Appendix 11

Arup - Fire Consultant

Cambridge Civic Quarter

RIBA Stage 2 Fire Strategy Report - Guildhall

P04

07/11/2024

Document Verification

Revision	Date				
P01	27/09/2024	**Description**	Initial draft of RIBA Stage 2 fire strategy report for Client and Design Team comment		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
P02	15/10/2024	**Description**	Updated to incorporate design team feedback		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
P03	01/11/2024	**Description**	Updated to incorporate CCC client feedback		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
P04	07/11/2024	**Description**	Updated comment within basement drawing		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
		Description			
		Name	**Prepared by**	**Checked by**	**Approved by**

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Report overview

This report outlines the Stage 2 Fire Safety design requirements for The Cambridge Guildhall, for the preferred option.

There are two leased spaces on the South elevation of the Guildhall, these do not form part of the Civic Quarter project and therefore are not commented on within this report.

The Corn Exchange Fire Strategy is covered within a separate report.

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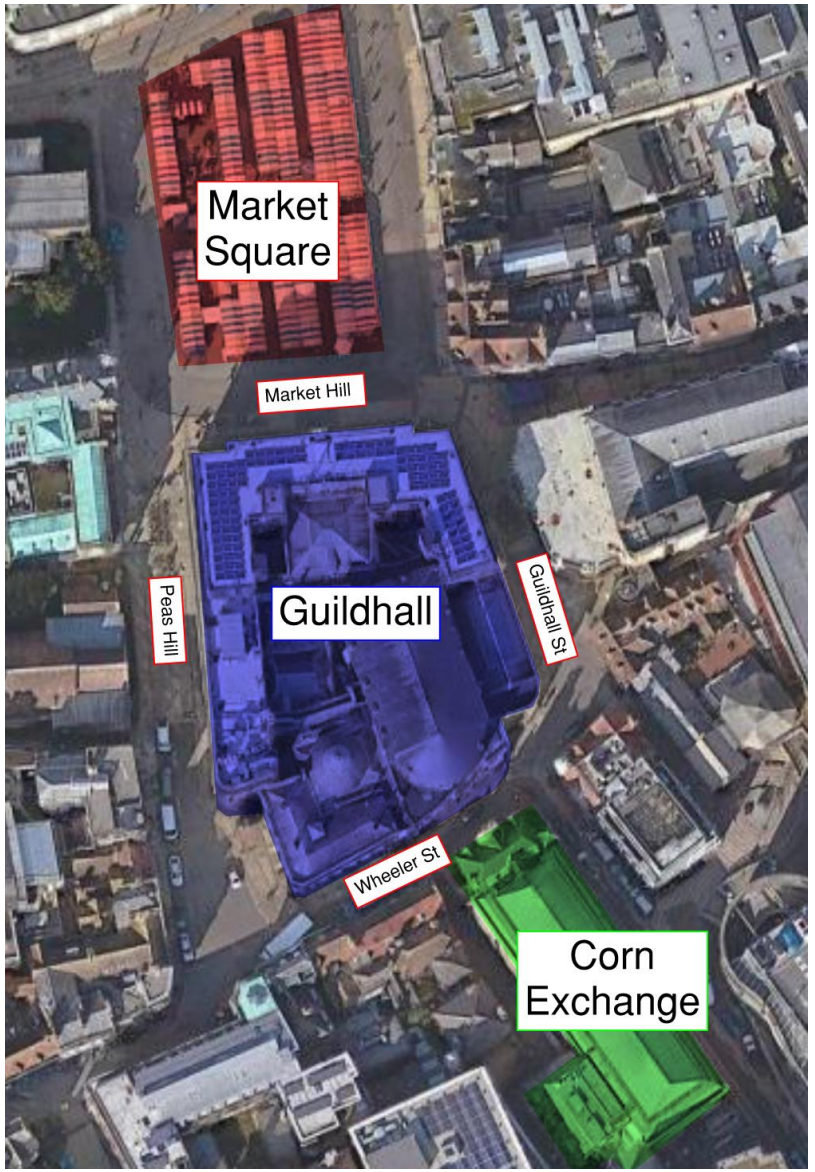
Contents



Building arrangement © Google Maps

Introduction

Project overview

The Civic Quarter project is a refurbishment of the existing Guildhall building, Corn Exchange building and the Market Square, all of which are listed.

The Guildhall is a mixed-use building providing Council offices, public access Council Chambers and events halls.

The client goals for the refurbishment of the Guildhall are to provide a modern open office space for Cambridge City Council (the council) as well as lettable office space to produce an income from the building. A key aspect of the design is enclosing the lightwells to form internal atria and extended these through the ground floor slab into the basement.

The option to include a museum in the basement has not been included in this report however some commentary on the likely impact has been made.

Fire strategy approach

This refurbishment does not constitute a change of use and so the minimum requirement of the Building Regulations is to make the existing levels of fire safety no less satisfactory with the proposed works; however, improvement will be made where reasonably practicable. There are constraints with the existing building which are likely to require deviation from aspects of prescriptive guidance.

From a fire strategy perspective, there are mixed uses of the Guildhall throughout the building, which is reflected with differing risk profiles.

While the Guildhall is existing, no existing fire strategy design information has been received. Therefore, Arup have undertaken a site visit on the 9th July 2024 for familiarisation and to measure key exit widths. Arup have not been commissioned to produce a retrospective fire strategy report for the Guildhall.

The proposals in the basement include council space (likely to be used as a large meeting room suite), space for other commercial uses, plant and back of house accommodation. The ground floor will have council reception, within the heart space and the customer service centre. These spaces are publicly accessible. There will also be council offices and the entrance to the other commercial uses off Peas Hill. The 1st floor will have the council chamber, the large and small halls, which will be publicly accessible. Otherwise, there is council office space at this level. The 2nd floor will be part council office and part commercial space. There will also be some public access to the galleries of the Large Hall and Council Chamber. The 3rd and 4th floor are solely commercial office.

This document sets out key fire strategy considerations at RIBA Stage 2 of the Guildhall within the Civic Quarter project by addressing the principles of fire safety provisions for parts B1 to B5 of the Building Regulations 2010 (as amended). Key risks and opportunities have been identified within the text and the content of this report has been discussed with Cartwright Pickard via the markups. <u>All aspects of the fire strategy will require discussion with Building Control and Fire and Rescue Service.</u>

Guidance document

The design guidance used to demonstrate the compliance with Part B of the Building Regulations 2010 (as amended) is BS 9999:2017.

Risk profile

Due to the mixed use of the building, there are several applicable use profiles as outlined below. When designing fire safety items applicable to the whole building (e.g. structural / compartment fire resistance) then the worst-case risk profile shall be used.

- Council and tenanted office space – A2*
- Publicly accessible spaces** – B2

* Although these areas are accessible to the public, as it is expected that staff will guide / be with members of the public it is expected they will be aware of their surroundings to guide the members of public.

** These areas are the basement customer services facilities, museum, ground floor reception, the first-floor event space, and the second floor viewing galleries.

Fire Strategy Mark-ups

This concept fire strategy should be read in conjunction with the mark-ups appended to this report.

Market square

The Market Square scope is limited to refurbishments works to the open-air market and retention of an existing small underground storage area.

The fire strategy requirements for the Market Square are that the refurbishments do not make the arrangements any worse than existing conditions. This includes the fire vehicle access routes around Market Square which serve the Guildhall building.

B1: Means of Warning and Escape

Evacuation strategy

A simultaneous evacuation strategy will be adopted whereby in the event of a fire, all floors in a building will be evacuated immediately.

Fire detection and alarm systems

Due to the atria in the building, an L1 automatic detection and voice alarm is required throughout the building.

Minimum number of exits

The minimum number of exits from each area should be provided based on the maximum occupancy in accordance with Table 10 of BS 9999. This is reproduced below in Table 1.

Travel distance

The maximum travel distance from the different areas of the buildings to the closest exit is presented in Table 2 in accordance with BS 9999 Table 11.

Dead-end corridors

Any dead-end corridor greater than 2m in length should be constructed as a protected corridor, enclosed in REI 30 fire resisting construction and FD 30S fire doors. The current design includes a dead end corridor in the basement providing access to the ‘zoom booths’.

Table 1: Minimum number of exits

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

Table 2: Travel distance limits

Building / area	Risk profile	One-way travel distance limit (m)	Two-way travel distance limit (m)
Office spaces	A2	22	55
Public spaces	B2	20	50
Event spaces*	B2	15	37.5
Rooftop	-	60	200

* Travel distances have been reduced by 25% on the assumption that alcohol will be served.

B1: Means of Warning and Escape

Occupancy numbers

Available vertical egress routes are presented in Appendix A. All the stairs in The Guildhall are existing stairs, while new lobbies to some stairs are to be provided as part of the refurbishment. Stair 6 requires a lobby to ensure suitable capacity for the Large and Small Halls, one way to achieve this is to have double doors from the Small Hall as shown. Additionally, the exit from the Large Hall to the corridor leading to Stair 1 must be enlarged to at least 1050mm to allow for 600 occupants in the Large Hall. See images to the right. If these changes cannot be accommodated, then a reduction of occupants for the Halls will be required.

The dimension of the stairs has been confirmed by Arup when undertaking the site visit.

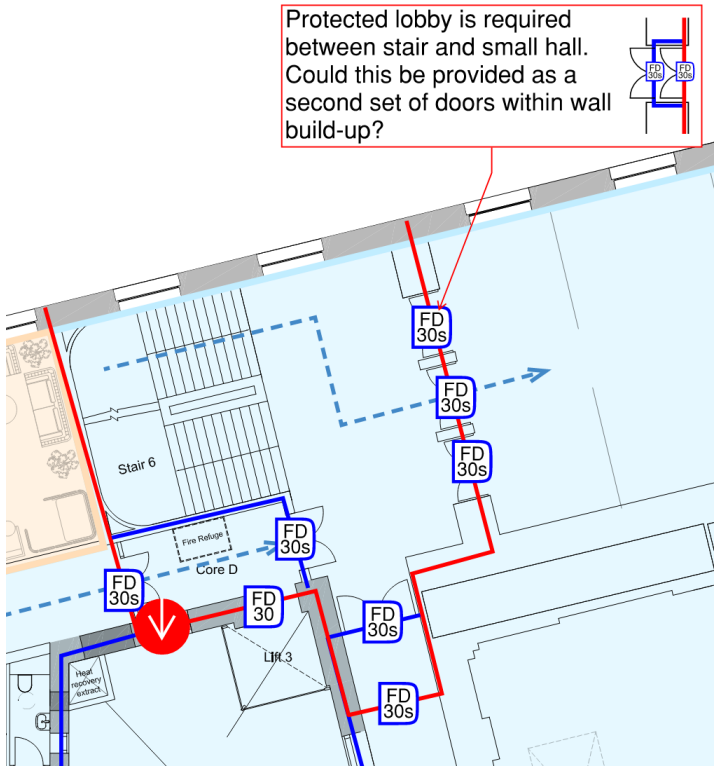
The maximum capacities of the Guildhall are:

- L4 - 158
- L3 - 179
- L2 - 296
- L1 - 993
- L0 - 265
- B – 165

Final exits

Final exits from all protected stairs must discharge direct to outside. The final exit routes are shown indicatively in the mark-ups in the Appendix.

Where merging flows occur at the base of a stair, the ground floor capacities have been taken based on the available escape width.



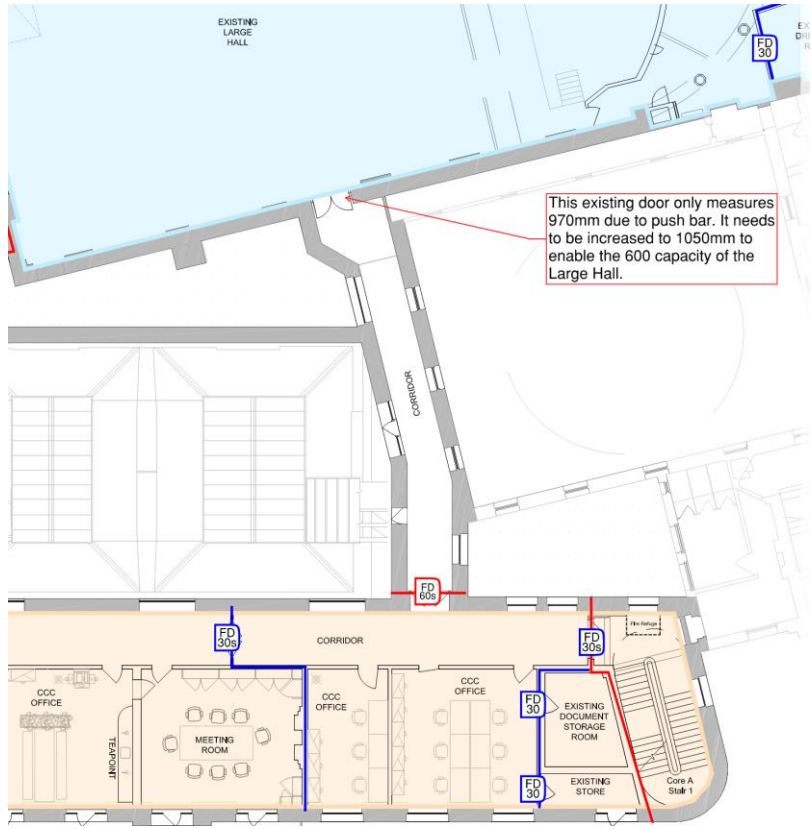
Stair 6 lobby option

Escape past the void

There are two atria formed by the existing external light wells penetrating compartment floors. In both cases, the atria will be enclosed in smoke resisting construction and therefore escape within 4.5m of a void is not required.

Corridor subdivision

All corridors greater than 12m in length which connect two or more storey exits are required to be subdivided by self-closing fire doors at approximately mid-way between the two storey exits. Vision panels should be provided within these sub-dividing corridor doors and they should be dual swing where available.



Large Hall exit requiring upgrading

B1: Means of Warning and Escape

Inner room

Where any room is accessed directly from another room, it is defined as an inner room. Based on the L1 detection and voice alarm system, these arrangements are compliant with Section 16.3.4 of BS 9999.

Disabled evacuation

Refuge area

Refuge area must be provided in all the protected lobbies associated with protected stairs to provide a place of relative safety to the occupants who are unable to escape down the stairs independently. Refuges should be 900x1400mm size and outside the flow of escaping occupants; if restrictions on escape routes is required, this may affect the available capacity.

