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White River Pipeline Crossing Design

GeoEngineers' expert collaborative team designs diverted dry-ditch crossing for a remote, difficult site



White River crossing site after temporary bridge and phase 1 diversion were installed

Overview

Questar Pipeline Company is an interstate natural gas pipeline firm that provides transportation and underground storage services in Utah, Wyoming and Colorado. Questar's planned ML-103 pipeline extension project included constructing 8.5 miles of new 20-inch-diameter natural gas pipeline in western Utah.

Questar first retained GeoEngineers to study whether it would be possible to cross the White River using trenchless methods. The remote site is located at the base of a 500-foot cliff, but despite these challenging conditions, GeoEngineers completed its investigation and determined that neither the HDD construction method nor the auger-bore construction method was feasible.

A few months after accepting GeoEngineers' feasibility report, Questar informed us that the US Fish and Wildlife Service (USFWS) had tentatively approved a trenched pipeline crossing at the site, provided that it was completed as a diverted, dry-ditch crossing. This approach involves diverting the river to one side of the channel and installing the pipeline within the diverted half, then diverting the river to the other side and installing the remaining half of the pipeline within the river channel.

GeoEngineers had all of the expertise in house—hydrology, dewatering and shoring—to design the diverted dry-ditch crossing of the White River. By leveraging this expertise to provide the necessary project services, we solved a very challenging design problem for our client and the pipeline was constructed successfully.

EXPERTISE

- Pipeline Services

MARKET

- Energy

LOCATION

- Uintah County, Utah

Approach

Testing at the bottom of a 500-foot wall

The remote and extremely rugged site made it very difficult to complete the subsurface borings necessary to evaluate crossing options. Additionally, USFWS considered the site critical habitat, and GeoEngineers had to negotiate access to tribal lands. Crux Subsurface provided a track-mounted drill rig that was winched down a 500-foot canyon wall to the White River crossing location to complete the exploratory borings.

Creative diversion design

In addition to the significant challenge of diverting a river with a design flow of up to 900 cubic feet per second (CFS), the design had to provide a dry, shored, 12-foot-deep excavation in the middle of the river channel that would be safe for a worker to enter and weld the two sections of pipe together.

Our creative design included:

- **Two-phased river diversion** using either Portadam frame system, or 4,000-pound, concrete-block walls to create over half an acre of isolated in-channel dry workspace. The contractor selected the concrete-block wall for river diversion.
- **Well-point dewatering system.** Based on conditions at the time of construction, GeoEngineers worked with the dewatering contractor, Malcolm drilling, to augment the well-point dewatering system with deeper dewatering wells.
- **Soldier-pile and steel-sheet lagging shoring system** to support the 10- to 12-foot deep excavations.



Innovation

GeoEngineers drew from four of its offices in the Western United States to assemble a team of experts with the wide range of skills needed to tackle each aspect of this challenging design project. The collaborative, interdisciplinary team included river scientists, water resource engineers, a fisheries biologist, a hydrogeologist, geotechnical engineers and an overall project manager.

Results

- Questar successfully installed its 20-inch natural gas pipeline across the White River in September 2012.
- The installation employed methods that isolated the workspace from the river, significantly reducing the environmental impacts normally associated with conventional “wet” open-trench construction methods.
- GeoEngineers demonstrated that the diverted dry-ditch crossing method can be an effective way to install pipelines across major rivers where trenchless options and conventional methods are not feasible.



Preconstruction: Looking west across the White River Canyon



Side booms lowering the pipeline into the trench within the diverted river channel

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