

PURCELL

**UNIVERSITY OF MANCHESTER
MANCHESTER MUSEUM EXTENSION
NEW LOUVRES TO NORTHLIGHTS**

DESIGN, ACCESS AND HERITAGE IMPACT
STATEMENT

September 2021

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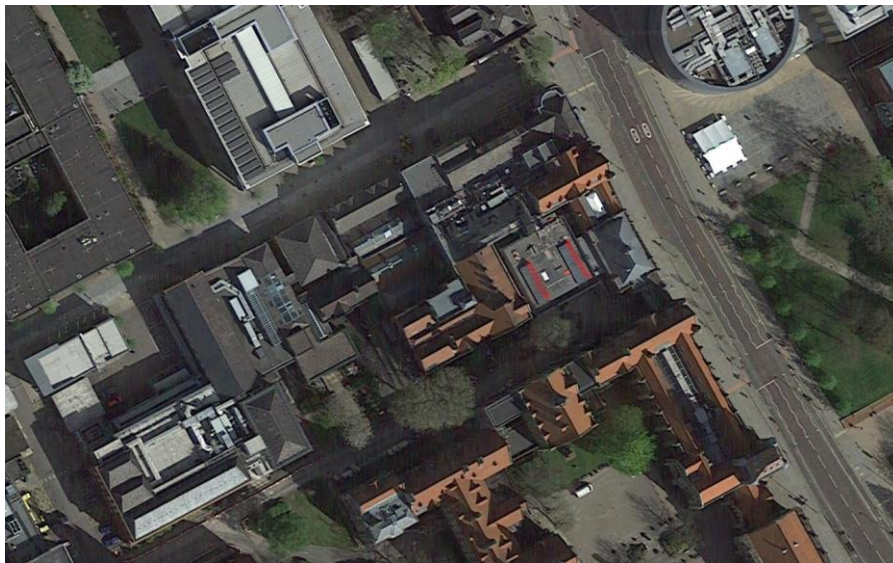
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1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This Design, Access and Heritage Impact Statement explains the proposal to install vertical louvres with horizontal hardwood blades to the northlights on the recently completed gallery extension to Manchester Museum. In collaboration with the museum staff and engineers Arup, Purcell have developed the design proposal to install new louvres in order to further control sunlight within the gallery spaces, now submitted for Full Planning and Listed Building Consent. This report contains a summary of the site context, design proposal, access and potential heritage impact. It should be read in conjunction with the proposed drawings.



Googlemap showing the proposed louvre locations in red. The main road running north to south on the east side of the site is Oxford Road, with Bridgeford Street running east to west on the north side and Coupland Street, parallel to Bridgeford Street on the south side of the site.

1.2 MANCHESTER MUSEUM COURTYARD PROJECT

Manchester Museum has been successfully granted planning and listed building consent to form a new extension and a new entrance. The new extension on Coupland Street accommodates two new galleries, the South Asia Gallery and the Exhibition Hall, and the new main entrance will be located on Oxford Road. The build works to the extension have been completed in the summer of 2021 and the exhibition design to the South Asia Gallery is under way. Further information can be found under the application reference 130016/JO/2021.



Newly completed Manchester Museum extension. The northlights are located behind the terracotta parapet roof level.

1.3 SITE CONTEXT & MATERIALITY

Manchester Museum is located on Oxford Road, Chortton-on-Medlock, Manchester, and is part of the University of Manchester. The newly completed two-storey extension, which has infilled the existing courtyard, faces Coupland Street off Oxford Road. Its modest form is respectful to the surrounding listed buildings, which include grade II listed Rutherford Building (1901), Haworth Building (1911), Haworth Extension (1911), Museum Building (1927) and grade II* listed Waterhouse Building (1888). The northlights are located on the extension roof behind the faience terracotta parapet. They are not visible at street level and the roof and the cheeks of the northlights have been clad in lead to match the adjacent lead roof of the Haworth Building. The vertical northlight windows are polyester powder coated in black to match the other metalwork associated with the new gallery extension.



Panoramic view of the newly completed extension roof with the two northlights. Surrounding buildings include (from left) 1927 Museum Building, 1913 Haworth extension, 1911 Haworth Building, 1888 Waterhouse Building and 1901 Rutherford Building

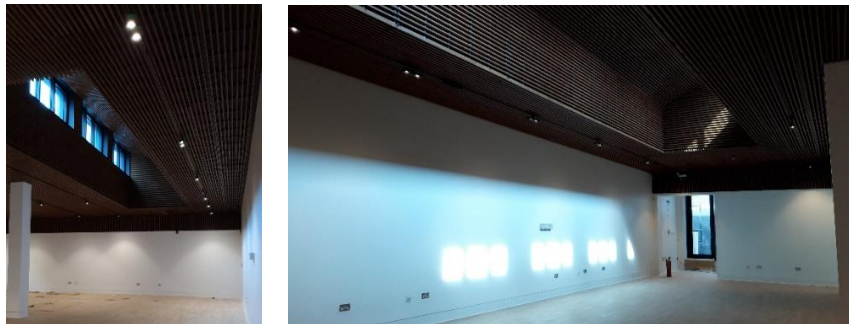


Views of the northlights showing lead cladding and vertical glazing facing north-east.

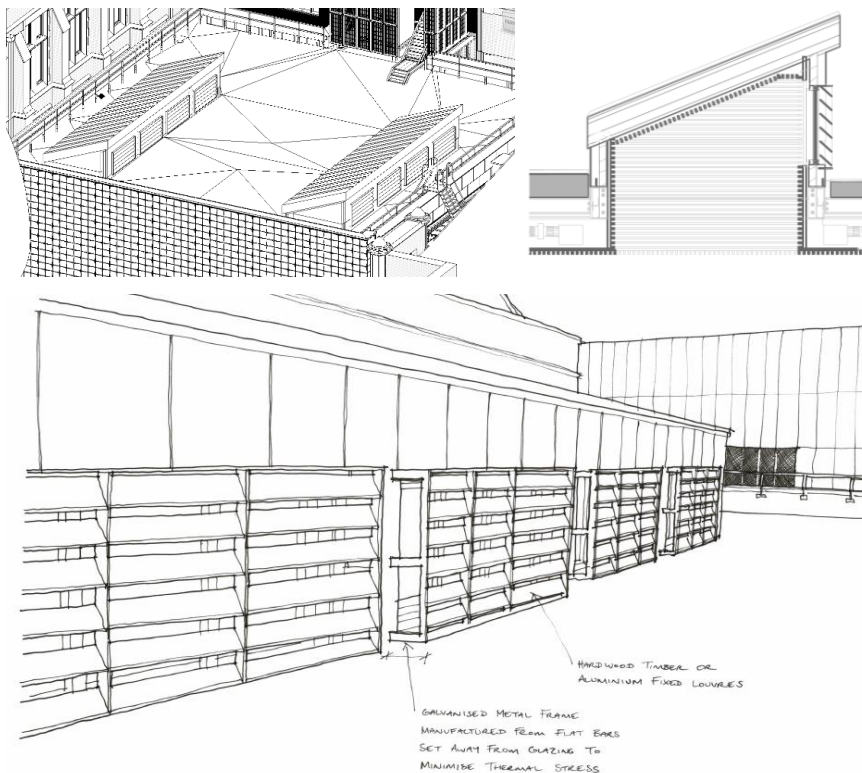
2.0 PROPOSAL

2.1 DESIGN

This planning and listed building application relates to the installation of new timber louvres to the northlights at roof level of the new gallery extension. There are currently two sets of vertical northlights, facing north-east, on the roof of the extension which let natural light into the new South Asia Gallery on the first floor. Consultation with the museum, lighting consultant and the exhibition designer has identified the necessity to introduce some shading to these windows in order to protect the exhibits from direct sunlight. Various options were considered, such as blocking the windows completely, applying blackout films to the glass and installing internal blinds. The external louvres have been chosen as the preferred option by the client as they would provide the necessary shading required for the exhibits but still allow natural light into South Asia Gallery which is desirable. The use of blackout or translucent films was explored but ruled out on the basis of extensive consultation. The daylight study has been carried out by Arup and is appended to this report.



Internal views of the northlights with the morning sun reflecting onto the exhibition wall.



MANCHESTER MUSEUM ROOFLIGHT LOUVRES

Proposed visuals and section of the timber louvres

2.2 ACCESS

As the louvres are proposed to the northlights only, the access arrangement will remain as existing.

2.3 HERITAGE IMPACT

The proposed louvres will screen the individual northlight and will be framed in flat metal bars and fixed to the window frame. The louvre blades will be in painted hardwood and inserted into the metal frame. The angle of the blades will be fixed at 48 degrees to provide the optimum shading to the South Asia Gallery as per specialist's calculation (please refer to the appended report).

The louvres will be sized to match the northlight windows and they will be attached to the frame to minimise the visual impact to the surrounding buildings. This way the northlights and the associated louvres can remain discrete whilst providing necessary shading required for the future exhibition. Neither the northlights or the louvres will be visible from Coupland Street, and therefore heritage impact will be negligible.

