THE HONG KONG
POLYTECHNIC UNIVERSITY

13 March 2013 (By Email)

Panel Members
Panel on Food Safety and Environmental Hygiene
Legislative Council
Hong Kong.

Dear Sir,

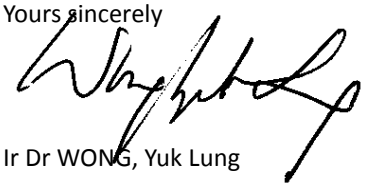
Study Report on Fire Safety and Design of Fixed Pitch Hawker Stalls in Hong Kong

The Fa Yuen Street deadly blaze has aroused public concern on the fire safety of on-street hawker stalls. As fire professionals, we would like to make contribution to the public safety in this area. We have conducted extensive study on this subject and would share the results and our viewpoints through distribution of our report, which is attached herewith.

We would draw your attention that the proposed fire safety requirements of government authorities in the draft specifications of hawker stalls in LegCo Paper is unable to elevate the fire safety standards of hawker stalls to an acceptable and effective level and cannot provide adequate protection to the public from hawker stall fire. We would urge the government authorities to conduct immediate reviews on their requirements and to make necessary revision in this regards. We have made proposed solutions in our report and hope it would help government authorities to re-frame their requirements to achieve high standards in public safety.

To promote the awareness on fire safety, we have also distributed this report to Legislation Council, District Councils, Coroner's Court and public media. If you have any queries or questions, please feel free to contact the undersigned at email address ceylwong@polyu.edu.hk or by mobile .

Yours sincerely



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Study Report

Fire Safety and Design of Fixed Pitch Hawker Stalls in Hong Kong

Report No. ylw201302

Prepared by

Ir Dr Y.L. Wong
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Department of Civil and Environmental Engineering
The Hong Kong Polytechnic University

12 March 2013

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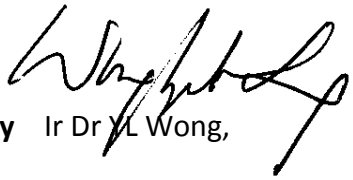

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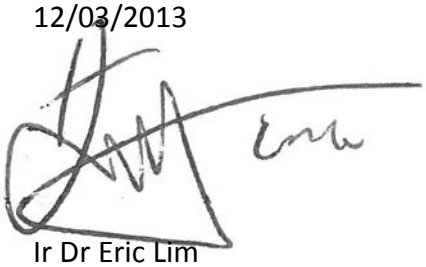

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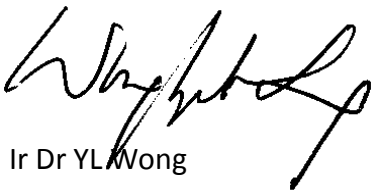

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Study Report

1. Background

1.1 On-Street Shopping Culture in Hong Kong

On-street shopping culture is one of the special features in Hong Kong, which has been extensively developed throughout Hong Kong over several decades and makes significant contributions to the tourism development. It is closely connected to the economy of Hong Kong and supports the living of operators of thousands on-street hawker stalls and their families.

1.2 Fires at On-Street Hawker Stalls

A No. 3 alarm fire broke out at Fa Yuen Street, Kowloon on 6 December 2010 damaged a number of single-storey tin-sheeted and wooden hawker stalls with fire spread to the adjacent buildings. The fire was identified to be arson afterwards. Since then, various improvement measures to increase fire safety of hawker stalls have been formulated. These include the use of fire-resisting materials for constructing the stalls, the provision of proper separation space between hawker stalls and space for passage of fire engines, and the installation of legal electricity supply.

On 30 November 2011, a severe No. 4 alarm fire broke out at Fa Yuen Street again, and caused casualty of 9 death and 34 injured. The fire destroyed 23 hawker stalls on the two sides of the street. It also spread to the units on the ground floor, cockloft and the first floor of the nearby buildings, causing various degrees of fire damages on 7 shop units and 9 residential units. Fire Services Department (FSD) and the Police have investigated the causes of the fire and the reasons causing high injuries/casualty. It is believed that the deadly blaze was caused by electrical fault of an electric wiring which set fire to the insulating materials of electric cable and in turn ignited the combustible canopy. The fire spread to other hawker stalls in few minutes and further spread to the adjacent buildings.

In the wake of fire, the Authorities considered to escalate the controls in addition to the aforementioned improvement measures, such as the possibility of introducing a demerit system for the hawkers who violated the restrictions, dismantling the stalls after trading hours, and disallowing overnight storage of goods at stalls, to increase the fire safety of the stalls.

Figure 1.2.1 – Fa Yuen Street Fire on 30 November 2011 (From Oriental Daily News)

1.3 Study on Fire Safety and Design of Fixed Pitch Hawker Stalls

These two fire incidents drew the attention of board members of Passive Fire Protection Research Centre (PFPRC) which is a non-profit making organization established by a group of engineering professionals/academics to promote the research, development and applications of passive fire protection materials and systems for fire safety of building structures. PFPRC liaised with a research team of the Department of Civil and Environmental Engineering of The Hong Kong Polytechnic University (PolyU) to form a research project of developing an effective and practical passive fire protection system of hawker stall structures to enhance public safety, to minimize the risk of fire, and to take into account of the interests

of the licensees of the hawker stalls. During the period from 18 October to 29 October 2012, the PolyU Research Team led by Ir Dr Y.L. Wong, and members of PFPRC conducted extensive surveys to the hawker stalls at 20 streets in Hong Kong Island, Kowloon, and New Territories. Figures 1.3.1 – 1.3.20 are typical photographs of hawker stalls taken at these hawker permitted areas. The stall operators and hawkers associations were interviewed. Useful information, such as sizes and spacing of stalls, structural forms and construction materials, means of electricity supply, types and quantity of selling goods /products, operation hours, and overnight storage of goods were collected. These findings and details are listed in the following sections and will be adopted as the criteria for the proposed fire safety and design of the hawker stalls.

