



1.1 Introduction to the louvre options appraisal

This report has been prepared to demonstrate the options considered for the proposed louvres to be used within the façade of No3 Circle Square, Manchester, and addresses comments received from Manchester City Council regarding the louvres in connection with their visit to view the Project visual mock up panel (VMU) on 26th July 2023.

The document supports the partial discharge of condition 3 attached to planning permission 134288/FO/2022, for materials discharge approval.

The report serves to describe the design development process relating to the selection of louvres to be used within the building facades, and demonstrates that the proposed louvre type has emerged from a comprehensive assessment of available options.

The report covers louvre materiality and design aesthetic, together with technical and performance considerations.

1.2 No.3 Circle Square approved application; development of the façade design

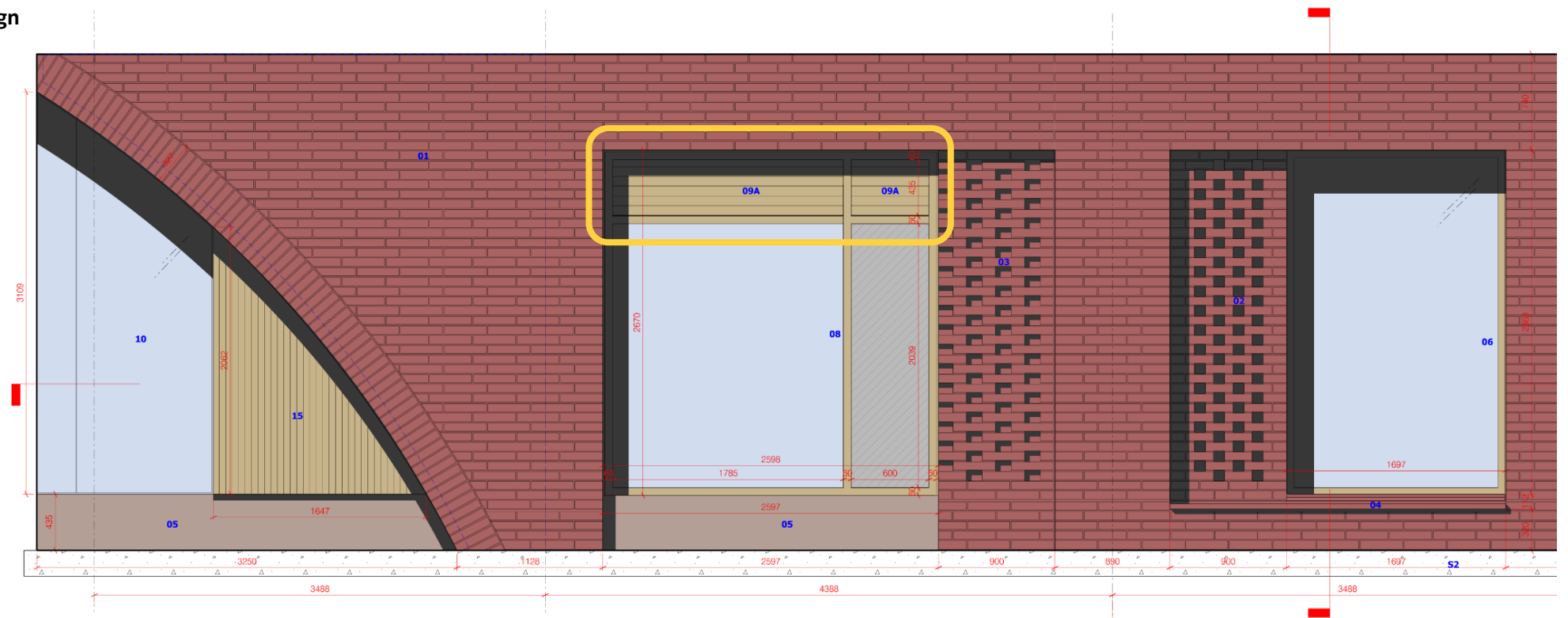
The principles of façade design, including fenestration/opening patterns and scale, and materiality were first established following extensive pre application discussions with Manchester City Council.

The scheme was approved under planning permission 134288/FO/2022 on 4 November 2022. Although Condition 3 relates to the sign-off of materials, the approved design drawings clearly illustrate and reference 'Aluminium louvres/ louvered screen with blanking panels to rear, powder coated bronze colour'. As the approved approach, this is what has formed the basis of all designs, technical approach and cost planning to date.

Information was subsequently submitted to Manchester City Council by Deloitte in relation to VMU scope in January 2023, which also described the same aluminium louvres. The on-site VMU was constructed on the basis of this agreed scope of façade materials and design.

Following inspection of the VMU and specific comments received from Manchester City Council regarding higher quality design aspirations for ventilation designs, and notwithstanding the established planning position, the Design Team has undertaken a full options appraisal of alternative louver/ vent grille types. These consider design aesthetic, design performance and technical implications and are described further overleaf.

The louvres presented on the VMU panel are referenced as **Vent type A – proprietary polyester powder coated louver blades** in this report, and are considered to be the best design approach for the building aesthetically and technically when considered with the associated constraints. The justification for this, and comparison with alternative ventilation options is considered further on the following pages.



