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Non-Disruptive Road Crossing Methods used by DEWA for High Voltage Cables Laying in Transmission Power Projects

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Abstract: ***Non-Disruptive Road Crossings are of the project is to enhance the management, planning, design, construction, maintenance, and operation of all roads and related infrastructures to ensure a safe and uniform operational and structural capacity throughout the road network in Dubai. NDRC techniques that can be that ensure that the roads are not destroyed for the crossing of major waterways to a technique that can be employed in very congested utility corridors along busy highway systems as well as over longer distances employed in laying down underground crossings of Transmission Power Lines in Dubai Power Network. It reduces or eliminates damage often caused by conventional open-cut trenching methods, in turn reducing the costs.***

Keywords: NDRC, HDD

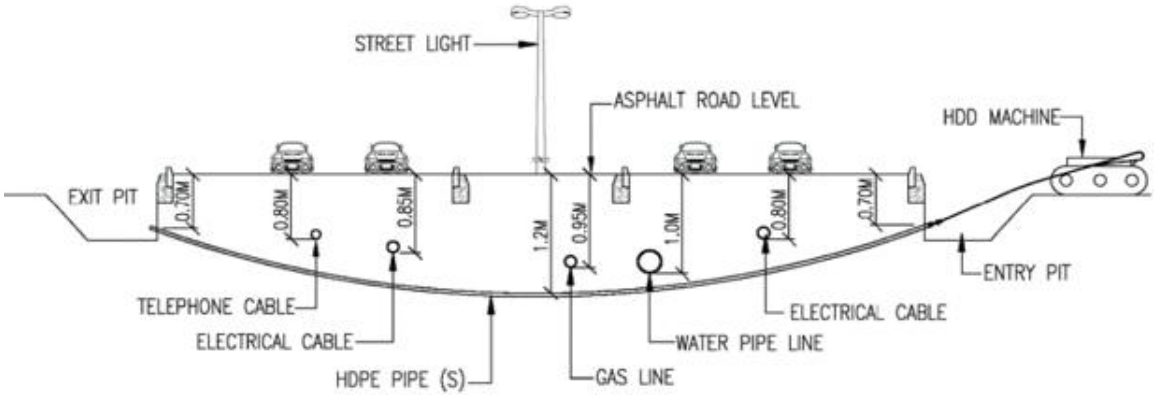
Dubai Electricity and Water Authority (DEWA) is the exclusive provider of electricity and water services in Dubai. **DEWA** do their best to manage the generation, transmission and distribution of electricity and water across the emirate. **DEWA** serves a large customer base across the emirate. **DEWA** constructing substations are part of **DEWA's** efforts to increase the capacity, efficiency, and readiness of the power transmission network in the Dubai emirate and meet the future needs of customers, developers, and the business sector,"

The purpose of a substation is to 'step down' high voltage electricity from the transmission system to lower voltage electricity so it can be easily supplied to homes and businesses in the area through lower voltage distribution lines. To feed the substation to the proposed substation to existing transmission system 132kV High Voltage cables were laid within the approved corridor allocated by Dubai Electricity (DEWA) and by relevant authorities.

For the laying of 132kV cables from Substation to substation various methods were used In the High Voltage Cable laying Transmission projects. One of the method is **Non-Disruptive Road crossing (NDRC).NDRC** is used when trenching or excavating is not practical for the crossing of major waterways to a technique that can be employed in very congested utility corridors along busy highway systems as well as over longer distances where traditional open-cut methods would require work hour restrictions and/or adversely impact activities along the path. It is suitable for a variety of soil conditions and jobs including road, landscape, and service crossings.

Horizontal Directional Drilling is the latest advanced technology in non-disruptive road crossings. Ideal for water, Gas, electric & fibre optic cables and telephone cables of single or multiple ducts. It is a steerable trenchless **method** of installing underground pipe, conduit, or cable in a shallow arc along a prescribed bore path by using a surface-launched **drilling** rig, with minimal impact on the surrounding area.

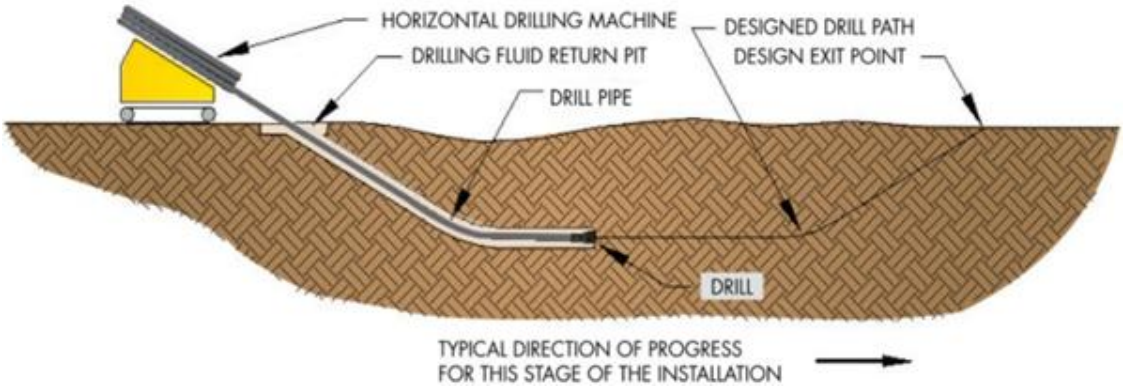
They eliminate the need to cut roads, which are expensive to restore and provide traffic diversions. They are ideal in environmentally sensitive areas for minimum disturbance to the surrounding environment. They reduce disturbance to traffic and businesses and are much faster than conventional methods.



