Building and Construction Authority

An MND Statutory Board

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Dear Sir/Madam

ENHANCED REQUIREMENTS FOR ENSURING THE SAFETY OF DEMOLITION WORKS

Objective

This circular is to inform the industry of the requirements (summarised at paragraph 6 and explained at paragraphs 8 to 11 below) ("**enhanced requirements**") for demolition works regulated under Part II of the Building Control Act 1989 ("**BC Act**"), which shall apply to a building (or any part thereof) where:

(a) the building is more than 5 storeys high; or

(b) the building is more than 40 years old*, but excluding any bungalow, semi-detached, terrace or linked house ("**residential landed properties**"). **The age of the building shall be determined from the date of the temporary occupation permit (or its equivalent at the time) or certification of statutory completion (or its equivalent at the time), whichever is earlier, to the date of submission of the first structural plan under section 5(1) of the BC Act for the project involving the demolition works.*

("**applicable building**")

Background

2. Paragraph 7 of the objectives and performance requirements set out in the Fifth Schedule of the Building Control Regulations 2003 ("**BC Regulations**") relating to 'Structural Design and Construction' states that:

> "If a building or structure or any part thereof is to be demolished, the demolition works shall be carried out safely and without impairing the stability of any other part of that building or structure or another property."

3. In the Approved Document, paragraph B.3.6.1 states that: "The demolition works shall conform to the Code of Practice for Demolition – SS 557" ("**SS 557:2010**"). In turn, SS 557 stipulates, among other things, that:

(a) The demolition plan should be prepared with findings from a detailed survey of the building to be demolished and its vicinity. Throughout all stages of the demolition, it is essential to maintain the structural stability of the building being demolished, including neighbouring and adjoining buildings and temporary works. This is to be supported by a stability report with the necessary and appropriate calculations;

(b) The building should be examined and, if necessary, tests carried out to determine its condition, and whether the constituent materials have deteriorated in strength which could result in structural instability due to the demolition works.

4. BCA considers the demolition works in respect of the applicable buildings to have greater safety risks and hence BCA will be imposing the enhanced requirements on the applicable buildings.

Commencement date

5. The enhanced requirements for demolition works shall apply to an applicable building where the first structural plan for the project is submitted to the CBC under section 5(1) of the BC Act on or after 1 November 2022.

Summary of the enhanced requirements

6. A summary of the enhanced requirements for demolition works carried out in respect of an applicable building is as follows:

(a) Pursuant to Regulation 10B(2)(a) of the BC Regulations, the demolition sequence in the demolition works plans submitted to the Commissioner of Building Control ("**CBC**") under section 5(1) of the BC Act ("**demolition works plans**") must include details of the soft stripping (explained at paragraph 8 below) to be carried out by the builder appointed under section 8(1)*(c)* of the BC Act ("**Builder**"); and

(b) The Qualified Person appointed under section 8(1)*(b)* or 11(1)*(d)*(ii) ("**QP**") must conduct a detailed inspection and appraisal of the structural elements of the building ("**structural appraisal**") after soft stripping has been carried out by the Builder. Following this, the QP must, pursuant to section 6(2)*(e)* of the BC Act, prepare and submit the following additional documents to the CBC, along with the application for permit to carry out structural works in respect of the demolition works under section 6(1) of the BC Act ("**demolition permit**"):

(i) the declaration in **Annex A**; and
(ii) a structural appraisal report, of which the requirements are minimally set out at paragraph 10 below.

Please refer to the flow chart at **Annex B** which summarises how the enhanced requirements interact with the current submission requirements under sections 5(1) and 6(1) of the BC Act in respect of demolition works.

7. Notwithstanding the enhanced requirements, please note that project parties remain responsible and are expected to exercise their professional judgment to ensure that regulation 26 of the BC Regulations as well as any other requirements in the BC Act and its subsidiary legislation are complied with. For example, project parties should consider carrying out soft stripping and conducting a structural appraisal of a building (even where the building is not an applicable building) where the circumstances call for the same.

Requirement for soft stripping

8. The objective of soft stripping is to expose the structural elements of the applicable building for the purpose of enabling the QP to carry out a detailed structural appraisal of the

applicable building. Such soft stripping shall include but not be limited to the removal of all fixtures and fittings, partitions and ceilings, and all types of internal claddings.

