



Report

Project Carlow Library Extension

Report Title Stage 2a Report

Our Ref DI/4502/R1 Issue 1

Report

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1.0 INTRODUCTION

Jeremy Gardner Associates Ireland Limited as Fire Safety Consultants on the proposed Carlow Library extension have prepared this Stage 2a Report to outline the anticipated fire safety design requirements for the proposed development.

Basis of Compliance

Building Regulations Technical Guidance Document B (TGD B) provides guidance on fire safety requirements in buildings in Ireland including assembly buildings. The primary guidance of the TGD B is life safety.

Building Regulations are functional, however, and there is no requirement to follow the standard guidance. Alternative fire engineering solutions are possible provided they are designed to achieve an equivalent standard of safety as that in the code. It should be noted, however, that any fire engineering solutions will need to be agreed with the local Fire Department and, therefore, carry an approvals risk.

2.0 EXISTING BUILDING – BUILDING REGULATIONS COMPLIANCE

In accordance with Building Regulations (S.I. No. 496 of 1997), a formal Fire Safety Certificate application (to the Local Authority) will be required for the proposed new extension to the building.

Fire Safety Legislation in Ireland is not retrospective, and therefore, fire safety measures in an existing building do not need to be upgraded to comply with current standards (unless a material change of use takes place) – unless specifically requested by the Local Authority Fire Service.

Where material alterations take place, the onus is to ensure that the existing standard of fire safety within the building is not reduced as a result of the proposals i.e. no greater contravention to the existing level of safety has occurs.

The existing building will be unchanged by the proposed extension and therefore the existing standard of fire safety within the building will not be reduced as a result of the proposed works.

The existing Convent, which is currently used as library/assembly space, is linked to the proposed new extension and therefore will be subject to material alterations. As detailed above, as the Convent will not be subject to a material change of use, it is not required under Building Regulations to upgrade the existing fire safety measures within the building to comply with current standards. Therefore, the existing building's structure i.e. walls and floors will not be altered as part of the proposed works.

It should be noted however, that additional fire rated internal walls and doors will be provided within the Convent as part of the proposed works, which will constitute an improvement to the existing standard of fire safety within the building.

3.0 MEANS OF ESCAPE

Occupancy

The occupancy of the existing library building, and the proposed extension has been based on a combination of occupant load factors recommended within the TGD-B and BS 9999:2008.

| Location | Area(m ²) | OLF(m ² /person) | No. of Occupants |
|--|-----------------------|-----------------------------|-------------------|
| Basement Level | | | |
| Reserve Collection | 72 | 5 | 15 |
| Comms Room | (Transient space) | - | - |
| | | | Total - 15 |
| Ground Floor | | | |
| G2- Tourist Info | 33 | 2 | 17 |
| Local Studies - Collection & Reading(G3) | 19 | 5 | 4 |
| Local Studies - Collection & Reading(G4) | 48 | 5 | 10 |
| Local Studies Department Collection(G5) | 26 | 5 | 6 |
| Main Library Area | 469 | 5 | 94 |
| Process Room | 62 | 5 | 13 |
| | | | Total -144 |
| First Floor | | | |
| Meeting Room (1.1) | 33 | 1 | 33 |
| Lockers/Lobby (1.2) | (Transient space) | - | - |
| Reading Room (1.4) | 49 | 2 | 25 |
| Book Room (1.5) | 27 | 5 | 6 |
| Library Mezzanine | 242 | 5 | 49 |
| | | | Total -113 |
| Second Floor | | | |
| Meeting Room (2.1) | 33 | 1 | 33 |
| Office (2.2) | 18 | 7 | 3 |
| Office (2.3) | 18 | 7 | 3 |
| Archive collection/reading (2.4) | 49 | 5 | 10 |
| Archive collection (2.5) | 27 | 5 | 6 |
| | | | Total - 55 |

Table 1: Calculated Occupancy of Library Building

The occupant capacity of the upper floors of the existing library has been calculated to be 119 occupants and the occupant capacity of the first-floor mezzanine of the new extension has been calculated 49 occupants. It is noted that while the occupant capacity may appear unduly high for the building, it is based on the

recommendations of code guidance and will allow flexibility in design layouts. Please note, the toilets, comms room & lobbies are considered transient and have not been included in the overall occupancy.

No. of Storey Exits

The following exits are proposed from each floor level from the new library extension: -

Basement

- 1 storey exit into Stair 2.

Ground Floor

- 3 exits from the main library area.
- 2 exits from the existing Convent.

First Floor

- 2 no. storey exits from the mezzanine into stairs 2 & 3 respectively
- 2 no. storey exits from the existing Convent building into stairs 1 & 2 respectively.

Second Floor

- 2 no. storey exits from the existing Convent building into stairs 1 & 2 respectively.

