Guidelines on Formulation of Fire Safety Requirements for New Railway Infrastructures

January 2013






PREAMBLE

The development of railway fire safety design in Hong Kong evolved from the first underground railway project in around 1970s. Without preceding project references and prescriptive requirements under the Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment (FSI Code), the Fire Services Department (FSD) in collaboration with railway corporations and other government departments, since then started to draw up fire safety requirements for railway infrastructures.

Owing to the unique and complex design nature of railway stations and their associated premises, performance-based fire safety designs have been widely adopted in the planning of railway projects. In principle, fire safety standards provided by the fire engineering approach should not be inferior to the prescriptive requirements stipulated in relevant codes and standards. On top of fire engineering approach, sets of fire safety requirements drawing on local practice and experience with due reference to the international standards on railway safety, such as National Fire Protection Association 130 (NFPA 130) of the USA and Office of Rail Regulation (ORR) of the UK, have also been developed. In gist, the underlying fire safety design principles for railway infrastructures are to provide the best fire safety protection to passengers and operational staff as well as emergency personnel in the event of a fire and other calamity.

To facilitate stakeholders of the railway industry to adopt a consistent fire safety design towards new railway infrastructures in the future, this Guidelines serve to provide general guidance on formulating fire safety requirements by incorporating the latest fire safety measures of

various railway lines under construction in Hong Kong. Railway corporations and fire engineering consultants will find this Guidelines useful in formulating fire safety requirements for new railway infrastructures in the future, including railway stations, depots, ancillary buildings and trackside areas.

This Guidelines should be read in conjunction with the current FSI Code (April 2012 Edition), FSD Circular Letters and the Code of Practice for Fire Safety in Buildings 2011 (FS Code) issued by the Buildings Department (BD). In case of special factors and circumstances, the Director of Fire Services may require additional fire safety requirements to be imposed before he is so satisfied. Moreover, the general fire safety measures relating to Means of Access (MoA), Means of Escape (MoE) and Fire Resisting Construction (FRC) stipulated in this Guidelines should be subject to the final satisfaction and agreement of BD. Yet, compliance with the fire safety requirements stipulated in this Guidelines should not be taken as compliance with the fire safety requirements under the Buildings Ordinance, which are under the jurisdiction of the BD.

With regard to the fire safety issues to be addressed by the fire engineering approach, such as determination of fire size, assessment of tenability, design of smoke control system, evaluation of occupants evacuation time and pattern, etc., reference should be made to Part G of the FS Code and other well-recognized international standards and guidelines, including but not limited to CIBSE Guide E, SFPE Handbook, etc. The existing mechanism using Computational Fluid Dynamics (CFD) fire modeling, computational simulation of tunnel ventilation system, engineering calculation, fire risk assessment, etc. may also be accepted by FSD on a case-by-case basis. In fact, a practical and pragmatic approach would be adopted on a case-by-case basis when there are any physical constraints leading to non-fulfillment of the requirements stipulated in this Guidelines and the railway corporation has made its due efforts in meeting the

requirements.

To meet the higher expectation on railway safety from the general public and align with the world's enhanced fire safety requirements, FSD will keep on reviewing the current fire safety measures and make amendments if necessary.

GUIDELINES ON FORMULATION

OF FIRE SAFETY REQUIREMENTS

FOR

NEW RAILWAY INFRASTRUCTURES

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Contents

Part I

General

1.1 Title

This document shall be titled “Guidelines on Formulation of Fire Safety Requirements for New Railway Infrastructures” hereinafter referred to as the “Guidelines”.

1.2 Definitions

“Ancillary Building”

A non-public area which is designed mainly for a wide range of functions, including but not limited to power supply, ventilation, substation and electrical/mechanical plant area. All ancillary buildings are, in general, unmanned and should not be accessible by the public.

“Concession Area”

A designated area for approved retail trades and commercial facilities/services located within the railway station. The design of such area shall be based on the “Cabin Concept” as described in Appendix I.

“Depot”

A building area which is designed to carry out essential railway depot functions, including but not limited to stabling of trains, permanent way facilities and engineering train sidings, etc.

“Designated Emergency Entrance (DEE)”

An emergency access point at each station/ancillary building/depot, designated as the primary access point for emergency personnel. Fire protection facilities such as Fire Services inlets, sprinkler inlets, Fire Services control panels, automatic fire alarm panels, FSD telephone panel and remote unlocking devices will be installed in the vicinity.

“Emergency Access Point (EAP)”

A location designated as the access point for emergency personnel, leading from street level or at grade to the trackside area.

“Emergency Egress Point (EEP)”

A location designated as the egress point for detrained passengers to leave the trackside area safely and reach the Ultimate Place of Safety.

“Escape Route”

A continuous path or paths taken by passengers and/or other station occupants to reach the Ultimate Place of Safety.

“Firefighting and Rescue Stairway (FRS)”

A stairway accommodating an access staircase and a fireman’s lift.

“Fire Resistance Rating (FRR)”

The period of time for which any element of construction, wall, door, fire shutter or other components of a building is capable of resisting the action of fire when tested in accordance with BS 476: Parts 20 to 24, or as specified in the Code of Practice for Fire Safety in Buildings 2011 (FS Code). In this Guidelines, only overall FRR in hour are

specified. Reference should be made to the FS Code for detailed FRR criteria in terms of stability, integrity and insulation for elements of construction, fire barriers and other components.

“Fire Separated Corridor”

A designated fire services access corridor constructed with walls, floor and ceiling having an FRR of not less than 2 hours. It is equipped with a sprinkler system, pressurization system and smoke detection system with no unprotected services other than fire service installations provided within the corridor.

“Integrated Entrance”

An entrance to the station which leads directly from the adjoining property development area with a physical connection to the railway station. Such entrance will be under the direct control of the corporation station management. It will be provided with a fire shutter having an FRR of not less than 4 hours and will not be treated as MoE in the event of a fire.

“Long Adit”

A normal public circulation route under the direct control of the corporation station management and in the form of a long corridor or pedestrian subway over 50 m in length.

“Non-public Area”

A station area which is not accessible by the general public and should be used for daily railway operations, including office, staff area, plant room and other building services, relating to the station only. All non-public areas shall be separated from station public areas by a physical separation having an FRR of not less than 2 hours.

“Place of Safe Passage”

A passage under the direct control of the corporation station management through which passengers and other station occupants will pass for evacuation in the event of a fire. Inside the passage, a smoke clear height of not less than 2.5 m is maintained by the smoke extraction system for a minimum period of 60 minutes for evacuation. This will normally be on the floor immediately above or below or an area adjacent to where a fire occurred. Place of Safe Passage shall be provided with stairway and/or escalator to the next level or Ultimate Place of Safety as defined herein.

“Point of Safety”

An entrance to the Place of Safe Passage or a protected route which leads to the Ultimate Place of Safety as defined herein.

“Primary Substation (Zone Substation)”

A primary substation or zone substation is a substation receiving power from extra high voltage substations or bulk infeed substations as defined by the Hong Kong Planning Standards and Guidelines issued by the Planning Department.

“Property Development Area”

An area which is not under the direct control of the corporation station management. Property development areas shall be separated from the station areas by means of a fire separation having an FRR of not less than 4 hours.

“Protected Route”

A route including protected lobby, corridor, stairways, ramp and passageway leading from the Point of Safety to the Ultimate Place of Safety providing physical fire separation from adjacent areas with an FRR of not less than 2 hours. It shall be equipped with sprinkler system, fire hydrant/hose reel system, smoke detection system, directional/exit signs and emergency lighting, and has no unprotected services other than fire service installations provided within the corridor.

“Public Area”

A station area, including platform, concourse, paid area, unpaid area, concession area, long adit and entrance, which is accessible by the general public and used for railway operation and its associated activities. All station public areas shall be separated from non-public areas by means of a fire separation with an FRR of not less than 2 hours.

“Supplementary Emergency Entrance (SEE)”

A supplementary emergency access point at each station/ancillary building/depot, designated as the secondary access point for emergency personnel. Fire protection facilities such as Fire Services inlets, sprinkler inlets, Fire Services repeater panels, FSD telephone panel and remote unlocking devices will be installed in the vicinity.

“Station”

The entire railway station in which one or more of the following areas are included:

(i) Station area
(ii) Station related area
(iii) Integrated entrance

“Station Area”

An area used for railway activities and services, including public area, concession area, staff accommodation, plant room and other non-public areas.

“Station Related Area”

An area under the direct control of the corporation station management and essential to the operation of the station. It includes vehicle drop-off, pick-up and queuing areas and access roads where prescriptive requirements of relevant local codes shall be followed.

“Trackside Area”

An area used for supporting the movement of rolling stocks and railway activities.

“Ultimate Place of Safety”

A location in open air at street level or at grade where occupants are protected from the effects of fire and offered with adequate provisions for safe evacuation.

1.3 Abbreviation

AFA	Automatic Fire Detection and Alarm System
BAV	Backup Access Vehicle
BD	Buildings Department
BS	British Standard
CEDD	Civil Engineering and Development Department
CFATS	Computerized Fire Alarm Transmission System
CFD	Computational Fluid Dynamics
CIBSE	Chartered Institution of Building Services Engineers
DEE	Designated Emergency Entrance
DTRS	Digital Trunked Radio System
EAP	Emergency Access Point
EEP	Emergency Egress Point
EMSD	Electrical and Mechanical Services Department
ERB	Emergency Rail Bus
EVA	Emergency Vehicular Access
FCR	Fire Control Room
FH/HR	Fire Hydrant/Hose Reel
FRC	Fire Resisting Construction
FRP	Fire Resistance Period
FRR	Fire Resistance Rating
FRS	Firefighting and Rescue Stairway

FS Code	Code of Practice for Fire Safety in Buildings 2011
FSD	Fire Services Department
FSI	Fire Service Installations
FSI Code	Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment (April 2012 Edition)
HKPF	Hong Kong Police Force
HyD	Highways Department
IoE	Instrument of Exemption
LandsD	Lands Department
LPC	Loss Prevention Council
MIV	Motorized Isolation Valve
MoA	Means of Access
MoE	Means of Escape
MTR	Mass Transit Railway
NFPA	National Fire Protection Association
OCC	Operations Control Centre
ORR	Office of Rail Regulation
PA	Public Address
PlanD	Planning Department
RDO	Railway Development Office
SCR	Station Control Room
SEE	Supplementary Emergency Entrance
SFPE	Society of Fire Protection Engineers

SSCC	Safety and Security Coordinating Committee
STIC	Station and Transport Integration Committee
TD	Transport Department
TSSC	Trackside Safety and Security Committee
UPS	Uninterruptable Power Supply

1.4 Processing Mechanism of Railway Projects

Having regard to the exceptional nature of railway projects, the Building Authority may, under the provisions of section 54(2) of the Mass Transit Railway Ordinance (Cap. 556), issue an Instrument of Exemption (IoE) to exempt such building works from the Buildings Ordinance (Cap. 123). Such exemption is confined to those procedures and requirements relating to the appointment of Authorized Person and Registered Structural Engineer as appropriate, approval of plans, consent to commencement and resumption of works and occupation of buildings under sections 4, 14 to 17A and 19 to 21 of the Buildings Ordinance, such that the Building Authority's duties and sanctioning power to ensure standards of health and safety are not undermined. Instead of submitting building plans through the Centralised Processing System for ordinary building projects, the following Committees with specific "Terms of Reference" are formed to ensure that railway infrastructures are designed, built and operated to the required safety standards.

