

BB7

Canada Street, London – Block D Detailed Fire Strategy

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Quality Assurance

Revision	Date	Prepared by	Reviewed by	Authorised by	Reason
-	01/06/2020	Salah Benkorichi	Joshua Parker	Stuart Crick	For issue
Rev A	07/06/2020	Stuart Crick	Stuart Crick	Stuart Crick	Fire Strategy drawings updated, general updates following design team comments
Rev B	13/10/2020	Megan Atherton	Dane Owen	Dane Owen	Stage 4 Update
Rev C	15/10/2021	Joshua Parker	Tom Gibbins	John Rigby	Updated fire strategy drawings within the appendix

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This report relates only to statutory requirements for Building Regulations compliance. Additional fire safety measures may be necessary for insurance and other purposes. Where no reference is made within this report to a certain element, all detailed aspects of the design and construction will, unless explicitly stated otherwise in this report, be in accordance with the recommendations of the selected design guidance identified in the legislation section of this report and the appropriate British Standards.

The validity of this report is dependent upon the recommendations being implemented in full and as described.

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This report relates to a project that is subject to review from Approval Authorities. It should be ensured that the contents of the report are agreed with all the relevant approval bodies prior to implementation.

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1 Introduction

1.1.1 BB7 have been commissioned by Stephen Marshall Architects to develop this report, detailing the proposed fire engineering principles adopted for the student residential accommodation development of Canada Street, London. This is to satisfy the functional requirements of Part B of the Building Regulations based on fire engineering design principles.

1.2 Legislation

1.2.1 Under the Building Regulations a building owner is required to provide an adequate level of life safety to the building by providing suitable means of escape, means of warning occupants of a fire, limiting internal fire spread, protecting the adjacent property from fire, and facilitating Fire Service operations. This can be achieved by the adoption of standard guidance, such as documented within Approved Document B (ADB) 2019 Edition. However, ADB further recognises that alternative solutions may provide a more appropriate design. The use of an alternative approach is detailed in ADB, Use of Guidance, Page 3.

“The fire safety requirements of the Building Regulations will probably be satisfied by following the relevant guidance in this approved document. However, approved documents provide guidance for some common building situations and there may be alternative methods of complying with the Building Regulation’ requirements. If alternative methods are adopted, the overall level of safety should not be lower than the approved document provides. It is the responsibility of those undertaking the work to demonstrate compliance.”

1.2.2 As an alternative to ADB, BS 9991 – *Fire Safety in the design, management and use of residential buildings* will be considered within the design. BS 9991 superseded BS 5588-1 in December 2011 and has been used for the residential areas. Ancillary and non-residential areas where which will evacuate simultaneously will consider the guidance of ADB.

1.2.3 This report provides the minimum level of protection required regarding compliance for Part B of the Building Regulations. If additional items are required due to property protection, this will need to be advised as soon as possible as changes may be required to be made to the fire strategy.

1.2.4 Where no reference is made within this report with regards to a certain element, all aspects of the building are to be in full accordance with the recommendations of BS 9991 and/or the appropriate British Standard. A fire engineering approach will be used where the design deviates from BS 9991.

1.2.5 The validity of this report is dependent upon the recommendations being implemented in full and as described. Any subsequent changes to the design by any party which is not agreed with BB7 will invalidate this report.

1.2.6 This report has not yet been approved and should not be relied upon for design until it has been agreed with the relevant approval bodies, be this Building Control and/or the Fire Service.

1.2.7 Measures detailed in this strategy will need to be considered by the Responsible Person in developing the Fire Management Plan and Risk Assessment for the site to discharge the operator’s responsibility under The Regulatory Reform (Fire Safety) Order 2005 (RRFSO).

1.3 Important Information

1.3.1 This report addresses life safety issues but has not considered any requirements associated with property protection additional to those which are inherent within the prescriptive guidance and any discussions associated with variations to the prescriptive approach. It is the responsibility of the client to inform us of any specific

regulations to insurers specifications, business continuity requirements or other additional considerations which would exceed basic life safety regulations.

1.3.2 It should be noted that all recommendations made in this report are of equal critical importance for life safety and compliance and the report should be read in its entirety. If you have any queries or don’t understand anything within this report, please contact us.

1.3.3 Any proprietary systems or product used should be confirmed by the manufacturer and installer as appropriate for the use in the application to meet the performance specification of this report.

1.3.4 Ongoing maintenance is critical to life safety systems and all systems referenced in this performance specification should be maintained in full accordance with the manufactures recommendations.

1.3.5 It is considered that the recommendations in this report will provide sufficient guidance to obtain approval from the relevant authorities and achieve a satisfactory level of safety commensurate with the risks of the occupied premises.

1.3.6 This report and images contained within are the copyright of BB7.

1.3.7 The validity of this report is dependent upon the recommendations being implemented in full and as described. Any subsequent changes to the design by any party which are not agreed with BB7 invalidate the report.

1.4 Building Description

1.4.1 The proposed development will provide mixed-use, multi-height buildings up to 8 storeys (G+7), split into blocks for designated purpose groups. Blocks D will provide private residential accommodation upon Canada Street, London.

1.4.2 The Private residential block will provide 4 duplex apartments alongside 37 traditional layout apartments, ancillary areas such as boiler and tank rooms, refuse store and private cycle store.

1.4.3 The height of the building, when measured from the lowest adjacent ground level to the uppermost occupied storey, is c.21.5m.

1.4.4 Site plan and location of Block D can be seen in Figure 1.



Figure 1: Site Plan and Block D Location

1.5 Project Information

1.5.1 Table 1 provides a summary of the information that has been considered to develop this fire strategy. Where the design of the building is referred to in this report. This draft report has been based primarily on the original planning drawings with consideration of the updated layouts which are currently being developed.

Table 1: Drawing Schedule

Architect	Description	Drawing Number	Rev	Date
Stephen Marshall	Northern Buildings Block B & D Ground Floor Plan	SM2001-30	P4	August 2020
	Northern Buildings Block B & D First Floor Plan	SM2001-31	P3	August 2020
	Northern Buildings Block B & D Second Floor Plan	SM2001-32	P3	August 2020
	Northern Buildings Block B & D Third Floor Plan	SM2001-33	P3	August 2020
	Northern Buildings Block B & D Fourth Floor Plan	SM2001-34	P3	August 2020
	Northern Buildings Block B & D Fifth Floor Plan	SM2001-35	P3	August 2020
	Northern Buildings Block B & D Sixth Floor Plan	SM2001-36	P3	August 2020
	Northern Buildings Block B & D Seventh Floor Plan	SM2001-37	P3	August 2020
	Northern Buildings Block B & D Eighth Floor Plan	SM2001-38	P3	August 2020
	Site GA Ground Floor	SM2001-06	P1	January 2020

2 Emergency Escape Strategy

2.1 Evacuation Principle

Apartments

- 2.1.1 The principle mode of evacuation for the private residential accommodation will be defend-in-place, whereby only the occupants from the apartment of fire origin will evacuate. This standard approach reflects the high degree of compartmentation present in these types of building and minimises the impact of false alarms – an important consideration in residential accommodation.
- 2.1.2 Evacuation of the remaining apartments will not take place automatically, it will be initiated via instruction to leave by the Fire Service, building management or the independent action of the occupants.
- 2.1.3 One of the recommendations published in the Grenfell Tower Inquiry: Phase 1 report, published 30th October 2019, recommends that existing high-rise residential buildings should “be equipped with facilities for use by the Fire and Rescue Services enabling them to send an evacuation signal to the whole or a selected part of the building by means of sounders or similar devices”. This can be achieved by adopting the latest guidance on evacuation alert systems which has been published and provides bespoke recommendation for blocks of flats (BS 8629: Code of practice for the design, installation, commissioning and maintenance of evacuation alert systems for use by Fire and Rescue Services in buildings containing flats).
- 2.1.4 Whilst this an evacuation alert system currently not a legislative requirement, the client may wish to consider reviewing facilities/measures for the Fire Service to manage an incident. BB7 should be advised if such a measure is required by the client so the fire strategy can be updated as required.

Ancillary Areas

- 2.1.5 Ancillary areas such as refuse, cycle store etc. will adopt a simultaneous evacuation strategy i.e. when the alarm is activated by the detection systems in these areas, it will result in the evacuation of all occupants within the affected area. The alarm system within the Ancillary areas shouldn't be linked with the residential alarm, therefore, in an event of alarm activation within residential ancillary areas it should not sound alarms in the residential area and vice versa.

2.2 Building Population

Apartments

- 2.2.1 Given that only an apartment will ever need to be evacuated at any one time, the maximum predicted number of occupants would be c.10 including considerations for guests.

Ancillary Areas

- 2.2.2 Areas such as refuse stores and cycle stores etc. are considered unoccupied/transient spaces; where occupant would only be present for a limited period. Thus, it is deemed acceptable additional occupancy is not accounted for in these areas.

2.3 Automatic Fire Detection and Alarm (AFDA)

- 2.3.1 A summary of the fire alarm and detection system requirements for the ancillary and residential areas of the building has been provided in Table 2, with the applicable design standard also provided.

Table 2: Non-Residential Fire Detection and Alarm System Coverage

Area	Minimum Coverage	British Standard	Manual Call Points	Sounders
Ancillary Areas	Category L1	BS 5839-1	Yes	Yes
Common Corridors	Category L5	BS 5839-1	No	No
Standard Apartments	Grade D1 Category LD1	BS 5839-6	No	Yes
Duplex Apartments	Grade D1 Category LD1	BS 5839-6	No	Yes

- 2.3.2 Ancillary areas are to be provided with a Category L1 alarm and detection system designed and installed in accordance with BS 5839-1. This is to ensure that all ancillary accommodation is provided with automatic detection, alerting occupants to a fire in its incipient stage when sounders are activated within the area. This system should be linked to the smoke control system at these levels.
- 2.3.3 The minimum fire detection and alarm coverage in a residential apartment is a Grade D1 Category LD2 system as recommended within BS 9991. However, it is proposed that Grade D1 Category LD1 alarm system is to be provided to all apartments, this permits a single sprinkler flow alarm per level, rather than one being required per flat.
- 2.3.4 Common corridors serving the residential accommodation are to be provided with Category L5 detection designed and installed in accordance with BS 5839-1. It is to consist of detection only with no sounders or manual call points, the purpose of this system is to actuate the smoke control systems serving the corridors only. A sounder should be provided on the external terrace to alert occupants of a fire affecting the common escape route.
- 2.3.5 The fire alarm is to interface with a number of other systems such as plant shut down and lift installations; these interfaces should be designed in accordance with BS 7273. In particular door release mechanisms and hold-open devices should be interfaced in accordance with BS 7273-4.
- 2.3.6 The position of the fire alarm panel is to be determined by the design team; however, it is recommended that it is located in such a place that it can be monitored constantly by management and is visible from the external such the Fire Service can assess the panel before entering the building. Fire alarm repeater panels should be provided at all fire service entry points (not all entry points to the building).

2.4 Horizontal Evacuation

Residential Areas

Travel Distances

- 2.4.1 Table 3 highlights the recommended travel distances in residential accommodation in accordance with BS 9991. Where these travel distances are not met, justification has been provided in this report. Any areas not mentioned are assumed to meet the distances set out below.

Table 3: Travel Distances – Residential Areas

Area	Single Direction	Alternative Escape
Apartments	20m*	N/a
Common Corridor	15m*	60m*

Note: * - Where category 2 residential sprinklers are provided in accordance with BS 9251 and LD1 detection in accordance with BS 5839-6 is provided in the apartments, the single direction travel distance within the common corridor can be increased to 15m and apartment internal travel distances can be up to 20m

Standard Apartments

Travel distances in Standard Apartments should be limited to 20m from the furthest point in the room to the apartment entrance door as Grade D1 Category LD1 detection in accordance with BS 5839-6 and sprinkler protection in accordance with BS 9251 is provided.

