# Outline Fire Strategy Report

# Nicholsons House – Maidenhead, Berkshire

# Residential Apartments

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| Project Title: | Nicholsons House – Residential Apartments |
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|---|---|
| Type of building work(s): | Redevelopment – Residential Apartments |

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|---|---|
| Comments based on: | BS 9991:2015 & Approved Document B 2022 - Dwellings |

# 1 Introduction

AM Pyro Consulting has been appointed by Aegon UK Property Fund Limited to provide fire engineering services for the redevelopment of the Nicholsons House building that is located in Maidenhead, Berkshire SL6 1LB. This report will supplement a previous Gateway 1 statement that was completed for the building.

The project will consist of a complete redevelopment of the tower block which will include residential apartments and appropriate fire safety upgrades.

** Please note that there are commercial elements on the ground floor; however, the commercial aspect is not part of the application process and is not included in this report.*

This report is aimed at providing an adequate level of life safety within the completed scheme. Any additional requirements aimed at property protection and/or extreme events will not be discussed in this report as they are beyond the scope of Building Regulations 2010.

The structure of this report follows the general format of Part B of the Building Regulations 2010 (i.e., sections B1 to B5).

## 1.1 Guidance

For the building, compliance with the above requirements will be achieved by the application of British Standard 9991:2015 (including BS 9999: 2017 and Approved Document B where appropriate) and supplementing this with fire engineering solutions when necessary to ensure that the key fire safety objectives for the design are achieved.

This legislation is primarily concerned with life safety and property protection is not specifically considered although the fire protection provisions to be provided for the building will offer some degree of property protection.

Furthermore, other issues such as insurer's requirements, cultural heritage, environmental, or continuity issues have not been specifically addressed or included within the development of the fire safety strategy.

## 1.2 Building Description

The Nicholsons House building is an eight-storey tower block with a height of approximately 26.7m (from ground floor to the topmost occupied floor level). The building consists of 42 residential apartments (6 units per floor level) that are located over the seven floor levels (floor levels 1-7). Furthermore, the building has a small basement level and mezzanine level on the ground floor level.

** Please note that there are commercial elements on the ground floor; however, the commercial aspect is not part of the application process and is not included in this report.*

On the basement level, there is a single ancillary space and on the ground floor level, there is a refuse store and cycle store. The mezzanine level on the ground floor level consists of a single ancillary space.

The building is served by two staircases (located on the East and West elevations) and two lifts (located on the West elevation). Due to the height of the building, all floor levels will be served by a firefighting shaft (fire-fighting stair and fire-fighting lift), an automatic sprinkler system and a dry riser main.

The following figures illustrate the plans of the development:

