DESIGNING FOR FIRE SAFETY

Selangor Uniform Building (amendment)(no2) By-Laws 2012 and Malaysian Standards MS 1183:2015

Ar Chong Lee Siong

APAM MIFireE MMIArbs

PAM CPD SEMINAR

The Uniform Building By-Laws

is a

“PRESCRIPTIVE” BUILDING CODE

- Compliance with this code is a requirement by law
- Sets rules and regulations on the application of the code
- Provides pre-determined prescriptions

The prescriptions are absolute :

no smaller than……..
no bigger than……..
no shorter than……
no longer than……
or
no less than and no more than.

The MS 1183:2015

is a

“Descriptive” code of practice

- **Provides informative descriptions**
- **Establishes normative practices**
- **Describes performance criteria**

CONCEPTS OF FIRE SAFETY

1 EVACUATION

2 PASSIVE CONTAINMENT

3 ACTIVE INTERVENTION

4 ACCESS FOR FIRE FIGHTING AND RESCUE

PURPOSE GROUP

Amendment of Fifth Schedule UBBL (2012)

130. Fifth Schedule of the principle By-Laws is amended—

(a) by substituting for paragraph (I) the following paragraph:
"I. Small residential

Private dwelling house detached or semidetached or terraced.";

I : Small Residential

(b) in paragraph (II)—

(i) by substituting for the words "Hospital, school" the words "Hospitals, schools, colleges, libraries, nursing homes"; and

(ii) by inserting after the word "used" the words "for education or";

II : Institutional

(c) in paragraph (III), by inserting after the words "I and II" the words ", including hotels, hostels, dormitories, apartments, flats, old folks homes and orphanages.";

III : Other Residential

(d) in paragraph (V), by substituting for the words "meaning thereby premises not being a shop but " the words "shopping complexes, food courts, wet and dry markets, premises"; and

V : Shop

(e) in paragraph (VII), by inserting after the words "I to VI" the words ", including convention centres, museums, art galleries, cinemas, theatres, auditoriums, places of worship, transportation passenger terminals".

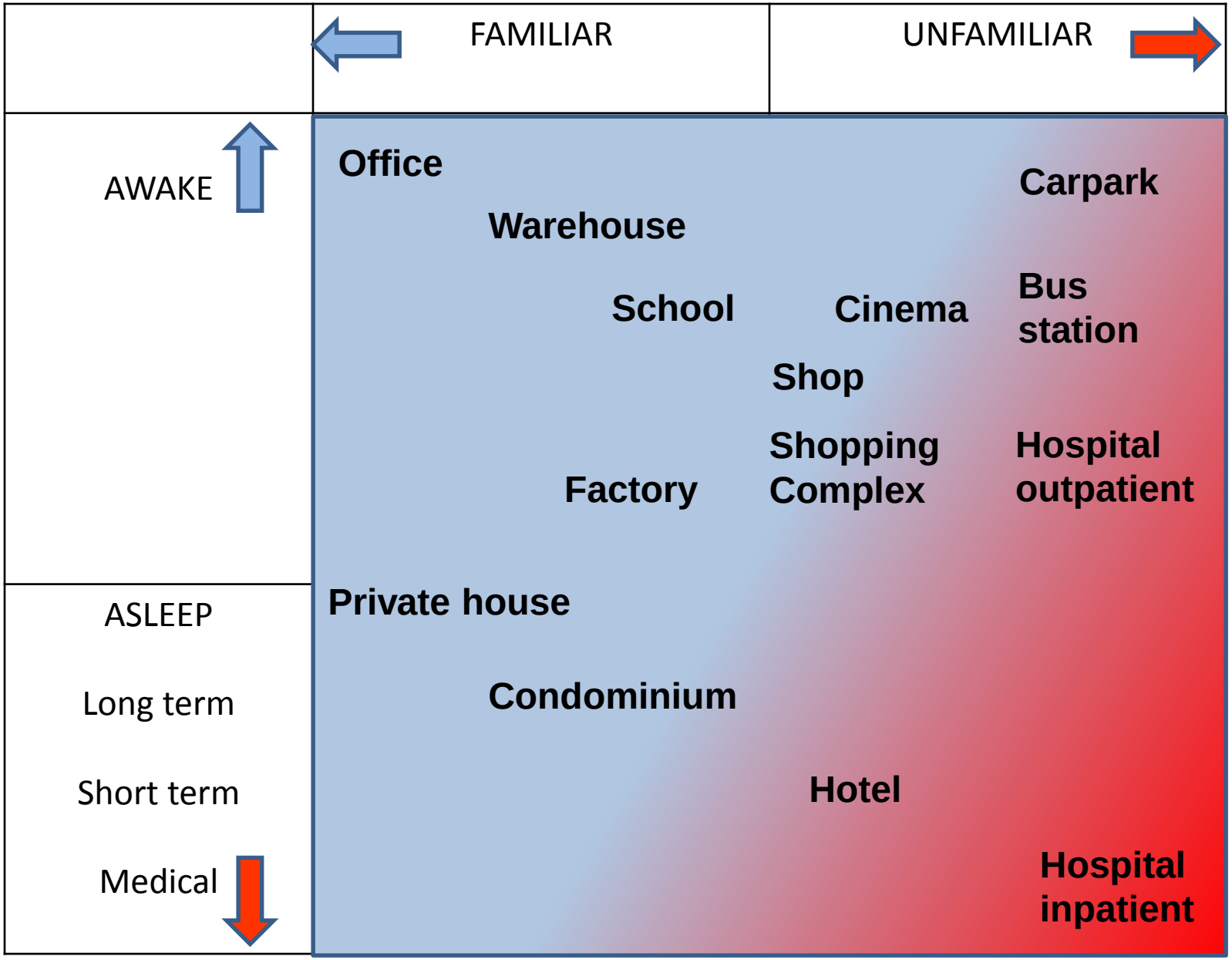
VII : Place of Assembly

IV : Office

VI : Factory

VIII : Storage and general

MS 1183:2015 : Occupancy characteristics



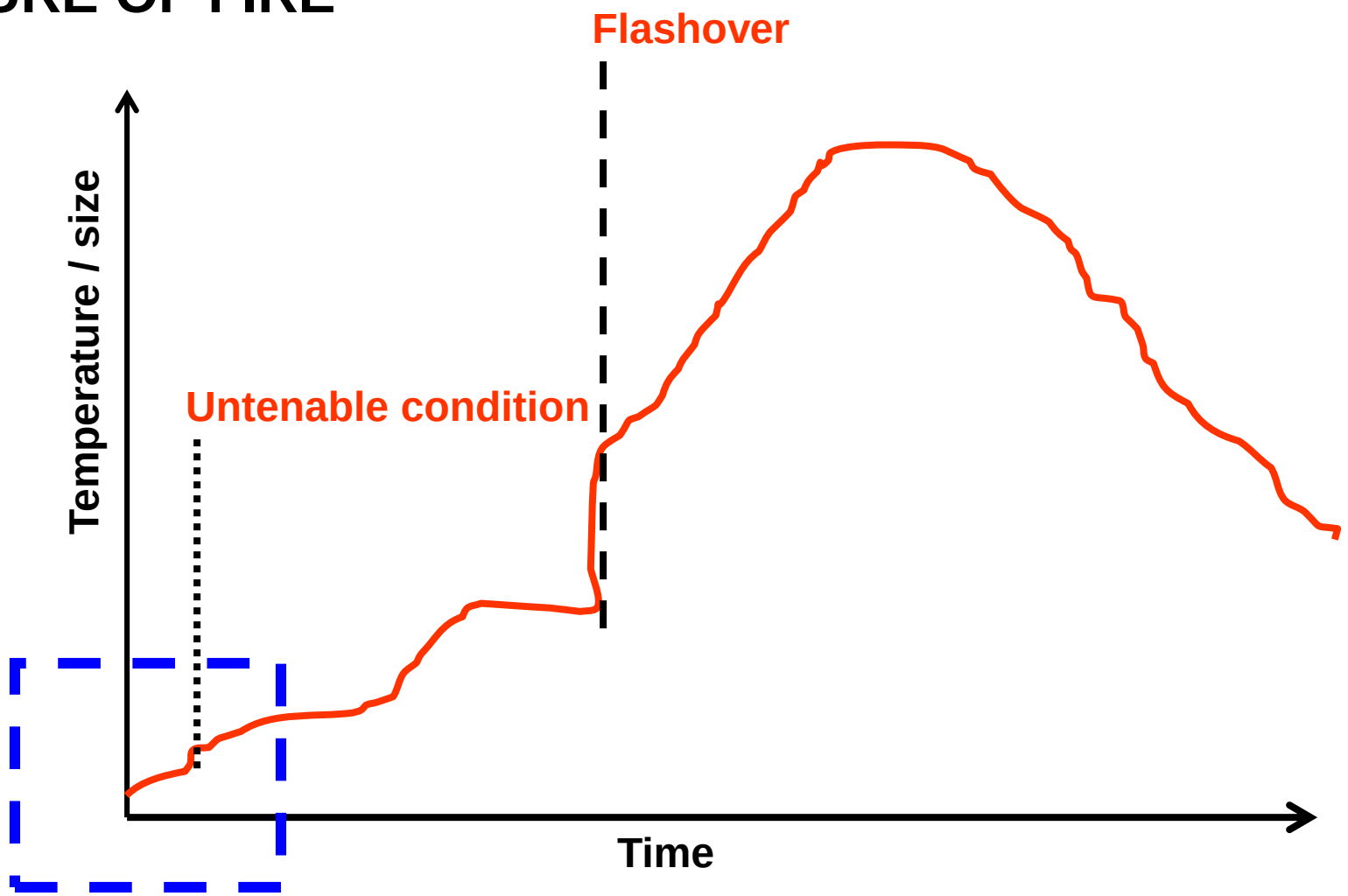
- **EVACUATION**

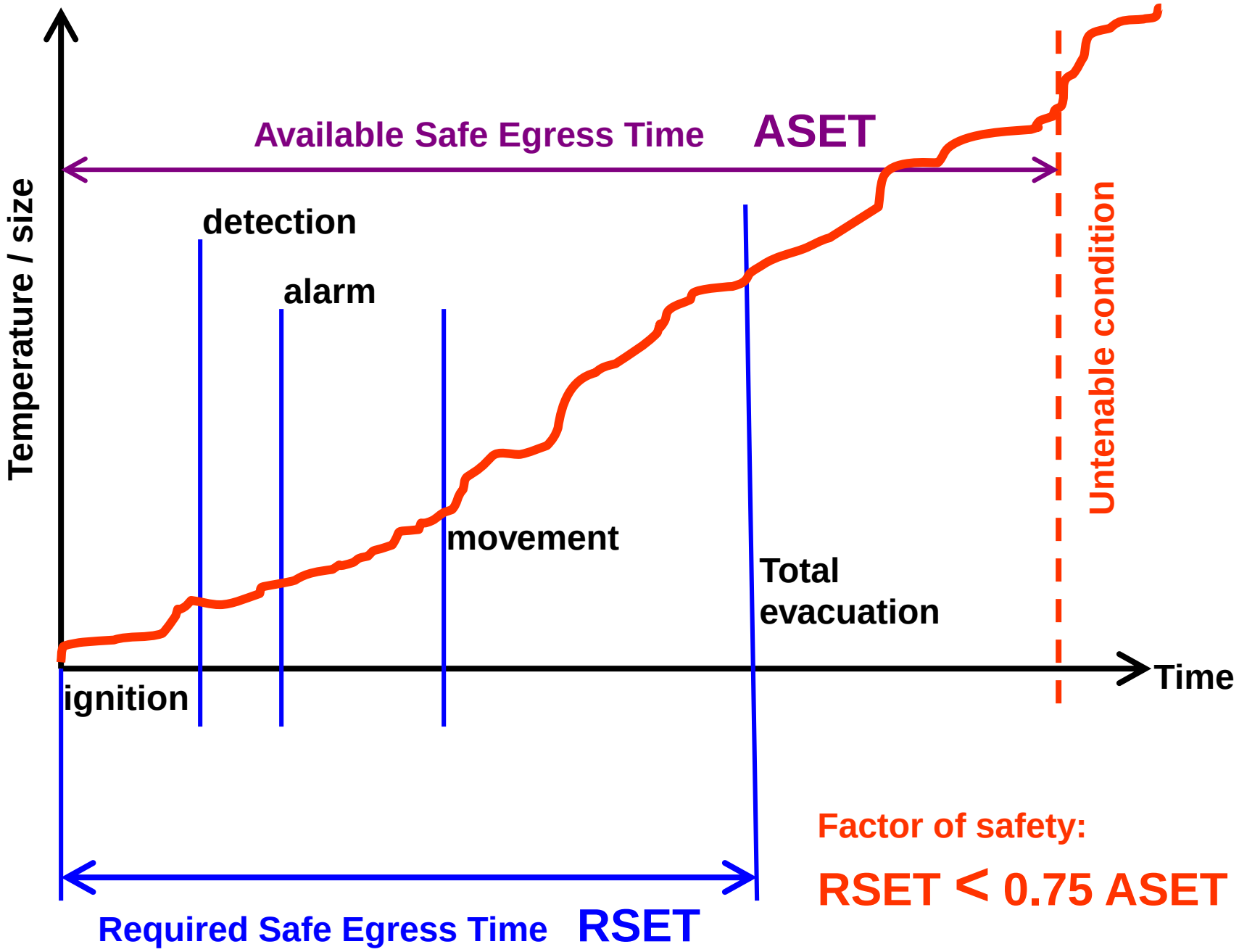
- Detection
- Alarm
- Exits
- Travel distance
- Components
- Capacity of exits

Accepted assumption in designing for safe evacuation:

“Only one fire at one location at a time”

NATURE OF FIRE




Temperature / size
Available Safe Egress Time
ASET
detection
alarm
movement
Total
evacuation
Untenable condition
Time
ignition
Required Safe Egress Time
RSET
Factor of safety:
RSET < 0.75 ASET

exit

- Final exit
- ‘Alternative exits’
- Storey exit
- Horizontal exit
- Exit route

Final exit

- **UBBL 133** – interpretations

- Final exit refers to the threshold that separates “still within the building” and “out of the building”. The liability of the design for evacuation from the building ends at this point.

‘Alternative exits’

- **UBBL 166**

- This is the primary concept for safe evacuation. Every floor space shall be provided with at least two exits on the basis that if one exit is inoperable, the other exit can serve the function.
- This ‘designing for redundancy’ principle applies to all aspects of evacuation.

Horizontal exit

- **UBBL 171**

- Exits that lead to an adjacent (horizontal) separated compartment within the same floor

Storey exit

- **UBBL 167, 174**

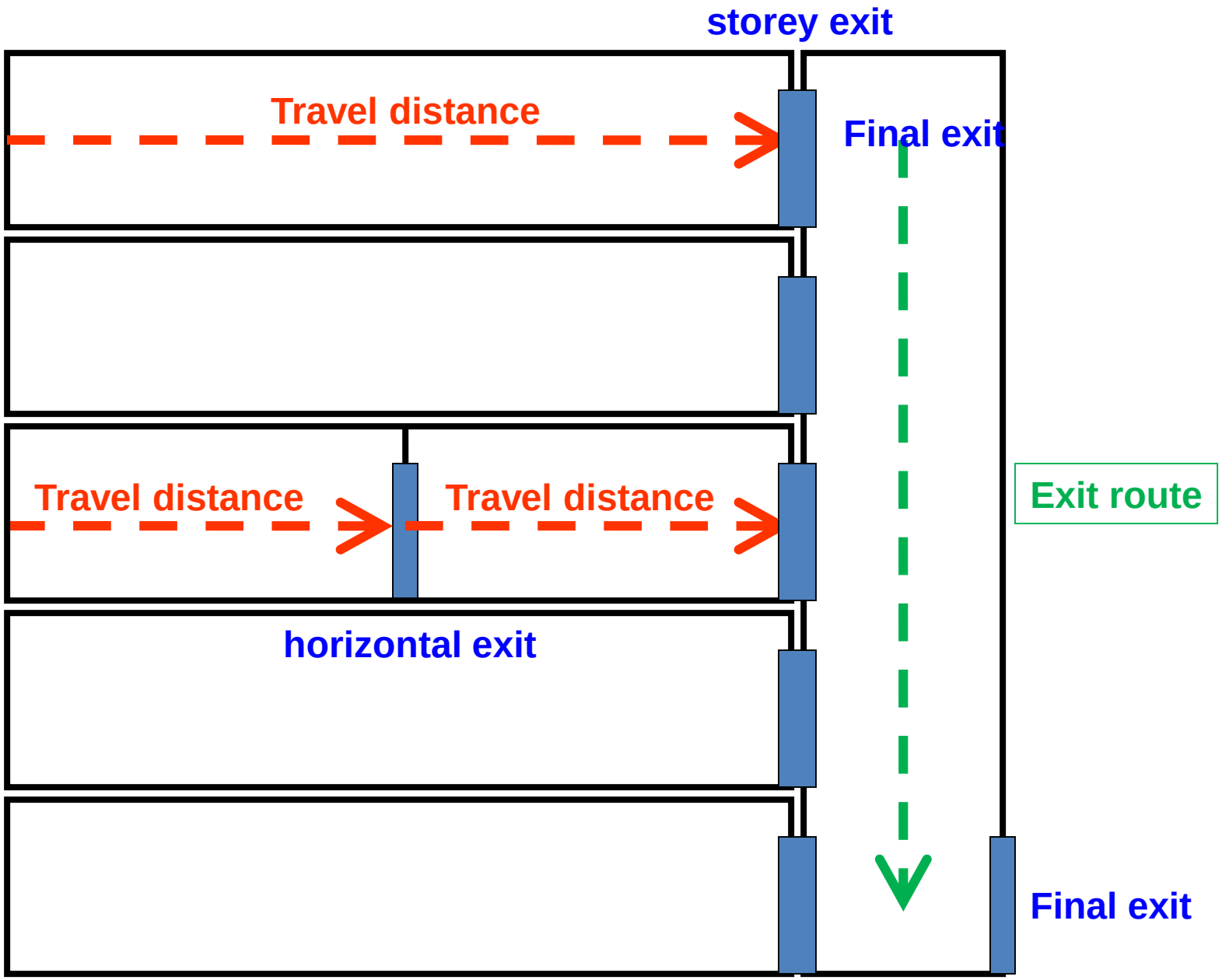
- Exits from a floor which is of a different level from the final exit, or, if on the same level, a distance away from the final exit.

- A storey exit is to lead to a final exit.

Exit route

- **UBBL 133 – interpretations**
- **UBBL 169**

- the protected passage from a storey exit that leads to the final exit.
- Can include spaces that are designated as areas of refuge anywhere between the storey exit and the final exit


storey exit
Travel distance
Final exit
Travel distance
Travel distance
Exit route
horizontal exit
Final exit

MS 1183:2015
EVACUATION STRATEGIES

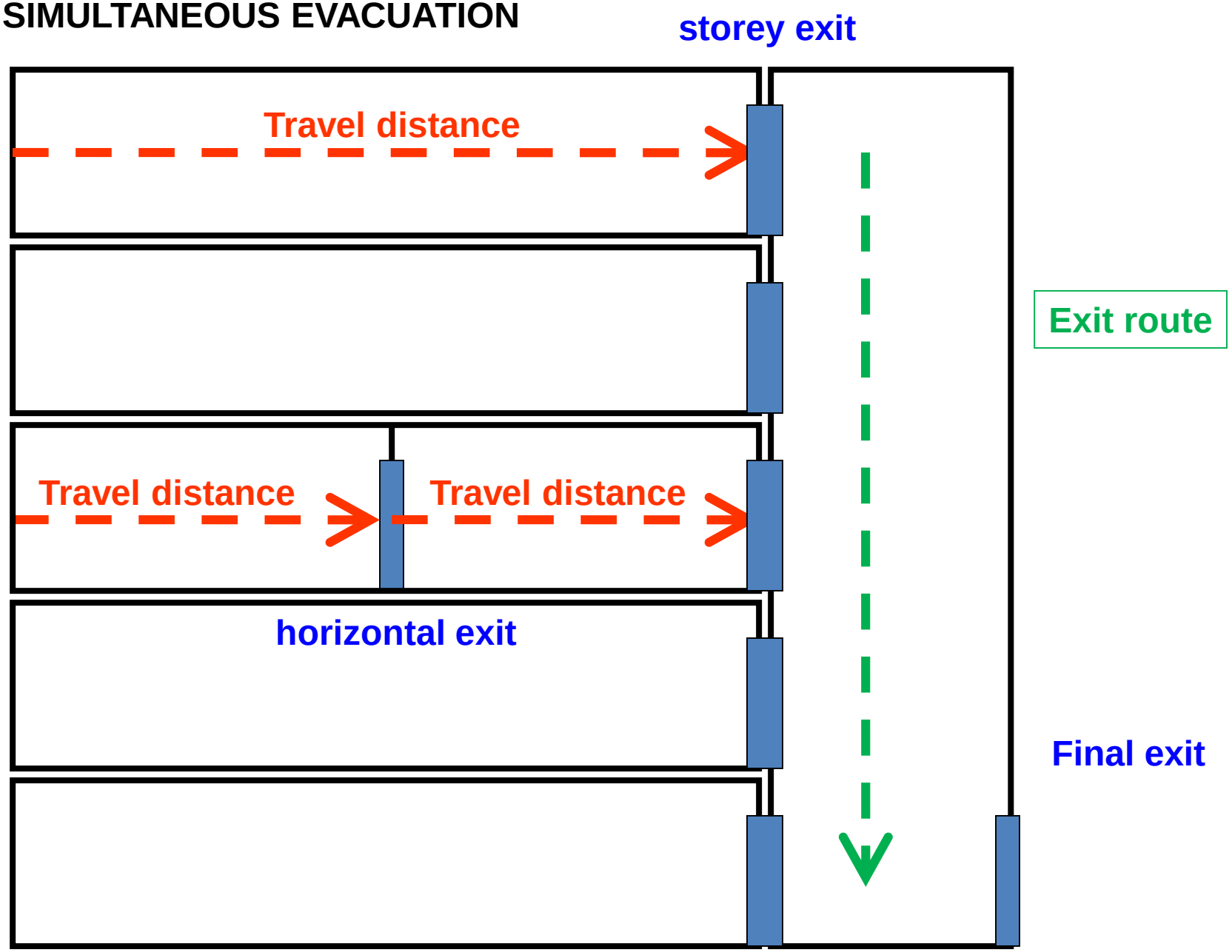
TOTAL EVACUATION

- **Simultaneous**
- **Phased**

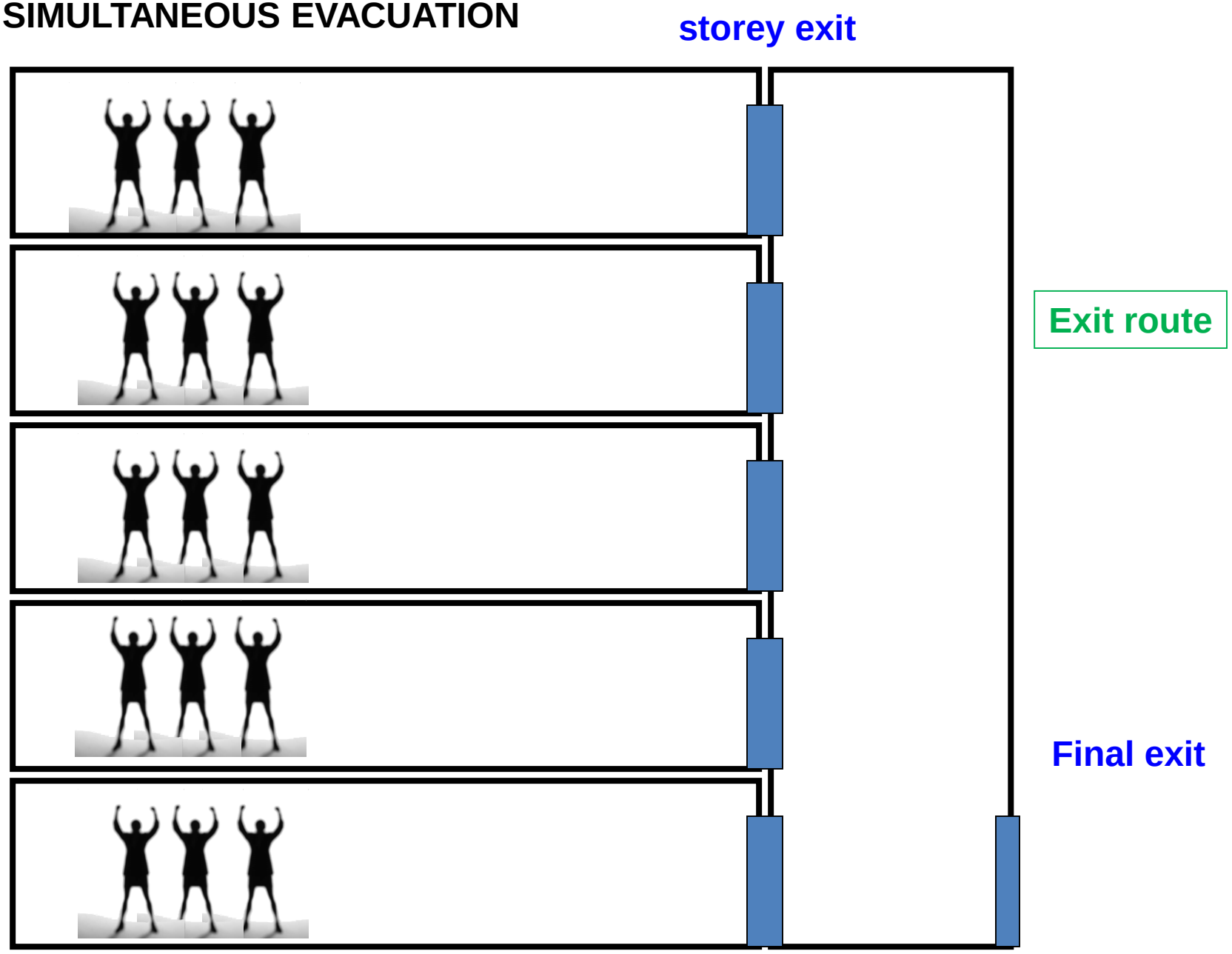
PROGRESSIVE EVACUATION

- **Vertical or horizontal**
- **Zoned**

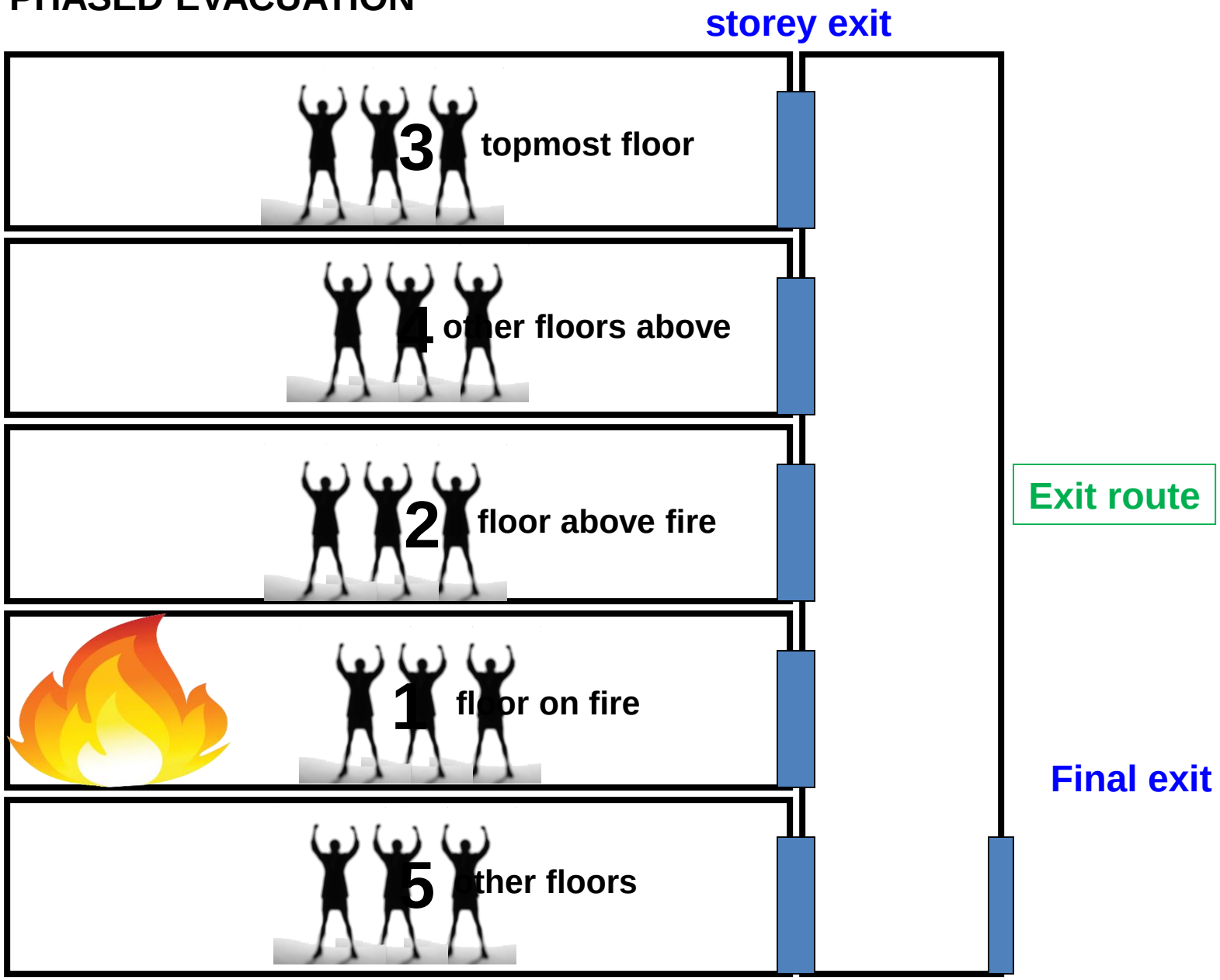
SIMULTANEOUS EVACUATION



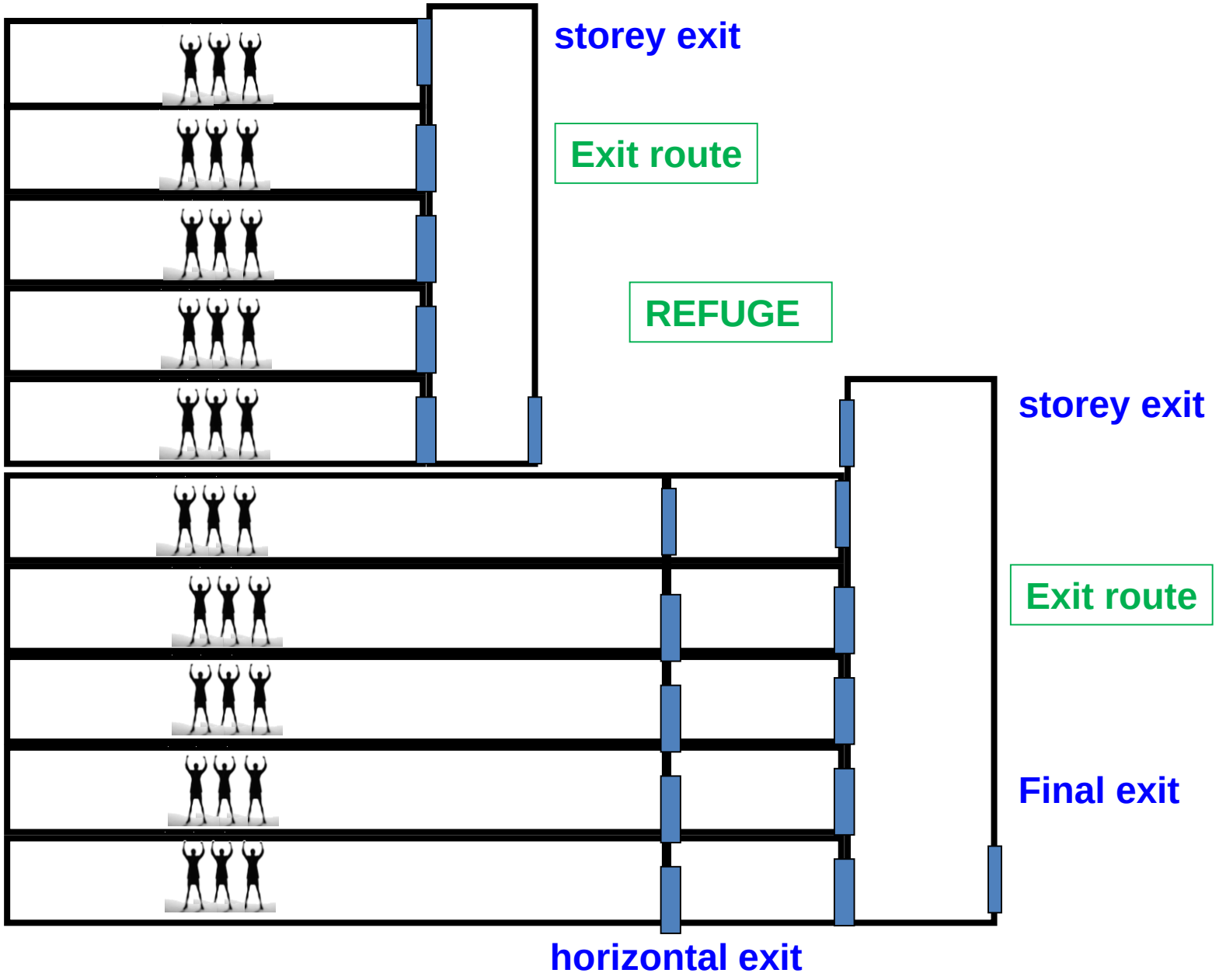
SIMULTANEOUS EVACUATION



PHASED EVACUATION



PROGRESSIVE EVACUATION: VERTICAL and HORIZONTAL



ZONED EVACUATION

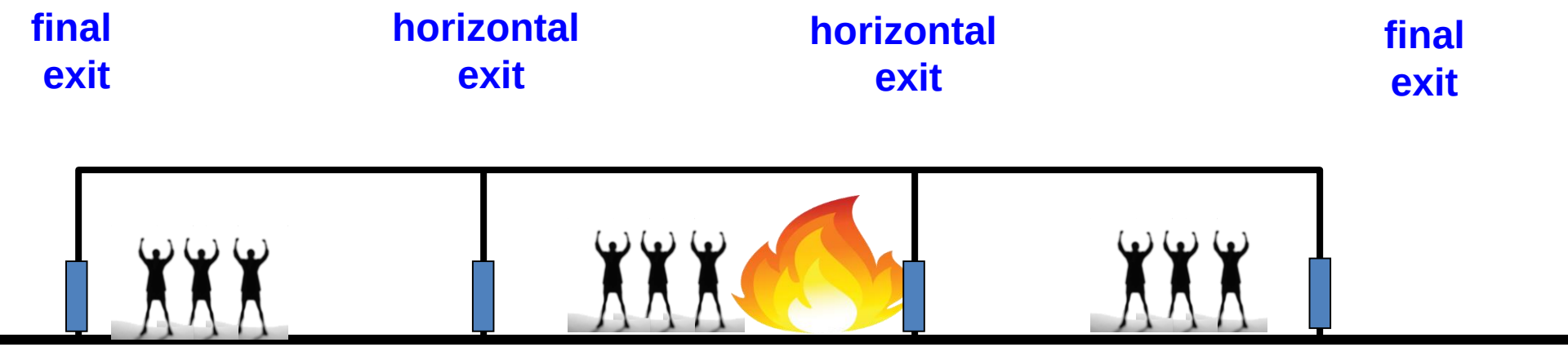
final exit

horizontal exit

horizontal exit

final exit

ZONED EVACUATION



EVACUATION LIFTS

UBBL 2012

34A

" Any building shall

a) be approved with access to enable disabled persons to get into, out of and within the building……."

c)…..(to be in)...compliance with Malaysian Standards MS 1183 and MS 1184

MS 1184:2014

15.6

"All lifts in new buildings should comply to statutory requirement on fire requirement for **evacuation**."

