# DAID FORUM FOR RESEARCH AND DESIGN SOLUTIONS

2024/25,

VOL I, STUDIO IV,

Design of School Complexes,

Chapter One: Case Studies

Editor in Chief: Prof. Arch, Paul Mwangi Maringa (PHD), CBS, FAAK, MKIP

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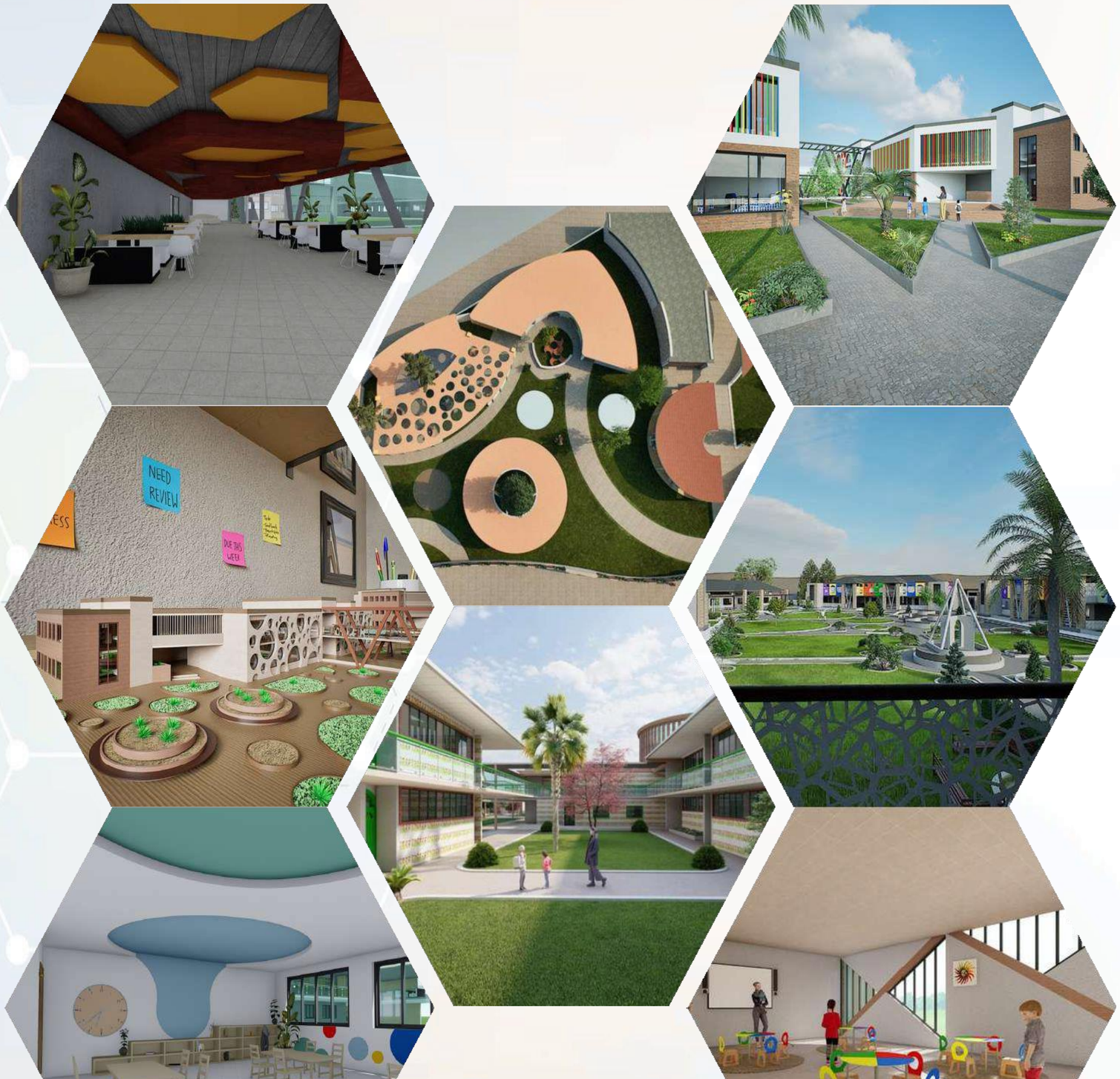
## Chapter One: Case Studies


DEPARTMENT OF ARCHITECTURE AND INTERIOR DESIGN (DAID)

SCHOOL OF ENGINEERING AND ARCHITECTURE (SEA)

KENYATTA UNIVERSITY (KU)

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Prof. Arch. Paul Mwangi Maringa (PhD), CBS, FAAK, MKIP

Department of Architecture and Interior Design (DAID),

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SCHOOL OF ENGINEERING AND ARCHITECTURE (SEA),
KENYATTA UNIVERSITY (KU).

# DEPARTMENT OF ARCHITECTURE AND INTERIOR DESIGN (DAID)
# FORUM FOR RESEARCH AND DESIGN SOLUTIONS

# FOREWORD

It is with immense satisfaction, I introduce this volume celebrating the architectural achievements of the fourth-year, first-semester Design Studio cohort. The projects featured here are a testament not only to the refined resolution of their designs, but to the unwavering dedication, imagination, and advancement that each individual has exhibited over the course of this semester.

Our semester emphasized diverse design considerations for learning environments, catalysts for dynamic conversations about school/institutional design, personal and collective identity, and the nature of shared public spaces. Accompanying these talented students through an exploration of the pivotal building types inherent in learning institutions, was immensely rewarding, as we delved into their societal impact on learning and essential interaction, spatial requirements, and their remarkable power to motivate and unite young people in learning and character formation.

What stands out most is how these students infused conceptual analyses into built form, responding and aligning to the existing archetypal images and local context with both sensitivity and bold ambition. Their perseverance, enthusiasm for learning, and inventive spirit continually raised the bar of our studio practice, making this journey deeply fulfilling.

Thank you, dear students, for your diligence, tenacity, and wholehearted commitment. May this book mark a significant step forward in your academic journey, serving as a lasting source of inspiration.

Dr. Rehab Hamdi Elnaggar (PhD), EEE-EES,
Studio Master, Department of Architecture and Interior Design (DAID),
Kenyatta University (KU), Nairobi, Kenya.
September 2025

# EDITORIAL NOTE

A spirit of inquiry, play, and continuous exploration forms the foundation of architectural education. Pioneering building design calls for students to embrace risk, adapt to change, and pursue unconventional pathways. Their creativity thrives when imagination merges seamlessly with hands-on technical expertise.

Every designer's journey is shaped by a blend of local context and global perspective, fostering a dynamic exchange of influences. This diversity ignites inventive approaches and fresh solutions in the design process. Students are instructed through a balance of structured methodologies with opportunities for spontaneous expression. This approach offers students a robust framework yet ample space to unleash their originality. By engaging in direct, client-focused projects, students tackle authentic architectural challenges, contributing meaningfully to their communities.

Collaboration and shared learning experiences are at the core of bringing remarkable ideas to life. Genuine innovation emerges from interactive teamwork and the ability to respond to shifting social and environmental contexts. Students are guided through all phases of architectural development, from uncovering client goals and reading the nuances of each site, to untangling complex problems and envisioning unique design options.

Progressing through every stage, whether investigation, critical analysis, site assessment, or actual design, students rely on constructive feedback through class presentations and desk crits. They are also encouraged to exercise regular thoughtful self-assessment to refine their creations. Throughout the process, careful attention is given not only to how a building is conceived but also to the practicalities of its realization and its role within its surroundings.

Welcome to this didactic discourse of an empirical, creative architectural design process.

Prof. Arch. Paul Mwangi Maringa (PhD), CBS, FAAK, MKIP,
Adjunct Professor of Architecture and Planning, Department of Architecture and Interior Design (DAID), School of Engineering and Architecture (SEA), Kenyatta University (KU).

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# PREFACE

**PROJECT 01: DESIGN A SCHOOL COMPLEX. PRINCIPAL POLICY ANCHORS:**

I. Sustainable Development Goal (SDG) 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
II. Africa Agenda 2063 goal 2: Well-educated citizens and skills revolution underpinned by science, technology, and innovation.

The importance of schools extends far beyond their physical structures; they serve as foundational hubs where knowledge meets aspiration, shaping the minds and futures of generations. Schools are pivotal in nurturing intellectual curiosity, fostering social development, and instilling values that prepare individuals for active participation in society. Moreover, they embody cultural heritage and community identity, serving as gathering places that cultivate collaboration and lifelong learning.

As architects tasked with designing a school complex, we recognize the profound impact these institutions have on shaping society and are committed to creating environments that promote innovation, inclusivity, and a sense of belonging for all stakeholders.

Our goal is to design a visionary school complex. This project presents a unique opportunity to redefine educational spaces, blending functionality with creativity to foster an environment conducive to learning and growth. As architects entrusted with shaping the future of education, our goal is to design a campus that not only meets the practical needs of a modern educational institution but also inspires and empowers the community it serves. This brief outlines the objectives, challenges, and creative avenues for designing a school complex that promotes innovation, inclusivity, sustainability, and excellence in the educational process. Our aim is to envision a space where architecture becomes a catalyst for educational transformation and student enrichment.

# PREFACE

**Design objectives** for a school complex typically aim to create a conducive environment for learning, safety, and community engagement. Here are some key objectives:

1. **Educational Functionality:** Design spaces that support various educational activities, from classrooms to laboratories, libraries, and recreational areas, ensuring they are adaptable, attractive,stimulating and conducive to effective learning (Scheduled 1-hour topical lecture inputs on essentials of interiors).

2. **Safety and Security:** Prioritize the safety of students and staff with secure building layouts, controlled access points, and emergency response plans.

3. **Accessibility:** Ensure the school complex is accessible to all, including students with disabilities, by incorporating ramps, elevators, and accessible facilities throughout the campus.

4. **Sustainability:** Integrate sustainable practices such as energy-efficient building design, renewable energy sources, water conservation measures, and green spaces to promote environmental stewardship. Considered choice of materials for internal and external use is encouraged. This feeds well into to sustainability concepts of a circular economy in building resource use. It minimises embodied energy by reducing extraction, processing/manufacture, transportation and waste of materials. It also scales down life cycle environmental impacts of the buildings (Scheduled topical lecture input).

5. **Community Engagement:** Create spaces that foster community interaction, such as multipurpose halls, outdoor gathering areas, and facilities for extracurricular activities to enhance social development.

# PREFACE

**6. Flexibility and Adaptability:** Design flexible (adjustable, versatile, refitable, convertible and scalable) spaces that can accommodate changes in educational methods and technologies over time, allowing for easy adaptation to future needs without major renovations. Apply well thought-out design with regard to space organisation, structural order, services and the building envelop. Adaptable buildings reduce the life cycle environmental impacts of the buildings (Scheduled 1-hour topical Lecture input).

**7. Aesthetic Quality:** Enhance the aesthetic appeal of the school complex through thoughtful attractive, stimulating, architectural design, landscaping, and integration with the surrounding environment to create an inspiring and pleasant atmosphere (Scheduled 1-hour topical lecture inputs on principal landscaping features).

**8. Technology Integration:** Incorporate modern technology infrastructure including high-speed internet, smart classrooms, and digital resources to support contemporary teaching methods and learning experiences.

**9. Health and Well-being:** Promote the well-being of students and staff with well-ventilated spaces, natural light, ergonomic furniture, and facilities that encourage physical activity and healthy lifestyle choices.

**10. Maintenance and Durability:** Design buildings and outdoor spaces with durable materials and efficient maintenance practices to ensure longevity and cost-effectiveness over the life cycle of the school complex (Anchored well by earlier scheduled inputs on the circular economy and adaptability).

**11. Neighbourhood context:** Conform with prevailing development and user profiles of the immediate urban setting. Recognise and creatively adhere to the governing zoning policies and development control guidelines.

# PREFACE

These objectives collectively aim to create a school complex that not only meets educational requirements but also enhances the overall experience and development of its students and staff while contributing positively to the community and environment. The ultimate focus of learning in design to the thematic areas of sustainability and environment, in the functionality and efficiency of design is in this way ably introduced.

**Design Elements**

1 Kindergarten building.

2 Elementary building.

3 Middle school building.

4 High school building.

5 Playground areas.

6 Courts (soccer, basket, pool, ….)

7 Auditorium.

8 Parking area.

# CHAPTER ONE

# CASE STUDIES

# REFLECTIONS ON SABIS INTERNATIONAL SCHOOL

The focus of discussion here is on a well analysed international, award-winning precedent of an architectural design project, and in its analysis that emphasises concepts and technical considerations.

**B.A.S YEAR IV CONTRIBUTING STUDENT RESEARCHERS AND DESIGNERS - 2024/2025**

Brenda Abac
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Tabitha Maina
Victor Kimani

# Sabis International School

Group 1

*Sabis international school Runda, Wairimu, 2024.*
*Rethinking The Future. https://www.re-thinkingthefuture.com*

# INTRODUCTION

## Overview

- Introduction
- Site Analysis and Design Resolutions
- Design Concept
- Spatial Organization
- Structural Order
- Landscaping
- Form
- Materials
- Sustainability
- User Experience
- Project Critiques

*Sabis international school Runda, Waiimu, 2024. Rethinking The Future. https://www.re-thinkingthefuture.com*

## Professional team:

- **Client**: Africa Crest Education Holdings
- **Concept Design Architects**: ARCHIKA Kamal Homsi Architects SAL
- **Executive Architects**: Boogertman + Partners
- **Sustainable Building Consultant**: WEB Limited & Solid Green Consulting
- **Landscape Architect**: Greenersol Landscape Limited
- **Development & Project Manager**: Athena Properties Limited
- **Quantity Surveyors**: Cost Plan Quantity Surveyors
- **Structural Engineer**: Gath Consulting Engineers
- **Electrical Engineer**: Maiteri & Associates
- **Fire Engineer & Mechanical Engineer**: Maiteri & Associates
- **Wet Services**: Maiteri & Associates
- **Main Contractor**: Seyani Brothers & Co. (K) LTD

## Background Information

- The Sabis International School is located in Runda, Kiambu county
- It is situated off Kiambu Road after the Northern Bypass Underpass
- The school occupies a 20 acre piece of land.
- The construction commenced in June 2016 and finalized by June 2018
- The site has a steep slope and buildings are connected using gently sloping ramps
- The school is situated between two roads, one to the north and another to the south.

*Sabis international school Runda, Waiimu, 2024. Rethinking The Future. https://www.re-thinkingthefuture.com*


*Location of Sabis international school Runda*
*Adapted from Google Earth (2024). Aerial view of Sabis international school Runda https://earth.google.com*

## The facilities include:

1. An independent kindergarten section
2. Upper and lower school buildings
3. A cafeteria
4. A gymnasium
5. Administration block
6. A playing field
7. Tennis courts
8. A mini car track
9. An auditorium
10. A pool
11. Parking
12. Dormitories

A global propriety curriculum that is built on international standards based on both the American and British educational systems, and the shared core values of the Sabis Network of schools.

Students cover a broad range of subjects including English, Kiswahili – a world language, mathematics, science, Kenyan social studies, music, fine arts, and P.E.

The school was opened in 2018 to students in kindergarten to Grade 6.

Today, the school offers Kindergarten to Grade 10, and will add a new grade level each year until reaching a full K-12 school system.

The school has been awarded the Green Star Africa-Kenya PEV Design rating in recognition of its consideration of the urban and climate context.


*Sabis international school Runda, Wairimu, 2024, adapted from Rethinking The Future.*
*https://www.re-thinkingthefuture.com*

# SITE ANALYSIS AND DESIGN RESOLUTIONS

## ACCESS AND LOCATION


*Location of Sabis international school Runda, Kavata, 2024, adapted from Google Earth. (2024). Aerial view of Sabis international school Runda. https://earth.google.com*

The Sabis School Runda is situated in Nairobi, Kenya off Kiambu Road after the Northern Bypass Underpass.
The main access road is on the northern side and it is a relatively busy 2-lane road.
A murram road connects the school main to the Kwaheri Road on the southern side, which is less busy with traffic.

The main form of transport is private means with the closest bus stop at Evergreens and Mimosa which are about 6-7 minutes away.

**Response:** Cyclist facilities and school bus amenities to enhance overall transportation efficiency for students.

# CLIMATE

The pick up and drop off points for students is inside the school compound.

The development of an infrastructure to connect the school main gate to the Kwaheri Road which is less busy hence more convenient access.

There is a pedestrian way along the main road.


*Main entrance at Sabis International school Runda*
*Adapted from Wairimu, 2024.*
*Rethinking The Future. https://www.re-thinkingthefuture.com*

## SUNSHINE

The site location experiences adequate sunshine hours of approximately 6.8 to 7 hrs per day

**Response:**

Classrooms and offices designed to maximize natural lighting by use of large glazed windows that are efficiently sun-shaded to minimize heat gain into the indoors

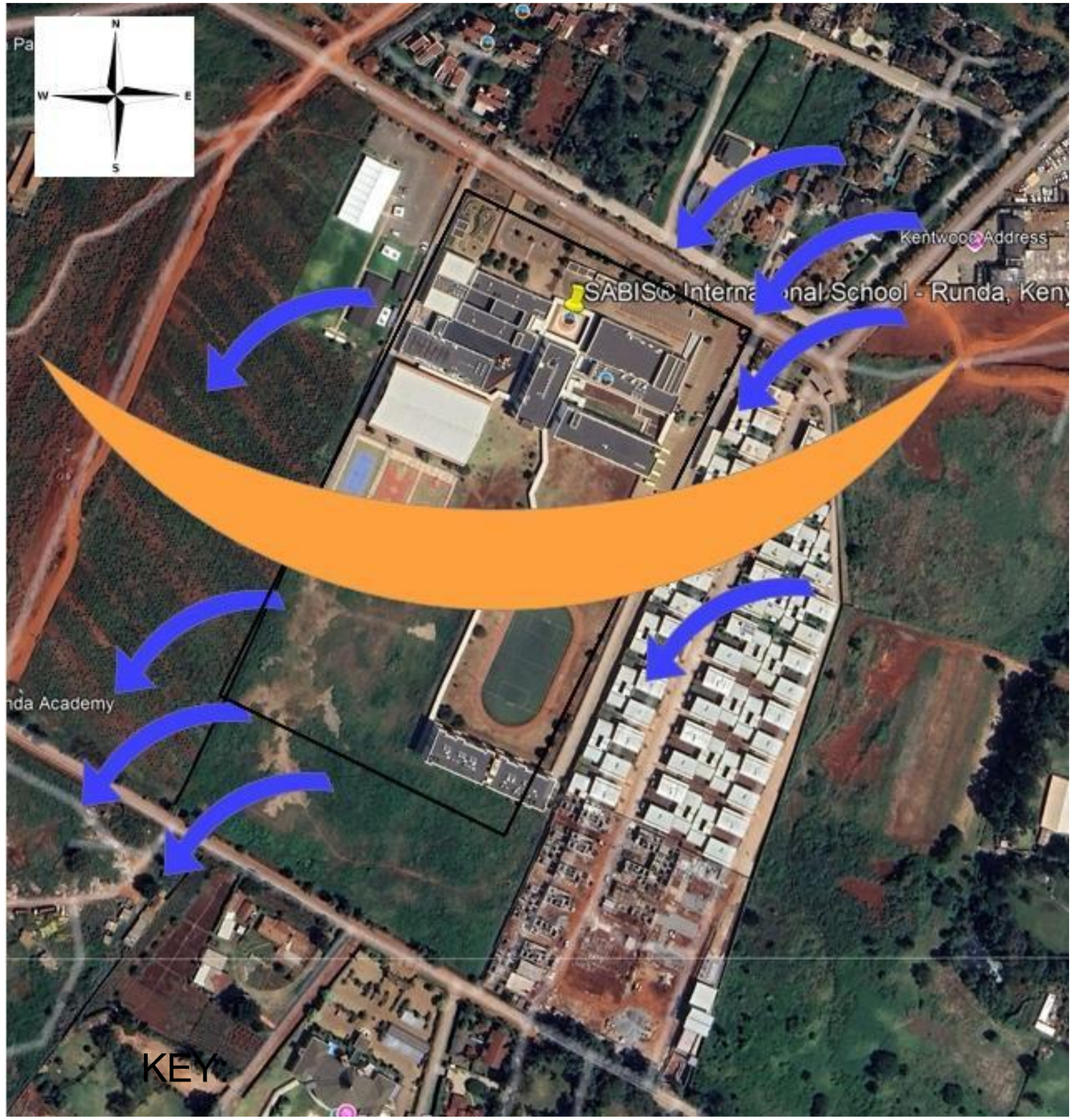
Incorporation of solar heaters to heat water

The incorporation of a courtyard for playground and the sun-shaded hallways to keep the students from the sun

## WIND

Windiest month March 27km/h averagely

Main entrance to Sabis international school
https://maps.app.goo.gl/hsB2EeVD9Uw7MJW18?g_st=ac




*Sabis international school Runda*
*Adapted from Google Earth (2024). Aerial view of Sabis international school Runda. https://earth.google.com*

Sun Path

Wind Path

## TEMPERATURE

Coldest month July 18 degrees averagely

Hottest month March 22 degrees averagely

**Response**:

Classroom blocks oriented in N/S with less openings facing east or west to minimize heat gain through the openings

## HUMIDITY

It is about 70%

**Response**:

Buildings oriented in N/S with high and large glazed windows to maximize natural ventilation.

## RAINFALL

The site location experiences plentiful rainfall with annual precipitation of 606.5mm per year

Wettest month is November with an average of 98.5mm

**Response:**

Extensive rainwater harvesting and storage in the school

Covered walkways for protection from rain during the rainy season.

Incorporation of gardens and landscapes for learning

Photo 1

Sabis International School Runda, Wairimu, (2024). Rethinking The Future. https://www.re-thinkingthefuture.com

Photo 2

Photo 1&2: Sabis international school Runda, Wairimu, (2024). Rethinking The Future. https://www.re-thinkingthefuture.com

# NEIGHBOURHOOD

- The school is surrounded by a CITAM church and coffee farm to the west side, a residential area to the north and south and a boutique estate called Ineza Runda to the east
- The **neighborhood** is mostly home for diplomats and humanitarian workers with offices nearby, therefore it is kept under heavy security.
- Majority of people in this neighborhood own most of the property they live in.
- There is also those that rent property based on their job contracts
- The **population** is made up of mostly people of high class and global middle class who can easily afford luxuries.
- Private corporations provide communal utilities promoting a consistent service delivery and a higher living condition.
- According to **zoning** regulations, total coverage of all buildings must not exceed 25% of the plot area.
- A clear space of 2.4m is maintained on boundaries according to community regulations.
- According to the landscaping regulation in the area, the space between one's plot boundary and the road is intended for services and pedestrian footpaths.
- **Responses:** the school design and facilities are high end.
- The design has also allowed for pedestrian footpath.

Photo 3

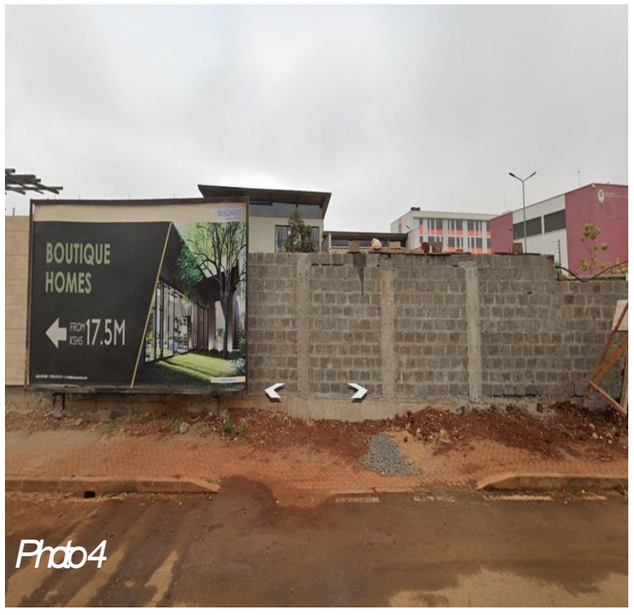



Photo 4

Photo 3&4 Neighbouring Sabis international school Runda to the North and East respectively Google Earth.(2024). Street view of the road to Sabis international school Runda off Kamburu Road https://earth.google.com

# SOIL AND TOPOGRAPHY

## SOIL

The site location has rich red soil which supports diverse plant growth

**Response:**

Incorporation of botanical gardens in the design

## TOPOGRAPHY

The site has a steep slope

**Response:**

Buildings are positioned in a staggered manner and connected through gently sloped, landscaped ramps.

The design ensures accessibility between buildings easing movement even for those with limited mobility.

# SENSORY ASPECTS

## NOISE

The area is very tranquil with the only noise coming from the road on the northern side.

**Response:**

Classrooms were located some distance from the main entrance with the dormitories further away from the road.
Parking facilities and mini car track are instead located near the main entrance.

## VIEWS

There are nice views all around the school especially those of the expansive coffee farmlands to the west side of the school

**Response:**

Buildings have glazed windows to enable users to enjoy the outdoor views.

## SMELL

There are no smells coming from the neighborhood; the air quality is good.

**Response:**

Buildings have well designed openings to maximize ventilation and improve indoor air quality

*Sabis international school Runda, Wairimu, (2024). Rethinking The Future. https://www.re-thinkingthefuture.com*

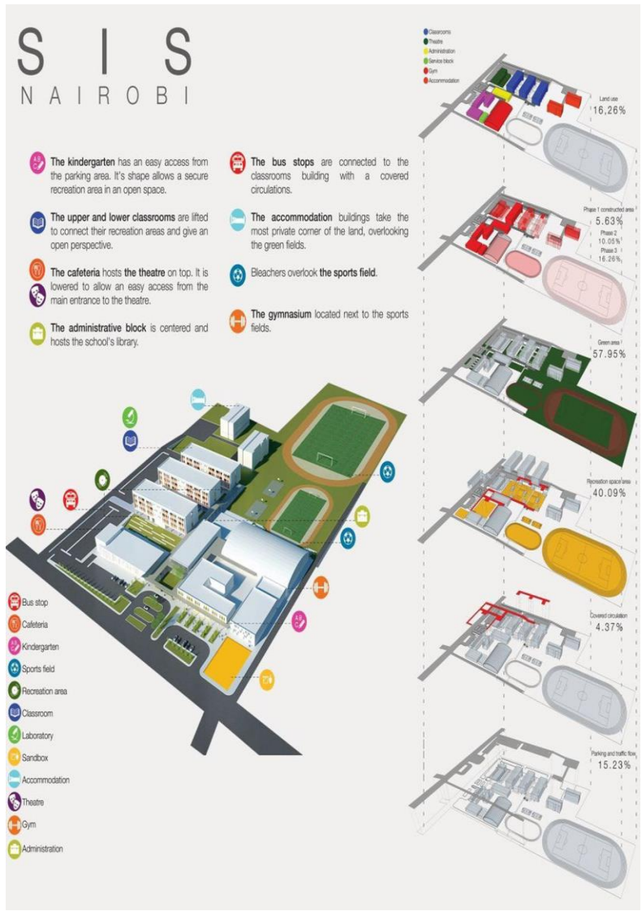
# DESIGN CONCEPT

The design concept is derived from the school mission and vision statements.

