

SCOPE OF WORKS

Introduction

The work the design team has undertaken to date remains at an early stage. The initial focus has been on investigating the existing building and establishing its current condition to identify constraints and minimise the risk of unforeseen issues arising later in the project.

As information has been collected, the team has been developing the overall design approach, defining the scope of the proposed works, and exploring different options for addressing the main issues.

Project Brief

Great Arthur House previously had separated project briefs: repairs to kitchen and bathroom windows, fire compartmentation upgrades, and sprinkler installation. The revised brief consolidates these elements and has been relaunched as one complete package of works.

The scope of works consists of:

- fire compartmentation;
- fire resisting enclosure to service risers;
- fire resisting entrance doors and screens;
- firestopping of services;
- smoke ventilation;
- sprinklers/suppression;
- kitchen and bathroom window repairs - including replacing glass with vacuum glazing;
- installing new mechanical ventilation;
- decorations to communal areas; and
- full electrical upgrades including emergency lighting.

The safety of the gas system has been reviewed and the implications of the removal of gas is being considered.



TIMBER WINDOWS

Existing Condition



Timber-framed kitchen and bathroom windows. The top-hung opening windows sit proud of the frame when closed.

The bathroom and kitchen windows are timber-framed with single glazing. The windows and opening casements are made from softwood, which expands and contracts as its moisture content changes with the weather. As a result, the windows can become difficult to open or close, and at other times gaps may form, allowing draughts to enter.



Timber beading projects out from the frame.

The timber glazing beads are also made from softwood and project beyond the face of the surrounding timber frame. The amount they project varies between flats.

Proposal

Inspections of several void flats found the timber window frames to be in generally good condition, largely due to their sheltered position set back from the balconies. Frames on the lower floors were also in better condition than those on the upper floors, likely because they have been less exposed to the weather. As a result, the existing fixed frames can be retained, with localised repairs carried out where required, while the top-hung opening casements would be replaced.

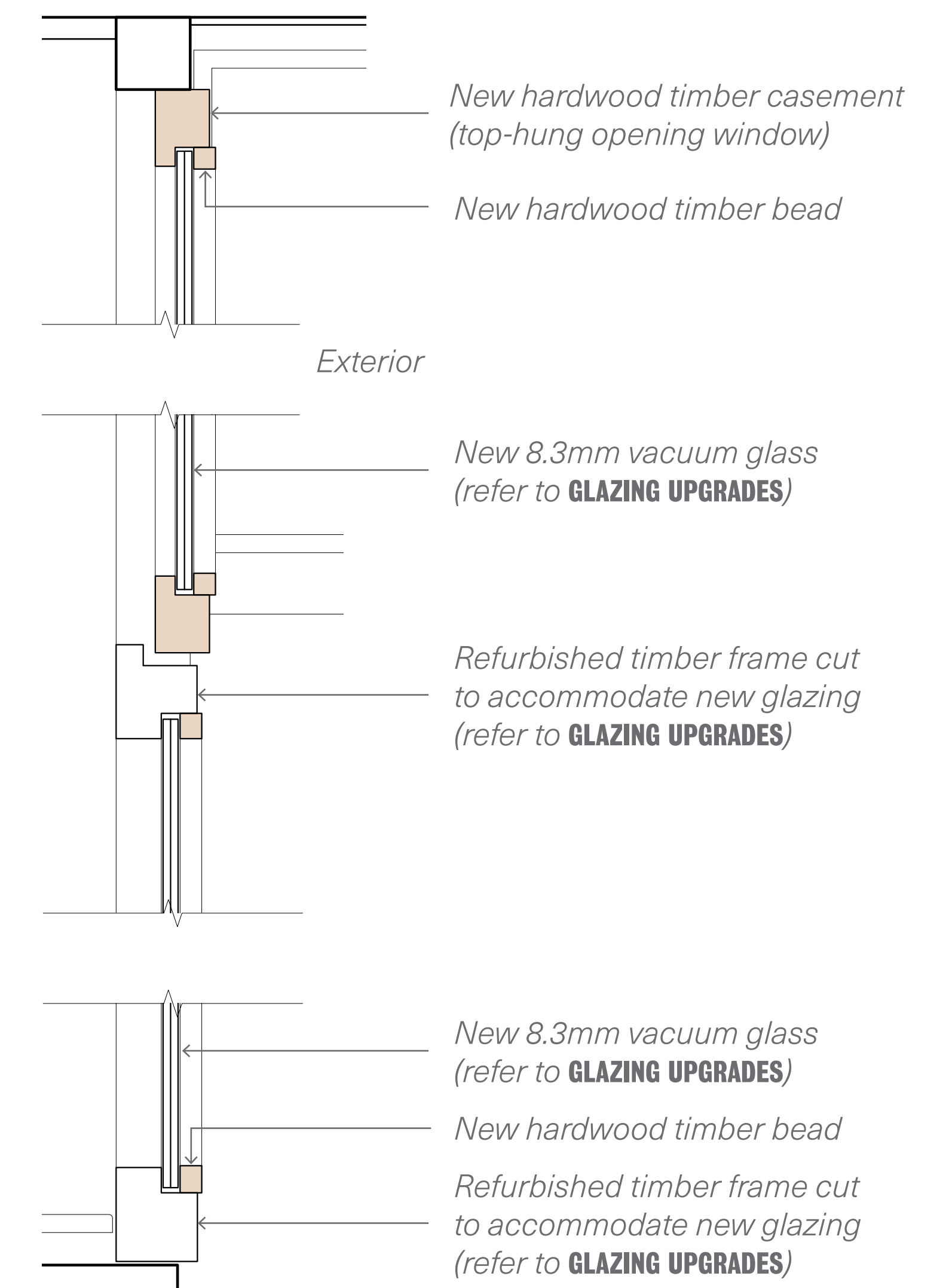
New hardwood opening casements are proposed to replace the existing top-hung windows. Hardwood is generally more durable and dimensionally stable than softwood, making it less prone to movement caused by changes in moisture. This should help the windows open and close more reliably over time. The hardwood will still be painted to match the rest of the frames.

The existing timber beading across all windows, opening and fixed, will also be replaced with hardwood.



Top-hung openable windows in the bathroom and kitchen.

The existing timber frame will need to be cut to accommodate the new thicknesses of the proposed new glass (refer to **GLAZING UPGRADES**). The new hardwood frames will be sized accordingly, taking into consideration the new glazing.



Proposed section through the kitchen window - new hardwood frame for the opening window, new hardwood beading for both the fixed and opening windows.

GLAZING UPGRADES

Clear Glass

Clear vision glass within bathroom and kitchen window frames will be replaced with new vacuum insulated glass (VIG). Typically the vacuum glass is formed from two sheets of 4mm toughened glass separated by a 0.3mm vacuum. It is the vacuum which gives the glass its high performance in terms of thermal insulation and sound transmittance.

The vacuum glass will help to retain heat and reduce solar gain & overheating.

	single glazing	vacuum glazing
U-Value (thermal performance)	4.8-5.8	0.5
G-Value (solar transmittance)	0.9 - 0.85	0.53
Acoustic (sound reduction)	29 dB	36 dB
Light Transmittance Value (LTV)	90%	77%

Performance of vacuum glazing vs single glazing. Lower U-value & G-value figures are better, higher acoustic and LTV are better.



CGI of vacuum glass (LandVac).

1. Toughened glass
2. Edge seal
3. Getter
4. Low E coating to glass
5. Micro spacers (required to maintain vacuum).

Reeded Glass

Reeded glass is only used in the low level window of the bathrooms. This will be replaced with a composite glazed unit consisting of an outer layer of reeded glass with an inner layer of vacuum glass.

This will provide an external appearance closely matching the existing appearance, and maintain the same level of privacy while also delivering the same thermal performance of the new vacuum glazing elsewhere.



Existing reeded glass installed only in bathroom low-level window.

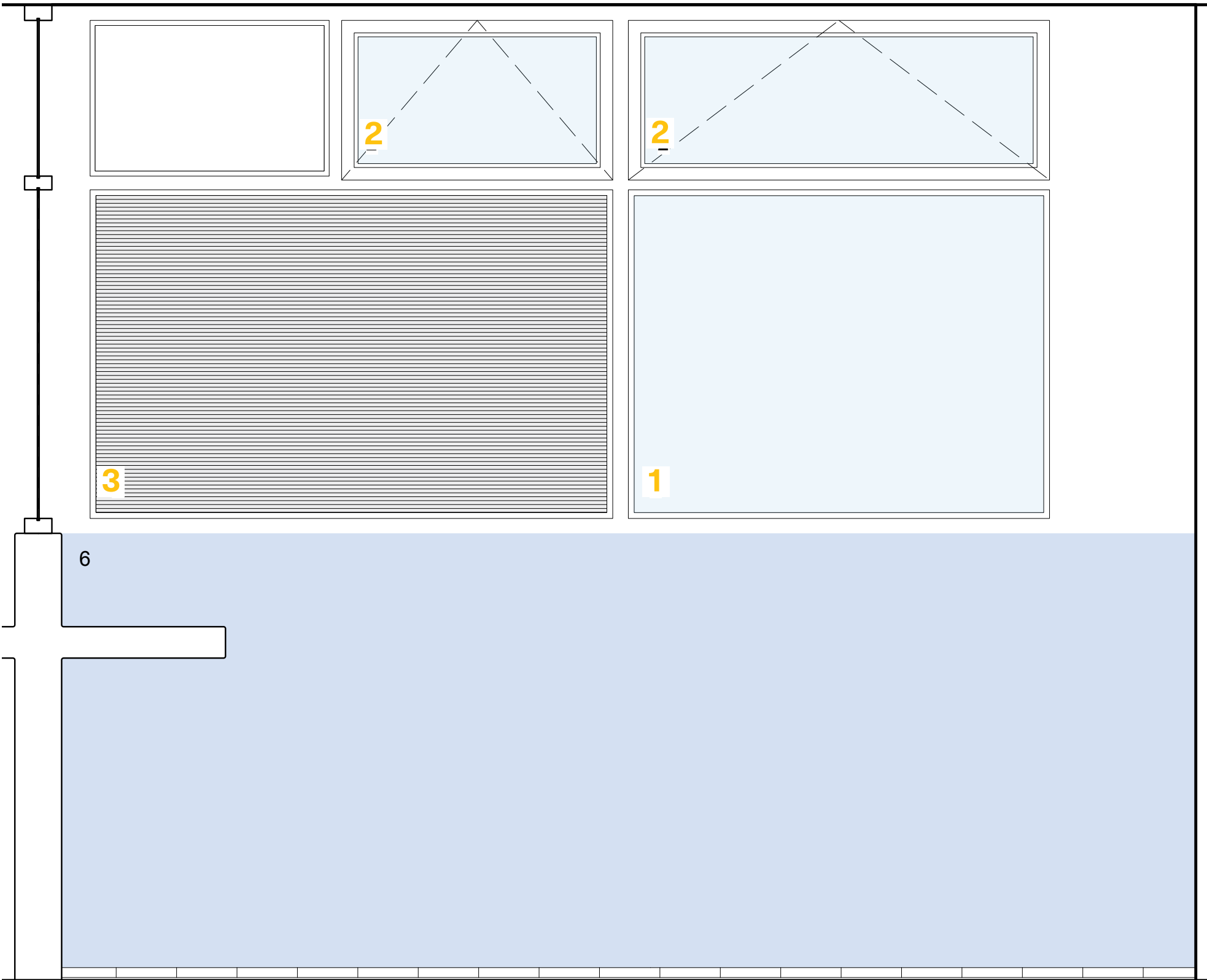


CGI of replacement reeded glass double glazed unit.

