This chapter includes information to support the contents of this report.
It includes:

E1. Sun access studies - Residential apartments, design principles
- Passive shading devices and light shelves

E2. Sun-access studies for the childcare levels:
- Floor plate analysis for level 03 and Level 04

E3. Sun-access studies for the residential apartments:
- 2hr or more of direct sun-light to private open spaces for the 22nd of March and 21st of June.
- 1hr or more of direct sun-light to private open spaces for the 22nd of March and 21st of June.

E4. Sun-access studies for the hotel rooms:
- 2hr or more of direct sun-light to hotel room windows for the 22nd of March and 21st of June.

E5. Sun access studies for the atrium at level 11
- Daylight factor and surface reflectance
- Illuminance of space

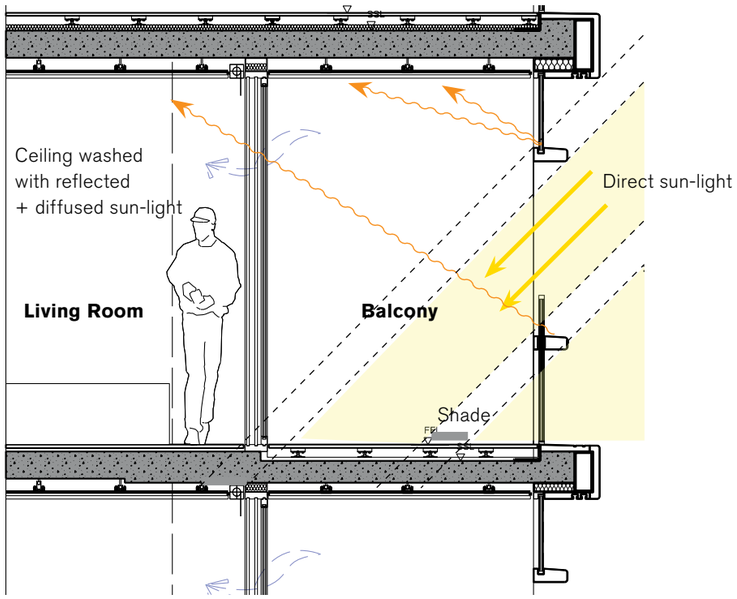
Passive shading devices and light shelves

The façade has also been designed to maximise daylight to the habitable areas of the apartments while minimising too much direct solar access. The façade uses passive elements which works in tandem with the MEP systems of the building to minimise the energy loads required for providing a comfortable environment for residents within the apartments. To this extent, we have introduced horizontal shading devices, in the form of louvers. These are very effective at cutting out the high angle most intense sunlight in line with best practice ESD principles. The horizontal shades are position and designed to also reflect light off their top surfaces to act as 'light shelves'. They bounce sunlight into the apartments, washing the ceilings with daylight, whilst diffusing its intensity by using a reflective spectral finish. The exact design profile colour and finish will be looked at and modelled in computer simulations as well as mock-ups during the next detailed design to maximise this effect.

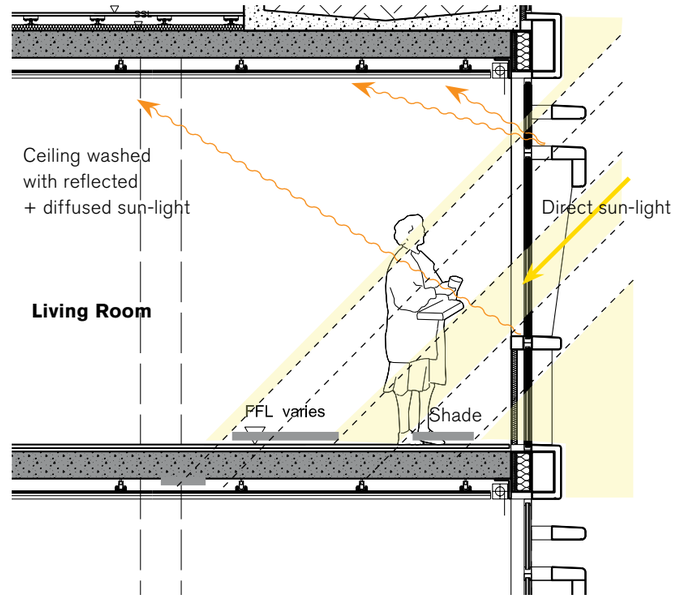
The massing form of the building aims to improve sun-access at corners, where balconies and living rooms are located and to achieve cross ventilation to the maximum number of apartments.

The private open space of each apartment are designed to be a flexible extension of the internal living space or "lanai." This is articulated in the facades by the way the elevation "opens up" along its length; they are placed along the northern, western and southern perimeter of the residential apartments; their position and orientation allow to maximize the amount of solar access they receive during the evening hours. They provide a sufficient large and well proportioned outdoor space, directly adjacent to the living room area, with a minimum depth of 2.0 m clear.

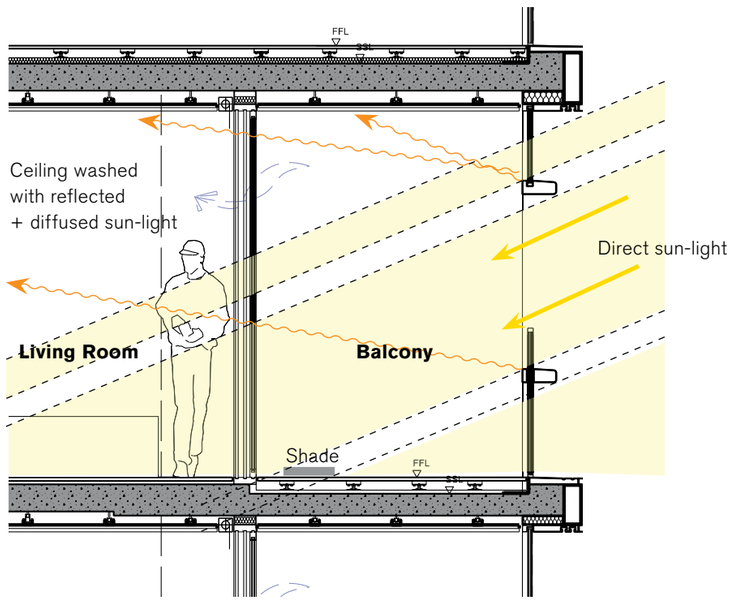
The design of the balustrade and the height of the horizontal louvers allow for views out towards south, west and north, while providing for safety and visual privacy.



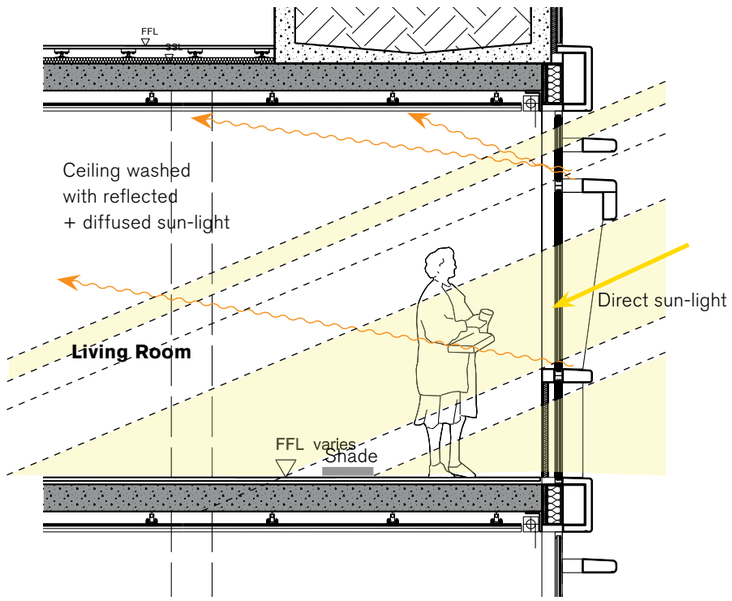
Living room/balcony scenario 01, high sun-angle



Living room scenario 02, high sun-angle



Living room/balcony scenario 01, low sun-angle



Living room scenario 02, low sun-angle

Sun access study - Childcare

Regulation Compliance - 22nd June

Objective

Identify the direct sunlight availability for proposed outdoor child care areas based on Sydney DCP 2012 regulations

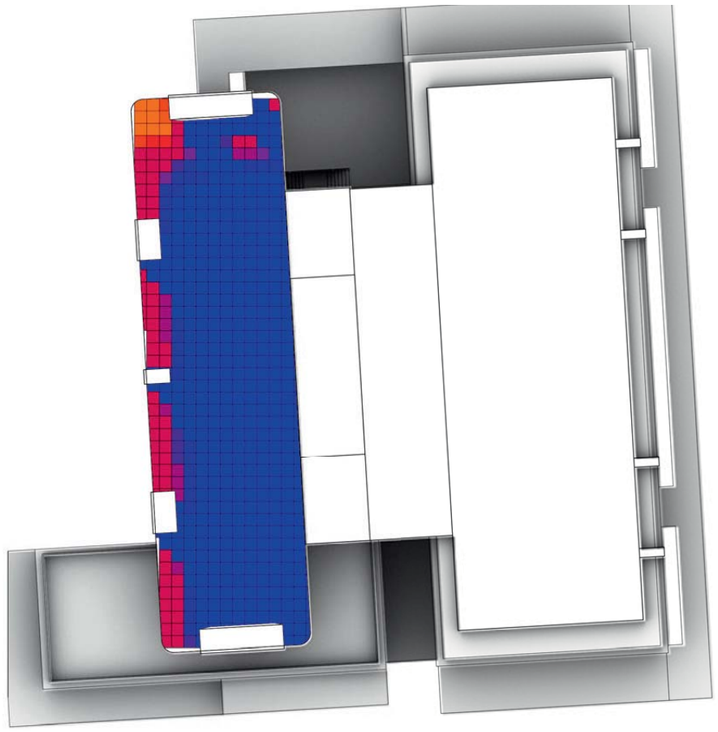
Methodology

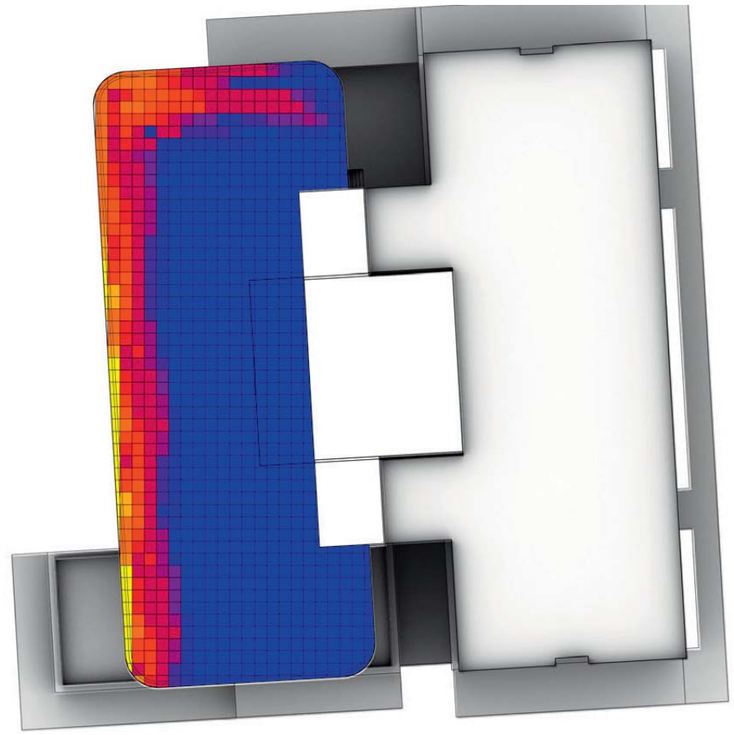
The assessment was run in accordance with Sydney DCP 2012 section 4.4.4.4(3)(c).

'[Outdoor areas must] be provided with at least 3 hours of solar access to 50% of the required outdoor area between 9am and 3pm on 22 June'

The Sunlight simulations and analysis has been carried out using a custom software program which links Bentley Microstation and the Radiance simulation engine to perform Sunlight Hours Analysis. The analysis used the AUS_Sydney_IWEC.epw weather file, running the raytrace program at a 15 minute interval for the specified dates/times requested.

The study aims to find areas that meet the minimum requirements by taking direct solar access to 1m x 1m panels located at floor level in designated areas.





Third Floor

Percentage of hours:

3 hours or more -	**0%**
2 hours -	**0%**
1 hours -	**3%**
0 hours -	**97%**

Fourth Floor

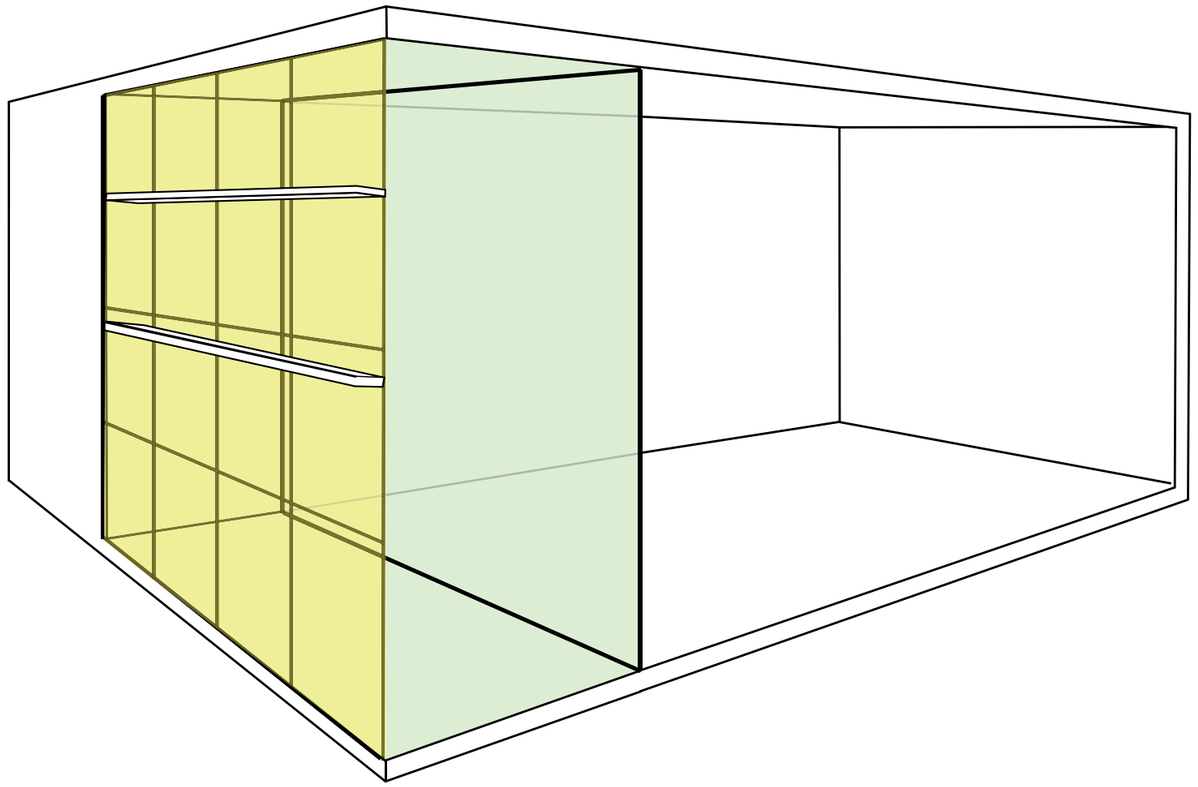
Percentage of hours:

3 hours or more -	**0%**
2 hours -	**4%**
1 hours -	**8%**
0 hours -	**88%**

Solar Assessment - Client Requirement

minimum **2 hours** of direct sunlight to the required minimum area of private open space.

The division into 1m² surfaces was done in order to get a more safe result. Keeping the area as a single surface the study would test only the middle of it and it would not provide sufficient evidence.



Sun access study - Residential

RFDC/DCP Compliance

22nd of March

09:00 - 15:00

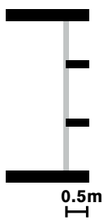
Minimum **2 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements.

