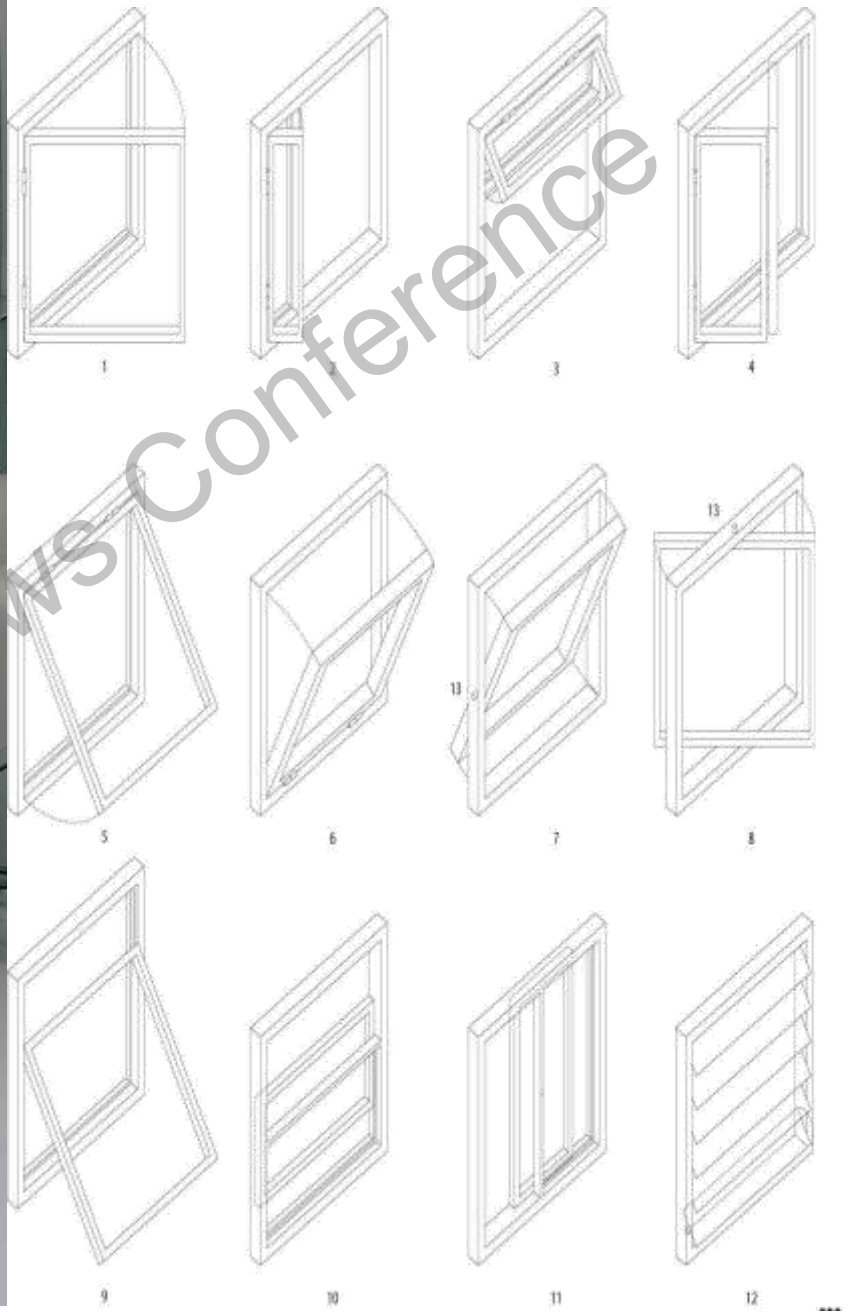
SUSTAINABILITY AND THE ROLE OF WINDOWS

I want to do to you what the wind does to the cherry trees!

WINDOWSThrough these windows
comes the breath of the world,
fresh red roses,
flags embroidered with
the victories of the people.




Zak World of Windows Conference

The Transience of Light was an optical light installation that explored the idea of shaping the material world. Something that keeps changing with space and time. Dematerialisation, gestalt, phenomenology and ephemeral

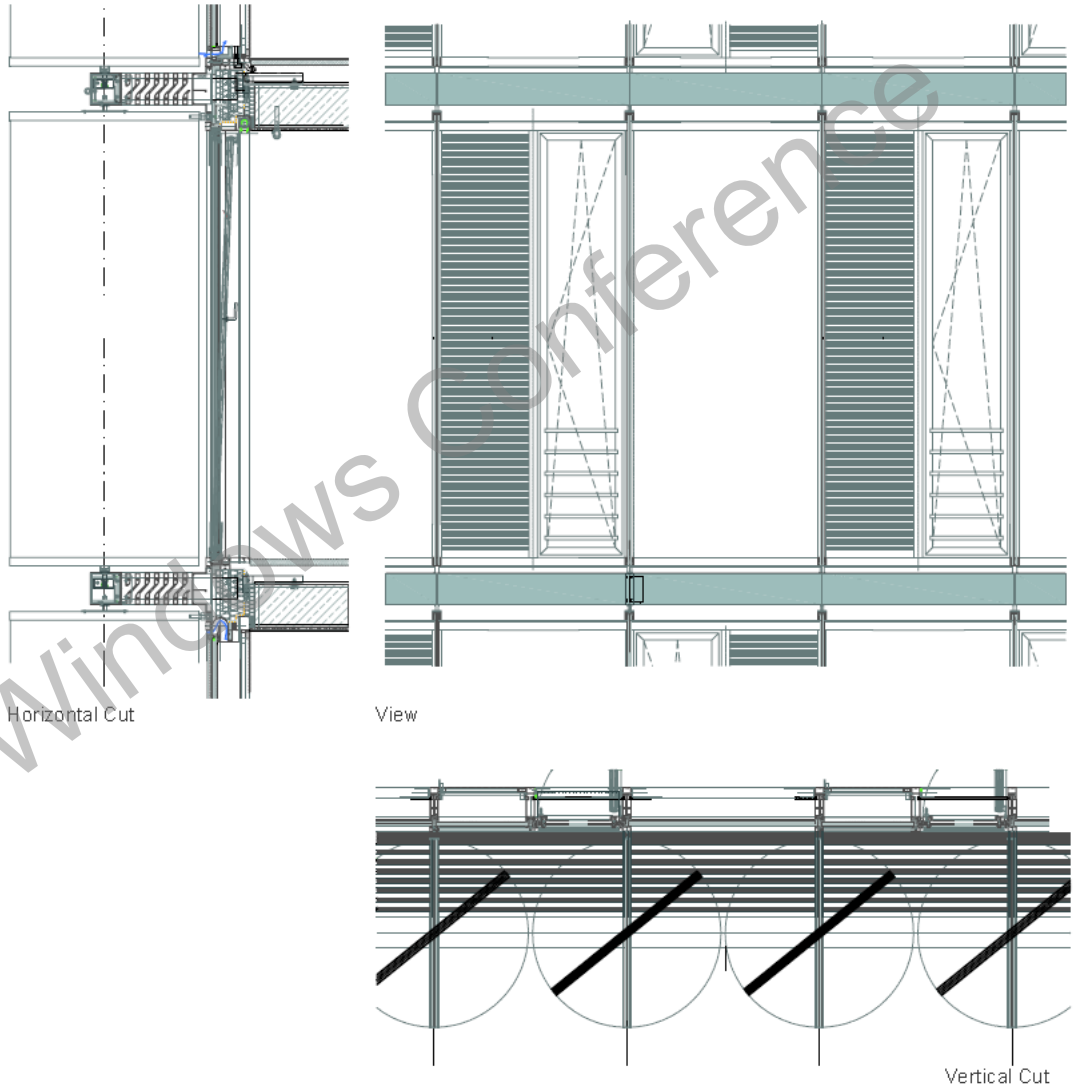


Fig. D7.4 View and cross-section of the office façade

SUSTAINABILTY

PREHISTORIC

CAIRN, CARN
A heap of stones piled up as a monument, tombstone

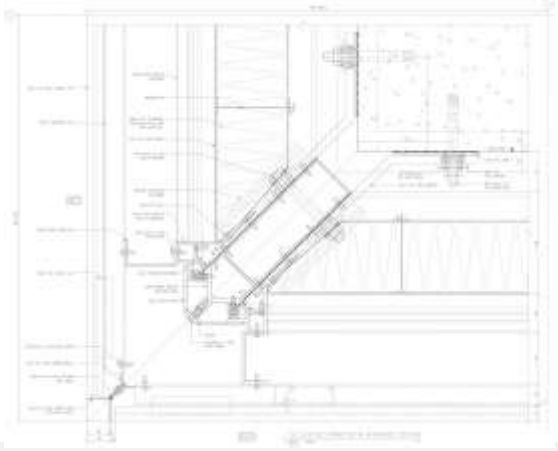
TUMULUS, BARROW
An artificial mound or earth or stone, esp. over an ancient grave.

DOLMEN
A prehistoric monument consisting of two or more large upright stones supporting a horizontal stone slab, found esp. in Britain and France and usually regarded as a tomb.

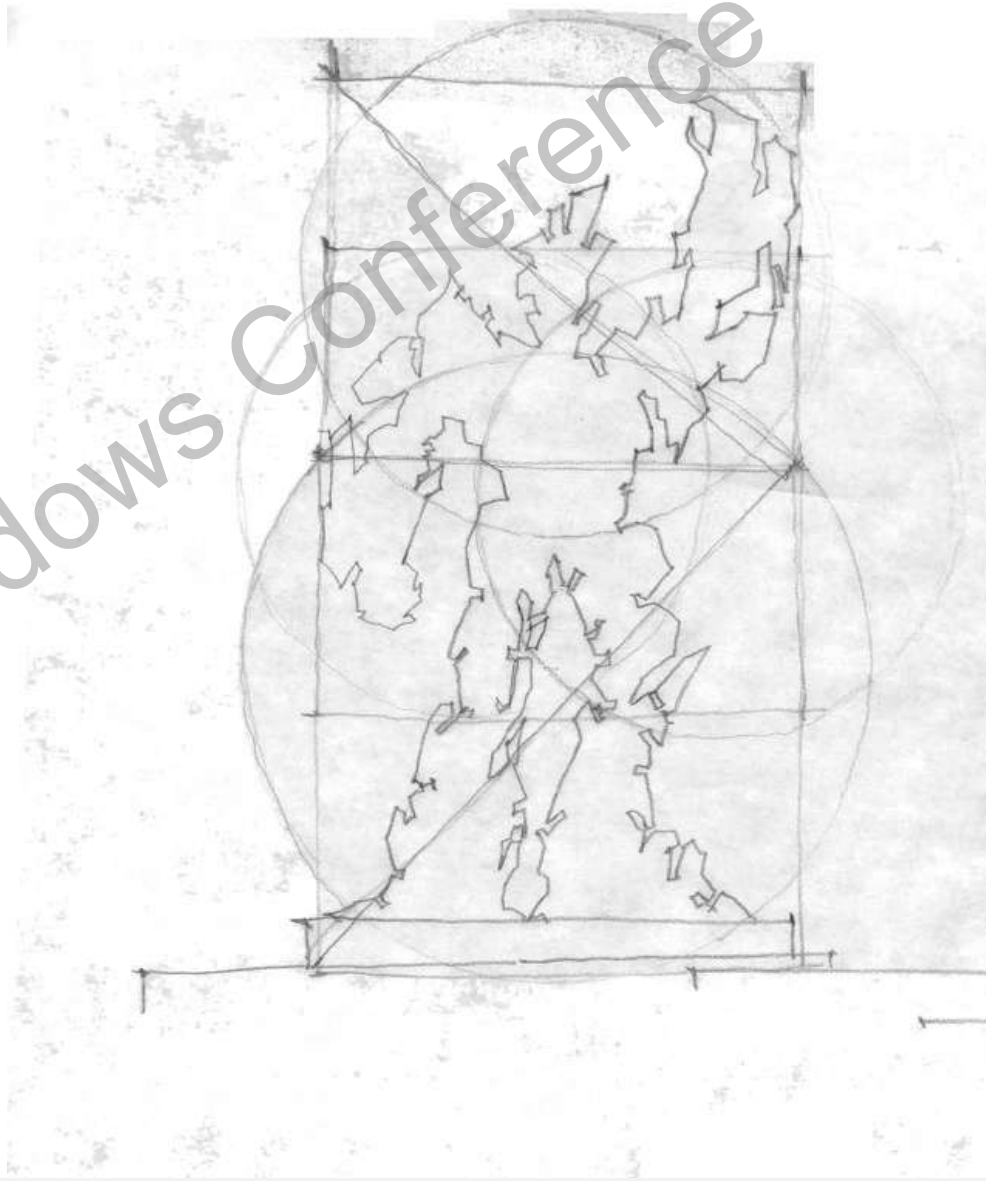
It is the pervading law of all things organic and inorganic,
Of all things physical & metaphysical,
Of all human & all things super-human,
Of the heart, of the soul,
That the life is recognizable in its expression,
That form ever follows function. This is the law.
- Louis Sullivan

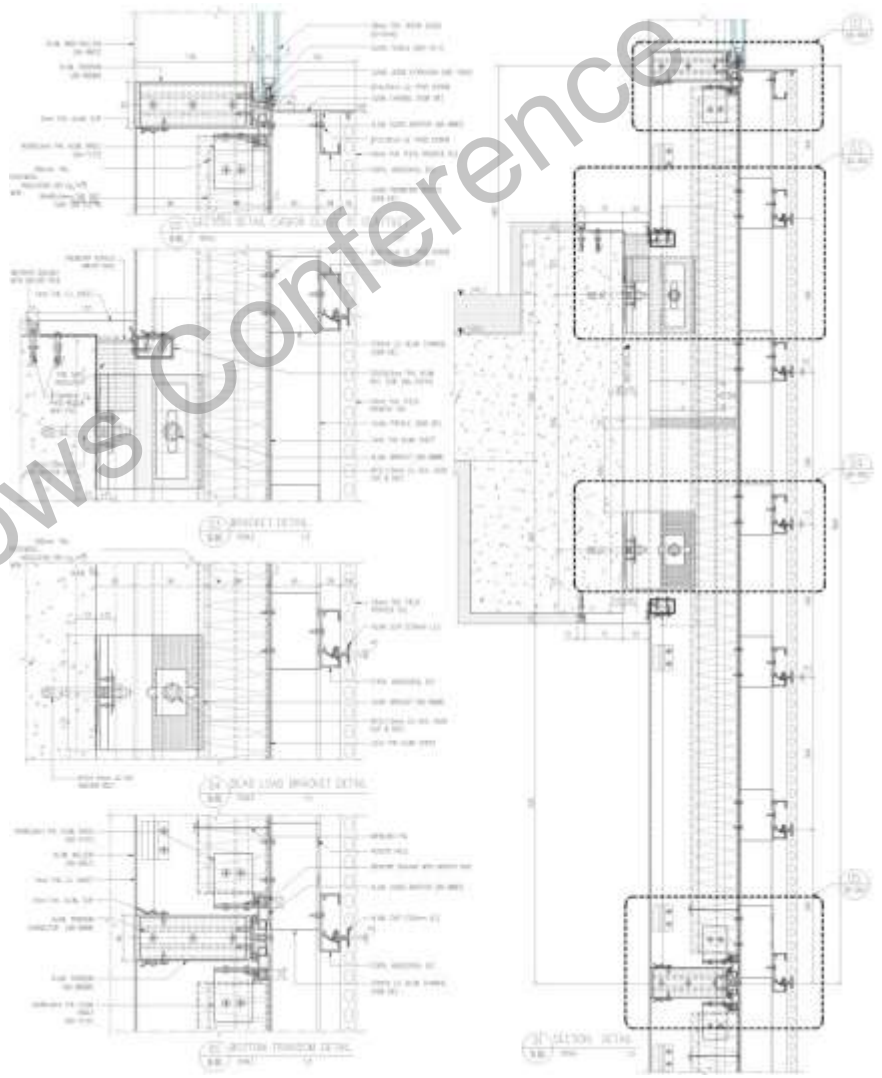
SUSTAINABILTY

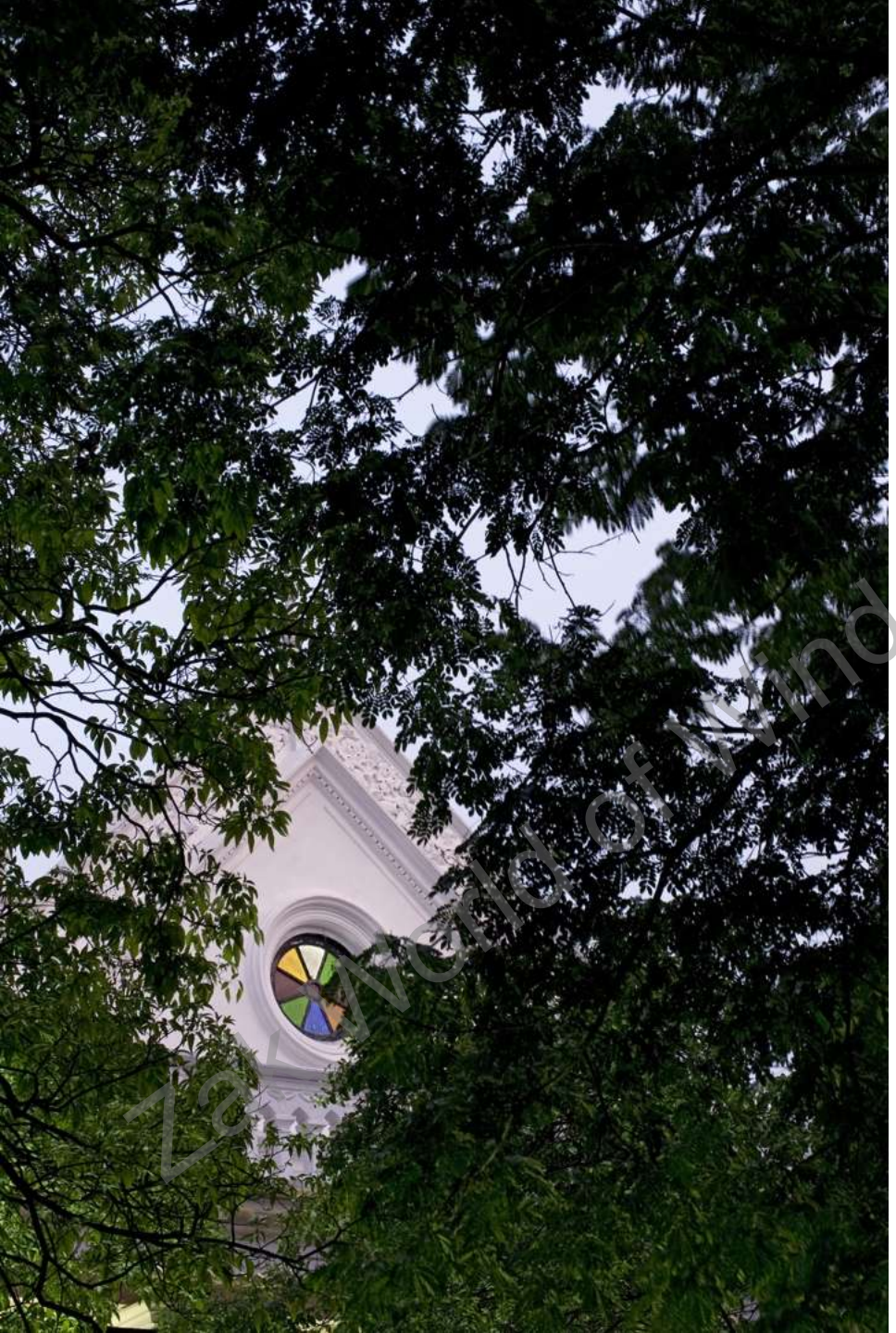
"Natural light is not flat. You may feel the day going and the clouds moving. And there's what I call a Magritte Moment- when daylight goes and you start turning on the lights. Lights make the room look alive."
- Renzo Piano

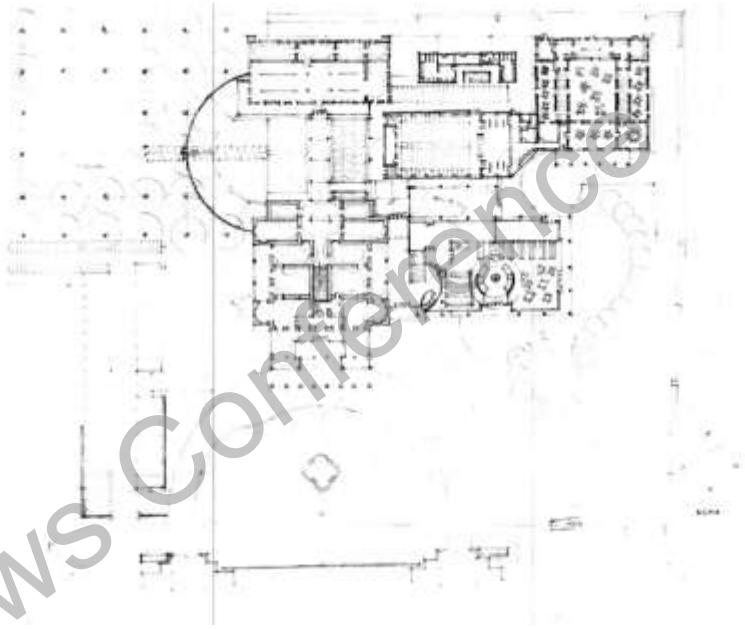


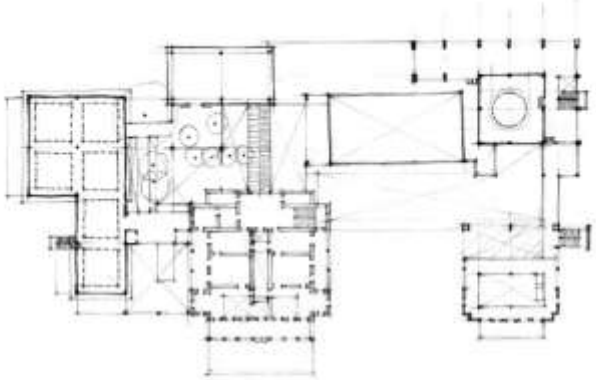
A 10% skylight phenomena India.