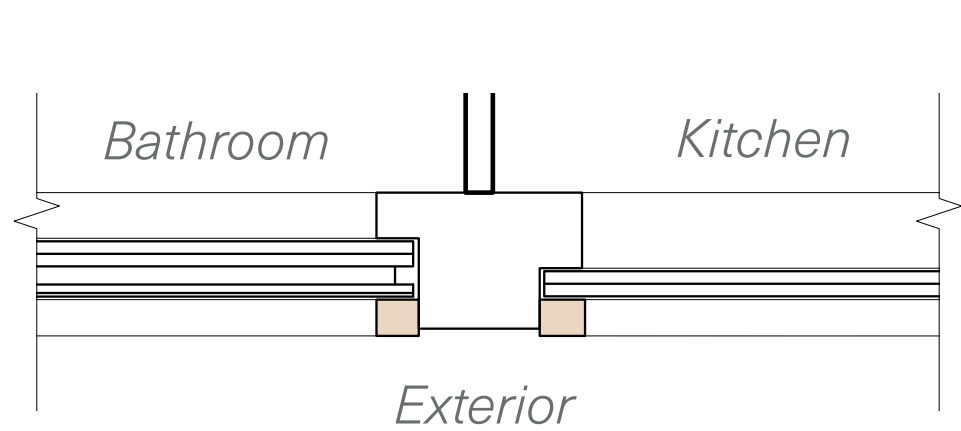


1. Vacuum insulated glass
2. Laminating sheet
3. New reeded glass.

Overall, the windows would retain their existing appearance but be in better condition and easier to open and close and have a better thermal performance.



1. Fixed new 8.3mm vacuum glass.
2. Top-hung opening window, new 8.3mm vacuum glass.
3. Fixed new reeded glass laminated to 8.3mm vacuum glass.

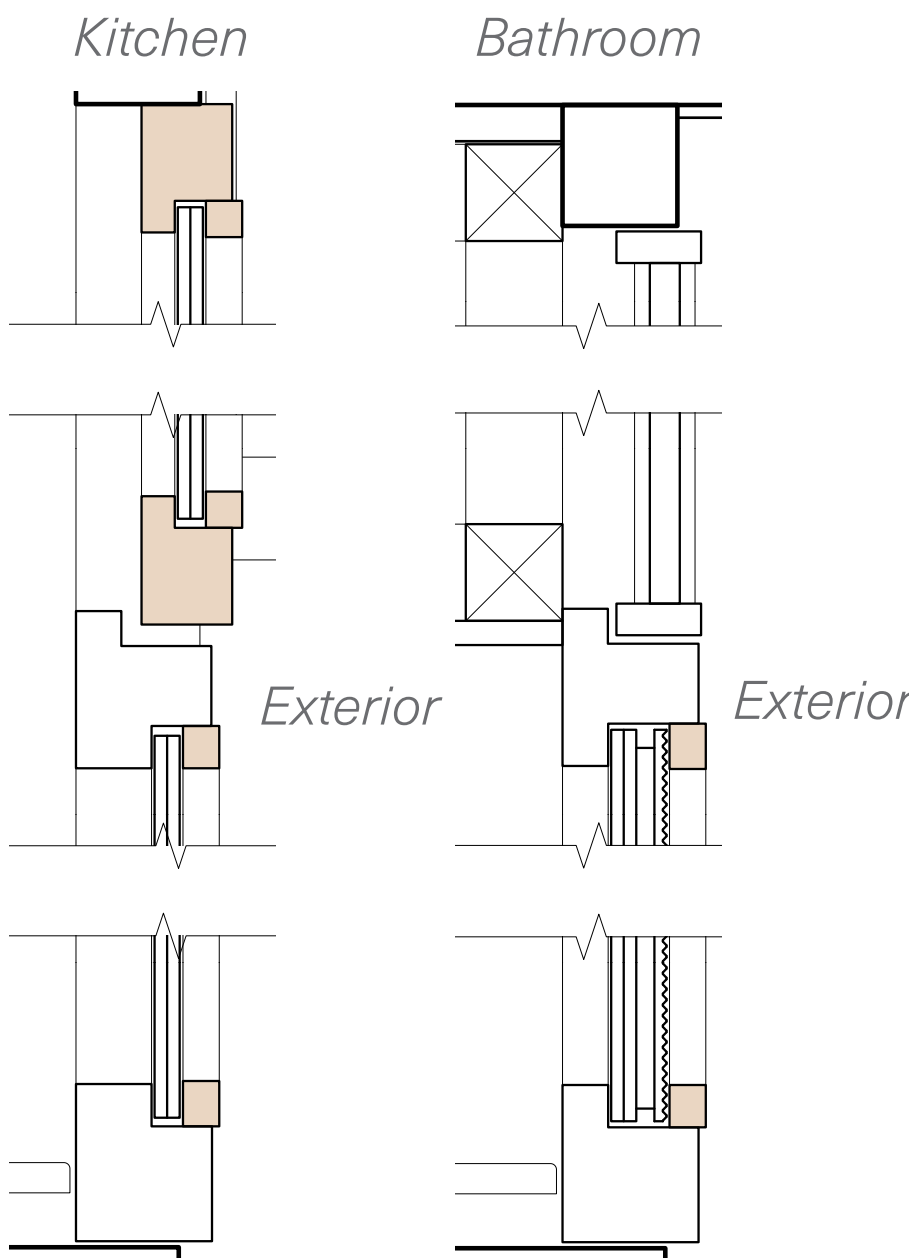


Above: Proposed plan through the fixed bathroom and kitchen windows.

Right: Proposed section through the fixed bathroom and kitchen windows.

A hybrid VIG double glazed unit with reeded glass in the bathroom, and clear VIG in the kitchen.

Timber frames will need to be cut to accommodate the new thicknesses of the glazing (refer to **TIMBER WINDOWS**).



Existing Risers

There are four service risers running the full height of the building, with two located in each stair lobby. The services branch off into each flat.



Risers contain: gas, water, electricity, telecommunications, rainwater and foul drainage services.

The risers are heavily congested, with some redundant services still in place, leaving insufficient space for the additional services required as part of the proposed works.

Ryefield distribution boards are located within the service risers at the north-west and south-west ends of the building. Positioned on every third floor, they project into the adjacent stair lobby.

Individual gas and electricity meters are located within each flat's entrance lobby.



