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POSITION PAPER ON SAFETY AGAINST FIRE IN BUILDING

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CONTENTS

EXECUTIVE SUMMARY

1. INTRODUCTION

- 1.1 The Issues
- 1.2 Objectives
- 1.3 Scope of Task Force
- 1.4 Members of Task Force

2. BACKGROUND

- 2.1 Record of Fires
- 2.2 Analysis of Data

3. REVIEW OF LAWS AND REGULATIONS

- 3.1 Existing By-Laws and Regulations
- 3.2 New/Revised/Amended By-Laws and Regulations

4. PREVAILING PROBLEMS

- 4.1 Infrastructure of water provision
- 4.2 Maintenance
- 4.3 Renovations and/or Change of Use
- 4.4 Conflicts with Security Requirements
- 4.5 Inadequate Knowledge / Knowledge Deficiency

5.0 RECOMMENDATION

- 5.1 Education
 - Public (Layman) awareness, starting at school level
 - Continuous Professional Development
- 5.2 Enforcement
- 5.3 Publicity & Knowledge Sharing
 - Publication of cases
 - Data collection centre open for public reference
 - Forensic studies and education
- 5.4 Research
- 5.5 Insurance

Appendices

- A Task Force Members
- B Analysis of fire statistics from FRDM's "Perangkaan Kebakaran & Khidmat Khas Di Seluruh Malaysia Tahun 1990 – 2002"

EXECUTIVE SUMMARY

This paper examines both the macro and micro issues relating to safety against fire in buildings. Issues reviewed cover the regulations in place; the role played by the owners and professionals; the capability of the installers and operators; right down to the part played by the end-users and the level of awareness of the general public.

The following recommendations were arrived at by The Institution of Engineers, Malaysia (IEM) after detailed deliberations and discussions with the relevant parties, culminating in a formal forum with IEM members:-

The existing regulations, policies and guidelines, though having served us well, need to be reviewed and updated to keep up with global developments and also to obviate inconsistent interpretations. In particular, the Uniform Building By-Laws (UBBL 1984) need to be revamped in the area of categorization of buildings and occupancy types; clearly stipulate the acceptance of performance-based approach as well as review and extend the list of liable submitting persons in the light of the involvement of third party Fire Engineering specialists. The responsibility and liability of installers need to be incorporated too. As an alternative, perhaps it may be more prudent for the Fire & Rescue Department Malaysia (FRDM) to consider enlisting the assistance of the industry players to accelerate the production and publication of a Fire Regulations Requirement (as had been successfully achieved previously with the publication of the “Guide to Fire Protection in Malaysia”), rather than continue to wait for the revision to the UBBL 1984 which does not seem forthcoming in the near future.

In the area of public awareness and education on the risks of fires, compulsory modules and practical demonstrations of fire fighting and prevention should be considered at school level. Such a curriculum could next be extended to the newly introduced mandatory National Service programme. In terms of financing, a smart partnership with the General Insurance Association of Malaysia (acronym PIAM) could and ought to be considered; after all a ‘Zero Fire’ policy translates to 100% profit for the insurers. At the professional designers’ level, the insurers could be roped in to provide a compulsory module as part of the Continuous Professional Development (CPD) syllabus, commencing with the Architects and extending to the Engineers (albeit when the Board of Engineers, Malaysia makes CPD compulsory). There is also need for some of the insurer’s onerous and outdated technical requirements to be deliberated (and where necessary, amended) for meaningful application.

The need to classify Fire as a specialist discipline should be pursued with the relevant professional regulatory bodies. Alternatively, the FRDM may consider exercising administrative registration control of such professionals with the assistance of relevant professional bodies by using corporate membership in specialist organisations as a way of bench-marking the relevant experience gained in order to practise.

Whilst our fire regulations, designs and installations are comparable with world-class standards, the same cannot be said of our maintenance and sustenance of such

installations. A concerted effort needs to be formulated to upgrade this area of weakness. FRDM is encouraged to work closely with the industry and in particular with the Malaysian Fire Protection Association (MFPA) and the Construction Industry Development Board (CIDB), to conduct the appropriate and compulsory training courses for proper maintenance of fire installations. A FRDM registration of qualified maintenance contractors will serve to upgrade the standard in the industry. MFPA (and others) can assist to benchmark the standard of maintenance and work with government agencies (starting with government buildings) to allow for fair maintenance charges to attain such a minimum standard. The insurers can also play their part by giving insurance incentives for the use of such registered maintenance contractors. The industry should also need to convince the insurers to acknowledge the value of Fire Certificates and provide equitable insurance incentives as such.

The FRDM is also urged to review and simplify their licensing and enforcement divisions for consistent and transparent standards. Such professionalism will help gain public trust and appreciation as well as eliminate wastage of national resources. This will also serve to advance the ultimate goal that fire safety is 'our joint' responsibility rather than that of the Fire Authority alone.

