SBS4113 Architecture & Buildings

http://ibse.hk/SBS4113/

Lecture : Introduction to building services I - Fire Safety & Fire Services

15 September 2016

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Web site jointly developed with *Dr Hui : http://www.ad.arch.hku.hk/research/BEER/

Fire Safety & Fire Services for Buildings

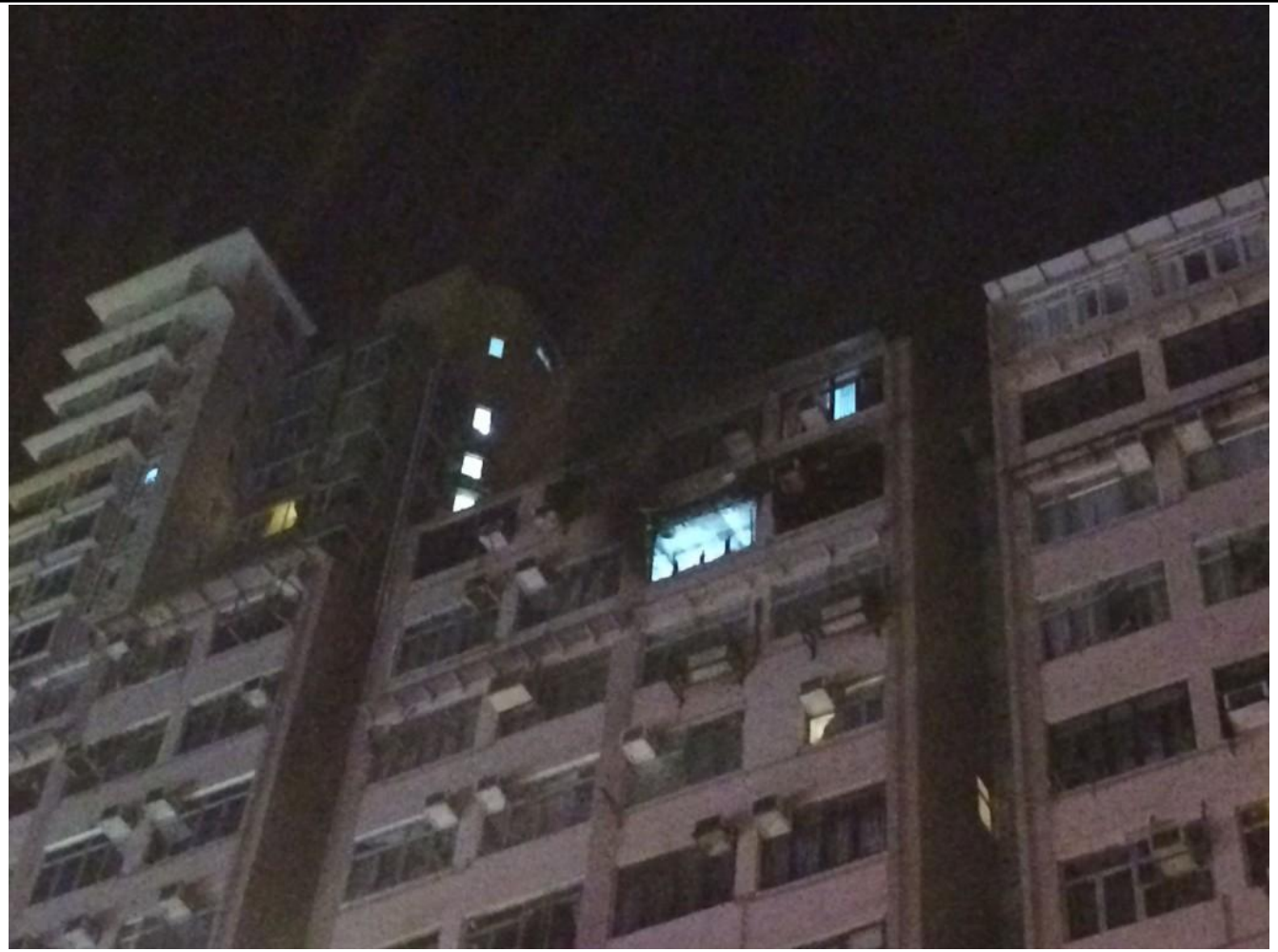
Priority :

Safety [structural, fire, accident prevention] ,

Health [good indoor air quality- good IAQ, little Electromagnetic effect, reasonable daylight, greening,],

Comfort [Reasonable comfort : temperature, humidity, noise versus quietness] ,

Sustainable building & Sustainable world [Energy saving, Energy efficient, Low carbon building]



Fatality fire in Mongkok, 25 Mar 2015旺角火警一對母子死亡起火單位外牆燻黑

2015-03-25 HKT 04:00 RTHK News http://rthk.hk/rthk/news/expressnews/20150325/news_20150325_55_1087025.htm

旺角聯合廣場對上的東海大廈發生火警，起火單位外牆燻黑。（馮卓垣攝）

旺角聯合廣場對上的東海大廈發生火警，一對分別91歲和61歲的母子昏迷，送院後證實死亡。火警期間有大約90名住客疏散，1名消防員手部受傷，送院治理。事發在昨晚深夜11時許，消防接報指東海大廈12樓一個單位起火冒煙，出動一隊煙帽隊開一條喉灌救，約半小時後將火救熄。起火單位外牆被燻黑，火警原因仍待調查。

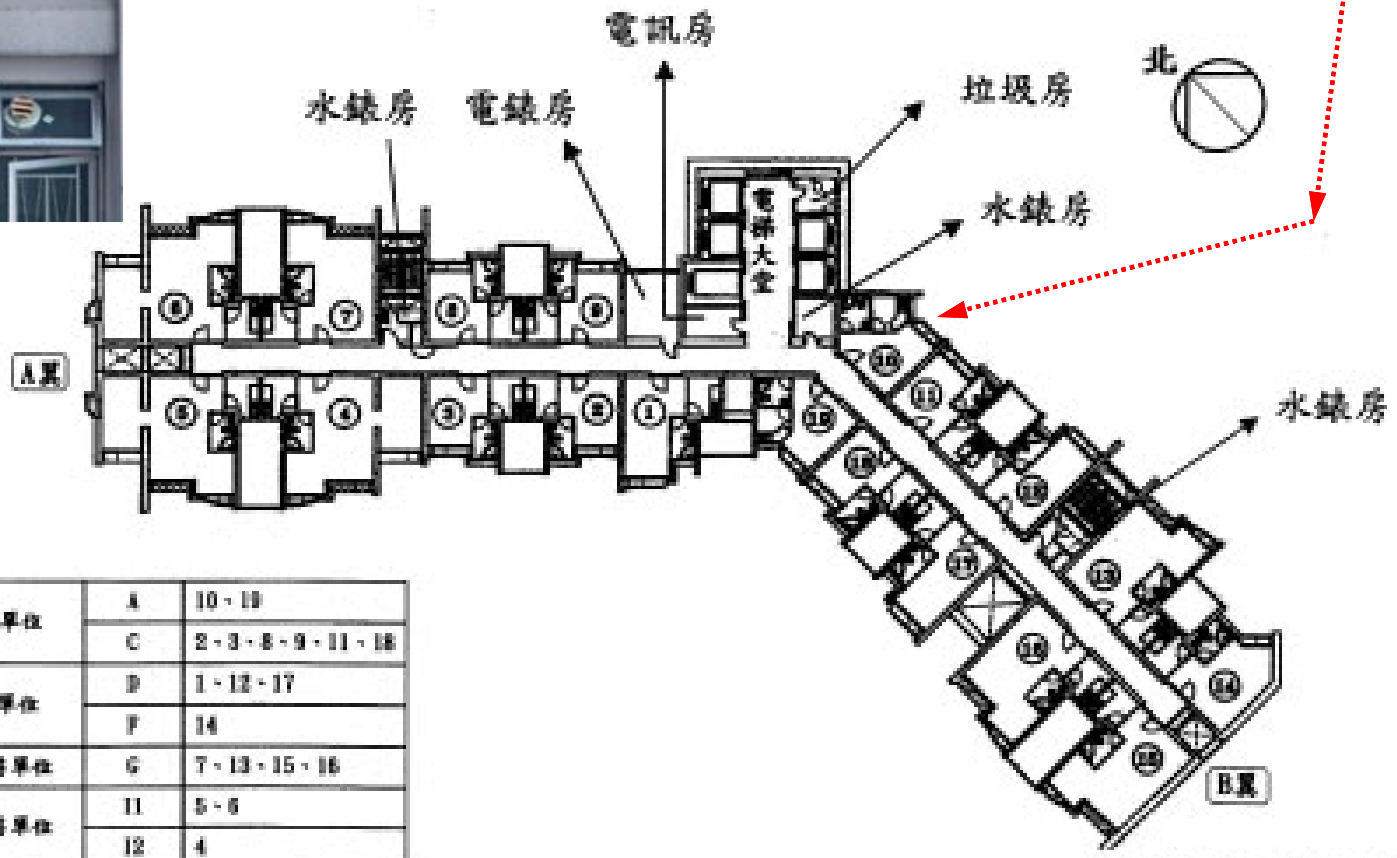
走廊一片狼藉，堆滿肇事單位的雜物。

Appledaily news -Town gas explosion and fire, Shek Kip Mei 23 Nov 2014 -A1頭條-石硤尾邨大爆炸 戶主死 6消防命危 2014年11月23日 http://hk.apple.nextmedia.com/realtime/breaking/20141123/53157106 石硤尾邨美映樓發生煤氣大爆炸慘劇，一隊消防員在破門進入一個懷疑洩漏煤氣的單位時，單位內突然發生大爆炸，威力強大，波及大廈多個單位，連升降機門亦炸至飛脫。9名消防員首當其衝，分別被炸傷及烈焰灼傷，當中6人危殆。消防員稍後在單位內發現一具男屍，連同受傷的街坊，事件共釀成1死12傷。警方初步調查懷疑有人開煤氣自殺，觸發今次慘劇。