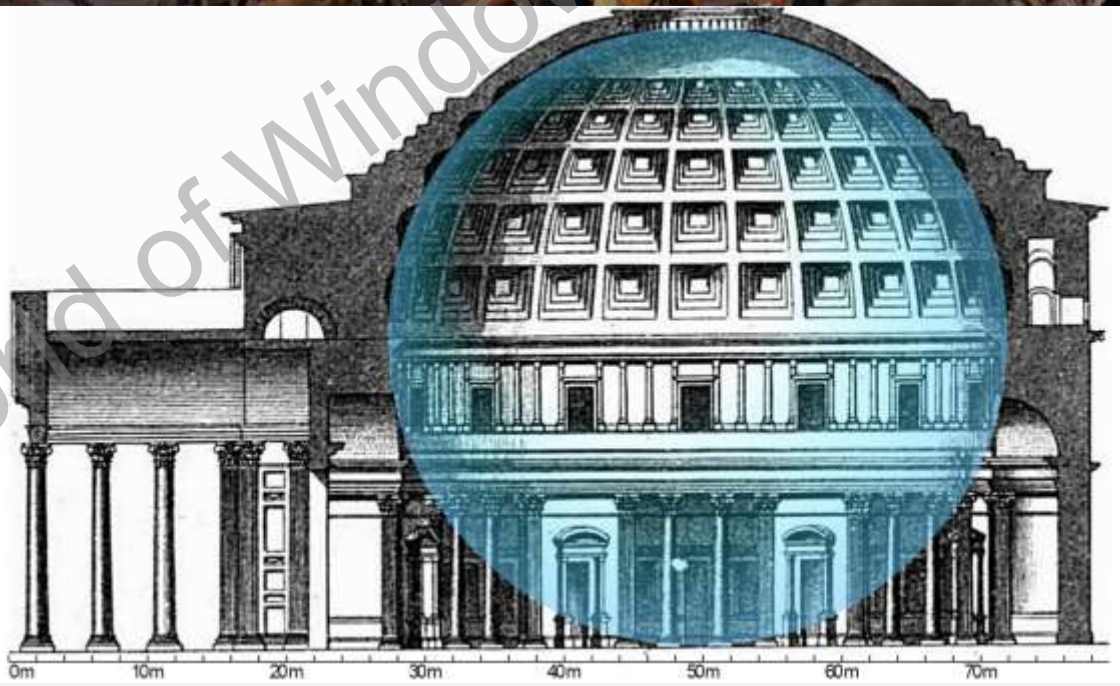






NEO CLASSICAL

NEO CLASSICAL – PANTHEON DOME



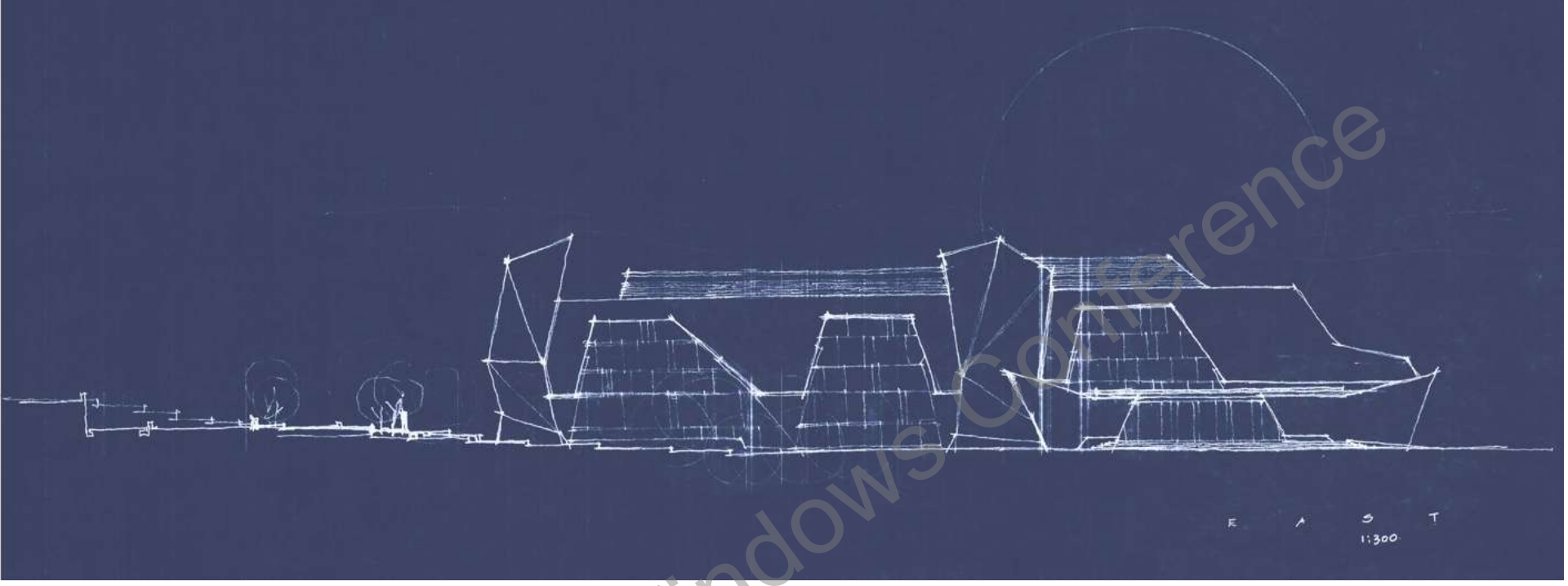
POST MODERNISM

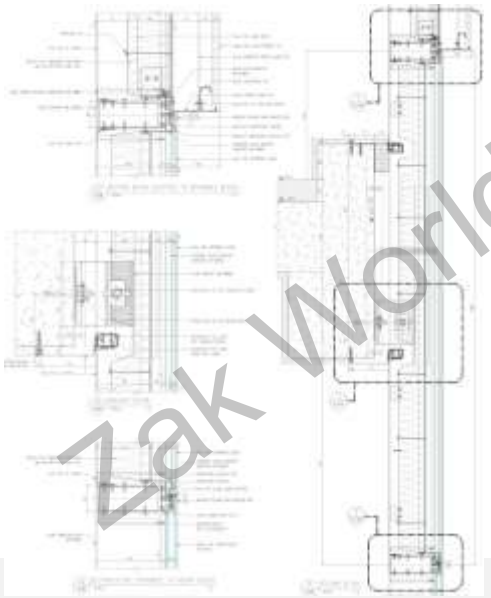
CONTRUCTIVISM

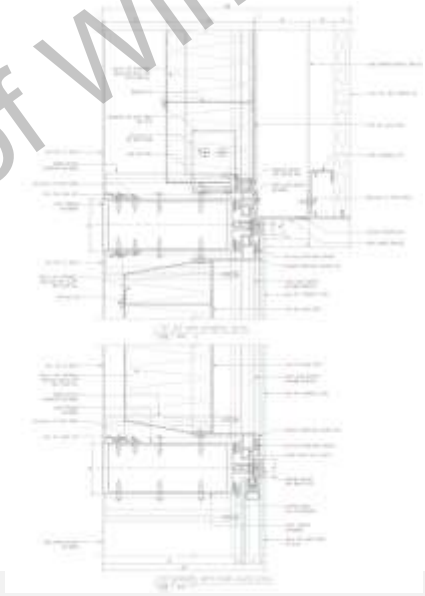
HISTORY

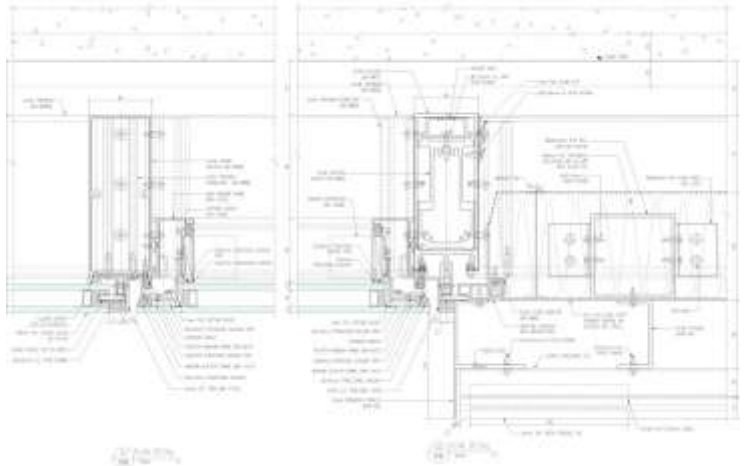
21ST CENTURY

Everything we do is life has an environmental impact.



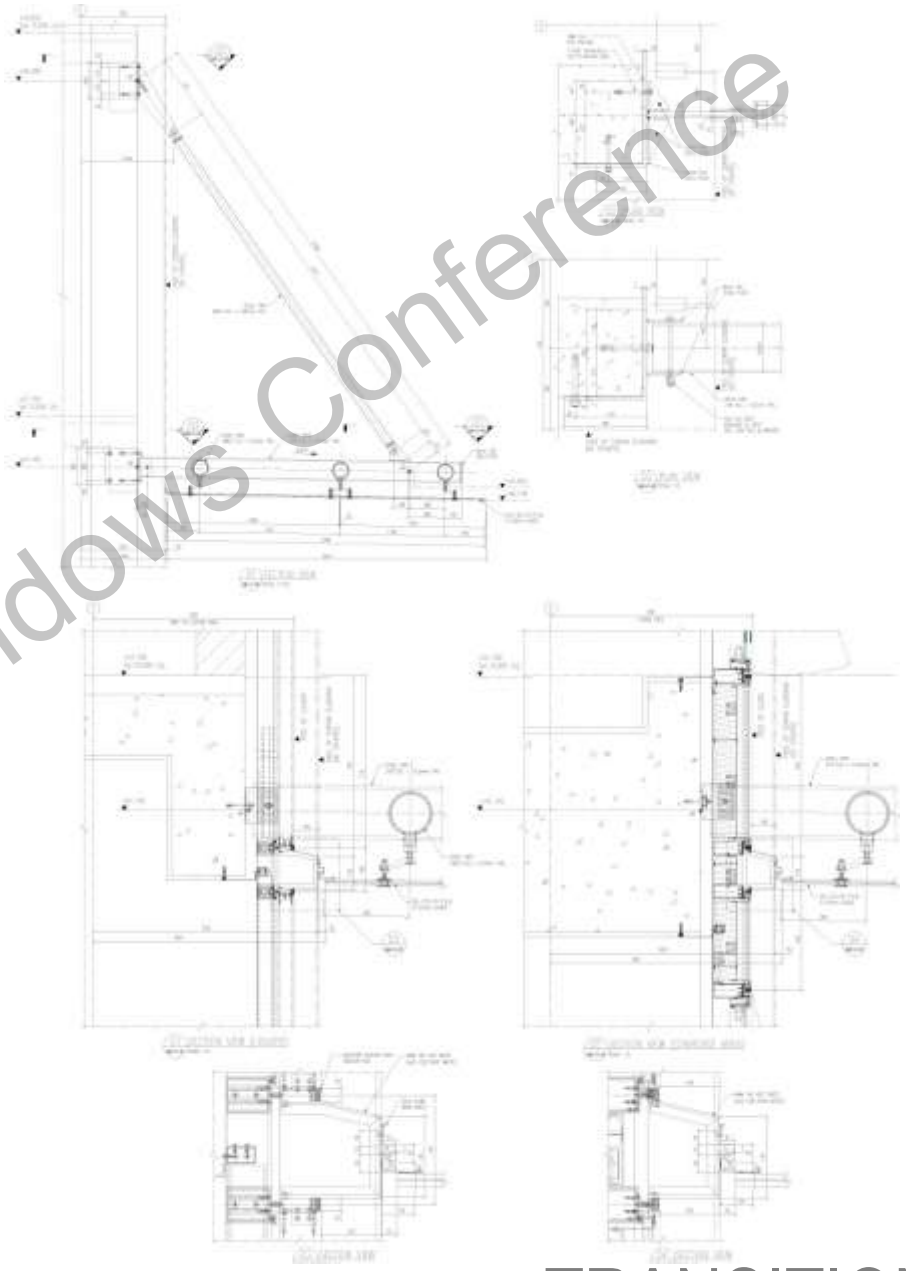




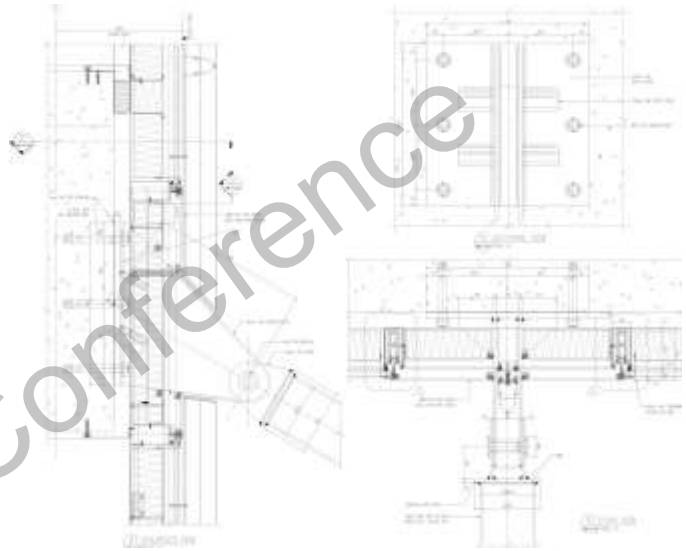


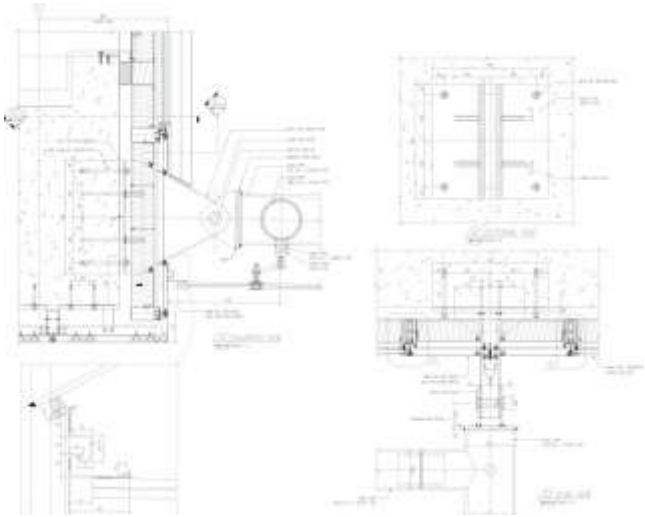
THE ROLE OF WINDOWS

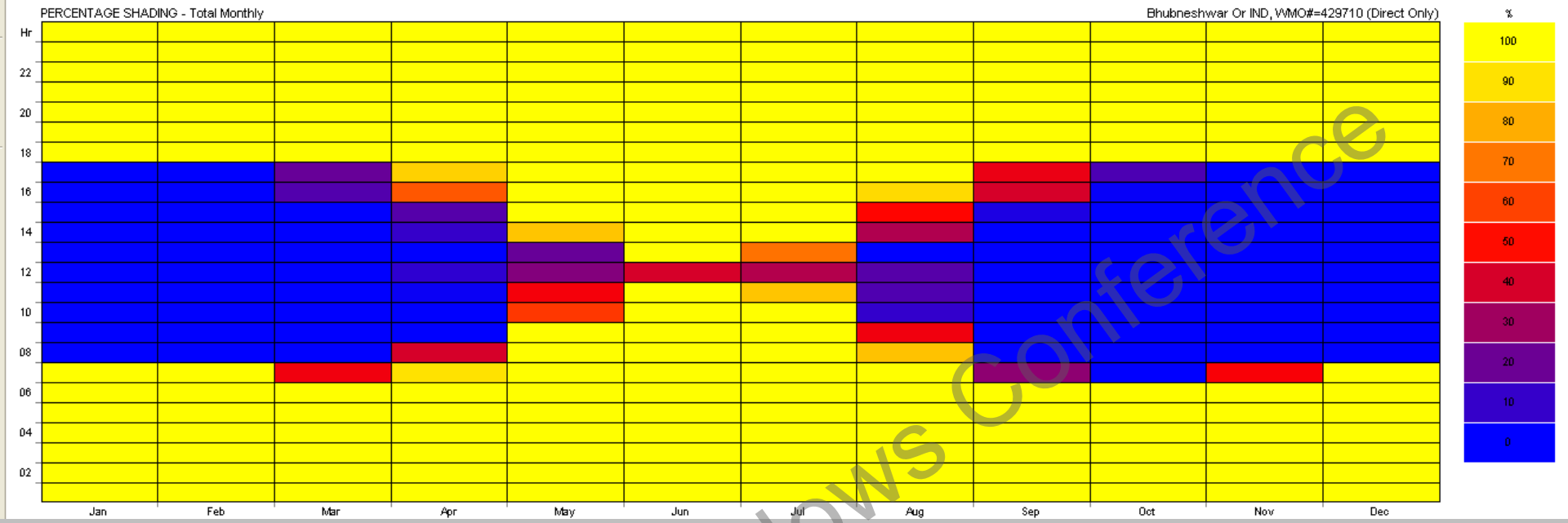

Zak World of Windows Conference

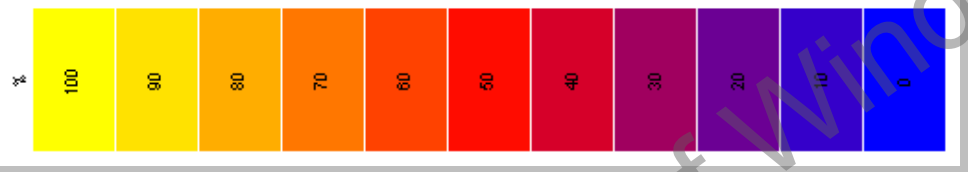


TRANSITION







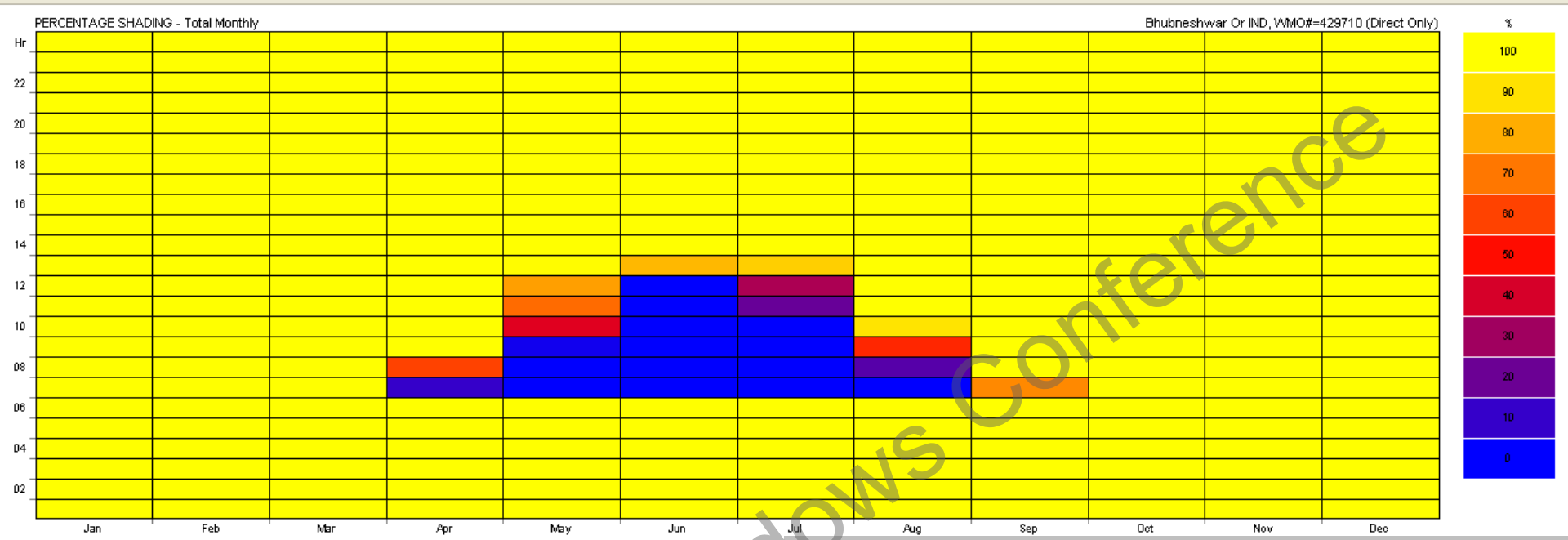


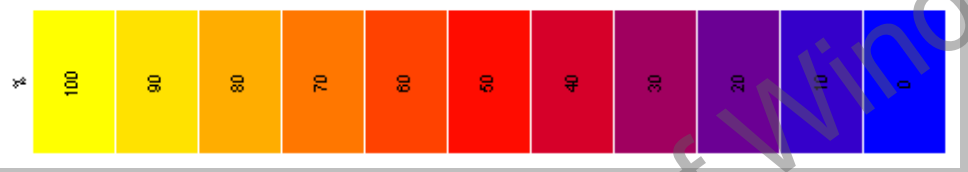
83% of the south façade is fully shaded

MONTH	AVAIL. Wh/m2	AVG SHADE
Jan	171065	73%
Feb	137470	76%
Mar	176322	79%
Apr	117862	86%
May	134961	99%
Jun	86432	100%
Jul	63563	100%
Aug	61473	91%
Sep	43080	80%
Oct	87862	74%
Nov	89342	73%
Dec	114097	72%
TOTALS	1283529	

The Analysis grid is placed on glass.

