



THE ROLE AND RESPONSIBILITY OF PE FOR TEMPORARY WORKS DURING CONSTRUCTION STAGE

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Date: 18 April 2022
Venue: Zoom



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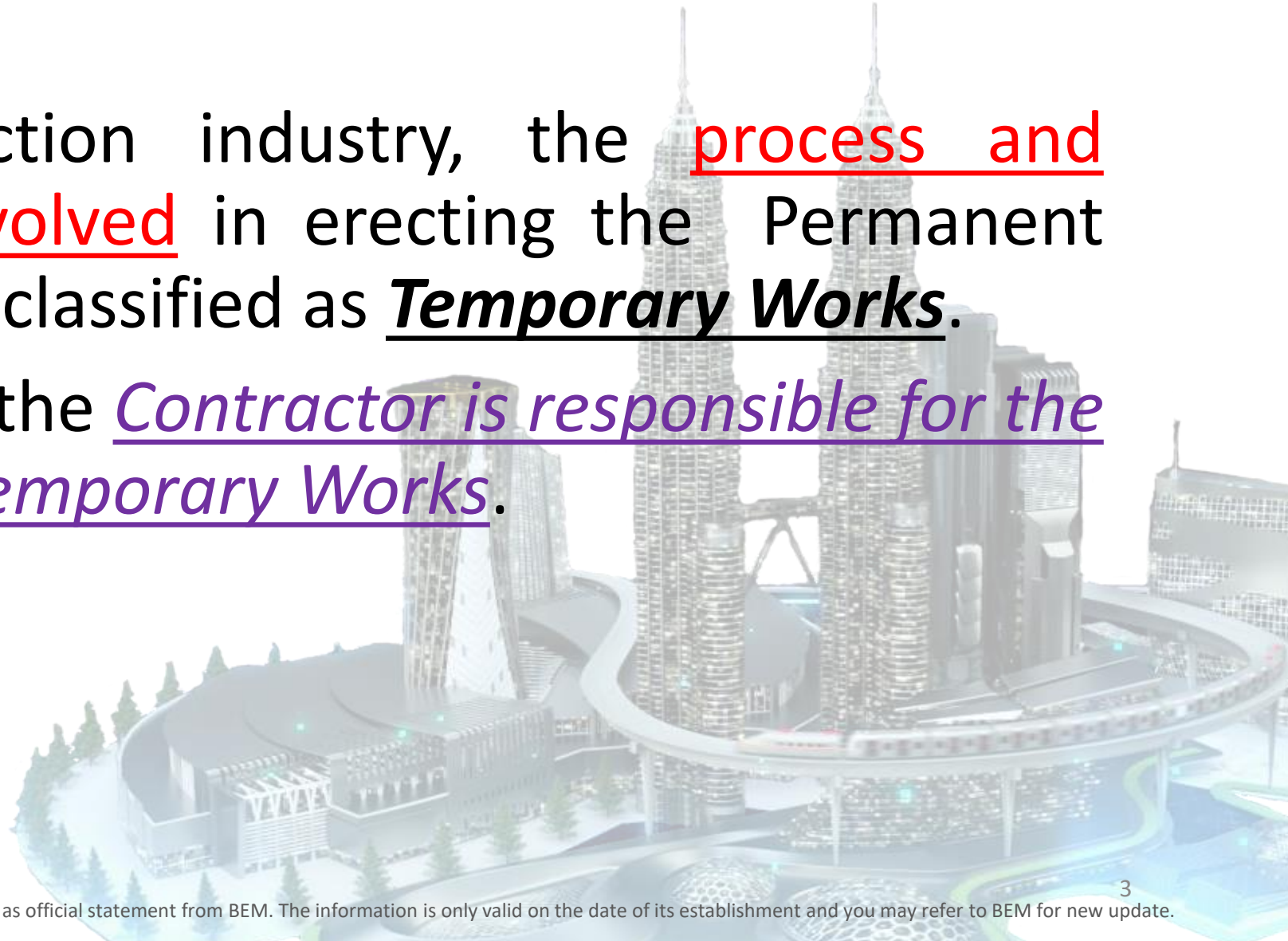




WHAT IS TEMPORARY WORKS ?

In the construction industry, the process and constructions involved in erecting the Permanent Works at site are classified as **Temporary Works**.

Norm has it that the Contractor is responsible for the construction of Temporary Works.





IS TEMPORARY WORK DIFFICULT ?

In the old days when the buildings and construction are much simpler, temporary works are usually not complicated thus less likely to fail.

As the buildings (supertall highrise, complicated bridges, space frame, etc.) and construction (deep excavation, tunneling, soil structure interaction structures, etc) become more **COMPLICATED** and **Difficult to construct**, Temporary Works can be **very tricky and high risk** to failure without proper design and construction.



TEMPORARY WORKS **vs** PERMANENT WORKS

- Important to Differentiate Temporary Works and Permanent Works !!!
- Simple Tips :
 - 1) **Permanent Works** are usually works that are shown in CONSTRUCTION DRAWINGS issued by Submitting Person (Consultant) that after completion of the project the **PHYSICAL WORKS ARE PERMANENTLY AT SITE (throughout the service life intended)**
 - 2) **Temporary Works** are works to facilitate Permanent Works construction and Upon completion of the project, Temporary Works are either **REMOVED or/and NO MORE IN FUNCTION.**



WHY PEOPLE RELUCTANT TO DO PROPER TEMPORARY WORKS?

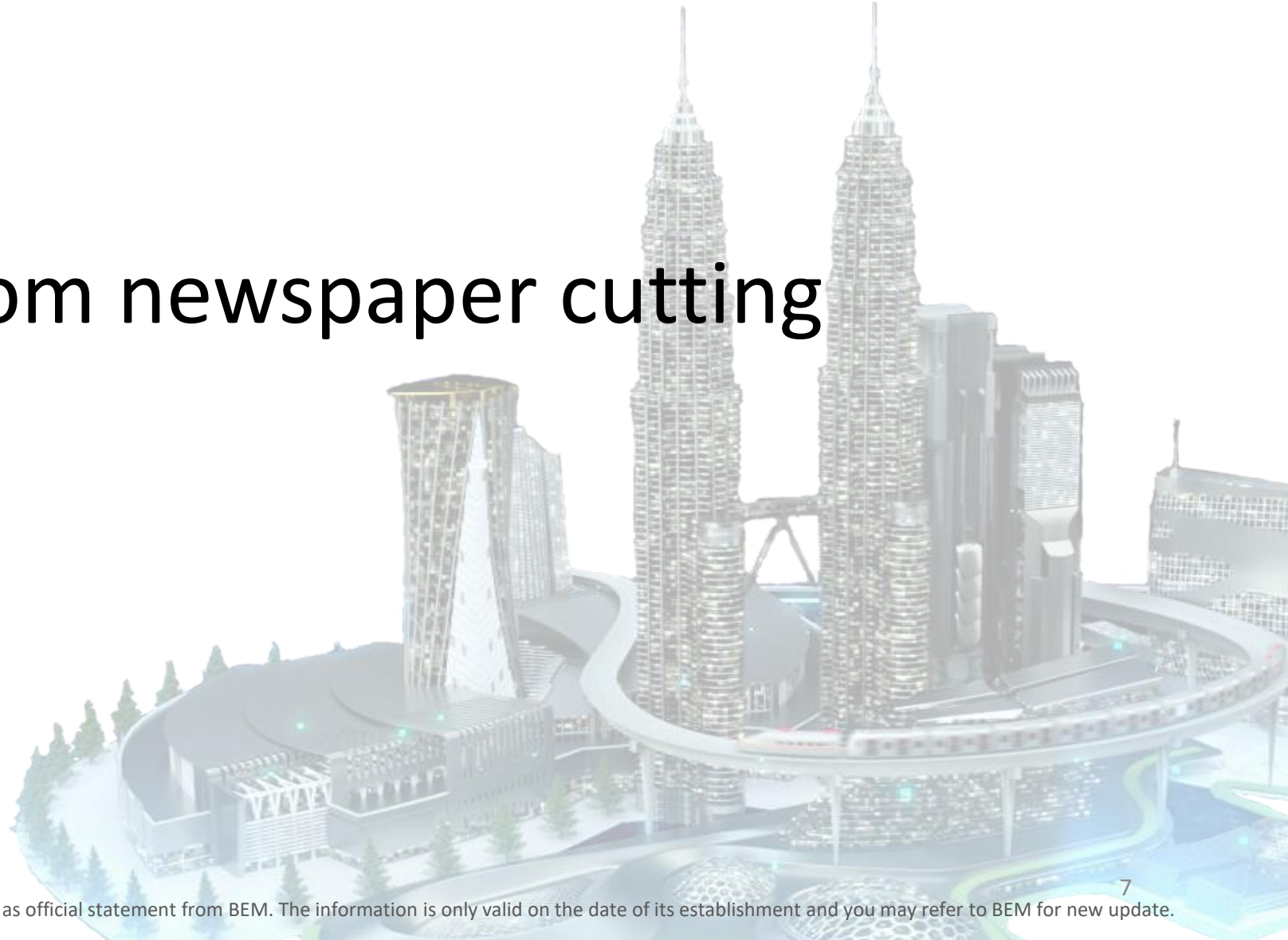
- Old Practices taking MORE RISK on Temporary Works (e.g. faster, site constraints, money, ignorance).
- As Temporary Works sometimes lasted for few days or few weeks (despite some will last a few months), thus Contractor find it not economical to spend MONEY or cause SLOW DOWN.
- Unaware the DANGER posed by improper Temporary Works.
- Short time usage does want mean it will not FAIL and Cause Safety issue.
- Important for Client and Consultant to ensure the ***Tender*** have proper BOQ and Specification for Contractor to PRICE for it during Tender (all Tenderers are to be contractually EQUAL in ensuring Safety of Temporary Works) = Level Playing field for all Tenderers.

**“SAFETY HAVE A PRICE \$\$\$!!!
Either you Pay Now or Pay Later.”**



CASE HISTORIES OF TEMPORARY WORKS FAILURES

- Mainly from newspaper cutting



10.1.2001

Highrise
Building
(Scaffolding
Collapse)

Falseworks and Scaffolding Works

Scaffolding collapses

Malay Mail Jan 10, 2001

Three cars damaged,
massive traffic
jams after incident

BESIDES the developer, only one villager incurred huge losses when the scaffolding of a nine-storey apartment hit the ground last night.

The incident, which happened about 5pm yesterday, damaged three cars belonging to a villager and caused massive traffic jams along the narrow Kampung Rumah Panjang Seri Permai road leading to Taman Puchong Perdana.

A team from the Subang Jaya Municipal Council (MPSJ) which was on its way to check a nearby night market, had no choice but to make a temporary 'diversion' from their duties, as their services were needed elsewhere.

An enforcement officer told *The Malay Mail* that team members were on their way to the night market when they saw the scaffolding fall.

"There was a strong wind and we saw the 20-metre-high metal scaffolding fall," said the MPSJ officer.

"It was like watching giant pieces of dominoes fall piece by piece - like a chain reac-



ABOVE:
The
fallen
structure
in
Puchong

By AZLAN
HARUN

tion - before hitting the power cables, causing an explosion. It also damaged three cars parked nearby.

"As there were huge crowds gathering at the scene, we had no other choice but to take control of the situation by advising the public to keep their distance."

Congestion

"We also helped to direct the traffic to ease the congestion there."

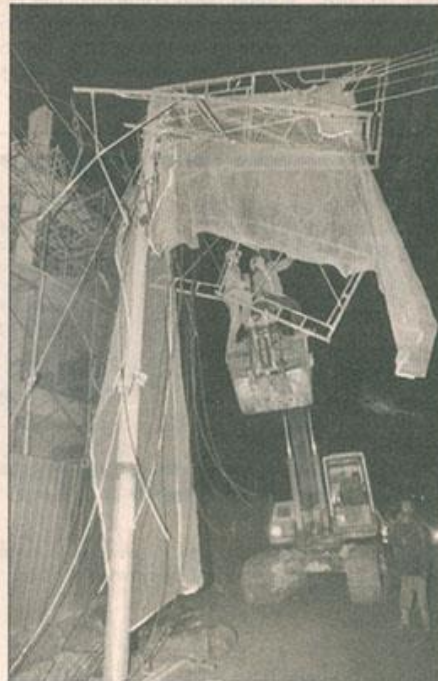
Husin Haji Osman, 48, owner of the damaged cars, said he would approach the developer to claim for damages.



