How to improve the Safety of Temporary Works in Construction

Presented by:
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President of IEM
Secretary General of FEIAP

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- What is Temporary Works
- Case Histories of Temporary Works Failures
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What is building failure?

“behaviour not in agreement with the expected condition of stability, or as lacking freedom from necessary repair, or non-compliance with the desired use and occupancy of the structure”

Ir Dr Judin Abd Karim paper on Building failure - 1996
Responsibility of Failures

Hammurabi Code of 1950 BC

“If a contractor builds a house for a man and does not build it strong enough, and the house which he builds collapse and causes the death of the house owner, then the contractor shall be put to death “

From: Ir Dr Judin Abd Karim’s paper on Building failure - 1996
Temporary Works in Construction

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.
Case Histories of Temporary Works Failures

From Newspaper Cutting
3.7.2014 (Pudu Underpass)

1. An aerial view of the sinkholes at the Jalan Pudu–Jalan Imbi intersection.
2. Ongoing construction of the tunnel is believed to be the cause of the road to collapse.
3. Local authorities and government agencies at the site assessing the situation and controlling traffic.
4. Traffic has been diverted following the collapse of the tunnel.

– Photo by MUHAMAD SHAHRIL ROSLI and GLENN GUAN
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.
20.8.2014 (MRT Viaduct Deck toppled)

Breach in work procedures
Initial probe shows safety regulations were not observed

BY HUSSAIN HAMIDAN and D. KANYAMUKI
newsdesk@thestar.com.my

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

According to MRT Corp CEO Dato' Aziz Arifin Hanani, 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 Mahaluk Penisagaran 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 MRT site located on land that used to belong to the Banting Research Institute of Malaysia along Jalan Sungai Buloh, just across Kota Damansara.

Azhar said MRT Corp had always engaged an auditor to the point where its contractors often resent the organization was “overspreading,” and that MRT Corp’s requirement “wasn’t a norm in the industry”.

To that, Azhar agreed that having workers do “not the norm” either, and added that he would see through the investigations and ensure the “wronged and their families get the justice they deserve. The three Bangladesh workers were killed when a concrete span weighing 650 tonnes at the site collapsed at 4.30pm, killing them underneath.

“The incident occurred while work to pour the concrete slab for the gallery, made up of 7 units of segmented box stopers, was being carried out.

“We have spoken to the Bangladeshi High Commissioner and told them the bodies will be sent home as soon as the paperwork is done.

“Now, we have informed the families and told them to make the necessary arrangements to receive the bodies,” he said.

The bodies of Muhammad Salim Hussain, 21, Muhammad Fauzi Khan, 38, and Muhammad Anwaruddin Mustafiz, 41, were all recovered yesterday.

Azhar said he did not wish to speculate now and why the workers were unable to escape in time.

“There is a lot of verification to be done and it might take as long as two weeks for all the details to be finalised,” he said.

Operations at the site have been stopped and can only commence when authorities are satisfied with the safety standards on the site.

Brendan reported that Prime Minister Tan Sri Muhyiddin Tun Razak has called for a full investigation into the incident.

“shocked and saddened to about the MRT site accident. Investigation must be carried immediately to ensure this happens again,” he said in a Twitter.

The last high profile accident at the MRT was on June 24, a Prestressed steel pile being hit by an excavation site, causing a conveyer belt.

Through no one was hurt in the incident, MRT Corp named the contractor and staff involved, other than barring the senior manager from building the future MRT tracks.

CEOs resigns over fatal MRT site accident

Azhar was appointed as the CEO on Sept 1, 2011, following the government’s decision to set up the government-owned company.

In his exit, he would continue through his contract so that the families of the deceased workers would be

**HOW IT HAPPENED?**

During installation of 14th panel

Temporary jacks

IMBALANCE DUE TO UNEVEN SIDED LOADING

1. No shims
2. Sitting on a temporary jack
3. Parapet installation on one side

**WHAT HAPPENED?**

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

VIADUCT ON TEMPORARY JACKS PRIOR TO INCIDENT

DIHEMPAP BESI BINAAN

SEPAKAT suara istri paru selepas kereta Honda Civic dihampar kerangka besi projek pembinaan Transit Aliran Ringan (LRT) yang meletak dalam kejadian di Jalan Lapangan Terbang Subang, Petaling Jaya, semalam. Ketika kejadian pada pukul 9 pagi itu, kedua-dua mangsa dalam penjaulan kereta kerja dan tidak sempat mengikuti kerangka besi itu yang jatuh dari ketinggian enam meter.