% shading in the South side

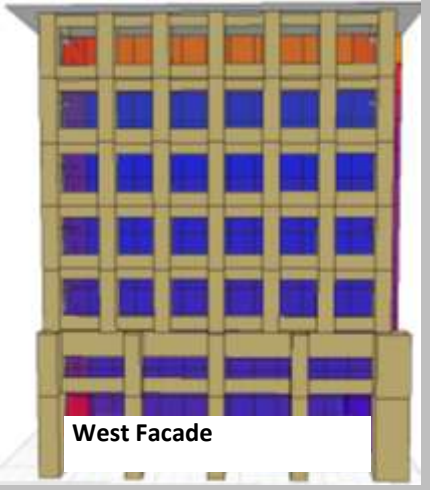


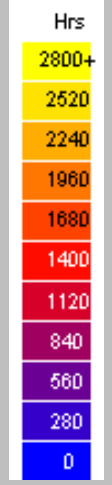


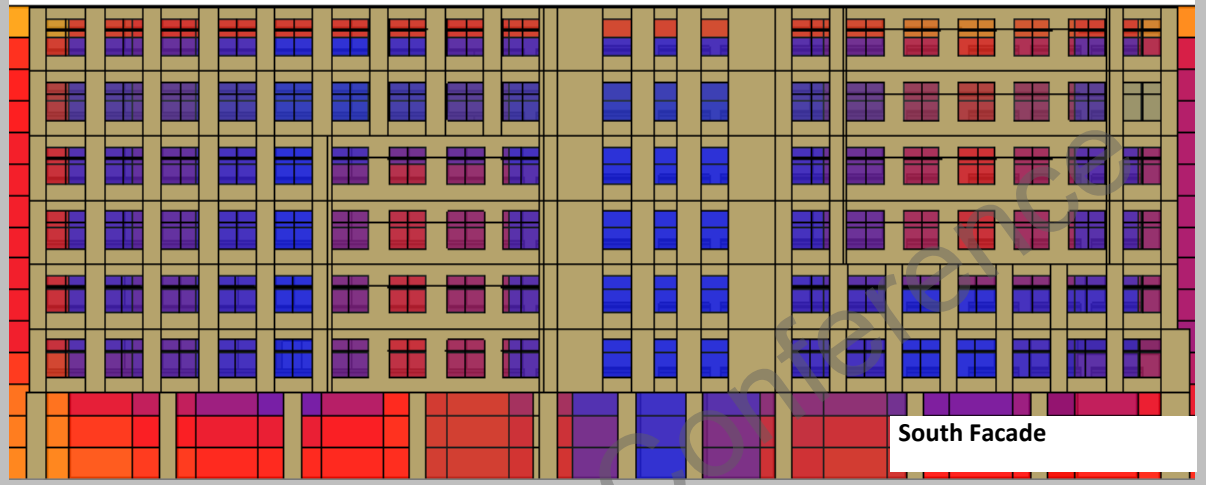
86% of the North façade is fully shaded

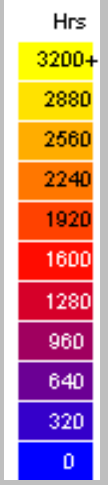
MONTH	AVAIL. Wh/m2	AVG SHADE
Jan	171065	100%
Feb	137470	100%
Mar	176322	100%
Apr	117862	89%
May	134961	64%
Jun	86432	49%
Jul	63563	54%
Aug	61473	82%
Sep	43080	99%
Oct	87862	100%
Nov	89342	100%
Dec	114097	100%
TOTALS	1283529	

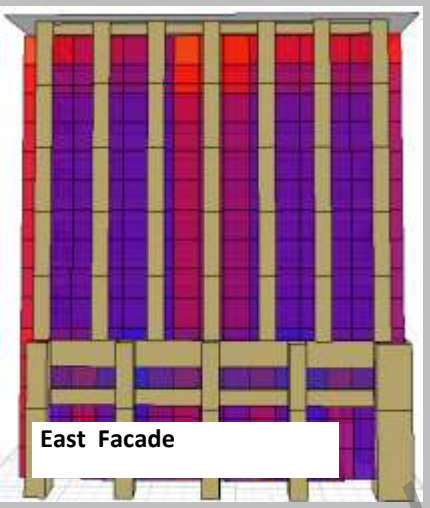
% shading in the North side

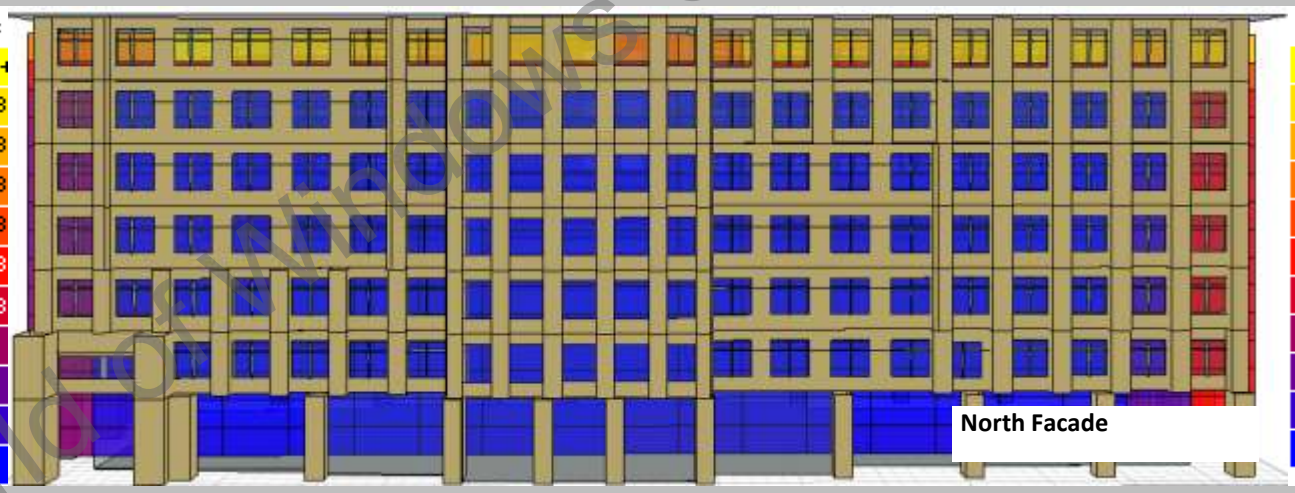








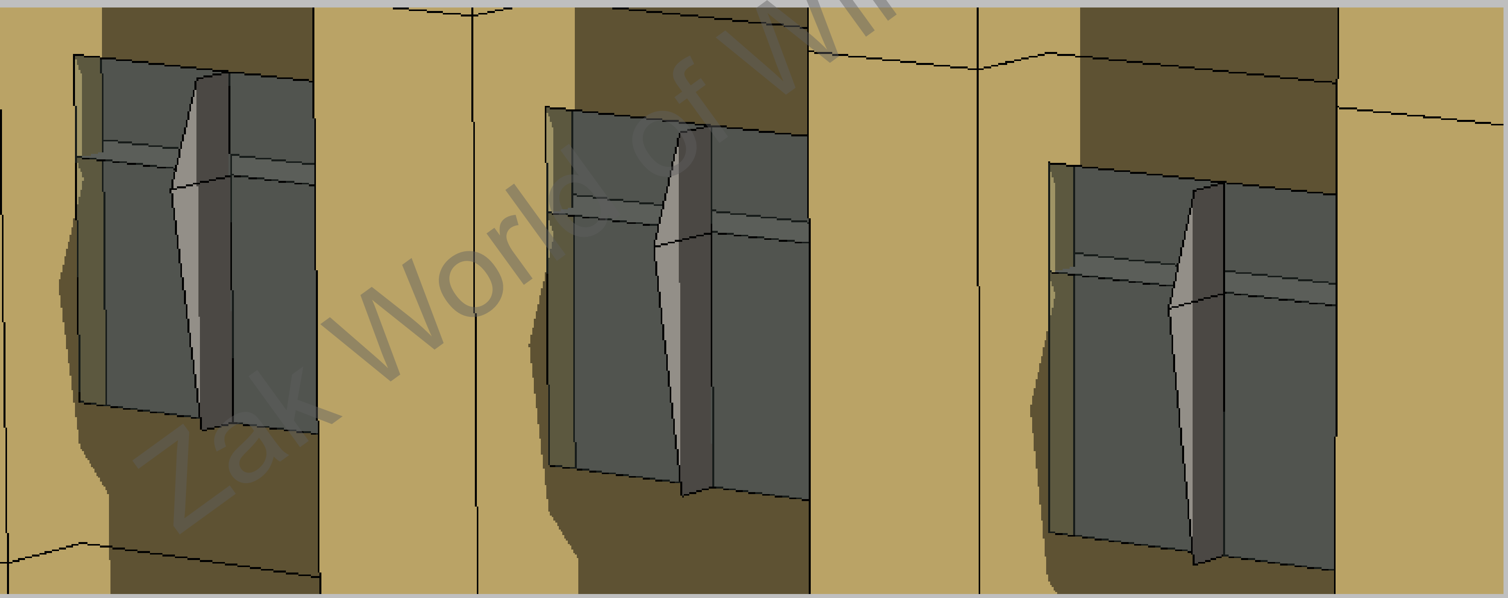


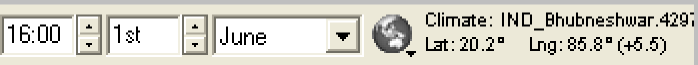


Sunlight Hours on Each Facade

15:00 1st December Climate: IND_Bhubneshwar.4297
Lat: 20.2° Lng: 85.8° (+5.5)

South View





North View

North View

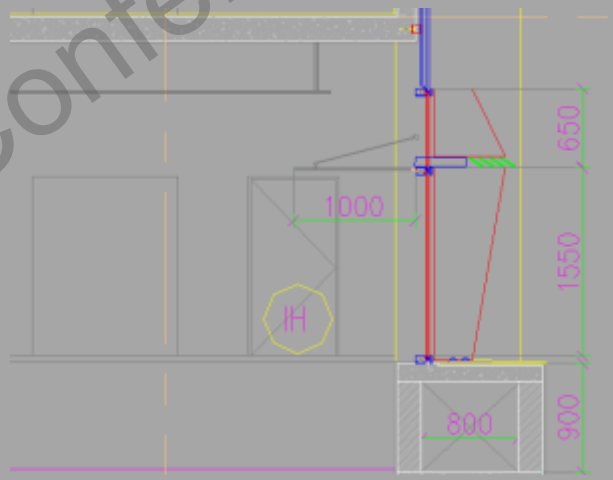
Summary

Solar Analysis for North and South Façade is done to control the glare issues and proper shading devices are proposed for North and south façade to control the glare.

Following are the shading devices Proposed

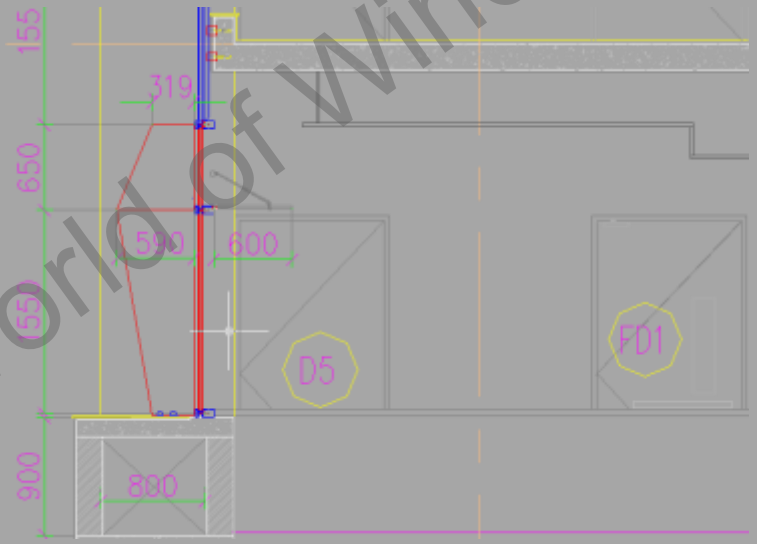
South:

- **Horizontal Shade like louvers**
- **Vertical fins**



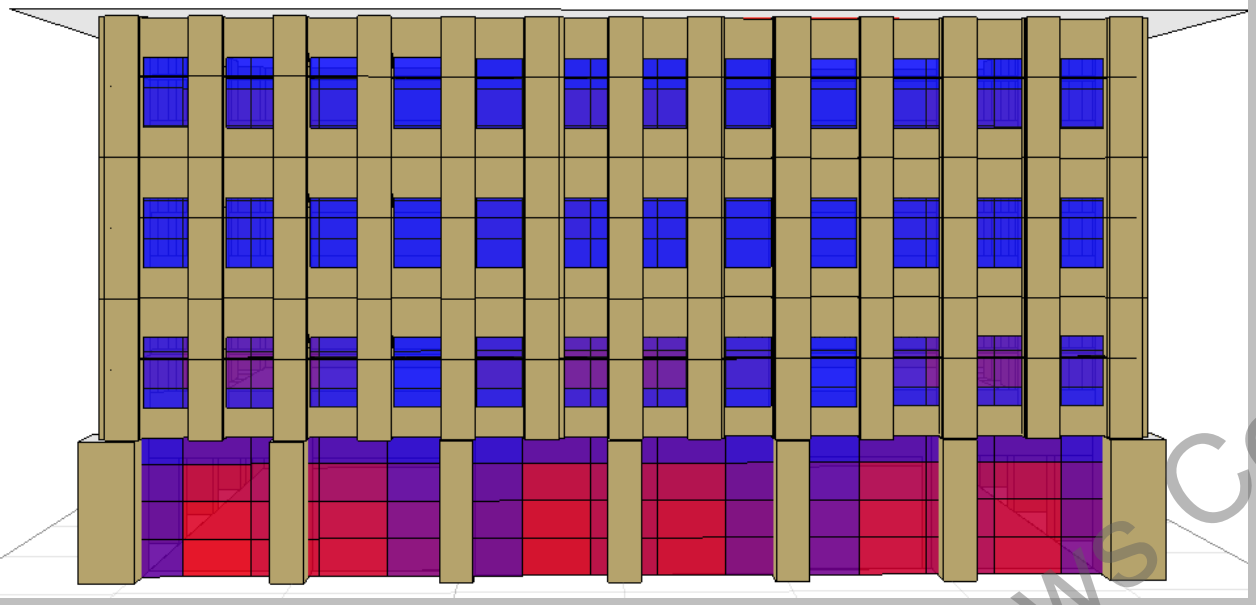
North:

- **Vertical Fins**

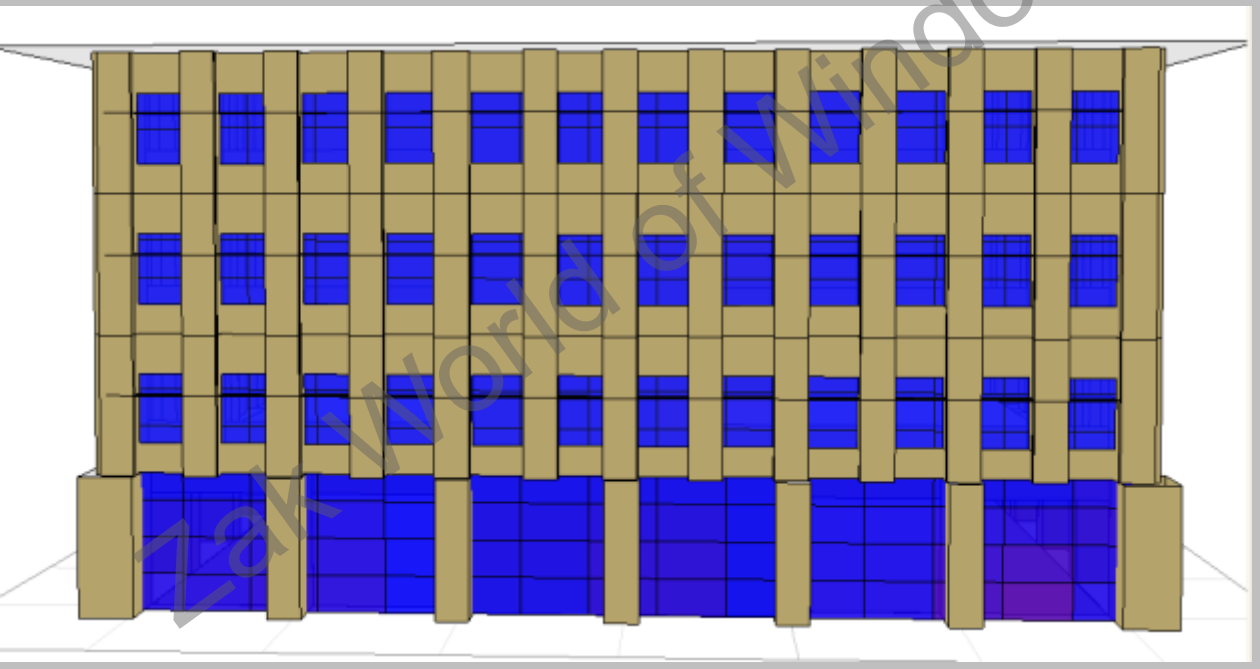


East & west:

No shading devices are proposed for east and west façade ,since we cannot control the glare in these areas these areas we are going to control by having blinds.



