4. Evolving the design

4.1 The brief

4.1.1 The functional brief for Norman Shaw North sits within the wider ambitions for the improvement and development of the Northern Estate to support parliamentary business in both the short and long term.

4.1.2 The brief for NSN has been derived in response to the inherent character and specific opportunities of this particular building, and comprises:

- Office space to HoC accomodation policy
- Additional tea points and print hubs with reference to BCO guidance
- Meeting room provision to suit requirements
- Provision of a self-service restaurant with 130 seated covers
- Provision of space for staff
- Provision of workshop space to meet current standards
- Upgraded plant and servicing to enable the building to meet current and future workplace standards
- Improved security
- Improved landscaping and access in and around the building, including a new step free entrance
- Fire safety improvements and fabric upgrades
- Facilities for cyclists to support sustainable travel and well being

4.1.3 Response to NEP drivers

4.1.4 The following summary provides an overview of the proposals.

4.1.5 Resilience for estate functions and infrastructure

4.1.5.1 The proposed Norman Shaw North works will provide a NIA of circa 5,304sqm for the main purpose of housing Parliamentary offices and associated ancillary services to these uses.

4.1.5.2 The creation of a new covered courtyard space will provide an additional 405sqm of usable area to deliver the catering aspect of the brief. Building on the success of the courtyard space at Portcullis House, the NSN courtyard will provide restaurant space to fulfil the requirements of the wider Estate catering strategy, an environment to hold informal meetings, and the opportunity to enjoy the courtyard setting of the Grade I listed Norman Shaw North building. This self-service restaurant will provide 130 seated covers, excluding the new upper terrace area.

4.1.5.3 In addition, key interventions are proposed to facilitate improved accessibility and upgrade facilities such as WCs and tea points. The new internal courtyard is adapted to maintain level access from Laundry Road, whilst modification of existing openings from the Ground Floor will provide access to the new terrace area within the courtyard. The new terrace makes use of an existing internal roof area to the south. The proposal also offers improved stair access between sixth and seventh floor levels.

4.1.5.4 Implementation of a new building services strategy to include mechanical ventilation, heating and cooling, miscellaneous specialist cabled services, small power and lighting, fire protection and detection systems throughout including a mist sprinkler fire protection system, public health systems, and interconnections to infrastructure networks and incoming supplies. This will involve the complete strip out of existing services which are beyond their functional and economic life spans. Non-original partitions and fittings will be carefully removed in order to facilitate an upgrade to contemporary office standards.

4.1.5.5 To accommodate new building plant and enable the introduction of a water management strategy, areas of basement slab are to be adapted or reconstructed.

4.1.5.6 In order to facilitate ventilation air intake and discharge, roof details and basement lightwells will require modification.

4.1.5.7 As part of a thermal upgrade strategy, secondary glazing will be installed, and existing roof areas upgraded.

4.1.5.8 Staff facilities will be provided.

4.1.6 Heritage and conservation

4.1.6.1 The proposed works include the complete refurbishment of the Grade I listed building. Historic and original fabric, including façades, fenestration and the roof are to be restored, repaired or renewed as appropriate. A new interior design strategy will be applied throughout, referencing the original colour scheme.

4.1.6.2 The removal of a temporary portacabin and unsightly waste and cycle storage in the internal courtyard, as well as the concrete roof to the single-storey courtyard structure, will improve the heritage setting. Furthermore, poorly designed modern plant, ductwork and other services obscuring the original architecture will be removed.

4.1.6.3 The new glazed courtyard roof is designed to appear as light as possible, to float in the space and mitigate impact upon the surrounding courtyard elevations and roof scape beyond. The oculus will be reinstated as the central feature of the courtyard, enhancing the setting.

4.1.6.4 Refurbishment and restoration works are intended at Lower Ground Floor level of the north elevation along Curtis Green. This area has been subject to unsightly modern interventions and still bares the scarring following the removal of the original outbuilding. A new structure will comprise an equivalent volume to this lost structure.

4.1.6.5 Rationalisation to the landscape and plinth to the west elevation will provide a more generous and resolved grounding to the building, while also enabling step free access to the new main entrance.

4.1.7 Security and access

4.1.7.1 Security and fire safety improvements will be made throughout the building. The introduction of new accessible passenger lifts to the east and west building wings will greatly improve the building's functionality and safety. This will also, in conjunction with improvements to building entrances and thresholds, make the building over 97% accessible. Each core will have a fire fighting and an evacuation lift.

4.2 Opportunity for change

4.2.1 Building exterior

4.2.1.1 It was Shaw's intention that New Scotland Yard was more than just a facade composition, as was typical of many contemporary public buildings of its time. For example, early section drawings clearly show Shaw's attention to the inward facing courtyard elevations.

4.2.1.2 Similar to the principal street facing elevations the lower floors feature channelled stone with red brick and stone banding at the upper floors, all set below pitched roofs with dormers.

4.2.1.3 Whilst the elevations of Norman Shaw North remain relatively unaltered, some change has occurred and the following opportunities have been highlighted and explored in the initial concept proposals;

- Urgent action to put the overall envelope, roof, walls, windows, and doors into good order, to address water ingress, rot, draughts etc.
- Seize the opportunity to repair and waterproof the building envelope whilst leaving traces of the history of alteration to the original fabric exposed and readable.
- Concentrated envelope upgrades in the areas highlighted through existing thermal envelope analysis.
- Make better use of the courtyard's potential as identified in the brief, by converting it to an internal space. The courtyard space is currently open to the elements and houses a portacabin building over two storeys. An enclosed courtyard would increase the building's thermal efficiency by simply internalising a significant area of facade.
- Remove non-original doors within arched openings to the courtyard elevation facing north.
- Creation of level access entrances through the courtyard space by modifying existing openings adjacent to the principal stair.
- Improvement or adjustment to the non-original stepped plinth around the north and west building elevations to create a more accessible landscape.
- Removal of the non-structural upper level extension to the main stair case and reinstatement of its original layout.
- Develop a consolidated waste and logistics strategy to prevent the ad hoc arrangement of waste containers around the building at external street level and remove existing plant and flues from the courtyard space.
- Understanding of the existing basement connections enabling flexibility to exploit opportunities for connectivity to more efficient centralised infrastructure in the future.

4.2.1.4 Historic England's The Setting of Heritage Assets: Historic Environment Good Practice Advice (2017) encourages ways to maximise enhancement and avoid or minimise harm from the project's inception. The design process has thus involved identifying opportunities to enhance or better reveal the heritage asset's significance, (the works to the courtyard provide the opportunity to follow this guidance by removing detrimental additions to the courtyard and thus revealing its historic design).

4.2.2 Building interior

4.2.2.1 A study of the significance of the building heritage has been undertaken by BDP with DIA.

4.2.2.2 The study reviewed the original internal arrangement of Norman Shaw North, the architectural intent and subsequent amendments made to the original fabric. The study was principally concerned with defining an appropriate strategy for the integration and distribution of new services, as part of the planned refurbishment of the building.

4.2.2.3 As the earliest built plans date from 1944, it is acknowledged that change may have occurred between design intent and construction in the 1887-1890.

4.2.2.4 Given the Grade I listing and assessment of the sensitivity of the fabric the opportunities for significant intervention without affecting valuable fabric are relatively limited for NSN and will require balanced assessment. Any interventions should respect and maintain the integrity of the existing architecture.

4.2.2.5 From this consideration, the following opportunities have been identified and tested:

- Carpeting throughout conceals original floor finishes and some damage has been caused to walls by the incorporation of modern (surface mounted) services. Original floors and walls could be repaired and recovered.
- The thermal upgrade of all internal faces of external walls has been considered. However, applying new insulation and internal linings to the existing rooms could risk damaging the integrity of fabric and would compromise the proportions and internal decorative detailing (architraves, cornices, dado rails, skirting boards etc.) of rooms. It is considered that applying new internal linings throughout would be too detrimental to the Grade I listed building.
- The original methods for concealing services within the fabric could be reused or a similar strategy could be employed, e.g. joinery casings in the passageways.
- Original chimney voids and/or lifts could be employed for vertical distribution, subject to integrity and size.
- Spine walls on each wing (that currently contain the chimneys) could be reconstructed or lined to accommodate de-centralised vertical distribution.
- A small number of rooms on each floor level could be more substantially adapted to accommodate larger, more centralised vertical distribution. These would ideally be directed to areas that have already been compromised in previous refurbishment, and are thus less sensitive.

