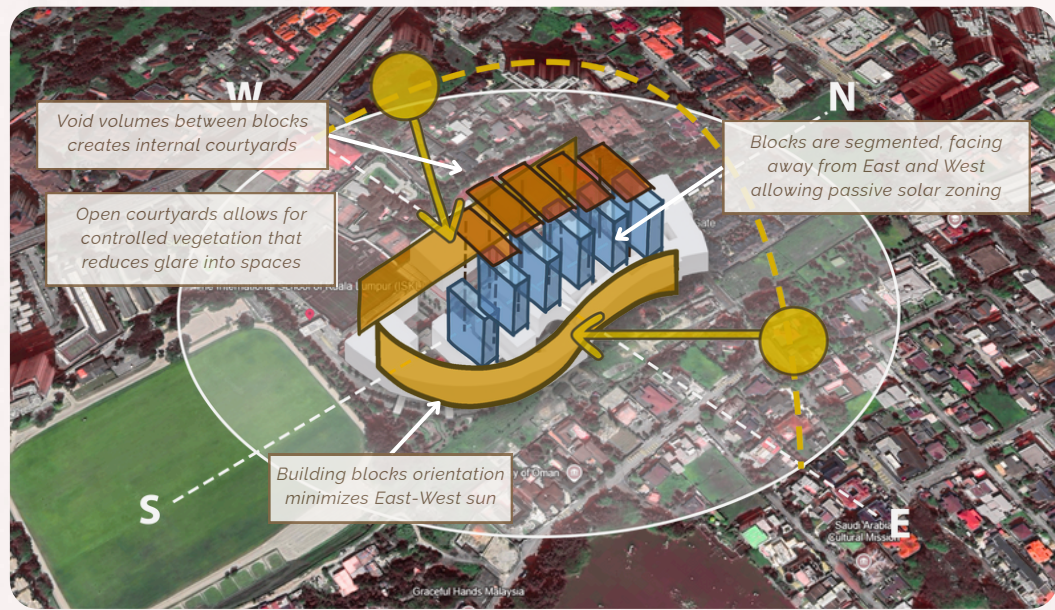


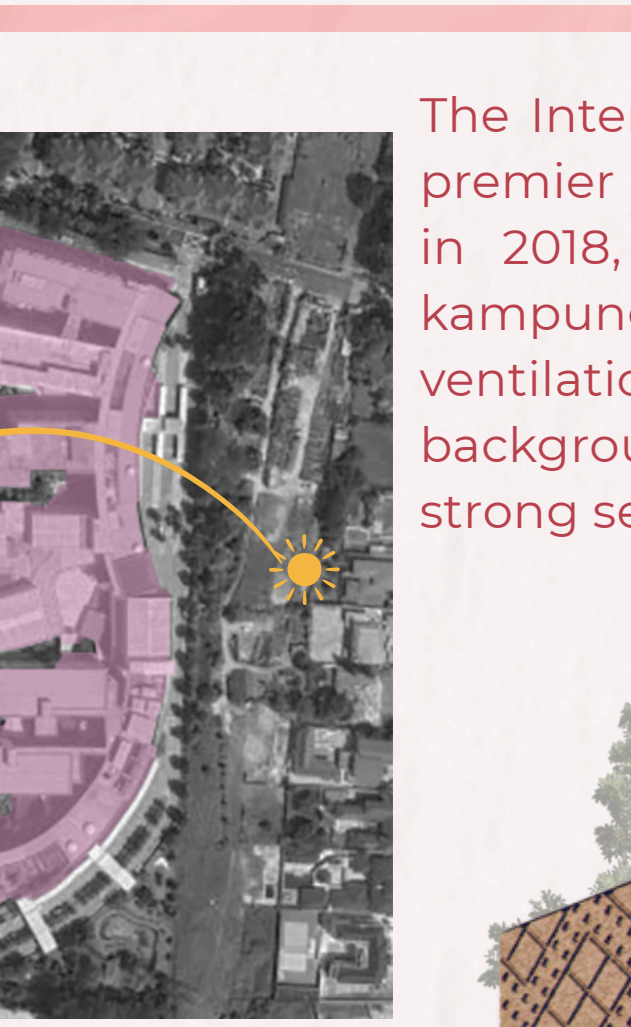
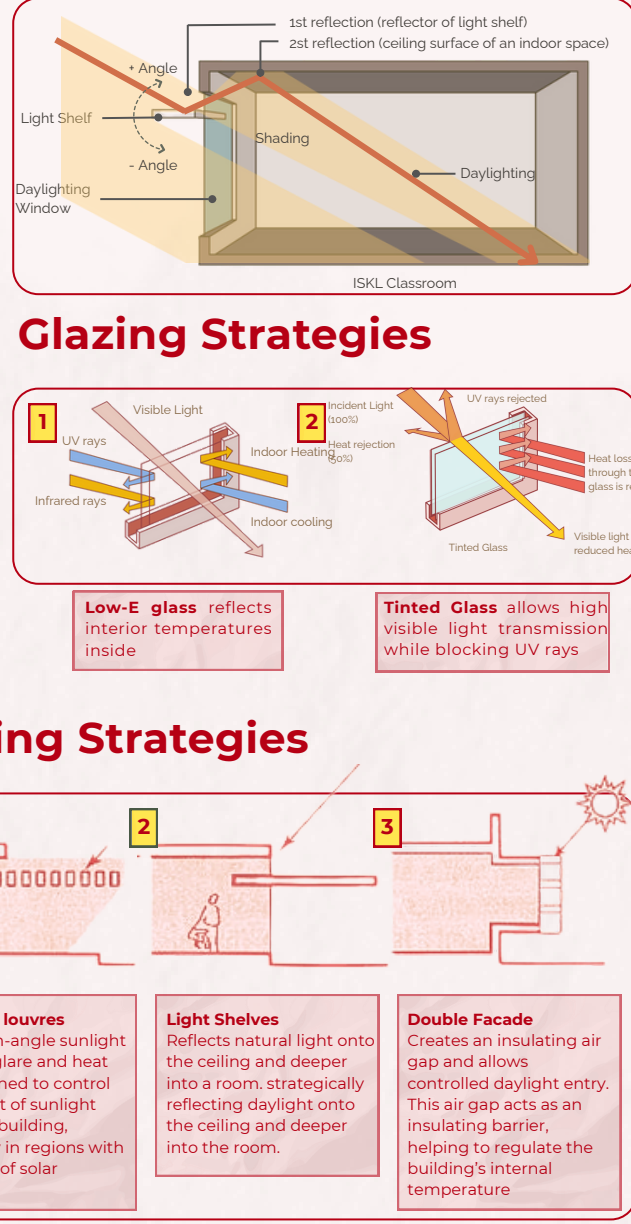
Daylighting

Urban Strategies



- ISKL responds by breaks down its massing into discrete, linear blocks and organizes them around internal courtyards and open corridors.
- Blocks are oriented to minimize east-west solar exposure, reducing glare and heat gain.
- The segmentation of mass into multiple blocks allows passive solar zoning, separating high-glare zones from soft-lit zones.
- This creates a more responsive micro-urban environment, allowing for smaller courts and passive ventilation paths that regulate light and airflow.

