(ARC61804)

GREEN STRATEGIES FOR BUILDING DESIGN

Assignment 1: Passive Green Building Case Studies Poster & Booklet

Bioclimatic Flexi-Office, Saigon, Vietnam

The Kendeda Building, Atlanta, United States

BELLY WONG 0356764 | DESMOND 0366926

WILLIAM LIMMANJAYA 0364193 | CHOONG SHANYE YI 0364567

KIMIKO YONG YI XUAN 0359628 | NICOLAUS PUTRA TANJAYA 0360735

TUTOR : NIK SYAZWAN BIN NIK AB. WAHAB

TAYLOR'S UNIVERSITY
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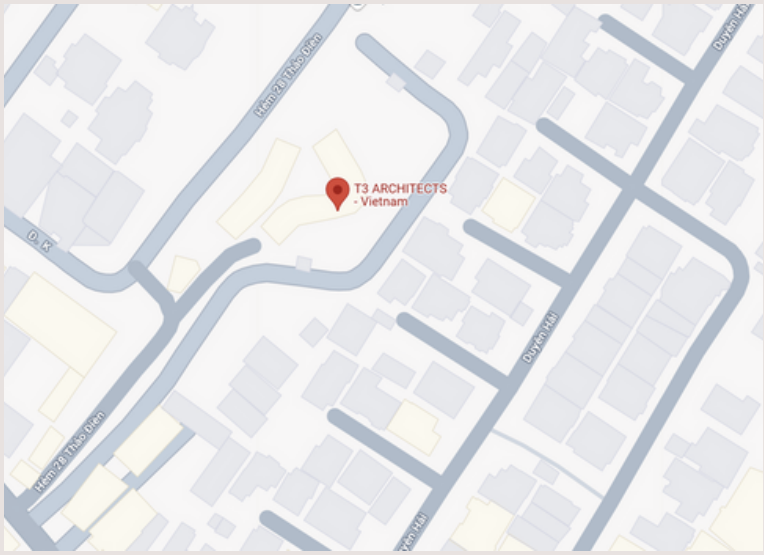
1.0 Bioclimatic Flexi-Office, Saigon, Vietnam

Name Bioclimatic Flexi-Office
Location Saigon, Vietnam
Area 380m²
Year 2020
Architects T3 Architects (based in Ho Chi Minh City)
Lead Architect Tereza Gallavardin, Rafael Lira
Architect Hai Ta Quang
Interior Designer(S) Huy Nguyen
Contractor / Builders Harmonie
Structure Consultants Harmonie
Lighting Design Kobi Lighting Studio
Energy Efficiency Consultant ARTELIA Group
HVAC Khang Nguyen



Concept

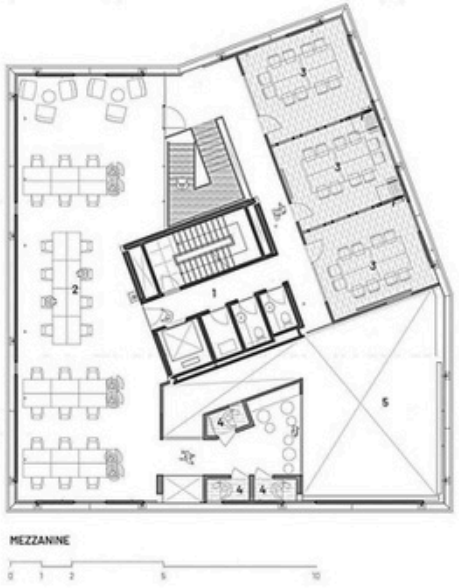
It was essential to bring "good vibes" from the first moment users entering the building, with a reception like any nice resort, a direct connection with a tropical garden, surrounded in natural tones, loose furniture, locally-sourced materials (as much of bio-sourced in Vietnam like bamboo, lime plastering, solid wood, local stone and plants from South Vietnam). The additional concept was to emphasize the idea that the building is located in Vietnam, specifically in the Thao Dien ward, and get a strong feeling of the village's lifestyle with all facilities around, providing a view of the surroundings and tropical greenery.

Idea

By renovating an existing building with the challenge to create an "office of the future" that gives users a "better day at work". To envision this office, T3 had to understand people are not always going to work with the same mood every day, so the main intention was to start considering what employees are expecting from their workspaces and offer them the best, with many different options to adapt to their moods of the day: need of concentration, need of inspiration, need of meeting people, need of calm and comfort, etc.

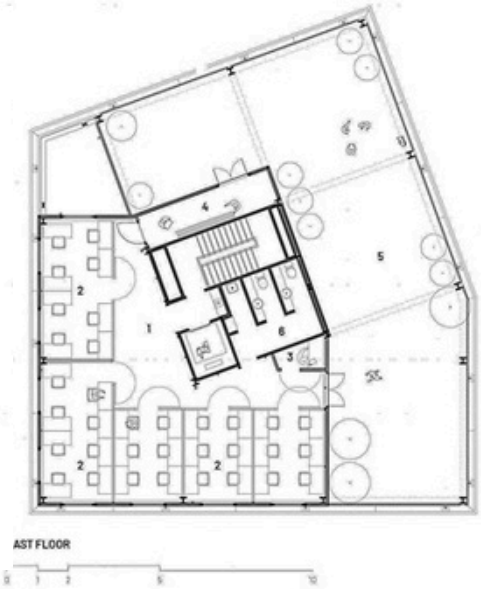
Ground Floor Plan

First Floor Plan

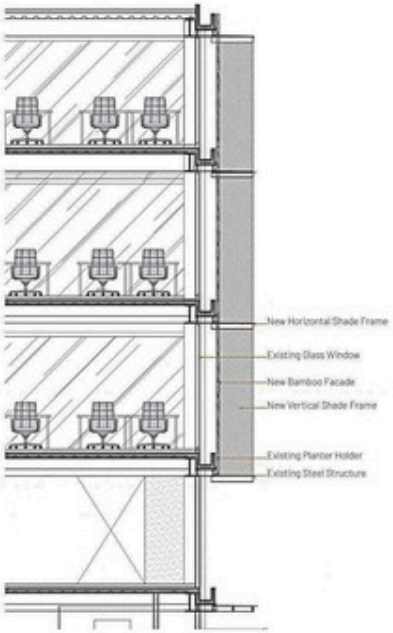


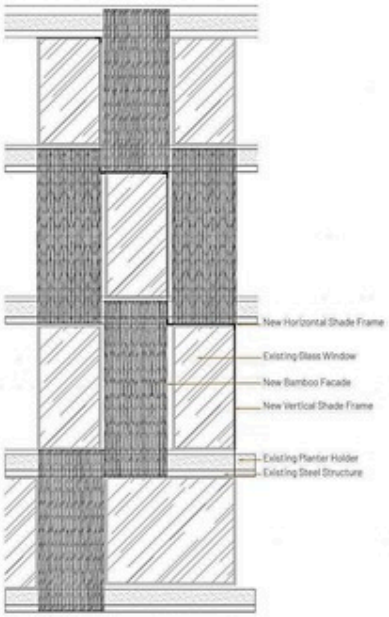
Second Floor Plan

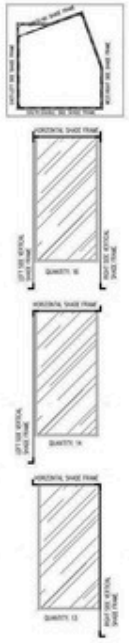
Third Floor Plan



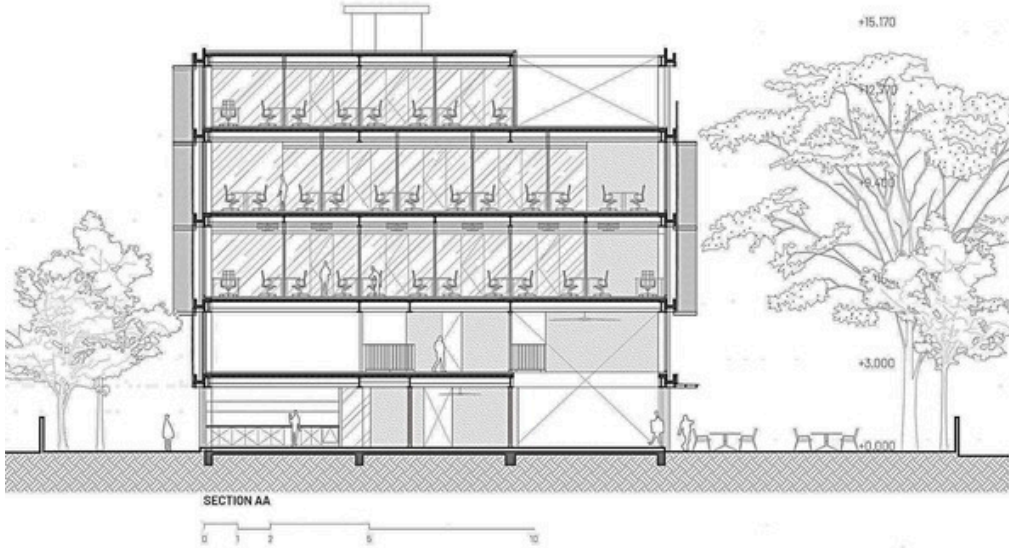
Wall to Facade Detail

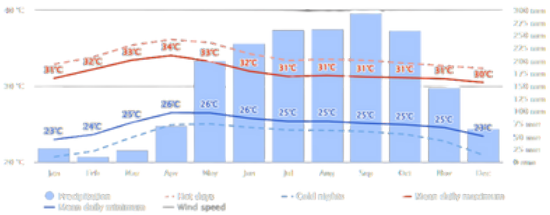






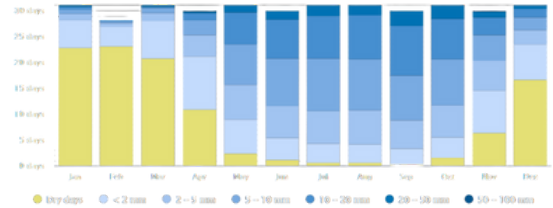
Section





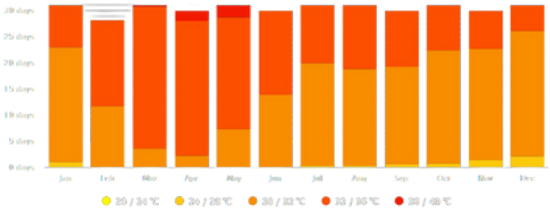
Average Temperatures and Precipitation

- Max temperature: Peaks in April–May, 33–34°C
- Min temperature: Dec–Jan, 23–26°C
- Rainfall: Highest July–Nov (peak in Sept ~275 mm); driest in Feb–March
- Hot days in April–May; and cold nights in Jan, Feb, Dec
- Wind speed is consistent with slight increase in June–July



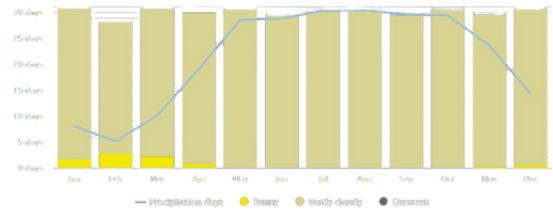
Precipitation Amounts

- The early months of the year have a high number of dry days
- From May to November, there is an increase in rainy days with varying intensity
- The wet season (mid-year to late-year) experiences more days with significant rainfall (greater than 10 mm)



