DAID FORUM FOR RESEARCH AND DESIGN SOLUTIONS

2024/25,

VOL I, STUDIO IV,

Design of School Complexes

Chapter Two: Site Analysis

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

2024/25,
VOL I, STUDIO IV,
Design of School Complexes

Chapter Two: Site Analysis

DEPARTMENT OF ARCHITECTURE AND INTERIOR DESIGN (DAID)

SCHOOL OF ENGINEERING AND ARCHITECTURE (SEA)

KENYATTA UNIVERSITY (KU)

DAID FORUM FOR RESEARCH AND DESIGN SOLUTIONS

2024/2025,

Volume I, Studio IV,

Design of School Complexes

DAID FORUM FOR RESEARCH AND DESIGN SOLUTIONS

2024/205,

Volume I, Studio IV,

Design of School Complexes

Chapter Two: Site Analysis

Editor-in-Chief:

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

Department of Architecture and Interior Design (DAID),

School of Engineering and Architecture (SEA), Kenyatta University (KU),

Nairobi, Kenya.

COPYRIGHT

Webpage: https://engineering-architecture.ku.ac.ke/departments/architecture-and-interior-design Email: hod@daid.ku.ac.ke
ISBN No: 978-9966-54-106-2
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).

TABLE OF CONTENTS

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 TWO :

SITE ANALYSIS

TOPICAL CUES ON SITE ANALYSIS

In order to maintain accuracy of the originally intended meanings and retain authenticity, materials obtained from online sources and published references are kept in their original text and acknowledged accordingly

An introductory lecture by Dr. Arch Rehab Hamdi Elnaggar (PHD) EES, Year master, B.Arch IV, Department of Architecture and Interior Design (DAID)

TOPICAL CUE

An introductory lecture by: Dr. Arch. Rehab Elnaggar, Lecturer

Site Analysis

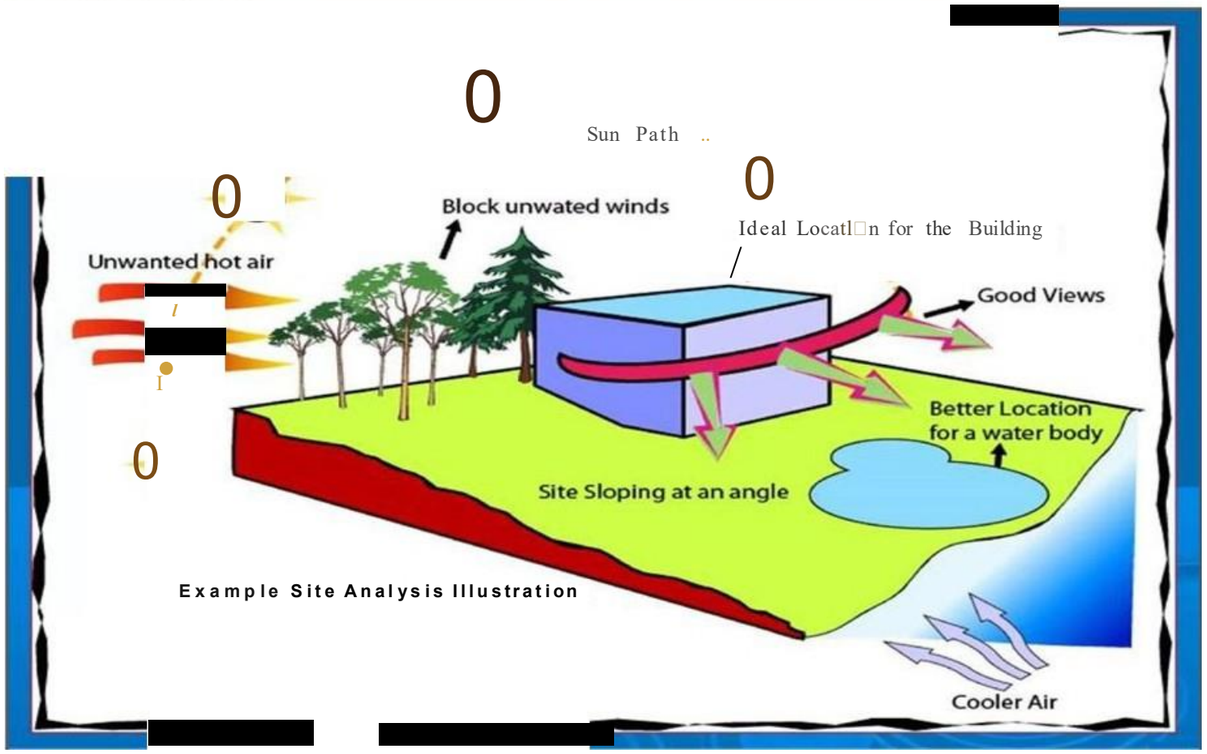


Image source: (Sabeer Hamid, 2018)

Goals of Site Analysis

- ToAchieve a successful design Site analysis is a must & should be done carefully.
- Site analysis involves taking inventory of site elements and analyzing these factors relative to theclients needs & aim.
- Gathering relevant information about thesite.
- Analyze these Features and incorporate them into the design

A. Natural features

1. Climate

A. North Direction
B. Precipitation
C. Wind Direction
D. Solar Intensity
E. Precipitation
F. Average/ Highest/ Lowest Temperature

2. Topography

3. Vegetation

A. Type, Size, location,
B. Shade pattern,
C. Aesthetics , Ecology.....

R Accessibility

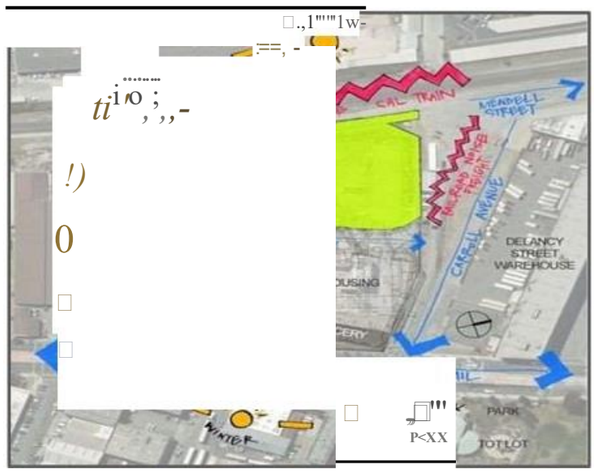


Image source: (Sabeer Hamid, 2018)

C. Sile Sut[OUPdiug

District Character
LandMarks
Building heights

D. Surrouudinr Activities

Architectural Style
Attraction Buildings /point
Nodes

Site Surrounding Context

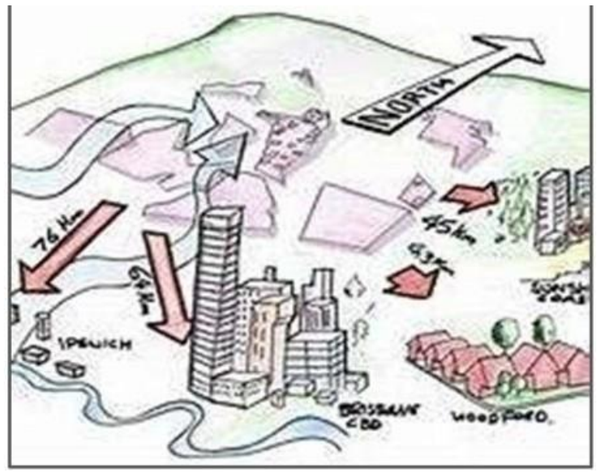


Image source: (Sabeer Hamid, 2018)

E. **JJ!ilities**

Sanitary
Water Supply
Electrical
Gas

F, **Site Beru Jation**

Setback
Height

Am!

Analysis
Discussions
Decisions

AW

- ToAttract and compete in the Global market.
- This require a good, updated, Contemporary, well equipped Design.
- Tomatch and meet all expectation.
- To host and welcome all users from different cultures and backgrounds within the Kenyan Identity
-

Your Building is a message to the Future...

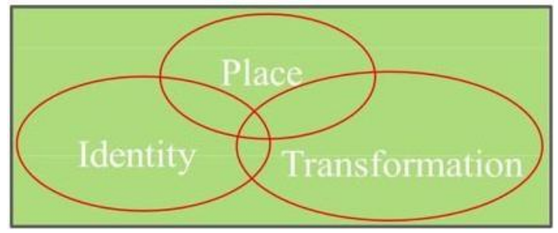


Image source: (Sabeer Hamid, 2018)

Main Asoects of Design

- Social
- Cultural
- Technological
- Environmental
- Psychological
- Technical

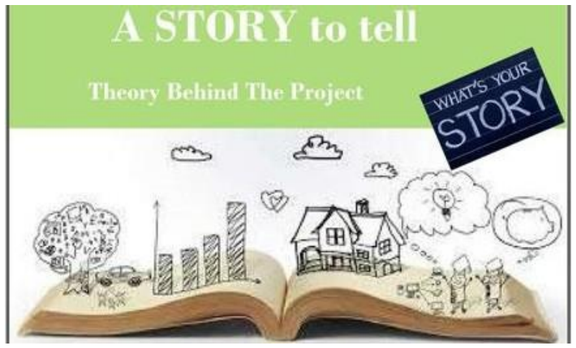


Image source: (Sabeer Hamid, 2018)

PROPOSED SITE LOCATIONS

The proposed location pins:
Westlands
https://maps.app.goo.gl/1qqD7hrEgoGgJbAO6

Tigoni
https://maps.app.goo.gl/CvcsU6nZdyFZXz5A6?g_st=iw

Parklands
https://maps.app.goo.gl/dWg88spS5NSMT9sr7?g_st=iw

JAMHURI HIGH SCHOOL - GROUP TWO PERSPECTIVES

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

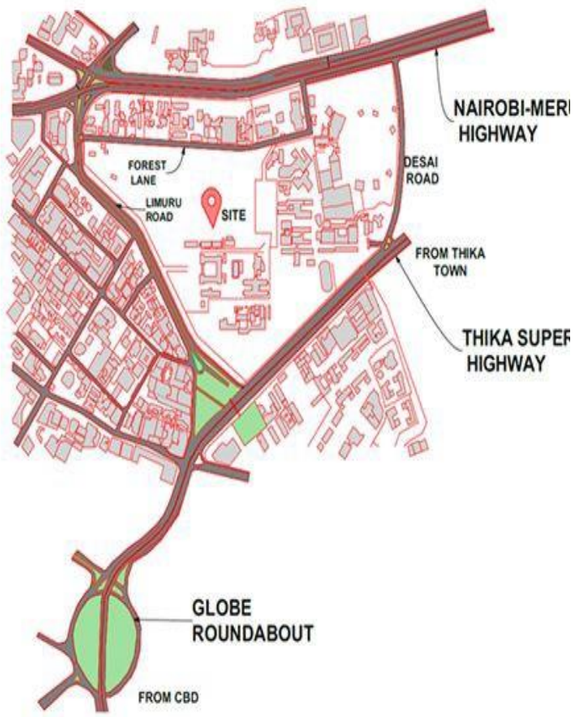
Eric Maguta
Hadija
Mwinyi
Hussein Sudi
Joseph
Amimo
Lionel
Kuchio
Murigo Nguti
Pauline
Wambua
Victor Shayo

SITE LOCATION & NEIGHBORHOOD

SITE LOCATION

Map showing location of Nairobi in Kenya
Source: wikipedia

The highlighted area showcases location of Starehe in Nairobi
Source: gadm.org



Site location
Source: author, 2024 Adapted from Google Maps

Starehe Constituency
Surce: starehe.ngcdf.go.ke

The site is located in Ngara, Starehe Constituency, off Limuru Road in Nairobi.

It is in close proximity with Nairobi CBD, well connected with public transport with several bus routes and matatus serving the area.

Hotel along Limuru Rd.
Source: author, 2025

NEIGHBORHOOD

Historical and Cultural context and significance;

Ngara Neighborhood

Ngara emerged as a residential area, primarily for the working class. After independence, the area continued to grow and evolved into a commercial hub with markets/ shops for the local residents.

Historic neighborhoods in Ngara
Source: researchgate.net

Demographic and Economic Factors

The neighborhood has diverse population. It exhibits a range of socioeconomic statuses, from affluent to working class neighborhood. The area has religious diversity.

Existing Land Use and Zoning

EDUCATION

City Primary School
Source: sikh-heritage.co.uk

COMMERCIAL

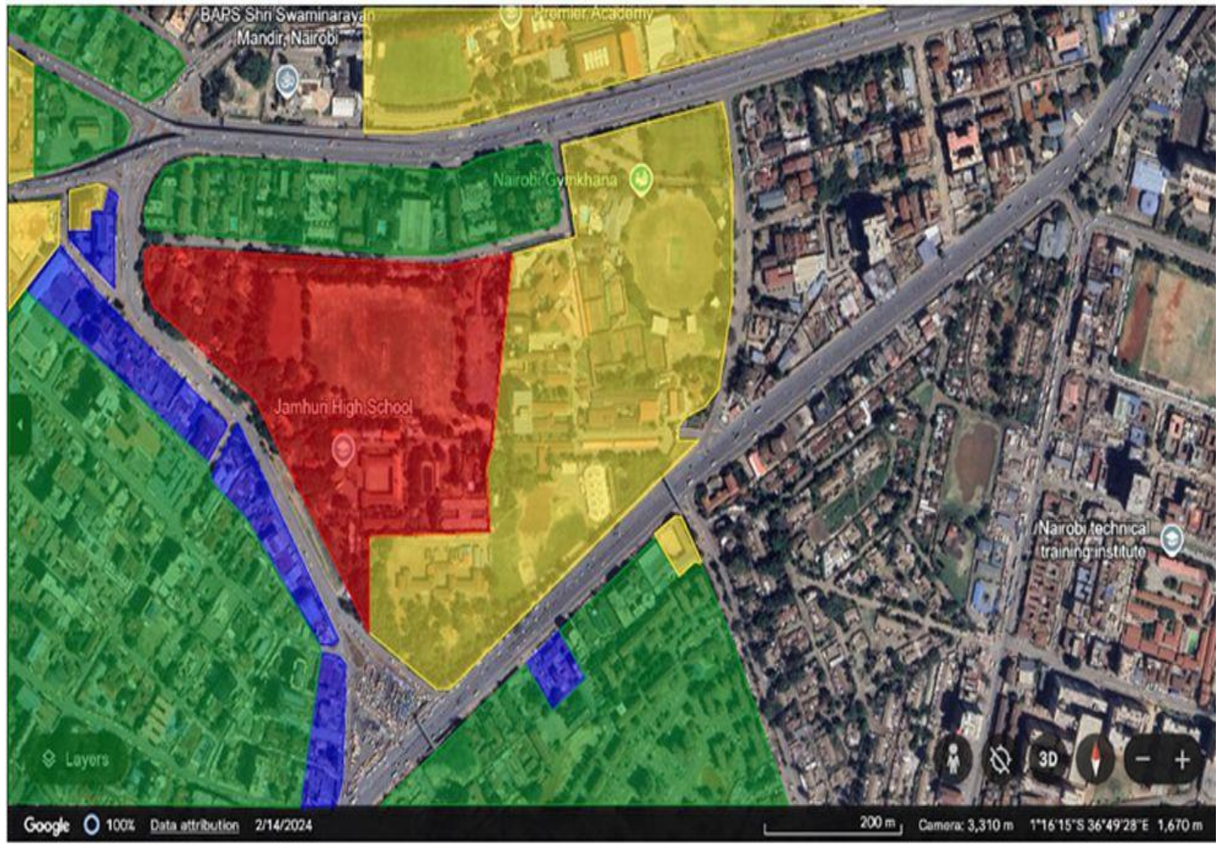
The neighborhood has different commercial spaces such as; retail shops, hotels, bars and restaurants.

