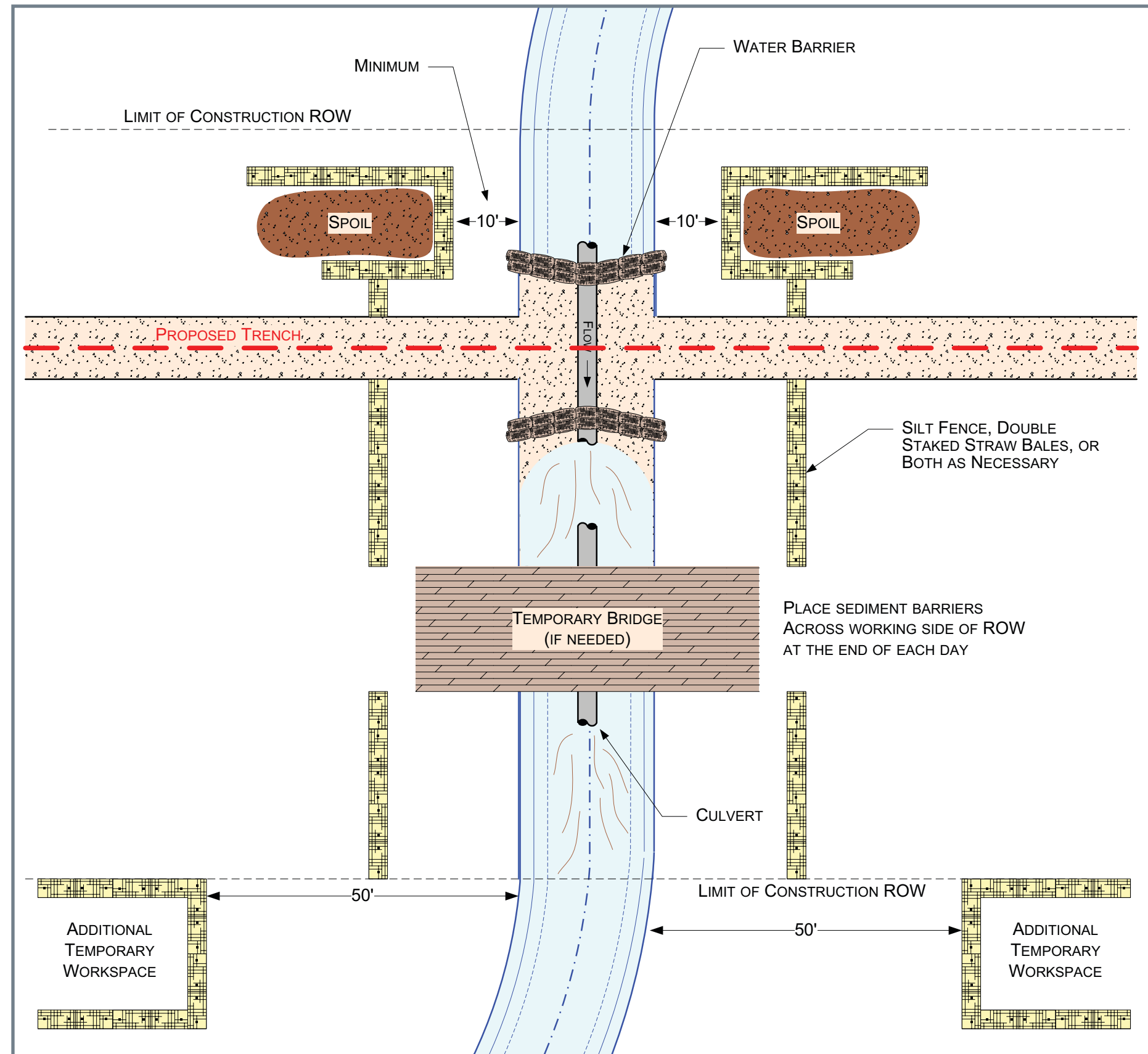


## Water Crossing Methods



### ◀ FLUME METHOD