MS 1183:2015

Annex G

Recommendations for refuges and **evacuation lifts**

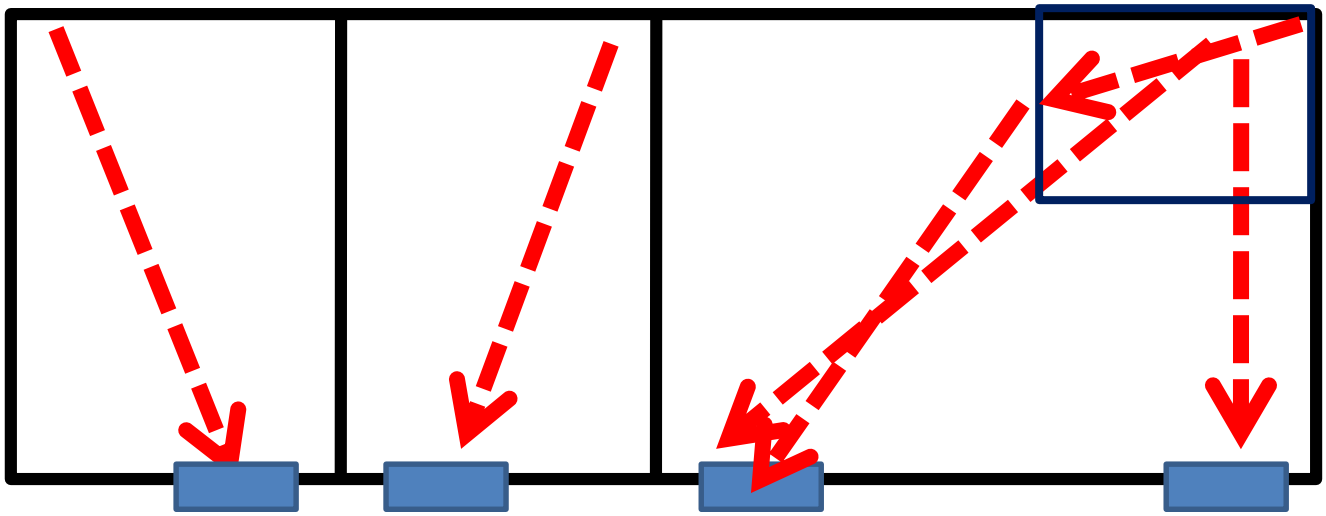
EVACUATION LIFTS

A designated Evacuation Lift …..

- Shall be within a Protected Shaft
- Shall be a component within a protected Exit Route
- Shall be able to switch to evacuation mode by Authorised Person at the Fire Fighting Access Level
- Preferably to be a lift in every day use
- i.e the physical and functional requirements is similar to a BOMBA lift.

Travel distance

- **UBBL 165**
- **7th Schedule**
- Dead end
- initial travel distance before a point where an alternative path becomes available
- Direct distance
- Stipulates that travel distance must be measured along the actual path of travel
- Open plan
- Where an actual path of travel cannot be determined, the direct distance can be measured as a straight line direct to the exit. Permitted travel distance is then reduced to 2/3.



UBBL 165 (B) Max 15m if room < 6 pax

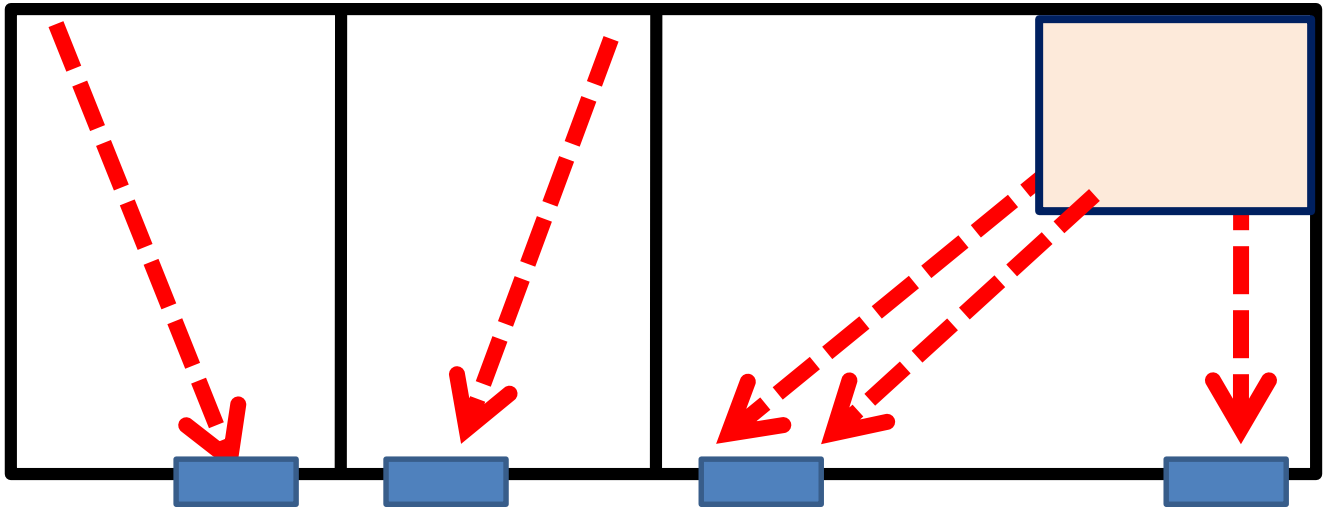
Final exits

To comply with dead end and travel distance

Max distance is 15m within room plus max allowable travel distance From door of room to final exit

Evacuation : multiple areas

	165. Measurement of travel distance to exits. (3) In the case of individual rooms which are subject to occupancy of not more than six persons, the travel distance shall be measured from the doors of such rooms: Provided that the travel distance from any point in the room to the room door does not exceed 15 metres.	(3) In any of individual room which is subjected to occupancy of not more than six persons, the travel distance shall be measured from the door of such room: Provided that the area of the room does not exceed 15 square metres or any other area determined by the Fire Authority.	To clarify that this requirement is applicable to each individual room. Measurement based on floor area of a room provides stricter control.

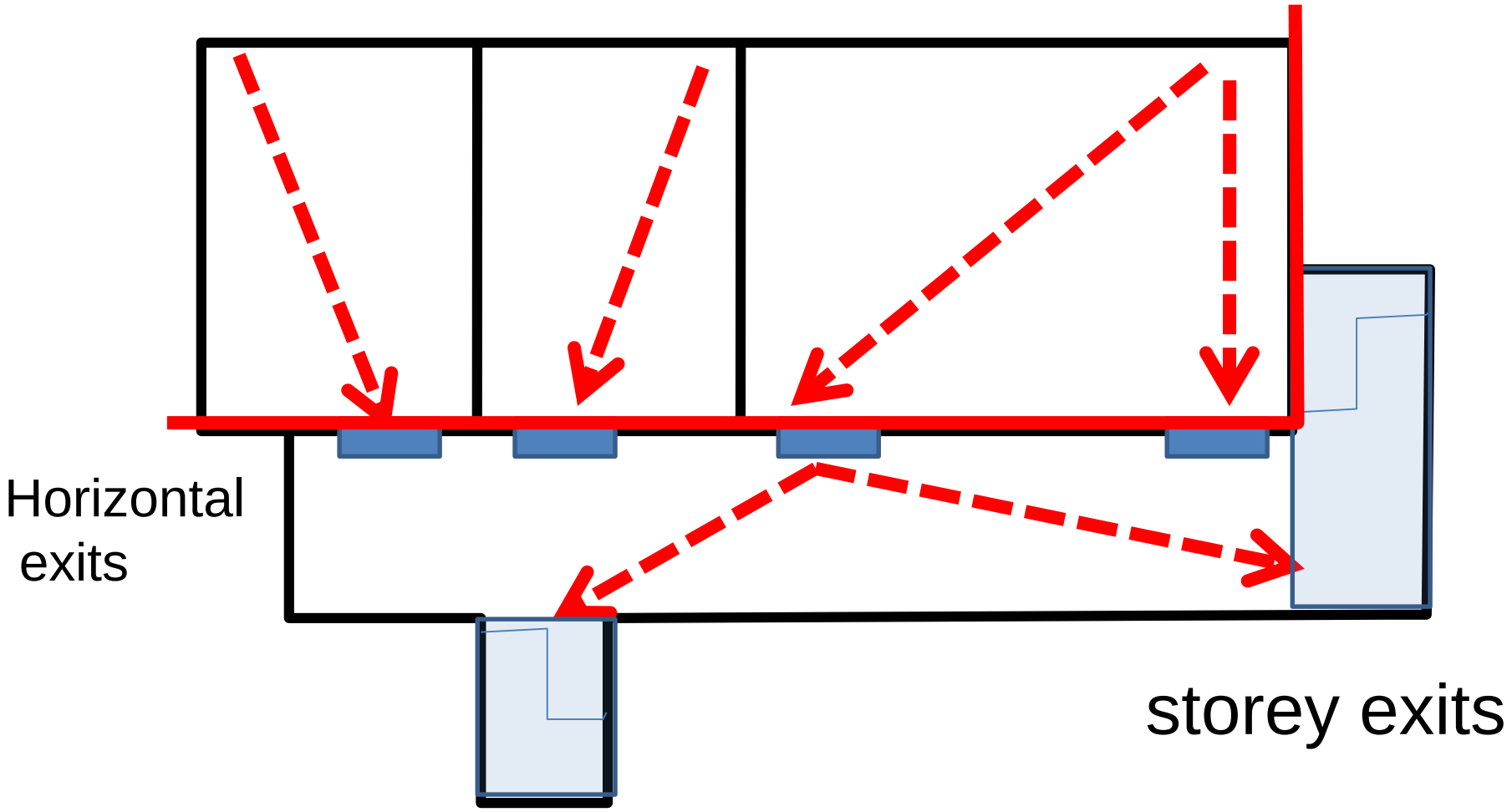


Final exits

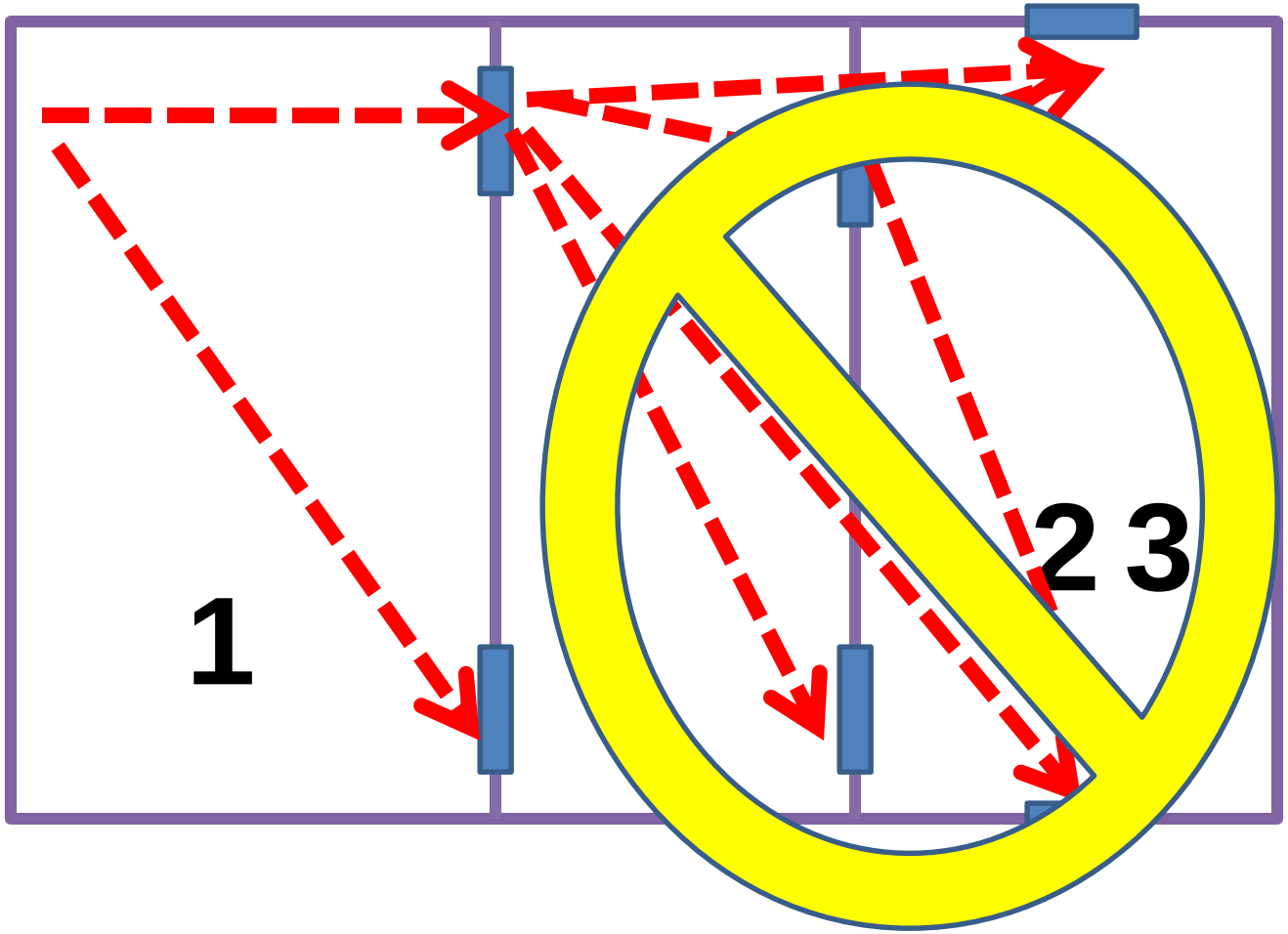
UBBL 165 (B)

Travel distance measured from door if room is less than 15m2 and with less than 6 occupants

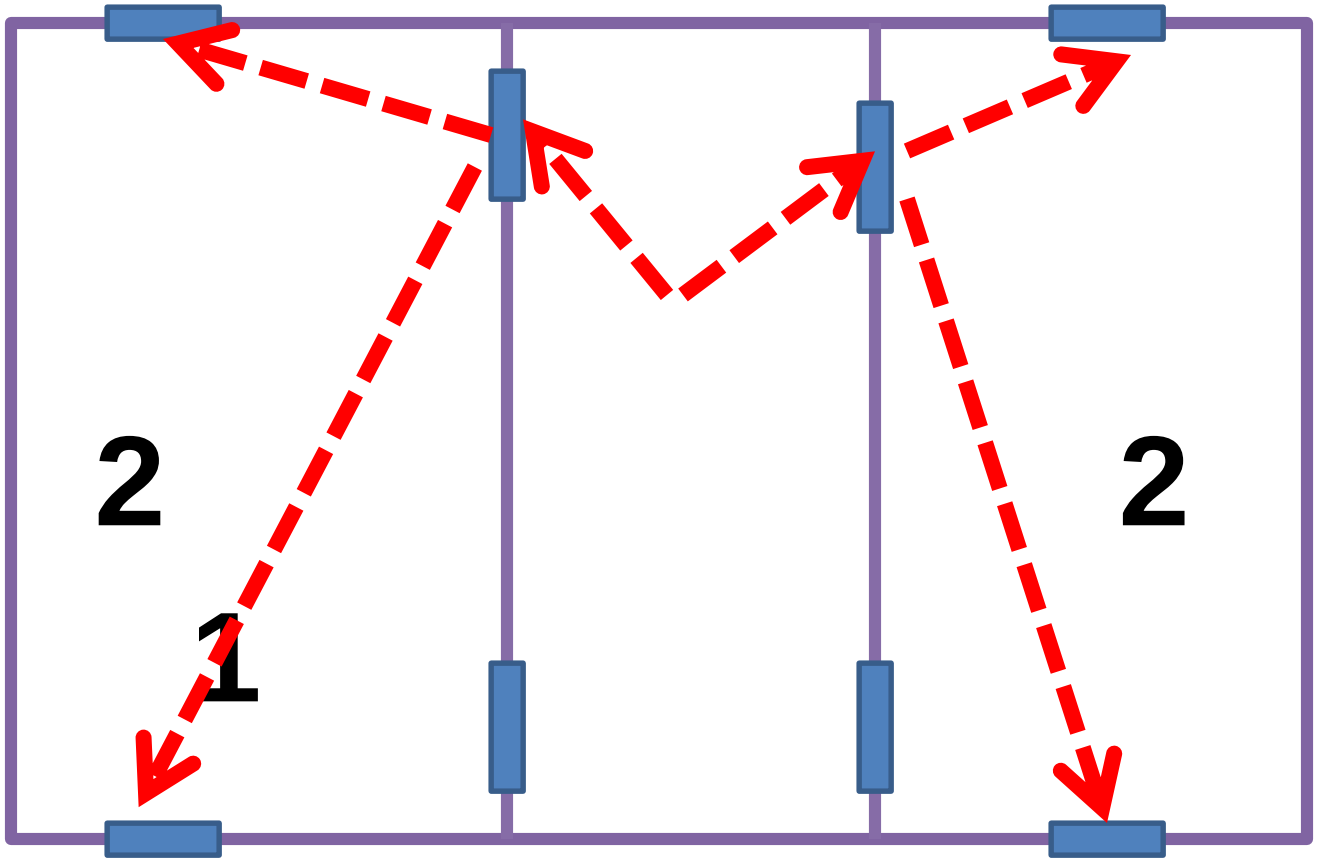
Evacuation : multiple areas



Evacuation : multiple areas



Horizontal exits



Horizontal exits

Exit Route components

- Exit door
- Exit discharge
- Protected corridor
- Protected staircase
- Balcony approach
- Single staircase

Exit door, exit discharge

- **UBBL 173**
- **UBBL 186**
- **UBBL 193**
- **UBBL 133 - interpretations**

- ‘Door’ refers to the physical door installed at an exit, and all its functional components e.g. locksets, latches, hinges and closers
- ‘discharge’ refers to the ‘doorway’ or threshold of an exit

Exit door, exit discharge

- Not all fire rated doors are exit doors
- Not all exit doors need to be fire doors
- Not all doors need to be exit doors
- Not all doors can be exit doors

- **To qualify as an Exit Door:**
- Exit doors must always be able to be opened (without undue effort) at all times
- Exit discharge must always allow the passage of people at all times
- ‘Exit’ in this context means storey exit, horizontal exit or final exit

Protected corridor, protected staircase

- **UBBL 133-interpretations**
- **UBBL 157, 189, 190, 191**

- While not expressed, it is inferred from the UBBL that all components that form the Exit Route shall be of protected construction.

- Using the same inference, ‘protected’ shall mean ‘enclosed’, ‘separated’ or ‘isolated’ from untenable exposure to Fire or Smoke

Single stair

- **UBBL 194**

- Special provision for the common ‘shop-house’ design

- Usage limited to shop (ground floor only), residential or office.

- Uppermost floor level limited to 12m

UBBL 2012 : amended provision for:

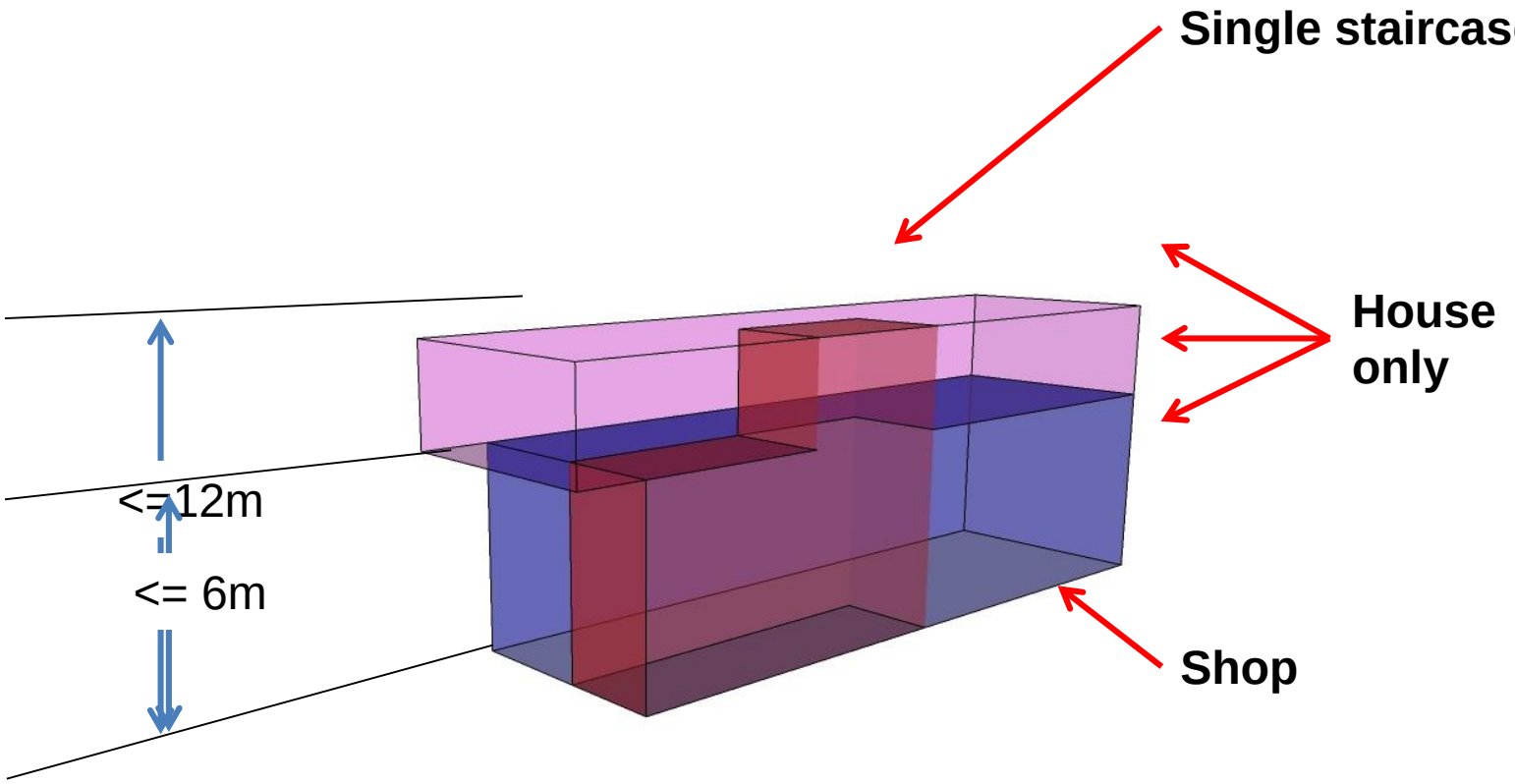
194. Buildings with single staircase.

A single staircase may be permitted in the following premises:

(a) any dwellings at a height of 12 metres measured from the fire appliance access level to the highest ~~and lowest~~ floor; and

(a) any shophouses or dwellings not exceeding two (2) storeys ~~or~~ (and) the first storey not exceeding 6 metres from the ground level.

Clause 194 (b) : single staircase for shop house



1) House only on upper floor
2) No more than 2 storeys
3) Height of first floor no more than 6m above <u>ground</u> level

Clause 166 and 167 (not less than two exits) shall apply for other building types

Capacity of exits

- **UBBL 7th Schedule**
- **UBBL 175, 176, 178**

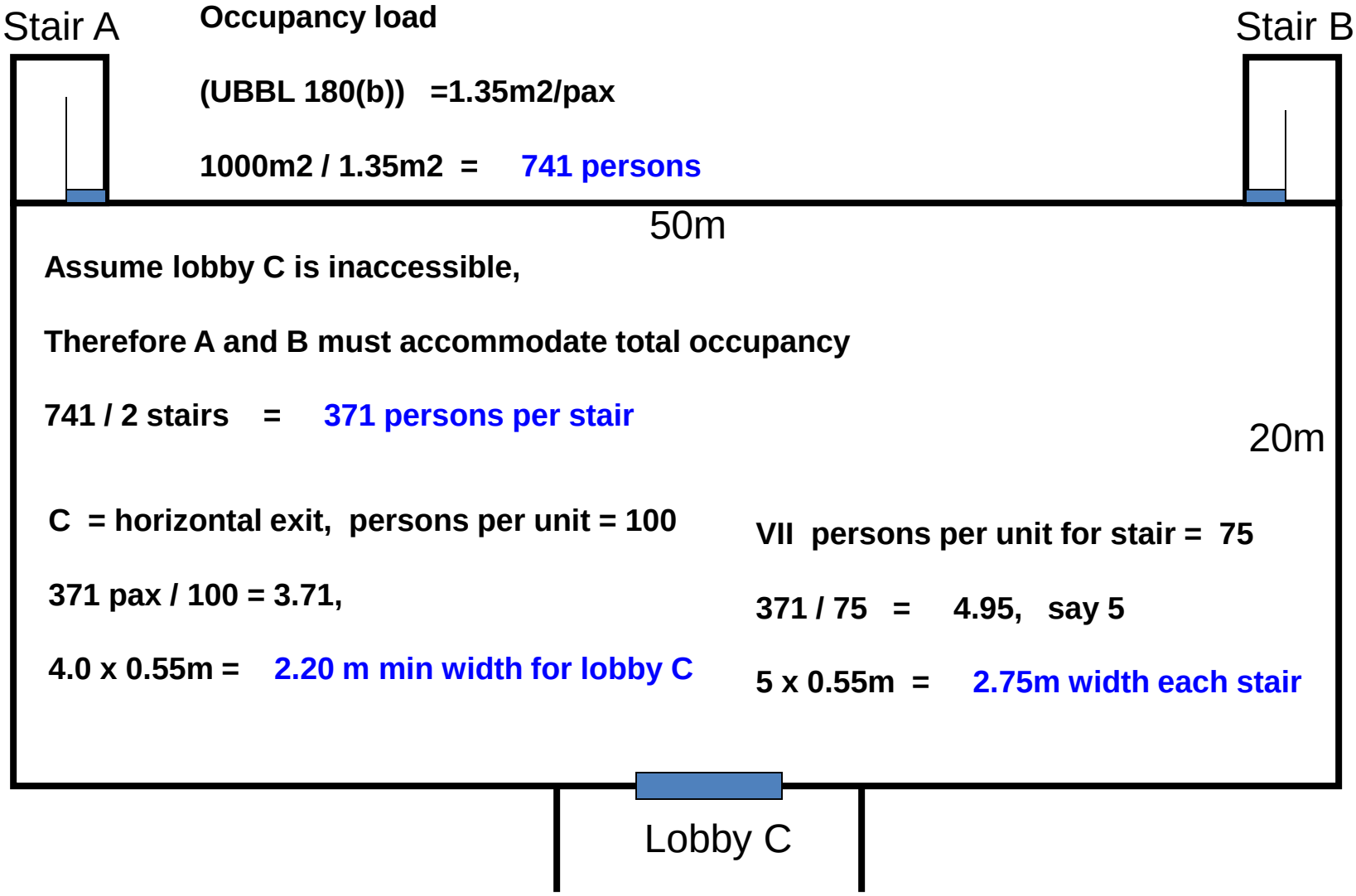
- Occupant load

- Exit width

- Application of horizontal exit

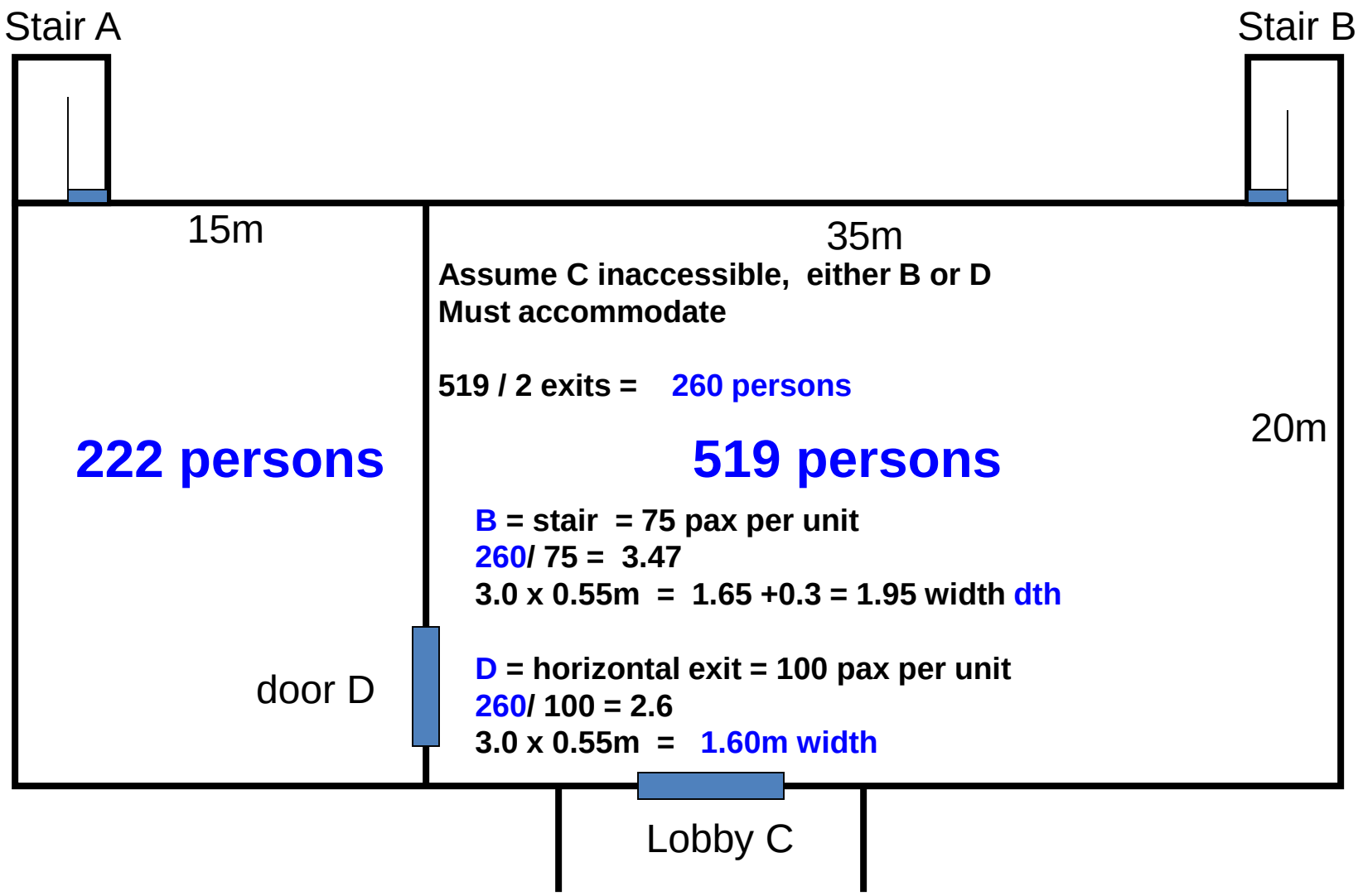
Sample calculation

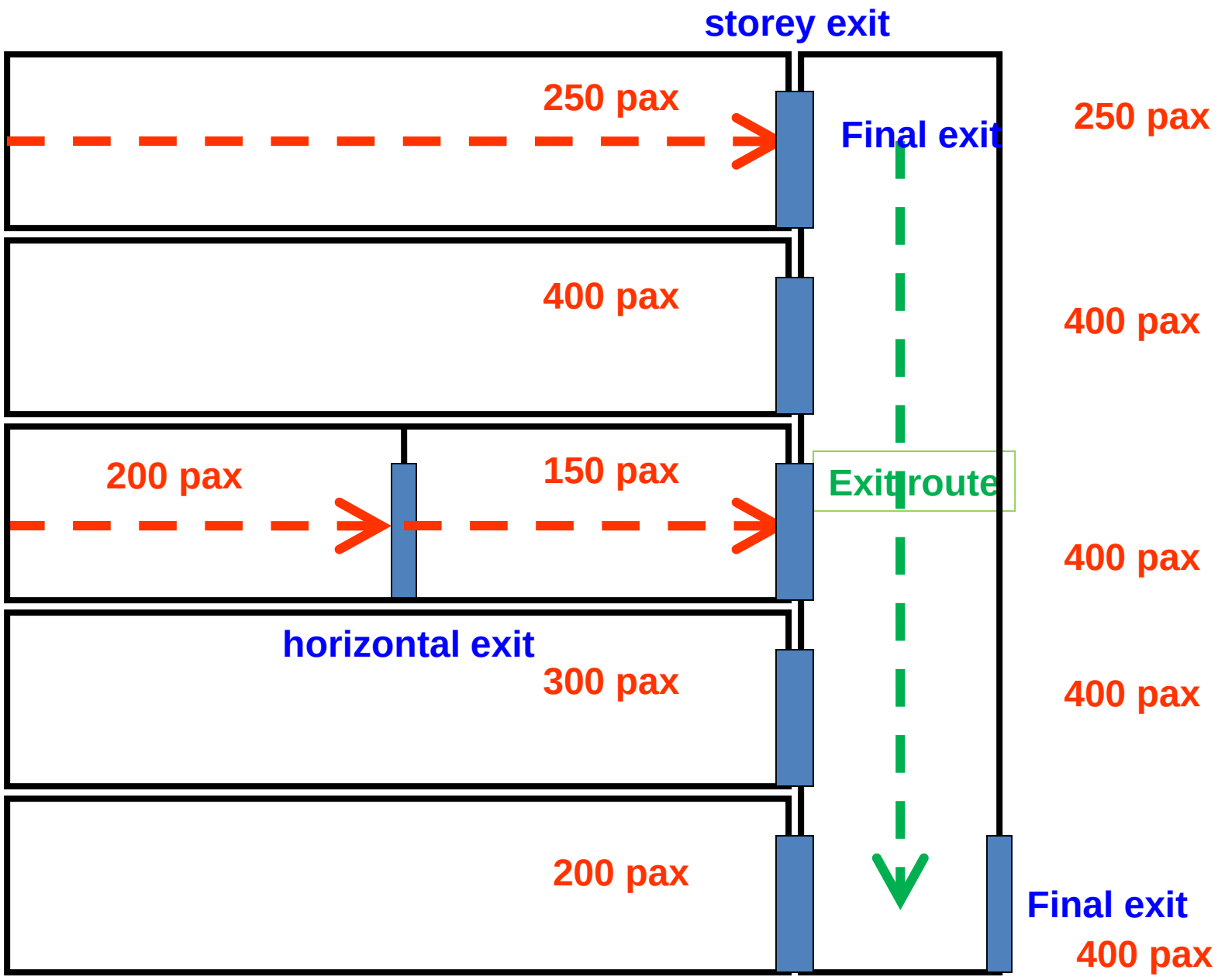
Scenario 1: upper floor assembly area in an institutional building



