



Dredging and Beachfill, Delaware River Main Channel Deepening



**Pennsylvania,
New Jersey and Delaware**

April 2015 thru March 2016



Summary

The U.S. Army Corp of Engineers (USACE), Philadelphia District was faced with a unique challenge. The Delaware River Main Channel, which provides access to the Philadelphia Port from the sea, needed to be deepened, but also required a location to place the material. A small community near Lewes, Delaware was losing their battle to keep its coastline intact. Thus, a project was formed to benefit both parties. The contract to complete the initial construction was awarded on June 6th, 2014 to Weeks Marine, Inc. (WMI). Construction on the Dredging and Beachfill, Delaware River Main Channel Deepening project started in April 2015 and was expected to provide roughly 1.9 million cubic yards of material on the beach at Broadkill. The work to be completed consisted of dredging new material within the Miah Maul and Brandywine ranges of the Delaware River Main Channel from station 432+200 to station 512+000. Dredging was required to a depth of 45 feet MLLW plus a 1 foot allowable overdepth.

Broadkill Beach is located on the Delaware Bay just North of Cape Henlopen. A 3-mile long stretch of beach adjacent to the Prime Hook National Wildlife Refuge, Broadkill Beach is known as the official sanctuary for horseshoe crabs. The channel itself is used by various types of marine vessels including commercial vessels sailing to the ports in Philadelphia, PA. The Broadkill Beach, DE project was authorized for construction by Title I, Section 101 (a) (11) of WRDA 1999 under the House Committee Resolution dated October 1st, 1986. The Delaware Department of Natural Resources and Environmental Control was the Sponsor for this project. The majority of the funding was provided by the federal government and 25 percent of the project was funded by the Philadelphia Port Authority.



The main purpose of this project was to increase the navigable channel depth from 40 feet to 45 feet MLLW to allow for larger commercial vessels to travel safely through the Delaware Bay.

Other objectives for this project included provisions for hurricane and coastal storm damage reduction at Broadkill Beach.

WMI successfully completed the dredging portion using two hopper dredges, the *RN Weeks* and the *BE Lindholm*. Both dredges use suction drag-arms to remove material from the sea floor and accumulate that material in a large containment area called a hopper. The material is then transported via the vessel to a designated off-loading point and in this case, the dredged material provided the community of Broadkill Beach with a 150-foot-wide berm and a new dune in March 2016.

Project Team

Affiliation	Team Member	Role
WMI	Chuck Broussard	Vice-President
WMI	Doug Nelson	Project Manager
WMI	Rich James	Project Manager
WMI	Ed Cohen	Site Manager
WMI	Mike Attasani	Captain – RN Weeks
WMI	Joe Purcell	Captain – RN Weeks
WMI	George Arey	Captain – BE Lindholm
WMI	Kent Hambrecht	Captain – BE Lindholm
WMI	Allard van der Velde	Chief – Booster 3301
WMI	Joe Pace	Safety Officer
USACE	Jake Lambert	Dredging Quality Management
USACE	Randy Grundin	Project Engineer
Triangle Survey	Bill Kotis	Vice-President
Triangle Survey	Colleen Brazil	Project Engineer
Broadkill Beach Preservation	Jim Bailey	President
Homeowner	Julie McCall	Horseshoe Crab Coordinator
DNREC	Tony Pratt	Shoreline Manager

Environmental Benefits

There was some concern that the timing of sand placement may coincide with the peak spawning period of the horseshoe crab between April and June. One local resident, Julie McCall was hired by WMI to coordinate the relocation efforts of the crabs ahead of the advancing beach fill. Between the many volunteers and WMI beach crews, close to 8,000 horseshoe crabs were moved to areas of the beach where renourishment was completed and released to continue their spawning activities.



Innovation

Constantly changing sand waves produced by fast river currents and tidal fluctuations, made it difficult to evaluate the amount of material being removed using single-beam methods. For WMI to more accurately calculate the amount of material being removed and compare volume

measurements with the USACE, WMI purchased a Multi-beam system. With this new system, WMI could ensure digging accuracy and efficiently report findings to the boat captains. According to Ed Voigt, Chief of Public and Legislative Affairs for the Corps' Philadelphia District, the use of Multi-beam technology has led to greater efficiencies and cost savings on projects.

