



THE FIRE SURGERY

65 Fleet Street, London
KWG Group

Fire Strategy Report, Stage 3 Report
Revision 1

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THE FIRE SURGERY

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1 Executive Summary

1.1 Overview

This is a RIBA Stage 3 report and considers all key fire safety design areas for the proposed redevelopment at 65 Fleet Street, London.

The intention is to show that the current scheme design can viably fulfil the fire safety principles necessary to meet the functional requirements of Part B the Building Regulations 2010.

This report is based upon the recommendations of BS 9999: — Code of practice for fire safety in the design, management and use of buildings (2017). Fire engineering has been used where appropriate to provide an alternative but equivalently safe design solution.

65 Fleet Street consist of two buildings, the North and South buildings, that have common spaces on the basement and lower ground floors. The North building consists of two distinct sections named North building A and North building B for the purposes of this report. These two sections are consolidated on the second to fourth floors to provide a single office accommodation. The North building is adjoined to the Tipperary Pub, but is separated from the Tipperary Pub by party walls and is a separate building. The North building has a height of 13.6m measured to the top occupied fourth floor. The South building has a height of 32.7m to the eighth floor and 36.5m to the ninth roof terrace.

Both buildings are to be designed on a simultaneous evacuation strategy. Confirmation of a fire from either building will send an evacuation signal to throughout the lower ground and basement floors, and vice versa.

The North building incorporates a single stair arrangement, proposed not to be approached through protected lobbies on the ground and first floors. Both arrangements deviates from guidance. The escape stair is to be provided with a pressurisation system to protect it from smoke ingress. The system will be a Class C system designed to BS EN 12101-6. The building is also to be provided with sprinkler coverage throughout to BS EN 12845. These fire safety provisions are provided to justify the single stair arrangement such that it is deemed acceptable.

The exits available from the South building reception are either through a circle slider door or the speed lanes. For both of these exits to be acceptable for means of escape, they have to fail open upon loss of power or activation of the fire alarm.

The retail spaces on the ground and first floors of the North Building A are provided as single combined space connected by an accommodation stair. There is a single escape route from the first floor up until the base of the accommodation stair on the ground floor. The expected actual single direction travel distance from the first floor is marginally extended by 2m. Considering that the evacuation time is likely to be dominated by the pre-travel time, the extension to the travel time by 2 seconds is not considered to have a significant impact on the overall evacuation time from the building. The extended travel

distance from the first floor of the North building A is deemed to present a very low fire risk to occupant such that the design is considered to be acceptable.

All external terrace areas, except on the ninth roof terrace, have escape routes through adjacent office spaces. The terrace areas are therefore considered as inner rooms. The occupancy on the terrace areas with an inner room arrangement will therefore be limited to a maximum of 60 people. If more than 60 people are to be accommodated on the terrace area, e.g., for events, then the occupancy figures will have to be justified by a fire risk assessment of the proposed event. Due to their potential use, sounders are to be provided to all external terrace areas linked to the building's fire detection and alarm system.

Additional refuge points are to be incorporated in the building in the enclosure of escape stair 4 on the lower ground floor, main core lift lobby on the ninth floor and adjacent to escape stair 4 entrance on the ninth floor. Evacuation of people with mobility impairments from the North building is to be through carry up and down procedures using evacuation chairs. Evacuation of people with mobility impairments from the South building is to be through firefighting lifts (prior to the arrival of the fire service) and the evacuation lift in the central core, supported by carry up and down procedures using evacuation chairs. As the evacuation lift landing area is open to the reception accommodation on the ground floor, a fire and smoke curtain is to be provided to protect this lift well from smoke ingress.

The North building loadbearing elements of structure are to be protected to a period of 60 minutes fire resistance. The South building loadbearing elements of structure are to be protected to a period of 90 minutes fire resistance. This was reduced from the expected 120 minutes fire resistance for buildings over 30m in height as the building met ventilation requirements to permit for this arrangement. The basement and lower ground floors support the loadbearing elements of structure for the South building therefore loadbearing elements of structure on these floors are to be protected to a period of 90 minutes fire resistance.

All floors, except the basement and first floor slab in the North building, are to be provided as compartment floors. The opening that extends from the ground to the seventh floors of the South building is therefore to meet atrium guidance. This involves incorporating natural smoke vents at high level providing at least 10% of the void area. The supply of inlet air to the atrium base is to be confirmed. The atrium void and the office accommodation are to be separated by glazing elements providing 30 minutes fire resistance (integrity) on the upper floors above ground. Fire and smoke curtains are to be provided to enclose the openings through the glazing elements to allow for an accommodation stair on the first and second floors.

The measured separation distances are adequate to permit the indicated unprotected opening areas on the façades. The separation distance on the south elevation is not indicated, and this will be confirmed in RIBA Stage 4. The North building external wall surfaces do not have to meet any requirements. The South building external wall surfaces are to meet national class 0 or European Class B-s3, d2 (portion of the building under 18m is permitted to have external wall surfaces that meet national

class 1 or European Class C-s3, d2). Any insulation product, filler material (not including gaskets, sealants and similar), etc. used in the external wall construction of the South building should be of limited combustibility. Any new roof coverings to the North building should meet National class AA, AB, or AC, or European class B_{roof}(t4). The new roof coverings to the North building are to meet National class BA, BB, or BC, or European class C_{roof}(t4).

The North and South buildings are to be provided with a sprinkler system throughout in accordance with BS EN 12845. The sprinkler system is also to be fully compliant with the requirements of the Loss Prevention Council Rules. A sprinkler tank with a volume of at least 135m³ is to be provided. For water sensitive areas where the use of a water-based fire suppression system is inappropriate, an alternative form of fire suppression system is to be provided.


North building A firefighting provisions are to be met through perimeter access. The North building is to be provided with a dry riser main with outlets on the stair landing areas. The inlet connection to this dry riser main is to be within 18m of a parking location of a pumping appliance. The location of this inlet connection is to be confirmed. The South building is to be provided with two firefighting shafts (FFSs).

A landlord electrical riser is proposed to be located and accessed from the firefighting lobbies of FFS 2 and this arrangement deviates from guidance. This riser only serves the firefighting shaft and the adjacent toilet block, and all services from the riser will be routed so as to not pass onto the office floorplate. The toilet block will be enclosed in 120 minutes fire resisting construction. This will mean that all areas served by the landlord electrical riser will be separated from the main floorplate, and therefore the main fire risk, by 120 minute fire rated construction. [Management procedures are to be put in place to ensure that the fire doors to these risers are locked after access and that access into this riser is only made out of hours.](#)

The firefighting lift installation in FFS 1 is proposed to be used as a goods lift during normal operation of the building. [Management procedures are to be put in place to ensure that firefighting lobbies are not used for storage purposes even temporarily. The use of the firefighting lift to move goods should be closely monitored to ensure that lift doors are not blocked/ propped open.](#) It should be noted that the access route for goods into the building is at basement level and fire service access is at lower ground floor, therefore the fire service access route will not be used for transporting goods in and out of the building. The South building is to be provided with two firefighting shafts. In the unlikely event that the firefighting lift in FFS 1 cannot be recalled for the use by the fire service, the firefighting lift in FFS 2 will be available. The proposed arrangement to use the firefighting lift as a goods lift is deemed to be acceptable. This was discussed during a meeting with London Fire Brigade on 2nd December 2020, meeting minutes are provided in Appendix B.

The following bullet point list highlights the key features of the fire strategy:

North building

-  The building is to be designed to adopt a simultaneous evacuation strategy based on a single knock regime.

- ✿ A category L2 fire detection and alarm system in accordance with BS 5839-1.
- ✿ Means of escape and exits dimensioned and configured in accordance with BS 9999.
- ✿ A Class C pressurisation system to BS EN 12101-6 to protect the escape stair from smoke ingress.
- ✿ Provision of disabled refuge points on all levels (except ground level) equipped with emergency voice communication systems linked to a master station in the reception area.
- ✿ The use of carry up and down procedures using evacuation chairs to assist egress of personnel with mobility impairments.
- ✿ Emergency lighting in accordance with BS 5266.
- ✿ All loadbearing elements of structure to be protected to achieve a period of at least 60 minutes fire resistance.
- ✿ Internal fire compartmentation is specified in accordance with BS 9999.
- ✿ An automatic sprinkler system in accordance with BS EN 12845 (with alternative localised fire suppression systems in water sensitive areas where sprinklers are not appropriate).
- ✿ A dry fire main to meet firefighting provisions.
- ✿ Secondary back up power supply to life safety and firefighting systems to be provided by a generator.
- ✿ Implementation of 'Adequate' level 2 fire safety management regime in accordance with BS 9999.

South building

- ✿ The building is to be designed to adopt a simultaneous evacuation strategy based on a single knock regime.
- ✿ A category L2 fire detection and alarm system in accordance with BS 5839-1.
- ✿ Means of escape and exits dimensioned and configured in accordance with BS 9999.
- ✿ Provision of disabled refuge points on all levels (except ground level) equipped with emergency voice communication systems linked to a master station in the reception area.
- ✿ The use of an evacuation lift and firefighting lifts (prior to the arrival of the fire and rescue service) to assist egress of personnel with mobility impairments. This is to be supported by a carry up and down procedures using evacuation chairs.
- ✿ Emergency lighting in accordance with BS 5266.
- ✿ All loadbearing elements of structure to be protected to achieve a period of at least 90 minutes fire resistance.
- ✿ Internal fire compartmentation is specified in accordance with BS 9999.
- ✿ An automatic sprinkler system in accordance with BS EN 12845 (with alternative localised fire suppression systems in water sensitive areas where sprinklers are not appropriate).
- ✿ Two firefighting shafts in accordance with BS 9999, each including a firefighting lift installation to BS EN 81-72 and BS9999, firefighting lobby with a smoke ventilation system, dry rising fire main to BS 9990 and a fire telephone system to BS 5839-9.

- 🌿 Firefighting shafts to be enclosed in 120 minutes fire resisting construction.
- 🌿 A powered smoke and heat ventilation system to provide an extraction rate of at least 10 air changes per hour to the basement floor.
- 🌿 Secondary back up power supply to life safety and firefighting systems to be provided by a generator.
- 🌿 Implementation of 'Adequate' level 2 fire safety management regime in accordance with BS 9999.

The key work areas highlighted in this report that will require further developed are:

- 🌿 The provision of inlet air to the atrium base on the ground floor.
- 🌿 The locations of extended cavities and the provision of cavity barriers.
- 🌿 Separation distances between the building façades and the site/ relevant boundaries.
- 🌿 Alternative suppression systems to be adopted for water sensitive rooms are to be confirmed.
- 🌿 The water protection measures to the new firefighting lift in FFS 2.
- 🌿 The water protection measures to the existing firefighting lift in FFS 1.
- 🌿 The inlet connections to the dry mains to be provided to the North and South buildings.
- 🌿 Review of the fire strategy principles outlined in this report by SOCOTEC Building Control and London Fire Brigade.

2 Introduction

2.1 Introduction

The Fire Surgery has been commissioned by KWG Group to provide Fire Engineering support to the proposed redevelopment at 65 Fleet Street, London.

This report is for RIBA Stage 3: Spatial Coordination for the proposed redevelopment. The objectives of this fire engineering report are to provide a strategy that demonstrates that the design complies with the functional requirements of the Building Regulations 2010 for part B, Fire Safety.

The report is to be used for design team coordination of the fire safety systems and also for discussion with the approving authorities. There is background text to support the engineering solutions for the benefit of Building Control and the Fire Authority. For ease of reference for the design team and cost consultant, a summary of the design fire safety provisions is provided in Section 11.2.



This report is intended for the sole use of KWG Group and their design team for 65 Fleet Street. It should not be used in full or in part to support any other scheme.

Changes to the design of the building may invalidate the proposals of this scheme and therefore the report will need updating by the project fire engineer.

This report is a performance specification for fire safety. The detailed design of systems is by designers and contractors but shall be meet the requirements of this fire strategy.

2.2 Applicable legislation

The primary pieces of legislation relevant to this project are:

-  The Building Regulations 2010,
-  The Regulatory Reform (Fire Safety) Order 2005.

2.3 Guidance documents

BS 9999: 2017 is the primary design guidance used for the fire strategy for this project.

2.4 Alternative fire engineering solutions

The Building Regulations identify the above approach as an acceptable method of achieving fire safety in buildings.

Fire safety engineering can provide an alternative approach to fire safety. It may be the only practical way to achieve a satisfactory standard of fire safety in some large and complex buildings and in buildings containing different uses, e.g., airport terminals. Fire safety engineering may also be suitable

for solving a problem with an aspect of the building design. The British Standards Institute recognises the importance and advantages of fire engineering and performance-based design solutions over prescriptive-based designs. The advantages of performance-based design include:

- 🌱 A design which specifically addresses a building's unique aspects and enables the realisation of architectural and client aspirations which may otherwise be restricted by standard design codes; and
- 🌱 A logical basis for the development and selection of alternative fire protection options based on the project's needs and budget; and
- 🌱 A strategy in which fire protection systems are integrated, rather than designed in isolation; and
- 🌱 A strategy, in which other aspects of the building design, such as security, can be integrated.

Engineering solutions are applied to 65 Fleet Street for the following:

- 🌱 The use of a fire and smoke curtain to enclose the evacuation lift installation on the reception accommodation on the ground floor.
- 🌱 The use of three fire and smoke curtain to enclose the atrium void from the office accommodation on the first and second floors.
- 🌱 The provision of sprinkler coverage throughout the North building and a pressurisation system to justify the proposed single stair arrangement.
- 🌱 Increased compartmentation provisions to the toilet block adjacent to FFS 2 to justify a landlord electrical riser being contained in the FFS.
- 🌱 A combined firefighting and goods lift in FFS 1.

2.5 Fire strategy objectives

The objectives of the fire strategy are to meet the functional requirements of the Building Regulations 2010. This is concerned with life safety of the occupants and fire fighters.

The fire strategy considers single accidental fires of those associated and most likely to occur in commercial offices, retail units and restaurants.

The principles of the strategy are to demonstrate occupants on a fire floor can escape into a place of relative safety (the protected lobby and staircase) in a reasonable time.

Any text within this fire strategy highlighted in blue indicates any item that will require a positive management response from the client/ responsible person(s) for the building in terms of whether design assumptions can be delivered in practice, and items that must be specifically accounted for as part of the premises fire risk assessment (where required under the Regulatory Reform (Fire Safety) Order 2005).

2.6 Approvals

The design is subject to formal approval by SOCOTEC Building Control with a statutory consultation with London Fire Brigade (LFB).

2.7 Insurer's requirements

KWG Group should contact their intended building insurers to identify any additional requirements (e.g., from a property protection and/or business continuity perspective) and confirm acceptance of the proposals in this concept fire strategy.








2.8 Fire safety management

Fire safety in buildings is a balance between the technical systems within the building and how the building is then used and managed. It is not possible to rely solely on the technical provisions in the building, and an active role on the part of the management is essential. It is therefore necessary that the building is used as intended in this report and that the systems are managed appropriately.

As with all buildings, there will be standard fire safety management requirements for the day to day operation of the building. It is a fundamental assumption that features described within this fire strategy will require management and maintenance throughout the life of the building.

Managing fire safety is a process that lasts throughout the life of a building, starting with the initial design, which is intended both to minimize the incidence of fire and to ensure that if a fire does occur, appropriate fire safety systems (including active, passive and procedural systems) are in place and are fully functional.

Effective management of fire safety can contribute to the protection of the building occupants in many ways:

-  By working to prevent fires occurring in the first place,
-  By monitoring the fire risk on an on-going basis and taking appropriate action to eliminate or reduce risk,
-  By being aware of the types of people in the building (such as disabled people, elderly people, children, pregnant women, etc.) and any special needs,
-  By ensuring that all of the fire safety measures in the building are kept in working order and in particular that the means of escape are always available,
-  By providing adequate means for the fire service to effectively gain access to the building should a fire occur,
-  By taking command in the event of a fire until the fire and rescue service arrives,
-  By updating the Fire Strategy for changes in the use of the building.

Upon completion, building management will need to undertake fire risk assessments and emergency plans and have these available for inspection by the fire service at any time. This should typically be undertaken annually by a competent person and is carried out to ensure that the fire strategy is upheld throughout the life of the building and that the risk of fire is kept low. Text highlighted in **blue** in this report highlights items/ issues that need to be considered specifically as part of any fire risk assessments for this building.

KWG Group will commission a fire risk assessment of the building before the building is occupied. This fire risk assessment will typically be updated annually, or when there are significant changes in the building, and this will be the responsibility of KWG Group.

Specific areas of management required for this building include:

- 🏠 Implementation and maintenance of an 'Adequate' fire safety management level 2 system to BS9999: 2017 (see Appendix A).
- 🏠 Completion of fire risk assessments and emergency plans for the building.
- 🏠 Disabled person evacuation procedures.
- 🏠 Designation and allocation of appropriate assembly points.
- 🏠 Occupants should be directed to evacuate the North building immediately upon activation of the fire alarm system.
- 🏠 Fire doors to the landlord electrical riser in FFS 2 are to be locked after access. Access into this riser should also be made during out of hours.
- 🏠 Firefighting lobbies are not to be used for storage purposes, even temporarily.
- 🏠 The use of the firefighting lift to move goods should be closely monitored to ensure that lift doors are not blocked/ propped open.
- 🏠 Maintaining all fire safety systems.

It is strongly recommended that the client/ responsible person(s) for the premises ensures that the above items (and all other areas highlighted in 'blue' text within this report) are adequately defined and are specifically accounted for as part of the premises fire risk assessment(s), as required under the Regulatory Reform (Fire Safety) Order 2005.

3 Building Description

3.1 Building Description

The proposed scheme is to refurbish the existing building located at 65 Fleet Street, London. The existing building consists of the North and South buildings that share the same escape stairs on the basement and lower ground floors as shown in Figure 2 to Figure 15 below.

The building faces Fleet Street on the north elevation, Bouverie Street to the west elevation, Whitefriars Street on the east elevation, Ashentree Court and Magpie Alley on the south elevation. There are to be cycle facilities on the basement floor and an amenity/ gym space on the lower ground floor. The main cycle entrance is to be from Ashentree Court. The main entrance to the amenity/ gym space is to be from Bouverie Street on the ground floor with an accommodation stair that connects to the lower ground floor.

Landing areas prior to the final exits for the main escape stairs 2 and 3 are on the lower ground floors. The building is situated on a slope such that entrance/ exits to the main escape stairs 2 and 3 are on a half level between the lower ground and ground floors of the building.

The North and South buildings share a common courtyard on the ground floor. This courtyard is accessed on level ground from Bouverie Street and stepped access from White Friars Street. There is level access to the courtyard from Fleet Street through an entrance colonnade in between North buildings A and B.

There is an existing Tipperary Pub that extends from the lower ground, through the ground and first floors of the North building A, to the third and fourth floors of the combined North building. The Tipperary Pub is an independent building separated from the North building by party walls. The Tipperary Pub does not form part of the scope of works considered in this report.

3.1.1 North Building A

North Building A is a part of the North building that extends from the ground to the first floor connected with an open accommodation stair. It abuts the Tipperary Pub and is to be used as a retail space. This retail space is to be accessed from Fleet Street, Whitefriars Street and the courtyard.

3.1.2 North Building B

North Building B is a part of the North building that also extends from the ground to the first floor and then at second to fourth extends over the entrance colonnade and North Building A. There is a retail space on the ground floor that abuts the reception to office/ retail spaces on the upper floors. This retail space is accessed from Bouverie Street and the courtyard. The reception area is accessed from Fleet Street and the entrance colonnade. It is connected to the office accommodation on the first floor through an open, spiral accommodation stair.

First to fourth floors are to be served by escape stair 1 in a single stair arrangement. The office accommodation on these floors abut the independent Tipperary Pub. There is a plant room on the roof

of this building. The height of the building to the top fourth floor is 13.6m above ground floor as shown in Figure 14 below.

Escape stair 1 extends from the lower ground floor to the fourth floor, with its final exit on the ground floor onto the entrance colonnade. There are two lift installations that extend from the lower ground floor to the fourth floor. These lift installations are proposed to open directly onto the accommodation on the ground and all upper floors.

3.1.3 South Building

The existing South building consists of ground and six occupied upper floors. The existing height of the South building to the occupied sixth floor is ca. 25m. The proposed refurbishment works consist of adding three occupied floors, with the new ninth floor being used as an external terrace. The new height of the building will be 32.7m to the eighth floor and 36.5m to the ninth floor as shown in Figure 15 below.

The ground floor is to consist of retail spaces either side of the main reception to the upper floor office accommodation. These retail spaces and the reception open directly into the courtyard. There is to be an entrance into the lower ground floor amenity/ gym area from the ground floor on the East elevation with direct egress onto Bouverie Street. To the south of the main central core is to be office accommodation. All upper floors are to provide office accommodation with the roof terrace provided as an ancillary space for office occupants. The floor area of the South building cuts back with height with some of the floor roof area to be provided as external terrace areas on the seventh and eighth floors.

The South building is to be served by three escape stairs. Escape stair 2 and 3 are to extend from the basement to the seventh floor. Escape stair 2 further extends to the roof terrace floor. Escape stair 4 is to extend from the lower ground to the roof terrace. There are to be seven lift installations in the main central core with all of them extending from the basement to the seventh floor. Four of these are to further extend to the eighth floor whilst three of these extend to the roof terrace. There is to be one lift installation adjacent to escape stair 4 that is to extend from the lower ground to the eighth floor.

There are to be two openings that will extend between different floors. One of these is to connect the ground and first floors with its base within the main reception area. The other opening is to connect the ground and all upper floors to the seventh floor with its base in the centre of the building. There is to be an accommodation stair within this central opening extending from ground to the second floor. Both openings are to be enclosed from the office accommodation with glazing elements on the upper floors.

The indicated usage of 65 Fleet Street is shown in Table 1 below.

Floor	Use
Basement floor	Plant rooms , sprinkler tank rooms, showers and changing rooms, bike store, bin store, store room.
Lower ground floor	Amenity/ gym, office accommodation, cycle workshop.

North Building A	
Ground floor	Retail Class A1.
First floor	Retail Class A1.
North Building B	
Ground floor	Reception/ Retail Class A1/ B1, Retail Class A1.
First floor	Office/ Retail Class A1/ B1.
Second to fourth floor	Office accommodation, WCs.
Fifth floor	Office accommodation, WCs.
South Building	
Ground floor	Retail/ Reception Class A1/ B1, Reception, Retail/ Reception Class A1/ B1, amenity/ gym entrance, office accommodation, WCs.
First to sixth floor	Office accommodation, WCs.
Seventh floor	Office accommodation, WCs, plant room, external terrace areas.
Eighth floor	Office accommodation, WCs, plant room, external terrace areas.
Ninth floor/ Roof terrace	External terrace area.

Table 1: Use of building

This report is based on the Stage 3 drawings and information supplied by Buckley Gray Yeoman (refer to Table 2 below).

Drawing Number	Title	Date	Rev
1046-GA-00	Proposed Plan Basement	16/02/2021	D4
1046-GA-01	Proposed Plan Lower Ground	16/02/2021	D4
1046-GA-02	Proposed Plan Ground Floor	16/02/2021	D4
1046-GA-03	Proposed Plan First Floor	16/02/2021	D4
1046-GA-04	Proposed Plan Second Floor	16/02/2021	D4



1046-GA-05	Proposed Plan Third Floor	16/02/2021	D4
1046-GA-06	Proposed Plan Fourth Floor	16/02/2021	D4
1046-GA-07	Proposed Plan Fifth Floor	16/02/2021	D4
1046-GA-08	Proposed Plan Sixth Floor	16/02/2021	D4
1046-GA-09	Proposed Plan Seventh Floor	16/02/2021	D4
1046-GA-10	Proposed Plan Eighth Floor	16/02/2021	D4
1046-GA-11	Proposed Plan Ninth Floor Roof Terrace	16/02/2021	D4
1046-GA-12	Proposed Plan Roof Level	16/02/2021	D4
1046-GE-01	Proposed Context North Elevation Fleet Street	16/02/2021	D2
1046-GE-02	Proposed East Elevation Whitefriars Street	16/02/2021	D2
1046-GE-03	Proposed West Elevation Bouverie Street	16/02/2021	D2
1046-GE-04	Proposed Context North Elevation South Building	16/02/2021	D2
1046-GE-05	Proposed Ashentree Court Elevations South Building	16/02/2021	D2
1046-GE-06	Proposed North Elevation North Building	16/02/2021	D2
1046-GE-07	Proposed South Elevation North Building	16/02/2021	D2
1046-GE-08	Proposed North Elevation South Building	16/02/2021	D2
1046-GE-09	Proposed Colonnade Elevations North Building	16/02/2021	D2
1046-GS-01	Proposed Section A-A	30/04/2021	P1
1046-GS-02	Proposed Section B-B	30/04/2021	P3
1046-GS-03	Proposed Section C-C	30/04/2021	P1
1046-GS-04	Proposed Section D-D	30/04/2021	P3
1046-GS-05	Proposed Section E-E	30/04/2021	P3
1046-GS-06	Proposed Section F-F	30/04/2021	P3



1046-GS-07	Proposed Section G-G	30/04/2021	P3
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Table 2: Drawing List

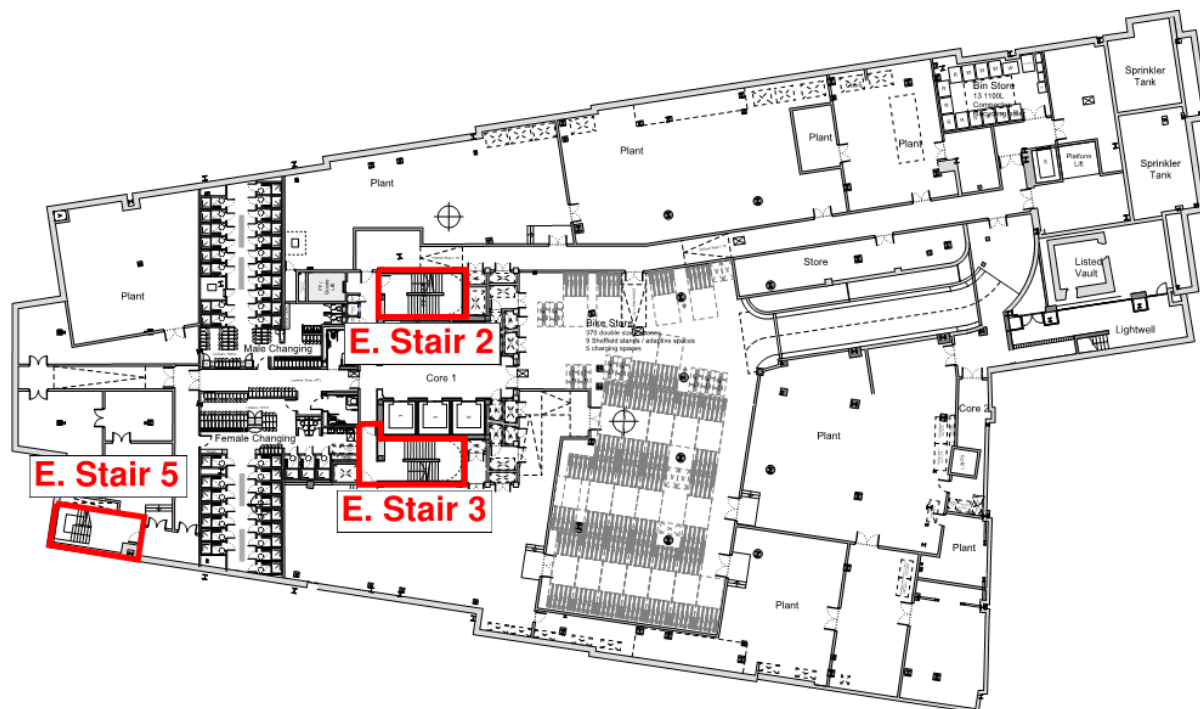


Figure 1: Proposed basement plan

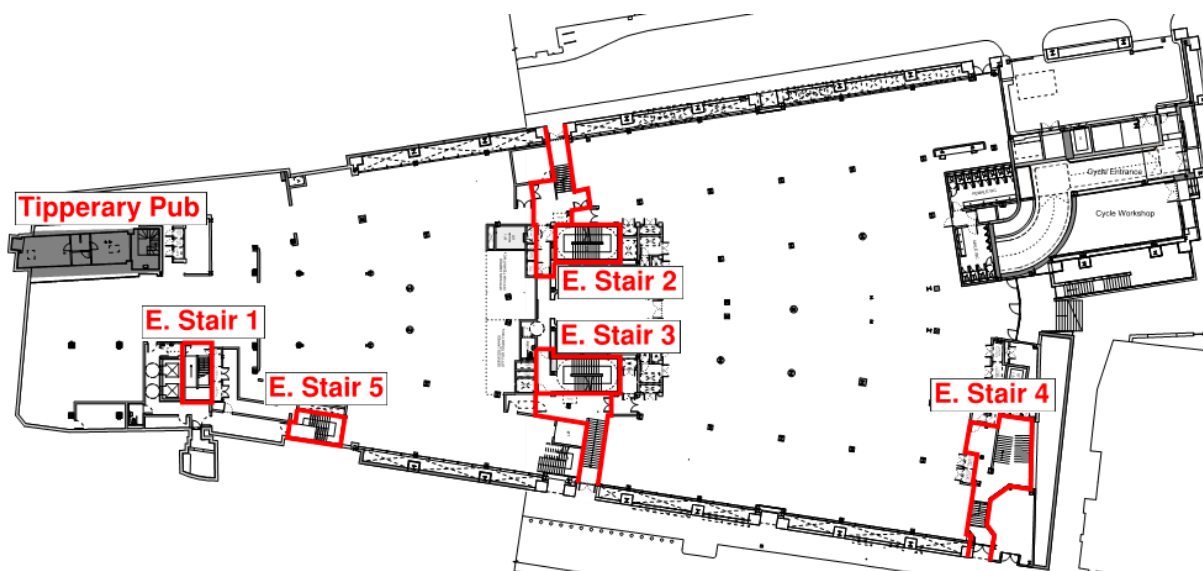


Figure 2: Proposed lower ground floor plan



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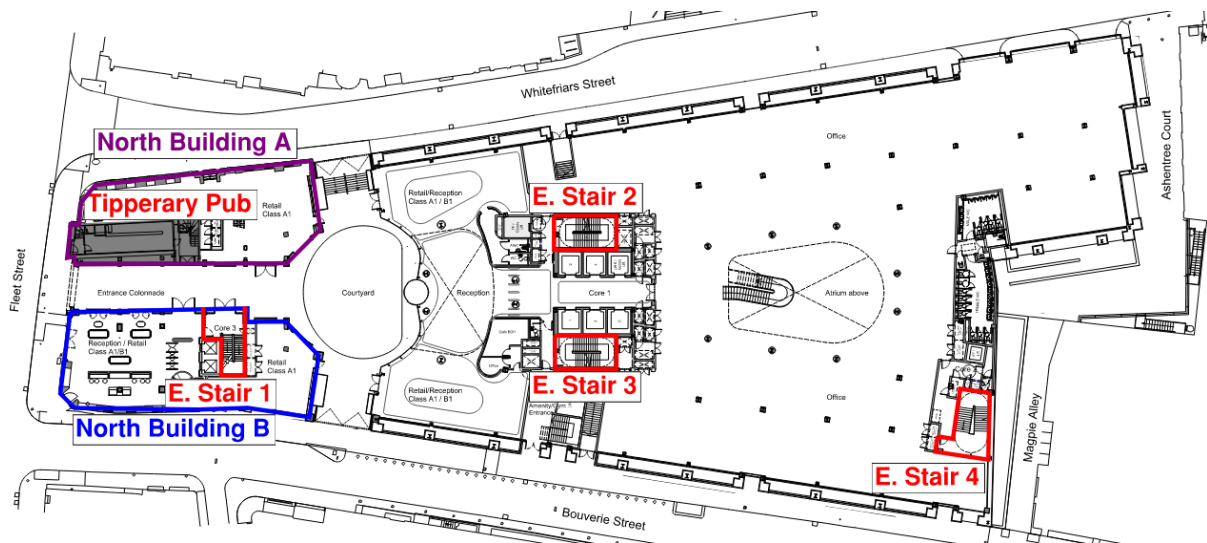


