EWS1 report

Bridge Place

30th April 2021

Croydon Borough Council

12125BB

Revision History

Version	Date	Author	Comments
01	30/04/2021	Steve Golding	Initial issue to client

Document reference
12125BB

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Contents

1. Introduction

BB7 have been appointed to conduct an intrusive survey and provide a comprehensive report forming an EWS1 assessment for 50 – 89 Bridge Place at Bridge Place, Croydon.

This report outlines BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 25th March 2021; the survey was conducted by James Groves, Steve Golding and Lee Wilson.

The full building description is found in Section 2 of this report. The following figures show the original cladding on the building and on the building after re-cladding.

Figure 1. Existing building circa 1960's

Figure 2. Re-clad. Presumed circa late 1990's

This document and the associated EWS1 form are only applicable to Bridge Place. Please note that this document and associated EWS1 form is valid for a period not exceeding 5 years. In accordance with Note 03 of the EWS1 form, this report and the associated EWS1 form have been reviewed by a chartered registrant with the Engineering Council UK (Chartered Engineer) who is registered through the Institution of Fire Engineering.

In reviewing and applying their signature to these documents the Chartered Engineer is verifying that, although they may not have attended site in person, they agree that the inspection was carried out by a suitably experienced engineer and they agree with the assessment and outcome.

2. Building Description

Bridge Place House contains 39 dwellings and provides general needs housing. Four apartments are present per floor level.

The building was originally constructed circa 1962 – 1965 (REF: mailto:https://www.towerblock.eca.ed.ac.uk/development/bridge-place-wates-croydon-i and the original construction was a large panel system.

The building is 11 storeys, consisting of residential accommodation from the first to the tenth floor with storage on the ground floor and plant on the roof. The building is served by a single stair core running full height and a second stair between floors 8 – 10. The main stair access is at first floor level in line to the Gloucester road street level which is elevated above the road access from Bridge place. The stair extends down to elevated street level at first floor and at ground floor level to an access lobby and external means of escape.

Stair landings 1 - 7 are served by a single stair and are separated from the lobby by a Georgian wired glass partition. Ventilation is by means of an AOV with detection situated in the lobby. The travel distances within these from each apartment entrance are within 7.5m.

The upper three levels (levels 8-10) have a distinctly different arrangement to the other floor levels due to the presence of two stair cores, one of which is the main stair core serving all upper floor levels, and other appears to be a secondary escape stair. Landings served by both stair cores to floors 8 - 10 are separated from both stairs by Georgian wired glass partitions. There does not appear to be ventilation to the enclosed lobbies at these levels, travel distances are within 7.5m to either stair core. There is ventilation to the head of each stair by means of an AOV although detection is located within the enclosed lobby area and not apparent at the head of the stair. The operation of the system at levels 8 – 10 requires further investigation to confirm operational compliance (i.e., if there is smoke logging within the stair cores but not the lobby, will a form of detection enable the AOV's at the head of the stair cores to activate). It would appear that the intent is to ventilate these upper levels via the secondary stair case, however, this is outside the scope of this document.

The bin chute runs from first floor to the ground floor of the building which is accessible from the stair (note that the asset drawings incorrectly show this as being full height). The chute is not installed with a fusible link damper and the fire rated ceiling has either been completely damaged or removed.

First floor level (which corresponds with Gloucester road street access) contains ancillary areas consisting of a guest room, laundry, office area and WC on the footprint of an apartment. The ground floor contains further ancillary areas consisting of storage areas, water filter room, maintenance area, bin store and electrical rooms. Areas of staining and leaks were seen within the electrical room which appeared to be an oil-based material which may indicate oils leaks from the incoming supply cable.

The building is provided with sprinkler protection although not all apartments have accepted the sprinkler installation and are provided with a capped supply close to the front entrance door. The pump and break tanks are located within the roof plant area, the pump unit is dated 8th March 2019.

Dry rising mains are provided at every other floor (at even number floor levels). A fireman's lift appeared to be installed. The fire alarm system appears to be a modern system and has been provided with a red care dial out line, this did not however appear to be connected.

The Fire Service has reasonable access to the building, three facades can be reached directly from a public road or the car park at the rear and the fourth via an adjacent footpath. This would enable the Fire Service to spray water onto the façade of the building within an 18m reach of a roadway. Due to the limited local water pressure of 1 bar the anticipated fire hose reach would be limited to the range of 5 – 6 floors without the use of a high reach appliance. Immediate attendance by a high reach appliance cannot be relied upon, only pump appliance attendance can be guaranteed. Based on the access provisions there would not be an undue delay in getting water onto a façade fire for most floor levels below 18m.

The building was originally constructed as a large panel system (LPS) building consisting of concrete cladding panels. The first floor and above has been re-clad with an aluminium cassette panel system during the 1990's over the original facade. The ground floor level has remained as masonry and concrete structure, although some masonry panels appear relatively new in appearance indicating that alteration works have taken place to the façade in this area.

The aluminium panel system was infilled with mineral wool insulation which is fixed against the original concrete façade of the building. Apartment windows have been replaced with UPVC units, whilst common areas retain the original metal frame windows which have received replacement spandrel panels. There are no balconies to the building, the only protruding structure is the concrete bridge between the first floor and Gloucester road.

BB7 have been provided with a Type 4 Fire Risk Assessment for Bridge Place dated 16th January 2020 which was conducted by Ridge and Partners LLP.

Figure 3 shows a site plan of building demonstrating the location of the building and the boundary formed by the surrounding streets.

Figure 3. Ariel view of the development

3. LPS Construction

Large Panel System (LPS) construction is a form of construction where large storey height pre-cast Reinforced Concrete panels are assembled together on site to form the buildings' structure, this was a very popular method of construction for council housing in the 1960's and 1970's made semi-famous by the Ronan point collapse in May 1968 following a gas explosion. LPS buildings can be designed to be up to 24 storeys in height, but 50-89 Bridge Place is substantially lower than this.

The Ronan point collapse was caused by a gas explosion on a mid-level floor. The explosion dislodged loadbearing panels which triggered a disproportionate collapse. This report does not consider collapse mechanisms under Approved Document A; such an assessment should be carried out by a structural engineer. Croydon Council should satisfy themselves that the structural health of the building is not a risk to life safety during a fire event. Furthermore, it has not been possible to determine the insulation present in external wall panels, and as such it cannot be determined whether a deflagration event could occur. It was typical for the blowing agent to be Pentane in the 60's and 70's. This report therefore does not consider deflagration risks as this would need to be determined by a DSEAR expert.

Figure 4. Ronan point collapse

There are many types of LPS construction, and it is not possible to definitively state which type of structure was used; however, it is known that 50-89 Bridge Place was constructed by Wates in the late 1960's. A large number of LPS buildings were based on the Bison method of construction. Typically, the external walls of LPS buildings are similar to that shown in the figure below and correspond to the site findings.