Commercial neighborhood
Source: author, 2024

Commercial neighborhood
Source: author, 2024

RESIDENTIAL

There are residential flats, apartments, estates around the neighborhood.



LEGEND:

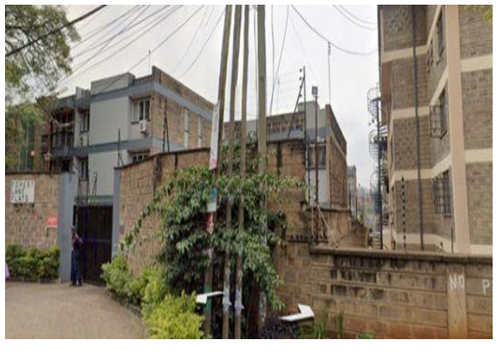
COMMERCIAL SPACES

EDUCATIONAL SPACES

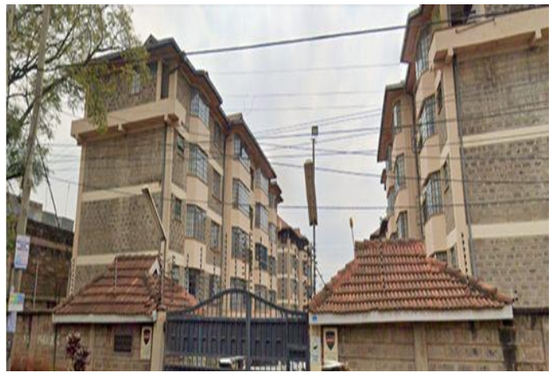
RESIDENTIAL SPACES

SITE- JAMHURI HIGH SCHOOL

Zoning in Starehe constituency
Source: author, 2024
Adapted from: google earth



Residential apartment
Source: author, 2024



Residential apartment
Source: author, 2024

1. Brahma Sabha Nursery

It is an educational center. Its facade is composed of plaster, glass windows with aluminium frames and decorative moulding on the gate. It is also composed of buildings with two floors.

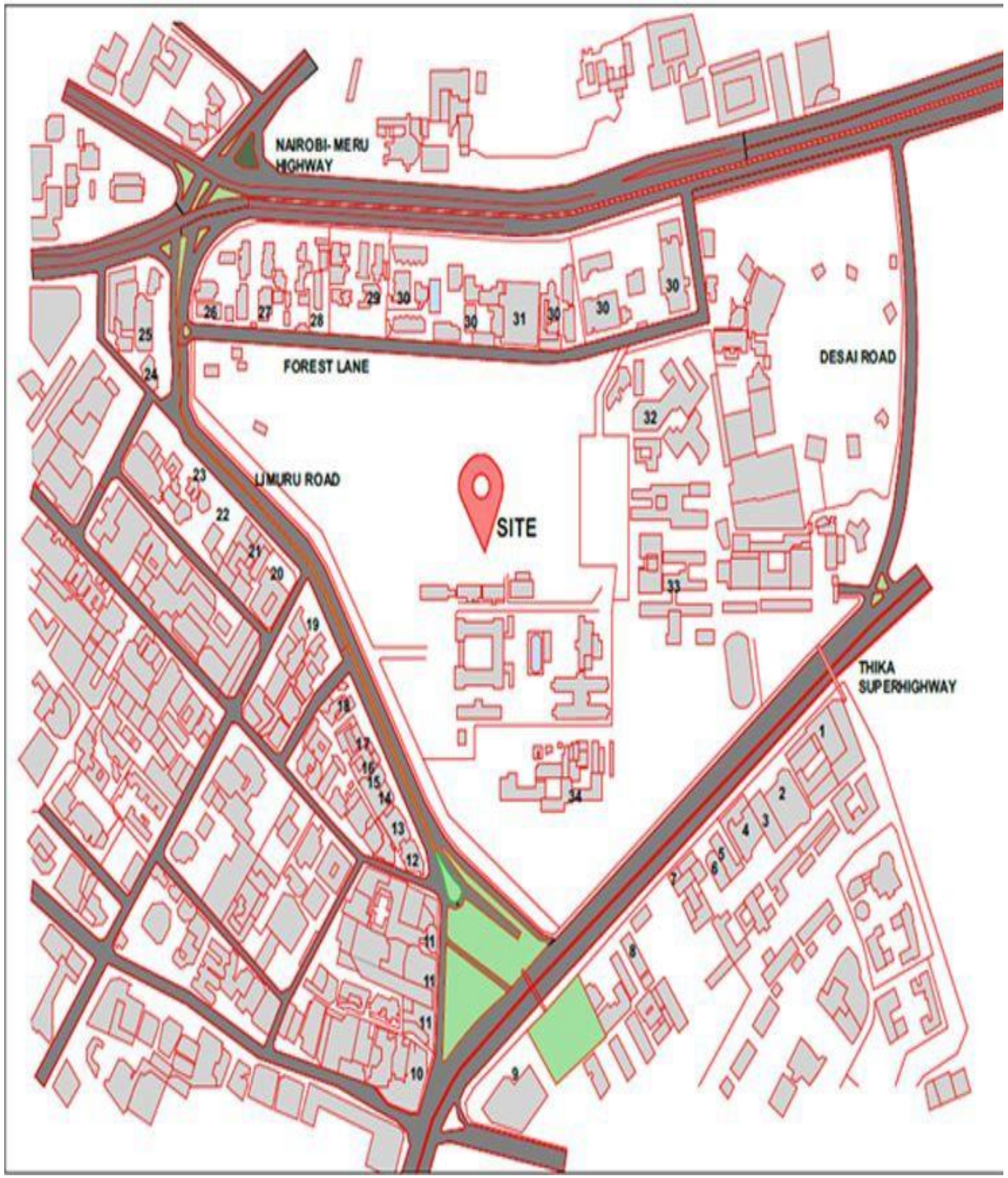
Brahma Sagha Nursery
Source: author, 2024

2.Shalom Grace church

Facade composed of beige painted walls and column structures, glass windows with aluminum frames.

Shalom Grace Church
Source: author, 2024

Map extract of the site, showing neighbouring structures



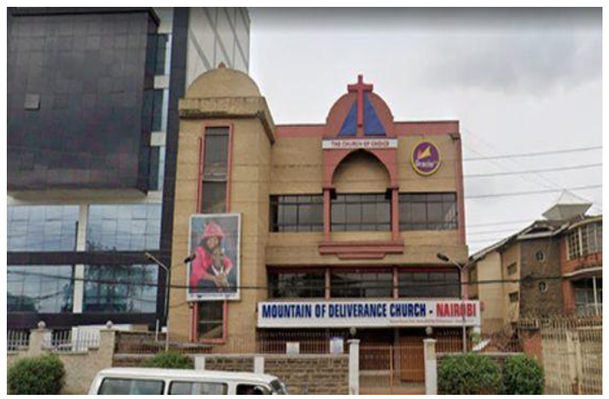
3.Aqua flats and office

Suites, mixed-use center with residential and office spaces. Facade composed of large glass windows and curtain glass wall, and beige painted walls. Plaza is 5 floors and office suites is 8 floors.

Aqua flats and offices
Source: author, 2024

4.Mountain of Deliverance Church of Nairobi

Facade is composed of glass windows with aluminum frames, plastered walls painted brown, 8 floors.



Mountain of deliverance church of Nairobi
Source: author, 2024

5. Medcare healthcare ltd building

Is a medical center. Facade composed of glass windows with aluminum frames, gray painted plastered walls.

Medcare healthcare ltd building
Source: author, 2024

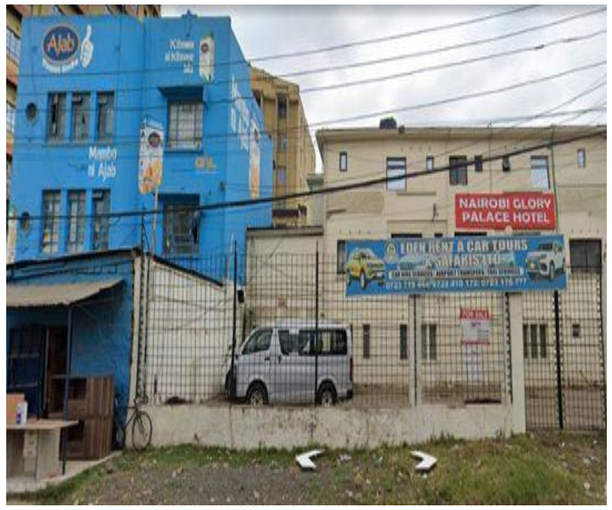
6. La casa Bendita

Is a residential building with commercial spaces at the ground floor. Has 9 floors, with facade having glass windows, horizontal elements running across per floor, plastered walls painted beige and brown.

La casa Bendita
Source: author, 2024

7. Nairobi Glory Palace Hotel

Is a commercial space. Facade has beige painted walls, glass windows. Has 3 floors.



Nairobi Glory Palace hotel
Source: author, 2024

10. Fig tree stalls

Commercial spaces for carrying out trading activities. Structure has plastered cream painted walls, glass windows with aluminum frames.

Fig tree stalls
Source: author, 2024

11. Commercial stalls

These are temporary wooden structures covered with iron sheets where locals carry out trading.

Commercial stalls
Source: author, 2024

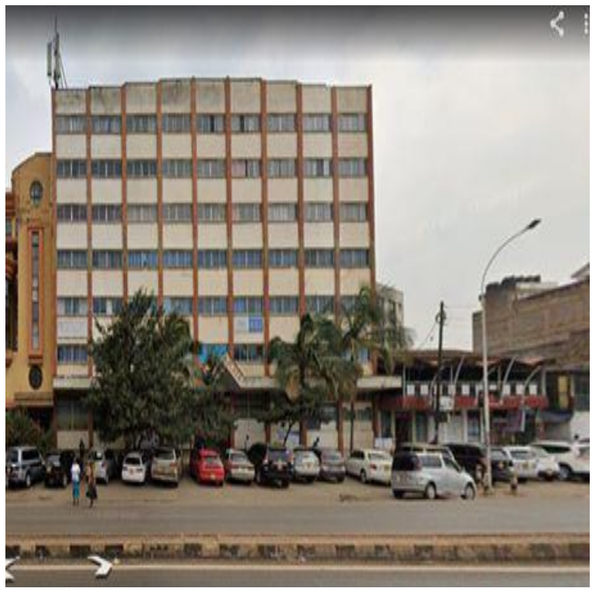
12. Nairobi Transit Hotel

A commercial space that accommodates people. Exhibits modern architecture, with use of curves and straight lines. Presence of glass windows with aluminum frames. Walls are painted brown.

Nairobi Transit Hotel
Source: author, 2024

13. Suraj Plaza

A commercial space housing office spaces. The facade exhibits use of white plastered walls with interplay of vertical elements of brick material, with use of glass windows with aluminum frames.



Suraj Plaza
Source: author, 2024

14. Sides club and Lounge & 15. Cosmo Guilt

Recreational center. Have 2 floors. Potential source of noise due to clubbing activity

Sides club and lounge & 15 cosmo guilt
Source: author, 2024

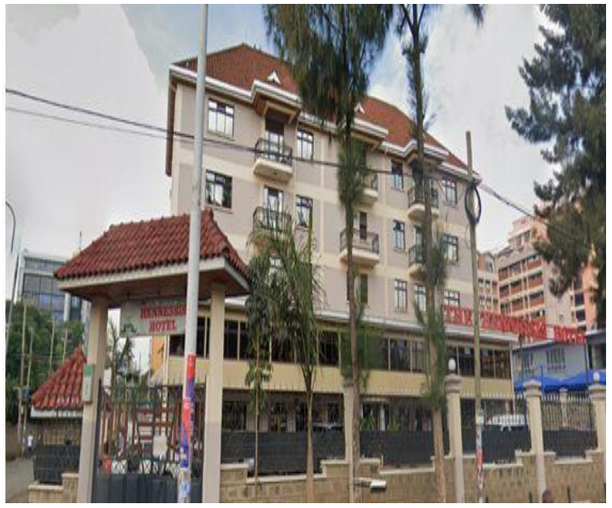
16. Vineyard tusker- Kieni House & 17. Rabi Hotel

Kieni house is a recreational centre offering clubbing activity. Has 2 floors. Has plastered walls, glass windows of aluminium frames.
Rabi hotel is a commercial space that provides accommodation. Has 5 floors. Facade has white painted plastered walls, with metal doors and glass windows.

Vineyard tusker- Kieni house and Rabi hotel
Source: author, 2024

20. Hennessis Hotel

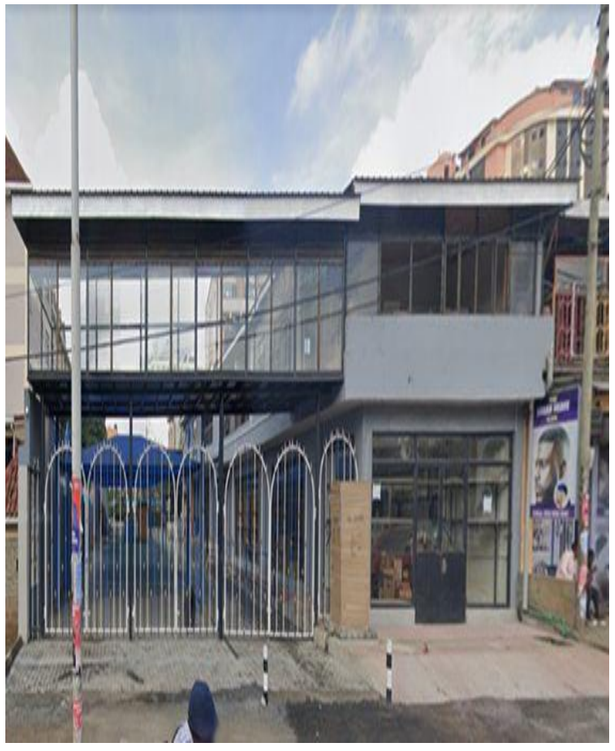
Commercial space, providing accommodation. Has hipped roofing, with facade having glass windows with aluminium frames, with cream plastered walls.
Has five floors.