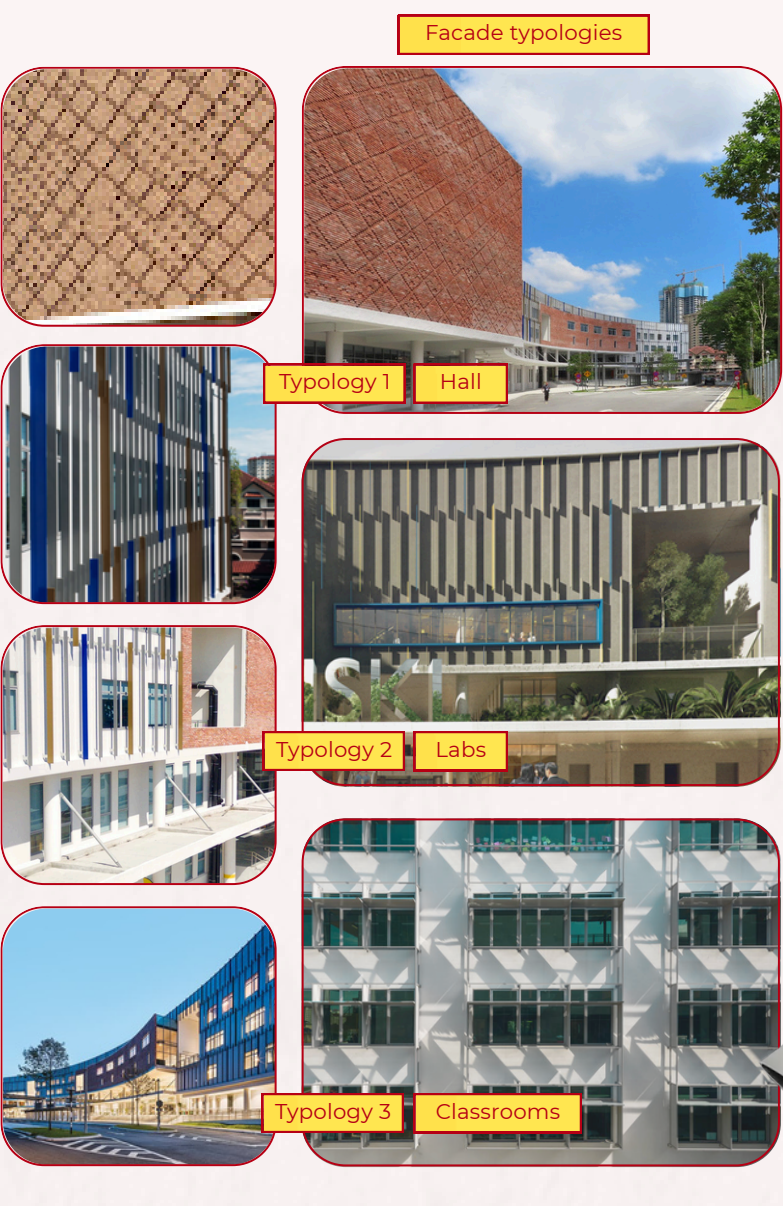
Room Strategies



Facade Design

Design Strategies

- Clay Brick Facade**
 - Filtered light and reflected more sunlight
 - Major openings to achieve thermal comfort
 - Thermal mass stabilize interior climate in hot-humid conditions
- Metal Fins**
 - Prevent heat transfer and give shading through interior space
 - Reduce direct sunlight from afternoon peak sun
- Overhang Roof**
 - Blocking solar exposure on Ground floor, and improved air circulation
 - create sheltered outdoor spaces, promoting natural ventilation and enhancing indoor air quality.
- Curtain Wall**
 - Allows ample daylight into communal spaces and corridors
 - Set behind deep eaves and vegetation to prevent glare and overheating.

