Building and Construction Authority

Towards Construction Excellence

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See Circulation list

Dear Sir/ Madam

MANDATORY PERIODIC STRUCTURAL INSPECTION
Under Section 28 of Building Control Act

As part of our continuous review effort, BCA has enhanced the guidelines for mandatory periodic structural inspection (PSI) taking into consideration of the feedback from the owners and professionals. The enhancement highlights the duties of owner and professional engineer, good practices and consistency in inspection report to ensure effective PSI. They are incorporated in the following guides:

(a) Requirements on Periodic Structural Inspection (Annex A);

(b) Building Owner's Guide (Annex B);

(c) Guidelines for Structural Engineers (Annex C).

2 For easy reference, the extracts of the enhancement are listed in Annex D. This circular, the updated Building Owner's Guide and Guidelines for Structural Engineers can be downloaded from BCA's website at www.bca.gov.sg from July 07 onwards.

3 If you need further clarification, please contact Mdm Chua Bee Tee at tel: 6325 7533.

Thank you.

Yours faithfully

ONG CHAN LENG
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for COMMISSIONER OF BUILDING CONTROL
BUILDING AND CONSTRUCTION AUTHORITY

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ANNEX A

BUILDING CONTROL ACT
REQUIREMENTS ON PERIODIC STRUCTURAL INSPECTION

1. GENERAL

1.1 Under Section 28 of the Building Control Act, buildings have to be inspected at regular intervals by structural engineers to ensure that they are structurally safe throughout their life.

1.2 The requirements of such periodic structural inspections are stipulated under Part V "Inspection of Buildings" of the Building Control Act and the Building Control (Inspection of Buildings) Regulations made under the Act.

1.3 An extract of Part V of the Building Control Act and the Building Control (Inspection of Buildings) Regulations are available on BCA's website at http://www.bca.gov.sg.

2. BUILDINGS TO BE INSPECTED

2.1 The requirement for periodic structural inspection shall apply to all buildings except:-

a) detached houses, semi-detached houses, terraced or linked houses which are used by the owners or occupiers solely as their residence; and

b) temporary buildings.

2.2 The interval between each periodic structural inspection is as follows:

a) for buildings used solely for residential purposes, every 10 years; and

b) other buildings (those not used solely for residential purposes), every 5 years.

3. DUTIES OF THE OWNER

3.1 Each building owner, on receiving the notice, shall appoint a structural engineer within the time period specified. (See Section 4)

3.2 Provide full and free access to the appointed structural engineer to any part of the building required for inspection.

3.3 Notify BCA if the PE does not personally carry out visual inspection.

3.4 Carry out measures or building works recommended by the structural engineer within a specified period.

4. APPOINTMENT OF STRUCTURAL ENGINEER

4.1 "Structural engineer" means a person who is registered as a professional engineer under the Professional Engineers Act in the civil or structural engineering discipline.

4.2 A list of structural engineers who have indicated that they are able to provide periodic structural inspection services has been compiled by BCA and is available for information to building owners on BCA's website at http://www.bca.gov.sg/PSI/.

4.3 The structural engineer to be appointed for the purpose of carrying out a periodic structural inspection of a building shall not have any professional or financial interest in the building. A structural engineer shall be regarded as having a professional or financial interest in any building if:

(a) he is or has been responsible for the design or construction of the building in any capacity, except in minor alterations of the buildings;

(b) he or any of his nominee is a member, officer or employee of a company or body which has a professional or financial interest in the building;

(c) he is a partner or is in the employment of a person who has a professional or financial interest in the building; or

(d) he holds any interest in the building.

5. DUTIES OF THE STRUCTURAL ENGINEER

5.1 A structural engineer who is appointed to carry out the periodic structural inspection of a building shall:

a) personally carry out the inspection in a manner prescribed under the Regulations;

b) on completion of the inspection, prepare and sign a report of the result of the inspection. The first and last page of report shall bear the standard certification stamp found in section 7.2(m) of "Guidelines for Structural Engineers"

c) submit a copy of the report to the Commissioner of Building Control within 2 months from the date of appointment by the building owner. The report of the results of inspection shall be in accordance with clause 5 Building Control (Inspection of Buildings) Regulations; and

d) submit the Checklist together with inspection report. The Checklist is obtainable from Annex A of "Guidelines for Structural Engineers" in BCA's website at http://www.bca.gov.sg

ANNEX B

ANNEX B

Building and Construction Authority

PERIODIC STRUCTURAL INSPECTION OF EXISTING BUILDINGS

BUILDING OWNER'S GUIDE

June 07

OWNER'S GUIDE TO PERIODIC INSPECTION OF BUILDINGS

Q1 What is the purpose of inspecting the structure of buildings periodically?