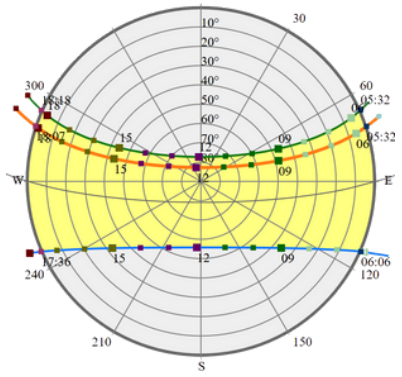
Maximum Temperature

- Most days fall within the 24-32°C range throughout the year
- Hotter days (above 32°C) are more frequent around April and May
- Cooler temperatures (around 20-24°C) are more frequent at the beginning and end of the year



Cloudy, Sunny, and Precipitation Days

- A high number of sunny days throughout the year (27-31 days per month)
- Overcast days are infrequent
- The number of precipitation days is higher from June to November
- The number of precipitation days is lower in the early months of the year



Sunrise and Sunset Times

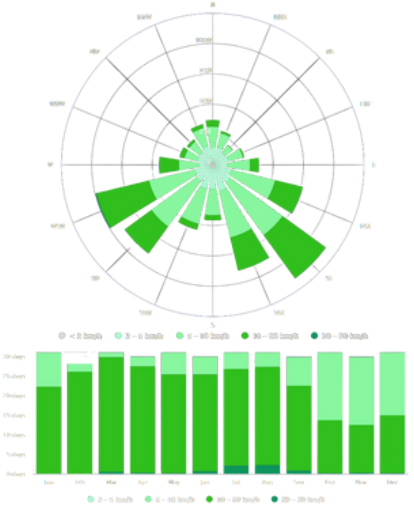
- Sunrise Times (June): ~12.75 hours of daylight
- Earliest: ~5:32 AM
- Latest: ~6:18 PM
- Sunset Times (December): ~11.5 hours of daylight
- Earliest: ~5:36 PM
- Latest: ~6:06 AM

Sun Altitude (Noon)

- Equinoxes :~90° (March, September)
- Solstices: 70°–80° at noon (June and December)

Solar Azimuth (Sun's Direction)

- Rises between East and Northeast
- Sets between West and Northwest
- The sun is in the southern sky at noon in winter



Wind Diagram

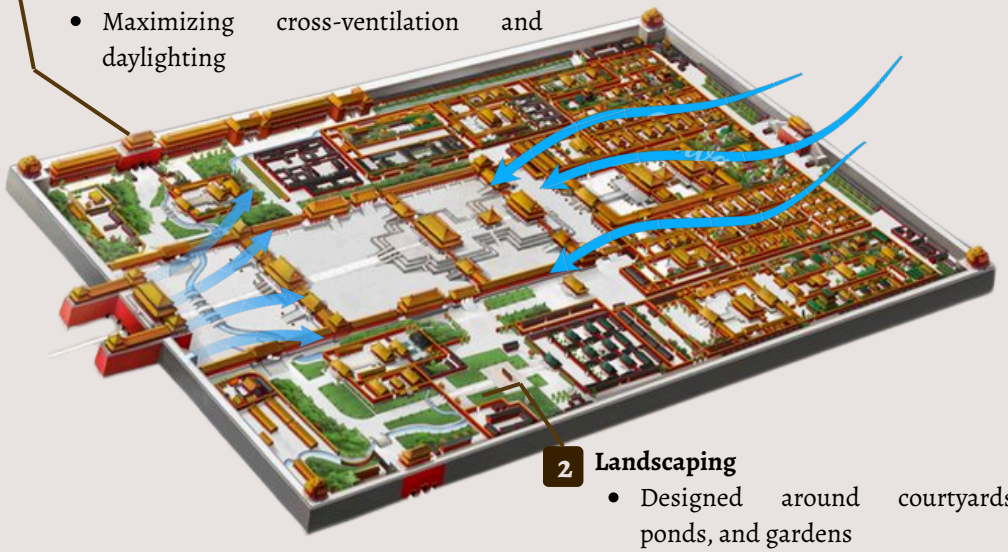
- Majority of the wind come from Southeast and Southwest with speed of 10–20 km/h
- Moderate winds of 20–30 km/h occur in July-August, and light winds of 2–5 km/h in in October–February

Traditional Built Form

Layout and Oreintation

1 Open Plan and Orientation

- Feng-shui to align it with the cardinal direction (South)
- Maximizing cross-ventilation and daylighting



2 Landscaping

- Designed around courtyards, ponds, and gardens
- Water elements and trees helped create cooler microclimates

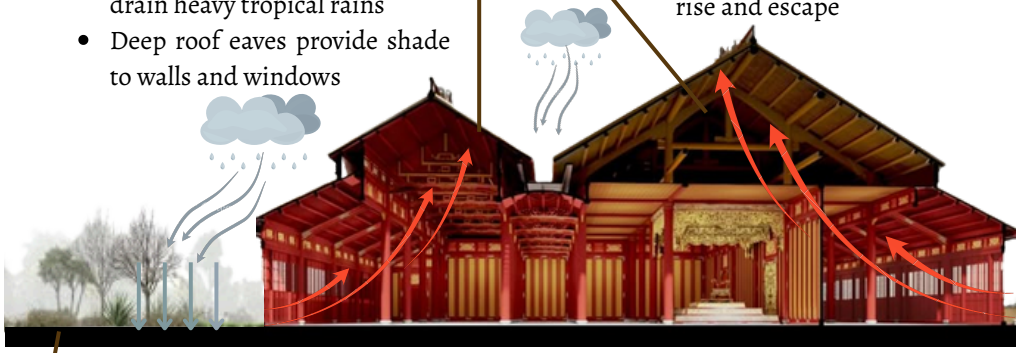
Shading, Ventilation, and Rain Management

3 Roofing

- Steeply pitched roofs quickly drain heavy tropical rains
- Deep roof eaves provide shade to walls and windows

4 Ventilation

- High ceiling allows hot air to rise and escape



5 Permeable Outdoor Space

- garden courtyard absorb rainwater, preventing flooding.

6 Shading Device

- Shutters and louvered windows provide shade and allow air in even during rain

Materiality

7 Terracotta Tiles

- Curved shape and air gaps under the tiles allow slow heat transfer.
- Good drainage during heavy monsoon rains

8 Brick Walls

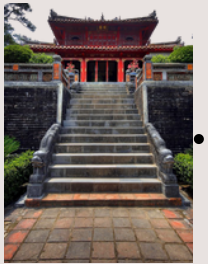
- The abundance of clay in Vietnam
- Porous and breathable, helping regulate humidity Works well in thick walls for thermal insulation

9 Timber Structure

- Naturally absorbs and releases humidity, helping to stabilize indoor moisture levels
- Cool to the touch in hot weather

10 Stone Foundation

- Absorbs heat slowly and releases it gradually, regulating interior temperatures
- Durable and Weather-resistant, ideal for structures exposed to rain and floods



Site Selection and Building Layout

Considerations

Climate

- Hot-humid tropical climate - focused heavily on passive cooling, natural ventilation, and shading

Transport

- Proximity to local infrastructure encourages walkability and reduced car dependency

Greyfields

- Promotes urban infill within a dense residential neighborhood in Ho Chi Minh City
- Reusing an existing residence, minimizing disturbance to undeveloped land and supports urban regeneration

Layout and Orientation

1 Orientation

- Longer facade oriented North-South to optimize daylight, by exposure to harsh east and west sun, and cross-ventilation

2 Layout

- flexible layout and zoning, allow to adapt overtime between office and residential functions

3 Landscape

- A generous setback for green space and breathing room around the structure, helping to cool down the structure

4 Fenestration

- repositioned openings promoting cross-ventilation and daylight, allow to modulate internal climate and light.
- Large sliding doors and open floor zones encourages seamless transitions between indoor and outdoorspaces

Stormwater Management & Impervious Surface

Additional Landscape

5 Vegetation and landscaping

- Enhances ground water recharge, reduces urban hear island effect, and improves thermal performance at ground level

Breaking the Concrete

6 Drainage

- More permeable surface allow the rainwater infiltration, minimize flooding, and reduce reliance on urban drainage systems

7 Increased Permeable Surface

- Existing outdoor concrete slabs were broken and replaced with permeable natural soil

Landscape & Grading Consideration

Restoration

8 Landscape

- The site is relatively flat and needed minimal grading, largely for manage water flow and create effective garden levels
- Helps direct stormwater, enhances site drainage, and prevents erosion and ponding

9 Tropical Garden

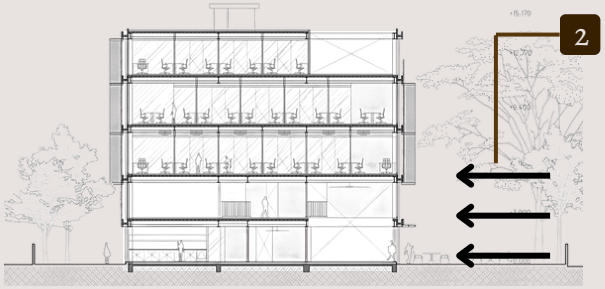
- A tropical garden was created using native and low-maintenance plat species
- The garden act as a microclimate regulator providing shades, evaporative cooling, and improving the air quality
- Connecting the outdoor and indoor seamlessly, enhancing thermal comfort, reduces urban heat, and promotes biodiversity

Daylighting Design

Urban Design Context

1 Dense Neighborhood

- Located in a tightly packed residential area with limited open space.
- Design to maximize daylight while preserving privacy



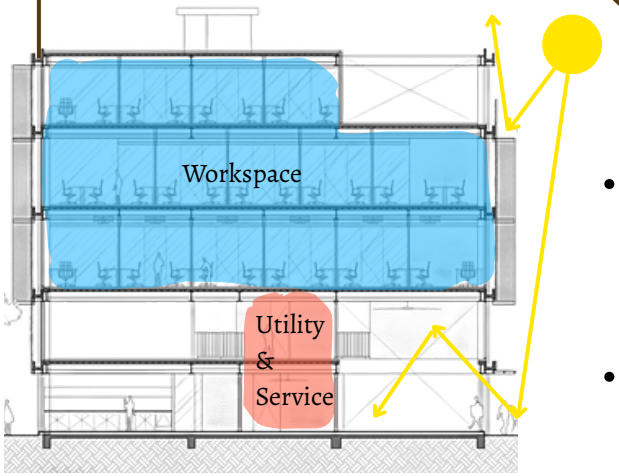
2 Landscape

- Narrow setbacks from neighboring structures, allowing light to penetrates from multiple sides
- The setbacks provide spaces for tropical garden, and so the vegetation act as a light diffusers

Building and Room Design

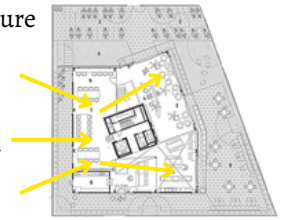
3 Orientation

- Longer facade facing North-South, minimize exposure to the harsh east-west sunlight



4 Layout

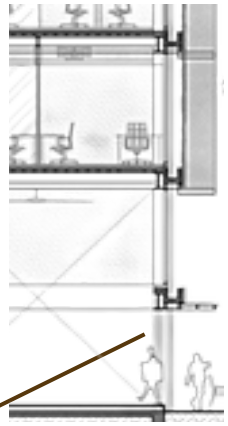
- Long, narrow, open plan allowing daylight to penetrate deep into the structure

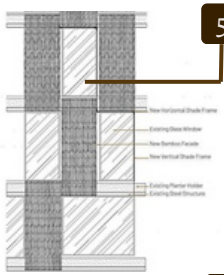


- Zone based on lighting needs
  - Workspace with stable natural light
  - Utility and service areas with less daylight exposure
- Double height volumes to maximize daylight access vertically

Daylighting System & Solar Control

Windows Design and Visual Comfort





5 Glazing

- Low-E glazing was used on east and west facade while clear glazing was used in north and south facade
- Glazing allows for daylight to penetrate while minimizing heat gain

6 Facade Design

- Windows are recessed and shaded by overhangs or bamboo louvers to prevent direct solar gain while maintaining light penetration.

