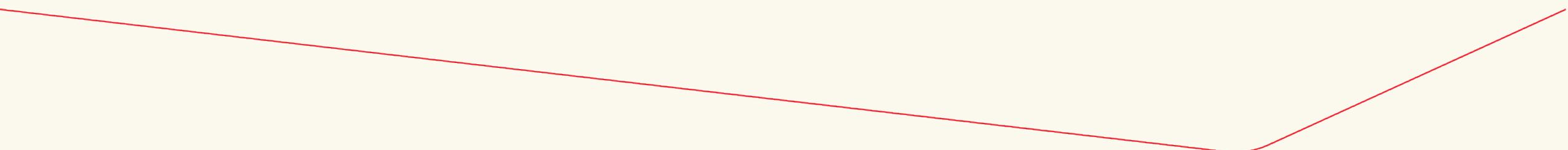


Façade Inspection Course For FM/MA



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1. Understand the common façade types in Singapore
2. Understand the possible façade defects
3. Curtain Wall & Vulnerable Facades
4. Periodic Façade Inspection (PFI)
 - PFI framework (duties, person involved, requirements)
5. Legislative requirements and duties for building maintenance.
 - Robust off-cycle Maintenance of Facade
 - Notice to Maintain, Unsafe Exterior Feature under PART 4A of BC Act 1989
 - Reportable Matters Regulations 2025 in relation to fallen exterior feature safety incident

Common Facade

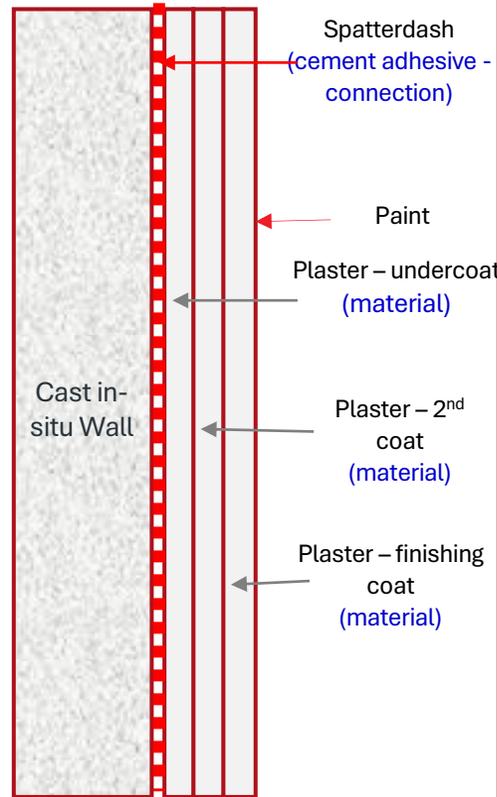


Common Façade in Singapore

Plaster Façade



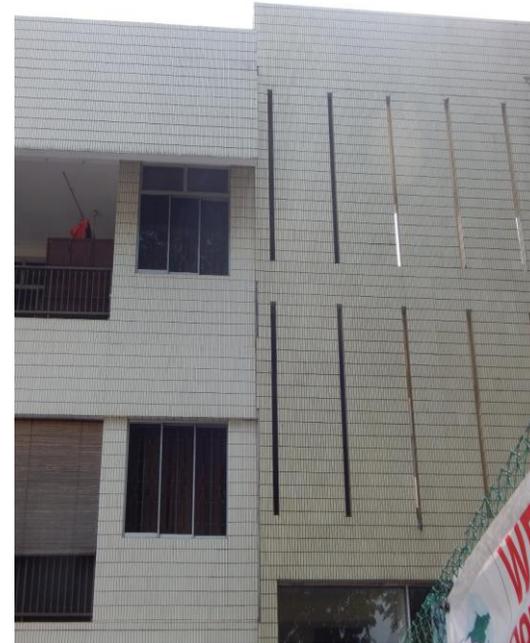
Front View



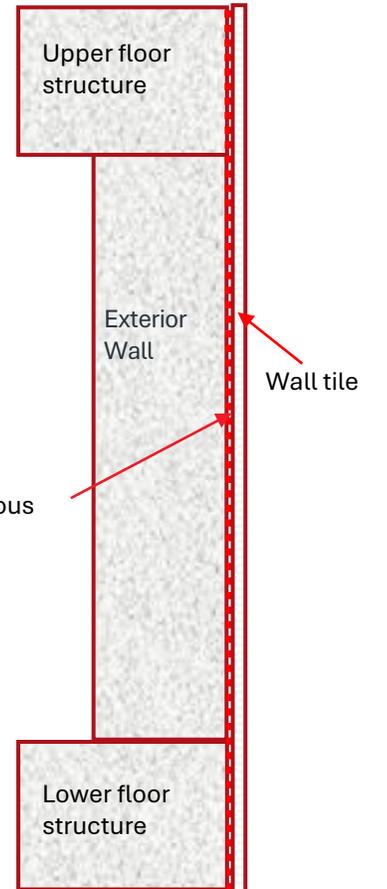
Side View

Connection: Adhesive

Tile Façade



Cementitious adhesive



Connection: Adhesive

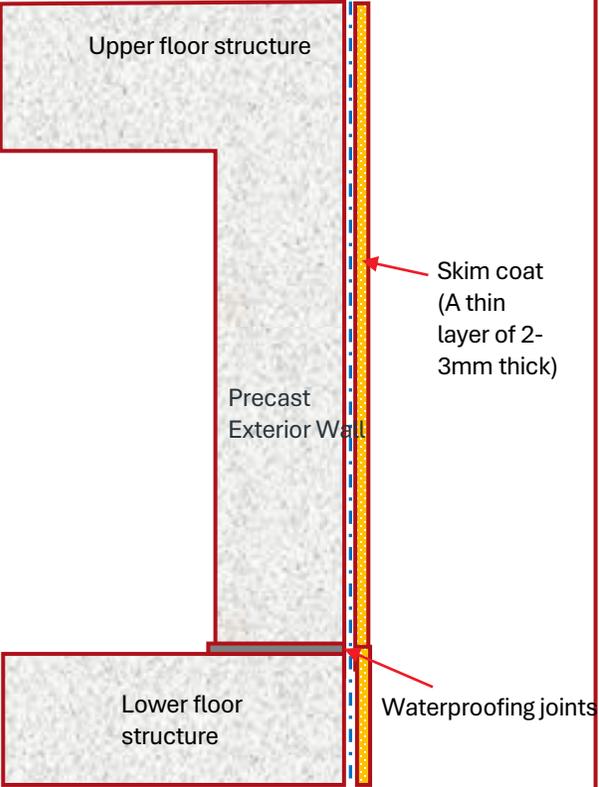
Common Façade in Singapore

Brick Façade



Common Façade in Singapore

Precast Façade



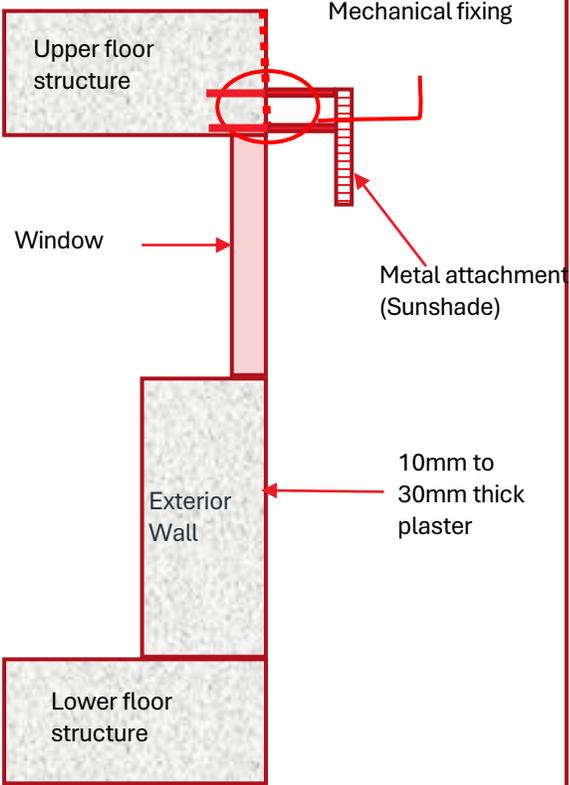
Side View

Connection: Adhesive

Plaster Façade with Attachment



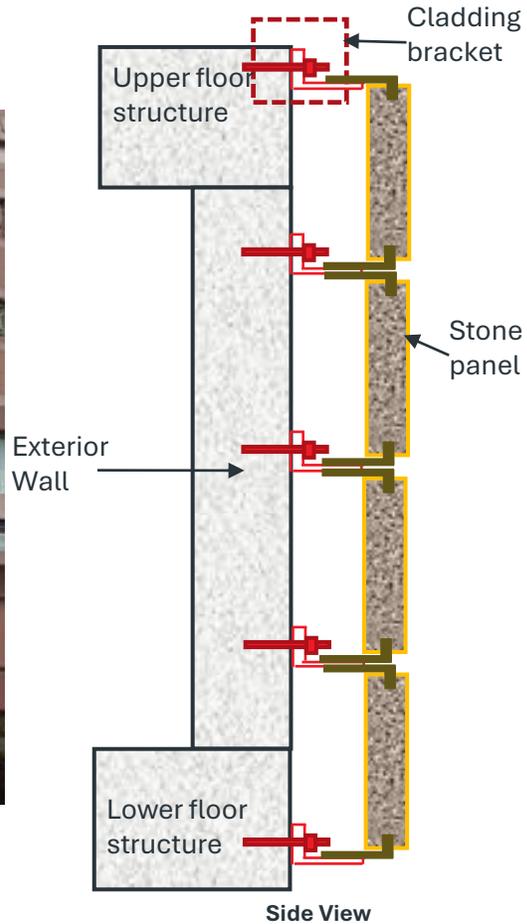
[Source: Google]