Figure 1.3.1 – Hawker Stalls at Fa Yuen Street

Figure 1.3.2 – Hawker Stalls at Peel Street

Figure 1.3.3 – Hawker Stalls at Gage Street

Figure 1.3.4 – Hawker Stalls at Graham Stree

Figure 1.3.5 – Hawker Stalls at Tung Tak Avenue

Figure 1.3.6 – Hawker Stalls at Lee Yuen Street West


Figure 1.3.7 – Hawker Stalls at Lee Yuen Street East


Figure 1.3.8 – Hawker Stalls at Pottinger Street


Figure 1.3.9 – Hawker Stalls at Tai Yuen Street

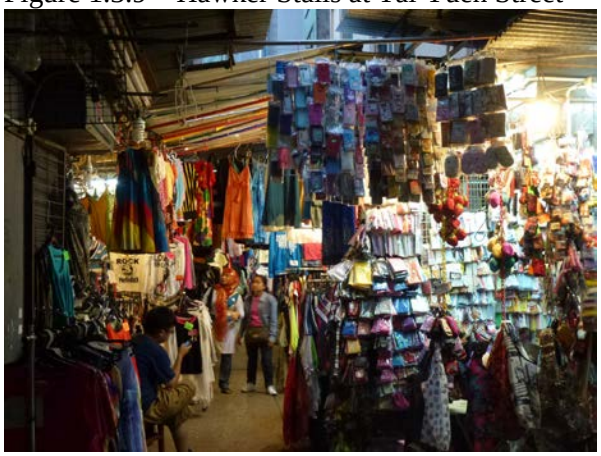


Figure 1.3.10 – Hawker Stalls at Jardine Crescent

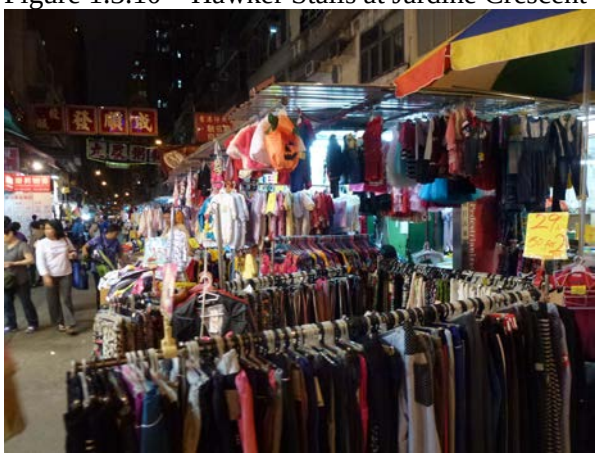


Figure 1.3.11 – Hawker Stalls at Marble Street

Figure 1.3.12 – Hawker Stalls at Ki Lung Street

Figure 1.3.13 – Hawker Stalls at Kwalin Street

Figure 1.3.14 – Hawker Stalls at Pei Ho Street

Figure 1.3.15 – Hawker Stalls at Apliu Street

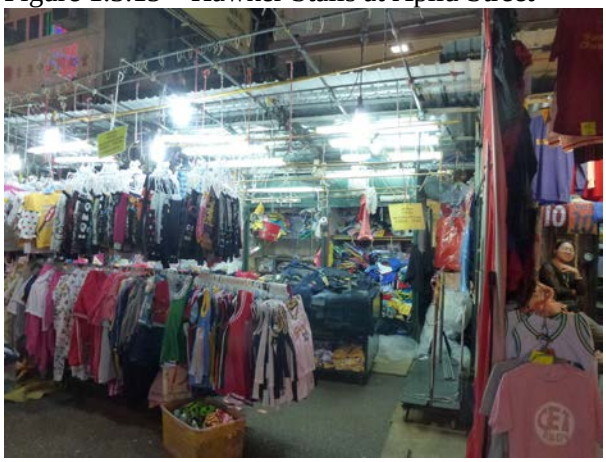


Figure 1.3.16 – Hawker Stalls at Fuk Wah Street

Figure 1.3.17 – Hawker Stall at Tung Choi Street

Figure 1.3.18 – Hawker Stalls at Bowling Street

Figure 1.3.19 – Hawker Stalls at Temple Street

Figure 1.3.20 – Hawker Stalls at Kam Sheung Road

2. Potential Hazards at Hawker Stalls

2.1 Combustible Structure of Hawker Stalls

The hawker stalls are largely made of thin metal sheets, steel angles and posts. Although these construction materials are non-combustible, they cannot provide adequate strength to contain fire. Fire can easily spread out of the stalls to nearby properties. The canopies and the roof of some hawker stalls are made of highly combustible materials which impose additional fire hazard to the stalls. They are blamed to be the medium of fire spread to the adjacent buildings in the Fa Yuen Street Fire. (See Figures 2.1.1 to 2.1.4)

Figure 2.1.1 – Newly Erected Tin-sheeted Structure for Fixed Pitch Hawker Stall

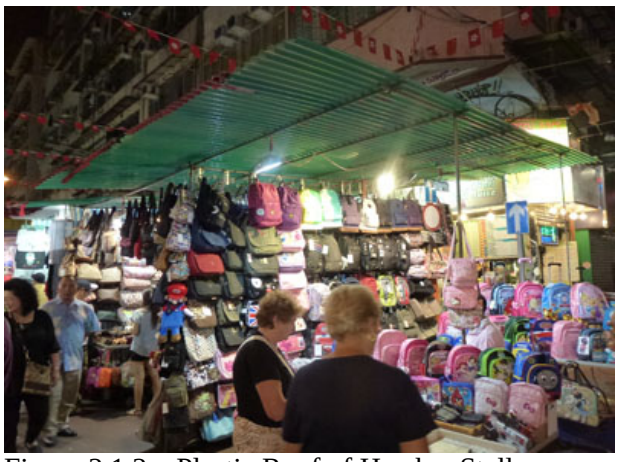


Figure 2.1.2 – Plastic Roof of Hawker Stall

The most critical structures are the dismantable hawker stalls at Temple Street and Tung Choi Street. This type of stalls is required to be dismantling after trading hours and erected again for business next day. They use steel conduits as frame and plastic sheets as weather shelter. Some

Figure 2.1.3 – Combustible Retractable Canopies of Hawker Stall

Figure 2.1.4 – Combustible Sunshade of Hawker Stall

structures are as high as 5 m reaching to 1st floor level of adjacent building. Combustible goods are hung up in height on the steel frame and add loading to the temporary structure. Both the structure and combustible contents are easily ignitable. Fire could easily spread though the hawker permitted area from one stall to another as well as to the adjacent buildings with fire size reaching to above 20 MW. The strength of steel structures drops by about 40 percent when exposed to temperatures exceeding 500^{O}C. Once the stall on fire, the structure will be weakened within 5 to 6 minutes and collapsed. People on the street will be easily trapped inside collapsed structures and will suffer from serious burn. If the fire occurs in rush hours, hundreds of casualties could be encountered on the street, especially when most of the passageways are blocked. Fire will also jeopardize the people escaping from the adjoining buildings and resulting additional casualties. This type of structures brings high fire risk exposure to the public. (See Figures 2.1.5 to 2.1.7)

Figure 2.1.5 – Dismantable Hawker Stalls at Temple Street with Combustible Structures

Figure 2.1.6 – Dismantable Hawker Stalls at Tung Choi Street with Combustible Structures

Figure 2.1.7 – Dismantable Hawker Stalls at Tung Choi Street with Combustible Structures

2.2 Combustibility of Selling Products at Hawker Stalls

Majority of the selling goods are fashion clothings. Others are hand bags, domestic appliances, toys and stationery products, and food. Most of the selling goods are made of cotton, synthetic fibers,

paper and plastic which are highly combustible (See Figures 2.2.1 to 2.2.8). Referring to PD7974-1:2003 Table A.20 of BSI, 1 kg paper or cotton are taken as equivalent to 20 MJ fire load and 1 kg plastic is corresponding to 40 MJ. Once these products on fire, they can generate 5 to 20 MW fire (See estimation in Section 2.3) resulting catastrophic damages to nearby properties and deadly tragedy while inadequate fire protection are provided to the hawker stalls.

To make the matter worst, some hawker stalls at Temple Street sell matches, cigarette lighters, mini blow torches and small cans of butane gas refill for lighter and blow torch. It was observed that customers kept on testing the lighters and blow torch repeatedly and generate naked flame in the area. All these items are dangerous goods and are highly inflammable. Their existence in such a dense populated hawker permitted area expose the public to high fire risk.

Figure 2.2.1 – Electric Lighting at Hawker Stall

Figure 2.2.2 – Clothings at Hawker Stall

Figure 2.2.3 – Cushion and Decorative Materials at Hawker Stall

Figure 2.2.4 – Paper Lantern, Toys and Stationery at Hawker Stall

Figure 2.2.5 – Toys at Hawker Stall

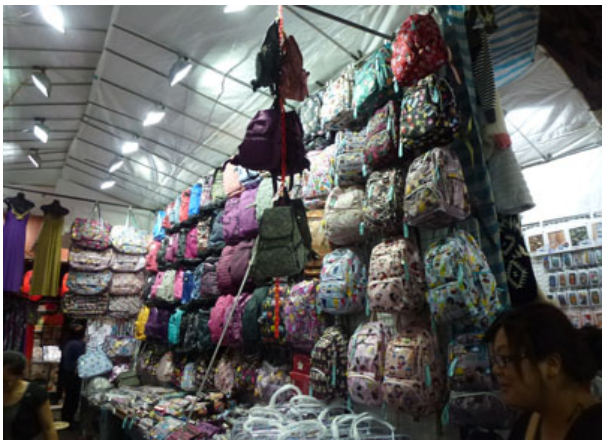


Figure 2.2.6 – Bags at Hawker Stall

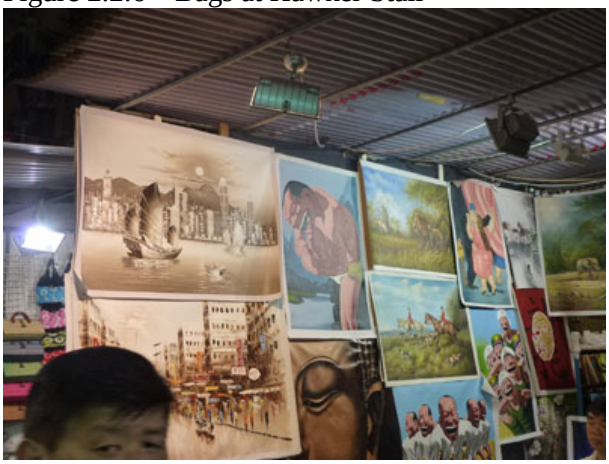


Figure 2.2.7 – Paint at Hawker Stall


Figure 2.2.8 – Mobile Accessories at Hawker Stall

2.3 Overnight Storage of Combustible Products at Hawker Stalls

Other than the dismantable hawker stalls, most of the hawker stall operators store their goods at their stalls overnight. It was observed that goods fully occupied the space of hawker stalls and generated high fire loads to the stalls. For a small-size hawker stall with floor space of 900 mm x 1200 mm, it can contain goods up to about 20 medium-size suitcase equivalent. Taking a normal practice that each suitcase can holds 15 kg of clothing. The maximum weight of clothing contain in a small-size hawker stall is around 300 kg. Referring to PD7974-1:2003 Table A.20 of BSI, 1 kg paper or cotton are taken as equivalent to 20 MJ fire load and 1 kg plastic is corresponding to 40 MJ. Assuming that all these clothing are made of cotton, the total fire load of a small-size hawker stall is around 6000 MJ. Cotton fire is considered to be medium growth fire. According to Section 8.2.2.3 of PD 7974-1:2003, medium growth fire has been observed with effective fire duration of about 20 minutes (1,200 seconds) only. Therefore, if small-size hawker stall with cotton contents is on fire, it will generate a 5 MW fire (6000 MJ/1200 s). With similar estimation, fire size of a medium-size hawker stall with floor space of 900 mm x 1800 mm and fire size of a large-size hawker stall with floor space of 1200 mm and 1800 mm are 7.5 MW and 10 MW respectively. (See Figures 2.3.1 and 2.3.2)

