

# HDD HORIZONTAL DIRECTIONAL DRILLING/ BORING

This standard is to provide guidance to assist the engineer and planner in regards to the installation of conduit using HDD horizontal directional drilling/boring.

## General:

1. There are three approved construction techniques for NVE underground cable installation:
  - a. Open-cut trenching using stick PVC conduit. **Preferred**
  - b. Plowing in cable in conduit. Used only on steep terrain. See Vol. 5 CAB12U.
  - c. HDD, Directional drilling / boring using job specific conduits.
2. HDD is a guided boring/ and directional drilling used in the trenchless installation of new conduit. This would be used under a roadway, across a landscaped area etc. The drill path may be straight or gradually curved, and the direction of the drilling head can be adjusted at any stage during the bore to steer around obstacles. Drilling can be carried out between pre-excavated launch and reception pits, or from the surface by setting the machine to drill into the ground at a shallow angle.
3. The advantages of trenchless technology for construction have become more widely available and used. Some city /counties may now have requirements against open-cut techniques (particularly in roads or established areas) when a 'no-dig' alternative is available. Apart from the obvious environmental benefits of trenchless installation, the relative cost of guided boring has fallen to below that of trenching for many applications, even ignoring the social costs of traffic disruption and delay.
4. Guided boring or directional drilling can be used for the trenchless (or minimum excavation) installation of conduits in most diameters and over distances of up to a mile, limited by the amount of conduit the rig can handle and cable pulling considerations.
5. Both surface-launched and pit-launched drilling machines are available, the choice depending on the nature of the project.
6. Machines range from compact rigs suitable for small bores and operation in restricted spaces, to extremely large units designed for large diameter, long distance crossings.
7. Most guided boring machines use a drilling fluid which lubricates and stabilizes the bore, and also conveys the excavated material in suspension. Some rigs are however, designed for dry operation, and may offer benefits depending on the bore diameter and the ground conditions.

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8. The DB120 stick/ rigid conduit is preferred but the bore must be absolutely straight. The DB120 conduit can also be used inside large casing pipe where multiple conduits are being installed. Under a freeway is a good example of this type of installation where there would be power, gas, telephone TV etc. in a common casing. An HDPE conduit system is used for non-straight installations.

All conduit lengths are subject to maximum cable pulling lengths. See CAB06U Volume 5.

How a complete project or single bore is originally engineered is affected by actual site conditions including soil formations, terrain, existing utilities, and setup constraints. The length and final outcome of the bore may differ from the original design subject to the limitations of drilling conditions encountered. Pre-planning and evaluation by the NVE designer inspector, and contractor are keys to successfully minimize potential conflicts about work performed and price issues. When possible, thorough on-site evaluation and contingency planning are strongly recommended.

**Access:** NVE should obtain access from local property owners prior to construction.

**Soil conditions:** The ground conditions greatly affect penetration rates, downhole tooling selection and other issues regarding the contractor's price. The contract should also allow price changes for differing or unforeseen soil conditions.

**Drill pipe limitations and rig setup:** Special consideration must be given to the limitations of the drill pipe. Rig setup can be affected by a number of environmental logistical concerns.

**Installation limitations:** Steel pipe, HDPE, and PVC rigid stick conduits are affected by a combination of stress factors including pulling forces, profile of the bore, bend radius of the pipe as it enters the ground, and stress from overburden and external hydrostatic stress. HDPE and PVC conduit are subject to collapse stretch, flattening or breakage depending on soil conditions.

**Existing utilities and subsurface obstacles:** Most installations call for a minimum depth of installation at 48" but consideration must be given to existing utilities. A majority of city utilities including gas, water, and power are at a 36" to 48" depth. In order to maintain specified clearances and minimum depth requirements, the bore installation must usually be drilled at depths of 60" or more. All potentially affected utilities should be contacted prior to commencing work. The **contractor is responsible** for locating other existing buried utilities.

**Conduit:** Any casing material is acceptable if boring for multiple utilities such as under a freeway. The conduit inside the casing shall be at least DB120 stick PVC. On a bore PVC stick conduit of at least DB120 is accepted if the bore is completely straight; this is usually limited to around fifty feet. HDPE (High Density Polyethylene) smooth wall conduit is the industry standard for the typical bore which is not straight and will veer around obstacles. Conduits shall be the typical size that are used on an open cut installation.

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**Sweeps Bends:** It is the **responsibility of the HDD contractor** to ensure that the minimum bending radius of conduit is greater than that recommended by the conduit manufacturer. Sweeps will be what is typically used in open cut conduit installation.

**Conduit acceptance:** The conduit will be mandrelled and a pull line provided in accordance with CD0001U, Vol. 17, Sections 19.0 and 20.0.

**Tagging Conduits:** As the conduits are pulled in, it is the **responsibility of the contractor** to ensure that they be identified and tagged. The identification must be of a permanent type, such as that done with on plastic or corrosion resistant metal tags. The tag must be securely attached to the conduit. Paper or cloth tags are not acceptable.

**Conduit Markers:** It is the **responsibility of the contractor** to ensure that location of permanent conduit markers shall be as shown on the W.O. sheets.

**Responsibilities:** It is the responsibility of the Contractor and NVE to jointly review the staking sheets prior to the start of construction. At that time, the Contractor shall propose any desirable changes or clarifications. These changes, if approved by NVE, shall be made and recorded on the staking sheets. No changes on the staking sheets shall be made by the Contractor without the prior written approval NVE. A representative of NVE shall remain in the immediate vicinity of the HDD operations at all times and shall consider and possibly approve any acceptable changes proposed by the Contractor. Documentation of changes and an 'as-built' will be provided by the contractor.

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