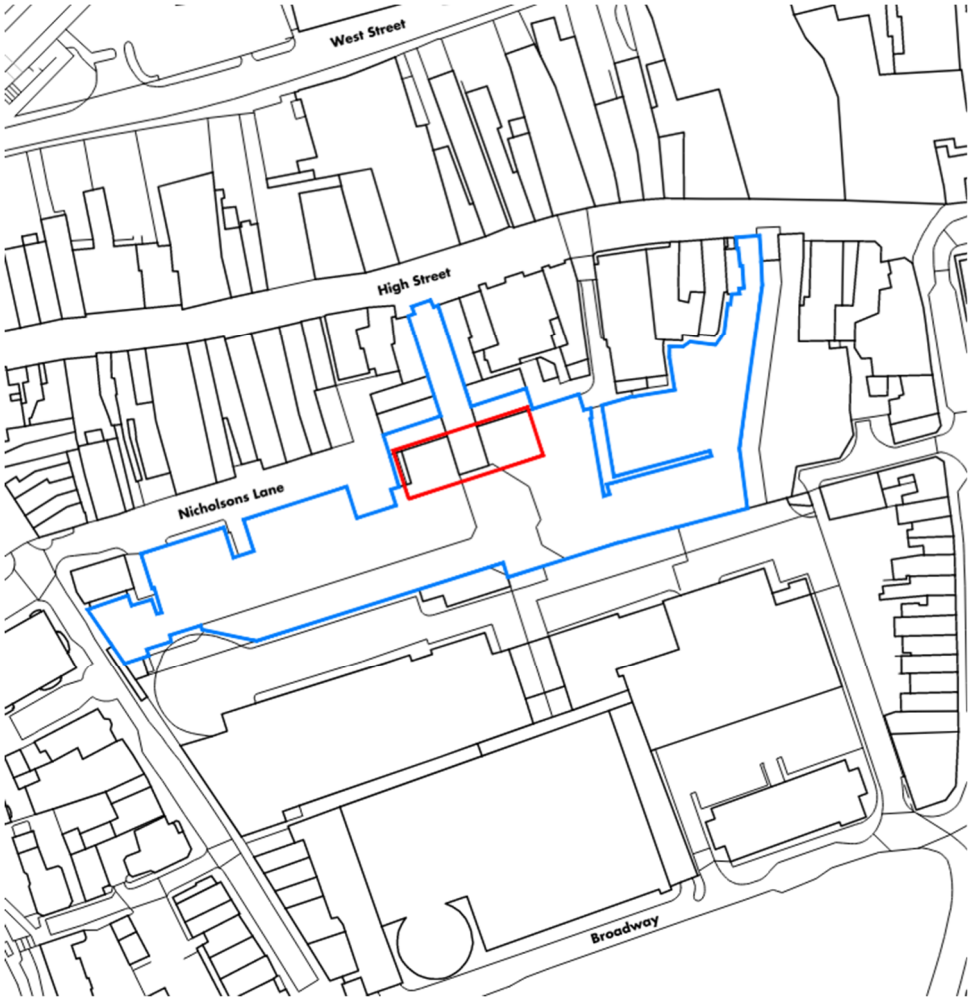



**Figure 1: Simplified Estate Layout**

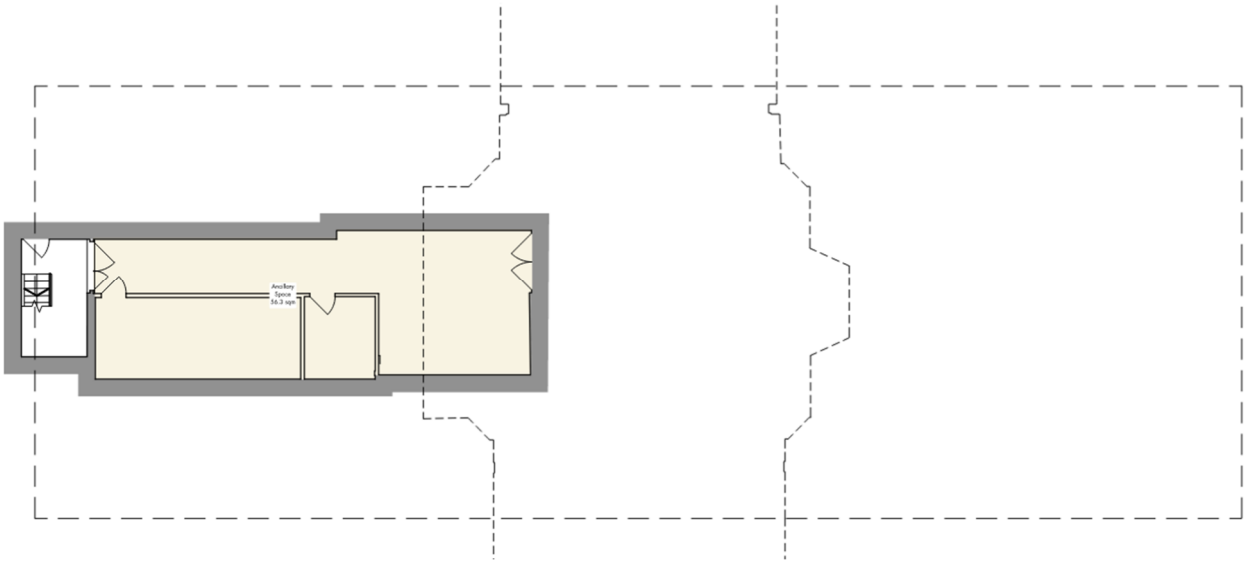


**Figure 2: Proposed Basement Level**

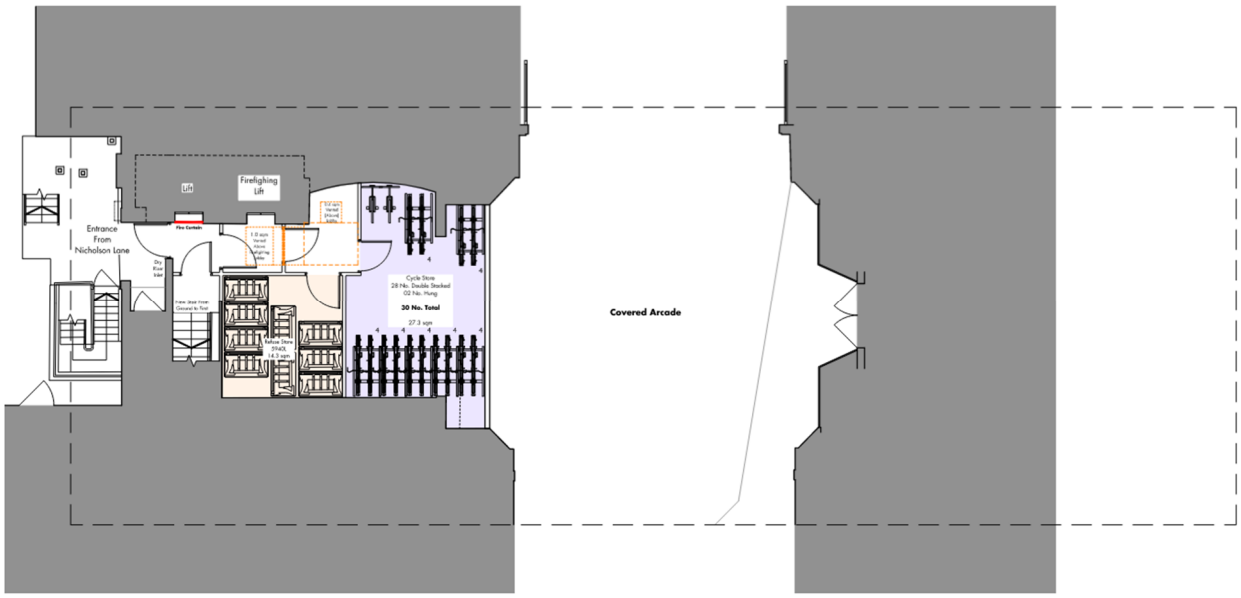



**Figure 3: Proposed Ground Floor Level**

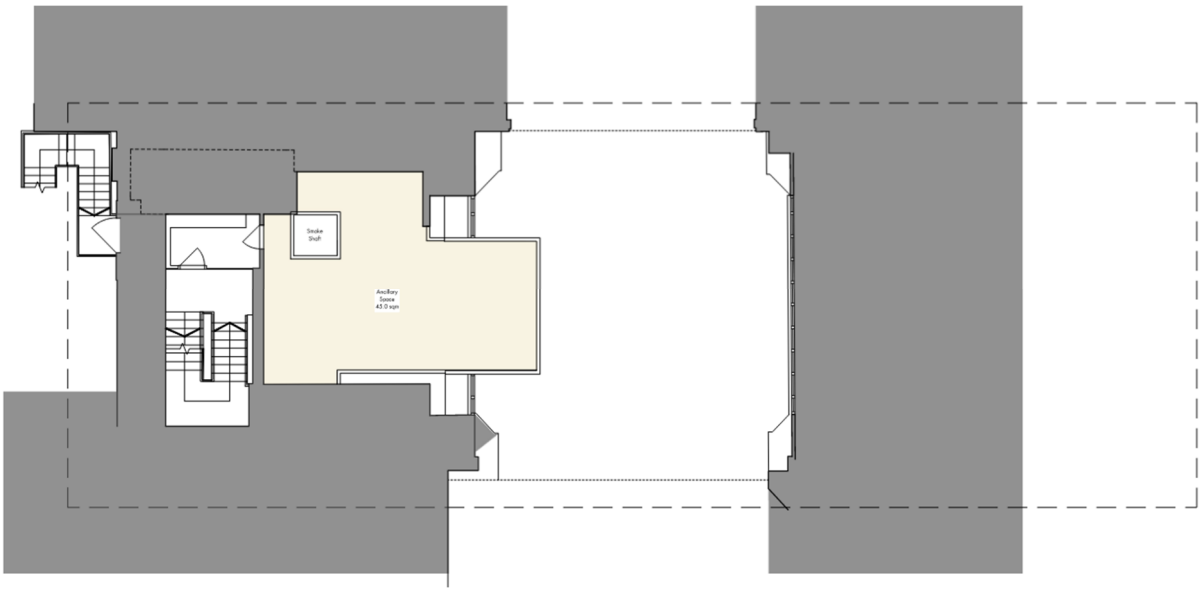



**Figure 4: Proposed Ground Floor Mezzanine Level**

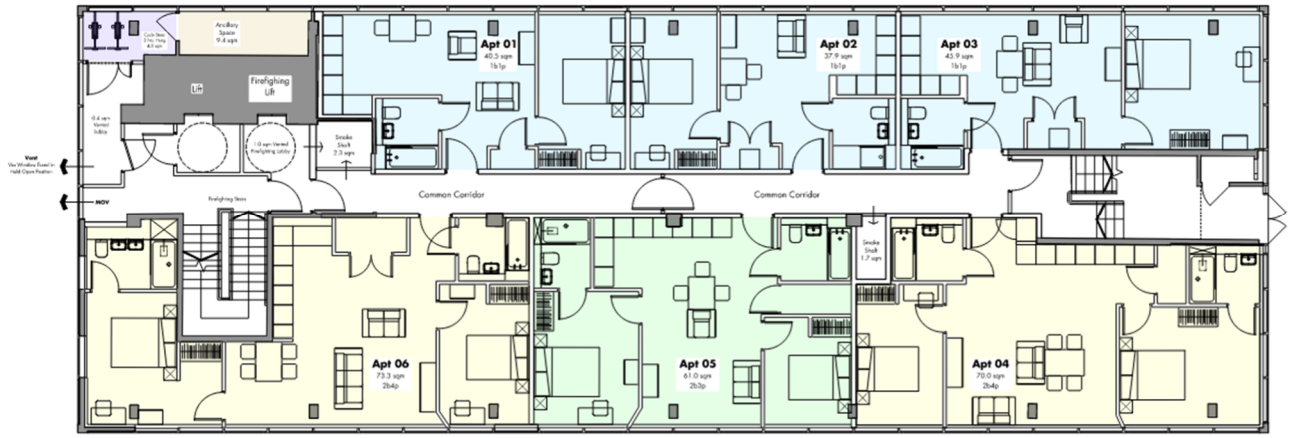



**Figure 5: Proposed First Floor Level**

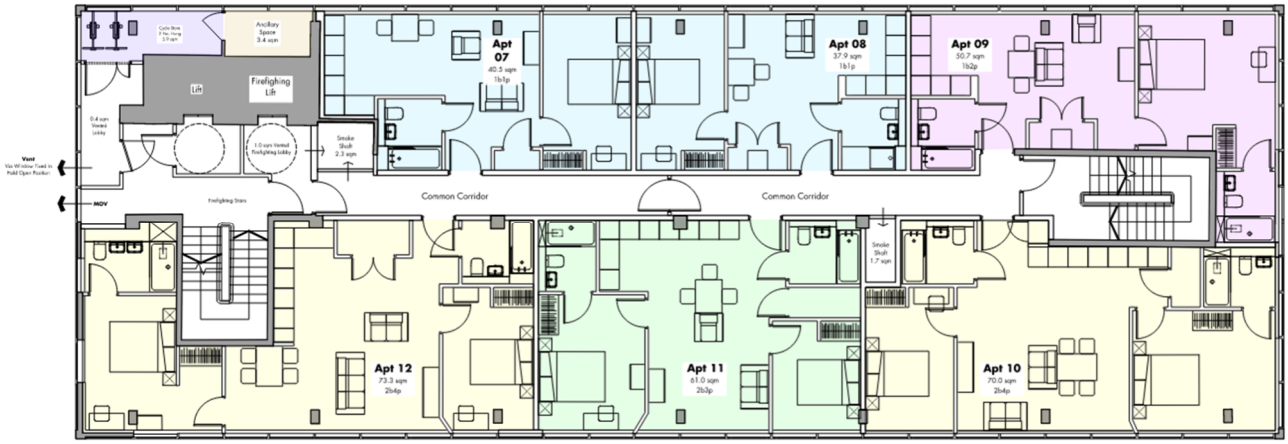



**Figure 6: Proposed Second Floor Level**

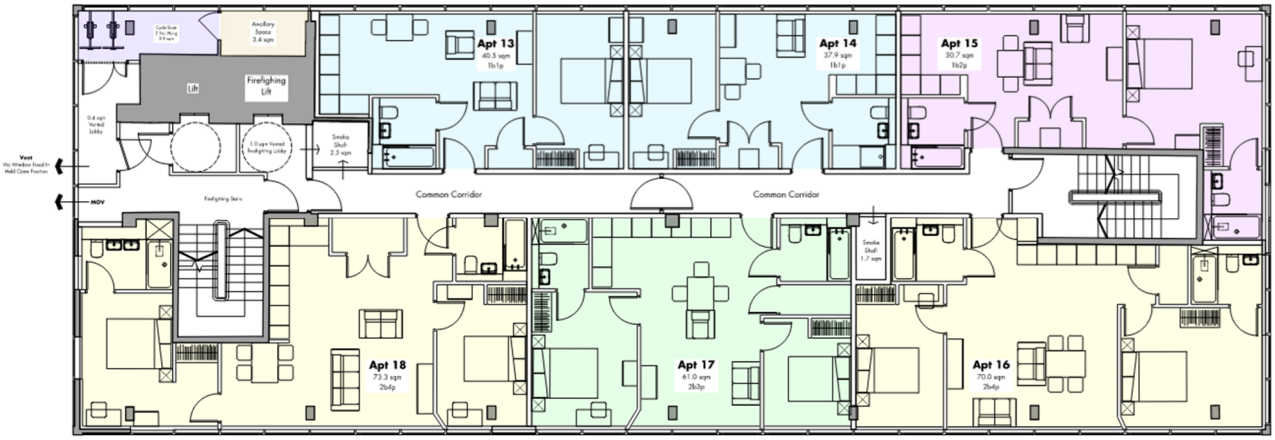



**Figure 7: Proposed Third Floor Level**

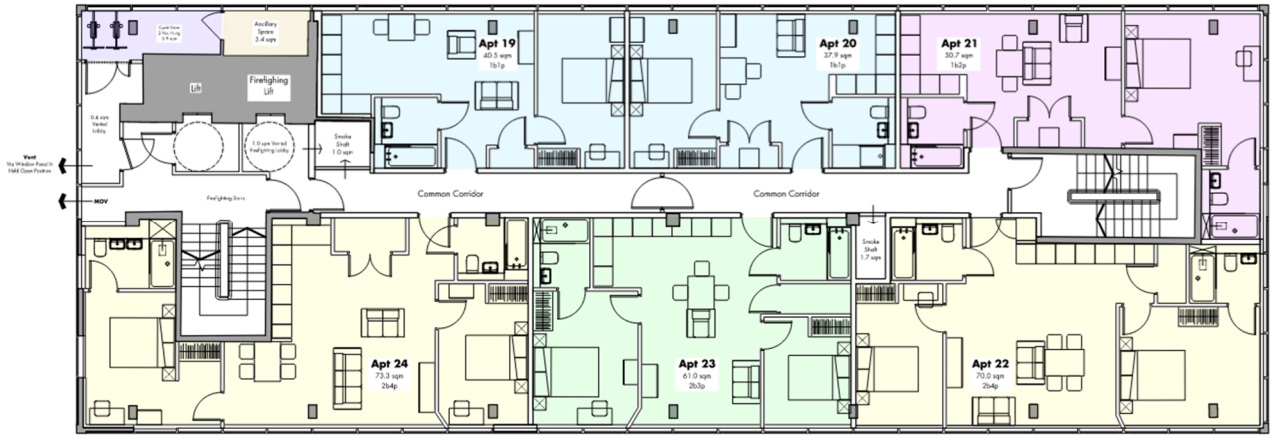



**Figure 8: Proposed Fourth Floor Level**

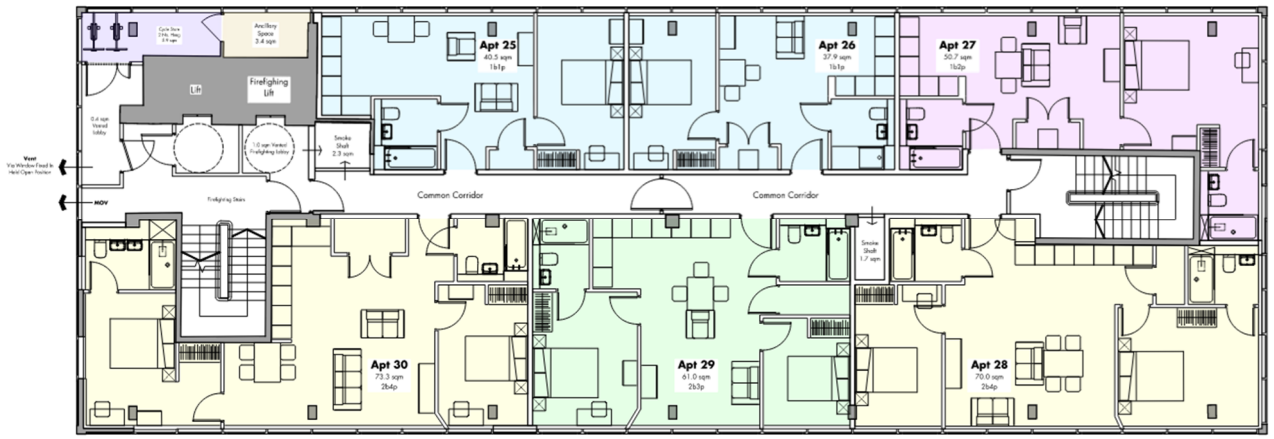



**Figure 9: Proposed Fifth Floor Level**

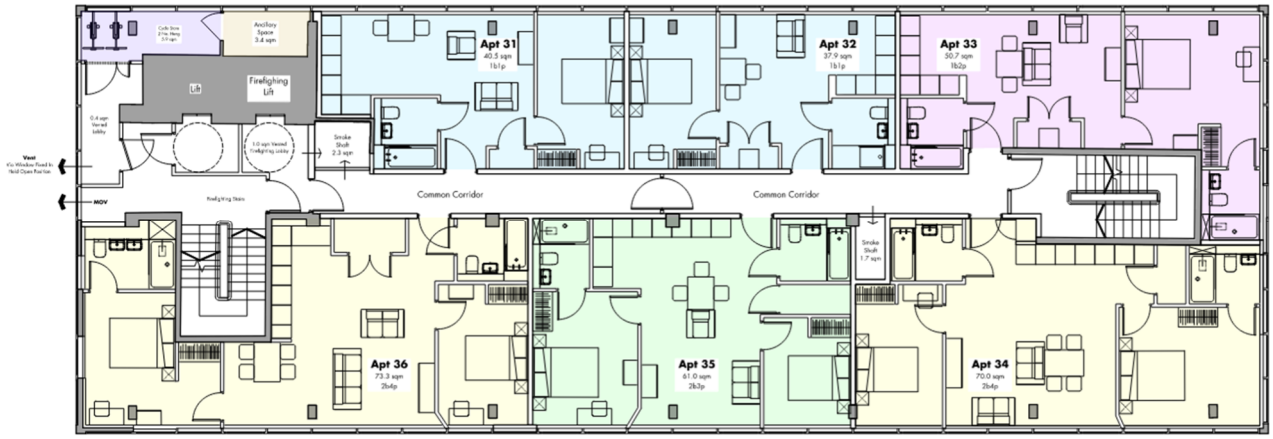



**Figure 10: Proposed Sixth Floor Level**

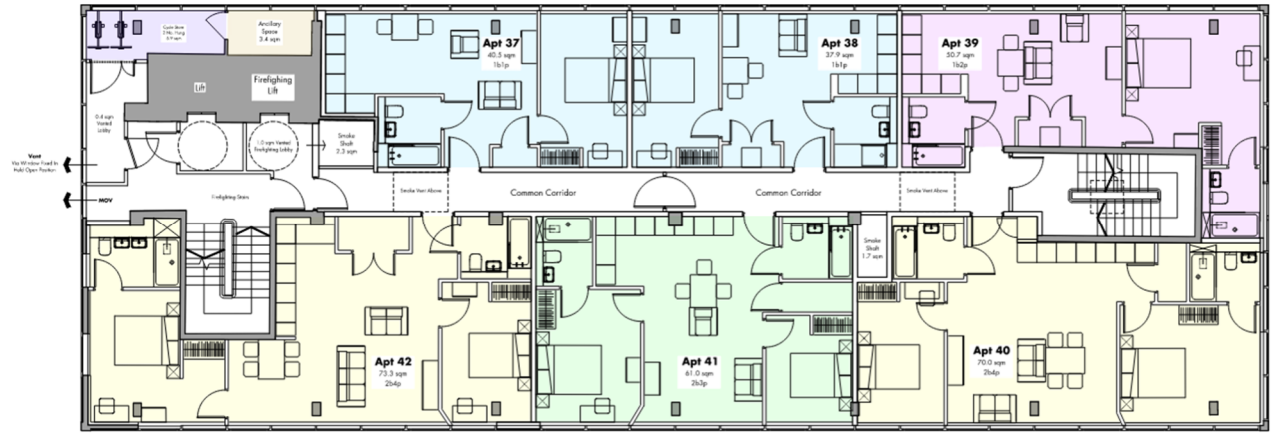



**Figure 11: Proposed Seventh Floor Level**

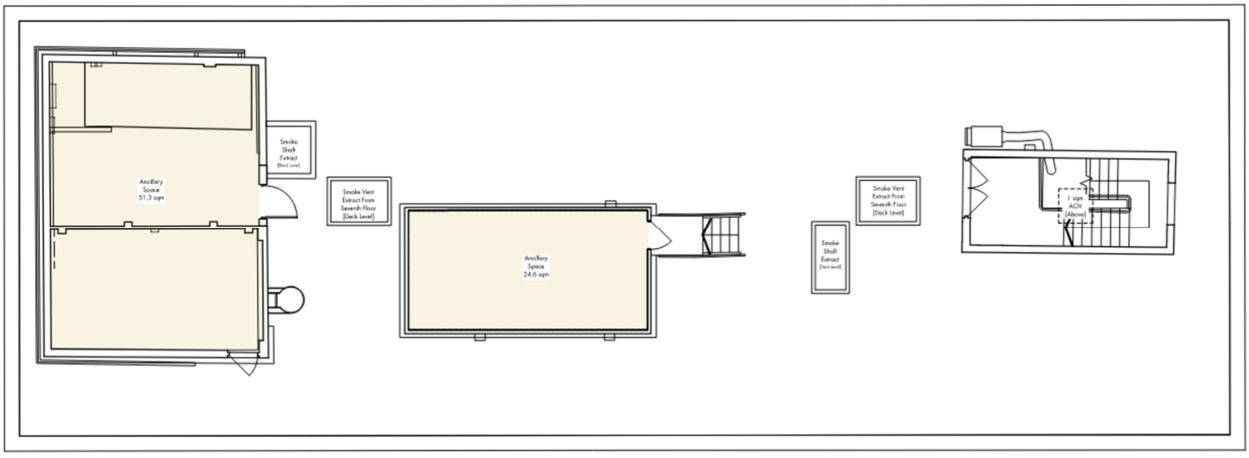


**Figure 12: Proposed Roof Level**

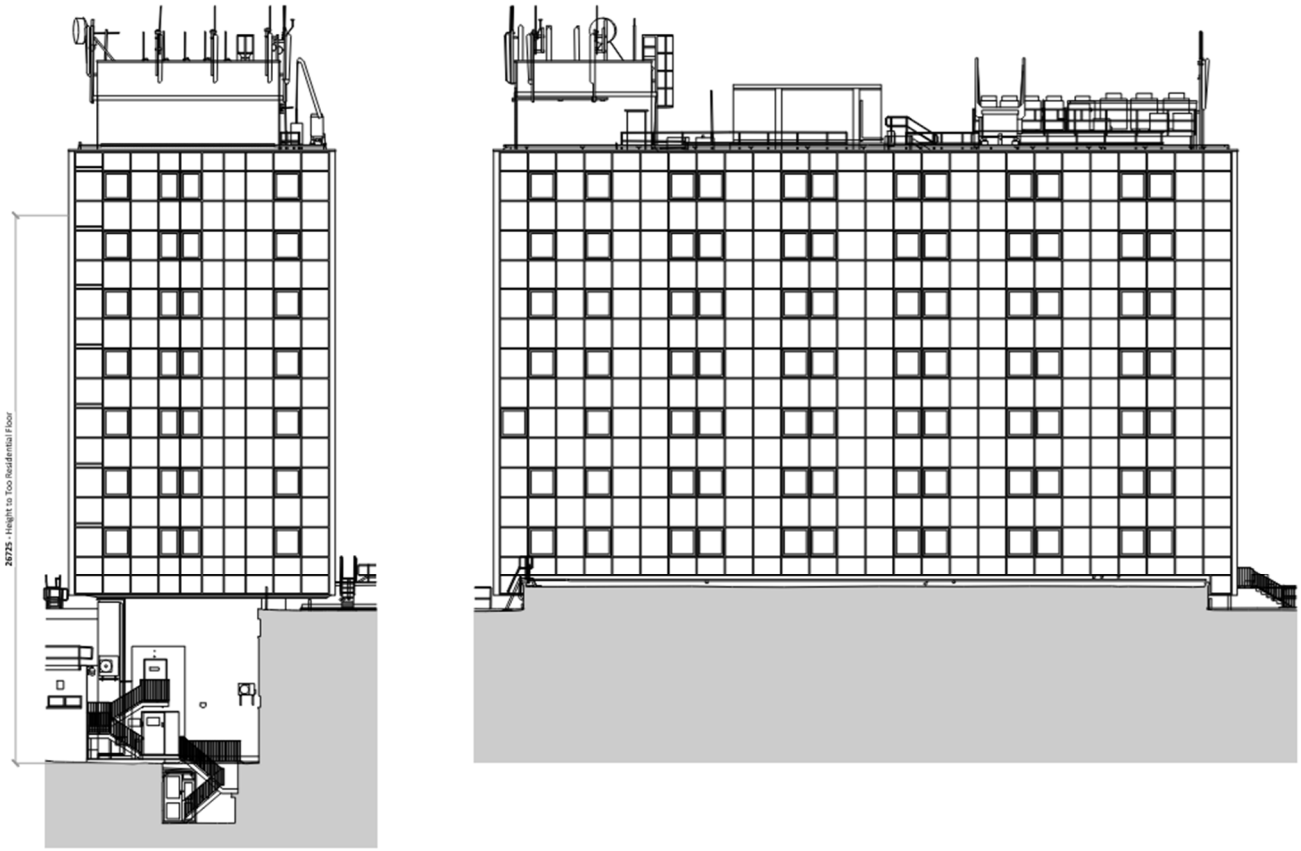



**Figure 13: Proposed Elevations 1 & 2**

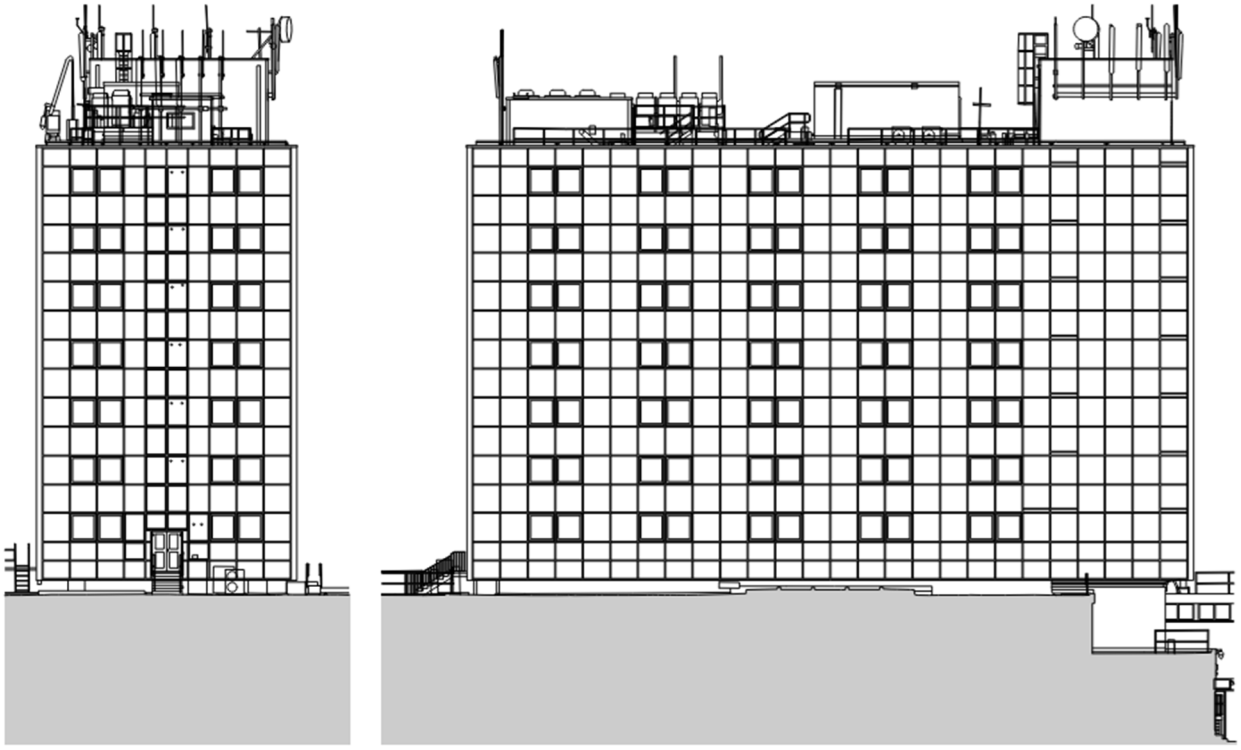


**Figure 14: Proposed Elevations 3 & 4**

### *1.2.1. Drawings*

This report is based on the drawings provided by Studio RBA architects. The GA plans are displayed in Table 1:

**Table 1: Drawing Reference**

| Drawing Number | Date | Description |
|---|---|---|
| RBA_286_(2-)_A100 | June 2024 | Proposed Basement Level |
| RBA_286_(2-)_A101 | June 2024 | Proposed Ground Floor Level |
| RBA_286_(2-)_A102 | June 2024 | Proposed Ground Floor Mezzanine Level |
| RBA_286_(2-)_A103 | June 2024 | Proposed First Floor Level |
| RBA_286_(2-)_A104 | June 2024 | Proposed Second Floor Level |
| RBA_286_(2-)_A105 | June 2024 | Proposed Third Floor Level |