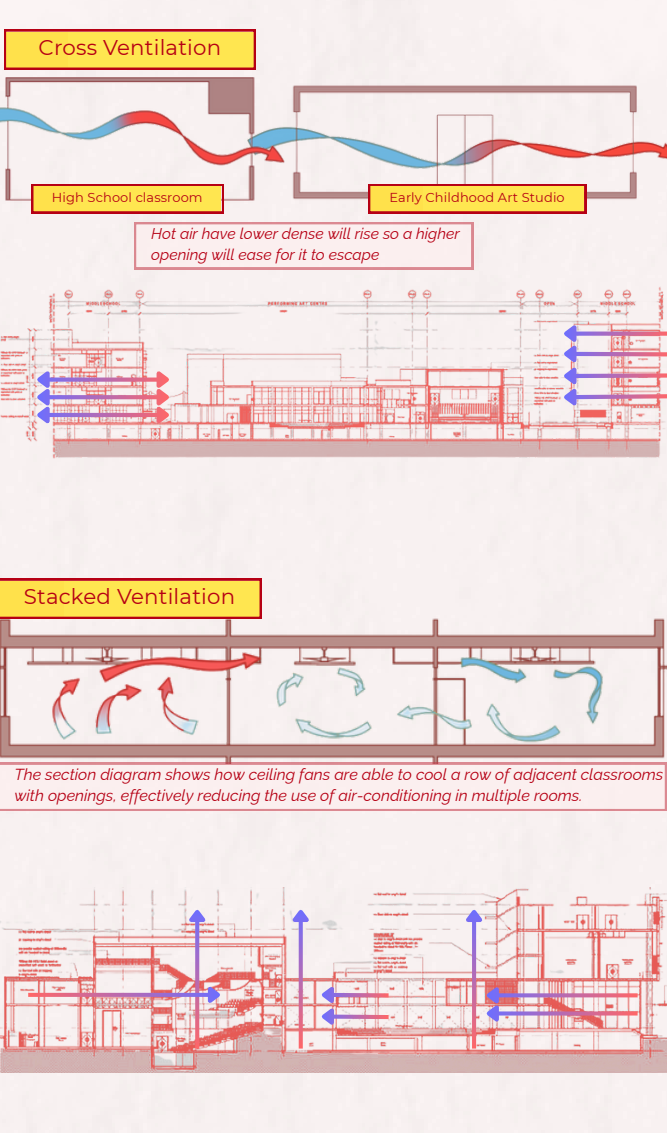


Material Strategies

- Clay Brick**
 - Slowly absorb and release heat. A tropical location makes it warmer at night and cooler during the day.
- Recycle Steel Bars**
 - Strong support, vast spans with small section sizes, and a slim, industrial appearance are all provided by vertical fins.
- High Performance Glazing Glass**
 - Cut down on solar heat gain, increase the amount of natural light.
- Aluminum-colored fins**
 - Reduces the demand for artificial light by enabling controlled daylighting.

Natural Ventilation

Design Strategies



Stack ventilation

- maximized via double-volume spaces, high ceilings, and clerestory windows/roof vents.
- Warm air** rises and escapes through upper openings.
- Cooler air** enters through lower openings, creating vertical airflow. This reduces reliance on mechanical cooling.
- Stack ventilation** maximized via double-volume spaces, high ceilings, and clerestory windows/roof vents.
- Warm air** rises and escapes through upper openings.
- Cooler air** enters through lower openings, creating vertical airflow. This reduces reliance on mechanical cooling.



Design Strategies

- Wide, covered walkways connect different sections of the campus. Even it is not air-conditioned but designed to promote cross-ventilation using natural airflow.
- High ceilings and ventilation openings at the top allow warm air to rise and exit.
- The campus is oriented to face South and North, to capture prevailing breezes, especially from the Southwest, and to avoid direct sunlight heat from East and West.
- Large overhangs and vertical fins, help shade windows and walls. These design minimizing solar gain while permitting airflow through semi-outdoor and indoor spaces.

Site Planning

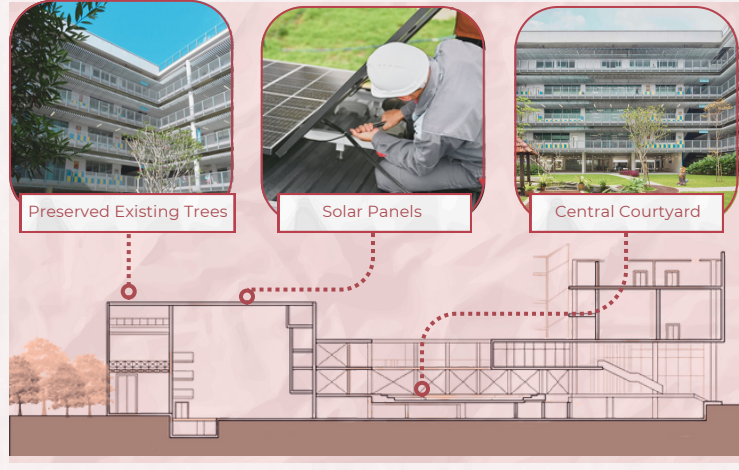
Climate Response

- Building Orientation**
 - Organized around a curved north-south spine, minimizing east-west exposure and reducing heat gain from low-angle morning and evening sun.
- Rainwater Harvesting**
 - Deep roof overhangs, sunshades, and vertical fins protect glazing and facades from direct solar radiation.
- Shade & Sun Control**
 - Deep roof overhangs, sunshades, and vertical fins protect glazing and facades from direct solar radiation.