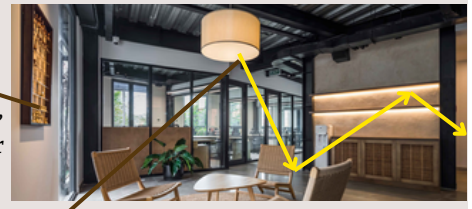
7 Windows

- Large operable windows positioned mainly on the ground floor allow maximum daylight penetration and corss-ventilation

System Enhancing Natural Light

8 Interior

- Light-colored interior (walls, floors, ceilings) are used to reflect light further into the rooms
- Glass partitions and openings allow light to travel internally between rooms



9 Artificial Lighting

- Design to meet the WELL standards and minimal use during daytime

10 Garden

- Vegetation and water features on the exterior create reflective surfaces that gently bounce daylight into shaded areas.

Shading

11 Vegetation

- Greenery along the perimeter provides a soft, responsive shade that adapts seasonally

12 Facade

- The bamboo screens, vertical fines, and overhangs block high-angle midday sun and allow low-angle morning & evening sun to penetrate

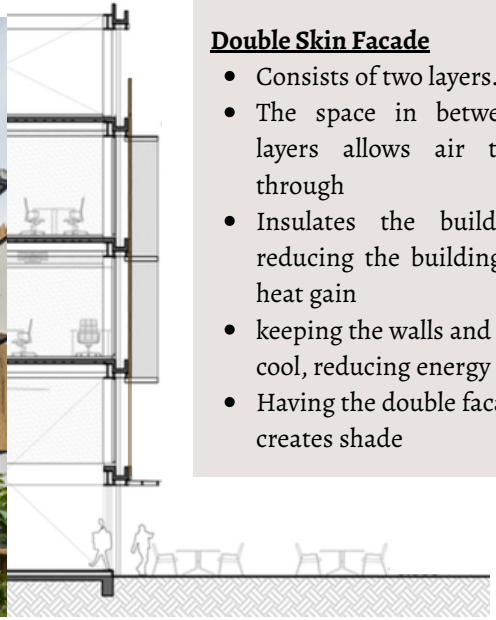
Characteristics of the Facade

1 **Double Skin Facade**
Acts as insulation and reduces solar heat gains

2 **Sun Shading**
Present on the South, West and East sides to reduce the amount of direct sunlight entering

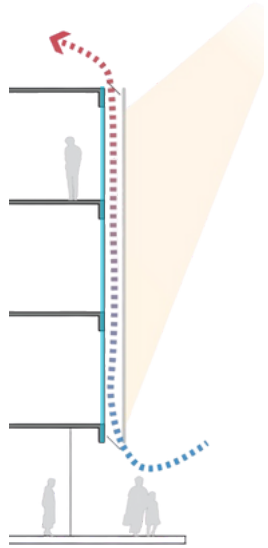
3 **Bamboo Cladding**
Locally available and sourced bamboo cladding is used for the cladding

4 **Large Windows**
Large windows allow daylight to penetrate deep into the building



Double Skin Facade

- Consists of two layers.
- The space in between the layers allows air to flow through
- Insulates the building by reducing the building's solar heat gain
- keeping the walls and interior cool, reducing energy usage
- Having the double facade also creates shade



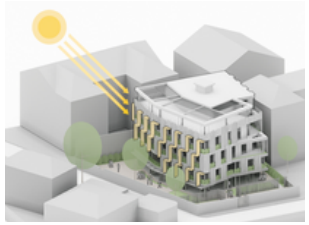
Green Strategies of the Facade

Reducing Energy Usage

- Reducing solar heat gains through the windows to reduce the amount of energy required to cool the building.
- Reducing solar heat gains through the walls to reduce the amount of energy required to cool the building

Usage of Local Materials

- Sourcing materials locally from credible sources reduces carbon emissions from logistics and harvesting practices.



1 Double Skin Facade

Reduces energy usage of building by:

- absorbing heat in the outer facade, keeping it away from the wall of the building
- creating a gap between the outer facade and building wall where cooler air can rise up and cool the building

2 Sun Shading

- The building has sun shading devices on the south, east and west but not on the north side
- This is because Hanoi is north of the Equator, so the sun's path is to the south of the building
- They retain the views from the interior while blocking out sunlight

3 Bamboo Cladding

- Bamboo is a readily available local material
- Bamboo is an insulator, reducing the solar heat gain of the building

Ventilation Strategies

1 Double-Skin Façade & Shading

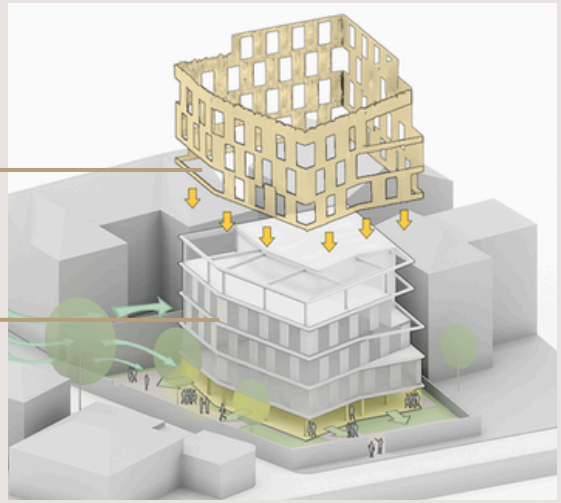
- Exterior shading system: Includes metal mesh, vegetation, and screens that form a ventilated layer

2 Cross Ventilation

- Openings on opposite sides of workspaces allow air to move across rooms

3 Less Mechanical Cooling Dependency

- The building is intentionally designed to avoid the use of air conditioners in most spaces



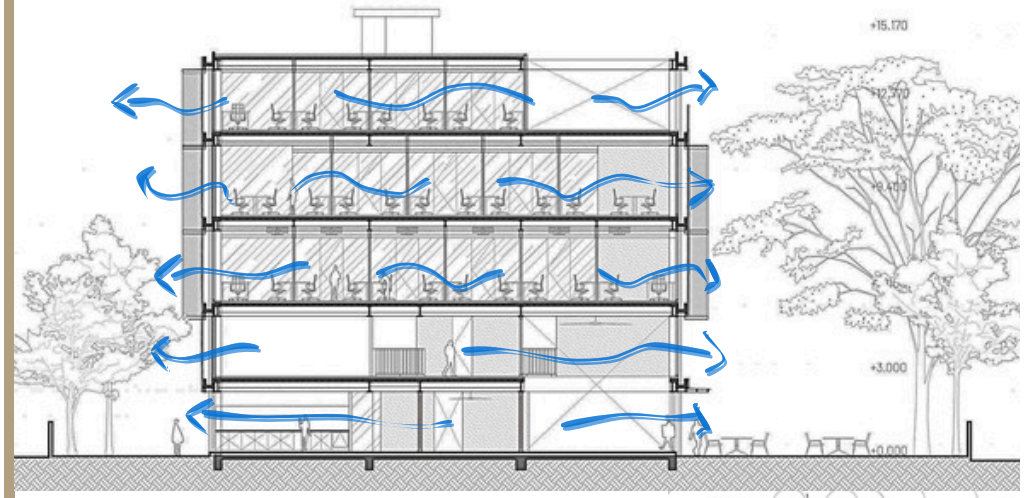
4 Stack Effect Ventilation

- Double-height spaces, open stairwells, and vertical voids support vertical air movement
- Warm air rises and exits through roof-level openings, drawing cooler air from shaded areas below

5 Porous Materials and Breathable Walls

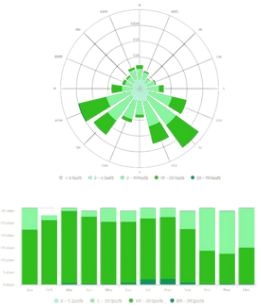
Use of perforated blocks, louver systems, and open brick walls allows ventilation even when spaces are shaded or semi-enclosed

Natural Cross Ventilation



The building is oriented to take advantage of local wind patterns. The placement of windows, doors, and ventilation openings is optimized for natural airflow, with the building's layout aligned to the prevailing winds to maximize ventilation without the need for mechanical systems

Wind Analysis

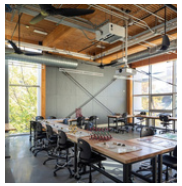


- Majority of the wind come from Southeast and Southwest with speed of 10–20 km/h
- Moderate winds of 20–30 km/h occur in July-August, and light winds of 2–5 km/h in in October–February

