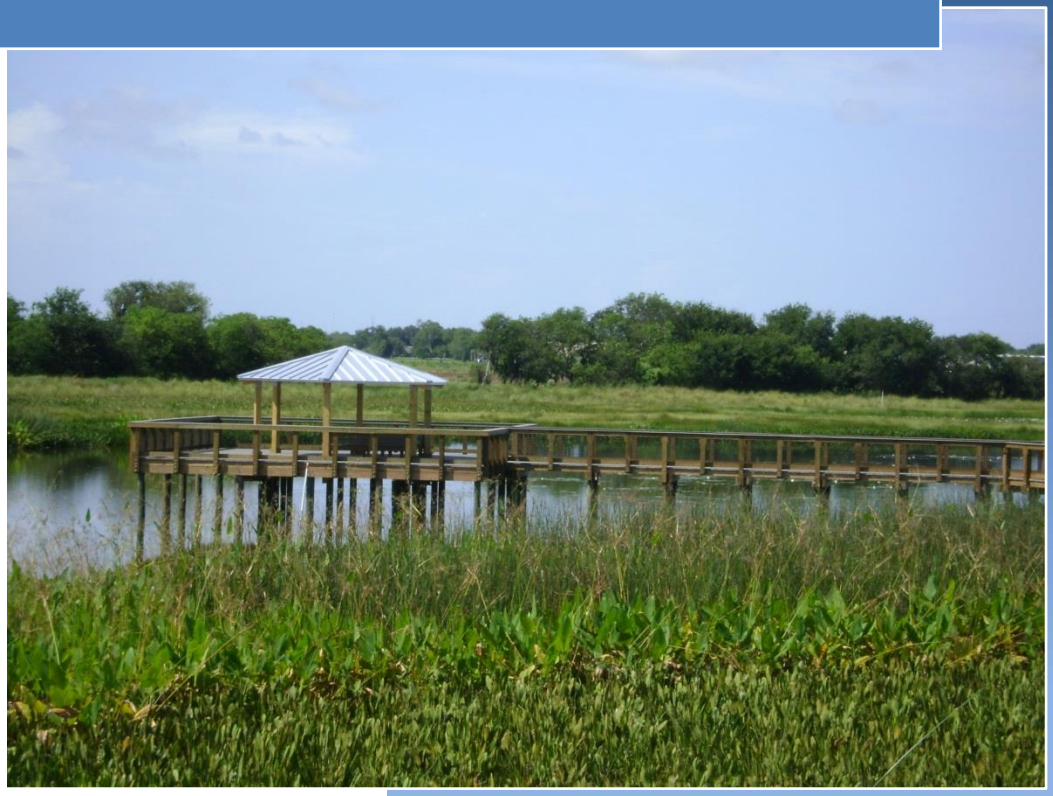
2014

CELERY FIELDS REGIONAL STORMWATER FACILITY PHASE 3 EXPANSION



Sarasota County

Final Project Report

For Florida Department of Environmental Protection Water Quality Restoration Program TMDL Grant

April 2, 2014

Final Project Report

For

Celery Fields Regional Stormwater Facility Phase 3 Expansion

Stanley Consultants
A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

Department of Environmental Protection FLORIDA

Southwest Florida Water Management District

VHB Vanasse Hangen Brustlin, Inc.

Ardaman & Associates, Inc.

Kimley-Horn and Associates, Inc.

Sarasota County

April 2, 2014

Prepared for Florida Department of Environmental Protection

by Stanley Consultants, Inc.,

in conjunction with Vanasse, Hagen, & Brustlin, Inc. and Sarasota County Public Works