Figure 3: Proposed ground floor plan

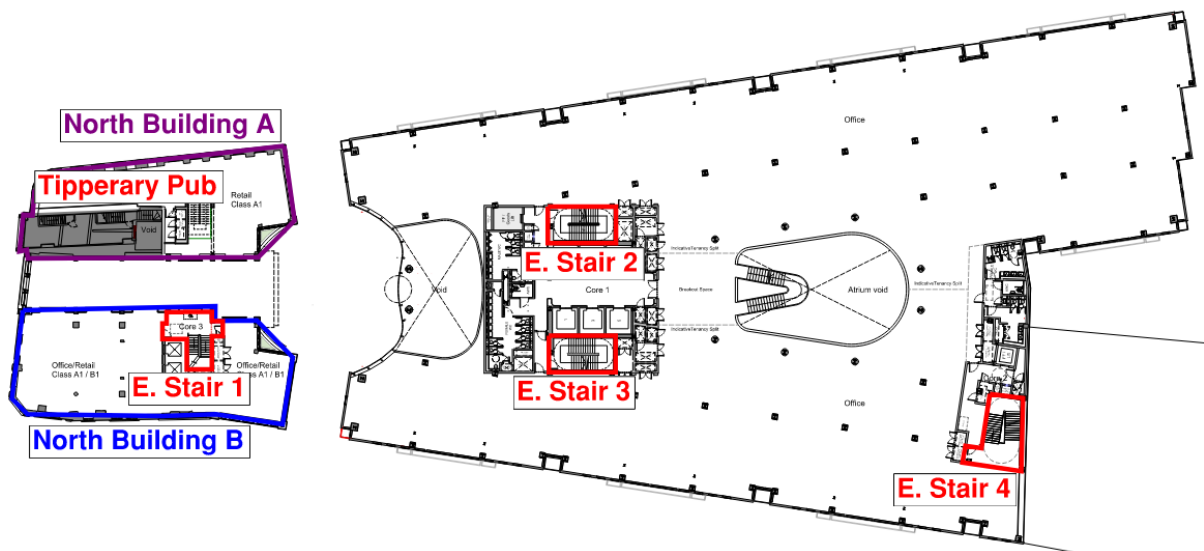


Figure 4: Proposed first floor plan

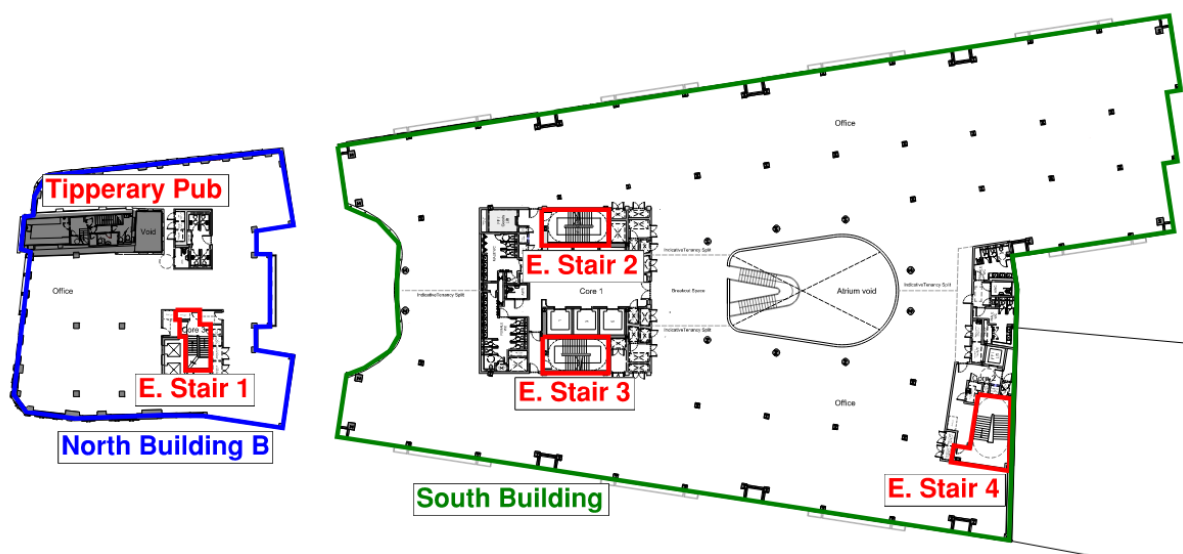


Figure 5: Proposed second floor plan

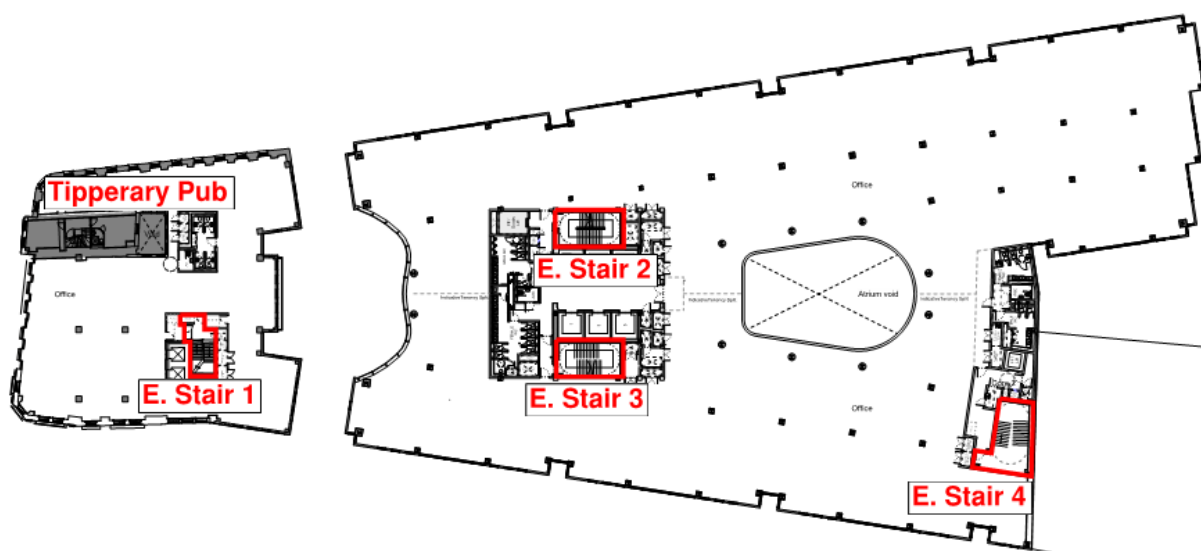


Figure 6: Proposed third floor plan

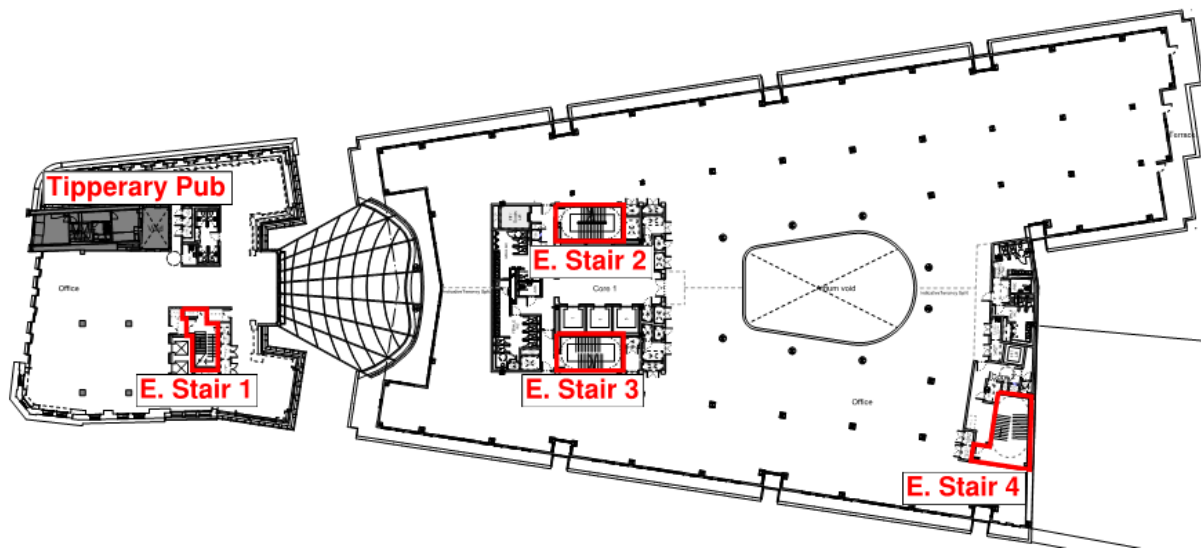


Figure 7: Proposed fourth floor plan

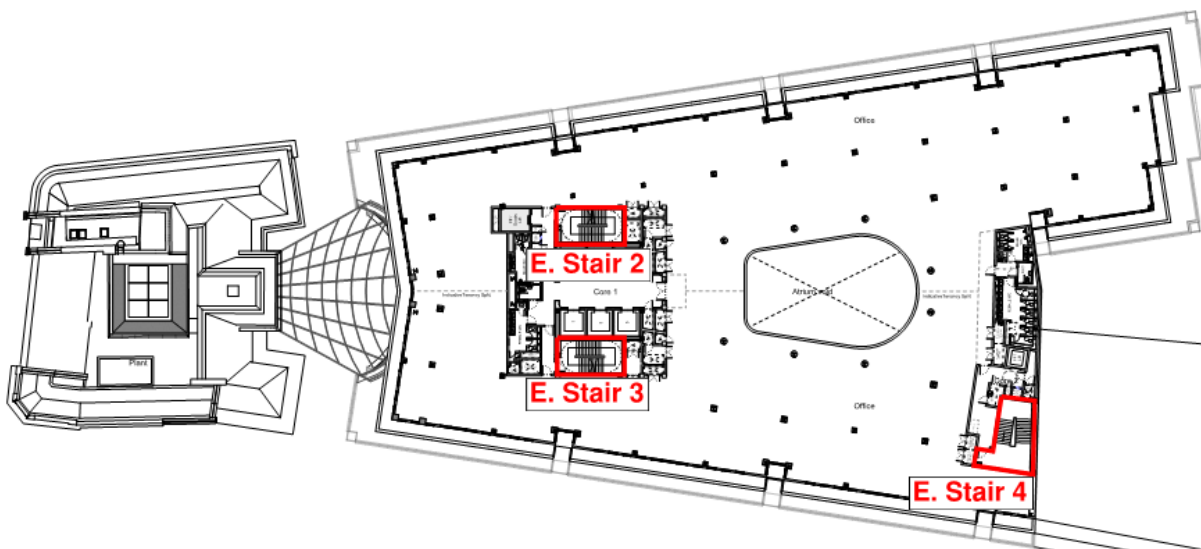


Figure 8: Proposed fifth floor plan

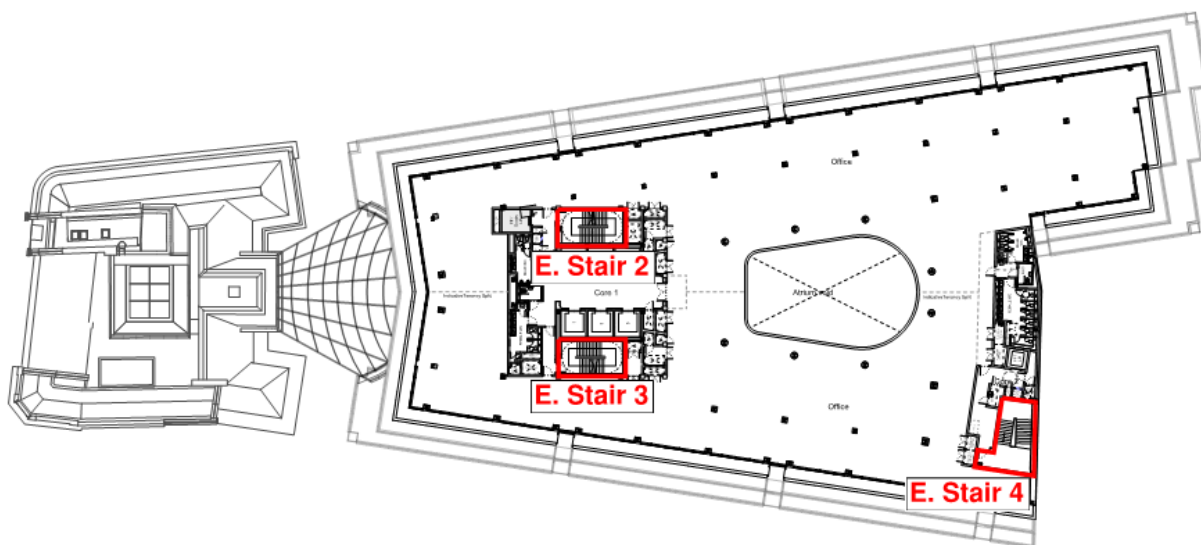


Figure 9: Typical proposed sixth to seventh floor plan

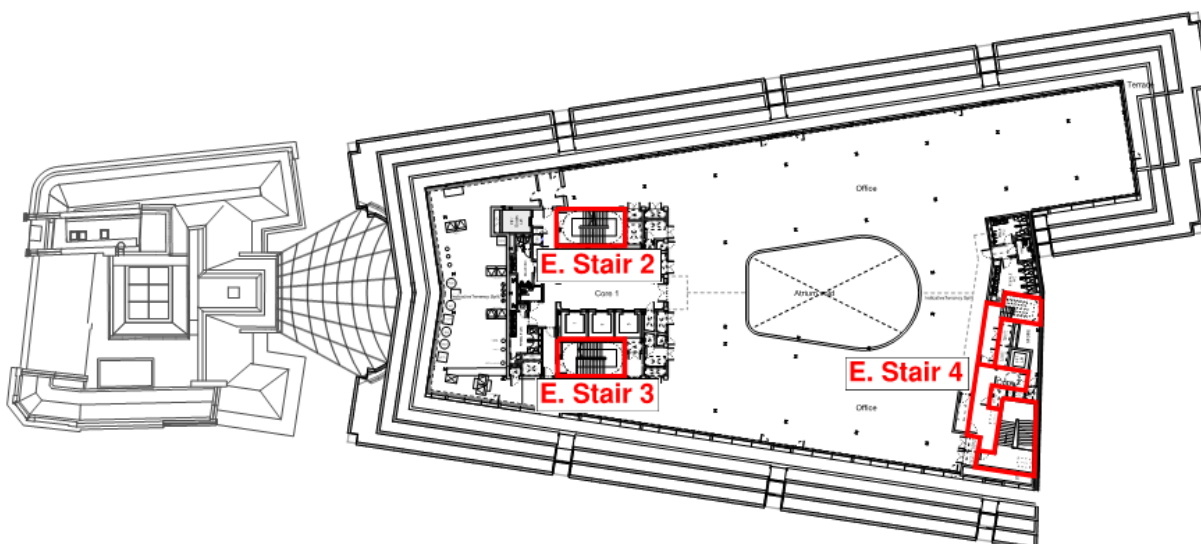


Figure 10: Proposed seventh floor plan

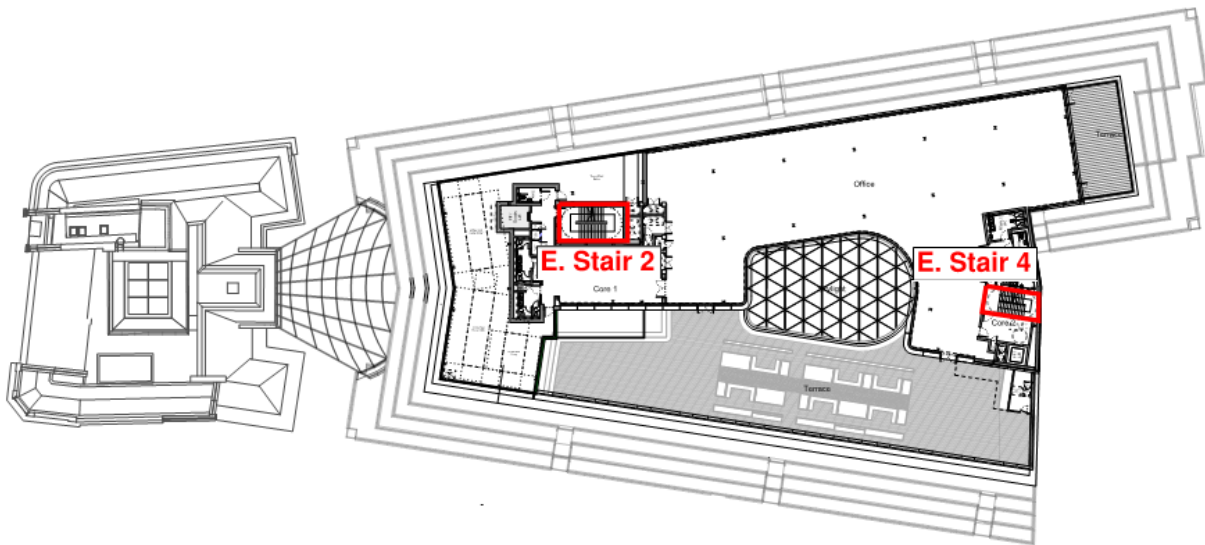


Figure 11: Proposed eighth floor plan

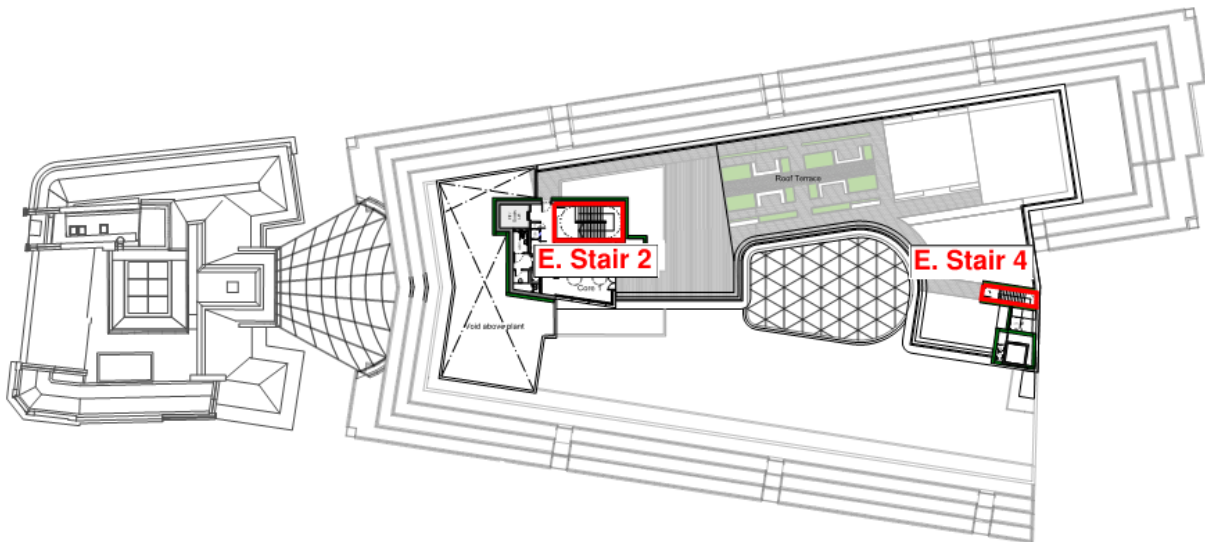


Figure 12: Proposed ninth floor plan

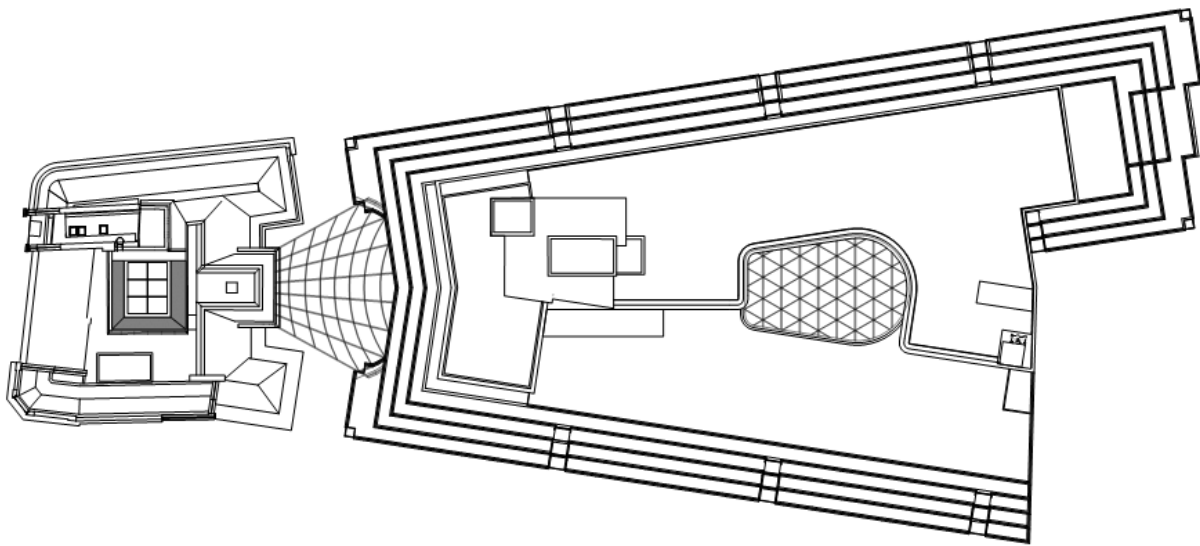


Figure 13: Proposed roof plan

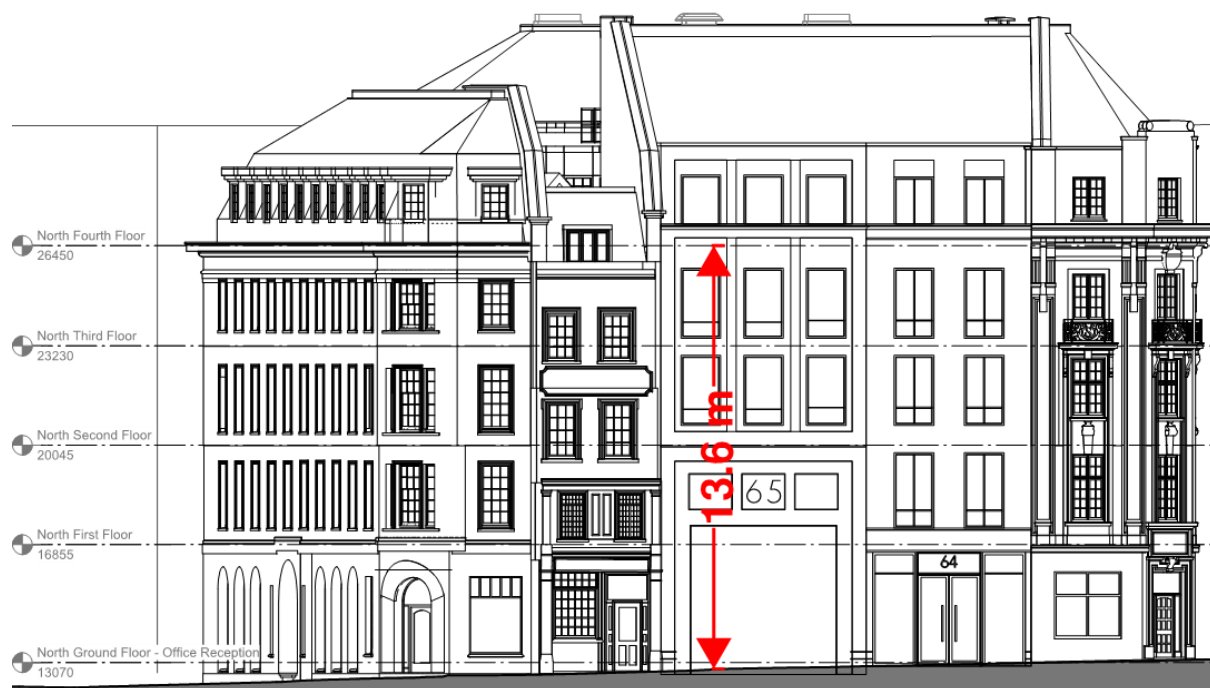


Figure 14: North elevation showing the height of the top occupied floor for the North building

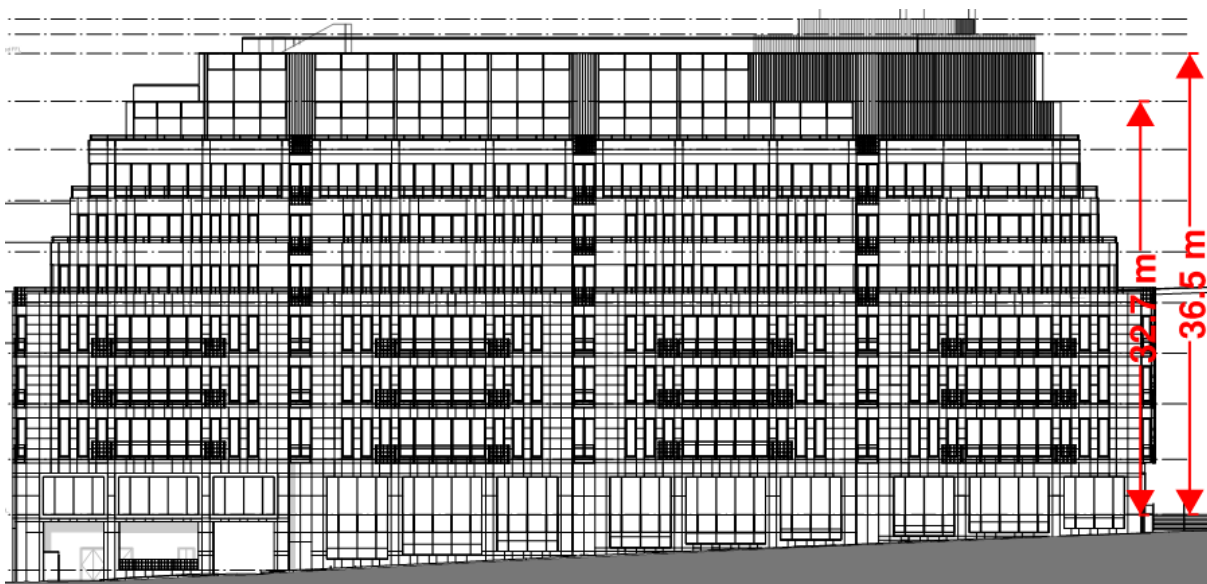






Figure 15: East elevation showing the heights of the top occupied eighth and roof terrace floors for the South building

3.2 BS9999: 2017 risk profiles

Under BS9999: 2017, risk profiles need to be allocated to each use/ area within the building, with this then informing the means of escape design.

The following key risk profiles are to be considered:

-  Office and gymnasium use
Occupancy characteristic A – awake and familiar (gymnasium occupants are assumed to receive induction)
Fire growth rate 1 – slow (with sprinkler protection)
Risk profile 'A1'
-  Reception use
Occupancy characteristic B – awake and unfamiliar
Fire growth rate 1 – slow (with sprinkler protection)
Risk profile 'B1'
-  Retail use
Occupancy characteristic B – awake and unfamiliar
Fire growth rate 2 – medium (with sprinkler protection)
Risk profile 'B2'
-  Plant rooms

Occupancy characteristic A – awake and familiar (this is based on the assumption any maintenance staff will receive an induction.)

Fire growth rate 2 – medium (with sprinkler protection)

Risk profile 'A2'

With the provision of additional fire safety measures/ features, BS9999: 2017 permits the following additional means of escape design criteria to be claimed in for all risk profile spaces in the building:

- 🏡 The use of a Category L2 fire detection system (where a manual system is the minimum BS9999 requirement): +15% increase in allowable travel distance, and a -15% reduction in door, corridor, and stair width.

As a result of the above, the following key means of escape criteria can be applied for each risk profile present:

- 🏡 Risk profile 'A1' Office

Single direction travel distance limit of 29.9m, two-way travel distance limit of 74.75m to nearest storey exit (direct travel measurements of 2/3rd of these values to be applied where internal layouts unknown; 19.9m and 49.8m respectively).

Door/ escape route width allowance of 2.805mm/person.

Stair width allowance of 1.275mm/person for the evacuation of 9 floors.

Stair width allowance of 1.19mm/person for the evacuation of 11 floors.

- 🏡 Risk profile 'B1', Reception

Single direction travel distance limit of 27.6m, two-way travel distance limit of 69m to nearest storey exit (direct travel measurements of 2/3rd of these values to be applied where internal layouts unknown; 18.4m and 46m respectively).

Door/ escape route width allowance of 3.06mm/person.

- 🏡 Risk profile 'B2', Retail

Single direction travel distance limit of 23m, two-way travel distance limit of 57.5m to nearest storey exit (direct travel measurements of 2/3rd of these values to be applied where internal layouts unknown; 15.3m and 38.3m respectively).

Door/ escape route width allowance of 3.485mm/person.

Stair width allowance of 2.465mm/person for the evacuation of 4 floors.

- 🏡 Risk profile 'A2', Plant rooms

Single direction travel distance limit of 25.3m, two-way travel distance limit of 63.25m to nearest storey exit (direct travel measurements of 2/3rd of these values to be applied where internal layouts unknown; 16.8m and 42.1m respectively).

Door/ escape route width allowance of 3.06mm/person.

Stair width allowance of 3.825mm/person for the evacuation of 1 floor.

4 Means of escape and fire detection / warning

4.1 Evacuation strategy

4.1.1 North building

The North building is to be designed on a simultaneous evacuation strategy. Smoke detection in any part of the building, including all retail units, the basement and lower ground floors, is to initiate the evacuation signal to all parts of the building, including the basement and lower ground floors.

4.1.2 South building

The South building, including the basement and lower ground floors, is to be designed on a simultaneous evacuation strategy. Smoke detection in any part of the building, including the basement and lower ground floor, is to initiate the evacuation signal to all parts of the building, including the basement and lower ground floors.

4.2 Means of detection and warning

4.2.1 North building

Based on the low risk of offices, BS 9999 requires a category M fire alarm system. This consists of manual break glass call points on each floor only.

The North building, including the basement and lower ground floors, is to be provided with an automatic fire detection and alarm system (AFDA) to a category L2 standard. The system is to be designed to meet the recommendations detailed in BS 5839-1. Manual break glass call points are to be provided in accordance with BS 5839-1. The provision of a category L2 fire alarm system represents an enhanced early means of detection and warning.

The main fire alarm panel is recommended to be provided in the reception area of the North building B on the ground floor, visible to the fire service from outside. The pressurisation system controls and refuge communication systems for the North building B are also recommended to be provided in the same area as the main fire alarm panel.

4.2.2 South building

Based on the low risk of offices, BS 9999 requires a category M fire alarm system. This consists of manual break glass call points on each floor only.

The South building, including the basement and lower ground floors, is to be provided with an automatic fire detection and alarm system (AFDA) to a category L2 standard. The system is to be designed to meet the recommendations detailed in BS 5839-1. Manual break glass call points are to be provided in accordance with BS 5839-1. The provision of a category L2 fire alarm system represents an enhanced early means of detection and warning.

The main fire alarm panel is recommended to be provided in the office reception area on the ground floor, visible to the fire service from outside. Repeater panels are recommended to be provided in the lobby areas to the firefighting shafts on the lower ground floor. The mechanical smoke ventilation system controls and refuge communication systems are also recommended to be provided in the same area as the main fire alarm and repeater panels.






4.3 Cause and effect

4.3.1 North building

The North building, including the basement and lower ground floors, is to be designed on a single knock basis on activation of a manual break glass unit, sprinkler head or two smoke/ heat detectors. Upon a single activation a manual call point or sprinkler head and second smoke/ heat detector, the fire alarm will send out an evacuation signal throughout the building, including the basement and lower ground floors. An alert signal is to be sent to the fire alarm panels of the South building.

The cause and effect strategy will determine what systems need to operate for scenarios of fires in various locations. This will be set in principle by the fire strategy but will be designed in detail by the MEP consultant and specialist subcontractors.

Upon activation of the AFDA system, the following procedures will commence:







-  The fire alarm will sound an evacuation signal throughout the building, including the basement and lower ground floors,
-  Passenger lifts will return to the lower ground floor with doors open,
-  Air handling units will shut down,
-  The pressurisation system will activate (unless activation is in the standalone retail units),
-  The sprinkler system will activate when the bulb activation temperature is reached.

4.3.2 South building

The South building, including the basement and lower ground floors, is to be designed on a single knock basis on activation of a manual break glass unit, sprinkler head or two smoke/ heat detectors. Upon a single activation a manual call point or sprinkler head and second smoke/ heat detector, the fire alarm will send out an evacuation signal throughout the building, including the basement and lower ground floors. An alert signal is to be sent to the fire alarm panels of the North building.

The cause and effect strategy will determine what systems need to operate for scenarios of fires in various locations. This will be set in principle by the fire strategy but will be designed in detail by the MEP consultant and specialist subcontractors.

Upon activation of the AFDA system, the following procedures will commence:

-  The fire alarm will sound an evacuation signal throughout the building, including the basement and lower ground floors,
-  Passenger lifts will return to the lower ground floor with doors open,
-  Firefighting lifts will return the lower ground floor with doors open to the firefighting lobby,
-  Air handling units will shut down,
-  The mechanical smoke ventilation system will activate if smoke is detected in the firefighting lobby,
-  The sprinkler system will activate when the bulb activation temperature is reached.

4.4 Expected Occupancy Levels

In order to calculate the overall means of escape requirements, it is necessary to understand how many occupants are on each floor. Floor space factors of 2m² and 6m² per person are used according to BS 9999 for typical retail and office accommodations. Toilets, shower rooms and terrace areas have been discounted to avoid double counting occupants.

The anticipated occupant loading in each part of the building is shown below.

Level	Accommodation	Area m ²	Floor space factor m ² per person	No. of people
Basement	Plantrooms	1927	30	64
	Male changing	-	-	19
	Female changing	-	-	19
	Disabled showers	-	-	2
Lower ground	Amenity/ gym	1155	4	289
	Office	1574	6	262
	Loading bay	133	30	4
	Cycle workshop	67	30	2
North building				
Ground	Retail (Building A)	164	2	82
	Reception (Building B)	-	-	16

	Retail (Building B)	80	2	40
First	Retail (Building A)	146	2	60*
	Retail (Building B)	229	2	114
Second	Office	564	6	94
Third	Office	564	6	94
Fourth	Office	532	6	88
South building				
Ground	Retail 1	108	2	54
	Retail 2	108	2	54
	Reception	100	6	16
	Office	2062	6	344
First	Office	2573	6	429
Second	Office	2688	6	448
Third	Office	2688	6	448
Fourth	Office	2259	6	377
Fifth	Office	2052	6	342
Sixth	Office	1754	6	292
Seventh	Office	1196	6	199
Eighth	Office	667	6	111
Ninth	Roof terrace	355	2	178
Total				4376

* Limited to a maximum of 60 occupants as there is a single escape route

Table 3: Occupant capacity

The occupant loading of the building, using floor space factors, is ca. 4664 people. The terrace area occupant figures are not presented above as they are to be occupied by office occupants from the office

accommodation. The occupant loading is distributed to 949 people on the basement and lower ground floors, 601 people in the North building and 3292 people in the South building.