01 *Enclosure to courtyard would reduce the thermal envelope. Potential for 405sqm of area transformed to usable, high quality space*

02 *Scope for significant thermal improvements roof envelope*

03 *Potential for improvements to water proofing and thermal performance with repair works*

04 *Opportunity to address and repair defects*

05 *Scope to improve acoustic and security performance of existing glazing*

06 *Reinstatement of original features such as the oculus*

07 *New entrances to and from key historic spaces*

08 *Internal original features revealed and/or refurbished where possible*

09 *Remove non original unsympathetic features such as trunking and bulkheads*

10 *Refurbishment and new use of the existing terrace*

11 *Re-organisation of basement areas provides opportunity for improved waterproofing and thermal upgrade*

12 *Opportunity to repair lower floor of the north elevation, following removal of lost structure*

Key section (existing)

4.3 Relationship to the Estate

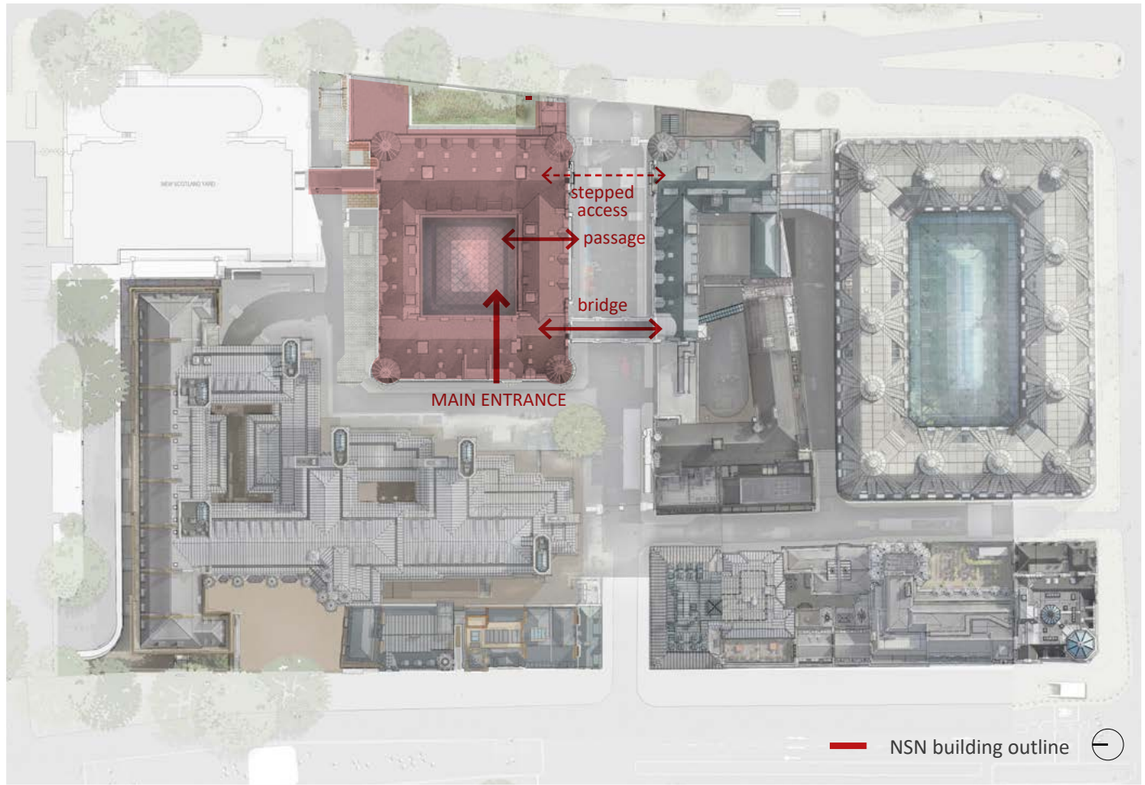
4.3.2.1 The proposals create a new main entrance to the building with level access, as part of achieving step-free building access throughout the Estate.

4.3.2.2 The new entrance better connects the building to the Parliamentary campus ground plane and provides an inclusive, legible circulation route for everyone to use from Laundry Road at the centre of the Northern Estate.

4.3.2.3 Landscaping improvements provide a direct connection from the new building entrance to Richmond House, opposite

4.3.2.4 Existing stepped connections and entrances are maintained to support existing circulation patterns. A new southern route is reinstated to provide equity and flexibility at lower ground level.

4.3.2.5 The re purposing of the courtyard provides one of the key amenity spaces within the estate.



Norman Shaw North's relationship to the masterplan

4.4 Design principles and concepts

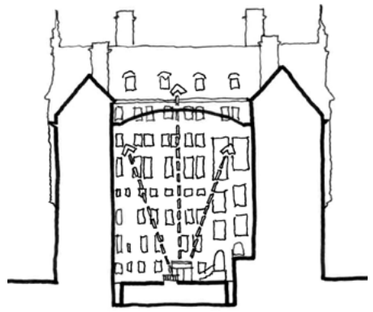
4.4.1 Courtyard roof

4.4.1.1 Building on the success of the courtyard space at Portcullis House, it is proposed that the NSN courtyard will provide restaurant space to help fulfil the requirements of the NEP catering strategy. As in Portcullis House, the covered courtyard space will be an ideal environment to hold informal meetings, as a gathering point, but unique to NSN this space provides the opportunity to enjoy the Grade I listed internal elevations.

4.4.1.2 A series of development studies have been carried out to test ways in which the courtyard roof could be supported and at what height within the courtyard it should span. The proposals rely on the existing building for support to enable a clear span structure, maximising uninterrupted views of the courtyard elevations.

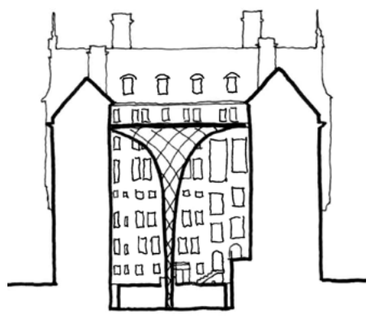
4.4.1.3 A curved diagrid construction is proposed for its inherent efficiency as a structure and in turn its ability to span the courtyard with relatively small structural section sizes. This produces a roof design that appears as lightweight and transparent as possible.

4.4.1.4 From an energy perspective, the courtyard roof at a higher level minimises the thermal envelope of NSN and in turn provides on balance the maximum opportunity for energy saving and CO2 offset.

