

FROM DESERT PLAINS



New Mexico city completes historic river rehab using retaining wall system

Like many growing cities, Santa Fe, N.M., has faced significant storm water problems. As the population has grown, runoff has increased, eroding the Santa Fe River bed and causing it to drop nearly 15 ft in some areas, and threatening adjacent homes and infrastructure with the collapse of the river channel.

The city wanted to improve this threatened river corridor to protect homes and businesses as well as create a multiuse pathway that runs along the river. To get started, it brought in Weston Solutions, an environmental services group.

“The Santa Fe River could be more accurately characterized as an arroyo

[dry wash] for most of the year, with a bed composed largely of alluvial decomposed granite, cobbles, silt and urban detritus,” said Robert Oberdorfer, who was senior landscape architect for Weston Solutions at the time of the project. “During spring runoff and monsoon season, however, the river can become a roiling torrent, leaving debris in its wake and deep scars in the riverbed.”

In 2007, the Santa Fe River received two distinctions: It was named America’s Most Endangered River by American Rivers, a Washington, D.C.-based advocacy group, and also one of New Mexico’s 12 most endangered places by the New Mexico Heritage Preservation Alliance.

“The tipping point came when

hundreds of yards of aging wire-tied riprap, installed to protect adjacent residences, finally succumbed to 20 years of abrasion from the silt-laden runoff and lost their integrity, dumping tons of stone into the riverbed and again threatening to undermine adjacent properties,” Oberdorfer said.

The Solution

Reinforcing the river channel required a solution that would combine natural aesthetics with proven engineering. Phase one of the Santa Fe River Trail project included stabilizing the river channel, protecting homes and creating the pathway.

“No one, including those of us on the



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consultant team, wanted a concrete-lined channel, which would have been the only sure-fire way to control the aggressive erosion that was occurring,” Oberdorfer said. “The final solution became a hybrid approach, blending elements of ‘natural channel design’ with more traditional hydraulic engineering underpinnings.”

The design team needed a solution that could withstand the massive amounts of water the river would eventually contain. The first priority included widening the river channel to reduce flow velocities. To accomplish this, the team designed a meandering low-flow channel capable of handling the one- to two-year frequency storms without overtopping. The team also designed overbank terraces to widen the channel and create up to 100 ft of floodway width to meet peak design flows of more than 9,000 cu ft per second.

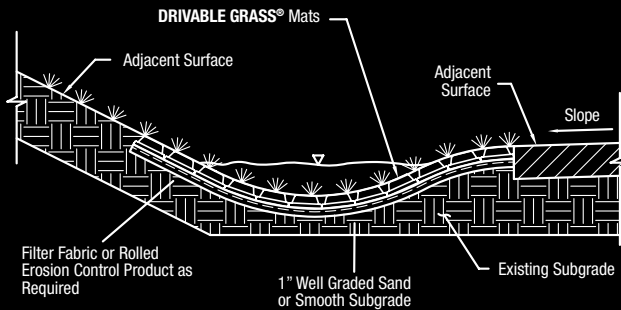
“In several areas of severe erosion, structural retaining walls were required to protect the banks and support the trail and adjacent private properties above the river channel,” Oberdorfer said. “These walls took two forms: The majority were constructed of limestone boulders matching those in the grade control structures, but mortared in place to prevent water from scouring behind them, while one test section used large prefabricated modular concrete blocks sculpted to look something like a stacked stone wall.”

Redi-Rock is an engineered precast retaining wall system that uses massive, 1-ton blocks that stack up like giant Lego blocks. The blocks are composed of wet-cast concrete, which is engineered to perform well in water applications and withstand freeze-thaw cycles. Because the blocks are so massive, the system can rely on gravity to hold the wall up, rather than geogrid reinforcement, in many applications, including this one. Gravity walls require less excavation, minimizing disturbances to nearby homes and infrastructure, as well as saving existing vegetation.

This project utilized Redi-Rock 9-in. Setback blocks, which step back 9 in. per course to create a more gradually walled slope. This is often beneficial for storm water projects because it allows taller

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walls to be built without reinforcement, and it also creates a more gradual slope for safety.

The wall tied into the natural limestone wall as well as boulder veins. "Boulder veins help with diverting the water in the direction it needs to go," said Bryan Klock of local Redi-Rock manufacturer Materials Inc. "[They] help divert the water where there's a step

down within the system. The boulders were placed on the back side of the Redi-Rock protruding planter blocks to tie the whole structure together."

Santa Fe is an artsy, historic town that did not want a "run-of-the-mill construction look," Klock said. To keep the channel looking as natural as possible while still providing an engineered solution, the design team chose the Ledgestone

Redi-Rock texture, which is cast in molds taken from real stone to give it the most natural look possible. Manufactured locally by Materials Inc., these blocks were colored to match the natural stone in the riverbed, including a historic stone wall built along the upper reaches of the river by the Civilian Conservation Corps in the 1930s.

"Redi-Rock fit all the aesthetic design requirements as well as the structural requirements," said Don MacCornack, P.E., of MacCornack Eng., which designed the walls for the project.

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The Construction

R.L. Leeder installed the wall for the project. The 7,800-sq-ft retaining wall took about 12 weeks to build.

"Putting in that bottom course is what takes you the time," Klock said. "You've got to make sure that base course is dead level, exactly the way you want it, so you're sure the rest of your wall goes in smoothly."

The installation crew utilized two excavators, a loader, a backhoe and a roller for the Redi-Rock portion of the project. The wall was 2,000 ln ft, with a maximum height of 15 ft. In some areas, 7 ft of the wall were below grade.

"The guys were really the key to how fast that wall was built," said Greg Smith of R.L. Leeder. "We were in a very small area of the river," so the blocks were staged down river, then transported up to the construction site.

The Outcome

"We had a freak storm before construction was even finished that was a 300-year flood," Smith said. "The Redi-Rock wall was complete, but the entire project was still under construction. The water was 10 to 12 ft deep at the wall; the river had never experienced that before. It didn't faze the wall at all, though."

The wall has been in place since 2012, and has been performing exactly as engineered. **SWS**

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