A1 All buildings in Singapore, except for detached, semi-detached, terraced or linked houses which are used for residential purposes and temporary buildings need to be inspected at regular intervals by structural engineers in accordance to Section 28 of the Building Control Act. The purpose of such inspections is to ensure that structural defects due to lack of maintenance can be detected and rectified early to keep our buildings structurally sound for continued occupation, particularly as buildings age, and wear and tear set in. Through such inspections, appropriate measures can be taken to prevent further deterioration.

Q2 How can I play my part?

A2 BCA will serve building owners with a Notice of Inspection when the building is due for inspection. You can play your part by:

- Appointing a structural engineer promptly;
- Providing access to critical parts of the building to be inspected by your structural engineer. This could include the removal of claddings/ false ceilings at specific locations requested by the structural engineer for inspection of structural members hidden behind claddings/false ceilings (eg. concealed timber roof structure or other critical structures);
- Providing the necessary equipment/ machinery such as ladders, platforms or aerial ladder cranes;
- Providing a set of as-built structural layout plans;
- Providing information on the maintenance and history of the building, particularly if any addition or alteration works had been carried out;
- Providing previous periodic inspection reports for reference;
- Carrying out rectification works and/or monitoring of defects highlighted by your structural engineer promptly;
- Maintaining your building in good condition at all times.

Q3 How often do I need to carry out structural inspection of my building?

A3 Buildings which are used for residential purposes only (eg. condominiums and apartments) are to be inspected at 10-yearly intervals.

All other types of buildings (e.g. commercial, industrial and institutional buildings) are to be inspected at 5-yearly intervals.

Nevertheless, this does not mean that you should inspect your building only when required to do so. As and when defects or deterioration are detected, you should engage a structural engineer to investigate and propose remedial measures.

Q4 Can my structural engineer purchase a set of my building's structural layout plans on my behalf? What is the cost involved?

A4 Yes, your structural engineer can make an application on your behalf to the Legal Search Unit at Counter 10, 2nd storey Tower Block of the MND Complex. A copy of the application form can also be obtained from BCA's website http://www.bca.gov.sg/build_control/request_copy_plans/appl_forms/others/ls02.doc

Documentary proof of ownership of property (latest property tax bill, Title Deed or Notice of Transfer) has to be submitted together with the application form. A search fee of $20 per property has to be made together with the application. The applicant would be notified by post on whether the plans are available for viewing and selection.

Drawings kept in the office of BCA are in the form of microfilms. The microfilms may contain both architectural and structural drawings, as well as more than one set of approved or as-built drawings for

a property. The applicant would thus need to view the microfilms and select the appropriate set for copying. For the purpose of periodic structural inspection, only the structural layout plans are required.

To view and select the drawings, the applicant is required to bring along the plan viewing notification letter.

The details of the fee structure are as follows:

Schedule of Fees

Type	Rate
Search fee (upon application)	$20 per property
Copying(administrative) fee *	$25 per set of plans
Certification of True Copy fee *	$5 per copy of plan

* To be paid only after the viewing and selection of drawings

Printing of Plans

Printing service is provided by BCA's contract vendor and fees are to be paid directly to the vendor. The drawings are printed on the same day.

Type	Drawing Size	Rate
Microfilm/ Aperture Card	Size A2	$3 per sheet

Q5 Can I engage any structural engineer to inspect my building?

A5 You can engage any structural engineer registered with the Professional Engineers Board (PEB) who has no professional nor financial interest in the building. For the directory of Professional Engineers, you can refer to PEB's website at www.peb.gov.sg.

Q6 I am an individual unit owner of a building with multiple owners. Can I appoint my own structural engineer to inspect my unit? What are the required conditions for such an appointment?