HUSIN: To
claim
damages
from
developer

Salim Razali, 37, who has been staying in the area for the past nine years, said this is the first time that such a thing had happened there.

He said the developer apparently did not adhere to proper safety procedures in erecting such a high scaffolding for a nine-storey building.



RIGHT:
Work to
dismantle
the
collapsed
structure
carried
on at
night

Two die in scaffolding mishap



Dangling scaffolding: Workers and passers-by looking up at part of the collapsed scaffolding left in mid-air after the 12.30pm mishap which killed two workers.

Granite slabs come crashing down

KUALA LUMPUR: Two men were killed and 12 others injured when an upper-level scaffolding with several granite slabs collapsed and hit them.

Police said the scaffolding could have collapsed from the weight of the slabs, each weighing about 50kg.

The tragedy occurred at 12.30pm yesterday at the 5ha construction site of the Pavilion Kuala Lumpur, a residential cum boutique hotel project, in Jalan Bukit Bintang here.

The dead are 52-year-old Malaysian Liew Wan Chew and Myanmar national Boi Nei Tang, 35.

It is believed that the two were in a lift outside the second level of the building when they were hit by the slabs, which fell 15m from the seventh level.

Twelve slabs, each weighing about 50kg, were said to have fallen from a platform on the scaffolding.

The falling slabs also injured 12 workers

who were on the ground floor. Four of them are in serious condition.

The injured have been identified as Balraj Singh, 21, Pretap Singh and Arjan Singh both 22, Aman Singh, 23, Kala Singh and Gurbachan Singh, both 24, Salam Khan, 25, Subash Kumar, 26, Gurnam Singh, 30, Jamuna Prasad, 33, Rampal Singh, 37 and Kashmeer Singh, 40.

Except for Salam who is from Bangladesh, the rest are from Punjab, India.

At press time, Balraj Singh, Gurbachan Singh, Subash Kumar, Salam Khan, Arjan Singh, Rampal Singh and Kashmeer Singh were still warded in Kuala Lumpur Hospital.

Dang Wangi OCPD Asst Comm Mohammad Zulkarnain said the police have classified the case as sudden death.

When met at the Kuala Lumpur Hospital mortuary, Lim's wife, who declined to be named, demanded action to be taken against those responsible.

Deaths the second fatal incident in five months

KUALA LUMPUR: The death of two workers from falling granite slabs at the Pavilion Kuala Lumpur project site was the second fatal accident in five months. A stop-work order has been issued on the project.

Human Resources Minister Datuk Seri Dr Fong Chan Onn said a worker died in August last year after he was hit by a piece of wood that fell from a scaffolding.

"The fact that there had been two accidents within five months shows some degree of non-compliance or a lapse in the system," he told reporters after inspecting the accident site and a briefing by developer Pavilion Kuala Lumpur Sdn Bhd yesterday.

Dr Fong said an immediate stop-work order had been issued on the residential cum boutique hotel project.

"The scaffolding may have given way due to overloading," he said.

During the briefing, Pavilion executive director Y.S. Liew said the project was just six months away from completion.

He said the workers had been installing tiles on the outer part of the building when the incident occurred.

In a faxed statement, Pavilion and its subcontractor Putra Perdana Construction Sdn Bhd expressed regret over the incident and extended their condolences to the families of the deceased workers.

January.2007

KL Highrise Building (Scaffolding Collapse)

Falseworks and Scaffolding Works

16.3.2008

Kuching
Highrise
Building
(Falseworks
Collapse)

Falseworks and Scaffolding Works

Workers fall after structure gives way



KUCHING: Nine foreign workers were injured after part of the building structure of a multi-million ringgit international hotel-cum-shopping mall project at Jalan Bukit Mata here collapsed.

The workers, one of whom suffered a broken arm, were thrown to the ground when the structure they were standing on gave way at 4pm on Saturday.

Ambulances rushed the injured workers to the Sarawak General Hospital where most of

Massive clean-up job: Workers clearing the debris after part of the building structure collapsed in Kuching yesterday.

29.7.2013

Factory in
Johor
(Falseworks
Collapse)

Falseworks and Scaffolding Works

STAR 29/7/13

Two Indonesian workers crushed to death at JB site

JOHOR BARU: Two Indonesian workers were crushed to death when a slab of wet cement floor collapsed on them at a supermarket construction site at Taman Gaya, Ulu Tiram here.

Known only as Asmawi, 27, and Aripin, 24, they were working on a cracked cemented floor at about 3.30pm on Saturday when tragedy struck.

Johor Baru South OCPD Asst Comm Zainuddin Yaacob said the site supervisor had instructed the two workers to repair a cracked beam on the first floor of the building.

"While repairing the crack, the wet concrete ceiling above the beam collapsed on top of them," he said, adding that they died at the scene of the incident.

Johor Fire and Rescue Department (operations) deputy assistant director Mohd Rizal Buang said a team of 24 firemen rushed to the scene after receiving a distress call at about 3.50pm.

"We had to use a crane and an excavator to retrieve the bodies which were trapped in a stack of



Deadly development: Fire Department personnel inspecting the scene of the deadly collapse in Ulu Tiram, Johor.

hardening cement.

"It took us almost six hours to find Asmawi's body among the huge pile of cement and another 10 minutes to free the body from the dried

cement stack," he said.

He said that Aripin's body was only found at about 12.50am and it took the firemen another hour to retrieve the body.

The department is investigating the cause of the incident while the victims' bodies had been sent to the Sultanah Aminah Hospital for a post-mortem.



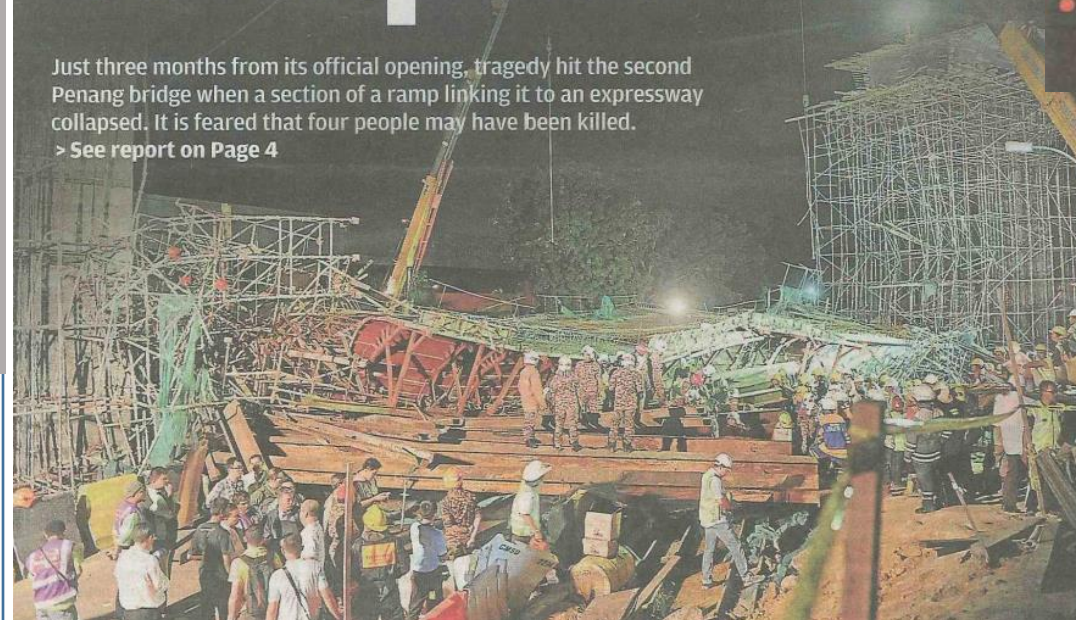
5.6.2013

2nd Penang
Bridge Ramp
(Falseworks
Collapse)

Falseworks and Scaffolding Works
Bridge Construction

Bridge ramp collapses

Just three months from its official opening, tragedy hit the second Penang bridge when a section of a ramp linking it to an expressway collapsed. It is feared that four people may have been killed.
> See report on Page 4



Picture by Michael Ong

1 dead, 3 injured

SECOND BRIDGE HORROR: Ramp under construction in Batu Maung, Penang, collapsed at 7.15pm yesterday

- Rescue team finds body in a car, three others feared dead
- Scaffolding gave way during pouring of concrete
- Two foreigners and local woman sent to Penang Hospital



July.2005

Bridge
Construction
Collapse

Special Bridge Construction Process



Meru-NKVE interchange collapse

- Nine workers injured, passing car damaged

‘ There were what sounded like two loud explosions, then the two sections

CRASHED ’

■ By Arman Ahmad, V. Shankar Ganesh and R. Anbu

SHAH ALAM, Sun. — Hundreds of tonnes of concrete crashed onto the Klang-bound lanes of the New Klang Valley Expressway (NKVE) when a section of a flyover under construction collapsed.

The collapse at 1.40pm today injured nine foreign construction workers working on top of the section, which fell five metres to the ground. The flyover is part of a 7.5-km interchange

TURN TO PAGE 6, COL 1



• NST pix by Fathil/Asri

20.8.2014

MRT Viaduct Deck toppled

Special Bridge Construction Process

Breach in work procedures

Initial probe shows safety regulations were not observed

By NURBAITI HAMDAN and D. KANYAKUMARI
newsdesk@thestar.com.my

PETALING JAYA: Initial inquiry into the fatal worksite accident that killed three workers at Sungai Buloh suggests that there has been a breach of safe work procedure, said the project owner, Mass Rapid Transit Corporation Sdn Bhd (MRT Corp).

According to MRT Corp CEO Datuk Wira Azhar Abdul Hamid, upon talking to some workers at the site, there are indications that certain quarters had disregarded safety regulations.

"We are, however, still investigating as this site is under the jurisdiction of our subcontractor, Syarikat Muhibbah Perniagaan dan Pembinaan Sdn Bhd, and the exact details will be disclosed as soon as the investigations are completed," he said during a press conference at the

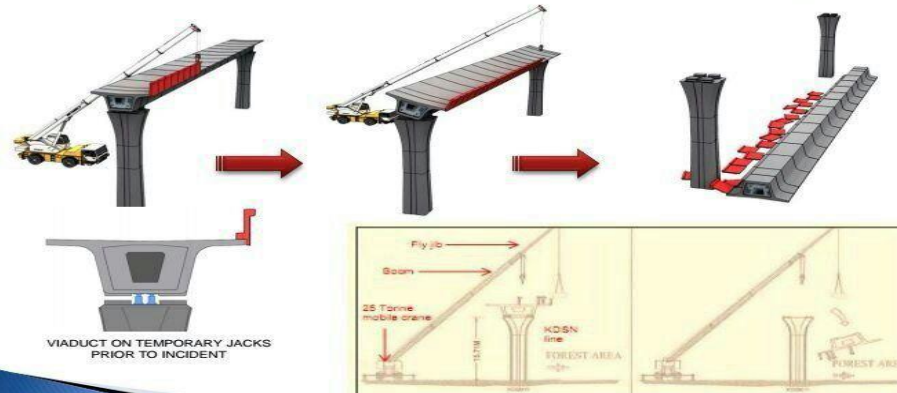
Recovery exercise: A crane being used to lift the concrete span as workers clear the debris to recover the bodies of the three Bangladeshi workers.



WHAT HAPPENED?



A SINGLE TRACK VIADUCT DECK UNDER CONSTRUCTION TOPPLED AND LANDED ON GROUND.



