TAYLOR'S UNIVERSITY

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GREEN STRATEGIES FOR BUILDING DESIGN (ARC61804)

ASSIGNMENT 1 : PASSIVE GREEN BUILDING CASE STUDIES BOOKLET

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Group: 1

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INTERCROP OFFICE

1. Introduction

The Intercrop Building is a modern agricultural facility designed to optimize space, resources, and crop yield. Featuring vertical farming systems, climate control technology, and energy-efficient infrastructure, it supports year-round cultivation while minimizing environmental impact. With a focus on innovation and sustainability, the Intercrop Building transforms how we grow food in urban and rural settings alike.

Site Location: Soi Phahonyothin 7, Samsen Nai, Phaya Thai, Bangkok, Thailand

Area: 3500m²

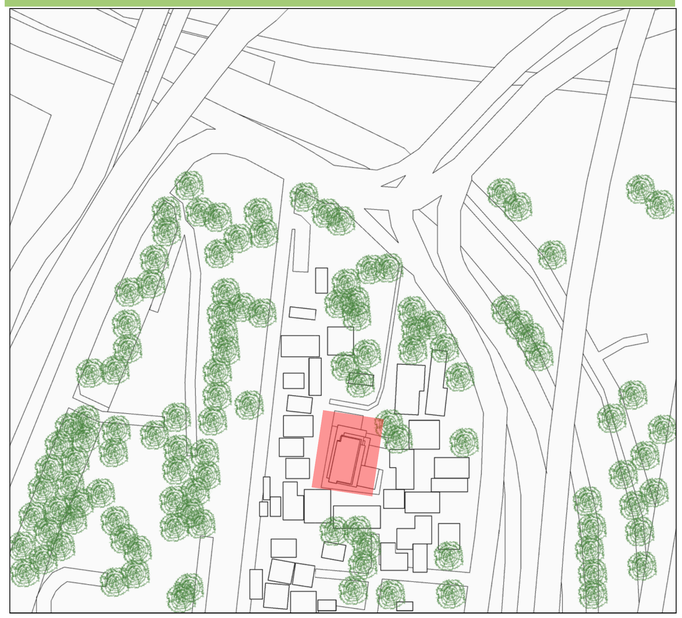
Built Year: 2018

Building Typology: Office Building

Architect: Stu/D/O Architects

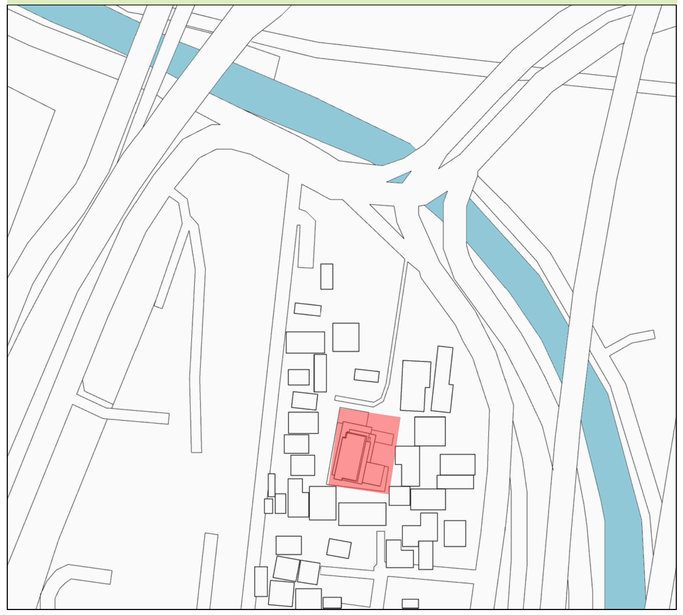
SITE ANALYSIS

VEGETATION DENSITY



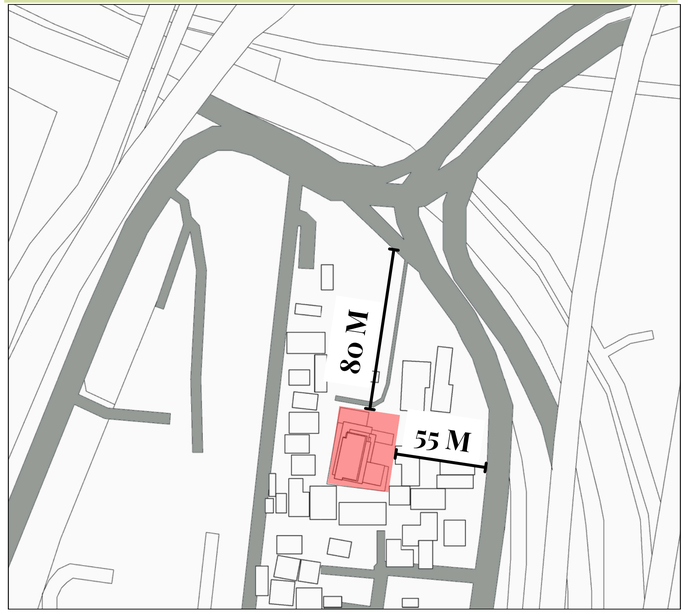
Dense vegetation around the site provides natural shading and evaporative cooling, reducing the ambient temperature around the building, improving the air quality too. It can dampen urban noise, creating quieter indoor and outdoor spaces. Also green areas offer habitats for birds, insects, and small animals, enhancing urban biodiversity.

WATER FEATURE



The raw water canal contributes to cooler air temperatures through evaporative cooling to its surroundings.

SETBACK AND ORIENTATION

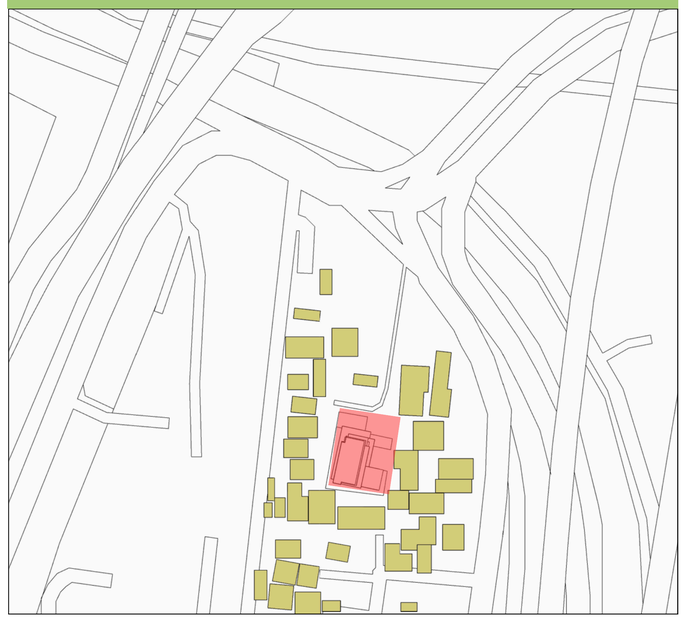


The building is well set back from the main road, possibly to reduce noise pollution and increase safety. It's oriented in a way that maximizes exposure to natural light and ventilation, critical for energy efficiency in tropical climates.

ACCESSIBILITY

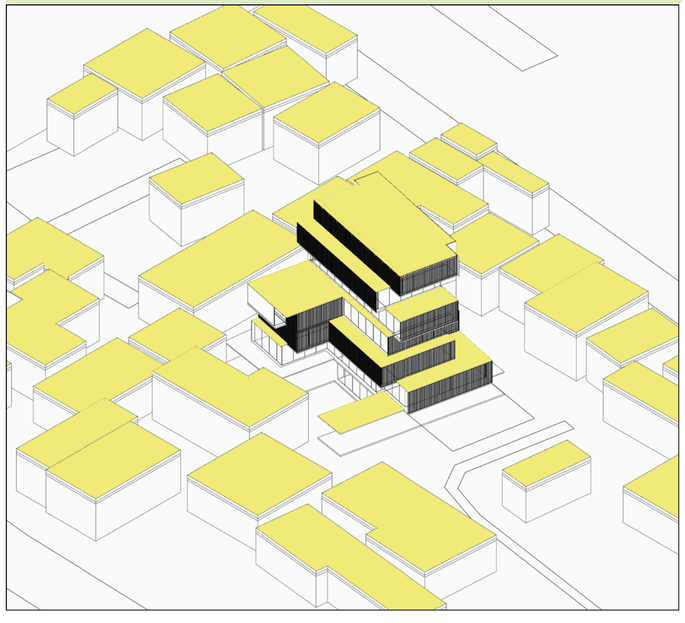
The site is strategically located near major highways, ensuring easy vehicular access. It's placement suggests strong connectivity to the broader city, benefiting from existing infrastructure.

URBAN INFILL DEVELOPMENT



The building is inserted into a dense urban fabric, making efficient use of available land without expanding into undeveloped areas. This approach promotes compact urban form and mitigates urban sprawl.

CONTEXTUAL INTEGRATION

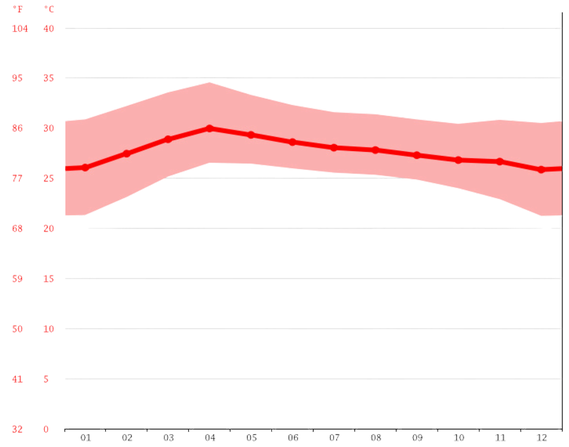


The form and scale respect the low-rise context of the surrounding residential area, avoiding overwhelming contrast. The tiered design helps visually reduce the building's mass, allowing it to blend better with its environment.

SITE ANALYSIS

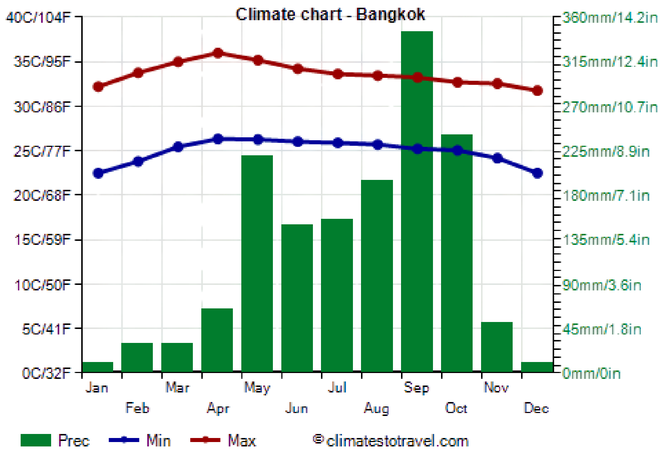
Climate

Average Temperature in Bangkok



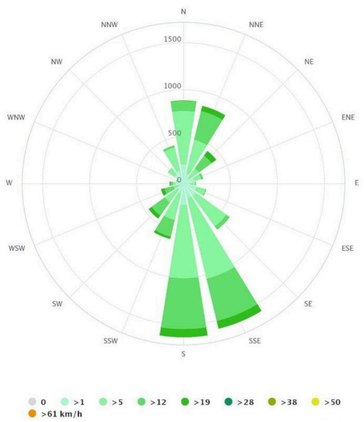
- April is the warmest month of the year. The temperature in April averages 29.9 °C | 85.8 °F. December is the coldest month, with temperatures averaging 25.9 °C | 78.6 °F.

Average Rainfall in Bangkok



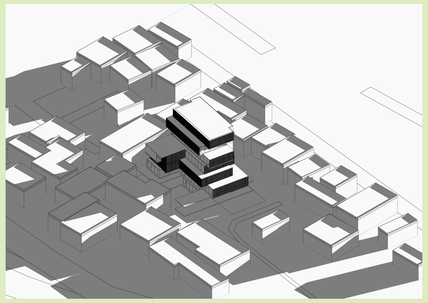
- In Bangkok (Krung Thep Maha Nakhon), there is a tropical climate, hot all year round, with a dry season from November to April and a rainy season, due to the monsoon, which runs roughly from mid-May to October.
- Throughout the year, 1,650 mm (65 in) of rain fall. The wettest months are at the beginning and the end of the monsoon, namely May, September and October.

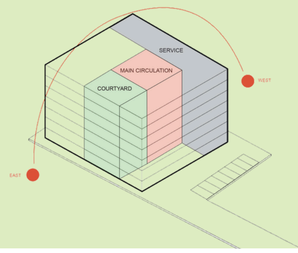
Windrose Diagram in Bangkok



- wind mostly comes from south and south east.
- East and West experience the least amount of wind
- Winds from south and south east are the stronmgest reaching speed of upto 19km/h

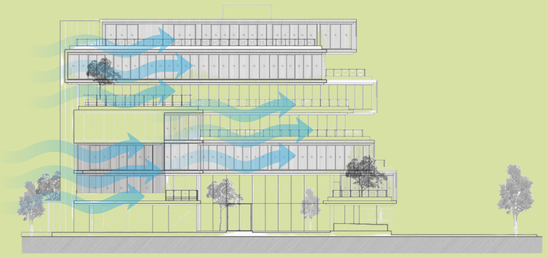
Building Orientation for Natural Light



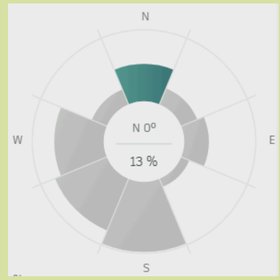


- The main facilities of the building do not face direct sunlight although access for enough natural light is present in each area
- Building orientation is set in a way to minimize solar heat gain from Bangkok's high temparature and also to maximize the amount of natural light to building.

