FSC TECH

Engineered Marine and Estuarine Protection System

SeaHive®

Dissipates Wave Energy While Creating Habitat

Laboratory Tested to Category 5 Hurricane Conditions

A COST-EFFECTIVE ECO-ENGINEERING ALTERNATIVE

The SeaHive® system provides an efficient alternative for the protection of the transportation network and the built environment in coastal communities that can be tuned for both low and high energy areas.

HABITAT CREATION

Its potential for biocompatibility and habitat creation is provided by its faceted perforated geometry and the use of ecofriendly materials, for a versatile and protective green engineered system.

LESS WAVE REFLECTION AND HIGHER WAVE ENERGY DISSIPATION

Laboratory tests on SeaHive® models have shown that the system provides better protection against storm surge and wave action than traditional coastal protection structures such as vertical seawalls and trapezoidal submerged breakwaters. Perforations on the side faces of SeaHive® units form interconnected channels allowing water flow under surging or breaking waves and dissipating wave energy through turbulence.

UNIVERSITY OF MIAMI

DESIGNED BY UNIVERSITY OF MIAMI

Extensive research documented by National Cooperative Highway Research Program (NCHRP) Report IDEA-213, with the assistance of FDOT, up to Category 5 Hurricane conditions.

FSC STRUCTURAL INNOVATION

The adoption of the FSC Reinforcing Technology, with the very innovative way of using FRP, provides SeaHive® a long corrosion free service life and fosters industrialized production processes, with reduced cost and a lower carbon footprint.

SeaHive® Design

THE OBJECTIVE OF THE SeaHive® PROJECT

There are two objectives of the SeaHive® project, the first was to research and develop a sustainable estuarine and marine revetment system that provided coastal storm protection while enhancing marine habitat.

The second objective was to create a design that could enable the elements to be mass produced on existing dry cast production machinery readily available in the precast market. This significantly lowers the overall cost of the system while providing long term product life. Together the two objectives provide the maximum value to project stakeholders.

STRUCTURAL PERFORMANCE TESTS

A study was conducted to analyze the structural performance of SeaHive® reinforced with either internally GFRP bars or externally bonded GFRP longitudinal strips and pretensioned transverse GFRP wraps (FSC Reinforcing Tech).

The latter reinforcement methodology applied to dry-cast concrete is shown to be superior.

GFRP bars

Load or Deflection	CB-1	CB-2	FB-1	FB-2
First cracking load (kN)	73	79	89	156
Ultimate load (kN)	143	179	222	250
Maximum deflection (mm)	17	19	N/A	10

GFRP wraps (FSC Tech)

Load or Deflection	CS-1	CS-2	FS-1	FS-2
First cracking load (kN)	145	172	73	75
Ultimate load (kN)	360	354	227	315
Maximum deflection (mm)	17	15	8.3	14.68

HYDRODYNAMIC PERFORMANCE TESTING

System design testing focused on the optimum shape and wave energy reflection coefficients. This testing led to the selection of the Hexagonal shape which provides an inherent stability and maximized volume for a given amount of material, similar to a beehive and allows the units to have a natural locking together aspect.