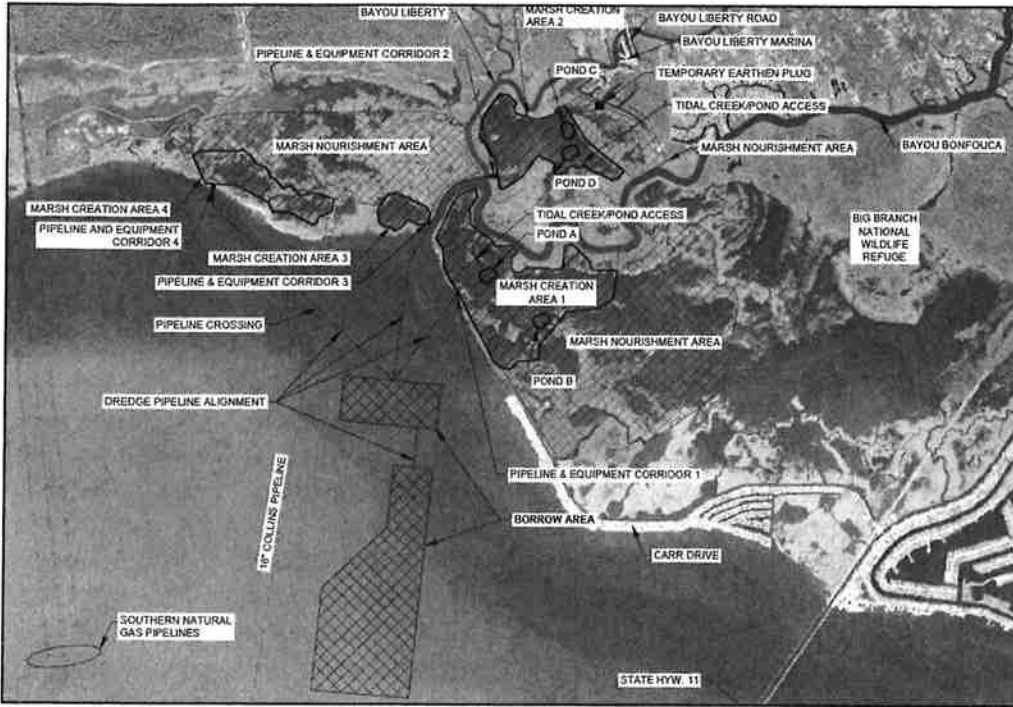


# Large Scale Marsh Creation and Nourishment in St. Tammany Parish – Part I of II

By Gary Leonards, PE



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The Louisiana Coastal Protection and Restoration Authority (CPRA) initiated construction activities on a large scale marsh creation project in St. Tammany Parish in September 2016. The intent of the project is to create over 600 acres of low salinity brackish marsh and nourish an approximate additional 250 acres immediately north and east of the marsh creation areas. The project is located on the east and west sides of Bayou Liberty and Bayou Bonfouca near the intersection of Bayou Bonfouca and Lake Pontchartrain.

**Providence Engineering and Environmental Group LLC** (Providence) was awarded the construction administration component of this project for CPRA. Providence is responsible for acting as CPRA's representative throughout the construction of the project, until

final acceptance. The construction administration tasks for this project include the following: conduct pre-construction conference, review shop drawings and submittals, conduct bi-weekly construction progress meetings with CPRA and construction contractor, review construction contractor invoices, prepare required field changes and change orders, conduct daily construction inspection to ensure compliance with construction plans and specifications, conduct Davis-Bacon Act compliance interviews and payroll review, and prepare a project completion report.

Storm surge created from Hurricane Katrina and subsequent storms greatly deteriorated the low salinity marshes in lower St. Tammany Parish, with a large percentage of this deterioration on Big Branch Wildlife Refuge. A portion of the project borders Bayou Liberty, a designated Louisiana Scenic Stream by the LDW, so specialized design considerations were implemented to ensure no impact during the marsh creation construction activities. CPRA was responsible for the engineering design, with assistance from the



