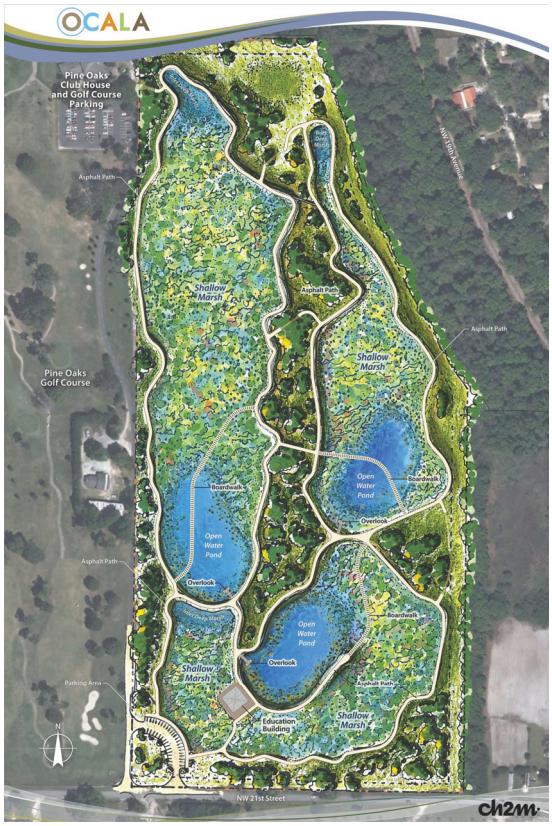
FDOT Transportation Innovation Initiative: FRPM&S—Design Innovation

Ocala Wetlands Recharge Park FRP Pedestrian Features

FAST FACTS:

FRP Members &/or Structures



Project Location: 2201 NW 21st Street
Ocala, Florida 34475
Marion County

Governing Agency: City of Ocala Utility Engineering

Project Name: Ocala Wetlands Recharge Park

Project Description: This projects involved the design, manufacturing, and construction of fiber-reinforced polymer (FRP pedestrian features including 1518 linear feet of boardwalks, three wildlife overlook areas (55 linear feet/each), and 462 linear feet of pedestrian railings.

Project Costs: $1.43M (Total Cost)
$1,032,382 (Materials) / $400,000 (Construction)

Construction Dates: June 9, 2018 to August 1, 2019

Project URL: https://bit.ly/2XBi6NP

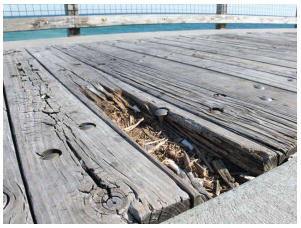
Project Video: https://bit.ly/30k7xR0

Project Purpose & Need:

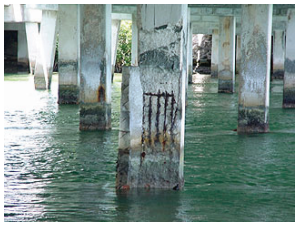
The Ocala Wetland Recharge Park allows the City of Ocala to efficiently use its water resources by constructing an aquifer recharge park. In developing and operating this park, the City of Ocala will further it's goal of achieving net zero water usage. Additionally, the project will create a wetland ecosystem, improve water quality, and boost regional groundwater supplies by utilizing treated wastewater. The park sits on a 60-acre site, located near Lillian Bryant Park. The Ocala Wetland Recharge Park is home to an educational pavilion, boardwalks, two and a half miles of paved walking trail, and wildlife overlooks.

The City of Ocala decided to implement structural Fiber-Reinforced Polymer FRP) over traditional materials such as timber/wood. Structural FRP members minimizes future maintenance and provides a significant savings to the life-cycle costs of the project. Furthermore, structural FRP provides enhanced aesthetics and does not react to acidic soils and is not susceptible to chemical attacks in the surrounding environment. Since it is a utility owned park, their desire was to avoid on-going maintenance and repairs. The expected lifecycle savings is estimated to be $20 to $30 Million.