| RBA_286_(2-)_A106 | June 2024 | Proposed Fourth Floor Level |
| RBA_286_(2-)_A107 | June 2024 | Proposed Fifth Floor Level |
| RBA_286_(2-)_A108 | June 2024 | Proposed Sixth Floor Level |
| RBA_286_(2-)_A109 | June 2024 | Proposed Seventh Floor Level |
| RBA_286_(2-)_A007 | June 2024 | Proposed Roof Level |
| RBA_286_(2-)_A008 | June 2023 | Proposed Elevations 1 & 2 |
| RBA_286_(2-)_A009 | June 2024 | Proposed Elevations 3 & 4 |

# 2 Means of Escape and Warning

## 2.1 Evacuation Philosophy

The evacuation strategy will be ‘stay put’ meaning that only the apartment on fire will evacuate and all the other areas will remain in place. Residents may feel the need to evacuate but this will be on their own accord. The ‘stay put’ policy will be supported by the compartment and fire resisting construction.

## 2.2 Fire Detection and Alarm Systems

### *2.2.1. Alarm Systems*

For all the residential apartments, a category LD1 (Grade D1) fire alarm and detection system in accordance with BS 5839: Part 6 will be installed and maintained.
For the common areas of the residential parts of the building, a category L5 system (BS 5839: Part 1) will be provided. The purpose of the system is to activate the ventilation on the affected fire areas. All non-residential areas will be provided with an L2 system (BS 5839: Part 1).

There may also be a requirement for a full evacuation system in line with the guidance of BS 8629:2019 system. This will be a standalone system which will be operated by the Fire Service if they feel that there is a need for a full building evacuation. The details of all AFDA standalone and interconnected systems will be subject to the detailed design.

### *2.2.2. Automatic Water Fire Suppression System (AWFSS)*

Due to the height of the topmost occupied floor level, an automatic category 4 sprinkler system will be provided throughout residential areas in accordance with BS 9251 (2021 edition).