Executive Summary / Abstract

The Celery Fields Regional Stormwater Facility Phase 3 Expansion is a multi-faceted stormwater project; it incorporates flood protection, water quality improvements, restored wetland habitat and integrates public recreation and educational opportunities at one facility. This project's primary objective was to alleviate flooding to the downstream urban area in the Phillippi Creek drainage basin. The second objective was to improve water quality by restoring the function of the original natural wetlands of this area. A third benefit included passive recreational opportunities of bird watching, walking/exercising, mountain biking, and sightseeing offered by the diverse terrain, plants, wildlife/birds and trails of this multi-faceted ecosystem. The stormwater facility treats over 3,524 acres or 10% of the upper north Phillippi Creek 55-square mile drainage basin area. The total project included four (4) wet detention cells comprising 360 acres to create floodplain storage and treat stormwater runoff. Phase 3 of the project, which included the final two cell areas, required two years of construction that began in July 2009 and was completed in the spring of 2011. The South Cell pond, a 120 acre wetland mitigation area was constructed for enhanced water quality treatment and floodplain storage. The adjacent Walker Tract cell, a 30-acre wetland re-creation area, provided the final cleansing of the stormwater before it is discharged into Phillippi Creek and Roberts Bay North. Part of the project scope also included pesticide and arsenic soil cleanup, removal and monitoring. These contaminants were the result of past row-crop farming activities. Project funding initially included a $10,079,880 Florida Department of Environmental Protection (FDEP) Water Quality Restoration Program TMDL grant and $1.8M SWFWMD cooperative grant with the balance of the funds from the established Capital Improvement Project for Phillippi Creek basin. The FDEP TMDL grant was later reduced to $6,751,687 due to lower than expected construction bids and the final amount charged to the grant was $5.39M. The total project costs for design, permitting, geotechnical, construction, inspection and monitoring were $10.8M. A Best Management Practices (BMP) Evaluation water quality study was completed April 2012 and the final monitoring report was completed in December 2013. One of the successes and outcomes from the study is that the pollutant load removal results were significantly better than expected for this wet detention facility. Pollutant load removal efficiencies were as much as 53% for Nitrogen, 50% for Phosphorus and 82% for Total Suspended Solids. The observed results for annual pollutant load reduction to the receiving waters of Roberts Bay North were 15,198 lb/yr for Total Nitrogen (TN), 2,040 lb/yr for Total Phosphorous (TP) and 528,467 lb/yr for Total Suspended Solids.

Project History

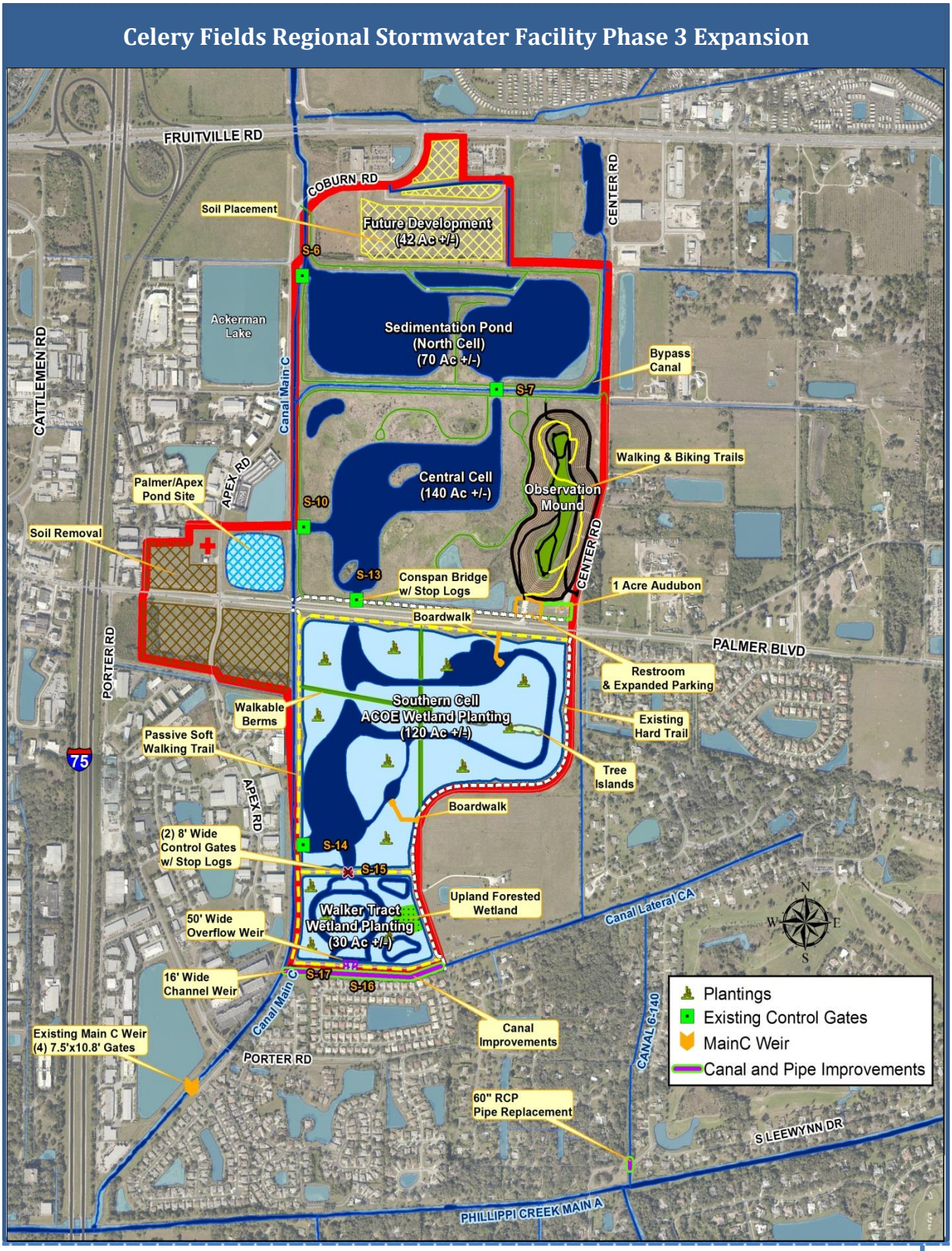
Celery Fields aerial view looking north 2011

