[ARC61804]

GREEN STRATEGIES FOR BUILDING DESIGN

Assignment 2 : Passive Green Building Strategies Report

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01 SITE INTRODUCTION

MACRO SITE PLAN

Persiaran Wawasan, Taman Wawasan,
47100 Puchong, Selangor

South of Taman Wawasan Recreational Park in Puchong offers a jogging track, basketball courts, and a children's playground.
It becomes especially lively on weekends, as residents gather for exercise, leisure, and various community activities.
This vibrant space plays a key role in fostering social interaction and promoting a healthy lifestyle among the local community

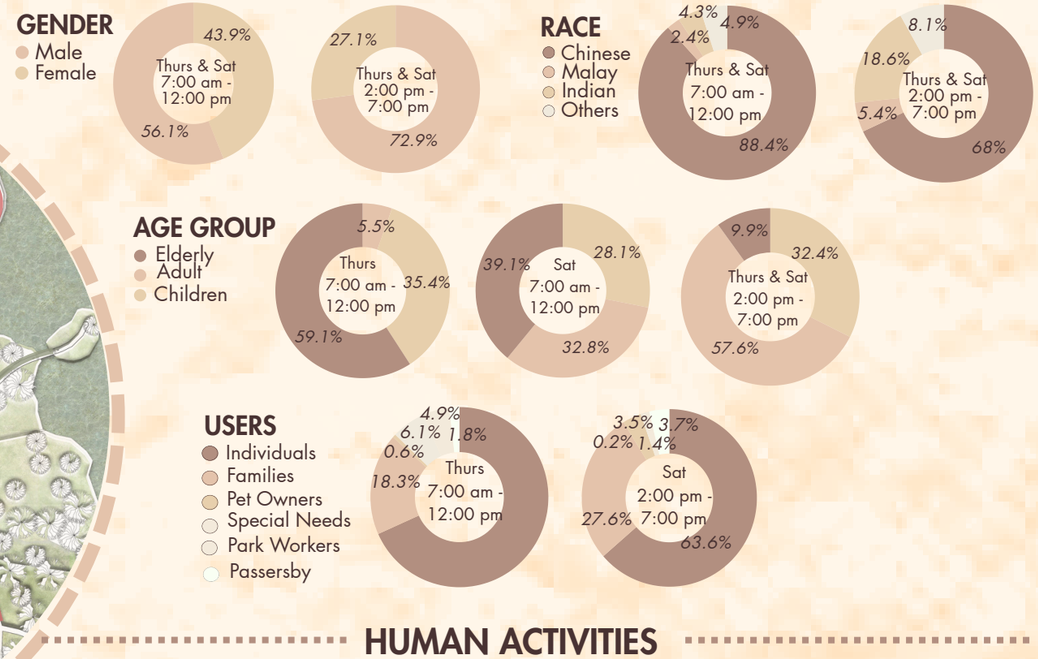
TAMAN WAWASAN RECREATIONAL PARK, PUCHONG

Taman Wawasan in Puchong is a freehold **mixed residential** and **commercial** township developed by **Setia Promenade Sdn Bhd** (S P Setia) located strategically between Bandar Puchong Jaya and Bandar Puteri Puchong.

It has **strong connectivity** through **major highways** like LDP, KESAS, ELITE, and the North-South Highway, and is within walking distance to the Pusat Bandar Puchong **LRT station** on the Sri Petaling Line.

The township sits at about 49 meters above sea level with **mostly flat terrain**, making it ideal for development and comfortable living.

For selected study site, it is located at the **recreational centre** of Taman Wawasan which spans over **38,800 sqm.**



CIRCULATION

Main Pathways

Secondary Pathways

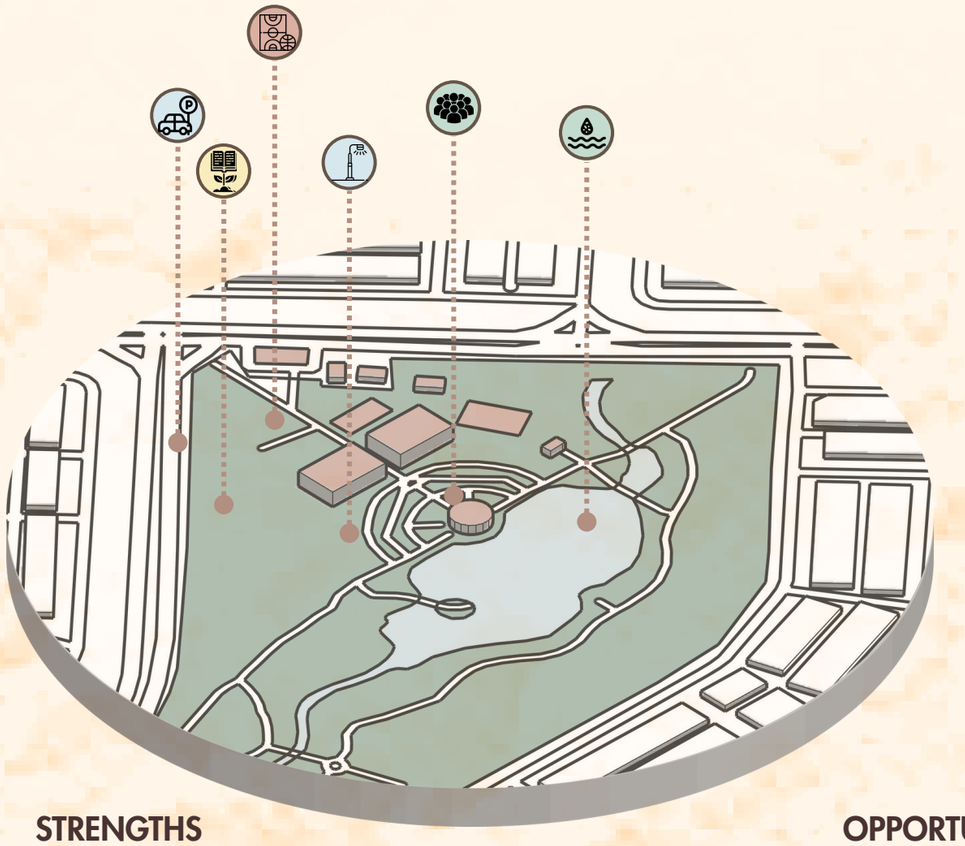
ACCESSIBILITY INTO PARK

Entrances & Exits

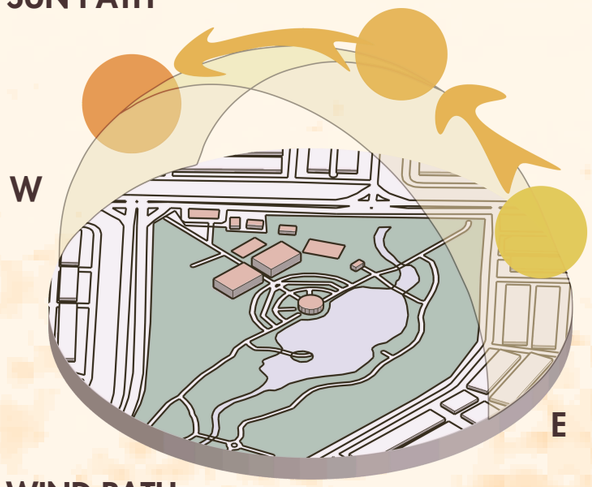
HUMAN ACTIVITIES

01 SITE INTRODUCTION

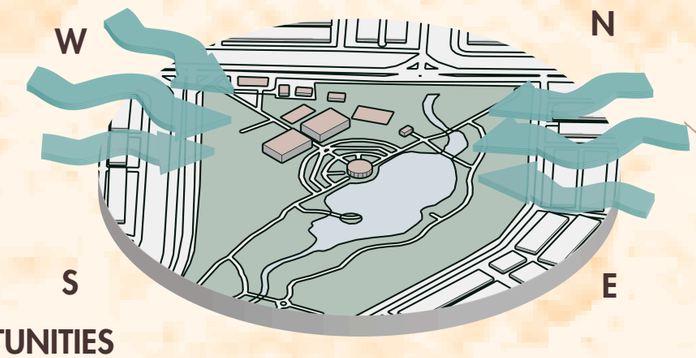
SWOT



SUN PATH



WIND PATH



STRENGTHS

Recreational Variety

The park includes tracks, courts, playgrounds, gym gear, and a man-made lake, fostering community and shaping its identity

WEAKNESS

Limited Parking

Few designated spots lead visitors to park roadside, causing congestion and affecting their overall experience

Lighting Limitations

Some areas of the park have limited nighttime lighting, making it less safe and less attractive at night

OPPORTUNITIES

Eco-Education Programs

Nature trails, plant labels, and weekend workshops can turn the park into an outdoor learning space

THREATS

Environmental Degradation

Lack of upkeep and visitor care can lead to the decline of the park's cleanliness and natural appeal

Overcrowding

High visitor numbers on weekends and holidays can cause congestion and reduce the quality of the experience

THE UNDERREPRESENTED USER GROUPS

USER GROUP

Passersby

Pet Walking, Jogging, Cycling

AGE

25-65+ Years

REQUIRED SPACE

Proper pathways

USAGE OF PUBLIC SPACE

Taman Wawasan is favored by joggers, dog walkers, and casual walkers; however, uneven paths and shared vehicle routes create safety and comfort issues, restricting accessibility and daily use

USER GROUP

Leisure

Reading, Fishing, Meditation, Tai Chi, Yoga

AGE

40-65+ Years

REQUIRED SPACE

Semi-isolated spaces

USAGE OF PUBLIC SPACE

Visitors seeking quiet—like readers, meditators, or tai chi practitioners—struggle with the park's open layout, which offers little privacy or separation from busier areas

USER GROUP

Cultural

Special Needs Community Games / Bazaar, Indian Dance Classes, School Band

AGE

10-20 Years

USAGE OF PUBLIC SPACE

Cultural events occur occasionally, but without dedicated space or facilities, they feel out of place and remain infrequent, limiting local expression

02 PROJECT INTRODUCTION

ADIV : MyReka-reasi CLUSTER

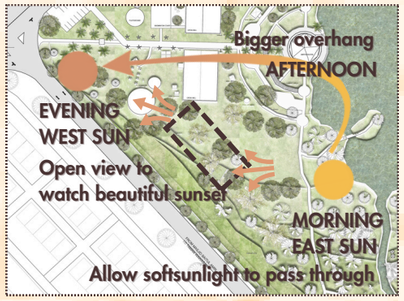
TAMAN WAWASAN CREATIVE AND RECREATIONAL HUB

Function: Elderly & Child Care
Building Height: 2 storeys
Building Siting: Setbacks 6m from Lot Boundary facing the road, 3m from other boundaries
Approximate Floor Area
Indoor Spaces: Approximately 900 sqm of net floor area
Outdoor Spaces: Not included in the 900 sqm are outdoor learning spaces

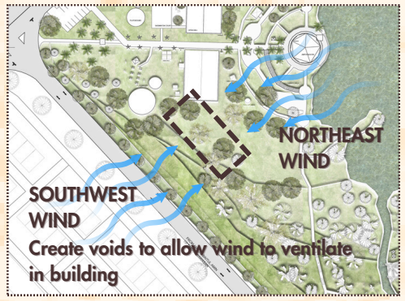
Rather than dropping children off at a traditional tadika (kindergarten), families are invited to a space in the heart of the park — a living structure where learning and leisure intertwine. Here, grandparents don't just wait; they belong.