The refuge should be equipped with an emergency communication system and designed in accordance with BS 5839-9:2011. A received should be located near the main fire alarm panel / security office that allows occupants to talk with building management where their evacuation can be organised.

Evacuation lift

An evacuation lift is to be provided adjacent to the West atrium which serves all floors. It is to be enclosed within an REI 60 fire resisting enclosure, separating the lift from the atrium.

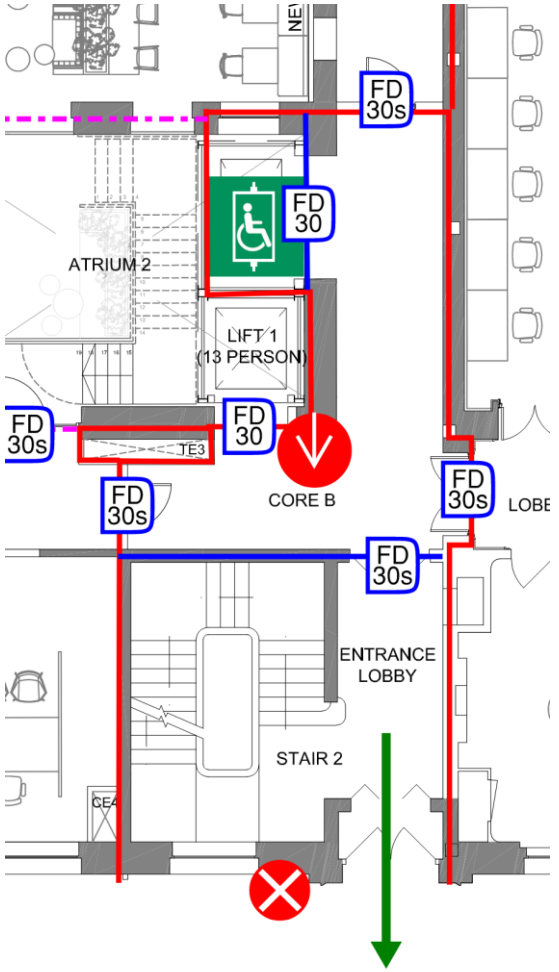
Evacuation lifts are required to be design and installed in accordance with BS EN 81-20 and BS EN 81-70. Backup power is required via either a backup generator, diverse routing of primary and secondary power supplies or via batteries proving enough cycles for the number of disabled occupants (a cycle being travel from ground floor to a refuge and back).

The evacuation lift shall discharge directly to a final exit.

Final exits

Not all final exits are step-free. Therefore, assistance maybe required for escaping disabled occupants even from Ground level. Where this is required, suitable refuges should be located at ground level to give occupants a safe location to wait for evacuation.

The exit serving the evacuation lift is step-free.



Evacuation lift final exit arrangement and location

B2/B3: Internal Fire Spread

Linings

Wall and ceiling linings shall be designed in accordance with Table 33 of BS 9999.

There are some areas with timber panelled walls which may require treatment to limit the spread of flame classification.

Structural fire resistance

60 minutes structural fire protection is required the building based on the use and size. Any new elements of structure, or existing structure which is altered as part of the refurbishment must meet this performance requirement.

The structural resistance of the existing building is to be confirmed as no existing design information has been received to outline what the original design intent was.

Compartment Floors

A compartment floor is required between the basement and ground floor slab only. This is subject to a detailed external fire spread assessment to confirm that the existing façade is sufficiently fire resistant to limit the risk of fire spread to adjacent buildings.

The ground floor slab is required to achieve REI 60 fire resistance when exposed from below. It is also recommended that the fire resistance of the existing floor slab construction is assessed and confirmed.

Protected shafts

Any shaft which penetrates the compartment floors should be constructed as protected shafts with 60 minutes fire resistance. The doors associated with the shafts are required to achieve FD30S rating.

Atrium protection

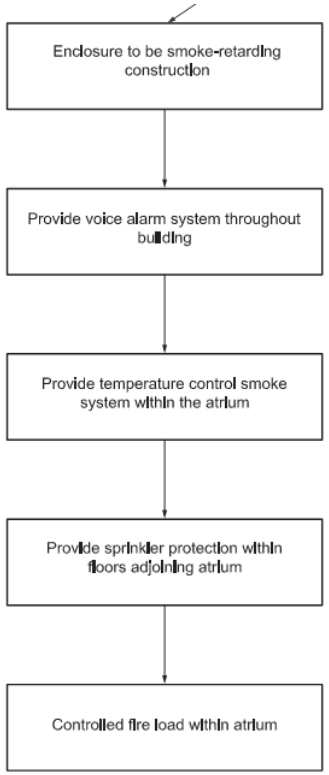
As the two atria penetrate the compartment floor at ground level, additional measures are required to limit the rapid spread of heat and smoke via the atria. Following the guidance within Annex C of BS 9999, Exemplar 6 (shown to the right) recommends the following:

- Atrium to be enclosed in smoke-retarding construction. This is achieved on all levels other than basement which is proposed to be open.
- L2 automatic detection and voice alarm system. This will be achieved and enhanced to an L1 detection and voice alarm system throughout the building.
- Temperature control system to limit smoke to less than 200°C. This shall be achieved.
- Sprinklers on the floors linked to the atria. Sprinklers are not proposed.
- Controlled fire load in the atrium base. Fuel load is proposed to be limited to chairs and tables which is less than the adjacent office accommodation, but not in line with the ‘fuel load islands’ concept.

It is proposed to carry out CFD analysis during RIBA Stage 3 to demonstrate that the proposed atrium fire protection measures are sufficient to limit the risk of rapid fire and smoke through the atrium. It is considered that the life safety and functional requirements of the guidance can be met without the need to enclose the atrium at the basement, to provide sprinklers or to control the fuel load in the base of the atrium.

It is noted that compartment floors are unlikely to be required to achieve external fire spread requirements, and therefore, the atrium strategy only needs to limit fire and smoke spread between floors during the evacuation period.

See B5 requirements for an outline of the atrium design approach.



Relevant atrium guidance from BS 9999

B3: Internal Fire Spread (Structure)

Fire resisting enclosures

The following areas require fire resisting enclosures:

- Shafts penetrating compartment floors – REI 60
- Compartment walls – REI 60
- Compartment floor – REI 60
- Stair lobbies – REI 30
- Party walls – REI 60
- Separation of the evacuation lift and atrium – REI 60
- Protected corridors – REI 30

Other fire resisting enclosure requirements are outlined on the markups contained within the Appendix.

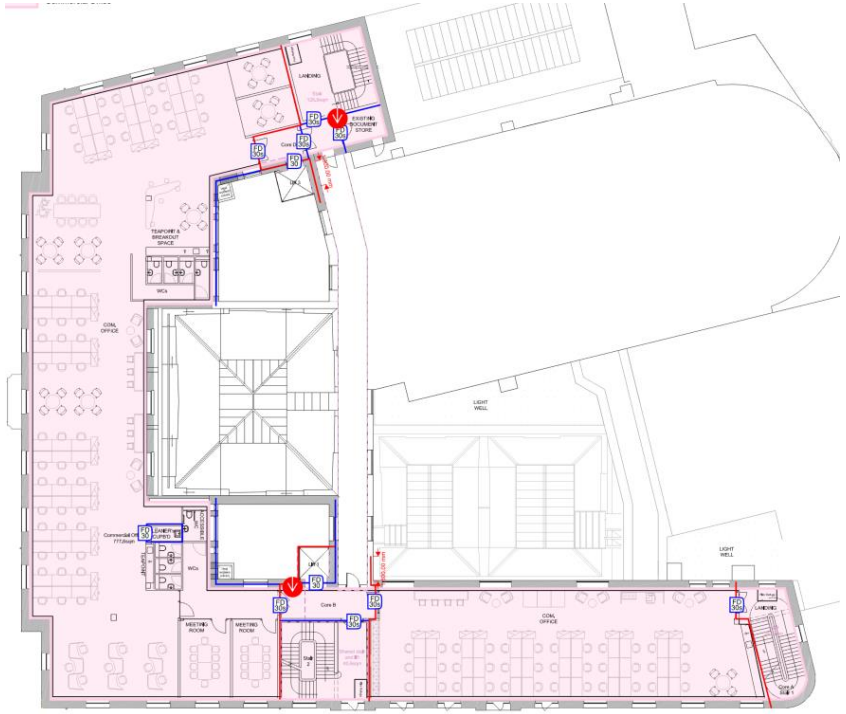
Fire stopping

Any service penetrations to fire resistant partitions will need to be fire stopped, and protected against smoke where protecting an escape route (e.g. smoke dampers). This includes dead-end corridors over 2m.

Sprinklers

Sprinklers are not required for a building of this size and use under BS 9999, however, they are recommended as part of the atrium protection strategy. As discussed on the previous page, it is proposed to carry out CFD analysis to demonstrate that the proposed atrium protection measures can limit the rapid spread of heat and smoke without the need for sprinklers. This decision has been taken due to the complexity of adding sprinklers to a listed building and the need for a large plant space for the relevant equipment and water tanks.

The inclusion of sprinklers can be reviewed if this is a desired addition from the client for property protection, business continuity or insurance purposes.



Example Office fire resisting construction requirements

B4: External fire spread

The existing walls are proposed to be upgraded to improve the thermal performance. It is recommended that non-combustible insulation is used to limit the risk of fire spread via the façade.

As the size and use of the building is not being changed, the risk of external fire spread will be no worse than the existing condition, which is sufficient to demonstrate compliance with the Building Regulations. However, it is proposed to demonstrate that the existing facades provide sufficient fire resistance to limit the risk of fire spread to adjacent buildings.

As described on page 8, the atrium design is intended to demonstrate rapid fire and smoke spread between levels will not occur. Initial BR 187 calculations have shown that for a fire limited to a single storey, there is not a requirement for a fire resisting external walls for the Guildhall.

Confirmation of the external fire spread via calculations will be undertaken in the next stage of design.

Guildhall external wall © Google Maps

External fire spread measurements (representative of the closest boundary) © Google Maps

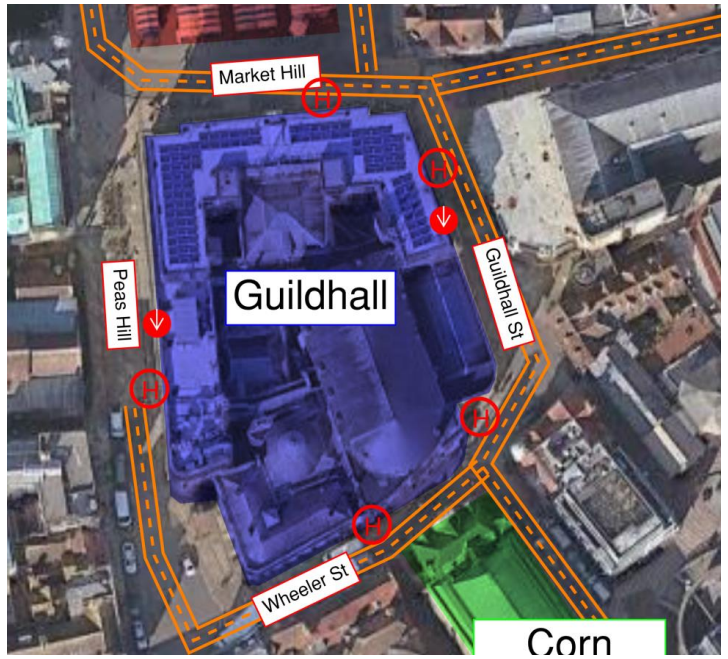
B5: Access and facilities for the fire services

BS 9999 recommends that buildings with risk profile A or B between 11m – 18m should be provided with dry risers in two escape stairs with protected lobbies.
Where the building includes assembly and recreation use over 7.5m, BS 9999 recommends firefighting shafts (without lifts) are provided.
The only parts of the building which fall under the definition of 'Assembly and Recreation' use are the Large and Small Halls and the Council Chamber which are located on Level 1 (4m above ground) with limited gallery space at Level 2 (8.7m above ground).

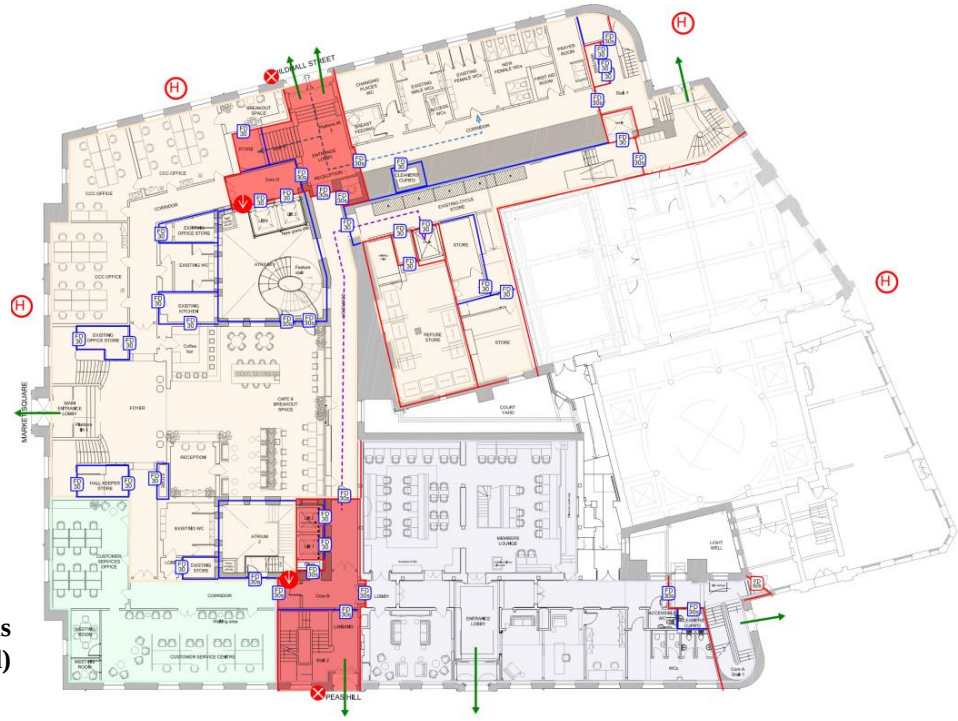
However, upgrading the existing heritage stairs to firefighting shafts is unlikely to be practicable and so the it is proposed to provide the stairs with new dry risers on the following basis:
- The assembly and recreation (B2 risk profile) is located primarily on the first floor and therefore below the 7.5m requirement.
- Whilst the galleries are above the 7.5m threshold, these areas are understood to be infrequently used and provided with a choice of escape routes.
- The extent of the changes to achieve full compliance with a firefighting shaft are unlikely to be achievable given the listed status of the building.