Sarasota County acquired over 444 acres of land for what is now known as the Celery Fields Regional Stormwater Facility (CFRSF), to provide stormwater-runoff detention, flood protection, and a diverse environmental filtration system that delivers cleaner water to Phillippi Creek and ultimately to Sarasota Bay and Roberts Bay North. The land purchases, design, and construction for the CFRSF started in the mid-1990s after major flooding occurred in the downstream urban areas of Phillippi Creek from the "no-name storm" of June 1992. Phases 1 & 2 of the CFRSF project were completed in 1997 and included construction of numerous control structures and large sedimentation ponds on roughly 300 acres in the North and Central Cell areas. Other minor North and Central Cell changes, associated with roadway improvements, were conducted between 2000 and 2005. Between 2009 and 2011, Phase 3 of the CFRSF was built south of Palmer Boulevard on two properties referred to as the South Cell and Walker Tract. As part of the original land purchase, four (4) additional parcels of land, approximately 10 acres each were part of the acquisition. This land, referred to as the as the Quad sites, was a part of the area used for Phase 3. From past Phase 2 excavation activities, two (2) of these parcels had an overburden of unsuitable fill stockpiles, that had to be removed as part of the Environmental Resource Permitting (ERP) surface water permitting. The excess fill was removed and used to create portions of the observation mound. Also, before the actual stormwater facility Phase 3 began, certain land areas within the project limits were tested and found to have above normal levels of arsenic and pesticide soils. Approximately 1,590 tons of this non-hazardous soil was removed and hauled by Waste Management Services to the Okeechobee Landfill. Design, modeling and permitting began in December 2003; permitting was complete in December 2004 and modified in 2008 with final design bidding completed in March 2009. Construction began on July 6, 2009, and Final Acceptance was granted on August 1, 2011. The Best Management Practice (BMP) Evaluation Water Quality Monitoring Study began on April 1, 2011

Site Location

The CFRSF is located in Sarasota County (Sections 19, 20, 29, and 30 of Township 36 South, Range 19 East), south of Fruitville Road, and east of Interstate 75. The CFRSF is framed by a series of canals with Main Canal C on the west and Lateral Canal CA to the south. On the east side, the CFRSF is bordered by the Bypass Canal on the north end, the Center Road drainage ditch in the central part, and the Raymond Road drainage ditch on the south end of this stormwater facility. As shown in *FIGURE 1 – Site Map*.

FIGURE 1 – Project Site



The Celery Fields Regional Stormwater Facility (CFRSF) once represented one of the largest isolated sawgrass wetlands marshes in Sarasota County. The Celery Fields area was used extensively to grow agricultural row crops, such as celery for most of the 20th century. Prior to the sawgrass era, the lands were once an old lake used by Pleistocene Epoch animals such as mammoths and mastodons. During the early construction phases many well preserved prehistoric megalodon fossils were found.

Loading Bell Brother's truck with celery 1940's

Goals and Objectives

The Celery Fields Regional Stormwater Facility was initially conceived to achieve flood protection goals and evolved into a multi-faceted stormwater park. The primary benefits included:

- **Enhanced Flood Storage and Protection**. - The project was designed to increase the flood plain storage and reduce historical flooding in the downstream Phillippi Creek.
- **Pollutant Load Reduction** – The 360 acre facility treats stormwater runoff from 3,524 acres of the upper drainage sub-basin of Phillippi Creek Basin.
- **Restored natural wetland areas** – Restored treatment functions of 150 acres of wetland mitigation area and natural habitat with bird boxes, snags and an osprey platform.
- **Provided diverse recreational and educational opportunities** – Created walking trails for bird watching, diverse terrain for sightseeing, exercising and mountain biking with educational signage along the trails.