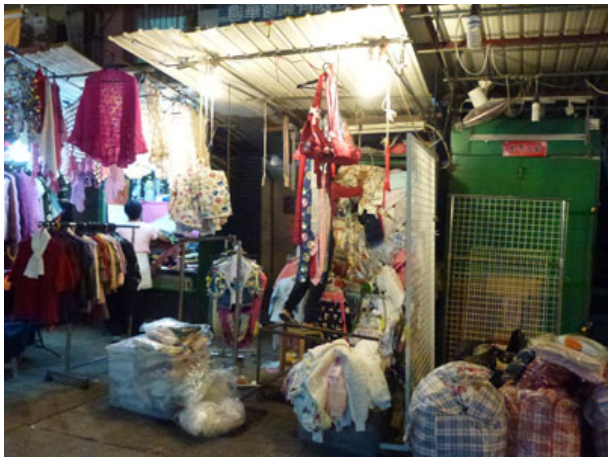


Figure 2.3.1 – Overnight Storage of Clothing

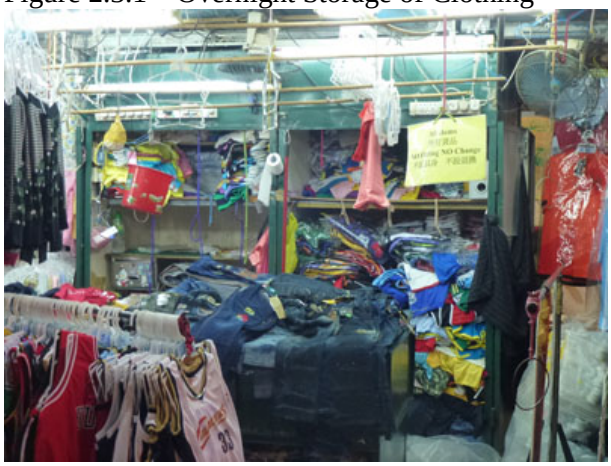


Figure 2.3.2 – Overnight Storage of Clothing

For hawker stall with plastic contents, the fire size will be double of those with cotton contents. Therefore the fire size will be increased up to 20 MW. Under such situation, fire can easily spread to nearby hawker stalls, properties and adjacent buildings while they are close together. (See Figure 2.3.3)

Figure 2.3.3 – Overnight Storage of Plastic Toys

Some hawker stalls use additional trolleys for overnight storage of their goods and place them next to their stall. This type of trolleys are either made of mild steel or wood with size up to 1200 mm (W) x 1600 mm (L) x 1000 mm(H). They add additional fire loads to the hawker stalls and significantly increase the fire risk. (See Figure 2.3.4)

Figure 2.3.4 – Additional Metal Trolleys for Overnight Storage at Hawker Stalls

2.4 Fire Separation of Hawker Stalls

Fire separation is used to isolate the fire and prevent fire spread to nearby properties. However, most of the fixed pitch hawker stalls are erected close to the adjacent buildings with only about 600 mm away from the building boundary lines. Some of dismantable hawker stalls are as high as 5 m reaching to 1st floor level of the adjacent building. As fire containment capabilities of hawker stall are poor, fire can easily spread to the adjacent buildings. Radiation heat from hawker stall fire will also injure people on the pedestrian way. (See Figures 2.4.1 and 2.4.2)

Figure 2.4.1 – 6 Hawker Stalls Linking Up Together and

2.4.2 – 5-m High Hawker Stall at Ting Choi Street Reaching 1st Floor Level of Adjacent Buildings

Besides, fire separations between hawker stalls are also inadequate. Hawker stalls are linked up together longitudinally in rows from 2 stalls up to 6 stalls (See Figure 2.4.1). Passage for separating different rows of hawker stall is only about 1 m in width. The most critical situations are encountered at Jardine Crescent, Tung Choi Street and Temple Street. Hawker stalls in these areas are very congested and are extended from both sides of the road leaving the passage at the middle of road less

than 1.5 m (See Figures 2.4.3 to 2.4.5) . A hawker stalls in Marble Street is believed to be linked up by two 1800 mm length stalls by single operator and forms a mega stalls as large as 3600 mm stall front with excessive fire load (See Figure 2.4.6)

Figure 2.4.3 – Congested Hawker Stalls at Jardine Crescent

Figure 2.4.4 – Congested Hawker Stalls at Tung Choi Street

Figure 2.4.5 – Congested Hawker Stalls at Temple Street

Figure 2.4.6 – Mega Hawker Stall at Marble Street

While hawker stalls are not made of fire resisting enclosure, fire can easily spread from one stall to another or to the opposite rows very quickly and escalate the fire to extra-large fire size which will be beyond the control of initial attendance firefighters. Fa Yuen Street fires have demonstrated the importance of fire separations and fire resisting construction for on-street fixed pitch hawker stalls.

2.5 Obstructions to Means of Escape

Figure 2.5.1 – Hawker Stalls Close to Staircases of Adjacent Buildings at Temple Street

Some hawker stalls are located right in front of the staircase of adjacent buildings. Some of them are even extended to parts of the pedestrian ways. Fire can easily block the means of escape and jeopardize people escaping from adjacent buildings. Heat and smoke from hawker stall fire will rise up to the staircase and will create a stack effect in staircase. People escaping from the adjacent buildings will be either incapacitated under high

temperature or will be poisoned by toxic gas within few minutes. Deadly blaze at Fa Yuen Street is a typical example of these situations.

Figure 2.5.2 - Hawker Stalls Close to Staircases of Adjacent Buildings at Tung Choi Street

2.6 Electrical Hazards at Hawker Stalls

Figure 2.6.1 – Damaged Power Box Lack of Maintenance

Electric fire is one of the common causes of fire in Hong Kong. It is also believed to be the cause of fatal fire at Fa Yuen Street. During the survey, it was also not uncommon to observe that sub-standard electricity supply/connections were at risk at many hawker stalls. They included uncovered power supply box, unauthorized or overloaded power connections, damaged power box and combustible around power points (see Figures 2.6.1 to 2.6.6). All these sub-standard connections significantly increase the fire hazards of the stalls and exposed hawker stalls at high fire risks. Situations are more critical at Temple Street and Tung Choi Street where combustible hawker stalls are located. Excessive uses of high power halogen lamps are also noted; which may overload power supplies system. Excessive heat from halogen lamps will also ignite nearby combustible materials, like plastic sheets. (See Figure 3.8.9)

Figure 2.6.2 – Improper /Overload Connections of Power Supplies

Figure 2.6.3 – Illegal Connections of Power Supplies

Figure 2.6.4 – Overloaded Power Points Covered by Combustibles

Figure 2.6.5 – Improper / Overload Connections of Power Supplies

Figure 2.6.6 – Damaged Power Box and Illegal /Substandard Connections of Power Supplies

2.7 Obstructions to Emergency Vehicular Access

Emergency vehicular access is essential for Fire Services response so as to provide speedy and effective rescue and fire fighting in case of fire. Under the hawker stall policy of the government, 6 m width passageways have to be reserved in hawker permitted area for emergency vehicular access.