Hennessis Hotel
Source: author, 2024

21. Dumais International Gospel Centre, Nairobi

Has grey painted plastered walls, large glass windows and iron sheet roof.



Dumais International Gospel centre
Source: author, 2024

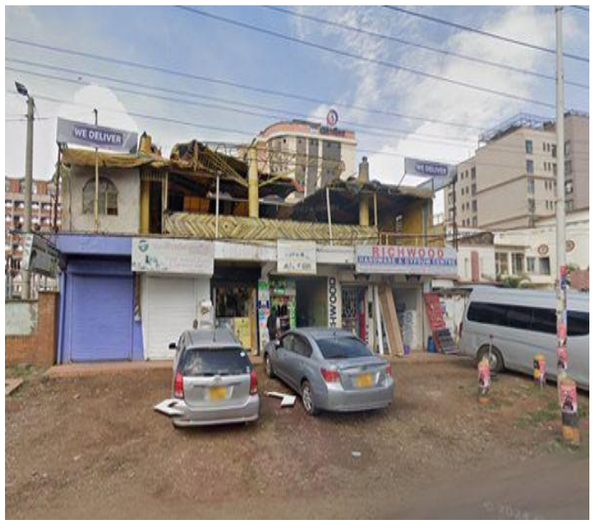
22. KPLC Workstation

This center distributes power to the neighborhood, monitors and controls power, provide maintenance for issues of power.

KPLC Workstation
Source: author, 2024

23. Richwood hardware and Gypsum Centre

Commercial space for trading activities.



Richwood hardware and Gypsum centre
Source: author, 2024

24. Laxcon House

Is a mixed-use development. Facade has grey plastered walls, with large glass windows spanning horizontally across the building. Has 9 floors. Has green outdoor on the 3rd floor.

Laxcon House
Source: author, 2024

25. Auto express Building

A commercial building offering servicing and maintenance of vehicles. Has curtain glass wall facade, white and yellow plastered walls and ground floor houses vehicles for servicing

Auto express building
Source: author, 2024

26. Forest Lane Flats

Is a residential area, providing housing for households in the neighborhood. Each flat has 3 floors. Exhibits use of masonry walling with grey painted plastered walls and glass windows. Has flat roof.

Forest lane flats
Source: author, 2024

27. Temple View Apartments

A residential area. Use of masonry walling with beige painted plastered walls and large glass windows. Has hipped roofs.

Temple view apartments
Source: author, 2024

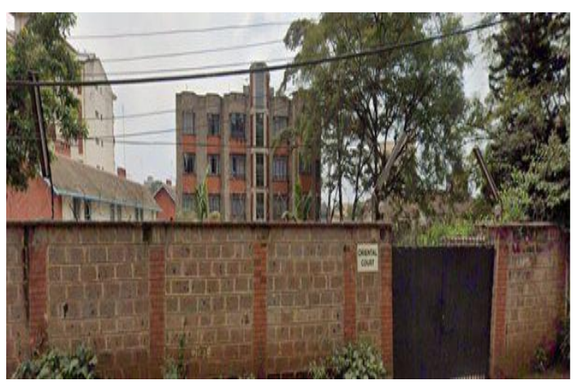
28. Residences

Are residential centers for the locals and providing housing for families. • Materials used range from use of masonry walls, plastered walls, clay tiles for roof, aluminum frames.

Residences along Forest lane
Source: author, 2024

29. Oriental court

Is a residential center, gated court that offers housing to different families and households. Exhibits use of masonry walls with brick on the facade, employing of glass windows. Has 4 floors.



Oriental court
Source: author, 2024

31. Jubilee Christian Church

Is a religious center for worship. Is accessed from Prof. Wangari Maathai road.

Jubilee christian church
Source: author, 2024

33. Kenya Institute of Curriculum Development

Is a government facility, where development, review and implementation of national curriculum and shapes the education system in Kenya. Facade exhibits white tiling, with glass windows. Has 8 floors.

Kenya Institute of Curriculum Development
Source: author, 2024

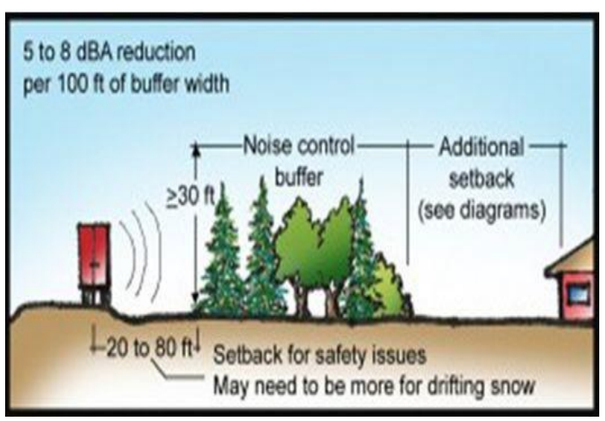
34. City Primary school

An educational facilities. Is an immediate neighbor to the site. Characterized by white painted walls, arches, glass windows, clay tile roof. Has 2 floors.

City Primary school
Source: author, 2024

RESPONSES

Create buffers through landscape elements, i.e. trees to block potential noise from neighboring roads and building.



ACCESS, CIRCULATION AND SPATIAL ORGANISATION

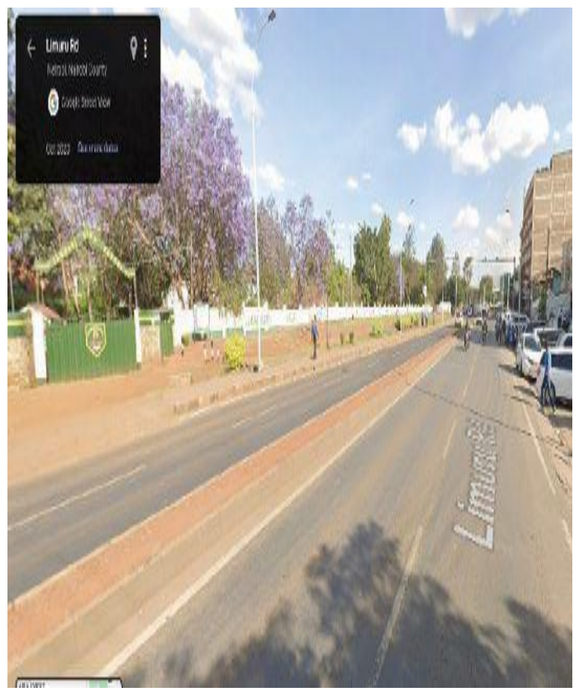
1. VEHICULAR ACCESS

The site can be accessed via two main roads around the site:

- Limuru Rd.
- Forest Lane

a. Features of Limuru Rd.:

- Peak hours in the morning and evening
- Well-lit with street lights
- Has CCTV camera for security
- Mainly tarmac road
- Has pedestrian walkways



Limuru Road
Source: author, 2024

Access points via Limuru Rd. include:

1. Main Gate

Main gate access
Source: author, 2024

The main gate allows for both vehicular and pedestrian traffic.
It is well secured with CCTV cameras.
Remains the primary access to allow screening of individuals as they access the premises.

2. Abandoned gate
Located on a public area along Limuru Rd. and leads to the staff quarters. It appears to not be in use.

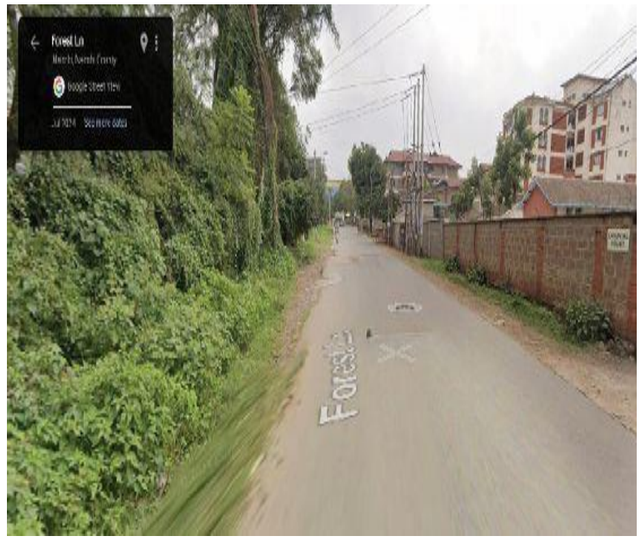
Abandoned gate
Source: author, 2024

Conclusion:

- The main gate being accessed from the major road remains crucial.
- The abandoned gate can be renovated in case a new structure is built within the staff area.

b. Features of Forest Lane:

- A slightly busy road
- Mainly leads to the residential areas
- There is less vehicular traffic
- No pedestrian walkways



Forest lane
Source: author, 2024

Access points along Forest Lane:

Path leading to rear gate
Source: author, 2024

It is a remotely positioned gate with less traffic.

The gate is always locked to prevent unauthorized access.

It leads to a murram road within the school compound.

Leads to the subordinate staff quarters and a potential construction site.

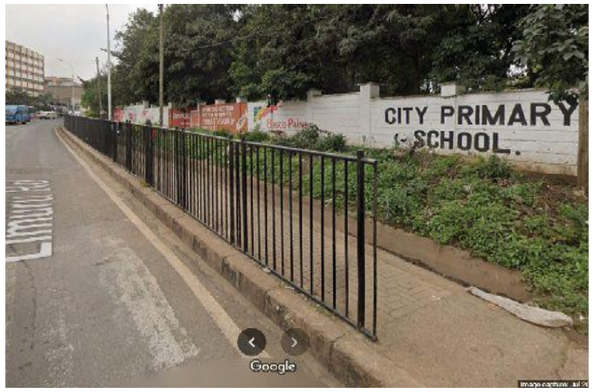
Conclusion:

- Provides a good access for the community into school facilities open to the community.
- Can also be used by construction vehicles to access the site.

2. PEDESTRIAN ACCESS

The main pedestrian access is along Limuru Rd.. The road has a pedestrian crossing area at City Primary School.

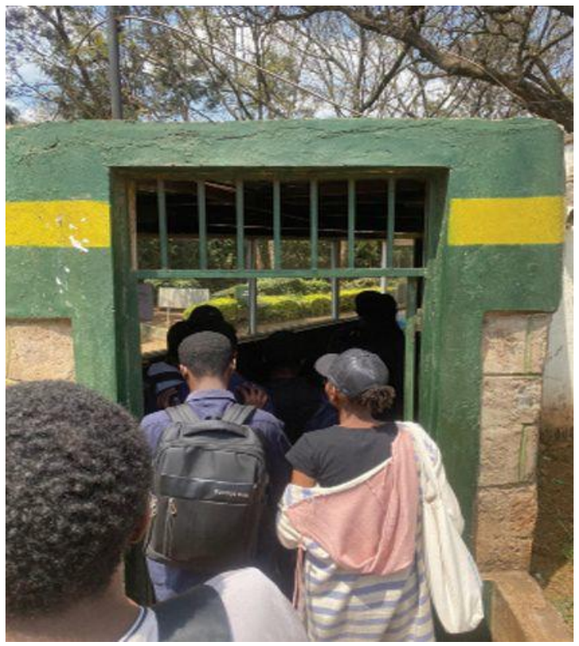
Limuru Rd. provides an easy access to public transportation at Ngara Bus Terminus.



City Primary school
Source: Google maps

Access via Limuru Rd.:
The main pedestrian access is via the main gate. Allows for visitors to be screened as a security precaution. Students can sign in at the main gate.

It leads to the main route for accessing the administrative area of the school.



Pedestrian main gate access
Source: author, 2024

Conclusion:

- Allows a more controlled pedestrian traffic
- It is closer to the public transport within the neighbourhood
- Expanding the pedestrian gate will be viable to combat the potential surge in pedestrian traffic

SPATIAL ORGANISATION AND CIRCULATION

1. CLUSTERED ORGANISATION

Buildings and areas with similar functions have been grouped together.

This allows for clear understanding of the school layout hence ease in circulation.

It is divided into four zones namely:

a. Academic area composed of the the administrative offices, the classrooms, laboratories and the prayer area.

b. The boarding area consisting of the school canteen, kitchen area, dining area an the boarding section.

c. Recreational area which has a basketball court and the swimming pool.

d. Staff quarters area which houses the homes for the teaching and non-teaching staff.

a. Academic Area

The classrooms are divided into blocks; form 1 and form 2 students share one block, while form 3 and form four students share another block.

The form three and form four students' block has a central courtyard, and houses the administrative offices.

Form 1 & 2 block
Source: author, 2024

Quadrangle
Source: author, 2024

b. Boarding Area

This zone poses a major challenge with accommodation.

As such, some zoning facilities have been incorporated in the academic area.

There is an active construction site for the dining hall.

Canteen
Source: author, 2024

Kitchen
Source: author, 2024

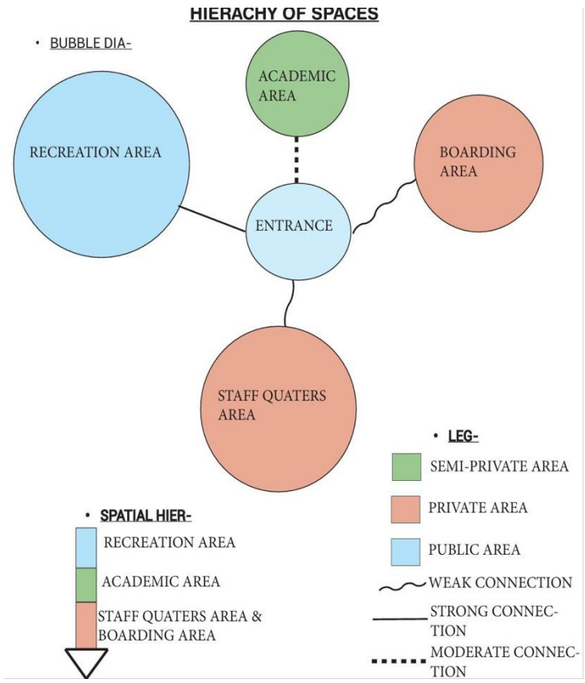
Proposed Dining hall
Source: author, 2024

d. Staff Quarters

Has been sectioned into two:
The teaching staff residing along the abandoned gate
The subordinate staff residing along the forest lane access.

Recommendations

The zones should be maintained as they are well functioning.
A suitable dumping site should be identified, as the current one is unsightly and poses a health hazards to both students and staff.