Non-residential buildings are generally adequately protected as long as the issue of proper maintenance is addressed. The fire statistics attest to this statement as it clearly shows the majority of fires (over 42 %) affect residential dwellings. A more comprehensive forensic data gathering of all fires needs to be implemented for research purposes to identify and eliminate or at least reduce the prevalent cause of such fires. Local research should be encouraged to improve safety against fires as well as balance the need for over provision of requirements. Some of the issues that have been proposed to be studied are;

- Residential Sprinkler System to Malaysian Standard
- District Sprinkler System
- Non combustible material for Electrical Distribution Boards
- Internal Hydrants in lieu of Wet Risers and Hose Reels
- Accelerate the use of 6 kg (and below) portable Dry Powder extinguishers

The industry further suggests that the FRDM consider the initiative of carrying out joint post-incident fire investigations with fire consultancy practices so that consultants can see where building protection has failed and where it has worked and thus gain a better understanding of how their designs may perform in a fire.

IEM strongly recommends that the above policies and procedures be implemented by the Government as soon as possible to improve and enhance the fire safety of our buildings.

1. INTRODUCTION

1.1 The Issues

- Fire, anywhere, will always be a major cause of damage to property, injury and loss of life. Fire, accompanied with smoke within enclosed places such as buildings of any type, will pose even greater threats. Fighting a fire in order to save property and life is rather belated and ineffective whatever the facilities that are available.
- Thus the most appropriate solution against risk of fire is to adopt adequate safety measures incorporating prevention, early detection and control means if fire does occur.
- All buildings should be designed and provided with the appropriate level of safety measures in accordance with engineering and legislative requirements and thereafter be continuously maintained. Prevention should include proper design and installation of systems to mitigate against all potential causes of fire.
- It is noted that in Malaysia the occurrence of fire in buildings is still relatively high, whether reported in official statistics or from daily reports of such fires in the news media. This must and can be minimized through greater awareness and appropriate action plans.

1.2 Objectives

- To draw up policy and guidelines for the consideration and acceptance by the Government.
- To ensure developers, consultants, contractors and building owners comply with good engineering practices in design, construction and maintenance of buildings with their attendant facilities and services.
- To ensure compliance with legislations and enable easy and effective enforcement and monitoring by the regulating agencies and authorities.

1.3 Scope of Task Force

- To examine existing local legislations and suggest review, where appropriate.
- To examine existing engineering practices on building and facilities design.
- To examine existing building maintenance and operational practices.
- To compare with overseas examples and practices, where available.

1.4 Members of Task Force

- A committee was set up by the Institution of Engineers, Malaysia (IEM) headed by Ir. Chen Thiam Leong and comprising members from the Fire and Rescue Department Malaysia (FRDM), Pertubuhan Akitek Malaysia (PAM), Malaysia Fire Protection Association (MFPA), General Insurance Association of Malaysia (PIAM), volunteer fire organization and engineers in private practice to formulate the position paper. Invitations were also extended to the Energy Commission and

universities. The list of members of the task force can be viewed in the attached Appendix.

2. BACKGROUND

2.1 Record of Fires

Statistics and Data of fires were obtained from:-

The Fire and Rescue Department Malaysia, entitled “Perangkaan Kebakaran & Khidmat Khas Di Seluruh Malaysia Tahun 1990 – 2002”

2.2 Analysis of Data

The overall statistics show that annually, there are on the average over 2,000 fire incidents involving buildings for the past 13 years (1990 to 2002) except for year 1998 with 3,011 incidents. The following interpretations may be derived from this trend:

- The exceptionally high fire incidents in year 1998 which was immediately after the Asia Financial Crisis of 1997 could possibly be partly contributed by moral hazards. This sharp peak should hence not be taken into consideration in the evaluation of the trend as it is impossible to regulate or control moral hazards.
- Both the graphs in linear scale and absolute terms show an upward trend over the 13 years period. However, if the graph is analysed based on the percentage of buildings with fire incidents during the said period, it would have reflected a downward trend. This is because during the same period the number of buildings erected had grown many folds. Unfortunately, such comparative actual figures are not available. It should also be noted that the country’s annual GDP grew substantially over the same period.

The various fire incidents have been categorized into 15 building types or occupancies, namely:

- a - Residential units
- b - Others
- c - Shops
- d - Factory
- e - Store (small scale storage)
- f - Squatters (Setinggan)
- g - Office
- h - School/Institution
- i - Workshop
- j - Amusement parks like disco, pubs
- k - Restaurants

- l - Hospital
- m - Resthouse/hotel
- n - Shopping centres
- o - Warehouse (large scale storage)

Residential fires are far ahead of the rest recording 13,552 out of the total of 32,057 fire incidents over the 13-year period. This equates to 42.3% of the total. The average number of residential fires per year was 1,042.

