NONPOINT SOURCE MANAGEMENT PROGRAM
PROJECT FINAL REPORT
FOR THE SECTION 319(h) GRANT

Project # NF065

Sandra Stetson Aquatic Center Stormwater and
Green Infrastructure Demonstration

Completed by Volusia County, Florida

Final Project Report completed by
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Stetson University
Institute for Water and Environmental Resilience

3/2/2021

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EXECUTIVE SUMMARY

PROJECT NAME: Sandra Stetson Aquatic Center Stormwater and Green Infrastructure Demonstration

LEAD ORGANIZATION: Volusia County

COOOPERATING ORGANIZATIONS: East Central Florida Regional Planning Council

PROJECT START DATE: 12/16/2019 **PROJECT COMPLETION DATE**: 3/31/2021

BUDGET SUMMARY TABLE BY CATEGORY:

Category Totals	319 Funding	Match Funding	Match Source
Salaries Total	$0	$0	N/A
Fringe Benefits Total	$0	$0	N/A
Travel Total	$0	$0	N/A
Subcontracting: Contractual Total	$60,000.00	$44,945.49	Stetson University
Subcontracting: BMP Implementation Total	$0	$0	N/A
Subcontracting: Monitoring Total	$0	$0	N/A
Subcontracting: Public Education Total	$60,000.00	$44,945.49	Stetson University
Equipment Purchases Total	$0	$0	N/A
Supplies/Other Expenses Total	$0	$0	N/A
Land Total	$0	$0	N/A
Indirect Total	$0	$0	N/A
Total:	$60,000.00	$44,945.49	
Total Project Cost:	$104,945.49		
Percentage Match:	57.2%	42.8%	

SUMMARY ACCOMPLISHMENTS: Construction of demonstration site showcasing three green infrastructure practices at an educational and park facility located on the waterfront of Lake Beresford, a listed impaired water within the Middle St. Johns River.

BMPs: Construction of a rain garden/bioswale, littoral plantings, and floating wetlands to demonstrate enhanced nutrient treatment and habitat services within an existing stormwater management system.

EDUCATION: Information kiosks installed on site, direct mentoring of university students, and webinar presentations to public stakeholders.

FUTURE PLANS FOR WATERSHED: Continued education to encourage reduction of nonpoint source loading and septic to sewer conversions and progressive implementation of additional stormwater BMPs

INTRODUCTION

This project implemented a series of Florida Friendly Landscaping and native plant-based green infrastructure interventions for demonstration and public education purposes. The project was developed within the footprint of an existing stormwater management system that serves the recently constructed Sandra Stetson Aquatic Center (SSAC), which is located in Volusia County at 2636 Alhambra Ave., DeLand, FL 32720 (29° 0'1.17"N; 81°21'19.52"W). The site is located on the waterfront and within the watershed of Lake Beresford, which is part of the Middle St. Johns River system (Figure 1). Lake Beresford is listed by Florida Department of Environmental Protection (FDEP) as impaired for TP, TN, and Chlorophyll A, but to date does not have an adopted Total Maximum Daily Loading (TMDL). The property is also located within the springshed for Volusia Blue Spring, which has a pending Basin Management Action Plan (BMAP) to reach a target nitrate concentration of 0.35 mg/L.

Prior to the development of this demonstration project at the SSAC, Volusia County was implementing a separate USEPA/FDEP 319 education grant to inform policy-makers and the general public about the benefits of green infrastructure. The opportunity to develop a green infrastructure demonstration at the SSAC facility, which had previously received $400,000 in grant support from Volusia County's ECHO program for development of a public nature trail and installation of a new wastewater connection line through a neighborhood previously served only by septic tanks, was viewed as a logical extension of Volusia County's extant USEPA/FDEP 319 programming.

Accordingly, the primary purpose of the project design was to create a native plant-based green infrastructure demonstration site and interpretive signage within the site's existing stormwater management system. The project was initiated by contract on December 16, 2019, with an original completion date of September 30, 2020. Major societal disruptions associated with the outbreak of the COVID-19 pandemic in March 2020 caused some delays in the project implementation, and the contract completion period was extended to March 31, 2021. All final project construction tasks, including implementation of green infrastructure plantings and installation of education kiosks, were completed by November 17, 2020. The overall cost of implementing the project was $104,945.49**,** of which $60,000 or 57.2% percent, was provided by the U.S. Environmental Protection Agency.

The project was implemented by faculty, staff, and students at Stetson University's Institute for Water and Environmental Resilience (IWER) in partnership with Volusia County and various other community partners and stakeholders. Consistent with IWER's mission to promote environmental stewardship of waterways in Florida, the completed project will be managed as a demonstration site the showcases the benefits of green infrastructure as a water quality improvement strategy within the Lake Beresford watershed and Volusia Blue springshed. This includes demonstrating use of diverse native plantings as a mechanism for enhancing wildlife habitat, improving water quality, requiring less energy intensive inputs (e.g., mowing) for site management, and generally beautifying the stormwater management system such that it becomes a valued landscape amenity. The educational audience not only includes students, faculty, staff, and other members of the Stetson University community, but will also reach the many visitors who

access the site for athletics events associated with Stetson's Men's and Women's Rowing teams and environmental education/public outreach events hosted by IWER.

Figure 1: Location of the Sandra Stetson Aquatic Center project site

PROJECT TASK SUMMARIES

The project implemented three green infrastructure practices at the SSAC facility for demonstration and education purposes in an existing stormwater management system: 1) a rain garden/bioswale; 2) littoral and shoreline plantings; and 3) floating wetlands. Four educational kiosks explaining these green infrastructure concepts and encouraging local residents within the Lake Beresford watershed to develop low impact practices for water quality projection were developed and installed on the site.

PROJECT TASKS AND OUTCOMES

Task 1: Design

The existing stormwater system at the SSAC contains an engineered stormwater pond with overflow discharge into a spreader swale system (Figure 2). The banks and littoral zone of the stormwater pond were originally vegetated with Bahia sod at construction, and the pond pool area was not originally planted with any native vegetation. The spreader swale, although drawn as a "rain garden" in original site designs (Figure 3), was planted in Bahia sod at construction. While these conventional plantings within the stormwater system fully comply with the requirements stipulated by the Environmental Resource Permit (ERP) for construction of the SSAC facility, the shared interest by Stetson University's Institute for Water and Environmental Resilience (IWER) and Volusia County to demonstrate "green infrastructure-based" plantings within stormwater systems served as the driving impetus in applying for USEPA/FDEP 319H grant funds in March 2019.