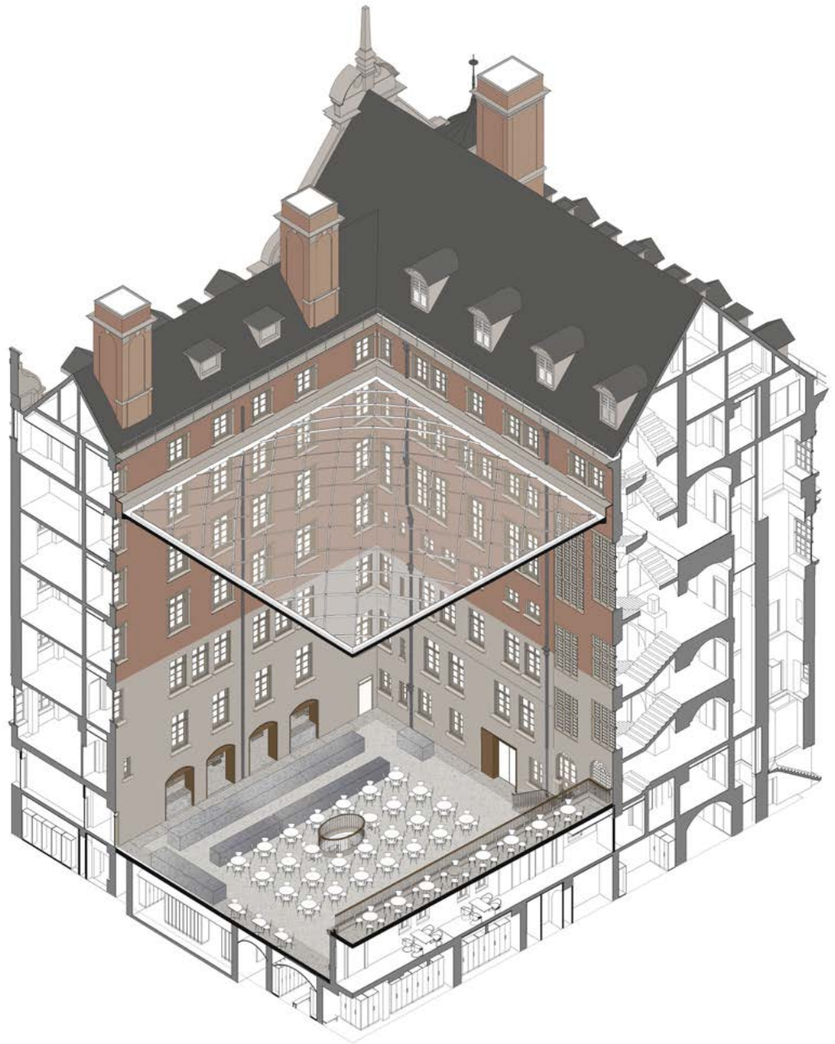


Clear span

Independent structure

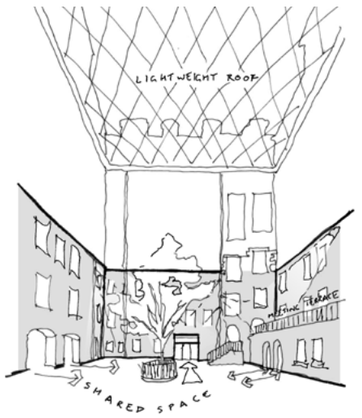


Sculptural intervention

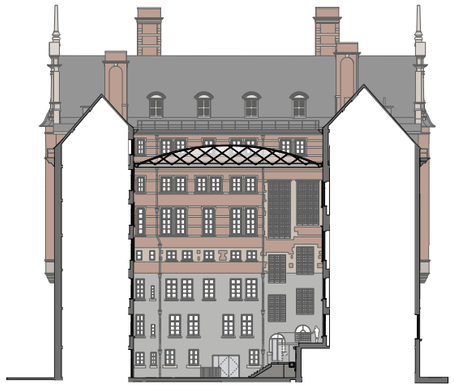


Courtyard roof supported by existing structure

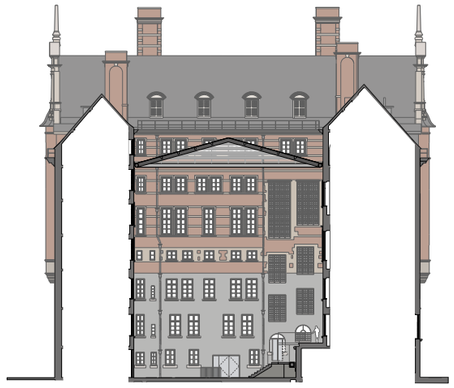
Precedent from the Northern Estate masterplan: Portcullis House



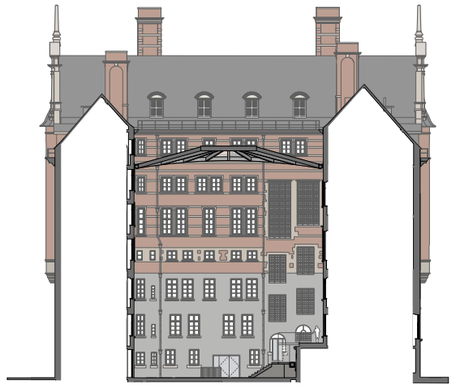
Courtyard roof supported by existing structure



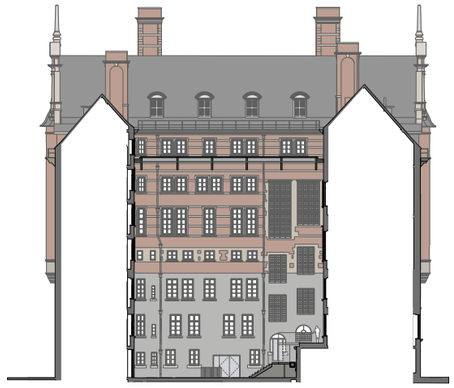
Glazed diagrid



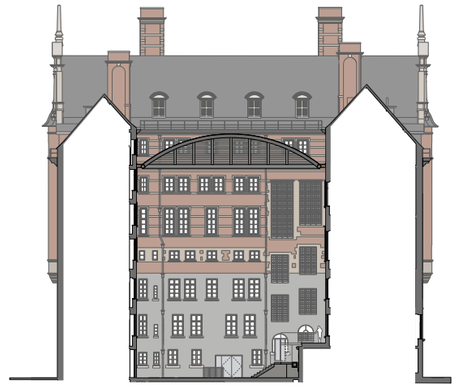
Glazed pyramid



Glazed lantern

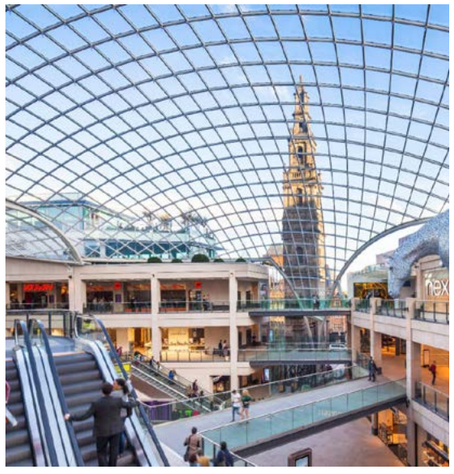


Trussed flat roof



Glazed barrel

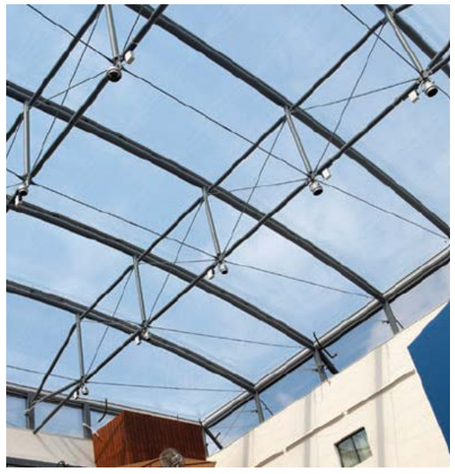
Structural Precedents



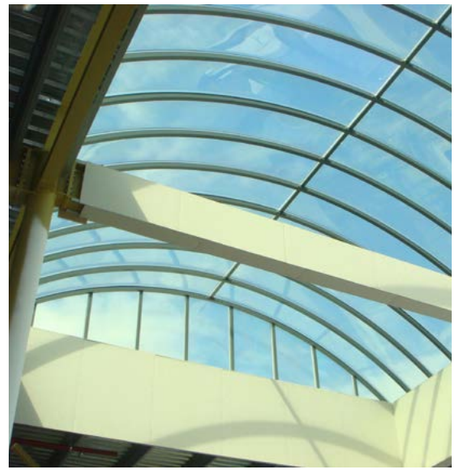
- Slender fabricated sections to form a curved shell over the entire courtyard, directly supporting a regular diamond grid of clear glazed panels.
- Modular structural strategy with 1800sqmm glazed panels.
- 2000mm rise to centre from consistent perimeter level.

- Larger primary structural elements to form four sided pyramid.