Proposed Services & Riser Location

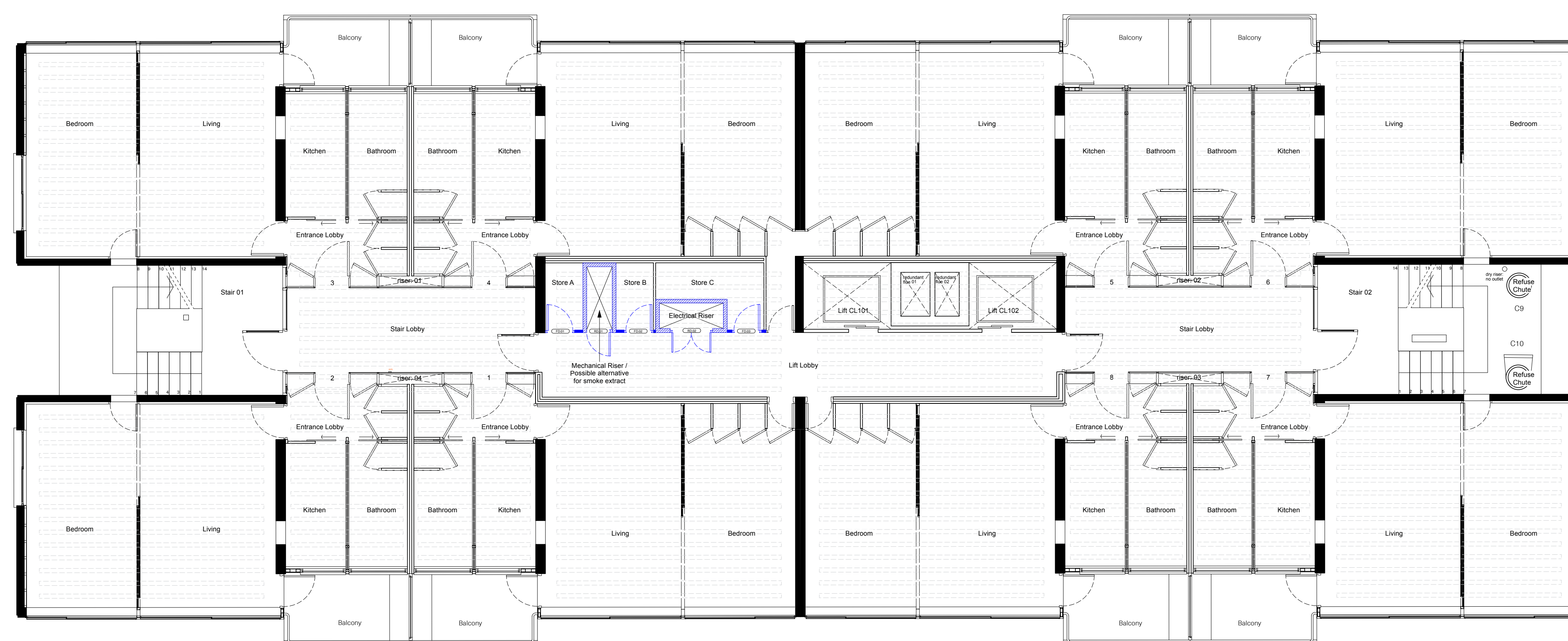
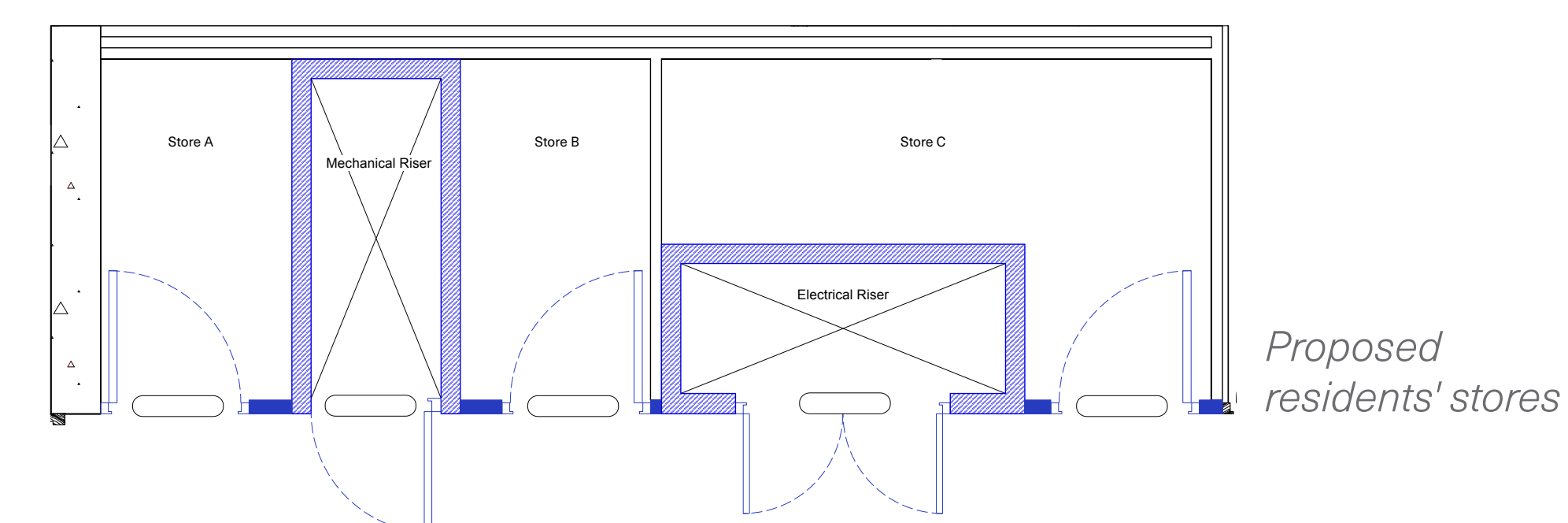
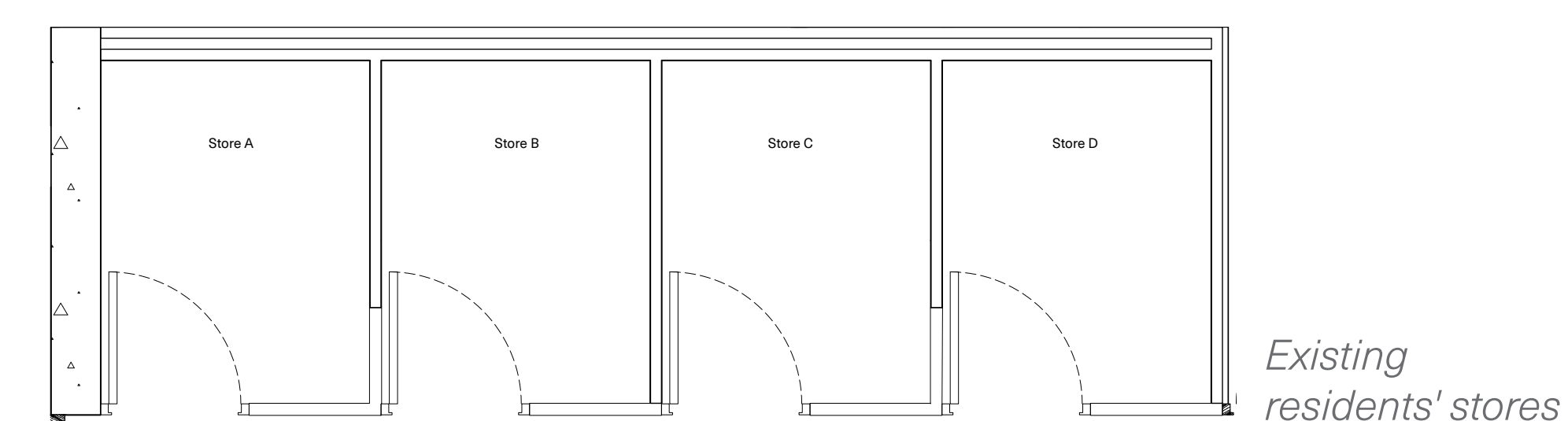
New services are required throughout the building, including:

- Sprinkler pipework
- Low voltage electricity distribution cables (Ryfield board feeds)
- Low voltage electricity distribution cables (Landlord feeds)
- Data and extra low voltage cables (fire/access/CCTV)

As the existing risers are heavily congested and additional services are required, new risers are likely to be needed elsewhere in the building.

Providing new riser locations would allow the new services to be installed and commissioned before the existing systems are disconnected, enabling a phased changeover and helping to avoid interruptions to residents' power and other essential services.

Each of the 15 typical storeys contains 4 resident store rooms. This option proposes combining adjacent pairs of store rooms to form two new vertical risers (mechanical and electrical) per floor, providing a central location for service distribution.



Existing

The overall objective is to contain a fire within the flat of origin, enabling the building to operate under a 'stay put' evacuation strategy.

To achieve this, the existing deficiencies in fire separation between flats and the common areas must be addressed.

The design team has therefore begun to investigate and assess the existing fire protection, including: the fire protection of the existing structure and linings; potential routes for smoke and fire spread; means of escape and smoke ventilation, and the provision of active fire suppression.

A 'stay put' strategy would avoid the complicated arrangements of different sounders and floors of evacuation.

The current strategy is described as: "a simultaneous evacuation of all common areas and a phased evacuation of the residential floors (all flats on the floor of fire origin, two floors above and one floor below the floor of fire origin are simultaneously evacuated). It is understood that residents are advised that on a continuous alarm signal they should immediately evacuate and on an intermittent alarm signal they should stay put unless their flat is affected by smoke or fire".

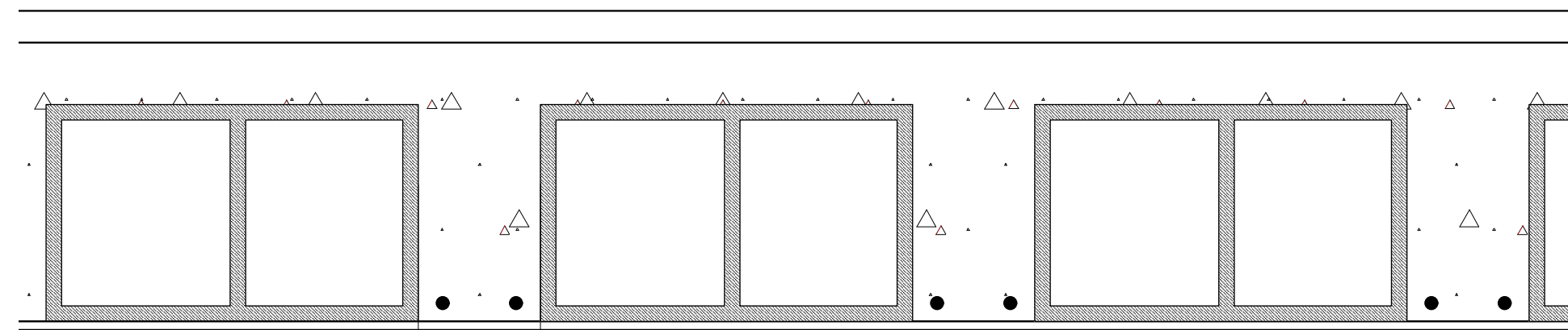
↑ Escape route from flat main entrance

□ Outline of a flat



Existing Structure

All floors are formed from reinforced concrete. The floors within the apartments have hollow concrete pots cast into the bottom of the slab, supported by reinforced concrete walls spanning in the north-south direction.



Existing soffit detail - indicative detail of the configuration of the clay hollow pots and concrete ribs with the steel reinforcement bars.

An intrusive survey found the concrete cover to the steel reinforcement varied from approximately 7 mm to 23 mm, with some areas below the 20 mm typically required for fire protection and durability. The survey also identified carbonation in some poorly compacted concrete, meaning the concrete around the steel was no longer providing adequate protection against corrosion where moisture and oxygen are present.



Full height timber glazed partitions separating the living room and bedroom, including the original sliding partition, and the fixed glazed partition between the kitchen and bathroom.

The relationship between the head of the partition and the ceiling is a heritage consideration.