During the survey, it was observed that both Temple Street and Tung Choi Street were fully occupied by dismantable hawker stalls and only left a passage of about 2 m in the middle of the road. As parts of these stalls are removable, stall operators are well alerted and are able to clear the road for emergency vehicles passing through in case of fire. It is understood that FSD frequently carries out test run of fire engines in these area to test the response of stall operators. Anyhow, this situation will cause certain degree of obstructions to the FS operations. (See Figures 2.4.3 and 2.4.4)

Jardine Crescent is encountered with the most critical situation while the fixed pitch hawker stalls occupy both sides of the road and leave only about 1 m width passage for pedestrians. The entire street is completely inaccessible by fire engine. It seriously obstructs rescue and firefighting of FSD and exposed the nearby residents and building occupiers at extremely high fire risk. (See Figure 2.4.5)

Figure 2.7.1 – 6-m Width Free Passage For Emergency Vehicular Access

2.8 Deficiencies on Fire Protection

Currently, neither active nor passive fire protection has been provided for on-street fixed pitch hawker stalls, not even a fire extinguisher. In case of fire, there is no available means of firefighting / fire protection equipment for tackling the fire. Fire will develop to large size before the arrival of fire services.

2.9 On-street Arson

There are over hundreds of on-street arsons in Hong Kong every year. Some of them directly involve hawker stalls, like Fa Yuen Street hawker stall fire in 2010, Mable Street hawker stall fire, Kam Wah Street hawker street fire. On-street hawker stalls are liable to vandalism and may also be affected by on-street arsons nearby. It exposes the on-street hawker stalls to significant fire risks as arson fires are hardly to control and prevent.

3. Design of Fixed Pitch Hawker Stalls

3.1 Size of Hawker Stalls

According to the requirements of Food and Environmental Hygiene Department (FEHD), there are three typical sizes of the hawker stalls (See Figures 3.1.1 to 3.1.3), including:

- Small stall – 900 mm x 1200 mm
- Medium stall – 900 mm x 1800 mm
- Large stall – 1200 mm x 1800 mm

All the stalls are limited to 2500 mm in height. It is observed that there are some stalls with the size of 1200 mm x 1200 mm at Kweilin Street and Ki Lung Street (See Figure 3.1.4). These stalls are only provided with enclosure in lower half portions..

Figure 3.1.1 – 900 mm x 1200 Hawker Stall at Fa Yuen Street

Figure 3.1.2 – 900 mm x 180 mm Hawker Stall at Jardine Crescent

Figure 3.1.3 – 1200 mm x 1800 mm Hawker Stall at Marble Street

Figure 3.1.4 – 1200 mm x 1200mm Hawker Stall at Ki Lung Street

3.2 Connections of Hawker Stalls

Figure 3.2.1 – Detached Hawker Stall

During the survey, it is observed that hawker stalls are either detached or connected with

each from 2 stalls up to 6 stalls. (See Figures 3.2.2 to 3.2.5)

Figure 3.2.2 – 2 Connected Hawker Stalls

Figure 3.2.3 – 3 Connected Hawker Stalls

Figure 3.2.4 – 4 Connected Hawker Stalls

Figure 3.2.5 – 6 Connected Hawker Stalls

3.3 Openings of Hawker Stalls

Most of the hawker stalls are designed with full height enclosure with openings for business operations ranging from one side to 4 sides. Some are with full height openings and some with half height openings. The openings are either in form of doors or in form of removable panels. Roller shutters and folding gates are also commonly used, especially for single opening stall. Some doors are kept opening at 90 degree with the adjacent stalls and are used for displaying selling products. Some doors are opened upward and used for weather shelter. The doors being opened are used as table for product display. (See Figures 3.3.1 to 3.3.6)

Figure 3.3.1 – Stall with 1-side Opening

Figure 3.3.2 – Stall with 2-side Openings

Figure 3.3.3 – Stall with 3-side Openings and Folding Gates

Figure 3.3.4 – Stall with 3-side Openings

Figure 3.3.5 – Stall with 4-side Openings

Figure 3.3.6 – Stall with 4-side Openings

3.4 Stalls on Ramp and Stepped Street

It is observed that some hawker stalls are located on ramp or stepped street in Hong Kong Island.

Figure 3.4.1 – Hawker Stall on Ramp

Figure 3.4.2 – Hawker Stalls at Stepped Street

Figure 3.4.3 – Hawker Stalls at Stepped Street

3.5 Roof and Footing of Hawker Stalls

Figure 3.5.1 – Tilted roof of Hawker Stall

Hawker stall are commonly designed with tilted roof and are made of either flatted or corrugated tin sheets with extension about 450 mm from the stall (See Figure 3.5.1). The footings of stalls are normally free standing. Some of the stalls are rested on concrete plinth. Some are sat on concrete pads. (See Figures 3.5.2 to 3.5.3)

Figure 3.5.2 – Concrete Plinth Footing of Stall

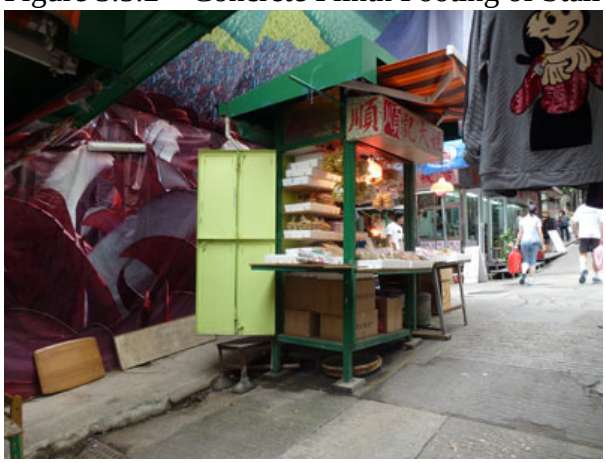


Figure 3.5.3 – Stall Sat on Concrete Pads

3.6 Retractable Canopy of Hawker Stalls

Figure 3.6.1 – Retractable Canopy of Stall

Retractable canopies are widely used for sun shade / rain shelter (See Figure 3.6.1).

3.7 Display Facilities for Selling Products

Figure 3.7.1 – Overhead and Free Standing Hanging Racks for Clothing Display

Figure 3.7.2 – Metal Shelves for Flower Display

Figure 3.7.3 – Hanging Racks of Toys Display, and Metal Shelf for Shoes Display

Different types of racks / shelves are used for displaying selling products. Metal nets are commonly fixed on the doors of hawker stalls for product display.

Figure 3.7.4 – Metal Nets and Wooden Shelves for Shoes Display

Figure 3.7.5 – Metal Shelves for Food Display

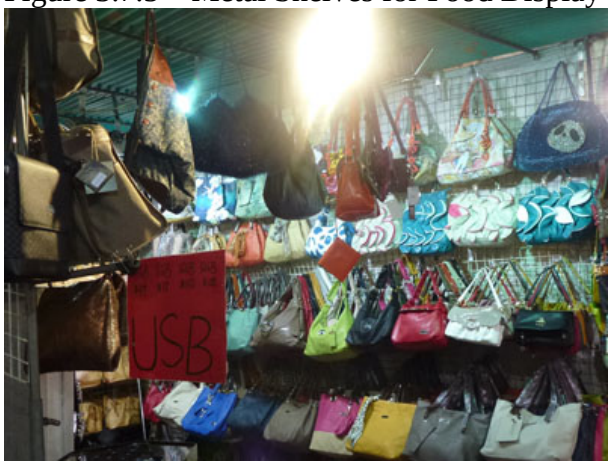


Figure 3.7.6 – Metal Net for Bags Display

3.8 Power Supplies of Hawker Stalls

Each hawker stall is commonly installed with their own power distribution box at the back of the stall (See Figure 3.8.1). At Bowling Street, two hawker stalls share one power distribution box (See Figure 3.8.2). At Graham Street, free standing power distribution boxes are provided separately (See Figure 3.8.5). Each power distribution box houses electric meter, miniature circuit breaker, residue current device and main switch of power supplies (See Figure 3.8.3). The boxes are made of mild steel and are weatherproof. The sizes of the boxes vary with reasonable dimensions at 400 mm (W) x 500 mm (H) x 200 mm (D). It is noted that some boxes are oversized and give unpleasant appearance to the stalls.

Most of the power supplies are sourced from underground power cables and branched off by armoured cable to the stalls. 50 mm diameter steel cable conduits are used to protect the armoured cable. Some cables are provided with oversized conduits with 100 mm diameter. Some cable conduits are installed at a tilted angle from the road curbs (See Figure 3.8.1). These features give unpleasant appearance and create tripping hazard. Overhead cable trunking systems are provided at Graham Street, Lee Yuen Street East and Lee Yuen Street West for power supplies to hawker stalls (See Figure 3.8.4).

