

Periodic Structural Inspection and Maintenance of Buildings

40 Slides

26 Feb 2026

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Learning Outcomes

- 1) Understand the PSI regime and workflow under the Building Control Act
- 2) Understand the role of Managing Agent / Facility Manager and how to contribute to the maintenance of buildings
- 3) Identify common building defects/ detect common unauthorised works
- 4) Importance of regular off-cycle inspection and maintenance of buildings/ awareness of good practice guide and checklists
- 5) Inspection technology available in the market

- 1) PSI workflow
- 2) Duties and responsibilities
- 3) Identify common structural defects
- 4) Detect common unauthorised works
- 5) Rationale of regular off-cycle inspection and maintenance of buildings
- 6) Good practice guide and checklists
- 7) Inspection technology



PSI Regime

The Periodic Structural Inspection regime is established in 1989 mandated under the Building Control Act 1989 (BC Act) and BC (Periodic Inspection of Buildings and Building Facade) Regulations 2021. It ensures structural safety by identifying potential defects, ensure timely maintenance, and prevent risks associated with structural deterioration, through regular inspections.

Inspection Cycles

Every **10** years for primarily residential buildings, and every **5** years for all other buildings.

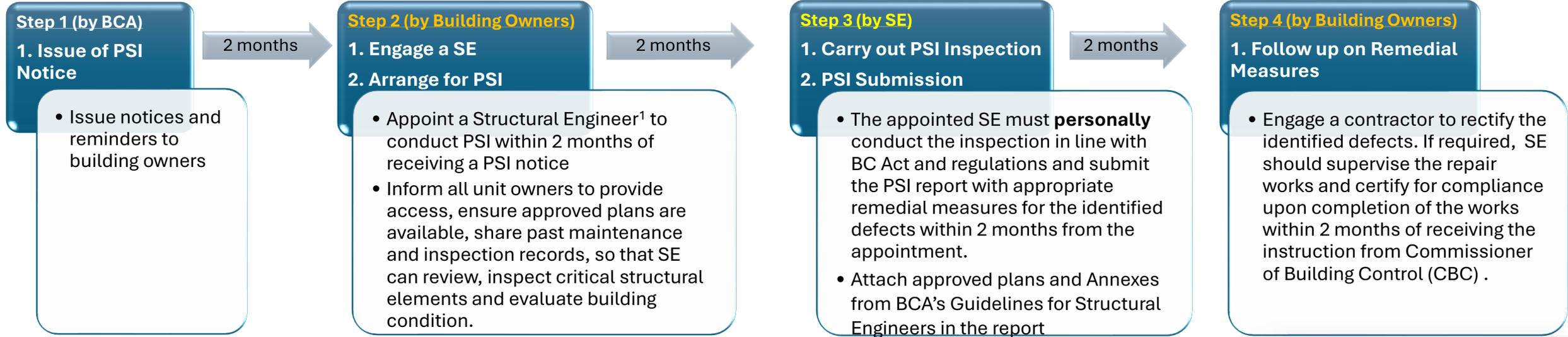
(Excludes detached houses, semi-detached houses, terraced or linked houses used as places of residence; and temporary buildings.)

Building owners/MCSTs must ensure their properties are properly maintained and regularly inspected.

Hotel New World:

Link: <https://www.channelnewsasia.com/watch/days-of-disaster/hotel-new-world-collapse-1503421>

PSI Timeline



*Moving forward, eNotices will be send via emails. MCST to set up generic email address to facilitate this.

Inspection Coverage (PSI)

- Higher inspection coverage** is recommended to detect and identify localised degradation / deterioration of building material for ageing buidings.
- Inspection intervals **than 500m²** (indoor areas) and **250m²** (outdoor areas) specified in Section 4.3.2.

Managing Agents / Facility Managers to assist building owners/MCST to :

- ✓ Comply with regulatory requirements and keep proper maintenance records
- ✓ Ensure approvals are obtained before allowing any building works to be carried out.
- ✓ Facilitate SEs in their inspection coverage, inspection methodology and repair methodology based on findings from the building's maintenance history.

¹Structural Engineer: a Professional Engineer registered under Professional Engineers Board (PEB).



Building and Construction Authority

Periodic Inspection of Building For MCST Buildings

What you need to know about Electronic Notices

What are Electronic Notices

Electronic Notices are softcopies of the notice of Periodic Inspection served via electronic means. Electronic Notices are environmentally sustainable, more efficiently delivered, easier to record and disseminate for building owners.

When will the Electronic Notices be received

For MCSTs which have provided their consent, the notice of inspection will be issued electronically to the provided e-mail at the next inspection cycle.

How can MCSTs receive the Electronic notices

MCSTs may H1 and return the consent form downloadable from the QR code or link at the bottom of the page.

Download the Consent Form at go.gov.sg/consent-psi-notice



Section 28(9) of the BC Act

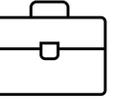
Any **building owner** who fails to appoint an SE as required under the PSI notice shall be guilty of an offence under section 28(9) of the Building Control Act 1989 and shall be liable on conviction to a fine not exceeding **\$20,000** or to **imprisonment** for a term not exceeding 12 months or to **both**. [Section 28 of BC Act].

Section 28(5A) of the BC Act

A **person** who hinders, obstructs or delays a structural engineer, competent person or façade inspector in the performance of that person's duty under subsection (5) shall be guilty of an offence and shall be liable on conviction —

(a) to a fine not exceeding **\$5,000**; and

(b) in the case of a continuing offence, to a further fine not exceeding **\$500** for every day or part of a day during which the offence continues after conviction.



MCSTs/Building Owners

- ✓ Appointment of Structural Engineers - within 2 months of receiving a PSI notice.
- ✓ Carry out the proposed repairs by the SE promptly with a proper a supervision by a SE

Role of Managing Agents/Facility Managers

- ✓ Regulatory compliance – advise Owner/MCST on legal obligations and property management issues.
- ✓ Maintain proper records – maintenance history, ensure approvals obtained prior to work commencement
- ✓ Facilitate inspections, maintenance and repairs – provide full and free access for inspections, including concealed structures, supply necessary plans and past maintenance records for review, organize and ensure property is properly maintained and arrange for repairs.

