Minimum Site investigation requirements for foundation design

The introduction of Eurocode a number of mandatory obligations in relation to site investigation are required for compliance.

It is the aim of this document to provide guidance as to the scope of site investigation required for a cost effectively designed foundation scheme.

It is advised that as certain aspects of this process can be iterative, members of the FPS experienced at fulfilling the demands of the structure are involved at an early stage in order to optimise the scope and extent of the ground investigation to facilitate an efficient conclusion.

With the further advancement of building information modelling (BIM) and digital design the availability of AGS format digital data to the designer and use of the FPS E-schedule are also recommended.

BSEN 1997-2 Geotechnical design; Part 2 ground investigation and testing (June 2010) Annex B

Dependent upon the structure the advice on depth and frequency of site investigation varies;

Retaining structures

For a non water retaining structure, the maximum depth should be the greater of either the height to be retained plus 2m or the embedment of the wall plus 2m. In low permeability soils (such as clays) the latter should be extended by a further 3m.

In the case of water retaining structures the depth of investigation should be 2m beyond the depth of the natural impermeable barrier.

Investigation points should be taken within the range of 20-200m apart

Piled foundations for high rise or civil engineering structures

In all cases the depth of investigation should extend beyond the depth of the piles. This depth should be greater than either:

Three times the base diameter.

6m below the pile toe

Or 3 times the shortest length of the relevant pile group.

Individual investigation points should be based on a grid pattern with intersections spaced at a minimum of 15m up to a maximum of 40m

BS8004; 2015 Section 4.2.1 Code of practice for foundations

Additional advice is given for low rise structures;

The frequency of investigation should be no less than 1 for every 100m2 of the building footprint area. The depth of any investigation should be either 3m beyond the pile toe or twice the shortest length of the building, whichever is greater.

BS 5930:2015 Section 17.7.2.2 Code of practice for site investigations

In addition, the following factors should be taken into account when planning the depth of exploration.

The depth of exploration should be sufficient to identify any weak strata beneath the anticipated toe of the pile.

Where it is anticipated that the foundation will required to achieve rock head the boreholes should be of sufficient depth to establish conclusively the presence of suitable founding rock. The rock should then be further explored, usually by means of rotary drilling, to such a depth that the geotechnical advisor is satisfied that there is no possibility of weaker strata occurring beneath.

If any structure requiring piled foundations is likely to be affected by subsidence due to mining or any other causes, greater exploration depths than those recommended might be required so that basic geological data can be obtained. Permission should be sought from the coal authority to enter should any invasive drilling be necessary in coal seams. A coal mining risk assessment from the same source may also be required depending on the risk profile of the development.

Further useful information on specific aspects can be found in;

ICE manual of ground engineering (2012)

NHBC foundation efficient design of piled foundations for low rise housing (2010)

NHBC technical standards (2018) chapter 4.1

JDB 1.3.19