2016 Outstanding Pool & Recreational Project

Coveleigh Club Pool Construction

By Mason Guarino

The swimming pools in this country are aging, whether it is because of outdated shapes, changes in desired use, or a deteriorating finish or pool shell. This makes the pool renovation industry a big one. Some owners just want a new finish installed to make the pool look new. Other owners want an entirely new pool. Lately, it has become commonplace for country clubs, beach clubs, and yacht clubs to want to upgrade their aging facilities, including their swimming pools. Sometimes this is accomplished by simply adding a set of steps or two, but for the Coveleigh Club in Rye, NY, it meant completely ripping out their old pool and replacing it with a bigger, newer, more efficient pool. Before South Shore Gunite Pools & Spas, Inc. (SSG), was involved, the Club, along with a team of swimming pool and construction professionals, teamed up to make this dream a reality.

The design process for the replacement swimming pool portion of the project was extensive. This involved building a pool that had a water surface area of 7700 ft^2 (715 m^2) with a maximum depth of 13 ft (4 m) located approximately 40 ft (12 m) from the Atlantic Ocean. The design team had to figure out the best way to put a pool of this size in this location that had a constant and difficult water condition. A major concern to the design team was how to keep the pool in place when the pool was empty and the ocean tide was high. In these situations, a normal pool can float out of the ground and cause severe structural damage. The designers, with the help of Bill Drakeley as their special inspector/sprayed applications consultant, came up with the idea to anchor a monolithic pool structure to the earth with a system that consisted of driven piles, grade beams, and a monolithic pool structure all tied together with concrete and reinforcement. With the monolithic pool structure requirement, the design team decided that shotcrete would be their concrete placement method of choice for the swimming pool structure.

Fig. 1: Grade beams installed and under-pool piping being installed between grade beams

After design was complete, it was time to move onto construction. At this point, however, it was getting late in 2014. The build team did some research and called around to get information on which swimming pool builders were capable of building a pool this size with the complications that go along with building a pool next to the ocean in the winter and do it correctly. The team ended up deciding in August 2014 that they wanted SSG to build their new pool. In their research, they found that no other pool builder in their area met the criteria they were looking for. With a desired start date in September 2014, the build team asked SSG if they could begin the project. Unfortunately, that late in 2014, there was not room in SSG's construction schedule to complete the project in time for an opening on Memorial Day 2015. Thus, the Coveleigh Club's build team decided to put the construction on hold for 1 year so SSG would be available to build their pool.

Construction started when the club's pool was closed for the winter in September 2015. First, the existing pool and adjacent area were demolished and the excavation brought down to as much as 6 ft (1.8 m) below finish pool floor elevation to install the piles and grade beams. Working on a constantly wet and mucky site in the winter makes everything move slowly. The pool construction team was not able to start anything until December 2015, just in time for winter. The somewhat mild winter helped with the construction process, but it was still cold. Throughout the majority of the construction of the pool structure, the nights were below freezing with the occasional day where it might have reached 50°F (10°C) for 5 minutes in the afternoon but for the most part we were working in below-freezing weather.

Under-pool piping was installed, which included a maze of schedule 80 polyvinyl chloride (PVC) pipes ranging from 2 in. (50 mm) for the returns up to 12 in. (300 mm) for the main drains. The plumbing had to be coordinated to fit in and through the grade beam system that supports the pool structure from settling or floating.

Setting the formwork followed the installation of the grade beams, PVC piping, and final stone grade. Forms consisted of 2 x 4 in. (51 x 102 mm) and 1 x 3 in. (25 x 76 mm) lumber, strapping, and stay-in-place expanded steel mesh. The 2 x 4 in. (51 x 102 mm) pieces were used for the main supports, with the smaller 1 x 3 in. (25 x 76 mm) lumber used to tie the 2 x 4 in. (51 x 102 mm) pieces together and support the steel mesh. This forming system is pretty minimal, as it only needs to support the impact of the shotcrete from the nozzle and help keep the walls upright. It consists of far less material and erection time than forms that would support the weight of fluid concrete. After the shotcrete cures, the lumber is stripped and the stay-in-place steel mesh remains on the back side of the wall that will be backfilled.