Beyond the statutory inspection regimes, **MAs/FMs need to conduct regular self-inspections and advise Building Owners/MCSTs to implement timely repairs** helping to ensure their buildings remain safe at all times. Where preventable incidents lead to injury or damage, MCSTs/building owners may face legal or regulatory action, compensation claims, potential insurance complications, and reputational harm.

Duties of SEs and Reporting Requirements - appointed SE must personally conduct inspection in line with BC Act and regulations, prepare, endorse and submit report to BCA within the notice timeframe. Attach approved plans and Annexes from BCA's Guidelines for Structural Engineers in the report.

Identify Common Structural Defects

Identify common defects



Non-structural defects

Though non-structural, Building Owner is to **appoint contractor** to carry out repair soonest before further deteriorate into serious structural defects.

Damage and stains on false ceiling



Damage on non-load bearing wall



Rising dampness



Veg growth & mold



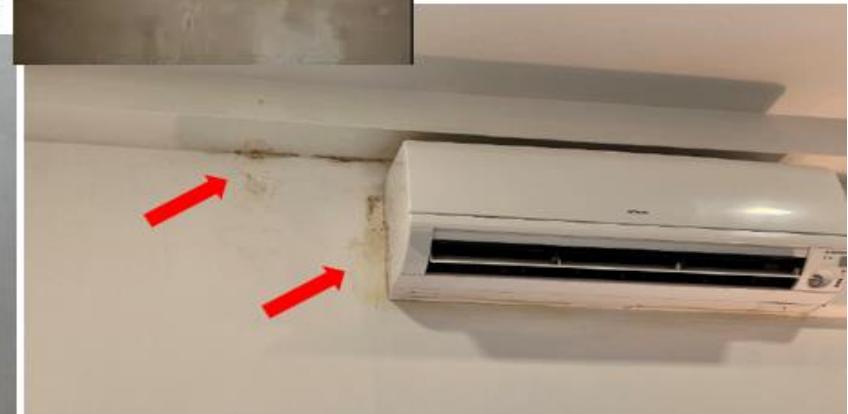
Damaged tile



Ceiling leakage



Moldy and dampness on wall

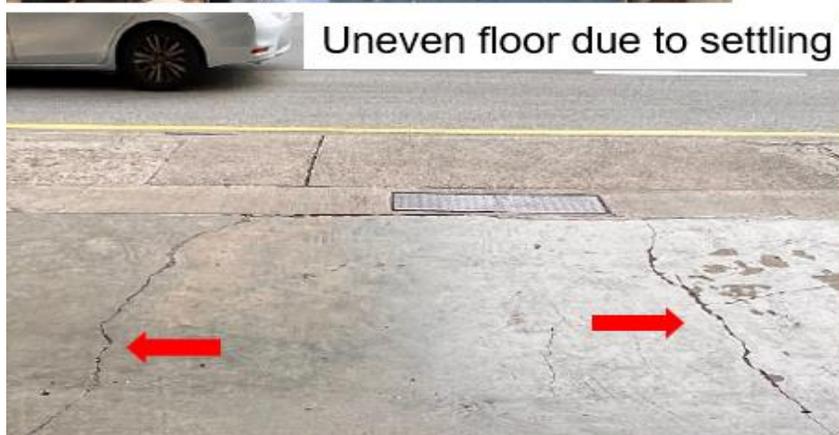
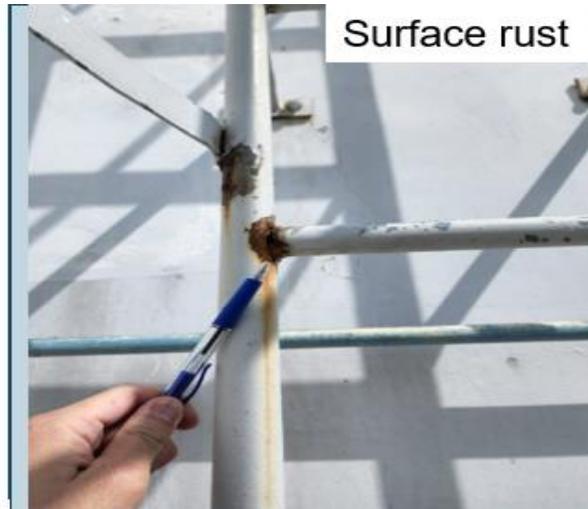


Identify common defects

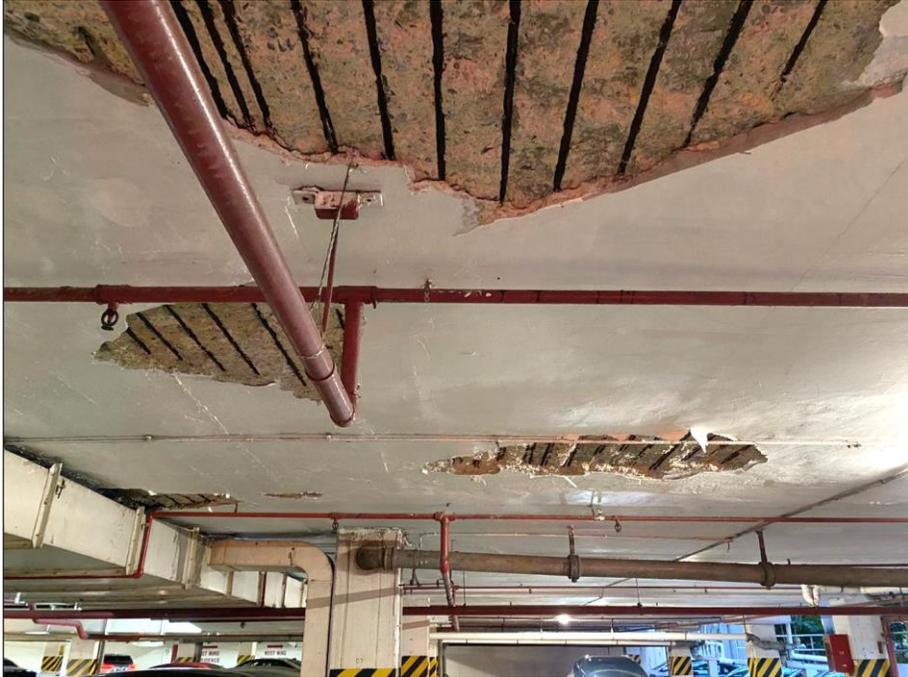


Non-structural defects

Though non-structural, Building Owner to **appoint contractor** to carry out repair soonest before further deteriorate into serious structural defects.