VMU panel : approved drawing extract (aluminium louver extent highlighted)

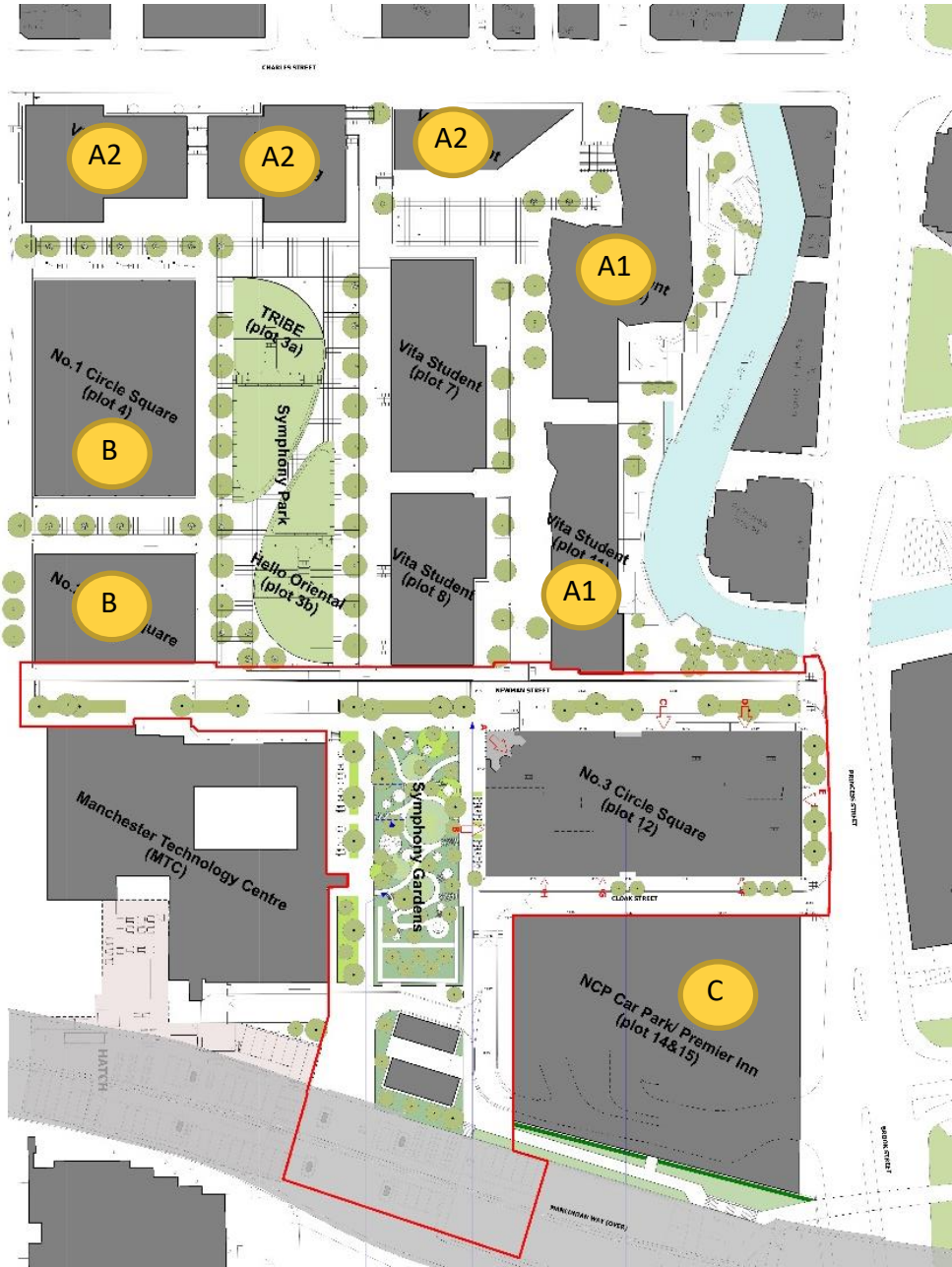


On site VMU panel – with louvres installed



1.3 Circle Square Masterplan; site context and louvre/ vent precedent

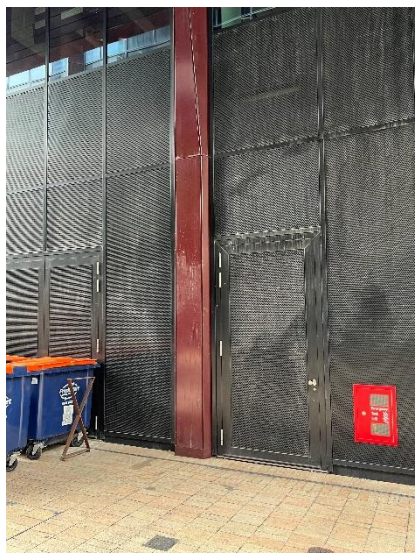
There are various louvre and vent grille types present on the building facades within the Circle Square Masterplan. These are characterised as follows:



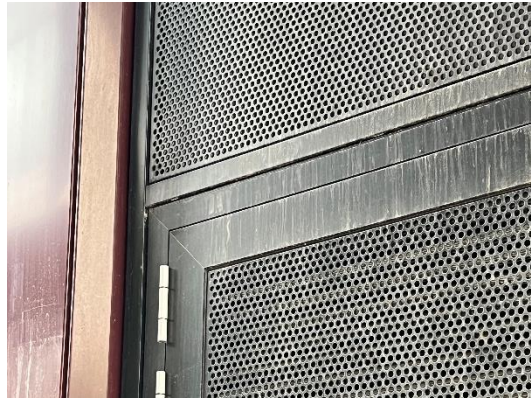
A1 Vent type A1 – polyester powder coated louvre blades, wide blade profile



A2 Vent type A2 – polyester powder coated louvre blades, narrow blade profile



B Vent type B – polyester power coated metal mesh



C Vent type C – polyester power coated perforated metal decorative panel



1.4 No.3 Circle Square: proposed louvre locations and ventilation strategy

The locations where ventilation is required are typically limited to the ground floor and mezzanine levels and uppermost floors of the building. Vent locations relate to intake and extract for plant located internally at these floor levels.

Locations are as highlighted on the elevations shown adjacent

The location of louvres was considered carefully at design stage, and the locations have been sensitively selected and integrated in the context of the wider building facades and surrounding street scene. . The general principle of the design for louvered areas is to minimise the amount of louvres, such that louvered zones typically accommodate active intake and extract (and are not used with blanking panels for screening purposes).

The general arrangement plan of the building is organised so that plant rooms, sub stations etc are accommodated internally adjacent to Cloak Street. This means louvres are intentionally concentrated on Cloak Street, which is not a prime pedestrian route. This serves to minimise the amount of louvres on the prime, public facing Princess Street, Symphony Gardens and Newman Street facades, so that at street level all openings are predominantly glazed.

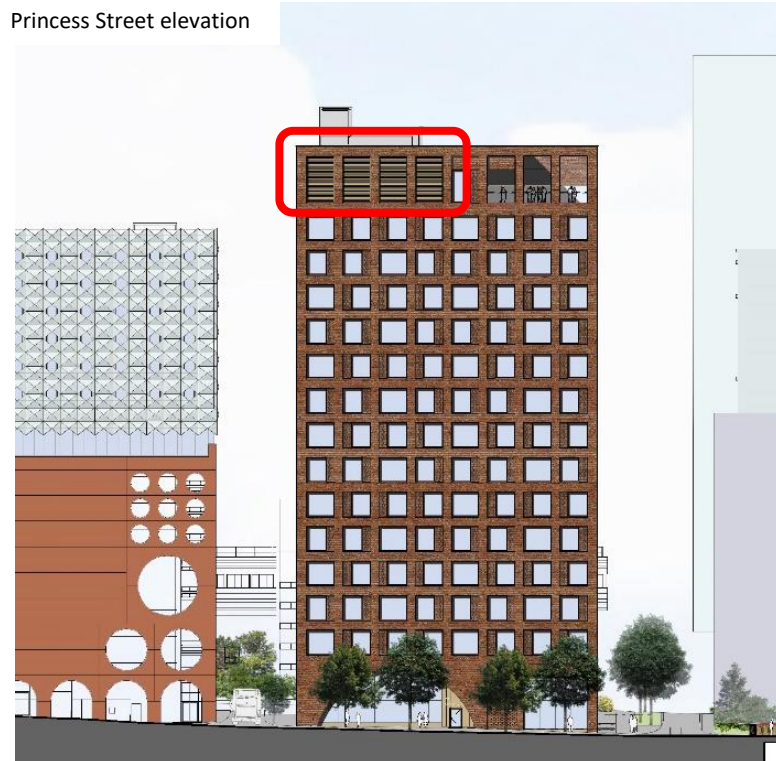
The louvres on Newman Street are discretely set within the curtain walling and relate solely to the proposed Commercial Units. These will provide vent provision for future Tenant fitout specific to these locations.

The louvres located on the 14th floor provide ventilation, and visual screening to the plant room areas.

All louvres will also serve to provide provide acoustic attenuation for the plant installations located internally directly behind each louvred element on the façade.

It is noted that the open brick vent panels (with metal polyester powder coated louvres set behind) utilised across a large portion of the façades are not covered in this report, on the basis that the design and detail as demonstrated by the VMU is accepted.

Princess Street elevation



Newman Street elevation



Cloak Street elevation



1.4 No.3 Circle Square: proposed louvre locations and ventilation strategy

Limiting factors

In assessing the ventilation louvre/ vent panel options the following factors have been applied to the assessment of all options:

1. Availability and size of openings within established façade pattern

The building facades have an established rhythm, pattern and size of rectilinear and arched openings. As set out in the Design and Access Statement for No.3 Circle Square these have been carefully designed such that the building sits comfortably in terms of scale, proportion within the Circle Square and wider City Centre context. Similarly, the structural grid as been designed to achieve efficiencies in weight of materials and cost. The established size of openings in the facade and positions of steel column and beams means that the available opening sizes for louvres are limited by these factors.

