



Although the new breakwaters were primarily intended to stop erosion, sediment is already building up behind the barriers as a side benefit. (Courtesy of CPRA)

CASE STUDY:

ROCKEFELLER REFUGE

Arcosa Lightweight is proud to be a part of preserving and stabilizing the Southwestern Louisiana coastline after decades of severe erosion at the Rockefeller Wildlife Refuge.

In January 2021, *Civil Engineering*, the magazine of the American Society of Civil Engineers (ASCE), published a thorough article about the massive land-saving project along the 26.5 mile section - with an emphasis on a specific 9.2 mile stretch of marshland - bordering the Gulf of Mexico in Cameron and Vermillion Parishes.

The article, entitled “Breakwaters Aim to Halt Ongoing Erosion at Coastal Refuge”, was written by Robert L. Reid, the magazine’s senior editor and features manager. Of particular note were comments from Brett Geesey, P.E., Coastal Project Manager of HDR Engineering’s Lafayette, Louisiana office who says: “Only the lightweight aggregate core breakwater, which lost only 3 ft

of land, met all our criteria.” The article explains that HDR previously used LWAC breakwaters in Louisiana, but only in interior water systems — never along an exposed gulf shoreline.

Trusting the Process of Creating the Best Lightweight Product

We’d like to highlight the role Arcosa’s encapsulated lightweight aggregate played in doing the crucial work of saving Louisiana from losing more valuable coastline. While the *Civil Engineering* article is very detailed and a compelling read, Arcosa’s Jeff Speck wants to clarify what the company’s lightweight aggregate brings to the table in this work.

Speck explains exactly how the lightweight aggregate is ideal to fill the geotextile bags that make up the coastal breakwaters. “The clay is mined onsite at the Erwinville, LA plant,” Speck

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says. “It’s fired in a rotary kiln to about 2000 degrees Fahrenheit. In this process, the clay gets just to the point of becoming a molten material, kind of like lava in a volcano. During that phase, the material releases gases and imparts these tiny air voids into the mass of the clay. Once the material cools after it’s expanded, it’s no longer clay, but a ceramic aggregate.”

Winning Combination: Arcosa Lightweight and Industrial Fabrics

Arcosa Lightweight and Industrial Fabrics have long been partners in coastal preservation and stabilization. The two companies have finely honed their products for longevity. The process of creating breakwaters has become second nature. And it’s done right on the job site.

Arcosa’s lightweight aggregate is placed in the specifically designed geotextile bags by the contractor on site, sewn shut, and then placed along the shoreline and capped with riprap. These essential breakwaters are also environmentally friendly and have held up against storms and tide for nearly two decades.

Trial and Error and the Path to Encapsulated Lightweight

Speck says the geotextile bags are necessary so that the material stays in place. That may sound obvious, but coastal preservation has gone through many stages over the years. In very soft subsurface conditions such as Rockefeller Refuge, traditional methods just didn’t cut it.

“Ordinary stone, well it sinks in the mud basically,” Speck explains. “It settles. Sometimes it would sink

so fast that they could never break the water line. They just keep adding stone and adding stone and it would just keep sinking.” Which wasted time and money and with budget approvals on the line, a new method had to be discovered.

Speck nods. “It’s been a work in progress. Years ago, maybe 30 years ago, the Corps of Engineers was doing some work in the Gulf of Mexico, trying to build berms by dumping lightweight aggregate into the water in the Gulf. And they had a difficult time because the current would take some of the aggregate away,” Speck says. “So they were trying to come up with ways to encapsulate it, and one of the early designs was to try to lay fabric down, dump the aggregate on top of it, and then wrap the aggregate with the fabric. That just wasn’t practical.”

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Speck says that somewhere in the middle of this trial and error process, a light went on. “Somebody, I don’t know who it was to be honest with you, came up with the idea of using these geotextile bags and it’s an ingenious idea. I wish I had come up with it,” Speck laughs.

Hope for the Future

The combination of Arcosa’s lightweight aggregate and Industrial Fabrics geotextile bags has been a saving grace for Louisiana’s coastline. Rockefeller Wildlife Refuge alone has lost 15,000 acres since its creation in 1920.

More than 300 feet of land has disappeared in recent years and the race to save the coast has been fraught with weather, effects

of humans, subsidence, and other challenges. Fortunately, engineers arrived at a successful solution beginning in 2000. The Louisiana Coastal Protection and Restoration Authority and the National Marine Fisheries Service created the Rockefeller Refuge Gulf Shoreline Stabilization Project.

The main focus was on a severely eroded 9.2 mile stretch of the refuge located in Cameron Parish. Designated as ME-18 under the Coastal Wetlands Planning, Protection, and Restoration Act, the more than \$33 million dollar project stopped the dramatic erosion that had erased land mass.

With the right engineering and products, we’ve seen how humankind can preserve precious resources such as our coastlines.

Arcosa Lightweight is ready for those challenges.

FACTS AT A GLANCE:

- \$33 Million+ project
- ME-18 protected by several 4 mile-long breakwaters
- Lead Design Firm: HDR Engineering Inc.
- General Contractors: LeBlanc Marine, Rigid, Patriot
- Encapsulated lightweight aggregate: Arcosa Lightweight
- Geotextile Bags: Industrial Fabrics



The lightweight aggregate core breakwater was the only demonstration effort that met all the project’s criteria. (Photograph courtesy of Phillip L. Trosclair III)