Examples of structural defects



Extensive spalling concrete



Peripheral & radial cracks on flat slab



Shear cracks on beams

| DO | DON'T |
|-----------------------------|---|
| Monitor crack / keep record | Ignore widening or spreading cracks |
| Check location of cracks | Paint / patch over or cover up large cracks without confirming type of defect |



Severe and Extensive Spalling Concrete

It is *advisable to engage a registered Professional Engineer* for advice on the structural repair if the following severe conditions are encountered:

- Spalling concrete affecting beyond the depth of the reinforcing steel bars or where the prestressing/ post-tensioning strands are exposed;
- Severely rusted and / or broken reinforcing steel bars;
- Spalling concrete affecting large areas or multiple areas;
- Water seepage or failure of waterproofing system especially at basement or roof;
- Honeycomb on concrete element whereby the coarse aggregates are exposed, and its void not filled by cement mortar; and
- Through cracks and / or holes on concrete element.



DO

Treat rust and patch concrete

Inspect surrounding areas

DON'T

Paint over without removing rust

Delay repairs once rebar is exposed

Spalling Concrete Repair Process - Minor



Step 1: Inspection and Assessment

Begin with a detailed inspection to identify underlying causes including the extent of damage and locate any hidden corrosion beneath the surface.



Step 2: Removal of Damaged Concrete

Clean affected area by carefully remove loose or damaged concrete to expose the corroded steel reinforcement.



Step 3: Steel Treatment

Rust and corrosion are thoroughly cleaned, and protective coatings / rust inhibitors are applied to prevent future damage.



Step 4: Concrete Restoration

Area is refilled with high-quality repair mortar designed for durability and weather resistance. Use bonding agents to ensure good adhesion between new and old concrete.



Step 5: Finishing and Protection

Finally, the surface is smoothed, sealed, and protected to restore its appearance and prevent future spalling.

Minor Repair Checklist from Good Practice Guide item 7.6 Pg. 92

| S/N | Description | ✓/×/NA |
|-----|--|--------|
| 1.0 | Repair Procedure for Minor Spalling Concrete | |
| 1.1 | Remove loose concrete pieces and trim the affected area until sound concrete is observed | |
| 1.2 | Clean and remove rust from reinforcing steel bars using a wire brush and apply antirust paint to the reinforcing steel bars | |
| 1.3 | Apply bonding agent to the reinforcing bars and concrete surfaces to ensure proper adhesion to the repair mortar | |
| 1.4 | Apply cementitious repair mortar suitable for spalling concrete repair to the affected areas; application should be in multiple layers to ensure proper adhesion of the grouts | |
| 1.5 | Wait for the repaired areas to be cured for a time period recommended by the product manufacturer | |
| 1.6 | Apply paint and / or protective coating to protect the affected area for long term protection | |
| 1.7 | Apply architectural finishes after the repair work is completed | |

Spalling Concrete Repair Process – Injection Grout



Step 1: Preparation

Before pressure grouting process can begin, the area must be cleaned and prepared. Any loose debris or dirt must be removed to ensure a proper bond between the grout and the concrete.



Step 2: Drilling

Small holes are drilled into the slab at strategic locations to access the voids or cracks that need to be filled. Size and spacing of the holes will depend on the size and location of the voids.



Step 3: Injection

A grout mixture is then prepared according to the specific needs of the slab. The grout is then pumped into the holes under high pressure, using a specialized injection pump.



Step 4: Monitoring

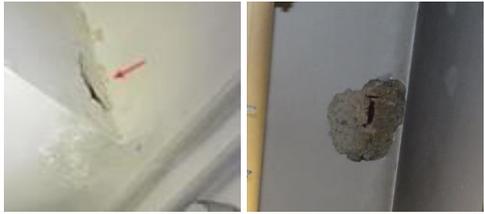
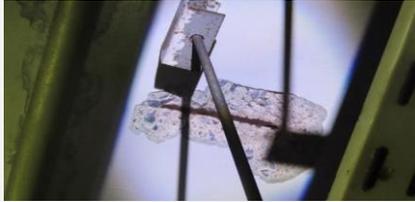
As the grout is injected, technicians carefully monitor the pressure and flow rate to ensure the voids are completely filled. They may also use sensors or other equipment to monitor.

Step 5: Curing & Finishing

Once grout has been injected, any excess is cleaned up and holes sealed. The slab is then allowed to cure for a period of time, typically several days, to ensure the grout has fully hardened and set.

Repair costs

Addressing defects early is cost-effective and reduces the risk of building failure.

| Typical Case | Duration since defect occurred till discovery | Description | **Sample image (for reference only) | Estimated cost of repairs |
|--|---|--|---|---------------------------|
| Scenario 1 – Building regularly inspected every 6 months by MAs / FMs | 1-6 months | Initial signs of spalling, with minor surface cracking and small areas of concrete detachment. The rebar might start showing slight corrosion but may not be extensively exposed yet. |  | \$ 300 - 1000 |
| Scenario 2 – Building regularly inspected every 5 years | 1-5 years | Spalling becomes more significant, with larger patches of concrete falling away and rebar becoming exposed. Corrosion on the rebar is noticeable, with rust forming and potentially affecting the rebar's surface. |  | \$ 2000 - \$3000 |
| Scenario 3 – Building regularly inspected every 5/10 years | 5-10 years | Extensive spalling, with substantial areas of concrete missing, revealing more of the rebar. The corrosion is severe, with significant rust and potential reduction in the rebar's structural capacity. |  | \$ 5000 - 12000 |
| Scenario 4 – Building inspected more than 10 years | 10+ years | Severe spalling, potentially compromising the slab's structural integrity. Rebar is heavily corroded, with extensive rust and possible complete loss of cross-section in certain areas, requiring urgent structural assessment and repair. |  | \$ 15000 - 50000 |

**Note: The images and cost of repairs are purely for illustrative purposes. They are not meant to be actual representative of the defects described.