Site Response

- Topography**
 - Preserved existing trees and natural topography, embedding the building into a green framework.
- Environmental & Ecological**
 - Incorporates photovoltaic solar panels to generate clean energy.
- Hardscape**
 - Central courtyard as a communal space, supported by shaded walkways and native landscaping



- Massing**
 - Features clusters of low-rise buildings, including a five-story administrative building.
- Organized around a central and curved spine that runs north to south, minimizes east-west exposure and reducing solar heat gain and enhancing natural ventilation.

The International School of Kuala Lumpur (ISKL), located in Ampang Hilir, is a premier international school that offers an American-based curriculum. Opened in 2018, the school's design draws inspiration from traditional Malaysian kampung houses, particularly in its emphasis on communal spaces and natural ventilation. Its modern campus serves over 1,500 students from diverse backgrounds and is designed to encourage collaboration, innovation, and a strong sense of community.



- Ampang Hilir, KL
- Tropical
- 105,000 m²
- HOK, VERITAS

- LEED Gold
- 4 Storesys
- School, Education
- Clustered Form

International School of Kuala Lumpur
Kuala Lumpur, Malaysia

Comparative Analysis

- Site Context**
 - Surrounded by residential neighborhoods and green spaces
 - Native landscaping support educational and outdoor use
 - Natural topography preserved integrating with existing trees
- Sustainability Strategies**
 - Consume 60% less energy than typical schools in similar hot, humid climates.
 - North-south orientation to maximize natural light penetration
 - Flexible learning spaces that can adapt to evolving educational needs.
- Building Strategies**
 - Form:** Fragmented, low-rise, courtyards. Minimized E-W exposure
 - Daylight Control:** Courtyards, double facades, reflective elements
 - Shading devices(passive):** Aluminum Light shelves, Vertical fins, Horizontal louvres, Blinds and glazing
 - ISKL utilizes passive shading and sustainable materiality to enhance daylighting while mitigating glare.
- Facade Typologies**
 - Double skin:** reduce heat gain and temperature swings. Outer layer blocks glare, inner layer diffuses light
 - Vertical fins:** reflects glare, offering passive shading to lower indoor temperatures
 - Reflector shelves:** Aluminum panels reflect and shade into classrooms
- Design Strategies**
 - Clay bricks:** Locally abundant, low carbon footprint, contributes to heat dispersion
 - Aluminum:** Prefabricated and lightweight, reflects heat and glare. Reducing need for A/C
 - Low E Glazing:** Reflects UV and Infra rays, keeping interior cool, reduces heat gain and lose.
- Air Movement**
 - Open-air corridors allow air flow across the campus
 - High ceilings enable stack ventilation
- Massing and Orientation**
 - Facing South and North to capture breezes
 - Fragmented massing promotes air circulation between the individual blocks
- Landscape and Plantation**
 - Water feature around the school absorbs heat from surrounding when ventilation happens.
 - The presence of open spaces in the design promotes the stack ventilation
- Sustainable goal:**
 - Prioritizes strategic landscapes to reduce the need for active cooling and preventing semi outdoors corridors to overheat.
- Landscape arrangement:**
 - Clustered pockets of landscape at ISKL are placed between building blocks, creating green zones throughout the campus.
- Plantation:** Tropical plants are selected to withstand the monsoon season in Malaysia.

