112A Great Russell Street, London

Concept Fire Strategy Report

Job No: 1173

July 2020

FIRE STRATEGY REPORT CONTENTS

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Distribution
Marco Veneri (My Construction) Michael Hinitz (My Construction) John Woodhead (Criterion Capital)

Note: all amendments and modifications made after the preceding fire strategy report submission will be indicated with a vertical line in the right hand margin of the paragraph concerned as demonstrated here.

FDS Consult Limited
152-154 London Road
Greenhithe
Kent
DA9 9JW
Tel: +44 (0) 1322 387411
Fax: +44 (0) 1322 386361
Web: www.fdsconsult.com

1.0 INTRODUCTION

1.1 REPORT SCOPE AND OBJECTIVES

1.1.1 FDS Consult has been appointed by My Construction and Carpentry Limited to produce the concept fire strategy for the project known as 112A Great Russell Street, located in London. This project will cover basement levels 4 and 5 of the development.

1.1.2 The fire strategy is intended for discussion between the design team and to assist the design team in gaining approval in principle from the Approving Authorities. The objective of this report is to detail the arrangements for both means of escape and firefighting while ensuring internal and external fire spread is adequate to meeting the Building Regulations requirements. Specific requirements on property protection for client / insurers brief have not been instructed.

1.1.3 This report is based on the guidance in Approved Document B (ADB) to the Building Regulations, April 2006 Edition (incorporating 2010 and 2013 amendments) as well as other relevant guidance such as BS 9999-2017.

1.1.4 The strategy detailed within this report follows the main sections in Approved Document B however in some specific areas, fire engineering has been used to demonstrate and justify deviations from the guidance. Such deviations are explained in each section as appropriate. These deviations are risk until approved by the approving authorities.

1.1.5 Typically the adoption of a fire engineering approach can result in a greater design freedom or flexibility and reduced project and building lifetime costs, whilst maintaining or often exceeding the level of fire safety inferred by the Building Regulations: Approved Document B.

1.1.6 The findings and opinions expressed are based on the conditions encountered and / or the information reasonably available at the date of issue of this document, and shall be applicable only to the circumstances envisaged herein.

1.1.7 As this document forms an approach for fire matters, the design team must ensure the approved contents of the report are incorporated in the building design development and construction.

1.2 BUILDING DESCRIPTION

1.2.1 The project will solely consider the fourth and fifth basement levels of 112A Great Russell Street. Both levels consist of hotel bedrooms as well as various plant and ancillary rooms. Basement level 4 also consists of a back of house commercial space. Basement level 5 also comprises of ancillary accommodation.

1.2.2 The uses within the development can be classified in the following Purpose Groups under Approved Document B: The ancillary units are to be treated as ancillary units to the main purpose group. Travel distance requirements of the ancillary units will still be considered as per ADB.

Accommodation	Purpose Group
Other residential accommodation (Hotel)	2(b)
Ancillary accommodation / plant facilities	2-7(a)

1.2.3 Basement levels 4 and 5 are shown in the figures 1 and 2 below.

Figure 1 – Basement level 4 of the development

Figure 2 –Basement level 5 of the development

1.2.4 The use and the numbers of levels within the building are shown in the table below.

Floor	Type of accommodation	Staircases
Basement level 4	Hotel bedrooms and other ancillary rooms	Core 1 (F.F Core), Core 2 and Core 3
Basement level 5	Hotel bedrooms and other ancillary rooms	

1.3 FIRE STRATEGY OVERVIEW

1.3.1 The proposals outlined in this document demonstrate a level of fire safety equal to or greater than the general standard implied by compliance with the recommendations in Approved Document B. This level of safety therefore satisfies the functional requirements of the Building Regulations relating to fire safety.

1.3.2 The fire strategy described in this report can be summarised as follows:

- Means of escape will be based on a full simultaneous evacuation of the entire hotel accommodation based on a double knock system with a 6 minutes investigation time.
- The basement accommodation will be served by three protected staircases. One of the staircases is to be a firefighting shaft (i.e. Core 1), whilst the other two will also be used for means of escape (Cores 2 & 3). The firefighting lobby shall be consisting of a Mechanical Smoke Ventilation System (MSVS) in order to ventilate the lobby sufficiently.
- The building will be provided with 120 minutes fire resistance to the elements of structure.
- Each floor will be built as a compartment floor. There are no voids passing through the floors apart from the natural vents which are used for smoke clearance (as discussed in Section 6.5.6). However, these will be compartmented from other floors.
- Core 1 will be designed as fire fighting core with fire fighting staircase, fire fighting lift, ventilated fire fighting lobby and dry rising main. Core 3 will also include a dry rising main.
- A commercial mist suppression system will be provided in both the levels of the building in accordance with BS 8489-1 :2016 to a life safety standard.
- A Mechanical Smoke Ventilation System is to be used within the firefighting shaft (Core 1) with a 1.0m^2 AOV at the head of the stair. The remaining two staircases do not require smoke ventilation.
- The majority of travel distances and escape widths are code compliant as per Approved Document B. Further fire safety provisions are proposed where the design includes for non-code compliant design due to extended travel distances.
- Disabled refuge spaces will be provided within all three cores on both the floors.
- The fire alarm and detection system within various sections of the building will be:
  - Within hotel rooms - L1
  - Within hotel communal areas - L1
  - Ancillary areas - L1
  - Office Areas - L1
  - Goods in entrance/exit - L1
- Internal fire spread containment will adopt the recommendations of Approved Document B. Structural fire protection will be in accordance with Table A2 of Approved Document B.

- Cores 2 and 3 will be designed as such as a protected shaft and adopt 120 minutes fire rated construction with FD60S doors. Design will accommodate sufficient escape width for means of escape.

- As the lowest floor is located below 10m from the access level, Core 1 will be designed as a fire fighting shaft comprises of fire fighting staircase, fire fighting lift, ventilated fire fighting lobby and a falling dry main. In order to ensure that all the areas of the accommodation are accessed within permissible hose distance, an additional dry main will be provided within Core 3. A dry riser inlet connection point will be provided on the face of the building of Cores 1 and 3 within 18m from a suitable Fire Service pumping appliance parking location.

2.0 LEGISLATION

2.0.1 The main fire legislation applicable to this building includes The Building Regulations and The Regulatory Reform (Fire Safety) Order 2005.

2.0.2 This document forms an approach for fire matters, the design team must ensure the contents of this report are incorporated in the building. This Fire Strategy will not prevent a fire occurring and good housekeeping will be encouraged to reduce the risk. This strategy is mainly concerned with getting occupants out of the building safely and providing measures, where necessary, to assist the fire fighters in their operations.

2.0.3 The Fire Strategy is only valid where the systems are designed correctly and maintained in an operating condition. If there is a failure in the management approach and a fire occurs, this Fire Strategy will not reduce the impact on contents and building damage. Until this report is agreed with the Approving Authorities, the content should only be used 'As Preliminary Information'.

2.0.4 Following occupation, the developer / management of the premises are required under current legislation to carry out a fire risk assessment. This document will be developed following completion of the fit out works and will form part of the fire manuals developed for the premises (BS9999 provides appropriate guidance in this area).

2.1 BUILDING REGULATIONS

2.1.1 The construction or modification of any building in England needs to comply with the statutory requirements of the Building Regulations. These regulations deal with the minimum standards of design and building work for the construction of domestic, commercial and industrial buildings. The Building Regulations contain a list of requirements, referred to as Schedules, which are designed to ensure the health and safety of people in and around buildings. There are 15 Parts, which cover subjects such as structure, fire safety, ventilation, drainage, etc.

2.1.2 In the case of fire, the regulations are dealt with under the functional requirements B1 to B5 of Schedule 1 of the Building Regulations. There are a number of prescriptive documents, which can be adopted to show compliance with the Schedules. These include Approved Document B and the British Standard BS9999, which is considered as adequate to provide general guidance for the more common buildings. An alternative approach is to adopt Fire Safety Engineering, which integrates fire engineering calculations, life safety systems, building inherent features and professional judgement, to produce a fire strategy that achieves appropriate levels of safety to a specific building and use.

2.1.3 Responsibility for deciding if the requirements of the Regulations have been met rests with the Building Control body (a Local Authority Building Control Officer or an Approved Inspector).

2.2 REGULATORY REFORM (FIRE SAFETY) ORDER 2005

2.2.1 The Fire Safety Order is the primary piece of legislation relating to fire safety in existing, common parts of the residential premises, and is usually enforced by the local fire authority.

2.2.2 The duty of ensuring that the requirements of the Order are met rests with the Responsible Person, who must undertake a risk assessment for the purpose of identifying the fire precautions he needs to take.

2.3 CONSTRUCTION, DESIGN AND MANAGEMENT REGULATIONS 2015

2.3.1 Projects undertaken in the UK are subject to the requirements of the Construction (Design and Management) Regulations 2015, or within the European Union, that particular country's interpretation of the European Union Directive.

2.3.2 This report defines the strategy for meeting the functional and performance requirements for fire safety in the finished building. It is intended to form part of the submission for approval under the Building Regulations, Part B (Fire safety). Where any conclusions or recommendations contained within this report specify particular materials, products or forms of construction these will have been assessed, in accordance with Construction, Design and Management Regulations 11 and 18 (duties for designers).

2.3.3 In the event that these involve significant residual risks or health and safety critical assumptions, this information will be made available to the Principal Designer. Where the architect or other consultants use all or part of this report to specify works, they are understood to be competent in alerting the Client, Principal Designer, Designers, Contractors and Building Occupier of issues arising under the Construction, Design and Management Regulations.

2.4 STATUTORY CONSULTATION

2.4.1 During the Building Regulations application process, the Building Control body is required to formally consult with the Local Fire Authority. The purpose of this consultation is to give to Fire Authority the opportunity to make observations with respect to the Building Regulations and to provide an opportunity to make the applicant aware of action that may have to be taken to meet the requirements of the Fire Safety Order.

2.4.2 The consultation should allow both parties to reach mutually compatible views on whether the building meets the requirements of both pieces of legislation. In the exceptional event that the Fire Authority propose to require physical changes to the building to meet the requirements of the Fire Safety Order, the Building Control body should make the applicant aware.

3.0 MEANS OF ESCAPE

3.0.1 Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B1, Means of Warning and Escape:

> *"The building shall be designed and constructed so that there are appropriate provisions for the early warning of fire, and appropriate means of escape in case of fire from the building to a place of safety outside the building capable of being safely and effectively used at all material times."*

3.0.2 The following discusses the implications of the proposed building designs and seeks to demonstrate that a satisfactory standard of fire safety is achieved.

3.1 GENERAL PRINCIPLES

3.1.1 The general philosophy for the means of escape of occupants is that there is satisfactory means of giving warning of a fire and travel distances (normally in a single direction) are limited. The principles of the escape strategy are that in the event of a fire people can turn their back on a fire and make their way to a place of intermediate safety (e.g. a protected route or stair core) without additional assistance from other occupants or fire fighters. A place of intermediate safety should always give direct access to a place of ultimate safety (e.g. ground level at the front of the building) and escaping occupants should not have to leave the place of intermediate safety to reach the place of ultimate safety.

3.1.2 The type of evacuation proposed for this element of the building can have a significant impact on the overall design and flexibility of the building. In this case, the evacuation of the hotel accommodation will follow simultaneous evacuation of the entire hotel accommodation on the operation of the fire alarm system.

3.1.3 The type of evacuation proposed for this building can have a significant impact on the overall design and flexibility of the building. At this stage it is proposed that evacuation of the entire building (i.e. hotel accommodation) will be simultaneous on operation of the fire alarm system either via a single manual call-point, the mist suppression system or two smoke/heat detectors. In the event that a single heat/smoke detector activating then initially there is a 60s acknowledgment period, if no action is taken and the 60s times out then the fire alarm enters evacuation mode. If the fire alarm is acknowledged at the main panel within the 60s period, then a 6 minutes investigation period will commence to allow the cause of the alarm to be determined and be either confirmed or cancelled. If either, the 6 minutes period elapses or no action is taken then the fire alarm will go into evacuation mode. If a manual call point, mist suppression system or second detector activates at any time then the fire alarm will immediately cancel the investigation period and go into evacuation mode invoking simultaneous evacuation of the hotel accommodation.