Detect Common Unauthorised Works

Detect common unauthorised works



Works not Requiring Building / Structural Approval or Permit

In addition, it would be advisable for owners to engage a registered architect specialising in architectural services and/or professional engineer (PE) specialising in the field of civil and structural works, to advise on whether the building works require approvals from BCA and other relevant authorities.

Section 20 of the BC Act

Carrying out building works³ without an approval from BCA is an offence under Section 20 of the BC Act. Such an offence may incur a fine up to \$200,000 or imprisonment for a term not exceeding 2 years or both. This does not apply to works termed as 'Insignificant Building Works' (IBW).

MCSTs/Building Owners

✓ Engage a PE before starting any building works and ensure approvals are obtained from relevant authorities.

MCSTs

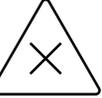
✓ Obtain a 90% resolution at a general meeting if proposed works affect the Gross Floor Area (GFA) of the development.

³ "Building works" means –

(a) the erection, extension or demolition of a building;

(b) the alteration, addition or repair of a building;

(c) the provision, extension or alteration of any air-conditioning service or ventilating system in or in connection with a building and includes site formation works connected with or carried out for the purpose of paragraph (a), (b) or (c).



Works not Requiring Building / Structural Approval or Permit

Insignificant Building Works (IBW) - certain types of works do not require building / structural plan approval or a permit to carry out structural works from the Commissioner of Building Control. For details of this exemption, do refer to the First Schedule of the Building Control Regulations or in the Singapore Statutes Online (www.statutes.agc.gov.sg):



Adobe Acrobat
Document

Please note that it is the owners' responsibility to check if clearances from other relevant authorities (e.g. the Urban Redevelopment Authority or URA) are required. In addition, owners should be mindful of having to comply with other laws (e.g. caveats, MCST by-laws).

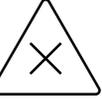
For general enquiries / feedback please use our [online feedback form](https://www1.bca.gov.sg/feedback) (<https://www1.bca.gov.sg/feedback>)

FIRST SCHEDULE

Regulation 3A

INSIGNIFICANT BUILDING WORKS

1. Building works carried out for or in connection with —
 - (a) site formation works involving any excavation or filling not exceeding 1,500 millimetres in depth or height;
 - (b) any shaft, manhole, trench or tunnel for the purpose of laying sewer, water or other utility pipes, where the pipe does not exceed 1,000 millimetres in internal diameter, and where the building works are not located within the site of other building works that are not specified in this Schedule;
[S 665/2013 wef 01/04/2014]
 - (c) any boundary wall, boundary fence or gate, that is not load bearing;
[S 218/2025 wef 01/04/2025]
 - (d) any awning, windowhood or cantilevered roof constructed of tiles, and having a projection not exceeding 1,400 millimetres;
[S 665/2013 wef 01/04/2014]
 - (e) any awning, windowhood or cantilevered roof constructed of lightweight material, or glass not exceeding a thickness of 13 millimetres, and having a horizontal projection not exceeding 3,000 millimetres;
[S 665/2013 wef 01/04/2014]
 - (f) any single storey shelter (whether open-sided or enclosed) that is erected on the ground or on an existing reinforced concrete roof and —



Commonly found Unauthorised Structures

A. **Lofts** are considered Insignificant Building Works only if built with timber flooring and does not exceed 5 square metres.

'lightweight material' means —

(a) any sheet or board material such as timber board, plywood, fibreboard, plasterboard, gypsum board, calcium silicate board, fibre-based cement board, aluminium sheet, corrugated metal sheet or polycarbonate sheet;

(b) any concrete product made with lightweight aggregates such as pumice, perlite or vermiculite;

(c) any hollow concrete block, hollow glass block, autoclaved aerated concrete block and the like.

B. **Shelters** are considered Insignificant Building Works only if:

(i) any single storey enclosed shelter (whether open-sided or enclosed) that is erected on the ground or on an existing reinforced concrete roof, not exceeding an area of 50* sqm. (*- is in a private space, beam span does not exceed 6m, cantilever span does not exceed 3m, enclosed with lightweight materials not acting as safety barriers and roof is constructed of lightweight material.)

(ii) The “area” refers to the floor area below the coverage of the roof or the floor area occupied by the structure, whichever is larger.



Detect common unauthorised works



C. **Mezzanines** are considered insignificant building works only if any single level platform (including the space below the platform)

- (i) used solely for the purpose of the storage of goods;
- (ii) located in an industrial building or a part of an industrial building;
- (iii) that is not accessible by the public;
- (iv) that does not exceed 4 metres in height and does not exceed 50 square metres;
- (v) where no span of beam or any slab that is part of the platform exceeds 6 metres;
- (vi) where no span of any cantilever that is part of the platform exceeds 3 metres.



D. **Additions and Alterations Works** that involves any hacking or slabbing of any structural elements will require plan submissions to relevant authorities and BCA.