Ventilated Spaces

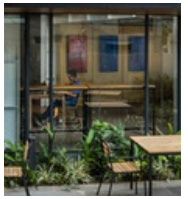
Open-Plan Workspaces

- Cross ventilation is maximized with openings on opposite walls



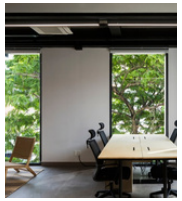
Vegetated Courtyard / Lightwell

- A central green lightwell or courtyard acts as a natural ventilation hub



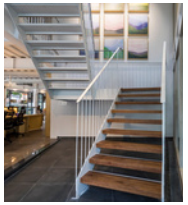
Meeting Rooms and Quiet Spaces

- Located near ventilated façades with louvered windows or openable panels

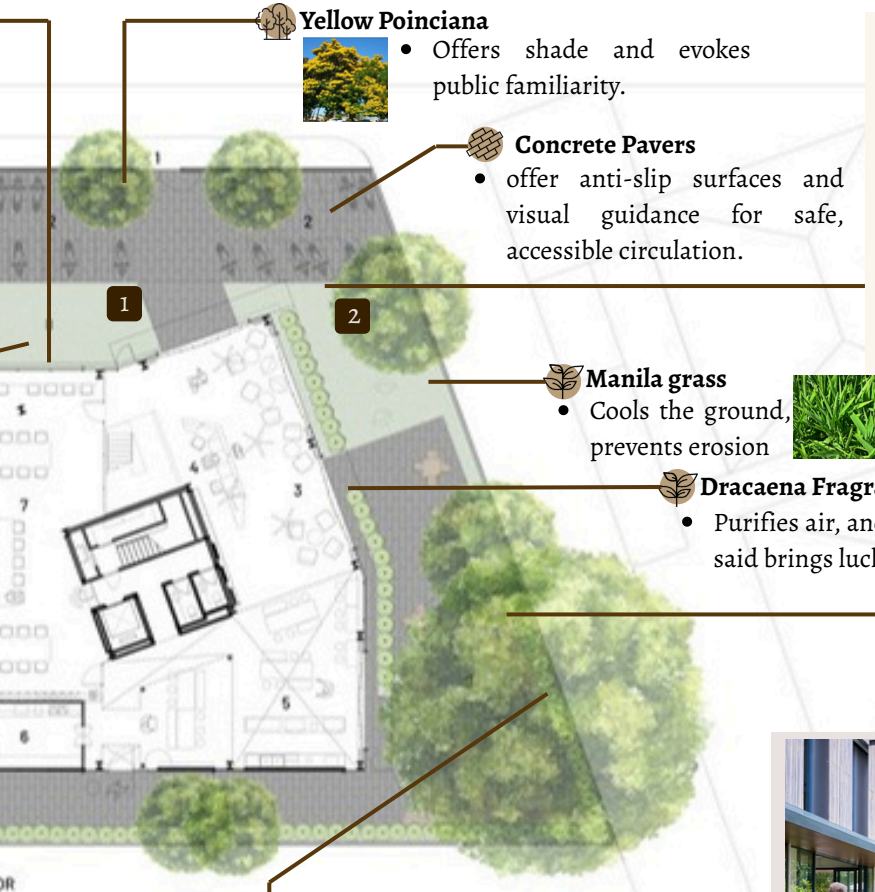


Stairwell and Vertical Circulation Areas

- Designed as ventilation shafts



Elements of Softscape & Hardscape and User Experience



Parakeet flower

- Adds tropical color and attracts birds and butterflies, enhancing visual appeal and biodiversity.

Stone Pavers

- Guides circulation while reducing runoff and evoking traditional tropical paths.

Jackfruit Tree

- Provides cool shade, produces edible fruit, prevents soil erosion

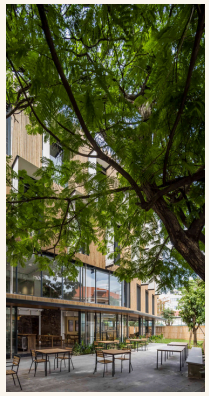
Yellow Poinciana

- Offers shade and evokes public familiarity.

Concrete Pavers

- offer anti-slip surfaces and visual guidance for safe, accessible circulation.

Cultural Link via Vegetation



- Native plants express local identity and foster connection.
- Yellow Poinciana
- Tree Barks

Manila grass

- Cools the ground, prevents erosion

Dracaena Fragrans

- Purifies air, and culturally said brings luck and calm.

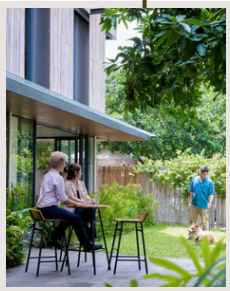
Garden Area

- Provides relaxation & promoting well-being.
- Lush greenery, flowering plants

Seating areas

- Supports rest and informal interactions

Shaded Sitting Zones



- Natural shade from Trees provides thermal comfort and peaceful seating spots.
- Dappled shade
- Leaves rustling overhead

Bamboo fencing

- Provides natural privacy, allows airflow, culturally rooted boundary.

Bamboo

- Acts as a natural screen and symbol of resilience

Spider Plant

- Improves microclimate by cooling air through transpiration

Strategic Landscaping Features

1 Wind Corridor Alignment through Landscaping

- Open landscaped paths are aligned with prevailing southwest breezes to maximize natural ventilation
- Trees and shrubs are spaced to avoid blocking airflow, enhancing thermal comfort without relying on mechanical systems

2 Layered Planting

- Combination of trees (tall), shrubs (mid-level), and groundcovers (low) placed in layers
- Enhances evapotranspiration, keeps the ground cool, and maintains comfortable humidity levels around the building

Site Planning

Climate-Responsive Layout

Provide natural ventilation & daylight

Soft, diffused natural light

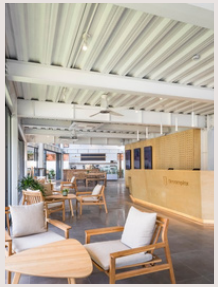
stable temperature

Green Buffer Integration

Increase permeable surfaces and tropical gardens

Cool microclimate

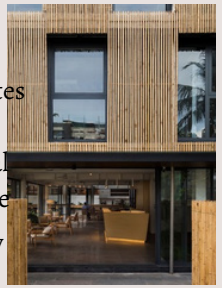
Natural Ventilation



Air Quality & Sensory Comfort

Constant airflow eliminates stale air and prevents humidity buildup—crucial in Saigon's tropical climate

fresh, natural airflow through



Natural Ventilation Indoor-outdoor

Many spaces are semi-open or lined with plants, allowing wind to interact with greenery

sensational air breeze outdoor and indoor

Daylighting

Optimized Orientation & Layout

Oriented North–South axis with a narrow, open plan

Natural light in the building

Strategic Window Placement & Shading

Large, operable windows and recessed frames, overhangs, and bamboo louvers throughout the structure

Glare free natural light

cross-ventilation

Climate-Specific Glazing

Low-E glazing is used on the East-West and clear glazing on North-South

Soft, diffused light

reduce heat gain

Natural Light Enhancement

Light-colored interior, double-height spaces, and glass partitions

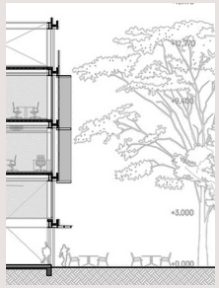
Soft, diffused natural light

Facade Design

Sun Shading Devices:

- Reduce the amount of direct sunlight
- Maintain views to the surroundings

Comfortable light intensity inside



Double Skin Facade

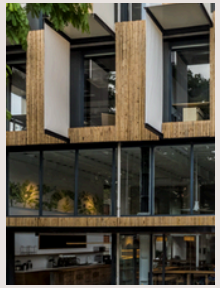
- Reduce the amount of direct sunlight from entering the building, reducing over lighting and over heating

Reduce heat gain

Bamboo Cladding

- The bamboo cladding changes the appearance of the building.

Warm, natural material



Large Windows

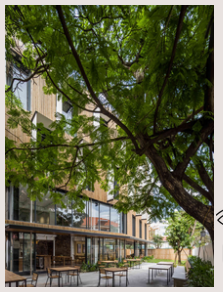
- The large windows on the lower levels of the building allow lots of light to enter.

Allows plenty of daylight to enter

Strategic Landscaping

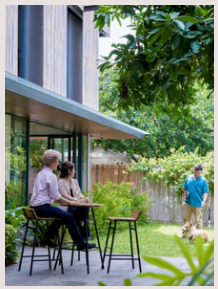
Garden Area

- Provides relaxation & promoting well-being.
- Lush greenery, flowering plants



Cultural Link via Vegetation

- Native plants express local identity and foster connection.
- Yellow Poinciana
- Tree Barks



Shaded Sitting Zones

- Natural shade from Trees provides thermal comfort and peaceful seating spots.
- Dappled shade
- Leaves rustling

Conclusion

The Bioclimatic Flexi Office uses passive design to create a comfortable, energy-efficient space suited to Saigon's tropical climate. Through passive design, the building reduces heat gain, enhances airflow, and maximizes natural light. Green buffers, shading devices, and native vegetation further improve comfort and sustainability.

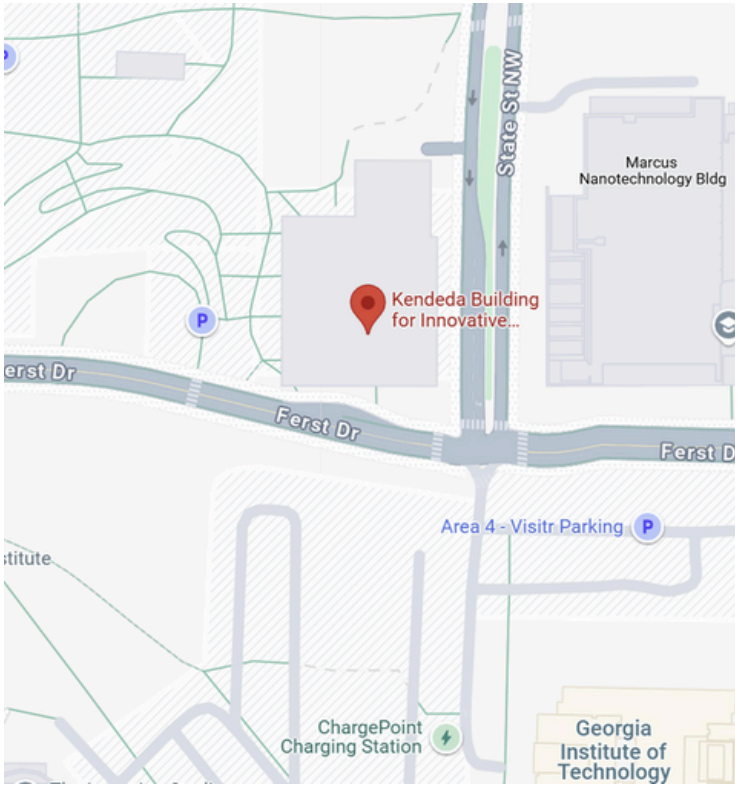
Name The Kendeda Building for Innovative Sustainable Design
Location Atlanta, United States
Area 4366m^2
Year 2019
Architects Lord Aeck Sargent, Miller Hull Partnership
Lead Architect The Miller Hull Partnership
(Brian Court, Margaret Sprug, Chris Hellstern, Matt Kikosicki
Collaborating Architect/Prime Architect Lord Aeck Sargent
Landscape Architect Andropogon
Civil Engineer Long Engineering
echanical, Electrical & Plumbing Engineer PAE, Newcomb & Boyd
Structural Engineer Uzun & Case
Grey Water Systems Biohabitats

Concept

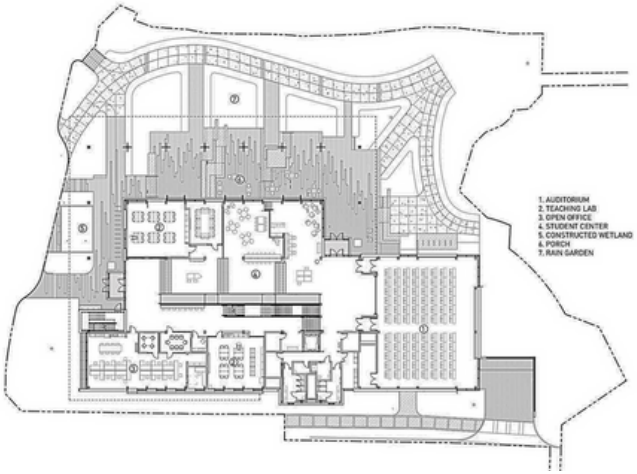
The Kendeda Building was created to foster environmental education, research, and a public forum for community outreach. As the first Living Building of its kind in the Southeast US, the project sets a new standard for sustainability.

