

# **Position paper on Responsibility and Accountability of Stakeholders in Construction Industry**

## **1. Objective**

A paper to identify issues and weakness in the construction industry supply chain in respect to failure of buildings and site fatal accident and propose recommendations to minimise such mishaps and improve the situation.

## **2. Background**

Building failures and site fatal accident are common in the construction industry. Construction site accident accounts approximately 10% of total accident to general workers in general. The high profile cases of Highland Tower collapse in 1993 and the series of landslides claiming several lives have prompted authorities to beef up the regulations and guidelines such as the recent issuance of Guidelines on hill Site and Highlands development in 2010 that have given more emphasis on the planning aspects of hill slope.

However, the recent spate of building failures either during construction, occupation or demolition has created great concern to the public with wide publicity in the press. Structure collapse which does not incur loss of life or physical injury may not be noticed and can be easily remedied on site. Since site accident involving life or injuries is of concern to the public, it is therefore covered in this position paper for review and recommendation.

With the wide negative publicity on stakeholders involved in the construction industry even for a minor event such as falling ceiling or leaking roof of public building, the Board of Engineers Malaysia (BEM) has decided to form a Working Group (WG) to study the whole supply chain of the construction industry. The study will look into the stages of development against the stakeholders involved, relevant laws or policies related to it, possible causes of failures and recommendations. Literature reviews will also be performed on past cases of building failure related to the above.

## **3. Working Group (WG) of Responsibility and accountability of stakeholders in construction industry**

The WG is headed by Ir. Tan Yean Chin, Chairman of Professional Practice Committee of the Board of Engineers Malaysia (BEM), with representatives from the construction industry as follow:

Chairman: Chairman of BEM Professional Practice Committee  
Members: IEM - Institution of Engineers, Malaysia  
          KPKT - Kementerian Perumahan & Kerajaan Tempatan  
          ACEM- Association of Consulting Engineers Malaysia

CIDB -	Construction Industry Development Board
PSDC -	Professional Service Development Corporation
MBAM -	Master Builder Association Malaysia
DOSH -	Department of Safety and Health
PAM -	Persatuan Arkitek Malaysia
LAM -	Lembaga Arkitek Malaysia
BEM -	Lembaga Jurutera Malaysia

#### **4. Scope of review**

As the scope for this subject is broad, the WG has decided to limit the scope to the following:

##### **4.1 Type of failure**

- a) Building failure of all public buildings involving structure or services
- b) Building failure of other building/structure involving life or injury to human or incidence as reported in the press
- c) Construction site accident involving human injury or fatality.
- d) Serviceability problem of buildings which creates nuisance and interruption to users of public buildings (internal piping burst, parliament roof leaks etc)

##### **4.2 Stakeholders**

- a) Developer / project proponent
- b) Planner
- c) Architect
- d) Engineer
- e) Contractor
- f) Tradesman
- g) Site Supervisor
- h) PTD (Land officer)

#### **5. Supply chain of construction industry**

The supply chain of the construction industry involves the following phases:

- a) Development project inception /proponent
- b) Land conversion
- c) Planning approval
- d) Building plan approval (including Earthworks/ utilities/ infra)
- e) Procurement process
- f) Construction
- g) Building delivery (CFO/CCC)
- h) Maintenance and management
- i) Periodical inspection

j) Demolition

At each of these phases, different stakeholders and different regulatory bodies empowered under different laws applies. This review will examine each of these phases to identify the common or possible causes of building failures or site accident.

**6. Common/possible causes of building failures or site accident  
(What goes wrong)**

A short summary of the above is as tabulated in Appendix A.

From literature review, past failures can be attributed during any phase of supply chain of property development by any of the stakeholders stated above although the probability of occurrence differs. For ease of documentation, the causes of failure /incidence are categorised as follow:

**6.1 Development project inception stage:**

- a) *Project proponent carrying out structure work without professional input within the local authority areas or outside local authority area.*

Street, Drainage and Building Act (SDBA) 1974 & UBBL regulates local authority area whereas construction works outside local authority areas are not within their jurisdiction. In fact, many structures outside local authority areas such as rural village houses, agriculture buildings (lately 3-4 storey swiftlets houses), bridges etc were built without any approval from any authority. As of 2010, only Perlis, Kedah and Melaka have every inch of their land under local authority area.

The recent collapse of a canopy Bridge at Perak in 2009 claiming 3 students' lives while on outdoor activities is one such case where a donor appointed a contractor to build the canopy bridge without input from professional engineer; neither is there any plan submitted for approval.

The landslide at Cameron Highlands farm in 2003 was again due to construction of ponds at mid slope by farmers without professional advice.

It would appear from the above that project proponents takes thing for granted relying on contractor's experience or following examples on what was built in other places without due regard to the geotechnical conditions. The same can happen in house extension or renovation where enforcement from local authority is lacking.

There are also instances where developers call the shot in deciding the final design or construction method and over-rule consultant's recommendation in the development phase. Some common problems are the earth filling for low cost housing where depth of fill for each compaction can be as thick as a metre or more. The Ministry of Housing has received many complaints of such nature

particularly for low cost housing (due to low profit margin) as compare to the medium to high cost housing area. One of the main reasons is the low margin of profit for the construction of low cost housing projects.

*b) Short and unreasonable time line to complete complex structures*

Several structure failure were caused partly due to the short time frame to complete the project where intricate works have to be carried out round the clocks by same team of skill and unskill workers and supervisors. The structural failure of Sekolah Menengah Majidee Johor Bahru in 1988 under the 'projek segera' was mainly due to the rush works at the expense of proper site control and monitoring. Classroom floor screed dislodged itself when it was opened to use. Investigation showed some core samples of slab below 10 Kn. Similarly, installation works such as space frame requires concentration and attentive effort. Error in one component or member can lead to undue stresses in other areas. Some of the local stadium roof collapses are such examples.

**Recommendation:**

- a) Awareness to the public on the risk aspect of structural works without engineer's advice through education, campaign or village leadership training (since many happen in rural areas). Pamphlets may be produced similar to the types used by Hong Kong to educate house owners staying near hill slope on landslide risk.
- b) Strengthen SDBA and UBBL to cover a wider area outside local authority areas.
- c) Stakeholders must insist on reasonable time line for project completion and avoid night work with the same crew to avoid fatigue, loss of concentration and ineffective supervision.

**6.2 Land conversion stage**

- a) *Land office approving development application without considering the geo-hazard in the particular areas especially farming activities at hill slope area.*

Land office with the authority to approve land conversion is the first check point for the whole approval processes ie. land conversion, planning approval, Building plan etc. It is therefore very important that Land office understand the risk implication of the site against possible failure in relation to the geotechnical, geological or environmental setting. The approval of several property developments at Bukit Antarabangsa areas by land office even though it has several unstable slopes set the starting points of several mishaps.

## **Recommendation**

- a) All land conversion application on hill slopes and sensitive areas should be attached with a brief evaluation report on site suitability against the proposed development by Professional Engineer with relevant experiences in geotechnical engineering.

