



Report

Project	Varley SEND School, Manchester
Report Title	Fire Engineering Review
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1.0 INTRODUCTION

1.1 Description of Building

It is proposed to build a new SEND (special education needs and disabilities) school off Varley Street, Manchester. The school will have a single storey and incorporate typical educational facilities, including classrooms, laboratories, a main hall, a canteen, and other ancillary areas such as staff offices and plant/store rooms.

The proposed ground floor layout is shown in Figure 1.



Figure 1: Ground Floor Layout

1.2 Aim of Report

This report summarises a fire engineering review of the proposals against the guidance for fire safety design given in *Building Bulletin 100: design for fire safety in schools*, and Building Bulletin 102: *Designing for disabled children and with special educational needs* commonly known as BB 100 and BB 102 respectively. These documents contain Building Regulations guidance on the design of schools and BB 102 specifically addresses the additional considerations which should be accounted for in SEN schools.

This report highlights key elements of the building's fire strategy to be considered to aid the design team in the development of the detailed design. This report is not suitable for submission to Building Control or the Fire Service. A detailed fire strategy report will be developed at a later stage, once the fire strategy principles have been agreed, suitable for submission.

The recommendations in this report are not exhaustive, and unless mentioned otherwise it is assumed that the standard building design elements will be designed in line with the recommendations of BB100 and other relevant codes of practice.

1.3 Employers Requirements

Jensen Hughes's input addresses compliance with the Building Regulations. There are likely to be Employer requirements and insurance requirements for the fire safety design of government funded schools which go beyond life safety. On similar projects we are involved in one of the employer's requirements was compliance with Technical Annex 2C: External Fabric for schools when considering external materials for fire safety. It should be confirmed whether this also needs to be achieved for this scheme and whether there are any other Employer's requirements relevant to fire safety.

2.0 ACTIVE FIRE SAFETY SYSTEMS

2.1 Sprinklers

BB100 is the principal guidance document for fire safety design in schools. The document recommends all schools should be provided with sprinklers unless a risk assessment is carried out which concludes that the school is low risk, or it can be justified that it is not cost effective to provide sprinklers. The risk assessment would consider factors including:

- Probability and consequence of different fire scenarios;
- Location and accessibility of the building;
- Site vulnerability to intruders;
- Site construction;
- Security provisions;
- Waste facilities;
- Fire and Rescue Service response time;
- Availability of water supply.

A joint exercise was carried out by the design team on the 13th of March to complete the risk assessment using the appropriate tools referenced in BB 100. The risk assessment concluded with the recommendation that sprinklers should be provided to the premises. The client should be consulted to make a decision on whether the recommendation to install sprinklers should be followed. Key items for their consideration should be:

- *BB 102 Designing for disabled children and children with special educational needs* states that schools with significant numbers of SEN children will generally be considered as medium to high risk. Due to this requirements SEND school would typically be expected to have sprinklers.
- The government has issued a consultation in 2021 to withdraw the requirement from BB100 to carry out a fire risk assessment to determine the need for sprinklers, and to recommend sprinklers as a default requirement in all SEN schools. The new BB100 has yet to be released however it is likely that this will go ahead. Due to a wider industry push including from the National Fire Chief Council (NFCC) to have sprinklers in all schools to match the requirements in other devolved areas of the UK there is also a possibility that this requirement could be extended to apply to all government funded schools and not just SEN schools.
- SEN schools can present a higher risk of arson compared to mainstream schools, depending on the nature of the issues that the pupils are being helped to address.
- A cost benefit analysis should also be carried out in line with BB100 guidance to establish the long term financial gains of having sprinklers.

It should be noted that sprinklers in this type of school are primarily needed as a property protection /business continuity measure. From a life safety perspective single storey schools do not represent a significantly enhanced risk compared to other public buildings.

Whether sprinklers are provided or not will affect some of the key design requirements. Where relevant these have been highlighted in this report.

If sprinklers are provided, the system should be designed to a commercial standard, i.e. following BS EN 12845.

If sprinklers are provided, consideration should be taken to conceal the pipe work and whether the sprinkler heads should have tamper resistant covers.

2.2 Automatic Fire Detection and Alarm

2.2.1 Evacuation Strategy

The school should operate a simultaneous evacuation where on confirmation of a fire the full building evacuates, and the fire alarm system should be designed and programme accordingly.

2.2.2 Type of System

A BS5839-1 compliant fire alarm and detection system should be provided with a minimum performance classification of L2. Additional measures may be needed to account for the individual needs of the pupils. BB 102 recommends that the different 'sounders' for lesson changes and the fire alarm are used and visual alarms for hearing impaired occupants are included. The need for this should be considered against the needs of the students.