After the forms came time for installation of the reinforcing bars. While on 99% of SSG jobs installation of all reinforcement is completed in-house, this job was a little different. This pool contained 50 tons (45 metric tons) of reinforcing bar ranging from No. 4 to No. 7 (No. 10M to No. 12M), all arranged in double mats in the walls and floors. The decision was made to subcontract this job to Merkel Rebar from Pennsylvania, as they had the capability to install all this reinforcing bar in under 3 weeks. A 12-person crew installed the reinforcing bar, including the Merkel

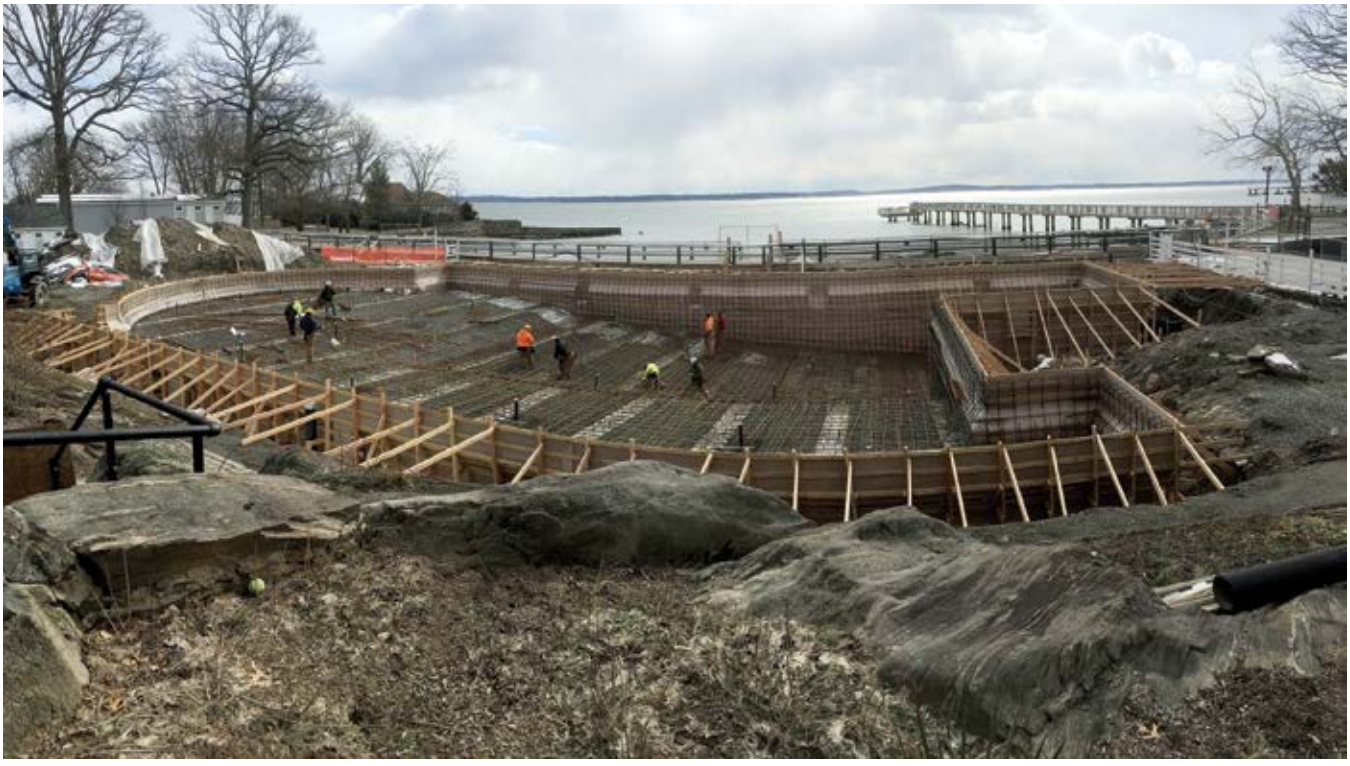

Fig. 2: 50 tons (45 metric tons) of reinforcing bar being installed

Rebar team and a few SSG employees to provide equipment support for Merkel and some supervision.

With a Memorial Day completion date, SSG did not have the luxury of waiting for good weather to be able to start the shotcrete process. Shotcrete work took place from February 22 through March 4, 2016—a cold time of year in New York. The shotcrete portion of the project was estimated to require approximately 550 yd^3 (420 m^3) of shotcrete because both the floor and walls were to be shotcreted. The 7700 ft^2 (715 m^3) floor had many different breaks and shapes in the floor, so it was decided that shotcrete would be the best way to create a monolithic floor. It would have been very difficult to cast over 300 yd^3 (230 m^3) of concrete with all the contours of the floor in one continuous pour. SSG decided to mobilize their on-site batching equipment for the job. The on-site batching is the first choice for SSG because it allows us to stop and start as needed without worrying about concrete trucks backing up. It also makes it a lot easier to shoot large amounts of material in regular working days without the downtime of concrete trucks switching out or being late.