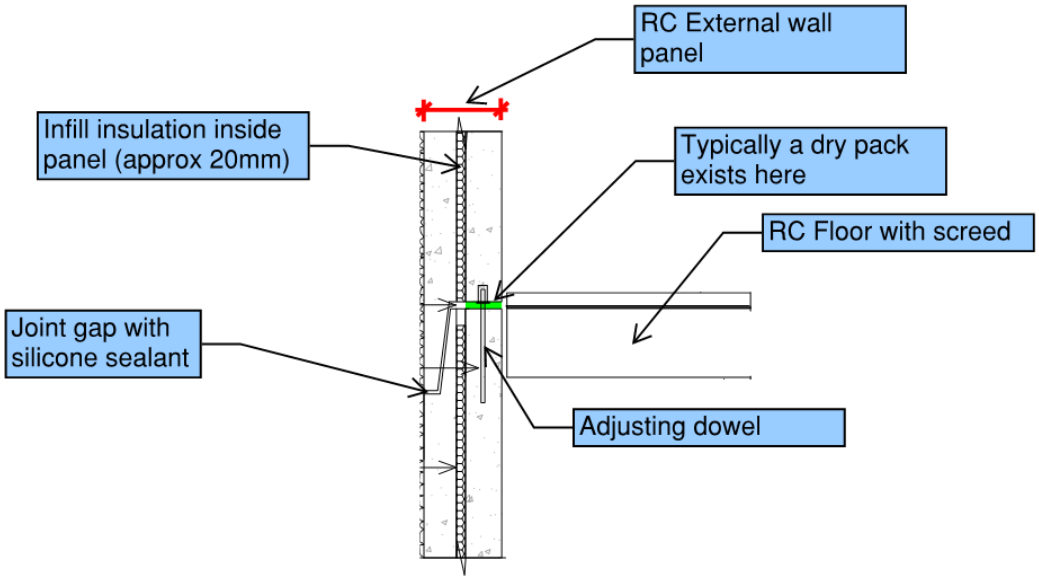

Figure 5. Typical composition of external walls

It can be seen that there is a thin insulation layer within the panel itself and there is a path to this cavity from outside at the joint gap. This insulation is typically a form of EPS or XPS which is a highly combustible substance, however, it is encapsulated between two >100mm leaves of RC which means it is offered a significant degree of protection. The cavity in which the insulation exists is generally 20mm wide, but this can very across the different manufacturers. Based on making drill holes at the building it was found that the cavity was within the 20-25mm range. There is a route for fire spread via the joint between panels, the silicone sealant used is of a substantial volume and will offer some fire resistance into the panel system, however, a period of time cannot be determined. Typically a dry pack is present which aids in preventing fire re-entry into the building.

Whilst there is a risk of fire making its way to this zone, the risk is substantially lowered by the 100mm layer of mineral wool insulation which has been provided as part of the re-cladding works. On that basis the combustible insulant in the structural panel itself has been largely not considered as part of this report. Due to the location of the insulant, it is not likely to contribute to uncontrolled fire spread. Furthermore, if fire did reach the insulation the rate of fire spread in this cavity would be likely low on the basis that the cavity has a small width and will not entrain air to any great degree, and the fire would need sufficiently make its way through the insulation to spread which would take time to accomplish. On that basis it is considered reasonable to omit this layer of insulant from the main risk assessment, however, it will still be acknowledged to exist.

Due to the different types of structural wall present in LPS buildings (i.e., flank wall, side wall, etc) there are panels of different styles which have been noted. Typically most panels are the same as that noted in Figure 5, the difference of note is the coarseness of the facing material. The other system that exists commonly is a facing brickwork system. The exact method of construction is not known, however, from investigations it is clear that a cavity exists between the brick work and the substrate behind. Again, there are multiple types of construction method that could be employed here, so assumptions based on common practice have been made as part of this assessment.

Similar to the method shown in Figure 6 there are a number of instances where the facing brick work is supported with an RC upstand/downstand. The residual cavity formed is similar to that shown in Figure 7.

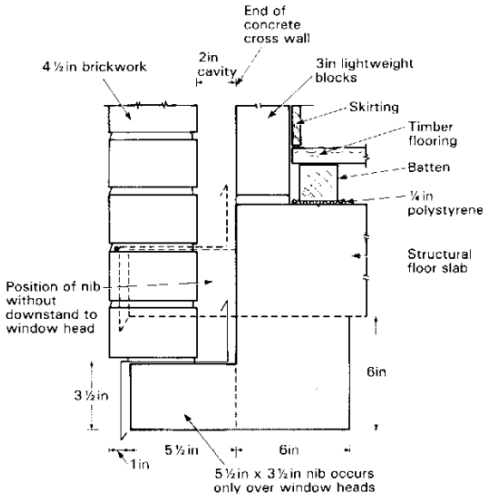

Figure 6. Typical brick on RC downstand

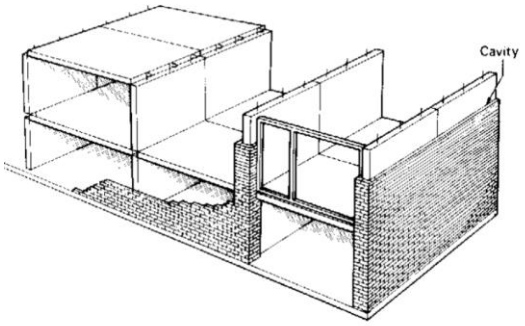

Figure 7. Typical brick façade to LPS

A cavity is typically formed between the facing brick work and the RC structure/block work substrate. Based on drill hole surveys this cavity was found to exist., but it could not be determined whether insulation exists in this cavity.

Typically cavity barriers can be omitted from cavities formed between two layers of masonry which are >75mm thick, and the guidance has historically allowed for combustible insulation to be present in such cavities. This is due to the fact that masonry is dense, inert, robust and non-combustible and is very unlikely to contribute to uncontrolled fire spread. As per the rest of the wall system the brick work is situated by c. 100mm mineral wool insulation which will offer a high degree of protection. On that basis it is considered reasonable to omit the areas behind the facing brick work from the risk assessment, however, the presence will still be acknowledged.

4. Scope & Limitations

4.1 Scope

This report is based on the information provided by Croydon Borough Council. The scope was to review the building and the product will be an EWS1 form and accompanying report. Please note that this report and the EWS1 form issued will only apply to the buildings specifically noted in Section 1 of this report.

Under the EWS1 process, the building may require remedial works before it is satisfactory. As part of this scope, we will provide a completed EWS1 form for the building, which is designed to satisfy lenders.

We cannot guarantee that lenders will be satisfied with the EWS1 form but this form has been agreed by many lenders and, as far as we are aware, is the only system available for this purpose.

The EWS1 form has been coordinated by RICS and supported by MHCLG in principle.

4.2 Limitations

This review is for the sole and exclusive use by Croydon Borough Council in relation to the buildings noted in Section 1 of this report only.

This review considers the combustibility and risks of external fire spread via the external walls only, and does not endorse any other elements of the design such as alarm, suppression, structural protection, etc.

In the site survey a reasonable sample of locations were reviewed. We can only base the findings of our report on the sample information gathered during these site surveys.

4.3 Relevant Legislation & Guidance

The decision was taken by the client that the building will be subject to an assessment to quantify the risk posed by the wall materials to residents with respect to health and safety.