SITE ANALYSIS & RESPONSES

SUN PATH



WIND PATH



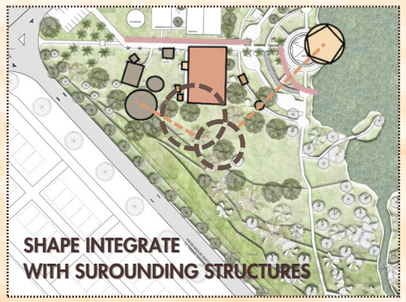
TOPOGRAPHY

PEDESTRIAN CIRCULATION

VIEWS FROM SITE

NOISE

MANMADE STRUCTURES



VEGETATION & SHADED AREA

VEHICULAR CIRCULATION

VIEWS TO SITE

03 PRECEDENT STUDIES

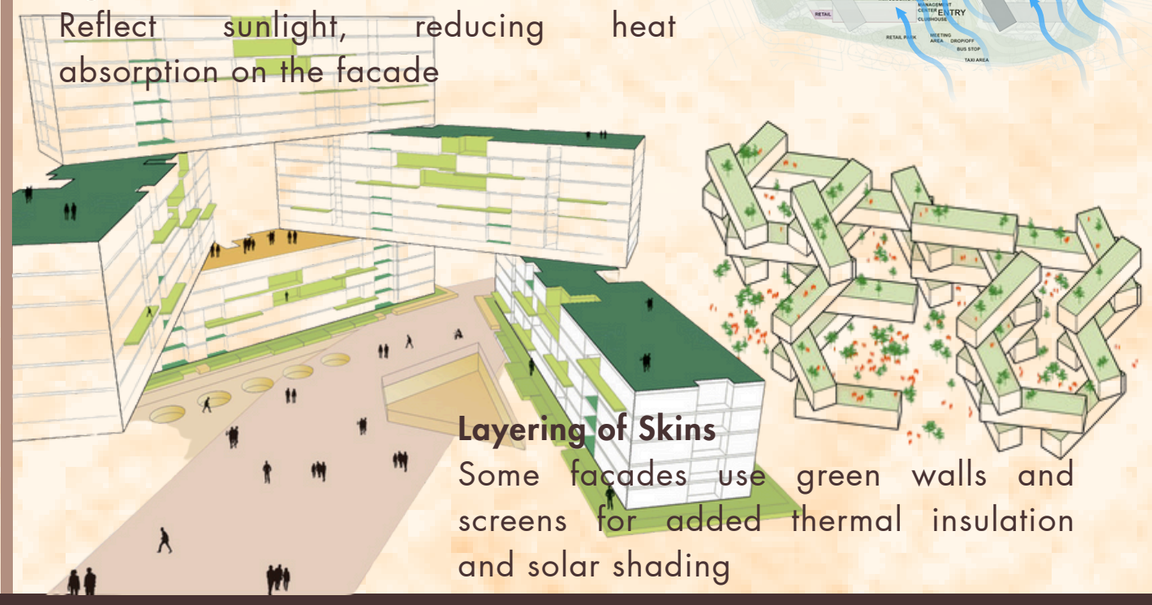
THE INTERLACE

180 Depot Rd, #01-02 The Interlace, Singapore 109684

FACADE DESIGN

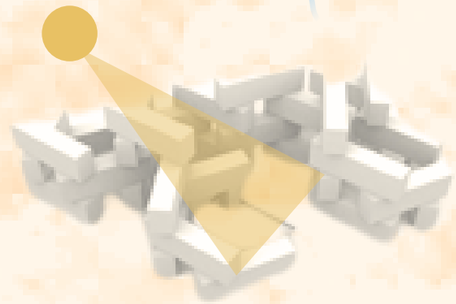
Light-Colored Finishes

Reflect sunlight, reducing heat absorption on the facade



Layering of Skins

Some facades use green walls and screens for added thermal insulation and solar shading



SITE PLANNING

Orientation for Wind and Sunlight

The hexagonal arrangement of the blocks allows optimal airflow and diffused daylight penetration throughout the site

Community Courtyards

Large voids between stacked blocks create open communal courtyards that enhance ventilation and shading

DAYLIGHTING

Staggered Massing

The horizontal stacking of blocks creates shaded terraces and allows natural daylight to enter deeper into units

Overhangs and Shading

Cantilevered blocks act as passive sunshades for lower floors

NATURAL VENTILATION

Cross Ventilation

The layout ensures that most units have openings on multiple sides, enabling natural airflow through the building

Void Spaces & Air Wells

Courtyards and atriums help channel wind through the site, increasing cooling and reducing the need for mechanical ventilation

STRATEGIC LANDSCAPING

Green Roofs & Vertical Gardens

Reduce thermal mass impact and provide insulation, lowering indoor temperatures

Water Features

Some courtyards have water elements, promoting evaporative cooling

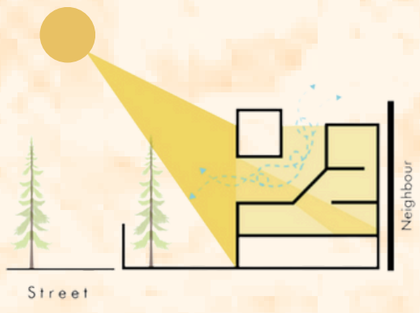
Shaded Pathways

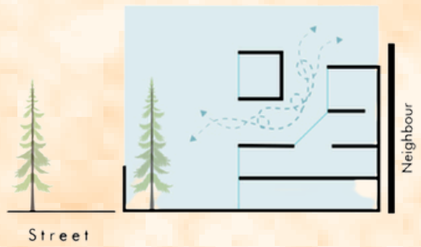
Trees and pergolas are used to shade walkways, reducing radiant heat exposure to pedestrians

03 PRECEDENT STUDIES

INSIDE OUT HOUSE

Hamedan, Iran





SITE PLANNING & SPATIAL LAYOUT

Central Light Void & Inverted Program

A vertical skylight is placed at the center and is linked to a horizontal semi-open porch space—modeled after traditional Iranian houses. All key living areas are oriented inward toward this core, maximizing daylight exposure and defining a blurred internal/external boundary

Efficient Use of North-Facing Lot

The design addresses a narrow north-facing site (~10 m) by drawing light into the middle of the home—countering typical limitations of north-facing lots in Iran

DAYLIGHTING

Central Roof Light as Main Daylight Source

An inverted vertical void collects daylight and channels it into adjacent interior zones, brightening deep rooms that lack external windows

Semi-Open Courtyard Porches

This open structure filters light into the home while diffusing glare—creating a soft ambient interior illumination

FACADE & MATERIAL EXPRESSION

Minimal Solid External Walls

The outer facades remain largely solid, protecting the interior from excessive sun while the interior-facing walls are treated to invite light inward

Blurred Inside–Outside Interface

The semi-open core softens the distinction between indoor and outdoor areas, contributing to thermal comfort and spatial fluidity

NATURAL VENTILATION

Stack Ventilation via Central Void

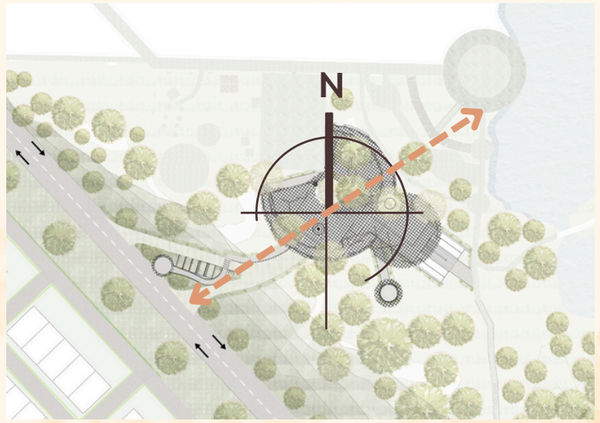
The vertical opening supports a stack effect, allowing warm air to rise and exhaust, drawing in cooler air from below

Cross-Ventilation Paths

Semi-open porches and internal corridors help create air movement channels, enhancing passive cooling.

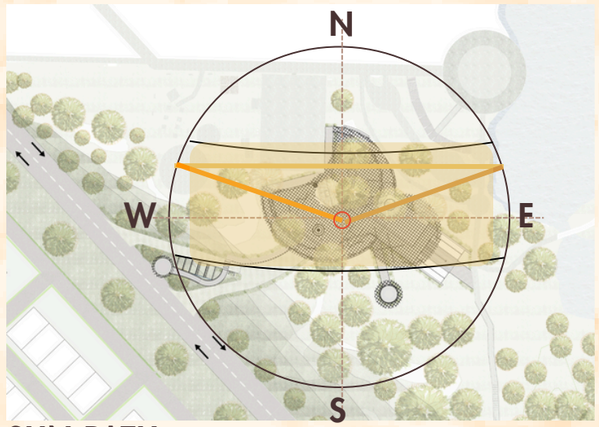
04 SITE PLANNING

CLIMATIC ANALYSIS



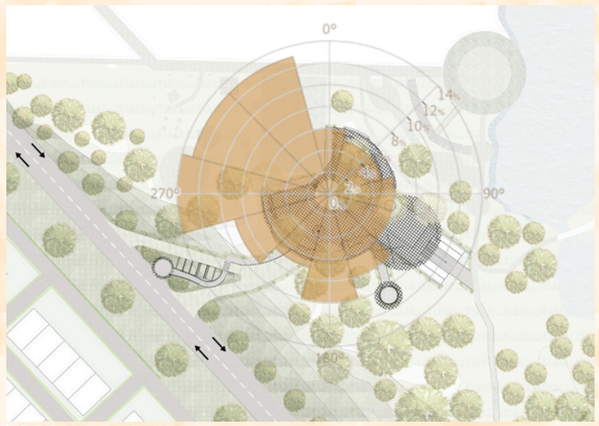
ORIENTATION

The site's Southwest–Northeast orientation guides the overall building placement. This alignment allows for effective solar management by minimizing harsh afternoon sun exposure while optimizing access to softer morning light. The layout ensures that each building cluster harmonizes with the natural flow of the site and surrounding environment.