4.5 Vertical escape

According to BS 9999, a building with a top occupied floor at a height of 11m above the access level should be provided with at least two escape stairs. The width of escape stairs:

- ✿ Should not be less than the width of any exits affording access to them,
- ✿ Should not reduce at any point on the way to a final exit,
- ✿ Should not be less than 1000mm for downward travel (1100mm for firefighting stair) and 1200mm for upward travel.

Handrails that protrude no more than 100mm can be ignored on either side.

4.5.1 North Building B

4.5.1.1 Single stair arrangement

The fourth floor of North Building B is 13.6m above access level. This building is proposed to be provided with a single escape stair and this deviates from guidance. Alternative escape stairs are recommended to provide a robust fire safety design in the instance that one of the escape stairs becomes smoke logged and therefore cannot be used for egress.

North Building B is to be provided with sprinkler protection throughout which is an added fire safety provision above minimum requirements for a building of this size. This will restrict the maximum fire size that can be attained. Escape stair 1 is to be provided with a pressurisation system to protect it from smoke ingress. As North Building B is provided with an enhanced means of detection and alarm, and designed to adopt a simultaneous evacuation strategy, the risk that this escape stair will become smoke logged is very low such that this arrangement is deemed to be acceptable.

4.5.1.2 Lobby protection

According to BS 9999, an escape stair should be provided with a protected lobby/ corridor or a pressurisation system where the stair is the only one serving a building that has more than one storey above ground storey. These protected lobbies/ corridors should be provided at all levels except the top storey. This is to reduce the likelihood of smoke, from accommodation on a lower floor, to infiltrate into a single escape stair and prevent escape of occupants from upper floors.

Escape stair 1 is proposed to be accessed directly from the accommodation without lobby protection on the ground and first floors. This stair is to be provided with a pressurisation system that will prevent smoke from entering the stair enclosure. The risk of smoke entering the stair enclosure is therefore very low such that these arrangements on the ground and first floors are deemed to be acceptable.

4.5.1.3 Stair capacity

Escape stair 1 is to provide a clear width of 1100mm for downward travel. The stair serves the first floor which could be used as a retail space. The most onerous risk profile of B2 is therefore considered with a 15% additional margin due to the provision of an enhanced means of detection and warning. Occupants on the ground floor have direct egress to outside therefore are not considered to use the escape stair. The escape stair serves four upper floors therefore a width factor of 2.465mm per person is used to give a stair capacity of 446 people. North Building B is estimated to provide an occupancy of 390 people. The stair capacity is adequate to permit the estimated occupancy of the building.

4.5.2 South building

The South building is provided with three escape stairs as shown in Figure 3 above and detailed in Table 4 below.

Stair	Type	Extent	Clear width (mm)	Clear width limiting stair capacity (mm)
E. stair 2	Firefighting stair	Basement to ninth roof terrace	1600	1368
E. stair 3	Escape stair	Basement to seventh floor	1600	1222
E. stair 4	Firefighting stair	Lower ground floor to ninth roof terrace	1600	-

Table 4: Stair information

All escape stairs are to be approached from accommodation through protected lobbies, except for escape stair 4 on the upper most ninth roof terrace floor. All escape stairs are therefore to be considered in the calculation of the stair capacity.

Escape stairs 2 and 3 have their escape routes reduced on the way to a final exit by as shown in Figure 16 below and this deviates from guidance. Note: these widths are not shown on the current GA plans but are to be incorporated into the design. These restrictions are a result of the constraints of working on an existing building. The capacities of the stairs are to be limited by the smallest clear width. The expected occupancy to use these stairs for evacuation do not exceed the combined stair capacities as outlined in sections 4.5.2.2 below, therefore the arrangements are deemed to be acceptable.

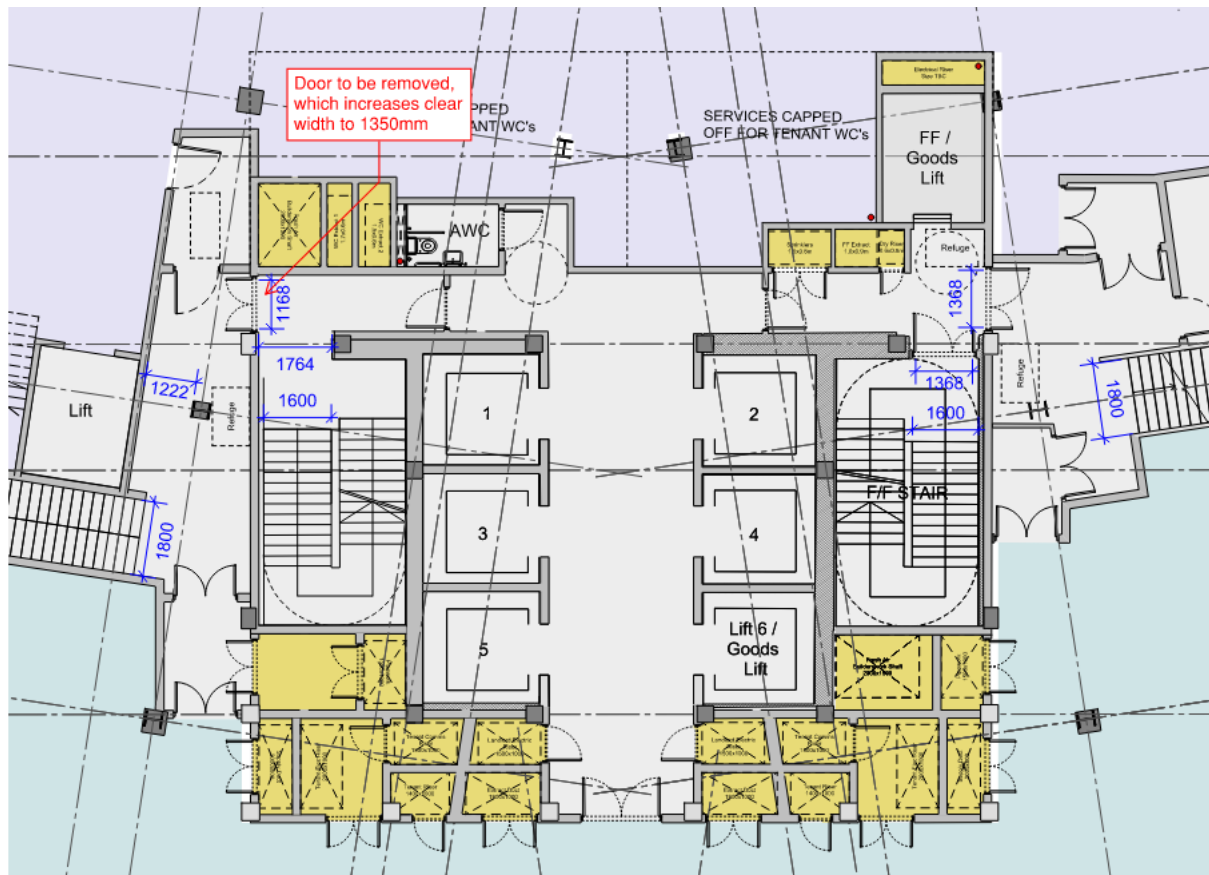


Figure 16: Arrangements limiting the stair clear widths (Note: these arrangements are not currently shown on the GA plans but will be incorporated into the design.)

4.5.2.1 Basement stairs

In a building with a basement floor and when there is more than one escape stair serving upper storeys of a building, BS 9999 requires that one escape stair be terminated on the ground floor. Other stairs can connect with the basement floor if they are provided with ventilated protected lobbies. This is required because basement stairs are relatively more likely to be filled with smoke and heat. A fire on the basement is therefore more likely to affect means of escape from upper storeys.

The lower ground floor has openings directly to outside and is also the discharge level for the three staircases in the South building, therefore it is not considered as a true basement floor. From the three stairs that serve the upper floors, escape stair 4 is terminated on the lower ground floor. Escape stairs 2 and 3 are proposed to extend down to the basement floor without any separation on the lower ground floor. Both are accessed from the basement floor through a protected lobby, except for the entrance from the plantroom into escape stair 3. Escape stair 2 is to be provided within a firefighting shaft with a ventilated lobby. Although not currently shown on the GA plans, it has been agreed that a stair door is to be added to escape stair 3 on the basement floor such that there will be lobby protection from the

plant room as shown in Figure 17 below. The protected lobby to escape stair 3 is to be ventilated from the powered smoke ventilation system to be provided on the basement floor. The arrangement to extend escape stairs 2 and 3 to the basement floor is therefore deemed to be acceptable.

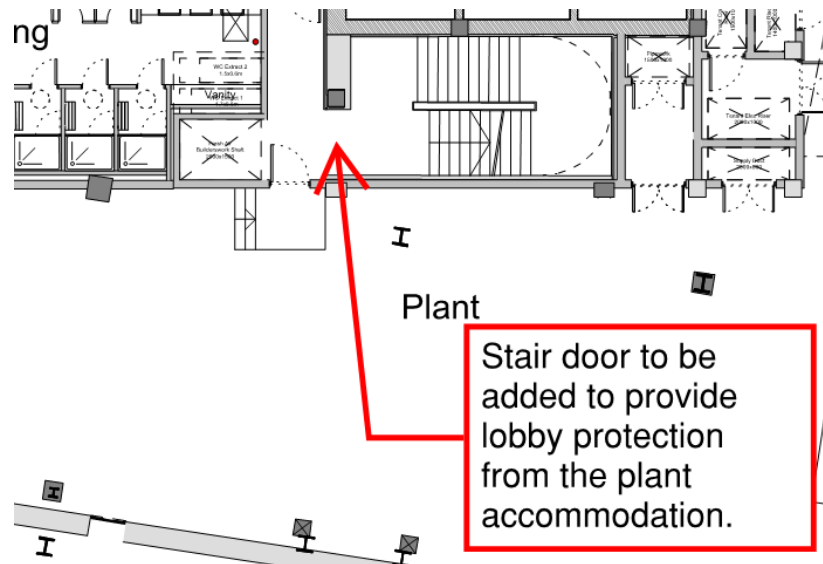


Figure 17: Lobby protection to be provided to escape stair 3 on the basement floor

4.5.2.2 Stair capacity

According to BS 9999, if a stair and storey exit at the final exit level share a common final exit, the total number of floors served by the stair should include the storey at final exit level. All escape stairs from the South building share their final exits with the accommodation on the lower ground floor, the escape stairs are therefore considered to serve the lower ground floor.

The stair capacities for escape stairs 2, 3 and 4 serving the South building are outlined below. The width factors incorporate a reduction of 15% as the building is to be provided with an enhanced means of detection and warning.

	Floors served	Width factor (mm/ person)	Clear width (mm)	Capacity
E. stair 2	11 (LG to 9 th)	1.19	1368	1149
E. stair 3	9 (LG to 7 th)	1.275	1222	958
E. stair 4	11 (LG to 9 th)	1.19	1600	1344



Total	3451
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Table 5: Stair capacities

The escape stairs are to provide a combined capacity of 3451 people, which is sufficient for the expected occupancy.

4.5.3 Basement level

There are three escape stairs that serve the basement floor. The final exit route from escape stair 1 is reduced to 900mm by doors on the lower ground floor. This is deemed to be acceptable as this escape route will facilitate upward travel over a single level. The entrance to escape stair 1 on the basement floor also has a clear width of 900mm. As there is no merging flow in this section of the stair with other floors, the flow rate through the basement stair door, escape stair enclosure and the final stair door on the lower ground floor will remain the same therefore there is no risk of a bottleneck at the final stair exit on the lower ground floor.

Escape stair 2 and 3 are considered to provide clear widths of 1368mm and 1222mm as outlined in section 4.5.2 above. Using the most onerous A2 risk profile on the basement floor and a stair serving a single floor, a width factor of 3.825mm per person is used (incorporating a 15 reduction due to the enhanced means of detection and warning). Escape stairs 2 and 3 therefore provide a combined capacity of 677 people. The basement floor is estimated to accommodate a maximum of 104 people at any one time. The stair capacity from the basement is therefore adequate to permit the estimated occupancy.

4.6 Exit width

According to BS 9999, when there are two or more storey exits, an assumption should be made that a fire might prevent the use of one exit. The largest exit should therefore be discounted when evaluating the exit capacity on a storey.

The required exit width from any level is based on the number of occupants on that level. These will be based on clear width factors as outlined in BS 9999. With the provision of an enhanced means of detection and warning, a 15% reduction of these width factors is applied.

In areas where the exit clear widths are less than 1050mm, the exit capacity is calculated using the equation below:

$$\text{Number of people} = 500 / \text{minimum width per person.}$$

The minimum exit widths required regardless of risk profile and for unassisted wheelchair access are 800 and 850mm respectively. Notwithstanding this, Approved Document M accessibility guidance may

call for larger door widths. Door widths should be measured as effective clear width (door stop to door stop, or door stop to projecting door hardware, whichever is narrowest).

The retail spaces on the ground and first floors of North building A are considered as a single space as they are connected by an accommodation stair. The storey exits from this combined space are on the ground floor.

Sometimes two independent exits lead to a single storey exit therefore only the storey exits are considered.

The available exits widths and their capacities have been assessed, with the results shown in Table 6 below.

Level	Room	Available exit width mm	Minimum exit width mm per person	Estimated number of people	Exit capacity
Basement	Male changing	880*	2.805	19	60
	Female changing	1 x 880 1 x 880*	2.805	19	60
Lower ground	Gym	1 x 1500 1 x 1350 1 x 980 1 x 800 [#]	2.805	289	837
	Office	1 x 1640 2 x 1350 1 x 1000 1 x 880	2.805	262	1016
Ground	Reception (North building B)	1 x 2470 1 x 2060* 1 x 1040	3.06	16	223
	Retail (North building B)	1 x 1510 1 x 810 [#]	3.485	40	143

	Reception (South building)	TBC	3.06	16	TBC
	Office	1 x 880 1 x 880 1 x 800	2.805	344	356
	Retail 1 (South building)	1 x 1760 ⁺	3.485	54	60
	Retail 2 (South building)	1 x 1760 ⁺	3.485	54	60
Ground		1 x 2240			
First	Retail (North building A)	1 x 1500 1 x 910* 1 x 800	3.485	142	573
	Retail (North building B)	1 x 800 [#] 1 x 780 [#]	3.485	114	143
First	Office (South building)	1 x 880 1 x 880 1 x 800	2.805	429**	356**
	Office (North building)	1 x 780 [#] 1 x 780 [#]	2.805	94	178
Second	Office (South building)	1 x 880 1 x 880 1 x 800	2.805	448**	356**
	Office (North build)	1 x 780 [#] 1 x 780 [#]	2.805	94	178
Third	Office (South building)	1 x 880 1 x 880 1 x 800	2.805	448**	356**
Fourth	Office (North build)	1 x 780 [#]	2.805	88	178

		1 x 780 [#]			
	Office (South building)	1 x 880 1 x 880 1 x 800	2.805	377**	356**
Fifth	Office	1 x 880 1 x 880 1 x 800	2.805	342	356
Sixth	Office	1 x 880 1 x 880 1 x 800	2.805	292	356
Seventh	Office	1 x 880 1 x 880 1 x 800	2.805	199	356
Eighth	Office	1 x 880 1 x 870	2.805	111	178
Ninth	Terrace	1 x 880 1 x 870	2.805	178	178

* Limited to a maximum of 60 people as door opens against direction of escape

+ Limited to a maximum of 60 people as there is a single escape route

[#] 850mm required for wheelchair access

** see commentary below

Table 6: Exit widths

The exits highlighted in **yellow** are below the minimum recommended width for unassisted wheelchair access, however as existing exits they are considered acceptable as a non-worsening of the existing conditions.

On the first to fourth floor of the South Building the capacity of the exits are lower than the expected occupancy levels. This is considered further as follows. There are four exits into the two cores as shown in the figure below. These four exits into the cores lead to three storey exits into the three staircases. To assess the exit capacity, it is necessary to discount an exit and calculate the capacity based on the remaining exits. When discounting any of the exits into Core 1 the layout is such that both escape stairs 2 and 3 in Core 1 will still be accessible. Escape stair 4 will also be available. The total capacity of the floor is then based on the three storey exits into the escape staircases. These exits have a combined capacity of 534, which is sufficient for the maximum expected occupancy of up to 448 people.

In the event of a fire blocking access into escape stair 4, the only storey exits available will be those into escape stairs 2 and 3. These exits have a capacity of 356, which is 92 fewer than the maximum expected occupancy of up to 448 people. However, there are three available exits into the core and a large area available for queuing. The three exits into the core have capacity for 979 people and there is an area of approximately 62m² available for queuing. Based on a queuing density of 0.3m² an area of 62m² can accommodate 206 people queuing and is therefore more than sufficient to accommodate longer queuing times that result from having 92 people more than the stair door capacities.

The exits available from the reception are either through the circle slider door or the speed lanes. For both of these exits to be acceptable for means of escape, they have to fail open upon loss of power or activation of the fire alarm.

All terrace areas, except that on the 9th floor, have an inner room arrangement therefore a maximum occupant capacity of 60 people will be accommodated in these areas. If more than 60 people are to be accommodated on a single terrace, e.g., for events, then the occupancy figures will have to be justified by a fire risk assessment of the proposed event.

The width of a corridor or escape route should be not less than the greater of:

- a) the exit width based on the calculation; or
- b) 1200 mm (where the corridor is not accessible to wheelchair users, this width may be reduced to 1000 mm).

All escape routes should have a clear headroom of not less than 2000mm, with no projections below this height (except for door frames).

4.6.1 Merging flow

4.6.1.1 North building

There is merging flow between occupants from the lower and upper floors within escape stair 1 enclosure on the ground floor. Occupants from the ground floor have direct escape to outside and are not considered in the merging flow calculation. According to BS 9999, where there is merging flow in the stairs between lower and upper floors, final exits are required to provide clear widths as outlined in Figure 18 below.

There is a minimum separation distance of 2.8m between the final stair exit and the closest stair riser. The following equation can therefore be used to calculate the minimum clear widths required:

$$W_{FE} = BX + 075S_{up}$$

Assuming the worst case fire scenario to eliminate one of the storey exits from the gym space on the lower ground floor, a total of 577 occupants will be distributed between two storey exits. An occupancy of 289 people can therefore be expected to use escape stair 1 from the lower ground floor. There are three escape stairs from the basement floor with an estimated occupancy of 104 people at any one

time. An occupancy of 35 people can therefore be expected to use escape stair 1 from the basement floor. A combined occupancy of 324 people is expected from the lower floors. The exit width factor associated with a B2 risk profile is 3.485mm per person. The upper section of escape stair 1 has a clear width of 1100mm. The final exit to escape stair 1 is recommended to provide a clear width of at least 1733mm. This final exit has a clear width of 2250mm, therefore the proposed arrangement meets merging flow recommendations.

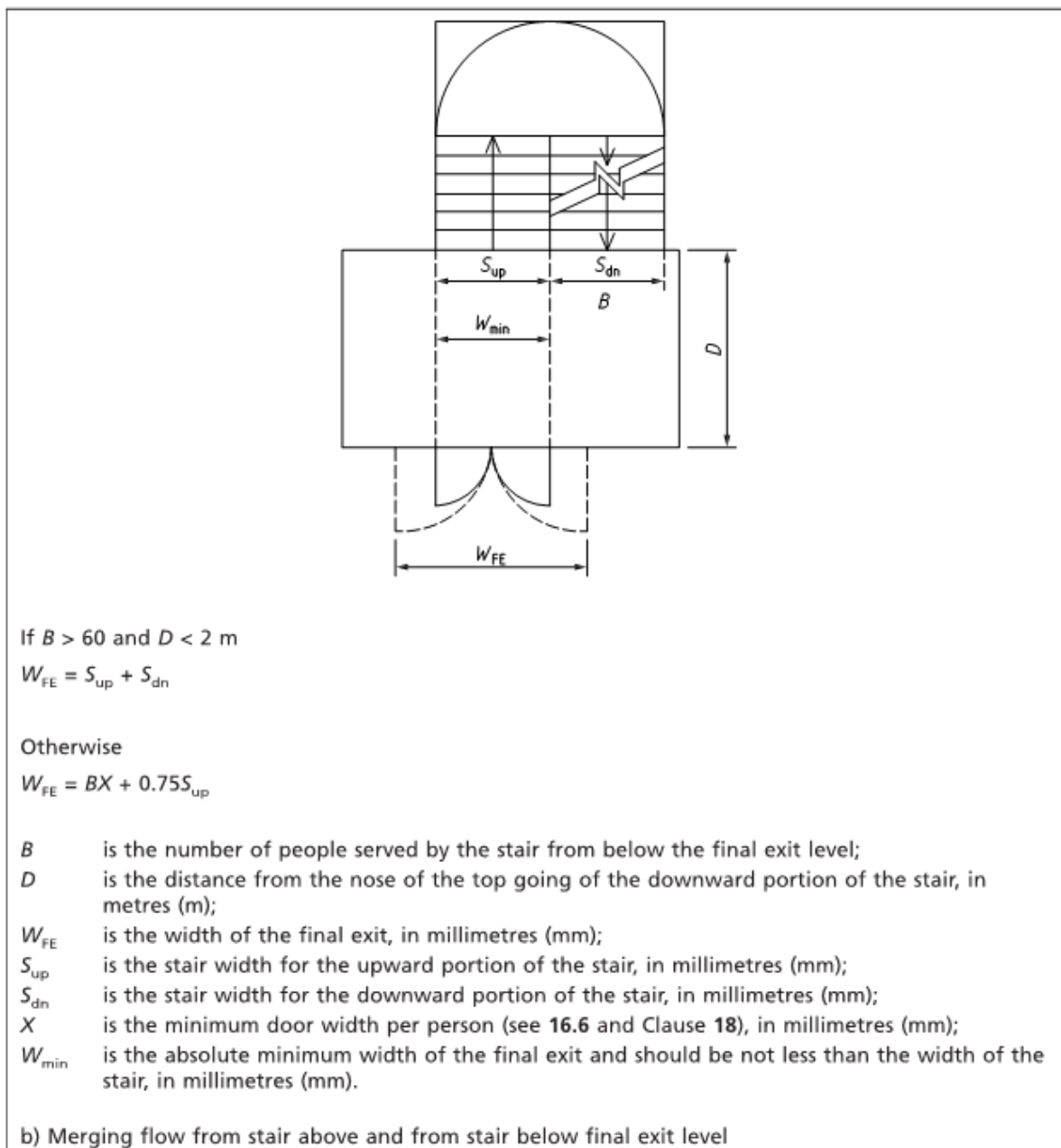


Figure 18: Final exit clear width requirements for merging flow from upper and lower levels

4.6.1.2 South building

Escape stair 2, 3 and 4 have their final exits from the lower ground floor. Escape stair 4 terminates on the lower ground floor. The basement floor is therefore the only downward portion of escape stairs 2

and 3. The occupants on the lower ground floor are factored in the stair capacity calculations therefore they are considered to be part of the upper storeys served by the escape stairs. Merging flow in the escape stairs is considered to be between occupants from the basement floor and those from the lower ground and upper floors.

The basement floor is served by three escape stairs with an estimated occupancy of 104 people at any one time. Each escape stair is expected to have an occupancy of 35 people from the basement floor. The following equation from Figure 18 above can therefore be used to calculate the minimum clear widths required:

$$W_{FE} = BX + 075S_{up}$$

The exit width factor associated with an A1 risk profile is 2.805mm per person. The upper sections of escape stairs 2 and 3 are assessed as having clear widths of 1368mm and 1222mm, respectively. In both cases the calculation produces a final exit width of less than the assessed clear width of the stairs. In the case the final exit width needs to be as per the assessed clear width of the stairs.

Final exits to escape stairs 2 and 3 are to provide clear widths of at least 1368mm and 1222mm therefore the proposed arrangement meets merging flow recommendations.

4.7 Travel distances

The minimum number of exits needs to meet the criteria set out in Table 10 of BS9999: 2017:

Minimum number of escape routes and exits from a room, tier or storey	
Maximum number of persons	Minimum number of escape routes/exits
60	1
600	2
More than 600	3

Where areas are served by more than one exit it is recommended in BS 9999 to discount an exit due to blockage by fire. If one exit is blocked there should be adequate exits remaining. In order for multiple escape routes to be considered truly independent from one another they must be 45° or more apart or be separated by fire resisting construction if less than 45°, as per Figure 7 of BS 9999 shown below.

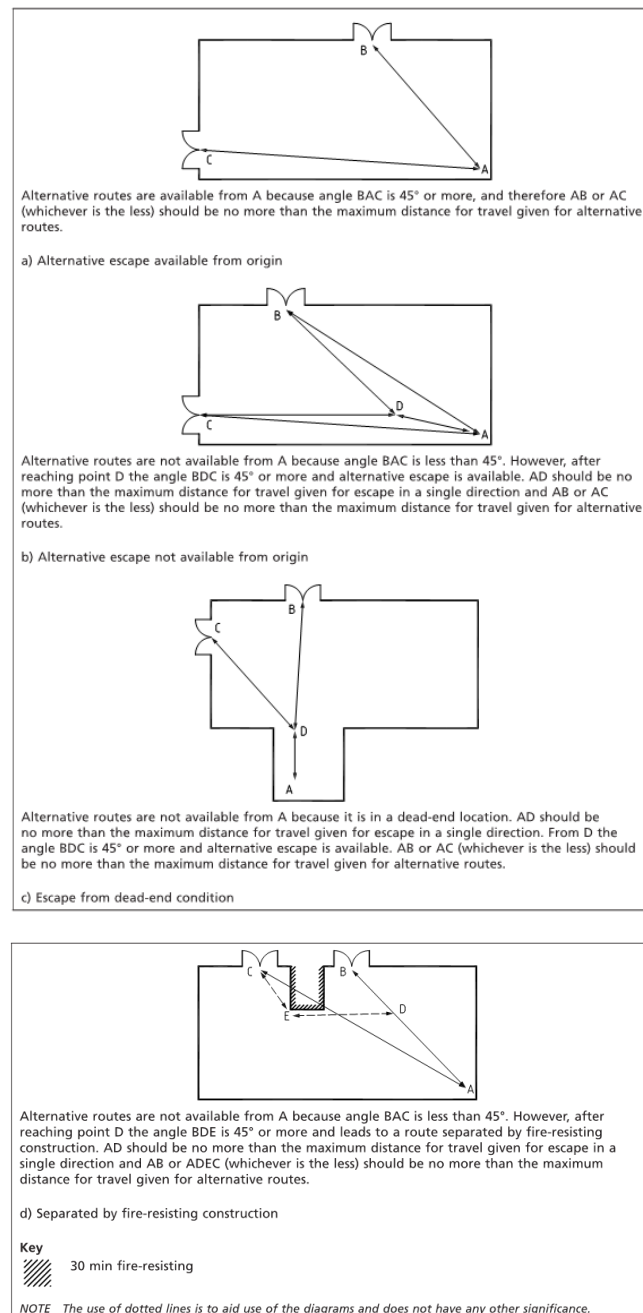


Figure 19: Definition of alternative escape routes

4.7.1 Offices and ancillary accommodation (including gym space)

The means of escape from the office spaces (including the gym space) is through two directions of travel. Enhanced means of detection and warning will be provided hence the maximum travel distances can be increased by 15%.

The maximum permitted actual travel distances required from BS 9999: 2017 are 29.9m and 74.75m for one and more than one direction of travel respectively. The internal layout of the office spaces is yet unknown hence the direct travel distances are used. The direct travel distance is $\frac{2}{3}^{\text{rd}}$ the actual travel



distance stated in BS 9999: 2017. The maximum direct travel distances will therefore be 19.9m and 49.8m.

The single direction travel distance is measured to a point where there is at least a 45° angle between two alternative exit doors. The two-direction travel distance is then acquired by adding the single direction travel distance with the distance annotated with a (+) sign.

The annotations of the maximum travel distances from the office and its ancillary accommodation are shown below.

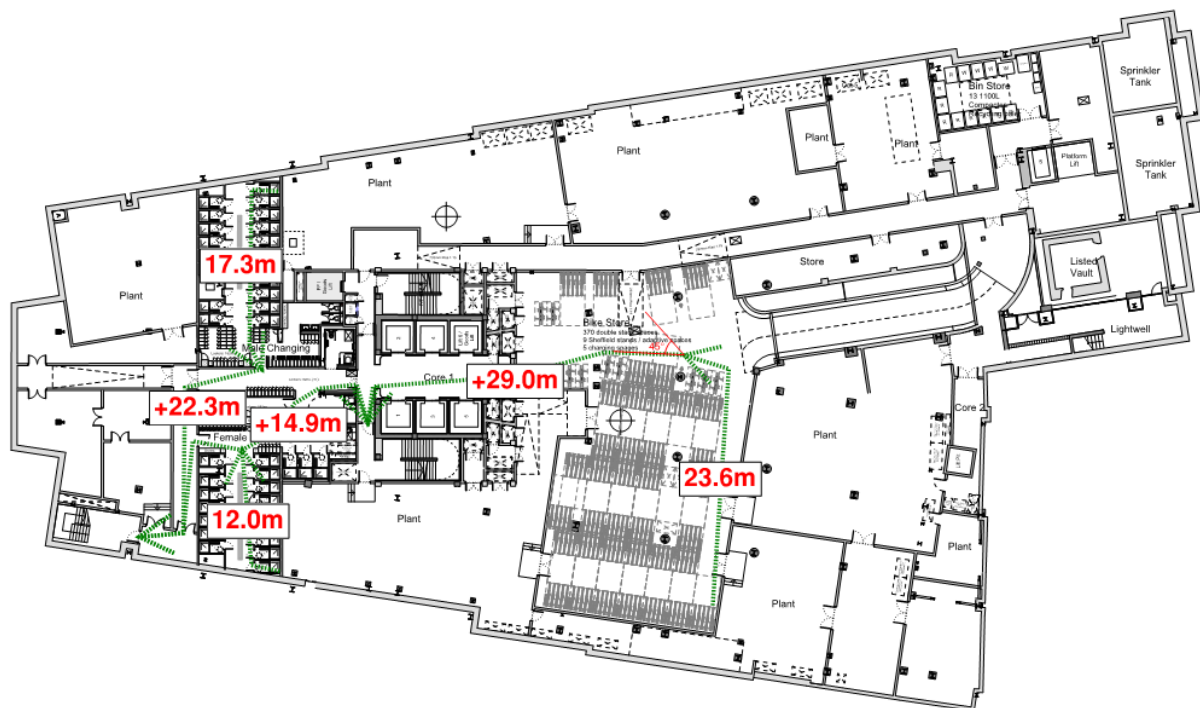


Figure 20: Basement floor travel distances

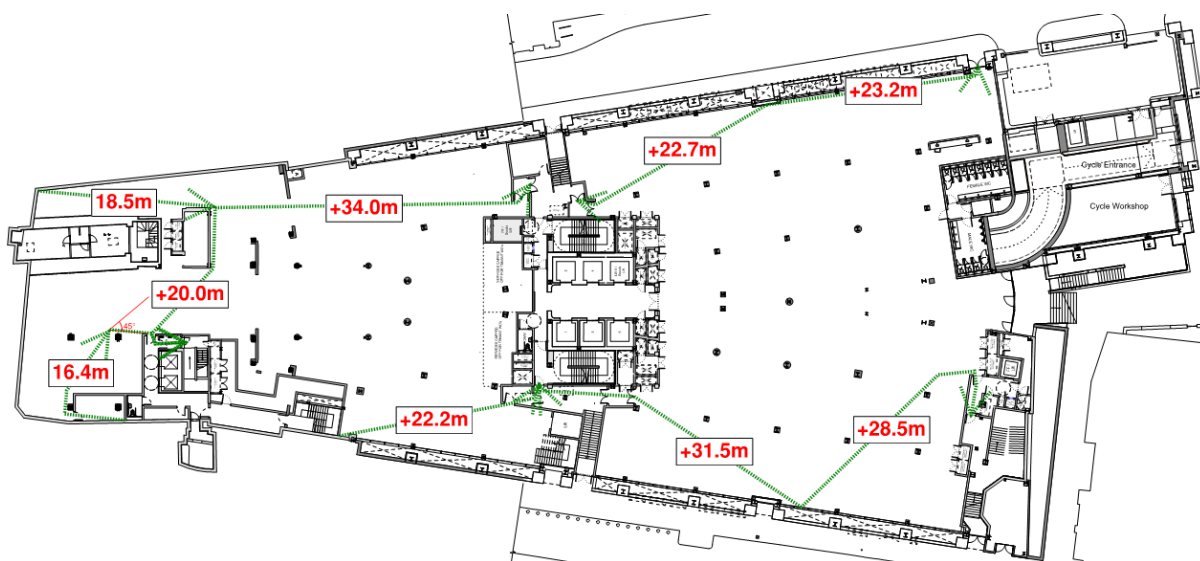


Figure 21: Lower ground floor travel distances



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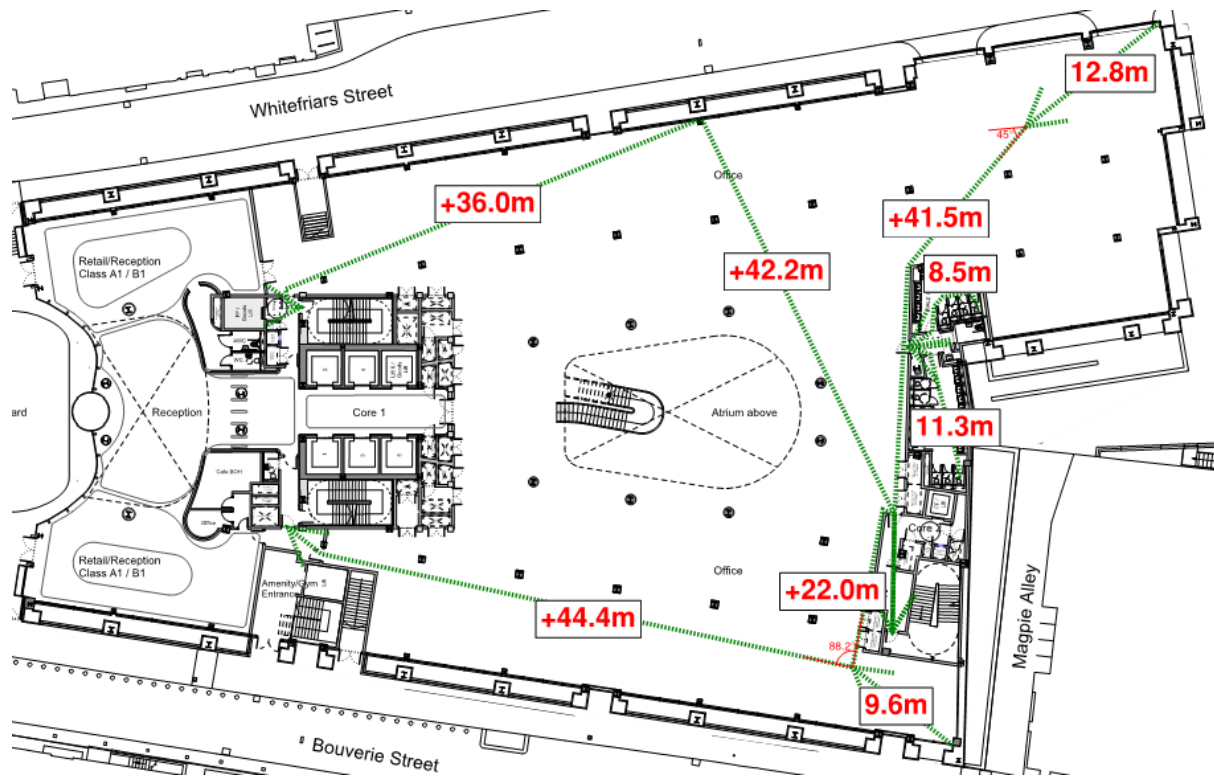


