



Town of Hilton Head Island

Jarvis Creek Project

Project Proposal:

The Town of Hilton Head Island is utilizing FEMA, Flood Mitigation Assistance Project Grant Funds to address a flood prone area of the Island. The “Headlands” area, located in Hilton Head Plantation and the Main Street commercial area, has suffered severe flooding due to faulty stormwater drainage systems.

The Town, with the assistance of Thomas and Hutton Engineering, completed an Island Wide Drainage Study in 1995. A unique solution to this flooding problem grew out of the Drainage Study. Due to sensitive wetlands and environmental issues that are common to the Lowcountry, it has been necessary to design with these issues in mind. The Town is creating a 13 acre lagoon and pump station on Town owned property (purchased in 1996) to assist the bottleneck drainage system that currently exists. The SC Department of Transportation (SCDOT) is providing a box culvert (5’ x 12’) that will cross beneath US 278. This will be an upgrade from the existing 60” diameter culvert. The improvements Hilton Head Plantation will make to their system will allow the stormwater to flow through the box culvert, under US 278. The water will then proceed by way of the pump station into the lagoon, through the spill way and finally into Jarvis Creek. With all improvement to the watershed complete, the Town will not only solve the stormwater drainage issue but will have created a recreational facility for residents and visitors. Dollars from the excavation of the lagoon will fund the park facility.

Overall Project Cost: \$3,826,600.00

Project Narrative:

Overview:

Hilton Head Island, located in southern Beaufort County, is a barrier island on the coast of South Carolina. It occupies an area of approximately 41 square miles. It is approximately 90 miles south of Charleston, SC and 30 miles north of Savannah, Georgia. The Island is five miles wide at the broadest point. Broad Creek nearly divides the Island with the low-lying “Folly” serving as the connection. The southern end of the Island is low, and contains marsh and wetland areas while the northern headland rises to a twenty-two foot high bluff. Wide sandy beaches line the Atlantic coast. Calibogue Sound separates the Island from the mainland and salt marshes line the coast. A single four-lane highway (highway 278) is the main arterial road connecting the Island to the mainland.

The terrain characteristic of Hilton Head Island is very flat with little topographic relief. The low elevation of the island, compounded with the flat characteristic of the land, causes storm drainage to be a critical issue. Flooding of the Island can result from either falling or rising water. According to a 1991 Beaufort County Flood Insurance Study, the anticipated Atlantic Ocean surges for the Hilton Head area are as follows:

Stillwater Elevation - Feet National Geodetic Vertical Data (NGVD)

<u>10 Year</u>	<u>50 Year</u>	<u>100 Year</u>	<u>500 Year</u>
11.0	12.8	14.0	15.3

The stillwater elevation is the ocean water elevation with no wave action. In addition to the stillwater elevation there is an increase in the water elevation due to wave effects. For the 100 year frequency storm surge event, the Federal Emergency Management Agency (FEMA), states the wave crest elevation is 21.6 msl for Hilton Head. In studying the Island, it is evident that the majority of the Island is at an elevation of 14 msl or lower and the highest point is elevation 28.

The Hilton Head Island drainage facilities are not capable of accommodating a storm surge from the Atlantic Ocean. Within the planned communities of the Island, the drainage networks consist of a complex arrangement of inter-connected lagoons that ultimately discharge into the Atlantic Ocean. The complexity of the lagoon system is created by the build-up of storage within each lagoon. This buildup is the driving force that releases water from the system. The water accumulation in each lagoon impoundment builds up a driving energy head that forces the flow of water from higher to lowest areas. Thus, the interaction between lagoons is an intricate and delicate drainage network.

The drainage systems of the majority of the unplanned communities are comprised of various piping, ditching and detention. The systems have not been designed with comprehensive planning to consider the overall design. This form of drainage network evolution results in ditching and piping with non-uniform longitudinal slopes. The flow of storm drainage is sometimes slowed, stopped or even reversed as a result. The delicacy of the Island drainage systems due to the ocean’s tides and surges is having a direct effect on the system’s efficiency. For example, if a high tide or a surge coincides with a heavy rainfall event, flooding potential is increased.