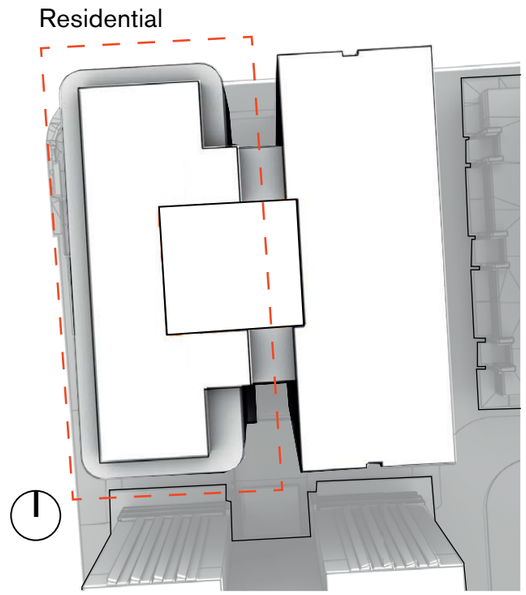
The following result is due to a combination of the technicality of how solar access is measured and to the orientation of the residential apartments;
there is good sun-access on the northern facade, limited access on the western (only after 1.00 PM) and no sun-access to the southern facade. It should be noted that the orientation was due to maximising the unobstructed views to the west.

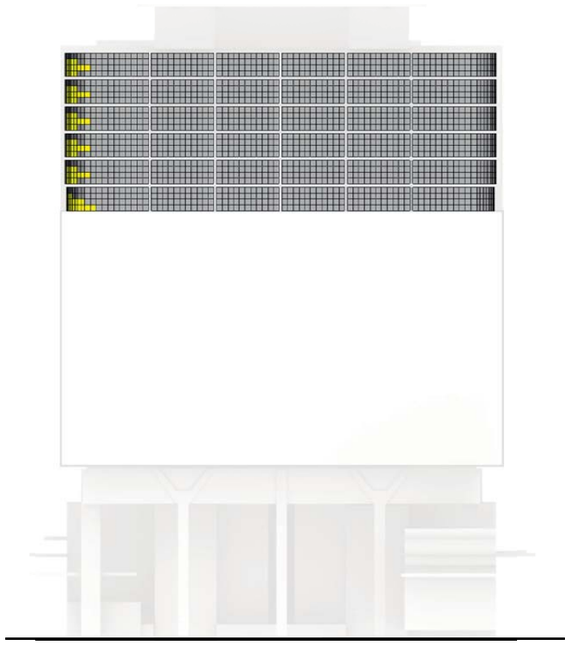
Section of balcony showing studied surface



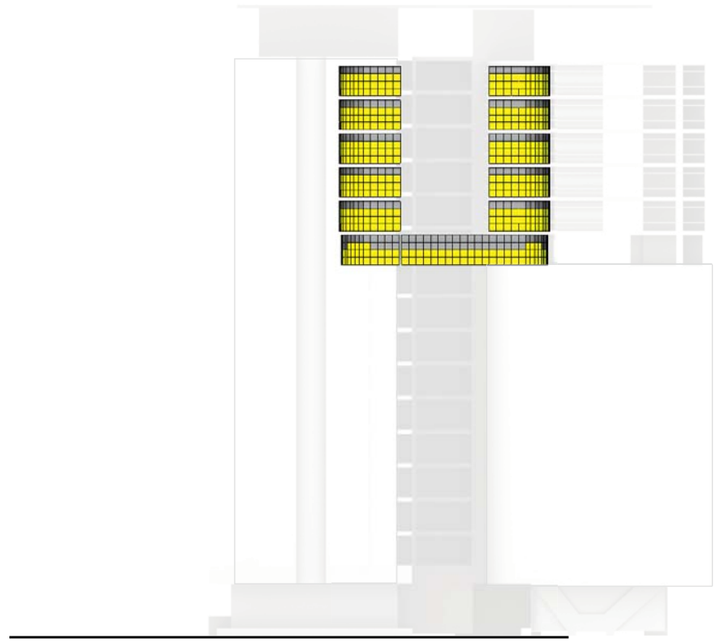
floor	% of flats complying
16	25%
15	25%
14	25%
13	25%
12	25%
11	25%
	25%

overall 25% of 2 hours or more, direct sun for residence

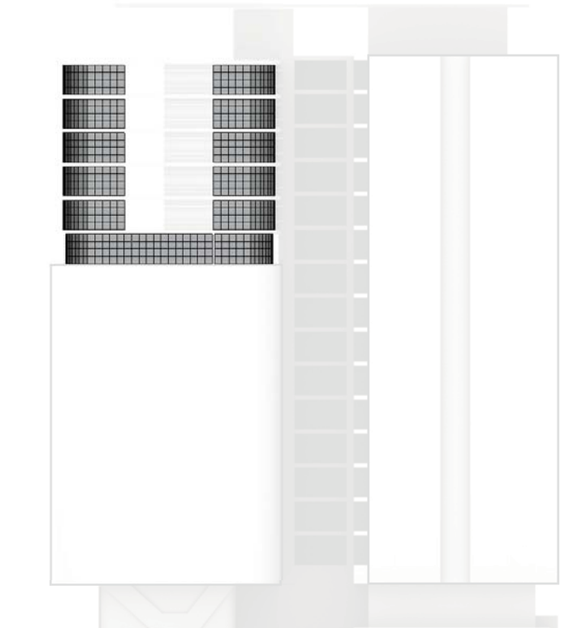




West Elevation



North Elevation



South Elevation

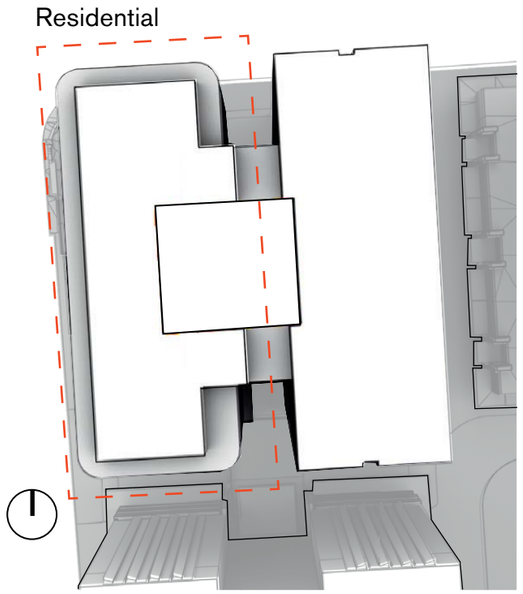
< 2 Hours ≥ 2 Hours

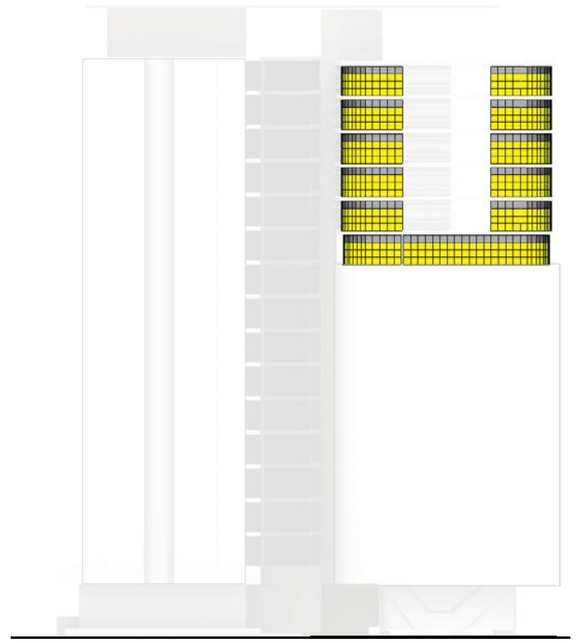
22nd of March
07:30 - 16:30

Minimum **2 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context. The percentage result that is given below indicates the percentage of flats on each facade that comply to the requirements

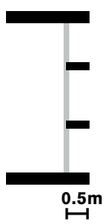
The extended hours show an improved analysis result. The number of compliant apartments is up to 88% from the previous 25% now shown in the analysis. This jump in percentage is mainly due to the fact that the balconies and the facade elevation are now read as the same western elevation. This result in all balconies having the same orientation and therefore exposed to the same sun angle.





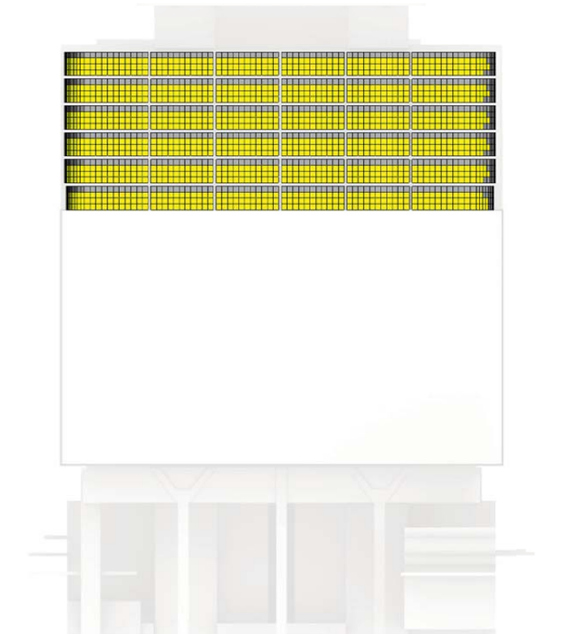
North Elevation

Section of balcony showing studied surface

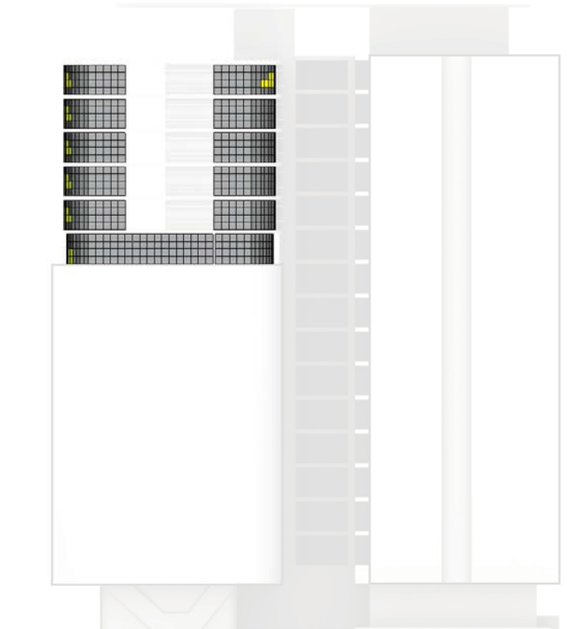


floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

overall 88% of 2 hours or more, direct sun for residence



West Elevation



South Elevation

< 2 Hours ≥ 2 Hours

Sun access study - Residential

RFDC/DCP Compliance

21st of June

09:00 - 15:00

Minimum **2 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements.

The following result is due to a combination of the technicality of how solar access is measured and to the orientation of the residential apartments;
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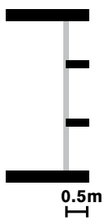
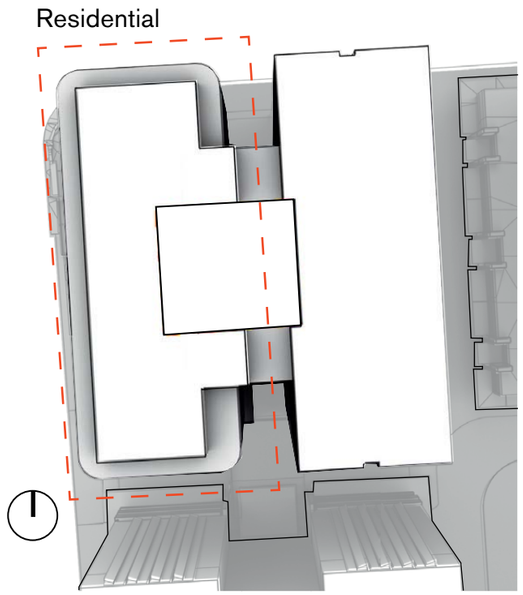
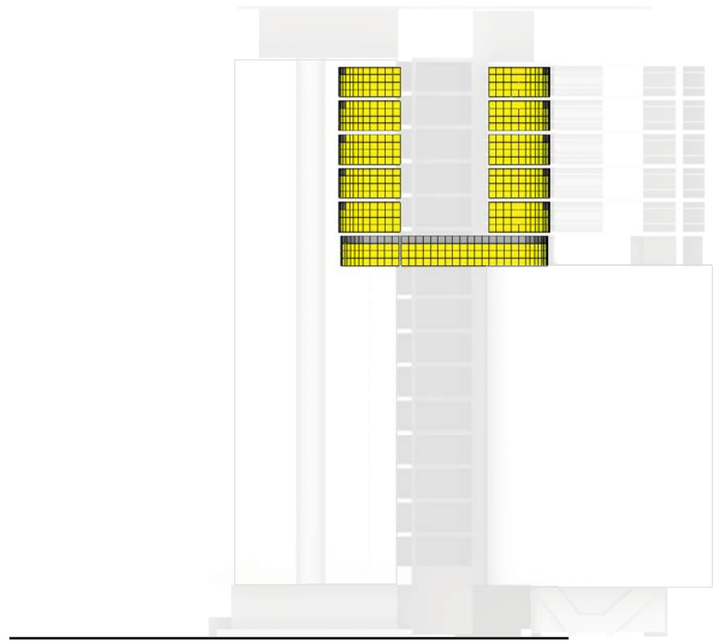


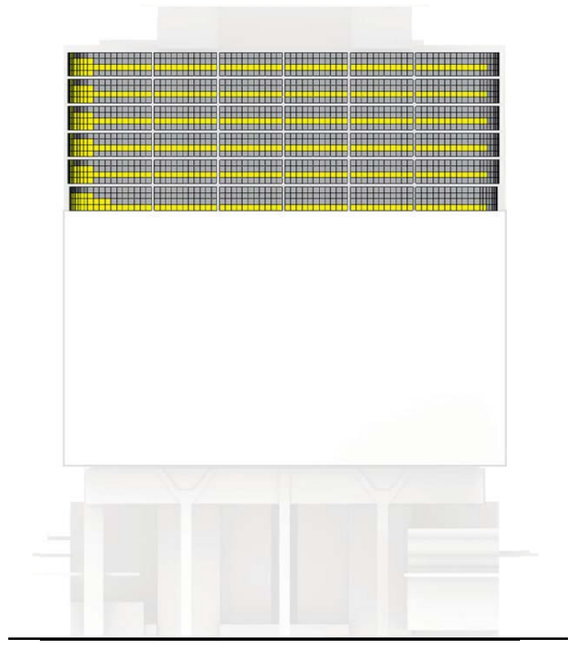
floor	% of flats complying
16	25%
15	25%
14	25%
13	25%
12	25%
11	25%
	25%

overall 25% of 2 hours or more, direct sun for residence

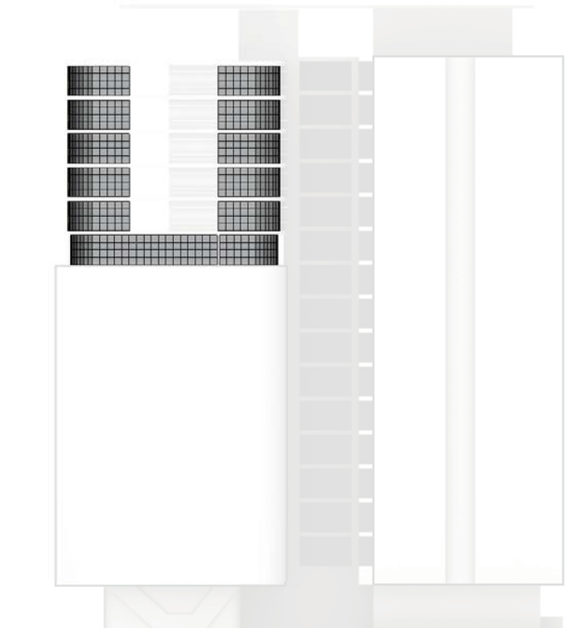




North Elevation



West Elevation



South Elevation

< 2 Hours ≥ 2 Hours

21st of June
07:30 - 16:30

Minimum **2 hours** of direct sunlight to the required minimum area of private open space.