1.4.1 Station and Transport Integration Committee (STIC)

(a) STIC is chaired by the Railway Development Office, Highways Department (HyD). STIC members comprise representatives from Fire Services Department (FSD), Buildings Department (BD), Transport Department (TD), Hong Kong Police Force (HKPF), Planning Department (PlanD), Lands Department (LandsD), Civil Engineering and Development Department (CEDD), Regional Office of HyD and the railway corporation.

(b) STIC provides a forum for the discussion and agreement, mainly on the integration into the built environment, construction of new railway stations, ancillary buildings, depots, or modification

to the existing facilities; provision of pedestrian accesses to station entrances; and integration of other transport modes with railway services.

1.4.2 Safety and Security Coordinating Committee (SSCC)

(a) SSCC is chaired by the Railways Branch of Electrical and Mechanical Services Department (EMSD). SSCC members comprise representatives from FSD, BD, HyD, HKPF and the railway corporation.

(b) SSCC provides a forum for the discussion and agreement on the safety and security related issues of railway stations, depots and/or other associated structures for which an IoE has been issued by the Building Authority, including existing and new facilities, permanent and temporary structures and modification to the existing facilities.

1.4.3 Trackside Safety and Security Committee (TSSC)

(a) TSSC is also chaired by the Railways Branch of EMSD. TSSC members comprise representatives from FSD, BD, HyD, HKPF and the railway corporation.

(b) TSSC provides a forum for the discussion and agreement on the safety and security related issues of railway tracksides and associated facilities for which an IoE has been issued by the Building Authority, including existing and new facilities, permanent and temporary structures and modification to the existing facilities.

1.5 Formulation of Fire Safety Requirements

1.5.1 As one of the core members of STIC, SSCC and TSSC, FSD is responsible for giving advice on fire safety requirements to railway projects. The fire safety requirements stipulated in Part II of the Guidelines are formulated by making due reference to previous standards of railway projects, international standards, fire engineering studies, prescriptive codes, etc. For railway premises/structures of special designs or hazards which necessitate special considerations, FSD may accept, on a case-by-case basis, fire engineering approach as an alternative provided that safety standards provided by the fire engineering approach should not be inferior to the prescriptive requirements. Methodology for application of the fire engineering approach should outline a structured fire engineering principle(s) to the assessment of total fire safety effectiveness and to the achievement of pre-identified design objective(s) having taken into consideration of the objectives of fire safety requirements for the protection of life including operation staff and emergency personnel and property within the railway premises/structures in the event of emergency.

1.5.2 In general, prescriptive requirements (Deemed-to-Comply provisions) of the following local codes or circular letters shall also be adhered to:

(i) ***Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment April 2012 (FSI Code)*** which stipulate the minimum fire service installations and equipment to be provided and give guidance as to the conduct of inspections and tests in order to satisfy the Director of Fire Services; and

(ii) ***FSD Circular Letters*** which are published from time to time by the Director of Fire Services requiring Authorized Persons and other concerned parties to comply with the latest requirement on fire safety provisions.

(iii) ***Code of Practice for Fire Safety in Buildings 2011 (FS Code)*** which stipulates the requirements for fire resisting construction, means of escape, means of access and emergency vehicular access. In addition, it also provides guidelines on the testing standards for the fire properties of building elements and components, fire safety management of buildings and the alternative approach in fire safety design, i.e. fire engineering approach. Insofar as the Buildings Ordinance is concerned, the FS Code shall apply to railway works that are submitted through SSCC, TSSC and STIC and the works of which have not yet been commenced on or before 1 April 2012.

Part II

General Fire Safety Requirements for Railway Infrastructures

2.1 Station

2.1.1 Fire Service Installations (FSI)

***Requirements* – Systems/Installations/Equipment for:**

(i) Audio/visual advisory system
(ii) Automatic actuating devices
(iii) Automatic fixed installation other than water
(iv) Emergency power supply
(v) Emergency lighting
(vi) Exit sign
(vii) Fire alarm system
(viii) Fire control centre
(ix) Fire detection system
(x) Fire hydrant/hose reel system
(xi) Fire Services communication system
(xii) Fireman's lift
(xiii) Firefighting and rescue stairway
(xiv) Portable hand-operated approved appliance
(xv) Pressurization of staircase
(xvi) Sprinkler system
(xvii) Static or dynamic smoke extraction system
(xviii) Street fire hydrant system
(xix) Special equipment/requirement
(xx) Ventilation/air conditioning control system

Extent

(i) Flashing exit signs/directional signs and Public Address (PA) System shall be provided in station public circulation areas as part of the audio/visual advisory system to direct passengers towards the designated exits.

(ii) As required by that equipment which requires to be automatically actuated.

(iii) To be provided to areas where the use of water is undesirable for the risk.

(iv) An independently powered generator or dual power supply from two independent primary substations (zone substations) of sufficient electrical capacity to meet the essential services it is required to provide.

(v) Emergency lighting shall be provided throughout the entire station and all exit routes leading to the Ultimate Place of Safety.

(vi) (a) Sufficient directional and exit signs shall be provided to ensure that all exit routes from any floor/premises within the station are clearly indicated as required by the configuration of escape routes serving the station.

(b) All directional and exit signs in public areas shall be internally illuminated and of flashing type. During emergency evacuation, the directional and exit signs within the public area shall be switched on and flashing to indicate the appropriate exit routes to the Ultimate Place of Safety.

(c) "Hidden flashing exit signs" are designed for emergency evacuation. It shall be provided for escalators which would normally run against the direction of escape routes and would stop under emergency situation.

(d) "MTR graphic type" directional/exit signs are acceptable in public areas. However, non-public areas shall follow the relevant prescriptive requirements.

(vii) (a) For non-public area, one actuating point and one audio warning device are to be located at each hose reel point. Visual alarm signals shall be provided where necessary in accordance with the current Design Manual - Barrier Free Access. This actuating point shall include facilities for starting fire pump and initiating audio/visual warning device.

(b) For public area, one actuating point is to be located at each hose reel point. This actuating point shall include facilities for starting fire pump.

(c) An "Acknowledgement" button shall be provided on the local Integrated Backup Control Panel. Upon acknowledgement of an alarm signal, Mass Transit Railway (MTR) staff shall investigate the cause of the alarm. If the fire alarm is not acknowledged within the pre-defined delay period (1 minute), fire evacuation operation will be activated. Evacuation message shall be automatically transmitted via the Public Address (PA)

System to all station public areas. The PA system shall be used to broadcast pre-recorded evacuation message to passengers. Exit signs shall flash to direct passengers towards the exits.

(d) A "Confirm" button shall be provided on the local Integrated Backup Control Panel to activate automatic fire evacuation operation when the fire alarm is confirmed.

(viii) Minimum of one, additional to be provided according to the complexity of the station. It shall normally be located at ground floor level on the main face of the building, preferably adjacent to the main entrance, and be continuously manned by trained personnel/promptly attended by trained personnel in case of emergency. For typical station with station control room accommodated with the Fire Services control panels and automatic fire alarm panels, it could be accepted as an alternative provision.

(ix) The entire station area shall be covered by a fire detection system, except above ground lavatory where automatic fixed installation is provided.

(x) (a) There shall be sufficient fire hydrants (with twin-hydrant outlets or two single-hydrant outlets) and hose reels to ensure that every part of the station can be reached by a length of not more than 30 m of Fire Services hose and hose reel tubing.

(b) The fire hydrant/hose reel system of the railway station shall also serve the fire hydrant system of associated tunnels or viaducts.

(xi) To be provided to enable three separate talk groups of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk radio communication within the station simultaneously. In addition, the radio coverage shall also be extended to the area within a radius of 50 m from DEE/SEE of the station at grade level. Direct line telephone housed in a dedicated FSD telephone panel at the entrances of DEE/SEE and trackside EAP shall be provided for communication with the Operations Control Centre and Station Control Room.

(xii) As required by the FS Code. In addition, the car of a fireman's lift in DEE should have a minimum dimension of 1 400 mm x 2 400 mm. The minimum dimension of a fireman's lift in SEE usually follows the prescriptive requirements stipulated in the FS Code provided that the DEE could provide access to all station levels/areas.

(xiii) As required by the FS Code.

(xiv) As required by the occupancy

(xv) (a) Required for above ground portion of the station exceeding 30 m above the point of staircase exit to open air at ground floor level or ultimate place of safety where:-

(1) natural venting of staircase is not provided for above ground portion of the station;

(2) the cubical extent of the above ground portion of the station exceeds 28 000 cubic metres; and

(3) the aggregate area of openable windows of the

above ground station does not exceed 6.25% of the floor area of the station, calculated on a floor by floor basis or such windows are not so situated that effective cross ventilation can be provided.

(b) Required for the basement portion of the station where:-

(1) no open air access routes to the basement portion for firemen are provided; and

(2) the cubical extent of the basement portion exceeds 7 000 cubic metres.

(c) The number of pressurized staircases to be provided shall be determined by the table stipulated under the definition of "Pressurization of staircase" in Part II of the FSI Code and the number of pressurized staircases required shall not exceed the total number of staircases as required by the FS Code.

(xvi) Required to cover all parts of the station except above ground plant rooms and areas covered by (iii) above.

(xvii) (a) Required for:

(1) atrium of the station, if the compartment of the atrium exceeds 28 000 cubic metres, or any basement level or floor of the station forming part of that compartment; or

(2) any fire compartment exceeding 7 000 cubic metres in the station where:-

– the aggregate area of openable windows of the compartment does not exceed 6.25% of the

floor area of that compartment; or

– such windows are not so situated that effective cross ventilation can be provided.

(3) station public areas at any basement level; or

(4) station non-public areas, including all back-of-house areas and plant rooms (except service ducts, plenums, plant rooms with gas flooding protection system and small plant rooms with site constraints, etc.), at the basement of three or more levels; or

(5) basement, irrespective of the number of levels, exceeding a depth of 30 m from the floor level of the ground storey above the basement to the floor level of the lowest storey in the basement, except service ducts, plenums, plant rooms with gas flooding protection system and small plant rooms with site constraints, etc.

(b) Hot smoke test will be required for the following compartments if considered necessary by FSD:

(1) with a headroom of 12 m or more; or

(2) with irregular geometrical dimensions or extraordinary large size or long length.

(xviii) Spacing between fire hydrants should be 100 m staggered on alternate sides of the roadway wherever applicable. Wherever possible, there should be at least two street fire hydrants within the site of the station concerned and they

should be strategically fixed within 30 m as far as possible but not less than 6 m from the DEE/SEE of the station they are intended to protect.

(xix) As required by FSD.

(xx) When a ventilation/air conditioning control system to the station is provided, it shall stop the mechanically induced air movement within a designated fire compartment.

Additional Requirements

(i) All concession areas in the station shall be protected by the Cabin Concept as described in Appendix I.

(ii) All linings for acoustic and thermal insulation purposes in ductings and concealed locations shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or equivalent, or be brought up to that standard by use of an approved fire retardant product.

(iii) All linings for acoustic, thermal insulation and decorative purposes within the protected means of escape shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or equivalent, or be brought up to that standard by use of an approved fire retardant product.

(iv) In general, dangerous goods shall not be used or stored in the station. Any intended use or storage of dangerous goods as defined in Chapter 295 of the Laws of Hong Kong shall make separate application to FSD for approval.

(v) The glazing (solar control tempered glass panel) shall not be of the type which melts and forms burning droplets under fire

situation. Also, when it is shattered, it does not form sharp and harmful pieces.