Daylighting

- Form:** Circular ring, central courtyard, uniform 360 exposure
- Daylight Control:** Atriums, skylights, Clerestory, reflective elements
- Shading devices(active):** Motorized louvres, deep reflective overhang, fritted and glazed glass.
- Apple Park utilize simple modern technology, dynamic louvres, custom glazed curtain walls to maximize daylighting and preventing heat and glare

Facade

- Motorized louvres:** Adaptable shade and reflector. Allows ventilation while reflecting glare
- Glazed curtain wall:** Prevents glare while welcoming light into interior.
- Sliding glazed wall:** Allows ventilation and integration with outdoors
- Uniformity:** Easy construction, with prefabricated elements. Allows efficient shading.
- Reflective glass/ metal:** Reflects harsh desert light without absorbing heat
- Solar panel roofing** Utilize harsh desert sun to generate renewable energy

Ventilation

- Air Movement**
 - Air gaps between Apple Park's facades serve as thermal buffers to enhance passive airflow
 - Automated window support natural ventilation
- Massing and Orientation**
 - Continuous facade enables cross ventilation, allowing breezes to flow through from any direction.
- Landscape and Plantation**
 - Approximately 9,000 trees through evapotranspiration help to reduce temperature in the courtyard.
 - Central courtyard enables cross ventilation

Landscaping

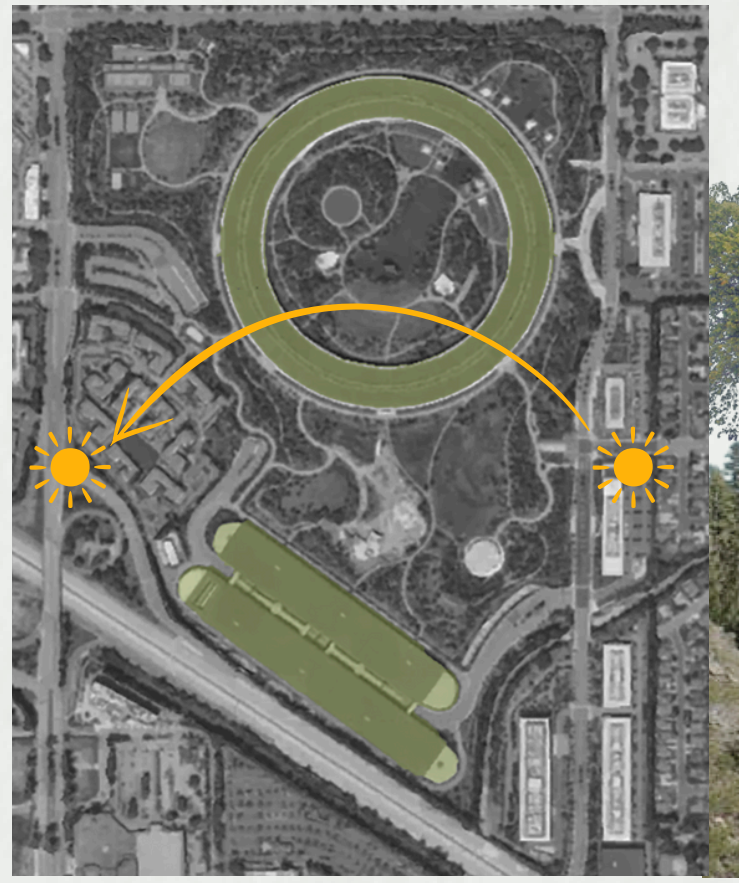
- Sustainable goal:**
 - Apple Park's aims to recreate the local California environment within the campus, utilizing over 9,000, drought-resistant plants
- Landscape arrangement:** Apple Park's landscape is centralized in a large inner courtyard, designed to host events, house cafes, and support fruit plantations.
- Plantation:** Local plants are opted to fit the Mediterranean climate with mild, wet winters and hot, dry summers.

