

	TRENCHLESS TECHNOLOGIES RESOURCE CENTRE	
	TRENCHLESS TECHNOLOGY GUIDELINES	SECOND EDITION
	AUGER BORING	NEW GUIDELINES AUGUST 2005

1 OVERVIEW

Auger Boring is a technique for the bored installation of a casing pipe into the ground. Product pipe or final services are then installed within the casing pipe as required. It could be described as a Pipe jacking technique but as the casing pipe is an integral part of the construction methodology it has been decided to give it its own section within the ISTT Guidelines. The technique is normally found to be cheaper than full microtunnelling or pipe jacking but does have limitation on the range of ground in which it can operate effectively in its standard form, in particular very wet ground, but with special adaptation can operate in ground including rock. Depth limits are dependent on the size of excavation required to access the auger boring unit and the practical length of pipe that can be installed from what is generally quite a large dimension launch shaft/pit.



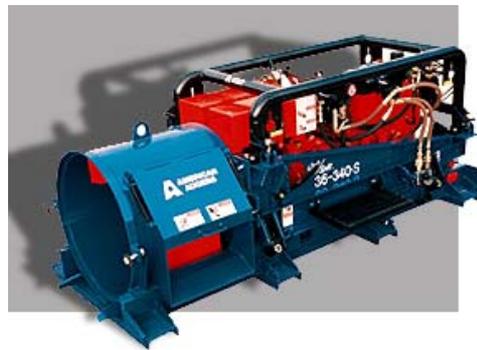
*A typical Auger Boring set up
Picture courtesy of Allen Watson Ltd*

2 APPLICATIONS

As the name Auger Boring implies, the excavation technique employed is that of using a rotating auger chain/flight fitted with a cutter head. The cutter head is driven by, and is positioned at the lead end of, an auger string that has been established within the casing pipe, the auger diameter being dimensioned to the just below the full diameter of the casing to allow rotation. Rotating the helical auger chain within the casing pipe allows the cutter head to excavate the ground at the face, with spoil being removed back along the auger string within the casing pipe to the launch shaft or pit. Spoil is removed by hand or mechanically or placed into muck skips for removal as it exits the casing pipe.

The system is normally an unguided technique and is not generally used for installations requiring very high accuracy in line and level, although experienced operators can achieve very good accuracy where ground conditions permit. Some systems have been developed that allow for some limited steering capability to be applied to the cutter head or to the casing pipe to counter minor deviations as they occur.

The system is normally applied to the softer ground conditions like clay soils and soils with contained cobbles. Some systems have been designed to handle softer rock formations with the use of a special cutter head, and as time progresses rock capability is improving. High water table and flowing ground does cause auger boring a problem as the auger flight is not generally a sealed system and the auger chain is the only means of preventing loss of ground from the face and is neither water tight nor sealable.



*Typical Auger Boring machines.
Pictures courtesy of Barbo (left) and American Augers (right)*

3 EXCAVATION AND SPOIL REMOVAL USING AUGER BORING

Generally, Auger Boring systems are usually diesel or hydraulically driven and are used for non-displacement boring operations. They are designed for the installation of casing pipes from about 102 to 1,830 mm diameter over distances of up to around 200 metres although larger diameter is normally associated with longer bores.

The installation process requires the establishment of a launch pit dimensioned to allow the installation and operation of the auger boring machine and the required pipe length to be accommodated within it, or at least the length of pipe that it is practical to work with. As the casing pipe is generally manufactured from steel, the welding together of lengths to create the total pipe length required is not a problem.

The auger boring machine, usually operated by a single operator using controls on the body of the machine, is set up on a set of tracks or rack and pinion system on the line and level required for the casing installation. The first casing pipe length is positioned at the head of the machine with its auger flight already installed. The cutter head is at the head of this auger flight. The auger boring machine rotates the auger flight and thus the cutter head as it thrusts forwards along the track or rack and pinion arrangement. The cutter head excavates the ground and removes spoil to the start pit for manual or mechanical removal. When the auger boring machine reaches the end of its stroke, governed by the length of the track/rack arrangement, the casing pipe is released and the machine is withdrawn to its original starting point. A new length of pipe is positioned with its own auger flight in place, the auger flights

are connected together to drive the cutter head and the pipe ends welded to form a continuous pipe length. The excavation and thrust process is repeated in this way until the drive length required is completed with the arrival of the cutter head at a reception pit.

The drive is completed with the withdrawal of the auger flight chain from within the casing pipe and the casing being cleaned out of all remaining spoil leaving only, the now empty, casing pipe in the ground. The product pipe(s), cables or drainage system can then be installed within the casing pipe as required, on a precise line and level if necessary.

4 SUMMARY

1. Auger Boring tends to be for straight, unsteered drives in softer ground over relatively short bores, although some systems offer limited steering capability.
2. Ground conditions may mean limitations in terms of depth and capability particularly in high water table areas.
3. Rock condition installations may be possible with specialised equipment.
4. Auger Boring does not generally install product pipes directly but installs casing pipes into which product pipes or services may be placed later.
5. Launch pit dimensions for Auger boring machines may mean access requirement limitations.
6. Lower cost option than 'traditional' microtunnelling provided ground conditions and site situation are favourable.