Figure 22: Ground floor travel distances

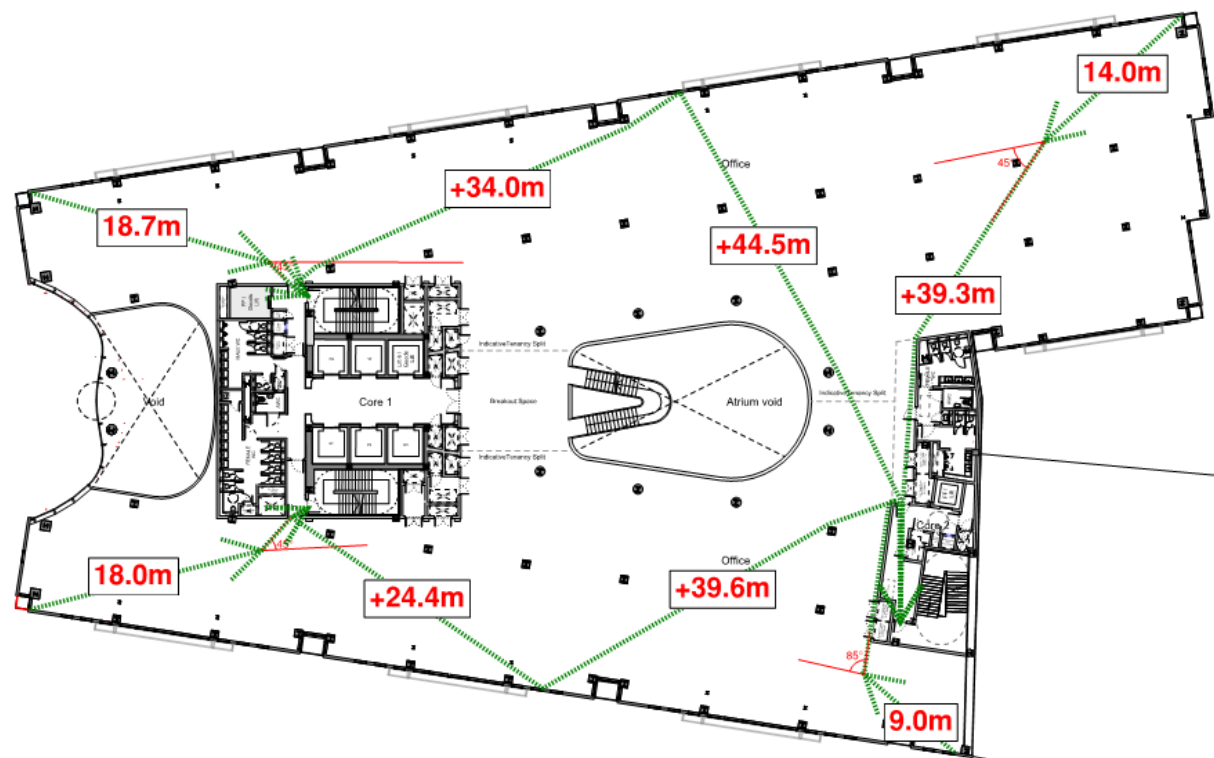


Figure 23: Typical South building upper floor travel distances shown on the first floor

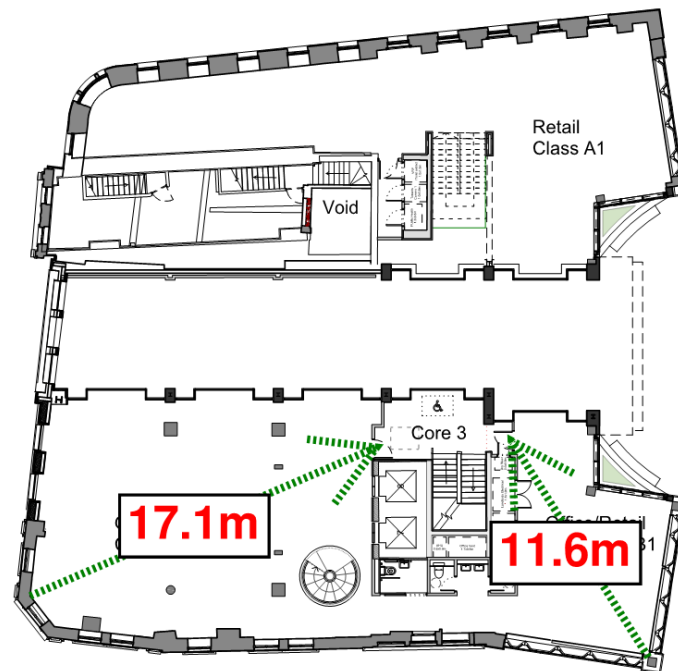


Figure 24: North building travel distances on the first floor

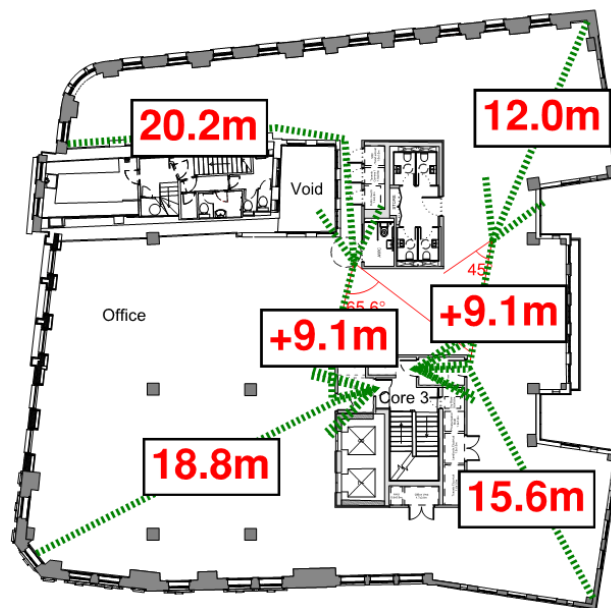
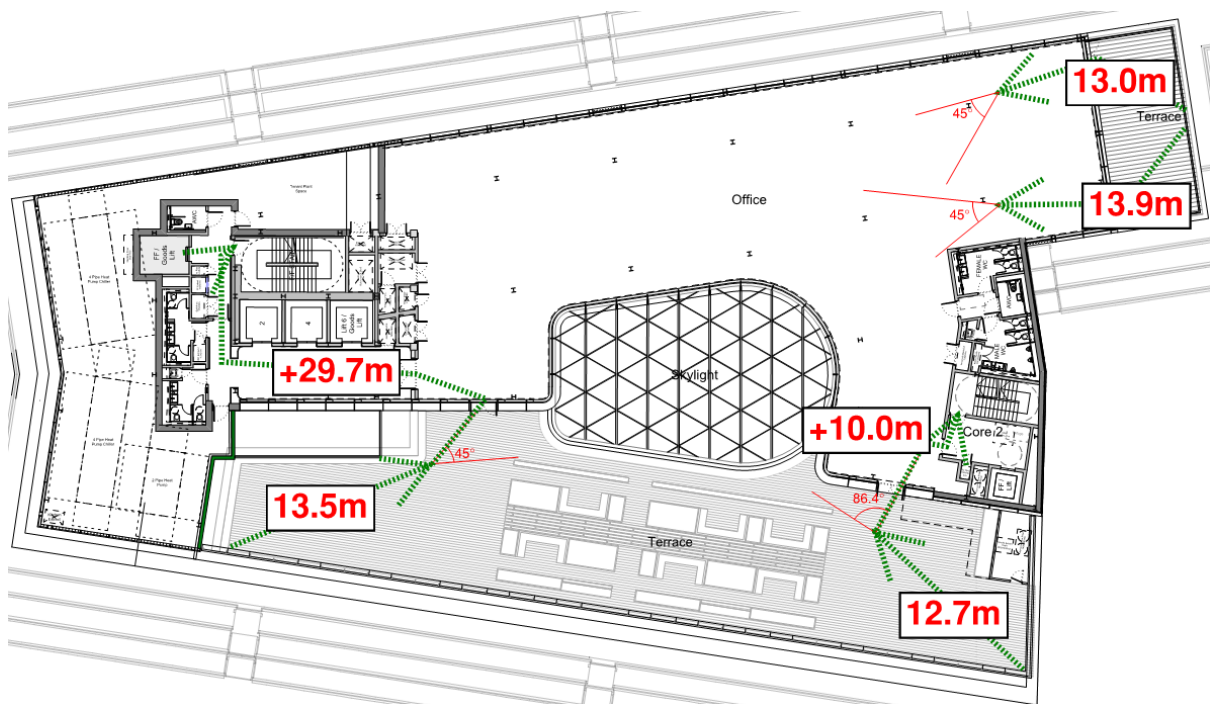
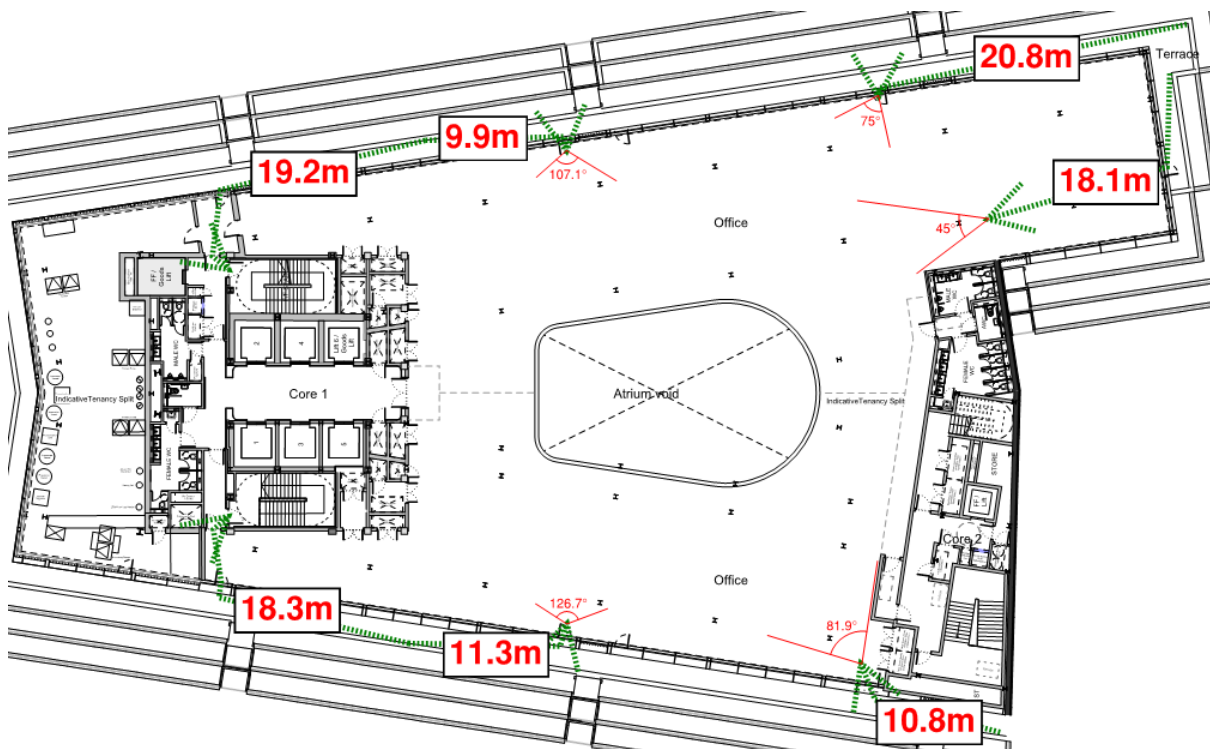


Figure 25: Typical North building upper floor travel distances shown on the second floor



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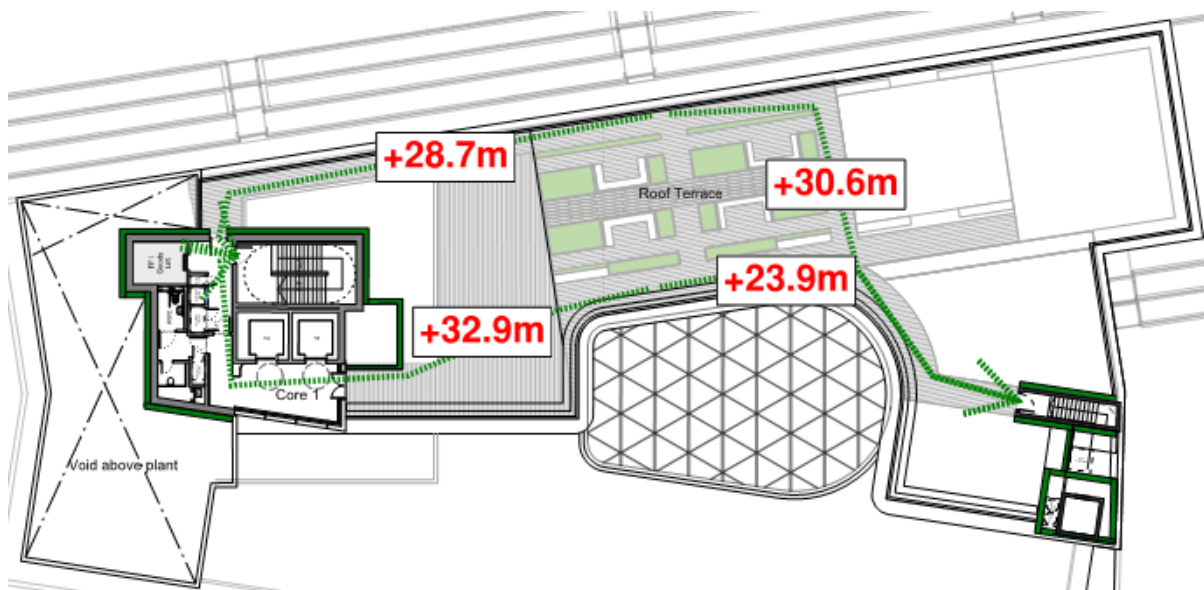


Figure 28: Ninth terrace floor travel distances

Since the building cuts back with height, the largest office floor area is from the first floor. The most onerous travel distances for a typical office accommodation in the South building are therefore outlined on the first floor in Figure 23. These travel distances are shown with the base build design. The tenancy split indicated separates the building into two sections through the centre. A protected lobby in front of escape stair 4 will allow egress from both tenant spaces. The indicated tenancy split does not have an adverse effect on the travel distances shown in Figure 23 therefore these also adequately represent the tenancy split design.

The single direction travel distances from external terrace areas on the seventh and eighth floors are shown until there is an alternative escape route (this is within the adjacent office accommodation for the seventh floor).

The direct single direction travel distance from the North building office spaces (second to fourth floors) is ca. 20.2m and therefore marginally extended. The direct travel distance from the South building external terrace area (seventh floor) is ca. 20.8m and also marginally extended. These travel distances are unlikely to exceed 29.9m when the layout has been designed therefore, they are deemed to be acceptable. Travel distances from all other spaces are within the prescribed limits therefore the proposed base build and tenancy split designs are acceptable.

4.7.2 Retail areas

The maximum permitted actual travel distances required from BS 9999: 2017 for a B2 risk profile, with enhanced means of detection and warning, are 23m and 57.5m for one and more than one direction of travel respectively. The internal layout is unknown therefore the direct travel distances are used. The maximum direct travel distances are 15.3m and 38.3m. The annotations of the maximum travel distances from the restaurant are shown below.

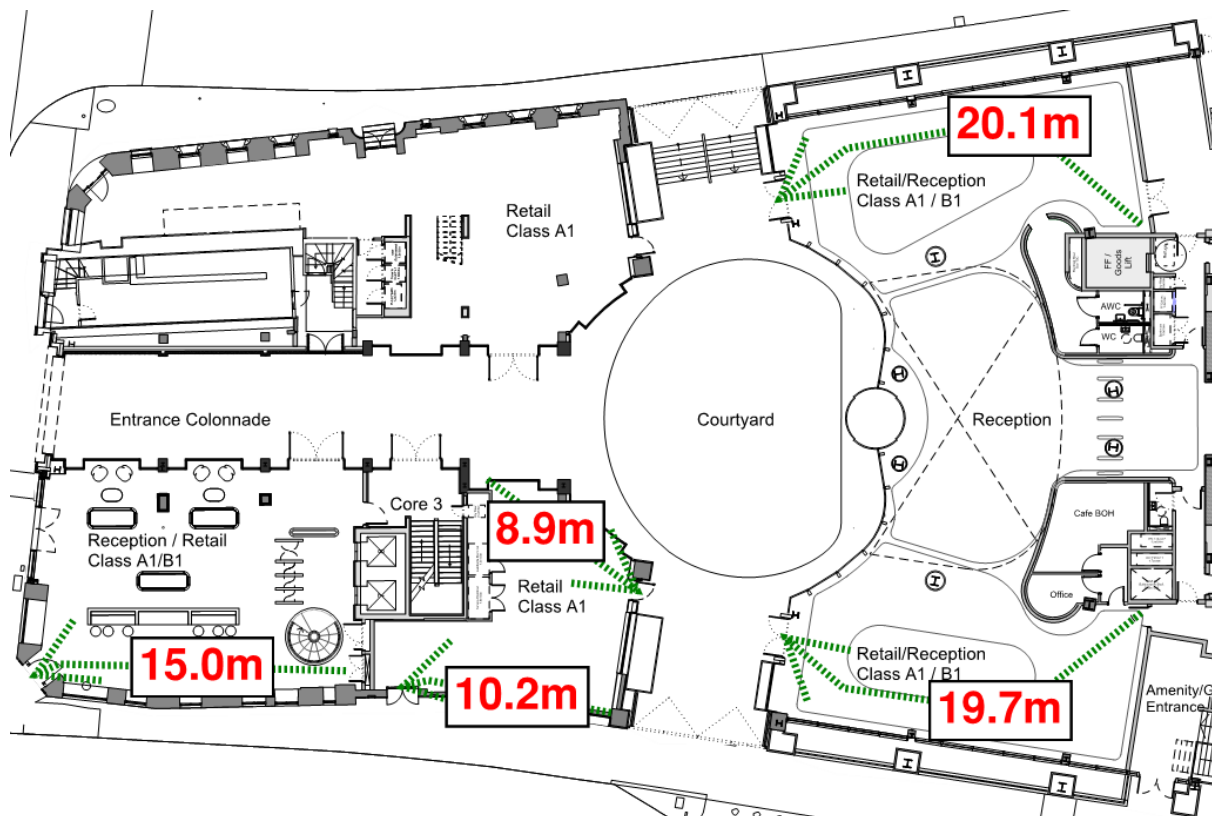


Figure 29: Travel distances from retail spaces on the ground floor

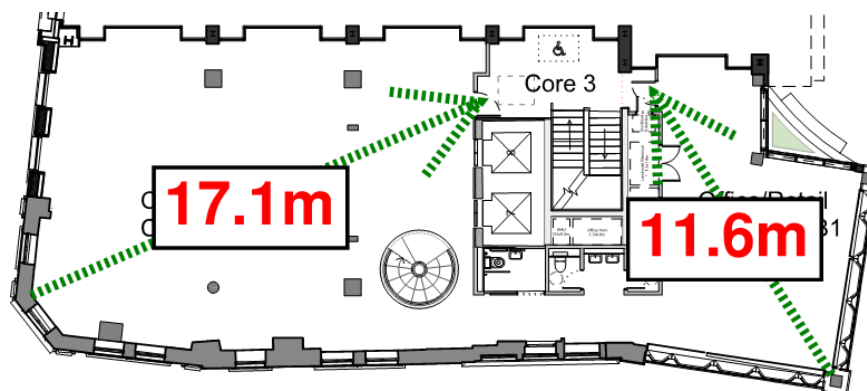


Figure 30: Travel distances from retail spaces on the first floor on North building B

The direct single direction travel distance from the North Building B (first floor) is ca. 17.1m and therefore extended. The actual travel distance is unlikely to exceed 23m when the layout has been designed therefore this arrangement is acceptable. All other travel distances are within the prescribed limits therefore the proposed designs are acceptable.

4.7.2.1 North Building A

The retail spaces on the ground and first floors of the North Building A are provided as single combined space connected by an accommodation stair. There is a single escape route from the first floor up until the base of the accommodation stair on the ground floor. The expected actual single direction travel

distance from the first floor is shown in Figure 31 below. This is indicated to be ca. 25m and therefore marginally extended by 2m.

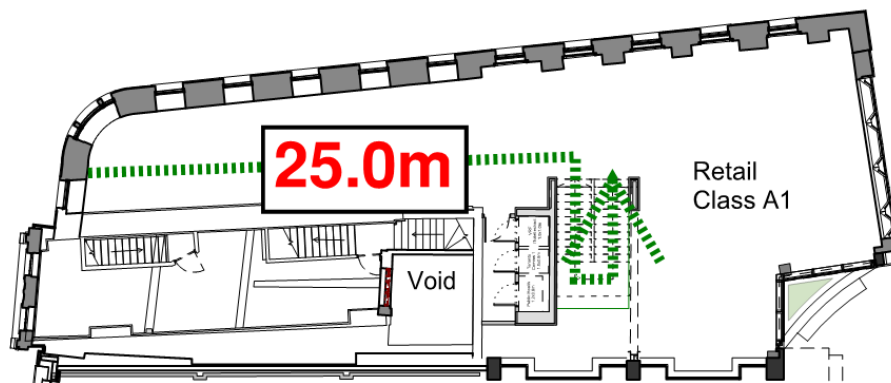


Figure 31: Single direction travel distance from the first floor retail space of North building A

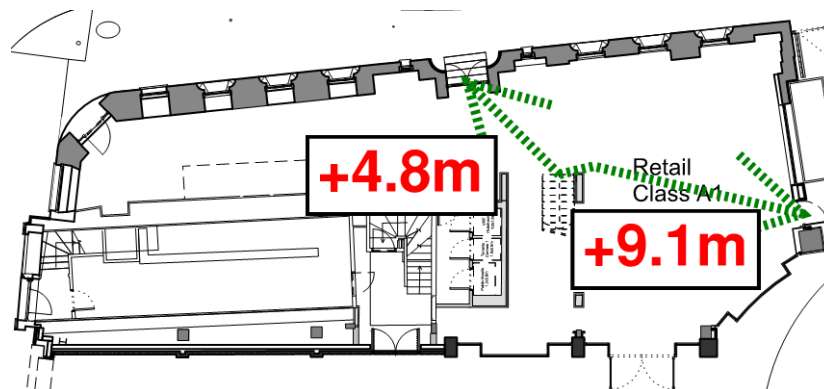


Figure 32: Two direction travel distances from the ground floor retail space of North building A

Assuming an average walking speed of 1m/s for ambulant persons that do not require assistance with access/ egress, this extended travel distance represents an extension to the travel time by 2 seconds. Considering that the evacuation time is likely to be dominated by the pre-travel time, the extension to the travel time by 2 seconds is not considered to have a significant impact on the overall evacuation time from the building. The extended travel distance from the first floor of the North building A is deemed to present a very low fire risk to occupant such that the design is considered to be acceptable.

4.7.3 Plantrooms

The maximum permitted actual travel distances required from BS 9999: 2017 for an A2 risk profile, with enhanced means of detection and warning, are 25.3m and 63.25m for one and more than one direction of travel respectively. Where the internal layout is unknown, the direct travel distance is used. The maximum direct travel distances are 16.9m and 42.2m. The annotations of the maximum travel distances from the plantroom spaces are shown below.

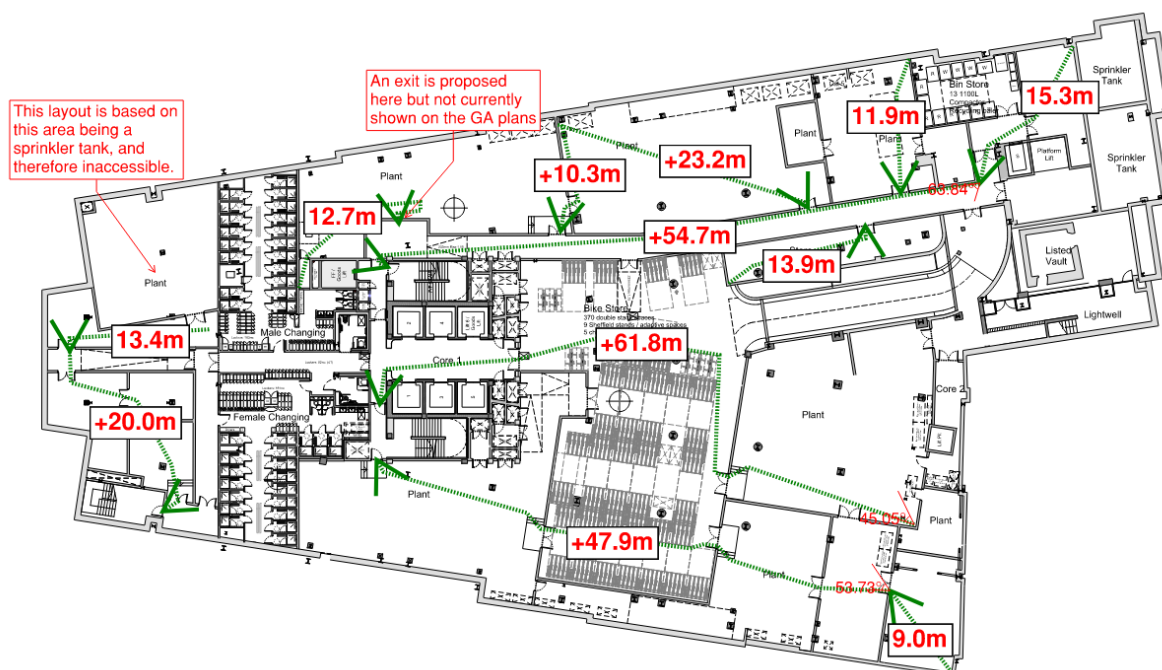


Figure 33: Travel distances on the basement floor

To achieve two directions of escape from some of the basement plantrooms there are instances where the second direction of escape is through other plantrooms. Access and signage for the second escape routes will need further consideration in RIBA Stage 4.

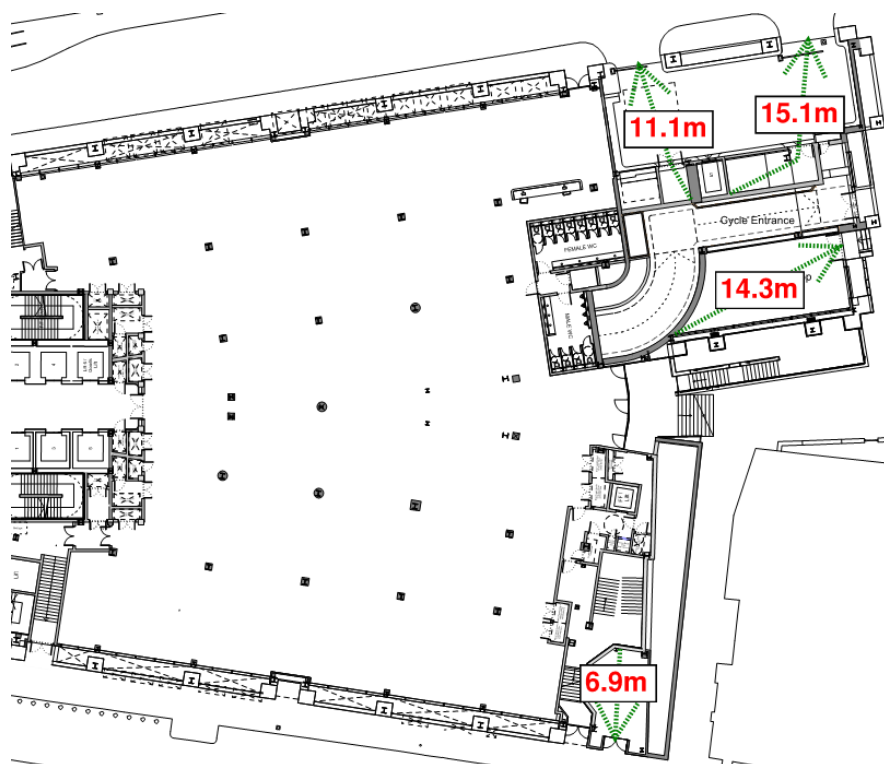


Figure 34: Travel distances on the ground floor

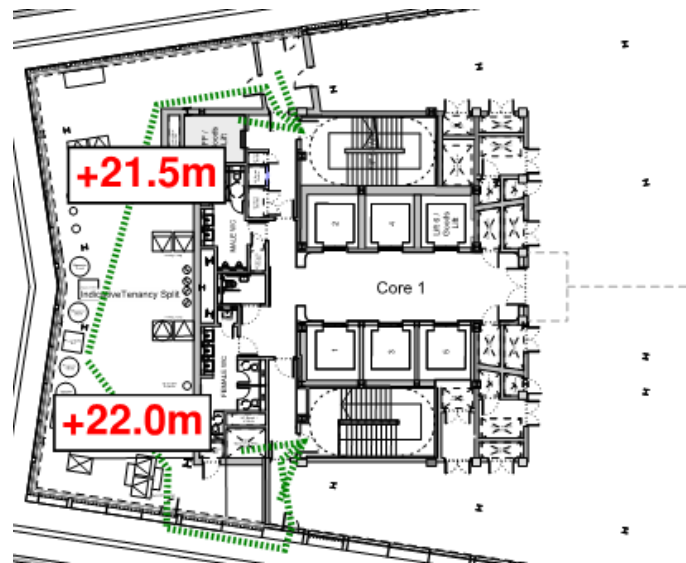


Figure 35: Travel distances on the seventh floor

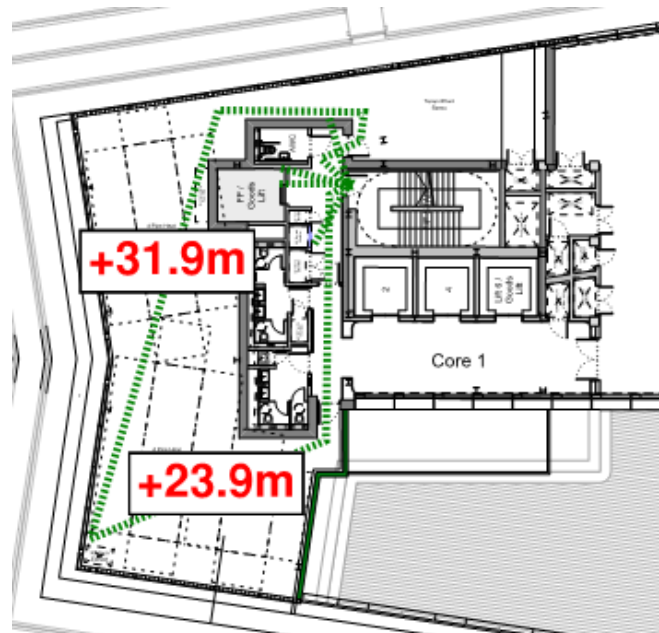


Figure 36: Travel distances on the eighth floor

4.7.4 Reception areas

The maximum permitted actual travel distances required from BS 9999: 2017 for an B1 risk profile, with enhanced means of detection and warning, are 27.6m and 69m for one and more than one direction of travel respectively. Where the internal layout is unknown, the direct travel distance is used. The maximum direct travel distances are 18.4m and 46m. The annotations of the maximum travel distances from the plantroom spaces are shown below.