Comparative Analysis

Site Planning

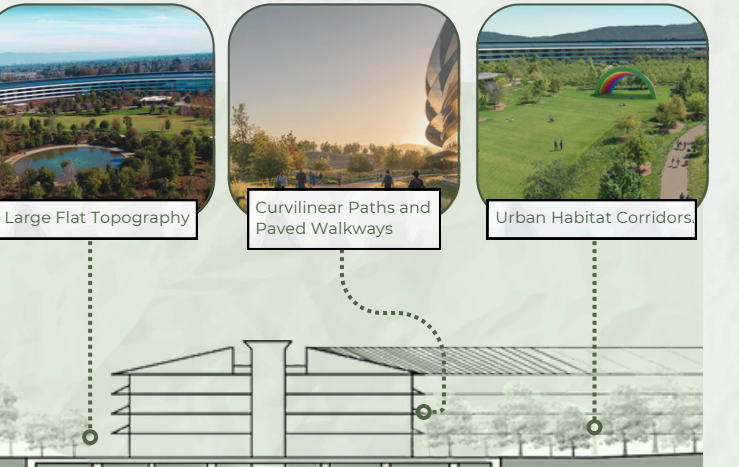
Climate Response

- Building Orientation**
 - Apple Park's main building is a massive, circular "ring" oriented to maximize exposure to natural light while minimizing heat gain.
- Shade & Sun Control**
 - Use of curved glass panels incorporates solar control coatings and shading strategies that reduce solar heat gain
- Rainwater Harvesting**
 - Designed with bioswales, permeable pavements, and landscaped basins to manage stormwater and enhance groundwater recharge.



Site Response

- Topography**
 - Largely flat with subtle elevation changes. Ideal for creating a large, unified building footprint like the circular "ring" structure.
- Hardscape**
 - Curvilinear paths and paved walkways follow the natural contours of the site, designed to encourage walking and biking over vehicular use.
- Environmental & Ecological**
 - 80% of the site is green space, including orchards, meadows, and forested areas that act as urban habitat corridors.



- Massing**
 - A perfect circle symbolizes unity, infinity, and seamless collaboration, reducing vertical transportation.
- The structure rises four stories above ground and extends three stories below, maintaining a low profile that integrates with the surrounding landscape, promotes a sense of openness.

Apple Park, located in Cupertino, California, is Apple Inc.'s global headquarters and a benchmark in sustainable corporate architecture. Completed in 2017, the campus features a striking circular main building set within a 175-acre landscape. Its design subtly references the forms and layouts of early California missions, emphasizing harmony with the natural environment through cloister-like courtyards, low horizontal forms, and fluid indoor-outdoor transitions.

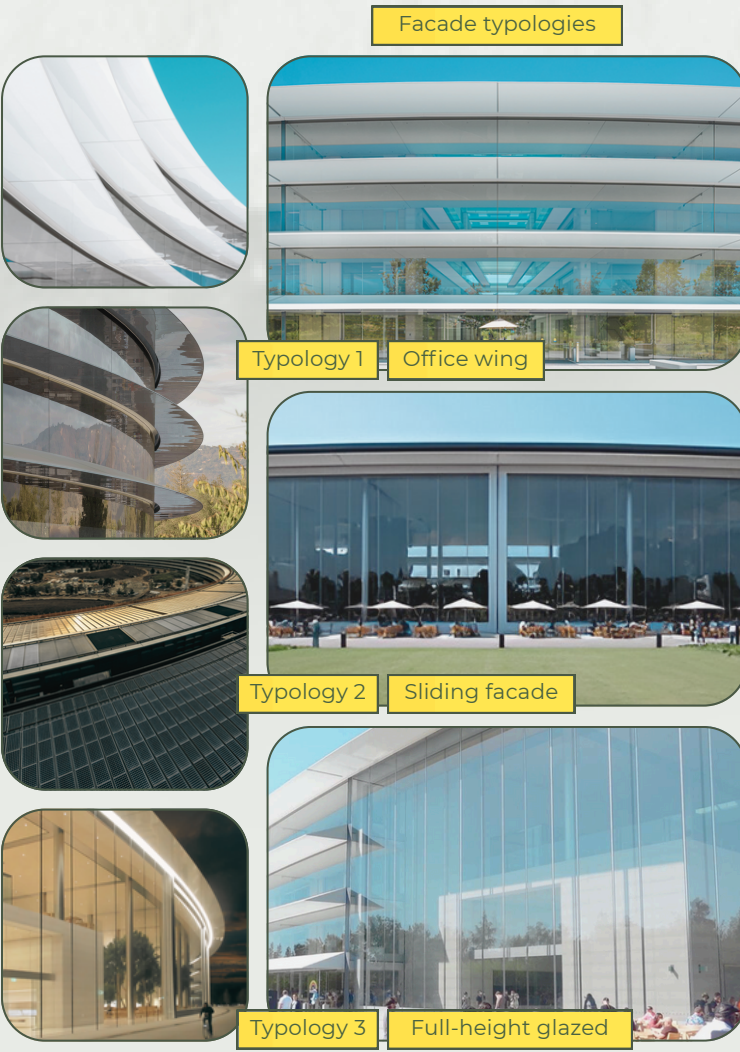
- Cupertino, California
- Mediterranean, Desert
- 708,000 m²
- Foster+Partners