Deliverables: The Grantee will complete the design of the Sandra Stetson Aquatic Center Stormwater and Green Infrastructure Demonstration Project.

Documentation: The Grantee will submit a signed acceptance of the completed work by the Grantee and a summary of design activities to date, indicating the percentage of design completion and the time period covered in the payment request. For the final documentation, Grantee will also submit a copy of the final design.

Task 1 Outcomes

At a roughly concurrent period to the submission of the original application for this project to FDEP in March 2019, issues associated with insufficient water pressure in the local water supply system prompted Stetson University to solicit engineering site designs for an auxiliary water supply tank to serve as an emergency pressurization backup for the building's fire suppression system. As shown in Figure 4, the original site design for the water tank proposed to site the system within the footprint of the already constructed spreader swale, thereby implying major changes to the function of the as-built stormwater system. David Sacks, a Florida Registered Landscape Architect, worked in consultation with Dr. Jon Calabria (Associate Professor of Landscape Architecture, University of Georgia), Dr. Jason Evans (Associate Professor of Environmental Science and Studies, Stetson University), Dr. Wendy Anderson (Professor of Environmental Science and Studies, Stetson University), Katrina Locke (Volusia County), and a variety of other

student and university stakeholders to develop an alternative site location for the emergency water tank and a native wetland planting design (i.e., a stormwater wetland/rain garden) within the previously sodded spreader swale (Figure 5).

As shown in Figure 2, the approved and implemented engineering site design for the water tank construction was revised to be consistent with the overall green infrastructure landscape site plan developed by Sacks (Figure 6). Sacks and Calabria also developed planting concepts for littoral plantings and floating wetlands as part of their design project with Stetson (Figure 7). After consultation with additional university stakeholders, an alternative floating wetland design (but that is still consistent with the original proposed area within the grant application) was developed for implementation (Figure 8). The approved design for this project can therefore be characterized as an installation of three green infrastructure planting interventions within the as-built grade of the existing stormwater management system: 1) shoreline and littoral zone plantings along the edge and banks of the stormwater pond; 2) floating wetlands within the stormwater pond; and 3) a stormwater wetland/rain garden within an existing spreader swale feature. An overview map of the full project site is provided as Figure 9.

Figure 2: Final Site Grading Plan and Stormwater Management System as Approved and Permitted for Construction, Sandra Stetson Aquatic Center

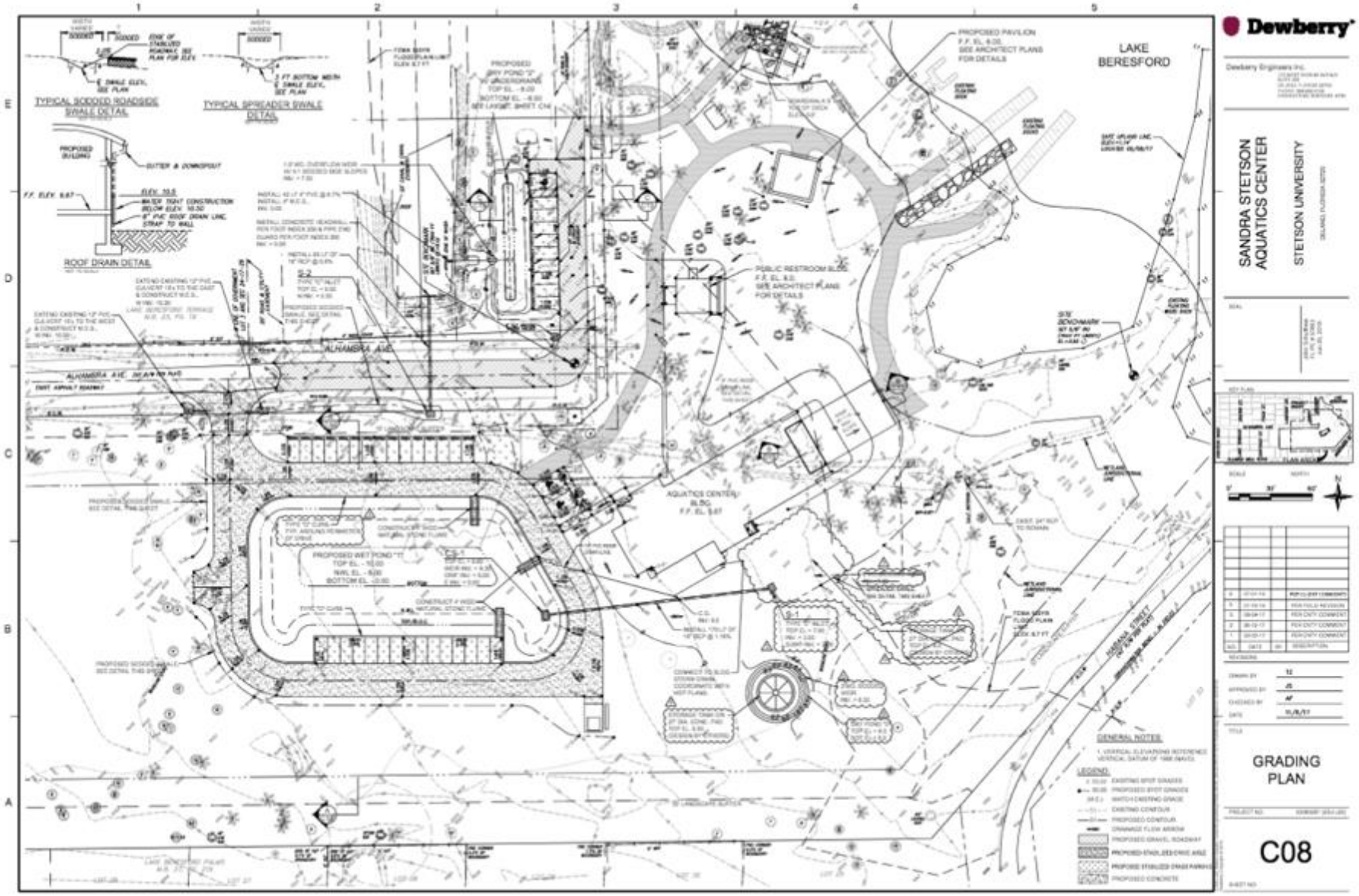


Figure 3: Original Site Geometry Bid Plan (with Rain Garden), Sandra Stetson Aquatic Center