Traditional Approach:



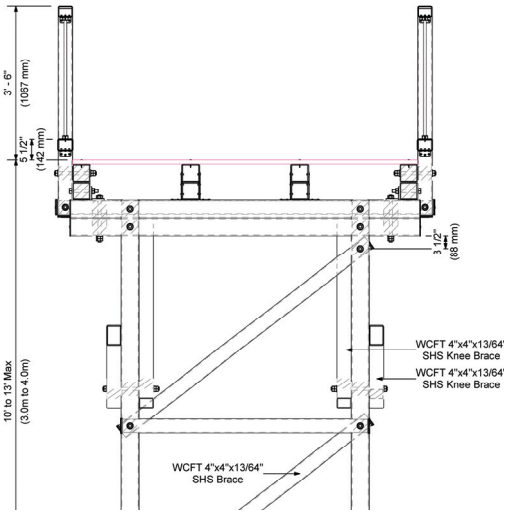
Traditionally, materials such as wood, concrete, or steel would be used for the construction of the structures. Given the location of the project and considering the Ultraviolet (UV) light exposure, humidity, environmental classification of the water/soil, etc., the service life of traditional materials would be greatly reduced. These materials would be susceptible to UV degradation and humidity, which leads to wood rot. Additionally, due to the discharge of treated wastewater, the materials would also be susceptible to chloride and other chemical attacks leading to concrete spalling and corrosion of the reinforcing or structural steel. It was estimated, traditional materials would require maintenance and/or repairs within the first ten years of the service life, resulting in higher life-cycle costs to the City of Ocala.



New Approach:

On January 2015, The Florida Department of Transportation (FDOT) added Volume 4, Fiber-Reinforced Polymer Guidelines FRPG) to the Structures Design Guidelines. These new guidelines paved the way in innovation for the use of FRP in pedestrian structures and features. Having similar strengths of steel at only 25% of the weight, FRP have provided owners/clients an alternative material that can meet their specific needs in sensitive areas with Extremely Aggressive Environment Classifications. Wagners Composite Fiber Technologies WCFT) materials and products provide superior strength and longevity giving the asset owner a longer life-cycle and a lower lifetime maintenance solution potentially saving millions of dollars over the life of the asset.

For this application, WCFT s main structural members including piles, bent supports, and joists for the boardwalks and overlook areas resemble common Steel Hollow Structural Sections HSS) with dimensions of 5"x5"x1/4". The FRP members allows for efficient installation using minimal and readily available construction equipment. The piles were installed to the minimum tip elevations and the axial capacities were independently verified in the field through geotechnical testing. Using these 5", low displacement piles minimized the footprint of the boardwalks and overlook areas, mitigating the overall environmental impacts of the project. The pile bracings, pedestrian railing posts, and pedestrian railing top/ bottom rails are composed of the 4" FRP structural sections. All structural members were connected with ASTM 316 Stainless Steel through bolts, mitigating corrosion and adding to the longevity of the structures and features. For the overall aesthetics of the project, all the FRP members were painted during the manufacturing process with a UV resistant paint in the colors specified by the City of Ocala.



Top Innovations Employed:

The project implemented the use of structural FRP materials in an Extremely Aggressive Environmental Classification area with treated wastewater, high UV exposure and humidity.

Primary Benefits Realized/Expected:

The primary benefit of structural FRP members in the construction of these pedestrian boardwalks, overlook areas, and pedestrian railings are a longer service life without major maintenance. The high strength and lightweight characteristics of the structural FRP members results in minimal and smaller construction equipment making it easier to transport to remote locations. The structures are designed with a 100-year life expectancy. It is anticipated the boardwalks and features will require no to low maintenance for the first 25 years of the service life.

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Construction Contractor: **Petticoat-Schmitt**

Project Contact:

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