Dormitory
Source: author, 2024

c. Recreational area

The swimming pool lies in a derelict condition due to poor maintenance. The field, however, is well maintained. It can be accessed via both Limuru Rd. and Forest Lane.

Playing Fields
Source: author, 2024

Staff quarters
Source: author, 2024

Jamhuri high school site
Source:Google earth

Circulation within the site is mostly by pedestrians using the paths and corridors within the school.
There is however a small vehicular traffic around the academic area as that is the position of the school parking lot with more movements in the morning.

Pathways in school compound
Source:Google earth

Connection to public transport:
The main access for the pedestrian to the site is via Limuru Rd. The main route has to be from City Primary area where the pedestrians have a zebra crossing. Pedestrians from areas around Ngara West face a challenge to access the site as there is no pedestrian crossing facilities despite there being a bus station. There is no signage to indicate a school along the road.

Limuru road
Source: author, 2024

Safety of movements around site:
Vehicle movement in the site is restricted to the front of the site only. This ensures safety of learners within the school as there is less contact with vehicles.

Universal Accessibility:
Whereas most circulation is mostly by pedestrians, the school lacked much inclusivity in terms of accessibility by persons living with disability.
There is less observable ramps particularly in the old preserved buildings that would make accessing the library and laboratories in the first floor difficult.

Recommendations:
The pedestrian walkways can be improved by using permeable surfaces. This will allow flow of movement during the rainy seasons.
Design universally accessible buildings with incorporation of ramps.
Have a well-laid out parking lot at the front of the school.
Installation of pedestrian crossing areas near the school and erection of a school sign.

EXISTING STRUCTURES AND THEIR STYLES

Jamhuri school site
Source: Google earth

KEY:
1. Gate
2. Jamhuri High complex
3. Laboratories
4. Swimming pool
5. Dormitory
6. Kitchen
7. Classrooms
8. Changing rooms
9. Ablution blocks
10. Staff quarters
11. Workshop

THE MAIN GATE

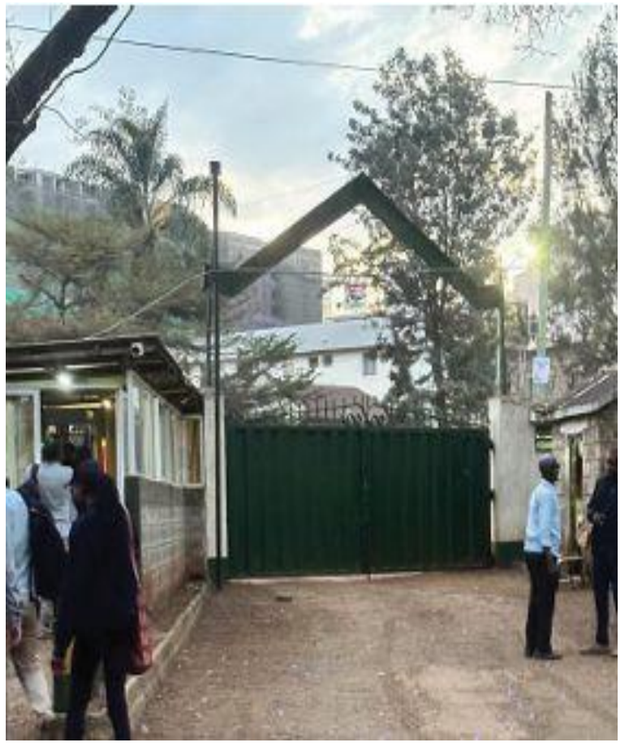
The school has a metallic double door gate with the school name written on it.

Response: Use of neo-classical principles in improving the maingat such as use of classical columns to support the gate an school name.

JAMHURI HIGH COMPLEX

This complex is laid out in U-shaped plan surrounding a cabro-paved quadrangle.

It is the identity building of the school. It is the heart of the school.



Main gate
Source: author, 2024

It was constructed in 1928. Facilities available in the complex:
1. Administration offices
2. Math Department
3. Form 4 and 3 classes
4. library
5. exam hall
6. English department
7. Humanities Department
8. Art room
9. Viewpoint
10. Ablution block
11. Dormitory

Architectural Style and Properties
The double-storey building complex is designed in a Neoclassical architectural style with a site plan enclosing a quadrangle with colonnaded, covered walkways. It has a clock tower.

The lay-out of the complex shows great **symmetry**.

Classical order columns have been used ie. Doric columns.

The walls are built of smooth rendered stone painted a brilliant white beneath a gable Mangalore tiled roof. This displays the grandeur of structure.

There is use of clean lines for the walls.

The doors are metallic supported in arched frames while windows are glazed in standard steel casements.

Jamhuri high school
Source: author, 2024

The windows are tall and narrow in proportion echoing proportions of classical columns. The windows have elaborate grills to add to ornamental touch.

The balconies have stone railings and are supported by brackets richly detailed echoing classical forms.

The floors in the interiors are finished in a variety of granite, terrazzo and wood parquet.

Jamhuri high school
Source: author, 2024

Jamhuri high school
Source: author, 2024

Responses
Increase number of windows while maintaining the aspect of symmetry to enhance a more friendly learning environment.

Replace the metallic doors with timber doors ie mahogany or oak which can be ornamented with classical art.

Frame the windows with classical mouldings and use contrasting colors for them to break monotony of the white coloUr.

Use of classical arches and columns for the 2-year and 5-year old classroom blocks to improve their aesthetics and maintain the rich history of the school.

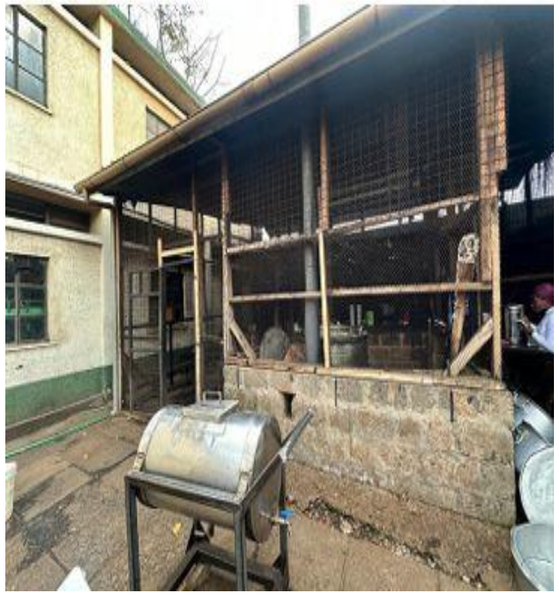
KITCHEN
The walls are built of smooth rendered stone painted a brilliant white and green.

The interior walls are clad in white ceramic tiles. The windows are small.

Concrete flooring used in the kitchen. Plaster countertops for use in the kitchen. The extension of the kitchen has a low stone wall and iron sheets roof.

Jamhuri high school kitchen
Source: author, 2024

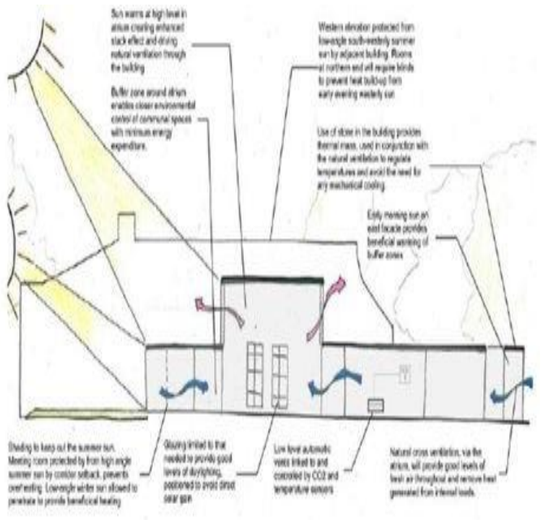
The kitchen is too small and has a low ceiling which inhibits proper ventilation within the space, due to excess smoke emission during cooking.



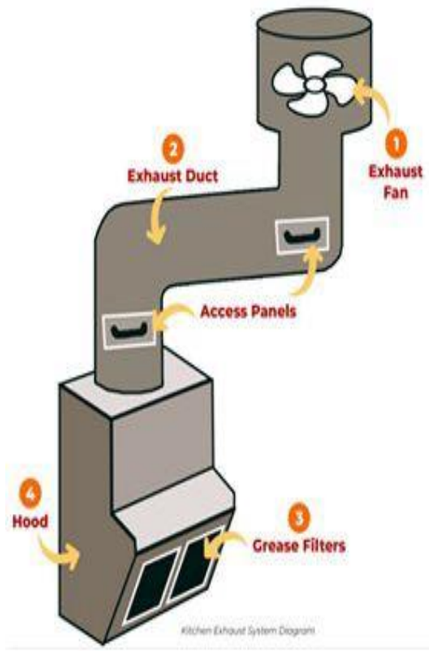
Jamhuri high school kitchen
Source: author, 2024

Recommendations

- Incorporation of high ceiling to allow for better ventilation.



- Installation of better HVAC system.



FORM 1 AND FORM 2 BLOCKS

They 2 storey and 3 storey buildings contain classes that are only used by the form one and two.

The walls are built of stone, and the columns and beams are painted in white.

The plinth is painted in green. Windows are glazed in green steel casements. They are large to allow for ample ventilation.

The roof is pitched and is covered in clay roof tiles.

Form 1 and 2 block
Source: author, 2024

Functionality takes precedence in their design. The element of the line can clearly be observed in these buildings. Use of circular columns at the front, and square columns along the corridors.

WASHROOMS AND CHANGING ROOMS

The walls are built of smooth rendered stone painted a brilliant white and green.

The interior walls are covered in white ceramic tiles. Windows are glazed in green steel casements. They are large to allow for ample ventilation. The doors are made of wood.

The floor is made of concrete, whereas inside the stalls, the floor is covered in white ceramic tiles.

Use of white porcelain sinks, suspended plywood ceiling within the wash rooms.

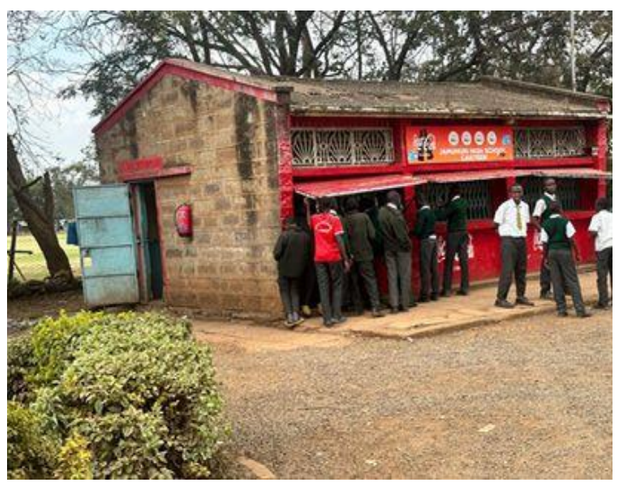
Washroom
Source: author, 2024

- Currently the changing rooms are not in use, as they will be undergoing renovation.

Changing rooms
Source: author, 2024

CANTEEN

The one storey building has walls built of stone, with the front façade painted in a bright red colour, whereas the sides are left bare. Serves the students with snacks during their breaks from classes



Canteen
Source: author, 2024

Recommendations:
Incorporate the same characteristics, such as the colour of the main building complex so as to ensure conformity throughout.

Quadrangle
Source: author, 2024

STAFF HOUSING

Use of stone walls. Average sized windows glazed in steel casements. The roof is pitched and is covered in clay roof tiles.

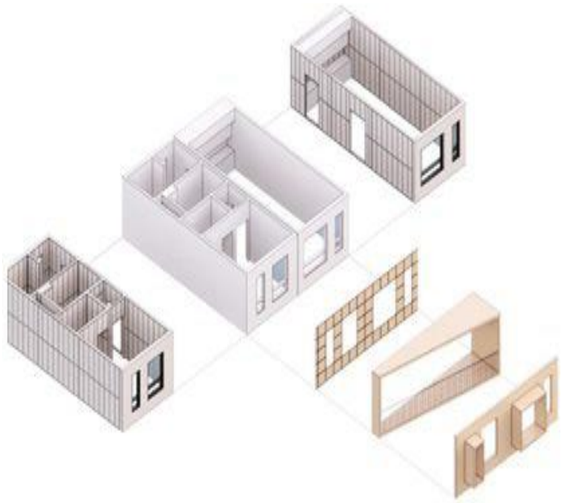
Staff housing
Source: author, 2024

SUPPORT STAFF HOUSING

Small one storey houses used as the abode for the support staff. Iron sheets used for the walls and the roofs. Small sized steel casement windows.

Support staff housing
Source: author, 2024

Recommendations:
Provide better housing by such as the use of prefabs that are also cost efficient.



ABLUTION BLOCK

The block is built of smooth rendered stone painted in brilliant white and green. Windows are glazed in green steel casements. They are large to allow for ample ventilation. The roof is pitched and is covered by clay roof tiles. The outside sinks are used by the students to wash up.

Ablution block
Source: author, 2024

DORMITORY

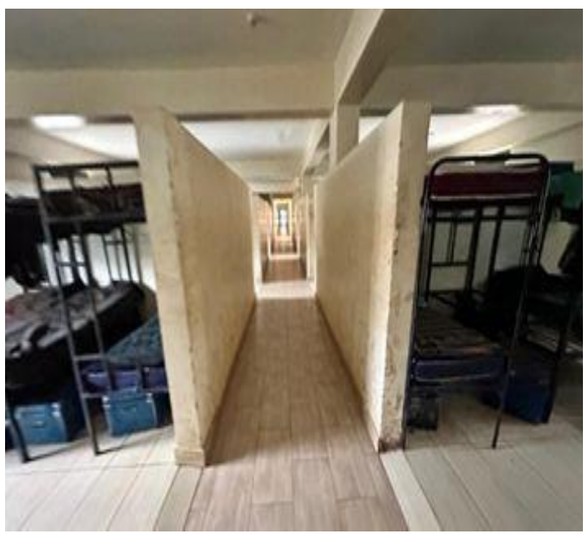
- This dormitory is under construction. It is meant to house 2250 students in 3 floors.
- The ground floor is already occupied by the students. The Building is designed in a Modernism architectural style. Functionality takes precedence, there is no ornamentation, use of modern construction materials such as reinforced concrete.

The building's structure is exposed ie. Reinforced columns and beams are seen to the outside.
Coffered ceiling is used to expose the beams. Exterior walls are stone wall plastered though not properly. Use of steel framed casement windows.

- The plan is H-shaped to maximise on natural light. Interior walls are plastered and painted white. Wood parquet finish has been used for 1.5m wide walkways.

- Currently the dormitory is overcrowded with a cube measuring 5.2m by 4.5m housing 16 students on 8 double decker beds. The washrooms have ceramic tile finish on the walls and the floor which is waterproof.

