Building and Construction Authority

An MND Statutory Board

Our Ref : APPBCA-2024-19

02 Dec 2024

For enquiries, please contact:
Building Resilience Group (#10-01)
Tel: 1800 3425222 (1800-DIAL_BCA)
or use our Online Feedback Form at:
https://www.bca.gov.sg/feedbackform/

See **Distribution List**

Dear Sir/Madam

BCA'S FINDINGS FOLLOWING THE IMPLEMENTATION OF THE ENHANCED PERIODIC STRUCTURAL INSPECTION (PSI) GUIDELINES AND INTRODUCTION OF THE STANDARD PSI REPORT TEMPLATE

Objective

This circular is to inform the industry of BCA's findings following the implementation of the Enhanced Periodic Structural Inspection (PSI) Guidelines ("**Guidelines**") and introduction of the standard report template.

Background

2 BCA released the latest version of the Guidelines[1] on 01 Sep 2022. The latest Guidelines aim to further improve the standard of inspection across Professional Engineers by (i) providing clarity on the minimum inspection coverage for concealed structural elements in residential and non-residential buildings, (ii) incorporating learning points from past building incidents, (iii) addressing higher risk of ageing buildings and (iv) incorporating new and emerging construction technologies.

3 To reinforce industry best practices for inspecting and maintaining aging structures, BCA has also implemented the Differentiated PSI Approach[2] on 01 Feb 2023. The aim of implementing the Differentiated PSI Approach is to adopt a risk-based approach with greater scrutiny of the methodologies and reports of the PSI of ageing buildings and to find out the building conditions of these buildings, whether inspections conducted comply with the latest Guidelines and making sure appropriate actions were taken at an early stage such that these buildings can continue to perform well structurally beyond their intended service life.

4 To date, BCA has facilitated over 120 meeting sessions under the Differentiated PSI Approach with industry stakeholders, including Structural Engineers, building owners, and facilities management teams. During these sessions, participants have shared maintenance records and recent Additions & Alterations (A&A) works that have been carried out in respect of their buildings, and the challenges faced during building inspections.

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[1] refers to circular ref. APPBCA-2022-20 dated 01 Sep 2022.

[2] refers to the meetings with industry stakeholders during which the Structural Engineers will present their findings following building inspections. Also referred to as "PSI+" during the dialogue-cum-seminar sessions on 27 Oct 2022.

Findings from Differentiated PSI Approach Sessions

5 Since the introduction of the Differentiated PSI Approach a year ago, we observed some challenges faced by stakeholders in compliance to certain requirements and how they were effectively overcome through various approaches. During our dialogue-cum-seminar sessions on 27 Oct 2022 and 20 Nov 2023, these findings were shared with the industry which covered the following aspects:

i) Inspection coverage
ii) Inspection of cladding columns
iii) Inspection of concealed structures
iv) Referencing to structural plans
v) Defects and recommendations
vi) Checking past defects and maintenance history of buildings
vii) Survey of unauthorised works

Please see **Annex A** for details.

Effective Strategies for Complying with PSI Requirements

6 During the meeting sessions, industry stakeholders also shared effective strategies for complying with PSI requirements despite site constraints. They shared practical solutions they had implemented when encountering challenges during building inspections. These include:

i) in relation to inspection coverage, new technologies were embraced by Structural Engineers to systematically organise and tag photographs to the plans during inspections, for example, by using commercially available mobile applications;

ii) with regards to the inspection of cladded columns, (a) small holes were created through the existing finishes of cladded columns, with the consent of building owners, to allow for the use of a borescope for inspection and (b) installation of appropriate access points on the cladded elements for future inspections or identifying suitable alternative access points, such as using false ceiling to access the columns requiring inspection; and

iii) for the inspection of concealed structures, alternative access points were utilised, such as using the existing vents or lighting points, to facilitate the use of a borescope for inspection.

Please see **Annex B** for details.

7 In addition to the strategies outlined above, Structural Engineers and building owners can implement the following good practices for future PSI:

i) Conduct a preliminary desk study of the approved plans and building maintenance records of the building before the on-site inspection. This helps identify potential areas of concern in advance, leading to more efficient inspections.

ii) Survey for any addition or alteration works affecting the structure of the building, as these may pose structural safety risks.

iii) Building owners should provide early notification to rooftop occupants and access to wet areas in the building to facilitate inspections, as these areas are particularly susceptible to defects.

iv) For buildings with Mass Engineered Timber structures, you may refer to the Good Practices for the Design, Inspection and Maintenance of Mass Engineered Timber Structures[3].