Connection: Adhesive – Plaster, Mechanical Fixings – Sunshade

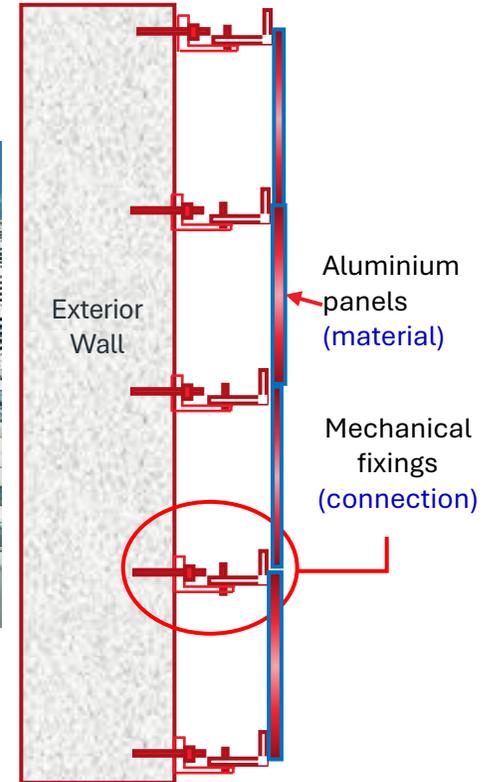
Common Façade in Singapore

Stone Cladding



Connection: Mechanical fixings

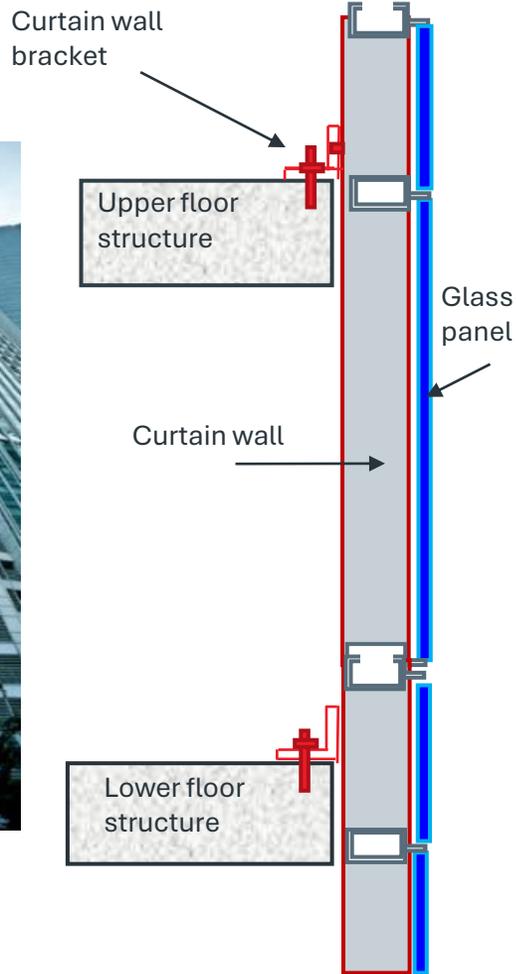
Metal Cladding



Connection: Mechanical fixings

Common Façade in Singapore

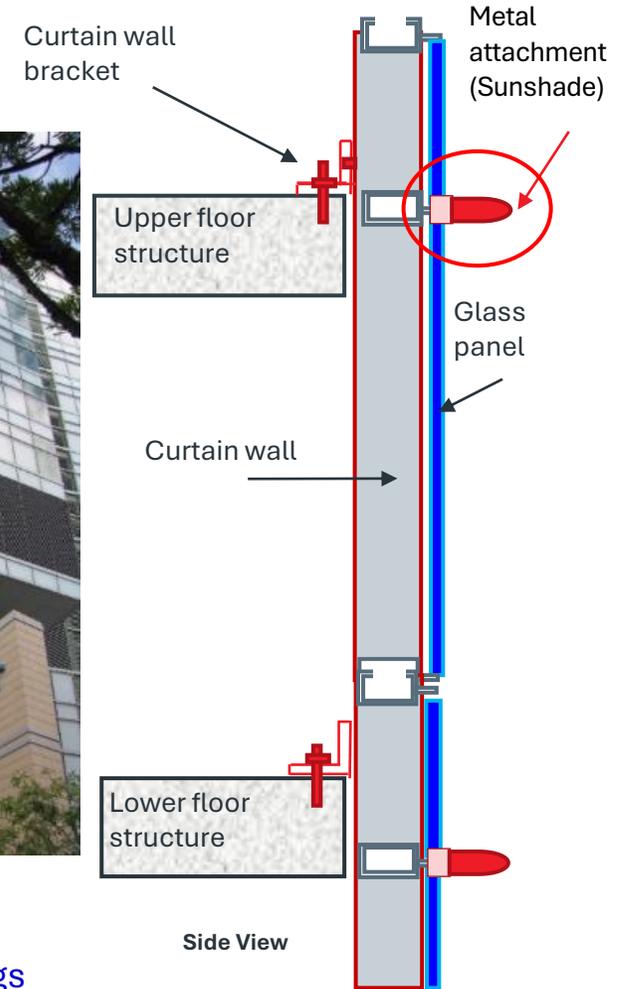
Curtain Wall



Side View

Connection: Mechanical fixings

Curtain Wall with Attachment

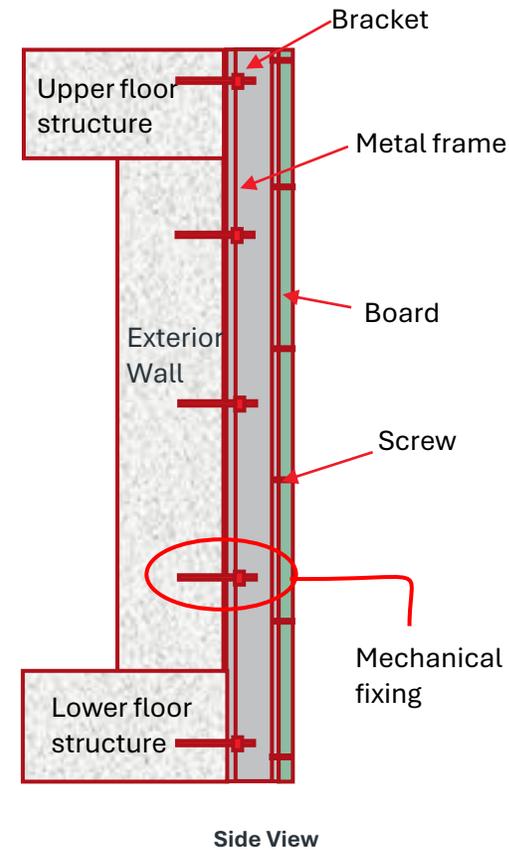


Side View

Connection: Mechanical fixings

Common Façade in Singapore

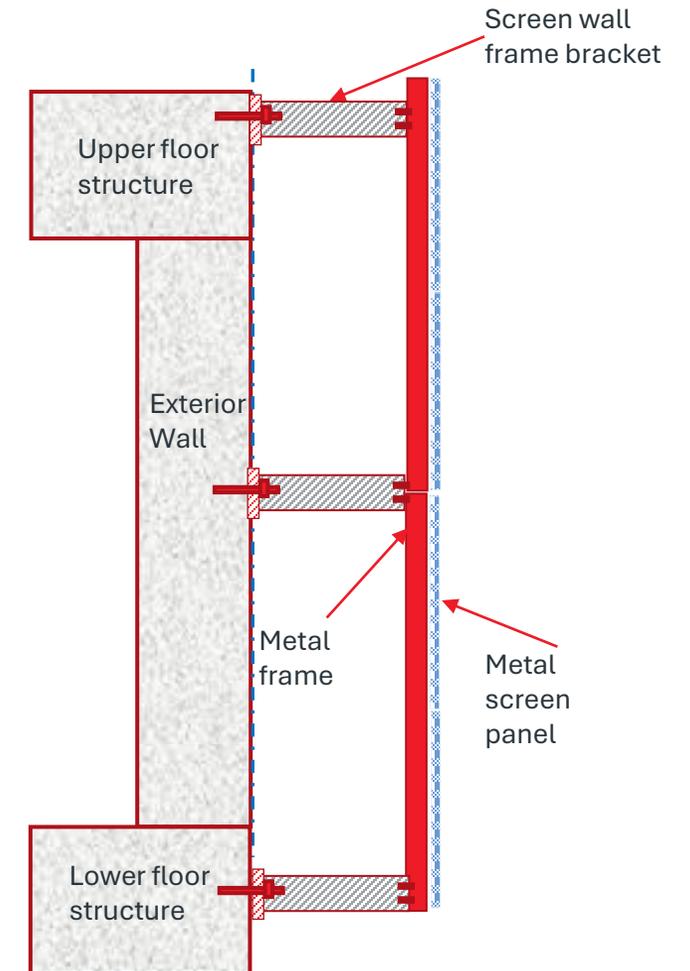
Cladding Boards



Connection: Mechanical fixings

Common Façade in Singapore

Screen Wall



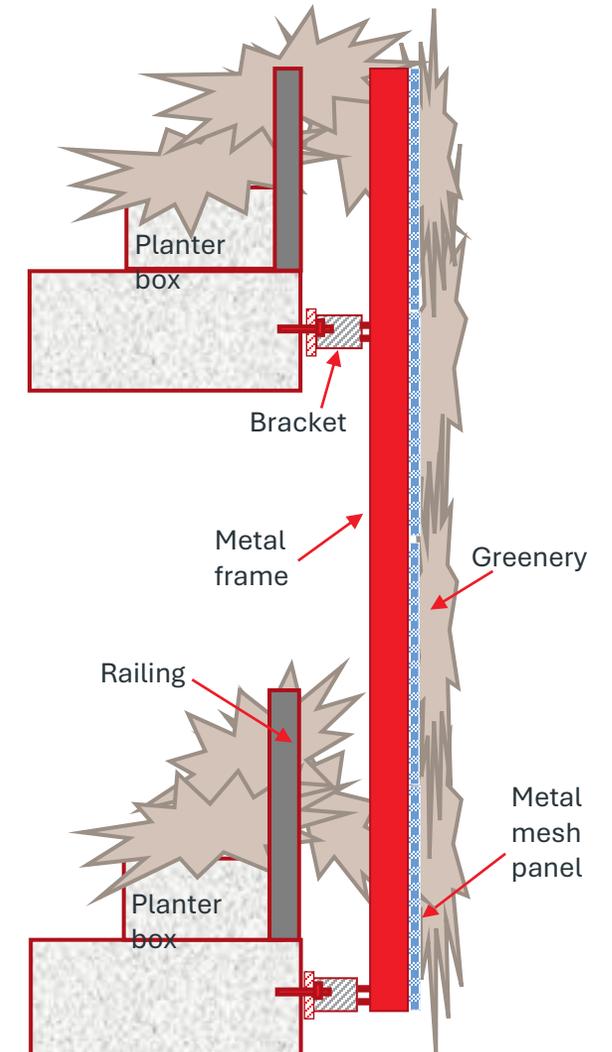
Connection: Mechanical fixings

Common Façade in Singapore

Green Wall



Connection: Mechanical fixings



Common Façade in Singapore

Others



[Source: Google]



[Source: HDB]

Façade Abnormalities

Façade generally made up of:

1) Material



[Picture source: Google]

2) Connection



Used to attach plaster and tile



Used for curtain wall, cladding facade

[Picture source: Google]

Mechanical Fixing (i.e. metal fasteners)

- Façade fall due to **failure of material or connection**