懷疑洩漏煤氣的單位
The flat on fire

石硤尾邨第一期

美映樓（2樓至30樓）

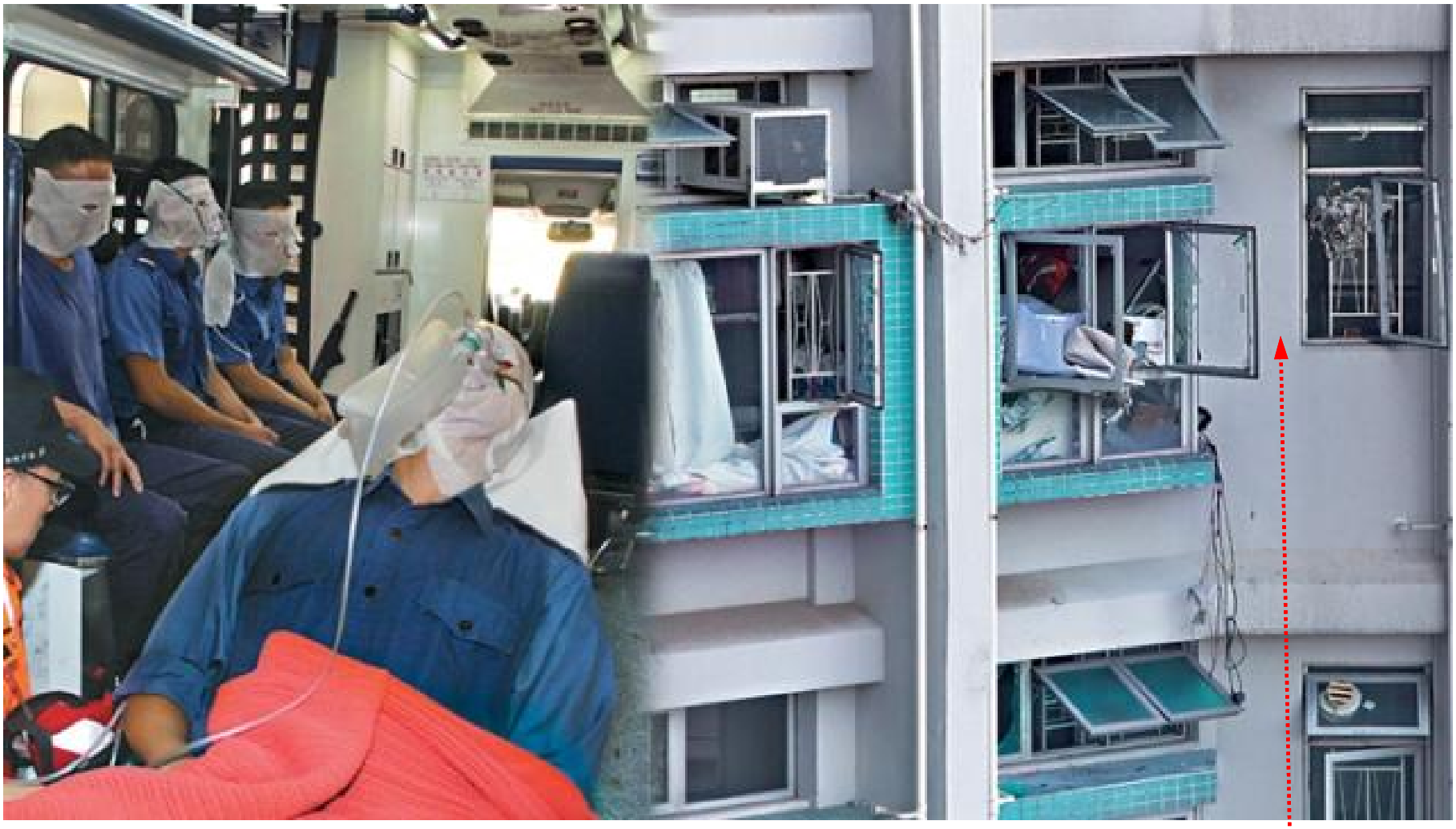


小型單位	A	10、19
	C	2、3、8、9、11、18
2人單位	D	1、12、17
	F	14
一睡房單位	G	7、13、15、16
兩睡房單位	H	5、6
	I	4

註：每層各有二部升降機直達。

此圖供例事考，所有圖則、用料及設備，以香港房屋委員會最後批准為準。

石硤尾邨美映 **Mei Ying House, Shek Kip Mei, Kowloon, HKSAR** , Source : http://s51.photobucket.com/user/pauper889/media/meiying230.jpg.html



四名消防員須敷燒傷面膜送往明愛醫院。(左)肇事單位多扇玻璃窗震爛，有電線跌出窗外。(右)

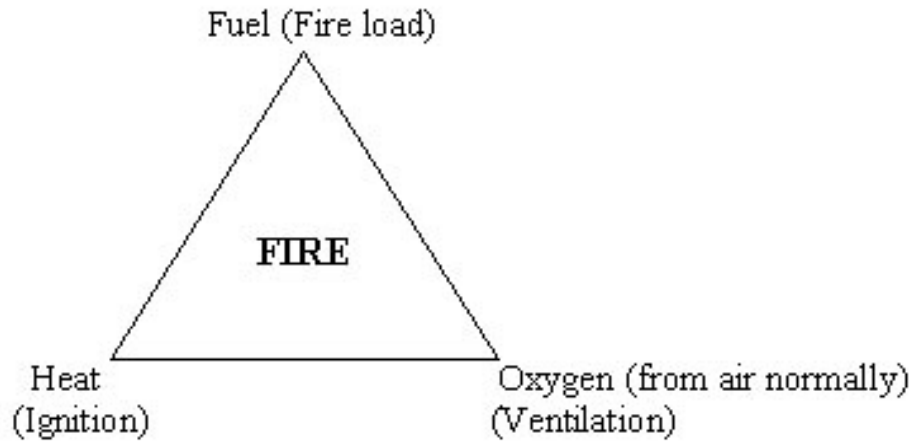
懷疑洩漏煤氣的單位
The flat on fire

Appledaily news -Town gas explosion and fire, Shek Kip Mei 23 Nov 2014 -A1頭條-石硤尾邨大爆炸 戶主死 6消防命危
2014年11月23日 http://hk.apple.nextmedia.com/realtime/breaking/20141123/53157106 石硤尾邨美映樓發生煤氣大爆炸慘劇，一隊消防員在破門進入一個懷疑洩漏煤氣的單位時，單位內突然發生大爆炸，威力強大，波及大廈多個單位，連升降機門亦炸至飛脫。9名消防員首當其衝，分別被炸傷及烈焰灼傷，當中6人危殆。消防員稍後在單位內發現一具男屍，連同受傷的街坊，事件共釀成1死12傷。警方初步調查懷疑有人開煤氣自殺，觸發今次慘劇。

A fire is started

- **NFPA Test Burn – VIDEO - -showing flashover - flashover means all combustibles in the room burn together : when the room fire temperature is around 600 degree C** http://www.youtube.com/watch?v=5GMhfLamERc
- **Christmas Tree Fire Safety** http://www.youtube.com/watch?v=IwBiZtfjioU&feature=related

This video is from NIST (National Institute of Standards and Technology). It is a Safety Video of a Dry Scotch Pine Tree that fully engulfs a room in 48 seconds.



The Fire Triangle

→see http://arch.hku.hk/~kpcheung/fire/fire-n1.htm on

Fire occurrence and principles of suppression -

video **The Fire Triangle : http://www.youtube.com/watch?v=mgNOjLnzplo

Fire safety design principles

***To contain the fire: Fire Resisting Construction

*** people shall get away, after the fire is detected manually [by actuating the breakglass unit, or automatically [by smoke detector or heat detector] → go through Means of Escape → go to places of relative safety, then places of ultimate safety

**To suppress the fire: automatic sprinkler system for offices, shops- LPC Rules for Automatic Sprinkler Installations; LPC=Loss Prevention Council, UK

#In fact a hydrant-supported sprinkler system should be installed for residential buildings in HK. That is , to connect small pipes to the hydrant riser of residential buildings to supply one or two sprinklers for each flat.
→ Greatly enhancing fire safety for residential buildings

** First aid fire fighting : "Teach You How To Use Fire Service Installations

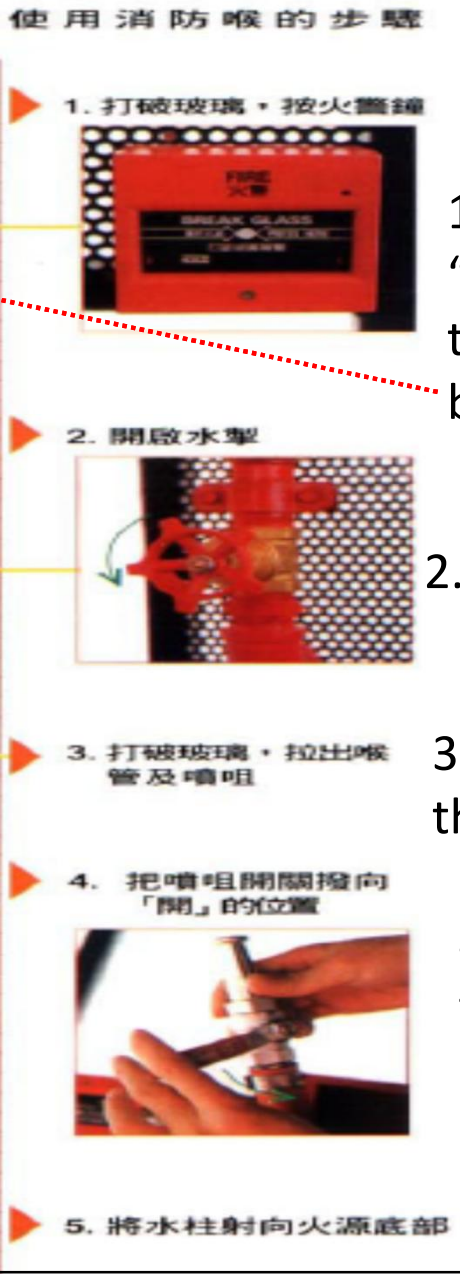
http://arch.hku.hk/~kpcheung/fire/teach.pdf " a Chinese paper reproduced with the kind permission of The Consumer Council, HK :

→ If you cannot overcome the fire, please get away at once

消防喉全圖

用，市民自行裝置的滅火筒為安全計，最好能按規定每年進行定期檢查保養，確保滅火筒在火警發生時能正常操作，發揮滅火效用

滅火筒的應用



1.Break the glass of the “Breakglass unit” : the alarm bells will sound, and the fire service pump will operate

2.Open the water valve

3.Break the glass and pull out the hose and the nozzle

4.Open the control valve of the nozzle

5. Shoot the nozzle water to the base part of the fire

Automatic Fire Sprinklers

Home Fire Sprinkler Demonstration http://nfpa.typepad.com/firesprinklerinitiative/

A side-by-side room display set up at the Plymouth Massachusetts Fire Department. Sprinklers had been installed in only one of the rooms. Both rooms were set on fire. Home fire sprinklers are designed to activate when a certain degree of heat increase is reached, so as the temperature in the display went up, the sprinklers went off. As seen in this demonstration, the fire in the sprinklered room was controlled quickly by overhead sprinklers. In contrast, the fire in the room without sprinklers burned out of control until the fire department put out the fire.

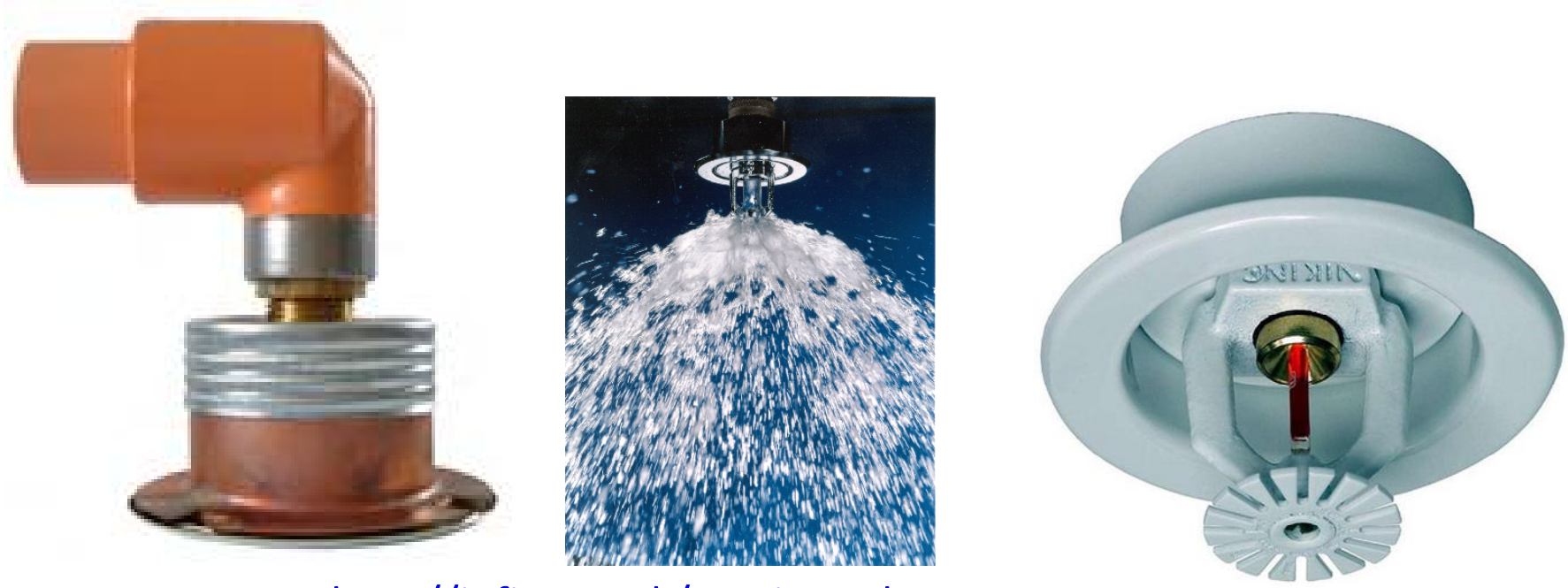


Image courtesy: http://jpfire.co.uk/Services.php :
from left : concealed sprinkler [the circular plate is fitted to the false ceiling;
Middle : Activated sprinkler head -water discharged from a pendent sprinkler;
Right: Sprinkler Head and Rosette, with rosette fitted to false ceiling

See the **NIST Recreation of "The Station Nightclub Fire" with Sprinklers**
http://www.youtube.com/watch?v=gT1EWVR1iP8&feature=related

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf : [238 pages]

These requirements will affect design of floor layout, building massing and structural systems.