8 Over time, an increasing number of buildings are being retained beyond their design lifespan[4]. As such, building owners and responsible parties should continue to play a key role (a) in ensuring that their buildings are regularly inspected and (b) during the inspection process in relation to regular inspections of their buildings. Routine inspections, maintenance and timely repairs will avoid major, costly and disruptive repair works subsequently. They should assist their appointed Structural Engineers to look at the past PSI reports to assess the effectiveness of the repair works carried out for past defects and to follow up on the proposed areas of repairs in a timely manner. Additionally, building owners will now be able to request the release of past inspection reports for their buildings by submitting the consent form (see **Annex C**) to BCA upon receiving their notice.

Standard PSI Template

9 We encourage the Structural Engineers to use the Standard PSI template for consistency, improved clarity, and compliance with the requirements (see **Annex D**).

10 We would appreciate if you could disseminate the contents of this circular to your members. Please contact us at Tel: 1800-3425222 or through the online feedback form (https://www.bca.gov.sg/feedbackform/) should you need any clarification. Thank you.

Yours faithfully

PUNITHAN SHANMUGAM
DIRECTOR
BUILDING RESILIENCE GROUP
for COMMISSIONER OF BUILDING CONTROL

[3] *refers to circular ref. APPBCA-2022-03 dated 01 Mar 2022.*
[4] *refers to the intended period for which a building is designed to remain functional and structurally sound.*

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Annex A

FINDINGS FROM DIFFERENTIATED PSI APPROACH SESSIONS

No.	Shortfall	Observations	Requirements	Rationale
1	Inspection Coverage	• Insufficient inspection coverage e.g., failed to cover 100% at topmost floor or special structures • No indication that inspection coverage is well representative of building's condition. • No summary of inspected areas	• Summary of inspected units • Indicate compliance to inspection coverage requirements by referring to S4 and Annex D of the PSI guidelines (special and critical structures[5] and structures without redundancies[6], number of units based on building age, topmost units to be inspected)	As buildings age, there is an increased need for inspections to identify potential issues before they become critical. The inspection coverage also includes ensuring public safety, applying lessons from past incidents, implementing risk-based approaches, and improving cost-effectiveness through early issue detection. These factors collectively aim to enhance the thoroughness and effectiveness of structural inspections, thereby maintaining the integrity and continued safety of buildings over time.
2	Inspection of Cladded Columns	• Cladded columns not identified and inspected	• At least 30% of the cladded columns should be exposed for inspection • Indicate the locations of all cladded columns on the building layout plan and pin-point which columns were inspected • Describe the methodology adopted for inspection and	Cladding can conceal underlying structural problems in columns, making regular inspection crucial. There is also the need to prevent moisture-related damage and to address material deterioration over time. The inspection aims to identify and mitigate potential risks associated with such columns that may not be immediately visible, thereby

			indicate the inspection coverage (Building perimeters, lobbies, drop-off points, function rooms, buffet areas and restaurants. Past incidents where buckled columns were reported).	enhancing overall building safety.
3	Inspection of Concealed Structures	• High suspended ceiling at entrance of buildings are not inspected • Suspended ceiling without access panels not inspected (e.g. cold room, roof structures)	• At least 1 suspended ceiling should be assessed every 500m^2 indoor • At least 1 suspended ceiling should be assessed every 250m^2 outdoor • Indicate location of suspended ceiling accessed on a layout plan	The justification for inspecting other concealed structures follows that of examining cladded columns. Hidden structural elements throughout a building require inspection to ensure structural integrity and safety.
4	Referencing to Structural plans	• Relevant structural plans not attached with the PSI report • Remarks that owner did not provide structural plans • Reference made to architectural layout plans and other sketches instead	• SE to obtain a set of buildings' latest structural layout plans from BCA • Attach relevant copies of structural plans with PSI report • Attach plan search correspondence if no plans available (locations of small-size, narrow or slender columns, special, critical and structures without redundancies, aware of allowable imposed loads)	Referencing relevant plans helps identify any past modifications and critical structural elements, offers historical context, and supports risk assessment. This will allow inspectors to compare the current state of the building with its original design and focus on areas of potential structural concern.