Wind Collection for Buildiing



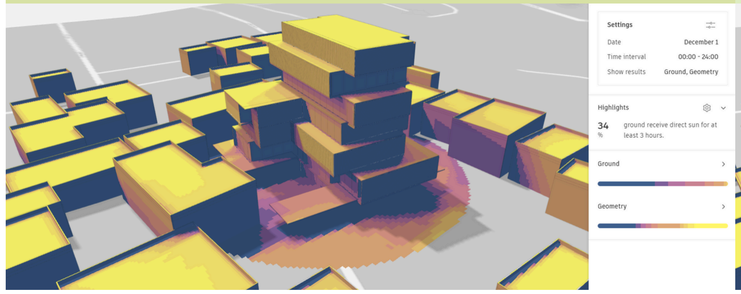
- The balconies facing the west side of the building gets most of the winds from the south and southwest collected which helps with ventilation and air flow



SITE ANALYSIS

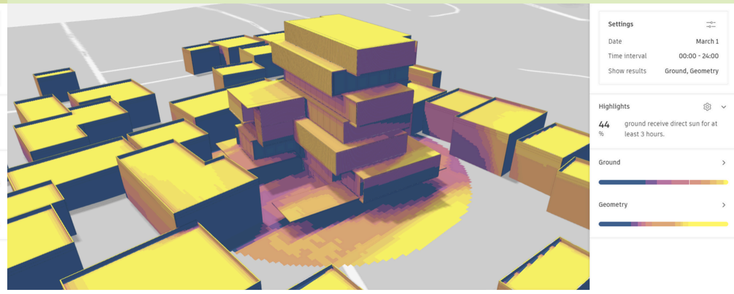
Sun hours analysis

December



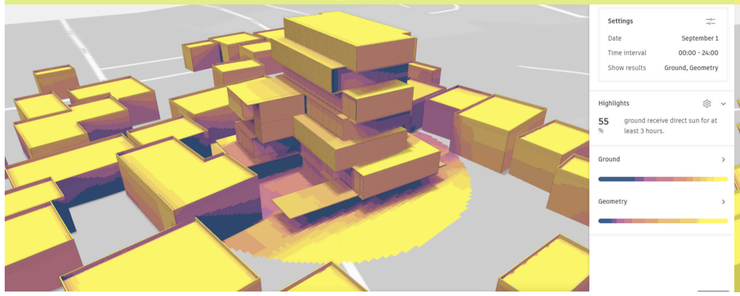
The ground receives 34% of direct sun for at least 3 hours. The North and East elevations are well shaded to avoid direct sunlight.

March



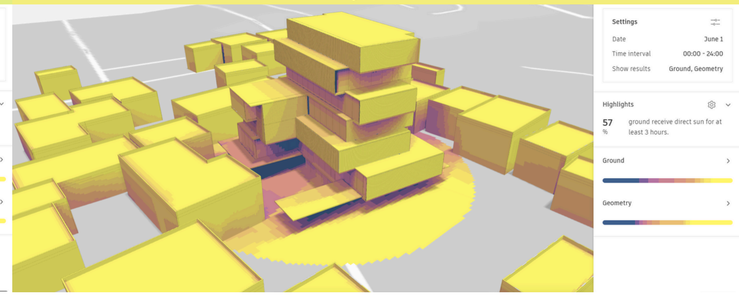
The ground receives 44% of direct sun for at least 3 hours. The North and East elevations receive indirect sunlight. The 'flushed' blocks are protected from intense sunlight penetration.

September



The ground receives 55% of direct sun for at least 3 hours. On the North and East elevations the double facade (curtain walls & louvres) are flushed into the blocks to reduce the heat gain.

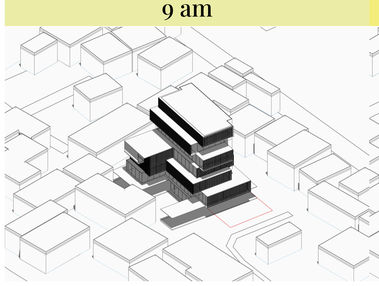
June



The ground receives 57% of direct sun for at least 3 hours. Blocks shifting mass strategy significantly reduces the heat gain and solar radiation during the sun peak hours.

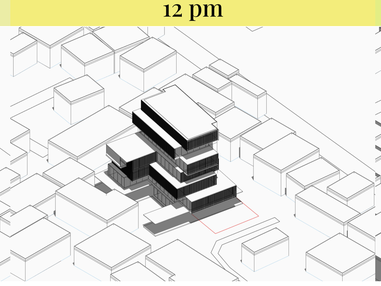
Shadow study

9 am



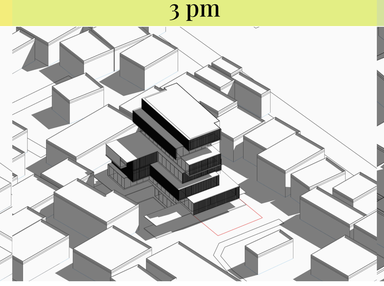
Shifted blocks cast the shadows on each other so the building acts as a shading device for itself.

12 pm



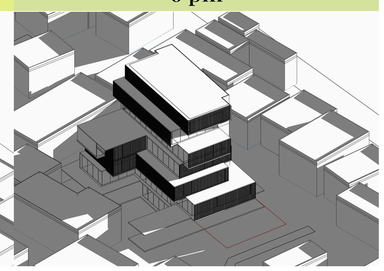
At 12 pm the sun is at its highest point, the green roofs allow to absorb the heat and ensure a thermal comfort inside the building.

3 pm



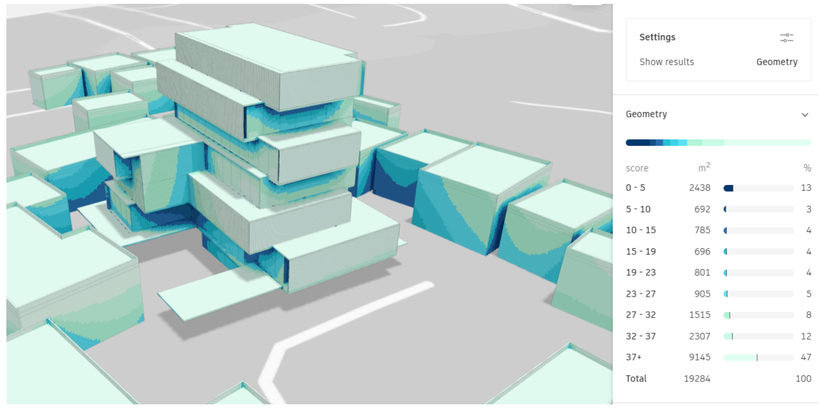
The typical heat peak hours last from 12 pm to 3 pm. The working spaces and outdoor amenities are purposely pushed to the eastern side.

6 pm

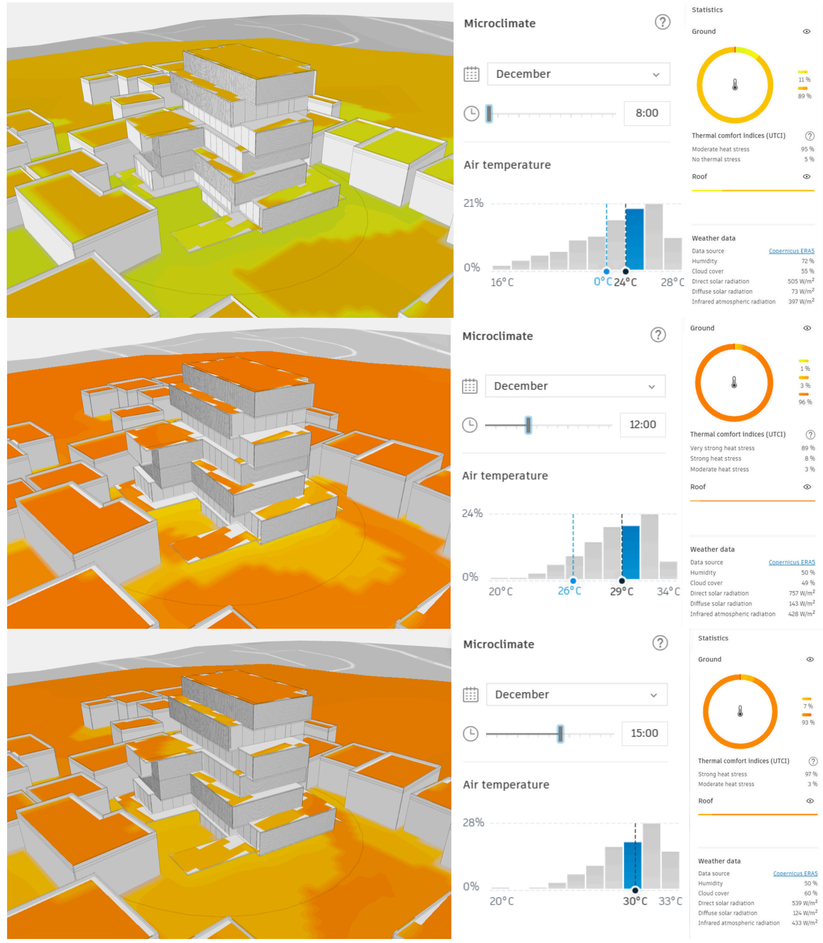


The building casts shadows on its courtyard and adjacent properties. The Western elevation consists of solid facade which blocks it from direct sun exposure.

Daylight potential analysis



Microclimate analysis



From 12 pm to 3 pm solar radiation continues to accumulate and receives a strong heat stress ranging from 89% to 97% during these hours.

DAYLIGHTING

Natural Lighting

Large windows and skylights are included into the design of the structure to allow natural light to reach the interior spaces

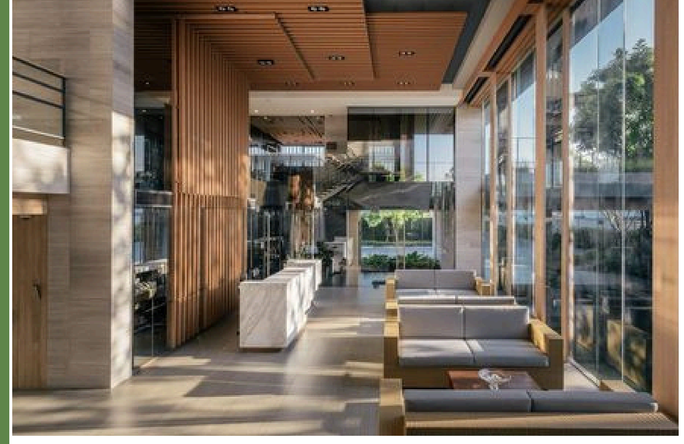
lessens the need for artificial lighting

produces visually attractive environment that is closely connected to the surroundings.

Building Orientation

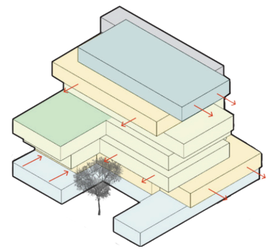
The building is designed and orientated to block the West sun with its services. Users of the building are more encouraged to be in the East side where the courtyard is located

South facing facades typically receive the most direct sunlight in the northern hemisphere, allowing for ample daylight penetration. The design includes larger windows and openings on the southern side of the building to maximize the intake of daylight.



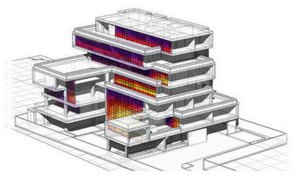
Double Volume Spaces

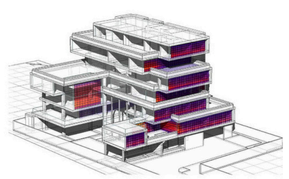
Some areas inside the building are designed with a double volume space to allow more natural lighting into the interior. The large glass windows allow light to penetrate deeper in the spaces in the building.

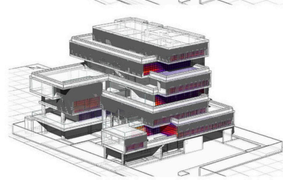


Balconeys

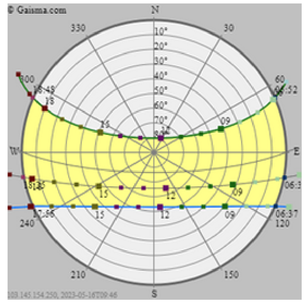
the mass of each floor is shifted different to each other, creating a series of overlapping cantilevered terraces. Balconies located around the building brings in natural light without affecting users in the interior with harsh UV light. shape of the building acts as passive shading for optimum amount of natural lighting during the day. environment with a strong connection to the outdoors





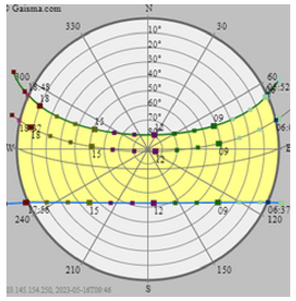


Sunpath Diagram



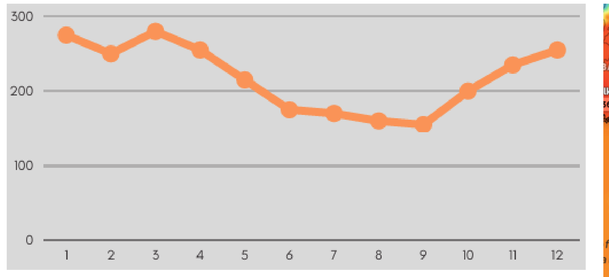
21 February

Equinox (March, September)

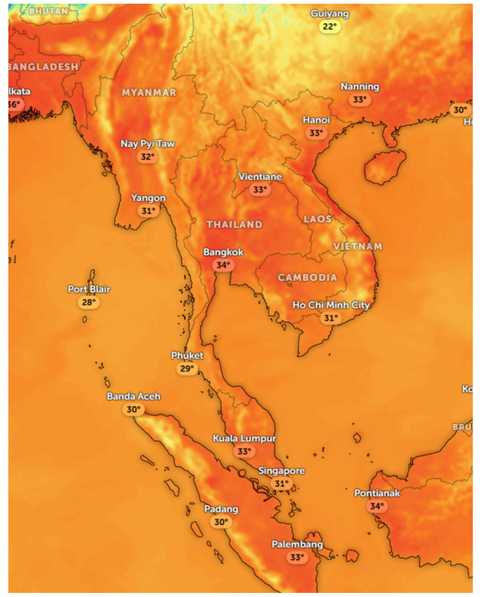


21 August

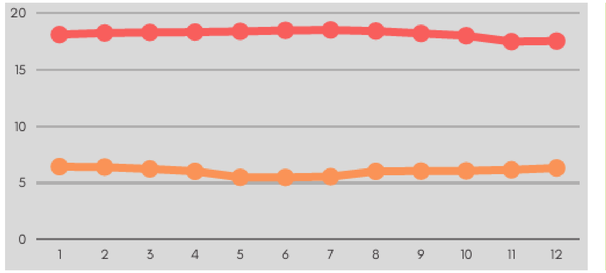
Monthly Sun Hours in Bangkok, Thailand



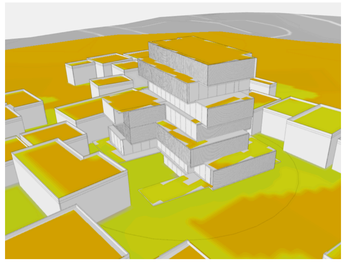
On average, January is the sunniest month with 273 hours of sunshine. While September has on average the lowest amount of sunshine with 155 hours. This data concludes that Bangkok received an average of 219.16 hours of sunlight on an average monthly basis. The average yearly amount of sun in Bangkok is 2630 hours