- Important to **arrest tell-tale signs as early as possible** to restore integrity of material or connection before it fails

Curtain Walls

Common Defects & Associated Risks

COMMON DEFECTS



Aesthetic issues – no risk

COMMON DEFECTS

Sealant (weather sealant)



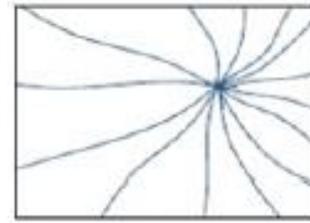
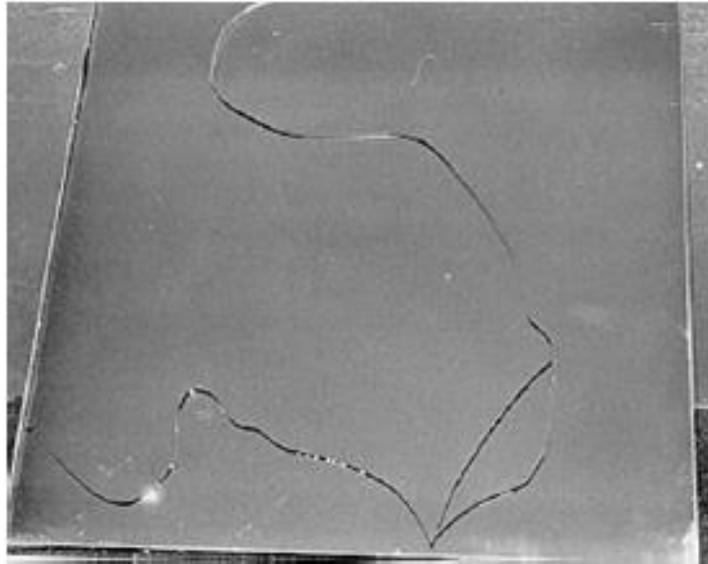
Deteriorated sealant



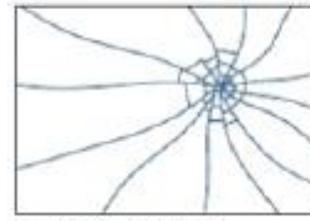
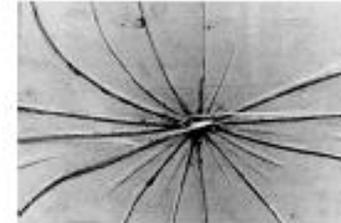
Deteriorated sealant

Performance issue – no risk

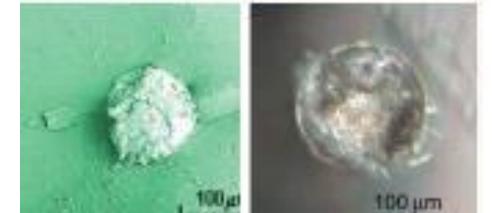
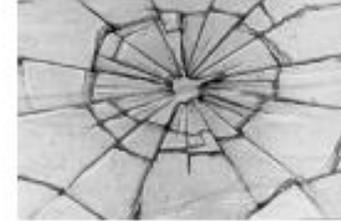
COMMON DEFECTS



(b) *Hard body impact*



(c) *Soft (spherical) body impact*



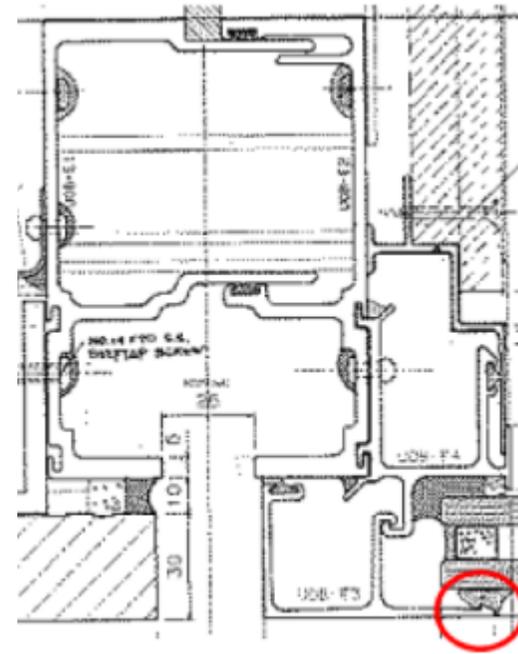
Cracked glass maybe due to thermal stress (Left), impact (Centre) or spontaneous breakage (Right)



Risk of fallen glass

COMMON DEFECTS

Gasket (For stick system)



Capping can be loosen due to missing/dislodged gasket

13 Risk of fallen capping

COMMON DEFECTS

Fixings (for attachments)



Loosen end cap of sunshade



Missing screw fixing



Incomplete screw tightening



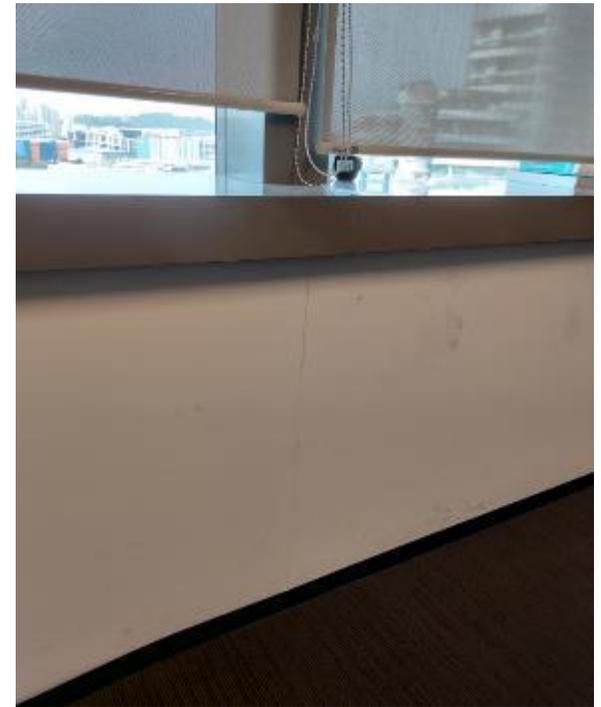
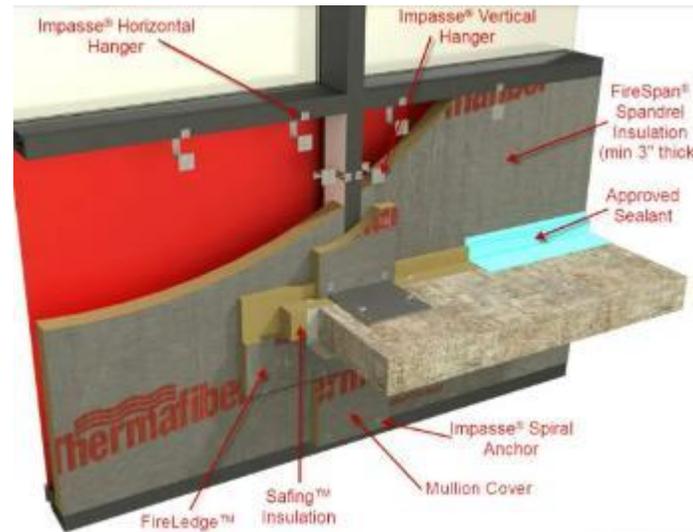
Damaged fixtures (could be due to cleaning works)