Ketua-dua mangsa berjaya dilikup oleh pasukan bomba dan penyelamat untuk dibawa ke Hospital Sultan Azlan Shah, Semenyih, Ketapang, semalam.
Slope responsibility of landowner

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
sheilasripriya@thestar.com.my
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 action taken.

He said 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.
Two Indonesian workers crushed to death at JB

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 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.

Deadly development: Fire Department personnel inspecting the scene of the deadly collapse in Ulu Tiram, Johor.
3.7.2013
(Temporary Excavation causing 3 deaths)
‘Nasib baik rakan sempat tarik saya’

Ampang: “Saya rasa bumi seperti bergerak sebelum terperosok ke dalam lubang dan ditimbus tanah,” kata pekerja warga Myanmar, Zaw Ko Rey, 25, yang tertelantarnya dalam kejadian tanah runtuh di Taman Sierra Ukay, Ukay Perdana, di sini semalam.

Katanya, ketika kejadian dia bersama tujuh rakan senegaranya sedang bekerja di bawah tebing iot perumahan baru itu se-
Lorong Gelugor caves in

Stop-work order on next-door developer

工作要停止，邻居开发商要停下来看看

There is a development on one side of the Lorong Gelugor cave-in, which occurred near the houses with blue roofs. — NST picture by Ahmad Irham Mohd Nor

Lorong Gelugor caves in

By Alang Bendahara

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

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

None was hurt as they came out of their houses.

Most were allowed to return home by midnight except for 14 families.

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

The 14 families were put up at the nearby Phoenix Hotel.

Their accommodation was paid for by the developer of Komunia Westside City, a 19-storey business complex being built in the area.

PWID deputy director-general Datuk Mohd Noor Yatcoho says PWID and City Hall workers living near the cave-in will have to move into our care and park them away from the houses.

“Cracks kept appearing in the mud from the time we

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

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.
何清泉地陷
驚心
大窟窿

一線之危
當地封鎖地陷的主要地方，以免有好奇的公众趁隙查看而发生意外。

滿目瘡痍
地陷現場蕩然無存，所幸沒有造成人命傷亡。

觸目驚人
地陷的地方部分塌陷坍塌，讓人觸目驚心。
5.6.2013  (Bridge Ramp Falseworks collapse – 1 dead)

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

1 dead, 3 injured

- 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
Jaya Supermarket collapses

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 retrieved at 6.45pm 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 Syed Jalaluddin said 30 personnel rushed to the scene after receiving a distress call at 5.38pm.

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

Two injured victims, Suntono, 31, and Saleh, 45, were sent to the University Malaya Medical Centre.

Police said four workers were taken to the hospital but it was not immediately known what injuries they suffered.

The rescue operation started with the help of the police and the company in charge of the demolition work.

The company provided excavators, including a JCB and a D7 Caterpillar, to clear debris and the police provided rescuers with cutting equipment.

The company involved was not identified.

A wall of the car park fell on the building causing it to collapse.

The company was also involved in the construction of the nearby D71 Condominium.

The building is adjacent to the area which was once a landmark.

A worker, Ank, 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 worker who had been working on the construction site for 20 days.

Rejak kitchen helper Mohd Yezid, who operates a van just opposite the building, said the building shaked and collapsed.

“I saw six0c0s doors falling down along with the building. I just left my van and ran for my life,” he said.

Housing and Local Government Minister Datuk Sri 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, rescue worker Saleh 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.
Ipoh shophouse demolition mishap causing 2 deaths of passing by motorists - 2009

Sequence of demolition

Front road
Ipoh shophouse – cantelever collapse

2009
Ipoh shophouse demolition mishap causing 2 deaths of passing by motorists - 2009
21.3.2008 (Bridge under construction collapses)

Bridge under construction collapses

LANGKAWI: A bridge being constructed here to connect Sungai Kilim and Gua Kelawar collapsed suddenly on Wednesday afternoon.