Slab over/ hacking of slab

For more information on insignificant building works, please refer to [Building Works that do not Require Plan Submission to BCA | Building and Construction Authority \(BCA\)](#)

Rationale of Regular Off-cycle Inspection and Good Practice Guide and Checklists

Regular inspection and maintenance of buildings

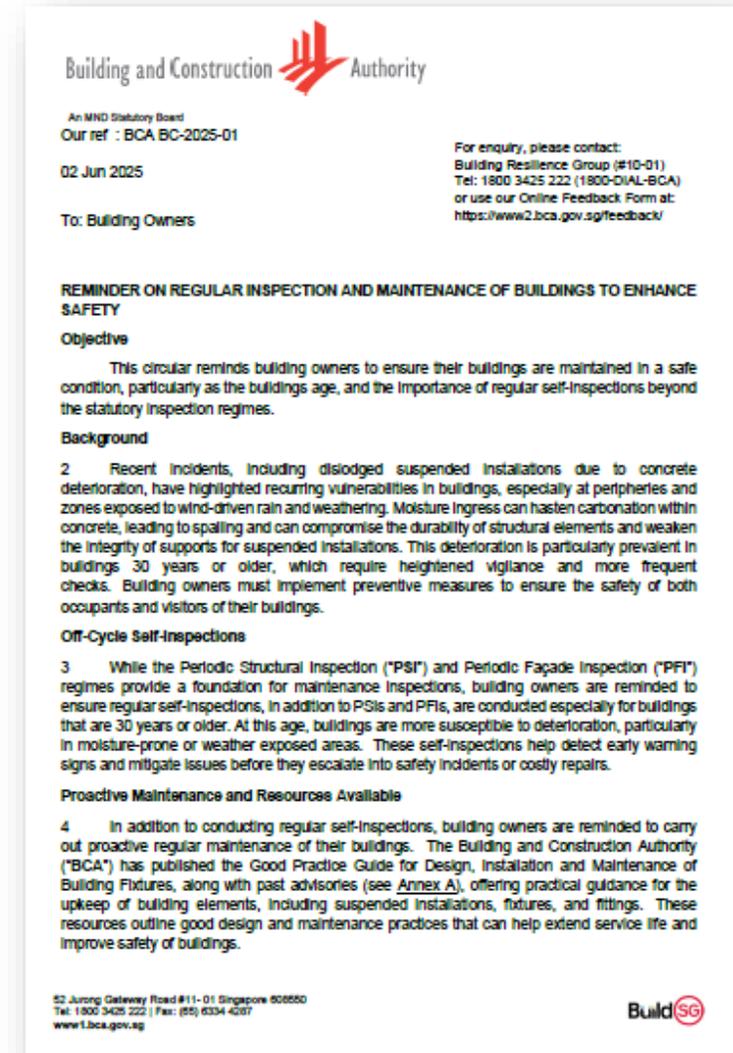
BCA circular 02 Jun 2025 and Good Practice Guide 01 Mar 2022

Safety: Regular inspections help in identifying potential hazards, such as deteriorating structural elements (e.g. poorly maintained concrete can lead to spalling), which can pose safety risks to users and occupants.

Early Detection of Issues: Conducting routine inspections allows for the early detection of defects or deterioration. This proactive approach can prevent minor issues from escalating into significant safety incidents or costly repairs.

Cost-Effectiveness of Early Intervention : Regular and proactive maintenance is often more cost-effective than addressing major repairs after failures occur. Early intervention can significantly reduce the risk of failure and associated costs. Studies from National Research Council, government data from US Department of Transportation, and industry experience all confirm that **costs escalate sharply** when intervention is postponed.

=>Advise Building Owner/MCST that rectifying building defects early is not only **safer** but **far more cost-effective** than delaying repairs.



Building and Construction Authority

An MND Statutory Board
Our ref : BCA BC-2025-01

02 Jun 2025

To: Building Owners

For enquiry, please contact:
Building Resilience Group (#10-01)
Tel: 1800 3425 222 (1800-DIAL-BCA)
or use our Online Feedback Form at:
<https://www2.bca.gov.sg/feedback/>

REMINDER ON REGULAR INSPECTION AND MAINTENANCE OF BUILDINGS TO ENHANCE SAFETY

Objective

This circular reminds building owners to ensure their buildings are maintained in a safe condition, particularly as the buildings age, and the importance of regular self-inspections beyond the statutory inspection regimes.

Background

2 Recent incidents, including dislodged suspended installations due to concrete deterioration, have highlighted recurring vulnerabilities in buildings, especially at peripheries and zones exposed to wind-driven rain and weathering. Moisture ingress can hasten carbonation within concrete, leading to spalling and can compromise the durability of structural elements and weaken the integrity of supports for suspended installations. This deterioration is particularly prevalent in buildings 30 years or older, which require heightened vigilance and more frequent checks. Building owners must implement preventive measures to ensure the safety of both occupants and visitors of their buildings.

Off-Cycle Self-Inspections

3 While the Periodic Structural Inspection ("PSI") and Periodic Façade Inspection ("PFI") regimes provide a foundation for maintenance inspections, building owners are reminded to ensure regular self-inspections. In addition to PSIs and PFIs, are conducted especially for buildings that are 30 years or older. At this age, buildings are more susceptible to deterioration, particularly in moisture-prone or weather exposed areas. These self-inspections help detect early warning signs and mitigate issues before they escalate into safety incidents or costly repairs.

Proactive Maintenance and Resources Available

4 In addition to conducting regular self-inspections, building owners are reminded to carry out proactive regular maintenance of their buildings. The Building and Construction Authority ("BCA") has published the Good Practice Guide for Design, Installation and Maintenance of Building Fixtures, along with past advisories (see [Annex A](#)), offering practical guidance for the upkeep of building elements, including suspended installations, fixtures, and fittings. These resources outline good design and maintenance practices that can help extend service life and improve safety of buildings.

52 Jurong Gateway Road #11-01 Singapore 606560
Tel: 1800 3425 222 / Fax: (65) 6334 4267
www1.bca.gov.sg

Build SG

Regular inspection and maintenance of buildings

BCA circular 02 Jun 2025 and Good Practice Guide 01 Mar 2022

Compliance with Regulations: Building owners are responsible for ensuring their buildings remain safe at all times, regardless of the statutory inspection cycle. Carry out **regular off-cycle inspections** can help maintain compliance with safety regulations and standards.

Preservation of Property Value: Maintaining a building in good condition preserves its value over time. Regular upkeep can enhance the aesthetic appeal and functionality of the property, making it more attractive to users and occupants.

Documentation and Record Keeping: Regular inspections are a vital tool for property management. The detailed records created during these inspections not only help track the building's condition but also provide the information needed for a **SE's review**, guide future repair decisions, and ensure that the building remains safe and well-maintained over the long term.