A6 No, owners of a building with multiple owners shall jointly appoint a structural engineer to inspect the building within the stipulated timeframe. Subject to BCA's approval in exceptional cases, you may engage your own structural engineer to inspect your unit on the following conditions:

(a) The structural system and ownership of your unit are such that it can be demolished and re-constructed without involving the adjacent units.
(b) Your unit must not be within the same vertical boundaries as other units (eg. one on top of the other). Units which are within the same vertical boundaries must be inspected as a whole.
(c) Your building must not be under a subsisting lease registered under the Registration of Deeds Act or the Land Titles Act.

In addition to the above, you are required to liaise with the owners of the adjoining units, as well as to share the responsibility and cost of repair works for defects detected in the shared elements (eg. party walls, walkways, etc).

Q7 What does the periodic structural inspection process involve?

A7 This may differ slightly from building to building but would likely involve the following:

- Assessment of loading and usage;
- Identification of defects, deterioration, distress and deformation;
- Determination of whether such defects, deterioration, distress and deformation are of structural significance (Note: this may involve the localised removal of finishes such as paint, plaster, tiles etc);
- Assessment of whether addition and alteration works have been carried out to the building structure;
- Identification of aggressive environments that may be detrimental to the building structure;
- Identification of heavy suspended fixtures over crowded locations;
- Recommendation of remedial measures to be carried out.

Where defects of structural significance are detected, the structural engineer may recommend a full structural investigation (2nd stage investigation) of localised areas or the whole building for BCA's consideration and approval.

Q8 What does a 2nd stage investigation involve?

A8 A 2nd stage investigation generally involves the following:

- Obtaining detailed information relating to the design, construction, maintenance and history of building;
- Assessing the structural adequacy of the building by checking the structural plans and calculations, and reconstructing the structural plans if they are not available;
- Carrying out tests on the materials used and structural elements of the building;
- Carrying out load test on parts of the building if necessary;
- Recommending appropriate safety precautions and remedial measures to restore the integrity of the building structure.

Q9 Can I engage a different structural engineer for the 2nd stage investigation?

A9 Yes you can engage any structural engineer registered with the Professional Engineers Board (PEB) who has no professional nor financial interest in the building.

Q10 If the structural engineer engaged by the management corporation of my building did not inspect my unit, can I request that he inspect my unit?

A10 Yes, you can request, through the management corporation, the appointed structural engineer to inspect your unit.

Q11 I am an individual unit owner of a building with multiple owners. Can the structural engineer jointly appointed by all owners of my building inspect only selected units?

A11 No, the structural engineer jointly appointed by all owners of a building with multiple owners must inspect all units of the building and submits a joint report to BCA.

Q12 I have appointed a structural engineer but he never seems to come in person to inspect my building. Is this allowed?

A12 Your appointed structural engineer is expected to carry out a comprehensive visual inspection based on his engineering judgement and assessment. He is expected to take active and personal interest in the planning and carrying out of the inspection of the building. A situation where he does not visit the building or totally delegates the inspection work to his assistant or another person who is not a registered professional engineer is not acceptable. You are encouraged to notify BCA for follow-up with the structural engineer if you have such evidence.

Q13 My building is tenanted and I am unable to schedule inspections of all units within the timeframe that BCA has given to complete the inspection. What should I do?

A13 You can write to BCA for an extension of time stating your reasons.

Q14 What happens after my structural engineer submits the inspection report?

A14 BCA will vet through the report and may seek clarification from the structural engineer with regards to the contents of the report. The structural engineer is required to respond to clarifications and, where the situation warrants, BCA may also conduct a joint site inspection of the building with the structural engineer and/or require the structural engineer to conduct a presentation to BCA.

Upon the acceptance of the report, BCA will write to the building owner to follow up with the recommendations of the structural engineer on the defects detected. You should carry out the remedial works promptly to prevent further deterioration of the building and thereafter submit the structural engineer's certification on the completion of the remedial works, where applicable.

Q15 My structural engineer has informed me that he requires more time to finish the entire inspection and prepare the report to be submitted to BCA, as inspection of some areas have taken more time than expected (e.g. due to difficulty in gaining access). What should I do?

A15 You can write to BCA for an extension of time stating your reasons.

Q16 My building has just been renovated recently or is presently undergoing addition and alteration works (A/A). Can its periodic structural inspection be postponed to a later date?