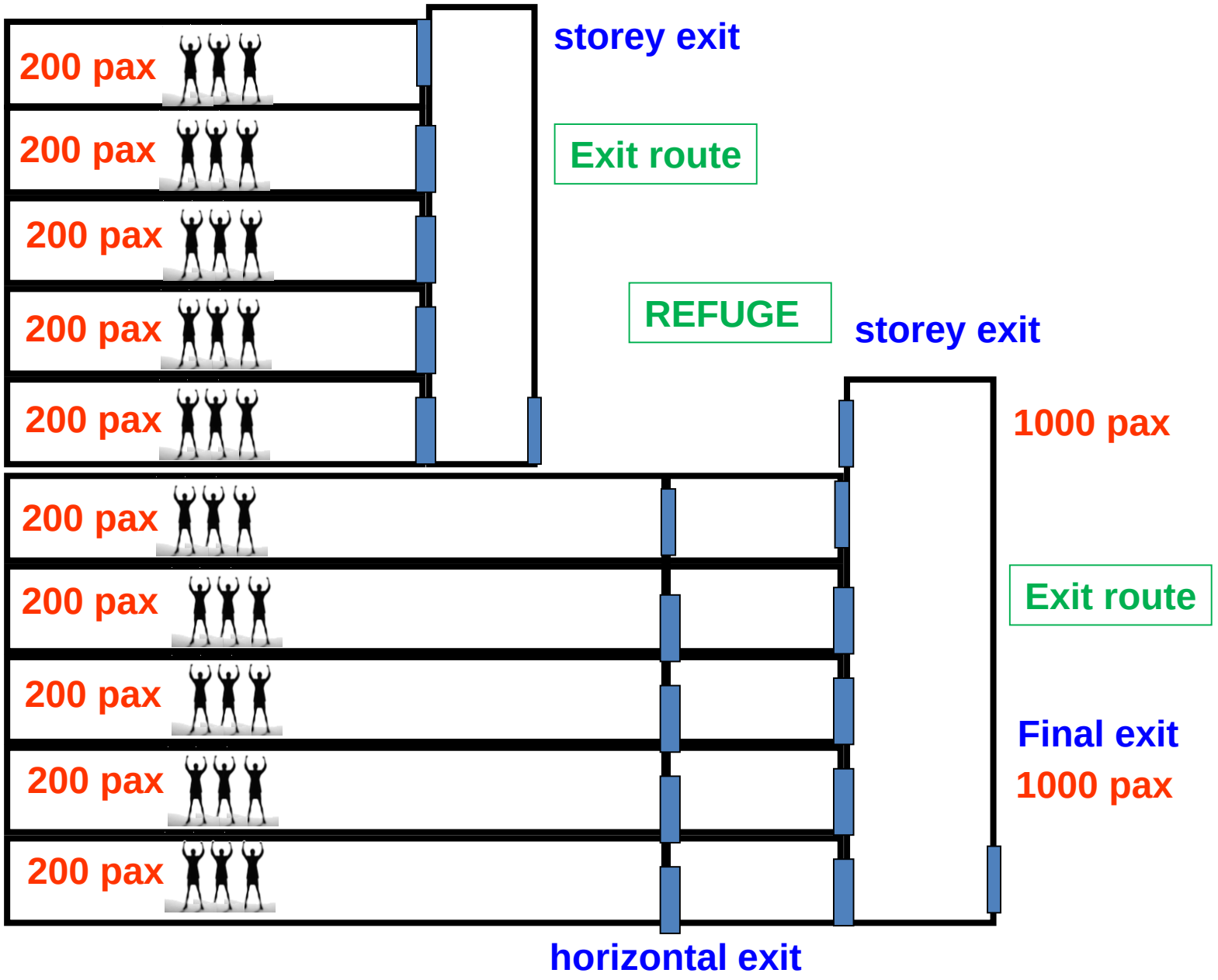
Sample calculation

Scenario 2: upper floor assembly area in an institutional building

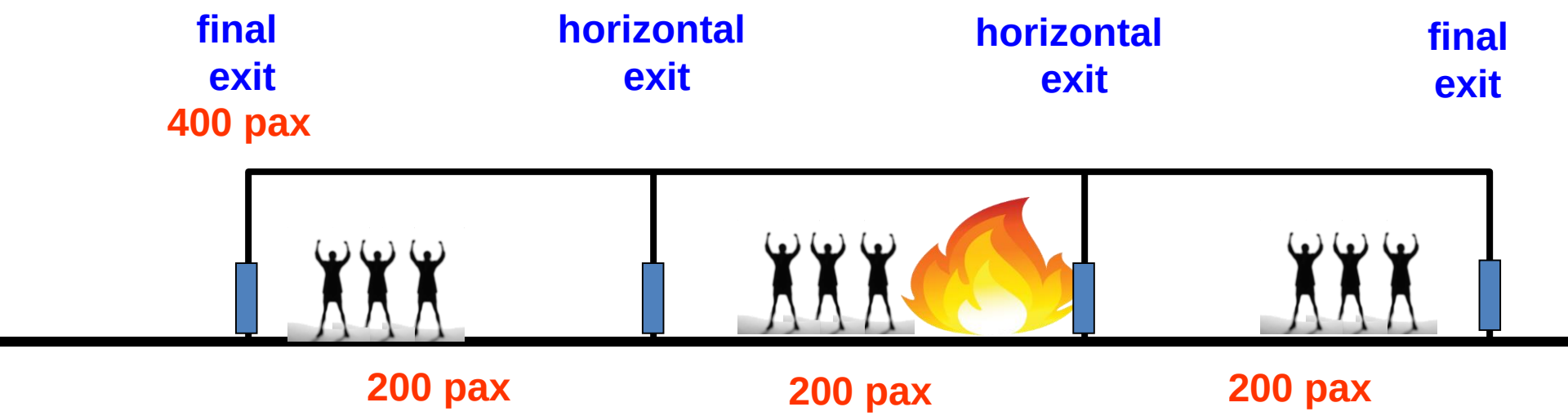



storey exit
250 pax
Final exit
250 pax
400 pax
400 pax
200 pax
150 pax
Exit route
400 pax
horizontal exit
300 pax
400 pax
200 pax
Final exit
400 pax

PROGRESSIVE EVACUATION: VERTICAL and HORIZONTAL



ZONED EVACUATION



UBBL 2012 : 7th Schedule : Maximum Travel Distance

Purpose Group	Limit when alternative exits are available		
	(1) *Dead-End Limit (metre)	(2) Unsprinklered	(3) (metre) Sprinklered
I. Small Residential	NR	NR	NR
II. Institutional			
Hospitals, Nursing Homes, etc	9 15	30	45
School	6 15	45	60 75
Open Plan	NR	30	45
Flexible Plan	NR	45	60
III. Kediaman lain			
Hotels	10 15	30	45
Flats	10 20	30	45 75
Dormitories	0 15	30 45	45 75
IV. Office	15	45	60 75
V. Shops	15	30 45	45 60
VI. Factory			
General and Special Purpose	15	30	45 60
High Hazard	0	22	22.5 35
Open structures	NR	NR	NR
VII. Place of Assembly	0 15	45	61 60
VIII. Storage and general			
Low and Ordinary hazard	NR 15	NR 30	NR 60
High Hazard	NR 10	22.5 20	30 35
Parking Garages	15	30 45	45 60
Aircraft Hangars (Ground Floor)	NR 15	30+	45+
Aircraft Hangars (Mezzanine Floor)	NR 15	22.5 20	22.5 20

UBBL 1984 provisions shown in **RED**

UBBL 2012: 7th Schedule : Occupant Load and capacity of exits

	Purpose Group	Occupant load square metre per	CAPACITY EXITS *No. of persons per unit–Exit Width*					
			Doors outside	*Horizontal Exit*	*Ramp Main Exit*	*Ramps Sec. Exit*	*Escalator*	*Stairs*
I.	**Small Residential**	NR	NR	NR	NR	NR	NR	NR
II.	**Institutional**		100	100	100	60	-	60
	Class-room Area	2 net						
	Workshop and Vocational areas	4.5 net						
	Day Nurseries with sleeping facilities	3.5 net						
	Hospital	-	30	30	30	30	-	22 15
	Sleeping Department	12 gross						15
	In-patient Department	24 gross						
III.	**Other Residential**	20 gross	100 50	60 50	60 50	60 50	45	45 30
	Flat	24 gross	50	50	50	50		30
	General public area in Hotels (Bedroom in hotels at 2 persons per room)	24 gross						
IV.	~~Shops~~ **OFFICE**	10 gross (4)	100	100	100	60	60	60
V.	~~Kedai~~ **SHOP**	-	100	100	100	60	60	60
	Street floor and sale basement	3 gross (4)						
	Other floors	6 gross (4)						
	Storage and shipping	10 gross						
VI.	**Factory**	10 gross	100	100	100	60	60	60

UBBL 1984 provisions shown in **RED**

Horizontal exit


PINTU RINTANGAN API
HENDAKLAH SENTIASA
DITUTUP.
Arahan Jabatan Bomba


KELUAR
PINTU RINTANGAN API
HENDAKLAH SENTIASA DITUTUP
(LALUAN KECEMASAN SAHAJA)
PINTU RINTANGAN API
HENDAKLAH SENTIASA DITUTUP
(LALUAN KECEMASAN SAHAJA)

Final exit

Compartmentation

- Size limitations of ‘compartments’
- Fire Resistance Ratings of ‘elements of structure’

Compartmentation

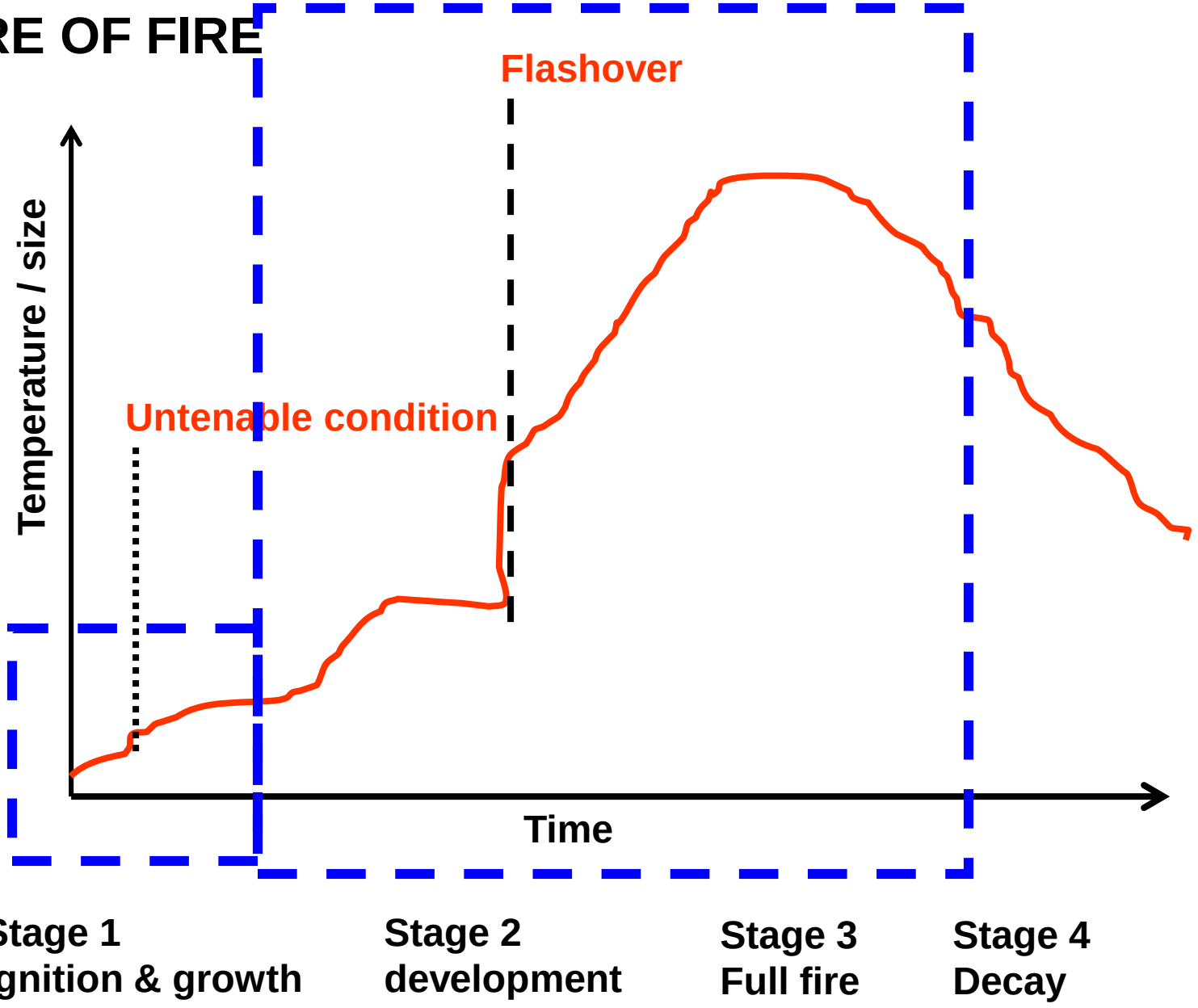
- To contain the spread of fire from point of origin
- To limit the potential size of the fire
- To separate areas of different levels of hazard
- To separate areas for safe exit, evacuation or refuge
- To limit threat to the structural integrity of the building
- To allow sufficient time for safe evacuation, active extinguishment of fire and rescue.

compartmentation

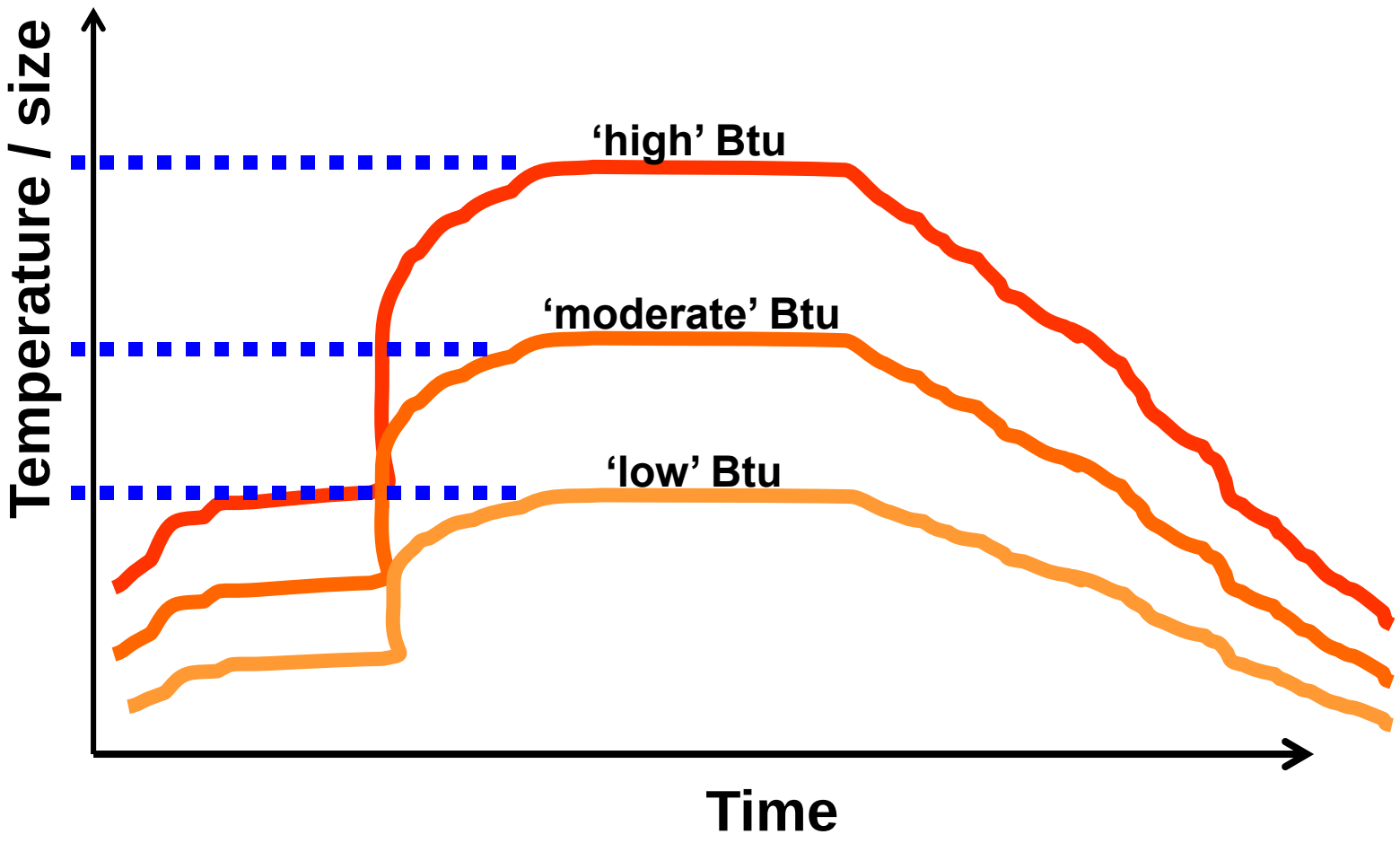
Fire Load

- Surface area / volume of combustible content (A)
- Combustion heat per area / volume (B)
- Fire Load = (A) x (B)

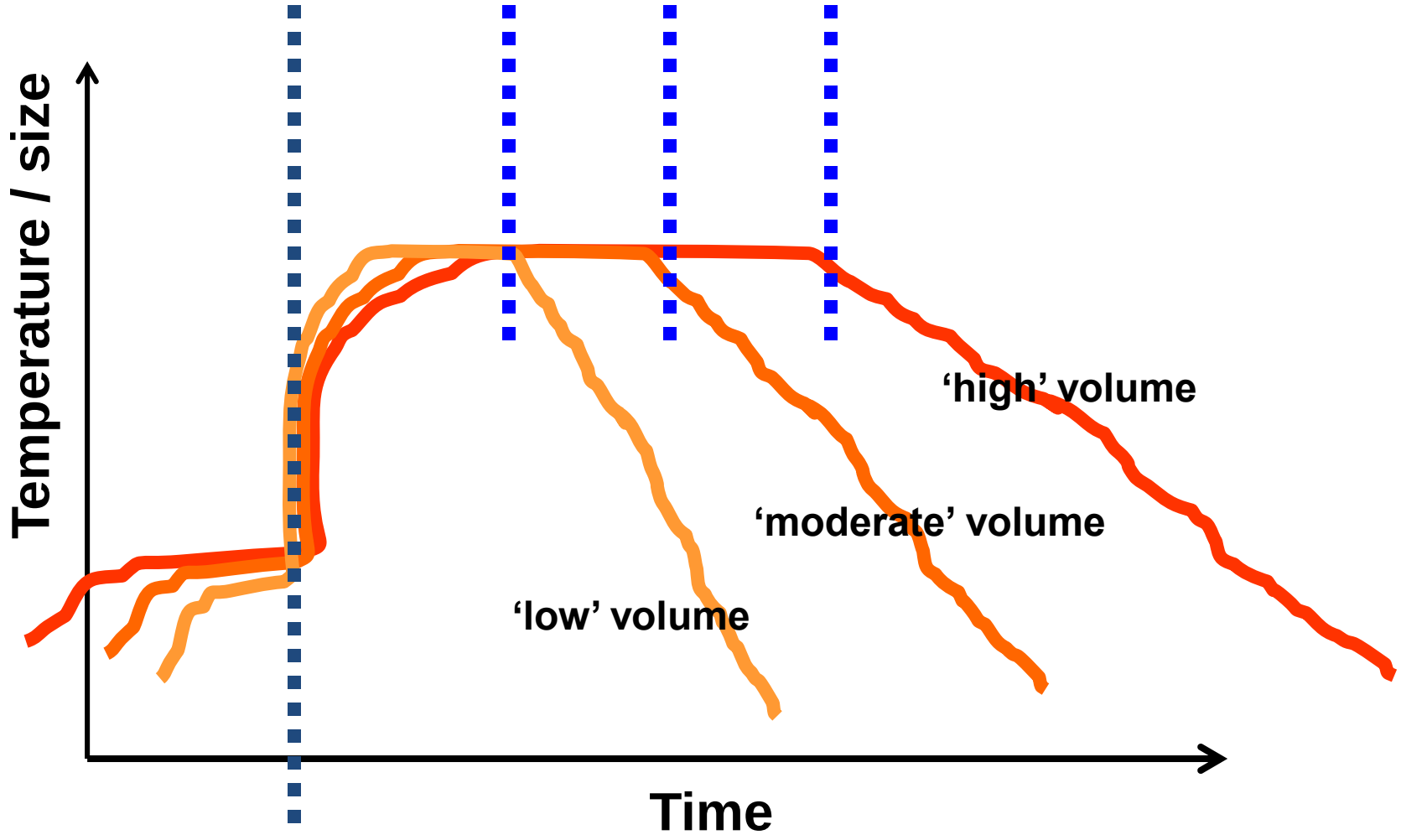
NATURE OF FIRE



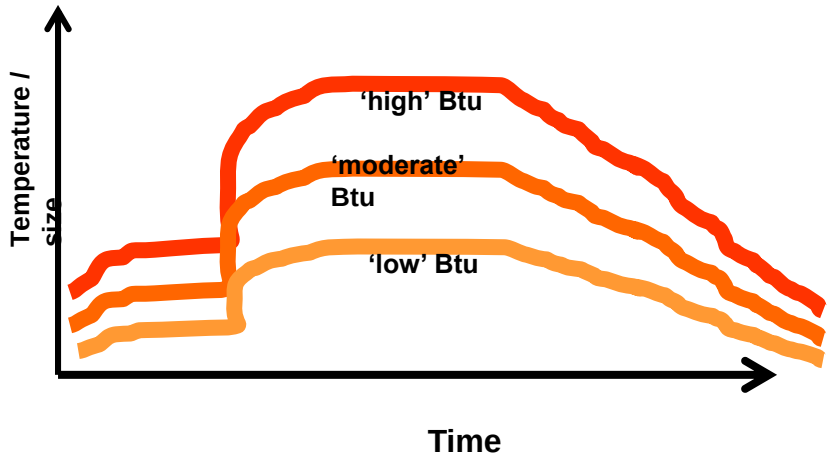
EQUAL VOLUME



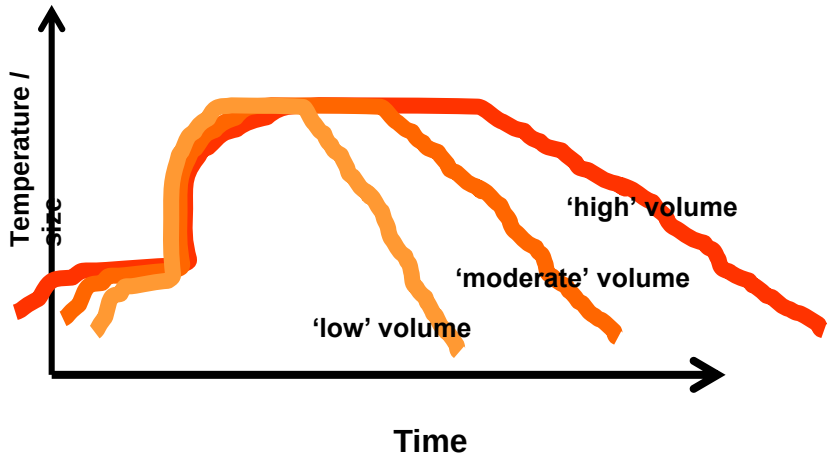
EQUAL Btu


Temperature / size
Time
'high' volume
'moderate' volume
'low' volume

EQUAL VOLUME



EQUAL Btu



Purpose Group classification

Limitation of
Floor Areas and Volume

Prescription of
Fire Resistance Rating

Accepted assumption in designing for safe evacuation:

"Only one fire at one location at a time"

Primary objective of compartmentation:

"To contain the one fire within the one location at all times"

Contributing factors to potential fire load :

Contents of the building

- Fittings and furnishings…….
- ……..including the building itself
- Furniture and equipment
- Consumables
- Storage items
- Presence of hazardous materials
- Presence (or absence) of human occupants

These factors lead to the
<u>designation of purpose groups</u> in the
5th Schedule, UBBL, …….

……and to the prescriptions of UBBL

6th Schedule
8th Schedule
9th Schedule

UBBL 5th Schedule

- **UBBL 5th schedule**
- **UBBL 134**
- **UBBL 135, 136, 137, 138, 139**
- Every building is to have one overall designation
- Individual components of building with different usage from overall must be designed to accommodate the more stringent requirement, and where these requirements ‘spill’ into the other parts of the building, the more stringent requirement applies.
- Only ‘horizontal’ separation is allowed between buildings of different purpose groups

UBBL 5th Schedule

- Dimensions of buildings and compartments

- Single storey buildings : limitations apply only to II and III
- Others : dimensional limitations does not apply to I, IV and VII

other limitations that may affect areas and volumes

- UBBL
- 136, 220 : if automatic sprinklers installed, limits can be doubled (x 2)
- 137 : floor to floor compartmentation
- 138 : floor and wall compartmentation for flats, basement and areas of different usage
- 139 : compartmentation of hazardous areas

other limitations that may affect areas and volumes

- 158, 178 to 188 : specific coverage for VII – places of assembly
- Travel distances and occupant loads

UBBL 6th Schedule

- UBBL 142, 145 Construction and protection of external walls

UBBL 8th Schedule

- UBBL 204 to 207
- Flame spread over surfaces of walls and ceilings

UBBL 9th Schedule

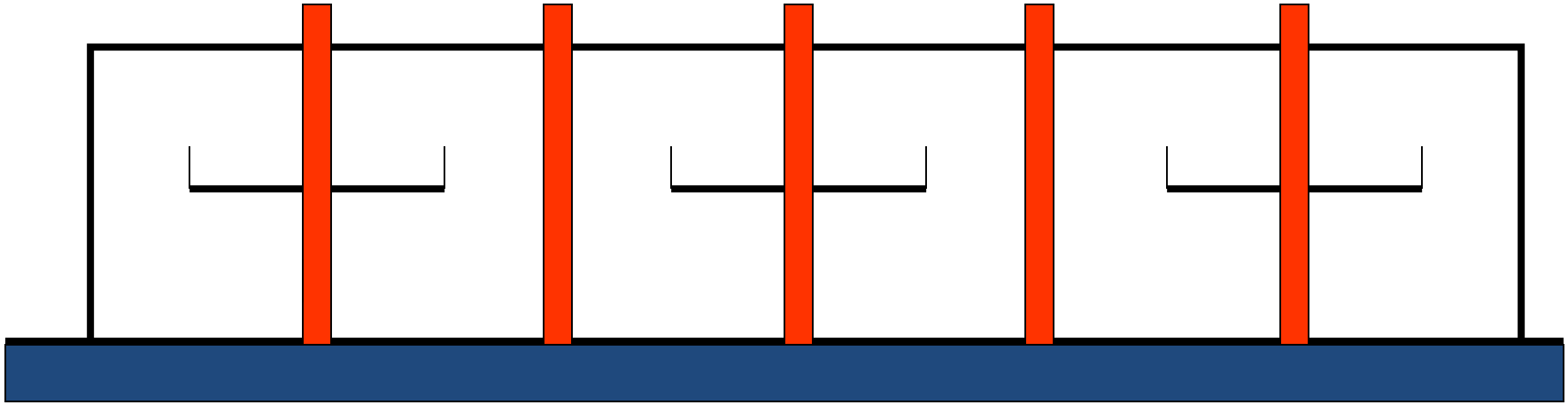
- Minimum periods of Fire Resistance for Elements of Structure.

- UBBL 213 : every element of structure to have FRP no less than as specified in 9th Schedule

Elements of structure
for application of FRP

- Structural frame, beams and columns (excluding roof structures)
- Floor (except the lowest floor)
- Compartment floor
- External wall
- Separating wall (including party wall)
- Compartment wall
- Protected shaft : structure and enclosure
- Load bearing wall
- gallery

UBBL 2012 : SEPARATING WALL : TERRACE HOUSES

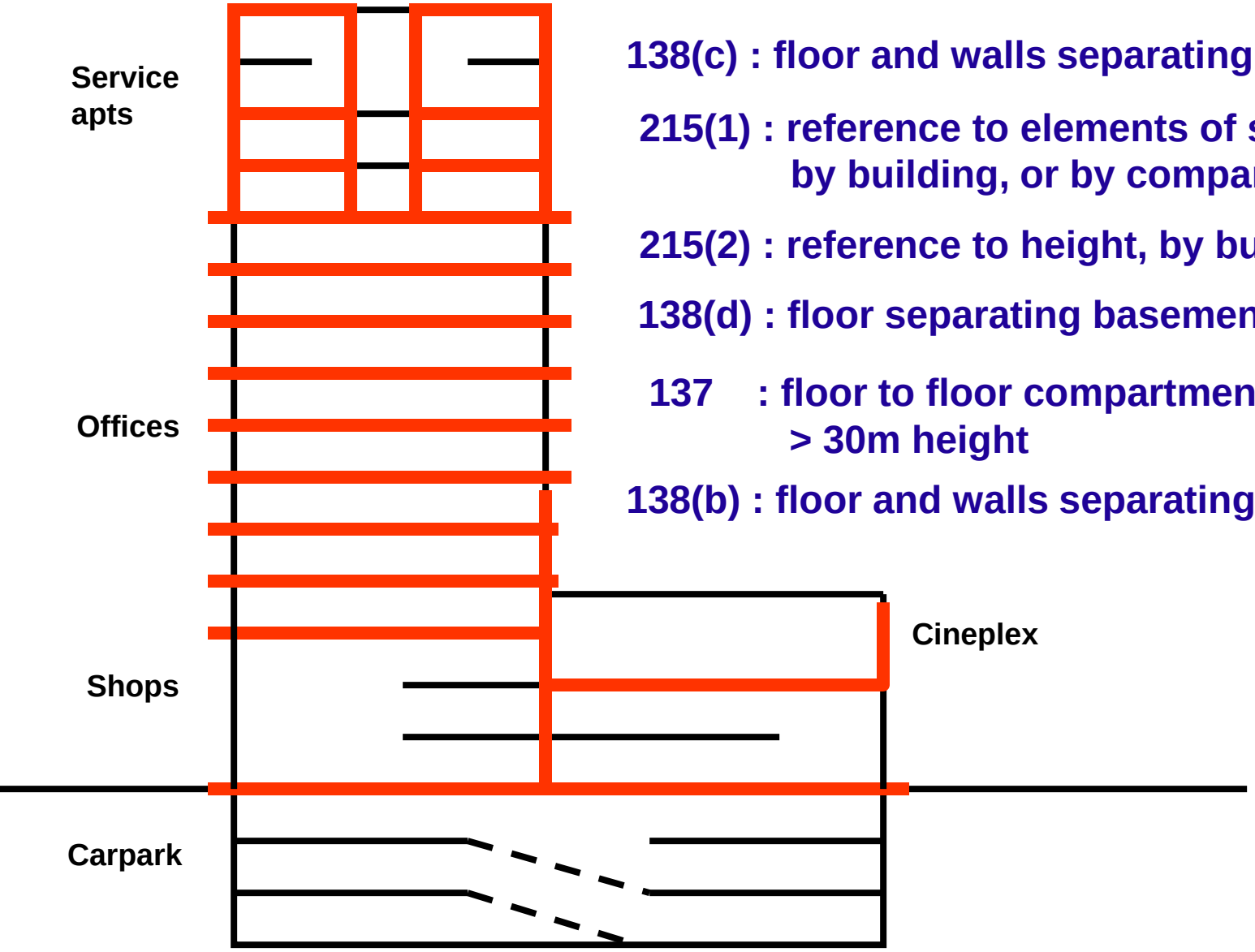


- **Constructional function : Party Wall UBBL 86**
- **Fire safety function : Separating wall to be Compartment Wall UBBL 138(c)**
- **Check compartment size**
- **Check Fire Resistance Period of elements of structure**

- **UBBL 214 : External Wall and Separating Wall minimum FRP**

UBBL 1984		UBBL 2012	
86	Party walls. (1) All party walls shall generally be of not less than 200 millimetres total thickness of solid masonry or insitu concrete which may be made up of two separate skins each of not less than 100 millimetres thickness if consctructed at different times: Provided that in multi-storeyed flats and terrace houses of reinforced concrete or of protected steel framed construction having floors and roofs constructed to the requirements of these By-laws, the party wall thereof shall not be less than 100 millimetres total thickness. (2) Party walls in single storeyed houses may be in load-bearing 100 millimetres solid masonry or insitu concrete provided the requirements of Part V, VI and VII of these By-laws are complied with. (3) All party walls shall be carried above the upper surface of the roof to a distance of not less than 230 millimetres at right angles to such upper surface. (4) Other non-combustible materials may be used for party walls provided the requirements of Part V, VI and VII of these By-laws are complied with.	-Deleted-	By-law 141: Separating walls has already provided the necessary fire requirements served to prevent the spread of fire from one separate unit of house to another. As such the Fire Authority will only make reference to by-law 141.

COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP



138(c) : floor and walls separating purpose group

215(1) : reference to elements of structure, by building, or by compartments

215(2) : reference to height, by building only

138(d) : floor separating basements

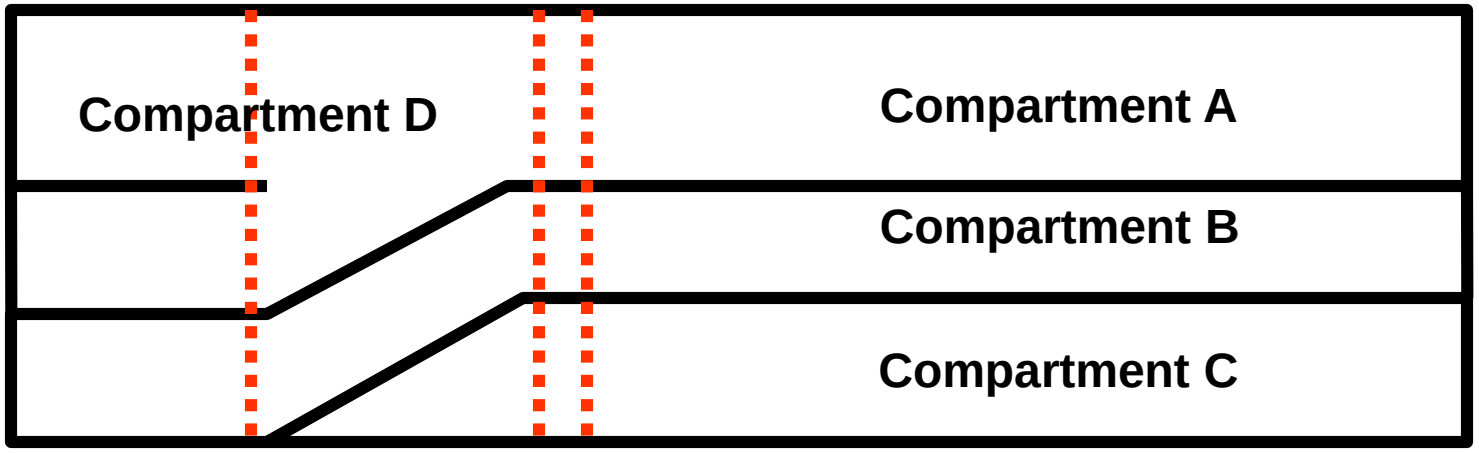
137 : floor to floor compartment for buildings > 30m height

138(b) : floor and walls separating flats

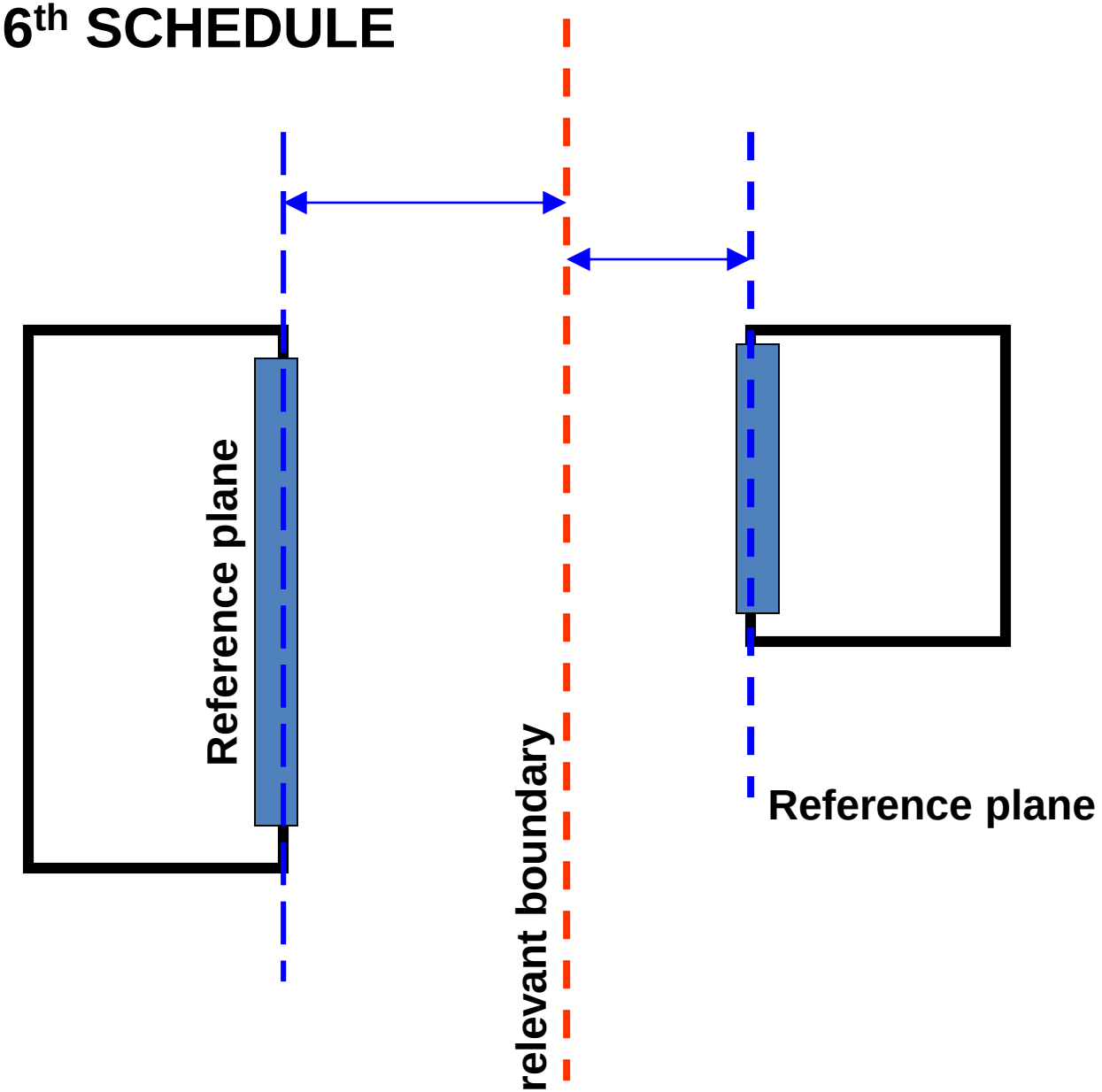
COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

Basement compartment **volume limit 42,000m3**

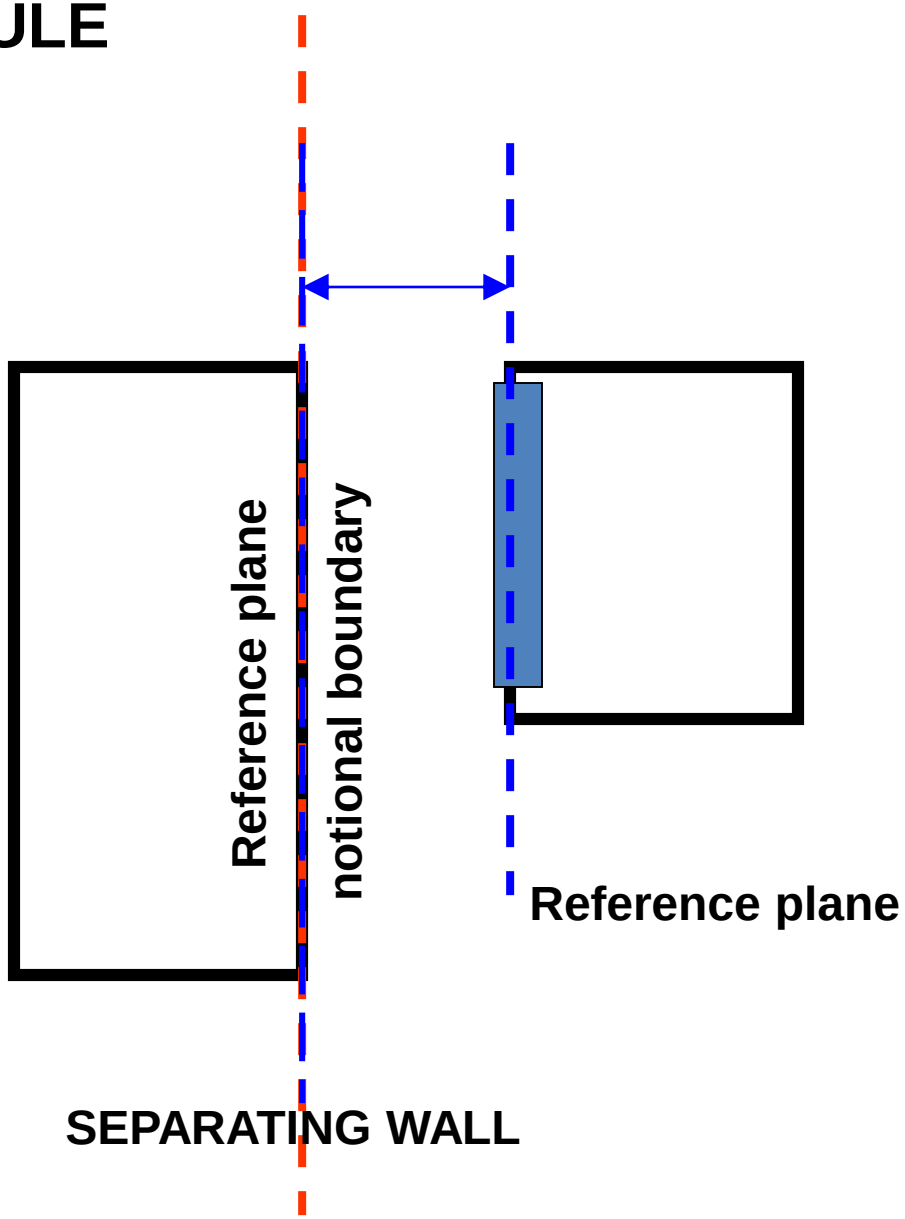
Separation of vertical ‘shaft’



UBBL 6th SCHEDULE



UBBL 6th SCHEDULE



Sample calculation

1) **Establish Purpose Group**

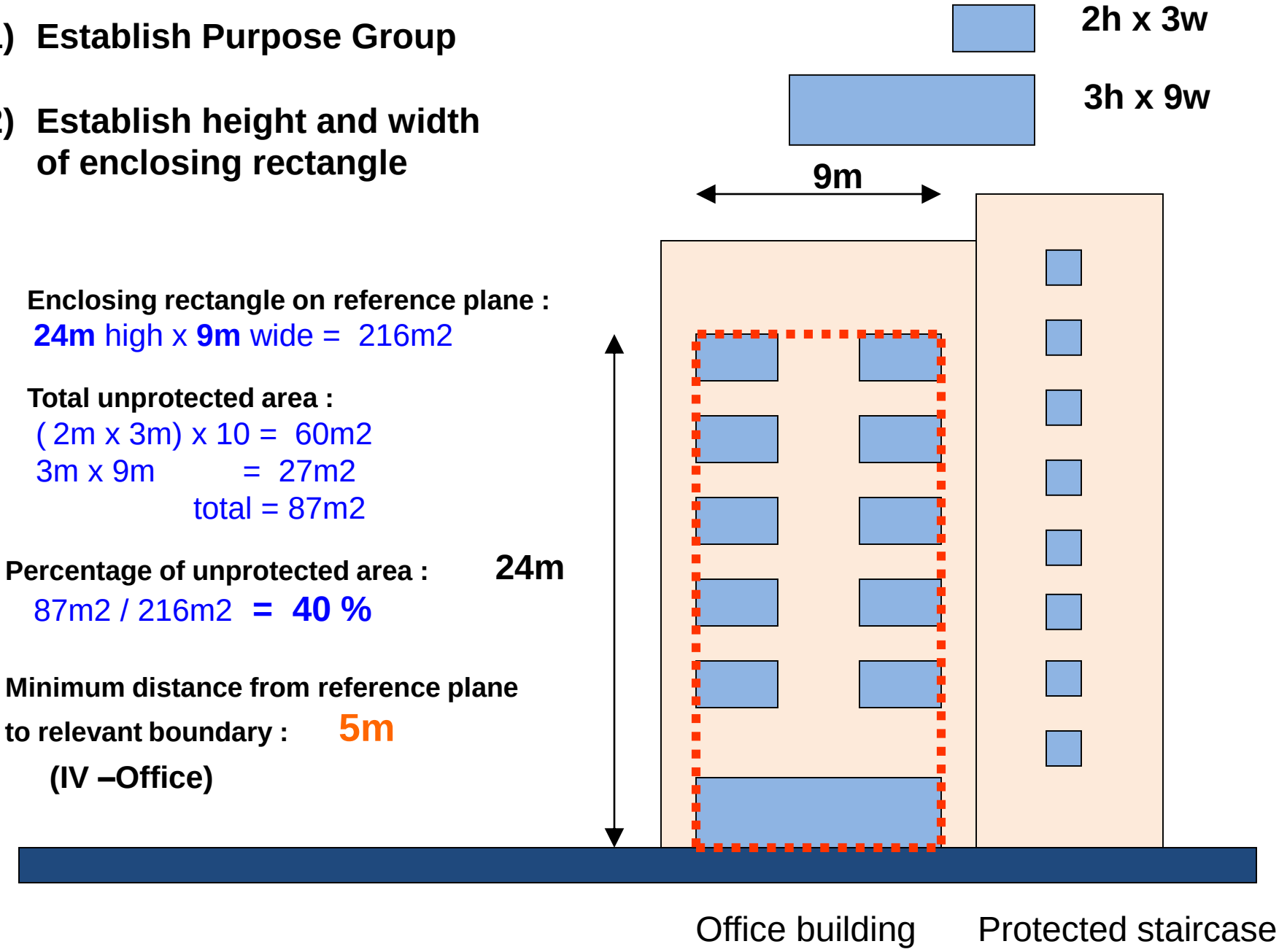
2) **Establish height and width of enclosing rectangle**

1) **Enclosing rectangle on reference plane :**
24m high x **9m** wide = 216m2

2) **Total unprotected area :**
(2m x 3m) x 10 = 60m2
3m x 9m = 27m2
total = 87m2

3) **Percentage of unprotected area :**
87m2 / 216m2 **= 40 %**

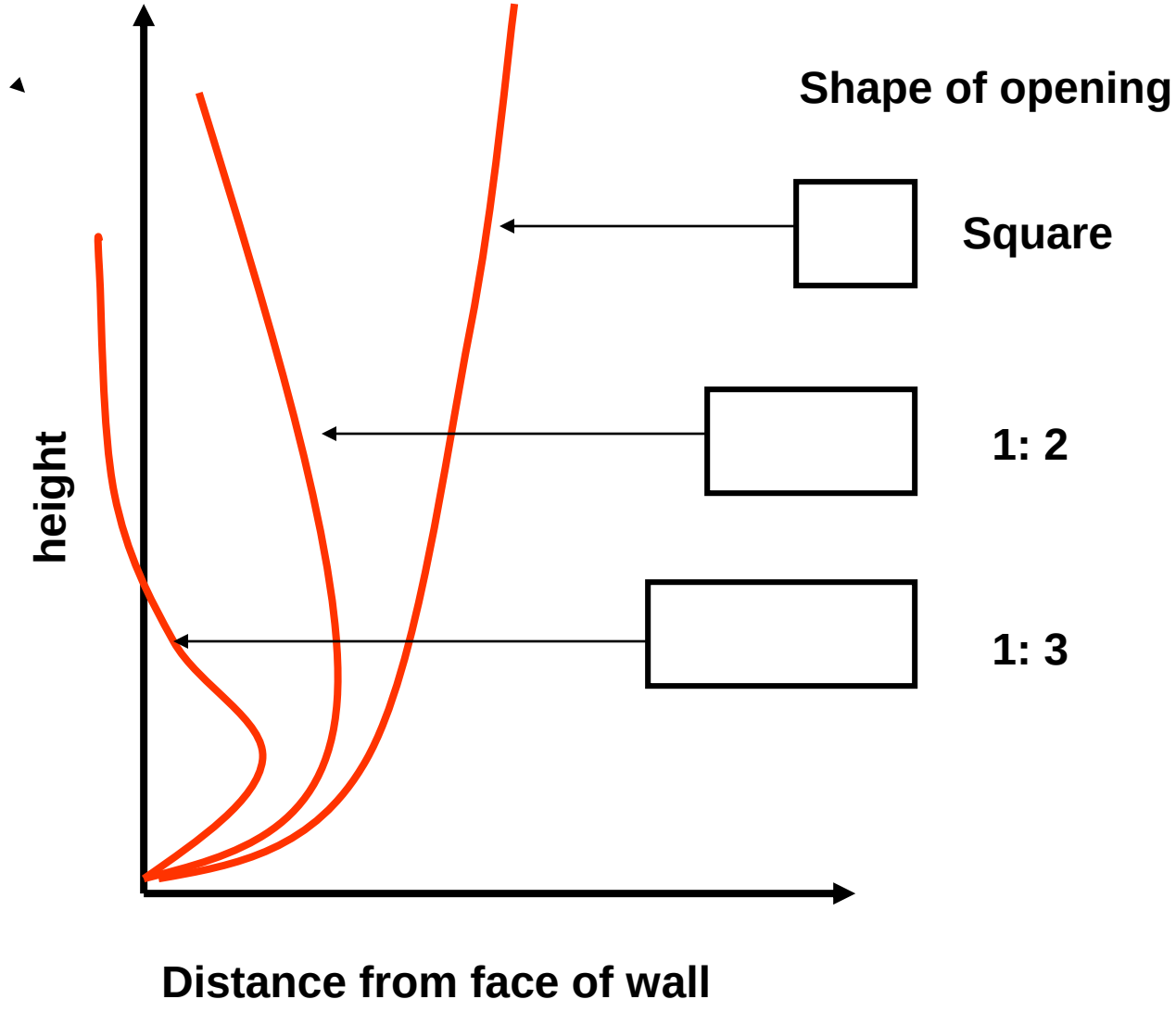
4) **Minimum distance from reference plane to relevant boundary :** **5m**
(IV –Office)



[Sixth Schedule]

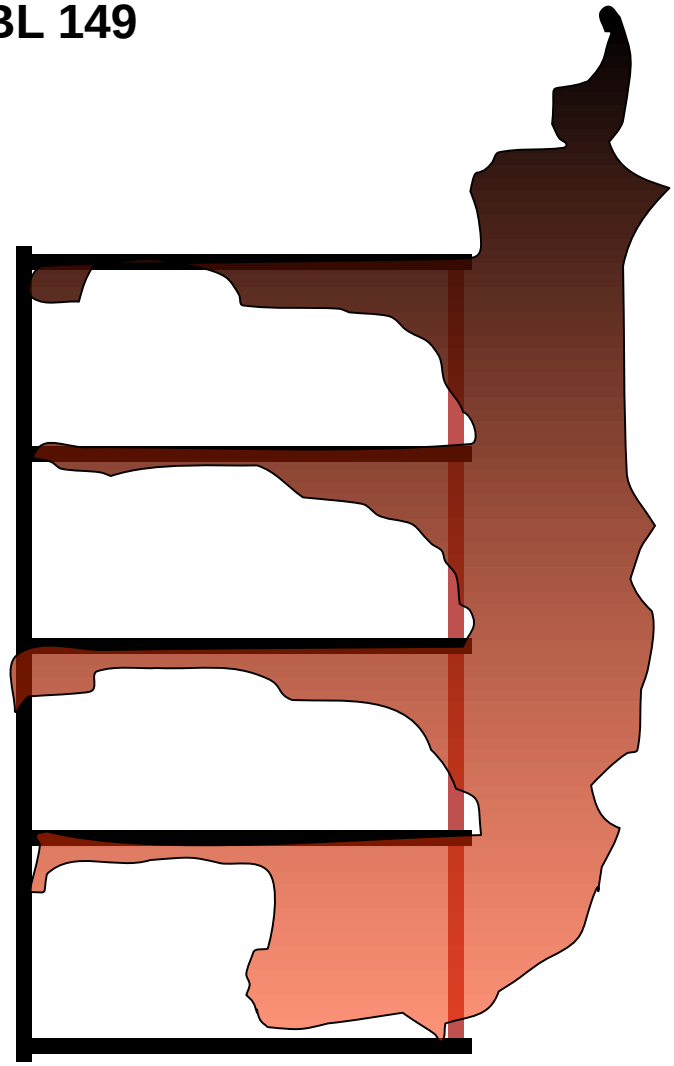
Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100 %
Enclosing rectangle 24 m high									
3	0.5	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5
6	1.5	2.5	3.5	4.5	5.0	5.5	6.0	7.0	7.0
9	2.0	3.5	5.0	5.5	6.5	7.5	8.0	9.0	9.5
12	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.5
15	3.0	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0
18	3.0	5.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0
21	3.5	6.0	8.0	9.5	10.5	12.0	13.0	14.0	15.0
24	3.5	6.5	8.5	10.0	11.5	12.5	14.0	15.0	16.0
27	4.0	7.0	9.0	11.0	12.5	13.5	15.0	16.0	17.0
30	4.0	7.5	9.5	11.5	13.0	14.0	15.5	17.0	18.0
40	4.5	8.5	11.0	13.0	14.5	16.0	18.0	19.0	20.5
50	5.0	9.0	12.0	14.0	16.0	17.5	19.5	21.0	22.5
60	5.0	9.5	12.5	15.0	17.0	19.0	21.0	23.0	24.5
80	5.0	10.0	13.5	16.5	18.5	21.0	23.5	25.5	27.5
100	5.0	10.0	13.5	17.0	20.0	22.5	25.0	27.5	29.5
120	5.5	10.0	13.5	17.5	20.5	23.5	26.5	29.0	31.0
No limit	5.5	10.0	13.5	18.0	21.0	24.0	27.5	30.0	32.5

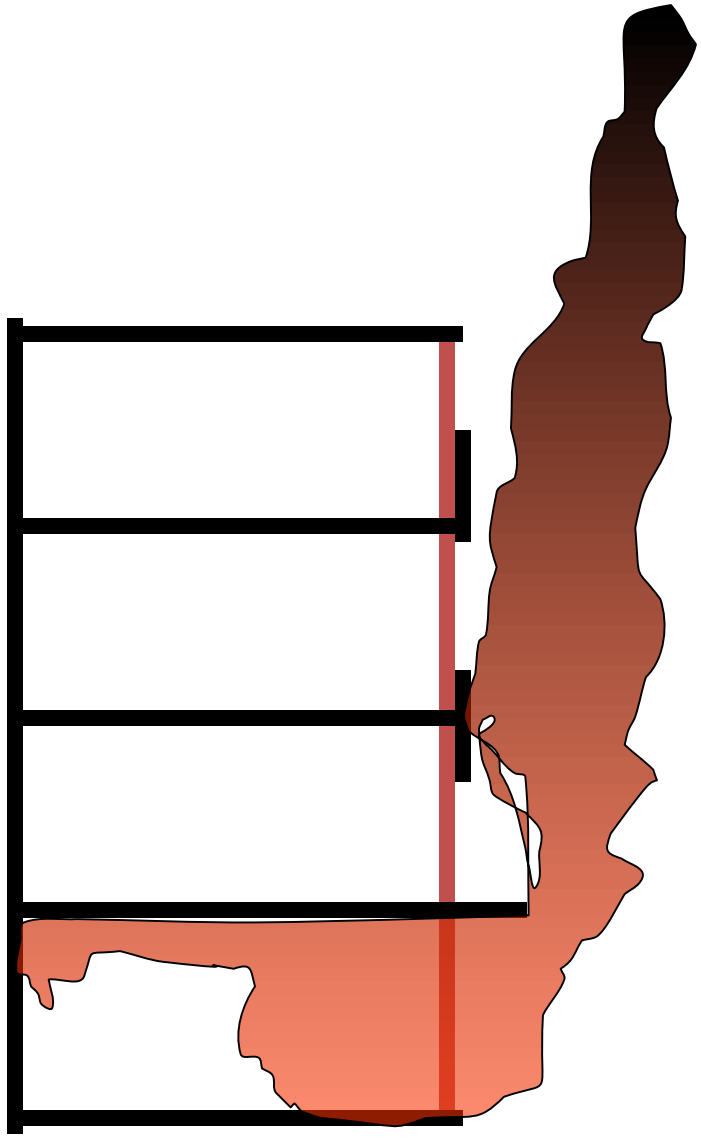
FLAME TRAJECTORY OUTSIDE WALL OPENINGS



EXTERNAL WALL BARRIERS

UBBL 149





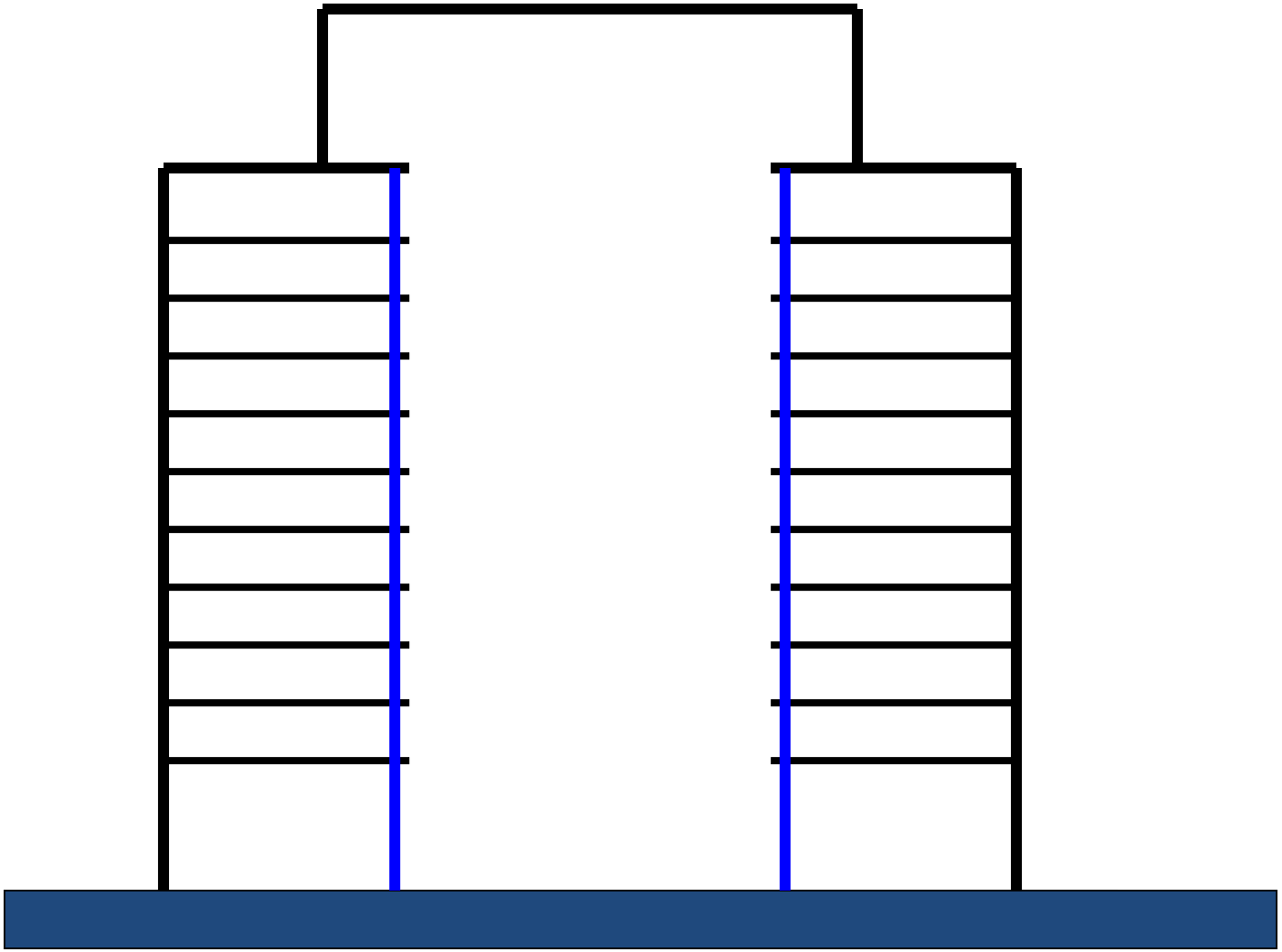
900mm vertical or
750mm horizontal barrier

ATRIUMS

UBBL 2012 clause 137
UBBL 2012 clause 252A
MS 1183:2015 Annex B

COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

Atrium Space



	UBBL 1984	UBBL 2012	
137	Floor in building exceeding 30 metres in height to be constructed as compartment floor. In any building which exceeds 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor. -None- -None-	Compartmentation by height. (1) In any building not exceeding 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor. (2) In any building exceeding 30 metres in height, all floors shall be constructed as compartment floors, other than a compartment which is within a residential maisonette which may comprise two storey levels. (3) An atrium shall comply with the requirements of by-law 252A.	To provide stricter requirements in relation to the extent of subdivision of a building as compartment floors.

UBBL 1984

Clause 137 : Compartment Floor

In any building which exceeds 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor.

1984 UBBL cl 137

All Buildings above 30m

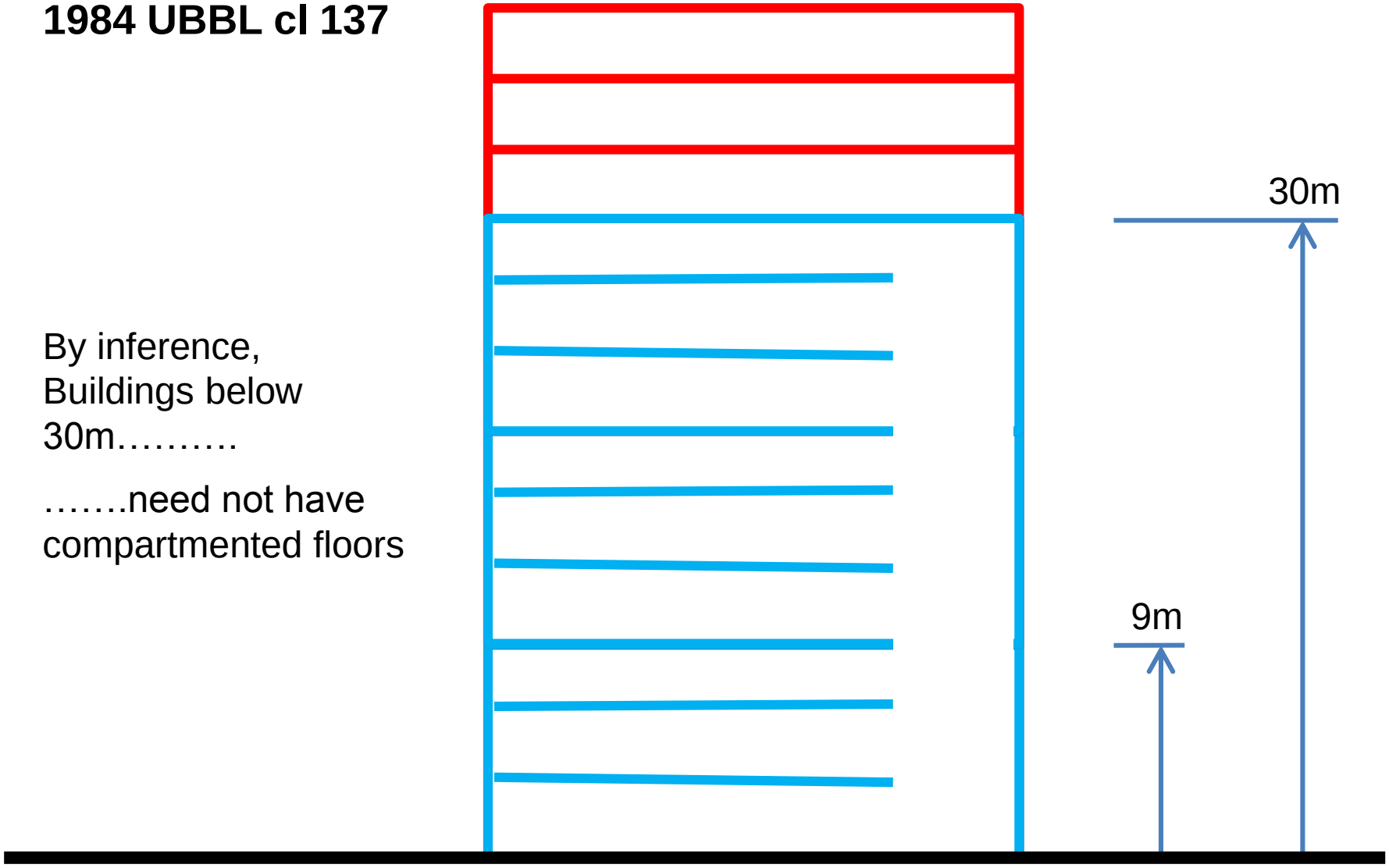
All floors above 9m to be Compartment Floors

Floors 9m or below need not be compartmented

1984 UBBL cl 137

By inference, Buildings below 30m…….

…….need not have compartmented floors



2012 UBBL

Clause 137 : Compartment Floor

(1) In any building not exceeding 30 metres in height, any floor which is more than 9 metres above ground floor level which separates one storey from another storey, other than a floor which is either within a maisonette or a mezzanine floor shall be constructed as a compartment floor.

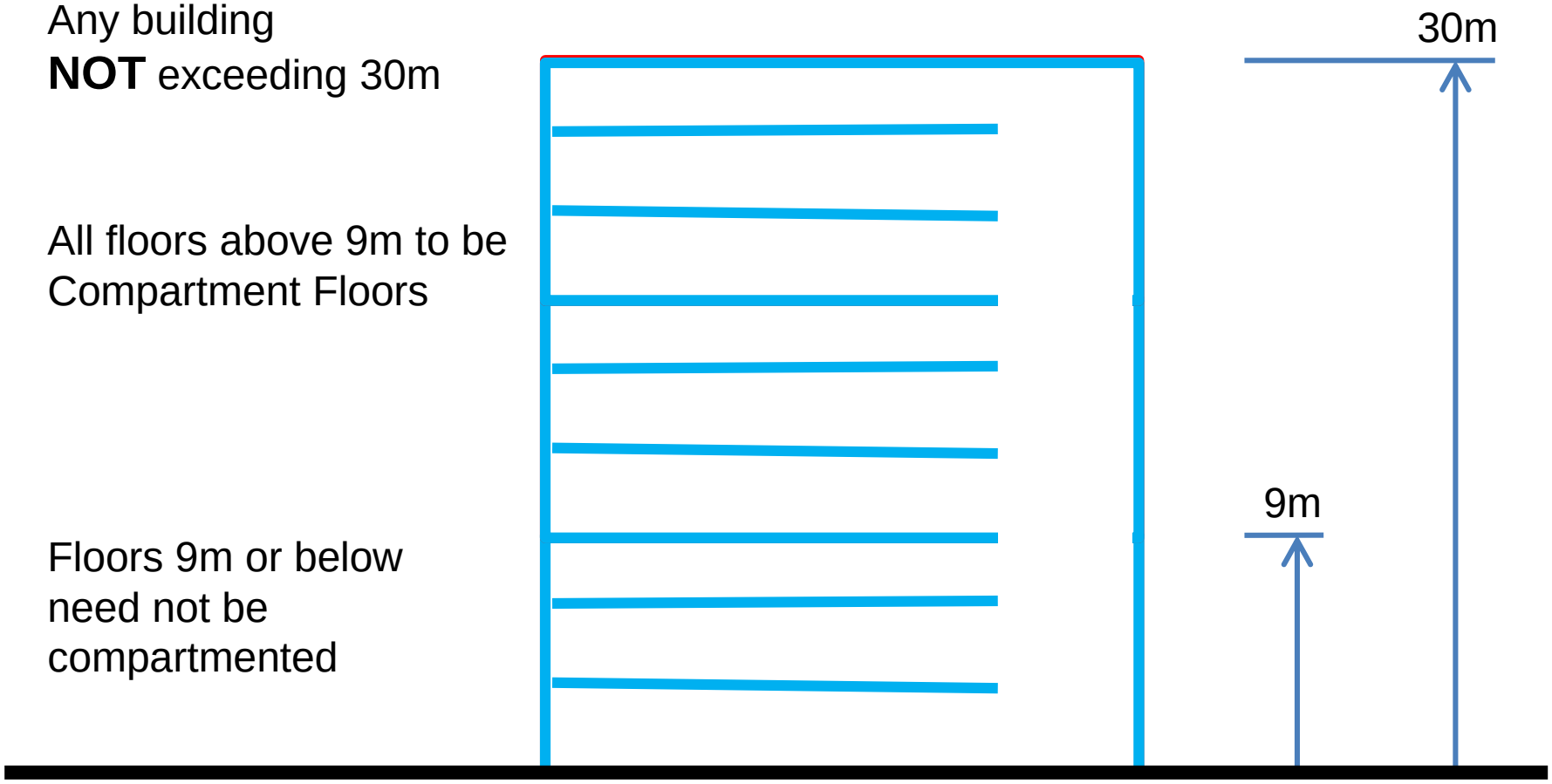
(2) In any building exceeding 30 metres in height, all floors shall be constructed as compartment floors, other than a compartment which is within a residential maisonette which may comprise two storey levels.