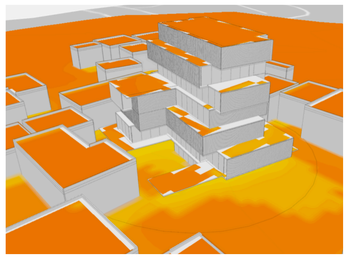
Daily Sun Hours in Bangkok, Thailand



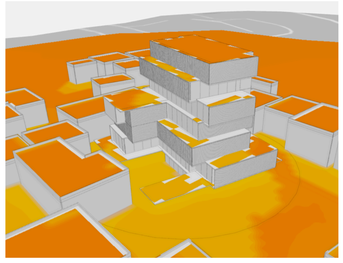
On average, June has the longest hours of daylight with the average of 12:58 hours a day. While December has the shortest average hour of daylight with only 11:22 hours a day. The average yearly hours of daylight in Bangkok is 11:08 hours a day



8am- 24 degrees

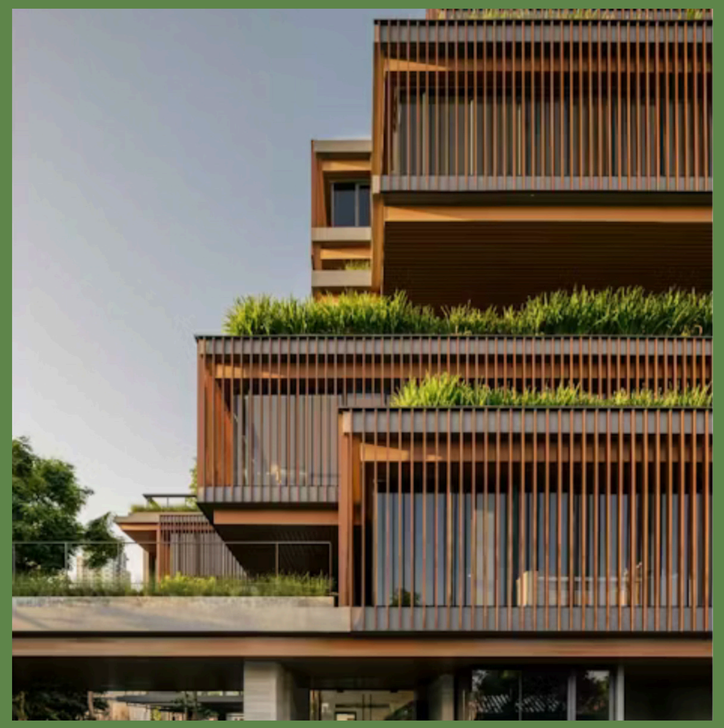


12pm- 29 degrees

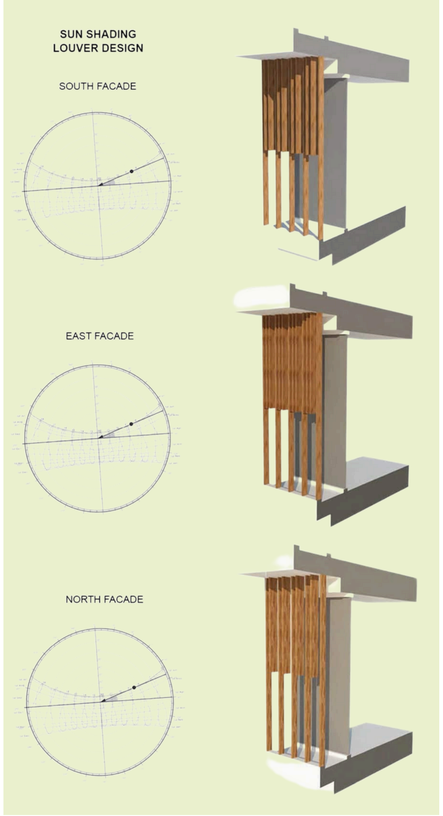


3pm- 30 degrees

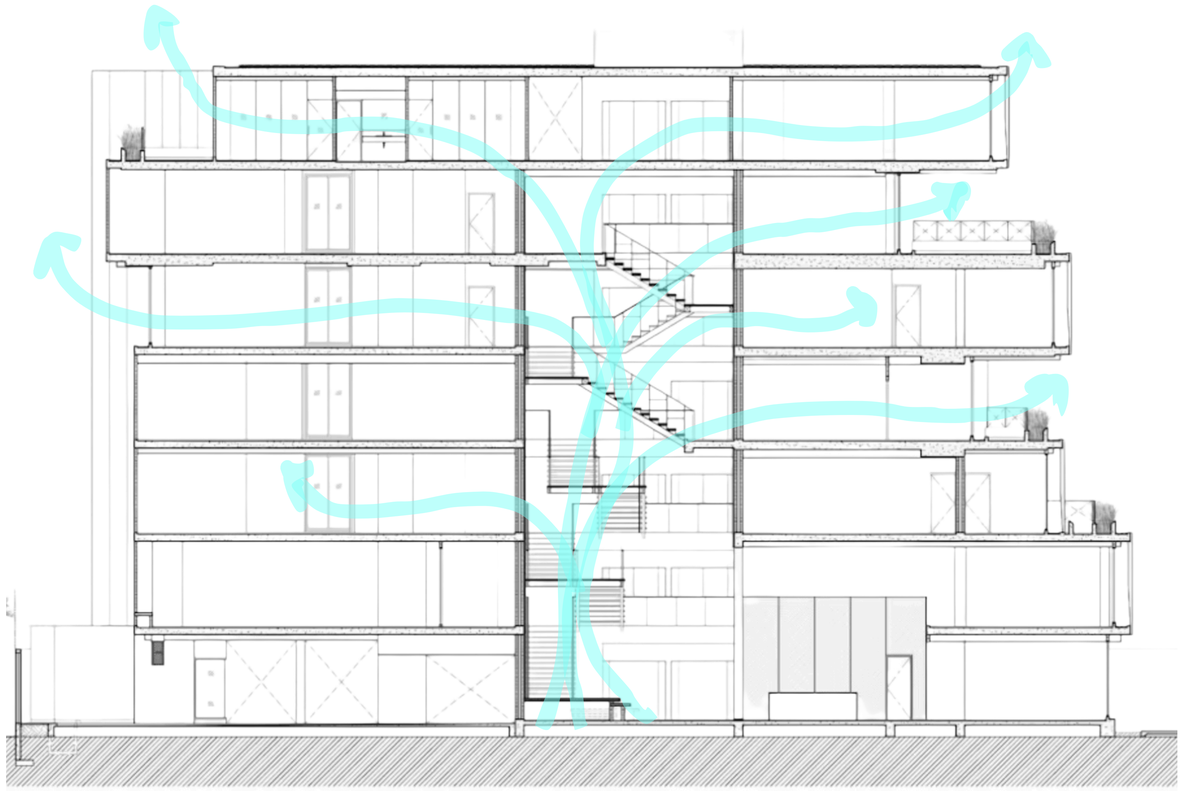
NATURAL VENTILATION



The design reduces reliance on air conditioning by filtering excess heat and sunlight while enabling cross-ventilation. This helps maintain a comfortable indoor climate in Thailand's tropical conditions

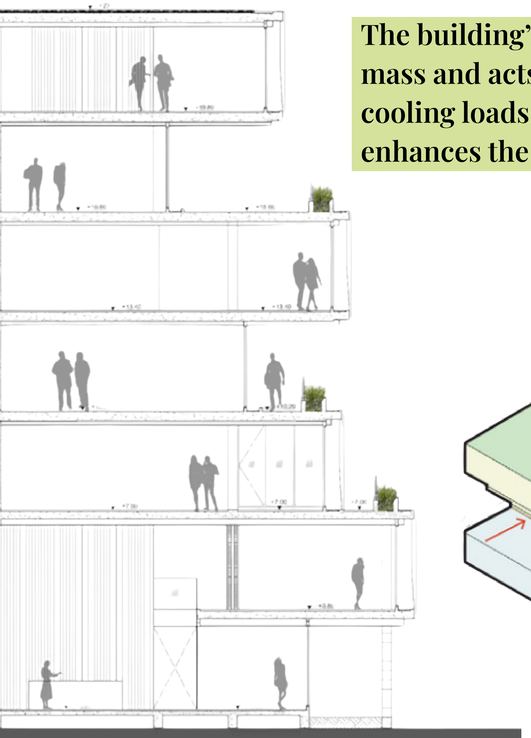


The Intercrop Office utilizes aluminum vertical louvres on its facade, which are precisely calibrated to the sun's angle.

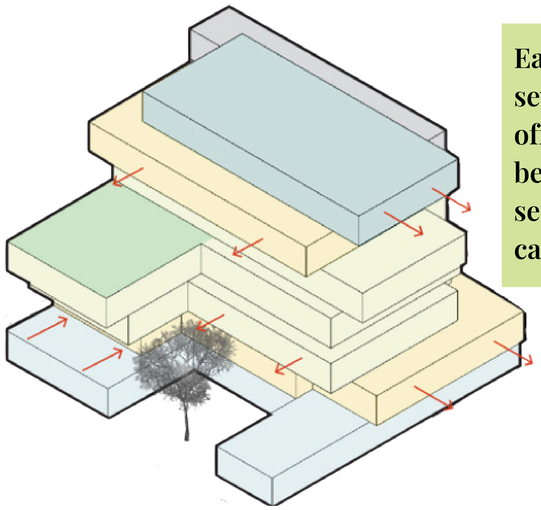


When louvers absorb the suns heat, it warms up the air around it, allowing the air to rise and go through openings, this creates air flow, which creates stacking effect

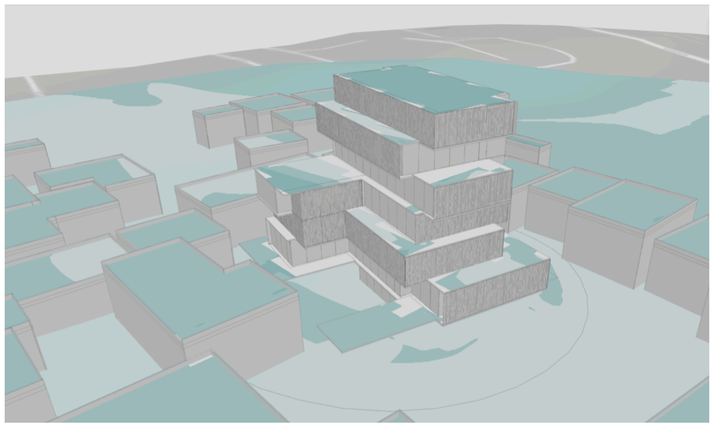
These louvers do more than provide shade, they also serve as channels for natural ventilation, allowing fresh air to flow between the exterior and interior spaces.



The building's "rice terrace" floor design adds thermal mass and acts as natural insulation, further lowering cooling loads and supporting a microclimate that enhances the effectiveness of natural ventilation

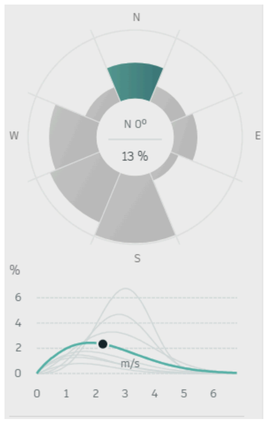


Each of the building's seven floors is slightly offset from the one below, creating a series of overlapping cantilevered terraces



The darker blue areas around the ground and on rooftops indicate stronger wind exposure

The surrounding buildings and context help simulate wind flow around the building

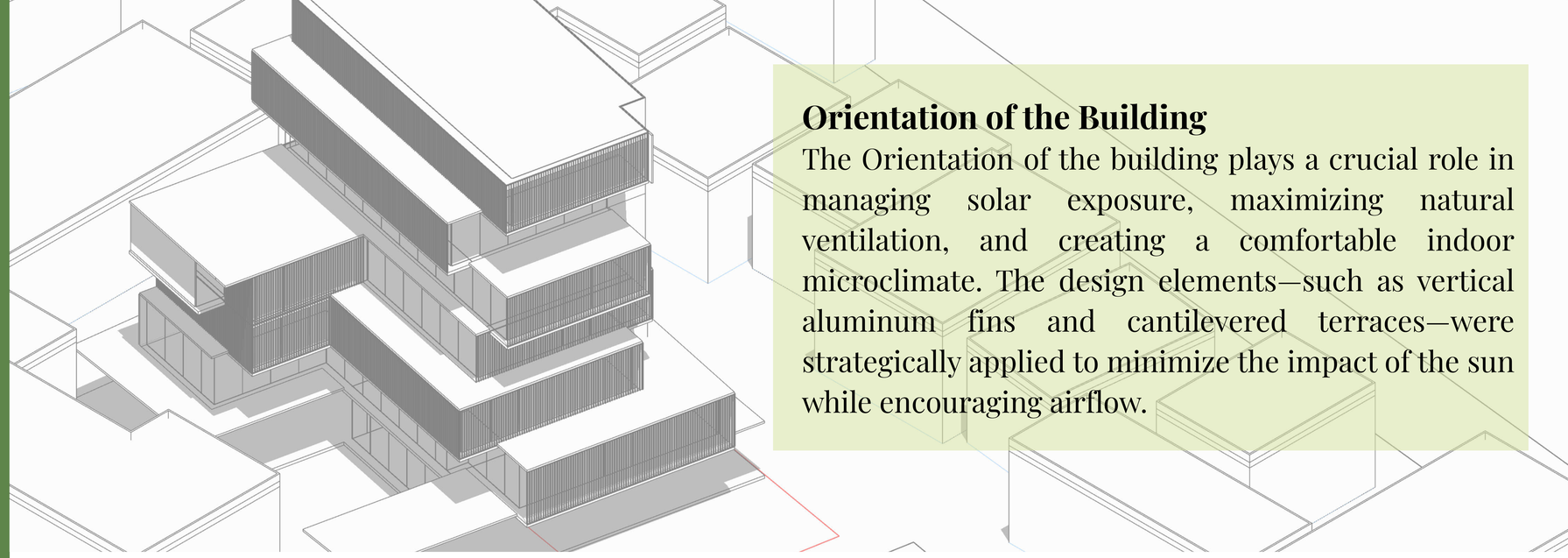


Wind Speed~2 m/s (light breeze)
Suitable for outdoor comfort and natural ventilation strategies

Wind Direction
Winds coming in from the southwest and a few prevailing winds from the north

FACADE DESIGN

The Intercrop Office in Bangkok utilizes advanced climate-responsive design strategies to optimize energy efficiency, thermal comfort, and interaction with the environment. By focusing on Orientation, Window-to-Wall Ratio (WWR), and Materials, the façade creates a harmonious blend of form and function, ensuring the building adapts to the tropical climate while reducing environmental impact.