Residential units can be further categorized into rural and urban units. Generally, rural units are constructed of combustible materials with increased fire risks. Most if not all, residential units do not have fire fighting appliances installed and thus any incipient fire can spread rapidly. It is important to note the monetary value of losses for residential fires is generally low in comparison with other types of occupancies.

Shop houses comprised the 2nd highest category of fire incidents. However, their total is only one third that of residential units. Fire fighting appliances installations for shops are normally limited to portable fire extinguishers. It is not uncommon for shop occupiers to disregard fire safety with prevalent practices of poor housekeeping, overloading of electrical circuits and without any 'No Smoking' policy in place, just to name a few examples.

As for warehouses, active fire protection system installations tend to be inadequate. This is because the goods stored could vary drastically from highly combustibles and high rack storage to low combustibles and low rack storage. Generally, the approval plans of warehouses are submitted on the basis of low combustible storage to obviate the need for active systems notably automatic wet sprinkler installation.

The rest of the categories of buildings generally have more types of fire fighting appliances installed in compliance with the UBBL 1984. These would include portable fire extinguishers, hose reel system, dry or wet riser system, sprinkler system and external hydrants. In general, any fire incident should be easily brought under control with the manual application or automatic activation of the installed fire fighting appliances. Unfortunately, the lack of proper maintenance of these facilities may render them ineffective in the event of a fire. The value of monetary losses (apart from human lives) would be high under such circumstances.

3. REVIEW OF LAWS AND REGULATIONS

3.1 Existing By-Laws and Regulations

3.1.1 Uniform Building By-Laws, 1984 (reference is also made to the Sarawak Building Ordinance 1994)

The existing by-laws governing fire safety in buildings are the Uniform Building By-Laws, 1984 under the Street, Drainage and Building Act, 1974. The various requirements in the design and construction of buildings are prescribed in nine parts as follows:

- a) Part I: Preliminary
- b) Part II: Submission of plans for approval
- c) Part III: Space, light and ventilation
- d) Part IV: Temporary works in connection with Building Operations
- e) Part V: Structural requirements
- f) Part VI: Constructional requirements
- g) Part VII: Fire Requirements
- h) Part VIII: Fire Alarm, Fire Detection, Fire Extinguishment and Fire Fighting Access
- i) Part IX: Miscellaneous

In addition, there are also a total of ten schedules listing the details of design requirements. However, only the following schedules relate to fire safety:

- a) Fifth Schedule: Designation of Purpose Group
- b) Seventh Schedule: Maximum Travel Distances
- c) Eight Schedule: Classification of Flame Spread
- d) Ninth Schedule: Limits of Compartmentation
- e) Tenth Schedule: Requirements for Fire Fighting Systems

Together with Parts VII and VIII, these schedules determine all essential aspects of fire safety systems in buildings. Along with the codes and standards referred to in the By-Laws, the standard of fire safety in this country is comparable to that of any developed nation and is thus deemed adequate to ensure public life safety.

In terms of electrical installations relating to fire safety, the following specific By-Laws are applicable:

- a) By-Law 39 specifies the requirements for natural lighting and ventilation.
- b) By-Law 154 specifies the requirements for emergency mode of operation in the event of mains power failure.
- c) By-Law 155 specifies the requirements for fire mode of operation.
- d) By-Law 239 specifies the requirements for both fire brigade communication system and public address system.
- e) By-Law 240 specifies the requirements for fireman/electrical isolation switch.
- f) By-Law 253 specifies the requirements for emergency power system for lighting, fire detection and fire fighting system.

However, all these By-Laws and regulations listed above deal only with the design and construction of a building before the Certificate of Fitness for Occupation (CFO) is issued. Once the CFO is issued, the local authority including the FRDM has little power under these sets of laws and regulations to continue to enforce measures to be taken for safety of the occupants.

3.1.2 Fire Services Act, 1988

With the appreciation of the importance of proper usage and maintenance of approved premises so as to ensure continuous fire safety, the Fire Services Act was enacted in 1988. There are eight parts to this Act, namely:

- a) Part I: Administration
- b) Part II: Abatement of Fire Hazard
- c) Part III: Water and Fire Hydrants
- d) Part IV: Fire Certificates
- e) Part V: Enforcement
- f) Part VI: Enquiries into Fires

g) Part VII: Welfare Fund

h) Part VIII: Miscellaneous

Of the eight parts, the section with the most impact to building owners and managers are Parts II, IV and V. Under Part IV, a building once classified as a designated premise will be required to obtain a Fire Certificate for it to be occupied. This Fire Certificate is issued by the FRDM and shall be renewed annually upon inspection by the Fire Authority to verify that the building is safe from fire hazards.

With this Act in place, the FRDM will be able to monitor and control the way the buildings are managed and operated and most important of all, ensure that fire safety equipment do not fall into a state of disrepair as has happened so often in the past.