- **VISION:** to foster a community of **lifelong learners** who are equipped to succeed in an **ever-changing world.**

- **MISSION**: To provide rigorous education that empowers students to:

1. Take ownership of their learning
2. Shape a positive learning culture
3. Develop practical leadership and life skills




*Design Concept*
*Adapted from ARCHKA Kamal Hbmsi Architects SAL*

# CONCEPT ACTUALIZATION

1. Open, flexible learning spaces encourage student-directed exploration and collaboration, fostering **ownership of learning.**

2. Prominent displays of student work and achievements throughout the building help shape a **positive learning culture.**

3. Integrated technology hubs and maker spaces equip students with practical skills for **an ever-changing world.**

*Image 1: Students artwork displayed*

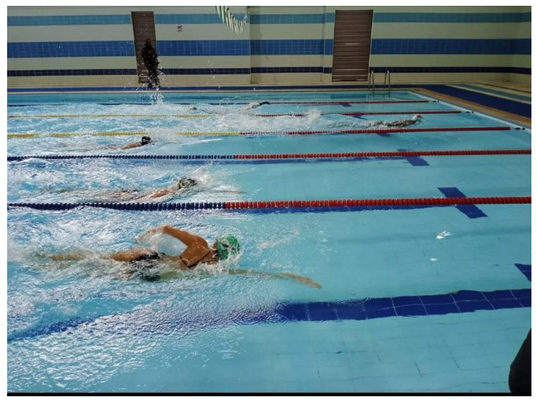


*Image 2: Students engaging in competitive swimming in the semi-olympic pool*

*Image 1 and 2 are adapted from Instagram (2023). https://www.instagram.com/fundasabis/*

# SPACE TYPOLOGIES

1. **Academic Spaces:**
Classrooms
Exam halls
Science laboratories
Computer labs
Libraries/Media centers
Art studios
Music rooms

2**. Administrative Spaces:**
Main office
Principal's office
Counseling offices
Teachers' lounges

3. **Common Areas:**
Cafeteria/Dining hall
Auditorium/Assembly hall
Student lounge areas

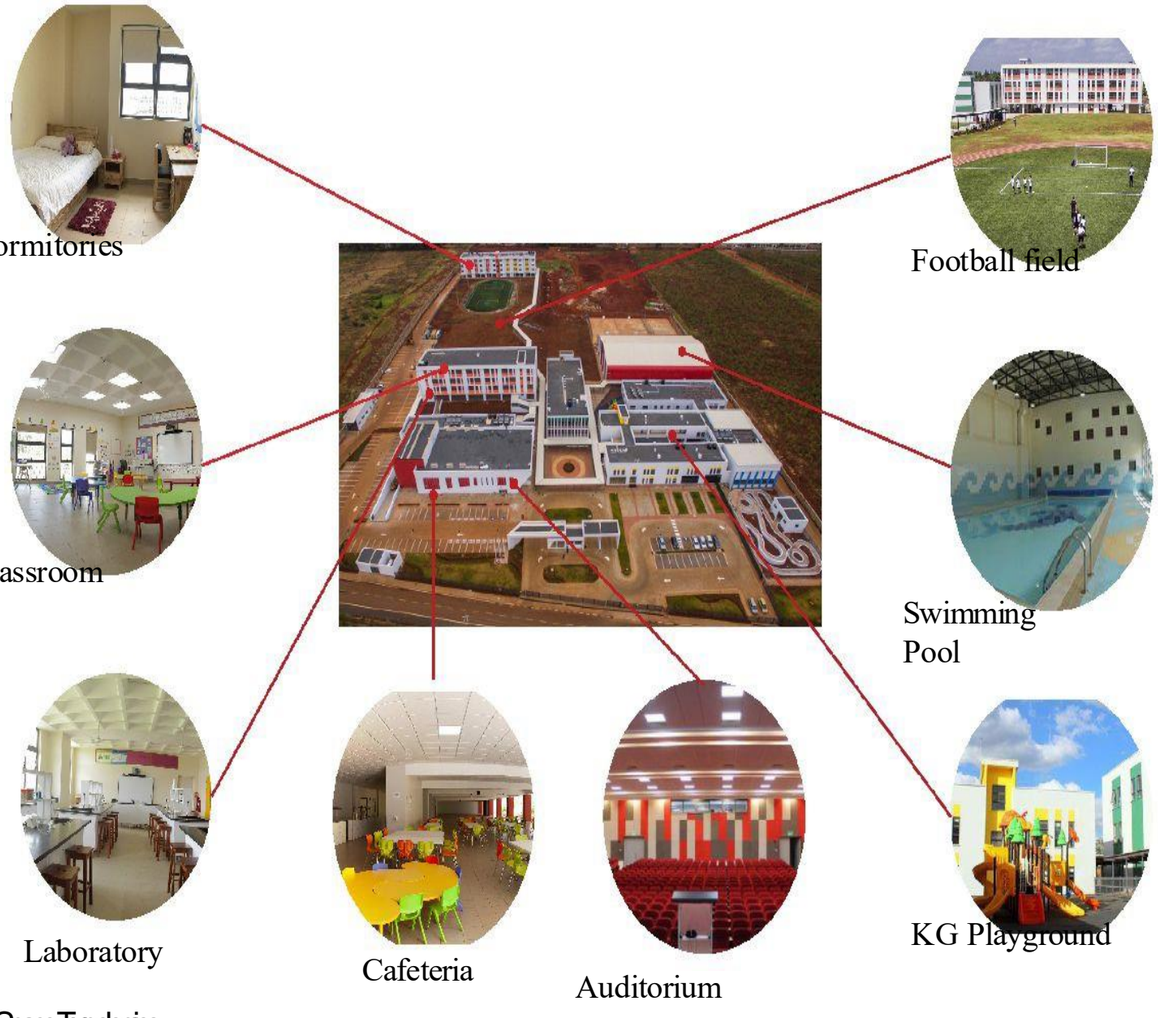
4. **Athletic Facilities:**
Gymnasium
Heated swimming pool
A dance studio
Sports fields/courts

5. **Outdoor Spaces:**
Playgrounds
Gardens or green areas
Parking lots

5. **Outdoor Spaces:**
Playgrounds
Gardens or green areas
Parking lots

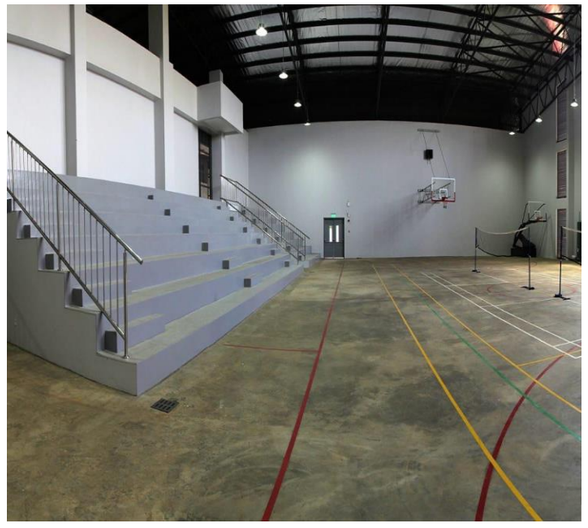
6. **Specialized Facilities:**
Health center/Nurse's office
Special education rooms
Language labs

7. **Support Spaces:**
Maintenance rooms
Storage areas
IT support rooms




Space Typologies
*Adapted from Sabis Runda (2018). https://sabisrunda.sabis.net/virtual-tour*





Indoor Basketball Court & Music Room
Adapted from Sabis Runda (2018).
*https://sabisrunda.sabis.net/virtual-tour*

# STRUCTURAL ORDER

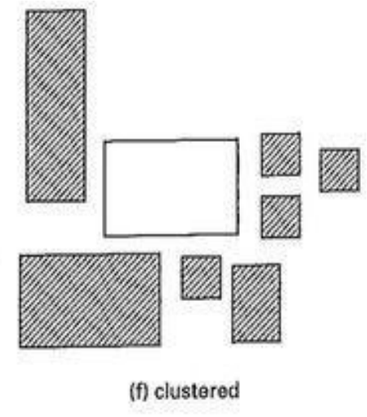
Architectural structural order refers to the systematic arrangement and organization of a building's physical elements and spaces.

Sabis international school is arranged in a **clustered structural order**

Spaces have **large spans** that allow for large column free **clear spaces** making the internal spaces more flexible

Clear spaces within the site are functional and are used for parking and sports.

The **structural order is flexible** as it allows for future expansion like the proposed addition of classes to meet the K-12 level requirements

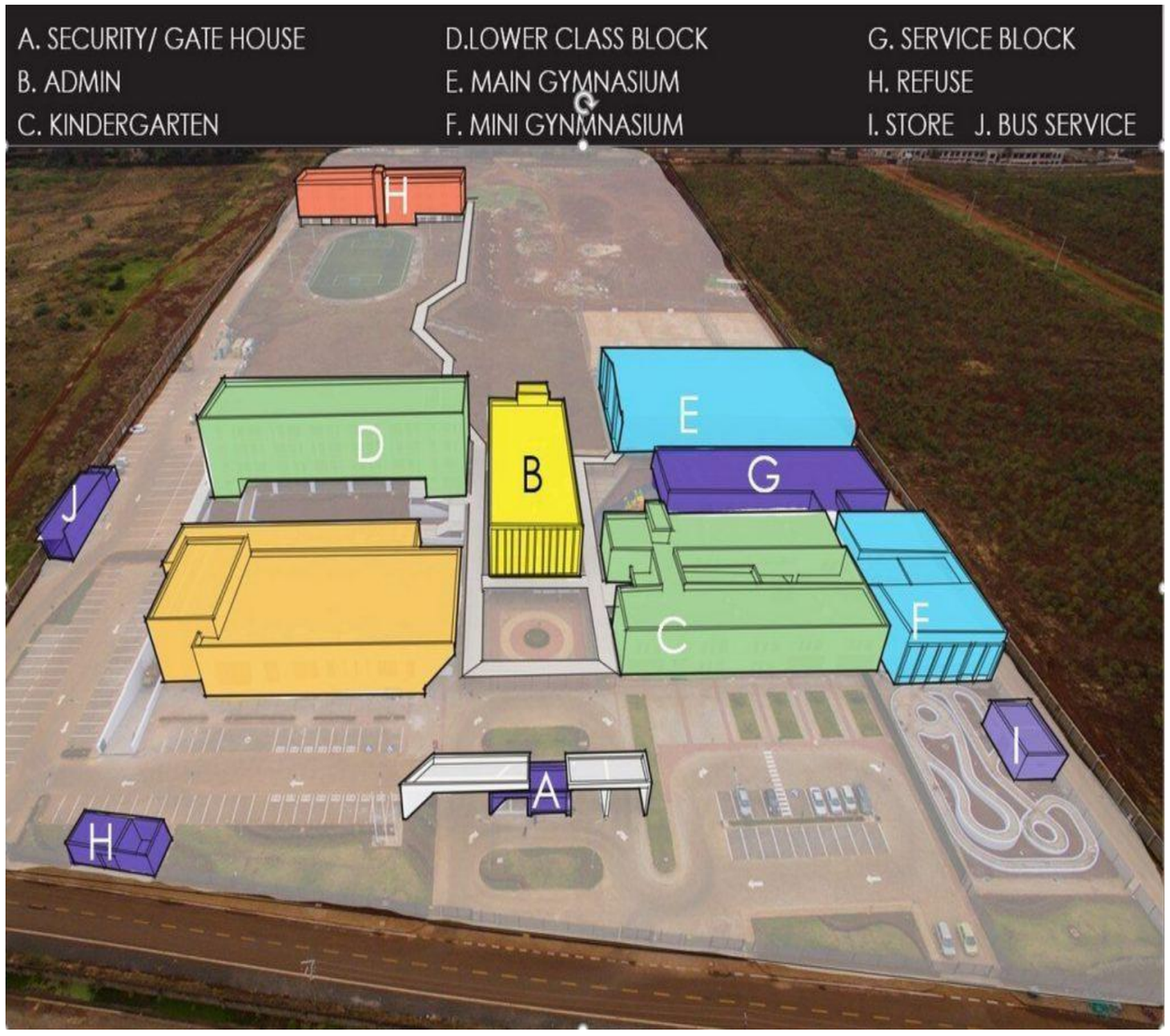



Clustered Structural Order
*Adapted from Pinterest (2019). https://www.pinterest.com*


Space Typologies
*Adapted from Sabis Runda (2018).*
*https://sabisrunda.sabis.net/virtual-tour*

# SPATIAL ORGANIZATION

- The main entrance is off Kiambu Road.
- A **privacy gradient** is observed with public activity spaces like the mini-track and theater near the entrance and dormitories at the furthest corner of the site.
- The administration block is the central point of the site for ease of access from the entrance and other buildings.
- The sports fields are located at the back for outdoor games like football, tennis and track.
- There is a gym that houses the indoor swimming pool, basketball court and dance studio
- There are other extra-curricular spaces like the music room




*Spatial Organization*
*Patrick Mugo, D.M., Olawo, A.G., Opi, A.A. & Mokua, Q.E., 2023 'Designing For Climate Change a Case Study of Sabis School– Runda Kenya. Nairobi, BORAQS*

# SPATIAL CIRCULATION

- The spatial circulation is **well defined** and **equitable** catering for all users
- Vehicular circulation is designed in a manner that allows **ease of traffic** with chamfered edges for an appropriate turning radius.
- There are **ample parking spaces** available adjacent to various spaces ie the kindergarten has its own parking.
- There is a **drop off point** near the entrance for the school bus.
- They have provided access directly to the dormitories and the fields for convenience.
- **Shaded walkways** are provided to protect users from sunshine and rain. Increasing comfort
- **Gently sloping ramps** are provided since the site is slopy and to cater for handicapped persons.

Sabis International School, Runda
Wairimu, (2024). *Rethinking The Future*.
https://www.rethinkingthefuture.com

https://maps.app.goo.gl/hsB2EeVD9Uw7MJW18?g_st=ac

Drop-off Point
Adapted from Sabis Runda (2018).
*https://sabisrunda.sabis.net/virtual-tour*

https://maps.app.goo.gl/hsB2EeVD9Uw7MJW18?g_st=ac

# LANDSCAPING

- **Expansive lawns:** The main quad and playing fields are covered in lush green lawns.
- **Mature trees:** Offers shade in the central courtyard and along the perimeter of the campus
- **Flower beds:** Additional flower beds can be found along the perimeter of the campus.
- **Trees:** A variety of trees, including fruit trees, can be found in the school's green spaces and along the perimeter.
- **Paths:** Well maintained paths wind through the grounds, providing access to different areas of the campus.
- **Ramps:** Site is on a steep slope so the buildings were staggered and connected with soft, landscaped ramps to make the buildings easily accessible to one to another and for the mobility of impaired

https://www.re-thinkingthefuture.com/wp-content/uploads/2023/07/A10591-Sabis-International-School-Runda-Kenya-1.jpg?w=999

# FORM

Architectural Reasons for the Form

1. **Efficiency and Functionality**: Rectangular shapes are often used in educational buildings due to their efficiency in maximizing space. They allow for clear organization of classrooms, hallways, and other facilities.
2. **Structural Stability**: Rectangular structures are generally more structurally sound and can withstand various weather conditions and seismic activity.
3. **Cost-Effectiveness**: Rectangular buildings are often less expensive to construct compared to more complex shapes, as they require simpler materials and construction techniques

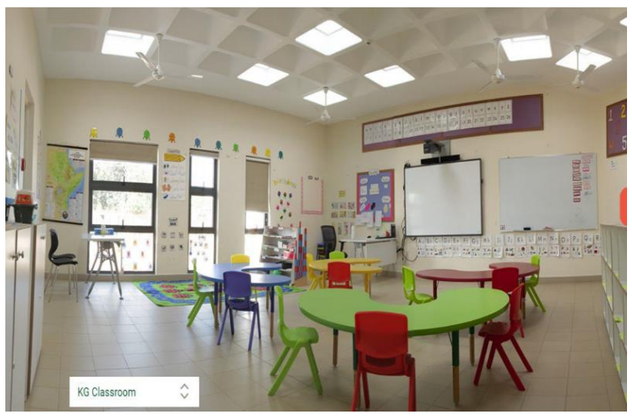
*Image Adapted from https://maps.app.goo.gl/8JxAoQyKd6Rphgef7*

# Use of the White Color with Hints of Other Colors

1. Versatility: White provides a neutral base that can be complemented with accents of other colors to create a visually stimulating and engaging environment. These accents can be used to identify different areas or departments within the school, or to incorporate local cultural elements.
2. Accessibility: White can improve visibility for students with visual impairments, making the school more inclusive.
3. Psychological Benefits: White can create a sense of calm and serenity, which can be conducive to learning and concentration
4. Neutrality: White is a neutral color that doesn't evoke strong emotional responses. This makes it a versatile choice that can be easily combined with other colors without overwhelming the space.
5. Stimulation: Bright, warm colors like red, orange, and yellow can stimulate the mind and create a more energetic atmosphere. These colors might be used in areas like the cafeteria or gym.
6. Calm: Cooler colors like blue and green can promote relaxation and focus. These colors might be used in classrooms or libraries.

*Image Adapted from https://maps.app.goo.gl/8JxAoQyKd6Rphgef7*

*Image Adapted from https://maps.app.goo.gl/8JxAoQyKd6Rphgef7*




**Classroom.** *Adapted from sabisrunda.sabis.net 2024*

# MATERIALS

- It's construction majorly involved use of concrete, steel and glass.
- Most of the structures have used post and lintel system of construction.


*Adapted from YOUTUBE SABS International School Runda September 2018, Africa Crest Education Holdings*


*Adapted from YOUTUBE SABS International School Runda September 2018, Africa Crest Education Holdings*

## Concrete

Use: Main structural framework(slabs, beams and columns)

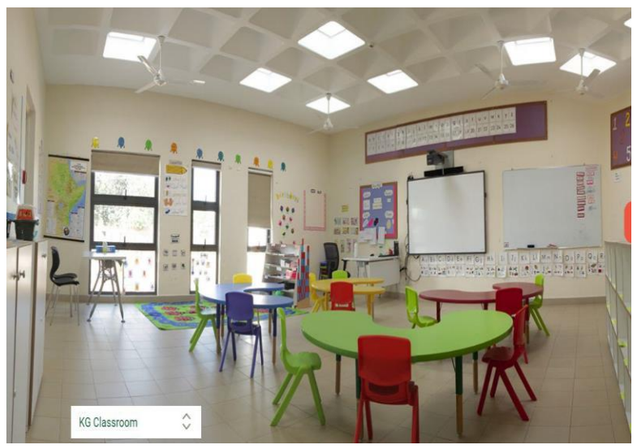
Why: Durable and resistant to environmental factors; provides a strong foundation for multi-level buildings.

## Glass

Use: Windows and partitions in the Gymnasium

Why: Allows natural light to flood into the building, enhancing energy efficiency and creating a bright, welcoming atmosphere.


*Adapted from YOUTUBE SABS International School Runda September 2018, Africa Crest Education Holdings*




*Adapted from YOUTUBE SABS International School Runda September 2018, Africa Crest Education Holdings*

## Steel

Use: Structural support for beams, columns and roofing structures.

It has been used in pavements' columns and beams, Gymnasium roofing and concrete reinforcements.

Why: Provides flexibility in design while ensuring strength and stability, particularly for large spans and open spaces.


***Drop-off point***
*Adapted from Sabis Runda (2018), https://sabisrunda.sabis.net/virtual-tour*


*Adapted from YOUTUBE SABS International School Runda September 2018, Africa Crest Education Holdings*

## Hollow blocks

Use: walls of the dormitories, gymnasium, classrooms and offices.

Why: They are cost effective and better alternative due to their good durability, fire resistance, partial resistance to sound, thermal insulation, small dead load and high speed of construction.


*Adapted from YOUTUBE SABS International School Runda September 2018, Africa Crest Education Holdings*

*https://kenyabuilders.com/catalogue/concrete-hollow-block_41/*

**Plaster and Paint**

Use: Interior and exterior wall finishes

Why: For smooth and refined wall surfaces; provides ease in maintenance and versatility in color choices.


*Adapted from YOUTUBE SABIS International School Runda September 2018, Africa Crest Education Holdings*

**Iron sheets**

Use: Gymnasium roofing.

Why: Metal roofing (often aluminum or steel) is durable and weather-resistant.

**Ceramic Tiles**

Use: Flooring majorly in classrooms and offices.

Why: Durable, easy to clean, and available in various designs, making them ideal for high-traffic areas.

# SUSTAINABILITY

## ENVIRONMENTAL SUSTAINABILITY

**Energy Efficiency**: Implementing energy-saving measures, such as using 100% led lighting or solar panels, White washed exterior walls

**Water Conservation**: Practices like using water-efficient fixtures and promoting water-saving habits among students as well as rainwater collection.

**Recycling Programs**: Establishing comprehensive recycling programs helps manage waste effectively and educates students about the importance of recycling.

**Landscaping:** Creating and maintaining green spaces, such as school gardens, enhance biodiversity and provide educational opportunities related to environmental stewardship.

**Outdoor Learning**: Utilizing outdoor spaces for learning can connect students with nature and promote environmental awareness.

**Low-VOC finishes**: such as paints, adhesives and sealants – to ensure that the children are not exposed to toxins, hence a significant improvement in the school's indoor environmental quality.

***Sun shading and white washing on the exterior,*** *Sabis Runda (2018). https://sabisrunda.sabis.net/*

***Overhead tanks to store recycled blackwater,*** *Solid Green Consulting CC 2020. https://www.solidgreen.co.za/*

## SOCIAL SUSTAINABILITY

Involvement in Local Community: Schools often engage in community service projects or partnerships with local organizations, which can foster a sense of social responsibility among students and staff.

Support Systems: Providing support services such as counseling and special education resources helps address the diverse needs of students.

Health and Safety: Ensuring a safe and healthy learning environment is crucial for social sustainability.

Low-VOC finishes – such as paints, adhesives and sealants – to ensure that the children are not exposed to toxins, hence a significant improvement in the school's indoor environmental quality

*Low voc finishes (paints & sealants), Wairimu, R (2024). Rethinking The Future, https://www.rethinkingthefuture.com*

## ECONOMIC SUSTAINABILITY

**Career Preparation:** By offering programs that prepare students for the job market, including career counseling and internships, the school helps students become economically self-sufficient in the future.

**Entrepreneurship Programs:** Encouraging entrepreneurial skills through projects or courses that prepare students to contribute economically in innovative ways.

**Cost Management:** Effective management of resources and operational costs can ensure the school remains financially viable. The energy efficiency techniques reduce operational costs.


***N/S orientation, reduces operational costs***.
*Adapted from Sabis Runda (2018).*
*https://sabisrunda.sabis.net/virtual-tour*

***Fundraising ceremony***, *Sabis Runda (2018).*
*https://sabisrunda.sabis.net/virtual-tour*

# USER EXPERIENCE

**Engagement and Comfort**

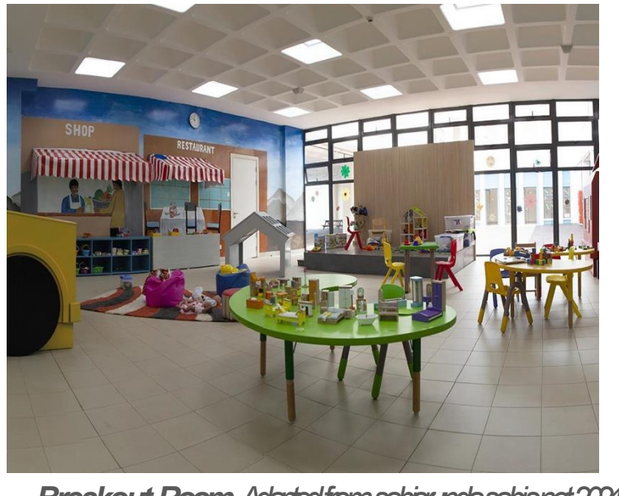
- Spacious Classes filled with Natural Light.
- Raised windows to avoid distractions in class.
- Covered walkways to shelter from sun & rain
- Internet blockers to ensure students focus on only school materials

**Flexible Learning Spaces**

- Breakout areas enabling collaborative and self-directed learning.
- Outdoor learning areas are available, allowing nature-based learning activities.

***Students in class.*** *Adapted from sabisrunda.sabis.net 2024*

***Classroom Façade.*** *Adapted from sabisrunda.sabis.net 2024*



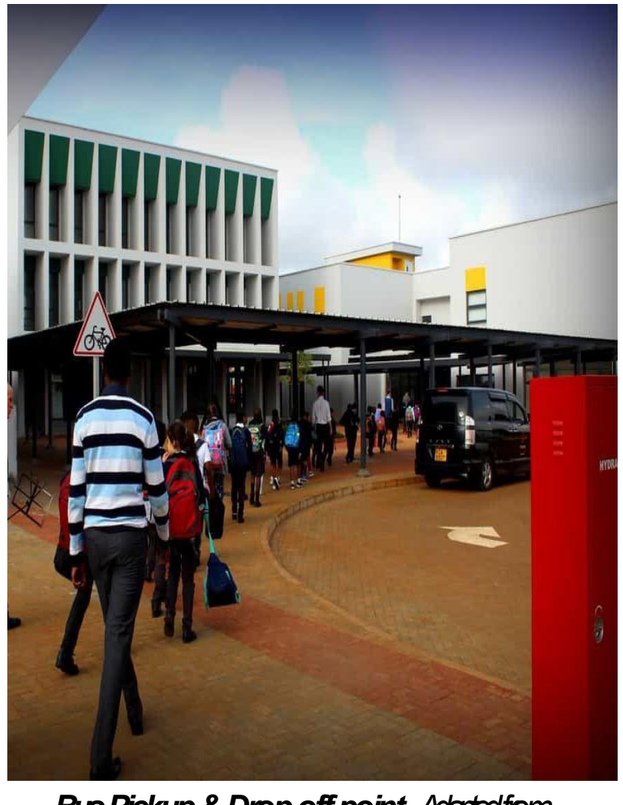

***Breakout Room.*** *Adapted from sabisrunda.sabis.net 2024*

**Accessibility and Movement**

- Wide corridors, ramps, and elevators are incorporated to ensure everyone can access.
- Clear signage that make navigation easy and safe.