Clause A1.3

Diagram A1 shows the framework for fire safety in buildings.

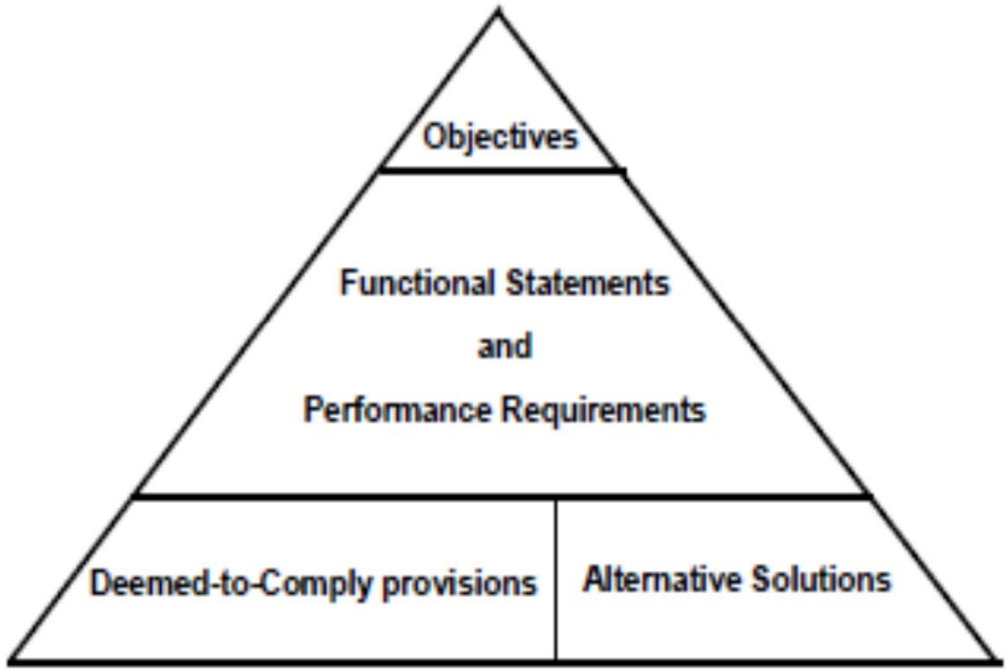
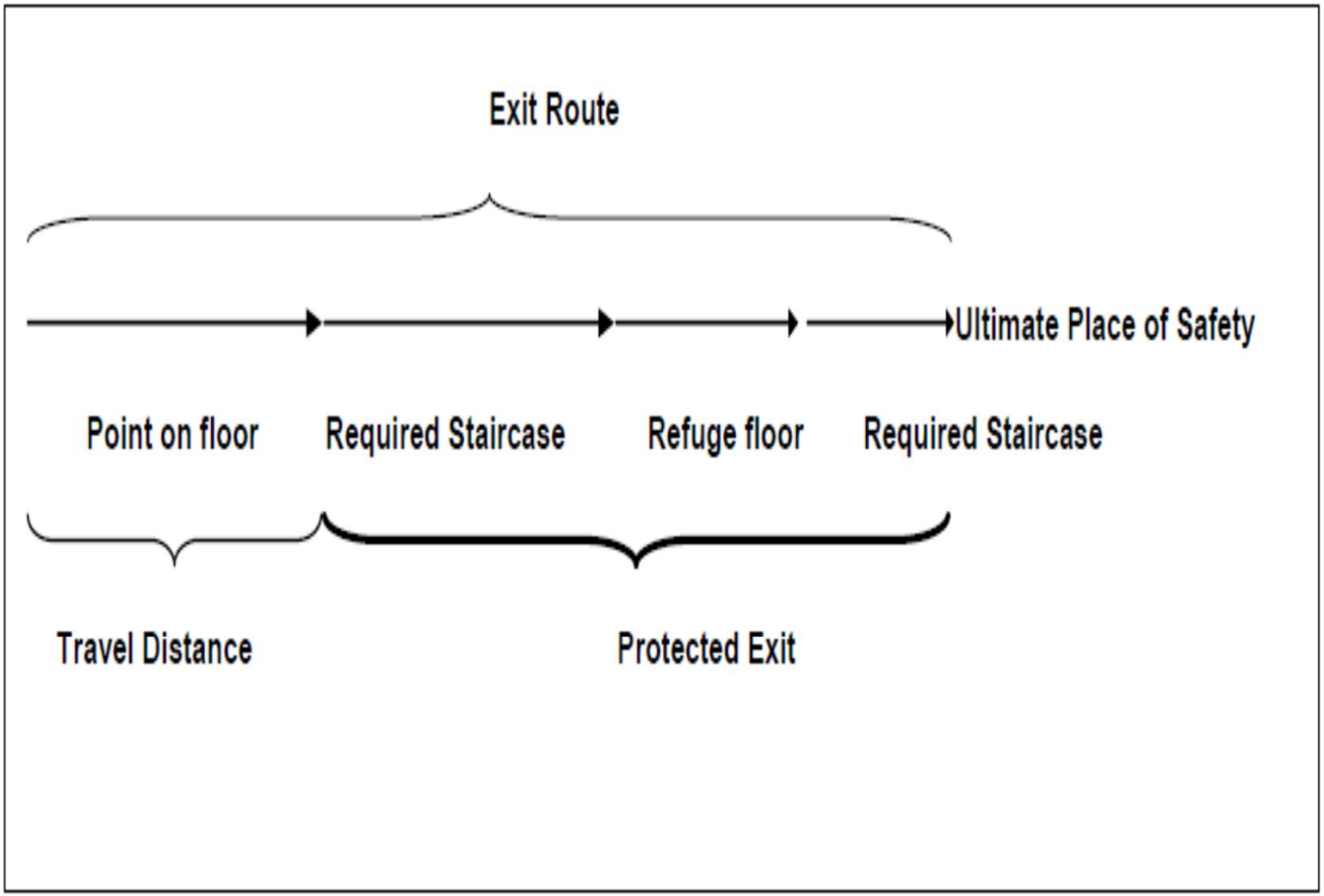


Diagram A1 – Framework for Fire Safety in Buildings

For details see [Page 2 – Ref. 1]

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]



Means of Escape : For details see [Page 21 – Ref. 1]

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Section 2 – Provisions of Means of Escape

Subsection B4 – Assessment of Occupant Capacity

Clause B4.1

As a guide to assessing the requirements on means of escape, the following Table B1 should be used as the basis for calculating the occupant capacity of a building or part of a building.

Table B1: Assessment of Occupant Capacity

Use Classification	Type of Accommodation	Occupancy Factor (usable floor area in m^2 per person) or otherwise as specified
1b	Flats: - with corridor or balcony access having five or more flats on each floor served by each staircase - flats not covered by the above	 4.5 9
1c	Tenement houses	3
2	Boarding houses, hostels, hotels, motels, guesthouses	Number of bedspaces
	Dormitories	3

AND other types of buildings- For full table and details - – see [Page 25-27 - Ref. 1] – How many people are there in the building?

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Table B2

Table B2: Minimum number and width of exit doors and exit routes from a room, fire compartment or storey

Occupant Capacity of room, fire compartment or storey (No. of persons)	Minimum No. of exit doors or exit routes	Minimum total width (in mm)		Minimum Width (in mm) of each	
		Exit doors	Exit routes	Exit door	Exit route
4- 30	1			750	1050
31-200	2	1750	2100	850	1050
201-300	2	2500	2500	1050	1050
301-500	2	3000	3000	1050	1050
501-750	3	4500	4500	1200	1200
751-1000	4	6000	6000	1200	1200
1001-1250	5	7500	7500	1350	1350
1251-1500	6	9000	9000	1350	1350
1501-1750	7	10500	10500	1500	1500
1751-2000	8	12000	12000	1500	1500
2001-2500	10	15000	15000	1500	1500
2501-3000	12	18000	18000	1500	1500
>3000 persons - the number of exit doors, exit routes and their width to be determined by the Building Authority					

For full table and details - see [Page 34 - Ref. 1]

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Table B4

Table B4: Discharge Value of a Required Staircase in a Sprinkler Protected Building

No. of storeys served	Width of required staircase					
	1050mm but under 1200mm	1200mm but under 1350mm	1350mm but under 1500mm	1500mm but under 1600mm	1600mm but under 1700mm	1700mm to 1800mm
1	420	480	540	600	640	680
2	452	518	585	651	697	742
3	484	556	630	702	754	804
4	516	594	675	753	811	866
5	548	632	720	804	868	928
6	580	670	765	855	925	990
7	612	708	810	906	982	1052
8	644	746	855	957	1039	1114
9	676	784	900	1008	1096	1176
10	708	822	945	1059	1153	1238
Each additional storey add	32	38	45	51	57	62

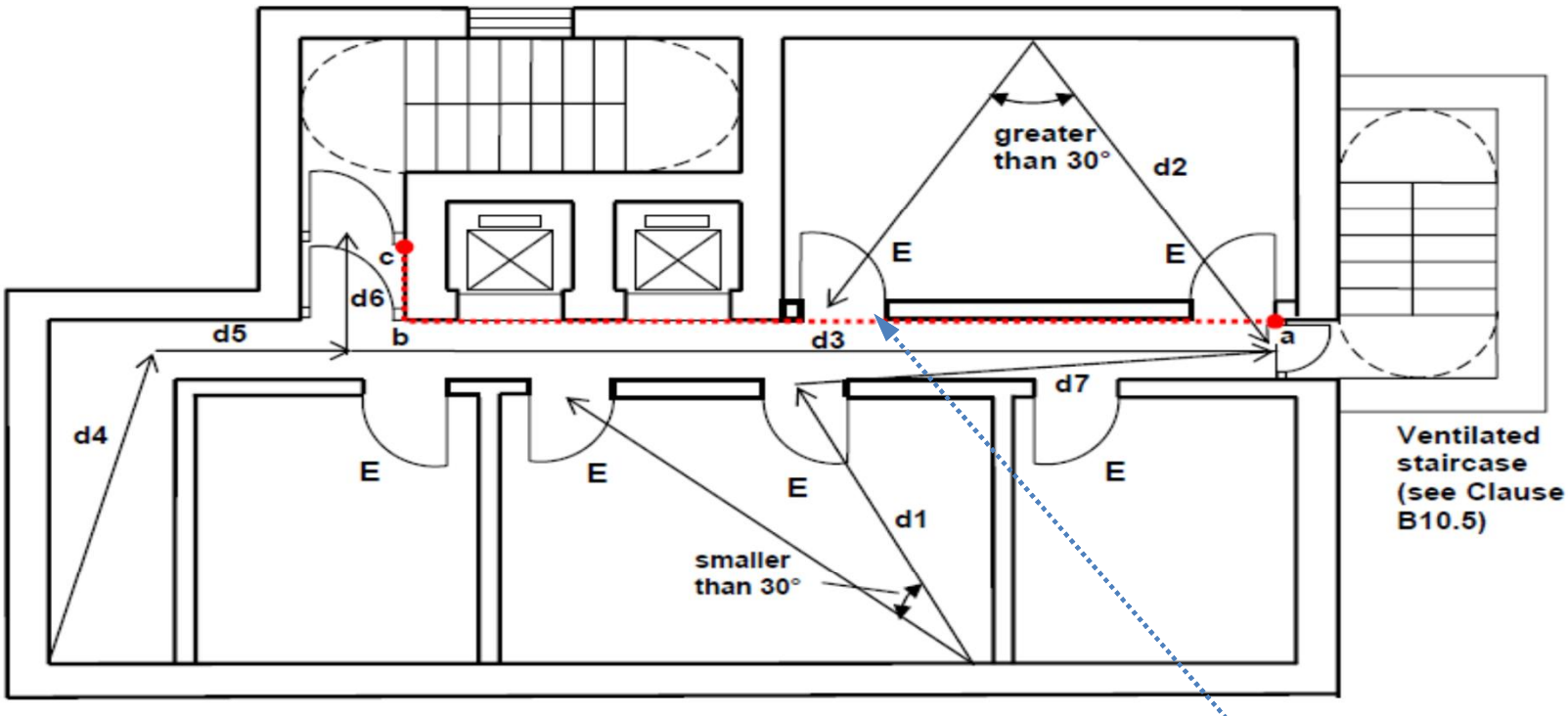
Note:

1. The discharge value of a required staircase having a width more than 1800mm may be obtained by using linear projection from the table.