Requirement for structural appraisal report

9. After soft stripping has been carried out by the Builder, the QP must conduct a structural appraisal of the applicable building and prepare a structural appraisal report. The declaration at **Annex A** and the structural appraisal report must then be submitted to the CBC, along with the application for demolition permit, pursuant to section 6(2)*(e)* of the BC Act.

10. The structural appraisal report prepared by the QP must minimally:

(a) identify and address any weaknesses, defects, deterioration in or other damage to the structural elements of the applicable building, or otherwise certify that there are no such weaknesses, defects, deterioration in or other damage to the structural elements;

(b) identify and address any risks posed by structures which do not have any redundancies, or which are subject to tension forces (e.g. cantilever structures, hanging columns, transfer structures, etc), or otherwise certify that there are no such risks posed by structures which do not have any redundancies, or which are subjected to tension forces;

(c) identify and address any risks posed by structures which are constructed of timber or masonry, or otherwise certify that there are no such risks posed by structures which are constructed of timber or masonry;

(d) identify and address any risks of an unplanned collapse due to change of use or loading regime in the course of the proposed demolition works, or otherwise certify that there are no such risks of an unplanned collapse due to change of use or loading regime in the course of the proposed demolition works;

(e) certify that the demolition works plans remain adequate for the purpose of ensuring that the demolition works are carried out safely and without impairing the stability of any other part of the applicable building or another/adjacent property or affecting public safety;

(f) where necessary, propose additional measures to ensure that the demolition works are carried out safely and without impairing the stability of any other part of the applicable building or another/adjacent property or affecting public safety throughout the demolition process;

(g) for buildings which are more than 40 years old (as determined in accordance with paragraph 1(b) above) or where the strength or quality of the concrete of the applicable building is in doubt, certify that the appropriate non-destructive tests * to determine the applicable building's condition and its constituent materials have been conducted. Such non-destructive tests include but are not limited to core tests to determine the in-situ concrete strength;
** The tests carried out shall comply with SS EN13791:2009 and its complementary standard SS 592:2013.*

(h) certify that section 5.2.2 of SS 557:2010 has been complied with.

11. Where the structural appraisal reveals that:

(a) the demolition works plans are inadequately prepared for the purpose of ensuring that the demolition works are carried out safely and without impairing the stability of any other part of the applicable building or another/adjacent property or affecting public safety; or

(b) the demolition works plans do not tally with the actual structural layout or structural framing of the building,

the QP is to submit amendment demolition works plan for approval under section 5A(1) of the BC Act.

Reminder on ensuring safety of demolition works

12. Separately, we would also like to remind the QPs of the matters set out in **Annex C**.

Clarification

13. Please disseminate the contents of this circular to your members. If you need any clarification, please submit your enquiry through BCA's Online Feedback Form at https://www.bca.gov.sg/feedbackform/. Thank you.

Yours faithfully



ER. VIVIEN FOO
DIRECTOR
BUILDING ENGINEERING GROUP
BUILDING AND CONSTRUCTION AUTHORITY
for COMMISSIONER OF BUILDING CONTROL

ANNEX A

Declaration by the Qualified Person appointed under section 8(1)*(b)* or 11(1)*(d)*(ii) of the Building Control Act 1989 in respect of the demolition works

(Explanatory notes:

1. *To be submitted together with an application for a permit to carry out structural works pursuant to section 6(2)(e) of the Building Control Act 1989 ("**BC Act**");*
2. *Only required for demolition works involving a building (or any part thereof) where:*
   (i) the building is more than 5 storeys high; or
   (ii) the building is more than 40 years old, but excluding any bungalow, semi-detached, terrace or linked house.*

   **The age of the building shall be determined from the date of the temporary occupation permit (or its equivalent at the time) or certification of statutory completion (or its equivalent at the time), whichever is earlier, to the date of submission of the first structural plan under section 5(1) of the BC Act for the project involving the demolition works.*)

Project Ref. No: ST Ref. No.:

Project Description: (the "**Building**")