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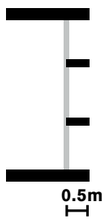
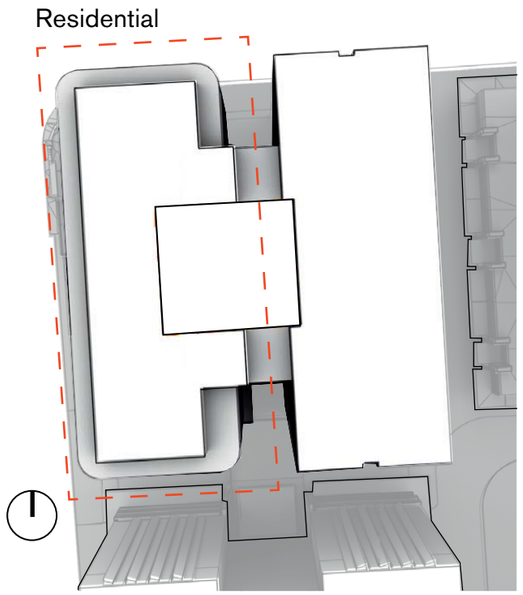
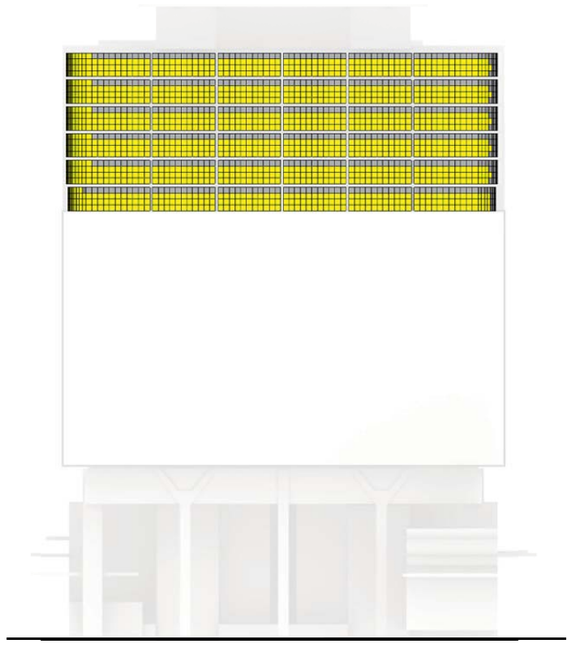


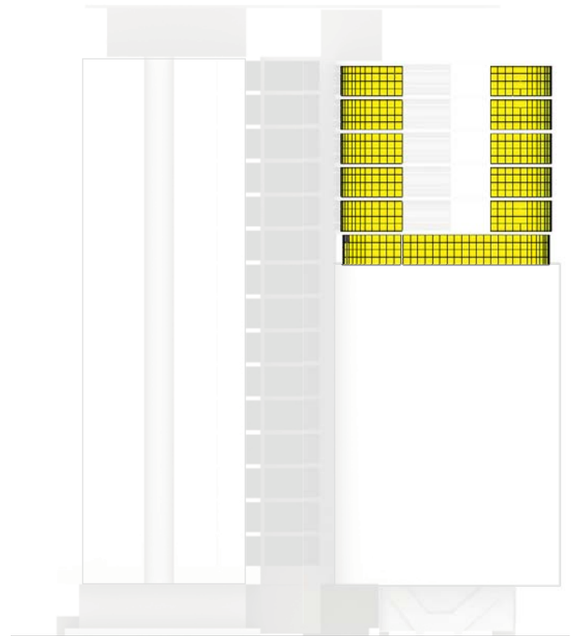
floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

overall 88% of 2 hours or more, direct sun for residence

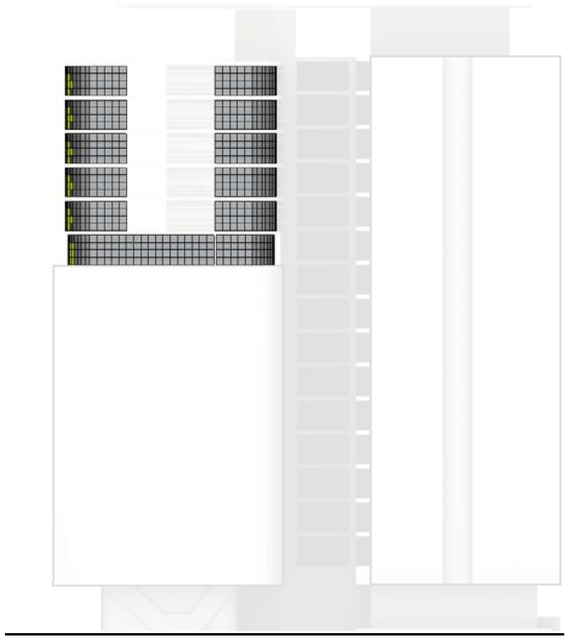




West Elevation



North Elevation



South Elevation

< 2 Hours ≥ 2 Hours

Sun access study - Residential

Client requirement

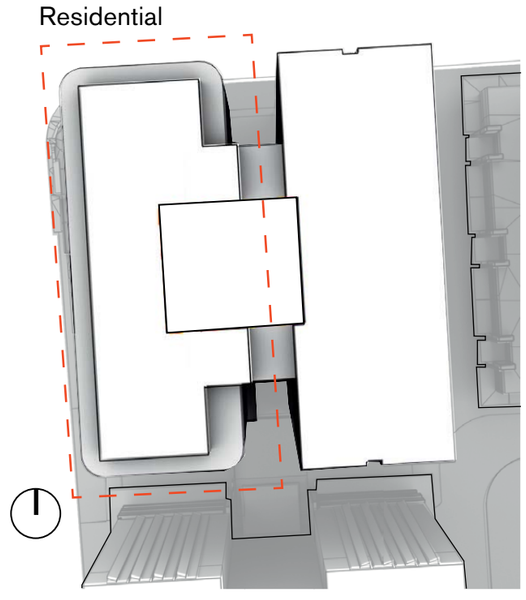
22nd of March

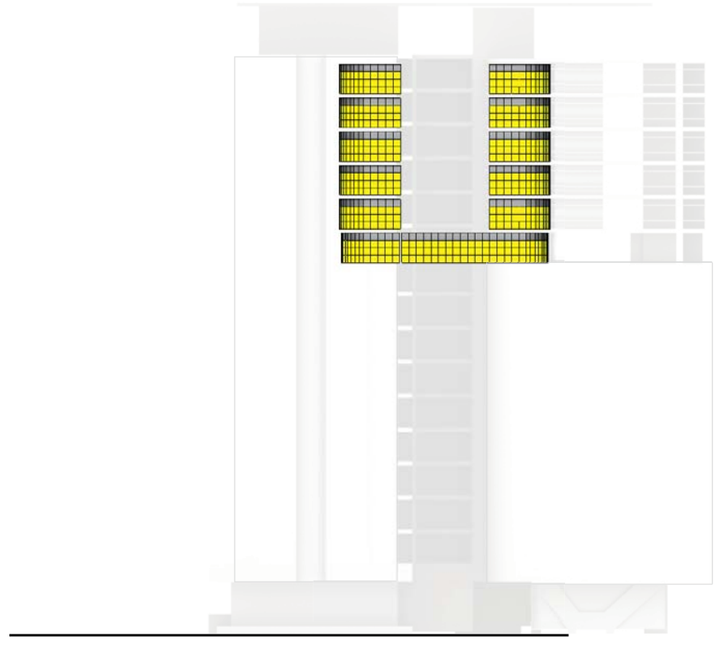
09:00 - 15:00

Minimum **1.5 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

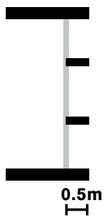
The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements





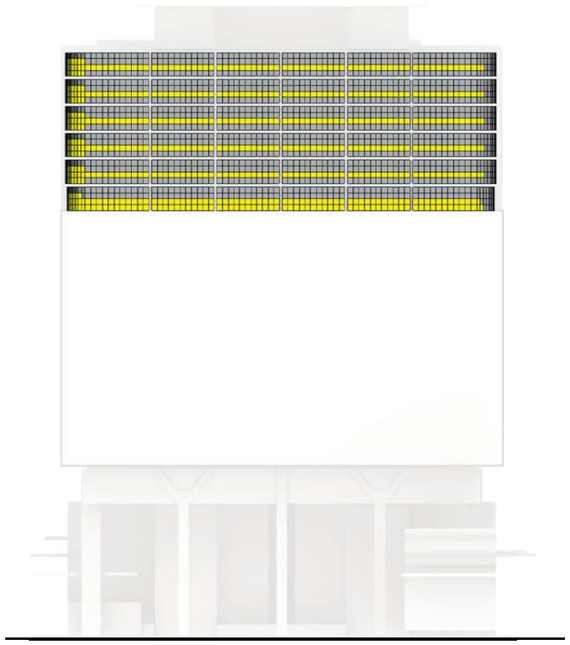
North Elevation

Section of balcony showing studied surface

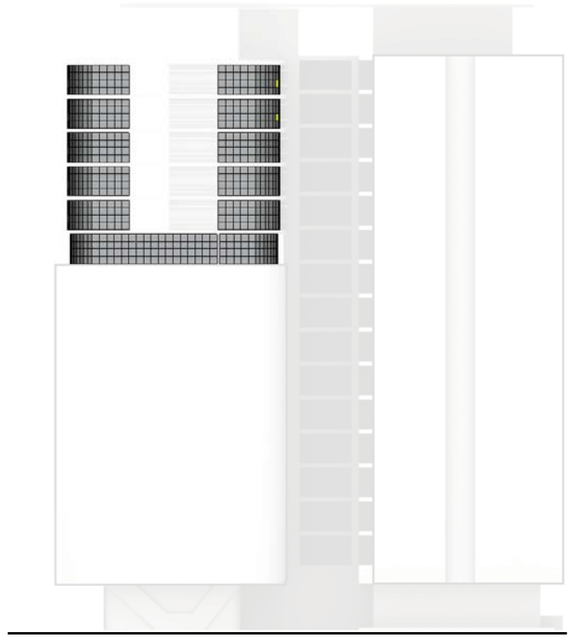


floor	% of flats complying
16	25%
15	25%
14	25%
13	25%
12	25%
11	25%
	25%

overall 25% of 1.5 hours or more, direct sun for residence



West Elevation



South Elevation

< 1.5 Hours ≥ 1.5 Hours

Sun access study - Residential

Client requirement \ extended hours

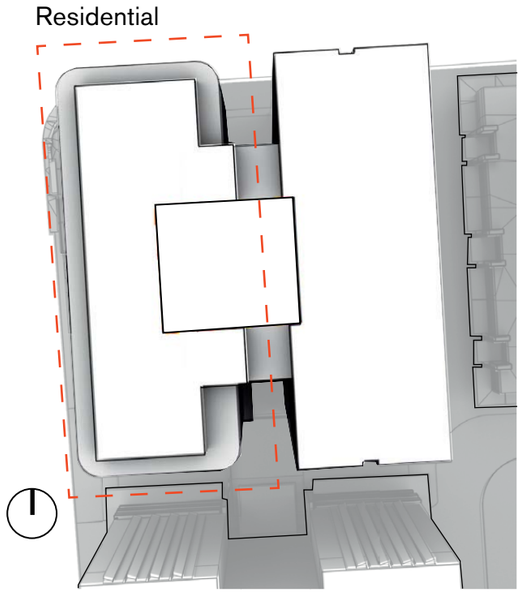
22nd of March

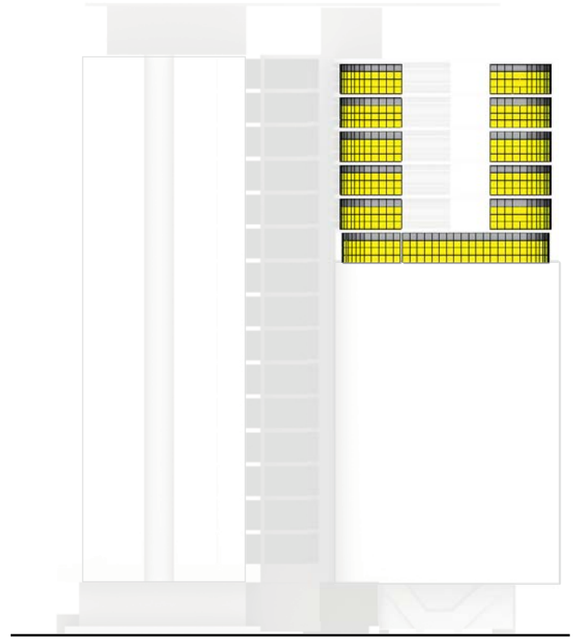
07:30 - 16:30

Minimum **1.5 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

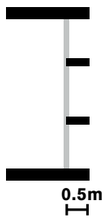
The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements





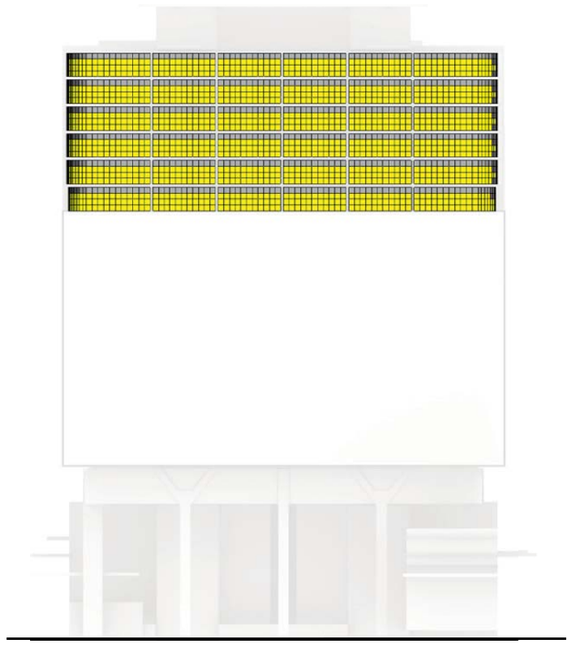
North Elevation

Section of balcony showing studied surface

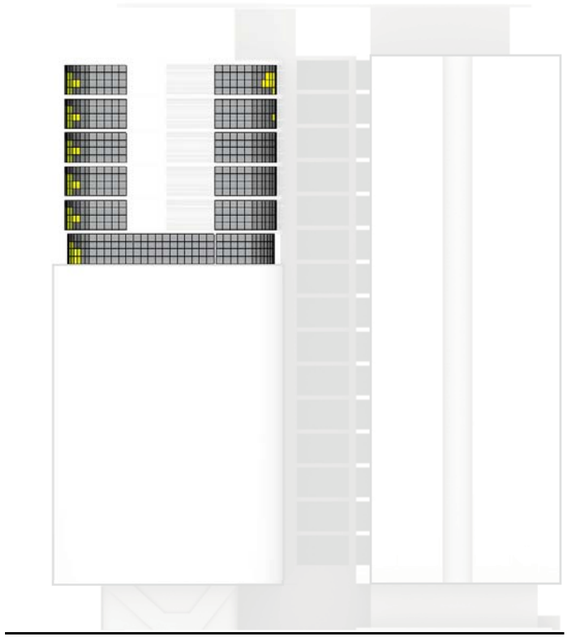


floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

overall 88% of 1.5 hours or more, direct sun for residence



West Elevation



South Elevation

< 1.5 Hours ≥ 1.5 Hours

Sun access study - Residential

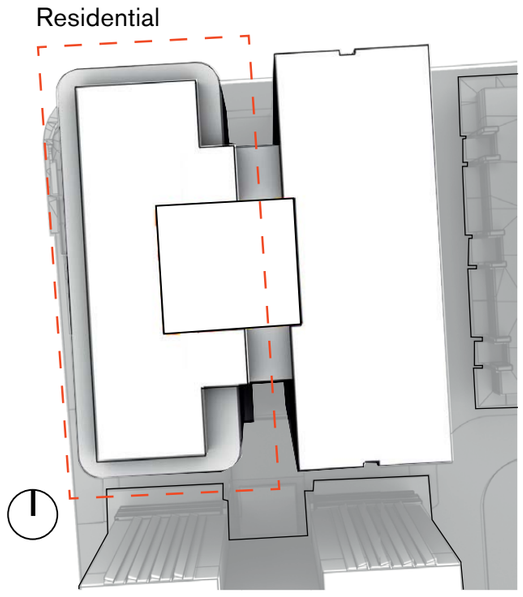
Client requirement

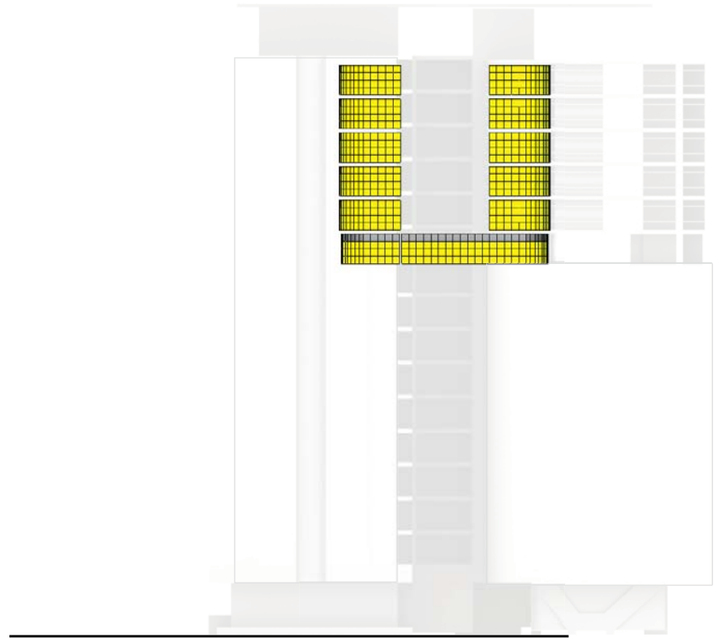
21st of June
09:00 - 15:00

Minimum **1.5 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

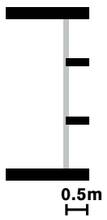
The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements





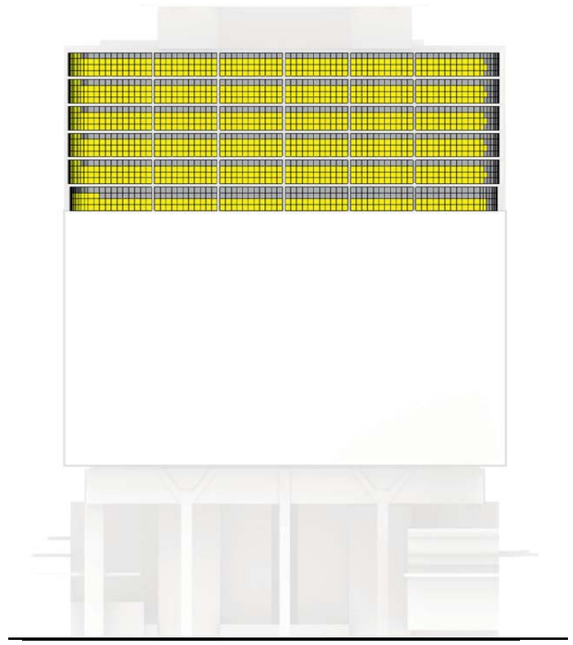
North Elevation

Section of balcony showing studied surface

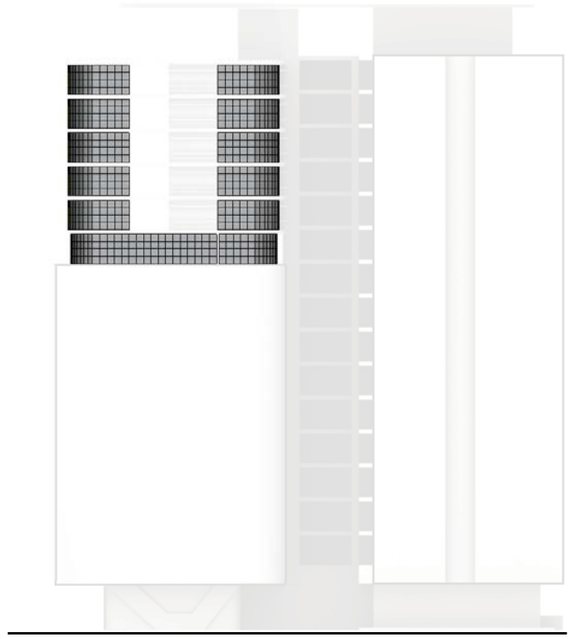


floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	25%
	77%

overall 77% of 1.5 hours or more, direct sun for residence



West Elevation



South Elevation

< 1.5 Hours ≥ 1.5 Hours

Sun access study - Residential

Client requirement \ extended hours

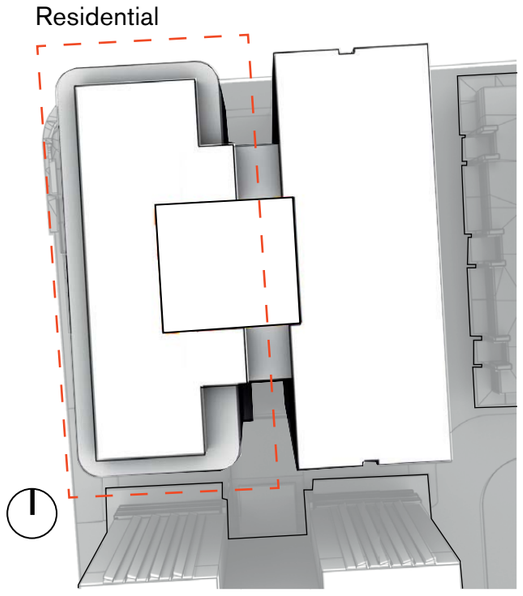
21st of June

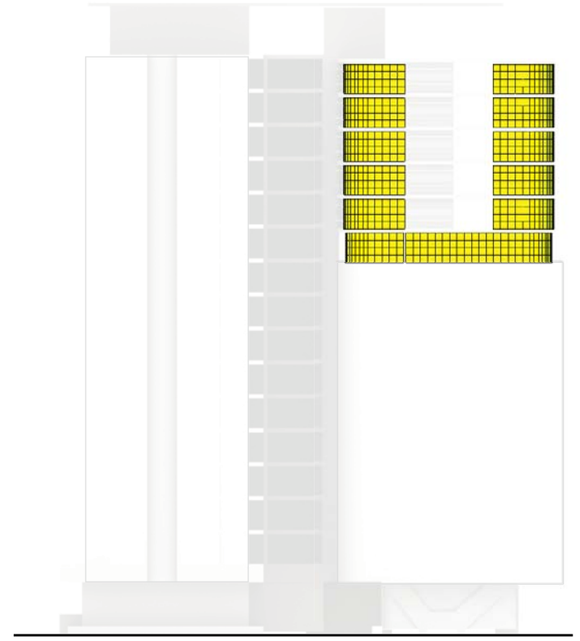
07:30 - 16:30

Minimum **1.5 hours** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

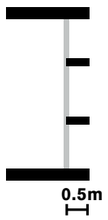
The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements





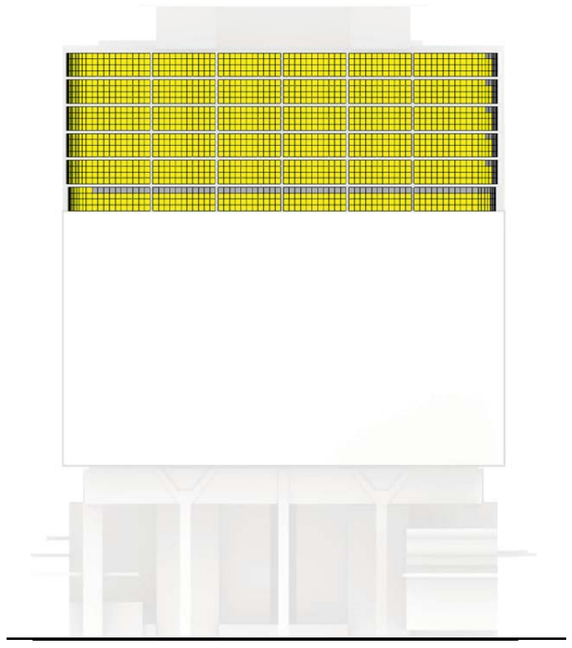
North Elevation

Section of balcony showing studied surface

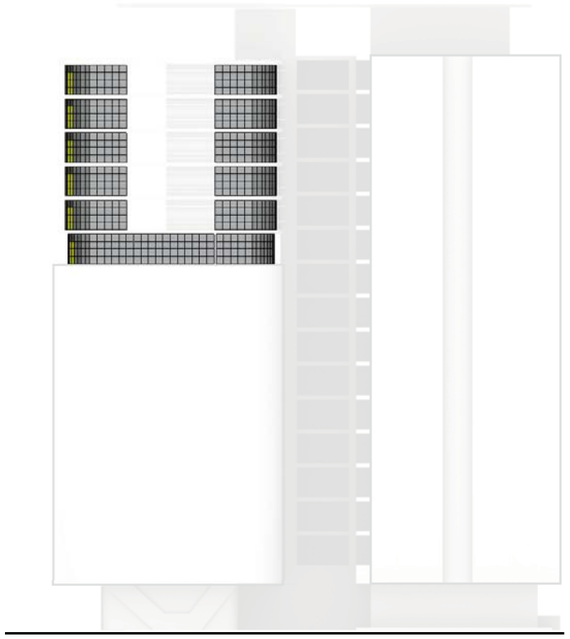


floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

overall 88% of 1.5 hours or more, direct sun for residence



West Elevation



South Elevation

< 1.5 Hours ≥ 1.5 Hours

Sun access study - Residential

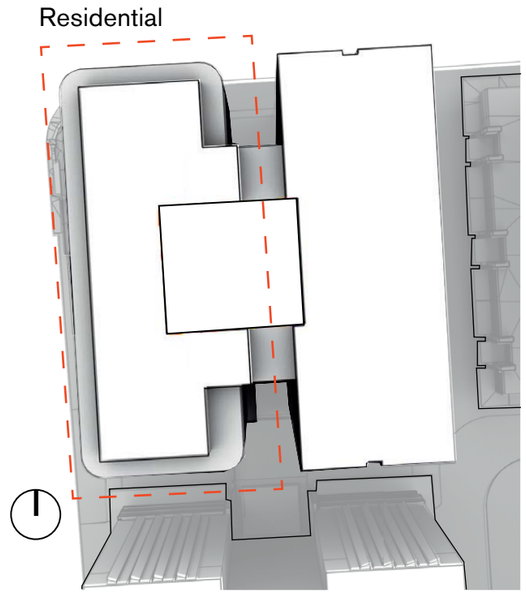
Client requirement

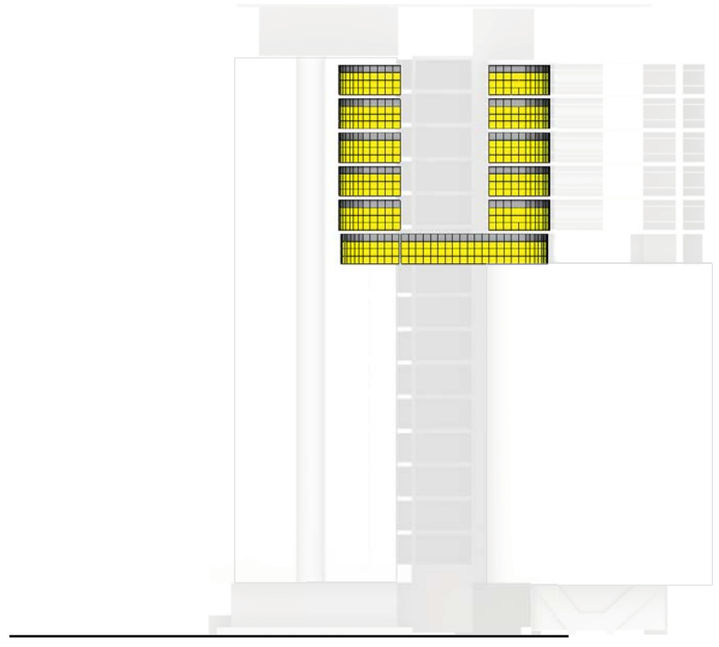
22nd of March
09:00 - 15:00

Minimum **1 hour** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

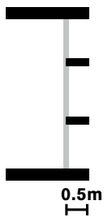
The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements





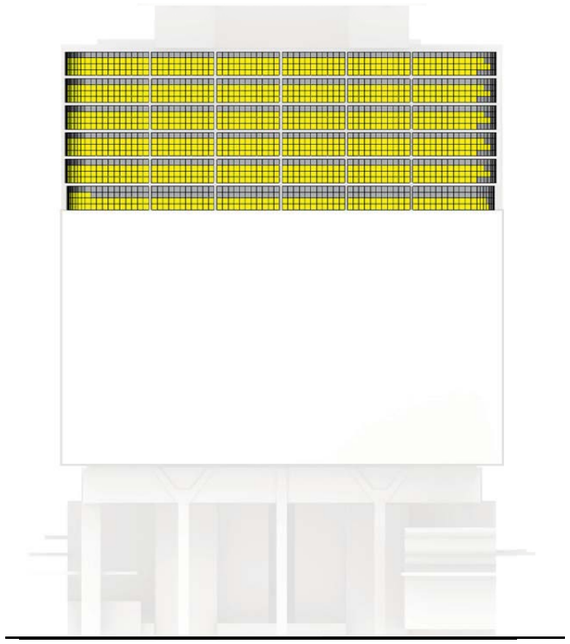
North Elevation

Section of balcony showing studied surface

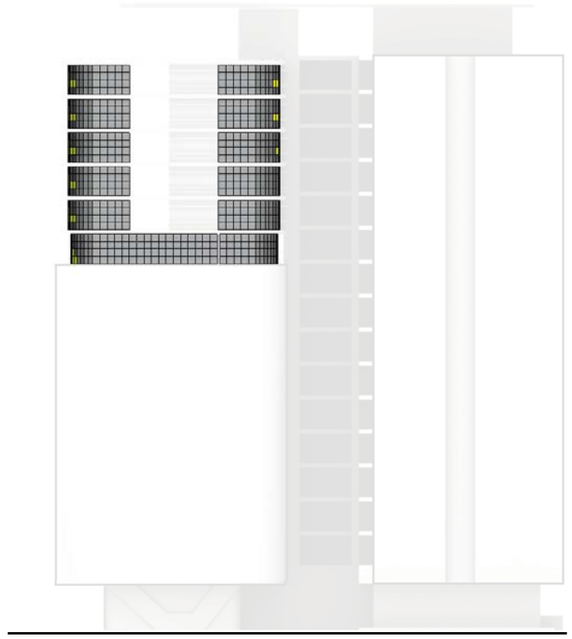


floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	25%
	77%

overall 77% of 1 hour or more, direct sun for residence



West Elevation



South Elevation

< 1 Hour ≥ 1 Hour

Sun access study - Residential

Client requirement \ extended hours

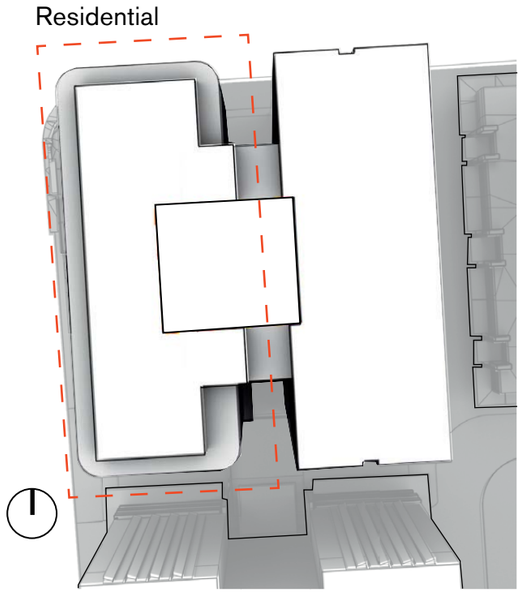
22nd of March

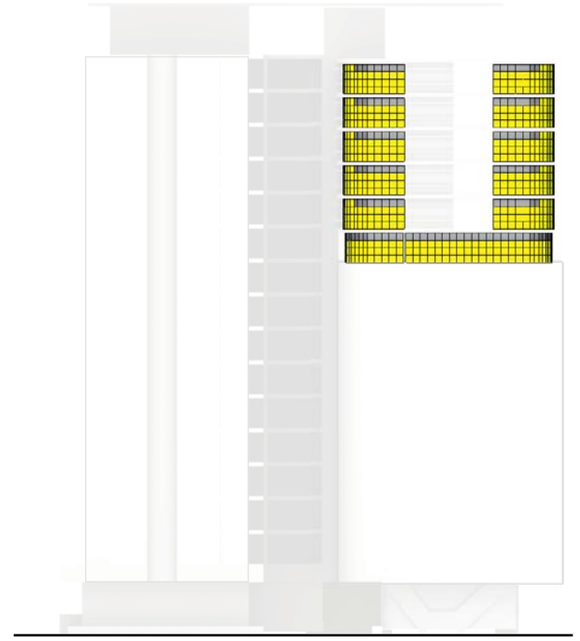
07:30 - 16:30

Minimum **1 hour** of direct sunlight to the required minimum area of private open space.