- LEED Platinum
- 4 Storesys
- Office Campus
- Circular Form

Facade Design

Design Strategies

- White Glass Canopy**
 - Protrude from the structure to label floors
 - Reduce diffuse light and enhance comfort
 - Provide shade and support natural ventilation
- Glass Paneling**
 - Reduce daytime use of artificial lighting
 - High-performance glass minimizes heat gain
 - Skylights enhance natural interior lighting
- Solar Panel Roofing**
 - Directly generate clean electricity on-site, reducing reliance on grid power.
 - Helps the campus achieve a near net-zero energy status
- Glass Sliding Facade**
 - Allow massive airflow, drastically reducing the need for air conditioning.
 - Floods the interior with natural light, cutting down on artificial lighting use.
 - Seamlessly link indoor areas with the outdoor green spaces



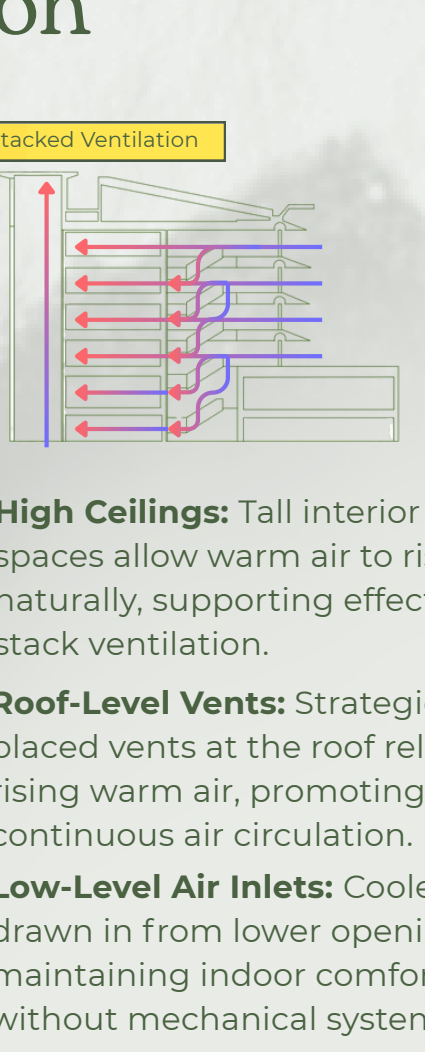
Material Strategies

- Curved Glass Bend**
 - Optimize natural light and thermal regulation, reducing energy for lighting and cooling.
- Limestone**
 - Durable and locally abundant. Passive thermal regulation
- Aluminum panels**
 - Durable and recyclable, rising warm air, promoting continuous air circulation.
- Timber**
 - Renewable and locally sourced, low carbon footprint.

Natural Ventilation

Design Strategies

- Cross Ventilation**
 - The ring-shaped building features precisely placed gaps on both its inner and outer walls.
- Stacked Ventilation**
 - Ensures a steady flow of fresh air throughout office zones.
- Ventilation Gaps:** The ring-shaped building features precisely placed gaps on both its inner and outer walls.
- Cross-Ventilation:** Ensures a steady flow of fresh air throughout office zones.
- Reduces AC Reliance:** Natural ventilation significantly cuts down the need for AC



- Design Strategies**
 - Acts as both floors and ceilings, create a natural ventilation system by allowing warm air to rise and exit through their internal spaces
 - Louvers in the facade draw in fresh outdoor air, ensuring a continuous supply of healthy air year-round.
 - Operable openings allow direct natural ventilation during favorable weather conditions.
 - Durkee's underfloor air dispersion system uses fabric air ducts beneath a raised access floor to deliver conditioned to specific areas.