2012 UBBL cl 137

Any building
NOT exceeding 30m

All floors above 9m to be Compartment Floors

Floors 9m or below need not be compartmented

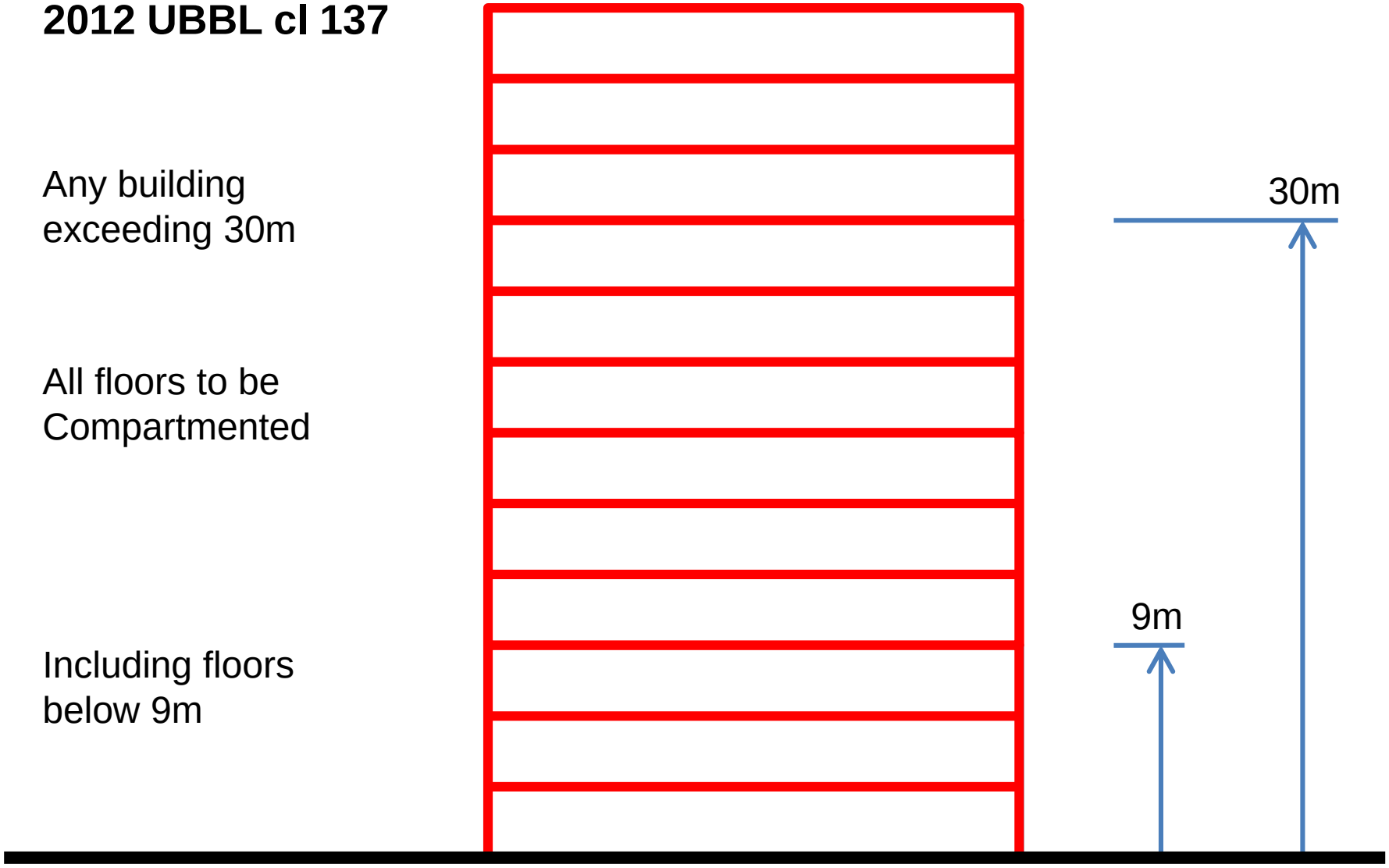


2012 UBBL cl 137

Any building exceeding 30m

All floors to be Compartmented

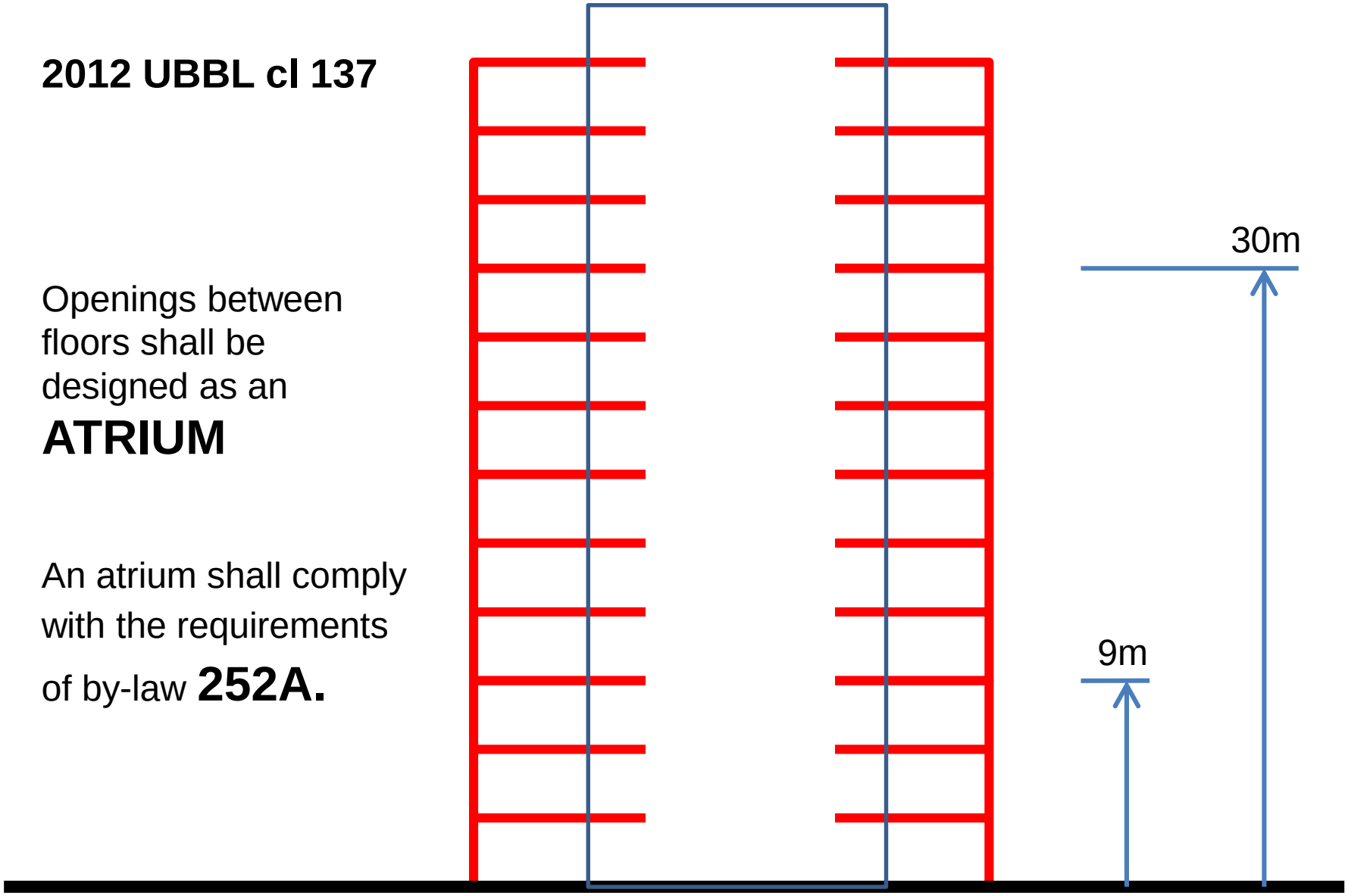
Including floors below 9m



2012 UBBL cl 137

Openings between floors shall be designed as an **ATRIUM**

An atrium shall comply with the requirements of by-law **252A.**



2012 UBBL 252A Atriums in buildings

1. Minimum dimensions: 6m and 95m2
2. Exits separated from atrium
3. 1 hour FRP separation
4. Automatic sprinklers
5. Smoke control/exhaust system

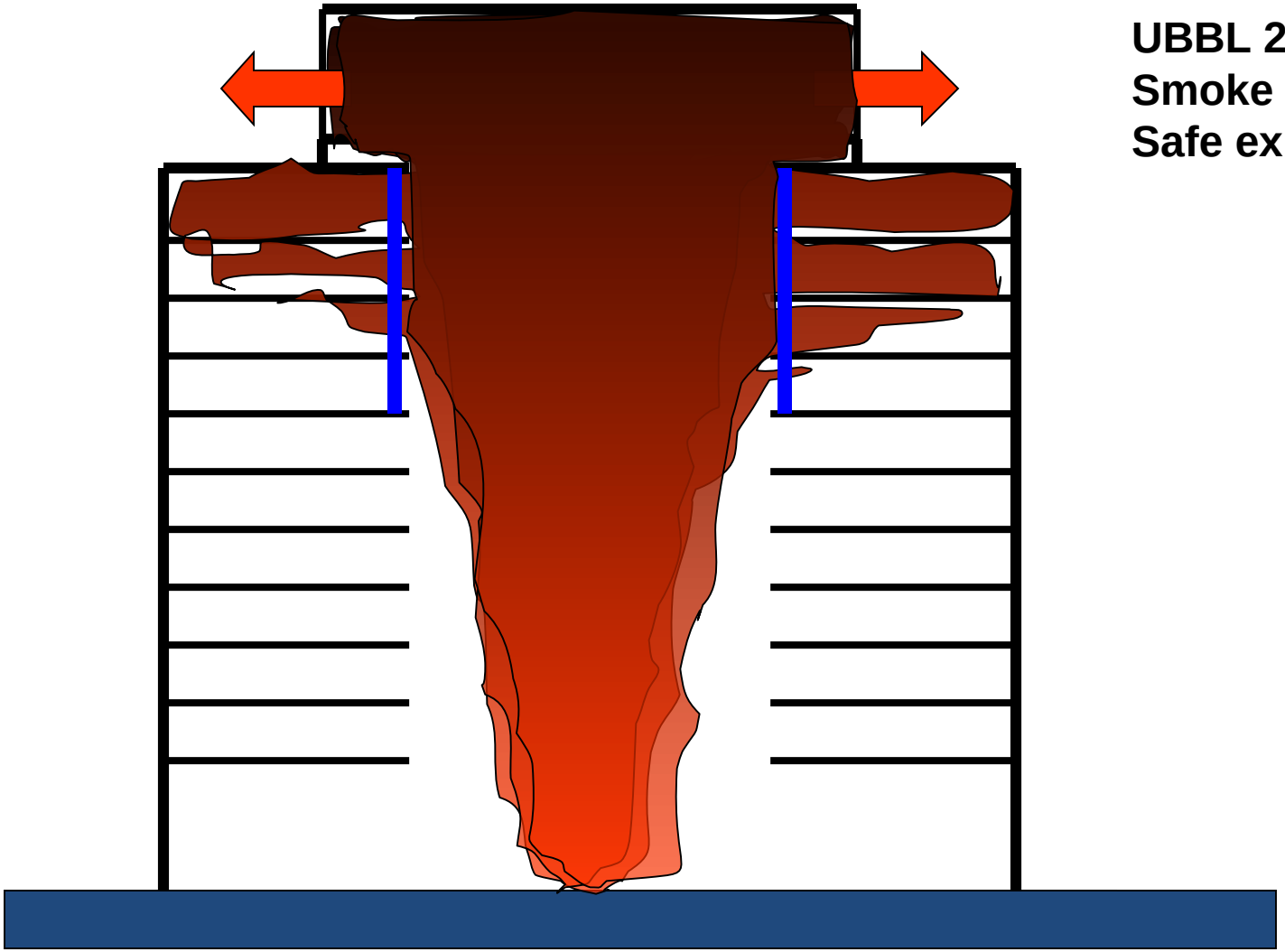
COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

Atrium Space (NFPA 101)

- Minimum dimension of 6m and minimum area of 95m
- Required exits to be separated from atrium volume
- Atrium construction and usage to be of hazard level no higher than ‘ordinary’
- Entire building to have automatic sprinklers
- Designed for smoke exhaust and smoke control
- Atrium volume to be separated from adjacent occupancy, or to be engineered such that the adjacent occupancies are not at risk from a fire originating from the atrium

COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

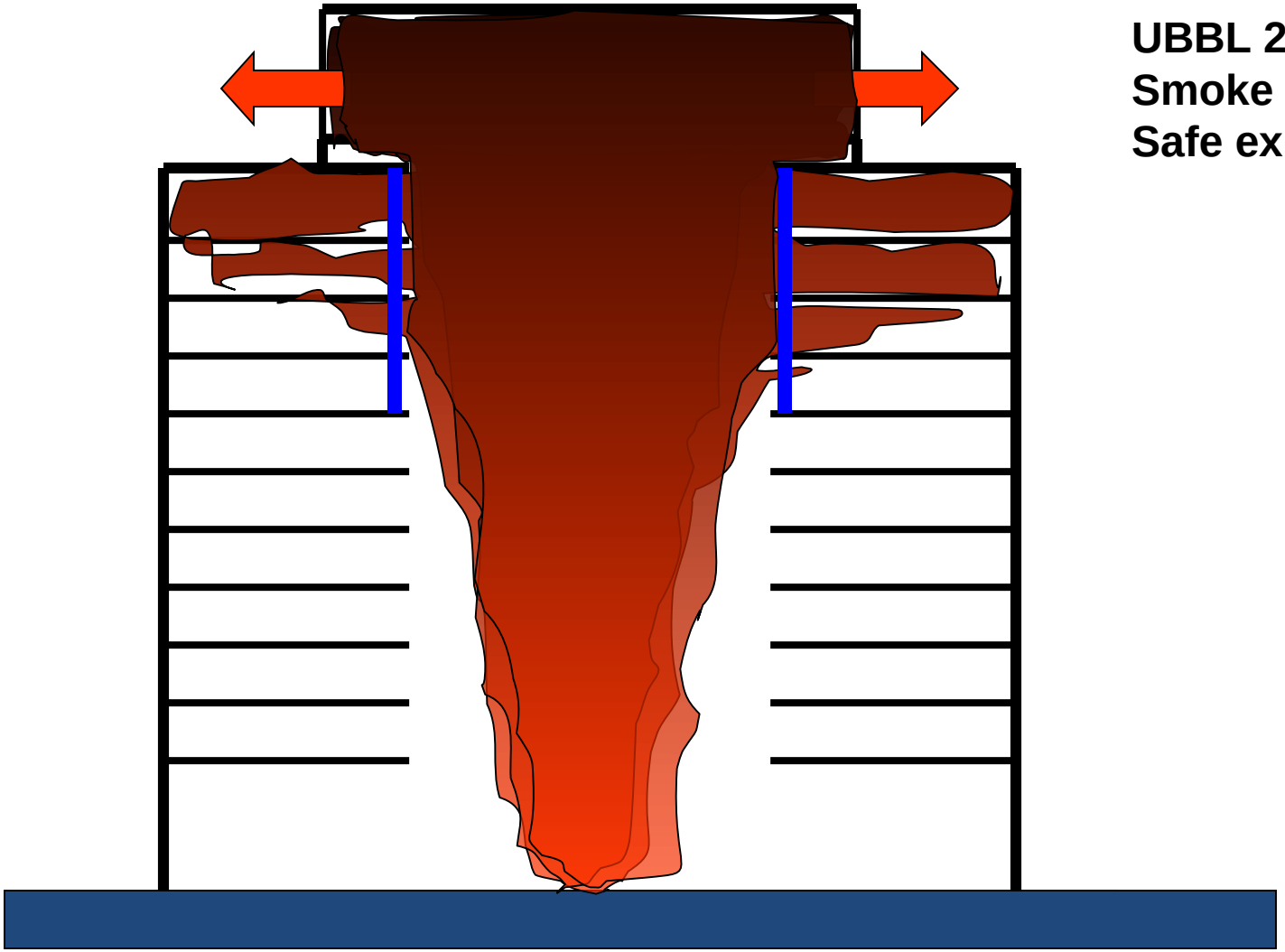
Atrium Space



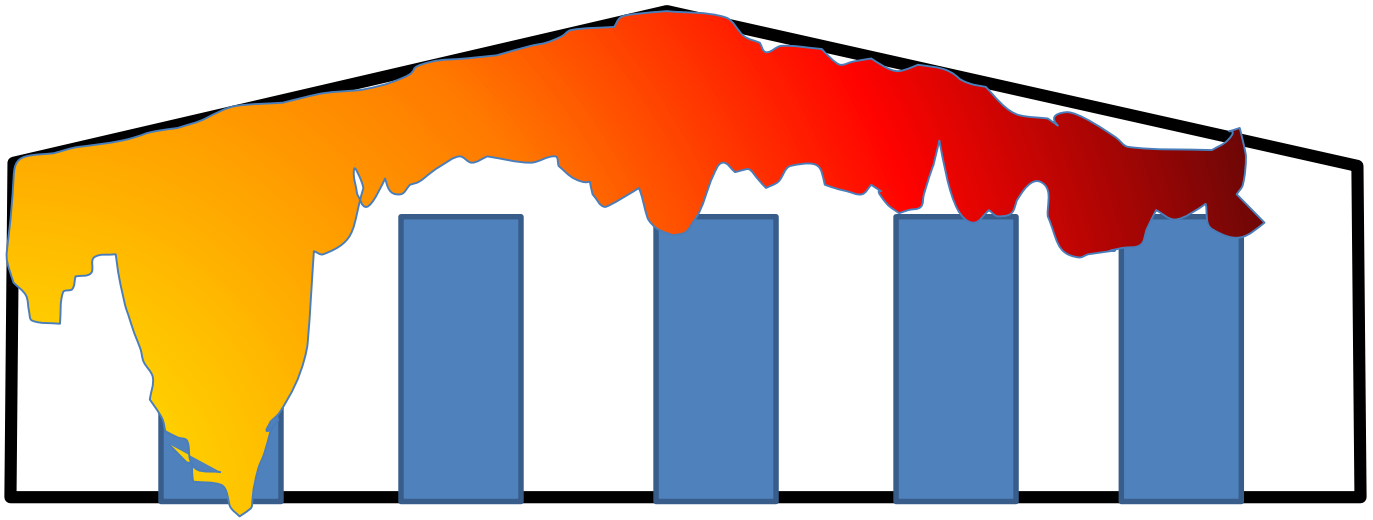
UBBL 251
Smoke venting for Safe exit

COMPARTMENTS, ELEMENTS OF STRUCTURE AND FRP

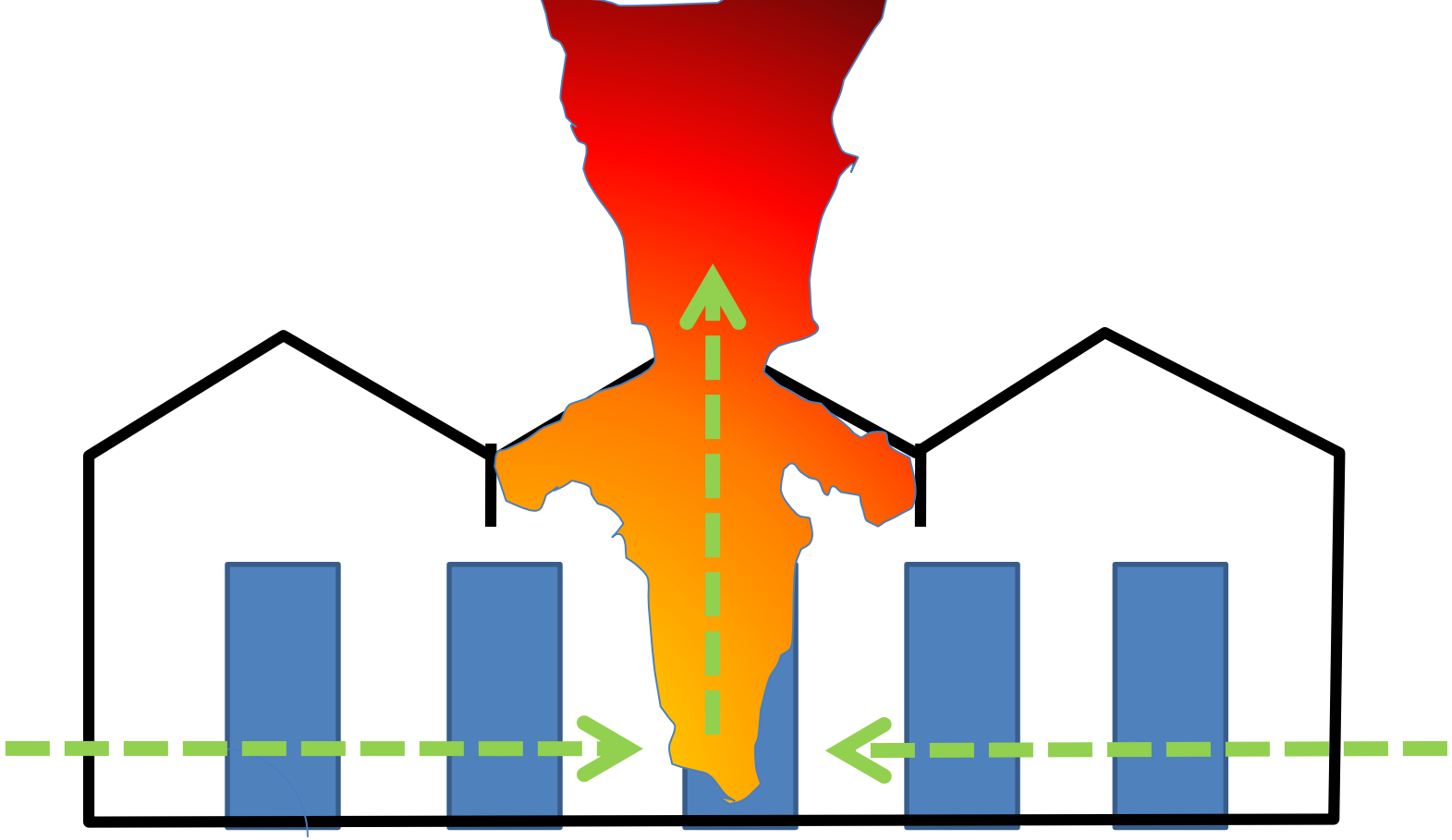
Atrium Space



UBBL 251
Smoke venting for Safe exit



Compartmentation of large volumes



Compartmentation of large volumes

Protection of penetrations through compartments and elements

- **UBBL 141 : Separating walls**

  - **Diameter of combustible pipe < 25mm**
  - **Diameter of non-combustible pipe <150mm**
  - **No flue pipes allowed**
  - **Doors to have equal or greater FRP as with the element**

UBBL 148 : Compartment floor and walls

- **Opening for protected shaft**
- **Ventilation duct with fire damper**
- **Encased ducts to have FRP no less than half of the element**

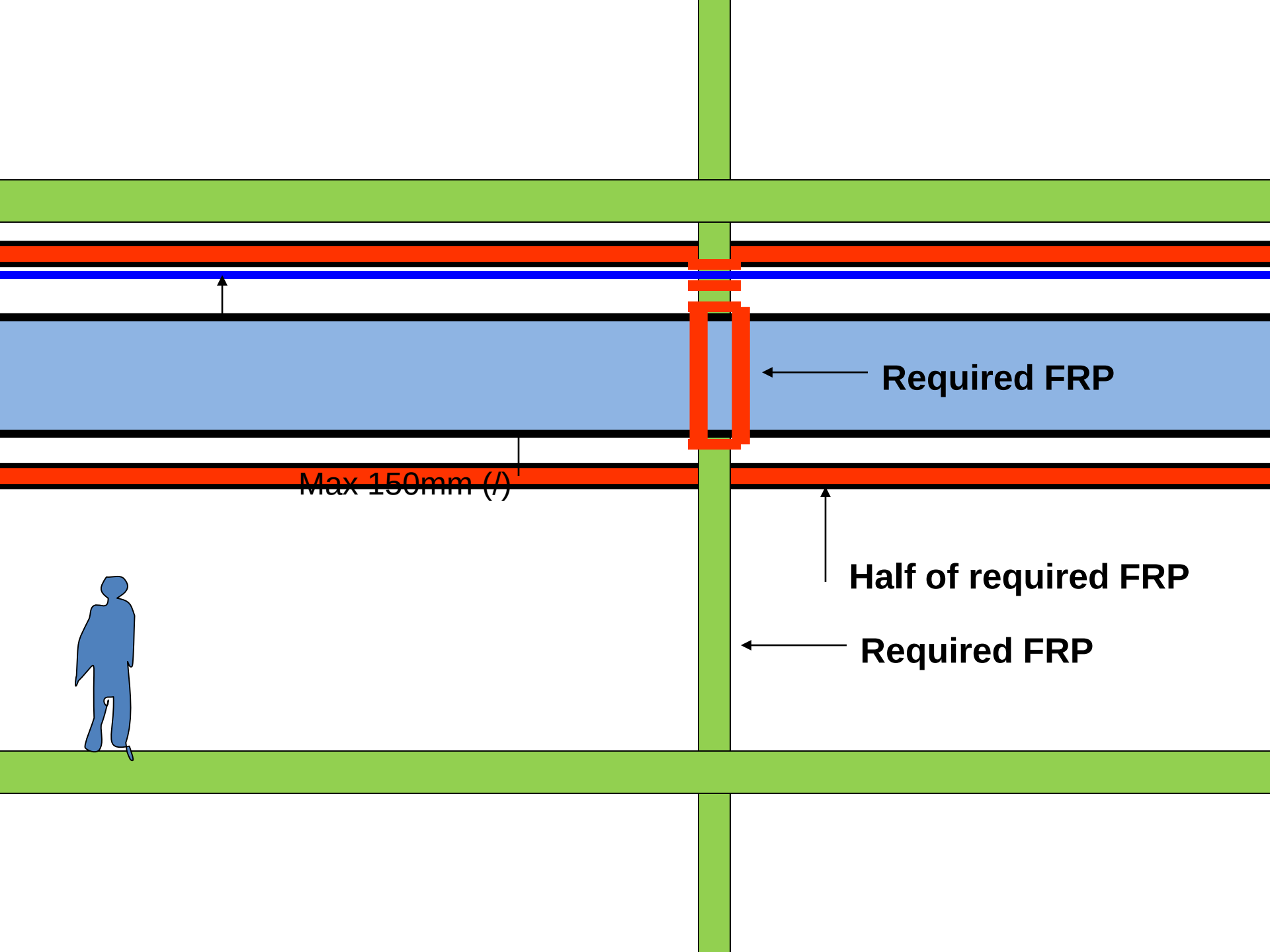
Protection of penetrations through compartments and elements

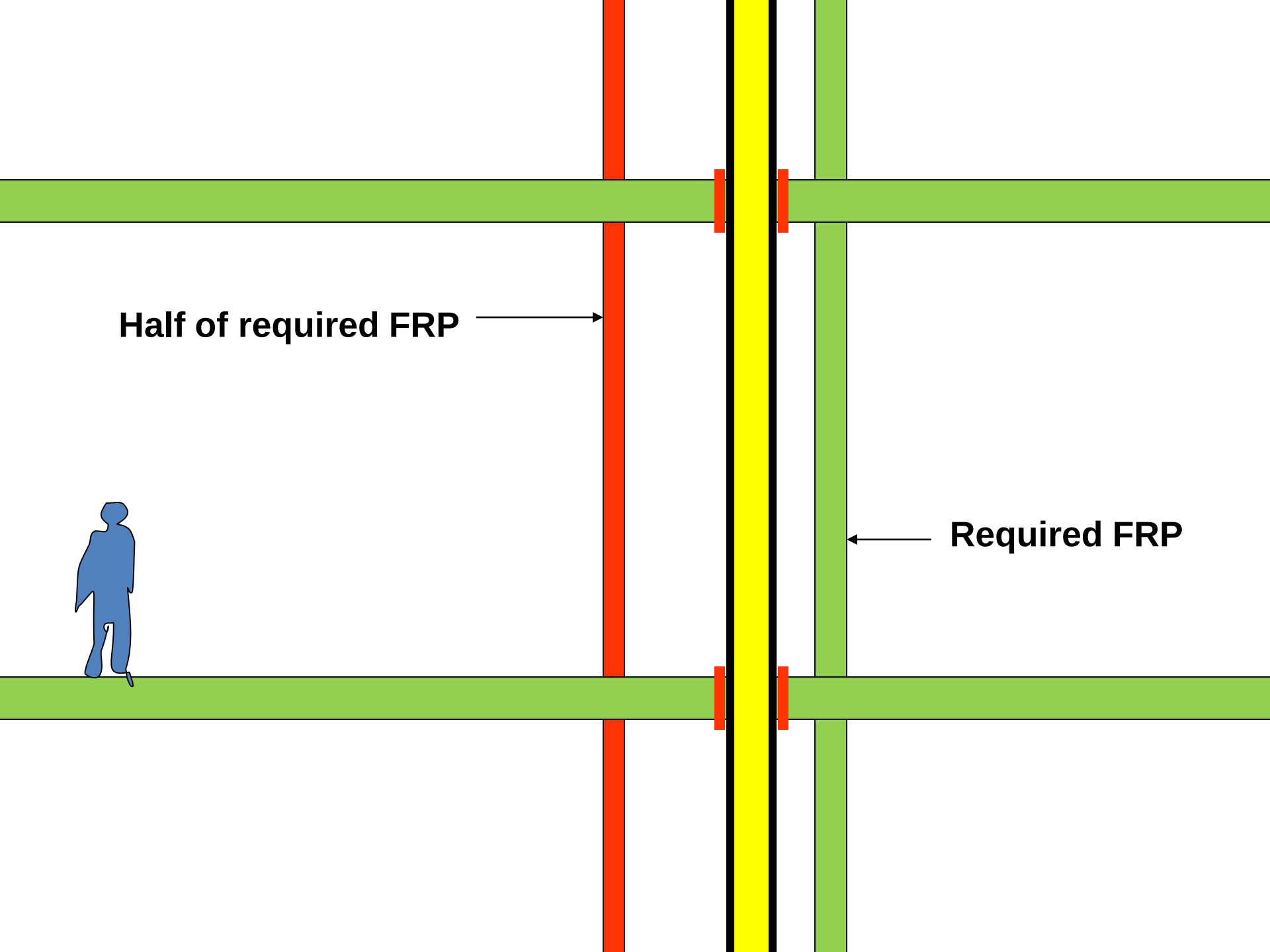
UBBL 150 : Protected Shafts

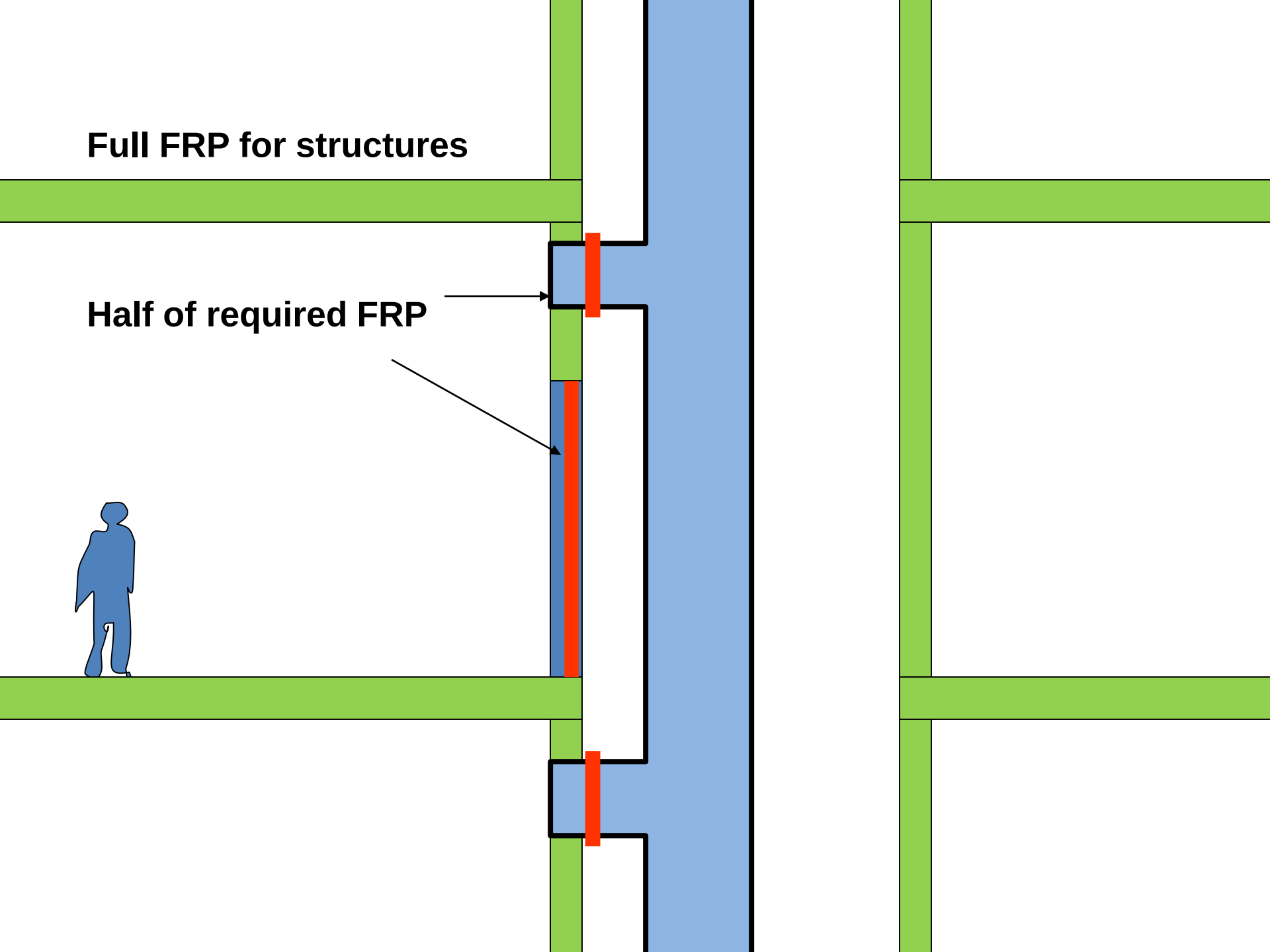
- for pipes, ducts, sanitary facilities, staircase, lift

UBBL 156 : Ventilating Duct in Protected Shaft

- To have automatic Fire Dampers at ‘appropriate’ intervals


Required FRP
Max 150mm (/)
Half of required FRP
Required FRP


Half of required FRP
Required FRP


Full FRP for structures
Half of required FRP

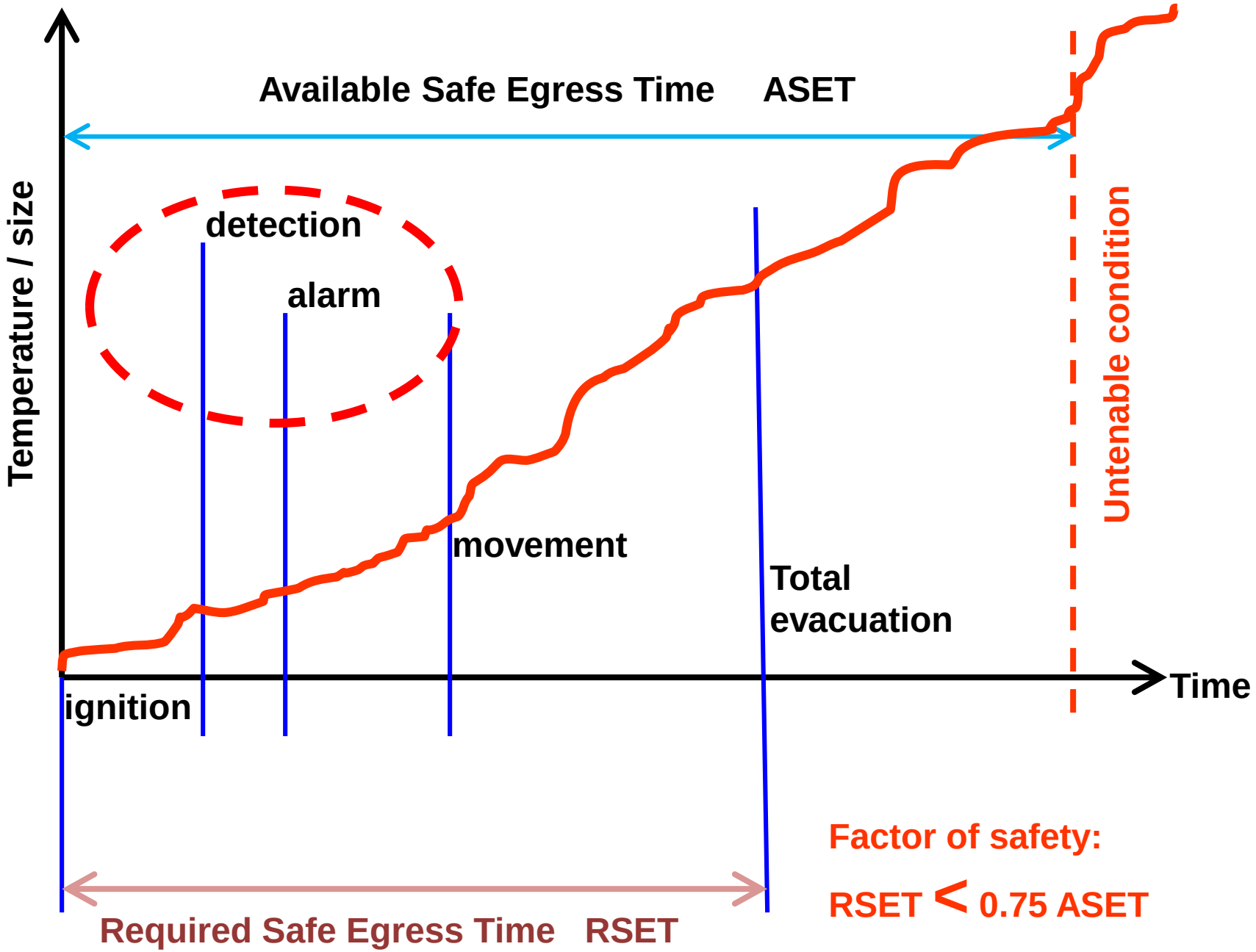

NTANGAN API AUTOMATIK
TOMATIC FIRE SHUTTER
Shops
HELP
14c
LG2


VAS DILARANG MELETAK KENDERAAN DIBAWAH RINTANGAN API AUTOMATIK
CAUTION DO NOT PARK VEHICLE BENEATH THE AUTOMATIC FIRE SHUTTER
Active Park Assist.
17


KELUAR

Active systems for…..

- EVACUATION and FIRST AID
  - Detection and Alarm
  - Communication
  - Smoke control
  - Portable fire extinguishers


Available Safe Egress Time ASET
Temperature / size
detection
alarm
movement
Total
evacuation
Untenable condition
ignition
Time
Factor of safety:
RSET < 0.75 ASET
Required Safe Egress Time RSET

UBBL 2012 amended 10th Schedule

Amendment of Tenth Schedule

129. Tenth Schedule of the principal By-Laws is amended—

(a) by substituting for Schedule to the "SCHEDULE OF TABLE OF REQUIREMENTS FOR FIRE DETECTION, FIRE ALARM AND FIRE EXTINGUISHMENT SYSTEMS" the following schedule:

TENTH SCHEDULE

TABLE OF REQUIREMENTS FOR FIRE DETECTION, FIRE ALARM AND FIRE EXTINGUISHMENT SYSTEMS

(By-law 225 (1), 238)

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
I. SMALL RESIDENTIAL		
(i) Private dwelling up to 2 storey		
(a) Terrace Type	(See Note 5)	-
(b) Semi Detached	(See Note 5)	-
(c) Detached	(See Note 5)	-
(ii) Private dwelling more than 2 storey	(See Note 5)	(See Note 6)

NOTE 5:

Portable fire extinguishers are to be provided for private dwellings.