KEY:



2.1m clear internal headroom zone required for circulation/ doors



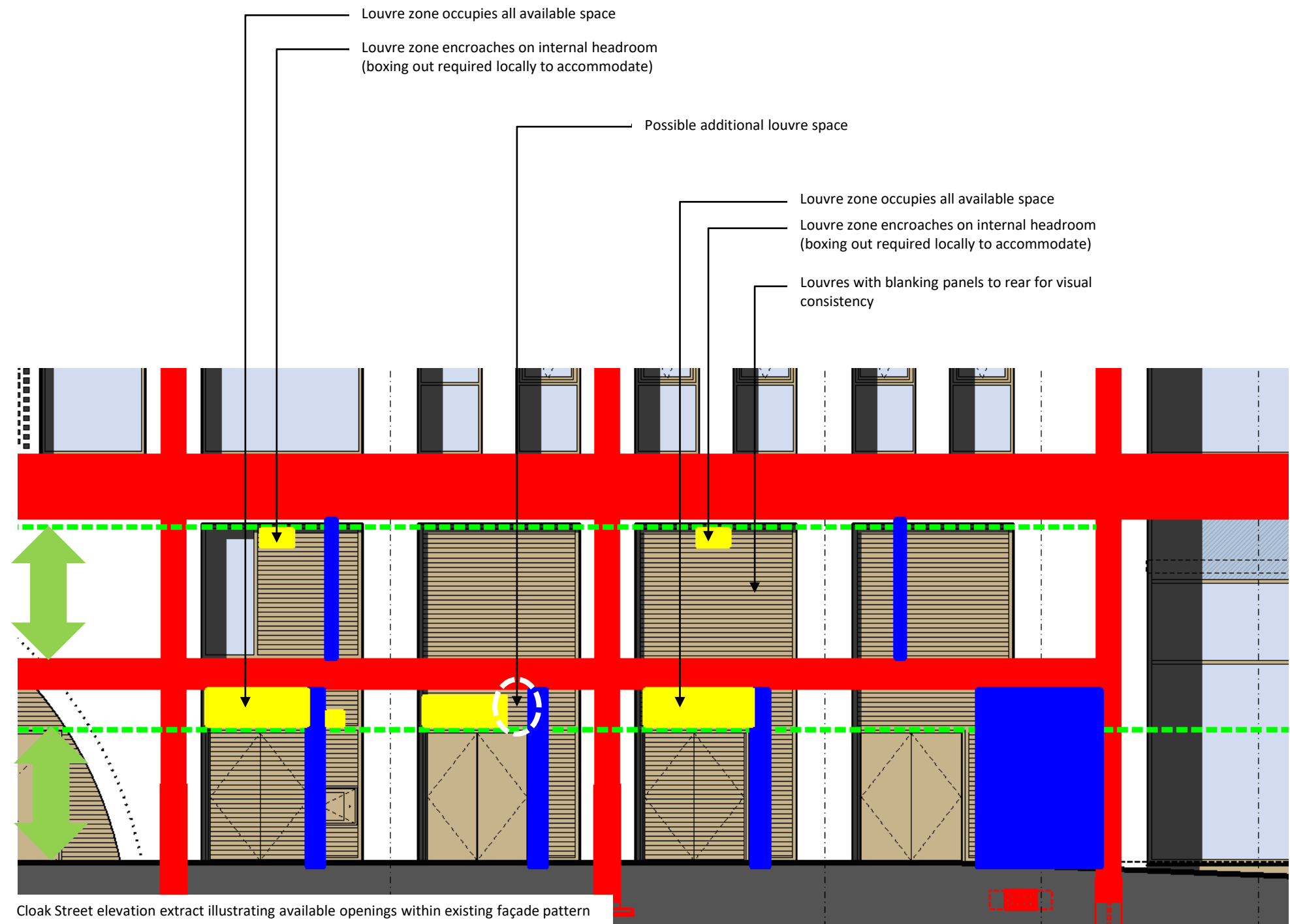
Ductwork opening via façade (louvred face as currently designed)



Structural steelwork and floor structure zones



Internal partitions/ incoming services zones etc



1.4 No.3 Circle Square: proposed louvre locations and ventilation strategy

Limiting factors (continued)

2. Spatial considerations

In order to maintain air flow it is noted that different vent panel options require different plenum box sizes, which in turn impacts on how ductwork configures and connects internally. Similarly, any mesh panels or perforated metal panels overlaid onto louvres need to be accommodated dimensionally. With this in mind different vent options need to be considered in the context of any spatial constraints.

These constraints include the building general arrangement plan, headroom clearances, and presence of internal walls, floors and structure for internal duct connections and plenum boxes, which limit the opportunities for ductwork connections.

3. Louvre weight and depth

Louvre depth and weight (including any associated accessories and secondary supporting structure), which may have an impact on the relative position of louvres as set within opening reveals.

4. Sustainability

Louvres are typically located on the façade adjacent to the areas to which they relate within the building, as such this improves the efficiency and performance of the intake and extract systems. The louvre locations therefore relate to the internal plan arrangements of the building. Similarly the louvre/ screen type impacts on the resistance to airflow and thereby different solutions have an impact on the energy use within the building.



