

CHAPTER 3

The Proposals


Overall Proposals Scope

In summary the proposals are for the installation of 21 units of internal secondary glazing within the East Wing at Levels 01 & 02. The installation of these units is required to ensure the spaces remain occupiable and therefore the functions within them can be maintained. These functions support critical operational functions in the Museum and the Museum’s front of house visitor experience.


The proposals are for installation of the secondary glazing units and other sundry works, including boarding up of existing rooflights internally, on a temporary basis only during the ECP construction period. Upon ECP completion the secondary glazing will be removed and required repairs will be sensitively undertaken to restore the existing status quo.


The proposed locations for installation have been determined through a case by case analysis rather than a blanket approach, but naturally are in areas directly adjacent to expected ECP construction activity (and the additional noise this will generate), as illustrated in the adjacent diagram.

Intervention has only been proposed where there is a demonstrated need and where other mitigation measures such as management procedures are not suitable. As such, the proposals represent the minimal interventions required in order to ensure critical operations and functionality of the Museum is maintained. For further description of the needs case and determination of extent of proposed secondary glazing achieved through specialist acoustic survey and analysis, please refer to Chapter 1 of this document.



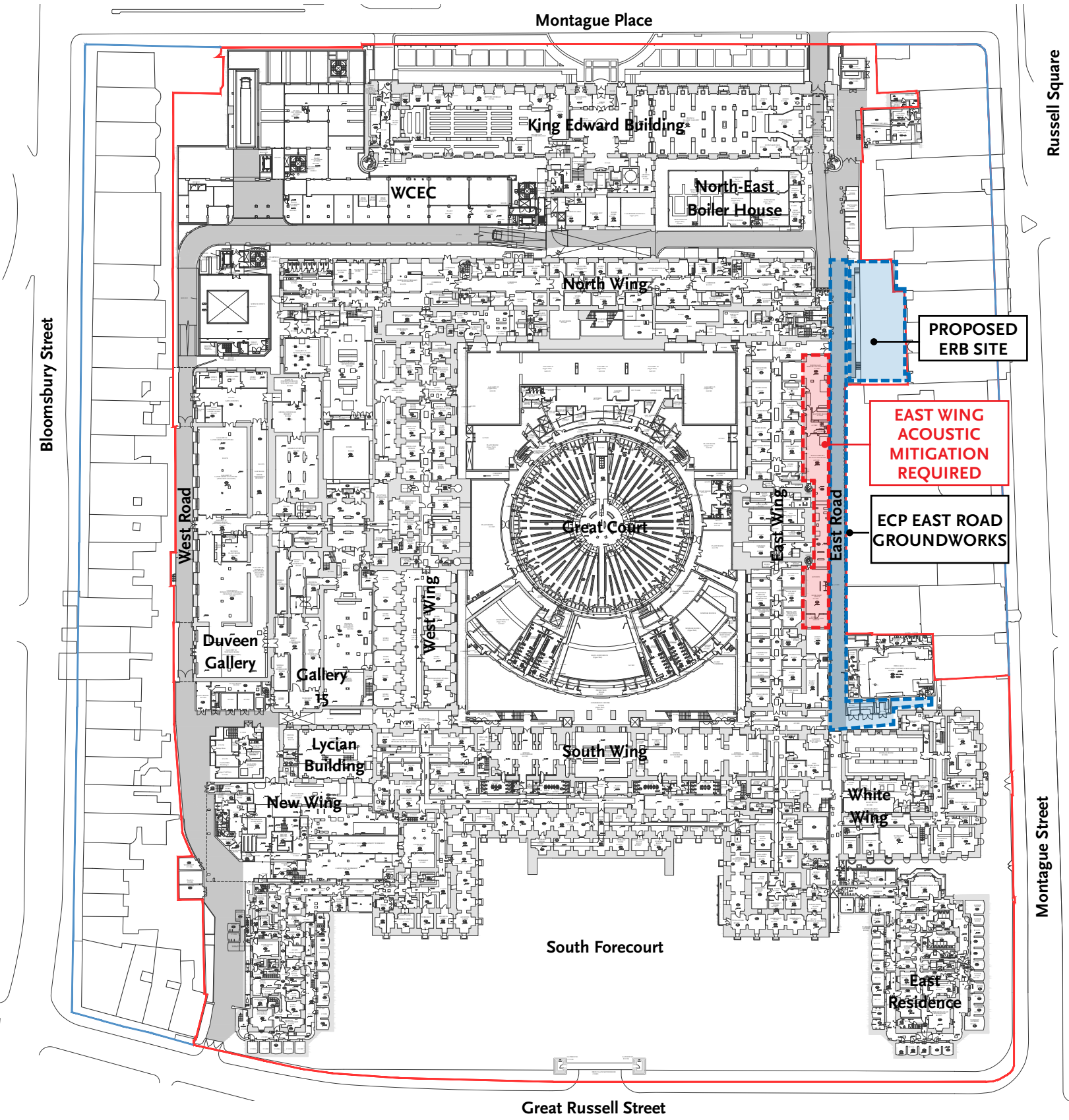
Key:

 Planning Application Red Line Boundary

 Other land in applicants ownership

Right:

Level 02 plan of the Museum Estate showing the location of the development site and relevant existing buildings



In July 2024 Historic England published “Adapting Historic Building for Energy and Carbon Efficiency: Historic England Advice Note 18 (HEAN 18)”.

The advice note was produced to “provide clarity - in support of consistent decision making - on approaches to improve the energy efficiency and support carbon reduction of historic buildings, whilst conserving their significance”.

Within section 4 the advice note states:

- *Installation of secondary glazing to the windows will generally be acceptable.*
- *In most cases, the impact of its installation on significance will only cause minimal harm to historic fabric and architectural interest, which will generally be acceptable in view of the benefits obtained.*
- *Exceptions may include interiors of exceptional architectural quality (such as the finest state rooms of a great house), buildings with historic shutters which would be damaged or rendered inoperative by the installation, and buildings with glazing of exceptional significance which should not be obscured. In many of these cases, temporary secondary glazing used seasonally will generally be acceptable.*
- *Listed building consent is unlikely to be required for all other secondary glazing works.*
- *Secondary glazing can provide very effective*

draughtproofing as well as improved thermal efficiency.

- *Secondary glazing will provide considerable improvements to thermal performance and energy conservation. In respect of multipane windows, it often outperforms double-glazing.*

These proposals align with this guidance, in that their installation will improve acoustic environmental performance, but also draughtproofing and energy performance of the fabric for the duration of their install. They are proposed to be temporary in nature for a set period, in a similar fashion to the seasonal temporary glazing considered generally acceptable even in exceptional circumstances of architectural quality.



Adapting Historic Buildings for Energy and Carbon Efficiency

Historic England Advice Note 18 (HEAN 18)



Right:

Front cover of the Historic England’s “Adapting Historic Building for Energy and Carbon Efficiency: Historic England Advice Note 18 (HEAN 18)”, published July 2024. Copyright Historic England

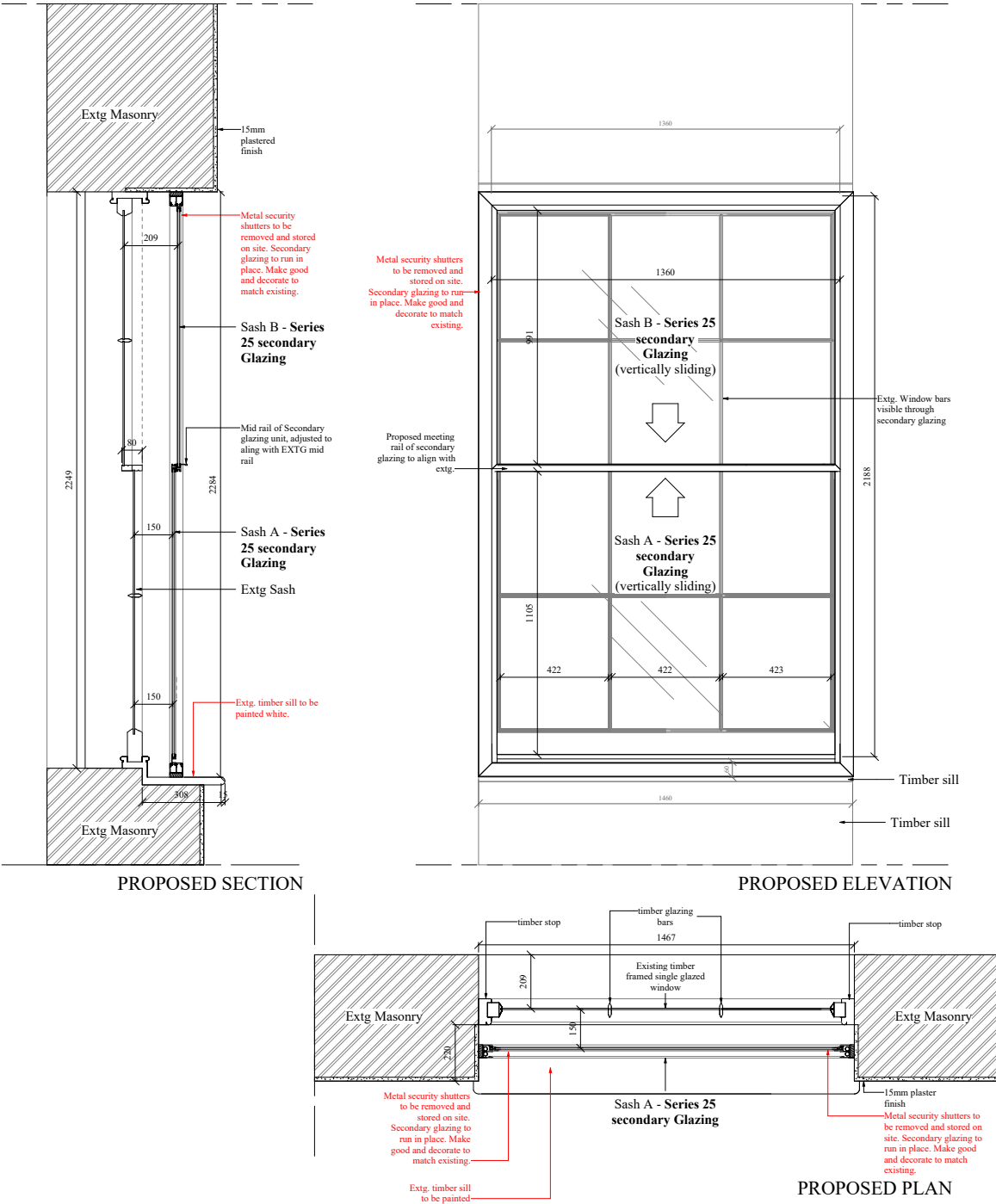
3.3

Detailed Drawings & Schedule

It should be noted that this chapter provides an illustrated summary of the works only. It is intended to be read in conjunction with, and not a replacement for, the full detailed drawings and schedule contained within the application documents.