The HDD process, in general terms, follows three basic stages that are described below.

First Stage -Drilling pilot bore hole

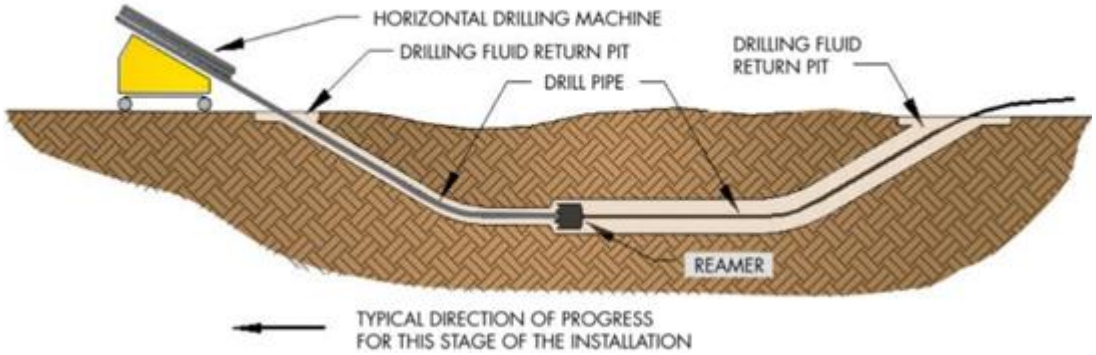
The pilot bore is launched from the surface at an angle between 6 and 15 degrees to the horizontal, and transitions to horizontal as the required depth is reached. A bore path of very gradual curvature or near straight alignment is normally followed to minimize friction and to stay within the allowable joint deflection and the allowable bend radius for the pipe. This minimizes the chance of getting the pipe string "hung up" in the soil or damaging the pipe string.



During this phase of the process, the pilot-hole path is monitored, and periodic readings of the inclination and azimuth of the leading edge of the drill are taken in conjunction with measurements of the distance drilled since the last survey point. This information is used to calculate the horizontal and vertical coordinates along the pilot hole relative to the initial entry point on the surface. The operator can then adjust the drill inclination as needed to come up out of the ground at the pre-determined exit point.

Second Stage –Pre-Reaming:

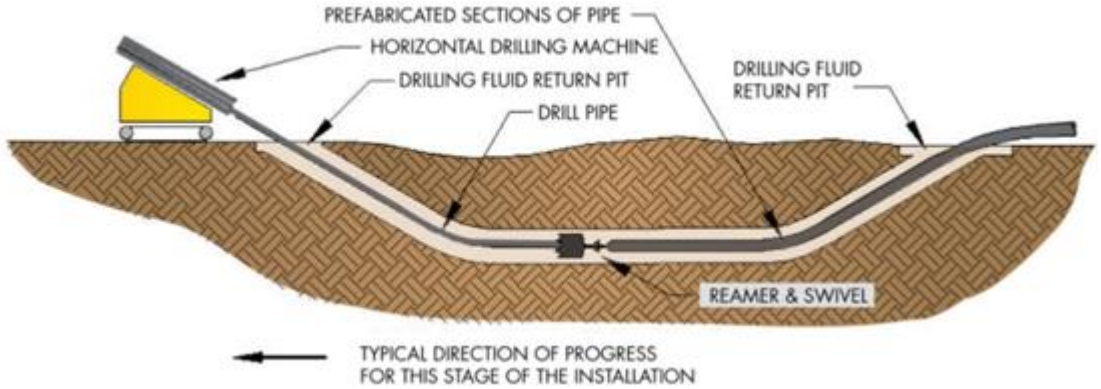
The second stage of the process involves pre-reaming the pilot hole in preparation to install the pressure pipe. Although not required, many experienced contractors repeat this intermediate step to minimize the force required to pull the pipeline along the initial pilot hole without overburdening the drilling equipment. Reaming tools typically consist of a circular array of cutters and drilling fluid jets and are often custom configured for a particular borehole size or soil type.



The pilot hole is enlarged by pulling back increasingly larger reamers, or reaming heads, from the pipe "Exit Point" to the rig side, conventionally defined as "Entry Point". To achieve the appropriate bore path size it may be necessary to perform several reaming operations. Generally, all reaming procedures prior to the actual product pipe installation are referred to as Pre Reaming, and the final ream to which the product pipe is connected is referred to as the 'Back Reaming

Third Stage – Pulling the Pipes

After the pre reams procedures, the Pulling Head and connecting product pipe are attached to the reamer using a Swivel, a device that isolates the pipe string from the rotation of the HDD drill pipe "Rod".The product pipe is then pulled behind the final reamer back through the horizontal directional drill path to the exit pit on the rig side.



The final stage involves pulling the pressure pipe through the enlarged pilot hole. This is accomplished by attaching the prefabricated pipeline pull section behind the reamer assembly at the exit point and pulling the assembly back to the drilling rig. A swivel is utilized between the reamer and the pressure pipe being installed to minimize torsion transmitted to the pressure pipe as it is being pulled through the enlarged pilot hole into its final position. After the pipe is pulled through the bore, it is typically allowed to "relax" for a period of time to self-correct any elongation that may have occurred during the installation process.

Conclusion

Directional drilling can be a viable alternative to consider for pressure pipe installations in areas that typically require only traditional cut-cover installation techniques. In addition to expediting the project schedule, this construction technique can also minimize earth disturbance and traffic impacts, which may have positive benefits on project permitting. HDD is becoming more cost competitive versus traditional methods for Transmission Power Lines of 132kV cable projects in DEWA (Dubai Electricity and Water Authority) networks.

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