No.3 Circle Square from Newman Street

2.1 Louvre/ vent selection appraisal criteria

An options appraisal has been undertaken to determine the most appropriate louvre/ vent grille type for the building. The selection process for the louvres/ vent grilles has been driven by the following interrelated factors:

• Aesthetic; colour and materiality:

All louvres and grilles options are considered on the same basis of being fabricated in metal with a powder coated bronze colour finish. This is to match the glazing frames and the already agreed and established colour and material palette for the building.

• Aesthetic: appearance and profile:

There are various means for achieving openings suitable for vent on facades these include; louvres (with various blade size and profile options), metal mesh and perforated metal sheet panels (with various perforation opening size and pattern options)

• Aesthetic: visual consistency:

In order to reduce visually clutter on the facades, it is important to have a consistent approach for louvre/ vent grilles across the facades. The appraisal has been undertaken on the basis that the selected louvre/ vent grille solution is applied throughout.

• Aesthetic: overall amount of vent area on facades generally:

For the performance reasons described adjacent, vent grilles (combined with louvres) require a larger area to perform, therefore impacting on the size of openings with the façade. The result would mean increasing the % area of overall amount of vent provision relative to other façade elements, which would impact on the established design rhythm of the facades.

• Performance: Durability, weathering and acoustics:

These factors are considered specifically in the context of position of louvres within the façade; height above ground and mounting position relative to louvre opening reveal depth and other façade modelling/ building overhangs etc.

The acoustic performance requirements are to meet the standards set by Manchester City Council for noise attenuation from plant.

Louvres provide tested weather protection and certified acoustic performance. Vent grilles are particularly open to the elements and do not provide any certified acoustic performance, and as such in the context of No.3 Circle Square are only being considered when combined with louvres as an additional layer.

• Performance: Free area provided vs. intake and extract requirements:

Different louvre and vent grille types, designs and configurations provide substantially different free area opportunities for intake and extract. The louvre/ vent grille selection needs to meet the intake and extract performance requirements associated with its specific function. Louvres can provide the same performance in a smaller area, compared to vent grilles/mesh combined with louvres which have a higher resistance to air flow and therefore need to have a larger square meter area to compensate. Vent grilles require a larger area to perform therefore impacting on the size of openings with the façade and increasing the % area overall amount of vent provision relative to other façade elements.

• Performance: impact on thermal performance due to vent area required:

As described above, different louvre and vent grille types, designs and configurations provide substantially different free area opportunities for intake and extract. Vent grilles require a larger area to perform therefore impacting on the size of openings with the façade. The result of using vent grilles (combined with louvres) is that the overall % area of vent provision is increased relative to other façade elements. As the thermal performance of louvre/ vent grilles is poorer than other façade elements (brickwork, curtain walling, widows etc) this would lead to increased thermal losses from the building fabric.

In selecting appropriate louvres/ vent panels, various options have been considered.

Louvre and vent panel options were initially reviewed with regard to aesthetic requirements of the louvre itself and its context within the wider building façade design.

The other performance based selection criteria were then used to narrow the choice of louvre/vent options down.

It is critical that the louvre/ vent grille selected is suitable for the intended use.

The following pages summarise the various aesthetic louvre/ vent panel types that have been placed under consideration and the primary reasons for being discounted or further considered, in order to demonstrate how and why the preferred louvre has been selected.

3.1 Review of louvre/ vent options considered

A Vent type A – proprietary polyester powder coated louvre blades

Description

Louvres are typically horizontally configured and use different types of blade or blade configuration to control and manage airflow.

Aesthetic considerations

Louvres can provide good visual screening of the mechanical elements set behind them. They can be configured such that blades appear to run in a continuous line, so that individual panels, that would be otherwise limited by material size constraints, are not expressed. This was an important consideration where louvres are proposed to be set within arches at ground floor and mezzanine levels, such that the arch profile is not visually compromised by visible mullions.

Louvres can provide visual interest to the building façade, by providing crisp shadow lines.

Louvres can be scribed to suit the arched openings in the façade.

The design of the external doors to the sub stations on Cloak Street are wholly prescribed by Power On (electricity sub-station infrastructure supplier) and need to be louvred. As the doors are set within larger masonry apertures that contain a mixture of other intake and extract elements, there was a desire to maintain visual consistency within the aperture and use louvres throughout.

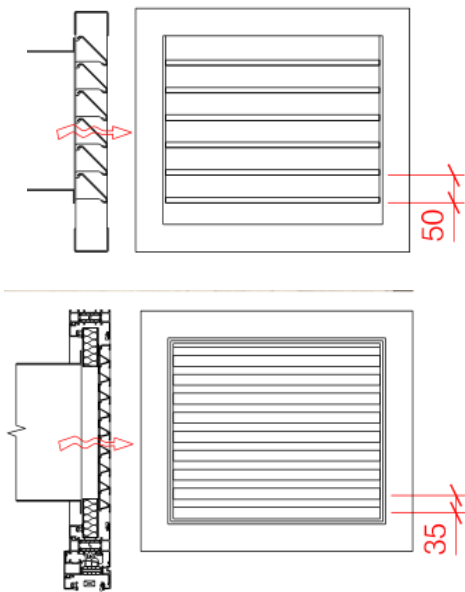
Performance considerations

Polyester powder coated metal will provide a robust finish able to withstand weathering.