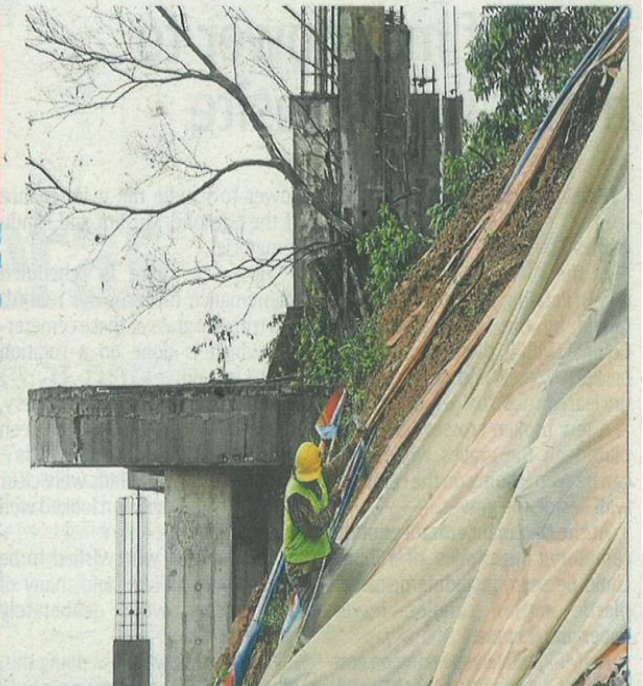
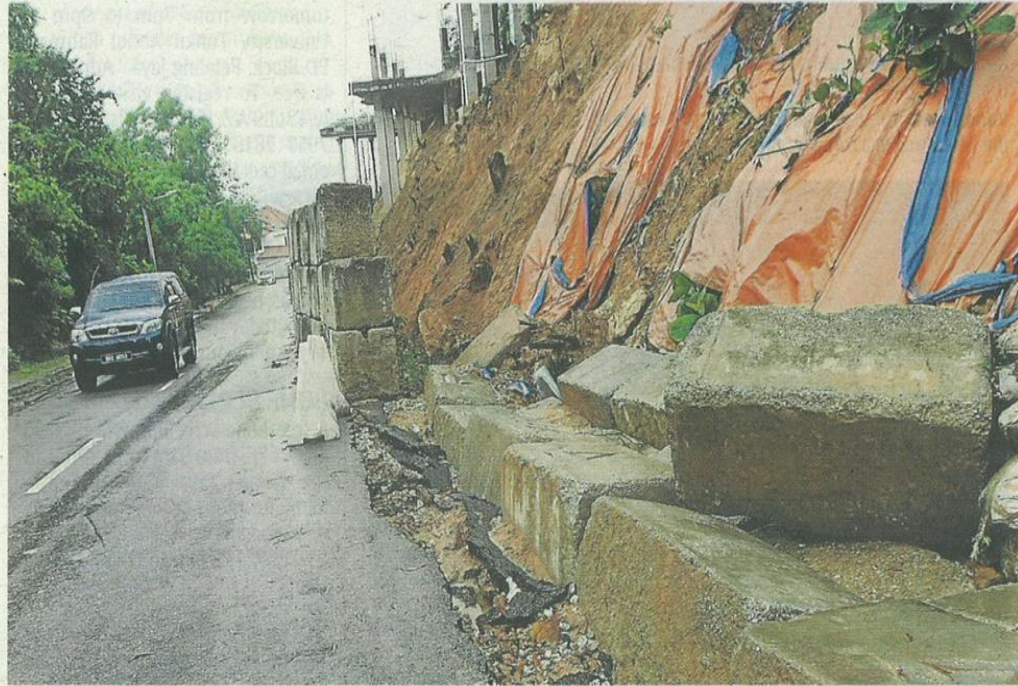
21.10.2013

Temporary Slope Erosion & Slip

Temporary Earthworks / Excavation

Slope responsibility of landowners

Otherwise work in Bukit Gasing may cost council RM50mil, says MBPJ



For safety of residents: MBPJ has embarked on hill strengthening works in Jalan 5/64. The project should be completed within eight months.

By **SHEILA SRI PRIYA**
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Photos by **SAM THAM**

THE Petaling Jaya City Council may have to spend RM50mil to strengthen several hillslopes in Bukit Gasing if the individual landowners fail to fulfil their responsibility.

Councillor Derek Fernandez pointed out the owners were legally

responsible to ensure their land was well maintained.

"There are about 37 plots of land here.

"The state should seize the land of irresponsible owners if they fail to look after the slopes on their properties," he said during a visit to Jalan 5/64 in Section 5, Petaling Jaya.

MBPJ has appointed contractors to strengthen two hill slopes in Jalan

5/64 and Jalan 5/66 following several landslides and soil erosion in the areas.

It is estimated that the works will cost RM4.5mil and RM8mil respectively.

The hill strengthening work in Jalan 5/64 will be completed by June next year.

Meanwhile, the council has banned all major development, termed Class Three and Four, in the

neighbourhood to prevent further soil erosion and landslides.

A landslide on May 5 in Jalan 5/64 uprooted trees, damaged several cars and cut off access to the area.

Bukit Gasing assemblyman Rajiv Rishyakaran commended the council for the pro-active measures taken.

He said he would raise at state-level the issue of seizing the privately-owned land.

"MBPJ should not have to strengthen these hillslopes using public funds.

"However, it is necessary to ensure the safety of those living and visiting the Bukit Gasing recreational area," he said.

The poor hillslope condition has also resulted in clogged drains.

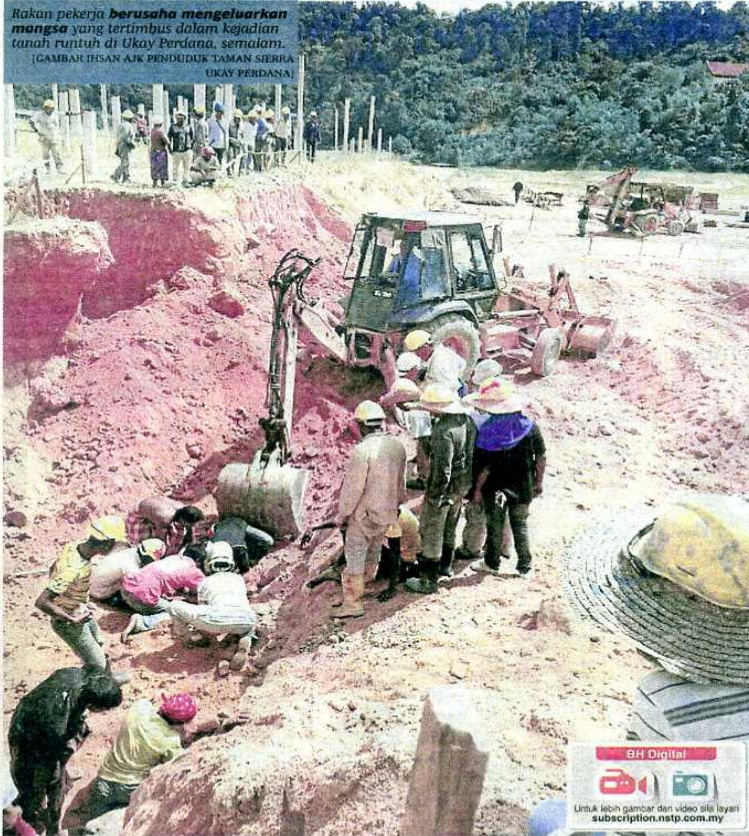
The hill strengthening works in Jalan 5/64 uses the "soil nailing" technique over 2,300sqm of land.

3.7.2013

Temporary Excavation Slip Failure

Temporary Earthworks / Excavation

Rakan pekerja berusaha mengeluarkan mangsa yang tertimbus dalam kejadian tanah runtuh di Ukay Perdana, semalam. (GAMBAR IHSAN AJK PENDUDUK TAMAN SIERRA UKAY PERDANA)



Kronologi Tanah Runtuh

- 11.25 pagi: kejadian tanah runtuh
- 11.29 pagi: Jabatan Bomba dan Penyelamat menerima maklumat kejadian
- 11.35 pagi: seorang mangsa berjaya diselamatkan oleh rakan sekerjanya
- 11.50 pagi: jentera



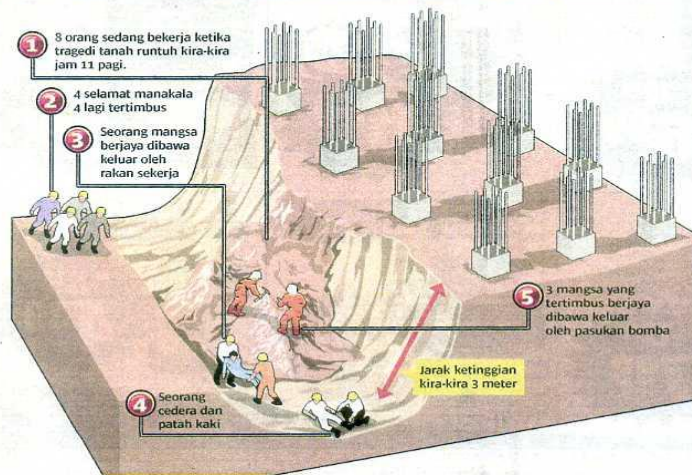
Tiga buruh asing maut tertimbus

» Tebing runtuh ketika mangsa sedang menjalankan kerja penyelenggaraan

Oleh Hardi Effendi Yaacob, Safeek Affendy Razali, Fitri Nizam dan Muhammad Mustakim Ramli
bhnews@mediaprima.com.my

Hulu Klang

Tiga pekerja binaan mati tertimbus, manakala seorang lagi cedera dalam kejadian tanah runtuh di sebuah taman perumahan baru di Ukay Perda-

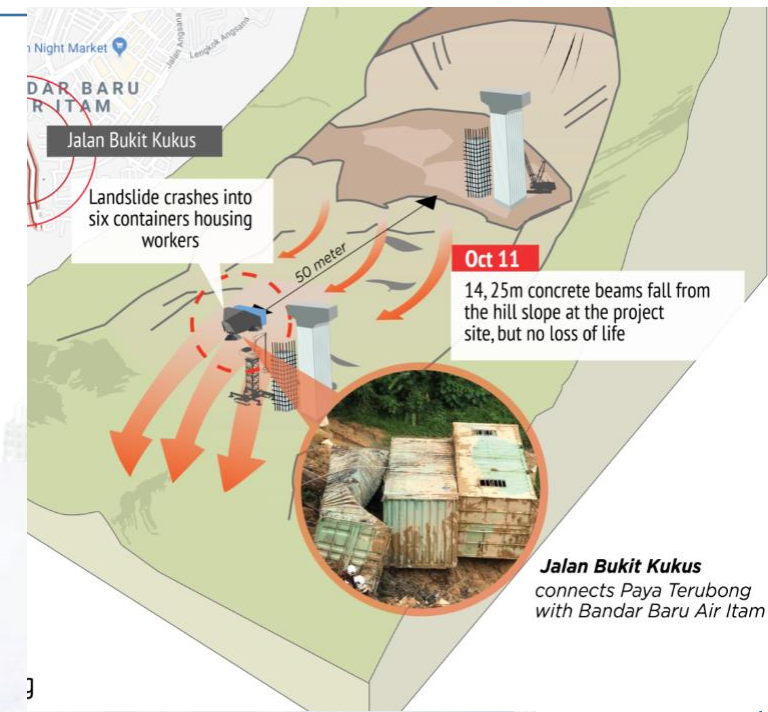


Lokasi kejadian tebing runtuh yang mengorbankan tiga pekerja warga asing di tapak perumahan mewah Taman Sierra Garden, Ukay Perdana, semalam.

19.10.2018

Temporary Earthfill Slip Failure

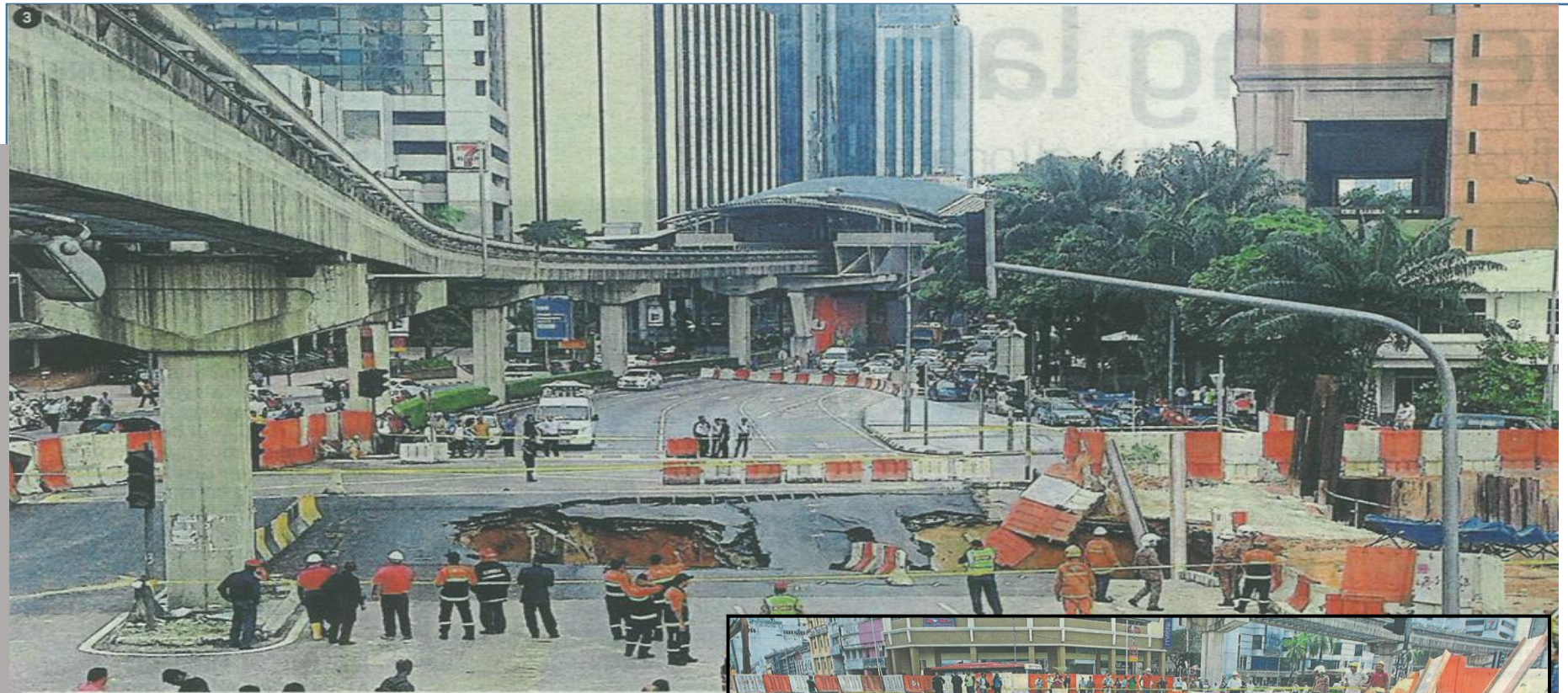
Temporary Earthworks



3.7.2014

Pudu Underpass

Tunnelling (Mining)