Age of the Building:
Number of storey:
Approximate height of the Building:

I, _____ (insert name) hereby certify and declare that:

the Builder appointed under section 8(1)*(c)* of the BC Act had removed all fixtures and fittings, partitions and ceilings and all types of internal claddings ("**soft stripping**") of the Building on _____ (insert dates); and

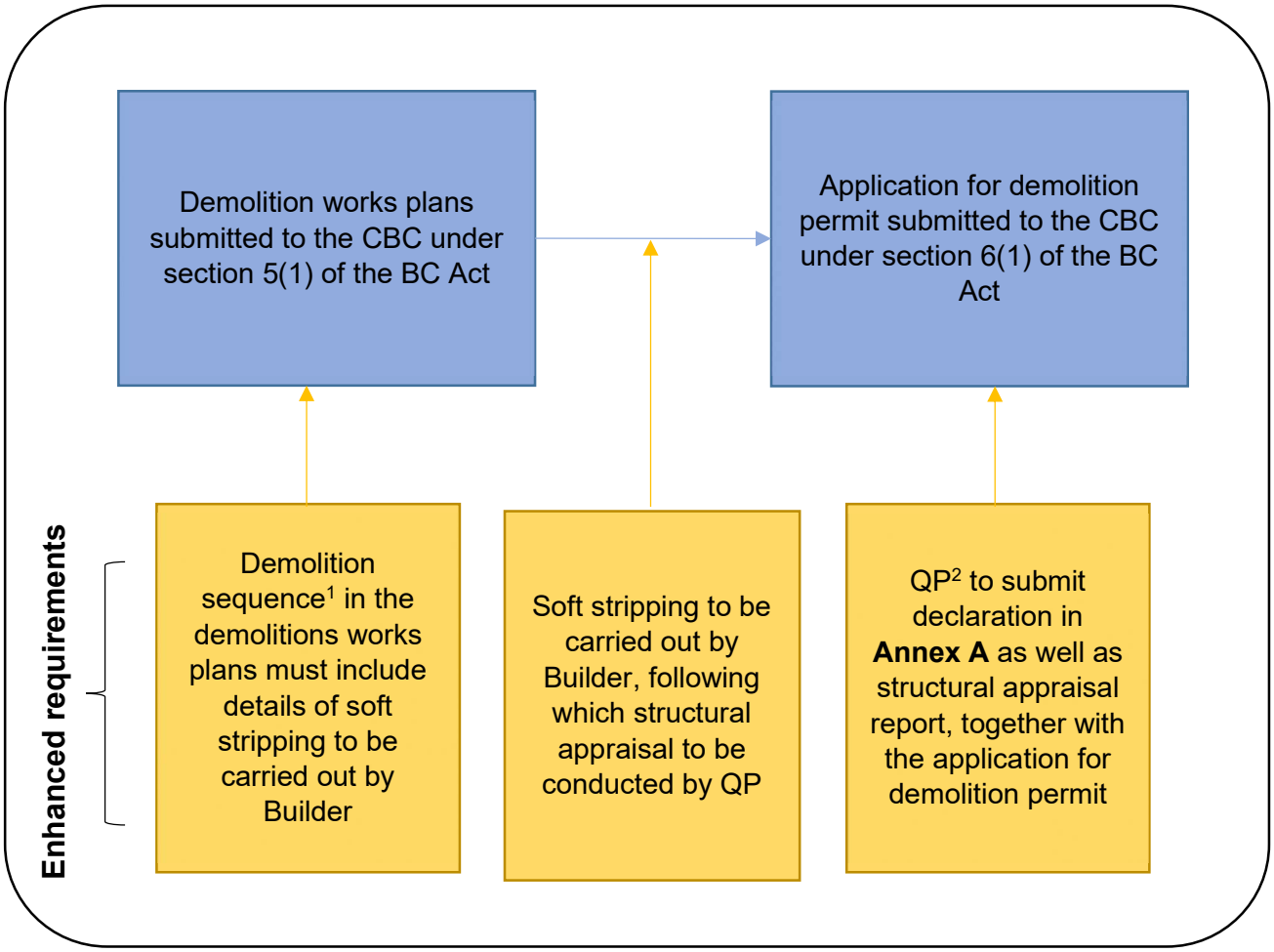
I have on _____ (insert dates) inspected and appraised the structural elements of the Building and, in my opinion, the demolition works shown in the demolition works plans are adequate for the purpose of ensuring that the demolition works are carried out safely and without impairing the stability of any other part of the Building or another/adjacent property or affecting public safety.