Stair & Exit Capacity

The upper levels of the proposed extension are served by 2 escape stairs.

Stair 1 – Worst Case scenario: Stair 2 is unavailable. Number of occupants using this stair in the worst-case scenario from the upper levels: 119 occupants (64 from 1st floor + 55 from 2nd floor) in addition to the occupants from the existing Convent building. Based on the drawings provided stair 1 has a clear width of approximately 1150mm therefore as noted in the table below the capacity of escape stair 1 is limited to 260 persons.

Stair 2 – Worst Case scenario: Stair 1 is unavailable. Number of occupants using this stair in the worst-case scenario from the upper levels: 144 occupants (89 from 1st floor + 55 from 2nd floor)

Stair 3 – Worst Case scenario: Stair 2 is unavailable. Number of occupants using this stair in the worst-case scenario from the upper levels: 49 occupants (49 from 1st floor)

Stair 4 – Unchanged from the existing situation.

Escape stairs 1, 2 & 3 have been assessed following the guidance in Table 1.6 of the TGD-B.

| Stair | Width ¹ | No of floors served | Capacity (Maximum estimated occupancy) |
|---------|--------------------|---------------------|--|
| Stair 1 | 1100 | 2 | 260 |
| Stair 2 | 1000 | 2 | 190 (144) |
| Stair 3 | 1000 | 1 | 150 (49) |

Table 2: Stair Capacity

Based on the occupancy schedule detailed above, the following minimum clear ope width of exit doors is required to comply with code guidance recommendations: -

- Ground Floor – 3 x 850mm doors (Final Exit door from stair 3 at ground level will be required to achieve a minimum clear opening width of 1250mm due to the merging flow of occupants escaping from the ground floor and from the mezzanine via stair 3)
- 1st Floor existing Convent– 2 x 850mm doors

- 1st Floor Library mezzanine – 2 x 850mm doors
- 2nd Floor – 2 x 850mm doors.

Travel Distances

The following travel distances are recommended for assembly buildings: -

Places of Special Fire Hazard

- Escape in a single direction - 9m
- Escape where an alternative is available - 18m

Areas not Listed Above

- Escape in a single direction - 18m
- Escape where an alternative is available - 45m

Exits should be located so that the above travel distance limits are not exceeded.

Where alternative escape routes are provided from rooms/areas at upper floors, both escape routes will be fire separated using a combination of passive fire safety measures (fire rated walls/glazing/doors) to ensure that both escape routes are not compromised by the effects of smoke/fire.

Escape towards open connections/voids

Code guidance recommends that escape routes and exits should not be compromised by open connections between floors. Where escape is in one direction only, it should not be towards or within 5m of an open connection. Where there is a choice of escape routes, at least one should lead away from the opening.

There is to be an open balcony at 1st floor of the new extension, overlooking the ground floor below. Currently there are 2 no. storey exits from the 1st floor (via stairs 2 and 3 respectively). The storey exit into Stair 2 is located adjacent to the balcony and therefore, in accordance with code guidance, may be compromised in the event of fire at ground floor below.

The storey exit into Stair 3 is located at least 5m from the edge of the open balcony and may be reached by occupants without travelling towards the balcony edge (i.e. occupants can travel towards this storey exit along the east elevation of the building). However, the Local Authority Fire Service may consider it more likely that occupants will escape towards the void edge to reach Stair 3, which would not comply with code guidance – this will be subject to Fire Service approval.

An alternative Fire Engineered approach could be adopted if required, involving the use of the proposed rooflights to be located at high level above the double height ground floor, as smoke vents in the event of fire. The vents, which would open automatically on detection of smoke, would exhaust smoke to outside at roof level and delay/minimise the risk of smoke flow into the 1st floor library area, where it could compromise escape.

This approach would also be subject to Fire Service approval.

Escape Stairs

The upper floors of the proposed library are served by four escape stairs (existing Stair 4, located north-east has not been highlighted in the proposed drawings).

Stair 1 is an existing stair and provides escape from the existing Convent building as well as the proposed library building. Escape stairs 2 and 3 are new stairs proposed to serve the new library extension.

There are a number of potential areas within the existing building which would not comply with current code guidance regarding means of escape, however, most of these areas will remain unchanged from the existing situation. As part of the building is existing, we are required to demonstrate that the new situation will not create any new or greater contravention in terms of safety compared to the existing design. Based on that, material alterations within the existing part of the building should not increase the occupancy from the existing situation or reduce the capacity of means of escape from these areas unless it can be demonstrated that the design strictly complies with Part B of Building Regulations.