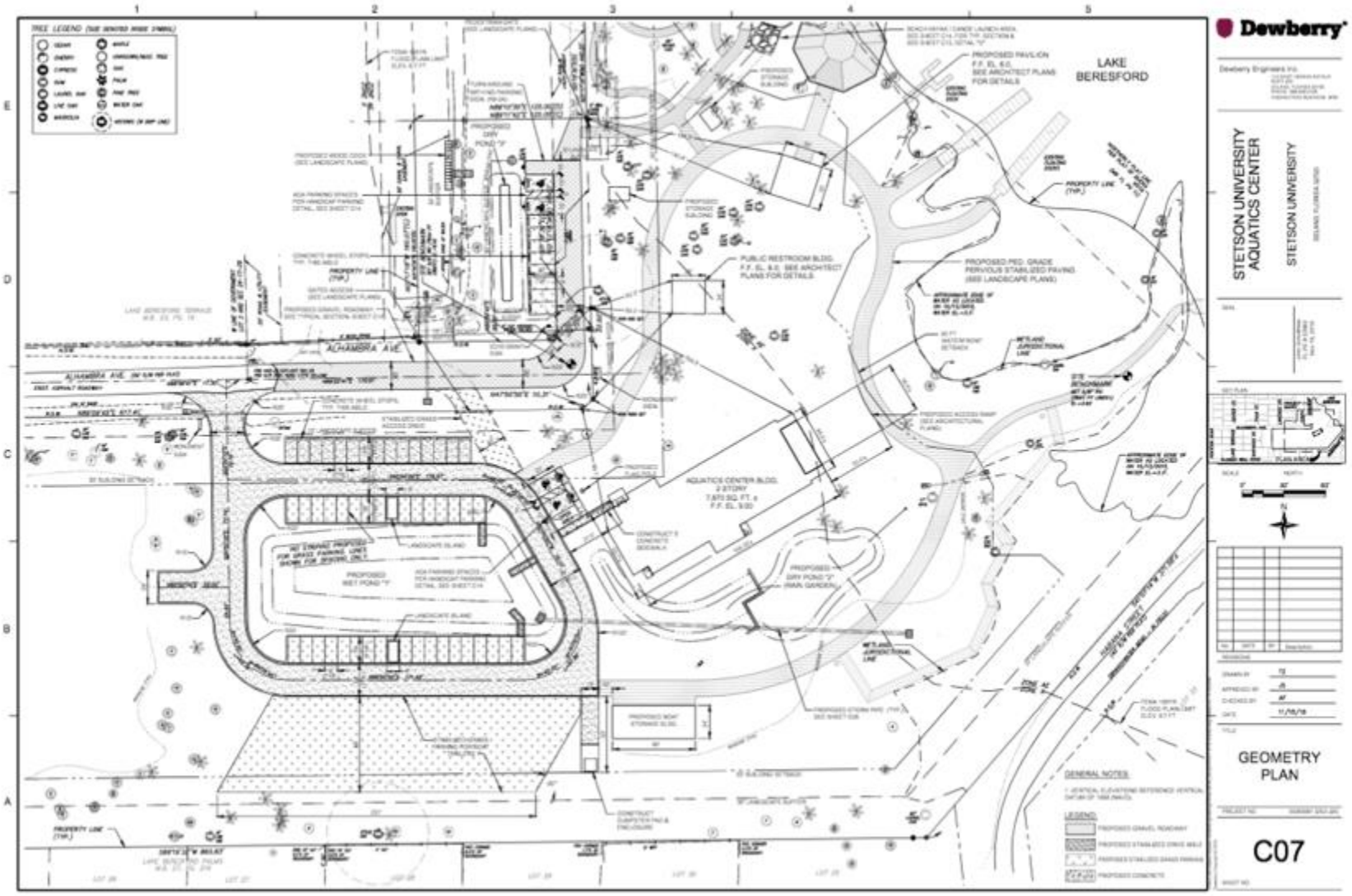


Figure 4: Original Water Tank Site Design Proposal, Sandra Stetson Aquatic Center