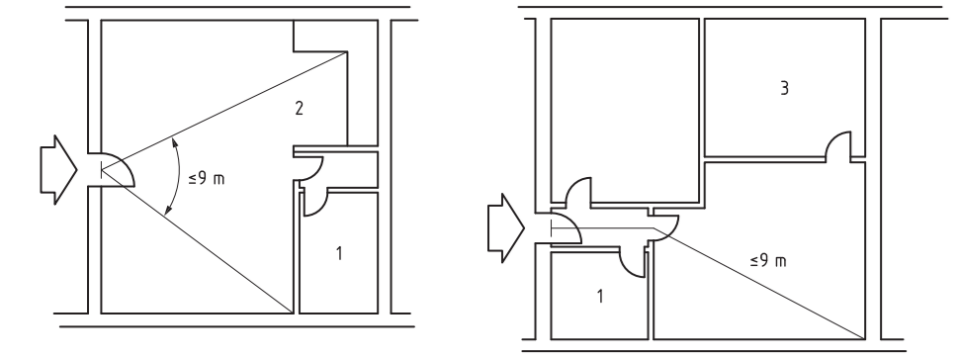
### *2.2.3. Cause and Effect Matrix*

The cause-and-effect matrix will be subject to detailed design from the AFDA designer and installer.

## 2.3 Means of Escape – Residential Areas

### *2.3.1. Apartments*

The guidance of clause 9.4 of BS 9991:2015 for an open plan apartment states that the total travel distance from any point of the flat to the entrance door of the flat should be limited to 9 m. This limit may be extended to 20m if an automatic sprinkler system and an LD1 AFDA system in accordance with BS 5839-6:2019 are installed. Any cooking facilities should be sited away from the flat entrance door and the internal escape route. The figure below illustrates the required open plan arrangement:




a) Open-plan flat (studio)

b) Flat with separate habitable rooms

**Key**

1 Bathroom
2 Kitchen area
3 Kitchen

Entrance to dwelling

**Figure 15: BS 9991 (Figure 10) - Apartments with Restricted Travel Distance**

### *1.3.2. Escape From Common Areas*

The guidance of BS 9991 for both travel distance limitations and ventilation requirements will be followed in all parts of the communal areas of the residential parts of the building. The figure below indicates a typical BS 9991 compliant arrangement with common corridor access:

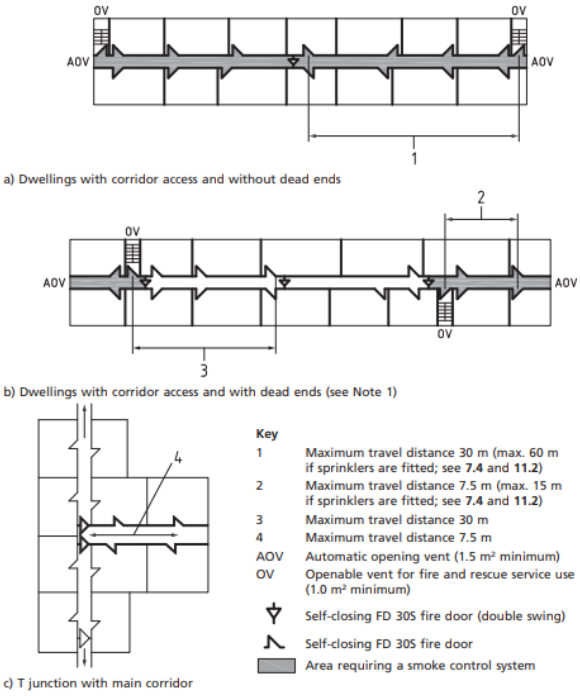



**Figure 16: BS 9991 (Figure 7) – Common Escape Routes in Multi-Stair Buildings**

### *1.3.3. Smoke Ventilation – Common Corridor*

The common corridor connects the two available stairway exits and as such will require the corridor to be separated with a central cross-corridor partition. The partition will include a double swing FD 30s fire door (with vision panel) that is fitted with a self-closing device.

