2018 Outstanding Pool & Recreational Project

Making Concrete Waves at Frisco's Northeast Community Skatepark

By Jamie Curtis and Yann Curtis

The Northeast Community Skatepark in Frisco, TX, is a destination-scale, all-wheeled sports facility catering to skateboards, bikes, inline skates, and scooters (Fig. 1). The city's 75 acre (30 ha), $16 million project for phase one includes the skate park, concession and storage buildings, restroom facilities, a pond, new trails, and sports fields. As of writing this article, the 47,000 ft^2 (13,656 m^2) skatepark is the second largest facility of its kind in Texas and one of the largest in the United States as a whole. Newline Skateparks, Canada, designed the facility. SPA Skateparks, Austin, TX, was selected as the turnkey skatepark construction contractor.

SHOTCRETE SCOPE

As is commonplace within the world of skateboard park construction, the project called for the wet-mix shotcrete process. Shotcrete is the most controlled and productive method to achieve the intricate, close tolerance shapes required of the skateboarding surface. Incorporated into the skatepark is approximately 850 yd^3 (650 m^3) of wet-mix

Fig. 1: Over 1 acre (0.4 ha) of skateboarding paradise at the City of Frisco's Northeast Community Skatepark

shotcrete work, accounting for roughly half of the 1800 total yd^3 (1376 m^3) of concrete placed. Shotcrete placement was continuous throughout the entire 9-month project duration and includes features such as banks, quarter pipes, skateable art, and other transitional elements.

As with all modern skateparks, the concrete is the final riding surface. Skateboard wheels are typically between 1.9 and 2.6 in. (50 and 65 mm) in diameter. Transitional skateboarding elements commonly have radii between 3 and 11 ft (1 and 3 m). Therefore, the utmost detail must be taken at all times during shotcrete operations to achieve the tightest of tolerances. Smaller-quantity, more controllable shotcrete "shoots" allow our specialized crews to focus each day on quality, shaping, and implementation of a Class A steel-trowelled finish. Placement of shotcrete in layers eliminates sloughing of the concrete and enhanced our control of tolerances.

A hot and cold weather protection and curing plan was implemented to mitigate any negative effects from the extreme Texas weather. Sun and wind-block structures helped minimize surface moisture evaporation and excessive water loss during placement. In the Texas heat, hydration curing blankets help keep the concrete surface cooler and enhance hydration by keeping moisture in. These blankets can be a costly addition to a project but greatly improve the surface quality and reduce potential shrinkage cracking. A detailed jointing plan aims to cut the concrete very soon after initial set (while still "green") to provide proper stress relief from the onset. Daily toolbox talks, preplacement checklists, weekly site inspections, and safety meetings ensure safe practice efforts and production goals are always top of mind.

SHOTCRETE MIXTURE DESIGN

Before construction, the shotcrete contractor and ready mixed concrete supplier developed a construction-friendly shotcrete mixture design that easily exceeded the 4000 psi (27.6 MPa) 28-day compressive strength requirement and other performance-based specifications. A 15% fly ash replacement of portland cement was used in the mixture design. Using fly ash is preferred over a cement-only mixture, as it creates a denser crystalline structure and ultimately a more durable product. Fly ash also helps improve concrete pumpability and finishability. The shotcrete mixture includes several industry-leading admixtures. Microfibrillated polypropylene fibers supplement the plastic shrinkage reduction efforts and also enhance resistance to impact and surface abrasion. A water-reducing admixture limits excessive free water while achieving proper slump and maintaining a water-cementitious materials ratio (*w/cm*) ratio of 0.35 to 0.45. A shrinkage-reducing admixture helps control drying shrinkage reduce shrinkage cracking. Finally, a hydration control product added during the warmer months, both at the plant and dosed as-needed on site, provided the crew additional time in the field for proper placement and finishing. Collectively, these admixtures provide substantial control over concrete quality, usability, set time, and slump. Aesthetics play a major role in any successful skatepark project. Concrete coloring was added to the concrete truck while on site. Integral color pigment was chosen over other decorative concrete techniques because of its durability and visual consistency. This step adds considerably to the shotcrete process and is yet another on-site task prior to placement. On-site dosing and proper mixing takes time and affects the slump. Jointing and color matching need to be taken into consideration in preshoot discussions and concrete truck ordering/scheduling.