- Lantern style roof with central oculus to reflect courtyard base.
- Complex geometry and structure radiating from central ring beam requires increased number of primary structural elements and varying glazed panel sizes.
- Inconsistent perimeter condition (curved in elevation).



- Deep trussed structure to support a flat glazed roof.
- Potential conflict with existing window positions based on depth of structure.
- Oblique views of structure visually obtrusive.



- Barrel type roof construction with two vertical faces to the east and west elevations potentially obscuring views to and from the courtyard.
- Large structural elements spanning the width of the courtyard.

4.4.2 Courtyard roof option studies

4.4.2.1 Initial option studies were prepared to explore alternative forms for a proposed courtyard roof covering. The intention of this exercise was to understand the structural and visual implications of each, to assist the selection of the solution most appropriate to this historic setting. The driving design principle was transparency, with the intention that a lightweight appearing structure will allow continued appreciation of the courtyard's facades and will therefore retain the character of the space. The options were also presented at a pre-application meeting with Westminster City Council and Historic England.

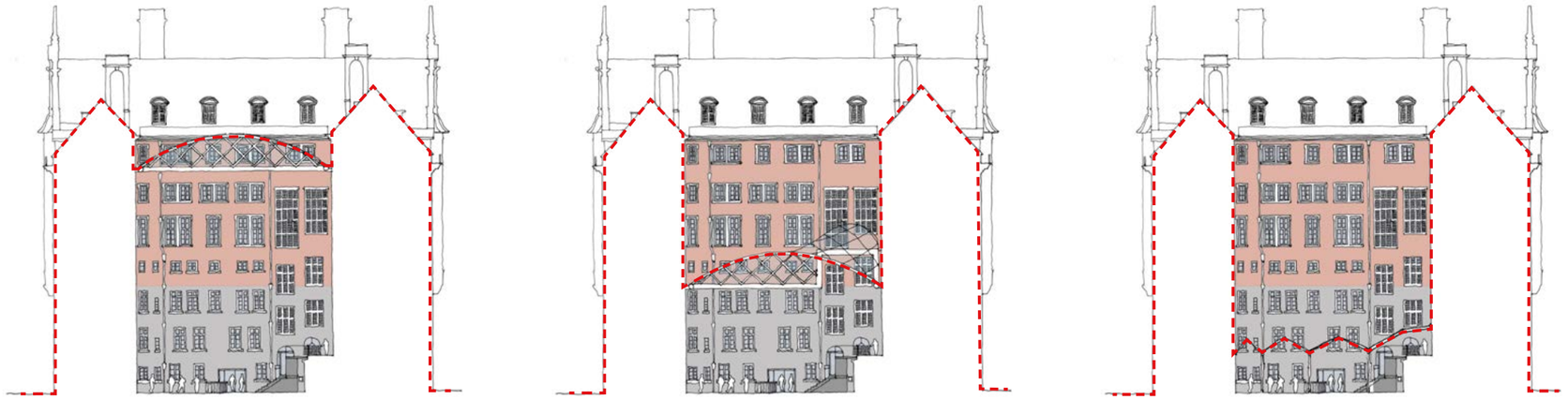
4.4.2.2 Regarding aesthetics, the diagrid solution offered the best opportunity for a lightweight appearing roof structure. Slender component sections provide a consistent shell-like structure across the courtyard.

4.4.2.3 Further option studies focused on the location of the courtyard roof, seeking the best holistic solution for the environmental performance of the Norman Shaw North building and the performance of the services within the newly enclosed courtyard. It was concluded that on balance a five storey courtyard held the maximum opportunity for reducing energy consumption and carbon emissions.

4.4.2.4 By placing the roof at fifth floor slab level, the thermal envelope is reduced and heat loss through the courtyard facing walls is reduced through the winter seasons. A lower courtyard roof requires higher heating consumption, and this additional requirement is greater than the reduction in cooling requirements achieved by lowering the courtyard roof, as illustrated in this diagram.

	Heating	Cooling
5 Storey courtyard	-	-
3 Storey courtyard	+4.2%	-0.5%
Single Storey courtyard	+6.5%	-1.7%

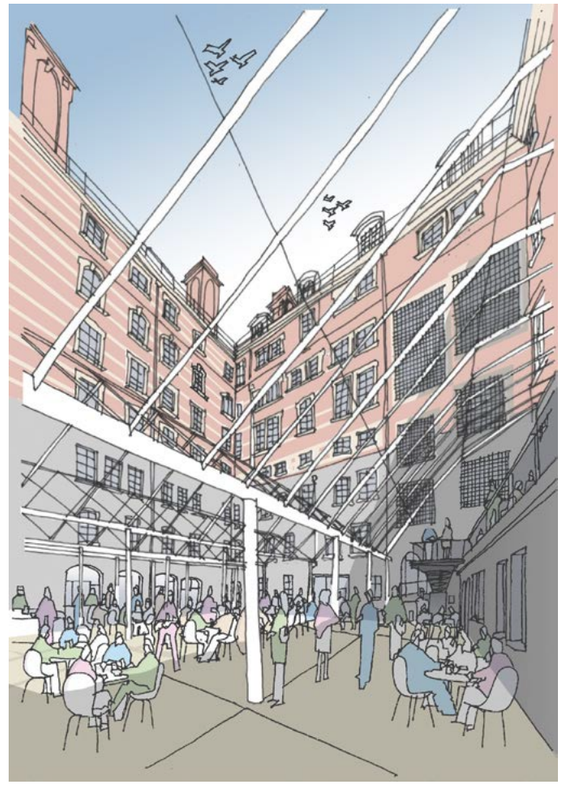
Annual energy consumption (% difference) using five storey as baseline



Option studies for level of courtyard roof

Option 1 - roof at fifth floor slab level

Option 2 - roof at second floor transition between granite and brick



Option 3 - single storey stepped roof

4.4.3 Courtyard roof location

4.4.3.1 A number of locations for the courtyard roof were explored and tested as part of the initial pre-application engagement for Norman Shaw North. Options at the Ground Floor level, the second floor level (the top of the granite base) and the fifth floor level were all tested.

4.4.3.2 The proposed courtyard roof location is the fifth floor slab level in the courtyard. This provides the only opportunity to locate the roof at a consistent level without interrupting the existing courtyard fenestration arrangement. It also internalises and therefore maintains clear visibility of the majority of the courtyard facing elevations whilst maintaining sight lines to the main roof, dormer windows and chimneys beyond.

Proposed courtyard elevations

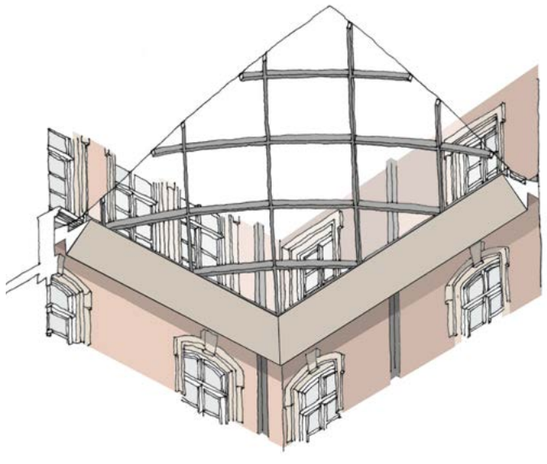
4.4.4 Courtyard roof support

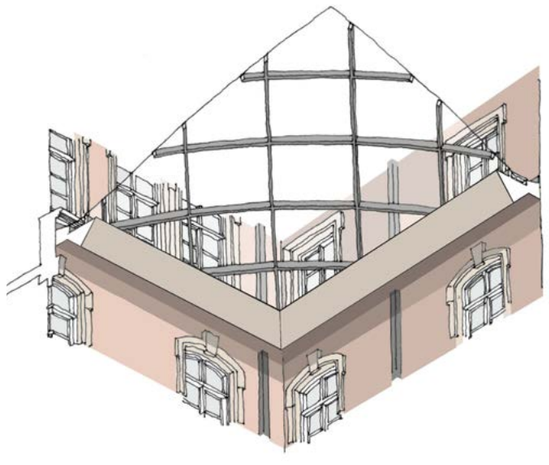
4.4.4.1 Particular consideration has been given to the edge detail of the perimeter beam, which has been articulated to minimise the perceived mass of the structural support.