The following figure shows the common corridor layout in the residential areas:

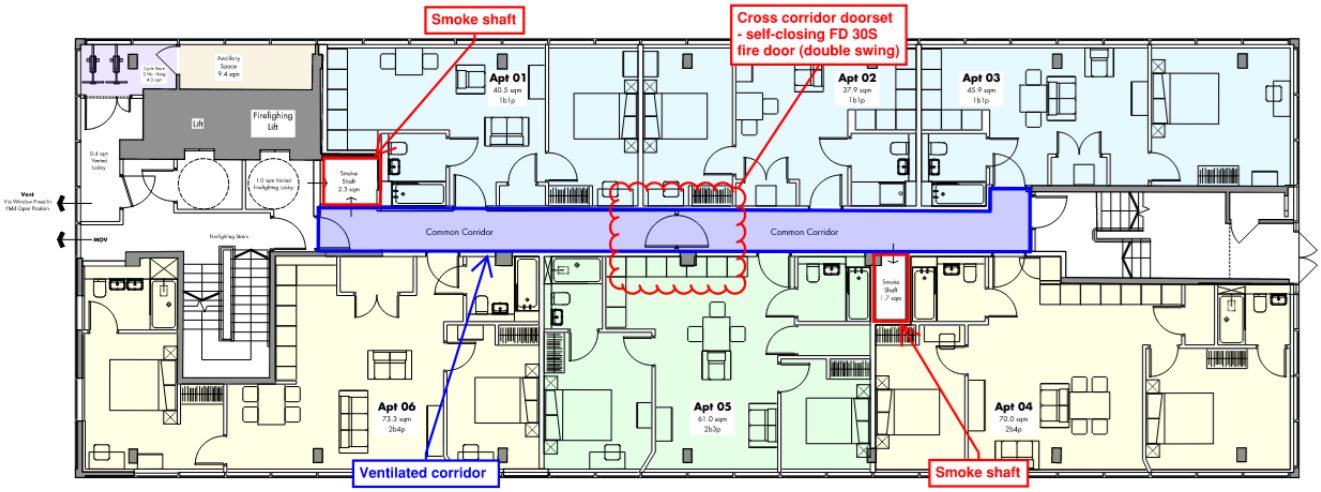



**Figure 17: Smoke Ventilation – Common Corridor**

The common corridor will require a smoke control system for the means of escape and due to the corridor separation, both sides of the corridor will require means of ventilation.

On the West corridor, the smoke control system will be achieved by the existing smoke shaft that is installed in the protected corridor. The smoke shaft will also serve the firefighting lift lobby and will require 1.5m$^2$ of minimum free area. The stairway (firefighting stair) will be served by MOV's (minimum free area of 1.0m$^2$) and will be positioned on the external wall at each storey. Where manually operated vents are used, the smoke control system should be designed to open the vent at the head of the stair either before, or at the same time as the vent on the fire floor.

The common corridor in front of the East stairway will be provided with smoke ventilation in the form of a natural smoke shaft with a minimum free area of 1.5m$^2$. The stairway will require ventilation in the form of AOVs located at the head of the stair. The recommendation is that the AOV is sited at as high a level as is practicable on the top storey of the stairway and having a minimum free area of 1.0m$^2$.

Due to building constraints, the common corridor on the seventh-floor level (topmost occupied floor) will be served by separate ventilation in the form of an AOV smoke vents (minimum free area of 1.0m$^2$) located in each section of the corridor.

### *2.3.4. Vertical Means of Escape*

#### *2.3.4.1. Escape Width*

For the purposes of this report, the width of a doorway is the clear width of the opening between the door leaf and frame (or projecting building hardware or the width between two opening door leaves in the case of double doors) assuming that the door leaf is free to open 90 degrees or more.

The minimum exit width for all exits must be 750mm.

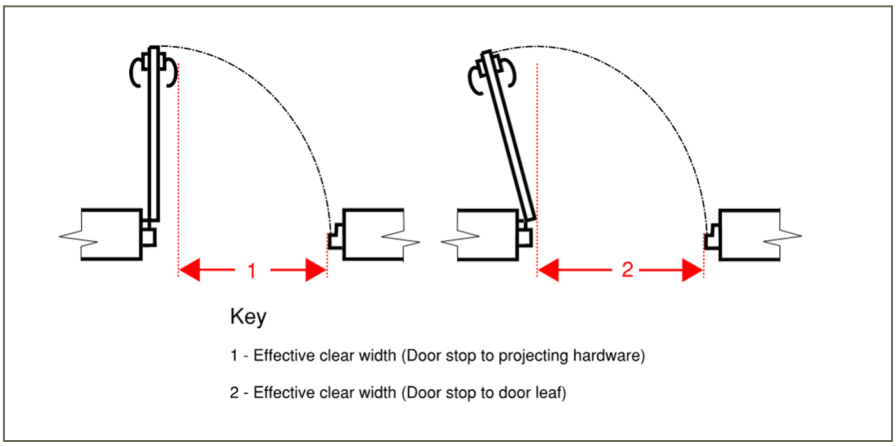



**Figure 18: Clear Exit Width**

The width of an escape route is the width at 1500mm above the pitch line when defined by the walls or the minimum width of passage available between any fixed obstruction (handrails fixed to the wall are ignored if less than 100mm).

All doors used for escape are to be provided with appropriate ironmongery for escape and should not be locked during material times.

*2.3.4.2. Stair Width*

The building escape strategy is based around the 'stay put' policy for all residential floor levels. However, the unobstructed width of each common stair should be not less than 750mm.

***Note:** Handrails and strings that do not intrude more than 100mm into these widths may be discounted when calculating the common stair width.*

## 2.4. Door Fastening Devices

A simple door fastening device must be provided on escape routes where the doors are required to have lockable devices. The mechanism must be easily operated from the inside (i.e. side of escape route).

Any secure doors provided with electromagnetically mains (or otherwise) powered locks must return to the unlocked position: Further recommendation on the failsafe of such devices is shown below:

- On loss of mains power or system error;
- Upon activation of the AFDA system;
- If a manual door release unit is activated (Type A) conforming to BS EN 54-11: 2001+A1 positioned at the door on the side approached by occupants making their evacuation. On circumstances where doors provide a means of escape in both directions the door fastening device must be installed on both sides of the door.

## 2.6 Emergency Lighting and Fire Exit Signage

Every escape route should be distinctively and conspicuously marked by emergency exit signage complying with the recommendations of BS ISO 3864: Part 1 and the Health and Safety (safety sign and signals) Regulations 1996. In general, signs containing symbols or pictograms that conform to BS ISO 3864: Part 1 satisfies these regulations.

'Fire door keep shut' or 'Fire door keep locked shut' signage should be provided to both sides of fire doors, except cupboard or riser doors which should be on the outside. Any held open fire doors should have automatic fire door keep clear signage.

The design and installation of the emergency escape lighting should be in accordance with BS 5266: Part 1.

## 2.7. Emergency Power – Life Safety Systems

All emergency power systems within the building must be designed and installed in accordance with the relevant standard. As a rule, all life safety systems e.g. emergency lights, suppression systems, detection systems, ventilation systems, fire/smoke dampers and firefighting lift, must be provided with alternative power supplies, in case of a power cut in the building mains. A standby power generator or an uninterrupted power supply (UPS) is recommended in the design (in accordance with BS 8519). Any power and control cabling – used as part of the life safety systems – must be of the category and fire survival time recommended by BS 8519.

## 2.8. Means of Escape for Persons with Mobility Impairments (MIPs*)*

Disable refuge areas are not required in the building due to the 'stay put' policy and sufficient compartment construction between the various building areas. However, if required, the evacuation of people with mobility impairments from the upper floor levels will be assisted using firefighting lift(s) which can also be used as evac-lifts. All areas from ground floor level will be provided with level access to the outside.

# 3 Internal Fire Spread (Linings)

The interior wall and ceiling surfaces in a building may have a significant influence on how fast a fire may develop. Building Regulations requires that internal linings shall adequately resist the spread of flame over their surfaces and, if ignited, have either, a heat release rate or a rate of fire growth, which is reasonable in the circumstances.

It is particularly important that in circulation spaces, where the rapid spread of fire is most likely to prevent occupants from escaping, the surface linings are restricted, by making provision for them to have low rates of heat release and surface spread of flame.

The surface finishes should satisfy the following classifications shown when tested under the European Classifications (in accordance with BS EN 13501-1:2002) as shown in the table below:

**Table 2: Wall and Ceiling Linings Classification**

| Location | European Class |
|---|---|
| Small room of area not exceeding 4m$^2$ for residential accommodation and 30m$^2$ for non-residential accommodation | D-s3, d2 |
| Other rooms and circulation spaces within dwellings | C-s3, d2 |
| Circulation spaces within the common areas | B-s3, d2 |

***Note 1:*** *When a classification includes 's3, d2' this means that there is no limit on the production of smoke or flaming droplets/particles.*

The surface linings of the walls and ceilings should generally conform to the classification recommended above for the appropriate location. However, parts of walls in rooms may be of a lower class but not lower than European Class D-s3, d2 provided that the floor area of those parts in any one room does not exceed one half of the floor area of the room, subject to a maximum of 20m$^2$ in residential accommodation and 60m$^2$ non-residential accommodation.

# 4 Internal Fire Spread (Structure)

## 4.1 Load Bearing Elements of Structure

All elements of structure will have to be provided with 90 minutes fire resistance. The elements of structure include, but are not limited to:

- A member forming part of a structural frame or any other beam or column or supporting element;
- A load bearing wall or load bearing part of a wall (internal or external);

- A compartment wall or floor;
- Any part of structure forming a floor;
- An external wall structure supporting fire protected elements for the prevention of external fire spread;
- Structure supporting roof top plant areas, i.e., heavy plant.

The period of fire resistance refers to the performance achieved by the structural elements when tested in accordance with the appropriate parts of BS 476: Parts 21-24 for load bearing elements of structure.

The elements of structure that support the roof only will not require any period of fire resistance.

Rooms of special fire hazard (such as plant rooms etc.) are to be enclosed within 60 minutes fire resisting construction.

### *4.1.2. Compartment Construction and Internal Fire Resistance*

In circumstances where one element of structure supports another element of structure, the fire resistance of the supporting structural component will not be less than the minimum period of fire resistance of the other element (regardless of the fact that it may not be a load bearing structural element).

The elements of structure that support the roof only will not require any period of fire resistance, unless the roof itself forms part of a means of escape route or functions as a floor, e.g. carrying heavy plant equipment or acting as a car park, or as part of a portal frame structure where the roof and the supporting stanchions form a single structural element.