The drawings show existing and proposed plans, sections, and elevations at 1:10 scale for each window type condition, along with accompanying scoping and type drawings. The accompanying window schedule contains key specification information such as sizing, window product specification, finish, works to existing elements required, referenced back to the window type and drawing number reference within the detailed drawing pack.

Reference should be made to this information for a full and detailed understanding of the proposals.



Right:

Proposed detail plan, elevation, and section drawing for secondary glazing type C1 proposed for installation within the East Wing.

3.4

East Wing Scope

The proposals for the East Wing are to install 21 units of secondary glazing at Levels 01, & 02, in the locations indicated on the adjacent plans. There is also an existing vent/grille which forms part of window type D2 in room A/2/007 for which boarding will be installed to mitigate flanking noise through the existing duct, which serves a collections area in the adjacent room to the south.



The existing windows are of varying types ranging from metal crittal type arched windows in back-of-house areas at basement level to earlier twin sash units at the northern and southern ends of Level 02 dating from c.1855, and later units dating from 1925-1970s of a different proportion in the central section of Level 02.

For type A the proposed unit presents elevational sightlines of 51mm at the jamb, sill and head within internal mullions and transoms of 23mm width. The lower section is proposed as two panes with a central dividing mullion aligned to the existing central glazing bar. An additional frame to infill the arched top section is proposed with an elevational sightline of 33mm. Frames are proposed to be finished in PPC off-white.

For types D1, D2, C1, & C2, the proposed unit has elevational sightlines of 73mm at the jamb, 85mm at the sill and head, with internal an internal transom of 28mm in width. Types C1, C2, & D1 are proposed to be finished in off-white to match the internal wall paint adjacent. The existing timber sill board will also be painted white to match.

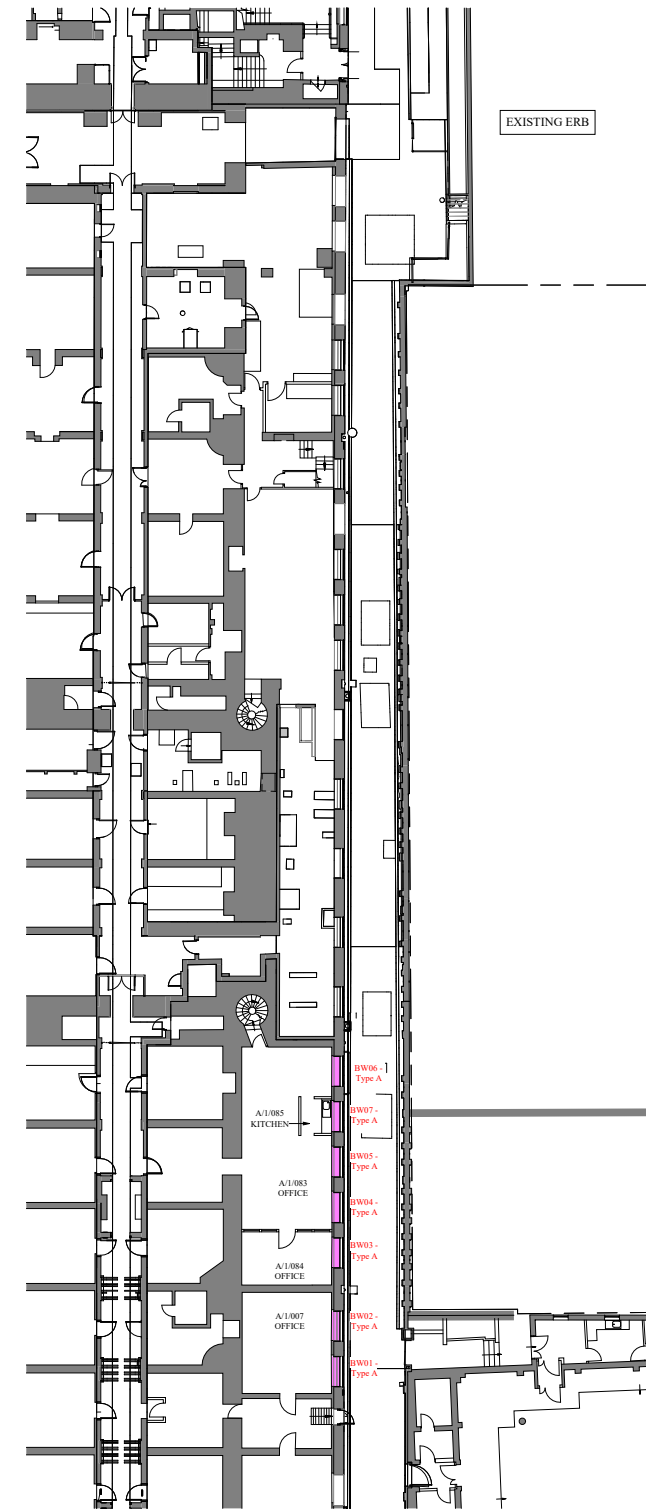


Key:

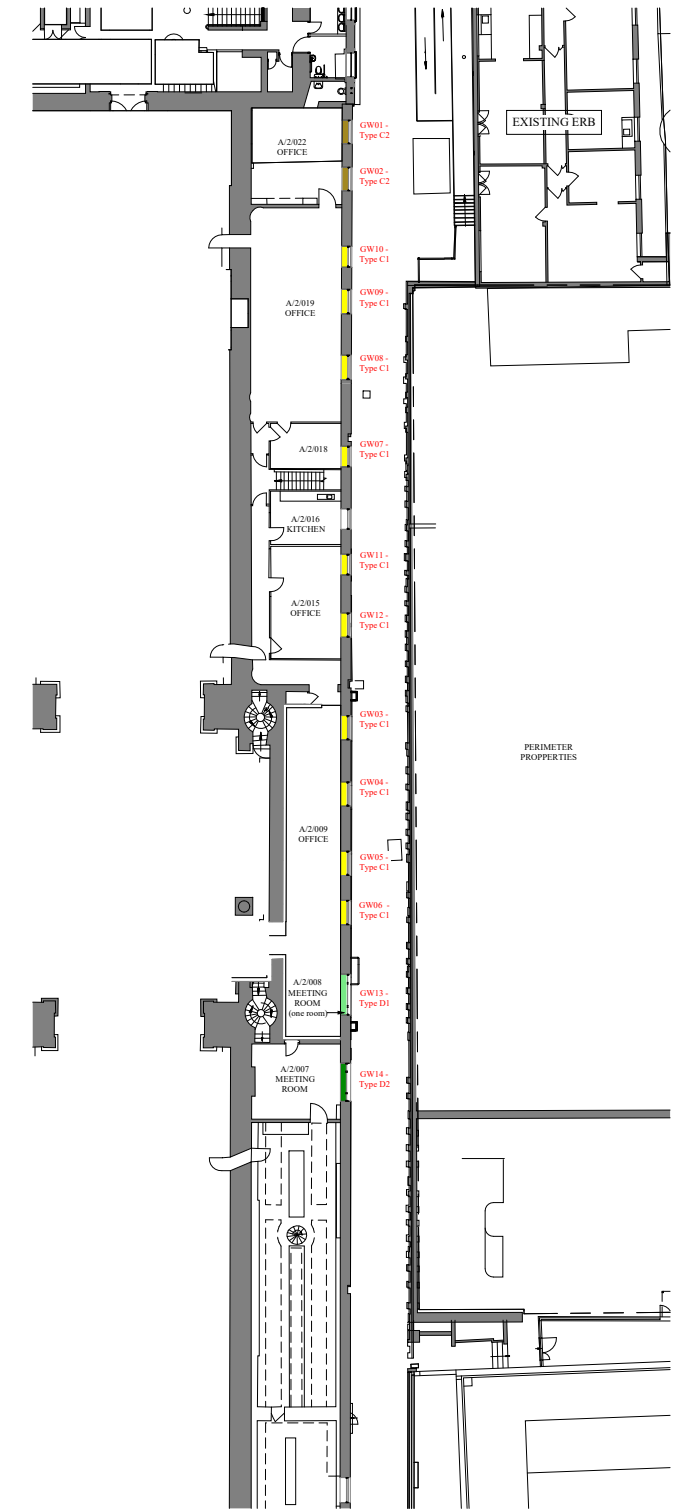
-  S.Glazing Type A
 S.Glazing Type D2
 S.Glazing Type D1
 S.Glazing Type C1
 S.Glazing Type C2

Right:

Scoping plans indicating the location and number of secondary glazing units proposed to be installed within the East Wing.



Level 01



Level 02

Type D2 is proposed to be finished in anodised bronze.

Further summary of the various types of window are provided on the following pages. Reference should be made to the detailed drawings and schedule contained within the application documents for further information.