3.2 TRAVEL DISTANCES

3.2.1 The travel distances for the different accommodations of the buildings should be in accordance with the travel distances recommended in Approved Document B (as indicated in the table below).

Accommodation	Travel within	Maximum travel distance (m)	
		In one direction	More than one direction
Within Guestroom	Up to front entrance door	9m	18m
Corridors serving the guestrooms	Corridors serving the guestrooms	9m	35m
Office	Office	18m	45m
Plant Room	Escape within room	9m	35m
	Enclosed escape route	18m	45m
	Escape route in open air	60m	100m
Storage	Normal Hazard	25m	45m
	High Hazard	12m	25m

3.3 ESCAPE WITHIN THE BEDROOMS OF THE HOTEL ACCOMMODATION

3.3.1 The travel distances within all of the hotel rooms are within the recommended travel distances detailed in Section 3.2.1. Please see the figure 3 below for a typical compliant guestroom within the hotel accommodation.

3.3.2 The travel distance within the rooms adhere to the recommendations of 9m in a single direction of escape and therefore no further consideration is necessary.

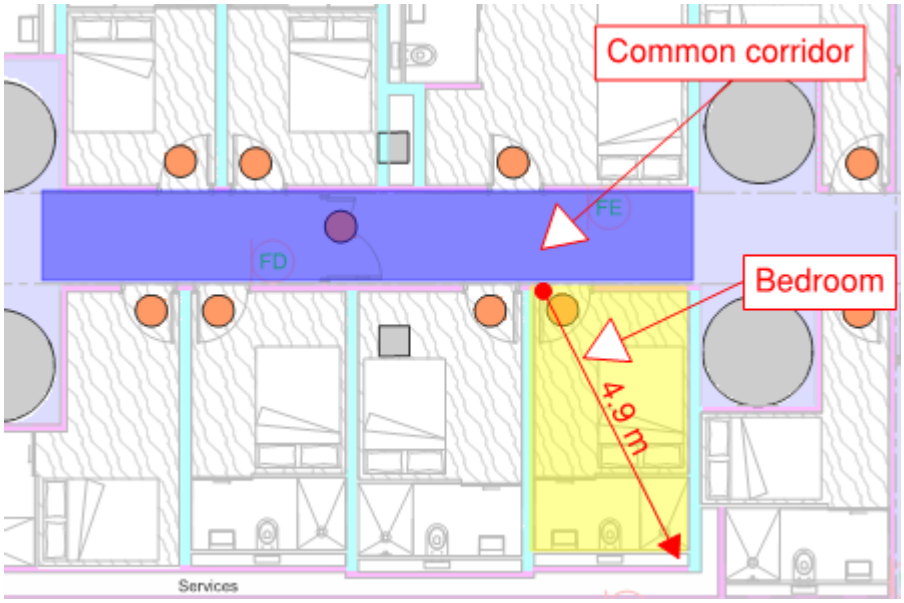


Figure 3 - Typical hotel bedroom accommodation

3.3.3 Figure 3 shows a typical hotel bedroom with compliant travel distances (<9m).

3.4 ESCAPE WITHIN THE COMMON AREAS OF THE HOTEL ACCOMMODATION

3.4.1 Access between basement levels 4 and 5 is via the Firefighting stair (Core 1), Core 2 and Core 3. The firefighting shaft is to be accessed via a firefighting lobby, whilst Core 2 and Core 3 will not have lobby protection, therefore travel distance should be measured to the fire fighting lobby door for Core 1 and to the staircase door for Cores 2 and 3.

3.4.2 Once outside the bedrooms, travel to the nearest storey exit should be limited to 9m in a single direction or 35m where escape is possible in more than one direction.

3.4.3 Any dead-end sections of corridor, longer than 4.5m, should be constructed as protected corridor with a minimum fire resistance of 30 minutes and FD30S doors. Additionally, in order to prevent a fire impeding two escape routes simultaneously cross-corridor separation should be introduced approximately midway between two escape routes. This separation should be a minimum of 30 minutes fire resistance with FD30S double swing doors. If desired it is possible that these cross-corridor doors can be held open on electro-magnetic door holders interlinked to the fire alarm in everyday use and programmed to close on the activation of the fire alarm.

3.4.4 Cross corridor doors will be provided within both floors as the corridor which connects the two stair cores is in excess of 12m. This ensures that if a fire occurred in one of the hotel accommodation rooms, smoke cannot spread throughout the whole corridor, thus at least one storey exit would be free smoke.

3.4.5 The figure below shows that the travel distances within the common corridors basement level 4 are compliant with Approved Document B as per section 3.2.1.

3.4.6 The travel distances within the majority of the common corridors are within the recommendations as shown in Figures 4 and 5 below. However, there are some dead-end corridors which include extended travel distances up to the point from where two directional escape is provided. The travel distances in a single direction of escape is extended up to a maximum of 12m on basement level 4 as shown in Figure 4 below.

Figure 4 – Means of escape within the hotel accommodation on Basement level 4.

Figure 5 –Means of escape within the hotel accomodation on Basement level 5

3.4.7 The travel distance is extended up to 12m in a single direction of escape within the dead-end corridor. This represents an extension of 3m over the recommended travel distance. The maximum travel distances within the bedrooms is 4.9m, which is 4.1m less than the allowable travel distances. Therefore, the total travel distance from the furthest point of the room to the nearest storey exit would still be less than the total allowable travel distance of 18m (i.e. 9m in the room and 9m in the corridor).

3.4.8 Further to the above, the hotel accommodation will include an enhanced fire alarm and detection system (i.e. an L1 type). This will provide early warning to the occupants resulting in early movement of the occupants. Bearing in mind that the additional travel distance (i.e. extended up to a maximum of 12m) results in only a maximum of up to 3 seconds extension (based upon a conservative 1.0m/s travel speed), it is clear that the increased detection coverage and reduced detection times compensate for the slight extension in the travel distance. As well as this, the development will include a mist suppression system within the development, therefore, should a fire start, occupants will have an even greater chance of escaping due to the restricted fire load. Based on these, the proposed travel distances within the common corridors serving the hotel bedrooms are considered reasonable.

3.4.9 As simultaneous evacuation is proposed for the hotel accommodation, smoke venting is not required within the corridors. However, Core 1 will be designed as a fire fighting shaft and therefore the fire fighting lobby will need to include smoke venting to assist fire fighting operations. It is proposed to incorporate a Mechanical Smoke Ventilation System (MSVS) to ventilate the firefighting lobby as shown in Figure 6 below. The location of the MSVS is to be confirmed by the Smoke Venting contractor.

3.4.10 The Mechanical Smoke Ventilation system will be adopted within the development and have a free area of at least 0.5m^2 (where specified) Further details of the mechanical system will be provided by the smoke venting contractor.

3.4.11 Further to the above, a 1.0m^2 Automatic Opening Vent will be provided at the head of the fire fighting staircase (Core 1). The AOV at the head of the staircase will open upon smoke detection within the fire fighting lobby.

3.4.12 Generally, the stair door should swing into the corridor in order to provide make-up air i.e. to open the doors towards the airflow. However, as this is impractical, it is proposed to provide pressure switches onto the staircase doors for this project. Upon exceeding a certain pressure in the corridor, the pressure sensor will turn off / ramp down the smoke extract fans allowing the corridor to return to equal pressure to the stair. Further details and requirements on the pressure switches to be provided by the chosen smoke ventilation contractor.

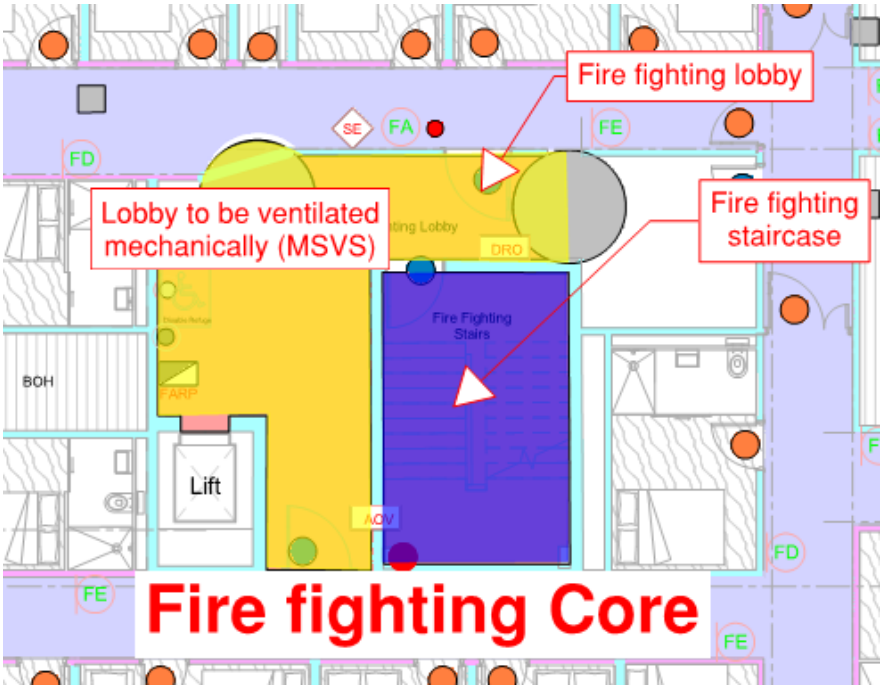


Figure 6 – Firefighting core with Mechanical Ventilation

3.4.13 CFD analysis will need to be carried out by the chosen smoke ventilation contractor to demonstrate system performance of the MSVS shafts throughout the development. CFD analysis should be undertaken in accordance with BS 9999 and follow the objectives set out in Section 27.1.3 of BS 9999.

3.4.14 Due to the sleeping risk within the building, ADB recommends that the lifts should be separated from the remainder of the accommodation / corridors by a protected lobby. All lifts are accessed via a protected lobby and therefore are accepted.

3.4.15 Some of the staircases serving the hotel accommodation at levels -4 and -5 also serve the other accommodation on levels -3, -2 and -1. This is a clear deviation under the recommendation. However, this is an existing building with level -4 and -5 converted into the hotel accommodation. This report only covers the hotel accommodation and the proposals for mean of escape on levels -3, -2 and -1 are unknown. However, at the worst-case scenario all the occupants (sharing the means of escape stairs) can be evacuated simultaneously in the event of a fire in any of these accommodations.

3.4.16 Core 1 discharges at the ground floor level. There is another staircase (serving accommodation above ground floor) which discharges into the same space at the ground floor. In this case, it is proposed to separate the other staircase from Core 1 by 120 minutes fire curtain (integrity/insulation) to separate two means of escape routes from different accommodation.

3.4.17 Further to the above, the fire fighting lift is also accessed from the same lobby. BS 9999 recommends that the fire fighting lift should not be accessed directly from the fire fighting staircase. In order to achieve this fire separation, it is proposed to provide a 60 minutes fire curtain (integrity only) to separate the fire fighting staircase from the fire fighting lift.

3.5 ESCAPE WITHIN OFFICE (ANCILLARY) ROOMS

3.5.1 The maximum travel distances within offices and associated rooms should be limited to 45m to the nearest storey exit where escape is possible in two directions, and 18m where escape is possible in one direction.

3.5.2 The travel distance within the associated rooms will be limited to “direct” travel distances as the floor layouts of the spaces are unknown. These are recommended as two thirds of the maximum recommended travel distances in Section 3.2.1 (i.e. 12m where escape is in a single direction and 30m where escape is possible in more than one direction).

3.5.3 Travel distances within the associated rooms satisfy the above recommendations.

3.6 ESCAPE WITHIN THE ANCILLARY / PLANT AREAS

3.6.1 The majority of the plant and services equipment serving the building is located in the basement level -4 ramp. Due to the potential uses of these areas plant rooms are considered to be “places of special fire risk” and are therefore treated with greater caution over the general accommodation.

3.6.2 The travel distances requirements from plant rooms are broken down into two stages i.e. escape within the room itself and the overall escape route. In this case the maximum respective single and multiple direction travel distance within the plant room itself will be 9m and 35m. The maximum overall travel distances from the furthest point in the plant room to a storey or final exit are 18m in a single direction or 45m where there is more than one direction of escape.