Figure 3.8.1 – Power Distribution Boxes with Tilted Cable Conduits

Figure 3.8.2 – Large Power Distribution Boxes for Two Hawker Stalls

Figure 3.8.3 – Internal Layout of Power Distribution Box

Figure 3.8.4 – Power Supplies From Overhead Cable Trunking System

Figure 3.8.5 – Free Standing Power Distribution Box

At Tai Yuen Street, improved electricity connections were in progress during site survey. Power pillars are being installed by Wanchai District Council. Each pillar provided two 13A sockets for power supplies to the adjacent two stalls. (See Figure 3.8.6)

Power pillars are also provided at Tung Choi Street and Temple Street (See Figures 3.8.7 and 3.8.8). However, each of these power pillars are used to provide power supplies for 10 hawker stalls. Hawker stalls have to connected power cables from a distance. Cable management are in mesh and the maintenance of the power pillar are poor. Some of them are broken. These problems create unnecessary fire hazard to the stall.

The main power consumptions of hawker stalls are lighting. Some stalls use high power halogen lamps as many as 8 lamps per stall (See Figure 3.8.9). With the estimations of 500W per lamp, total power consumptions of each hawker stalls would be around 15A to 20A per stall. Currently, only one 13A socket is provided for each stall. Obviously, the power demands of each stall are under-estimated. It leads to overloading of the power supplies system and creates unnecessary fire hazards to the hawker stalls.

Figure 3.8.6 – Power Pillar at Tai Yuen Street

Figure 3.8.7 – Power Pillar at Temple Street with Cables in Mesh

Figure 3.8.8 – Broken Power Pillar at Tung Choi Street

Figure 3.8.9 – High Power Consumption Halogen Lamps

3.9 Associated Electrical Facilities of Hawker Stalls

Figure 3.9.1 – Lighting of Hawker Stall

Figure 3.9.2 – Lighting of Hawker Stall

It is observed that following associated electrical facilities are commonly provided for the hawker stalls:

- ❖ Lighting (See Figures 3.9.1 to 3.9.2)
- ❖ Electric Fans (See Figure 3.9.3)
- ❖ Air-conditioner (See Figure 3.9.4)
- ❖ Refrigerator (See Figure 3.9.5)

Figure 3.9.3 – Electric Fans of Hawker Stall

Figure 3.9.4 – Air-conditioners of Hawker Stall

Figure 3.9.5 – Refrigerator of Hawker Stall

3.10 Drainage of Hawker Stalls

Rain water collection system is commonly provided at the tilted roof of hawker stalls. Rain water collection trough is installed at the rear of the roof and is connected to a 50 mm diameter PVC rain water pipe discharging to the public drainage on roadside (See Figure 3.10.1). Some rain collection systems are provided with oversized rain water pipe of 100 mm diameter and give an unpleasant appearance to the hawker stall (See Figure 3.10.2)

Figure 3.10.1 – Rain Water Collection System of Hawker Stall

Figure 3.10.2 – 100 mm diameter Rain Water Pipes

4. Interviews with Hawker Operators and Associations

During site survey, interviews have been made with hawker stall operators. Site meetings have also been conducted with the representatives of hawkers associations. Both hawker stall operators and representative of hawker associations have indicated their willingness to pay for up-grading the fire safety protection of their stalls to satisfy the fire safety requirements if the associated cost is affordable and there will be no lost on the internal spaces of the stall.

At present, the cost of constructing a new small size 900 mm x 1200 mm sheet-metal hawker stall with dismountable door panels is about HK$18,000 and that with a metal roller shutter is about HK$25,000. It is desirable if the stalls can allow overnight storage of goods and the stall can provided with full height openings for business operations on three sides with certain relaxation on the height limits of the hawker stall. Hawkers also express their expectations on the government providing reasonable subsidies for upgrading the fire safety and design of hawker stalls so as to safeguard the lives of public and their properties as well as revitalizing the hawker permitted areas.

The expectations and comments of the hawker stall operators and representatives of hawker associations have been taken into considerations for developing solutions for fire safety and design of new hawker stalls.

5. Consultation with Government Authorities

In addition to the interviews and meetings with the hawker stall operators and hawker associations, consultations have also been made with related government authorities, including FEHD and FSD. Meeting was conducted with the Chief Fire Officers, Licensing and Certification Command Mr. Lau Mun Ming and his officers on 11 October 2012. Views and comments on the fire safety requirements for hawker stalls were exchanged, including active and passive fire protection, fire resistance of hawker stall, fire proof of retractable canopy, fire separations of hawker stalls etc.

Another meeting was conducted with the Assistant Director (Operations)2 Mr Fan Yung Kai and his officers on on 30 October 2012. Extensive discussions were made on the fire safety and design of hawker stalls, including construction materials, design configurations, associated facilities, costing and revitalization of hawker permitted areas. Some officers of FEHD expressed their worries that strengthened structure of hawker stalls will give misleading impressions to hawker stall operators as permanent provision. They stressed that fixed pitch on-street hawker stalls and hawker permitted areas are only treated as temporary provision under current government policy.

Fruitful results have been achieved from the consultatons with the government authorities. Views and comments from FEHD and FSD have been taken into account for developing the solutions for fire safety and design of new hawker stalls in this report.

6. Deficiencies on Draft Specifications of Hawker Stalls in LegCo Paper

To further improve the fire resistance capability and design of hawker stalls, the Secretary for Food and Health announced on 3 September 2012 a plan to launch a five-year Assistance Scheme for hawkers operating in the 43 hawker areas. The latest draft fire resistance specifications for re-construction of fixed pitch hawker stall are listed in Annex B of LegCo Paper No. CB(2)572/12-13(03) which is used for discussion in the Legislative Council Panel on Food Safety and Environmental Hygiene on 5 February 2013. Copy of the Annex B is reproduced in Appendix A.

Having review of the draft fire resistance specifications, it is noted that there are serious misconceptions of fire resistance performance. Fire safety deficiencies are identified and discussed in the following sections.

6.1 Fire Resistance Performance of Steel

The draft specifications required that the stall structure shall be constructed of 2 mm thick galvanized mild steel (GMS) or other metal materials with equivalent fire resistant capabilities of 2 mm thick GMS. Certification of fire resistance rating from accredited laboratory shall be provided.

This is a mission impossible requirement while 2 mm thick GMS itself does not have any fire resistance rating. Steel itself will lose 40% of its strength under temperature of 550^{O}C. It will distort and collapse just within few minutes of fire and cannot provide any fire containment capability. Fire will spread out of the stall structure and will damage other properties or injure nearby people. Besides, steel have high thermal transmission capability. Thermal conduction and radiation of steel from fire can also ignited nearby materials and will lead to fire spread.

It is also impracticable to enhance the fire resistance rating of GMS by the application fire resisting coating on it while available fire resisting coating system in the market is only applicable for structural steel with an minimum thickness of not less 3.5 mm under a designated Hp/A ratio. The thickness of the coating is required to reach 4 to 5 mm. 2 mm thick GMS cannot provide any fire

resistance rating in terms of integrity and insulation. There is no accredited fire laboratory in the market can provide certification and proof of fire resistance rating of GMS. Specifying 2 mm thick GMS for improvement of the fire resisting capabilities of hawker stall structure is inappropriate and inadequate.

Indeed it is wasting of public funding to subsidize the reconstruction the hawker stall by 2 mm thick GMS while most of original stalls before Fa Yuen Street deadly fire were already constructed of mild steel. There is no change in materials in the new specifications other than thickness. Fa Yuen Street fire has already given a concrete evidence that mild steel cannot withstand high temperature and cannot contain fire. If the new stalls constructed of mild steel catch fire leading to numerous fatalities again, can government answer the serious criticisms of the public?

6.2 Fire Resistance Rating of Hawker Stall

According to the Code of Practice for Fire Safety in Buildings 2012 Part A Section 3, fire resistance rating (FRR) shall satisfy one or more criteria of stability, integrity and insulation in term of minutes. The draft specifications for hawker stalls have not clearly specified the criteria and the time required to achieve. It is unable to ask accredited laboratory to provide any certification or proof of fire resistance rating without clear specifications..

According to the same fire code Part C, every building should be suitable enclosed by external wall and roof with an FRR to ensure protection against spread of fire to adjoining buildings or sites. Buildings with distance from adjoining buildings less than 1800 mm shall be provided with fire barriers having an FRR not less than that of the internal elements of construction. Referring to Table C1 and C2 of the same fire code, the lowest FRR of non-bearing wall and roof for different Class of Use is 60 minutes integrity and 60 minutes insulation.