For full table and details - see [Page 31 - Ref. 1]

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Diagram B2 : Internal Corridor Access



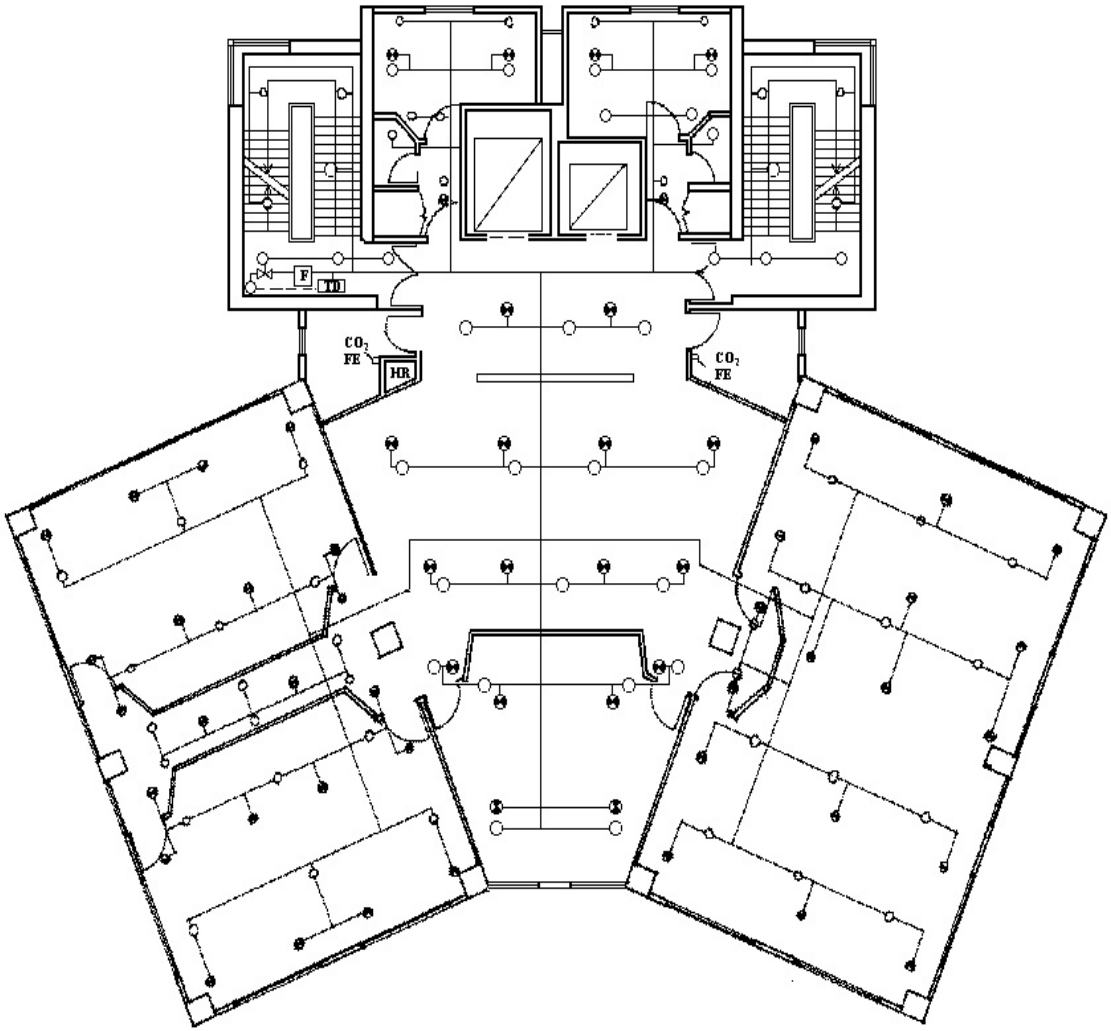
For details - **See Page 63-67 of Ref. 1**

Notes:

E	Exit door	
d4 + d5	Deadend travel distance	See Clause B11.2
d1	Deadend travel distance	See Clause B11.2
a – b – c	Minimum separation between 2 required staircases	See Clause B10.2(b)
d3 + d6	Maximum separation between 2 required staircases	See Clause B11.3(b)
d2	Travel distance	See Clause B11.3(a)
d1 + d7	Travel distance	See Clause B11.3(a)

Red-dotted distance:
Maximum 48 m :
Details, see:
Clause B11.3 (b) of Ref. 1

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]



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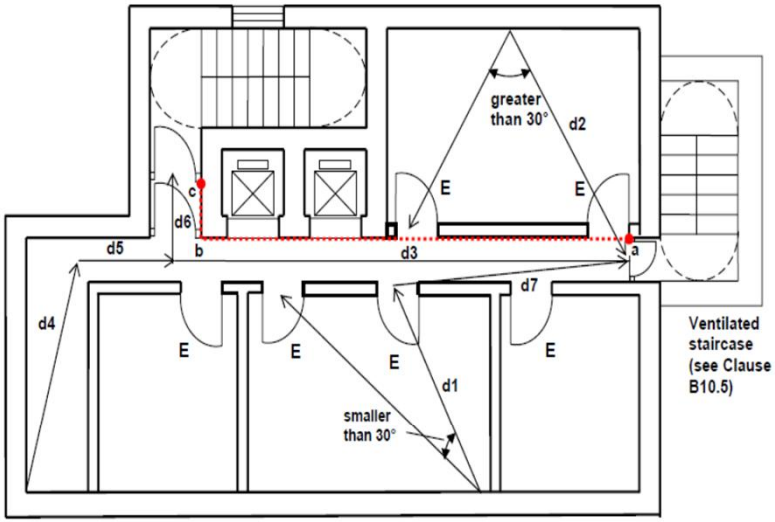

Notes:

E	Exit door	
d4 + d5	Deadend travel distance	See Clause B11.2
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a – b – c	Minimum separation between 2 required staircases	See Clause B10.2(b)
d3 + d6	Maximum separation between 2 required staircases	See Clause B11.3(b)
d2	Travel distance	See Clause B11.3(a)
d1 + d7	Travel distance	See Clause B11.3(a)

5/F Tsui Tsin Tong Building, HKU – Sprinkler Layout –
Also compare the staircase and lift layout with the COP diagram in the previous slides
http://arch.hku.hk/teaching/intgtech/117.htm ; http://arch.hku.hk/teaching/intgtech/content.htm ;

http://www.safety.hku.hk/homepage/pdf/FPTTT.pdf ; http://www.safety.hku.hk/homepage/manual_Floorplan.html

People evacuation principles and software illustration

Reference :

COP for Fire Safety in Buildings 2011 http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf ; http://www.bd.gov.hk/english/documents/ ;

Codes of Practice for Minimum *Fire Service Installations* and Equipment and Inspection, Testing and Maintenance of … 2012 http://www.hkfsd.gov.hk/eng/source/safety/File2012.pdf ; http://www.hkfsd.gov.hk/eng/code.html

buildingEXODUS V4.0 simulation of highrise building evacuation
https://www.youtube.com/watch?v=6E0VO6dTUBA [2:12 minute]

Crowd Simulation - Evacuation Drill
https://www.youtube.com/watch?v=kHfHewzp5ls [1:19 minute]

Christmas Tree Fire Safety https://www.youtube.com/watch?v=ZLHhG65fLeY [1:58 minute]

$$\frac{Tp + Ta + Trs}{Tf} \leq 1, \text{for safe escape from certain point in space ein a building}$$

SEE : An examination on the people evacuation parameters addressed by some computational software in modeling people evacuation in huge uncompartmented building volumes in case of fire http://arch.hku.hk/~kpcheung/fire/fire-n6.htm

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m^2	60
4. Commercial:		
4a. Business Facilities	Not exceeding 10,500m^2	60
4b. Mercantile Facilities	Not exceeding 2,500m^2	60
	Exceeding 2,500m^2 but not exceeding 10,500m^2	120

For details see [Page 71 – Ref. 1]

Fire resistance - The ability of an element of building construction to withstand the effects of fire for a specified period of time without loss of its fire-separating or load bearing function (see BS476: Part 20 to 24). The 3 elements for fire resistance period (FRP) are:- Stability / Integrity / Insulation - For a wall, e.g. 140/130/120 (in minutes); for a metal panel, e.g. 150/110/- (in minutes).

See : http://arch.hku.hk/~kpcheung/fire/fire-n3.htm

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Table C2: Fire Resistance Rating Criteria for Elements of Construction, Fire Barriers and Other Components