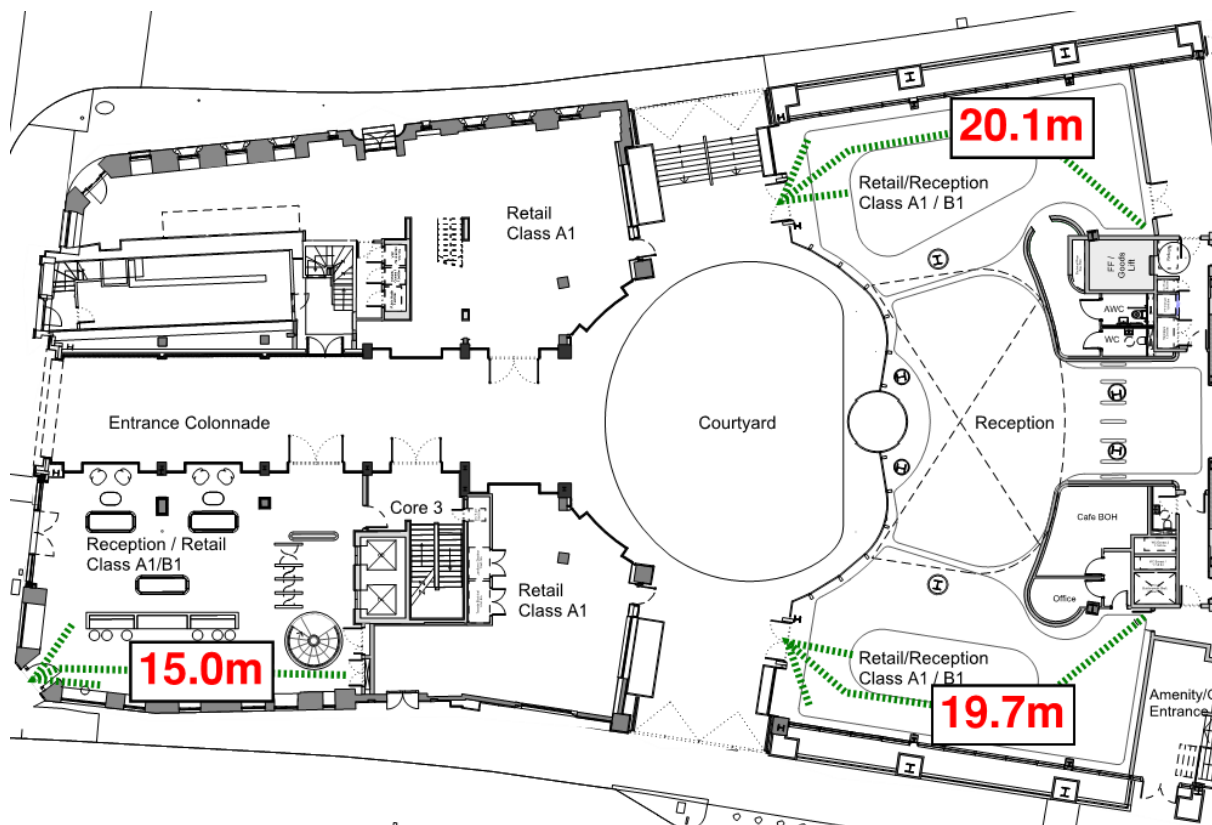


Figure 37: Travel distances from reception areas on the ground floor

The travel distances from the reception areas are within the prescribed limits therefore the proposed designs are acceptable.

4.8 Open spatial planning

There is to be an open connection between the ground and first floors of the North Building B to incorporate an open spiral accommodation stair. This introduces open spatial planning in the design where smoke and heat from a fire on the lower floor could potentially travel via the opening to the upper floor. Under BS 9999, the following means of escape requirements apply where there is open spatial planning;

- 🌿 Storey exits are to be sited away from open connections so that escape routes do not approach the openings,
- 🌿 Escape routes should not pass within 4.5 m of the opening as shown below.

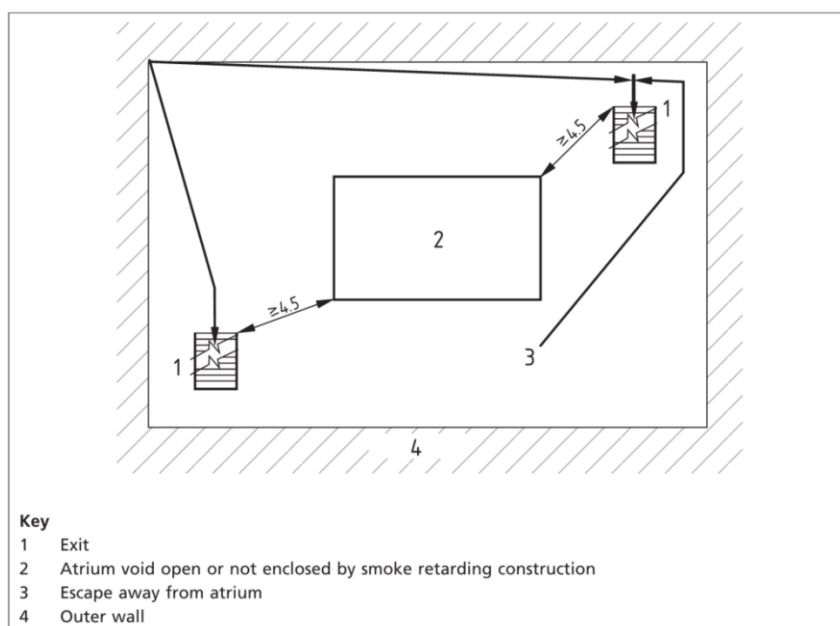


Figure 38: Escape considerations in open spatial planning

The proposed open spatial planning arrangement on the first floor of North building B is shown below. Escape routes and storey exits are shown to be at least 4.5m away from the opening therefore this layout is acceptable.

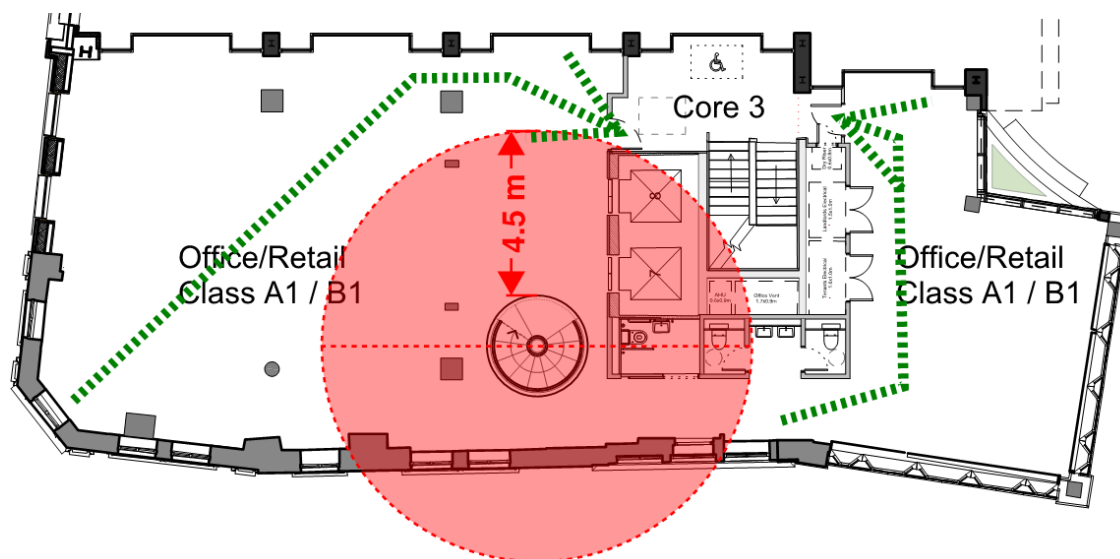



Figure 39: Open spatial planning on the first floor of North building B

4.9 Inner rooms

Where inner room arrangements are proposed, the following requirements are to apply in accordance with BS 9999;

-  the occupant capacity of the inner room does not exceed 60 (30 where the occupants require assistance escaping);

- the inner room is entered directly from the access room;
- the escape route from the inner room does not pass through more than one access room;
- the travel distance from any point in the inner room to the exit(s) from the access room does not exceed the allowable one-way travel distance;
- the inner room is not a bedroom;
- the access room is not a place of special fire hazard and is in the control of the same occupier as the inner room;
- the enclosures (walls or partitions) of the inner room are stopped at least 500 mm below the ceiling; or
- a suitably sited vision panel not less than 0.1 m² is in the door or walls of the inner room, to enable occupants of the inner room to see if a fire has started in the outer room; or
- the access room is protected by an automatic smoke detector that either operates an alarm that is audible in the inner room, to a sound pressure level in accordance with the minimum recommended in BS 5839-1, or gives a visual indication in the inner room if the ambient noise levels are so great as to make an alarm inaudible.

The inner rooms from the proposed design consist of:

Floor	Inner room	Access room
Basement	Plant rooms	Plant rooms
	Male changing	Corridor with lockers
Ground	Café BOH	Retail/ reception
	Office	
Seventh	External terrace areas	Office accommodation
Eighth		

Table 7: Inner and access room arrangements

The common corridor that provides access to the male changing room is proposed to contain lockers therefore it is considered as an accommodation. The male changing room therefore becomes an inner room. The male changing room is indicated to have an occupancy of 19 people.

All external terrace areas, except on the ninth roof terrace, have escape routes through adjacent office spaces. The terrace areas are therefore considered as inner rooms, with the office spaces being the access rooms. The occupancy on the terrace areas with an inner room arrangement will therefore be limited to a maximum of 60 people. If more than 60 people are to be accommodated on the terrace area, e.g., for events, then the occupancy figures will have to be justified by a fire risk assessment of the proposed event.

All access rooms are to be provided with automatic smoke detection. The proposed inner room arrangements will meet the requirements of BS 9999 listed above therefore they are acceptable.

Due to their potential use, sounders are to be provided to all external terrace areas. They will be linked to the building's fire detection and alarm system.

Tenants will need to specifically account for the use and management of the terrace areas as part of their fire risk assessment(s), as required under the Regulatory Reform (Fire Safety) Order 2005, considering the specifics of the proposed events and activities, and what additional control measures can be implemented. In addition, careful management of door security fastenings will need to be considered for the terrace areas, again as part of the fire risk assessments; should these terrace areas be in use, then it will need to be ensured that all doors required for escape purposes from the terrace areas are unlocked with the doors easily openable.

4.10 Emergency lighting

Emergency escape lighting designed and installed to BS 5266-1: 2016 is to be provided throughout the building, including external and terrace areas. This is to be provided in case of failure of the main lighting system.

4.11 Emergency signage

Emergency escape routes and other relevant fire safety related provisions will be provided with signage in accordance with the Health and Safety (Signs and Signals) Regulation 1996. This will include the signing of exit doors/ routes in accordance with BS ISO 3864-1 and BS 5499-4.

Signs will be provided within stairways to identify floor levels and the final exit route from the stair. Refuge points will also be clearly identified by appropriate signage.

Dry rising main inlets will need to be clearly signed externally, so that their location is clearly visible to the attending fire crews.

The route(s) to the main sprinkler room/ stop valve will need to be clearly signed in line with BS EN 12845.

4.12 Door opening direction, door fastenings, and headroom

All escape doors should open in the direction of travel unless there are 60 people or less using the door (or an alternative managed approach is adopted, as is anticipated could be supported for the external terrace areas through a fire risk assessment).

All doors and gates on escape routes (including final exits to external) should be fitted with simple fastenings and hardware that allow them to be easily and readily opened from the side approached by people making their escape. Additional guidance relating to the appropriateness and choice of door fastenings and furniture can be found in the Door & Hardware Federation '*Code of practice: hardware for fire and escape doors – Issue 4*'.

Vision panels should be provided where doors on escape routes subdivide corridors, where any doors are hung to swing both ways, or where it is required as one of the conditions for providing an inner room arrangement.

All escape routes should have a clear headroom of not less than 2m and there should be no projection below this height (except for door frames).

4.13 Escape for mobility impaired persons

Where access is provided for those in wheelchairs or with mobility impairments, a suitable means of escape strategy should be provided. The design should be explicit as regards the provisions of means of escape for disabled people. It is not acceptable, according to BS 9999: 2017, to omit such detail and state simply that management procedures should/ will be developed to cater for these occupants.

The designer should be able to describe how means of escape in the event of fire is to be achieved from all accessible locations in the premises, whether or not it is intended that disabled people have frequent access to those locations.

The design for wheelchair user evacuation is therefore a balance between the active and passive systems provided and the resource and training of staff to support escape.

Refuge points are to be provided throughout both buildings for personnel with mobility impairments to wait for assistance in a relatively safe enclosure. They are to measure at least 900mm by 1400mm to allow wheelchair users to manoeuvre into position. Where refuge points are provided, they will not obstruct or reduce the clear width of the escape routes provided. Each refuge point will be provided with an emergency voice communication (EVC) system, linked to a master station in the reception area to allow mobility impaired occupants to call for assistance. Refuge points are indicated to be provided in the following locations.

Building	Floors	Location	Additional locations required
-	Basement	Escape stair 1 enclosure Main core lift lobby	-
-	Lower ground	Escape stair 1 enclosure Escape stair 2 final corridor Escape stair 3 final corridor Outside exit to Ashentree Court	Escape stair 4
North	First	Escape stair 1 enclosure	-
	Second to fourth	Escape stair 1 enclosure and lobby (two refuge points on each floor)	-
South	Ground	Escape stair 2 lobby Escape stair 4 lobby	-
	First to eighth	Main core lift lobby Escape stair 4 lobby	-
	Ninth roof terrace	-	Main core lift lobby Adjacent to escape stair 4 entrance

Table 8: Refuge point provision

Additional refuge points are to be incorporated in the building in locations highlighted in yellow above.

The preferred means of evacuation for people with mobility impairment from upper floors, according to BS 9999, is by a lift with enhanced fire safety features that allow it to be used safely in the event of a fire. If these are not available, then it might be necessary to carry a person with limited mobility up or down the escape stair. Alternatively, evacuation chairs can be provided to aid their vertical evacuation. Adequate staff and training should be provided to allow safe egress through the adopted approach.

Within North Building A there is no lift access to the 1st floor, and therefore no disabled refuge is proposed. If a future tenant of this space installs a platform lift for public access they will need to carefully consider disabled means of escape as currently there is no provision for refuges at 1st floor and platform lifts are not normally appropriate for escape.

Within North Building B, there are no firefighting or evacuation lift installations to be provided. Evacuation of occupants with mobility impairments will be solely through carry up and carry down procedures using evacuation chairs.

Within the South building, there are to be two firefighting lift installations and one evacuation lift installation in the main core. Prior to the arrival of the fire service, firefighting lifts are to be used as evacuation lifts to facilitate the evacuation of mobility impaired persons. Post the arrival of the fire service, the evacuation lift will continue to be used to facilitate disabled egress. This arrangement is to be supported by carry down procedures using evacuation chairs from refuge points provided in escape stair 4 lobbies post the arrival of the fire service.

4.13.1 Evacuation and firefighting lift use for disabled egress

Evacuation lifts are to be provided in accordance with BS EN 81-20 and BS EN 81-70. Firefighting lift installations are to be provided in accordance with BS EN 81-72 and BS9999, these lifts can therefore be used to assist with the evacuation of disabled persons in the time prior to the fire service taking control of these installations as part of their firefighting activities.

Generally, under BS 9999, the lift will ground with doors open. It is then operated by the fire safety manager or a delegated representative, trained and authorized in the use of the lift. The lift can then be used on specific floor levels to assist with evacuation.

The building will be provided with 24-hour management / security. During the hours that onsite building management are present, they will operate the evacuation and firefighting lifts. Outside of these hours, it is proposed that the security personnel operate these lifts. If this is not feasible, it is the responsibility of the tenants to ensure that adequate arrangements are in place, detailed in personal emergency evacuation plans (PEEPs), for the evacuation of mobility impaired persons.

4.14 Assembly points

Consideration should be given to areas outside the building that would be capable of accommodating occupants of the building. This will need to be considered by each tenant. The assembly point should

be remote enough from the building to minimise the hazards of falling debris. It should also be located such that the arrival of the Fire Service is not obstructed. The designated assembly point should follow the guidelines below:

- 🌿 Located at a minimum distance of *1.5 x the building height (m)* away from the building
- 🌿 Visible from the Fire Service access road
- 🌿 Suitably identified either by fire drills, induction or signage to and at the assembly point
- 🌿 Sized to accommodate the maximum occupancy of the building.

The exact location of the assembly points shall be determined by building management and the responsible person.

5 Compartmentation

5.1 Load bearing elements of structure

In order to prevent premature collapse of building during means of escape and firefighting, the structure will provide specified minimum periods of fire resistance.

5.1.1 North building

For a sprinkled building more than 5m but less than 18m in height (measured to the topmost floor), with a risk profile of B2, the load bearing elements of structure require a minimum of 60 minutes fire resistance. Elements of structure for the North building are to be protected to a minimum period of 60 minutes fire resistance.

5.1.2 South building

All buildings more than 30m in height (measured to the topmost floor), the load bearing elements of structure require a minimum of 120 minutes fire resistance. When a building achieves the ventilation requirements outlined in Figure 40 below, loadbearing elements of structure are permitted to be protected to a minimum of period of 75 minutes fire resistance.

The ventilation conditions for the office accommodation are assessed using a single level as there will be compartment floors to separate each level. The ventilation parameter and ratio (%) of opening to storey height is then calculated as outlined in Table 9 below and compared to the requirements outlined in Figure 40.

Floor	Floor area (m ²)	Glazing area (m ²)	Ventilation parameter (%)	Storey height, H (m)	Glazing height, h (m)	h/H ratio (%)
Ground	2567	516	20	4.4	3	68
1	2694	438	16	4.4	3	68
2-3	2673	404	15	4	2.7	68
4	2259	264	12	4	2.6	65
5	2026	264	13	4	2.6	65
6	1730	416	24	4	2.7	68
7	1366	371	27	3.8	2.2	58
8	902	371	41	3.8	3.6	95

Table 9: Ventilation conditions for the South building

Ground to 7th floors meet these requirements. For 8th floor the h/H ratio is 95% which exceeds the recommended range of 30 to 90%.

Table 25 of BS9999: 2017 guidance calls for the height of the potential ventilation openings to be in the region of 30 – 90% of the storey height (measured from floor to ceiling). The minimum potential area of ventilation as a percentage of floor area is 5%; there is no maximum limit placed on potential ventilation

area. There are also no other requirements stated in relation to the size, shape, or placement of the potential ventilation openings.

As detailed in the introductory text of clause 30.2.1 of BS9999: 2017, the origins of Tables 24 and 25 come from assessments of the variables associated with parametric fires in different scenarios (looking at compartment size/ geometry, fuel load density, ventilation, thermal properties, and so on), using BS EN 1991-1-2 guidance for fully developed fires and Monte Carlo analysis. The BS9999 Handbook also outlines that the following key factors were considered:

- Buildings with a high potential for ventilation to outside will encounter shorter fire durations.
- Sprinklers reduce the fire severity but do not necessarily extinguish the fire.
- A sleeping occupancy within a building represents a greater risk compared with occupants who are awake.
- The perceived risk associated with structural failure increases with the height of the building.

For the 8th floor the proposed glazing exceeds the generic 90% upper limit of potential ventilation openings for office use. It is however thought that this arrangement is reasonable based on the following quantitative and qualitative rationale, keeping in mind the background origins of Tables 24 and 25 mentioned above.

From a qualitative perspective, the following features related to 8th floor are relevant:

- The glazing is distributed around the perimeter of the floor. As one of the primary objectives of providing potential ventilation openings is to provide a means via which heat from a fire can be released from the internal of a building to external to relieve conditions, the provision of glazing around the perimeter of a building will provide a better opportunity for this potential to be realised compared to glazing that is provided in one concentrated area. As mentioned above, BS9999 guidance does not stipulate how the minimum 5% potential ventilation openings should be distributed around the building, where they should be positioned in terms of high or low level, or how these should be configured/shaped. Therefore, it is theoretically possible to only provide the minimum 5% potential opening area in an arrangement that is far less favourable in terms of achieving this heat release mechanism than what is being proposed (e.g. if the glazing being used to satisfy the 5% requirement was provided in a relatively thin strip at low level on one side of a building, the effectiveness of heat release via this opening could be expected to be far less than what is present at 8th floor which has the potential to provide well distributed ventilation at a higher level).
- The area of minimum potential ventilation openings far exceeds the minimum 5% requirement for offices; the 8th floor is provided with a potential ventilation area of ca. 41% of the floor area. BS9999 does not set a maximum limit on the potential ventilation opening area; it is therefore assumed that the more potential venting openings to external that can be provided, the better for supporting the approach to reducing fire resistance periods based on ventilation. The 8th



floor is therefore not being designed to minimum acceptable standards in this respect; the potential area of ventilation openings is enhanced.

As all floors above ground meet the requirements, subject to the commentary above, load bearing elements of structure for the South building are permitted to be protected to a minimum period of 75 minutes fire resistance.

Note: The classification periods 75, 105 and 135 do not exist in European classification system BS EN 13501-2 and BS 9999: 2017 requires that the next higher classification be used in this instance. For the purposes of this report, the load bearing elements of structure for the South building are specified as 90 minutes fire resistance.

Table 25 Ventilation conditions for application of Table 24

Occupancy characteristic ^{A)}	Use	Ventilation parameter as percentage of floor area %	Height of opening ^{B)} as percentage of storey height (i.e. from floor to ceiling) %
A	Office	5	30 to 90
A	Industrial	2.5	30 to 80
B	Retail	5	50 to 100
B	Assembly and recreation	2.5	30 to 80
Ci	Individual residential	10	30 to 90
Cii and Ciii	Other residential	10	40 to 90

NOTE 1 The ventilation describes the type of building and is a reflection of the geometry and not its contents, and therefore independent of the risk within the specific category.

NOTE 2 The potential area of ventilation refers to any construction where it is reasonably expected to fail during a post flashover fire, e.g. non-fire-resisting glazing is the prime example. It does not imply that the designer has to assess what area of glazing will fail in the fire process.

^{A)} As defined in Table 2.

^{B)} This is the weighted mean height (by ventilation area) of the potential openings, such as non-fire-resisting windows and other areas that are liable to fail. If a storey has openings each with an area of $A_1, A_2, A_3, \dots, A_n$ and heights of $h_1, h_2, h_3, \dots, h_n$, then the total area of the openings $A = A_1 + A_2 + A_3 + \dots + A_n$, and the weighted mean height, h , is given by:

$$h = \frac{A_1 h_1 + A_2 h_2 + A_3 h_3 + \dots + A_n h_n}{A}$$

NOTE In the calculation of the weighted mean height it is also acceptable to selectively consider only the height(s) of the openings that achieve the minimum ventilation area.

If h is the weighted mean height of all the openings and H is the height of the storey then h/H should be between the values given in the end column.

Figure 40: Ventilation requirements to provide reduced fire resistance for elements of structure

5.1.3 Basement and lower ground floors

The North and South buildings are connected on the basement and lower ground floors. As these floors support the loadbearing elements of structure for the South building, loadbearing elements of structure on the basement and lower ground floors are to be protected to a minimum period of 90 minutes fire resistance.

5.2 Compartmentation

Compartmentation is provided throughout the building to protect escape routes, aid firefighting and to separate areas of risk from other occupancies.

Compartmentation is a complete barrier to fire and smoke including the junctions with other walls and floors. The performance of compartmentation is taken from the load bearing structural performance therefore a minimum of 60 minutes and 90 minutes fire resistance (structural, integrity and insulation) are required for the North and South (including the basement and lower ground floors) buildings, respectively.

Specifically, for the North building:

- ✿ The ground, second, third and fourth floor slabs are to be provided as 60 minute compartment floors.
- ✿ Independent retail spaces are to be separated from each other and from the office accommodation with construction providing 60 minutes fire resistance.
- ✿ There are no compartment subdivision requirements on each office floor. These can be open plan.
- ✿ Service risers are to be enclosed within construction providing 60 minute fire resistance and FD30 fire doors.
- ✿ Escape stair 1 is to be enclosed within construction providing 60 minute fire resistance. Doors to the stair enclosure are to be provided as FD30S fire doors.
- ✿ Protected lobbies to escape stair 1 are to be enclosed with construction providing 30 minute fire resistance.
- ✿ Store rooms are to be enclosed in construction providing 30 minute fire resistance.
- ✿ Any enclosures containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems, will be separated from the building by 120-minute fire resistance construction, with FD60S doors.
- ✿ Ductwork systems will need to be afforded with adequate fire protection measures (use of fire dampers, fire resisting enclosures, or fire resisting ductwork) in line with clause 32 of BS9999: 2017.
- ✿ Cavity barriers will need to be provided in extensive concealed spaces/ voids in line with clause 33 of BS9999: 2017.

Specifically, for the South building:

- ✿ All floor slabs, except the basement, are to be provided as 90 minute compartment floors.
- ✿ Independent retail spaces are to be separated from each other and from the office accommodation with construction providing 90 minutes fire resistance.
- ✿ There are no compartment subdivision requirements on each office floor. These can be open plan.

- 🌿 Service risers are to be enclosed within construction providing 90 minute fire resistance and FD60 fire doors.
- 🌿 Firefighting shafts 2 and 4 are to be enclosed in construction providing 120 minute fire resistance. Doors into the firefighting shaft enclosure are to be provided as FD60S fire doors.
- 🌿 Firefighting stairs and risers within firefighting shafts are to be enclosed in construction providing 60 minute fire resistance. Doors to the firefighting stair enclosure are to be provided as FD30S fire doors.
- 🌿 Escape stair 3 is to be enclosed within construction providing 90 minute fire resistance. Doors to the stair enclosure are to be provided as FD60S fire doors.
- 🌿 Protected lobbies to escape stair 3 are to be enclosed with construction providing 30 minute fire resistance.
- 🌿 The opening above the reception area on the ground floor is to be separated from the office accommodation on the first floor with construction providing 90 minute fire resistance.
- 🌿 The atrium void is to be separated from the office accommodation with glazing elements providing 30 minute fire resistance (integrity).
- 🌿 A fire and smoke curtain providing 30 minute fire resistance (integrity) to protect the evacuation lift from smoke ingress on the ground floor.
- 🌿 Storerooms are to be enclosed in construction providing 30 minute fire resistance.
- 🌿 Plant rooms are to be separated from the office accommodation/ enclosed in construction providing 60 minute fire resistance.
- 🌿 The refuse store on the basement floor is to be enclosed in construction providing 90 minute fire resistance.
- 🌿 Any enclosures containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems, will be separated from the building by 120-minute fire resistance construction, with FD60S doors.
- 🌿 Ductwork systems will need to be afforded with adequate fire protection measures (use of fire dampers, fire resisting enclosures, or fire resisting ductwork) in line with clause 32 of BS9999: 2017.
- 🌿 Cavity barriers will need to be provided in extensive concealed spaces/ voids in line with clause 33 of BS9999: 2017.

Areas of ancillary accommodation will need to be enclosed in fire resisting construction in accordance with BS9999: 2017 Table 29 reproduced below.



Table 29 Structural fire protection of areas of ancillary accommodation	
Area of ancillary accommodation	Type of construction needed to separate ancillary accommodation from other parts of the building
1 Storage areas greater than 1 m ² in area but not greater than 450 m ² (other than refuse storage areas).	Robust construction having a minimum standard of fire resistance of 30 min ^{A)}
2 Repair and maintenance workshops where flammable or highly flammable liquids are not used or stored	
3 Kitchens (separately or in conjunction with an associated staff restaurant or canteen)	
4 Transformer, switchgear, and battery rooms for low-voltage or extra-low-voltage equipment	
5 Engineering services installation rooms (other than those covered by items 8, 15 and 19)	
6 Dressing rooms or changing rooms	
7 Cinema projection rooms ^{B)}	
8 Storage areas greater than 450 m ² (other than refuse storage areas)	Robust solid non-combustible construction having a minimum standard of fire resistance of 60 min ^{A)}
9 Car parks within or adjoining the building and not greater than 450 m ² in area	
10 Service installation rooms (other than those covered by items 4, 16, 17, 18, 19)	
11 Places classified as high fire risk areas	
12 Repair and maintenance workshops where flammable or highly flammable liquids are used or stored	
13 Covered loading bays and storage areas other than those covered in items 1 and 8	Robust solid non-combustible construction having a minimum standard of fire resistance equivalent to that required for the elements of construction of the building and in no case less than 60 min ^{A)}
14 Car parks within or adjoining the building and greater than 450 m ² in area	
15 Refuse storage areas	
16 Boiler rooms	
17 Fuel storage spaces	
18 Transformer and switchgear rooms for equipment above low voltage	
19 Rooms housing fixed internal combustion engine(s)	
20 Scene docks	Robust solid non-combustible construction having a minimum standard of fire resistance of not less than 120 min ^{C)}
21 Any electrical substation or enclosure containing any distribution board, generator, powered smoke control plant, pressurization plant, communication equipment, and any other equipment associated with life safety and fire protection systems	
^{A)} Any openings in the required construction should be protected by doors having a similar standard of fire resistance.	
^{B)} Attention is drawn to the Cinematograph (Safety) Regulations 1955 [47] in particular in respect of cellulose nitrate film.	
^{C)} Any openings in the required construction should be protected by doors having a fire resistance not less than 60 min.	

Figure 41: Compartmentation for ancillary accommodation

Compartmentation plans are provided in Appendix C.

5.3 Fire stopping

Any penetrations through compartmentation, cavity barriers or areas of high fire risk will be fire stopped to the same fire resistance in which the penetration passes. The junctions between compartment floors and the façade are to be fire stopped to provide 60 minute and 90 minute fire resistance for the North and South buildings, respectively.

5.4 Fire and smoke curtains

A fire and smoke curtain is to be provided to protect the evacuation lift from smoke ingress on the ground floor where the lift lobby is open to the reception area.

The fire and smoke curtain is to be designed and installed in accordance with BS 8524-1 and BS 8524-2. The fire and smoke curtain is to meet the following design specification.

Location	Enclosing the evacuation lift from the reception accommodation (ground floor)
Fire resistance	Minimum of 30 minutes (integrity).
Initiation method	Close upon activation of a confirmed fire anywhere in the South building.
General requirements	In accordance with BS 8524-1 and BS 8524-2.
Deployment method	Immediate single full deployment.
Emergency egress and access controls	No
Width	Width: As per the width and length of the evacuation lift doors.
Drop	Drop: As per the height of the evacuation lift doors.
Smoke containment	Yes, maximum leakage 3m ³ /m/h.
Reaction to fire classification	National class 1, or European class C-s3, d2.
Deflection zone	The deflection to be measured in accordance with BS EN 1634-1.
Reliability/ durability	Class C1 in accordance with BS EN 14600.

Obstruction warning	A device giving a warning alarm, and/or permanent markings should be provided to indicate the area to be kept clear.
Inspection, testing and maintenance	As specified by the manufacturer.

Table 10: Recommendations for fire and smoke curtain in the South building

5.5 Fire doors

Fire doors form part of compartmentation required to protect escape routes. The requirements for fire doors are outlined below.

	Fire door specification	
Location	North building	South building (including basement and lower ground floors)
Firefighting shaft	-	FD60S
Firefighting stair	-	FD30S
Firefighting lift installation	-	FD30
Escape stair	FD30S	FD60S
Escape stair lobby	FD30S	FD30S
Life safety plantroom	FD60S	FD60S
Plantroom	FD60S	FD60S
Refuse store	-	FD90S

Firefighting service riser	-	FD30
Accommodation service riser	FD30	FD60
Passenger lift installations	FD30	FD60

Table 11: Fire door specification

All fire doors performance requirements are highlighted on the fire strategy drawings contained within Appendix C of this report.

5.6 Atrium arrangement

An atrium is a void that penetrates compartment floors. This provides a route for smoke and fire to readily spread from floor of fire origin to remote floors.

The South building is to be provided with compartment floors on all levels. The proposed opening that extends from the ground floor to the seventh floor breaches compartment floors therefore atrium guidance is to be incorporated in the design.

The atrium height to the seventh floor is below 30m above access level. According to BS 9999, for an atrium less than 30m, an A1 risk profile and a building adopting a simultaneous evacuation strategy, the following provisions are required:

- 🌿 A smoke reservoir with a depth of at least two storeys is to be provided at the top of the atrium.
- 🌿 Natural or mechanical smoke clearance system from the atrium.
- 🌿 Atrium can be open or enclosed with fire resisting and smoke retarding construction.
- 🌿 Fire load at the base of the atrium to be comparable to the use and contents of the adjoining floors.

These provisions are outlined in the exemplar schematic below.