SKATEPARK TERRAIN

The overall layout can be summarized in three main areas. First, an urban-inspired plaza area runs the entire length of the project and includes skate features such as granite capped ledges, custom metal ledge frames, stairs, banks, and hips. The second main area is an expansive, multi-depth flow bowl (Fig. 2). The bowl includes a notable 6 ft (1.8 m) tall vertical extension above the coping, a central pump bump used to maintain speed, two roll-in hips, a custom fabricated metal barrier, and an over-vertical capsule that is 15.5 ft (4.7 m) tall. Finally, a replica swimming pool has radii with vertical sections at the top and range in depth between 7 and 10 ft (2 and 3 m) (Fig. 3). It is accentuated with ceramic tile detailing and concrete pool coping. This pool feature is used

Fig. 2: Flow bowl section with speed and direction control features on the floor. A 6 ft (1.8 m) tall wall extends above the coping line

Fig. 3: Proper shotcrete preparation, crew positioning, and concrete placement. An initial layer placed early in the project assures protection of the compacted subgrade from damage due to adverse weather

during a normal day of use for all ages as well as a qualified site for professional-caliber contests. Standing out from the rest are several features that put Frisco's first skatepark on the wish list for skateboarders in the region.

Concrete Wave

A 14 ft (4 m) tall over-vertical, cantilevered "concrete wave" feature serves as a turnaround skate element where users can change direction while keeping their speed (Fig. 4). This feature required the expertise of a structural engineer to calculate concrete thickness, reinforcement configuration, and the design of a substantial concrete footing for support. The footing was cast and vibrated to ensure a structurally sound foundation structure. A few days later, the surface was roughened and brought to a saturated surface-dry condition. Bench shooting the wave in layers of uniform thickness eliminated any potential for sloughing of the concrete during placement.

Over-Vertical Capsule

A multi-depth "flow bowl" is highlighted with a 15.5 ft (4.7 m) tall over-vertical capsule (Fig. 5). The construction of the capsule included steel stucco lathe placed between the two curtains of reinforcement bar. The stucco lathe enabled the shotcrete to encapsulate each individual curtain of reinforcement while shooting from both outside and inside the capsule (Fig. 6). This process eliminated the need for any traditional formwork.

Fig. 4: Over-vertical, cantilevered concrete wave feature in foreground

Fig. 5: Second (final) concrete layer with Class A steel-trowelled finish. Over-vertical concrete capsule protected from overspray

Fig. 6: ACI Certified Nozzleman and blow pipe operator. Stucco lathe placed between reinforcement curtains. Shotcrete pump and equipment in background

Tombstone Extension

Another standout piece within the flow bowl is a 14 ft (4 m) tall "tombstone" (Fig. 7). This extension increases the height of the bowl above the coping line and is designed for more advanced riders. Again, vertical bench shooting in layers proved advantageous in preventing sloughing due to the weight of concrete during placement.

OPEN TO THE PUBLIC

After a year of public use, the City of Frisco's first skatepark has quickly become one of its most cherished park facilities (Fig. 8). The Texas Recreation and Parks Society (TRAPS) presented the project with the coveted Park Design Excellence Award during its 2018 North Region Annual Conference. The future of skateboarding and associated facilities is bright. Skateboarding will now be in the Summer Olympics, starting in Tokyo 2020. The sport's popularity and continued establishment has sparked a trend for cities to develop skate-friendly master plans. It is our company's obligation to provide owners and fellow skatepark users the most advanced construction techniques and products available. Shotcrete's role in our daily operations is truly vital in the development of these successful projects.

Fig. 7: Final shaping of transitional surface with pole tools

Fig. 8: City of Frisco's Northeast Community Skate Park in proximity to residential areas and complimentary park amenities

2018 OUTSTANDING POOL & RECREATIONAL PROJECT

Project Name
City of Frisco Texas Northeast Community Skate Park

Project Location
Frisco, TX

Shotcrete Contractor
SPA Skateparks

Architect/Engineer
New Line Skateparks*

Material Supplier/Manufacturer
Redi-Mix Concrete

Equipment Manufacturer
Putzmeister*

General Contractor
CORE Construction

Project Owner
City of Frisco

*Corporate Member of the American Shotcrete Association

Jamie Curtis *is President of SPA Skateparks, a design-build firm of custom concrete skateparks for municipalities. Curtis serves as Senior Estimator and leads construction operations. Curtis is an ACI Certified Nozzleman and has been placing shotcrete for over 10 years. Curtis is also a Principal of Curtis Concrete Pumping (CCP), a related entity focusing on shotcrete placement for the commercial and public markets in Texas and the surrounding region.*

Yann Curtis*, Vice President of SPA Skateparks, leads business development efforts and serves as Project Manager during design and preconstruction phases of development. As Vice President of CCP, Curtis frequently educates engineers, contractors, and project owners on shotcrete placement. Curtis is an ACI Certified Nozzleman who places a priority on being active in the field during technical projects.*