A16 No, this is because the scope of A/A works do not involve the structural inspection and submission of inspection report by an independent structural engineer as required under Section 28 of the Building Control Act.

Q17 I have the intention to carry out extensive A/A works to my building in the near future. Can the periodic structural inspection be postponed?

A17 The request can be considered on a case-to-case basis.

Q18 I have the intention to demolish my building in the near future. Can it be exempted from periodic structural inspection?

A18 Please let us know the date of your planned demolition for our consideration. You should also inform us when the building has been demolished so that notices would not be issued in future.

Q19 I am in the process of selling my building. Can it be exempted from periodic structural inspection?

A19 The building still needs to be inspected. However, if you have the agreement of the buyer to comply with our Notice of Inspection, you can inform us of this agreement and we can consider letting the new owner take over the compliance.

Q20 My PE who has just carried out periodic structural inspection of my building recommended some remedial works. I now intend to sell my building. Can I be exempted from carrying out the repairs?

A20 No, you cannot.

Q21 I would like to carry out some addition & alteration (A/A) works to my building. How do I know if BCA's approval is required?

A21 Most building works require prior approval from BCA and other relevant government agencies. However, BCA does exempt some minor works from the approval process. A booklet entitled "Build It Right" can be downloaded from BCA's website at www.bca.gov.sg (under the heading 'Public Info') for the list of minor building works that do not require approval from BCA. Nevertheless, if in doubt, you should consult an architect or structural engineer to advise you accordingly.

Q22 I noticed some construction works being carried out in my neighbourhood. It appears to be unsafe or improper. What should I do?

A22 You can inform BCA by calling 6325 7720 for our follow up.

ANNEX C

ANNEX C

PERIODIC STRUCTURAL INSPECTION OF EXISTING BUILDINGS

GUIDELINES FOR STRUCTURAL ENGINEERS

Jun 2007

CONTENTS

GENERAL

1 Background

1.1 The periodic structural inspection of existing buildings was introduced with the promulgation of the Building Control Act in 1989. Requirements governing periodic structural inspection of existing buildings are stipulated in Part V of the Building Control Act and the Building Control (Inspection of Buildings) Regulations.

1.2 The periodic structural inspection applies to all existing buildings except:

a) detached houses, semi-detached houses, terraced or linked houses which are used solely as places of residence; and

b) temporary buildings.

1.3 Periodic structural inspections are carried out based on the following frequency:

a) every 10 years for buildings where at least 90% of its floor area is used solely for residential purposes; and

b) every 5 years for all other buildings.

1.4 The inspection consists of one or both of the following stages:

Stage 1: visual inspection.

Stage 2: full structural investigation.

2 Qualifications and Expectations of Structural Engineers

2.1 There is a common misconception that a periodic structural inspection involves only a "visual" record of the observations during a brief tour of the building. Such misconception has to be corrected. The Building Control Act requires the visual inspection to be conducted by a structural engineer who must be a registered professional engineer in the civil or structural engineering discipline, rather than any other person. It is so because of the need for and importance of professional assessment and judgement in structural engineering during the visual inspection. Any other lesser assessment would provide little more than what a lay person could have observed from a casual inspection.

2.2 The structural engineer who is appointed by the building owner is therefore expected to carry out a comprehensive visual inspection that relies largely on his professional engineering assessment, judgement and advice. He shall exercise reasonable diligence and take active and personal interest in the planning and carrying out of the inspection of the building. A situation where he does not visit the building or totally delegates the inspection work to his assistant or another person who is not a registered professional engineer in the civil and structural discipline is not an acceptable practice.

STAGE 1 : VISUAL INSPECTION

3 Scope of Visual Inspection

3.1 Prior to the commencement of visual inspection, the structural engineer is to obtain a set of the building's structural layout plans from the building owner. The availability of the structural layout plan will help the structural engineer to:

(a) understand the structural system and layout of the building;
(b) identify critical areas for inspection;
(c) identify the allowable imposed loads, in order to assess the usage and possibility of overloading; and
(d) verify if unauthorised addition or alteration works that affect the structure of the building have been carried out.

