



Certification Performance Criteria Guidance

B4.5 Ground Improvement

Revision A

Performance Criteria

Where ground improvement techniques are proposed to improve the nature of the ground, Certifiers must satisfy themselves that the level of performance specified for the treated ground is compatible with that assumed in the calculations for the design of the foundations and that there has been reasonable enquiry to see that the required performance can be achieved.

Where ground improvement techniques have been used to improve the nature of the ground prior to certification, Certifiers shall satisfy themselves that adequate testing has been carried out to demonstrate the improved nature of the ground and that the test results have been made available to the designer of the foundations.

Background

Section 1.1.4 in the Technical Handbook explains that the foundations of buildings should be designed to sustain and transmit the loadings to the ground in such a manner that there will be no ground movement which will impair the stability of the building or the stability of buildings in the vicinity.

Where it has been determined that the nature of the ground is such that it is likely that significant ground movement will occur there are a number of techniques which could 'improve' the ground making it possible to support the loadings from buildings, without impairing the stability of the building or of other buildings.

Such techniques include dynamic compaction, vibro compaction, vibro replacement (e.g. vibro stone columns, vibro concrete columns).

Techniques which improve the nature of the ground solely by changing its compaction do not require a building warrant and therefore there is no requirement for the design to be certified. Techniques which involve the introduction of material into the ground, e.g. stone or concrete do require a warrant and these such designs will require to be certified.

Whichever technique is used, Certifiers must undertake sufficient enquiry to satisfy themselves that any ground improvement works which have been carried out provide the level of performance that has been assumed in the calculations for the substructure.

Where the work is still to be undertaken Certifiers should satisfy themselves that the specified performance for the ground improvement works is consistent with that assumed in the calculations for the substructure and that appropriate site testing has been specified.

Guidance

Certifiers must see that drawings, specifications, reports, etc. detailing the works undertaken, or to be undertaken, including any subsequent testing have been prepared and appropriately checked and that level of performance achieved is as assumed in the design for the substructure of the building.

CIRIA Publication C573 'A guide to ground treatment' describes a wide range of techniques and the physical principles involved. General guidance is given on the matters to be considered with particular attention given to design responsibilities.

Useful guidance is also contained within Part 4 of the NHBC Guidance Notes Section 4.1 in the case of Vibratory Ground Improvement.

Ground Improvement schemes generally require the input of a specialist contractor. The contractor will often be involved in the investigation and may advise on the most suitable method of treatment and establish performance criteria for the improvement works e.g. bearing capacity and settlement characteristics. It is essential that the Certifier checks that the performance criteria are compatible with the design of the substructure.

Where appropriate, the certification of the design of ground treatment using vibro stone columns may be carried out using the third party designed details option, with the work included on Schedule 1. Detailed guidance on the use of this option is given in B1.4. It should be noted that this option is only to be used where the finalisation of the design is being carried out by a specialist contractor; the warrant drawings must contain sufficient details of the initial or conceptual design and there must be adequate justification for this design.

The BSD publication 'Procedural Guidance on Certification including information to be submitted with a Building Warrant Application' April 2010 version 2 (sometimes referred to as the Blue Book) provides further details of what information should be included in the warrant submission which includes:

- Layout of treatment (including diameter and notional centres of stone columns where applicable)
- The required Safe Bearing Capacity
- Site Testing Details

Examples of Major Non-conformances

Absence of or grossly inadequate evidence of the Certifier's review of the proposed ground improvement techniques.

Where ground improvement has been carried out prior to certification, absence of or grossly inadequate evidence that the Certifier has reviewed the testing results.

Failure to demonstrate that the ground improvement measures undertaken or to be undertaken have been assessed and that these are taken into account in the design of the foundations.

Drawings/specification do not describe requirements for site testing, where the works are still to be undertaken.

Failure to demonstrate that the extent of the ground improvement measures has been identified or defined.

Examples of Improvement Issues

Insufficient evidence of the Certifier's review of the proposed ground improvement techniques.

Where ground improvement has been carried out prior to certification, insufficient evidence that the Certifier has reviewed the testing results.

Failure to indicate the extent of any ground improvement works on the warrant plans.

Requirement for site testing inadequately described on the drawings or in the specification, where the works are still to be undertaken.

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