The near 80 per cent complete concrete bridge, which was 40m long and 6m wide, crumbled and sank into Sungai Kilim about 2pm.

The bridge was off-limits to users and no one was hurt in the incident.

Its construction began two years ago, funded by the Langkawi Development Authority (Lada). Losses were estimated at RM200,000.

State Works Committee chairman Datuk Nawawi Ahmad said initial investigations showed that cracks had appeared at the foundation of the bridge two days before it collapsed.

"The design was faulty and materials used were not according to standards approved by the Works Ministry. Investigations are on-going," he said after visiting the scene yesterday.

Also present were Lada technical manager Abdul Munaf Majid and public relations manager Ramizi Hassan.

Nawawi, the Kuah state assemblyman, directed local authorities to submit a full report to the State Executive Council.
Nine hurt in site collapse

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 them were given outpatient treatment for cuts and bruises on their bodies.

An eyewitness said that the structure collapsed as the workers were pouring mixed concrete on part of the first floor of the building.

The cause of the incident is being investigated.

Some 25 workers, most of them foreigners and aged between 25 and 35, were working on the project when the incident occurred.
Two die in scaffolding mishap

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 5th floor 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, Gunnam Singh, 30, Jamuna Prasad, 31, Rampal Singh, 37 and Kashmei 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 Kashmei Singh were still warded in Kuala Lumpur Hospital.

Dang Wangi OCPD Asst Comm Mohammad Zulkarmain 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 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 a 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.
July 2005 (Collapse during Bridge Construction)

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 7.5km interchange.

TURN TO PAGE 6, COL 1
‘TWO BANGS AND THEN CRASH!’

Workers recount their close brush with death

By FADHAL ILAHI ABD GHANI

SHAH ALAM: Construction workers at two Meru Link flyovers heard two loud “bangs”, before part of a flyover came crashing down on them yesterday.

The incident took place at

Mahmood said he saw a black Honda Jazz dodge the collapsing flyover. A yellow gondola used by workers hit the left side of the car.

“The cage bounced and hit the front of the car, damaging

MANGLED WRECK: A section of the collapsed flyover and the gondola of the NKVE-Jalan Meru Link flyover

MERU-NKVE INTERCHANGE CRASH

Workers preparing to anchor the segmental girders

Segmental girders fall

Unbalanced four segmental girders on the other side fall
Scaffolding collapses

Malaymail 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 reaction – 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

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

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)
### Legislations regulating the various phases along the construction supply chain in relation to causes of failure

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<th>Item</th>
<th>Property development supply chain</th>
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<td>Land conversion National Land Code</td>
</tr>
<tr>
<td>b</td>
<td>Planning permission Town and Country Planning Act,( Act 172)</td>
</tr>
<tr>
<td>c</td>
<td>Building plan approval Street, Drainage and Building Act ( Act 133), UBBL, earthworks By-Laws, Electricity supply Act, Water Service Act, Sewerage Service Act, Solid waste management &amp; public Cleansing Act, Telecommunication Act, Fire service Act,</td>
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</table>
Legislations regulating the various phases along the construction supply chain in relation to causes of failure

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<thead>
<tr>
<th></th>
<th>Procurement</th>
<th>Contract Act 1950</th>
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</thead>
<tbody>
<tr>
<td>e</td>
<td>Construction</td>
<td>Act 133, UBBL, E/works bylaws, OSHA, CIDB</td>
</tr>
<tr>
<td>f</td>
<td>Building delivery</td>
<td>Act 133, UBBL</td>
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<tr>
<td>g</td>
<td>Extension &amp; renovation works</td>
<td>Act 133, UBBL, Act 172, Fire Service Act</td>
</tr>
<tr>
<td>h</td>
<td>Periodical Inspection</td>
<td>Act 133, UBBL</td>
</tr>
<tr>
<td>i</td>
<td>Demolition</td>
<td>Act 133, OSHA</td>
</tr>
</tbody>
</table>
Sec 95: Protection of the State Authority and officers from personal liability

“the state authority, local authority and public officer of local authority shall not be subject to any action, claim, liability or demand what-so-ever arising out of any building in accordance of this act..”
Uniform Building By-Laws 1984