3.2 In general, the structural engineer is expected to carry out, with reasonable diligence, a visual inspection of:

a) the condition of the structure of the building
   - to identify the types of structural defects
   - to identify any signs of structural distress and deformation
   - to identify any signs of material deterioration

b) the loading on the structure of the building
   - to identify any deviation from intended use, misuse and abuse which can result in overloading

c) any addition or alteration works affecting the structure of the building
   - to identify any addition or alteration works which can result in overloading or adverse effects on the structure.

3.3 If there are no signs of any structural deterioration or defects, the visual inspection should suffice and unless the structural engineer otherwise advises, no further action needs to be taken.

3.4 If, on the other hand, signs of significant structural deterioration or defects are present, the structural engineer should make a professional assessment of the deterioration or defect and recommend appropriate actions to be taken. Such actions may involve repair works or full structural investigation to parts or whole of the building.

4 Limitations of Visual Inspection

4.1 There could be some difficulties in the conduct of a visual inspection as some of the main structural elements in a building may have been covered up by architectural finishes. It is therefore important that professional judgement is exercised by the structural engineer to determine which areas that are covered up should be exposed for inspection. Reference to structural layout plans to determine the presence of critical structural elements would be crucial under such circumstances.

4.2 Notwithstanding these difficulties, an inspection by an experienced structural engineer who exercises reasonable diligence would not be entirely fruitless or futile.

5 Coverage of Visual Inspection

5.1 Structural engineers and building owners often question the expected coverage of a visual inspection. Owing to difficulties of access and other practical problems, it is sometimes not possible to inspect 100% of all areas in a building within a reasonable period of time.

5.2 The danger of prescribing any percentage lower than 100% is the possibility of doing the minimum, with the possible consequence of missing something important. It is therefore generally expected that the structural engineer carry out the visual inspection of all units or areas of a building. This is especially so for buildings where the imposed loading is high, usage varied or likely to be subjected to abuse or overloading, for example factories, industrial buildings, warehouses, shop houses, public assembly areas, etc.

5.3 For other buildings where the imposed loading is light, usage is fairly uniform and unlikely to be subjected to overloading (such as residential apartments, hotel rooms, general office areas), or if a reduced percentage of coverage is inevitable, the structural engineer must have the inspection sampling well distributed throughout the building and no significant defect or deterioration is found during his inspection of the sample. If the structural engineer foresees the possibility of abuse or overloading and detects signs of significant structural defects and possible deterioration, he should consider 100% inspection of the structure.

5.4 All parts of a building with special and critical structural elements or with no redundancy (e.g. transfer girders, slender columns, cantilever structures, long span structures, cable structures, connections and support conditions, etc.) must be inspected fully.

6 Repair Works arising from Visual Inspection

6.1 Major repairs and strengthening work, where necessary, shall be treated as building works. As such, procedures relevant to application for approval of plans, permit to carry out building works and supervision of building works shall apply.

6.2 Minor repairs can be treated as routine maintenance and will not require plan submissions or permit applications.

FORMAT OF VISUAL INSPECTION REPORT

7 Main Contents of Report

7.1 A report produced by the structural engineer is expected to be professional, clear and conclusive. A stereotype report written in a manner, which can be used for any building with minor changes to its title block, is defeating the purpose of the Act. On the other hand, a thick book consisting of mainly

photographs with no engineering input may also not serve the purpose. The report should therefore reflect the fact that the structural engineer had carried out the inspection in a professional manner with reasonable diligence expected of him as a professional engineer. A well-prepared and professional report is demonstrated by the engineering views, assessment, judgement, conclusion and follow-up recommendations put forth based on the observations. Such a report is also useful for the owner as a maintenance record for any follow-up.