Duplex Apartments

2.4.2 Four duplex apartments are provided on the ground and first floor. These apartments are similar to dwelling houses in that they are accessed direct from external. In order to provide safe means of escape for the occupants either:

- Each of the habitable rooms on the upper floor should be provided with suitable egress window; or
- A protected stair should be provided which gives access to the habitable rooms on the upper floor

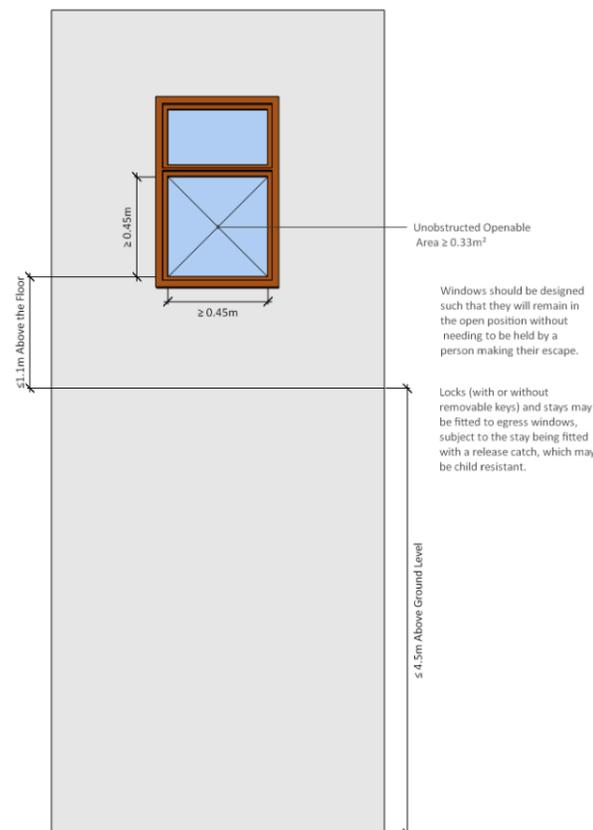


Figure 2: Egress Windows

- 2.4.3 Openings to be used as egress windows should meet the following requirements, and comply with:
- An unobstructed openable area that is a minimum of 0.33m² and at least 450mm in height and width;
 - Bottom of openable area should not be less than 1100mm above floor of the room it is in;
 - The maximum height of the upper floor FFL should be 4500mm;
 - Any doors (including a French window or patio window) should be guarded with a protective barrier in accordance with BS 6180);

2.4.4 The ground beneath the window should be clear of any obstructions (such as iron railings or horizontally hung windows) and should be of a size and material that is suitable and safe for a supporting ladder.

Ancillary Areas

2.4.5 Travel distance in a single direction in the ancillary areas should typically be limited to 18m in normal risk rooms (such as common amenity and car parks, reduced to 9m in high risk rooms (such as fuel storage spaces and transformer rooms). Each of the ancillary rooms at ground floor appears to meet these limits.

2.4.6 There is a terrace area at Seventh Floor. The travel distance within this area is within 45m as recommended by BS 9991 and leads to a place of relative safety within the common corridor.

2.4.7 Where bin store is accessed internally, it should be accessed through a protected lobby with a minimum 0.2m² of permanent natural ventilation or equivalent mechanical alternative. It should be noted if a mechanical alternative is adopted, fire rated fans ductwork and standby power will be required.

2.5 Common Residential Corridors

2.5.1 The recommendations of BS 9991 permit a single direction travel distance of up to 7.5m in an unventilated corridor on the basis that the corridor then provides access into a dedicated ventilated lobby then into a protected stair. Alternatively, BS 9991 also permits a 7.5m single direction travel distance within a ventilated corridor from an apartment entrance door to the protected stair. The travel distance in the corridor can be increased to 15m in a single direction where the apartments provided with a sprinkler suppression system in accordance with BS 9251.

2.5.1 Where the common corridors/lobbies have travel distances within the recommendation in BS 9991, the ventilation is achieved by either:

- An AOV of 1.5m² direct to the external; or
- An AOV of 1.0m² in an area which discharges into a vertical natural smoke shaft with a clear internal area of 1.5m² Natural Shaft (minimum dimension 0.85m in any direction); or
- A 0.8m² mechanical ventilation shaft with a pressure sensor in the corridor/lobby to prevent excessive depressurisation. (Smoke ventilation contractor should confirm the size of the shaft).

2.5.2 All residential corridors in each block have compliant travel distances and will be ventilation via an AOV of 1.0m² in an area which discharges into a vertical natural smoke shaft with a clear internal area of 1.5m².

2.5.3 A 1.0m² AOV should be provided at the head of stair core. The smoke ventilation arrangement has been highlighted in Figure 3

2.5.4 The residential roof terrace should be limited to 60 persons due to the single means of escape. There is limited management expected to actively control occupancy therefore it is proposed to include strategic landscaping to limit the accessible area and therefore also limit the associated occupancy.



Figure 3: Smoke Ventilation Arrangement, First to Sixth Floor



Figure 4: Smoke Ventilation Arrangement, Seventh Floor

2.6 Ventilation Provisions

Automatic Openable Vents (AOV's)

2.6.1 The method to calculate the free area of the Automatic Openable Vents is highlighted in Figure 5.

2.6.2 AOVs opening to outside air should conform to BS EN 12101-2 and should:

- Be outward opening;
- Not be top hung;

- Open to a minimum of 30°;
- Be clearly identifiable and accessible;

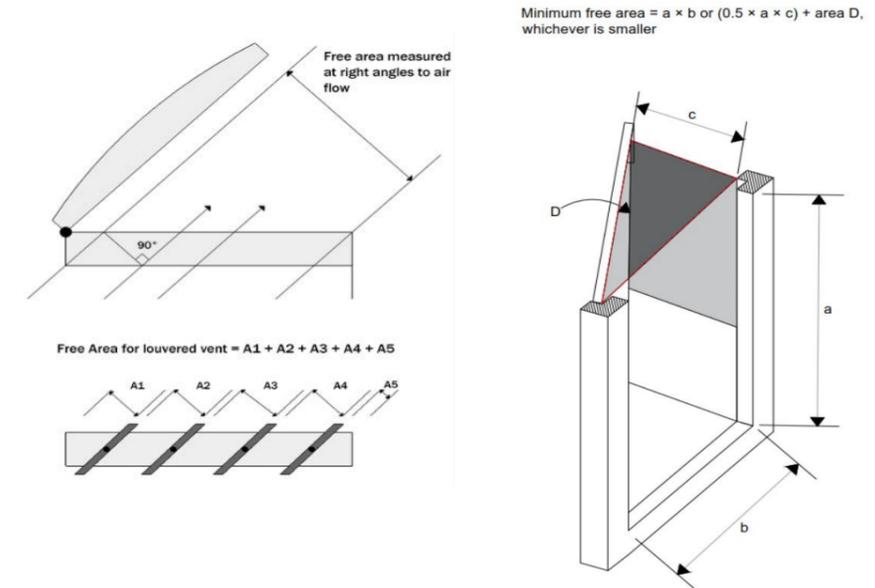


Figure 5: Free Area of Smoke Ventilation

Common Corridor/Stair Ventilation

2.6.3 The stair is required to be provided with 1.0m² AOV at the head of the stair. The method to calculate the free area of the AOV is highlighted in Figure 5.

Note: Latching's for the roof vents should not be on electromagnetic holding devices due to unpredictable performance leading to failure under fire conditions. Such failure can occur due to a loss of power to the devices, or through the magnetic fields of the devices being weakened as temperatures in and around the smoke shaft increase. These devices should be replaced with a more robust form of vent actuator.

Natural Smoke Shaft

2.6.4 Where a natural smoke shaft is adopted it will be designed to meet the following criteria:

- Minimum cross-sectional area 1.5m² (minimum dimension 0.85m in any direction), opening at roof level at least 0.5m above any surrounding structures within a horizontal distance of 2.0m.
- The shaft should extend at least 2.5m above the ceiling of the highest storey served by the shaft. If not desirable a 1.5m² rooflight can be provided in the corridor of the highest occupied floor as an inlet to the mechanical smoke shaft and therefore it will prevent a chimney. The 1.5m² AOV would be located adjacent to the staircase, near the natural smoke shaft which is to not serve the highest occupied floor
- The minimum free area of the vent from the corridor into the shaft and at the head of the shaft and all internal location within the shaft (e.g. safety grilles) should be at least 1.0m².
- The smoke shaft will be constructed from non- combustible material.
- The shaft will be no more than 4m at an inclined (maximum 30°) from the base to head.

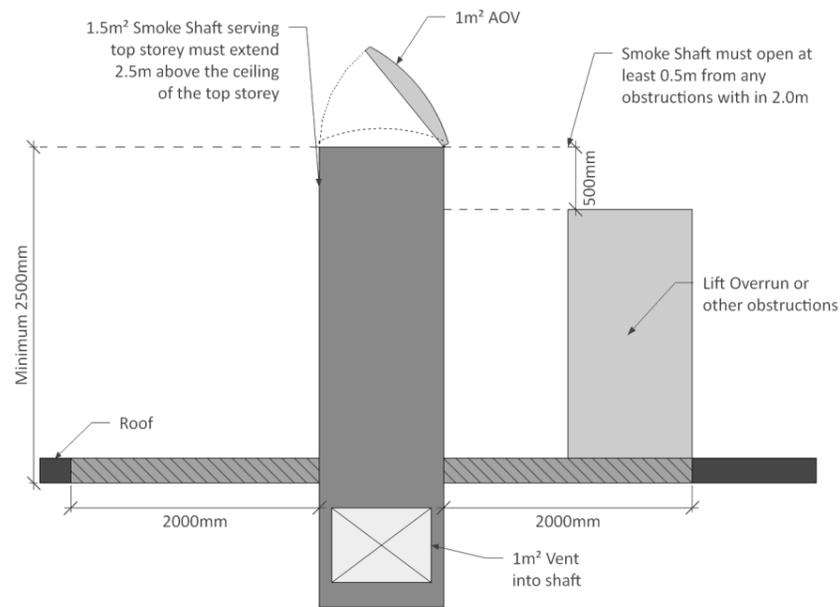


Figure 6: Natural Smoke Shaft

2.7 Vertical Means of Escape

General

2.7.1 BS 9991 states that a stair of acceptable width for everyday use will be sufficient for escape purposes from residential apartments. However, due to the height of the building, the stair will be designed as a firefighting stair. The firefighting stair will require to have a minimum width of 1100mm, further details on the design of firefighting shaft can be found in section 6.3.

Final Exit from Stair

2.7.2 In full accordance with BS 9991, egress from the stairs should be direct to the external at the lowest adjacent ground level as per Figure 34a and 34b of BS 9991. Every protected stairway should discharge directly to the external or by way of a protected corridor to the external.

2.7.3 As the stair is to be designed as a firefighting stair, the final exit route from the stair should also be treated as part of the stair itself and will be required to be enclosed in 120 minutes fire resisting construction. In addition, the final exit from the firefighting stair cannot open into the firefighting lift lobby then to external.

2.7.4 Any final exit doors from the stair would need to provide an equivalent clear width of the stair they serve. However, due to “Defence in place” policy evacuation principal and less than 60 occupants escaping at any given time, it is therefore proposed that the final exit widths could be reduced to 750mm. (Note: to enable wheelchair users to manoeuvre themselves in the refuge, the door with should have a clear opening not less than 850mm as per Part M of Building Regulation). This is to be discussed and agreed with Building Control.

2.8 Doors on Escape Routes

2.8.1 Access control measures incorporated into the design of the building which restrict access or egress from the building should not adversely affect the means of escape. If some escape routes are secured outside of normal hours the remaining measures should be sufficient to allow safe egress of any persons remaining within the building.

2.8.2 When the building is occupied, all electrically powered locking mechanisms are to return to the unlocked position on operation of the fire alarm system or loss of power. Any doors also provided with a manual door release unit complying with BS EN 54-11 on the side approached by people making their escape.

2.8.3 Where access to the means of escape is provided via a room, it should be ensured that appropriate measures are in place which would allow for the access doors to be open without the need of a key. Doors should either failsafe open or, be provided with a break glass unit, or other appropriate systems.

2.8.4 Doors at the base of the stair should be as wide as the stair they serve, they measure at 1000mm similarly with the stair width.

2.8.5 Doors on escape routes should:

- Be hung to open not less than 90 degrees
- Should be sufficiently recessed to prevent its swing from encroaching on the required egress route of the escape route or stair.
- Provided with vision panels if they are provided to sub-divide corridors or where doors are hung to swing both ways.
- Only fitted with lock or fastenings which are readily operated, without the use of a key and without having to manipulate more than one mechanism.

