

Rising from the Waters of Chesapeake Bay



Once pounded by storms and decimated by erosion, Poplar Island is being restored.

Poplar Island once thrived as a habitat for Chesapeake Bay's waterfowl and as a place of rest and relaxation for American presidents Franklin D. Roosevelt and Harry Truman. Years of erosion have since decimated the original island to nothing more than ghostly tree limbs climbing out of the Chesapeake's waters. Continuously pounded by storms and the bay's crashing surf, what was once more than 1,000 acres of land and refuge—complete with residents and buildings—had disappeared.

In the mid-1990s, Poplar Island was designated as a potential site for disposal of dredged material from the shipping lanes of Chesapeake Bay leading in and out of Baltimore. In 1998, work began

on a restoration project that will use more than 38 million cu yd of material to create a new refuge for the region's birds. When completed, the habitat will feature 1,100 acres of uplands and lowlands with work estimated to run through 2016.

With the pumping of dredged material into the island comes the need to continuously raise its dikes to ensure containment. VSA Construction Services, LLC (Jessup, MD) is among the construction firms working with the Army Corp of Engineers on the project's most recent phase of adding another three-ft lift to the existing dike of Cell 2, the island's largest cell with an estimated five-mile perimeter. To remain on schedule, VSA utilizes diverse equip-

ment to excavate, haul, and place an estimated 4,500 cu yd of material per day in a challenging work environment.

Richard Vance, president, VSA, spent 23 years in the military building everything from high security structures to airfields. Certified as a Disabled Veteran Small Business, the firm is a spin-off of the former construction group of Horne Engineering—the same group that performed the previous phase of dike construction on Poplar Island.

Every piece of heavy equipment (articulated trucks, excavators, wheel loaders, dozers) and associated support equipment is barged in. Employees travel to work each day via boat. Local equipment supplier Midlantic Machinery relocated two of its service trucks (complete with full-time mechanic) to the island. And the tumultuous weather associated with an island in the middle of Chesapeake Bay can wreak havoc on what is otherwise a pleasant and unique place to work.

One element of VSA's work on Poplar Island involves repairing a breach in the original dike caused by Hurricane Isabelle. The most intense work on the island, however, involves the excavation, hauling and placing of over 530,000 cu yd of material to raise the dike of Cell 2 to its desired height: 23 ft above water, 70 ft wide with a 15-ft bench, and a required 2-1 step back.

Vance's company has turned Cell 4 of Poplar Island into a borrow pit, loading up 30-ton articulated trucks with sand that is hauled to Cell 2 at the other end of the island. Cell 4 sits only ten ft above water level, and when Poplar Island was first rebuilt, extra amounts of sand were pumped into that cell to serve as a future source of material for dike building



Dozers on Poplar Island are in constant motion shaping and finish grading multiple haul roads located within the borrow pit, a requirement in order to keep trucks on the move.

projects. The company currently has excavated 20 ft of material in some places, bringing ground levels to ten ft below water level.

The company relies on Komatsu (www.komatsu.com) PC300LC-7 excavators (242 hp, 74,856 lb.) to continuously load eleven Komatsu HM300-1 articulated trucks (30-ton capacity) throughout the day with sand for the Cell 2 dike. The teaming of these two machines offers the construction firm an impressive combination: The equipment manufacturer's excavator technology offers increased digging power and fuel efficiency; and the articulated trucks feature powerful transmissions and smooth rides.

As the excavators work to load the articulated trucks, a 36,160 lb. PC160LC-7 excavator digs perimeter and finger ditches throughout the borrow area. This is designed to channel water that is being expelled from the stockpiled materials and seeping in from outside the dike to areas where the water can be pumped back into the bay. These ditches are constantly lowered by the smaller excavator, which navigates the borrow pit on crane mats to prevent from sinking into the material. As all of this is happening, D61 dozers are constantly shaping and finish grading dike slopes and grading haul roads within the borrow pit, a necessary evil in the constant battle to keep trucks moving.