**Recreation and Wellness**

- Recreational areas, such as playgrounds, sports courts, and a swimming pool, which provide spaces for physical activities and relaxation.
- Green spaces and gardens are integrated throughout the campus to promote environmental awareness and well-being.



***Bus Pickup & Drop-off point*** *. Adapted from sabisrunda.sabis.net 2024*

***Ramp .*** *Adapted from sabisunda.sabis.net 2024*

***Running track .*** *Adapted om sabisunda.sabis.net 2024*

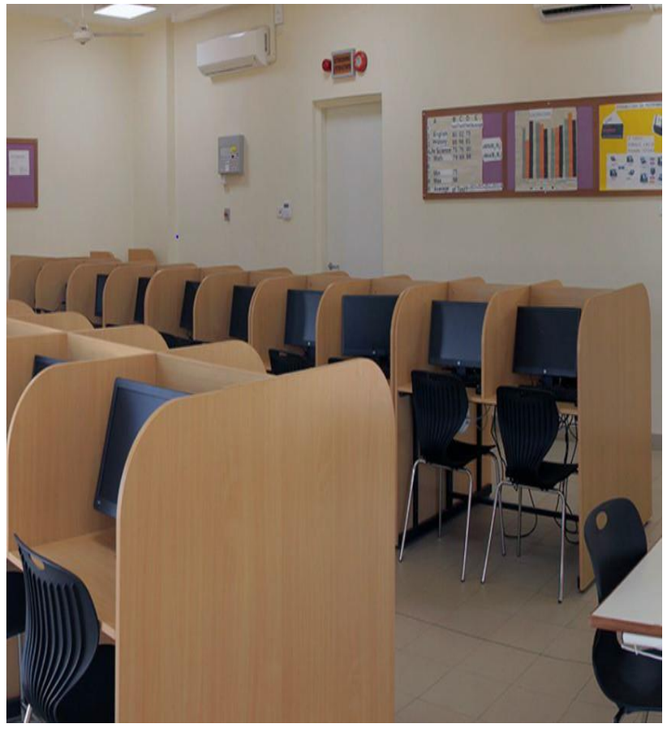
***Swimming Pool Area .*** *Adapted om sabisunda.sabis.net 2024*

## Technology Integration

- There's seamless integration of technology, with high-speed internet, digital resources, and IT support hubs.
- Teachers have access to well-equipped laboratories, music rooms, and art studios to provide hands-on, experiential learning opportunities.

## Safety & Security

- The school's layout ensures that all areas are easily monitored.
- Secure entry points, surveillance systems, and emergency protocols are in place to provide a safe environment for both teachers and students.



***Computer Lab.*** *Adapted from sabisunda.sabis.net 2024*


***Library.*** *Adapted from sabisunda.sabis.net 2024*

# PEDAGOGICAL IMPACT

## Support for Diverse Learning Styles & Needs

Breakout spaces outside classrooms provide areas for individualized instruction.

## Enhancing Focus & Attention

By providing ample natural light, ventilation, and acoustic control in classrooms, the architecture minimizes distractions and enhances students' ability to concentrate.

## Promoting Outdoor & Experiential Learning

The integration of outdoor learning spaces, such as gardens, courtyards, and sports facilities, encourages experiential learning opportunities beyond the traditional classroom setting.

***Breakout Room.*** *Adapted from sabisunda.sabis.net 2024*

***Classroom.*** *Adapted from sabisunda.sabis.net 2024*

***Outdoor space*** *Adapted from sabisunda.sabis.net 2024*

# COMMUNITY ENGAGEMENT

**Fundraising Events**: The school regularly organizes charity drives where students collect funds, and items to support underprivileged groups.

**Environmental Initiatives**: Students often participate in environmental initiatives such as tree-planting, recycling drives, and clean-up campaigns in and around the Runda area.

**Collaboration with local NGOs and community organizations:** To provide students with opportunities to engage in volunteer work.

***Donated Desk to a primary school****Adapted from Instagram.* *https://www.instagram.com/fundasabis/*


***Students planting trees in the school..*** *Adapted from Instagram.* *https://www.instagram.com/fundasabis/*

# PROJECT CRITIQUES

## Positive

- The project has incorporated appropriate responses to the tropical climatic conditions of the site. This include passive design strategies through natural ventilation as well as building orientation in reference to the sun path.
- The building has revitalized the use of materials from the typical natural stone to concrete hollow bricks

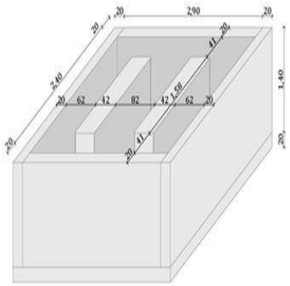
which ultimately reduce the thermal mass of the buildings making it appropriate for the climate type.

- Creation of a 'third space' for students. The project has incorporated break out rooms, outdoor study areas and relaxation spaces which enhance students' learning experience

***Image of the building blocks showcasing sun shading elements.*** *: Wairimu, R (2024). Rethinking The Future.*

***Image of a break-out room.*** *Wairimu, R (2024). Rethinking The Future.*

- The project has ensured separation of the different groups of learning. The kindergarten is independent from the rest of the school with its own facilities i.e. a mini-gym and playground. This ensure the safety and security of the younger group
- There has been a multi-use of the spaces i.e. a theatre above the cafeteria, a gym fitted with an indoor pool to cater to the limited space available. Proper planning has enabled fitting a variety of facilities within the site. Clustered organization of the building blocks to ensure overutilization of the space.
- The kindergarten design The layout is designed to accommodate a courtyard which serves as an independent playground
- The sustainable practices that have been put in place ultimately reduce the cost of construction and maintenance.

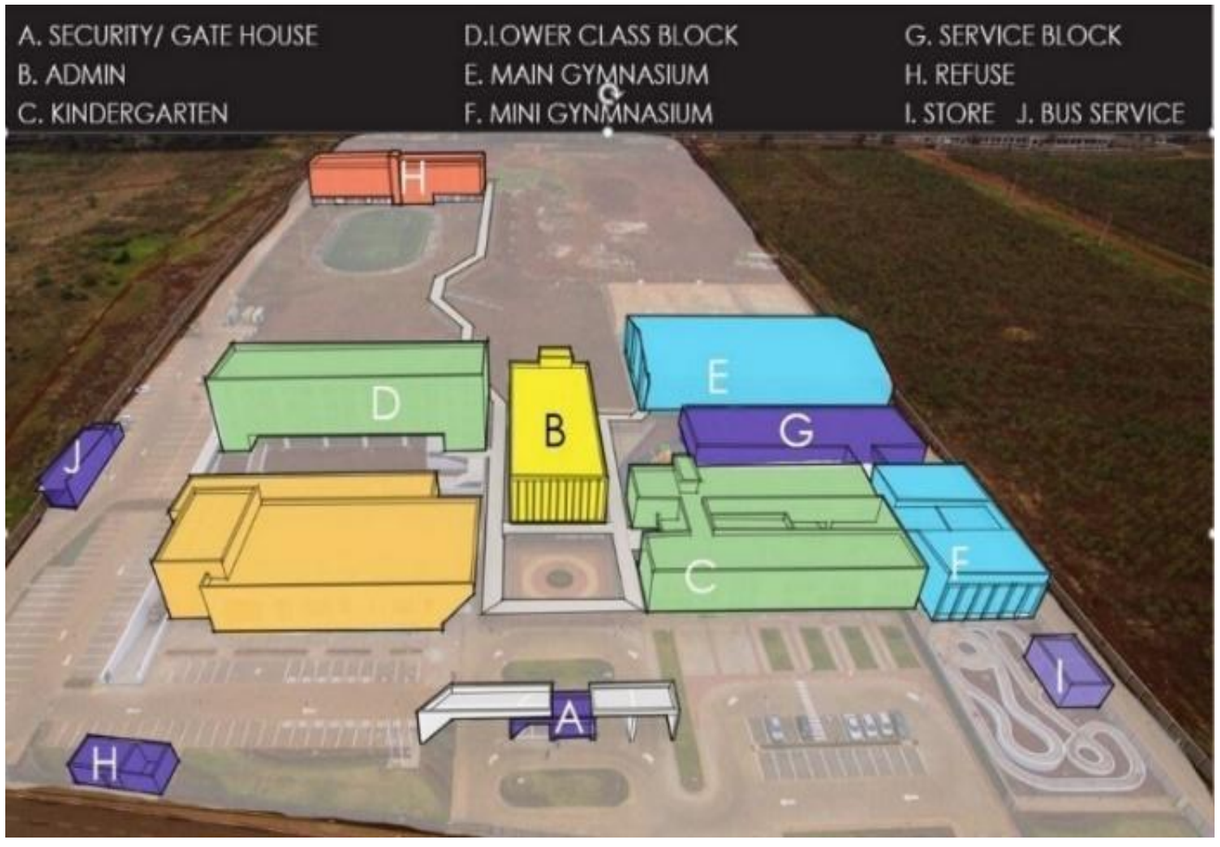


*Hanusec L., Barbuta M., Bejan L., Rosu R., Tmu A., 2020. "Experimental Study on Hollow Blocks with Wastes"*





***Kindergarten layout.*** *Wairimu, R (2024). Rethinking The Future. https://www.re-thinkingthefuture.com*




***Conceptual site layout.*** *Patrick Mugo, D.M, Otawo, A G, Opi, A A & Mokua, Q.E, 2023 'Designing For Climate Change*



**Negative**

Most buildings use a flat roof which is not suitable for the rainfall amount received in the location and incorporate expensive strategies to mitigate.

Less focus has been placed on the landscape design with only a mix of soft and hard landscape with limited vegetation. This makes the space appear bare.

**Recommendations**

Incorporate a hipped roof design in our buildings to drain off rain water that may accumulate on the roof. This would ultimately lower the cost required to drain accumulated water.

Incorporate more landscaping elements e.g. vegetation, water features and outdoor furniture elements.

***Image showing the site plan, showcasing the flat roof design and overall landscape of the school.*** *Wairimu, R (2024). Rethinking The Future.*

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# REFLECTIONS ON HAYAH INTERNATIONAL ACADEMY

The focus of discussion here is on a well analysed international, award-winning precedent of an architectural design project, and in its analysis that emphasises concepts and technical considerations.

**B.A.S YEAR IV CONTRIBUTING STUDENT RESEARCHERS AND DESIGNERS - 2024/2025**

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Wambua
Victor Shayo

# ACADEMY
New Cairo, Egypt


Hayah International Academy - Administrative Building
Source: Hayah International Academy | Gallery | Egyptian Education

# PROJECT DESCRIPTION

**Name**: Hayah International Academy

**Location**: New Cairo, Cairo, Egypt

**Architects**: Medad Consultant Engineers

**Year of Completion**: 2004

**Site Area**: 55,000 sqm.

**Ground Coverage**: 16,500 sqm.

**Accommodation:** approximately 1,620 students and 190 teaching staff

**Education System**: American System, IB System

**The Beginning of Hayah International Academy's Journey**

- **Proprietor:** Hayah International Academy was founded by Mr. Hesham Elsewedy, Mrs. Howaida Elsewedy, and co-founded by Ms. Abeya Fathy and Mr. Mohamed Mag- di. They established Hayah as the first character-building school in New Cairo, Egypt.
- **Why in this district:** New Cairo is a modern and rapidly developing area with excellent infrastructure, including roads, public transportation, and amenities thus provides a conducive environment for a top-tier international school.
- **Growing Community:** The area is experiencing significant growth with a lot of residential apartments coming up.

## 1. School Facilities

### A. Academic

- Classes equipped with smart boards to promote interactive learning
- 6 specialized science labs fully equipped with to cater to the different age groups and curriculums.
- A fully equipped library that caters to the different age groups

*Library, Hayah International Academy*
*Source: https://hayahacademy.com*

### B. Artistic

- Spacious arts rooms fully equipped with different mediums to help students develop in a comfortable environment.
- Five computer labs with 25 computers in each.
- iPads and tablets within the pyp classrooms.
- State of the art makerspace lab with 3d printers and equipped to run robotics and coding classes efficiently.
- An open-source software policy in the ICT department allows students to experiment with the software inside and outside the classroom.

*Students painting in the outdoor space*
*Source: https://hayahacademy.com*

### C. Sports

- A multi-purpose building that accommodates basketball, volleyball, handball, two squash courts, two Jacuzzis and two locker rooms
- A 560 square foot lifting room and a 560 square foot martial arts room.
- Outdoor facilities include 2 basketball courts, a soccer court, 2 Padel Tennis courts, and 2 tracks (the 400 meters track surrounds a standard-size soccer field),an Olympic-size swimming pool and an enclosed 25 meters swimming pool.
- Early Childhood and Elementary schools each have their own playgrounds with jungle gyms, sand pits and open areas full of greenery.
- The school runs from 8.00 am to 5.00pm, after which the community sports facilities are open to the public at a fee. The funds collected are used for maintenance of the facilities within the school.

*Students painting in the outdoor space*

*Source: https://hayahacademy.com*

*School gym*

*Source: https://hayahacademy.com*

## 2. Sustainable Student Activities

### A. Warsha

- This is an Arabic word meaning workshop.
- In Hayah, it is a student led community event eg. In 2019 it was led by middle school students and they were brainstorming on efficient ways to manage waste sustainably in school.
- **Architecturally,** such an activity would call for designing of facilities such as conference halls to enable these workshops.

*Middle schools students at a warsha with various stakeholders*
*Presented by Aliaa Samaha- Hayah International Academy @ 4th NYC, Green Teaching & Learning Practices*
*Source: https://hayahacademy.com*

**B. Tatawar**

This is an Arabic word meaning development. It is an online programme that brings together schools and students in Middle-East to develop solutions innovative for the future to become more committed to sustainability.

Such an activity requires a school to provide facilities such as computer lab to facilitate network connection for the online program.

**C. 'We Are Innovators'**

This is an international competition which challenges stu- dents to create innovative solutions to the world's pressing issues.

*Five students participated and shortlisted to competitions final and teacher receiving award as recognition of being an ambassador of Tatawwar, 2020. Presented by Aliaa Samaha- Hayah International Academy @ 4th NYC, Green Teaching & Learning Practices*
*Source: https://hayahacademy.com*

**D. Hayah Annual Art Competition**

Every year an annual art competition is held. Recently (6 years), they made sure that there is an element in competition that includes students who have used recycled materials to deliver their message.

In 2019 the theme of the Annual Art Competition was " The power of green" This implies that such an activity would require a school to have a space dedicated to art such as painting.


*Students participating in the Annual Art Competition. Presented by Aliaa Samaha- Hayah International Academy @ 4th NYC, Green Teaching & Learning Practices*
*Source: https://hayahacademy.com*



**E. Clean-up campaigns**

Students travel to different places such as R. Nile, Red Sea and the Mediterranean. They travel with specialized NGOs who fundraise to support the course.

*Students participating in a clean-up campaign. Presented by Aliaa Samaha- Hayah International Academy @ 4th NYC, Green Teaching & Learning Practices.*
*Source: https://hayahacademy.com*

# 3. Sustainable Setting

## A. ENERGY EFFICIENT SYSTEMS

(a)LED lamps

In 2019, the school integrated LED Lamps which have enabled reduction of electrical consumption in the school by over 50%.

(b)Renewable energy

(i)Solar panels

In 2019, the school integrated solar panels on the rooftops. This helped to cut annual electricity cost in the school by 24%.

*The images above and below show Solar panel layout on rooftop of Hayah International Academy*
*Source: Presentation by Cairo Solar on how solar helped Hayah international academy save electricity. https://youtu.be/Wf24ZHvZGyQ?si=oMqP_gHWs26AGjs0*

## B. WATER CONSERVATION

(a) Efficient Irrigation system

Green areas in the school are integrated by efficient irrigation system to reduce water consumption in the school.

(b)Water pressure controllers(for water taps)

The school integrated water pressure controllers but unfortunately couldn't stick to that since water pressure coming from external source was not strong enough.

## C. WASTE REDUCTION/ MANAGEMENT

In 2011, Parents Teachers Association had awareness for environment that brought that up further.

Recently the school segregates waste; PLASTIC &PER into differently colored bins.

The waste is sent to an NGO and the money generated from this is used to buy more bins for the school.

*Coloured waste bins in classrooms for collecting different kinds of waste*
*Source: Presentation by Aliaa Samaha – Hayah International Academy @ 4th NYC, Green Teaching and Learning Practices*

# 3. Sustainability Curriculum

Involves creating engaging, interactive and reflective learning experiences that equip students with the skills, knowledge and values needed to appreciate and contribute to a sustainable future. Hayah's curriculum has adopted STEM and project-based learning approach to offer students with the opportunity to focus on real-world problems.

**Aspects:**

1. Collaborative spaces: open-plan classrooms, outdoor learning areas for nature-based learning and community engagement, state of the art makerspace lab facilitate group work, discussions and idea sharing
2. Technological integration: smart classrooms, labs to provide students with hands-on experience.
3. Creativity and innovation: flexible rooms that can be adapted for various purposes.

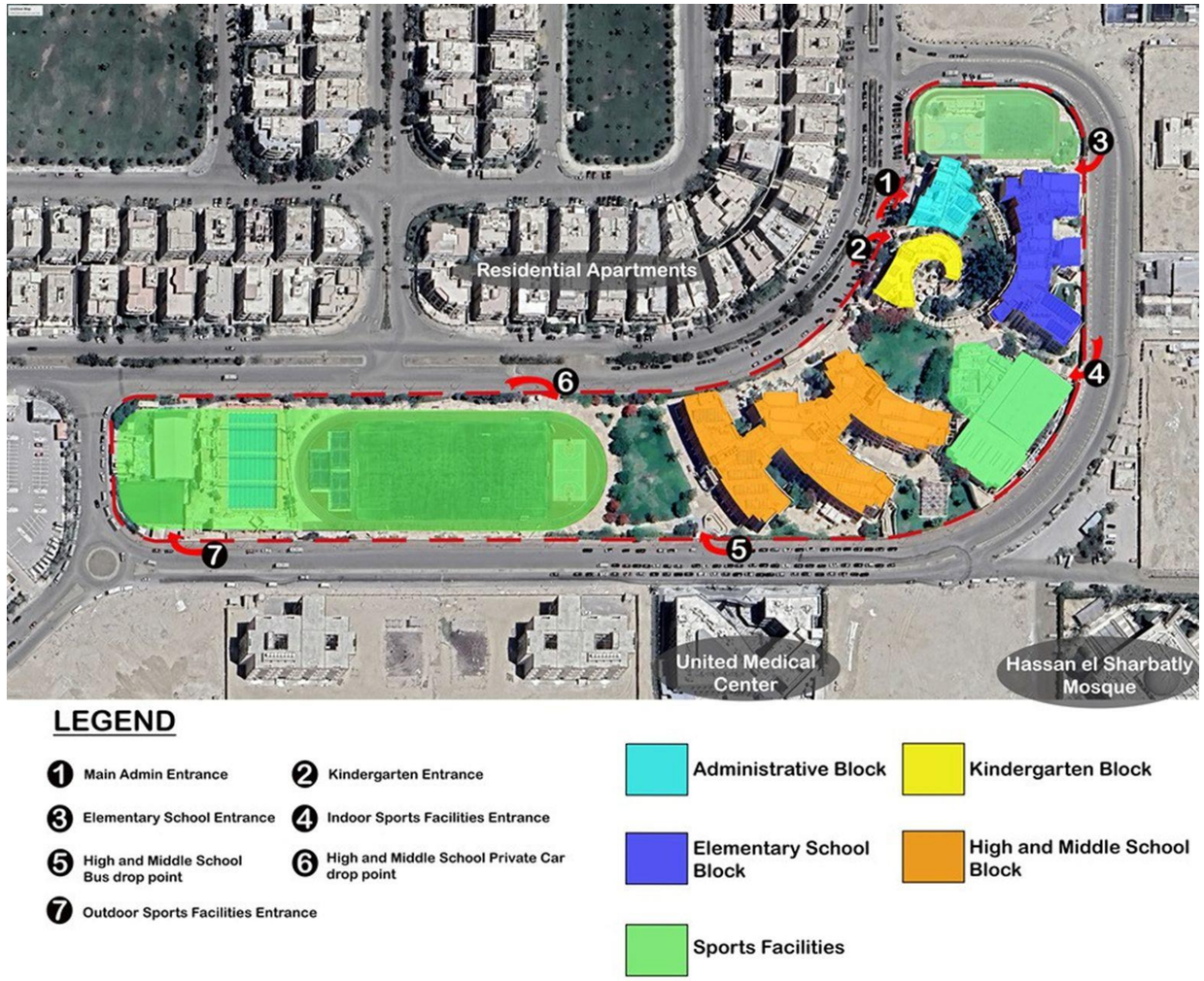
**Economic Sustainability**

1. Use of solar panels helps generate electricity at a much lower cost than grid-supplied power. This has led to substantial savings over time by the school, as the reliance on solar energy has reduced power consumption by 24%, hence the school pays less for power.
2. Recycling of school waste:There are designated waste bins for different kinds of waste.When the waste is collected, it is taken to an NGO, which recycles waste and in return the school gets paid.The money helps in purchase of more bins that have been spread all over the school for waste disposal.
3. School facilities as community centre:After the completion of school activities during the day, the school functions as a community centre in the evening/night where members of neighbouring community can use the school facilities and in return they pay to use these facilities. This acts as income/ revenue stream for the school administration.

*Swimming pool as one of the shared facilities between the school and the community*
*Source: https://hayahacademy.com*



# SITE DESCRIPTION




*Hayah International Academy Site Plan Source: Hussein Sudi 2024 Adapted: Google maps*

**Location and Neighborhood**

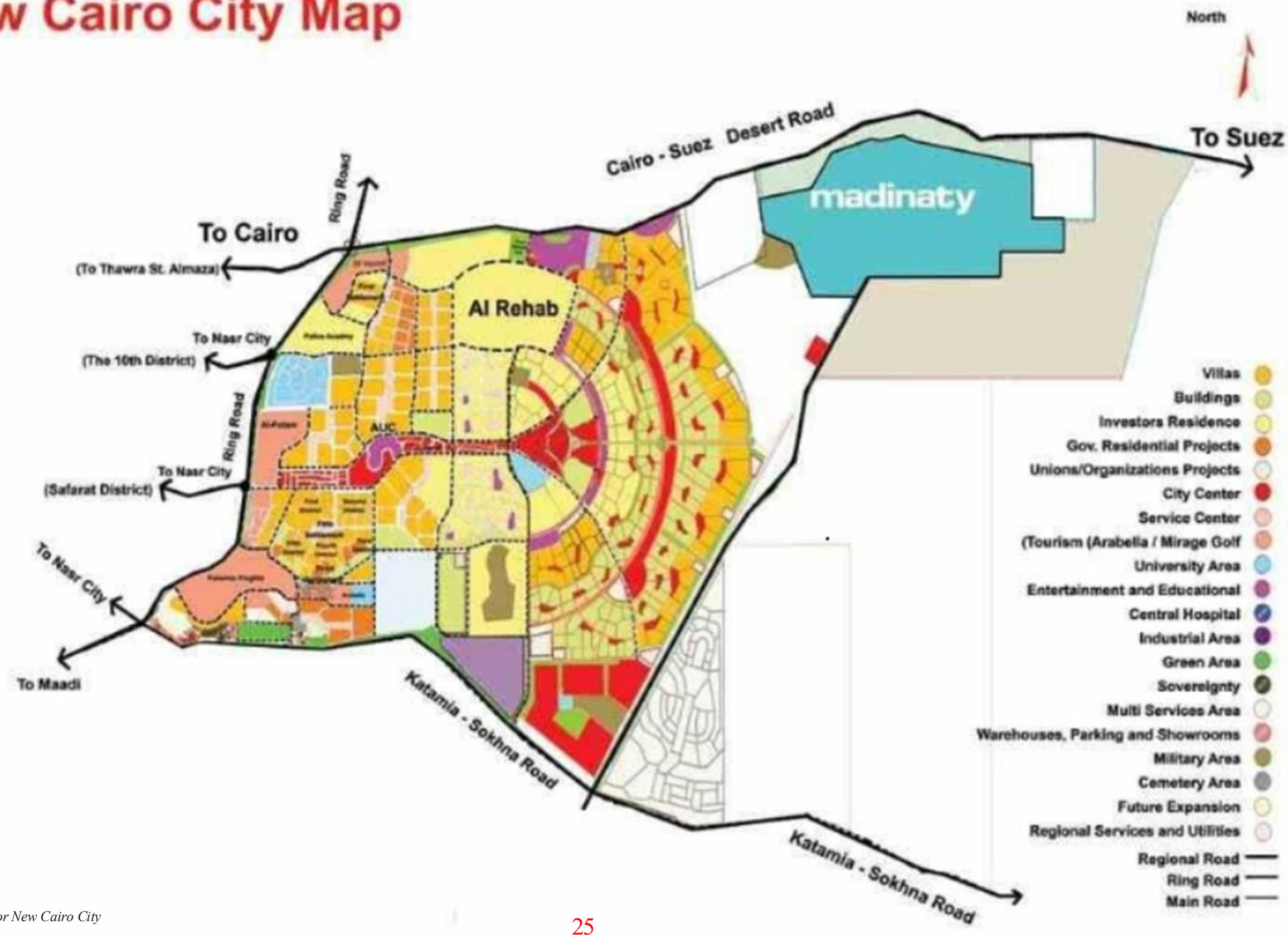
New Cairo: This area was chosen for its modern infrastructure, accessibility, and growing community. It is a well-planned district with a mix of residential, commercial, and recreational facilities, making it an ideal location for an educational institution.

Road System and Infrastructure: The campus is well-connected by major roads and highways.

The school complex has two functions,
-it acts as a learning hub in the morning
-And a community center from afternoon to evening

The sports facilities are shared with the community and the money generated is used for maintenance and buying school resources like bins.

# New Cairo City Map




*Zoning plan for New Cairo City*
*Source:*

# CONCEPT DEVELOPMENT

**Philosophy of design**: Creating a holistic environment for the development of individuals to impact the local and global community.

