

## 2017 Honorable Mention

# Surf Ranch 2.0

By Paul Mendoza

In 2017, Kelly Slater Wave Company set out to accomplish the impossible feat of creating the perfect wave in the middle of the agricultural San Joaquin Valley of California, 100 miles (160 km) away from the ocean. While artificial waves have existed since the 1960s, they have failed to create the hollow “barrel” required for surfing inside a wave curl due to their inability to mimic the size and power of natural waves.

Slater debuted this first-time feat in December 2015, and it was immediately named as a game changer for the world of surfing. The wave that is formed in the pool is 1200 ft (370 m) long and goes in two directions to form both a right-hand and a left-hand wave. High-performance surfing could now happen in landlocked areas and inside stadiums. Surf Ranch project was the first time Kelly Slater Wave Co. set forth to create a competition-worthy wave facility in the United States. The project team was held to a tight schedule to allow for the inaugural Future Classic surf competition

(unofficially known as the “Test”) to be held at that facility in September 2017. This would be the first wave pool contest run by the World Surf League (WSL), considered by WSL to be “a milestone moment for professional surfing.” Shotcrete was an ideal choice for the walls as it easily accommodated the demanding schedule, with production shooting beginning in May 2017 and all operations completed by the end of July 2017.

Shotcrete was used to shoot the 8 and 10 in. (200 and 250 mm) thick perimeter walls and some of the slopes in the 2250 ft (685 m) long x 235 ft (72 m) wide wave pool (Fig. 1). Concrete North, Inc., poured in place the floor and transitions. The walls were shot in alternating panels to allow for 1 in. (25 mm) sponge rubber expansion joints to be set. Nationwide Shotcrete Inc. (NSI) shot some of the slopes integral with the wall, while the rest of the slope was cast by Concrete North, Inc., prior to the shotcrete walls being placed.

There were two engineering teams: KPFF designed the north, west, and south walls, while Hilts Consulting Group designed the east walls. The east walls were 8 in. (200 mm) thick with a single curtain of No. 6 (No. 19M) bars at 6 in. (150 mm) spacing vertically and No. 4 (No. 13M) bars at 12 in. (300 mm) spacing horizontally. The typical walls for the KPFF portion were 10 in. (250 mm) thick double-curtain No. 4 (No. 13M) bars at 12 in. (300 mm) spacing horizontally with the front curtain of reinforcing bar using No. 6 (No. 19M) bars at 8 in. (200 mm) spacing vertically and the back curtain using No. 4 (No. 13M) bars at 12 in. (300 mm) spacing vertically. Preconstruction test panels (Fig. 2) were



Fig. 1: Reinforcing bar and formwork prior to shooting condition at south wall, where wall and slope were shot monolithically



Fig. 2: Preconstruction test panel for cores approving nozzle men for project

(Photo courtesy of Technicon Engineering Services)



Fig. 3: Completed north wall

shot for evaluation by both engineers and the NSI nozzle-men were found qualified to shoot on the project.

CEMEX was selected to be the ready mix supplier for the shotcrete work. They supplied an eight-bag, 4500 psi (30 MPa) mixture with 3/8 in. (10 mm) pea gravel,  $2 \pm 1$  in. ( $50 \pm 25$  mm) slump, and  $5 \pm 1.5\%$  air entrainment. The plant was less than 2.5 miles (4 km) away from the project site, and this ensured timely delivery of ready mix concrete to the project site.

The use of shotcrete on this project helped eliminate much of the formwork that would have been required were the walls formed and poured using conventional means. This helped reduce prep time required to setup for the shotcrete placement. Using shotcrete, the forms could be stripped as soon as the following day, allowing for efficient reuse of the forms by rotating them along the walls as the shoot progressed. After shooting, the rebound was collected and delivered to a local concrete recycling site.

The wave pool construction ran on time and was ready (Fig. 3) for the secret-but-rumored competition to take place. The 300 competition invitees were reported to have had a great time experiencing the man-made wave (Fig. 4). After surfing the wave, Filipe Toledo was quoted as saying “It’s perfect. It’s that wave that we dream about...” and the WSL announced in November 2017 that Surf Ranch will serve as a new stop for the Championship Tour. The WSL commissioner said the technology will change the competitive experience by allowing for waves at any location in the world. The idea of using artificial wave pools for including the sport in Olympic events has been considered when the games take place in inland areas. Nationwide Shotcrete is proud to have taken part in the production of Kelly Slater Wave Company’s Surf Ranch competition facility.



Fig. 4: The “Test”

## 2017 HONORABLE MENTION

*Project Name*  
**Surf Ranch 2.0**

*Project Location*  
**Lemore, CA**

*Shotcrete Contractor*  
**Nationwide Shotcrete, Inc.\***

*General Contractor*  
**DPR/Concrete North**

*Architect/Engineer*  
**KPFF Consulting Engineers/Hilts Consulting Group**

*Material Supplier/Manufacturer*  
**Cemex**

*Equipment Manufacturer*  
**Western Shotcrete Equipment**

\*Corporate Member of the American Shotcrete Association



**Paul Mendoza** is an Estimator/Project Manager at Nationwide Shotcrete. He has 10 years of experience in the shotcrete industry, working for shotcrete and concrete contractors in California. He is licensed as an Engineer-In-Training in the State of California.