NOTE 6:

Smoke detector of the self contained type is to be provided at the top of the staircase.

UBBL 2012 amended 10th Schedule

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
II. INSTITUTIONAL		
1. Educational Occupancies		
(i) Rooms or halls used for instructional purposes only.		
(a) Open corridor design		
(A) 2 storeys and below	-	-
(B) 3 to 5 storeys	A	1
(C) 6 storeys and above	A	1 & 2
(b) Other designs		
(A) Two or more storeys	-	-
(B) Less than 1,000 sq. m per floor	A	1
(C) 1,000 sq. m to 2,000 sq. m per floor	A	1 & 2
(D) Exceeding 2,000 sq. m per floor or more than 30 m height	A & B	1, 3, 4 & 5
(ii) Canteen/kitchen detached	-	-
(iii) Laboratories and Workshops (total floor area per block)		
(a) Low hazard Laboratories and workshops such as physics lab, electronics lab, computer lab and for metal work over 1,000 sq. m in floor area	A	1 & 2
(b) High hazard laboratories and workshops such as chemical lab and for wood work		
(A) Less than 1,000 sq. m	-	-
(B) 1001 to 2,000 sq. m	A	1 & 2
(C) Exceeding 2,000 sq. m	A & B	1 & 3
(iv) Library (total floor area)		
(a) Less than 500 sq. m	-	-
(b) 501 sq. m to 1,000 sq. m	A	- 1
(c) 1001 sq. m to 2,000 sq. m	A	1 & 2
(d) Exceeding 2,000 sq. m	A & B	1, 3, 4 & 5

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
(v) Vocational School (total floor area)		
(a) Low hazard workshops such as for metal work over 1,000 sq. m in floor area	A	1 & 2
(b) High hazard laboratories and workshops such as for wood work		
(A) Less than 1,000 sq. m	-	-
(B) 1001 to 2,000 sq. m	A	1 & 2
(C) Exceeding 2,000 sq. m	A & B	1 & 3
(vi) Multi-purpose hall (total floor area)		
(a) Single storey and less than 2,000 sq. m	-	-
(b) 2 storey and above or exceeding 2,000 sq. m	A	1
(vii) Buildings with Central Air-conditioning (total floor area)		
(a) Less than 1,000 sq. m	-	-
(b) 1,001 sq. m to 2,000 sq. m	A	1 & 2
(c) exceeding 2,000 sq. m	A & B	1, 3, 4 & 5
(viii) Educational Institutions in office complexes and shopping complexes	To be considered as part of overall risk in the complex.	
2. HOSPITALS AND NURSING HOMES (Total floor area)		
(i) Clinic–day care	-	-
(a) 1,001 sq. m. to 2,000 sq. m	A	1
(b) 1,001 sq. m. to 2,000 sq. m	A	1 & 2
(c) above 2,000 sq. m	A & B	1, 3, 4 & 5
(ii) In-patient Treatment		
(a) Part of office or shopping complex	To be considered as part of overall risk with special requirements for emergency lighting stretcher lifts.	

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
(b) Not exceeding 250 sq. m per floor		
(A) Single storey	-	-
(B) 2 storeys	-	1
(C) 3 or 5 storeys	A	1 & 2
(D) 6 storeys and over	A & B	1, 3, 4 & 5
(c) Exceeding 250 sq. m per floor		
(A) Single storey	-	-
(B) 2 storeys	A	1
(C) 3 or 4 storeys	A	1 & 3
(D) 5 storeys and over	A & B	1, 3, 4 & 5
NOTE: (i) Stretcher lift facilities to be provided for buildings above 4 storeys. (ii) All fire alarm systems within wards shall be of the signal indicator type.		
III. OTHER RESIDENTIAL		
1. Hotels		
(i) Open corridor design with open staircase with extended lobby or tower staircase		
(a) 1 to 3 storeys		
(A) 50 rooms or less per block	-	(See Note 7)
(B) More than 50 rooms per block	A	(See Note 7)
(b) 4 or 5 storeys		
(A) 20 rooms or less per block	-	(See Note 7)
(B) 21 to 50 rooms per block	A	(See Note 7)
(C) 51 rooms and over per block	A	1 & 2
(c) 6 to 10 storeys		
(A) 50 rooms or less per block	A	1 & 2
(B) 51 rooms and over per block	A & B	1, 3, 4 & 5
(d) 11 storeys and over	A & B	1, 3, 4 & 5

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
(ii) Other Designs		
(a) Less than 10 rooms per block	-	(See Note 7)
(b) 11 rooms to 20 rooms per block	-	1 & 2
(c) 21 rooms to 50 rooms per block	A	1 & 2
(d) 51 rooms and over per block		
(A) 3 storeys and below	A	1 & 2
(B) 4 storeys and above or exceeding 18 m height	A & B	1, 3, 4 & 5
(iii) Hotel above shops or office occupancies	But not less than that required for over all occupancy risk or 1 & 2 above	
2. Hostels, Dormitories, Old Folk Homes and Ophanages		
(i) (a) Single storey	-	-
(b) 2 or 3 storeys	A	1
(c) 4 or 5 storeys		
(A) Less than 250 sq. m per floor	A	1, (See Note 7)
(B) More than 250 sq. m per floor	A	1 & 2
(d) 6 to 10 storeys	A	1 & 2
(e) 11 storeys and over	A & B	1, 3, 4 & 5
(ii) Open corridor design 11 storeys and over and for other designs 6 storeys and over	A & B	1, 3, 4 & 5
NOTE: Hotels at locations that cannot be reached within reasonable time or not accessible to required type and number of fire appliances shall be required to provide higher standard of protection as required by D.G.F.R.		
3. Apartments and Flats		
(i) Apartments/flats 5 storeys and below	(See Note 5)	-
(ii) Open corridor design	-	-
(a) Apartments/flats 6 storeys to 10 storeys or less than 30 m height	A, (See Note 5)	1

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
(b) Apartments exceeding 10 storeys or 30 m	A, (See Note 5)	1
(iii) Internal staircase or core design		
(a) 6 storeys to 10 storeys or less than 30 m	A, (See Note 5)	1
(b) Exceeding 10 storeys or 30 m height	A, (See Note 5)	1, 2 & 5
(iv) Duplex or multi-level units	-	(See Note 6)
(v) Apartments with common central air-conditioning with ducted systems		
(a) 3 storeys to 5 storeys	A	1
(b) 6 to 10 storeys (less than 30 m)	A	1 & 2
(c) 11 storeys and over	A & B	1, 3 & 5
IV. OFFICES (total gross floor area)		
1. 4 storeys and less or less than 1,000 sq. m	-	-
2. 5 storeys and above or exceeding 1,000 sq. m	A	1
3. Exceeding 18 m but less than 10,000 sq. m	A	1 & 2
4. Exceeding 30 m but less than 10,000 sq. m	A & B	1, 3, 4 & 5
V. SHOPPING COMPLEXES, SHOPS AND MARKETS		
1. (i) Floor area not exceeding 250 sq. m per floor built as separate compartments with building less than 4½ storeys or 18 m height	-	-
(ii) Combination of ground floor shop and/ or residential and/or office on upper floors	-	-
2. Single storey		
(i) Less than 750 sq. m	-	-
(ii) 750 to 1000 sq. m	(See Note 8)	-
(iii) 1,001 to 2000 sq. m	A	1 & 2
(iv) More than 2,000 sq. m	A & B	1 & 3
3. 2 storeys (Total floor area)		
(i) Less than 750 sq. m	-	-

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
(ii) 750 to 1,000 sq. m	(See Note 8)	2
(iii) 1,001 to 2,000 sq. m	A	1 & 2
(iv) More than 2,000 sq. m	A & B	
4. 3 storeys and above (total floor area)		
(i) Less than 1,000 sq. m	A	1
(ii) 1,000 – 3,000 sq. m	A	1
(iii) 3,000 sq. m and over	A & B	1, 3 & 5
5. Hawker Centers, Food Courts, Wet and Dry Markets		
(i) Detached building less than 2,000 sq. m with open structure design and naturally ventilated	-	-
(ii) 2,000 sq. m and over	A	1 & 2
6. Combined shop and hotel occupancy and combined office and shop occupancies	Gross area calculated against the highest risk requirement.	
VI. FACTORY		
1. Single Storeys detached or terrace units		
(i) Less than 750 sq. m	-	-
(ii) 750 to 1,000 sq. m	(See Note 8)	1
(iii) 1001 to 2,000 sq. m	A	1 & 2
(iv) More than 2,000 sq. m	A & B	1, 3 & 5
2. Open Structure Design		
(i) Steel or metal fabrication works, engineering or metal works or similar low fire risk establishments	-	-
(ii) Sawmill	A & D	1
(iii) Steel mills	A & D	1
3. Two Storeys detached or terrace units: each floor built as separate compartment single or terrace type construction		
(i) Each floor area less than 500 sq. m	(See Note 8)	1
(ii) Each floor area 500 – 1,000 sq. m	A	1 & 2
(iii) Exceeding 1,000 sq. m per floor area	A & B	1, 3 & 5

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
4. Flatted Factories Block		
(i) 2 storeys and over		
(a) Less than 500 sq. m per compartment	(See Note 8)	1
(b) 500 – 1,000 sq. m per compartment	A	1
(c) Exceeding 1,000 sq. m per compartment	A & B	1, 3, 4 & 5
(d) Compartment Exceeding 7,000 cu. m	-	-
(ii) Three storeys and over	A & D	1 & 2
(a) With compartment exceeding 1,000 sq. m	A, B & D	1, 3, 4 & 5
(iii) Vehicle Assembly and similar Plants		
(a) Less than 1,000 sq. m	-	-
(b) 1001 to 2,000 sq. m	(See Note 8)	-
(c) 2001 to 5,000 sq. m	A & D	1
(d) Exceeding 5,000 sq. m	AB & D	1, 2, 3 & 5
5. Special hazards		
(i) Factory complexes such as palm oil mill complex, palm oil refinery, sugar mills, paper mills, paint shops, cement works	A & D	1
(ii) (a) Buildings with wet processes	A	1
(b) Building with hazardous processes	A, B, C or D	1, 2, 3, 4, 5
NOTE: 1. Factories in operation after hours of darkness shall be required to provide emergency light as required by the D.G.F.R. 2. Special risks or hazardous processes or storage shall be required to provide fire protection requirements as required by D.G.F.R.		
VII. PLACE OF ASSEMBLY		
1. Place of assembly below level of exit discharge exceeding 500 sq. m (Total floor area)	A & B	1
2. Convention Center, Community Centers, Private Clubs, Exhibition Centers, Museums And Art Galleries (total floor area)		
(i) Single storey not exceeding 1,000 sq. m	-	-

A. Hose Reel System
B. Sprinkler System
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D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
(ii) Single storey 1,001 sq. m to 2,000 sq. m	A	1
(iii) 2 storey and above or exceeding 2,000 sq. m	A & B	1, 3, 4 & 5
3. Theatres, Cinemas, Concert Halls, Auditoriums (total floor area)		
(i) Single storey or not exceeding 1,000 sq. m	-	1 & 2
(ii) 2 storeys and above or exceeding 1,000 sq. m	A & B	1, 3, 4 & 5
4. Amusement centers (total floor area)		
(i) Single storey or not exceeding 1,000 sq. m	A	1 & 2
(ii) 2 storeys and above or exceeding 1,000 sq. m	A & B	1 & 3
5. Bus terminals, train stations, airports (total floor area)		
(i) Single storey or not exceeding 1,000 sq. m	-	1
(ii) 2 storeys 1000 sq. m to 2,000 sq. m	A	1 & 2
(iii) 3 storeys and above or exceeding 2,000 sq. m	A & B	1, 3, 4 & 5
6. Place of worship		
Place of assembly used purely for religious purposes	-	-
VIII. STORAGE AND GENERAL		
1. Car parks		
(i) Open structure car-parks above ground		
(a) Single storey or less than 750 sq. m	-	-
(b) 2 storeys and above or more than 750 sq. m per floor	A	1
(ii) Underground car parks		
(a) Less than 2000 sq. m (total floor area)	A	1
(b) 2000 sq. m and above atas (total floor area)	A & B	1, 3, 4 & 5
(iii) Automated multi level car parks	A & B	1 & 3

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

Occupancy Hazard	Extinguishing System Note 2	Detection and Fire Alarm Systems Note 3
2. Warehouse and storage of non-combustible such as clay and bleaching earth		
(i) Single storeys and less than 2,000 sq. m	-	-
(ii) 2 storeys and above or more than 2,000 sq. m	A	1
3 Warehouse and Storage of combustible products		
(i) Single storeys (total floor area)		
(a) Open sided exceeding 1,000 sq. m	A	1
(b) Less than 250 sq. m	-	-
(c) 250 – 500 sq. m	(See Note 5)	1
(d) 501 – 1,000 sq. m and less than 7,000 cu. m	A	1 & 2
(e) More than 1,000 sq. m or 7,000 cu. m	A & B	1, 3 & 5
(ii) Two storeys and over (total floor area)		
(a) Less than 1000 sq. m and less than 7000 cu. m	A	-
(b) Exceeding 1,000 sq. m and over or more than 7,000 cu. m	A & B	1, 3 & 5

NOTE:

Open Structure

(1) Total surface area of openings is to be no less than 40% of the total perimeter wall area enclosing the floor or compartment.

(2) The opening(s) is too be shaped and located in such a way that total length in plan of the opening(s) is to be no less than 50% of the perimeter of the floor or compartment.

Open Corridor

(1) Total surface area of openings is to be no less than 25% of the total perimeter wall area enclosing the balcony.

(2) The opening(s) is too be shaped and located in such a way that total length in plan of the opening(s) is to be no less than 50% of the perimeter of the balcony.

"Openings" is to be opened to outside, unenclosed space or permitted airwells. Any individual opening having surface area less than 600 mm² or area width of opening is less than 25 mm is not to be regarded as an opening for the purpose.

A. Hose Reel System
B. Sprinkler System
C. Gaseous Extinquishing System
D. Pressurized Fire Hydrant

1. Manual Electric Fire Alarm
2. Automatic Fire Detector System
3. Centralised Monitoring System
4. Public Address System
5. Fire Command Center

OPEN STRUCTURES
OPEN CORRIDORS

UBBL 2012 10th Schedule

OPEN STRUCTURE

(1)Total surface **area** of openings is to be no less than **40%** of the total perimeter wall area enclosing the floor or compartment

(2)The opening is to be shaped and located in such a way that total **length** in plan of the opening(s) is to be no less than **50%** of the perimeter of the floor or compartment

" Openings" is to be opened to outside, unenclosed space or **permitted airwells**. Any individual opening having a surface area less than 600mm2 or area width of opening is less than 25mm is not to be regarded as an opening for this purpose.

OPEN STRUCTURES

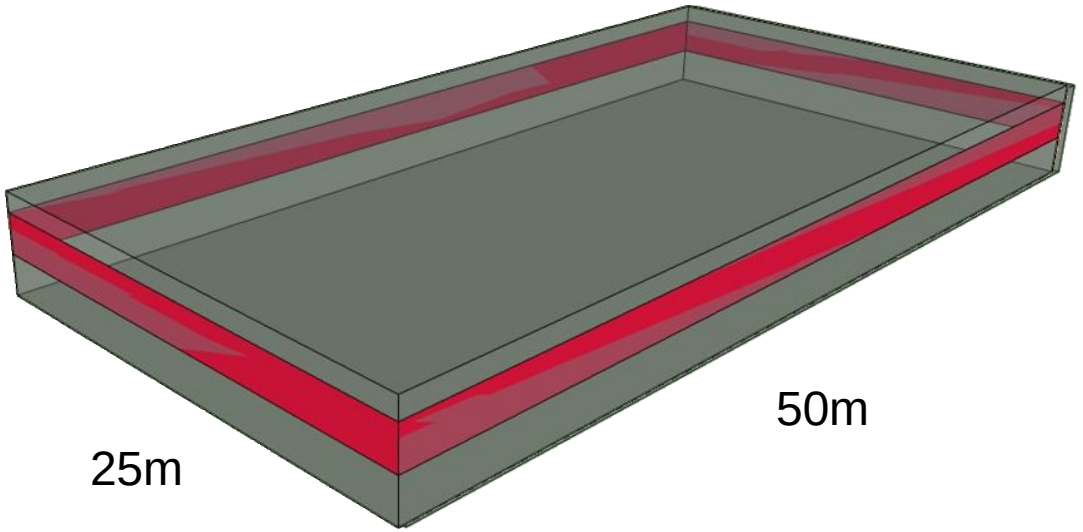
Example:

Total perimeter length (25m + 50m) x 2 = 150m

minimum 50% = 75m

Total perimeter wall area 150m x 5m = 750m2

minimum 40% = 300m2



Total length of openings (25m + 50m) x 2 = 150m

Total area of openings 150m x 2m = 300m2

OPEN CORRIDOR

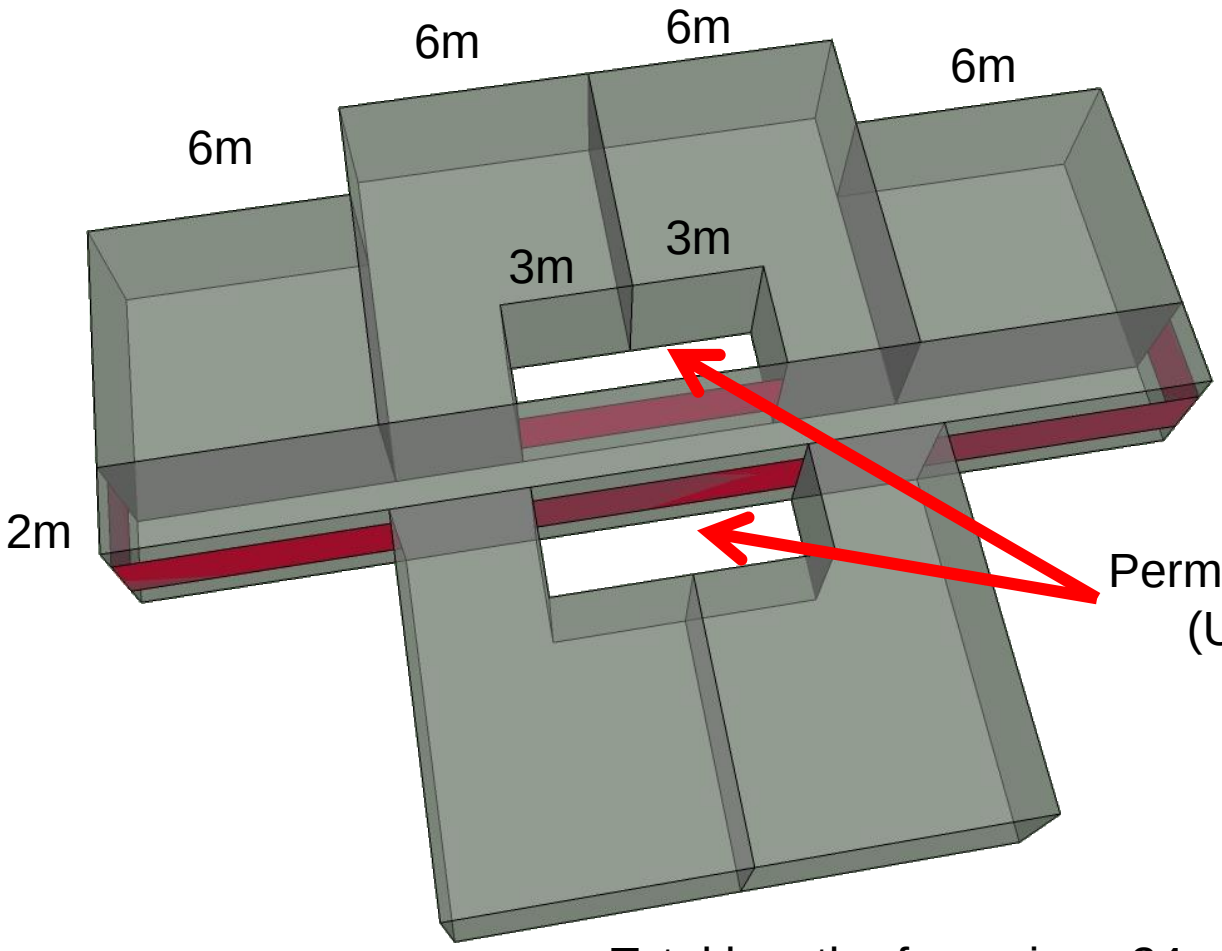
(1)Total surface **area** of opening(s) is to be no less than **25%** of the total perimeter wall area enclosing the balcony (corridor)

(2)The opening(s) is to be shaped and located in such a way that total **length** in plan of the opening(s) is to be no less than **50%** of the perimeter of the floor or compartment

" Openings" is to be opened to outside, unenclosed space or **permitted airwells**. Any individual opening having a surface area less than 600mm2 or area width of opening is less than 25mm is not to be regarded as an opening for this purpose.

OPEN CORRIDOR

Example (corridor)
Total perimeter length (24m + 2m) x 2 = 52m
minimum 50% = 26m
Total perimeter wall area 52m x 3m = 156m2
minimum 25% = 39m2



Total length of openings 24m + 2m + 2m= 28m
Total area of openings : 28m x 1.5m = 42m2

10th SCHEDULE

VI. FACTORY		
1. Single Storeys detached or terrace units		
(i) Less than 750 sq. m	-	-
(ii) 750 to 1,000 sq. m	(See Note 8)	1
(iii) 1001 to 2,000 sq. m	A	1 & 2
(iv) More than 2,000 sq. m	A & B	1, 3 & 5
2. Open Structure Design		
(i) Steel or metal fabrication works, engineering or metal works or similar low fire risk establishments	-	-
(ii) Sawmill	A & D	1
(iii) Steel mills	A & D	1
3. Two Storeys detached or terrace units: each floor built as separate compartment single or terrace type construction		
(i) Each floor area less than 500 sq. m	(See Note 8)	1
(ii) Each floor area 500 – 1,000 sq. m	A	1 & 2
(iii) Exceeding 1,000 sq. m per floor area	A & B	1, 3 & 5

A : HR
B : Spkr
C : GasEx
D : PrHy

1 : ManAl
2 : AutoD
3 : CMS
4 : PAS
5 : FCC

10th SCHEDULE

VIII. STORAGE AND GENERAL		
1. Car parks		
(i) Open structure car-parks above ground		
(a) Single storey or less than 750 sq. m	-	-
(b) 2 storeys and above or more than 750 sq. m per floor	A	1
(ii) Underground car parks		
(a) Less than 2000 sq. m (total floor area)	A	1
(b) 2000 sq. m and above atas (total floor area)	A & B	1, 3, 4 & 5
(iii) Automated multi level car parks	A & B	1 & 3

A : HR
B : Spkr
C : GasEx
D : PrHy

1 : ManAl
2 : AutoD
3 : CMS
4 : PAS
5 : FCC

10th SCHEDULE

II. INSTITUTIONAL		
1. Educational Occupancies		
(i) Rooms or halls used for instructional purposes only.		
(a) Open corridor design		
(A) 2 storeys and below	-	-
(B) 3 to 5 storeys	A	1
(C) 6 storeys and above	A	1 & 2
(b) Other designs		
Two or more storeys		
(B) Less than 1,000 sq. m per floor	A	1
(C) 1,000 sq. m to 2,000 sq. m per floor	A	1 & 2
(D) Exceeding 2,000 sq. m per floor or more than 30 m height	A & B	1, 3, 4 & 5

A : HR
B : Spkr
C : GasEx
D : PrHy

1 : ManAl
2 : AutoD
3 : CMS
4 : PAS
5 : FCC

10th SCHEDULE

HOTELS

Hotels		
(i) Open corridor_design with open staircase with extended lobby or tower staircase		
(a) 1 to 3 storeys		
(A) 50 rooms or less per block	-	(See Note 7)
(B) More than 50 rooms per block	A	(See Note 7)
(b) 4 or 5 storeys		
(A) 20 rooms or less per block	-	(See Note 7)
(B) 21 to 50 rooms per block	A	(See Note 7)
(C) 51 rooms and over per block	A	1 & 2
(c) 6 to 10 storeys		
(A) 50 rooms or less per block	A	1 & 2
(B) 51 rooms and over per block	A & B	1, 3, 4 & 5
(d) 11 storeys and over	A & B	1, 3, 4 & 5

Other Designs		
(a) Less than 10 rooms per block	-	(See Note 7)
(b) 11 rooms to 20 rooms per block	-	1 & 2
(c) 21 rooms to 50 rooms per block	A	1 & 2
(d) 51 rooms and over per block		
(A) 3 storeys and below	A	1 & 2
(B) 4 storeys and above or exceeding 18 m height	A & B	1, 3, 4 & 5

A : HR
B : Spkr
C : GasEx
D : PrHy

1 : ManAl
2 : AutoD
3 : CMS
4 : PAS
5 : FCC

10th SCHEDULE

3. Apartments and Flats		
(i) Apartments/flats 5 storeys and below	(See Note 5)	-
(ii) Open corridor design	-	-
(a) Apartments/flats 6 storeys to 10 storeys or less than 30 m height	A, (See Note 5)	1
(b) Apartments exceeding 10 storeys or 30 m	A, (See Note 5)	1
(iii) Internal staircase or core design		
(a) 6 storeys to 10 storeys or less than 30 m	A, (See Note 5)	1
(b) Exceeding 10 storeys or 30 m height	A, (See Note 5)	1, 2 & 5
(iv) Duplex or multi-level units	-	(See Note 6)
(v) Apartments with common central air-conditioning with ducted systems		
(a) 3 storeys to 5 storeys	A	1
(b) 6 to 10 storeys (less than 30 m)	A	1 & 2
(c) 11 storeys and over	A & B	1, 3 & 5

A : HR
B : Spkr
C : GasEx
D : PrHy

1 : ManAl
2 : AutoD
3 : CMS
4 : PAS
5 : FCC

SMOKE CONTROL

UBBL 2012

251

"smoke control systems where specified shall be designed and installed in accordance with **MS 1780**

MS 1780: 2017

8.5 smoke control of hotel guestroom corridors

8.5.1

"Where internal guestroom corridors are NOT mechanically presurised, such corridors shall be smoke purged or diluted at a rate no less than 10 air change per hour."

8.5.3

Natural ventilation is permissible only if induced cross ventilation is available……."

Protection of stairs and lobbies

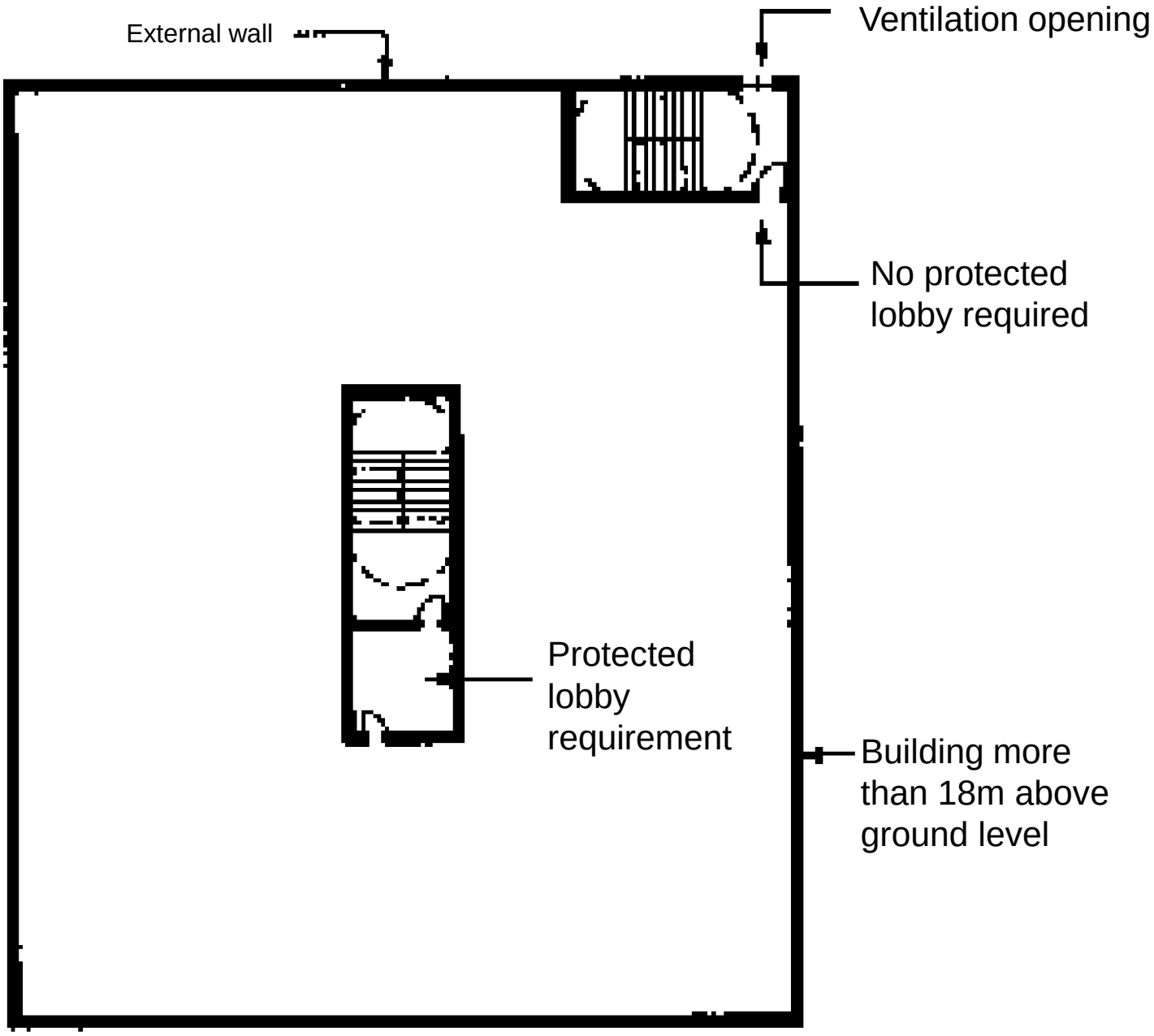
UBBL

- 196, 197 - smoke lobbies, protected lobbies
- 198, 199, 200, 201 – ventilation of stairs
- 229 – fire fighting lobbies

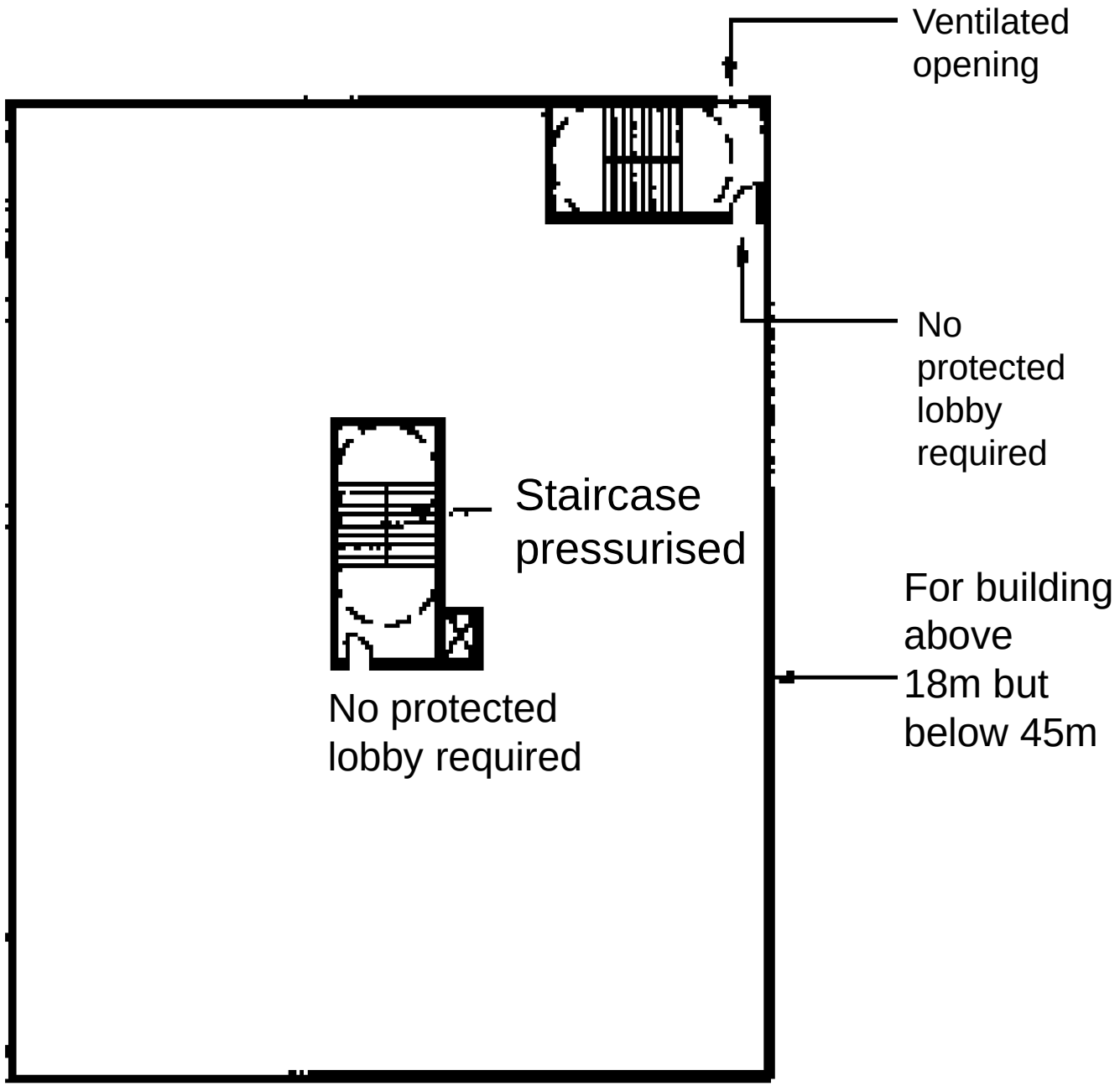
Protection of stairs and lobbies

- **Protected Lobby :** protected lobby separated or isolated from fire and smoke infiltration
- **Smoke Lobby :** a protected lobby primarily to isolate staircases from smoke infiltration
- ventilated lobby : protected/smoke lobby by means of natural ventilation from outside
- **Fire Fighting Access Lobby :** a protected lobby designed for fire fighting access

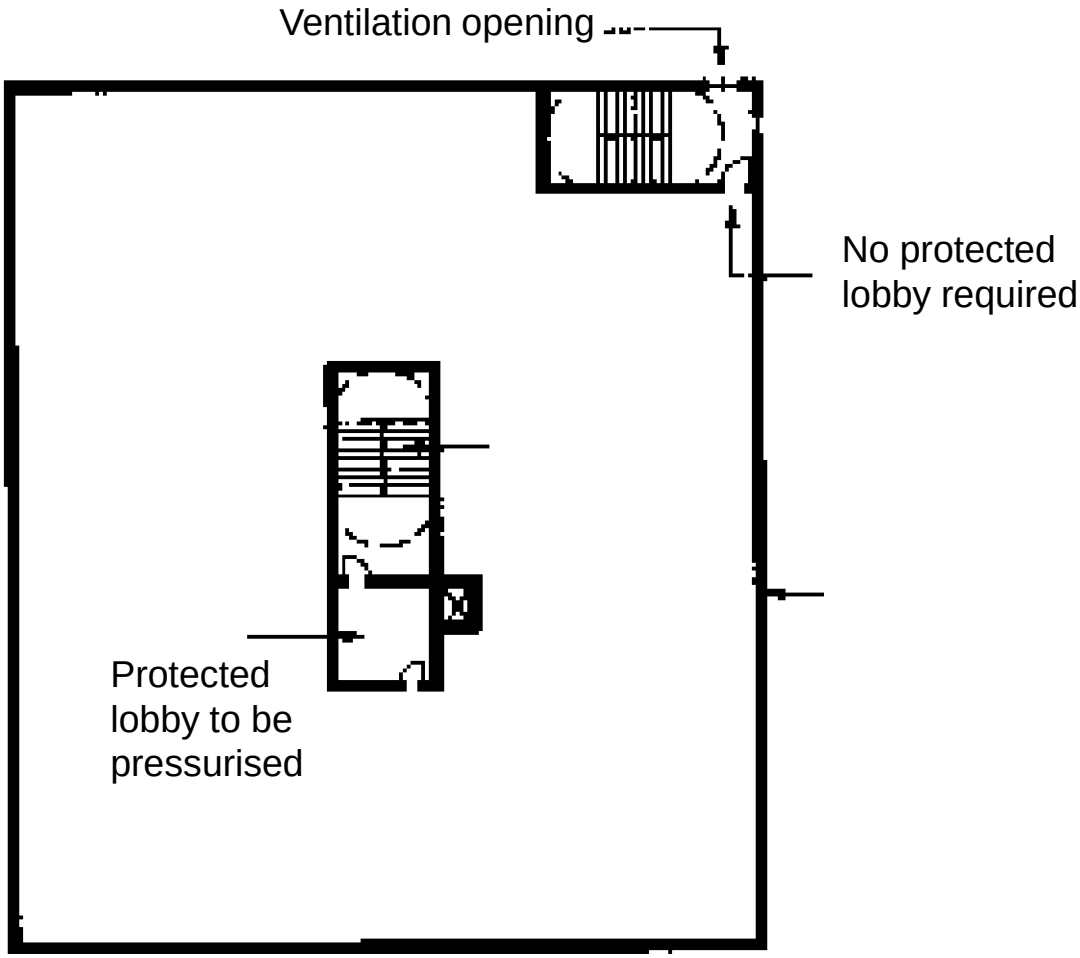
Protected lobby requirement for building > 18m (By-Law 197)



Omission of protected lobby for pressurised staircase for buildings below 45m



Protected lobby requirement for building > 45m [By-Law 197(2)]



Above 18m, need PROTECTION

Above 45m, protection by PRESSURISATION

FIRE FIGHTING ACCESS

UBBL clause 140
UBBL clause 197
UBBL clause 197A
UBBL 197B

140 Fire Appliance Access

(1) Accessway shall be provided within the site of a building to enable fire appliances to gain access to the building. Access openings shall also be provided along the external walls of buildings fronting the accessway to provide access into the building for fire fighting and rescue operations.

