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See **Distribution**

Dear Sir/Madam

A&A WORKS TO OR NEAR CONSERVED BUILDINGS AND MAINTENANCE OF CONSERVED BUILDINGS

Who should know

Building owners, developers, architects, engineers and building specialists

Objective

1. This circular provides approaches to address structural issues that may be encountered when carrying out additions and alterations (A&A) works to or near conserved buildings^[1], particularly shophouses, to safeguard the integrity of the conserved building and its adjoining neighbours, and to remind building owners of their responsibility to regularly maintain their conserved properties. This is to safeguard the integrity of conserved buildings as well as that of the adjoining properties.

Addressing Structural Concerns about Conserved Buildings

2. The bulk of Singapore's conserved buildings are old shophouses and terrace houses which used traditional construction methods and materials such as brick, timber, and stone, and have shared party wall structures. These historic structures are sensitive and prone to damage by vibration and ground movement.

3. New building works carried out, such as to the building façade, roof, party walls, floors, rear extension etc, could cause or exacerbate differential settlement between buildings, between the main building structure and its façade, and between adjacent building façades.

4. Building owners and developers should refer to the guidelines in **Appendix A** for aspects typically considered when preparing to carry out structural works as part of A&A to conserved buildings or intending to carry out works on larger development sites near to conservation areas.

[1] The location of conservation areas and conserved buildings are available online at <https://www.ura.gov.sg/maps/?service=CONSERVATION>

5. QPs submitting such A&A proposals for conservation buildings, sites next to conservation buildings, as well as for large development sites adjoining conservation buildings and areas should factor in the vulnerability of conserved buildings and propose appropriate structural and foundation system to comply with code requirements for the building use throughout its entire design lifespan.

6. QPs and builders should also propose restoration works and protective measures for the conserved building where appropriate. URA's Conservation Technical Handbooks^[2] provide best practices and technical expertise on restoration works to better understand the nature of locally used materials, construction methods and restoration techniques for heritage buildings. A&A proposals to conserved buildings should also comply with Conservation Guidelines^[3].

7. Building owners should seek the necessary approvals from the relevant agencies if carrying out any building works, such as Conservation Permission^[4] from URA. If the works require structural modifications^[5], Structural Plan approval (and Building Plan approval where applicable) is also required from BCA.

Building Owner's Responsibility to Ensure the Regular Maintenance of Their Buildings

8. Conserved buildings should be regularly maintained so that they remain structurally safe. Building owners and responsible parties such as Managing Agents play a key role for the timely maintenance of the structures, facades, and fixtures within their strata areas such that they are in a state of good and serviceable condition. When defects are left unchecked and unaddressed, the structural integrity of any building could potentially be affected, exterior features and appendages attached to building facades may dislodge and pose a safety risk to members of the public.

9. Some common tell-tale signs of defects are:

- a. Spalling concrete, efflorescence, deterioration of structural connections
- b. Cracks in brick piers, debonding of masonry units, beams, or facades,
- c. Termite infestation or rotting of roof timber members,
- d. Signs of water leakages or seepages such as water stains, delamination of plaster or bubbles observed in the wall paint, organic growth, water ponding, etc.

[2] Conservation Technical Handbooks are available online at <https://www.ura.gov.sg/Corporate/Guidelines/Conservation/Best-Practices>

[3] The Conservation Guidelines set out allowable works to retain the essential architectural features and spatial characteristics of the buildings while allowing flexibility for adaptive reuse, they are available online at <https://www.ura.gov.sg/Corporate/Guidelines/Conservation/Conservation-Guidelines>

[4] Requirements for A&A submission to obtain URA's Conservation permission and the definition of Category of Works (Category 1, 2 & 3) are available online at <https://www.ura.gov.sg/Corporate/Guidelines/Conservation/Additions-Alterations> and <https://www.ura.gov.sg/Corporate/Guidelines/Conservation/Additions-Alterations/Types-Works>

[5] New or Modification of structural works not exempted under insignificant building work requires BCA submission. Please refer to <https://www1.bca.gov.sg/public/general-public/building-works-that-do-not-require-plan-submission-to-bca> for more information on insignificant building works.

10. In such situations, we advise building owners to engage a Professional Engineer (PE) or other suitably qualified professional to implement the appropriate rectification work to address the root cause of the defect and prevent further deterioration.

11. **Appendix B** presents requirements for periodic structural inspections and repair and maintenance to conserved buildings.

12. Should you need any clarification, you may contact the following agencies:

Type of Clarification	Contact Authority
Conservation Requirements	URA via URA's enquiry form (https://www.ura.gov.sg/feedbackweb/contactus_feedback.jsp)
ST Submission Requirement	BCA via BCA's Online Feedback Form (https://www.bca.gov.sg/feedbackform/)

Yours faithfully



ER. DR YEI NAI SONG
DIRECTOR
FOUNDATION ENGINEERING DEPARTMENT
For COMMISSIONER OF BUILDING CONTROL
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APPENDIX A

QPs submitting A&A proposals for conservation buildings, sites next to conservation buildings, as well as for large development sites adjoining conservation buildings and areas should factor in the vulnerability of conserved buildings and propose appropriate structural and foundation system to comply with code requirements for the building use throughout its entire design lifespan.

The following table presents the aspects typically considered.