The table below illustrates the required fire resistance within different parts of the building:

**Table 3: Fire Resistance Requirements**

| Part of the Building | Minimum provisions when tested to the relevant part of BS 476 (minutes) | | | Method of Exposure |
|---|---|---|---|---|
| | Load bearing capacity | Integrity | Insulation | |
| **Structural (Frame, Beam or Columns)** | 90 | N/A | N/A | Exposed faces |
| **Load Bearing Wall** | 90 | N/A | N/A | Each side separately |
| **Floors (all floors of the building)** Compartment Floors | 90 | 90 | 90 | From underside |
| **Compartment Walls (between different uses)** | 90 | 90 | 90 | Each side separately |
| **Roofs** Any part forming an escape route | 30 | 30 | 30 | From underside |
| **External Walls** | | | | |
| ➢ Any part <1000mm from the relevant boundary(1) | 90 | 90 | 90 | Each side separately |
| ➢ Any part >1000mm from the relevant boundary(1) | 90 | 30 | 15 | From inside the building |
| ➢ Any part adjacent to an external escape route | 30 | 30 | 30 | From inside the building |
| **Protected shafts** | | | | |
| ➢ Smoke shafts | 90 | 90 | 90 | Each side separately |
| ➢ Lift shafts | 90 | 90 | 90 | |
| ➢ Services risers | 90 | 90 | 90 | |
| **Fire-Fighting shafts** | | | | |
| ➢ Access route | 120 | 120 | 120 | Each side separately |
| ➢ Fire-fighting stairs | 120 | 120 | 120 | |
| ➢ Fire-fighting lift shafts | 120 | 120 | 120 | |
| ➢ Separation within the fire-fighting shaft | 60 | 60 | 60 | |
| **Enclosure** Residential Apartments | 60 | 60 | 60 | Each side separately |
| **Fire Resisting Construction** Ancillary accommodation | 60 | | | Each side separately |
| **Cavity Barriers** | N/A | 30 | 15 | Each side separately |

*4.1.2.1. Apartment Construction*

The required compartment construction for the apartments is 60 minutes fire resistance for the compartment walls and 30-minute FD30s fire doors for the apartment entrance. The following figure is an example of the recommended fire resistance for the compartmentation of the apartments:

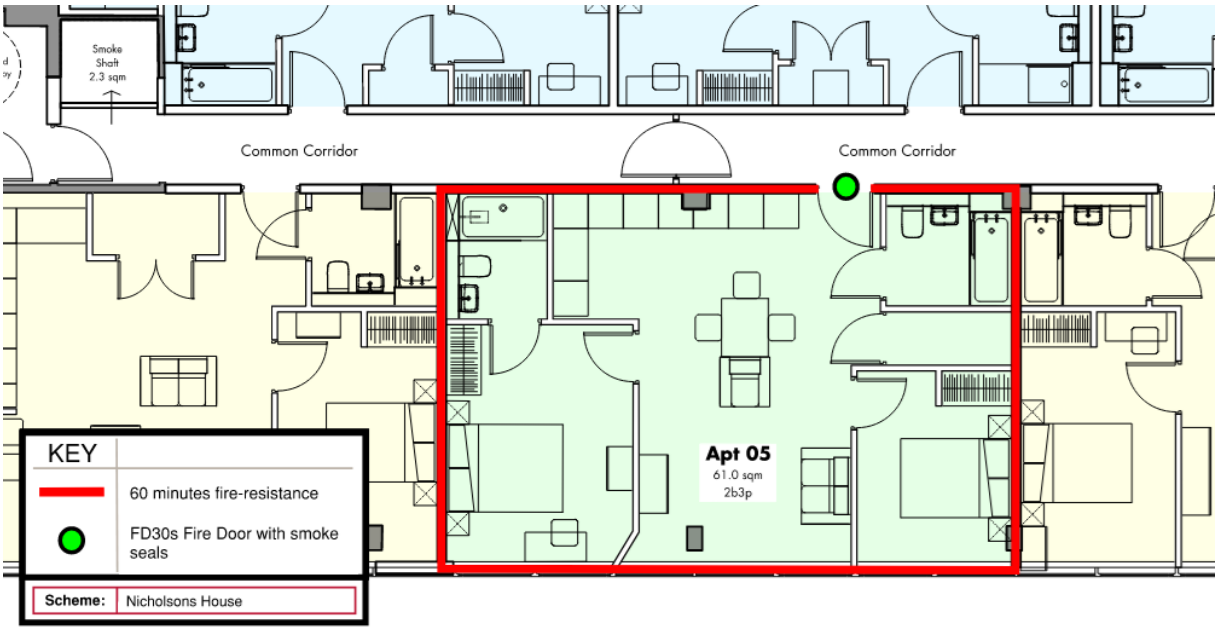



**Figure 19: Compartmentation – Example of Apartment Layout**

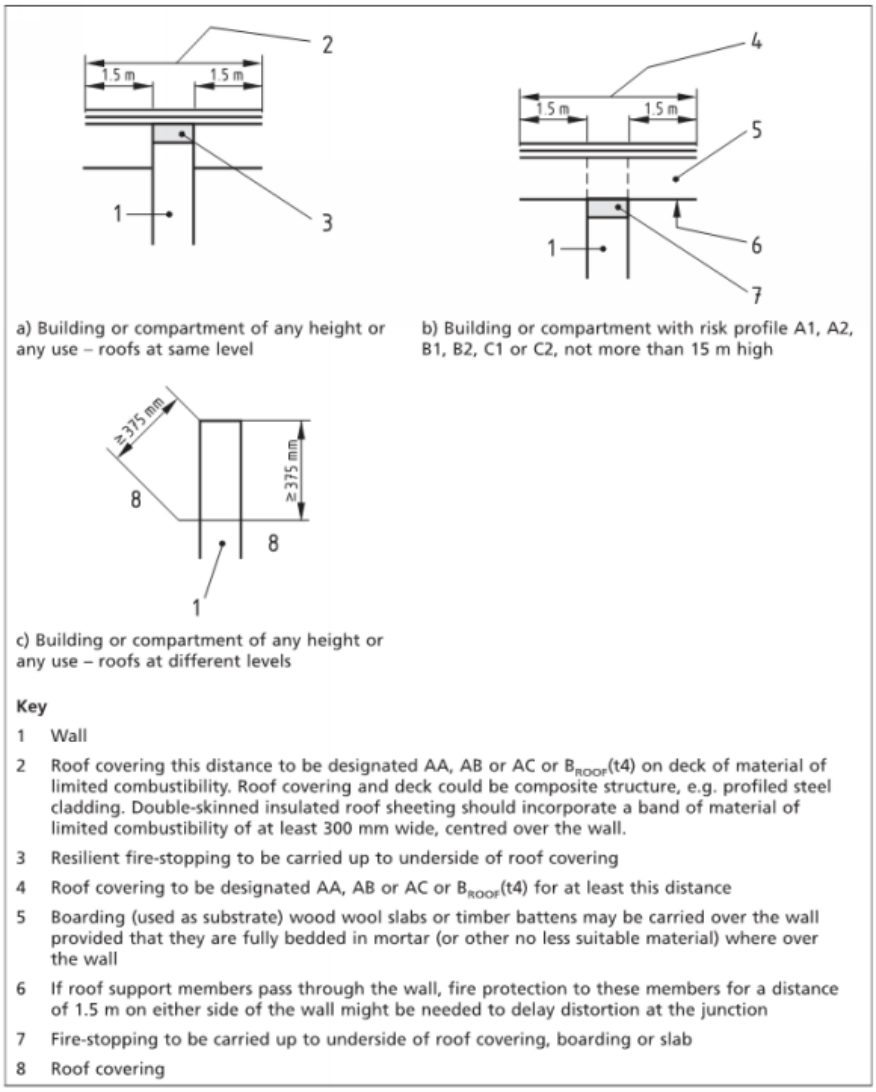
## 4.2. Junctions of Compartment Construction

### *4.2.1. Junction of compartment walls and floors with other walls*

The guidance of BS 9991 and BS 9999 has been followed in this outline Fire Strategy report which means that where a compartment floor or a compartment floor meets another wall, or in cases where it meets an external wall then the junction will be provided with the same fire resistance.

### *4.2.2. Junction of compartment walls and roofs*

The following figure demonstrates the principle of junctions between walls and roofs (Figure 30 from BS 9999):




a) Building or compartment of any height or any use – roofs at same level

b) Building or compartment with risk profile A1, A2, B1, B2, C1 or C2, not more than 15 m high

c) Building or compartment of any height or any use – roofs at different levels

**Key**

1 Wall

2 Roof covering this distance to be designated AA, AB or AC or $B_{ROOF}(t4)$ on deck of material of limited combustibility. Roof covering and deck could be composite structure, e.g. profiled steel cladding. Double-skinned insulated roof sheeting should incorporate a band of material of limited combustibility of at least 300 mm wide, centred over the wall.

3 Resilient fire-stopping to be carried up to underside of roof covering

4 Roof covering to be designated AA, AB or AC or $B_{ROOF}(t4)$ for at least this distance

5 Boarding (used as substrate) wood wool slabs or timber battens may be carried over the wall provided that they are fully bedded in mortar (or other no less suitable material) where over the wall

6 If roof support members pass through the wall, fire protection to these members for a distance of 1.5 m on either side of the wall might be needed to delay distortion at the junction

7 Fire-stopping to be carried up to underside of roof covering, boarding or slab

8 Roof covering

**Figure 20: Junction of Compartment Wall and Roof**

## 4.3. Fire Doors

All fire doors should be provided to all fire resisting enclosures in accordance with BS 476: Part 22 and specified with ‘smoke seals’ in accordance with the recommendations of BS 476: Part 31.

All fire doors within fire resisting compartment walls should achieve the same level of fire resistance as the wall itself, although fire doors to the protected stairs and any service risers may be half the fire resistance of the wall.

Any doors to storerooms, risers, cupboards, and plant rooms that are normally locked shut should be fitted with self-closing devices. In the case of an emergency, any hold open devices should release the door on activation of fire alarm systems.

The fire doors are designated by reference to their recommended performance (in minutes) for integrity only, and whether they need to retard the passage of smoke at ambient temperature. For example, the reference FD30 is a door that should achieve not less than 30 minutes fire integrity. The addition of an S to the reference to form FD 30S means that the door will require smoke seals. An overview of the fire door requirements is tabulated below:

**Table 4: Fire Door Requirements**

| Position of door | Minimum fire resistance of door in terms of integrity |
|---|---|
| Protected entrance halls/stair landings in residential apartments | FD30 |
| Apartment entrance doors | FD30S (self-closing) |
| Protected lift doors | Half the fire resistance of the wall for which it forms part of |
| Fire-fighting stair doors | FD60S (self-closing) |
| Fire-fighting lift doors | FD60 |
| Service riser doors | Half the fire resistance of the wall for which it forms part of |
| Smoke shaft doors | Half the fire resistance of the wall for which it forms part of |
| Ancillary Accommodation | The same fire resistance of the wall for which it forms part of |

***Note:*** *Rooms housing life safety systems should include FD120 or two FD60 doors entering the room.*

## 4.4. Concealed Spaces

Concealed spaces or cavities in the construction of the building provide a ready route for smoke and flame spread, especially in voids above and below ceilings/floors. As the smoke or flames would be concealed it presents a greater danger. For more information on concealed spaces see Clause 19 from BS 9991:2015.