South Facade

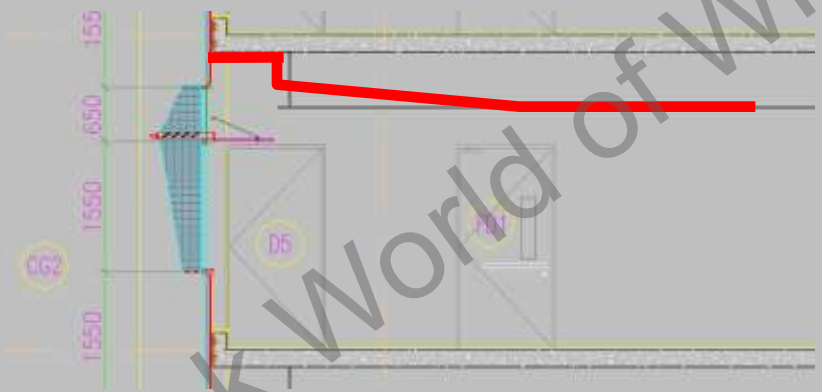


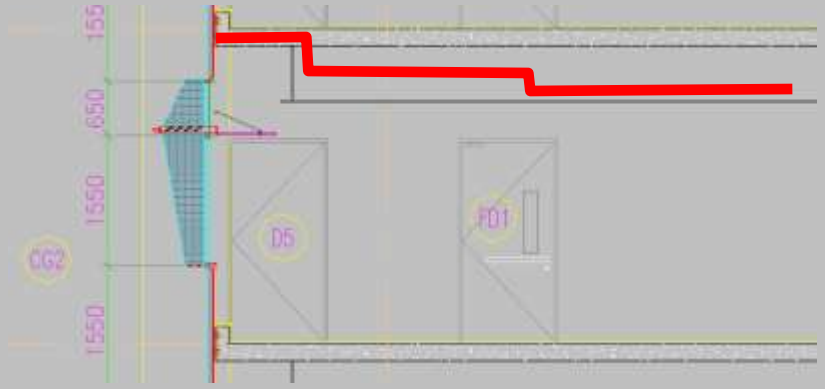
North Facade

Sunlight Hours on Each Facade

Option - 1

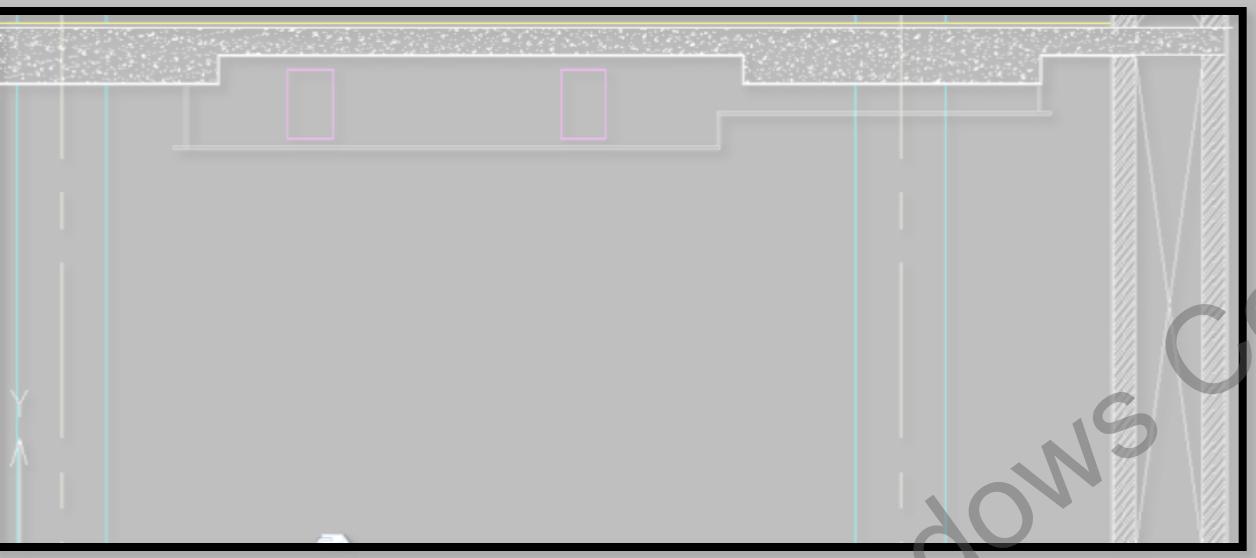
Option - 2



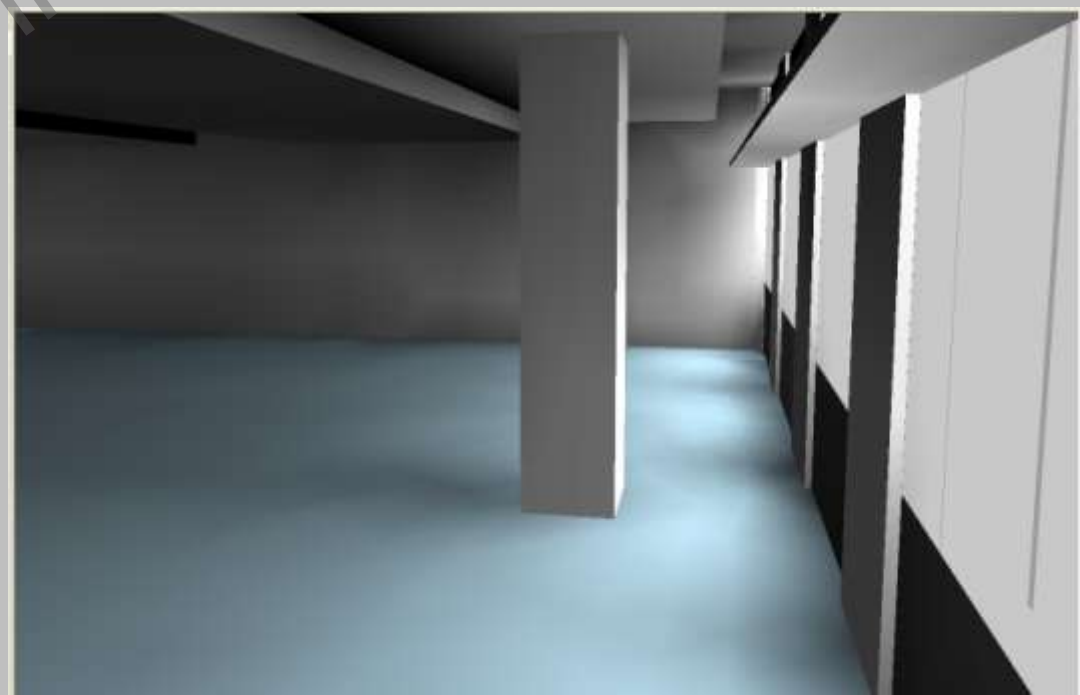


Compared to inclined false ceiling option stepped false ceiling option gives more daylight penetration hence ,stepped down option is recommended..

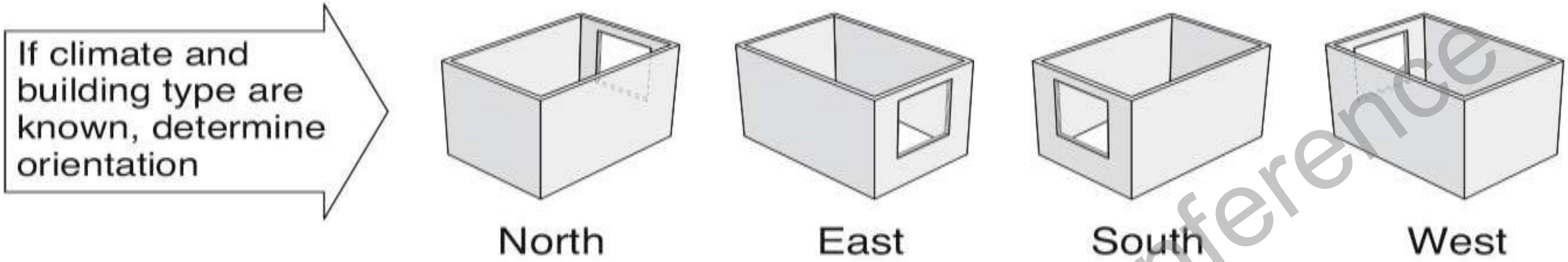
Stepped Ceiling

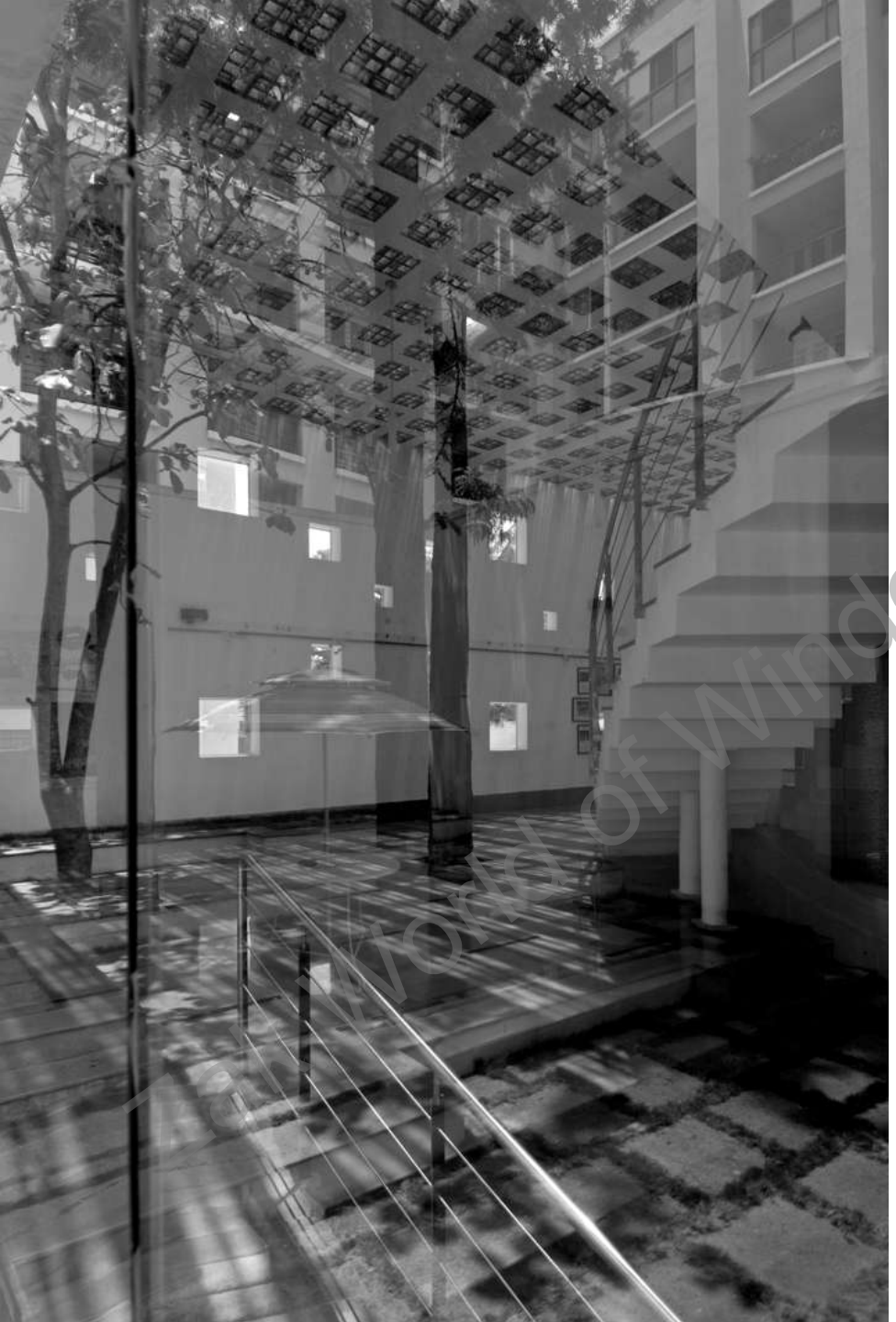


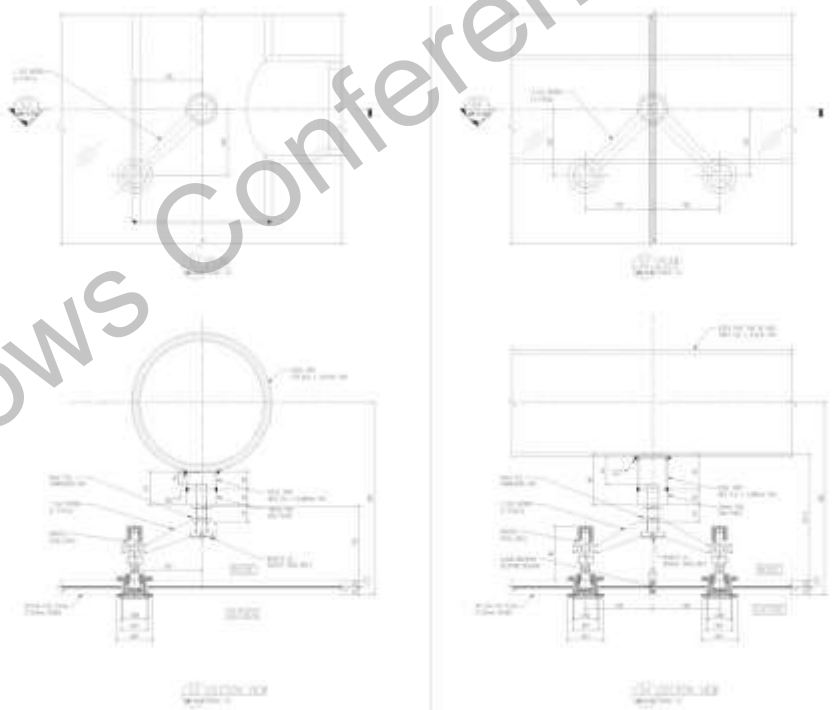
Rendering along with daylight – Lux level/Daylight Factor contours



ORIENTATION



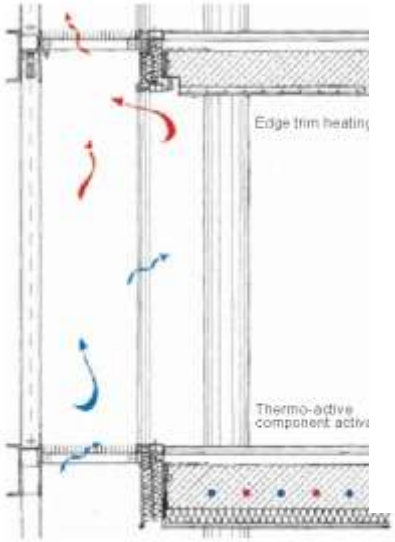


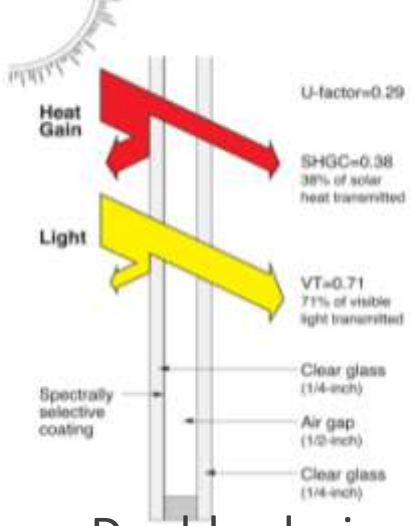


TRANSITION

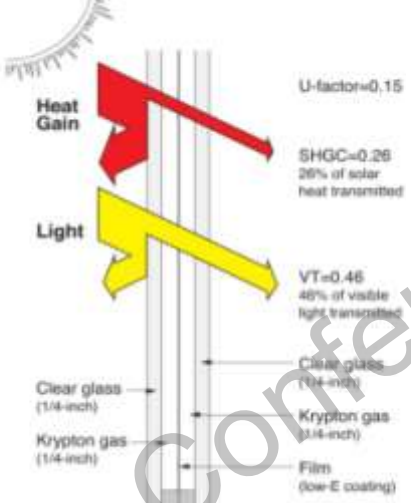
Connecting space between two confined spaces.

Transitional spaces between outdoor and indoor environments

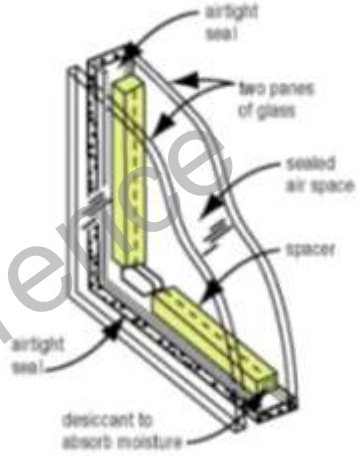




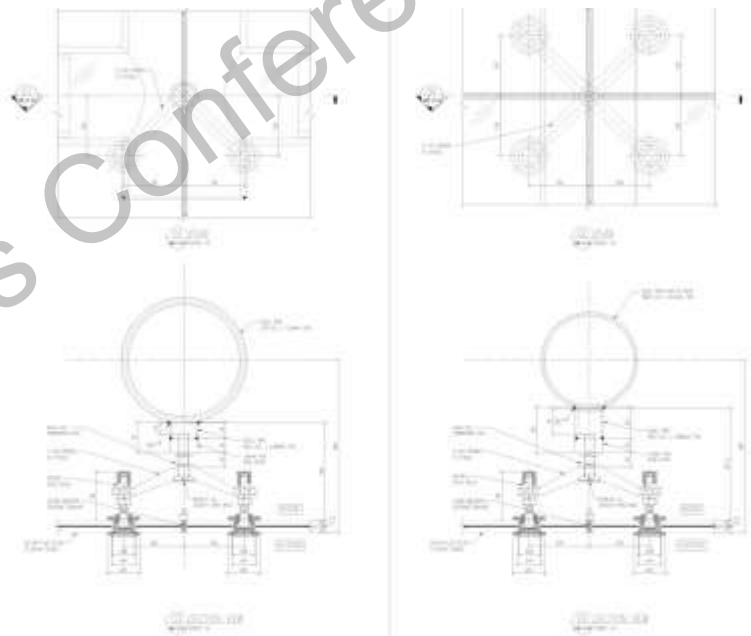
Double glazing



Triple glazing

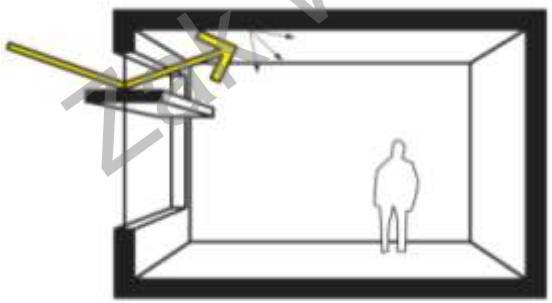


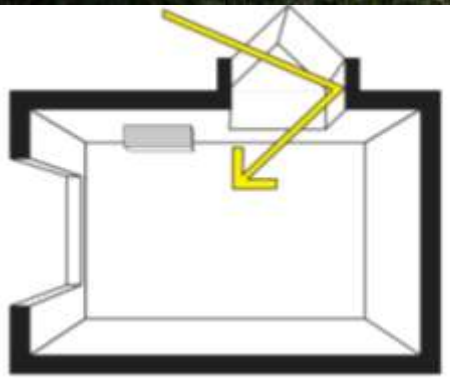
Typical Double glazing

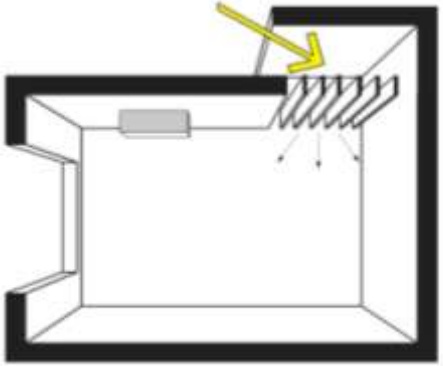


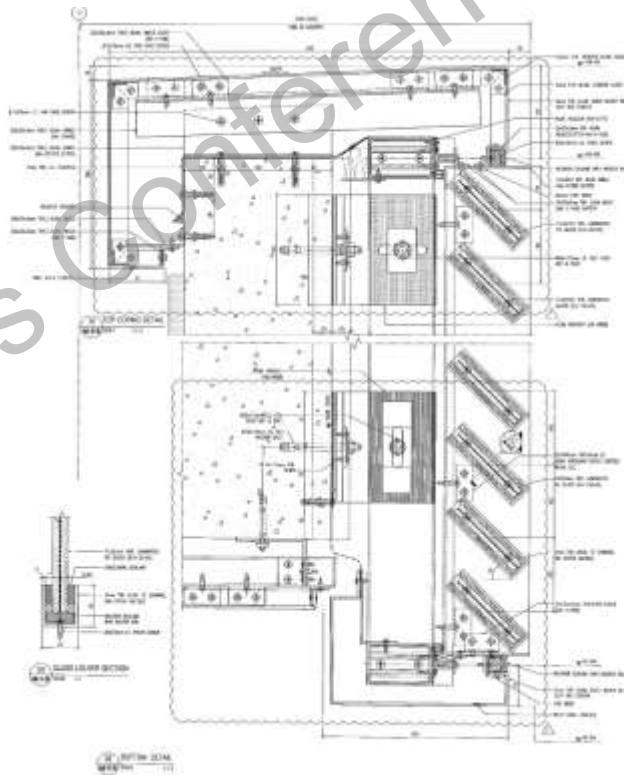
A territory refers to a specific universe with a specific set of properties, dynamics, flows, elements, parts, etc.