Idea

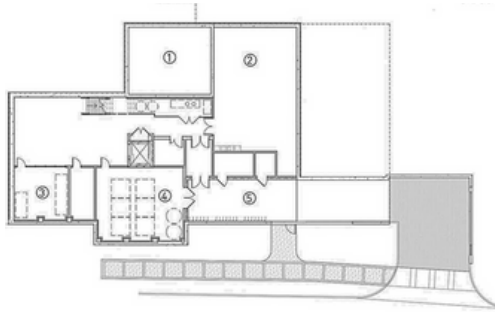
The Kendeda Building is a multi-disciplinary education building intended to serve as a working model of what is possible with integrated sustainable design that equitably supports sustainability curriculum. It aims as a building that will direct every future building in the South, Kendeda is more than a sustainable university building. Rather, it is a tool that can help steer the conversation about the environment.



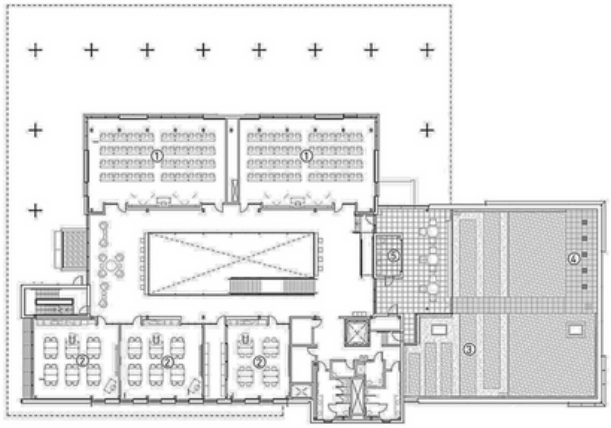
Ground Floor Plan



First Floor Plan

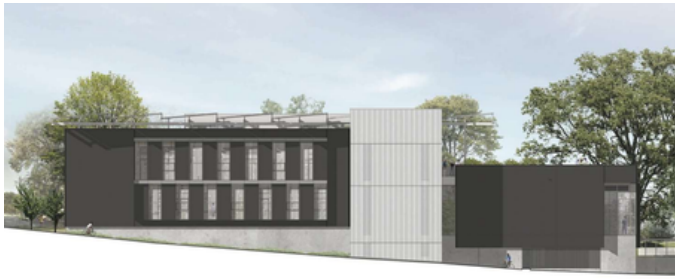


Second Floor Plan



West Elevation

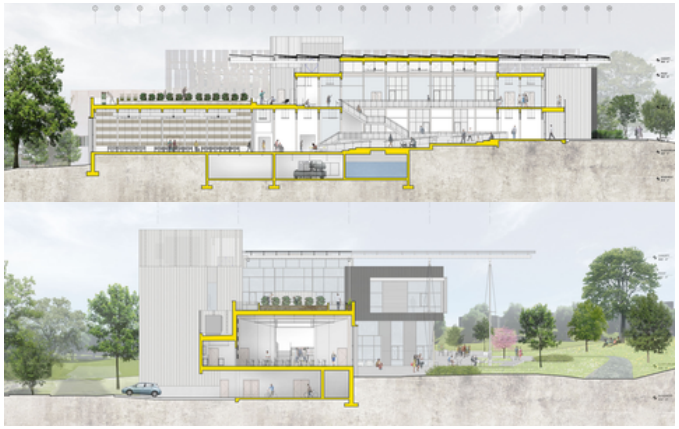
East Elevation



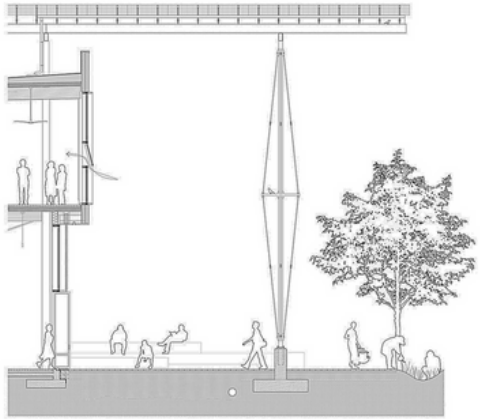
South Elevation

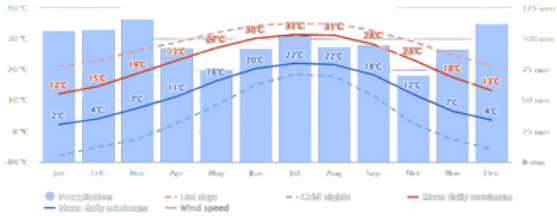
Sectional Perspective

Sections



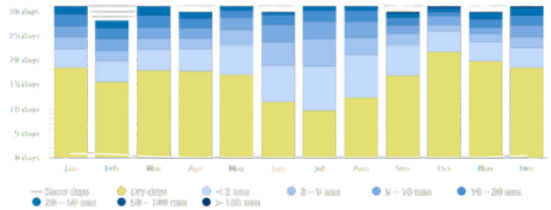
Wall & Canopy Detail





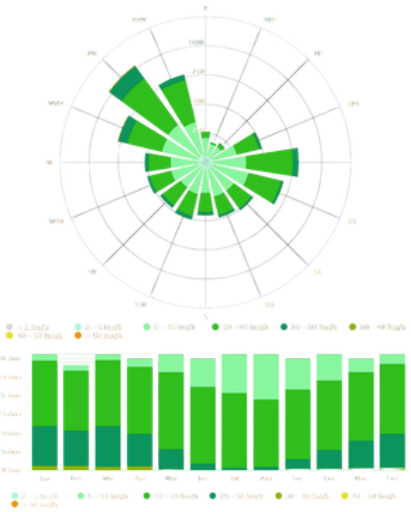
Average Temperatures and Precipitation

- Hot season: May–September, hottest in July–August (~31°C)
- Coldest month: January (~2°C min) with some frost risk (Dec–Feb)
- Rainfall: Evenly spread, peaks in March and December (~110 mm)



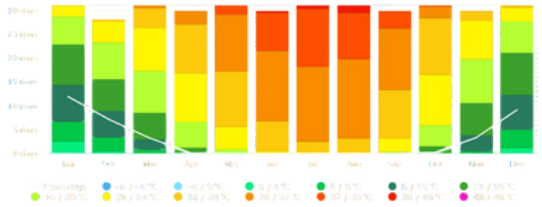
Precipitation Amounts

- Atlanta has year-round rainfall with no distinct dry season
- Snowfall is rare and mainly occurs in January and February
- The frequency of rainfall is relatively consistent throughout the year



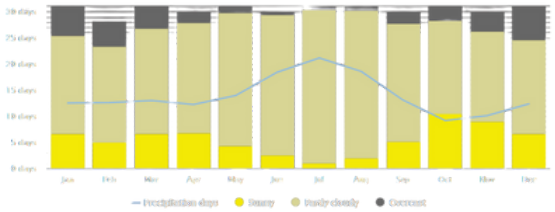
Wind Analysis

- Majority of the wind come from the Northwest and East with speed of 5–20 km/h
- Moderate winds of 20–30 km/h occur regularly, as well as light winds of 2–5 km/h
- Wind speeds are consistent throughout the year



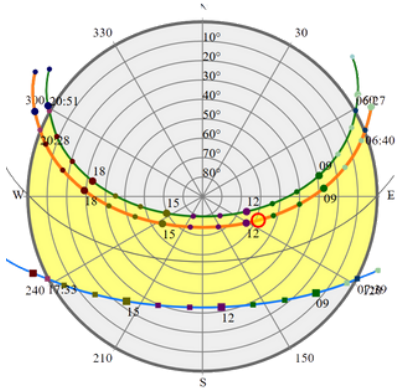
Maximum Temperature

- Cool winters with frost: December–February
- Warm springs: March–May (20–24°C)
- Hot summers: June–August (28–36°C)
- Mild autumns: September–November (Oct: 20–24°C; Nov: 8–16°C)
- Temperature trend: Rises to a summer peak, then gradually declines



Cloudy, Sunny, and Precipitation Days

- High number of sunny and partly cloudy days year-round
- Summer (May–September): 8–10 sunny days per month (most sunny)
- Winter (November–February): More overcast days, fewer sunny days
- Partly cloudy skies dominate most months (15–20 days/month)
- Precipitation is fairly consistent (9–13 days/month)



Sun Altitude (Noon):

- Summer: ~80° (very high)
- Winter: ~33° (low)
- Sun is never directly overhead due to Atlanta's latitude

Sunrise and Sunset Times

Summer (June 21): ~14.5 hours of daylight

- Sunrise: 6:27 AM (northeast)
- Sunset: 8:51 PM (northwest)

Winter (December 21): ~10 hours of daylight

- Sunrise: 7:39 AM (southeast)
- Sunset: 5:33 PM (southwest)

Solar Azimuth (Sun's Direction):

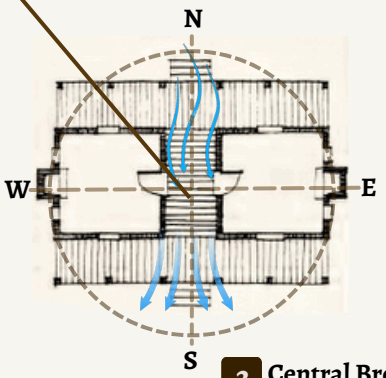
- Rises in the northeast (summer), southeast (winter)
- Sets in the northwest (summer), southwest (winter)
- At noon, sun is always in the southern sky

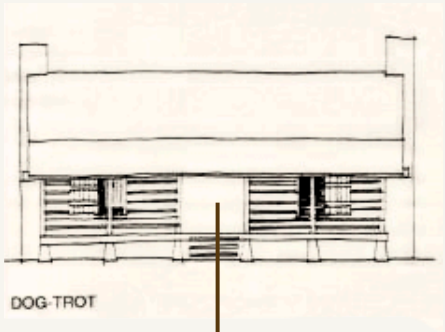
Traditional Built Form

Layout and Oreintation

1 Orientation

- oriented east-west taking full advantage of southern winds and reducing solar exposure on longer facades
- Breezeways ran north-south maximizing cross-ventilation





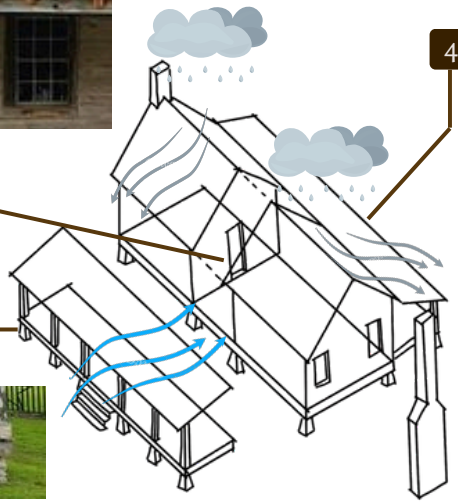
2 Central Breezeway

- open, covered breezeway separating two enclosed living areas
- Acts as a thermal buffer and a natural wind tunnel, channeling prevailing breezes through the home to cool it naturally

Shading, Ventilation, and Rain Managment

3 Fenestration

- Multiple operable windows and doors on opposite walls with the dogtrot breezeway to maximize cross-ventilation



4 Pitched Roof with Deep Overhangs and Wraparound Porches:

- Deep overhangs for shading windows and walls
- Porches provide additional shaded outdoor areas, reducing indoor heat gain
- Steeply pitched roofs to drain heavy rains, made from metal or wood shingles to shed water quickly and resist rot