Stair 1

It should be confirmed that means of escape and estimated occupancy from the exhibition areas at first and second floor will remain unchanged from the existing situation, including Stairs 1 and the alternative escape stair along the East elevation (Stair 4). On this basis, escape stairs 1 & 4 will be considered unchanged from the previous situation and will be limited to serve up to existing capacity.

Based on the existing drawings provided it appears that the primary escape route from Stair 1 at ground level is to the external on College Street by way of a corridor/hallway. This will remain unchanged by the proposals. This corridor will be considered part of the escape stair and is required to be enclosed in 60 minutes fire resistant construction. The escape route from this stair should be considered a fire sterile area, however, as this is not the only escape stair serving the upper floors, a reception area is permitted to be included within this area at ground floor provided it does not exceed 10m².

Escape routes from the existing part of the building and the new extension will be independent in order to avoid any occupants from the new extension using means of escape from the existing part of the building. This will support the approach for the existing parts of the building (i.e. demonstrate that the new situation will not create any new or greater contravention in terms of safety compared to the existing design).

It should be noted that final exit should achieve at least the same clear width as the escape route that it serves (i.e. Stair 1). However, this exit may need to be widened to serve the additional occupants at ground floor. It is also recommended that the final exit to the external is maintained from the existing children's library at ground floor as per the existing situation.

Stair 2

Stair 2 will be redesigned and relocated (from existing) as part of the proposals and will serve occupants from the existing building and the new extension. This stair will be enclosed in compartment construction at all levels (including ground floor).

Code guidance recommends that escape stairs should not form part of the primary circulation route between different parts of a building at the same level. Currently, Stair 2 forms part of the circulation route between the existing building and new extension at first floor. However, a fire engineering case can be made based on the provision of hold open devices (linked to the fire alarm system) to any fire doors enclosing the stair, which would release to the closed position on activation of the fire detection and alarm system and therefore maintain the fire integrity of the escape stair enclosure. This approach would be subject to Fire Service approval.

The current proposal is for Stair 2 to discharge to the external via an access corridor which is deemed to be an extension of the stair to where it discharges to the external and should be separated from the adjoining accommodation at ground floor level by fire resisting walls.

The escape stair and lift should be separated from the basement by a protected lobby achieving 0.05m² ventilation to the external.

Stair 3

The storey exit into stair 3 at ground level from the main library should be revised to open in the direction of escape.

The final escape from Stair 3 to outside is adjacent to the elevation/window of the main library space at ground floor. Therefore, in the event of a fire within the ground floor library, escape from Stair 3 may be compromised. In accordance with code guidance, it is recommended that the escape route from Stair 3 is fire separated from the adjoining elevation, particularly any adjacent windows, so that the escape route remains available in the event of fire.

The junction of the external walls of escape stair 3 and the adjacent accommodation needs to be fire rated (for 60 minutes) to a distance of 1.8m along the main library space elevation.

Protection of Escape Stairs

The new escape stairs will be enclosed in 60 minutes fire resisting construction with FD30s doors.

Pipes carrying gaseous or liquid fuels will not be incorporated within the protected stairs. Places of special fire risk will not be located so that they can communicate directly with the protected stairs.

Internal angles

Escape stairs 2 and 3 form internal angles with the adjoining external walls of the building, therefore the distance between any unprotected area in the external enclosures to the building and any unprotected area in the enclosure to the stairway should be at least 1.8m.

Disabled Refuges

Disabled refuges will be provided at each upper level within both escape stairs. These refuges should comply with the recommendations of BS 5588: Part 8, 1999 Fire Precautions in the design and construction of buildings – code of practice for means of escape of disabled people and should have a minimum dimension of 900mm x 1400mm.

An Emergency Voice Communication (EVC) system should also be provided within each refuge space and comply with BS 5839-9: 2011.

Stair 2 is accessed at different levels from the library and from the existing building, therefore, two disabled refuges will be required at first floor level within Stair 2.

The disabled refuge proposed outside the final exit to stair 3 cannot be considered to be in a place of relative safety, if located beside a non-fire rated window, where the occupant could be exposed to fire conditions within the building. If it is intended to leave the disabled refuge outside a minimum distance of 1.8m should be maintained between any unprotected areas (i.e. non fire rated window) and the disabled refuge.

4.0 CONSTRUCTION & COMPARTMENTATION

Fire Resistant Construction

The top floor height of the new extension will not exceed 20m. Elements of structure including floors and supporting structure should achieve a minimum period of 60 minutes fire resistance.

Structural steel will be fire protected by means of either intumescent coating or fire encasement of the steelwork.

The escape stair enclosures should also achieve a minimum period of 60 minutes fire resistance. Protected lobbies should achieve 30 minutes fire resistance.

The fire resistance of the floors within the existing building has not been determined. However, as detailed in Section 2 above, on the basis that the existing building is not subject to a material change of use, there is no requirement to upgrade the existing floors under Building Regulations Part B. However, this will be subject to Fire Service approval.