(2) The requirements of accessway shall be as follows:

(a) the accessway shall have a minimum width of 6 metres throughout its entire length and shall be able to accommodate the entry and manouvering of fire engine, extended ladders pumping appliances, turntable and hydraulic platforms;

(b) the accessway shall be metalled or paved or laid with strengthened perforated slabs to withstand the loading capacity of stationary 30 tonnes fire appliance;

(c) the accessway shall be positioned so that the nearer edge shall be not less than 2 metres or more than 10 metres from the centre position of the access opening, measured horizontally;

(d) the accessway shall be laid on a level platform or if on an incline, the gradient shall not exceed 1:15. The access road shall be laid on a incline not exceeding a gradient of 1:8.3;

(e) the dead-end accessway and fire engine access road shall not exceed 46 metres in length or if exceeding 46 metres, be provided with turning facilities;

(f) the outer radius for turning of accessway and fire engine access road shall comply with the requirements of the Fire Authority;

(g) the overhead clearance of fire engine access road shall be at least 4.5 metres for passage of fire appliances;

197A. Means of access and fire fighting in building over 18.0 metres high.

(1) Buildings in which the topmost floor is more than 18.0 metres above fire appliance access level shall be provided with means of gaining access and fighting fire from within the building consisting of fire fighting access lobbies, fire fighting staircases, fire lifts and dry or wet rising systems.

197B. Fire fighting access lobbies.

Fire fighting access lobbies shall conform to the following requirements:

(a) each lobby shall have a floor area of not less than 6.0 square metres; and

(b) the openable area of windows or area of permanent ventilation shall be not less than 25% of the floor area of the lobby and, if ventilation is by means of openable windows, additional permanent ventilation having a free opening of 464 square centimetres shall be provided except that mechanical pressurisation may be provided as an alternative

FIRE APPLIANCE ACCESS

2012 UBBL 140

ACCESS WAY

An area for the entry, maneuvering and parking of Fire Appliances during fire fighting and rescue operations

ACCESS ROAD

A road capable of accommodating the passage of Fire Appliances to enter an Access Way

ACCESS OPENINGS

Doorways or openings that allows fast and safe entry of Fire Fighting and Rescue personnel into a building during fire fighting and rescue operations

EXTERNAL ACCESS

Access for emergency and rescue vehicles, equipment and personnel

- Roads
- Pavements
- Parking

Availability of water :

- Hydrants
- Storage tanks
- Lakes, rivers, ponds

And access to fire fighting systems in the premises

AT THE PREMISES

Clarity of :

- Type of building and function
- Configuration of building
- Location of fire control panel
- Location of breaching inlets and pump rooms

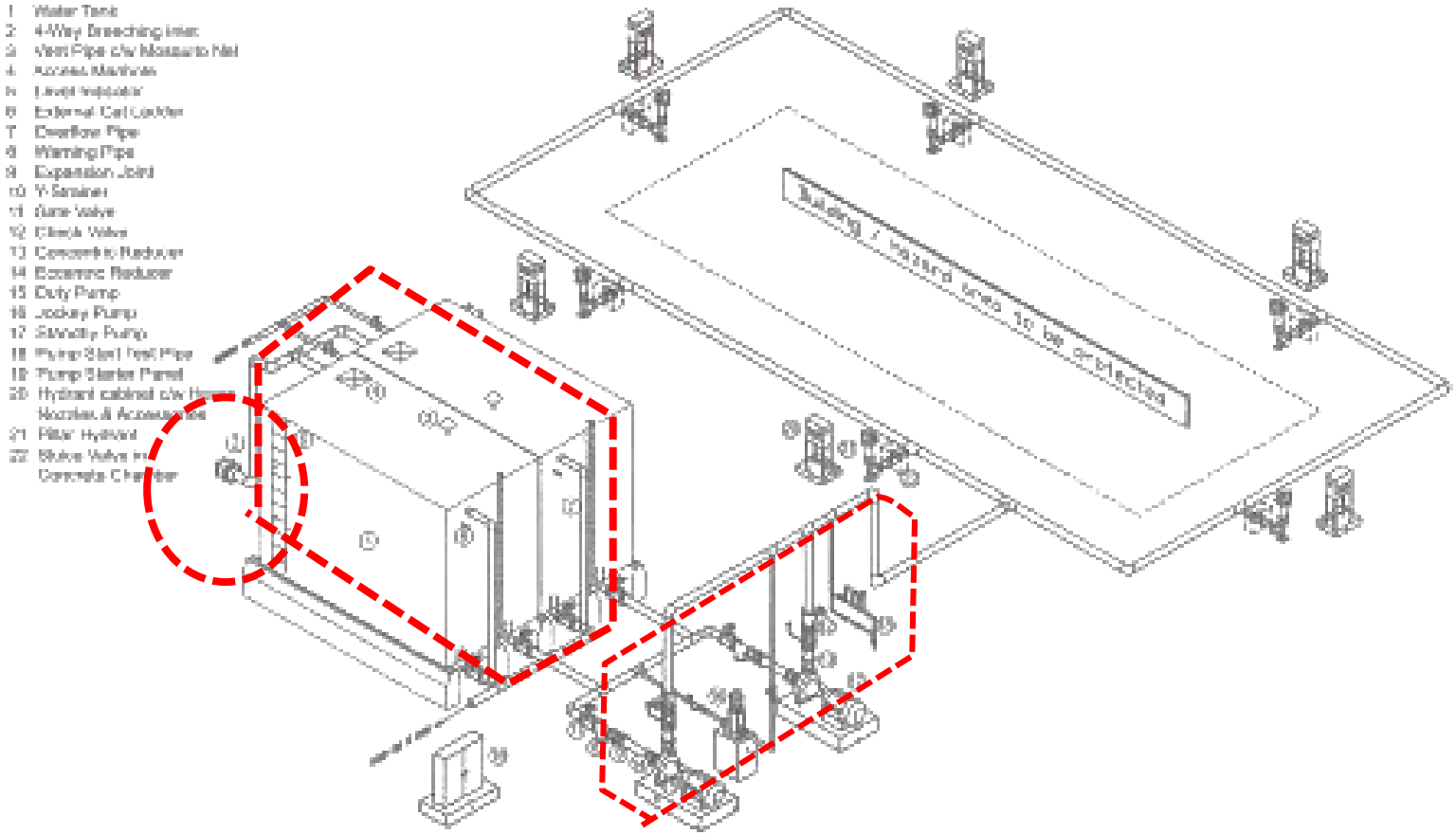
Access into the building

- Protected passage
- Protected stairs
- Firemen’s lift
- Fire fighting lobby

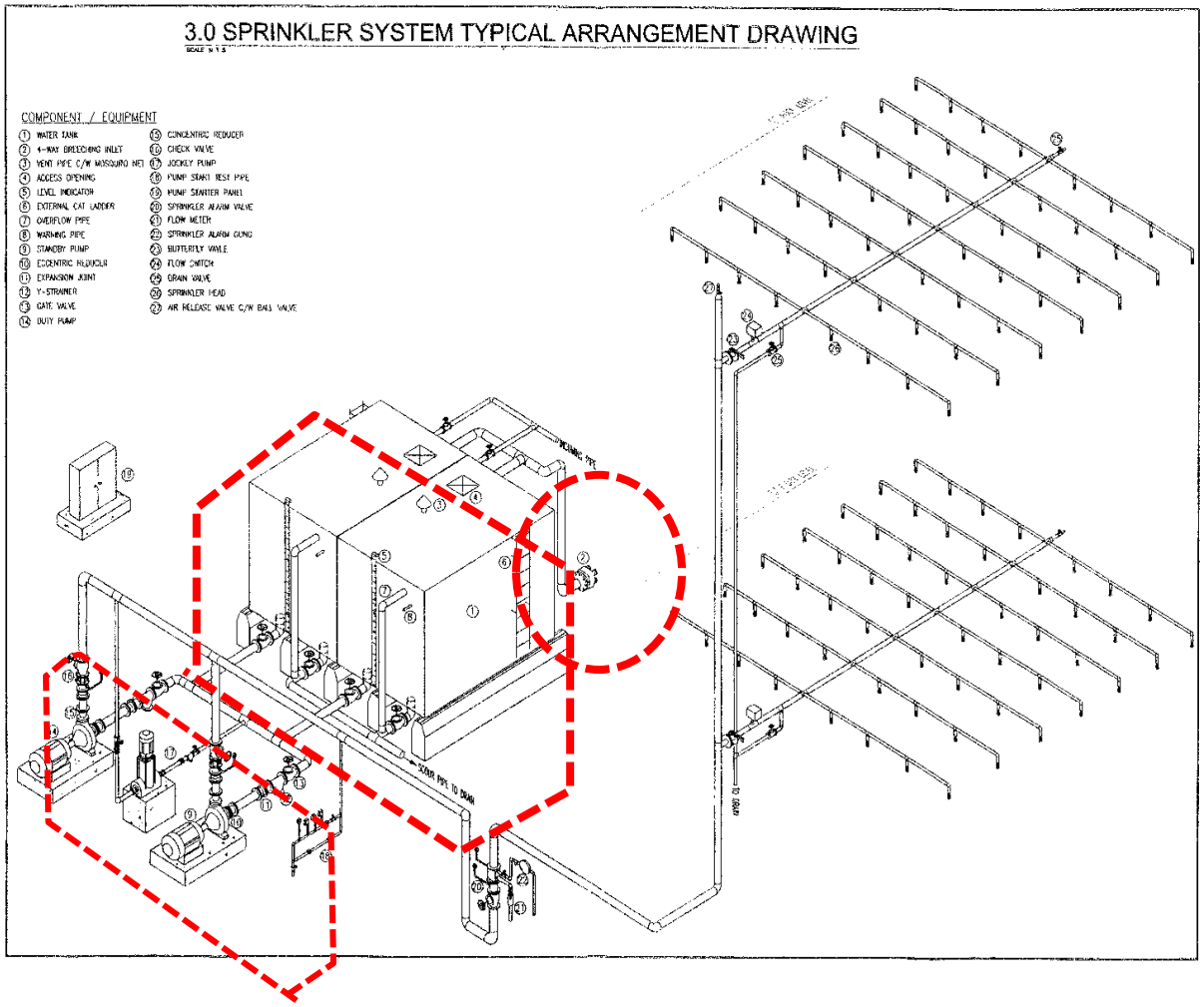
Pressurised Hydrant System

Figure 6.2 Pressurised Hydrant System Typical Arrangement Drawing

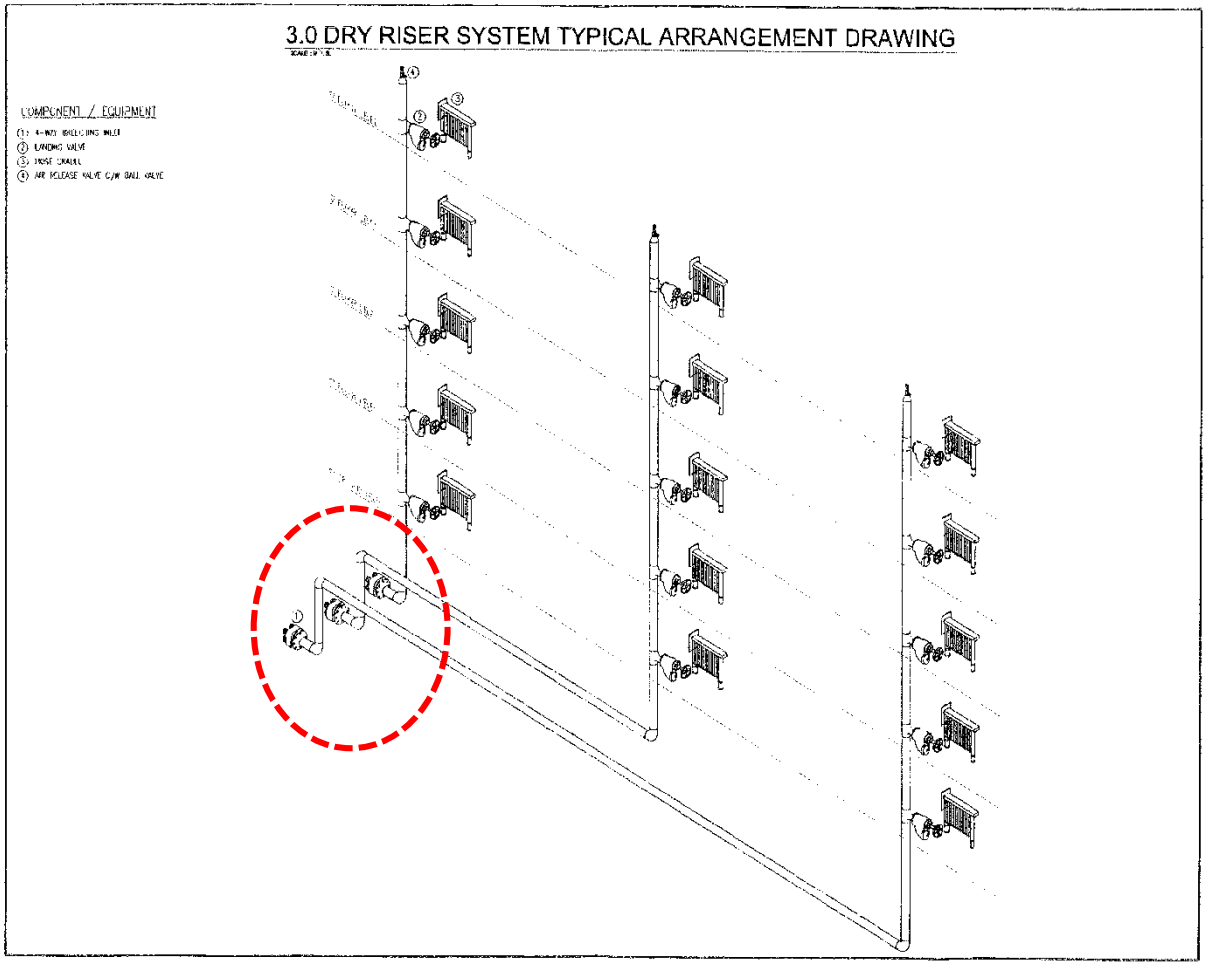
SCALE: N.T.S



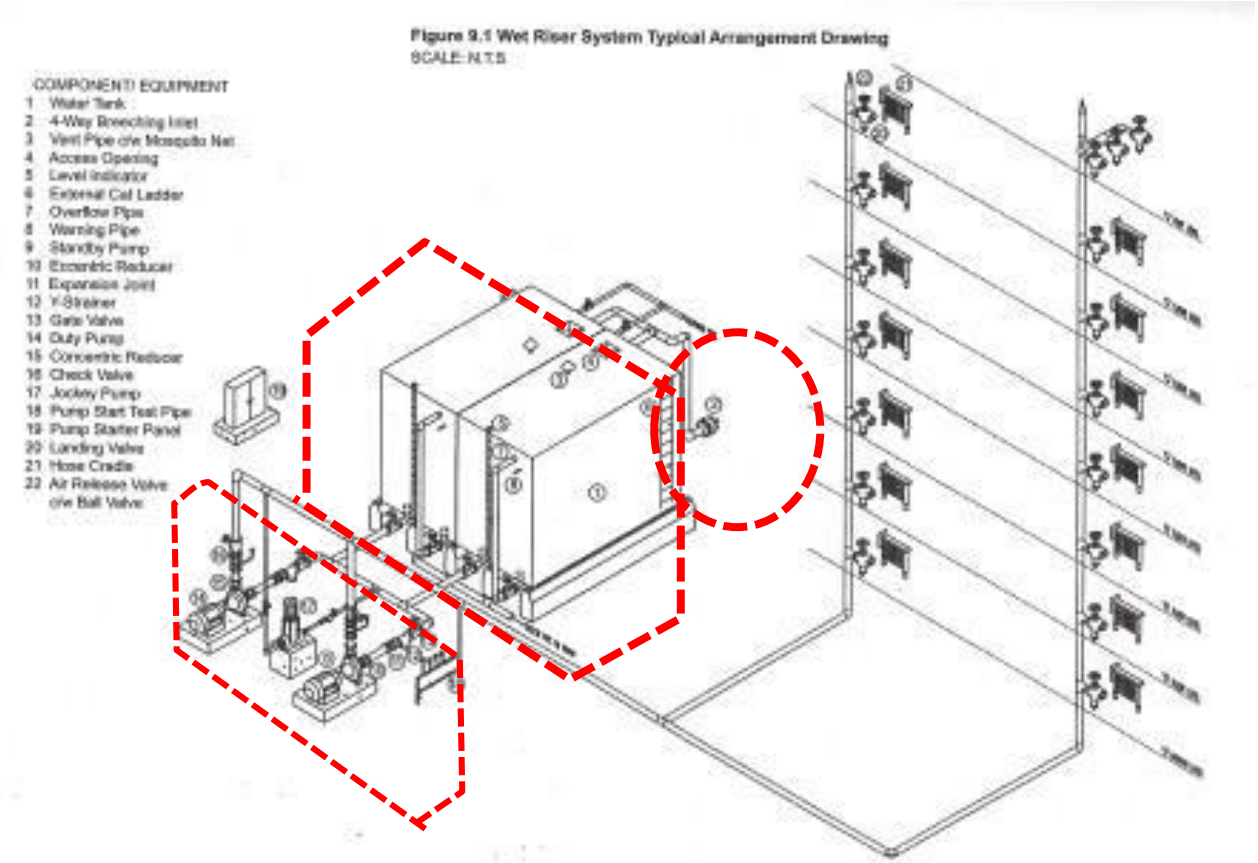
Sprinkler System



Dry Riser system



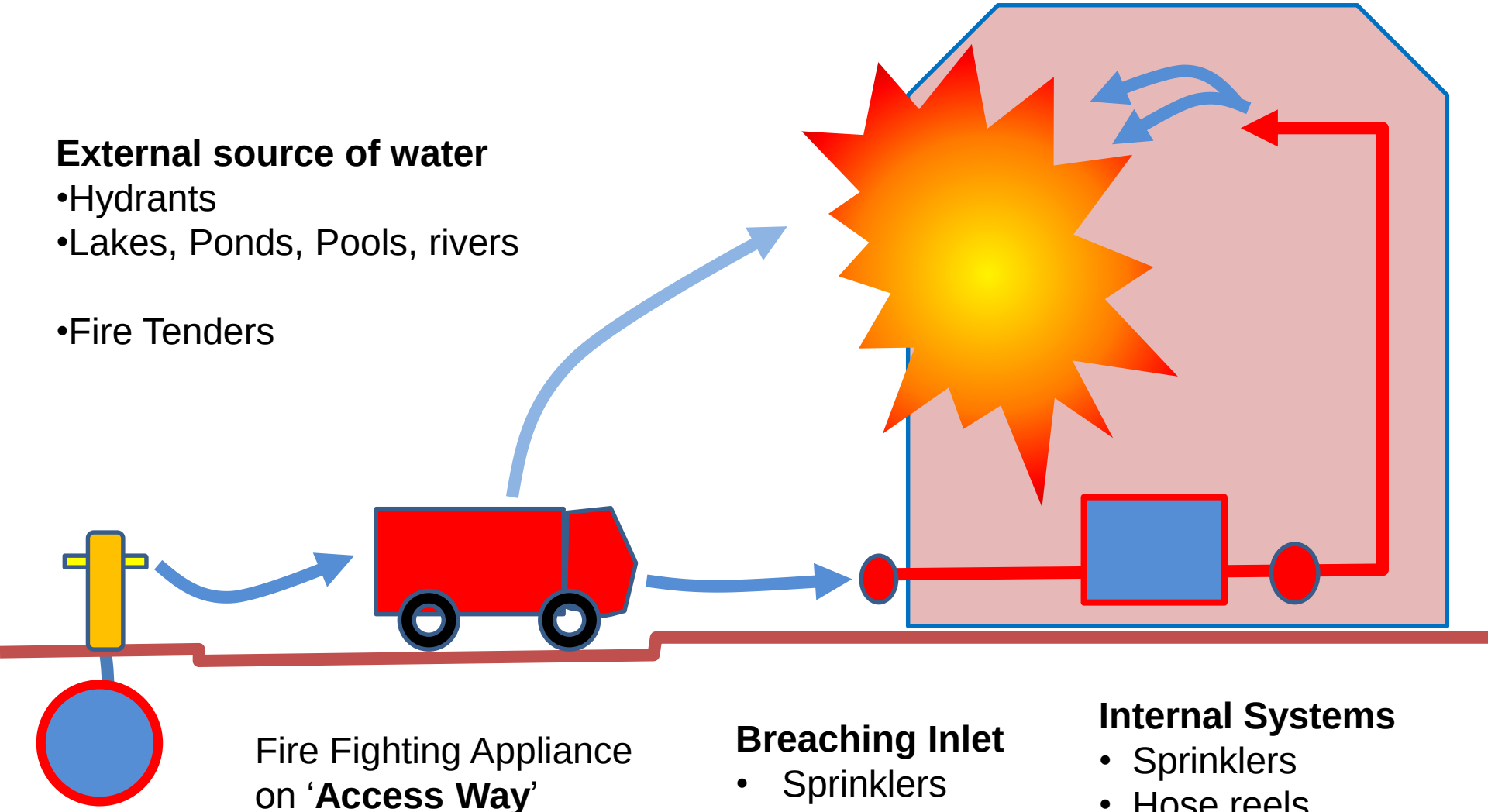
Wet Riser System



External source of water

- Hydrants
- Lakes, Ponds, Pools, rivers

- Fire Tenders



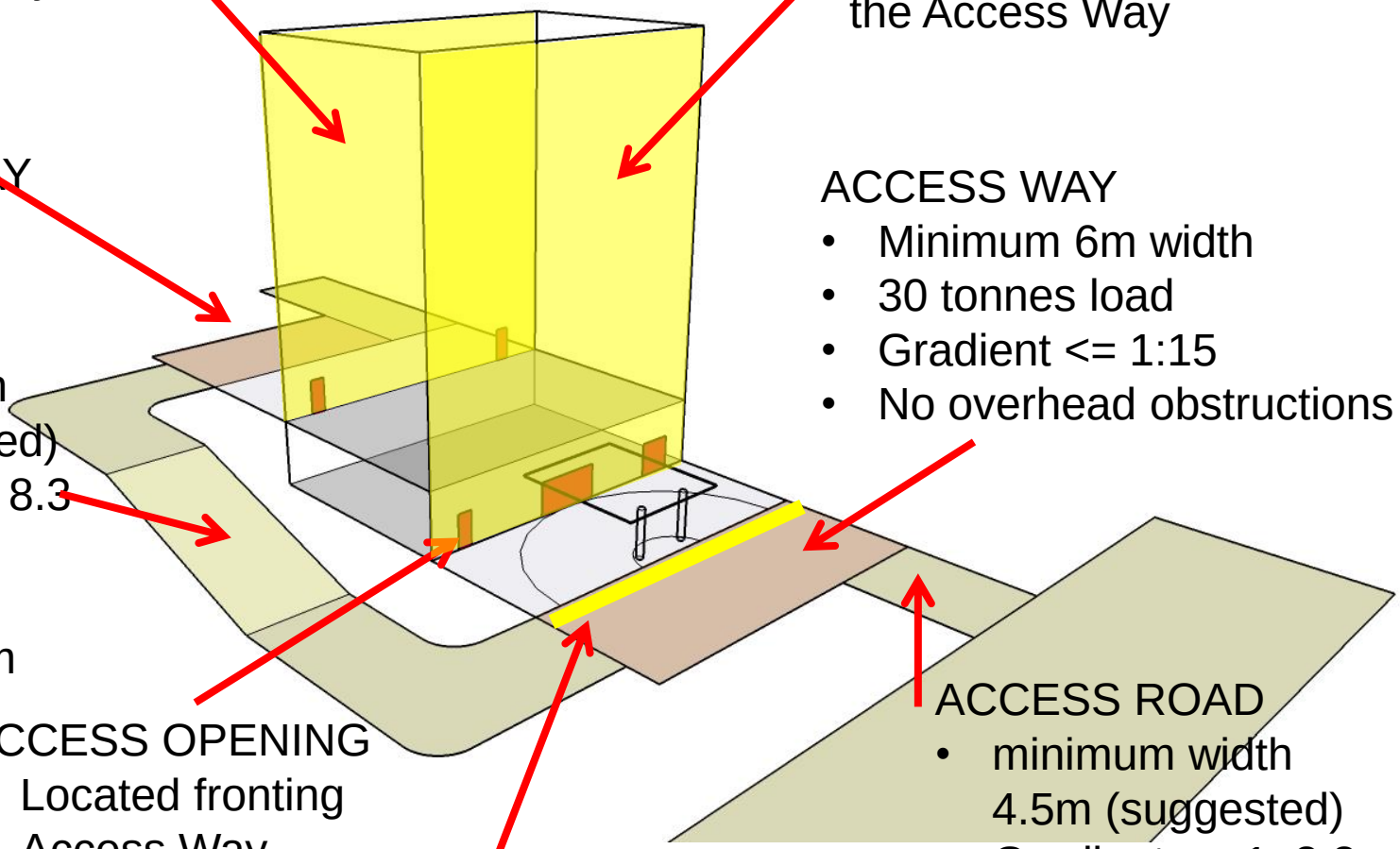
Fire Fighting Appliance on '**Access Way**'

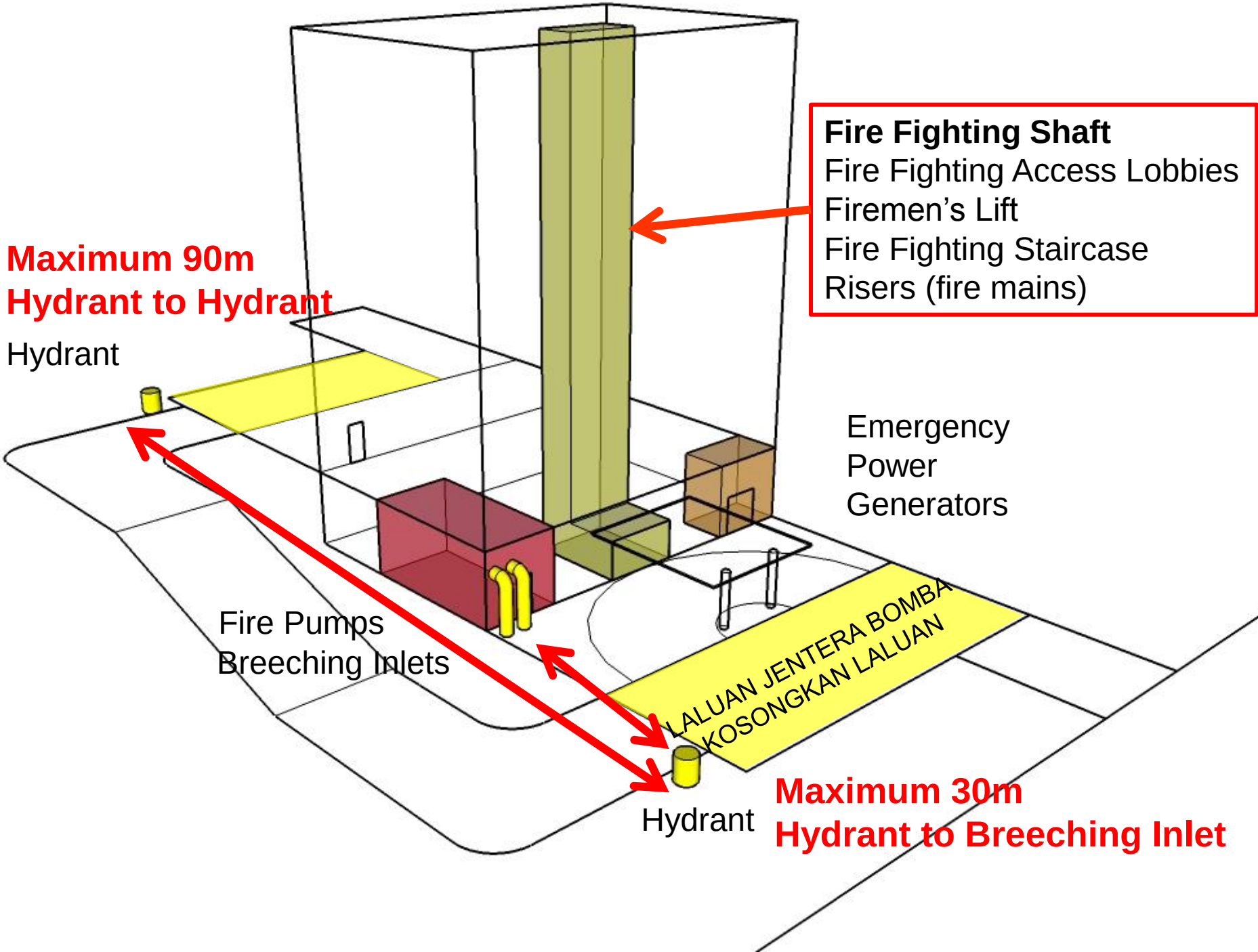
Breaching Inlet

- Sprinklers
- Risers

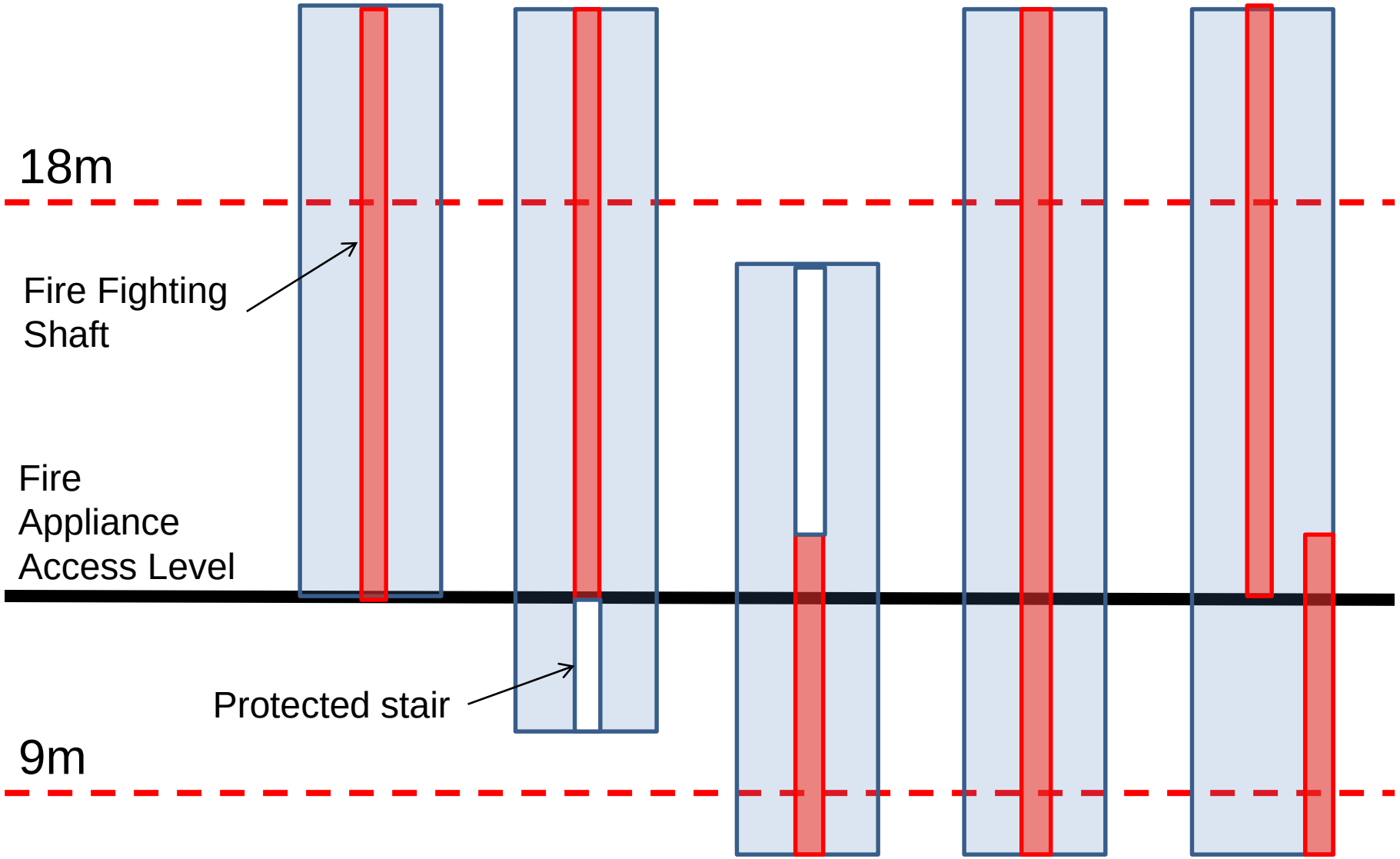
Internal Systems

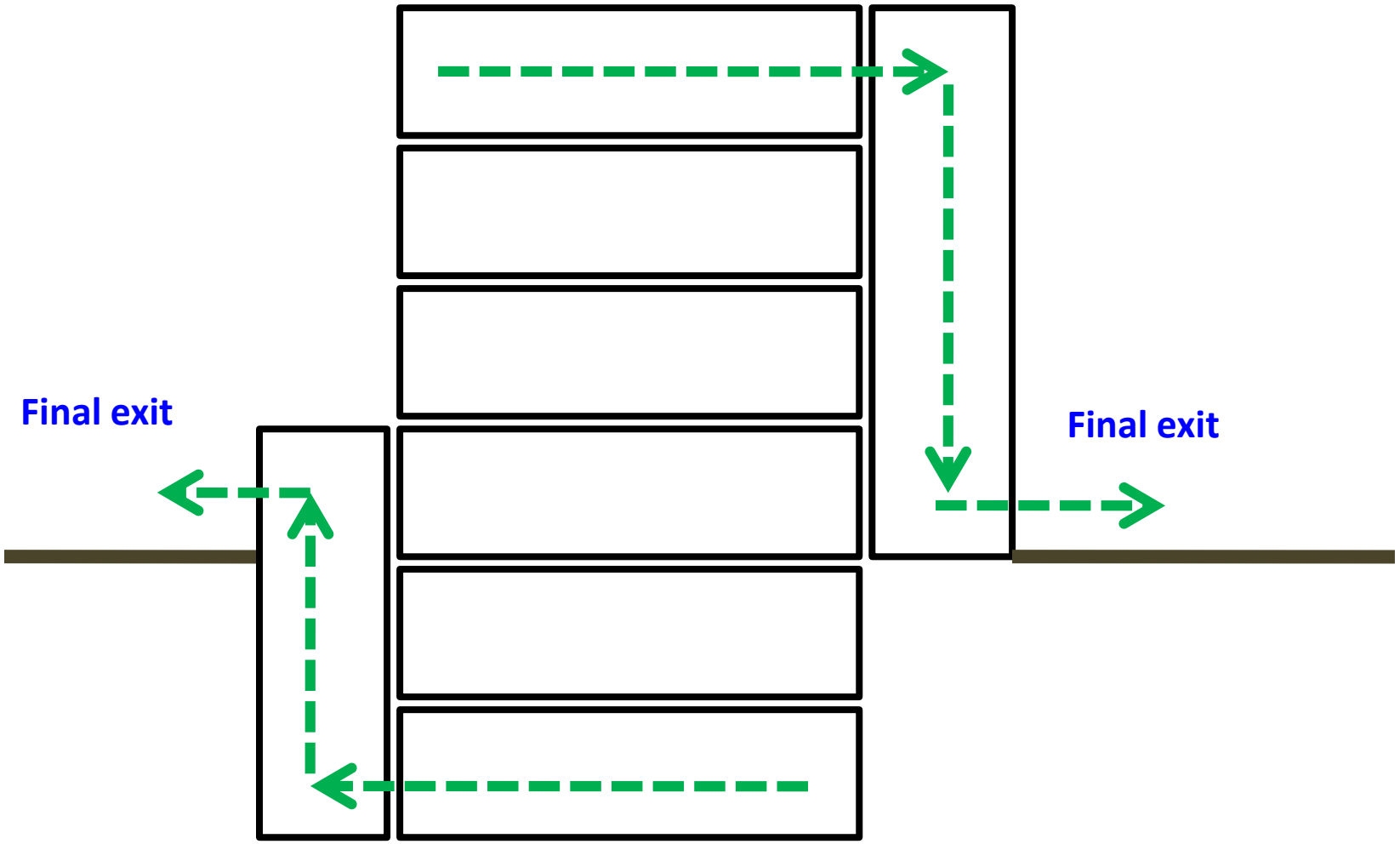
- Sprinklers
- Hose reels
- Risers


Required portion of building fronting the Access Way
Required portion of building fronting the Access Way
ACCESS WAY
ACCESS WAY
• Minimum 6m width
• 30 tonnes load
• Gradient <= 1:15
• No overhead obstructions
ACCESS ROAD
• minimum width 4.5m (suggested)
• Gradient <= 1: 8.3
• Minimum overhead clearance 4.5m
ACCESS OPENING
• Located fronting Access Way
• (suggested) width >= required exit width
Edge of Access Way
• Minimum 2m
• Maximum 10m
ACCESS ROAD
• minimum width 4.5m (suggested)
• Gradient <= 1: 8.3
• Minimum overhead clearance 4.5m