Construction Improvements

With the construction improvements in place, the Celery Fields facility provides a diverse wildlife habitat that offers local, regional, and international birders with opportunities to view rare and interesting bird life. A network of trails, two wetland boardwalks, a gazebo, and a unique observation mound that is one of the highest elevations in Sarasota County were constructed as recreational amenities. The Celery Fields facility provides numerous recreational opportunities for birding, walking, hiking, running, biking, fishing, environmental education, fitness, and other special events.

Trail grading South Cell

The CFRSF Phase 3 design, permitting and bidding documents were prepared by Kimley-Horne & Associates, Inc., for the following construction improvements:

- Providing over 1,000 acre-feet of floodplain storage volume to reduce flood stages
- Adding three (3) major water control structures; a 16' channel weir, double 8-foot wide flood control gates and a 50' wide overflow weir structure
- 150 acres of new wetland and upland mitigation plantings in the Walker Tract and South Cell
- Culvert replacement and upsizing from 30" to 60" pipe at S. Leewynn Drive

Excavation Operations South Cell

- More than 1,000 feet of channel widening and excavation along Lateral CA canal to improve flow and increase hydraulic flow capacity
- Excavation, stockpiling, and grading over 1.1 million cubic yards of soil and earthwork
- Creation of an 85-foot high observation mound with recycled crushed concrete walking paths and moderately sloped 4:1 bike trails
- (10,000 LF) of perimeter double rail Mortise wood fencing
- Seven (7) miles of passive walking trails looped around the stormwater facility
- Landscaping and irrigation enhancements with trees and ground cover throughout the project
- Expanded public parking area near the existing look out Gazebo with drainage improvements, onsite dry retention pond with gravel filtration system
- Two (2) elevated observation boardwalks for nature and bird viewing
- Thirteen (13) educational interpretive signs arranged throughout project site and two (2) project Kiosk's
- Wood duck boxes (7), an Osprey platform, and tree snags (10)
- Accommodations for the future Audubon Society interpretive nature center

Enhanced Flood Storage and Protection

The Celery Fields Regional Stormwater Facility was designed to improve the County's level of service to reduce street and structure flooding including removal of 12 homes out of the 100-year floodplain limits downstream along Phillippi Creek.

Flood Gate between South Cell and Walker Tract

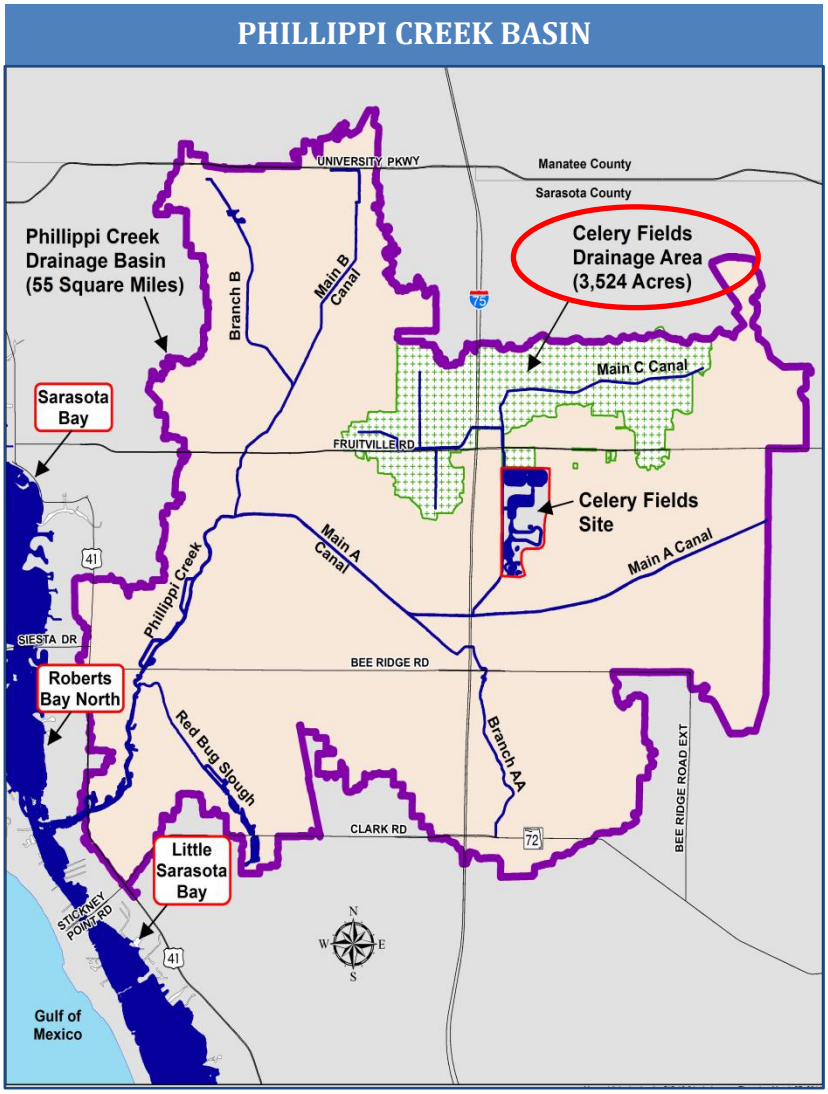
Operation and how the treatment facility works: (Also refer *to FIGURES 1 and 3)*