Compartmentation

Due to the size of the proposed extension no internal 60-minute fire resisting compartmentation is required by code guidance. However, any rooms designated as places of special fire risk should form separated 60-minute compartments. This includes any plant rooms, comms rooms or kitchens.

The library extension should form a separate compartment to the existing building to reduce the impact of external fire spread on the existing building. Therefore, any windows or doors between the library extension and the existing building should achieve 60 minutes fire resistance.

5.0 ACTIVE FIRE SAFETY SYSTEMS

Fire Detection and Alarm System

The fire detection and alarm system in the building will comply with I.S 3218: 2013 Code of practice for fire detection and alarm systems for buildings – system design, installation, and servicing, achieving an L2/L3 standard of coverage.

Emergency Lighting

Emergency lighting of three hours duration will be provided to IS 3217: 2013, to adequately indicate and illuminate all escape routes, and so that all firefighting equipment and call points can be easily seen.

Exit signage

Exit signage and safety notice signage will be provided to BS 5499: Part 4, 2013.

6.0 EXTERNAL ELEVATIONS

External Wall Construction

The overall height of the building is less than 18m and the distance to boundary is to be greater than 1m. Therefore, as the building is of an assembly and recreation purpose group the external wall surfaces should achieve a Class C – s3-d2(European) surface spread of flame classification.

Space Separation

The proposed library extension will be located close to the adjacent existing buildings on the East Elevation.

Based on the dimensions on the drawings provided the library extension will have a compartment height along the East elevation of approximately 8.2m and a width of 40m, therefore, based on an enclosing rectangle of 9m x 40m the unprotected area of the external wall construction on the East Elevation may be 21.5% unprotected at a boundary distance of 2.3m measured from the site plan provided. This permits an unprotected area of 77.4m², based on the east elevation drawing provided the extent of unprotected area amounts to approximately 68.8m². Based on the above we do not foresee external fire spread will be an issue provided the unprotected area proposed does not increase.

As noted in Section 4 above the library extension should form a separate compartment to the existing building to reduce the impact of external fire spread on the existing building. Therefore, any windows or doors between the library extension and the existing building should achieve 60 minutes fire resistance.

7.0 ACCESS AND FACILITIES FOR FIREFIGHTING

Fire Hydrants

One fire hydrant should be provided for every 1000m² of the area covered by the ground floor. Based on the overall ground floor area it is estimated that 2 hydrants would be required to comply with code guidance. Please confirm the existing hydrant provisions, as they may be sufficient for compliance with code guidance. If required any new hydrants should be located such that their distance from the building is not less than 6m or more than 46m.

Fire Tender Access

The height to top storey of the building is less than 10m and the volume of the building is less than 7,000m³, therefore vehicle access is required at a rate of 2.4m in length for every 90m² of ground floor area on one elevation for pump appliance access. The overall floor area at ground level has been measured to be approximately 1310m², therefore, vehicle access to 35m of the building perimeter is required. This appears to be achievable along the South and East elevations.

Roadways should be suitable to allow fire appliances to access the perimeter of the building (i.e. minimum width of roads between kerbs is limited to 3.7m and a carrying capacity of 12 tonnes. It is noted that the width of college street narrows at the existing Convent building to below the required width for a fire appliance. However sufficient access is provided on the North and East of the building. Can it be confirmed that access is available for the fire brigade into presentation place. If presentation place is not accessible, then access to the North of the building will be required.

Please note the minimum width between gates is 3.1m and the minimum clearance height is 3.7 for a pump appliance.

Smoke Venting of Escape Stairs

Each escape stair should be provided with smoke venting by way of either: -

- A 1m² AOV provided at the top of each escape stair. This AOV should also be remotely operable by firefighters with the provision of a switch at the bottom; or
- An openable window provided at each upper storey or landing in each escape stair.

Basement Ventilation

The proposed basement area is less than 200m² and is not more than 3m below ground level, therefore, ventilation of the basement is not required.

Existing Basement

In relation to the existing basement served by Stair 1, provided no material alterations are proposed to the walls of the rooms within the existing basement we do not require to address the existing basement as part of the Fire Safety Certificate application (i.e. it will remain unchanged). The provision of a new boiler within the plant room does not require to be captured within the fire safety certificate application, this can be deemed as minor works and does not lessen the current standard of fire safety at basement level.

