

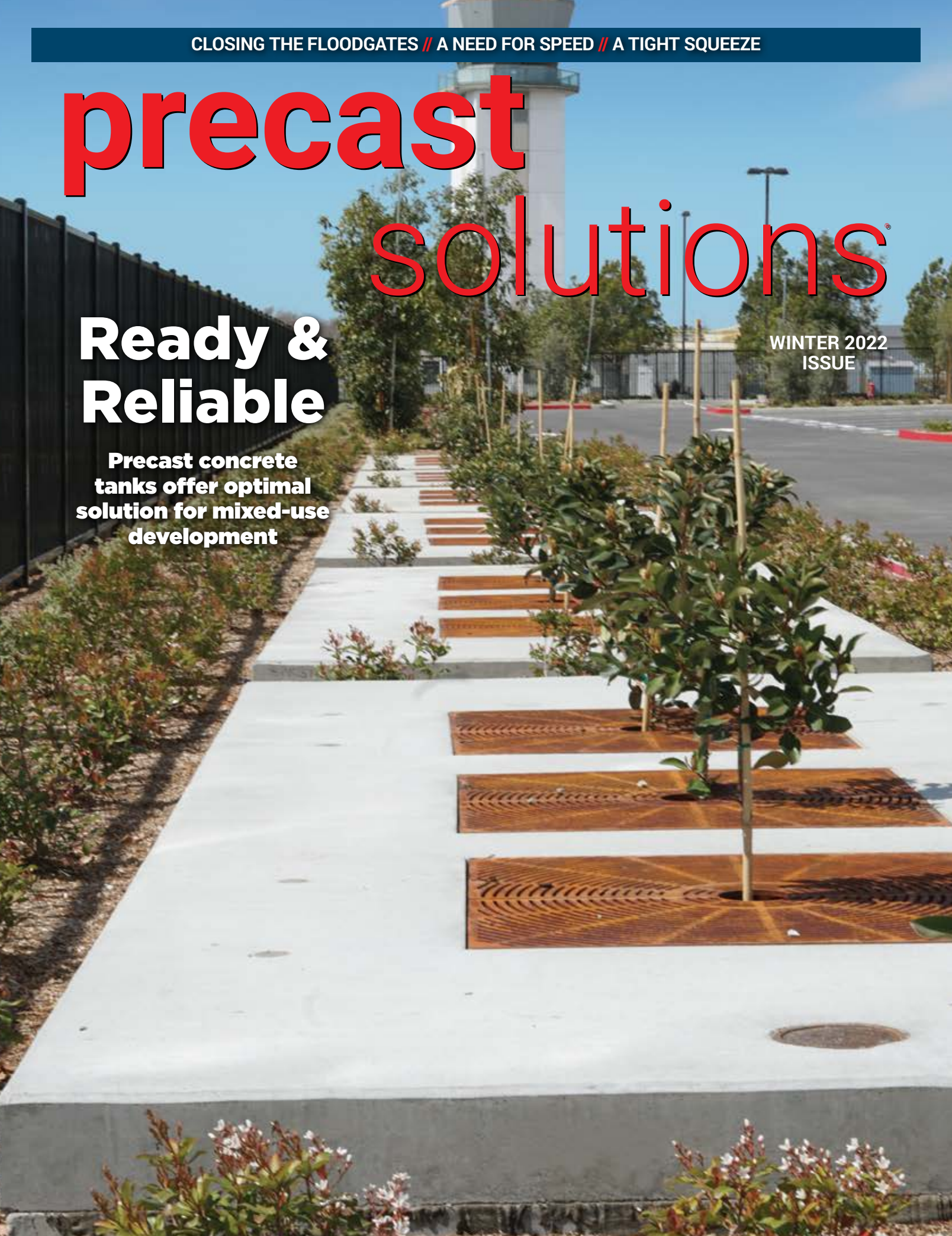
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Tight Squeeze

Single-structure precast lift stations make for a small footprint and a super quick installation for the city of Sedona.

By Shari Held

Photos provided by Oldcastle Infrastructure

Sedona, Ariz., is without a doubt one of the most beautiful cities in the United States. Three million visitors flock to the Verde Valley in the heart of the Sonoran Desert each year to enjoy the incredible scenic views, nearly 2 million acres of Red Rock Country, national forests and spiritual vortex meditation sites.

Sedona is situated at the bottom of the Verde Valley, while the Sedona Wastewater Treatment Facility and Wetlands Preserve is at a much higher elevation. That means the majority of Sedona's wastewater must run through a series of pump stations before it reaches the wastewater treatment plant, five miles outside the city limits.

"We have major hills that we have to overcome to get wastewater from one side of town to the next and then eventually out to our treatment plant," said Roxanne Holland, P.E., director of wastewater for Sedona.

When Sedona's 2017 Wastewater Master Plan Update indicated two of the city's 17 lift stations – Mystic Hills and Chapel – were aging and inadequate, it was cause for concern. The existing lift stations were two-structure stations with precast wet wells and a T-Lock lining system.