### **6.3 Planning approval stage**

- a) *Approving plan with structures on unstable ground /hazard area*

Planning is about spatial arrangement of built environment. The planning authority is guided by the Town and Country Planning Act and 43 Planning Guidelines (as of 2009) to evaluate planning submission prepared by Town Planners or architects for approval. Again, some understanding of the site is important as there are still projects being approved at unsafe hill site or ex-dump site such as the recent Klang valley bungalow projects on hill slope (steep slope with land slide in 2008) and the Lembah Subang Flats and apartment PPR (threat of methane gas arising of the thick waste dump beneath the ground).

- b) *Approving build environment on flood prone plain*

Development project on flood prone area as happened in Taman Sri Muda creates social problems for the residents and occupants. It will also mean additional burden to the local government to install and maintain huge pumping facility to pump out flood water on periodical basis.

#### **Recommendation:**

- a) Planning authority should be careful when approving planning permission for new projects. Where hill slopes or sensitive areas (ex-dump sites, wet lands, and peat soil area) are involved, they should insist on comment from engineers. Alternatively, town planners submitting plans for planning permission approval must attach engineer's report of ground suitability for hill slope or sensitive areas.

### **6.4 Building Plan approval stage**

- a) *Architect submitting building plan with structure elements*

Architects have been submitting building plans with structural elements such as roof truss, lintels or high wall. There is no clear line drawn yet on the eligibility of architect and engineer to submit plan for some of these elements of the structure. The joint list of project/ component issued jointly by the Board of Architect and Board of Engineers places roof truss under list C, meaning both architect and engineer can submit. The Streets, Drainage and Building Act defines structural element as that component of

building can carries moment and forces. Although there is no reported failure on short roof trusses for houses, the long span roof truss is beyond architect's competence. In the case of timber roof truss failure involving long span and usage of splice of Monatech Kulim development project, both architect and engineer tried to distant themselves from the responsibility.

*b) Incompetency of design engineer*

There are several cases where design errors were detected during and after the construction such as that of a trade centre in KL, a school project in Cheras, a government training centre building in Bangi, a private college in Petaling Jaya, a linkway bridge in Petaling Jaya and etc. In the case of 2 government projects, the design engineers had only few years of experience and had started ECP when they obtained PE. Error in design is a common cause where wrong parameters were used or wrong analysis applied on structure.

Some projects were awarded to consultant without the required experience and resource to undertake complex structures such as the space frame for big complexes.

There are also cases discovered by BEM Professional Practice Committee whereby electrical engineer signing for C&S plan.

*c) Insufficient soil investigation for geotechnical related work*

There were cases where little or no sub surface investigation was conducted for structures with geotechnical setting. The retaining wall failures at Kulim housing project revealed the absence of any soil investigation.

## **Recommendation**

- a) Review the joint list of project submission for architect and engineer as agreed by the 2 professional boards providing clear authority and responsibility between architect and engineer in respect of design involving structural elements.
- b) Professional engineer (PE) must have a minimum number of years of relevant experience (e.g. in engineering consultancy services) before being allowed to act as Submitting Person for structure plan to local authority.
  - select consultant based on Quality Based Selection (QBS) process such as FIDIC's guidelines to ensure that only competent consultants with relevant experiences are selected.
  - Design of complex structure or geotechnical works must be vetted by Accredited Checkers registered with the Board of Engineers Malaysia (BEM).

- c) Reviewing UBBL to require submission of structure plan to be accompanied with soil investigation and geotechnical report by Professional Engineers with relevant Geotechnical engineering experiences for works where is geotechnical setting.
- d) Take stern action against Professional Engineer (PE) that practise beyond the field of engineering that they are competent with.

## 6.5 Procurement process stage

- a) *Incompetent and inexperienced contractor*

As contractor being the person who is actually doing the construction works, it is important that they are qualified to handle the job depending on the complexity of the job. There are prevailing requirements for the registration of contractor depending on the classification by CIBD. However, in practice, many contractor do not seems to possess the necessary qualification and experience as evident by the number of failures of structure due to contractor negligence since the consulting engineer cannot be on site full time. There was a case of 14 storey building project in Penang awarded to a contractor with no prior experience. Works proceeded to 5th floor even though the non-verticality of the columns at floors below were beyond allowable limit and slanting columns were clearly visible to the naked eyes. All cube tests passed but on coring, 80% failed the required strength. The structure has to be demolished eventually after it reached level 5.

### Recommendation:

- a) Selection of contractor for complex works should be based strictly on the contractor's experience, support of skill technical staff and financial standing.
- b) costing should be included into the 'Preliminary ' of the contract for the cost of ensuring safety and in complying with the provisions of OSHA (ACT 514), Factory and Machinery , Act 139 and the Rules on requirements on Site Safety Supervisors under Factories and Machinery (Building Operators and Works of Engineering Construction)(Safety) 1986.

## 6.6 Construction stage

- a) *Incompetent site supervisor (SS)*

Supervisors or COW for construction work are engaged to act on behalf of

either the consultant or contractor. There were several cases of failures that were attributed to the incompetency of the supervisors. Site supervisors are also not regulated in any Act or regulation. CIDB registers them as COW for the contractor. Since engineer cannot be on site full time for most projects, it is therefore important that site supervisors possess the right competency to undertake the task to ensure structures are constructed according to plans and engineering principles. In the government service, fresh SPM school leavers can join as junior technician immediately upon being accepted into the service.

Some developers second their office staff as SS who might not be qualified nor have sufficient time for site supervision.

b) *Insufficient site supervisors (SS)*

It is common for government projects to be supervised by a skeleton strength of SS. The case of structure failure of SM Majidee Johor Bahru in 1988 points to the lack of supervision where a technician had to supervise 4 schools under 'projek segera' scheme and concreting was allowed at night. During investigation by JKR HQ, for similar project across the causeway, a Jurong Town Corporation housing flats in Jurong had allocated 4 technicians for a single project. The recent sub structure problems at Istana Negara projects also attributed to insufficient SS on site relative to the size of the projects.

c) *Temporary works overseen by incompetent contractor/supervisor or without engineer's input for works involving structural input*

Temporary works failures such as temporary retaining structure for deep trench or basement excavation, struts, formwork, scaffolding, catch platform, crane etc is common on construction site. Contractor tends to take the easy way out since it is not part of the final product. Many of these are performed without engineer's input and they are based on contractor's experience on trial and error basis. The few cases of trenches cave-in claiming few lives of construction workers had prompted DOSH to produce guidelines on work safety for trenching works.

d) *Removal of consultants' scope of service in construction stage*

Bylaw 5 of UBBL stipulated that no erection of building can proceed unless the submitting person (PE who submitted the structure plan) undertakes the supervision of that building. However, some government agencies and developers removed the scope of services in the construction stage from the consultants and took over the role of supervision or involving minimum services of the consultants.



- e) *Contractor's fraudulent act resulting in inferior product/ unsafe construction*

There are cases of contractor who cheat on materials and compromise on workmanship. This can result in weaker concrete strength and durability, less stable structure, regular breakdown of building services, water seepage on wall and floor, etc.