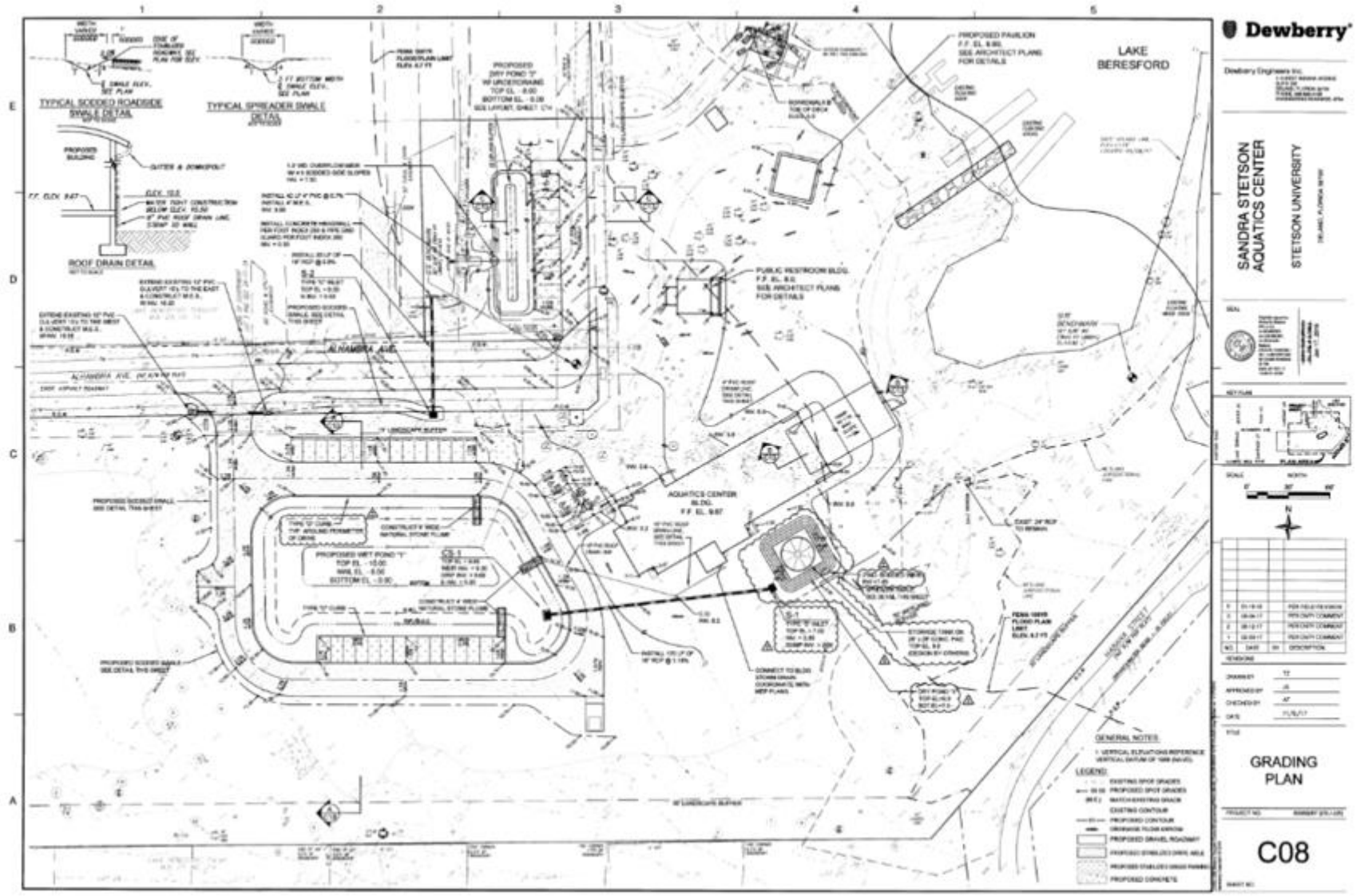


Figure 5: Alternative and Adopted Water Tank Siting with Rain Garden/Stormwater Wetland Design
Sandra Stetson Aquatic Center

Figure 6: Green Infrastructure Landscape Site Diagram, Sandra Stetson Aquatic Center