Proposed student dormitories
Source: author, 2024



Existing student dormitories
Source: author, 2024

Responses:
1. To solve on water leakage through the windows on the ground floor, cover the slab with sloping roof awaiting the next phase of construction.

To improve on speed of construction of the upper floors to solve on the issue of overcrowding on the ground floor.

2. Use neo-classical elements such as ornamentation on the window frames to beautify the dormitory and to maintain the heritage of Jamhuri High School. Re-plaster the worn out plaster on the ground floor.

LABORATORIES

The labs are located within a 2 storey building that has covered corridors throughout.

Practical experiments for the science subjects are carried out within these spaces.

The walls are built of smooth rendered stone painted a brilliant white and green.

Windows are both top hung and bottom hung, and are glazed in green steel casements. They are large to allow for ample ventilation.

The labs in the ground floor have terrazzo flooring, whereas, the ones in the 1st floor have wooden floors. The working tables are made of strong mahogany wood, porcelain sinks and the taps are made of stainless steel. T

he roof is pitched and is covered by clay roof tiles.
The ceiling is made of plywood and is suspended from the roof. The wooden flooring in the 1st floor labs is rotting due to the frequent spillage of water within the space.

Response:
Apply the same use of terrazzo flooring.

School laboratories
Source: author, 2024

UTILITIES AND SERVICES

ELECTRICITY

The school receives its power from national electricity grid (Kenya Power).
It uses fluorescent bulbs.

Kitchen
Source: author, 2024

Responses:
Natural grid is not a reliable source due to frequent blackouts.
Provide solar powered street lights in every circulation path.
Provide LED light bulbs due to their energy efficiency thus saving electricity cost.
Rechargeable bulbs that automatically turn on during blackouts on corridors, common areas and washrooms.
Motion sensors bulbs automatically turn off when no one is present

Provide a backup system generator in case of outages.

WATER SUPPLY

The school water supply comes from Nairobi Municipal Network.

There are also storage water tank to store water in case of shortage.

There are fresh water points, hand wash stations placed at strategic points such as near classrooms, washrooms and eating/ dining areas.

Responses :
Regular maintenance of the water points and HWS to keep them in good condition • Increase in the number of water storage tanks to mitigate water shortage from municipal.

SEWER AND GARBAGE

The school sewer system is connected to the municipal sewer line. There are open drainage lines that pose health risks.

Garbage
The school dump site is poorly placed and cannot be easily accessed for waste collection. There are few waste bins within the school.

Response to sewer challenges:
Cover open drains with grates to reduce health risks and accidents •

Regular maintenance schedule to clean and inspect drainage line.

Responses to garbage challenges:
Dump site should be relocated away from the buildings, classrooms and play areas .

This is in order to minimize the impact of odour, pests and visual pollution.

Dump site should be easily accessible for waste collection and disposal.

Consider using barriers or screening to conceal the dump site from view. Encourage recycling and composting to reduce the amount of waste generated.

FIRE SAFETY

There are fire extinguishers strategically placed throughout the school. The new dorm is fitted with smoke detectors and fire alarm switch.

Responses:

- Add another exit to the lab
- Clearly mark emergency exits

SECURITY

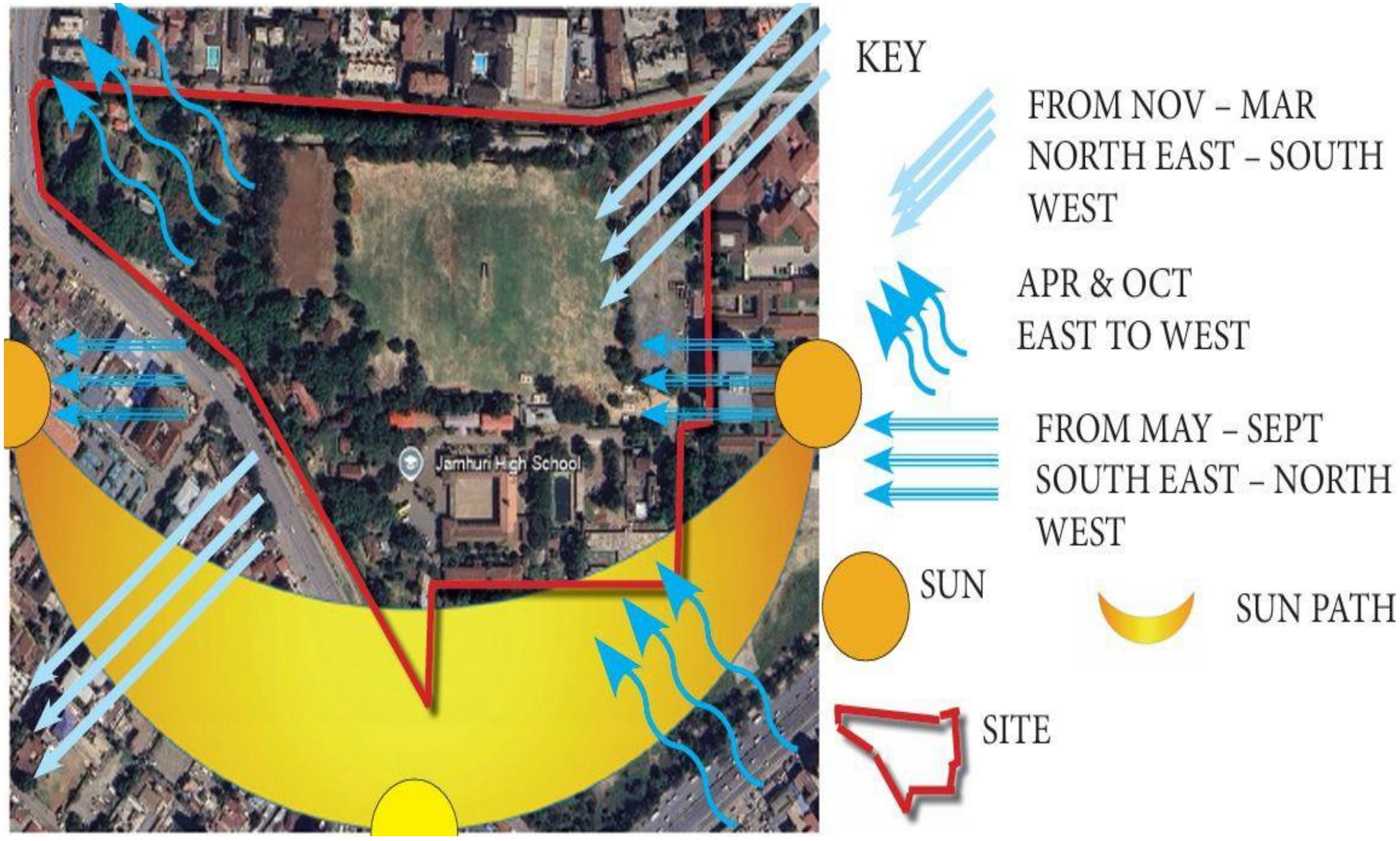
The entry point of the school is well monitored and controlled by a security guard.

Presence of cameras that provide valuable surveillance for monitoring school grounds and is being monitored at the principal office.

The school perimeter is well secured with fences or perimeter fence.

Response:
Optimize placement of cameras to cover all critical areas

These include entrances, exits and outdoor spaces and assign personnel to monitor camera footage on a regular basis.



CLIMATE

1. SUNSHINE

On average, January is the sunniest month with 288 hours of sunshine.

August has on average the lowest amount of sunshine with 127 hours.

On average, the total annual amount of sun is 2452 hours.

2. RAINFALL

The month with the most rain in Nairobi is April, 85mm average. The rainless period of the year lasts for 3.8 months, from June 7 to September 30.

The month with the least rain in Nairobi is July, with an average rainfall of 3 millimeters.

3. WIND

The windiest month of the year in Nairobi is December, with an average hourly wind speed of 17.5 kilometers per hour •

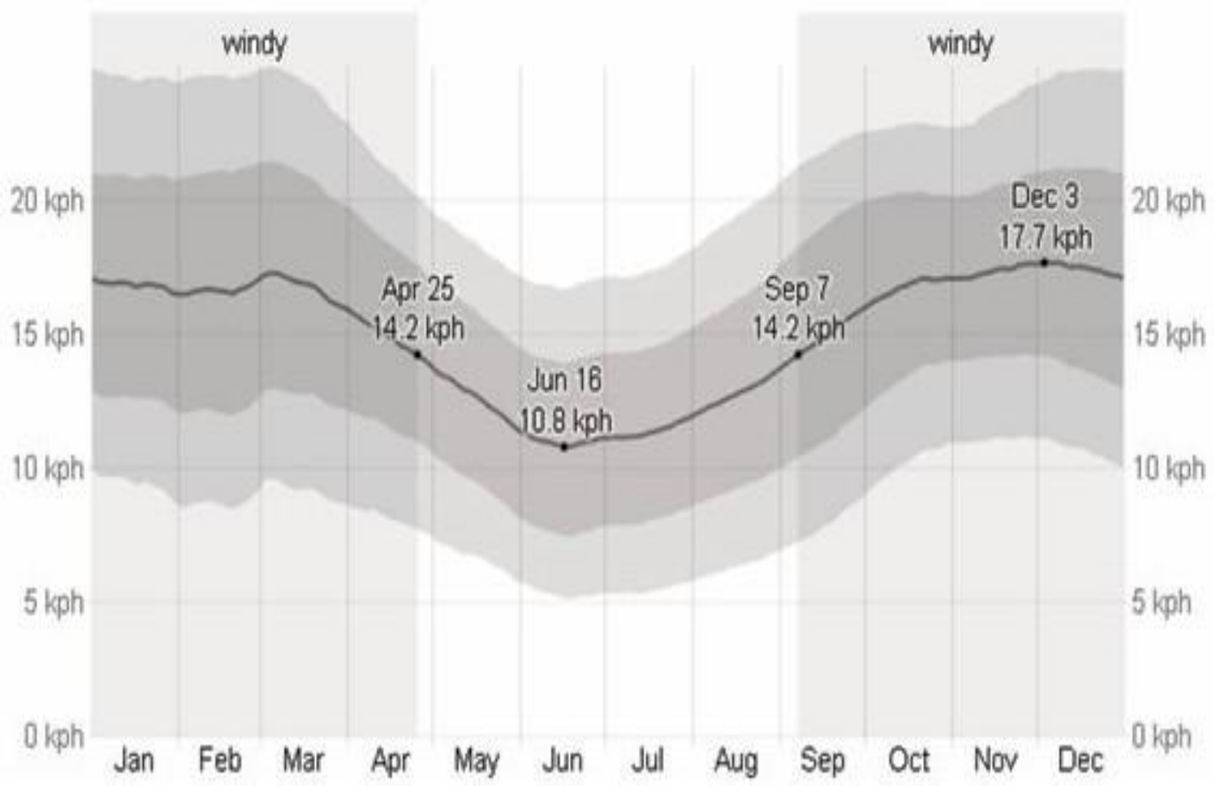
The calmest month of the year in Nairobi is June, with an average hourly wind speed of 11.0 kilometers per hour.

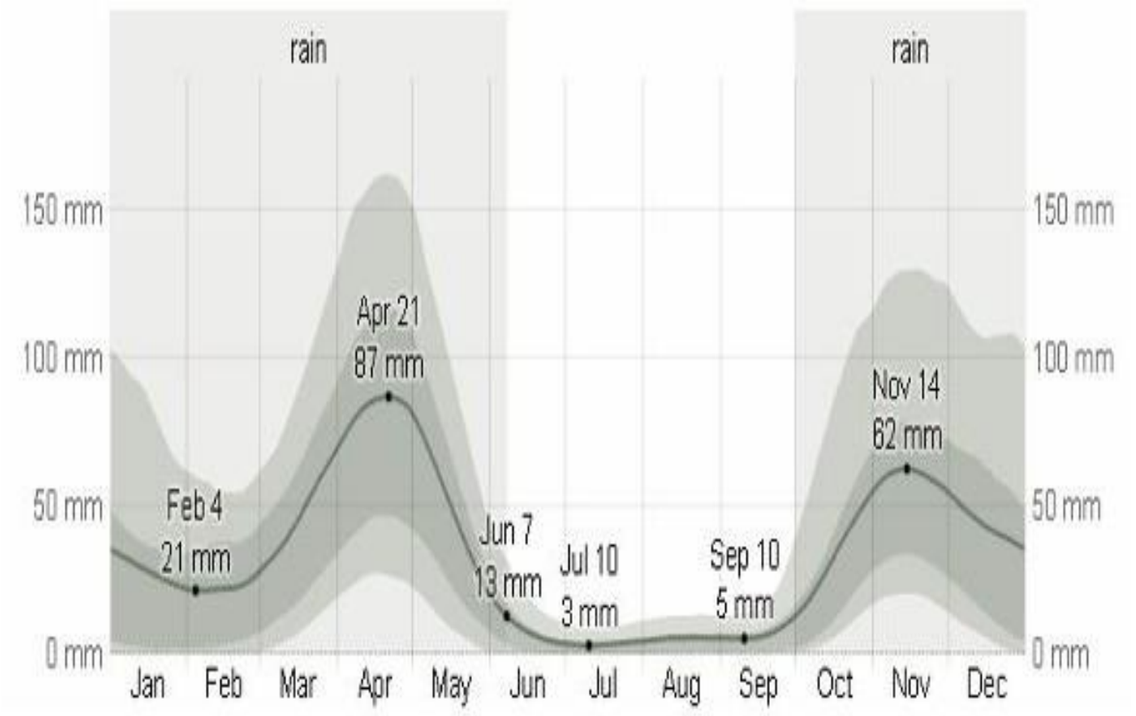
4. TEMPERATURE, SUNSHINE

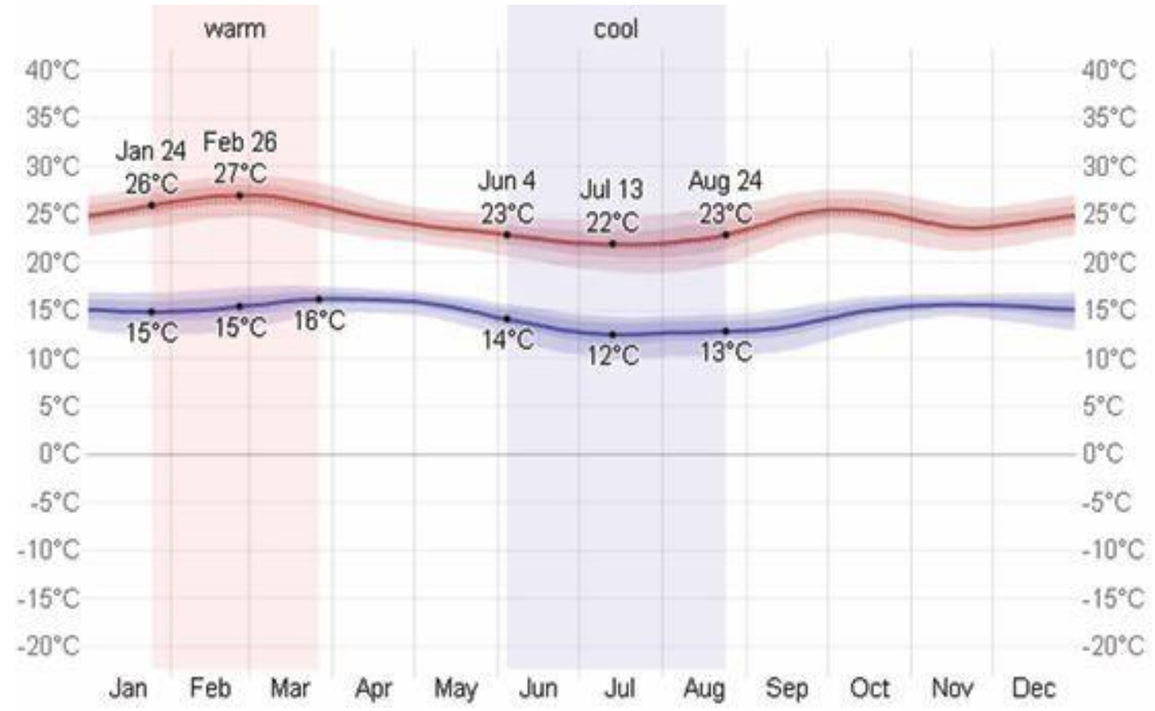
The hottest month of the year in Nairobi is March, with an average high of 26°C and low of 16°C. The coldest month of the year in Nairo bi is July, with an average low of 13°C and high of 22°C.