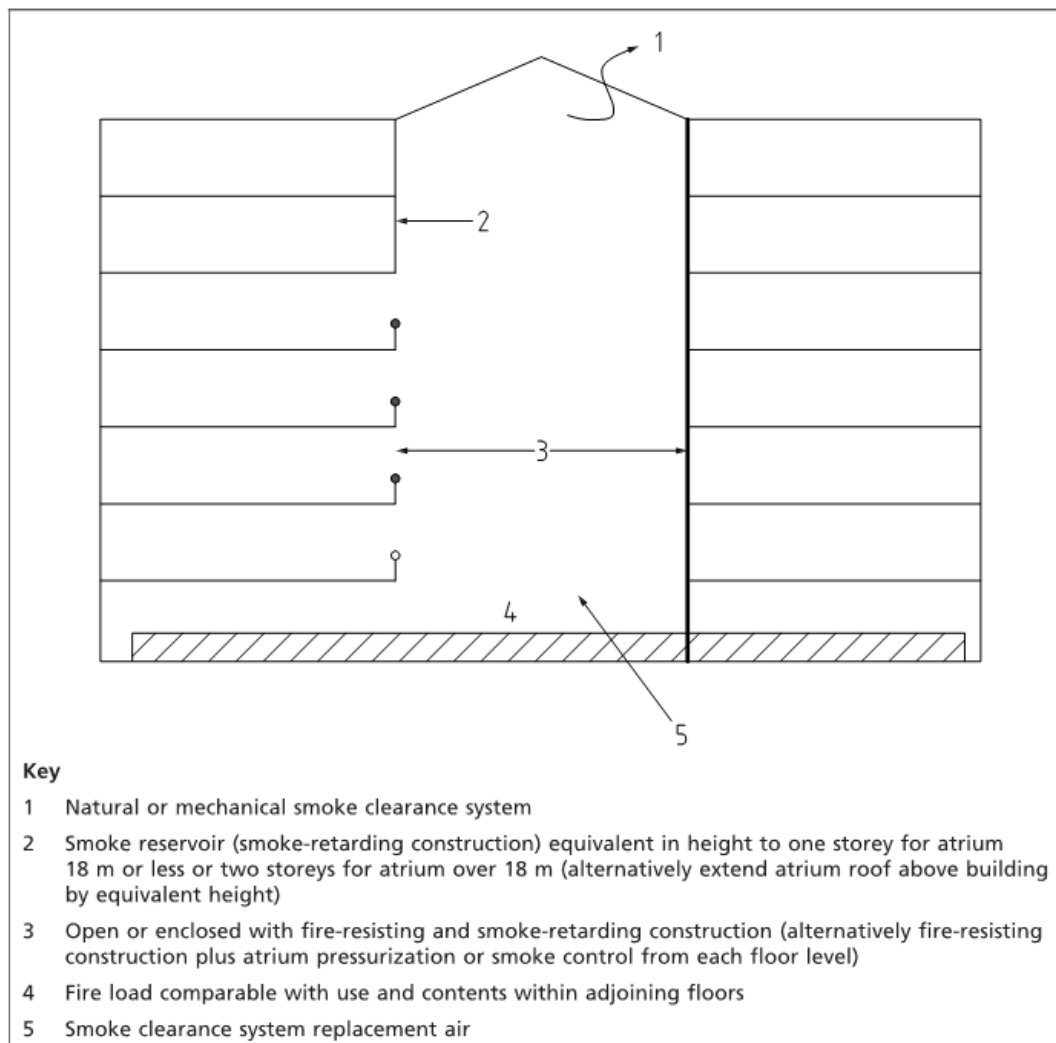


Figure 42: Atrium provisions exemplar

Although the atrium is permitted to be open to the office accommodation on the first to fifth floors, the atrium within the South building is to be enclosed from the office accommodation with 30 minute fire resisting glazing elements (integrity) from the first to the seventh floors. This provides a smoke reservoir with a depth of seven storeys. Natural smoke ventilation is to be provided at high level above the atrium in accordance with BS EN 12101-2, providing a combined geometric free area of at least 10% of the maximum void area.

The atrium base is permitted to have a fire loading similar to that associated with an office accommodation. The arrangement for the atrium base to be within an office accommodation is therefore acceptable.

The roof glazing should be a fire-resisting glazed system designed for external application with a minimum of 30 min integrity performance, tested for overhead use in a horizontal or inclined orientation, as applicable, in accordance with BS 476-22 or classified in accordance with BS EN 13501-2.



The façade glazing outside and above the atrium at 8th floor should be part of a fire-resisting glazed system, with a minimum classification of 30 min integrity.

Replacement air is required to the base of the atrium. The provision of inlet air to the atrium base is to be confirmed in RIBA Stage 4.

5.7 Internal linings

Restrictions are placed on the use of wall and ceiling linings within certain areas of buildings. This is to limit the spread of fire and production of smoke.

Although they are unlikely to be the first materials to ignite, the choice of materials for wall and ceilings can significantly affect the spread of a fire and its rate of growth and should be selected carefully. Selecting internal linings for circulation spaces having non-flammable characteristics that can delay the spread of fire is particularly important so that the occupants' means of escape is not compromised.

The internal linings in this building will need to accord with Figure 49 (Table 33 taken from BS9999: 2017):

Table 33 Classification of linings ^{A)}		
Location	National class ^{B)}	European class ^{C), D)}
Small room of area not exceeding 4 m ² in a residential building and 30 m ² in a non-residential building and domestic garages not exceeding 40 m ²	3	D-s3, d2
Other rooms (including garages)	1	C-s3, d2
Circulation spaces within dwellings	1	C-s3, d2
Other circulation spaces ^{D)} including the common areas of flats	0	B-s3, d2

NOTE Linings which can be effectively tested for "surface spread of flame" are rated for performance by reference to the method specified in BS 476-7:1987, under which materials or products are classified 1, 2, 3 or 4, with Class 1 being the highest. Class 0 is better than Class 1. It is not identified in any BS test standard. A Class 0 product is either:

a) composed throughout of materials of limited combustibility; or

b) a material having a Class 1 surface spread of flame and which has a fire propagation index (I) of not more than 12 and a sub-index (I_s) of not more than 6.

The fire propagation index is established by reference to the method specified in BS 476-6.

European classifications are described in BS EN 13501-1:2007+A1.

^{A)} Recommendations are given in Clause 33 for linings of concealed voids.

^{B)} The national classifications do not automatically equate with the equivalent classifications in the European column, therefore products cannot typically assume a European class, unless they have been tested accordingly.

^{C)} When a classification includes "s3, d2" this means that there is no limit set for smoke production and/or flaming droplets/particles.

^{D)} Large rooms such as open plan offices, shops display areas and factories need not be regarded as circulation spaces even though there are circulation routes in them.

Figure 43: Classification of linings taken from BS9999: 2017

For 65 Fleet Street, internal linings are to provide the following:

- 🏠 Stores and plantrooms less than 30 m² in area: Walls and ceilings will achieve National class 3 or European class D-s3, d2.
- 🏢 Office accommodation and plant rooms exceeding 30 m² in area: Walls and ceilings will achieve National class 1 or European class C-s3, d2.
- 🚪 Circulation/ escape corridors, firefighting lobbies, and stair enclosures: Walls and ceilings will achieve National class 0 or European class B-s3, d2.

Cavity barriers will be provided to close the edges of cavities, including around openings. Cavity barriers will also be provided:

- a) at the junction between an external cavity wall (except where the cavity wall conforms to Figure 36 of BS9999: 2017) and every compartment floor and compartment wall; and
- b) at the junction between an internal cavity wall (except where the cavity wall conforms to Figure 36 of BS9999: 2017) and every compartment floor, compartment wall, or other wall or door assembly which forms a fire-resisting barrier.

NB: Cavities also include those created by rain-screen cladding.

It should be noted from the above that cavity barriers are required to ensure both horizontal (e.g. floor) and vertical (e.g. walls) fire compartmentation.

It is important to continue any compartment wall up through a ceiling or roof cavity to maintain the standard of fire resistance, therefore compartment walls will be carried up full storey height to a compartment floor or to the roof as appropriate. It is therefore not appropriate to complete a line of compartmentation by fitting cavity barriers above the compartment wall.

For a protected escape route, a cavity that exists above or below any fire-resisting construction because the construction is not carried to full storey height or, in the case of a top storey, to the underside of the roof covering, will be either:

- a) fitted with cavity barriers on the line of the enclosure(s) to the protected escape route; or
- b) for cavities above the fire-resisting construction, enclosed on the lower side by a fire-resisting ceiling which extends throughout the building, compartment or separated part.

Extensive concealed spaces will be subdivided to meet the dimensions in Figure 45 above, with the following exceptions:

- a) in a wall which should be fire-resisting only because it is loadbearing;
- b) in a masonry or concrete external cavity wall shown in Figure 46 below;
- c) in any floor or roof cavity above a fire-resisting ceiling, as shown in *Figure 47* below and which extends throughout the building or compartment subject to a 30 m limit on the extent of the cavity;
- d) formed behind the external skin of an external cladding system with a masonry or concrete inner leaf at least 75 mm thick, or by over cladding an existing masonry (or concrete) external wall, or an existing concrete roof, provided that the cavity does not contain combustible insulation and the building is not put to a residential or institutional use;
- e) between double-skinned corrugated or profiled insulated roof sheeting, if the sheeting is a material of limited combustibility and both surfaces of the insulating layer have a surface spread of flame of at least Class 0 or Class 1 (national) or Class C-s3, d2 or better (European) and make contact with the inner and outer skins of cladding (see Figure 38);

f) below a floor next to the ground or oversite concrete, if the cavity is less than 1 000 mm in height or if the cavity is not normally accessible by persons, unless there are openings in the floor such that it is possible for combustibles to accumulate in the cavity (in which case cavity barriers should be provided and access should be provided to the cavity for cleaning);

g) cavities that are specifically protected by a sprinkler system in accordance with BS EN 12845.

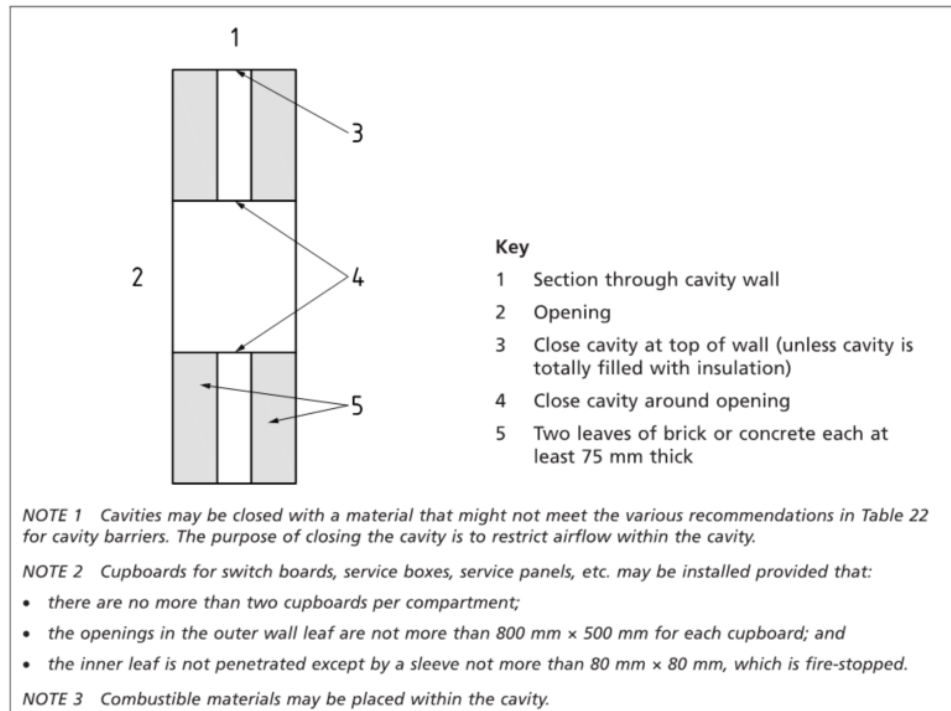


Figure 46: Cavity wall excluded from cavity barrier provision (Figure 36 from BS 9999)

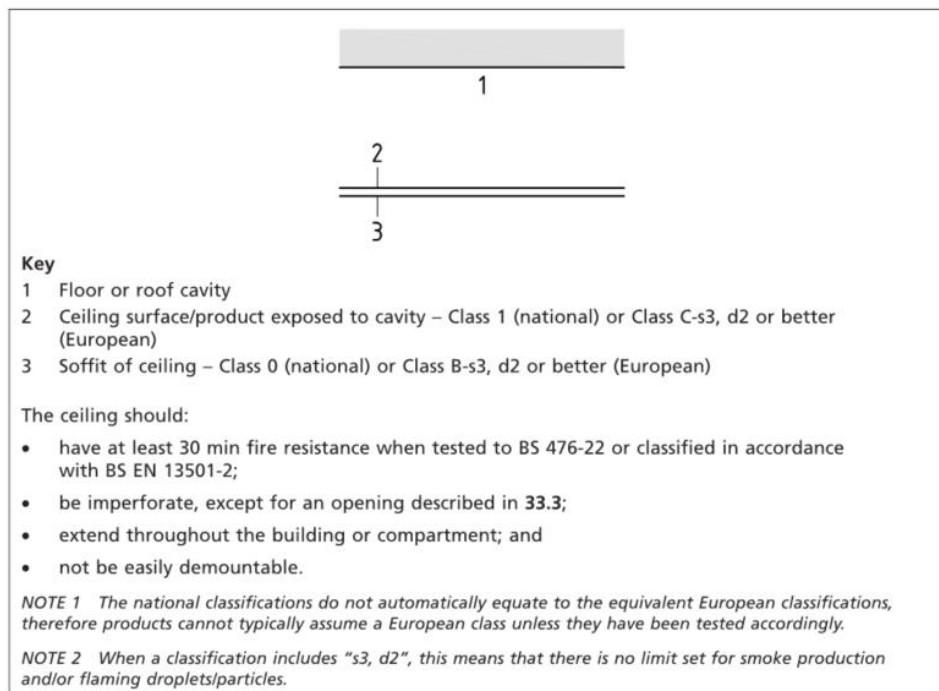


Figure 47: Fire resisting ceiling below concealed space (Figure 37 from BS 9999)

Where any single room with a ceiling cavity or underfloor service void exceeds the dimensions given in Figure 45 above, cavity barriers will be provided on the line of the enclosing walls/partitions of that room, where:

- 1) the cavity barriers are no more than 40 m apart; and
- 2) the surface of the material/product exposed in the cavity is Class 0 or Class 1 (national) or Class C-s3, d2 or better (European).

Where the concealed space is over an undivided area which exceeds 40 m (this may be in both directions on plan), the cavity will be limited to the dimensions in Figure 45 above, unless all of the following criteria are met:

- a. the room and the cavity together are compartmented from the rest of the building;
- b. an automatic fire detection and fire alarm system meeting the relevant recommendations of BS 5839-1:2013 is fitted in the building. Detectors are only required in the cavity to satisfy BS 5839-1:2013;
- c. the surface of the material/product used in the construction of the cavity which is exposed in the cavity is Class 0 (national) or Class B-s3, d2 or better (European) and the supports and fixings in the cavity are of non-combustible construction;
- d. the flame spread rating of any pipe insulation system is Class 1 or Class C-s3, d2 or better (European);
- e. any electrical wiring in the void is laid in metal trays, or in metal conduit;
- f. any other materials in the cavity are of limited combustibility or Class A2 or better (European).

The locations of extended cavities and the provision of cavity barriers within 65 Fleet Street are to be confirmed in RIBA Stage 4.

5.9 Building services ductwork

When ductwork systems are installed within a building it is important that the ductwork does not assist in transferring fire and smoke through the building and put at risk the protected means of escape from the accommodation areas.

Measures to aid fire-fighting control should be incorporated, including the following.

- a) Ventilation systems serving protected escape routes should not serve other areas and the normal airflow pattern should be directed away from the escape route.
- b) Separate ventilations systems that do not allow for the re-circulation of air within them should also be provided for:
 - 1) each protected stairway;
 - 2) plant areas;
 - 3) car parks;
 - 4) non-domestic kitchens; and
 - 5) residential parts of mixed-use buildings.
- c) Ducts passing through the enclosure of a protected escape route should conform to the relevant fire-resistance recommendations
- d) Ducts passing through compartment walls and floors and other fire separating elements should maintain the fire integrity using one of the following methods given in BS 9999:2017, clause 32.5.2:
 - 1) Method 1 (using thermally actuated fire dampers);
 - 2) Method 2 (using fire resisting enclosures);
 - 3) Method 3 (using fire resisting ductwork);
 - 4) Method 4 (automatically actuated fire and smoke dampers triggered by smoke detectors)
- e) Where a ductwork system serves more than one part of a compartmented or fire separated escape route, smoke detector operated fire dampers should be provided. Method 1 as outlined in point d) above is not acceptable with these arrangements.
- f) The fire resistance of ducts and dampers should be equal to the fire resistance required for the building element being penetrated. All ducts should be fire-stopped where they penetrate compartments and fire-resisting enclosure of escape routes.

- g) Systems which re-circulate air should be fitted with smoke detectors in the extract ductwork before the point of separation of the re-circulated air and the air to be discharged and before any filters or other air cleaning equipment. Detection should cause the system to immediately shut down or switch to extract the air to an external location.
- h) Systems should be provided with overriding fire-fighting controls in accordance with BS 9999: 2017, clause 32.5.7.
- i) Air transfer grills should not be positioned in enclosures to protected stairways, protected lobbies, protected corridors, fire-fighting stairways and lobbies, protected shafts and compartment walls or floors.
- j) Exhaust outlets should be positioned such that they:
 - 1) do not discharge products of combustion close to final exits or other parts of escape routes;
 - 2) are not close to any combustible or otherwise vulnerable element of the building construction;
 - 3) do not enable re-entry of exhaust products back into the building or other ductwork.
- k) Ducts should be designed and constructed in accordance with BS 8313.
- l) Where pressurization or other smoke control systems are installed within a building any ventilation and air conditioning system should be compatible with its operation under fire conditions.
- m) Where plant areas are within the building, they should be treated as separate fire compartments in order to isolate any fire source.

Additional detailed guidance relating to the configuration of mechanical ventilation and air-conditioning systems from a fire safety perspective can be found in clause 32.5 of BS9999: 2017.

6 External Fire Spread

BS 9999 recommends that space separation requirements should be assessed in order to limit fire spread from one building to another and vice versa. External walls within 1m of the boundary are required to provide a period of fire resistance the same as that of the building.

65 Fleet Street faces Whitefriars Street to the east elevation, Fleet Street to the north elevation, Bouverie Street to the west elevation and a neighbouring building to the south elevation. The North and South buildings face each other towards the courtyard. The separation distances between 65 Fleet Street, public roads, the North and South buildings are shown in Figure 48 and Figure 49 below.

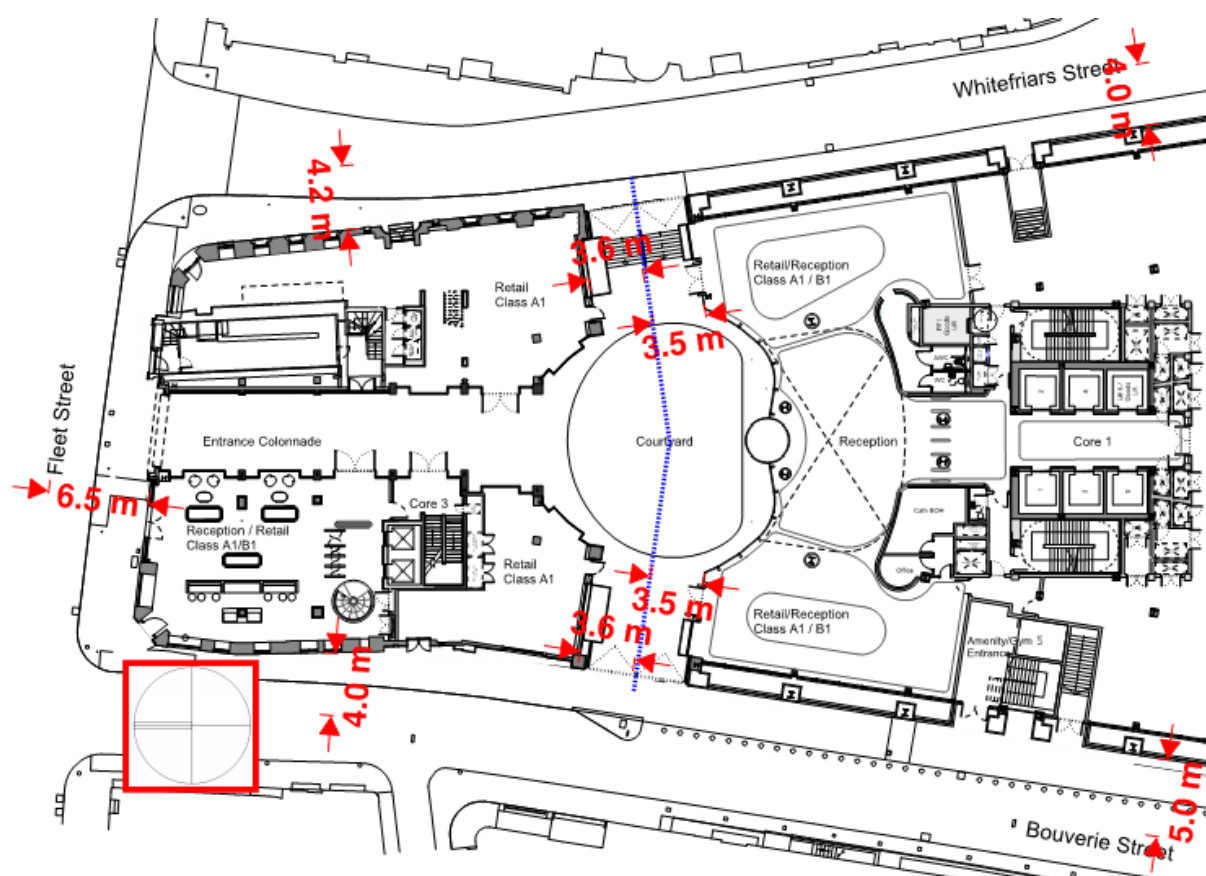


Figure 48: Building outlines on the ground floor showing roads and separation distances



Figure 49: Separation distances between the North and South buildings on the second floor

Where the façades are more than 1m away from the relevant boundary, unprotected openings are permitted if their area does not exceed that permitted by the methods described within BRE 187. The area of unprotected openings for 65 Fleet Street are to be evaluated with the available separation distances as outlined above.

6.1 BRE 187 Assessment

The method used is adopted from BR 187, *External Fire Spread: Building separation and boundary distances*, 2015. This methodology is based on the number of openings and unprotected areas in the external enclosure of the building. Under this method, the required separation distances can be reduced by 50% when an automatic sprinkler system is provided.

The required separation distance is taken from the building façade to the relevant site boundary. Where the façade faces a road, the notional boundary is established to be in the middle of the road. Where two buildings face each other, the relevant boundary is established as a notional boundary between the two buildings.

The South building is to be provided with an atrium in the middle of the building. Even though this atrium is permitted to be open to the accommodation, these spaces are to be separated from each other with glazing elements providing 30 minute fire resistance. A note from Annex B.8 of BS 9999: 2017 states

that if an atrium building is sprinklered, when evaluating the external fire spread, the atrium can be considered as a building with compartment floors at each level.

The South building is to be provided with an automatic sprinkler system. It is therefore considered to limit fire spread between floors; the radiating surface will be based on a fire from a single level/compartment. Openings and unprotected areas are taken as glazing and frames. Areas with solid construction are to provide the same fire resistance as that of the building i.e., 60 minute for the North building and 90 minutes for the South building.

6.2 North building

The external fire spread assessment is outlined below to show the amount of unprotected opening areas permissible in the façades. *NB. Solid wall construction is assumed to provide 60 minutes fire resistance.*

The enclosing rectangles and their dimensions for all elevation of the building are shown below.

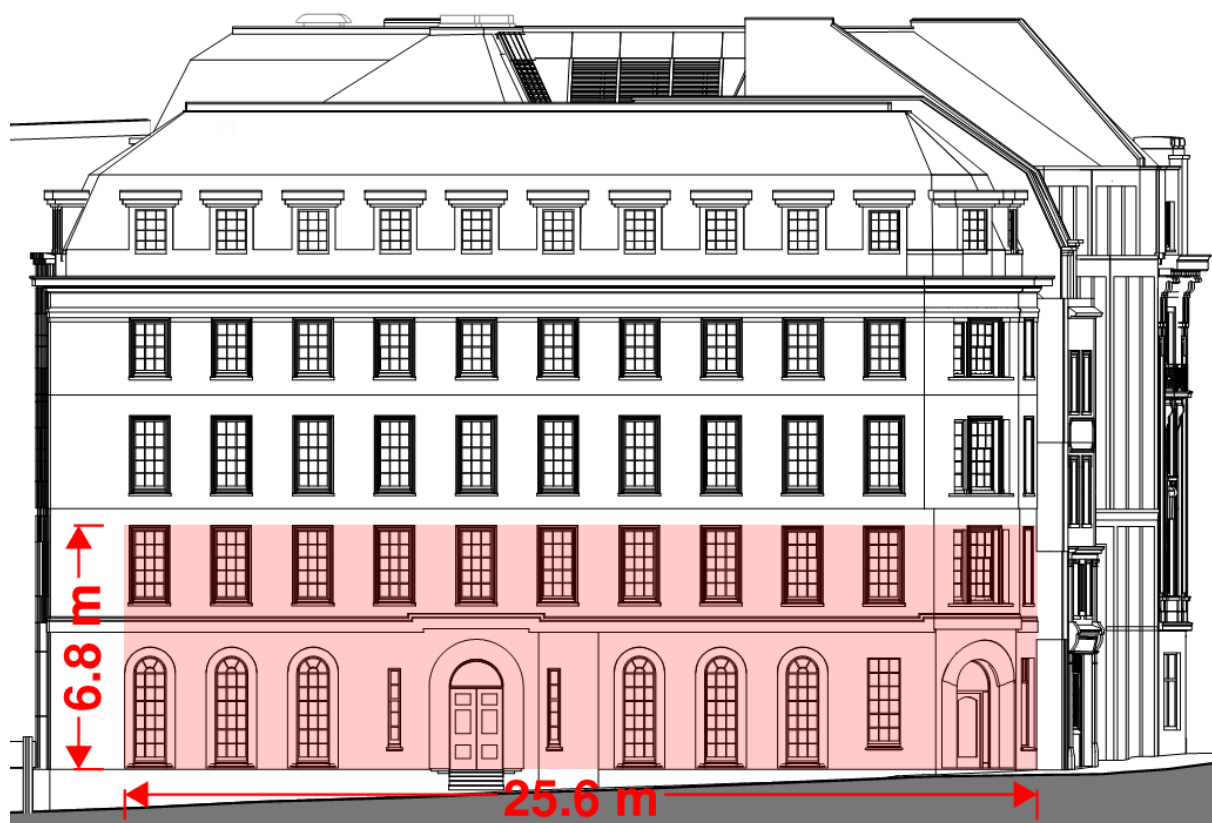


Figure 50: Enclosing rectangle on the east elevation



Figure 51: Enclosing rectangle on the north elevation



Figure 52: Enclosing rectangle on the west elevation



Figure 53: Enclosing rectangle on the south elevation

Elevation	Enclosing rectangle (ER) (m)	Available separation distance (m)	Permitted unprotected opening area relative to the ER area (%)	Unprotected opening areas indicated relative to the ER area (%)
East	9 x 27	4.2	79	25
North	6 x 50	6.5	100	32
West	9 x 30	4.0	70	20
South (North building A)	15 x 18	3.5	50	45
South building (second floor)	6 x 60	2.8	62	21

Table 12: External fire spread assessment for the North building

The measured separation distances are adequate to permit the indicated unprotected opening areas on the facades. These separation distances are to be confirmed in RIBA Stage 4.

6.3 South building

The external fire spread assessment is outlined below to show the amount of unprotected opening areas permissible in the façades. *NB. Solid wall construction is assumed to provide 90 minutes fire resistance.*

The enclosing rectangles and their dimensions for all elevation of the building are shown below.

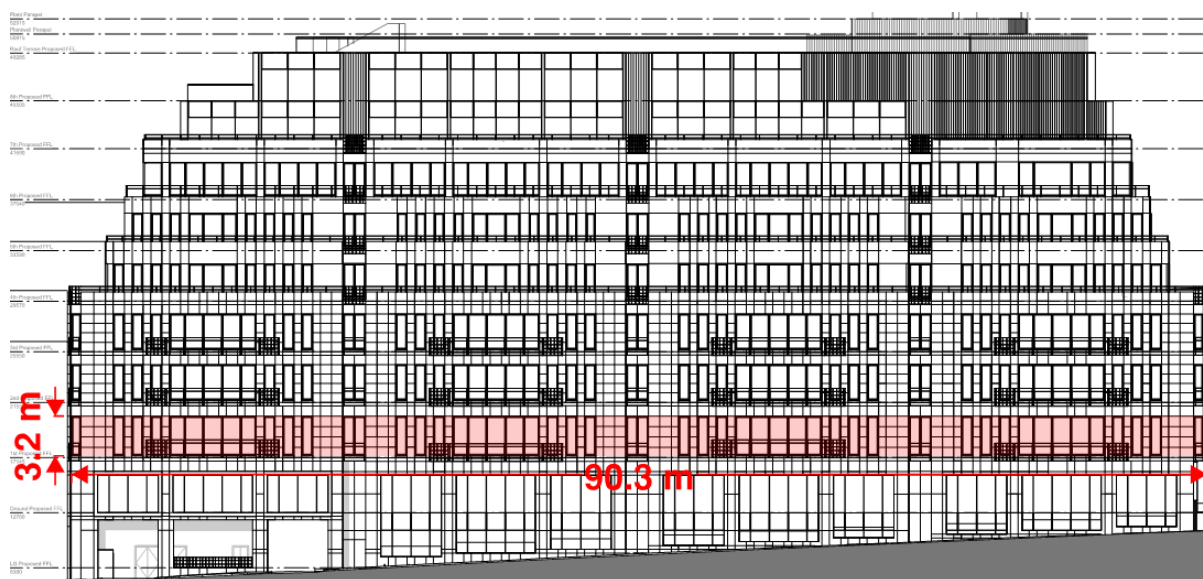


Figure 54: Enclosing rectangle on the east elevation

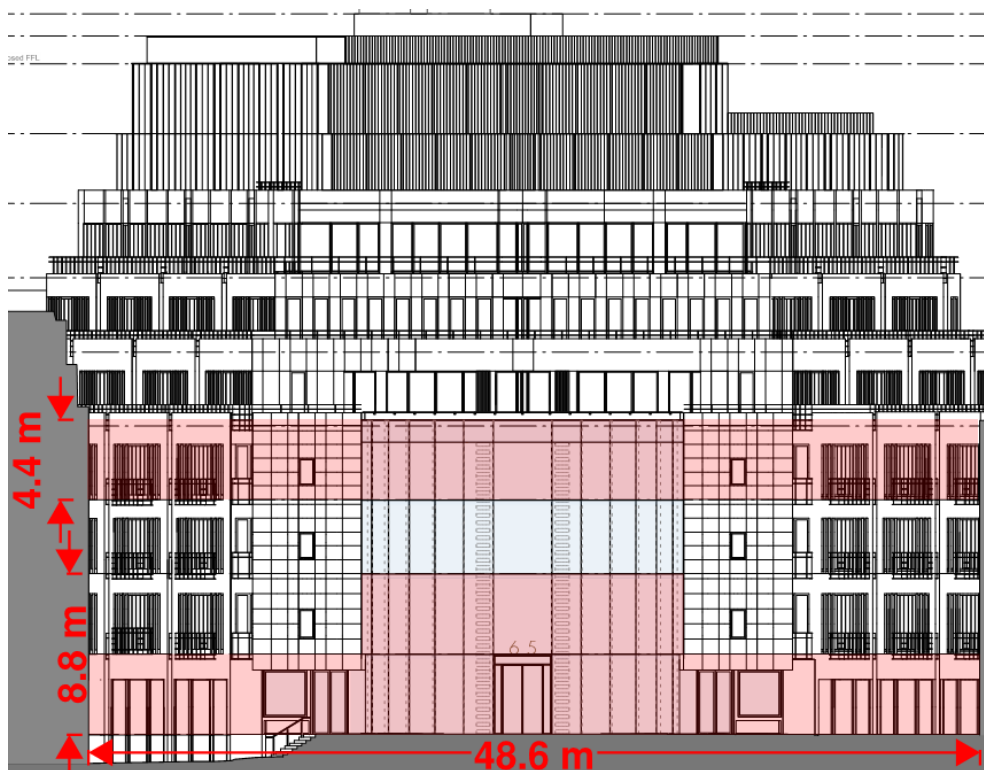


Figure 55: Enclosing rectangle on the north elevation

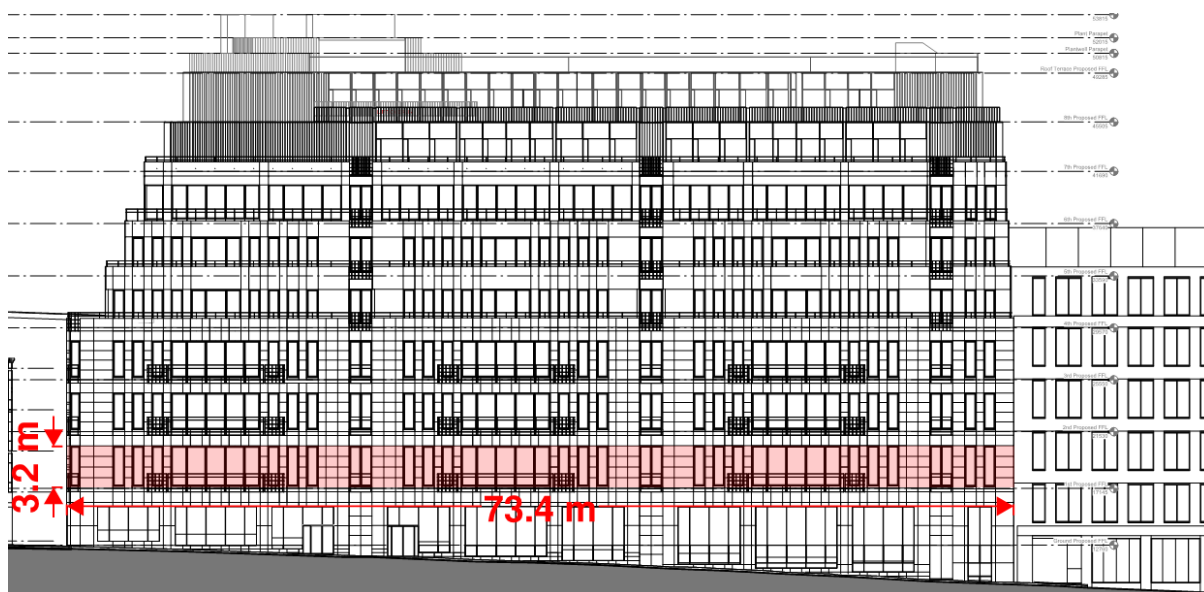


Figure 56: Enclosing rectangle on the west elevation

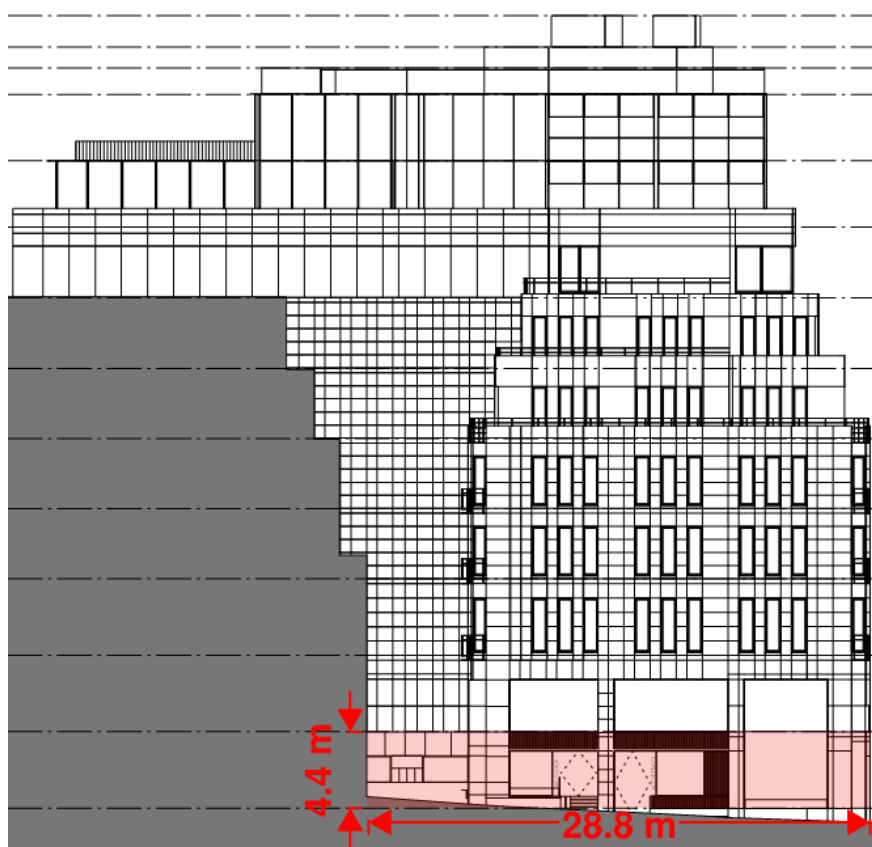


Figure 57: Enclosing rectangle on the south elevation

Elevation	Enclosing rectangle (ER) (m)	Available separation distance (m)	Permitted unprotected opening area relative to the ER area (%)	Unprotected opening areas indicated relative to the ER area (%)
East	6 x 100	4.0	80	30
North (ground + first floors)	9 x 50	3.5	53	53
North (second floor)	6 x 50	2.8	61	40
West	6 x 80	5.0	100	60
South	6 x 30	TBC	TBC	TBC

Table 13: External fire spread assessment for the South building

The measured separation distances are adequate to permit the indicated unprotected opening areas on the facades. The separation distance on the south elevation is not indicated and is to be confirmed in RIBA Stage 4.