7.2 The following is a guide on the manner in which the Visual Inspection Report should be prepared. In addition, a checklist in Annex A is to be included in and as part of the inspection report.

a) General Information of the Building

- Name and address of the building
- Number of storeys in each block of building
- Description of main usage of the building
- Maintenance history of the building, if known

b) Structural System of the Building

- Description of the structural forms, systems and materials used in different parts of the building e.g. reinforced concrete, prestressed concrete, steel, etc
- Description of the soil condition and foundation system, if known

- Identification critical structures and structures without redundancies (eg. transfer girders, slender columns, cantilever structures, long span structures, cable structures, etc)

c) Diary and Scope of the Visual Inspection

- Dates of inspection for different parts of the buildings
- Description of any areas not covered by the visual inspection, the reasons and an assessment of whether such areas are critical to overall structural integrity of the building.

d) Survey of Loading on the Building Structure

- Records of and comments on the observations on the loading conditions, indicating the usage at different parts of the building and identifying any misuse, abuse or deviation from intended use. Special attention to be paid to industrial buildings (eg. factories and warehouses).
  - State whether existing usage and loading condition is compatible with the intended purpose of the structure.
  - State whether any misuse, abuse or deviation from intended use has given rise to excessive loading which can adversely affect the building structure.
- Recommendations on any remedial actions to be taken by the owners e.g. restricting the usage, relocating heavy machineries, further investigation on the adequacy of the structure.
- Where there is deviation from its intended use resulting in overloading or supporting higher design imposed load as recommended in BS6399, the need for further design check on structural adequacy and display of allowable imposed loading signage shall be recommended in the inspection report.

e) Survey of Addition or Alteration Works to Building Structure

- Records of and comments on the findings of any addition and alteration works to the building structure. Such information can be obtained by visual inspection, engineering judgement, interviewing the management corporation, owners and users, and checking the drawings if available to the engineer.
- State whether any addition and alteration works have given rise to excessive loading or other adverse effects on the building structure.
- Recommendations on any remedial actions to be taken by the owners e.g. the need for the removal of the addition and alteration works.

f) Survey of Signs of Structural Defects, Damages, Distress, Deformation or Deterioration

- Records of observations of any signs of structural defects, damages, distress, deformation or deterioration e.g. cracks, excessive deflection, connection failure, instability, floor settlement, foundation settlement, tilt, spalling concrete, corrosion of steel, termite infestation, dry & wet rot timber, etc. This could entail judicious removal of plaster or architectural finishes to establish the underlying structural condition. The seriousness of any structural defects should be assessed.
- Comments on the extent, possible causes and assessment of the seriousness of these identified problems.
- Assess whether the identified problems are:
  - Defects of no structural significance
  - Defects requiring remedial action and/or monitoring
  - Suspected defects of structural significance requiring full structural investigation and immediate action
- Recommendations on remedial actions and/or monitoring necessary to ensure the structural stability and integrity of the building.
- Where there are signs of termite attack on timber structures the engineer shall recommend the owner to carry out inspection and treatment by an anti-termite specialist and obtain the certificate of termite treatment accordingly.
- If there are signs of significant structural problems, the engineer shall make recommendations for a full structural investigation to be carried out without further delay.

g) Survey of exposure to aggressive environment

- Presence of column(s) immersed in water (eg. ground floor water tank, sea water, lakes, etc)

- Presence of aggressive chemical which may accelerate the deterioration of structural elements, particularly in industrial buildings.

h) Survey of retaining walls and slope protection structures (eg. soil nails, ground anchors, shorcrete slope)

- Evidence of wall movement, inadequate surface drainage, unintended imposed loading behind wall, corrosion of anchor blockhead, spalling of shotcrete protection, tension cracks, presence of big trees nearby etc.

i) Survey of safety barriers (eg. parapets and railings)

- Signs of corrosion, excessive deflection, spalling, cracks, etc observed on safety barriers particularly those in buildings where large crowds are expected (eg. shopping malls, institutional buildings, sport halls, stadiums, theatres, etc)

j) Other Surveys or Checks Carried Out

- Presence of heavy suspended fixtures in crowded locations, such as heavy false ceilings over high human-traffic areas like food courts, lobbies etc.
- Records of and comments on any known maintenance problems and 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;

k) Conclusions

- Conclusions on the structural condition shall include conclusions on loading conditions; addition and alteration works; structural defects, damage, distress, deformation, deterioration; and overall structural integrity and stability.

l) Sketches, Plans and Photographs

- All sketches, plans and photographs should have proper titles, explanations and cross-references to the main body of the report.
- Although photographs are often used by structural engineers as a record of their inspections, the entire collection of photographs should not be submitted indiscriminately, e.g. photographs of non-structural elements with no defects.

m) Structural Engineer's Endorsement and Standard Certification

- The report shall be signed and endorsed on the first and last page by the Structural Engineer appointed to carry out the inspection as follows.

