

Guidelines on Submission of Record Structural Plans

1. The building regulations require that if the Qualified Person (QP) for whom the building works are to be carried out intends to have any building works depart or deviate materially from the approved structural plans, the QP shall submit the structural plans to BCA for approval of plans. Only departure or deviation involves immaterial changes⁴ to the approved structural plans will be captured in the record structural plans.
2. If the QP intends to have any buildings works depart or deviate from the approved structural plans during construction, he must first determine if the affected structural elements¹ are key structural elements². He must also determine that if a re-design of these affected structural elements is required.
3. If the departure or deviation involves key structural elements and a re-design of the key structural elements is required, such departure or deviation should be termed as material changes³ to the approved structural plans, and submission of amendment structural plans for approval is required.
4. List of material changes to the approved structural plans that require the submission of amendment structural plans for approval is attached (see Appendix I). This list will be expanded if necessary.

¹ “Structural Elements”, which is defined in the Building Control Regulations, means those parts or elements of a building which resist forces and moments and includes foundations, beams, columns, shear cores, slabs, roof trusses, staircases, load bearing walls and all other elements designed to resist forces and moments but exclude doors, windows and non-load bearing walls.

² “Key Structural Elements”, which is defined in the Building Control Act, means the foundations, columns, beams, shear cores, structural walls, struts, ground anchors and such other parts of a building which are essential for its support and overall structural stability.

³ “Material Changes”, which is defined in the Building Control Regulations, in relation to building works, means 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.

⁴ “Immaterial Changes”, which is defined in the Building Control Regulations, in relation to building works, means any changes that –

- (a) do not affect any key structural elements; or
- (b) affect the key structural elements but the effects are localised in nature and do not require a re-design of the key structural elements.

Appendix I

*Examples of Material Changes of Structural Works

Changes made in	Material Changes
<p>1. Sub-Structural Elements</p> <p>eg. Pilecaps, Footings, Rafts, etc.</p>	<ul style="list-style-type: none"> • Add pilecaps, footings and rafts. • Combine multiple pilecaps into a larger pilecap, etc. • Reduction in sizes of pilecaps, footings, rafts.
<p>2. Reinforced Concrete Structures</p> <p>eg. Beams, including RC, Precast and Prestressed Beams</p>	<ul style="list-style-type: none"> • Add beams, including transfer beams. • Continuous Beams become Simply Support Beams or cantilevered beams or vice versa. • Changes in tendon profile of prestressed beams. • Add RC staircase.
<p>eg. Columns, including RC and Precast Columns</p>	<ul style="list-style-type: none"> • Add columns, including transfer columns. • Re-orientate RC and precast columns. • Changes to the shape of the columns.
<p>eg. Slabs, including Precast and Prestressed Slabs and Flat Slabs</p>	<ul style="list-style-type: none"> • Add cantilevered slab with span more than 1000mm. • Changes in tendon profile of prestressed slabs.
<p>eg. Walls, including RC, Precast and Prestressed Walls</p>	<ul style="list-style-type: none"> • Add RC retaining wall with a visible height of more than 1500mm. • Add RC or precast or prestressed walls. • Changes from propped cantilevered retaining wall to free cantilevered retaining wall.

3. Steel structures	<ul style="list-style-type: none"> • Changes of connection design from welded joints to bolted joints or vice versa. • Add steel beams and columns, including transfer beams and transfer columns. • Re-orientate steel stanchions. • Changes to the shape of the steel columns.
4. Changes of structural material and design	<ul style="list-style-type: none"> • Pad footings change to combined footings or raft or vice versa. • Pile foundation changes to footings or raft or vice versa. • Changes from RC structural elements to timber or steel or precast or prestressed or vice versa.
5. New Structures added	<ul style="list-style-type: none"> • All building works other than the Insignificant Building Works as listed in the First Schedule of the Building Control Regulations. eg. Add single storey covered linkway, carporch, bin centre, guardhouse with an area exceeding 10m²

* The listed examples above are not meant to be exhaustive. If there are doubts on the interpretation of the examples listed above, the Building Control Act and its Regulations shall take precedence.

Guidelines on Submission of Record Piling Plans

1. The building regulations require that if the Qualified Person (QP) for whom the building works are to be carried out intends to have any building works depart or deviate materially from the approved piling plans, the QP shall submit the amendment piling plans to BCA for approval of plans. Only departure or deviation involves immaterial changes to the approved piling plans will be captured in the record piling plans.
2. Any major changes made to the configuration of piling layout due to changes in load taking will constitute as “material changes” to the approved piling plans and submission of amendment piling plans for approval is required.
3. Generally, the geotechnical design of the piles shown in the piling plans submitted to BCA can be categorised as follows -

Reinforced Concrete Bored Piles

- I. Design of Piles based on Design Parameters verified by Instrumented Ultimate Pile Load Tests

The QP specifies the pile capacity, the unit skin friction and unit end bearing parameters for different strata of soil/rock on the piling plans for approval. In this case, the QP will verify these design parameters through instrumented pile load tests at site. Any changes made to the unit skin friction and/or unit end bearing parameters will constitute as “material changes” to the approved piling plans, and submission of amendment piling plans is required.

- II. Design of Piles based on Design Parameters and Pile Embedment Length into Competent Rock

The design of piles is based on unit skin friction and unit end bearing for different strata of soil as well as requirements of pile embedment length into competent rock. In this case, in addition to the verification of design parameters through instrumented pile load tests, the constructed pile must satisfy the approved pile embedment length into competent rock. Any changes made to the unit skin friction and/or unit end bearing parameters and/or any reduction in the pile embedment length into competent rock will constitute as “material changes” to the approved piling plans. Submission of amendment piling plans is required.

Percussion Piles

III. Design of Piles based on Pile Penetration Length and Pile Set Criteria

The designed pile capacity is based on pile penetration length and pile set criteria. Pile penetration length is derived by static calculation using assumed unit skin friction and end bearing resistance, which shall be verified by pile load tests. Pile set criteria contain weight, height and efficiency of the hammer used, set and temporary compression to be achieved, all to be specified together with the dynamic formula used in the piling plans. If the installed pile cannot achieve the pile set criteria on site or a lower driving energy is used or the reduction in pile depth is more than 20%, amendment piling plan submission is required.

4. In summary, items I to III are tabulated in Appendix I.

Appendix I

Category	Adopted Design	Material Changes
I	Unit Skin Friction and Unit End Bearing	Any changes
II	Unit Skin Friction and Unit End Bearing and Pile Embedment Length into Competent Rock	Any changes in parameters or any reduction in embedment length
III	Pile Length and Pile Set Criteria	Lower driving energy used or larger set or larger temporary compression adopted, or reduction of pile length by more than 20%

5. List of immaterial changes captured in the Record Piling Plans

- a. Localised minor changes on number of piles and pile size as long as pile capacity is adequate for the column loads
- b. Localised minor changes on configuration of pile group
- c. Eccentricities of piles within permissible construction tolerances