Dear Sir/Madam

CIRCULAR ON PERIODIC STRUCTURAL INSPECTION (PSI) OF CRITICAL COLUMNS IN VOID DECKS OF OLD RESIDENTIAL BUILDINGS

The current ‘Guidelines for Structural Engineers’ recommends critical structures such as slender columns to be identified during PSI. We would like to advise Professional Engineers (PEs) carrying out PSI to pay special attention to the inspection of small-size/narrow (i.e. those with dimension of 300mm or less) or slender RC columns in void deck of residential buildings built before 1989 and using grade 20 concrete. For such structural elements, lack of maintenance, natural deterioration, accuracy of rebar placement, differential support settlement, or accidental impact force (e.g. from vehicles in void deck carparks) could significantly affect the load capacity.

2. During the inspection of such critical columns, PEs are to be thorough in identifying early signs of deterioration or distress and seriously consider recommending full structural investigation in order to ascertain the structural integrity of the columns as well as the need for strengthening or protection.

3. To assist PEs in carrying out the inspection and proper reporting of their findings, we have introduced the ‘Supplementary Checklist for Critical Columns in Residential Buildings built before 1 Jan 1989’ as part of the Guidelines. With immediate effect, the inspection report should address all the items in this supplementary checklist for PSI of all residential buildings built before 1 Jan 1989. The complete updated checklists, which can also be downloaded from BCA’s website at www.bca.gov.sg/PeriodicStructuralInspection/others/PSI_PE.pdf, are enclosed for reference.

4. If you require any clarification, please contact the undersigned at tel: 6325 7392 or e-mail: clement_tseng@bca.gov.sg.
Thank you.

Yours faithfully,

[Signature]

CLEMENT TSENG
DEPUTY DIRECTOR
ENFORCEMENT & STRUCTURAL INSPECTION DEPARTMENT
for COMMISSIONER OF BUILDING CONTROL

Encl.
- Checklist for Periodic Structural Inspection of Existing Building
- Supplementary Checklist for Critical Columns in Residential Buildings built before 1 Jan 1989

Circulation list:

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ANNEX A – CHECKLIST¹ FOR PERIODIC STRUCTURAL INSPECTION OF EXISTING BUILDING AT

<Building Address>

I declare that I have addressed in my visual inspection report all the checklist items as ticked² below.

1. Structural plans and details.
   a) Reference to structural layout plans
   b) Description of foundation system
   c) Description of structural system (including storey height)
   d) Any flat slab system (to state location)

2. Presence of critical structures and structures without redundancies
   (eg. transfer girders, small/ narrow/ slender columns³, cantilever structures, long span structures, cable structures, timber structures, etc)

3. Loading:
   a) Compatibility of existing usage with the design loading
   b) Deviation from intended use or supporting higher design imposed load as recommended in BS 6399 (to recommend design check by a PE and display of signage for allowable imposed loading)
   c) Signs of overloading (to show affected locations on plan)
   d) Recommended remedial actions to be taken

   a) Presence of A&A (to show locations on plan)
   b) Impact of A&A on the building structure
   c) Recommended remedial actions to be taken

5. Signs of structural defects and deterioration:
   a) Building tilt/ settlement
   b) Structural deformation
   c) Major structural defects (e.g. structural cracks, decayed timber member)

¹ This checklist is to be included in the inspection report.
² All checklist items are to be ticked and addressed in inspection report.
³ Supplementary Checklist for Critical Columns in Residential Buildings built before 1 Jan 1989’ to be included where applicable

v. Jan 2012
d) Minor structural defects

e) Non-structural defects

f) Recommended remedial actions to be taken

6. Termite Attack:
   a) Need for inspection by anti-termite specialist
   b) Need for termite treatment by anti-termite specialist

7. Exposure to aggressive environment:
   a) Column immersed in water (e.g. ground floor water tank, sea water, lakes etc)
   b) Aggressive chemical which may accelerate the deterioration of structural elements, particularly in industrial buildings

8. Retaining walls and slope protection structures:
   a) Defects of retaining wall and other slope protection structures (e.g. cracks, tilt, displacement, etc.)
   b) Signs of undesirable condition surrounding retaining wall (e.g. tension cracks in soil, weephole chokage, presence of big trees nearby, inadequate surface drainage etc.)

9. Safety Barriers (i.e. parapets & railings):
   a) Any defects
   b) Any continuous handrail for full glass barriers

10. Record of previous strengthening works done

11. Standard Certification on first and last page of report

__________________________
Structural Engineer
For Periodic Inspection of Buildings
(Signature and Stamp)
SUPPLEMENTARY CHECKLIST\(^1\) FOR CRITICAL COLUMNS IN RESIDENTIAL BUILDING(S) BUILT BEFORE 1 JAN 1989

I declare that I have addressed in my visual inspection report all the checklist items as ticked\(^2\) below.

1. Presence of Critical Columns:
   a) Design concrete grade 20
   b) Small-size, narrow, or slender columns\(^3\)
   c) Columns subjected to bi-axial bending or bending about minor axis
   d) Columns unbraced along minor axis
   e) Void deck used as carpark

2. Signs of structural defects and deterioration:
   a) Spalling, cracks, or deformation
   b) Signs of damage by external force (eg. vehicular impact)
   c) Signs of differential settlement

3. Recommendations:
   a) Need for full structural investigation
   b) Need for crash barrier around void deck columns

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Structure Engineer
For Periodic Inspection of Buildings
(Signature and Stamp)  

Date

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\(^1\) This supplementary checklist is to be used together with 'Annex A - Checklist for Periodic Structural Inspection of Existing Building' and submitted with the inspection report.

\(^2\) All checklist items are to be ticked and addressed in inspection report.

\(^3\) As a guide, small size or narrow columns are defined as having minimum width less than/equal to 300mm
EXPLANATORY NOTES TO SUPPLEMENTARY CHECKLIST

1 Structural engineers are to pay special attention to the inspection of small-size, narrow or slender RC columns in void deck of residential buildings built before 1989 and using grade 20 concrete. For such structural elements, lack of maintenance, natural deterioration, accuracy of rebar placement, support settlement, or accidental impact force (eg. from vehicles in void deck carparks) could significantly affect the load capacity.

2 During the inspection of such critical structures, structural engineers are to be thorough in identifying early signs of deterioration/ distress and seriously consider recommending full structural investigation in order to ascertain the structural integrity of the columns as well as the need for strengthening or protection.