1. Stormwater from the upper sub-basin of Phillippi Creek enters into the north sedimentation pond to settle out solids and sediments. (S-6)
2. Under n**o**rmal operations, water levels are manipulated with control stops logs to permit flow through the vegetative treatment system. (S-13)
3. Prior to heavy rains, flood control gates are operated to drain the system increasing storage volume within the facility. The large storage ponds detain and slowly release water to avoid overloading the downstream canals. (S-10 and S-14)
4. Post storm event, a double flood control gate was installed to isolate the south and north cells to provide more opportunity to manage and retain flood waters. (S-15)

Pollutant Load Reduction

Through a Water Quality Restoration Program TMDL grant from Florida's Department of Environmental Protection the role of the Celery Fields was expanded beyond flood protection to provide water quality improvements through pollutant load reductions. The goal was to reduce the pollutant load to Phillippi Creek and subsequently Roberts Bay North from 3,524 acres of the contributing drainage basin. Part of the grant deliverables included the implementation of a Water Quality Monitoring Program. Vanasse Hangen Brustlin, Inc. (VHB) prepared the Quality Assurance Project Plan (QAPP) that would determine the effectiveness of the facility at removing pollutants and nutrients from the upstream Phillippi Creek watershed. The monitoring included stormwater inflow and outflow of the North

FIGURE 2



Project Treatment Area within Phillippi Creek Basin

Cell, Central Cell, South Cell, and Walker Tract, as shown in *FIGURE 2*. The monitoring program included baseflow and storm flow monitoring during the period from April 1, 2011 through March 31, 2013. Seven (7) stations were set and maintained in a telemetry data collection network throughout the facility. Refer to *FIGURE 3*. The study monitored and analyzed rainfall events, record water stage and discharge, and water samples on a continual basis over a 24-month period to evaluate system performance.

The pre-project estimated pollutant load removal efficiency for nitrogen, phosphorus and suspended solids was at the rates of 5%, 24% and 21% respectively. The final results from the two year monitoring study indicated greater efficiencies were achieved with actual removal rates of 53%, 50% and 82% for nitrogen, phosphorus and suspended solids respectively. The pollutant load reductions far exceeded the goals for the grant. (Results shown in Table 1.)

TABLE 1
POLLUTANT LOAD REMOVAL OBSERVED RESULTS

Parameter	Annual Mean Removal lbs/yr	Annual Mean Removal Efficiency (percent)
Total Phosphorus (TP)	2,040	50%
Total Nitrogen (TN)	15,198	53%
Total Suspended Solids (TSS)	528,467	82%

Source: Celery Fields Regional Stormwater Facility Best Management Practice (BMP) Evaluation Project, VHB dated 12/2013

The observed results for annual pollutant load reduction to the receiving waters of Roberts Bay North were 2,040 lb/yr for Total Phosphorous (TP), 15,198 lb/yr for Total Nitrogen (TN), and 528,467 lb/yr for Total Suspended Solids.

A time-of-travel study was completed as part of the monitoring effort. This study measured the residence time of the water traveling through the cells under average conditions. The residence time ranged from 50 to 84 days from inflow to outflow through the four retention cells.