- f) *Inferior quality of building materials used*

There were few cases that were highlighted in the media that relates to inferior building material being used such as the pipe burst incidence at few newly completed government buildings. One of the building has an incompatible end piece of pvc pipes that gave way when main pipes were under water pressure thus flooding the floor and damaging the ceiling.

- g) *Incompetent or inexperienced tradesmen engaged on site*

Incompetent tradesmen are also contributors to minor failures in building such as piping, wiring, sanitary plumbing, water-proofing. The current system of registration of tradesmen by CIBD is good but often than not, many of the construction works were sub-contracted to other un-registered tradesmen who may not have the basic knowledge of the trade and are also not directly responsible to the main client. In the case of a housing project in KL, excessive leakage occurred in the plumbing system in about 30 houses at various areas of the houses as the plumbers did not considered the fact that booster pump were installed at every house by the developer. The same problem also happened to a newly completed building in Kuala Lumpur where a non-compatible end-piece was connected to a piping system.

- h) *Lack of safety measures on site*

The standard of safety measures on site including that of the employment of competent safety officer is often not on the priority list of the contractor and it is also an area where cost cutting tend to be exploited. Some of the site accident can be traced to lack of basic safety provision of necessary safety equipments, supervision and built-in measures.

## **Recommendation**

- a) Regulate Site Supervisors (SS) (SS includes contractors' site supervisor and also consultant's clerk of works (COW)) through amending 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 (e.g. number of personnel) of SS against the size and complexity of the projects and categories of SS.
- c) review existing guidelines on temporary works in respect to structure stability and hazard to public. Identify any gap in the guidelines and enhance enforcement.
- d) Make key personnel of contractor (e.g. directors, key important posts) personally responsible and punishable through amendments of CIDB Act or other regulations on negligence and fraudulent act resulting in inferior product (e.g. cheating, bad workmanship, defective or inferior quality of materials used, negligence, etc)

## 6.7 Building Delivery (CCC/CFO) stage

- a) *Certifying without checking / visiting the project*

There are a number of complaints from Local Authorities that submitting person signed Form E for application of CFO without visiting the sites and some did not even know the location of the site for small projects in rural areas.

The case of the structural failure of government housing Flats (prefab system from Korean company) is an example in which the local consultant certified Form E without active involvement in the project. He was appointed as the submitting person just to satisfy the requirement for local PE to sign and submit plans to local authority on behalf of a foreign consultant on patent system of pre-fabricated construction.

- b) *Contractor/site manager's not regulated in respect of building failure*

Under UBBL, construction failure is showered onto consultant and supervisor's shoulder as far as Building related legislations are concerned. Even with the introduction of Form Gs for the issuance of CCC (Certificate of Completion and Compliance), the contractor column only mention CIDB registration number. It would appear that contractor accountability is only limited to de-registration of CIDB licence and not on the penalty aspect of the person responsible. There is a need to make the person responsible (such as cutting corner to maximise profit or fraudulently using inferior materials) and criminally accountable for any construction failure.

### Recommendation

- a) Regular reminder to PE on their responsibility and accountability when certifying works and publicise cases in BEM publication or press conference by BEM/minister.

- b) Take stern action against PE that do not act professionally or ethically.
- c) The contractor's column in all Form Gs where contractor column appears, must be signed by the contractor's company director and the site manager jointly.
- d) Take stern action against individual (e.g. directors and site/project manager) of contracting company that acted irresponsibly or fraudulently.

## 6.8 Extension and renovation works

- a) *Performing extension or renovation works without checking on design's capacity of structure*

This is a common feature whereby owner renovates the structure without the engagement of engineer to check against the carrying capacity due to additional loading. Certain internal renovation need not obtain approval from local authority even it involves extensive material change and it is not noticeable to authority. Example of such failure are the Singapore New World Hotel collapse in the 1986, Korea Sampoong building in 1995 where change of use of buildings had introduced extra loading due to air conditioner units, water tank, exterior tiling, raised floor etc.

### Recommendation

- a) Strengthen UBBL to make it a requirement to submit structural plan to local authority (for endorsement only) for any renovation that incur extra loading. This will imply the engagement of engineer as only PE can sign on the structure plan. Since it is only to deposit the plan with local authority, it does not impose any bureaucracy on the process.

## 6.9 Maintenance and management

- a) *Incompetent technical personnel handling refurbishment / repair structural work*

Repair or refurbishment works are often overlooked on the structural safety aspect whereby works are often carried out by incompetent supervisors or left to the contractors themselves. In the case of the Johor Bahru Lumba Kuda 16-storey flats' roof 500,000 litre pressed steel water tank collapse in 1993 killing a youth and damaging several cars, residents were forced to move out for a day. Although the tank was just repaired by replacing new struts, the corroded cleats joining the strut and the tank plate were not replaced. The hacking and rejoining the struts and the plate had made the joints weaker and failed 2 weeks after the completion of the repair. The technical assistant as the most senior technical officer from Jabatan Perumahan Negeri has no proper training or experience to pre-

empt such risk and properly relied upon contractor experience to do a proper job.

### **Recommendation**

- a) Repair of structural elements should be managed by qualified technical personnel. For complicated structures or slope/ ground, professional engineers must be engaged. Since incidence of such nature affects mainly complexes or big building, owner and the managing team should be educated on this risk as part of their work manual

### **6.10 Periodical Inspection**

- a) *Failure to perform periodical inspection of building by owner*

Building deteriorates over time over the span of its life cycle. Corrosion effect of reinforcement due to carbonation or concrete crack will reduce the structural capacity as building ages. On top of it, incremental loading over the building due to change of use on certain floors can have detrimental effect to the building integrity. Such incremental threat need to be identified and remedied. Section 85A of the Street, Drainage and Building Act 1974 provides for the mandatory inspection of buildings more than 5 storeys every 10 years. However, the Act requires the local authority to issue notice to owners of buildings and most of them hardly do so. Owners took advantage of this and consequently, very few building owners perform such task that is perceived as additional financial burden. Should another building collapse due to same causes as mentioned above, fingers will be pointing again on stakeholders again.

### **Recommendation**

- a) Government especially the state government should issue instruction to all local authorities to ensure notices are sent to all building owners to observe this rule. Alternatively, Act 133 can be amended to make it the mandatory for the owners of buildings to perform periodical inspection by professional engineers according to the guidelines drawn up by the Ministry of Housing and Local Government. (Guidelines on Periodical Inspection of Building issued by Ministry of Housing & Local Government 1996).

### **6.11 Demolition**

- a) *Demolition done by contractor without understanding the structural behaviour of the building structure*

This is a common practice whereby demolition of structure especially if it is of low rise; contractor and worker take things lightly on the safety aspects of workers and the public. Components of structure are demolished based on convenience of operation.

In the recent case of Ipoh shop-houses collapse during demolition killing 2 passer-bys in 2009, it was a case where the sequence of demolition was wrongly performed. Contractor started demolishing the shop house from the back leaving the shop front end fronting the street unprotected. As demolition reached the front, the cantilever action of the cantilever balcony of the building together with stacked tiles suddenly tilted towards the street and fell on 3 passing cars killing 2 persons.

