

In the U.S., an irrigation district is a cooperative, self-governing public corporation set up as a subdivision of the state government. It has taxing power to obtain and distribute water for irrigation of lands within its defined geographic boundaries and is created under the authority of a state legislature with the consent of a designated fraction of the landowners or citizens. The Washington State Water Resources Assn. (WSWRA) is the coordinating agency for the irrigation districts in Washington state. It includes 35 irrigation district members covering 1.1 million irrigated agricultural acres.

The Naches-Selah Irrigation District (NSID) encompasses 11,000 acres in north Yakima County, Wash., near the towns of Naches and Selah, and serves more than 1,700 landowners. The Naches River is a tributary of the Yakima River in central Washington and runs about 75 miles. After the Little Naches and Bumping River converge, the name becomes the Naches River. The Naches and its

Replacement of the wood flume trestles was included in the 1995 Comprehensive Water Conservation Plan and again in the 2007 Modernization Plan. A total of \$9 million worth of capital improvements was completed during 2005 to 2014. "Improvements included canal lining, replacement of some wooden flumes, replacement of wood pipe and open canals with gravity pressurized pipe networks, modern pressurized farm deliveries and canal automation," said Justin Harter, district manager of NSID.

The topography of NSID's service area provides 200 to 300 ft of fall (available head pressure). Deliveries range from minimal pressure to 40 to 90 psi, depending on the elevation difference from the canal that flows into the pipe networks. More than 3,000 acres no longer need to be pumped, resulting in a power cost savings.

The replacement of 4,600 ft of wood flumes was completed along with 2,800 ft of canal lined with concrete. The wood flumes were replaced with 3,600 ft of centrifugally cast, fiberglass-reinforced, polymer mortar (CCFRPM) pipe with the remaining footage converted into sections of concrete-lined canal. The concrete canal sections include a polyethylene lining that is placed under the reinforced concrete to prevent leakage. Hobas Pipe USA supplied 96-in.-diameter CCFRPM pipe with a stiffness class of 36 psi.

"A number of pipe materials were considered. Steel pipe required maintenance of coatings with potential to require coating replacement in 50 years or less to manage corrosion. Although higher in initial costs, non-ferrous pipe provide a lower overall cost with a longer lifespan and less maintenance. Hobas was one of the few pipes that could meet the project schedule and performance criteria," Harter said. Hobas was not intentionally sole sourced, but the higher specification requirements limited competition.

Tapani Inc. of Battle Ground, Wash., began construction in November 2014 and was finished during the limited time between October and April when the canal is not flowing, before the April 1 watering season start. "This project had a very tight schedule to meet in order to supply water to the local farms for the 2015 growing season," said Aaron Halling, project manager for Tapani Inc.

There were eight wood trestles from heights of 5 to 75 ft and draws of 20 to 500 ft wide. In this case, a trestle is a rigid frame used as a support, especially referring to a bridge composed of a number of short spans supported by such frames. Many wooden roller coasters are built using design details similar to trestle bridges.

Other sections of wood flume were on grade, resting on existing soils that were leveled 80 or more years ago. "The 96-in. pipe was installed on grades as steep as 50% [or greater], and the existing access roads had to be widened in order to get the pipe to the place of installation. Access was limited and delivering to the farther locations with off-road equipment took [more than] a half-hour per piece of pipe," Halling said.

Wood stave flume trestles were replaced with large inverted siphons, which are used to convey water being carried in canals or flumes across valleys for irrigation. With no pump, they are powered by the fall of the water as it flows down the pipe under the pull of gravity. The water is discharged at a level lower than the surface of where it originated.

The pipe provided to Tapani included factory-assembled FWC couplings. Useful for direct bury applications, the FWC coupling is a structural filament-wound sleeve overwrapped and mechanically locked to an internal full-face elastomeric membrane. "We faced challenges, but the project was still an overall success and the pipe performed well," Halling said. **w&wd**

Erin Boudreaux is marketing manager for Hobas Pipe USA. Boudreaux can be reached at [eboudreaux@hobaspipe.com](mailto:eboudreaux@hobaspipe.com).



# Irrigation District Upgrade

By Erin Boudreaux

Washington irrigation district replaces outdated system with CCFRPM pipe

tributaries drain a portion of the eastern side of the Cascade Range, east of Mount Rainier and northeast of Mount Adams. In terms of discharge, the Naches River is the largest tributary of the Yakima River.

Selah Valley Canal (NSID's main canal) was put into operation in 1892. As with many older systems, replacement was required, as the facilities had passed their useful life and continued maintenance and repairs could not guarantee reliable operation. In addition, the manually controlled canal system was a challenge to operate. Selah Valley Canal includes 8,000 ft of wood flumes, which are 9 ft in diameter, as well as concrete canals. Repairs up to this point have included approaches such as placing plywood sheeting over the leaking wood stave flumes. In other cases, where the flumes collapsed, the time required to fix them could be around two weeks. During the watering season, any disruption could be damaging to the crops.

## Decades in the Making

The 2015 Main Canal Flume Replacement and Other Canal Improvements Project is the most recent phase of the overall modernization and improvement plan. The \$7 million project is a continuation of more than a century's worth of improvements: The original materials installed in 1892 were upgraded to the existing wood and concrete facilities between 1910 and 1956, and this new phase is another improvement.