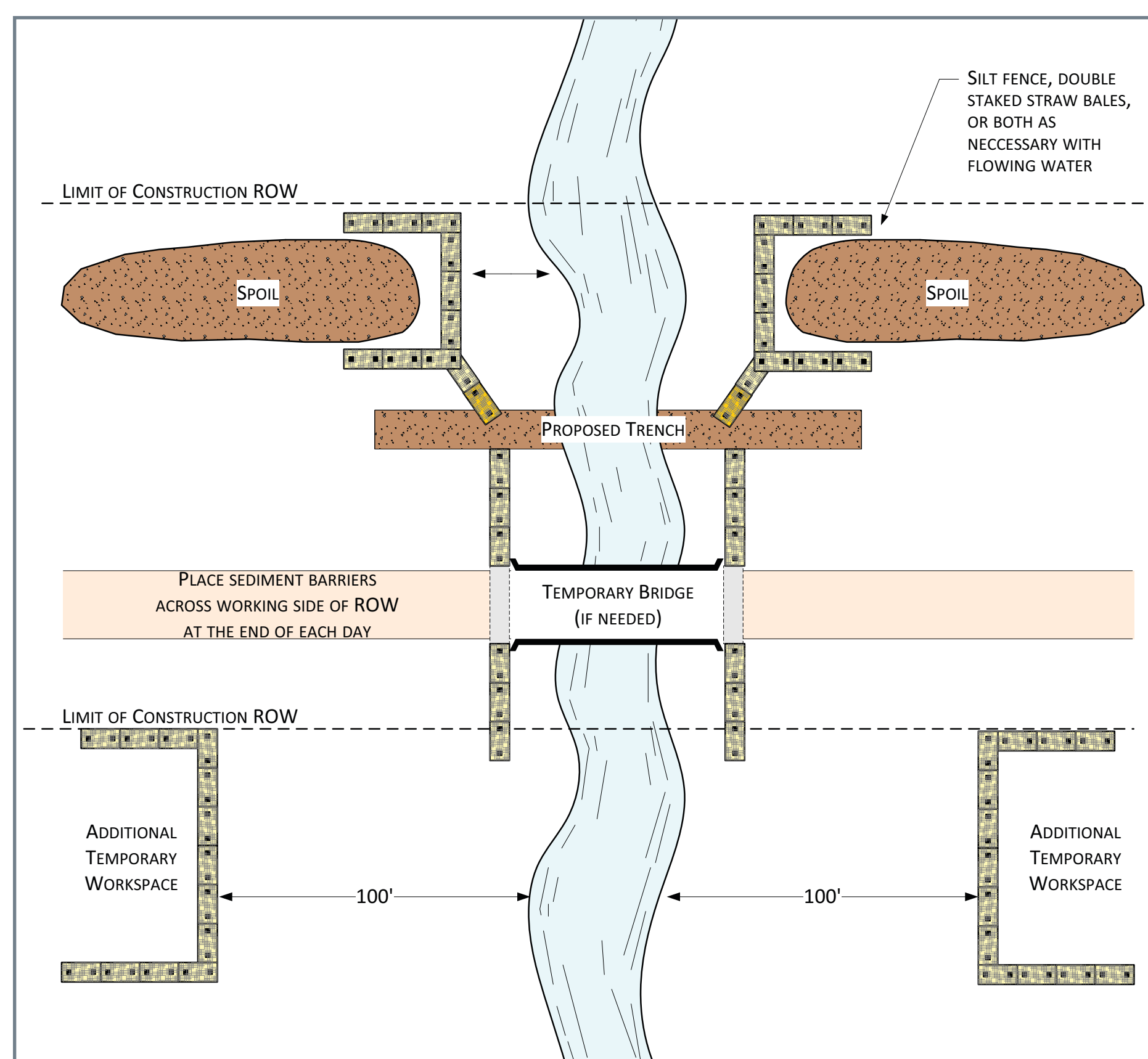
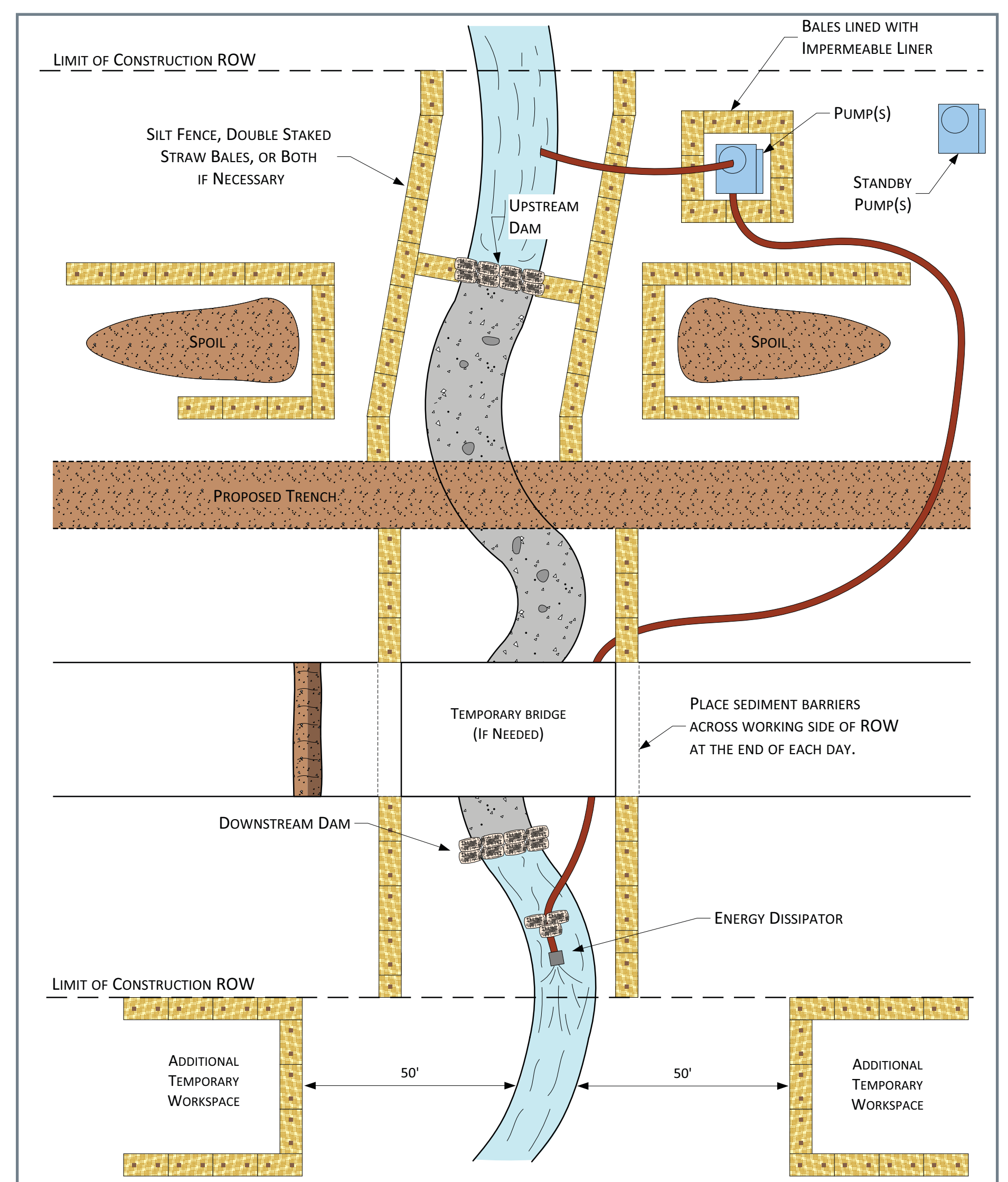
Used to cross small to intermediate flowing waterbodies that support cold water or other significant fisheries.