2.1.2 Means of Escape (MoE)

(i) There shall be adequate means of escape for all calculated population under the worst scenario, as agreed in STIC and SSCC Stage 1 Submissions, to escape safely from the fire scene to an adjacent Place of Safe Passage within 4.5 minutes without being overwhelmed by the effects of fire and smoke. Inside the passage, a smoke clear height of not less than 2.5 m is maintained by the smoke extraction system for a minimum period of 60 minutes for evacuation. This will normally be on the floor immediately above or below or an area adjacent to where a fire occurred. Place of Safe Passage shall be provided with stairway and/or escalator to the next level or Ultimate Place of Safety.

(ii) The maximum travel distance in public areas, including platform, concourse, paid area, unpaid area and concession area, from the egress point to the foot of the stair or escalator or other Points of Safety, leading to the Place of Safe Passage at another level or the Ultimate Place of Safety, shall not be more than 50 m (25 m for dead end situation) measured in actual walking distance. This principle is not applied by just reaching an adjacent smoke zone maintained as a Place of Safe Passage. In case there are site constraints rendering it impossible to fully comply with the above requirements, an alternative approach will be adopted on a case-by-case basis, such as the case of long adit scenario.

(iii) The maximum travel distance in unoccupied non-public areas to the Point of Safety shall not be more than 50 m (25 m for dead end situation).

(iv) The maximum travel distance in occupied non-public areas, such as government offices, station staff offices and staff/administrative rooms in railway terminus (except typical station), shall comply with the prescriptive requirements of the FS Code.

(v) A long adit, apart from forming part of the Place of Safe Passage, also serves as an escape route from the station. It may connect various areas of the station via a series of smoke zones, e.g. platform and concourse or concourse and entrance. The long adit shall be constructed of low combustible materials and finishes due to long travel distance. Setting up of vending machines and concession areas along the long adit or in any of the related lift lobby areas are not desirable. The types, numbers and positions of advertising panels shall be restricted and limited to the minimum in the long adit. Previously agreed requirements for long adit in the West Island Line are listed below for reference:

(a) Non-LCD/Plasma or similar type;

(b) In 4-sheet size [1 115 mm (W) x 1 640 mm (H) x 150 mm (Thick)]; and

(c) The 4-sheet advertising panels will be mounted in pair. Spacing between each pair of advertising panels on the same wall will not be less than 6 m whereas the spacing to the opposite pair will not be less than 4.5 m. They are also designed with almost zero combustibles (metal frame and toughened glass) and comply with high standard of

electrical installation requirements.

2.1.3 Means of Access (MoA)

(i) At least one designated emergency entrance (DEE) and one supplementary emergency entrance (SEE) shall be provided from street level. Additional DEE/SEE may be required due to unique layout or topographic nature.

(ii) Parking spaces for 7 numbers of 12 m long fire appliances shall be provided near the DEE/SEE of the station.

(iii) Every part of the station shall be within the distance of 60 m from the door of the lobby to the Firefighting and Rescue Stairway (FRS) or fireman access point measured along actual passages. Provision of fire separated corridors extending from the FRS as a mitigation measure shall be subject to the acceptance of FSD on a case-by-case basis and other enhancement measures may be required as considered necessary.

(iv) The configuration of the fireman's lift and fireman's staircase shall adhere to the FS Code for FRS. Fireman's lift shall be provided when any above ground floor exceeds 15 m or when any basement floor exceeds 9 m from the mean level of the lowest street.

(v) The fireman's lift and fireman's staircase at the DEE, if required, shall lead from the entrance at ground level to the station control room or fire control room.

(vi) Horizontal MoA route connection by fire separated corridor will be provided between FRS and station control room or fire control room.

(vii) Fire protection facilities such as Fire Services inlets, sprinkler inlets, Fire Services control panels, automatic fire alarm panels, FSD telephone panel and remote unlocking devices will be located in the vicinity of DEE/SEE.

2.1.4 Fire Resisting Construction (FRC)

(i) All elements of construction of the basement as well as fire barriers forming the fire compartment between the ground storey and a basement shall have an FRR of not less than 4 hours. This includes all required staircases serving the basement.

(ii) Fire barriers forming fire compartment walls within basements shall have an FRR of not less than 2 hours.

(iii) Ventilation ducts, ventilation shafts and plenums extending from tunnels or underground areas to discharge outlets shall have an FRR of not less than 4 hours.

(iv) Overhead track extraction ducts along the station trackside shall have an FRR of not less than 2 hours provided that such ducts will not run across any fire compartment with an FRR greater than 2 hours.

(v) Separation at the integrated entrance which leads directly from the adjoining property development area shall be provided with an FRR of not less than 4 hours.

(vi) Doors in openings of compartment walls shall have an FRR of not less than that of the walls.

(vii) All removal panels or dampers provided in the compartment wall or on the floor shall have the same FRR as that of the wall or floor.

(viii) All station non-public areas shall be separated from public areas with a separation having an FRR of not less than 2 hours and each plant room shall form a separate compartment.

(ix) For concession areas, separation walls between cabins and back of the house area as well as the cabin's enclosure walls shall have an FRR of not less than 2 hours.

(x) Transformer and the associated switchboards of different supply sources shall be separated from each other in different fire compartments.

(xi) All transformers and high hazard utilities associated with high fire or electrical hazard should be located in the periphery of the station box at ground floor level as far as practicable, while transformers fed from the internal power transmission network of the railway line have to be located underground due to electrical design considerations. Besides, low-fire-risk transformers should be used in rooms with FRR of not less than 4 hours and equipped with gas flooding protection system.

2.1.5 A checklist of FS Requirements for Station is enclosed at Appendix II for reference.

2.2 Depot

2.2.1 Fire Service Installations (FSI)

***Requirements* – Systems/Installations/Equipment for:**

(i) Automatic actuating devices
(ii) Automatic fixed installation other than water
(iii) Emergency power supply
(iv) Emergency lighting
(v) Exit sign
(vi) Fire alarm system
(vii) Fire control centre
(viii) Fire detection system
(ix) Fire hydrant/hose reel system
(x) Fire Services communication system
(xi) Fireman's lift
(xii) Firefighting and rescue stairway
(xiii) Portable hand-operated approved appliance
(xiv) Pressurization of staircase
(xv) Ring main system with fixed pump
(xvi) Sprinkler system
(xvii) Static or dynamic smoke extraction system
(xviii) Street fire hydrant system
(xix) Special equipment/requirement
(xx) Ventilation/air conditioning control system

Extent

(i) As required by that equipment which requires to be automatically actuated.

(ii) To be provided to areas where the use of water is undesirable for the risk.

(iii) An independently powered generator or dual power supply from two independent primary substations (zone substations) of sufficient electrical capacity to meet the essential services it is required to provide.

(iv) Emergency lighting shall be provided throughout the entire depot and all exit routes leading to the Ultimate Place of Safety. In addition, such lighting shall also be provided to ensure adequate external illumination to permit safe evacuation to the outside of the site boundary.

(v) Sufficient directional and exit signs shall be provided to ensure that all exit routes from any floor/premises within the depot are clearly indicated as required by the configuration of escape routes serving the depot.

(vi) One actuating point and one audio warning device are to be located at each hose reel point. Visual alarm signals shall be provided where necessary in accordance with the current Design Manual - Barrier Free Access. This actuating point should include facilities for starting fire pump and initiating audio/visual warning device.

(vii) Minimum of one, additional to be provided according to the complexity of the depot. It shall normally be located at ground floor level on the main face of the building, preferably

adjacent to the main entrance, and be continuously manned by trained personnel/promptly attended by trained personnel in case of emergency.

(viii) The entire depot area shall be covered by a fire detection system, except above ground lavatory where automatic fixed installation is provided.

(ix) There shall be sufficient fire hydrants (with twin-hydrant outlets or two single-hydrant outlets) and hose reels to ensure that every part of the depot can be reached by a length of not more than 30 m of Fire Services hose and hose reel tubing.

(x) To be provided to enable three separate talk groups of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk radio communication within the depot simultaneously. In addition, the radio coverage shall also be extended to the area within a radius of 50 m from each emergency entrance of the depot at grade level. Direct line telephone housed in a dedicated FSD telephone panel at the entrances of DEE, SEE and trackside EAP shall be provided for communication with the Depot's Operations Control Centre.

(xi) As required by the FS Code.

(xii) As required by the FS Code.

(xiii) As required by the occupancy.

(xiv) (a) Required where:-

(1) natural venting of staircase or open air access route for firemen is not provided;

(2) the cubical extent of the above ground level exceeds 28 000 cubic metres or basement of three or more levels exceeds 7 000 cubic metres; and

(3) the aggregate area of openable windows of rooms/units of the above ground depot does not exceed 6.25% of the floor area of those rooms/units, calculated on a floor by floor basis or such windows are not so situated that effective cross ventilation can be provided.

(b) The number of pressurized staircases to be provided shall be determined by the table stipulated under the definition of "Pressurization of staircase" in Part II of the FSI Code and the number of pressurized staircases required shall not exceed the total number of staircases as required by the FS Code

(xv) To be provided to cover those areas of the building not adequately served by the public water mains.

(xvi) Required to cover all parts of the building within the depot except above ground plant rooms and areas covered by (ii) above.

(xvii) (a) Required for:

(1) any fire compartment of above ground level exceeding 7 000 cubic metres in the building where:

– the aggregate area of openable windows of the compartment does not exceed 6.25% of the floor area of that compartment; or

– such windows are not so situated that effective cross ventilation can be provided; or

(2) any fire compartment exceeding 7 000 cubic metres in the basement with a total floor area exceeding 230 m^2.

(b) Hot smoke test will be required for the following compartments if considered necessary by FSD:

(1) with a headroom of 12 m or more; or

(2) with irregular geometrical dimensions or extraordinary large size or long length.

(xviii) Spacing between fire hydrants should be 100 m staggered on alternate sides of the roadway wherever applicable. Wherever possible, there should be at least two street fire hydrants within the site of the depot concerned and they should be strategically fixed within 30 m as far as possible but not less than 6 m from the designated emergency entrance of the depot they are intended to protect.

(xix) As required by FSD.

(xx) When a ventilation/air conditioning control system to the building is provided, it shall stop the mechanically induced air movement within a designated fire compartment.

Additional Requirements

(i) All linings for acoustic and thermal insulation purposes in ductings and concealed locations shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or equivalent, or be brought up to that standard by use of an

approved fire retardant product.

(ii) All linings for acoustic, thermal insulation and decorative purposes within the protected means of escape shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or equivalent, or be brought up to that standard by use of an approved fire retardant product.

(iii) Any intended storage or use of dangerous goods as defined in Chapter 295 of the Laws of Hong Kong shall make separate application to FSD for approval.

2.2.2 Means of Escape (MoE)

(i) The maximum travel distance in unoccupied areas to the Point of Safety shall not more than 50 m (25 m for dead end situation).

(ii) The maximum travel distance in occupied areas shall comply with the prescriptive requirements of the FS Code.

2.2.3 Means of Access (MoA)

(i) At least one designated emergency entrance (DEE) and one supplementary emergency entrance (SEE) shall be provided from street level. Additional DEE/SEE may be required due to unique layout or topographic nature.

(ii) Parking spaces for 7 numbers of 12 m long fire appliances shall be provided near the DEE/SEE of the station.

(iii) At least two EAPs shall be provided at the perimeter of the

depot. These two points shall lead to a designated EVA within the depot which will enable firemen to reach various areas of the depot.

(iv) A fireman's access route leading from the entrance of DEE at street level to the Depot Control Centre shall be provided.

(v) Every part of the depot shall be within the distance of 60 m from the door of the lobby to the FRS or fireman access point measured along actual passage.