- b) *Demolition contractor submitting standard method statement without understanding the structural behaviour of structure*

Contractor demolishing building has been using the same standard method statement to satisfy the local authority and DOSH as the rule requires them to submit such document before commencing demolition work. Contractor may not follow what was stated in the method statement. In 2009 alone, there were 2 building demolition sites with sudden building collapse with fatalities.

### **Recommendation**

- a) Demolition of building more than 2 storeys must engage the service of professional engineer to advise the sequence of demolition and precautionary measures. For practical purpose, demolition report from engineer need only to be lodged with local authority and CIDB before demolition works to avoid bureaucracy.
- b) Method statement must be signed by PE, thereafter to submit to DOSH and undertake to supervise the demolition of the critical part of the structure.

## **7. Analysis of stakeholders exposure to causes of failure and its frequency:**

Basing on the data, the causes of failure in relation to the stakeholders exposing to it and the frequency of the occurrence may be summarized as follow: (refer to *appendix A & B*):

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

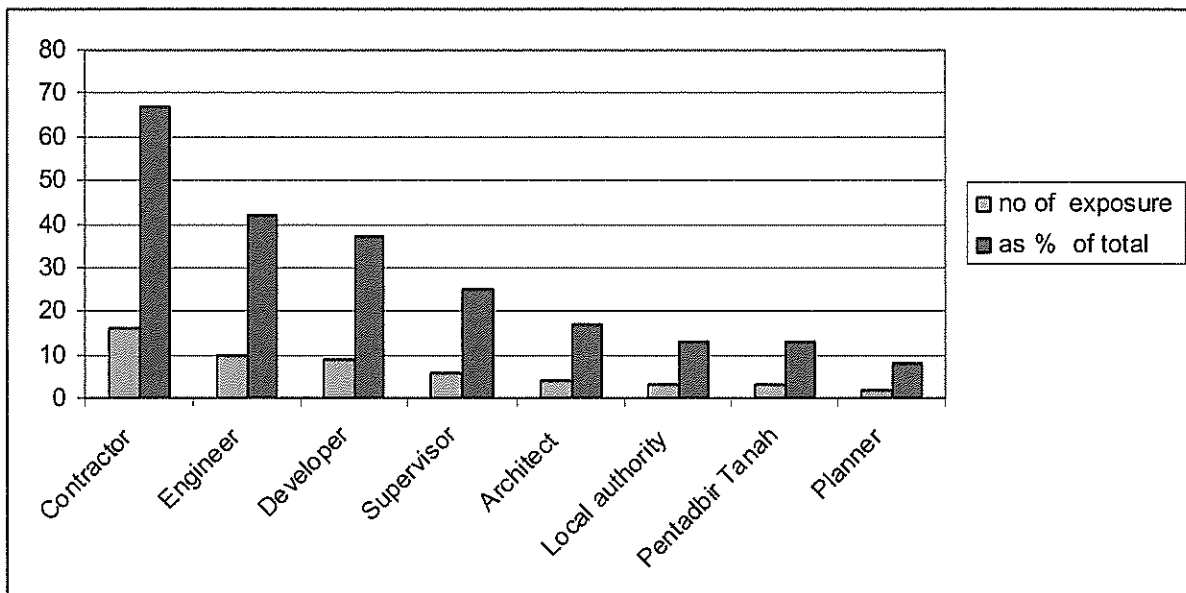
It would appear that contractor has the most number of exposure to causes along the supply chain with 16 (67%) followed by Engineer with 10 (42%) based

on total identified possible causes of 24. (some causes may have more than one stakeholder)

**Table 1 : Number of exposure to causes by stakeholders along the supply chain**

stakeholder	no of exposure	as % of total
Contractor	16	67
Engineer	10	42
Developer	9	37
Supervisor	6	25
Architect	4	17
Local authority	3	13
Pentadbir Tanah	3	13
Planner	2	8
Other agency	2	8

**Chart 1 : Number of exposure to causes by stakeholders along the supply chain (as % of total)**



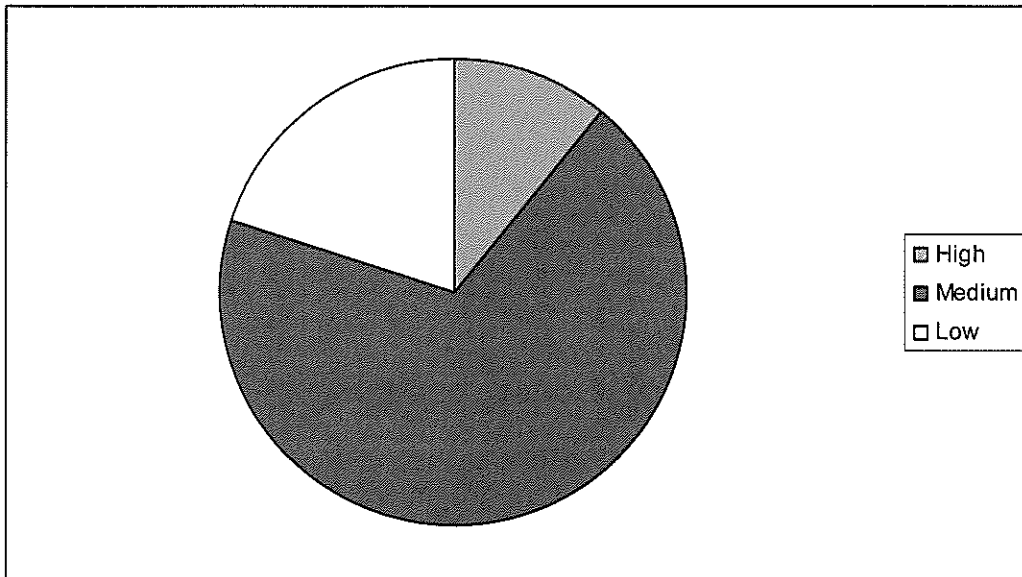
Total number of identified exposure to causes of failure : **24**

## 7.2 Frequency of degree of stakeholders exposure to stated causes of building failure

In terms of frequency of exposure to building failure, the number of such causes under category of High, medium and Low is as follow:

High : 6  
 Medium : 38  
 Low : 11

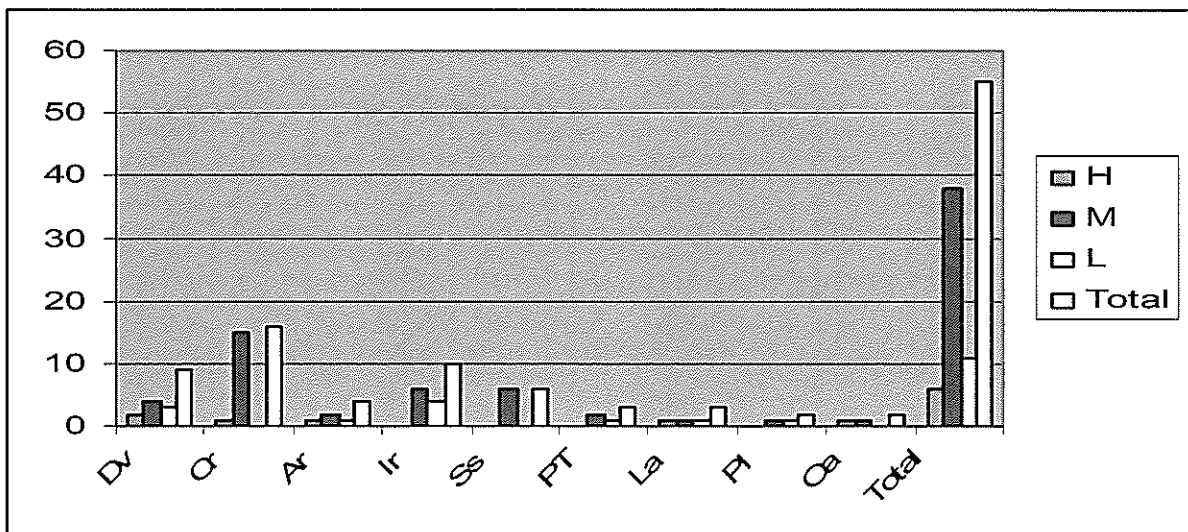
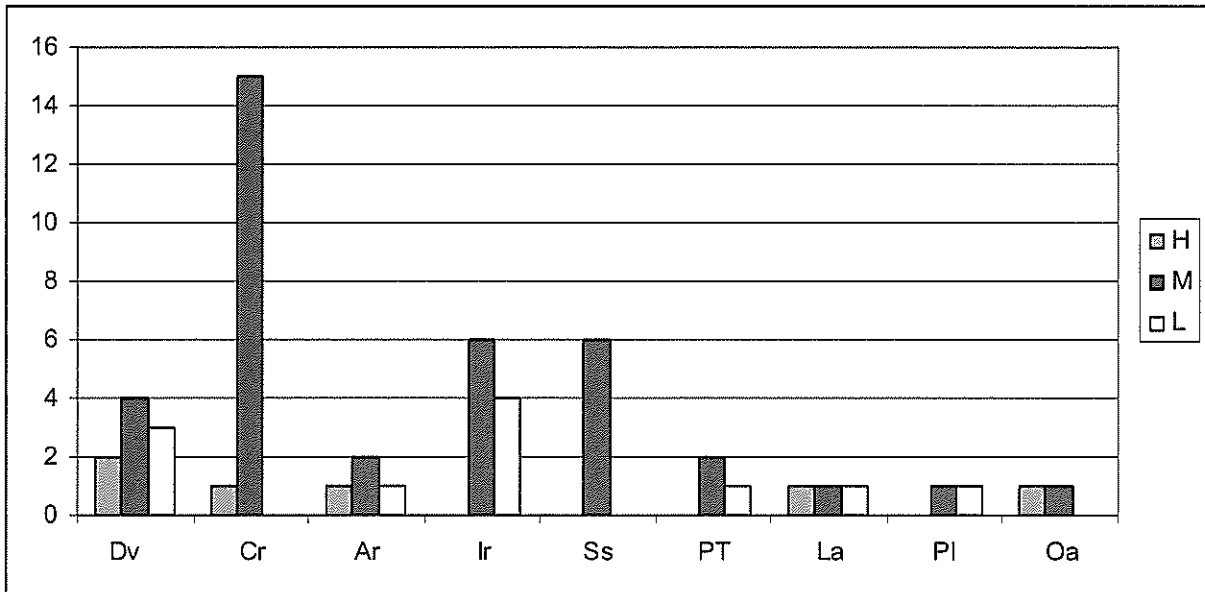
**Chart 2 : Frequency of degree of stakeholders exposure to stated causes of building failure**



**Table 2 : Frequency of degree of stakeholders exposure to stated causes of building failure**

	Dv	Cr	Ar	lr	Ss	PT	La	PI	Oa	Total	%
<b>H</b>	2	1	1	0	0	0	1	0	1	<b>6</b>	<b>11</b>
<b>M</b>	4	15	2	6	6	2	1	1	1	<b>38</b>	<b>69</b>
<b>L</b>	3	0	1	4	0	1	1	1	0	<b>11</b>	<b>20</b>
<b>Total</b>	<b>9</b>	<b>16</b>	<b>4</b>	<b>10</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>55</b>	

**Chart 3 : Frequency of degree of stakeholders exposure to stated causes of building failure**



Majority of identified causes of failure are in the **medium range** of frequency of possible occurrence comprising of 69% of the total. Of these, contractor has the highest exposure rate (16), followed by Engineer (10), Developer (9), and supervisor (6). As such, more attention should be placed with these 4 categories of stakeholders to minimize building failure or mishaps on site.



**8. Legislations regulating the various phases along the construction supply chain in relation to causes of failure:**

	Item	Property development supply chain
a	Land conversion	National Land Code , Act 56
b	Planning permission	Town and Country Planning Act,( Act 172)
c	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 & public Cleansing Act, Telecommunication Act, Fire service Act,
d	Procurement	Contract Act 1950
e	Construction	Act 133, UBBL, E/works bylaws, OSHA, CIDB
f	Building delivery	Act 133, UBBL
g	Extension & renovation works	Act 133, UBBL, Act 172, Fire Service Act
h	Periodical Inspection	Act 133, UBBL
i	Demolition	Act 133, OSHA

In

general, the regulations in place other than CIDB Act are sufficient to regulate the construction industry in respect to building failure or work site accident. CIDB Act has no provision to regulate the individual or director of construction company who commit any fraudulent act. From the data recorded so far, most of the mishaps are due to non-compliance of the regulations or negligence by the various stakeholders.

Generally, the regulating authorities have limited resources to inspect every detail and even if this is done, there is no guarantee that mishap cannot happen. The local authorities' technical personnel's are generally not conversant with the design codes and requirement and work specification. In fact, most of their professional staff are not registered with the regulatory boards. The primary function of these regulatory staff is to ensure compliance with procedures and

policies of government. In fact, the government trend now is shifting towards self-regulation whereby bigger burden will be imposed upon the professional consultant to carry the accountability and responsibility since the Street, Drainage and Building Act as the main Act governing the construction works and the Interpretation Act, Act 388 provides indemnity to the government bodies and its officers against any liability thereof.

## **9. Responsibility and accountability of stakeholders**

In view of the higher expectation of the professionals on works' quality and compliance arises from the series of self-regulating mechanisms introduced such as the CCC where Ar. or Ir. have been given the authority to issue CCC which was formerly the sole authority of local authority, all stakeholders especially the professionals must adhere to a level of professionalism to gain public confidence on the safety and health aspect of the construction industry.

There must be a consolidated effort among stakeholders to reduce the frequency of mishaps in the construction industry in order to restore the confidence of the public locally and abroad. The Straits Times editorial headlines on the 4<sup>th</sup> June 2009 "The Collapse of professionalism" calling professionals in the Building industry to step up and act on any failure in carrying their duties with due care and diligence in accordance with the laws and ethics that govern their professionals is a wake-up call to stakeholders to take measures to improve the situation. With the liberalization of service sectors within the ASEAN region particularly for the professionals by 2015, there is a more urgent need

to improve the professionalism of our local professionals if we are to face the competition from the regional players amongst the 580 million strong ASEAN communities. Meanwhile, it is also important to prevent sub-standard professionals from fellow ASEAN community to practice in Malaysia where public safety is of paramount concern.