A follow up regulation was introduced in 2001 under the Fire Services (Fire Certificate) Regulations 2001 to clearly spell out the responsibility and liability of owners of designated premises. Following an extensive nation wide road show, this regulation came into effect on 1st August 2002. However, the effectiveness of this regulation and the intended improvement to the affected premises can only be measured or collated over the next few years.

3.2 New/Revised/Amended By-laws and Regulations

Presently, there are sufficient Acts in place for the purpose of ensuring fire safety in buildings. The regulations for fire safety in the design and construction of buildings are adequate and present enforcement by the FRDM already ensures that buildings are properly designed and constructed for fire safety.

However, once the building is issued with Certificate of Fitness for Occupation, a different situation occurs. Fire safety equipments are seldom properly maintained or tested and have been known to fail to operate in the event of fire. This notorious maintenance culture of the Malaysian society must be addressed and it is hoped that the Fire Certificate regulations will be effectively enforced to achieve its objectives. The assistance of related industry players is vital to realize this goal. These industry players include the designers (engineers and architects), the installers (contractors and vendors), the servicing and maintenance contractors, the operators, the insurance industry and the owners.

The next set of challenge to the industry is the advent of Fire Engineering – Performance Based Designs. International Standards on this subject are being developed and finalized (emanating from various existing guidelines) as the design aspects represent a dynamic and constantly evolving process. Although Malaysia is already well exposed to Performance Based Designs with a number of buildings

approved based on such principles, the inadequacy of local experts needs to be addressed by the Fire Engineering fraternity.

An oft-asked question is the sustainability of premises approved on performance-based designs which render them inflexible for alterations. With the acknowledgement of the poor maintenance culture locally, such tendency of premises being inadvertently converted into fire hazards are very real. The need to address such default at annual Fire Certificate application stage must be well understood and properly enforced with the support and backing of the entire fire industry. As an example, there should be a concerted effort by the authorities to work with the insurance industry to provide incentives such as further reduction in insurance premiums for buildings with Fire Certificates.

The insurance industry should be urged to work closely with the fire authority and industry to review their onerous and outdated technical requirements. Any technical requirement should be consistent with local practice, By-Laws and national policies. Hence, technical requirements stipulated by the international insurance body should be reviewed and 'localised' for meaningful application.

4. PREVAILING PROBLEMS

4.1 Infrastructure of water provision

External public hydrants are normally connected to the infrastructural domestic water piping reticulation. At the onset of design, water supply pressures would be confirmed by the relevant Water Works Authority for the particular development be it a building/housing project or scheme. The water supply pressures are normally conservative and adequate for the proposed scheme once approval is obtained.

However, problems do arise after issuance of the Certificate of Fitness for Occupation (CFO). Improper use of public hydrants inevitably results in the following scenario:

a) Low water pressure

Low water pressure in hydrants should theoretically not arise as designers have allowed for adequate pressure following approval from the relevant Water Works Authority.

Low water pressure may be attributed to leaking water mains but more often than not it is due to water pilferage including illegal tap-off from the water mains. Water pilferage is unfortunately quite rampant be it under the residential, commercial or industrial categories. Residential water pilferage tends to be prevalent in illegal squatter settlements and old housing schemes which have been overtaken by surrounding developments. Commercial water pilferage can

be found in make-shift hawker centres. Industrial water pilferage is more often due to either blatant water thefts or development taking place ahead of infrastructure planning.

Leaking pipework is another cause for low water pressure at the hydrants. However, compared with water pilferage, this problem can be easily detected and rectified.

b) Missing Hydrants

During fire emergency, locating underground hydrants is far more difficult than locating aboveground ones. Underground hydrants are subject to damage as a result of ground condition and soil settlement. Due to improper installation or non-coordinated road resurfacing, underground hydrants end up being buried and become extremely difficult to locate during emergency.

c) Disabled Hydrants

Very often, hydrants are rendered inoperable due to problems associated with sluice valves which are subject to failure (corrosion/rust and failure of gaskets/seals), manufacturing defects (poor quality) and damage due to ground condition. It is rather common to find sluice valves that cannot be closed water tight.

d) Abused Hydrants

Abused hydrants are not uncommon, especially those located within or adjacent car parking bays. Besides that, hydrant markers for underground hydrants tend to disappear altogether due to frequent damage by vehicles.

e) Lack of Testing

In some developments especially single building projects, water connection cannot be effected by the Water Works Authority without the mandatory Letter of Clearance from the fire authority. This Catch 22 situation does not enable proper pressure testing to be carried out. Hence, it is possible that some hydrants may remain non-functional when finally connected. There are also instances of hydrants left unconnected to the water mains as a result of this authority red tape.

f) Lack of Standardization of Components

Due to different manufacturers adopting different design and manufacturing standards, not all hydrant components are compatible with each other. For example, instantaneous coupling that is attached to the hydrant outlet may not

accommodate the male coupling of hydrant hose used by the FRDM. This will certainly pose a major problem during actual fire fighting.

g) Lack of Maintenance

Hydrants require regular inspection and maintenance as they are subject to physical damage, corrosion and changes in water supply condition. Generally, maintenance of hydrants is lacking. The attempt to transfer such responsibility to local residents and corporations by Local Town Councils under the Hydrant Adoption Scheme has failed miserably. A prudent and sustainable systematic maintenance programme needs to be devised nationwide.