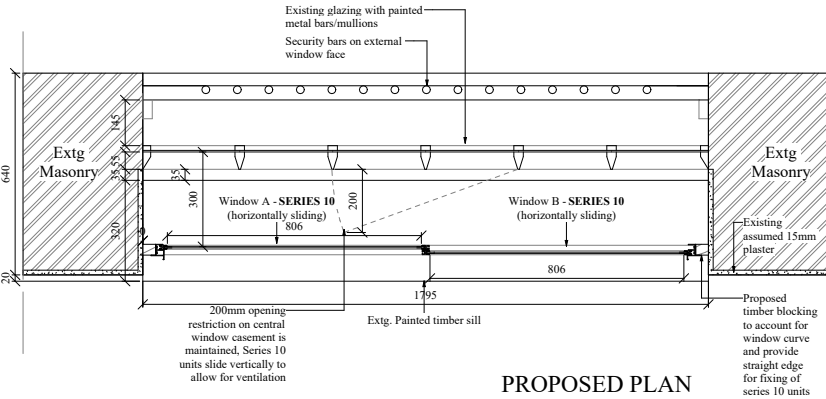
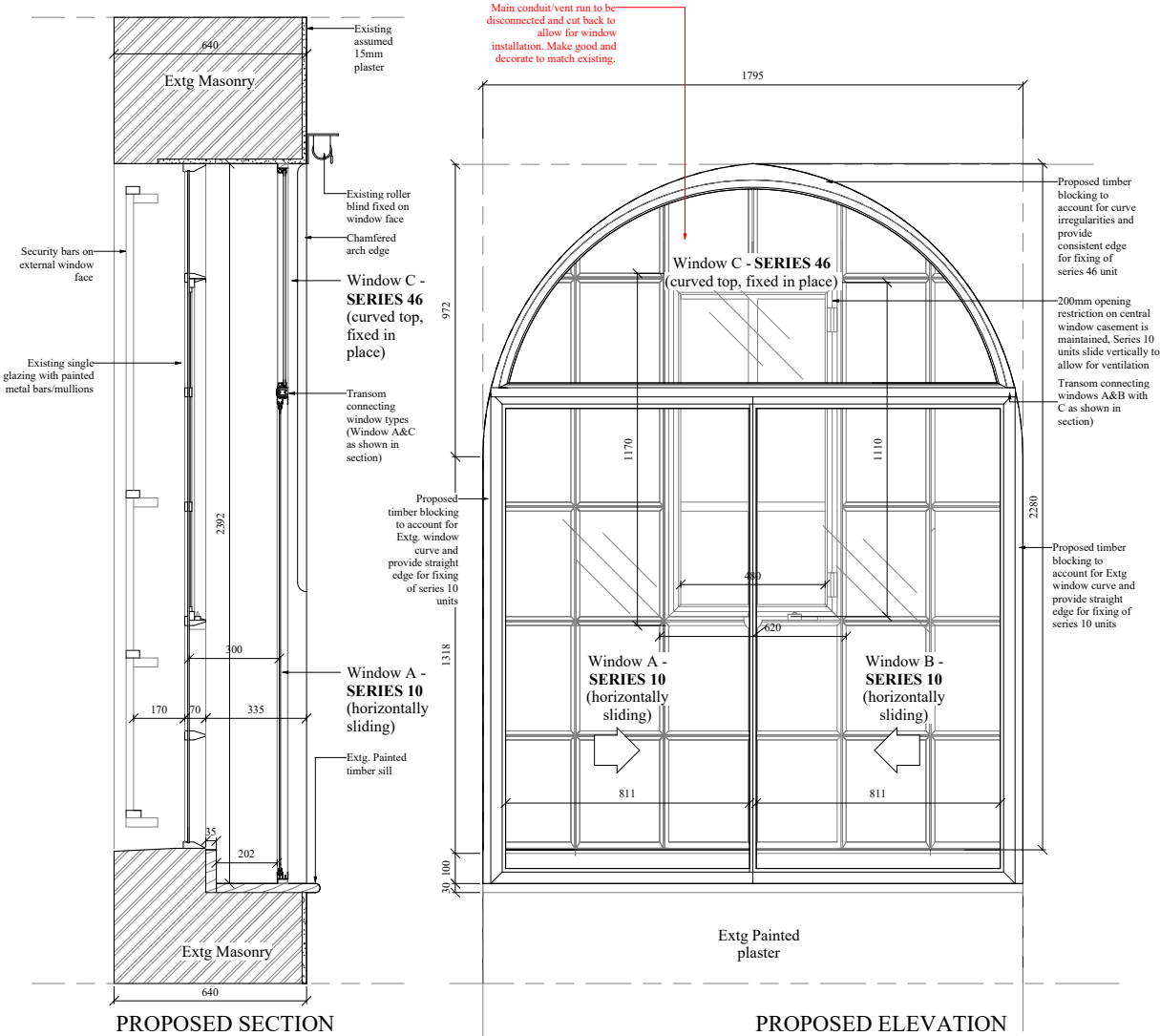
SERIES 10 HS
- Type A



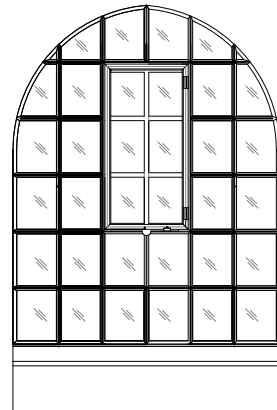
SERIES 25 VS
- Type C1, C2, C3, D1, D2, F



Left to right:
CGI showing the proposed secondary glazing section types
Proposed drawing for window types A



EAST WING L01



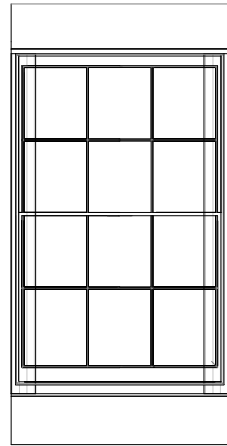
1 Type A

1 : 20

Existing Window Arrangement Notes:
Arched window with operable central casement
Proposed Secondary Window Finish
PPC - White
Number of instances
7

- Type A

EAST WING L02



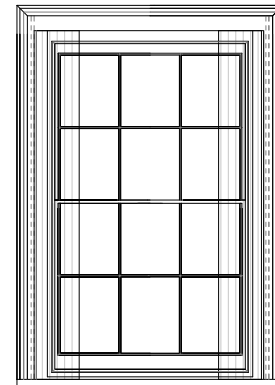
3 Type C1

1 : 20

Existing Window Arrangement Notes:
Vertical sliding sash window with metal shutters on internal face
Proposed Secondary Window Finish
PPC - White
Number of instances
10

- Type C1

EAST WING L02



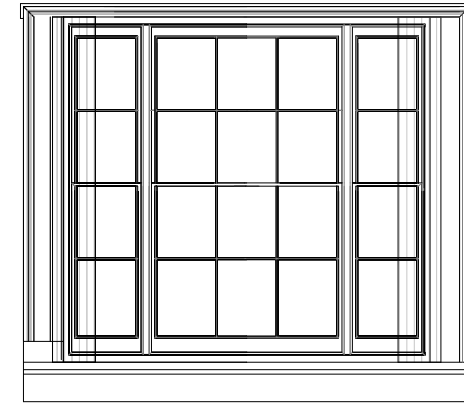
4 Type C2

1 : 20

Existing Window Arrangement Notes:
Vertical sliding sash window with Extg Secondary glazing + metal shutters (boxed from window) and roller blind
Proposed Secondary Window Finish
PPC - White
Number of instances
2

- Type C1

EAST WING L02

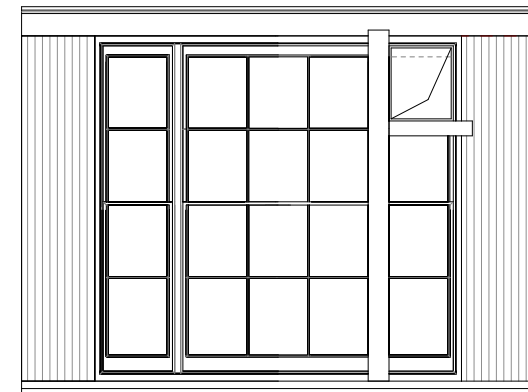


6 Type D1

1 : 20

Existing Window Arrangement Notes:
Vertical sliding sash window with Extg Secondary glazing + metal shutters
Proposed Secondary Window Finish
PPC - White OR Anodised bronze
Number of instances
1

- Type D1



7 Type D2

1 : 20

Existing Window Arrangement Notes:
Vertical sliding sash window with Extg Secondary glazing + metal shutters and roller blind. Vent in top right corner
Proposed Secondary Window Finish
PPC - White OR Anodised bronze
Number of instances
1

- Type D2

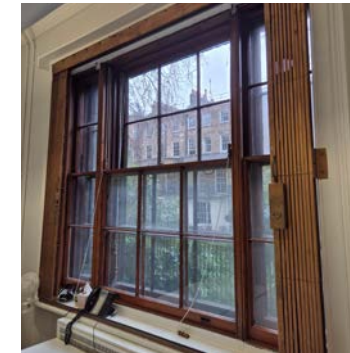
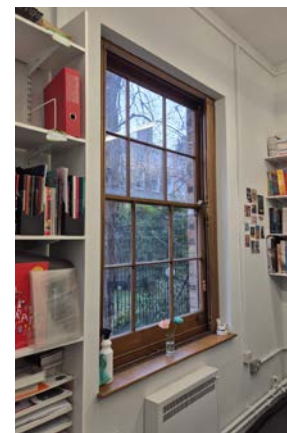


Key:

- S.Glazing Type A
- S.Glazing Type D2
- S.Glazing Type D1
- S.Glazing Type C1
- S.Glazing Type C2

Right:

Relevant type drawings and photographic survey of existing windows.