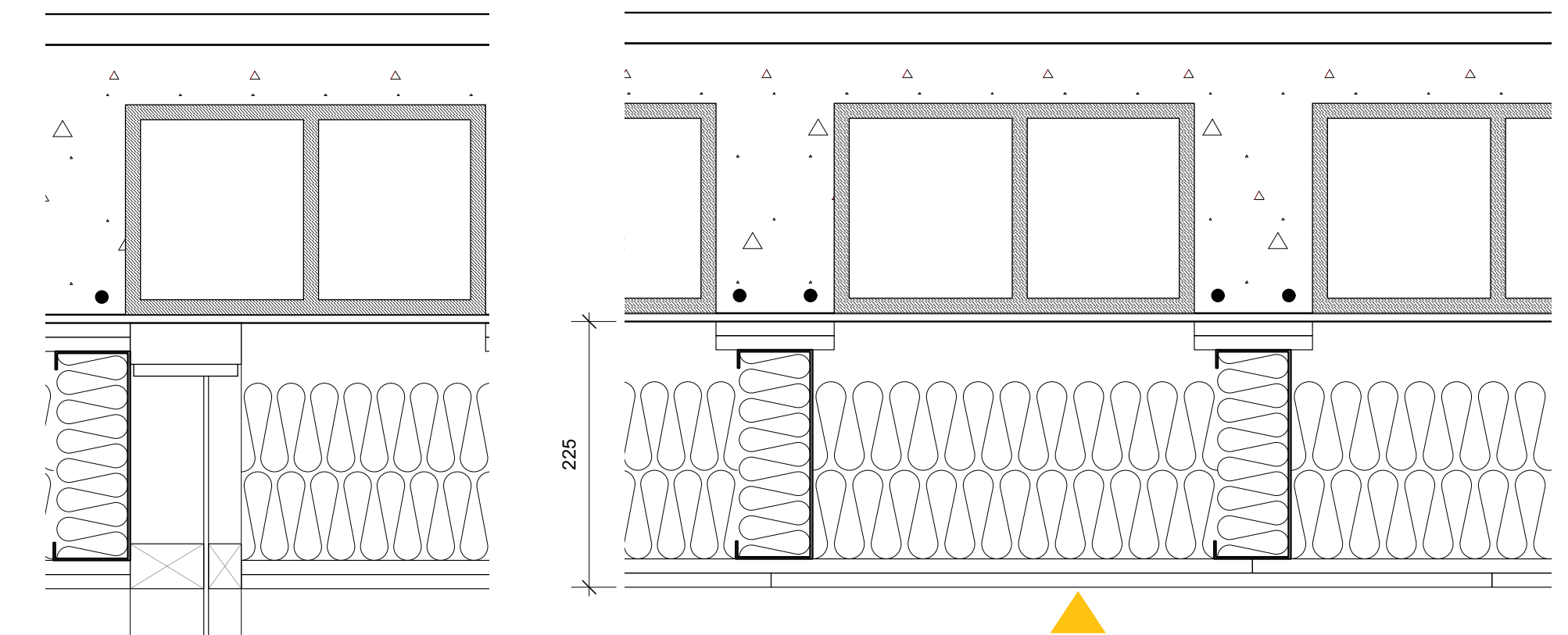
Steel in the reinforced concrete ribs with poorly compacted concrete carbonation.



Proposed Options

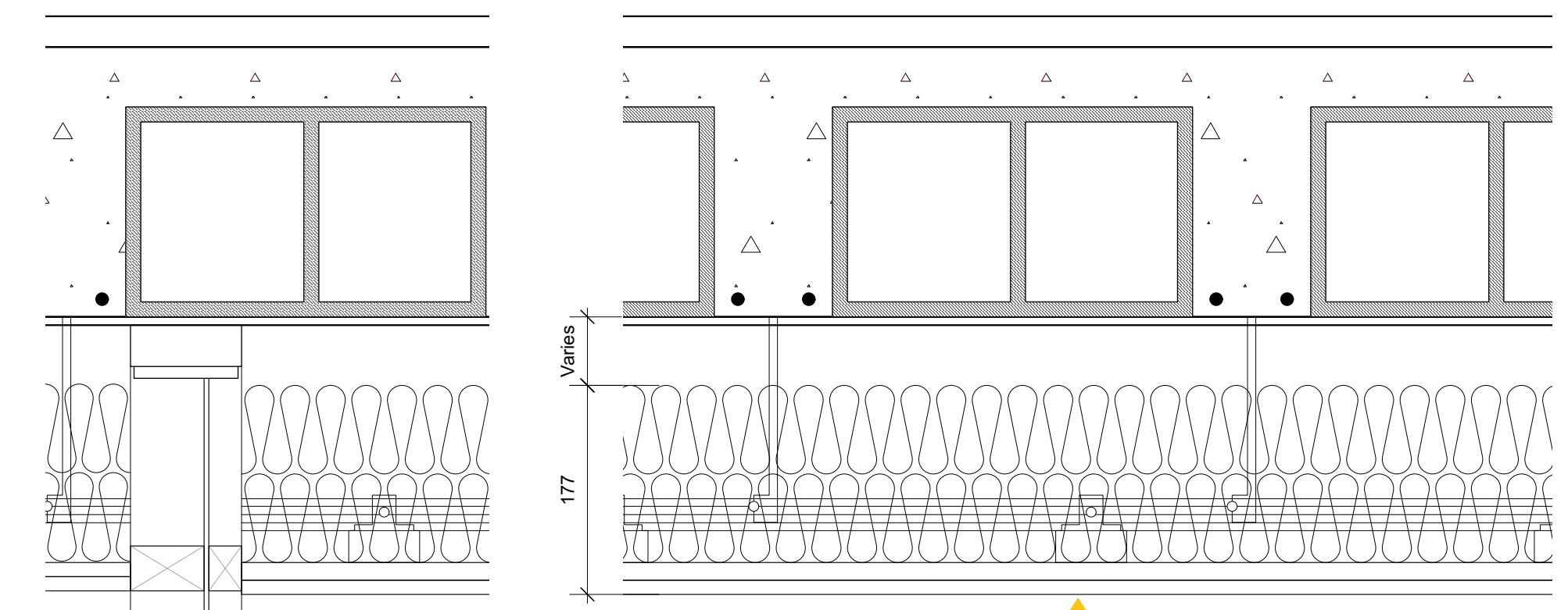
The team have explored potential remedial solutions to enhance the fire protection to the underside of the slabs, with the aim of achieving 120 minutes fire resistance.

Self-supported Ceiling



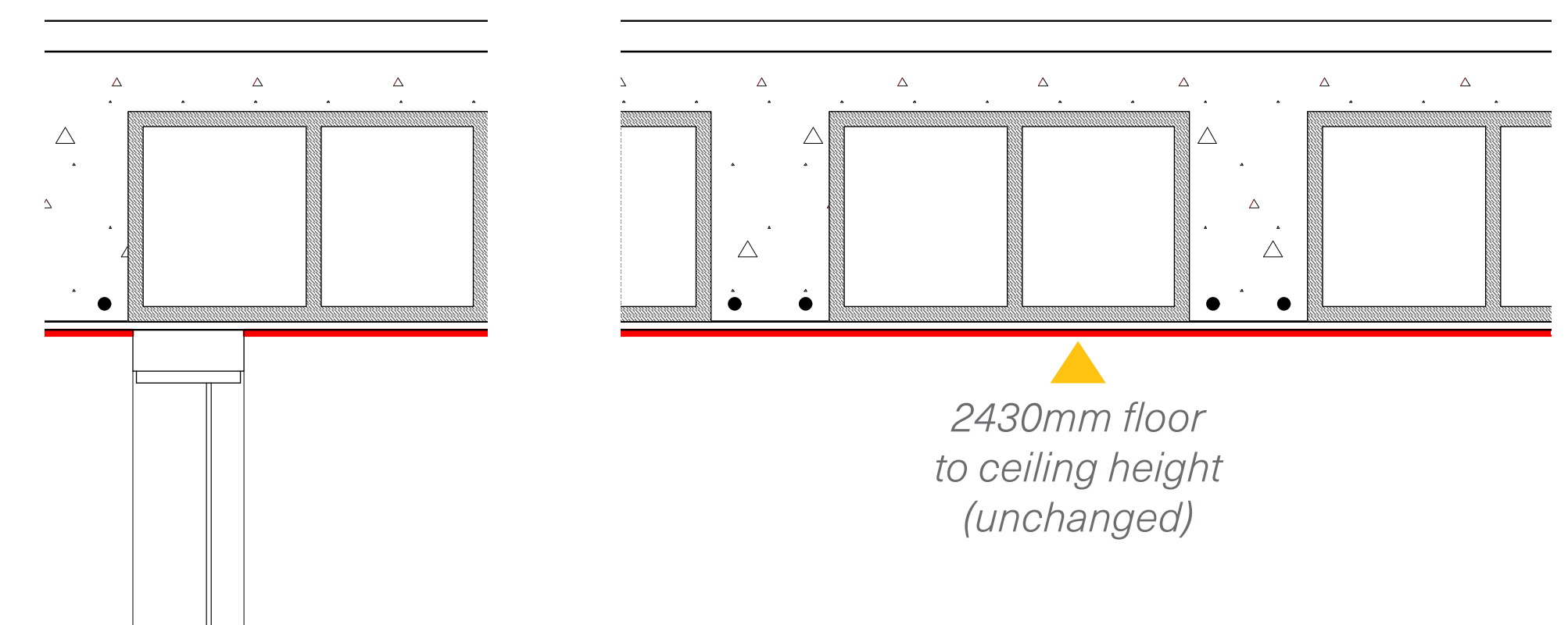
2115mm floor to ceiling height

Suspended Ceiling



2263mm floor to ceiling height

Intumescent Paint



2430mm floor to ceiling height (unchanged)

Interaction with timber glazed partition.

Depth of proposed remedial solution; new floor to ceiling height (appx.) and interaction with soffit.

Existing Flat Entrance Screens

The timber-framed entrance screens are a distinctive historic feature of Great Arthur House but present a significant challenge to improving fire separation between the flats and the communal areas.

The screens are constructed from timber with original infill panels that provide limited fire resistance and are understood to contain asbestos, requiring careful management during any works.



Screen with heritage features and integrated flat entrance door.



Original condition.

They also contain original features namely the parcel hatches and letterboxes. These openings create potential routes for fire and smoke spread. As a result, the entrance screens provide only limited fire protection between the flats and the communal escape routes.