3.6.3 The plant room on level -4 includes slightly extended travel distances i.e. 10.6m in a single direction of escape. As discussed earlier, the building will include a mist suppression system and enhanced fire alarm and detection system (i.e. L1 type). Based on this, the slight extension in travel (i.e. 1.6m over the recommended travel distances) is considered reasonable.

3.6.4 The automatic fire alarm and detection system within all ancillary areas should be designed in accordance with BS5839 Part 1 and be of at least an L1 coverage.

3.7 ESCAPE WITHIN THE GOODS ENTRANCE/EXIT

3.7.1 The ground floor includes for a Goods entrance/exit area which will be used for storage. Therefore this is not a typical loading bay. This is a storage area provided at the top of ramp serving level -5. The Goods entrance/exit is used for the storage which will be brought down to hotel accommodation via a golf cart due to the low floor to ceiling height. The travel distances within the storage area should adhere to Section 3.2.1, 25m in a single direction and 45m where there is more than one direction available. Therefore, the Goods entrance/exit area adheres to these recommendations.

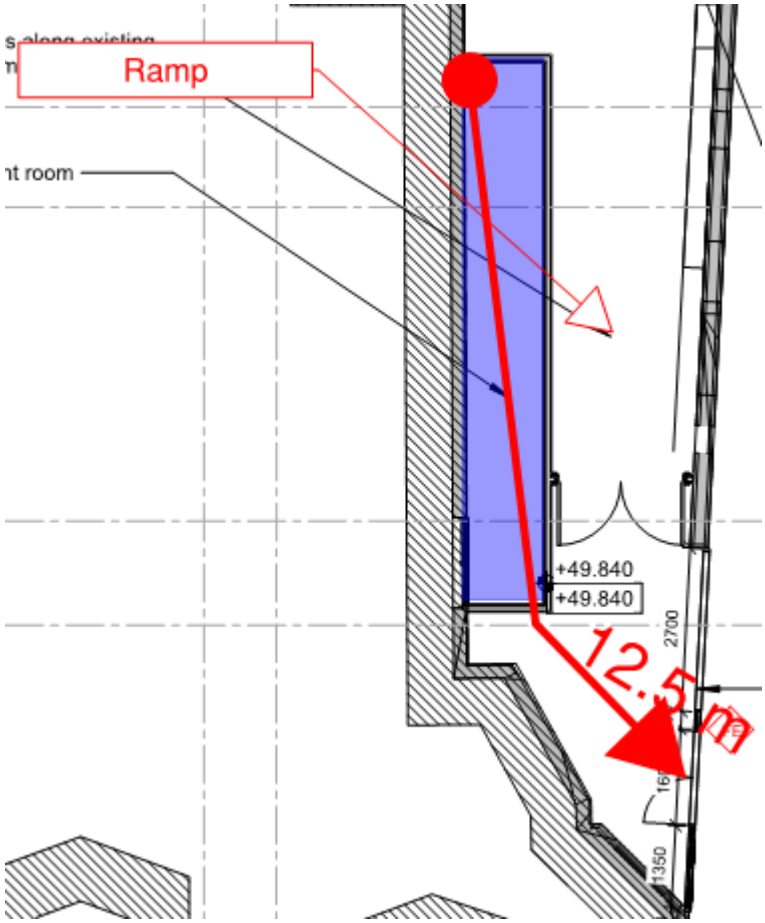


Figure 7 – Goods entrance/exit area

3.7.2 The automatic fire alarm and detection system within the Goods entrance/exit should be designed in accordance with BS5839 Part 1 and be of at least an L1 coverage.

3.8 GENERAL RECOMMENDATIONS

3.8.1 Any dead-end sections of corridor, longer than 4.5m, will be constructed as protected corridors with a minimum fire resistance of 30 minutes and FD30S self-closing doors for ADB purposed.

3.8.2 Where the room occupancy or floor occupancy is more than 60 persons, all doors from the individual rooms or floor will open in the direction of escape.

3.8.3 In order to prevent a fire impeding two escape routes simultaneously cross-corridor separation will be introduced approximately midway between the two corridor escape routes. This separation will be a minimum of 30 minutes fire resistance with FD20S double swing doors. If desired, it is possible for these cross-corridor doors to be held open on electro-magnetic door holders interlinked to the fire alarm in everyday use and be programmed to close on the activation of the fire alarm.

3.8.4 Inner rooms within the guestrooms are discussed earlier in Section 3.3. However, some of the rooms in the building form inner rooms. These inner rooms are considered acceptable providing the following conditions are adopted:

- The occupant capacity of the inner room will not exceed 60 people
- The escape route from the inner room will not pass through more than one access room
- The travel distance from any point in the inner room to the exit from the access room will not exceed 12m (when layout is unknown) or 18m (when layout is known).
- The access room will not be a place of special fire risk (e.g. Transformer Rooms, Switch Gear Rooms, Boiler Rooms or Plant Room)
- The door between the inner room and the access room will include either a vision panel with an area not less than 0.1m^2 or the access room and inner room should be fitted with smoke detection and alarms (to provide early warning in the event of a fire).

3.8.5 Any electronic doors, security doors or gates forming part of an escape route will need to be linked with the fire alarm system to disengage the door on activation of the fire alarm system or loss of power.

3.8.6 The escape doors secured by electronic locks will,

- Fail safe in open position on power failure
- Be provided with a manual release alongside the door in the form of break-glass unit (Green colour)
- Be provided with a sign indicating the operation of the manual door release in an emergency

3.9 EXIT WIDTHS

3.9.1 The staircases and exit widths for the various occupancies within the hotel accommodations should be in accordance with the table below. See Figure 8 below for details on how ADB requires door widths to be measured.

Maximum number of persons	Minimum number of escape routes / exits
60	1
600	2
More than 600	3

Maximum number of persons	Minimum width (mm)
60	750
110	850
220	1050
More than 220	5 per person

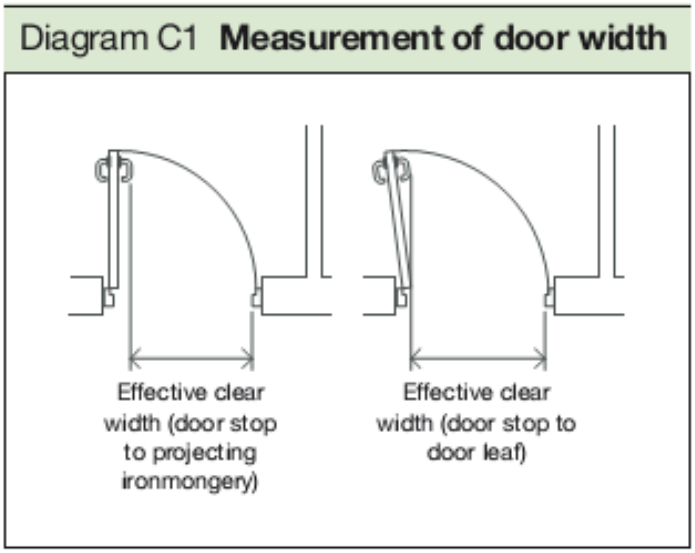


Figure 8 – Approved Document B method for measuring door width

3.9.2 As the simultaneous evacuation of the whole hotel shall be carried out, it is necessary to determine the total expected occupancy of the building.

3.9.3 When the rooms are to be designed to contain less than 60 people the door(s) into the room can open in either direction. When any room or area that require occupancy of more than 60 people will need to be provided with a secondary exit, suitably remote from the first. The exits catering for more than 60 people will need to open in the direction of escape.

3.9.4 The relevant occupancy load factors recommended in ADB have been adopted to determine the maximum occupancy within the building. In some areas, the designed occupancy has been considered provided by the architect

3.9.5 The occupancy is dependent upon the type of room. The table below distinguishes the occupancy load factor per relevant room. The tables below show the minimum required and available escape widths from individual floors.

Floor	Rooms	Number of Rooms	Occupants per room	Occupancy	Total Occupancy
Basement 5	DDA room	6	2	12	**244**
	Double bedroom	70	2	140	
	Family room	14	3-4	50	
	Single room	1	1	1	
	Twin room	19	2	38	
Basement 4	DDA room	4	2	8	**215**
	Double bedroom	59	2	118	
	Family room	13	3-4	46	
	Single room	1	1	1	
	Twin room	21	2	42	

3.9.6 Currently, the escape doors onto Cores 1, 2 and 3 are 983mm, 1050mm and 1050mm wide respectively. Cores 1 and 3 are accessed by a protected lobby. There are two 1050mm wide doors and one 983mm door provided onto the fire fighting lobby (i.e. lobby to Core 1). As basement levels -4 and -5 are expected to be occupied by maximum of 215 and 244 respectively, therefore this gives a total occupancy of 459 people. Across stair cores 1 and 3 (2 is to be discounted as it does not include for a lobby), the total occupancy of each floor is (459/2) 230. Therefore, each core should achieve a minimum of 115 people for floor. However, as the clear width of the escape door onto Core 1 is 983mm, the maximum occupancy permitted through this door is calculated to be 110 people. Therefore, the door width of 983mm is not wide enough to contain the expected occupancy of the building. However, further consideration can be given to the waiting times of occupant's egresses through Core 1. The firefighting lobby can provide occupants a safe passage to wait whilst other occupants are moving through the staircase. Therefore, the extra capacity of 5 people can be mitigated as they are able to wait in a protected area. The door widths are considered acceptable.

3.9.7 The stores and plant rooms are all less than 1800m^2 in area and therefore can remain to be served via a single escape door of 750mm escape width (subject to travel distances being adhered to) on the basis that an Occupancy Load Factor (OLF) of 30m^2/person is applied following the guidance of Approved Document B.

Staircase Width

3.9.8 As discussed earlier, some of the staircases serving the hotel accommodation at levels -4 and -5 also serve the other accommodation on levels -3, -2 and -1. This is a clear deviation under the recommendation. However, this is an existing building with level -4 and -5 converted into the hotel accommodation. This report only covers the hotel accommodation and the proposals for mean of escape on levels -3, -2 and -1 are unknown. However, at the worst-case scenario all the occupants (sharing the means of escape stairs) can be evacuated simultaneously in the event of a fire in any of these accommodation.

3.9.9 The evacuation strategy for the building is based on a simultaneous evacuation for the entire building. Therefore, the staircases should be designed with sufficient capacity to provide escape for the occupancy of the building.

3.9.10 Two basement levels (hotel accommodation) within the building are served by three staircases (i.e. Cores 1, 2 and 3). Core 1 is designed as fire fighting staircase and therefore is approached via a protected ventilated lobby. Core 3 is also accessed by a protected lobby from the hotel accommodation on levels -4 and -5. However, Cores 2 is not accessed via a protected lobby on all floors. As discussed above, Cores 1, 2 and 3 also serves other accommodation (i.e. YMCA and St. Giles). The layout of the other accommodation on levels -3, -2 and -1 are unknown and therefore it is not known if the lobby access is provided onto Cores 1, 2 and 3 from the other accommodation at these levels. However, Core 1 is designed as a fire fighting staircase and therefore must be accessed by a protected ventilated lobby.

3.9.11 Based on the above, Cores 1 and 3 will not need to be discounted in the event of a fire (as approached via a protected lobby). However, Core 2 may not have a protected lobby access and therefore, Core 2 will be discounted at the worst- case scenario.

3.9.12 The occupier of the other accommodation on levels -3, -2 and -1 have provided the maximum estimated occupancy on these levels and shown in the table below.

Floor	Occupants
Basement Level -1	250
Basement Level -2	250
Basement Level -3	700
Basement Levels -4 and -5 (Hotel Accommodation)	459
Total Occupancy	**1659**

3.9.13 The clear width of each staircases and their capacities are shown in the table below.

Staircase	Measured staircase width	Numbers of floors served (levels)	Capacity of the staircase (occupants)
Firefighting Stair (Core 1)	1500mm	5	540
Core 2	1100mm		380
Core 3	1500mm		540
Total capacity of staircases			**1460**
Total occupants served by staircases (after discounting Core 2)			**1080**

3.9.14 As discussed earlier, Core 1 is designed as firefighting staircase and therefore is approached via a protected ventilated lobby. However, Core 2 may not be accessed via a protected lobby from levels -3,-2 and -1. Core 3 is also approached via a protected lobby. Based on this, Core 2 is discounted for the purpose of the vertical means of escape. Based on this, the remaining two staircases (i.e. Cores 1 & 3) can provide escape for at least 1080 people from five basement levels.