It is therefore proposed that fire mains will be installed within the building, in accordance with the requirements of BS 9999 for a building more than 11m but less than 18m in height without assembly and recreation above 7.5m.
The proposed location of fire mains are outlined on this drawings. These provide hose coverage within 45m of all areas of the building.

This approach is subject to agreement with the Fire Service.



Fire service access routes © Google Maps



Firefighting stair locations (highlighted in red)

B5: Access and facilities for the fire services

Basement ventilation

The existing basement ventilation provisions appear to be limited to break-out panels with a total area of 18.5m², which is approximately 0.9% of the floor area. This is significantly less than the recommended 2.5% of the floor area for basement smoke ventilation. Furthermore, given the current subdivision in the basement the majority, if not all the ventilation is unlikely to be in the vicinity of the fire.

It is proposed to improve the basement smoke ventilation provisions by utilising the new connections between the basement and the roof via the two atria. Initial calculations have been carried out to assess the feasibility of this approach and have indicated that it is possible. The required ventilation area is dependent on multiple variables but is likely to be in the region of 6-10m² for each atrium.

The following has been assumed in these calculations:

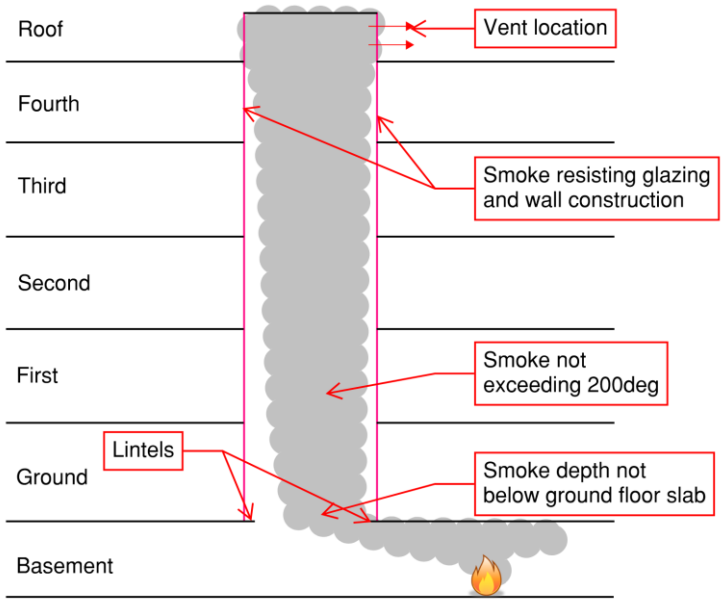
- A medium growth rate fire in the basement during the evacuation period.

- The vents at the head of the atrium are automatically opening and are bottom hinged windows instead of slatted louvres. The vents are arranged to avoid a positive pressure condition due to wind.

- The existing pavement break out panels are replaced with automatic opening vents to provide make-up air. Internal air paths from the perimeter of the building to the central office area.

- The atrium roof is above Level 4 giving a height from the basement slab to the underside of the roof of circa 21m.

CFD or further analysis would provide more realistic ventilation requirements suitable for the atria geometry, smoke temperature and required basement smoke layer. The calculations undertaken at this stage are only intended to outline the intent is feasible.



Atria design

Next Steps

This Stage 2 Concept Fire Strategy sets out the key principles of the fire strategy which will need to be developed by others, into a detailed design.

The following areas have been highlighted as requiring additional investigation in order to discuss and agree with Building Control and the Fire Service:

1. Atrium fire protection. It is proposed to demonstrate that rapid fire and smoke spread between levels will be limited using CFD smoke modelling.
2. Basement smoke ventilation. It is proposed to demonstrate that sufficient smoke can be ventilated from the basement using CFD smoke modelling.
3. Confirm the amendments needed to the means of escape provisions to enable the proposed population numbers.
4. Agree the proposed fire fighting access strategy with the Cambridgeshire Fire and Rescue Service.

CCC Office Accommodation

Commercial Office Accommodation

CSC Office Accommodation

Democratic Rooms, Meeting Rooms and Assembly Halls

CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

ARUP

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Fire Doors
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Fire Resistance (FR)
- 30 mins FR
- 60 mins FR
- Smoke resisting construction

Fire Doors
- FD 30
- FD 30 S
- FD 60
- FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet

Drawing Original Size
A0

Notes

DWG Issues
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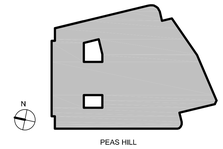

Wall Type Key:

Existing

Proposed

Drawing Revisions

Date:	Rev:	Note:	Check:
07.10.24	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Basement 2 Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-B2-DR-A-2000

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Clear air path from pavement lights to atria will be required. This could be via a plenum above the office plant room.

Any penetration through floor slabs requires an EI 60 enclosure to maintain the compartment floor

Basement smoke ventilation is proposed to be via 2 x new atria. See comments on roof for more detail.

Open stairs in the atria are not relied upon for means of escape but they can be used if occupants choose.

Addition of the Museum in the Basement
CCC have requested a design option which includes a public museum covering half the basement level.
With splitting the basement into two separate use groups (i.e. museum and office), separation of use groups with compliant means of escape arrangements needs to be reviewed and developed.
The general requirements to consider are:
- Compartmentation separating the office and museum;
- Where escape through the adjoining area is required, a protected corridor would be required;
- A check on travel distances for compliance, especially where there are dead-ends; and
- The fuel load associated with the museum will need to be similar to that of an office fit-out, otherwise the proposed smoke ventilation system may no longer be valid.
- Current capacity figures are based on Option 2a, however, options to increase the basement capacity can be reviewed if this becomes a requirement at the next stage of design.

Compartmentation, means of escape and travel distances are shown on these markups

Each floor slab is required to be a compartment floor achieving REI 60 fire resistance. Comment applies to all floors

A protected corridor, as shown here, is required if a museum is included.
If however the basement is formed of 2 office spaces, escape through the adjacent demise maybe achievable subject to approval with Building Control

Automatic opener on this window may be required to act as inlet air to smoke ventilation system. A clear air path will need to be maintained to the atria which is likely to be a challenge if a protected corridor is required to accommodate the museum use.

Dead-end corridor requires 30 minutes fire resistance including smoke dampers on ductwork.

The compartment floor formed by the ground floor slab must be maintained. This could be by enclosing this stair or providing a new REI 60 floor in line with the slab

If this rooms provides back up power supply to life safety equipment, such as evacuation lifts, then it must be enclosed in 120 minutes REI fire resistance.

Clear air path from pavement lights to atria will be required. This could be via a plenum above the rooms.

A lobby to protect the stairs in this location would be beneficial. This would enable to use of this stair in capacity calculations, otherwise it would have to be discounted.

A compartment wall in this location means that the break out panels provide ventilation to the plan and the commercial hotel area does not require ventilation. The corridor is considered a protected corridor and must be kept fire sterile for this assumption

CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

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Fire Resistance (FR)	Fire Doors
30 mins FR	FD 30
60 mins FR	FD 30 S
Smoke resisting construction	FD 60
	FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet

Wall Type Key:
- Existing
- Proposed

PEAS HILL

Drawing Original Size
A0

Notes

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Drawing Revisions

Date:	Rev:	Note:	Check:
20.09.24	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Basement 1 Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-B1-DR-A-2001

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- CCC Office Accommodation
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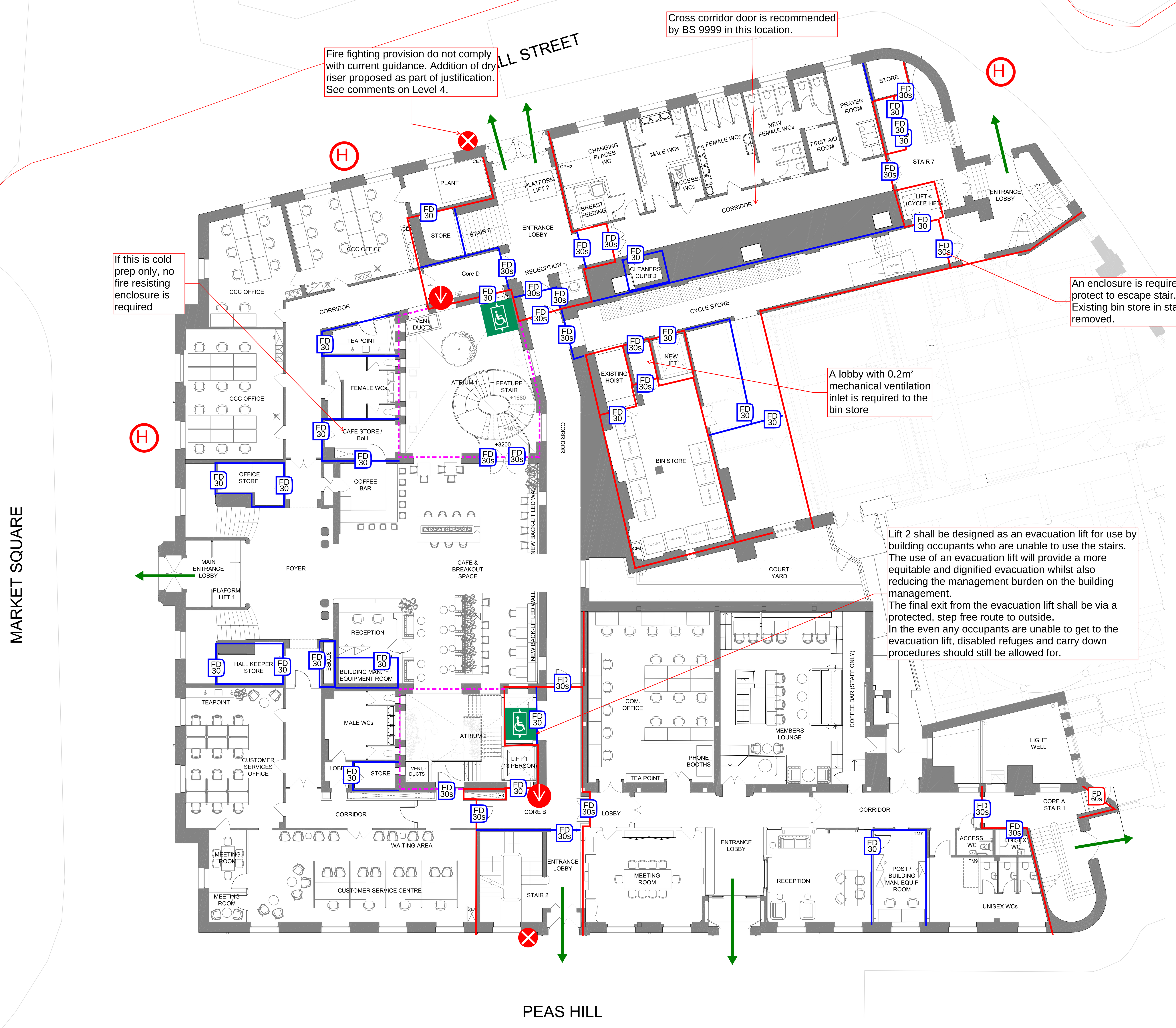
- 30 mins FR
- 60 mins FR
- Smoke resisting construction

Fire Doors
- FD 30
- FD 30 S
- FD 60
- FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet



Chair Count
CCC Office: 182
Customer Service: 21
Commercial office: 61
Total: 264

Floor space factor
CCC Office: 184
Customer Service: 15
Commercial Office: 66
Total: 265

Capacity

L4 - 158
L3 - 179
L2 - 296
L1 - 993
L0 - 265
B - 165

Drawing Original Size
A0

Notes

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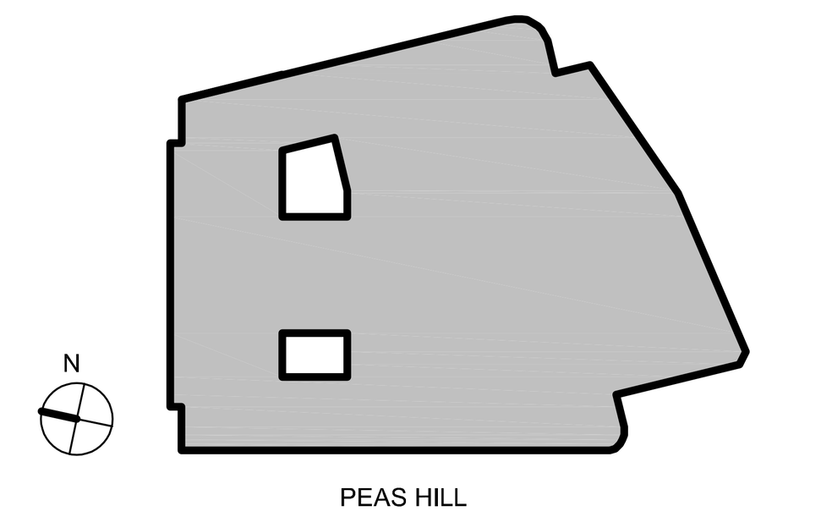

Wall Type Key:
- Existing
- Proposed

Site boundary

Drawing Revisions

Date:	Rev:	Note:	Check:
20.09.24	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Ground Floor Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-00-DR-A-2002

London Office
1 Canal Side Studios
8-14 St Pancras Way
London NW1 0QG
Tel 020 7554 3830