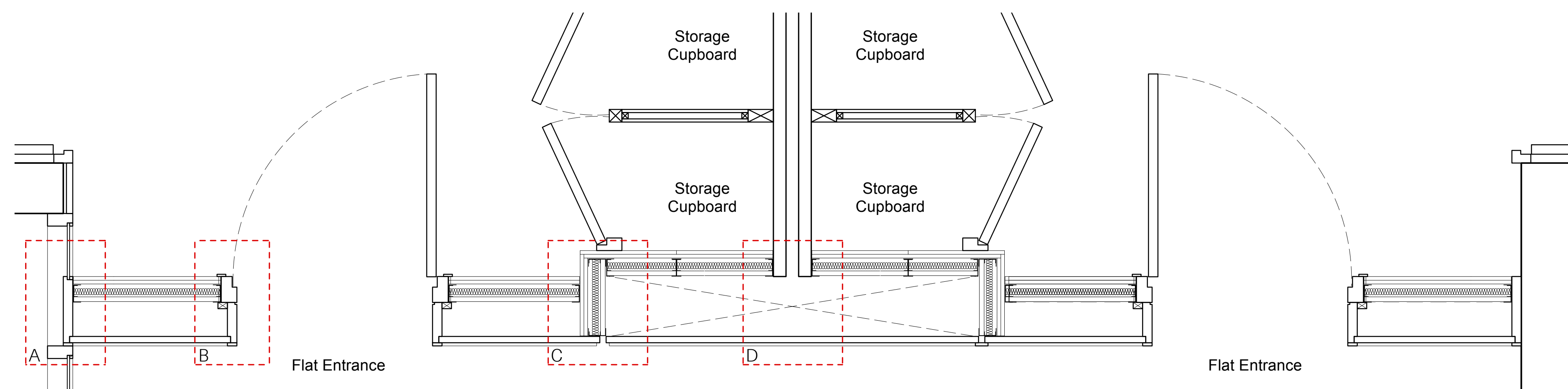
Letterbox.

Proposed New Fire Rated Lining

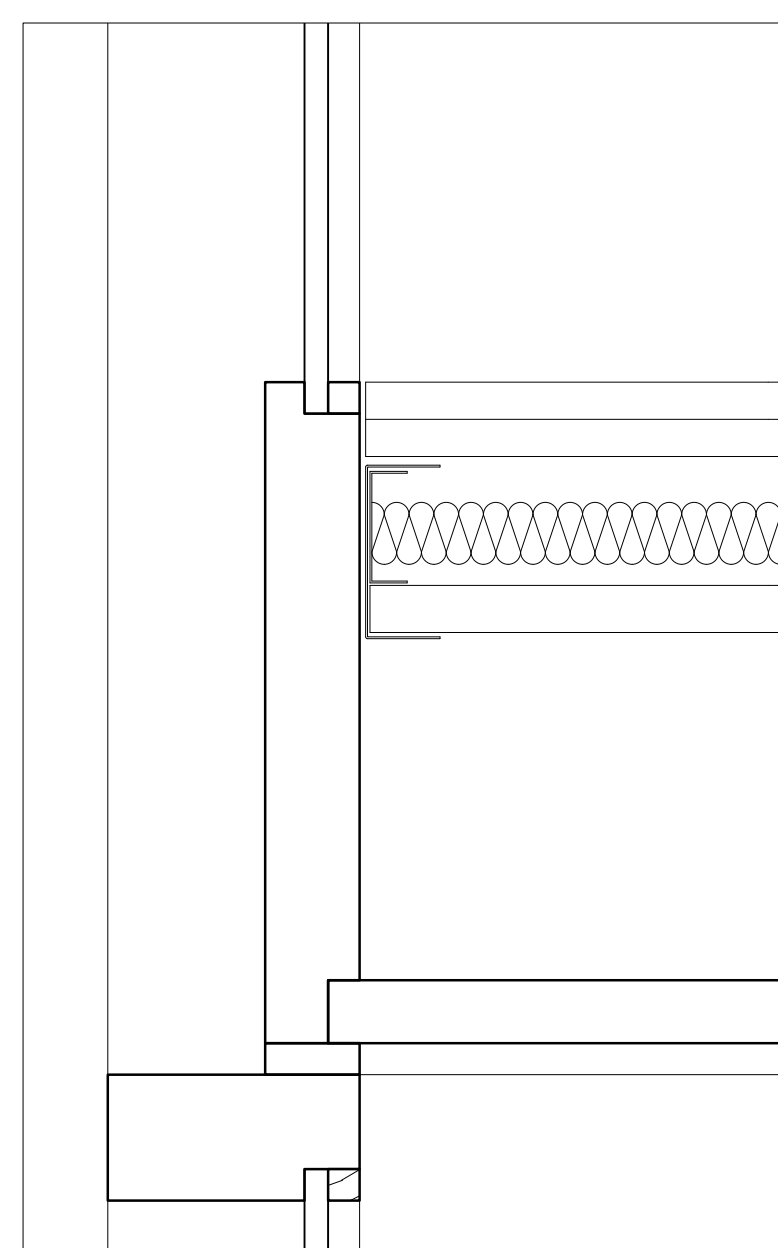
Flat front entrance doors are also integrated into the timber frame of the screens, making them part of the fire separation line between flats and common areas. As the doors do not provide the required fire protection, they will also need to be replaced with suitable fire doors.

Of the options considered so far, a version using a 'Shaftwall' system, can achieve a fire separation line. The new fire doors will be integrated into the design.

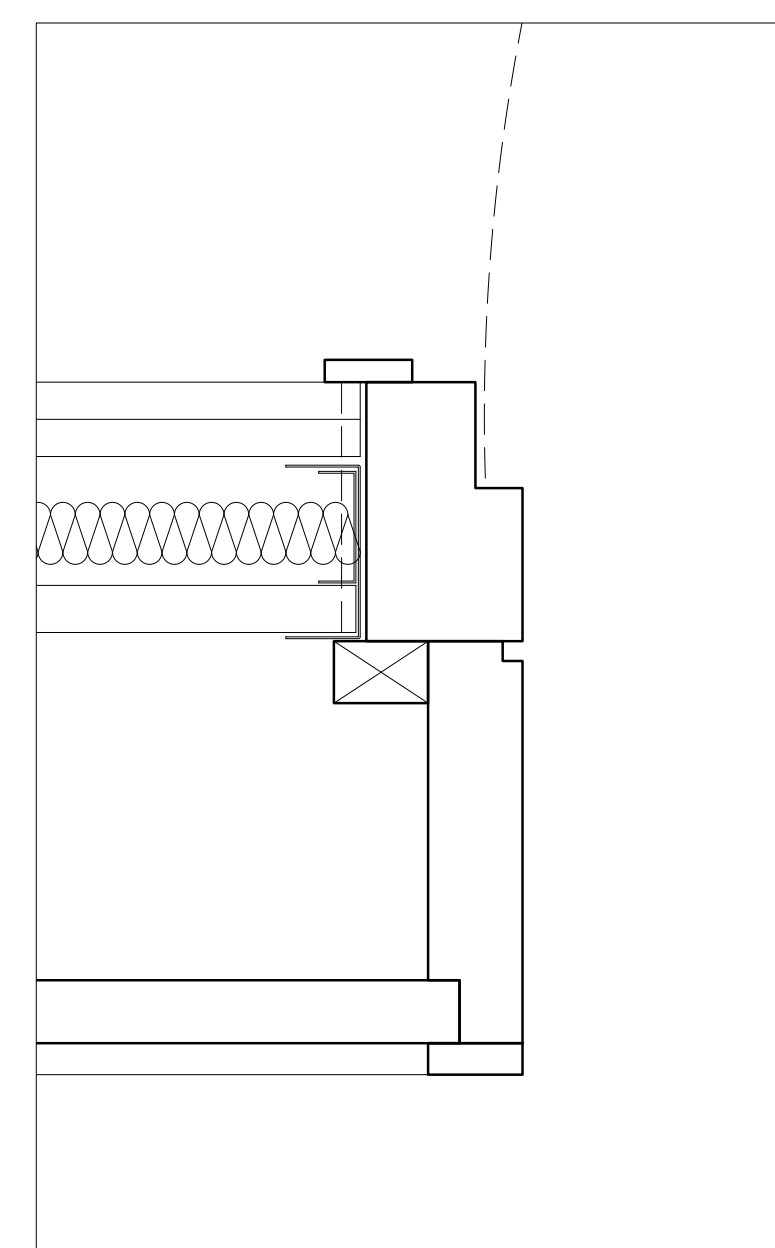
Installing the lining to the rear of the screen creates a simple, continuous fire-protecting line while allowing the front of the entrance screens to retain their historic appearance. However, the letterboxes and parcel hatches would no longer be accessible from inside the flat. Furthermore, the two storage cupboards inside the flat could no longer be used and another would be slightly reduced in size.



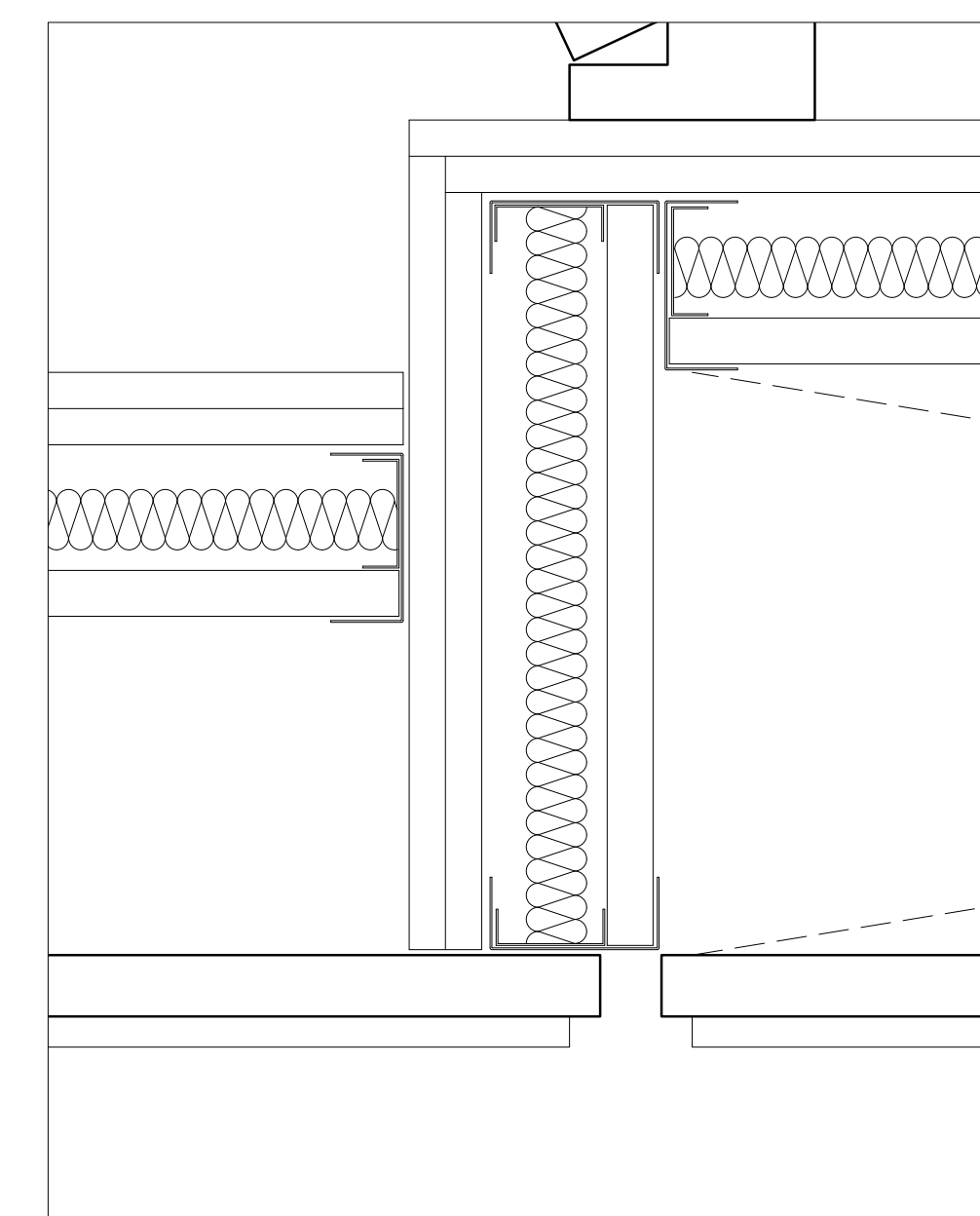
Detailed plan showing a proposed Shaftwall lining to the rear of the riser and storage cupboards with key junctions highlighted - see below.