3.9.15 It is clear that the proposed staircase widths are acceptable for the hotel accommodation (levels -4 and -5) as these two levels are expected to be occupied by a maximum of 459 people. Core 1 and Core 3 have a capacity of 540 people (each core). It is understood that Core 1 provides access to YMCA at levels -1 and -2 whilst Core 2 leads onto the escape staircase of the St Giles Hotel conference space at level -3. Moreover, please also note that St. Giles and YMCA may also have other alternative means of escape other than escape onto Cores 1, 2 and 3; which will reduce the burden onto Cores 1, 2 and 3. However, this is currently unknown. Therefore, it is proposed to ensure that adequate means of escape provisions along with escape/staircase widths are provided from these areas in order to provide adequate means of escape from St. Giles and YMCA.

3.9.16 This information must be passed onto other occupancies who are sharing the staircases. They will need to produce their own risk assessment and management plan based on their occupancy levels and available means of escape widths. The management strategy of respective occupancies should also identify if simultaneous evacuation is appropriate from all the accommodation or a staged evacuation is required.

3.9.17 The general requirements for escape stairs are as follow:

- Stairs should be at least as wide as the exits (clear width of escape door) opening onto them.
- The stairs should remain the width throughout the building (i.e. they should not narrow as they approach the final exit).
- The final exits route from the stair and the final exit door from the stair should be at least as wide as the stair.
- Approved Document M should be consulted as this may result in larger stairs than those required for means of escape under ADB.

3.9.18 Based on the above, the final exit doors from Core 1, 2 and 3 should be 1500mm, 1100mm and 1500mm respectively. However, as Core 1 is the fire fighting core, in accordance with BS 9999 an additional 500mm clear width should be provided at the fire service access level. Therefore, the access route for the fire service at the ground floor level (Core 1) should maintain a clear width of at least 2000mm (including doors and corridor). It is understood that this additional 500mm width is required to allow firefighters to access the fire fighting shaft should the occupants are still escaping. In this case, a dedicated fire service access route is provided to the fire fighting lift which will not be affected by the occupants escaping through the fire fighting staircase. Please see Figure 9 below.

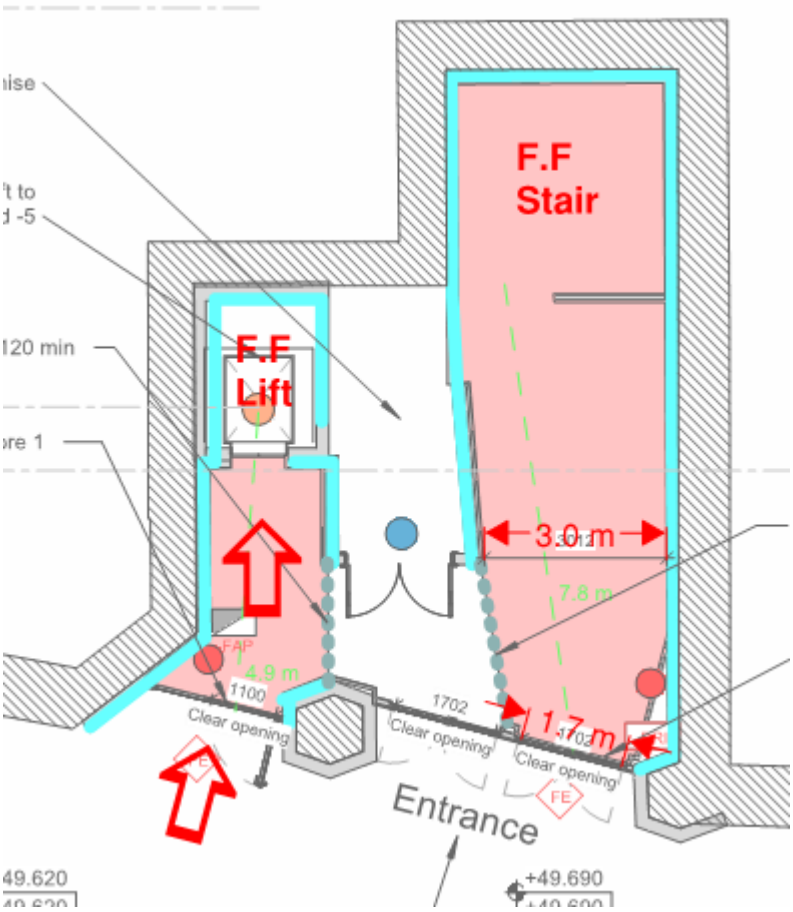


Figure 9 – Final means of escape

3.9.19 As shown in Figure 9 above, the final exit door is 1700mm wide. A dedicated fire service access route is provided to the fire fighting lift through a 1100mm wide door. The access to the fire fighting lift is not relied through the fire fighting staircase. Therefore, the firefighters can still access the fire fighting lift even if the occupants are escaping through the fire fighting staircase.

3.9.20 Based on this, though the final exit door from the staircase is not 2000mm wide, the proposal is still considered reasonable as a dedicated fire service access route is provided to the fire fighting lift.

3.10 DISABLED EVACUATION

3.10.1 The evacuation of disabled occupants plays an important role in the overall evacuation of the building. The building operates on basement levels and therefore, where escape is not direct to outside, provisions are required for disabled occupants to reach a place of refuge before being fully evacuated by staff. Escape from the basement floors are not direct to outside and therefore disable refuges will be required.

3.10.2 At present it is not intended that the lifts within the building be used as part of the means of escape for disabled occupants. The exits will be arranged so that escape is provided into a refuge.

3.10.3 Currently it is proposed that simultaneous evacuation is carried out within the development should smoke be detected in areas. Disabled occupants should be able to exit through each of the three cores.

3.10.4 Egress of disabled persons is made possible by the provision of refuges located either in the lobby approaches to stair cores or in the stair core itself. In the case of the Personal Emergency Evacuation Plan (PEEP) of individual guests, this will include measures whereby the staff undertake active measures to support the MIP and include evacuation to a place of ultimate safety.

3.10.5 The refuges should have a minimum area of 1400mm x 900mm which will be positioned so as not to hamper the main means of escape route. This should be located in a protected area of the escape route in either the stair or the stair lobby. Emergency Voice Communications should be provided in the refuge area which will be provided in line with BS5939-9:2-11 or BS9999:2017 in these locations.

3.10.6 A management strategy will need to be developed for the accommodation by the developer/ building Management and will incorporate details of how the building complies with the requirements of the Disability Discrimination Act. The management strategy should include information on staff training, how disabled occupants will be evacuated in the event of a fire and identify key roles in ensuring that they are assisted in a fire situation.

3.11 FIRE ALARM AND DETECTION SYSTEMS

3.11.1 An automatic fire alarm and detection system within the hotel will be provided with a coverage equivalent to a category L1 Standard in accordance with BS5839 Part 1. The system will comprise of a fire alarm panel, manual call points at storey and final exits, automatic detection and sounders / beacons installed strategically within the hotel.

3.11.2 Fire alarm sounders will be provided to ensure that sound pressure levels of 65dB(A) or 5dB(A) above background noise (whichever is greater) is achieved within the hotel.

3.11.3 On activation of the fire alarm system, all HVAC plant will shut down. On the detection of smoke in the fire fighting lobbies, the smoke ventilation system will also operate in the affected floor only.

3.11.4 The main fire alarm panel for the hotel accommodation should be located within the ground floor entrance (principle entrance to the building). It is envisaged that the Fire Service will initially go this point to gain further information on the incident, building and relevant access facilities. As discussed earlier, fire curtains are proposed within the hotel accommodation (Core 1). These curtains will be interlinked to the fire alarm and detection system such that the curtains descend on the operation of the fire alarm system.

3.11.5 Any electronic doors, security doors or gates forming part of an escape route should be linked with the fire alarm system to disengage the door on activation of the fire alarm system or loss of power.

3.11.6 As a mechanical smoke shaft is proposed manual controls will need to be provided from the ground floor status panel at entrance of fire fighting shaft to allow the Fire Service to control the system.

Cause and Effect of Fire Alarm and Detection System

3.11.7 Based on the above discussions the following fire alarm cause and effect principles can be summarised in the table below.

Accommodation	Type of fire alarm system	Cause	Effect
Hotel/Commercial/Ancillary accommodation/Goods entrance/exit	Independent L1 System – BS5839 Part 1	Single smoke detector activated or manual call point engaged	• Initially there is a 60s acknowledgment period, if no action is taken and the 60s times out then the fire alarm enters evacuation mode. • If the fire alarm is acknowledged at the main panel within the 60s period, then a 6 minutes investigation period will commence to allow the cause of the alarm to be determined and be either confirmed or cancelled. • If either, the 6 minutes period elapses or no action is taken then the fire alarm will go into evacuation mode. • If a manual call point, mist suppression system or a second detector activates at any time then the fire alarm will immediately cancel the investigation period and go into evacuation mode invoking simultaneous evacuation of the hotel accommodation and associated landlord areas. • All HVAC plant will shut down. • Interlink with main fire alarm panel (where provided) • Hold-open doors will be disengaged • Lifts will ground • Fire curtains to be deployed upon detection (where applicable)

3.11.8 In the event of a fire, the lift will fail to the ground floor position. If there is a fire on the ground floor, then the lift will open at a suitable alternative floor.

3.11.9 Any security doors forming part of the means of escape route should be linked with the fire alarm system to disengage the door with a manual override. Please note, any cross-corridor doors can be held open using magnetic hold-open devices, but these should be interlinked with the fire alarm to disengage upon the activation of smoke detection.

3.12 EMERGENCY LIGHTING SYSTEMS

3.12.1 To facilitate normal working where applicable, the lighting levels throughout the building will be excellent. In the event of a fire within the building, it is very unlikely that the power to the normal lighting circuit would be lost in the early stages while the occupants are escaping. This is based upon the fact that the electric supply to the light fittings would initially be away from the fire origin and therefore continue to operate.

3.12.2 Nonetheless, assuming a power failure, emergency lighting as backup lighting meeting the recommendations of BS5266 Parts 1 and 7 will be provided in the following areas:

Purpose Group or use	Areas requiring escape lighting
Hotel	All common escape routes Underground or windowless accommodation Internal corridors more than 30m long Toilets with a floor area over 8m^2

3.12.3 Luminaries will be provided appropriately spaced to provide the light levels suggested within British Standard BS5266 that is to say:

Defined escape routes	**0.5lux**
Undefined routes	**1.0lux**

3.12.4 Emergency lighting shall be provided on all escape routes. The installation shall also comply with the Codes of Practice for Emergency Lighting BS5266 Part 1.

3.12.5 Final locations and routes shall be agreed during the design development.

3.13 ESCAPE SIGNAGE

3.13.1 Escape signage will be provided above storey exits and final exit doors from the common areas within the hotel accommodation. Emergency escape signage will be required to meet the requirements of the Regulatory Reform (Fire Safety) Order.

3.13.2 Such signage will meet the recommendations of BS5499 Part 4 and will be located as follows, except for escape routes which are in ordinary use:

- All designated escape routes or escape routes across open areas will be provided with signage, especially stairs and other changes in level and direction,
- The position of all doors and other exits sited on escape routes, including storey exits and final exits will be identified by signs,
- Where an escape route from a room is not conspicuous or confusion could occur, the route will be indicated by a sign, including intermediate signs where necessary, and
- All changes of direction in corridors, stairways and open spaces forming part of an escape route will be marked with intermediate signs. Each intermediate door or junction will be similarly signed.

3.13.3 It is suggested that the final signage provision shall be agreed with the Regulatory Authorities prior to occupation of the complete building.

Other signage

3.13.4 Except for front doors to the hotel rooms, or internal fire doors within hotel rooms, fire resisting doors and fire exit doors (and escape routes in and around the development) will be provided with appropriate signage meeting the recommendations of BS5499 Part 5.

Method of closure	Signage	Sign diameter	Letter height	Location
Self-closing device		60mm	5mm	Fire doors in corridors, off staircases and refuse lobbies
Keep locked shut				On the outside door of the riser cupboards and maintenance access cupboards

3.14 MANUAL FIRE FIGHTING EQUIPMENTS / FIRE EXTINGUISHERS

3.14.1 Manual fire fighting equipment is not necessary under Building Regulations however the Regulatory Reform (Fire Safety) Order 2005 does request that first aid fire fighting facilities should be provided in places of work.