4.2 Maintenance

With reference to FRDM's Statistical Report for all fire incidents in Malaysia from year 1990 to 2002, electrical fires form a large percentage of the total fire incidents in Malaysia. Most of the fires occurred after the buildings are in operation for years and are mainly attributed to poor or non-maintenance.

Electrical installations are tested and certified to be in good working condition following testing and commissioning procedures prior handing over to the building owner. Hence the possibility and incidence of electrical fires in a new building is relatively low. However, the electrical installations will subsequently deteriorate due to wear and tear. Performance and safety of electrical equipment can be maintained if such installations are serviced, repaired and inspected regularly. In essence, well-maintained electrical installations will serve to minimise any likelihood of electrical fires.

Electricity Supply Act 1990, Regulation 110(3) requires an installation other than domestic installation to be checked and tested by a competent person at least once in every five years or at any time as directed by the Director General of Electricity Supply. Regulation 110(4) requires protective relay and device of an installation to be checked, tested and calibrated by a competent person at least once in every two years, or at any time as directed by the Director General of Electricity Supply. On top of that, Regulation 67 requires a minimum of one inspection per month by a competent person for an installation not exceeding 600 Volts. For installation exceeding 600 Volts but not exceeding 11,000 Volts, a minimum of two inspections per month by a competent person is necessary. As for an installation exceeding 11,000 Volts but not exceeding 132,000 Volts, a minimum of four inspections per month by a competent person is required. All these regulations provide the basic guidelines for buildings in Malaysia to maintain and service their electrical installations routinely so as to ensure safe and proper use thereby minimizing incidence of electrical fires.

However, some electrical components are not serviceable and yet play an important role in the overall performance and safety of the electrical system. These include cable insulation and earthing system. The Electricity Supply Act 1990 has no provision mandating routine inspection or testing of cable insulation and earthing system.

Unfortunately, majority of electrical fires in residential dwellings are caused by short-circuiting as the result of poor cable insulation and jointing. Short circuits can be caused by phase-to-phase, phase-to-neutral or phase-to-earth shorting. Poor lightning earth can cause lightning discharge through other medium (instead of via down conductor and earth rod) and can create a significant damage to the building structure. Cables as well as earthing system are deemed non-consumable items and as such are usually not serviced and maintained periodically. As cable insulation and earthing system deteriorate over time, the possibility of electrical fire is increased. There is a dire need to establish a means of checking cable insulation and earthing system to overcome the increasing incidents of residential fires.

The use of combustible type polycarbonate casing to house miniature circuit breaker (MCB) in residential application is known to be a potential source of fire over the years. Such MCB which has replaced the older wooden fuse box, tend to be located in corners with stacked furniture and are normally shielded by curtains in most households. Overloading or short-circuiting will loosen the MCB cable joint over a period of time, and when the cable insulation catches fire the casing burns and drips causing secondary fires. Research need to be undertaken to determine the benefit of replacing with metal casing and/or locating such MCB away from areas likely to encourage accumulation of combustible materials.

4.3 Renovations and/or Change of Use

At the design and construction stage, designers make assumptions based on the design brief stipulated by Clients (usually Developers) who will not have any residual responsibilities over the sold buildings or areas once the completed properties are handed over to the buyers.

Whilst the buildings are designed based on assumptions of types of usage, they are nevertheless governed strictly by the relevant Planning guidelines and Building By-Laws governing the different categories of usage as approved. For example, car parks are treated differently from offices which are in turn treated differently from public access areas like shopping centres and concourses due to the different potential population loadings to be expected as well as the different fire loads that are likely to be encountered. The fire safety systems put in place, covering all aspects of fire safety from escape routes and capacities to compartmentation limits and extent of fire detection and extinguishing systems are tailored to suit accordingly.

Currently, it can be safely said that all new buildings issued with Certificates of Fitness for Occupation are safe and adequately protected from fire. Unfortunately, the same cannot be said of the buildings after the occupants have moved in and started using the building.

Renovation works covering interior decoration, partitioning and alterations are frequently carried out with scant regard for fire safety as a priority. Decorators and renovation contractors are unaware of or pay no attention to preservation of fire safety provisions in the renovated premises. Materials chosen very often increase rather than abate fire risks. Sprinklers and smoke control installations are rendered ineffective, alarm systems disconnected and escape routes diverted, left unprotected or blocked. The end result is invariably the same in all instances, life safety provisions are rendered ineffective or in some instances, the buildings or premises are rendered dangerous.