Type D1



Type D2 (Vent)

Types C2, D1, & D2 Existing Sashes

Window Types C2, D1, & D2 within the East Wing at Level 02 all contain an arrangement of twin single glazed sash windows in the existing condition.

Following the construction noise assessment report prepared by Bickerdike Allen Partners (BAP) in December 2023, further BAP assessment was commissioned by the Museum for these windows specifically, to determine if the existing construction/fabric would provide the the required acoustic mitigation on account of the twin window arrangement. If this was the case, the secondary glazing in this location would not be required.

BAP undertook further acoustic survey tests in accordance with BS EN ISO 717-1:2020 “Acoustics rating of sound insulation in building and building elements - Airborne sound insulation”. Sound level meters were setup to simultaneously measure levels of sound generated by an omnidirectional speaker in one third octave bands each side of the façade test specimen. The indoor measurements were taken using a manually scanned microphone path. A microphone was placed outdoors, approximately 4m above ground level and 2m away from the façade to obtain external levels.

The results demonstrated an enhancement of 10dB due to the existing secondary window, which is a reasonable improvement, but found the sound insulation performance of the existing primary (outer) window being 5-10dB lower than expected. Therefore BAP still recommended making intervention to these windows to achieve required sound insulation performance, including the installation of a tertiary unit of glazing as a temporary measure.

Right:
Photos showing the twin single casement glazing existing condition for types C2, D1 and D2.



Type C2



Type C2



Type D1



Type D2

Selected Window Types

The proposed secondary glazing windows are all proposed to be sourced from the same manufacturer, with a reputable reputation and track record of delivery and installation in sensitive heritage environments and listed buildings.

A summary of the types proposed and some precedent photography provided by the supplier is provided adjacent.

- The Series 10 unit is an aluminium framed slimline horizontal sliding pane unit
- The Series 25 is a mid range aluminium vertical sliding unit which provides higher capacity spring balances that allow treatments of larger windows
- The Series 46 is an aluminium slim frame unit which can be shaped and curved to provide solutions for arched applications

Reference should be made to the detailed drawings and schedule contained within the application documents for further information.



Top:
CGI showing the proposed secondary glazing section types

Bottom:
Precedent images of the proposed secondary glazing types, each photo corresponds to the CGI above. Courtesy of Selectaglaze.

With regards to finishes, full reference should be made to the window schedule, however broadly where existing internal timber shutters and trim are both treated in stained timber in the existing condition (type D2), a proposed anodised bronze finish is proposed. Where internal shutters or trims are treated in existing paintwork (all other types), an off-white PPC finish is proposed elsewhere, in either of two different shades to best match the existing finishes.

Anolok 545 anodised bronze

- Enhanced finish for East Wing L02 type D2 window , where an anodised bronze finish better matches the palette of the existing window and casement.

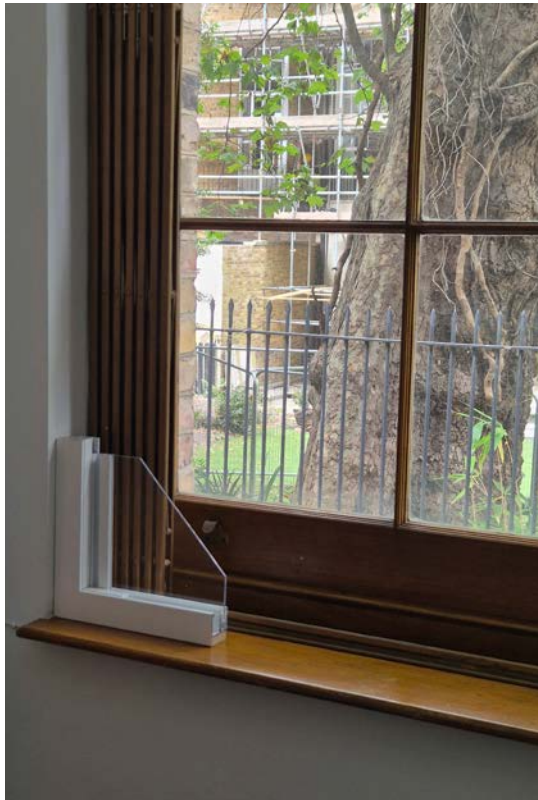


PPC RAL 9003/9010

- PPC RAL 9010 finishes proposed for L01 basement windows (finishes specified in schedule, to best match existing internal shutters & trims)
- PPC RAL 9003 finishes proposed on all other floors across the East Wing (finishes specified in schedule, to best match existing internal shutters & trims)

Top section, from left to right:
Photographs showing the corner sample of the proposed anodised bronze finish adjacent existing windows (thought to be of stained pine) and associated worn brass ironmongery

Bottom section, left to right:
Photographs of the corner sample of secondary glazing against existing painted shutters and trim to existing windows. Note the existing sill is proposed to be painted white and the internal metal security shutters removed.

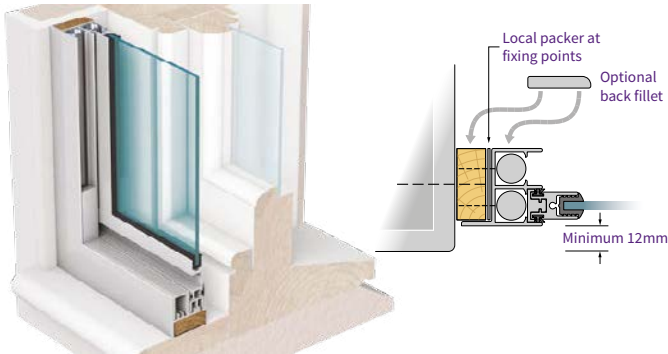


3.8

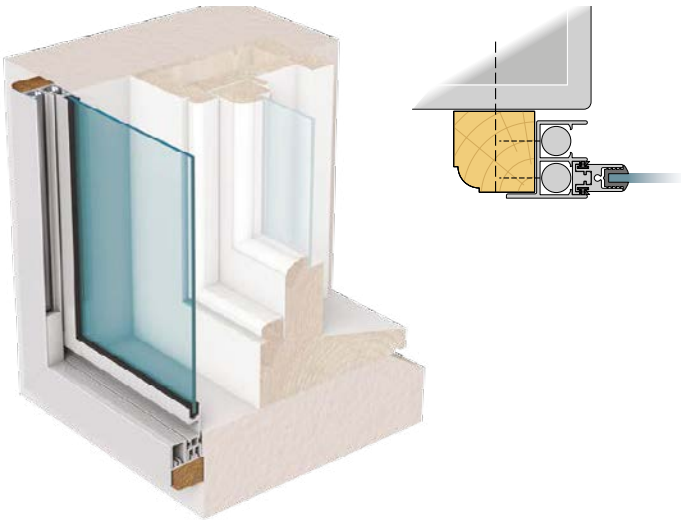
Proposed Fixing Details

Illustrations and descriptive text is provided adjacent and on the following page to describe the nature of the proposed fixings required to safely secure the secondary glazing units in place.

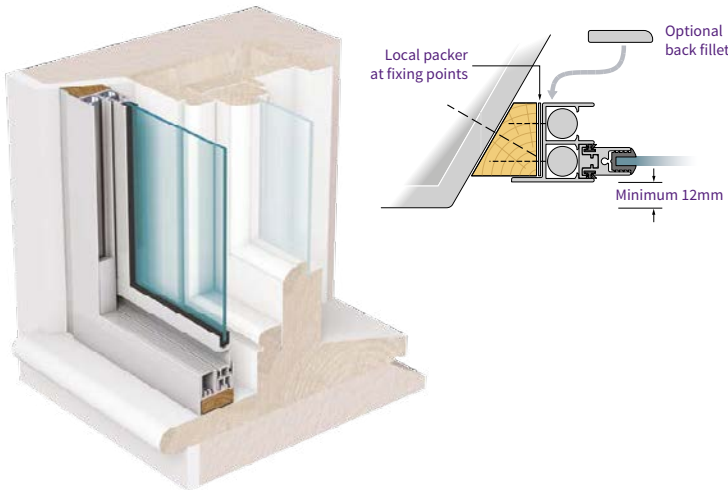
Further detail as to the fixing methods is also provided on the following page.



- Standard square reveal fix**
- 33mm x 15mm twice primed softwood ground bedded in acrylic sealant and fixed to structure
 - Odd leg frame with applied sealant is conceal fixed to ground
 - Local hidden packers take up opening tolerance
 - Optional caulking joint between frame and wall allows finished decoration



- Face fix**
- Softwood frame with minimum 38mm x 32mm Section bedded in acrylic sealant and fixed to Structure
 - Optional moulding
 - Odd leg frame with applied sealant is conceal fixed to timber



- Splayed reveal fix**
- Softwood timber machined to match the splay
 - Odd leg frame with applied sealant is conceal Fixed to timber
 - Local hidden packers take up opening tolerance