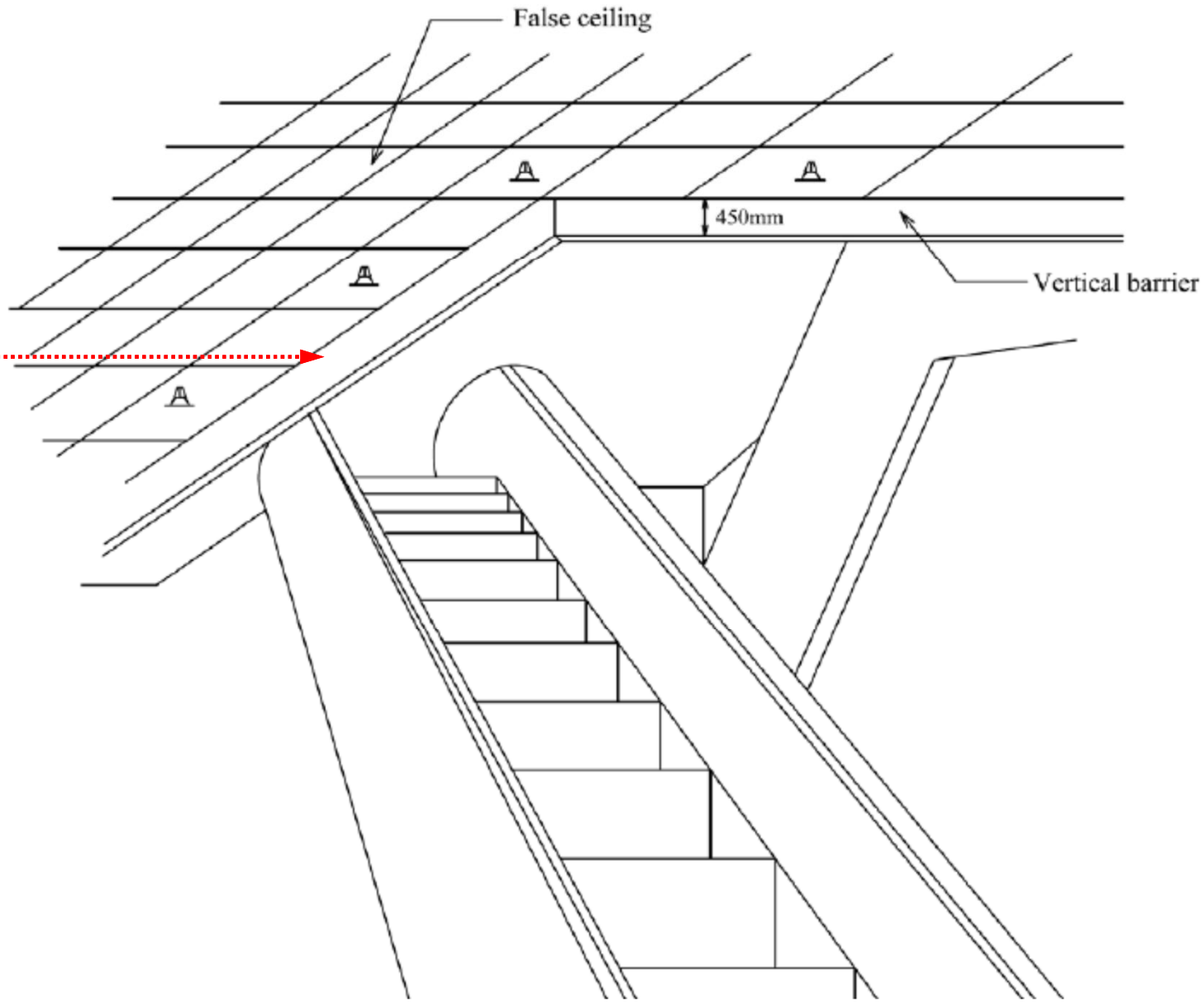
Elements of construction or other components		Criteria to be satisfied			Method of Exposure
		Stability	Integrity	Insulation	
1	Structural frame, beam or column	Y	N	N	Exposed faces only
2	Floor including fire compartment floor	Y	Y	Y	Each side separately
3	Roof forming part of an exit route or performing the function of the floor	Y	Y	Y	From underside
4	Loadbearing wall not being a fire barrier	Y	N	N	Each side separately
5	External wall	Y*	Y	Y	Each side separately
6	Loadbearing wall being a fire barrier	Y	Y	Y	Each side separately
7	Non-loadbearing wall being a fire barrier	N	Y	Y	Each side separately
8	Protected shaft, lobby and corridor	Y*	Y	Y	Each side separately
9	Fire shutter, fire stop, fire dampers, sealing system	N	Y	N (unless specified)	Each side separately

For full table and details , see **Page 73 of Ref. 1**

Fire resistance - The ability of an element of building construction to withstand the effects of fire for a specified period of time without loss of its fire-separating or load bearing function (see BS476: Part 20 to 24). The 3 elements for fire resistance period (FRP) are:- Stability / Integrity / Insulation - For a wall, e.g. 140/130/120 (in minutes); for a metal panel, e.g. 150/110/- (in minutes). **See : http://arch.hku.hk/~kpcheung/fire/fire-n3.htm**

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Diagram C4: Vertical Barrier at Escalator (see Clause C10.1)



Hot and toxic smoke is temporarily checked by the 450 mm vertical barrier from rising to the floor above trough the void

For details see [Page 99 – Ref. 1]

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Table D1 : Number of Access Staircases, Fireman's Lift and Firefighting and Rescue Stairways Required

Type of Building		No. of Access Staircases required	No. of Fireman's Lifts required	No. of Firefighting and Rescue Stairways required
(1) All buildings and all basements	Not exceeding 1 storey	-	-	-
(2) Domestic buildings for single family	Not exceeding 3 main storeys	-	-	-
(3) Domestic buildings or offices with G/F shop or carport	(a) exceeding 1 storey but not exceeding 6 storeys and uppermost floor not exceeding 13m above ground and usable floor area not exceeding 250m² per floor	One	-	-
	(b) exceeding 1 storey but not exceeding 6 storeys and uppermost floor	One	-	-

For full table and details, see **Page 107 of Ref. 1**

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]
http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf : [238 pages]
These requirements will affect design of floor layout, building massing and structural systems.

Part E -
Fire Properties of Building Elements and Components

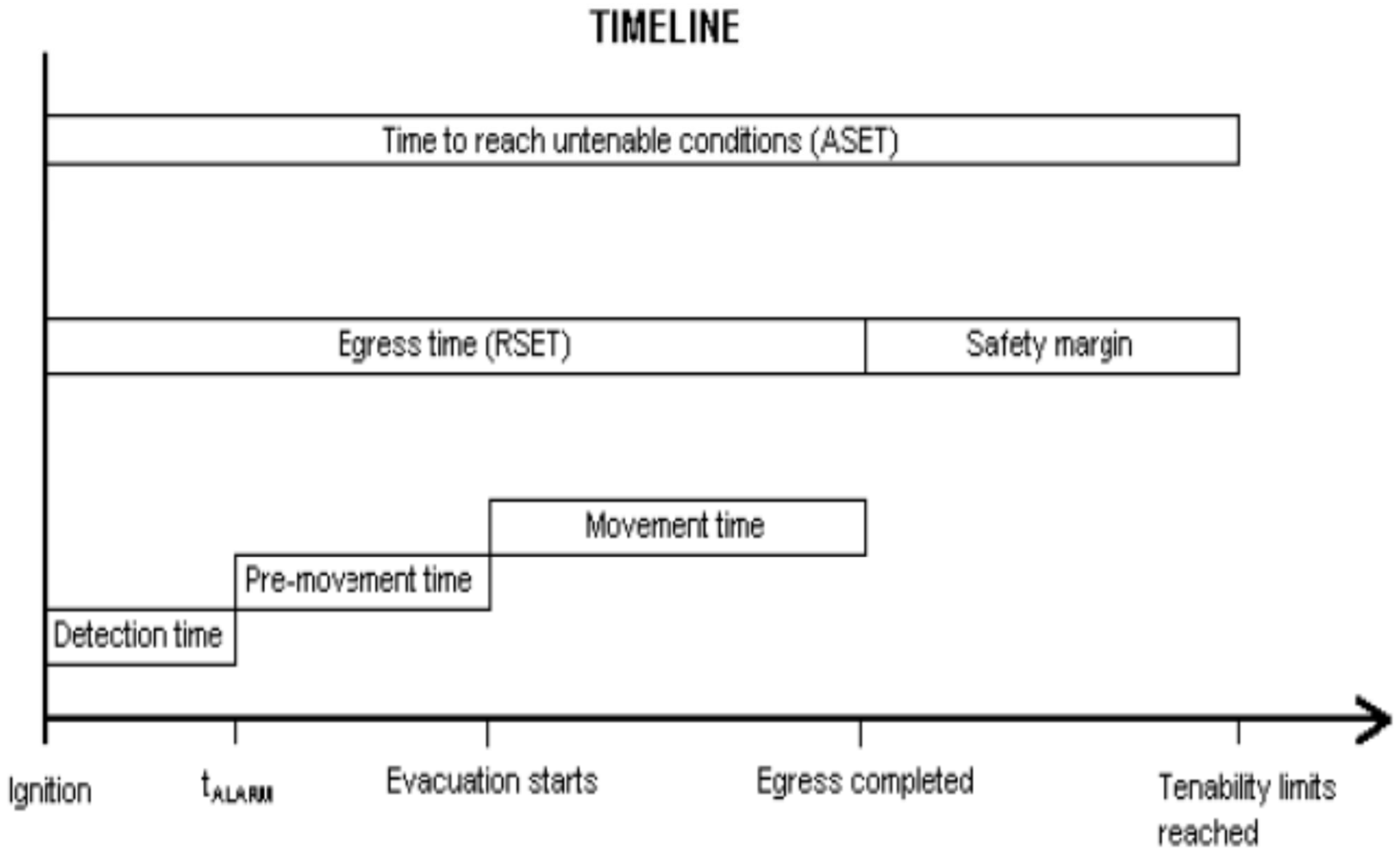
This Part contains six Sections:

- Section 1 – General
- Section 2 – Loadbearing Elements
- Section 3 – Non-loadbearing Elements
- Section 4 – Protection of Openings in Fire Barriers
- Section 5 – Non-combustibility
- Section 6 – Fire Testing Authorities
- Reference – List of Tables

For full details, see **Page 150-238 of Ref. 1**

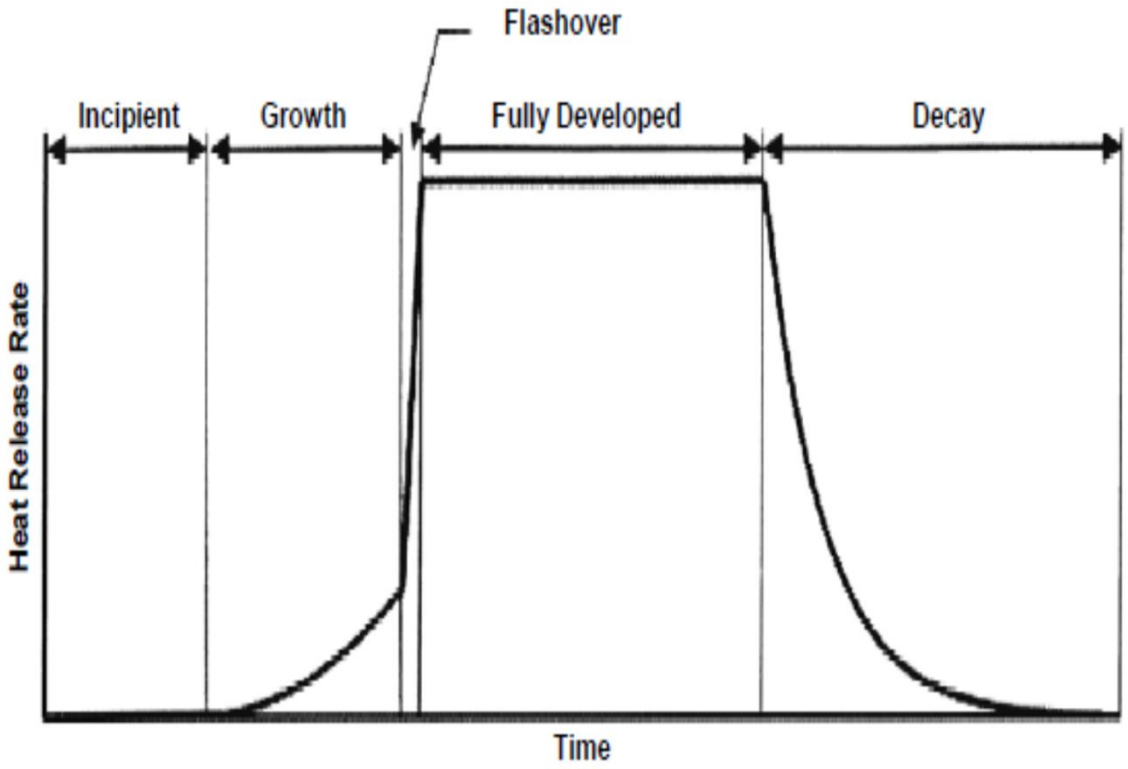
Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

Diagram G1: Graphical Representation of a Timeline Assessment



For details see [Page 212 – Ref. 1] : “Tenable” means air/smoke conditions still allow people to stay inside that part of the building, in case of fire

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]



For details see [Page 203 – Ref. 1]

Diagram G2: Typical Phases of a Fire Curve

Stages in an Enclosure Fire:

1. see http://arch.hku.hk/~kpcheung/fire/fire-n2.htm

2. “fire growth” video http://www.youtube.com/watch?v=9JU59Nsv2vg by NFPA http://www.nfpa.org/ ;

3.some notes in http://www.see.ed.ac.uk/~s0458490/thesis%20web/fire_types.html

Key points of Code of Practice for Fire Safety in Buildings 2011 (2.86MB) [Ref 1.]