Changes in use of premises are frequently carried out without second thoughts being given to the effect they have on the fire safety provisions. For example, shop offices converted into tuition centres or entertainment outlets impose very different occupancy loads on the provided escape and active fire safety installations. Because of the increased occupancy loads, extra capacity will have to be added to fire escapes and the level of active fire safety provision will also have to be increased. These are seldom looked into by both the building owner and contractor. Architects and engineers are seldom called upon to offer advice because there is no statutory requirement for the owners or occupiers to do so.

The current enforcement of compliance with statutory By-Laws relating to fire safety in renovation and/or change of use in completed properties is inadequate at best and non-existent in some instances. Conditions on nature of usage imposed at planning and building approval stages are not subsequently imposed at the occupation stage, which makes it a pointless exercise in the first place.

There is some light at the end of the tunnel with the imposition of the Fire Services (Fire Certificate) Regulations 2001. However, without the requirement for owners to engage Architects or Engineers to conduct Fire Safety Audits, and given the lackadaisical attitudes of building owners with respect to life safety, it will succumb to commercial or economic considerations which will invariably place life safety at the bottom of the list of priorities. In addition to that, certain premises like 4-storey shop offices which have been renovated to become entertainment outlets or restaurants do not come under the Fire Services Act due to technicalities on size. The two loopholes cited, may unfortunately defeat the very intention of the regulations. It is also not uncommon for owners to either ignorantly or intentionally remove or compromise the party wall between compartments during renovation and expansion of business.

4.4 Conflicts With Security Requirements

It is quite common for some tenants to install magnetic door locks or key locks at emergency staircases to prevent outsiders from intruding the premises. Whilst such security measures fulfill the requirement of tenants, they conflict with fire protection requirements by disabling unobstructed access for emergency escape during fire.

Tenants are known to install Card Access System using magnetic door lock at the front door permitting only authorized personnel with assigned cards to access the premise. The unfortunate fact is that such a system is usually implemented separately by the tenants after CFO as a stand-alone system, and is not integrated with the overall building fire protection system. When a fire occurs, the Card Access System will continue to operate under its normal mode, trapping those without access cards.

Other areas that tend to be overlooked when implementing security measures include improper cutting of fire rated doors for cable routing and installing of untested lock sets which will render the fire rating of the affected doors to be compromised.

4.5 Inadequate Knowledge / Knowledge Deficiency

4.5.1 Submitting Engineer & Professional Competency

The UBBL 1984 holds the submitting person liable for design and implementation (in this instance) of fire fighting/protection installations. Whilst passive fire protection designs are submitted by architects (except for 'Appendix C'* types of occupancies, where engineers are also permitted to submit), active fire protection designs are submitted by engineers. For the architects, there is no further categorization of their expertise whereas for engineers, the numerous disciplines can and have resulted in engineers in non-related disciplines submitting for fire designs (including such designs undertaken by others but endorsed by them).

The prevailing stand by the Board of Engineers Malaysia (BEM) and the Institution of Engineers Malaysia (IEM) need to be reviewed and tempered (at the very least) without undue influence by its general members. As it currently stands, IEM had in the past issued a circular stating that a Professional Engineer of any discipline may submit plans on fire designs. No doubt BEM's Code of Professional Conduct and Ethics stipulate a Professional Engineer shall not undertake work that he is not competent in, the level of competence claimed can be subjective and open to differing interpretation and abuse.

The Association of Consulting Engineers Malaysia (ACEM) on the other hand, has maintained the right of the FRDM to administratively determine the level of

competence and acceptance of such submissions by engineers of non-relevant disciplines. Rather than leave this subjective issue to be addressed in other even more subjective manners, it is time for BEM to come out with proper guidelines and/or directives, viz;

a) Classify Fire as a specialist discipline that should be practised by the relevant disciplines of

- Mechanical Engineering
- Electrical Engineering (albeit for electrical related design only)
- Civil and Structural Engineering (for passive design elements only)

or

b) Register Fire Engineers as a separate category as well as certifying those of other disciplines fit to practise under this category based on evidence of approved expertise.

5.0 RECOMMENDATION

5.1 Education

A comprehensive and extensive educational programme to inculcate and realize fire prevention measures need to be formulated. Examples of such programmes would include the following;

- a. Fire Safety workshops for children to inculcate the importance of fire safety:
 - From kindergarten to primary school level
 - Introduce the subject of Fire Safety and Fire Prevention in the school syllabus
- b. Introduce the concept of 'One Home One Fireman' by training youths on various fire safety and fire prevention techniques
- c. Organise awareness campaigns such as 'Home Safe Home' to promote zero fire in homes with the help of resident associations, "rukun tetangga" groups and family day gatherings.
- d. Design special safety programmes for senior citizens and the physically challenged community.
- e. Consolidate all volunteer fire fighters (currently numbering around 11,000) for 'train the trainers' programme to thereafter conduct fire safety clinics throughout the country. Tapping this resource will aid the FRDM manpower and finance.
- f. Introduce schemes to prevent forest fires such as the 'Smokey Bear' environmental programme.