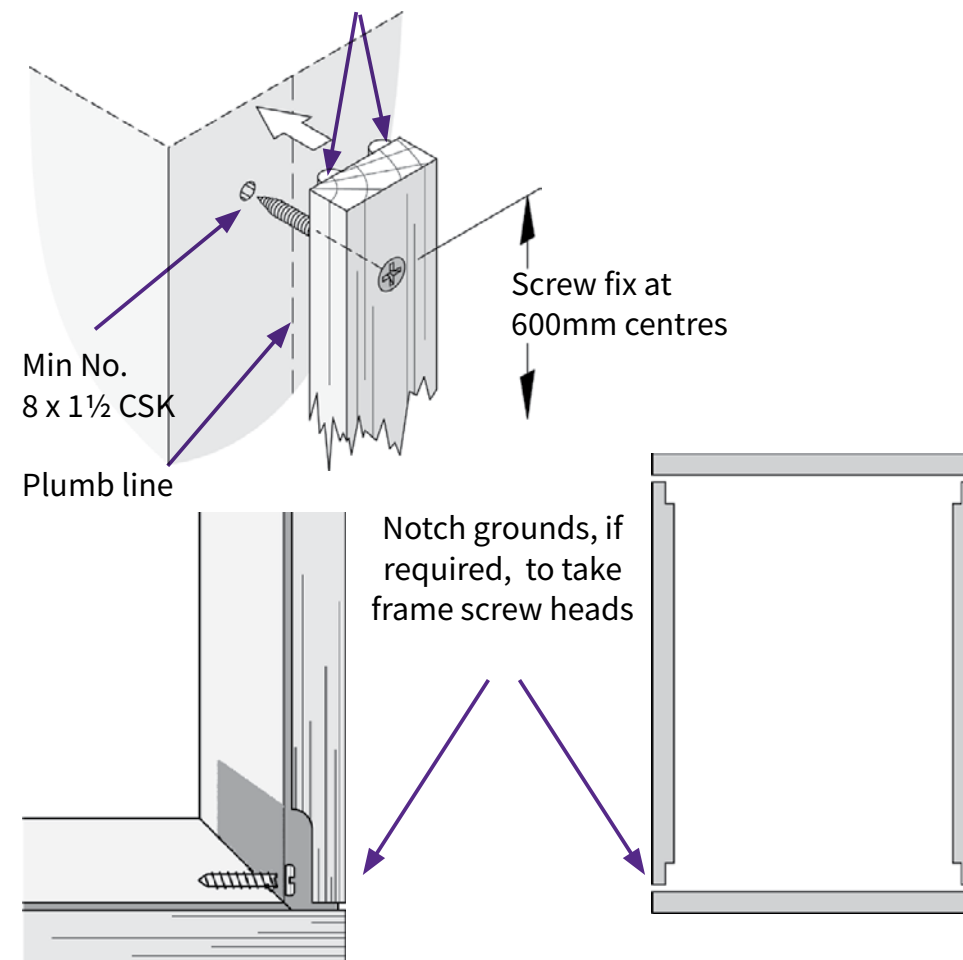
Top to bottom:

Selectaglaze Standard square fixing detail + CGI

Selectaglaze Face fixing detail + CGI

Selectaglaze Splayed reveal fixing detail + CGI

Typical fixing detail for vertical sliding units into timber grounds shown below.



Fixing centres

- (Same across all types) 150-250 *from light duty corners no greater than 600 mms*

Hinge centres

- (Same across all types) 177.5mm *from corners no greater than 1000 mm less than 2300 unit height, no greater than 600 mm above 2300 unit height*

Fixing into Masonry

- Series 10, 20, 25, 30, 45, 47 & 60 - Grounds; *Masonry nails, no6 (ø3.50) or 8 (ø4.20) screws and plug. Frame; no6 (ø3.50) screw hinges to be through fixed.*
- Series 90 heavy duty units - Grounds; *No8 (ø4.20) screws and plug. Frame; no8 (ø4.20) screws, hinges to be through fixed*

Fixing into Plaster board -

- Series 10, 20, 25, 30, 45, 47 & 60 - Grounds; *plaster board fixing & no8 (ø4.20). Frame; no6 (ø3.50) screws not hinged units*
- Series 90 heavy duty units - Grounds; *plaster board fixing & no8 (ø4.20). Frame; no8 (ø4.20) screws not hinged units*

Fixing into Timber panelling (series 90 Heavy duty units)

- Series 10, 20, 25, 30, 45, 47 & 60 - Grounds; *no6 or 8 (ø4.20) screws. Frame; no8 (ø4.20) screws hinges to be through fixed.*
- Series 90 heavy duty units - Grounds; *no8 (ø4.20) screws. Frame; no8 (ø4.20) screws hinges to be through fixed*

Image:

Typical Selectaglaze fixing detail

As noted earlier in this document, the proposed secondary glazing installations contained within this application are proposed as a temporary measure only as required to mitigate increased noise via construction through the Energy Centre Programme delivery period on site. Once this activity has been completed, the proposed interventions within this application will be reversed and the condition returned to the existing status quo. Where fixings into existing fabric are required to support the temporary installations, these will be repaired in-situ following SPAB guidance and methods.

For future repair of fixings locations:

Where repairing minor wear from screw fixings in timber panels, follow SPAB guidance and fill with hard, coloured wax.

Where repairing minor wear from screw fixings in plaster, allow for repair & repainting at point of fixing.

SPAB Guidance - ‘How can you repair a split timber panel?’

*Panels often split when they shrink but are prevented from moving within their framework, frequently due to paint accumulation. If freed, panels may be glued back together. Sometimes a timber spline is glued into the split (which may need widening) and planed flush with the panel face. The panel is held until the glue sets with temporary attachments clamped either side of the split or using suitable tape. Another option when dealing with painted panelling, and adopted at the SPAB’s headquarters, is to cover splits with a fabric-based intumescent tape. **Minor splits in panels might be filled with hard, coloured wax.***

Clockwise from top left:

Images showing process of wax filler repair to timber panelling, as per SPAB guidance.



Minor wear filled with wax



Excess wax removed



Surface polished/finished to match existing timber

The Museum holds a fabric condition survey completed in 2022, which assesses the condition of some, but not all, the windows contained within this application. The findings from the condition survey are summarised within the Window Schedule contained within the application documents.

The survey categorises recommended remedial works as either required in the short, medium, or long term. Short term works are typically associated with minor cleaning, replacement of cracked panes, or investigation of water ingress.

It is proposed that short term remedial maintenance work is undertaken as part of the proposed works if they:

- are applicable to the existing window unit itself, and do not require wider works to surrounding fabric such as external roofs or walls and;
- have not already been undertaken since the 2022 survey and;
- are able to be undertaken safely from the interior of the building (and therefore not require external scaffold and associated fixings into external fabric) and;
- are required to keep the window operational i.e. openable

For the avoidance of doubt, where remedial work to existing windows is undertaken, these will be undertaken on a like for like maintenance repair basis.

Prior to the secondary glazing units proposed being installed, a supplementary condition survey of the existing windows will be undertaken to include windows not assessed in 2022 as well as note any remedial works or further dilapidation that has occurred since 2022.

If further short term remedial work is found to be required, these will be undertaken on a like for like maintenance repair basis if they met the stipulated criteria as bulleted above.

Finally, it should be noted that all of the proposed secondary glazing units are openable, and therefore provide access to the existing windows for cleaning and maintenance works throughout the period of installation.

Sustainability

The applicant is aware of the benefits that the proposed secondary glazing will bring not only with regards to acoustic performance but also energy efficiency during the time of their install. These benefits are summarised further in recent Historic England Guidance note in section 3.2 of this chapter.

The project team has chosen proposed products which have high percentages of recyclability and also utilise recycled material in their making. The proposed product is 99% recyclable and the aluminium used made from 60% recycled material, the glass 35% from recycled material. The proposed supplier also notes their commitment to sustainability through:

- Minimising production waste using lean processing techniques
- Ensuring all timber and paper products are FSC certified
- Actively promoting reduction of waste and recycling
- Selecting vehicles which are ultra-low emission or as low emission as is practical encouraging safe and efficient driving
- Adopting strategies to reduce the environmental impact of business travel
- Monitoring and seeking ways to reduce energy
- Investing in energy efficiency measures for company premises
- Ensuring that fair procurement practices are applied and suppliers are paid on time
- Adhering to any Government recognized trading sanctions
- Avoid trading with suppliers which don't have the same social ideals

Condensation

There is a perception with secondary glazing that it may lead to an increased risk of condensation between the existing and new secondary glazing units.

The applicant has worked closely with the proposed secondary glazing manufacturer in developing proposals which mitigate this risk. This includes:

- Where existing radiators are present, locating the new secondary glazing unit so that the radiator is not contained within the cavity between the window units
- Not installing new brush seals to the existing outer windows - the secondary glazing manufacturer advised against this as the trickle ventilation provided through the existing historic window aids ventilation of the cavity
- Ensuring all installed secondary glazing units are openable to provide access for cleaning and maintenance to the cavity, but also allow for ventilation to the cavity if required.

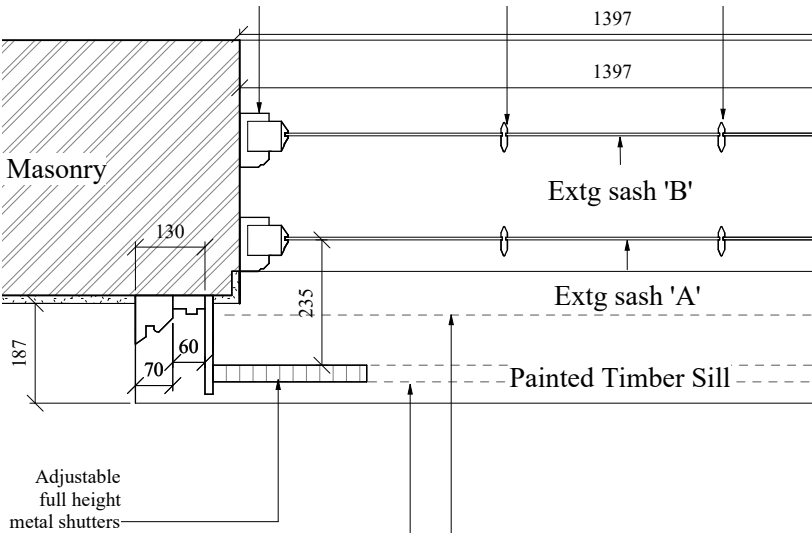
3.12

Items for removal to be stored on site

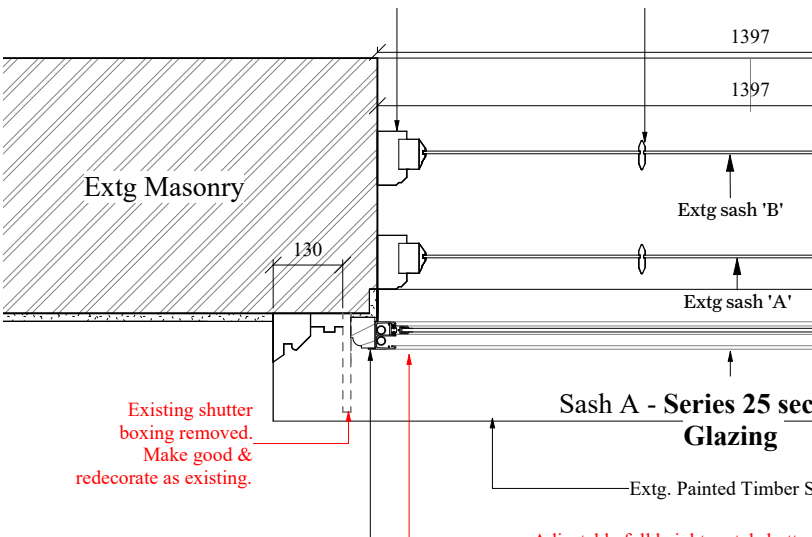
There are a number of modern elements or sundry items that will require minor alteration or removal in order to for the new secondary glazing to be installed. Full reference should be made to the proposed window schedule and detail drawings provided within the application documents, but in summary these include:

Redundant security shutters

These will be removed to allow for the installation of new internal secondary glazing units, stored on site for the duration of the ECP works before being reinstated.