SUN PATH

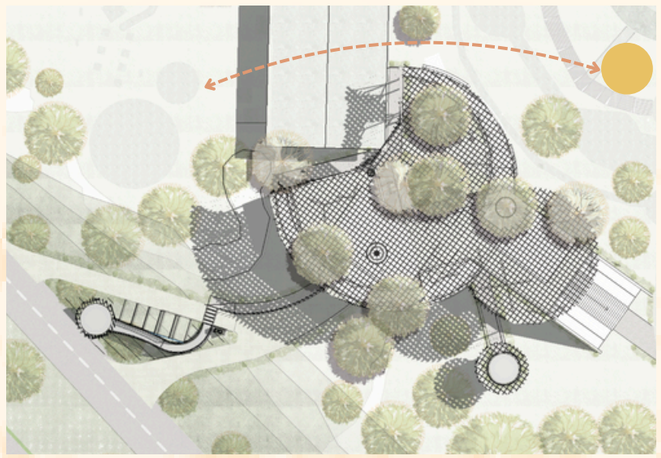
The design positions building clusters to reduce direct solar heat gain while maximizing gentle Northeast morning light, creating a balanced and comfortable indoor environment.



WIND PATH

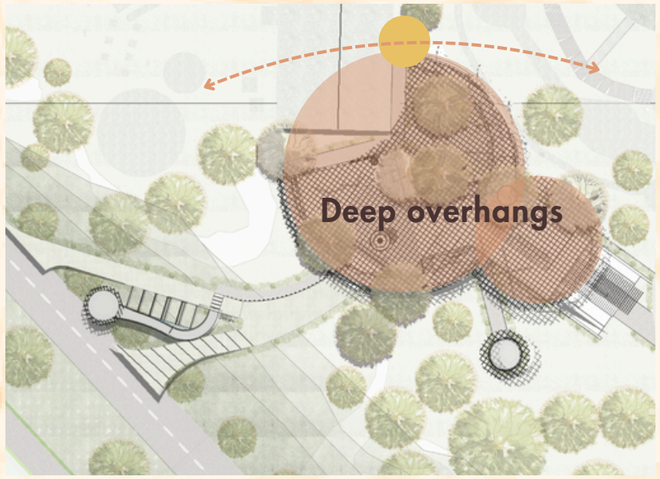
The wind path at Taman Wawasan Park is primarily influenced by prevailing breezes from the Northeast and Southwest. The building clusters are arranged to channel these natural winds through open corridors and shaded outdoor spaces, enhancing cross-ventilation and reducing reliance on mechanical cooling.

SUN SHADES ANALYSIS



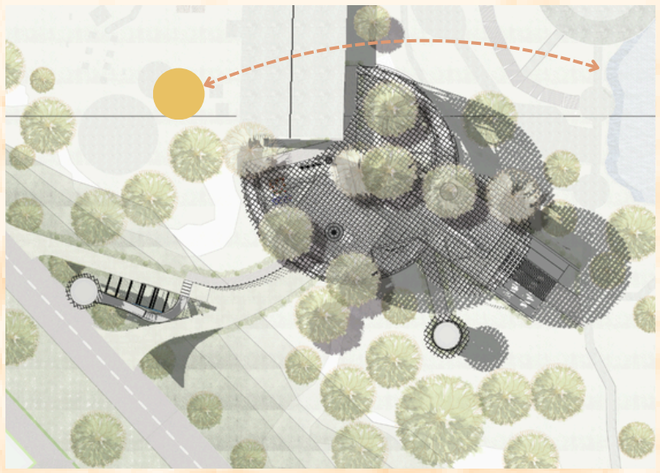
MORNING 10AM

Filtered openings with horizontal louvers diffuse soft daylight, reducing glare while keeping interiors bright and connected to the park.



AFTERNOON 1PM

Deep overhangs, green walls, and mature trees block harsh sunlight, lowering heat gain and shading outdoor plazas.



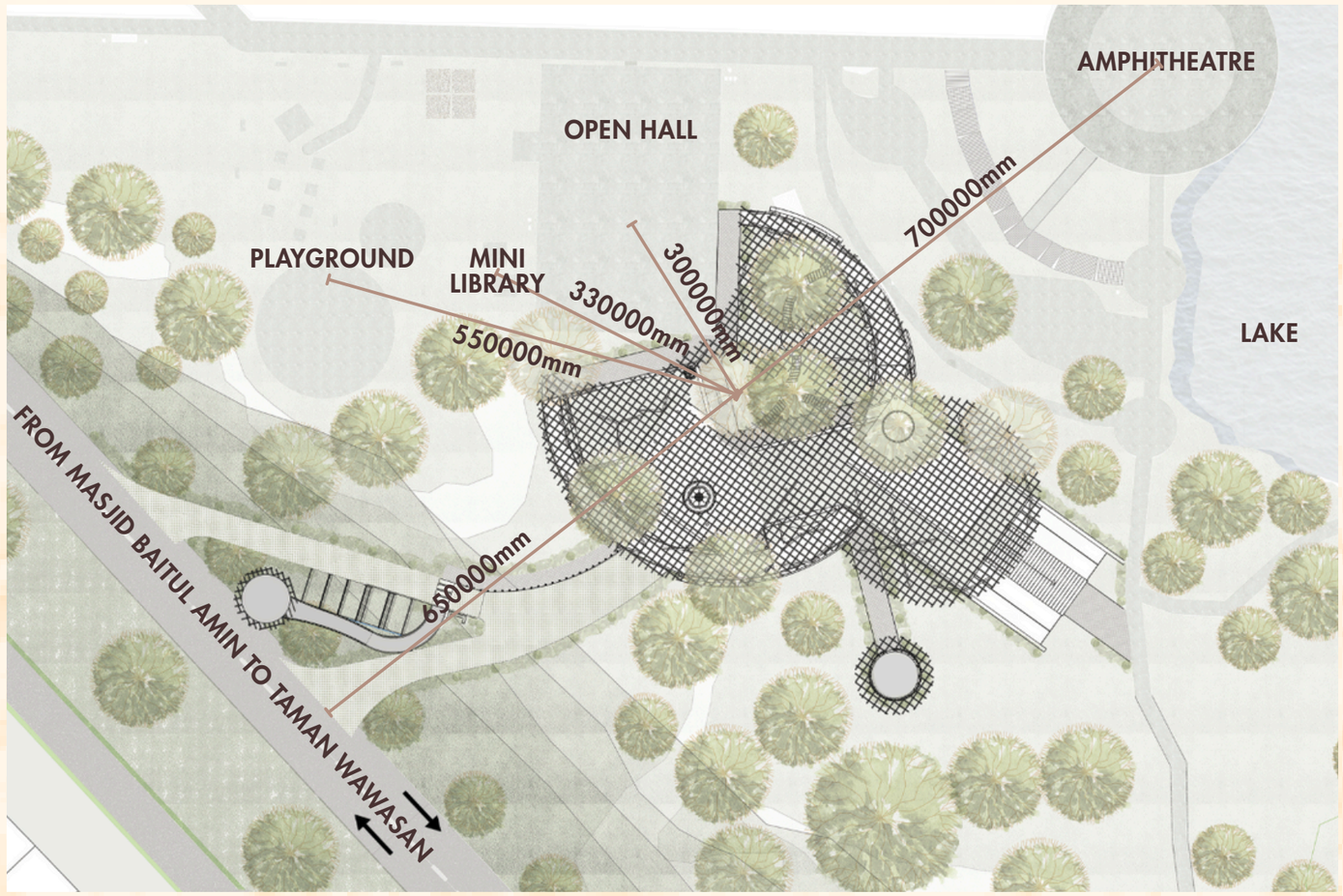
AFTERNOON 6PM

Adjustable screens and angled fins reduce glare from low sun while maintaining views and natural ventilation.

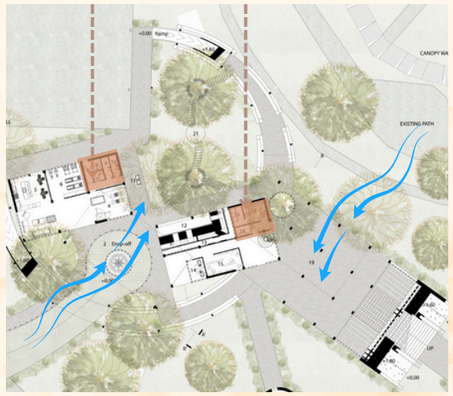
Mature Trees
Provide Shading to the building

04 SITE PLANNING

DISTANCE BETWEEN BUILDINGS & SURROUNDING FEATURES



LINEAR & STAGGERED LAYOUT

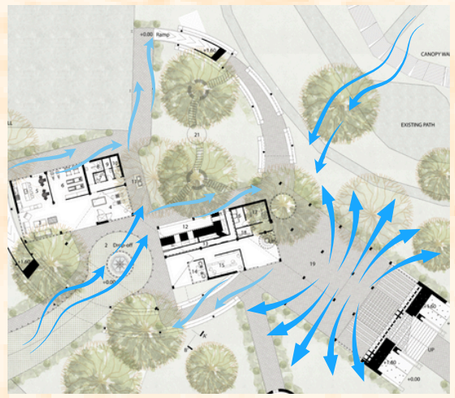


Arrange buildings along a Southwest–Northeast axis with slight staggering to optimize sun shading and wind capture

This layout allows airflow between building blocks and improves thermal comfort in outdoor plazas

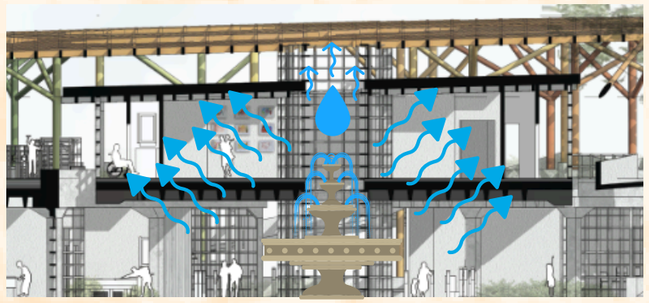
Services can be easily access from in and out