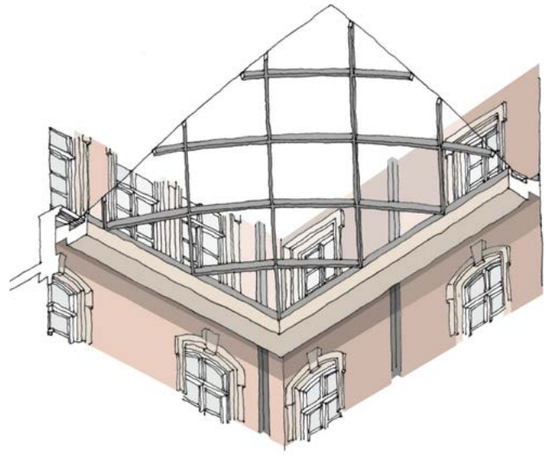
4.4.4.2 These sketches illustrate the manner in which different edge profiles could allow increased visibility of the adjacent elevation and the clear glazed diagrid roof above.

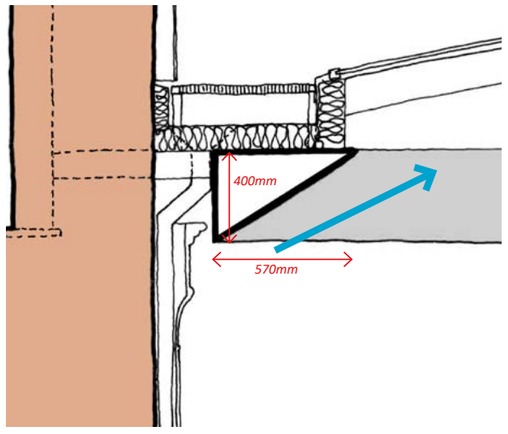
4.4.4.3 A stepped edge detail that sets back the perimeter grating and the diagrid's structural elements helps reduce the perceived mass of the roof edge.

4.4.4.4 Differentiating the finishes allows the ring beam to be read as an isolated element, with a consistent material language to the new interventions of the courtyard below, whilst the diagrid structure itself is intended to be as lightweight and transparent as possible, finished in a lighter coloured metal.

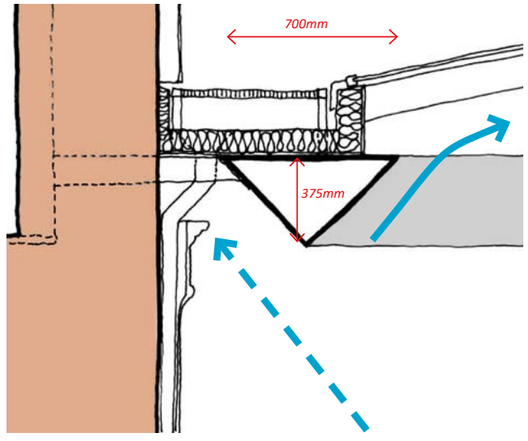




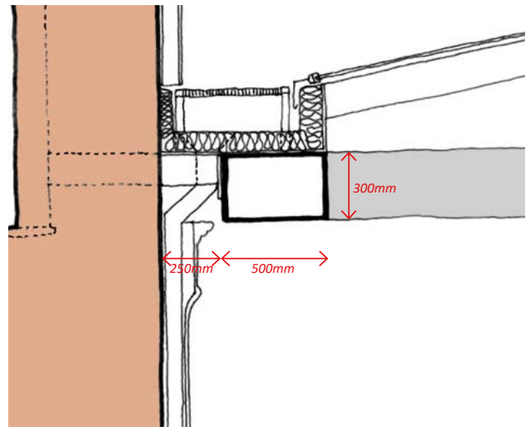




Chamfered face to beam



Double chamfered face to beam



Rectangular beam profile

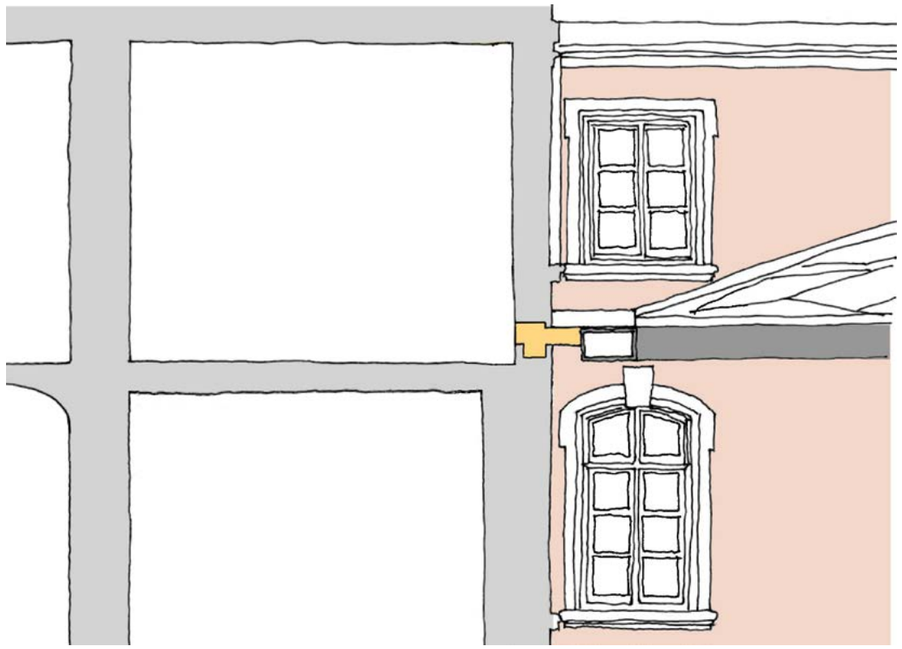
Courtyard roof support cont.

4.4.4.5 The initial structural strategy for supporting the new roof involved chasing a vertical post into the inside of the courtyard wall, from which a cantilevered arm is able to protrude through the wall and provide support for the new roof. The post was to be held by a new supporting structure inserted into the floor and between existing beams. This was limited to two locations per elevation which optimise structural performance and minimise the impact on heritage fabric..

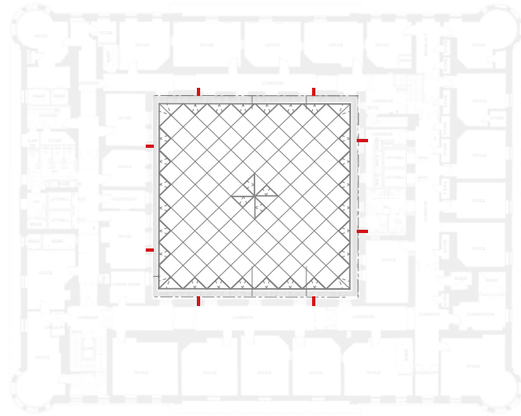
4.4.4.6 Following review with WCC/HE an alternative strategy has been developed which seeks to cause less intervention and impact to heritage.

4.4.4.7 Whilst the detailed roof design is in progress, the structural support strategy has developed with a view to minimising the removal of original fabric. As such, the previous post and beam has been omitted and the intervention limited to creating local openings in the courtyard elevations (again on the basis of two locations per elevation), in which a padstone is introduced to support a shorter cantilever support arm. Courtyard facing materials will be retained for reinstatement around the support arm openings, minimising visual impact from the courtyard.

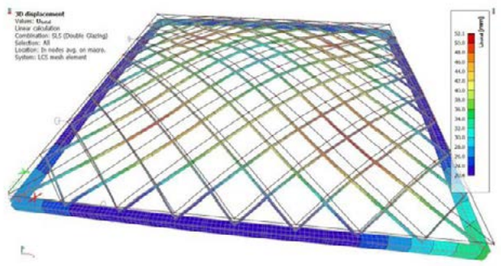
4.4.4.8 The unwrapped elevations adjacent illustrate the intended approximate location and size of the 8no openings required, which respond to the features of the particular elevation.