the furnace is at the back

For details see [Page 203 – Ref. 1]

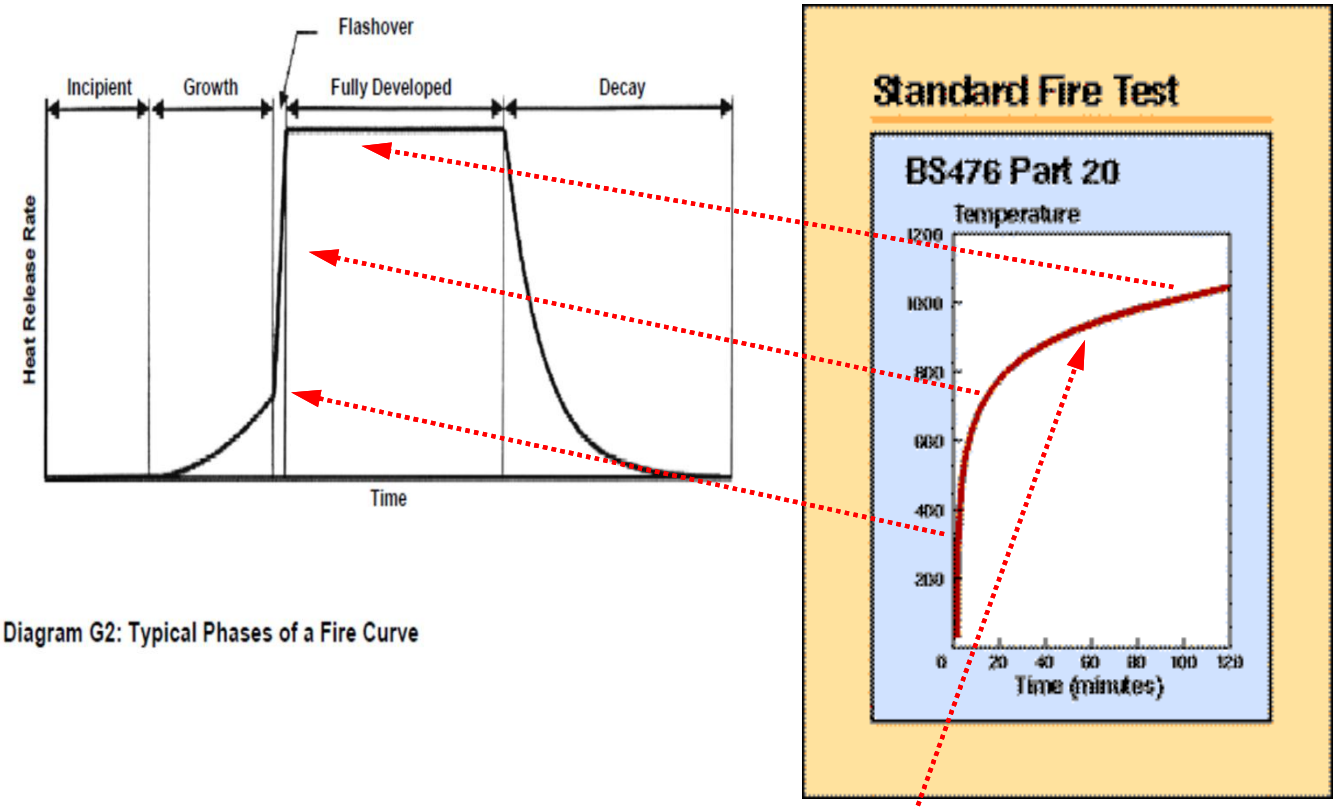
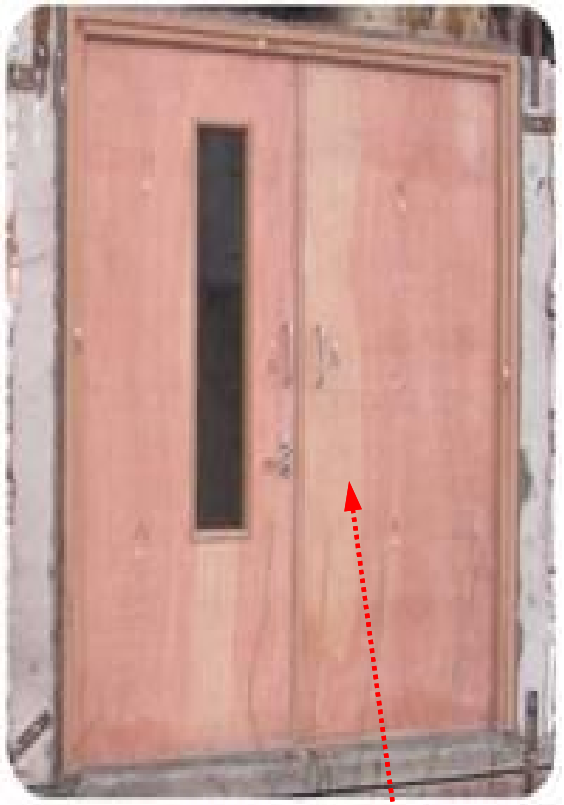


Diagram G2: Typical Phases of a Fire Curve



BS 476: Parts 20, 22, : Standard time-temperature curve

[image courtesy : http://www.911review.com/articles/jm/cache/fr006_files/firea27.gif]

of the furnace with equation :

T, furnace = T ,ambient + 345 log (8 t + 1), where

T, furnace = temperature of furnace , deg. C

T, ambient = temperature of ambient, deg. C, and

t is time from starting of the furnace in minutes

See : http://arch.hku.hk/~kpcheung/fire/fire-n3.htm

Fire Resistance Test Projects - Timber Door Set

http://www.red.com.hk/Projects-2.htm of RESEARCH ENGINEERING DEVELOPMENT FAÇADE CONSULTANTS LIMITED (RED) –Testing laboratory of curtain wall and fire properties of building components in Hong Kong

http://www.red.com.hk/

Code of Practice for Minimum Fire Service Installations and Equipment [COP -Minimum FSI] http://www.hkfsd.gov.hk/eng/source/safety/installation_2005.pdf – for building design – what are the types of fire services installations to be provided inside the building; e.g. page 38 of [COP-Minimum FSI] : Items (iv) to (xi), (xiv), (XV) apply to **Tsui Tsin Tong Building, HKU**

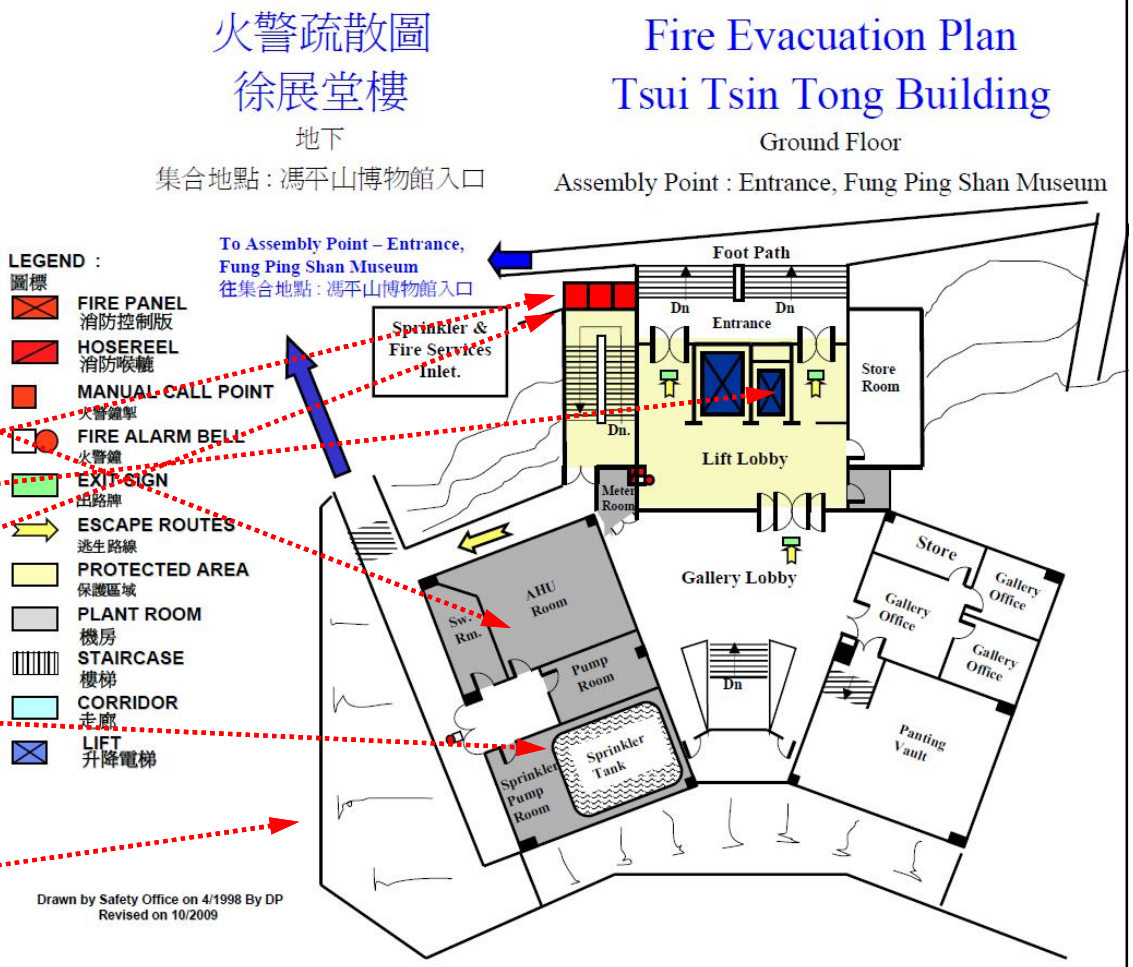
4.32 Institutional buildings—high rise

REQUIREMENTS—SYSTEMS/INSTALLATIONS/EQUIPMENT FOR:

(i) Audio/visual advisory system
(ii) Automatic actuating devices
(iii) Automatic fixed installation other than wat
(iv) Emergency generator
(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) Fireman's lift
(xii) Portable hand-operated approved appliance
(xiii) Pressurization of staircase
(xiv) Sprinkler system
(xv) Ventilation/air conditioning control system

apply

For plant rooms



Tsui Tsin Tong Building, HKU
http://www.safety.hku.hk/homepage/pdf/FPTTT.pdf ;
http://arch.hku.hk/teaching/intgtech/117.htm ;
http://arch.hku.hk/teaching/intgtech/content.htm ;

Code of Practice for Minimum Fire Service Installations and Equipment [COP -Minimum FSI] http://www.hkfsd.gov.hk/eng/source/safety/installation_2005.pdf – for building design – what are the types of fire services installations to be provided inside the building; e.g. page 38 of [COP-Minimum FSI] : Items (iv) to (xi), (xiv), (XV) apply to **Tsui Tsin Tong Building, HKU**