Risk of fallen components

COMMON DEFECTS

Concealed main connections

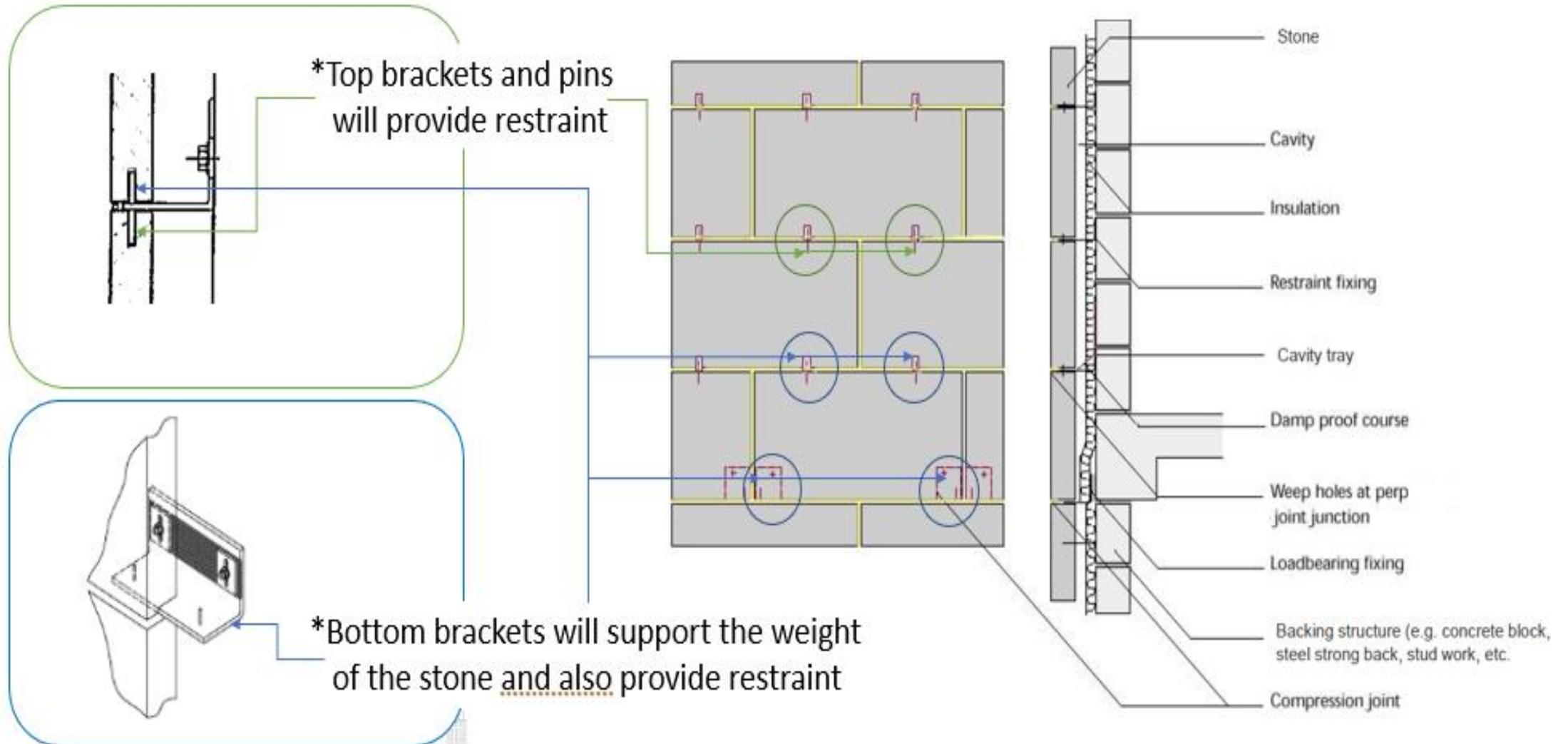


Vulnerable Facades

- Stone Cladding
- Brick façade
- Calcium Silicate Board



Periodic Façade Inspection



Periodic Façade Inspection

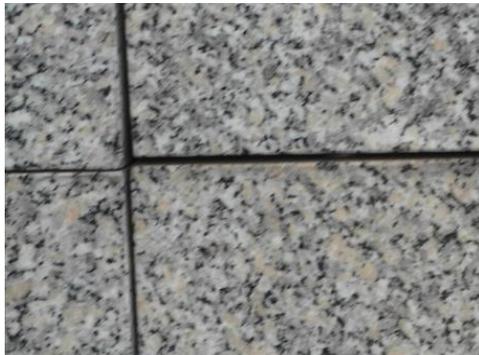
For example on stone cladding



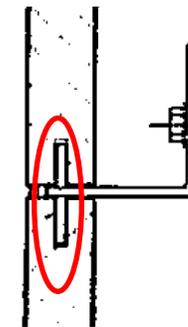
Cracks across stone panels



Tapping of the panel – check for loose stone



Misalignment of stone panel
(Detached or missing fixing)



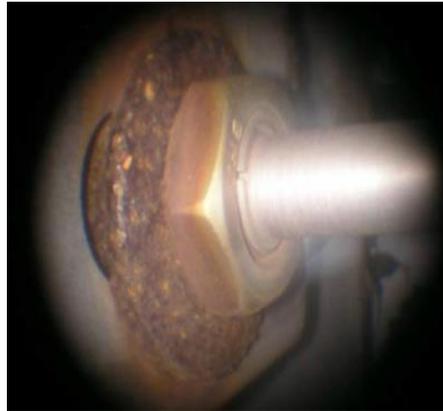
Metal detector - check presence of dowel pin

Periodic Façade Inspection

For example on stone cladding



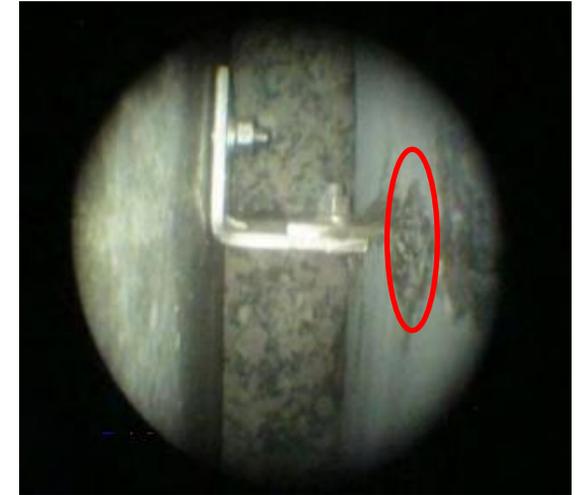
Borescope - inspect condition behind stone cladding