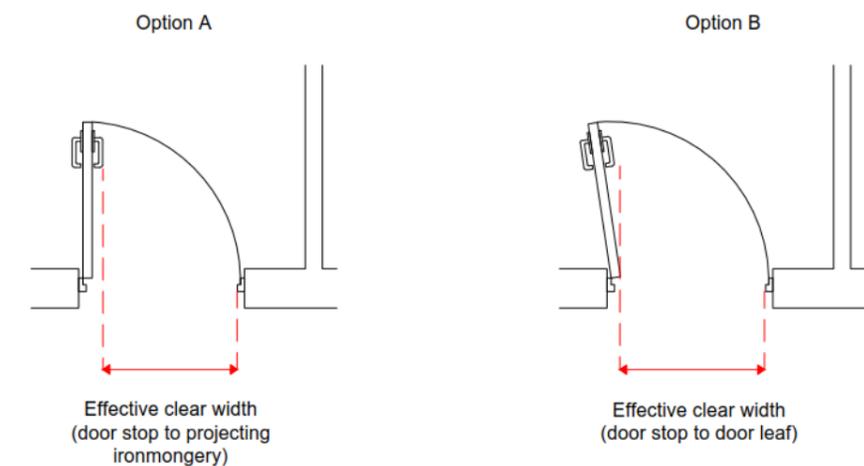


Figure 7: How to Measure Doors Widths

2.9 Evacuation of Non-Ambulant Persons

- 2.9.1 While not required for Building Regulations but part of the fire safety management plan, it is critical that adequate provisions are provided for the evacuation of any disabled users.
- 2.9.2 In the event of a fire, the building is afforded with enhanced levels of compartmentation which allows occupants to remain in the non-fire affected apartment. If a fire was to initiate within an apartment, the disabled occupants can evacuate to a protected place of safety in the common corridor. Furthermore, the disabled occupants could then move into the protected stair core to await assistance by the management (very few occupants should be using the stairs for evacuation at any one time, such that the implications of restrictions in the stair would be minimal).
- 2.9.3 Disabled occupants within the ground level can escape via one of the perimeter exit doors.
- 2.9.4 It is understood that the floor with external amenity spaces on the upper floor is for private use for resident's only. Therefore, disabled refuges and EVC system have not been proposed on those levels. However, the final building user will need to develop a disabled evacuation procedures plan for the building which will demonstrate how disabled occupants can be evacuated without any reliance on the fire service.
- 2.9.5 The building owner/management should prepare personal emergency evacuation plans (PEEPs) for all residents whose ability to self-evacuate may be compromised (such as persons with reduced mobility or cognition) and also include an up-to-date information about persons with reduced mobility and their associated PEEPs in the premises information box.
- 2.9.6 Consideration will need to be given for people who are deaf and hard of hearing in the design of the fire alarm and evacuation management plan. If the adoption of flashing beacons, vibrating pagers, or pillows is considered an appropriate interface will need to be provided to the localised alarm system.

2.10 Emergency Lighting

- 2.10.1 Emergency lighting will be provided in accordance with BS EN 1838. The escape lighting should be sited to provide an appropriate luminance near each exit door and where it is necessary to emphasise potential danger or safety equipment. The following bullet points indicate some of the critical areas:
- At each exit door intended to be used in an emergency
 - Near the fire alarm panel
 - Near stairs so that each flight of stairs receives direct light
 - Near any other change in level
 - Mandatory emergency exits and safety signs
 - At each change of direction
 - At each intersection of corridors
 - Outside and near to each final exit
 - Near each first aid post
 - Near each piece of firefighting equipment and call point

2.11 Emergency Escape Signage

- 2.11.1 Fire escape signs are to be provided to guide occupants from any point in a building via a place of relative safety (the escape route) to the place of ultimate safety (outside the building). Exit and directional signage should be provided in accordance with the requirements of:
- BS ISO 3864-1, BS 5499-4 & BS EN ISO 7010:2012+A7:2017.
- 2.11.2 Signage is provided to identify the primary escape route from each location within the building. To achieve this, the following principles have been adopted.
- At least one escape route or doorway leading to an escape route should be visible from any place within every room or enclosure (with the exception of the internal apartments).
 - Where direct sight of the escape route is obstructed, additional signage to be considered.
 - Escape route signage is to take precedence over all other signs.
 - All changes of direction in corridor, stairways, and open spaces forming part of an escape route will be marked with intermediate signs. Each intermediate door or junction will also be similarly signed.
 - Signs are not to be fixed to doors or sited where they are obscured by open doors.
- 2.11.3 Escape route signs are to be sited conspicuously within the normal field of vision. The following principles, which will assist the evacuating occupants to predict the location of successive signs, should be applied:
- Signs above doors or open spaces should be mounted between 2m and 2.5m from floor level, measured to the base of the sign, and be sited as close to the centre line of the escape route as practicable.
 - Signs sited on walls should be mounted between 1.7m and 2m from floor level to the base of the sign.
- 2.11.4 Signs should be sited at the same height throughout the escape route, so far as is reasonably practicable.
- 2.11.5 In addition to the above, all floor numbers should be clearly marked on each landing within the stairways and in a prominent place in all lobbies in such a way as to be visible both in normal conditions and in low lighting or smoky conditions.
- 2.11.6 Fire safety instructions should be provided by management (including instructions for evacuation) in a form that the occupants of the building can reasonably be expected to understand, taking into account the nature of the building and their knowledge of the occupants.

3 Internal Fire Spread

3.1 Linings

3.1.1 The choice of materials for walls and ceilings can significantly affect the spread of a fire and its rate of growth, even though they are not likely to be the materials first ignited. It is particularly important in circulation spaces where the rapid spread of fire is most likely to prevent occupants from escaping. The surface linings are restricted by limiting the surface spread of flames and minimising heat release rates.

3.1.2 All surface finishes are to achieve the classification in Table 4 when tested under the national classifications in accordance with BS 476 or the European classifications in accordance with BS EN 13501-1.

Table 4: Classification of Linings

Location	National Class	European Class
Small room not more than 4m ² in the residential accommodation i.e. bathrooms	3	D-s3, d2
Rooms not more than 30m ² in the non-residential areas i.e. store rooms	3	D-s3, d2
Other rooms i.e. kitchen, bedrooms, living spaces	1	C-s3, d2
Escape routes, stairs and protected entrance halls	0	B-s3, d2

Parts of walls in rooms may be of a poorer performance than specified in the above table (but not less than Class 3 / Class D-s3, d2, provided the total area of those parts in any one room does not exceed on half of the floor area of the room, and is subject to a maximum of 20m² in residential accommodation and 60m² in non-residential areas.

3.2 Structural Requirements

3.2.1 Premature failure of the structure can be prevented by provisions for load bearing elements of structure to have a minimum standard of fire resistance, in terms of resistance to collapse or failure of load bearing capacity.

3.2.2 The purpose of providing the structure with fire resistance is:

- To minimize the risk to occupants
- To reduce the risk to fire fighters who may be engaged on search and rescue operations
- To reduce the danger to people in the vicinity of the building.

3.2.3 Periods of fire resistance for structural fire protection refer to the rating when tested in accordance with the appropriate parts of BS 476 for load bearing elements of the structure.

3.2.4 The building has a height of 21.5m when measured from ground level to the topmost habitable storey. All elements of structure would be required to achieve an applied structural fire resistance of 90-minute fire when tested in accordance with the appropriate parts of BS 476 for load bearing elements of the structure. Elements supporting the firefighting shaft should achieve 120 minutes.

3.2.5 Where a building shares a party wall with a building with higher structural fire protection, the party wall should achieve higher protection.

3.3 Elements of Structure

3.3.1 Elements of structure are defined as follows:

- A member forming part of the structural frame of a building or any beam or column;
- A load bearing wall or load bearing element of wall;
- A floor;
- A gallery;
- An external wall structure supporting fire rated elements for the prevention of external fire spread;
- A compartment wall.

3.3.2 The following are excluded from the definition of elements of structure

- A structure that only supports a roof unless
 - The roof performs the function of a floor such as parking vehicles or as a means of escape
 - The structure is essential for the stability of any wall which needs to have fire resistance
- The lowest floor of the building

3.3.3 Where an element of structure forms part of more than one building or compartment, that element should be constructed to the standard of the greater of the relevant provisions

3.3.4 Where one element of structure supports, carries, or gives stability to another, the fire resistance of the supporting element should be no less than the minimum period of fire resistance for the other element (whether that other element is load bearing or not). This includes the structure supporting the firefighting shaft (firefighting stair, lifts etc).

3.4 Sprinkler Suppression System

3.4.1 The building is under 30m in height, the sprinkler system is not necessary as part of the structural fire protection for the scheme. However, the building will be fitted with a sprinkler system due to travel distances and to aid structural fire protection.

3.4.2 The residential areas should be provided with a minimum Category 2 suppression in accordance with the recommendations of BS 9251.

3.4.3 The sprinkler system in the residential areas will be a Category 2 system with a duration of 30-minutes, a discharge density of 4mm/min (single head), and 2.8mm/min (two heads), single pump, shared water supply and concealed heads.

3.4.4 Minimum operating pressure at any sprinkler should not be less than 0.5 bar.

3.4.5 The sprinklers are required to be installed within the residential accommodation areas and the ancillary accommodation within the residential areas, except for:

- Bathrooms with a floor area of less than 5m²,
- Cupboards and pantries with a floor area of less than 2m² and where the least dimension does not exceed 1m and the walls and ceilings are covered with non-combustible or limited combustible materials,
- Sterile common residential corridors and stairs.
- Crawl spaces.

3.4.6 The ancillary areas should be provided with a minimum Category 3 suppression in accordance with the recommendations of BS 9251.

4 Compartmentation

4.1 Provisions of Compartmentation

4.1.1 The spread of fire within a building can be restricted by sub-dividing the building into compartments separated from one another by wall and/or floors of fire resisting construction. This is to restrict rapid fire spread which could trap occupants of the building and reduce the risk of a fire becoming large.

Compartmentation

4.1.2 The buildings provided residential accommodation; therefore, all floors will be required compartment floors.

4.1.3 Each apartment is to be separate compartment and all-party walls (and walls to common areas) are to be compartment walls.

4.1.4 A summary of compartmentation and fire door requirements can be seen in Table 5 and Table 6. Further details are provided in the compartmentation drawing provided in Appendix A.

Table 5: Compartmentation Summary

Area of Building	Fire Resistance (minutes)	Fire Resistance (European Class)
Compartment Floors	60	REI 60
Firefighting Stair	120	REI 120
Firefighting Lifts	120	REI 120
Service Shafts	60	REI 60
Cycle Store	30	REI 30
Tank room / Boiler Room	30	REI 30
Protected Residential Common Corridors	60	REI 60
Apartments	60	REI 60
Protected Stairs within Apartments	30	REI 30

Table 6: Fire Door Requirements

Locality of the Door	Fire Rating (minutes)	European Standard (minutes)	Self-Closing Device Required?
Apartment Entrance Doors	FD 30S	E 30Sa	Yes
Doors into Firefighting Stairs	FD 60S	E 60Sa	Yes
Firefighting Lift	FD 60	E 60	N/A
Smoke Shafts	FD 60S	E 60Sa	Yes
Service Shaft	FD 30S	E 30Sa	Yes (Keep Locked Shut)
Bin Stores/Plant Rooms	FD 30S	E 30Sa	Yes (Keep Locked Shut)

4.1.5 Service risers, extending throughout the building can be protected by two approaches, either:

- Option 1: Continuous fire rated protection, encasing the riser with adequate fire resistance (depending on the required structural protection of the building, in this case 60-minutes). All penetrations through fire rated enclosure of the risers are to be adequately fire stopped. No floors are required within the riser however, access grills or other means need to be provided to satisfy the requirements of other parts of the Approved Documents; or
- Option 2: Risers fire stopped at floor level, achieving the same compartmentation of the floor plate. Any services passing through compartment floors are to be adequately fire stopped. Any services passing through fire rated walls would have to be adequately fire stopped (achieving the fire rating of the wall it passes through). Where risers are adjacent to common corridors, the walls adjacent to them should achieve 60min fire rating.

4.1.6 It is recommended that the above options are considered by the design team in order to decide the most applicable approach for the scheme.

4.2 Automatic Hold-Open Devices

4.2.1 Where automatic hold-open devices are to be installed in the development it is essential that these hold-open devices release automatically in activation of the fire alarm system and failsafe to release the door in the event of a power failure. These hold open devices should comply with BS 5839 Part 3.