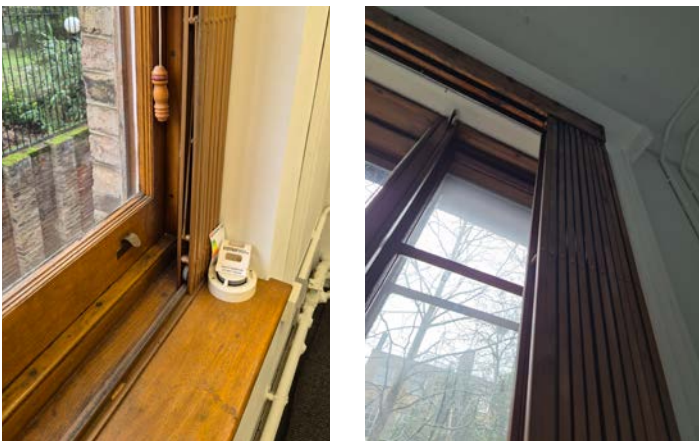


Existing plan - Type C2



Proposed plan - Type C2

Plan drawings adjustable full height metal shutters removed and stored on site. Secondary glazing to run in place (within existing shutter boxing).



Metal security shutters to be removed

Clockwise from top left:

Existing plan detail, S.Glazing Type C2

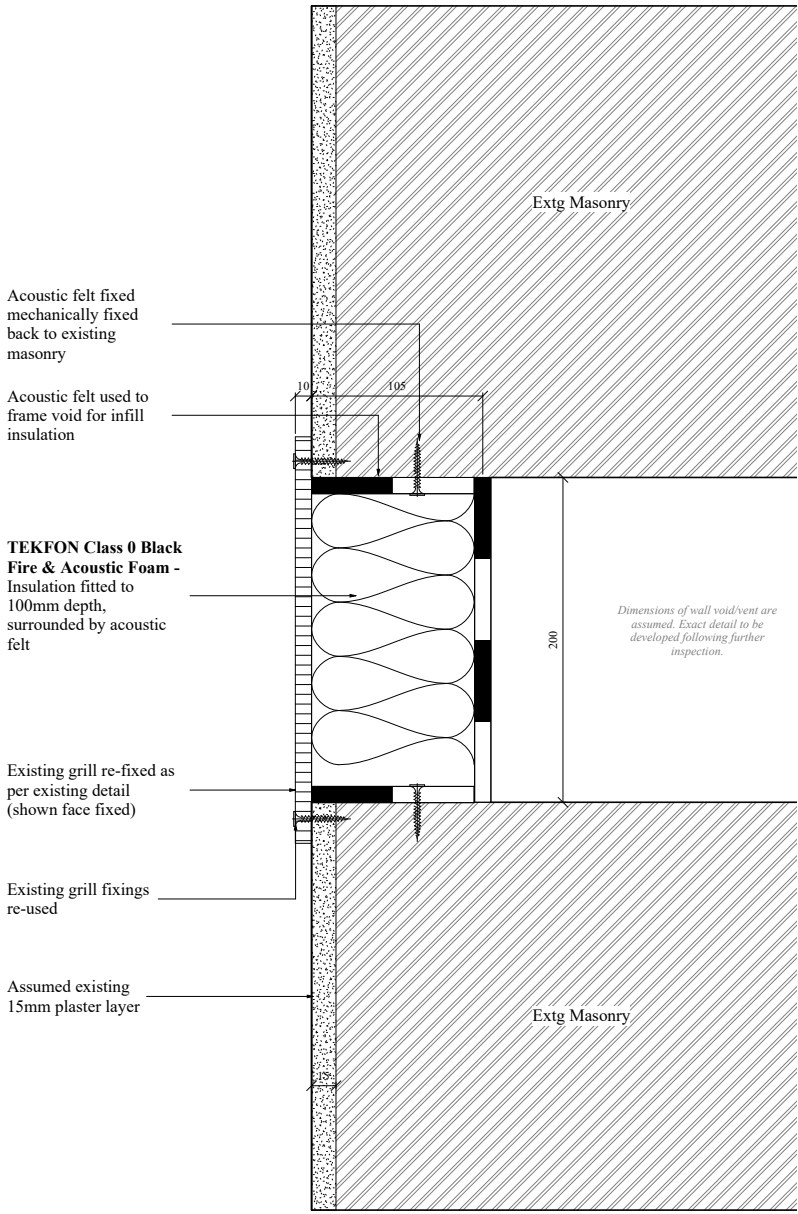
Photographic survey capturing extent of existing metal shutters to be removed and stored on site

Proposed plan detail, S.Glazing Type C2

3.13

Minor vent works

When undertaking photographic surveys on site, a number of internal metal grilles covering voids within the existing external walls where observed. The extent of the voids behind are not known, but there is a concern some may present the chance for noise to flank through the void into the interior space. Therefore, where these are present adjacent to the existing windows where secondary glazing is to be installed, the proposals allow for the existing decorative grilles to be carefully removed, and acoustic felt and foam to be placed within the outer section of the void, before the grille is carefully reinstated.



Right:

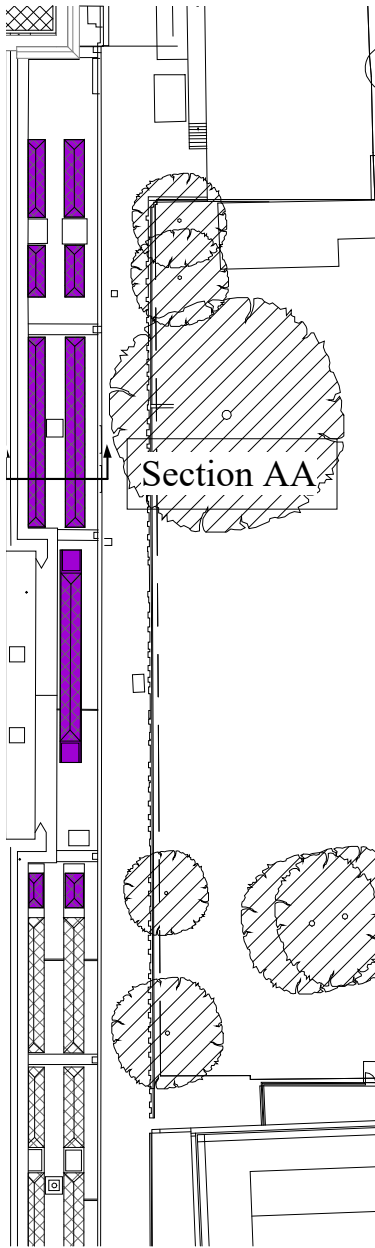
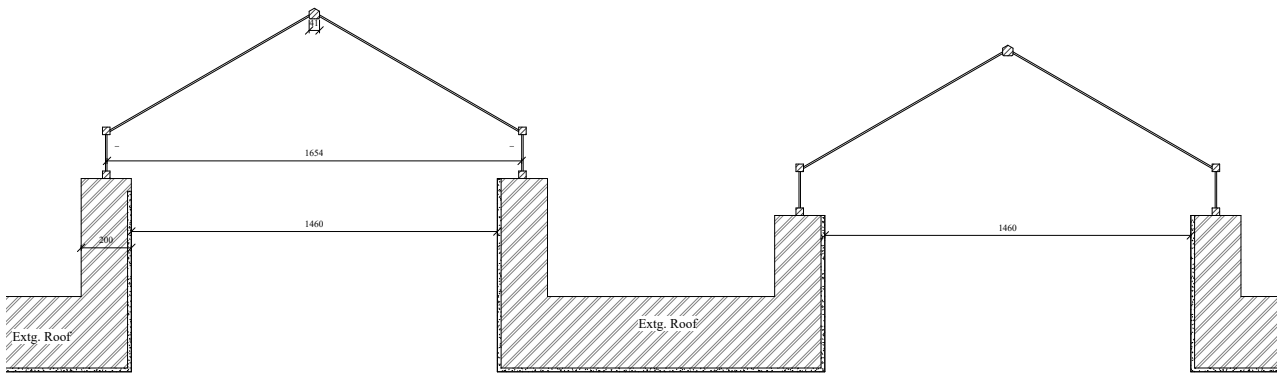
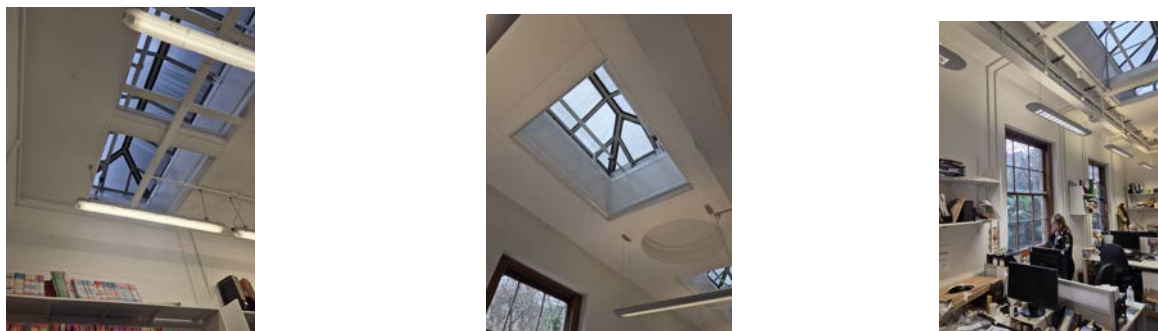
Typical detail showing internal face acoustic treatment.