rush hour chaos: One of the two sinkholes that appeared at the Jalan Pudu-Jalan Imbi intersection yesterday, disrupting traffic flow. - Photo by MUHAMAD SHAHRIL

The day the earth moved

Ongoing construction work on part of the Pudu Underpass project has caused the road above the tunnel to collapse leaving large holes at the intersection. 2 & 3



27.7.2009

Basement Retaining Wall Failure

Temporary Works of Basement Excavation



There is development on one side of the Lorong Gelugor cave-in, which occurred near the houses with blue roofs. — NST pictures by Ahmad Irham Mohd Noor

Lorong Gelugor caves in

By Alang Bendahara
alang@nst.com.my

Stop-work order on next-door developer

KUALA LUMPUR: A portion of Lorong Gelugor, near Jalan San Peng, caved in about 6pm on Saturday.

A couple of hours before, some residents of 22 units of Public Works Department (PWD) and City Hall quarters began to leave their homes after noticing cracks widening in the ground.

None was hurt as they came out of their houses.

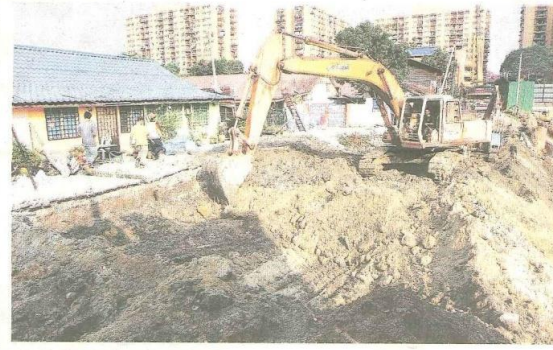
Most were allowed to return home by midnight except for 18 families.

None of the houses collapsed, although cracks appeared in some of them.

The 18 families were put up at the nearby Phoenix Hotel.

Their accommodation was paid for by the developer of Kemanga Wholesale City, a 19-storey business complex being built in the vicinity.

PWD deputy director-general II Datuk Mohd Noor Yaacob



Work to clear the site of the cave-in has started.



PWD deputy director-general II Datuk Mohd Noor Yaacob says PWD and City Hall workers living near the cave-in will have to move

into our cars and parked them away from the houses.

"Cracks kept appearing in the road from the time con-



CAVE-IN SCARE Part of Lorong Gelugor, near Jalan San Peng in Kuala Lumpur, caved in on Saturday forcing the evacuation of residents of 22 units of Public Works Department and City Hall quarters. None of the houses collapsed, although cracks appeared in some of them. Evacuees have been put up at a nearby hotel.



Reports by RASHITHA A. HAMID, YENG AI CHUN, BEH YEN HUI, M. KUMAR and TAN KARR WEI. Photos by AZAHAR MAHFOF, GLENN GUAN, AHMAD IZZRAFIQ, MOHD FAIHAN and MOHD SAHAR MISNI

Jaya Supermarket collapses



Once an icon: The old Jaya Supermarket building that was once a landmark in Petaling Jaya is now reduced to a rubble after it collapsed at about 5pm yesterday.

Two workers killed, one feared dead, four others still trapped

PETALING JAYA: One of the city's earliest landmarks, Jaya Supermarket, collapsed while demolition work was going on, killing two Indonesian workers.

Two bodies were recovered at 6.44pm and 10.25pm and another worker was feared dead.

Two other workers were pulled out alive at about 5.45pm and 6pm, while four more are still trapped beneath a tangle of steel and rubble after the building collapsed at about 5pm yesterday.

The five-storey portion of the building collapsed right to the basement, where the car park was located. A 10-storey office block at the other end of the building was not affected.

Selangor Fire and Rescue Department director Soiman Jahid said 50 firemen rushed to the scene after receiving a distress call at 5.08pm.

The number of rescue personnel was later increased to about 150 with the police, Civil Defence Department and Petaling Jaya City Council joining in.

The two injured victims, Suriono, 31, and Salleh, 45, were sent to the University Malaya Medical Centre.

Petaling Jaya OCPD Asst Comm Arjunaidi Mohamed said only one body had been identified, that of 28-year-old Maskor.

"The search-and-rescue operation will continue until all workers are accounted for," he told reporters at the site.

The workers were part of the more than 80 crew who were demolishing the building.

The 35-year-old Jaya Shopping Centre, which housed a supermarket and many outlets, was closed on Feb 6, 2008. The new owners of the building planned to demolish and rebuild it on the site.

Selangor Menteri Besar Tan Sri Khalid Ibrahim, urged the public not to go near the area as it would hamper search-and-rescue efforts.

Works Minister Datuk Shaziman Abu Mansor said the Public Works Department is ready to offer assistance in equipment and manpower to help with the search and rescue.

"We are also willing to help investigate why the building collapsed," he said.

When asked if the overloading of machinery on the upper level of the building was the cause of the collapse, he said it could be one possibility but could not say anything until the investigation is completed.

A worker, Andi, who was on the fifth floor of the building, was taking a break with nine others when the incident happened.

"I was sitting when I heard a loud sound. Then, the floor started tilting and we just ran for our lives. We rushed to the other end of the building. We are so lucky to be alive," said the 30-year-old who had been working on the construction site for 20 days.

Rojak seller Faizal Md Yusof, who operates from a van just opposite the building, saw the building shake and collapse.

"I saw six cranes falling down along with the building. I just left my van and ran for my life," he said.

Housing and Local Government Minister Datuk Seri Kong Cho Ha said the Fire and Rescue Department would work together with the police to probe into the cause of the collapse.

When met at the emergency ward of the hospital, rescued worker, Salleh told Bernama he was trapped in the rubble for more than an hour.

Suffering from a fractured right leg and arm, the father of four, who started work at the project just three days ago, said he was working on the ground floor of a four-storey building when the structure collapsed.

▶ See N34
For more pictures

29.5.2009

**Building
Demolition
induced
Collapsed
(Pre-stressed
Concrete)**

Demolition Works

2009

Building
Demolition
induced
Collapsed

Demolition Works



27.6.2014

Sheet pile drop from crane

Operation Process
(NOT TEMPORARY WORKS)





LEGISLATION & GUIDELINE ON TEMPORARY WORKS





LEGISLATION & GUIDELINES ON SAFETY OF TEMPORARY WORKS

- Occupational Safety and Health Act 1994 (Act 514)
- Factories and Machinery Act 1967 (Act 139)
- Factories and Machinery (Notification, Certificate of Fitness and Inspection) Regulations, 1970
- Factories and Machinery (Building Operations & Works of Engineering Construction) (Safety) Regulations, 1986 (BOWEC)
- Registration of Engineers Act 1967 (Revised 2007)
- BEM Guidelines 001 “The Role and Responsibility of Professional Engineers for Temporary Works during Construction” – for all Professional Engineers.



BOWEC

Factories and Machinery (Building Operations and Works of Engineering (Construction) (Safety) Regulations 1980 or **BOWEC**, certain design of Temporary Works requires the certification by the Professional Engineer, among these are:

- Regulation 28(1) (General Requirements)

*“Formwork and reshores shall be **certified structurally safe by a Professional Engineer** and shall be properly braced or tied together so as to maintain position and shape.”*

Note: Professional Engineer = BEM Registered Professional Engineer with Practising Certificate



BOWEC

- Regulation 30(5) (Concrete Work)

*“Where the formwork structure is designed by a Professional Engineer, he shall be **responsible for the supervision** of the construction and the stability of such structure”.*

- Regulation 43(2) (Catch platforms)

*“Such platform shall be **designed by a Professional Engineer and certified for safety** prior to erection.”*



BOWEC

- Regulation 75 (Design and drawings of scaffolds to be approved)

*“(1) Every metal tube scaffold exceeding 40 metres in height and every other scaffold exceeding 15 metres in height shall be constructed in accordance with the **design and drawings of a Professional Engineer**. All other metal tube scaffolds shall have their designs and drawings approved by the Chief Inspector.*

(2) A copy of the design and drawings of the structure shall be submitted to the Chief Inspector for his records prior to the erection of the structure.

(3) A copy of the design drawings certified by the Professional Engineer shall be made available at the worksite for inspection by an Inspector.”



BOWEC

- Regulation 112 (Stability of structures)

“Where there is any question of stability of structures adjoining or over areas to be excavated, such structures shall be supported where necessary by underpinning, sheet piling, shoring, bracing or other means made or erected according to the design of a Professional Engineer to prevent injury to any person.”

- Regulation 116(1) (Trench excavation)

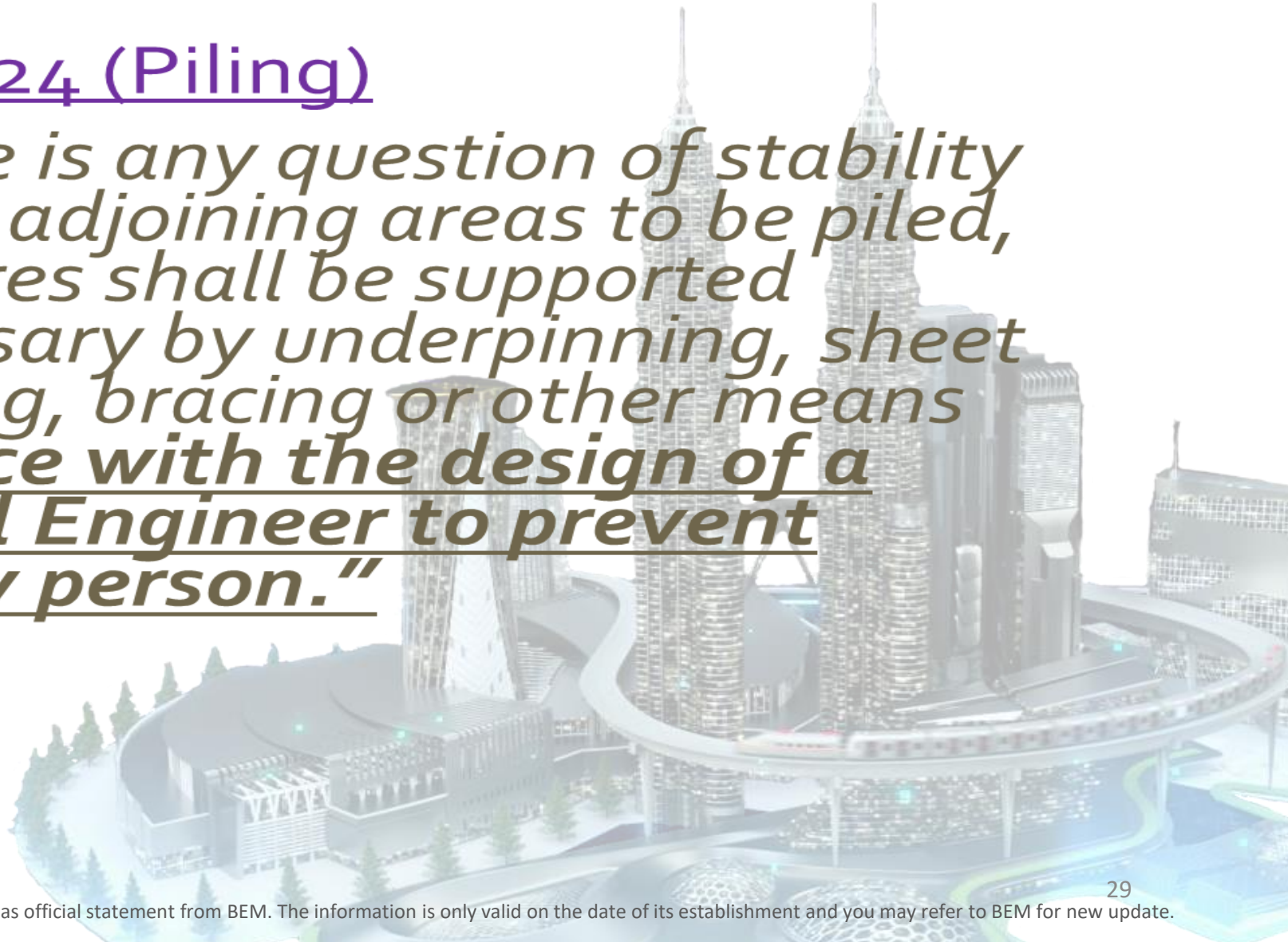
*“Pilings, shoring and bracing used in trench excavation to protect employees against falling or sliding materials shall be of adequate strength. Where the trench is to be excavated **exceeds 4 metres** in depth, such protection shall be constructed in accordance with the design and drawings of a Professional Engineer.”*