**Concept:**
Growth- the idea of growth was important as it symbolized the change of the children in 2 main stages:

1. Academics.
2. Physical.

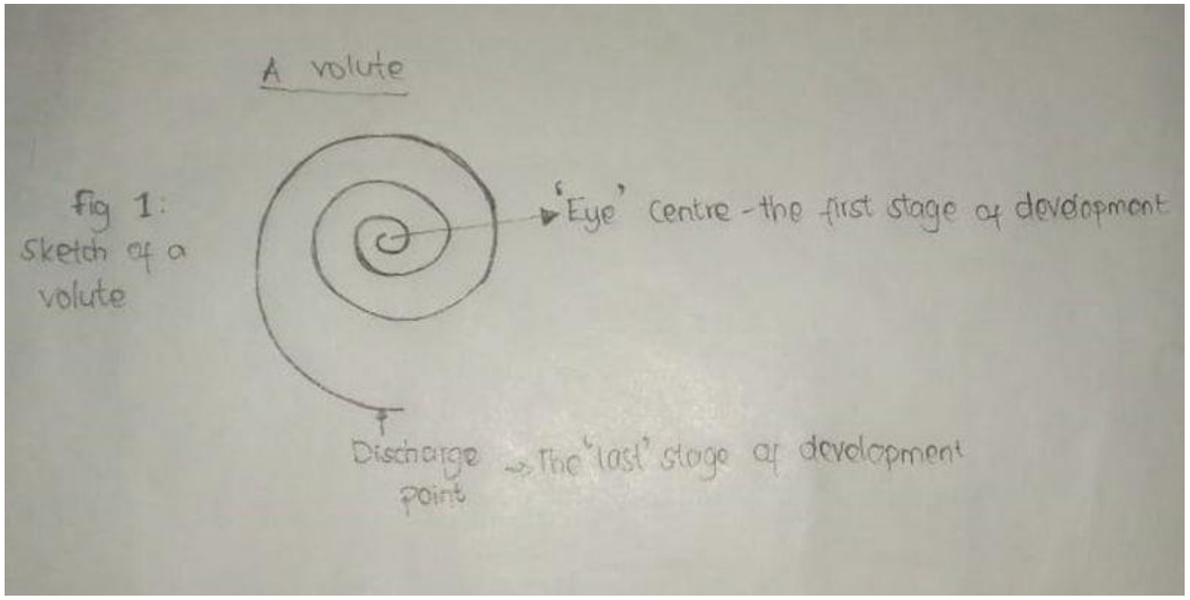
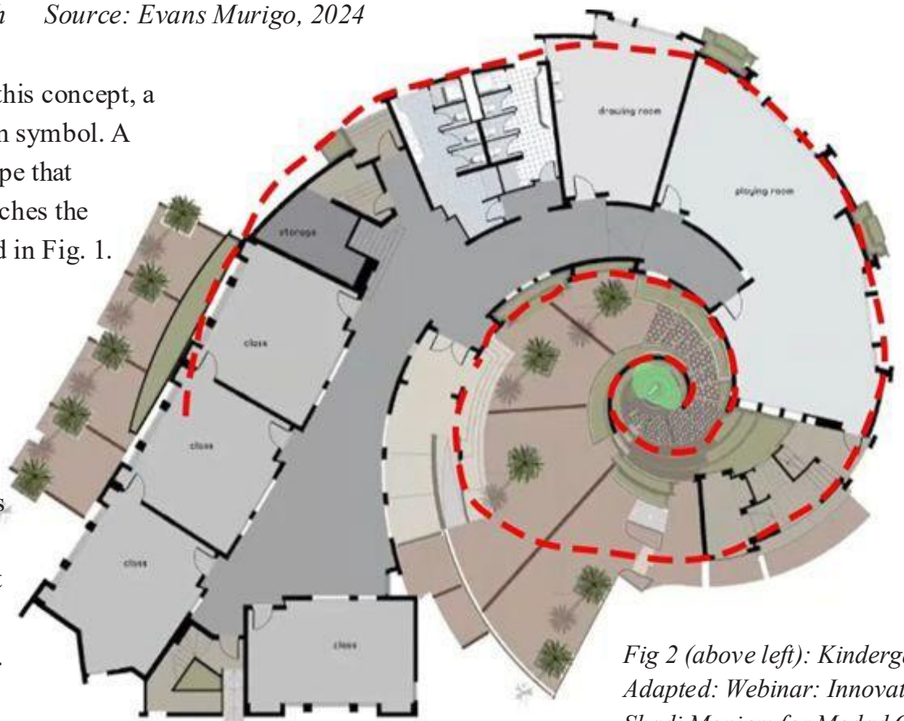



*Fig 1. A volute shape sketch  Source: Evans Murigo, 2024*

To enhance and incorporate this concept, a volute was used as the design symbol. A volute is simply a funnel shape that increases in area as it approaches the discharge point, as illustrated in Fig. 1.

To Medad, the 'eye' of the volute which is the center symbolizes the first stage of development and growth, the kindergarten stage. As the kids grow, the next stage is the elementary school level and at the discharge point is the middle and high school levels.



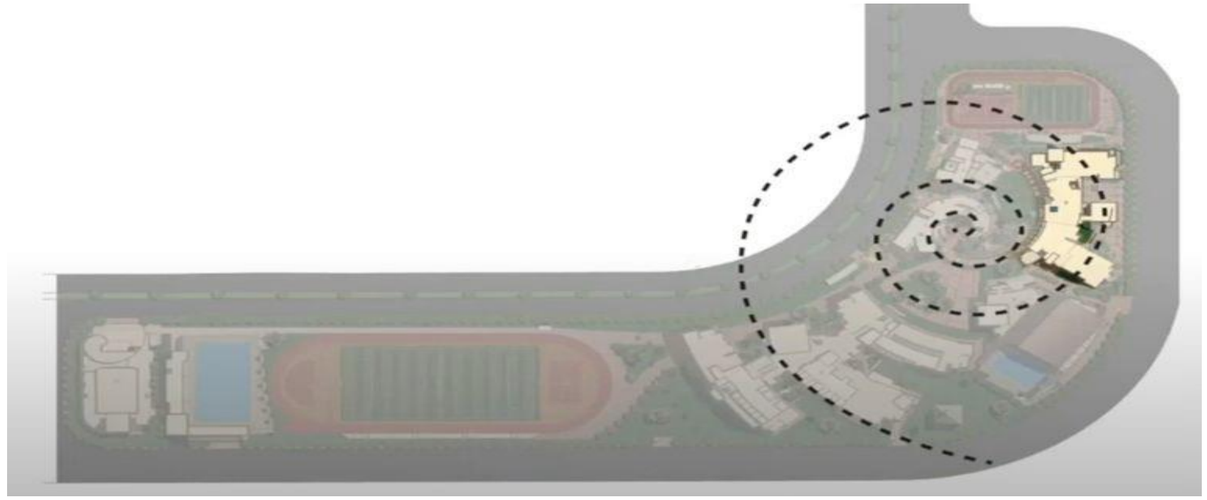



*Fig 3(below).: Site Layout - Hayah International*

*Source: Webinar: Innovative Architecture in Compliance with Local codes and standards; a presentation by Arch. Shadi Moniem for Medad Consultant Engineers, 9th December 2022.*


*Fig 4(below):. Hayah International Academy Site plan. Adapted: Webinar: Innovative Architecture in Compliance with Local codes and standards; a presentation by Arch. Shadi Moniem for Medad Consultant Engineers, 9th December 2022.*

*Fig 2 (above left): Kindergarten Ground floor Plan, Hayah International School. Adapted: Webinar: Innovative Architecture in Compliance with Local codes and standards; a presentation by Arch. Shadi Moniem for Medad Consultant Engineers, 9th December 2022.*

# Spatial Organisation

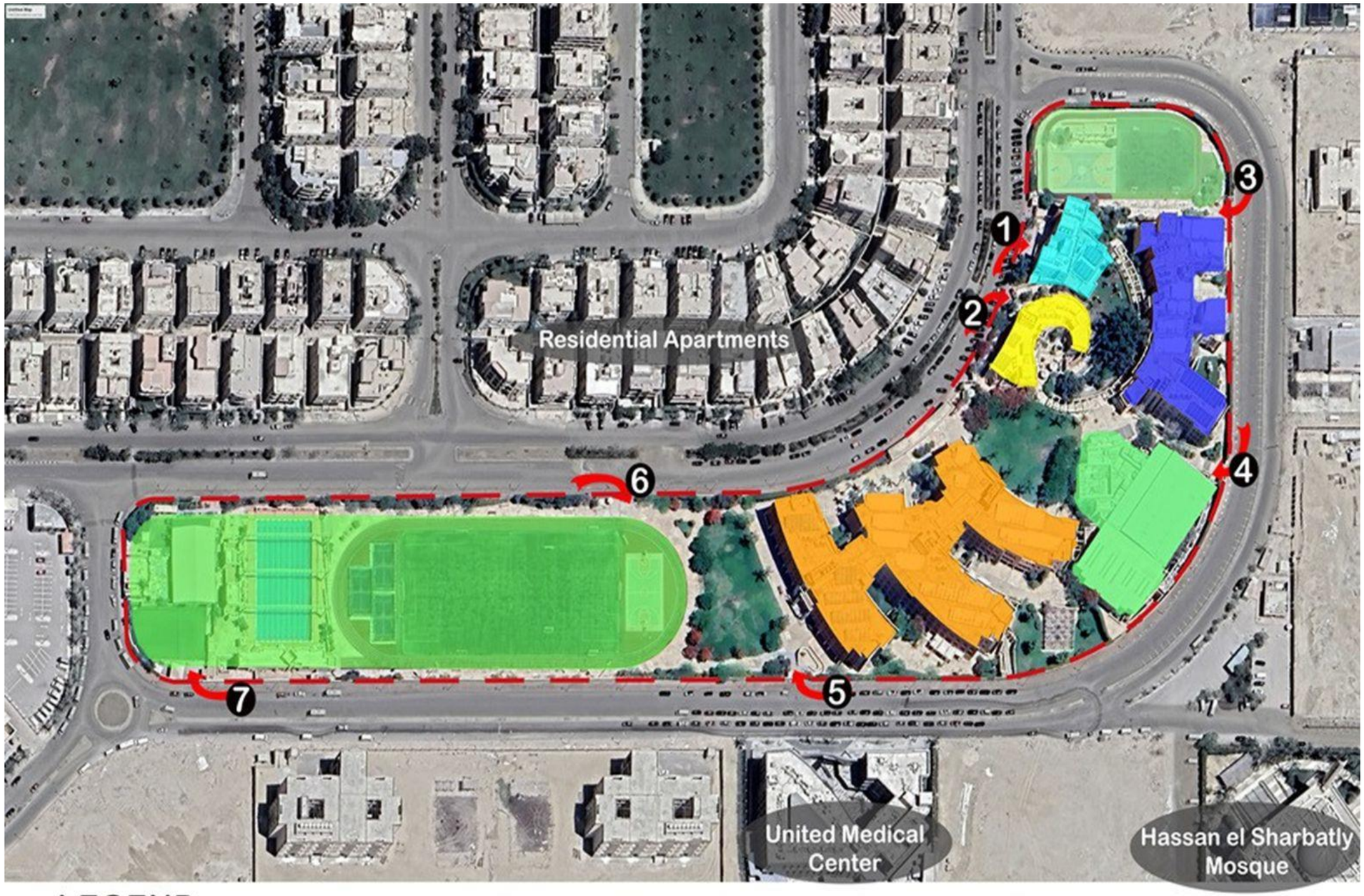
**Massing**

Hayah International Academy consists of a series of interconnected volumes that vary in size, shape and function.
The volumes are organized following a spiral pattern starting from the kindergarten near the main entrance to the Elementary School and finally to the middle and high schools.
This creates a clear hierarchy and balance in the layout.

*Hayah International Academy*
*Source: hayahacademy.com*

**Clustered Organization**

The buildings at Hayah International Academy are laid out in a clustered manner with related spaces of similar functions like classrooms grouped together being grouped together.
This allows for clear functional zoning within a building or a complex, where spaces with similar functions school is laid out in a cluster with spaces. It helps users easily understand the layout and flow of the space, improving navigation and wayfinding




*Hayah International Academy Site Plan Source: Hussein Sudi 2024*
*Adapted: Google maps*

The clusters throughout the school compound are arranged around courtyards and open spaces providing central points of orientation interaction and circulation.
This enhances accessibility, visual connections and natural lighting throughout the campus.
The Courtyards have been used as a unifying and organizational element in the design.

*Playfield - Hayah International Academy Source: PlatformVR Agency 2017*

**Movement and Circulation**

Movement throughout the campus is by pedestrian means only following the spiral paths, walkways and corridors from the main entrance. The most significant advantage of this is the reduction in the risk of accidents involving vehicles and pedestrians.
Children are particularly vulnerable in environments with vehicular traffic due to their unpredictable behavior and limited awareness of traffic rules.

**Solids and Voids**

The interplay between the solid built forms made up of the classrooms, Offices and indoor Facilities and the voids consisting of the courtyards and open spaces create a dynamic and engaging composition.
The courtyards help breaks down the built forms reducing visual monotony while also providing light ventilation and social spaces.
The use of courtyards is a design response to the hot climate of the area. They help regulate temperature, create shade and enhance natural ventilation

Source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.teacherhorizons.com%2Fschools%-2Fafrica-egypt-cairo-hayah-international-academy&psig=AOv-Vaw3rABJSylD0DZAeCH5FLki-U&ust=1726067632363000&source=images&cd=vfe&opi=89-978449&ved=0CBQQjRxqFwoTCNi8q-JLVuIgDFQAAAAAdAAAAABAS

*Hayah International Academy*
*Source: Ramy Nassar 2023*

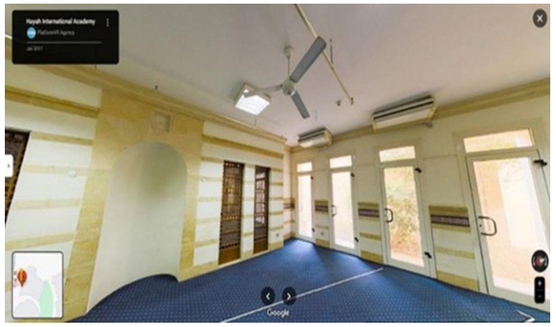
## How socio-cultural aspect was used as a concept

As a design concept this aspect defines majorly how spaces are laid out on a particular site and how they are used. It focuses on 2 key issues: Culture and Social interactions.
As such, socio-cultural helped shape the design of Hayah in:

- **Creation of public spaces**: Hayah has included the design of sporting facilities that is accessible by the local community during off school hours. This enables the students to interact not only amongst themselves but also the community during times when games are hosted.

*Sports facility- Hayah International Academy*
*Source: Hayah International Academy*

- **Designed for lifestyle:** this involves designing for daily routines and lifestyle of the user. The population at Hayah International academy is composed of people from various backgrounds and cultures and mainly the Muslims.
- To cater for their lifestyle, the architects had to incorporate prayer rooms that would allow the Muslim children to pray and conduct other religious studies.

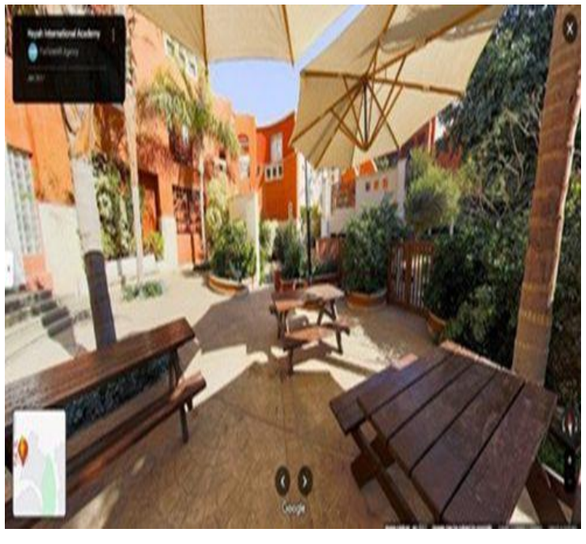


*Prayer room - Hayah International Academy Source: PlatformVR Agency 2017*

## How environment was used as concept

Hayah International Academy is located in a desert area where the climatic conditions are very hot and dry.

This is factor that also contributed to the design of the school as it is in that:
1. **There is a climatic responsive design**: to mitigate the very hot climate, the architects so the need for the integration of green spaces that are the courtyards around the academic areas.This help to provide a cooler environment and also act as an interaction zone with shades installed while for the kindergarten it is the main playground.



*Shades around courtyard - Hayah International Academy*
*Source: PlatformVR Agency 2017*

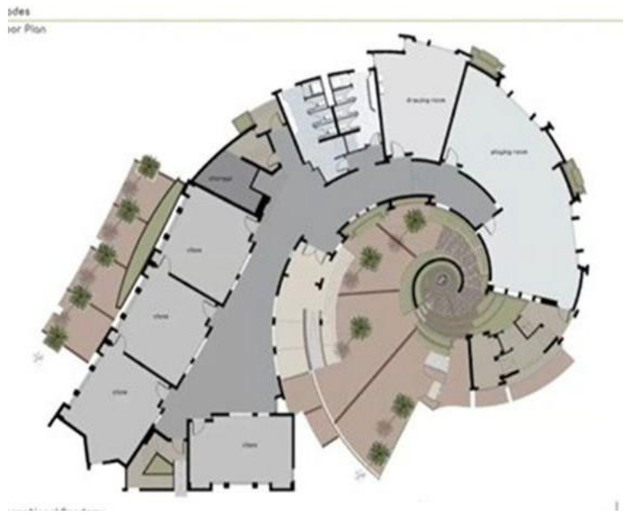
*Playfield - Hayah International Academy*
*Source: PlatformVR Agency 2017*

2. **There is use of sustainable design principles:** Hayah has employed sustainable design strategies that enable the school to reduce their reliance on non-renewable sources of energy. Of importance is that the architects incorporated the use of solar panels to supplement the school's power consumption. This was also as a design response to the hot climate in particular to sun- shine. From this case study, several architectural and design lessons can be drawn:

*Solar panel layout on rooftop of Hayah International Academy*
*Source: Presentation by Cairo Solar on how solar helped Hayah international academy save electricity. https://youtu.be/Wf24ZHvZGyQ?si=oMqP_gHWs26AGjs0*

**Flexibility and Adaptability of spaces**

## 1. KINDERGARTEN



*Kindergarten Ground floor Plan, Hayah International School.*
*Source: Webinar: Innovative Architecture in Compliance with Local codes and standards; a presentation by Arch. Shadi Moniem for Medad Consultant Engineers, 9th December 2022.*

The kindergarten section has the following spaces:

1. 4 Classrooms
2. Playroom
3. Drawing Room
4. Storage Room
5. Washrooms

The washrooms and storage room separate the classrooms on the left from the playroom and drawing rooms on the left.

Since the playrooms are shared among the 4 classrooms, this separation minimizes distractions and noise inside the class- rooms. The playroom is large enough to accommodate more than one class thereby encouraging inter-class interactions.



## 2. ELEMENTARY SCHOOL

*Hayah International Academy Source: PlatformVR Agency 2017*


*Elementary School sketch*
*Source: Lionel Kuchio 2024*

In the elementary school block; each set of 4 classrooms share a common open space for extracurricular activities as well as washroom facilities.

## 3. MIDDLE AND HIGH SCHOOL

This High School is different in that there is no assigned classroom starting from grade 9 to grade 12.
In this flexible or open-classroom model, students move between spaces rather than being assigned to a single classroom. The benefits of this approach include:

- Upper-grade students are encouraged to take responsibility for their own schedules, materials, and learning environments. This helps them develop time management and organizational skills as they move between different spaces for various subjects.
- Without assigned classrooms, students can more easily form study groups, collaborate with peers on projects, and engage in group work
- Teachers can utilize different spaces depending on their teaching approach—lecture-based, interactive, or project-based learning—without being limited by a traditional classroom setup.
- Students are not confined to one room for the entire day, which helps reduce restlessness and monotony. Moving between spaces allows for more physical activity, which can improve concentration and reduce fatigue.
- With no assigned classrooms, spaces and resources (e.g.) technology, specialized equipment, and learning materials) can be shared more efficiently between classes and subjects.
- The flexibility of moving between spaces allows students with different learning styles (visual, auditory, kinesthetic) to find environments that suit their needs.

The main aim of this is to prepare Upper-grade students for life beyond school, whether it's college or the workplace.

# SITE ANALYSIS

## Response to climate

Mechanical cooling systems such as Air conditioning (AC) units and ceiling fans used to cool the school's classrooms, offices, and other indoor spaces maintaining a comfortable environment.

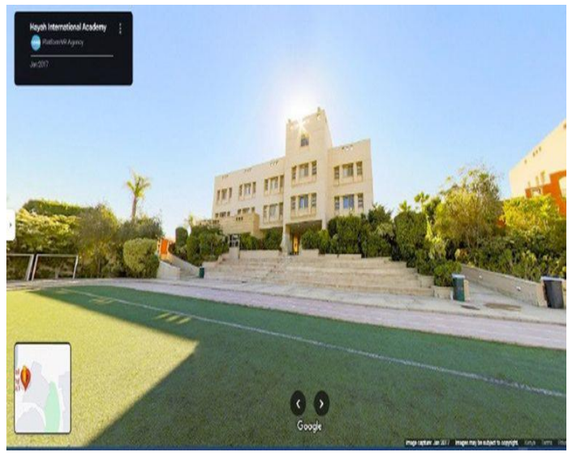
*Prayer room - Hayah International Academy Source: PlatformVR Agency 2017*

Trees and shrubs can provide shade, reduce heat absorption, and help to cool the ground.

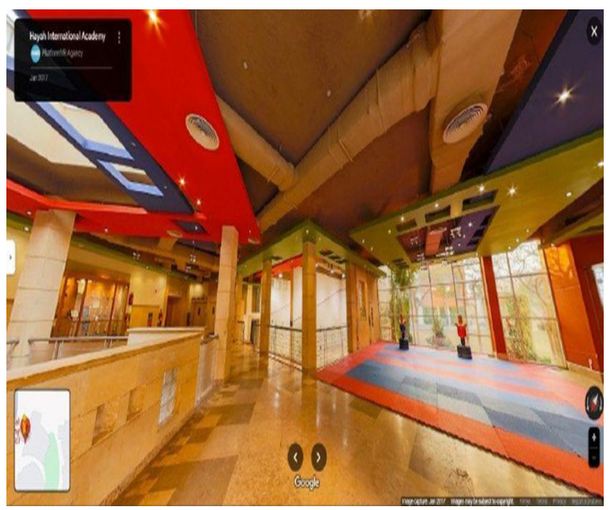
*Playfield - Hayah International Academy Source: PlatformVR Agency 2017*

Deep recessed windows to provide shade and protection from direct sunlight, reducing heat gain. Deep recessed windows to provide shade and protection from direct sunlight.

*Kindergarten playground - Hayah International Academy Source: Ramy Nassar 2023*




*Hayah International Academy Source: PlatformVR Agency 2017*




*Hayah International Academy Source: PlatformVR Agency 2017*



## Materials used

**Glass:**
Glass windows are incorporated into the school design, maximizing natural daylight, creating a conducive learning environment. Glass has also been used in facades to provide aesthetic appeal and visibility.

*Fig 1: Hayah International Academy Source: Search Associates, 21st Oct 2016*


*Fig 2: Library for lower classes Source: PlatformVR Agency, 2014*

**Brick and concrete** used for the walls, providing insulation and fire resistance. They also provides strength and durability, essential for supporting multi-story structures and ensuring


*Fig 3: Hayah International Source: Ramy Nassar, 2023*

*Fig 4: Kindergarten Source: Ramy Nassar, 2023*

**Ceiling**

Gypsum ceilings have been used within the cafeteria which complement the interior style, as well as providing sound insulation within the space.

*Fig 5 and 6: School cafeteria Source: PlatformVR Agency, 2014*

## Flooring

Ceramic tiles used on the cafeteria floors, the entrance, lobbies, corridors, laboratories and classrooms.

*Fig 7: Corridor*
*Fig 8: Cafeteria*
*Source: PlatformVR Agen- cy, 2014*

Carpeted flooring used in the libraries for acoustics. Carpets are also used within the lower classes.

*Fig 9: Library for lower classes*

*Fig 10: Library for the upper grades*
*Source: PlatformVR Agency, 2014*

Rubber mat flooring used for the gym floor and for the martial arts room as it provides cushioning, is durable and easy to clean.



*Fig 11: Gymnasium*
*Source:Hayah International Academy 2022*

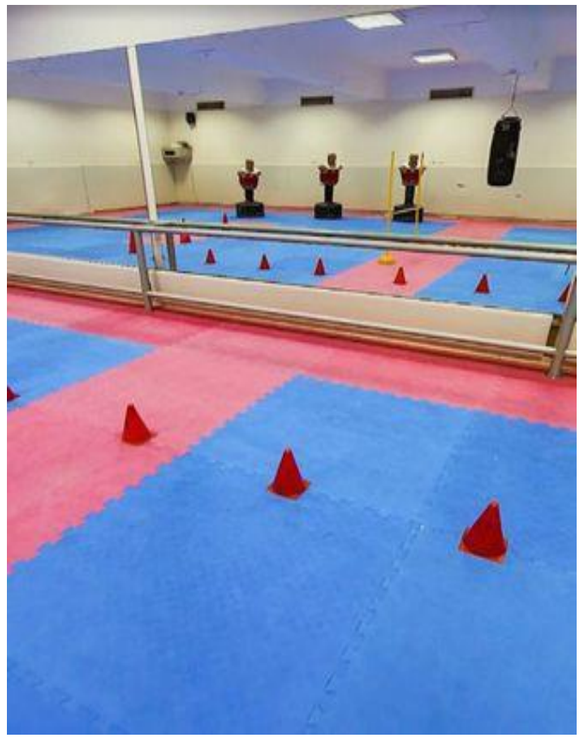


*Fig 12: Martial arts room*
*Source: PlatformVR Agency, 2014*

Wood flooring for the indoor basketball courts, providing optimal performance.

## Finishing Materials

Interior finishing materials such as paint is chosen for aesthetic qualities, by incorporating different colors.