3.14

Proposed rooflight work

Within the East Wing Long Room roof are a number of original single glazed rooflights, for which the Museum is currently developing repair proposals. Those works fall outside the scope of this application, however some acoustic mitigation is required in these locations to ensure the internal spaces remain usable with increased construction activity and noise from these and ECP construction works.

The proposed solution is to install a lightweight solid insulated partition which will provide acoustic separation but not require any alteration works to the original rooflights themselves. On completion of the works, these partitions would be demounted and minor plaster repairs made at fixing points into the internal upstand to return them to the existing condition.



Key:

Existing rooflight requiring internal panel treatment to mitigate flanking noise through the rooflight fenestration.

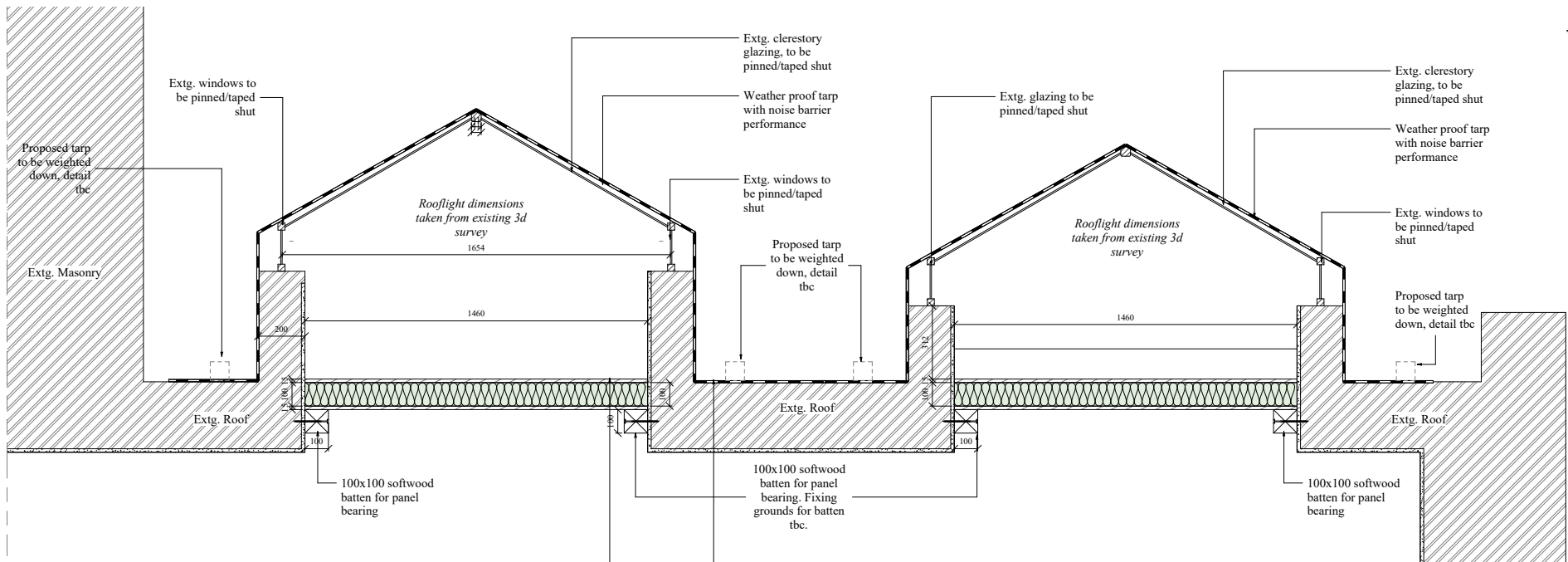
Clockwise from top left:

Photographic survey capturing rooflights along East Road L07.

Scoping plan taken at roof level (L07) indicating the location and number of rooflights included within scope of works.

Proposed rooflight detail showing works to minimise noise travel through rooflights.

Existing rooflight detail drawingw



- Rooflights included in scope of work

3.15

Proposed vent boarding: East Wing room A/2/007

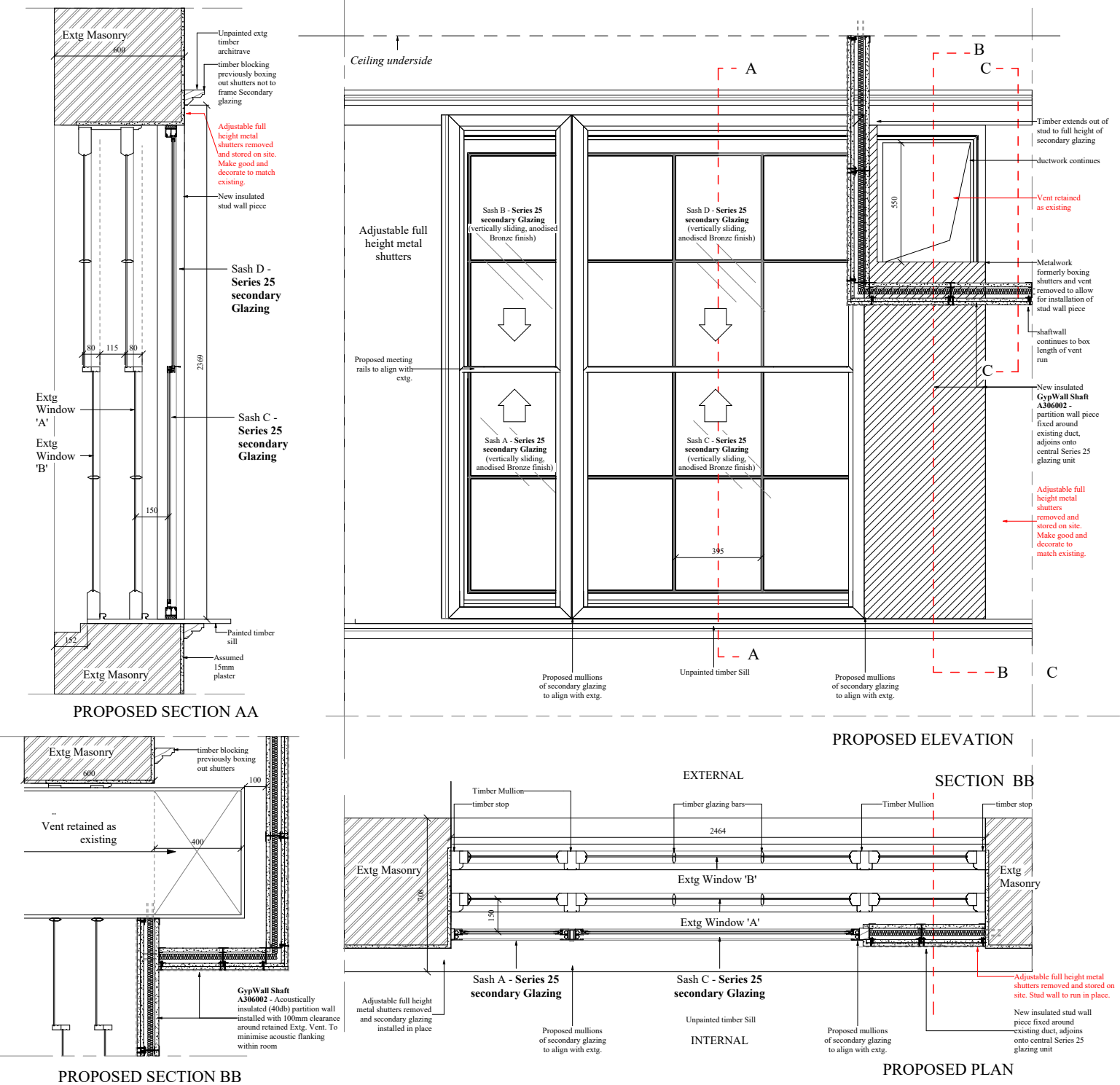
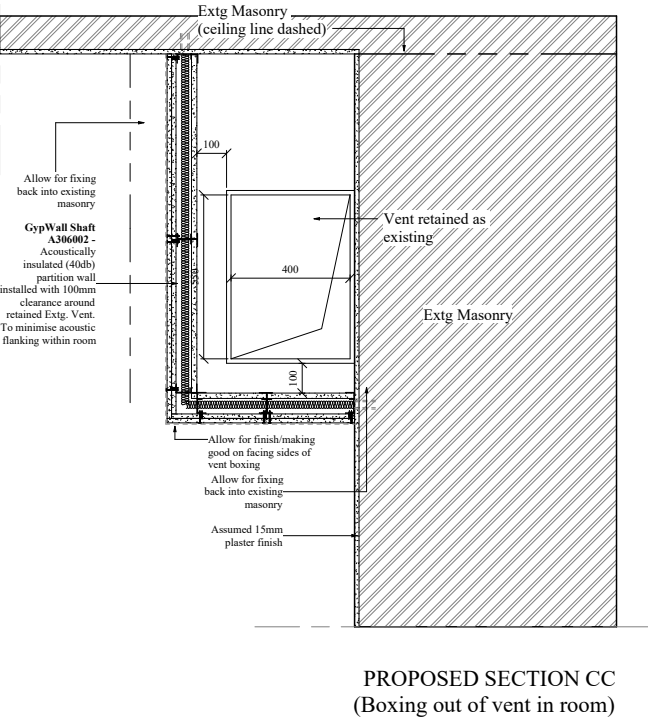
At Level 02 of the East Wing in Meeting Room A/2/007, the upper right hand pane of the upper sash to the existing window is occupied by a mechanical vent, connected to internal ductwork. The ductwork serves environmental control systems for collections within room A/2/006 to the south, and must remain operational.