BOWEC

- Regulation 124 (Piling)

"Where there is any question of stability of structures adjoining areas to be piled, such structures shall be supported where necessary by underpinning, sheet piling, shoring, bracing or other means in accordance with the design of a Professional Engineer to prevent injury to any person."





BEM Guidelines No. 001 :

The Role and Responsibility of Professional Engineers for Temporary Works during Construction Stage





BEM GUIDELINES ON TEMPORARY WORKS

The Temporary Works is classified into three main classes, namely :

Class 1 : Minor Temporary Works

= Not compulsory to get Professional Engineer

Class 2 : Major Temporary Works

= Contractor needs to engage Professional Engineer to Design, Endorse and Supervise.

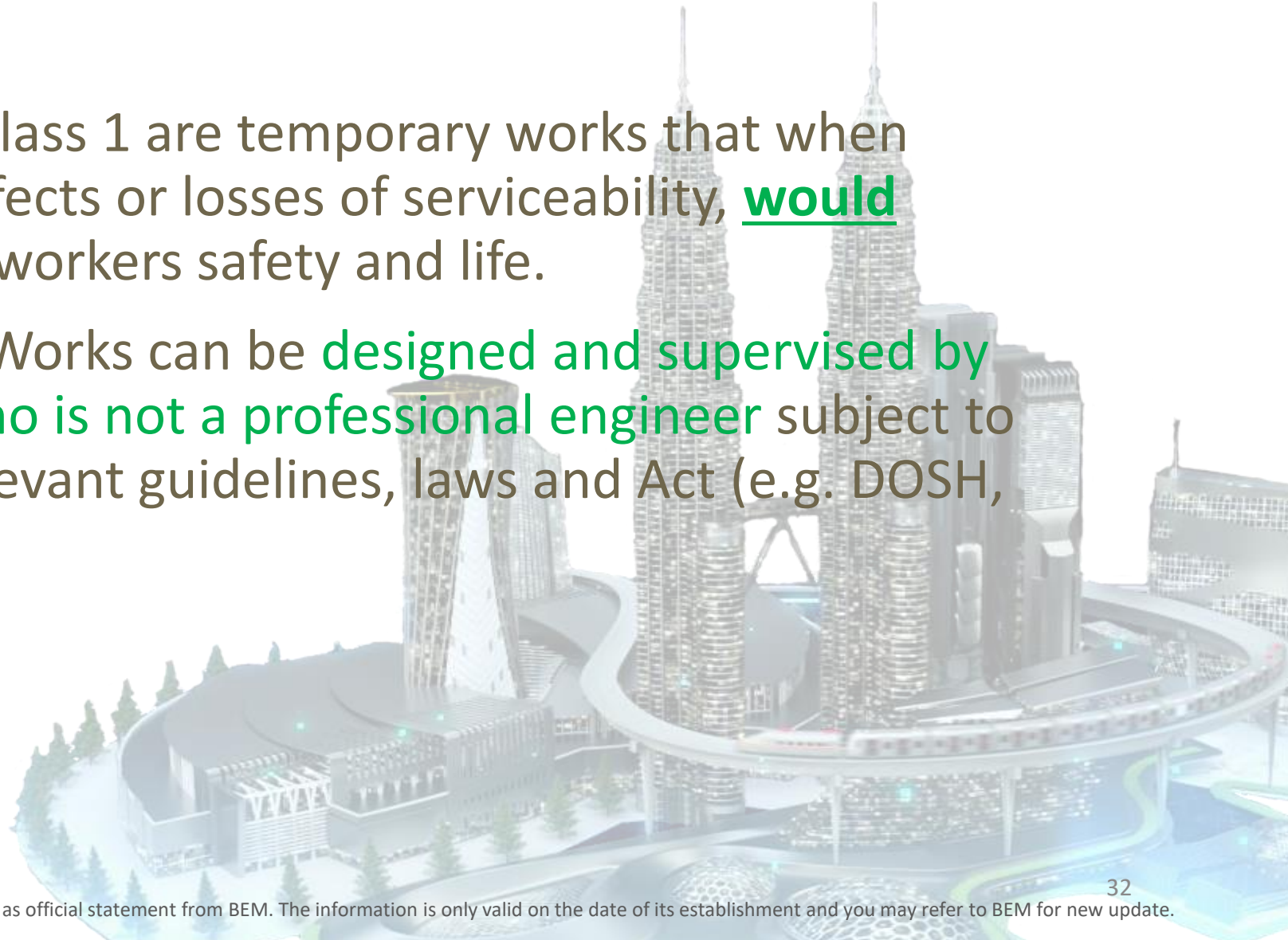
Class 3 : Temporary Works that form part of Permanent Works

= Designed by Design Consultant (Submitting Person)



CLASS 1 TEMPORARY WORKS

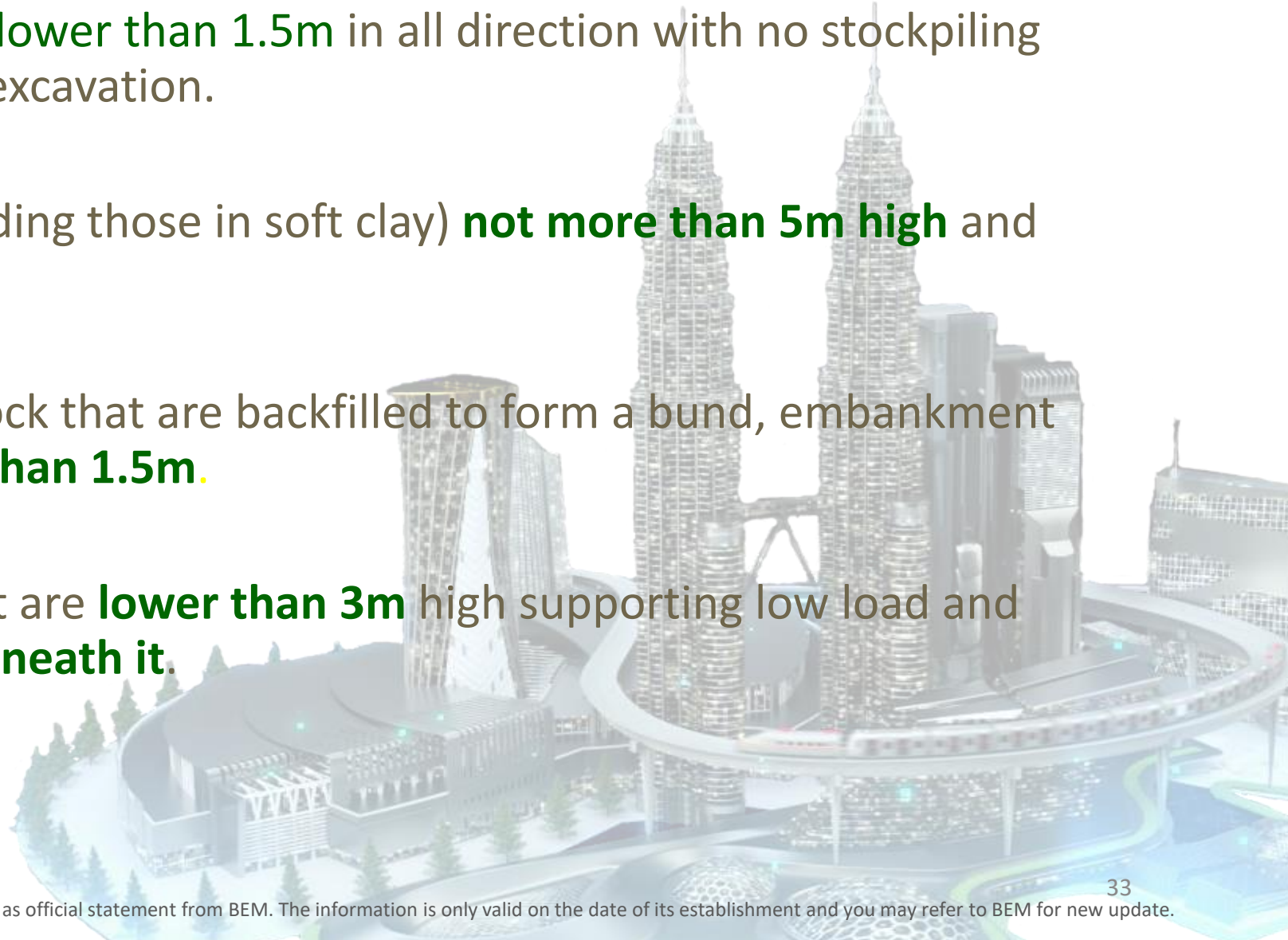
- **Minor** Temporary Works class 1 are temporary works that when subject to any failures, defects or losses of serviceability, **would unlikely** affect public and workers safety and life.
- Class 1 Minor Temporary Works can be **designed and supervised by Contractor or engineer who is not a professional engineer** subject to compliance with other relevant guidelines, laws and Act (e.g. DOSH, etc.).





CLASS 1 TEMPORARY WORKS

- 1) **Excavation or Trenching** shallower than 1.5m in all direction with no stockpiling of materials adjacent to the excavation.
- 2) **Temporary Cut** slopes (excluding those in soft clay) **not more than 5m high** and **gentler than 27 degrees**.
- 3) **Temporary Fills** of Soil and rock that are backfilled to form a bund, embankment or platform with **not higher than 1.5m**.
- 4) **Scaffolding / Falseworks** that are **lower than 3m** high supporting low load and with **no public or workers beneath it**.