Figure 7: Littoral Zone and Floating Wetland Design Concept

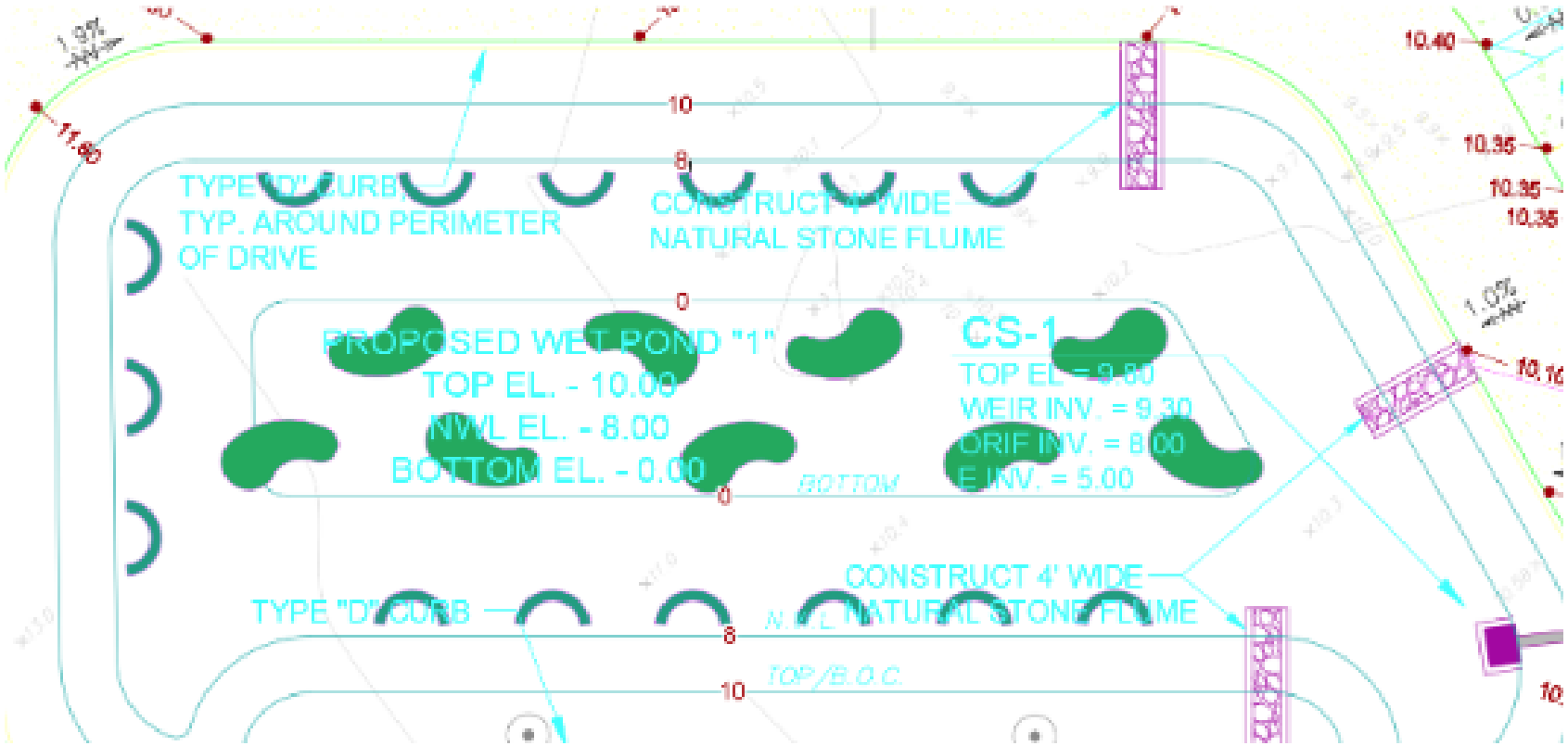
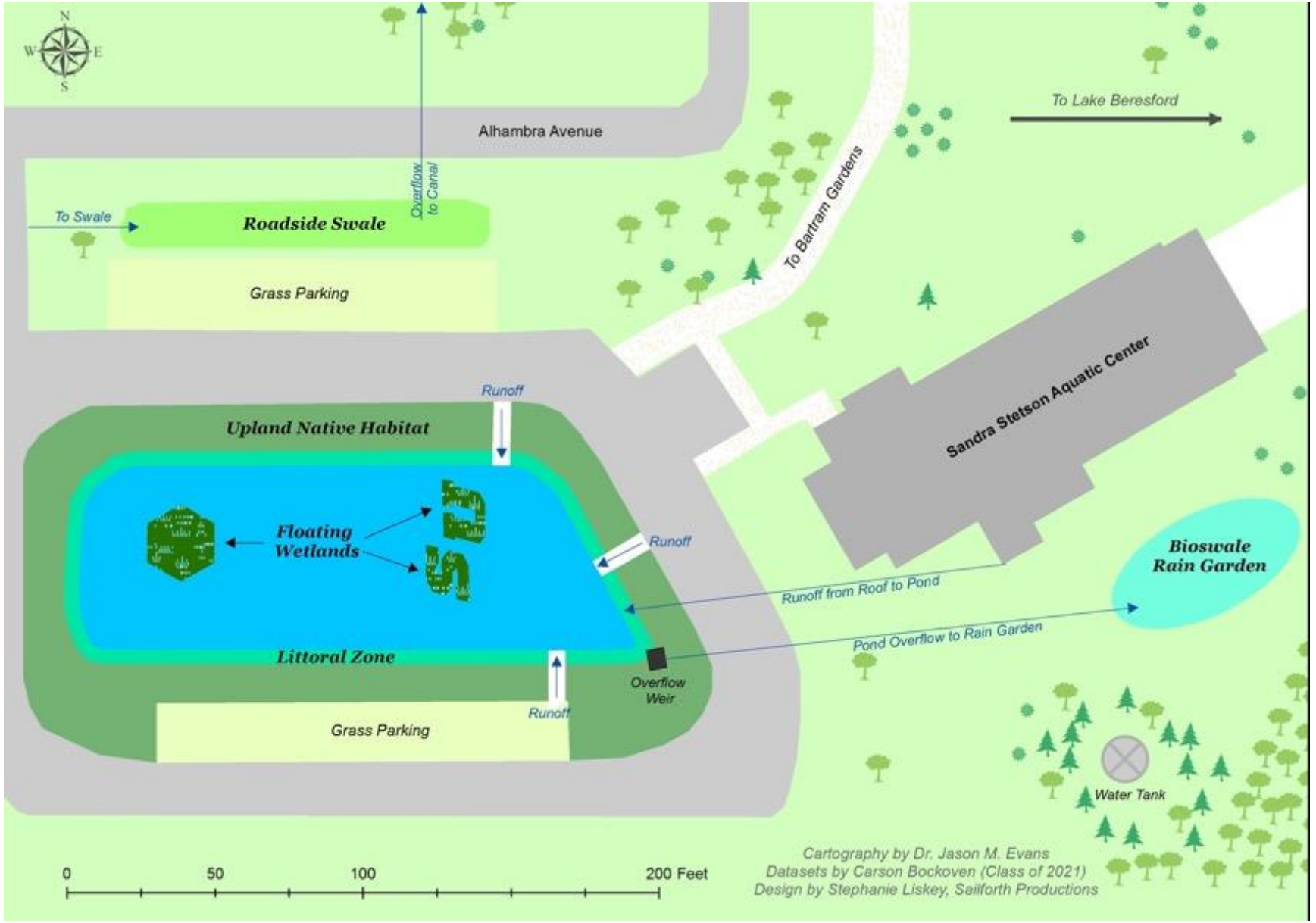


Figure 8: Floating Wetland "Beemat" Design for Installation

Figure 9: Final Design Site Map



Task 2: Construction

Deliverables: The Grantee will install: 1) native plantings along the littoral zone of an existing stormwater pond; 2) floating vegetative islands within an existing stormwater pond; and 3) a new rain garden/stormwater wetland.

Documentation: The Grantee will submit: 1) a detailed list of plants purchased and the dates and locations that the plants were installed; and 2) a signed acceptance of the completed work to date, as provided in the Grantee's Certification of Payment Request.

Task 2 Outcomes

All three green infrastructure components for this project have been installed at the Sandra Stetson Aquatic Center. These completed projects include:

1) Native shoreline and littoral zone plantings along the edge and bank of the site's stormwater pond (Figures 10-14).

2) Floating "Beemat" wetlands within the stormwater pond (Figures 15-17)

3) Planting of a stormwater wetland/rain garden within an existing spreader swale feature that serves as an overflow for the stormwater pond and runoff collection for portions of the adjacent Sandra Stetson Aquatic Center building (Figures 18-20)

Evans coordinated with personnel from Beeman's Nursery to install the stormwater pond and rain garden plantings on April 20-21, 2020 (plant lists are provided in Figures 21-23). Local drought conditions through late April and much of May required Evans to install a temporary irrigation system to assist with plant establishment. There was some plant loss within the stormwater pond plantings and more severe plant loss within the rain garden due to the drought conditions. Personnel from Beeman's Nursery returned to the site on May 29, 2020 to replace lost plants.

Dr. Jason Evans worked with personnel with Beemats, LLC, to install the floating wetlands within the stormwater pond on May 21, 2020 (construction material and plant lists are provided in Figures 24-25). Plants within the floating wetlands established successfully without supplemental care other than some minor weeding. Stetson University contracted with Beemats, LLC, to perform seasonal biomass harvest on the floating wetland and weeding maintenance of the shoreline plantings and rain garden on October 23, 2020.

The West Volusia Audubon Society provided Stetson University with wildflower seeds for distribution within the SSAC green infrastructure site on May 6, 2020. These seeds were spread on site by Evans in June 2020. All planted areas became permanently established with the onset of summer rains, and no supplemental irrigation was required after June 1, 2020. A part-time green infrastructure coordinator, Jenna Palmisano, was hired (position ran from June 1-October 15, 2020) to perform weeding and other ancillary maintenance within these planted areas, as well as assist with development of educational outreach materials.