## **10. Strategic plan to minimize/mitigate failure of building**

In view of the sizable number of identified possible causes of failures and mishaps in the construction industry based on statistical record, the Working Group had decided to focus on the causes with higher frequency and higher tendency as priority area while the others to be placed on long term goal.

Changes and improvements to the current acts, laws and guidelines by the Government are recommended with the assistance and participation of the stakeholders in the construction industry. The key areas where changes and improvements are to be made.

The strategic plan covers the 7 sections:

- a) General awareness of construction/building safety
- b) Strengthening role of regulating authority especially Local Authority
- c) Ensuring quality and independence of Engineers

- d) Upgrading competency of supervisors / COW
- e) Review Code of ethic of professionals
- f) Clearer delineation of responsibility of certain 'structure' drawing by architect and engineer
- g) Enhance accountability of contractor

### **10.1 General awareness of construction/building safety**

Since many of the causes of construction failure can be traced back to non-professionals' stakeholders such as owners, developers, Land officers, planners, occupiers and even financiers, it is therefore important that these non-professional stakeholders are fully aware of the prevailing regulations in place and understand the risk associated with construction works. With this in place, Land Officer will be careful before approving land conversion for site with adverse geotechnical conditions, ex-dump site or sensitive ground. Private projects will have to seek professional input before putting up structure even if it is of minor in nature such as small bridges etc. Extension works to existing building especially houses should seek engineer's input.

**The WG recommends the following general awareness action plan:**

- a. Publicity through circulation of pamphlets on risk of building failure
- b. make available easy access to professional associations CSR (Corporate Social Responsibility) service counter as practiced in Hong Kong to provide technical advice.

### **10.2 Strengthening role of regulating authority especially the Local Authority**

Since several projects failures are traced to incompetency of engineers as submitting persons due to insufficient experience on specific field, local government should insist on checking by Accredited Checker as provided in the Street, Drainage and Building Act, Act 133 for certain categories of building based on height, complexity and geotechnical setting. Act 133 should be amended to strengthen on this requirement as the current provision is only limited to project during the course of construction and much discretion is left to the local authority. Meanwhile, the Local Authority engineers should be trained and updated with the latest technology since they are the ones receiving and endorsing the consulting engineers design drawings. The Authorities shall exercise the power entrusted to them effectively.

**WG recommends the following:**

- a) All Government (Federal or State) projects especially those designed and supervised by Consultants shall be submitted to the local authorities in the interest of public safety and accountability in particular those design by Consultants

- b) To amend the Street, Drainage and Building Act, Act 133 and UBBL;
  - i) Prescribed the minimum duties of Project Owners or Developers as they sit at the apex of the project organization chart.
  - ii) Prescribed the minimum duties of the Qualified Person, Site Supervision Staff and the Contractors.
  - iii) Prescribed the minimum requirements for Site Supervision Staff in terms of nos. of staff, qualifications and experience in relation to project size and complexity.
  - iv) Make it mandatory to appoint Accredited Checkers base in the size and complexity of the project.
  - v) To support the amendments, develop Codes of Practice for (1) Design of Temporary Works (2) Site Supervision (3) Risk Management & Assessment and (4) Design for Safety.
- c) Local authority engineers to undergo mandatory training courses every 2 years to update them with the new technological practices and code of practices in structural and geotechnical works.

Similarly, JKR being the largest employer of Consultants and acts as the Supervising Officer in many Government Contracts will need to improve their competence.

### **10.3 Ensuring quality and independence of Engineers**

Of the 14,605 professional engineers registered by BEM as of 31.12.2010, about 2,288 are involved in Engineering Consultancy Practices while the rest are involved in various capacities related to engineering practices. The current system of becoming a consultant engineer with a minimum of 4 years of experience upon graduation should be reviewed. Many of these new consultants lack sufficient experience and knowledge of regulations in force on safety aspect of construction.

#### **WG recommended the following:**

- a. Proposed amendment to REA to impose compulsory Professional Competency Examination (PCE) for engineer intending to be the Submitting Person to local authority /authority. (Now awaiting for it to be tabled at Parliament).
- b. Selection of design consultant should be based on QBS (Quality Based Selection) process.

- c. Enforce effectively against anyone who causes the failure of building or earthwork as provided in the Street, Drainage and Building Act. Local authorities to take action under the severest penalty.
- d. Project proponent's responsibility shall be properly defined in the Building Law to require proper selection of consultant among others and contractor who has relevant and similar experience.

#### **10.4 Upgrading competency of supervisors**

Supervisors as the persons supervising directly on the construction works full time should be regulated to make them more accountable apart from just registering them. The level of expertise should be specified according to the size and complexity of the project.

##### **WG recommend the following:**

- a. Amend the CIDB Act to allow for penalty for Main Contractor's licensed Builder (or Project Manager) and or Consultant's Resident Site Supervisor/s who are found guilty of an offence arising out of failure of buildings.
- b. To specify in all local 'Standard form of Contract' on the number and level of qualification of the resident site supervisors needed to act for the consultants.
- c. 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)
- d. 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.

#### **10.5 Review Code of ethic of professionals**

Professional should act for public interest and not in collusion with developer for individual interest at the expense of the public. Developer as the pay master do sometimes exert influence over the professionals to act unprofessionally as happened in some housing projects such as over-certification for progress payment of certifying beyond their authority.

**WG recommended the following:**

BEM to review their procedure of Disciplinary Action against defaulting engineers including guidelines and regulations in a more effective manner

**10.6 Clearer delineation of responsibility of certain 'structure' drawing by architect and engineer**

The joint circular between BEM and BAM on the rights to submit Building Plan should be reviewed as per " appendix C " (common list jointly issued by LJM and LAM. ) contain few structures with structural elements. Structural element is well defined in the Street, Drainage and Building Act ie " ***structural elements means those parts or elements of a building which resist forces and moments and includes foundations, beams, columns, shear cores, slab, roof trusses, staircases, load bearing walls and all other elements designed to resist forces and moments but excludes doors, windows and non-load bearing walls***". There were cases where both architect and engineer denied responsibility in the event of failure of roof trusses as in the case of Monatech Kulim project.

**WG recommended the following:**

- a) a declaration from both the boards that any drawing submitted to the local authority with structural element would be the responsibility of any of the submitting person concerned unless the note of ' to engineering details ' is stated by the architect.
- b) The two boards review the 3 appendixes (Joint BEM/LAM Memorandum list) on the authority to submit building plans.

**10.7 Enhance accountability of contractor**

Contractors are licensed by CIDB Act but there is no regulatory power to impose penalty on them in respect of fraud or non-compliance to specification leading to failure of building.

**WG recommended the following:**

- a. 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.
- b. To introduce QBS (Quality Based System) process for the appointment of contractors and the use of 2 envelope systems of to 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.

- c. 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.
- d. all temporary works endorsed by Professional Engineers and submitted to DOSH shall be constructed strictly according to the submitted drawings.