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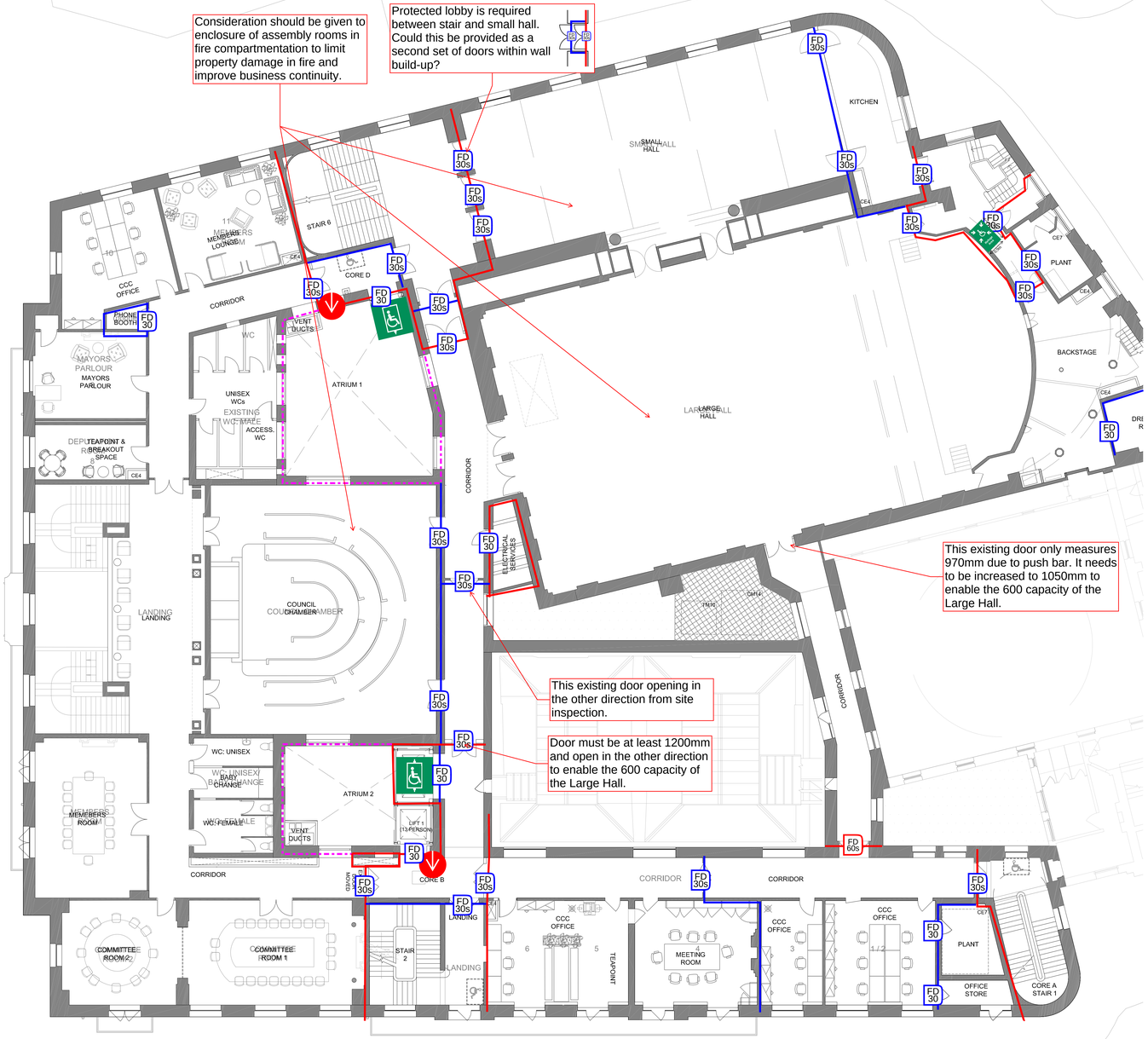

CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

ARUP

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Fire Resistance (FR)
The fire resistance rating of a material is defined in terms of loadbearing capacity (R), integrity (E) and insulation (I), when tested to the relevant standard, in the appropriate testing arrangement.

Fire Doors
FD 30 refers to a fire door achieving 30mins fire resistance. S means the fire door is also provided with smoke seals.

Fire Resistance (FR)
- 30 mins FR
- 60 mins FR
- Smoke resisting construction

Fire Doors
- FD 30
- FD 30 S
- FD 60
- FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet

Chair/Capacity count
Large hall: 600 (standing)
Small hall: 200 (standing)
Council Chamber: 100
Meeting rooms : 50
Office: 36
Total: 986

Floor space factor
Large hall: 600 (standing)
Small hall: 200 (standing)
Council Chamber: 100
Meeting rooms : 50
Office: 13
Office: 36
Total: 993

Capacity

L4 - 158
L3 - 179
L2 - 296
L1 - 993
L0 - 265
B - 165

Drawing Original Size
A0

Notes

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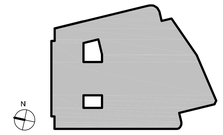

Wall Type Key:

- Existing
- Proposed

Drawing Revisions

Date:	Rev:	Note:	Check:
20.09.24	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed First Floor Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-01-DR-A-2003

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1 Canal Side Studios
8-14 St Pancras Way
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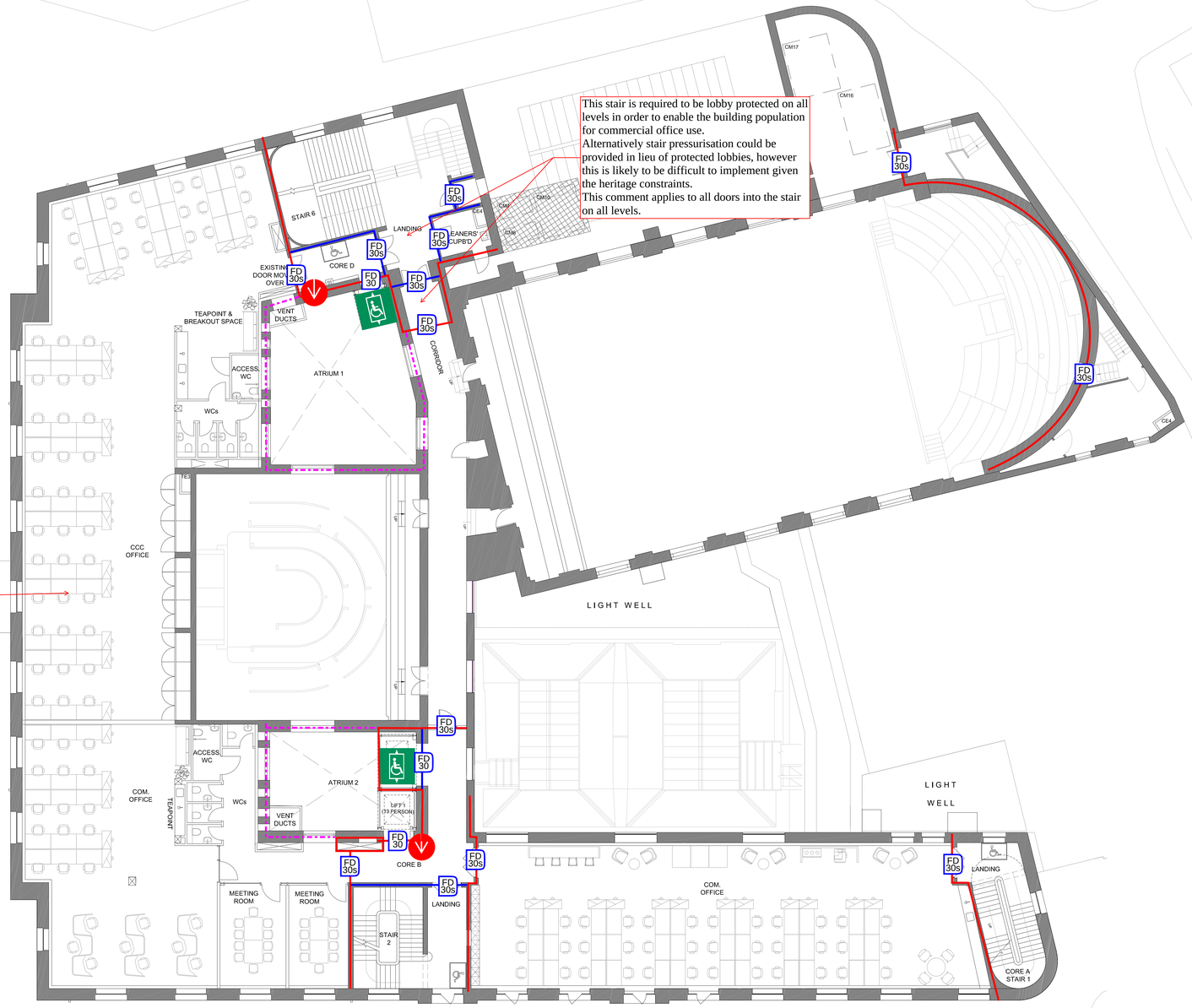
- Democratic Rooms, Meeting Rooms and Assembly Halls



Office on upper levels
It is assumed that each office space on the North elevation forms a single lease space. If the desire is to split these, the means of escape will need to be required as separate occupancies cannot pass through an adjacent occupancy to escape. Where this is required to reach a stair, this should be via a protected corridor. This will cause a decrease to the amount of lease space on each level if added.

CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

ARUP

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Fire Resistance (FR)
The fire resistance rating of a material is defined in terms of loadbearing capacity (R), integrity (E) and insulation (I), when tested to the relevant standard, in the appropriate testing arrangement.

Fire Doors
FD 30 refers to a fire door achieving 30mins fire resistance. S means the fire door is also provided with smoke seals.

Fire Resistance (FR)
- 30 mins FR
- 60 mins FR
- Smoke resisting construction

Fire Doors
- FD 30
- FD 30 S
- FD 60
- FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet

Chair count
Office: 99
Breakout: 50
Meeting: 28
Hall Gallery: 76
Chamber Gallery: 43
Total: 296 people

Floor space factor
Office: 119
Gallery: 76
Benches 43
Total: 238

Capacity

L4 - 158
L3 - 179
L2 - 296
L1 - 993
L0 - 265
B - 165

Drawing Original Size
A0

Notes

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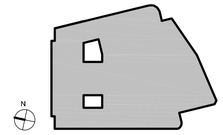

Wall Type Key:

- Existing
- Proposed

Drawing Revisions

Date:	Rev:	Note:	Check:
20.9.2024	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Second Floor Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-02-DR-A-2004

London Office
1 Canal Side Studios
8-14 St Pancras Way
London NW1 0QG
Tel 020 7554 3530

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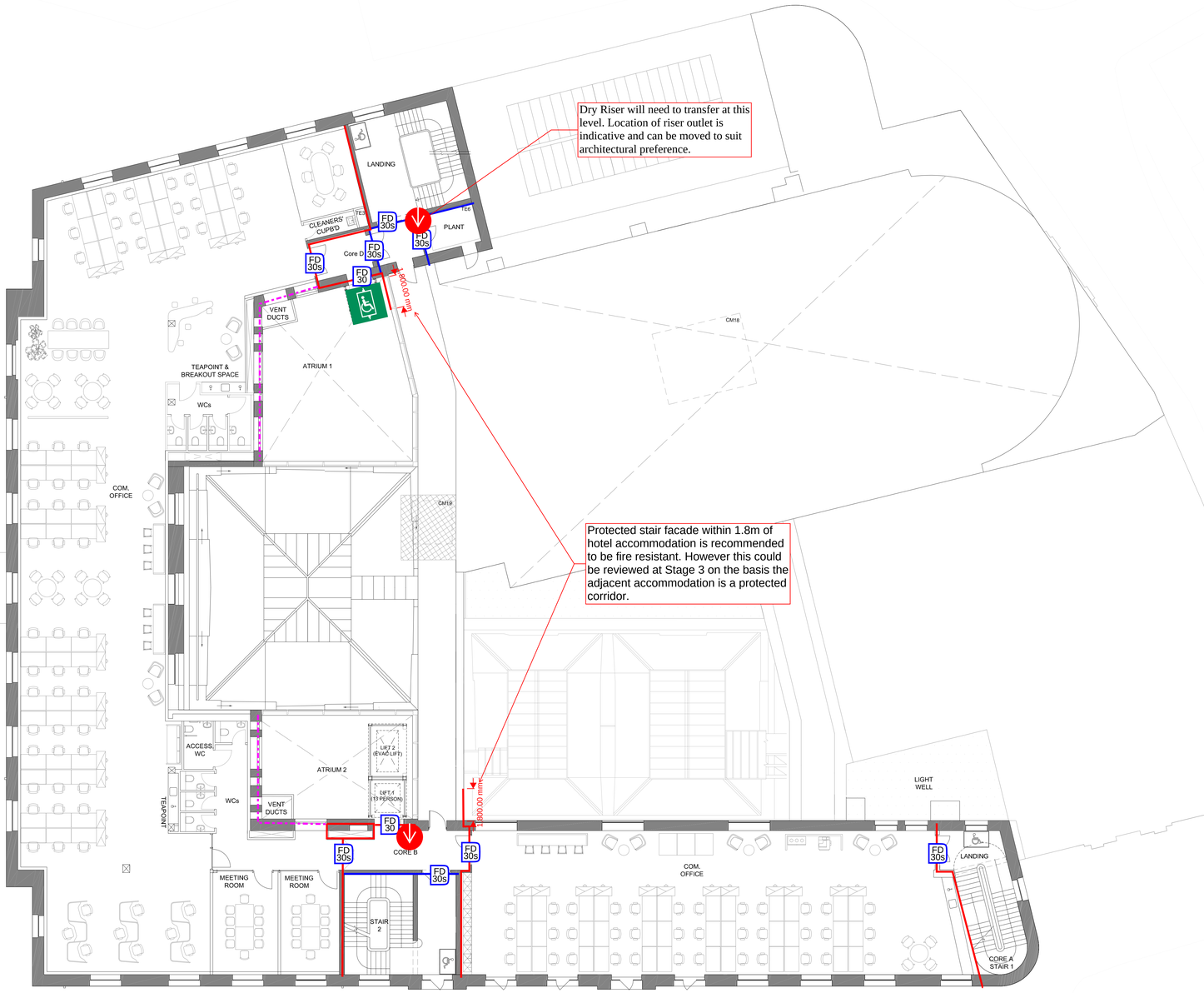

Chair count
Office: 99
Breakout: 52
Meeting: 20
Total: 179 people

Floor space factor
Total: 120 people

Capacity

L4 - 158
L3 - 179
L2 - 296
L1 - 993
L0 - 265
B - 165

CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

ARUP

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Fire Resistance (FR)
The fire resistance rating of a material is defined in terms of loadbearing capacity (R), integrity (E) and insulation (I), when tested to the relevant standard, in the appropriate testing arrangement.

Fire Doors
FD 30 refers to a fire door achieving 30mins fire resistance. S means the fire door is also provided with smoke seals.