When SSG is shooting pool walls along with pool floors, there is a strict rule of no stepping in the concrete once placed. Once concrete has been placed, it should be allowed to reach final set without any excessive vibration. Additionally, at SSG, cuttings or rebound are never allowed to fall to an area that has exposed reinforcement. To shoot this pool, they began shooting 4 ft (1.2 m) wide strips approximately 3 ft (0.9 m) off of the walls. They then placed more 4 ft (1.2 m) wide strips approximately 10 ft (3 m) apart from one another. These 4 ft (1.2 m) wide strips are easy to finish by hand, along with allowing them to roughen the edge surface to create good joints. The open 10 ft (3 m) wide strips are then filled in later in the process.

With the use of a spinning screed, it typically only takes three to four workers to shoot and finish these areas. The simplicity of the spinning screed allows relatively inexperienced laborers to work with the nozzlemen and place a good section of floor while the more experienced finishers are finishing the section of wall that was just shot. After shooting the 4 ft (1.2 m) wide strips, they then shot the coves and up the walls, essentially jumping back and forth between the floors, cove, and walls based on which sections were ready for more material. The pool floor ranged from 10 to 24 in. (250 to 610 mm) thick and the walls were all approximately 14 in. (350 mm) thick.

SSG had two wet-mix ACI Certified Nozzlemen and two dry-mix certified nozzlemen on site. The wet-mix process was chosen because of the overall quantity and section thickness of shotcrete required. SSG chooses wet-mix for most commercial pool applications because it allows faster material placement than the dry-mix process. While the dry-mix certified nozzlemen are less familiar with the details of wet-mix placement, they were still helpful to have on the team. With the amount of reinforcing bar in this pool, the ACI Certified Nozzlemens' knowledge was truly tested. Shooting through two mats of No. 7 (No. 22M) bar certainly requires the skill of a highly trained nozzlemen with classroom education and field experience as well as requiring a highly skilled blow pipe operator. With the quantity and sizes of the reinforcing bar, SSG chose to use non-contact lap splices in the reinforcement on this project. The team used a broom finish on the floor and a cut finish on the walls that would later accept a combination of tile and marcite plaster finishes.

Because the business is located in the Northeast, SSG is very familiar with handling cold weather shotcrete projects and was fully equipped for this one. Part of the mobilization

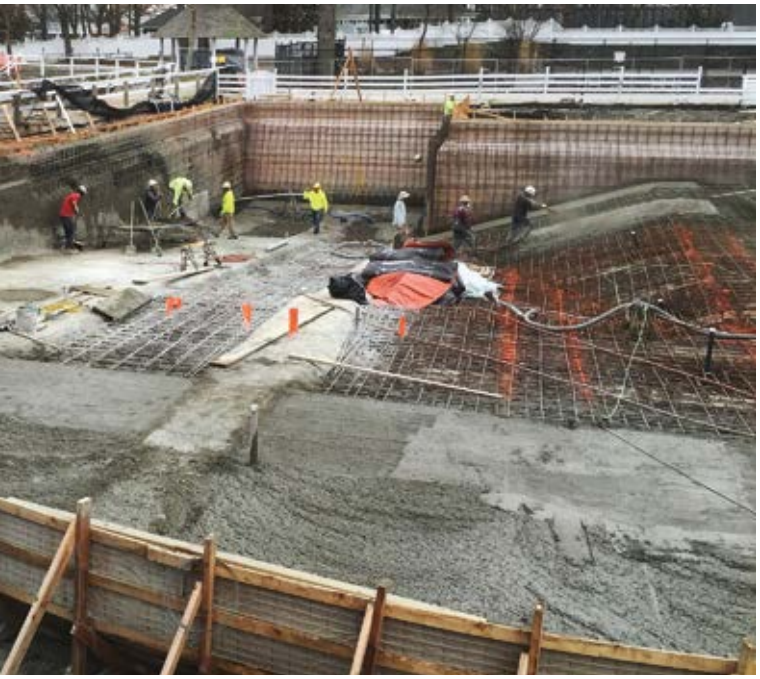

Fig. 3: Shotcrete installation—4 ft (1.2 m) wide strips being installed and the 10 ft (3 m) wide openings to be filled in later