6.4 External wall surfaces

External walls should be constructed using materials that do not exacerbate fire spread. Flame spread over or within an external wall construction should be controlled to avoid providing a route for rapid fire spread, by passing compartment floors or walls. This is particularly relevant to the retail and office spaces which are considered as different occupancies of the building. Combustible materials should not be used in cladding systems and extensive cavities. External wall surfaces near other buildings should not be readily ignitable, to avoid fire spread between buildings.

External walls should either meet the performance criteria given in BRE Report BR 135 [N1] for cladding systems using full scale test data from BS 8414-1 or BS 8414-2. The performance requirement for the external surfaces of walls (including cladding) must meet the performance shown in Figure 58 below, taken from BS9999.

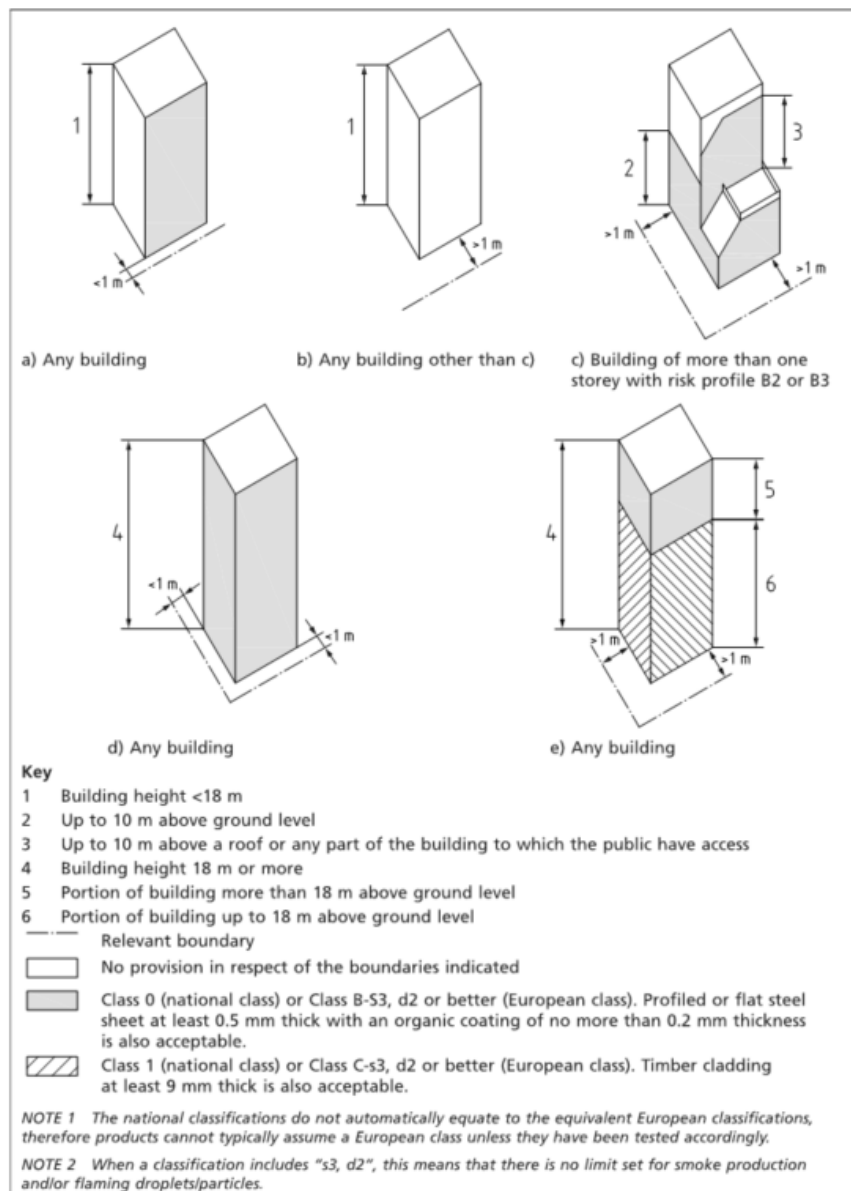


Figure 58: External surface requirements

The North building is less than 18m in height. The external wall surfaces do not have to meet any requirements.

The South building is more than 30m in height. External wall surfaces are to meet national class 0 or European Class B-s3, d2 (portion of the building under 18m is permitted to have external wall surfaces that meet national class 1 or European Class C-s3, d2). Any insulation product, filler material (such as the core materials of metal composite panels, sandwich panels and window spandrel panels but not including gaskets, sealants and similar) etc. used in the construction of an external wall should be class A2-s3, d2 or better.

6.3 Roof coverings

Roof coverings will achieve the performance levels shown in Figure 59, taken from BS9999:

Table 36 Separation distances for roof coverings

Designation of covering of roof or part of roof ^{A)}		Distance of roof from any point on relevant boundary			
National class	European class	Less than 6 m	At least 6 m	At least 12 m	At least 20 m
AA, AB or AC	B _{ROOF} (t4)	Acceptable	Acceptable	Acceptable	Acceptable
BA, BB or BC	C _{ROOF} (t4)	Not acceptable	Acceptable	Acceptable	Acceptable
CA, CB or CC	D _{ROOF} (t4)	Not acceptable	Acceptable ^{B), C)}	Acceptable ^{B)}	Acceptable
AD, BD (or CD ^{B)})	E _{ROOF} (t4)	Not acceptable	Acceptable ^{C)}	Acceptable	Acceptable
DA, DB, DC (or DD ^{B)})	F _{ROOF} (t4)	Not acceptable	Not acceptable	Not acceptable	Acceptable ^{C)}

NOTE 1 Unwired glass at least 4 mm in thickness has an AA designation.

NOTE 2 See Table 34 for limitations on plastics roof lights.

^{A)} The performance of roof coverings is designated by reference to the test and classification standards given in BS 476-3 (national class) and BS EN 13501-5 (European class).

^{B)} Not acceptable on any of the following buildings:

- occupancy characteristic A;
- buildings with a volume of more than 1 500 m³.

^{C)} Acceptable on buildings not listed in footnote B, if part of the roof is no more than 3 m² in area and is at least 1.5 m from any similar part, with the roof between the parts covered with a material of limited combustibility.

Figure 59: Roof covering performance

The North building fall is within 6m of the relevant boundaries therefore any new roof coverings should meet National class AA, AB, or AC, or European class B_{roof}(t4).

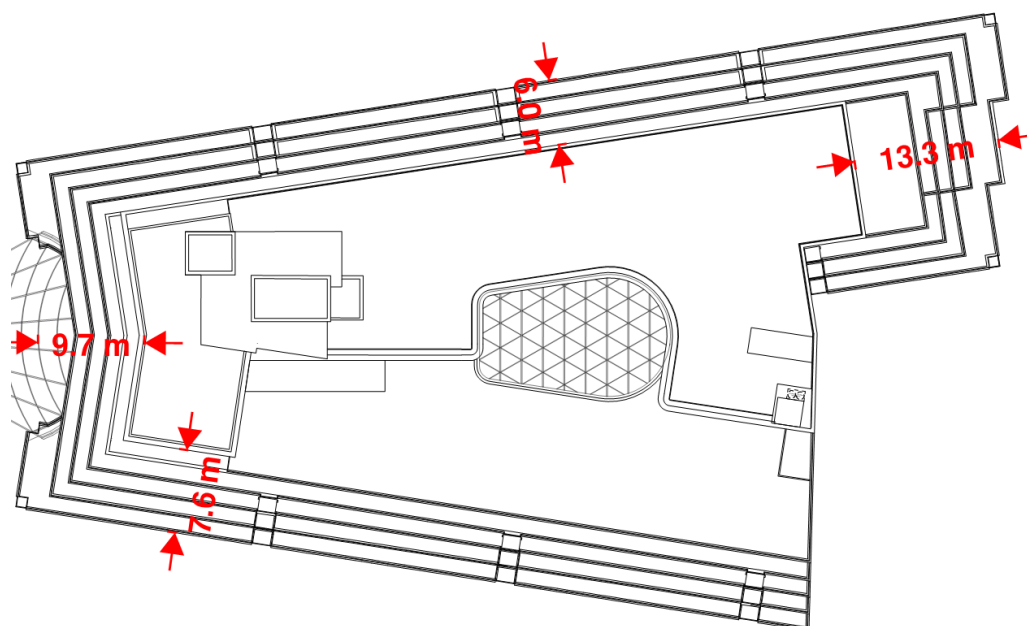


Figure 60: Roof of the South building showing how it sets back from the façades on the lower floors

The South building falls at least 6m away from the relevant boundaries, has an A occupancy characteristic and has a volume of more than 1500m³. The new roof coverings for this building are to meet National class BA, BB, or BC, or European class C_{roof}(t4).

7 Sprinkler System

The North and South buildings are to be provided with a sprinkler system throughout in accordance with BS EN 12845. The sprinkler system is also to be fully compliant with the requirements of the Loss Prevention Council Rules.

The building accommodates plantrooms on the basement floor. Plantrooms are associated with an Ordinary Hazard Group 3 (OH3). The minimum sprinkler tank volume required is 135m³.

The building is to consist mainly of office accommodation, WCs and storerooms on the upper floors. These spaces are associated with an OH1 category. The maximum difference between the highest and lowest sprinkler for the OH1 category is between the range 30m<h<45m. The minimum sprinkler tank volume required is 80m³.

The most onerous requirement is the provision of a sprinkler tank with a volume of 135m³ for an OH3 category.

The sprinkler tank and pump rooms are to be located on the basement floor. Since these are life safety systems, the rooms housing these systems are to be separated from other parts of the building by 120 minutes fire resistance.

For water sensitive areas where the use of a water-based fire suppression system is inappropriate, an alternative form of fire suppression system is to be provided.

8 Pressurisation system

A pressurisation system is to be provided to protect escape stair 1 from smoke ingress as North Building B has a single stair arrangement. The pressurisation system is to be provided in accordance with BS EN 12101-6.

North Building B is to be designed to adopt a simultaneous evacuation strategy and therefore a Class C system to BS EN 12101-6 is proposed.

8.1 General design criteria

The airflow through the doorway between the stair enclosure and the accommodation should not be less than 0.75m/s when:

- 🌿 on the fire floor the doors between the accommodation and the pressurized staircase and lobby are open,
- 🌿 the air release path from the accommodation, on the fire floor where the air velocity is being measured, is open,
- 🌿 all other doors other than the fire floor doors are assumed to be closed.

The pressure difference across a closed door between the pressurised space and the accommodation area should be given as shown below.

Position of doors	Pressure differentials to be maintained, min.
i) Doors between accommodation area and the pressurized space are closed on all storeys	50 Pa
ii) All doors between the pressurized stair and the final exit are closed	
iii) Air release path from the accommodation on the storey where the pressure difference being measured is open	
iv) Final exit door is closed	
v) Final exit door is open and items i) to iii) above are complied with	10 Pa
NOTE For flexibility in the acceptance test results there is $\pm 10\%$ tolerance on the measurement allowed.	

Figure 61: Minimum pressure differentials for Class C systems

The airflow and pressure difference criteria are schematically shown below.

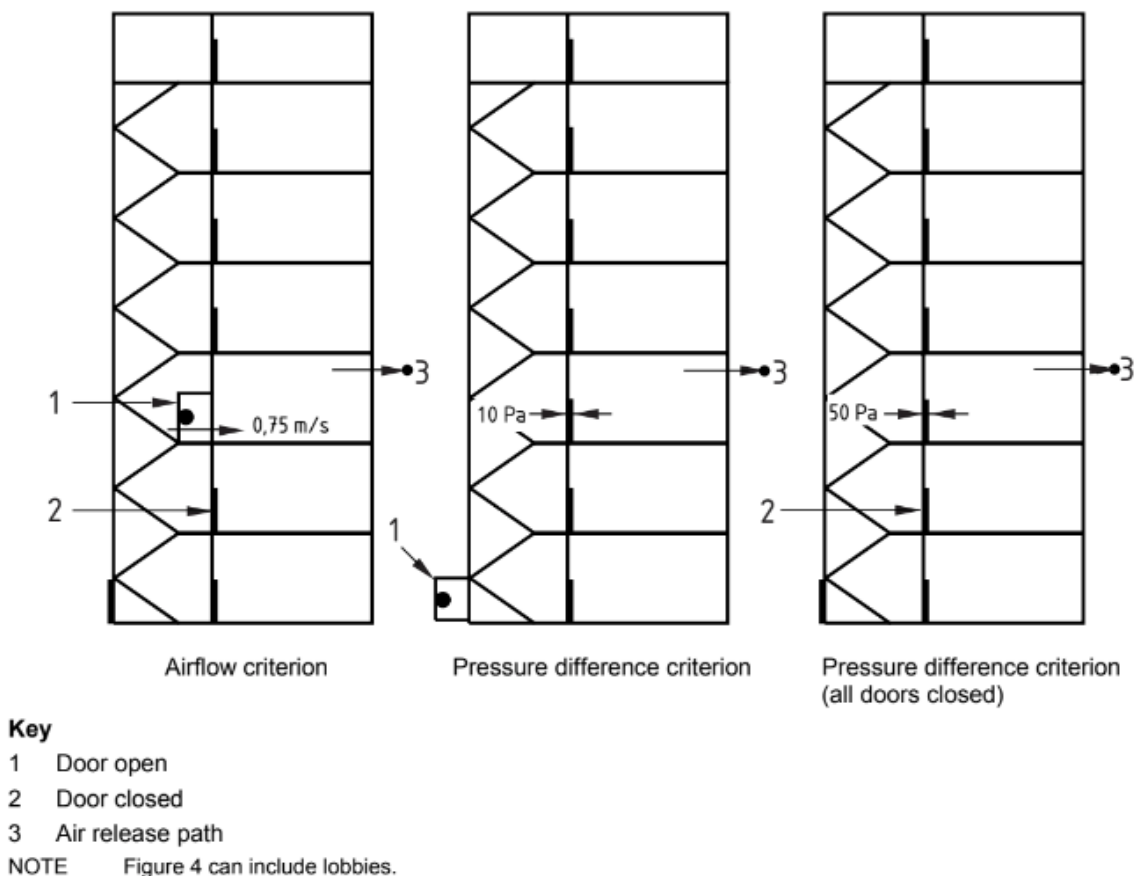




Figure 62: Design conditions for Class C systems

The system should be designed so that the door handle do not exceed 100N. *The force that can be exerted to open a door will be limited by the friction between the shoes and the floor and it may be necessary to avoid having slippery floor surfaces near doors opening into pressurized spaces, particularly in buildings in which there are very young, elderly or infirm persons.*

8.2 Site specific conditions

 A pressurisation shaft will be provided in the staircase from 2nd to 4th floor. The lowest level served by the staircase is lower ground floor. As lower ground is three levels below 2nd floor it should, under BS EN 12101-6 guidance, be provided with an air discharge point. However, due to the constraints of the existing site it is not feasible to provide the pressurisation shaft down to this level. The arrangement is considered acceptable on the following basis:

- A single discharge point at the head of the stair is acceptable for buildings up to 11m in height, and the difference between 2nd floor and lower ground floor is 11.7m which only represents a marginal extension.
- The building is provided with sprinklers to BS EN 12845. This will limit the potential fire size and present less onerous conditions for the pressurisation system compared to a non-sprinklered building.

 Air release is required from each floorplate from lower ground to fourth floor. *It will be a requirement that tenant fitouts do not block the air path route from the staircase to the air*

release vents.

- 🌿 Only the staircase is to be pressurised. This acceptable under BS EN 12101-6 guidance where the staircase either opens directly onto the floorplate or, where lobbies are provided, they are simple lobbies. A simple lobby is lobby which does not give access to lifts, shafts, or ducts that could constitute an appreciable leakage path for smoke to spread to other levels within the building. A lobby connected to a lift well or other shaft is still a simple lobby if all such shafts are pressurized. A simple lobby may be either unventilated or naturally ventilated.
- 🌿 The staircase connects to a basement stair at lower ground floor level, as shown below.

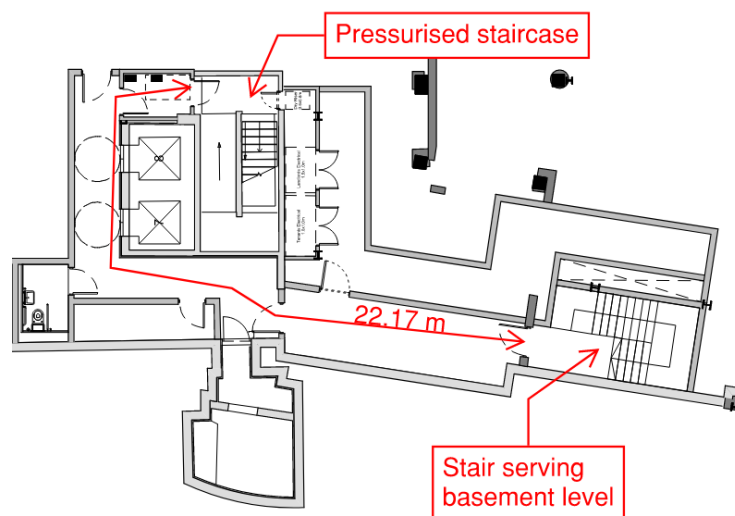


Figure 63: Connection to basement stair at lower ground level

The stair serving the basement level will not be pressurised. A fire at basement level is not considered to pose a risk to the pressurised stair for the following reasons:

- The basement is provided with sprinklers and a 10 air change per hour smoke extract system.
 - The basement has a high level of compartmentation.
 - At basement level the stair is approached via a protected lobby.
 - At lower ground level there is four door protection between the two staircases and a 22m distance.
- 🌿 The design conditions for a Class C system are based on the assumption that occupants will be alert and aware, and familiar with their surroundings, thus minimising the time they remain in the building. The ground and first floors of the North building B could be used as retail space with occupants that are unfamiliar with the building. At ground floor the exits are to outside and escape is not expected to be made through the staircase. At first floor the floorplate is relatively small with good sightlines to the exits, and it is therefore considered that occupants will escape from first floor in a relatively quick time. [With this arrangement, management procedures are to be put in place to ensure that occupants are directed to evacuate the building immediately upon activation of the fire alarm system.](#)

9 Mechanical Smoke Extract

Mechanical smoke control systems are to be provided to ventilate firefighting lobbies in accordance with BS 7346-8. This is to support means of escape and improve the safety for the fire service. This requires that smoke shafts, each of at least 0.6m², are provided in each firefighting lobby.

Under design conditions with the lobby doors to the fire floor open, the system provides a ventilation rate to clear smoke from the lobby. When the lobby doors are closed, the ventilation rate is automatically reduced to avoid excess depressurisation of the lobby.

Replacement air for the system will be provided by automatic opening vents (AOVs) provided at the head of firefighting stairs. The AOVs are to provide a minimum aerodynamic free area of 0.7m².

Computational Fluid Dynamic modelling may be required to demonstrate the suitability of each smoke control system. Whilst the design of the mechanical smoke extract system will be a proprietary item, the following performance specification shall be met:

- a) The top of the lobby or corridor vent should be located as close to the ceiling of the lobby or corridor as is practicable and should be at least as high as the top of the door connecting the lobby or corridor to the stairwell.
- b) The lobby or corridor vents, in the closed position, should either:
 - i) have a minimum fire and smoke resistance performance of 60 min and a leakage rate no greater than 200 m³/h/m² when tested in accordance with BS EN 1366-2; or
 - ii) be in accordance with BS EN 12101-8.
- c) The smoke shaft should be constructed of materials classified as A1 in accordance with BS EN 13501-1:2007+A1, or of materials determined to be non-combustible when tested in accordance with BS 476-4, or of any material which when tested in accordance with BS 476-11 does not flame or cause any rise in the temperature on either the centre of the specimen or the furnace thermocouples.
- d) Any smoke shaft which penetrates fire compartments should, as a minimum, maintain the same level of fire compartmentation as that which has been breached.
- e) No services other than those relating to the smoke shaft should be contained within the smoke shaft.
- f) Fans should be capable of handling gas temperatures of 300 °C for a continuous period of not less than 60 min and tested in accordance with BS EN 12101-3.
- g) The design of the mechanical smoke ventilation system will limit pressure differentials so that door opening forces do not exceed 100 N at the door handle when the system is in operation. Additional consideration will be given to door opening forces, where applicable

- h) A secondary power supply will be provided to the fans and all actuators and controls.
- i) Fans will be provided with a standby fan that operates automatically upon failure of the duty fan.

10 Access and Facilities for the Fire Service

10.1 Vehicle access

The nearest fire station to 65 Fleet Street is the Dowgate fire station which is 1 mile away. The fire service will have access to the building from Fleet Street, Bouverie Street or Whitefriars Street.

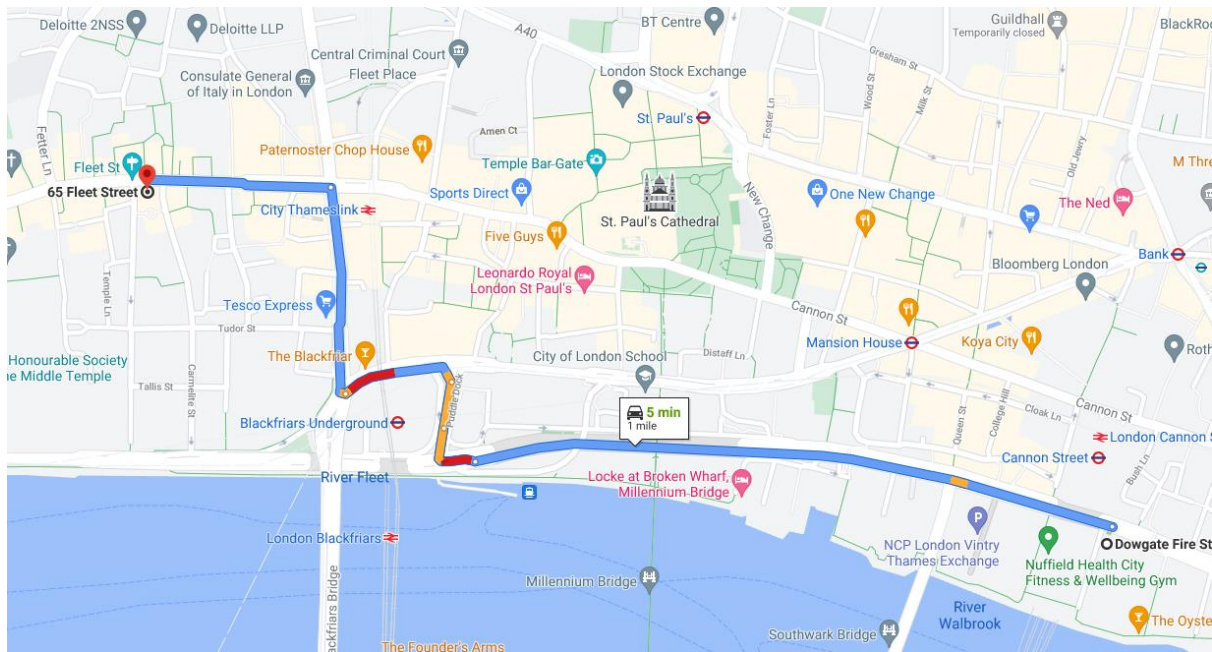


Figure 64: Location of the nearest fire station

10.2 Firefighting provisions

10.2.1 North building

According to BS 9999, escape stairs in a building with a height (measured to the top occupied floor) of 11m or more but less than 18m should be provided with an unvented protected lobbies with a fire main. Additional commentary regarding the provision of protected lobbies is reproduced below:

It is not necessary for lobbies to be provided to escape stairs solely to accommodate dry riser outlets. The riser outlets may be sited on landings or half-landings to the stair, provided that sufficient space is available for their use by fire-fighters without obstructing the opening of doors.

North Building B has the top occupied floor at a height of 13.6m above access level. It is to be provided with an escape stair with protected lobbies on all floors, except the ground and first floors. A dry fire main is to be provided in this escape stair enclosure with outlets on the lower ground to the fourth floors. This dry fire main is to be located on the stair landing areas. The dry riser outlet on the ground floor does not obstruct the opening of doors from the accommodation. The dry riser outlet on the first floor

obstructs the door from the accommodation, however, all occupants from this floor are expected to have evacuated from the building when the fire service attend site. The arrangement for the dry riser outlets to be provided on the stair landing areas is deemed to be acceptable.

When a building is fitted with an automatic sprinkler system in accordance with BS EN 12845, sufficient firefighting shafts should be provided such that every part of every storey is no more than 60m (40m for direct distances) from a fire main outlet in a firefighting shaft (escape stair), measured on a route suitable for laying hose.

The North building is to be provided with an automatic sprinkler system in accordance with BS EN 12845. The hose distances from the dry riser outlet to all parts of the floor plan are shown in Figure 65 to Figure 67 below and they are within the prescribed limits.

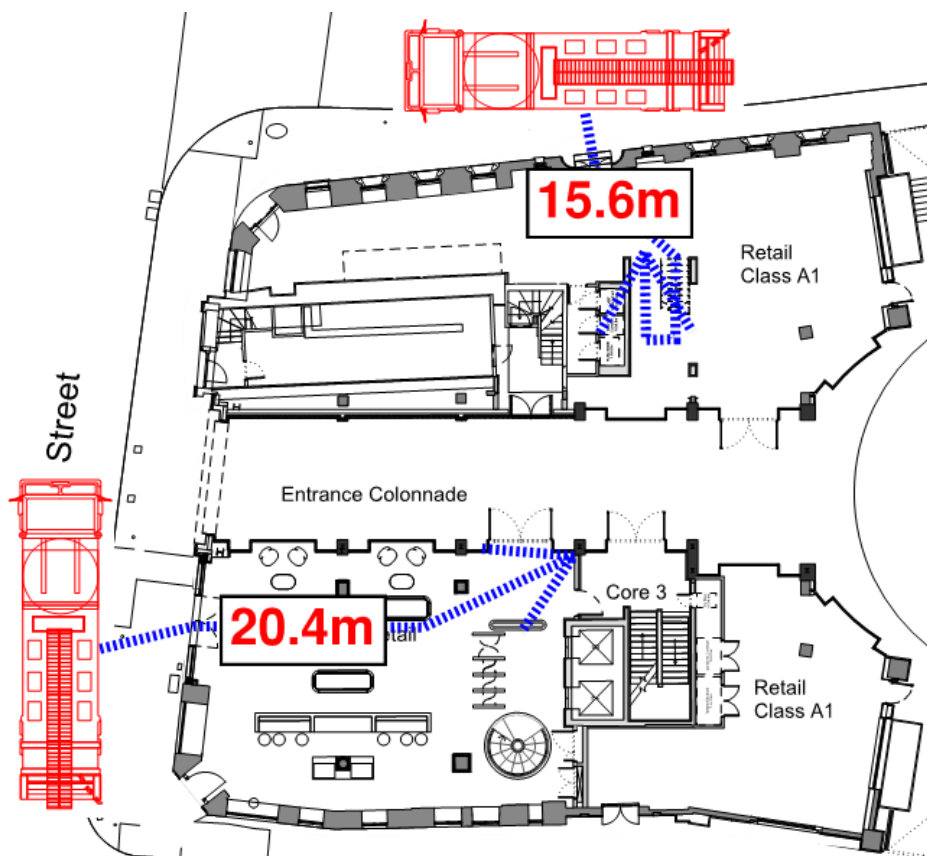


Figure 65: Hose distances on the ground floor

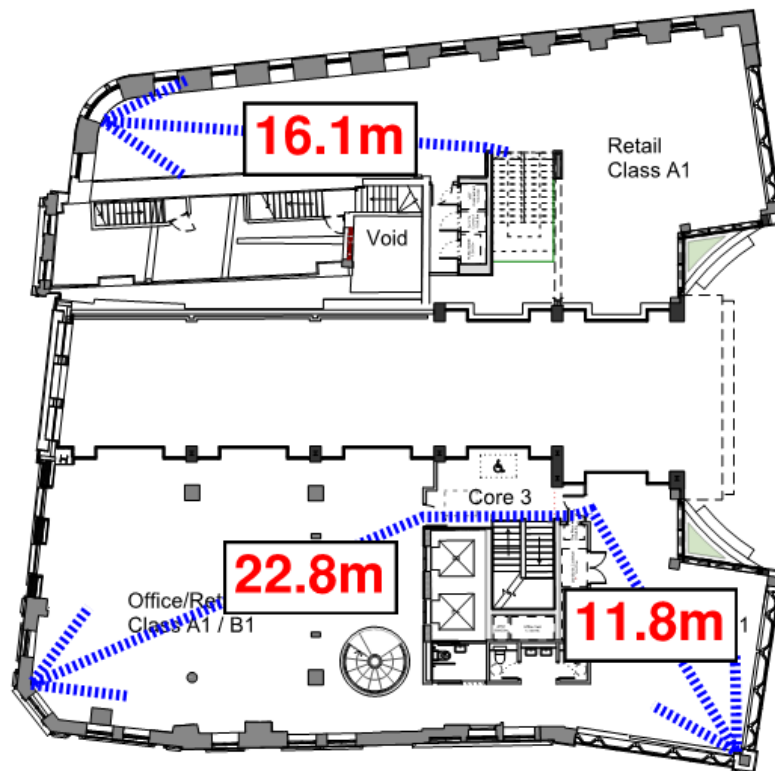


Figure 66: Hose distances on the first floor

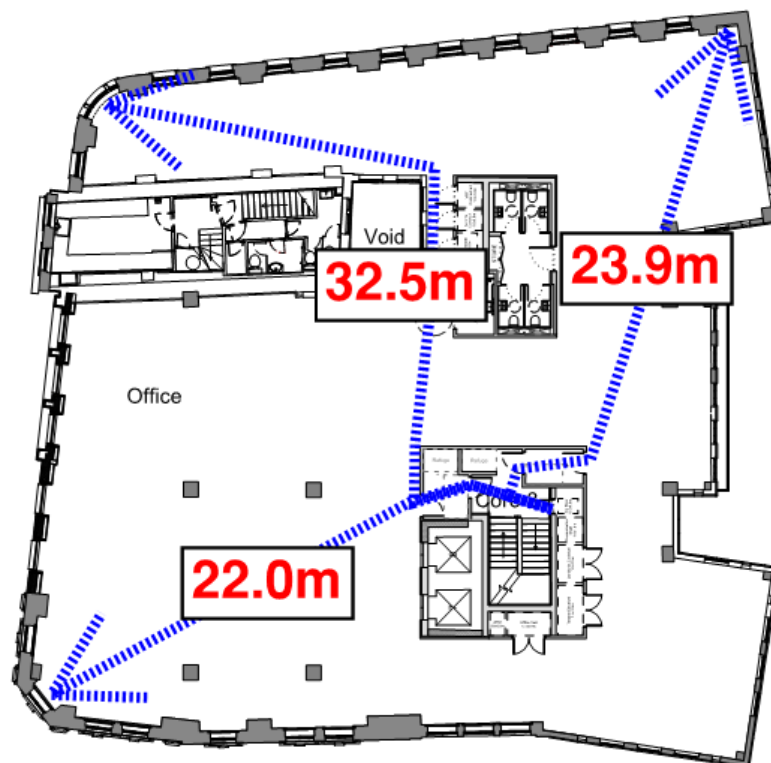


Figure 67: Typical hose distances on the upper floors shown on the second floor

10.2.2 South building

10.2.2.1 Firefighting shafts

According to BS 9999, firefighting shafts (FFSs) should be provided to buildings with a top occupied floor over 18m above the access level. A firefighting shaft comprises of:

- 🌿 Firefighting stair with AOV,
- 🌿 Firefighting ventilated lobbies with a fire main according to BS 9990, and
- 🌿 Firefighting lift installation according to BS EN 81-20 and BS EN 81-72.