Fire Resistance (FR)
- 30 mins FR
- 60 mins FR
- Smoke resisting construction

Fire Doors
- FD 30
- FD 30 S
- FD 60
- FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet

Wall Type Key:
- Existing
- Proposed

Drawing Original Size
A0

Notes

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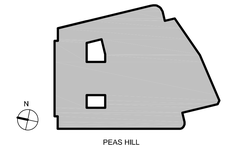

Drawing Revisions

Date:	Rev:	Note:	Check:
20.9.2024	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Third Floor Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-03-DR-A-2004

London Office
Unit 3 Clarendon Studios
N-N St Pancras Way
London NW1 0QG
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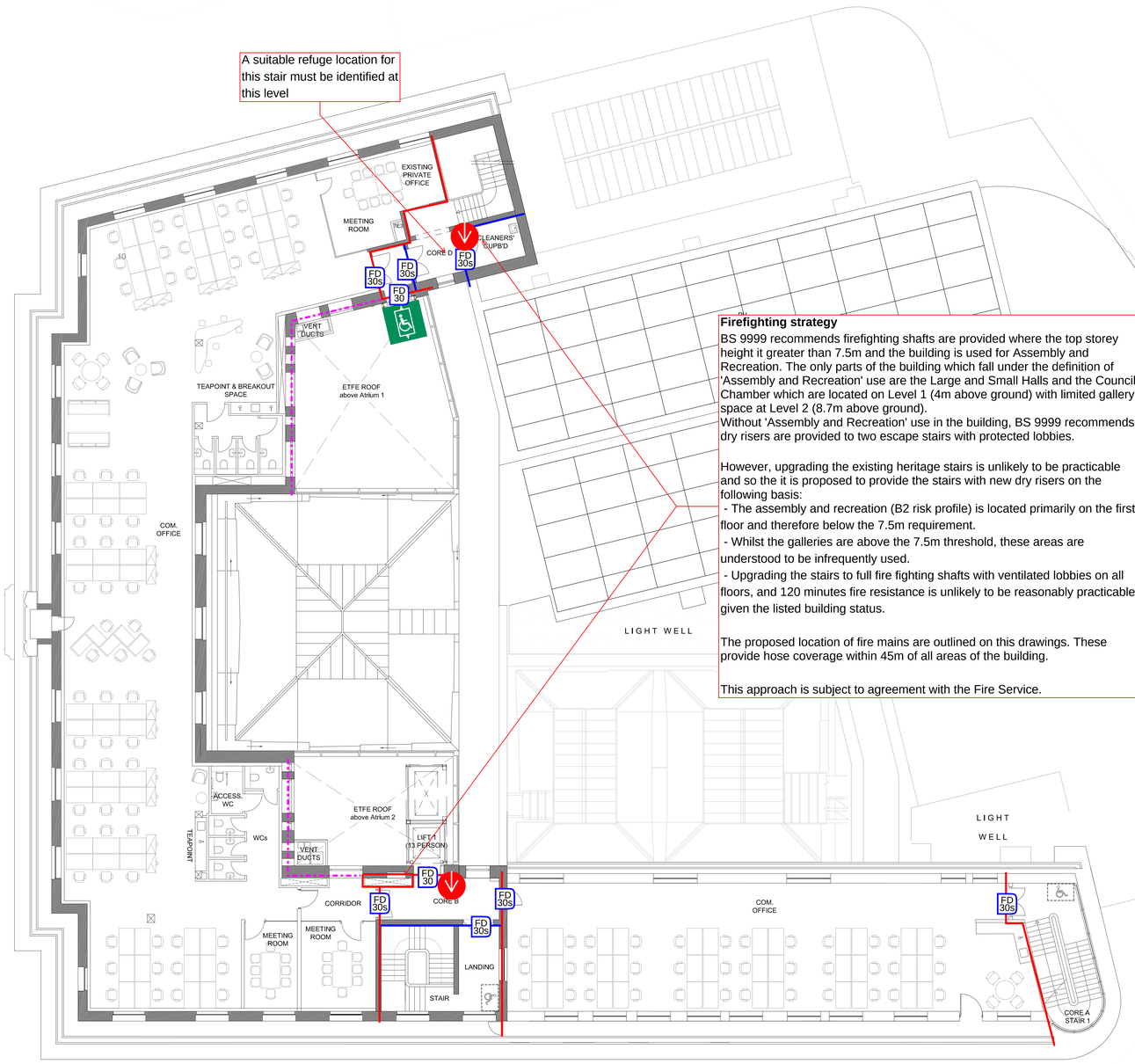

Firefighting strategy

BS 9999 recommends firefighting shafts are provided where the top storey height it greater than 7.5m and the building is used for Assembly and Recreation. The only parts of the building which fall under the definition of 'Assembly and Recreation' use are the Large and Small Halls and the Council Chamber which are located on Level 1 (4m above ground) with limited gallery space at Level 2 (8.7m above ground).
Without 'Assembly and Recreation' use in the building, BS 9999 recommends dry risers are provided to two escape stairs with protected lobbies.

However, upgrading the existing heritage stairs is unlikely to be practicable and so the it is proposed to provide the stairs with new dry risers on the following basis:
- The assembly and recreation (B2 risk profile) is located primarily on the first floor and therefore below the 7.5m requirement.
- Whilst the galleries are above the 7.5m threshold, these areas are understood to be infrequently used.
- Upgrading the stairs to full fire fighting shafts with ventilated lobbies on all floors, and 120 minutes fire resistance is unlikely to be reasonably practicable given the listed building status.

The proposed location of fire mains are outlined on this drawings. These provide hose coverage within 45m of all areas of the building.

This approach is subject to agreement with the Fire Service.

Chair count
Office: 60
Breakout: 20
Meeting: 18
Cafe (1 escape): 60
Total: 158

Floor space factor
Office: 76
Cafe: 60
Total: 149

Capacity

L4 - 158
L3 - 179
L2 - 296
L1 - 993
L0 - 265
B - 165

CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

ARUP

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Fire Resistance (FR)
The fire resistance rating of a material is defined in terms of loadbearing capacity (R), integrity (E) and insulation (I), when tested to the relevant standard, in the appropriate testing arrangement.

Fire Doors
FD 30 refers to a fire door achieving 30mins fire resistance. S means the fire door is also provided with smoke seals.

Fire Resistance (FR)
- 30 mins FR
- 60 mins FR
- Smoke resisting construction

Fire Doors
- FD 30
- FD 30 S
- FD 60
- FD 60 S

Firefighting Access & Facilities
- Fire Hydrant
- Fire Main Inlet
- Fire Main Oulet

Wall Type Key:

- Existing
- Proposed

Drawing Original Size
A0

Notes

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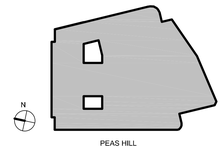

Drawing Revisions

Date:	Rev:	Note:	Check:
20.9.2024	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Fourth Floor Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-04-DR-A-2006

London Office
1 Canal Side Studios
8-14 St Pancras Way
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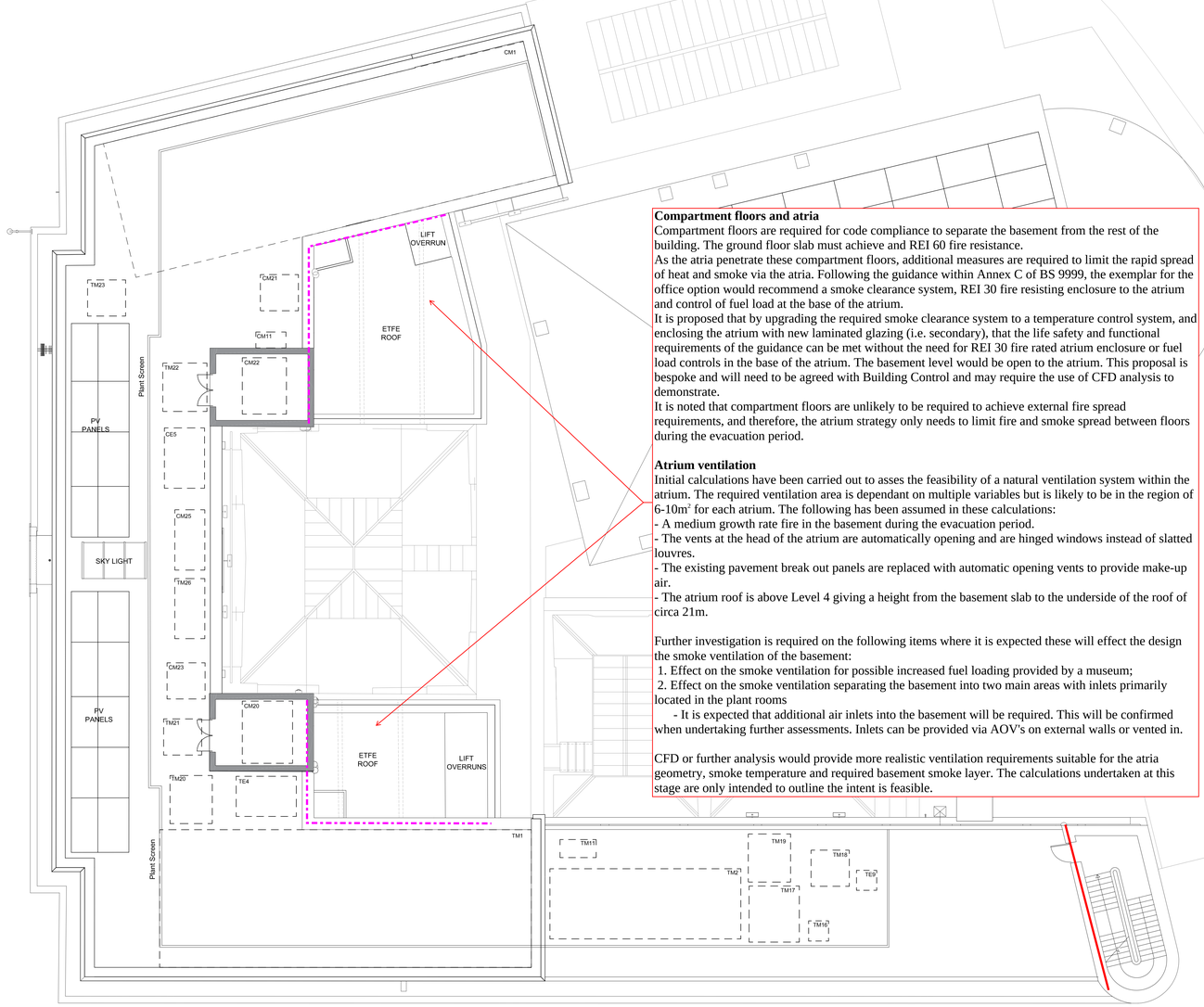
CCQ - Guildhall
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-006 - P03

ARUP



Compartment floors and atria
Compartment floors are required for code compliance to separate the basement from the rest of the building. The ground floor slab must achieve and REI 60 fire resistance.
As the atria penetrate these compartment floors, additional measures are required to limit the rapid spread of heat and smoke via the atria. Following the guidance within Annex C of BS 9999, the exemplar for the office option would recommend a smoke clearance system, REI 30 fire resisting enclosure to the atrium and control of fuel load at the base of the atrium.
It is proposed that by upgrading the required smoke clearance system to a temperature control system, and enclosing the atrium with new laminated glazing (i.e. secondary), that the life safety and functional requirements of the guidance can be met without the need for REI 30 fire rated atrium enclosure or fuel load controls in the base of the atrium. The basement level would be open to the atrium. This proposal is bespoke and will need to be agreed with Building Control and may require the use of CFD analysis to demonstrate.
It is noted that compartment floors are unlikely to be required to achieve external fire spread requirements, and therefore, the atrium strategy only needs to limit fire and smoke spread between floors during the evacuation period.

Atrium ventilation
Initial calculations have been carried out to asses the feasibility of a natural ventilation system within the atrium. The required ventilation area is dependant on multiple variables but is likely to be in the region of 6-10m^2 for each atrium. The following has been assumed in these calculations:
- A medium growth rate fire in the basement during the evacuation period.
- The vents at the head of the atrium are automatically opening and are hinged windows instead of slatted louvres.
- The existing pavement break out panels are replaced with automatic opening vents to provide make-up air.
- The atrium roof is above Level 4 giving a height from the basement slab to the underside of the roof of circa 21m.

Further investigation is required on the following items where it is expected these will effect the design the smoke ventilation of the basement:
1. Effect on the smoke ventilation for possible increased fuel loading provided by a museum;
2. Effect on the smoke ventilation separating the basement into two main areas with inlets primarily located in the plant rooms
   - It is expected that additional air inlets into the basement will be required. This will be confirmed when undertaking further assessments. Inlets can be provided via AOV's on external walls or vented in.

CFD or further analysis would provide more realistic ventilation requirements suitable for the atria geometry, smoke temperature and required basement smoke layer. The calculations undertaken at this stage are only intended to outline the intent is feasible.

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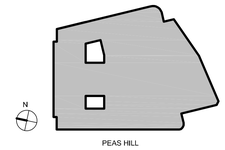
Fire Resistance (FR)
The fire resistance rating of a material is defined in terms of loadbearing capacity (R), integrity (E) and insulation (I), when tested to the relevant standard, in the appropriate testing arrangement.

Fire Doors
FD 30 refers to a fire door achieving 30mins fire resistance. S means the fire door is also provided with smoke seals.

