Military Reserve Center Preserved

Shoreline stabilization at historic Floyd Bennett Field in New York requires creative scheduling around tides to halt worsening erosion

The shoreline at the Floyd Bennett Field Marine Corps Reserve Center in Brooklyn, N.Y., recently required stabilization after experiencing considerable erosion that damaged a parking lot and posed a safety hazard. Photo credit: Berner Construction, Inc.

by Don Talend

OVER the course of several decades, the tides in Jamaica Bay off of the Brooklyn, N.Y., coast had significantly eroded the shoreline near the venerable Floyd Bennett Field Marine Corps Reserve Center (MCRC). In 2004, seeking a major upgrade over a severely deteriorated steel sheet pile wall protecting the MCRC, the U.S. Navy issued a contract to demolish and replace the structure. The Navy selected TN & Associates of Minneapolis as the prime contractor and the firm reached out for the services of Berner Construction, Inc., Gap, Pa., a woman-owned firm specializing in both shoreline stabilization and military base construction and remediation services.

Jim Irey, vice president of Berner, had spent nearly 10 years working on U.S. Navy facilities under a Remedial Action Contract (RAC), under which Irey had done several similar projects at facilities located in the Northeast United States. When the RAC began nearing completion, Andrea Irey, a chemical engineer, and Irey, a civil engineer, founded Berner Construction in 2002. Although Berner Construction was diversifying its services from base renovations, the need for shoreline stabilization at Floyd Bennett Field had become critical and Irey stepped back into a familiar role.

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Irey's experience with a wide variety of base projects would come in handy. Scheduling work around Jamaica Bay's tides and working in a wet environment were important aspects of the tricky five-month project.

Floyd Bennett Field, New York City's first municipal airport, was built in 1931 and named in honor of naval aviator Floyd Bennett, pilot of the first flight over the North Pole in 1926. It was constructed to divert the increasing volume of air traffic to New York City away from Newark Airport, where most New York-bound flights landed. By 1933, Floyd Bennett Field was the second busiest airport in the country. It was the landing site for Howard Hughes and other famous aviators who flew around the world in the 1930s, was conveyed to the U.S. Navy in 1941 and served as a major stateside air base during World War II.

Long past its prime as a major military base, Floyd Bennett Field began showing its age in recent years. An old steel sheet pile seawall along the shoreline had deteriorated over the years to the point where it had partially collapsed. Behind the steel sheet pile wall, the

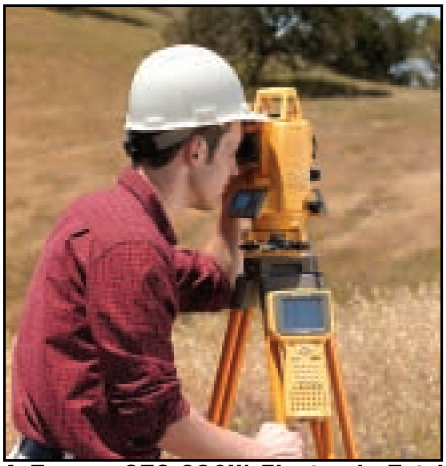
The first task was removal of the steel sheet seawall, which had badly deteriorated. Photo credit: Berner Construction, Inc.

shoreline was eroding away as a result of wave and tidal actions. The Navy not only was concerned that the deteriorating sheet pile wall posed a safety hazard but also saw that a reserve center parking lot was threatened. "The wall had deteriorated to the point where it was falling in on its own weight," Irey says. "The sea wall was made from steel sheeting that is three-eighths of an inch thick and standing above the water line 15 or 20 feet. Predominately, the job was hazard mitigation."

Berner Construction was contracted by TN and Associates to provide labor, equipment and supervision to replace 1,200 feet of revetment seawall, and started work in June 2006. The first task was to demolish the existing sea wall. "Over time, holes rusted through the wall and waves would come in and erode the shoreline," notes Irey. "They tried to bolster it with old blocks of concrete. During the reconstruction effort, we pulled out the concrete blocks, regraded the shoreline and rebuilt the armor rock revetment wall."