An enhanced or property protection system may be required as part of the Employer requirements. This should be confirmed.

2.2.3 Manual Call Points

As part of the fire alarm package manual call points will be needed. BB100 recommends that wherever possible these should be located such that they are less likely to be prone to malicious operation. This can sometimes be achieved by ensuring that they are in open view of staff. Where manual call points are still likely to be subject to casual, malicious operation, it is acceptable for a transparent, hinged cover to be fitted to the manual call points. Operation of this two-action manual call point then involves lifting the cover and operating the manual call point in the normal manner.

3.0 MEANS OF ESCAPE

3.1 Occupancy

The occupancy aspirations for the building have been informed by the architect. The number of pupils in the building will be in the range of 150 with an approximate split of 50/50 between ambulant and non-ambulant. The number of staff will be approximately 100. Accounting for staff/office/admin and back of house areas also, the building's occupancy will be 250.

Individual classrooms will not accommodate more than 16 occupants.

The Main Hall and dining hall are each being designed to accommodate a capacity of up to 150 occupants at a single time.

3.2 Circulation Doors and Storey Exits

There are multiple exits to outside which will provide a large surplus in escape capacity from the building.

Classrooms with large numbers of wheelchair users should have direct exits to outside.

All doors serving rooms accessible to pupils should be at least 900mm wide. Doors in staff only areas can be 850mm wide.

The main dining hall and main hall which will each accommodate up to 150 occupants should have at least three 1050mm wide exits opening in the direction of escape (the internal doors in the dining hall currently open in the direction of escape). Three exits will ensure large numbers of wheelchair users can evacuate the building without significantly impacting escape for non-ambulant pupils.

Cross corridor doors in the circulation corridors should swing to open in both directions and be provided with vision panels.

If heavy wheelchair traffic can be expected in the circulation corridors, consideration should be given to follow the door guidance in Health Building Note 00-04 which recommends for this scenario that both leaves achieve a minimum effective clear width of 850mm. This would typically require a 1900mm wide door set.

3.3 Travel Distances

Travel distances should be limited as summarised below:

- **General** – 18m in a single direction and 45m where there is more than one direction of escape.
- **Areas with lots of non -ambulant occupants** – 15m in single direction and 30m where there is more than one direction of escape.
- **Places of Special Fire Hazard** – 9m in a single direction and 18m where there is more than one direction of escape.

Places of special fire hazard are listed in Section 4.2.

There are two directions of escape from all areas once occupants reach the corridor. Based on the current plans and the numerous number of escape routes and exits travel distances throughout the site are within the recommended limits outlined above.

3.4 Assembly Point

A designated assembly point should be provided away from the building and escape routes and any areas at risk of falling debris. This should not impact the fire vehicle access route to the building's site and perimeter and should also consider the large number of wheelchair users that may be present.

3.5 Roof Escape

Two escape routes will be required due to the primary access stair not discharging straight to outside at ground.

These should be positioned so that travel distances across the open-air roof do not exceed 60m in a single direction and 100m overall.

4.0 STRUCTURE AND COMPARTMENTATION

4.1 Structure

Elements of structure requiring fire protection should achieve at least 60 minutes fire resistance and 30 minutes if sprinklers are provided. Structure only supporting the roof where it does not function as a floor and is not essential to the overall building structural, therefore in single storey buildings there would not typically be a need to fire rate the structure for Building Regulations purposes other than that supporting fire separating elements. However, the local school authorities may have a view in terms of impact on education and the wider community and we have been made aware on other government funded school projects that there is an employer's requirement to fire rate the structure to 60 minutes. This should be confirmed with the Employer.

4.2 Compartmentation

Compartments within a non-sprinklered school should be limited to 800m². If sprinklers are provided the maximum compartment size can be increased to 2,000m².

Walls between compartments should achieve 60 minutes fire resistance with FD60S doors. This can be reduced to 30 minutes if sprinklers are provided.

High risk plant rooms should be enclosed 60 minutes of fire resisting construction. Any plant rooms used for life safety equipment should be enclosed in 2 hours fire resisting construction (i.e. sprinkler pump or tank room, rooms relating to primary and secondary power supplies for life safety equipment etc.).

Places of special fire hazard should be enclosed in 30 minutes fire resisting construction. BB100 defines places of special fire hazard as:

- Boiler/plant rooms (other than plant rooms housing life safety equipment)
- Stores – for fuel, highlight flammable equipment (i.e. P.E. mats), chemicals, cloak rooms
- Laboratories
- Technology rooms with heat sources
- Kitchen
- Oil filled transformer and switch gear rooms.
- Rooms with combustion engines.

