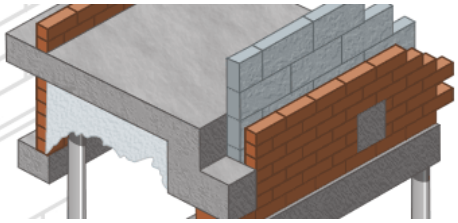


BORED PILING

DESCRIPTION

Bored piling is the forming of a hole of the required diameter to the design depth of the proposed pile which is subsequently filled with concrete or grout. Clearly in dry stable clay a hole can be drilled usually with sectional continuous flight augers using a track mounted mini piling rig which will go through domestic doors and work in a normal domestic head room. Such a rig is usually powered hydraulically from a remote diesel power pack which can remain outside the property thus avoiding problems with fumes.

TECHNIQUE

If a stable open hole in clay can be formed the bored piles will usually be filled with concrete at the end of the day. If the ground is stable but wet, piles can be filled with grout which is site mixed and pumped to the bottom of the pile (tremmied) from where is will displace the water being denser. The surplus water will be discharged onto the site surface which may require special management measures.

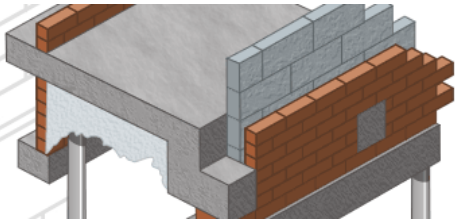
A pile can be formed in unstable ground eg. fill or sand and gravel by using either temporary casing (steel tubes in sections with threaded joints) which is advanced into the ground with the augers until a stable strata is reached or by the use of hollow stem augers which are screwed into the ground like a cork screw into a cork with as little displacement of soil as possible then filled by pumping grout (usually) down the hollow centre of the augers while maintaining grout pressure as the augers are withdrawn.

Pile design is critically dependent on adequate site investigation as the piles are installed to a predetermined length calculated based on the anticipated soil properties. As augered piles are generally used in clay strata they must be capable of dealing with clay heave. From the site investigation information the depth to which clay has been adversely effected by tree activity can be determined. The depth of the pile shaft is then ignored for load bearing purposes but should clay heave occur it has the potential to grip and apply uplift to the pile. This can be dealt with either by using proprietary anti-heave sleeving which limits (although not eliminates) the ability of the heaving clay to grip the pile or by using full depth reinforcement to anchor the top of the pile down to the working section of the pile below the heave zone. An efficient result may be achieved by using a combination of these two techniques.

Bored piles which mainly achieve their load bearing capacity by friction between the pile concrete and the bearing strata can achieve good resistance against tension loads which is essential for applications such as underpinning schemes using cantilever beams.

Being “drilled” into the ground the installation of augered piles is essentially vibration free. It is possible particularly in vibration sensitive situations to install augered piles where driven piles would normally be used ie. where the underlying strata is granular or rock however this will probably result in an additional cost which may be justified by the particular site conditions.

There are various ground conditions, notably chalk, where the use of augered or driven piles are equally appropriate. The decision as to which type of pile is used will depend on factors such as the need to eliminate vibration and access and actual soil properties. A variation on bored piles can also be useful where unsuitable material exists over rock eg. a backfilled quarry. If tension capacity is required, it cannot be guaranteed that the top of the rock strata



BORED PILING

is clean before filling the pile or the top of the rock strata is inadequate to support the required loads simply by casting a small diameter pile onto it, a socket can be drilled into the rock at the bottom of the pile shaft by use of various percussive drilling techniques to insure a sound contact between the pile and the rock.

It is generally accepted that factors of safety used in the design of bored piles can be reduced following load testing. In the context of the amount of piling required for the average underpinning scheme load testing is both expensive and time consuming and the costs involved generally far exceed the savings result from any resulting reductions in pile numbers and length. For this reason the load testing of piles in underpinning situations is not usually carried out and a Factor of Safety of 3 is adopted.

It is however often considered appropriate to test the integrity of the construction of bored piles and particularly to look for consistencies in the construction of the pile shaft. When constructing open pile bores in dry stable clay the risk of inconsistencies in the pile shaft is low however temporary casing of hollow stem augers are used. There are ground conditions which have the possibility of adversely effecting the integrity of the pile shafts despite the best installation techniques being used and it is often considered appropriate to carry out integrity testing which is relatively inexpensive and involves sending a small shockwave down the pile shaft which is reflected from any inconsistencies which may exist or from the bottom of the pile if everything is satisfactory.

ADVANTAGES AND DISADVANTAGES

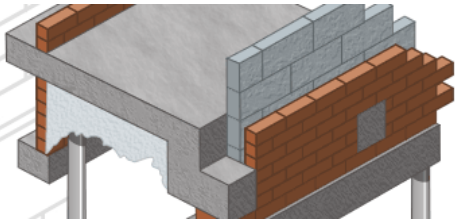
The question of advantages and disadvantages of using bored piling does not really apply as the choice of pile types is mainly dictated by ground conditions. Factors which may influence a decision to use augered piles in a situation where driven piles would generally be considered appropriate are:

- The need to eliminate more vibration
- A requirement for significant tension loads on the piles.

HEALTH AND SAFETY

Briefly, the main health and safety considerations are:

- Bored piling requires the use of relatively large and powerful piling equipment in restricted spaces. Operatives will require correct training and qualifications.
- Pile spoil must be safely removed from site.
- Surplus water may need to be safely removed from site.
- If pile spoil is contaminated appropriate special measures will be required.
- In particularly difficult access conditions cranage and hoisting of piling equipment may be required which will require proper planning and risk assessments and method statements.
- Proper investigation of existing services must be carried out and Permits to Dig obtained from main contractors.
- Not withstanding the apparent adequacy of site investigation information there is always the possibility of encountering unforeseen ground conditions. Work must stop



BORED PILING

while proper engineering solutions are developed as a piling technique which essentially requires the drilling of holes in the ground adjacent to existing foundations has, in some circumstances, the potential to destabilise existing foundations.

For detailed Health and Safety information, see ASUCplus ‘Guidelines on safe and efficient underpinning and mini-piling operations’

NOTE

The information provided above is applicable to underpinning within existing buildings and limited access and restricted space working situations.