Currently, the windows are recessed and that is their main combattant to sunshine.


300 hrs
280 hrs
240 hrs
200 hrs
160 hrs
120 hrs
80 hrs
40 hrs
0 hrs
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov

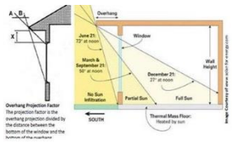

windy
windy
20 kph
15 kph
10 kph
5 kph
0 kph
Apr 25
14.2 kph
Jun 16
10.8 kph
Sep 7
14.2 kph
Dec 3
17.7 kph
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

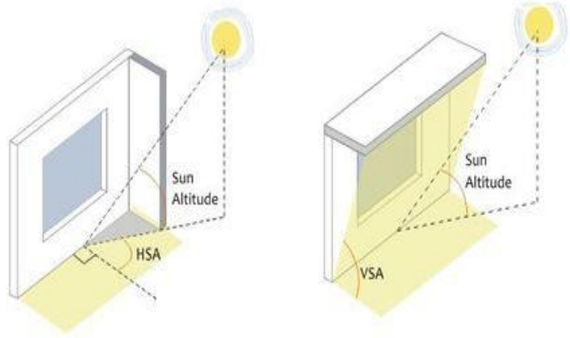

rain
rain
150 mm
100 mm
50 mm
0 mm
Feb 4
21 mm
Apr 21
87 mm
Jun 7
13 mm
Jul 10
3 mm
Sep 10
5 mm
Nov 14
62 mm
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


warm
cool
40°C
35°C
30°C
25°C
20°C
15°C
10°C
5°C
0°C
-5°C
-10°C
-15°C
-20°C
Jan 24
26°C
Feb 26
27°C
Jun 4
23°C
Jul 13
22°C
Aug 24
23°C
15°C
15°C
16°C
14°C
12°C
13°C
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

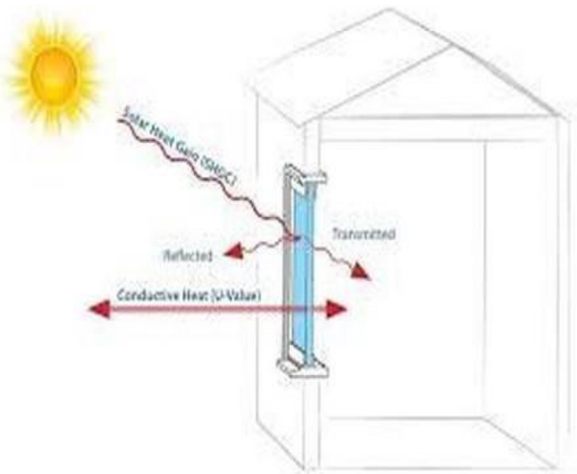
Responses to Sunshine and temperature:

- Apply sun shading devices of considering the depth they should extend to without limiting entry of sun rays completely.
- Coated glass used on window panes ; coated with reflective coatings to enhance their solar control properties and limit heat transmission.
- Vertical and horizontal sun shading techniques which block sun rays from directly reaching the building.

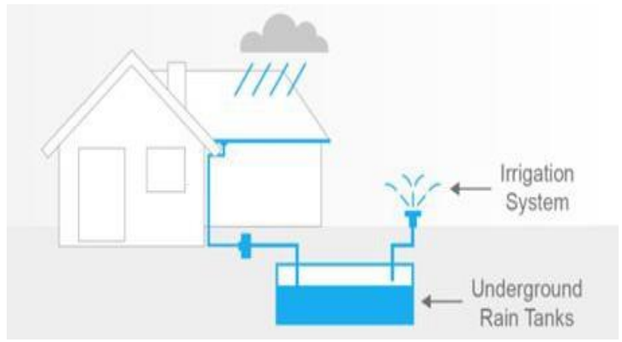




Responses to rainfall:



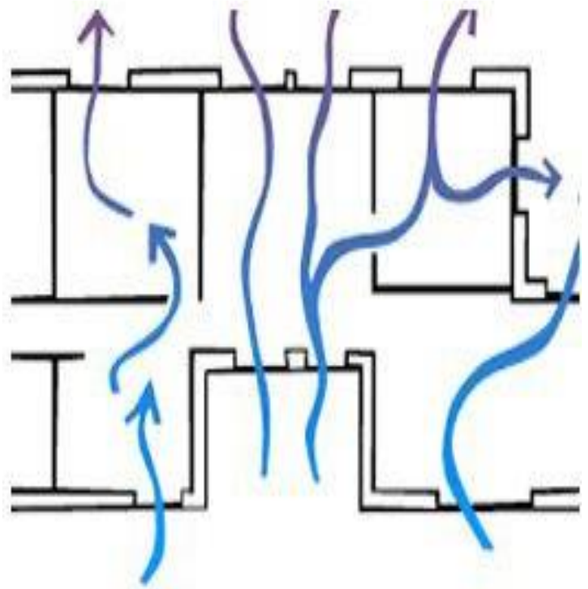
There is provision of gutters for stormwater drainage but no provisions for stormwater harvesting. Provision of stormwater drainage and harvesting to utilize the stormwater.

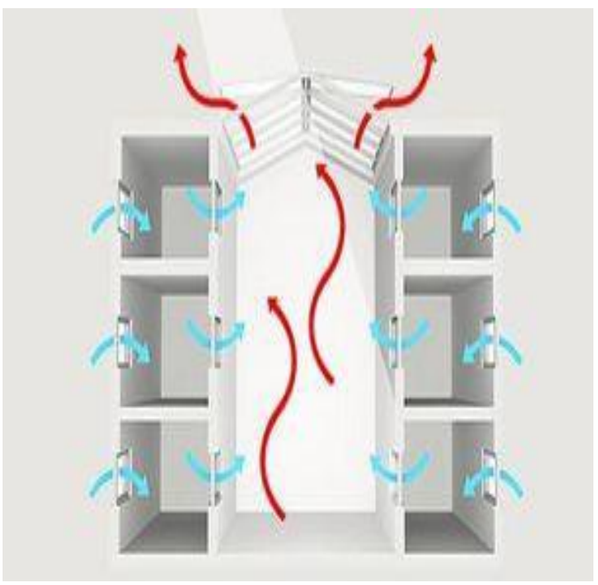


Provision of better ground stormwater drainage.

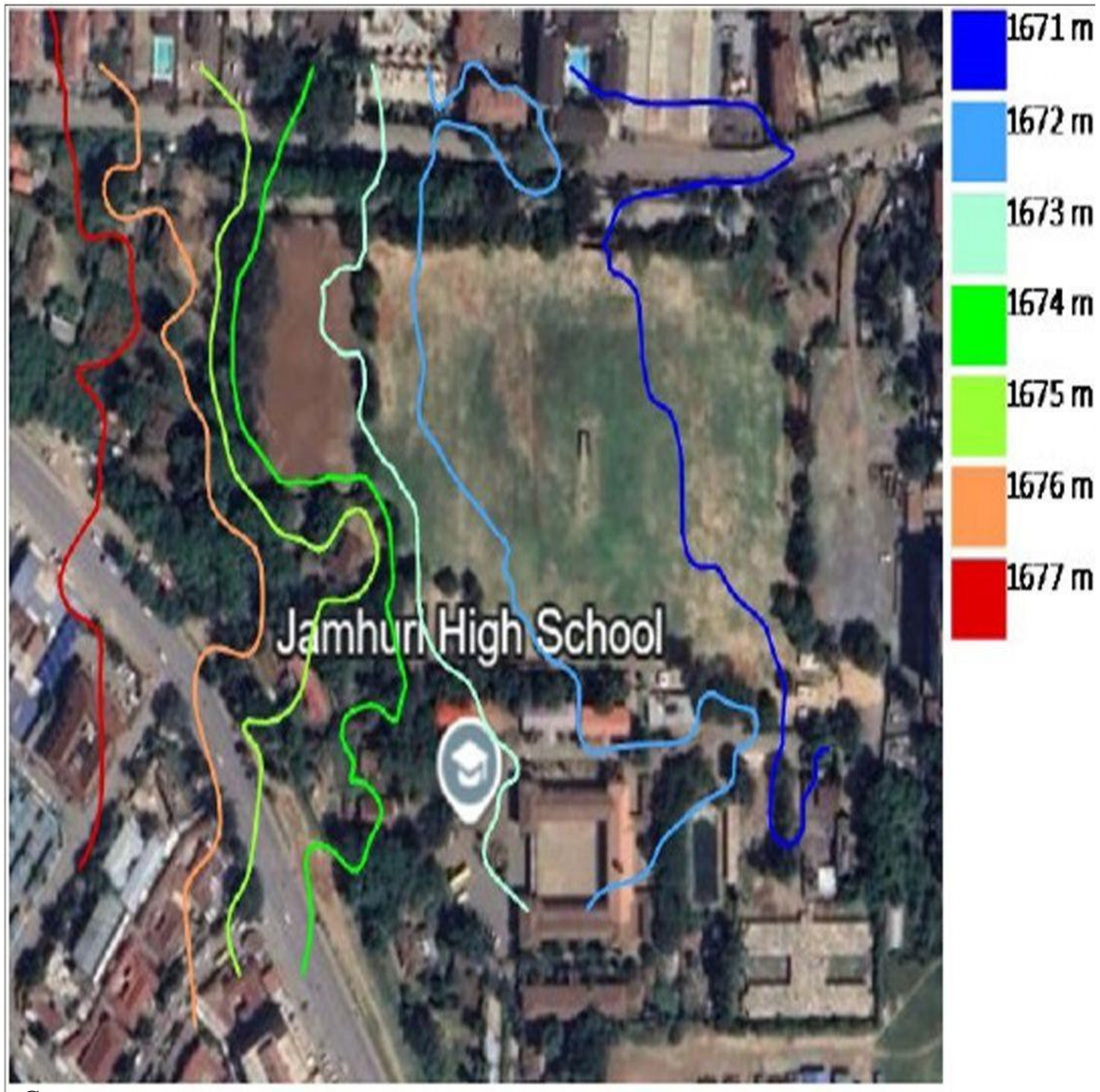
Responses to wind:

Application of cross and stack ventilation to harness the wind from proper ventilation in the building.





TOPOGRAPHY

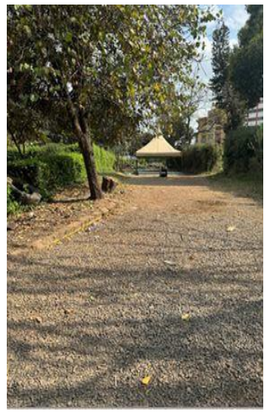


Contour arrangement on site
Source:Contour generator

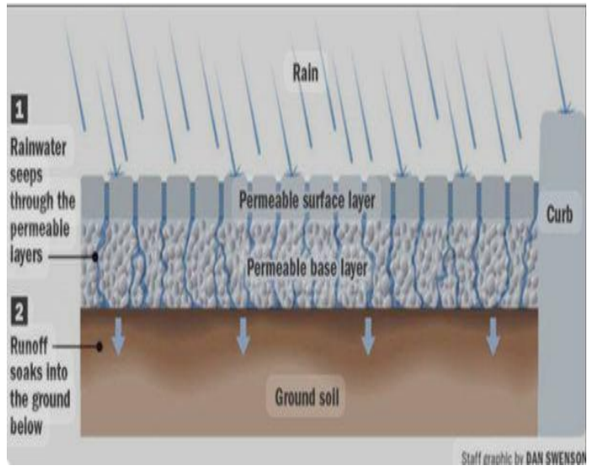
The land is gently sloping from the West to the East, with a slope gradient of 1.5%.

The slope allows for good drainage but poses the risk of ponding with the introduction of paving material.

Responses:
Permeable paving such as gravel, porous concrete or grass pavers should be used to allow efficient seepage of water to the soil. Groundcover grass and shrubs have been incorporated to prevent soil



Paving materials in school compound
Source:author 2025



erosion, and to aid in beautification of the school. This aspect is to be maintained for all the other proposed projects.

Tuition block for form 1 & 2
Source:author 2025

SENSORY ASPECTS

Auditory

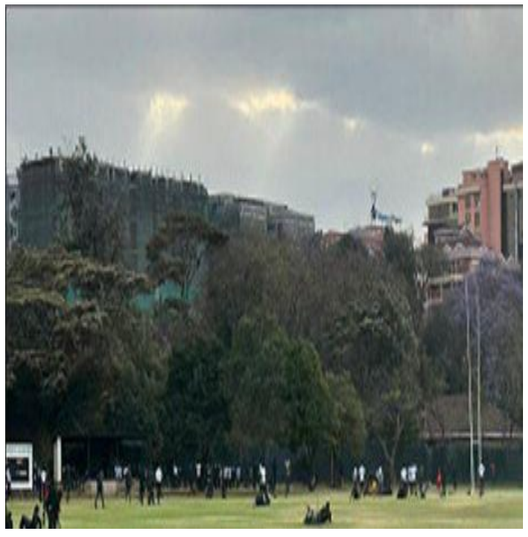
There is noise emanating from the traffic along Limuru road as well as the ongoing construction works. T

here is potential for noise distraction in the event the community joins the school for extracurricular activities in the field and the proposed recreation garden.