Guidelines on structural proposals as part of A&A to or near Conserved Buildings

No.	Stage	Aspects to be considered (where applicable)	
1	Planning and Design	1.1	<p>Investigate the soil condition at the development site via trial trench, drilled boreholes, and/or desktop study where applicable (e.g., geological map, historical data) to identify the soil stratification, state of the ground condition (e.g., check whether the soil is still consolidating and settling over time) etc.</p> <p><i>The sale and product info of Singapore Geology (2021) Map, the new publication for the geology of Singapore can be accessed via http://go.gov.sg/bundled-geomap-geomemoir</i></p>
		1.2	<p>Assess and design appropriate foundation system to eliminate/reduce some of the known concerns: -</p> <ul style="list-style-type: none">a) Excessive settlement of subject building (e.g., proposed works involve increase in loading due to addition of floors etc.) and consequential heave to adjacent building due to bearing failure from the use of shallow foundation with the presence of soft soil.b) Differential settlement due to incompatible foundation system (e.g., mixture of shallow and deep foundation, or mixture of hard and soft soil formations within the site) between: -<ul style="list-style-type: none">i) the main building structure and its façadeii) the subject building and the adjacent buildingsiii) the façade of the subject building and the

No.	Stage	Aspects to be considered (where applicable)	
			<p>adjacent buildings' façades.</p> <p>c) Vibration caused by the installation of deep foundation.</p> <p>d) Ground movement due to the adoption of displacement piles.</p>
		1.3	Assess the impact of excavation (if any) and provide adequate support or mitigation measures to minimise ground movement and to avoid damage to adjacent buildings.
		1.4	Propose a demolition sequence with the use of appropriate equipment, such as handheld tools, to minimise vibration. Demolition sequence should include measures to redistribute loads (e.g., adequate provision of shoring) if key bracing members or load bearing walls are to be demolished and to ensure adjacent buildings are protected.
		1.5	Design for suitable structural framing system and structural detailing between the façade and the main building structure, and between the façade and adjacent buildings' façade.
		1.6	<p>Carry out comprehensive pre-construction survey to determine the existing structural stability of building and adjacent units, propose adequate instrumentation and monitoring, and measure all cracks.</p> <p>Reference can be made to 2015 BCA Circular "Guidelines on pre-construction survey prior to carrying out construction works" on the required zone to carry out the pre-construction survey based on the type of proposed works.</p>
		1.7	Submit impact assessment to BCA for the proposed works considering the existing condition of adjacent buildings in the planning and design.
		1.8	Design for independent support and foundation (and any other consideration/mitigating measures) so that any new structures do not impose additional load on adjacent buildings during and after construction.
		1.9	Submit a structural investigation report and endorsement by a professional engineer (PE) as part of the planning submission to URA on the existing condition of the

No.	Stage	Aspects to be considered (where applicable)	
			<p>building and any strengthening measures proposed.</p> <p>The structural report should also outline any structural changes to the building, include structural drawings showing relevant changes, and any impact assessment of proposed works near to conserved building where applicable.</p> <p>For structural proposals, including those involving underpinning of facades or foundational works at the five-foot way or party wall of conserved buildings, a method statement for protection and/or restoration of facades and its relevant supporting structures should also be prepared and submitted to URA.</p>
2	During Demolition	2.1	Check that adjacent buildings sustain no damage and monitor during demolition that vibration are within the stipulated review levels.
3	During the Installation of foundation piles	3.1	Provide mitigation measures such as pre-boring, relief wells around the proposed deep foundation, shoulder wall to shelter the effect of soil migration beyond the project boundary and carry out trial installation of proposed deep foundation (if any) to ascertain that impact caused (vibration / ground movement) are within acceptable limits. Provide additional measures where required prior to proceeding with working piles.
		3.2	Check that adjacent buildings are not damaged and monitor that the review levels for vibration and building settlement are not exceeded.

APPENDIX B

Appendix B presents requirements for periodic structural inspections and repair and maintenance to conserved buildings.

1.1	<p>Requirements under the Periodic Inspection regimes</p> <p>The periodic structure inspection applies to all existing buildings other than detached houses, semi-detached houses, terraced or linked houses which are used solely as a place of residence.</p> <p>Building owners are required under Section 28 of the Building Control Act 1989 to ensure that their buildings fulfil the requirements under the Periodic Inspection regimes.</p> <p>Please refer to the following websites for more information on the Periodic Inspection regimes:</p> <ul style="list-style-type: none">a. Periodic structural inspection: https://www1.bca.gov.sg/regulatory-info/building-control/periodic-structural-inspection;b. Periodic façade inspection: https://www1.bca.gov.sg/regulatory-info/building-control/periodic-fa%C3%A7ade-inspection-pfi
1.2	<p>Repair and maintenance of localised conserved features</p> <p>Where works are intended to be carried out on a conserved building that are minimal and localised and/or are for the purpose of repair and maintenance, conservation permission is also required^[6]. Some of such works include one-for-one replacement or repair of door or window, transoms, vents, roof tiles, or rafters, and localised repair of decorative features, etc.</p>

[6] Owners and contractors are to make a Category 3 submission to URA to obtain conservation permission before carrying out the works. Category 3 application can be made at <https://www.ura.gov.sg/cmrWeb/>