WIND CHANNELING LAYOUT



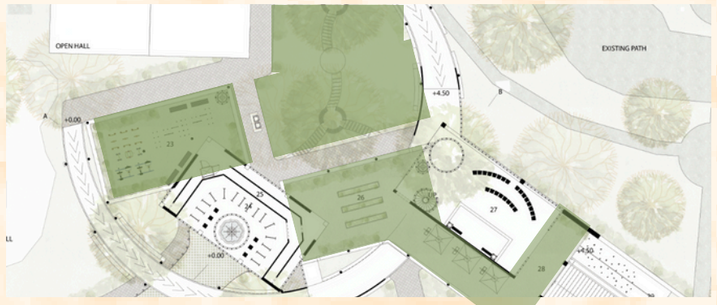
The staggered building layout creates wind corridors that capture Northeast and Southwest breezes, guiding airflow through plazas and between structures to enhance cross-ventilation and reduce mechanical cooling needs

INTEGRATED WATER COOLING SPINE



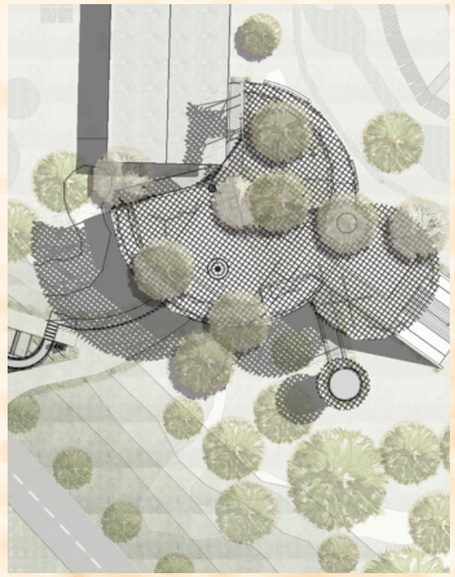
A water features is placed between building clusters to improve microclimate conditions. As wind passes over these features, evaporative cooling occurs, lowering surrounding air temperatures and improving thermal comfort in adjacent outdoor spaces

GREEN POCKET SPACES



Landscaped courtyards and green pockets are inserted between building masses to improve natural daylight penetration and create cooler microclimates. These planted zones act as both visual relief and functional buffers, enhancing comfort for occupants and visitors

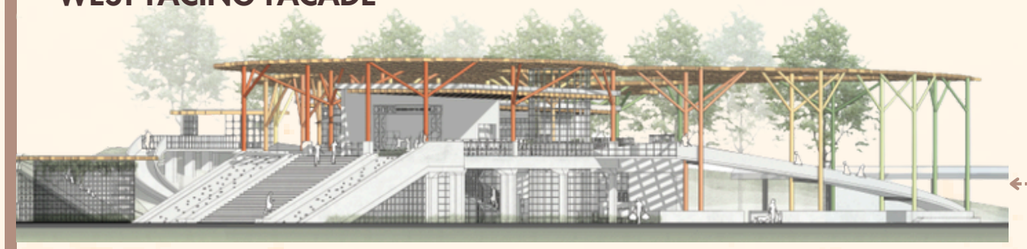
SHADED BUILDING PLACEMENT

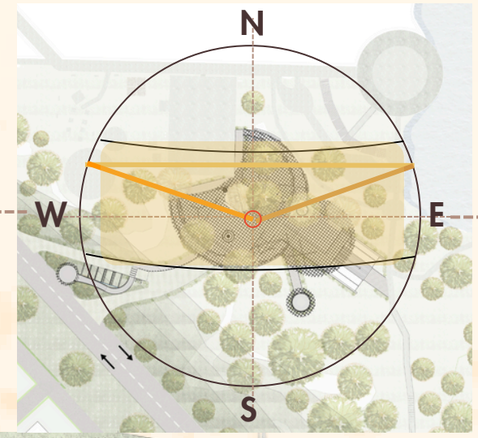


Building clusters are carefully positioned beneath or adjacent to preserved mature trees, using their natural canopies to shield façades from the sun. This strategy not only minimizes solar heat gain but also helps visually integrate the architecture with the park's green landscape

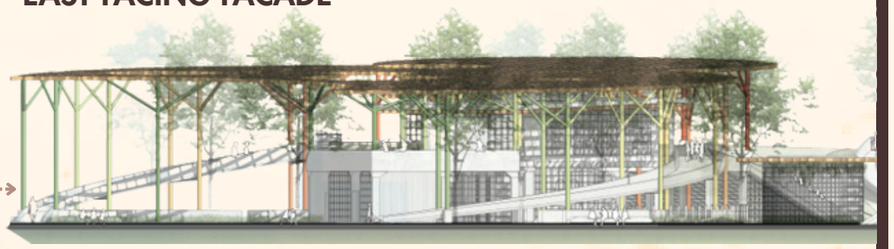
05 DAYLIGHTING

WEST FACING FACADE





EAST FACING FACADE

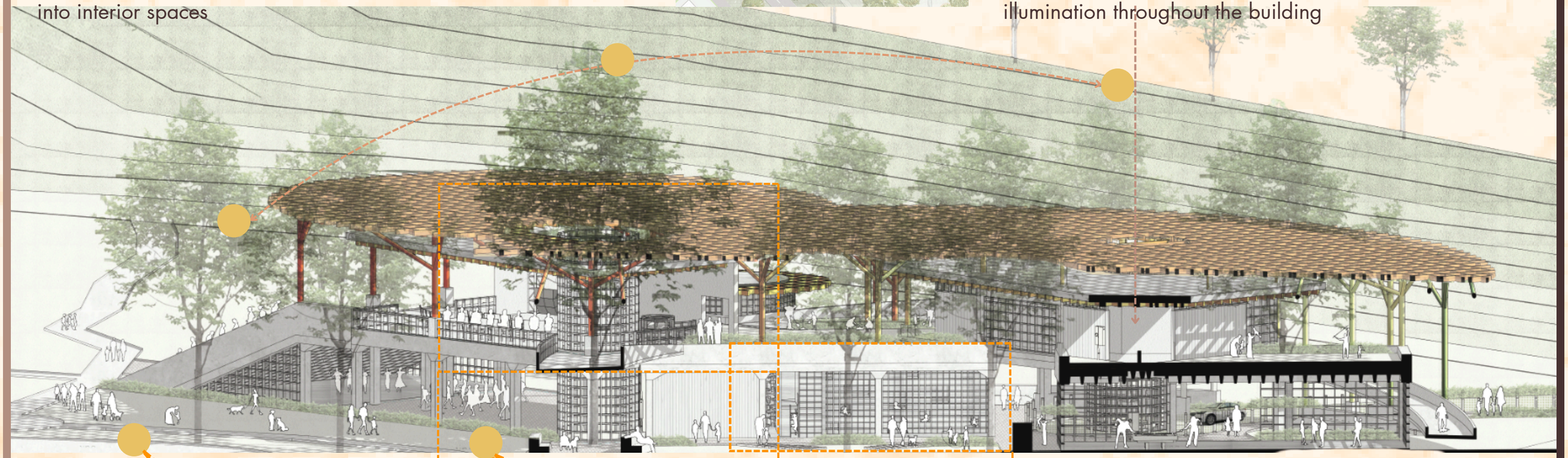


SOUTHWEST–NORTHEAST ORIENTATION

Align building clusters to capture soft morning light from the Northeast while creating opportunities for daylight to reach deep into interior spaces

REFLECTIVE INTERIOR SURFACES

Apply reflective finishes and strategically placed surfaces to bounce daylight into shaded zones, ensuring consistent illumination throughout the building



SKYLIGHT THROUGH CENTRAL VOID

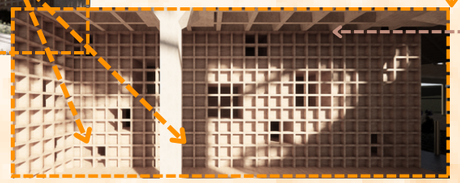
A large skylight above the central void functions as a natural light well, reflecting daylight off the water surface and light-colored materials to brighten the building's core and reduce artificial lighting needs

GRIDS ROOF

Use open grids roof to filter and distribute sunlight evenly across circulation space

CLERESTORY GRID

Allows high-level daylight to penetrate deep into the building while avoiding direct glare. Its elevated position ensures even light distribution across interior spaces, reducing the need for artificial lighting during the day



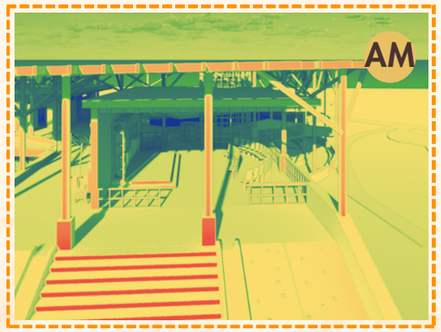
SEMI-COVERED CORRIDOR

Filtered daylight to enter through its partially open roof
Creates comfortable transition space between indoors and outdoors, enhances spatial quality with light and shadow