Site planning:

The classrooms have been placed further from the road.

The laboratories are the intermediate function, and therefore provide the buffer.



Playing fields
Source:author 2025

Olfactory
The school kitchen emits a lot of smoke which affects both the cooks and the students sleeping in the dormitory.

The school also has a lot of greenery which creates a refreshing atmosphere.

Kitchen area
Source: author, 2024

Responses:

- Increasing the ceiling height of the kitchen, and leaving a ventilation gap on top will assist in reducing the smoke pollution.

- Rooftop turbines can be used to create airflow to get rid of the smoke and encourage flow of fresh air into the spaces.

Rooftop turbines
Source: author, 2024

Olfactory
Dust from the ongoing and proposed construction projects pose a challenge to the air quality within the school.

The dumpsite smells can be upsetting especially during the rainy season.

Dumpsite
Source: author, 2024

Proposed dining hall
Source: author, 2024

Visual • The site captures scenic views of the background upland area, which includes the GTC. •

The view can be enhanced by having sitting area face that direction.

View of neighborhood from fields
Source: author, 2024

The views of the greenery within the school compound is captured from with in the classroom, offering a visual break from the concrete walls.

Greenery in school compound
Source: author, 2024

Tactile • For the proposed kindergarten, a sand pit can be included to encourage the kids to explore and interact with the different textures in the environment.

Sandpit
Source:https://creativestarlearning.co.uk/developing-school-grounds-outdoor-spaces/sandpits-outside-roar/

The different paving material also offer room for exploration in the environment.

Grass cover, shrubs and the variety of trees provide textures which complement each other.

Paving materials in school compound
Source: author, 2024

VEGETATION

1.Polyalthia longifolia

Polyalthia longifolia
Source: author, 2024

It is an evergreen species, maintaining its foliage year round.

Fairly deep root system, which makes it stable and suitable for urban areas.

• Drought-tolerant once established tolerates pollution, making it ideal for urban environments.

Strengths

- Excellent for use as a privacy screen or hedge due to its dense foliage and upright growth.
- Can also serve as a windbreak, especially in urban settings where wind tunnels are a concern.
- Ideal for narrow spaces, as its footprint is relatively small compared to its height.
- Its tolerance to pollution, dust, and poor soil makes it a suitable option for cityscape, streets capes, and industrial areas.

Weaknesses

- Despite its deep root system, its branches can be relatively brittle, particularly in stormy or windy conditions, leading to potential breakage.
- Susceptible to pests like scale insects and mites, which may require occasional pest management.

2.Ravenala madagascariensis

Ravenala madagascariensis
Source: author, 2024

Strengths

- Its ability to store water in the leaf bases offers an added point of interest.
- It can therefore be functional in areas where irrigation is irregular.
- The large leaves provide shade for understory plants.
- This makes it a useful element in layered plantings or tropical understory environments.

Weaknesses

Although it is a robust plant, its large leaves are susceptible to damage in strong winds, which can tear or shred the leaves and affect the overall appearance of the plant.

The root system is relatively shallow, making it less ideal for stabilizing soils on slopes or in areas prone to erosion.

3. Washingtonia robusta

Washingtonia robusta
Source: author, 2024

Strengths

Palm trees contribute significantly to the tropical and exotic aesthetic of the school's landscape.

Highly drought-tolerant once established, requiring minimal watering in dry conditions.

Palms are typically low-maintenance plants.

They are commonly used as focal points in gardens or landscapes due to their unique shape and striking appearance.

Weaknesses

Their overall canopy is often narrow, and they don't provide as much broad.

4.Grevillea robusta(silky oak)

Grevillea robusta
Source: author, 2024

Strengths

As it matures, Grevillea robusta develops a wide, spreading canopy that provides ample shade.

Grevillea robusta is quite drought-tolerant, making it resilient in urban heat islands.

Weaknesses

The wood of Grevillea robusta can be brittle and prone to breakage, particularly in high winds or storms.

The tree's roots can be invasive, potentially damaging nearby structures such as sidewalks, foundations, or plumbing if planted too close to buildings.

Due to its fast growth and irregular branching, grevillea robusta requires regular pruning to maintain an attractive shape.

5.Jacaranda mimosifolia

Strengths The tree's vibrant purple-blue flowers create a striking visual display.

Their broad canopy offers relief from the sun without being overly dense, allowing dappled light to filter through.

Jacaranda mimosifolia
Source: author, 2024

Weaknesses
The flowers, though beautiful, can create a slippery mess on sidewalks, driveways, and roads, requiring frequent clean-up during the blooming season.

6.Bauhinia variegata(Orchid tree)

Bauhinia variegata
Source: author, 2024

Strengths
The showy orchid-like flowers are a major feature.

They provide an impressive aesthetic appeal during blooming seasons.

Its medium size (6-12 meters) makes it versatile enough to be planted in both small residential gardens.

It also fits in well in larger public spaces without overwhelming the environment.

Weaknesses
Its beautiful flowers eventually fall to the ground, which can create litter issues.

Bauhinia variegata has relatively weak wood, making it vulnerable to wind damage

8.Karaka (Corynocarpus laevigatus)

Strengths •
Has a broad, dense canopy, making it an excellent choice for providing shade and privacy screening in urban and residential designs.

Weaknesses •
While the orange fruit is visually appealing, the seeds inside are

are highly toxic to humans and animals. • The large fruit and leaves can create litter, requiring frequent cleanup in high-traffic or manicured areas.

Karaka
Source: author, 2024

SHRUBS

1.Variegated Duranta (Duranta erecta 'Variegata')

Strengths
Aesthetic Appeal : leaves, which have a mix of green and cream or yellow margins.

Suitable for creating low to medium-height hedges, borders, or privacy screens.

Adaptability to contain ers and small spaces makes it ideal for urban landscapes, courtyards, and rooftop gardens where visual impact is needed without taking up too much space.

Variegated duranta
Source: author, 2024

Weaknesses
Duranta requires regular pruning, particularly when used as a hedge or border.

Duranta can be prone to common garden pests, such as spider mites, aphids, and whiteflies, especially in hot, humid environments.

Duranta can be prone to common garden pests, such as spider mites, aphids, and whiteflies, especially in hot, humid environments.

2. Cherry Laurel (Prunus laurocerasus)

A cherry laurel
Source: author, 2024

Strengths
They maintain their green colour color year-round, offering a lush, vibrant appearance throughout all season.

Is ideal for creating privacy barriers, sound insulation. Its ability to thrive in partial or full shade makes it versatile.

Weaknesses
All parts of the plant, especially the berries and leaves, contain toxic compounds like cyanogenic glycosides.

Pollen Sensitivity: not suitable for allergic people.

OPEN SPACES

1. Fields
For the most part the fields section at Jamhuri High School is covered with Kikuyu Grass (Pennisetum clandestinum) with few patches of exposed ground soil.

The grass is trimmed short to provide an even surface for sporting activities.

School playing fields
Source: author, 2024

2. Lawns Gardens
The open spaces between buildings at the sch are made up of lawns and gardens also covered with grass and fenced using short hedges of Variegated Duranta

Landscaping in school compound
Source: author, 2024

3. Hardscaping
The main driveway leading from the main gate to the administration offices and around the academic section is eroded .

Much of its surface material worn away leaving a surface of uneven ballast.

Maingate access
Source: author, 2024

The Pathways connecting the classrooms, labs, office and other facilities are paved using concrete slabs.

4.Quadrangle
The quadrangle is completely paved with interlocking concrete block pavement. This eliminates the chance to incorporate gardens, lawns, or other green spaces that could soften the area.

Quadrangle
Source: author, 2024

SOIL

The main types of soils are the black cotton and the red soils that form patches in different parts of the site.

The soils on site can be categorized under the Nairobi City soils which comprise of several spots of sensitive soils and variable/inclined ground profiles.

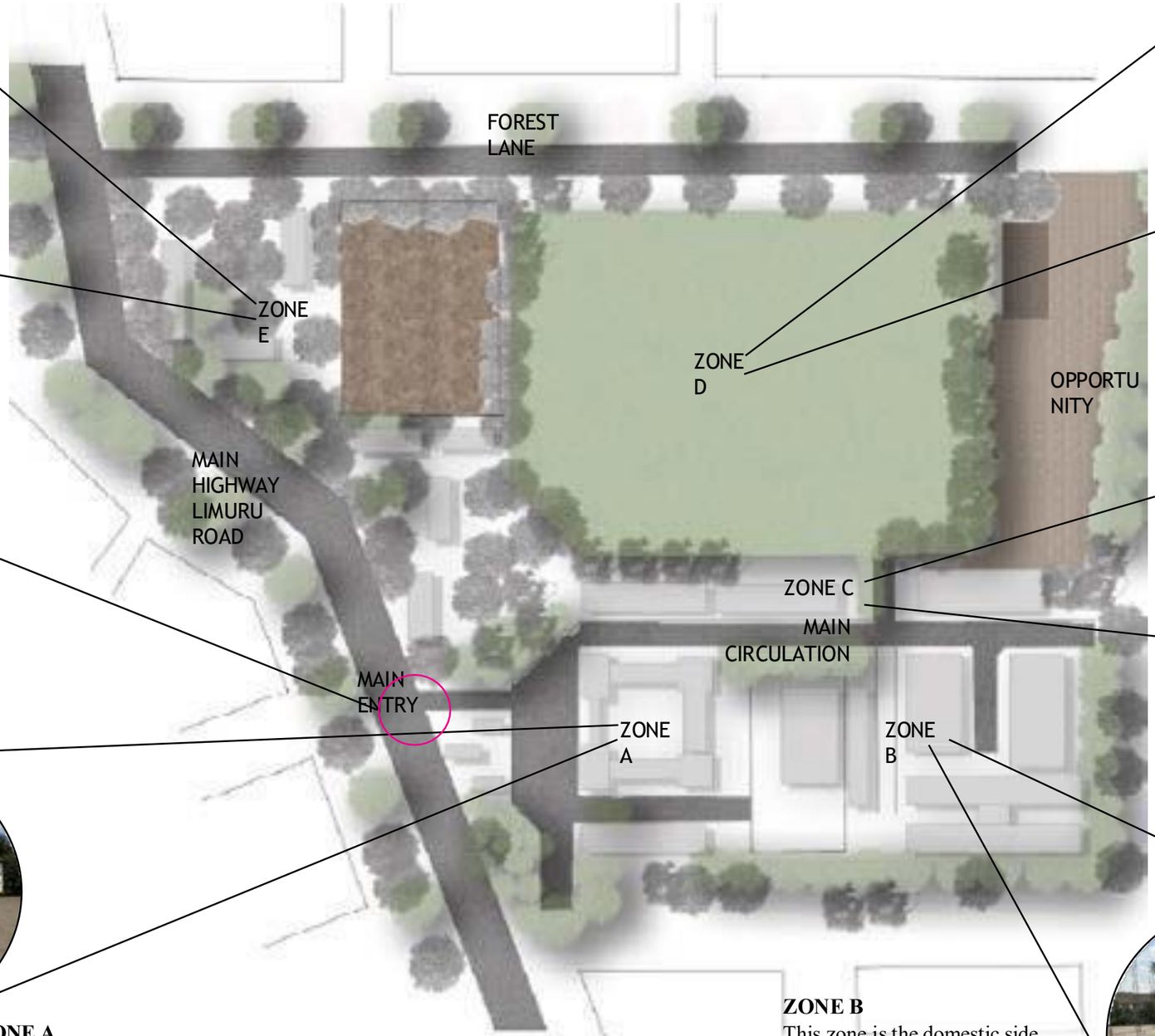
JAMHURI HIGH SCHOOL - GROUP THREE PERSPECTIVES

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

Stephen	Bett
Nderitu	Ezeani
George	Paschal
Mwaura	Anabwani
Rebecca	Bonvenja
Mwinja	Njoroge Joe
Mark	Thuo
Kahenya	Shelmith
Munyui	Kemunto
Geoffrey	Glen Karani
Bernice	Mageto Maina
	Onditi Theo

SITE MASTERPLANNING BREAKDOWN (INVENTORY)

MASTERPLAN



ZONE E
The residence for most of the teachers. though well organised, there seems to be a waste of space as aschool facilities are all crowded in one small location but vast spaces left for widely spaces houses meant for the teachers.

ZONE D
The school field.. well located with ample space for all students to engage in their activities.. Its also away from major roads thus discouraging misbehaviours or accidents in relation to the its immediate surrounding.

ZONE A
Administration zone.. where formal learning and official spaces of the school are located

Defines the core of the school and structures are meant to be retained as it refclects the true identity of the school.

ZONE C
These are new blocks for form 1 and 2 students. nearer to the administration side but has a different feel from the actual core of the school.

The structure feels foreign in its architectural language and off in positioning in responce to the entire scope of the school.

ZONE B
This zone is the domestic side of the school where students get to do their domestic home activi- ties. ie eat sleep and shower

It has a challenge though as most spaces haven't been thought through and positioning of structures isn't sequential.

BREAKDOWN

ZONE A
Analysis: This space forms the core and identity of the school. hence, the approach towards this is a conservative one. where the goal is to loudly
express this language with additional architectur- al features,

An opportunity to better the landspaing of the space so that the structures around appear more pronounced.

ZONE B
The domestic side has a large student traffic, less green areas and seems not be addequate- ly planned. for a better flow of activities and a smooth transsition between spaces within the school, a proper redo? redesign of this area is recommended.

there is an additional space just behind the school field where the spaces can comfortably pour into, making the section an L shaped space.

ZONE C
The form 1 and 2 block, though nicely designed, has been sandwitched between 2 traffic heavy zones, ie, the school's main circulation route and the school field. This translates to more dusty classrooms cause of traffic and noise polution for the students.

Relocation the circulation route and replacing with green spaces, or rather, allocation a new function for the classes can work. among other proposals.

ZONE D
Despite poor mater planning of the school, the field if a strong feature and its position is well placed. giv- ing all students good enough space to do their extra activities.

though it should be a last resort, eating a bit into this fied to create more room for additional green space and structures for the administration side is encour- aged.

ZONE E
The teaches quaters, though well organised and addequately planned needs to be reduces cause the school has a scersity of space for adddictional functional structures such as classrooms and dormitories.