4.3 Protection of Openings and Fire Stopping

4.3.1 To ensure all fire separating elements are effective, every joint or imperfection of fire, or opening to allow services to pass through the element suitable fire protection is to be provided by sealing or fire stopping so that the fire resistance of the element is not impaired. Bathroom pod risers should be fire stopped at floor level and the pod walls themselves should not be used to provide any fire-resistance for either compartmentation or structural fire protection.

Fire Stopping

4.3.2 All openings for pipes, ducts, conduits, or cables that pass through and/or any joints between fire separating elements should be appropriately fire stopped with consideration for a potential thermal movement of pipes and ducts. Where non-rigid materials are adopted or unsupported spans exceeding 100mm are adopted, the fire stopping material should be reinforced with materials of limited combustibility.

Openings of Pipes

Where services pass through a fire separating element, the following three fire stopping measures will need to be considered to evaluate the most appropriate fire protection measure.

Method 1 – Proprietary Seals

Provide a proprietary sealing system e.g. intumescent collar which has been tested to maintain the fire resistance of the walls, floor or cavity barrier for a pipe of any diameter.

Method 2 – Pipes with a restricted diameter

On the provision that the type and internal diameter dimension satisfies the requirements in Table 7, fire stopping such as cement mortar or intumescent mastic may be used around the pipe.

Method 3 – Sleeving

A pipe of lead, aluminium alloy, fibre cement or uPVC with a maximum nominal internal diameter of 160mm may be used with a sleeving of non-combustible pipes. The specification for non-combustible and uPVC are given in Table 7.

Table 7: Maximum Nominal Internal Diameter of Pipes Passing Through a Compartment Wall/Floor

Situation	Pipe material and maximum nominal internal diameter		
	Non-combustible material ¹	Lead, aluminium, aluminium alloy, uPVC ² , fibre cement	Any other material
Structure enclosing a protected shaft which is not a stairway or lift shaft	160	110	40
Compartment wall or compartment floor between apartments	160	160 (stack pipe) ³ 110 (branch pipe) ³	40
Any other situation	160	40	40

Note 1: Any non-combustible material (such as iron, copper or steel) which if exposed to a temperature of 800 degrees will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.

Note 2: uPVC pipes complying with BS 4514 and uPVC pipes complying with BS 5255

Note 3: These diameters are only in relation to pipes forming part of an above ground floor drainage system and enclosed in Method 3. In other cases the maximum diameters against situation 3 apply.

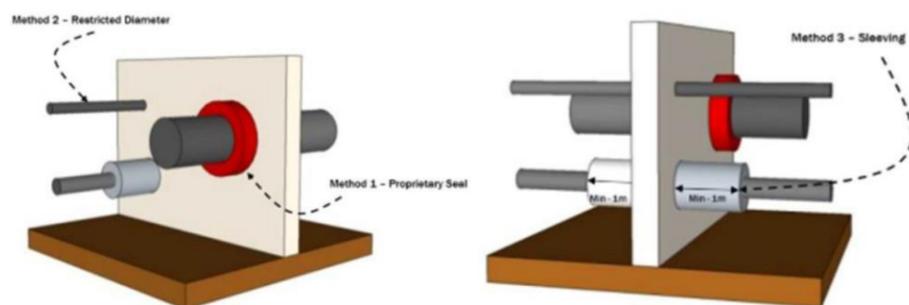


Figure 8: Service Breaches to Compartment Walls

Cable Trays & Multiple Cable Penetrations

4.3.3 Cable trays and multiple cable penetration through fire rated partitions require adequate fire stopping. Given the use of the building and the potential for additional cables to be required to be installed post completion, proprietary fire stopping systems should be considered which permit additional cables to be added to the route without compromising the fire stopping installation, these are commonly referred to as “fire rated cable pathways”.

4.4 Fire and Smoke Dampers

4.4.1 Where necessary, fire dampers will be provided in accordance with ADB and ASFP Grey Book: *Fire and smoke resisting dampers*.

4.4.2 Dampers are not required within internal protected stairs if:

- The duct work used is of rigid steel construction and all joints in the duct work are sealed with an intumescent sealant to prevent any leakage of hot smoke into the corridor.
- All penetrations in walls are fire stopped to the minimum fire resistance of the wall duct passes through.
- Ventilation ducts supplying or extracting air directly to or from a protected entrance hall, should not also serve other areas.
- Any system of mechanical ventilation which re-circulates air, and which serves both the stairway or entrance hall and other areas should be designed to shut down on the detection of smoke within the system.

4.4.3 If PVC ductwork is to be used and passes through (but does not serve) the enclosure to a protected entrance hall, an intumescent fire collar shall be fitted at the point at which the ductwork crosses the enclosing walls of the protected entrance hall. This is in accordance with NHBC guidance note on “Ductwork Passing through protected entrance halls in dwellings”:

4.4.4 Fire and smoke dampers are to be operated by smoke detection and thermal fusible link if ducts access or leave a compartment that forms part of fire protected escape route (apartment/corridor/stair etc.)

4.4.5 All fire dampers are to be tested to BS EN 1366-2 and be classified to BS EN 13501-3. The dampers are to have the same fire resistance as the wall or compartment floor they penetrate (subject to a minimum fire resistance of 60 minutes). Fire dampers should have an E classification (integrity) and leakage-rated fire dampers should be provided with an ES classification (integrity and smoke).

4.4.6 In ancillary accommodation or other non-residential accommodation, fire dampers should be provided on compartment boundaries. Where ductwork crosses an escape route, fire dampers should be actuated by automatic smoke detection.

4.5 Services

4.5.1 The routing of building services through the common residential corridor introduces a fire risk in the space and it is recommended against this where possible. However, where the routing of services through the corridor is unavoidable, the services should be run in separating construction or in a secured fire-resisting method. There are two options available in this regard:

1. Construct a fire resisting ceiling that achieves 30 minutes fire resistance as required by the location of the riser with all services being above the ceiling line & risers in the corridor; or
2. Control the fire load in the ceiling and riser space through the specification and selection of low-risk materials. This approach will require a fire risk assessment and agreement from Building Control; and should include but not limited to the following aspects as a minimum:
 - a. Minimising the number of electrical connections within the residential corridor
 - b. Correctly sized cables and follow up with comprehensive on-site testing and inspection
 - c. The surfaces of materials exposed to the corridor (i.e. ceiling void) will be of Class 0 (National Class) or Class B-s3, d2 or better (European Class)
 - d. The materials within the corridor (inclusive of any insulation) will be of limited combustibility (National Class) or Class A2-s1, d0 or better (European Class)
 - e. The services to be located within the corridor ceiling void will be of low fire risk
 - f. Any electrical cabling will be laid in metal trays or metal conduit
 - g. Access panels into ceiling voids to be secured (this can be by releasing devices or screw fixings to close)

- h. Any material or equipment located within the common corridor which have not been fire tested will have been fire risk assessed to demonstrate its low risk items in terms of ignition, combustibility and flammability by the system designer and system manufacturer
- i. Methods of cable support should be non-combustible (such as cable clips, cable ties or trunking)

4.6 Cavity Barriers

- 4.6.1 Concealed spaces or cavities in the construction of a building provide a route for smoke and flame spread. This is particularly in the voids above and below the construction of the building e.g. walls, floors, ceilings, roofs, around the windows and compartment walls. The provision of cavity barriers within the voids is intended to restrict the spread of smoke and flames.
- 4.6.2 Fire resistant cavity barriers are to be installed in cavity spaces exceeding 20m in any direction. The cavity barriers will offer a minimum of 30 minutes fire resistance integrity and 15 minutes fire resistance insulation (European Standard E30 & EI15).
- 4.6.3 See Table 8 for a summary of cavity barrier locations and the differentiation between cavity barriers and fire stopping.
- 4.6.4 Table 8 indicates the maximum dimensions of undivided concealed spaces for the different classifications of cavity barriers.

Table 8: Maximum Dimensions of Cavities

Location of Cavity	Class of surface / product exposed in cavity		Maximum dimensions in any direction (m)
	National	European	
Between roof and ceiling	Any	Any	20
Any other cavity	Class 0 or 1	Class A1 Class A2-s3, d2 Class B-s3, d2 Class C-s3, d2	20
	Not class 0 or 1	Not any of the above classes	10

- 4.6.5 Any exclusion from Table 8 should be in full accordance with the recommendations and specifications with ADB.
- 4.6.6 Cavity barriers are required at all floors, compartment walls and openings (e.g. windows and doors). Additional cavity barriers are required where a compartment walls meets an external wall of the building.
- 4.6.7 Where a concealed space is undivided area which exceeds 40m in either or both directions on plan there is no limit to the size of the cavity if:
 - The room and the cavity together are compartmented from the rest of the building
 - An automatic detection system compiling to BS 5839-1 is installed. Detectors are only required in the cavity to satisfy BS 5839-1.
 - The cavity is used as a plenum and the recirculation air distribution systems in BS 5588-9 are followed.
 - The surface of the material/product used on the construction of the cavity is Class 0 (National class) or Class B-s3, d2 or better (European class) and the supports and fixings on the cavity are non-combustible.

- The flame spread rating of any pipe insulation system is Class 1 (National class) or Class C-s3, d2 or better (European class)
- Any electrical wiring in the voids is laid in metal trays, or in a metal conduit
- Any other materials in the cavity are of limited combustibility or Class A2 or better (European class)

4.7 Construction and Fitting of Cavity Barriers

- 4.7.1 Cavity barriers should be constructed to provide 30 minutes of fire resistance (E30, EI15 when exposed from each side separately). The cavity barriers should be tightly fitted to a ridged construction and mechanically fixed in position. Where this is not possible (e.g. junctions with slates, tiles, corrugated etc.) the junction should be fire stopped in accordance with Section 4.6 of this report. Cavity barriers should also be fitted so that their performance is unlikely to be made ineffective by the movement of the building due to subsidence, temperature change etc. failure of their fixings, material or construction they abut or collapse of any services penetrating them.
- 4.7.2 Cavity barriers in a stud wall or partition or provided around openings may be constructed from:
 - Steel at least 0.5mm thick
 - Timber at least 38mm thick
 - Polythene sleeved mineral wool slab, in either case under compression when installed in the cavity; or
 - Calcium silicate, cement-based or gypsum-based boards at least 12mm thick
- 4.7.3 It should be noted that cavity barriers provided around openings may be formed by the window or door frame if the frame is constructed of steel or timber of the minimum thickness above. Any openings in a cavity barrier should be limited to those for:
 - 30-minute fire rated doors
 - The passage of pipes which meet the provisions set out in section of this report;
 - The passage of cables or conduits
 - Openings or ducts (unless fire rated) fitted with a suitable automatic fire damper where they pass through the cavity barrier.

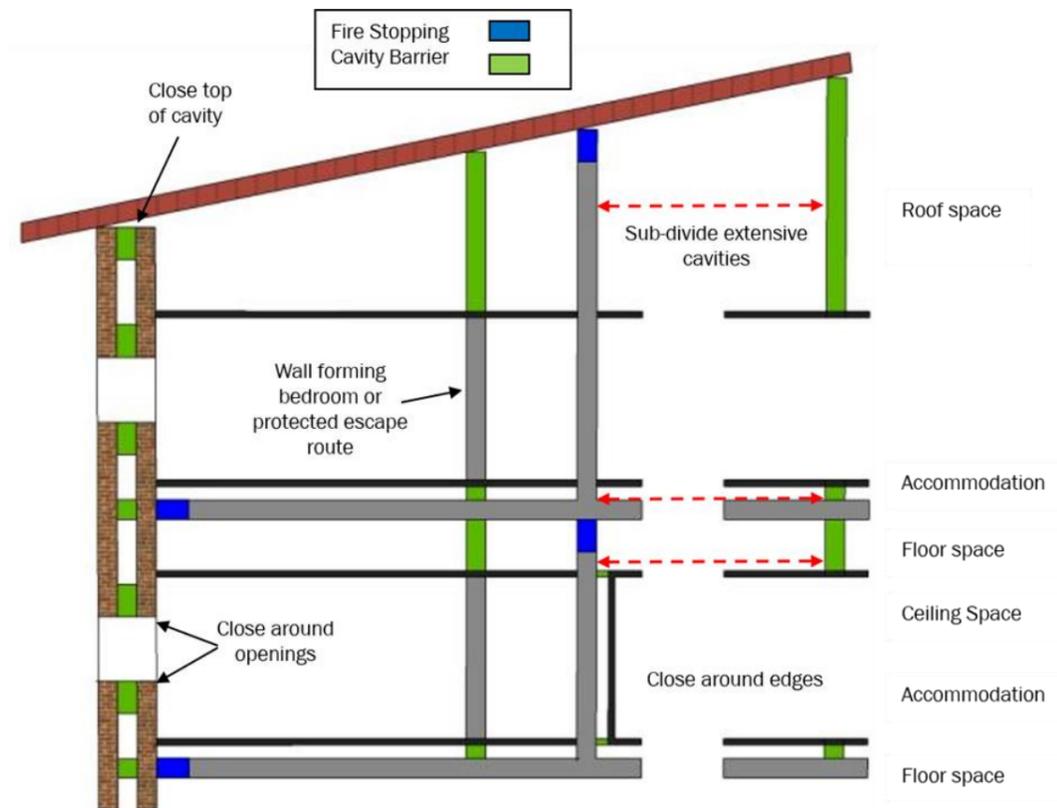


Figure 9: Typical Provision of Cavity Barriers

4.7.4 Cavity barriers should not be provided above party walls between flats. The party walls should be taken up to the underside of the slab and fire stopped.