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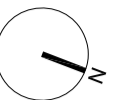


Legend

Compartment wall achieving 60 minutes fire resistance - 

Fire Resisting wall achieving 30 minutes fire resistance - 

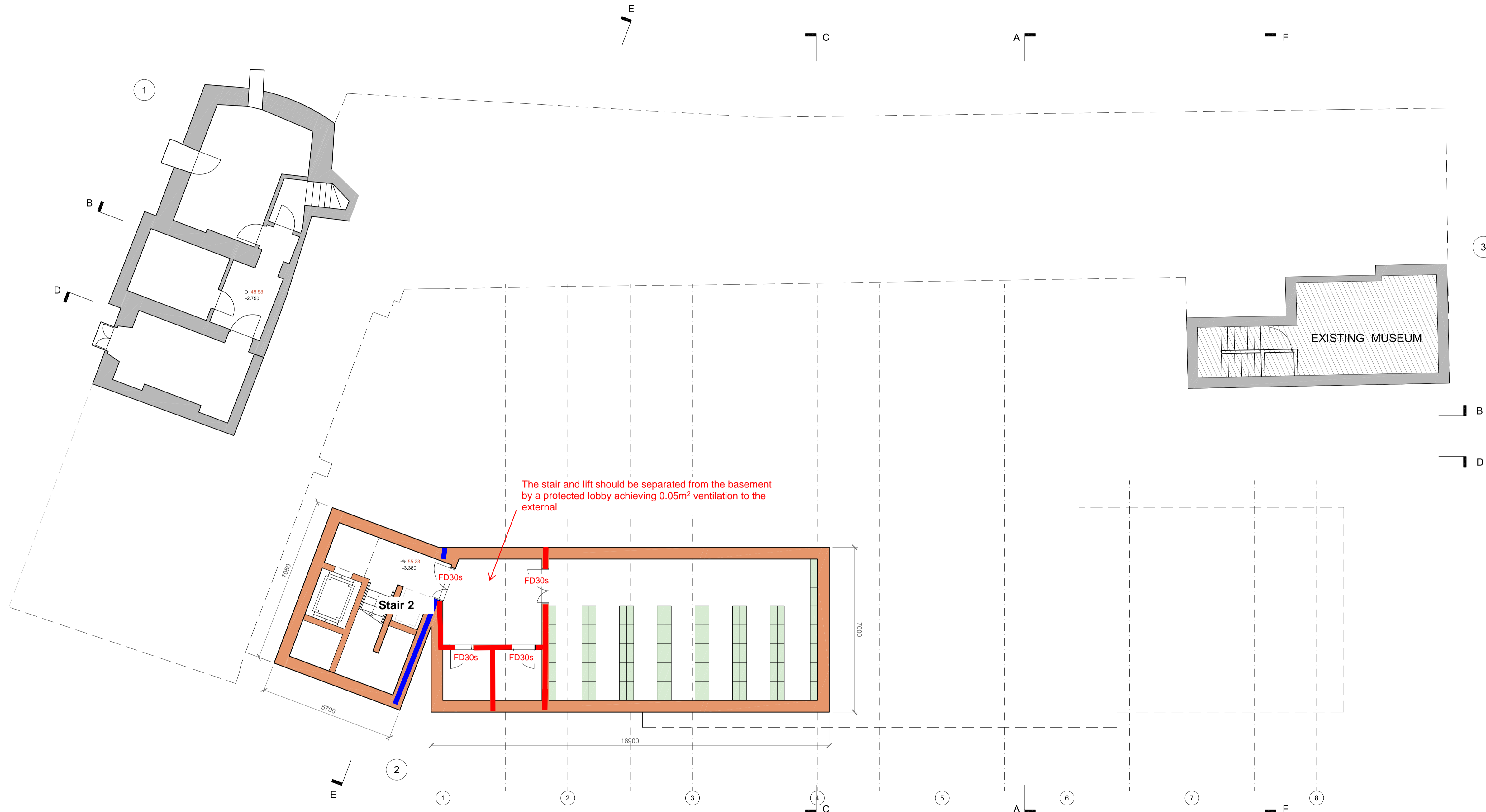
Fire Door achieving 30 minutes fire resistance - 



KEY

 SITE BOUNDARY

1. PRESENTATION BUILDING (EXISTING LIBRARY)
2. PROPOSED LIBRARY, CULTURAL, CIVIC, AND LEARNING SPACE
3. EXISTING MUSEUM (NOT SUBJECT TO THIS PLANNING APPLICATION)



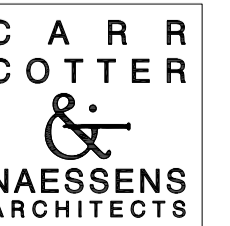
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| Project | PRESENTATION BUILDING REGENERATION LIBRARY, CULTURAL, CIVIC, AND LEARNING SPACE TULLOW STREET CARLOW | |

Title
PROPOSED BASEMENT PLAN


| Project No. | Drawing No. | Date | Scale @ A1 |
|-------------|-------------|----------|------------|
| 20CLB | PP_120 | 23.10.20 | 1:100 |