As the hawker stall cannot be defined as building under the Building Ordinance Chapter 123, Laws of Hong Kong, the above fire code cannot be applied. However, the fundamental principles of fire safety should be strictly followed. No matter it is a temporary structure or a building, it should not expose undue fire risks to nearby properties. When several hawker stalls linked up together, it will form a significant structure with significant fire loads. If they are not provided with appropriate FRR, once on fire it will easily develop into large fire and will quickly spread to the adjoining buildings and properties. The painful experience in Fa Yuen Street fire clearly demonstrated that if the fire could be contained within the hawker stalls, fire could not spread and casualties could be avoided.

Therefore FRR is an essential specification for the fire safety and design of hawker stalls, which should be clearly specified. 60-minute integrity and 60-minute insulation should be considered as reasonable and minimum requirements for the entire enclosure of hawker stalls as referring to the fire code. With these clear specifications, FRR of hawker stall can be properly tested in accordance with BS 476 Part 22 or equivalent with certification from accredited laboratory.

6.3 Fire Proof Performance of Retractable Canopy

The draft specifications for hawker stall allow retractable canopy to be constructed of fire retardant materials .like PVC tarpaulin. However, PVC tarpaulin is not non-combustible. It can only delay ignition for few minutes. Once on fire, it will support combustion. Specifying PVC tarpaulin for construction of retractable canopy is considered inappropriate.

There are wide ranges of fire proof fabric available in the market with fire proof performance ranging from $300^{O}C$ to $1200^{O}C$. Some of them are provided with silicate top coating which is water proof and chemical resistance. It will not burn nor support combustion and is an ideal material for fire proof retractable canopy. It is considered that fire proof performance requirement of $800^{O}C$ for the fabric of retractable canopy is reasonable and justifiable while the melting point of its aluminium alloy frame is around $463^{O}C – 671^{O}C$.

6.4 Fire Separations of Hawker Stalls

As discussed in Section 2.4. fire separations is an essential fire safety requirement for hawker stalls. However it is not specified as a requirement in the

draft specifications for hawker stalls. If unlimited hawker stalls are allowed to be linked up together, it will establish excessive fire loads. Once the hawker stalls on fire, it will quickly develop into large fire and will be difficult to control.

To protect hawker stalls at reasonable fire safety level, appropriate fire separations should be provided among hawker stalls. It is considered that limitations to link up a maximum of three small size hawker stalls of 3 x 1200 mm in length per row or a maximum of two medium / larger size hawker stalls of 2 x 1800 mm in length per row are reasonable and appropriate. That means the maximum length of each row of hawker stall should not be more than 3600 mm. Fire separations between two rows should not be less than 1 m.

6.5 Fire Protection Facilities of Hawker Stalls

Currently, there is no fire protection facility for the hawker stalls. Neither the draft specifications for hawker stall have mentioned any requirement on provision of fire service installations and equipment, not even a fire extinguisher. Fire protection facilities are essential for tackling fire at incipient stage and prevent it from developing into large fire.

Automatic sprinkler system is considered to be the most effective fire service installation for property protection. However, there are many technical administration problems need to be solved. As the size of each stall is so small, it is not practicable and justifiable to provide independent system for each stall. A sprinkler system may be considered to cover the entire hawker permitted area with the provision of sprinkler tank and sprinkler pumps on roadside. It will become very costly and may not be affordable by individual hawker stall operators. Besides, there is also problem on management and maintenance of the system in future. It is difficult to assign these responsibilities to individual stall operators, especially for common items like sprinkler tank, control panel and fire pumps. If these responsibilities are taken up by the FEHD, government will face liability issues in fire with sprinkler system failure. Therefore, provision of automatic sprinkler system may not be a viable and applicable solution for active fire protection of hawker stalls.

Automatic FM 200 gas fire extinguisher has been evaluated. However it is not suitable for outdoor use. It is considered that 12 kg automatic ABC dry powder fire extinguisher may be a suitable solution for this problem. It is an independent unit and can be installed at the ceiling of each stall. It operates automatically at 68^{O}C upon detection of fire and can cover an area up to a diameter of 2.5 m which is sufficient to provide protection to both interior and exterior of large size hawker stall. It is suitable for Class A, B and C fire and is applicable for outdoor environment. Protective guard can be provided to prevent accidental damage of the sprinkler head.

In addition, it is considered that 3 kg ABC dry powder fire extinguisher should be provided for each stall.

6.6 Periodical Inspections Testing and Maintenance

On-going maintenance is essential for fire protection of hawker stalls. However, the draft specifications for hawker stalls have not specified the requirements for periodical inspection, testing and maintenance. It is considered that following facilities should be inspected, tested and maintained periodically and the stall operators should be assigned with legal responsibilities in upkeeping these facilities in good working order at all times.

- The stall structure in related to fire resistance construction should be inspected and certified by a Registered Professional Engineer (Fire) or an authorized person of the manufacturer / supplier not less than once every 12 months.
- All fire service installations and equipment should be inspected, tested and maintained by a Registered Fire Service Installations Contractor with appropriate class not less than once every 12 months.
- The electrical installation should be inspected, tested and maintained by a Registered Electrical Contractor with appropriate class not less once every 5 years.

7. Proposed Solutions

7.1 60-minute Fire Rated Enclosure

As discussed in Section 6.2, FRR is recognized to be an essential fire safety requirement for hawker stall. In response to the proposed specifications of 60-minutes integrity and 60 minutes insulation, extensive studies have been made on various fire resistance materials. With the kind sponsorship of Intumescent Systems (Greater China) Limited, a newly design fire rated hawker stall has successfully passed fire resistance test in accordance with the procedures given BS 476 Part 22:1987 on 28 January 2013 at Leading Edge Construction Materials Testing Company Limited under the accreditation scheme of International Accreditation Services which is a mutual recognition arrangement partner of The Hong Kong Laboratory Accreditation Scheme. The test achieved 91-minutes integrity and 71-minuts insulation fire resistance rating. The dimension of the testing specimen reached to 1200 mm (W) x 1942 mm (L) x 2700 mm (H). A copy of the performance certificate on fire resistance rating of the fire rated hawker stall is attached in Appendix B.

It has been established that 60-minutes integrity and 60 minutes insulation FRR requirement is a practicable and justifiable solution for fire safety design of hawker stall. It can provide adequate capability to the stall structure to contain the fire within the fire rated enclosure of not less than 60 minutes without any fire spread to adjacent properties. Therefore, it is strongly recommended to include this FRR requirement in the draft specifications for the hawker stall.

7.2 Fire Separation of Hawker Stalls

Section 6.4 has identified suitable solutions for fire separation of hawker stalls. Limitation is recommended to be imposed on the connection of hawker stalls with restriction of maximum length for each row of hawker stalls not more than 3600 mm. Each row of hawker stalls is recommended to have clear fire separation with other rows of not less than 1 m. It can effectively prevent fire spread from one row to another and prevent it developing to large fire. It also provides adequate passageways for fire escape. It is strongly recommended to incorporate this fire separation requirement into the draft specifications for hawker stalls.

7.3 Prohibition of Flimsy Structures

Referring to the potential hazards discussions in Section 2, dismantable type hawker stalls at Tung Choi Street and Temple Street constitute extremely high fire risks to the hawker permitted areas and nearby buildings. All these stalls are constructed of flimsy highly combustible materials with extra-large size and extra height. Once they are on fire hundred people will be trapped underneath the collapsed structures under fire and will lead to hundred casualties. It is strongly recommended to prohibit this type of dismantable stall and replace them by fire rated fixed pitch stall. Priority should be given to remove these hazards as soon as possible.

7.4 Fire Proof Retractable Canopy

Combustible retractable canopy is being blamed as the agents for fire spread in Fa Yuen Street. Further to Section 6.3, fire proof fabric is considered to an applicable solution for retractable canopy instead of fire retardant materials. Fabric with fire proof performance of 800^{O}C is strongly recommended to be one of the draft specifications of hawker stall. The fabric is available in five different colours. It can be used for construction of colourful retractable canopy so as to revitalize hawker permitted areas. (See Figure 7.3.1) .

Figure 7.3.1 – colour of the fire proof fabric

7.5 Active Fire Protection

It is desirable to provide an effective active fire protection system to the hawker stalls. Since installation of conventional sprinkler system for

the hawker stalls is impractical, a 12 kg automatic ABC dry-powder fire extinguisher is recommended as a solution to fire service installation and equipment for the hawker stalls. It is installed at the ceiling of each stall with drop height of 389 mm (see Figure 7.5.1). Details of its functions have been discussed in Section 6.5. In addition, a 3 kg ABC dry powder fire extinguisher is also recommended for each hawker stalls. All these requirements should be included in the draft specifications for hawker stalls.