4.8 Junction of Compartment Wall with the Roof

4.9 A compartment wall should achieve both of the following:

- Meet the underside of the roof covering or deck, with fire-stopping to maintain the continuity of fire resistance.
- Be continued across any eaves.

4.9.1 To reduce the risk of fire spreading over the roof from one compartment to another, a 1500mm wide zone of the roof, either side of the wall, should have a covering classified as B_{ROOF}(t4), on a substrate or deck of a material rated class A2-s3, d2 or better, as set out in Figure 10.

4.9.2 Thermoplastic rooflights that, are regarded as having a B_{ROOF}(t4) classification are not suitable for use in that zone.

4.9.3 As an alternative to the provisions of paragraphs above, the compartment wall may extend through the roof for a minimum of either of the following (see Figure 10).

4.9.4 Where the height difference between the two roofs is less than 375mm, 375mm above the top surface of the adjoining roof covering.

- 200mm above the top surface of the adjoining roof covering where either of the following applies.

- The height difference between the two roofs is 375mm or more.
 - The roof coverings either side of the wall are of a material classified as B_{ROOF}(t4).
- 4.9.5 The requirements for junction of compartment walls with the roof has been highlighted below in Figure 10.

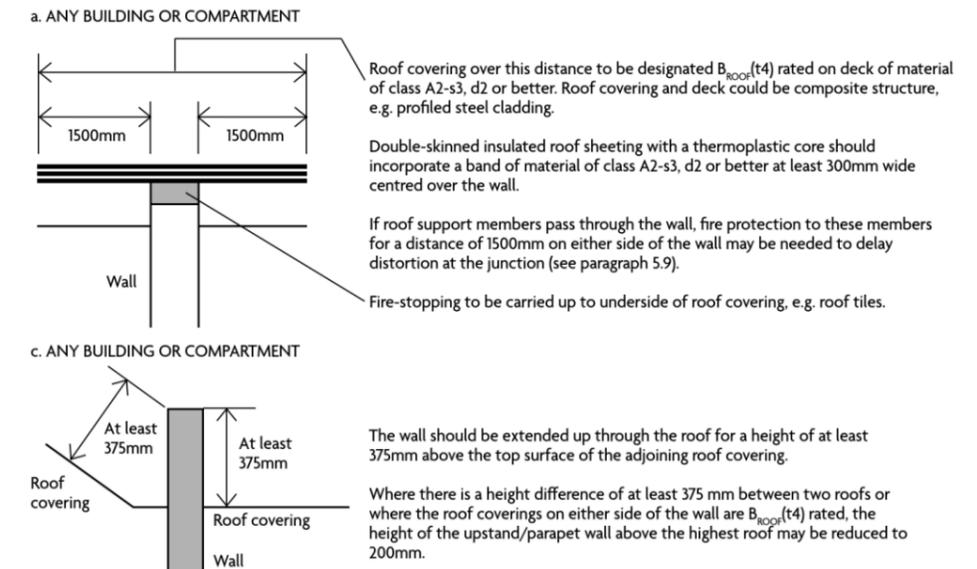


Figure 10: Junction of Compartment Wall with the Roof

5 External Fire Spread

5.1.1 Figure 11 highlights the boundary for the proposed development. Where a building adjoins a road, river, or railway, the site boundary can be extended to the centre of that area as it is considered that further development of that area is highly unlikely.



Figure 11: Site Plan

5.2 Space Separation

- 5.2.1 The spatial separation of the building from its relevant boundaries has been assessed in relation to preventing external fire spread. This is achieved by limiting the area of non-fire rated elements of the façade where the separation is less than the minimum requirement within BR 187 External Fire Spread; Building Separation and Boundary Distances.
- 5.2.2 The Unprotected Area (UPA) for each type of compartment within the building was calculated considering the distance from the relevant boundary, the compartment height, and width along with the occupancy profile.
- 5.2.3 Following our review of the building’s compartment elevations, 100% of unprotected areas is allowed.

5.3 Cladding, Insulation Material/Products and Exceptions

- 5.3.1 In a building with a storey 18m or more in height (when measured from the lowest adjacent side of the building to the upper floor surface of the topmost storey, excluding any floors consisting exclusively of plant), any insulation product, filler material (not including gaskets, sealants and similar) etc, used in the construction of an external wall should be of European Class A2-s1, d0 or better. Note, due to the use of the proposed building, Regulation 7(2) and 7(3) would be applicable and it prevails over the provisions stated within this paragraph.
- 5.3.2 *Note 1: Whilst the guidance above applies to any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the construction of an external wall, consideration should be given to the choice of material used for any other parts of an external wall or attachments to the wall which could impact on the risk of fire spread over the wall.*
Note2: Following recent Government, Circulars BB7 advises for residential/hotel buildings under 18m in height that any cladding, insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction should achieve a rating of A2-s1,d0 unless a BR 135 assessment has been undertaken or the cladding suppliers can demonstrate how the risk of fire spread is mitigated within their products.

Regulation 7(2) of Building Regulations 2010

- 5.3.3 Regulation 7(2) applies to any building with a storey at least 18m above ground level (when measured from the lowest adjacent side of the building to the upper floor surface of the topmost storey, excluding any floors consisting exclusively of plant), and contains one or more than one dwelling.
- 5.3.4 Subject to exclusions stated in Regulation 7(3), building work shall be carried out so that materials which become part of an external wall, or specified attachment, of a relevant building, are of European Classification A2-s1, d0 or Class A1, classified in accordance with BS EN 13501-1:2007+A1:2009 entitled “Fire classification of construction products and building elements. Classification using test data from reaction to fire tests” (ISBN 978 0 580 59861 6) published by the British Standards Institution on 30th March 2007 and amended in November 2009. Therefore, materials achieving limited combustibility cannot be deemed to meet the requirement using an alternative classification method.

Regulation 7(3) of Building Regulations 2010 – Exclusions

- 5.3.5 Paragraph (2) does not apply to the following (but not limited to):
 - a) Cavity trays when used between two leaves of masonry;
 - b) Any part of a roof (other than any part of a roof which falls within the definition of Building Regulations 2010) if that part is connected to an external wall;
 - c) Door frames and doors;

- d) Electrical installations;
- e) Insulation and water proofing materials used below ground level;
- f) Intumescent and fire stopping materials where the inclusion of the materials is necessary to meet the requirements of Part B of Schedule 1;
- g) Membranes;
- h) Seals, gaskets, fixings, sealants and backer rods;
- i) thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1; or
- j) Window frames and glass.

5.4 Roof Coverings

- 5.4.1 Limitations of the roof covering are to be in accordance with ADB. As separation distances are less than 6m, a roof rating of $B_{ROOF}(t_4)$ when tested in accordance with BS EN 13501-5 classification is required to be provided.
- 5.4.2 Note: The national classifications do not automatically equate with the transposed classifications in the European classification, therefore products cannot typically assume a European class unless they have been tested accordingly.

6 Fire Service Access

6.1 Fire Fighting Access & Provisions

6.1.1 Firefighters need to reach a fire quickly with their associated equipment, the physical safety and lives of the firefighters and the occupants of the building rely heavily on the ability to enter the building and attain access to the surrounding area.

6.2 Fire Vehicle Access

6.2.1 Access to the development should be designed in such a way that the Fire Service can easily access the site when a fire scenario occurs. Fire Service appliance access to Block D can be made via Canada Street. The main Fire Service access point into Block D will be via firefighting stair, this has been highlighted below in Figure 12.

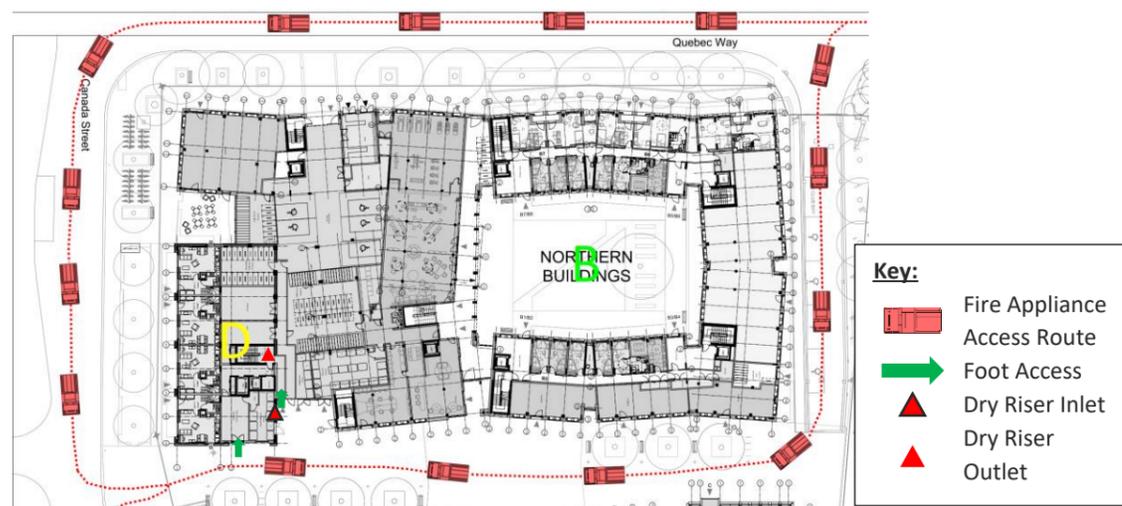


Figure 12: Fire Service Access

6.2.2 Any works to the roads need to be constructed in accordance with Table 9. It should be ensured that all access roads around the site will be adequate to accommodate the local fire service pump appliance.

Table 9: Fire Appliance Access Route Specification

Appliance Type	Minimum width of road between kerbs (m)	Minimum width of gateways (m)	Minimum turning circle between kerbs (m)	Minimum turning circle between walls (m)	Minimum clearance height (m)	Minimum carrying capacity (tonnes)
Pump	3.7	3.1	16.8	19.2	3.7	12.5

Notes: This table is subject to agreement with the fire service as some fire services have appliances of greater weight or different sizes.

6.3 Firefighting Shaft

6.3.1 As the height of the topmost storey exceeds 18m, a firefighting shaft is required, the firefighting shaft will contain:

- A 1100mm clear width in the stair.
- An AOV at the head of the stair with an aerodynamic free area no less than 1.0 m².
- Ventilated firefighting lobby (means of ventilation to be confirmed);
- A dry rising main within the firefighting lobby floors;
- A firefighting lift to be within 7.5m of the firefighting stair door on each landing;
- A firefighting lift in full accordance with BS EN 81 including a method of draining water from the lift pit. It should be noted the provisions detailed in Section E.2 (BS EN 81-72) will be afforded (providing a slope) and a sump pump is not required.

6.3.2 Flooring and floor coverings within the firefighting shaft are to be in accordance with the recommendations of BS 9999. All floorings and floor coverings should be chosen so as to maintain good traction when wet, resilient surfaces should be maintained in accordance with BS 6262-2, with the only emulsion polished used. This should be observed by the building management and coordinated accordingly with maintenance staff.

Notes: The slip resistance of resilient floors is reduced by contamination by dust or materials composed of oils and grease, it is essential that they are cleaned frequently.