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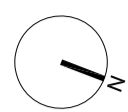



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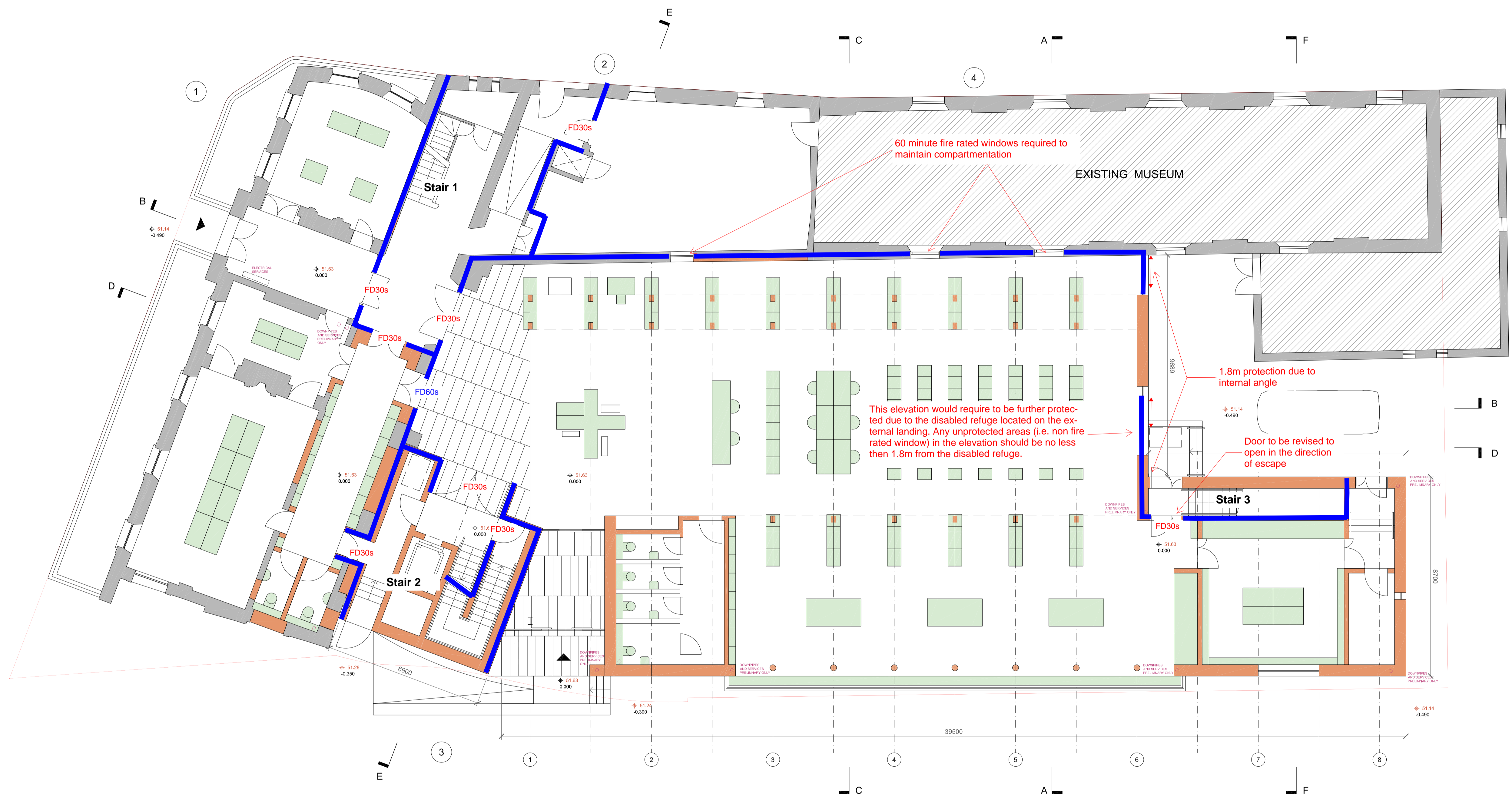
Compartment wall achieving 60 minutes fire resistance - 

Fire Door achieving 60 minutes fire resistance -  FD60s

Fire Door achieving 30 minutes fire resistance -  FD30s



- KEY**
-  SITE BOUNDARY
 - 1. PRESENTATION BUILDING (EXISTING LIBRARY)
 - 2. TOURIST OFFICE
 - 3. PROPOSED LIBRARY, CULTURAL, CIVIC, AND LEARNING SPACE
 - 4. EXISTING MUSEUM (NOT SUBJECT TO THIS PLANNING APPLICATION)




| Rev | Description | Date |
|-------------|---|----------|
| Project | PRESENTATION BUILDING REGENERATION LIBRARY, CULTURAL, CIVIC, AND LEARNING SPACE TULLOW STREET CARLOW | |
| Title | PROPOSED GROUND FLOOR PLAN | |
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| | | 1:100 |