Figure 7.5.1 – 12 kg Automatic ABC Dry Powder Fire Extinguisher

Figure 7.5.2 – Protective Guard for Sprinkler Head

7.6 Adjustment of Size of Hawker Stalls

The wall and door thicknesses of the newly designed fire rated hawker stalls are ranging from 55 mm to 70 mm. As expressed by the hawker stall operators and the representatives of hawker associations, they would not accept any reduction in floor space for fire rated design. In order to meet their expectations, it is strongly recommend making the following adjustments to the size of hawker stalls so as to obtain their acceptance to the fire rated requirements on the stall structure.

- Small size stall (980 mm x 1350 mm)
- Medium size stall (980 mm x 1950 mm)
- Large size stall (1205 mm x 1950 mm)

For the height of the stall, the new automatic fire extinguisher will occupy a space of 390 mm in height at the ceiling. In order to compensate the loss of space, it is strongly recommended to lift up the height limit from 2500 mm to 2800 mm.

7.7 New Design of Hawker Stalls

Based on the design criteria addressed in Section 3 and extensive study by the Research Group, schematic designs of the small and medium size hawker stalls are proposed and shown in Appendix C and Appendix D respectively. The design of large size of hawker stall will be same as the medium size other than the dimensions.

The stall will be constructed of composite fire rated materials with 1 mm thick mild steel covers both internally and externally. Colour coating will be provided for the entire stall at the choice of the hawker stall operators. The colour can match with the colour of retractable canopy which can provide attractive colourful appearance to the hawker permitted areas.

Door openings will be provided on two and half sides. In order to maintain the structural stability of the stall, fixed panels have to be provided to a least one and half side. Doors will be folding type with two panels for 900 mm and 1200 mm long openings and three panels for 1800 mm long openings, which can be fully openable and rest on the side wall or at the back. The whole structure of the stall is dismantable type and allows prefabrication off site and fabrication on site.

Overhead retractable hanging rack will be provided above roof. Tilted roof will provided for rain water collection. Retractable canopy will be an optional

item. Different type of display facilities will be provided for selection.

Adjustable footing will be provided for leveling the stall on uneven ground or on ramp /stepped street. Brackets will also be provided on the underside of base rack for fork lift operations.

7.8 Power Supplies and Drainage of Hawker Stalls

Independent power distribution box will be provided at back of each stall. 20A power circuit will be provided with one 13A socket inside the stall and one 13A socket outside the stall. All power distribution box will provide standard size of 200 mm (D) x 400 mm (L) x 500 mm (H). Rise main will be constructed of armour cable in 50 mm diameter cable conduit. The electrical installation of the stall will be installed and certified by a Registered Electrical Contractor with Work Completion Certificate (WR1) submitted to FEHD.

Rain water collection system will be installed at rear of the tilted roof. 50 mm rain water pipe will be fixed at the back of stall.

7.9 Control on Types of Selling Products

To prevent excessive fire loads and undue fire hazards in hawker stall, it is strongly recommended to impose proper control on type of selling products. Dangerous goods, like matches, lighter, blow torch, gas refill, essential oil...etc should be strictly prohibited.

7.10 Re-arrangement of Hawker Stalls

As the size of hawker stall has been slightly adjusted and fire separations are recommended for hawker stalls, it is strongly recommended to re-arrange the spaces for hawker stalls so as the meet the new fire safety requirements.

Referring to the LegCo Paper, relocations are also required for those hawker stalls which are located directly in front of staircase discharge points of buildings or obstructing emergency vehicular access and/or operation of aerial ladders.

Priority should give to rearrange / relocate hawker stalls ar Jardine Crescent where the situations are too congested and fire risks extremely high.

7.11 Selling Price of New Hawker Stalls

The proposed designs of the fire rated hawker stalls were sent to some reputable manufacturing factories for cost estimation. It is estimated that the selling price for supplying and installation of a batch of 50 numbers of typical 900 mm x 1350 mm x 2800 mm hawker stalls with an accredited 60-minute integrity and 60-miute insulation FRR fire test certificate is about HK$40,000 per stall. Such price has been discussed with hawker stall operators and representatives of hawker associations. They gave positive supports to the requirements on fire rated hawker stalls and indicated that it was affordable by them if certain incentive subsidence could be granted from the Authority.

7.12 Periodical Inspections Testing and Maintenance

The proposed solutions have been discussed and established in Section 6.6.

7.13 Way Forward

Upon establishment of series aforementioned solutions, it is strongly recommended FEHD to conduct overall review to the draft specifications for hawker stalls and incorporating the proposed solutions into the draft specifications as far as reasonable practicable.

Arrangement should be made to implement the improvement scheme as soon as possible. Priority should be given to those areas with higher fire risk.

Arrangement should also be made to reconstruct the existing hawker stalls area by area so as to maximize the cost benefit from bulk manufacturing.

9 Conclusion

On-street shopping culture is a valuable asset of Hong Kong. It does not only drive local economy but also vitalize tourism. It can be used to establish different icons and characteristics to different district. However, if we cannot provide adequate fire safety to on-street hawker stalls, it will become a bomb in the city. Fa Yuen Street fires are typical examples on this issue. As a leading city in the world, Hong Kong should always demonstrate our commitment to high safety standards to safeguard the lives of our people, our visitors and our properties. Fire safety should not compromise, even for temporary structures. With the investment of public funding, we should aim for proper fire safety standards for hawker stalls with appropriate fire resistance rating and fire separations and adequate fire protection facilities so as to prevent the recurrence of deadly tragedy.

It is concluded that the proposed fire safety requirements of the government authorities in the draft specifications of hawker stalls in the LegCo Paper is inappropriate and is not professional while it demonstrates serious misconceptions on fire resistance performance of mild steel. The overall strategy and direction on the requirement of fire resistance performance for the hawker stalls is appropriate, however the specifications on the materials are completely wrong. It cannot elevate the fire safety standards of hawker stalls to an acceptable and effective level and cannot provide adequate protection to the public from hawker stall fires.

The proposed solutions in this report can help government authorities to re-frame their fire safety requirements on hawker stalls. It can effectively contain fire inside the stall enclosure by appropriate fire resisting construction and can suppress the fire at its incipient stage by automatic fire extinguisher. The proposed solutions take care of the design, uses and cost of hawker stalls. Its costs are affordable by the hawker stall operators and are within the budgets of the government subsidies. With the contributions from different parties, we can assure that the public safety of Hong Kong can be maintained at a high standard.

*** END ***

Appendix A

Annex B of LegCo Paper No. CB(2)572/12-13(03)

Specifications of Stalls Constructed under the Assistance Scheme for Hawkers in Fixed-pitch Hawker Areas (DRAFT)

1. The stall structure (including fixed canopy and stall body) shall be constructed of metal, and retractable canopy shall be constructed of fire retardant materials (e.g. polyvinyl chloride (PVC) tarpaulin).

2. All metalwork of the stall structure, including the exposed and concealed structural framework, shall be rust-resistant. The exterior metal surfaces of the stall shall be painted with at least 2 coats of polyurethane paint.

3. If galvanized mild steel ("GMS") is used as the main construction material for the stall body, its thickness shall not be less than 2 mm. If other materials are to be used, certificates or proofs shall be provided to show that the material is non-combustible, has fire resistant capability comparable to 2 mm-thick GMS, is suitable for use as the main construction material for the stall and is durable for at least 8 years.

4. If the stall is used for sale of dry goods, the stall body (including the door) shall be fully enclosed. For stall selling wet goods, the portion of the stall body that is at least 2 m above the ground can have ventilation openings covered with metal wire gauze, and the remaining parts of the stall shall be fully enclosed.

5. All materials shall be new and free from defects.

6. The stall area shall not exceed the pitch area approved on the license.

7. Unless with the approval of the Food and Environmental Hygiene Department ("FEHD"), the height of the stall including its canopy shall not exceed 2.5 m.

8. Unless with the approval of FEHD, fixed canopy or any retractable awning when fully retracted shall not exceed any side of the pitch by 0.45 m. The canopy at the sides of the stall shall not be connected with the canopies of neighbouring stalls, and the canopy at the rear of the stall shall not be connected to or in contact with external wall of adjoining buildings.

9. Individual electricity meter boxes shall be installed for stalls with electricity supply, and it is suggested that meter boxes be located at the back of the stalls. Electricity supply to a stall shall be provided directly by the China Light and

Power Company Limited or the Hong Kong Electric Company Limited (as the case may be).