4.32 Institutional buildings—high rise

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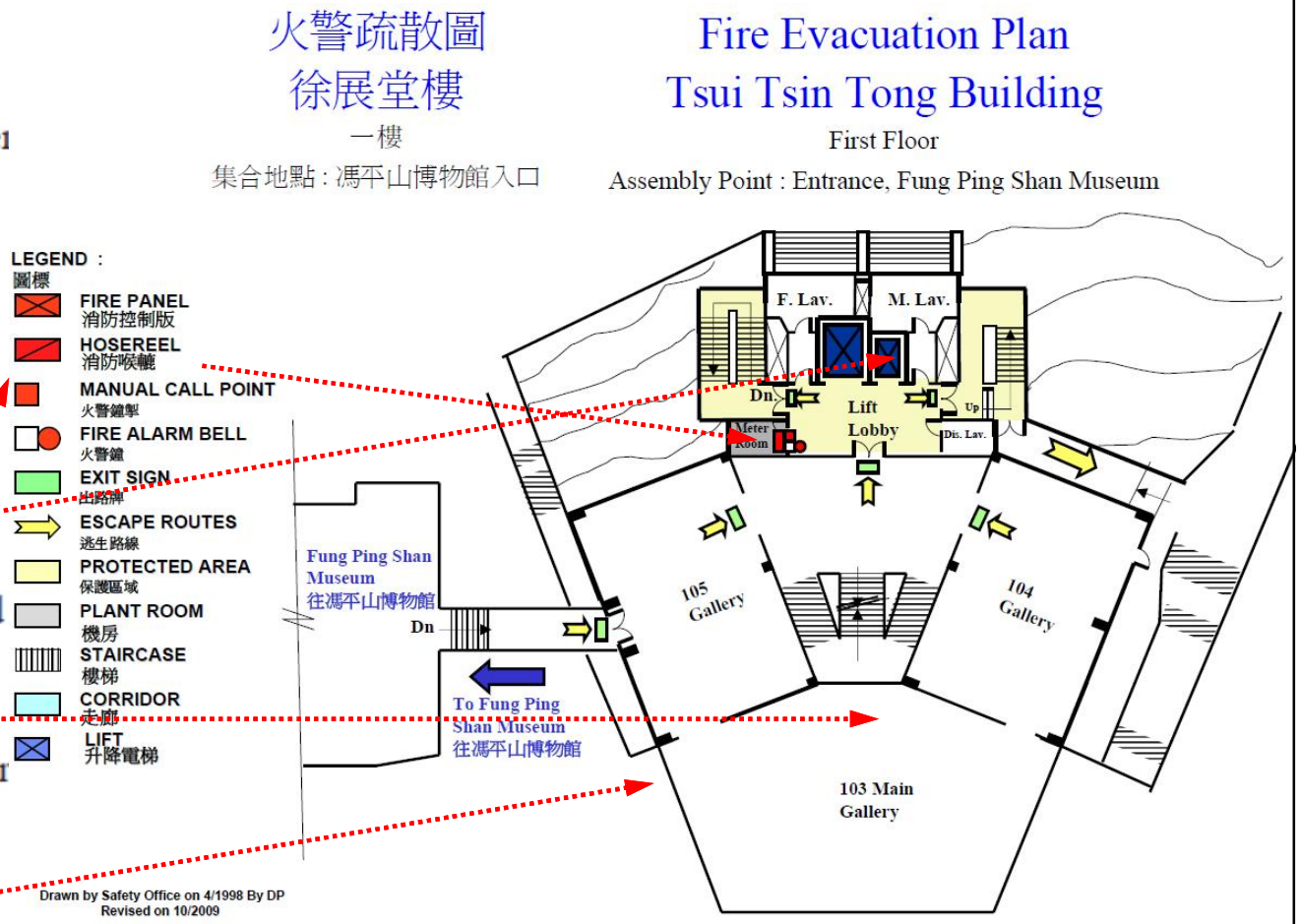
(x) Fire hydrant/hose reel system
(xi) Fireman's lift
(xii) Portable hand-operated approved
(xiii) Pressurization of staircase
(xiv) Sprinkler system
(xv) Ventilation/air conditioning contr

apply



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4.32 Institutional buildings—high rise

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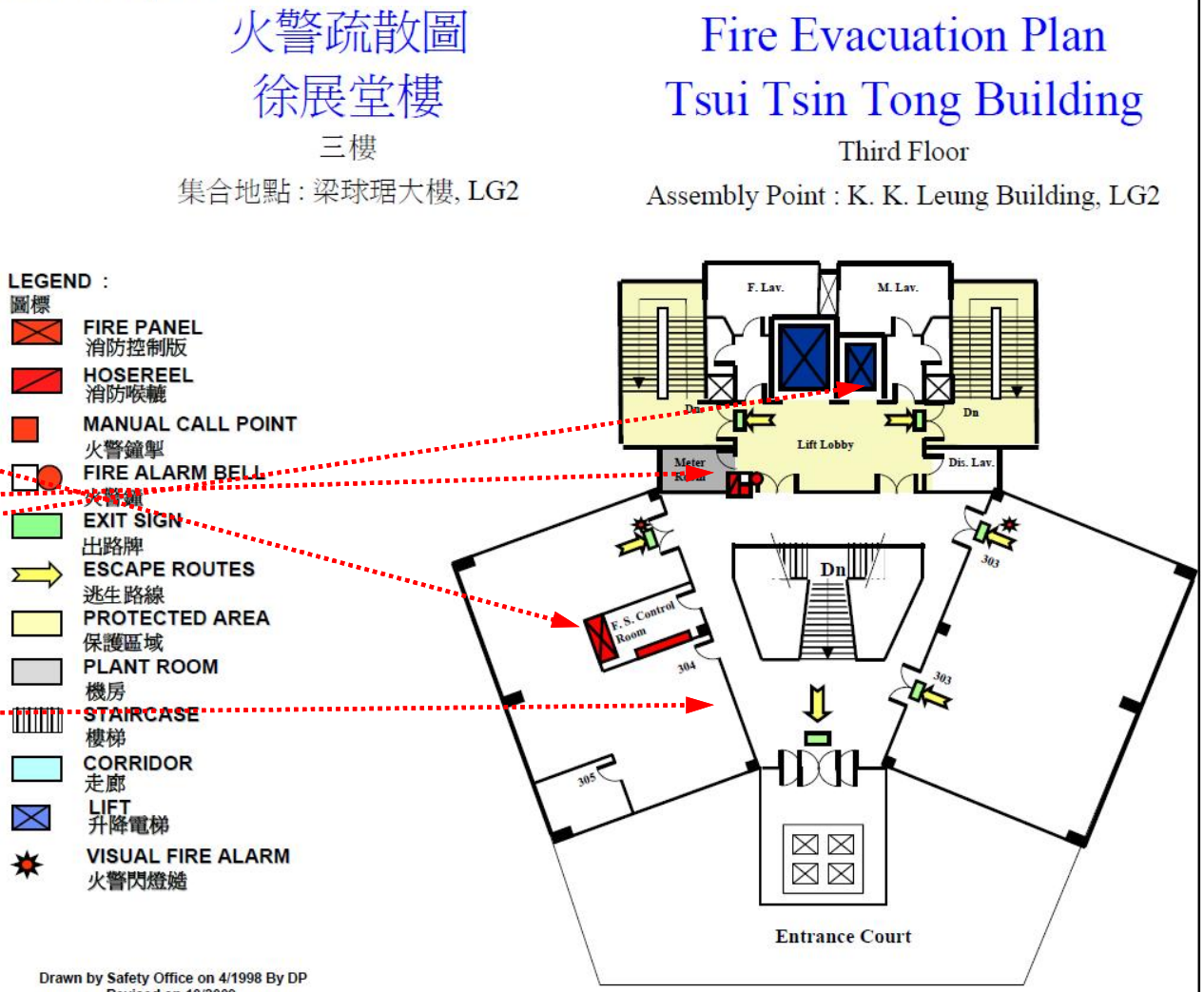
(x) Fire hydrant/hose reel system
(xi) Fireman's lift
(xii) Portable hand-operated approved ap
(xiii) Pressurization of staircase
(xiv) Sprinkler system
(xv) Ventilation/air conditioning control

apply



Tsui Tsin Tong Building, HKU
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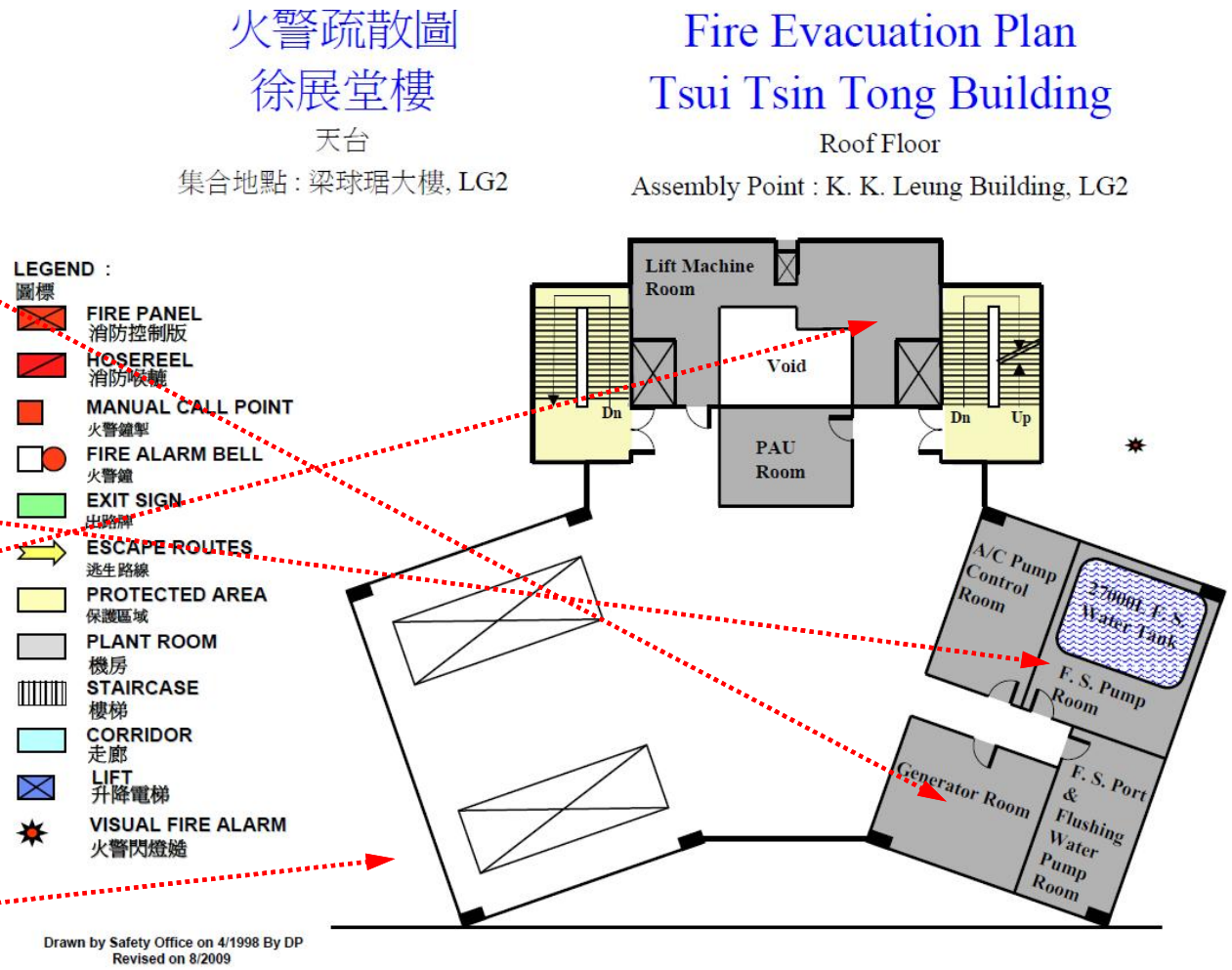
(iii) Automatic fixed installation other
(iv) Emergency generator
(v) Emergency lighting
(vi) Exit sign
(vii) Fire alarm system
(viii) Fire control centre
(ix) Fire detection system
(x) Fire hydrant/hose reel system
(xi) Fireman's lift **(Lift machine room)**
(xii) Portable hand-operated approved a
(xiii) Pressurization of staircase
(xiv) Sprinkler system
(xv) Ventilation/air conditioning contrc

apply



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http://arch.hku.hk/teaching/intgtech/content.htm ;