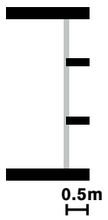
The simulation was done considering the building with its context.

The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements



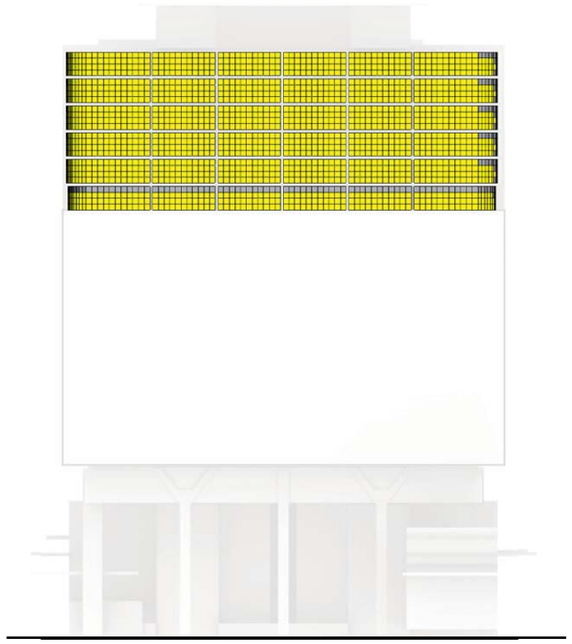


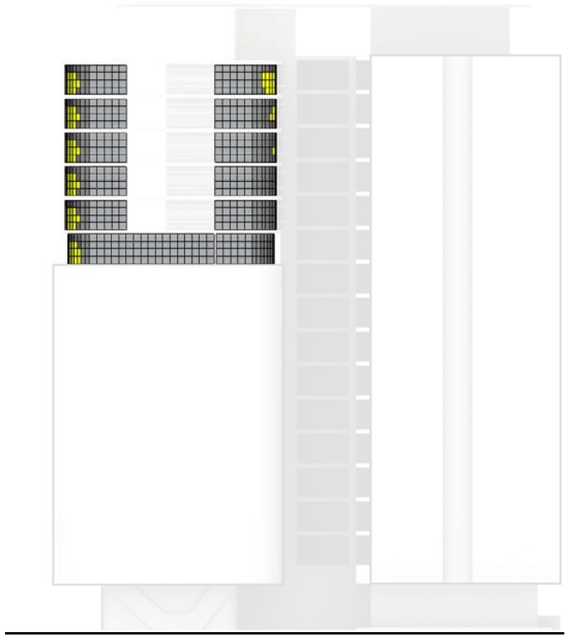
Section of balcony showing studied surface



floor	% of flats complying
16	100%
15	88%
14	88%
13	88%
12	88%
11	88%
	90%

overall 90% of 1 hour or more, direct sun for residence





< 1 Hour ≥ 1 Hour

Sun access study - Residential

Client requirement

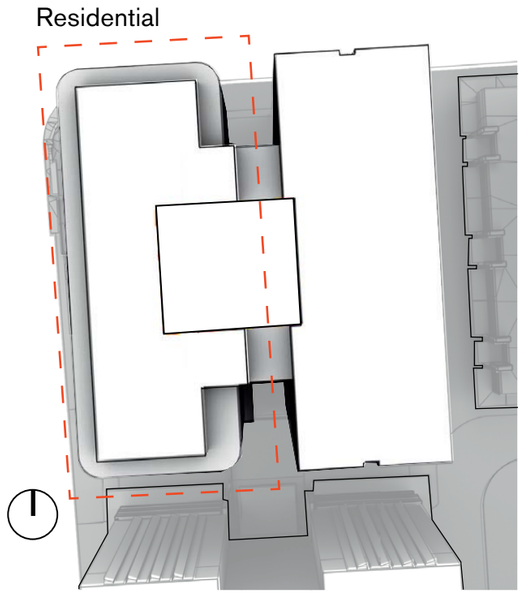
21st of June

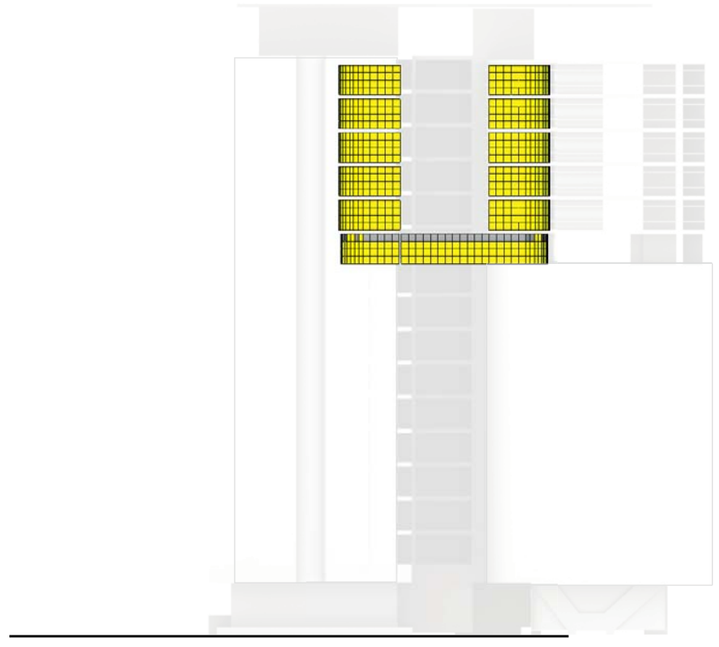
09:00 - 15:00

Minimum **1 hour** of direct sunlight to the required minimum area of private open space.

The simulation was done considering the building with its context.

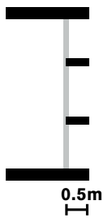
The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements





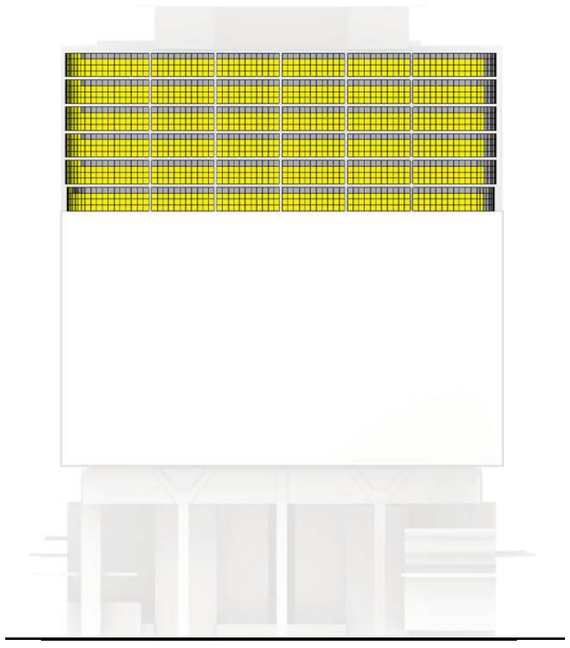
North Elevation

Section of balcony showing studied surface

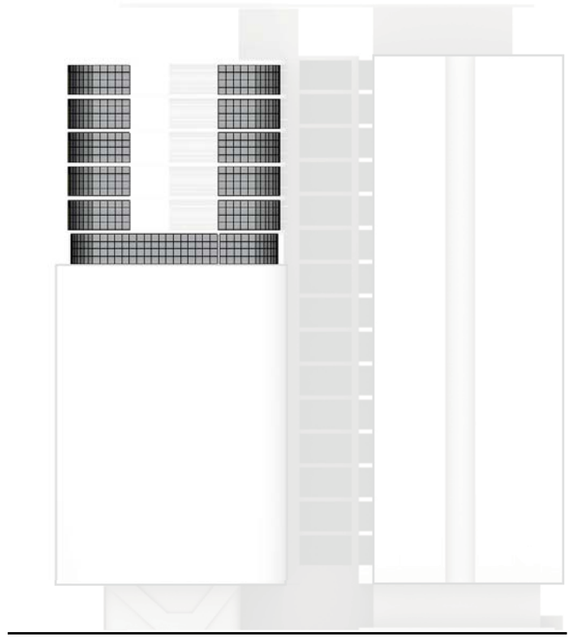


floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

overall 88% of 1 hour or more, direct sun for residence



West Elevation



South Elevation

< 1 Hour ≥ 1 Hour

Sun access study - Residential

Client requirement \ extended hours

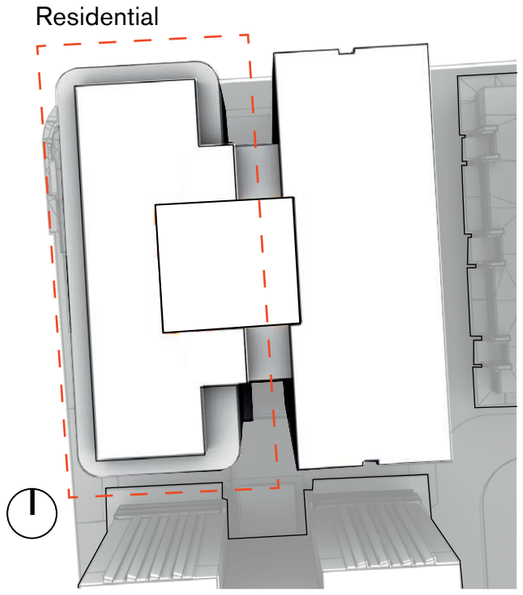
21st of June

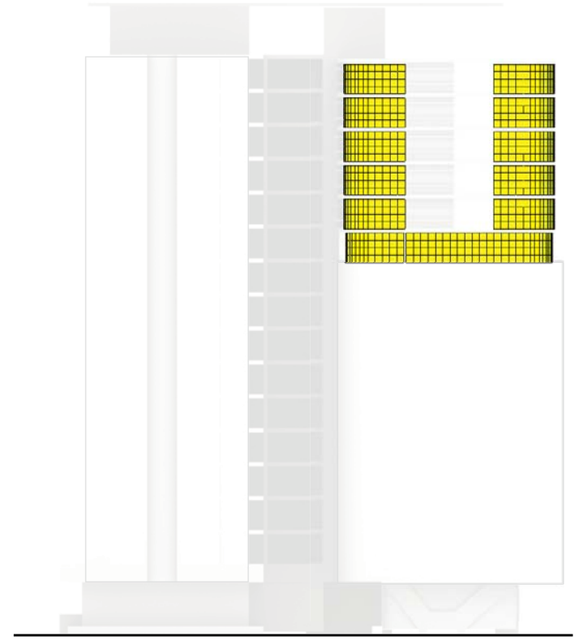
07:30 - 16:30

Minimum **1 hour** of direct sunlight to the required minimum area of private open space.

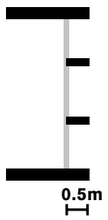
The simulation was done considering the building with its context.

The percentage result that is given bellow indicates the percentage of flats on each facade that comply to the requirements



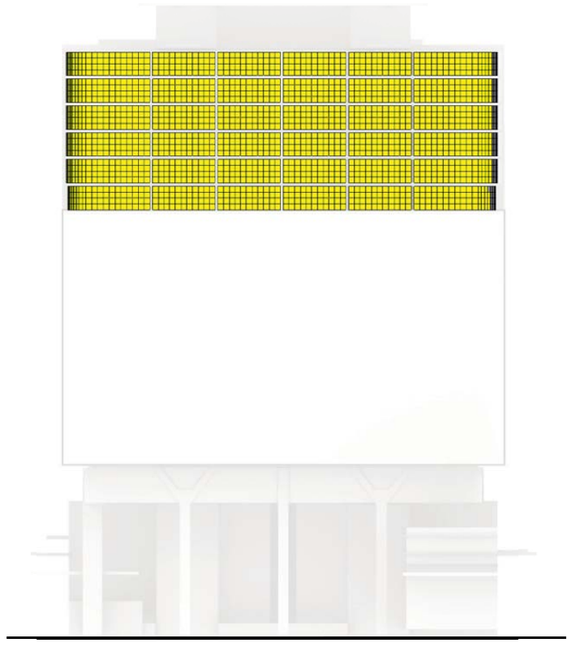


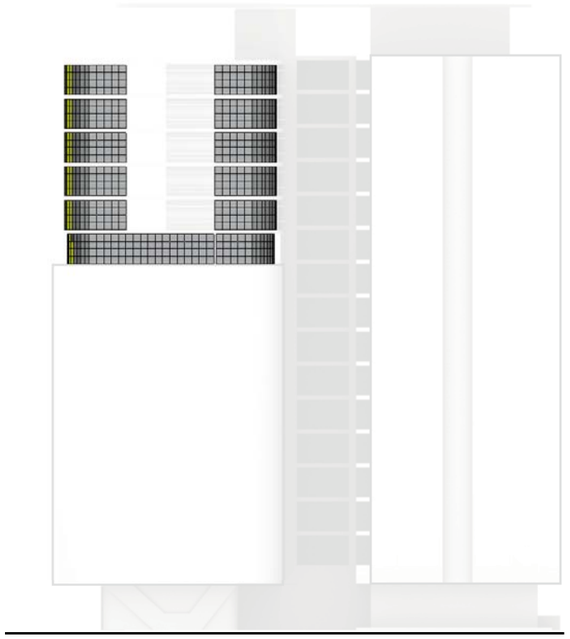
Section of balcony showing studied surface



floor	% of flats complying
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

overall 88% of 1 hour or more, direct sun for residence



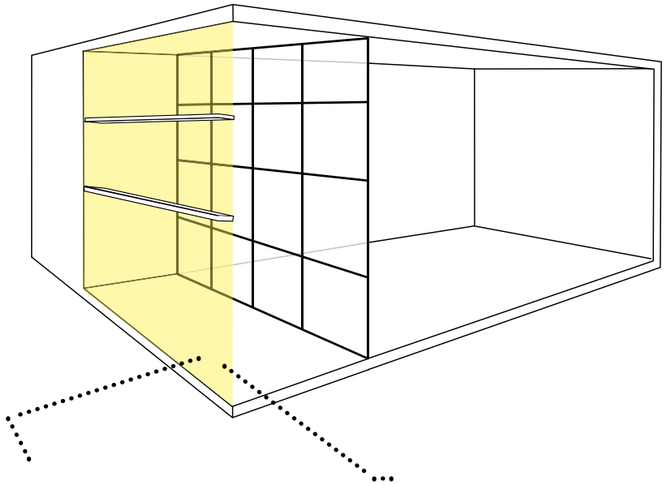


< 1 Hour ≥ 1 Hour

Solar Assessment - Sydney RFDC/DCP 2012

The following results illustrate the percentage of flats that comply to private open space, solar access requirements.