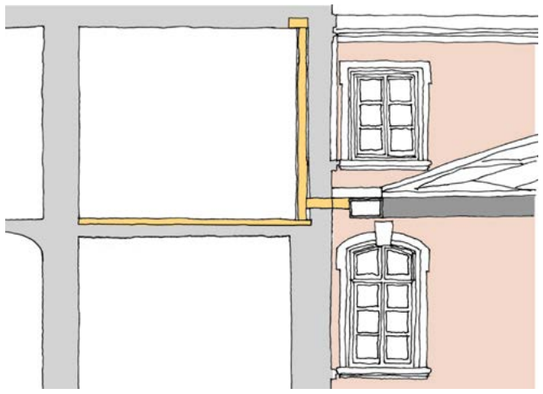
Refined proposal showing support methodology with support arm and padstone (yellow items)



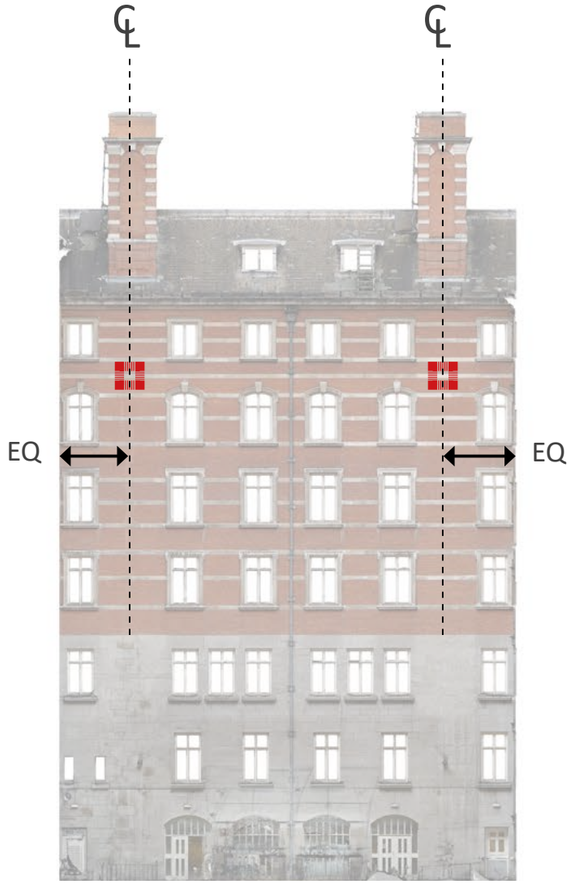
Indicative plan describing the location of eight structural supports at Fifth Floor level



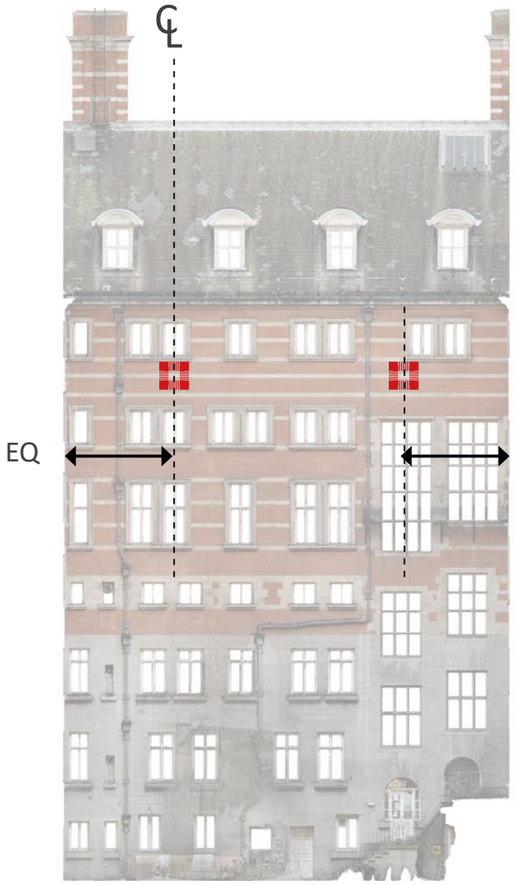
Finite Element Analysis modelling - stress distributed evenly across diagrid roof structure



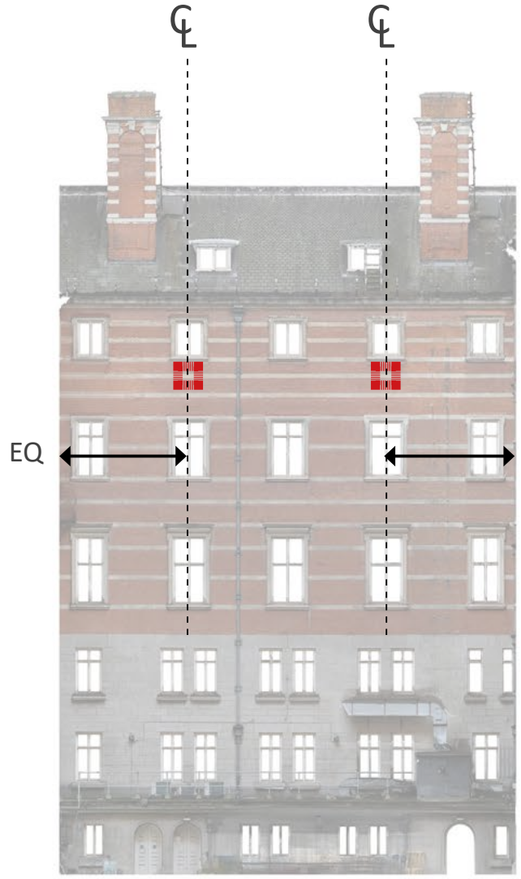
REJECTED structural scheme showing support methodology with post, beam and support arm (yellow items)



Existing north courtyard elevation



Existing east courtyard elevation

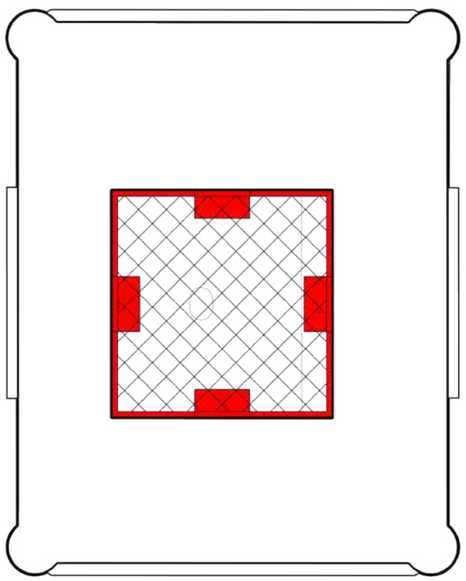


Existing south courtyard elevation

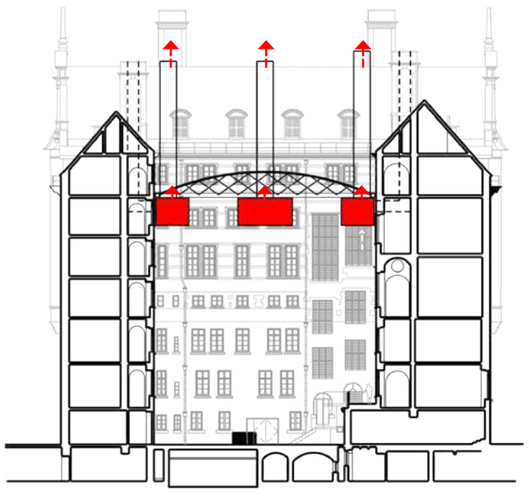
Existing west courtyard elevation

4.4.5 Courtyard roof ventilation

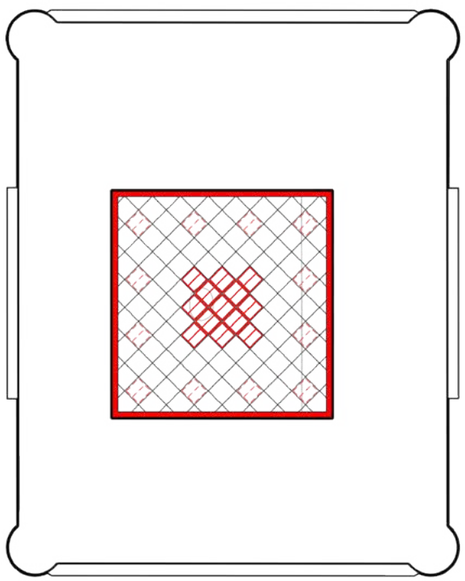
4.4.5.1 Strategically located opening lights will allow the courtyard to be fully naturally ventilated and provide smoke vent in the case of fire. Various options were considered, to balance performance and visual impact.