3.0 APPENDIX

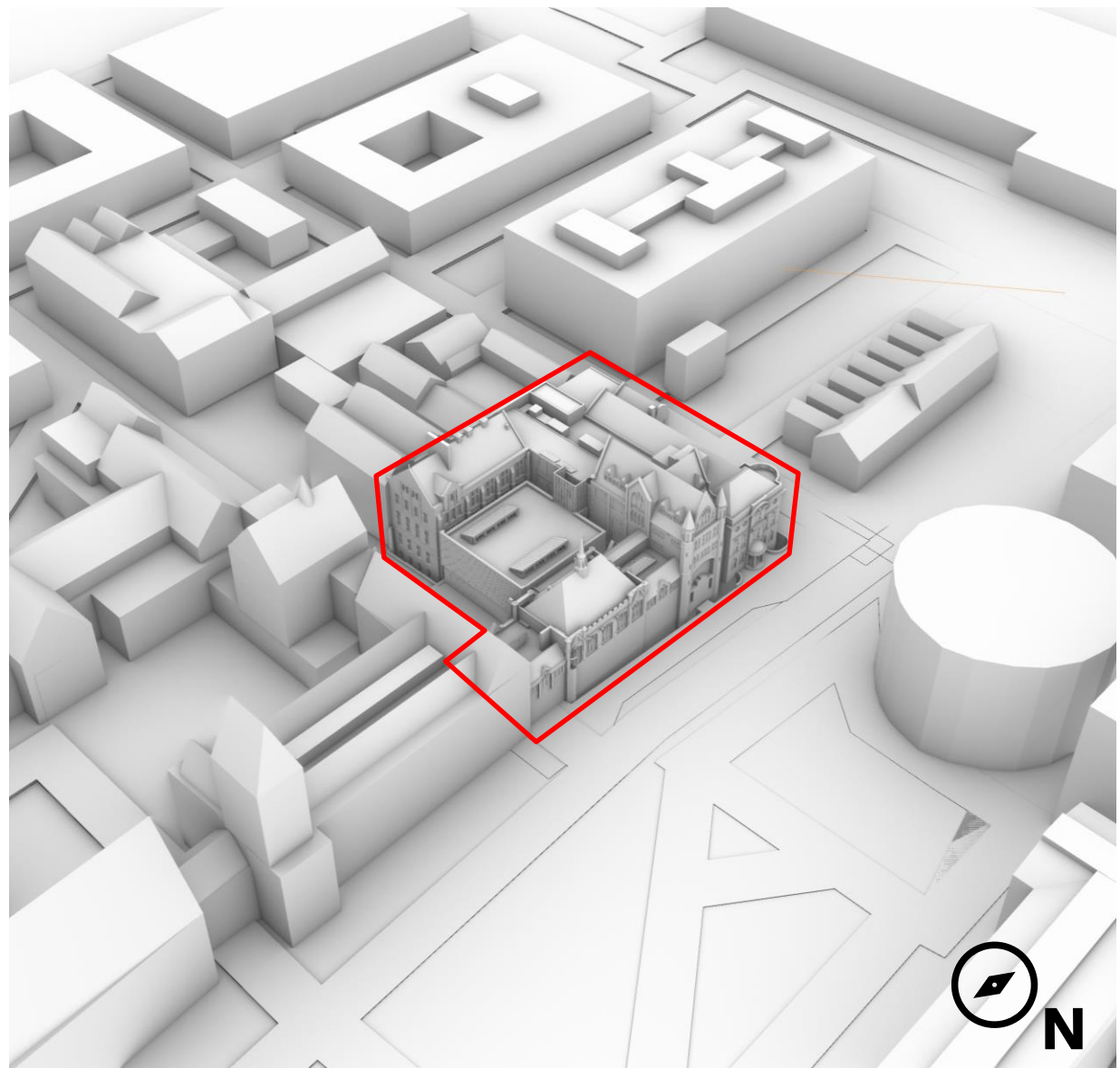
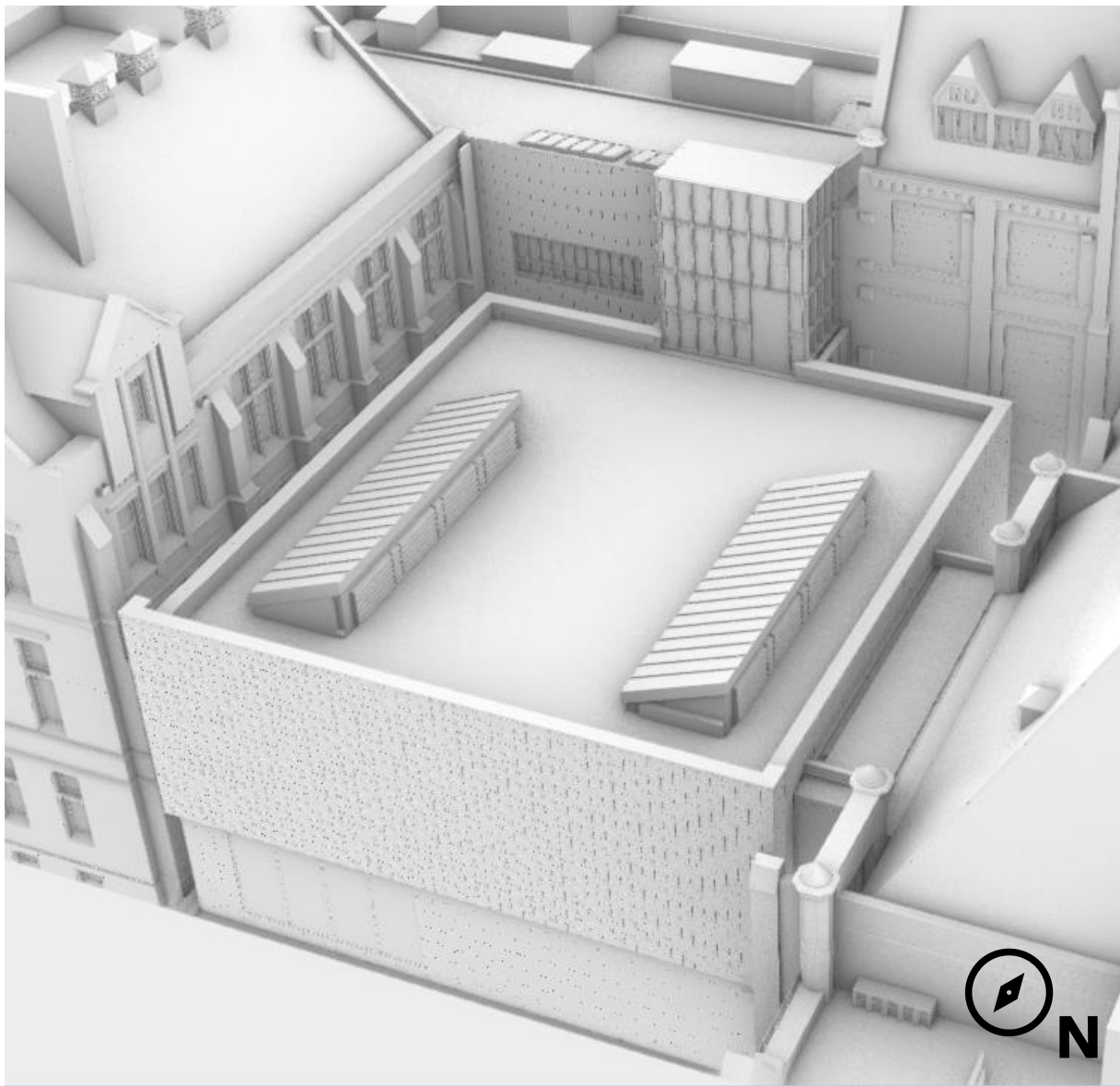
DRAWING LIST

6137-PUR-MMC-EXG-DR-A-0101	rev D	Location Plan
6137-PUR-MMC-EXG-DR-A-0102	rev D	Site Plan
6137-PUR-MMC-R-DR-A-0218	rev J	Roof Plan
6137-PUR-MMC-XX-DR-A-0221	-	Existing Southeast Elevation
6137-PUR-MMC-XX-DR-A-0226	-	Existing Section BB (Part northeast elevation)
6137-PUR-MMC-XX-DR-A-0231	-	Existing Section GG (Part northwest elevation)
6137-PUR-MMC-XX-DR-A-2221	-	Proposed Southeast Elevation
6137-PUR-MMC-XX-DR-A-2226	-	Proposed Section BB (Part northeast elevation)
6137-PUR-MMC-XX-DR-A-2231	-	Proposed Section GG (Part northwest elevation)

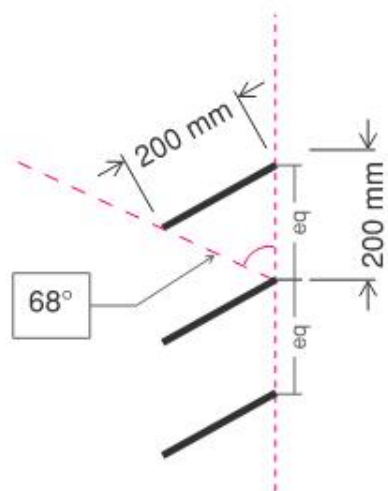
Manchester Museum South Asia Gallery Daylight Report

Skylight Louvres
Lobby Reflected Sunlight

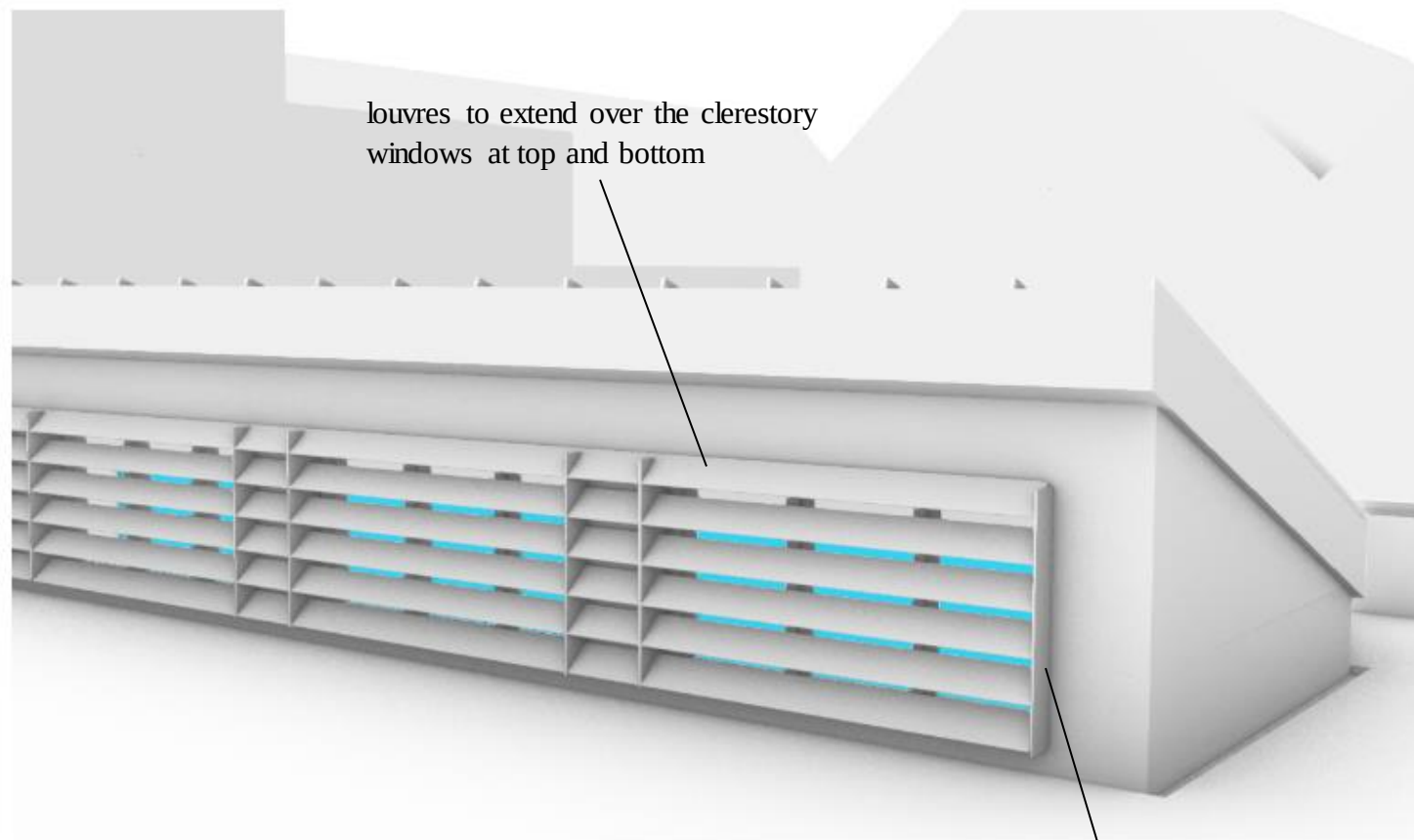
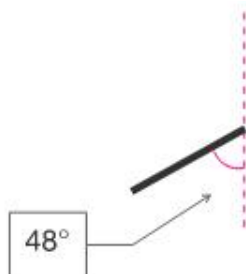
10th June 2021



