Building and Construction Authority

We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment.

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Dear Sir / Madam

GUIDELINE ON SUBMISSION OF AMENDMENT AND RECORD PILING PLANS

The Building Control Regulations (Regulation 18) require that where it is desired that any building works deviate from the approved plans of the building works involving material changes, the Qualified Person (QP) shall submit amendment plans of the building works to the Commissioner of Building Control for approval before construction. Where the deviations involve immaterial changes to the approved plans, the QP shall only be required to submit to the Commissioner of Building Control, upon completion of the building works, record plans incorporating all the immaterial changes.

2 A series of dialogue sessions with IES and ACES were held to discuss and work out a set of guidelines on what constitute material changes in the context of piling works. To assist the professionals in determining whether changes to the piling works constitute major or minor deviations, BCA has prepared the "Guideline on submission of amendment and record piling plans".

3 The guideline is applicable to foundation structures, which include cast in-situ bored piles, barrette piles, diaphragm walls or contiguous bored pile walls which act as load bearing structures, percussion piles and jack-in piles. In addition, examples of immaterial changes to the piling plans are also listed.

4 I would appreciate it if you could disseminate the contents of this circular and the guideline to your members. The guideline is also available on our website: http://www.bca.gov.sg/StructuralPlan/asp_duties06.html. Should you need any clarification, please contact me or Dr Yet Nai Song at Tel: 63252106 or email to: yet_nai_song@bca.gov.sg. Thank You.

Yours faithfully

CHAN BEE BEE (MS)
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Guideline on Submission of Amendment and Record Piling Plans

Introduction

1. This guideline outlines what constitute material and immaterial changes in piling works. Immaterial changes are to be incorporated in the record plans whereas material changes require submission of amendment piling plans for approval before construction.

Amendment Plans

2. The Building Control Regulations require that where it is desired that any building works deviate from the approved plans of the building works, and if the deviations involve **material changes**, the Qualified Person (QP) shall submit **amendment plans** of the building works to BCA for **approval before construction**.

3. "**material changes**", in relation to building works, is defined in the Regulations as any changes that affect the key structural elements of the structure to such an extent as to require a re-design of the key structural elements.

Record Plans

4. Where the deviations involve **immaterial changes**, there is no need to obtain prior approval from BCA before construction. The QP shall only be required to prepare and submit to BCA, **on completion** of the building works, **record plans** showing all the immaterial changes, together with the appropriate certificates.

5. "**immaterial changes**", in relation to building works, is defined as any changes that either do not affect any key structural elements or that affect the key structural elements but the effects are localised in nature and do not require a re-design of the key structural elements.

What constitute material changes in piling works

6. Any material change in piling works will require **amendment piling plans** to be submitted before construction works on the piling works that have deviated from the approved plan are carried out.

7. Deviations from the approved plans for piling works which are considered as material changes will include the following instances:

(a) Piling Layout

Changes made to the configuration of piling layout due to major changes made in the design of structures that are to be supported by the piles.

(b) Cast In-situ Bored Piles, Barrette Piles and Diaphragm Walls or Contiguous Bored Pile Walls which act as load bearing structures

(i) Where the **allowable pile capacity** shown on the approved piling plans is based on unit skin friction and unit end bearing parameters for different strata of soil/rock, and the QP will verify these design parameters through **instrumented ultimate pile load tests** on site, any change made to the **unit skin friction or unit end bearing parameters** will constitute as "material changes" to the approved piling plans.

(ii) Where, in addition to the **allowable pile capacity** shown on the approved piling plans which is based on unit skin friction and unit end bearing parameters for different strata of soil/rock and the QP will verify these design parameters through **instrumented ultimate pile load tests** on site, a requirement for specific **pile embedment length into competent rock** is also specified on the approved plan –

- any change made to the **unit skin friction or unit end bearing parameters**; or
- any **reduction in the pile embedment length** into competent rock,

will constitute as "material changes" to the approved piling plans.

(c) Percussion Piles where the **allowable** pile capacity is based on pile penetration length and pile set criteria

Pile penetration length is derived by calculations using assumed unit skin friction and unit end bearing parameters, which shall be verified by pile load tests. Pile set criteria, derived using the dynamic formula based on the hammer weight, height of drop, efficiency of the hammer used, set and temporary compression to be achieved and the adopted factor of safety, have to be specified on the piling plans. The following changes will constitute as "material changes" to the approved piling plans –

(i) a lower pile set criterion; or
(ii) a lower driving energy; or
(iii) a reduction in pile length of more than 20% or any other reduction in length which is assessed by the QP to be critical to affect the **allowable pile capacity**.

(d) Jack-in Piles where the **allowable** pile capacity is based on pile penetration length and pile termination criteria

Pile penetration length is derived by calculations using assumed unit skin friction and unit end bearing parameters, which shall be verified by pile load tests. Pile termination criteria, derived based on the magnitude and minimum duration for the application of jack-in load, minimum number of cycles and any other factor of safety, have to be specified on the piling plans. The following changes will constitute as "material changes" to the approved piling plans –

(i) a lower pile termination criterion; or
(ii) a reduction in pile length of more than 20% or any other reduction in length which is assessed by the QP to be critical to affect the **allowable pile capacity**.

8. Table 1 summarises the instances which are deemed as involving material changes to the piling works.

Table 1 - Material changes to the piling works

Type of piling system	Adopted Design Criteria	What constitutes Material Changes
All types	• Allowable pile capacity • Load on piles	• Any change in the load on piles resulting from major changes in the design of structure that are to be supported by the piles.
• Cast In-situ Bored Piles • Barrette Piles • Diaphragm Walls or Contiguous Bored Pile Walls which act as load bearing structures	• Unit Skin Friction • Unit End Bearing	Any change in the adopted design criteria
	• Unit Skin Friction • Unit End Bearing • Pile Embedment Length into Competent Rock	• Any change in any of the adopted design criteria; or • Any reduction in embedment length into competent rock
Percussion Piles	• Pile Length • Pile Set Criteria	• A lower pile set criterion on site (e.g. larger final pile penetration per blow or larger temporary elastic compression); or • A lower driving energy used; or • A reduction of more than 20% in pile length or any other reduction in length which is assessed by QP to be critical to affect the allowable pile capacity.
Jack-in Piles	• Pile Length • Pile Termination Criteria	• A lower pile termination criterion on site (e.g. lower jack-in load or shorter duration for the application of jack-in load); or • A reduction of more than 20% in pile length or any other reduction in length which is assessed by QP to be critical to affect the allowable pile capacity.

What constitute immaterial changes in piling works

9. Departure or deviations involving immaterial changes to the approved piling plans should be compiled and shown in the record piling plans which are to be submitted on completion of the piling works.

10. Examples of immaterial changes captured in the Record Piling Plans include –

    (a) Localised minor changes on the number and size of piles in a pile group as long as the allowable pile group capacity is adequate for the loads on piles;
    (b) Localised minor changes on the orientation of piles in a pile group;
    (c) Eccentricities of piles within permissible construction tolerances;
    (d) Eccentricities of piles that exceed permissible construction tolerances but allowable capacity of every individual pile in any pile group is not exceeded.

11. The details to be incorporated in the Record Piling Plans include the following –

    (a) As-built pile penetration length;
    (b) Location and type of pile load tests;
    (c) Pile eccentricities (to be submitted before commencement of basement floor or 1st storey floor, whichever is earlier);
    (d) Pile set (for percussion piles);
    (e) Pile embedment depth into competent material, where applicable.