TERRITORY









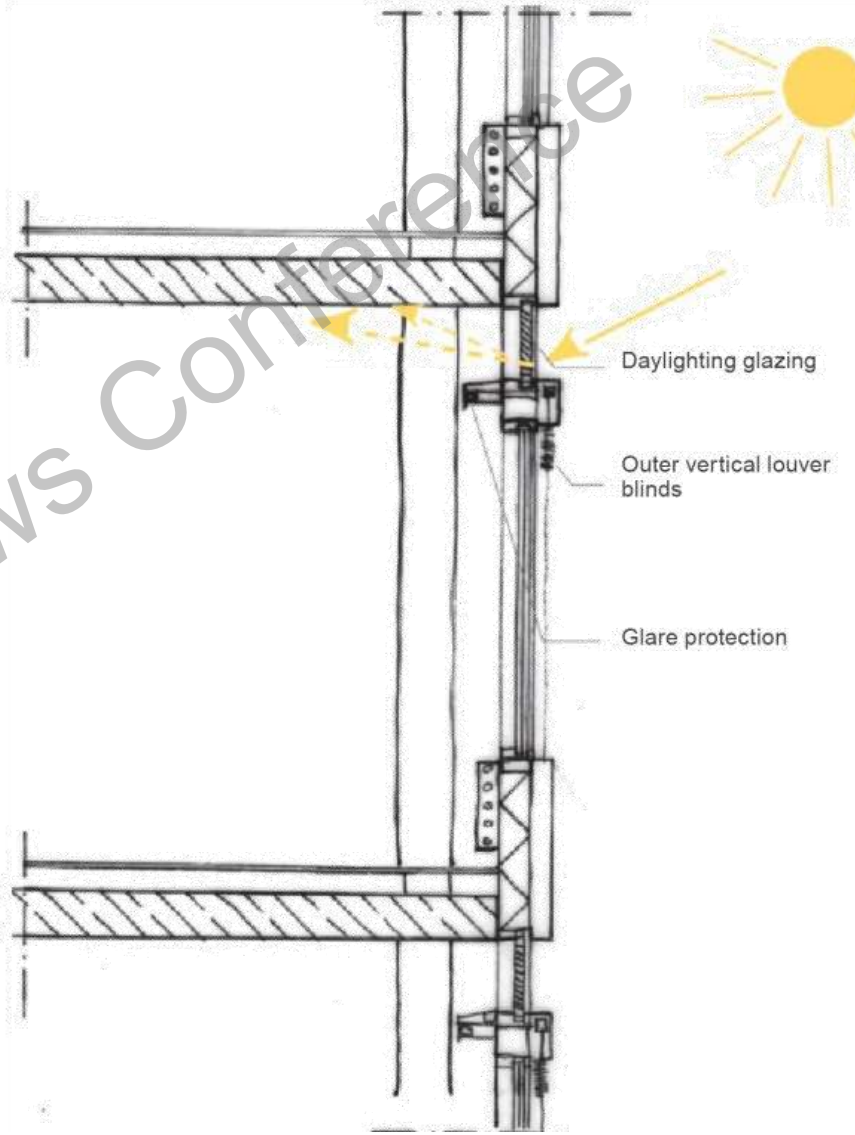
It represents the appearance and behaviour of the unified structure in which each supports, and in turn is supported by, all of the others.

FRAMES

There is no limit to the type or size of WINDOW that can fall within the practice of the Architect.

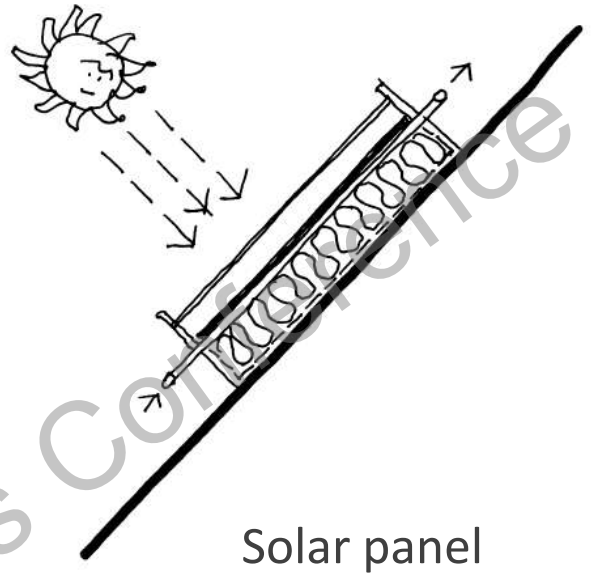
Similarly there is NO LIMIT to the range of activities which they may design.

SPACE

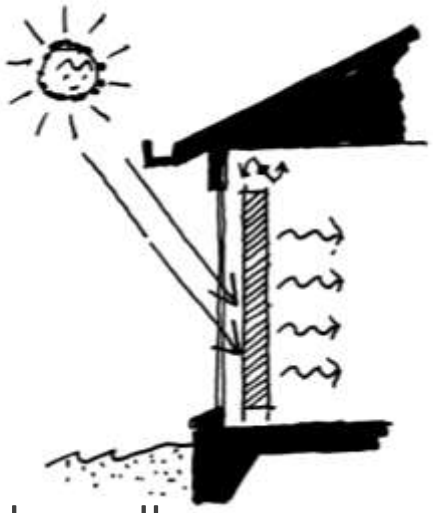


‘A room with a “window place” helps a person come to LIFE inculcating a psychological CONNECTION with the OUTSIDE WORLD.