(vi) The configuration of the fireman's lift and fireman's staircase shall adhere to the FS Code for FRS. Fireman's lift shall be provided when any above ground floor exceeds 15 m or when any basement floor exceeds 9 m from the mean level of the lowest street.

(vii) Crossing facilities shall be provided along the fireman's access route from EVA to track areas.

(viii) All crossing facilities shall be hard paved.

(ix) Fire protection facilities such as Fire Services inlets, sprinkler inlets, Fire Services control panels, automatic fire alarm panels, FSD telephone panel and remote unlocking devices will be located in the vicinity of DEE/SEE.

2.2.4 Fire Resisting Construction (FRC)

(i) Every element of construction, compartment wall, compartment floor in the basement and the separation between the depot and the adjoining storey shall have an FRR of not less than 4 hours.

(ii) All offices and plant rooms shall be separated by an element of construction having an FRR of not less than 2 hours from the rest of the depot areas and each plant room shall form a separate compartment.

(iii) Doors in openings of compartment wall shall have an FRR of not less than that of the wall.

(iv) All removal panels or dampers provided in the compartment wall or on the floor shall have the same FRR as that of the wall or floor.

(v) Transformer and the associated switchboards of different supply sources shall be separated from each other in different fire compartments.

(vi) All transformers and high hazard utilities associated with high fire or electrical hazard should be located in the periphery of the building at ground floor level.

2.2.5 A checklist of FS Requirements for Depot/Ancillary Building is enclosed at Appendix III for reference.

2.3 Ancillary Building

2.3.1 Fire Service Installations (FSI)

***Requirements* – Systems/Installations/Equipment for:**

(i) Automatic actuating devices
(ii) Automatic fixed installation other than water
(iii) Emergency power supply
(iv) Emergency lighting
(v) Exit sign
(vi) Fire alarm system
(vii) Fire control centre
(viii) Fire detection system
(ix) Fire hydrant/hose reel system
(x) Fire Services communication system
(xi) Fireman's lift
(xii) Firefighting and rescue stairway
(xiii) Portable hand-operated approved appliance
(xiv) Pressurization of staircase
(xv) Sprinkler system
(xvi) Static or dynamic smoke extraction system
(xvii) Street fire hydrant system
(xviii) Special equipment/requirement
(xix) Ventilation/air conditioning control system

Extent

(i) As required by that equipment which requires to be automatically actuated.

(ii) To be provided to areas where the use of water is undesirable for the risk.

(iii) An independently powered generator or dual power supply from two independent primary substations (zone substations) of sufficient electrical capacity to meet the essential services it is required to provide.

(iv) Emergency lighting shall be provided throughout the entire building and all exit routes leading to the Ultimate Place of Safety.

(v) Sufficient directional and exit signs shall be provided to ensure that all exit routes from any floor/premises within the building are clearly indicated as required by the configuration of escape routes serving the building.

(vi) One actuating point and one audio warning device are to be located at each hose reel point. Visual alarm signals shall be provided where necessary in accordance with the current Design Manual - Barrier Free Access. This actuating point should include facilities for starting fire pump and initiating audio/visual warning device.

(vii) Minimum of one, additional to be provided according to the complexity of the building.

(viii) The entire building area shall be covered by a fire detection system.

(ix) (a) There shall be sufficient fire hydrants (with twin-hydrant outlets or two single-hydrant outlets) and hose reels to ensure that every part of the building can be reached by a length of not more than 30 m of Fire Services hose and hose reel tubing.

(b) When the building is used as the Emergency Access Point (EAP) of underground trackways, the fire hydrant/hose reel system shall also serve the tunnel fire hydrant system.

(x) To be provided to enable three separate talk groups of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk radio communication within the building simultaneously. In addition, the radio coverage shall also be extended to the area within a radius of 50 m from each emergency entrance of the building at grade level. Direct line telephone housed in a dedicated FSD telephone panel at the entrances of DEE, SEE and trackside EAP shall be provided for communication with the Operations Control Centre and Station Control Room.

(xi) As required by the FS Code. In addition, the car of a fireman's lift should have a minimum internal floor area of 1 400 mm x 2 400 mm.

(xii) As required by the FS Code.

(xiii) As required by the occupancy.

(xiv) (a) Required where:

(1) natural venting of staircase or open air access route for firemen is not provided;

(2) the cubical extent of the above ground level exceeds 28 000 cubic metres or basement of three or more levels exceeds 7 000 cubic metres; and

(3) the aggregate area of openable windows of rooms/units of the above ground depot does not exceed 6.25% of the floor area of those rooms/units, calculated on a floor by floor basis or such windows are not so situated that effective cross ventilation can be provided.

(b) The number of pressurized staircases to be provided shall be determined by the table stipulated under the definition of "Pressurization of staircase" in in the Code of Practice for Minimum Fire Service Installations and Equipment Part II of the FSI Code and the number of pressurized staircases required shall not exceed the total number of staircases required by the FS Code.

(xv) To be provided to the entire building except above ground plant rooms and areas covered by (ii) above.

(xvi) (a) Required for:

(1) any fire compartment of above ground level exceeding 7 000 cubic metres in that building where:-

– the aggregate area of openable windows of the compartment does not exceed 6.25% of the floor area of that compartment; or

– such windows are not so situated that effective cross ventilation can be provided; or

(2) any fire compartment exceeding 7 000 cubic metres in the basement with a total floor area exceeding 230 m^2.

(b) Hot smoke test will be required for the following compartments if considered necessary by FSD:

(1) with a headroom of 12 m or more; or

(2) with irregular geometrical dimensions or extraordinary large size or long length.

(xvii) Spacing between fire hydrants should be 100 m staggered on alternate sides of the roadway wherever applicable. Wherever possible, there should be at least two street fire hydrants within the site of the ancillary building concerned and they should be strategically fixed within 30 m as far as possible but not less than 6 m from the designated emergency entrance of the ancillary building they are intended to protect.

(xviii) As required by FSD.

(xix) When a ventilation/air conditioning control system to the building is provided, it shall stop the mechanically induced air movement within a designated fire compartment.

Additional Requirements

(i) All linings for acoustic and thermal insulation purposes in ductings and concealed locations shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or equivalent, or be brought up to that standard by use of an approved fire retardant product.

(ii) All linings for acoustic, thermal insulation and decorative purposes within the protected means of escape shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard

476: Part 7 or equivalent, or be brought up to that standard by use of an approved fire retardant product.

(iii) In general, dangerous goods shall not be used or stored in ancillary buildings. Any intended use or storage of dangerous goods as defined in Chapter 295 of the Laws of Hong Kong shall make separate application to FSD for approval.

2.3.2 Means of Escape (MoE)

(i) The maximum travel distance in unoccupied areas to the Point of Safety shall not be more than 50 m (25 m for dead end situation).

(ii) The maximum travel distance in occupied areas shall comply with the prescriptive requirements of the FS Code.

2.3.3 Means of Access (MoA)

(i) Parking spaces for 7 numbers of 12 m long fire appliances shall be provided near the DEE of the building.

(ii) A fireman's access route leading from the entrance at street level to the fire control room shall be provided at the DEE.

(iii) Every part of the building shall be within the distance of 60 m from the door of the lobby to the FRS or a fireman access point measured along actual passage.

(iv) The configuration of the fireman's lift and fireman's staircase shall adhere to the FS Code for FRS. Fireman's lift shall be provided when any above ground floor exceeds 15 m or when

any basement floor exceeds 9 m from the mean level of the lowest street.

(v) Fire protection facilities such as Fire Services inlets, sprinkler inlets, Fire Services control panels, automatic fire alarm panels, FSD telephone panel and remote unlocking devices will be located in the vicinity of DEE.

2.3.4 Fire Resisting Construction (FRC)

(i) Every element of construction, compartment wall, compartment floor in the basement and the separation between the basement and the adjoining storey shall have an FRR of not less than 4 hours.

(ii) Ventilation ducts, ventilation shafts and plenums extending from tunnels or underground areas to discharge outlets shall have an FRR of not less than 4 hours.

(iii) Doors in openings of compartment walls shall have an FRR of not less than that of the walls.

(iv) All removal panels or dampers provided in the compartment wall or on the floor shall have the same FRR as that of the wall or floor.

2.3.5 A checklist of FS Requirements for Depot/Ancillary building is enclosed at Appendix III for reference.

2.4 Trackside Area

2.4.1 Fire Service Installations (FSI)

***Requirements* – Systems/Installations/Equipment for:**

(i) Closed circuit television system

(ii) Emergency power supply

(iii) Emergency lighting

(iv) Exit sign

(v) Fire Services communication system

(vi) Trackside fire hydrant system

(vii) Special equipment/requirements

(viii) Tunnel ventilation system

Extent

(i) To be provided at the track level at each Emergency Access Point (EAP) of a long or deep underground tunnel such that firemen can have a visual observation of the tunnel situation before getting into the tunnel.

(ii) An independently powered generator or dual power supply from two independent primary substations (zone substations) of sufficient electrical capacity to meet the essential services it is required to provide.

(iii) (a) Emergency lighting shall be provided throughout the entire trackway and all exit routes leading to the Ultimate Place of Safety.

(b) Illumination levels of trackside emergency lighting which shall be provided at strategic locations are as follows:

(1)	Evacuation walkway	: 5 lux (minimum)
(2)	Hydrant location	: 10 lux (minimum)
(3)	Signage location	: 20 lux (minimum)
(4)	Ramp and cross passage	: 10 lux (minimum)
(5)	Power socket	: 1.6 lux (minimum)

(iv) (a) Sufficient directional (reflective type) and exit signs (hidden type) shall be provided along the evacuation walkway and all exit routes leading to the Ultimate Place of Safety.

(b) Directional signs (reflective type) indicating the direction of the station or portal shall be provided throughout the entire trackway at 25 m intervals.

(v) (a) To be provided to enable three separate talk groups of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk radio communication within each station and its associated trackside area simultaneously. In addition, the radio coverage shall also be extended to the area within a radius of 50 m from any emergency entrance at grade level.

(b) Emergency telephones connected directly to the Operations Control Centre (OCC) shall be provided in suitable locations including any cross-passages and trackway access points.

(vi) To be provided throughout the tunnel or viaduct with twin-hydrant outlets or two single-hydrant outlets at 60 m

intervals and located on the same side of the elevated evacuation/fireman's walkway.

(vii) As required by FSD.

(viii) (a) To be provided inside tunnel or enclosed trackway, to maintain a smoke free path for emergency evacuation and fireman's access in case of fire. For longitudinal type tunnel ventilation system, sufficient critical velocity shall be maintained to prevent the back-layering of smoke and control the direction of smoke movement inside the tunnel. Dynamic smoke extraction systems shall be provided for underground trackway next to the platform to prevent smoke from spreading to platforms and other tunnel sections. Besides, a separate smoke zone with the smallest possible size should be assigned to the crossover and its adjoining tunnel sections to prevent smoke from spreading to other unaffected areas unless it can be demonstrated that smoke will not spread to adjacent tunnel(s) through the crossover.

(b) The tunnel ventilation system should be so designed that a positive airflow from a non-incident tunnel to an incident tunnel through cross-passage doors located at the down-stream of the fire should be maintained to avoid smoke spread when those doors are opened for evacuation.

Additional Requirements

(i) All linings for acoustic and thermal insulation purposes in ductings and concealed locations shall be of Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or equivalent, or be brought up to that standard by use of an

approved fire retardant product.

(ii) All cable installations inside tunnel shall be of low smoke zero halogen type and fire retardant. Cable for fire service installations shall be fire resistant and comply with section 5.15 and Appendix 6 of the FSI Code.