5	Defects and Recommendations	• No descriptions on possible causes, extent and seriousness of defects identified • Inadequate repair methodology and structural investigation	• Use appropriate tools such as tapping rods to assess extent of defects • Judicious removal of plaster or architectural finishes to assess underlying structural condition • Summary of defects and comprehensive recommendations (using proper tools to determine extent of defects, removal of plaster revealed cracks affecting underlying structural layer)	The inclusion of defects and recommendations in the reports helps to guide building owners and facilitate informed decision-making. This will enable effective risk management and maintain the structural soundness and safety over time.
6	Checking Past Defects and Maintenance History of Buildings	• No or little reference made on past defects and maintenance history of buildings • As there could be absence of detailed records of any past defects and maintenance work done on the building. Without proper documentation, it is difficult for SE to review the effectiveness of past repairs.	• Reference should be made to past PSI reports, A&A, strengthening and other repair works carried out by the owner • Review of effectiveness of past repair works and methodology • Inspection coverage, methodology and recommendation to be customised based on past maintenance history (higher scrutiny on inspection of basement structures and topmost units, effectiveness of past repair works and vicinity for visible defects, recommend material verification tests such as	Knowledge of past defects aids in prioritising areas for inspection and potential intervention. Historical data can help identify underlying causes of persistent structural issues. Inspectors will be able to evaluate the effectiveness of previous interventions and maintenance efforts.

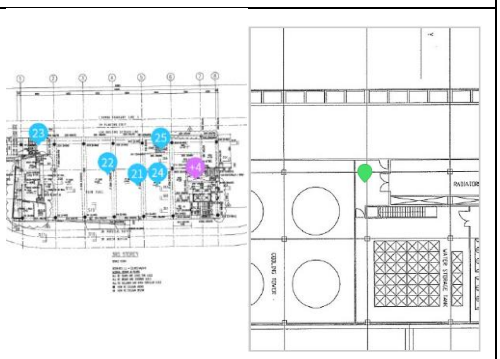
			carbonation and cover meter)	
7	Survey of Unauthorised Works (UA)	• Unauthorised works not identified and reported	• Inspect and assess the structural safety of the UA works • Investigate loading condition and other adverse effects on main building • Inform owners on the procedures for demolition and regularisation • Indicate details of UAs in the report (location of UAs on layout plan, specifying the affected area, assess structural condition of UA and assess loading condition and any adverse effects on main building)	Unauthorised (UA) works can undermine a building's structural soundness and pose safety risks to the occupants and the public. Such works introduce unanticipated structural loads, potentially surpassing the designed material capacities. When conducting building inspections, it is essential for inspectors to gain an understanding of the building's present state, including any potential risks arising from such unauthorised works.

[5] *Examples of special and critical structures are transfer girders/ beams/ trusses, small / slender columns, long span structures, cable structures, inclined columns, etc.*

[6] *Example of structures without redundancies are cantilever structures, cantilever structures without backspan, cantilever balconies exposed to elements, tension columns, hanging/suspended structures, nibs and corbels, etc.*

Annex B

EFFECTIVE STRATEGIES FOR COMPLYING WITH PSI REQUIREMENTS

No.	Challenges	Strategies	Illustrations
i	On inspection coverage, Structural Engineer is required to handle numerous photos, mark them on the plans, assess their representation of the building's condition, and furnish a summary of the inspected areas.	When it comes to inspection coverage, Structural Engineers are encouraged to embrace new technology to systematically organise and tag photographs to the plans during inspections, for example, by using commercially available mobile apps.	
ii(a)	On inspection of cladded columns, Structural Engineer might encounter challenges in inspecting at least 30% of the cladded columns. Some owners also expressed their concerns about exposing such columns.	When inspecting cladded columns, with consent from the building owners, some managed the situation by creating small holes through the existing finishes of cladded columns to allow for the use of a borescope for inspection.	
ii(b)	Installation of access points for Structural Engineer to conduct inspection on such columns.	Another approach involves installing appropriate access points on the cladded elements for future inspections or identifying suitable alternative access points, such as using false ceiling to access the columns requiring inspection.	

iii	On concealed structures, Structural Engineer might encounter challenges in conducting inspections if no inspection access points are provided for the high suspended ceiling.	While inspecting concealed structures, some employed alternative access points, such as using the existing vents or lighting points, to facilitate the use of a borescope for inspection.	

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Annex C

RELEASING PERIODIC STUCTURAL INSPECTION ("PSI") REPORTS TO APPOINTED STRUCTURAL ENGINEER ("SE")

Sign and complete this form to indicate if the owner of the Building (described below) wishes to give consent to the *Commissioner of Building Control* ("**CBC**") to release reports of past PSIs performed for the Building to the SE appointed by the Building owner.

