

2020 Outstanding Pool & Recreational Project

Barges, Golf Carts and Shotcrete

By Ryan Oakes



THE ISLAND

Bald Head Island, off the southern shores of North Carolina is a 6 mi² (16 km²) island, accessed only by ferry, for guests, and by barge, for construction. It is steeped in history, playing a part in both the American Revolution and the Civil War. Feared by seamen, it is well protected by 30 mi (48 km) of shoals right off the cape into the Atlantic Ocean, known as the Frying Pan Shoals.

North Carolina is famous for its barrier islands that border the entire coastal region, giving hundreds of miles of nature preserves and island fun to its residents. Many of its islands are accessed by bridge but a few, like Bald Head, are only accessed by boat. So, when we got a call to shoot three pools at the Bald Head Island Club for Miracle Pools, a local commercial pool builder, the first thing we said was, “how on earth do we do that?”

It did not take long for us to work out a strategy for how that would go down. It seemed simple at first glance: put materials on barge; cross over to island; drop materials off; and get to work. As we learned more about the process, we quickly realized this would be no small feat.

We would be given one week to shoot all three pools, less than a week to mobilize on site and less than a month to prepare for the effort. The first thing we would need to do is estimate all materials needed for the job, so we could ship them over. Then we had to schedule all shipments on one cargo barge. “Simple enough,” we thought.

THE BARGE

As it turns out, barge trips are made by appointment, months in advance. Thankfully, working for the island itself, we were able to fit in our loads with their rigorous schedule. The Bald Head Island Transportation department is a very

professional outfit and maintains a very rigid schedule. If you are late, you lose your appointment and you do not get another. If the wind blows more than 14 knots (29 km/hr) or if the waves are rough, they close down the barge, you lose your appointment and do not get another. So, the trick it turns out, is to book a few extra trips in anticipation of failure.

We had to deliver 400 tons (360 metric tons) of sand in advance and stockpile it for protection. It did not need to be dried since we had already stockpiled it at the sand pit and covered it with tarps. Ideal moisture content for the dry-mix shotcrete process is 2% to 5% depending on aggregate, and most sand deliveries come in between 8% and 15% moisture.

Additionally, we delivered a portable cement silo, and our first of four tanker loads of cement. We staged two full tankers on the island so that we could float back to the mainland for a reload during the shoot, while having some material onsite to load into our silo. This required two road tractors, one with a blower to convey cement and one just for delivery back and forth to the mainland.

Finally, just before game day, we brought over fuel tanks, two volumetric mixer concrete trucks for batching on site, two compressor trucks (one for back up) and support vehicles. Since we were literally on an island, we also brought additional staff, like our fleet manager and mechanics, along with welding supplies and other mechanical support items. There was no way to be over prepared for this job.

THE GOLF CARTS AND BEACH HOUSES

One of the more fun aspects of the trip, was the fact that other than our equipment, vehicles were not allowed on the island, so to get to the port and back, or to the rental house and back at the end of the day, we used golf carts! One can imagine, a shotcrete crew rolling into work on golf carts...

Accommodations were great. A rental beach house was complete with all amenities. Groceries from the mainland to meet the needs of the crew and good times all around.

THE POOLS

The pools themselves were freeform and had a tight rebar schedule, anywhere from 4 in. (100 mm) on center to 6 in. (150 mm) on center with multiple curtains of reinforcing. The forming could be minimally braced on one side due to the lack of hydraulic pressure that one experiences in form-and-pour concrete construction. A curved guide bar was placed with surveying equipment on the freeform walls so that the pre-ordered coping would fit the walls we shot.

Miracle Pools had done an excellent job in setting the forms and placing the reinforcing steel which helps make for



a successful shoot. As with any type of construction, each step is essential to the success of the next step and shotcrete is no exception.

We were given only a few days to stage materials and only one week to shoot the pools. This deadline was not arbitrary and had severe consequences to the builder and club owners. There was no room for error and there was only one barge to service the entire island, so we had to walk a tightwire in our project execution. Predicting that regular winds could cause daily shutdowns on the only barge available we decided that the risk would be best mitigated by on-site batching, even though the job was smaller than one which would typically justify onsite batching. There would be no room for a wet-mix mobile batch plant so not only was a dry-mix shotcrete operation the better choice, but it also really became the only good choice.

Being a multiple day shoot for the larger pool, we benched all material on the leading edge at a 45° angle and prepped the surface for the following day's shoot. The next day we would prepare the surfaces to a saturated surface dry (SSD) condition and shot at a 90° angle to the previous

day's work. We used a blow pipe (air lance) to keep the surface free of rebound, overspray, dust and debris. This allowed us to create a monolithic watertight shell with properly prepared construction joints over a multiple day shoot.

Form-and-pour or even using wet-mix shotcrete would have been extremely difficult due to the barge times and the unpredictable nature of the barges. Our barges were shut down on more than a couple trips over, which would have been impractical if transporting fresh ready-mix concrete over. Local firms have brought ready-mix concrete to the island in the past, but on smaller scale projects and with fewer time constraints that eliminated undue stress to the contractors.

Using the dry-mix shotcrete process is advantageous to allow for starts and stops without worrying about ready-mixed material setting before shooting. Here, that ability to hit the pause button seemed not only essential but took one more stressor out of the equation.

In conclusion, we only had a few days to stage everything, and one week to do the job. So, with hundreds of phone calls, to over 50 different people, within 10 different organizations, carrying over 60 vehicle trips on 30 barge runs a mile (1.6 km) across the water, we were able to send our crew to a remote barrier island and shoot over 300 yd³ (230 m³) and create three beautiful swimming pools.

2020 OUTSTANDING POOL & RECREATIONAL PROJECT

Project Name
Barges Golf Carts and Shotcrete

Location
Bald Head Island, NC, USA

Shotcrete Contractor
Revolution Gunite*

Architect/Engineer & General Contractor
Miracle Pools

Materials Supplier
Roanoke Cement

Equipment Manufacturer
Gunite Supply & Equipment Company*

Project Owner
Bald Head Island Club

*ASA Sustaining Corporate or Corporate Member



Ryan Oakes is a Professional Watershape Designer and President of Clearwater Construction Group, Inc., Revolution Gunite, and Revolution Pool Finishes, all of which are award-winning firms in their respective trade. Oakes is a faculty member at Watershape University, where he continually aims to raise the bar in the swimming pool and

the watershape construction industry. As a member of the leadership team for the International Watershape Institute (IWI) and through educational outreach to a vast pool builder network throughout the United States, he aims to improve the building techniques and methods of constructing swimming pools. Oakes is a member of ACI Committee 506, Shotcreting, and ACI Subcommittee 506-H, Shotcreting Pools. He serves on the ASA Board of Directors and also serves as Vice Chair of both the ASA Pool & Recreational Shotcrete Committee and the ASA Contractor Qualification Committee.