- g. Enhance public awareness through regular TV and Radio Talk Shows, Fire Safety Games and Telematches, quiz shows and the like, on issues such as;
 1. E.D.I.T.H. (Escape Drill In The Home)
 2. Installation of smoke detectors in homes
 3. Fire extinguishers and how to use them during fire emergencies
 4. Pre-planned quick escape routes in the event of fire
 5. Installation of keyless window escape grilles
 6. Installation of gas alarm
 7. Installation of electrical shock resistant covers for light switches
 8. Regular safety inspection check list
- h. Promote the setting up of a Disaster Assembly Area in each housing estate and residential high-rise building.
- i. Encourage formation of Emergency Response Teams in residential schemes.
- j. Publish simple graphic messages on Fire Safety in everyday used items such as match boxes, mosquito coil packaging, candle stick packaging, joss stick packaging, cereal packaging, school exercise book covers, comic book covers and the like.

The Board of Architects, Malaysia (BAM) to consider making it compulsory to attend a module on fire safety and fire insurance under their CPD scheme. Likewise, BEM should also accelerate their compulsory CPD scheme for their practitioners with a similar compulsory module.

5.2 Enforcement

5.2.1 Proper Enforcement

The maxim that there are more than adequate laws and regulations in Malaysia but what is lacking is their proper enforcement certainly holds true for the fire industry as well.

The lack of trained enforcement personnel must be addressed as one cannot put a value to a human life, not to mention the accompanying economic losses associated with a fire incident. Fortunately, with the recent setting up of the biggest fire training centre in the region in Trengganu, this issue should be resolved in due time.

5.2.2 Need to Foster Good Public Image & Relationship for Collaboration

Professionalism in the Fire Services industry will help the public (especially building owners) to readily accept the benefit of good practice, installation and operation of fire requirements. Such practice will serve to advance the ultimate goal that fire safety is 'our joint' responsibility rather than that of the Fire Authority or Fire Consultant or even Fire Contractor's responsibility.

It should be emphasized that the Fire Services industry encompasses all the relevant players of the industry from the authority to the professionals and the vendors/contractors. None of these players can yet claim to command total respect from the public with shortcomings ranging from inconsistent application or advice on fire safety requirements (in many instances as the result of lack of sufficient knowledge) to blatant abuse of their position (which includes specifying unnecessary or even unrealistic requirements, cheating on installations and not providing proper maintenance). The need for a proper registration of competent fire contractors and service maintenance contractors is long overdue from the authorities.

5.2.3 Prevent Overzealous Interpretation

The need for uniform and consistent enforcement of laws and regulations relating to fire safety requirements must be addressed with honesty and transparency if we desire to achieve sustainability.

Proper interpretation of the rules which are practical to local culture and work environment as well as taking into account the socio-economic impact to the country is important, as in the long run this will gain the support of the community.

Such examples would include;

- Kitchen hoods located in shop lots and directly exposed to the exterior need not be protected with fixed fire suppression system. Discretionary and inconsistent requirement for such protection along the same neighbourhood tend to result in the public's perception that fire safety requirements are not meant for safety but for other wrong reasons. Clear guidelines for such similar common issues that affect entrepreneurs should be established over the years and made available to the relevant professional bodies, trade organizations and NGOs for transparency in implementation.
- Shop lots with direct egress discharging to external open areas need not be provided with "Keluar" signs above their entrance doors, for example a typical coffee shop facing the main road. Such overzealous directive by fire enforcement officers makes a mockery of fire requirements as in practice the escape route is obvious even without the redundant and money wasting lighted sign.

5.3 Publicity & Knowledge Sharing

5.3.1 Publication of cases

- As a developing country with a maturing populace, there is necessity to use the 'stick and carrot' method to nurture the society to adhere to regulations meant to benefit and protect them when the need arises. Hence, it would be prudent to

publicise cases of owners and premises charged with serious non-compliance of the Fire Regulations to serve as an example and deterrent to other potential offenders.

- Publication of technical details related to fire incidents will serve to help the relevant industry players to review and eliminate or at the least improve on their shortcomings. Such would include designers, manufacturers, installers, operators and owners.

5.3.2 Data Collection Centre open for public reference

- FRDM data collection centres should be structured to permit easy access and encourage the public to utilize their contents. Such access should not be restricted to the industry players alone but also provide for academic researchers and any interest groups.
- Web-site access and updated information be regularly disseminated to the industry players.

