

## How We Cross Rivers and Streams

### Categories of Bodies of Water

Bodies of water such as streams and rivers are classified by the Federal Energy Regulatory Commission into three categories:

**Minor** – Includes all streams less than or equal to 10 feet wide at the water’s edge at the time of construction.

**Intermediate** – Constitutes perennial stream crossings greater than 10 feet wide, but less than 100 feet wide at the water’s edge at the time of construction.

**Major** – Includes crossings of more than 100 feet at the water’s edge at the time of construction.

### Methods of Crossing

There are four basic methods for crossing bodies of water. The techniques for each are site-specific:

#### *Open-Cut Wet-Ditch Method*

The open-cut wet-ditch method consists of digging an open trench in the stream bottom, laying the prefabricated length of pipe necessary to reach bank to bank and then backfilling.

#### *Open-Cut Dry-Ditch Method*

The open-cut dry-ditch method uses flume pipe(s) to direct the stream through the disturbed area, which allows trenching to be done in drier conditions. Small sandbag dams are constructed both upstream and downstream around the work area across the stream channel. Stream flow is then diverted through the flume pipe allowing the excavation to occur in the dry, under the flume pipe.

#### *Dam & Pump-Around Method*

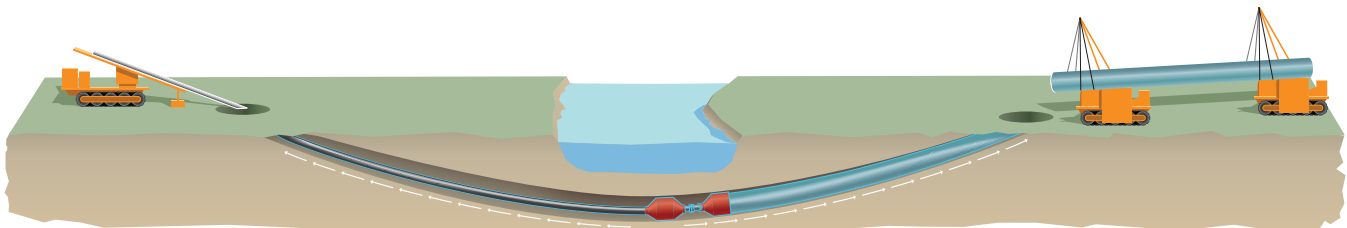
The pump-around method can act as a substitute to the open-cut dry-ditch method of construction. It may be

employed on small, low-flow streams where the dry-ditch method cannot be employed because of site-specific conditions. In application, small sandbag dams are constructed both upstream and downstream around the work area across the stream channel. Stream flow is then diverted around the work area using pumps and hoses.

#### *Horizontal-Directional Drilling (HDD) Method*

Installation of a pipeline by HDD is generally accomplished in three stages:

- The first stage consists of directionally drilling a small diameter pilot hole along a designed directional path. The path of the drilling string is tracked and directed using surface monitoring systems. The surface monitoring system determines the location of the drill bit in the hole by taking measurements from a grid or point on the surface. This allows the operator to follow the designed directional path.
- The second stage involves enlarging the pilot hole to a diameter that will accommodate the pipeline. The enlargement process involves the use of hydraulic cutting with drill bits and jet nozzles and hydraulic motors (also called “mud motors”) used to cut harder soils. It can take several passes to enlarge the hole to the required diameter, which is typically 12 inches larger than the pipeline being installed.
- The third stage begins once the pilot hole is enlarged to the correct size. The section of pipe, prepared in advance, is pulled back through the hole using the horizontal-directional drilling unit.



River Crossing – HDD Method