



North American Society for Trenchless Technology
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Jacking & Boring Quality Assurance / Quality Control

Boring and jacking, also known as horizontal auger boring, is a well established trenchless method that is widely used for the installation of steel pipes and casings, especially under railways and road embankments. It is a very economical trenchless pipe installation method that can be used under various soil conditions in diameters 4 to 72 in. This method can be used advantageously to reduce damage to pavements and disruptions to traffic, hence reducing the social costs associated with pipeline installations. Pipe jacking (used for diameters 42 in. and up, and pipe ramming (used for diameters 4 to 140 in.) are other methods of casing installations.

Boring and jacking is defined as a technique for forming a bore from a drive pit, by means of a rotating cutting head. Spoil is removed back to the drive pit by helical auger flights rotating in a steel casing. The basic components of a horizontal auger boring system includes the base unit, casing pusher, power pack, auger sections, track and track extensions. Cutting bits are available for different soil conditions.

For successful execution of boring and jacking projects, pre-survey of the site conditions for surface features, subsurface geotechnical conditions and utility data should be gathered and incorporated in the early stages of design process. It is required that the Design Engineer provide the Contractor with sufficient information about the nature of the site and the possible obstacles. This will help in determining the suitability of utility installation by boring and jacking method.

The pre-design survey includes the investigation of the general site condition, examination of existing underground utilities and potential for obstructions, geotechnical investigations (including groundwater), environmental conditions, required drive lengths, pipe diameters, site access, depth, grade, tolerances, impact to surface activities, location of existing/abandoned/proposed utilities, and rights-of-way requirements.

Geotechnical investigation of the site should be performed to identify the general and any special subsurface conditions. The extent of the investigation may vary depending on the knowledge of known local geological conditions.

Prior to the design of a boring project, all utilities should be located by non-destructive means. This process involves the use of several tools and should include, but is not limited to, a utility locator, a non-destructive digging device, and any utility maps. The utility's depth and diameter has to be established. Each utility is then mapped or plotted, and the bore path established to avoid the current utilities.

The boring pits should be located at a safe distance from existing structures to avoid any hazard to the structure or the public. The distance of the pit from the roadway should be adequate to allow sloping of the pit if necessary. If sufficient sloping cannot be accomplished due to constraints, an earth support system of pit walls should be considered. Enough room for safe loading and unloading of equipment, and for spoil removal should be provided. Accidents are less likely to occur at sites that are open and kept clear of debris.

Typically steel pipes are used for casing in order to prevent the potential damage caused by the rotating augers. The casing should be new (not previously used) and of good quality and should be well prepared. Machine-cut beveled ends assure casing alignment; joint end squariness and exact lengths keep the head at the correct location relative to the casing; and smooth walls reduce the required jacking force and the tendency of the casing to rotate during the boring process.

After successful installation of casing pipe, the carrier pipe (also called product or distribution pipe) can be installed. Carrier pipe is installed by first attaching wooden skids or pre-manufactured casing spacers to the carrier pipe before assembly. The carrier pipe is then installed, one piece at a time, from either the entry or exit pit. It can be installed by pushing by hand or with a boring/jacking machine, or by pulling with a winch, or other methods.

Pre-installation inspection includes checking alignment of the track for proposed grade of bore path and before casing enters the embankment, a thorough inspection should be performed for line and grade.

Post-installation and damage correction includes the following:

- Prepare an as-built drawing.
- Amount of spoil removal should be checked for possible voids outside of the casing. Any voids needs to be grouted with approved grouting materials and methods.
- In sandy or unstable soil conditions, there is a possibility of void formation in the line of bore, and in this condition grouting of outside of casing is strongly recommended.

SOURCE: ASCE Manual of Practice for Horizontal Auger Boring Projects, ©2004, American Society of Civil Engineers.

For Further Information on Jacking & Boring Equipment & Contractors Please Visit



Booth 428 & 430



Booth 331



Booth 226 & 228



Booth 329



Booth 520



Booth 615

For Further Information on Jacking Pipe Please Visit



Booth 527



Booth 418



Booth 202



Booth 630



Booth 303



Booth 517



Booth 400



Booth 311



Booth 309



Booth 323 & 325



Booth 626 & 628