

SUB-COMMITTEE STUDY - PILING CONDITIONS

Background

As a result of problems encountered with Piling work in the UK and also overseas, various underwriters have attempted to apply Piling conditions to restrict policy cover. The greatest problems concern temporary works and particularly sheet pile constructions. To a lesser degree, there are also difficulties inherent with the formation of permanent load bearing piles.

In the absence of any uniform approach a sub-committee have studied the topic, in association with an experienced consulting engineer, and would recommend consideration of adoption of the views contained herein. This paper follows the note dated 09.09.94 circulated to members in advance of (he group meeting in October 1994, and the paper issued in June 1995.

Objective

To produce standard market conditions which exclude "trade type" risks, such as:

Costs which the Piling contractor expects to incur and has (or should have) already built into his pricing equation

Loss or damage which is inevitable

Costs which a Piling contractor has not included in his contract price tender in order to secure the contract by competitive pricing

Inadequate or under-designed Piling where such arises at the choice of the Piling contractor

Loss or damage due to inadequate technique, skill, or care by the Piling contractor

Costs arising due to inability to prove the cause of loss or damage because the Piling contractor has not maintained adequate piling records, or notified early enough.

Some of these items will overlap. and some will be more properly dealt with by the policy defects and betterment exclusions.

The Piling Conditions included in this note are proposed for general application both in respect of temporary and permanent works.

The intentions of the Piling Conditions are hopefully self-explanatory, but it may be helpful to highlight a few points as follows:

Conditions a) & b) It can be extremely difficult subsequently to prove that damage below ground occurred during driving. A reputable Piling contractor will maintain adequate records, and will provide early notification of driving problems, so that the driving operation can be witnessed.

Sheet piles continue to reach new frontiers. Piles go deeper and are used in increasingly challenging ground conditions. Insurers can expect demands on the quality of piling work to increase.

Conditions c) & d) If loss or damage arises from a cause other than the piling work itself indemnity is provided.

Condition e) The financial consequences of a contractor stopping works in order to redesign and upgrade a revealed substandard temporary works method, including penalties for delay, can be very substantial. He may prefer to continue with the original method on the basis that the damage/disruption which may result could be the lesser, and might be something towards which insurers could contribute.

The above Piling Conditions may require additional sections or amendment particularly for contracts involving complex piling schemes. In such circumstances underwriters should technically evaluate the piling method and enhance the Conditions according to the circumstances prevailing.

For guidance purposes the following should also be of assistance:

- i) Temporary piling often does not have a formal specification and thus significantly relies on the skill of the piling contractor, without independent instruction or supervision. Underwriters may consider that a risk or a contractor demands greater investigation into systems, monitoring, records and adequacy of design.
- ii) The re-use of piles in temporary works within (the same site, or from previous sites, can cause problems. Such repeat usage can affect straightness of the pile, and/or, the clutch integrity. It is common for deformed pile heads to be 'burnt off', which can then lead to driving problems in addition to repeat usage problems.

Piles which exhibit pronounced head deformation during driving may well also be suffering declutching and/or deformation at their toes. Minor head deformation is commonly accepted. It is important that the insured understands that he risks his cover if he persists in the face of continuing pronounced head deformation.

(Pronounced head deformation shows that the hammer energy is being used in wasteful head damage instead of driving the pile. It indicates that piles are reaching refusal conditions and/or that the equipment/pile/ground system is wrongly balanced).

- iii) If any piles refuse under an appropriate hammer, special care is required to minimise the risk of damage, deformation and declutching. Records of any special measures adopted to obtain penetration must be in the form of a written procedure requiring early confirmation of satisfactory pile behaviour when using such techniques.
- iv) Where wall piles fail to reach the planned penetration, bulk excavation should not be carried out to depth until a revised design has been produced by the appropriate engineer. Safeguards should always be established to avoid over excavating.
- v) Proper records should be kept available of:
 - details of piling, the hammer type and pile head protection
 - the pile driving support system (frame and ground stability)
 - occasional regular driving records. For bearing piles, hammer drop and set should be recorded for each one.
 - detailed notes of any incident, or of unexpected hard driving.
- vi) Where declutching of interlocking piles is revealed during initial excavation, the contractor should investigate the likelihood of further declutching and assess the effect of such on the integrity of the piled wall and re-phase the excavation accordingly.
- vii) Composite piling systems involving King Piles which alternate with sheet pile infills (so-called 'combi walls') are extremely difficult to control in terms of quality. Spacing and vertical integrity is critical and effectiveness of the seams and precision of links between piles requires skilled workmanship. The position of the King Piles after each is driven, should be established and recorded. Vertical integrity can be particularly difficult when ground is pre-bored.
- viii) Problems with Composite pile systems should be catered for by the Piling Conditions, but where difficult piling conditions exist, or deep coffer dams are involved underwriters should expect increased controls.
- ix) The use of Bentonite (or the like) related equipment requires special consideration. Such equipment/systems call for particular skills.
- x) Loss/Seepage of Bentonite (or the like) into ground voids/fissures may cause the collapse of an open bore hole or diaphragm wall. Thorough ground investigations should be undertaken to avoid this. The same applies to loss of circulation, and there should be standby procedures to cover pump, power or pipe failure.

- xi) Cast 'in-situ' piles are particularly vulnerable to disturbances of surrounding ground while they are unset. Where a contract suggests significant exposure in this connection, underwriters may wish to exclude damage so caused. It would be difficult for underwriters to prove that damage occurred within a specified time period and it may be preferable therefore to reverse the burden of proof to the contractor, similar to the approach with damage during driving in Piling Condition (a).

With this type of pile it is usually possible to determine whether damage occurred while the piles were 'unset' or not. Some underwriters have attempted to deal with the problem by excluding losses arising within 48 hours of casting. However this approach can fail as it is generally impossible to determine whether damage occurred within a short specific time period. Also, the contractor may be using retarders in the pile material and this will render the setting time even more difficult to determine.

Another example of problems with cast in-situ piles is 'necking'. This can occur due to extraction of the temporary lining too quickly as the concrete is poured, which leads to 'necking' of the pile or ingress of non-cohesive soils into the pile as it is cast. It is simple and economical for the piling contractor to perform an 'echo sounding' check in order to establish and record that piles are sound when complete, or otherwise.

- xii) In respect of permanent load bearing piles underwriters may also wish to contain the risk by specifically limiting indemnity to the original tender cost per pile.
- xiii) A contractor may seek to blame design or a common fault in workmanship or choice of materials, so that only one deductible will apply. If the underwriter wishes to remedy this situation he could specify an excess applicable to each individual pile.

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