Compartment walls should be carried up to compartment floors or the roof. It is therefore not appropriate to complete a line of compartment construction by fitting cavity barriers above the compartment wall.

Cavity barriers should therefore be provided to sub-divide the cavities to restrict the spread of smoke and flame spread and should be provided in the following areas;

- Around openings and to close off edges of cavities Note 1;
- At the junction between an external cavity wall and any wall, floor or door assembly which forms a fire resisting barrier (fire stopping);

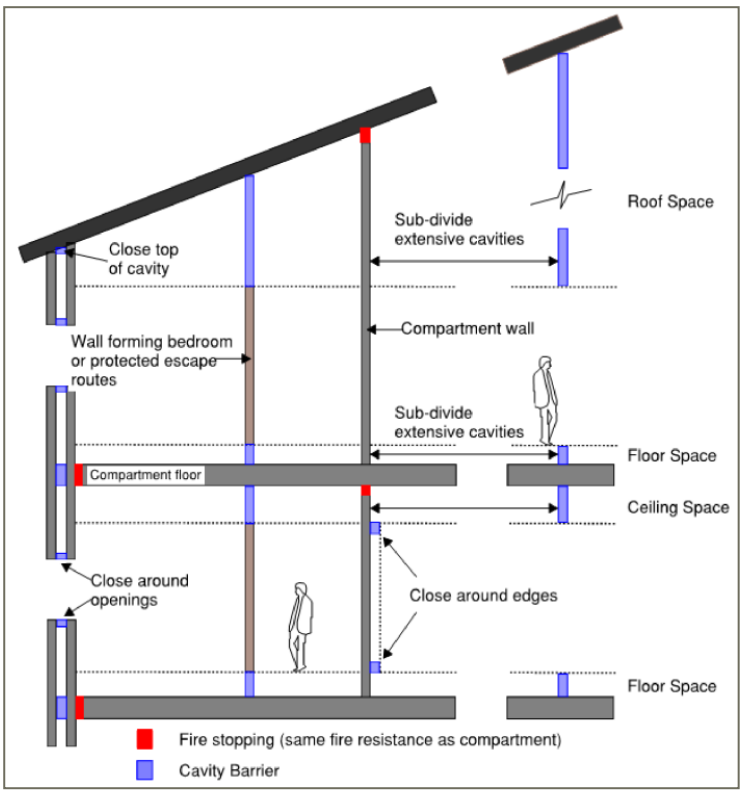



**Figure 22: Junction of Compartment Wall and Roof**

***Note 1:*** *Where Steel Framing Systems (SFS) is used, if the steel supports the structure, fire stopping (to the same fire resistance as the elements of structure) should be in place of cavity barriers around openings and to close top of cavities.*

A cavity that exists above or below partitions between bedrooms because the enclosures are not carried to full storey height or (in the case of the top storey) to the underside of the roof covering should;

- Fitted with cavity barriers on the line of the partitions (as indicated within the figure above); or
- For cavities above the partitions, enclosed on the lower side by a fire resisting ceiling which extends throughout the building, compartment or separated part.

***Note:*** *For more information see Clause 19.1.2 from BS 9991.*

Where a single room exceeds 20m in any direction, cavity barriers within the ceiling void (and within any floor voids) need only to be placed on the line of enclosing walls/partitions of any room. In addition, where services penetrate any fire-resisting floors to avoid vertical and horizontal voids meeting, every cavity barrier should be constructed to at least 30 minutes fire resistance. It may be formed by any construction provided for another purpose if it meets the provisions for cavity barriers. Cavity barriers in a stud wall or provided around openings should follow the guidance from Clause 19.2 from BS 9991.

The cavity barriers wherever possible be tightly fitted to a rigid construction and mechanically fixed in position. Where this is not possible the junction should be fire stopped.

- The cavity barriers are no more than 30m apart; and
- The surface of the material/product exposed in the cavity being Class C-s3, d2 or better (European Class).

## 4.5. Protection of Openings and Fire Stopping

If the fire separating element is to be successful, every joint or imperfection fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire stopping so that the fire resistance of the element is not impaired. Fire stopping should achieve the same fire resistance as the wall/floor it is fitted.

Pipes that pass through a fire separating element, should meet one of the following provisions;

- Proprietary seals - Provide a proprietary sealing system which has been shown by test to maintain the fire resistance of the wall, floor or cavity barrier;
- Restricted pipe diameter - Where a proprietary sealing system is not used, fire stopping may be used around the pipe, keeping the opening as small as possible. The nominal internal diameter of the pipe should not be more than the relevant dimension given in the table below:

**Table 5: Maximum Nominal Diameter of Pipes Passing Through Elements**

| Situation | Pipe Material and Maximum Nominal Internal Diameter (mm) | | |
|---|---|---|---|
| | Non-Combustible Material | Lead, Aluminium, Aluminium Alloy, uPVC, Fibre Cement | Any Other Material |
| Structure (but not a wall separating the existing and proposed building) enclosing a protected shaft which is not a stairway or lift shaft | 160mm | 110mm | 40mm |
| Compartment Wall or compartment floor between flats | 160mm | 160 (Stack pipe) Note 1<br>110 (Branch pipe) Note 2 | 40mm |
| Any other situation | 160mm | 40mm | 40mm |

***Note:*** *Any non-combustible material which, if exposed to a temperature of 800$^{O}$C, will not soften or fracture to the extent that flame or hot gas will pass through the wall of the pipe.*

***Note 1****: UPVC pipes complying with BS 4514:2001 and uPVC pipes complying with BS 5255:1989.*

***Note 2****: These diameters are only in relation to pipes forming part of an above-ground drainage system and enclosed as shown in Diagram 38 of Approved Document B Volume 2. In other cases, the maximum diameters against Situation 3 apply.*

- **Sleeving** - A pipe of lead, aluminium, aluminium alloy, fibre-cement or uPVC, with a maximum nominal internal diameter of 160mm, may be used with a sleeving of non-combustible pipe. The opening in the structure should be as small as possible and provide fire stopping between the pipe and structure. The sleeve should extend be no less than 1000mm either side of the structure as indicated in Figure 23 below:

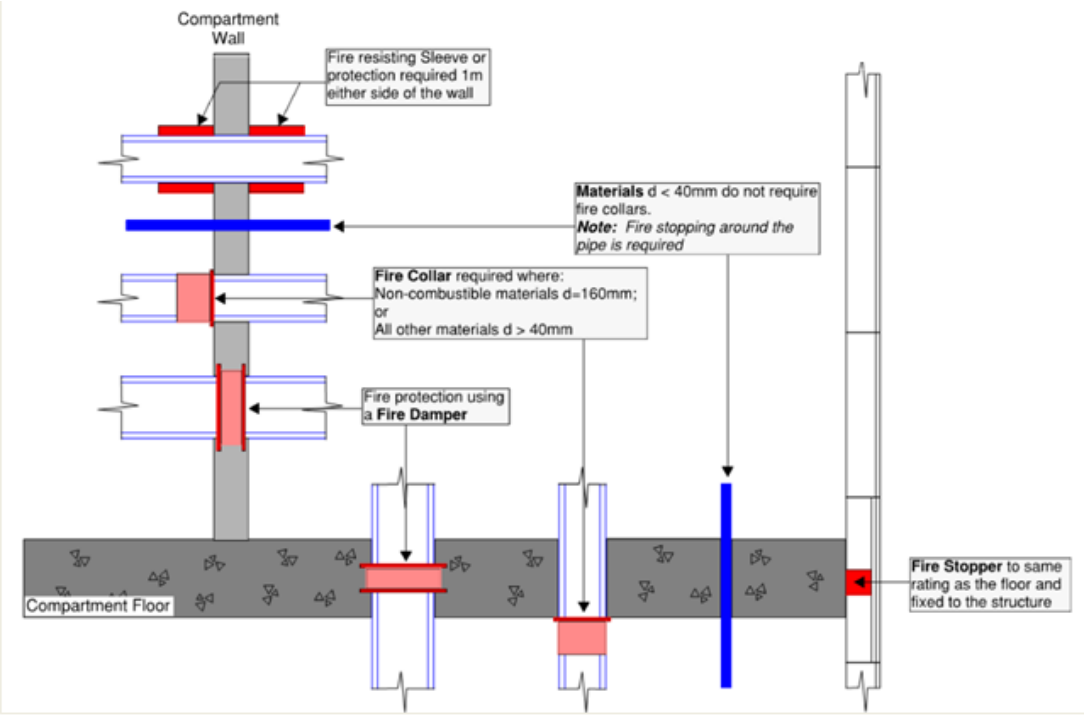



**Figure 23: Protection of Openings and Fire Stopping**

### *4.5.1. Ductwork*

Where a ductwork system serves more than one part of a compartment or fire separated protected escape route, smoke detector operated fire dampers should be provided where ductwork enters each fire separated section of the escape route. For more information see Clause 21 of BS 9991:2015.

Any ductwork passing through a protected stairway, lobby or corridor without an opening into that area should be fire resisting.

BS 9991:2015 section 21.2 references out to BS 9999:2017 for more information on how to protect the ductwork and air transfer grills see Clause 32.5.2 of BS 9999:2017.

The requirements for each option are indicated below;

***Method 1*** *– Thermally actuated fire dampers;*

- Fire dampers that are thermally operated can be provided where ductwork goes though fire resisting construction;
- Fire dampers are not suitable for protected escape routes.

***Note:*** *Fire dampers should be tested to BS EN 1560:2010. They should have an E classification equal to or greater than 60 minutes.*

***Note****: Method 1 is not suitable for ductwork serving kitchen extracts.*

***Method 2*** *- Fire resisting enclosures;*

- The fire resisting enclosures should achieve the same fire resistance as the wall the ductwork penetrates which forms a compartment known as a protected shaft. This allows a multiplicity of services to be transferred together with the duct to traverse a number of compartments within the building without the need for further subdivisions. Fire dampers (thermally or actuated by AFD) will only be required where the ductwork enters or leaves the protected shaft.
- Method 2 can only be used on ductwork that passes through an escape route providing the ductwork does not serve the escape route it passes through.