2.4.2 Means of Escape (MoE)

(i) Within underground or enclosed trackways, the maximum distance between exits shall not exceed 762 m. Otherwise, cross-passages shall be provided.

(ii) Cross-passages shall be permitted to be used in lieu of emergency exit stairways to the surface where trackways in tunnels are divided by walls having an FRR of not less than 4 hours or where trackways are in twin bores

(iii) Cross-passages shall not normally be farther than 244 m apart from each other and from the station or tunnel portal.

(iv) Cross-passages shall have a minimum of 1 800 mm in clear width and 2 200 mm in clear height.

(v) If any locking device is installed at the cross-passage door, a manual override device for unlocking the door shall be provided at the entrance of each cross-passage and the locking device shall be of fail-safe design.

(vi) Provisions shall be made for evacuating passengers via the non-incident trackway to a nearby station or other emergency exits.

(vii) Evacuation side walkway which is also used as fireman's walkway shall be provided throughout the entire trackway leading to the place of safety and shall have a minimum clear width of 850 mm and a clear height of 2 200 mm. The design of the side walkway shall take into account the floor height and stepping distance from all types of train using the tunnel. In general, the vertical step height shall be no greater than 250 mm and the horizontal step distance shall be no more than 200 mm for a typical straight section. Any change in level should be achieved by ramps with a gradient not steeper than 1 in 12. Please see Figure 1 for reference.

2.4.3 Means of Access (MoA)

(i) Access to the trackway shall be from the station or EAP.

(ii) EAP shall be at regular intervals along the trackway and the maximum distance between each EAP shall not exceed 1 km. In the case of tunnels going under the sea, under a mountain, or through areas where vehicular access cannot be arranged, distance between EAPs can be extended with appropriate mitigation measures in place such as Emergency Rail Bus (ERB) or Backup Access Vehicle (BAV).

(iii) The configuration of fireman's lift and fireman's staircase shall adhere to the FS Code for FRS. Fireman's lift shall be provided when any viaduct exceeds 15 m in height or when any underground tunnel exceeds 9 m in depth from the mean level of the lowest street.

(iv) Fireman's side walkway which is also used as evacuation walkway shall be provided throughout the entire trackway

leading to the place of safety and shall have a minimum clear width of 850 mm and a clear height of 2 200 mm. In the case of a short extension, e.g. West Island Line and Kwun Tong Line Extension, to the existing urban lines, the existing evacuation arrangements of the original line can be adopted.

(v) There shall be an access path at approximately the same level as the railway and on the side opposite to the evacuation/fireman's side walkway. The path shall be free of obstruction, at least 450 mm wide at foot level, 800 mm wide at shoulder level and 2 000 mm high. This path will be used for maintenance purpose under normal situation and can be used as an access for rescue purpose in case of emergency. Please see Figure 1 for reference.

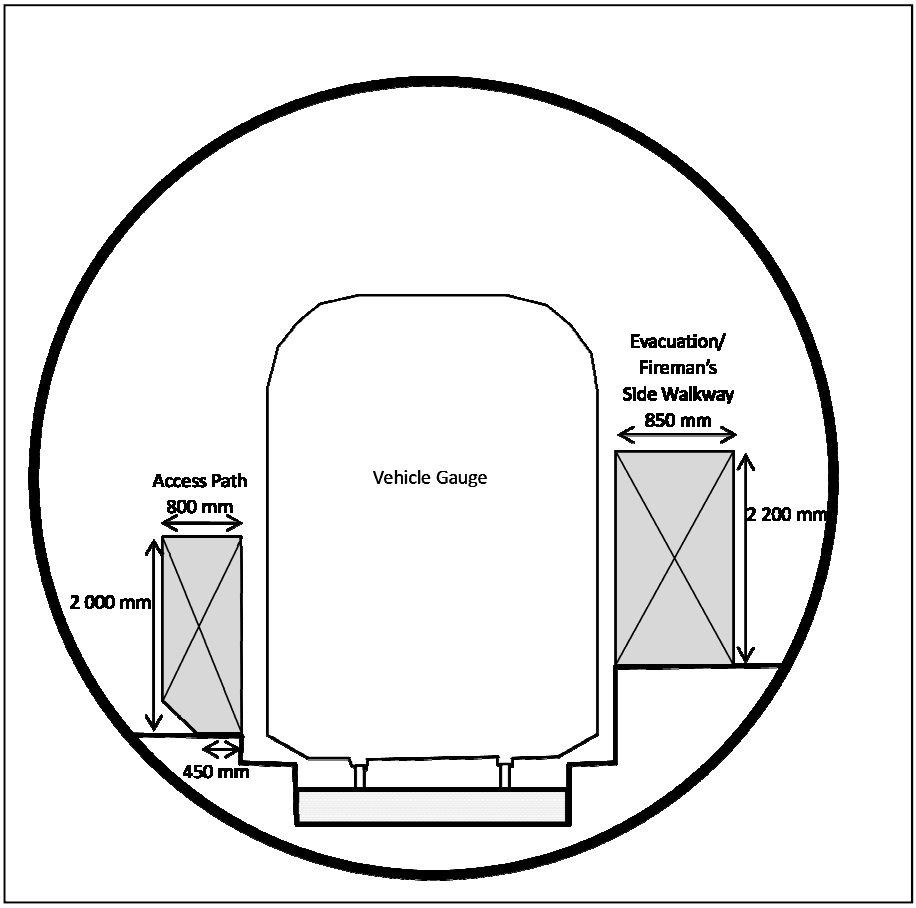

Figure 1: Tunnel evacuation/fireman's side walkway and access space

2.4.4 Fire Resisting Construction (FRC)

(i) Elements of construction of underground trackway and box structure shall have an FRR of not less than 4 hours.

(ii) Partition walls and associated doors between underground trackways shall have an FRR of not less than 4 hours.

(iii) 4-hour fire separation shall be maintained between uptrack and downtrack tunnels. If for any reasons a 4-hour FRR partition wall could not be provided, justifications and mitigation

measures shall be provided.

(iv) Should proper fire separation at crossover section could not be achieved, mitigation measure(s) with sufficient justification to prevent smoke spreading at the crossover shall be in place.

2.4.5 A checklist of FS Requirements for Trackside Area is enclosed at Appendix IV for reference.

Appendix I

Cabin Concept for Concession Area in Station

1. Background

1.1 "Cabin Concept" has been adopted for the fire safety design in a number of developments, such as Osaka Bay International Airport in Japan, Stansted International Airport in London, Hong Kong International Airport and railway stations in Hong Kong. The basic principle of "Cabin Concept" is to provide protection to high fire load areas while allowing flexibility in the use of large space without physical compartment walls.

1.2 Shops or concession areas are generally provided at station concourses of new railway stations for the convenience of commuters. Open type cabin concept is commonly applied to concession areas because these areas are identified as areas of higher fire load and fire risk as compared to general station circulation areas.

2. Design Parameters

2.1 Open type cabin concept relies on a combination of fire detection, sprinkler and smoke extraction systems. A sketch of the cabin concept is provided in Figure 2. For concession areas design using the cabin concept, the provisions are:

(i) fire detection and alarm systems;
(ii) sprinkler system with fast response type sprinkler heads;
(iii) sprinkler apron between the station areas and the shop areas to protect shopfronts;
(iv) fire rated smoke bulkhead to contain smoke above the apron of concession areas is to be fixed at 15^{o} from shop demise (shutter) line;
(v) dedicated smoke extraction system which is independent of the smoke extraction system for the station public areas; and
(vi) portable hand-operated approved appliances.

2.2 A fire within a cabin shall be detected at an early stage by a smoke detector at ceiling level. This shall automatically switch on the smoke extraction system. The cabin shall be fitted with smoke barriers at its boundaries to create a reservoir to prevent the smoke from spreading outside the cabin. Under the protection of the sprinkler system, the fire occurred inside the cabin shall be limited to a design fire size of not exceeding 2 MW.

2.3 In general, the maximum area of a single cabin shall not exceed 100 m^2. A dedicated smoke extraction system, which is independent of the smoke extraction system for the station public areas, shall be provided for the open cabin. The protected area may be a single concession area or a group of concession areas served by a common smoke reservoir. One smoke reservoir will serve a maximum area of 100 m^2 cabin zone. However, one smoke extraction system may serve several cabin zones without exceeding a total smoke zone area of 2 000 m^2.

2.4 The separation walls between different cabin zones and other back-of-house areas will be in full height with an FRR of not less than 1 hour and 2 hours respectively. Non-full

height separation wall of not lower than the designed smoke clear height with an FRR of not less than 1 hour is allowed for separating different concession areas within the same cabin zone while sharing the same smoke reservoir. The enclosure wall, if any, separating the concession area and station public area, will have an FRR of not less than 2 hours. The shopfront will not have any fire rated separation provision under open cabin design. However, a passage having a minimum width of 6 m in the front of the concession area measuring from the shop demise line should be maintained.

2.5 Apart from the above provisions, only trades approved by SSCC shall be permitted in the concession areas. All trading activities shall be contained within the protected concession area (cabin) and no combustibles are allowed to be placed or protruded out of the designated shopfront area.

2.6 Practical smoke tests shall be carried out in the cabin to the satisfaction of FSD.

2.7 The previously agreed trade list is enclosed in Appendix V for reference. Future trade list should be agreed on a case-by-case basis.

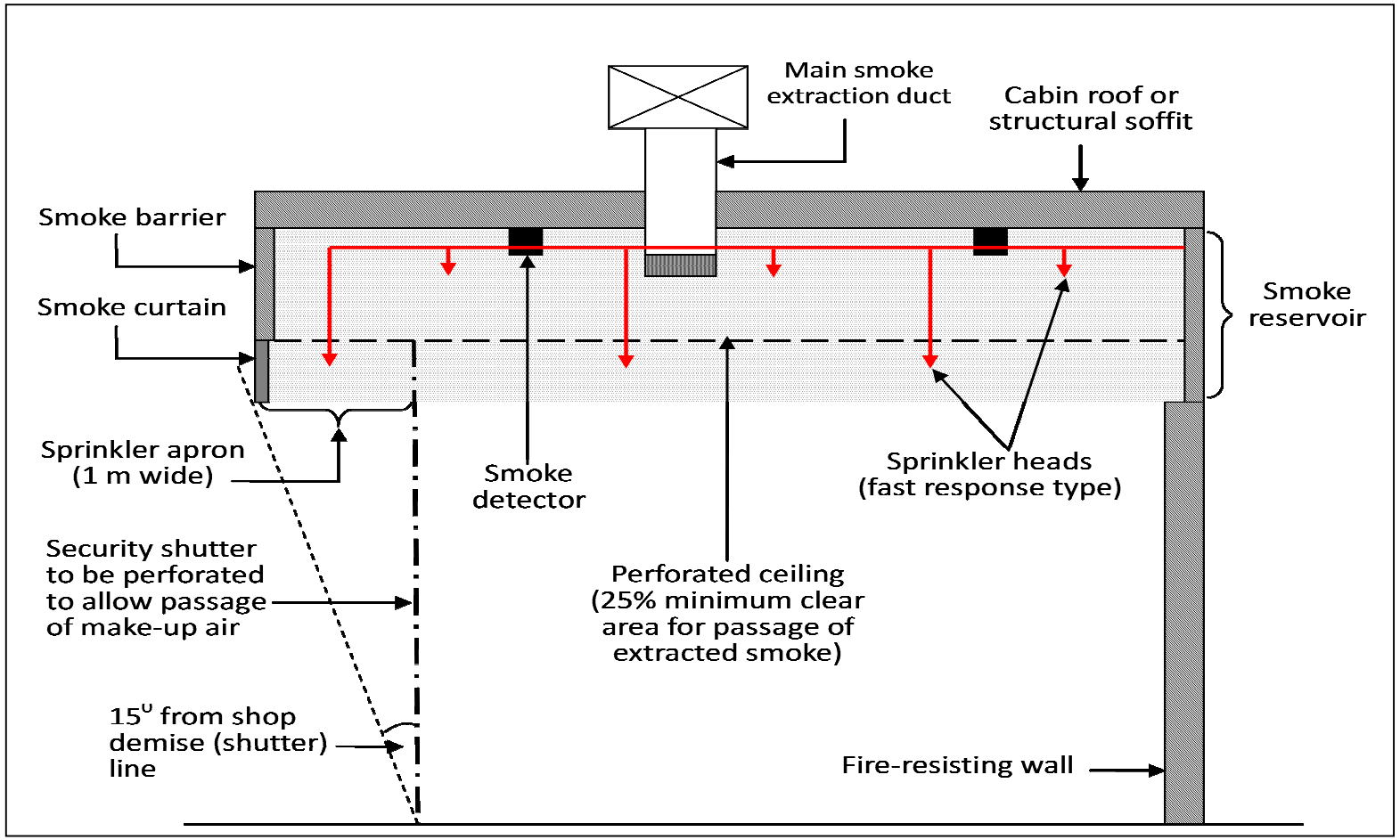

Figure 2: Sketch of the Cabin Concept

Checklist of FS Requirements for Station
(for reference only)