05 DAYLIGHTING

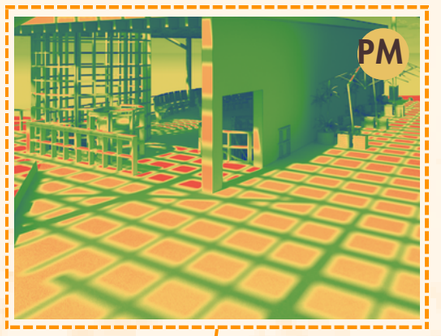
DAYLIGHTING SIMULAITON ANALYSIS

LUX



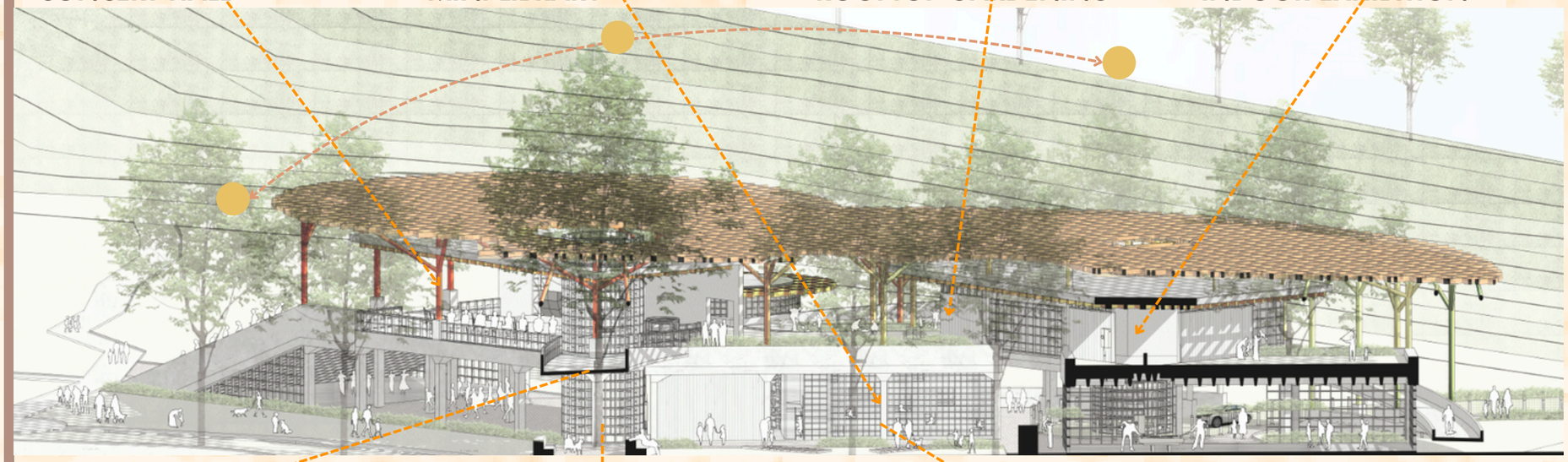
CONCERT HALL

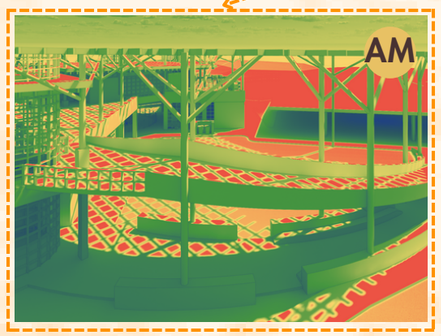
MINI LIBRARY



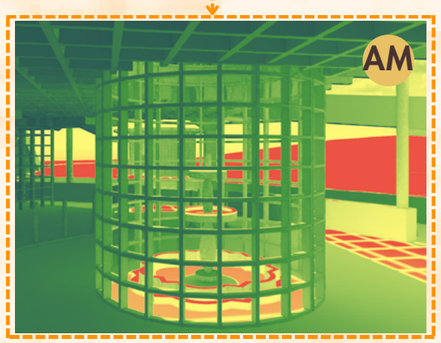
ROOFTOP GARDENING

INDOOR EXHIBITION

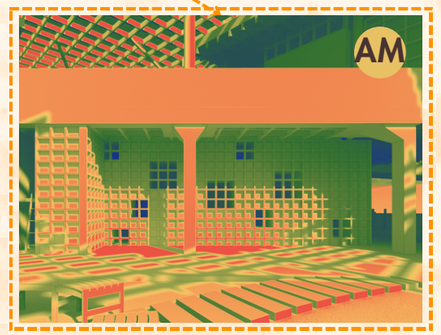




RAMP PATHWAY



DROP OFF ZONE



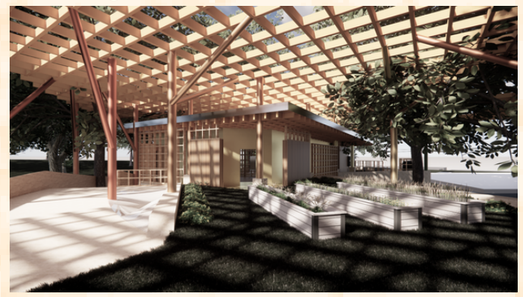
KIDS PLAYING ZONE

ROADSIDE DROP OFF

The daylighting simulation analysis evaluates how natural light penetrates and distributes throughout the building at different times of the day. By simulating various conditions, it helps identify areas with optimal daylight, potential glare zones, and underlit spaces. This data informs design decisions, such as the placement of skylights, clerestory grids, and semi-covered corridors, ensuring balanced illumination, reduced artificial lighting demand, and improved visual comfort for occupants.

SPATIAL EXPERIENCES

The overall exterior is defined by its open grids roof, preserved trees, and semi-covered spaces that invite natural daylight throughout the building



The grids roof filters daylight into the main entrance, creating a warm, naturally lit space. Soft shadows from the timber grid and surrounding trees blend the building seamlessly with the park

The semi-covered corridor allows controlled sunlight and framed views of the landscape, creating a comfortable, shaded environment that encourages social interaction

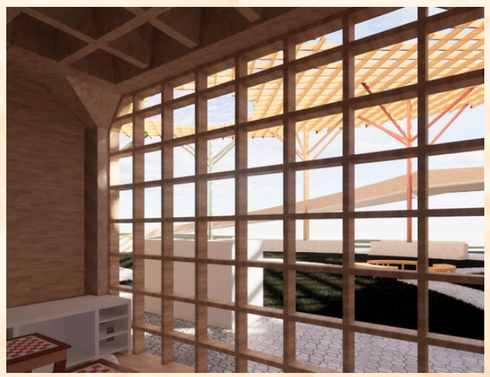
06 FACADE DESIGN

SOUTHWEST SHADING SYSTEM

Deep horizontal overhangs and vertical fins on the Southwest facade block harsh afternoon sun while allowing indirect daylight to enter, reducing heat gain and improving interior comfort

FRAMED VIEWS

Precisely placed facade openings frame key views of Taman Wawasan Park while maintaining solar control through recessed shading elements



TYPES OF FACADE

CLERESTORY GRID FAÇADE

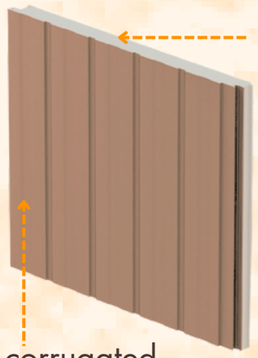
High-level grid openings filter daylight deep into interior spaces while enabling cross-ventilation, enhancing both energy efficiency and spatial experience

SHADING FACADE

Horizontal and vertical external perforated shading devices blocking direct sunlight while allowing diffused daylight, reducing glare and cooling loads

INSULATED PANEL FACADE

Prefabricated sandwich panels with insulation between exterior and interior finishes enhances energy efficiency, limits heat transfer, and offers a clean, modern appearance



GREEN FACADE LAYER

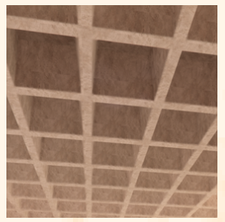
Climbing vegetation and planter-integrated trellises create a living facade that insulates the building, cools surrounding air, and visually merges architecture with the park's natural environment

PERFORATED FACADE

Facade panels with patterned perforations and mesh screens filters daylight, improves privacy, and creates architectural texture while reducing heat gain

MATERIALITY

GROUND FLOOR

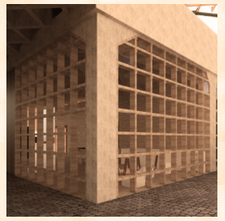


Concrete Waffle Slab

Adds structural strength and thermal mass for passive cooling

Concrete Columns

Provide stability and anchor the building visually to the ground



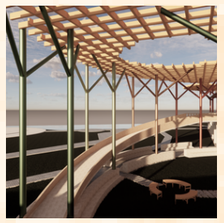
Wood Grids Wall

Filters daylight, enhances ventilation, and creates natural texture

Corrugated Aluminium Wall

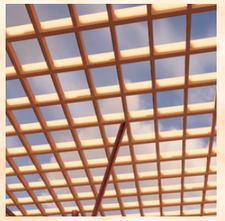
Lightweight, durable, and resistant to weather

FIRST FLOOR



Steel Column

Supports upper structure with minimal visual obstruction

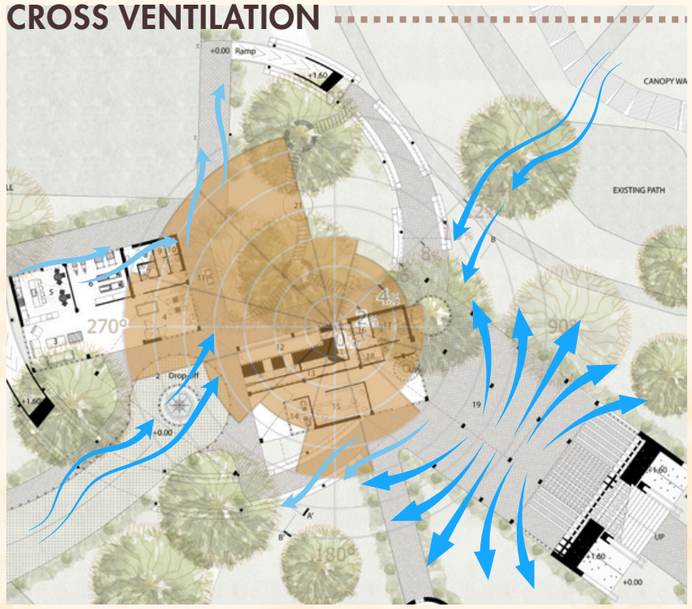


Wood Grids Roof

Softens sunlight, promotes airflow, and connects architecture to nature

07 NATURAL VENTILATION

CROSS VENTILATION



STAGGERED BUILDING LAYOUT

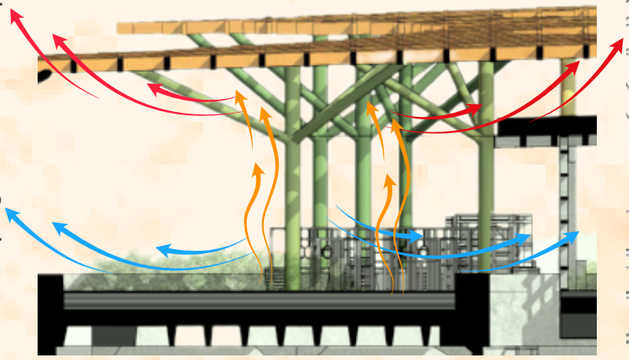
Position building clusters along the Northeast–Southwest wind path to create wind corridors that channel breezes naturally through open spaces and semi-covered areas