Orientation of the Building

The Orientation of the building plays a crucial role in managing solar exposure, maximizing natural ventilation, and creating a comfortable indoor microclimate. The design elements—such as vertical aluminum fins and cantilevered terraces—were strategically applied to minimize the impact of the sun while encouraging airflow.

Climate-Responsive Façade

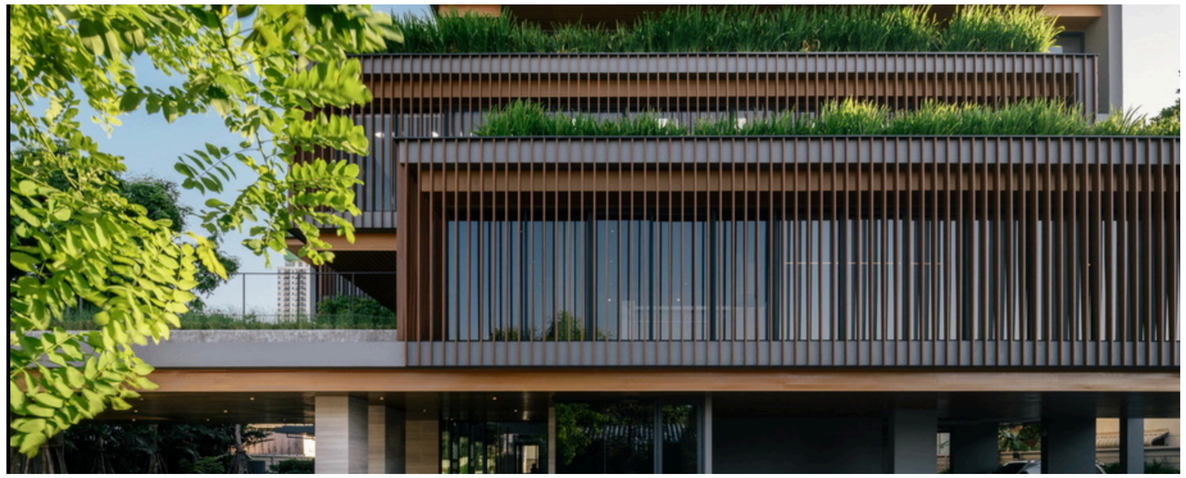
Function: The entire façade is tailored to Bangkok's tropical climate, with elements like fins and terraces working together to balance sunlight and heat distribution across different orientations.

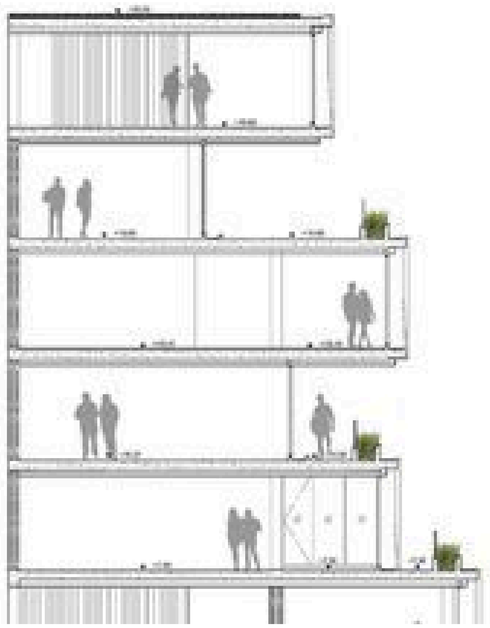
Impact: It creates a comfortable microclimate within the building and reduces the reliance on mechanical cooling systems.

Rice Terrace Floor Offsets

Function: The cantilevered floors create shaded terraces, which protect the building from excessive sun exposure while providing outdoor spaces for occupants.

Impact: These terraces also contribute to cooling the building naturally by promoting airflow and reducing solar radiation on lower floors.





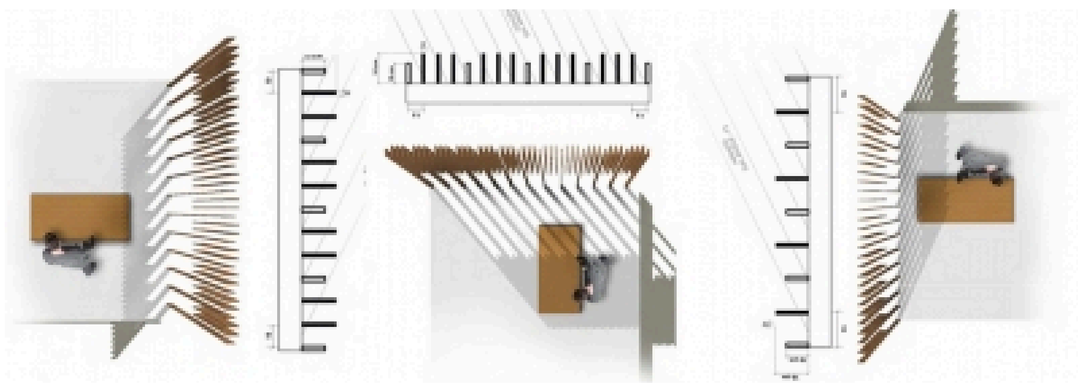
Window-to-Wall Ratio (WWR)

The Window-to-Wall Ratio (WWR) refers to the proportion of the building's surface area covered by windows (glazing) compared to the walls. An optimal WWR can enhance daylighting, reduce energy consumption, and improve visual comfort. The design of the Intercrop Office ensures that the glazing areas are maximized while maintaining thermal efficiency.

Vertical Aluminum Fins

Function: Shade devices that block direct sunlight but let in natural light.

Impact: Reduces glare and heat, enabling larger glazed areas without energy loss.



Materials & Functionality

Low-E glass and solar films reduce glare and heat, while light-colored materials and terraces minimize heat absorption. Together, they improve thermal comfort and lower cooling demands.

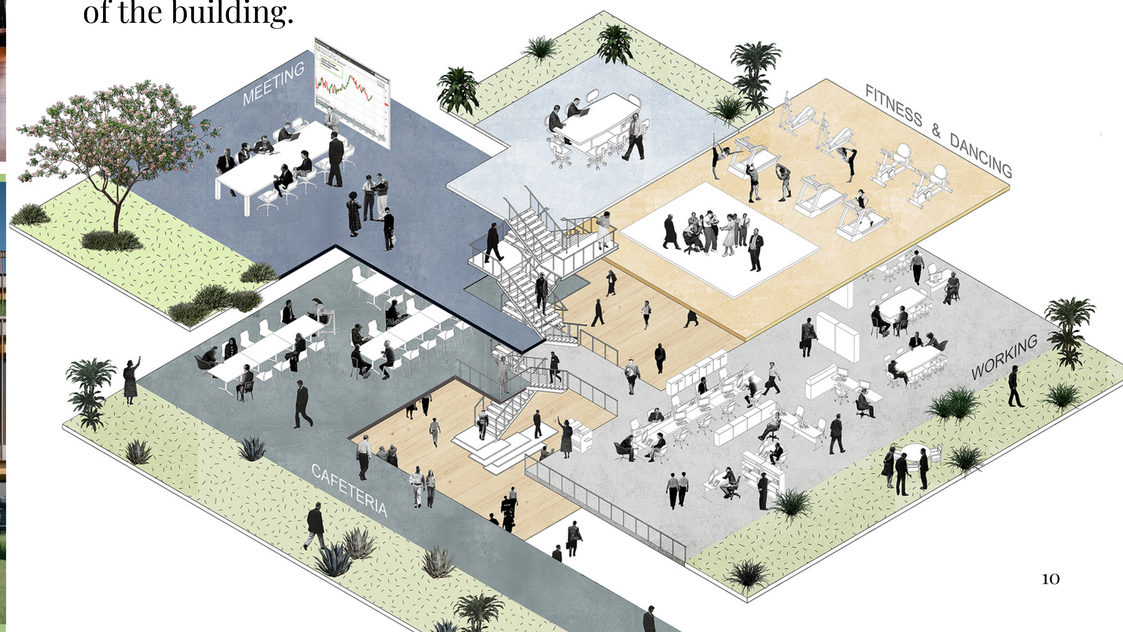
Facade Style & Design

Large glass panels enhance daylight and views, while vertical fins and terraces provide shading to reduce heat. The design combines modern looks with passive comfort.

Integrated Interior-Exterior Spaces

Function: The seamless integration of interior and exterior spaces through large glass panels encourages greater openness and transparency, effectively increasing the visual WWR.

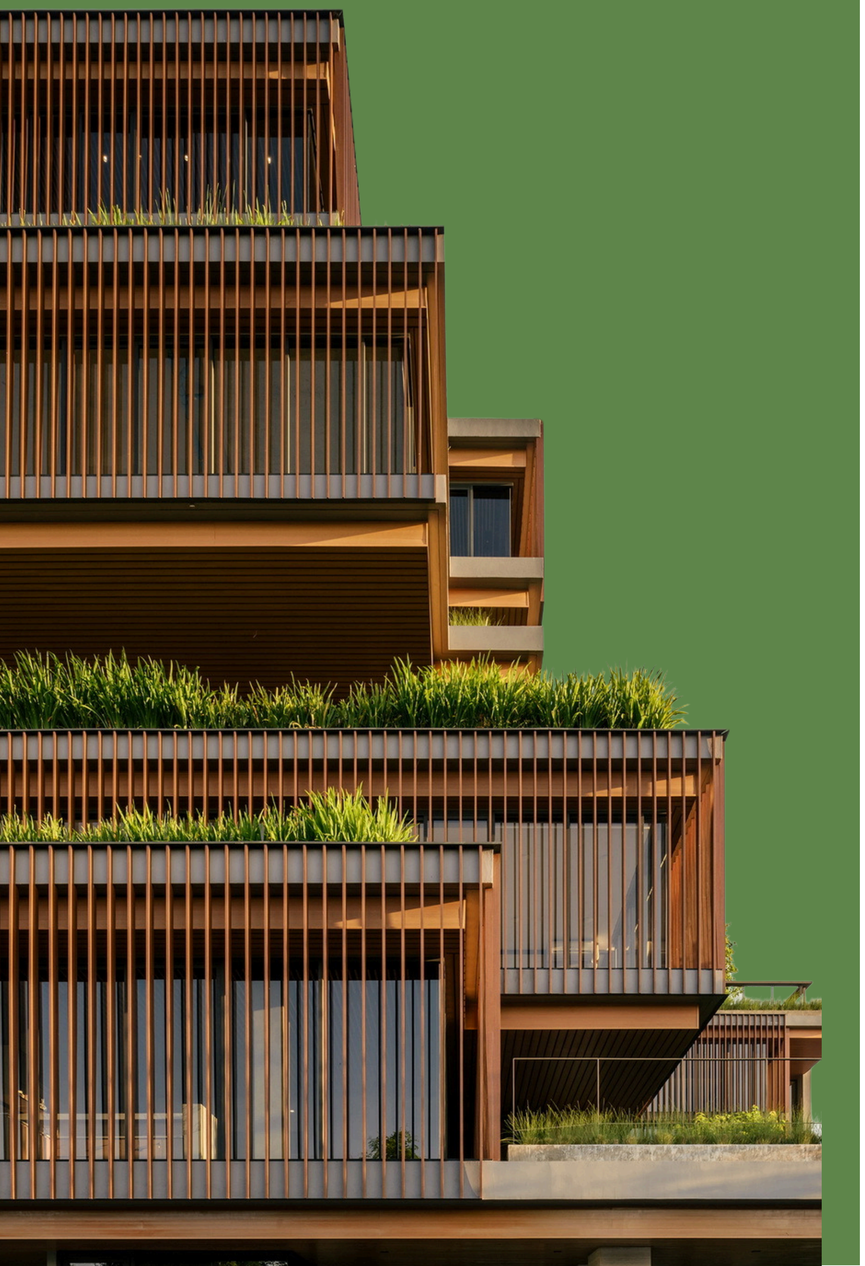
Impact: This creates a dynamic environment that encourages interaction with nature and enhances the overall aesthetic value of the building.



STRATEGIC LANDSCAPE

Importance of strategic landscaping

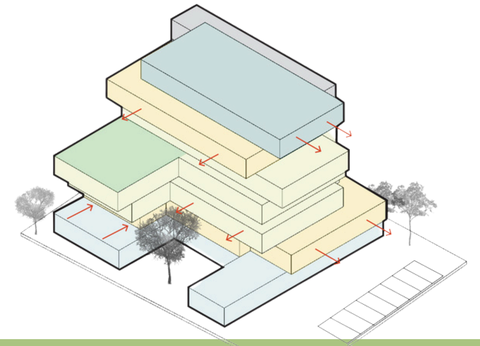
- Strategic landscaping is a fundamental aspect of the Intercrop Building's design, enhancing both its environmental performance and user experience. By integrating green spaces into the architectural layout, the building not only contributes to biodiversity but also optimizes energy efficiency and occupant well-being.