As part of the UK Government approach to fire safety since the Grenfell Tower fire, information has been supplied to building owners, particularly those who own and manage multi-storey residential buildings. Most recently, a document entitled '*Advice for building owners of multi-storey, multi-occupied residential buildings, (2020)*' provided advice for multi-storey buildings of any height.

As part of that guidance it states that, the Requirement B4 is clear and requires that "*the external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and location of the building. The need to assess and manage the risk of fire spread applies to buildings of any height*".

5. EWS1 Assessment Scheme

5.1 Requirements

Irrespective of the application of regulation to existing buildings and those under construction, valuations for residential apartments in a block now seek confirmation of compliance with the limitations in the use of combustible materials.

As it is not possible to verify this in a majority of existing premises a scheme has been devised in conjunction with the Building Societies Association and UK Finance to include an inspection and assessment option on the relative risk in case of fire.

In summary, the concept is for a technically competent engineering professional to inspect or otherwise ascertain the material used and construction of the external walling types and associated attachments. Subject to the findings of the inspection and the combustibility of the materials, options are available to assess whether it is considered to present an unacceptable level of risk and if remedial action is necessary.

Dependent on the outcome the following reports and documents will be required:

- A1 – EWS1 form completed with A1 confirmed plus inspection report
- A2 – EWS1 form completed with A2 confirmed plus report of assessment and conclusions regarding acceptable risk
- A3 – EWS1 form completed with A3 confirmed plus report of assessment and conclusions regarding unacceptable risk plus report giving remedial and interim measures
- B1 – EWS1 form completed with B1 confirmed plus report of assessment and conclusions regarding acceptable risk
- B2 – EWS1 form completed with B2 confirmed plus report of assessment and conclusions regarding unacceptable risk plus report giving remedial and interim measures

An EWS1 form is primarily intended for buildings where the highest floor is greater than 18m above ground level, or where there are reasons where a higher risk is associated with the building type; e.g. care homes etc. This building is in scope as it is >18m in height.

5.2 Mechanism for Fire spread

When reviewing a building with combustible products on the façade, the EWS1 form asks for the following to be considered in accordance with note 9 of the aforementioned (as detailed under the scope section 1.2 of this document.)

There is obviously some subjectivity as to exactly how to apply these requirements and further uncertainty as to how a particular wall build up or a wall with multiple build ups will behave in a fire.

BR 135 describes the mechanism for fire spread in Figure 03 of the document. This is illustrated in the figure below of this document.

This details that it is possible for fire to spread even on a building with a non-combustible façade via the windows. This mechanism is called restricted fire spread because fire may spread to the apartment above but it would then need to grow and develop before breaking out again to spread to the apartment above. This is described in BR 135 as follows:

"Following the initiation of a fire inside the building, if no intervention occurs, the fire may develop and break out from the room of origin through a window opening or doorway . Flames breaking out of a building from a post-flashover fire will typically extend 2m above the top of the opening prior to any involvement of the external face, and this is therefore independent of the material used to construct the outer face of the building envelope.

This form of fire spread should be feasible for the fire service to extinghuish and prevent it from spreading.

Rapid fire spread may be due to combustible materails which form part of the external wall build up or via fire spread within the cavity.

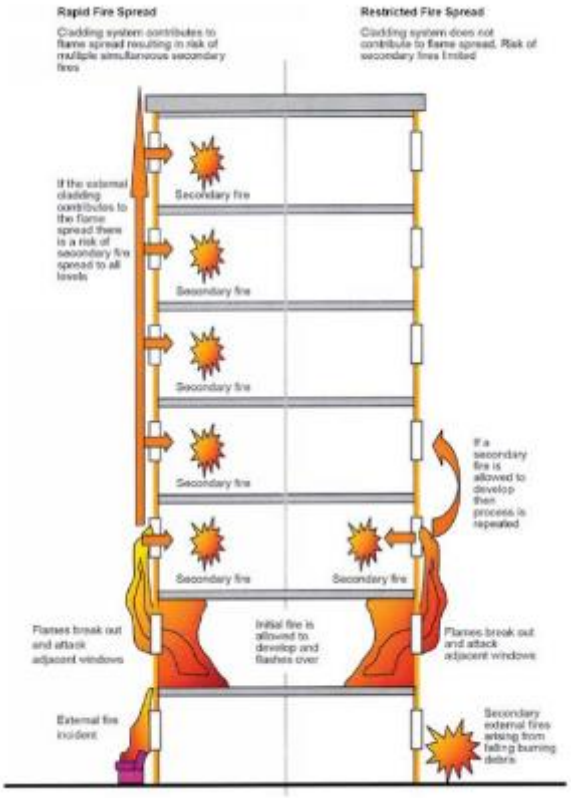

Figure 8. Mechanism for fire spread

When considering the requirements of the EWS1 form, the most probable prediction is made of the most possible worst reasonable case is reviewed against this criteria.

Then factors such as the height of buildling, the number of stairs, the provision of fire service access, the passive and active measures, are reviewed to evalulate the risk.

This is detailed in Section 7: External wall analysis.

6. Survey findings

6.1 Survey

BB7 intrusively surveyed the building on 25th March 2021. The survey was conducted by James Groves, Steve Golding and Lee Wilson. BB7 had pre-determined multiple survey locations on the building to maximise the findings of the visit and provide a representative sample, these were specified at compartment lines and around openings to ensure that cavity barriers were provided in their respective locations.

The locations were agreed with the contractor ahead of the survey. BB7 surveyed 10 locations across the building.

When surveying buildings from a fire safety perspective, confirming the existence of issues over several areas is key to ensuring a reliable survey. The number of survey points were specified so that any issues could be confirmed where found or could be proven as a "one off" if only found once. The number of locations surveyed was intended to provide reliability in the findings.

6.2 Location 1

Location 1 on the South elevation, facing the hard landscaping / car park.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) and vertical (party wall) reinforced mineral wool cavity barrier. The cavity barrier sat on top of the insulation (i.e., did not break through the insulation) and was generally not under compression to the face of the cladding panels.
- 60-70mm clear cavity.
- Building paper
- 110mm mineral wool insulation with metal fixings.
- 100mm solid concrete. A hole was drilled through the concrete to determine the thickness, however, it could not be further determined what was behind the concrete without potentially compromising the integrity of the structure and causing damage internally.

The same build up was identified at each of the following locations, however, they have been separated into four for the review.

Figure 9. Location 1 areas inspected

Location 1.1

Location 1.1 was on the South elevation at third floor slab level.

Figure 10. Location 1.1 horizontal cavity barrier at floor level, barrier has not been folded over and is not in compression against the cladding.

Figure 11. Location 1.1 100mm mineral wool insulation.

Figure 12. Location 1.1 Gaps identified at side of cavity barrier against cladding support rail, a further gap exists within the insulation behind the rail.

Location 1.2

Location 1.2 was on the South elevation at third floor slab level.

Figure 13. Location 1.2 line of horizontal cavity barrier at floor level, barriers are not folded over and only in partial compression.

Figure 14. Location 1.2 line of horizontal cavity barrier at floor level, barrier is not folded over and only in partial compression at the head.