Fire Fighting Shaft
Fire Fighting Access Lobbies
Firemen's Lift
Fire Fighting Staircase
Risers (fire mains)
Maximum 90m
Hydrant to Hydrant
Hydrant
Emergency
Power
Generators
Fire Pumps
Breeching Inlets
LALUAN JENTERA BOMBA
KOSONGKAN LALUAN
Hydrant
Maximum 30m
Hydrant to Breeching Inlet

FIRE FIGHTING SHAFTS





Evacuation : separation of routes

FIRE FIGHTING SHAFTS : LOCATION

Direct distance

Risers (UBBL 230, 231)
All parts of floor within **45m** from a landing valve

Fire Fighting Access Lobbies (UBBL 197A)
Level distance from furthermost point does not exceed **45m**

Route distance

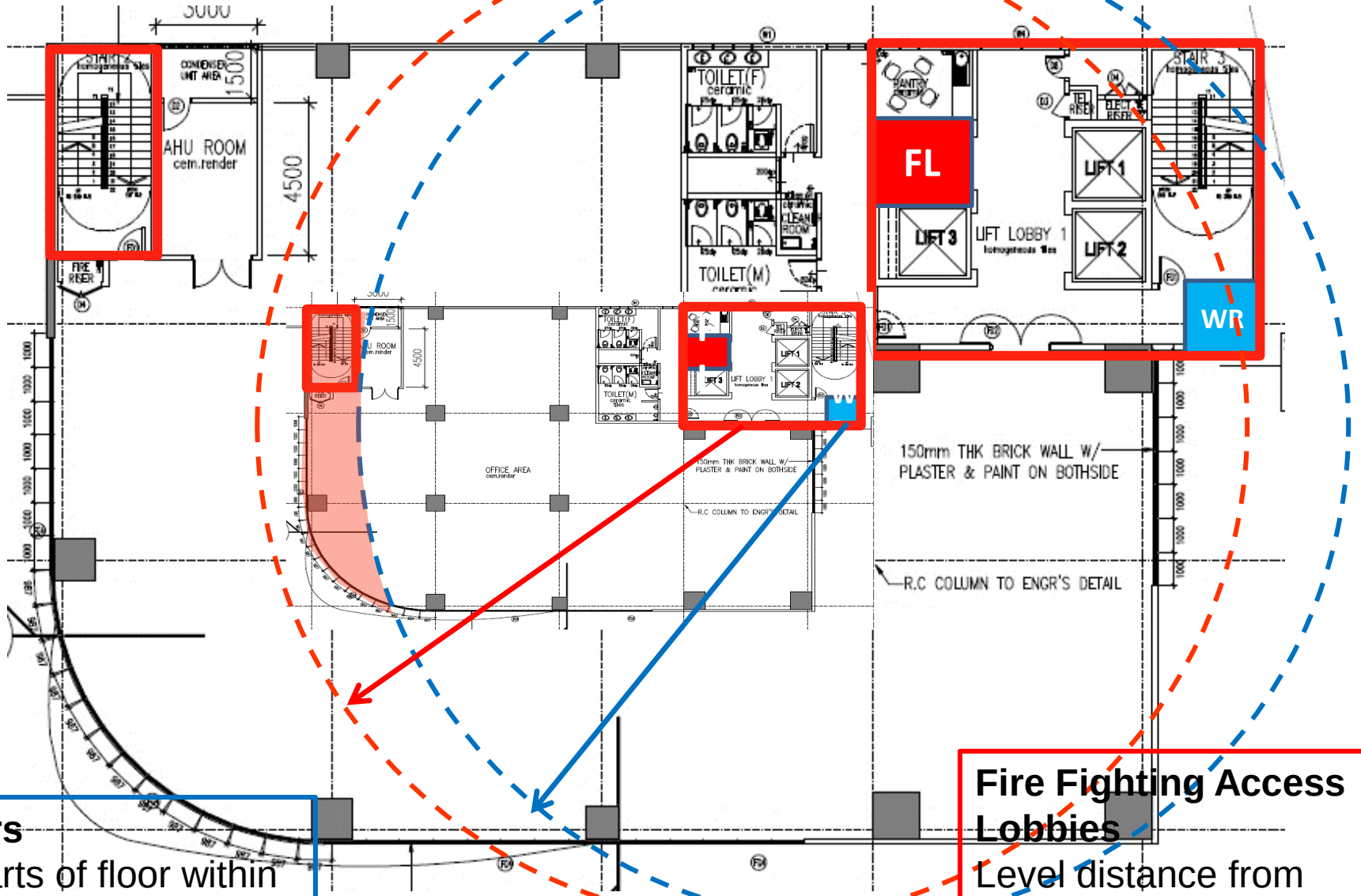
Fire Lifts (UBBL 197A)
Not more than **61m** travel distance from furthermost point

Fire Fighting Shafts (MS1183 21.2.3)
With Fire Lift, no more than **61m** from fire mains outlet measured on route in laying a hose

AND

Without Fire Lift, no more than **45m** from fire mains outlet measured on route in laying a hose

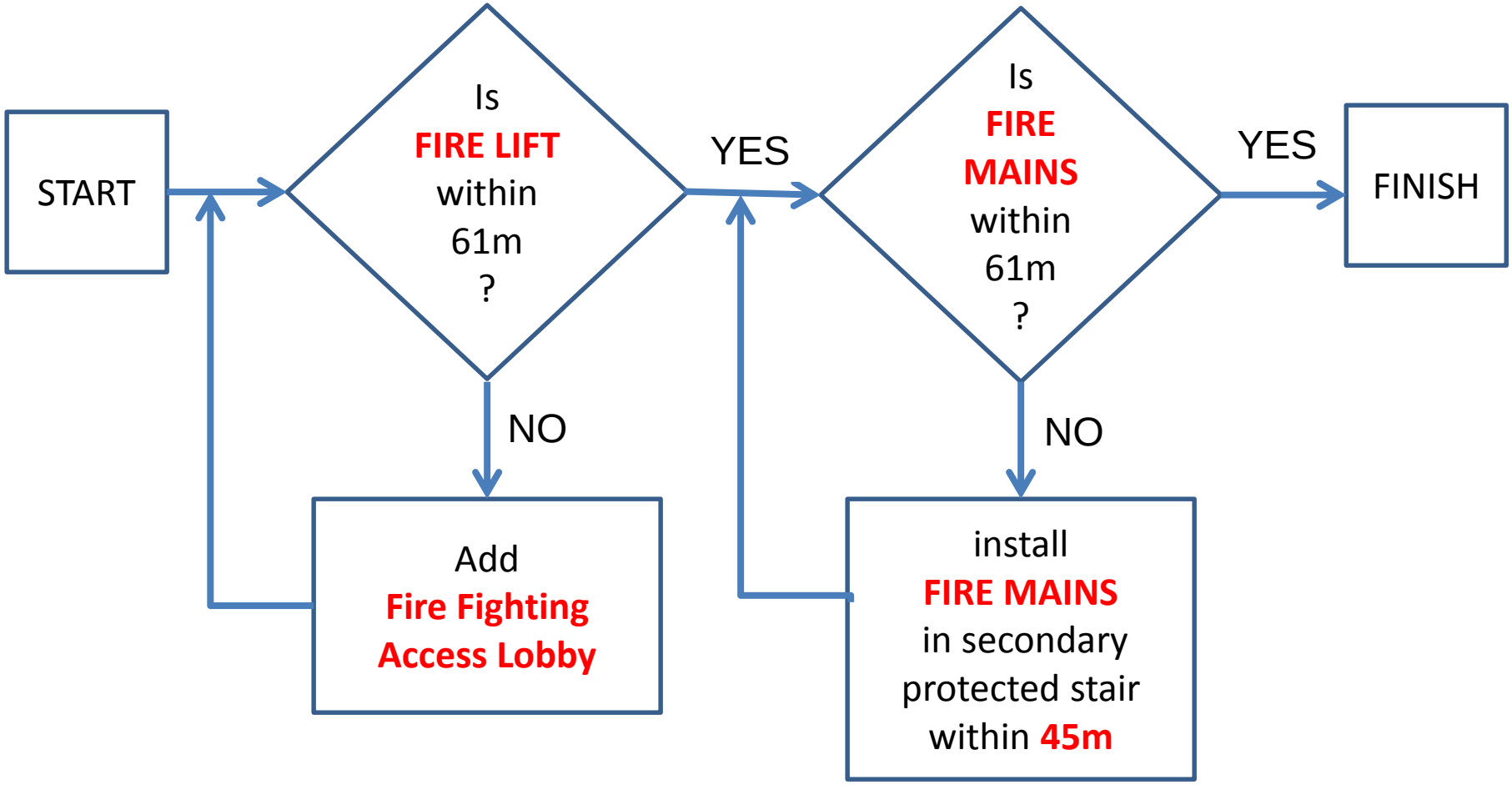
FIRE FIGHTING SHAFTS : LOCATION check with DIRECT DISTANCE



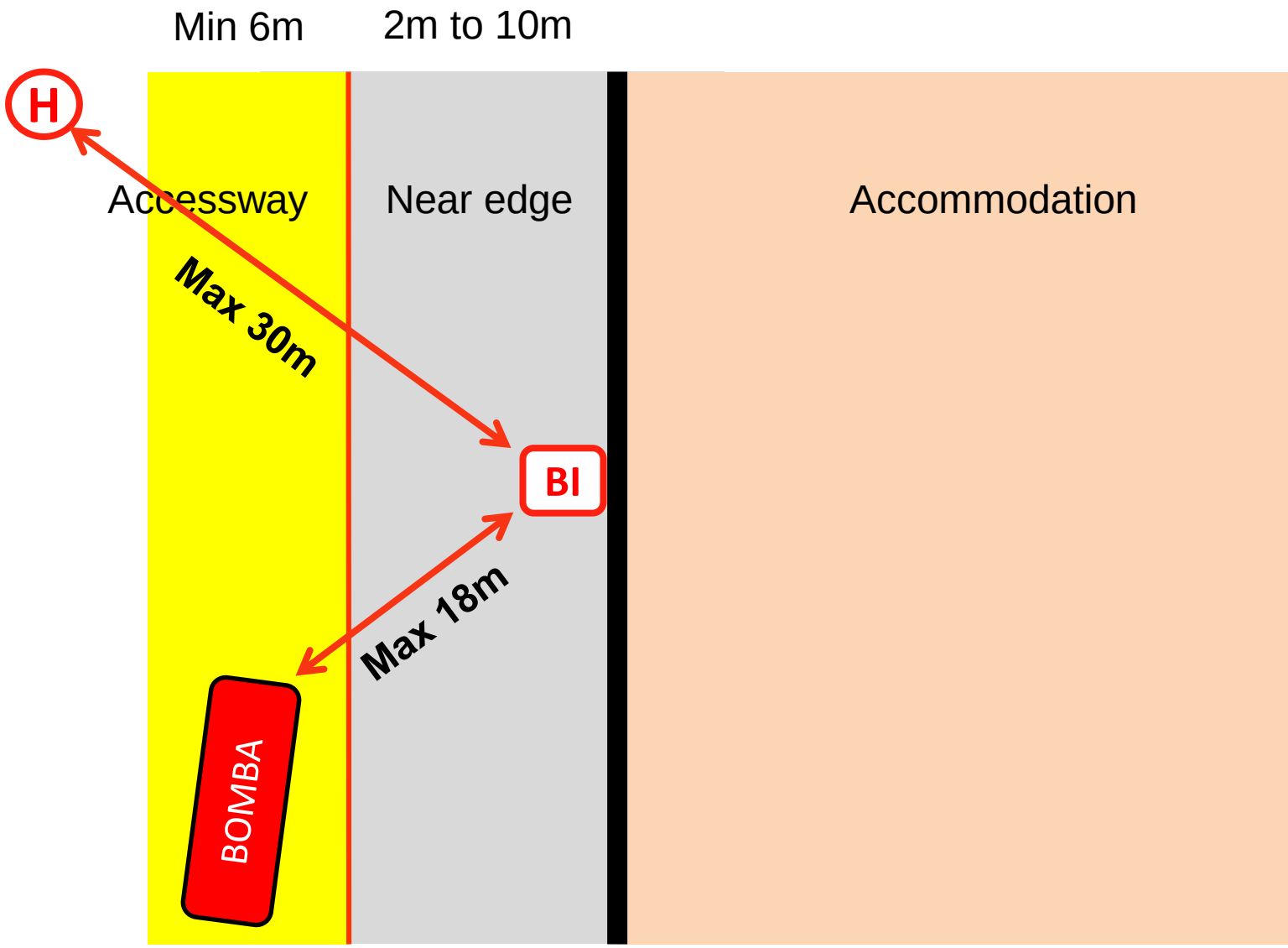
Risers
All parts of floor within **45m** from a landing valve

Fire Fighting Access Lobbies
Level distance from furthermost point does not exceed **45m**

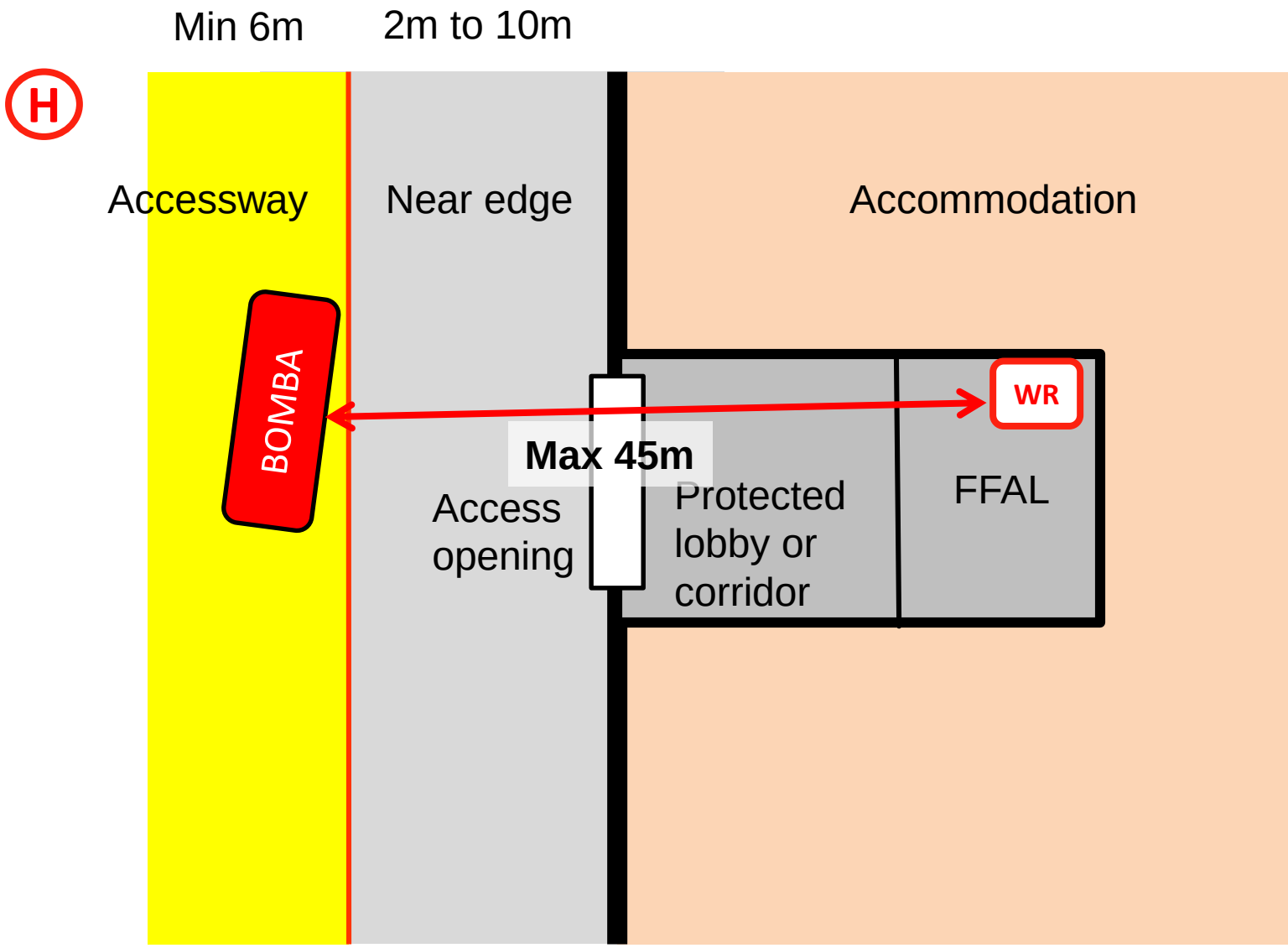
FIRE FIGHTING SHAFTS : LOCATION check with ROUTE DISTANCE



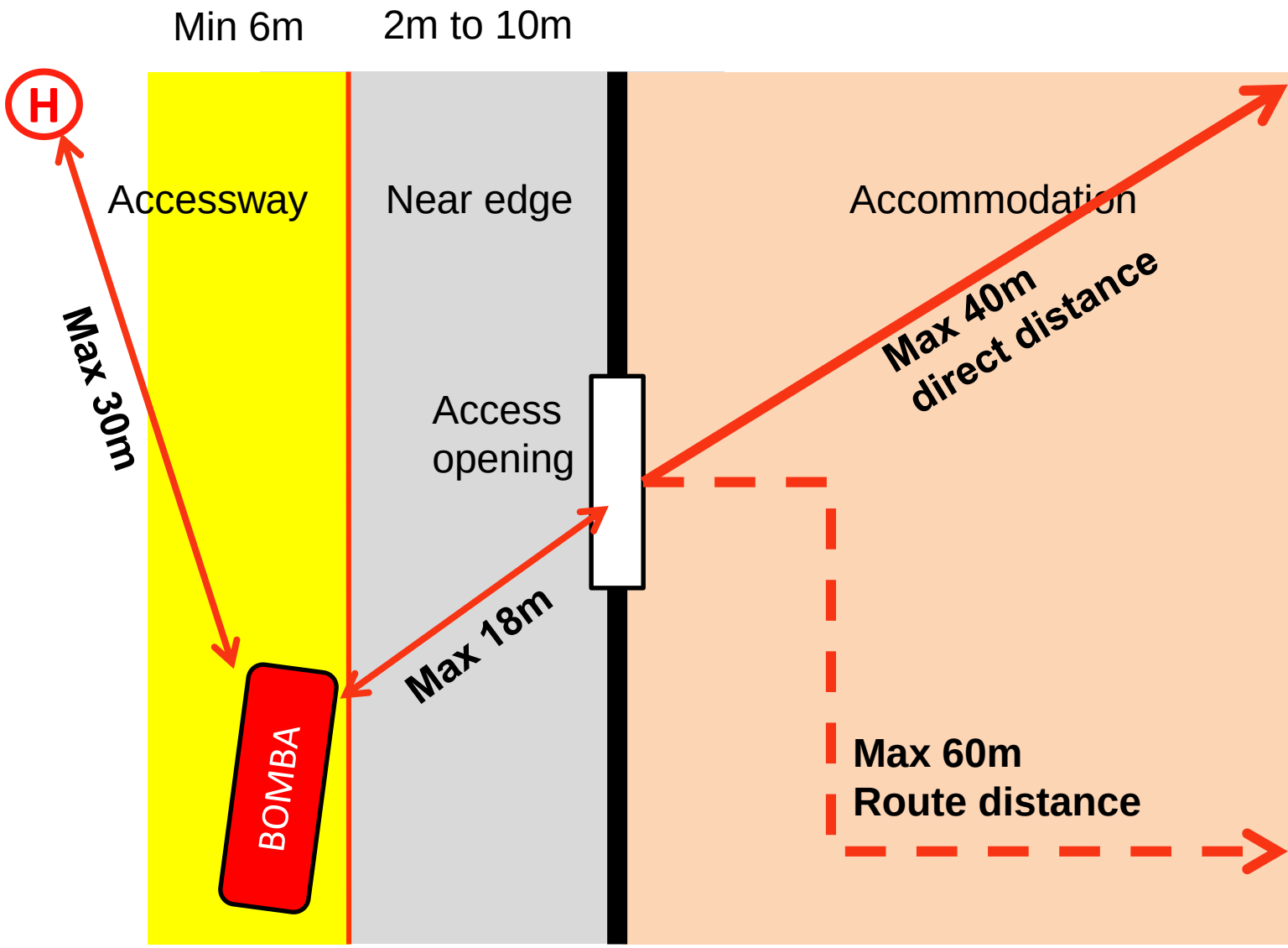
FIRE APPLIANCE ACCESS : to Breeching Inlets



FIRE APPLIANCE ACCESS : to Access Openings

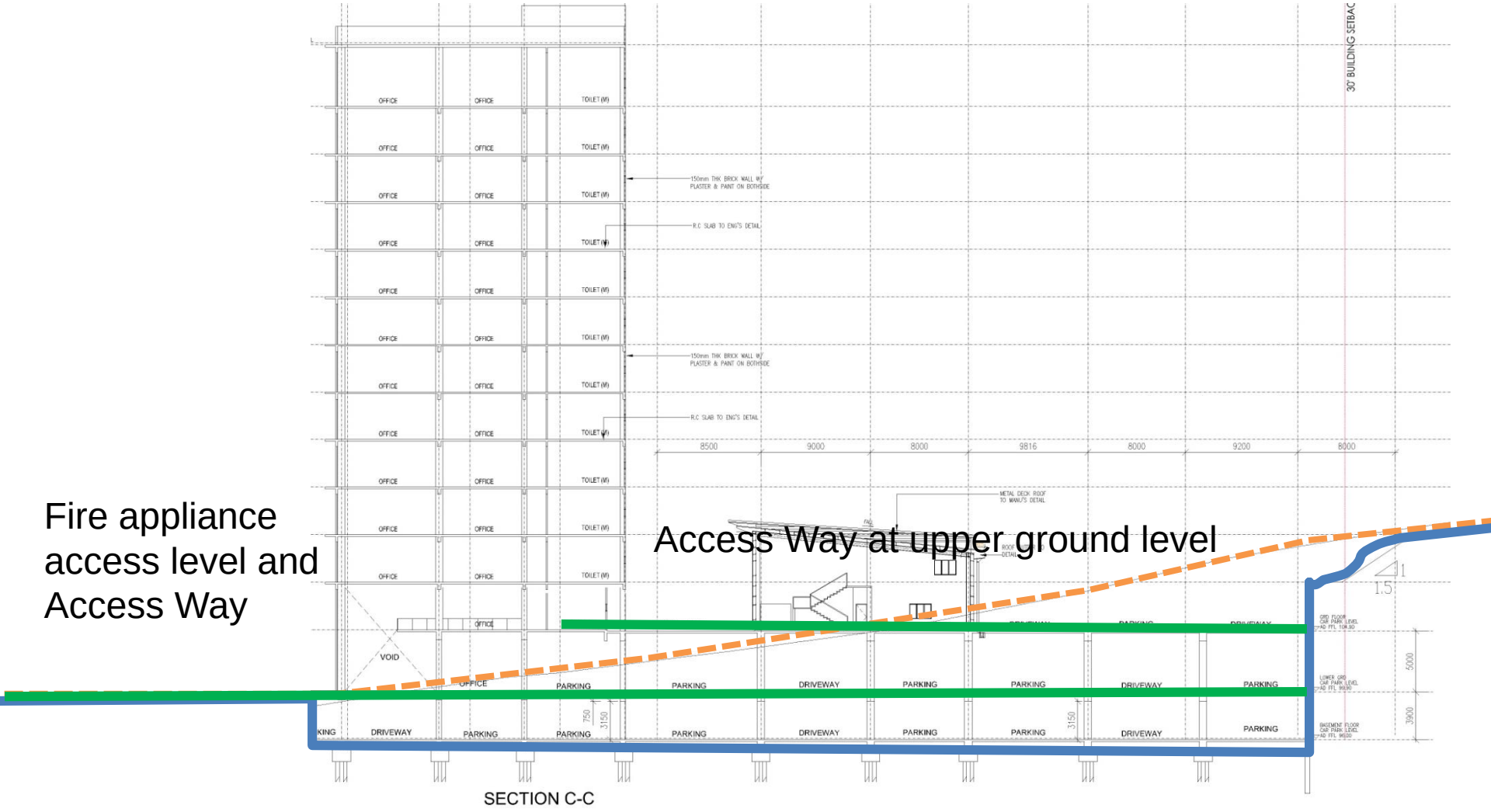


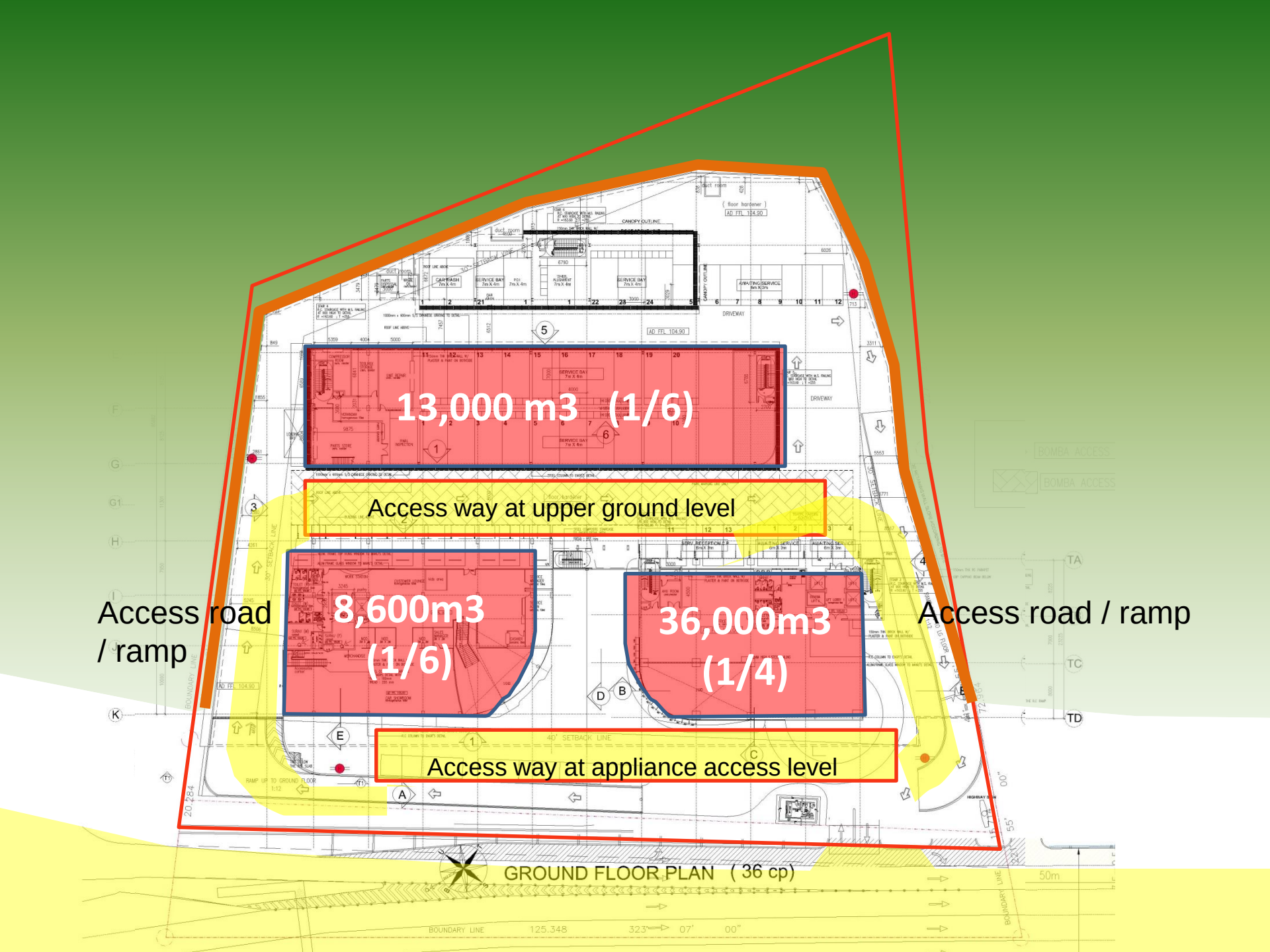
FIRE APPLIANCE ACCESS to Access Openings without Fire Mains

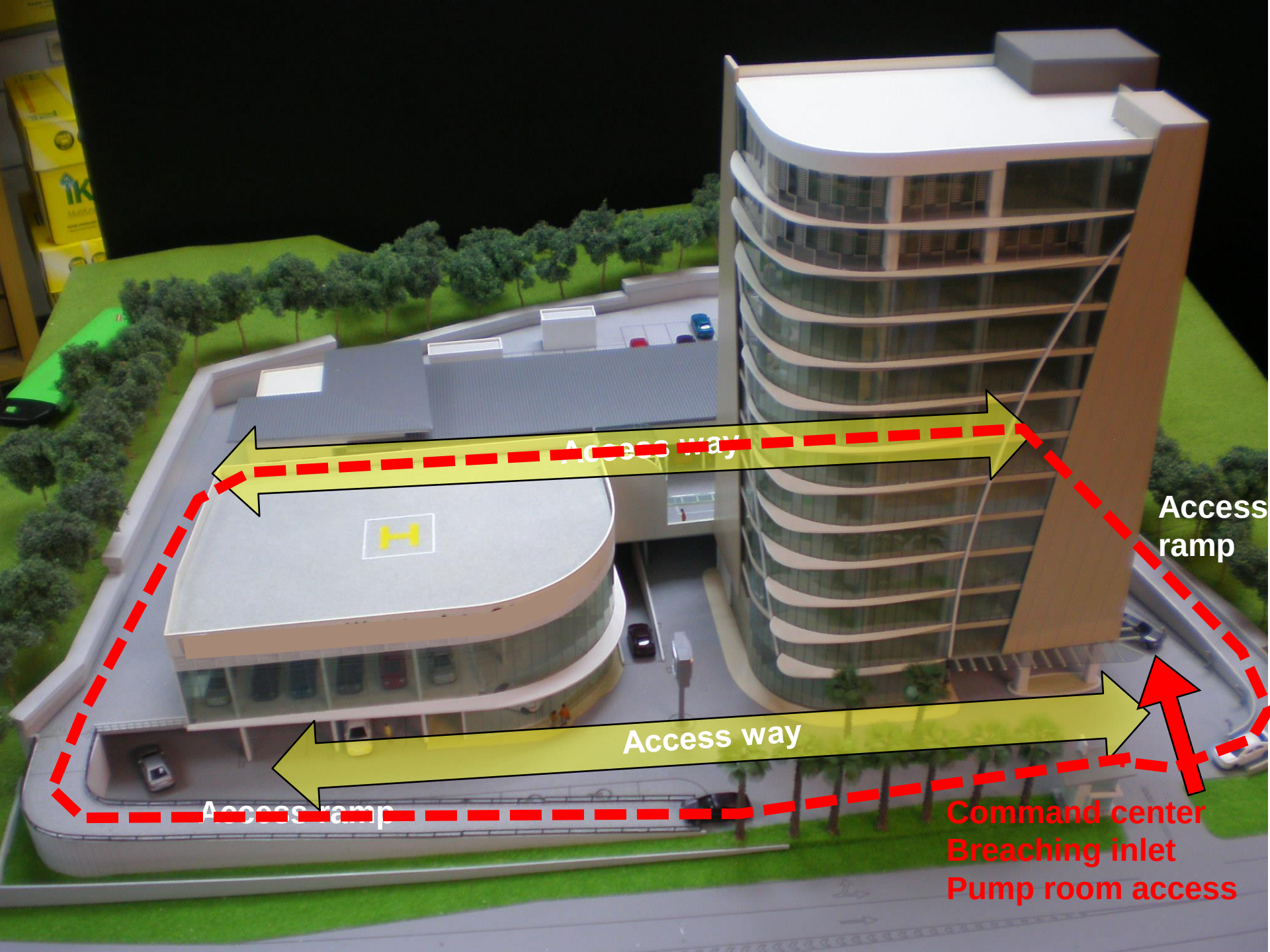



H

Fire appliance access level and Access Way




13,000 m3 (1/6)
Access way at upper ground level
8,600m3 (1/6)
36,000m3 (1/4)
Access road / ramp
Access road / ramp
Access way at appliance access level
GROUND FLOOR PLAN (36 cp)


Access way
Access ramp
Access way
Access ramp
Command center
Breaching inlet
Pump room access

Fire Rescue Tender (medium)

Fire Rescue Tender (light)

HAZMAT tender

Turntable ladders

Pump tanker

Hydraulic platforms


WESTSTAR
AUTO
SDN.BHD.
PERINGATAN


P SHOWROOM
SERVICE


Tempat Letak Kereta / Carpark
Had Tinggi 2.5m Masuk / Entry


SAFETY FIRST


BGD
990


CIVIL DEFENCE
CPL
331


DBHub CarPark


HDB Hub CarPark
DWG


SCDF
SCDF


nave
income
FIRE & RESCUE RESPONSE
SCDF


FIRE & RESCUE RESPONSE
172
The Life Saving For


P270
YM 8252 Y


GOLDEN VILLAGE
Giant
TANGS
172
SCDF

THANK YOU

Ar Chong Lee Siong

APAM MIFireE MMIArbs