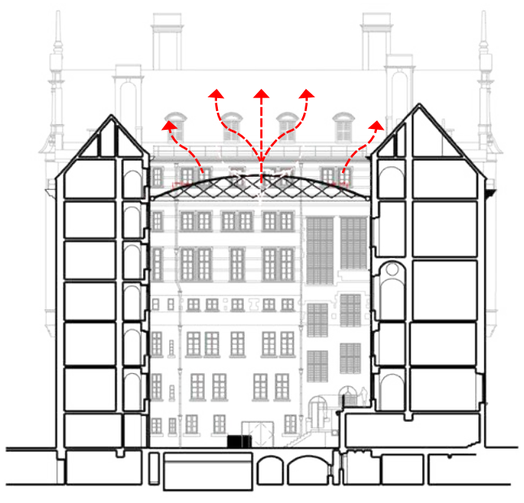
Mechanically ventilated through HVAC units below courtyard roof



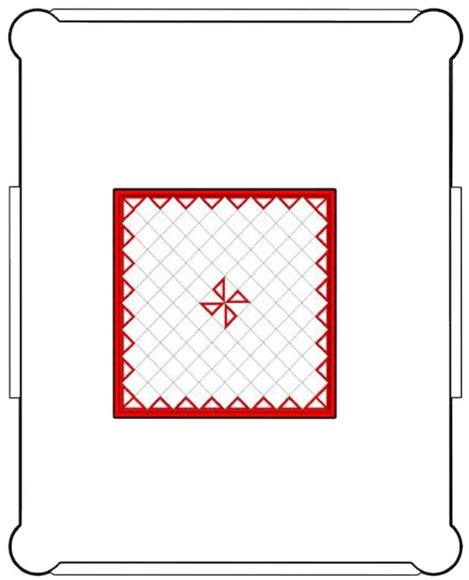
- Large units obstruct courtyard elevations.
- Large extent of Intrusive work to route air extract air through internal building and existing chimneys.



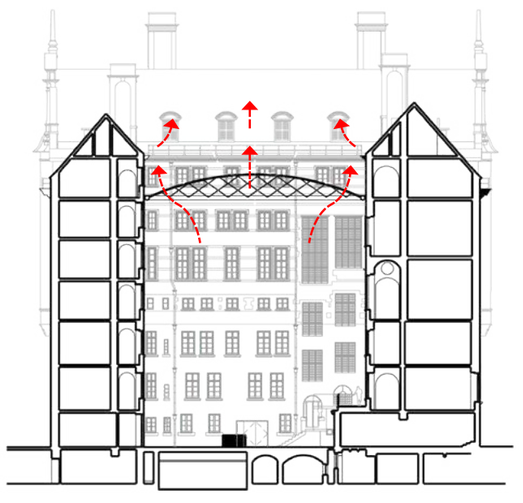
Naturally ventilated through openable panels at roof's apex



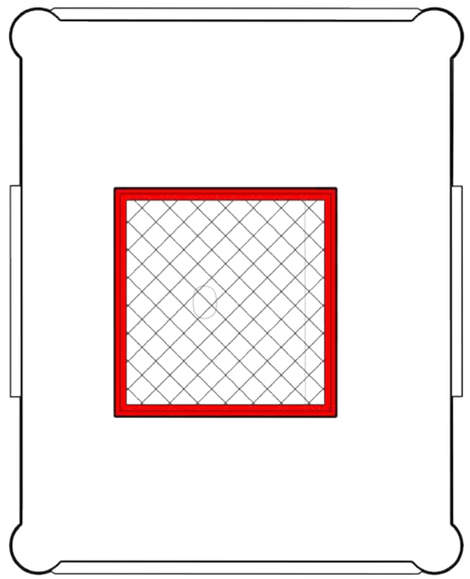
- Does not allow sufficient free area for ventilation of the courtyard.
- Additional diagrid frame thickness at opening lights in centre - most conspicuous area of the roof



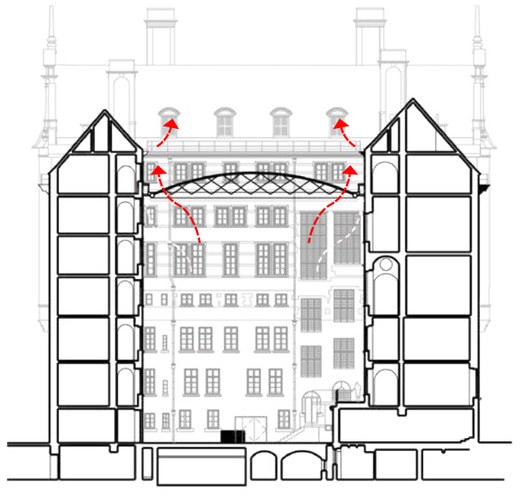
Combination of openable panels at perimeter and roof centre



- Additional diagrid frame thickness at opening lights in centre - most conspicuous area of the roof, as well as perimeter



Naturally ventilated at the perimeter



- Does not allow sufficient free area for ventilation of the courtyard, unless perimeter zone increased.
- Benefit in avoiding additional diagrid frame thickness / mechanisms at opening lights

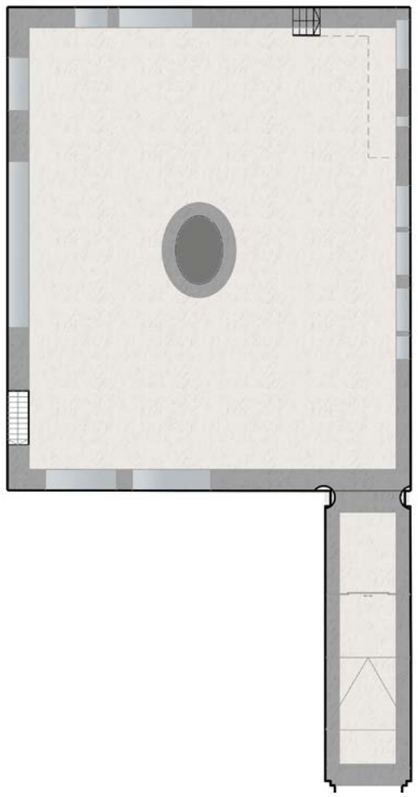
4.4.6 Courtyard base

4.4.6.1 As part of the decision to enclose the central courtyard, careful consideration has been given to the look and materiality of the ground surface.

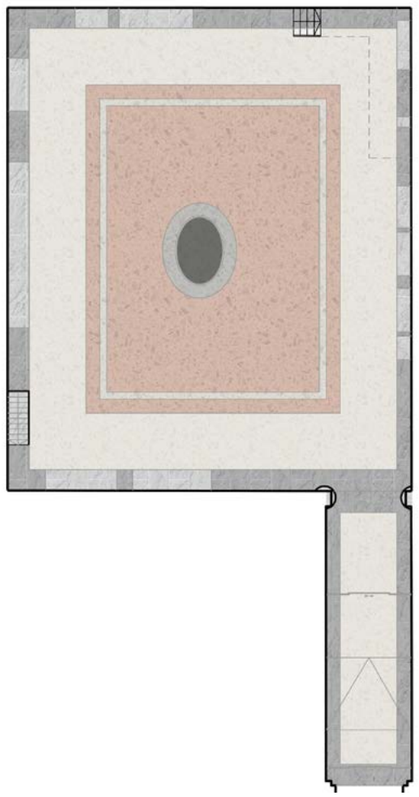
4.4.6.2 Proposals for the new floor finish explored reinterpreting elements of the existing building such as the Portland stone banding, terrazzo circulation spaces and the original layout. Alternatives referenced new design elements such as the diagrid pattern of the proposed courtyard roof. The intention to balance a degree or material refinement with the preservation of a sense of the space's external origins.