Bylaw 258 – **Failure to buildings**

(5) Notwithstanding that any plan, drawing or calculation has been approved by the local authority, the responsibility for the failure of any building shall *prima facie* lie with the person who submitted such plan, drawing or calculation.
Legislature review:

- Highland Towers collapse in 1993
- Amendment in Street, Drainage & Building Act, 1974, Act 133 in 1995:

- Sec 70B: Order to review safety and stability in the course of erection of building:
  - the building
  - the foundation of the building
  - the surroundings

The review shall be undertaken by a qualified person than the qualified person who prepared and certified the plans, calculations, particulars, documents or reports submitted to local authority.
Clause 71 :-

Where any building or part of a building fails in the course of construction or after completion etc. and such failures is due to;

- Misconstruction or lack of proper supervision during construction
- Misdesign or miscalculation; or
- Misuse

The person responsible shall be liable on conviction to a fine not exceeding Rm500,000 or to imprisonment for a term not exceeding 10 years or to both.
BEM Position Paper on Responsibility and Accountability of Stakeholders in Construction Industry
Prepare a paper to identify the issues and weakness in the construction industry supply chain in respect to failure of buildings and fatal site accidents and propose recommendations.
BEM formed a working group called “WG on Responsibility and accountability of Stakeholders in Construction Industry”

Chairman: Ir Tan Yean Chin, PPC chairman
- IEM - MBAM
- KPKT - DOSH
- ACEM - PAM
- CIDB - LAM
- PSDC - BEM
“WG on Responsibility and accountability on Construction Industry”

**TOR includes:**
- stakeholders involved at every stage of development (supply chain)
- relevant laws & policies
- study possible causes of failure and recommendations
- literature reviews of past cases of building failures
Scope of Review

Stakeholders responsible:

- Developer / project proponent
- Planner
- Engineers
- Site supervisors
- PTD (Land officer)
- Architect
- Contractor
- Tradesman
- Local authority
Supply Chain of Construction Industry

1. Project inception
2. Land conversion
3. Planning approval
4. Building Plan approval
5. Procurement process
6. Construction
7. Building delivery (CFO/CCC)
8. Maintenance and Management / COB
9. Periodical Inspection
10. Demolition

Covered in this Presentation
BEM Responsibility and Accountability of Stakeholders in Construction Industry

Stakeholders responsible:
- Developer / owner
- Architect
- Contractor
- Planner
- Engineer
- Tradesmen
- Site Supervisor
- Land Officer
- Local Authority

Failure of Building

Supply chain of property development:
- Project conception
- Land conversion
- Planning permission
- Building plan
- Procurement
- construction stage
- Building delivery (CFO/CCC)
- Maintenance & Management
- Periodical Inspection
- Demolition
**BEM Responsibility and Accountability of Stakeholders in Construction Industry**

**Number of exposure to causes by stakeholders along the supply chain**

<table>
<thead>
<tr>
<th>stakeholder</th>
<th>no of exposure</th>
<th>as % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>Engineer</td>
<td>10</td>
<td>42</td>
</tr>
<tr>
<td>Developer</td>
<td>9</td>
<td>37</td>
</tr>
<tr>
<td>Supervisor</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Architect</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Local authority</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Pentadbir Tanah</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Planner</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Other agency</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>
Number of exposure to causes by stakeholders along the supply chain

- Contractor
- Engineer
- Developer
- Supervisor
- Local authority
- Pentadbir Tanah
- Planner

BEM Responsibility and Accountability of Stakeholders in Construction Industry
Findings of Common causes of failure during 

**Construction stage**

a) Incompetent site supervisor  
b) Insufficient site supervisors (SS)  
c) *Temporary works* overseen by incompetent contractor/supervisor or without engineer’s input for works involving structural input  
d) Removal of consultant’s scope of service in construction stage  
e) Contractor fraudulent act resulting in inferior product  
f) Inferior quality of building materials used  
Incompetent tradesmen used
Common causes of building failure

**Construction stage**

*Recommendation:*

a) Regulate Site Supervisors (SS) in the Act or regulation to carry responsibility and accountability. Set some entry requirement for SS depending on the category of SS in relation to the size and complexity of the project.