Model of the site and surrounding building geometry



indicative dimensions for
an array of 6 vertical
louvres



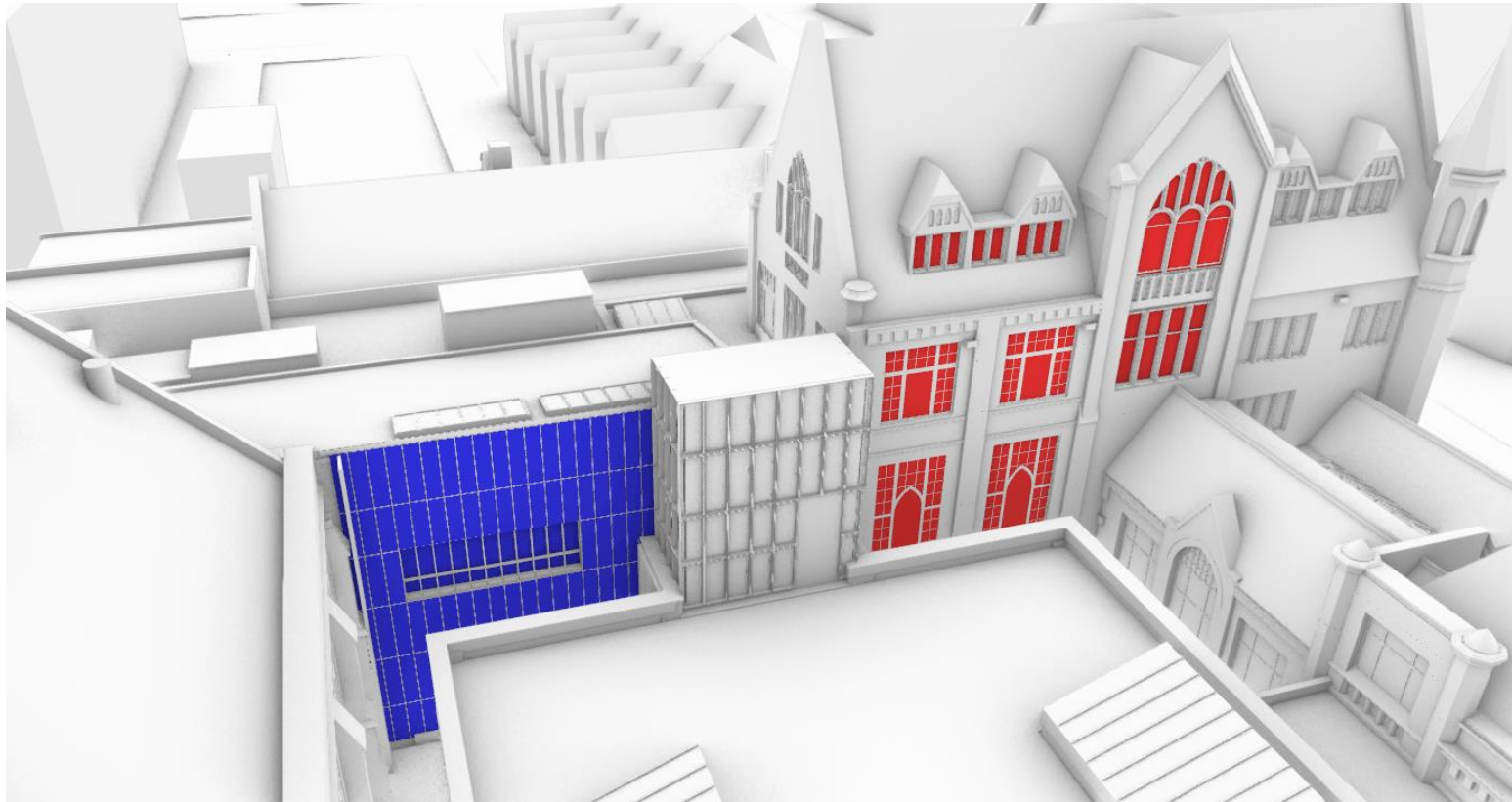
Design of the louvres

Sunlight Penetration Analysis

This section presents the findings of the sunlight penetration analysis into the gallery interior.

Sunlight Penetration Analysis

The louvres prevent direct sun to penetrate the main exhibition space of the South Asia Gallery at all time. Sun reflected from the existing building enters the lobby regularly during the summer, spring and autumn.



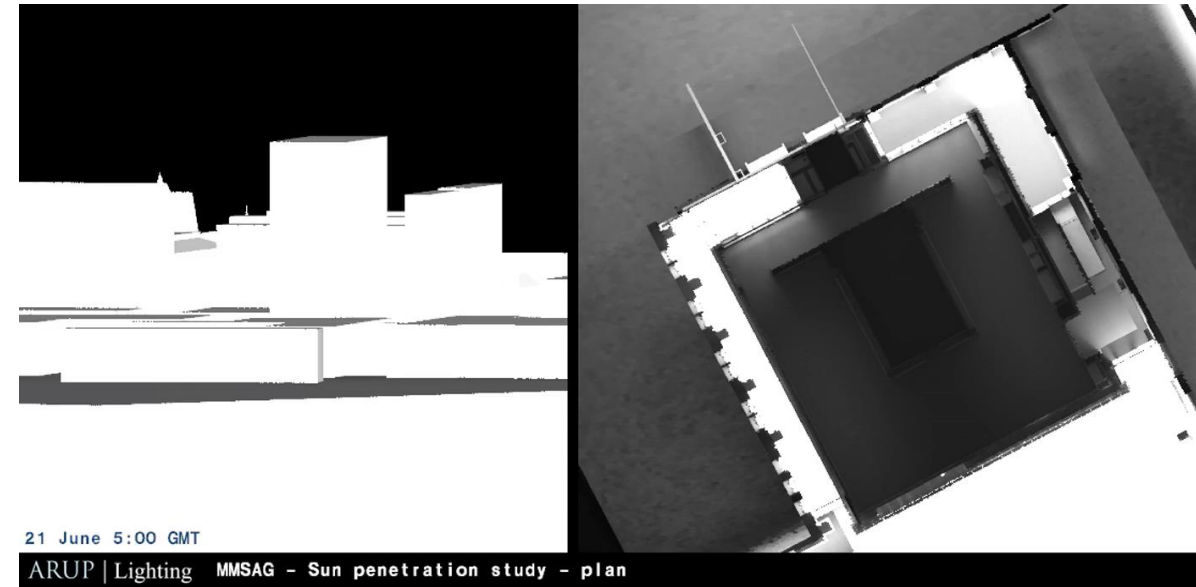
the glass in the surrounding building have been modelled with red and blue color as a visual cue to identify the sources of reflected sun entering the lobby and gallery spaces

Sunlight Penetration Analysis

In summer reflected sun penetrates mainly in the lobby floor and walls from mid morning to the early afternoon. No penetration of reflected sunlight into the gallery walls.



↑
Play!

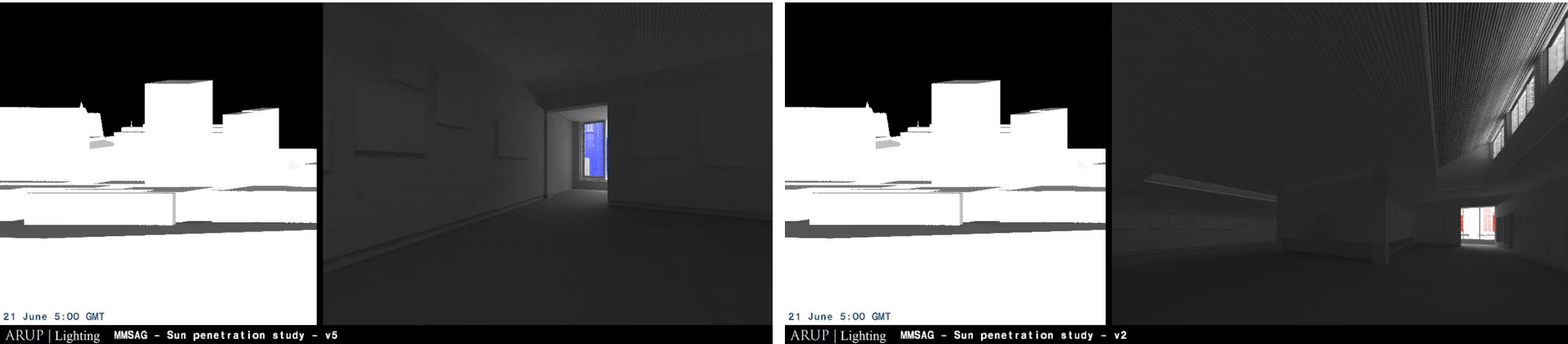


↑
Play!

21 June – summer solstice, perspective view in the lobby (left) and plan view on the right

Sunlight Penetration Analysis

In summer reflected sun penetrates mainly in the lobby floor and walls from mid morning to the early afternoon. No penetration of reflected sunlight into the gallery walls.



Play!



Play!