During the water quality monitoring period, a Bird Study Count was conducted to establish whether any trace or increases of nitrogen loading were attributable to their presence. It was concluded that the birds had no net effect on loading results at this facility.

Staff gauge monitoring equipment

The Best Management Practices Evaluation water quality study will assist with making practical management decisions that target improvements in future nutrient load reductions for the CFRSF and potentially for other regional stormwater facilities.

Restore natural wetland areas

The CFRSF Phase 3 construction for the South Cell and Walker Tracts created approximately 150 acres of upland, wetland, and open-water habitat with 80% of the surface area planted with 600,000 aquatic plants and trees. The slopes surrounding much of the newly reconstructed facility are lush with native aquatic plantings such as bulrush, pickerelweed, alligator flag, buttonbush and maidencane. Upland areas include sand cord grass, cabbage palm, slash pine, live oak, pignut hickory, Walter viburnum and wax myrtle bushes to further pre-treat stormwater flowing into the site from direct runoff.

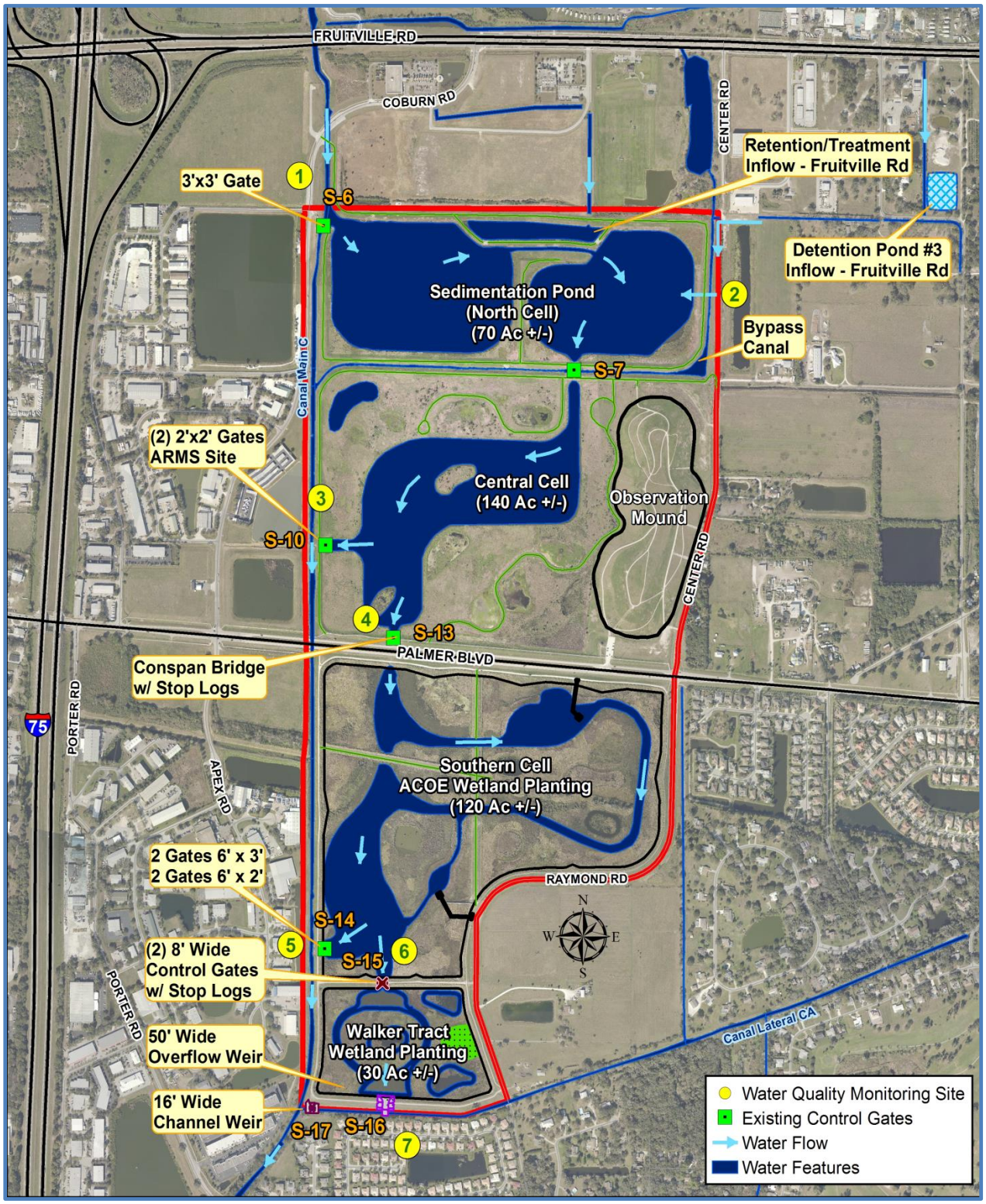
Water quality was improved by filter stormwater through wetland mitigation plants systems