5.3.3 Forensic studies and education

- It is noted that the FRDM has embarked on their forensic programme and it is hoped that this timely development will be expanded over the years in line with our advanced needs.
- Results of forensic investigations need to be published and made available to the public for educational and development purposes.
- The FRDM is further encouraged to consider the initiative of carrying out joint post-incident fire investigations with the industry (fire consultants) so that consultants can see where building protection has failed and where it has worked and thus gain a better understanding of how their designs may perform in a fire.

5.4 Research & Development

5.4.1 General

Although our requirements are based on overseas standards and codes, there is a need for us to update our antiquated practices in some instance as well as review the suitability of unmodified applications for certain codes to suit our local environment.

Examples of local R&D needs would include;

- a) Outdated and oversized portable fire extinguishers
 - 9 kg Dry Powder extinguishers are too heavy and bulky to be handled by a normal built and able-bodied Malaysian. Whilst such products have been replaced with 6 kg extinguishers in other countries, we have not only persisted with this impractical product but has even managed to be a leading

producer and exporter of such products to less developed (and similarly naïve) countries.

- Instead of now merely considering catching up with 6 kg extinguishers, we should carry out further R&D to determine perhaps a lighter version to suit our smaller physique.

b) Internal hydrants in lieu of Wet Risers and Hose Reels

- Wet risers are required for buildings exceeding 30.5m height. Except for residential classification, such high-rise buildings inevitably require total sprinkler protection.
- The high pressure and flowrate for such system are so high that they are meant only for use by fire fighting personnel. With spacing of fire fighting lift lobbies limited to 61m horizontal distance (under UBBL 1984), wet riser spacing will also be dictated likewise. Hence, the pressure rating of 75 psi is in practice rather excessive for internal building application.
- At the same time, hose reel flowrate and pressures are rather low and their effectiveness questionable for such sprinklered buildings since complimentary portable extinguishers would suffice.
- R&D to combine the two systems (wet riser and hose reel) into a single internal hydrant system usable by both the occupant and fire personnel should be explored. Such installation (if proven to be workable) will not only be more effective but also more economical.

c) Residential Sprinkler System

- The fire statistics in Malaysia clearly shows residential fires to be many times more prevalent than other building fires. Proposals to introduce self-contained smoke detectors have been put forward and such installations will certainly help to detect fire early and save human lives. However, the statistics also show that incidence of residential fire due to carelessness is rather high (when occupants are not home) and thus fire fighting installation and not merely fire detection system may be more appropriate.
- Automatic wet sprinkler installations have been proven to be the best form of fire fighting and prevention tool so much so that insurance premium reduction of up to 50% are given.
- However, installation of residential sprinklers in strict compliance with established codes are expensive to implement in Malaysia. Perhaps a less stringent code but sufficiently effective residential sprinkler system installation for Malaysia should be researched and developed. Suggestions would include tapping off from a pressurized water mains or hydro-pneumatic pumping system within individual residential units.

d) District Sprinkler System

- Similar to ‘District Air Conditioning Chilled Water System’, ‘District Sprinkler System’ should also be explored for this country to make fire sprinkler system installation compulsory and yet affordable for more applications.

e) Safer Material for Electrical Distribution Boards

- There is need to explore materials which will retain and contain any fire within the casing of electrical distribution boards. Designers and installers also need to review location of such components to reduce fire risk.

5.5 Insurance

5.5.1 Insurance disincentives for defaulters

Building owners, who do not adhere to the requirements or conditions of insurance policies, e.g. change of space usage like turning staircase landing to storage, corridor becoming an office area; locking up of fire escape doors; negligence in maintenance, etc, should be compelled to pay much higher premiums when their insurance policy is due for renewal.

5.5.2 Further insurance incentives

Building owners, who adopt risk management approach and judiciously adhere to the requirements and conditions of insurance, should be encouraged and provided with further insurance incentives. Such incentive should be further enhanced for buildings with Fire Certificates.

5.5.3 Dissemination of incentive schemes of PIAM (Association of Insurers)

PIAM should be encouraged to publicise and distribute their updated incentive schemes regularly to building owners, developers, business operators, property management companies and professionals like architects and engineers through their respective associations and institutions.

This will certainly help to promote the adoption of adequate fire prevention and protection measures for safety against fire.

5.5.4 Consistency of technical requirements of PIAM

Rationale for particular technical requirements of PIAM developed through their own findings in investigations of fire incidents, risk assessment inspections and other experiences should be made transparent through publications and dialogue meetings for the sharing of information with relevant authorities, professional bodies and trade associations. Such technical requirements must be consistent

with national policies such as Ozone Depleting Substances; UBBL 1984 requirements; as well as various standards and codes adopted in this country.

PIAM should take an active role to work with relevant parties like architects, engineers and associations involved in the development and construction of buildings for practical applications and consistency of interpretation in requirements for insurance purposes.

APPENDIX

Members of Task Force

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Ir. Lee Kok Chong	Member
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