Proprietary louvres can be set within the building façade to and maintain the sealed building envelope and provide rain defence. This is a critical requirement for the facades at No.3 Circle Square.

Proprietary louvres can provide sound attenuation and be specified to meet acoustic performance requirements based on certified test data.

Different louvre configurations, and blade pitch provide different levels of ‘free area’, which can be specified to suit the performance requirements set by the M&E Consultant to achieve the required critical air flow.



Note louvre blade size varies to suit performance requirements



This option is preferred for aesthetic reasons in terms of providing good levels of screening, and visual continuity and visual interest, particularly where set in the masonry arches to the Cloak Street facade

Technical and performance aspects have been tested at the design Stage of the Project by the M&E Consultant (CWC) and a proprietary louvre system will meet weathering, acoustic and free area requirements for intake and extract, within the designed façade dimensional and structural parameters

3.1 Review of louvre/ vent options considered

B Vent type B – proprietary polyester power coated aluminium mesh

Description

Aluminium mesh can be provided within a frame to provide a simple screening and vent solution. Mesh is typically used where rain penetration is not a concern and sight screening and acoustic performance is not critical.

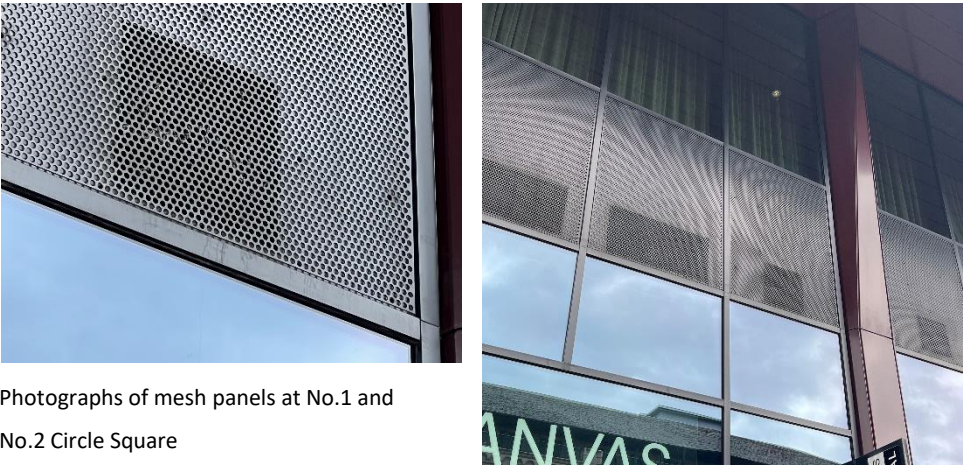
Mesh vent panels have been used on the facades No.1 and No.2 Circle Square and are located below the building overhang, where they are better protected against potential rain ingress by virtue of the building form.

At No.3 Circle Square the vent areas must provide rain defence as they form part of the building envelope. Therefore metal mesh has been considered in combination with louvres as a proprietary system.

Aesthetic considerations

At No.3 Circle Square perforated mesh alone has been discounted due to its poor visual screening properties. Whilst mesh combined with louvres will provide some visual screening of any unsightly elements set behind, the openness of the mesh means that the overall appearance is inconsistent and therefore deemed visually unacceptable,

Mesh typically has a more discrete visual appearance than louvres. At No.3 Circle Square, this wasn't considered appropriate, particularly where larger expanses are required on the Cloak Street façade.



Photographs of mesh panels at No.1 and No.2 Circle Square

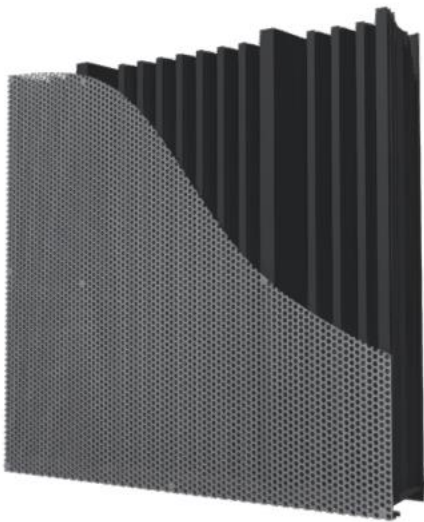
Performance considerations

Polyester powder coated aluminium mesh will provide a robust finish able to withstand weathering. However, when used at street level there are concerns with regard to impact damage causing unsightly deformation of the mesh due to its typically lighter gauge.

Proprietary louvres with mesh overlay can be set within the building façade to maintain the sealed building envelope and provide rain defence. This is a critical requirement for the facades at No.3 Circle Square.

Proprietary louvres with mesh overlay can provide sound attenuation and be specified to meet acoustic performance requirements based on certified test data.