## Summary of recommendations:

ITEM	Recommendation	Authority/ Agency
1	<b>A. <u>General awareness of construction/building safety:</u></b>	
	a. Publicity through circulation of pamphlets on risk of building failure	BEM
	b. make available easy access to professional associations CSR (Corporate Social Responsibility) service counter as practiced in Hong Kong to provide technical advice.	Local Authority/ IEM/ PAM
2	<b>B. <u>Strengthening role of regulating authority especially the Local Authority</u></b>	
	a. All Government (Federal or State) projects especially those designed and supervised by Consultants shall be submitted to the local authorities in the interest of public safety and accountability in particular those design by Consultants	KKR/ KPKT
	<p>b. To amend the Street, Drainage and Building Act, Act 133 and UBBL :</p> <p>i) Prescribed the minimum duties of Project Owners or Developers as they sit at the apex of the project organization chart.</p> <p>ii) Prescribed the minimum duties of the Qualified Person, Site Supervision Staff and the Contractors.</p> <p>iii) Prescribed the minimum requirements for Site Supervision Staff in terms of nos. of staff, qualifications and experience in relation to project size and complexity.</p> <p>iv) Make it mandatory to appoint Accredited Checkers base in the size and complexity of the project.</p> <p>v) To support the amendments, develop Codes of Practice for (1) Design of Temporary Works (2) Site Supervision (3) Risk Management &amp; Assessment and (4) Design for Safety.</p>	KPKT
	<p>c. Local authority engineers to undergo mandatory training courses every 2 years to update them with the new technological practices and code of practices in structural and geotechnical works.</p> <p>Similarly, JKR being the largest employer of Consultants and</p>	KPKT /JKR



	acts as the Supervising Officer in many Government Contracts will need to improve their competence	
3	<b><u>Ensuring quality and independence of Engineers</u></b>	
	a. Propose amendment to REA to impose compulsory Professional Competency Examination (PCE) for engineer intending to be the Submitting Person to local authority /authority. (Now awaiting for it to be tabled at Parliament).	BEM/ KKR
	b. Selection of design consultant should be based on QBS (Quality Based Selection) process.	Kem Kewangan/ JKR
	c. Enforce effectively against anyone who causes the failure of building or earthwork as provided in the Street, Drainage and Building Act. Local authorities to take action under the severest penalty.	Local authority
	d. Project proponent's responsibility shall be properly defined in the Building Law to require proper selection of consultant among others and contractor who has relevant and similar experience.	KPKT
4	<b><u>Upgrading competency of supervisors</u></b>	
	a. Amend the CIDB Act to allow for penalty for Main Contractor's licensed Builder (or Project Manager) and or Consultant's Resident Site Supervisor/s who are found guilty of an offence arising out of failure of buildings.	CIDB
	b. To specify in all local 'Standard form of Contract' on the number and level of qualification of the resident site supervisors needed to act for the consultants.	JKR/PAM/CIDB
	c. 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)	KPKT
	d. 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.	CIDB
5	<b><u>Review Code of ethic of professionals</u></b>	
	a. BEM to review their procedure of Disciplinary Action	BEM

	against defaulting engineers including guidelines and regulations in a more effective manner	
6	<b>Clearer delineation of responsibility of certain 'structure' drawing by architect and engineer</b>	
	a. a declaration from both the boards that any drawing submitted to the local authority with structural element would be the responsibility of any of the submitting person concerned unless the note of ' to engineering details ' is stated by the architect.	BEM/ LAM
	b. The two boards review the 3 appendixes (Joint BEM/LAM Memorandum list) on the authority to submit building plans.	BEM/ LAM
7	<b><u>Enhance accountability of contractor</u></b>	
	a. 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.	CIDB
	b. To introduce QBS (Quality Based System) process for the appointment of contractors and the use of 2 envelope systems of to 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.	Treasury/ CIDB
	c. 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.	CIDB/ DOSH
	d. all temporary works endorsed by Professional Engineers and submitted to DOSH shall be constructed strictly according to the submitted drawings.	DOSH

## 11. Action Plan

Taking cognizance of the various prevailing policies, legislations, guidelines and individual agency's action plans (Appendix C), the above recommendations would require consensus and engagement from all stakeholders to ensure its success in the implementation stage. Feedback from the construction industry

practicing on the ground level is equally important to gauge the effectiveness of the proposed recommendation.

## **12. Conclusion**

The local construction industry fraternity is recovering from the bad publicity due to the recent spate of building failures that are of equal concern to the public and government in particular. There is therefore an urgent call to beef up professional standing of our stakeholders in order to regain the confidence of the public and potential customers. Changes and improvements to the current Acts, laws and guidelines by the Government are recommended.

In the light of imminent liberalization of service sector by 2015 and beyond, it is even more urgent to improve the professional standing of local stakeholders responsible for the safety of the local property development. The action plan recommended by the Working Group is only a general framework for which further detail works are required if it is approved by the higher authority.

***Working Group  
Stakeholder Responsibility and Accountability  
in the Construction Industry.  
12<sup>th</sup> August 2014***

## Matrix of Responsibility and accountability of stakeholders in construction industry

### Index of causes

1. Development project inception stage:
  - 1a) *Project proponent carrying out structure work without professional input within local authority areas or outside local authority area.*
  - 1b) *Short and unreasonable time line to complete complex structures*
2. Land conversion stage
  - 2a) *Land office approving development application without considering the geo-hazard in the particular areas especially farming activities at hill slope area*
3. Planning approval stage
  - 3a) *Approving plan with intended structures on unstable ground /hazard area*
  - 3b) *Approving build environment on flood prone plain*
4. Building Plan approval stage
  - 4a) *Architect submitting building plan with structure elements*
  - 4b) *Incompetency of design engineer*
  - 4c) *Insufficient soil investigation for geotechnical related work*
5. Procurement process stage
  - 5a) *Incompetent and inexperienced contractor*
6. Construction stage
  - 6a) *Incompetent site supervisor*
  - 6b) *Insufficient site supervisors (SS)*
  - 6c) *Temporary works overseen by incompetent contractor/supervisor or without engineer's input for works involving structural input*
  - 6d) *Removal of consultants' scope of service for construction stage*
  - 6e) *Contractor fraudulent act resulting in inferior product/ unsafe construction*
  - 6f) *Inferior building materials used*
  - 6g) *Incompetent or inexperienced tradesmen engaged on site*
  - 6h) *Lack of safety measures on site*
7. Building Delivery ( CCC/CFO) stage
  - 7a) *Certifying without checking / visiting the project*
  - 7b) *Contractor/site manager not regulated in respect of building failure*
8. Extension and renovation works
  - 8a) *Performing extension or renovation works without checking on design's capacity of structure*
9. Maintenance and management stage
  - 9a) *Incompetent technical personnel handling structural components*
10. Periodical Inspection stage
  - 10a) *Failure by owner to perform periodical inspection of building*
11. Demolition stage
  - 11a) *demolition done by contractor without understanding the structural behaviour of the building structure*
  - 11b) *Demolition contractor submitting standard method statement without understanding the structural behaviour of structure*

### Legend:

Cr : contractor	Pl : Planner
Ir : Engineer	Ar : Architect
Dv : Developer	LA : Local Authority
S : supervisor	PT : Pentadbir Tanah Daerah
Oa : other regulating agency	