The report covers both the RFDC/DCP 2012 as well as the client requirements to test sun access considering the extended hours between 7:30 and 16:30



Vertical surface for private open space compliance study

2 hours requirement

March 09:00 - 15:00

16	25%
15	25%
14	25%
13	25%
12	25%
11	25%
	25%

March 07:30 - 16:30

16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

June 09:00 - 15:00

16	25%
15	25%
14	25%
13	25%
12	25%
11	25%
	25%

June 07:30 - 16:30

16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

1.5 hours requirement

March 09:00 - 15:00

16	25%
15	25%
14	25%
13	25%
12	25%
11	25%
	25%

March 07:30 - 16:30

16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

June 09:00 - 15:00

16	88%
15	88%
14	88%
13	88%
12	88%
11	25%
	77%

June 07:30 - 16:30

16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

1 hour requirement

March 09:00 - 15:00

16	88%
15	88%
14	88%
13	88%
12	88%
11	25%
	77%

March 07:30 - 16:30

16	100%
15	88%
14	88%
13	88%
12	88%
11	88%
	90%

June 09:00 - 15:00

16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

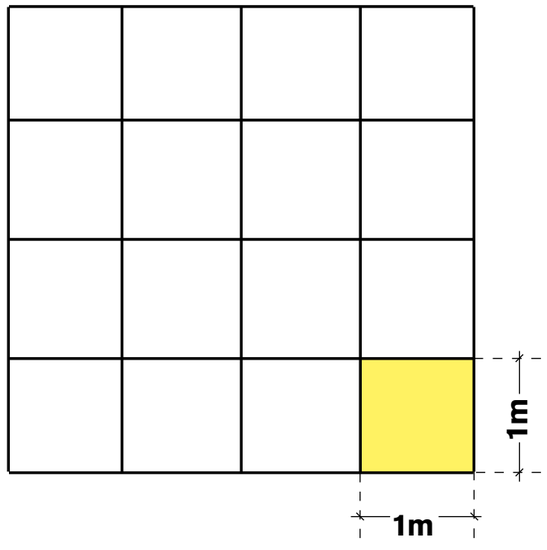
June 07:30 - 16:30

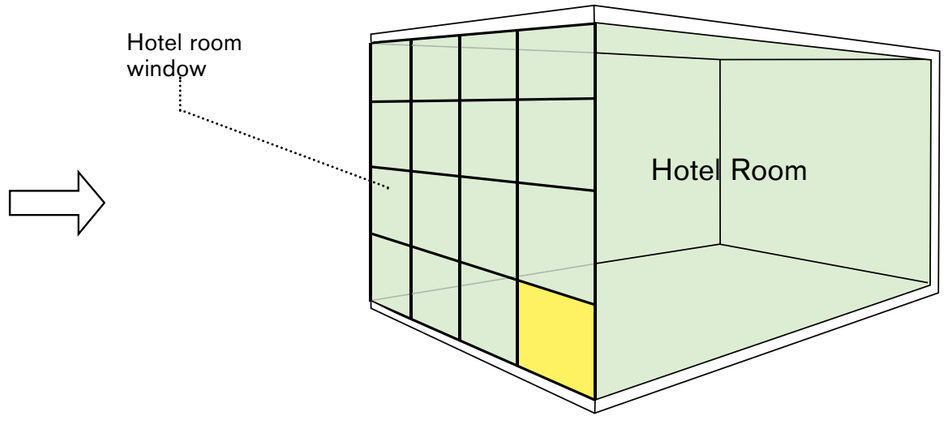
16	88%
15	88%
14	88%
13	88%
12	88%
11	88%
	88%

Solar Assessment

2 hours direct sunlight to at least 1m² of hotel room window on March 22nd and June 21st, between 9:00 - 15:00

this range was extended as requested by the client to 7:30 - 16:30





when at least 1m² of hotel room window gets 2h of direct sunlight or more, then that room complies with the DCP standards.

Sun access study - Hotel

Windows

22nd of March

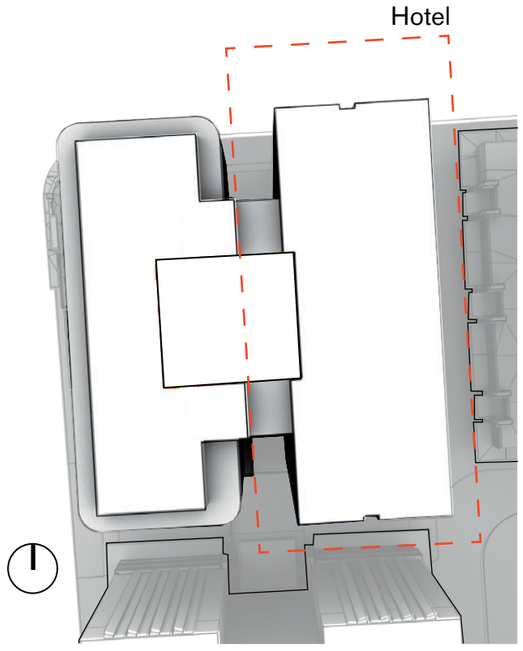
09:00 - 15:00

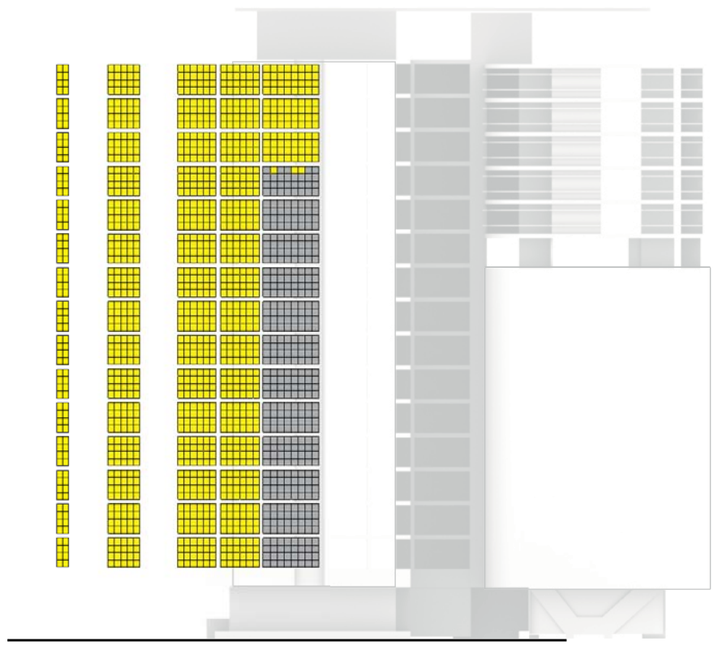
2 hours direct sunlight to at least 1m² of room window.

The windows were divided into 1m² surfaces to identify compliance with the minimum requirements.

The simulation was done considering the building with its context.

One window was tested for each room and the percentage result that is given bellow indicates the percentage of rooms on each floor that comply to the requirements.



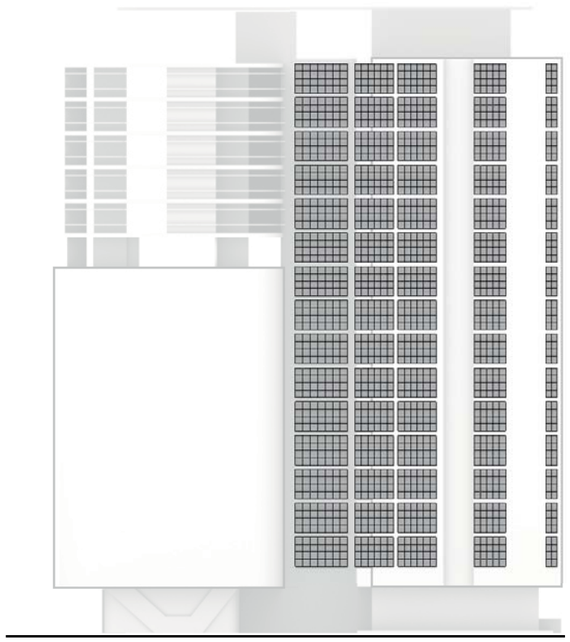


North Elevation

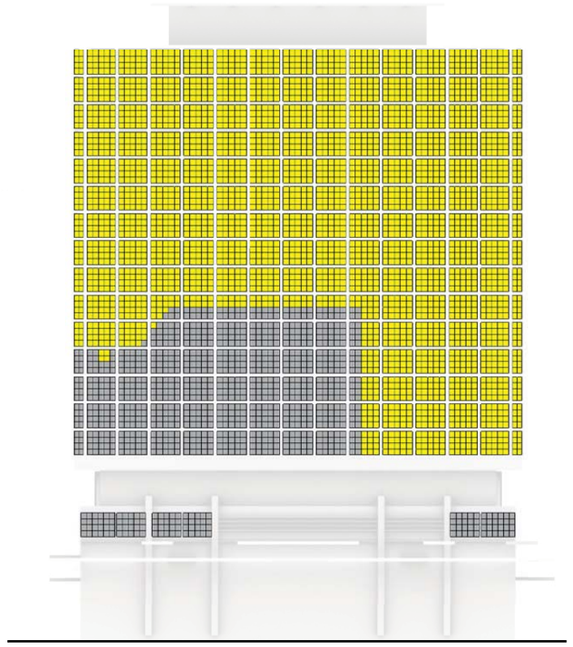
Section showing studied surface

floor	% of flats complying
16	89%
15	89%
14	89%
13	84%
12	79%
11	79%
10	79%
9	79%
8	79%
7	79%
6	53%
5	42%
4	37%
3	37%
2	37%
1	0%
	67%

Overall 67% of 2 hours or more, direct sun for hotel.



South Elevation



East Elevation

< 2 Hours ≥ 2 Hours

Sun access study - Hotel

DCP Compliance \ extended hours - Windows

22nd of March

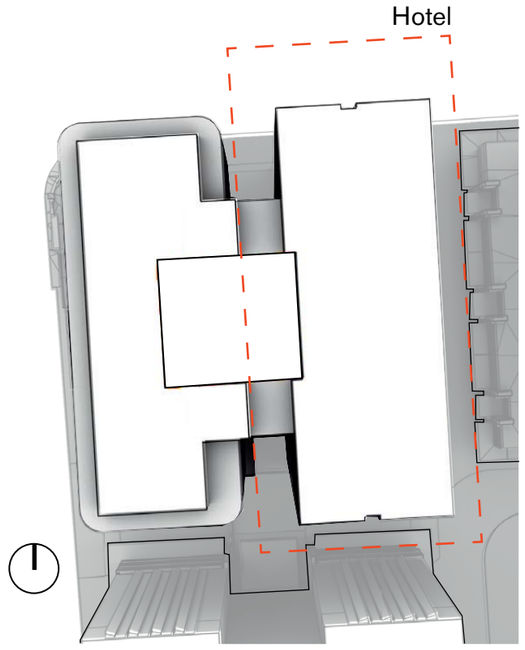
07:30 - 16:30

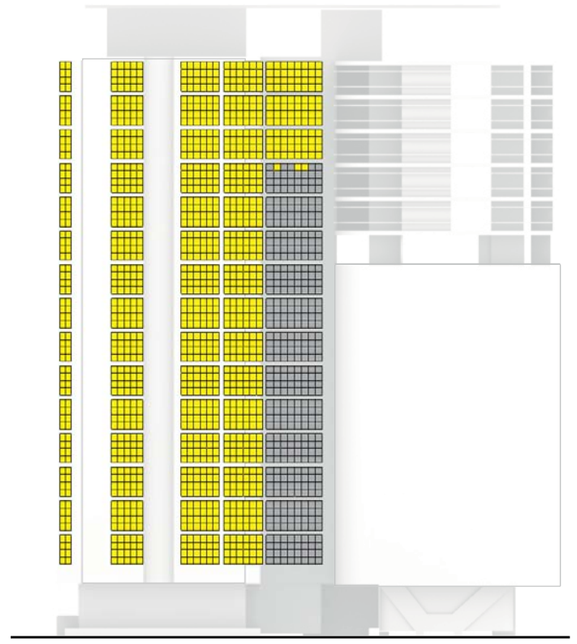
2 hours direct sunlight to at least 1m² of room window.

The windows were divided into 1m² surfaces to identify compliance with the minimum requirements.

The simulation was done considering the building with its context.

One window was tested for each room and the percentage result that is given bellow indicates the percentage of rooms on each floor that comply to the requirements.



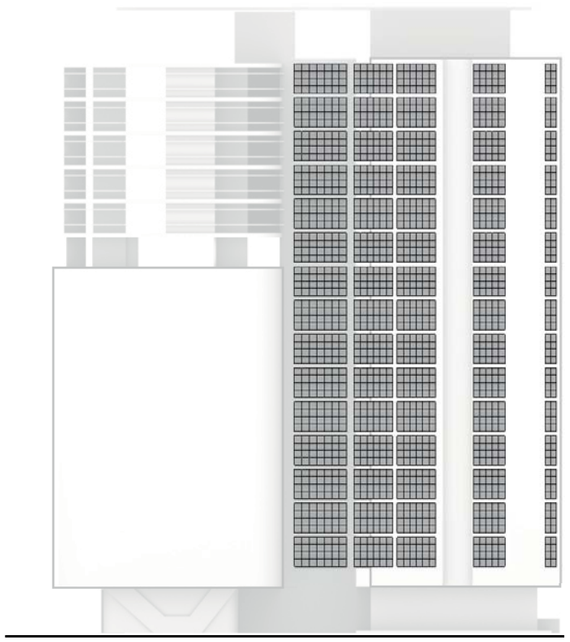


North Elevation

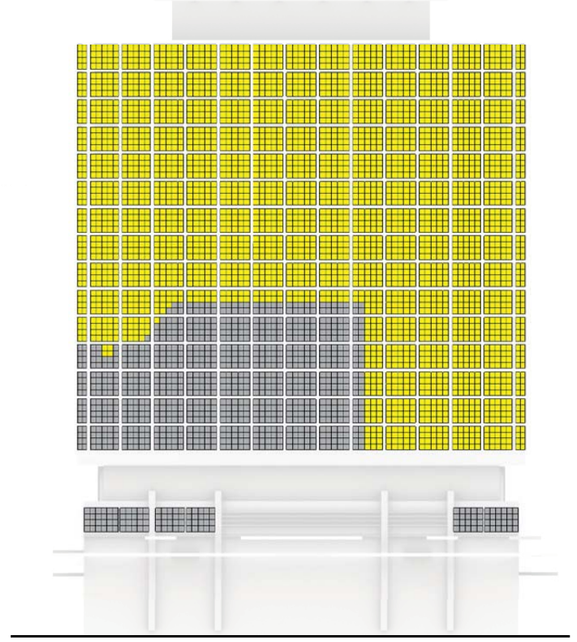
Section showing studied surface

floor	% of flats complying
16	89%
15	89%
14	89%
13	84%
12	79%
11	79%
10	79%
9	79%
8	79%
7	79%
6	53%
5	42%
4	37%
3	37%
2	37%
1	0%
	67%

Overall 67% of 2 hours or more, direct sun for hotel.



South Elevation



East Elevation

< 2 Hours ≥ 2 Hours

Sun access study - Hotel

Windows

21st of June

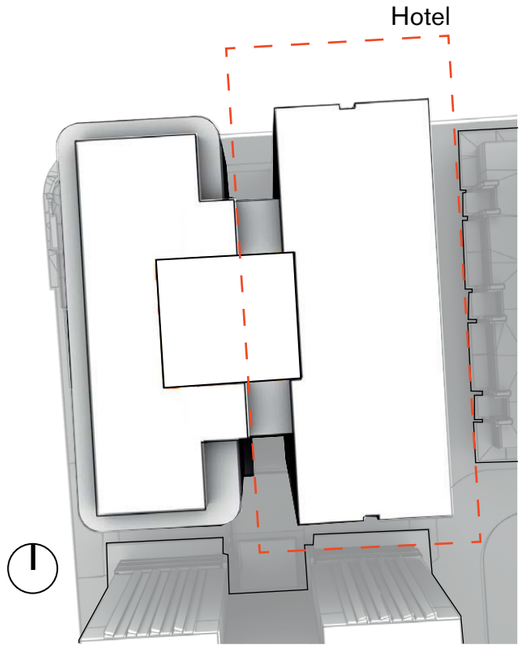
09:00 - 15:00

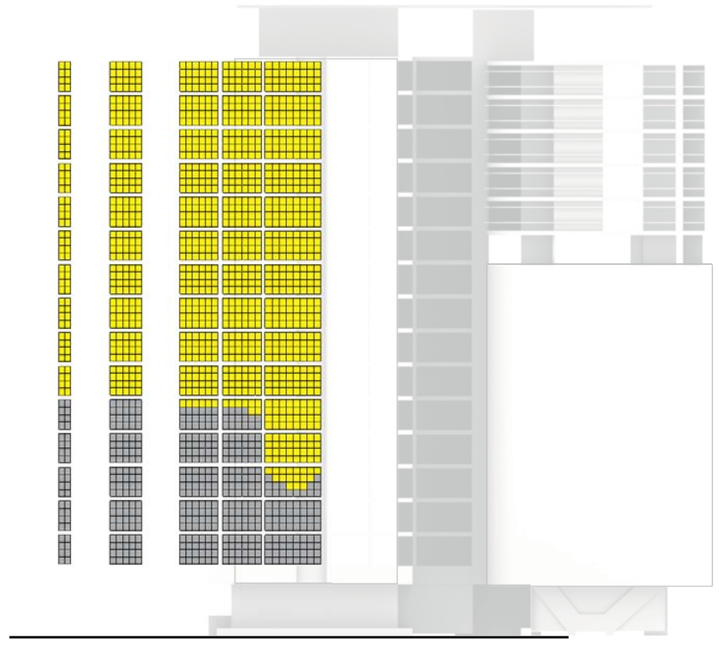
2 hours direct sunlight to at least 1m² of room window.