Green Roof

- As bangkok is a densely populated area in a tropical climate it was desiogned for the roof to have greener which covers 80% of the roof

Adaptive Building Massing

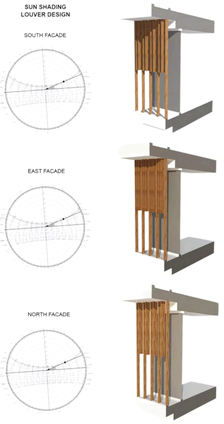


- The seven-story structure employs staggered floor plates, creating cantilevered terraces that mimic rice terraces. This design not only maximizes usable space but also facilitates natural ventilation and daylight penetration.

Surrounded by Greenery and vegetation

- The Greenery and Vegetation helps user by reducing heat and also helps by creating a better work environment as access to green spaces have shown to improve mental health

Climate-Responsive Facade



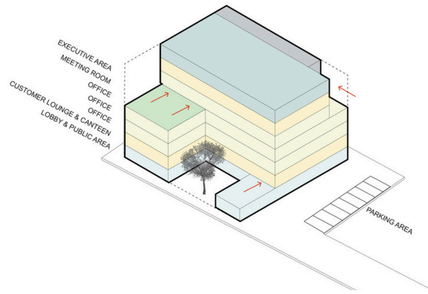
- An aluminum vertical fin system is calibrated to the sun's path, providing shading, enhancing natural airflow, and reducing solar heat gain. This approach minimizes reliance on air conditioning and contributes to energy efficiency

Stormwater Management

- Vegetated areas absorb rainfall, mitigating surface runoff and decreasing the risk of flooding, thereby contributing to sustainable water management practices.

Functional Zoning

- The building's layout is organized to support the company's operations, with flexible office spaces, meeting rooms, and communal areas that encourage interaction and innovation.



CONCLUSION

The Intercrop Office in Bangkok showcases a sustainable and climate-responsive approach to modern office design in a tropical urban setting. Thoughtful site planning preserves existing vegetation and introduces green spaces that improve thermal comfort, support biodiversity, and create a calming work environment. A water feature aids passive cooling and enhances the building's biophilic qualities, while well-placed access points integrate the project into the dense urban fabric.

Designed with Bangkok's hot, humid climate in mind, the building uses orientation, open layouts, and microclimate analysis to promote cross ventilation. Features like operable windows, shaded terraces, and double-skin façades reduce reliance on mechanical cooling.

Façade elements—such as vertical fins, recessed openings, and perforated screens—filter harsh sunlight while allowing ample natural light, ensuring energy efficiency and occupant comfort. The landscaping reinforces sustainability through native planting, permeable surfaces, and shaded outdoor areas, rooting the design in its local ecology.

MEDIA-TIC BUILDING

1. Introduction

The Intercrop Building is a landmark of sustainable and intelligent architecture. Serving as a hub for technology, innovation, and communication companies, it stands out for its bold, futuristic design and pioneering use of environmental strategies. A key feature is its adaptive façade system, which helps reduce energy consumption by intelligently responding to changing environmental conditions.

Site Location: Carrer de Roc Boronat, 117, Sant Martí, Barcelona, Spain

Area: 3,572.45 m²

Built Year: 2010

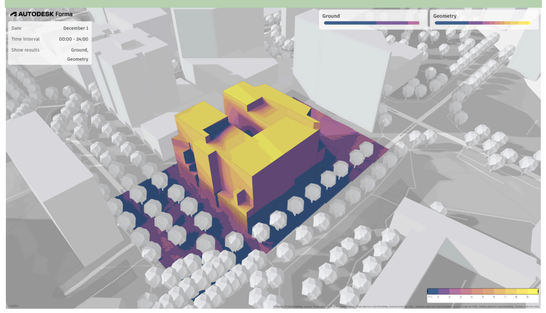
Building Typology: Office Building

Architect: Enric Ruiz-Geli

SITE ANALYSIS

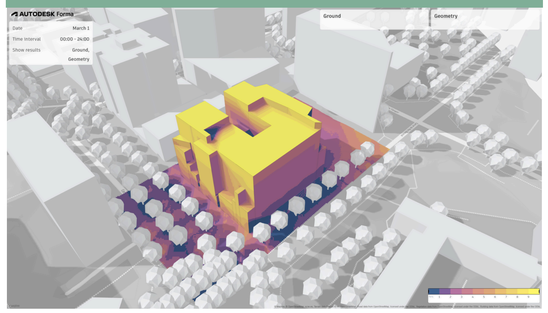
Sun hours analysis

December



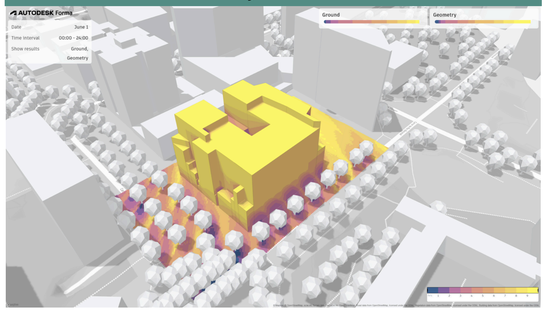
The ground receives 0% of direct sun for at least 3 hours. The front facades face North-east and North-west, the building receives cool indirect sunlight.

March



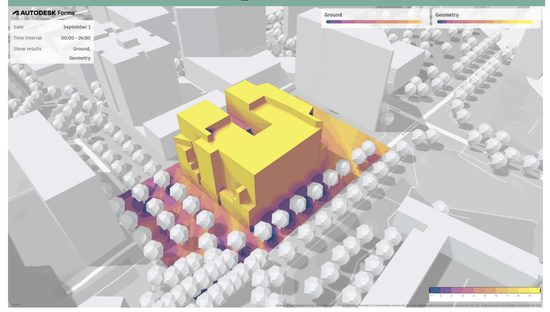
The ground receives 29% of direct sun for at least 3 hours. The front facades face North-east and North-west, the building's orientation offers a diffused soft light on the interior side.

June



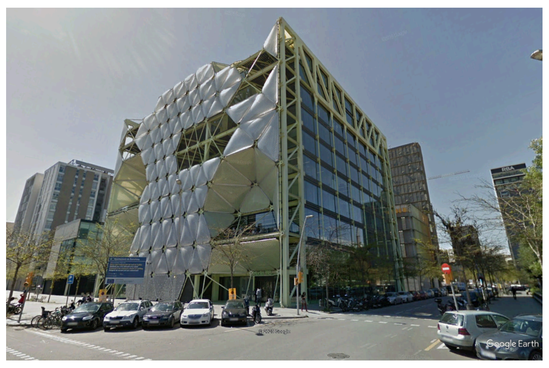
The ground receives 85% of direct sun for at least 3 hours. The North-east elevation receives a morning sun which is ideal for workspaces.

September



The ground receives 70% of direct sun for at least 3 hours. The North-west elevation gets afternoon sun, especially hot in summer. Thus the ETFE facade is placed on the North-west to protect a thermal comfort of interior spaces.

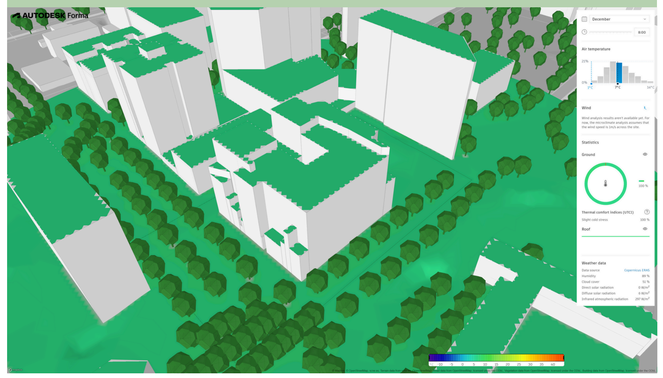
North-East elevation glazing



North-West elevation ETFE facade

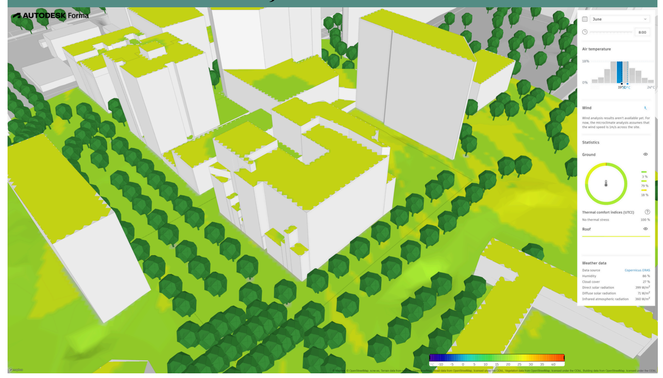
Microclimate analysis

December 8 am



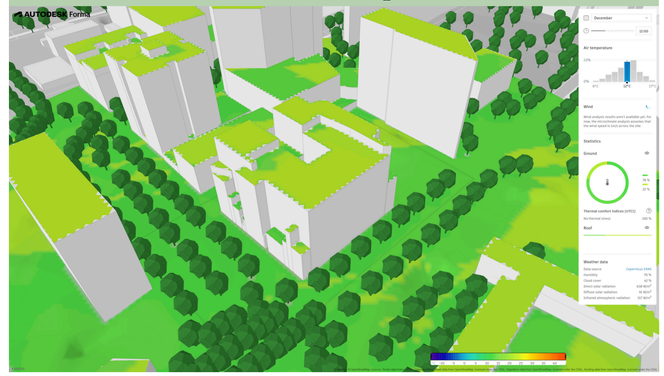
The temperature reaches approximately 7 degrees C, slight cold stress.

June 8 am



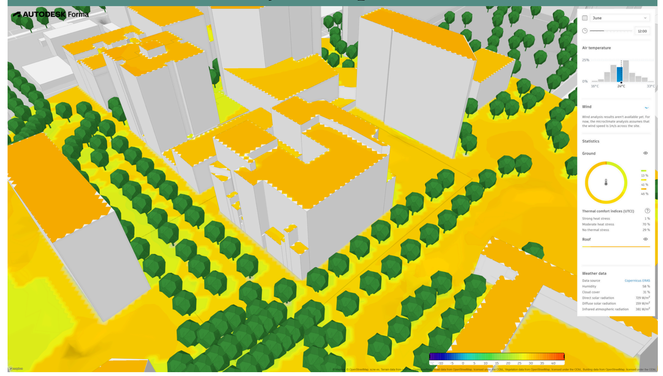
The temperature reaches approximately 20 degrees C, no thermal stress.

December 12 pm



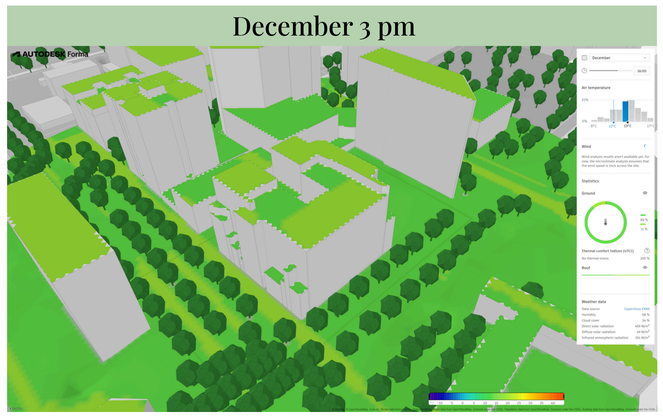
In the early afternoon temperature rises up to approximately 12 degrees C, no thermal stress.

June 12 pm



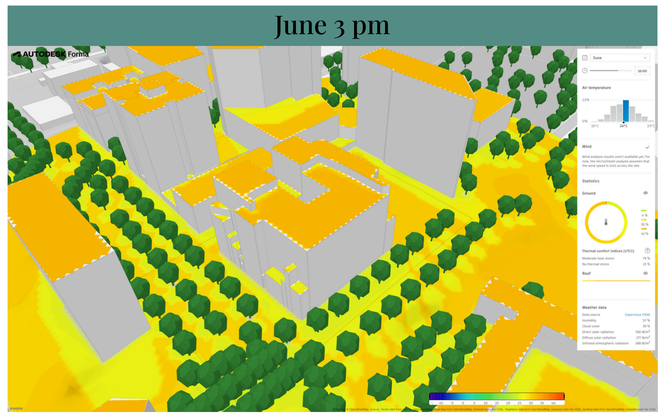
In the early afternoon temperature reaches up to approximately 24 degrees C, moderate heat stress (70%).

December 3 pm



In the afternoon the temperature does not fluctuate, no thermal stress until the evening time.

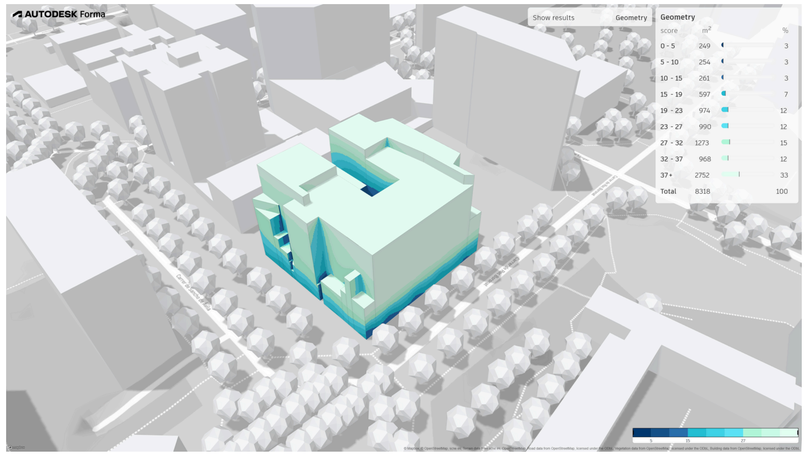
June 3 pm



During afternoon time the temperature does not fluctuate, moderate heat stress (79%).