3.14.2 In this case it is proposed that manual fire fighting equipment will be provided within the hotel accommodation. The quantity, location and type of extinguishers identified and agreed with the Fire Service.

3.14.3 At this stage a general guide for the extent of fire extinguisher provisions would be typically one extinguisher per 200m² of floor area with the type appropriate for the risk (i.e. Liquid fires – Powder or CO_2, General fires - Water etc.)

4.0 FIRE SPREAD AND CONTROL

4.0.1 Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B2, Internal Fire Spread (linings):

(1) To inhibit the spread of fire within the building the internal linings shall-

(a) adequately resist the spread of flame over their surfaces; and
(b) have, if ignited, a rate of heat release which is reasonable in the circumstances.
(2) In this paragraph 'internal linings' means the materials lining any partition, wall, ceiling or other internal structure.

4.0.2 Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B4, External Fire Spread:

(1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of building.
(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

4.0.3 The following sections discuss the implications of the proposed building design and seek to demonstrate that a satisfactory standard of fire safety is achieved with respect to both requirements stated above.

4.1 LININGS

4.1.1 The wall and ceilings should meet the recommendations shown in the table below.

Location	Class of lining	
	National Class*	European Class#
Small rooms of area; 4m² in residential accommodation and 30m² in non-residential accommodation	3	D-s3, d2
Other rooms	1	C-s3, d2
Circulations spaces within dwellings	1	C-s3, d2
Other circulation spaces including the common areas in the office	0	B-s3, d2

*Note: *National Classifications are based on tests in BS 746 Part 4, 6 and 7.*
#The European Classifications are described in BS EN 13501 Part 1.

4.1.2 The Class of linings recommended in the table above can be downgraded (but not less than Class 3 or D-S3, d2) in walls of rooms providing the total area of those parts in any one room does not exceed one half of the floor area of the room and subject to a maximum of 20m^2 in residential accommodation and 60m^2 in non-residential accommodation (i.e. Office areas).

4.1.3 For the purposes of this document the internal surfaces and linings includes only the floors within stair cores, the upper surface of all other floors are not subject to these limitations. Doors, door frames, window frames and frames in which the glazing is fitted, architraves and skirting are also exempt from these limitations.

4.2 UNPROTECTED AREAS

4.2.1 Due the development consisting of only basement levels below the ground floor, an external fire spread calculation of unprotected areas are not required.

4.3 EXTERNAL WALL CONSTRUCTION

4.3.1 Similar to the section 4.2.1, external wall construction is not to be considered due to the development being situated in the basement levels. However, in order to protect the staircase and the external walkway access routes from a fire on the floor plates the wall construction within 1.8m of the staircase and walkway should be fire rated to 30 minutes. The external envelop of the building should not be a medium for fire spread.

5.0 CONSTRUCTION

5.0.1 Schedule 1 of the Building Regulations requires the following functional requirements to be met in respect of B3, Internal Fire Spread (structure):

> *(1) The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.*
>
> *(2) A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those two buildings.*
>
> *(3) To inhibit the spread of fire within the building, it shall be sub-divided with fire resisting construction to an extent appropriate to the size and intended use of the building.*
>
> *(4) The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.*

5.0.2 The following sections discuss the implications of these requirements on the proposed design of the building.

5.1 SUMMARY OF PROVISIONS

5.1.1 The summary of the provisions required for the hotel accommodation are shown in a table below:

Fire resistance	Accommodation
240 minutes	• UKPN Substation (Usually a UKPN requirement)
120 minutes	• Elements of structure for basement levels 4 and 5 • Firefighting shaft • Enclosure to Stair Cores 2 and 3 • Compartment floors • Lift shafts • Service risers • Mechanical smoke shaft within firefighting lobby. • Rooms containing life safety plants (such as mechanical smoke extract fans, generator, mist suppression tank, pump etc). • Ground floor fire curtain separation (between two different staircases)
60 minutes	• Internal walls within the fire-fighting shaft • Fire curtains to dual entry firefighting lift • Ground floor fire curtain separation (between fire fighting lift and fire fighting staircase)
30 minutes	• Wall between the hotel room and common corridor • Hotel corridors • Hotel bedrooms • Plant rooms • Store rooms • Refuse room • Any other rooms for storage
Fire doors	
FD120S	• Smoke Shaft Doors/Dampers
FD60S	• Fire Fighting Shaft • Stair doors • Protected stair lobbies • Rooms containing life safety plants • Doors onto the compartment lines
FD30	• Firefighting Lift door • Plant room • Store rooms

FD30S	• Hotel bedrooms entrance doors • Cross-corridor doors

5.2 ELEMENT OF STRUCTURE

5.2.1 Where one element of structure supports or gives stability to another, the supporting element should have no less fire resistance than the other element. The measures also provide for elements of structure that are common to more than one building or compartment to be constructed to the relevant provisions. Any elements of structure which only support themselves or a roof do not require any specific fire resistance.

5.2.2 Due to the height of the building and upper floors, the element of structure for basement level floors 4 and 5 will need to achieve 120 minutes fire resistance.

5.2.3 Compartment floors will be provided throughout the development achieving at least 120 minutes fire resistance.

5.2.4 Including but not limited to, structural frame, load bearing walls, and protected shafts. Any space that connects compartments such as stairs and service shafts should be considered a protected shaft and should be protected accordingly. Openings within a protected shaft (doors, etc.) will be fire resistant to half the recommended rating of the shaft in which they are located.

5.3 COMPARTMENTATION

5.3.1 The following discusses the specific compartmentation principles to each design element of the project.

Hotel accommodation

5.3.2 The compartmentation within the hotel section will follow the recommendations in table below:

Part of Hotel accommodation	Required minimum Fire resistance	Fire doors
Common corridors	30 minutes	FD30S (cross-corridor door self-closing)
Service risers, lift shafts	120 minutes	Half the fire rating of the wall on which a fire door is provided
Smoke shafts	120 minutes	120 minutes

5.3.3 Following the guidance given in ADB the maximum compartment area on each floor should be limited to 2000m² where the building is not sprinklered, with the maximum compartment area on each floor increasing to 4000m² where sprinklers are installed. The building is proposed to be provided with a mist suppression system (equivalent to a standard sprinkler system) with no floor over 4000m² in area and therefore considered acceptable.

5.3.4 As hotel accommodation the building includes sleeping risks therefore each floor should be constructed as a compartment floor with a fire resistance of at least 120 minutes.

5.3.5 As the hotel accommodation is to include a mist suppression system, all bedrooms accessed from the common corridor will be separated from the common corridor and each other by a minimum of a 30 minutes fire resistance with FD30S self-closing doors.

5.3.6 As the lowest floor is located below 10m from the access level, a fire fighting shaft is required for the hotel accommodation. The fire fighting shaft will include a fire fighting staircase and fire fighting lobby. Both the fire fighting staircase and lobby will be separated from the adjacent accommodation by a minimum of 120 minutes fire resistance with FD60S doors. The internal construction separating the staircase from the lobby can afford 60 minutes fire resistance with FD30S doors. Due to the sleeping risk within the building, ADB recommends that the lifts should be separated from the remainder of the accommodation / corridors by a protected lobby. All lifts are accessed via a protected lobby.

5.3.7 Core 1 discharges at the ground floor level. There is another staircase (serving accommodation above ground floor) which discharges into the same space at the ground floor. In this case, it is proposed to separate the other staircase from Core 1 by 120 minutes fire curtain (integrity/insulation) to separate two means of escape routes from different accommodation.

5.3.8 Further to the above, the fire fighting lift is also accessed from the same lobby. BS 9999 recommends that the fire fighting lift should not be accessed directly from the fire fighting staircase. In order to achieve this fire separation, it is proposed to provide a 60 minutes fire curtain (integrity only) to separate the fire fighting staircase from the fire fighting lift.

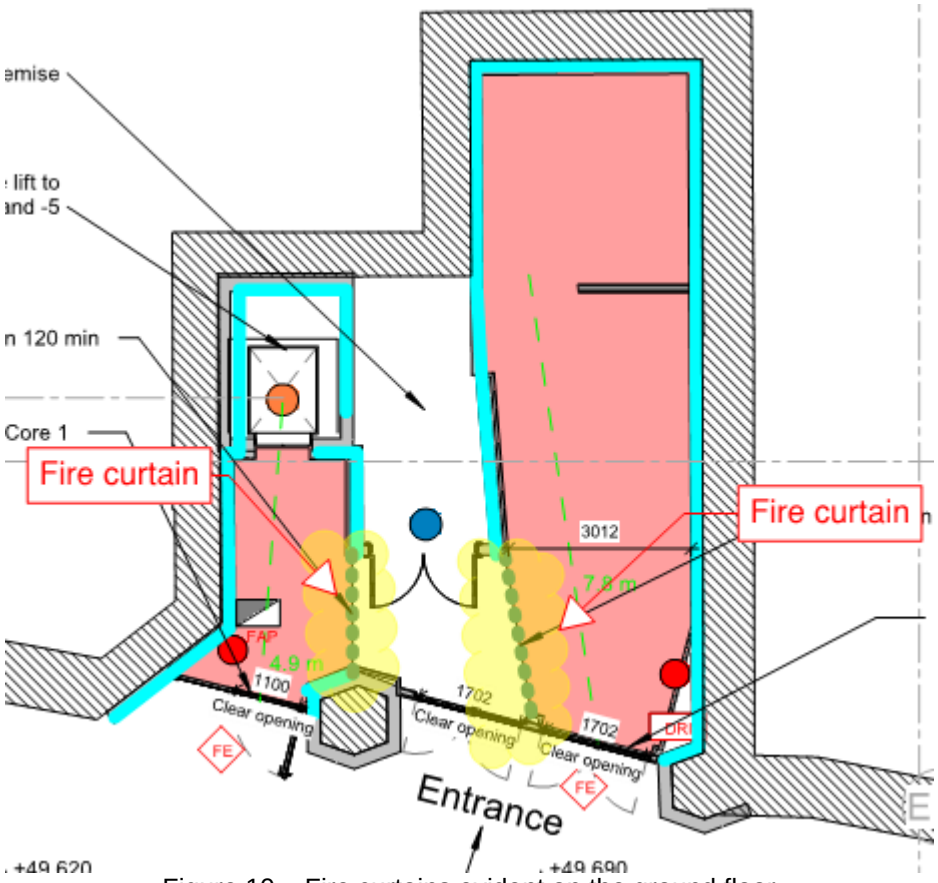


Figure 10 – Fire curtains evident on the ground floor

5.3.9 The fire curtain will be interlinked with the fire alarm detection system and should be designed in accordance with BS8524.

5.3.10 The mechanical smoke shafts provided within the fire fighting shafts will be constructed with a minimum fire resistance of 120 minutes and FD120S doors.

5.3.11 At ground floor level the staircases will need to discharge along a protected and sterile route to outside. It is advised that cupboards and stores are not accessed directly from the entrance lobby. No combustible furniture be stored within the final discharge route from all staircases.

5.3.12 Access to the fire fighting shaft will need to be via a protected route achieving at least 120 minutes fire resisting construction. Any access to the fire service access corridor should be by way of protected lobbies.

5.3.13 The fire fighting lift is not used as a goods lift. The fire fighting lift at level -4 is dual entry lift i.e. the lift is accessed from the fire fighting lobby as well as the hotel lobby. In this case, a 60 minutes fire rated curtain is proposed to separate the fire fighting lift from the hotel lobby upon smoke detection within the hotel lobby. This will eliminate the risk associated with a dual entry lift.

5.3.14 Service risers will be fire stopped either horizontally on a floor by floor basis or vertical as a protected shaft. The risers will need to adopt the same fire rating to the elements of structure (i.e. 120 minutes with FD60S doors) when no fire stopping provided at every floor. When fire stopping is introduced at every floor level (120 minutes fire resistance), the riser can adopt 30 minutes fire resistance with FD30S doors.

Ancillary accommodation

5.3.15 Plant rooms, refuse rooms, cycle stores and other ancillary units will be separated from the adjacent accommodations by at least 30 minutes of fire resisting construction with FD30 doors. Any ventilation ducts serving these areas will be protected to a similar standard of fire resistance to the outside.