6.3.3 Textile floor coverings should meet the following criteria:

- when tested, together with any underlay, in accordance with BS 4790, using the test procedure reflecting the method used for securing the floor covering to the floor, either:
- not ignite; or
- have effects of ignition on both the use- and under-surfaces not extending beyond a circle of radius 35mm centred on the central point of application of the nut.
- be firmly secured to the floor, with any adhesive used being non-water soluble; and
- be interrupted at all doors to and within the fire-fighting shaft along the line of the threshold of the doorway with a metal or other non-combustible strip not less than 50 mm wide.

6.4 Dry Rising Mains

6.4.1 The dry rising mains will be designed and installed in accordance with BS 9990 with outlets provided on all floors including Ground Floor. Where riser pipework is not within the stair it will need to be enclosed in 120-minute fire resisting construction.

6.4.2 The dry riser inlet connection points are to be within 18m and visible from the fire appliance. The indicative location of both the dry riser inlet and outlet has been provided in Figure 12 which are subject to Building Control and Fire Service approval.

6.4.3 Outlets for the fire mains should serve every floor within the building including the ground floor and be provided within the protected enclosure of the stair. Therefore, in accordance with BS 9991, hose laying distances are to be within 60m from the dry riser outlet in firefighting shafts to every part of each storey.

Air release Valve

6.4.4 An air release valve should be installed at the top of each vertical rising main. This allows for ventilation of the main, acting as a vacuum break allowing the water within the pipe to drain out after use.

6.4.5 Dry rising mains should have landing valves located on the roof if practicable to allow for testing.

6.4.6 Landing valves should be designed and installed in accordance with BS 5041-2.

6.5 Fire Hydrants

6.5.1 Hydrants should be located in positions that are near to building entry points (including entry points to the firefighting shaft containing a fire main) and fire appliance parking positions. For buildings provided with dry fire mains, hydrants should be provided within 90m of dry fire mains inlets.

6.5.2 The locations of any existing fire hydrants should be confirmed by the utility engineer.

6.5.3 All hydrants should have signage in accordance with BS 3251.

6.6 Wayfinding Signage for the Fire Service

6.6.1 As part of the May 2020 amendments to ABD¹, guidance for wayfinding signage to assist firefighters is now provided; these amendments will come into force on 26/11/20. For blocks of flats with top floors more than 11m above the ground floor, floor identification signs and flat indicator signs should be provided.

6.6.2 Floor identification signs denote which floor the reader is currently on, and flat indicator signs provide information regarding the flats accessed from that floor; the flat number for any multi-storey flats with two or more entrances should only be indicated on the normal access storey. Requirements for floor identification and flat indication signs are summarized in Table 10.

6.6.3 The floor closest to the mean ground level should be designated as either Floor 0 or Ground Floor, and each floor above the ground floor should be numbered sequentially, beginning with Floor 1. A lower ground floor should be designated as either Floor -1 or Lower Ground Floor, and each floor below the ground floor should be numbered sequentially beginning with Floor -1 or Basement 1.

Table 10: Wayfinding signage summary

	Floor identification sign	Flat indication sign*
Signage text	“Floor X”, where X is a numeral.	“Flats Y-Z”, where Y and Z are numerals. Lower number first; text supplemented by arrows if flats are in more than one direction.
Text height	≥50 mm, and ≥75mm for the floor numeral.	At least half that of the floor sign.
Text typeface	Sans serif.	Sans serif.
Mounting	Mounted 1.7m–2.0m above floor level; where practicable, all the signs should be mounted at the same height.	Directly below the floor signs, such that its top edge is no more than 50mm below the bottom edge of the floor sign
Visibility	Visible from the top step of a firefighting stair and, where possible, from inside a firefighting lift when the lift car doors open. Text (and any arrows) should be on a contrasting background, easily legible and readable in low level lighting conditions or when illuminated with a torch.	

¹Available via <https://www.gov.uk/government/publications/fire-safety-approved-document-b> (Last accessed 27/05/20)

7 Emergency Power

7.1 Introduction

7.1.1 Fire protection systems designed to operate in a fire require enhanced provisions to ensure a secure supply is available. Specific recommendations are detailed within BS 9999 Section 37.2.3.3, but the main aspects are detailed below.

7.2 Secondary Power Supply

7.2.1 To reduce the risk of loss the electrical supply to the fire protection systems that are required to operate continuously during a fire, a secondary supply is needed.

7.2.2 The secondary power supplies will be provided to the following systems:

- Firefighting lifts;
- Firefighting shafts (associated equipment and lighting);
- Smoke control systems;
- Sprinkler Suppression System;
- Fire alarms;
- Emergency Lighting;
- Powered doors and electronic locks (other than those which fail-safe open)

7.2.3 Where secondary power supplies are recommended these should have a primary supply taken from a public supply and a secondary supply from either:

- An alternative utility supply from another substation;
- A generator;
- An uninterruptible power supply (UPS);
- Batteries.

7.2.4 Alternative utility supplies and a second substation are not always possible due to the onerous requirements of the utility providers; as dual supplies can cause other safety risks relating to isolation. Generators, UPS and batteries are also not considered feasible due to the low reliability of the systems, Due to the infrequent use, only during and emergency, it is often found that these systems are not functional when called upon. Regular testing and maintenance are required to keep the systems operational, however, testing is not always effective as a system is rarely assessed for its full duration of the operation.

7.2.5 This issue has been addressed in the updated version of BS 9991. The update provides an alternative arrangement for where the primary and secondary power supplies can originate from. The document states that the two power supplies can emanate from the same substation provided that a number of recommendations are met. This sentiment is echoed in the guidance of BS 9999 which states that two separate intakes from an external substation may be used in some residential buildings where regular maintenance of a generator would not be expected.

7.2.6 The recommendations in BS 9991-Section 15: Power supplies, cabling, and installation-are outlined as follows:

7.2.7 *Where practicable, power supplies should be provided via two separate intakes into the building from the same external substation or via a single intake and a standby generator.*

7.2.8 *Where neither of these options is technically viable, e.g. a risk assessment has been undertaken which concludes that a life safety generator would be suitable, a single intake from the external substation, may be provided as the only alternative option remaining, provided that the following recommendations are met:*

- a) *The life safety system should be connected to an independent distribution board used exclusively for that system.*
- b) *The life safety distribution board should be clearly marked at the point of isolation with a warning explaining that isolation would switch off the life safety system.*
- c) *The life safety system distribution board should be located in a separate fire-resisting enclosure (with a minimum of 60-minute fire resisting construction) to the primary main electrical distribution board and should not be accessible directly from the communal areas of the building or from a part of the building where dual supply is required (such as a shaft serving an evacuation lift).*
- d) *The enclosure surrounding the primary main electrical distribution board should be provided with a minimum of 60-minute fire resisting construction.*
- e) *The substation or the transformer room should be either located outside the building or separated by 120-minute fire resisting construction and directly accessible from the outside. The diverse (primary and secondary) power cables should only come together in the fire compartment housing the control panel by means of an automatic change-over switch, unless the cable route is via a fire compartment which does not open onto areas requiring protection via the relevant life safety system.*
- f) *The Mechanical and Electrical Engineer is to carry out a risk assessment.*

7.3 Compliance with BS 9999-Section 15 Recommendations

7.3.1 It is stated that a single intake from a substation can be provided as long as the recommended criteria listed [a-e] are adhered to. The basis of the design for the development is outlined by the following key elements:

- The primary and secondary power supplies will be diversely routed. They will be routed in separate fire compartments that will correspond to the required item of life safety equipment.
- The two supplies will be terminated at an automatic change over switch device. This ensures that in the event of the primary power supply failing, the secondary power supply will be able to automatically take over. The automatic take over device must be designed in accordance with the relevant standard *BS EN 60947-6) and must be located in an enclosure that is fire rated and houses the life safety equipment that its serving.
- Protective devices such as circuit breakers and fuses will be required to be disconnected. This ensures that if there is a fault on the primary power supply cable it won't affect the secondary power supply cable.
- Failure of the life safety systems could only occur form a fire in the intake rooms which is fire separated from the rest of the building. A fire in the intake room would be fought externally and would not rely on any systems within the building.

7.3.2 The layout of the proposed system can be seen in Figure 13.

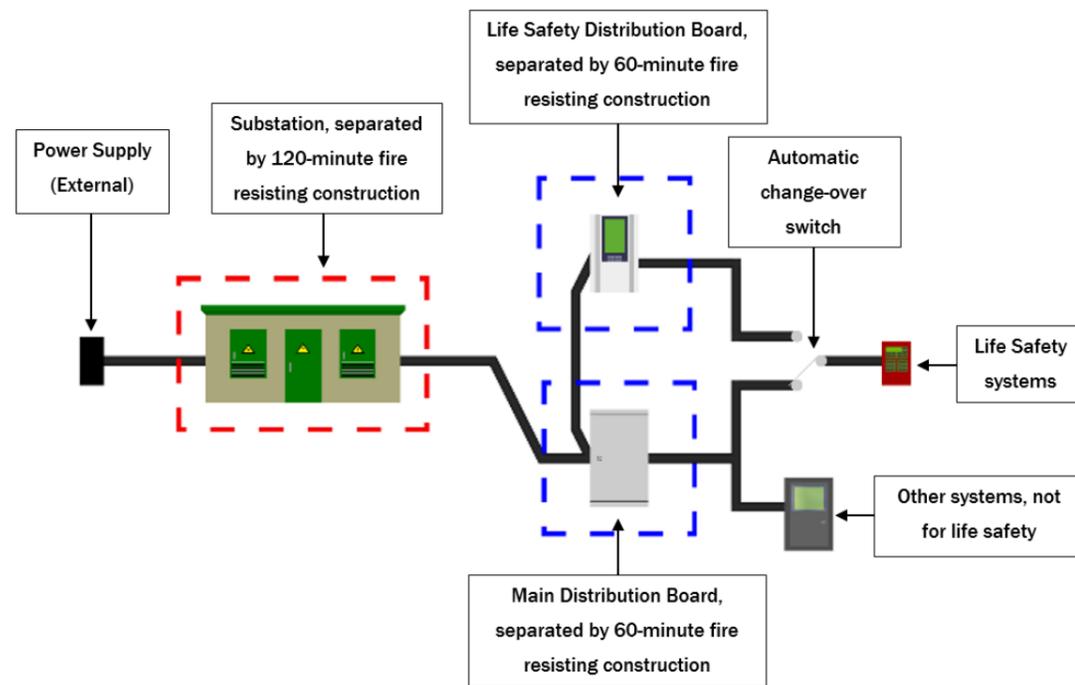


Figure 13: Emergency Power Supply Schematic

7.4 Wiring

7.4.1 The wiring for both primary and secondary power supplies that link fire safety systems are required to conform with the following specifications:

- The wiring should consist of either.
 - Mineral-insulated, copper-sheathed cables conforming to BS EN 60702-1 and meeting the relevant life safety and/or fire safety performance objectives given in BS7346-6; or
 - Cables meeting the relevant life safety and/or fire safety performance objectives given in BS 8491; or
 - Be protected against exposure to the fire by separation from any significant fire risk by a wall, partition or floor with a fire resistance of not less than that required of the building.
- The wiring systems should be separate from any circuit provided for any other purpose;
- Jointing and termination methods for cables conforming to BS EN 60702-1 should in addition conform to BS EN 60702-2;
- The wiring system should be protected from mechanical damage.

7.4.2 Wires/cable for the system should be selected via recommendation in accordance with BS 8519.

7.4.3 Cables supplying current to the life safety systems should be installed in accordance with BS 7671 and the manufacturers recommendations. The cables should have an inherently high resistance to heat and fire so as to maintain the integrity under such conditions.

7.4.4 Power supply cables should be separate from the primary supply, or be physically protected so that a breakdown, or any cause of breakdown on one supply will not adversely affect the other.

8 Fire Safety Management

8.1 Regulatory Reform (Fire Safety) Order

8.1.1 The Regulatory Reform (Fire Safety) Order came into force on 1st October 2006. The Order consolidates nearly all previous fire safety legislation revoking the Fire Precautions Act and the Workplace Regulations. The Order places a general duty of fire safety care on employees, occupiers and/or owners of businesses to provide and maintain adequate fire precautions.