5 Raised Floor

- Built on piers or short stilts to elevate the house above the damp ground, allowing air to circulate beneath the house, cooling the floor and reducing mold and moisture

Materiality

6 Local Timber and Wood Construction

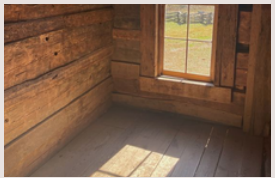
- Abundance of pine, oak, cypress, and poplar wood
- Allow air and moisture to pass through, help regulate indoor humidity
- Easily repaired

7 Uninsulated, Permeable Walls

- Often made with wood planks or logs with small gaps
- Allow airflow through the material , reducing internal hear and moisture buildup

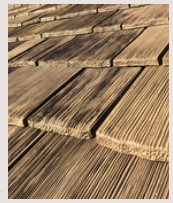
8 Natural Finishes:

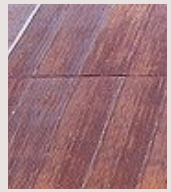
- Interiors were often unpainted or used lime wash, which helped surfaces breathe and reduce moisture retention



9 Wooden Shingle or Metal Roofs

- Lightweight and fast-drying during rain
- Reflective of solar heat
- Helps shedding water quickly, reducing chance of leaks and rot





Site Selection and Building Layout

Considerations

Climate

- Hot-humid summers and mild winter - focuses more on natural ventilation, shading, and rainwater harvesting

Transport

- The site is within Georgia Tech's walkable campus and connected to public transit, promoting low-carbon commuting

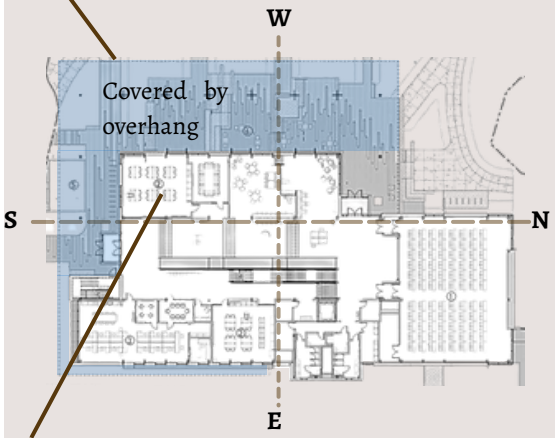
Greyfields

- Transforming an underutilized, impervious area (a parking lot) into a regenerative space aligns with the Living Building Challenge (LBC) certification, emphasizing environmental restoration

Layout and Orientation

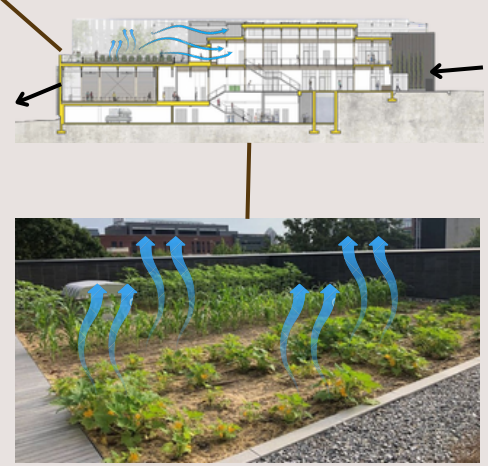
1 Orientation

- Longer facade oriented east-west to maximize solar gain in winter and minimize overheating in summer
- South-facing facade with deep overhangs and high-performance glazing to reduce heat gain



2 Landscape

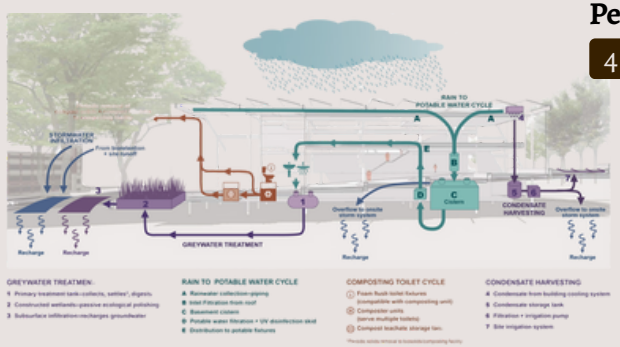
- minimizing cut-and-fill by positioning with the flow of the site's natural slope
- The roof garden and pollinator landscapes cool the building through evapotranspiration and buffer heat gain



3 Layout

- North-facing rooms benefit from diffuse natural light, ideal for classrooms and labs that require glare-free environments
- Connected to pedestrian and bike paths, promoting alternative transportation and reducing vehicular reliance

Stormwater Management & Impervious Surface



Permeable Surface

4 Minimizing Impervious Surface

- Building footprint is compact, leaving room for green space, trees, and permeable areas around it.
- Sidewalks and paths use permeable pavers

Drainage System

5 Rainwater Harvesting

- Entire road system including the solar panel collects rainwater that's channeled into a 50,000-gallon cistern and filtered to provide all potable water for the building

6 Green Infrastructure

- Bioswales and rain gardens slow down and filter runoff from walkways using native and adaptive plants, which reduce erosion and absorb pollutants.
- Wetland system treats greywater before it's infiltrated into the ground

Landscape & Grading Consideration

Grading

7 Rainwater Management

- Used slope to direct water flow to stormwater features
- Integrated rain gardens, bioswales, and wetlands

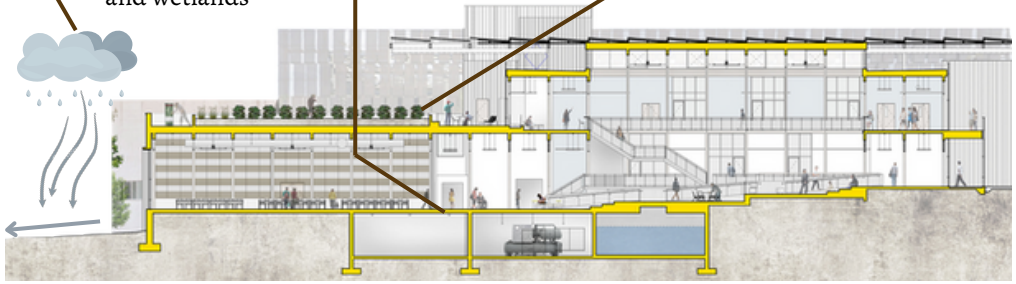
8 Existing Topography

- Minimal grading, only for 50,000-gallon cistern to be tucked beneath the building and for ADA access across the slope

Landscape

9 Vegetations

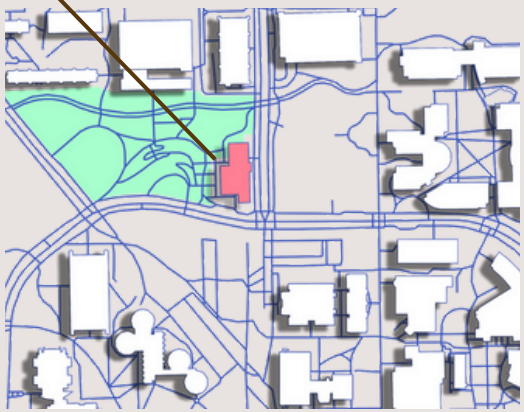
- Uses native and adaptive plants, so no irrigation needed
- Added edible and pollinator-supportive species



Urban Design Context

1 Low Building Density

- Located at the southeastern edge of Georgia Tech's campus with relatively low surrounding building height
- Minimum shadow cast by neighboring structures



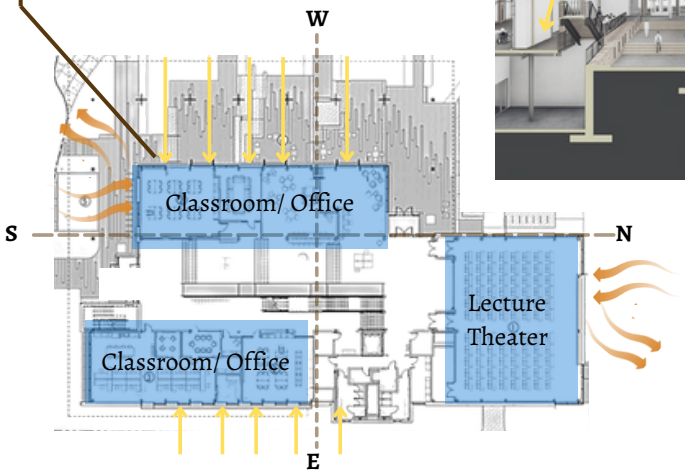
2 Landscape

- Surrounding landscape is open and low-profile, allowing full sunlight to reach into the building

Building and Room Design

3 Orientation

- Longer facade facing north and south to maximize the solar access from the south and reduce glare and heat gain from east and west

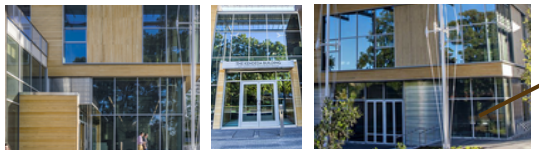


4 Layout

- Long, narrow floor plates with high ceilings allowing lights to penetrates
- Exposed structures allow lights to spread evenly
- Classroom, offices, and circulation zones aligned along facades to receive balanced light
- Open interior zones, including a central atrium, promote light diffusion and reduce the need for artificial lighting during daytime

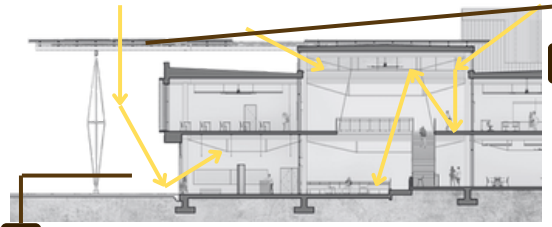
Daylighting System & Solar Control

Windows Design and Visual Comfort



5 Glazing

- All uses high performance Low-E glazing, which reduce solar heat gain while allowing ample visible light
- This also maintain visual comforts and reduces reliance on HVAC



6 Skylight

- The skylight brings in additional light in
- The rooftop solar canopy includes translucent panels that let lights in while still providing shades

7 Windows

- Large, strategically placed windows and clerestory on the north and south facades allow for consistent, low-glare daylight
- Operable windows allow for natural ventilation and daylight control

System Enhancing Natural Light

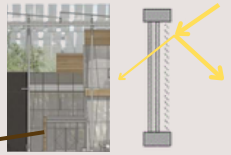
8 Interior

- Light-colored interior (walls and polished concrete floors) are used to reflect daylight and reduces the need for artificial lighting

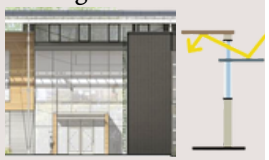
9 Artificial Lighting

- Dimmable LED is integrated with daylight sensors to automatically adjust

Venetian Blinds



Light Shelves



10 Shading Device

- Light shelves helps bring in daylight further into the building
- Venetian Blinds on the west facade automatically adjust throughout the day blocking direct sunlight during hot periods while allowing diffused daylight inside

Shading

11 Vegetation

- Vegetation and trellises on the landscape contribute to seasonal shading of low windows