Corroded fixing

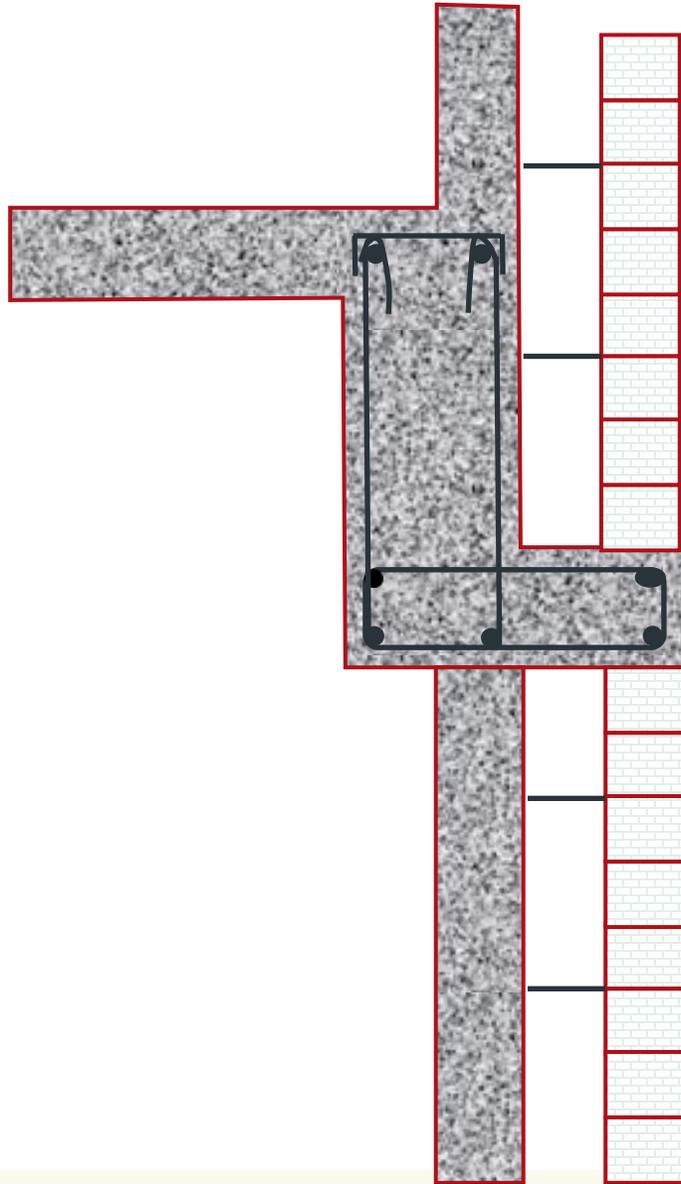


Spalling at pin location



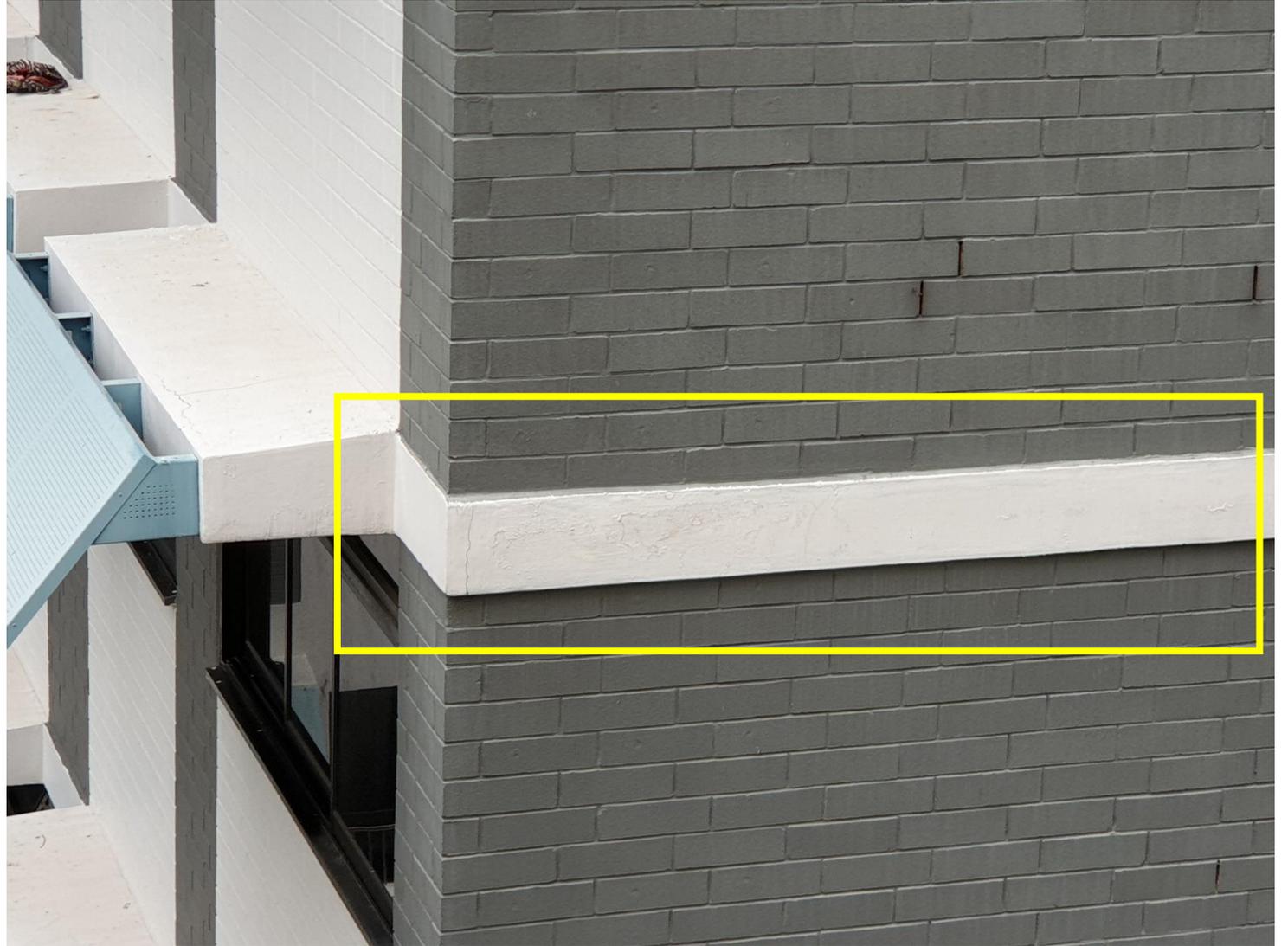
Signs of epoxy (indicating possibility of “gluing” bracket onto panel rather than being mechanically supported)

Vulnerable supporting structures for brick facades



- (1) The concrete nib: 150mm to 200mm thick.
- (2) The external face of the brick and concrete support is generally “flushed”

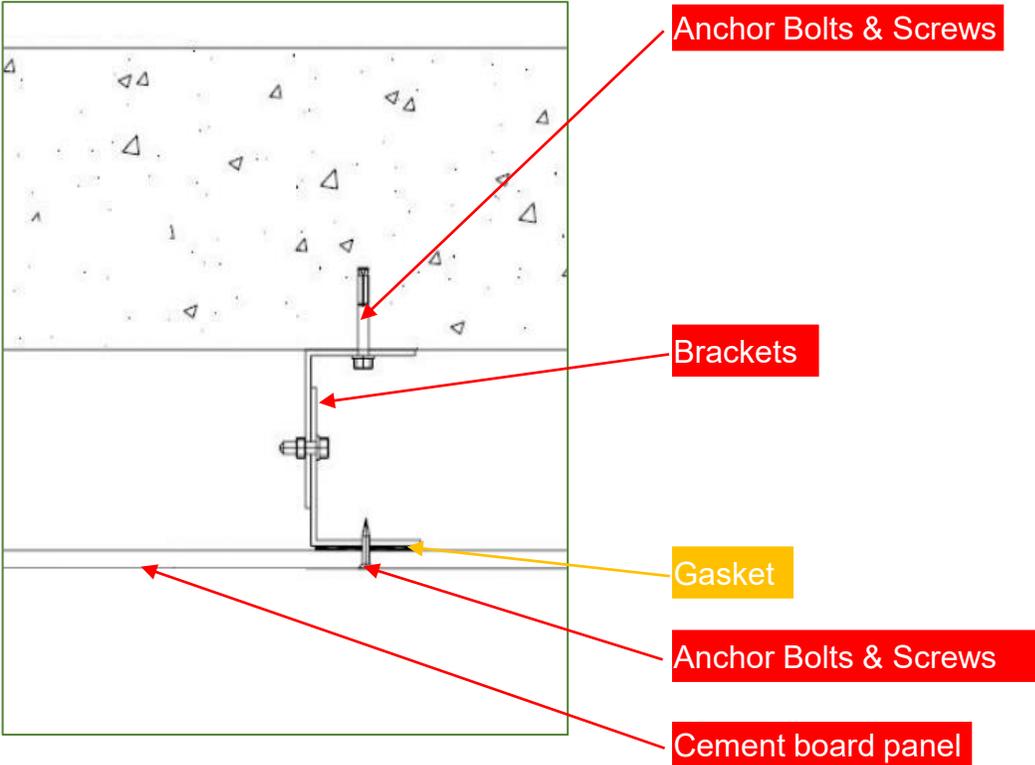
Example of brick supports that required detailed checked.