The past PSI reports will facilitate the Building owner's appointed SE to carry out the PSI for the Building, required by CBC in the notice issued by the CBC to the Building owner under section 28(1) of the Building Control Act 1989.

Note: There is no need to fill up this form if the present owner has acquired this property within the last 4 years.

To: The Commissioner of Building Control
52 Jurong Gateway Road #10-01
Singapore 608550

I am the owner / duly authorised representative of the owner (please delete as appropriate) of _____ (please state property address) ("**Building**"):

Name of Building owner	Name of duly authorised representative of Building owner (if applicable)	Designation (if applicable)	Email Address

I acknowledge that the Commissioner of Building Control ("**CBC**") has issued a notice under section 28(1) of the Building Control Act 1989 ("**Notice**") to the Building owner to, amongst others, perform periodic structural inspection ("**PSI**") for the Building, and the Building owner has appointed a structural engineer in compliance with the Notice (the "**SE**").

Please indicate the option of the Building owner by ticking the appropriate box:

☐ - The Building owner has the report(s) of past PSI(s) performed for the Building, and the Building owner will provide these reports to the SE appointed by the Building owner.

☐ - The Building owner consents to the CBC providing to the SE report(s) of past PSI performed for the Building.

☐ - The Building owner does **NOT** consent to the CBC providing to the SE report(s) of past PSI performed for the Building.

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BY:

Name of Building Owner: _____ Signature: _____

Designation
(if applicable): _____ Date: _____

Contact no.: _____

 # - This consent form to be submitted together with the "Appointment of Structural Engineer Form".

52 Jurong Gateway Road #11- 01 Singapore 608550
Tel: 1800 3425 222 | Fax: (65) 6334 4287
www.bca.gov.sg

BuildSG

Annex D

Structural Engineer's Logo (if applicable)

<Structural Engineer's Name / Firm Name>

Periodic Structural Inspection Report

Notice Reference No.: <SM YYYY/MM/XXXX>

< Name of Building>

<Address of building>

The Word document version can be downloaded from the BCA website:
https://www1.bca.gov.sg/regulatory-info/building-control/periodic-structural-inspection

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Standard Declaration by Structural Engineer

Standard Certification by the Structural Engineer

for Periodic Inspection of Buildings

In accordance with Section 28(6) of the Building Control Act 1989 (the "Act") and Regulations 6 and 7 of The Building Control (Periodic Inspection of Buildings and Building Façade) Regulations 2021 (the "Regulations"), I, **<Name of Structural Engineer>**, the Structural Engineer appointed by the building owner under section 28(3) of the Act have personally conducted a structural inspection of the building located at <Address> ("**Building**"), including a visual survey carried out personally, and hereby submit the report of my inspection of the Building. I certify and declare that the inspection of the Building was carried out and the report was prepared by me in accordance with the Act and the Regulations.

_____ _____

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

Date

Foreword

The visual inspection report contains observations and technical opinions by structural engineer appointed by the building owner. The structural engineer has carried out a comprehensive visual inspection that relies largely on his/her professional engineering assessment and judgement. He/She has exercised reasonable diligence and take active interest in the planning and carrying out of the inspection of the building.

Under Section 28(4) of the Building Control Act, where a building comprising 2 or more flats is not subdivided and there are subsisting leases for those flats registered under the Registration of Deeds Act 1988 or the Land Titles Act 1993, all the owners of those have jointly appointed the same structural engineer to carry out a structural inspection. The structural engineer has commenced the structural inspection after he/she has been jointly appointed by all owners of the building

For the purposes of Section 28(6)(a) of the Building Control Act, the appointed structural engineer must carry out the inspection in the manner prescribed in the Building Control (Periodic Inspection of Buildings and Building Facades) Regulations 2021.

This report consists of a visual survey carried out personally by the appointed structural engineer with reasonable diligence, which, broadly includes all the following:

(a) the condition of the building;
(b) the loading on the structure of the building;
(c) whether there is evidence of any structural works that are or were carried out without any prior approval of the plans of those works where prior approval is required by Part 2 of the Building Control Act.

Next, if an appointed structural engineer, after carrying out a visual inspection of the building, reasonably suspects or is of the opinion that there is any defect, deformation or deterioration in the structure of the building that will or will be likely to:

1) endanger or reduce the structural stability or integrity of any part of the building; and
2) is of the opinion that it is necessary to carry out a full structural investigation of the building in order —

i. to ascertain the cause of the defect, deformation or deterioration; and
ii. to recommend appropriate measures or other building works to ensure the structural stability or integrity of the building.