Fire Resistance (FR)	Fire Doors
30 mins FR	FD 30
60 mins FR	FD 30 S
Smoke resisting construction	FD 60
	FD 60 S



Wall Type Key:

Existing

Proposed

Drawing Original Size
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Notes

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Drawing Revisions

Date:	Rev:	Note:	Check:
20.09.24	P01	Stage 2 Report	DR

CARTWRIGHT PICKARD

Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Guildhall

Drawing Title
Proposed Third Floor Plan

Scale
1:100 @ A0

Drawing Created
July 2024

Revision
P01

Drawing No.
CCQ-CPA-GH-RF-DR-A-2007

London Office
1 Canal Side Studios
8-14 St Pancras Way
London NW1 0QG
Tel 020 7534 3630

cartwrightpickard.com

Cambridge Civic Quarter

RIBA Stage 2 Fire Strategy Report – Corn Exchange

P04

07/11/2024

Document Verification

Revision	Date				
P01	27/09/2024	**Description**	Initial draft of RIBA Stage 2 fire strategy report for Client and Design Team comment		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
P02	15/10/2024	**Description**	Updated to incorporate design team feedback		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
P03	01/11/2024	**Description**	Updated to incorporate CCC client feedback		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
P04	07/11/2024	**Description**	Confirmation of total building population		
		Name	**Prepared by**	**Checked by**	**Approved by**
			Hayden Conway	Tim Roberts CEng	David Stow CEng
		Description			
		Name	**Prepared by**	**Checked by**	**Approved by**

ARUP

Report overview

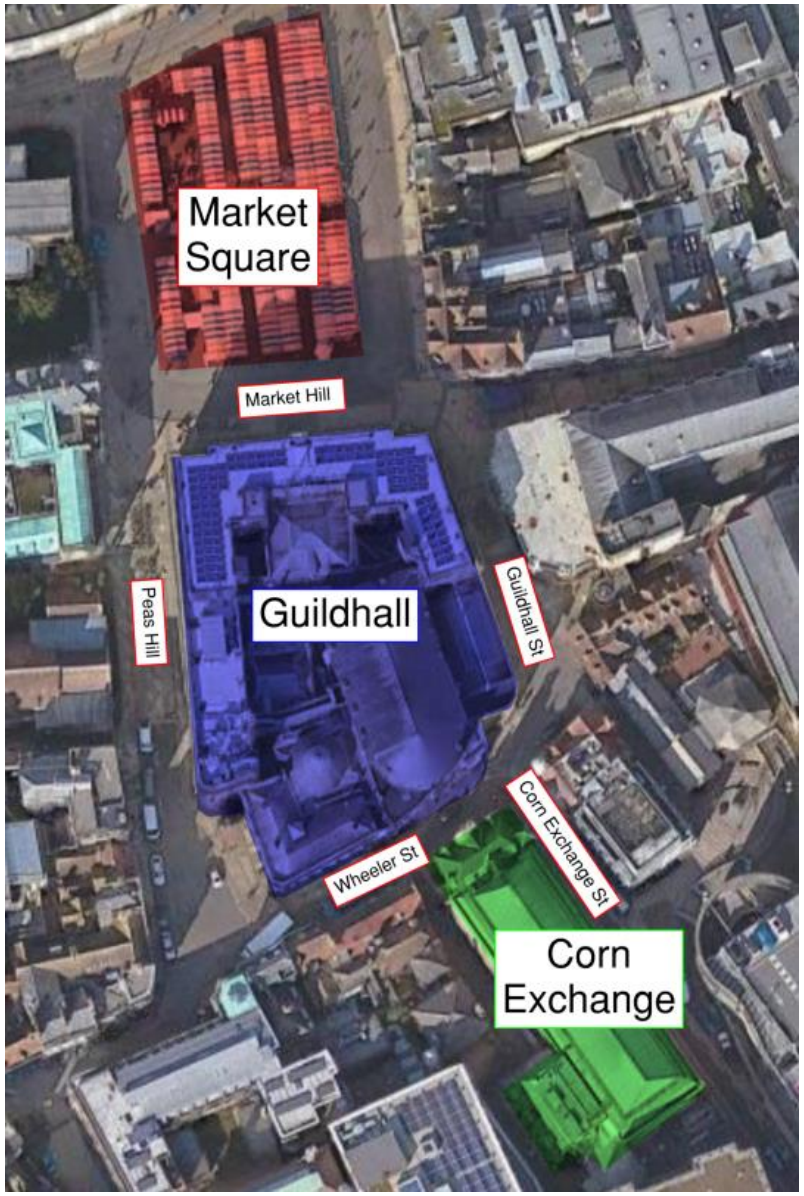
This report outlines the Stage 2 Fire Safety design requirements for The Cambridge Corn Exchange, assessing options to allow for an increased venue capacity within the auditorium and new bar / seating areas.

The Guildhall Fire Strategy is covered within a separate report.

Ove Arup & Partners Ltd
63 St Thomas Street
Bristol BS1 6JZ
United Kingdom
www.arup.com

ARUP

Contents



Building arrangement © Google Maps

Introduction

Project overview

The Civic Quarter project is a refurbishment of the existing Guildhall building, Corn Exchange building and the Market Square, in which all the buildings are listed.

The Corn Exchange is a music venue in the centre of Cambridge The with flexibility for seated and standing audiences.

The client goals of the Corn Exchange project are to modernise the venue and increase the potential revenue generation for Cambridge City Council.

The proposed changes are focussed on amending the layouts of the foyer / bar areas and improve the back of house accommodation. Limited changes are occurring to the auditorium.

Fire strategy approach

This refurbishment does not constitute a change of use and so the minimum requirement of the Building Regulations is to make the existing levels fire safety no less satisfactory with the proposed works; however, improvement will be made where reasonably practicable. There are constraints with the existing building which are likely require deviation from aspects of prescriptive guidance.

While the Corn Exchange is an existing building, no existing fire strategy design information has been received. Therefore, Arup have undertaken a site visit on the 9th July 2024 for familiarisation and to take initial measurements of key exit widths. Arup have not been commissioned to produce a retrospective fire strategy report for the Guildhall.

This document sets out key fire strategy considerations at RIBA Stage 2 of the Corn Exchange within the Cambridge Civic Quarter project by addressing the principles of fire safety provisions for parts B1 to B5 of the Building Regulations 2010 (as amended). Key risks and opportunities have been identified within the text and the content of this report has been discussed with Cartwright Pickard via the markups appended to this report. All aspects of the fire strategy will require discussion with Building Control and Fire and Rescue Service during subsequent RIBA stages.

Guidance document

The design guidance used to demonstrate the compliance with Part B of the Building Regulations 2010 (as amended) is BS 9999:2017.

Risk profile

From a fire strategy perspective, the Corn Exchange in a used for performance events with most occupants being unfamiliar with the building, being either visiting performers or the audience. Therefore, a single risk profile of B2 is suitable more all areas of the Corn Exchange. The fire strategy also follows the recommendations of BS 9999 for venues where alcohol will be consumed.

Fire Strategy Mark-ups

This concept fire strategy should be read in conjunction with the mark-ups appended to this report.

The corn Exchange © Google Maps

B1: Means of Warning and Escape

Evacuation strategy

The Corn Exchange will continue to operate a simultaneous evacuation. A new central fire compartment wall will be provided to split the building in half, allowing occupants to escape out of the compartment of fire origin into a place of temporary safety, from where they can make way to a final exit. The back of house areas and bar in the south-west corner will also form a separate fire compartment. This evacuation strategy is needed to enable the high population numbers within the building.

The escape routes from each fire compartment shall be sized to evacuate the maximum number of occupants from that compartment. The evacuation will need to be well managed to and the use of active/intelligent escape signage is recommended to assist.

Fire detection and alarm systems

A minimum M category fire detection and alarm system is required by BS 9999 for a B2 risk profile. However, it is proposed to provide an enhanced L1 automatic detection system with voice alarm to enable the proposed population numbers and evacuation strategy.

Minimum number of exits

The minimum number of exits from each area should be provided based on the maximum occupancy in accordance with Table 10 of BS 9999. This is reproduced below in Table 1.

Travel distance

The maximum travel distance from the different areas of the buildings to the closest exit is presented in Table 2 in accordance with BS 9999 Table 11.

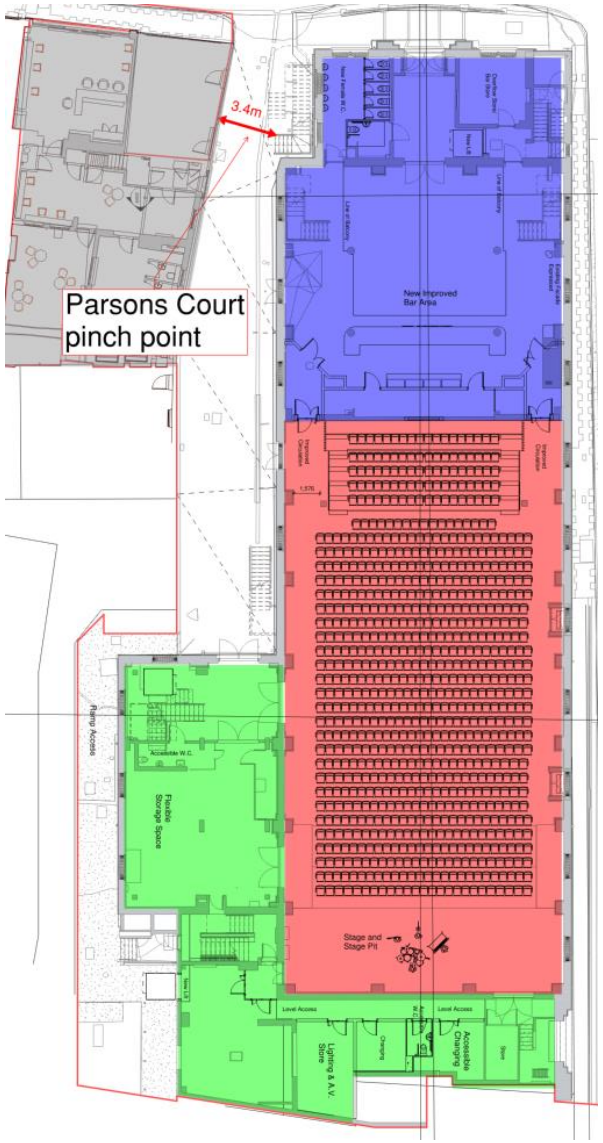
Additional consideration is required where the seating within the main hall is altered. This must be in accordance with Appendix D of BS 9999. Maximum travel distances for seating is outlined in Table 2. Note that as the venue serves alcohol, these travel distances have been reduced by 25% below typical figures in line with Table 11 of BS 9999.

Table 1: Minimum number of exits

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

Table 2: Travel distance limits

Building / area	Risk profile	One-way travel distance limit (m)	Two-way travel distance limit (m)
General access	B2	15	37.5
Rowed seating	-	15	32



Corn Exchange Compartments

B1: Means of Warning and Escape

Occupancy numbers

Available egress routes are presented in Appendix A.

While not all stairs are protected stairs, due to the proposed compartmentation approach, open stairs are able to be used for escape where they are in a different compartment from the fire. If stairs are discounted due to the location of a fire, occupants are able to escape into an alternative compartment and a 'place of relative safety' to continue their escape in a compartment without a fire.

The dimension of escape routes has been confirmed by Arup when undertaking the site visit.

The following bullet points setup the maximum desired population numbers within different areas of the building:

- 1550 people standing in the ground floor auditorium (as there are currently a few potential options, this is based on 0.3 m²/person and the area shown in the general arrangement drawings)
- 798 people seated in the ground floor auditorium (stalls).
- 500 people in the balcony seats.
- 530 people in the ground floor main foyer bar (0.3 m²/person).
- 180 people in the mezz main foyer bar (0.5 m²/person).
- 200 people in the south-west bar (limited by exits).

The initial hand calculations demonstrate there is sufficient exit capacity for these desired occupancies, of up to 1590 standing occupants and 500 occupants on the balcony. This gives a total building occupancy of 2090 subject to detailed calculations.

Whilst the hand calculation give up to 1590 standing occupants can be accommodated in the auditorium, the final exit routes include pinch points and merging flows which may reduce this escape capacity. Therefore, it is recommended that evacuation modelling is undertaken at Stage 3 on the Corn Exchange to confirm occupancy numbers with the compartmentation approach.

Final exits

Final exits from all protected stairs must discharge direct to outside. The final exit routes are shown indicatively in the mark-ups in the Appendix.

Where merging flows occur at the base of a stair, the ground floor capacities have been taken based on the available escape width.

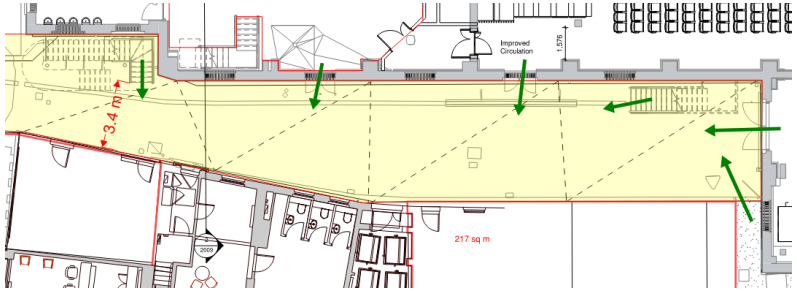
The final exit from the crew stair is currently 676mm which creates a pinch point as the flow rate is less than the stair. The final exit door should be widened to 900mm clear width to prevent a pinch point. This would also allow for an increase in capacity of the SW bar to 220 persons.

Parsons Court

There are up to six final exits which discharge into Parsons Court to the west of the building. The exit from Parsons Court to Wheeler Street is limited to 3.4m wide and therefore creates a pinch point. This will cause queuing of occupants escaping and will need to be reviewed at Stage 3 with evacuation modelling to assess if the holding capacity is sufficient to not impact the evacuation from the building. To enable this the west façade of the building will need to be 30-minute fire resistant to protect occupants queuing to get onto Wheeler St.

Corn Exchange Street

There are three exits which discharge onto Corn Exchange Street to the west of the building. The pavement is separated from the road with a railing to prevent occupants entering the road. However, in an evacuation event, this railing will limit the available escape width from these three exits. This will be reviewed in more detail during RIBA Stage 3 using evacuation modelling to assess the impact. If necessary, a gate may need to be added to the railing adjacent to the middle exit to maintain the escape width from the auditorium.



Parsons Court Pinch Point

Corn Exchange Street Railing

B1: Means of Warning and Escape

Dead-end corridors

Any dead-end corridor greater than 2m in length should be constructed as a protected corridor, enclosed in REI 30 fire resisting construction and FD 30S fire doors.

Crew stair

The crew stair at the south of the building forms the only means of escape from back of house areas on levels 1 and 2. As such, BS 9999 recommends that this stair is lobby protected of every level. The existing stair is not lobby protected and forms the only means of escape from BOH areas and so the minimum requirement of the Building Regulations is to make the existing condition no worse. However, as there are changes of layout proposed to the BOH areas, it is recommended that lobbies are added to the crew stair. This will be reviewed further during Stage 3, including alternative fire protection measures such as stair pressurisation or smoke extract.

Inner room

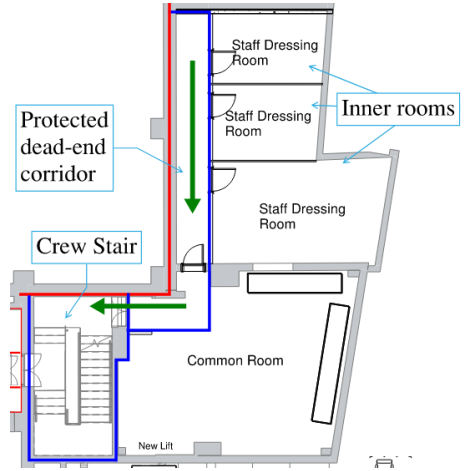
The dressing rooms and plant room to the south end of the building are accessed through other rooms and so are defined as 'inner rooms'. Based on the L1 detection and voice alarm system, these arrangements are compliant with Section 16.3.4 of BS 9999.