8.1.2 The legislation is supported by requiring a fire risk assessment and a fire safety plan.

8.1.3 The fire risk assessment is to be undertaken of the required business by a designated ‘responsible person’ who is liable to the legislation. This process looks to:

- Identify potential fire hazards
- Evaluate the risk from the hazards
- Identify who would be at risk
- Identify an adequate level of fire precautions to compensate for the risk

8.1.4 The fire risk assessment is to be fully documented if the building has an occupancy of 5 or more persons.

8.1.5 The fire safety management plan details the arrangements to implement, control, monitor, and review fire safety standards and to ensure those standards are maintained. The plan describes the arrangements for effectively managing fire safety to prevent fire occurring and, in the event of a fire, to protect people and property.

8.1.6 Both the fire safety management plan and fire risk assessment documentation should have been completed before the occupation of the building.

8.2 Regulation 38

8.2.1 Regulation 38 requires that, where the work involves the erection or extension of a relevant building or relevant changes of use of a building, fire safety information shall be given to the responsible person at the completion of the project or when the building or extension is first occupied. The information will facilitate the production of the risk assessment, a requirement under the Regulatory Reform Order. This fire strategy should be maintained throughout the works and accurately reflect the complete design. Table 11 provides a precis of the active and passive systems provided within the building.

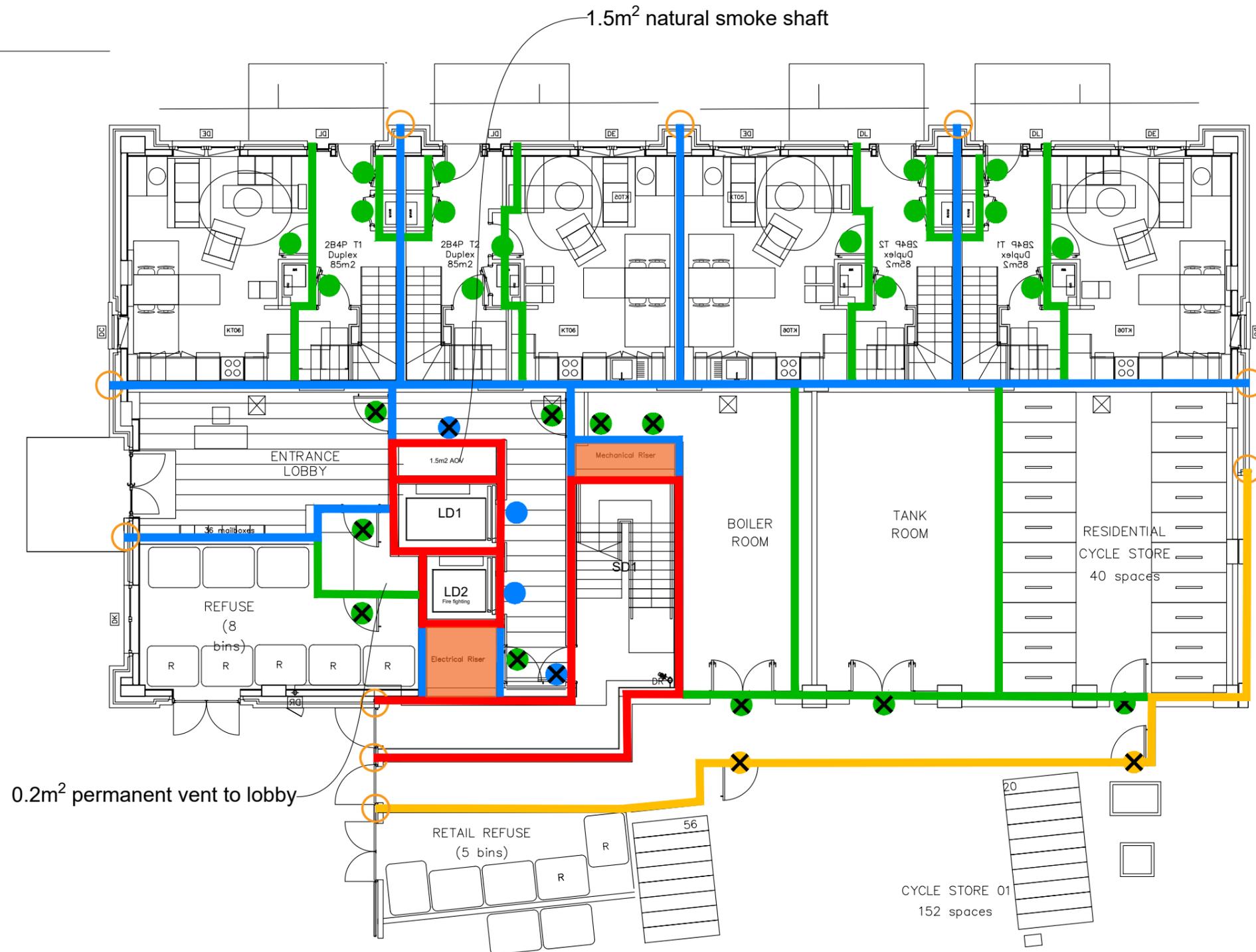
Table 11: Passive and Active Systems

	Provision	Reference in Strategy
Compartmentation	In accordance with the recommendations of BS 9991	Section 4
Ventilation	1.5m ² natural shaft within the common corridor. 1.0m ² AOV at the head of the Stair	Section 2.6
Cavity Barriers	Cavity barriers be provided in accordance with BS 9991.	Section 4.6
Fire Dampers	Motorised fire and smoke dampers to be afforded to serve breaching in compartmentation.	Section 4.4
Fire Doors	In accordance with the recommendations of BS 9991.	Section 4.1
Internal Linings	In accordance with the recommendations of BS 9991.	Section 3.1
Disabled Refuges	In accordance with BS 9991	Section 0
Structural Elements	60-minutes structural fire resistance.	Section 3.2
Signage	In accordance with: <ul style="list-style-type: none"> • BS ISO 3864-1. • BS 5499-4. • BS 5499-5. 	Section 2.11
Detection and Alarm	Grade D1 Category LD1 throughout apartments Category L5 to common corridors and stairs to actuate smoke control system and activate sounder at terrace Category L1 in ancillary areas	Section 2.3
Emergency Lighting	In accordance with BS 5266 and BS EN 1838.	Section 0
Firefighting shaft	In accordance with BS 9991.	Section 6.3
Sprinklers	Sprinkler System to be provided in accordance with BS 9251, Category 2 with 60 minute duration.	Section 3.4
Dry Risers	To be provided within the stair lobby in accordance with BS 9990.	Section 6.4
Hydrants	Fire hydrant location to be confirmed.	Section 6.5

9 Conclusion

- 9.1.1 Where proposed provisions are not strictly in accordance with the prescriptive guidance of BS 9991, the proposed provisions are considered reasonable to achieve the functional requirement of Part B of the Building Regulations.
- 9.1.2 The drawings used in Table 1 have been used in the production of this report and no other drawings have been reviewed. If you feel additional information should be considered or may have an impact on this report we are to be informed as it may have a bearing on the conclusion of this report.
- 9.1.3 It is considered that between a culmination of the prescriptive requirements and fire engineering approach, a solution will be provided which is adequate to address the risk, therefore providing a detailed strategy how compliance with the functional requirements of the Building Regulations can be met if the strategy is adopted in full but all design team members.
- 9.1.4 The recommendations presented within this report should not be relied upon for design until approved by the relevant approvals body, be this the Fire Service, Building Control, or other body.

Appendix A – Fire Strategy Drawings



FIRE SYMBOLS:

	30 MINUTES COMPARTMENTATION
	60 MINUTES COMPARTMENTATION
	90 MINUTES COMPARTMENTATION
	120 MINUTES COMPARTMENTATION
	30 MINUTES FIRE DOOR
	30 MINUTES FIRE DOOR + SMOKE SEALS
	60 MINUTES FIRE DOOR
	60 MINUTES FIRE DOOR + SMOKE SEALS
	90 MINUTE FIRE DOOR + SMOKE SEALS
	CAVITY BARRIER
	90 MINUTES FIRE STOPPED RISER

GENERAL NOTES:

- The drawings are not to scale and should not be used as construction drawings.
- Any changes to the compartmentation or fire safety provisions as indicated on the drawings should be discussed directly with BB7.
- Structural fire resistance for the scheme is to achieve 90 minutes integrity and insulation. The structure supporting the freighting shaft will need to achieve 120 minutes fire resistance.
- This Fire Strategy Drawing is based on and must be read in accordance with BB7 Detailed Fire Strategy for Canada Street and the relevant British Standards. The layout of the building is not strictly in compliance with the recommendations of the prescriptive guidance document ADB, any deviations are justified with a fire engineered approach to demonstrate compliance with the functional requirements of the Building Regulations.
- Fire ratings to external walls are not shown on these drawings. The external fire spread compartmentation requirements are detailed in the 'External Fire Spread' section of the detailed fire strategy. Where external walls require fire protection for external fire spread purposes it should be provided in accordance with the recommendations of the fire strategy to achieve 90 minutes fire resistance.
- All penetrations through fire compartment lines are to be appropriately protected by means of fire collar, automatic fire and smoke dampers or appropriate materials to maintain the fire protection required. Please refer to Fire Strategy Document for further information.
- Horizontal and vertical cavity barriers are to be provided in accordance with the Detailed Fire Strategy Note, these should also be provided at the top of cavities, around windows and doors openings.
- As the building exceeds 18m in height, all materials used in external wall and specified attachments to the external walls, other than permitted exceptions, should achieve at least Class A2-s1, d0 in accordance with SS EN 13501.
- All risers within the scheme are assumed to be fire stopped at each floor level, or alternatively should be fire rated in protected enclosure.
- All compartmentation is to be taken all the way to the underside of the roof, see the fire strategy for details.

Rev	Description	Date
A	Updated Layouts	04/10/2021

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Project Description:
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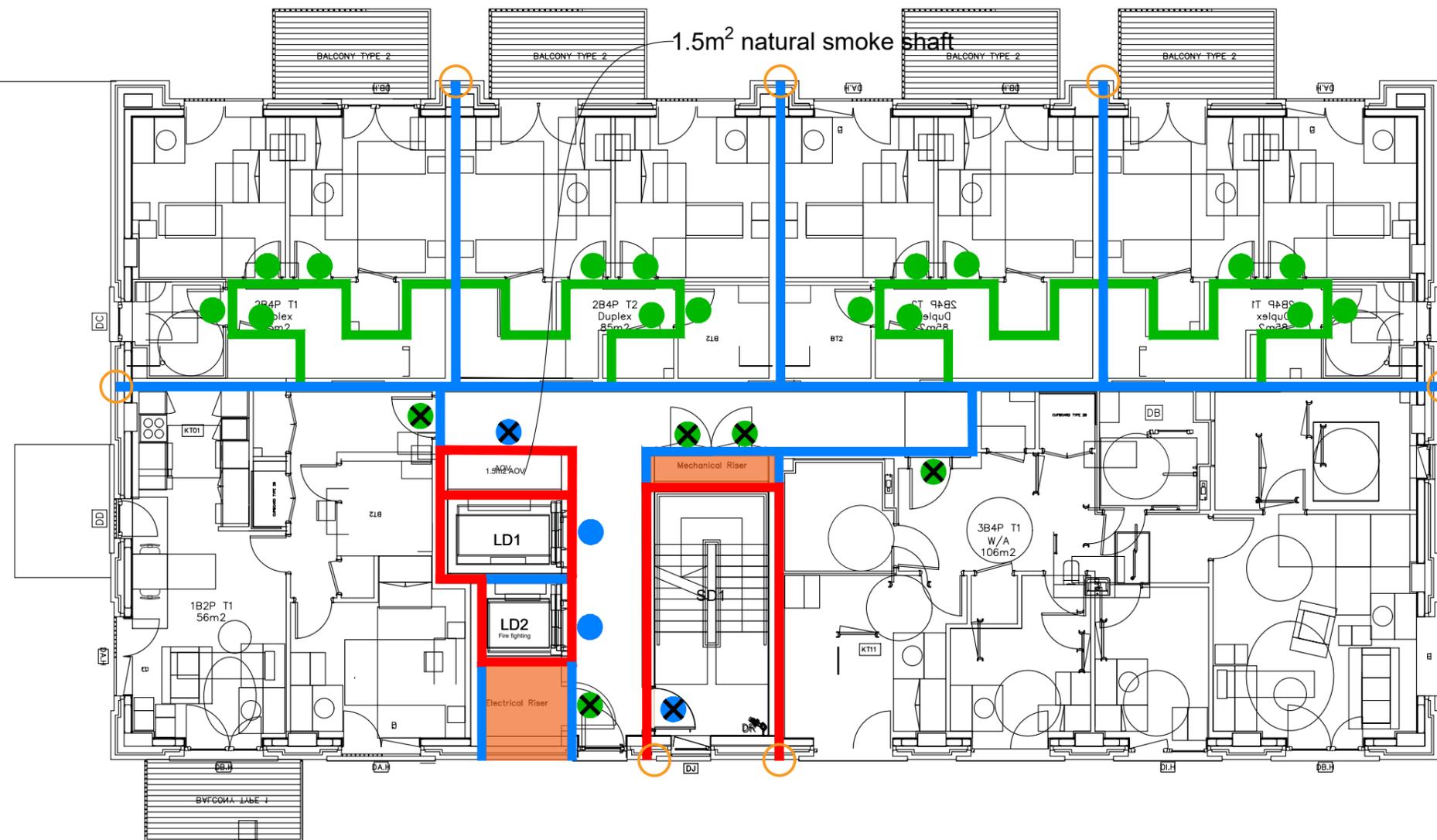
Project Address:
 Canada Street
 London

Client:
 Scape

Drawing Title:
 Ground Floor

Drawn By: JH	Checked By: MA	Authorised By: TG
Drawing Status: For Info	Drawing Scale: 1:125 at A3	Date: 04/10/2021
Drawing Based On: SM2001-030		Rev: A
Drawing Number: BB-FSD-10022-OF-01		

NOTE:
 The compartmentation requirements are in relation to conventional steel or concrete construction methods only. Light weight, SFS, modular or timber frame construction have not been considered.