Standard Certification by the Structural Engineer for Periodic Inspection of Buildings

In accordance with Section 28(6) of the Building Control Act (the "Act") and Regulations 4 and 5 of The Building Control (Inspection of Buildings) Regulations (the "Regulations"), I, _____, the Structural Engineer appointed by the building owner under section 28(3) of the Act have personally conducted an inspection of the condition and structure of the building and hereby submit the report of the results of my inspection. I certify that the inspection was carried out and the report was prepared by me in accordance with the provisions of the Act and the Regulations.

_____ _____

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

Date

- Depending on the results of the visual inspection, the Structural Engineer shall submit the Visual Inspection Certification (Form SF_ESID_SIS/SF-D3) as appropriate.

STAGE 2 : FULL STRUCTURAL INVESTIGATION

8 General

8.1 On the recommendation of the structural engineer who carries out the visual inspection, BCA may grant approval for a full structural investigation to be carried out.

8.2 If the structural deficiencies are of a localised nature, the structural engineer may recommend a full structural investigation for that area in the first instance. The scope and extent of the investigation should be clearly defined and subject to the approval of BCA. The outcome of this investigation may lead to a full structural investigation for the whole building.

8.3 The owner may engage a different structural engineer to carry out the stage 2 inspection and should inform BCA of the appointment.

9 Scope of Full Structural Investigation

9.1 The scope of the full structural investigation includes the following:

(a) obtaining information relating to the design, construction, maintenance and history of the building;
(b) assessing the structural adequacy of the building by checking the structural plans and calculations and reconstructing the structural plans if they are not available;
(c) carrying out tests on the materials used and structural elements of the building;
(d) carrying out load test on parts of the building if necessary;
(e) recommending appropriate safety precautionary and remedial measures to restore the structural stability and integrity of the building structure.

Building and Construction Authority

ANNEX A – CHECKLIST** FOR PERIODIC STRUCTURAL INSPECTION OF EXISTING BUILDING(S) AT *<building address>*

I declare that I have checked and included all of the following checklist items in my visual inspection report.

** Tick 'Yes' if checklist items have been checked and included in report. Otherwise, acceptable justifications to be provided.*

	Yes	No
1. Structural layout plans to assess the structural system and identify critical structural elements	☐	☐
2. Type of structural system	☐	☐
3. Type of foundation system	☐	☐
4. Presence of critical structures and structures without redundancies (eg. transfer girders, slender columns, cantilever structures, long span structures, cable structures, timber structures, etc)	☐	☐
5. Survey of 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 (and recommended design check by a PE and display of signage for allowable imposed loading)	☐	☐
c) Signs overloading & plan showing its location	☐	☐
d) Recommended remedial actions to be taken	☐	☐
6. Survey of Addition and Alteration Works (A&A):		
a) Presence of A&A	☐	☐
b) Plan showing location of A&A	☐	☐
c) Impact of A&A on the building structure	☐	☐
d) Recommended remedial actions to be taken	☐	☐
7. Survey of signs of structural defects and deterioration:		
a) Building movement	☐	☐
b) Structural deformation	☐	☐
c) Major structural defects (e.g. structural cracks, decayed timber member)	☐	☐
d) Minor structural defects	☐	☐
e) Non-structural defects	☐	☐
f) Recommended remedial actions to be taken	☐	☐

Yes No

8. Recommendations for Termite Attack
   a) Inspection by anti-termite specialist ☐ ☐
   b) Termite treatment by anti-termite specialist ☐ ☐

9. Survey on exposure to aggressive environment:
   a) Presence of column immersed in water (eg. ground floor water tank, sea water, lakes, etc) ☐ ☐
   b) Presence of aggressive chemical which may accelerate the deterioration of structural elements, particularly in industrial buildings ☐ ☐