CLASS 2 TEMPORARY WORKS

- Are Temporary Works that when subject to any failures, defects or losses of serviceability **would likely affect public and workers safety and life.**
- Shall be **designed, endorsed and supervised by a Professional Engineer with Practising Certificate (PEPC)** registered with BEM.
- Owner and Consultant shall state and specify clearly in the tender and contract document to the Contractor that the **Contractor shall get PEPC to design, endorse and supervise.**
- Design Consultant who are designer of Permanent Works, to ensure the Contractor comply with these requirements to safe guard public interest and safety



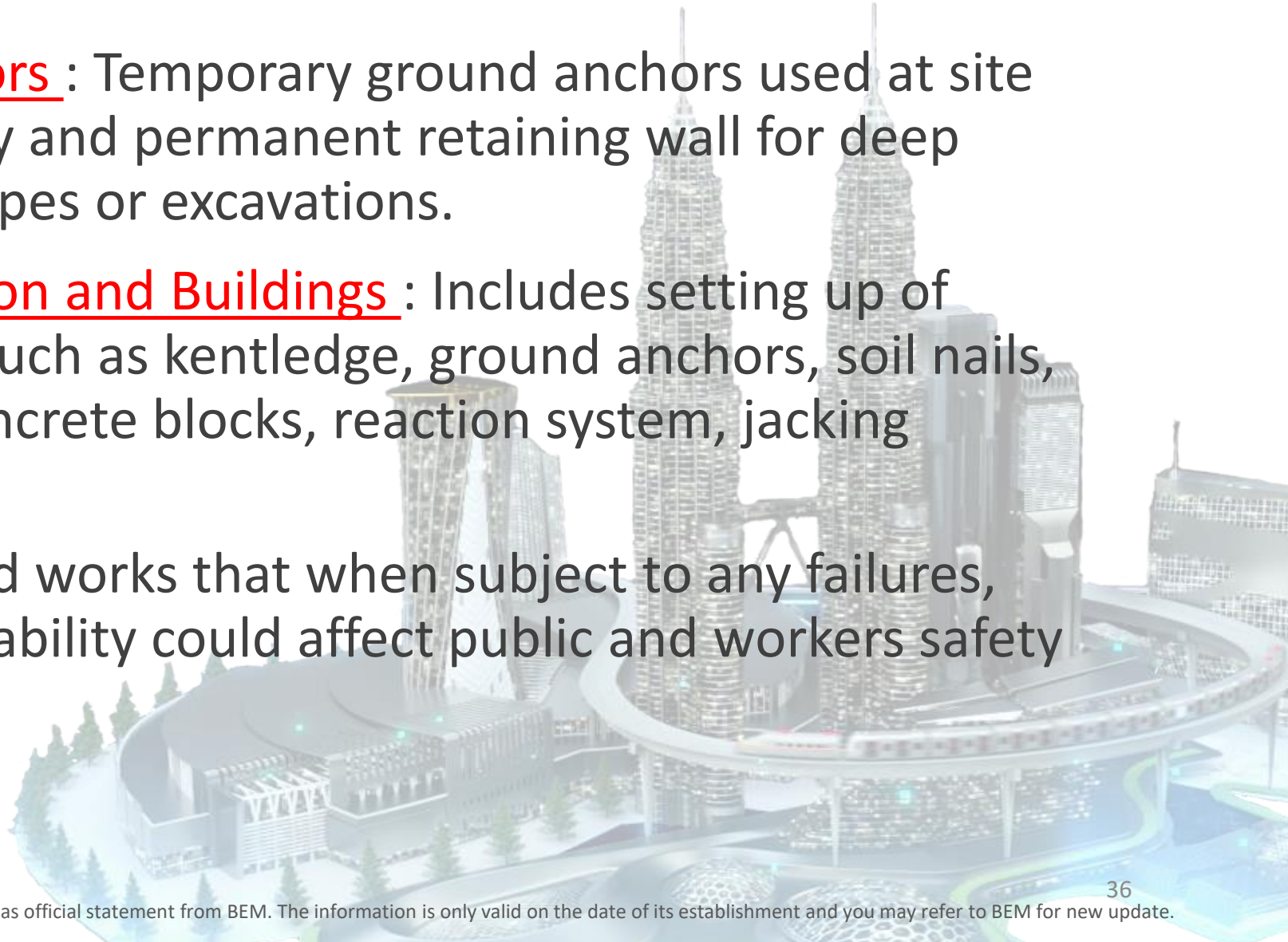
CLASS 2 TEMPORARY WORKS

- 1) Works not defined in Class 1.
- 2) Demolition Works : Demolition or removal of any obstruction and old construction works which can be either man-made or natural.
- 3) Pre-stressing Works : Works required to form pre-stressed structural elements.
- 4) Crane foundation: The design and construction of the foundation to support a static tower crane.
- 5) Temporary strutting and bracing for excavations : The temporary strutting and bracing used at site to support the retaining wall for excavation.



CLASS 2 TEMPORARY WORKS

- 6) Temporary ground anchors : Temporary ground anchors used at site to support the temporary and permanent retaining wall for deep excavations or for cut slopes or excavations.
- 7) Load Testing of Foundation and Buildings : Includes setting up of system for load testing such as kentledge, ground anchors, soil nails, steel beams, truss or concrete blocks, reaction system, jacking system, etc.
- 8) Temporary structures and works that when subject to any failures, defects or loss of serviceability could affect public and workers safety and life.





CLASS 3 TEMPORARY WORKS

- Temporary Works that form part of Permanent Works are temporary works that are hazardous to life in which any failure, defect or loss of serviceability **would seriously affect** the public and workers' safety and life.
- Works that form part of the Permanent Works (e.g. basement retaining wall, top down construction, temporary cut slopes that later become part of the permanent slopes, tunneling, etc.).
- Shall be designed, endorsed and supervised by the Design Consultant, who is the submitting person (qualified person) to the Local Authorities or other Government agencies (e.g. JKR, etc.).



CLASS 3 TEMPORARY WORKS

- 1) Cut Slopes (that form Permanent Slopes)** : Soil or rock slopes that forms the Permanent slopes.
- 2) Strengthening measures of slopes (that form Permanent Slopes)** : soil nails, ground anchors, rock strengthening measures for permanent slopes and retaining walls.
- 3) Retaining Wall** : all types of permanent retaining wall (e.g. rubble wall, crib wall, gabion wall, reinforced concrete wall, reinforced soil wall, sheet pile wall, soldier pile wall, contiguous bored pile wall, secant pile wall, diaphragm wall, barrette wall, etc.) that also function during temporary stage.
- 4) Strutting and bracing for excavations that form part of the Permanent Works**: The permanent strutting and bracing used at site to support the retaining wall for excavation.
- 5) Permanent Embankment, Bund or Fill**: For permanent embankment, bund and fill.
- 6) Ground Treatment that form part of the Permanent Works** : Ground treatment works (e.g. stone columns, excavate and replace, prefabricated vertical drains, piled embankment, embankment construction stages) that form part of the Permanent Works.

BEM Answers to Frequently Asked Questions (FAQ)





WHO SUPERVISE TEMPORARY WORKS?

FAQ 1 :

Is the PEPC engaged by a Contractor to design and endorse Temporary Works, required to supervise and be held liable for the Temporary Works?

BEM : YES. The PEPC who design and endorse the Temporary Works shall be responsible for the supervision of the Works.



ROLE OF SUBMITTING PERSON

FAQ 2 :

As the Submitting Person for a project, what should I do when I receive the Contractor's submission of Temporary Works design?

BEM :

1. As Submitting Person for the project, you are only liable for the design of the Permanent Works while the Contractor is responsible for the Temporary Works.
2. Verify with the PEPC engaged by the Contractor for Temporary works (PETW) to ensure the PETW is personally involved in the design, endorsement and supervision of the Temporary Works. (This is to prevent fake documentation or misuse of standard documents).
3. Submitting Person is not required to check on Temporary Works designed by PETW.



IS ICE RESPONSIBLE FOR TEMPORARY WORKS?

FAQ 3 :

As an Independent Checking Engineer (ICE) to carry out checking of all design works by the Submitting Person (PEPC who are the Design Consultant for the Project), am I responsible to check on Temporary works by Contractor?

BEM :

1. No. ICE is not responsible for Temporary Works.
2. ICE scope of works shall be clearly stated in appointment letter.
3. By default, the ICE shall carry out check on the analyses and design of permanent works submitted by the submitting person only.
4. ICE can also highlight to the Submitting Person on any missing or lacking of the design of the permanent works.
5. Unless otherwise stated in the scope of works, temporary works are not within the scope of works of ICE in terms of design or construction



WHO CAN SUPERVISE TEMPORARY WORKS

FAQ 4 :

As a PEPC engaged by the Contractor to design the Temporary works for a construction project, can I make use of the site personnel employed by Contractor to supervise the Temporary works designed by me?

BEM :

1. As shall be responsible for the supervision. The supervision can be carried out by the site personnel who have the necessary experience, qualification and registered with the BEM either as Professional Engineer, Graduate Engineer, Engineering Technologist or Inspector of Works (IOW). The Submitting Person (PEPC) shall be satisfied that the site personnel representing him to carry out supervision comply to the following criteria:
 - i. Take instruction and direction from the PEPC; and
 - ii. Report back to the PEPC on the supervision works.
 - iii. Act on behalf of the PEPC on the supervision works.
2. As long as all the criteria above are fulfilled, employment by either the PEPC or the Client or Contractor then seconded to PEPC is acceptable. Therefore the site personnel employed by the Contractor can represent the PEPC provided the site personnel fulfilled all the criteria above).



SUBMITTING PERSON STILL NEED TO INVOLVE IN TEMPORARY WORKS??

FAQ 5 :

As a Submitting Person (PEPC) of a project in which the Contractor carrying out the construction works has already engaged a PEPC to design and endorse the Temporary Works (PETW as defined in BEM Guidelines 001: The Role and Responsibility of Professional Engineers for Temporary Works During Construction Stage), do I still have to check and supervise the Temporary Works?

BEM :

1. As the contractor has appointed a Professional Engineer with Practising Certificate (PETW) to design and supervise the Temporary works, then the responsibility of the safety of the Temporary Works including design, endorsement and supervision are solely under the PETW.
2. As a Submitting Person (PEPC) of the project, your responsibility is only on the Permanent Works thus you do not need to check or supervise the Temporary Works.

Systematic Processes to ensure Safety of Temporary Works in Construction

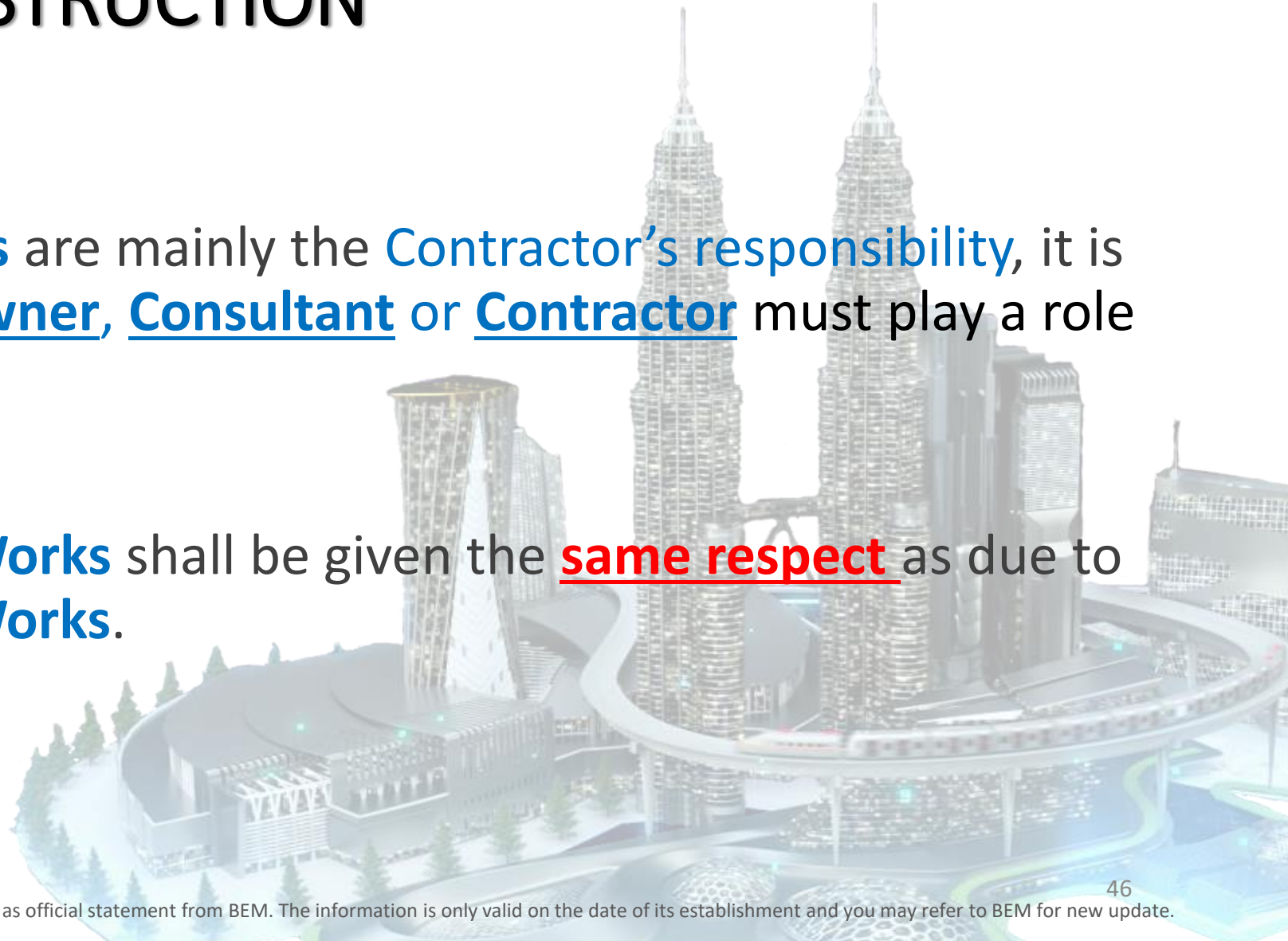




IMPORTANCE OF SAFETY OF TEMPORARY WORKS IN CONSTRUCTION

Although **Temporary Works** are mainly the **Contractor's responsibility**, it is however important that **Owner**, **Consultant** or **Contractor** must play a role in ensuring its safety.