b) set a minimum ratio of SS against size and complexity of the projects and categories of SS.
Responsibility and Accountability of Stakeholders in Construction Industry

Common causes of building failure

Construction stage (Continue)

Recommendation:

c) review existing guidelines on temporary works in respect to stability and hazard to public. Identify any gap in the guidelines and enhance enforcement.

d) amend CIDB Act to make key personnel of contractor (eg director) personally responsible on negligence and fraudulent act resulting in inferior product.
Responsibility and Accountability of Stakeholders in Construction Industry

Strategic Plan to minimize / mitigate failure

7 strategic plans:
1. General awareness of construction safety
2. Strengthening role of regulatory authority especially local authority
3. Ensuring quality and independence of Engineers
4. Upgrading competency of supervisors
5. Review Code of ethic of professionals
6. Clearer delineation of responsibility of certain ‘structure’ drawing between architect and engineer
7. Enhance accountability of contractor
Responsibility and Accountability of Stakeholders in Construction Industry

Strategic Plan to minimize / mitigate failure

Strategic plan 4:

Upgrading competency of consultant’s resident site supervisors

3. To amend UBBL on all Form G except G2 to require relevant consultant’s site supervisor/s to sign on the relevant Form Gs that he has supervised the project and that he takes responsibility on the portion of works he is connected with. (amendment to CIDB Act)

Note: New amended REA (2015), BEM will register Inspector of Works (IOW)

4. To amend CIDB ACT to make it a statutory requirement for site supervisor (both contractor’s and consultant’s) to be registered with CIDB. No one shall employ any deregistered site supervisors unless the registration has been reinstated.
Strategic Plan to minimize / mitigate failure

Strategic plan 7:
Enhance accountability of contractor

1. To amend CIDB Act to allow CIDB to act against the director and Site/Project Manager found responsible for the failure of a building with punitive action such as fine and suspension from any construction activity within a specified period.
Enhance accountability of contractor

2. To introduce QBS (Quality Based System) process for the appointment of contractors and the use of 2 envelope systems of technical and financial system evaluate bidders for the projects. For government projects, greater transparency system should be practiced whereby representatives from relevant organisations such as MBAM, ACEM, IEM or PAM be invited to sit on the tender board. The tender bids and successful bidders should be displayed for public viewing.
Strategic Plan to minimize / mitigate failure of building

Strategic plan 7:

Enhance accountability of contractor

3. contractor shall engage Professional Engineer to design, endorsed and supervise all temporary works on site. Temporary works shall be given the same due respect in terms of safety.

4. all temporary works endorsed by Professional Engineers and submitted to DOSH shall be constructed strictly according to the submitted drawings.
Role and Responsibility of Professional Engineer for Temporary Works in Construction
Although Temporary Works are mainly the Contractor’s responsibility, it is however important that Professional Engineers involved in the project either as 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 by 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.”
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.”
“(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.”
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.”
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 is drafting:

“Guidelines on the Role and Responsibility of Professional Engineers for Temporary Works in Construction”

as a guide to all professional engineers involved in temporary works.
Proposed Classification of Temporary Works

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

Class 1: Minor Temporary Works

Class 2: Major Temporary Works

Class 3: Temporary Works that form part of Permanent Works
Class 1: Minor 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. Other than those already listed below, the Consultant and Contractor shall discuss and itemize the temporary works for each project prior to construction.

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.).
Examples of Class 1: Minor 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 : Major 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.
- Carry similar level of risk to life as permanent works, shall be given same respect on safety as that of Permanent Works.
- Shall be designed, endorsed and supervised by a Professional Engineer (PE) 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 PE to design, endorse and supervise.
- It is the responsibility of the Consultant (submitting person/qualified person) to the Local Authorities or other Government agencies (e.g. JKR, etc.) and as designer of Permanent Works, to ensure the Contractor comply with these requirements to safe guard public interest and safety.
Examples of Class 2: Major Temporary Works

1) **Scaffolding / Falseworks**: Scaffolding / Falseworks covers any form of construction methods and materials used to support the construction of structure / buildings and for pouring of concrete or machineries or for workers. The works includes supply, installation, maintenance, ensuring of foundation and structural stability, and the removal of the scaffolding.