The South Cell and Walker Tract were separated into different planting zones based on the range of water depths that would be experienced when the Celery Fields Mitigation Site water level is at the control elevation. Initially, the South Cell received a total of approximately 500,000 plants comprised of 24 different wetland and upland species distributed over 37 planting subzones within the 120 acre area.

South Cell Mitigation Plantings

The Walker Tract received a total of 100,000 plants of 22 wetland and upland species planted in 16 planting subzone areas within its 30 acre area. Regular, quarterly maintenance for exotic nuisance species was conducted for the mitigation project. Significant sedimentation and nutrient uptake has occurred in the facility as a result of the extensive plantings, and the slow winding path the stormwater must take through the system to its final discharge point. Also refer to *FIGURE 3.*

FIGURE 3



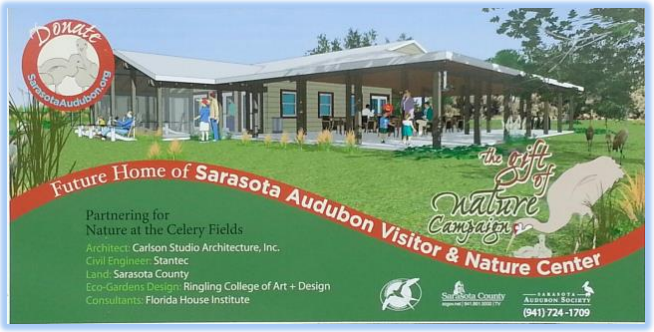
Flow through Celery Fields Four Wet Detention Cells

Final Outfall from Walker Tract into Lateral Canal CA

Landscape Improvements

Observation Mound Trail Landscape

With the major stormwater improvements complete, Sarasota County has begun to realize the significant benefits of the project. There has been an overwhelming public utilization of the site that a Parks and Recreation restroom facility and new parking lot are now under construction. A future Audubon Visitor and Nature Center is planned.



Audubon Visitor and Nature Center planned

Provide diverse recreational / educational opportunities

The project's outcome was a successful stormwater park that promotes ecotourism. The site has been added to the Great Florida Birding Trail as a destination point where over 200 species of birds have been identified. Seven miles of diverse trails allow for walking/jogging, biking and wildlife observation. Educational aspects include the installation of interpretative signage to aid visitors in understanding how the Celery Fields was designed to address stormwater runoff and treatment, and provide natural habitats. Wetland functions are shown through cross-sectional diagrams and downstream effects are also illustrated. There is much local interest in the site with as many as 30 schools expressing that they want naturalist led field trips for their students.

Educational Wildlife Sign

South Boardwalk

Wood Duck Box

Educational Interpretive Guide Signs

Timeline and Project Schedule

The project timeline for the CFRSF Phase 3 amassed over a ten (10) year time period in multi-phased stages of design, permitting, procurement, construction and monitoring efforts.

Completed Project Milestones	Date
Initiate Design and Stormwater Modeling	December 2003/04
SWFWMD Cooperative Grant (L210)	February 2005
Pesticide and Arsenic Soil Removals	November 2006
FDEP TMDL Grant Award S0317	January 2007
SWFWMD Coop Grant Amendment No. 1	September 2007
Complete Design and Bidding	May 2009
Award and Begin Construction (2-yrs)	July 2009
Substantially Complete Construction (2-yrs)	March 2011
FDEP TMDL Grant Amendment No. 1	January 2012
Boardwalks North and South	November 2012
Project Final Completion	September 2013
Water Quality Monitoring (2-yrs)	April 2013
Water Quality Data Analysis	June 2013
Final Water Quality Monitoring Report	December 2013
FDEP TMDL Grant Agreement Expires	September 23, 2013
Groundwater monitoring (1.5-yrs)	January 2014
Final Project Report	March 2014
Institutional Controls - Deed Restriction	September 2014

Budget and Funding

This project was funded through cooperative funding agreements between Sarasota County and the Southwest Florida Water Management District as well as the Florida Department of Environmental Protection. The District's $1.8M contribution covered flood protection, natural systems and educational activities while FDEP's TMDL grant contribution covered water quality improvements. The balance of matching funds were provided through stormwater basin assessments collected by the County's Stormwater Environmental Utility for the Phillippi Creek Basin and through appropriations by the Board of County Commissioners as part of the Capital Improvement Program.