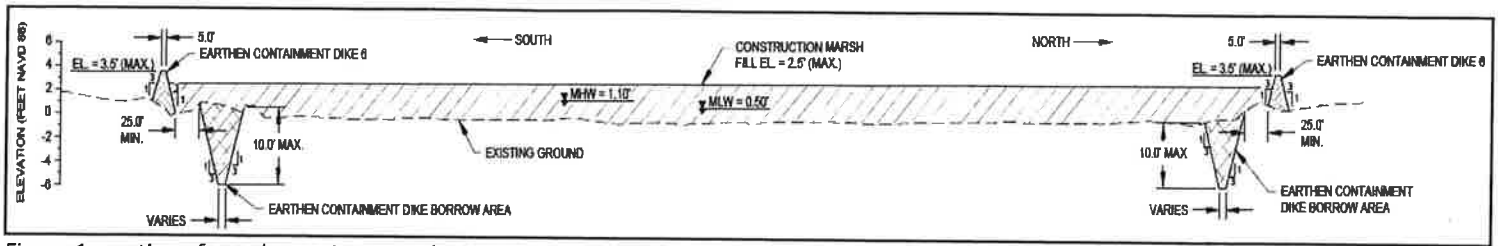


Figure 1: section of marsh creation area showing containment dike, containment dike borrows, and final marsh elevation.

local consulting community. The USFWS was also involved with the design of the project to ensure the refuge needs were met as well as the needs of the public who frequently use the refuge.

For marsh creation projects, it is important to estimate the rate of settlement with time to determine the period after which preferred marsh habitats can be established. Typically, settlement plates (SPs) are installed in the marsh creation areas to monitor the settlement of hydraulic fill. For this project, additional instrumentation including total pressure measurement cells, vibrating wire piezometers and drive point piezometers have been added to the settlement plates to estimate the settlement of hydraulic fill and foundation soils both during and after construction. These instrumented settlement plates (ISPs) have been installed at three locations in the vicinity of soil borings previously completed for the project. Data from the ISPs will be retrieved at regular intervals during the placement of the dredge fill material and surveyed to determine the in-situ settlement of foundation soil and marsh fill. This data will be plotted and compared to the theoretical marsh fill settlement estimates used for planning during the design phase.

Subsurface soil conditions at the project locations consisted primarily of firm to stiff clays and silty clays underneath and approximately five feet thick organic peat layer. The presence of the firm to stiff clay material underlying the project site allowed the design team to minimize the target elevation of the dredge spoil in the marsh creation areas to achieve the desired long term elevation of the constructed marsh areas. The long term target elevation of the top of fill for the marsh creation areas is +1.1' NAVD 88. To achieve this desired long term elevation, the top of the dredge spoil will be placed to a maximum elevation of +2.7' NAVD 88. The subsurface

soil conditions also allowed for the construction of containment dikes from the stiff clay material for the four marsh creation areas. The crown elevation of the containment dikes ranged in elevation from +3.5' NAVD 88 to +4.2' NAVD 88.

The borrow material will be obtained from the bed of Lake Pontchartrain for the creation of the marsh areas. The designated borrow sources are located between 3,000 and 9,000 feet away from the proposed placement areas. The material will be removed from the bed of Lake Pontchartrain with a hydraulic dredge and pumped in a slurry to each of the marsh creation areas.

The Bayou Bonfouca Marsh Creation Project is a CWPPRA project with the USFWS serving as the federal sponsor for the project. CIAP funds from St. Tammany Parish were responsible for a portion of the construction costs associated with the project.

**Weeks Marine, Inc.** was awarded the construction contract for the Bayou Bonfouca Marsh Creation Project. To date, approximately 58,000 linear feet of earthen containment dike has been constructed around the perimeter of the four marsh creation areas. Construction of the containment dikes was performed with long reach track hoes mounted on marsh tracks with spuds and earthen plugs have been installed to contain the dredge spoils. Articulating concrete mats are being placed on the exterior of the containment dikes along the edge of Lake Pontchartrain and several sections of the containment dikes are directly exposed to wind induced wave energy from Lake Pontchartrain. **Hydraulic dredge pipe and other dredge support equipment have been mobilized to the project site for construction of the dredge fill beginning in late February or early March 2017.** Approximately 3.5 million cubic yards of fill material will be placed within the contained marsh creation areas and approximately 2 million cubic yards of material will be placed in the designated marsh nourishment areas once dredge operations begin.



**Gary Leonards, PE**, is a professional engineer licensed in Louisiana and Mississippi. He has over 18 years of experience in civil engineering, including work in environmental, infrastructure, and coastal engineering arenas. He has executed governmental and private industry projects. His background includes design, studies, regulatory permitting, engineering oversight, field investigations, risk-based evaluations and design for waste disposal facilities. Some notable infrastructure improvement projects include: site design for new industrial facilities, marsh creation and restoration, shoreline protection, roadways, drainage systems, levees, water treatment facilities, sanitary sewer systems, pump stations, solid and hazardous waste containment and disposal facilities, storm water runoff evaluations, and storm water conveyance design.