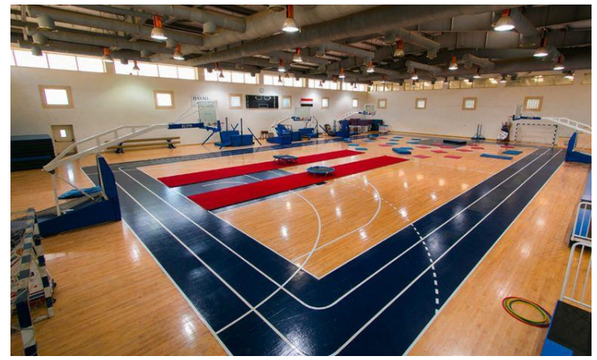


*Fig 13: Indoor basketball court*
*Source: Hayah International Academy, 10th Oct 2022*

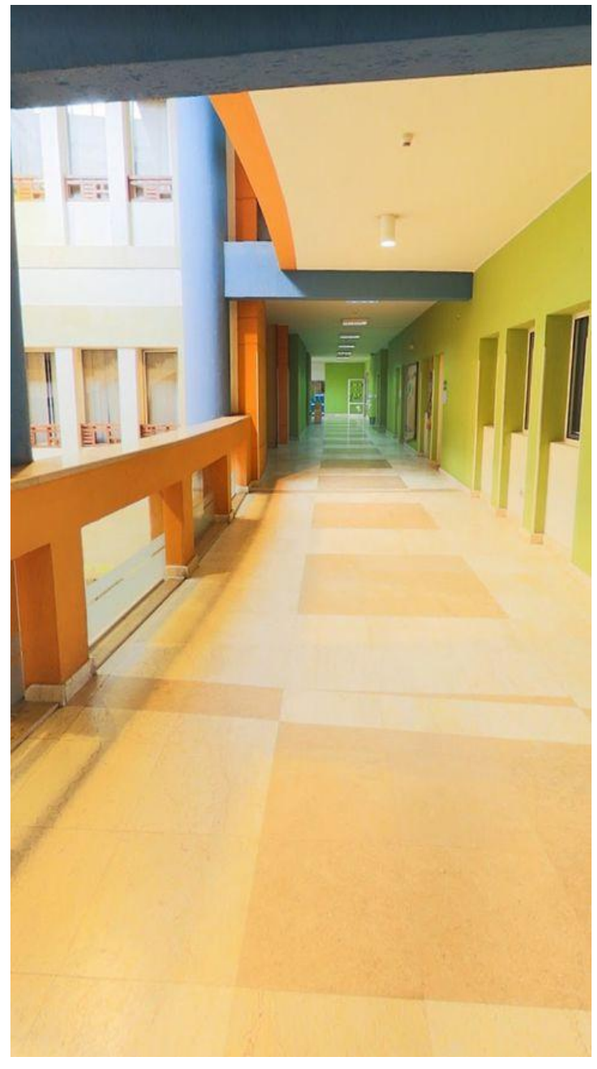


*Fig 14: Corridor*
*Source: PlatformVR Agency, 2014*

# LESSONS LEARNT

From this case study, several architectural and design lessons can be drawn:

1. Income generation and community involvement strategies benefit from multifunctional spaces and community-centered designs.
2. Student safety is maximized through efficient traffic management and controlled access points.
3. Sustainability is achieved by leveraging green building technologies, water-efficient landscaping, and energy-saving designs.
4. The concept is maintained through adaptable, culturally integrated spaces that evolve with the institution's needs.
5. Landscaping in harsh climates focuses on native plants, advanced irrigation, and microclimate management, enhancing outdoor spaces while minimizing resource consumption.

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4. https://hayahacademy.com/about-hayah/campus-facilities/
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# REFLECTIONS ON THE COPENHAGEN INTERNATIONAL ACADEMY

The focus of discussion here is on a well analysed international, award-winning precedent of an architectural design project, and in its analysis that emphasises concepts and technical considerations.

**B.A.S YEAR IV CONTRIBUTING STUDENT RESEARCHERS AND DESIGNERS - 2024/2025**

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Maina Onditi
Theo
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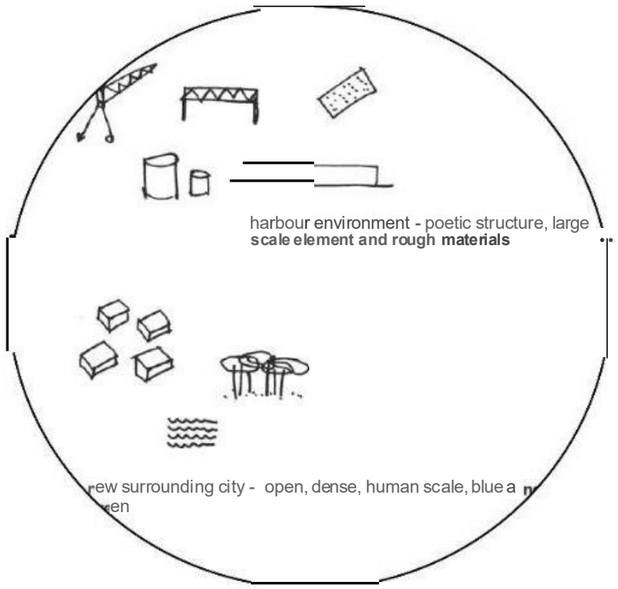
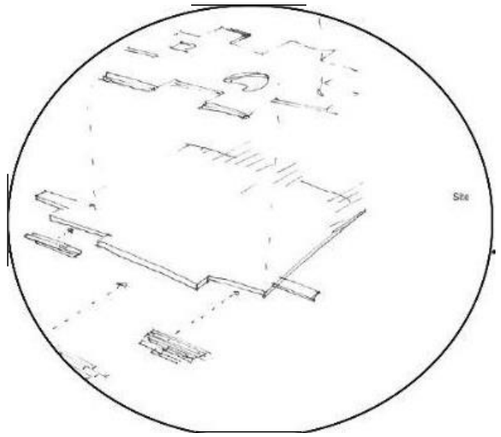
Nderitu George
Mwaura
Rebecca
Mwinja Mark
Kahenya
Munyui
Geoffrey
Bernice Bett

# CONCEPT DEVELOPMENT



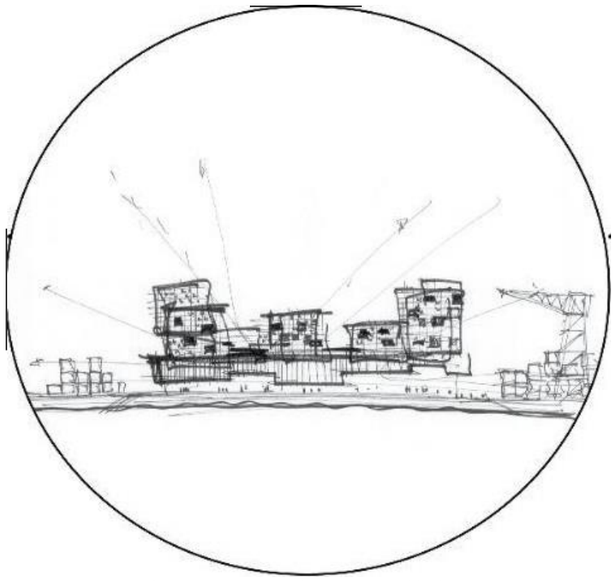

**ISSUES TO BE ADDRESSED**

- Sustainability
- Lighting
- Connection to the surrounding en vironment

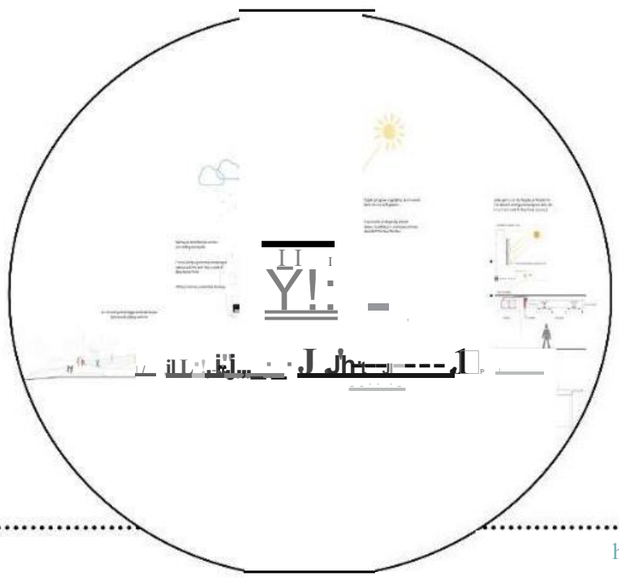


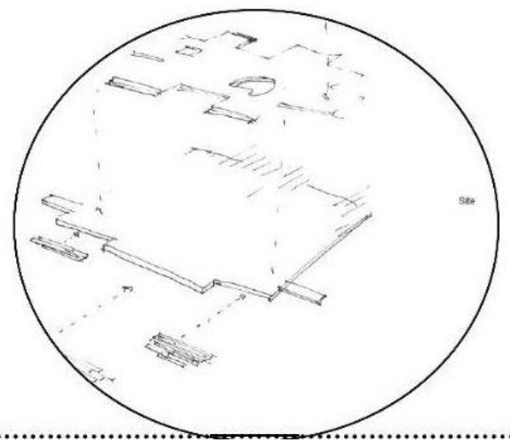
**CONCEPT**

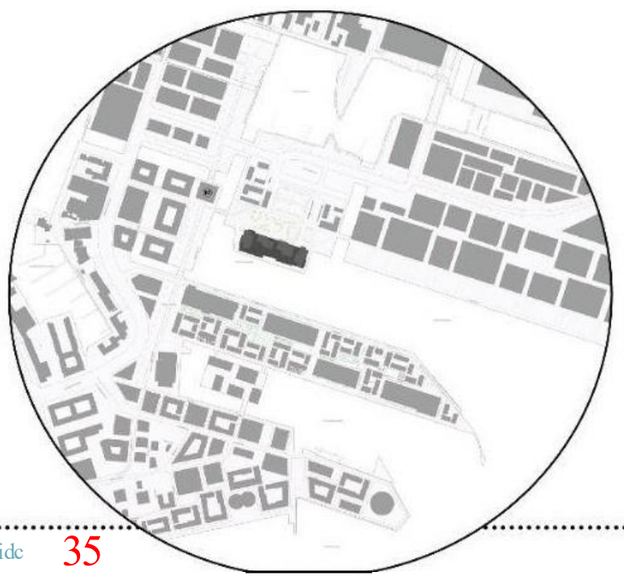
Far from being an isolated structure, the build ing's deliberate modular design is conceived as a direct and meaningful dialogue with its immediate surroundings. By mirroring the pragmatic geometries and industrial rhythm of the harbor's shipping containers, cranes, and logistical infrastructure, the architecture tells a story of its place, seamlessly integrating into the existing visual narrative of a bustling port while still asserting its own contemporary identity. This contextual sensitivity ensures the building feels like a natural extension, rather than an imposition, on the vibrant har bor landscape.



A cornerstone of our design is the building's metic ulously crafted modular arrangement, which serves as a powerful visual and experiential bridge to the surrounding harbor. This intentional mimicry draws inspiration from the raw, industrial textures of stacked shipping containers, the repetitive rhythm of their placement, and the dynamic interplay of solid forms found within the port. The result is an architectw·e that not only hannonizes with the bold geometries of the docks and quays but also imbues the structure with the rugged authenticity and active character synonymous with a bustling maritime environment.







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# SITE ACCESS




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As a driver, cally navigate through Co l-maintained road ne**mrjrk. The sc** ated in the m**odern Nordhavn distr** vhich has goc**d** roacl...connectia likely dec**ated** *f.* - m the vicinity; t oug **king** i ha gen generally req**ues a** :he **ence to p**ecific rules and p0tentially--payme D f i ng peak school h□-;-•□□art Zones **r** "School Zones" might be□ect--aroun **d** the school, w...ch restri'ct car access t0,cr.!ate safer environments for students, so drivers may need to be aware of tfme-limited entry bans or designated drop-off point□-

As a pedestrian, reaching Copenha□ terna**tional School is strai h t f o r** □ □ □ Nordhavn area :s **withpede** strian-friendly pathways and pr**omenades,** offering a pleasant walk of fn ong the waterfront. Public t**r** • **lcs-a** robust in Copenhagen, so you could a e a metro or bus to a nearby station or s to a m • . The sc **s itself** e□ integrate with the pu lt–s , **making** it welcoming for those arriving o n foot.

As a cyclist, Copenhagen Internation al School is exceptionally accessible, as Copenhagen is renowned as one of the most bicycle-friendly cities in the world. There's an extensive network of segre gated cycle tracks and dedicated cycling infrastructure throughout the city, includ ing in Nordhavn. Cyclists can safely and efficiently reach the school, likely utilizing wide cycle lanes and potentially even purpose-built bike bridges that connect different city districts. The school likely provides ample and secure bicycle parking facilities, encouraging this popular mode of transport among students and staff alike.

0 100 200

# SITE VIEWS

%.e Ian view.clearly delineates the site's footprint within a str□cture ur **id.Jug□□tin** g a dense, planned envuonment where flre bul I in g must effectively negotiate its immediate adjacen cies. The various photographic views reveal si□nificant ies opportuni and characteristics: the ground-level e perspectiv hlghlights the immediate public realm, indicating designed spaces for pedestrian activity and poter tial outdoor gathering, crucial for a public or institu tional building. The wider urban and aerial/ views c emonstrate the site's architectural alignmel)f° with surrounding modern developm□nts, sug□□rt:

Furthermore, t t view and the explicit har- bor view emph strong relationship with the waterfront, let g water features for aesthetic value and prov **din** pote **tia** viewsheds while also hinting at the potenth al fo from the adjacent port. This co mpr al sis reveals a rell-it tegrated into its urban fabric, cap its waterfron□oca io n, and designed with a stron□ public presence,

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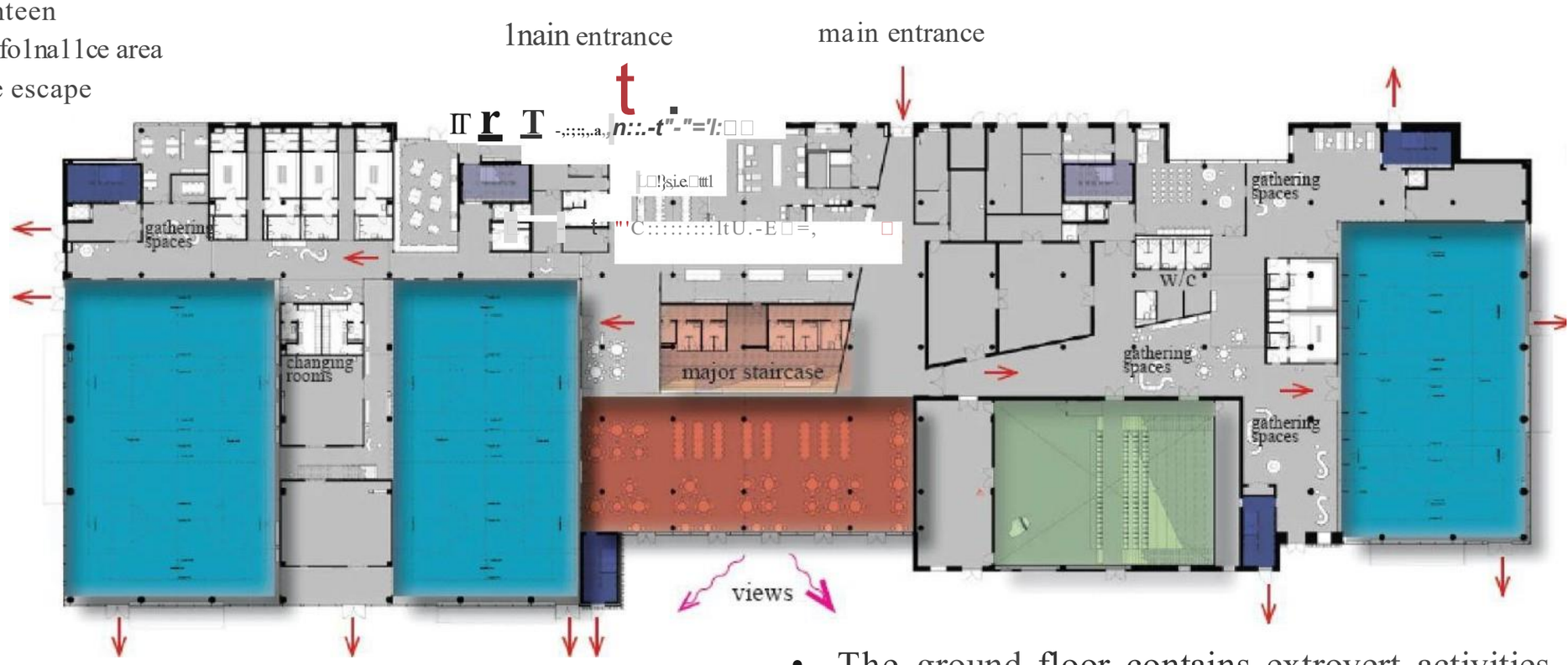
# SITE PLAN


- The school is designed to link the school premises with the public sphere in the urban environment.
- The outside landscaped area provide opportunities for relaxation and varoius activities and also giving the school an open ambience.
- The main school building is divided into four smaller towers each specially adapted to meet the needs of children at different stages of development.
- The separation of parking area from the school premises enables the movement of students around the school is safe and enjoyable as well as prevention of noise to the learning areas.

# GROUND FLOOR PLAN

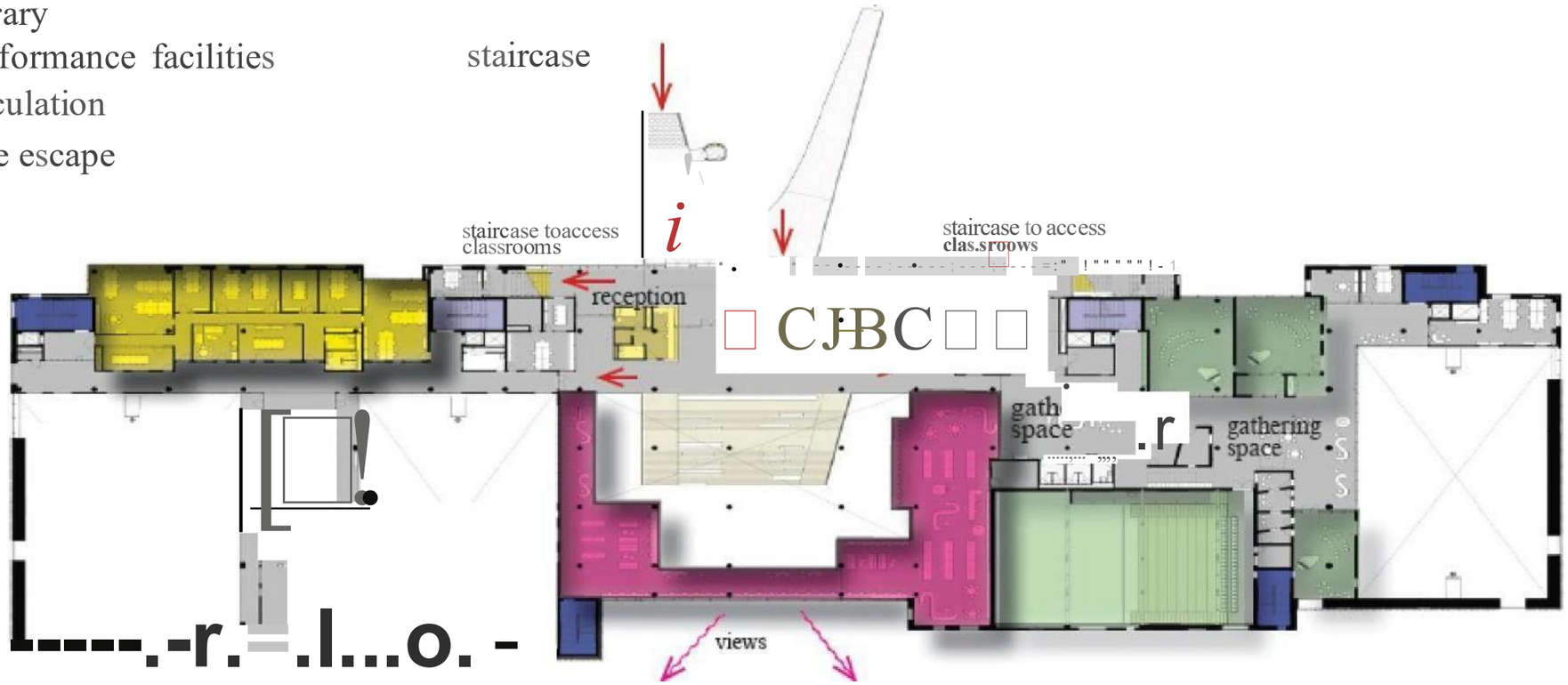
spo11s facilities
canteen
pelfo1na11ce area
fire escape

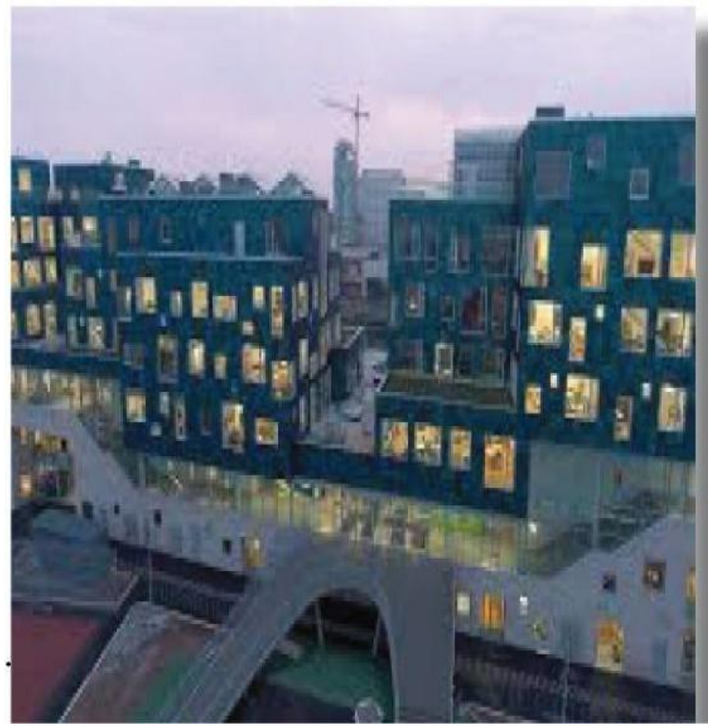



- The ground floor contains extrovert activities stlch as spoti facilities, a canteen and perfor mance facilities.
These spaces remain open for school and locaJ community events past school hours thus pro moting community engagement.
The use of glazed partitions in the ground spaces enables strong visual connection from the different spaces, also penetration of naturaJ light and also for views.
The major staircase and the canteen ai-e the major gathering spaces in this floor. These spaces allow for interaction of stud□nt□1□long the different age groups and for parents also.

# MEZZANINE **FLOOR PLAN**

library
performance facilities
circulation
fire escape
staircase



- The students access their classrooms throughl this floor from the two staircas e,s on tl1e left and right.
- This floor contailns the open library that has ac cess to the great sea views.
- This layout enables easy supervision and strong visual connection between this floor and the ground.
- The reception control access to the classrooms after school hours thus ensuring safety.

# FIRST FLOOR PLAN

access staircase

- fueescape

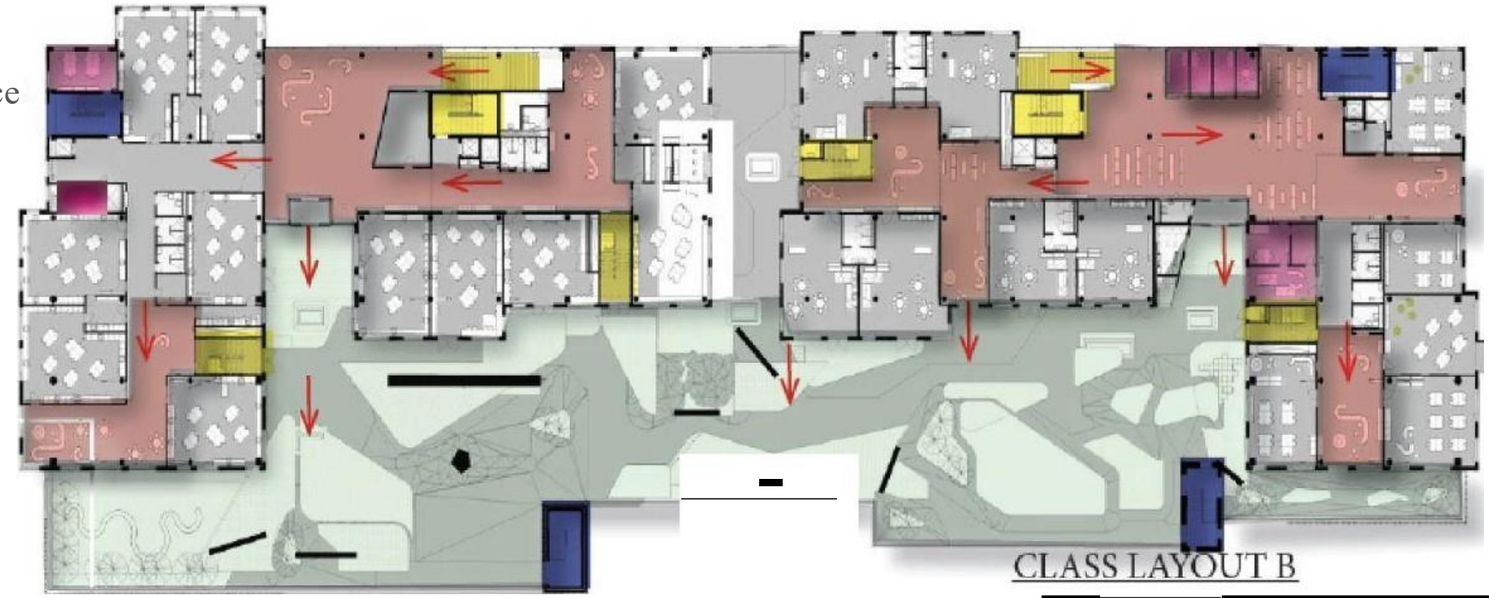
ten·acce

- teachers office

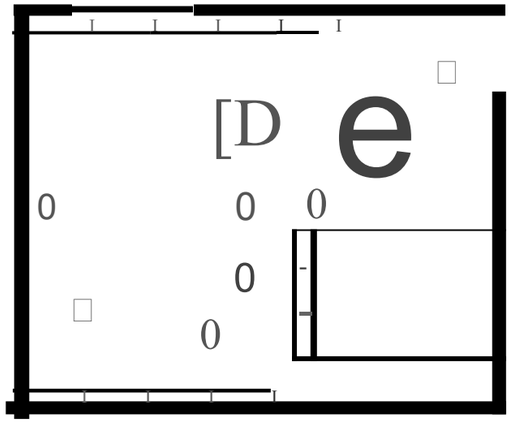
circulation

-interaction spaces

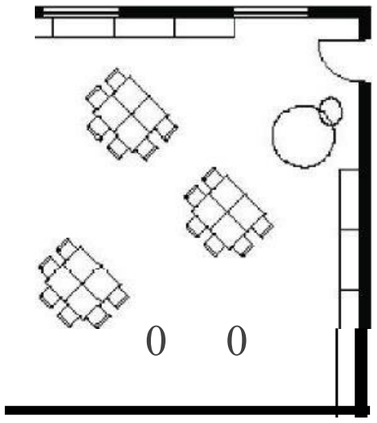
circulation conidor



CLASS LAYOUT B



LASS LAYOUT A



l tudent learn

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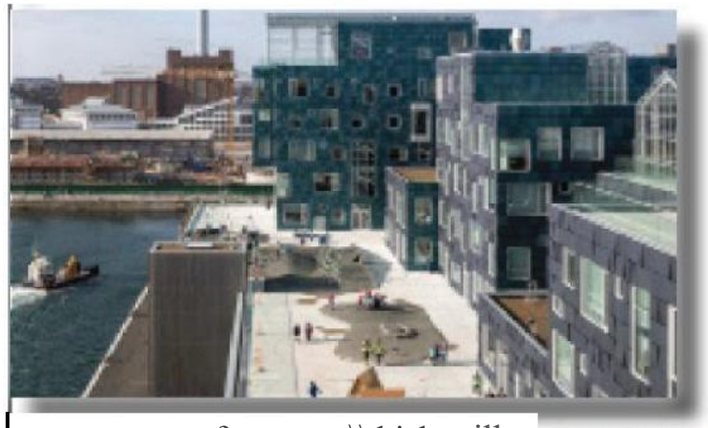
ROOF TERACCE



in groups to create

os h

:lass layout for older students

rre more open with limited par-.