Project Costs

Project costs were accumulated over a period of ten years, from initial geotechnical soils investigation, through design, permitting, construction, construction contract inspection and administration, and the final two year water quality monitoring project instituted to evaluate the project and provide concrete evidence of results. The actual contractual services cost for the Celery Fields Stormwater Regional Management Project is illustrated in *Table 2*.

TABLE 2 Total Cost of Celery Fields Stormwater Regional Management Project	
Geotechnical Investigation & Soil Removal	$ 436,340
Survey, Design and Permitting	$ 916, 231
Mitigation Permitting, Monitoring, and Maintenance	$ 171,811
Construction Improvements	$6,839,649
Construction Engineering & Inspection CEI)	$ 861,959
Boardwalks (North and South)	$ 601,868
Educational Interpretive Signage	$ 24,550
Landscaping Walker & Mound	$ 398,084
Water Quality Monitoring and Lab	$ 573,069
TOTAL	***$10,833,286***

The multiple benefits of this passive stormwater treatment system will continue to serve the residents of Sarasota County and visitors for many years to come.

Control Flood Gate (S-15)

Personnel and Project Team:

The key project team and stakeholders consisted of:

- Sarasota County Public Works Capital Projects - Peter Peduzzi, Billie Havey, and Anthony Bell
- Sarasota County Public Utilities, Water Quality - Jon Perry and John Ryan
- Sarasota County Public Works Construction - Mike Elfers, Robbin Levar and Paul Semenec
- Sarasota County Operations & Maintenance - Jason Brown, Tom Medal, and Lisa Wedin
- Sarasota County Field Services – Spencer Anderson
- Sarasota County Parks and Recreation – Lynda Heath and Jerris Foote
- FDEP Nonpoint Source Management Section – Michael Scheinkman and Eric Livingston
- SWFWMD Resource Projects Department – Manny Lopez
- Kimley Horn & Associates, Inc. – Mike Sturm, Senior Design Engineer (Engineer of record)
- Stanley Consultants, Inc. – Dave Dixon, Construction Engineering and Inspection (CEI)
- VHB, Inc. – Gary Serviss and Ronnie Van Fleet, Environmental Mitigation Permitting
- Ardaman & Associates, Inc. – Chip Hoover, Geotechnical Investigation
- Waste Management Services, Inc. – Soil cleanup and disposal
- Brooks & Freund, Inc. – General Contractor
- Lee Mar Construction, Inc. – Subcontractor excavation & grading
- Earth Balance, Inc. – Subcontractor wetland plants
- Atkins Global, Inc. – Chris Sharek, Boardwalk Design
- Marine Contracting Group, Inc. – Boardwalks
- Interpretive Graphics, Inc. – Educational signs
- DWJA Architects, Inc. – Landscape Architect
- Valley Crest, Inc. – Site landscaping
- Sarasota Audubon Society – Design collaboration (Jeanne Dubi)

Summary

Based on the project record as-builts and certification of completion, this project was constructed in substantial conformance with the design plans, including design revisions, and the Celery Fields Stormwater Improvements Facility Phase 3 functions as intended, with results in nutrient and pollutant reduction far greater than predicted. The goals of prevention of downstream flooding, floodplain storage, improvement in water quality, restoration of wetland habitat, and the addition of new passive recreational opportunities now comprise the multi-faceted uses of the Celery Fields Stormwater Improvements project. Currently, hundreds of people utilize the Celery Fields on a

daily basis for exercise, walking, environmental tours, and bird watching. One only has to visit the site and walk the path to the top of the Observation Mound to witness the scope and impact of the project from this excellent vantage point.

Project Awards and Recognitions

- Environmental Excellence Award from the National Association of Environmental Professionals (NAEP) in the category of Conservation, by Stanley Consultants, Inc. – Feb. 2013
- FICE Engineering Excellence Honors Award in the category of Water Resources, by Kimley-Horne & Associates, Inc. – January 2014
- Outstanding Achievement Award – Florida Stormwater Association (FSA) by Sarasota County Public Works / Public Utilities, June 2014
- Numerous local newspaper, TV media and magazine listings have been published.

Celery Fields from Observation Mound, 2011