Location 1.3

Location 1.3 was at the third floor ventilation extract grill.

Figure 15. Location 1.3 ventilation duct and back plate surround. Building paper facing is visible over mineral fibre insulation.

Figure 16. Location 1.3 Ventilation duct passes straight through walling to louvre behind.

The barriers were mineral wool type product reinforced with wire, which were common at the time of installation. This cavity barrier has to be folded over in order to ensure that the barrier fills the full depth of the cavity to reach the rear of the cassette panel, however, the barriers were found in some cases to be poorly fitted with gaps appearing next to the façade carrier system, it was not under compression so it may allow fire to bypass the compartment line here, which is not permissible.

Location 1.4

Location 1.4 was at the third-floor level.

Figure 17. Location 1.4 Horizontal cavity barrier at floor level, a vertical compartment barrier is located on the left hand side of the panel opening.

Figure 18. Location 1.4 Horizontal cavity barrier at floor level under window. The vertical aluminium rails offer a pathway through the cavity barriers in the 'u' of the rails. This is however minimal in sectional area.

Figure 19. Location 1.4 View showing the original concrete cladding panel with a drilled hole to verify the concrete depth of 100mm without a cavity. Arisings from drilling appeared to be masonry dust only. It would be expected that a layer of EPS insulation has been incorporated within the external wall material although this could not be verified by drilling.

Location 1.5

Location 1.5 was at first floor window level.

Figure 20. Location 1.5 The original head flashing has been peeled back to allow window replacement.

Figure 21. Location 1.5 The mastic seal at the window head appears intact behind the flashing, but is unlikely to be fire resistant.

Figure 22. Location 1.5 Windows are UPVC units with additional metal weather flashings, these have 'v' cuts for drainage which appear to drain into the cladding cavity. There is evidence of water damage to the insulation. There was also a vermin hole at this location.

Figure 23. Location 1.5 A vertical compartment barrier is shown at the right-hand side of the party wall location. There is evidence of water damage to the insulation on the left-hand side. Cavity barriers around windows have not been installed but were not required by building regulations at the time of the over cladding works.

Around windows it was noted that a mastic that isn't fire rated has been used to seal the windows in. Cavity barriers were not a requirement around windows on blocks of flats until the year 2000, therefore assuming the re-clad occurred in the late 1990's the lack of barriers would have been Building Regulations compliant.

Generally all cladding rails are considered to be outside spaces because the inside of the "C" shape takes the cladding returns and sits exposed to the open air. The rear of the rails sits against the insulation and the cavity barriers sit between rails. Between windows on different floors is a

central rail which is not open to fresh air and forms a cavity between compartments. This will be addressed in Section 9.

Location 1.6

Location 1.6 was at first floor window level

Figure 24. Location 1.6 Window jamb, shows original concrete panels with panel joint seal intact, mastic seal around window is from the time of replacement and not thought to be a fire seal.

Figure 25. Location 1.6 cavity barrier at side of window (horizontal barrier), this is located at a higher level above the slab level but against concrete panels. It is not folded over and provides only minimal compression against the cladding at the head.

Location 1.7

Location 1.7 was at first floor slab level.

Figure 26. Location 1.7 The first-floor slab is apparent at the top of the image, brickwork infill to the ground floor has been added at a later refurbishment. Vermin droppings are evident on top of the brickwork and top of the metal soffit panel.

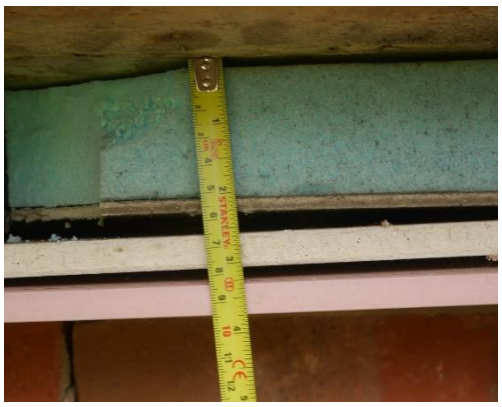

Figure 27. Location 1.7 The first-floor slab has been underdrawn with a cement particle board backed with foam insulation, further underclad with two layers of what appear to be pink plasterboard.

Figure 28. Location 1.7 The soffit provides what appears to be an undivided gap around the building of 470 - 500mm wide x 750mm high.

Figure 29. Location 1.7 Cavity barriers at this location are positioned above floor slab level against the cladding. They do not form compression against the cladding panels. The soffit is a 2mm metal panel.

6.3 Location 2

Location 2 was on the East elevation, facing the car park and Bridge place roadway.

The system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) and vertical (party wall) reinforced mineral wool cavity barrier. The cavity barrier sat on top of the insulation (i.e. did not break the insulation) and was not under compression.
- 60-70mm clear cavity.
- Building Paper
- 110mm mineral wool insulation with metal fixings.
- 100mm concrete panels.

Figure 30. Location 2 areas inspected

Location 2.1

Location 2.1 was to a cavity barrier at second floor location.

The barriers were mineral wool type product reinforced with wire, which were common at the time of installation. This cavity barrier has to be folded over in order to ensure that the barrier fills the full depth of the cavity to reach the rear of the cassette panel, however, the barriers were found in some cases to be poorly fitted with gaps appearing next to the façade carrier system, it was not under compression so it may allow fire to bypass the compartment line here, which is not permissible.

Figure 31. Location 2.1 Horizontal cavity barrier at second floor level which does not provide compression against the cladding panel face. Evidence of vermin route across the top of the barrier.

Location 2.2

Location 2.2 was to the first-floor kitchen extract panel.

Figure 32. Location 2.2 Kitchen extract tracks horizontally within the insulation depth using a plastic extract duct. The point of entry into the RC structure could not be found and was therefore not surveyed.

Figure 33. Location 2.2 Cavity barrier shown at first floor level below the kitchen extract. The barrier and insulation above is damaged due to vermin infestation.

Location 2.3

Location 2.3 was at the first-floor cavity barrier

Figure 34. Location 2.3 Horizontal cavity barrier at first floor level, there is little or no compression against the cladding panels.

Figure 35. Location 2.3 Section of barrier shows vermin routes both horizontally and vertically against the cladding panel.

6.4 Internal Survey

The common areas in Bridge House were reviewed internally on each level.

The block is served by a single stair core between ground and tenth floor, and a second stair core between the eighth and tenth floor. There are four apartments per floor level with ancillary and storage areas to the ground floor and to an area at first floor level.

The stair cores are provided with a vent to each staircase (approx. 0.5m^2), at the head. At floors 8 - 10 due to the presence of internal Georgian wired glazed screens these cannot cross vent and therefore extract only the stairs served. The upper-level lobbies served by two staircases are not smoke vented as they are enclosed by glazed lobby partitions, however, there does appear to be detection within these areas. The operation of the smoke venting system within the stair cores and upper lobby areas appears unclear and requires further review, (i.e. if there is smoke logging within the stair cores but not the lobby, will a form of detection enable the AOV's at the head of the stair cores to activate).

The apartments from levels 1 – 7 exit into lobby with ventilation via an AOV. It is presumed that the AOV works on detection which was identified in the lobby.