However, when combined with louvres the mesh compromises and reduces the free area required for ventilation. The result is that the overall area of vent would need to be increased to compensate for the free area reduction.



Typical proprietary louvre with perforated mesh overlay system



This option has been discounted for aesthetic reasons and due to concerns regarding robustness; particularly where its use would be required at street level. On this basis technical performance aspects have not been reviewed in further detail by the M&E Consultants (CWC)

3.1 Review of louvre/ vent options considered

C Vent type C – bespoke polyester power coated perforated metal panel

Description

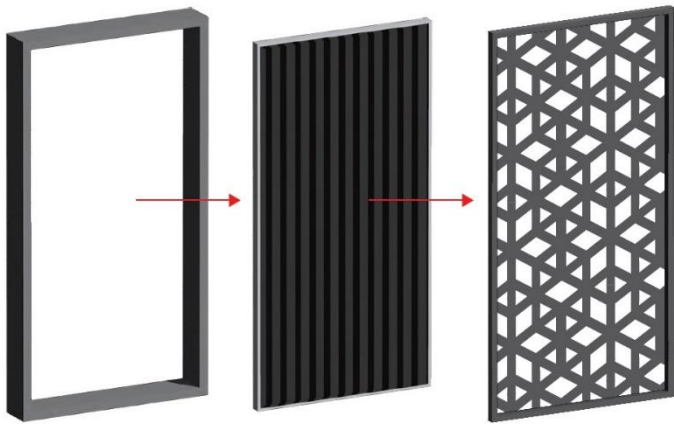
Bespoke perforated metal panels can be provided within a frame or on a concealed support framework to provide a simple screening and vent solution. Perforated panels are typically used where rain penetration is not a concern and sight screening and acoustic performance is not critical.

Perforated metal vent panels have been used on the facades of the MSCP and at 2 Circle Square where water ingress is not an issue.

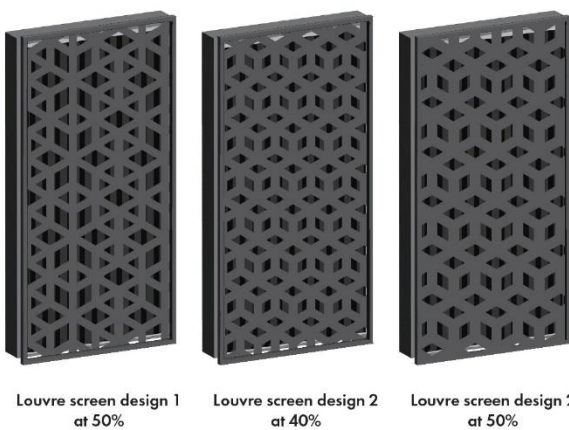
At No.3 Circle Square the vent areas must provide rain defence as they form part of the building envelope. Therefore perforated metal panels have been considered in combination with louvres in a bespoke arrangement.



Photograph of perforated metal panels at the MSCP, Circle Square



Illustrative vent panel build up with louvre and perforated panel build up



Perforation pattern options and free area provided

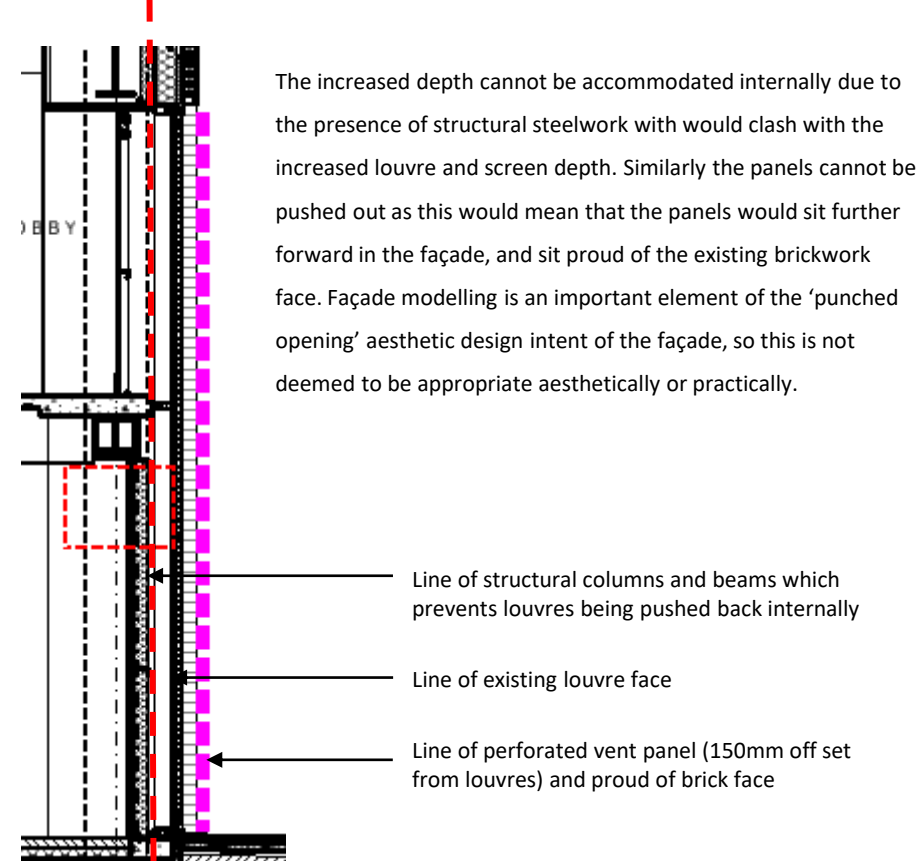
3.1 Review of louvre/ vent options considered