- Temporarily divert the flow of water through one or more large-diameter, steel flume pipes
- Allows trenching to occur in a relatively dry riverbed (beneath the flume pipes)
- Keeps excess sediment from entering the waterbody

### DAM AND PUMP METHOD ▶

Generally used on smaller waterbodies where mechanical pumps can keep up with stream flows.

- Pumps and hoses used instead of flume pipes to isolate and transport the stream flow around the construction area
- Creates a relatively dry work area
- Keeps excess sediment from entering the waterbody

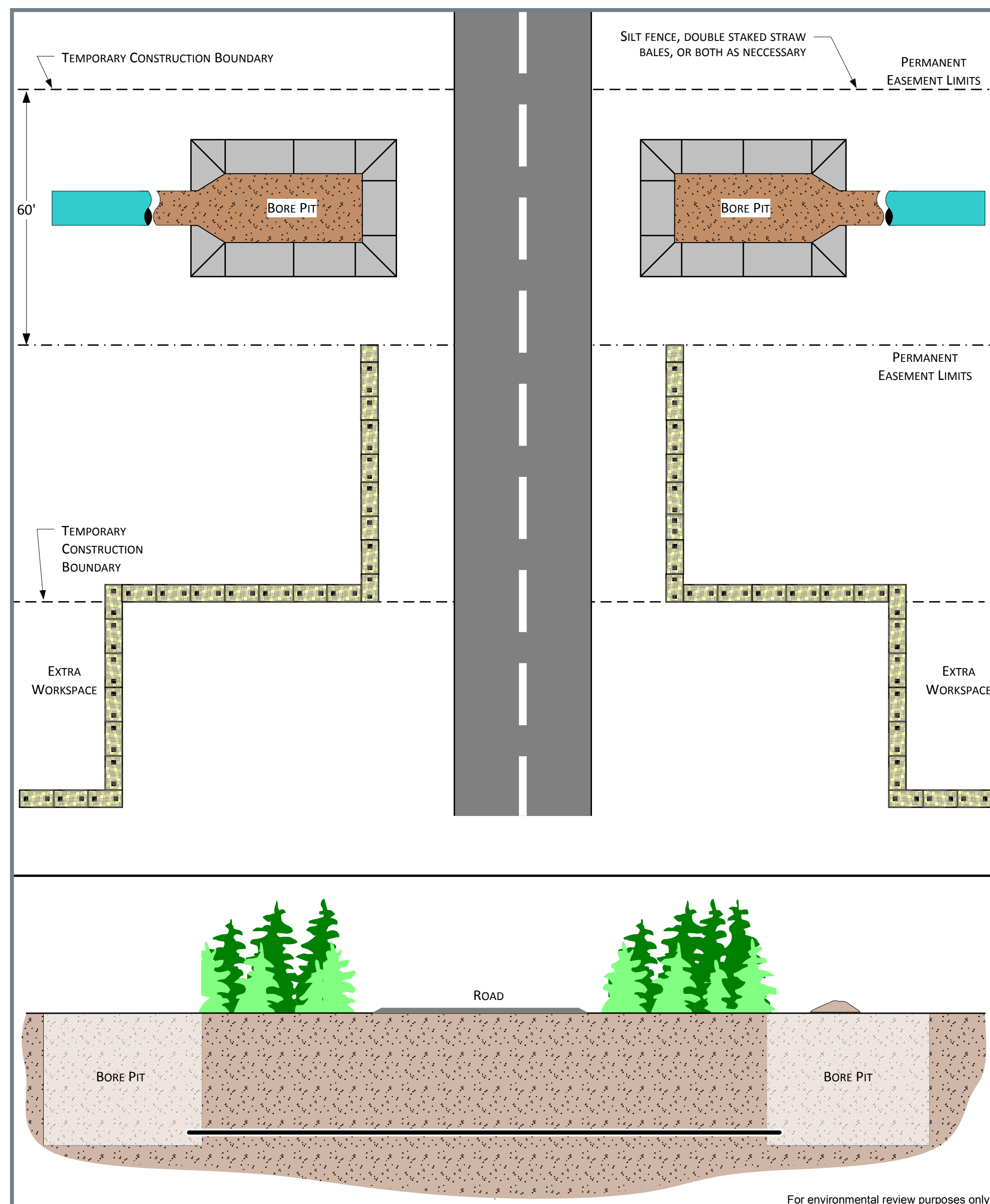


### ◀ OPEN CUT OR WET TRENCH METHOD

In-stream construction activities are limited to 24 hours on waterbodies 10 feet wide or less and 48 hours on waterbodies 10 to 100 feet wide.

- Trench is constructed while water continues to flow
- Pipe is pre-fabricated before trenching begins
- Backhoes typically work from one or both streambanks to excavate trench
- If the stream is too wide to excavate the entire trench from the banks, equipment may operate from within the waterbody with prior approval from appropriate regulating agencies