The windows were divided into 1m² surfaces to identify compliance with the minimum requirements.

The simulation was done considering the building with its context.

One window was tested for each room and the percentage result that is given bellow indicates the percentage of rooms on each floor that comply to the requirements.



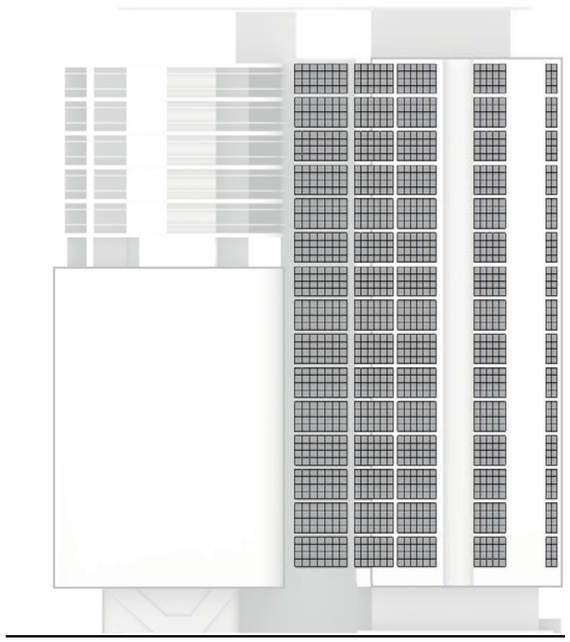


North Elevation

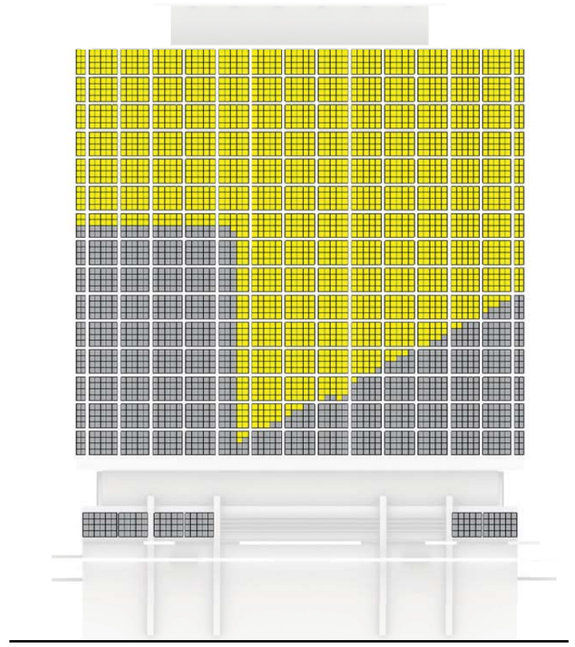
Section showing studied surface

floor	% of flats complying
16	89%
15	84%
14	84%
13	84%
12	84%
11	84%
10	84%
9	63%
8	63%
7	63%
6	58%
5	37%
4	32%
3	16%
2	5%
1	0%
	61%

Overall 61% of 2 hours or more, direct sun for hotel.



South Elevation



East Elevation

< 2 Hours ≥ 2 Hours

Sun access study - Hotel

Extended hours - Windows

21st of June

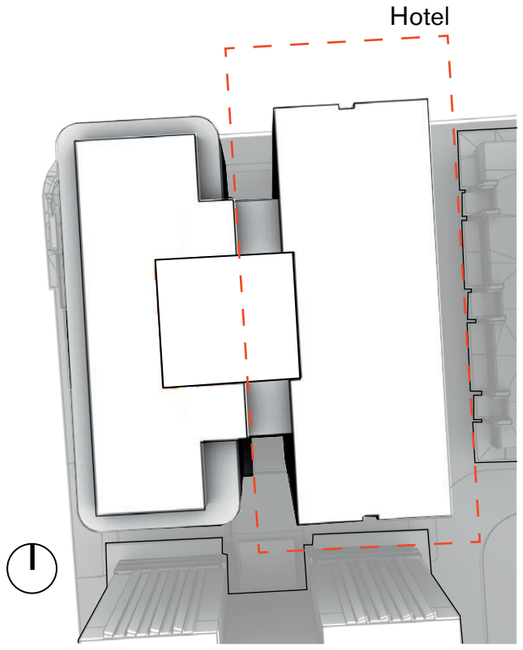
07:30 - 16:30

2 hours direct sunlight to at least 1m² of room window.

The windows were divided into 1m² surfaces to identify compliance with the minimum requirements.

The simulation was done considering the building with its context.

One window was tested for each room and the percentage result that is given bellow indicates the percentage of rooms on each floor that comply to the requirements.

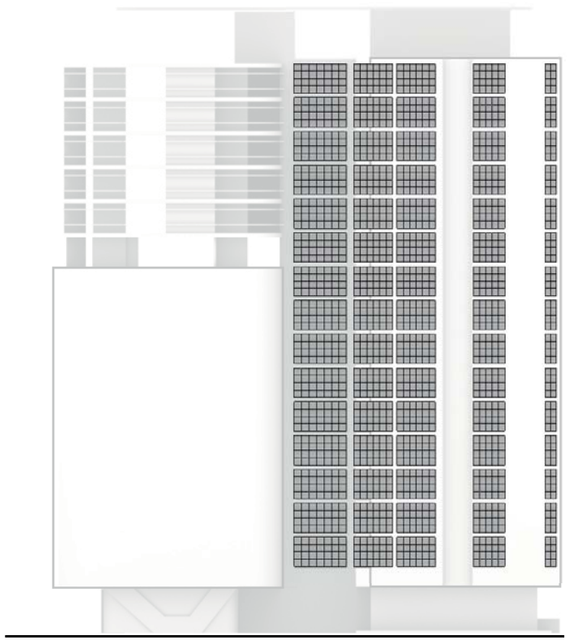


North Elevation

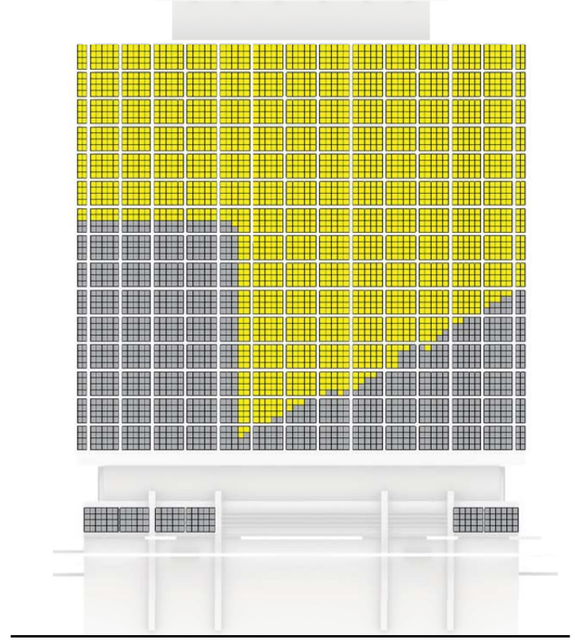
Section showing studied surface

floor	% of flats complying
16	89%
15	84%
14	84%
13	84%
12	84%
11	84%
10	84%
9	63%
8	63%
7	63%
6	58%
5	42%
4	32%
3	16%
2	5%
1	0%
	61%

Overall 61% of 2 hours or more, direct sun for hotel.



South Elevation

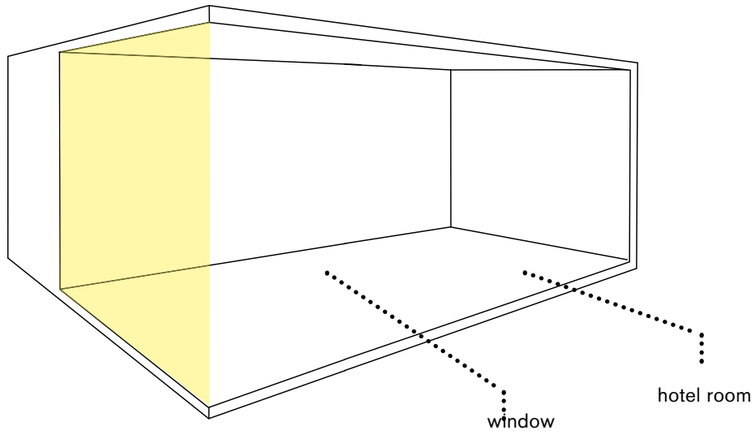


East Elevation

< 2 Hours ≥ 2 Hours

Solar Assessment

The following table summarize the assessment above for each floor and for the whole hotel block.



2 hours requirement

March 09:00 - 15:00

16	89%
15	89%
14	89%
13	84%
12	79%
11	79%
10	79%
9	79%
8	79%
7	79%
6	53%
5	42%
4	37%
3	37%
2	37%
1	0%

67%

March 07:30 - 16:30

16	89%
15	89%
14	89%
13	84%
12	79%
11	79%
10	79%
9	79%
8	79%
7	79%
6	53%
5	42%
4	37%
3	37%
2	37%
1	0%

67%

June 09:00 - 15:00

16	89%
15	84%
14	84%
13	84%
12	84%
11	84%
10	84%
9	63%
8	63%
7	63%
6	58%
5	37%
4	32%
3	16%
2	5%
1	0%

61%

June 07:30 - 16:30

16	89%
15	84%
14	84%
13	84%
12	84%
11	84%
10	84%
9	63%
8	63%
7	63%
6	58%
5	42%
4	32%
3	16%
2	5%
1	0%

61%

1.5 hours requirement

March 09:00 - 15:00

16	89%
15	89%
14	89%
13	89%
12	79%
11	79%
10	79%
9	79%
8	79%
7	79%
6	79%
5	79%
4	79%
3	53%
2	53%
1	0%

77%

March 07:30 - 16:30

16	89%
15	89%
14	89%
13	89%
12	79%
11	79%
10	79%
9	79%
8	79%
7	79%
6	79%
5	79%
4	79%
3	53%
2	53%
1	0%

77%

June 09:00 - 15:00

16	89%
15	84%
14	84%
13	84%
12	84%
11	84%
10	84%
9	84%
8	84%
7	79%
6	79%
5	58%
4	47%
3	37%
2	32%
1	0%

71%

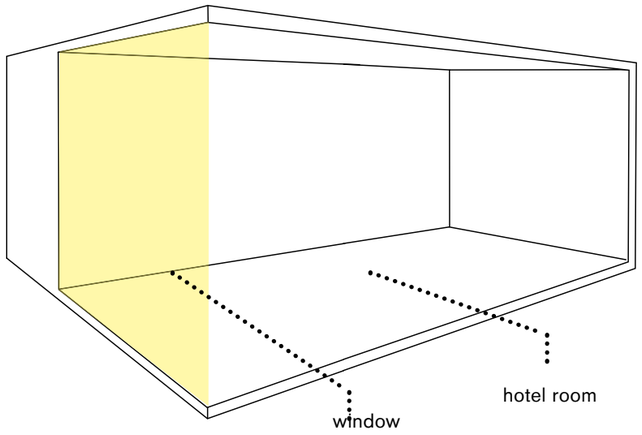
June 07:30 - 16:30

16	89%
15	84%
14	84%
13	84%
12	84%
11	84%
10	84%
9	84%
8	84%
7	79%
6	79%
5	58%
4	53%
3	42%
2	32%
1	0%

72%

Solar Assessment

The following table summarize the assessment above for each floor and for the whole hotel block.



1 hour requirement

	March 09:00 - 15:00	March 07:30 - 16:30	June 09:00 - 15:00	June 07:30 - 16:30
16	89%	89%	89%	89%
15	89%	89%	84%	84%
14	89%	89%	84%	84%
13	89%	89%	84%	84%
12	84%	84%	84%	84%
11	84%	84%	84%	84%
10	84%	84%	84%	84%
9	84%	84%	84%	84%
8	84%	84%	84%	84%
7	84%	84%	84%	84%
6	84%	84%	84%	84%
5	84%	84%	68%	74%
4	84%	84%	58%	58%
3	84%	84%	47%	47%
2	84%	84%	42%	42%
1	0%	0%	0%	0%
	84%	**84%**	**75%**	**75%**

Daylight Factor and Surface Reflectance

To further study the materiality of the residential void, we have executed two different studies based on 2 different scenarios.
- **Scenario 1**; All walls to have a reflectance factor of 0.5
- **Scenario 2**; In this combined reflectance scenario, all north and south facing walls have a reflectance factor of 0.5, while East and West facades have a reflectance factor of 0.85 (highly reflective)

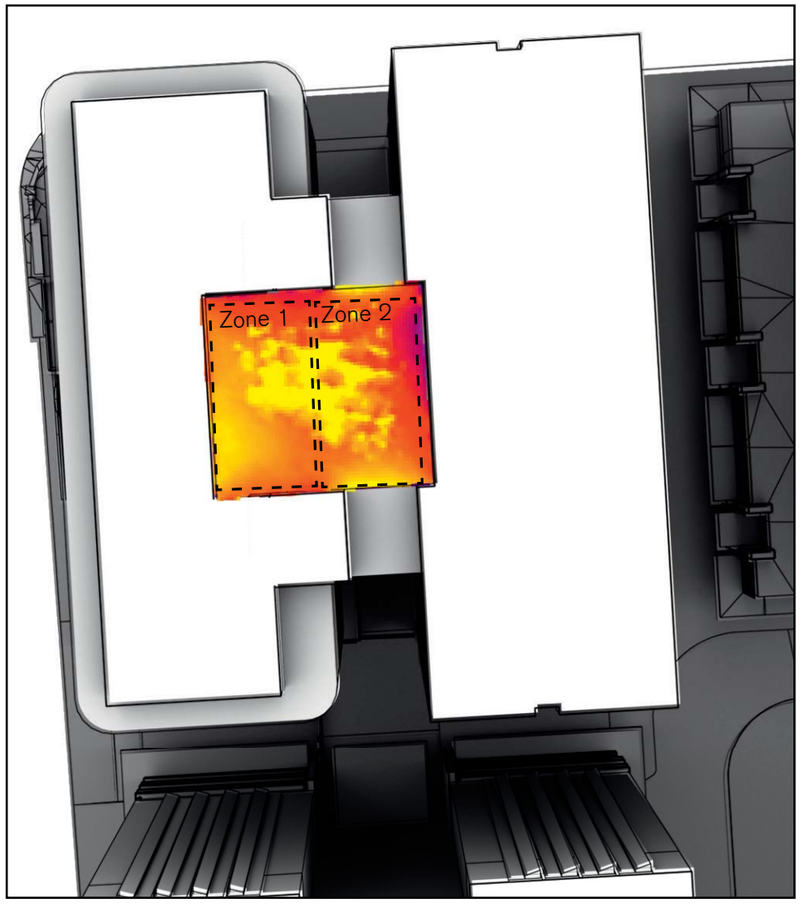
This daylight factor test is run through a Radiance tool based on a set horizontal sky illuminance to 100 lux (overcast sky). The result is the worst case percentage of the available daylight on each surface.

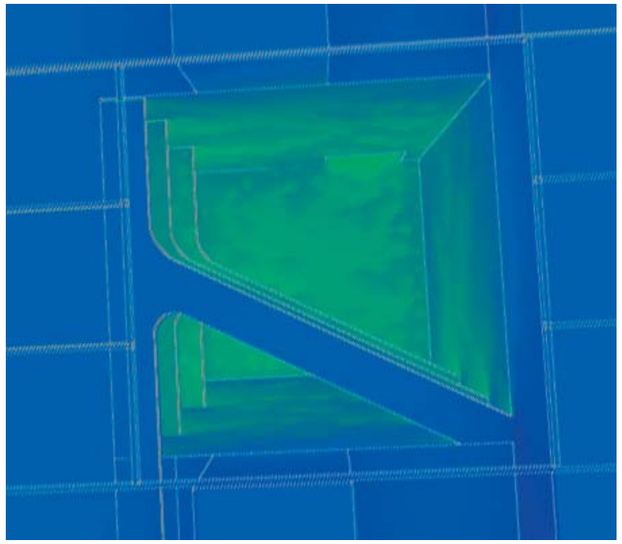
The assessment was run under the following assumptions;

▪ Reflectance:		
▪ Floors	0.3	
▪ Non atrium Walls	0.5	
▪ Atrium walls	0.5	(North/South)
	0.85	(East/West)
▪ Ceiling	0.7	
▪ Walkways	0.3	

- Sky: design sky illuminance 8348 Lux (Tregenza formula method)
- Sides of courtyard treated as “walls” in test to have comparable benchmark
- Number of reflections - 4
- Grid set at working plane - 800mm from atrium floor

Note: These tests illustrate the daylight factor within the space, the false colour images illustrate the level of lux coming of a surface based the reflectance of the surface; therefore the more reflective the materials in the space the higher illuminance.