A minimum of two firefighting shafts are recommended in buildings with a storey that exceeds 900m² in area. Additionally, for a sprinklered building, FFSs are recommended to be provided such that all parts of the floor plan are within a hose distance of 60m (45m direct distance when the layout is not indicated) from the dry main outlet.

The South building has a maximum floor area of ca. 2900m², therefore it is to be provided with two firefighting shafts as shown in Figure 68 below. These FFSs are extend from the lower ground floor to the ninth roof terrace. FFS 1 is to also extend to the basement floor. The firefighting lift within FFS 2 is to be terminated on the eighth floor.

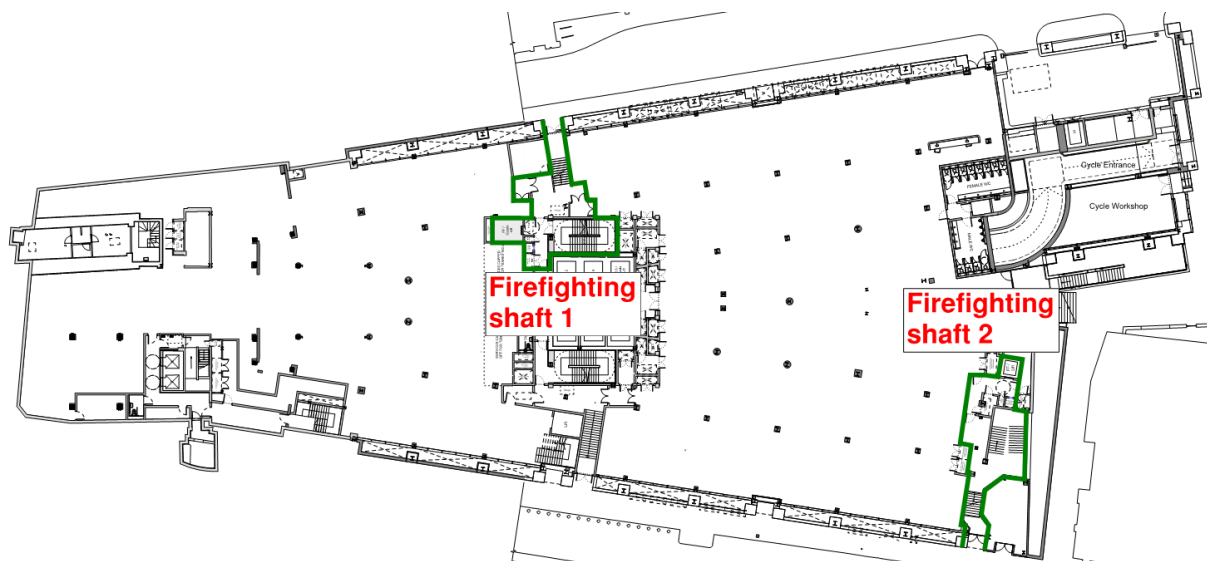





Figure 68: Firefighting shafts provided in the South building

The hose distances from the dry main outlets are shown in Figure 69 to Figure 71 below.

The lowest basement floor in the South building is less than 10m below the access level therefore the firefighting shafts do not have to be extended to the lower floors. However, to improve access, the office FFS 1 is to descend to the basement level. The actual hose distances on the basement floor are shown in Figure 69. The maximum actual hose distance is ca. 78.4m therefore the hose distances on the basement floor are extended by ca. 10m. This is considered acceptable on the following basis:

- 🌿 Under guidance, the basement could be assessed on perimeter access alone.

-  The basement will be sprinklered to BS EN 12845.
-  The basement will be highly compartmented.
-  The basement will be provided with a mechanical 10 air change per hour smoke exhaust system.

Hose coverage on the lower ground floor is supplemented by the provision of an additional dry riser main in escape stair 1. The direct hose distances with this arrangement are shown in Figure 70 and they do not exceed the prescribed limits. The design on the lower ground floor is therefore acceptable.

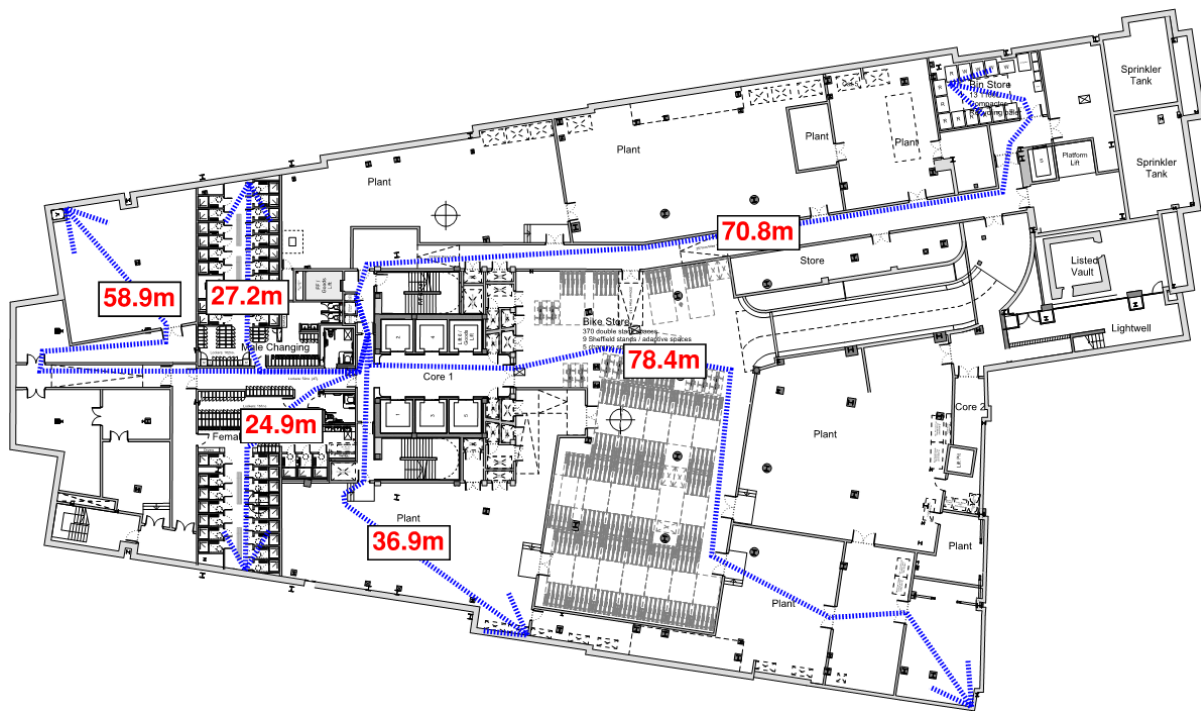


Figure 69: Hose distances on the basement floor

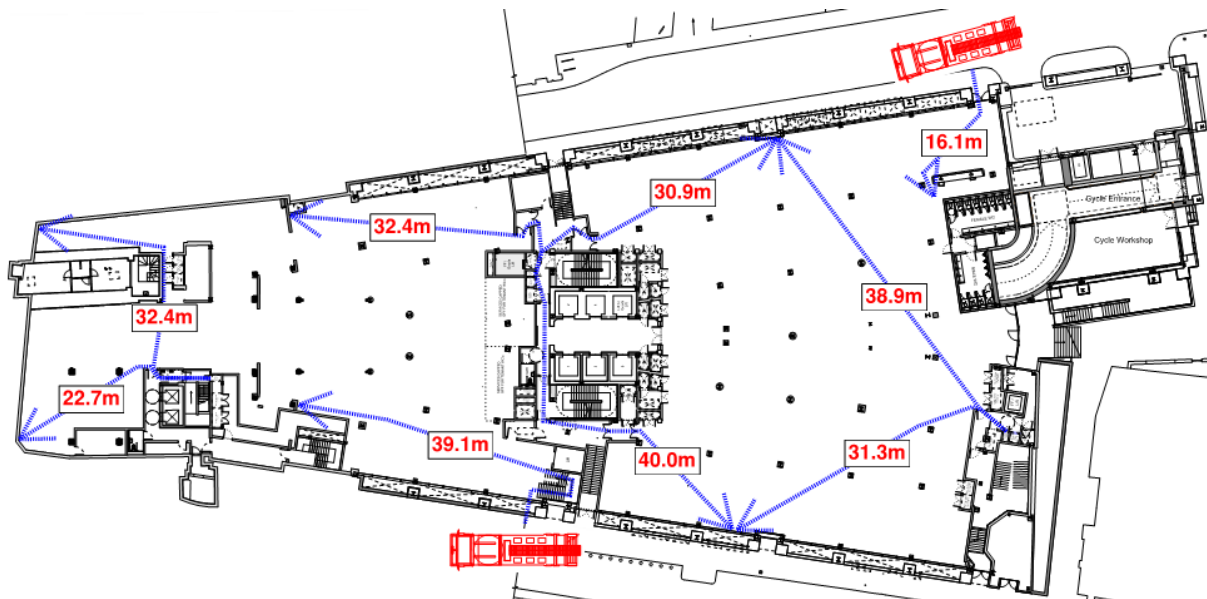


Figure 70: Hose distances on the lower ground floor when an additional riser is provided

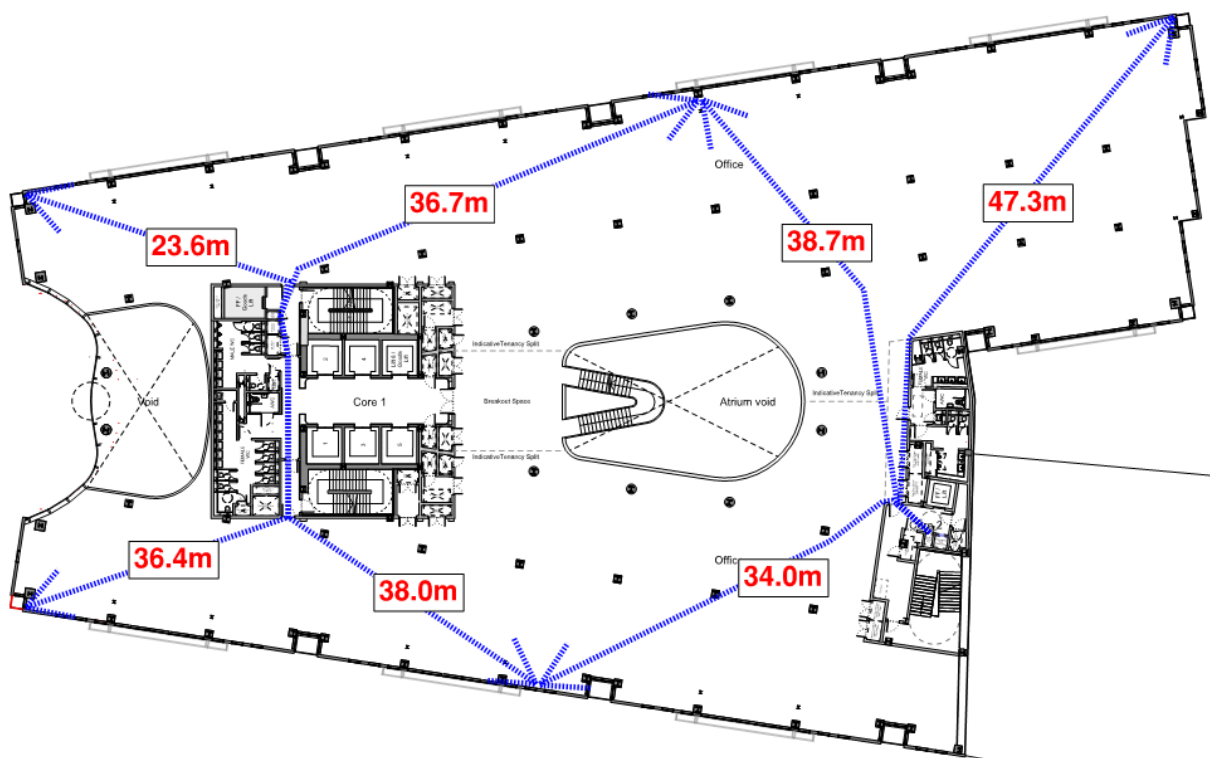


Figure 71: Hose distances on the first floor

The hose distances for the upper floors are shown on the first floor in Figure 71 which has the maximum floor area. The hose distances on the upper floors are within the prescribed limits therefore the proposed design is acceptable.

BS 9999 prohibits services other than those associated with the firefighting shaft (smoke shaft and dry riser) to pass through or be contained within the firefighting shaft. This includes any cupboards or access to service shafts serving the building.

A landlord electrical riser is proposed to be located and accessed from the firefighting lobbies of FFS 2 and this arrangement deviates from guidance. This riser only serves the firefighting shaft and the adjacent toilet block, and all services from the riser will be routed so as to not pass onto the office floorplate. The toilet block will be enclosed in 120 minutes fire resisting construction. This will mean that all areas served by the landlord electrical riser will be separated from the main floorplate, and therefore the main fire risk, by 120 minute fire rated construction. [Management procedures are to be put in place to ensure that the fire doors to these risers are locked after access and that access into this riser is only made out of hours.](#)

10.2.2.2 Firefighting lobbies




Firefighting lobbies should provide a clear area of at least 5m² and not exceed 20m². All principal dimensions should not be less than 1.5m or exceed 8m. Firefighting lobbies should also be provided with smoke control facilities.

The firefighting lobbies for FFS 1 and FFS 2 are to be provided with mechanical ventilation as outlined in section 9 above. Firefighting lobbies in FFS 1 have maximum areas of ca. 10m². Firefighting lobbies for FFS 2 have maximum areas of ca. 25m² and this exceeds the recommended 20m² limit. The reason for an upper limit on the size of firefighting lobbies is to limit the risk of them being used for storage or have other items of fire load placed in them. In this instance the layout of the firefighting lobby is such that the space is needed for circulation, and therefore the risk of additional items being contained in the lobby is considered low. On this basis, the arrangement is considered acceptable.

10.2.2.3 Firefighting lifts

The firefighting lift installations are to be provided in accordance with BS EN 81-20 and BS EN 81-72.

Electrical equipment within the firefighting lift well should be protected from water damage in accordance with BS EN 81-72. The following measures can be used to keep lift wells free from water in accordance with Annex N of BS 9999: 2017:

-  The use of a raised threshold to the lift entrance.
-  The use of a drainage grid to the lift entrance.
-  The use of a floor sloped away from the lift entrance.

For the redevelopment of 65 Fleet Street, the new firefighting lift in FFS 2 is to be protected from water ingress using one of the methods listed above. This is to be confirmed in RIBA Stage 4. The water protection measures for the existing firefighting lift in FFS 1 is to be confirmed in RIBA Stage 4.

The firefighting lift installation in FFS 1 is proposed to be used as a goods lift during normal operation of the building. BS 9999 provides the following commentary regarding the use of firefighting lifts to move goods in a building:



The lift may be used in normal times as a passenger lift by the occupants of the building but, in order to prevent the risk of the entrance being obstructed when the lift is required to go into the fire-fighting mode, it is essential that it is not used for moving refuse, nor for moving goods. In buildings provided with a single lift, its use for the transport of goods needs to be avoided unless essential, lift lobbies need to be kept clear, and when the lift is used for moving goods it is essential that the doors are not propped open.

Management procedures are to be put in place to ensure that firefighting lobbies are not used for storage purposes even temporarily. The use of the firefighting lift to move goods should be closely monitored to ensure that lift doors are not blocked/ propped open. It should be noted that the access route for goods into the building is at basement level and fire service access is at lower ground floor, therefore the fire service access route will not be used for transporting goods in and out of the building. The South building is to be provided with two firefighting shafts. In the unlikely event that the firefighting lift in FFS 1 cannot be recalled for the use by the fire service, the firefighting lift in FFS 2 will be available. The proposed arrangement to use the firefighting lift as a goods lift is deemed to be acceptable. This was discussed during a meeting with London Fire Brigade on 2nd December 2020, meeting minutes are provided in Appendix B.

10.3 Access to the Building

10.3.1 North building A

According to BS 9999, buildings not fitted with a fire main should be provided with vehicle access either;

-  to within 45m (30m direct distance) of every point on the projected plan area, or
-  to 15% of the perimeter.

All areas on the floor plan of the North building A are within 32m from the parking location of a pumping appliance from Whitefriars Street as shown in Figure 65 above. The direct access distance is marginally extended; however, the actual distance is unlikely to exceed 45m. The building is also provided with vehicle access to at least 40% of the building perimeter as shown in Figure 72 below. Fire vehicle access to North building A is therefore acceptable.

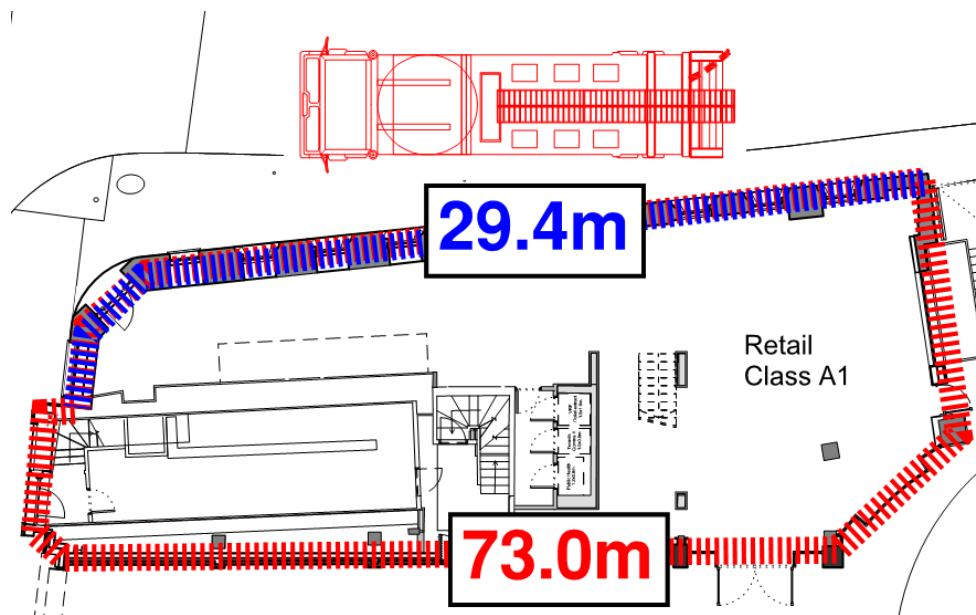


Figure 72: Vehicle perimeter access to the North building A

10.3.2 North building B

According to BS 9999, in buildings fitted with dry fire mains, there should be access for a pumping appliance to within 18m of each fire main inlet point, typically on the face of the building, and the inlet should be visible from the appliance.

The inlet point to the dry riser main to be provided in North Building B is to be within 18m from the location suitable for parking location of a pumping appliance. The dry riser inlet connection is to be confirmed in RIBA Stage 4.

10.3.3 South building

According to BS 9999, entry to a firefighting shaft on the access level should be either directly from open air or by way of a protected corridor not exceeding 18m in length.

In the South building, the firefighting shafts are to be accessed by way of a protected corridor. The protected corridors are under 18m in length. BS 9999 guidance recommends that the access corridors to firefighting shafts are 500mm wider than required for means of escape. Due to the existing nature of the building it is not possible to satisfy this recommendation, however the arrangements are a non-worsening of the existing condition.

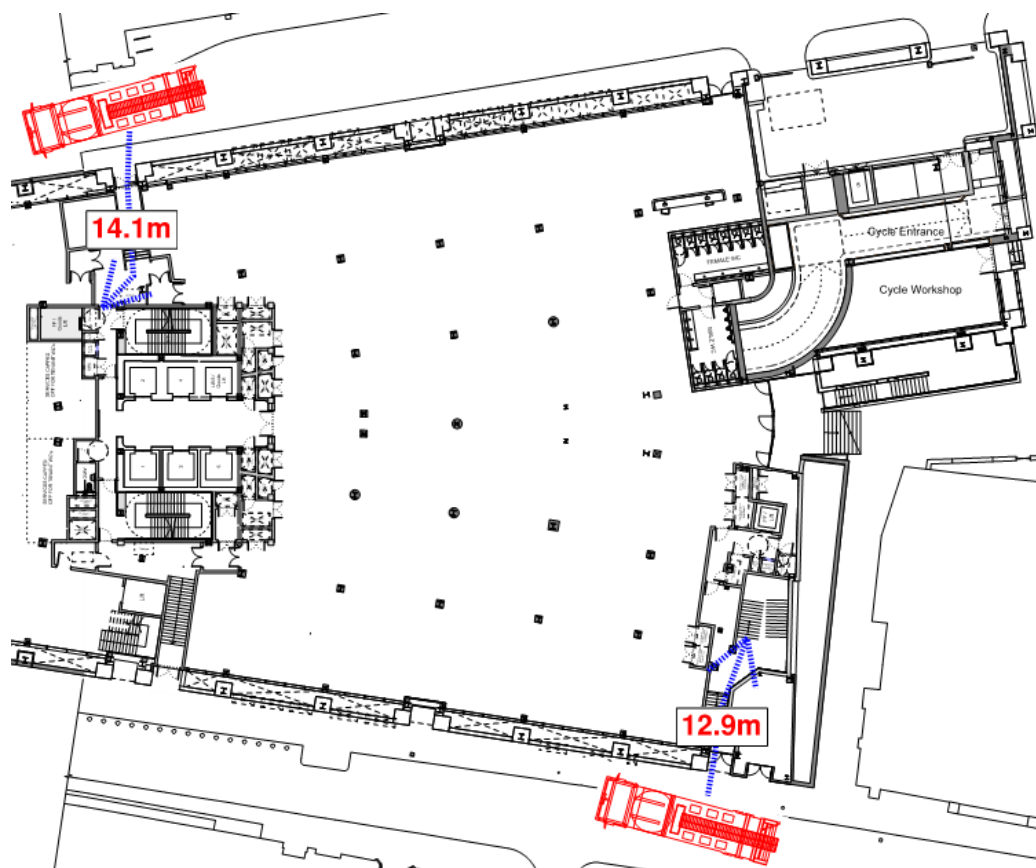


Figure 73: Firefighting access into the building

10.4 Fire telephone

A fire telephone is to be provided in accordance with BS 5839-9. This can be provided as a combined system with the EVC system in the firefighting shafts.

10.5 Fire mains

Fire mains are to be designed and installed in accordance with BS 9990.

According to BS 9999, dry main inlets are required to be within 18m of the fire tender parking position and then a further 18m to the fire stair door. The inlet points are to be on the external building façades, located along Whitefriars Street and Bouverie Street, and are to be within 18m from the fire service parking position. The inlet points will be visible and accessible to where fire service access is provided. The dry riser inlet connections are to be confirmed in RIBA Stage 4.

Each dry main is to be provided with outlets on all levels of the building that it extends to, including the ground floor.

10.6 Basement ventilation

The lower ground floor has openings to outside therefore it is not considered as a basement floor. The basement floor has areas more than 250m². As the building is to be provided with an automatic sprinkler system to BS EN 12845, powered smoke and heat ventilation is to be provided.

The mechanical smoke extract system is to meet the following principles:

- 🌿 provide ten air changes per hour;
- 🌿 be capable of handling gas temperatures of 300 °C for not less than 60 min;
- 🌿 come into operation automatically on the automatic fire detection system
- 🌿 replacement air will be provided and open automatically, using the smoke detection system
- 🌿 the system should have an independent power supply which would operate in the event of failure of the main supply;
- 🌿 the ductwork and fixings will be constructed of materials with an elevated rating of not less than 300°C or equivalent to the fire resistance rating (integrity and insulation) of any compartment boundary through which it passes, whichever is the greater;
- 🌿 all wiring associated with the fans will be in accordance with BS 7346-6.

10.6.1 Refuse store ventilation

Rooms for refuse storage should either be approached directly from open air or by way of a protected lobby provided with a minimum of 0.2m² permanent ventilation, or suitable mechanical alternative.

No guidance is offered as to what a suitable mechanical alternative is. Under BS 5906, which is referenced in clause 15.10 of BS9999, the fire purpose of this ventilation is to prevent the build-up of flammable gases that could potentially be released from the refuse.

The refuse store on the basement floor is to be provided with mechanical ventilation, in order to prevent air / gas / smells leaking into the rest of the building. Under this arrangement, the protected lobby to the refuse is not provided with any ventilation. This arrangement will prevent the build-up of flammable gasses and is therefore considered to be a suitable mechanical alternative to the 0.2m² permanent natural vent.

10.7 Secondary power supply

A secondary power supply is to be provided by a backup generator for the life safety systems provided in the building. These systems include (not an exhaustive list):

- 🌿 The sprinkler systems,
- 🌿 The lobby smoke control systems,
- 🌿 The basement mechanical smoke ventilation system,
- 🌿 The fire alarm system,

- 🌿 Emergency lighting,
- 🌿 Firefighting lifts.

10.8 Site hydrants

Supplementary water supply to support firefighting operations will be provided by public fire hydrants. The locations of the nearest public fire hydrants are to be confirmed in RIBA Stage 4.

10.9 Portable firefighting equipment

Handheld fire extinguishers will be provided by the tenants in accordance with BS 5306 part 8. This includes one per 200m² of floor area, for use by trained personnel. Fire extinguishers should be suitable for the risk in that particular area. This will be 1 x 13A Water and 1 x 2kg CO₂ per fire point every 200m².

Fire points typically include:

- 🌿 A break glass manual call point,
- 🌿 Emergency lighting,
- 🌿 Portable firefighting equipment,
- 🌿 Information on Assembly point locations,
- 🌿 Other instructions on what to do in the event of a fire,
- 🌿 Telephone numbers for Facilities management/control room.

10.10 Premises Information Box

A premises information box should be provided for the fire service.

It is recommended that the box includes:

- 🌿 Simple plans and /or schematic representations of the building and any relevant information relating to equipment/fixed installations design and operation provided for means of escape or firefighting operations.
- 🌿 Basic operating instructions for fire protection and fixed firefighting equipment. This will include location of the sprinkler pump room.

11 Conclusions

11.1 General conclusions

This report has laid down the required fire safety principles necessary to meet the functions requirements of the Building Regulations, Part B. It is a performance specification for fire safety. The information contained in this report highlights the key features associated with the design at RIBA Stage 3. This report also highlights the principal fire safety systems to allow first stage tender.

Overall, the current design can be further developed to RIBA Stage 4: Technical Design with assurance that it will comply with the functional requirements of the Building Regulations.

11.2 Summary of key fire safety systems/ provisions (for M&E and design team co-ordination)

11.2.1 North building

- 🌿 Category L2 fire detection and alarm system to BS5839-1: 2017.
- 🌿 Emergency lighting system to BS5266-1: 2016.
- 🌿 Emergency Voice Communication (EVC) system for disabled refuges to BS5839-9: 2011.
- 🌿 60-minute fire resisting glazing (integrity and insulation) on party walls that lie on the site boundary.
- 🌿 Automatic sprinkler system to BS EN 12845: 2015; alternative suppression systems to be provided in water sensitive areas.
- 🌿 Dry rising main installation to BS9990: 2015.
- 🌿 Pressurisation system to protect escape stair 1 to BS EN 12101-6: 2005.
- 🌿 Secondary back-up power supply generator to life safety and firefighting systems.

11.2.2 South building

- 🌿 Category L2 fire detection and alarm system to BS5839-1: 2017.
- 🌿 Emergency lighting system to BS5266-1: 2016.
- 🌿 Emergency Voice Communication (EVC) system for disabled refuges to BS5839-9: 2011.
- 🌿 Evacuation lift within the central core to BS EN 81-20 and BS EN 81-70.
- 🌿 30-minute fire resisting glazing (integrity) to enclose the atrium void from the office accommodation
- 🌿 One 30 minute fire and smoke curtain (integrity) to protect the evacuation lift from smoke ingress.
- 🌿 Three 30 minute fire and smoke curtains (integrity) to enclose the atrium void from the office accommodation.
- 🌿 Natural smoke ventilators at high level of the atrium in accordance with BS EN 12101-2, providing a combined geometric free area of at least 10% of the maximum void area.
- 🌿 Automatic sprinkler system to BS EN 12845: 2015; alternative suppression systems to be

provided in water sensitive areas.

- 🌿 Dry rising main installations to the firefighting shafts to BS9990: 2015.
- 🌿 Mechanical smoke ventilation systems (lobby depressurisation) to firefighting shafts, including minimum 1.0m² automatic opening vents to the head of the firefighting staircases.
- 🌿 A system of powered smoke and heat ventilation for the basement floor.
- 🌿 Firefighting lifts to BS EN 81-72: 2015 and BS9999: 2017.
- 🌿 Fire telephones to firefighting shafts to BS5839-9: 2011.
- 🌿 Secondary back-up power supply generator to life safety and firefighting systems.

Appendix A – BS9999 ‘Adequate’ management level 2 criteria

The building management for 65 Fleet Street is expected to comply with an ‘Adequate’ Level 2 management regime from BS 9999. This is a proactive approach to fire safety management with the main provisions explained. The client will therefore need to ensure that the minimum requirements below are delivered for the development.

Level 2 demonstrates good practice in which the organisation’s management system is determined to meet the requirements of legislation.

Regardless of the management system level, the fire safety manager or person nominated to monitor, and control management of fire safety should define the organisation’s fire risk management system, and method of implementing the overarching policy within a fire risk management strategy.

The following principal factors listed should be taken into account when defining and documenting fire risk management strategy once the building is occupied. More detailed guidance relating to the required fire safety management regime can be found in section 8 of BS9999: 2017.

‘Adequate’ Level 2 fire safety management regime

Good practice, adequate level of assurance - Conformity with requirements of legislation.

Fire risk assessment

Those responsible for the design and construction of the building should provide fire safety information to the responsible person at the completion of the project or when the building or extension is first occupied.

A pre-occupation fire safety assessment is the process of identifying fire precautions in a newly constructed building, taking into account the approved fire strategy, and deciding whether or not the new or refurbished premises is likely to be fit for occupation. This assessment should be undertaken to ensure a smooth transition from the design and construction phase to the operational phase of new premises.

Resources and authority

The resources necessary to implement, maintain and improve the fire risk management system should be determined. In determining the necessary resources, account should be taken of the organisational hierarchy, the role of the fire safety manager and communication and collaboration with other users of the building. For the management of fire risk to be effective, those with fire safety responsibilities should be empowered and able to command sufficient resources to maintain the system.

Fire safety training

Sufficient numbers of staff should be trained in fire prevention, fire protection and evacuation procedures, and be able to use the appropriate extinguishing equipment (and media), so as to provide full coverage of the building, with provision for contingencies, sickness or holiday absences.

Control of work on site

The means by which the end user or occupier will control work on site should be determined, e.g. repairs to structure, and in particular hot work. A work control system should include clear lines of responsibility communicated to contractors; a permit system which takes into account the risks to relevant persons; logging and work control audit processes; and routine checking and supervision.

Maintenance and testing

An accurate record of fire precautions, and procedures for operating and maintaining any fire protection measures within the building, are necessary to enable the owner or end user to plan, document and implement control processes for maintenance and testing of fire safety systems to ensure that they operate effectively in the event of a fire. Processes should be determined for maintenance and testing of fire safety systems.

Communication

The need for internal and external communication procedures should be determined, to ensure that all of those involved in management of fire risk, or who could potentially be involved in an incident, are provided rapidly and effectively with relevant information. These procedures should include defined lines of communication of significant findings arising from fire risk assessments and should stress the importance of maintaining fire safety information.

Emergency planning

A good relationship with the fire and rescue service has benefits for both the owner/end user and the fire and rescue service. In particular it ensures that the fire and rescue service is able to have an appropriate pre-determined response strategy for the premises concerned, and enables the owner/end user to seek advice where appropriate on:

- a) how to prevent fires and restrict their spread in their buildings and other property;
- b) the means of escape from buildings and other property in the event of fire.

Procedures for identifying and responding to unplanned events, potential emergencies or disasters should be established, documented and maintained. Where fire is concerned, liaison with the fire and rescue service should include: emergency shut-down of equipment, effective arrangements for notifying the fire and rescue service of changes to the occupancy, periods of abnormal occupancy, fire growth characteristics, and other relevant factors.

The arrangements should also consider a post-incident plan and contingency plan.

Appendix B – LFB Meeting Minutes

Appendix C - Compartmentation drawings