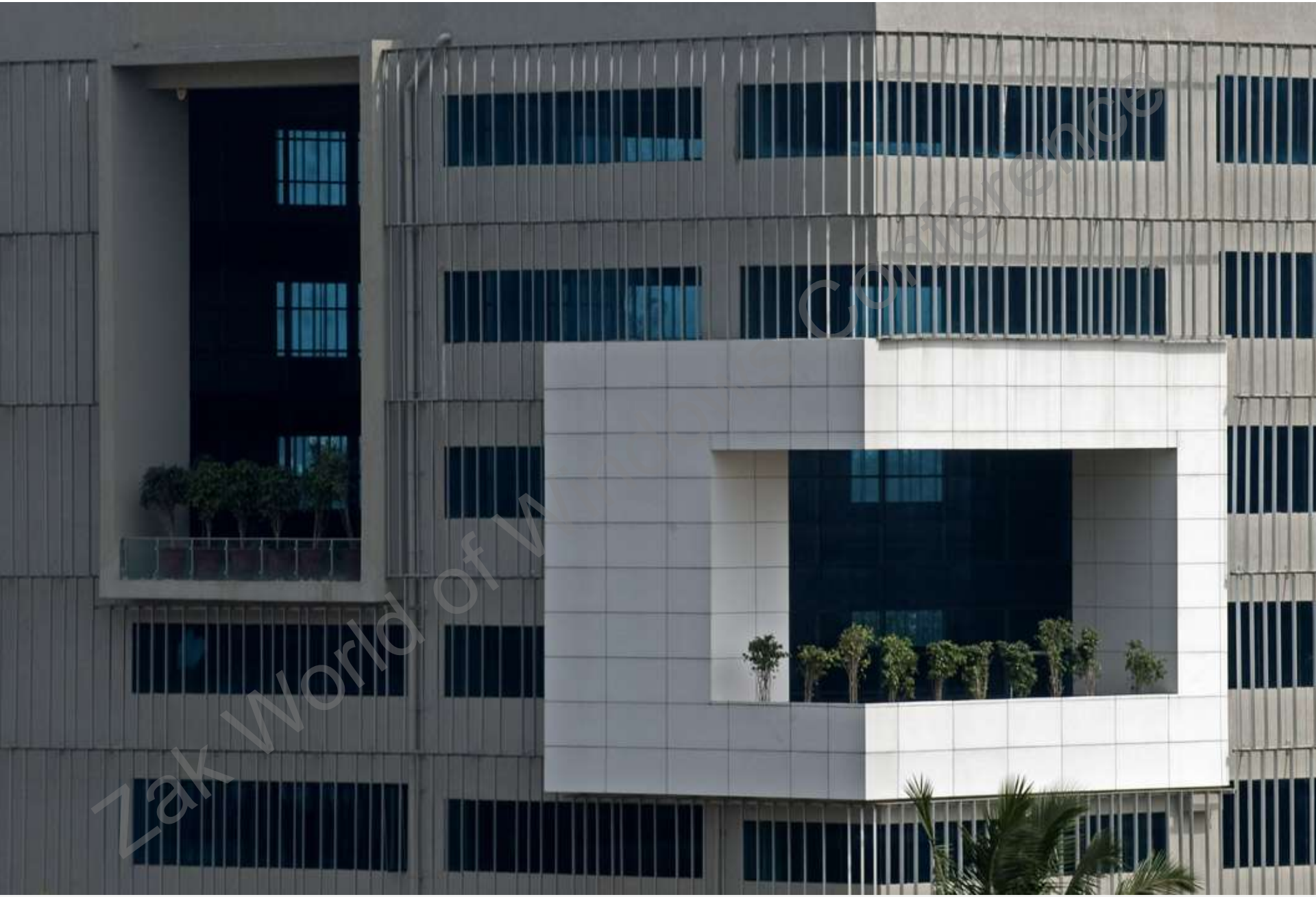
SPACE TO OUTSIDE



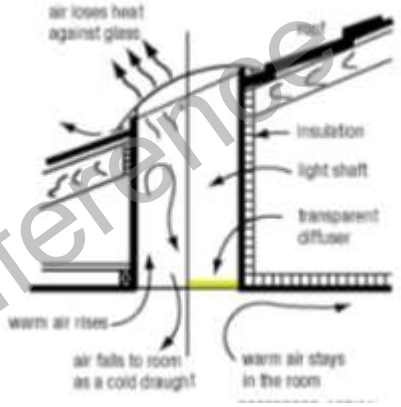
Solar panel



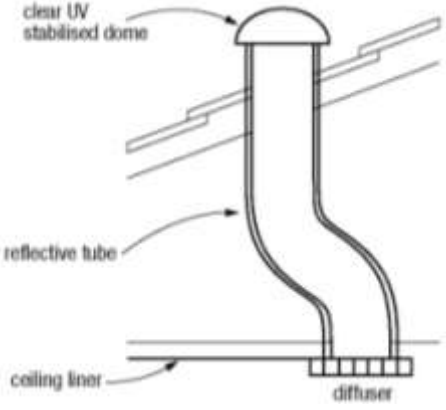
Trombe wall



SPACE TO OUTSIDE

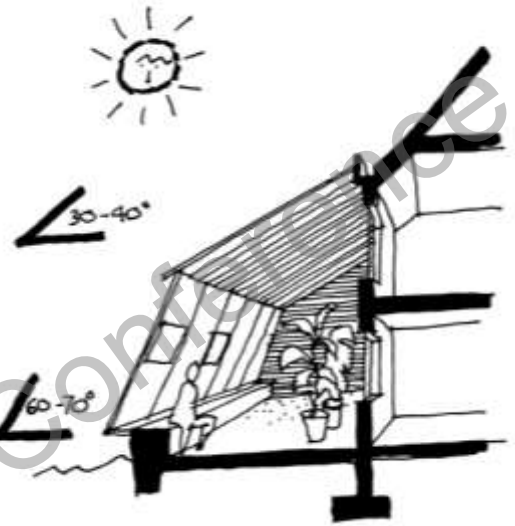


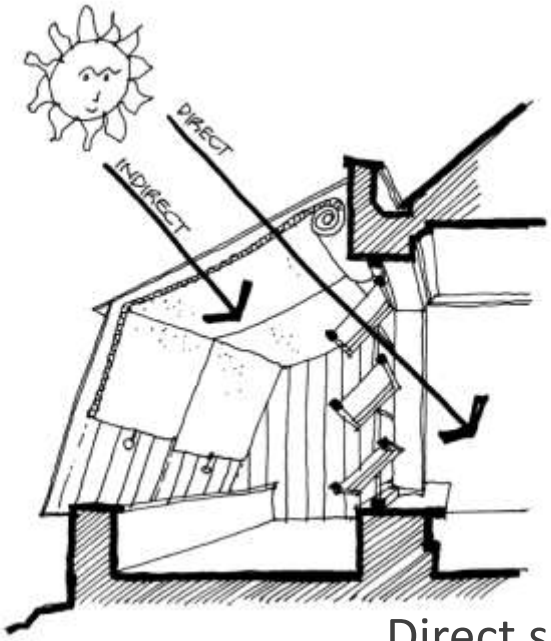
Skylight diffuser



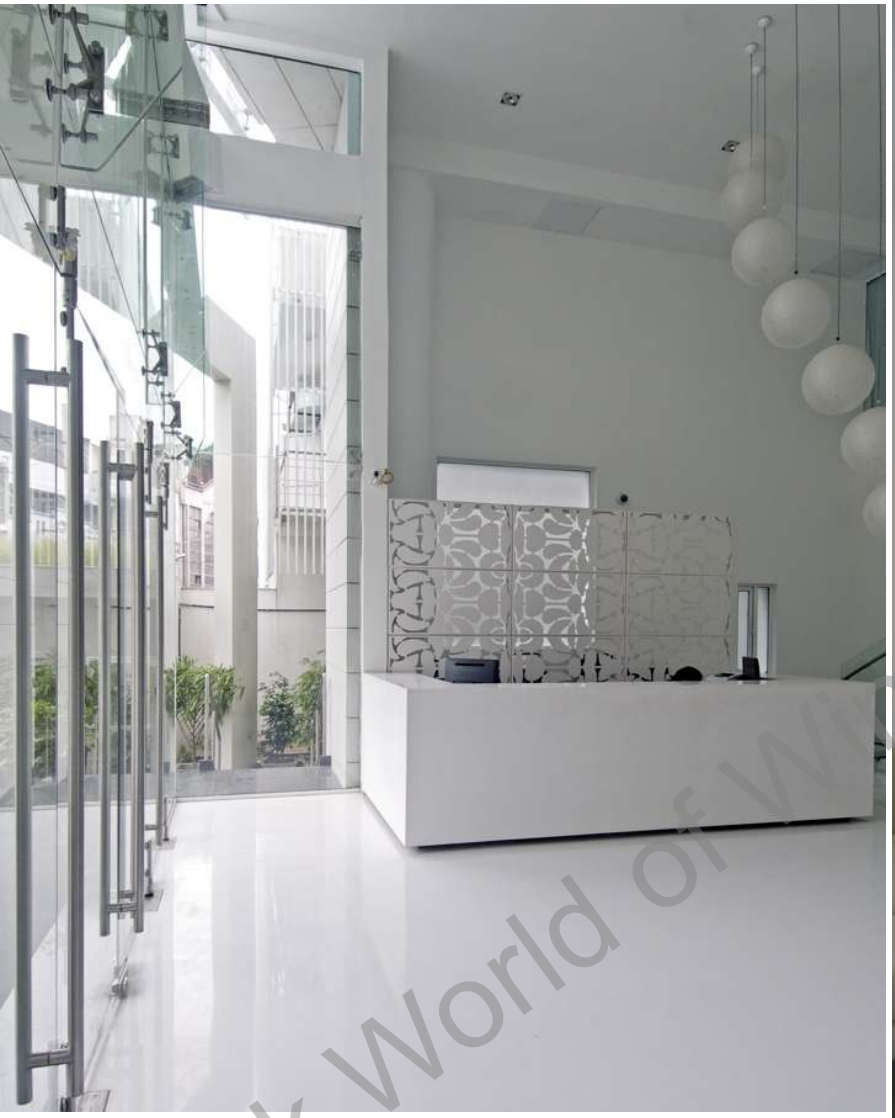
Daylight tube

ENERGY SPACE

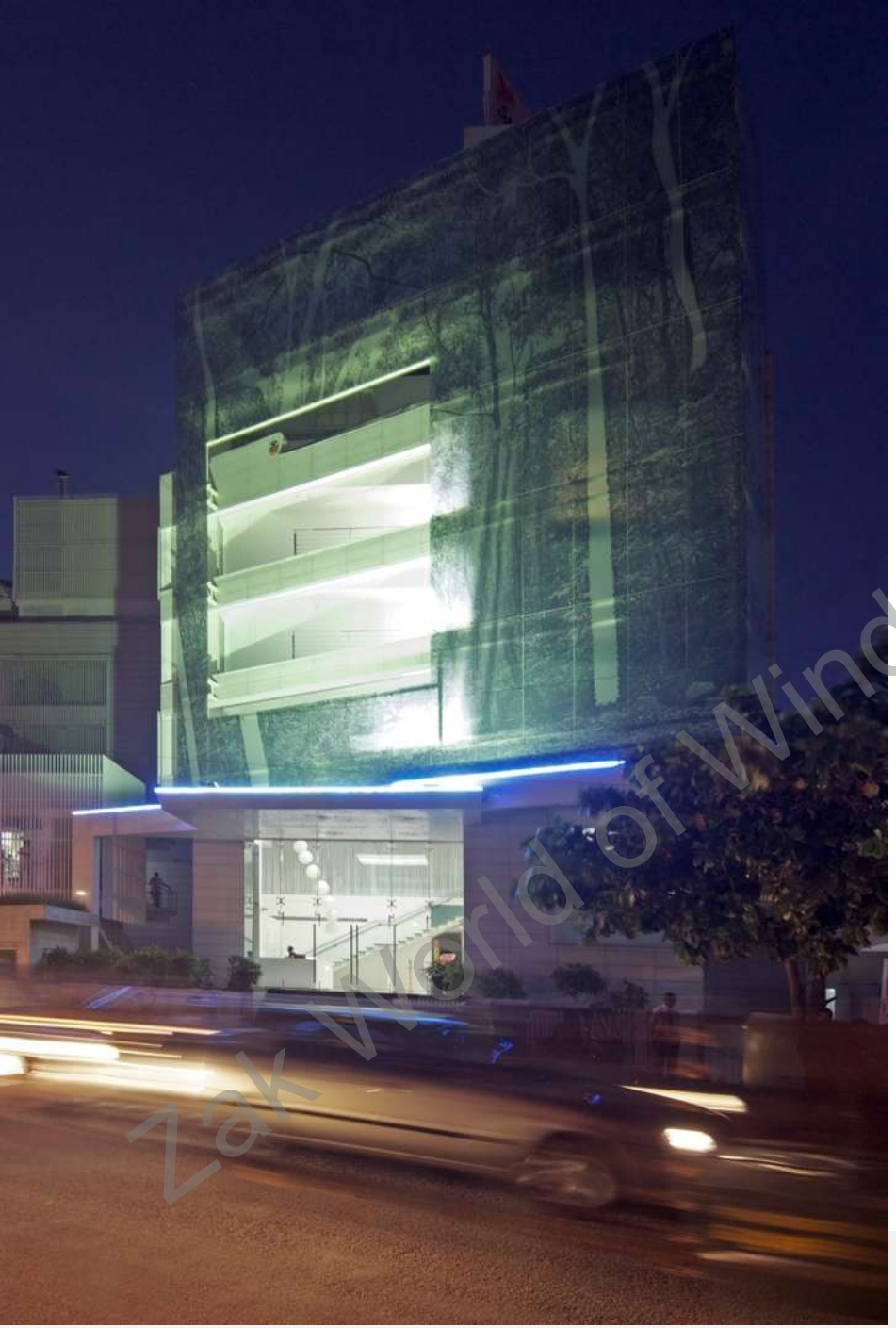


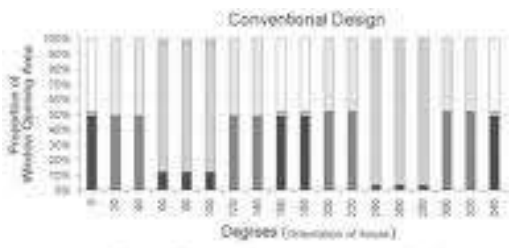


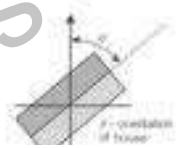
Direct solar gain

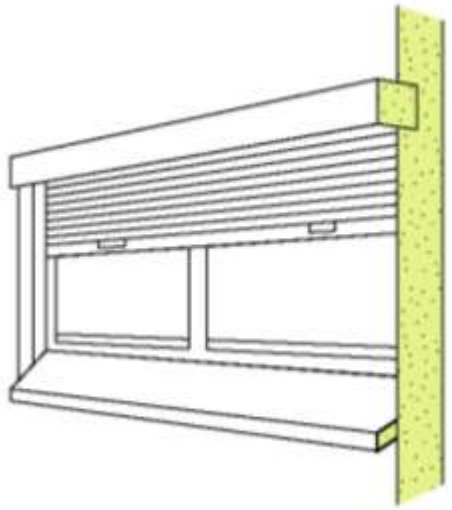


EMBODYING SPACE



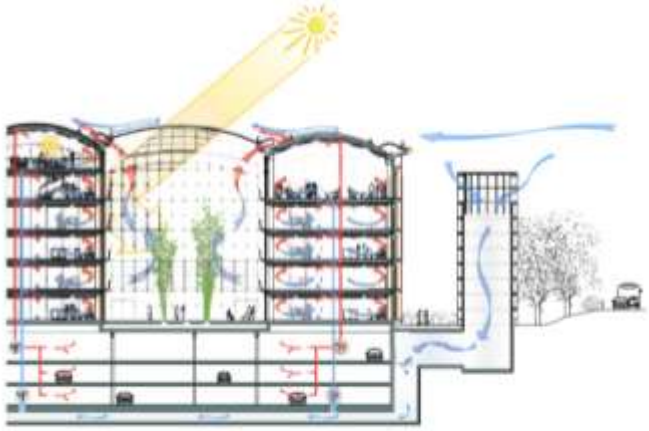


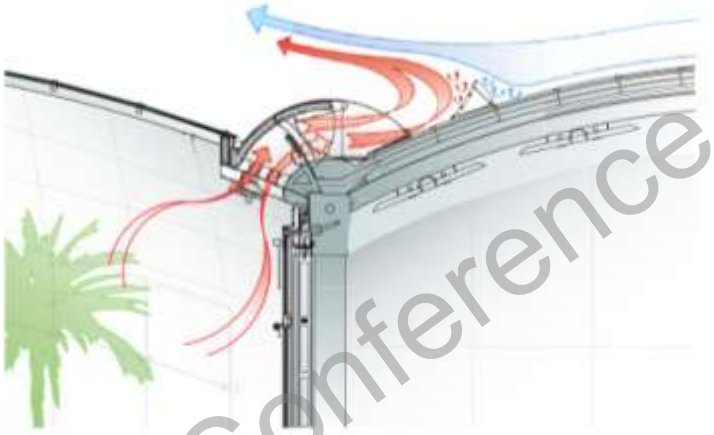




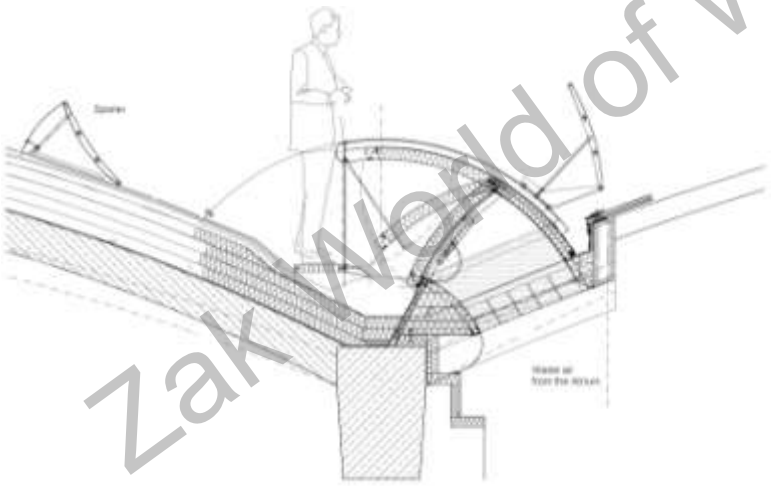
roller shutter

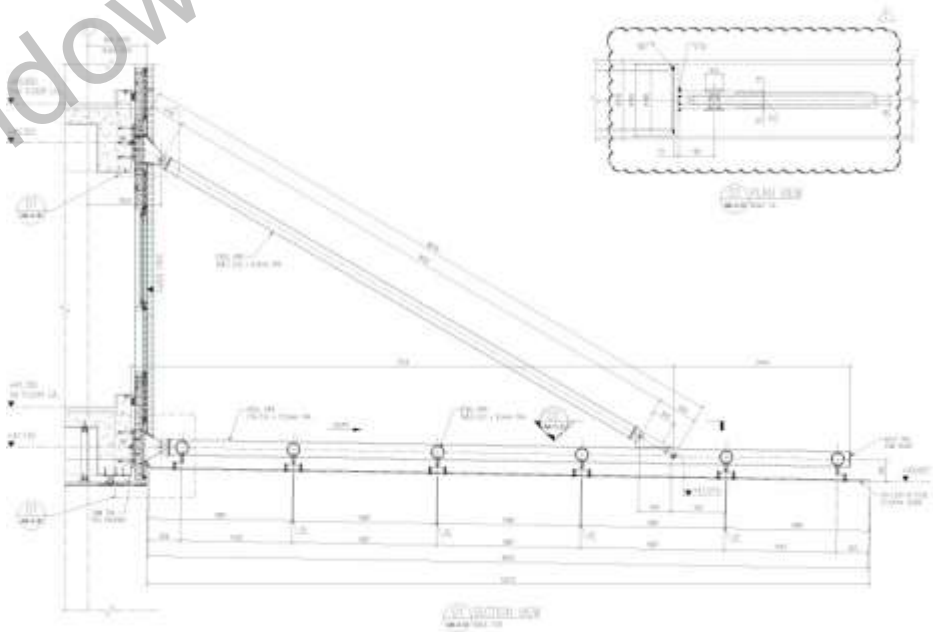
BREATHE SPACE



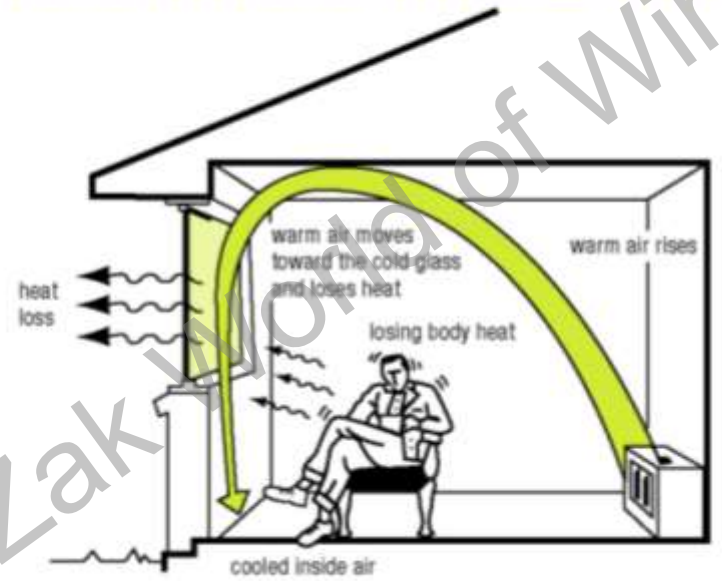


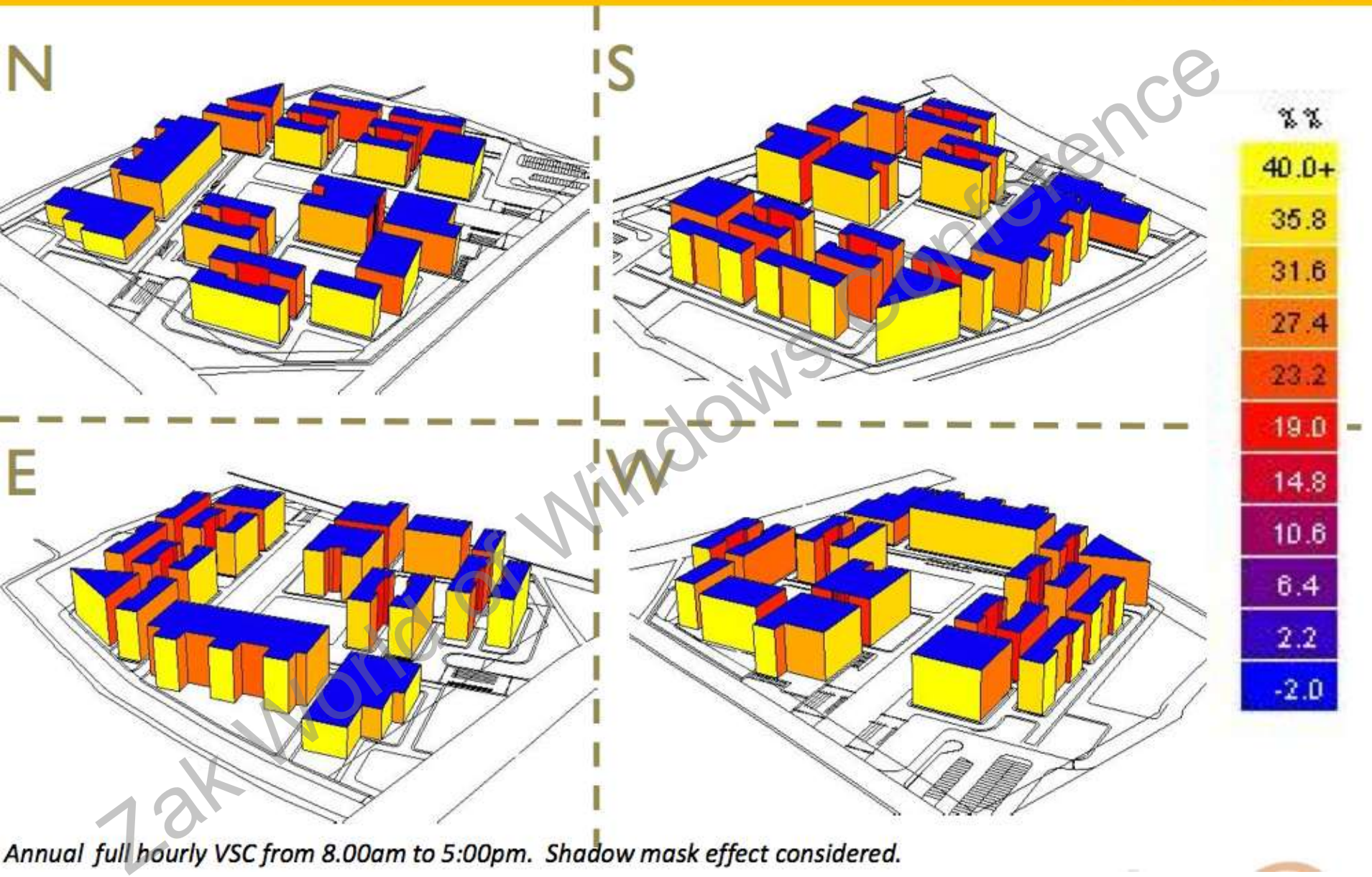
Façade cut represents a rigid light control system, the lower façade is effectively shaded by outer vertical louver blinds



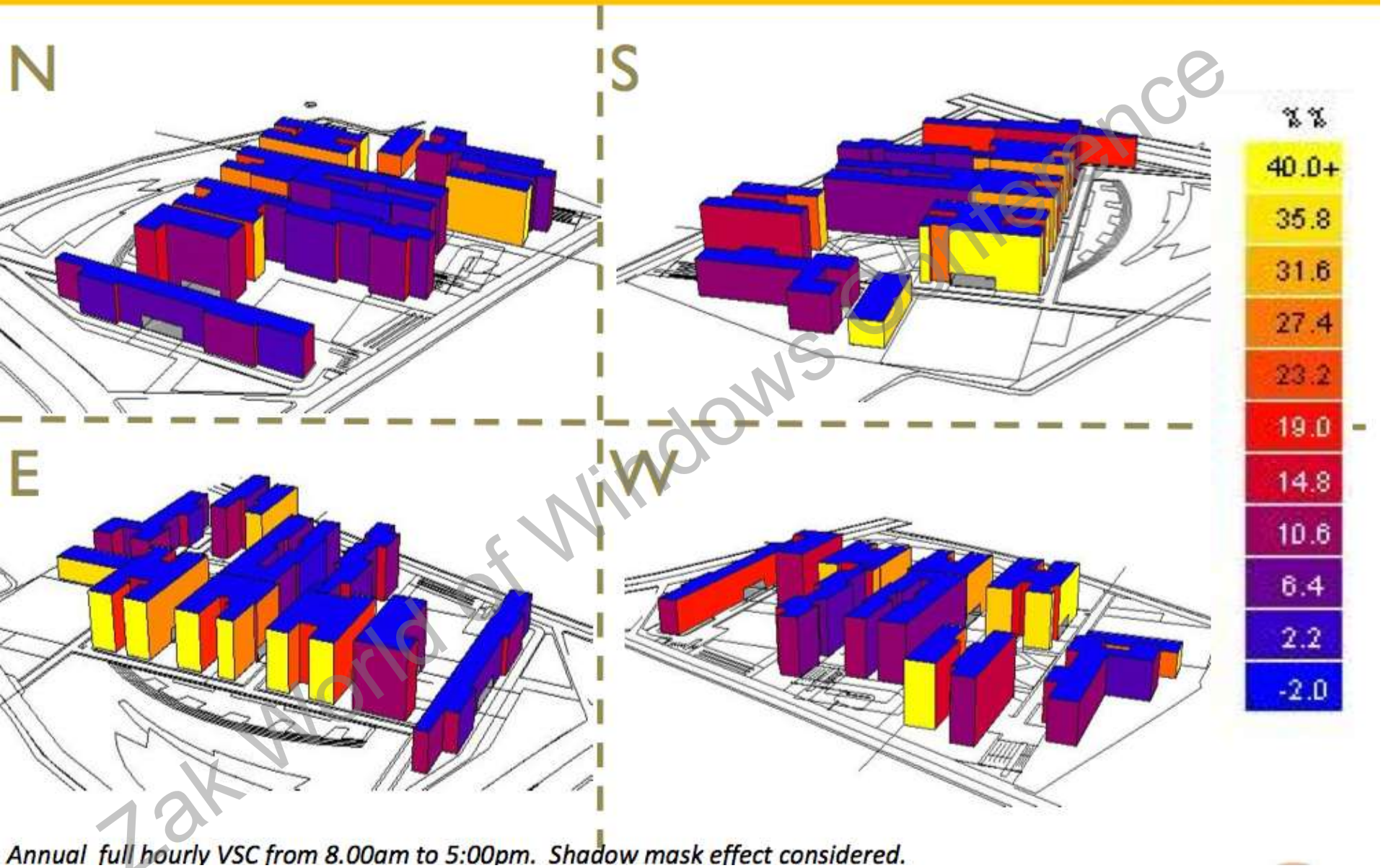


EMBODYING SPACE

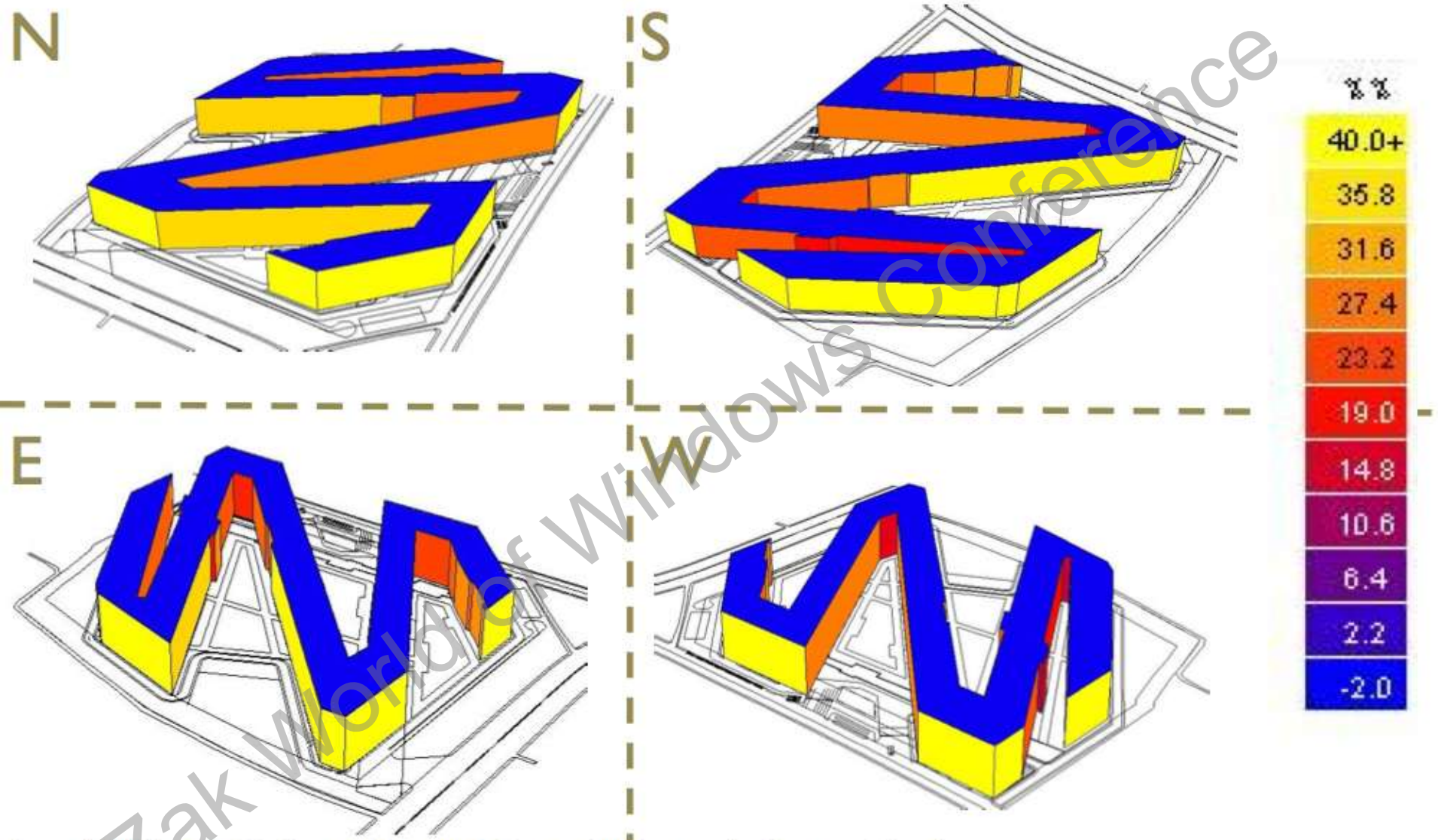




Annual full hourly VSC from 8.00am to 5:00pm. Shadow mask effect considered.



Annual full hourly VSC from 8.00am to 5:00pm. Shadow mask effect considered.

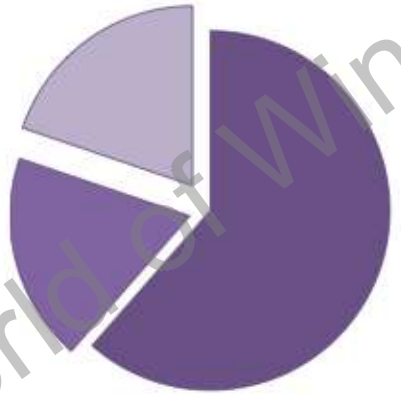


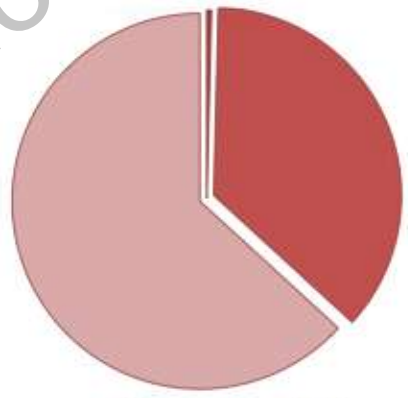
Annual full hourly VSC from 8.00am to 5:00pm. Shadow mask effect considered.