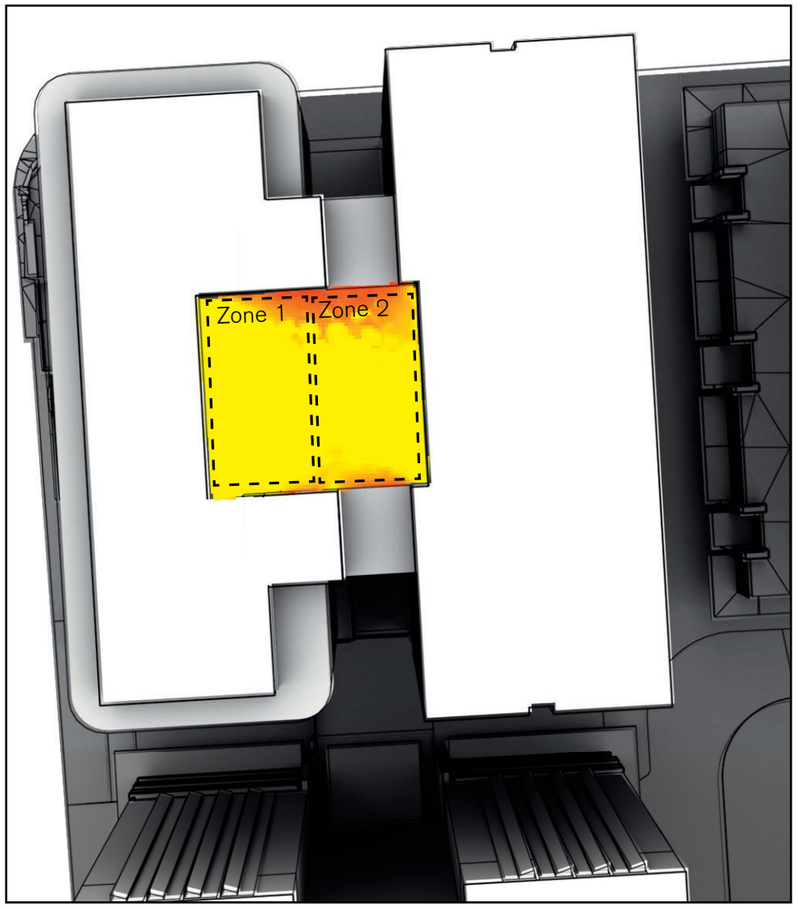


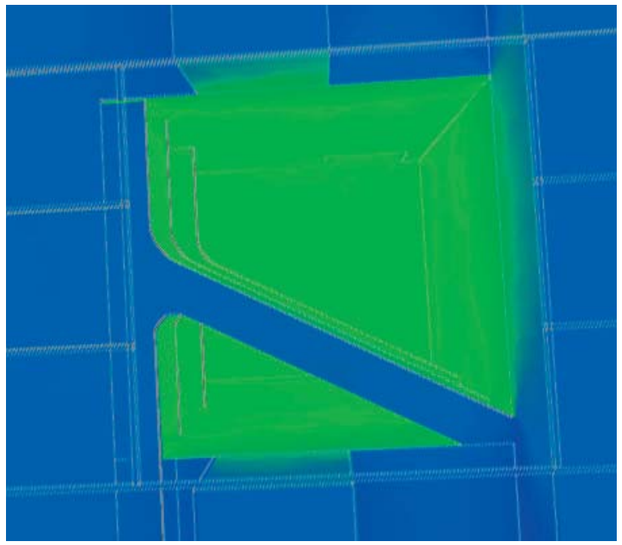


SCENARIO 1
Reflectance Test 0.5

Total average DF at working plane - 15.4%
Zone 1 - 15.5%
Zone 2 - 15.4%

- Good daylight factor to north east of the courtyard
- External nature of space gives good results



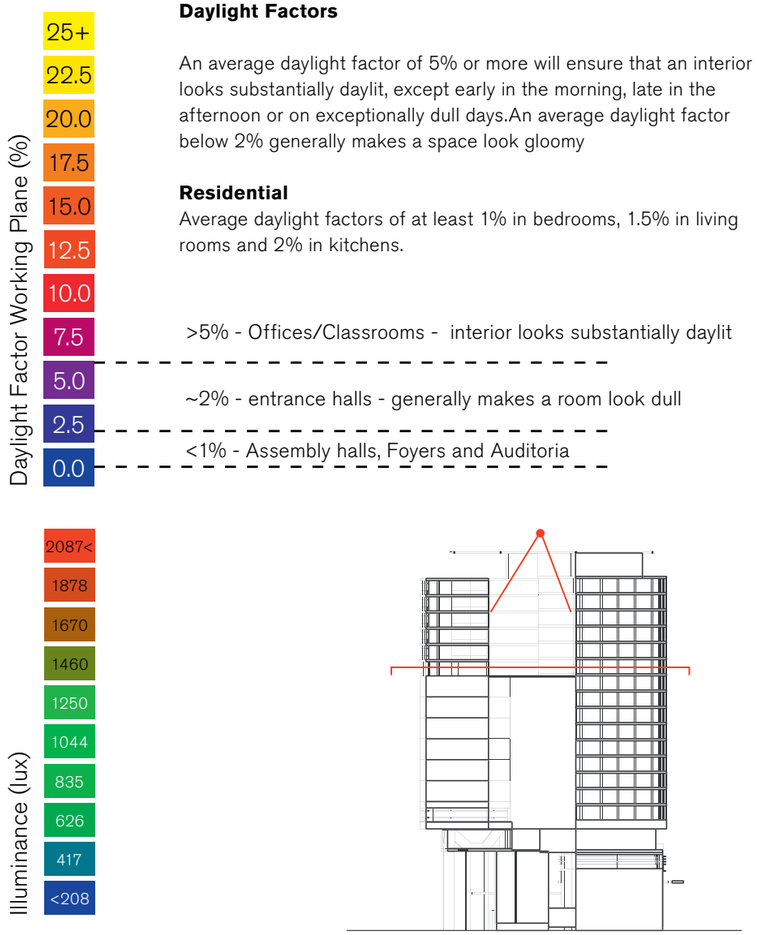


SCENARIO 2

Reflectance Test Combined

Total average DF at working plane - 21.8%
Zone 1 - 22.1%
Zone 2 - 21.6%

- Highly reflective surfaces on East and West provides more even distribution in areas under walkways
- highly reflective nature of the space significantly increase daylight in space



Daylight Factors

An average daylight factor of 5% or more will ensure that an interior looks substantially daylit, except early in the morning, late in the afternoon or on exceptionally dull days.An average daylight factor below 2% generally makes a space look gloomy

Residential
Average daylight factors of at least 1% in bedrooms, 1.5% in living rooms and 2% in kitchens.

>5% - Offices/Classrooms - interior looks substantially daylit

~2% - entrance halls - generally makes a room look dull

<1% - Assembly halls, Foyers and Auditoria

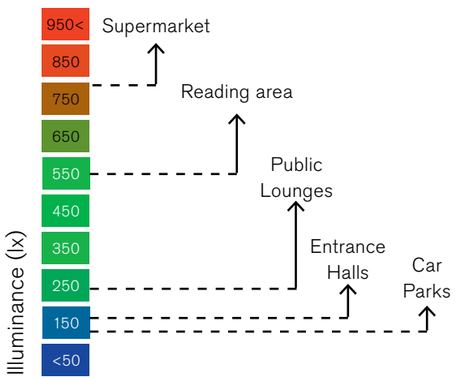
Illuminance of Space - Space Use

To further study the materiality of the residential void, we have executed two different studies based on 2 different scenarios.
- **Scenario 1**; All walls to have a reflectance factor of 0.5
- **Scenario 2**; In this combined reflectance scenario, all north and south facing walls have a reflectance factor of 0.5, while East and West facades have a reflectance factor of 0.85 (highly reflective)

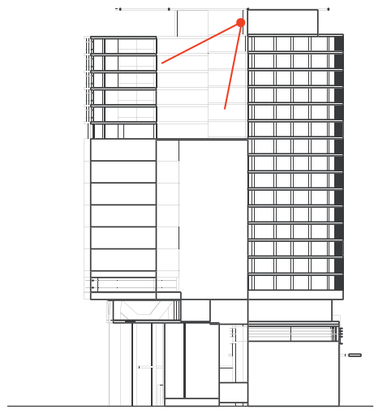
All tests are based on CIE clear sky analysis at 16:30 on either 21st June or 21st December and the images show a comparison of illuminance levels based on the amount of light reflected off each surface. The images are scaled with contour lines ranging from 0 to >1425 Lux.

CIBSE SLL Code for Lighting section 2.2 Schedule of lighting requirements has a recommended maintained illuminance on the reference surface for the interior (area) for a task or activity. Comparable activities for this space can be found below;

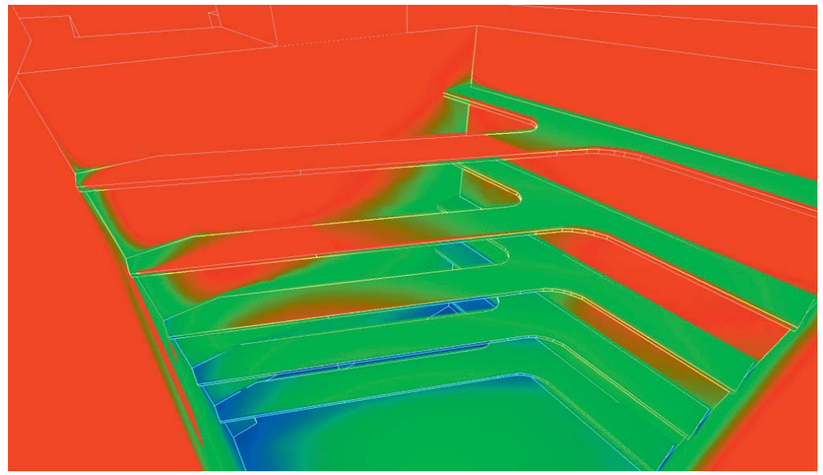
Retail (Supermarkets)	750-1000 lux
Reading area (Library)	500 lx
Public Lounges	200 lx
Entrance halls	100 lx
Internal public car parks	75 lx



Note: These tests illustrate illuminance in the space based on under clear sky condition and higher reflectivity and therefore results must be assumed to be a best case scenario.

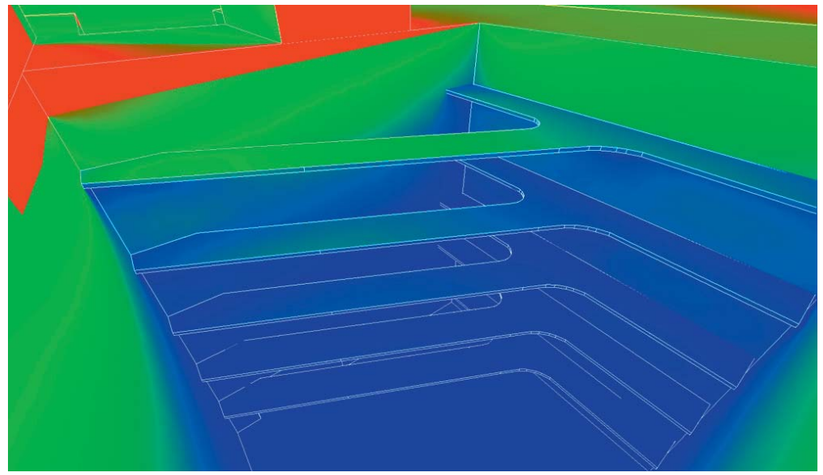


SCENARIO 1
0.50 Reflectance - 21st December (Summer) 16:30



Good levels of illuminance are maintained at atrium floor level on average space likely to be suitable for general activities although some local lighting may be required.

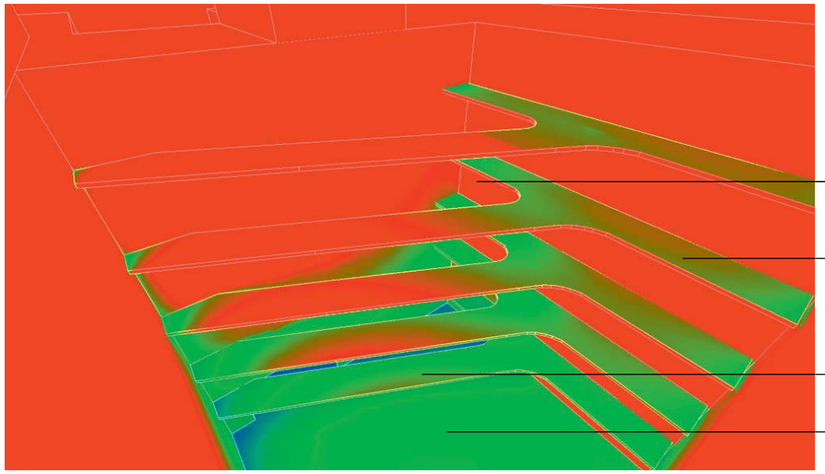
SCENARIO 1
0.50 Reflectance - 21st June (Winter) 16:30



Lower reflectance levels and winter sun position will reduce illuminance of the space to below 75 lux at lower levels with the some areas receiving around 35 lux. Lower spaces may require additional lighting.

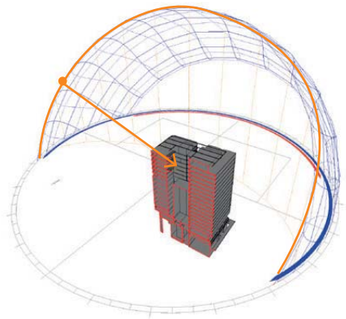
Solar Access Assessment - Residential Void

SCENARIO 2
Combined Reflectance - 21st December (Summer) 16:30



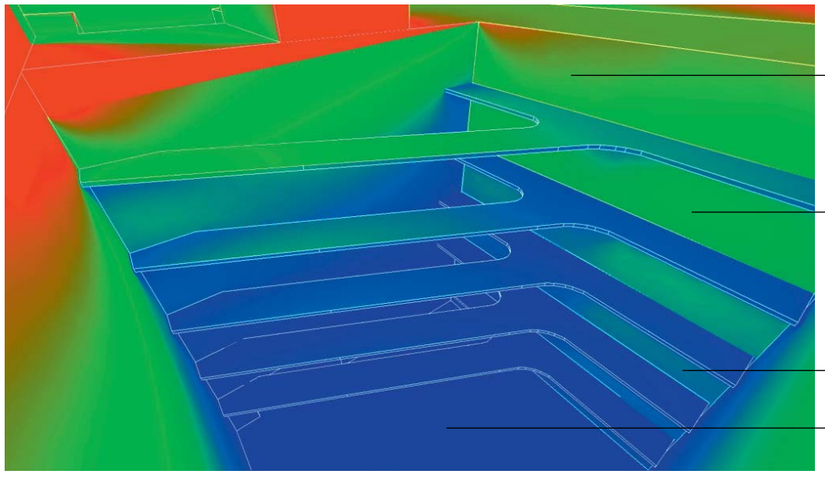
Increased reflectance of East and West walls assists in getting more natural light to the apartment access corridors and bridges.

High level of illuminance is distributed to lower levels in the space.



21st December (Summer)
16:30

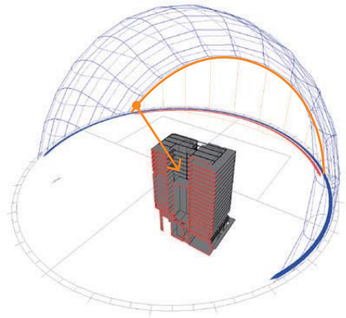
SCEANRIO 2
Combined Reflectance - 21st June (Winter) 16:30



The increased surface reflectance provides some additional daylight penetration into the residential void area.

Increased reflectance of East and West walls assists in getting more natural light to the apartment access corridors and bridges.

Time of day is likely to still require some artificial lighting to fully lit the internal space at the bottom of the void. However the reflective material selection will decrease artificial light utilisation at the top levels



21st June (Winter)
16:30