Escape past the void

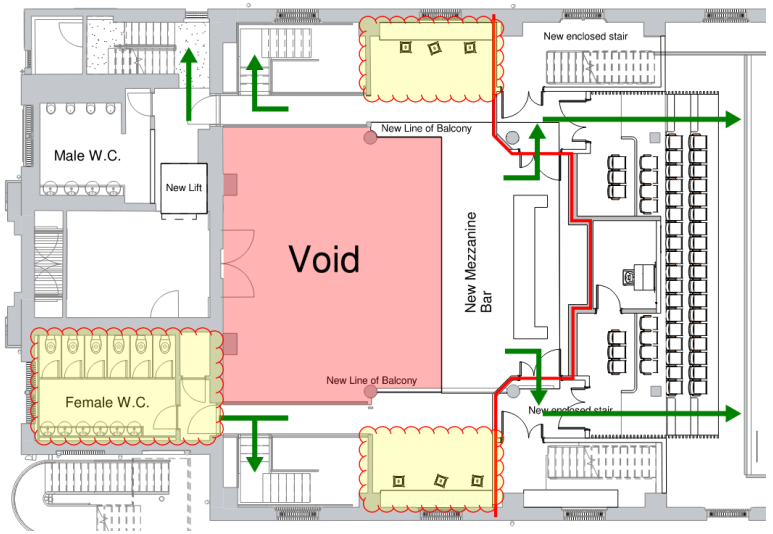
The new mezzanine bar introduces new accommodation accessed by the open stairs by the main entrance. Access is also available into the main auditorium.

BS 9999 does not recommend escape within 4.5m of a void, unless the escape routes are away from the edge of that void. In the proposed arrangement, escape from the bar is available into the main auditorium which is away from the void edge. However, there are three areas where occupants have to initially escape towards the void before moving away. This is considered to be acceptable as the high visual connectivity from the mezz bar to the void is very good and so occupants should be aware of a fire very early, hence are able to escape before significant volumes of smoke are produced. Furthermore, the number of occupants in the bar is expected to be limited given the floor area and so the amount of queuing at the exits is reduced. The Female WC's do not have the direct visual connectivity to the void and so enhanced detection within the void is required (either Beam or Aspirating) to provide early alarm.

A quantitative assessment will be conducted at RIBA Stage 3 to demonstrate this.



Inner Room and Dead end corridor requirements



Void location with alternative escape routes

B1: Means of Warning and Escape

Disabled evacuation

Improvements are being made to increase the accessibility of the building, including a new lift from the main entrance to the new mezz bar in the entrance foyer.

There are areas of the building which are only accessed by stairs , e.g. basement WC's and balcony seating in the auditorium. Occupants in these areas are understood to be able to self-evacuate.

Evacuation lifts

The existing evacuation lift adjacent to the south-west bar shall be maintained or replaced like-for-like to serve the bar and the disabled viewing spaces in the boxes.

Both evacuation lifts are required to be design and installed in accordance with BS EN 81-20 and BS EN 81-70. Backup power is required via either a backup generator, diverse routing of primary and secondary power supplies or via batteries proving enough cycles for the number of disabled occupants (a cycle being travel from ground floor to a refuge and back).

The evacuation lift shall discharge directly to a final exit.

Refuge area

Refuges must be provided for occupants not able to self-evacuate. The balcony and basement are only accessed by stairs and so not considered to be accessible; all other areas should be provided with refuges in the escape routes. The management team within the building shall be sufficiently trained to be able to assist with the evacuation of disabled occupants, including carry down procedures using evacuation chairs.

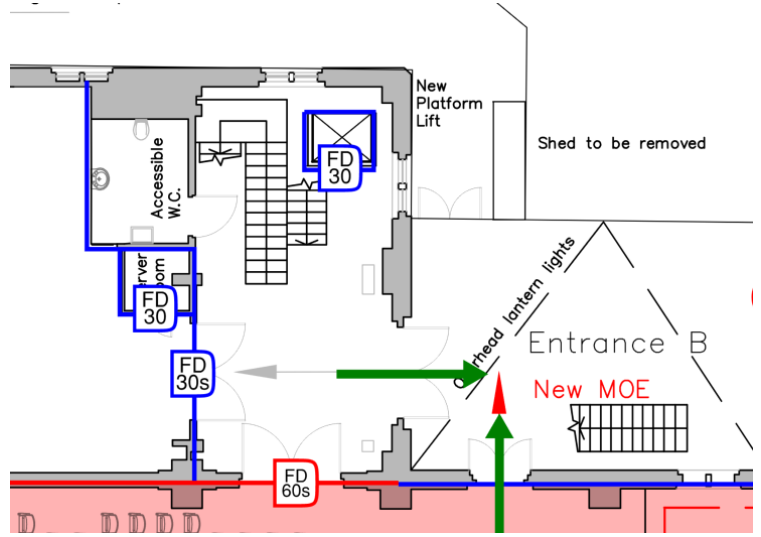
The number of refuges should be suitable for the expected number of disabled occupants. Refuges should be 900x1400mm size and outside the flow of escaping occupants; if restrictions on escape routes is required, this may affect the available capacity.

Each refuge should be equipped with an emergency communication system and designed in accordance with BS 5839-9:2011. A receiver should be located near the main fire alarm panel / security office that allows occupants to talk with building management, where their evacuation can be organised.

Final exits

Not all final exits are step-free. Therefore, assistance maybe required for escaping disabled occupants even from Ground level. Where this is required, suitable refuges should be located at ground level to give occupants a safe location to wait for evacuation.

The exit serving the evacuation lift is step-free.



Evacuation lift final exit arrangement and location

B2/B3: Internal Fire Spread

Linings

Wall and ceiling linings shall be designed in accordance with Table 33 of BS 9999.

Structural fire resistance

60 minutes structural fire protection is required to new elements of structure, or existing structure which is altered as part of the refurbishment.

Compartment Floors

Compartment floors are not required within the Corn Exchange.

Compartments

The Corn Exchange is split into 3 compartments, as shown in differing colours on page 5. These compartments form an essential part of the evacuation strategy in order to enable the required occupancy numbers.

Compartment walls are required to achieve REI 60 fire resistance, with any doors in the compartment walls being FD 60S doors.

The fire resistance of these existing walls should be assessed and their fire resistance confirmed.

Fire resisting enclosures

The following areas require fire resisting enclosures:

- Compartment walls – REI 60
- Stair enclosures – REI 30
- Stair lobbies – REI 30
- Evacuation lift enclosure – REI 30
- Protected corridors – REI 30
- Stores – REI 30
- Plant rooms – REI 30

Other fire resisting enclosure requirements are outlined on the markups contained within the Appendix.

Fire stopping

Any service penetrations to fire resistant partitions will need to be fire stopped, and protected against smoke where protecting an escape route (e.g. smoke dampers). This includes dead-end corridors over 2m.

Sprinklers

Sprinklers are not a code requirement, and therefore are not required to ensure life safety.

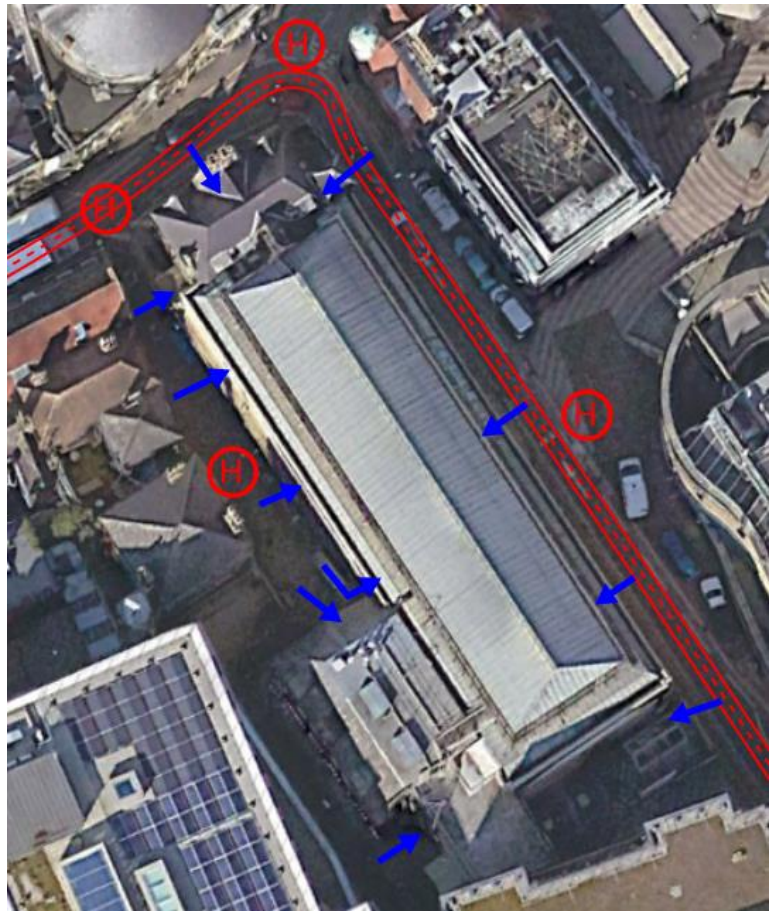
B4: External fire spread

It is not considered that external fire spread is being made worse than the current provisions by the proposed work within the Corn Exchange.

The design improves on the external fire spread by reducing compartment sizes due to the increased number of compartment wall, and therefore, the risk form the current design is less than existing. No assessment has been undertaken at this stage to confirm there is no risk to adjacent buildings.

B5: Access and facilities for the fire services

It is not considered that the firefighting arrangement is being made worse than the current provisions by the proposed work within the Corn Exchange. Therefore, the perimeter access approach will be maintained by the project.



Fire service access arrangement

Next Steps

This Stage 2 Concept Fire Strategy sets out the key principles of the fire strategy which will need to be developed by others, into a detailed design.

The following areas have been highlighted as requiring additional investigation in order to discuss and agree with Building Control and the Fire Service:

1. Means of escape arrangements including pinch points, merging flows and capacities. It is proposed to demonstrate this using evacuation modelling.
2. Single stair serving back of house area. It is proposed to demonstrate this using lobbies or smoke ventilation to the stair.
3. Escape past void from the mezz bar. It is proposed to demonstrate that occupants can evacuate prior to the open escape route becoming discounted.

CCQ - Corn Exchange
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

SK-YF-005 - P02

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Fire Doors
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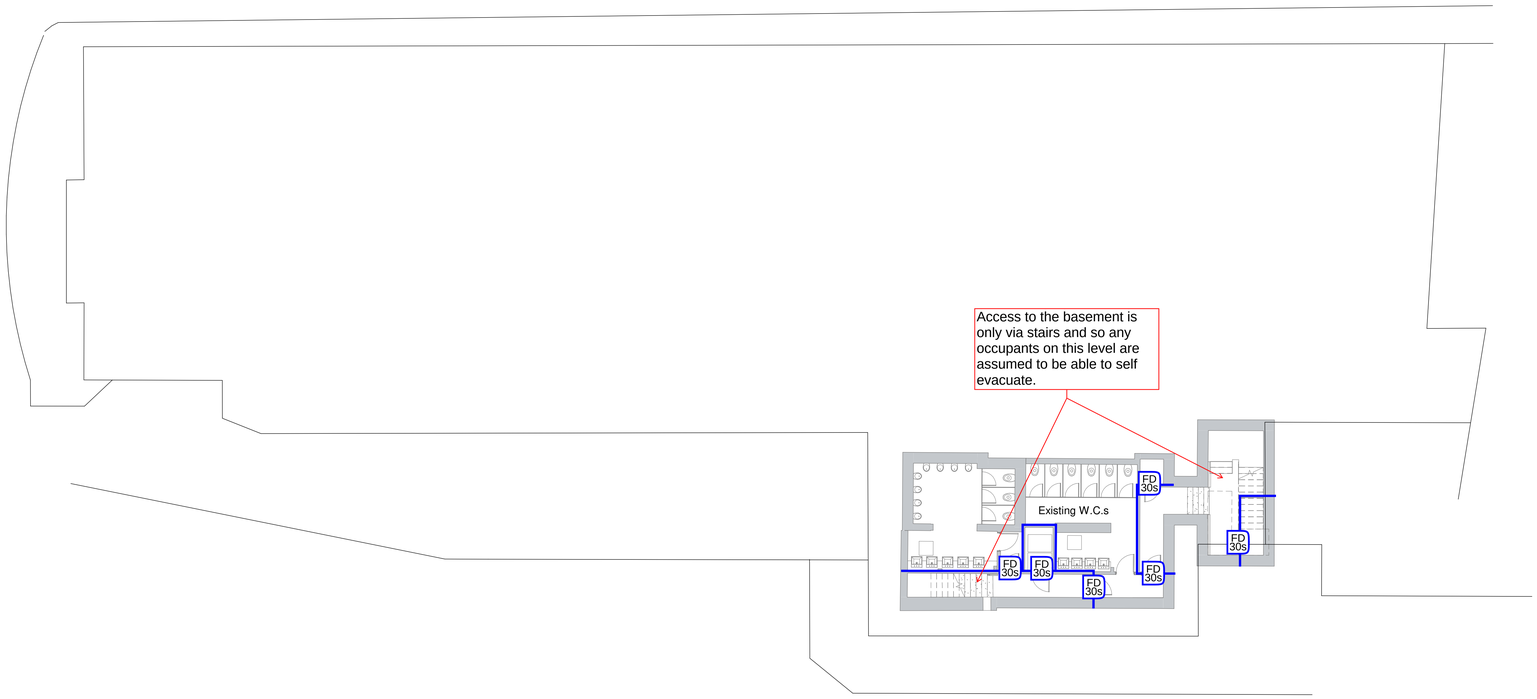
Fire Resistance (FR)
30 mins FR
60 mins FR

Fire Doors
FD 30
FD 30 S
FD 60
FD 60 S



Wall Type Key:

- Proposed Demolition
- Existing
- Proposed

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Drawing Revisions

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Client
Cambridge City Council

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CCQ | Cambridge Civic Quarter

Building Name
Corn Exchange (proposed)

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Proposed Floor Plan B1

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CCQ - Corn Exchange
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

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Fire Resistance (FR)	Fire Doors
30 mins FR	FD 30
60 mins FR	FD 30 S
	FD 60
	FD 60 S

Approximate location of existing Fire Hydrant

Escape capacity from the ground floor auditorium of up to 1590 people when discounted the two routes onto Parson's Court (which could both be discounted due to a single fire). This is based on BS 9999 for a B2 risk profile, a voice alarm system and high ceilings. Additional analysis may be required in later design stages to validate this assessment.