=> Carry out **regular off-cycle inspections** and advise Building Owner/MCST to implement **timely repairs** prevents further damage from occurring, can extend the lifespan of the building, meeting regulations, eliminate unsightly defects and signs of damage.



Good practice guide and checklists

Good Practice Guide 01 Mar 2022

A summary of good practices that may be adopted for the design, installation and maintenance of building fixtures, developed with inputs from various industry representatives, professional institutions, associations and stakeholders.

Covering common issues, good practices, inspection guidelines and checklists for:

- **Suspended Ceiling**
- **Air-conditioning and Mechanical Ventilation Fixtures**
- **Mechanical, Electrical and Plumbing Fixtures**
- **High Volume Low Speed Fans**
- **Overhead Fixtures**
- **Spalling Concrete**

(<https://www1.bca.gov.sg/docs/default-source/dfm/good-practice-guide-for-design-installation-and-maintenance-of-building-fixtures.pdf>)



Disclaimer: The Building and Construction Authority disclaims any liability (including any liability arising from negligence) arising in respect of any matter and the consequences of any act done or not done by any person in reliance on anything in or omitted from this Guide.

Good practices for Maintenance of Buildings

A) Importance of Regular Off-cycle Inspections and early intervention

- Essential for early detection of structural defects that may develop from deterioration, wear and tear, overloading, or poor maintenance
- Consider the use of inspection technology
- Critical for maintaining building safety and preventing risks to occupants and the public

B) Responsibilities of MCSTs, Building Owners and Developers

- Always engage a Qualified Person (QP) - either a registered Architect or Professional Engineer (Civil & Structural) - to assess if works need regulatory approval. Consult BCA when uncertain about works like lofts or A&As.

C) Ensuring Regulatory Compliance

- If plans do not require approval, appointed PEs must ensure designs meet relevant guidelines
- MCSTs must address unauthorised structures by requiring unit owners to either obtain proper approval or remove them, and such matters documented during Annual General Meetings

D) Preventing Unauthorised Works

- MCSTs/building owners need to implement proper systems to ensure unit owners obtain necessary approvals before proceeding with construction. This prevent unauthorised works that could cause structural overloading which is a key responsibility of MCSTs/building owners.

Spalling concrete maintenance and inspection checklist

| S/N | Description | ✓/✗/NA | Remarks |
|-----|---|--------|---------|
| 1.0 | Documentation and Tools | | |
| 1.1 | Check for records of repeated spalling concrete and rectification works carried out at same or similar locations | | |
| 1.2 | Place emphasis on concrete structures subjected to unfavourable environmental conditions such as exposure to wind, rain, moisture, condensation, exhaust, heat and vibration that may accelerate the deterioration of building structures | | |
| 1.3 | Photograph and document details of any new defects (e.g., location, defect observed, repair work that are carried out, etc.) | | |
| 1.4 | Prepare inspection tools such as tapping tools and torch light, or an effective visual or scanning technology for inspection on concrete surfaces. | | |
| 2.0 | Signs of Wear and Tear on Protective Coating | | |
| 2.1 | Deteriorated or peeled off protective coating such as waterproofing membrane or anti-carbonation coating | | |
| 2.2 | Deteriorated or peeled off paint coat | | |
| 3.0 | Signs of Spalling Concrete | | |
| 3.1 | Hollow sounds when concrete surfaces are tapped with a tapping tool, which indicates the concrete has delaminate and spalling is imminent | | |

| | | | |
|-----|---|--|--|
| 3.2 | Deformed or uneven concrete surfaces, which could be a sign of spalling concrete bulging. To carry out step 3.1 to verify if it is spalling concrete | | |
| 3.3 | Concrete crack lines on concrete surfaces, which could be a sign of spalling concrete. To carry out step 3.1 to verify if it is spalling concrete | | |
| 3.4 | Presence of water stains, efflorescence, moulds, and water leaks on the concrete surfaces, which could be a sign of spalling concrete. To carry out step 3.1 to verify if it is spalling concrete | | |

Suspended Ceiling / Overhead Fixtures maintenance and inspection checklist

2.6 SUSPENDED CEILING MAINTENANCE AND INSPECTION CHECKLIST

Building: _____ Company: _____
 Block / Storey: _____ Name of Supervisor: _____
 Inspection frequency: _____ Date of Inspection: _____

| S/N | Description | ✓/✗/N A | Remarks |
|-----|---|------------|---------|
| 1.0 | Documentation | | |
| 1.1 | A set of approved drawings, manufacturer/supplier's operation and maintenance manual (OEM) and warranty documentation are available | | |
| 1.2 | Review records of any known maintenance problems and previous rectifications carried out on the fixtures, including data from the Building Management Systems (BMS) such as leakages, temperature and humidity fluctuation, excessive vibration, etc. | | |
| 1.3 | Place emphasis on suspended ceiling over high human traffic and public assembly areas such as waiting/seating areas, lobbies, entrance, food courts, etc. | | |
| 1.4 | Place emphasis on suspended ceiling subjected to unfavourable environmental conditions such as exposure to wind, rain, moisture, condensation, exhaust, heat and vibration that may accelerate the deterioration of fixtures | | |
| 1.5 | Photograph and document details of any new defects (e.g., location, defect observed, repair work that was carried out, etc.) | | |
| 2.0 | Suspended Ceilings Panels | | |
| 2.1 | No uneven, sagging, deformed, damaged, corroded or dislodged suspended ceiling | | |

| | | | |
|-----|--|--|--|
| 2.2 | No water stains, efflorescence, moulds, or water leaks | | |
| 2.3 | No fixture or equipment such as lighting, piping, ducts and diffusers is dislodged and imposing its self-weight onto the suspended ceiling panel or frame | | |
| 3.0 | Supporting Structures – Hangers, Frames, And Connections | | |
| 3.1 | No missing, loose, bent, kinked, corroded, sagging, damaged or inappropriately altered supporting structures such as hangers, frames, bolts, nuts, screws, clips, brackets, etc. | | |
| 3.2 | No hanger is used to support other building fixtures not designed for (e.g., improper use of suspended ceiling's suspension and hangers to hang cables, cabinets, pipes, display screens, signages or resting network, communication or switch equipment on the grids) | | |
| 3.3 | No signs of other forms of deterioration and damage on the hangers, frames and connecting bolts and nuts | | |
| 4.0 | Structural Elements – Columns, Beams, And Slab | | |
| 4.1 | No concrete crack lines around the connections | | |
| 4.2 | No spalling concrete | | |
| 4.3 | No corrosion on steel structure | | |
| 4.4 | No water stains or water seepage | | |
| 4.5 | No termite infestation | | |
| 4.6 | No other signs of deterioration | | |