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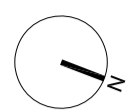
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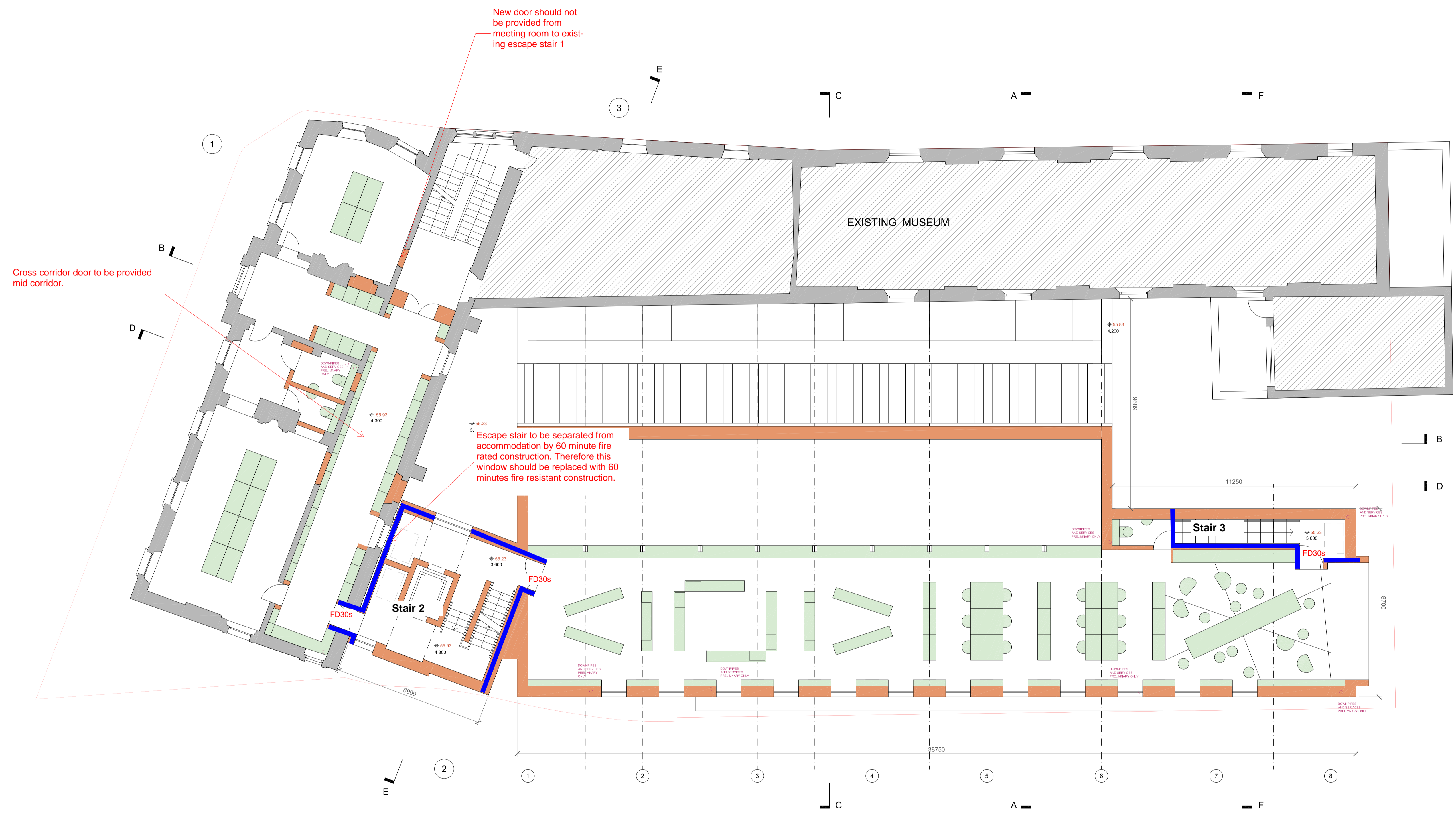
Legend

Compartment wall achieving 60 minutes fire resistance - 

Fire Door achieving 30 minutes fire resistance -  FD30s



- KEY**
-  SITE BOUNDARY
 - 1. PRESENTATION BUILDING (EXISTING LIBRARY)
 - 2. PROPOSED LIBRARY, CULTURAL, CIVIC, AND LEARNING SPACE
 - 3. EXISTING MUSEUM (NOT SUBJECT TO THIS PLANNING APPLICATION)