LINKS

AXIS

WEDGE

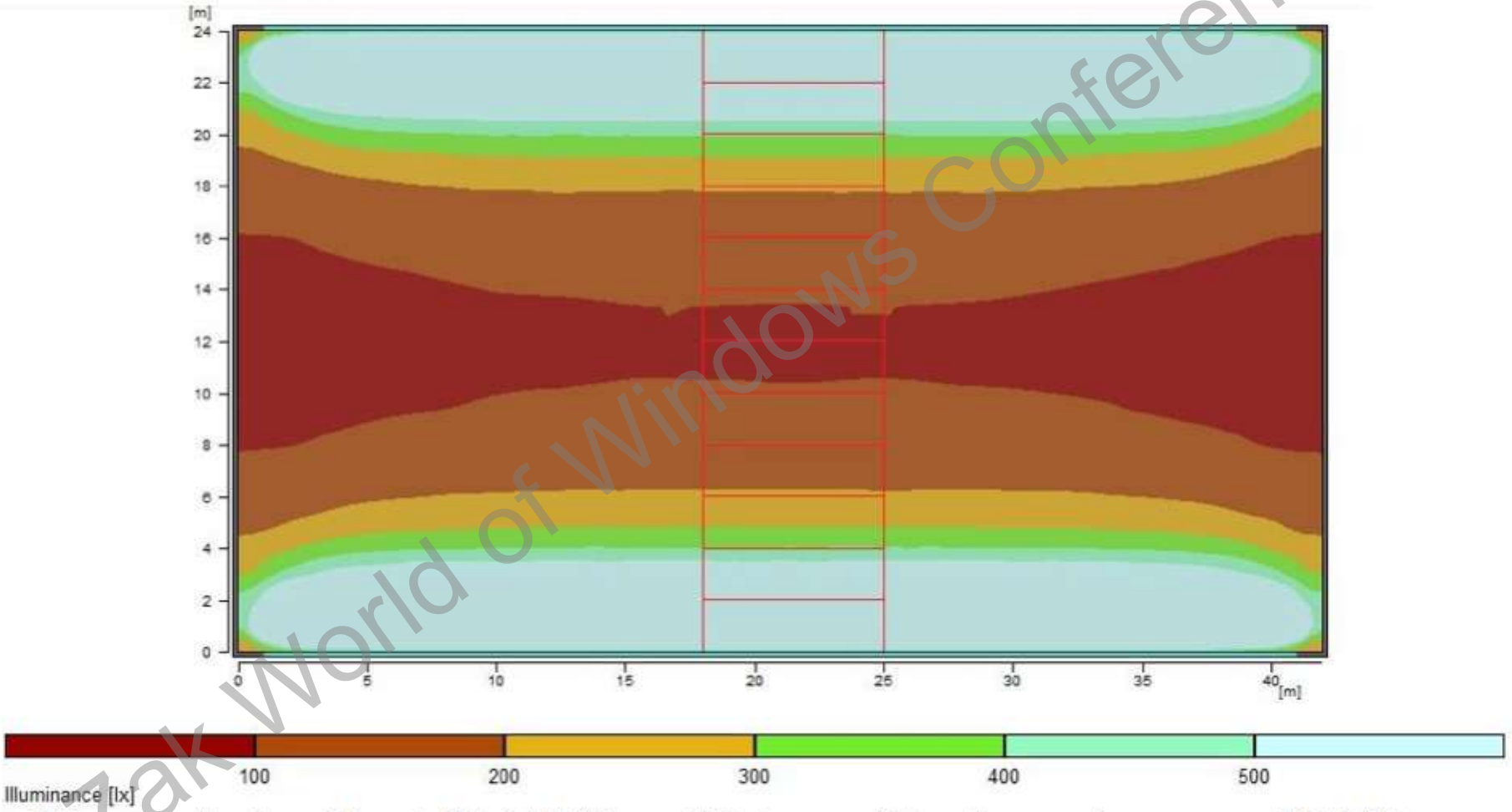




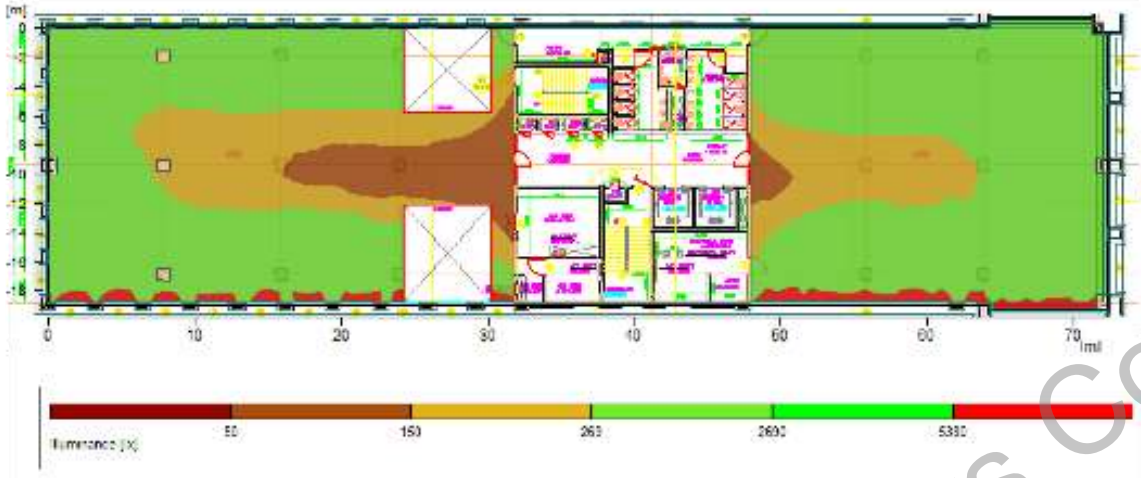
-BALANCING HEAT/DAYLLIGHT
-OPTIMIZING BLG. GEOMETRY
-BUILDING SPACING
-FLOOR PLATE
-WWR
-OPENINGS
-LIGHT SHELVES

Cumulative Annual full hourly VSC from 8.00am to 5:00pm for all facades. Shadow mask effect considered.

FLOOR PLATE depth – 50% WWR



Conditions on Equinox March 21st 12:00pm, CIE sky condition Overcast, measured @ 750mm, work plane level, VLT of Glass=55%. no shading or light shelf considered.

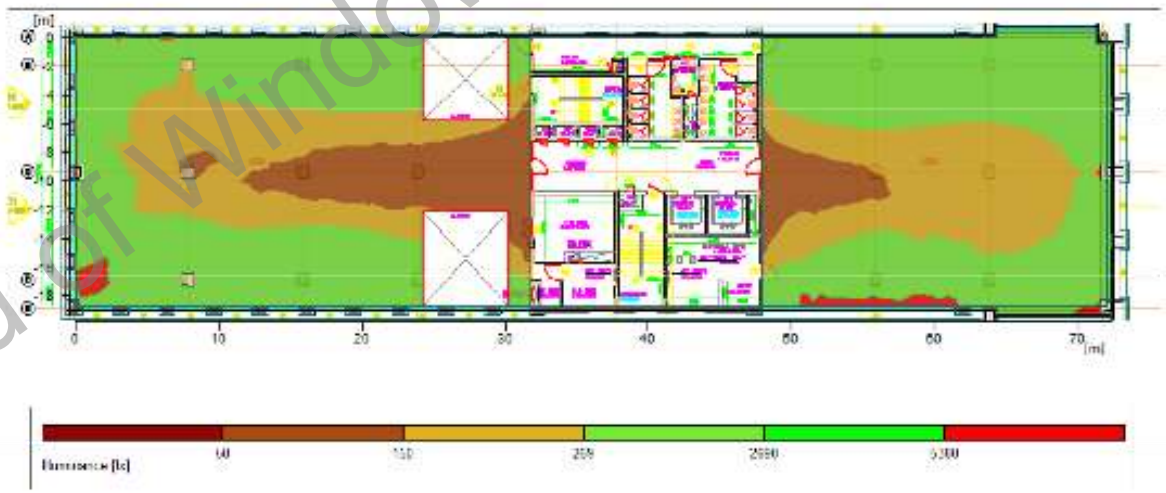


21st September : 0900

Windows area can be considered to increase.

21st September : 1500

Windows area can be considered to increase.



Daylight study : Block A First

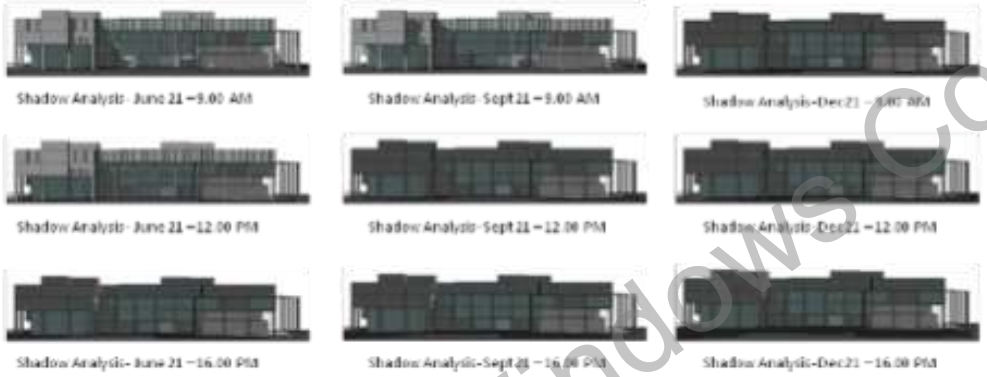
7 Recommendations for Daylight Improvement – Additional Fenestrations

Based on the architectural layouts provided by architects, certain spaces were identified where daylight conditions can be improved through provision of additional windows/ fenestrations on external facade. Some partitions in the interior plans can have provision of daylight windows (glazing above 2250mm) depending on the use and location in the layout. The same recommendations have been shared with architects for their review and implementation as practically possible.

8 Recommendations for Fenestration Shading Improvement – Solar Shading

Solar Shading Devices

- **North West and North East Oriented Fenestrations**

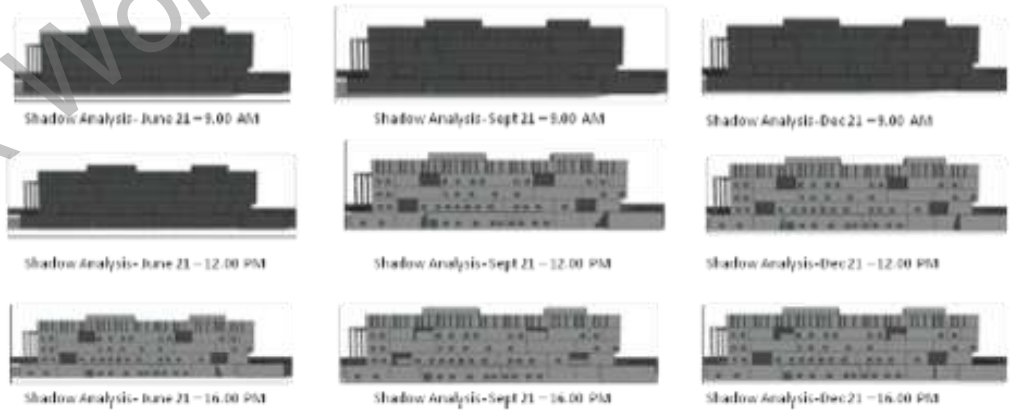


As discussed earlier in the report, north west and north east facades are exposed to direct radiations in early morning (Till 11.30 AM) and late afternoon (Post 3.30 PM) due to low sun angles. Impact of these radiations on daylight and shading for lobby and second floor office areas have been illustrated earlier in the report.

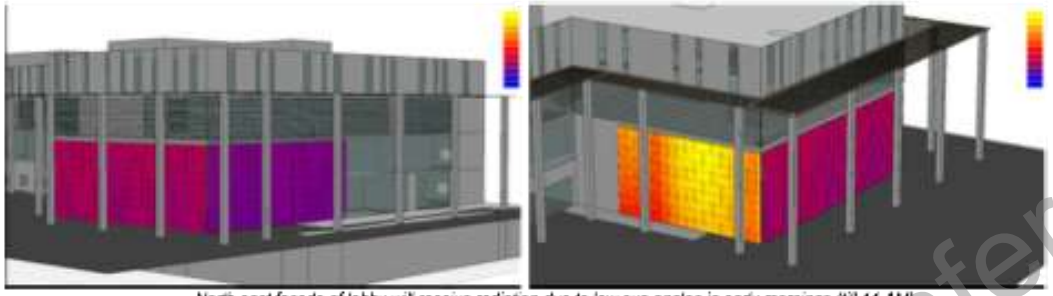
Provision of Light Shelves: For the third floor offices facing North East and North West, it is recommended to have provision of internal light shelves on these windows. Apart from the benefits of cutting down solar radiation and excess glare, it will also benefit in improving daylight penetration deep inside labs located along this facades.

Note: Feasibility to be checked with architecture team.

- **South West and South East Oriented Fenestrations**

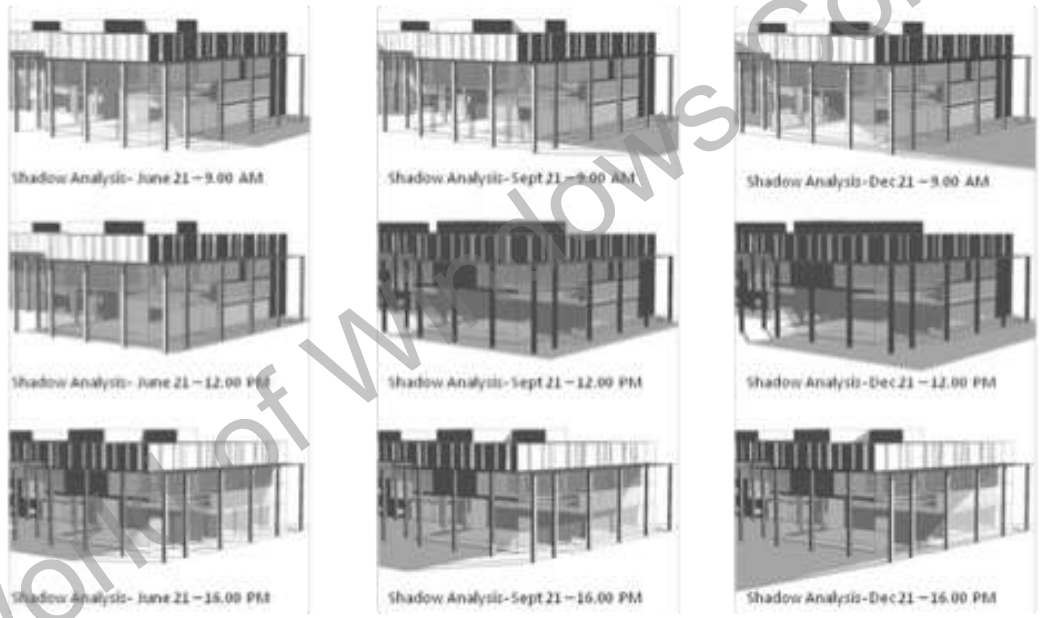


Below is Solar Insolation Analysis (Radiation Analysis) for North-West and North-East facades of lobby respectively.

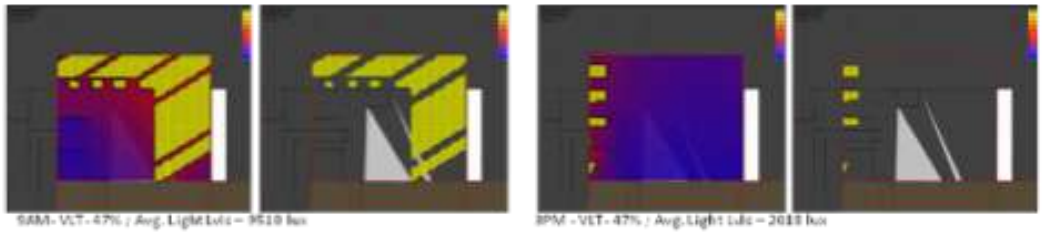


North east façade of lobby will receive radiation due to low sun angles in early mornings (till 11 AM)

Shading Analysis for the Entrance Lobby Area – Annual Shading Variations on Lobby Facades



Daylight and Excess Glare Analysis for the Entrance Lobby Area



9AM- VLT- 47% ; Avg. Light Lux – 9510 lux

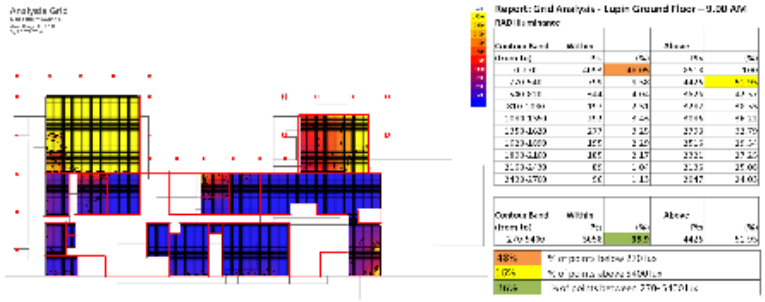
Around 58% of floor plate has daylight levels between 270-5400 lux

8PM - VLT- 47% ; Avg. Light Lux – 2010 lux

Around 96% of floor plate has daylight levels between 270-5400 lux

As observed in the simulation result above, lobby area will have excessive glare both early morning and late afternoons due to ingress of low sun angles.

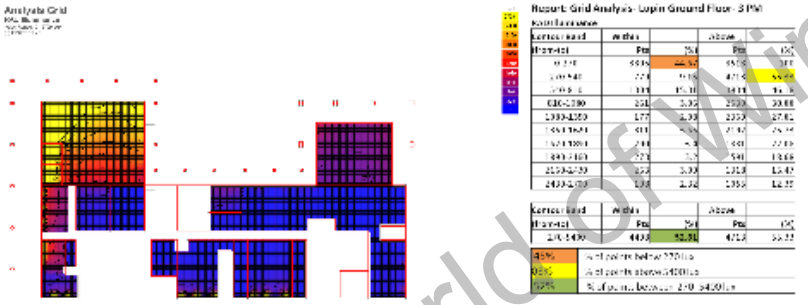
Daylight Simulation Output | Ground Floor | 21st Sept. at 9.00AM



Conclusion – Only 35.9 % of regularly occupied spaces have daylight levels between 270 – 5400 lux as required under LEED India 2011 NC guidebook.

Compliance with LEED Requirement - NO

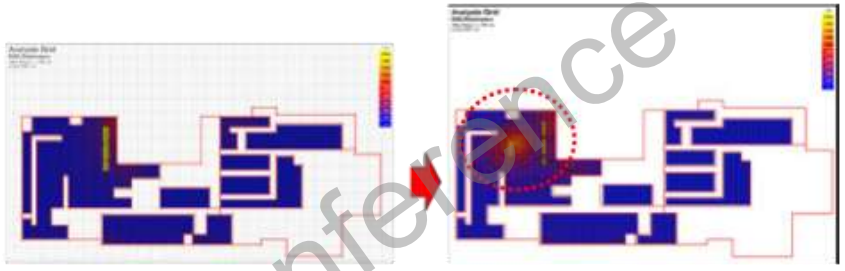
Daylight Simulation Output | Ground Floor | 21st Sept. at 3.00PM



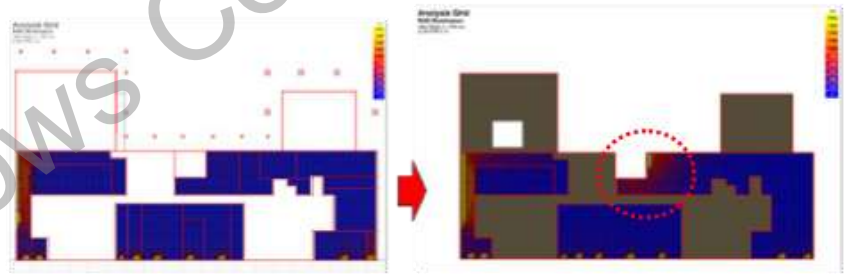
Conclusion – Only 52.8 % of regularly occupied spaces have daylight levels between 270 – 5400 lux as required under LEED India 2011 NC guidebook.

Compliance with LEED Requirement – NO

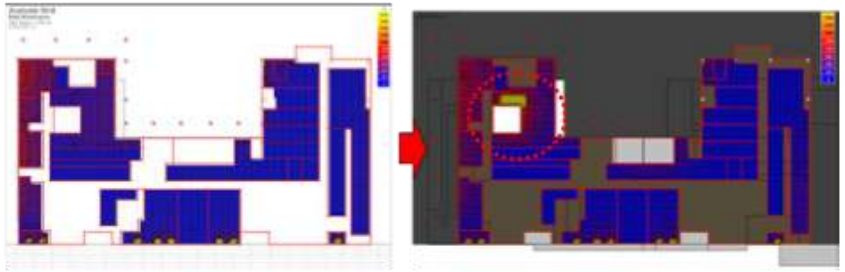
Comparative Daylight Simulation Output | Lupin Lower Ground Floor



Comparative Daylight Simulation Output | Lupin First Floor



Comparative Daylight Simulation Output | Lupin Second Floor



Comparative Daylight Simulation Output | Lupin Third Floor

Daylight Simulation Output | Second Floor | 21st Sept. at 9.00AM

Conclusion – Only 28.36 % of regularly occupied spaces have daylight levels between 270 – 5400 lux as required under LEED India 2011 NC guidebook.

Compliance with LEED Requirement - NO

Daylight Simulation Output | Third Floor | 21st Sept. at 9.00AM

Conclusion – Only 39.36 % of regularly occupied spaces have daylight levels between 270 – 5400 lux as required under LEED India 2011 NC guidebook.