Whilst not a requirement of Building Regulations guidance, other areas which may benefit from being enclosed in 30 minutes fire resisting construction include:

- ICT rooms
- Corridors/circulation spaces
- Rooms used for the storage of exams/coursework.

A mark of the key recommendations for internal fire subdivision is given in the Jensen Hughes Fire Engineering Review Mark-up issues on the 10/03/2023. It should be noted that this is not exhaustive and additional rooms may need to be enclosed in fire resisting construction subject to a fire risk assessment of the content and activities.

4.3 Cross-Corridor doors

Where cross corridor doors subdivide the corridor the fire resistance should be extended elevation to elevation.

4.4 Dead-end corridors

All dead-end corridor partitions more than 2m in length should achieve 30 minutes fire resistance with FD30S fire doors and fire stopping as necessary.

Guidance also recommends that dead-ends more than 4.5m in length should have cross-corridor doors to subdivide the two escape routes in the T branch of the corridor. The current plans shown two dead-end corridors serving staff rooms up to 5m. We understand introducing additional cross corridor doors in the T branches would have large implications on the current layouts and present operational nuisances. Our view is that the minor extension has limited impact on the standard of safety achieved and it is reasonable to make a derogation in this instance, particularly if sprinklers will be provided. However, this will need to be agreed with Building Control. Technical justification can be provided in the fire strategy.

5.0 FIREFIGHTING

5.1 Firefighter Access

Based on the size and height of the building a fire vehicle should be able to access at least 15% of the building perimeter to comply with code guidance. This should be achieved without tender vehicles needing to reverse more than 20m to complete turning manoeuvres. The site landscaping should allow for this. Firefighting Facilities

The building will only have a ground storey. There is no need to provide internal firefighting facilities, such as a firefighting shaft, dry risers etc. to satisfy the Building Regulations.

5.2 Fire Hydrants

The building should be within 100m of an existing fire hydrant, or a new fire hydrant should be provided within 90m of the building entrance. The location of existing hydrant should be confirmed.

6.0 EXTERNAL ELEVATIONS

6.1 External Wall Construction

It is understood that the building will have a predominately masonry external wall construction and that all primary construction materials such as insulation products, cladding and filler materials are proposed to achieve at least Class A2-s1,d0 or better. This is a robust strategy that will ensure there is no adverse risk of external fire spread.

However, the Employers Requirements may dictate a higher specification (e.g. A1). This should be confirmed.

6.2 External Fire Spread

Assuming the building faces onto the school ground with several metres to the site boundaries (e.g. >10m) we would not expect there to be restrictions on the area of non-fire-resisting construction permitted on the external elevations facing the site boundary. We can review this further when a site plans becomes available.

The classroom wings have elevations that face directly onto other parts of the building. As the distance between elevations is greater than 28 meters, there will not be any restrictions on the area of non-fire-resisting construction permitted on these elevations.

Detailed calculations to demonstrate the external fires spread requirements will be carried out as the design develops.

7.0 INFORMATION, LIMITATIONS AND ASSUMPTIONS

The information limitations and assumptions used in the preparation of this report are noted below: -

Drawings

This report is based on drawings issued to us. Dimensions have been taken from these drawings. The following drawings were used:

 VAR-ISG-XX-XX-RP-W-00902(P01)

 VAR-JMA-ZZ-00-DR-A-00001-S2-P13_Proposed Ground Floor Plan

 VAR-JMA-ZZ-RF-DR-A-27001-S2-P04_Proposed Roof Plan

 VAR-JMA-ZZ-ZZ-DR-A-00201-S2-P08_Proposed Building Elevations

Building Regulations

This report considers building regulations, which deal with life safety. Property protection and insurance issues are not addressed in this report and should be consulted separately.

Other Limitations

Complying with the recommendations of this report will not guarantee that a fire will not occur.

Unless otherwise described in this report, the fire strategy assumes that the building design, the mechanical and electrical systems, construction methods and materials specifications will comply with current Building Regulations guidance, and relevant British Standards and Codes of Practice. The design of mechanical and electrical systems such as fire alarm and sprinklers is a specialist area. Fire Strategy recommendations are given in this report, however, the design and specifications need to be developed at the appropriate stage in consultation with the specialist designers of these systems.

This report has been prepared for the sole benefit, use and information of ISG Ltd and the liability of Jensen Hughes, its directors and employees in respect of the information contained in the report will not extend to any third party.

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