A selection of native trees was (bald cypress, wax myrtle, southern magnolia, and cabbage palms) were planted around the water tank to serve as both an ecological enhancement and aesthetic screen function prior to the green infrastructure project implementation. These tree plantings were an integral part of the approved landscape plan for implementing the stormwater wetland/rain garden planting plan into the previously sodded spreader swale feature and are therefore included as part of the project match.

Figure 10: Shoreline Plantings, Picture 1, July 17, 2020

Figure 11: Shoreline Plantings, Picture 2, July 17, 2020

Figure 12: Shoreline Plantings, Picture 3, July 17, 2020

Figure 13: Shoreline Plantings, Picture 4, July 17, 2020

Figure 14: Shoreline Plantings, Picture 5, July 17, 2020

Figure 15: Floating Wetlands, Picture 1, July 17, 2020

Figure 16: Floating Wetlands, Picture 2, July 17, 2020

Figure 17: Floating Wetlands and Stormwater Pond, Picture 3, May 23, 2020

Figure 18: Rain Garden, Picture 1, July 17, 2020

Figure 19: Rain Garden, Picture 2, July 17, 2020

Figure 20: Rain Garden, Picture 2, July 17, 2020

Figure 21: Plant List for Rain Garden (Beeman's Nursery)

QTY	DESCRIPTION	UNIT COST	TOTAL
	Aquatic Center Rain Garden - 2500 sq. ft.		
1,500	Mixed Bare Root aquatic species	0.55	825.00
1,000	Mixed 4" Native Grasses	1.05	1,050.00
1,500	Labor Charges to Install Bare Root	0.40	600.00
1,000	Labor Charges to Install 4" grasses	0.90	900.00
	Beemansnursery@gmail.com	**TOTAL**	$3,375.00

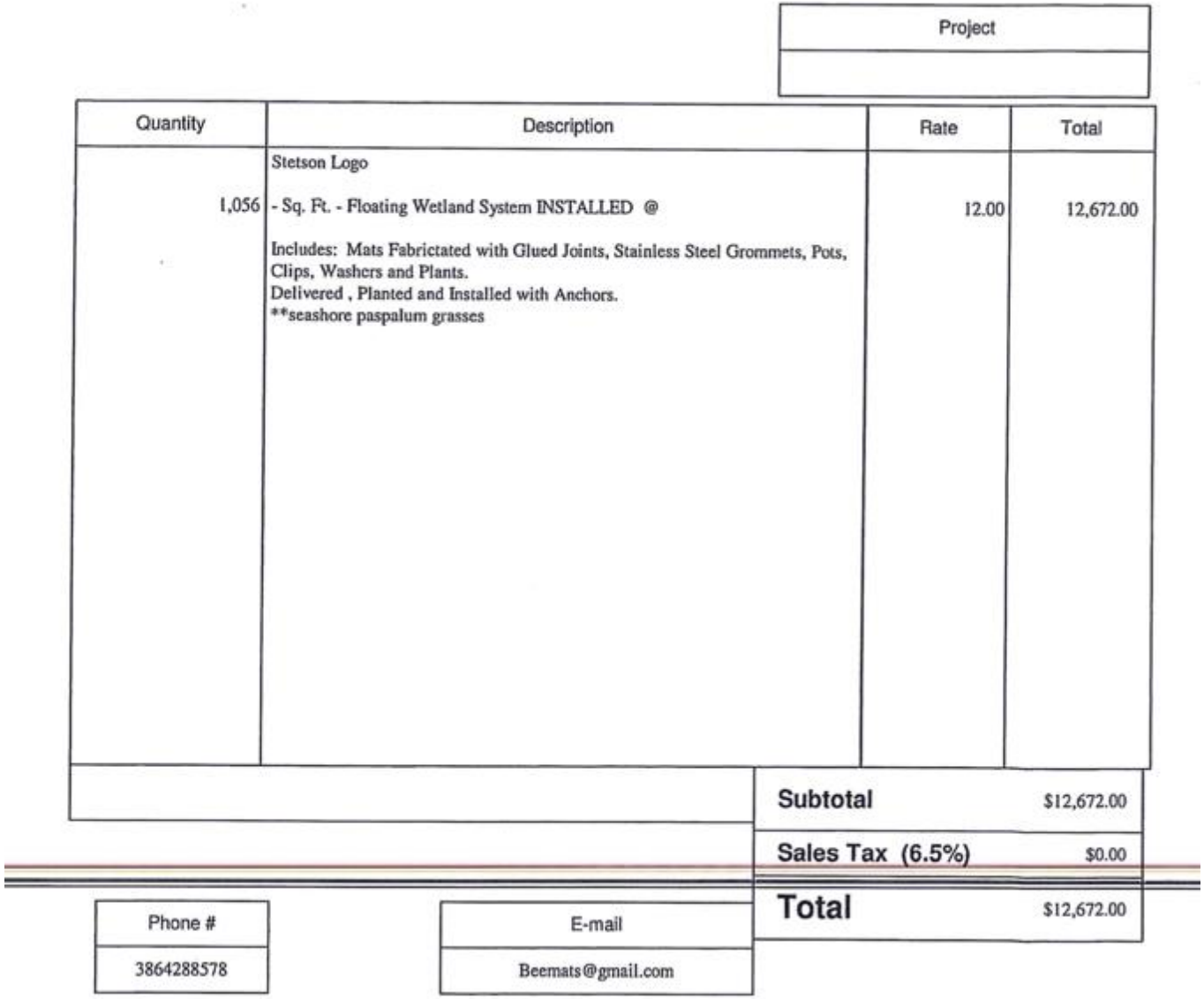
Figure 22: Plant List for Stormwater Pond Bank (Beeman's Nursery)