The appointed structural engineer will, and only with the prior approval of the Commissioner of Building Control, with reasonable diligence carry out a full structural investigation of the building.

Acronyms, Abbreviations and Definitions

List of Definitions

Structures without redundancies	Example of structures without redundancies are cantilever structures, cantilever structures without back span, cantilever balconies exposed to elements, tension columns, hanging/suspended structures, nibs and corbels, etc.
Special and critical structures	Examples of special and critical structures are transfer girders/ beams/trusses, small / slender columns, long span structures, cable structures, inclined columns, etc
Additional inspection coverage	Additional inspection coverage that are required due to age, defects observed and maintenance history
Concealed columns	Columns concealed behind architectural finishes with air gaps between the column face and the finishes. It excludes those columns concealed with materials adhered fully to the column face, i.e. tiles, plaster, wallpaper
Structural materials	Structural materials such as reinforced concrete, pre-stressed concrete, steel, etc.
Unauthorised works	Any structural works that are or were carried out without any prior approval by the Commissioner of Building Control of the plans of those works where prior approval is required under Part 2 of the Building Control Act 1989
<others>	<to insert as required>
<others>	<to insert as required>
<others>	<to insert as required>
<others>	<to insert as required>

List of Acronyms and Abbreviations

BCA	Building and Construction Authority
ST Plans	Structural Plans
BP Plans	Building Plans
TOP	Temporary Occupancy Permit
CSC	Certificate of Statutory Completion
RC	Reinforced Concrete

Section 1 – Structural System of the Building

1.1 General Information of the Building

- Name and address of the building
- Number of storeys in each block of building
- Describe the usage of the building (e.g. commercial, residential, mix-use development consist of commercial and residential, industrial, etc.)
- Maintenance history of the building, if known
- Know defects from past PSI report provided by the owner, if any.
- Any resurfacing of past defects.

1.2 Description of foundation and structural system

The inspection was conducted with reference to the following BP Plans / ST plans: Axxxx-xxxx-xxxx-STxx, Axxxx-xxxx-xxxx-BPx.

The building was constructed of conventional RC system, with RC beams and slab supported on piled foundation system. (Please provide attachments, e.g. structural plans)

The pitch roof is constructed of timber rafter supporting the tiled finishes.

The building was completed in YYYY according to the information obtained from legal search. The building is xx years old.

There are no special and critical structural systems identified in the building.

Or

Critical structural systems in the building consist of RC transfer beams located at … (Please provide attachments, e.g. structural plans)

1.3 Usage of building

S/N	Location	Usage	Photograph no.	
1	Level 1	Retail shops	No. xx	
X	Level 2	Residential		

Section 2 – Observations

2.1 Diary and Scope of Visual Inspection

The visual inspection was conducted on DD/MMM/YYYY in the presence of the building owner / owner's tenant.

High-resolution digital camera with long distance zoom was used in the visual inspection. Other items and equipment used during the inspection includes:

- Borescope
- Tapping rod

The visual inspection has covered all structural elements within the buildings.

Or

Residential Developments

All special and critical structures and structures without redundancies within the residential building have been visually inspected. Where such structures are concealed by architectural finishes, access has been made to inspect the concealed structure.

All structural elements in the common area (e.g. corridor, stairway, lift lobby, clubhouse) have been inspected.

The building is xx years old. The building is not more than 30 years old. More than 20% of the residential units has been accessed for inspection. The units selected are well-distributed and representative of the building's structural condition. The principal in selecting the units is as follows:

- All rooftop units have been accessed and inspected.
- At least 1 unit per storey on all other storeys have been accessed and inspected
- The units selected for inspection are well distributed (i.e. units inspected are situated at different wings in the tower/block)

Non-residential Developments (e.g. Commercial/Industrial)

All special and critical structures and structures without redundancies have been visually inspected. If such structures are concealed by architectural finishes, access have been made to inspect the concealed structures. No deterioration been observed.

All areas with unconcealed structural elements have been visually inspected. No deterioration been observed.

For indoor areas not exposed to weather and covered by suspended ceilings, at least 1 suspended ceiling has been accessed at every 500m^2 interval. No deterioration been observed.

For outdoor areas exposed to weather (e.g. outdoor shelter, pickup/drop off point) and covered by suspended ceiling, at least 1 suspended ceiling has been accessed at every 250m^2 interval. No deterioration been observed. The photos of the accessed ceiling can be found as appended justifying the required coverage.