Dry rising mains are provided at every other floor (at even number floor levels). A fireman's lift appeared to be installed. The fire alarm system appears to be a modern system and has been provided with a red care dial out line, this did not however appear to be connected.

Within the main stair core the original metal glazing units have been retained. These consist of glazed units to the upper sections but spandrel panels at low level which appear to be metal faced. An intrusive inspection was not carried out to these panels however they should be expected to contain combustible insulation possibly within the external metal facings.

Service risers are located in the lobby with 'Intumescent sealant' fire stopping provided to service penetrations. However, some issues were identified including poor fire stopping around cable penetrations. Cable duct penetrations could not be verified to have firestopping within the ducts, where passing across compartments. The sprinkler stop valve was noted in the lobby of the

buildings, there appeared to be tank provision within the rooftop plantroom providing break capacity in additional to the mains feed. The sprinkler plant was located within the roof plant area with an approved date of 2019.

The plant room within the roof area is accessed via a ladder access hatch from the tenth-floor landing. This consists of a heavy timber double hatch door, although is ill fitting and could not be secured shut. The plant room area is a single space containing the lift plant, the sprinkler plant and break tanks, other control gear and electrical supplies and the remnants of historic redundant plant. The within this area underdrawn with a layer of polystyrene which is not encapsulated, this represents a risk of fire spread within the plant room area.

The lift shaft head is open the roof plant room. The lift plant and control gear are located lifting beams and supporting frames over the shafts. One of these beams has failed and shows significant lateral torsional distortion.

The external roof area around the plant room does not have a restraint system and is not man safe. It was therefore not investigated further. There are however stacks of crawling duck boards and items of rubbish and debris apparent within the gutter and pitched metal roof.

Apartments are located on floors 1 – 10 on a repeating footprint. The only exception being the first floor where one of the apartments has been omitted and is taken up by an ancillary area consisting of a guest room, laundry, office area and WC. The building appears to be managed somewhat from this area although the extent and frequency could not be ascertained.

First floor also has the only access to the waste chute via a ventilated lobby separated with a fire door. The door when inspected appeared to be solid and robust with working self-closers although could not be verified as a modern compliant fire door with intumescent seals. The chute disposal access was a metal hatch and frame but did not appear to have intumescent seals.

The chute terminates within the bin store at ground floor level which is accessed from the adjacent parking area via a metal double door. Internally there has historically been a fire rated ceiling fixed to a timber frame, although only the timber frame now remains with fragments of the fire boarded ceiling. The cladding around the chute which would be protected by the ceiling now allows a pathway within the cladding cavity up to the lobby above and potentially into the external wall cavity above. The roof to the bin store is a trapezoidal metal roof fixed to a metal structure. The side walls of the store are the concrete panels of the original construction. The waste chute does not have a fusible link damper to the base, and would allow the passage of smoke and flame up into the lobby above should a fire originate within the bin store. UPVC pipework also penetrates through the roof and walls of the store without adequate firestopping which would allow the transfer of smoke and flame into the building.

The ground floor contains further ancillary areas consisting of storage areas, water filter room, maintenance area, bin store and electrical rooms. The room areas are formed in part with masonry walling but are plasterboard to the stair lobby and protected corridor.

Areas of staining and leaks were seen within the electrical room which appeared to be an oil-based material which may indicate oils leaks from the incoming electrical supply cable.

The underside of the slab within the ground floor area was underdrawn with plasterboard which is fixed with screw fixings and washers, the joints had not been taped and jointed to achieve the ceilings full fire resistance. The ancillary and storage areas are not provided with sprinkler protection.

6.5 Fire Risk Assessment

The following information has been provided:

- Fire Risk Assessment (5010580) - Assessed 2020-01-16 - For Bridge Place

The following provides a review of the documents and the information provided represents that found in the reports. This was to gain additional understanding of the building and potential risk but does not endorse or influence the findings of the documents.

A Type 4 Fire Risk Assessment dated 16th January 2020 was conducted by Ridge and Partners LLP. No overall risk rating was determined within the report.

No risk rating is highlighted with the assessment, the report highlights areas of deficiency only but does not assesses the importance or risk of those items. The areas primarily identified are issues with fire doors, compartmentation and fire stopping. Additionally, although ventilation was identified in the stair and lobby, it could not be confirmed how these operated, particularly in the upper floor areas with twin staircases.

Summary

Although a fire risk assessment has been carried out, it actually only highlights areas of work which are deficient and provides a schedule of work and cost against them. It does not assess which works are high risk or consider which are required to be actioned immediately.

The findings of the FRA align with the findings of the internal survey carried out, however, it was not part of the scope of this assessment to review in detail.

Until the FRA findings are actioned, the building risk is increased.

7. Fire Service Access & Facilities

This section has been added to demonstrate the availability for a pump appliance to gain access to each elevation to fight a fire.

Figure 1. Site Plan

The building is bounded on the West side by car parking and Bridge Place roadway, by Gloucester Road to the East and to the south by hard landscaping / car parking within a fenced enclosure.

This is considered to provide good Fire Service access within sufficient proximity to the majority of the elevations on the development.

From Gloucester Road, the Fire Service can reach the front within 18m and Bridge Place and the car park provides access to the West and South within 18m.

Where access cannot be achieved by an appliance directly to the façade, there are pedestrianized routes with paved pathways which would enable them to reach the façade and apply water without delay.

Internal Provisions

There are dry riser outlets provided on every second-floor level (i.e. even floors) within the lobby serving the stair. The riser inlet is provided in the lobby on the ground floor. Both lobby and stair are provided with ventilation. The building is not provided with a firefighting lift and, therefore, it is presumed that a firefighting shaft is also not provided. The stairs are approx. 1100mm, which is sufficient width for a firefighting stair. A "firemans" lift has been provided evidenced by the override switch at ground floor level.

There is also an auto-dial system identified in the ground floor lobby which is expected to automatically call the Fire Service on detection within the common area. This is a benefit as it removes the reliance on the resident calling in the event of a fire.

The building is also provided with sprinkler protection which is likely to reduce the potential fire size and spread.

8. Analysis

8.1 Overview

There were two systems present due to the original construction and the over-cladding. Analysis of the build-up behind the original concrete construction was not carried out on site as removing large panels could be potentially damaging to the building.

The overclad system was found to be:

- 5mm solid aluminium cassette panel attached to aluminium rail system.
- 100mm horizontal (floor level) and vertical (party wall) reinforced mineral wool cavity barrier. The cavity barrier sat on top of the insulation (i.e. did not break the insulation) and was not under compression.
- 60-70mm clear cavity.
- Building Paper
- 110mm mineral wool insulation with metal fixings.
- 100mm solid concrete / masonry. A hole was drilled through to determine the thickness; however, it could not be further determined what was behind without potentially compromising the integrity of the structure and causing damage internally.

8.2 Background issues

There are some items which should be addressed before the analysis of each system, these items will feed into each analysis.

Large panel system

The existing large panel system (LPS) was not reviewed in any detail as an intrusive survey could damage the integrity of the structure or cause damage internally to the building.