Therefore, here a ‘hybrid’ solution of boarding the right hand section of the window and around the duct is proposed, with the central and left hand section acoustic mitigation coming from the installation of secondary glazing. Again, these works would be temporary only, with the existing condition reinstated upon completion of the ECP works.



Above:
Photograph of the existing window and mechanical vent.

Shown to the right:
Drawings detailing S.Glazing Type D2, showing vent boxing throughout room A/2/007



As part of the design development, the use of alternative products was explored which would limit the extent of fixings required into existing fabric. These are described below and their limitations/ constraints which unfortunately render them unsuitable for the proposed application are noted.

Magnetic Window research

Magnetic ‘clip on’ style Magneglaze secondary glazing was explored, which minimises the use of mechanical fixings

Unfortunately, these units are not suitable as they only achieve a 10.4db reduction, where the project aims for a 35db reduction across all windows to achieve required internal noise levels as advised by Bickerdyke Allen & Partners.

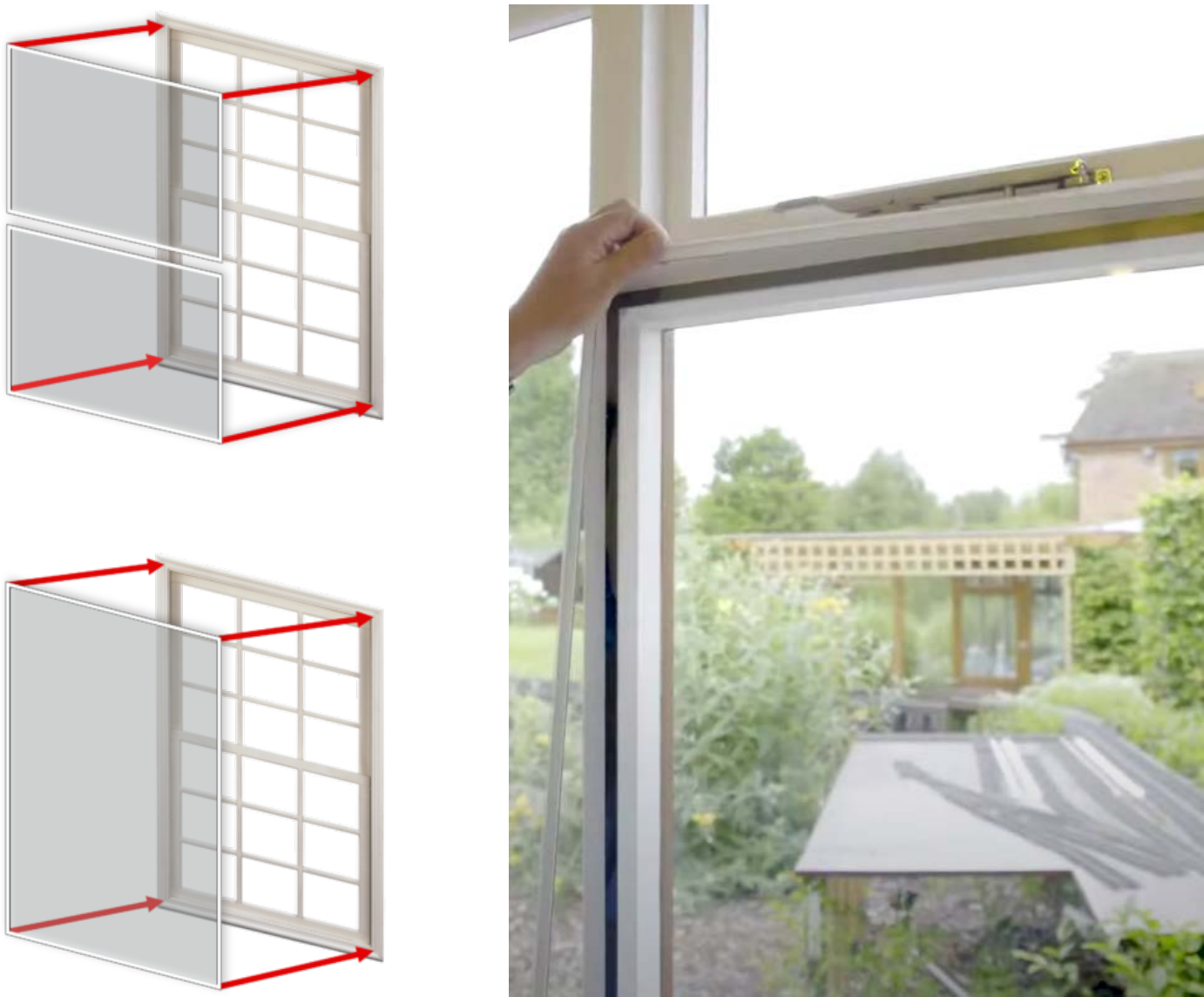
Additionally the larger window sizes and curved head requirements are not able to be manufactured by this product range.

Furthermore, units cannot be opened for ventilation without being entirely removed, limiting occupants ability to attain some natural ventilation in times of lower external noise in summer months. Requirements for manual removal and storage also create further issues.

Finally, there was some concern as to the scars that would be left by adhesive used to stick the magnetic strips to the existing window frames, particularly where these are finished in stained timber.

Shown to the right:

Images showing typical applications of Magneglaze secondary glazing units



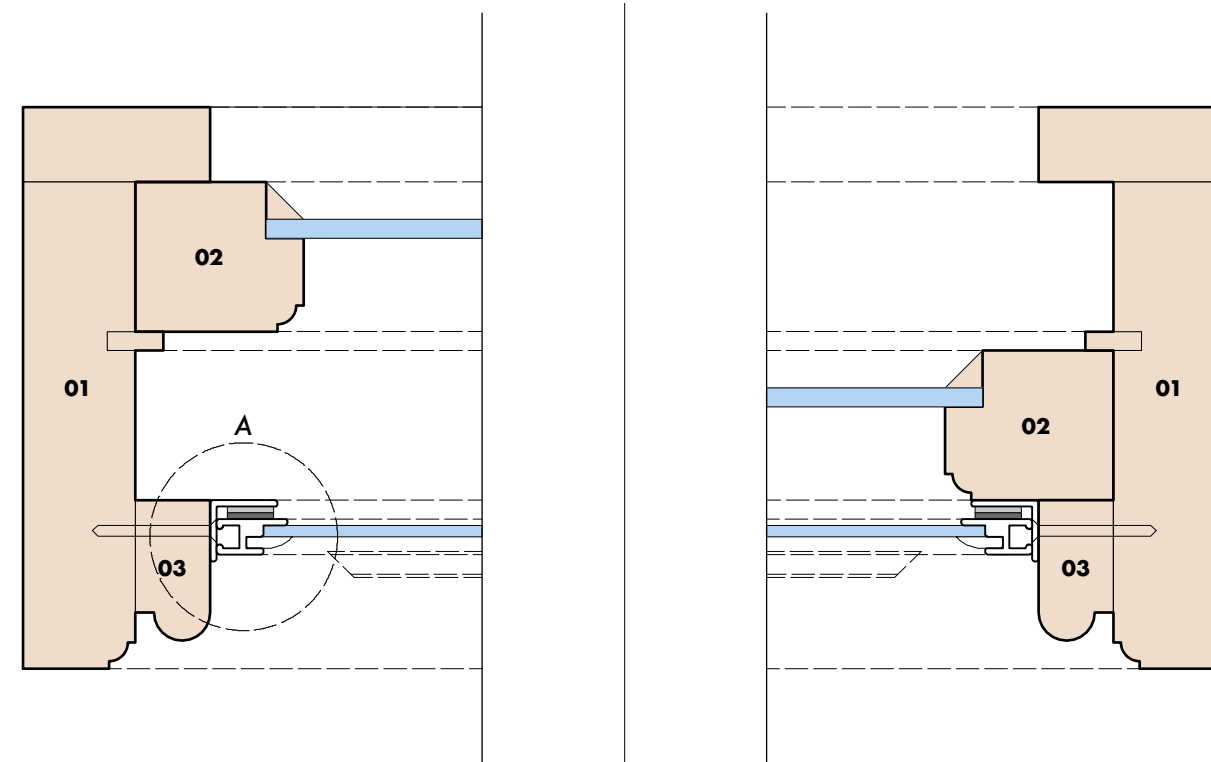
Storm windows

Storm windows, as used in the SPAB headquarters, are a 'hybrid system which combines magnetic and mechanical fixings. This type would still require mechanical fixings into the existing fabric as indicated on the adjacent drawings.

Although achieving the targeted 35db acoustic drop, these products were deemed unsuitable as they are only available in powder coated finishes (removing capacity for enhanced anodised finish for type D2 window).

Additionally, units have a width restriction of 1.8m, window types D1, D2 require greater widths than this, meaning Storm window products cannot be used.

In summary therefore the product put forwards in the proposals represents the minimum intervention required whilst still meeting the required acoustic performance, sizes, and finishes selections.



Top to bottom:

Typical Storm windows vertically sliding unit detail in plan, with L bracket mechanical fixing.

Typical applications, taken from Storm Windows website.