(*Please refer to FSI Code, relevant Standards and Circular Letters for details*)

1	**Audio/Visual Advisory System**		
A	Flashing exit signs / directional signs	Shall be provided in station public areas as part of audio/visual advisory system to direct passengers towards the designated exits.	☐
2	**Automatic Actuating Devices**		
A	Fire Shutter	(i) Having a sufficient fire resisting rating	☐
		(ii) Provided with smoke detector(s) and manual control device(s) on both sides of the openings for automatic and manual operation respectively	☐
		(iii) The detectors shall be installed in accordance with LPC Rules for Automatic Fire Detection and Alarm Installations for the Protection of Property and BS 5839: Part 1: 2002+A2:2008 and FSD Circular Letter No. 1/2009 and No. 3/2010	☐
3	**Automatic Fire Detection**		
A	All fire alarm signals including fire detectors, flow switches and manual fire alarm	(i) Shall be linked to CFATS by a direct telephone line	☐
		(ii) Repeated to SCR/FCR of station	☐
B	An 'Acknowledgement' and 'Confirm' button	Shall be provided on the local Integrated Backup Control Panel	☐
C	Automatic fire alarm panel	(i) Provided in SCR/FCR to receive all fire alarm signals of the entire station including smoke detectors, heat detectors, break-glass units and flow switches	☐
		(ii) All fire alarm signals shall be repeated to AFA panels at DEE, SEE and OCC	☐
D	Automatic fire detection	Shall be addressable (BS 5839: part 1: 2002 + A2: 2008 and FSD Circular Letter No. 1/2009 and No. 3/2010)	☐
4	**Automatic Sprinkler System**		
A	Automatic fixed	Provided for areas where the use of water is	☐

Checklist of FS Requirements for Station
(for reference only)

	installations other than water	undesirable for the occupancy (section 4.4(ii) of FSI Code)	
B	Automatic sprinkler system (OH III)	Provided for all areas of the station except above ground plant rooms (section 5.24 of the FSI Code, LPC Rules for Automatic Sprinkler Installations incorporating BS EN 12845:2003 and FSD Circular Letter No. 3/2006 and No. 3/2012)	☐
C	Fast response type sprinkler heads	Provided for all underground sprinkler protected areas	☐
D	Re-cycling pre-action sprinkler system	Comply with LPC Rules for Automatic Sprinkler Installations incorporating BS EN 12845:2003 and FSD Circular Letter No. 3/2006 and No. 3/2012	☐
E	Sprinkler alarm	(i) Linked to CFATS by a direct telephone line (ii) All sprinkler alarm signals shall also be transmitted to the fire control panel in SCR & FCR and repeated to AFA panels at DEE, SEE and OCC	☐ ☐
F	Sprinkler inlets	Provided at DEE/SEE and be interconnected	☐
G	Sprinkler pumps (one duty & one standby) and one jockey pump	Provided in Sprinkler Pump Room	☐
H	Water tank	(i) Sufficient Capacity (e.g. 124 m^3) (ii) Single end feed water supply	☐ ☐
5	**Emergency Lighting**		
A	All batteries in UPS room	comply with BS 6290 Part 4	☐
B	Emergency lighting	(i) Backed up by UPS and capable of maintaining function for a period of not less than 2 hours in case of power failure (ii) Provided throughout the station and all exit routes leading to place of ultimate safety (BS 5266: Part 1, BS EN 1838 and section 5.9 of FSI Code	☐ ☐
C	Independent mechanical	Shall be provided as stipulated in section 8, Part XI of	☐

Checklist of FS Requirements for Station
(for reference only)

	ventilation system	FSD Circular Letter No. 4/1996	
6	**Emergency Power Supply**		
A	Dual feed power supply from two independent primary substations (zone substation)	(i) Capable of supporting all essential services running simultaneously (ii) Single point of failure shall be avoided by means of separate routing for distance separation, or by means of FRR and mechanical separation	☐ ☐
B	Transformer and the associated switchboards of different supply sources	Separated from each other in different fire compartments	☐
7	**Exit Signs / Directional Exit Signs**		
A	All exit signs in non-public areas	Internally illuminated with English and Chinese character of not less than 125 mm high with 15 mm wide strokes (section 5.10 of FSI Code and FSD Circular Letter No. 5/2008)	☐
B	All exit signs / directional exit signs in public areas	(i) Shall be of flashing type and internally illuminated. (ii) Shall be switched on and flashing to indicate the appropriate exit route to the place of ultimate safety during emergency evacuation. (iii) Hidden-type flashing exit signs shall be provided for the escalators which normally run counter to the direction of escape	☐ ☐ ☐
C	Exit signs / directional exit signs	(i) Backed up by UPS and capable of maintaining function for a period of not less than 2 hours in case of power failure (ii) Provided throughout the station (iii) Provided to ensure all exit routes from any area within the station are clearly indicated as required by the configuration of escape routes serving the station	☐ ☐ ☐
8	**Fire Alarm System**		

Checklist of FS Requirements for Station
(for reference only)

A	Fire alarm bells	(i) Provided at back-of-house areas except SCR, FCR and fire separated corridor.	☐
		(ii) For station public areas, all fire alarm signals shall be connected to the PA system for fire evacuation announcement.	☐
B	Manual fire alarm system	(i) As an integral part of the fire detection system and linked with CFATS via direct telephone line	☐
		(ii) Provided throughout the station and incorporated into each hose reel point of the FH/HR system	☐
		(iii) The actuation point shall start the fire pump and initiate alarm bells in non-public area	☐
9	**Fire Hydrant/Hose Reel System**		
A	Fixed fire pumps (one duty & one standby) and one jockey pump located at FS Pump Room	Maintain a system running pressure between 350 kPa and 850 kPa with an aggregate flow of not less than 1350 litres/minute from any three fire hydrant outlets i.e. each with a flow of not less than 450 litres/minute at a running pressure of not less than 350 kPa operating simultaneously	☐
B	Fire hydrant/hose reel system	All areas in the station can be reached by a length of not more than 30 m of Fire Services hose and hose reel tubing (section 5.14 of FSI Code)	☐
C	Fire hydrant outlets	(i) Each rising main shall be connected to an independent Fire Service inlet	☐
		(ii) Provided in fireman's staircases	☐
		(iii) Where there are several rising mains in the system, such inlets shall be interconnected	☐
D	Fire main	Fitted with twin hydrant outlets or two single outlets and individually controlled by a wheel-operated screw valve	☐
E	Fire pumps	started by actuation of break-glass unit at any hose	☐

		reel point or a fall in water pressure of any fire hydrant outlet	
F	Fire Service inlets	(i) Provided at DEE and SEE (ii) All Fire Service inlets shall be interconnected	☐ ☐
G	Intermediate booster pump	Capable of maintaining sufficient pressure and flow (section 5.14 of FSI Code)	☐
H	Motorized isolation valve	(i) Normally opened and located at the headwall and tailwall units of the station (ii) Remote open/closed status indication of MIV shall be provided at SCR / FCR	☐ ☐
I	Self-contained pressure reducing type fire hydrant(s) or pressure reducing valve	Provided whenever the system pressure at any fire hydrant outlet exceeds 850 kPa	☐
J	Water supply	(i) Provided from 2 separate sources (ii) Provided as indicated on plans to serve the tunnel fire hydrants of long turnback and refuge siding tunnel (iii) All tunnel and station Fire Service inlets shall be interconnected	☐ ☐ ☐
K	Water tank	Sufficient Capacity (e.g. 36 m^3)	☐
10	**Fire Resisting Cable for Fire Service Installations**		
		Comply with section 5.15 and Appendix 6 of the FSI Code	☐
11	**Fire Services Communication System**		
A	Digital Trunked Radio System (DTRS)	(i) Equipped with at least one base station with one carrier (i.e. one control channel and three voice channels) to enable 3 separate talkgroups of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk mode radio communication at the enclosed area of the station	☐

Checklist of FS Requirements for Station
(for reference only)

		(ii)	Radio coverage shall also be extended to a range within the radius of 50m from DEE/SEE of the station at grade level	☐
B	Telephone panels	(i)	For dedicated use by FSD personnel to communicate with SCR or FCR of stations and OCC	☐
		(ii)	shall be provided at DEE/SEE of the station at grade level	☐
		(iii)	Telephone is available in the headwall & tailwall units for railway operation which can be used for communication between SCR/FCR/OCC.	☐
12	**Fireman's Lift**			
			shall be provided and marked as 'A' on plan	☐
13	**FM200 Gas Flooding Fire Extinguishing System**			
A	FM200 gas flooding fire extinguishing system	(i)	Installed in accordance with NFPA 2001	☐
		(ii)	Provided with smoke detectors of cross-zoned arrangement for the protected area for automatic operation	☐
		(iii)	Provided with a manual release unit at the entrance of the protected area for emergency manual operation	☐
14	**Portable Hand-operated Approved Appliance**			
			Provided for all plant rooms and the locations as indicated on plans	☐
15	**Pressurization of Staircase**			
A	Mechanical ventilation (Pressurization)		Provided for the fireman's staircases and corresponding staircase lobbies and fireman's lift lobbies (FS Code)	☐
B	Staircase pressurization system		Provided as indicated on plans in accordance with the latest edition of BS 5588: Part 4, section 5.21 of FSI Code and FSD Circular Letter No. 2/2006	☐
16	**Smoke Extraction System**			

Checklist of FS Requirements for Station
(for reference only)

A	Mechanical smoke extraction system	(i) Provided for station public areas and concession areas (sections 2.2 and 5.23 of the FSI Code) (ii) The smoke extraction system shall be activated by any two smoke detectors or sprinkler of the incident smoke zone.	☐ ☐
17	**Ventilation / Air Conditioning Control System**		
A	Ventilation / air conditioning control panel	Provided in SCR and FCR of the station	☐
B	Ventilation / air conditioning control system	Comply with section 5.27 of the FSI Code and FSD Circular Letter No. 2/2005	☐
18	**Requirements (Additional)**		
A	All linings for acoustic and thermal insulation purposes in ducting and concealed locations	Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product	☐
B	All linings for acoustic, thermal insulation and decorative purposes within protected means of escape	Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product	☐
C	No dangerous goods shall be used or stored	Any intended storage or use of dangerous goods as defined in Chapter 295 of the Laws of Hong Kong shall be separately notified to the Director of FSD	☐
D	Glazing (solar control tempered glass panel)	(i) Shall not be of type which melts and forms burning droplets under fire situation. (ii) When it is shattered, it does not form sharp and harmful pieces.	☐ ☐