SITE ANALYSIS

Daylight potential analysis



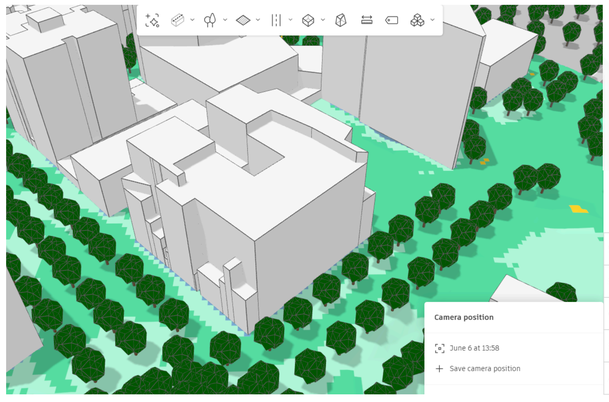
- North light is soft and consistent which is ideal for the building's typology and use.
- East and west façades receive strong, low-angle light in the mornings and afternoons.

Metric	Value
Annual Sunlight Hours	~2,500 hours/year
Winter Solstice Sun Altitude	~24° (low angle)
Summer Solstice Sun Altitude	~72° (high overhead sun)
Peak Solar Months	**April–September**
Sunlight Duration (Summer)	14–15 hours/day
Sunlight Duration (Winter)	9–10 hours/day

Wind direction analysis

- Variable wind directions throughout the year allows proper ventilation that reduces urban heat island effect and improves comfort.
- Dense vegetation allows to diffuse the wind.
- Harness summer sea breezes (SE) for beneficial passive cooling and cross-ventilation.

Comfort level analysis



- Summer:

SE sea breezes (gentle, cooling) – desirable for comfort and ventilation

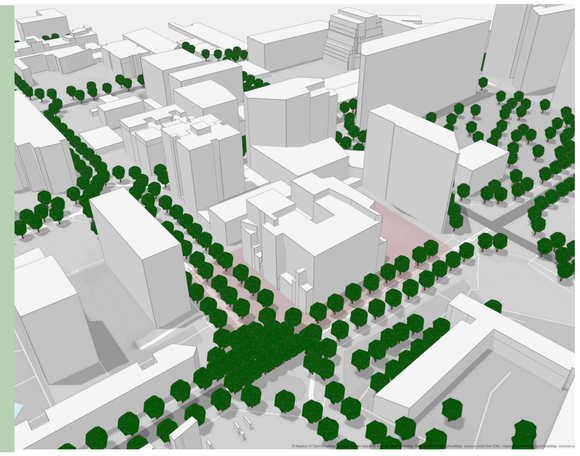
- Winter:

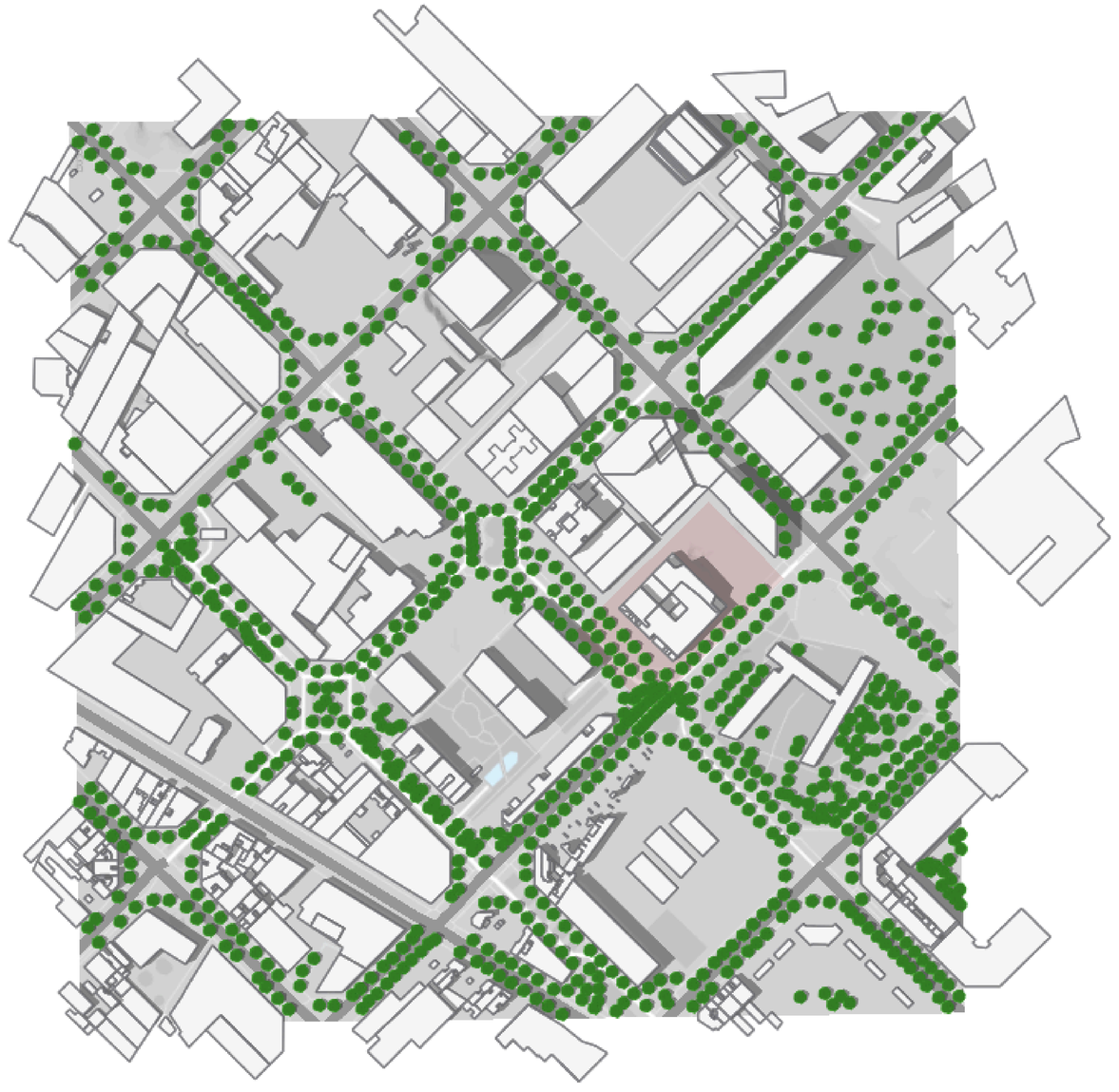
NW/N winds (stronger, colder) – can reduce comfort, especially in open or exposed areas

Season	Main Wind Directions	Characteristics
Summer	**SE (sea breeze)**	Light–moderate, cooling
Winter	**NW, N (Mistral, Tramontana)**	Cold, dry, can be strong
Spring/Autumn	Variable (E, SE, W)	Breezy, transitional patterns
Annual Prevailing Winds	**SE (from sea)** + NW (from inland)	Balanced coastal–continental mix

Dense Vegetation

- The corridor features well-established street trees (likely Platanus × hispanica or Celtis australis), providing dense shade and greenery especially along pedestrian routes.
- Urban gardens, planters, and informal green clusters add biodiversity and improve the microclimate within the block.
- Trees lower radiant heat by up to ~23°C in summer, significantly cooling streets and open spaces during peak hours.



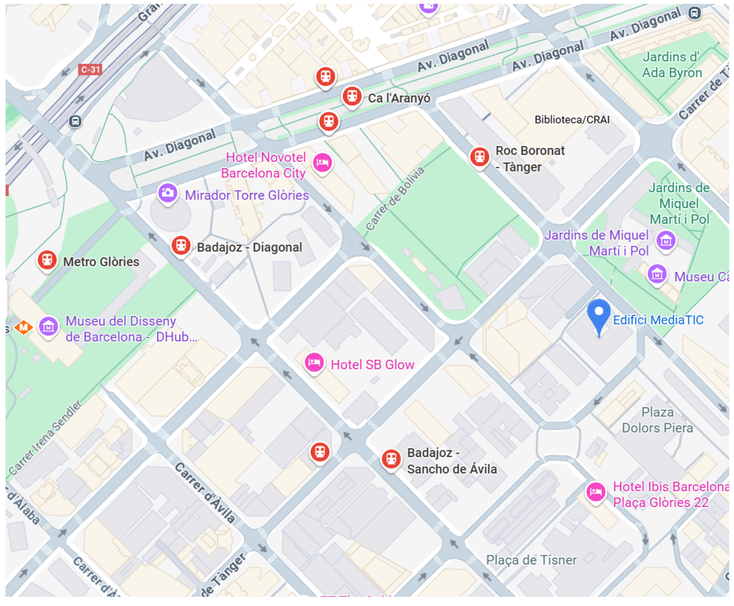


SITE ANALYSIS

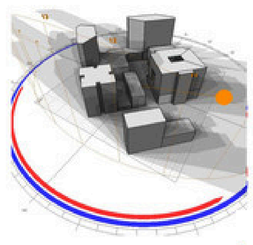
Transportation and Mobility

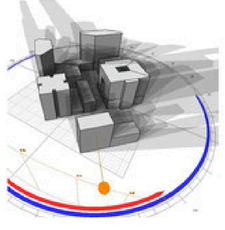
During the summer the building receives maximum direct sunlight, with longer daylight hours and deeper penetration into the interior. On the winter solstice, sunlight is less direct and enters only the upper parts of the building due to the sun's lower position. During the equinoxes, sunlight is evenly distributed throughout the day, providing a balanced light effect across the building's facade.

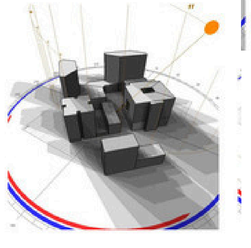
The Media-TIC building in Barcelona benefits from excellent transportation connectivity. It is located near Sants Estació, a major train hub with access to both regional and high-speed trains. The building is also served by the L3 (Green Line) metro, with a nearby station providing easy access. For those opting for a more sustainable commute, the building is within walking distance from several key areas, making it highly accessible and well-connected to the city.



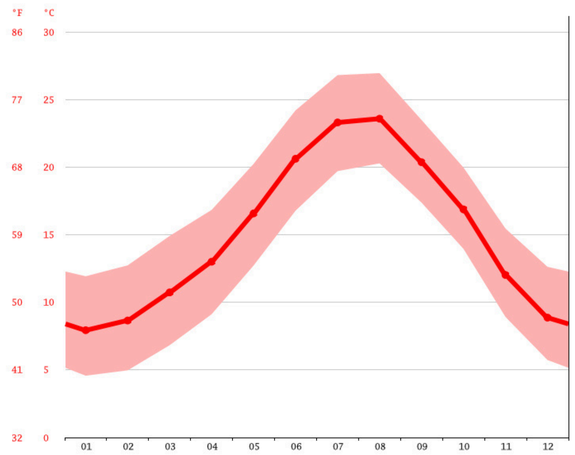
Natural Light





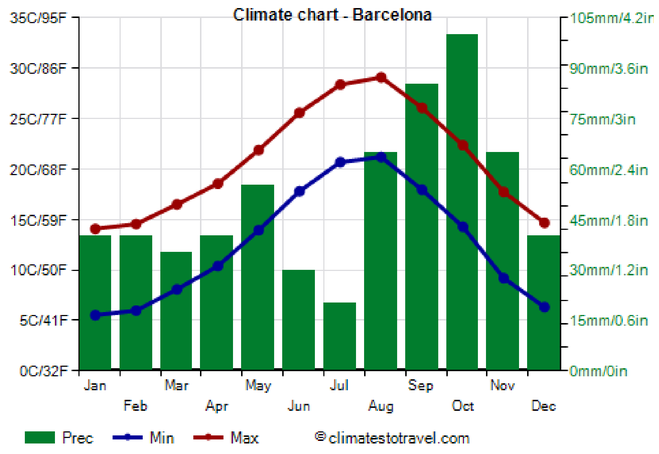


Average Temperature in Barcelona



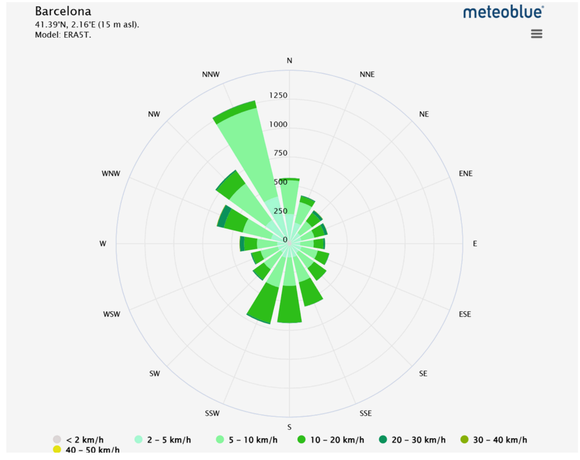
Barcelona has a mild Mediterranean climate with warm summers and cool winters. The hottest month is August, with average temperatures around 29°C (84°F), while the coldest month is January, averaging about 8°C (46°F).

Average Rainfall in Barcelona



Barcelona receives roughly 620 mm to 660 mm of rainfall per year . The wettest month is October, which sees around 90–100 mm of rain on average (about 3.5–3.7 inches) . Conversely, July is the driest, with only 20–27 mm of precipitation (0.8–1.1 inches)

Windrose Diagram of Barcelona



The windrose for Barcelona shows that the most frequent winds come from the southwest (SW) and northwest (NW). These directions have the longest bars, mainly in the 10–20 km/h range. Winds from the north, east, and southeast are less common.

DAYLIGHTING

The Media-TIC building uses an advanced facade made of ETFE (ethylene tetrafluoroethylene) cushions, which are transparent, lightweight, and highly durable. These cushions act as both daylight filters and thermal regulators, allowing natural light to enter while controlling heat gain.

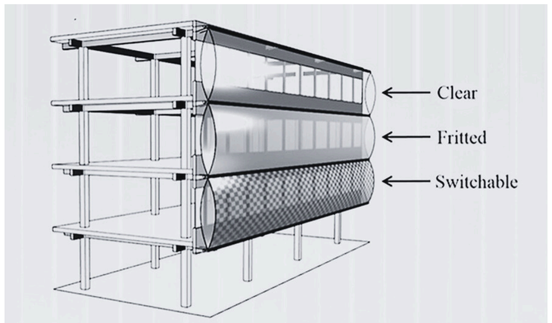
The southeast and southwest facades receives the most sunlight (around six hours per day). They are covered with 106 ETFE pillows and can inflate or deflate in response to sunlight intensity, thanks to a network of sensors and pneumatic mechanisms.

