The Yellowstone National Park was established in 1872 by Ulysses S Grant, making it America’s first national park. It is recognized for its rugged scenery, unique geological features and ample wildlife. The first year that it was opened, it saw 300 visitors. Today, it has become an international tourist destination with more than three million visitors annually.

In order to provide infrastructure support for this continual visitor growth, needs were identified for increased utility capacity. The greatest priority was replacing the Fishing Bridge water system, which services campgrounds and other building infrastructure and crosses the Yellowstone River near its outlet point at Fishing Bridge. In addition to a replacement water line to cross the river, there were electrical utility lines that needed upgrading as well.

Nelson Engineering of Jackson, Wyoming, was tasked with designing a
multi-utility crossing of one of the most pristine waterways in the country for the Fishing Bridge Water Replacement Project. The site is located at an elevation of over 8,000 feet and is heavily populated by tourists during the late spring to early fall season.

The National Park Service had never utilized horizontal directional drilling (HDD) for a project of this magnitude in Yellowstone. Nevertheless, Nelson recommended HDD as the best and least intrusive approach to install new water and power lines in this environmentally sensitive area. Rather than disturbing this pristine waterway with traditional construction, it was decided that directionally drilling under the river would provide the optimal installation methodology for the required scope (see Figure 1).

Much of the design centered on minimizing disturbance to the park functionality and sensitive environmental areas. The design consisted of a 1,395-foot-long 24-inch-diameter Fusible PVC® casing pipe installed using HDD. This casing pipe spanned the Yellowstone River and tied into normal construction depths safely back from the river and bridge foundations. Inside this casing, a 10-inch Fusible PVC water line, three three-inch high density polyethylene (HDPE) conduits, and three four-inch HDPE conduits used for power and fiber optic lines where installed. Casing spacers were used to keep a consistent cross-section of the utilities as they were installed in the casing. The utilities would then be tied into the required alignments on either side of the river and bridge after the installation was complete. This crossing would connect to additional infrastructure being added as part of the overall improvement project, after it was completed.

Scout Lake Construction of Selah, Washington, was awarded the project and selected Nomad Pipeline Services of Rockville, Minnesota, to perform the HDD installation. The construction window for the crossing was limited to the period between the end of prime tourist season and the onset of the typical early winter snowfalls and closure of the park for the year in late November.

The 24-inch pipe was fused in a single length and staged on roller stands to facilitate the insertion process. Then the 10-inch pipe for the water line was also assembled at the same time and staged next to the 24-inch (see Figure 2). The HDPE pipe for the conduit applications were provided on reels of 500-foot lengths. The reels were thermally fused together during the installation process of the carrier assembly. All of the carrier pipe assembly was strapped together to keep it in a standard cross-section during insertion.

Construction of the HDD bore hole was straightforward. There were no issues with the soil conditions and they were as expected from the geotechnical survey work performed on the site. Disposal of the drilling slurry was a point of concern and focus for the drilling operation. No spilling of the drilling slurry was to be tolerated in the environment of the installation. The isolated nature of the project site, which was 1.5 hours away from any tangible equipment or
supplies, meant that everything needed to be “packed in” and available. Equipment breakdown was a major issue since a mechanic or any other specialized help would take days to arrive. Cold weather was also a big issue due to the timing of the installation, which could not be helped due to the requirements of the project.

After preparation of the bore hole was complete, insertion of the 24-inch casing pipe took about six hours and was trouble-free. The installation took place on a brisk day – with temperatures in the 20’s – and fluid management for the installation along with all pumping equipment was monitored closely. Several days later, the carrier pipe and conduit assembly was installed. After successful installation, the ends of the piping were capped and the holes were backfilled. The reconnections and operation of the system will be completed at the end of the 2015 season in order to coordinate with the other construction work still being completed.

All work was completed a week before the park closed for the year. The project coordination proved to be a valuable asset, with all aspects of the construction expedited through the Parks Department due to the very tight schedule and critical nature of the project. In the end, this project stood as the first HDD installation within Yellowstone National Park, and it couldn’t have come a more opportune or critical time in its history.
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