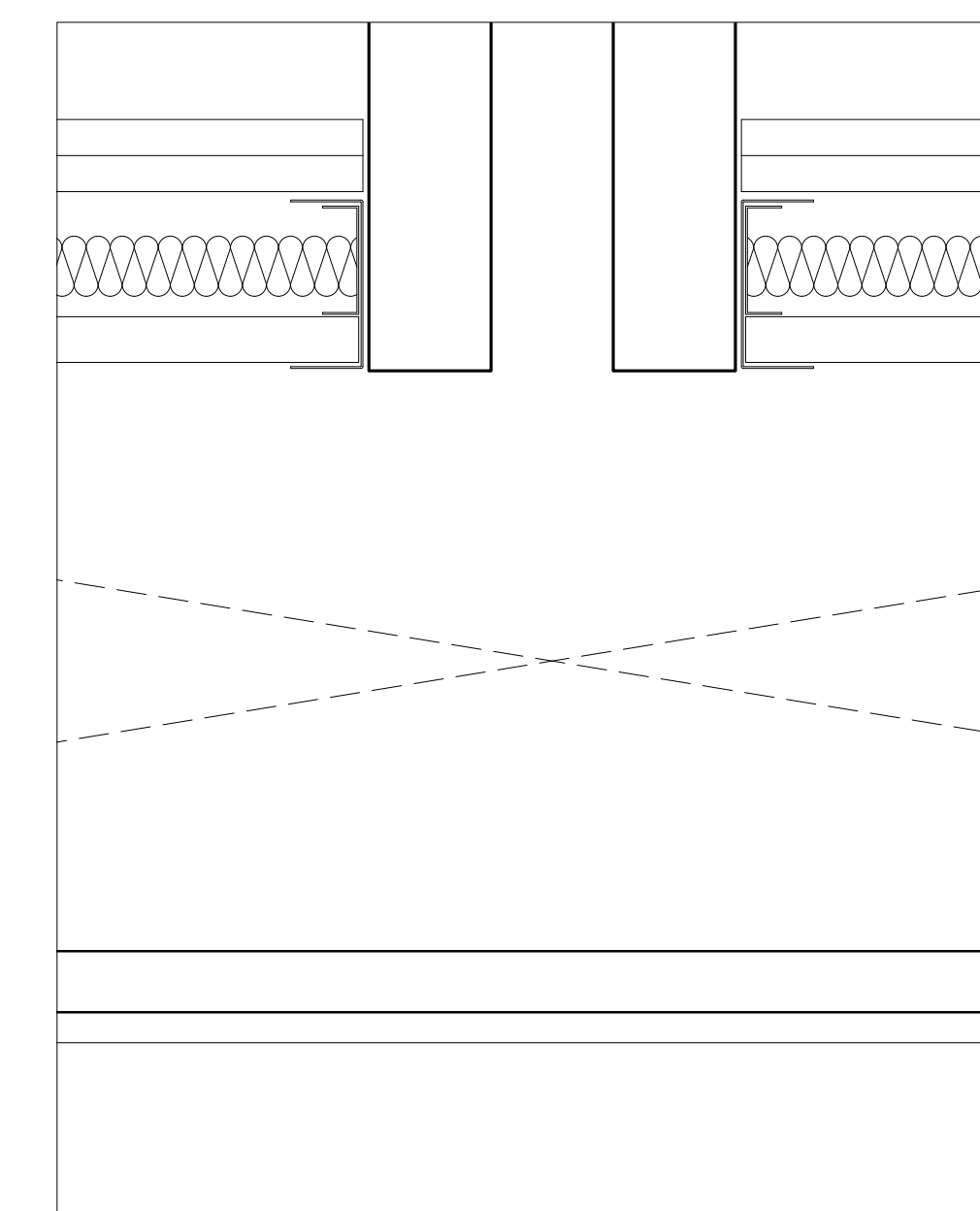
A - Junction with glazed screen (end flats only).



B - Junction with flat entrance door.



C - Corner junction.



D - Junction at existing party wall.

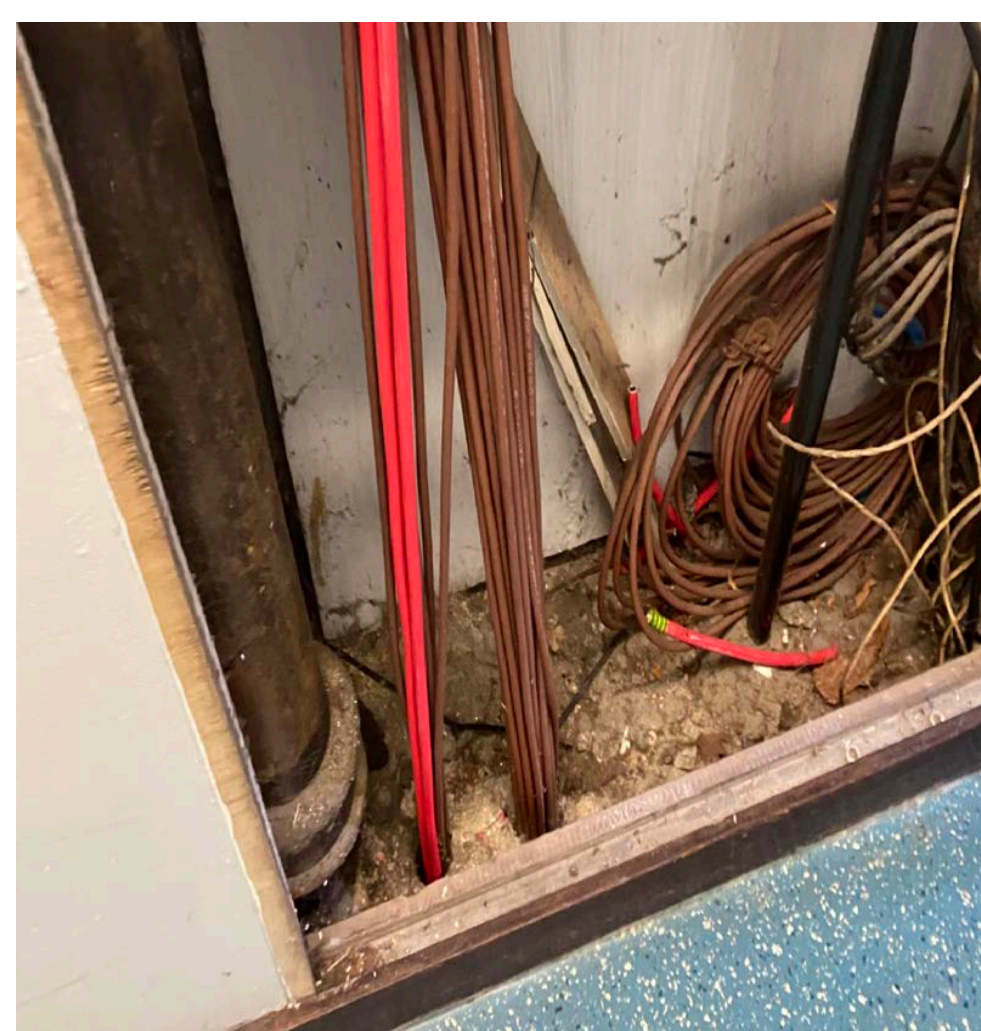
Existing Paths of Smoke & Fire Spread

Through initial surveys, it is evident that fire protection between flats and common areas is compromised in a number of locations.

The vertical services riser is shared between a pair of neighbouring flats and also connects to the building's communal areas. The wall separating one flat from the neighbouring flat was open within the riser cupboard.