Compliance with LEED Requirement - NO

Daylight Simulation Output | Second Floor | 21st Sept. at 3.00PM

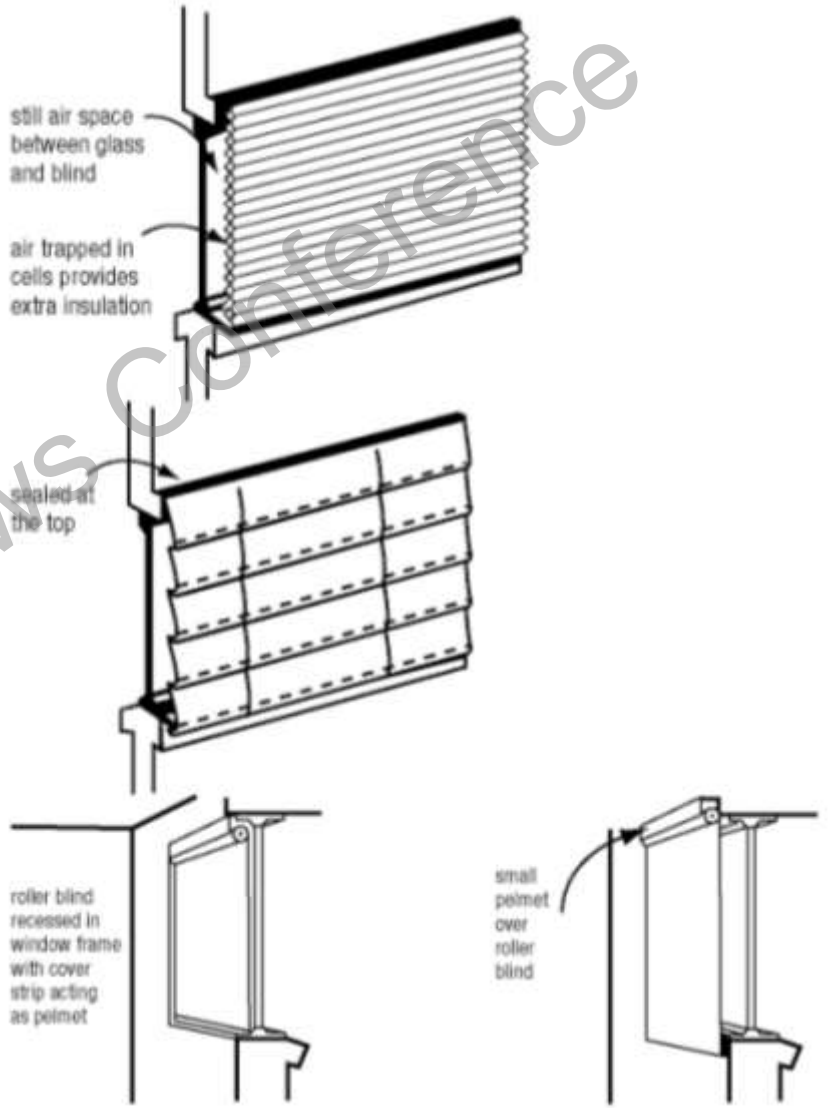
Conclusion – Only 25.94 % of regularly occupied spaces have daylight levels between 270 – 5400 lux as required under LEED India 2011 NC guidebook.

Compliance with LEED Requirement – NO

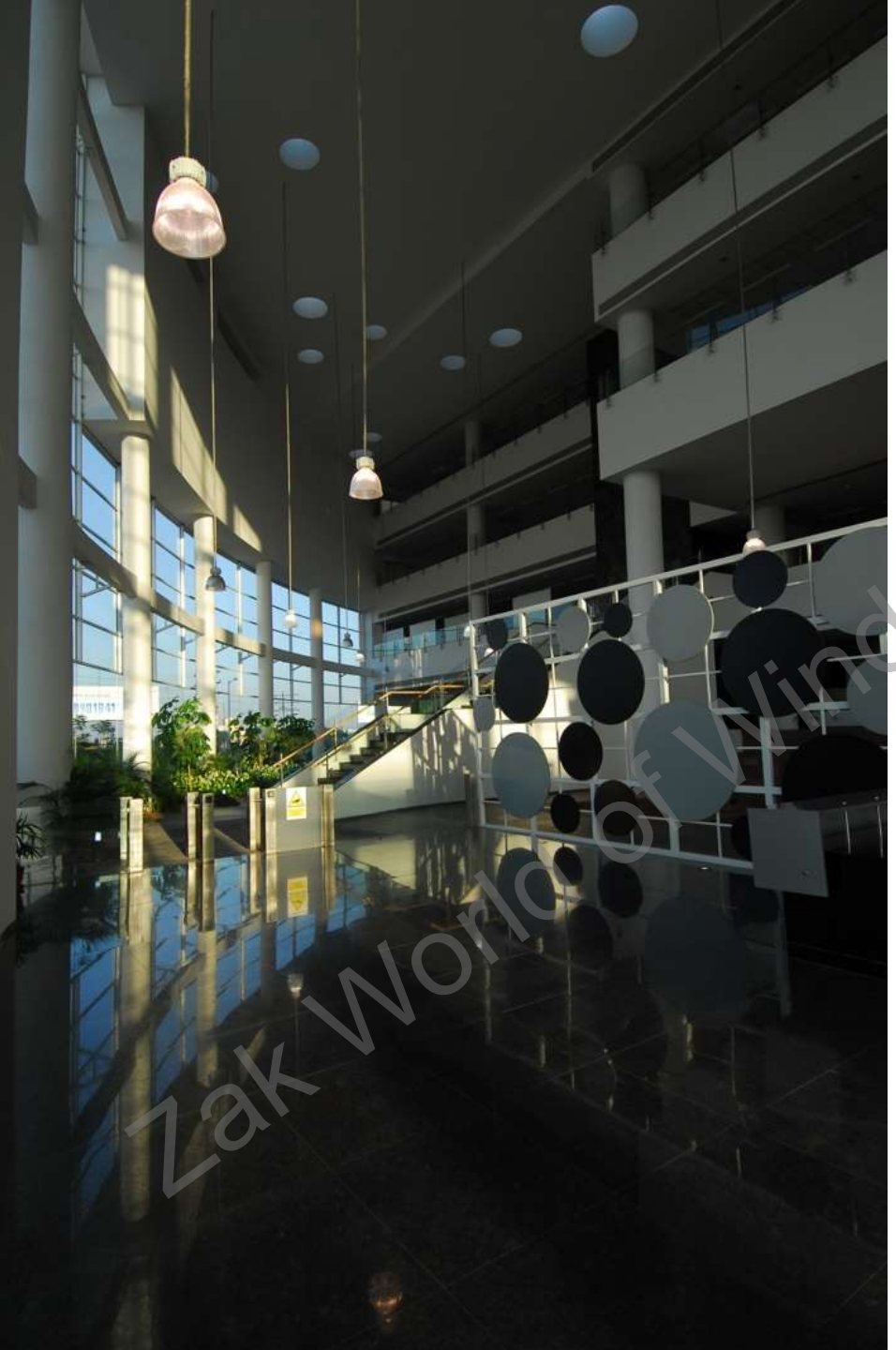
Daylight Simulation Output | Third Floor | 21st Sept. at 3.00PM

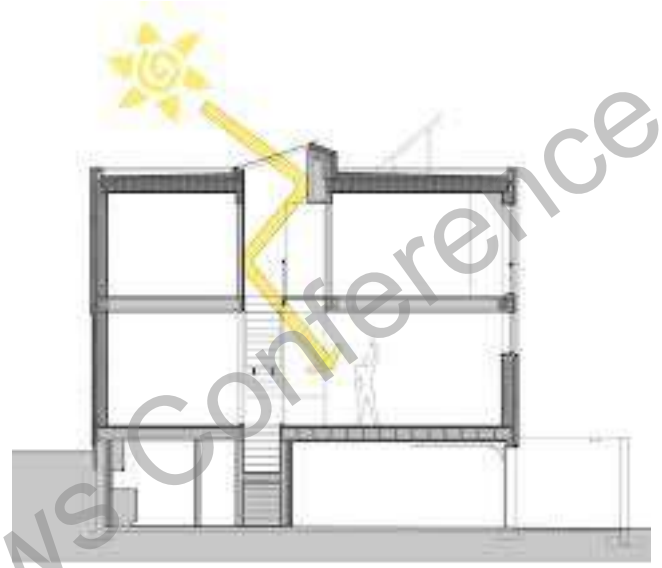
Conclusion – Only 37 % of regularly occupied spaces have daylight levels between 270 – 5400 lux as required under LEED India 2011 NC guidebook.

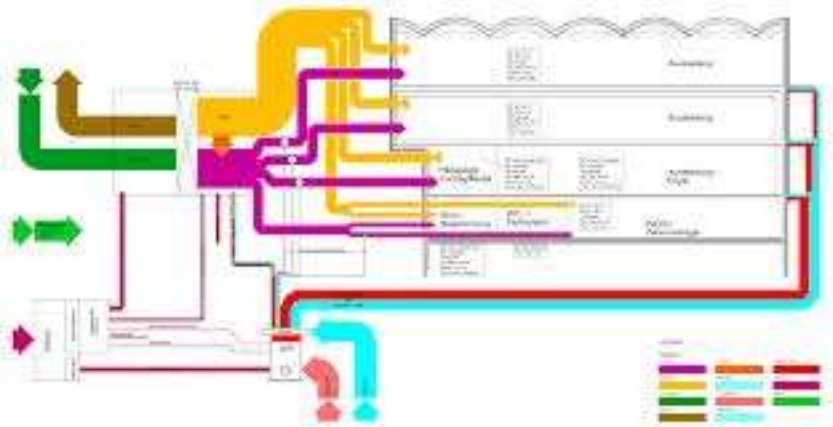
Compliance with LEED Requirement – NO



FEATURE SPACE

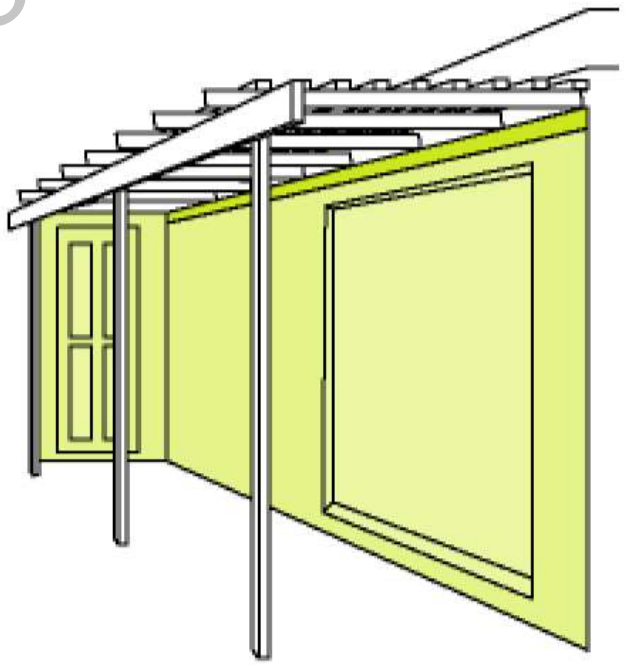






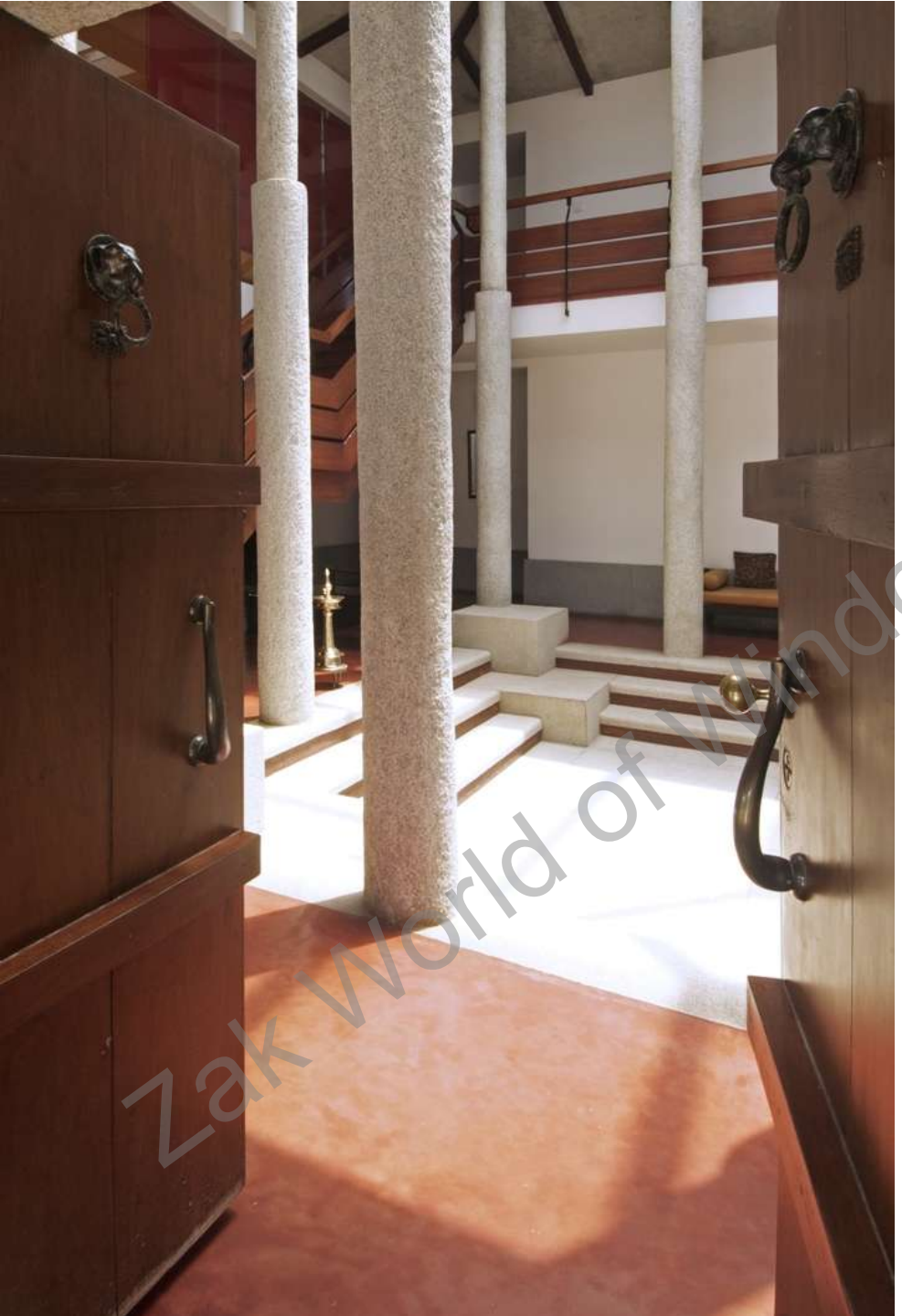
ENIGMA SPACE

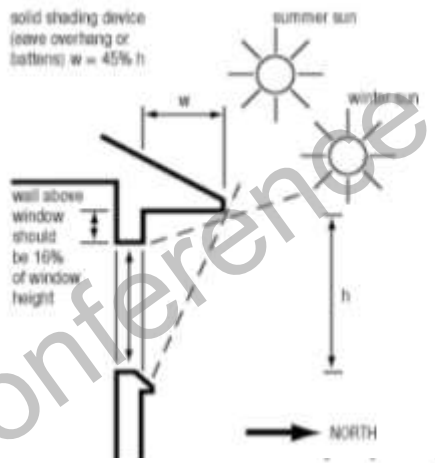
That attribute of development in which so many rigid controls are put in place, to defeat every imaginable future problem, that any possibility of life, spontaneity, or flexible responses to unanticipated events.”

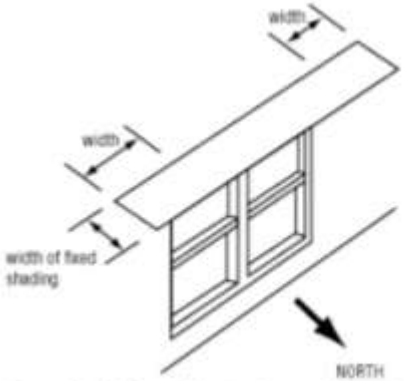


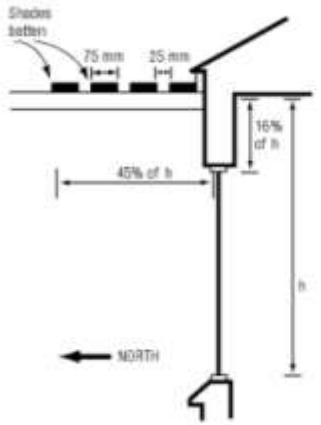
Fixed shading

COMPOSITION SPACE

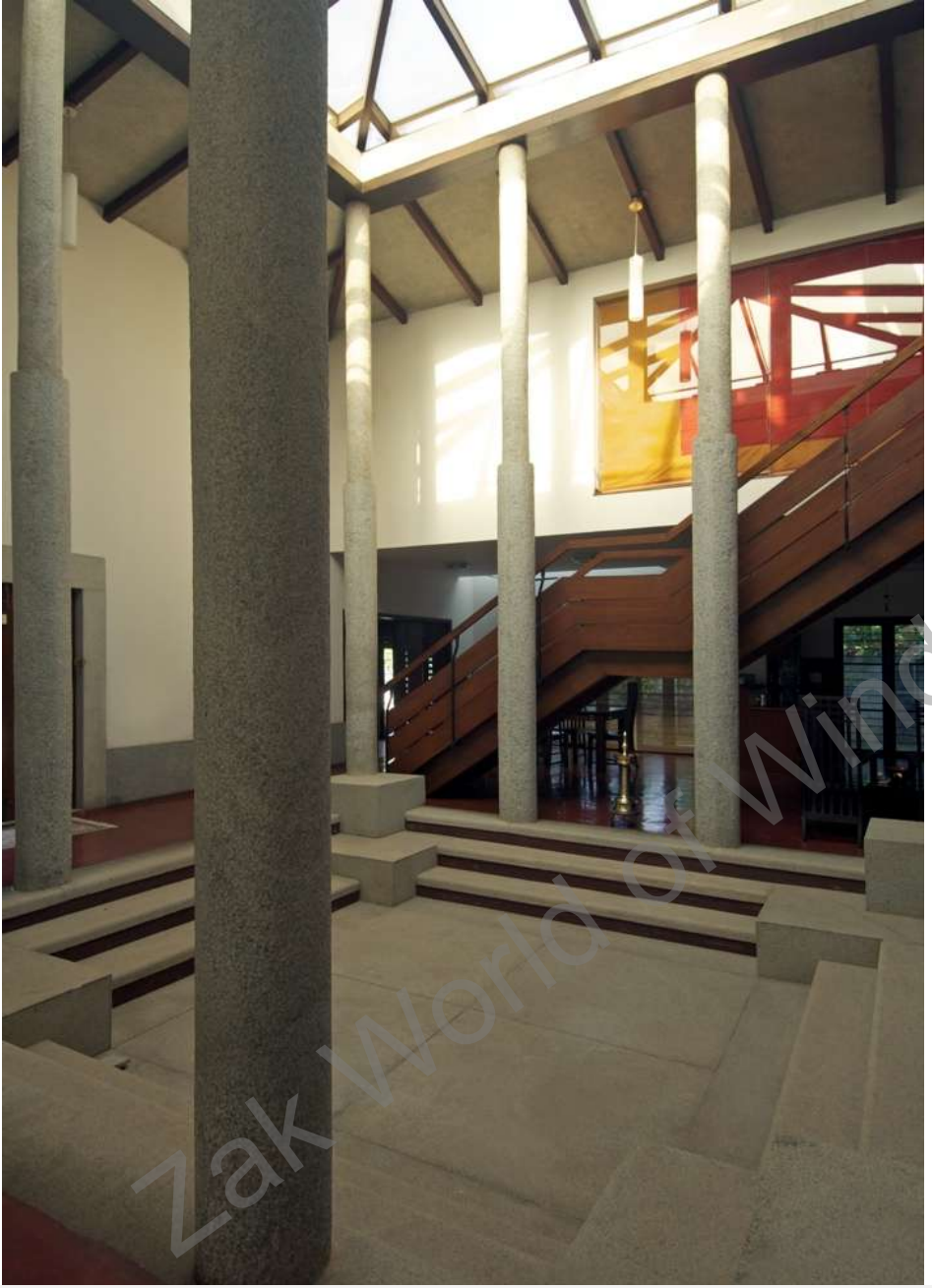


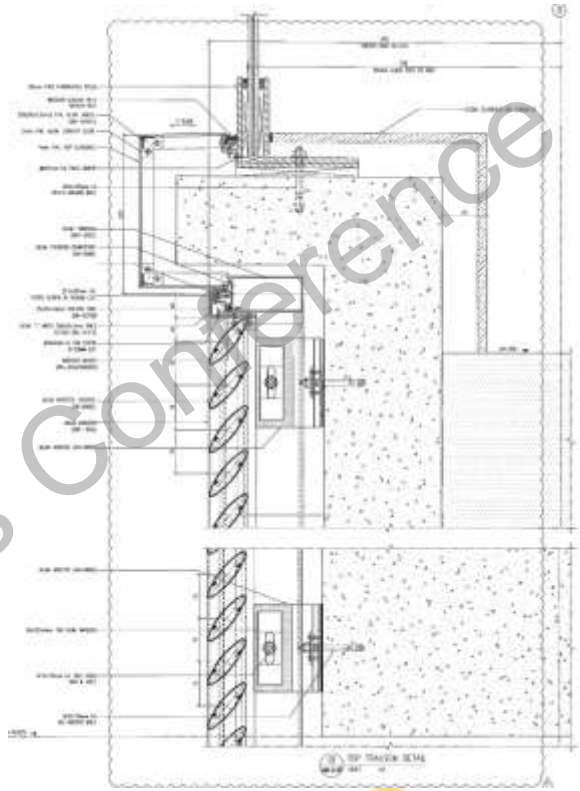






SUSTAINABILITY SPACE





STATISTIC SPACE

HOPE SPACE

VISION

INNOVATION

IMAGINATION

CREATIVITY

"YOU MUST BE THE CHANGE YOU WISH TO SEE IN THE WORLD"