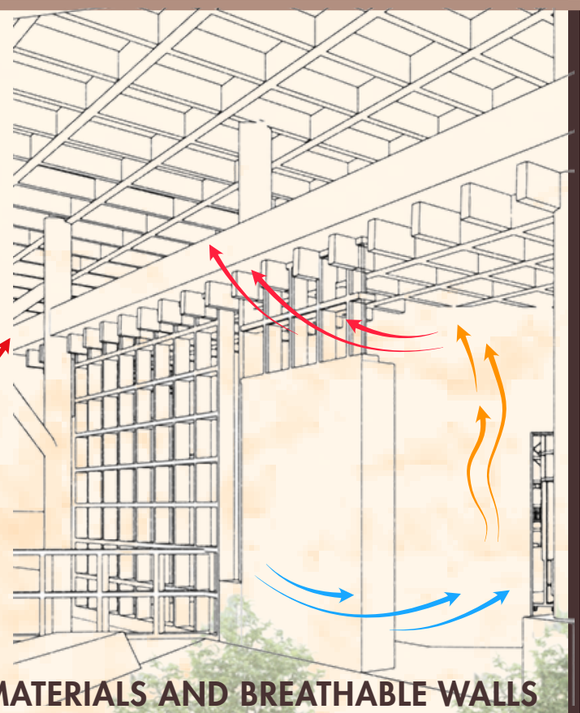
VEGETATED WIND CHANNELS

Line wind corridors with vegetation and water features to naturally cool incoming air before it enters living and communal spaces

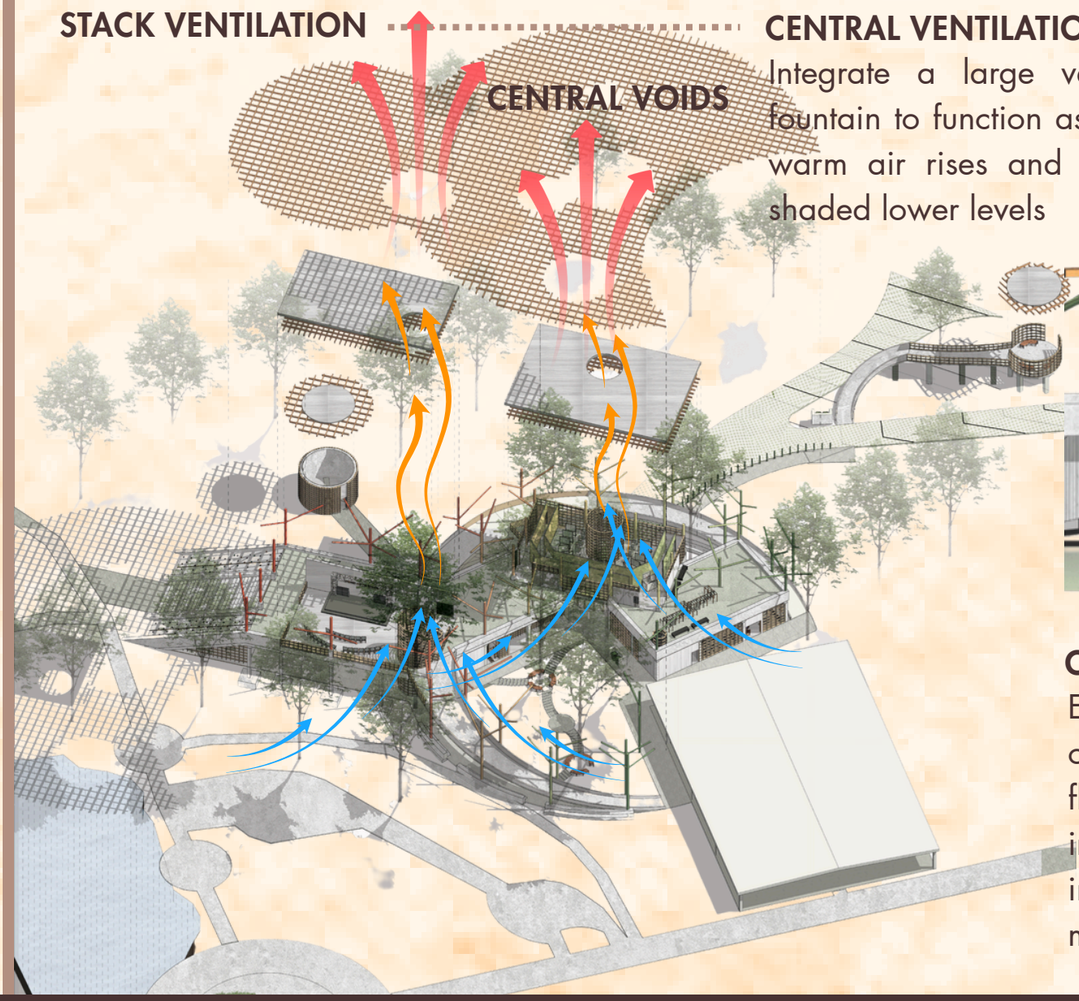
OPERABLE HIGH-LEVEL OPENINGS

Include clerestory windows or upper ventilation slits to exhaust hot air, improving thermal comfort while maintaining daylight access





STACK VENTILATION

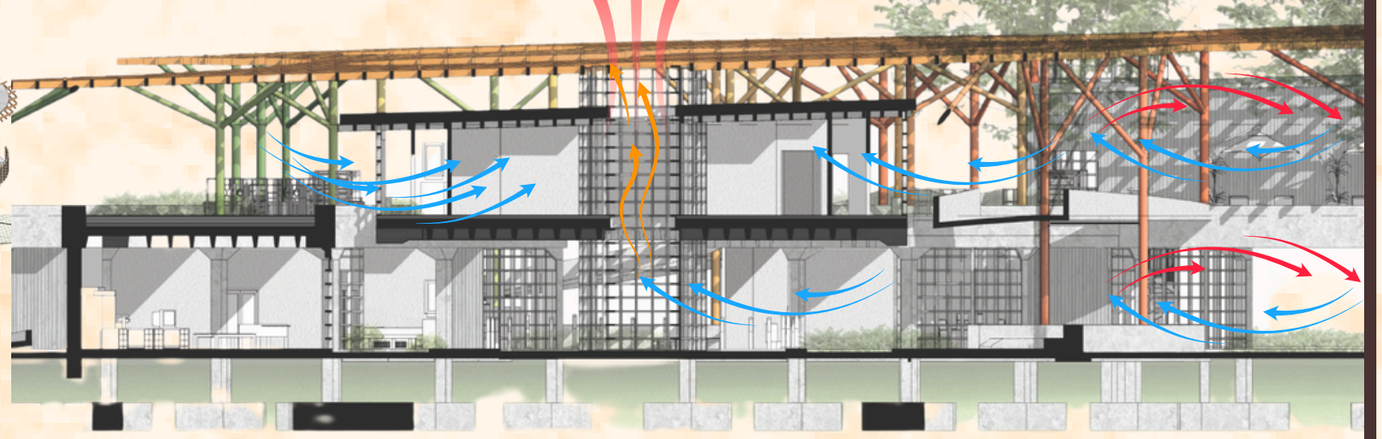


CENTRAL VENTILATION VOIDS

Integrate a large vertical void above the water fountain to function as a stack ventilation core, where warm air rises and exits, drawing cooler air from shaded lower levels

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



OVERSTACKING BUILDING

Elevate parts of the building on pilotis to enable wind to flow beneath and upward into the occupied spaces, improving comfort without mechanical cooling

SEMI-COVERED CORRIDORS

Design corridors with open sides and perforated panels to allow wind to pass through, connecting interior spaces with the surrounding park's natural airflow

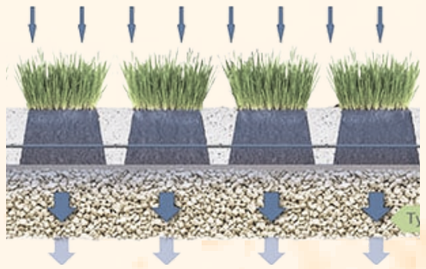
PERMEABLE GRIDS WALLS

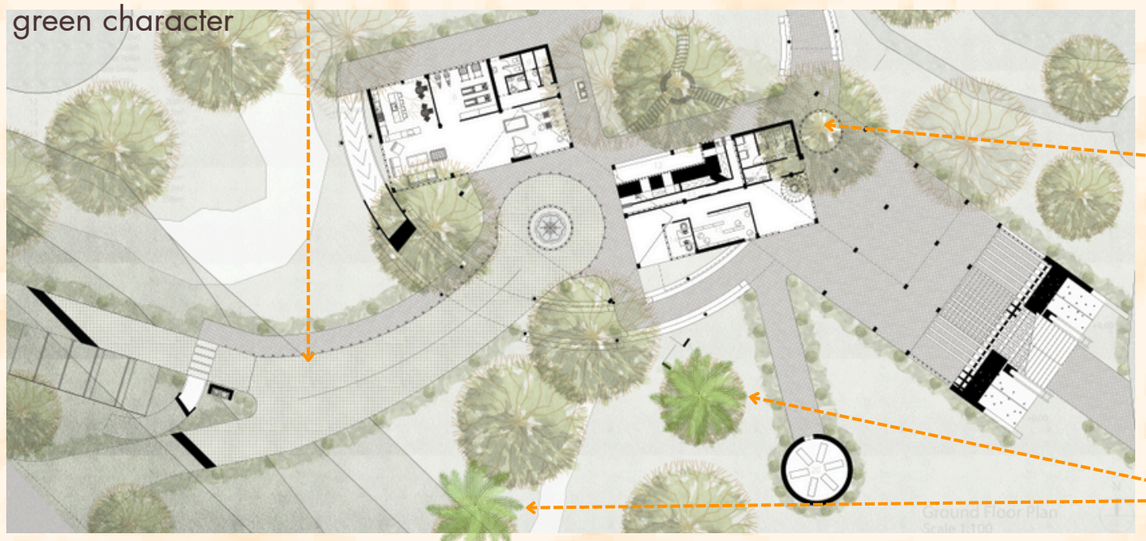
Use porous grids walls on the façades to promote continuous airflow while maintaining privacy and shading, reducing heat buildup in enclosed spaces

08 STRATEGIC LANDSCAPING

GRASSCRETE FOR VEHICULAR PATHWAY

Grasscrete is used for vehicular pathways to reduce surface heat, improve stormwater infiltration, and minimize hardscape impact on the site. Its permeable structure visually blending circulation routes with the surrounding landscape and reinforcing the park's green character



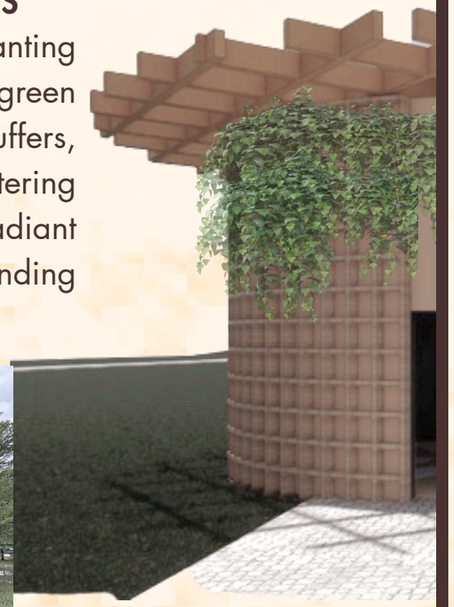


SHADING TREE PLACEMENT

Preserve and position mature trees near Southwest-facing façades and outdoor plazas to reduce solar heat gain, naturally cool adjacent spaces, and improve user comfort.