Original terrazzo flooring in entrance of Norman Shaw South

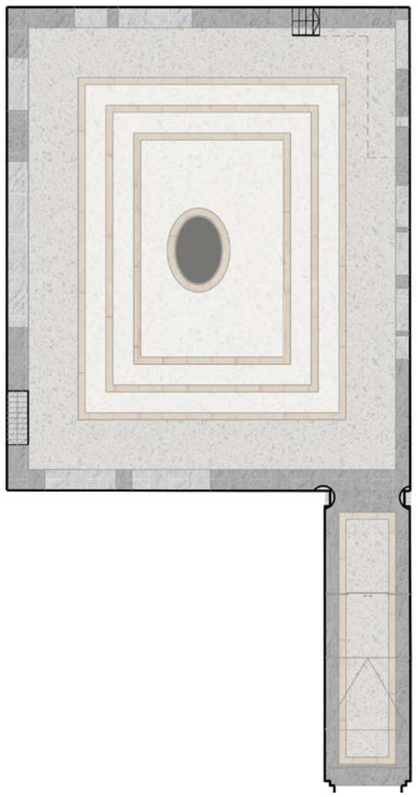
Contemporary terrazzo courtyard precedent



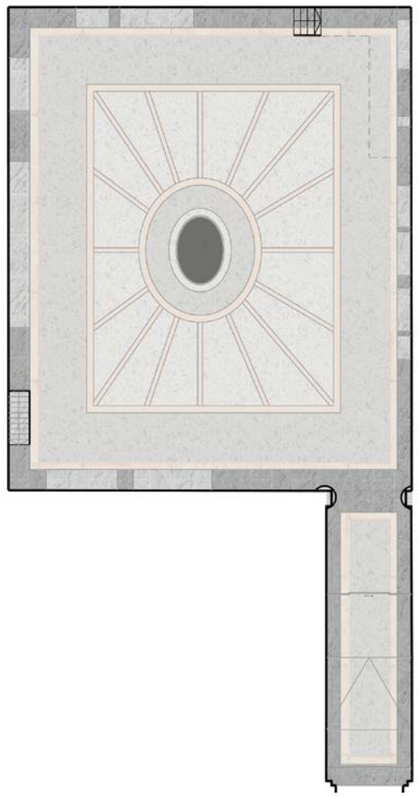
Baseline - perimeter border to align with existing grilles



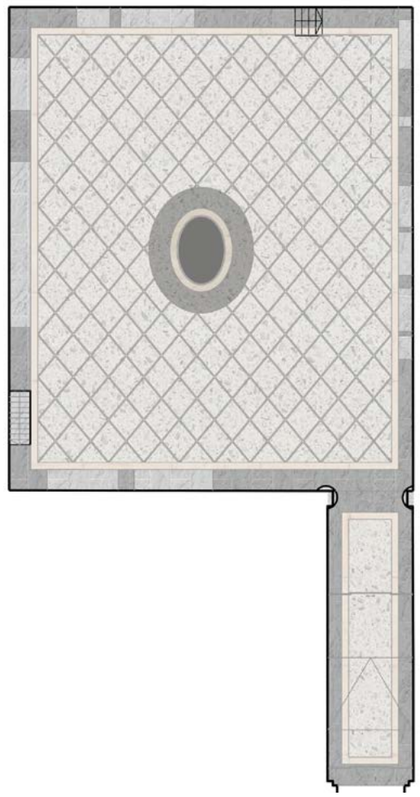
Reference to terrazzo design in NSS entrance and red brick



Reference to horizontal stone banding in elevations



Pattern radiating from central oculus



Reflecting the proposed diagrid roof pattern

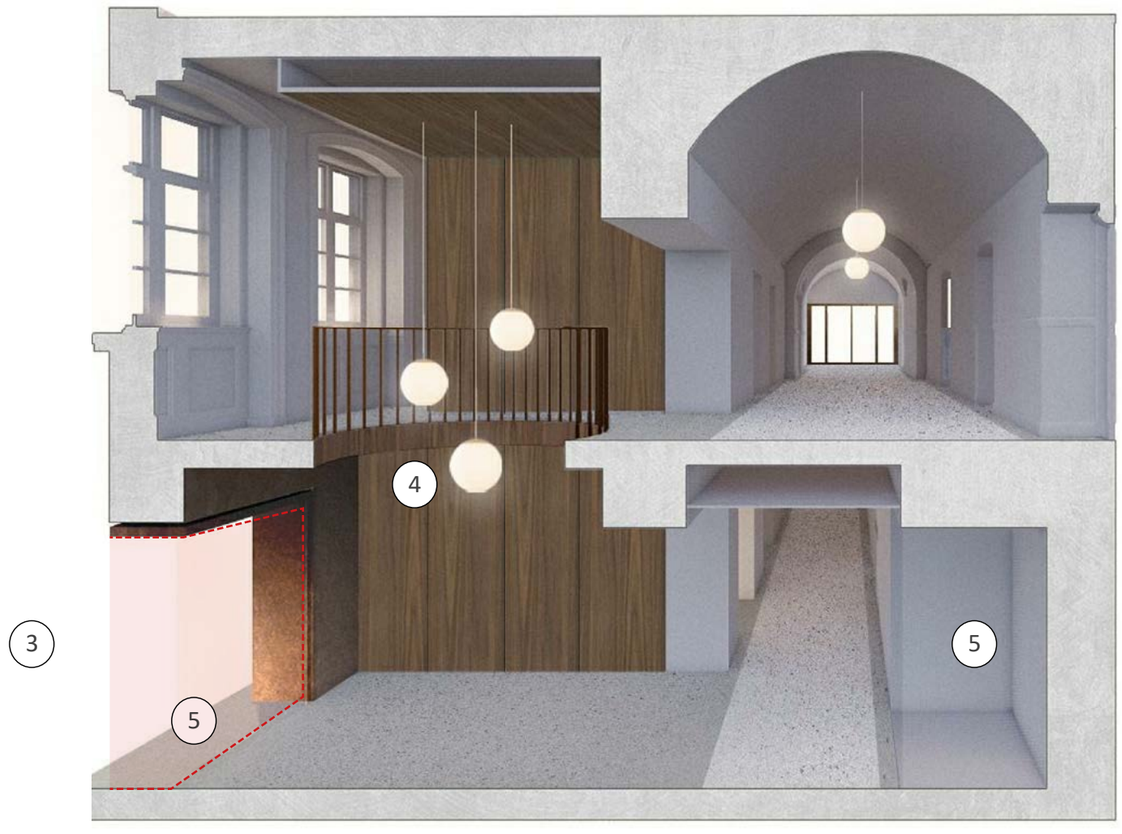
4.4.7 Courtyard entrance

4.4.7.1 To signify the new inclusive and accessible entrance to the building, designs have been developed to create a double height reception space that provides clear visual connection to the circulation space beyond as well as the current entrance level above.

4.4.7.2 It is intended that the new opening will co-ordinate with the positions of existing openings, to lessen the impact on original fabric. Fine linings to the walls conceal services and in conjunction with a display case set on axis, provide a rich backdrop to the entrance space.

Early photograph of Norman Shaw North courtyard looking towards the location of the proposed new main entrance

1. *Principal entrance from Laundry Road*
2. *Draught lobby enclosed by sliding doors*
3. *Central courtyard*
4. *Double height entrance to NSN*
5. *Display cabinet*



Concept development, exploring, volume, circulation, views and lighting. Newly made entrance highlighted in red

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