## Road and Trail Crossing Methods



### ◀ SUBSURFACE BORING METHOD

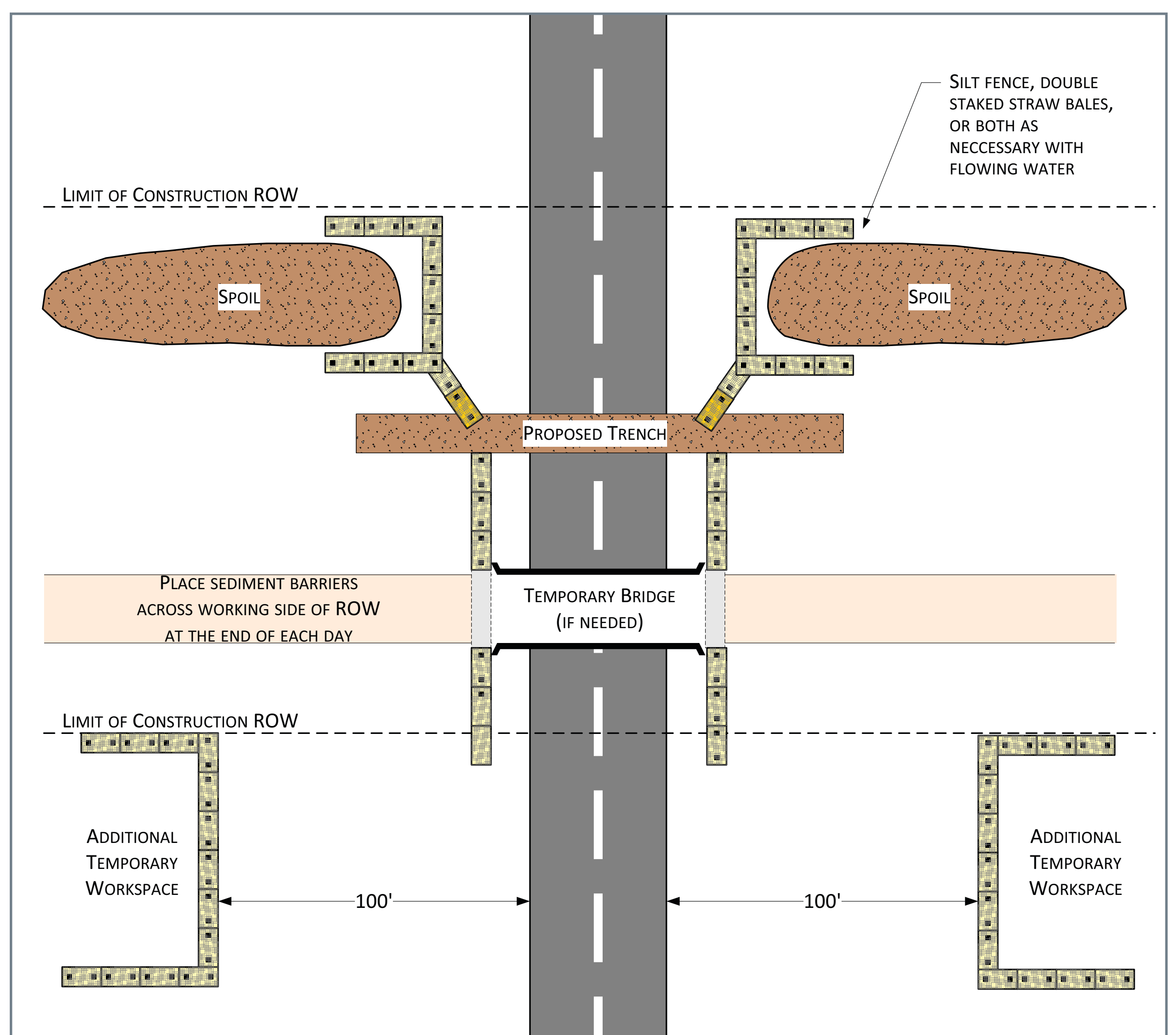
**Most paved roads and highways will be crossed by conventional subsurface boring beneath the roadbed.**

- **Excavate boring pits on each side of the road; use boring equipment to bore a hole under the roadbed then pull the section of pipe (or series of pipe sections) through the hole**
- **Results in little to no disruption of traffic on road**