GREEN BUFFER ZONES

Introduce dense planting strips and vertical green walls as landscape buffers, reducing noise, filtering dust, and lowering radiant heat from surrounding hardscape areas



TREE


Satellite Tree


Weeping Fig


Madagascar Almond Tree


Oil Palm Tree


Blackboard

SHRUB

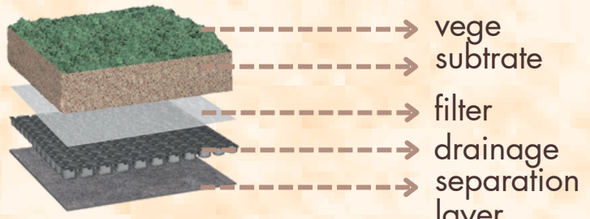

Golden Gardenia


Spray of Gold

EDIBLE ROOFTOP GARDEN

Introduce small-scale productive gardens within community zones to encourage interaction, education, and sustainable food practices

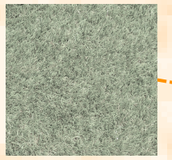
INTENSIVE ROOF



GREEN POCKET SPACES

Green pockets are inserted between building clusters to act as microclimate buffers and social nodes. These landscaped pockets bring greenery closer to interior spaces, improve natural ventilation, filter daylight, and provide shaded resting spots, enhancing both environmental performance and user experience

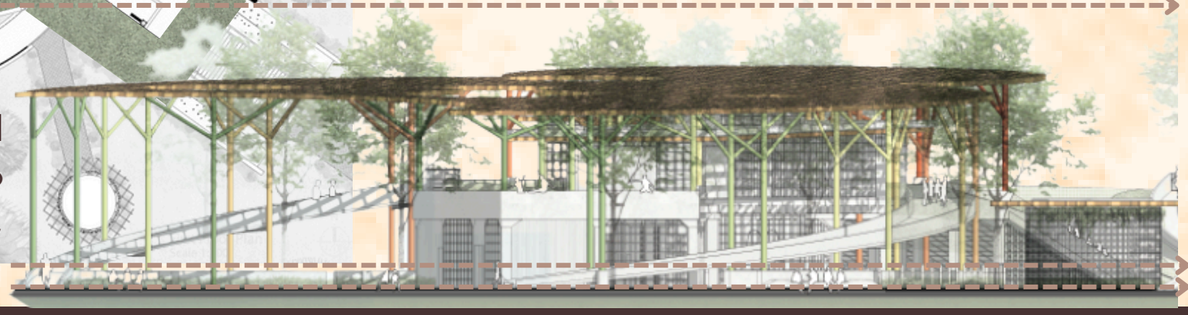
GROUNDCOVER


Cow Grass


Carpet Grass

LAYERED PLANTING ZONES

Combine ground covers, shrubs, and tree canopies in vertical layers to create thermal buffers, filter pollutants, and provide shade at multiple heights

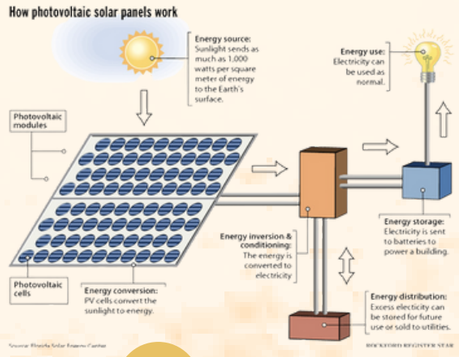


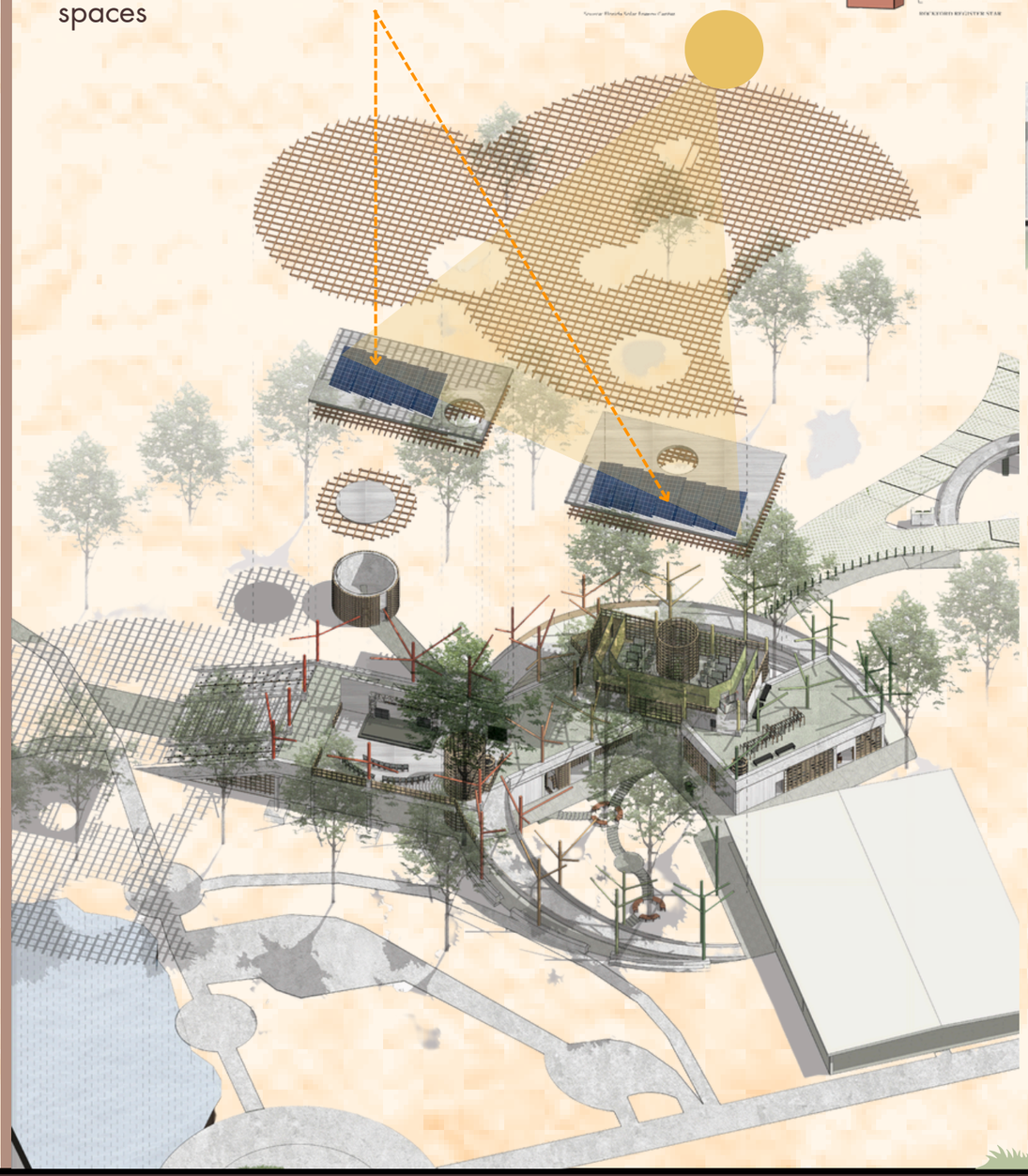
09 ACTIVE STRATEGIES

PHOTOVOLTAIC-INTEGRATED ROOF

The roof is equipped with photovoltaic panels strategically placed on sun-exposed sections to generate renewable

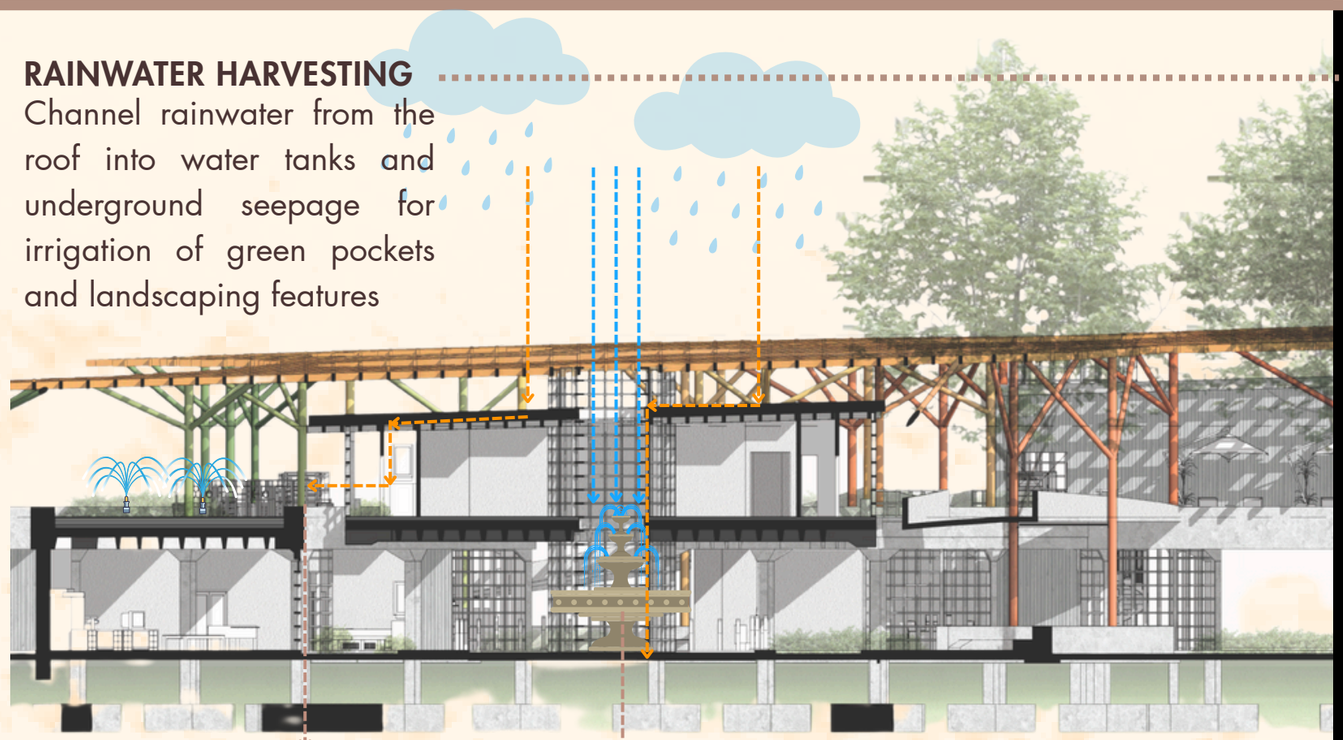
The panels reduce direct solar heat gain beneath the roof, improving thermal comfort for semi-covered spaces