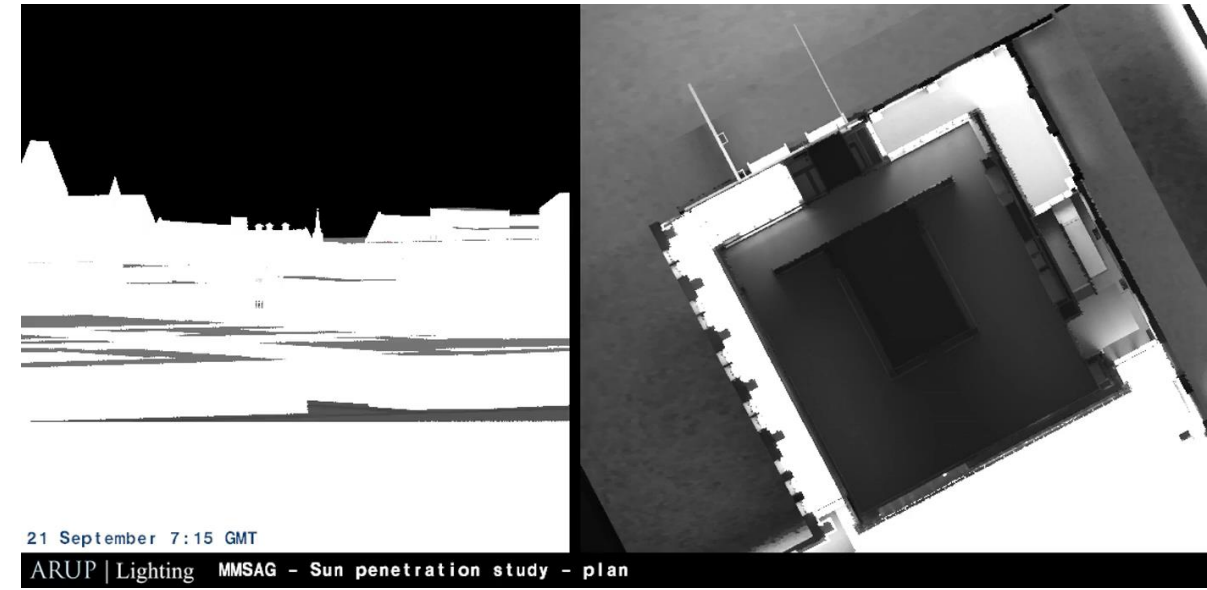
21 June – summer solstice, perspective view from the main exhibition space (western and eastern entrances on left and right respectively)

Sunlight Penetration Analysis

In spring and autumn, reflected low sun penetrates the northwest and northeast end of the gallery through the west entrance (top left) and east entrance (top right) respectively. Reflected sun directly illuminates the eastern walls adjacent to the entrances.



↑
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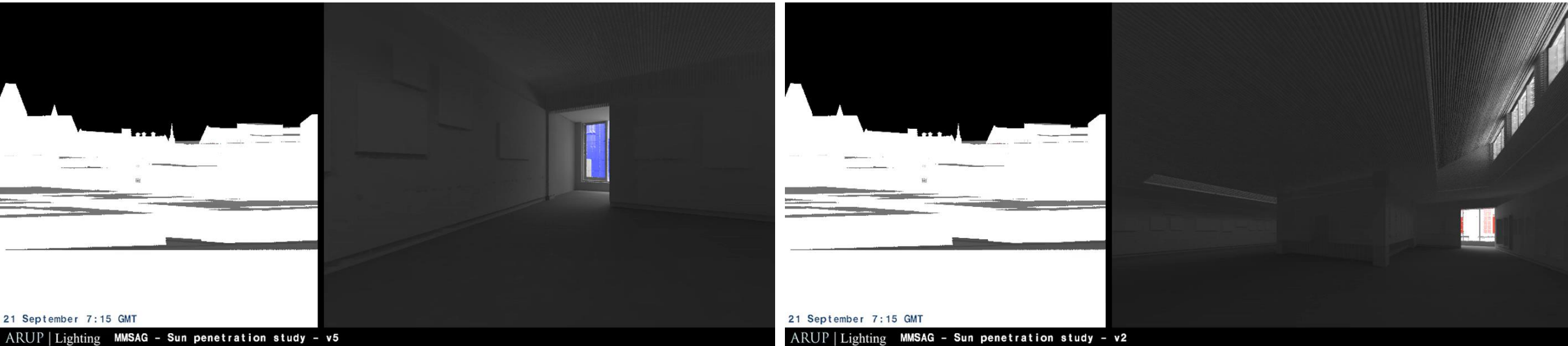


↑
Play!

21 September – equinox, perspective view in the lobby (left) and plan view on the right

Sunlight Penetration Analysis

In spring and autumn, reflected low sun penetrates the northwest and northeast end of the gallery through the west entrance (top left) and east entrance (top right) respectively. Reflected sun directly illuminates the eastern walls adjacent to the entrances.



Play!



Play!

21 September – equinox, perspective view from the main exhibition space (western and eastern entrances on left and right respectively)

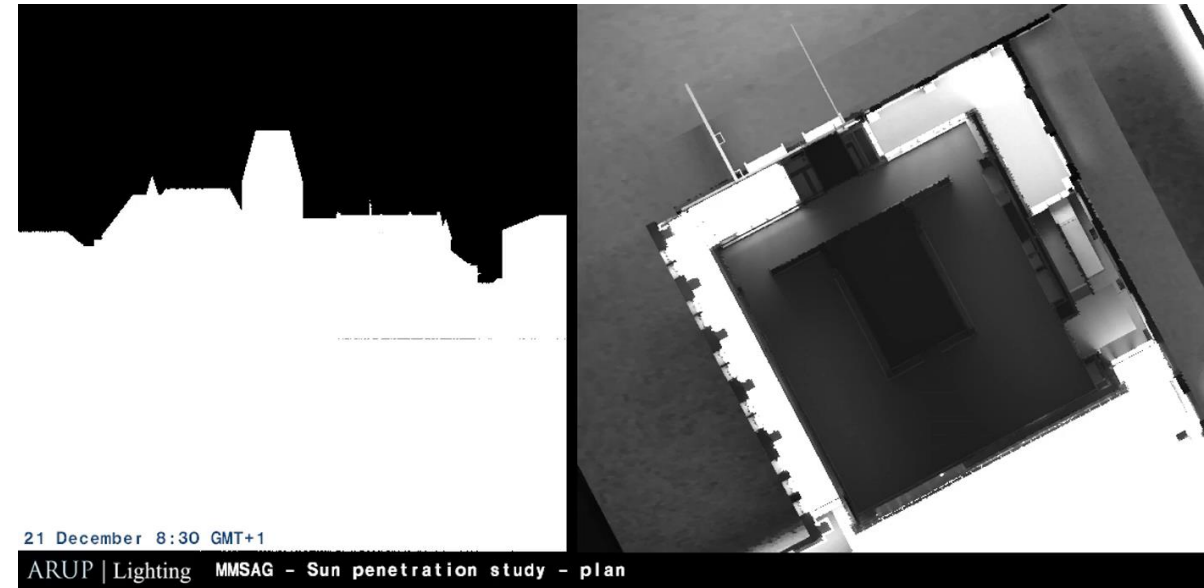
Sunlight Penetration Analysis

In winter, there is no penetration of reflected sunlight into the gallery nor the lobby.



21 December 8:30 GMT+1
ARUP | Lighting MMSAG - Sun penetration study - v4

↑
Play!



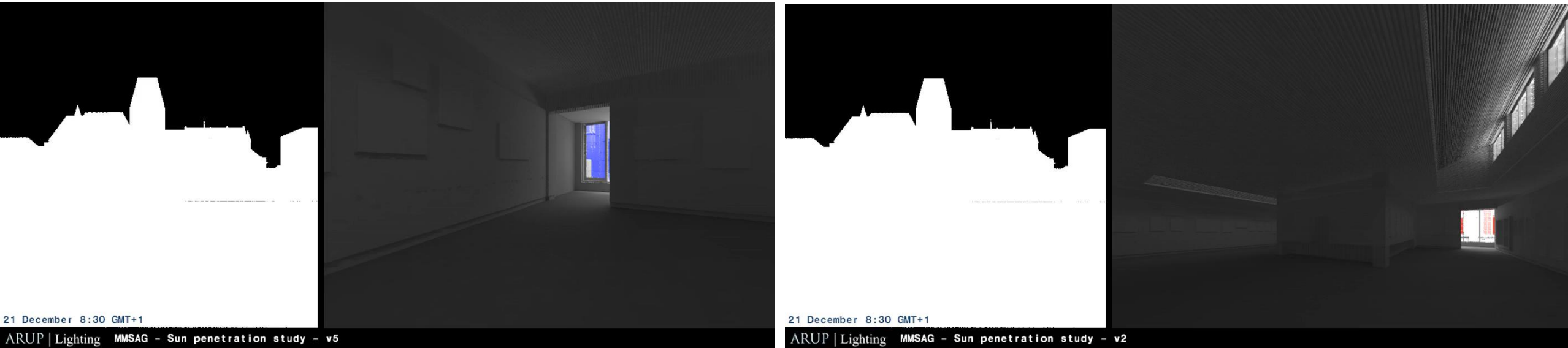
21 December 8:30 GMT+1
ARUP | Lighting MMSAG - Sun penetration study - plan

↑
Play!

21 December – winter solstice, perspective view in the lobby (left) and plan view on the right

Sunlight Penetration Analysis

In winter, there is no penetration of reflected sunlight into the gallery nor the lobby.



Play!



Play!