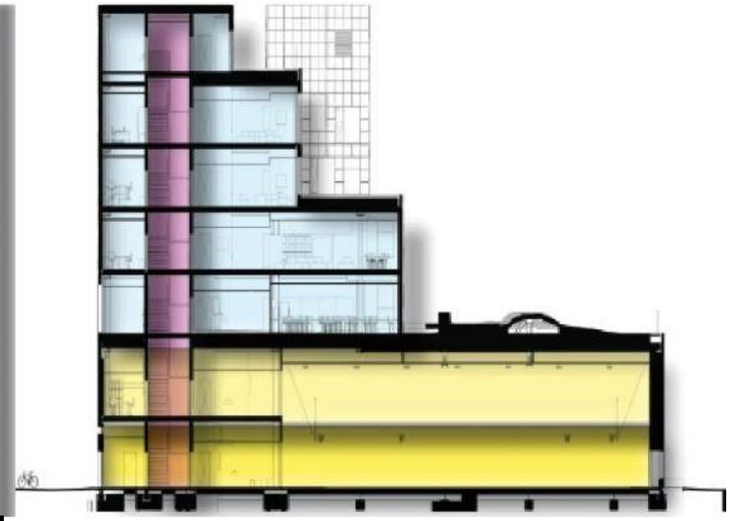
:ationing and more openings.

common roof terrace \\hich will function *as* a school playground for the whole school - and the youngest pupils in particular. The elevated school playground provides a secure environmentt which prevents students from coming too close to the water or fro1n straying off the school

layouts are more enclosed to create intimate spaces with 1ninimal openings there is incorporation of various sections within the layout for dUf reftf.l ai;nin activities such-asfc ve a

non active areas.

# VERTICAL LAYOUT



vertical circulation

Roof garden

classrooms arranged in towers per particular agebracket

administration spaces
extrovertic spaces

open library

communal gathering spaces
performance spaces
playground facilities

classrooms arranged in towers per particular agebracket

ACTORS SHAPING VERTICAL LAYOUT

- SAFETY OF THE STUDENTS
- HARSH WINTER CLIMATE
- INTERACTION AMONG DIFFERENT GROUPS
- VIEWS

PUBLIC

communal gathering spaces, performance spaces and playground facilities

administration spaces, extrovertic spaces and open library

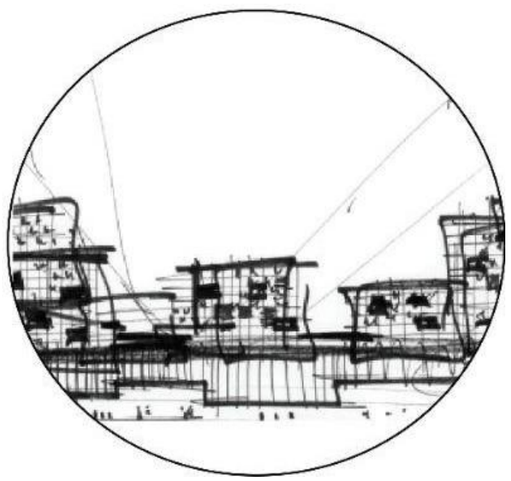
dassroo1ns arranged in towers per particular agebracket

Roof garden

PRIVATE

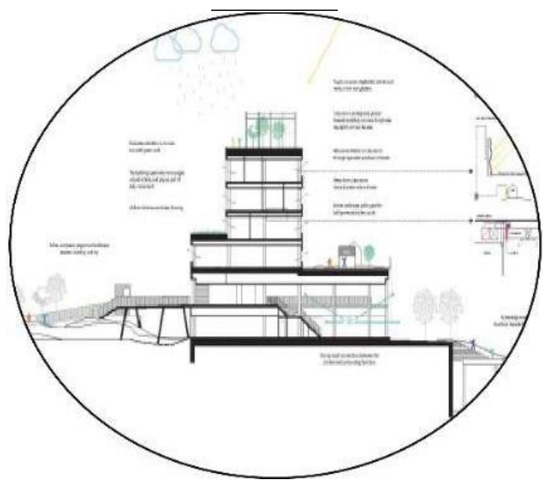
# SUSTAINABILITY

Striking fai;:ade of over 12,000 solar panels inte grated into the buildings cladding
The energy produced covers half of the school's energy needs
Angled to create a sequin effect
The solar cells also help students to monitor energy production and use data in physics and mathematics

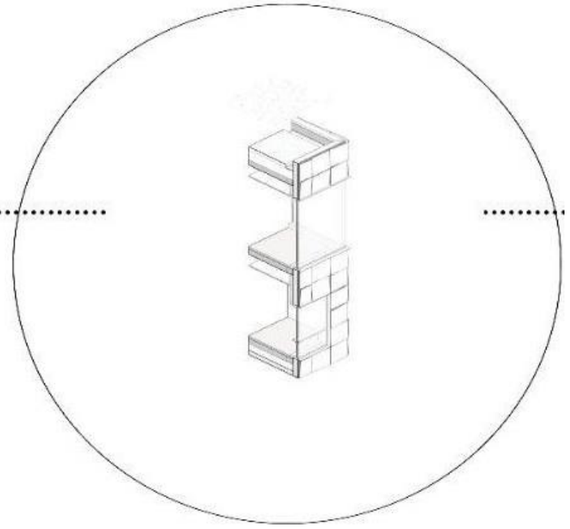


There are greenhouses on top of each tower from which students can use vegetables for their cook ing classes, and as far as biological waste from the kitchen is concerned, it is fed to a bio tank and reused to feed animals.

**Natural Ventilation**
The school was also designed according to the path of the maritime to maximize ventilation through natural means



**Sustainable Materials**
bamboo bookshelves
Oiled oakwood floors
Bricks
Green roofs



**Other sustainabilitypractices**
LED lights
rainwater harvesting
use of secondary water for toilet flushing.
There are sensors controlling all water fau cets and lights while CO2 and temperature levels are constantly monitored and adjust ed to save energy and optimize comfort.

https://images.adsttc.com/media/images/59af/7004/b22e/38b8/4 l00/00cb/slideshow/CIS_29_photo_by_Adam_Moerk.jpg?1504669684

# TECHNOLOGICAL APPLICATION IN EDUCATION

Interactive learning through screens harnesses the power of digital technology to create engaging and personalized edu cational experiences. This approach goes far beyond simply displaying static content; it leverages dynamic interfaces to involve learners directly. Through touchscreens, responsive web applications, and immersive software, students can ma nipulate virtual objects, participate in simulations, collabo rate on digital whiteboards, receive immediate feedback on quizzes and exercises, and engage with multimedia elements like videos and animations that respond to their input. This enables a more active exploration of concepts, caters to diverse learning styles, and provides opportunities for self paced progression, making abstract ideas more tangible and accessible, whether in a traditional classroom setting or in remote learning environments.

Faster internet connectivity is vital for modern learning, enabling seamless access to diverse on line educational resources, supporting engaging virtual classrooms without interruption, and fostering real-time collaboration among students and educators. It is fundamental for utiliziJ1g personalized learning tools and developing essential digital literacy, ultimately democratizing access to quality educa tion and preparing learners for a digitally driven future.

Tnterlearning, or peer-to-peer learning, among students and pupils is a profoundly impactful educational approach that harnesses the collective intelligence and diverse perspectives within a classroom or learning com munity. It moves beyond the traditional teacher-centric model, empowering learners to become active partici pants in each other's development.

This collaborative process offers numerous benefits. Students often find it easier to grasp complex concepts when explained by a peer who might break it down in a relatable way, having recently navigated the same learn ing curve. It also fosters a deeper understanding for the "teacher" student, as explaining a concept solidifies their own knowledge and exposes gaps in their understanding. Beyond academic gains, interlearning cultivates crucial social and emotional skills, including active listening, constructive feedback, empathy, problem-solving,and conflict resolution. It builds confidence in articulating ideas, encourages diverse viewpoints, and creates a more supportive and il1clusive learning environment where every voice is valued, ultimately preparing students for real-world collaboration and lifelong learning.

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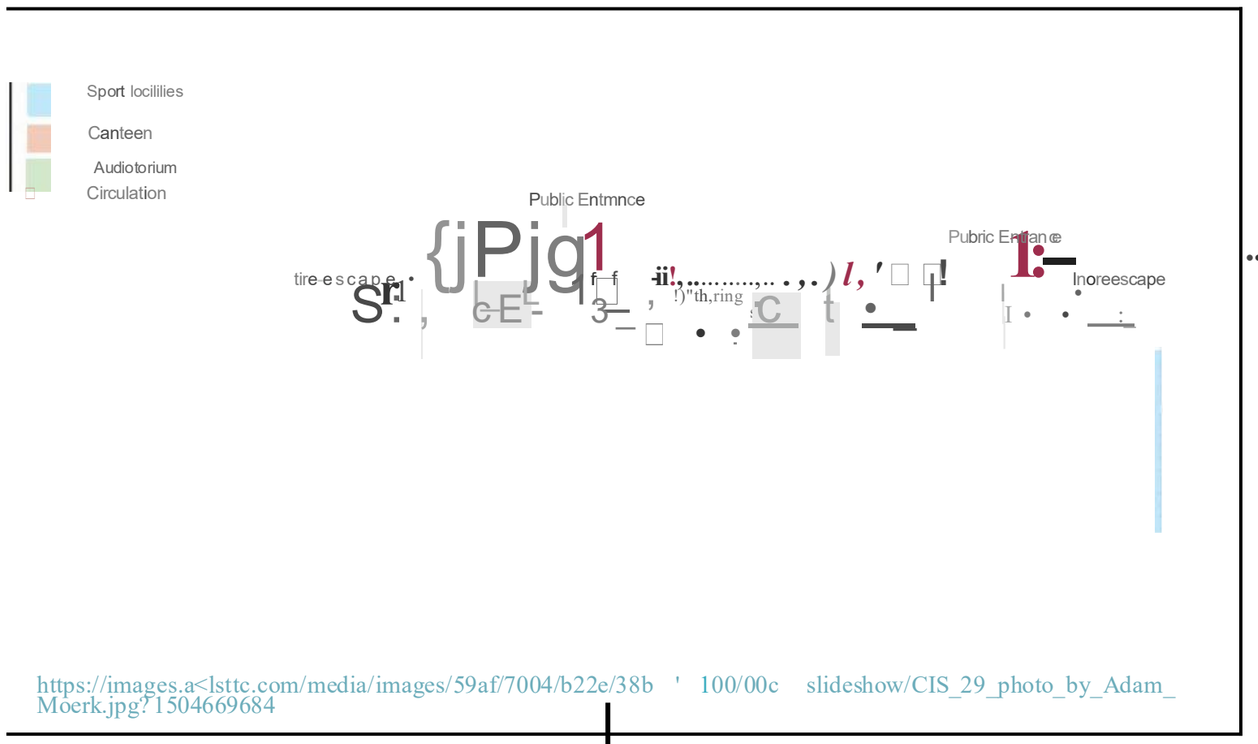
# SAFETY AND SECURITY

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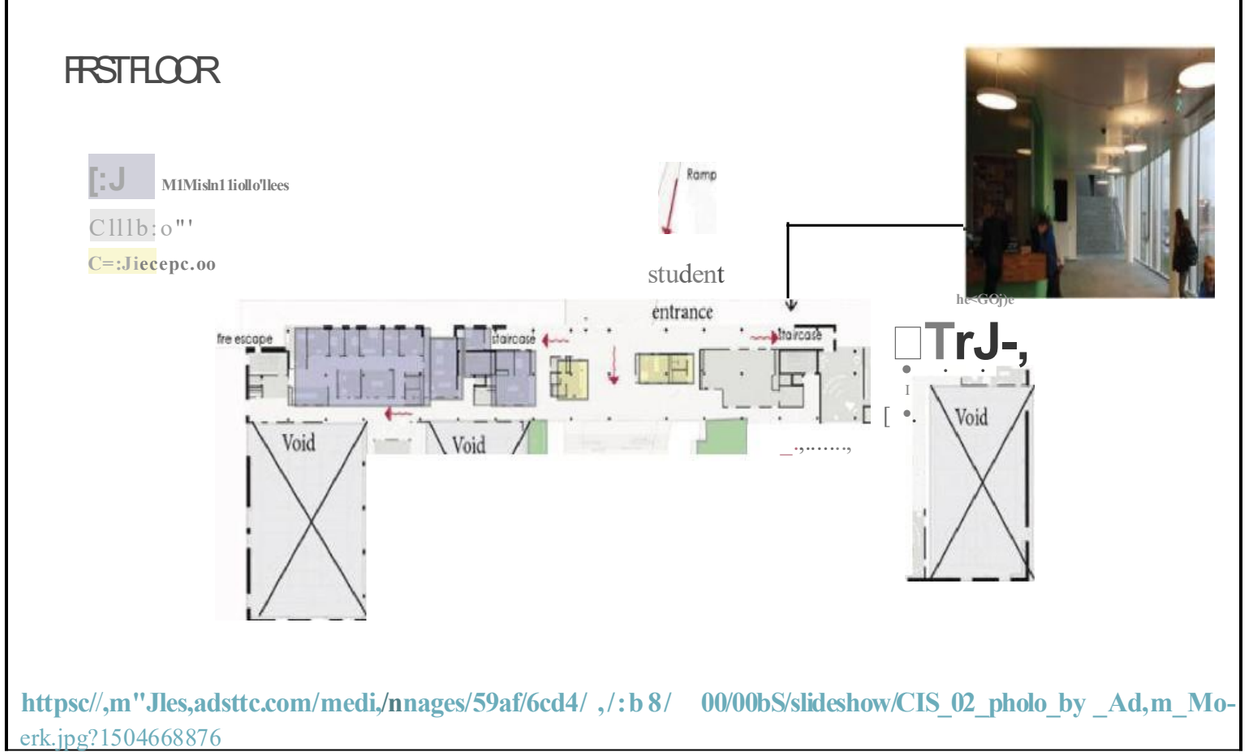


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## OPEN AND VISIBLE LAYOUT

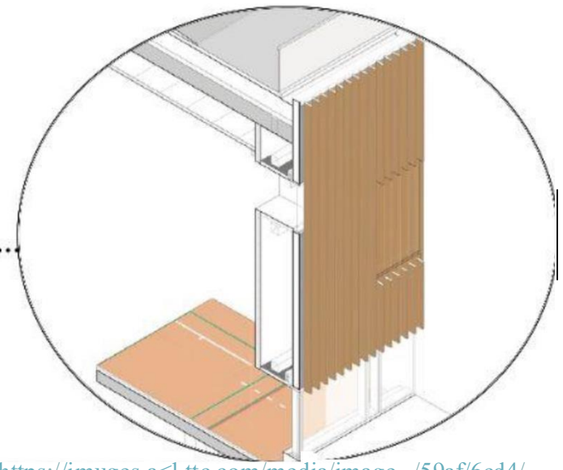
An open and visible layout in a learning environment prioritizes transparency and unobstructed sightlines through architectural design choices like minimal internal walls and extensive use of glass, creating bright, inviting, and connected spaces. This design philosophy serves a dual purpose: aesthetically, it fosters a sense of community and openness, while practically, it significantly enhances safety and supervision. By ensuring dear views across classrooms, common areas, and outdoor spaces, staff can ••• ••etrectiveiy llioiiit'cw□rutlefifactiv!fies;l:It'tltl<l'fidemrfy·ah'd••••••••• respond to emergencies, and proactively address safety concerns, ultimately contributing to a more secure, orderly, and engaging educational atmosphere.

A robust secure access control system is implemented to meticulously manage and restrict entry, utilizing keycard access for authorized personnel as the primary mecha nism to effectively prevent unauthorized individuals from gaining entry. This systematic approach ensures that only vetted and approved individuals can access designated ar eas, significantly enhancing the overall safety and security of the premises by mitigating risks associated with intrud ers and protecting occupants, valuable assets, and sensitive information.

Implementing secure access control is a critical security measure that systematically regulates entry into a facili ty, ensuring only authorized individuals can gain access. This is primarily achieved through keycard access, where unique electronic cards are issued to vetted personnel. By requiring a valid keycard for entry, the system effectively prevents unauthorized access to sensitive areas, thereby enhancing overall safety, protecting assets, and maintain ing a secure environment for all occupants.

The "FIRE EXIT CIRCULATION" in our facility (or CIS) is meticulously designed to prioritiz,e life safety, integrating a comprehensive sttite of fire protection measures. This includes the strategic use of fire-resistant materials in con struction, which are critical for containing fire and slowing its spread, thereby extending evacuation time. Complement ing these passive measures are active systems: integrated smoke detectors for early warning, fire alarms to ensure immediate occupant notification, and automated sprinkler systems to actively suppress flames. TIis multi-layered approach ensures clear and protected evacuation routes, allowing for rapid and safe exit during a fire emergency.

# TAKEAWAYS



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**Sustainability: Integrating renewable energy sourc es, like solar panels, and using green building mate ria|s to reduce environmental impact.**

This highlights a commitment to ecological respon sibility. "Renewable energy sources like solar panels" indicates a move towards energy independence and reduced reliance on fo sil fuel□."Green buil.ding materi als» refers to materials that are environmentally friendly in their production, use, and disposal (e.g., recycled content, low VOCs, locally sourced). The overarching goal is to minimize the building' carbon footprint and operational environmental impact.

**InnoYative Design: Emphasizing flexibility in space usage to accommodate various educational acti ities and future adaptability.**

This point focuses on foresight and responsiveness. "Fie. ibility in space usage" means spaces can be easily reconfigured r repurposed for different learning styles (e.g., individual study, small group collaboration, large lectures, practical labs) without significant structural changes. "Future adaptabilit( acknowledges that edu cational methodologies evolve, and the building should be able to upport the e changes without becoming obsolete. This often involves modular design, movable partitions, and easily accessible utilities.

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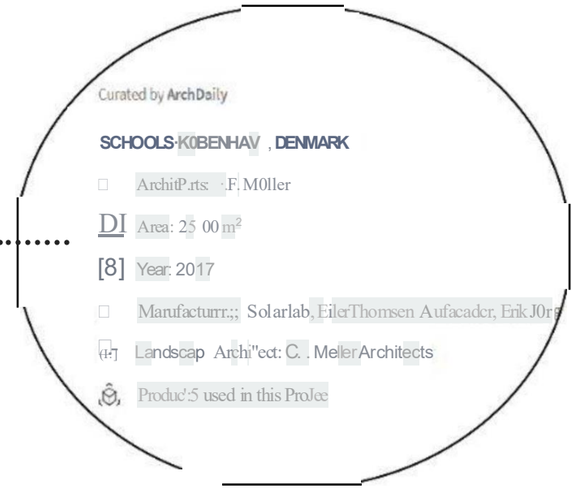
**Community Integration: Designing spaces that foster community interaction and engagement, benefiting both the school and the surrounding area.**

lhis speaks to the social role of the learning institution. " ostering community interaction and engagement" suggest that the building is not just for students and staff, but also serves as a hub for the wider community. This could involve shared facilities (e.g., auditoriums, sports facilities, libraries accessible to the public), public green paces, or de.ign elements that invite community memb rs in, creating a symbiotic relationship between the institution and its neighborhood.

**Aesthetic and Functional Balance: Combining vi sually appealing architecture with practical f□nc tionality to create an inspiring and effective learning environment.**

This emphasize a holistic approach to design. "Vi ually appealing architecture" recognizes that the environment itself influences mood, creativity, and well-being. It suggests attention to form, materials▸light and propor tion. "Practical functjonality" ensure, that the beautiful design doesn't compromise u ability, efficiency, or safi ty. The balance aims to create a space that is not only beau tiful to look at but also highly effective and comfortable for teaching and learning. "Inspiring and effective" suc cinctly captures the desired outcome of this balance.

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Technological ntegration: -n ming the building upporc ad anced educational technologies for enhanced learning experiences.

This addre'Se' the digital dimension of modern education. "Supports advanced educational technologies» means the infrastructure (e.g., robust network connectivity, ample power outlets, adaptable AV systems, interactive displays, smart classroom features) is built in from the ground up to accommodate current and future tech needs. This goes beyond just Wi-Fi; *it* ensures that irnmersive virtual reality, collaborative digital tools, specialized software, and other innovative learning aids can be seamlessly incorporated, enhancing the learning experience and preparing 'tudents for a technologically advanced world.

## REFERENCES


Pictures sourced from Archdaily articl s and wikipidia publications us reterences.

Additional information sourced from youlube videos. https://youtu.be/DaHwaOAKtzk?si=3HCDAOijBj7X-5.f2

Additional source of information from the Architec tura1 website.

hllps:/ /www.cfmoller.com/

Other photos were screenshots captured from google maps

# REFLECTIONS ON THE DIAMOND RANCH HIGH SCHOOL

The focus of discussion here is on a well analysed international, award-winning precedent of an architectural design project, and in its analysis that emphasises concepts and technical considerations.

**B.A.S YEAR IV CONTRIBUTING STUDENT RESEARCHERS AND DESIGNERS - 2024/2025**

Bernard Nguha
Wakarindi
Douglas Karani
Emmanuel Maina
Emmanuel Yego
Glen Gikundi
Karani Joseph
Oburu
Lucy Wachera
Wachira Nick
Marete
Shelmith
Kemunto
Sulayman
Kimutai

# CASE STUDY: DIAMOND RANCH HIGH SCHOOL

# INTRODUCTION

## Overview

- Project background
- Philosophy and design principles
- Site analysis and Responses
- Sustainability practice adopted
- Site and landscape integration
- Materiality
- Form and geometry
- Key takeaways

Sabis international school Runda, Waiimu, R (2024). Rethinking The Future. https://www.re-thinkingthefuture.com

# PROJECT BACKGROUND

•Architects: Morphosis

• Architects Location: California, USA

•Project Architect: John Enright

•Project Designer: Fabian Kremkus

•Team: Sarah Allan, Cameron Crockett, Cameron Crockett, Dave Grant, Dave Grant, Janice Shimizu, Patrick Tighe

•Design Year: 1994 – 1996Construction

•Year: 1997 – 1999

•Client: Pomona Unified School

•District Type: Educational

# PHILOSOPHY AND DESIGN PRINCIPLE

## Deconstructivism and Fluidity

*Design Concept*
*Adapted from ARCHKA Kamal Hbmsi Architects S.A.L*

Philosophy:

The school challenges traditional school architecture by using sharp angles, irregular forms, and non-linear layouts. It embraces the architectural philosophy of deconstructivism, which rejects the idea that structures should follow conventional, ordered forms.

Design Principle:

The irregular, fragmented design represents fluidity, symbolizing the ever-changing nature of education and learning environments. The structure itself encourages creativity and thinking outside the box.

## Integration with Environment

·Philosophy: The school is nestled into the rolling hills of Pomona, California, and the design takes advantage of the natural landscape. This shows an emphasis on blending architecture with the environment.

·Design Principle: Diamond Ranch High School demonstrates a deep respect for the terrain, with its buildings terraced into the hills, reducing its environmental footprint while maintaining an organic connection with nature.


*Sabis international school Runda, Waiimu, R (2024). Rethinking The Future.* https://www.re-thinkingthefuture.com

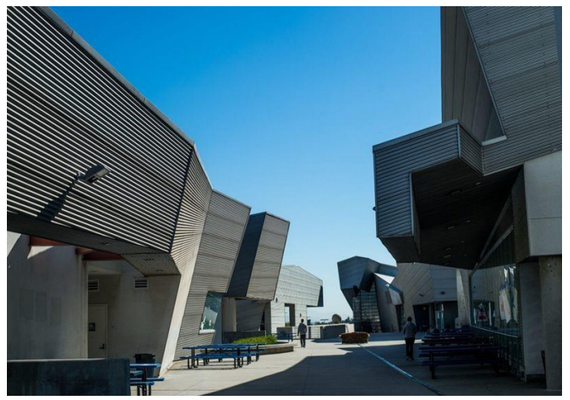


## Community and Interaction

·Philosophy: The design fosters a sense of community among students and faculty. By breaking up the conventional school block layout into separate, interconnected buildings, it encourages movement, interaction, and collaboration.

*Sabis international school Runda, Waiimu, R (2024). Rethinking The Future.* https://www.re-thinkingthefuture.com

Design Principle: Open plazas, gathering areas, and walkways promote socialization and the exchange of ideas, creating an environment conducive to learning through community engagement.



*Sabis international school Runda, Waiimu, R (2024). Rethinking The Future.* https://www.re-thinkingthefuture.com

·The pathways are wide to enhance student engagement and forceful interaction by making the students to use the path as the main and the only walkway from the parking to the classes.

*Sabis international school Runda, Waiimu, R (2024). Rethinking The Future.* https://www.re-thinkingthefuture.com

## Flexibility and Adaptability

·Philosophy: Diamond Ranch High School's design is meant to be flexible, adapting to the changing needs of its students and the evolving nature of education.