2) **Temporary Excavations**: Temporary excavation into soils or rocks. E.g. excavation for pile caps, excavation for retaining wall, trenches etc. Necessary retaining wall system or support system can be employed.

3) **Temporary Cut Slopes**: Soil or rock slopes that are excavated temporarily to form temporary slopes.
Examples of Class 2: Major Temporary Works

4) **Temporary Fills**: Soil and rock fills that are backfilled to form a temporary bund, embankment or platform higher than 1.5m.

5) **Demolition Works**: Demolition or removal of any obstruction and old construction works which can be either man-made or natural.

6) **Pre-stressing Works**: Works required to form pre-stressed structural elements.

7) **Crane foundation**: The design and construction of the foundation to support a static tower crane.

8) **Temporary strutting and bracing for excavations**: The temporary strutting and bracing used at site to support the retaining wall for excavation.
Examples of Class 2: Major Temporary Works

9) **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.

10) **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.

11) 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 that form part of Permanent 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.).

Carry similar level of risk to life as permanent works, they shall then be given the same respect in regards to safety as Permanent Works.

Shall be designed, endorsed and supervised **by the Consultant**, who is the submitting person (qualified person) to the Local Authorities or other Government agencies (e.g. JKR, etc.).
Examples of Class 3 : Temporary Works that form part of Permanent Works

1) **Scaffolding / Falseworks that form part of the Permanent Works** : Scaffolding / Falseworks that form part of the Permanent Works covers any form of construction methods and materials used to support the construction of structure / buildings and for pouring of concrete or machineries, for workers and public. The works including supply, installation, maintenance, ensure foundation and structural stability, and removal of the scaffolding.

2) **Cut Slopes (that form Permanent Slopes)** : Soil or rock slopes that forms the Permanent slopes.

3) **Strengthening measures of slopes (that form Permanent Slopes)** : soil nails, ground anchors, rock strengthening measures for permanent slopes and retaining walls.
Examples of Class 3: Temporary Works that form part of Permanent Works

4) 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.

5) Strutthing 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.

6) Permanent Embankment, Bund or Fill: For permanent embankment, bund and fill.
Examples of Class 3: Temporary Works that form part of Permanent Works

7) **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.

8) **Temporary structures and works that form part of the Permanent Works**, that when subject to any failures, defects or loss of serviceability could affect public and workers safety and life.
Role of PE on Temporary Works

The Professional Engineers who are entrusted with the design of the Temporary Works shall ensure the following:

✓ He must practice within the discipline of engineering he is registered with BEM.

✓ He must only practice on works that he has the necessary experiences and competence to safeguard public safety and interest.

✓ A Professional Engineer with Practicing Certificate in force can be engaged by Contractor or Owner to design, endorse and supervise the Temporary Works of Class 2 and Class 3.
Role of PE on Temporary Works

(Cont’)

✓ He shall design and supervise the Temporary Works to the relevant standards, code of practice and good engineering practice.

✓ There shall be adequate numbers of qualified and experienced Professional Engineer’s representatives at site (Temporary Works Site supervising personnel) to supervise the Temporary Works full time. This supervisory staffs are responsible to the Professional Engineer who design and endorse the Temporary works. These supervising staff shall be independent from the Contractor’s staff in carrying out the Temporary Works.
Role of PE on Temporary Works

(Cont’)

✓ No physical works shall be allowed on the Class 2 and Class 3 temporary works unless all the design which include but are not limited to construction drawings, specifications, method statements and construction procedures that had been properly endorsed and approved by Professional Engineers, are in place, and supervision team are ready at site.

✓ It is the responsibility of the Consultant who is the submitting person (qualified person) of the project to the Local Authorities to ensure that the project comply with the guidelines on temporary works. Any temporary works of Class 2 and Class 3 which does not have proper documentations (e.g. drawings, specifications, method statement, etc.) or proper full time supervision and inspection, the works shall not be carried out at site.
1. Safety of Temporary Works is very important.

2. Contractor is the key stakeholder responsible for Safety of Temporary Works.

3. Professional Engineer (PE) shall be entrusted to design, endorse and supervise Temporary Works that could affect public and workers safety.
THANK YOU

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