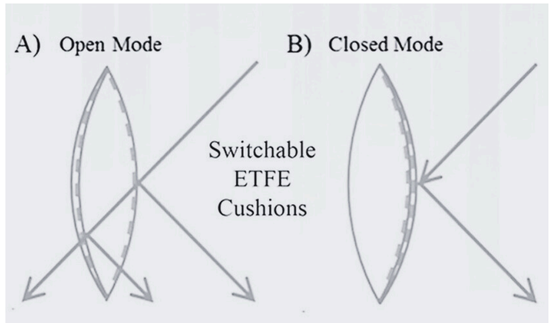
Some ETFE cushions are filled with nitrogen, increasing their opacity and further filtering sunlight when needed. This reduces glare and heat while still allowing diffuse daylight to penetrate the interior

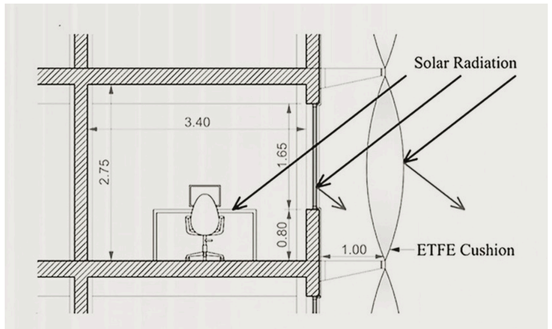
Inflation:
The cushions are kept pressurized by a dedicated air handling unit. When inflated, the cushions become more opaque, blocking up to 65% of solar radiation, while still allowing diffuse daylight to enter. This helps reduce heat gain and glare inside the building.

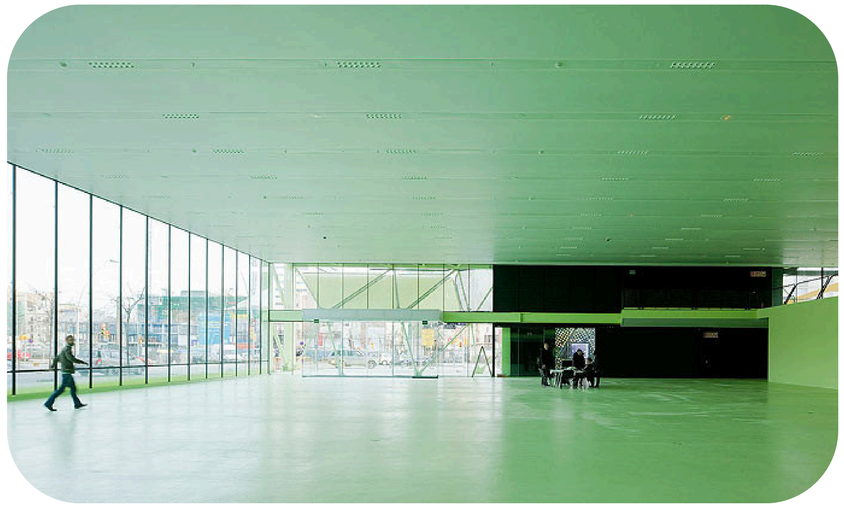
Deflation:
When less solar protection is needed (such as on cloudy days or in cooler months), the cushions can be partially deflated, allowing more direct daylight to penetrate and increasing transparency.

Sensors and Control:
Each cushion is equipped with sensors that measure sunlight intensity, temperature, and sun angle. These sensors autonomously control the inflation or deflation of each cushion in real time, optimizing daylight and thermal comfort throughout the day









The two sunniest facades use the ETFE cushion system, while the other sides uses internal blinds for additional sun protection.

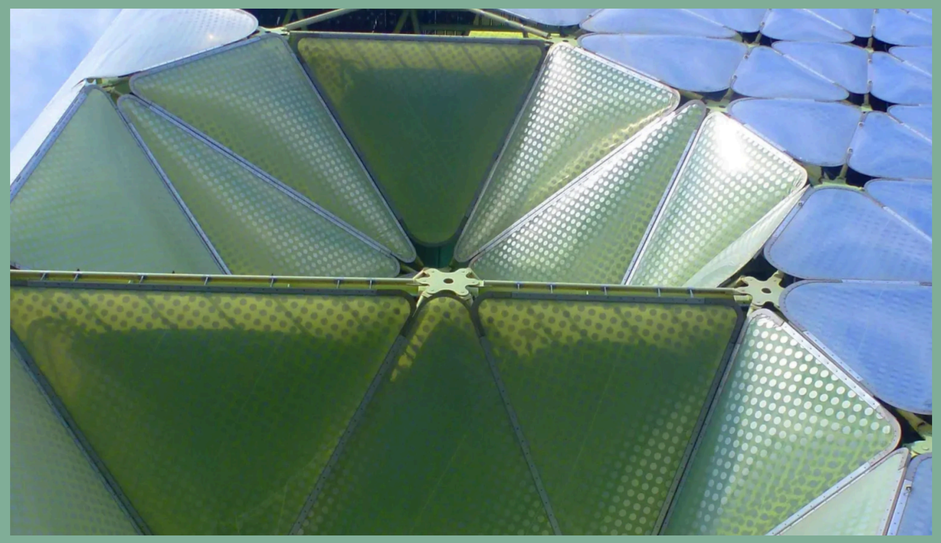
The building's design ensures that daylight is maximized in public and workspaces, creating bright, open interiors without excessive heat or glare

This system provides optimal daylighting while minimizing the need for artificial lighting and air conditioning, which significantly saves costs

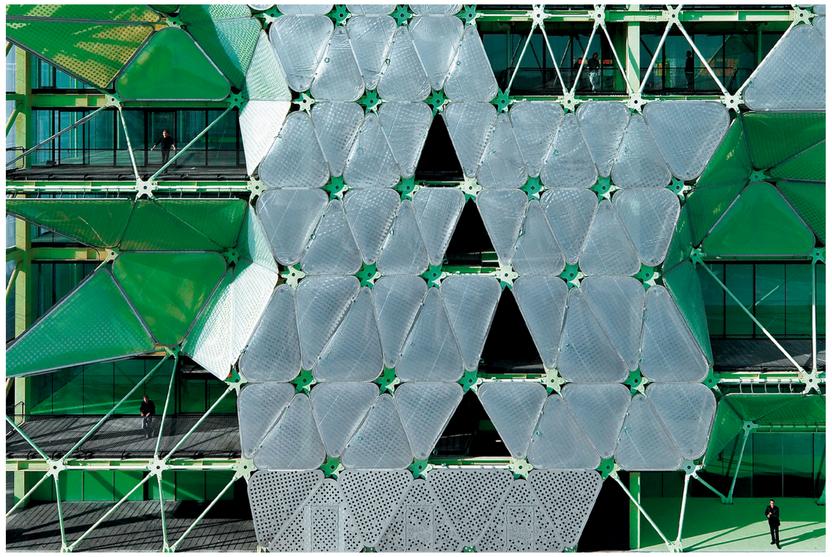
NATURAL VENTILATION

Adaptive facade systems

ETFE Cushions: The building's façade is composed of ETFE (ethylene tetrafluoroethylene) cushions, which can be inflated or deflated to control solar radiation and thermal gain. This dynamic system allows the façade to become opaque or transparent in response to external climatic conditions.



Sensor-Driven Climate Control
The building is equipped with sensors that monitor temperature, humidity, and pressure. These sensors collect external information to adapt the internal conditions, optimizing natural ventilation and energy efficiency.

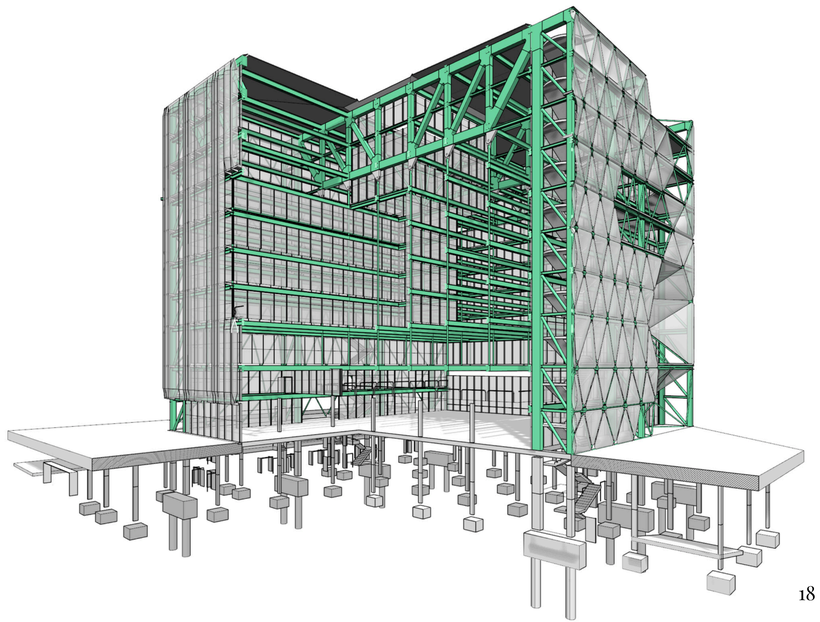


Solar Radiation Management: By adjusting the opacity of the ETFE cushions, the façade can block up to 65% of solar radiation during hot months, significantly reducing the cooling load on the building's HVAC systems.

Thermal Insulation: The air chambers within the ETFE cushions provide additional thermal insulation, helping to maintain stable indoor temperatures and reducing the need for mechanical heating.

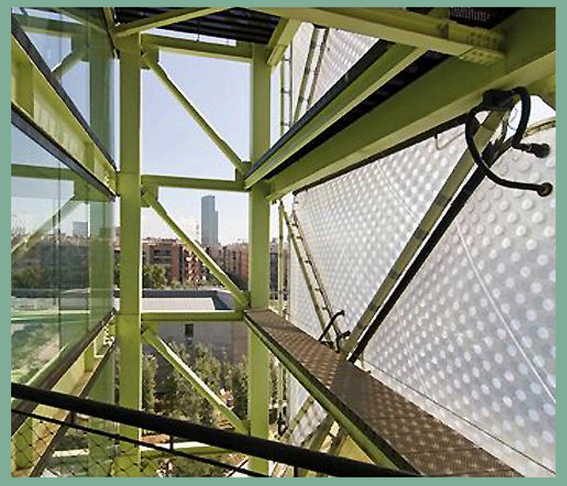
Atrium Ventilation
A large central atrium acts as a natural ventilation shaft.
Hot air rises through the atrium and exits through openings at the top, drawing cooler air from the lower parts of the building — a stack effect.

Cross Ventilation
The building's open plan and internal layout enable cross ventilation, especially on intermediate floors.
Windows and louvers can be controlled (some automatically) to allow fresh air in and stale air out.

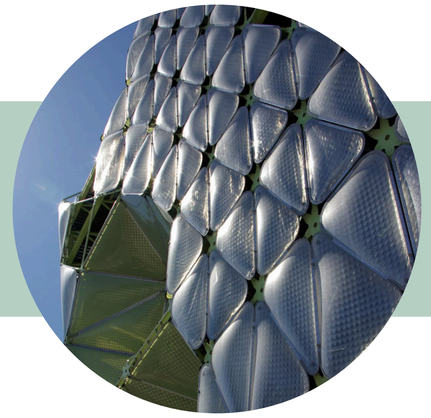


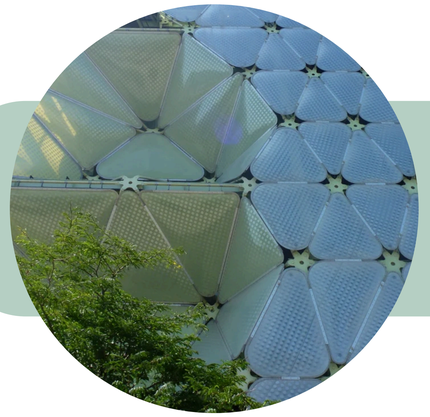
FACADE DESIGN

The Media-TIC Building's façade is a groundbreaking example of smart, sustainable design, using adaptive ETFE cushions that respond to sunlight and temperature in real-time. With systems tailored to each façade, it passively controls heat and light, drastically reducing energy use and CO_2 emissions. More than just functional, its translucent, high-tech appearance reflects the building's role as a digital innovation hub in Barcelona's 22@ district, making the façade both a climate shield and an architectural statement.



ETFE Façade System
The Media-TIC Building uses a lightweight, transparent ETFE cushion system designed for dynamic solar and thermal control. Two main façade systems are adapted according to sun exposure to improve energy performance and indoor comfort.

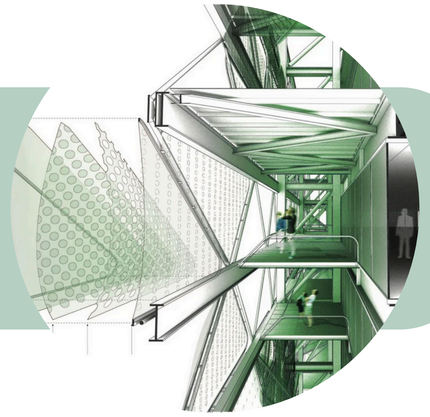




Sustainability Performance
The dynamic façades significantly reduce the building's energy demand for heating and cooling. This contributes to up to a 95% reduction in CO_2 emissions and has earned the building LEED Gold certification.

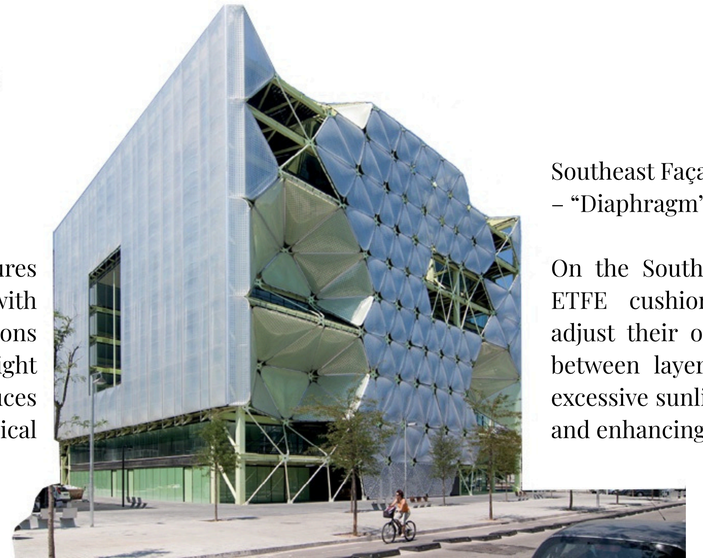
Solar Radiation Mapping and Façade Orientation Logic
The facade design responds to detailed solar radiation mapping, not just basic sun path. Different cushion types are placed based on intensity and angle of sunlight—lenticular cushions on the southwest block low-angle afternoon heat, while diaphragm cushions on the southeast control high-angle morning sun. This creates tailored "climate zones" across the facade, making it highly efficient and uncommon in standard commercial buildings.