21 December – winter solstice, perspective view from the main exhibition space (western and eastern entrances on left and right respectively)

Sunlight Penetration Analysis – Summary

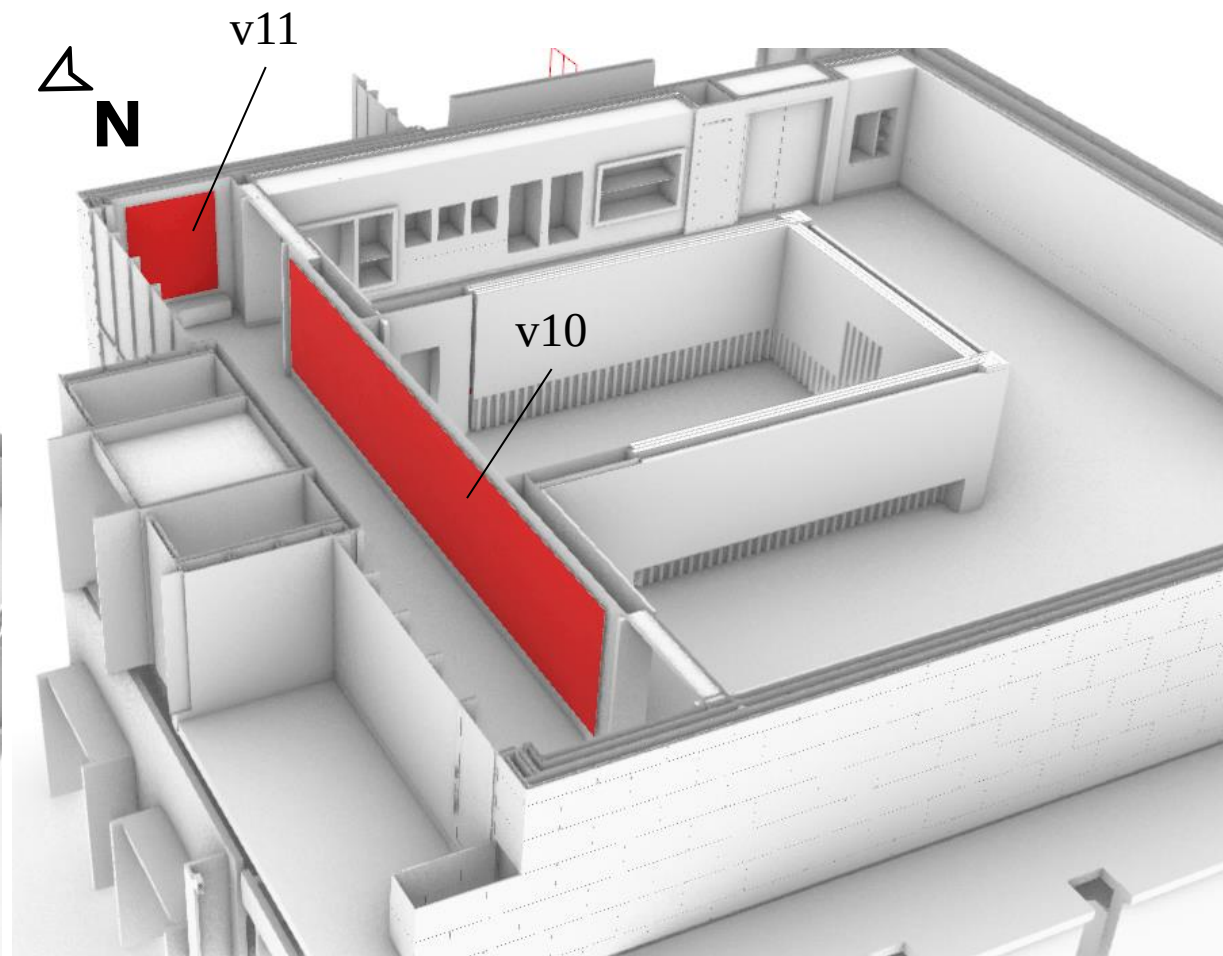
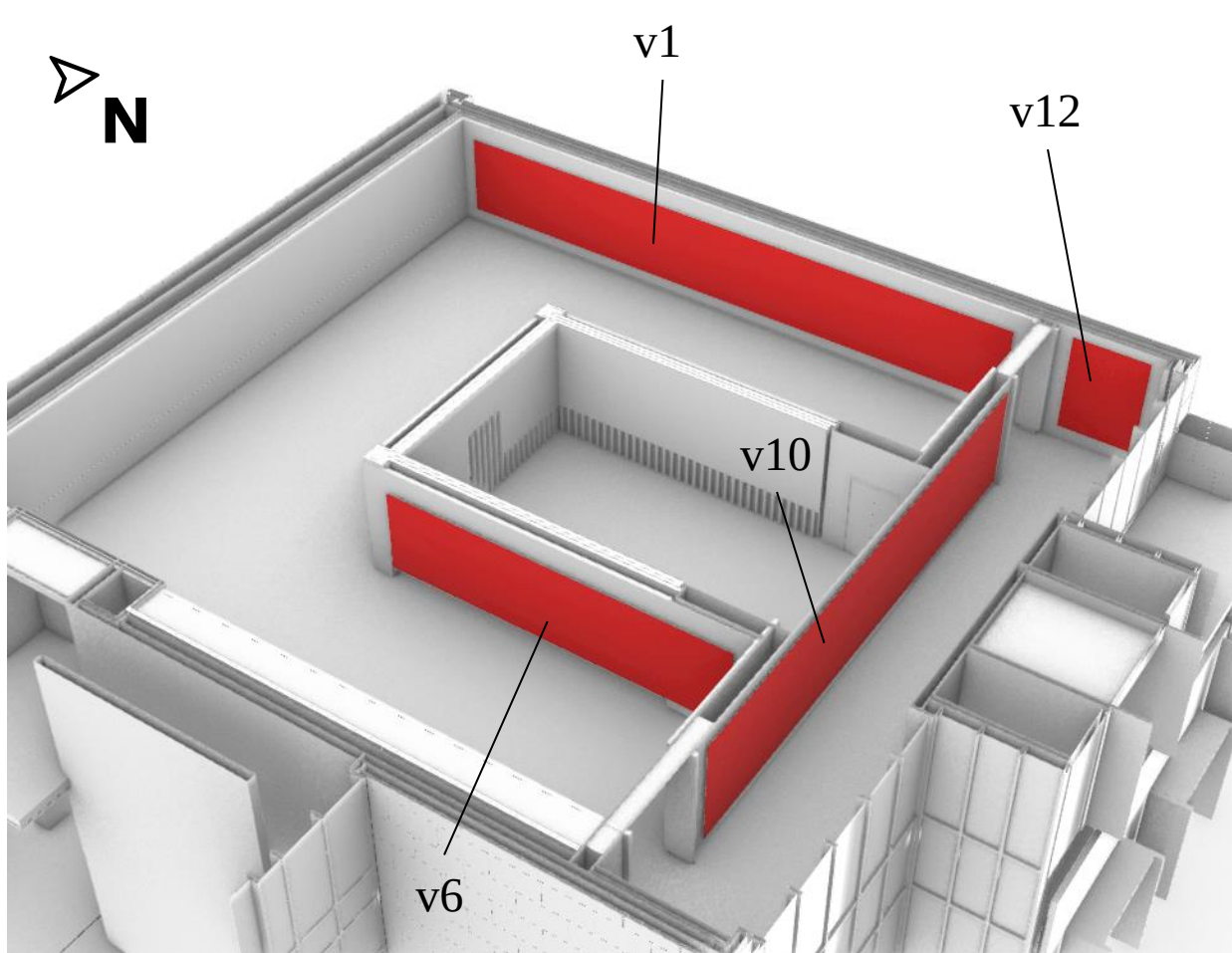
The summary of the approximate times and durations of reflected sun penetration into the lobby:

Time of year	Time	Duration (h)
21 June – summer solstice	08:15 – 14:15	6
21 March/September - equinox	09:15 – 14:15	5
21 December – winter solstice	None	None

total hours of sun penetration reflected from all groups of windows in the existing surrounding buildings

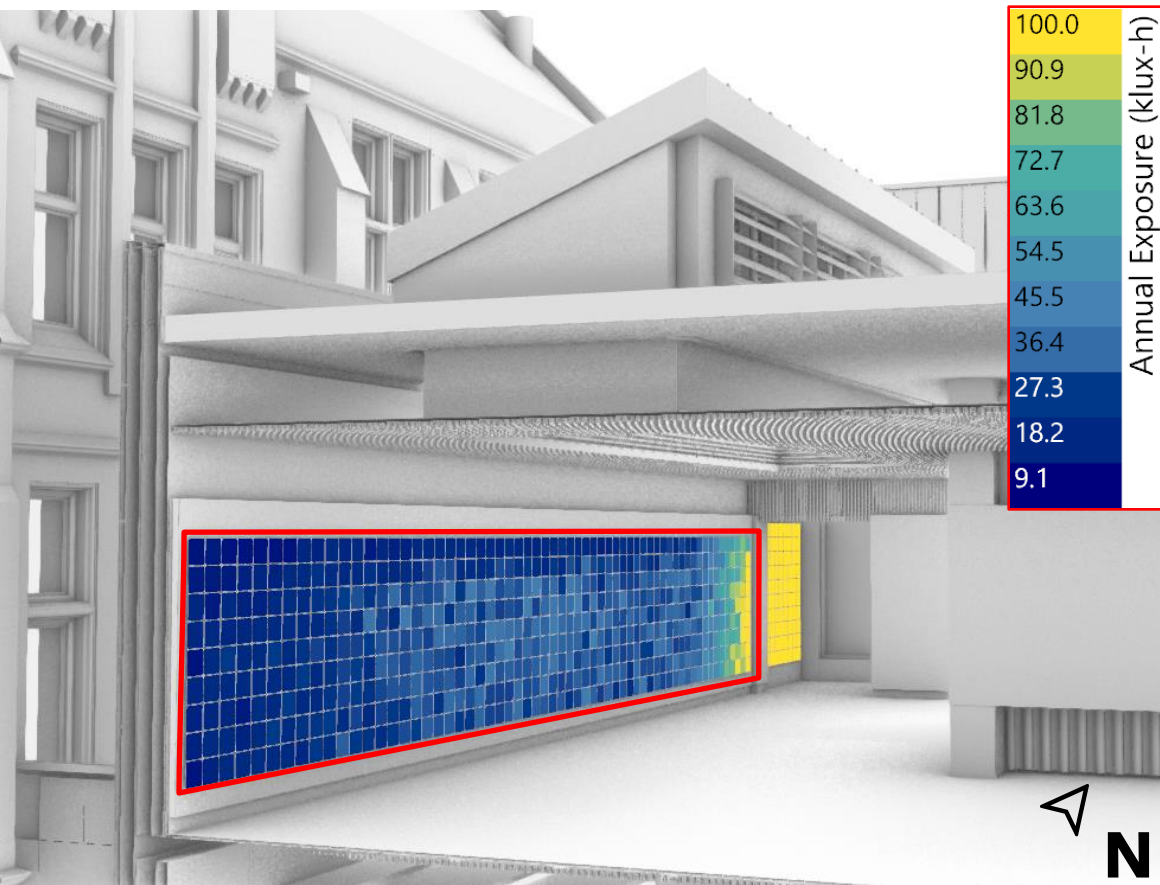
Annual Exposures Analysis

Exposure analysis has been carried out on the same grids as the daylight factor analysis to provide an indication of predicted illuminance levels in the gallery over time.