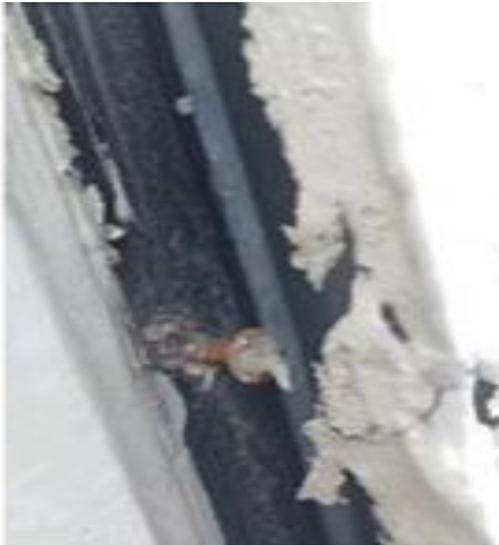
Brick Facades Incident



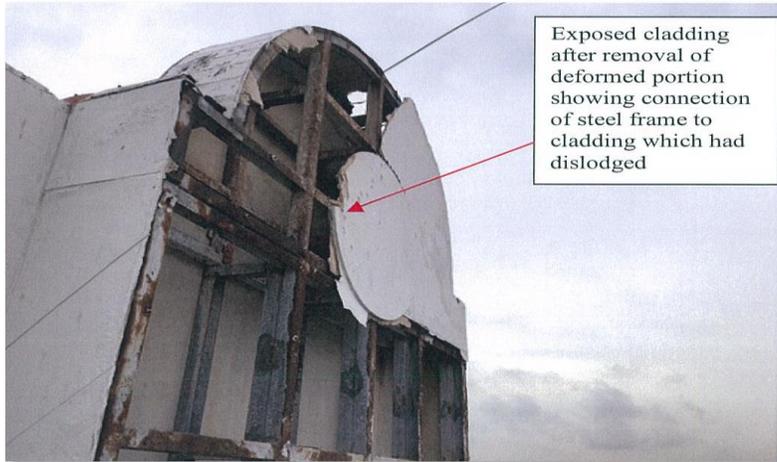
Calcium Silicate Board Facades Incident



Calcium Silicate Board Facades Incident



Calcium Silicate Board Facades Incident



Fallen Façade Incidents



Source: STOMP

东陵福屋龄逾50年组屋 2.5米石灰板 10楼轰然坠地



石灰板，所幸没有伤人。昨晚11时，第45座龄逾50年的组屋至38及联邦座至60，被重建局（STOMP）调查。



Source: STOMP

Source: Sin Ming Ri Bao



Source: STOMP

Fallen Façade Incidents

Source: CNA

Singapore
HDB block at Indus Road cordoned off after metal panels fall from facade

The incident happened at Block 77 Indus Road on Saturday (Apr 1) and two nearby blocks have also been cordoned off as a precautionary measure, says the Jalan Besar Town Council.

03 Apr 2017 09:18PM

Bookmark

Source: Wanbao

百砖砸穿走廊盖 一家三口与猫玩耍 逃一劫!

高楼层 坠落
 百多块砖头从高空坠落，幸好没有砸到人。事发时，一家三口正在楼下玩耍，幸好及时躲开，才逃过一劫。

淡滨尼市镇会总经

淡滨尼市镇议会总经表示，事发时，一家三口正在楼下玩耍，幸好及时躲开，才逃过一劫。

淡滨尼市镇议会总经表示，事发时，一家三口正在楼下玩耍，幸好及时躲开，才逃过一劫。

Metal pieces fall from building in Shenton area

CLEARING UP: Security officers from Prudential Towers removing the metal claddings from the scene.

Source: TNP

Singapore
Investigations ongoing after cladding falls off HDB block in Pasir Ris

The cause of the damage is under investigation. (Photos: Facebook / Zainal Bin Sapari)

Source: CNA

刚建成一年多 天台装饰板 40楼坠下

▲警方封锁现场至今早。

陆佳丽 报道 曾美玲 摄影

明地迷亚路惊险一幕！刚建成一年多的预购组屋，天台装饰板不知何故脱落，从40楼直坠到游乐场旁草丛中，惊动警方到场，所幸没砸到人！

这起事件发生在昨晚约7时，地点是明地迷亚路第10B座组屋。

记者接到通报走访现场，居民李女士告诉记者，一家人在一年多前搬到这个预购组屋单位，昨天傍晚，她和家人在客厅看电视时，突然听到一声巨响，但因为附近有工地施工，所以误以为是施工所致。

“岂料，我们组屋区的群组突然有人发送照片，表示天台的一片装饰板突然脱落，从40楼直坠到组屋底层的草地旁。”

李女士拍下的照片显示，这块长约1.2米，宽约30公分的装饰板不偏不倚地落在游乐场旁，据目测，该片板有两三公斤重。

警方封锁游乐场约半个篮球场大的范围超过17小时之久，展开调查。

李女士称，看到有多名相信是市镇会的员工，赶到天台顶楼查看，所幸没有人在这起事故中受伤。她表示，今早经过时，封锁范围缩小，但截至中午12时，封锁线仍在。受访居民纷纷表示，发生了这样的事，如今行走会更为小心。

Source: Shin Min

Fallen Façade Incidents

Source: Wanbao

2015年10月24日 星期六 P5

鸟节豪杰大厦

大石灰块从天降 砸毁德士挡风镜

吴若仪 报道
gohry@sph.com.sg
吴庆顺 摄影



▲德士司机被突然从高空落下的石灰块吓昏。石灰块砸坏德士的挡风镜。

鸟节豪杰大厦外堆的石灰块从高楼落下，砸向较小的石灰块不偏不倚砸中德士，砸毁挡风镜。吓得司机慌忙开车门下车。

位于鸟节路的豪杰大厦昨天凌晨2时突发传来“砰”的一声巨响，一块大石灰块不知何故从七楼落下，砸中一辆德士。

德士司机陈伟祥（61岁）受访时说：“我原本开车要离开，但石灰块却落在我的车顶上碎成两半，然后滑过挡风玻璃落在地上。”

（47岁）告诉记者：“街道上的男女原本有说有笑，但看见石灰块落下后都吓得面露失色，竞相逃避。”

记者赶往豪杰大厦时，只见石灰碎片满地都是，警方围起封锁线不让公众靠近。

陈伟祥心有余悸地表示：“真是太危险了！幸好我当时在车上，而且也没人在过马路，不然被石灰块砸中，后果肯定不堪设想。”

对于事故的发生，陈伟祥大叹倒霉，指自己至少两天无法开工，损失估计达600元。

豪杰大厦保安队长表示，事发地点围起封锁线。此外，当局也下令管理层聘请专业工程师探讨事故发生的原因，并进行适当的维修工作。

工程师也须检查大厦外墙的天花板，并在有必要时进行修补工作。

news 5

Strange sounds, then... crash!

Four taken to hospital after ceiling falls at Hilton Singapore entrance



REPORT BY SHAFIQ ALKHAZMI
and@tnt.com.sg

He had just picked up his boss at Hilton Singapore hotel in a car and was about to turn from the driveway into Orchard Road when he heard a loud crash.

"I turned around and saw that part of the ceiling above the main entrance had collapsed," personal driver Mohamed Sulaiman, 31, told The New Paper yesterday.

"My boss and I were both shocked as we were at that very spot just seconds ago. We missed the collapse by seconds."

At least two other vehicles - a white taxi and a Malaysian-registered black car - were not so lucky.

They were covered with debris when TNP visited the spot at around 1pm. Twisted bits of metal and broken pieces of plaster were also seen dangling from the ceiling outside the main entrance along the driveway facing Orchard Road.

The incident happened at about 2.30pm.

The Singapore Civil Defence Force (SCDF) said it received a call about the incident and sent an ambulance and a fire engine to the scene.

Two women, a girl and a man were taken to Tan Tock Seng Hospital. They were conscious.

SCDF said no one was trapped underneath the debris.

Responding to queries from TNP, Hilton Singapore hotel said the ceiling was made of plasterboard with an aluminium frame.

ALERT DOORMAN

The full-time doorman said: "The jack was covered in white dust and she seemed to be in a daze."

"Another woman, her colleague, was holding the injured woman's hand and helped her to the ambulance. I hope she is fine."

Hilton's regional manager Peter Webster told The Straits Times that heavy rain could have been caused the accident.

In a statement yesterday evening, the hotel said: "Following this isolated incident, guests and staff were promptly evacuated from the area... all our efforts are currently focused on fully cooperating with the local authorities on their current investigation and as such, we are not in the position to comment further."

The Building and Construction Authority (BCA) said yesterday evening that engineers have inspected the damage and assessed the building structure to be intact and unaffected by the collapse of the false ceiling.

It added: "BCA has also directed the building owner to get the professional engineer appointed by the building owner to carry out a further detailed investigation of the incident, check all similar false ceiling at other parts of the driveway, as well as recommended remediation measures and follow up with repair works on the affected areas."

Orchard Road has been hit by several incidents this month.

On Saturday, water seepage due to heavy rain resulted in a power outage at Orchard Central mall.

On Wednesday, a slab of concrete fell from a pedestrian bridge outside Orchard Plaza, narrowly missing two passers-by.

Earlier this month, Christmas decorations, including a Christmas tree, caught fire in two separate incidents along the shopping belt.