"We've got trucks running up to the top of the tires," says Vance. "The trucks are even dragging the differential at times. The material is sand with a lot of very fine clays that ruts up constantly—it's the job of the dozers to work behind the trucks and fill them in."

Once the trucks are loaded and are able to extract themselves from the bog-like borrow pits, the ride to Cell 2 is considerably easier. Well maintained haul roads allow the HM300s to safely reach hauling speeds of 35 mph on the trek to the new dike and back, a cycle of 14 to 22 minutes, depending on which end of the cell trucks are hauling to, as trucks are staggered to prevent traffic jams in the borrow pit. The dike is generally raised in lifts of one ft, with the articulated trucks dumping sand and D65PX-15 dozers (low ground pressure

models) forming each lift. Material from each lift is tested at on-site soil labs, with sieve analysis and water content tests ensuring that deposited material is stable enough to continue building the dike.

Tandem Key to Productivity

Each articulated truck racks up roughly 120 miles per day on Poplar Island—a large amount, without even considering that the trucks are constantly transitioning from dredging through wet, fine sand and clay to solid haul roads and through varying conditions of the dike and its bench. Only articulated trucks can effectively handle these conditions while remaining efficient to operate. Four of the eleven HM300s even feature "wide profile" tires to make driving through the material easier.

Dave Krebs, field manager for VSA at Poplar Island, explains: "Day to day, weather is the biggest factor, and we work in material that is unforgiving. I've been impressed with these dump trucks because they go through this material better than any truck I've ever had. They've got the best (hydro-pneumatic) suspension of any off-road dump truck that I've ever driven, and the way the bed is designed and the way the cylinders are manufactured, it handles the load much better. These trucks are very fuel efficient, and we've been steadily going through material 30 inches deep."

Another feature critical to the operations on Poplar Island is the truck's wet disc braking system. "These trucks are in the water most of the time," says Vance. "Standard disc brakes would allow water to get them wet, and then the fine sand would tear them up. The dry braking system wouldn't last, and a lot of times wouldn't even work."

The other half of the loading equation is the excavator fleet, including the PC300LC-7. New excavator technology, like that built into the manufacturer's "Dash-7" line of machines, makes the job easy on the operator and keeps material moving.

"They've got lots of power (37,040 lb. maximum SAE bucket digging

force)," says Vance in reference to the PC300LC-7s. "The machines are not really stressed. When you consider lb/cu ft, this wet sand is about as bad (heavy) as it gets. We've never had an issue with digging power or response speed. These machines can fill a truck quickly—our turnaround time on trucks is less than one minute."

The performance level can be attributed to the good size match between the PC300LC-7 and the HM300-1 (loading in roughly six passes) and the power and efficiency of the excavator. The machine's smooth hydraulic system and pressure proportional controls not only allow operators to easily handle mass excavation projects, but also provide enough finesse to let operators sift through and set aside unwanted materials with quick stick and bucket movements—important when material like clay cannot be used in dike construction.

"One thing our operators are getting very good at," says Thielker, "is separating the clay from the sand. When they're unloading a bucketful, almost instantly they are kicking the clay out on the side and keeping the sand there."

Krebs points to operator comfort in addition to speed and power as a critical feature, especially when operating a machine 11 hours per day: Another key to productivity is keeping equipment running. In addition to the equipment's on-board diagnostics and conveniently located service stations, the on-site mechanic is crucial. With 28 pieces of equipment on the island and access restricted to boats and barges, running out to get a part is not an effective option. Midlantic Machinery maintains, services, and fixes every piece of equipment on the island.

With work on this phase completed in May 2004 and with another phase of the project just over the horizon, the commitment to return the island to its former glory combined with effective management and utilization of resources have ensured a successful project. Despite the unique challenges of working on an island in the middle of Chesapeake Bay, effective equipment operations and strong management have made it a memorable project. 