5.3.16 Any rooms containing the components of the life safety systems (such as a mist suppression room, extract fans, primary and secondary LV switch rooms, room containing generator/UPS etc.) should be enclosed in 120 minutes fire rated construction with FD60S doors.

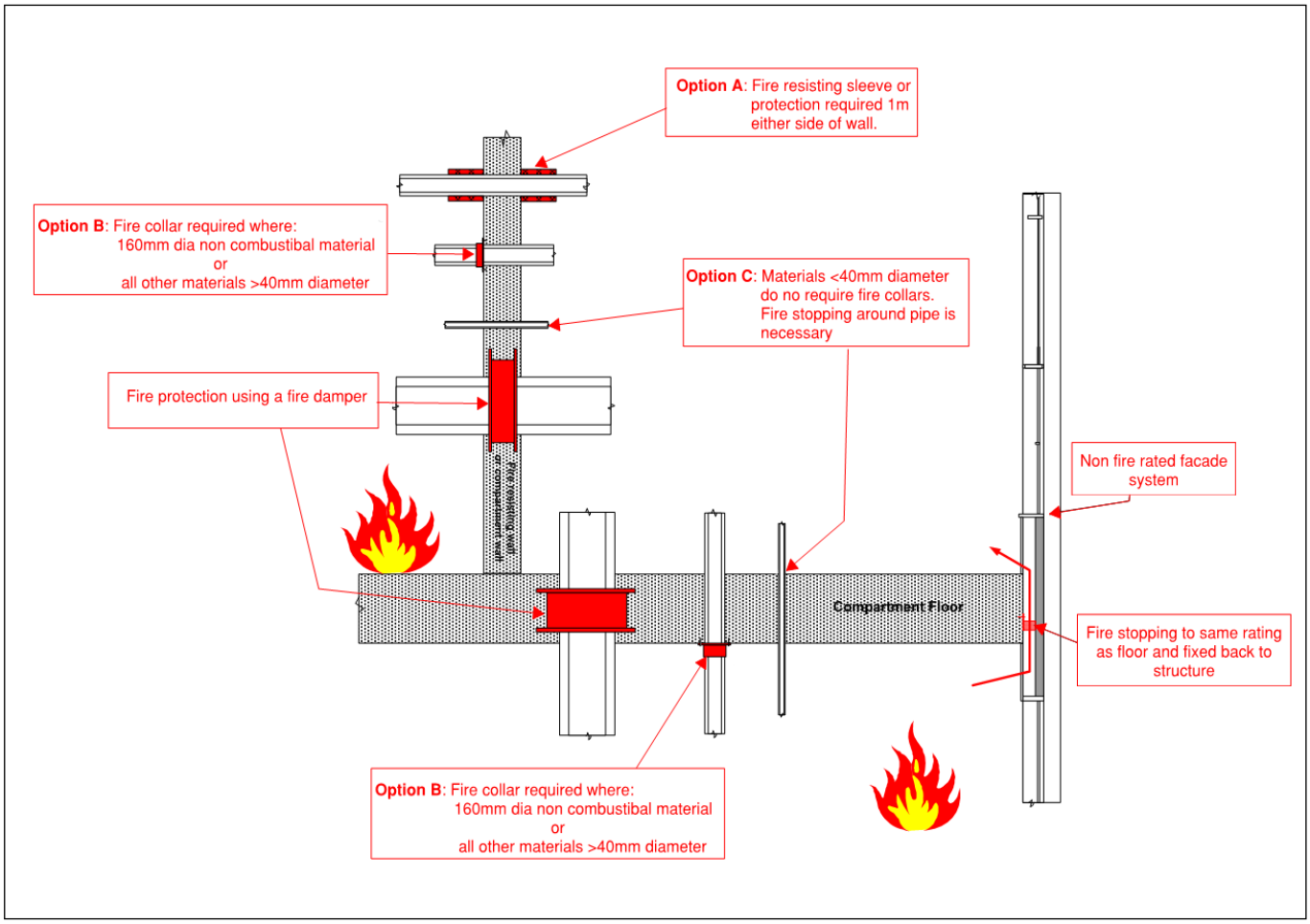
General recommendations

5.3.17 Openings in compartment walls will be limited to the passage of service ducts and access doors fitted with smoke seals. Where service ducts pass through compartment walls these will be provided with a fire barrier. All openings will be provided with a similar period of fire resistance to the wall they are provided within and the fire doors are to be locked closed.

5.3.18 Service risers will be fire stopped either horizontally on a floor by floor basis or vertical as a protected shaft. The risers will need to adopt the same fire rating as the element of structure (e.g. 120 minutes with FD60S doors).

5.4 FIRE STOPPING

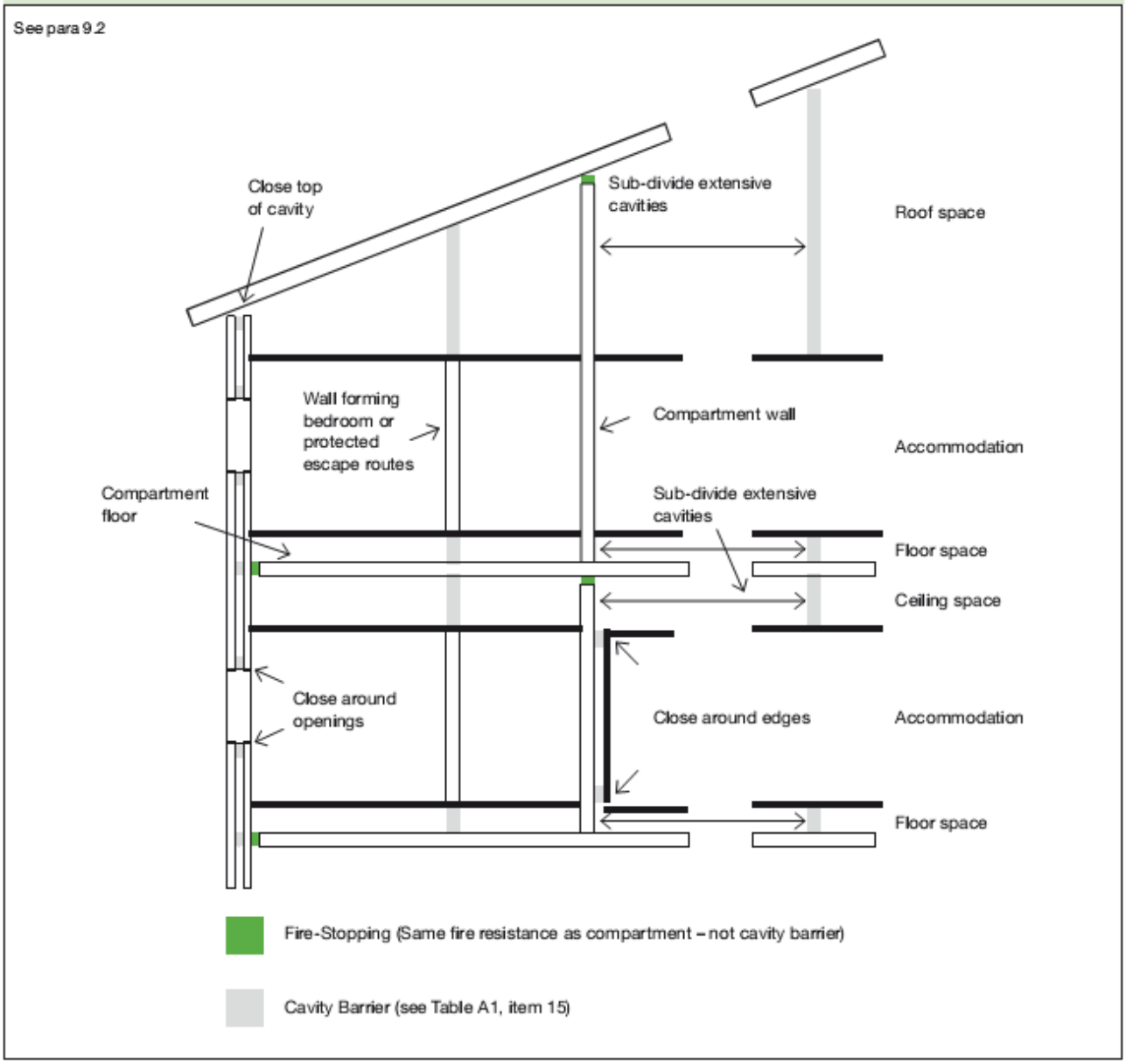
5.4.1 Any openings for services (exceeding a dimension set out in table 14 of Approved Document B shown below) breaching compartment walls will be fire stopped (unless protected throughout their entire length with fire resisting material) in accordance with Section 10 of Approved Document B.



5.4.2 This is to prevent the passage of fire and assist in retarding the movement of smoke. Joints between elements of structures that serve as barriers to fire will be fire-stopped to prevent the passage of fire and smoke.

Situation	Pipe material and maximum nominal internal diameter (mm)		
	(a) Non-combustible material	(b) Lead, aluminium, aluminium alloy, uPVC, fibre cement	(c) Any other material
Structure (but not a wall separating buildings) enclosing a protected shaft which is not a staircase or a lift shaft	160	110	40
Compartment wall or compartment floor between hotel rooms	160	160 (stack pipe) 110 (branch pipe)	40
Any other situation	160	40	40

Diagram 33 **Provisions for cavity barriers**



5.5 CAVITY BARRIERS

5.5.1 Cavity barriers will be included in any large cavity with the potential for extensive unseen fire spread. The key areas that require cavity barriers are as follows:

- At the junction between an external cavity wall and a compartment wall that separates buildings; and at the top of such an external cavity wall,
- At the junction between an external cavity wall and every compartment floor and compartment wall,
- At the junction between a cavity wall and every compartment floor, compartment wall, or other wall or door assembly that forms a fire resisting barrier,
- In a protected escape route, above and below any fire resisting construction that is not carried full storey height,
- Within the void behind the external face of rain screen cladding at every floor level and on the line of compartment walls abutting the external wall, and
- At the edges of cavities (including around openings).

5.5.2 In addition to the above locations cavity barrier are also normally required in cavities (including ceiling voids and under floor service voids) where the cavity exceeds 20m in any direction for a Class 0. For non-Class 0, cavity barriers are required within the cavity when the cavity exceeds 10m. However Approved Document B makes the recommendation those cavity barriers (including dampers in air conditioning ductwork) can be omitted, resulting in unlimited cavity sizes providing the criteria outlined in paragraph 9.12 of Approved Document B are adopted.

5.5.3 In the event that larger cavities are required a summary of the necessary provisions are discussed below:

Approved Document B recommendations from Paragraph 9.12
A) The room and the cavity together are compartmented from the rest of the building.
B) An automatic fire detection and alarm system meeting the relevant recommendations of BS5839 Part 1 is fitted in the building (however detectors are not required in the cavity – subject to void protection under BS5839 Part 1).
C) The cavity is used as a plenum and the recommendations about re-circulating air distribution systems in BS9999 are followed.
D) The surface of the ceiling exposed in the cavity is **Class 0** and the supports and fixings in the cavity are non-combustible construction.
E) The flame spread rating of any pipe insulation system is **Class 1.**
F) Any electrical wiring in the void is laid in metal trays, or in metal conduit.
G) Any other materials in the cavity are of limited combustibility.

5.5.4 The cavity barriers will provide a 30 minute fire rating (i.e. 30 minutes integrity and 15 minutes insulation). Any penetrations through the cavity barriers will be either;

- Fitted with a proprietary sealing system, or
- Pipes of limited diameters that are sealed with fire stopping, or sealed with sleeving of non-combustible pipe material.

5.6 FIRE SUPPRESSION SYSTEMS

5.6.1 It is understood that the existing level -4 and -5 includes fire suppression system. The hotel accommodation at levels -4 and -5 are proposed to be provided with automatic water mist suppression system. The water mist system will be designed in accordance with BS 8489-1 :2016 with coverage provided to all parts of the building to a ‘Life Safety’ standard.