PHOTO COURTESY OF CHEN HO LAY'S MIRROR

Source: TNP

Source: Wanbao

大巴窑组屋

下雨漏水 居民出入不便 走廊天花板脱落 阿婆提心吊胆

陈可扬 报道
tanky@sph.com.sg
陈斌勤 摄影



阿婆家人向记者表示，假天花板掉落至今已逾三个月，当局虽然曾派人查看，但始终仍未修理。（陈渊庄摄）

组屋门口走廊的假天花板三个月前开始脱落，出现三四米大的缺口。当局至今没有派人修理；阿婆成天提心吊胆，忧心天花板随时掉，一家出入“不平安”。

居住在大巴窑7巷第9组屋顶层11楼的阿婆，去年12月的一个深夜被门外的一声巨响惊醒。她开门时赫然发现一米长半米宽的假天花板块掉在门前的走廊上，吓得她急全身。

不愿意透露姓名的阿婆（78

循环路组屋

4米外塔飞坠



5版

Source: Wanbao

Fallen Façade Incidents



Metal Cladding



Stone Cladding

Fallen Façade Incidents

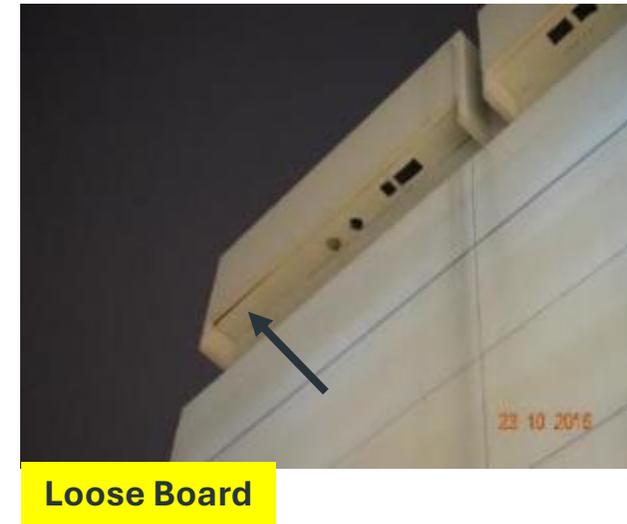
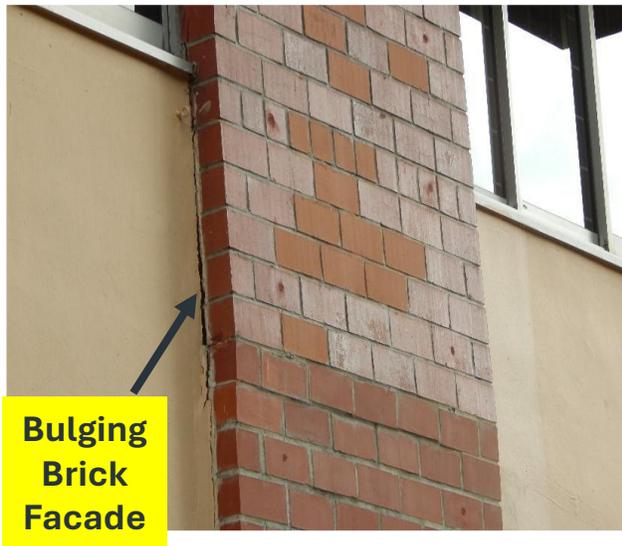
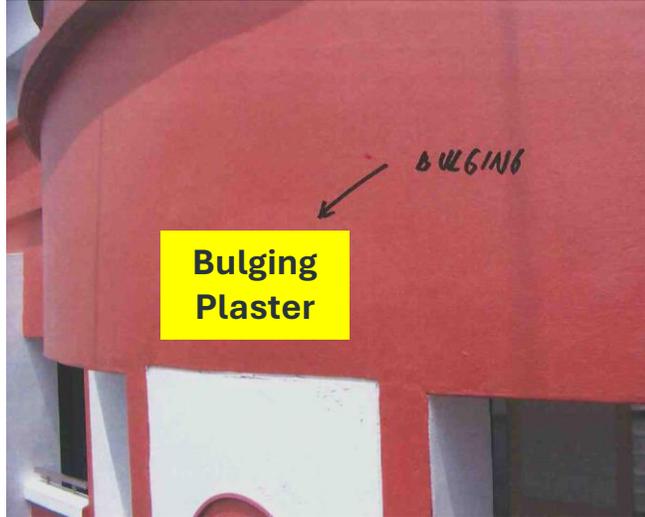


Dislodged bricks



Spalling Concrete

Near-Misses



Overseas Fallen Façade Incidents



greene of Brooklyn, was struck in the head Sunday when a portion of an eighth-floor window ledge gave way,

er, Susan Frierson, 60, was injured, the police said.

urred around 11:05 a.m. The incident occurred on W 5th Streets, officials said.





Periodic Façade Inspection

Framework

WHY these buildings?

>20 Years of age

- Lifespan of common materials
- Focused on older buildings

> 13 metres in height

- Higher safety risk posed

Exemption: Landed houses and temporary buildings

WHO is involved?

Building Owner/ TC/ MCST

- Appoint CP upon receiving PFI notice
- Follow up repair works as recommended by CP

Competent Person (CP)

- Professional Engineer (C&S) or Registered Architect in Singapore
- Detect signs of deterioration and propose rectification works for owner to carry out

Façade Inspector (FI)

- With prescribed qualifications & experiences
- Accredited with IES_ACES_BCA Joint Accreditation Committee
- CP can be assisted by FI in façade inspection

**CPs & FIs must attend & complete façade inspection approved by BCA*

HOW is PFI implemented?

Issuance of PFI Notices

- Starting with older buildings
- Once every 7 years

Inspection Procedures

- CP to conduct visual inspection on entire facade & min. 10% representative close range inspection for each elevation of building facade
- CP can leverage technologies for more efficient inspections e.g. drones, borescope & scanning equipment, subject to CBC's approval

Periodic Façade Inspection

Objective

- To **mitigate the risk of fallen façade** affecting public safety in Singapore's high-rise and highly built-up urban environment
- **Engagement of trained professionals** to inspect their building facades regularly, and carry out repair works to ensure integrity of the facades

Periodic Façade Inspection

Building Control (Periodic Inspection of Buildings and Building Facades) Regulations 2021

- Meaning of “façade” of building
- Requirement to be competent person
- Qualification & Accreditation of facade inspector
- Appointment and replacement of appointed competent person
- How façade inspection to be carried out (Visual & Close-range inspection, full façade investigation)
- Reports of façade inspection carried out

Periodic Façade Inspection

Buildings



Walk-up Apartments



Hotels & Shopping Centres



Office Towers



Industrial Buildings



HDB Estates



Condominiums



Schools



Hospitals

Periodic Façade Inspection

“Façade”, in relation to the building, means:

- (a) *The exterior of the building;*
- (b) *Any exterior feature attached to the building, including any bracket or similar installation attaching the exterior feature to the building; and*
- (c) *Any other part of the building as may be prescribed*

Examples but not limited to:

- cladding, curtain wall, tile, plaster, bracket
- concrete, façade bricks, external walls
- exterior false ceiling, green wall, screen wall
- sunshade, clothes drying system, awning



Plaster



Cladding



Curtain Wall



Clothes Drying System



Sunshade

Periodic Façade Inspection

Who should do the inspections?

Inspection by registered Professional Engineer (C&S) or Registered Architect (PE/RA)

- assisted by Inspectors (RE, RTO, etc.)

Competent person (CP) and Façade inspector (FI) must go through mandatory training course, “Certificate in Façade Inspection”.



[Source: www.freepik.com]



[Source: www.nkbpc.com]

**professional engineers board
singapore**

board of architects singapore



**THE INSTITUTION
OF ENGINEERS
SINGAPORE**

Periodic Façade Inspection

What should the inspection entail?

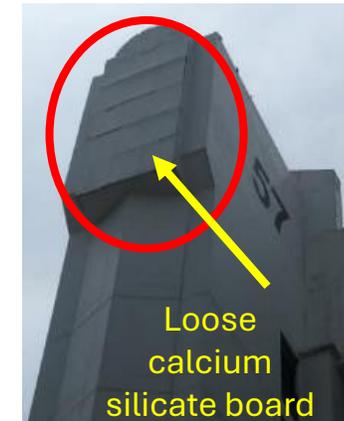
Observation of the building's entire façade condition from **ground level** or other available **vantage points** and **openings**



Loose gypsum board



Cracked Brick Facade



Loose calcium silicate board

Periodic Façade Inspection

What should the inspection entail?

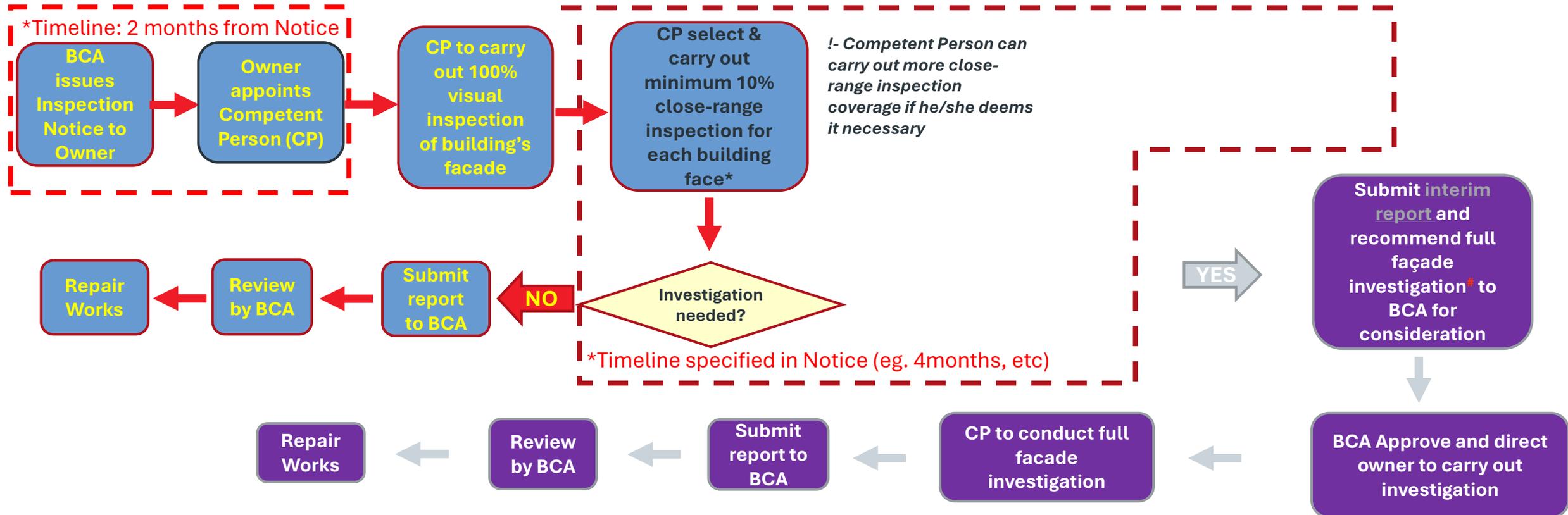
- “Close-range” inspection covering representative area (i.e. at least 10% area of each façade elevation)
- Contact with façade (i.e. tapping, borescope, scanner, etc.)
- Coverage spread out around perimeter
- Locations above areas with high human traffic
- Additional coverage if there are tell-tale signs of deterioration or extensive abnormalities