### ▶ OPEN CUT METHOD

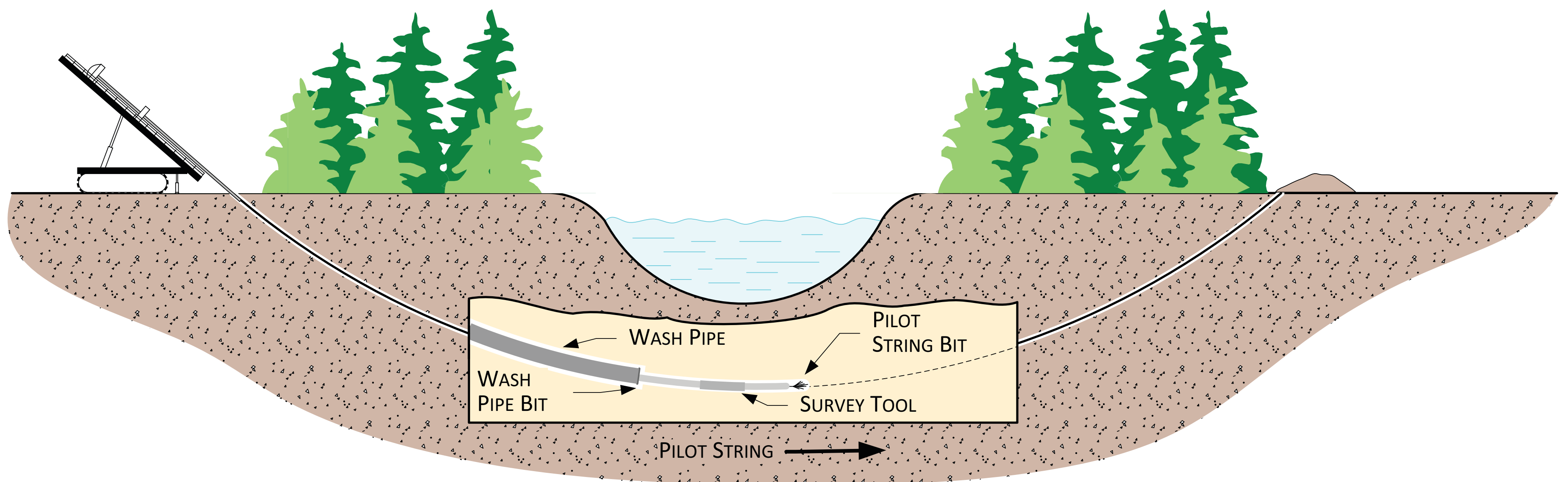
**Unpaved roads, trails and driveways as well as roads in areas with a high water table will be crossed using the open cut method and then restored to preconstruction condition.**

- **May require temporary road closure**
- **If no reasonable detour feasible, at least one lane will be kept open to traffic except for a brief period when the pipe is installed into the trench**
- **Most open cut crossings completed and the road restored within a few days**

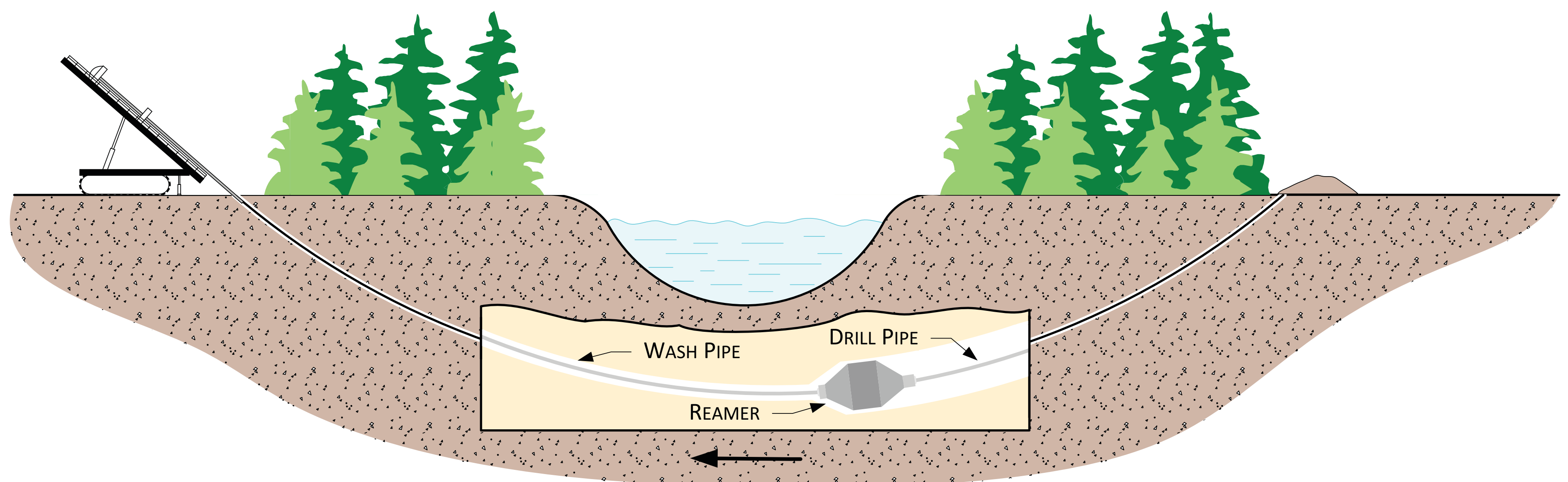


## Horizontal Directional Drill Sequence

### PILOT HOLE



### PRERREAM



### PULLBACK