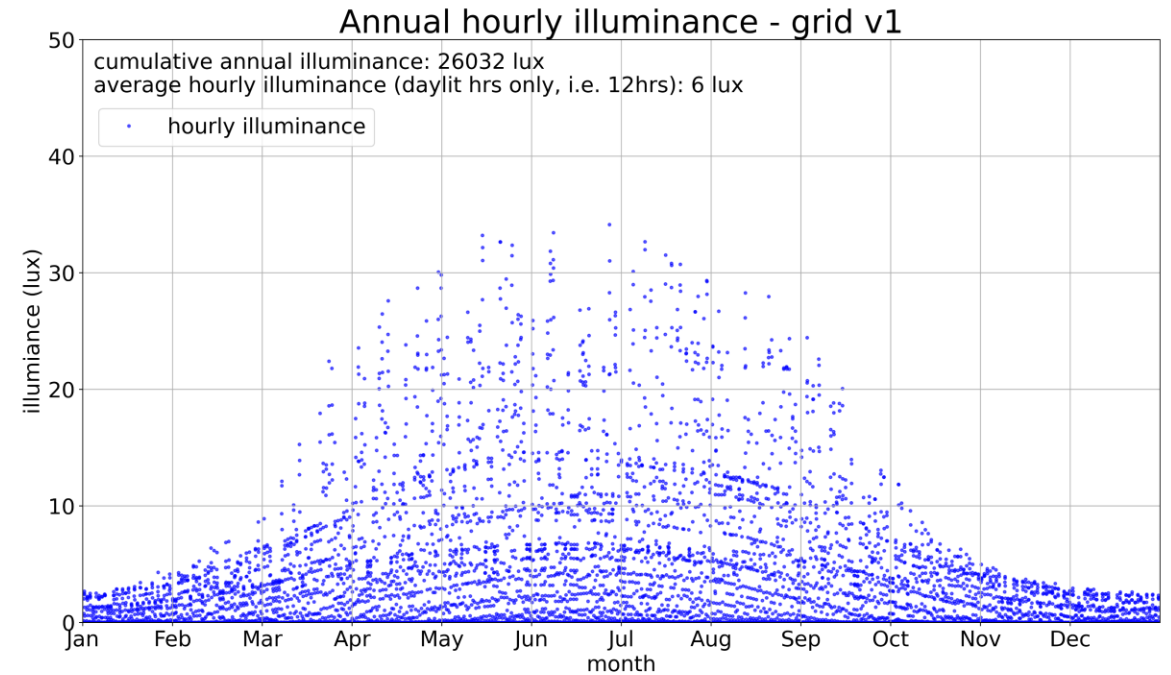


Overview of calculation grids in the gallery

Grid v1 – wall opposite to clerestory glazing, near right entrance



*colour scale is different from other images



*Note: the scale is different from other diagrams

Grid v1 – annual exposure visualization on the left and annual hourly illuminance graph on the right

Grid v1 – wall opposite to clerestory glazing, near right entrance

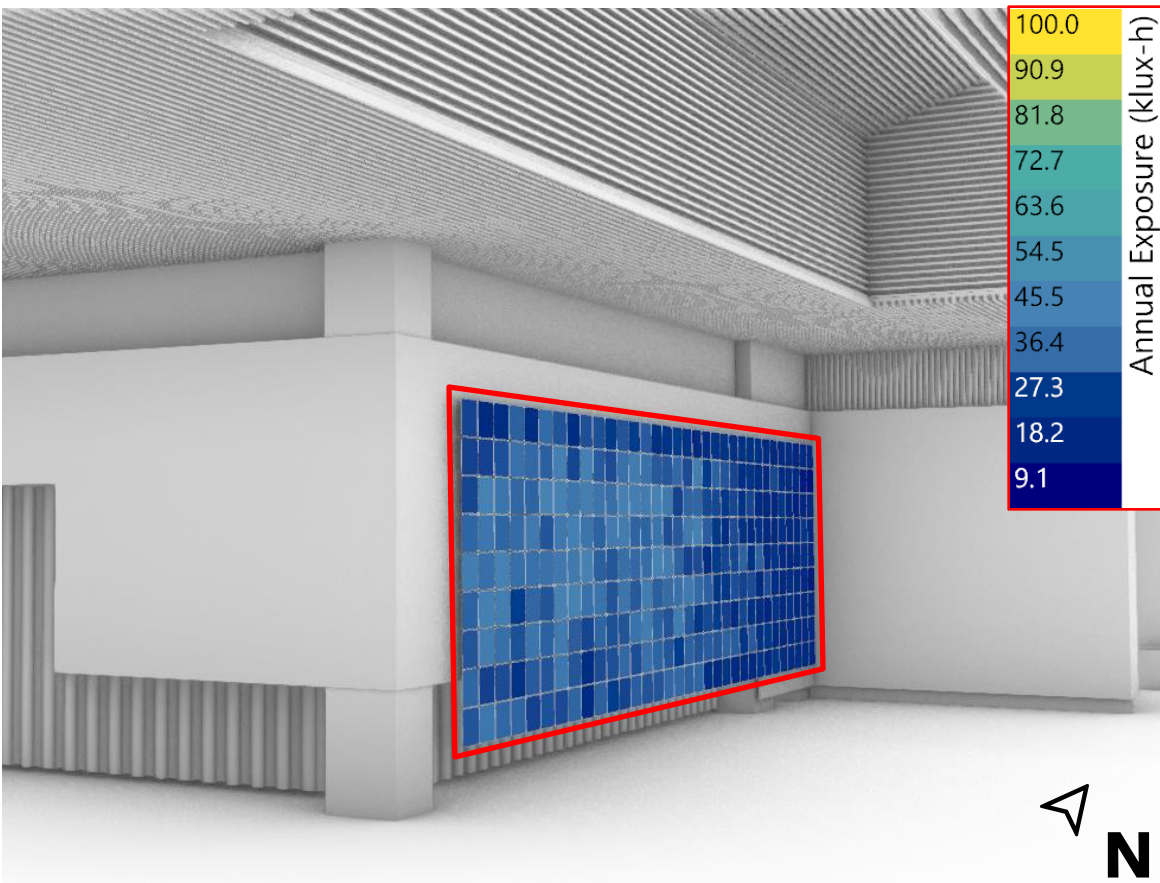
The high peak hourly illuminance is primarily due to sunlight reflected from the façade of the existing building on the north penetrating the gallery and falling on this wall. The peak illuminance from it is never more than 40 lux.

The presence reflected sunlight on the analyzed account for at least 2h per day during the summer period and around 1h per day during spring/autumn.

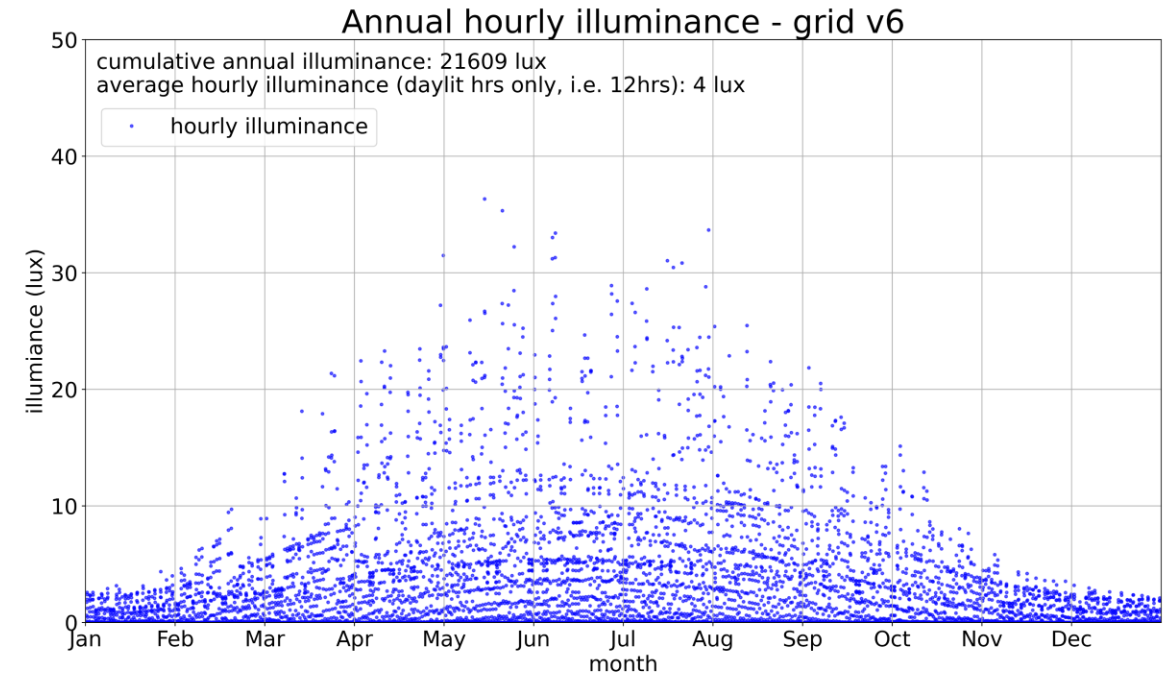
In the absence of reflected sunlight the hourly average illuminance are below 10lux.

As can be seen from the annual exposure visualisation, the entire wall is below 100 klux-hours and therefore suitable for medium responsivity objects. Areas towards the south side of the galleries shows values below 15 klux-hours and are suitable for high responsivity materials.

Grid v6 – wall opposite to clerestory glazing, near left entrance



*colour scale is different from other images



*Note: the scale is different from other diagrams

Grid v6 – annual exposure visualization on the left and annual hourly illuminance graph on the right