[Source: www.hue.com.sg]

Periodic Façade Inspection

Inspection Procedure[#]



* - Owner to obtain BCA's approval on time extension if required

*Robust off-cycle
to upkeep the façade
safety?*

Improve Façade Safety



Planning + Design

- ✓ Ensure Design adequacy
- ✓ Use suitable and durable materials & connections for facade



Construction

- ✓ Ensure adequate supervision
- ✓ Ensure construction and installation according to approved plans and specifications



Maintenance

- ✓ Ensure regular inspection and maintenance of facade

Key Message: Routine and proactive maintenance regime is to ensure façade safety!

Maintenance Duty

PART 4A:MAINTENANCE OF BUILDINGS

(Newly effective from 1 Oct 2025)

- ❖ Under S25E, the commissioner of building control (CBC) may issue Notice to Maintain as to require building owner to carry out repairs in respect of any buildings.
- ❖ Under S25H, any person responsible for the exterior feature fails to keep/maintain the exterior feature such as to be securely fixed as will prevent any collapse 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.

Thus, building owner/MA should have robust building maintenance framework as to prevent any fallen exterior feature incidents!

Maintenance Duty

- ❖ Potential high risk area
 - ✓ Roof edge
 - ✓ Vulnerable façade types (eg. Tiles, board materials, brick claddings, stone claddings, etc.)
 - ✓ Different façade systems interfacing area (eg. Corner panels, attached brackets, etc.)
 - ✓ High human traffic area (eg. Entrance, above walkways, etc.)

- ❖ Robust off-cycle inspection and checklist
 - ✓ Routine visual inspection at high risk area
 - ✓ Visual inspection by Drones to capture deteriorated tell-tale signs at height

- ❖ Readiness to activate Professionals, repair contractor and accessibility provider contacts

Proactive Maintenance – Research findings

Predicted service life under Singapore climate conditions

results from current study

Façade Material	Service life from Previous Desktop Study (Years)	Reduction in service life	Mean Service Life (Years)	Lower Bound Service Life Due to Climate Change (Years)	Lower Bound Service Life (Years)
Steel Brackets	25-75	2 – 6%	99	78	83
Aluminium Brackets	20-50	4 – 16%	65 (7mm)	50 (7 mm)	59 (7 mm)
Aluminium Rivets	20-50	3 – 11%	30 (3mm)	22 (3 mm)	25 (3 mm)
Stainless Steel Brackets	40-120	3 – 11%	315 (3mm)	205 (3 mm)	230 (3 mm)
Stainless Steel Fixings	40-120	3 – 11%	56 (4mm)	42 (4 mm)	47 (4 mm)
Structural Sealant	20-40	Negligible	52	38	38
Weather Sealant	20	Negligible	50 (expected) little degradation at 35	50 (expected)	50 (expected) little degradation at 35
Gasket	15-20	1 – 13%	22 (exposed) 29 (unexposed)	18 (exposed) 22 (unexposed)	21 (exposed) 25 (unexposed)
Tile adhesive	25-50	9 – 30%	53	10	14
Plaster	20-25	Negligible	50 (expected) little degradation at 30	50 (expected)	50 (expected) little degradation at 30
Fibre-cement board	20-25	Negligible	30 (expected) failure at fixing location may happen at 15	30 (expected)	30 (expected) failure at fixing location may happen at 15

“Lower Bound Service Life” from research is within the service life range from previous study **except** for tile adhesive

Reportable Matters Regulations 2025

(Newly effective from 1 Oct 2025)



Who?

- MCST / person responsible / CP, FI or Builder/ supervisor

What?

- Report to Commissioner of Building Control (CBC) of any safety incident - **Fallen Exterior Features within the estate**

When?

- Within **6 hours** after owner/person responsible becomes aware of incident

How?

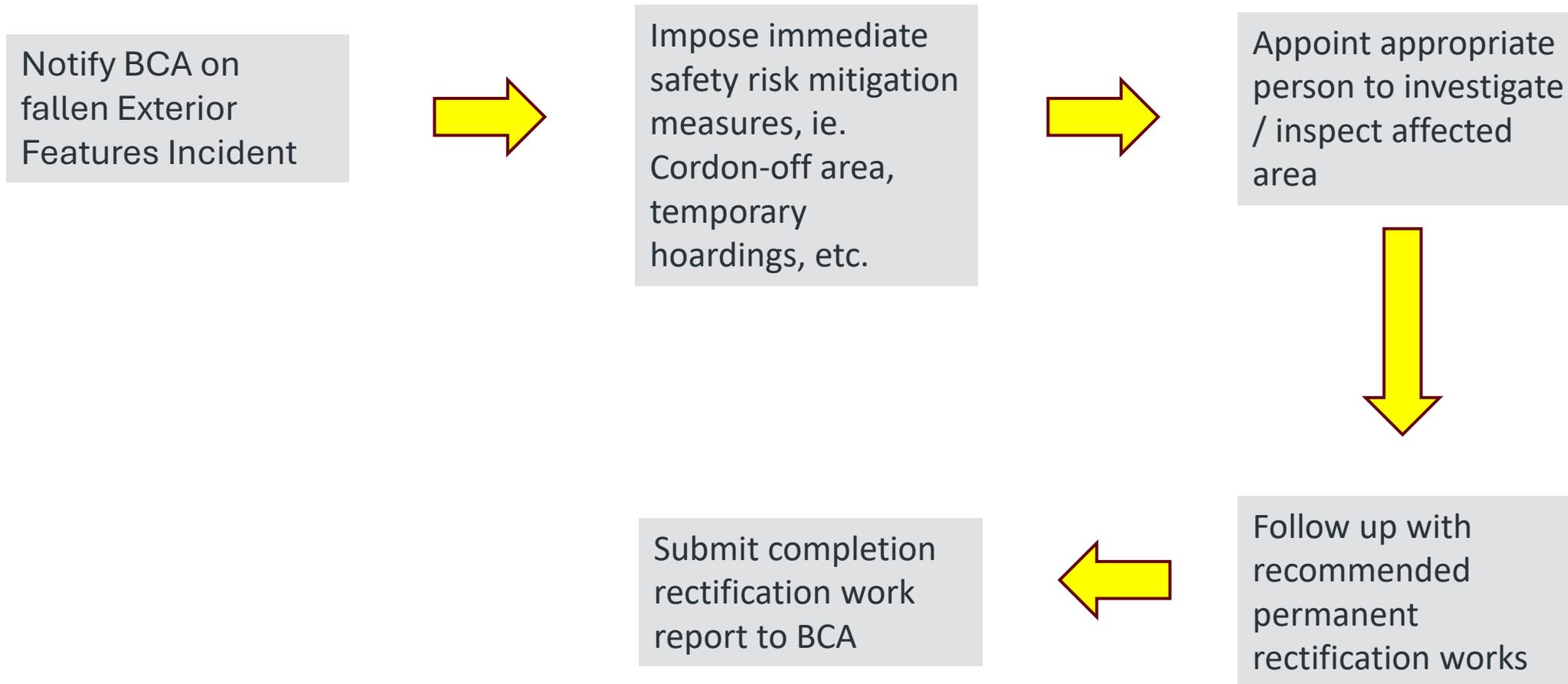
- call **9789 7847** or **9781 6720** and
- follow up with **FormSG**. Report must contain information such as the **name and address of reporter** as well as **location and details** of reportable matter.

Form SG link: [Reportable Matters Regulation 2025 - Fallen Exterior Features \(EFs\) | FormSG](https://go.gov.sg/rm-regulations2025)



Fallen Exterior Features Incidents

- Actions to be taken by MCST



In Closing

To use **SUITABLE** and **DURABLE** materials and fixings for building façades

Include **FAÇADE ACCESS** in planning/design stage to facilitate façade maintenance, inspection and repair

Regular façade inspection and maintenance is **CRITICAL** to ensure façade safety, hence the need to **CARRY OUT PERIODIC FAÇADE INSPECTION (PFI)**

Refer to BCA website on the PFI requirement:

[Periodic Facade Inspection \(PFI\) | Building and Construction Authority \(BCA\)](#)



Thank You



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