"Both of them needed to be upsized," Holland said. "We didn't have adequate capacity. And any time you don't have adequate capacity, you want to increase that in a fairly quick timeframe."

The city's goal for the replacement project was two-fold: increasing pump capacity while decreasing the lift stations' footprints to ensure quick and efficient installation.

THE PERFECT SOLUTION

The biggest challenge with the project was lack of space. Both lift stations were in areas of hard bedrock. This had the potential to make the excavation process more difficult and time-consuming. At one point, the city even considered acquiring additional land to accommodate the building of new lift stations, but that wasn't an ideal solution.

Precast was the preferred building material to expedite the project. A cast-in-place pump station would require onsite forming, concrete placement and curing time, which could increase the overall job costs. Another benefit that precast's fast installation provided was that it helped avoid excessive bypass pumping costs and lift station downtime during the installation process.

Ultimately, Sedona determined the best method moving forward would be to install two OneLift™ pump stations, manufactured in Chandler, Ariz., by Atlanta, Ga.-based Oldcastle Infrastructure, formerly Oldcastle Precast. Oldcastle Infrastructure houses all the company's precast, stormwater, enclosure and building accessory products.

OneLift's integral pump station is a single-structure lift station with a monolithic valve vault built into the often unused top portion of the wet well. This design reduces conventional pump station footprints up to 50% compared to conventional two-structure pump stations. The maximum footprint (with collar) is 8 feet by 13 feet, 10 inches.

"We needed something that would allow us to take the old lift station out and put the new one in, in one day, so we would

minimize bypass time,” Holland said. “We considered several ideas, but this just seemed like the most efficient way to get the project done.”

DESIGN AND MANUFACTURING

The design for each pump station was different. The Mystic Hill pump station required a smaller footprint that would allow it to accommodate the construction of an adjoining masonry wall.

The specifications required the wet wells to be manufactured using self-consolidating concrete and to have a 28-day compressive strength of 5,000 psi.

The integral RC 611 pump station is 6 feet long and 11 feet wide, with a capacity of 468 gallons per vertical foot. The Mystic Hill pump station measures 15 feet, 10 inches in depth. The Chapel pump station is two feet deeper. The base, the heaviest pick weight, weighs 17 tons.

“This lift station came as a package,” Holland said. “Everything was all set. We didn’t have to spec out each item independently.”

Pumps, piping (from 2 to 6 inches in diameter), valving, wiring and controls – all the interior equipment – were tested at the plant. The pump station was pre-assembled at the plant and then partially disassembled prior to shipping.

The pump stations were loaded on flatbed trucks for the 140-mile trip from Oldcastle’s Chandler plant to the city.

EXCAVATION AND INSTALLATION

In 2018, excavation and construction began at the Mystic Hills lift station. Both stations required excavation into rock to reach the required depth for installation. OneLift’s larger-volume wet well helped reduce the depth needed. Reducing the time for an open excavation made the job site safer.

Unfortunately, unforeseen site conditions necessitated the Mystic Hills lift station to be kept online while a new hole was excavated to house the replacement precast wet well. The crew encountered a significant amount of bedrock, increasing the installation timeline. It took approximately 160 days from the beginning of excavation to the setting of the precast wet well.

The installation of the precast wet well took only one day thanks to the straightforward installation process. First, a crane placed the base section into the excavated area, then the additional sections were set, grouted and sealed. Next, the crane set the long discharge pipes and pump guide rails into place in the station. Finally, any loose piping, valves and specialized components that were disassembled at the factory were assembled. Within hours, the pump station was installed and ready to be backfilled.



At the Chapel lift station, the new precast wet well was installed in the existing location. Demolition of the old wet well and installation of the new wet well took only approximately 70 days at this site. Again, the setting of the precast wet well took only one day.

“OneLift’s prepackaged and pre-plumbed features made my job as project manager much easier,” said Michael Thomas with Flagstaff, Ariz.-based Kinney Construction Services, the general contractor for the project. “We were able to install the product in one day, and it required only minimal pipe and electrical work on-site, making it easily compatible with project specifications.”

Since each lift station was installed in one day, everyone involved in the installation (electricians, civil engineering crew, etc.) had to be on-site and ready to perform.

“One of the biggest challenges was coordinating all the different construction specialties,” Holland said.

A WINNING SOLUTION

OneLift pump stations integrated seamlessly into Sedona’s existing infrastructure with minimal disruption to neighboring properties. Less on-site excavation was necessary, reducing overall project costs and the project timeframe, which was 14 months from start to finish. And even though the new pump stations were smaller than the two-structure lift stations they replaced, they provided increased capacity.

“This project was unique because we did have minimal bypass time and we were able to take out an old lift station and put a new one online fairly quickly,” Holland said. “We now have adequate capacity at both of those lift stations. With new equipment, everything runs better and there’s less maintenance.” **PS**

Shari Held is an Indianapolis-based freelance writer who has covered the construction industry for more than 10 years.