Code of Practice for Inspection, Testing and Maintenance of Installations and Equipment

http://www.hkfsd.gov.hk/eng/source/safety/testing_1994.pdf – How are the types of fire services installations inside the building to be tested to satisfaction for issuance of occupation permit for the building

sprinkler flow detector, To give alarm at control Panel at 3/F centre

sprinkler water flow

Sprinkler Installation Valves

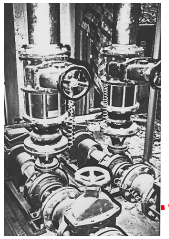
http://upload.wikimedia.org/wikipedia/en/b/b4/Sprinkler_valve.png

Sprinkler – exposed type, Pendent, 68 Degree C rating

Sprinkler Inlet – Fire Engine supplies water

Sprinkler – concealed type

Sprinkler Tank [50 or 75, cubic metre, common]



Sprinkler Inlet –Fire Engine supplies water

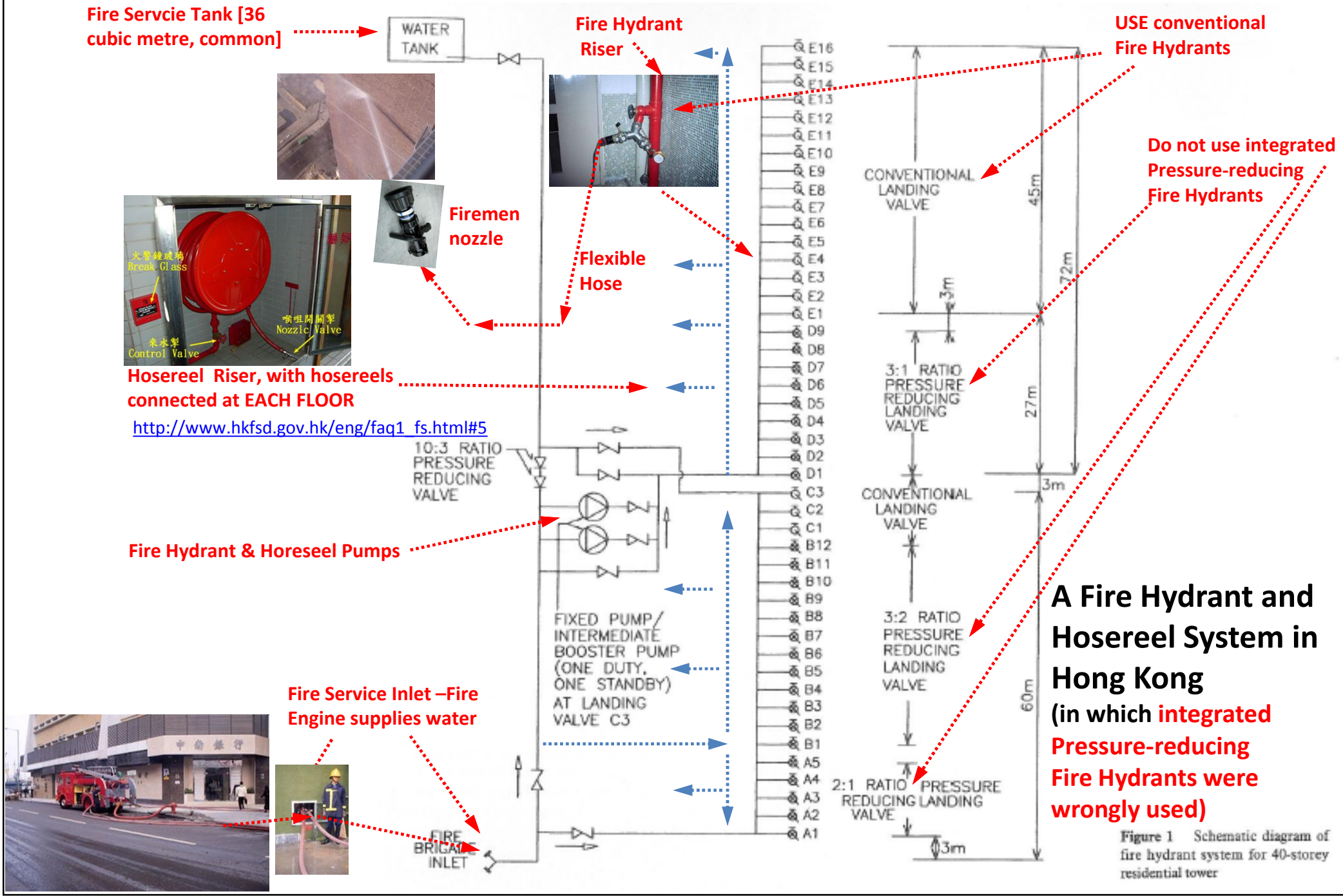
Sprinkler Pumps http://arch.hku.hk/teaching/intgtech/1113.htm

Tsui Tsin Tong Building, HKU – Sprinkler System Schematic Diagram

http://arch.hku.hk/teaching/intgtech/113.htm

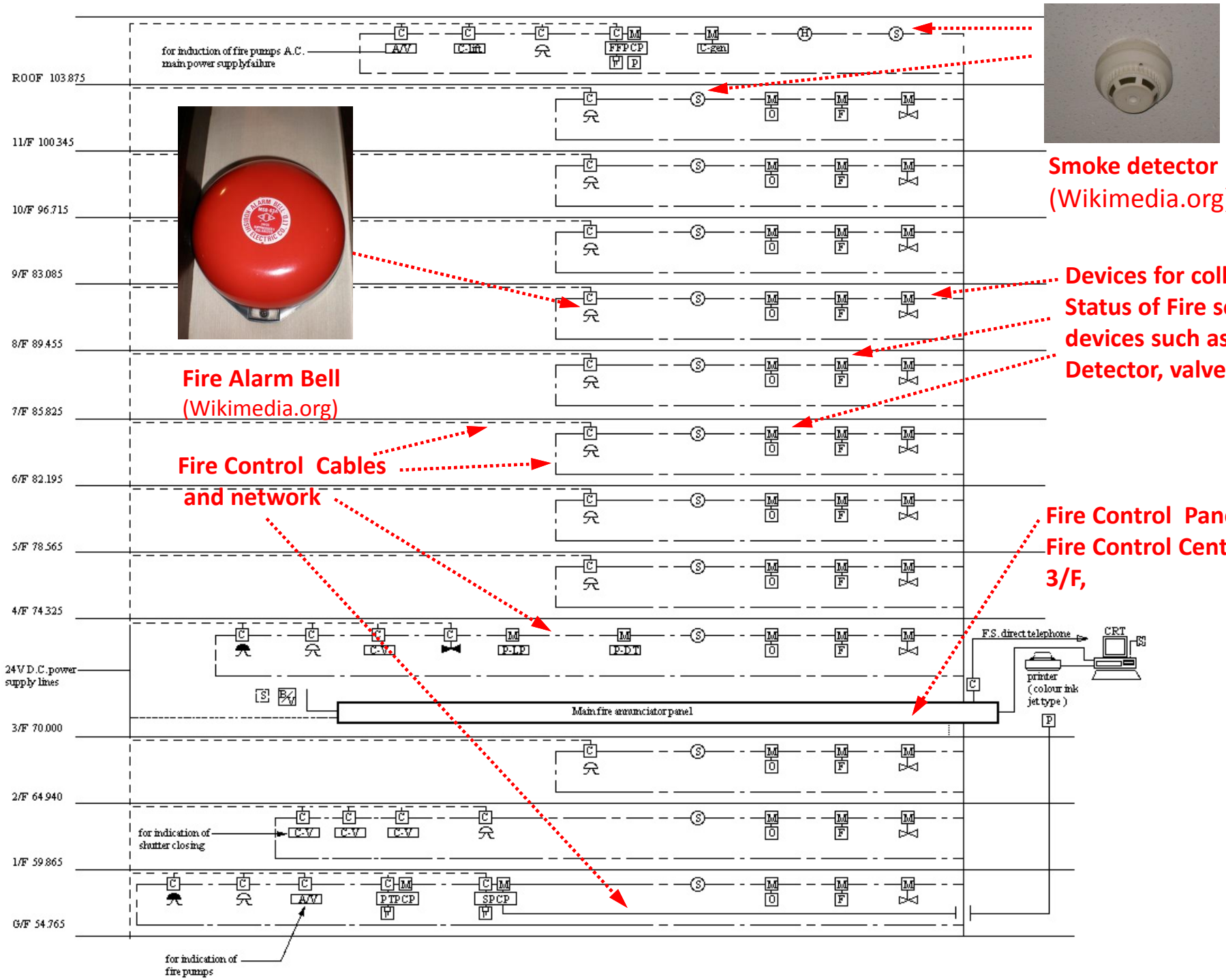
Code of Practice for Inspection, Testing and Maintenance of Installations and Equipment

http://www.hkfsd.gov.hk/eng/source/safety/testing_1994.pdf – How are the types of fire services installations inside the building to be tested to satisfaction for issuance of occupation permit for the building



A Fire Hydrant and Hosereel System in Hong Kong
(in which integrated Pressure-reducing Fire Hydrants were wrongly used)

Figure 1 Schematic diagram of fire hydrant system for 40-storey residential tower



Tsui Tsin Tong Building, HKU – Fire Detection and Alarm Diagram http://arch.hku.hk/teaching/intgtech/111.htm

Integrated Sustainable Approach

DESIGN MANUAL - BARRIER FREE ACCESS 2008 →
http://www.bd.gov.hk/english/documents/code/e_bfa2008.htm

- Unwanted fire is minimized ,and suppressed quickly : minimum loss of property and objects burnt, minimum injury, best no injury and no life loss. [note :Wanted fire: cooking]
- Means of Escape affect floor layout, and staircase location, and structural systems
- Water tanks and pump rooms for fire fighting systems, and plumbing and drainage systems to be provided inside buildings
- Electrical Transformer Room & Main switch room are commonly provided at G/F, cable duct and sub-switch rooms are provided at each floor
- Water efficient and energy efficient pumps and equipment are to be used
- Optimized overall planning with air-conditioning and other building services, and FUNCTIONS of the buildings to be carried out to attain **Integrated Sustainability**

Case study on overall *Building Services Integration*

- **Tsui Tsin Tong Building, HKU:** Building No.13 in HKU main campus map
- Case Study http://www.ad.arch.hku.hk/teaching/cases/tttsui/tttsui.htm
- Integrated technology study by BA(AS)-3 students 95/96 [HKU] : http://www.ad.arch.hku.hk/teaching/intgtech/
- Floor Layout and evacuation plans for **Tsui Tsin Tong Building, HKU :** http://www.safety.hku.hk/homepage/pdf/FPTTT.pdf

Basic Reading :

1.Code of Practice for Fire Safety in Buildings 2011 (2.86MB)
http://www.bd.gov.hk/english/documents/code/fs_code2011.pdf

2.CODES OF PRACTICE FOR MINIMUM FIRE SERVICE INSTALLATIONS AND EQUIPMENT AND INSPECTION, TESTING AND MAINTENANCE OF INSTALLATIONS AND EQUIPMENT
http://www.hkfsd.gov.hk/eng/source/safety/File2012.pdf

3.Buildings Department , HKSAR :Codes of Practice, Design Manuals
http://www.bd.gov.hk/english/documents/index.html

4. Some Notes on Basic Concepts of Fire by K P Cheung http://arch.hku.hk/~kpcheung/fire/fire-n.htm

5. Tsui Tsin Tong Building, HKU- Case study http://arch.hku.hk/teaching/intgtech/ ;

6. Tsui Tsin Tong Building, HKU - Evacuation plans with building services plant rooms
http://www.safety.hku.hk/homepage/pdf/FPTTT.pdf ;

7. Smith, David Lee, *"Environmental Issues for Architecture"*, Chapter 12 & 13. Hoboken, N.J. : Wiley, c2011. HKU Lib. Call # 720.47 S645

8. Reid, Esmond, *"Understanding Buildings",* London : Construction Press, 1984. HKU Lib. Call # 690 R35

Further reference :

All buildings of HKU - Evacuation plans with building services plant rooms
http://www.safety.hku.hk/homepage/manual_Floorplan.html

*** **Thank you very much** ***