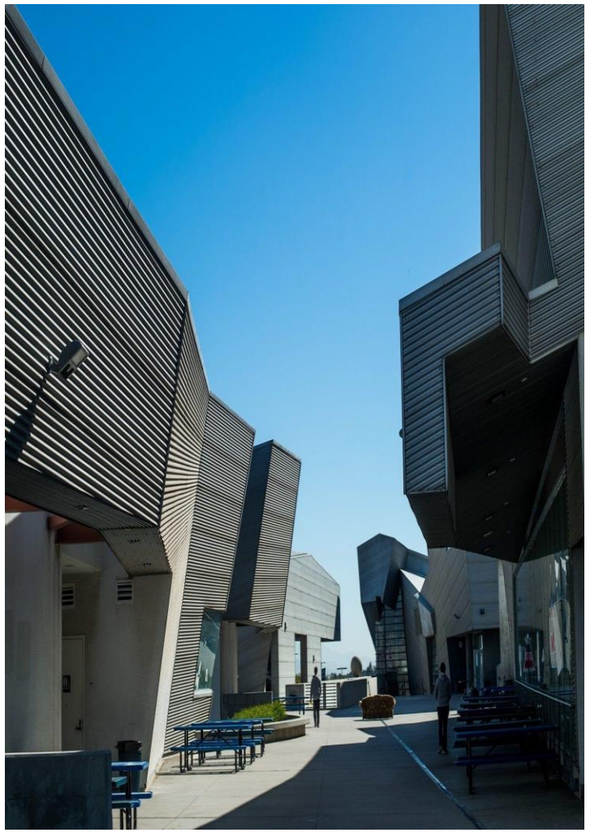
·Design Principle: The modular design allows for future expansion or reconfiguration without losing the architectural integrity. Spaces are designed to be multifunctional, enabling different teaching styles and group sizes.

*Design Concept Adapted from ARCHKA Kamal Hbmsi Architects SAL*

## Transparency and Openness

·Philosophy: The design uses transparency, with large windows and open spaces, to create an atmosphere of openness and accessibility. This promotes a psychological sense of openness and freedom for students.

·Design Principle: The use of glass and open structures allows natural light to penetrate the school buildings, reducing energy consumption and promoting a positive, uplifting learning environment.

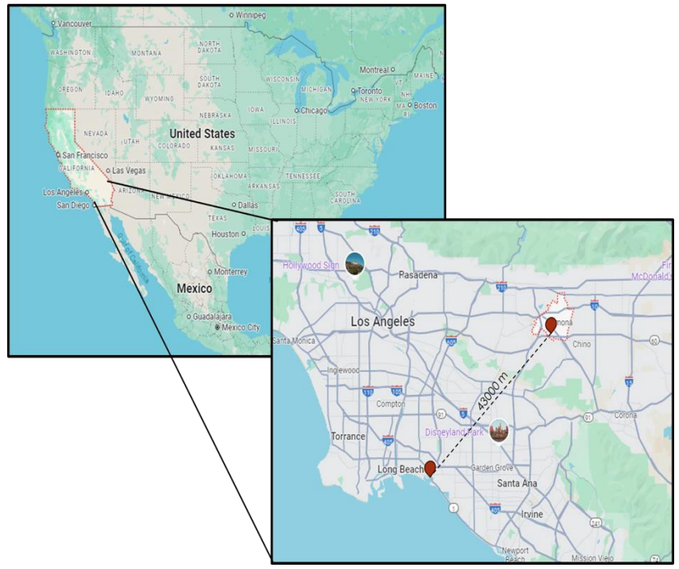


*Design Concept Adapted from ARCHKA Kamal Hbmsi Architects SAL*

# SITE ANALYSIS AND DESIGN RESPONSE

## Location

It's located in Carlfornia, Pomona, United states of America
Pomona is about 43000m from Long beach which neighbours the pacific



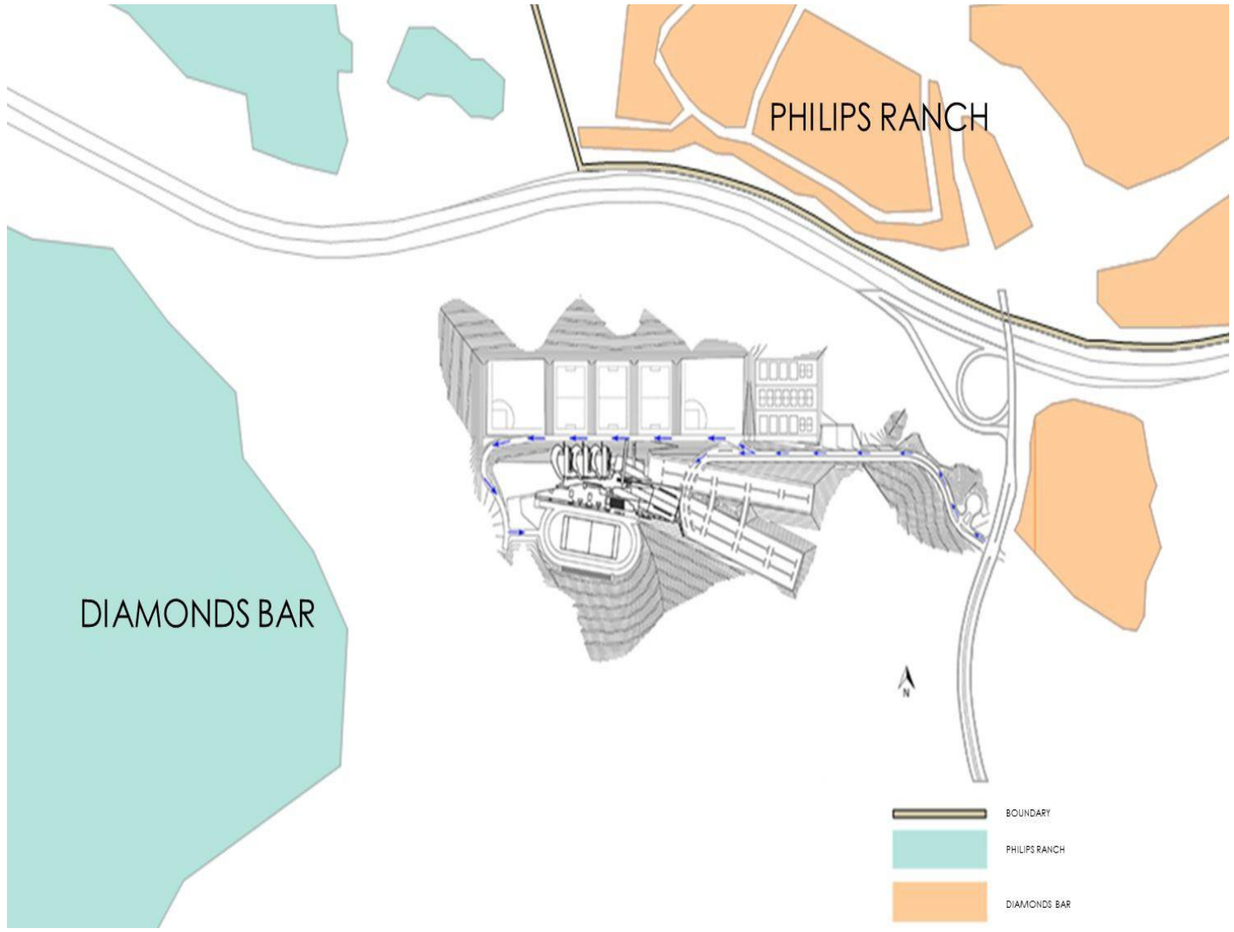

*Design Concept Adapted from ARCHKA Kamal Hbmsi Architects SAL*

## Neighborhood

Diamond ranch High School is a public school in Pomona unified district and serves students from Diamond bar and Philips ranch

Its serves grade 9-12

It's situated in a suburban area




*Design Concept Adapted from ARCHKA Kamal Hbmsi Architects SAL*

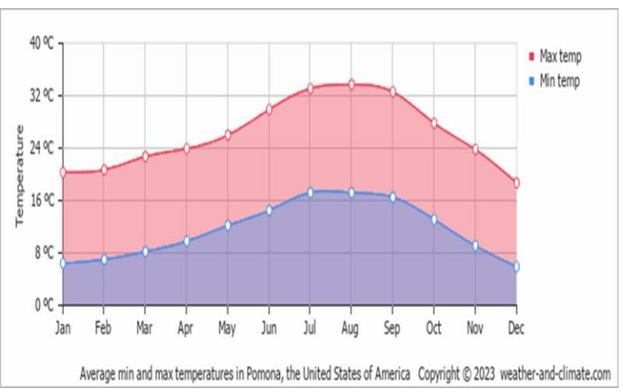
## Climate

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Nov | Oct | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Record high °C (°F) | 29.0 (84.2) | 30.0 (86.0) | 30.0 (86.0) | 33.0 (91.4) | 34.0 (93.2) | 38.0 (100.4) | 44.0 (111.2) | 39.0 (102.2) | 44.0 (111.2) | 38.0 (100.4) | 32.0 (89.6) | 27.0 (80.6) | 44.0 (111.2) |
| Average high °C (°F) | 19.95 (67.91) | 18.47 (65.25) | 18.88 (65.98) | 23.17 (73.71) | 24.19 (75.54) | 28.42 (83.16) | 32.53 (90.55) | 33.24 (91.83) | 31.83 (89.29) | 28.09 (82.56) | 23.19 (73.74) | 18.71 (65.68) | 25.06 (77.11) |
| Daily mean °C (°F) | 17.09 (62.76) | 15.78 (60.4) | 16.34 (61.41) | 20.19 (68.34) | 21.38 (70.48) | 25.29 (77.52) | 29.2 (84.56) | 29.87 (85.77) | 28.57 (83.43) | 24.83 (76.69) | 20.14 (68.25) | 16.09 (60.96) | 22.06 (71.71) |
| Average low °C (°F) | 12.8 (55.04) | 11.72 (53.1) | 11.78 (53.2) | 14.83 (58.69) | 16.32 (61.38) | 19.64 (67.35) | 23.56 (74.41) | 24.32 (75.78) | 23.59 (74.46) | 20.14 (68.25) | 15.54 (59.97) | 12.06 (53.71) | 17.19 (62.94) |
| Record low °C (°F) | 3.0 (37.4) | 6.0 (42.8) | 3.0 (37.4) | 2.0 (35.6) | 11.0 (51.8) | 14.0 (57.2) | 17.0 (62.6) | 14.0 (57.2) | 15.0 (59.0) | 11.0 (51.8) | 7.0 (44.6) | 4.0 (39.2) | 2.0 (35.6) |
| Average precipitation mm (inches) | 11.31 (0.45) | 17.49 (0.69) | 17.97 (0.71) | 11.78 (0.46) | 1.67 (0.07) | 0.17 (0.01) | 2.25 (0.09) | 0.64 (0.03) | 1.55 (0.06) | 1.34 (0.05) | 12.21 (0.48) | 20.92 (0.82) | 8.28 (0.33) |
| Average precipitation days (≥ 1.0 mm) | 1.09 | 1.0 | 2.45 | 0.73 | 0.55 | 0.0 | 0.64 | 0.27 | 0.27 | 0.27 | 0.91 | 1.27 | 0.79 |
| Average relative humidity (%) | 39.82 | 39.2 | 50.06 | 47.21 | 49.85 | 47.04 | 41.46 | 40.51 | 39.26 | 36.03 | 35.57 | 38.99 | 42.08 |
| Mean monthly sunshine hours | 9.63 | 10.54 | 10.41 | 10.91 | 13.62 | 14.26 | 14.14 | 11.45 | 11.54 | 11.18 | 8.29 | 8.09 | 11.17 |

•California experiences a mediterranean like climate with warm dry summers and mild, wet winters

•Pomona experiences summers from June to August with a daily average of 28.2 degree celsius

•Winters are from December to February with a daily average of 16.32 degrees celsius

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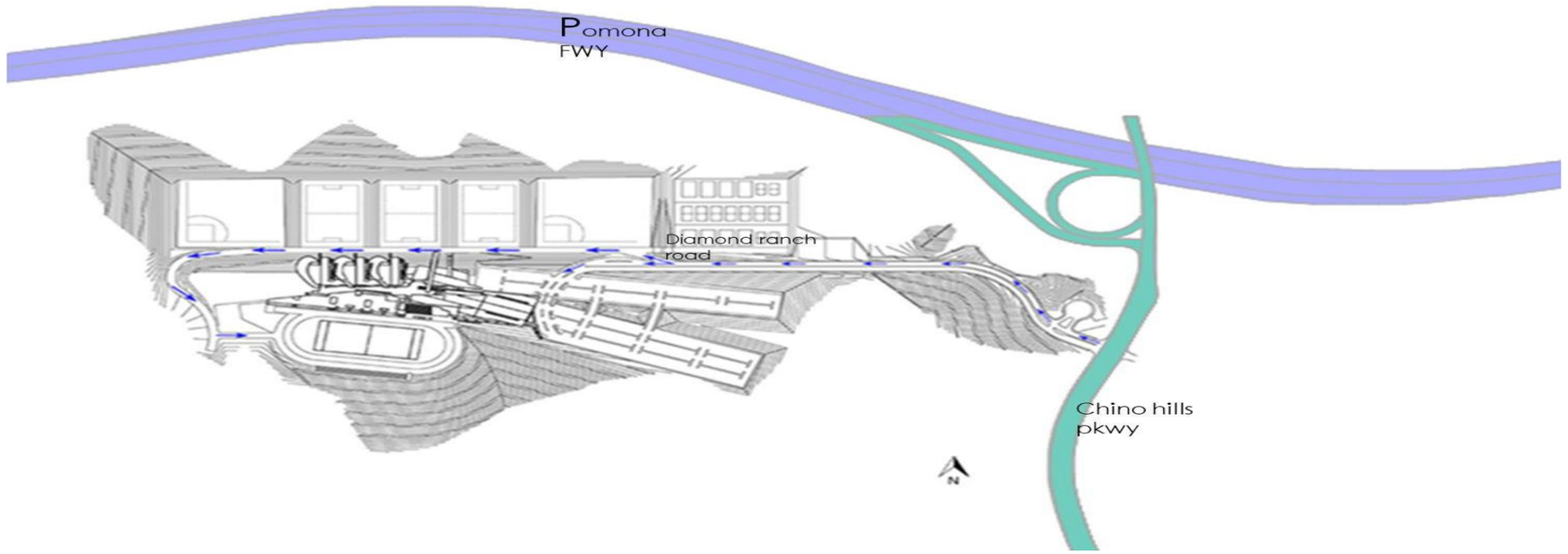


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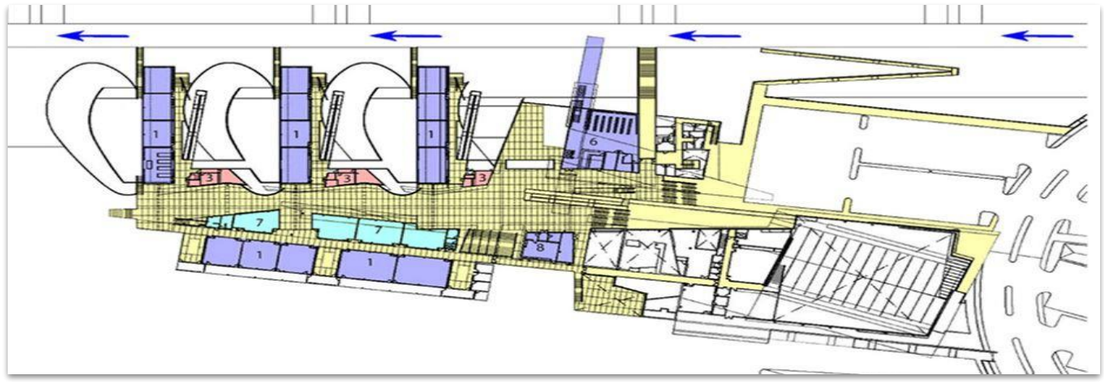
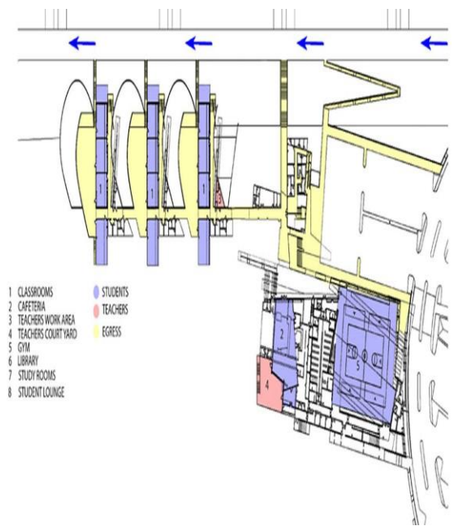


## Access

From the Pomona freeway branches the Chino hills parkway from which the Diamond ranch road feed into

The main access into Diamond ranch is through Diamond Ranch road which runs from the parking area across the playing fields to the baseball field on the other side

The campus is organised around open, outdoor pathways and terraces that weave through the various buildings

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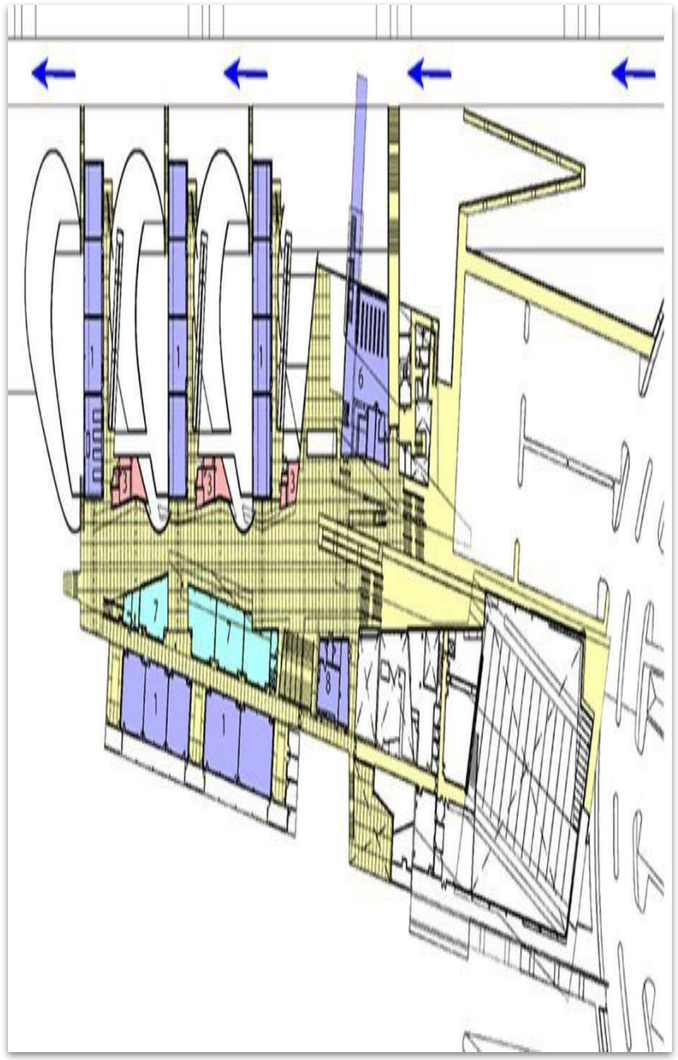
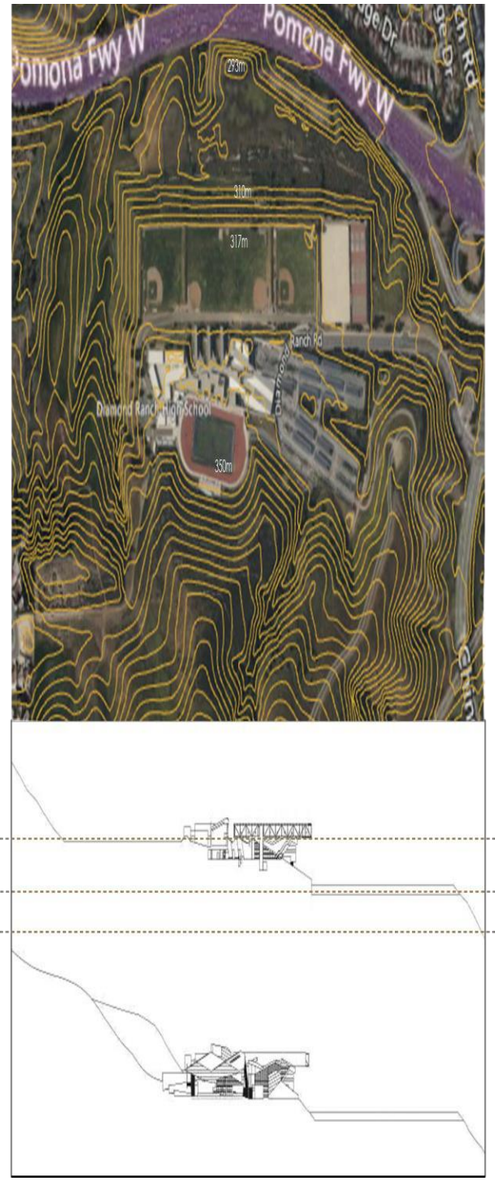


# SUSTAINABLE PRACTICES ADOPTED

Topography

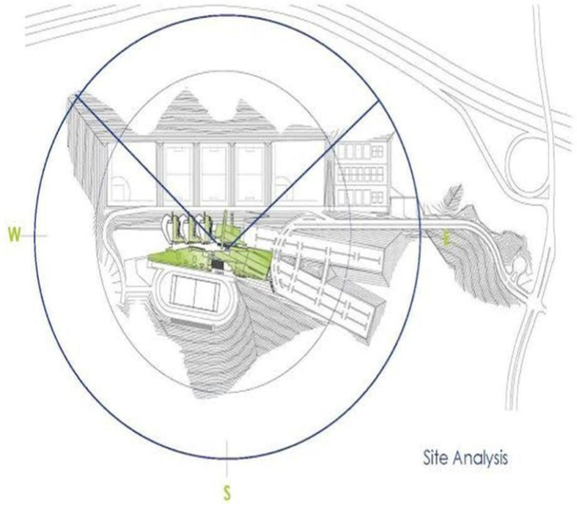
Diamond Ranch High School is situated on a steep, 72-acre hillside site

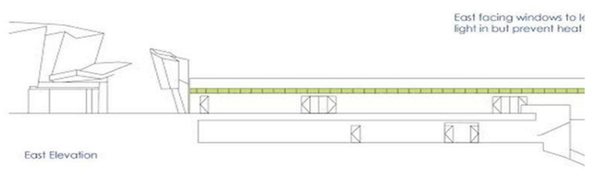
The site slope varies from 1:1 to 5:1 with a total relief across the site of 116m

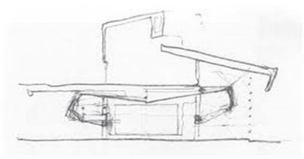



1. **Orientation and climate response**

Orientation & Climate Response: The design leverages natural light and airflow, reducing the need for artificial lighting and air conditioning.
The building is strategically placed to utilize natural light and ventilation. Classrooms are designed with north-south orientations, minimizing heat gain while optimizing daylight.