QTY	DESCRIPTION	UNIT COST	TOTAL
	Slope to the Curb - 8045 sq. ft.		
651	1g misc. Native Grasses	2.10	1,367.10
2,925	4" misc. Native Grasses	1.05	3,071.25
24	3g Silver Saw Palmetto	20.00	480.00
10	15g Bald Cypress	60.00	600.00
50	1 gal Helianthus debilis, dune sunflower	2.00	100.00
50	1 gal Gaillardia pulchella, blanket flower	2.00	100.00
651	Labor Charges to Install 1g. Native Grasses	1.80	1,171.80
2,925	Labor Charges to Install 4" grasses	0.90	2,632.50
24	Labor Charges to Install Silver Saw Palmetto	10.00	240.00
10	Labor Charges to Install Bald Cypress	30.00	300.00
100	Labor Charges to Install Dune Sunflower and Blanket Flower	1.00	100.00
	Beemansnursery@gmail.com	**TOTAL**	$10,162.65

Figure 23: Plant List for Stormwater Pond Littoral Zone (Beeman's Nursery)

QTY	DESCRIPTION	UNIT COST	TOTAL
	Pond Bank Buffer zone - 4600 sq. ft.		
2,300	Mixed Bare Root Aquatic Species	0.55	1,265.00
2,300	Mixed 4" Native Grasses	1.05	2,415.00
2,300	Labor Charges to Install Bare Root	0.40	920.00
2,300	Labor Charges to Install 4"	0.90	2,070.00
	Beemansnursery@gmail.com	TOTAL	$6,670.00

Figure 24: Plant List and Construction Materials for Floating Wetlands 1 & 2 (Beemats, LLC)



Project

Quantity	Description	Rate	Total
	Stetson Logo		
1,056	- Sq. Ft. - Floating Wetland System INSTALLED @ Includes: Mats Fabrictated with Glued Joints, Stainless Steel Grommets, Pots, Clips, Washers and Plants. Delivered , Planted and Installed with Anchors. **seashore paspalum grasses	12.00	12,672.00

Subtotal	$12,672.00
Sales Tax (6.5%)	$0.00
Total	$12,672.00

Phone #	E-mail
3864288578	Beemats@gmail.com

Figure 25: Plant List and Construction Materials for Floating Wetlands 3 (Beemats, LLC)

Project

Quantity	Description	Rate	Total
	Octagon Shapled Island		
512	- Sq. Ft. - Floating Wetland System INSTALLED @ Includes: Mats Fabrictated with Glued Joints, Stainless Steel Grommets, Pots, Clips, Washers and Plants. Delivered , Planted and Installed with Anchors. ** border planted with grasses with center planted with serveral species of flowering aquatic plants	10.00	5,120.00

Subtotal	$5,120.00
Sales Tax (6.5%)	$0.00
Total	$5,120.00

Phone #	E-mail
3864288578	Beemats@gmail.com

Task 3: Public Education

Deliverables: The Grantee will provide public education information about the project and its environmental benefits in the following formats: 1) kiosk/sign(s) installed at the project location; and 2) workshop(s). Announcements through the web or print materials for Workshop, conference, demonstration days or other events as part of a project funded by a 319 assistance agreement shall contain a statement that the materials or conference has been funded in part by the United States Environmental Protection Agency. If outreach component includes physical signage, the signage shall contain the EPA logo. If the physical design of the sign allows, it should also include the following text: "This cooperative project has been funded in part by the United States Environmental Protection Agency." Non-traditional educational materials may not be subject to a required acknowledgement statement. The Grantee will consult the Department's Grant Manager prior to submittal of draft documentation to determine the applicability of a statement for each deliverable type.

Documentation: The Department's Grant Manager must approve draft materials prior to public distribution. Completed public education activities to date as described in this task, as evidenced by:1) copy of draft kiosk/sign(s) text and graphics and dated photograph(s) of installed kiosk/sign(s) as approved; 2) draft materials for workshop(s) and copy of workshop notice(s), agenda(s), meeting minutes or notes, and sign-in sheet(s).

Task 3 Outcomes

Stetson University contracted Sailforth, LLC, for implementation of four interpretive kiosk signs at the site. Sailforth, LLC has previously developed a total of sixteen interpretive signs for the Bartram Gardens and Trail portion of the Sandra Stetson Aquatic Center site, as funded through a Volusia County ECHO grant. The desire for aesthetic continuity with the other signs on site and overall satisfaction with the previous work produced by Sailforth for Stetson and Volusia County resulted in the selection of this company to perform the work.

These four interpretive signs include:

1) One double-sided 36" x 51" panel that provides a map overview of the site and general explanation of stormwater management and green infrastructure (Figure 26, Front; Figure 27, Back).

2) A one-sided 24" x 36" panel describing shoreline and littoral shelf plantings (Figure 28).

3) A one-sided 24" x 36" panel describing the floating wetlands (Figure 29).

4) A one-sided 24" x 36" panel describing the rain garden/stormwater wetland area (Figure 30).

The kiosk designs were approved by DEP's Grant Manager, Mitch Holmes, on September 4, 2020, and Volusia County's Grant Manager, Katrina Locke, on September 10, 2020.

Additional site condition investigations, native plant list developments, and project outreach at Stetson University and the broader public were conducted by three student researchers, Jenna Palmisano, Carson Bockoven, and Gabriel Rey. The funding support for these students was provided by a private gift donation to IWER for dedicated use as match support for this USEPA/FDEP green infrastructure project. Dr. Jason Evans developed text for interpretive signage, supervised all student researchers, and prepared presentation materials for delivery in public workshop forums.

Identify any delays or problems encountered: The COVID-19 pandemic necessitated the abandonment of any plans for in-person workshops or volunteer events at the site through the project period. However, the project results were communicated by Dr. Evans through presentations at the following web-based public outreach forums over the grant period:

1) May 29, 2020 – Landscaping and the Law: Native and Florida-Friendly Plants in Your Community. Hosted by St. Johns River Water Management District
2) September 9, 2020 – Legally Landscaping in Your Community. Hosted by St. Johns River Water Management District
3) November 12, 2020 – Save Our Springs and Rivers Academy. Hosted by Riverside Conservancy
4) November 17, 2020 – Green infrastructure seminar for the DeLand Garden Club
5) January 12, 2021 – Green infrastructure seminar for Halifax Country Garden Club
6) January 28, 2021 – Save Our Springs and Rivers Academy. Hosted by Riverside Conservancy

The development of the signage ran behind schedule, largely due to complications with arrangement of field visits by non-Stetson personnel (i.e., Sailforth staff) and adjustments to working in an almost complete remote work environment. Kiosks were, however, delivered on-site to the SSAC on October 27, 2020. Installation of the signs was originally scheduled for completion by Campbell Construction on November 12, 2020. However, inclement weather associated with a tropical storm forced a delay of the final installation to November 17, 2020. Final installation of the kiosks on site is shown in Figures 31-35.