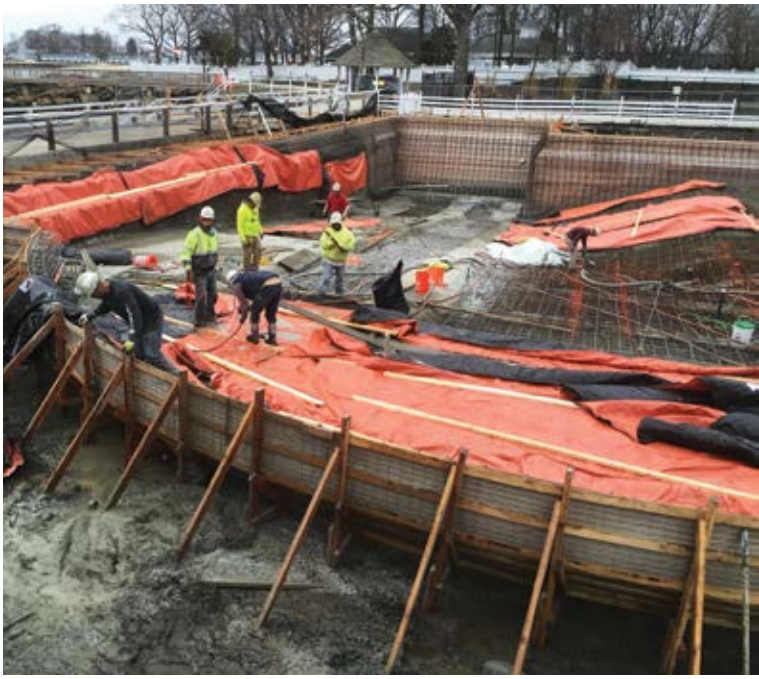

Fig. 4: Covering with thermal blankets to protect from freezing

process included bringing an excavator to the site to charge the batch plant with sand and stone. This excavator was towed with a tri-axle dump truck also loaded with thermal insulation blankets for the job. Raw materials were delivered to the site in dump trucks where truck exhaust passed through the body to keep the sand and stone from freezing along their over-60-minute trip to the site. The material was delivered free of frozen materials and then kept from freezing with more thermal blankets while on site. SSG limited material deliveries to reduce or eliminate the amount of material that had to be kept warm overnight, if there was any left over at the end of the day.

It is common practice to start using jobsite hot water heaters once the cold weather sets in, but on this job, they got lucky and there was a hot water spigot on the side of the building that they were allowed to use. The weather was accommodated by washing everything down with hot water and then covering in the sections to be shot with thermal blankets. With this process, SSG was able to keep the substrate above 40°F (4°C) before shooting began. The non-frozen raw materials were mixed together with 120°F (49°C) water and pumped down 100 ft (30 m) of 2.5 in. (63 mm) slick line to 60 ft (18 m) of 2.5 in. (63 mm) concrete hose to another 100 ft (30 m) of 2 in. (50 mm) concrete hose.

At the end of every day, all the shotcrete placed that day was covered in thermal blankets, along with what was planned to shoot for the following days. In addition to the cold, they also had to deal with adjacent Atlantic Ocean creating problems with a brackish ground water on the site. Many submersible pumps were running continuously throughout the project to keep the ground water levels down. Every day before shooting in the deep end, all the reinforcing bar had to be thoroughly cleaned with pressure washers to get the residual salt coating off them.

They shot all 550 yd^3 (420 m^3) of the project in 8 shooting days. On one day, over 120 yd^3 (92 m^3) was installed in one shift, which was exciting considering they were not allowed to start our equipment until 7:30 a.m. and needed to stop shooting by 4:00 p.m. to allow enough time to finish, clean up, and cover everything before it got too dark. Light towers were used to help with the final finishing and cleanup, but they try not to shoot under the lights unless it is truly necessary as, by that time, the crew starts to get fatigued and the shadowing makes it a bit more difficult. The equipment for this project included a Cemen Tech portable batch truck, Cemen Tech portable cement silo, a Western Shotcrete Warrior 3050HP shotcrete pump, a CAT 315 excavator, and Gunite Supply shotcrete finishing tools.