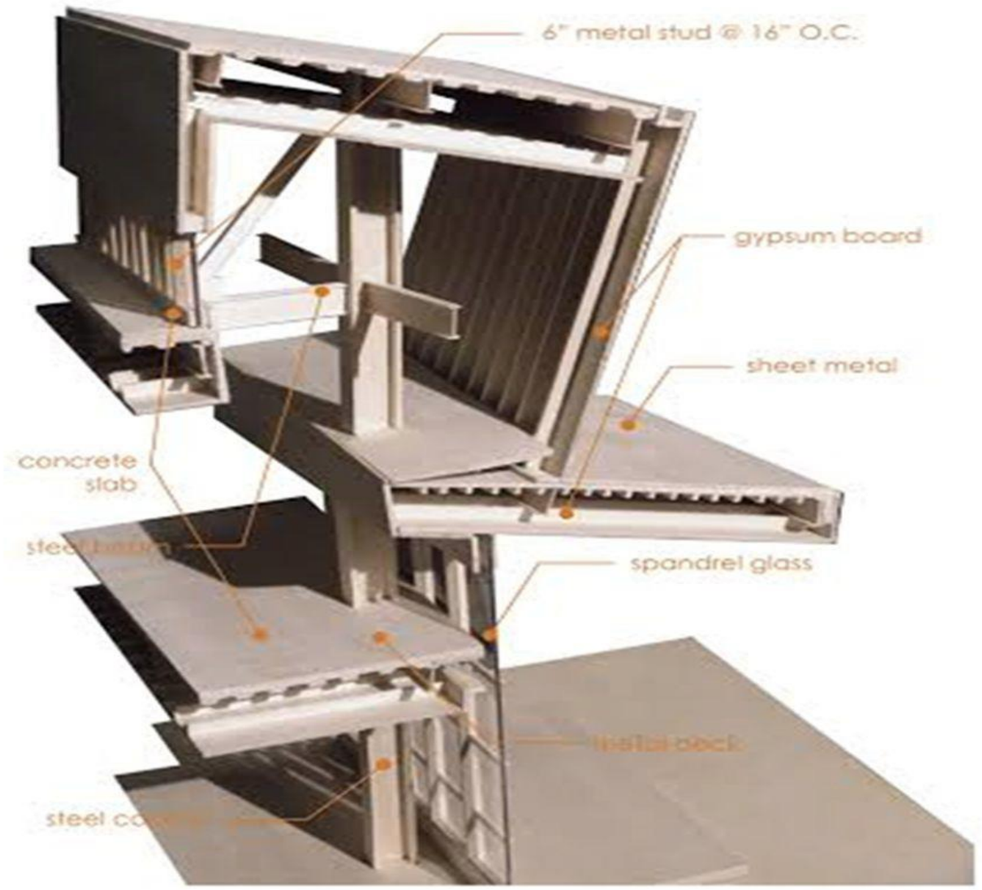



Dayligt
Integra

2. **Energy efficiency**

Low-Energy Materials: Materials with low embodied energy, such as recycled steel and concrete, were used in the construction to lower overall energy consumption. Concrete is particularly effective at absorbing heat during the day and slowly releasing it at night, helping to regulate indoor temperatures naturally

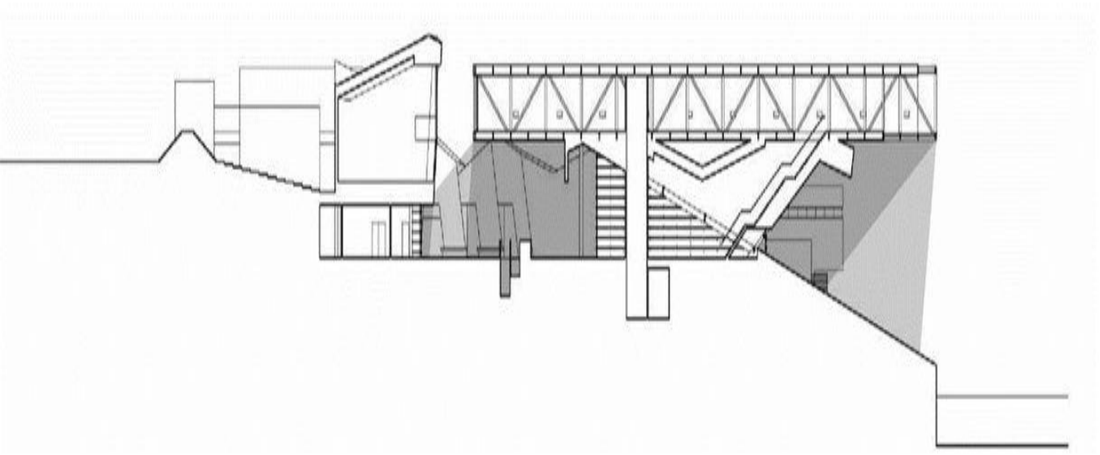


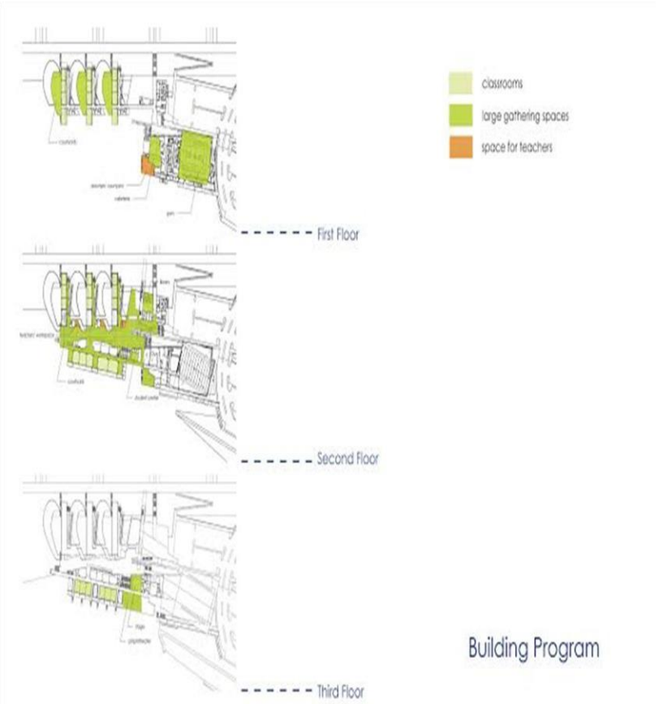

*Design Concepts Adapted from ARCHKA Kamal Hornsi Architects SAL*



*Design Concepts Adapted from ARCHKA Kamal Hornsi Architects SAL*

3. **Space utilisation**






*Design Concept Adapted from ARCHKA Kamal Hamsi Architects SAL*

# KEY ARCHITECTURAL DESIGN ELEMENTS

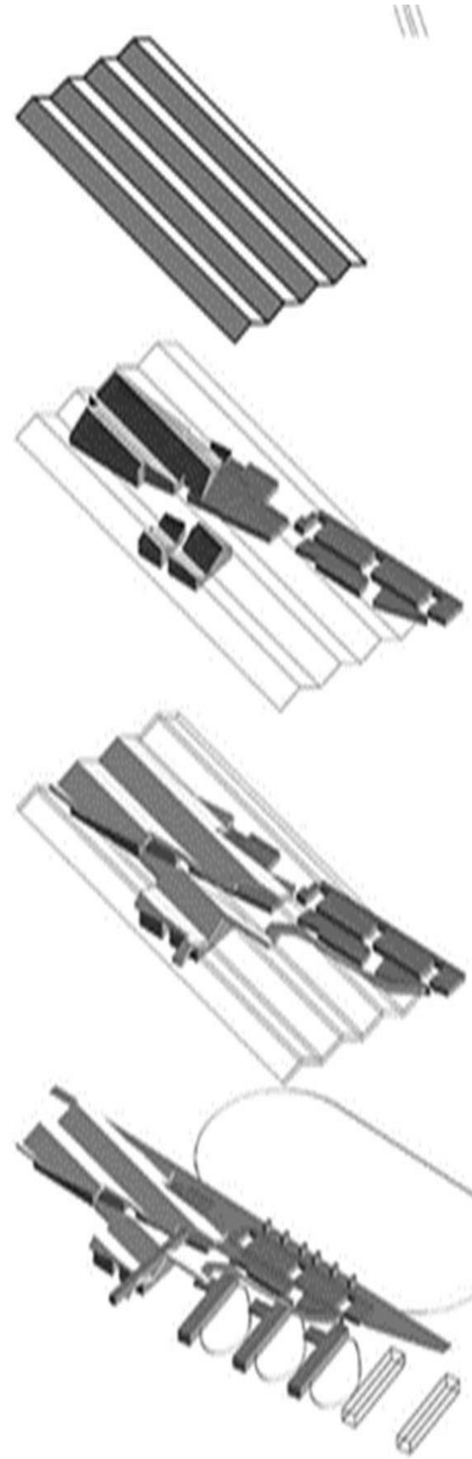
1. **Site and Landscape Integration**

Diamond Ranch High School is situated on a steep, 72-acre hillside site, presenting the first major design challenge. Instead of flattening the landscape, the design embraces the natural terrain.

The buildings are strategically arranged along the hill, following the topography, which results in a terraced campus layout. This approach minimizes disruption to the environment and enhances the school's connection to the surrounding landscape.

The undulating and sloped terrain creates a dynamic interaction between the buildings and the open spaces, allowing the landscape to become part of the architecture

The buildings follow the natural topography of the hillside, creating a hybrid landscape that minimizes the environmental impact by blending the structures with the surrounding area. This terracing approach reduces the need for extensive earthworks and preserves the natural drainage patterns of the site, helping to prevent erosion. Outdoor teaching spaces are integrated between classroom units, providing natural views and an eco-friendly learning environment.



*Design Concepts Adapted from ARCHKA Kamal Hamsi Architects SAL*

## 2. Form and geometry

The school's design is characterized by sharp, angular forms, with many of the buildings featuring sloped roofs and asymmetrical lines. This abstract geometry gives the campus an almost futuristic or industrial feel, setting it apart from traditional school designs.

Angular Steel Panels:

Large steel plates and panels are used extensively throughout the exterior, giving the buildings a sleek, metallic sheen. The panels, often at sloping angles, enhance the modern aesthetic.

Cantilevered Structures:

Many of the buildings, especially the classroom blocks, are cantilevered over walkways or open spaces. This creates dramatic visual effects and practical shading for the outdoor areas below.

*Design Concepts Adapted from ARCHKA Kamal Hamsi Architects SAL*

*Design Concepts Adapted from ARCHKA Kamal Hamsi Architects SAL*

## 3. Site and Landscape Integration

The materials were selected not only for their modern aesthetic but also for their durability and sustainability, crucial for an educational environment.

Concrete: Exposed concrete walls provide a sense of solidity and permanence. The concrete surfaces are left raw, emphasizing texture and creating contrasts with the smoother steel and glass elements.

Steel: Steel beams and panels are prominent, contributing to the industrial, high-tech feel of the design. The steel elements are painted in dark, muted tones that contrast with the lighter concrete surfaces.

Glass: Glass is used strategically in areas like the administration building and common areas to allow natural light to penetrate deep into the interiors, enhancing the connection between inside and outside.

*Design Concepts Adapted from ARCHKA Kamal Hamsi Architects SAL*

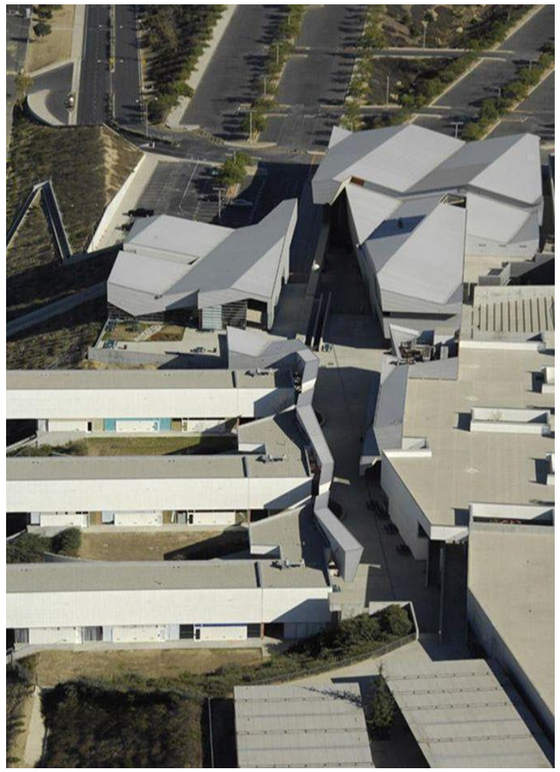
## 4. Environmental considerations

Diamond Ranch High School is also notable for its environmental considerations. The design utilizes passive solar principles, with buildings positioned to maximize natural light and ventilation. The angular forms and cantilevered structures create natural shading, reducing the heat load on the buildings and minimizing energy use.

- Ventilation: Natural ventilation systems are integrated throughout the design, allowing for cooling breezes to flow through the campus and reducing the reliance on air conditioning



*Design Concepts Adapted from ARCHKA Kamal Homsi Architects SAL*



*Design Concepts Adapted from ARCHKA Kamal Homsi Architects SAL*

## 5. Colour and light

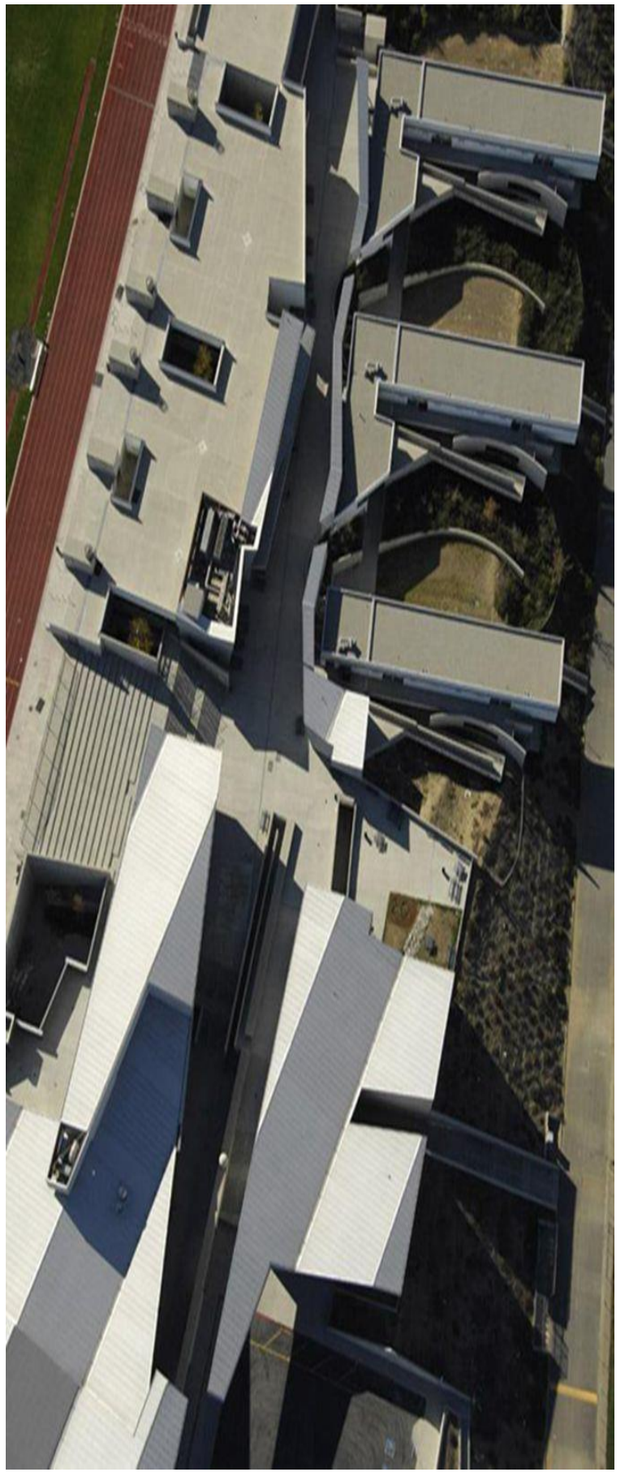
While much of the material palette is industrial and monochromatic, Mayne incorporates bold color accents to energize the space. These colors, often bright reds, yellows, and blues, are used sparingly but effectively, highlighting entry points, staircases, or specific building elements.The strategic use of glass allows natural light to flood into interior spaces, reducing the need for artificial lighting

## 6. Site and Landscape Integration

Rather than long, monotonous corridors, the campus is organised around open, outdoor pathways and terraces that weave through the various buildings.

Given the sloping terrain, bridges and elevated walkways are a key feature, linking different parts of the campus. These walkways provide dramatic views of the surrounding hills and offer a sense of movement through the school.

The buildings are punctuated by open courtyards and terraces that serve as informal gathering spaces. These courtyards are framed by the angular forms of the buildings, creating a dynamic interplay between indoor and outdoor spaces



*Design Concepts Adapted from ARCHKA Kamal Homsi Architects SAL*

# KEY TAKEAWAYS

1. **Innovative Use of Site**

The school uses its challenging hillside location to create terraced buildings that follow the natural contours of the land.

What We Can Do:

Site Analysis: Thoroughly analyze your site's topography. If it's sloped or uneven, consider how you can use the natural landscape instead of reshaping it.

Terraced Structures: If your site has elevation changes, design buildings that are stepped or terraced, creating layers that blend into the environment. This can reduce construction costs and minimize environmental impact.

Natural Flow: Ensure the design facilitates natural movement of people by creating pathways that follow the terrain, minimizing the need for stairs or ramps.

1. **Community and Context**

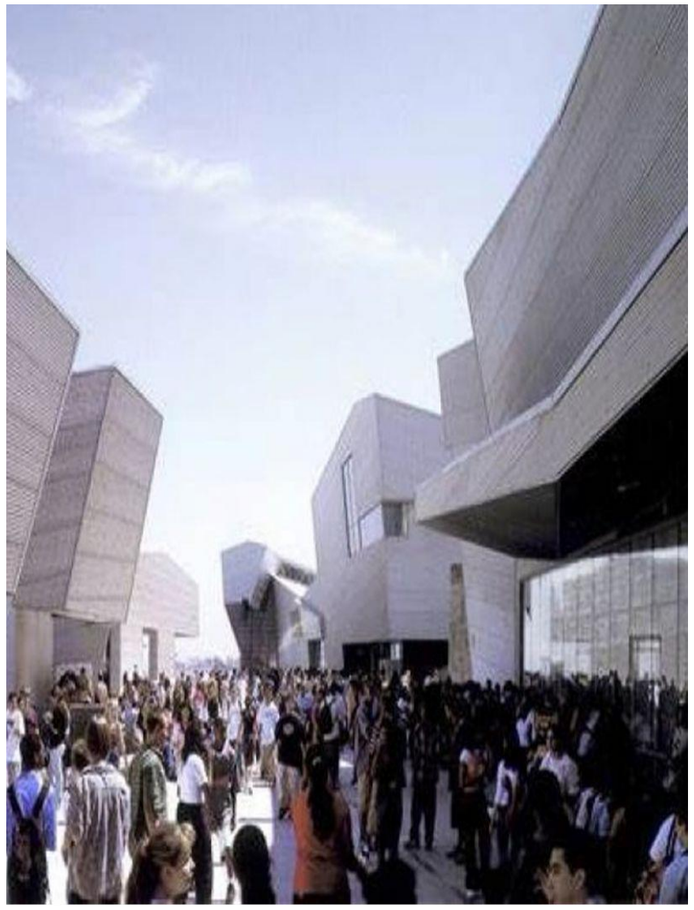
The school reflects its local environment by integrating its buildings with the natural hills, making it a recognizable landmark.

What You Can Do:

Understand the Local Context: Research your design site's geographical, social, and cultural context. Use local materials, colors, and design elements that reflect the identity of the community.

Landmark Building: Create a focal point or a signature structure that gives your school an iconic look, enhancing its identity within the community.

Open Campus: If your school is in an urban or suburban area, consider creating public spaces like parks, plazas, or courtyards that the surrounding community can use. This creates a connection between the school and the neighborhood.



*Design Concept Adapted from ARCHKA Kamal Hamsi Architects SAL*

1. **Sustainability through Design**

The design works with the natural environment by incorporating open spaces and natural ventilation to reduce energy usage.

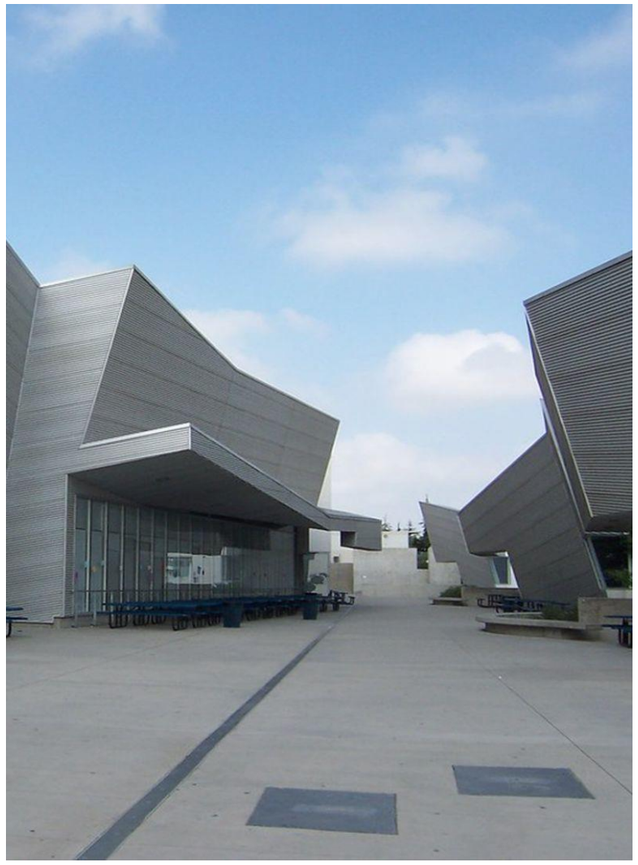
What We Can Do: Passive Design: Focus on natural ventilation and daylighting strategies. Incorporate large windows, open courtyards, and atriums that bring in light and fresh air to reduce the need for artificial lighting and air conditioning.

1. **Use of Materials and Aesthetics**

The school uses raw, industrial materials like concrete and steel, combined with bold colors, to create a modern and futuristic aesthetic.

What We Can Do:

Material Palette: Select materials that complement your site's natural surroundings while providing durability and low maintenance. Use concrete, steel, glass, or wood in innovative ways to create a modern aesthetic.



*Design Concept Adapted from ARCHKA Kamal Hamsi Architects SAL*

# KEY TAKEAWAYS

1. **Engagement with Surroundings**

The campus is designed to interact with the surrounding neighborhood, becoming a communal landmark and shared space.
What We Can Do:

Inclusive Spaces: Design spaces within the campus that are open for public use during non-school hours, such as an auditorium, sports facilities, or green spaces. This creates a deeper connection between the school and the community.

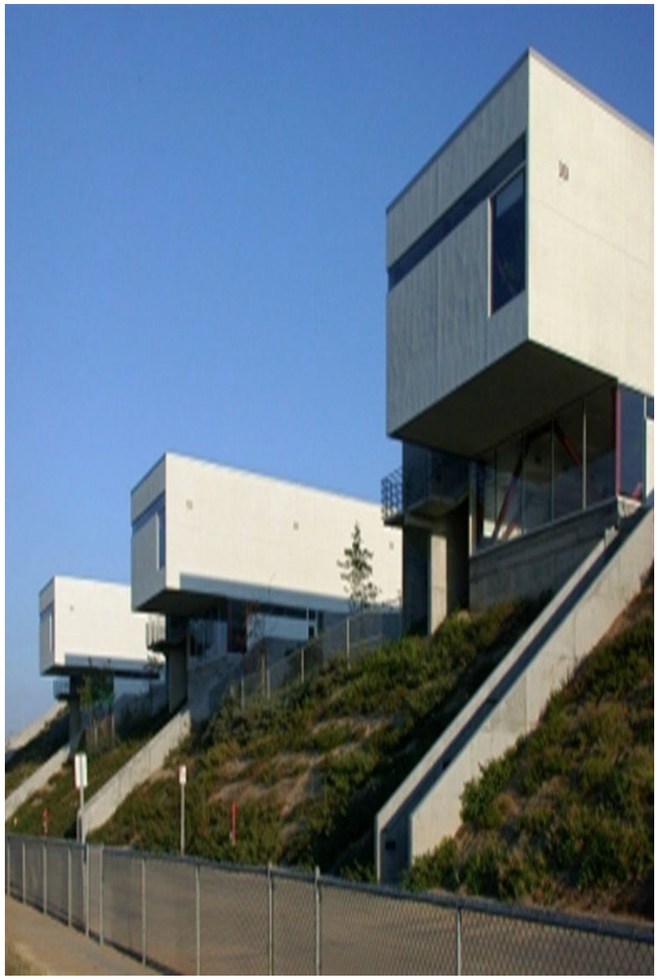
Visual Transparency: Use glass walls or large windows to create a sense of openness, making the school feel less isolated and more welcoming to the community. This can also enhance security through passive surveillance

Public Art and Culture: Include public art installations or cultural references that resonate with the local community, making the school an educational and cultural hub

1. **Form and Function**

The school uses bold, sculptural forms that are aesthetically interesting and also functional, creating diverse spaces for learning and interaction

What We Can Do;
Dynamic Architecture: Avoid traditional, rigid rectangular structures. Experiment with angular, organic, or asymmetrical forms that can create dynamic, flexible spaces inside and outside the buildings.



*Design Concept Adapted from ARCHKA Kamal Homsi Architects SAL*

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**Dr. Rehab Hamdi Elnaggar (PHD), EEE-EES**

Rehab Hamdi Elnaggar is a lecturer, architect and urban designer with 25 years of academic and professional experience. She has been a lecturer at Kenyatta University since 2021. Dr. Elnaggar began her academic journey by earning a Bachelor's degree (BSc Hons) in Architecture and Urban Design from Ain Shams University in 1997. She furthered her education by obtaining a Master's degree (MSc) from the same institution in 2007 and a PhD from Cairo University in 2015. Dr. Elnaggar's teaching career spans nearly two and a half decades, including her tenure at Arab Academy for Science, Technology and Maritime Transportation (AASTMT) from 2000 to 2019 and at AI Shorouk Academy from 2016 to 2019. Throughout these years, she has demonstrated an unwavering commitment to education and the advancement of architectural knowledge. In parallel with her academic endeavours, Dr. Elnaggar has developed a robust professional practice. Since her graduation, she has designed and supervised the implementation of numerous significant and specialized projects, ranging from hospitals and residential towers to resorts, schools, private residences, showrooms and a variety of interior design projects. Her dual career as an educator and practicing architect highlights her dedication to both the academic and practical dimensions of architecture and urban design.

**Prof. Arch. Paul Mwangi Maringa (PHD), CBS, FAAK, MKIP**

He is an Adjunct Professor of Architecture and Planning at JKUAT, KU and UoN, with 36 years of academic and professional experience. He has taught various courses, published widely, and served as editor for academic journals, and research books. Maringa has also worked as a consulting architect/planner for government and private firms. He is a registered architect and member of several professional bodies. Additionally, he has held senior expatriate roles in Kigali, Rwanda, serving as Ag., Deputy Vice Chancellor AA in KIST; technical expert & master trainer, associate project team leader (SCE) & Senior Expert project management and planning in WDA. He was a long serving State Officer - Principal Secretary in Kenya's Ministry of Transport, Infrastructure, Housing, Urban Development, and Public Works, in three of its five state departments. He has considerable expertise in sustainability, urban growth management, and TVET planning.

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*ResearchGate:* *https://www.researchgate.net/profile/Paul-Maringa-2/publications*

*Academica.Edu:* *https://jkuat.academia.edu/PaulMwangiMaringa*

*Amazon:* *https://www.amazon.com/Books-Prof-Paul-Mwangi-Maringa/s?rh=n%3A283155%2Cp_27%3AProf%2BPaul%2BMwangi%2BMaringa*

**Arch. Robinson Manguro**

Robinson Manguro is a registered Architect with 19 years of practical experience in architectural design, supervision and project management within the East African region (Kenya, Uganda, Rwanda, DR Congo and Tanzania). He is a PMP Certified Project Manager with 10 years' experience at senior management level and has participated in International Conferences, Trainings and Workshops. He holds a masters in Architecture for Health from Sapienza University of Rome, a master of Arts in Project Planning and Management as well as a bachelor of Architecture from the University of Nairobi. He has a passion in healthy designs and affordable housing.He also has keen interest in education and is currently engaged as an adjunct lecturer at Kenyatta University department of Architecture. He has a passion for mentoring young people and has lectured at Kirinyaga University, the Technical University of Kenya and Maseno University.

**Landscape Arch. Regina Wango Kasau**

A Landscape Architect and Lecturer at Kenyatta University, Department of Architecture & Interior Design, specializing in Environmental Design. With a robust academic foundation, that includes a Master's degree in Architecture (Environmental Design option) and a Bachelor's degree in Landscape Architecture, Regina conveys a profound understanding of how built and natural environment intersect to effect ecological and human wellbeing.Her works emphasize the incorporation of sustainable principles into landscape and architectural design, specifically regarding how spaces can support emotional well-being.Among her published works include:

1).Inmates' perception of environmental factors affecting psychological well-being: a case of Kamiti maximum security prison in Nairobi, Kenya. *Journal of African Interdisciplinary Studies*, 8(10), 121-140.

2). The built environment of Kamiti maximum security prison, Nairobi: implications for rehabilitation and psychological well-being. *East African Journal of Interdisciplinary Studies,* 8(1), 176-191. https://doi.org/10.37284/eajis.8.1.2865.

3). Thermal comfort in urban open spaces in the tropics: a case of Nairobi County, Kenya. *Innovare Academic Sciences.*

Thesis supervised:

Inclusive design on gender diversity in sports grounds: a case of Stima Sports Club, Nairobi, Kenya.

Biophilic design enhancing recovery of drug addicts in rehabilitation centres in Murang'a County.

Architecture on human-wildlife coexistence in safari lodges: a case of Nanyuki, Kirinyaga County, Kenya.

# DAID FORUM FOR RESEARCH AND DESIGN SOLUTIONS

## Design of School Complexes

## Chapter One: Case Studies

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