For cladded columns, at least 30% of the cladded columns has been inspection by using a borescope/accessing via the ceiling panel to determine the condition of the structure. No deterioration been observed. The photos of the inspected cladded columns can be found as appended justifying the required coverage.

Notwithstanding the minimum requirements for inspection coverage indicated above, professional judgement has been made if higher inspection coverage is required. A list of factors that will warrant higher inspection coverage should include, but are not limited to:

i) Age
ii) Areas of high humidity/Wet area (e.g. toilet)
iii) Cause(s) and extent of defect(s) observed
iv) Exposure condition of the building (e.g. heat, proximity to aggressive environment
v) Maintenance history of past defects and past strengthening works
vi) Complex structural layout (e.g. long span, transfer structure, different structural systems)
vii) Visibility of concealed structural elements based on line of sight from inspection point of suspended ceiling

As no defects has been identified, there is no need for additional coverage beyond the minimum requirements.

2.2 Other observation of visual inspection

Presence of heavy suspended fixtures (e.g. large ceiling fan, heavy air-con ducts, heavy false-ceiling, suspended decorations, etc.) has been observed in crowded locations, at food courts/ atrium/ waiting/seating areas.

According to the managing agent, there has been no known maintenance problems.

There no previous rectification carried out on the building structure.

<Useful plans, sketches, photographs and tabulations could also be included to illustrate the findings of the inspection.>

Section 3 – Key Findings from Inspection of the Building

3.1 Survey of concealed key structural elements (such as Connection Systems Of Prefabricated Prefinished Volumetric Construction – PPVC constructed Buildings)

Description by SE ……
……

Key findings for 3.1:

Choose an item.

Choose an item.

3.2 Survey of timber structures (including Mass Engineered Timber)

Description by SE ……
……

Key findings for 3.2

Choose an item.

3.3 Survey of loading on the building Structure.

Description by SE ……
……

Key findings for 3.3:

Choose an item.

3.4 Survey of any unauthorised works to the building structure

Description by SE ……
……

Key findings for 3.4:

Choose an item.

S/N	Name of Structure	Location	Size and Condition of the structure	Photograph no.
1	E.g. mezzanine floor	Roof / Workshop / Refer to sketch / plan …	XX m^2. The structure is in good condition. No distress has been observed on its supporting structure.	No. xx
X	XXX			
X	XXX			

3.5 Survey of signs of structural defect, deformation, or deterioration

Description by SE ……
……

Key findings for 3.5

Choose an item.

3.6 Survey of exposure to aggressive environment.

Description by SE ……
……

Key findings for 3.6

Choose an item.
Choose an item.

3.7 Survey of slope, retaining walls and slope protection structures

Description by SE ……
……

Key findings for 3.7

Choose an item.

3.8 Survey of safety barriers (e.g. parapets and railings)

Description by SE ……
……

Key findings for 3.8

Choose an item.

3.9 Other survey or checks carried out

Description by SE ……
……

Key findings 3.9

Choose an item.

3.10 Recommended remedial actions for all defects detected.

Defect Type	Non-structural defect /Minor structural defects / Structural defects	Repair Method
EXAMPLES Plaster cracks	Non-structural defect	List …
EXAMPLES • Minor RC Cracks < 2mm width AND < 30mm deep • Localised and minor Concrete Spalling (Extent of spalling < 300mm in longest direction) • Termite infestation/ Timber Rotting (not on key structural element. E.g. timber runner beam or purlin etc.) • Surface rust/ pitting of steel members (with no reduction in member thickness) • Settlement of non-suspended slabs	Minor structural defect	List …

EXAMPLES • Structural Cracks • Extensive Concrete Spalling (Extent of spalling > 300mm in longest direction) • Termite infestation/ Timber Decay • Corrosion of steel members (with reduction in thickness) • Excessive deformation/ deflection/ settlement/ bulging of structural elements	Structural defect	List … (and indicate the specific location)

Section 4 – Inspection Coverage and Conclusion

4.1 Inspection Coverage

Total no. of blocks in the vicinity: **xxx** **(entry box added)**

Age of building: **xxx** years old **(entry box)**

4.2 Summary List of inspected units

Residential

The summary list of residential units inspected and the observation from each unit have been tabulated in the following table. All units at the top floor has been inspected. At least 1 unit from every floor at different location has been inspected.

