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To: Building Owners, Developers, Architects,
Engineers, Builders and Facility Managers

For enquiries, please contact:
Building Resilience Group (#10-01)
Tel: 1800 3425 222 (1800-DIAL-BCA)
or use our Online Feedback Form at:
<https://www.bca.gov.sg/feedbackform/>

ADVISORY ON GOOD PRACTICES FOR THE DESIGN, INSPECTION AND MAINTENANCE OF MASS ENGINEERED TIMBER (MET) STRUCTURES FOR I) BUILDING OWNERS, RESPONSIBLE PARTIES, AND II) PROFESSIONAL ENGINEERS

As part of BCA's continuous effort to review existing measures and develop best practices on building maintenance through close consultation with industry practitioners and building owners, BCA has developed good practices for the design, inspection and maintenance of MET¹ structures.

2 The use of MET structures started in Singapore a few years ago and as with all building structures, it is crucial that MET structures are well designed, regularly inspected and properly maintained so that they remain safe for their occupants and users.

3 Qualified Persons (each referred to as "QP") appointed to design the MET structures play an important role to ensure that the proposed MET structure is well designed with a robust waterproofing system. This will ensure the moisture content of the MET elements stays within the allowable limits for the service class as specified in the design codes. Sound knowledge and prudent detailing of waterproofing provisions are essential in ensuring MET structures will not be adversely affected by moisture effects and termite infestations during their service life.

4 Building owners and responsible parties such as Managing Agents also play a key role in maintaining their MET structures and Professional Engineers (PEs) conducting inspections of MET structures should also pay attention to the common areas of concern during their inspections. Routine inspections, maintenance and timely repairs will avoid major, costly and disruptive repair works subsequently.

Design for Robust Waterproofing System

5 The [MET guidebook](#) published by BCA provides guidance on the design for maintainability, and structural and architectural design consideration. In addition to the MET guidebook, QP should ensure the following during design upstream:

¹ Mass Engineered Timber (MET) is a building material comprising engineered wood products with improved structural integrity. This includes:

- **Cross Laminated Timber (CLT)** – Layers of wood are stacked cross-wise and bonded with structural adhesives. It is predominantly used for walls, floors and roofs.
- **Glued Laminated Timber (Glulam)** – Produced in a similar fashion but with the grain aligned in the same direction. It is predominantly used for columns, beams and truss elements.

- a) Avoid the use of MET in areas that are consistently wet (e.g. toilet and outdoor planters). If MET is used in consistently wet areas, additional measures to dry the area with mechanical means shall be included in the design;
- b) Waterproofing system is adequately designed to prevent ingress, dampness and stagnation of water from rain and/or leakages;
- c) MET roof, slab and corridor shall have sufficient gradient to prevent stagnation of water;
- d) Adopt stringent deflection limits for long span structural elements to prevent stagnation of water from rain and/or leakages;
- e) Avoid features and/or fixtures that will punctuate the waterproofing system. If additional features and/or fixtures are required, additional measures (e.g. an additional layer of waterproofing) shall be included in the design;
- f) Ensure proper supervision in accordance with the design intent and drawings;
- g) Carry out a thorough water test to ensure watertightness with similar performance to toilet's waterproofing; and
- h) Post installation of features and/or fixtures (e.g. post install anchors) during Addition and Alteration (A&A) that could affect or damage the waterproofing system shall be taken into consideration.

Good Maintenance Practices for Building Owners and Responsible Parties

6 Building owners and responsible parties should do the following to ensure that their MET structures are properly maintained:

- a) Ensure that their MET supplier, with the concurrence and recommendation from Qualified Person, provide a guide on the maintenance requirements;
- b) Follow the maintenance guide, and keep a maintenance record on the regular visual inspections, termite treatments, and moisture content records;
- c) Monitor moisture content of MET for consistently wet areas (e.g. toilet and outdoor planter) that are on MET slab;
- d) Conduct regular visual inspections to detect water leakage, delamination of MET, excessive moisture content, excessive deflection, rusting/corrosion on connection details at the suggested intervals below:
 - i) On a three-monthly basis after completion;
 - ii) Annually after the first year;
- e) Engage a Professional Engineer with domain knowledge for advice if any issues under d) were observed during inspections;
- f) Engage termite specialist once a year or as recommended by the supplier (whichever with a shorter interval) to inspect the MET structure for any signs of termite or to assess whether termite treatment is adequate (e.g. to reapply termite treatment); and

- g) Engage a specialist with domain knowledge to carry out an assessment to ensure that any post installation of features and/or fixtures (e.g. post install anchors) will not damage any existing waterproofing system

Good Inspection Practices for PEs

7 When engaged by building owners to conduct an inspection, the PEs should take note of the following:

- a) Inspect the overall structure of the MET (including connection details) for any signs of deterioration (e.g. creep, deformation, delamination, cracks). If the structure is concealed, PE shall access the concealed structure for inspection;
- b) Review the maintenance records and maintenance guide from supplier to ensure that proper maintenance has been carried out;
- c) Inspect and identify areas prone to water leakage, accumulation of water that can result in ingress of water in the MET structure (e.g. end cap protection remain intact and water tight, waterproofing is still effective);
- d) Review the moisture content records provided by owners of the MET structure, and conduct moisture readings using a moisture meter to ensure that it is within the code requirement;
- e) Highlight any risks or signs of termite infestation and water ingress to the building owners; and
- f) Advise owners on measures to address any issues observed and whether there is a need to engage a timber specialist for any required rectification works

Clarification

8 Please bring the contents of this circular to the attention of your members. Should you need any clarification, please submit your enquiry through BCA's Online Feedback Form at <https://www.bca.gov.sg/feedbackform/> or call us at 1800 342 5222.

9 Thank you.

Yours faithfully



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