6.6 OVERHEAD FIXTURES MAINTENANCE AND INSPECTION CHECKLIST

Building: _____ Company: _____
 Block / Storey: _____ Name of Supervisor: _____
 Inspection frequency: _____ Date of Inspection: _____

| S/N | Description | ✓/✗/NA | Remarks |
|-----|---|--------|---------|
| 1.0 | Documentation | | |
| 1.1 | A set of approved drawings, manufacturer/supplier's operation and maintenance manual (OEM) and warranty documentation are available | | |
| 1.2 | Review records of any known maintenance problems and previous rectifications carried out on the fixtures, including data from the Building Management Systems (BMS) such as temperature and humidity fluctuation, excessive vibration, etc. | | |
| 1.3 | Place emphasis on overhead fixtures over high human traffic and public assembly areas such as waiting/seating areas, lobbies, entrance, food courts, etc. | | |
| 1.4 | Place emphasis on overhead fixtures subjected to unfavourable environmental conditions such as exposure to wind, rain, moisture, condensation, exhaust, heat and vibration that may accelerate the deterioration of fixtures | | |
| 1.5 | Photograph and document details of any new defects (e.g., location, defect observed, repair work that was carried out, etc.) | | |
| 2.0 | Overhead Fixtures and Components | | |
| 2.1 | No uneven, sagging, deformed, damaged, corroded or dislodged overhead fixtures, bolts and nuts, and its components | | |
| 2.2 | No signs of frayed or sagging of the hanging system or damaged guy wires (if present) | | |

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| 2.3 | The safety cable (if present) is secured properly to the mounting structure with as little slack as possible | | |
| 2.4 | No fixture or equipment such as lighting, piping, ducts, and diffusers is dislodged and imposing its self-weight onto the suspended overhead fixtures components or frame | | |
| 2.5 | No water stains, efflorescence, or moulds | | |
| 3.0 | Supporting Structures – Hangers, Frames, And Connections | | |
| 3.1 | No missing, loose, bent, kinked, corroded, sagging, damaged or inappropriately altered supporting structures such as hangers, frames, bolts, nuts, screws, clips, brackets, etc. | | |
| 3.2 | No hanger is used to support other building fixtures not designed for (e.g., cabinets, pipes, display screens, signages, etc.) | | |
| 3.3 | No signs of other forms of deterioration and damage on the hangers, frames and connecting bolts and nuts | | |
| 4.0 | Structural Elements – Columns, Beams, And Slab | | |
| 4.1 | No concrete crack lines around the connections | | |
| 4.2 | No spalling concrete | | |
| 4.3 | No corrosion on steel structure | | |
| 4.4 | No water stains or water seepage | | |
| 4.5 | No termite infestation | | |
| 4.6 | No other signs of deterioration | | |

Checklist for Periodic Structural Inspection of Existing Building (Annex A)

Survey of Loading

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)

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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

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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

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Checklist for Periodic Structural Inspection of Existing Building (Annex A)

Unauthorised Works

6. Survey of Loading:

- a) Compatibility of existing usage with the design loading

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- 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)

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- c) Signs of distress or deformation due to overloading (to show affected location(s) on plan)

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7. Unauthorised Works^D:

- a) Presence of unauthorised works (to show locations on plan)

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- b) Impact of unauthorised works on the building structure

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- c) Record of previous strengthening works without Approved Plans.

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- d) Additional unauthorised floor within a high volume/headroom space

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8. Signs of structural defects and deterioration:

- a) Building tilt/ settlement

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- b) Structural deformation

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- c) Major structural defects (e.g. structural cracks, decayed timber member, etc.)

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- d) Minor structural defects (e.g. minor corrosion and minor spalling, etc.)

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- e) Non-structural defects

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Checklist for Periodic Structural Inspection of Existing Building (Annex A)

Signs of structural defects and deterioration

6. Survey of Loading:

- a) Compatibility of existing usage with the design loading

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- 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)

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- c) Signs of distress or deformation due to overloading (to show affected location(s) on plan)

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7. Unauthorised Works^D:

- a) Presence of unauthorised works (to show locations on plan)

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- b) Impact of unauthorised works on the building structure

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- c) Record of previous strengthening works without Approved Plans.

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- d) Additional unauthorised floor within a high volume/headroom space

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8. Signs of structural defects and deterioration:

- a) Building tilt/ settlement

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- b) Structural deformation

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- c) Major structural defects (e.g. structural cracks, decayed timber member, etc.)

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- d) Minor structural defects (e.g. minor corrosion and minor spalling, etc.)

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- e) Non-structural defects

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Checklist for Periodic Structural Inspection of Existing Building (Annex A)

Exposure to aggressive environment

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| 9. Exposure to aggressive environment: | |
| a) Column immersed in water (e.g. ground floor water tank, seawater, lakes, etc.) | <input type="checkbox"/> |
| b) Aggressive chemicals or other similar substances which may accelerate the deterioration of structural elements, particularly in industrial buildings | <input type="checkbox"/> |
| 10. Slope, Retaining Walls And Slope Protection Structures^E: | |
| a) Signs of slope erosion | <input type="checkbox"/> |
| b) Defects of retaining wall and other slope protection structures (e.g. cracks, tilt, displacement, etc.) | <input type="checkbox"/> |
| 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.) | <input type="checkbox"/> |
| 11. Safety Barriers (i.e. parapets & railings): | |
| a) Any signs of structural defect, deformation or deterioration | <input type="checkbox"/> |
| b) Any continuous handrail for full glass barriers | <input type="checkbox"/> |
| 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 | <input type="checkbox"/> |
| b) Records of and comments on any known maintenance problems and previous rectification carried out on the building structure. | <input type="checkbox"/> |

Checklist for Periodic Structural Inspection of Existing Building (Annex A)

Other Surveys or Checks carried out

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

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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.)