Due to the nature of hopper dredging, small ridges of dredge material remain above the target elevations. WMI utilized a unique piece of equipment called the Water Injection Dredge, WID, to address these ridges. The WID uses high pressure water jets at specific angles to reshape the channel bottom at the location where these ridges exist. Utilizing the WID allowed the hopper dredges to keep the drag-arms at grade and continue with efficient dredge cuts. This conserved valuable dredge time, allowing the hopper dredges to clear larger sections of the channel.

Another interesting innovation that occurred during this project was something management called the "Shark Crossing." The subline, which transports material from the hoppers to the beach, had a section that was comprised of floating rubber hose. This 800 foot long raised section of line allowed sea creatures to pass freely up and down the coast with little or no interference from a construction pipeline typically submerged and placed on the bottom.



Economic Benefits

The Army Corp, in the effort to deepen the navigation channel between Philadelphia and the Atlantic, needed an area to place material that was removed from the bay.

The Broadkill community has long been in need of a wider beach to offer protection against storms. Many homes have been taken down and some continue to be threatened by the encroaching seas and approaching storms. Shannon Cunniff, Director, Coastal Resilience Environmental Defense Fund, was recently quoted at a North Carolina Beach Renourishment Conference saying, "One-dollar advanced investment in flooding hazard mitigation equals five-dollars in recovery costs." In other words, for every dollar spent on beach renourishment to protect the shoreline and its occupants, five dollars in disaster spending is saved if that area



were to be hit by a storm without protection. “Broadkill will be the longest continuous beach renourishment project tackled in Delaware so far,” as stated by Jeff Montgomery and Molly Murry from *Delaware Online*.

In addition to the storm protection, Broadkill Beach can now boast one of the largest beaches in the Lewes, DE area. Broadkill will become a destination beach with a large berm area and gentle wave action

to provide families with a safe and enjoyable beach experience. The additional activity will strengthen tourism in Lewes and bolster the local economy. Plus, with the addition of property to the homes along the beachfront, property values will be on the rise. Developers will be able to continue with plans for new homes with the assurance the shoreline will remain intact for many years to come.

The main purpose of the project was to deepen the channel to allow safe passage for larger vessels coming in and out of the Delaware Bay. “The deeper channel will provide for more efficient transportation of containerized, dry bulk (steel and slag) and liquid bulk (crude oil and petroleum products) cargo to and from the Delaware River ports, with estimated net annualized benefits of more than \$13 million to the U.S. economy” says a representative of the Philadelphia Regional Port Authority.

Tom Black of the *International Dredging Review* states, “Major commodities transported on the Delaware River include petroleum products, steel, chemicals, agricultural products, road salt, lumber and ‘project cargo,’ including windmill blades and heavy equipment.” More ships traveling to the Port of Philadelphia, means more commerce for multiple industries in the area and more jobs to tackle the increased traffic.

Transferability

Communities along the coast of the United State are constantly battling the ever-changing shoreline, and the USACE continues to seek ways to provide safer passage for vessels in coastal waters. Projects like this one with dual benefits can have significant impact and value to all parties involved.

The WID (Water Injection Dredge) can be a very useful tool depending on the project's requirements and circumstances revolving the situation. Because of the WID's ability to level small mounds, the hoppers can work more efficiently on future endeavors.

In situations where the activity of marine life is a concern, such as in the case with the "Shark Crossing," WMI continues to resolve issues with working solutions and innovative ideas.

Outreach and Education

For almost a year, the team lived and interacted with locals in the Lewes, DE area. The beach residents were extremely grateful for the addition of their shore. Beach crews were able to discuss the benefits of the renourishment and explain how the process works. Joe Pace, one of WMI's Safety Officers, was instrumental in helping Julie McCall with the relocation of the horseshoe crabs. Between organizing WMI employees and the many volunteers, he was doing his part to educate people on the horseshoe crab and provide safety awareness while working within an active construction zone.



Videos produced by the USACE can be seen on YouTube describing the entire project and the relocation of the horseshoe crabs.

References:

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