C Vent type C – bespoke polyester power coated perforated metal panel

Aesthetic considerations

At No.3 Circle Square perforated metal panels could provide visual interest on the facades and would provide good visual screening particularly when combined with louvres. There are numerous options for the design and pattern of the perforations (which each provide different % free areas) and the impact on free area of the various designs need to be considered in detail. More perforated or ‘open’ designs will serve to expose the louvres to the rear and not provide good visual screening, which would not be acceptable aesthetically.

The combined perforated vent panel and louvre build up has an overall increased depth compared to louvres alone. CWC assessments note that there would need to be at least a gap of 150mm left between the exterior perforated panel and the internal weather louvre to help avoid problems with airstream.



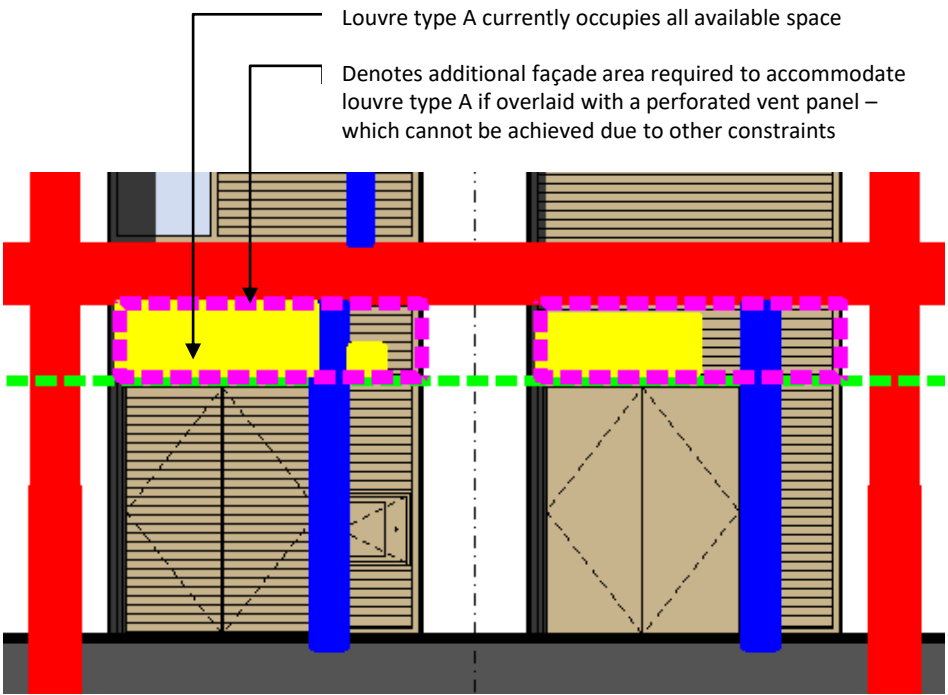
Cross section through façade (south elevation ground/ mezz levels)

Performance considerations

Polyester powder coated metal panels will provide a robust finish able to withstand weathering. At street level the gauge of the metal sheet could be specified to mitigate against impact damage.

Proprietary louvres with perforated panel overlay can be set within the building façade and maintain the sealed building envelope and provide rain defence. This is a critical requirement for the facades at No.3 Circle Square.

Given that the architectural aesthetic and performance requirements are met with this option further detailed technical appraisal has been undertaken by the Project M&E Consultants (CWC). Please refer to CWC report reference L014-CWC-XX-XX.XX-T-Z-000012 for details.



Façade extract (south elevation ground/mezz levels) illustrating increased louvre vent areas required as a result of adding perforated vent panel

In summary, the performance requirements are significantly compromised by the perforated metal panels due to them limiting airflow, the need for increased vent areas generally, impact on acoustics and inability to accommodate increased size of plenum boxes and offsets required for airflow within the currently designed façade build-up and structural arrangements.

Use of Louvre type C at No3 Circle Square would also:

- Result in increased energy consumption (due to increased resistance to airflow)
- Put building regulation compliancy at risk
- Negatively impact energy performance in relation to NABERS and EPC
- Cause unsolvable internal and external coordination problems with wall, structure and the façade unless the a wholesale building re-design was undertaken
- Increase noise levels at the façade which may impact adjacent buildings

X

This option has been discounted as in order to achieve the required performance, the building aesthetic would be significantly altered and sustainability significantly compromised. To achieve a vent panel using perforated metal panels would require significant redesign of both the building facades and internal plan arrangements by increasing the overall size of openings and re-routing of internal ductwork to them. Essentially this would fundamentally change the design of the building.