Checklist of FS Requirements for Depot/Ancillary Building
(for reference only)

(*Please refer to FSI Code, relevant Standards and Circular Letters for details*)

1	**Automatic Actuating Devices**			
A	Fire Shutter	(i)	Having a sufficient fire resisting rating	☐
		(ii)	Provided with smoke detector(s) and manual control device(s) on both sides of the openings for automatic and manual operation respectively	☐
		(iii)	The detectors shall be installed in accordance with LPC Rules for Automatic Fire Detection and Alarm Installations for the Protection of Property and BS 5839: Part 1: 2002+A2:2008 and FSD Circular Letter No. 1/2009 and No. 3/2010	☐
2	**Automatic Fire Detection**			
A	All fire alarm signals including fire detectors, flow switches and manual fire alarm	(i)	Shall be linked to CFATS by a direct telephone line	☐
		(ii)	Repeated to SCR/FCR of station(s) and FCR of depot/ancillary building and OCC	☐
B	Automatic fire alarm panel	Provided in FCR to receive all fire alarm signals of the entire depot/ancillary building including smoke detectors, heat detectors, break-glass units and flow switches		☐
C	Automatic fire detection	Shall be addressable (BS 5839: part 1: 2002 + A2: 2008 and FSD Circular Letter No. 1/2009 and No. 3/2010)		☐
3	**Automatic Sprinkler System**			
A	Automatic fixed installations other than water	Provided for areas where the use of water is undesirable for the occupancy (section 4.4(ii) of FSI Code)		☐
B	Automatic sprinkler system (OH III)	Provided for all areas of the depot/ancillary building except above ground plant rooms (section 5.24 of the FSI Code, LPC Rules for		☐

Checklist of FS Requirements for Depot/Ancillary Building
(for reference only)

		Automatic Sprinkler Installations incorporating BS EN 12845:2003 and FSD Circular Letter No. 3/2006 and No. 3/2012)	
C	Fast response type sprinkler heads	Provided for all underground sprinkler protected areas	☐
D	Re-cycling pre-action sprinkler system	Comply with LPC Rules for Automatic Sprinkler Installations incorporating BS EN 12845:2003 and FSD Circular Letter No. 3/2006 and No. 3/2012	☐
E	Sprinkler alarm	(i) Linked to CFATS by a direct telephone line (ii) All sprinkler alarm signals shall also be transmitted to the fire control panel in SCR/FCR of station(s) and FCR of depot/ancillary building and repeated to OCC	☐ ☐
F	Sprinkler inlets	Shall be interconnected	☐
G	Sprinkler pumps (one duty & one standby) and one jockey pump	Provided in Sprinkler Pump Room	☐
H	Water tank	(i) Sufficient Capacity (e.g. 124 m^3) (ii) Single end feed water supply	☐ ☐
4	**Emergency Lighting**		
A	All batteries in UPS room	comply with BS 6290 Part 4	☐
B	Emergency lighting	(i) Backed up by UPS and capable of maintaining function for a period of not less than 2 hours in case of power failure (ii) Provided throughout the depot/ancillary building and all exit routes leading to place of ultimate safety (BS 5266: Part 1, BS EN 1838 and section 5.9 of FSI Code)	☐ ☐
C	Independent mechanical ventilation system	Shall be provided as stipulated in section 8, Part XI of FSD Circular Letter No. 4/1996	☐
5	**Emergency Power Supply**		
A	Dual feed power supply from	(i) Capable of supporting all essential services	☐

Checklist of FS Requirements for Depot/Ancillary Building
(for reference only)

	two independent primary substations (zone substation)		running simultaneously	
		(ii)	Single point of failure shall be avoided by means of separate routing for distance separation, or by means of FRR and mechanical separation	☐
B	Transformer and the associated switchboards of different supply sources	separated from each other in different fire compartments		☐
6	**Exit Signs / Directional Exit Signs**			
A	Exit signs / directional exit signs	(i)	Backed up by UPS and capable of maintaining function for a period of not less than 2 hours in case of power failure	☐
		(ii)	Provided throughout the depot/ancillary building (section 5.10 of FSI Code and FSD Circular Letter No. 5/2008)	☐
		(iii)	Provided to ensure all exit routes from any area within the depot/ancillary building are clearly indicated as required by the configuration of escape routes serving the depot/ancillary building	☐
7.	**Fire Alarm System**			
A	Manual fire alarm system	(i)	As an integral part of the fire detection system and linked with CFATS via direct telephone line	☐
		(ii)	Provided throughout the depot/ancillary building and incorporated into each hose reel point of the FH/HR system	☐
		(iii)	The actuation point shall start the fire pump and initiate audio warning device	☐
8	**Fire Hydrant/Hose Reel System**			
A	Fire hydrant/hose reel system	All areas in the depot/ancillary building can be reached by a length of not more than 30 m of Fire		☐

Checklist of FS Requirements for Depot/Ancillary Building
(for reference only)

		Services hose and hose reel tubing (section 5.14 of FSI Code)	
B	Fire hydrant outlets	(i) Each rising main shall be connected to an independent Fire Service inlet	☐
		(ii) Provided in fireman's staircases	☐
		(iii) Where there are several rising mains in the system, such inlets shall be interconnected	☐
C	Fire pumps	Started by actuation of break-glass unit at any hose reel point or a fall in water pressure of any fire hydrant outlet	☐
D	Fixed fire pumps (one duty & one standby) and one jockey pump located at FS Pump Room	Maintain a system running pressure between 350 kPa and 850 kPa with an aggregate flow of not less than 1350 litres/minute from any three fire hydrant outlets i.e. each with a flow of not less than 450 litres/minute at a running pressure of not less than 350 kPa operating simultaneously	☐
E	Fire Service inlets	Provided at the locations on plans	☐
F	Fire main	Fitted with twin hydrant outlets or two single outlets and individually controlled by a wheel-operated screw valve	☐
G	Intermediate booster pump	Capable of maintaining sufficient pressure and flow (section 5.14 of FSI Code)	☐
H	Motorized isolation valve (MIV)	(i) Normally opened and located at the MIV cabinet	☐
		(ii) Remote open/closed status indication of MIV shall be provided at the SCR/FCR of station(s) and the FCR of depot/ancillary building.	☐
I	Self-contained pressure reducing type fire hydrant(s) or pressure reducing valve	Provided whenever the system pressure at any fire hydrant outlet exceeds 850 kPa	☐
J	Water tank	Sufficient Capacity	☐

Checklist of FS Requirements for Depot/Ancillary Building
(for reference only)

9	**Fireman's Lift**			
A	Fireman's lift	shall be provided and marked as 'A' on plan		☐
10	**Fire Resisting Cable for Fire Service Installations**			
		Comply with section 5.15 and Appendix 6 of the FSI Code		☐
11	**Fire Services Communication System**			
A	Digital Trunked Radio System (DTRS)	(i)	Equipped with at least one base station with one carrier (i.e. one control channel and three voice channels) to enable 3 separate talkgroups of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk mode radio communication at the enclosed area of the depot/ancillary building	☐
		(ii)	Radio coverage shall also be extended to a range within the radius of 50 m from DEE/EAP of the depot/ancillary building at grade level	☐
B	Telephone panels	(i)	For dedicated use by FSD personnel to communicate with FCR of depot/ancillary building and OCC	☐
		(ii)	shall be provided at DEE/EAP of the depot/ancillary building at grade level	☐
12	**FM200 Gas Flooding Fire Extinguishing System**			
A	FM200 gas flooding fire extinguishing system	(i)	Installed in accordance with NFPA 2001	☐
		(ii)	Provided with smoke detectors of cross-zoned arrangement for the protected area for automatic operation	☐
		(iii)	Provided with a manual release unit at the entrance of the protected area for emergency manual operation	☐
13	**Portable Hand-operated Approved Appliance**			

Checklist of FS Requirements for Depot/Ancillary Building
(for reference only)

		Provided for all plant rooms and the locations as indicated on plans	☐
14	**Pressurization of Staircase**		
A	Mechanical ventilation (Pressurization)	Provided for the fireman's staircases and corresponding staircase lobbies and fireman's lift lobbies (FS Code)	☐
B	Staircase pressurization system	Provided as indicated on plans in accordance with the latest edition of BS 5588: Part 4, section 5.21 of FSI Code and FSD Circular Letter No. 2/2006	☐
15	**Ventilation / Air Conditioning Control System**		
A	Ventilation / air conditioning control system	Comply with section 5.27 of the FSI Code and FSD Circular Letter No. 2/2005	☐
B	Ventilation / air conditioning control panel	Provided in FCR of the depot/ancillary building	☐
16	**Requirements (Additional)**		
A	All linings for acoustic and thermal insulation purposes in ducting and concealed locations	Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product	☐
B	All linings for acoustic, thermal insulation and decorative purposes within protected means of escape	Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product	☐
C	No dangerous goods shall be used or stored	Any intended storage or use of dangerous goods as defined in Chapter 295 of the Laws of Hong Kong shall be separately notified to the Director of FSD	☐

Checklist of FS Requirements for Trackside Area
(for reference only)

(*Please refer to FSI Code, relevant Standards and Circular Letters for details*)

1	**Electrical Power Points**		
A	Water-proof type power socket outlets	(i) 13A/240V or 220VAC	☐
		(ii) Permanent type and no additional adapter would be required for F.S. equipment	☐
		(iii) Provided at a maximum interval of 120m along the running track, at headwall and tailwall units of each platform end and the fireman's trackside access points to tunnels.	☐
2	**Emergency Lighting**		
A	Emergency lighting	(i) Provided throughout the entire trackside areas (BS 5266: Part 1, BS EN 1838 and section 5.9 of FSI Code)	☐
		(ii) Dual feed power supply	☐
		(iii) Automatically switched on when there is tripping of power supply of the overhead line and could also be switched on by OCC in case of emergency for the entire trackside	☐
B	Emergency lighting for tunnel / viaducts with noise enclosure	Backed up by UPS and capable of maintaining function for a period of not less than 2 hours in case of power failure	☐
C	Emergency lighting for at grade / elevated sections	Fed from essential power supply of adjacent stations	☐
D	Manual local control switches	Provided at the headwall and tailwall units of station(s) and at the trackside access point of ancillary buildings / overrun tunnel	☐
E	Remote control switches	Provided for each tunnel section inside SCR/FCR of station(s)	☐
F	The standard of luminance level	Evacuation and access walkway - 5 lux (min)	☐
		Hydrant location - 10 lux (min)	☐
		Signage location - 20 lux (min)	☐
		Ramp, steps and cross passage - 10 lux (min)	☐

Checklist of FS Requirements for Trackside Area
(for reference only)