The construction team first installed a silt fence for erosion control. Then wood, asphalt and concrete debris were removed from behind the existing sheet pile wall. Removal of the existing concrete cap on the sheet pile wall followed before the steel sheet pile wall was removed above the mud line.

With the existing structure removed, the team went to work on constructing a front-sloping stone revetment seawall that would stabilize the shoreline for many years in the future. The underwater base of the sea wall was to be sloped to break



A Topcon GTS-236W Electronic Total Station and RL-H3C Rotating Laser were used to hold and check grade during the process of placing rock in 25-foot sections. Photo credit: Topcon Positioning Systems.

the wave action and prevent erosion. First, the existing side slope was regarded, then non-woven geotextile fabric was installed to the mud line.

Installing the fabric was arguably the most difficult aspect of a project that, overall, required the team to schedule work around the tide in Jamaica Bay. "We changed our start time almost every day to accommodate the tide schedule," says Irey. "If the low tide was at 5 o'clock in the morning, we might start at 10 in the morning to catch the low tide on the way back in the afternoon—that way, we worked as much as possible without having to use portable lighting.

"To perform the rock placement, we followed the tide out and then back in again," he continues. "We divided the project in half; half of the project was in the water and half wasn't. The water level reached halfway up the slope during high tide. On the days where we couldn't work in the water, we'd work on the top of the slope. If there was a full moon, there was a lower low tide and a higher high tide, so you had to work faster."

The cross-section of the slope was 30 to 35 feet long, with a 3-foot delta. A Topcon GTS-236W Electronic Total Station and RL-H3C Rotating Laser were used to hold grade and then check the grade to make sure that the slope was not overfilled or underfilled. Berner's total station was part of Topcon's GTS-230W Series, the first electronic total stations with wireless operation that eliminates the use of a cable from the data collector to the instrument.

"We'd put two grade stakes down: one at 25 feet down and one at 15 feet down and we'd grade to them," notes Irey.

"About once every three days, we would put a guy in waders and a life vest at low tide to check the grade from the water's edge to be sure that we were meeting the intent of the design."

"At the end of the day, you're an artist and you want your work to look good. We would check the subgrade with the total station before we placed the material and then we would check it periodically before we would place the stone. About once every three days, we would put a guy in waders and a life vest at low tide to check the grade from the water's edge to be sure that we were meeting the intent of the design."

Irey recalls how difficult it was to get the fabric into place. The excavator operator weighed down the fabric with the first of three layers of rock, a bedding material. "As they were placing the fabric, the operator would have a bucket of fine crushed stone—the bedding material—to sprinkle on it to weigh it down. He was working in conjunction with the laborers as they were putting the fabric down. We worked in 25-foot sections, across the entire cross-section, since that was about the distance we could get done in a tide change."

The layer of crushed bedding material was 6 inches deep. The next layer was 3 feet thick and consisted of two layers of granite armor rock. The first layer was material with a smaller particle size to provide a base for, and fill gaps in, a second layer with a larger particle size.

The logistics of constructing the armor rock layer proved challenging as well. A very large quantity of material was required for the new revetment wall. It was delivered by barge and off-loaded at strategic locations along the seawall. A second barge unloaded the rock from the first barge using a clamshell attachment.

"Rock was barged in from a quarry just north of the city," says Irey. "The issue was that it's big rock that requires a steel truck for hauling. The likelihood of getting the quantities delivered at the time we needed it was not that great so bringing it in by barge was more manageable."

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The final stage of the project included constructing a new stormwater interceptor trench along the top of the new armor rock revetment wall, which was immediately adjacent to a 10-acre paved equipment storage yard at the MCRC facility. The stormwater interceptor trench solved another problem: the flow of stormwater across the storage yard directly to the top of the revetment. There was a concern that stormwater would eventually undermine the backside of the revetment, but the interceptor trench captures and redirects stormwater away from the revetment. The interceptor trench has a simple design consisting of a geotextile fabric-lined trench filled with No. 57 crushed stone.

By early November 2006, the revetment wall and stormwater interceptor trench were completed and the parking lot was repaved. The MCRC has a safe, stable shoreline that will provide protection that is expected to last for more than 50 years against the powerful Jamaica Bay wave action. **L&W**

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