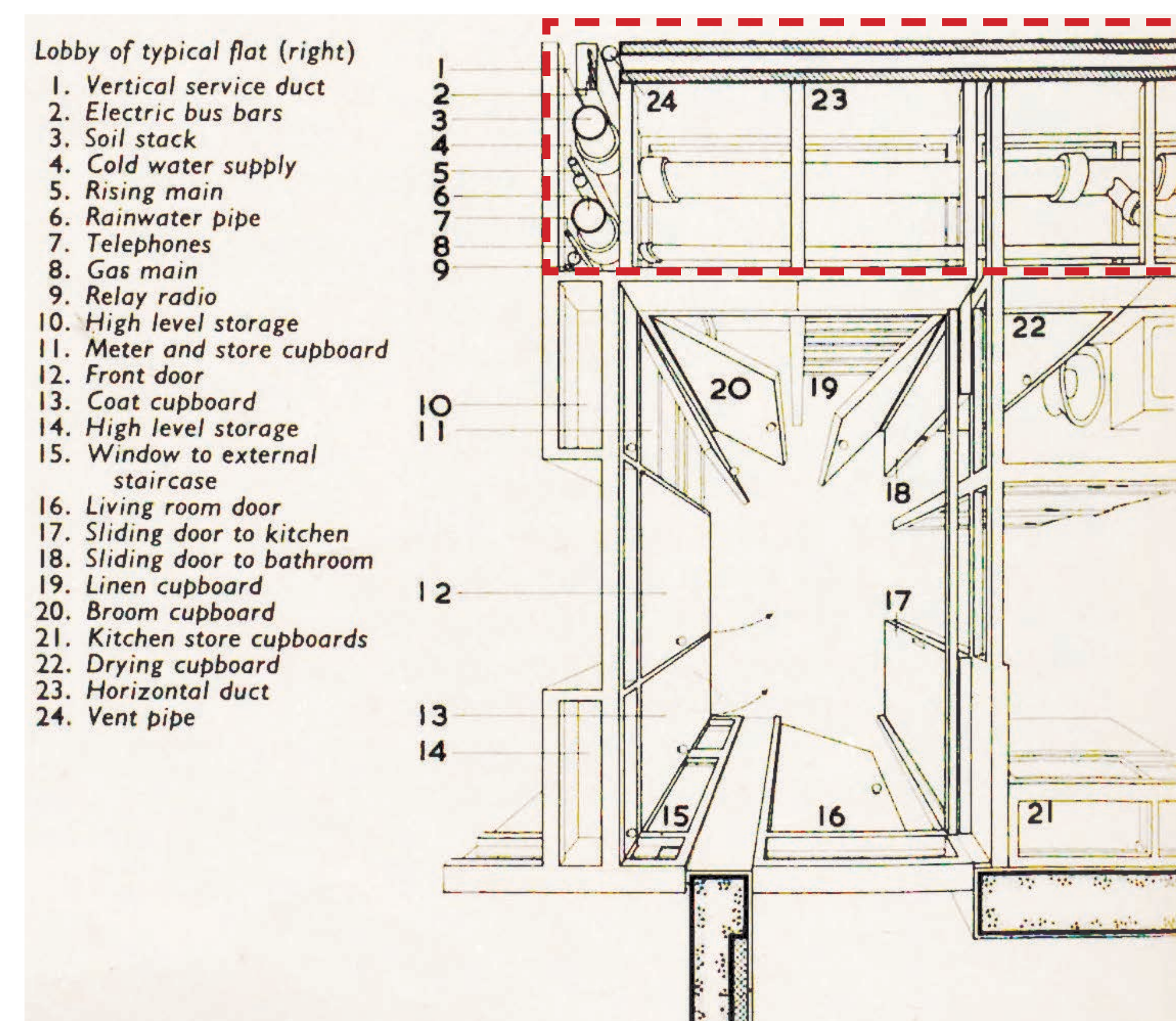


Because the separating wall between the flats does not fully continue through the riser space, it does not provide the level of fire separation that would normally be expected between homes. As a result, smoke or fire could potentially pass through the riser area and spread between neighbouring flats.



A survey of the service risers found that many openings around pipes and cables passing through the floors and ceiling had not been properly fire-stopped. These gaps could allow smoke and fire to spread between floors, flats and communal escape routes.

In the bathrooms, a boxed-in space contains service pipes that connect to the shared vertical service riser screen.



Drawing from article on Great Arthur House from Architecture & Building Magazine - October 1957.



During the inspection, it was possible to see the back of the riser panels from inside this boxing. Communal lighting from outside the flat was clearly visible through this space, showing that the wall and enclosure do not properly separate the flats from the communal areas.

In the void flats surveyed, sections of the original pipework had been altered using modern plastic pipework and there were instances where this plastic pipework had been wrapped with flammable wire wool.

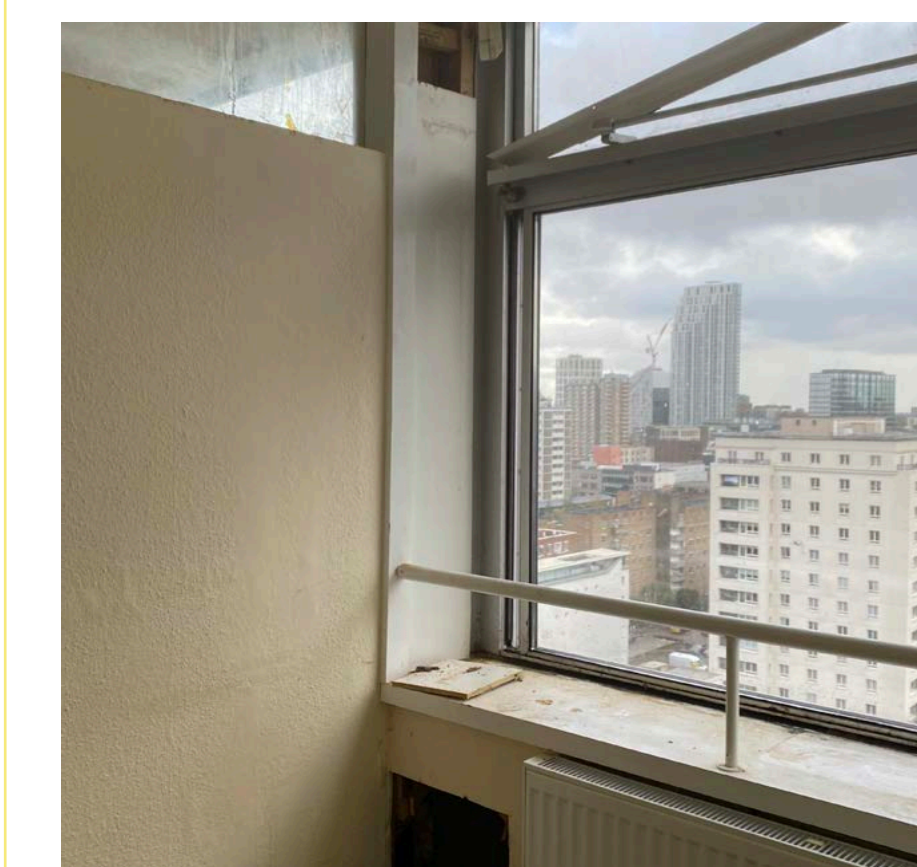
Such materials and ad hoc treatments are not suitable for maintaining fire separation, as they are liable to soften, melt, or fail under fire conditions. Given that these services penetrate floors and walls, their failure could result in the formation of openings, compromising the integrity of the fire separation and provide a potential route for the spread of smoke and fire between flats via the service penetrations.



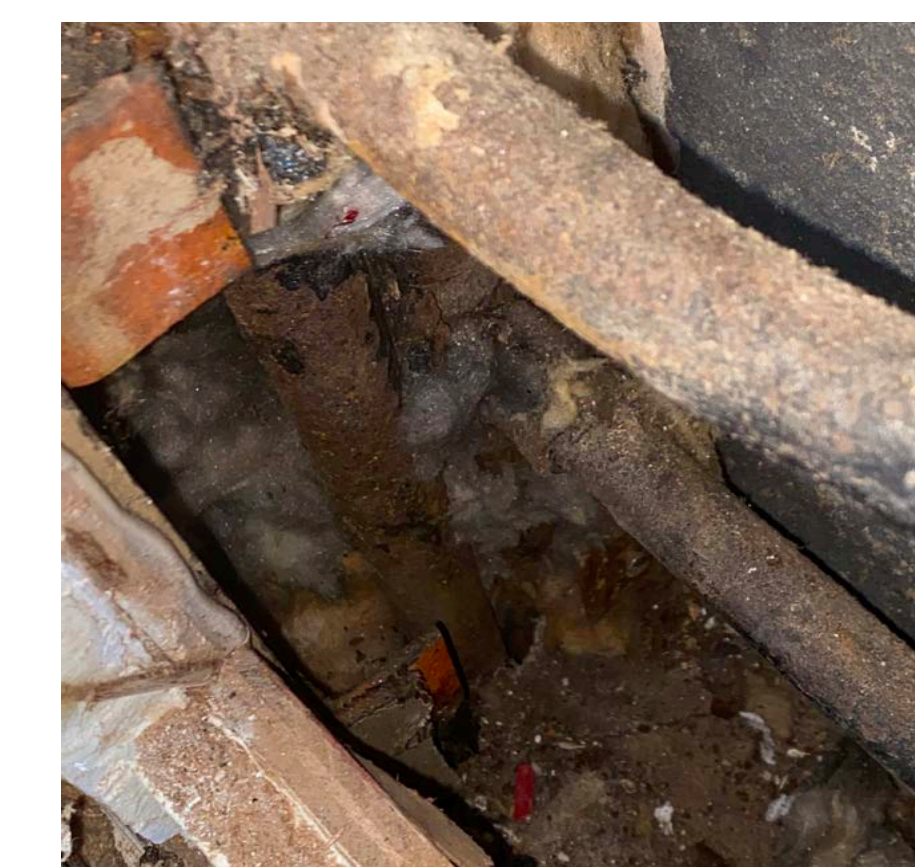
Plastic UPVC repair with wire wool wrapped around the pipework.



Metal wire mesh and bonding plaster with significant gaps.