FIRE SYMBOLS:

	30 MINUTES COMPARTMENTATION
	60 MINUTES COMPARTMENTATION
	90 MINUTES COMPARTMENTATION
	120 MINUTES COMPARTMENTATION
	30 MINUTES FIRE DOOR
	30 MINUTES FIRE DOOR + SMOKE SEALS
	60 MINUTES FIRE DOOR
	60 MINUTES FIRE DOOR + SMOKE SEALS
	90 MINUTE FIRE DOOR + SMOKE SEALS
	CAVITY BARRIER
	90 MINUTES FIRE STOPPED RISER

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Rev	Description	Date
A	Updated Layouts	04/10/2021

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Project Description:
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Project Address:
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 London

Client:
 Scape

Drawing Title:
 First Floor Fire Plan

Drawn By: JH	Checked By: MA	Authorised By: TG
Drawing Status: For Info	Drawing Scale: 1:125 at A3	Date: 04/10/2021
Drawing Based On: SM2001-031		Rev: A
Drawing Number: BB-FSD-10022-OF-02		

NOTE:
 The compartmentation requirements are in relation to conventional steel or concrete construction methods only. Light weight, SFS, modular or timber frame construction have not been considered.

FIRE SYMBOLS:	
	30 MINUTES COMPARTMENTATION
	60 MINUTES COMPARTMENTATION
	90 MINUTES COMPARTMENTATION
	120 MINUTES COMPARTMENTATION
	30 MINUTES FIRE DOOR
	30 MINUTES FIRE DOOR + SMOKE SEALS
	60 MINUTES FIRE DOOR
	60 MINUTES FIRE DOOR + SMOKE SEALS
	90 MINUTE FIRE DOOR + SMOKE SEALS
	CAVITY BARRIER
	90 MINUTES FIRE STOPPED RISER

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Rev	Description	Date
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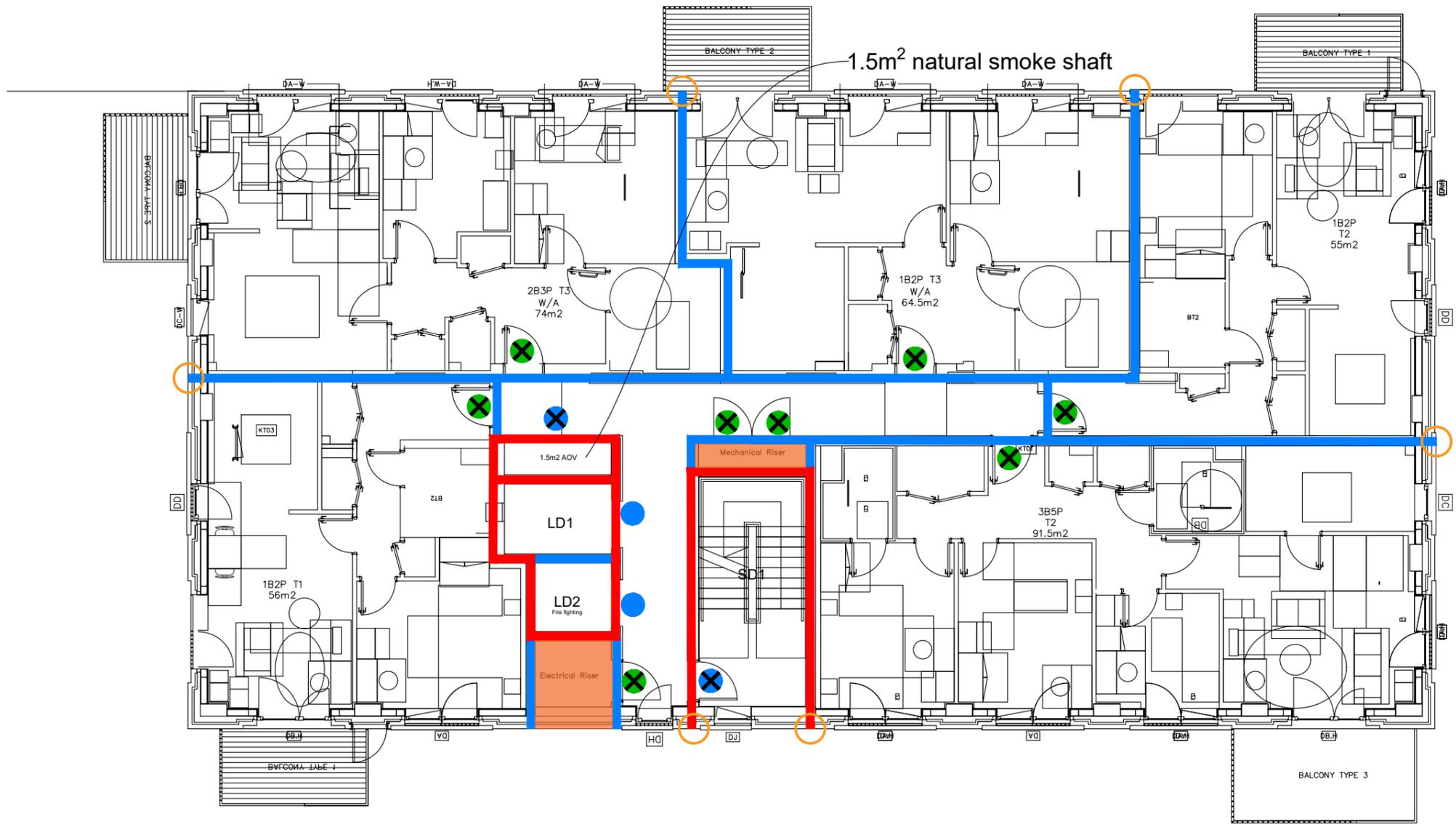
Client:
 Scape

Drawing Title:
 Second to Sixth Floor Fire Plan

Drawn By: JH	Checked By: MA	Authorised By: TG
Drawing Status: For Info	Drawing Scale: 1:125 at A3	Date: 04/10/2021

Drawing Based On: SM2001-032	Rev: A
Drawing Number: BB-FSD-10022-OF-03	

NOTE:
 The compartmentation requirements are in relation to conventional steel or concrete construction methods only. Light weight, SFS, modular or timber frame construction have not been considered.



FIRE SYMBOLS:	
	30 MINUTES COMPARTMENTATION
	60 MINUTES COMPARTMENTATION
	90 MINUTES COMPARTMENTATION
	120 MINUTES COMPARTMENTATION
	30 MINUTES FIRE DOOR
	30 MINUTES FIRE DOOR + SMOKE SEALS
	60 MINUTES FIRE DOOR
	60 MINUTES FIRE DOOR + SMOKE SEALS
	90 MINUTE FIRE DOOR + SMOKE SEALS
	CAVITY BARRIER
	90 MINUTES FIRE STOPPED RISER

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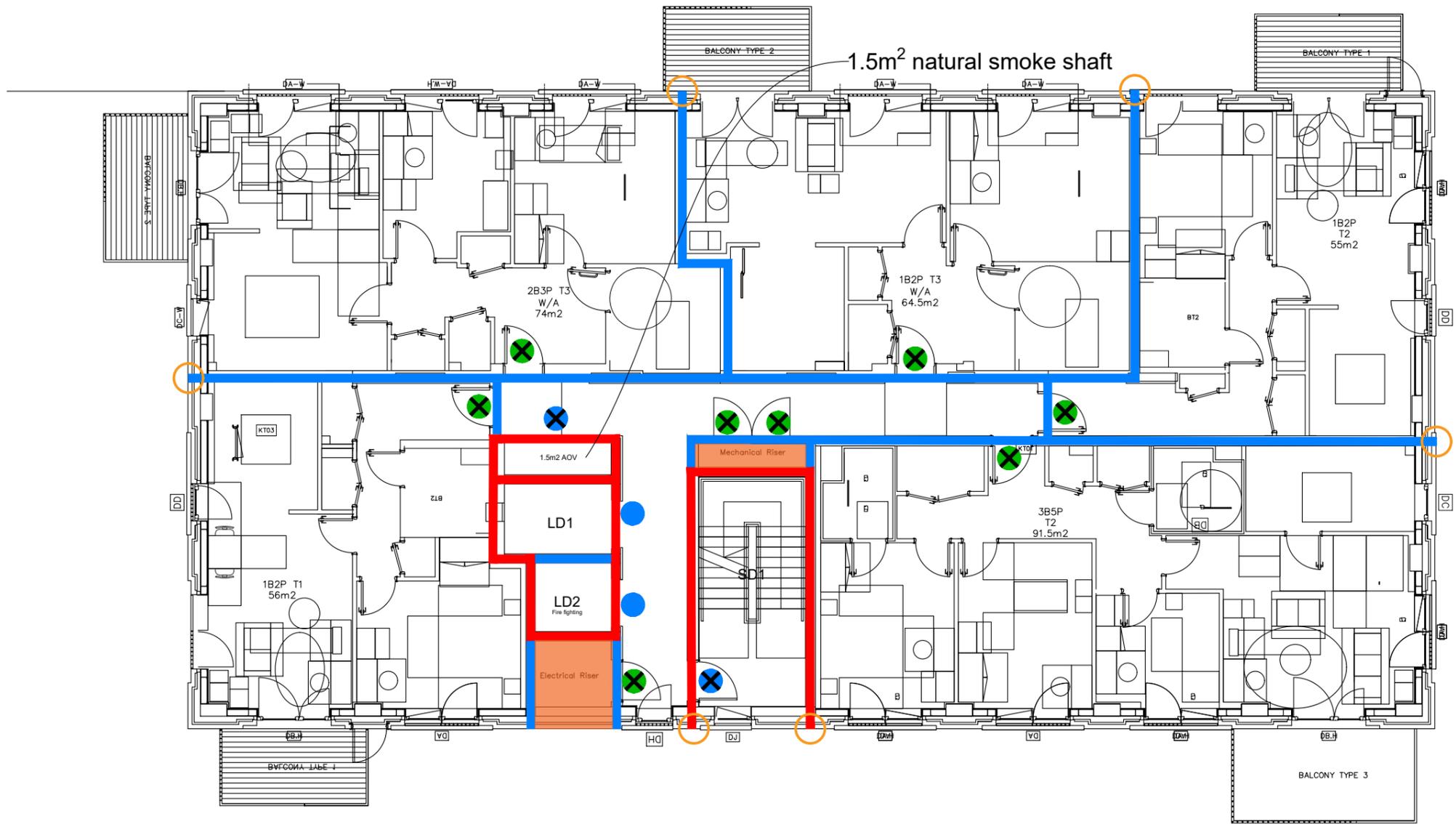
Client:
 Scape

Drawing Title:
 Seventh Floor Fire Plan

Drawn By: JH	Checked By: MA	Authorised By: TG
Drawing Status: For Info	Drawing Scale: 1:125 at A3	Date: 04/10/2021

Drawing Based On: SM2001-037	Drawing Number: BB-FSD-10022-OF-04	Rev: A
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NOTE:
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