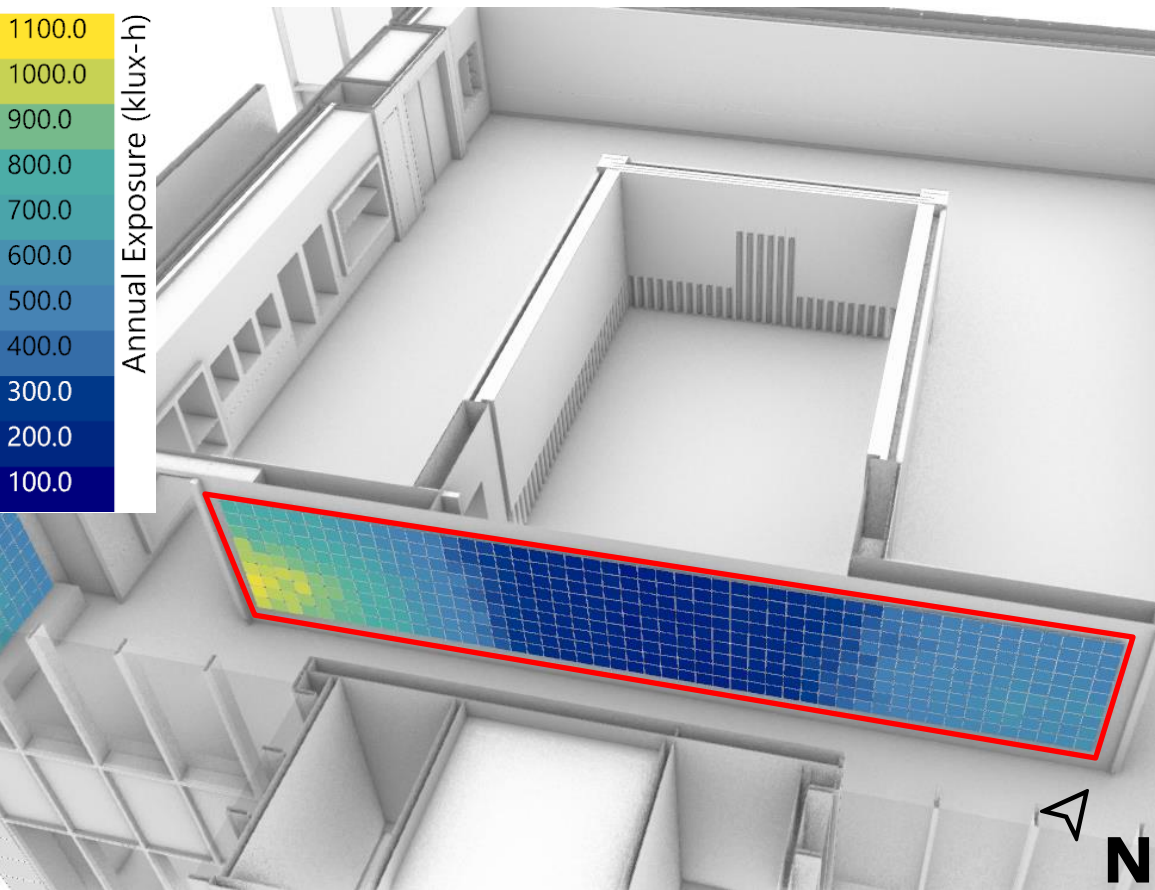
Grid v6 – wall opposite to clerestory glazing, near left entrance

The high peak hourly illuminance is primarily due to sunlight reflected from the façade of the existing building on the north penetrating the gallery entering the adjacent walls. The peak illuminance from it is never more than 40 lux.

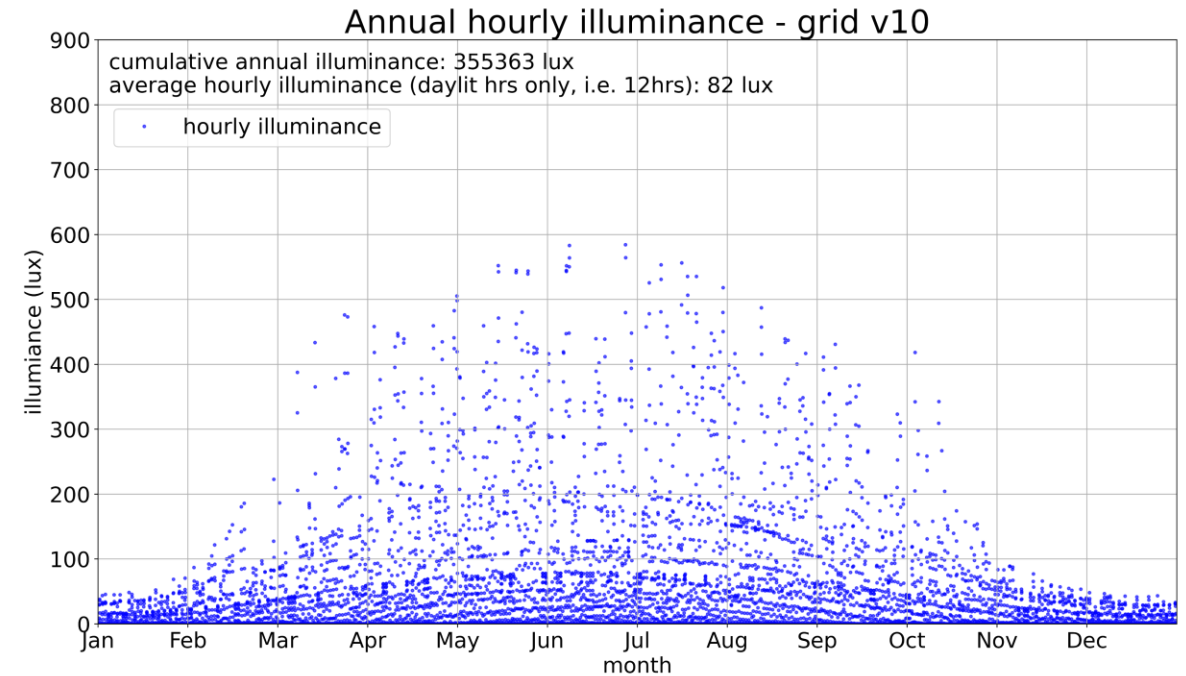
Sunlight reflected inside accounts for very limited time of the year. In the absence of reflected sunlight the hourly average illuminance are below 10lux.

As can be seen from the annual exposure visualisation, the entire wall is below 40 klux-hours and therefore suitable for medium responsivity materials.

Grid v10 – lobby wall north



*scale is equal from previous iteration



Grid v6 – annual exposure visualization on the left and annual hourly illuminance graph on the right

Grid v10 – lobby wall north

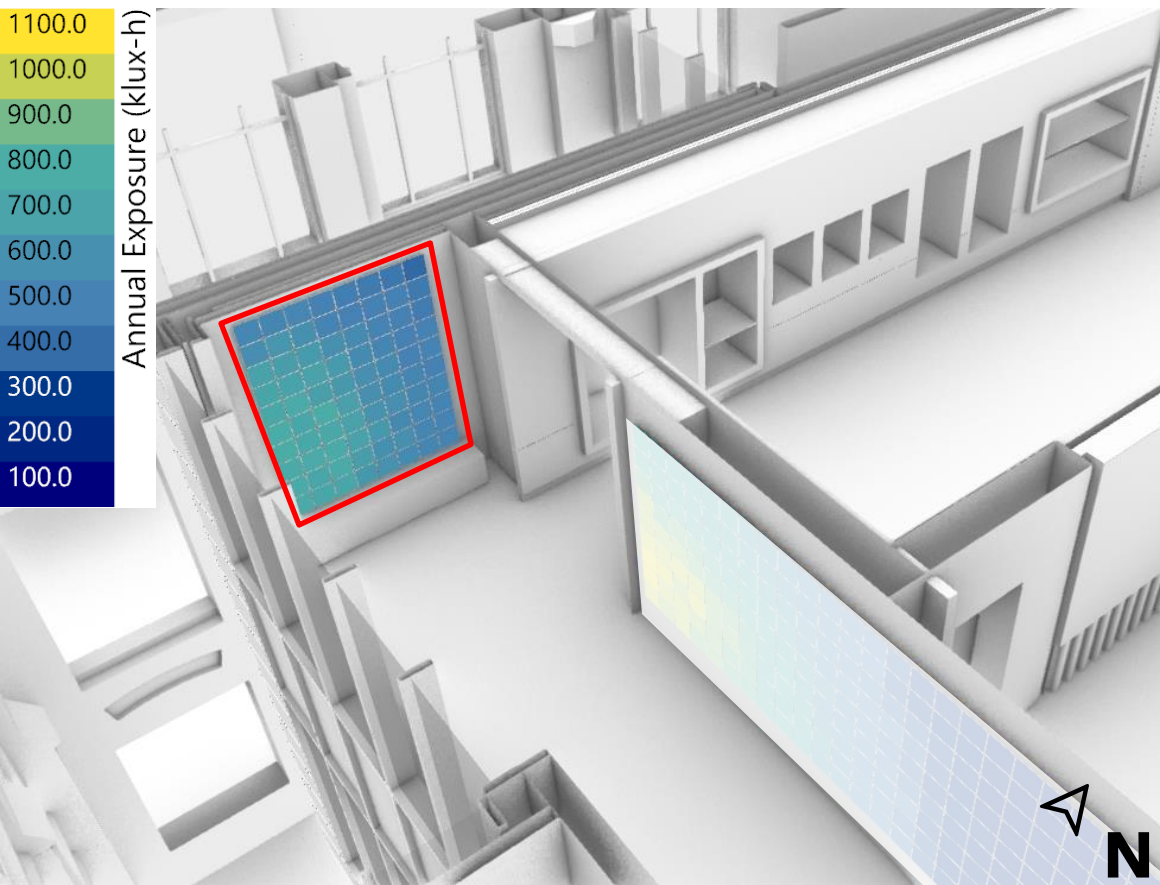
The high peak hourly illuminance is primarily due to sunlight reflected from the façade of the existing building on the north penetrating the gallery entering the adjacent walls.

During the summer, the highest maximum value is in excess of 550 lux, although the average values for this period are below 80 lux for areas without direct sunlight penetration.

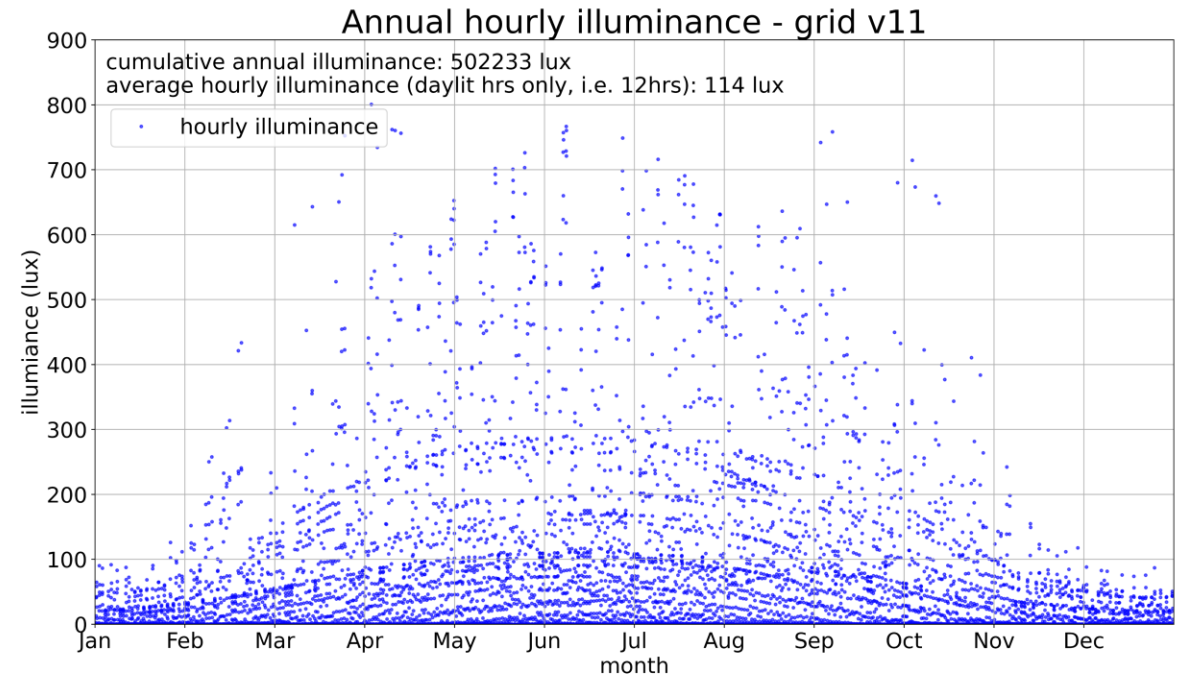
In the absence of reflected sunlight the hourly average illuminance ranges from approximately 60 to 200 lux.