5.6.2 Further details should be provided by the appointed mist suppression contractor.

6.0 FIRE SERVICE ACCESS

6.0.1 Schedule 1 of the Building Regulations requires the following functional requirement to be met in respect of B5, Access and Facilities for the Fire Service:

> *(1) The building shall be designed and constructed so as to provide reasonable facilities to assist fire fighters in the protection of life.*
>
> *(2) Reasonable provisions shall be made within the site of the building to enable fire appliances to gain access to the building.*

6.0.2 The following discusses the implications of these requirements on the proposed design with regard to access and facilities for the Fire Service within and around the building(s).

6.1 GENERAL PRINCIPLES

6.1.1 Fire Service access to buildings is required so as to provide access for fire personnel and a water supply to within a reasonable distance of the building entrance.

6.1.2 Where there are dead end road routes within the site, these will either be limited to approximately 20m or a turnaround (turning circle or hammerhead) facility provided.

6.1.3 In addition to these facilities where the top floor level exceeds 18m in height then the building will be provided with fire fighting shafts incorporating a fire fighting lift, dry riser and dual power supplies. Any fire fighting shafts will be designed following the principles of BS9999: 2017.

6.1.4 Core 1 will be designed as a firefighting shaft and be provided with a fire fighting staircase, fire fighting lift, ventilated fire fighting lobby and dry riser main.

6.2 EXTERNAL VEHICLE ACCESS

6.2.1 Fire Service vehicle access will be available to the site via the on-site road access. However, due care should be given to ensure that the vehicle access route meets the requirements for a pump appliance as shown in the table below (which is taken from London Fire Brigade – Guidance Note 29).

Appliance type	Minimum width of road between kerbs	Minimum width of gateways	Minimum turning circle between kerbs	Minimum turning circle between walls	Minimum clearance height	Minimum carrying capacity
Pump	3.7m	3.1m	16.8m	19.2m	3.7m	14.0t

6.2.2 Any access / security measures in and around the site (especially any bollards preventing vehicle access) will need to be by-passable by the Fire Service. The details of the bypass arrangements will need to be developed and agreed with the Fire Service as applicable.

6.3 INTERNAL ACCESS

6.3.1 As described in Section 6.1, internal fire fighting access to the building will be provided via a single fire fighting shaft (Core 1), which will be designed in accordance with BS9999. The fire fighting shaft will include,

- Fire fighting staircase enclosed in 120 minutes fire resisting construction,
- The fire fighting staircase will be at least 1100mm wide,
- Fire fighting lift (provided with dual power supply, water protection, etc.) enclosed in 120 minutes fire resisting construction,
- Ventilated Fire Fighting Lobby (achieved via the fan assisted smoke shaft),
- Outlet from the fire main at each storey that the fire fighting shaft serves (within the fire fighting lobby),
- Protected access (at least 120 minutes) onto fire fighting shaft at access level.
- A 1.0m² vent on the top of the staircase.

6.3.2 The floor area of the hotel accommodation is greater than 900m^2 in area. However, as discussed earlier, the building is an existing building and was served by a single firefighting staircase.

6.3.3 Moreover, the building includes a mist suppression system. A mist suppression system will prevent fire spread and contain the fire within the room of its origin, allowing safer fire service access to a fire room.

6.3.4 Further to the above, as a part of the fire strategy report, it is ensured that all parts of the accommodation are accessed within 60m from the dry riser outlet located in firefighting lobby and 45m from the dry riser outlet located in Core 3 (addressed in Section 6.4 and the hose distances are also shown in Figure 10 below).

6.4 FIRE MAINS

6.4.1 A dry riser main will be available in the firefighting shaft to ensure that all parts of the accommodation are accessed within 60m from the dry riser outlet located within the fire fighting lobby (Core 1). However, currently all parts of the accommodation cannot be accessed within 60m from the dry riser outlet located within the fire fighting lobby. Therefore, it is proposed to provide an additional dry riser within Core 3 to ensure that all parts of the accommodation are accessed within 45m from the dry riser outlet located in Core 3 and 60m from the dry riser outlet located within the fire fighting lobby.

6.4.2 Figure 11 below demonstrates that the hose distances are compliant as per Approved Document B and meets the minimum requirements of being within 60m (firefighting shaft) and 45m (core 3).

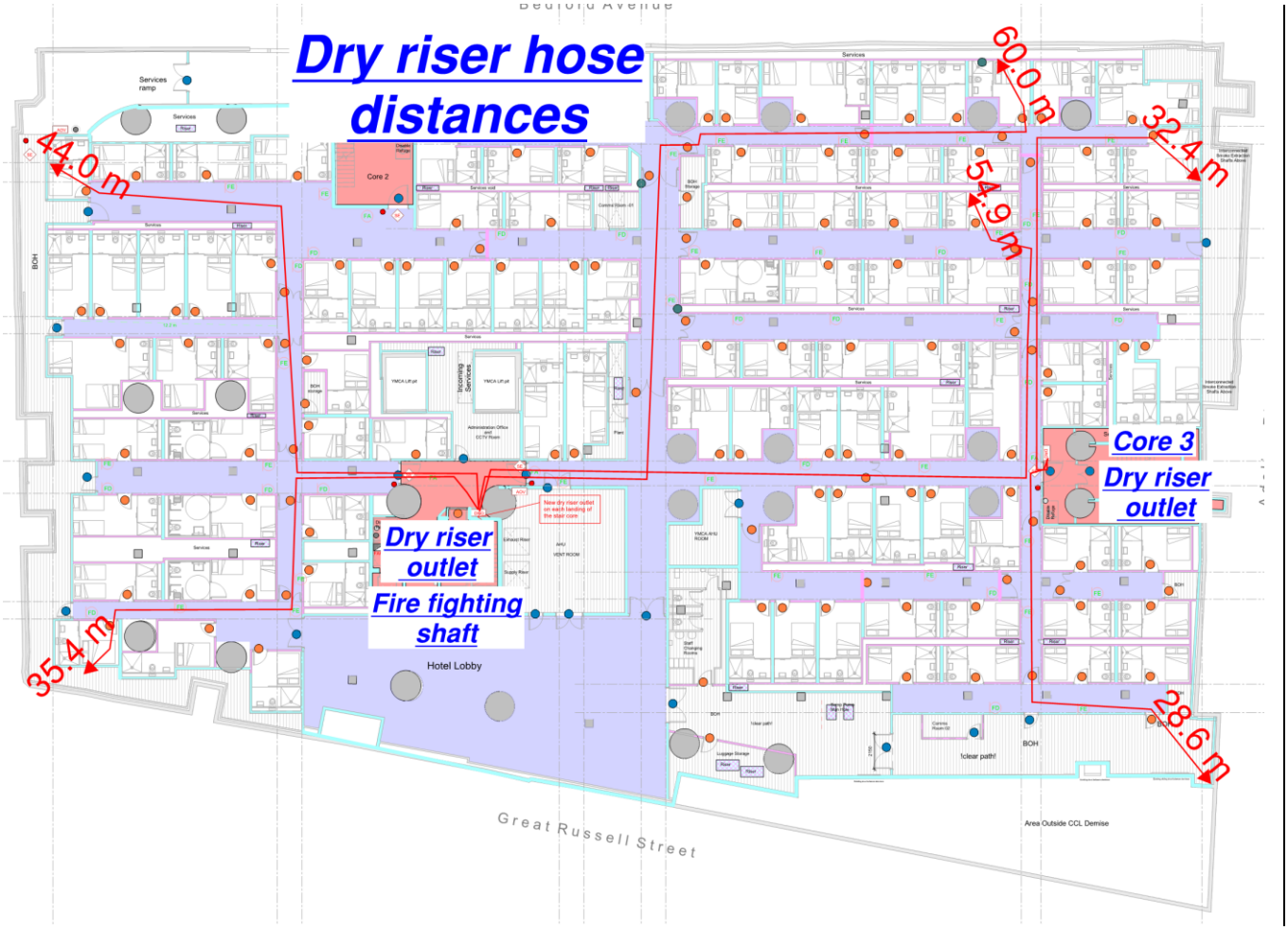


Figure 11– Dry riser hose distances

6.4.3 The riser inlet location is required to be located adjacent to the associated building entrance and be visible from the fire appliance (plus accessible within 18m from the Fire Service appliance parking location). Refer to Appendix C.

6.4.4 BS9990 includes the recommendation that connecting pipes between the inlet and the vertical run of the main should be kept to a minimum and should be given a fall towards the drain valve, and in a following note, it states that "…For typical building applications, the run of horizontal connecting pipe is a maximum of 18m in length…"

6.5 SMOKE VENTING

General Hotel Areas

6.5.1 The hotel accommodation will adopt a simultaneous evacuation philosophy on a double knock system. Therefore no smoke venting is required within the common corridors for means of escape purposes.

6.5.2 No smoke venting is required for the hotel accommodation under the Building Regulations. However, since the hotel accommodation is located at basement levels 4 and 5 a smoke clearance is needed for both basement levels.

6.5.3 Approved Document B recommends that a covered basement can be provided with ventilation to two sides equally to achieve a minimum natural vent area of 2.5% of the floor area.

6.5.4 However, the basement levels will be provided with a mechanical smoke clearance system providing 10 ACH to all corridors and the largest room in the basement. The natural replacement air will be provided from the existing shafts which contains break out panels at the ground floor level. Due to the nature of the basement it can be seen that the mechanical ventilation will aid the smoke clearance within to the basement compared to that of just solely natural ventilation.

6.5.5 The details of the mechanical smoke ventilation system along will be provided by others.

Fire Fighting Shaft

6.5.6 As discussed earlier, the fire fighting lobby will require smoke venting to assist fire fighting operations. Ideally the fire fighting shaft should be ventilated as per BS9999:2017 with traditional 1.5m² openable vents in the fire fighting lobby at each level. The fire fighting staircase should be provided by a 1.0m² openable vent at its head. Unfortunately, as the fire fighting lobbies are landlocked it is proposed to utilise a mechanical fan assisted smoke shaft to assist fire fighting.

6.5.7 In this case, mechanical smoke shafts will be provided to provide ventilation from the fire fighting lobbies.

6.5.8 As mechanical smoke ventilation is considered for the fire fighting shaft then the codes would typically recommend that the fire fighting shaft be pressurised following the principles given in BS EN 12101 Part 6 and be of Class B standard. However, as the building includes for a mist suppression system it should be possible to utilise a fire engineered approach based on providing 0.5m² mechanical smoke ventilation system (MSVS). The main purpose of the MSVS system is protect the fire fighting staircase and the fire fighting lobby from smoke ingress during fire fighting. This will be achieved by extracting the smoke out of the lobby through a smoke shaft.

6.5.9 The MSVS will have a free area of at least 0.5m² with a 0.5m² Automatically Opening Vent (AOV) into the smoke shaft from common corridor at every level. Further details of the MSVS system will be provided by the smoke venting contractor.

6.6 HYDRANTS

6.6.1 Approved Document B recommends that hydrants should be provided as necessary to ensure that rising main inlets and the building's entrances / dry riser inlet locations are accessed within 90m of a fire hydrant with hydrants no more than 90m apart.

6.6.2 It is proposed that a site survey confirms whether the above criteria is achieved based on any existing hydrant provisions. If this survey establishes that the existing hydrants are inadequate it is recommended that an additional private hydrant is included on the site.

6.7 GENERAL FIREFIGHTING PROVISIONS

6.7.1 To further support the proposals outlined within this report, it is proposed to provide Premise Information Boxes (drawing guidance from London Fire Brigade – Guidance Note 70) detailing these recommendations such that the attending fire crew are provided with suitable information for operational procedures.

6.7.2 The location of these boxes should be confirmed with the local Fire Authority, however at this stage, it is proposed to initially locate these at the entrances of Cores 1, 2 and 3. Additional copies should ideally be supplied to the local Fire Authority to enable any pre-planning for an emergency.

6.8 EMERGENCY POWER SUPPLIES

6.8.1 Each life safety system provided within the building will have an independent power supply which would operate in the event of a failure of the main supply. This will be,

- Automatic opening vents,
- Mechanical Smoke Ventilation System,
- Fire alarm system,
- Emergency lights and signs
- Fire Curtains,
- Fire fighting lift,
- Fire Suppression (Water Mist) pumps and controls

6.8.2 Secondary power supplies can be provided from another substation or an alternate power source (i.e. a battery back-up or a generator).