10. A hawker who applies for the grant for stall relocation or in-situ reconstruction ("applicant") shall submit the design of the stall and the construction works quotations for endorsement by FEHD. If FEHD is satisfied that the proposed new stall meets the required specifications, FEHD would give approval-in-principle, subject to the relevant caps of individual categories.

11. Upon completion of the construction works, the applicant shall submit to FEHD certificates or proofs issued by the relevant contractors, manufacturers, suppliers or accredited laboratories to ensure that all materials used for construction of the stall conform to the required specifications. If there is electrical installation at the stall, Work Completion Certificate (WR1) certified under Regulation 20 of the Electricity (Wiring) Regulations (Cap. 406 sub. leg.) covering the entire electrical installation of the stall shall be submitted to FEHD.

Appendix B

LEADING EDGE CONSTRUCTION MATERIALS TESTING COMPANY LIMITED
Unit 1604, 16/F, Citicorp Centre 18, Whitfield Road Causeway Bay, H.K.
Tel.: (852) 2380 3531 Fax.: (852) 2380 3535 Email: info@le-testlab.com

ACCREDITED TL-496

PERFORMANCE CERTIFICATE ON FIRE RESISTANCE RATING No. Q13A05-CR01

IN ACCORDANCE WITH BS476 Part 22:1987

Sponsor: Intumescent Systems (Greater China) Ltd.
Sponsor Address: Room 1006 Ricky Centre, 36 Chong Yip Street, Kwun Tong, Kowloon, HKSAR
Prepared by: Leading Edge Construction Materials Testing Company Limited
Testing Address: Asia Aluminium Industrial City, The New & High-Tech Industrial Development Zone, Dawang, Zhaoqing, Guangdong Province, China.
Product Name: Fire Rated Hawker Stall (Product No.:HSCS60EI)

This is to certify that the aforementioned product has been tested and assessed on fire resistance rating in accordance with the procedure given in BS476 Part22: 1987 under the accreditation scheme of International Accreditation Services which is a mutual recognition arrangement partner of The Hong Kong Laboratory Accreditation Scheme. The fire resistance performance of the aforementioned product is listed hereunder:-

Test Results:

Test Method, Number and Date	**Parameter** [a]	**Results**
Test to BS476 Part22:1987	**Integrity**	**91 min.**
Test on 28th January, 2013	Cotton pad	Passed
Test Report No.: Q13A05	Gap gauges	Passed
Dimension of Testing Sample :	Sustained flaming	Passed
1200mm(W) x 1942mm(L) x	**Thermal insulation**	**71 min.**
2700mm(H)	Average rising temperature on unexposed face <140°C	Passed
	Maximum rising temperature at any one point of unexposed face <180°C	Passed

Fire Resistance Rating: --/91/71

Signed and sealed for and on behalf of LEADING EDGE CONSTRUCTION MATERIALS TESTING COMPANY LIMITED

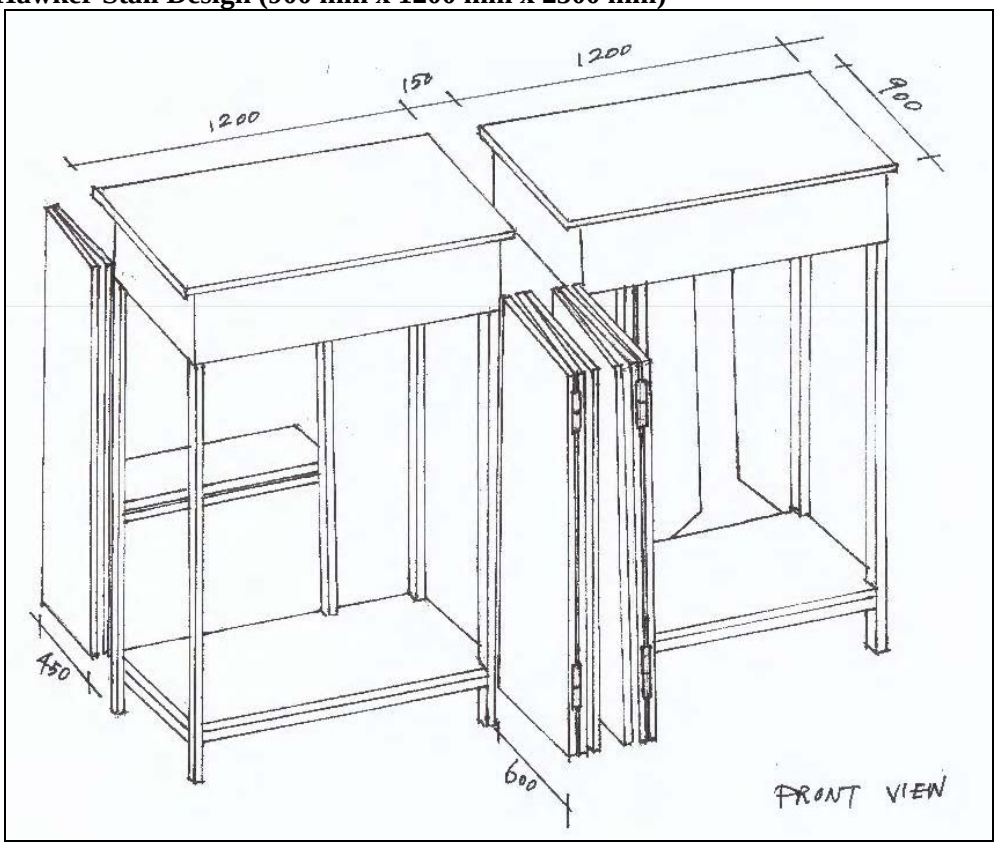
SIGNED

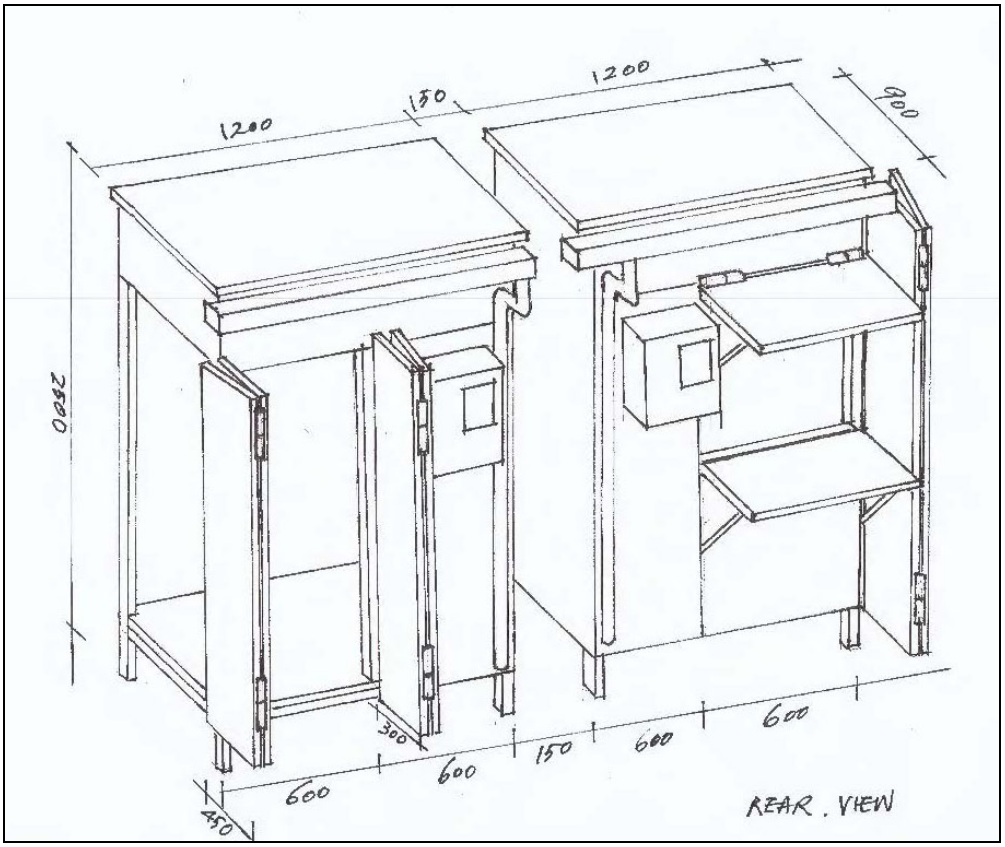
Thomas Tsang
General Manager

Date of Issue: 14th February, 2013
Valid to : 13th February, 2018

Appendix C

Hawker Stall Design (900 mm x 1200 mm x 2500 mm)





Appendix D

Hawker Stall Design (900 mm x 1800 mm x 2500 mm)