Figure 26: Front Side of Green Infrastructure Panel (actual size is 36” x 51”)

Figure 27: Back Side of Green Infrastructure Panel (actual size is 36” x 51”)

Figure 28: Shoreline and Littoral Shelf Panel (actual size is 24" x 36")

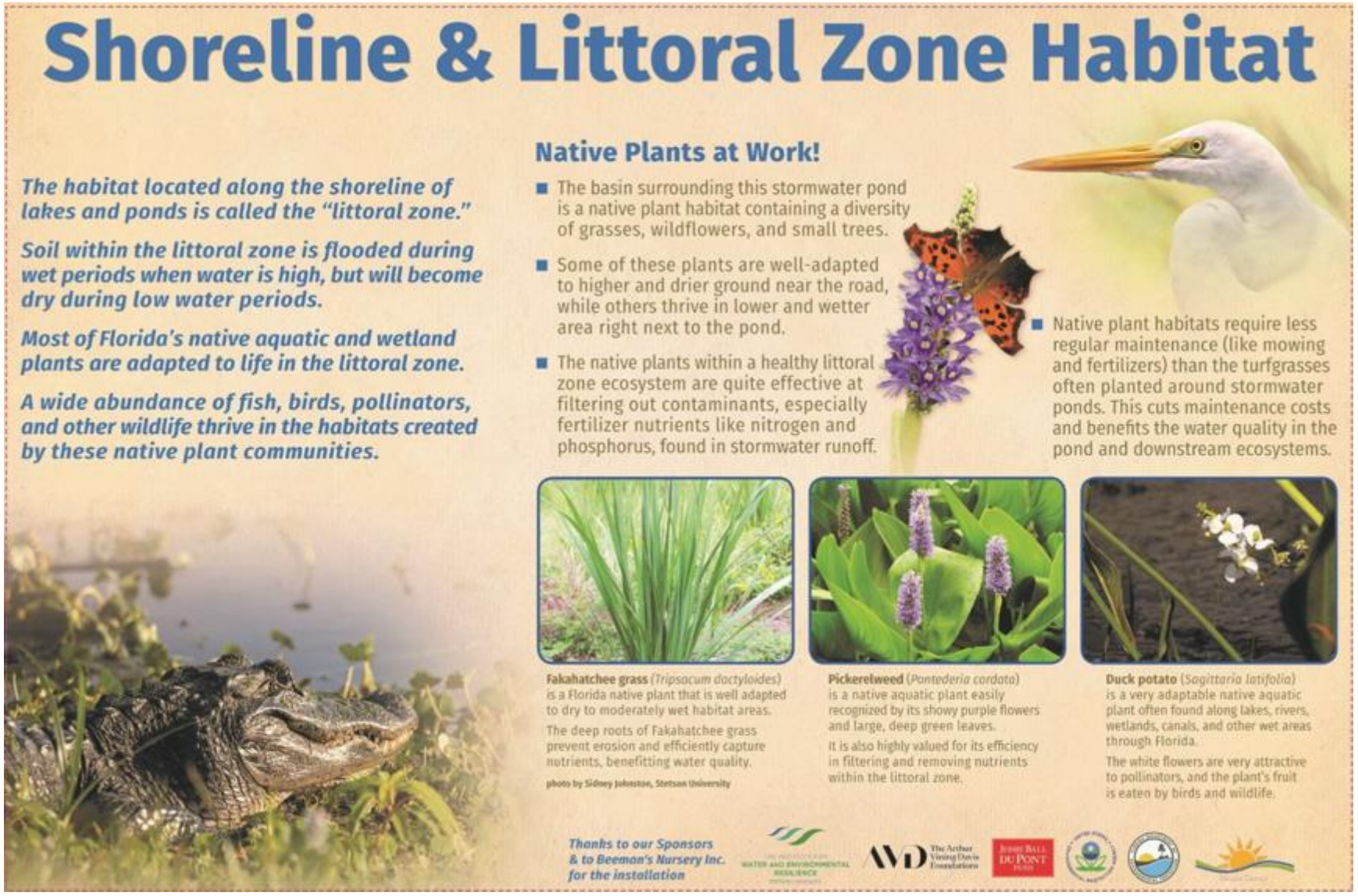


Figure 29: Floating Wetlands Panel (actual size is 24” x 36”)

Figure 30: Rain Garden Panel (actual size is 24” x 36”)

Figure 31: Front Side of Green Infrastructure Panel (Installed)

Figure 32: Back Side of Green Infrastructure Panel (Installed)

Figure 33: Shoreline and Littoral Shelf Panel (Installed)

Figure 34: Floating Wetlands Panel (Installed)

Figure 35: Rain Garden Panel (Installed)

Task 4: Final Report

Deliverables: The Grantee will prepare a Final Report summarizing the results of the project, including all tasks in the Grant Work Plan. The Final Report must include at a minimum:

- Project location and background, project description and timeline, grant award amount and anticipated benefits.
- Financial summary of actual costs versus the budget, along with any changes required to the budget. Include any match or locally pledged contributions provided, along with other related project work performed outside of this Agreement to identify the overall project cost.
- Discussion of project schedule versus actual completion, including changes required to the schedule, unexpected site conditions and adjustments, significant unexpected delays and corrections, and/or other significant deviations from the original project plan.
- Summary of activities completed as well as those not completed and why, as well as a brief summary of any additional phases yet to be completed.
- Dated color photo documentation of work performed (representative of the entire project), appropriate figures (site location, site plan(s), etc.), appropriate tables summarizing data/information relevant to Grant Work Plan tasks, and appropriate attachments relevant to the project.

Documentation: The Grantee will submit: 1) a copy of the draft Final Report in Word format; and 2) a copy of the Department-approved Final Report, in Word or PDF format.

Task 4 Outcomes

This final report, as developed by Dr. Jason Evans of Stetson University, serves as the deliverable for Task 4.