6.9 FIRE FIGHTING LIFTS

6.9.1 Each fire fighting lift within the fire fighting shaft will be designed and installed in accordance with BS 9999 and BS EN 81-72. The summary of the some of these measures are listed below.

- Dual Power Supply (i.e. emergency, stand-by or alternative power supply),
- Size of the lift should be at least 1100mm wide x 1400mm deep with a rated load of 630kg as described in ISO 4190-1.
- Fire lift switch at access level,
- Fire Service Communication System,
  - Built-in microphone and speaker
- Means of rescue such as: fixed ladders, portable ladders, rope ladders or safety rope ladders
- Provision to prevent water penetration into the fire fighting lift via,
  - Drainage grid to the lift entrance, or
  - A floor sloped away from the lift entrance, or
  - A raised threshold to the lift entrance (at least 25mm high).
- Water protection to the electronic equipment / control within the fire fighting lift well / car,
- Means to prevent water level in a lift pit from reaching equipment.
- Suitable means to prevent water rise above the level of fully compressed car buffer.

7.0 FIRE SAFETY MANAGEMENT

7.1 GENERAL

7.1.1 Given the use and likely occupancy of the building, management procedures will assist in the prevention and control of fires and the evacuation of occupants.

7.1.2 Good housekeeping standards will be enforced to ensure that the effectiveness of the fire safety provisions is not affected.

7.1.3 Maintenance procedures will be developed to ensure that all equipment and services within the building are able to operate effectively.

7.1.4 A full Fire Risk Assessment should be carried out by the employers within the building (coordinated by the landlord where multiple tenants are present) nearer to the development completion and be in place on occupation to meet the Regulatory Reform Order (RRO). The assessment should be maintained and act as a record of the provision and measures, passive and active, used to minimise fire risk within and around the building**.**

7.2 KEY MANAGEMENT ISSUES

7.2.1 This section describes each of the key management areas that will need to be implemented and maintained during the lifetime of the building:

- All necessary fire safety systems must be regularly maintained and tested.
- The Building Management will regularly monitor and control the specification and use of combustibles within the escape routes and circulation areas. These areas will generally be maintained free of all combustibles and the escape routes will be unobstructed at all times.
- A full Fire Risk Assessment will be developed for the building.
- All building staff and tenants will receive regular training including roles and responsibilities for key members of staff.

Control of evacuation and fire safety planning / implementation

7.2.2 A detailed fire safety plan will be drawn up by the Building Management, which will provide clear simple advice for the occupants in the event of an emergency.

7.2.3 The fire safety plan will be prepared, maintained and implemented by the fire personnel responsible for the various accommodations of the development and will include:

- The procedures to be adopted in the event of a fire signal being given,
- Procedures for evacuation of occupants,
- Procedures for equipment maintenance,
- Frequency and nature of fire drills,
- Staff training, and
- Procedures for recording and monitoring equipment maintenance and any fire incidents.

7.2.4 Expanding on the information given above the fire strategy includes a number of risk critical areas resulting in the need to formalise the fire safety management in the building. In order to develop and maintain the safety of the building, the building management should formulate a policy statement appropriate to the building configuration, location, occupation, and if relevant, to the building users. The policy statement should include.

a. General safety issues related to the use of the building,
b. Possible fire scenarios, and
c. Aims and objectives of the proposed management system and its methodology.

7.2.5 This policy should be endorsed by the highest level of management (by the client / management company).

7.3 REGULATION 38

7.3.1 To satisfy Regulation 38 of the Building Regulations it is proposed that a full package of building design information is passed to the end user for the hotel accommodation. As a fire engineered building it is proposed that the following information is provided to the end users:

- This fire strategy report,
- Any management information proposed in addition to that contained in this strategy,
- Details of all passive fire safety measures (including compartmentation, cavity barriers, fire doors, self-closers, and duct dampers),
- Details of the fire alarm and detection systems, emergency lighting, emergency signage, access controls, door hold open devices,
- Details of all active fire safety measures including control equipment, smoke control systems design, mode of operation and control systems,
- Details of the dry risers, fire hydrants,
- Any high risk rooms and equipment present,
- As built plans for the building,
- O&M Manuals for the building systems, including commissioning information and certification, and

7.3.2 This information will be transferred as a package of information by the main contractor at handover of the building.

8.0 CONCLUSIONS & RECOMMENDATIONS

8.1 This report outlines the fire safety strategy proposals for the basement levels 4 and 5 on the project known as 112A Great Russell located in London and seeks to demonstrate compliance with the Building Regulations (generally in the form of the recommendations of Approved Document B).

8.2 The design of the hotel accommodation, such as travel distances etc, generally complies with the recommendation of Approved Document B (ADB). However, the design includes slightly extended travel distances which have been justified via an enhanced fire alarm and detection system (i.e. L1 type). The building will also include coverage of a mist suppression system in accordance with BS 8489-1 :2016.

8.3 As a simultaneous evacuation approach is to be adopted, the fire alarm and detection system throughout the entire development will be to an L1 standard in accordance with BS5839: The means of escape from a fire affected hotel guestroom will adopt a simultaneous evacuation approach based on a double knock system with a 6 minute investigation time. After 6 minutes has elapsed, Alarm signals through hotel accommodation invoking full evacuation of hotel.

8.4 Occupancy load factors are compliant as per Approved Document B as all three staircases offer a satisfactory width to provide adequate means of escape for occupants from the hotel accommodation.

8.5 Both the basement level will include natural ventilation (i.e. 2.5% natural vents to the total area of the basement).

8.6 Disabled refuge spaces will be provided within the building providing a place where disabled occupants can take refuge prior to being evacuated. It is proposed that these are provided with communication to management for evacuation purposes. A management plan will be developed by the building management.

8.7 Core 1 will be designed as fire fighting core with fire fighting staircase, fire fighting lift, ventilated fire fighting lobby and dry rising main. Core 3 will also include a dry rising main.

8.8 A Mechanical Smoke Ventilation System is to be used within the firefighting shaft to a shaft size of 0.5m^2 with a 1.0m^2 AOV at the head of the stair. The remaining two staircases do not require smoke ventilation.

8.9 A full fire risk assessment should be carried out by the occupier of the building or nearer to the building completion and be in place upon occupation to meet the requirements of the Regulatory Reform Oder. The assessment should be maintained and act as a record of the provision and measures, passive and active, used to minimise fire risk within and around the building.

8.10 Based upon the above proposals it is considered that adequate measures are provided to meet the functional requirements of the Building Regulations.

APPENDIX A – MANAGEMENT RISKS / FIRE RISK ASSESSMENT LOG

The following log identifies the key fire strategy elements that must be highlighted to the end user / occupier of the various accommodation to assist them with managing and maintaining the fire safety strategy. These items should be incorporated into all applicable fire risk assessments and management procedures that consider fire safety within this building.

1. L1 fire alarm and detection system will be used within basement floors 4 and 5 and relevant ancillary areas. Once installed and commissioned, these systems should be regularly tested and maintained in accordance with their individual fire alarm and detection contractors' requirements.

2. The mechanical ventilation should be regularly tested and maintained in accordance with the smoke venting contractor's requirements.

3. Mechanical smoke venting is proposed within the firefighting staircase. This venting is reliant on the provision of inlet air from the Automatic Opening Vent at the head of the staircase. The staircase door and any cross-corridor doors (if provided) open due to the negative pressure generated by the fans provided at the top of the smoke shaft. Any security measures that would prevent the inlet of air (i.e. locks to the doors) should disengage upon detection of smoke within the common corridor.

4. Ongoing management control will be needed to ensure that all common areas and escape routes remain sterile.

5. On-site building management should ensure the entrance lobby remains free of fire risk to maintain an acceptable level of sterility.

6. The dry rising fire mains should be tested and maintained by the building management.

7. It is a requirement under the RRO for the building owners / occupiers to carry out a Fire Risk Assessment (FRA) for the building / accommodation and additionally develop / implement management procedures to assist with the safe operation and evacuation of the building / area (including the evacuation of any disabled occupants).

APPENDIX B – SCHEDULE OF DRAWINGS USED FOR ISSUE 07

- GRS-9101 - Fire Strategy Plan Level B5
- GRS-9102 - Fire Strategy Plan Level B4
- GRS-9103 - Fire Strategy Plan Level Ground Floor
- GRS-9104 - Fire Strategy Plan Ramp to Level B5
- GRS-9105 - Fire Strategy Plan Ramp to Level B4

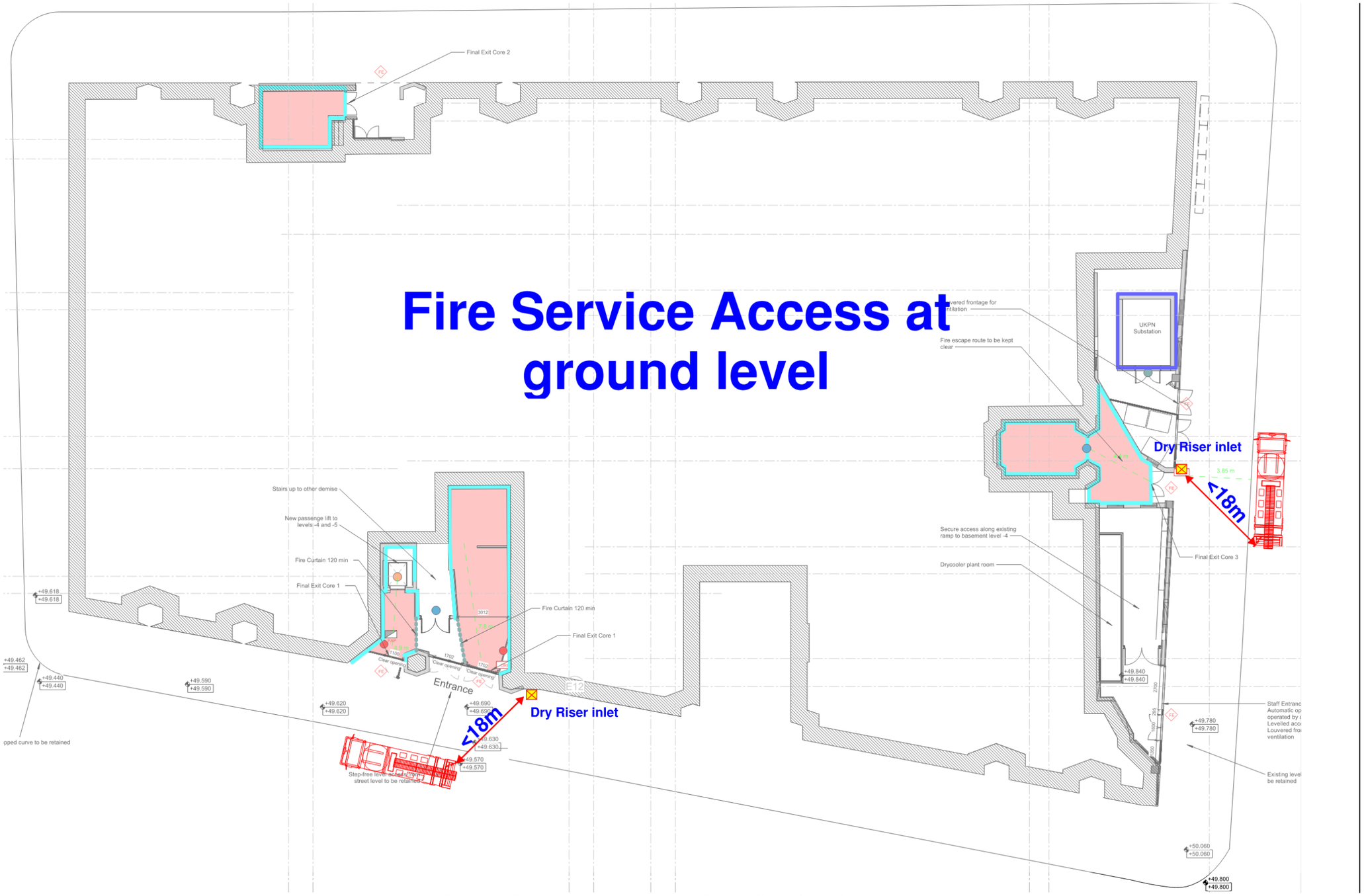


Figure 12 - Fire service access for the firefighting (Core 1) and Core 3