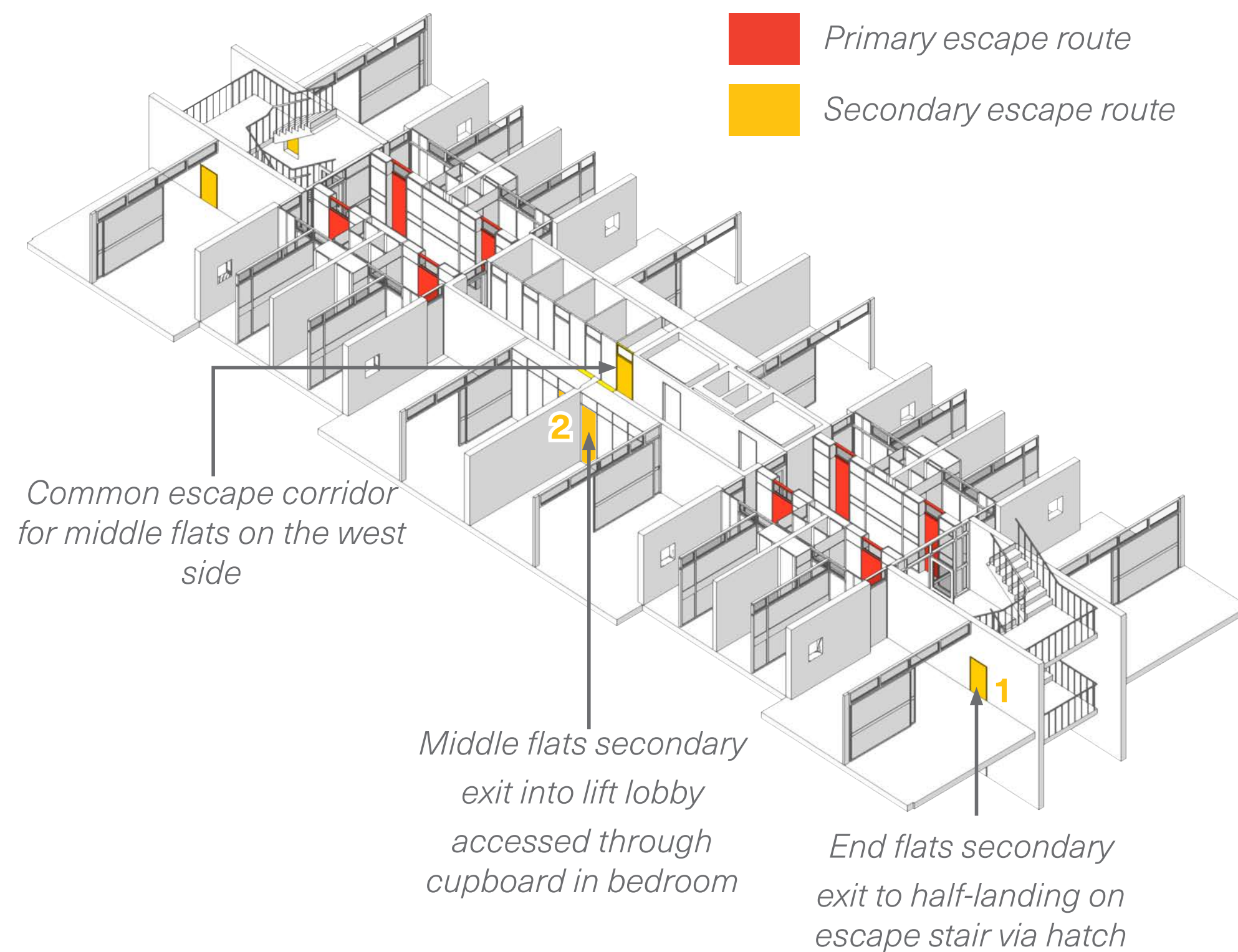
Redundant perimeter communal heating pipework provides a potential route for smoke and fire.



Existing gaps around the pipe penetrations require fire stopping to maintain fire separation at floors.

Escape Routes and Smoke Ventilation

The guidance in place at the time of construction did not fully address smoke spread through the lift shafts. Alternative escape routes from flats open directly into lift lobbies without smoke ventilation, allowing smoke from a fire to spread into the lobby and travel to other floors via the lift shaft.



The escape hatches are 1.5m above the stair and are not very practical.



The cupboard escape routes to middle flats are often obstructed - residents may not be aware of their purpose.

Proposal

The team proposed to remove the use of these alternative escape exit points and provide smoke ventilation to protect the stair and lift lobbies.

The team proposes that the exit doors and hatches are to be replaced with fire doors but sealed/boarded up from the inside to prohibit access. Replacing the doors, rather than removing them entirely and boarding up the gap left behind, prevents the heritage characteristics of Great Arthur House from being visibly altered.

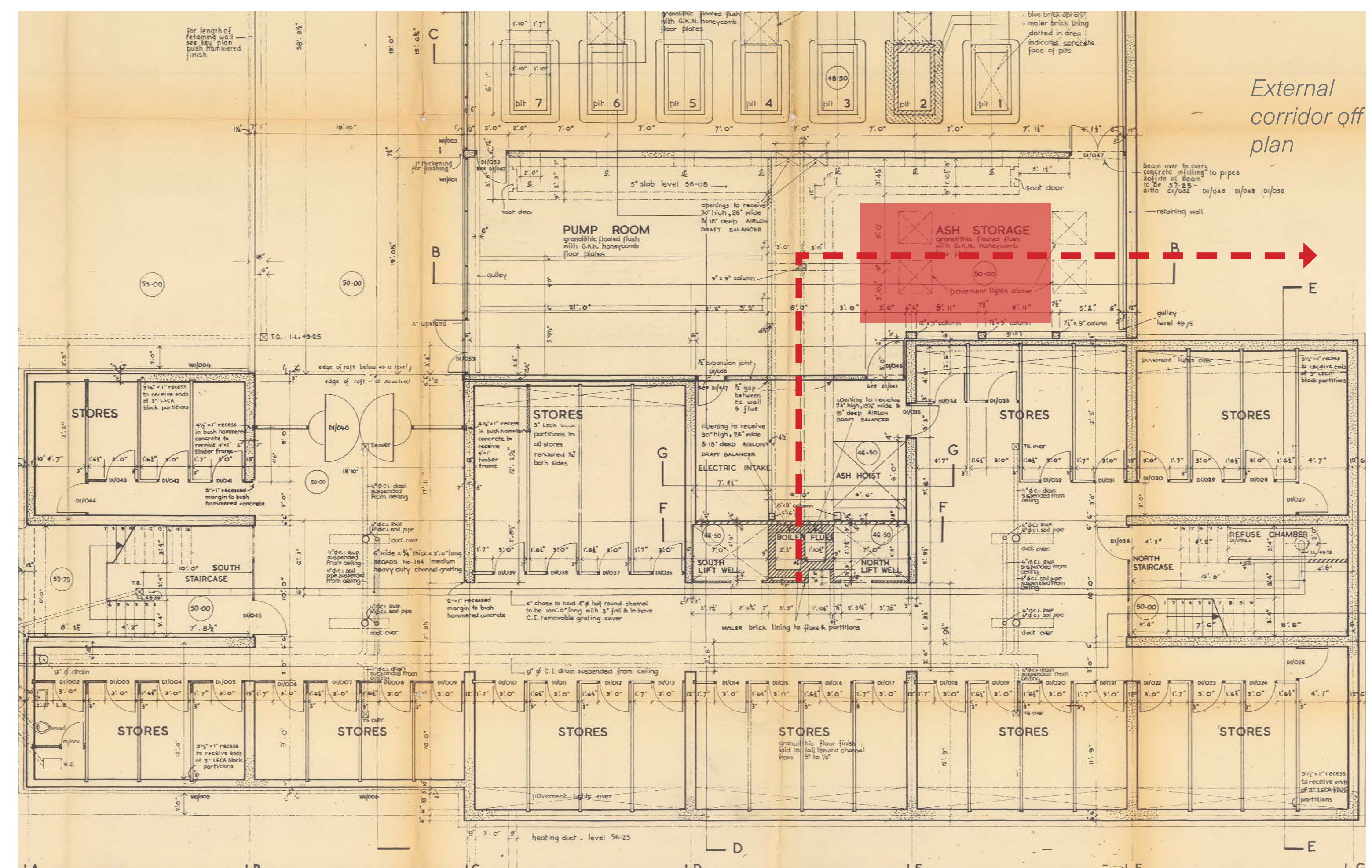
A mechanical smoke ventilation and extraction system is required to help keep escape routes clear for residents and provide safer conditions for firefighters.

Archive research and site investigations identified the route of the original boiler flue, which runs from the basement to the roof between the lift shafts. At basement level, the boiler flue turns horizontal at high level and connects to the boiler house.

Rather than locating smoke extract fans at roof level, fans could be installed on an external basement wall, using the existing flues to route the ductwork. Access to the basement is significantly safer and more straightforward for maintenance, and the existing boiler flue route provides a path for routing services through the basement. Further investigation, such as a CCTV survey, is being instructed to confirm whether the flues are suitable for reuse.

- Route of flue to proposed position of extract fans
- Proposed location of smoke extract system

Original contract drawing of the basement, highlighting the proposal for the smoke ventilation route and equipment.



Fire and Smoke Supression

An active fire suppression system is required alongside the proposed passive fire protection measures.

The installation of an active system, such as sprinklers or water mist suppression, is necessary to achieve the primary objective of the fire safety upgrades: to contain fire and smoke within the flat of origin and enable the building to operate under a 'stay put' evacuation strategy.

Both passive fire protection and active suppression measures should be improved as far as is reasonably practicable, to provide an appropriate and robust level of fire safety.



A fire which occurred in a tall residential building was contained and extinguished by the activation of the building's sprinkler system.

A water mist system is another form of active fire suppression, but unlike sprinklers, it uses a spray of very fine airborne water droplets. As a result, it uses significantly less water, reducing water damage if activated during a fire, and requires a much smaller water storage tank than a conventional sprinkler system.

However, the route to Building Regulations compliance is less straightforward - there is no British Standard to ensure consistent application of different mist systems.

A trial mist suppression installation has been carried out at 2 Bayer House.



Trial mist suppression installation at 2 Bayer House. The recessed head has pipework concealed within the ceiling.

Fire Alarm & Detection

The building currently operates a communal fire alarm system with a phased evacuation strategy, as the existing level of fire protection is insufficient to support a 'stay put' approach.

Subject to the proposed fire safety improvements, the evacuation strategy could revert to a 'stay put' arrangement by containing fire and smoke within the flat of origin.

The design team is aware that the current communal fire alarm system can result in the evacuation of a large number of residents. Repeated false alarms have also led to concerns, with some occupants becoming less likely to evacuate in response to activations.

The operational management and safety of the fire alarm strategy are therefore being considered as part of the overall fire strategy review.

A 'stay put' strategy would avoid the complicated arrangements of different sounders and floors of evacuation.

The current strategy is described as: "a simultaneous evacuation of all common areas and a phased evacuation of the residential floors (all flats on the floor of fire origin, two floors above and one floor below the floor of fire origin are simultaneously evacuated). It is understood that residents are advised that on a continuous alarm signal they should immediately evacuate and on an intermittent alarm signal they should stay put unless their flat is affected by smoke or fire".