Name, signature and stamp
Qualified Person appointed under section 8(1)*(b)* or 11(1)*(d)*(ii) of the BC Act for the demolition works

ANNEX B

FLOW CHART ON THE ENHANCED REQUIREMENTS

This flow chart summarises how the enhanced requirements interact with the current submission requirements under sections 5(1) and 6(1) of the BC Act.



[1] *For sequential demolition, please refer to the checklist at section 2, Annex B of SS 557:2010 for guidance.*

[2] *For applicable buildings where the enhanced requirements apply, it is recommended that the QP for design also be appointed as QP for the supervision works.*

ANNEX C

ENSURING SAFETY OF DEMOLITION WORKS

A. Top down demolition by machines

1. In preparing the demolition works plans, where demolition works are to be carried out by machines which are lifted and placed on the building for the demolition works to be carried out progressively from top down, the Qualified Person appointed under section 8(1)*(a)* or 11(1)(d)*(i)* of the BC Act must ensure that the following are thoroughly reviewed:

    (a) The location of openings for the steel ramp;

    (b) The number of layers and spacing of steel props;

    (c) The demolition sequence for each floor;

    (d) The method and safety measures for demolishing each structural element;

    (e) The safety zones for movement of demolition equipment (e.g. machine mounted breakers/crushers shall not be within a prescribed safe distance from the building's edge or an opening in the floor);

    (f) Adequacy of propping, catch fan, catch platform and safety netting;

    (g) Separate method statement to be provided for demolition of the following elements:

        (i) Prestressed beams or slabs, whether bonded or un-bonded;
        (ii) Precast structures; and
        (iii) Structures with limited load transfer capability.

    (h) Consideration for debris and waste handling, including the maximum height of debris allowed to be accumulated on the floor and location for debris removal;

    (i) Supervision required by accredited site supervisor to avoid overloading from accumulation of debris and that the demolition works are carried out in accordance with the approved plans.

B. Mechanical demolition by machine operating from the ground

2. Where demolition works are to be carried out by machines operated from the ground outside the building (e.g. high reach machines, which are typically equipped with long boom arm):

    (a) The QP must evaluate the risks involved in using such machines and ensure that the demolition works are carried out safely and without impairing the stability of any other part of the building or another/adjacent property;

    (b) Such machines must be operated with a minimum clear space of half the remaining building height to be demolished, which serves as a safety buffer against falling debris. A minimum clear space of half the remaining building height to be demolished should also be provided around the entire parameter of the

building to be demolished. For constricted sites where this is not possible, the QP may wish to consider using a top down demolition method or implementing other containment measures instead;

(c) The demolition works should begin from the highest floor and proceed downwards to the ground, floor by floor and the QP must ensure that the stability of the remaining building is maintained, and not impaired by the accumulation of debris which may result in an unplanned collapse.

***Note**: For more information on the use of high reach machines, please refer to the 'High Reach Demolition Rig – General Notes' by the National Federation of Demolition Contractors.*

C. Other safety considerations

3. Where the demolition works are likely to result in materials and debris falling onto areas of public access or private property that is not a part of the demolition site, protective hoarding, or catch fans should be erected, or a temporary closure be sought to prevent public access. The protective hoarding and catch fans should be of adequate strength for their intended purpose.

4. For demolition works involving buildings that are not applicable buildings (as defined in paragraph 1 of this circular), the QP should nevertheless conduct a structural appraisal of the building before the QP applies for the demolition permit in order to:

   (a) identify any weaknesses, defects, deterioration in or other damage to the structural elements; and

   (b) confirm that the as-built plans used for the preparation of the demolition plan accurately reflect the actual floor layout of the building.

5. For insignificant building works that are being demolished, the QP should remind the Builder to carry out the demolition of such insignificant building works in accordance with the relevant standards and codes of practice.

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