Changes in the storm design requirements have created difficulties such as drainage bottlenecks. As a general rule, the first areas to develop are adjacent to the beaches, rivers and major outfalls since these are the most aesthetically pleasing areas. This leaves the higher inland areas to be developed at a later date. Drainage problems arise when the outfalls are designed for 2.8 inches of rainfall and the inland drainage systems are designed for 8.0 inches of rainfall. However, with the majority of the Hilton Head developments being residential golfing communities, the large numbers of lagoons that were built with the plantations during the early years are providing a flood protection buffer that offers flood protection for storms that exceed a 10 year frequency. With this system in place, an in-

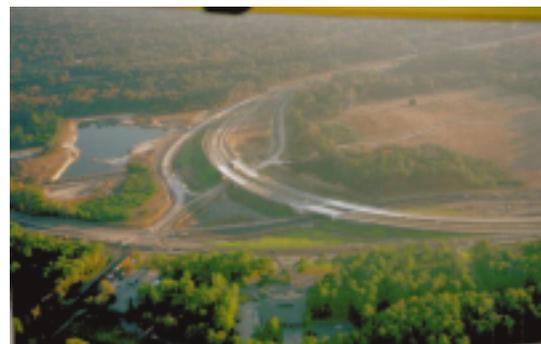
depth study of the drainage problems for storms with 8 inches of rainfall in twenty-four hours has led the Town to develop unique solutions.

Project Description:

On October 2, 1994, and October 12, 1994, storms were recorded having respectively 8 and 14 inches of rainfall during a 24 hour period of time. These storms equate to the 25 and 145-year rainfall events. Additionally, on the Labor Day weekends of 1987 and 1988, Hilton Head Island experienced severe floods. The isolated daily storm for both weekends exceeded the 100-year storm event. For the two Labor Day floods and the October 12th flood, the lagoons and groundwater were high due to Spring tides and long duration showers. The planned community, Hilton Head Plantation has experienced three storms within the past 10 years, which have exceeded the 100-year frequency and have coincided with spring tides. Each of these floods has caused a substantial amount of flooding not only on Hilton Head Plantation, specifically the “Headlands” area, but also in other areas on the Island as well. The larger of the storms occurred on October 12, 1994. During this storm it rained over 14 inches. The storm was the most catastrophic not only because of the volume of rainfall but also because of the lagoons and ground water table were still high from the October 2, 1994, 25-year flood. These storms caused a significant amount of damage due to the structural flooding that occurred to single family homes.

At the request of the Town, an inventory and analysis of the Island’s drainage infrastructure was being completed in 1995, entitled *The Town of Hilton Head Island, Island Wide Drainage Study*, by the firm of Thomas and Hutton Engineering. The analysis phase of the study made recommendations for areas throughout the Island. It determined that the stormwater conveyance system downstream from the “Headlands” was undersized. This was based on the Town’s existing stormwater design standards.

The stormwater conveyance system downstream from the “Headlands” mentioned above consisted of two elements. The first is a culvert crossing US 278 that was undersized and the second a ditch from the downstream side of the culvert to the tidal discharge into Jarvis Creek. The existing ditch was approximately 8-12’ wide at the bottom and was not well maintained. The study recommended that the ditch be upsized to a bottom width of 35’. Additionally, the study recommended that the existing 60” diameter culvert at US 278 be upgraded to a 5’ x 12’ box culvert.



Aerial photos of project site, adjacent to the recent Cross Island Parkway

Project Strategy:

It was also during the summer of 1996 that the Town was negotiating the purchase of property that was adjacent to the existing Jarvis Creek Ditch. The Town began to explore additional options to solving the drainage problem assuming Town ownership of the roughly 50 acres of adjacent property. As such, a large, 13 acre, lagoon capable of storing and conveying the necessary stormwater was envisioned. The bulk of which could be constructed on already cleared pasture land that existed on site. A pumping station would be needed in order to move the water from the ditch to the lagoon. This would be costly, however it was comparable to the \$3.0 million cost associated with the above-mentioned option. Additionally, littoral shelves were contemplated along the lagoon edges and areas that the Town could use to mitigate wetlands disturbed by other Town projects within the watershed. The benefits of detaining the stormwater via the lagoon on the quality of receiving water body have been demonstrated. Lastly, once constructed, the lagoon and surrounding land would provide an ideal setting for a Town-owned passive park.

As with all drainage projects, it is imperative that work proceed from the most downstream point, upstream. This is to avoid displacing the problem to the downstream landowners. The lagoon and pump station will be constructed first. Then as per SC Department of Transportation's commitment, the US 278 culvert will be put in place. Following the completion of the culvert, Hilton Head Plantation will complete other recommended improvements. Together, these steps will solve the identified drainage problem.



Photos of the basin under construction



Photos of the basin near completion