Small holes were drilled from external to establish the thickness of the structure but that was the extent of the review. LPS construction was a popular method of building high rise flats in the 1960s and 1970s as it was quick to build.

The system is essentially a method of construction in which walls, floors and ceilings, called panels, are produced in factories and then put together on site.

This type of construction is known to cause concern as the structural design is considered to be weak and there are frequently gaps between floor and wall panels. There is considered to be an increased risk if the blocks have gas in them. The annual probability of occurrence of these hazards was found to be very small. It should be noted that the FRA identifies that a number of the residents use compressed gas cylinders, this should be further investigated and steps taken to reduce and mitigate this issue where possible.

It was noted that there were panels wrapped around the building above the flat windows. This created a gap between the concrete panel of approximately 30mm.

The risk of the limited amount of combustible insulation is considered to be low due to the robustness offered by the masonry. This is considered to be justifiable based on the following figure which permits combustible insulation within the cavity between two leaves of masonry.

Many LPS buildings have been overclad due to inadequate weathertightness and deterioration along with the intent to improve thermal insulation and appearance. This can also create

problems if the over-cladding system is not installed adequately with appropriate cavity barriers, etc.

Although there is the potential for gaps and penetrations with no fire stopping or cavity barrier, it is not considered to be a route for fire uncontrolled fire spread given that the concrete and insulation is non-combustible.

Although there is an inherent risk from this type of construction, it is not considered to contribute to the risk of external fire spread.

Cavity barriers

Based on the contractor's knowledge of the building the re-clad occurred in the mid-late 90's, it is likely that the cladding system would be designed to Approved Document B: 1992 (ADB). Section 9 of ADB 1992 requires that cavity barriers should be provided at compartment floors and walls, the period of fire resistance which should be achieved by products are:

- Cavity barrier – 30 minutes integrity and 15 minutes insulation; and
- Fire barrier (i.e. fire stopping) – the integrity and insulation time should be the same as the fire resistance time for the compartment it serves in line with compartment floors only evidenced by Diagram 27 and Table 13

Diagram 27 and Table 13 of ADB: 1992 provide the guidance requirements for the placement of cavity barriers. Diagrams 39 and 40 below show the requirements at the time of construction, and that no cavity barriers are required around openings.

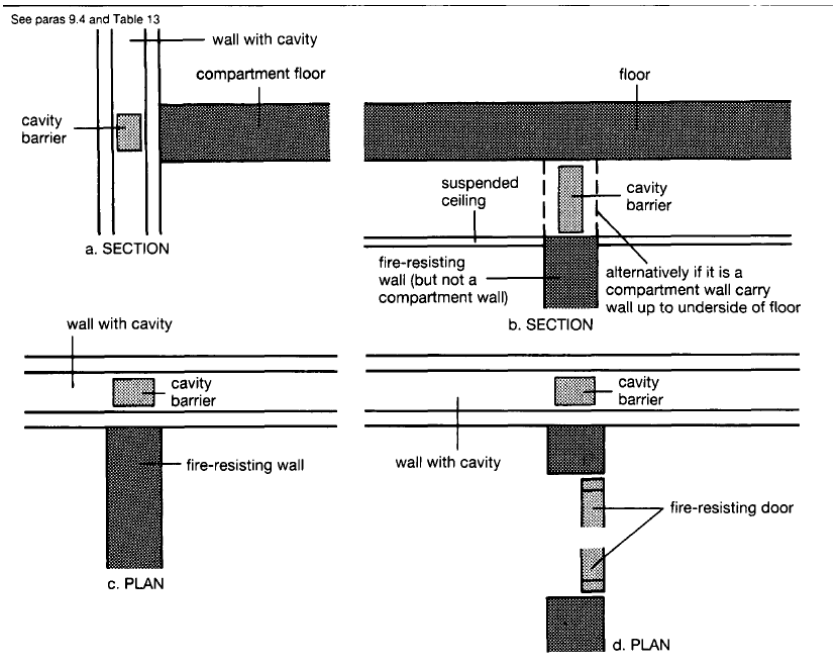

Figure 2. Diagram 27 ADB1992

B3

Openings in cavity barriers

9.14 Any openings in a cavity barrier should be limited to those for:

a. doors which have at least 30 minutes fire resistance (see Appendix B, Table B1, item 8(a)) and are fitted in accordance with the provisions of Appendix B;

b. the passage of pipes which meet the provisions in Section 10;

c. the passage of cables or conduits containing one or more cables;

d. openings fitted with a suitably mounted automatic fire shutter; and

e. ducts which (unless they are fire-resisting) are fitted with a suitably mounted automatic fire shutter where they pass through the cavity barrier.

Table 13 **Provision of cavity barriers**

Cavity barriers to be provided:	Purpose group to which the provision applies(3)			
	1b & c dwelling houses	1a Flat or maisonette	2 Other residential and institutional	3-7 Office, shop & commercial, assembly & recreation, industrial, storage & other non-residential
1. At the junction between an external cavity wall, which does not comply with Diagram 28, and a compartment wall that separates buildings; and at the top of such an external cavity wall.	x	x	x	x
2. Above the enclosures to a protected stairway in a house of three or more storeys (see Diagram 29a). (1)	x	-	-	-
3. At the junction between an external cavity wall which does not comply with Diagram 28, and every compartment floor and compartment wall.	-	x	x	x
4. At the junction between a cavity wall which does not comply with Diagram 28 and every compartment floor, compartment wall, or other wall or door assembly which forms a fire resisting barrier.	-	x	x	x
5. In a protected escape route, above any fire resisting construction which is not carried full storey height, or (in the case of a top storey) to the underside of the roof covering.(1)	-	x	x	x
6. Above any bedroom partitions which are not carried full storey height, or (in the case of the top storey) to the underside of the roof covering.(1)	-	-	x	-
7. Above any corridor enclosures which are not carried full storey height, or (in the case of the top storey) to the underside of the roof covering, where the corridor (which is not a protected corridor) should be sub-divided to prevent fire or smoke affecting two alternative escape routes simultaneously (see paragraph 3.21 & Diagram 30).(2)	-	-	x	x
8. To sub-divide any cavity (including any roof space) so that the distance between cavity barriers does not exceed the dimensions given in Table 14.	-	-	x	x
9. Within the void behind the external face of rainscreen cladding at every floor level, and on the line of compartment walls abutting the external wall, of buildings which have a floor more than 20m above ground level.	-	x	x	-

Key x provision applies
\- provision does not apply

Notes
1. The provisions in items 2,5 and 6 do not apply where the cavity is enclosed on the lower side by a fire resisting ceiling (as shown in Diagram 31) which extends throughout the building, compartment or separated part.

2. The provision of item 7 does not apply where the storey is sub-divided by fire resisting construction carried full storey height and passing through the line of sub-division of the corridor (see Diagram 30), or where the cavity is enclosed on the lower side as described in Note 1.

3. The classification of purpose groups is set out in Appendix D, Table D1.

Figure 3. Table 13 - ADB1992

Cavity barriers should be provided in the outer cavity in line with all compartment walls and floors based on the guidance at the time of construction. The outer cavity is considered to exist between the RC/brick substrate and the rear of the Aluminium cassette panel.