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11. Safety Barriers (i.e. parapets & railings):

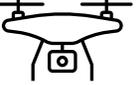
- a) Any signs of structural defect, deformation or deterioration
- b) Any continuous handrail for full glass barriers

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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.

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Inspection Technology

LEVERAGING INSPECTION TECHNOLOGIES TO SUPPORT BUILDING MAINTENANCE

Inspection Technology

1. Accurate and fast detection of latent and concealed defects
2. Non-invasive technologies to test concrete grade and carbonation for structures



Corrosion and carbonation scanners

Screening Eagle, Giatec iCOR



AI-enabled Drones for Façade Inspection

H3 Zoom, Operva AI, NovaPeak, Singapore Inspection and Engineering



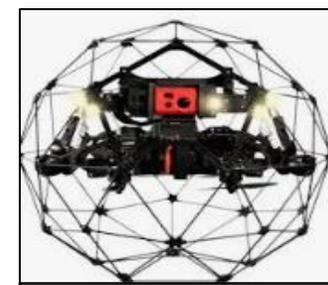
Millimeter wave for latent defect detection

Wavescan



Suspended ceiling inspection robots

Myrlabs, Viscoy, Falcon



False ceiling inspection using indoor drones

Viscoy, Avetic, Spinoff Robotics



Desired Outcomes

- **Accurate detection of defects with greater efficiency**
- **Improve productivity and efficiency during inspection of buildings**

INSPECTION TECHNOLOGIES – ROBOTIC CEILING INSPECTION

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| Companies <i>(non-exhaustive list)</i> |  | | |
| Inspection Method | <p><u>Crawl Robots</u> or <u>Mini Drones</u> are used to conduct inspections in confined spaces and remotely inaccessible locations (e.g. within false ceilings / service ducts).</p> |  |  |
| Benefits | <ul style="list-style-type: none">• Able to navigate easily in tight and elevated ceiling spaces for efficient and thorough inspection.• Reduces the need for multiple access hatches, preserving ceiling integrity and aesthetics.• Enables faster and more frequent inspections, identifying early-stage deterioration to prevent costly repairs and reduce the risk of accidents.• Improves site safety by minimizing the need for workers to operate at height. | | |

INSPECTION TECHNOLOGIES – DRONES FOR FACADE INSPECTION

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| Companies <i>(non-exhaustive list)</i> |  |
| Inspection Method | <p>High-resolution drones capture photographs during visual inspections, to identify critical defects and determining areas that require detailed close-range inspection. Combined with AI-powered software, the system could detect defects, classify them, and automatically generate reports.</p>  <p style="text-align: center;">VS</p> |
| Benefits | <ul style="list-style-type: none">• Eliminates the need for working at height (i.e. improved workplace safety).• Provides high-quality photographic documentation for quick and comprehensive building facade condition assessment/report.• Enable time-saving and cost-effective inspections while improving consistency, efficiency, and accuracy in defect assessment. |

COMPANY WEBSITES

| | |
|---|---|
|  | https://www.viscoy.com/products-solutions/ |
|  | https://www.myrmidonlaboratories.com/ |
|  SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN FALCON by ROAR Lab (SUTD) | https://www.sutd.edu.sg/ |
|  | https://www.h3zoom.ai/ |
|  | https://www.operva.ai/ |
|  | https://nova-peak.com/ |
|  | https://www.screeningeagle.com/en/singapore-inspection-engineering |

Disclaimer: This slide is for information purposes only, it does not constitute BCA's endorsement/promotion towards a particular brand/product.



PSI and Cost-Effectiveness of Early Intervention

Comply with PSI requirements by appointing SE within 2 months of receiving PSI notice.

Proactive maintenance through conducting regular off-cycle inspections is more economical.

- Common defects: cracks, spalling concrete, water seepage, corrosion of steel elements, settlement issues.
- Advise Building Owner/MCST to rectify building defects early is not only safer but far more cost-effective than delaying repairs
- Examples of unauthorised building works: Lofts, mezzanines, shelters, and additions that exceed permitted limits without approval.

Preservation of Property Value with Better Managed Sinking Fund

Advise Building Owner/MCST regular building maintenance helps protect and maintain property value by keeping the building both visually appealing and functional to the users.

- Timely repair also prevents further damage from occurring, can extend the lifespan of the building, meeting regulations, eliminate unsightly defects and signs of damage
- Early intervention can significantly reduce the risk of failure and associated costs

Documentation and Record Keeping and Adopt Inspection Technologies

Inspection records are important, track building conditions, support SE's reviews, inform maintenance decisions, and help long-term building safety.

- Ensure approvals obtained prior to work commencement
- Make use of Good Practice guide, useful Checklists and market-ready inspection technologies.

THE STRAITS TIMES

Some ageing condos in Singapore struggle with failing infrastructure, inadequate sinking funds

Some ageing condos in Singapore struggle with failing infrastructure, inadequate sinking funds

By Grace Lim. Got it's newsletter delivered to your inbox



Elevate Your Professional Standing



Differentiate through Regular Off-Cycle Inspections

- **Go beyond compliance** – implement comprehensive inspection programmes beyond minimum requirements
- **Early detection saves money** – identify defects before they become costly emergencies

Act Swiftly on Findings

- Every day of delay increases risk and repair costs
- Document meticulously, timely repair
- Move from reactive to proactive maintenance strategies

Your Competitive Advantage

- Technical knowledge to spot what others miss
- Strategic advice others cannot provide

Professional Responsibility

You are the guardians of our built environment – ensuring buildings remain safe, functional, and valuable through vigilant monitoring and prompt action.

Thank you