Block 1

S/n	Unit no.	Observation	Photo no.:
1	#10-101	No defect observed	
2			

Total units inspected: **xx**

Total no. of units in the tower/block: **xx**

Percentage of overall units surveyed: **xx%**

Block 2

S/n	Unit no.	Observation	Photo no.:
1	#10-201	No defect observed	
2			

Total units inspected: **xx**

Total no. of units in the tower/block: **xx**

Percentage of overall units surveyed: **xx%**

Commercial, Industrial, Institutional,

The summary list of *commercial/industrial/institutional units inspected and the observation from each unit have been tabulated in the following table.

4.3 Conclusion

Description by SE ……
……

The inspected building structure is found to be structurally safe and sound.

Key findings

Choose an item.
Choose an item.

4.4 Recommendation

Description by SE ……
……
It is recommended that the building owner shall continue to properly maintain the building and conduct their own regular checks before the next cycle of inspection which will be conducted again in 5-years.

For the durability of the timber structures, it is recommended that a pest control specialist to be engaged periodically to check for any presence of termite affecting the timber elements.

This will ensure that any newly developed defect could be discovered and rectified in time.

Key findings {drop-down list}

Choose an item.

Section 5 – Plans, Sketches and Photographs of Defects

5.1 Sketches and plans with defects locations indicated

Description by SE ……
……

<Insert sketches and ST plans>

5.2 Defect Photographs

Note: Please submit all other inspection Photos as a separate document.

<Photograph, clearly showing the usage or condition of the structural elements >	
Photograph 1	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 2	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 3	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 4	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 5	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 6	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 7	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 8	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

<Photograph, clearly showing the usage or condition of the structural elements >

Photograph 9	**General view of building exterior**
Observation	Defect has been observed
Nature of defect:	Non-Structural / Minor-Structural/ Structural
Recommended Actions	Reference to Summary List from 3.10

ANNEX A – CHECKLIST[A] FOR PERIODIC STRUCTURAL INSPECTION OF EXISTING BUILDING(S) AT: *<Building Address>*

Please tick Y or N/A, which are defined below, accordingly for all checklist items:

Y – Yes, I declare that I have checked and addressed the item in my report
N/A – Not applicable, I declare that I have checked and found the item to be not applicable (i.e. does not exist)

	Y	NA
1. Structural System of the Building:		
a) Reference to structural layout plans and details	✓	
b) Description of foundation system		
c) Description of structural system (including storey height)		
d) Location of critical floor systems (e.g. flat slab, flat plate or pre-stressed slab etc.), if any		
2. Special and Critical Structures[B]:		
a) Signs of distress, cracks, deformation or corrosion		
3. Structures without Redundancies[C]:		
a) Signs of distress, cracks, deformation or corrosion		
4. Concealed Key Structural Elements And Connection Systems Of Prefabricated Prefinished Volumetric Construction (PPVC) Constructed Buildings:		
a) Reference to approved structural plans for location and detail of inspection access points		
b) Signs of distress, deformation or corrosion on concealed structural elements and connection systems		

[A] This checklist is to be included in the inspection report.

[B] Examples of special and critical structures are transfer girders/ beams/ trusses, small / slender columns, long span structures, cable structures, inclined columns, etc.

[C] Examples of structures without redundancies are cantilever structures, cantilever structures without backspan, cantilever balconies exposed to elements, tension columns, hanging/suspended structures, nibs and corbels, etc. Reference should also be made to Annex C.

		Y	NA
5.	**Timber structures (including Mass Engineered Timber):**		
a)	Signs of biological damage or decay (e.g. termite attack or fungus growth, etc.)		
b)	Signs of deterioration (e.g. creep deformation, delamination, cracks, etc.)		
c)	Areas prone to water leakage, accumulation of water that can result in ingress of water (e.g. end cap protection remain intact and water tight, waterproofing is still effective)		
d)	Increase in moisture content beyond code and specialist recommendations checked using devices such as moisture meters and scanners.		
e)	Need for inspection and testing by a specialist (e.g. anti-termite, timber specialist, etc.)		
6.	**Survey of Loading:**		
a)	Compatibility of existing usage with the design loading		
b)	Deviation from intended use or supporting higher imposed load as recommended in the design codes (e.g. CP3, BS 6399 or SS EN 1991 and the relevant national annexes)		
c)	Signs of distress or deformation due to overloading (to show affected location(s) on plan)		
7.	**Unauthorised Works[D]:**		
a)	Presence of unauthorised works (to show locations on plan)		
b)	Impact of unauthorised works on the building structure		
c)	Record of previous strengthening works without Approved Plans.		
d)	Additional unauthorised floor within a high volume/headroom space		
8.	**Signs of structural defects and deterioration:**		
a)	Building tilt/ settlement		
b)	Structural deformation		
c)	Major structural defects (e.g. structural cracks, decayed timber member, etc.)		
d)	Minor structural defects (e.g. minor corrosion and minor spalling, etc.)		
e)	Non-structural defects		