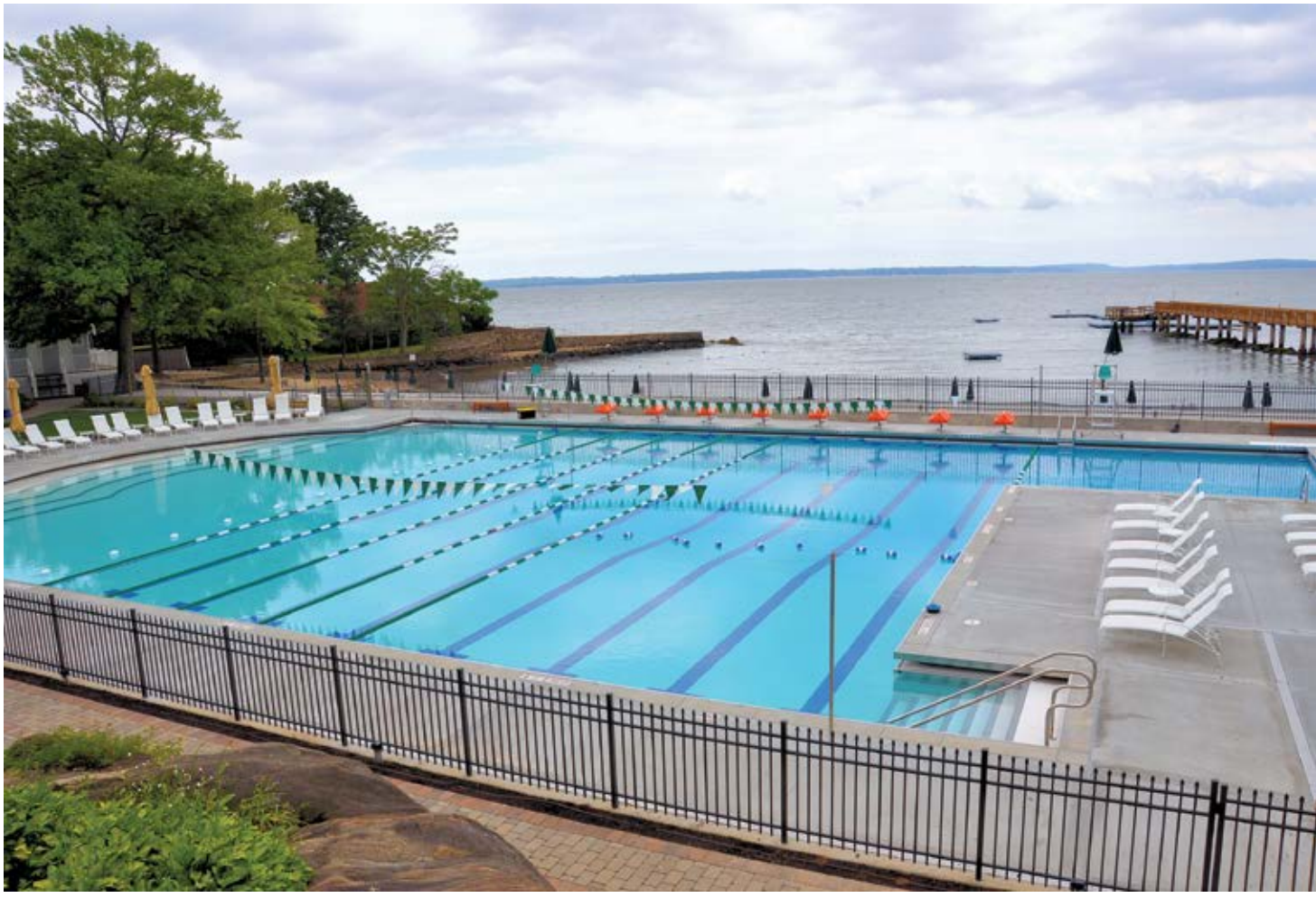

Fig. 5: Completed pool

The pool was finished on time for their opening weekend. A lot goes into swimming pool construction—more than most know. Many of the pools require tolerances of ±1/16 in. (1.5 mm) due to swimming competition regulations. The plumbing system on this pool circulates 1000 gal./min (3800 L/min) with a 25 hp pump just to keep the water clean. The pool also has automated heating, chemical control, and circulation. Some owners find it imperative that their projects are completed on time. Recognizing that, they are willing to spend a little more on the company that has never had a problem meeting a project deadline.

Mason Guarino *started in the pool industry when he was 14, learning how to install reinforcing bar. Since then, he has worked on all phases of swimming pool construction. Guarino has been with South Shore Gunite Pools & Spas, Inc., full-time since graduating from the Wentworth Institute of Technology with his BS in construction management in 2009. Guarino currently serves on ASA's Board of Direction and is an ACI Certified Nozzleman.*

2016 OUTSTANDING POOL & RECREATIONAL PROJECT

Project Name
Coveleigh Club New Pool

Project Location
Rye, NY

Shotcrete Contractor
South Shore Gunite Pools & Spas, Inc.*

General Contractor
DHI Construction Services

Architect/Engineer
Gary Spilatro, Architect

Material Supplier/Manufacturer
Cemen Tech Inc.,*
Western Shotcrete Equipment Inc.,*
Lafarge Holcim*

Project Owner
Coveleigh Club

*Corporate Member of the American Shotcrete Association