***Method 3*** *- Protection using fire resisting ductwork;*

- The ductwork itself forms a protected shaft. The ductwork should achieve the same fire resistance as the wall the ductwork penetrates. The fire resistance can be achieved by the ductwork material itself, or through the application of a protective material.
- Method 3 can only be used on ductwork that passes through an escape route providing the ductwork does not serve the escape route it passes through.

***Note:*** *The supporting hangers should be capable of supporting the ductwork for not less than the period of fire resistance of the ductwork.*

***Method 4*** *– Automatically actuated fire and smoke dampers triggered by smoke detectors;*

- Method 4 may be used for extract ductwork passing through the enclosures of protected escape routes, both where the ductwork does and does not serve the escape route.

***Note****: Method 4 is not suitable for ductwork serving kitchen extracts.*

***Note:*** *Fire and smoke dampers should be tested to BS EN 1560:2010. They should have an ES classification equal to or greater than 60 minutes.*

### *4.5.2. Air Transfer Grilles*

Any air transfer grilles required as part of the ventilation system should not be provided within enclosures to protected stairs, protected lobbies and compartment walls and floors. Air transfer grilles located in any fire hazard rooms should be provided with both fire and smoke containment. Any transfer grilles fitted in fire doors will need to be accompanied by a test certificate provided by the door manufacturer. For more information see Clause 36 from BS 9991:2015.

### *4.5.3. Voids over 800mm in depth (non-residential accommodation only)*

Any building voids over 800mm in depth (in non-residential accommodation only), will need to be provided with fire and smoke detection.

# 5 External Fire Spread

## 5.1 Fire Spread Between Buildings

The proposal is to change the use of the building i.e. from office to residential, and therefore an External Fire Spread analysis will be required. However, the building will further be enhanced by the high level of compartmentation and the provision of a sprinkler system. In addition, the building is an existing development and therefore it is reasonable to assume that the distances to the notional/relevant boundaries will not be

changed. The External Fire Spread analysis may not be deemed necessary, however, this will be confirmed in the detailed Fire Strategy Report.

## 5.2 Roof Coverings

Roof coverings refer to the external material layers, not the roof structure as a whole. The table below describes the separation distances according to the type of roof covering as described within Section 35.4.2 from BS 9999:2017.

**Table 6: Roof Coverings Classification and Spacing**

| Designation of Covering of Roof or Part of Roof | Minimum Distance from any Point to Relevant Boundary | | | |
|---|---|---|---|---|
| European Class | Less than 6 m | At Least 6 m | At Least 12 m | At Least 20 m |
| $B_{ROOF}$(t4) | Acceptable | Acceptable | Acceptable | Acceptable |
| $C_{ROOF}$(t4) | Not acceptable | Acceptable | Acceptable | Acceptable |
| $D_{ROOF}$(t4) | Not acceptable | Acceptable [(1)(2)] | Acceptable[(1)] | Acceptable |
| $E_{ROOF}$(t4) | Not acceptable | Acceptable | Acceptable [(1)] | Acceptable |
| $F_{ROOF}$(t4) | Not acceptable | Not acceptable | Not acceptable | Acceptable[(1)(2)] |

*[1] Not acceptable on any buildings with a volume of more than 1500m$^3$.*

*[2] Acceptable on buildings not listed in Note 1, if part of the roof is no more than 3m$^2$ in area and is at least 1500mm from any similar part, with the roof between the parts covered with a material of limited combustibility.*

## 5.3 External Wall Construction

### *5.3.1 Spread of Flame Classification*

All materials and products used in the external walls and building envelope must achieve A2-s1, d0 or A1 classification to BS EN 13501-1.

# 6. Fire-Fighting Provisions

## 6.1. Fire-Fighting Shaft

The finished floor level of the building is more than 18m and therefore the provision of firefighting shaft(s) is required for the development. The fire-fighting shaft(s) should be in accordance with BS 9991:2015 and include:

- A fire-fighting stair, with a minimum width of 1100mm, designed in accordance with BS 5395:1;
- A fire-fighting lift designed and installed in accordance with BS EN 81-72:2015;
- A ventilated fire-fighting lobby;
- A dry rising main designed and installed in accordance with BS 9900:2015, with outlets at all levels (including the roof).

The siting of the firefighting lift(s) should comply with the guidance of BS 9991:2015 and situated within the maximum travel distance of 7.5m from the fire-fighting stair.

The fire-fighting shaft requirements from Clause 50.3.2.2 and Figure 35 from BS 9991:2015 are shown below:

**Extract from BS 9991:2015 (Clause 50.3.2.2)**

*'The fire-fighting lift may open directly into the protected corridor or protected lobby, but the fire-fighting lift landing doors should not be placed more than 7.5 m from the fire-fighting stair and should not be located within the stair enclosure, even if the building is being refurbished'.*

Figure 35 **Components of a residential fire-fighting shaft**

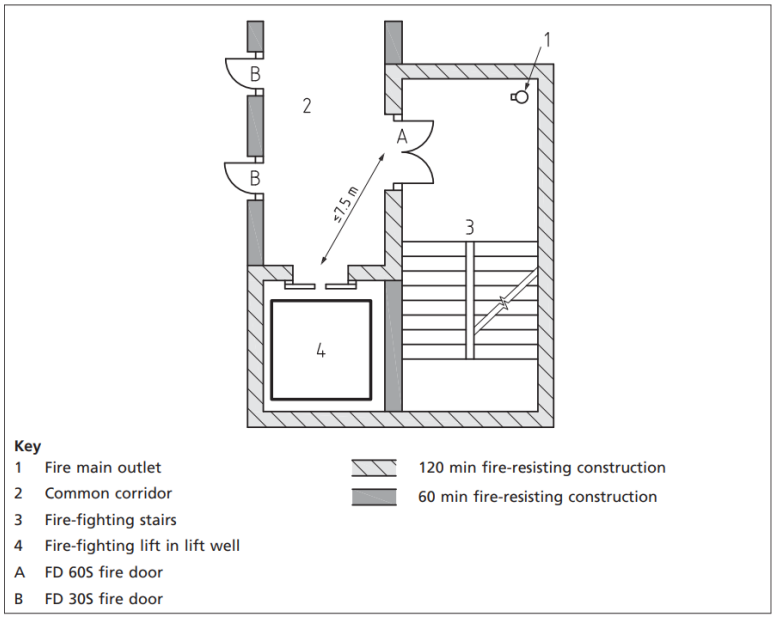



**Figure 24: BS 9991 – Figure 35 (Components of Fire-Fighting Shaft)**

## 6.2. Dry Risers

The requirement of dry risers will need to be included in the building with an inlet just outside the ground floor level. The outlets (landing valves) should be situated on the first floor and all the other upper levels respectively (including the roof).

There have been provisions made for a firefighting appliance to be able to park within 18m from a dry riser inlet. In addition, it should be noted that for the building the hose distances to all points do not exceed the 60m (with sprinkler provision) from the dry riser outlets in the fire-fighting shaft.

## 6.3. Fire Service Access

In case of emergency, fire service personnel will be able to access the building via Nicholsons Lane. There are also sufficient places for the fire appliances to park at the site on the nearby public road (Nicholsons Lane). The building access is illustrated in the figure below:

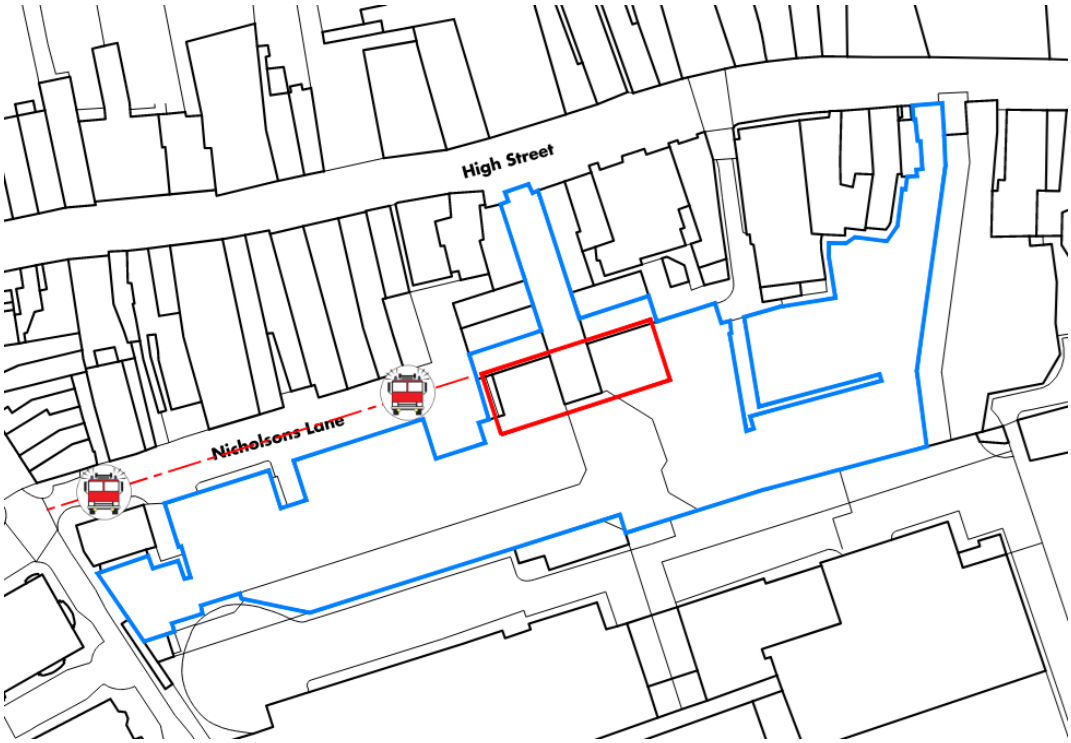



**Figure 25: Fire Service Access**

## 6.4 Fire Hydrants

A new, private or an existing fire hydrant should be provided no more than 90m from an entrance of the building and no more than 90m from any other hydrant, in accordance with BS 9990. ***The location of existing fire hydrants will need to be confirmed by the Client.***

# 7 Conclusion

This outline fire strategy report relates to the redevelopment of Nicholsons House which is located in Maidenhead, Berkshire SL6 1LB. The fire safety provisions of this report follow the guidance of BS 9991:2015 and the associated British Standards.

This report demonstrates that the building satisfies the functional requirements of Part B (fire safety) of the Building Regulations 2010.