12 Passive Shading

- Horizontal louvers, deep roof overhangs, and solar canopy to shields against high summer sun while allowing low winter sunlight in

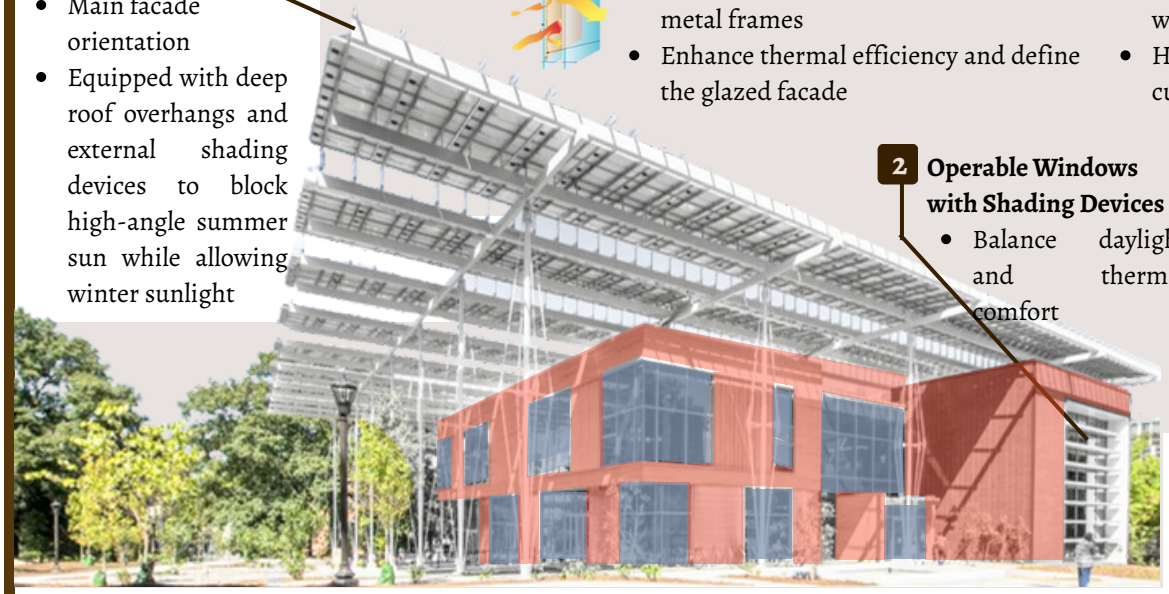
Characteristics of Facades

1 Deep Overhangs & Sunshades

- Minimize solar heat gain and glare during summer months
- Filter Sunlight

South-facing Side

- Main facade orientation
- Equipped with deep roof overhangs and external shading devices to block high-angle summer sun while allowing winter sunlight



2 Operable Windows with Shading Devices

- Balance daylight and thermal comfort

Types of Facades

Balance Glazed and Opaque Facades

The Kendeda Building uses a **hybrid facade system**, which means it balances both glazed and opaque components to optimize energy efficiency, comfort, and sustainability.

Glazed Facade Components

High-Performance Glazing

- Triple-glazed, low-E windows with metal frames
- Enhance thermal efficiency and define the glazed facade

Opaque Facade Components

Thermal Insulation

- High R-value walls reduce heat loss in winter and heat gain in summer
- Helps maintain stable indoor temperatures, cutting down energy use

North-facing Side

- Provides indirect natural light without solar heat gain
- Controlled glazing for consistent, glare-free daylight

West-facing Side

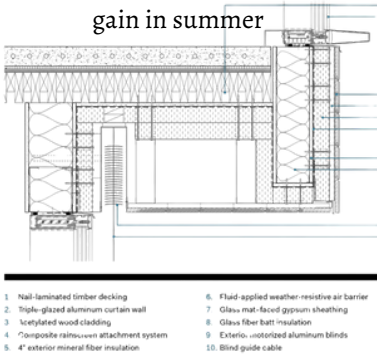
- Minimized glazing to avoid low-angle afternoon sun and excessive heat gain
- Uses opaque walls or dense vegetation for additional protection from solar exposure

East-facing Side

- Minimized glazing to avoid low-angle afternoon sun and excessive heat gain
- Uses opaque walls or dense vegetation for additional protection from solar exposure

3 Thick, Super-Insulated Walls

- Designed with insulation values well above code minimums
- Prevent heat loss in winter and heat gain in summer



1. Nail-laminated timber decking
2. Triple-glazed aluminum curtain wall
3. Acetylated wood cladding
4. Composite rainscreen attachment system
5. 4" exterior mineral fiber insulation
6. Fluid-applied weather-resistive air barrier
7. Glass mat-faced gypsum sheathing
8. Glass fiber batt insulation
9. Exterior motorized aluminum blinds
10. Blind guide cable

4 Concrete (CMU)

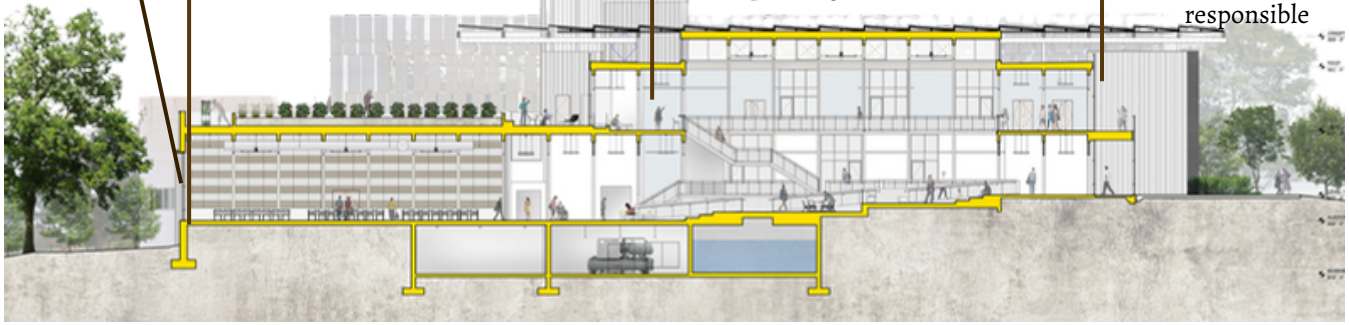
- Foundation walls & some service facades
- Structural support; thermal mass for temperature stability

5 Triple-Glazed, Low-Emissivity (Low-E) Glass

- Lets in natural light while keeping interiors cool or warm, depending on season

6 Reclaimed Wood Siding

- Adds warmth and texture to the facade while being environmentally responsible



Stick System

Assembled on-site using individual mullions and glazing units

- More adaptable to custom design
- Suited for small to medium projects like Kendeda

2.4 Natural Ventilation

Strategies Excecuted

1 Thermal Chimney
The design incorporates a thermal chimney, a vertical shaft that creates a stack effect. As warm air rises, it creates negative pressure, pulling cooler air into the building. This effect helps to cool the interior spaces naturally

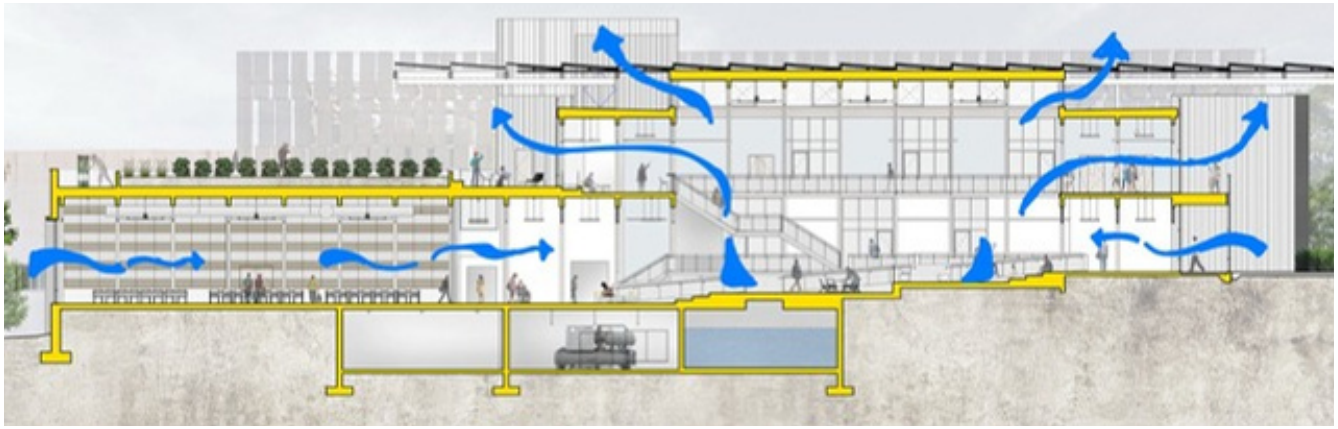
2 Stack Effect and Airflow Design
The building is designed to take advantage of the stack effect, where warm air rises and escapes from higher points, pulling in cooler air from lower openings

3 Reducing Air Infiltration
Operable windows – with a system override – throughout the building is mechanically operated when outdoor temperature, humidity, and pollen count are within an acceptable range to maintain system balance

4 Mixed-Mode Ventilation
- When outside conditions are ideal, the building switches to natural ventilation mode.

5 Operable Windows with Sensor Integration
- Manually operable windows allow occupants to control airflow based on comfort
- Linked to a building automation system that monitors CO_2 levels, temperature, and humidity

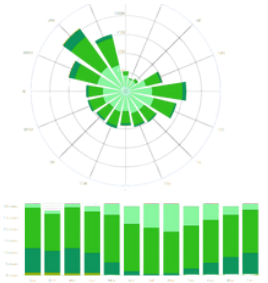
Natural Air Flow



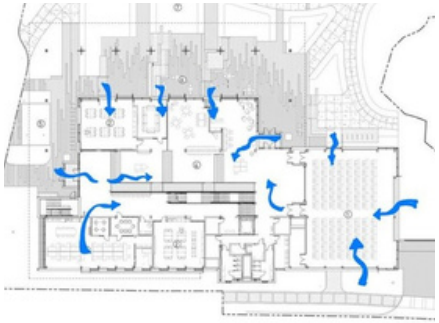
Responsive Ventilation

Climate-Responsive Design
- Given Atlanta's hot-humid climate, natural ventilation is optimized for the shoulder seasons (spring/fall) and cooler evenings
- minimizes reliance on mechanical cooling without compromising comfort

Wind Analysis



- Majority of the wind come from the Northwest and East with speed of 5–20 km/h
- Moderate winds of 20–30 km/h occur regularly, as well as light winds of 2–5 km/h
- Wind speeds are consistent throughout the year



- The natural ventilation strategy is customized for Atlanta's climate, where there are significant temperature fluctuations

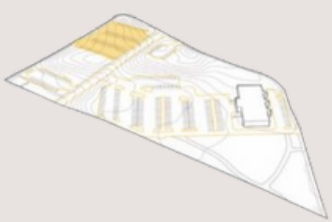
- The natural ventilation strategy is customized for Atlanta's climate, where there are significant temperature fluctuations

Site Integration

As part of a strategic landscaping approach, the building is positioned at the urban corner to preserve space for a new green area. It is carefully sited within a grove of mature oaks, with tiered ground-floor spaces that follow the natural slope along a vacated street.

