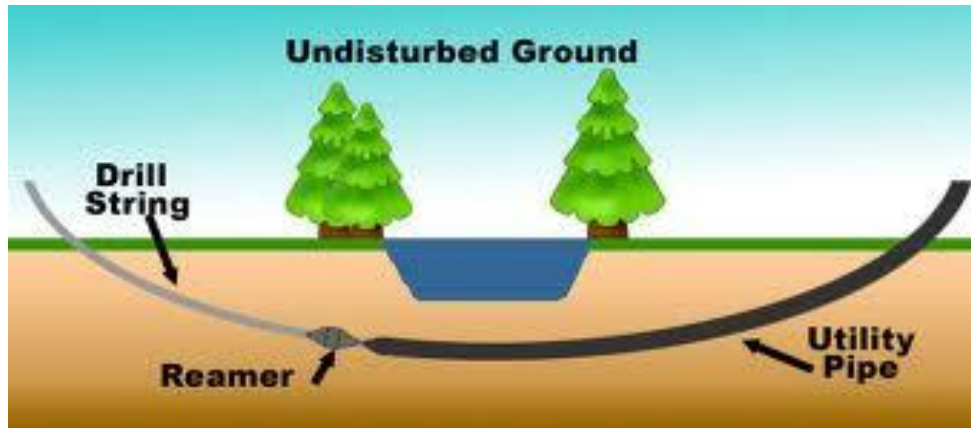


OUR METHOD

Horizontal Directional Drilling



A. Site Survey, Planning and Design The Bore

1. To establish the entry and exit point after considering the position of existing utilities, accessibility Drilling Rig and geographical site.
2. Extensive investigation using radio detection unit shall be conducted to finalize the entry pit and exit pit. Trial hole will be excavated to verify the base of the underground utilities.
3. Determine the horizontal distance and cross section profile of the proposed bore with measuring tape and dumpy level.
4. The drill profile shall be designed with a minimum depth of 3 meter below the road.

B. Pilot Bore Installation

1. Additional details of underground utilities shall be marked clearly on the plan and reviewed at site. If necessary, final adjustment will be made at site.

C. Drill Fluid

1. High Viscous [Hi-VIS] drilling fluid shall be used to ensure hole stability and reduced fluid loss. The drilling fluid will be consistently monitored and maintained at Funnel Viscosity above 40 seconds per quarts.

D. Drilling Operation

1. Drill path shall be marked on the ground as according to the design path.
2. A small pit [1.5 m length x 1.0 m Width x 1.0 m Depth] shall be dig at the entry and exit point to cater the cut material and fluid. Also, these pits serve to verify that the vicinity is hazard free from utilities.
3. Attach a 3" dia. fluid jet drill head with the sensor to the first drill rod and the drill head is directed into the ground and subsequently into the proposed drill path.
4. Throughout the forward run phase, the location and direction of drill is monitored at every 3 m interval by Digitrak Electronic tracking system.
5. If the drill head strays off course, the locator technician shall inform the drilling operator via two-way radio. The operator will make the required adjustment until the drill head get back to its original course.
6. Once the drill head reached the exit pit, it is removed and fluid jet fluid jet reamer is attached and the drilling operation is reversed.
7. During the retraction of reamer, borehole will be enlarged and bentonite fluid will stabilize the bore hole and transport the cutting materials out of the created bore hole.
8. The different diameter reamers are used to enlarge the borehole. Bore hole enlargement will be in steps. The maximum reamer size is about 30 percent more than the product pipe.
9. The product pipe will be laid on rollers after being string up.
10. After the final reaming, the product pipe is attached to the last reamer size and swivel and will be pulled into the borehole.

E. Site Cleaning

1. Upon installation of product pipe, both ends of the product pipes are capped to prevent any foreign particles from getting in. The site is cleaned and demobilization of our Horizontal Directional Drilling Rig and reinstatement.

METHOD STATEMENTS / SUMMARY OF GUIDED BORING

1) Authority Approval

Liasion and waylifts from relevant authorities for approval and coordinate with other services provider.

2) Insurance

Insurance coverage on Contractor All Risk and Workmen's Compensation for the Guided Boring works.

3) Mobilization

Mobilize our Guided Boring equipments, Welding Set, Gen-set and necessary sheet piles and I-Beam struts to work site.

4) Launching Pit and Piloting

Excavation and construction of launching pit c/w necessary shoring and piloting. Prior to Guided Boring works, we will locate and pilot for other essential services on the Launching and exit point using the latest high-tech Locator / Scanner for existing utilities.

5) Receiving Pit

Excavation and construction of receiving pit c/w necessary shoring.

6) Guided Boring

The guided boring method install small & medium diameter pipes with grade and alignment precision. Guided Boring Machines (GBM) are used in conjunction with a specially design CCTV theodolite to provide extreme accurate pipe installation especially for sewerage pipe installation, etc.

The pilot rods provide a guided path for the augers to follow. The drill head section contains a LED target for guidance. Through the hollow stem pilot rods provide and optical path for the CCTV theodolite which will displays the head position and orientation in relation to the pilot head steering.

The CCTV provides an image on the monitor so that the operator knows the position of the head in relation to the axis of the drive and the position of the pilot head for steering. When the pilot head reaches the shaft, the reaming auger and casing is fitted behind last pilot tube.

The products casing are installed one by one in to the line by hydraulic cylinders. The screw conveyors are also connected to one another. This is to remove the spoil when the casings are jacked in. The pilot tubes that are jacked and installed now act as the intended pipe gradient. The auger head provides a small over cut to allow the casings and there after the product pipes to be inserted with minimal friction for the ground.

When the reaming head reaches the target shaft the product pipes can be inserted which push out the augers and casings into the target shaft.