**1. Stakeholders exposure to stated causes of failure**  
(Ir, Ar, Cr, Pl, PT, Dv, La, Ss, Oa)

Phase of construction	Causes of failure																									
	1a	1b	2a	3a	3b	4a	4b	4c	5a	6a	6b	6c	6d	6e	6f	6g	6h	7a	7b	8a	9a	10a	11a	11b	11c	
1 Project inception	Dv	Dv	PT		Dv																					
2 Land conversion			PT		PT																					
3 Planning permission				Pl La Ar	Pl La	Ar																				
4 Building plan approval						Ir																				
5 Procurement process									Cr Oa																	
6 Construction	Cr	Cr				Ir	Ir			Ir Cr ss	Ir Cr Dv	Cr Ss Ir	Dv Ir	Cr Ss Ir	Cr	Cr Ar Ir Ss	Cr Cs									
7 CFO/CCC																		Ar Ir	Oa							
8 Renovation / Extension																				Dv Cr						
9 M & M																					Dv Cr Ss					
10 Periodical Inspection																						Dv La				
11 Demolition																								Dv Cr	Cr Ir	

**Total :**

Dv : 9  
Cr : 16  
Ss : 6  
La : 2  
Oa : 2

Ar : 4  
Ir : 10  
PT : 3  
PI : 2

2. Frequency of degree of exposure to stated causes of building failure (H, M, L)

	Phase of construction	Causes of failure																								
		1a	1b	2a	3a	3b	4a	4b	4c	5a	6a	6b	6c	6d	6e	6f	6g	6h	7a	7b	8a	9a	10a	11a	11b	11c
1	Project inception	L	M	M		L																				
2	Land conversion			M		L																				
3	Planning permission				M	L																				
4	Building plan approval						H	L	M																	
5	Procurement process								M																	
6	Construction	M	M					L		M	M	M	L	M	M	M	M									
7	CFO/CCC																		L	H						
8	Renovation / Extension																	M			H					
9	M & M																					M				
10	Periodical Inspection																									H
11	Demolition																	M							M	M

Summary of degree of frequency of exposure to building failure with respect to stakeholders

	Dv	Cr	Ar	Ir	Ss	PT	La	Pl	Oa	Total
<b>H</b>	2	1	1	0	0	0	1	0	1	<b>6</b>
<b>M</b>	4	15	2	6	6	2	1	1	1	<b>38</b>
<b>L</b>	3	0	1	4	0	1	1	1	0	<b>11</b>
<b>Total</b>	<b>9</b>	<b>16</b>	<b>4</b>	<b>10</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>55</b>

Legend:  
**H** : High frequency of occurrence  
**M** : Medium frequency of occurrence  
**L** : Low frequency of occurrence

**Construction Industry supply chain - stakeholders and laws**  
( In relation to responsibility & accountability for failure/accidence)

Item	Activity	Stakeholders	Prevailing laws & policies	Causes of failure	Past reference cases
1.	Conceptual stage	Developer / owner		a. design / construction without professional input/advice b. house extension	
2.	Planning	a) Planner b) Surveyor	a) TCPA - Act 172, planning guidelines	a. at ex-dump site b. on unstable surrounding c. at flood prone areas	
3.	Design	a) Architect b) Engineer	a) SDBA - Act 133 b) UBBL	a. Engineers acting beyond his competency b. wrong assumption of parameters c. error in calculation	
4.	Construction	a) Architect b) Engineer c) Supervisor d) Tradesmen e) Contractor f) Specialist contractor (pattern)	a) SDBA, UBBL, Earthwork BL b) OSHA 1994 –ACT 514 c) Act 139 - Factory & Machinery ( Building operations & works of engineering construction)(safety) regulations 1986.	a. lack of supervision by competent supervisors /no guidelines of categories of supervisors for categories of works b. temporary works by incompetent contractor/supervisors or without engineer's advice c. Installation error by incompetent installers d. contractor using his own design without professional advice / drawing	
5.	CPC/CCC	a) Architect b) Engineer d) Contractor	a) SDBA & UBBL b) Std conditions of contract, PAM forms, JKR, CIDB and FIDIC	a. certifying without checking on site	
6.	Extension / renovation	a) Owner b) Submitting person c) Contractor	a) SDBA & UBBL b) Architect Act c) Registration of Engineers Act	a. performing extension /renovation without referring to details in old drawing b. contractor accepting works without referring to engineers c. no structure plan by engineer d. incremental loading due to renovation/extension over a period of time including drastic	

7.	Maintenance and management	a) Owner/MC b) Facility Manager c) Outsourced M&M company	a) OSHA b) Strata Title Act- Act 318	change of usage of building	a. Incompetent M&M staff repairing structural elements of building b. incompetent M&M staff retrofitting steel waster tank c. sun-shade or sky-root structure installed without engineers input
8.	Periodical Inspection	a) Owner b) Engineer involved	a) SDBA sec 85A		a. no periodical inspection on structure of building as required by SDBA – detect additional loadings
9.	Demolition	a) Contractor b) SP – Engineer/ Architect	a) OSHA 1994-Act 514 b) SDBA – Act 133 c) MS 282: COP for building operation code (part1: demolition)		a. submission of standard method of statement without vetting by engineer b. wrong sequence of demolition – incompetent site agent

**Legends:**

- SDBA – Street, Drainage and Building Act
- TCPA – Town & Country planning Act
- UBBL – Uniform Building By-Laws
- OSHA – Occupational Safety & Health Act



**Construction Industry supply chain - stakeholders and laws  
( In relation to responsibility & accountability for failure)**

Item	Activity	Stakeholders	Prevailing laws & policies
1	Conceptual stage	Developer / owner	
2	Planning	a) Planner b) surveyor	a) TCPA - Act 172, planning guidelines
3	Design	a) architect b) engineer	a) SDBA - Act 133 b) UBBL
4	Construction	a) Architect b) Engineer c) supervisor d) tradesmen e) contractor f) specialist g) contractor ( pattern)	a) SDBA, UBBL, Earthwork BL b) OSHA 1994 –ACT 514 c) Act 139 - Factory & Machinery (Building operations & works of engineering construction)(safety) regulations 1986.
5	CPC/CCC	a) architect b) engineer d) tradesmen d) contractor	a) SDBA & UBBL b) Std conditions of contract, PAM forms, JKR, CIDB and FIDIC
6	Extension / renovation	a) owner b) submitting person c) contractor	a) SDBA & UBBL b) Architect Act c) Registration of Engineers Act
7	Maintenance and management	a) owner/MC b) facility manager c) outsourced m&m company	a) OSHA b) Strata Title Act- Act 318
8	Periodical Inspection	a) Owner b) engineer involved	a) SDBA sec 85A
9	Demolition	a) contractor b) SP – engineer/ architect	a) OSHA 1994-Act 514 b) SDBA – Act 133 c) MS 282: COP for building operation code ( part1: demolition)

## Legends:

- SDBA – Street, Drainage and Building Act
- TCPA – Town & Country planning Act
- UBBL – Uniform Building By-Laws
- OSHA – Occupational Safety & Health Act