Architectural Impact
The façade serves both as a climate control system and a striking design element. It symbolizes technological innovation and aligns with the digital identity of Barcelona's 22@ district.



Southwest Façade
– "Lenticular" System

The Southwest façade features vertical ETFE cushions filled with nitrogen gas. These cushions create a cloudy, diffused light effect that passively reduces thermal load without mechanical systems.



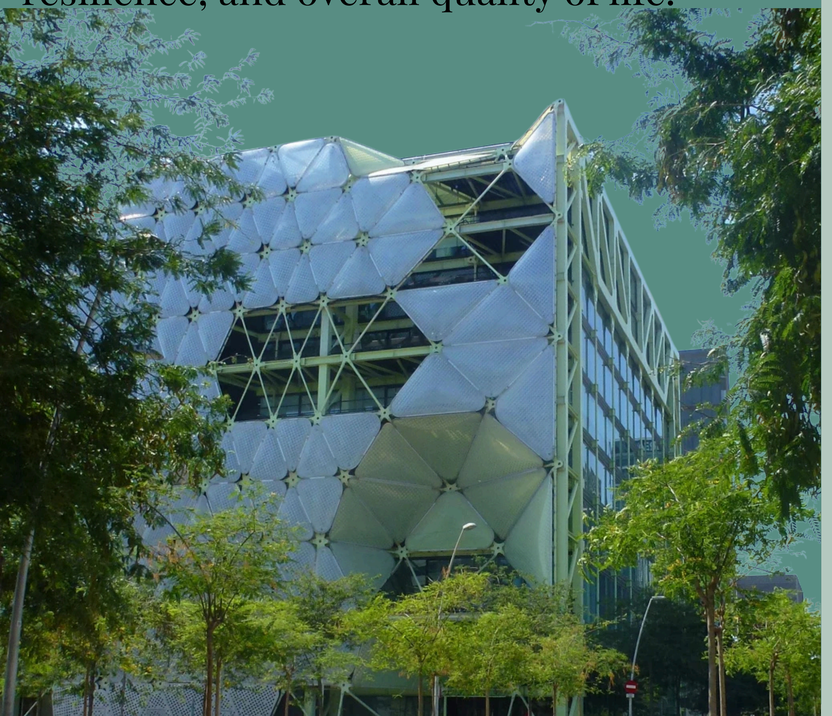
Southeast Façade
– "Diaphragm" System

On the Southeast façade, triangular ETFE cushions with three layers adjust their opacity by pumping air between layers. This system blocks excessive sunlight, reducing heat gain and enhancing indoor comfort.

STRATEGIC LANDSCAPE

Importance of Strategic Landscape

- Improves air quality by filtering pollutants and reduces noise pollution for a healthier environment.
- Moderates temperatures naturally, lowering heat stress and reducing energy use inside the building.
- Supports urban biodiversity by creating habitats and reconnecting ecosystems within the city.
- Manages rainwater through green areas and permeable surfaces, reducing flood risks and conserving water.
- Provides inviting green spaces that encourage social interaction and enhance well-being.
- Enhances the building's sustainability, resilience, and overall quality of life.



Biosolar Roof Integration

- 140 BP 3165S panels (165 Wp) deliver 23.02 kWp across ~182 m².
- Vegetation cools the panels, improving efficiency.
- Blends landscape and energy generation into a unified sustainable system.

Green Roof System with Photovoltaics

- The inverted Sedum-planted roof insulates the building and supports biodiversity.
- Cooling effect of vegetation enhances PV panel output.
- Roof includes a suspended platform for effective maintenance and durability.

Microclimate & Environment Control

- Trees, shaded zones, and softscape mitigate urban heat and improve outdoor comfort.
- Greenery passively cools the building envelope and boosts the ETFE facade's solar control.
- Reduced heat levels benefit the energy efficiency of both the building systems and PV panels.

Urban Biodiversity & Habitat Creation

- Native plants attract urban wildlife and support local biodiversity.
- Green elements form ecological corridors and microhabitats.
- Strengthens connections to Barcelona's green infrastructure network.

Rainwater Harvesting & Irrigation

- Rainwater is collected beneath the car park ramp and reused to irrigate the green roof.
- Supports a closed-loop system that cuts water demand and manages stormwater runoff efficiently.

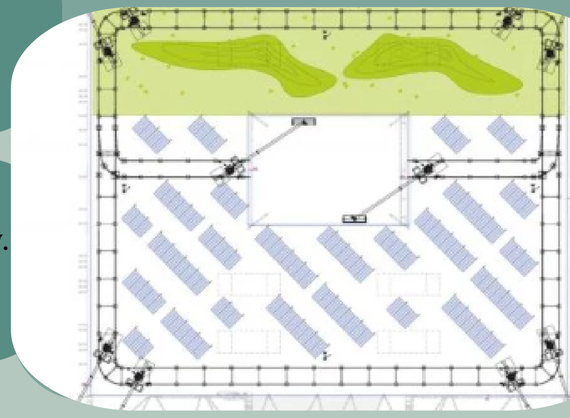
Permeable Landscaping & Stormwater Management

- Permeable surfaces and soil beds enable natural rainwater infiltration.
- Reduces runoff and replenishes groundwater, working in tandem with the green roof.

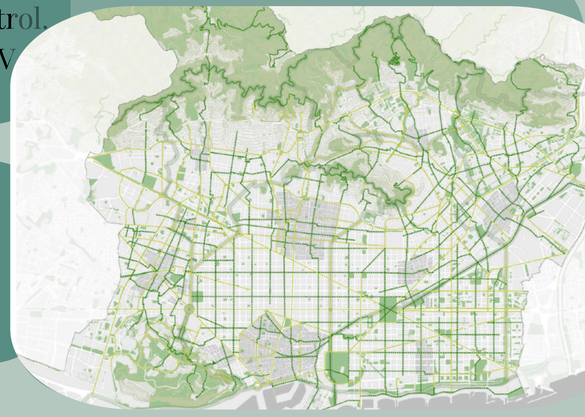
Integration with Urban Fabric

- Located in the 22@ Innovation District, a regenerated tech-focused area of Barcelona.
- Ground-level landscaping enhances walkability and public interaction.
- Includes bike lanes, pedestrian pathways, and open spaces that strengthen urban flow and social engagement.

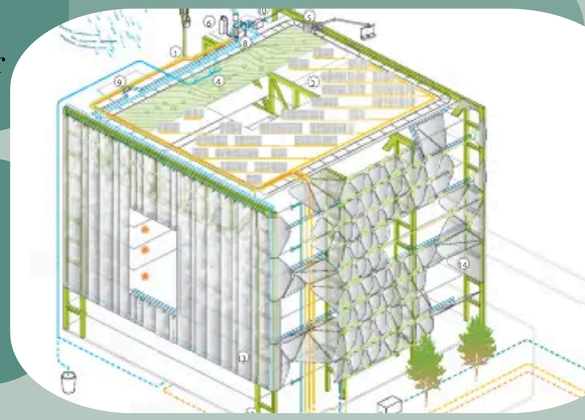
Green Roof System



Barcelona's Green Infrastructure



Rainwater Harvesting



CONCLUSION

Media TIC is a landmark that seamlessly fuses innovative design with environmental responsiveness, setting a precedent for future-forward architecture in Barcelona. Informed by comprehensive site analysis—including temperature fluctuations, rainfall patterns, prevailing winds, and solar trajectories—the building is a model of climate-conscious design. The dynamic façade, composed of ETFE cushions, acts as a responsive skin that adapts to solar gain and external conditions, optimizing both thermal comfort and energy efficiency.

Daylighting strategies and natural ventilation systems have been integrated into the design to reduce dependence on artificial energy, while ensuring occupant well-being. The open-plan interiors, enabled by long-span structural systems, foster flexibility and collaboration. Strategically positioned within a well-connected urban grid, the building benefits from excellent access to public transportation, reinforcing its role as a smart, accessible tech hub.

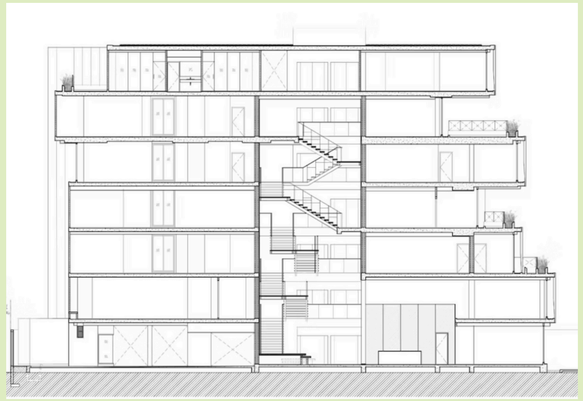
Complemented by a thoughtfully designed landscape that mitigates urban heat and enhances microclimate conditions, Media TIC is more than just a technological icon—it is a sustainable response to the unique challenges and opportunities of its site. In line with Barcelona's architectural legacy, the building merges tectonic clarity with digital innovation, embodying a vision for a resilient and connected urban future.

COMPARATIVE ANALYSIS

LOCATION BANGKOK, THAILAND

ARCHITECT STU/D/O ARCHITECTS

FIRST FLOOR PLAN



SECTION

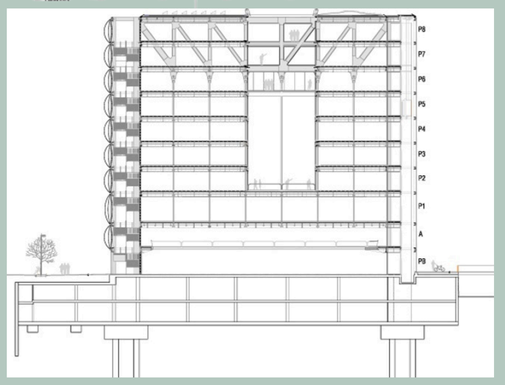
INTER CROP OFFICE

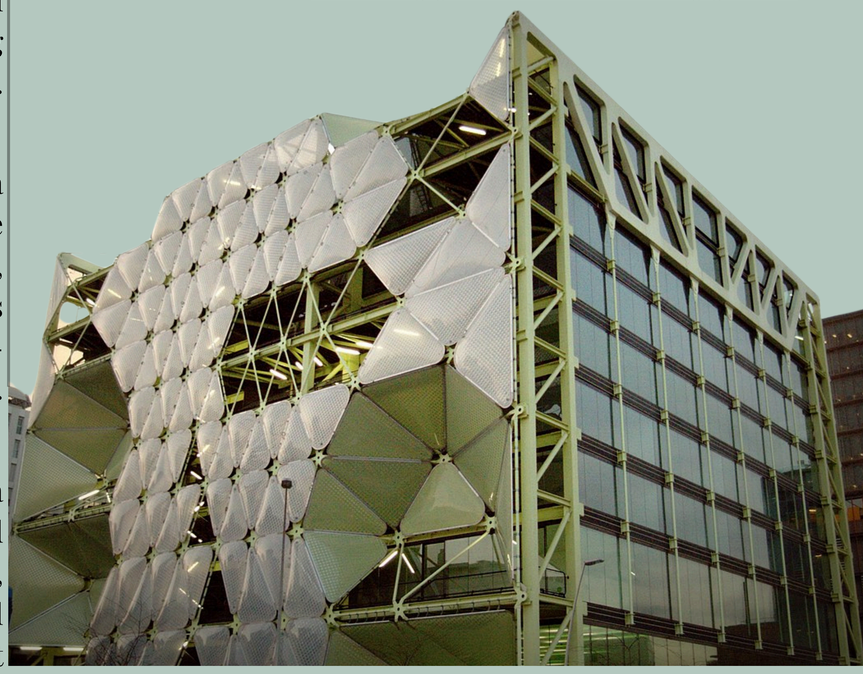
LOCATION BARCELONA, SPAIN

ARCHITECT ENRIC RUIZ-GEL

FIRST FLOOR PLAN

SECTION





MEDIA-TIC BUILDING

SITE ANALYSIS

Intercrop Bangkok is shaped for high temperatures, heavy rainfall, and low wind, using shaded terraces, vegetation, and open courtyards to enhance cooling and airflow.

Media-TIC Barcelona is planned for moderate rainfall, steady winds, and long sun hours, with a compact form, green roof, and translucent façade for daylight and insulation.

DAYLIGHTING

Intercrop Bangkok maximizes daylight through its open atriums and layered courtyards, allowing natural light to penetrate deep into the building while controlling glare and heat, ideal for a tropical climate.

Media-TIC Barcelona uses a translucent polycarbonate façade to diffuse daylight into interior spaces, reducing the need for artificial lighting while controlling solar gain in Barcelona's climate.

NATURAL VENTILATION

Intercrop Bangkok uses open corridors, courtyards, and operable windows to enhance cross-ventilation, reducing the need for air conditioning in a tropical climate.

Media-TIC Barcelona features a double-skin polycarbonate façade with adjustable vents, allowing controlled natural airflow while maintaining thermal comfort.

FACADE DESIGN

Intercrop Bangkok features a porous façade with open corridors, greenery, and layered screens that promote ventilation, daylight, and connection to nature.

Media-TIC Barcelona has a double-skin polycarbonate façade that filters light, reduces heat gain, and gives the building a luminous, tech-inspired appearance.

STRATEGIC LANDSCAPING

Intercrop Bangkok uses tiered green terraces inspired by rice fields to enhance shading, cooling, and a strong indoor-outdoor connection, focusing on microclimate improvement.

Media-TIC Barcelona features a green roof and rainwater collection system, supporting thermal insulation, reduced heat gain, and water reuse within building systems.

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