[D] Evidence of any structural works that are or were carried out without any prior approval of the plans of those works where prior approval is required by Part 2 of the Building Control Act

		Y	NA
9.	**Exposure to aggressive environment:**		
a)	Column immersed in water (e.g. ground floor water tank, seawater, lakes, etc.)		
b)	Aggressive chemicals or other similar substances which may accelerate the deterioration of structural elements, particularly in industrial buildings		
10.	**Slope, Retaining Walls And Slope Protection Structures[E]:**		
a)	Signs of slope erosion		
b)	Defects of retaining wall and other slope protection structures (e.g. cracks, tilt, displacement, etc.)		
c)	Signs of undesirable condition surrounding retaining wall (e.g. tension cracks in soil, choked weephole(s), presence of big trees nearby, inadequate surface drainage etc.)		
11.	**Safety Barriers (i.e. parapets & railings):**		
a)	Any signs of structural defect, deformation or deterioration		
b)	Any continuous handrail for full glass barriers		
12.	**Other Surveys Or Checks Carried Out**		
a)	Presence of heavy suspended fixtures (e.g. thick cement plaster, large cement-based or gypsum board over) in crowded locations, such as food courts, atrium, waiting/seating areas		
b)	Records of and comments on any known maintenance problems and previous rectification carried out on the building structure.		
13.	**Inspection Coverage**		
a)	Summarised list of units inspected • Percentage of units inspected: _____ %		
b)	At least 30% of cladded columns[F] are exposed for inspection • Percentage of cladded columns[F] exposed: _____ %		
c)	Suspended ceiling accessed points are indicated on a structural/building layout plan		
d)	Justification of inspection coverage		

[E] Examples of slope protection structures are soil nails, ground anchors, shotcrete slope, etc.

[F] Columns concealed behind architectural finishes with air gaps between the column face and the finishes. It excludes those columns concealed with materials adhered fully to the column face, i.e. tiles, plaster, wallpaper

	Y	NA
14. Recommended remedial actions for all defects detected		
15. Standard Certification on first and last page of report		

_____ _____

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

Date

Building and Construction Authority

ANNEX B – SUPPLEMENTARY CHECKLIST[G] FOR CRITICAL COLUMNS IN RESIDENTIAL BUILDINGS(S) BUILT BEFORE 1 JAN 1989

Please tick Y or N/A, which are defined below, accordingly for all checklist items:

Y – Yes, I declare that I have checked and addressed the item in my report
N/A – Not applicable, I declare that I have checked and found the item to be not applicable (i.e. does not exist)

	Y	NA
1. Presence of Critical Columns:		
a) Design concrete grade 20		
b) Small-size, narrow, or slender columns[H]		
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 (e.g. vehicular impact)		
c) Signs of differential settlement		
3. Recommendations:		
c) Need for full structural investigation		
d) Need for crash barrier around void deck columns		

_____ _____

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

Date

[G] This supplementary checklist is to be used together with 'Annex A - Checklist for Periodic Structural

[H] As a guide, small size or narrow columns are defined as having minimum width less than/ equal to 300mm

Building and Construction Authority

Standard Declaration by Structural Engineer

Standard Certification by the Structural Engineer

for Periodic Inspection of Buildings

In accordance with Section 28(6) of the Building Control Act 1989 (the "Act") and Regulations 6 and 7 of The Building Control (Periodic Inspection of Buildings and Building Façade) Regulations 2021 (the "Regulations"), I, **<Name of Structural Engineer>**, the Structural Engineer appointed by the building owner under section 28(3) of the Act have personally conducted a structural inspection of the building located at <Address> ("**Building**"), including a visual survey carried out personally, and hereby submit the report of my inspection of the Building. I certify and declare that the inspection of the Building was carried out and the report was prepared by me in accordance with the Act and the Regulations.

_____ _____

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

Date

The Word document version can be downloaded from the BCA website:
https://www1.bca.gov.sg/regulatory-info/building-control/periodic-structural-inspection