Double skin masonry systems

Cavity barriers can be omitted from certain types of construction such as construction comprising two leaves of masonry >75mm thick. The reason for this is due to the robustness offered by the masonry. This exemption is not relevant to the re-clad element of the building, it would only be applicable to the existing structure.

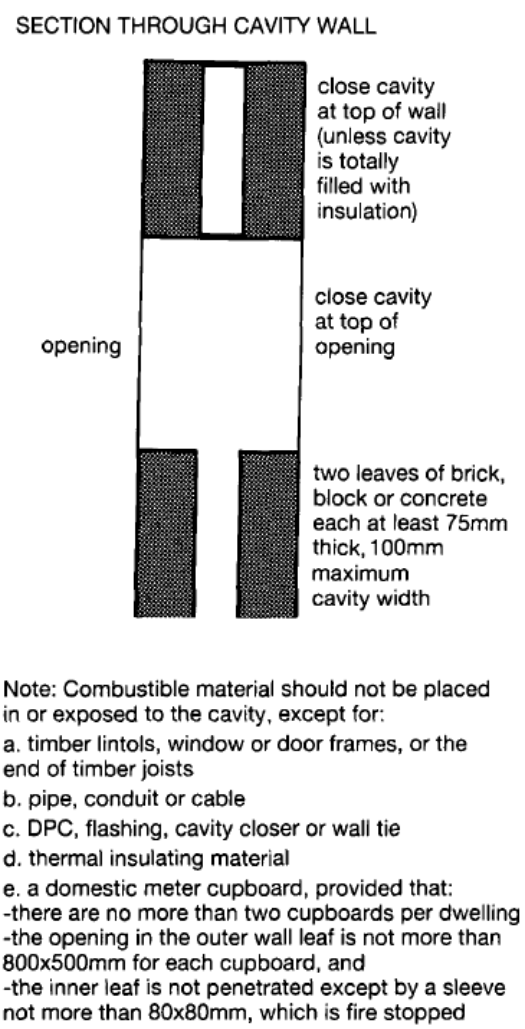

Figure 4. Diagram 28 – ADB 1992

It should be noted that all other construction types require cavity barriers to be fitted. Furthermore, any cavity existing outside of the masonry cavity will also require barriers.

8.3 System Analysis

System 1: Aluminium panel with mineral wool insulation

System 1 was the predominant cladding system on the building and comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
100mm concrete / masonry	Euroclass A1 to BS EN 13501-1	All locations	Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread. Please note that there is likely a thin EPS insulant between two >100mm layers of RC in the structure which is Euroclass E. Due to the encapsulation of this layer and the protection offered by the mineral wool this layer has been discounted as it is very unlikely to contribute to fire.
100mm mineral wool insulation	Typically, Euroclass A1 /A2 to BS EN 13501-1	All locations	Non-combustible, low risk of fire spread in the cavity.
Building Paper	Typically Euroclass E	All locations to face of Mineral wool insulation	This represents a combustible material and risk of spread across the face of the insulation.
60-70mm clear cavity	N/A	All locations	No combustible components.
100-110mm reinforced mineral wool cavity barrier	Typically, Euroclass A1 /A2 to BS EN 13501-1	Compartment floors, party walls	Locations of cavity barriers not strictly in accordance with ADB, however, generally adequate provision
5mm Solid aluminium cassette panel fixed to aluminium railing	Typically, Euroclass A1/A2 to BS EN 13501-1	All locations	Due to the non-combustibility BB7 consider that this item is low risk in terms of uncontrolled fire spread.

Behind the solid aluminium cassette panel was a 60-70mm cavity and 110mm mineral wool insulation mechanically fixed to the concrete panel system.

In the majority of cases, the mineral wool insulation was tightly fitted and abutted. Any gaps between the insulation were kept to a minimum and generally the installation was considered adequate. The non-combustible insulation is considered to reduce the possibility of uncontrolled fire spread.

Cavity barriers were typically found at compartment floors. Where the cavity barriers were present, they were reinforced with wire (typical) and, where they were folded over, they were compression fixed on top of the insulation (i.e. it was not broken). As the insultation is non-

combustible, this is considered to be adequate as it is unlikely that a fire could flank the barrier and spread on the façade. Both materials are non-combustible and unlikely to contribute to fire spread. Although the cavity barrier does not go back to the substrate, the risk is considered to be low as the insulation is also non-combustible and is unlikely to degrade during fire exposure.

There were no cavity barriers around the flat windows, however, if a fire were to break out of a window, then it is unlikely to rapidly spread through the cavity and up the building due to the lack of combustible materials and the flame front will not have a substrate to continue the fire spread. Furthermore, when fitted properly the fire spread will be inhibited by the horizontal cavity barriers at floor level. It was found in numerous locations that the cavity barriers were not fitted under compression meaning that there is potential for fire to bypass the cavity barriers. Whilst this would be considered to be low risk if limited instances were found, on this building BB7 did not find evidence of compartment floor barriers being folded and fully filling the cavity to the rear of the cassette panels. On that basis BB7 recommend that the cavity barriers are upgraded to ensure that they will inhibit the unseen spread of fire and smoke. This can be done in one of two ways:

1. Fold the existing barriers such that they are under compression; or
2. Provide new barriers.

BB7 would be satisfied with either option and would consider that the requirement of the Building Regulations to inhibit the unseen spread of fire and smoke in concealed spaces would be achieved.

There were no cavity barriers installed around the kitchen and bathroom vents inspected. The kitchen ventilation duct seen at location 2 was a plastic vent which tracked across the insulation zone. The level of risk with these items would be considered to be low as the insulation in these areas is non-combustible and there are no combustible elements or further pathways back into the building within close proximity.

There were no cavity barriers around the flat windows, however, there were vertical lengths of reinforced mineral wool that effectively 'boxed in' the windows. If a fire were to break out of a window then it is unlikely to rapidly spread through the cavity and up the building.

The horizontal cavity barriers were not continuous due to the aluminium rail system which left a gap of 100mm. This was identified under a flat window that stretched the height of the building. The risk of this is considered to be low as the gap was minimal and effectively external on the façade where there is limited chance of it breaking back into the building. Under the windows, the risk is also considered to be low as the rail is solid aluminium and there is no combustible insulation to potentially fuel a fire to spread.

Fixing brackets located at the ends of cladding panels are not considered to present a significant concern. Primarily because the 'C' shape of the bracket is open to external air and the rails sit against the insulation. However, the fixing brackets that are located centrally of wider panels between windows are of greater concern, as they would allow fire and smoke to bypass the horizontal cavity barriers. The brackets are 100mm wide and pass through the horizontal cavity barriers, meaning that the barriers are not continuous. The risk of this is considered to be low as the gap is small. It is also more likely that fire will spread from one dwelling to another externally, rather than through this gap in the cavity barrier, especially considering the channel in the bracket is isolated. The bracket is solid aluminium and there is no combustible insulation to potentially fuel fire spread. Furthermore, the flats are sprinklered which is likely to reduce the potential fire size and spread.