Due to the railing by the road, the occupants from this door must merge with occupants escaping from either of the adjacent doors in a 1m wide pavement. This will cause queuing which may slow down the building evacuation. Therefore, a gate and opening onto the road with suitable management plan to marshall traffic maybe required, or evacuation modelling may be able to demonstrate that the additional queuing can be accommodated.

This door needs to open in both direction to allow escape from either compartment.

250 person escape capacity each

Cross corridor door is required to separate the stair enclosure from the flight case zone

Store to be separated from the protected stair.

600 person escape capacity

545 person escape capacity each

340 person escape capacity

628 person escape capacity

Access to BOH space acceptable on the basis it is only accessed occasionally by staff

Dressing rooms are required to be enclosed in 30 mins REI fire resistance.

Amending the stair to this arrangement will improve flow of occupants if it can be achieved. Whether this is a requirement is subject to evacuation modelling.

This door needs to open in both direction to allow escape from either compartment.

This stair is the only means of escape from Level 1 and 2 and therefore current guidance would recommend lobby protection to all doors into the stair on all levels. There are three options to achieve this:
- Provide lobbies at each access into the stair as shown;
- Provide a stair pressurisation system to EN 12101-6; or
- Undertake ASET v RSET calculations to demonstrate that the stair will be safe for evacuation. This will utilise the L1 level of detection as well as on AOV at the head of the stairs but will not require any lobbies.

Final exit from stair is currently 676mm. Can this be increased to 900mm to avoid bottleneck and increase capacity of Level 1 bar?

Existing lift is already used for evacuation of disabled occupants and shall continue to do so after the refurbishment.

Stores on escape route must be enclosed in fire resistant construction.

Pinch point is likely to limit the flow of occupants leaving Parson's Court. Fire resistance to the external wall to the Corn Exchange will enable some queuing in Parson's Court but additional analysis (evacuation modelling) is likely to be needed to demonstrate this.

External wall shall achieve 30 EI minutes fire resistance to enable escape through Parson's Court, including some queuing. This is likely to be achieved by the existing wall construction.

Overflow Store/ Bar Store
Line of Balcony
New Lift
Existing Facade Expressed
Improved Circulation
New Improved Bar Area
New Female W.C.
Proposed West Elevation
Store
Accessible Changing
Accessible W.C.
Level Access
Changing
Lighting & A.V. Store
Stage and Stage Pit
Flexible Storage Space
Accessible W.C.
Ramp Access
3.40 m
1.576

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Wall Type Key:
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Client
Cambridge City Council

Project
CCQ | Cambridge Civic Quarter

Building Name
Corn Exchange (proposed)

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Proposed Floor Plan 00

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CCQ - Corn Exchange
Concept Fire Strategy Sketches

Cambridge Civic Quarter (304284-00)

07/11/24 | Prepared by: HC | Checked by: TR

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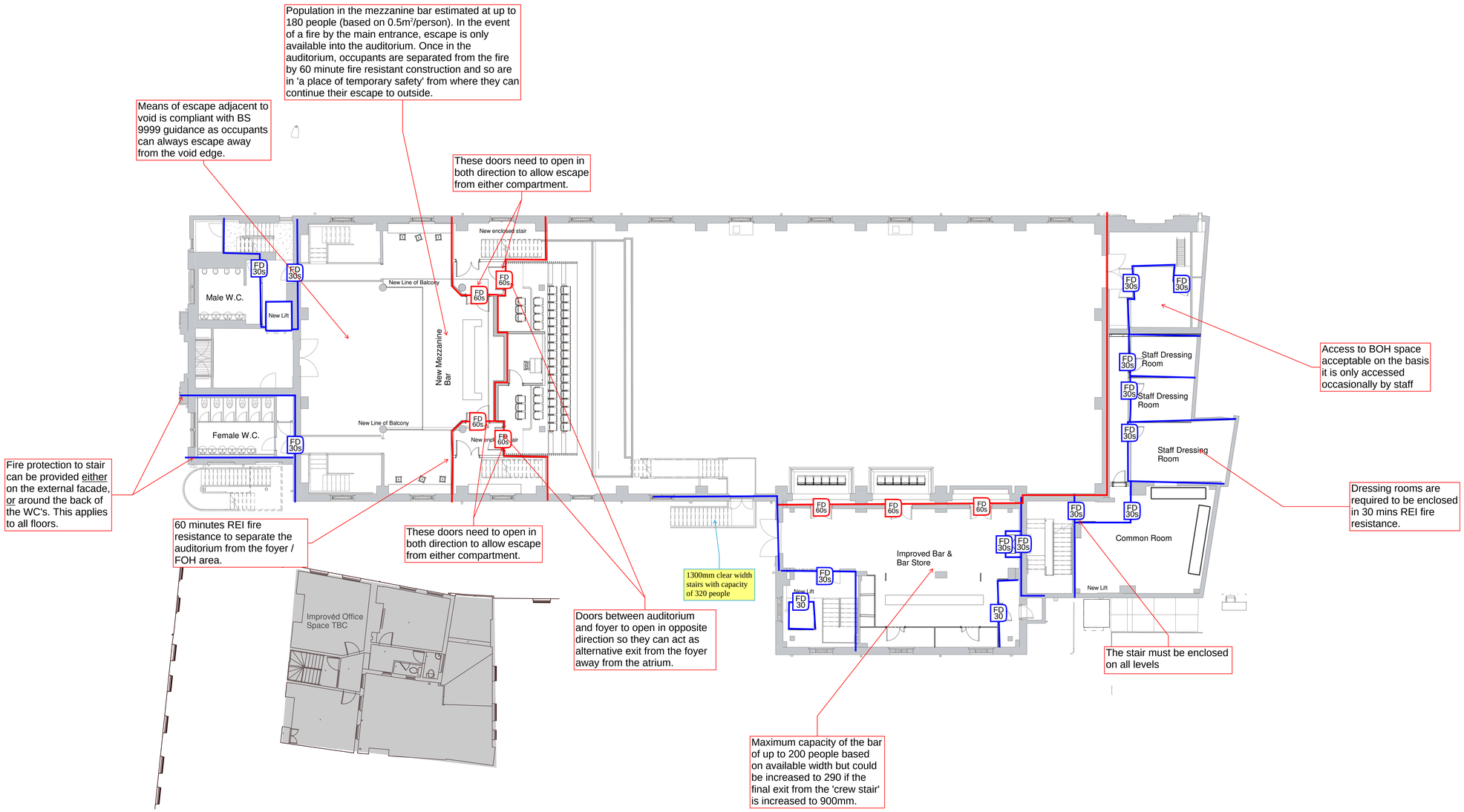

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Project
CCQ | Cambridge Civic Quarter

Building Name
Corn Exchange (proposed)

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Proposed Floor Plan 01

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Cambridge Civic Quarter (304284-00)

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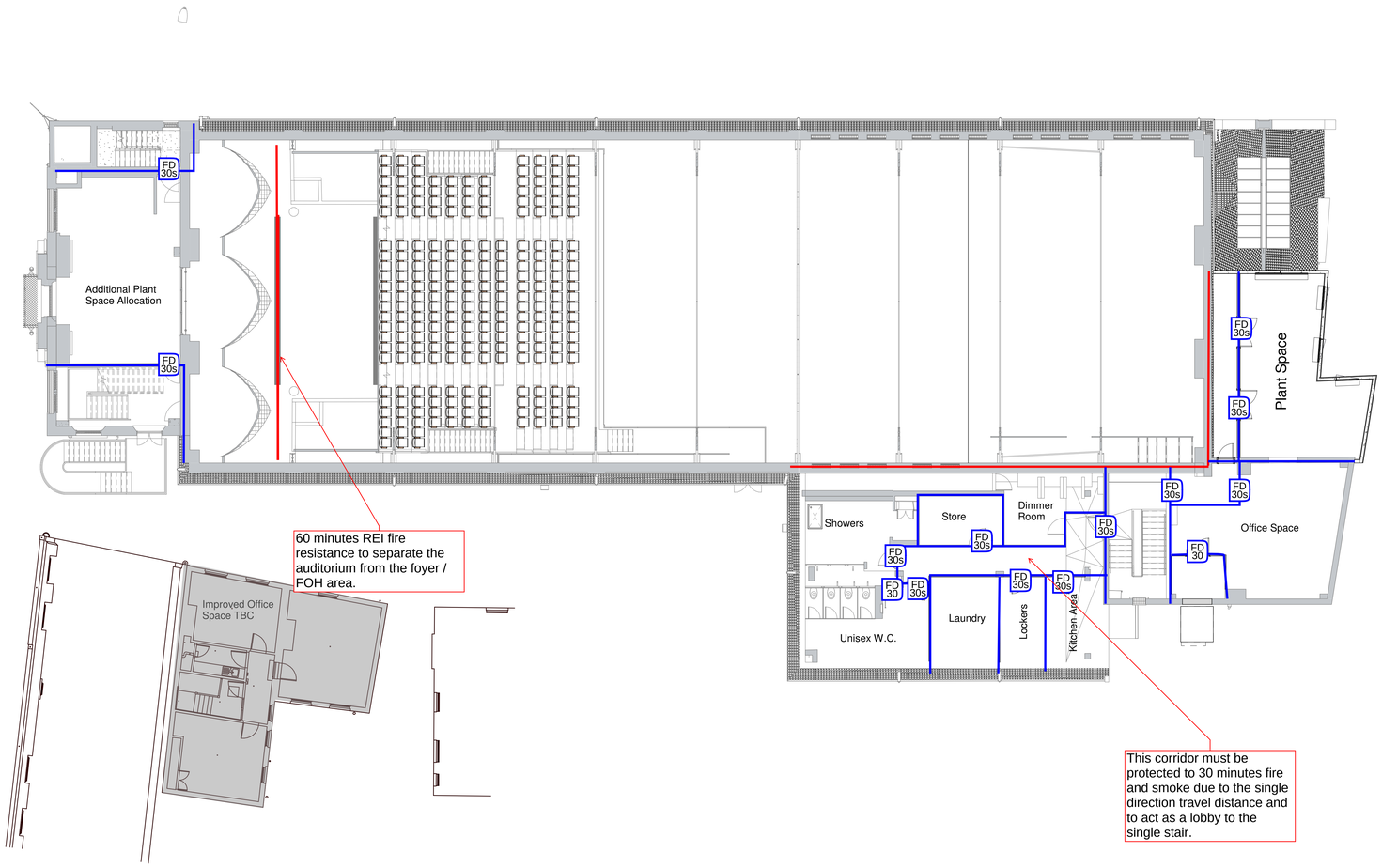

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CCQ | Cambridge Civic Quarter

Building Name
Corn Exchange (proposed)

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Proposed Floor Plan 02

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Cambridge Civic Quarter (304284-00)

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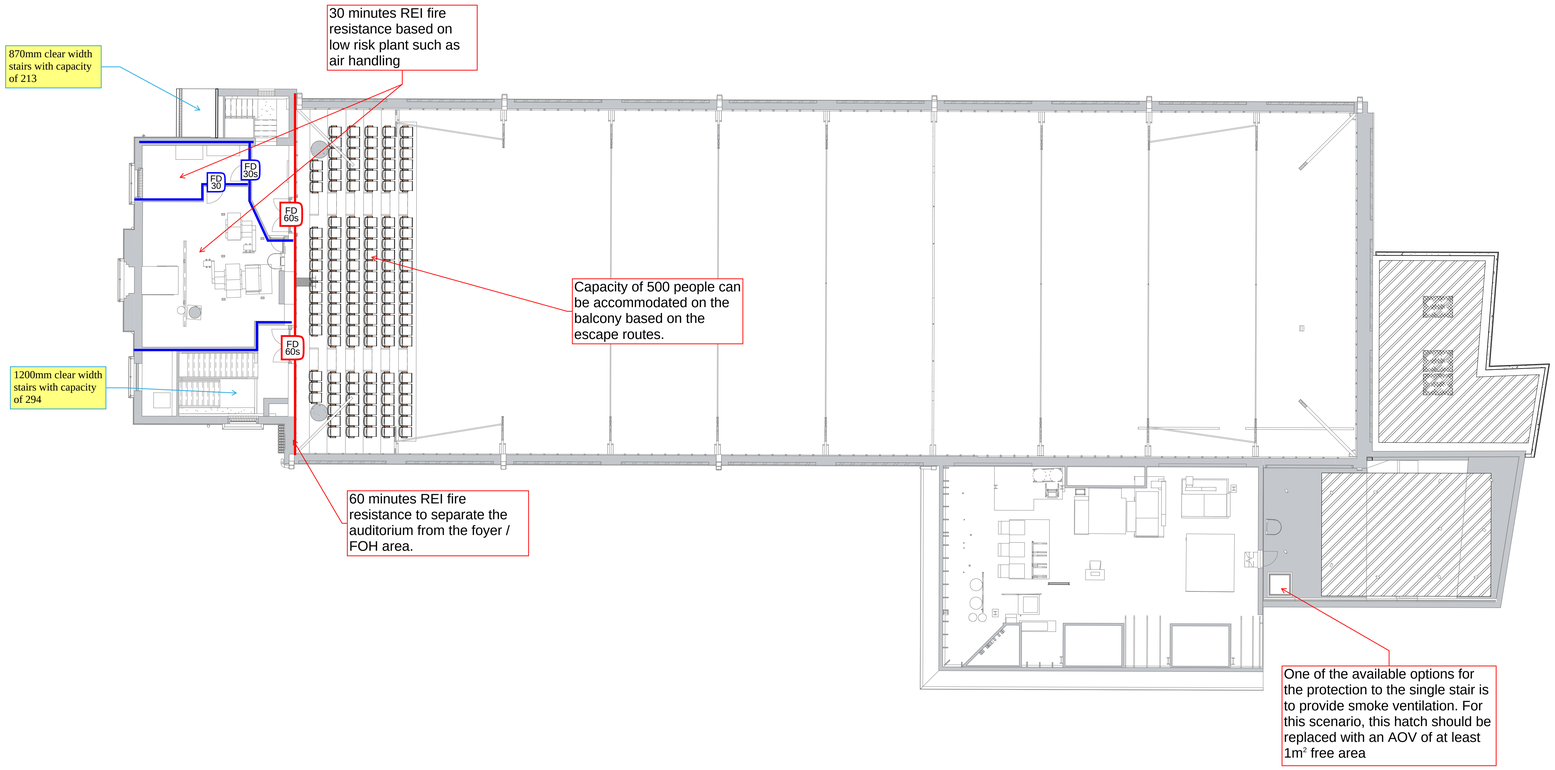

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Building Name
Corn Exchange (proposed)

Drawing Title
Proposed Floor Plan 03

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