As can be seen from the annual exposure visualisation, areas directly opposite to the lobby façades exceed 600 klux-h and will only be suitable for display of non-light sensitive materials unless blinds or other form of sunlight control is provided.

Grid v11 – lobby wall east



*scale is equal from previous iteration



Grid v6 – annual exposure visualization on the left and annual hourly illuminance graph on the right

Grid v11 – lobby wall east

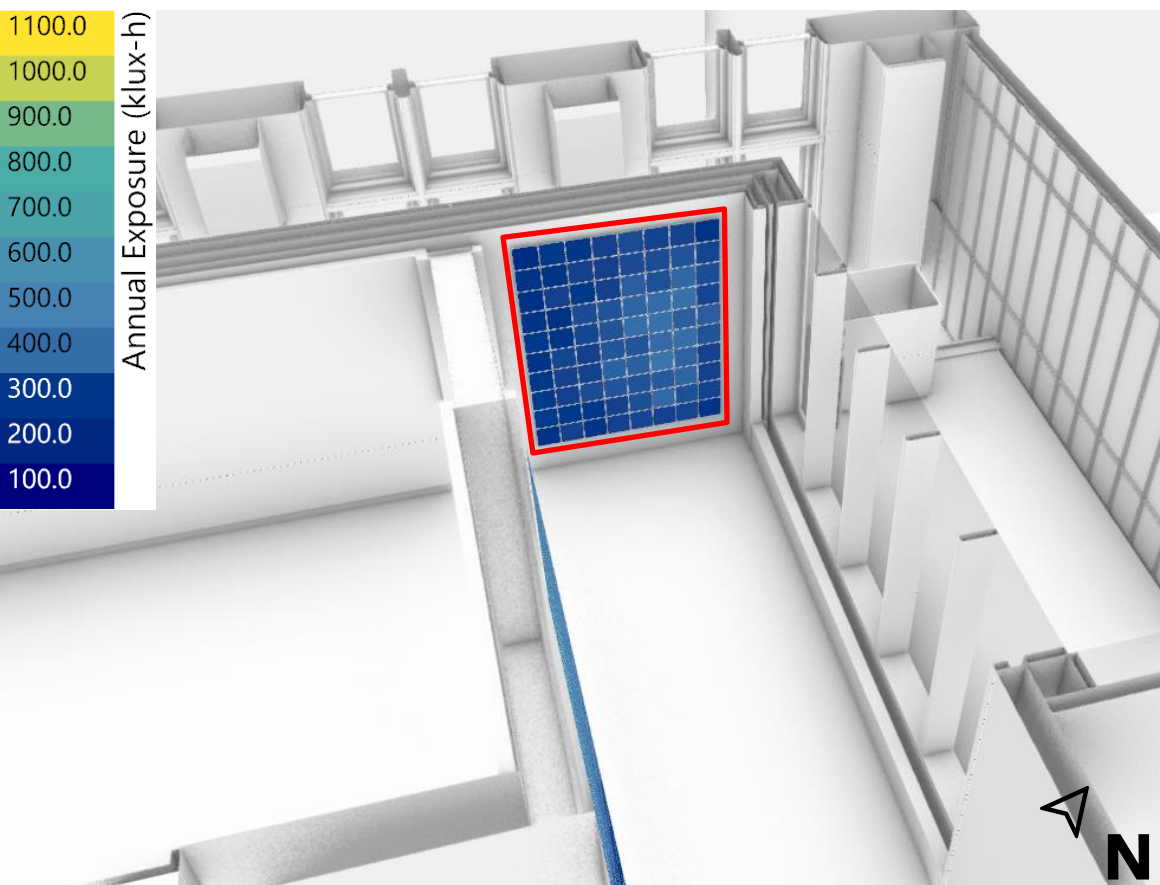
The high peak hourly illuminance is primarily due to sunlight reflected from the façade of the existing building on the north penetrating the gallery entering the adjacent walls.

During the summer, the highest maximum value is in excess of 800 lux, although the average values for this period are below 100 lux for areas without direct sunlight penetration.

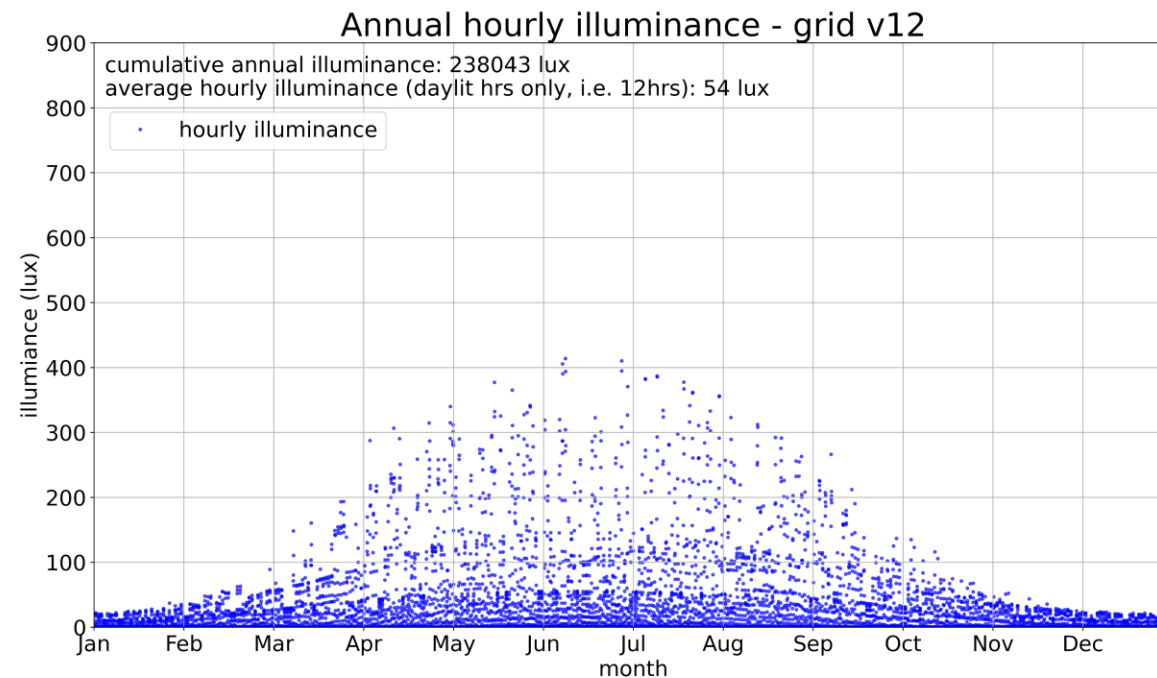
In the absence of reflected sunlight the hourly average illuminance ranges from approximately 60 to 250 lux.

As can be seen from the annual exposure visualisation, the majority of the area exceeds 600 klux-h and will only be suitable for display of non-light sensitive materials unless blinds or other form of sunlight control is provided.

Grid v12 – lobby wall west



*scale is equal from previous iteration



Grid v6 – annual exposure visualization on the left and annual hourly illuminance graph on the right

Grid v12 – lobby wall west

The high peak hourly illuminance is primarily due to sunlight reflected from the façade of the existing building on the north penetrating the gallery entering the adjacent walls.

During the summer, the highest maximum value is in excess of 400 lux, although the average values for this period are below 50 lux for areas without direct sunlight penetration.

In the absence of reflected sunlight the hourly average illuminance ranges from approximately 40 to 150 lux.

As can be seen from the annual exposure visualisation, the majority of the area exceeds 300 klux-h and will only be suitable for display of medium sensitivity materials unless blinds or other form of sunlight control is provided.

Annual Analysis – summary

The mean and maximum hourly illuminance and annual exposure values have also been calculated for each grid, to provide an indication of the overall illuminance for each grid and a useful overview of the results. These can be seen in the table below:

Grid	Mean hourly illuminance (lux)	Max. hourly illuminance (lux)	Mean Annual Exposure (klux-h)	Max. Annual Exposure (klux-h)
v1 (opp. skylight)	6	34	26	107
v6 (opp. skylight)	5	36	22	37
v10 (lobby central)	77	584	355	949
v11 (lobby east)	109	801	502	675
v12 (lobby west)	52	414	238	321

Conclusions & Recommendations

Conclusions

The skylight louvers effectively remove direct sun penetration and also significantly reduce daylight levels.

Daylight levels in the lobby are significantly higher than would be experienced in the galleries, leading to large contrast between the lobby and gallery space.

Daylight levels in the lobby, and the resulting annual exposure, are generally suitable for low responsive materials (600 klux.hr), however areas directly opposite the windows are brighter and reach levels of 800 klux.hr or more.

There is significant reflected sunlight entering the lobby space, and also into the gallery space, when the sun is low during the spring / autumn months.

Recommendations

There is currently significant contrast between the lobby and gallery, which will lead to visual adaption problems and visual discomfort. Blinds are recommended on the lobby windows to mitigate this.

Blind are also recommended to reduce reflected sunlight into the lobby space, which can occur throughout the spring, summer and autumn months.

Daylight levels in the lobby, whilst generally within or slightly above recommendations for low responsivity materials, are significantly higher than the adjacent gallery, and as such, use of blinds is recommended. This will also provide the reduction necessary for potential use of film / AV material.

Blind recommendations:

- The darker the blind material, the better the view out from the lobby. White is not recommended.
- Careful detailing of blinds is needed to ensure reflected sun doesn't come through the gaps between them.
- Where possible, a site test of the proposed material is recommended to ensure it provides sufficient diffusion.
- Initial recommendation: 5% open material (Mermet SV 5% - 0207 WHITE PEARL)

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