		Power socket - 1.6 lux (min)	☐
3	**Exit Signs / Directional Exit Signs**		
A	Exit signs	Provided throughout the trackside areas (section 5.10 of FSI Code and FSD Circular Letter No. 5/2008)	☐
B	Hidden-type exit signs	(i) Provided above or beside the unlocked cross-wall/cross passage doors	☐
		(ii) Provided for all egress points at station platform ends and at any other emergency egress points along the track-way	☐
		(iii) shall be switched on by local switch or remotely by OCC when the non-incident tunnel has been cleared and it is safe for evacuees to enter the cross-wall/cross passage doors	☐
C	Reflective directional exit signs	Provided at 25 m intervals along the entire tunnel	☐
4	**Fire Hydrant System**		
A	Double end feed tunnel fire hydrant system	(i) Installed for entire tunnel including running tracks, turn back tunnel and refuge siding	☐
		(ii) Water supply of trackside fire hydrant system shall be fed from the FH/HR system of stations/ancillary buildings at both end of each tunnel section	☐
B	Fire pumps	Started by a fall in water pressure of the tunnel fire hydrant system	☐
C	Motorized isolation valve	(i) Normally opened and located at the headwall and tailwall units of the station(s) or inside MIV cabinet of ancillary building(s)	☐
		(ii) Remote open/closed status indication of MIV shall be provided at the SCR / FCR of station(s) and FCR of ancillary building(s) on both sides of such tunnel section	☐

Checklist of FS Requirements for Trackside Area
(for reference only)

D	Self-contained pressure reducing type fire hydrant(s) or pressure reducing valve	Provided whenever the system pressure at any fire hydrant outlet exceeds 850 kPa		☐
E	Trackside fire hydrant system	(i)	comply with section 5.14 of FSI Code and Trackside Fire Safety Strategy	☐
		(ii)	Sufficient fire hydrants shall be provided to ensure that every part of tunnels (except trackway along station platform) can be reached by a length of not more than 30m of Fire Services hose	☐
F	Tunnel fire main with fire hydrant outlets	(i)	Provided at 60 m intervals at low level and on the same side of the fireman's access walkway along all tunnels including running tracks, overrun tunnel, turn back tunnel and refuge siding	☐
		(ii)	The hydrant outlets shall be not less than 800mm and not more than 1200 mm above the finished floor level of fireman's access walkway	☐
		(iii)	The fire main at each fire point shall be fitted with twin hydrant outlets or two single outlets and be individually controlled by a wheel-operated screw valve	☐
G	Tunnel fire hydrant system	Capable of delivering an aggregate flow of not less than 1350 litres/minute from any three fire hydrant outlets i.e. each with a flow of not less than 450 litres/minute at a running pressure of not less than 350 kPa operating simultaneously. The pressure at any fire hydrant outlet shall not exceed 850 kPa		☐
5	**Fire Services Communication System**			
A	Digital Trunked Radio System (DTRS)	(i)	Equipped with at least one base station with one carrier (i.e. one control channel and three voice channels) to enable 3 separate talkgroups	☐

Checklist of FS Requirements for Trackside Area
(for reference only)

		of FSD personnel to communicate effectively and efficiently by using their FSD radio equipment for trunk mode radio communication at the enclosed area of the trackside	
		(ii) Radio coverage shall also be extended to a range within the radius of 50m from EAP at grade level	☐
B	Telephone panels	(i) For dedicated use by FSD personnel to communicate with SCR or FCR of stations and OCC	☐
		(ii) shall be provided at the entrance of EAP at grade level and at the track access points.	☐
		(iii) Telephone is available in the headwall & tailwall units for railway operation which can be used for communication between SCR/FCR/OCC.	☐
6	**Requirements (Additional)**		
A	All cable installation inside tunnel	Low smoke zero halogen type	☐
B	All linings for acoustic and thermal insulation purposes in ducting and concealed locations	Class 1 or 2 Rate of Surface Spread of Flame as per British Standard 476: Part 7 or its international equivalent, or be brought up to that standard by use of an approved fire retardant product	☐
C	Fire resisting cable for FSI	Comply with section 5.15 and Appendix 6 of FSI code	☐
7	**Tunnel Ventilation Systems**		
		Shall be provided as per details stipulated in TSSC Stage 3 submission	☐

Appendix V

Previously Agreed Trade List

Trade	Restriction
Fashions and Apparels	
Travel goods and accessories	Propose new trade for agreement with SSCC, with proposed restriction for selling of travel cases, bags and other travel related accessories
Apparels and Accessories (e.g. ties, belts, socks, fur, hat, scarves, gloves, umbrella, lingerie, earning and bracelets)	For East Tsim Sha Tsui Station with no restriction imposed
Boutique (male and female)/casual wear/children's wear/sport wear	For West Rail Stations with no restriction imposed
Tailors	For West Rail Stations with no restriction imposed
Shoes & Handbags	For West Rail Stations with no restriction imposed
Jewellery & Accessories	Trade agreed with SSCC for West Rail Stations with the following restriction: A licensed security company (Type III) must be employed to design, install, maintain or repair security system. Functional security specifications and layout plans must be submitted to Crime Prevention Bureau for endorsement. These should including items in relation to physical security, access control, intruder alarm systems, CCTV systems and lighting system, etc.
Watches and Timepieces	For West Rail Stations with no restriction imposed
Foods and Beverages	
Cakes, bakeries, Cookies	Trade agrees with SSCC for West Rail Stations with the following restriction: On-site baking shall not be allowed.
Cigarettes and Tobacco	For West Rail Stations with no restriction imposed
Confectioneries (e.g. sweets and	For West Rail Stations with no

candies)	restriction imposed
Delicatessens	Trade agreed with SSCC for West Rail Stations with the following restriction: Only pre-packed food would be sold and no on-site food preparation would be permitted. The upper limit of storage and display of wines and spirits should not exceed 75 litres.
Light Refreshment Foods	Location as shown in the endorsed SSCC drawings with the following proposed restriction: No kitchen and no naked fire in the food preparation area No seating shall be provides
Pre-packed Food and Drinks	For West Rail Stations with no restriction imposed
Preserved Products	For East Tsim Sha Tsui Station with no restriction imposed
Wines and Spirits	Trade agreed with SSCC for West Rail Stations with the following restriction: Storage of wine & spirits shall not exceed 75 litres
Health and Personal Care	
Baby Care Products	For East Tsim Sha Tsui Station with no restriction imposed
Bath and Body Shop	For West Rail Stations with no restriction imposed
Beauty Products/Cosmetics	For West Rail Stations with no restriction imposed
Beauty Salons	For West Rail Stations with no restriction imposed
Hair Salons	Trade agreed with SSCC for West Rail Stations with the following restriction: Flammable aerosol shall not be used.
Medical Equipment & Supplies	For West Rail Stations with no restriction imposed
Optical	For West Rail Stations with no

	restriction imposed
Personal & Health Care (e.g. diet & weight control)	For West Rail Stations with no restriction imposed
Pharmacies	Trade agreed with SSCC for West Rail Stations with the following restriction: A licensed security company (Type III) must be employed to design, install, maintain or repair security systems. Functional security specifications and layout plans must be submitted to Crime Prevention Bureau for endorsement. These should include items in relation to physical security, access control, intruder alarm system, CCTV systems and lighting systems, etc.
Sporting Goods, Hobbies, Collectibles, Books, Music and Paints	
Arts and Crafts Items	For West Rail Stations with no restriction imposed
Cards and Novelties	For West Rail Stations with no restriction imposed
Collectibles (e.g. coins & currencies, stamps, crystals, silver & glass products and antique)	For West Rail Stations with no restriction imposed
Hobbies and Games	For West Rail Stations with no restriction imposed
Musical Instruments & Supplier	For West Rail Stations with no restriction imposed
Newspapers and Magazines	For West Rail Stations with no restriction imposed
Posters and Paintings	For West Rail Stations with no restriction imposed
Sale and rental of pre-recorded tapes, compact discs & records (e.g. video tapes, tapes, CDs, LDs, MDs, VCDs, DVDs, etc)	For West Rail Stations with no restriction imposed
Sewing & Needlework	For East Tsim Sha Tsui Station with no restriction imposed

Souvenirs, Gifts and Soft Toys	For West Rail Stations with no restriction imposed
Sporting Goods	For West Rail Stations with no restriction imposed
Stationeries and Books	For West Rail Stations with no restriction imposed
Interest Class	Trade agreed with SSCC for West Rail Stations with restriction for registration only
Household Goods	
Electrical Home Applications	For West Rail Stations with no restriction imposed
Household Goods & Sundries	For West Rail Stations with no restriction imposed
Interior Design & Decoration (with interior Furniture setup)	For West Rail Stations with no restriction imposed
Kitchenware & Tableware	For West Rail Stations with no restriction imposed
Electronics and Appliances	
Computers	For West Rail Stations with no restriction imposed
Electrical Appliances	For West Rail Stations with no restriction imposed
Telecommunication Products and Services	For West Rail Stations with no restriction imposed
Others	
Automobile Accessories (e.g. car radio, alarm, automobile products)	For West Rail Stations with no restriction imposed
Convenience Stores	Trade agreed with SSCC for West Rail Stations with the following restriction: Food preparation or-heating of food not permitted
Florists	For West Rail Stations with no restriction imposed
Groceries	For West Rail Stations with no restriction imposed
Photo-finishing and related products	Trade agreed with SSCC for East Tsim

	Sha Tsui Station with the following restriction: For digital photo processing and collection services only. For comentional photo finishing, approval shall be sought from SSCC on a case by case basis.
Travel/Visitor Services	
Money Exchange Services	Trade agreed with SSCC for West Rail Stations with the following restriction: A licensed security company (Type III) must be employed to design, install, maintain or repair security systems. Following the security design as per (a) above, functional security specifications and layout plans must be submitted to Crime Prevention Bureau for endorsement. These should include items in relation to physical security, access control, intruder alarm systems, CCTV systems and lighting systems, etc.
Motor Vehicle Rental Services	For West Rail Stations with no restriction imposed
Ticketing/Booking Services	For West Rail Stations with no restriction imposed
Tourist Information Services	For West Rail Stations with no restriction imposed
Travel Agency/Services	For West Rail Stations with no restriction imposed
Business Services	
Banking Services	For West Rail Stations with no restriction imposed
Business Service Centre (e.g. private mail centre, scanning, photocopying and faxing services)	For East Tsim Sha Tsui Station with no restriction imposed
Certified Public Accounting Services	For East Tsim Sha Tsui Station with no restriction imposed

Courier Services	For West Rail Stations with no restriction imposed
Financial Services	For East Tsim Sha Tsui Station with no restriction imposed
Insurance Services	For East Tsim Sha Tsui Station with no restriction imposed
Legal Assistance and Services	For East Tsim Sha Tsui Station with no restriction imposed
Packaging & Labeling Services	For East Tsim Sha Tsui Station with no restriction imposed
Post Office	Trade agreed with SSCC for west Rail Stations with the following restriction: Restricted to normal postal service only
Estate Agency	Trade agreed with SSCC for West Rail Stations with the following restriction: Restricted to normal postal service only
Consumer/Personal Services	
Catalogue/Mail Order Services	For West Rail Stations with no restriction imposed
Delivery/Collection Point for Laundry and Dry Cleaning Services	For West Rail Stations with no restriction imposed
Employment Services	For West Rail Stations with no restriction imposed
Key Cutting/Locksmiths Services	For West Rail Stations with no restriction imposed
Marriage Aid Services	For West Rail Stations with no restriction imposed
Shoes Repairing and Polishing Services	For West Rail Stations with no restriction imposed
Therapeutic Services	For East Tsim Sha Tsui Station with no restriction imposed
Counseling/Consultancy Services	For West Rail Stations with no restriction imposed
Medical Service Center (e.g. general out-patient services & special out-patient)	Subject to SSCC's endorsement on case-by-case basis, as WR
Self-operated machines, including	For West Rail Stations with no

automatic photo machines, payment express terminal, vending machine and cash dispensing machine, etc.	restriction imposed
Public Pay Phone	For West Rail Stations with no restriction imposed
Advertising Panel	For West Rail Stations with no restriction imposed