1 PROPOSED FIRST FLOOR PLAN
122 1:100

| Rev | Description | Date |
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Project PRESENTATION BUILDING
REGENERATION
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Title PROPOSED FIRST FLOOR PLAN


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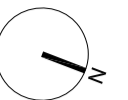
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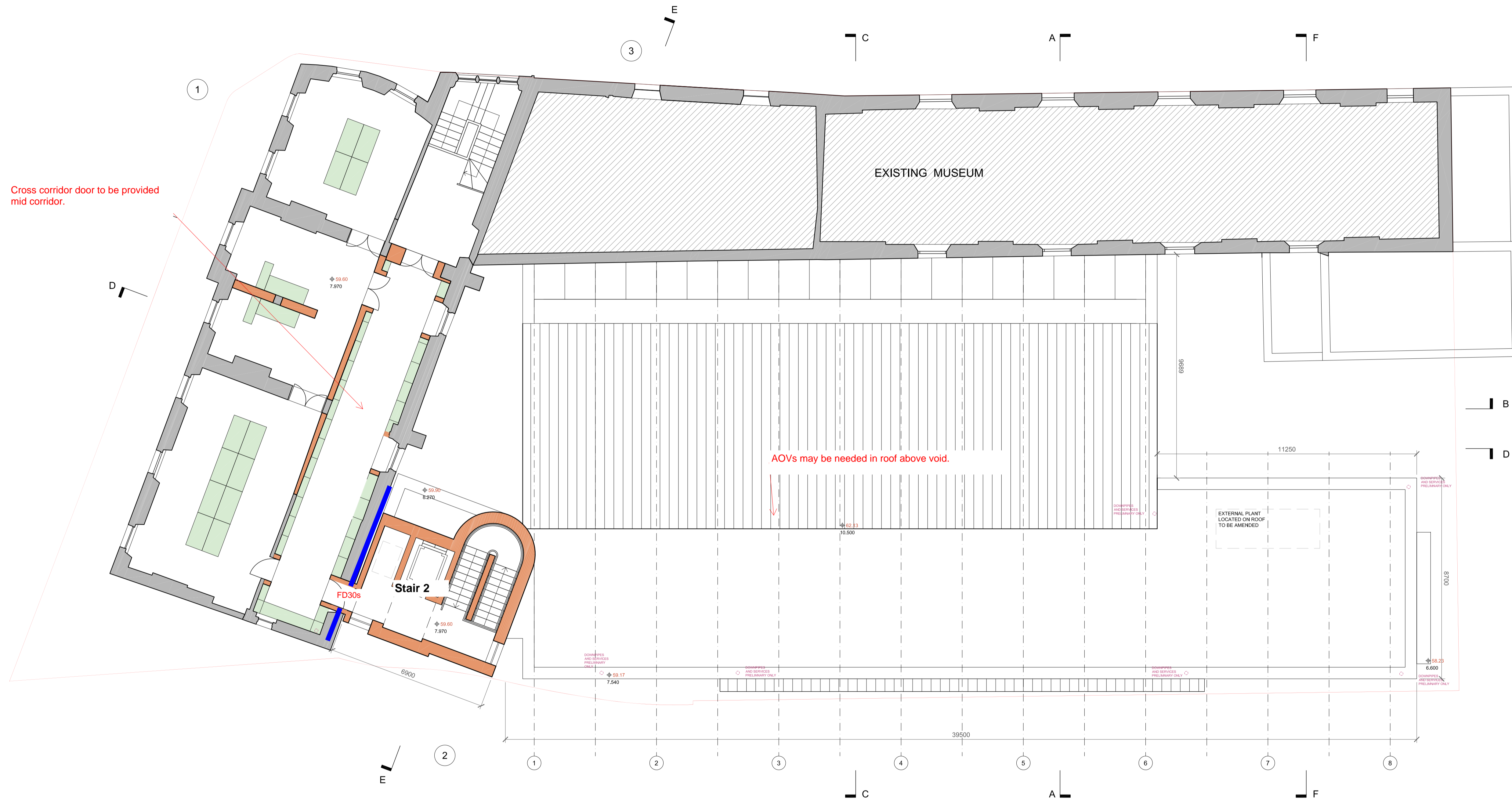
Compartment wall achieving 60 minutes fire resistance - 

Fire Door achieving 30 minutes fire resistance -  FD30s



KEY

-  SITE BOUNDARY
- 1. PRESENTATION BUILDING (EXISTING LIBRARY)
- 2. PROPOSED LIBRARY, CULTURAL, CIVIC, AND LEARNING SPACE
- 3. EXISTING MUSEUM (NOT SUBJECT TO THIS PLANNING APPLICATION)



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Project PRESENTATION BUILDING
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Title PROPOSED SECOND FLOOR PLAN

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