10. Survey of 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 ☐ ☐

11. Safety Barriers
   a) Defects of safety barriers (eg. parapets & railings) ☐ ☐

12. Other Surveys:
   a) Record of previous strengthening works done ☐ ☐

13. Standard Certification on first and last page of report ☐ ☐

_____ _____

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

Date

** *This Checklist is to be included in the inspection report.*

ANNEX D

ANNEX D

Items	**Enhancement** *(amendments underlined)*
(1) Requirements on Periodic Structural Inspection	**3. DUTIES OF THE OWNER** 3.3 Notify BCA if the PE does not personally carry out visual inspection. 3.4 Carry out measures or building works recommended by the structural engineer within a specified period. **5. DUTIES OF THE STRUCTURAL ENGINEER** a) personally carry out the inspection in a manner prescribed under the Regulations; b) on completion of the inspection, prepare and sign a report of the result of the inspection. The first and last page of report shall bear the standard certification stamp found in section 7.2(m) of "Guidelines for Structural Engineers" d) submit the Checklist together with inspection report. The Checklist is obtainable from Annex A of "Guidelines for Structural Engineers" in BCA's website at http://www.bca.gov.sg
(2) Building Owner's Guide	**Q2 How can I play my part?** A2 BCA will serve building owners with a Notice of Inspection when the building is due for inspection. You can play your part by: • Providing access to critical parts of the building to be inspected by your structural engineer. This could include the removal of claddings/ false ceilings at specific locations requested by the structural engineer for inspection of structural members hidden behind claddings/false ceilings (eg. concealed timber roof structure or other critical structures); **Q12 I have appointed a structural engineer but he never seems to come in person to inspect my building. Is this allowed?** A12 Your appointed structural engineer is expected to carry out a comprehensive visual inspection based on his engineering judgement and assessment. He is expected to take active and personal interest in the planning and carrying out of the inspection of the building. A situation where he does not visit the building or totally delegates the inspection work to his assistant or another person who is not a registered professional engineer is not acceptable. You are encouraged to notify BCA for follow-up with the structural engineer if you have such evidence.
(3) Guidelines for Structural Engineers	**7.2** The following is a guide on the manner in which the Visual Inspection Report should be prepared. In addition, a checklist in Annex A is to be included in and as part of the inspection report. **(b) Structural System of the Building** - Identification critical structures and structures without redundancies (eg. transfer girders, slender columns, cantilever structures, long span structures, cable structures etc) **(d) Survey of Loading on the Building Structure** - Records of and comments on the observations on the loading conditions, indicating the usage at different parts of the building and identifying any misuse, abuse or deviation from intended use. Special attention to be paid to industrial buildings (eg. factories and warehouses). - Where there is deviation from its intended use resulting in overloading or supporting higher design imposed load as recommended in BS6399, the need for further design check on structural adequacy and display of allowable imposed loading signage shall be recommended in the inspection report. **(f) Survey of Signs of Structural Defects, Damages, Distress,**

Deformation or Deterioration

- Where there are signs of termite attack on timber structures the engineer shall recommend the owner to carry out inspection and treatment by an anti-termite specialist and obtain the certificate of termite treatment accordingly.

(g) Survey of exposure to aggressive environment

- Presence of column(s) immersed in water (eg. ground floor water tank, sea water, lakes, etc)

(h) Survey of retaining walls and slope protection structures (eg. soil nails, ground anchors, shorcrete slope)

- Evidence of wall movement, inadequate surface drainage, unintended imposed loading behind wall, corrosion of anchor blockhead, spalling of shotcrete protection, tension cracks, presence of big trees nearby etc.

i) Survey of safety barriers (eg. parapets and railings)

- Signs of corrosion, excessive deflection, spalling, cracks, etc observed on safety barriers particularly those in buildings where large crowds are expected (eg. shopping malls, institutional buildings, sport halls, stadiums, theatres, etc)

(m) Structural Engineer's Endorsement and Standard Certification

- The report shall be signed and endorsed on the first and last page by the Structural Engineer appointed to carry out the inspection as follows.

Standard Certification by the Structural Engineer for Periodic Inspection of Buildings

In accordance with Section 28(6) of the Building Control Act (the "Act") and Regulations 4 and 5 of The Building Control (Inspection of Buildings) Regulations (the "Regulations"), I, _____, the Structural Engineer appointed by the building owner under section 28(3) of the Act have personally conducted an inspection of the condition and structure of the building and hereby submit the report of the results of my inspection. I certify that the inspection was carried out and the report was prepared by me in accordance with the provisions of the Act and the Regulations.

_____ _____

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

Date

Annex A: new Checklist format to be included in inspection report