PD 7974 recognises the benefits sprinklers and states that they are likely to reduce the potential fire size and spread, along with limiting compartment temperatures to approximately 100°C (CIBSE Guide E, Section 6.6.4). The reduction in severity of a fire within the flat will be substantially less than a flashover fire and, ultimately, the severity of a fire on the façade, if it spreads that far, will also be reduced.

Under draw materials to first floor slab exposed within the external wall cavity

Materials exposed within the soffit wall cavity to the building and comprised of the materials in the table below:

Material	Combustibility	Volume	Comments
Concrete slab	Euroclass A1 to BS EN 13501-1	All locations	Non combustible, low risk of fire spread in the cavity.
50mm foam insulation board	Typically, Euroclass E-F to BS EN 13501-1	Presumed across underside of first floor slab, exposed at perimeter	Exposed surface of insulation may give rise to uncontrolled spread within soffit cavity, ultimately spreading across the underside of the first floor slab.
5mm cement particle board	Typically, Euroclass B to BS EN 13501-1	Presumed across underside of first floor slab, exposed at perimeter	Limited combustibility, low risk of fire spread in the cavity.
Two layers of 12.5mm fire rated plasterboard	Typically, Euroclass A2 to BS EN 13501-1	Presumed across underside of first floor slab, exposed at perimeter	Non combustible, low risk of fire spread in the cavity.

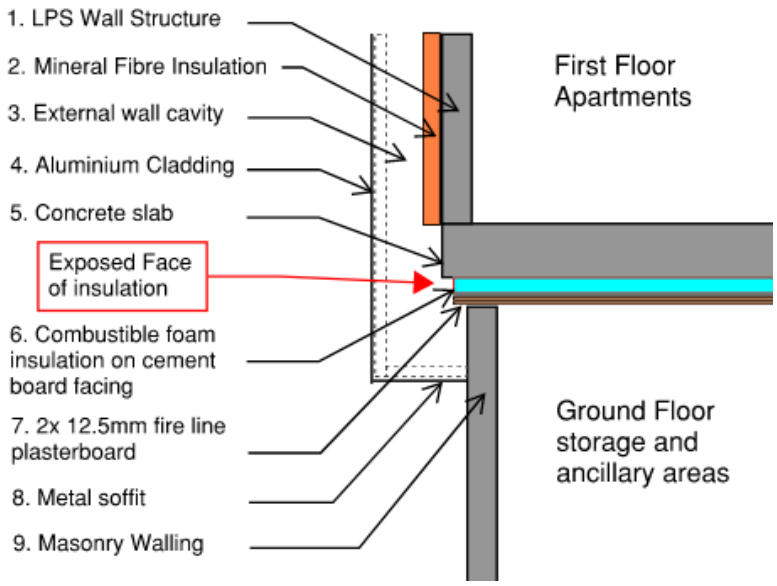

Figure 5. Section through External wall cavity and soffit

The underside of the first-floor slab has been underclad with a cement particle board which has a combustible foam insulation backing. The cement board is further over boarded with 2 layers of 12.5mm pink fire plasterboard for further protection, although these are poorly installed with gaps between joints and are not taped and jointed to achieve their full fire rating.

Whilst the boarding appears to be largely protected from spread of fire across the underside face, the edge face of the boards extend unprotected into the external walling cavity adjacent to the metal soffit. This can be presumed to be exposed into the soffit cavity all the way around the perimeter of the building, no evidence was seen within the cavity on the South Elevation to suggest that the space is divided with cavity barriers.

This issue presents the potential risk for spread of fire across the exposed face of the combustible foam board, the further risk of spread from outside into the building and potential ongoing spread into apartments via service penetrations to the slab which are not fire-stopped. In addition to the risk of spread from the outside to the inside, this material would also provide the risk of spread from inside of the building to the external walling system on the outside of the building if a fire were to originate within the storage and ancillary areas.

9. Conclusions and recommendations

9.1 Conclusions

BB7 have been appointed to provide an EWS1 form for Bridge Place located on Croydon, South London. This report has outlined BB7's intrusive survey findings, analysis of the external wall systems, and conclusions. BB7 intrusively surveyed the building on 25th March 2021; the survey was conducted by James Groves, Steve Golding and Lee Wilson of BB7.

Due to the recommendations that are to follow, the building will have a B2 designation on the EWS1 certificates that will be issued in conjunction with this report.

This report and EWS1 forms issued are valid for a period not exceeding five years.

9.2 Recommendations

BB7 make the following interim and long-term recommendations regarding the building:

9.2.1 Interim recommendations

The B2 designation does not, however, mean that the buildings evacuation strategy needs to change, it just means that we consider remedial works are necessary to bring the external walls up to a point where they need to be for the purposes of the form and government advice.

Section 11 of the Governments Consolidated Advice Note provides guidance on this issue. As per this report the building is generally well managed but there are actions on the FRAs which should be actioned, if not done so already.

There are a number of factors which can be considered:

1. Although the buildings are greater than 30m, they are provided with a sprinkler system which can reduce the severity of a fire within a flat.
2. Fire Service access to the building is generally good and the Fire Service would not experience an undue delay in getting water onto a façade fire. All facades are within reach of a hose from a standard pump appliance. The closest Fire Service station is less than 2 miles away from the development. The average call out time for Croydon FRS was 1min 23s in 2019.
3. The outer face is solid aluminium panels, and the insulation is non-combustible mineral wool throughout the main external wall system. This is unlikely to significantly add to fire spread up the external wall.
4. The cavity barriers are generally adequate from the inspection locations and are in locations which are broadly in line with the requirements of ADB.

On the basis of the above, BB7 suggest there is no immediate need to change the current escape However, there are some things that should be actioned to do to ensure occupant safety:

- An up to date FRA should be carried out considering the new information.
- Residents should be informed of their responsibilities in terms of fire safety.
- Risers in the lobby and stair should be reviewed to ensure fire and smoke spread is limited into the escape routes.
- The local FRS will need to be informed.

9.2.2 Long Term recommendations

BB7 make the following recommendations:

- The combustible foam boarding which protrudes from the underside of the first-floor slab into the external walling cavity should be removed or remediated so as not to be exposed into the external wall cavity.
- Damaged insulation and cavity barriers within the external walling system caused by vermin ingress should be remediated and further steps taken to prevent vermin movement within the external walling cavity.
- The operation of the smoke ventilation system operation to the upper floor levels be verified.
- The bin store should be refitted with a fire rated ceiling (preferably on a metal grid system), a fire damper to the base of the chute, and pipework and service penetrations should be fire-stopped with an accredited method to close off the penetrations in the event of a fire.
- Any composite panels with PIR or polystyrene insulation (i.e., to spandrel panels) should be replaced with a non-combustible alternative, and the polystyrene lining to the plant room ceiling removed.
- The fire alarm dial out red care system should be connected to a system which will respond in the event of activation (i.e., FRS, or an intermediate dial out handling centre).
- The use of compressed cylinders highlighted within the FRA by a number of residents should be addressed and a strategy developed to mitigate the use of such or provide alternative accommodation where necessary.
- All areas recommended to be remediated within the FRA should be rectified.

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