

## Drafting a performance specification

The procedure for drafting a Performance Specification may be operated in various ways. The two most common applications are as follows.

- (a) The Engineer provides a piling layout showing the location of individual piles required to carry stipulated working loads (which should also include a Pile Load Schedule). The Engineer may specify a minimum cross-sectional area, and should also refer to cut off levels for the piles. In this case the specialist is able to use judgement on the optimum pile diameter/length to suit the applied loads and soil conditions on the site.
- (b) The Engineer provides a plan showing the amount and location of vertical loads and any other forces to be carried by the piled foundation but does not specify the working loads of the piles. In this case the specialist piling contractor is responsible for determining the required layout of the piles as well as their individual design and should take into account any local eccentricities which may arise due to tolerances in position of the piles. This option may result in a wide variety of solutions being presented which require careful review both technically and commercially by suitably experienced personnel.

The attention of the Contractor should be drawn to special loading conditions caused by surcharging, removal of support, down drag or the like.

In order that the Engineer may ensure that the piled foundation and the structure to be supported will be compatible in terms of soil-structure interaction, he must consider the behaviour not only of an individual pile but also of the groups and the overall piled foundation before specifying the performance requirements for the piles (Institution of Structural Engineers, 1988).

Where a piling layout is provided by the Engineer, the specified working loads to be carried by the individual piles should be stated and a Pile Load Schedule included. In addition the limitations on settlement at the head of each individual pile type when subject to a specified proof load, and having due regard to the subsoil conditions should also be provided. It follows that these criteria can be specified only by the Engineer responsible for the design of the structure as a whole, who is in a position to form a judgement as to the capacity of the structure to resist total but more importantly differential settlement. He must therefore ensure that the performance criteria take into consideration the group action of all the piles supporting a structure with due recognition of the subsoil conditions, including those well below the toe of the pile groups.

When the working load of the individual piles is not specified, the specification of performance requirements becomes more difficult and criteria have to be related to the support of the individual loads which may be carried by individual piles or by pile groups, in terms of both factors of safety and relative settlements at service loads.

Irrespective of the type of performance specification, the Engineer must avoid requirements which are unrealistic in terms of the soil conditions within which the piles are to be constructed. He must take account of the fact that any limitations on settlement of the head of the pile must be greater than the elastic response of the pile shaft, having due regard to load-shedding through shaft adhesion.

Although the use of a performance specification may impose a design responsibility on the specialist piling contractor, subject to the terms and conditions of the main contract, the Engineer must bear in mind that this may not relieve him of his own ultimate design responsibility for such work and, in particular, the duty to satisfy himself that the type and design of the piles offered by the specialist contractor are suitable for construction in the ground conditions and are compatible with the site environment.

The specialist piling contractor should be required to furnish with his tender full details of the type of pile offered, its expected performance under load, the standards of control he intends to use, how the calculation and checking of the load-bearing capacity and settlement of the piles will be carried out, and the tests he proposes to undertake on site.

Although every effort has been made to check the accuracy of the information and validity of the guidance given in this publication, the Federation of Piling Specialists do not accept any responsibility for mis-statements contained herein or misunderstanding arising herefrom.