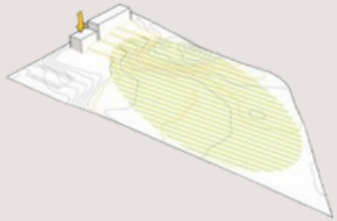
Minimize Disturbance

- Placing the building in a previously impacted area minimizes further environmental disruption.



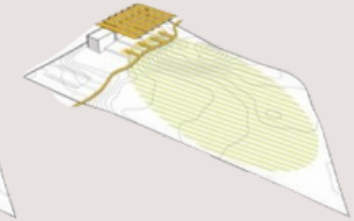
Blend with Landscape

- Design the building to follow the natural slope and nestle within existing trees, minimizing grading and enhancing integration.



Shape Public Path

- Create accessible public spaces along a new pedestrian route, encouraging movement and activating the green space.



Strategic Landscaping Features

1 Rooftop Garden

- The rooftop garden supports urban farming and research with blueberry bushes, milkweed, bee balm, black-eyed Susan, goldenrod, echinacea, and yarrow—plants that manage rainwater, reduce heat, and attract pollinators

2 Constructed Wetland

- Treats greywater using wetland plants and microbes, then filters and returns it to the ground for recharge; also serves educational and aesthetic purposes

3 Rainfall Management

- Captures and treats rainwater for drinking and reuse; manages runoff through permeable pavers and stepped terraces that store water and follow site slope, reducing stormwater impact

Elements of Softscape & Hardscape

Seating Areas
- Encourage rest

Planter Boxes
- Provide soil control

Pervious Pavers
- Enable stormwater infiltration

Granite Curbs
- protect edges of wetlands

Sedges

- Stabilizes soil, reduces erosion

Rooftop Deck
- Provides views of urban ecology

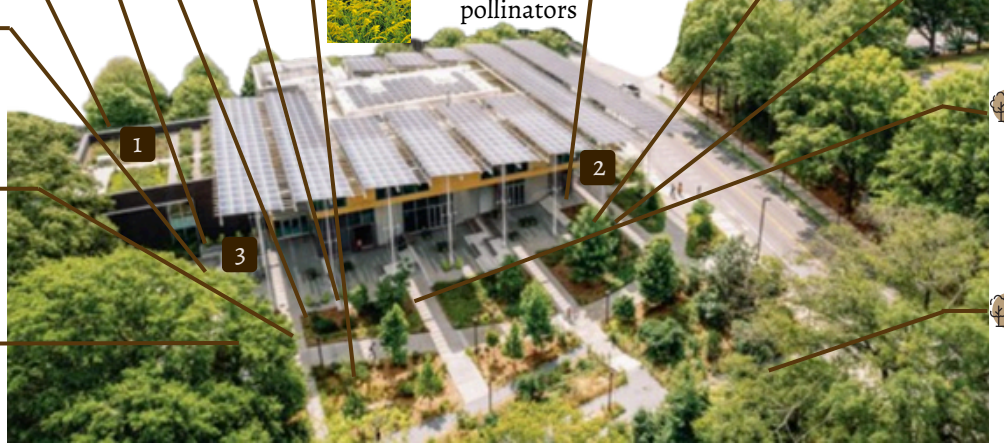
Goldenrods

- Feeds pollinators

Pepperbush
- Attracts pollinators

Water Oak Trees

- Absorbs stormwater



Black Oak Trees
- Partial shading & filtered light

Cardinal flower

- Attracts pollinators

White oak Trees
- Provides shades

Pickerelweed

- Assist water purification

The Kendeda Building, Atlanta, United States

Site Planning

Comfortable and Accessible Movement
Thoughtful grading and layout

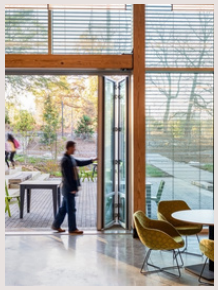
- Lush greenery
- Natural ventilation

5.Wetland
7.Rain Garden

Engaging Outdoor Interaction
Native landscaping and visible sustainable features

- Bioswale, wetland, and rain garden
- Nature

Natural Ventilation



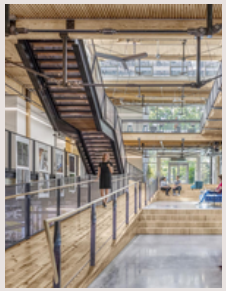
Air Quality and Comfort
Constant supply of fresh air, maintaining low CO_2 levels and reducing indoor pollutants.

- fresh air, calm mind and bonds with nature

Thermal Comfort
the building offers adaptive thermal comfort and connect occupants to seasonal changes.

- Adaptable ventilation, adapts to seasons.
- comfortable temperature

Daylighting



Enhanced Visual Comfort
Large windows, skylights, and carefully oriented spaces

- Soft, diffused natural light with minimal glare

Improved Mood and Well-being
Regular exposure to daylight

- Mental alertness and energized

Connection to Outdoor Environment
The surrounding landscaping and vegetation

- Strong sense of space without feeling confined

Reduced Reliance on Artificial Lighting
Effective use of daylighting decreases energy use

- Indoor experiences attuned with the circadian rhythm

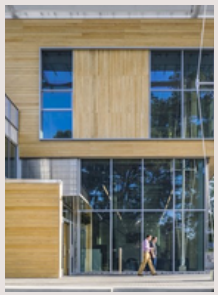
Facade Design

High-Performance Glazing & Shading Devices
Low-E glass & shaded roof reduce glare, eye strain while preserving views

- Glare-free, consistent daylight enhances visual comfort

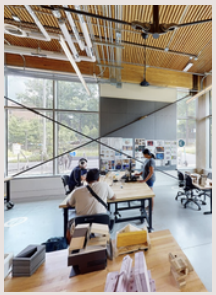
Insulated Walls & Window Positioning
Maintain interior comfort by reducing heat gain in summer and loss in winter, creating a cozy, temperate space

- Stable indoor temperature



Tactile Warmth & Material Connection
Reclaimed wood adds warmth and texture, inviting touch and enhancing a biophilic feel

- natural, textured material



Acoustic Quietness
Insulation and window placement reduce outside noise, creating a quiet indoor space

- Calm, quiet interior environment conducive to learning and reflection

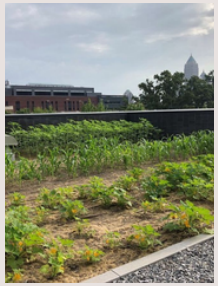
Strategic Landscaping

Natural Light and Shade Transition
Guide users from sun to shade for comfort and variety

- light and shadow patterns
- Temperature change

Social Space
Gathering under trees or on a lawn for classes, group chats, or events

- open, green views
- nature, people



Rooftop Garden
Smelling herbs, watching butterflies, maybe picking fruit

- Flowers, bees, butterflies
- Fragrant Plants

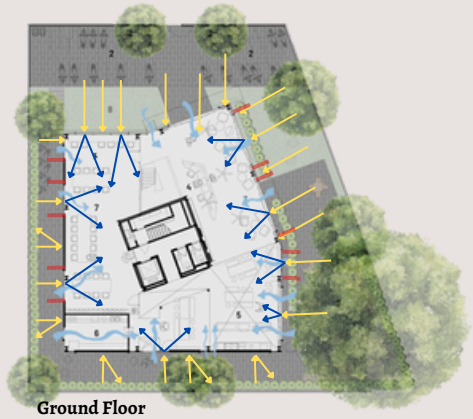
Conclusion

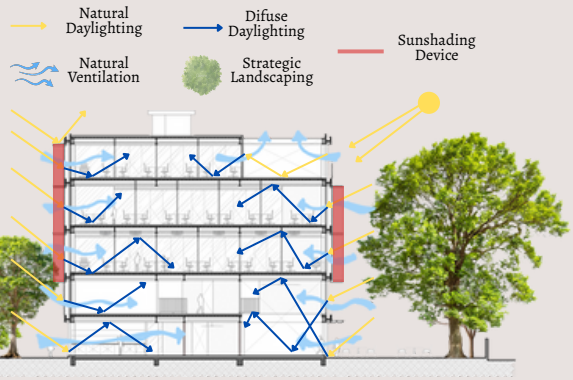
The Kendeda Building uses passive design to create a sustainable, comfortable, and nature-connected space. Natural ventilation, daylighting, and strategic landscaping enhance well-being, while efficient facades and reclaimed materials ensure thermal and visual comfort. The result is a quiet, energy-efficient, and human-centered environment.

3.0 Comparison & Conclusion

Comparison Between Bioclimatic Flexi-Office & The Kendeda Building

Location: Saigon, Vietnam





Bioclimatic Flexi-Office

Site Planning

The Flexi Office grading is used to increase the permeable surface around the structure allowing rainwater infiltration

The Kendeda Building grading is used to fit a cistern for greywater recycling and ADA access across the slope

Daylighting

The Flexi Office uses a double facade, clad in bamboo with fabric sunshades to reduce energy usage

The Kendeda Building have deep overhang roof, clerestories, light shelves, and venetian blinds to maximize daylighting

Facade Design

The Flexi Office uses perforated bamboo screens, concrete, greenery to filter natural light inside

The Kendeda uses reclaimed wood, triple-glazed glass, insulated panels to control and reduce glare

Natural Ventilation

The Flexi Office creates a sustainable, and energy-efficient environment by harnessing passive airflow tailored to the tropical climate of Saigon

The Kendeda Building uses passive design and operable windows to reduce energy and enhance comfort

Strategic Landscaping

The Flexi Office uses native plants and permeable surfaces to cool and manage rain in Saigon's climate

The Kendeda's landscaping uses native plants and green features to support biodiversity, manage water, and reduce heat

Spatial Experience

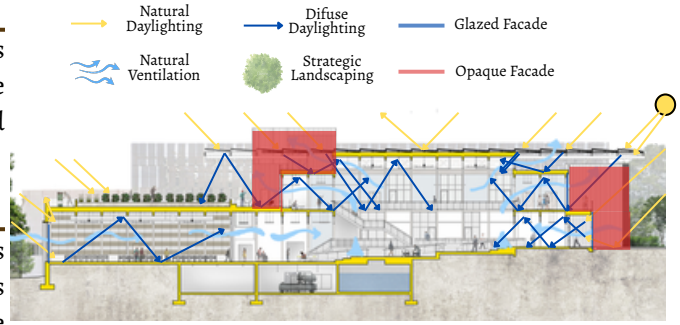
The Flexi Office uses passive design to create a sensory, low-energy workspace, cool breezes, soft light, fresh scents and edible plants, blending comfort with climate adaptability

The Kendeda creates a sensory-rich experience cool air, soft light, natural sounds and edible plants, blending comfort, sustainability, and human connection

Conclusion

The Flexi Office and The Kendeda both apply climate-responsive strategies to create sustainable, comfortable spaces. Flexi-Office uses passive cooling, bamboo facades, and permeable landscaping for Saigon's tropical climate, while Kendeda incorporates daylighting, reclaimed materials, and green features for Atlanta's temperate conditions. Despite regional differences, both buildings demonstrate how thoughtful design can harmonize with nature and enhance user well-being

Location: Atlanta, Georgia



The Kendeda Building

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