The design of **Temporary Works** shall be given the **same respect** as due to the design of **Permanent Works**.





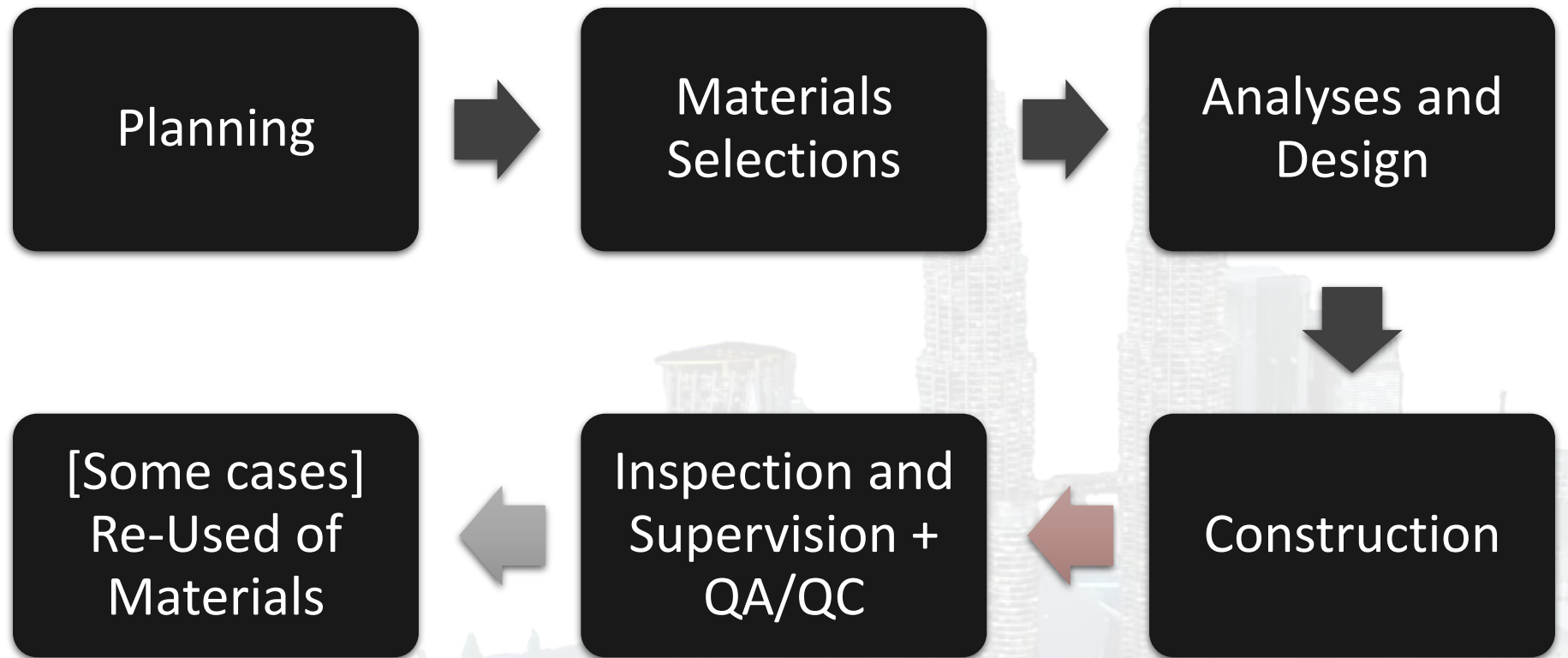
ROLE OF EACH STAKEHOLDER

Owner (Developer & Government) :- To include *Safety of Temporary Works as an Item in the Contract* to ensure Contractor priced properly for it.

Design Consultants (Submitting Person of the Project) :- To initiate the Safety procedures of Temporary Works by the Contractor. Ensure there is an Item on Safety of Temporary Works in the Site Meetings (to capture any potential hazards and risks).

Contractor (including Sub-Con and Tradesman) :- To carry out necessary processes to ensure Safety of Temporary Works. For Temporary Works that if any failure could lead to injury or death, must be constructed with properly designed, endorsed, and supervised by Professional Engineers.

Systematic Processes





PLANNING STAGE

- 1) **Client** (Developer / Government) needs to allocate sufficient budget and duration for safe Temporary Works construction.
- 2) To determine the Categories of RISK for all possible Temporary Works to be implemented for the project (usually advise to the **Client** by the Consultant).
- 3) **Consultant** (include QS) to **include requirements of Temporary Works in the Tender** so the Tenderer can price for the process required for Safety of Temporary Works.
- 4) **Contractors** (Tenderers) have to **price and prepare for proper implementation of Temporary Works** (e.g. for Class II Temporary Works to engage Professional Engineers)



MATERIALS/ PARAMETERS SELECTIONS

5.1.1 CIDB Act 520 (Amendment 2011) – Fourth Schedule

(1) With the Act 520 (Amendment 2011), CIDB is authorised to enforce and regulate construction products with the provisions⁶ of the CIDB Act. All construction materials/products listed in the Fourth Schedule of Act 520 (Amendment 2011) are required to obtain CIDB's Certificate of Standards Compliance (PPS)⁷.

NOTE 6: The related provisions of the CIDB Act 520 (Amendment 2011) are:

a) "Section 33C - The *Lembaga* shall, in the manner determined by the *Lembaga*, certify the construction material used in the construction industry and specified in the Fourth Schedule is in accordance with the standard specified in that Schedule".

b) "Section 33D(1) - A person shall not deal or undertake to deal, whether directly or indirectly, with the construction materials specified in the Fourth Schedule unless the construction materials have been certified by the *Lembaga*".

c) "Section 33D(2) - Any person who deals or undertakes to deal with the construction materials specified in the Fourth Schedule without the certification of the *Lembaga* shall be guilty of an offence and shall, on conviction, be liable to a fine of not less than RM10,000 but not more than RM500,000".

NOTE 7: Scaffolding is included in the Fourth Schedule and the specified standards is MS 1462. CIDB has established a procedure for applying for the PPS under the QPASS program (Appendix A).



ANALYSES AND DESIGN

- 1) Construction projects have become more complicated, thus it is important that proper analyses and design of Temporary Works shall be carried out to ensure safety.
- 2) Conventional way of constructing temporary works without proper design is subject to high risk of failure.
- 3) **Professional Engineer with Practicing Certificate** (PEPC) engaged by Contractor shall carry out analyses, design and endorsement of the Temporary Works.
- 4) **Contractors** need to implement the Temporary Works like implementing Permanent Works.



CONSTRUCTION

- 1) **Contractors** need to implement the Temporary Works like implementing Permanent Works.
- 2) Proper construction of Temporary Works will ensure safety of the construction.
- 3) All managers, supervisors and workers shall be properly briefed and trained to put effort on ensuring safety of Temporary Works (e.g. Construction Habits)





INSPECTION AND SUPERVISION + QA/QC

- 1) Professional Engineer with Practicing Certificate (PEPC) who designed the Temporary Works also needs to **SUPERVISE** the works (can be represented by his Representatives at site).
- 2) Contractor also need to get the supervisor to ensure proper implementation, inspection and QA/QC of the Temporary Works.
- 3) Proper supervision, inspection and QA/QC will prevent non compliance to proper construction processes.



CIDB CIS 22 & CIS23

SYSTEMATIC WAY OF ENSURING SAFETY OF FALSWORKS AND SCAFFOLDING

STANDARD INDUSTRI PEMBINAAN (CONSTRUCTION INDUSTRY STANDARD)

CIS 22 : 2017

SAFE USE OF SCAFFOLDING IN CONSTRUCTION

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Standard Writing Organisation



Lembaga Pembangunan Industri Pembinaan Malaysia
CONSTRUCTION INDUSTRY DEVELOPMENT BOARD MALAYSIA

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STANDARD INDUSTRI PEMBINAAN (CONSTRUCTION INDUSTRY STANDARD)

CIS 23:2018

SAFE USE OF FALSEWORK AND FORMWORK IN CONSTRUCTION

Description: Product standards, certification and marking, planning, product approval, design and drawing, quality check, erection, supervision, inspection, maintenance, alterations, dismantling, storage and care of falsework and formwork

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CONSTRUCTION INDUSTRY DEVELOPMENT BOARD MALAYSIA

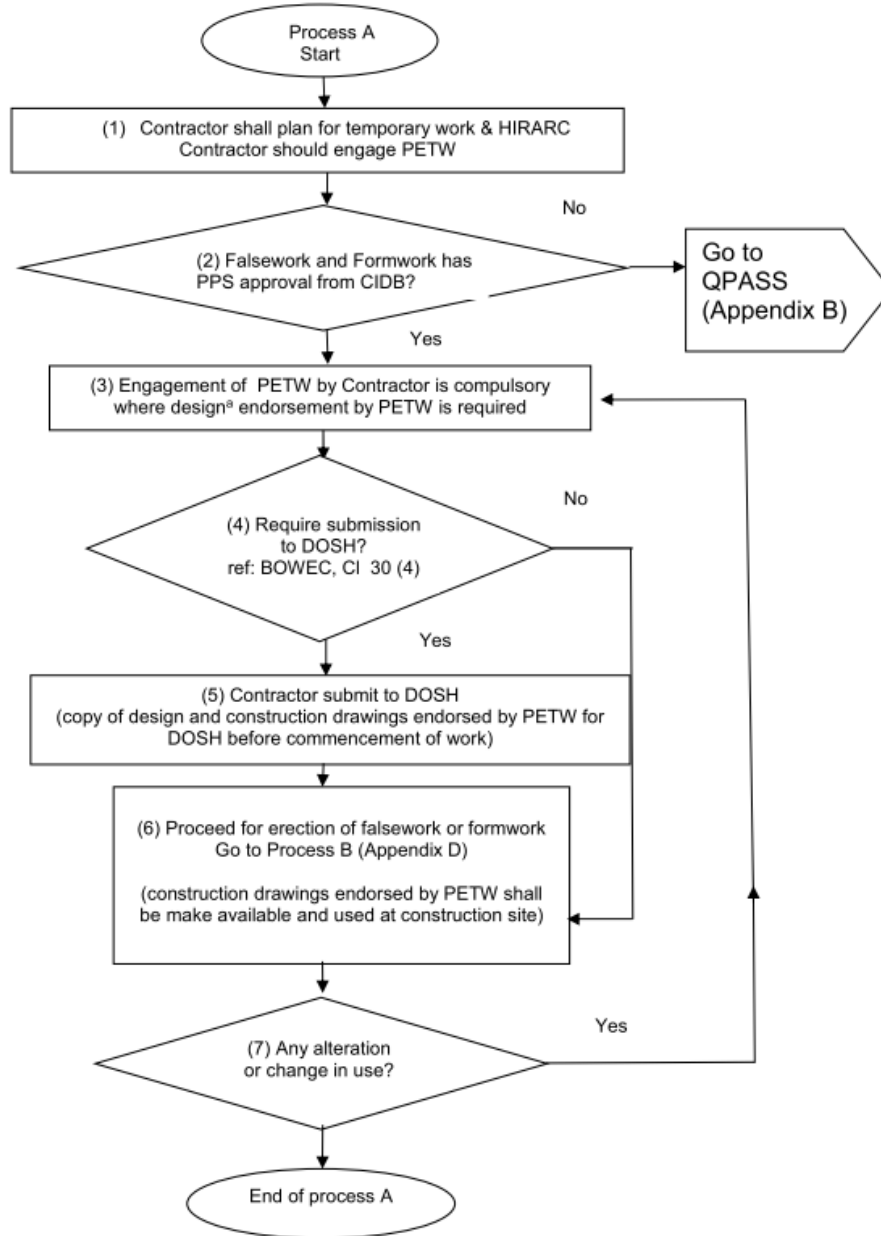


Construction Industry Development Board Malaysia
LEMBAGA PEMBANGUNAN INDUSTRI PEMBINAAN MALAYSIA