RAINWATER HARVESTING

Channel rainwater from the roof into water tanks and underground seepage for irrigation of green pockets and landscaping features



Water Storage Tank

Rainwater collected from the roof is directed through concealed downpipes into water storage tanks

This harvested water is then filtered and redistributed via irrigation system to intensive green roof

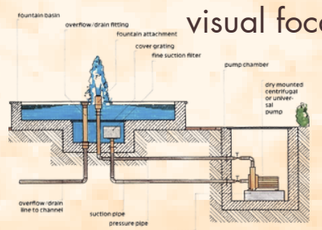
The integration of this system within the building design not only supports sustainable water management but also visually connects architecture and landscape through functional green infrastructure

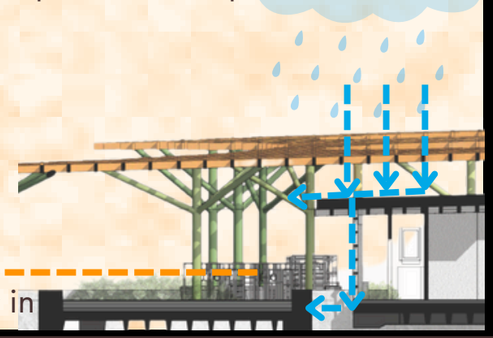
Water Fountain

The central water fountain is designed as a functional feature that collects rainwater from the grids roof and surrounding surfaces

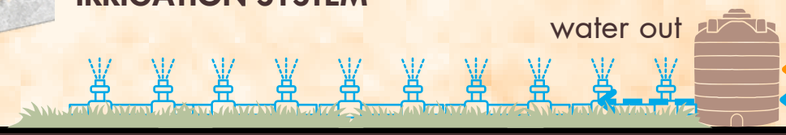
This harvested water is filtered and reused for landscape irrigation or to replenish the fountain itself, creating a closed-loop water system

Beyond its functional role, it also enhances the microclimate through evaporative cooling while serving as a visual focal point for the space





IRRIGATION SYSTEM



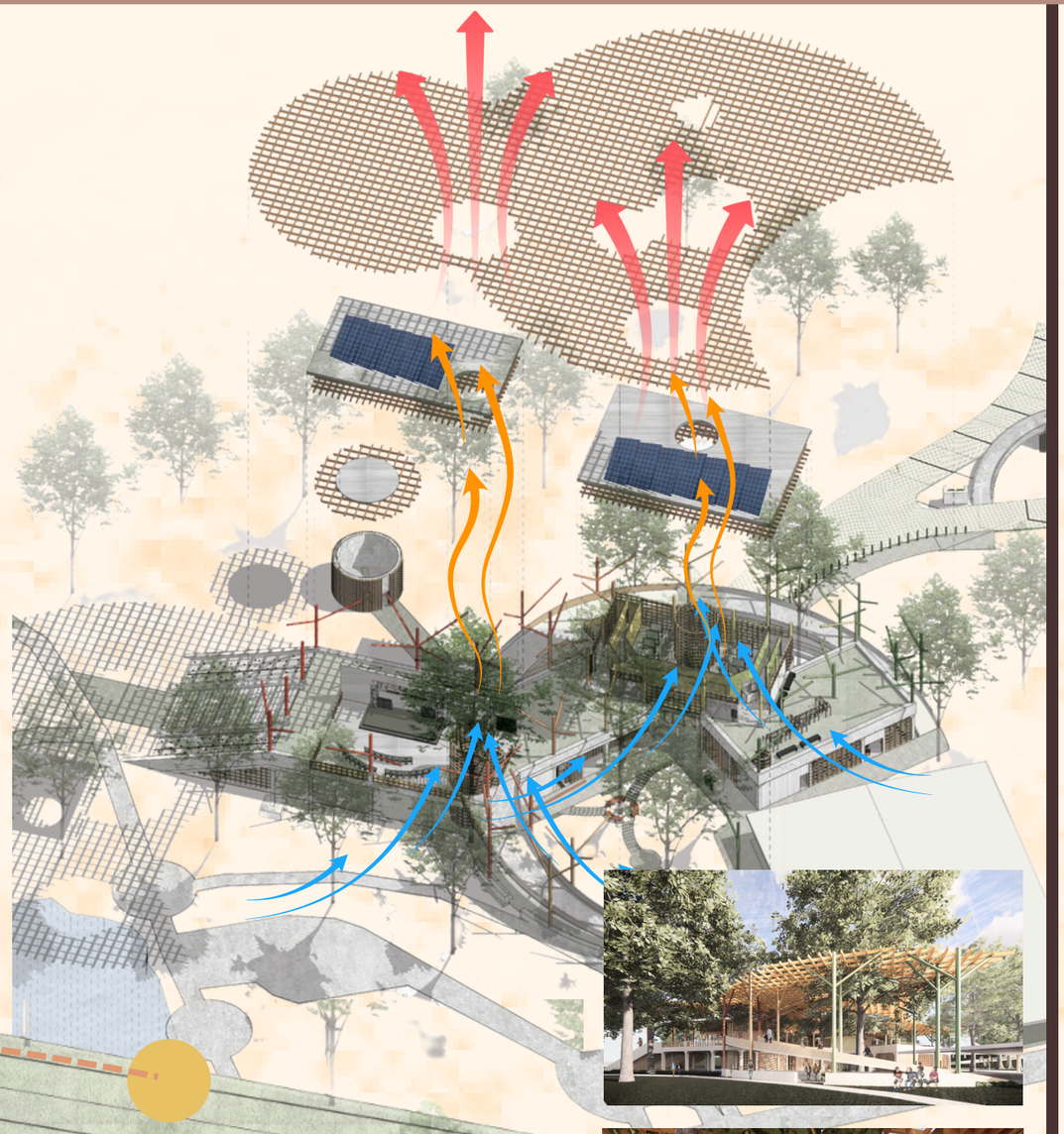
10 CONCLUSION & SPATIAL EXPERIENCES

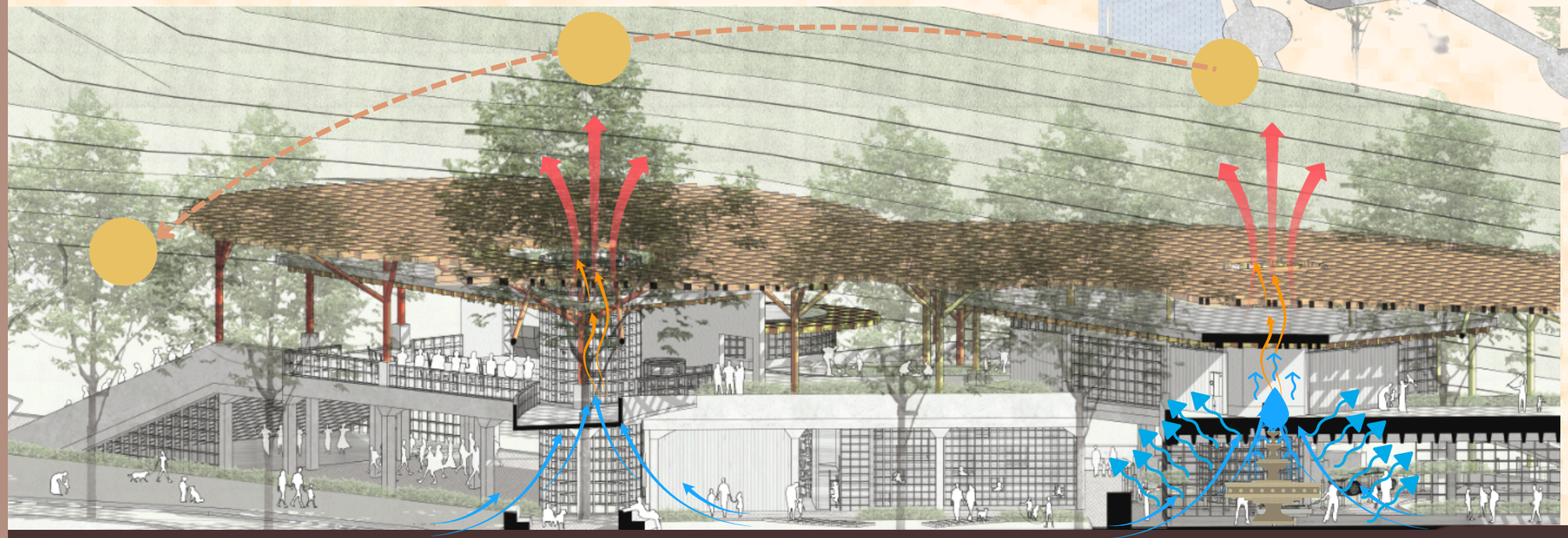
The integration of green strategies across orientation, daylighting, natural ventilation, façade design, and strategic landscaping creates an environmentally responsive architecture that blends seamlessly with Taman Wawasan Park.

The building's orientation aligns with the Southwest–Northeast axis to optimize sun and wind exposure, reducing heat gain while improving natural ventilation. Skylights and clerestory grids bring daylight deep inside, minimizing reliance on artificial lighting while creating vibrant and comfortable interior spaces. Staggered building clusters and a central ventilation void maximize cross-ventilation and stack effects, allowing fresh air to flow naturally through the building. Façade shading devices, vertical greenery, and double-skin systems control solar radiation while improving thermal comfort and strengthening the connection between inside and outside.

Strategic landscaping integrates green pockets, vegetated wind corridors, and grasscrete pathways to cool the site, manage stormwater naturally, and enhance the park-like experience. Photovoltaic panels on the roof generate renewable energy while providing additional shading, reducing energy demand and operational costs. Meanwhile, the rainwater harvesting system channels runoff from the roof and central fountain into storage tanks, where it is filtered and reused for irrigating landscaping and green roofs, closing the water cycle sustainably.

Together, these strategies transform the project into a sustainable, comfortable, and harmonious built environment that functions as an extension of Taman Wawasan Park and promotes long-term ecological balance.





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