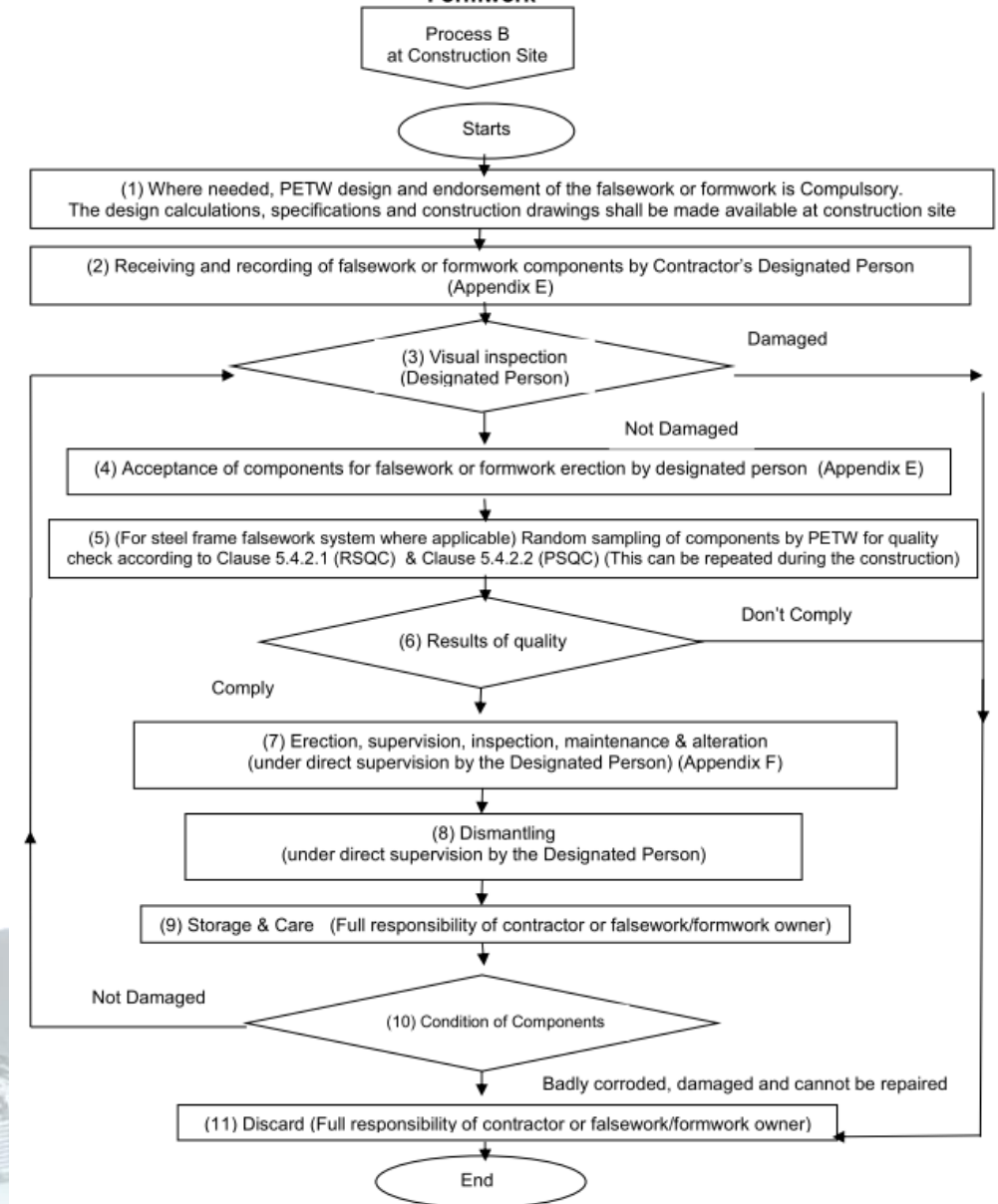
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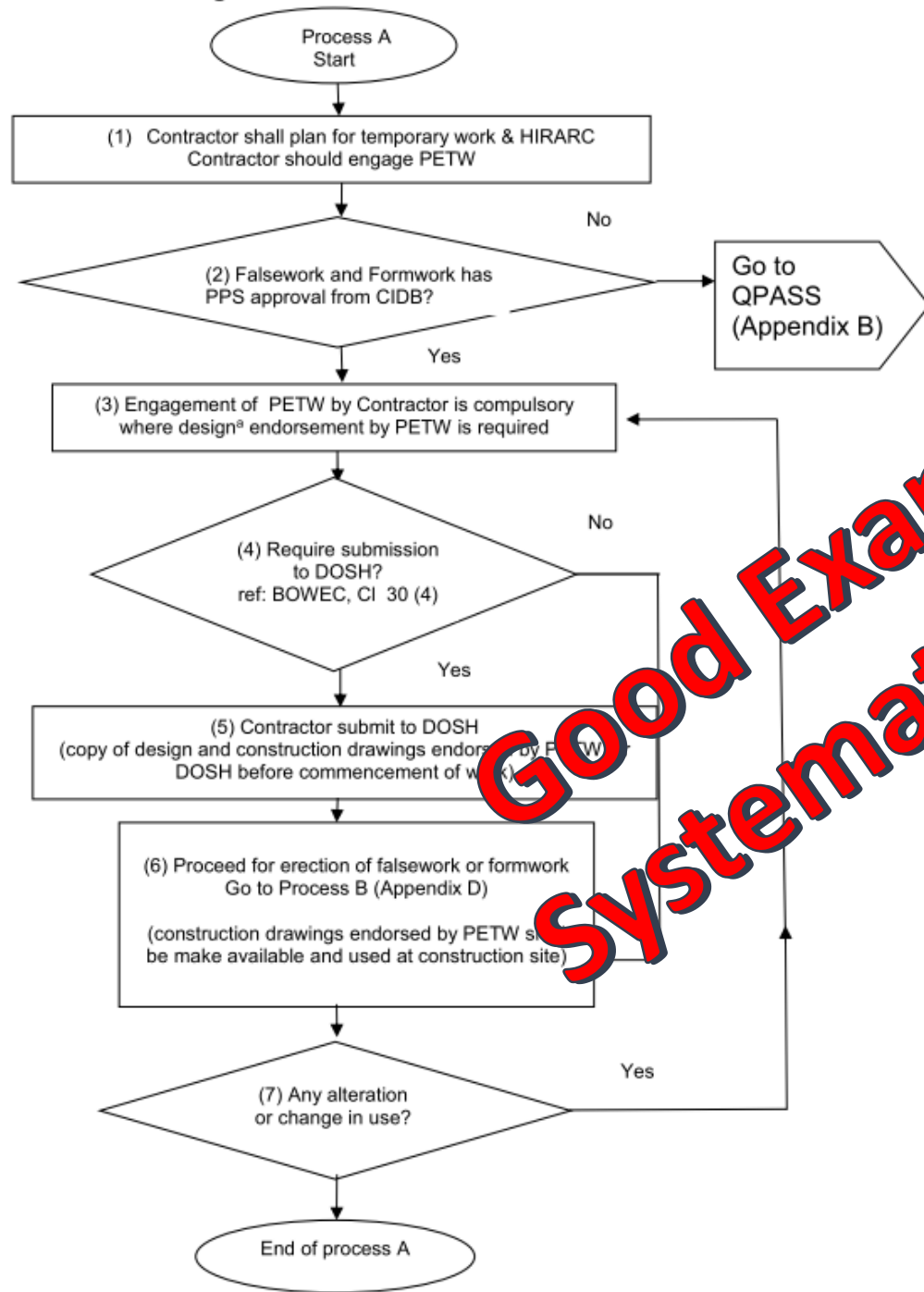
Process A: Flowchart for Design and Construction of Falsework and Formwork



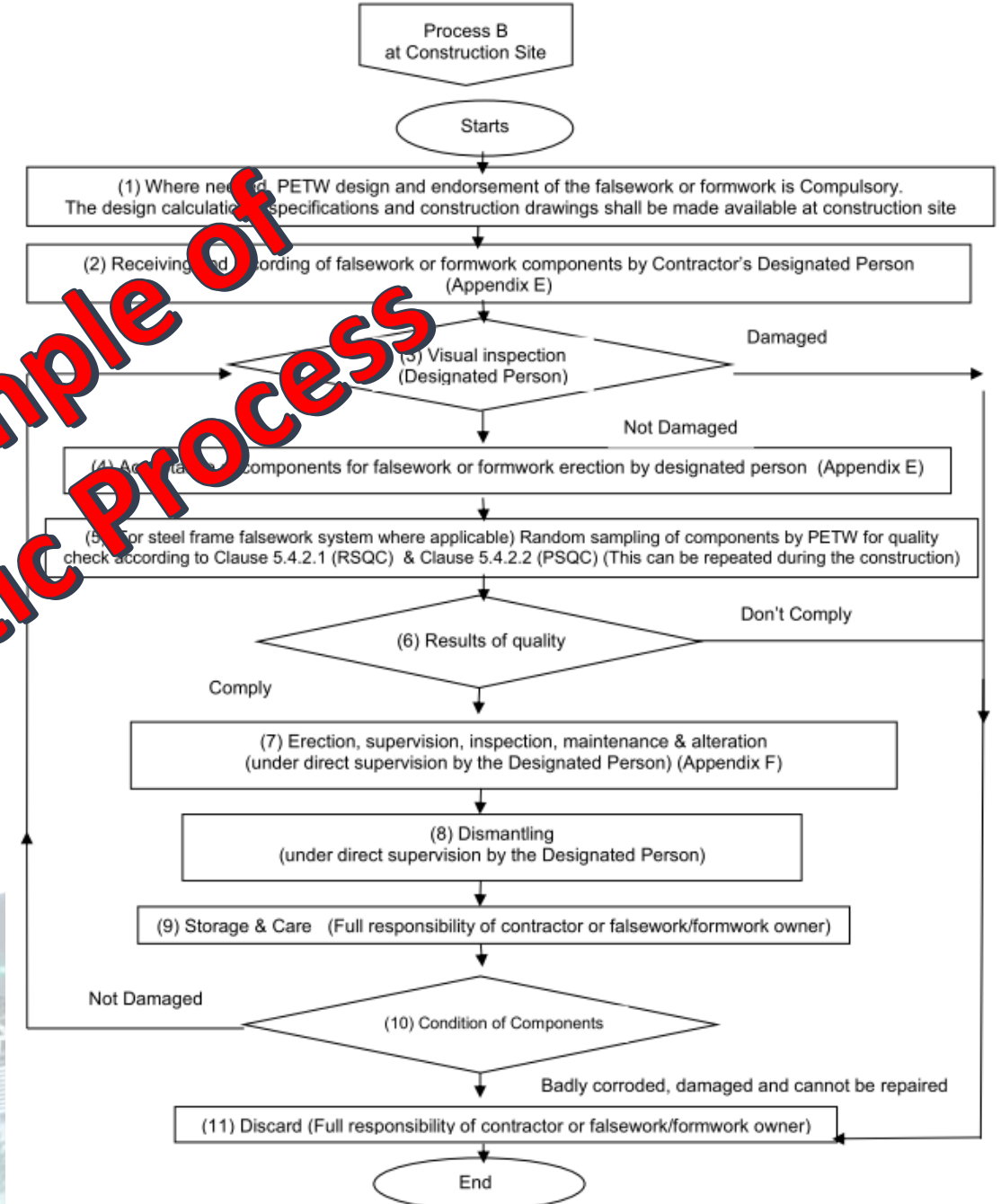
Process B: Flowchart for Receiving of Material, Quality Check, Erection, Supervision, Inspection, Alteration, Maintenance Dismantling, Storage and Care of Falsework or Formwork



Process A: Flowchart for Design and Construction of Falsework and Formwork



Process B: Flowchart for Receiving of Material, Quality Check, Erection, Supervision, Inspection, Alteration, Maintenance Dismantling, Storage and Care of Falsework or Formwork



Good Example of Systematic Process





CONCLUSIONS

All stakeholders (Client, Consultant, Contractors) have a role to ensure Safety of Temporary Works in Construction.
Systematic process in implementing the Temporary Works will improve the Safety of Construction.

**“SAFETY HAVE A PRICE \$\$\$!!!
Either you Pay Now or Pay Later.”**





Q & A



THANK YOU



Committed To Engineering Excellence

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