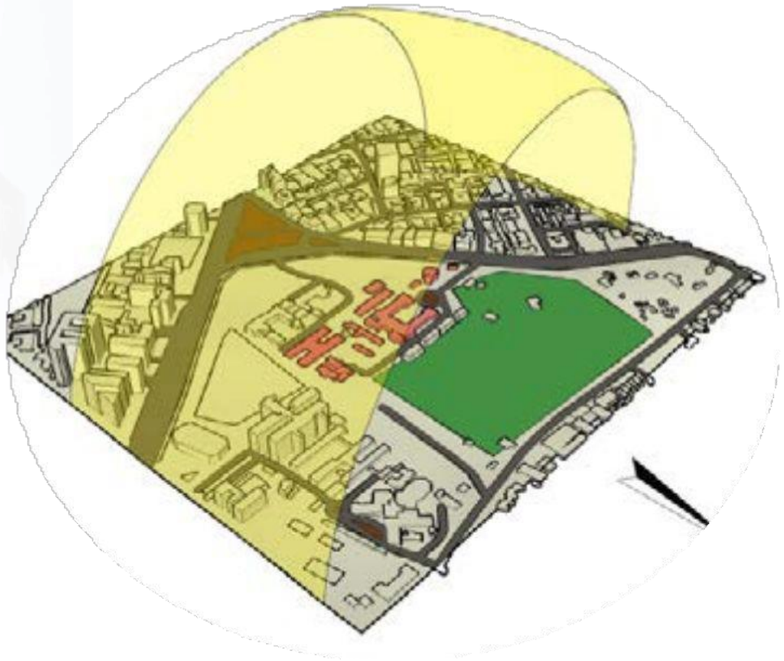
Amore communal layout is encouraged as teach- ers residing within the school need to be closer to each other to further enhacne the brief 's goal which is to create a community of belonging among the users of the rschool complex.

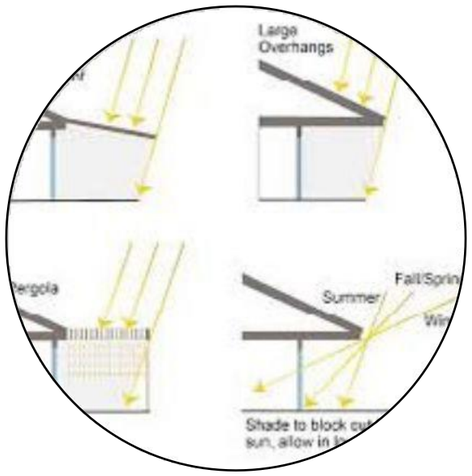
CLIMATE ANALYSIS

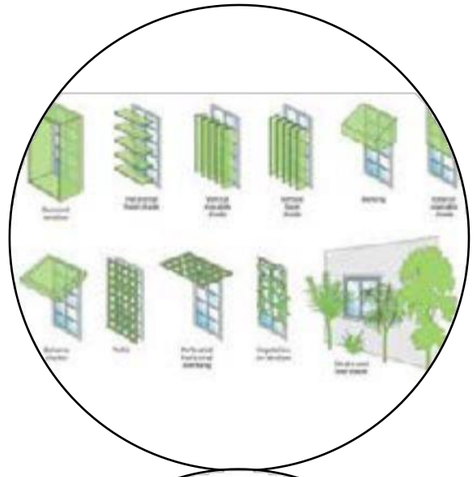
SUN DIRECTION

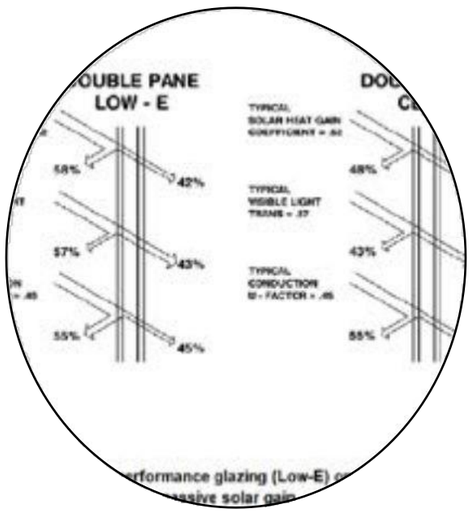
nairobi has a temperate climate with sunny days mostly in the dry months

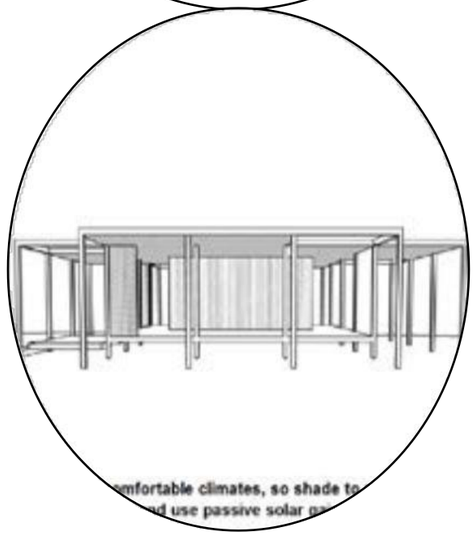
jamhuri lies in the tropics and hence longer hours of sun would mean exposure to a lot of solar radiation







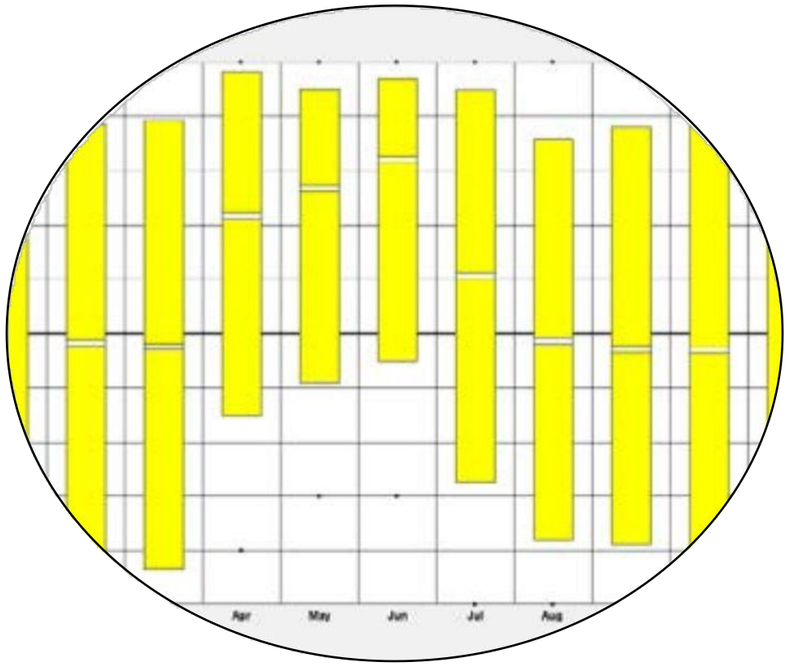


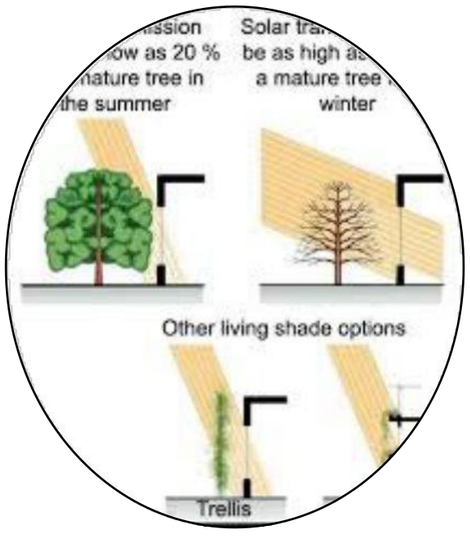


CLOUD COVER

cloud cover increases during rainy periods and vice versa hence .

the dry seasons of june and october often feature more sunshine and clearer skies





SITE CONDITIONS

HUMIDITY

Jamhuri experiences moderate humidity levels ranging from 50% to 80%

humidity is generally higher during the rainy seasons (march to may and october to december)

and lower during dry months (june to september)

RAINFALL

Most rainfall (rainy season) is seen in April and November.

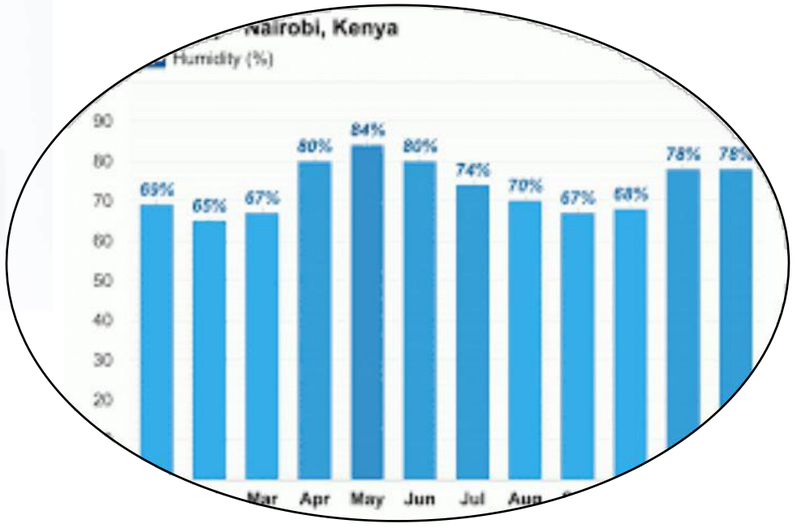
Nairobi has dry periods in July, August and September.

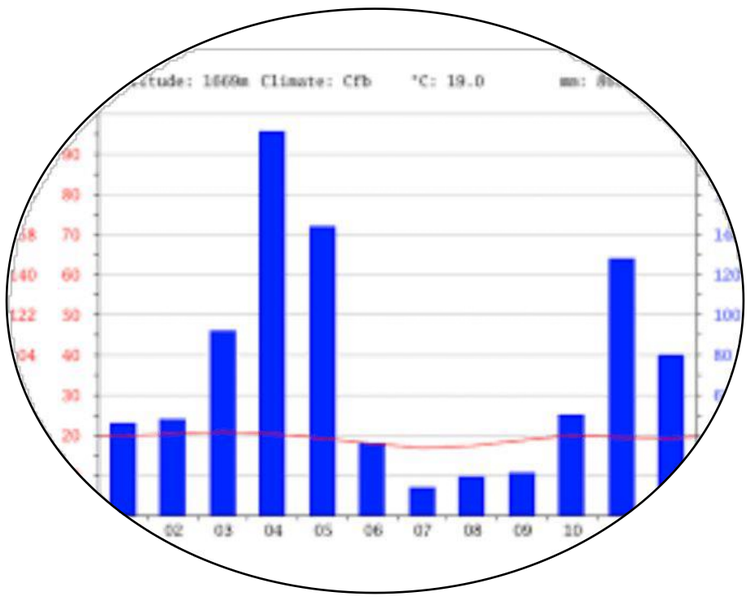
On average, April is the wettest month with 136 mm of precipitation.

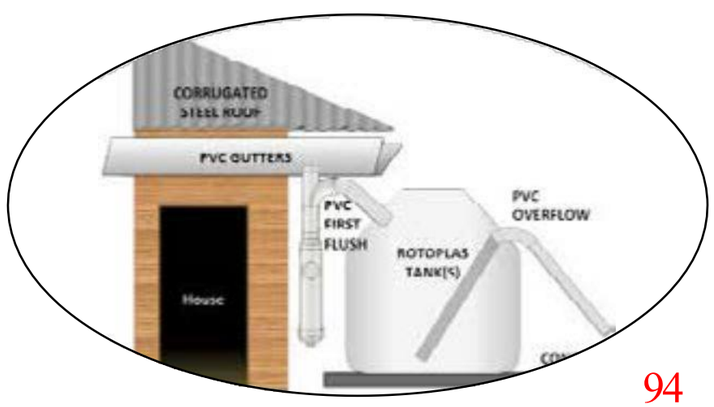
On average, July is the driest month with 17 mm of precipitation.

The average amount of annual precipitation is 698 mm.

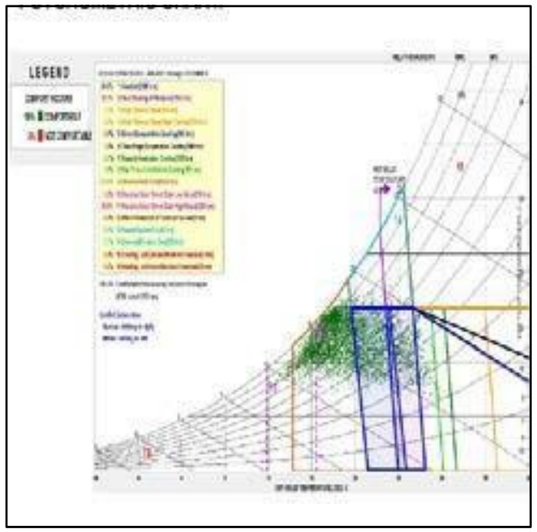
SITE CONDITIONS

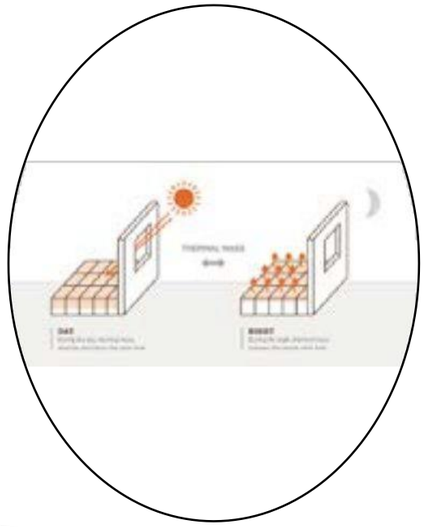


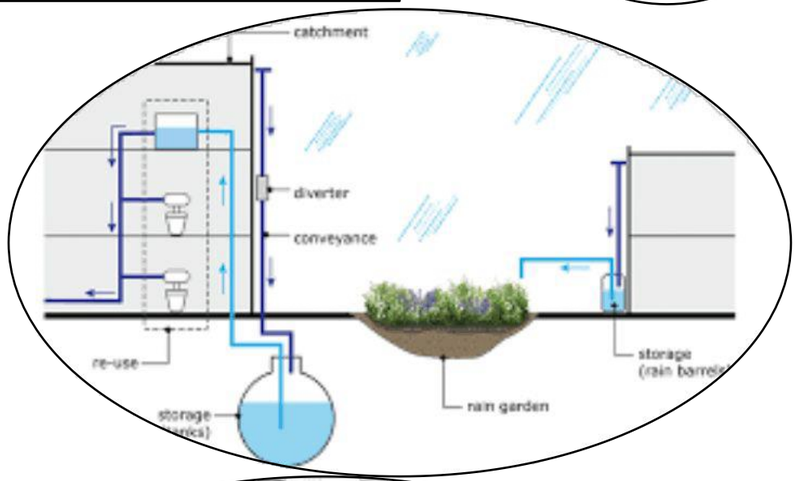


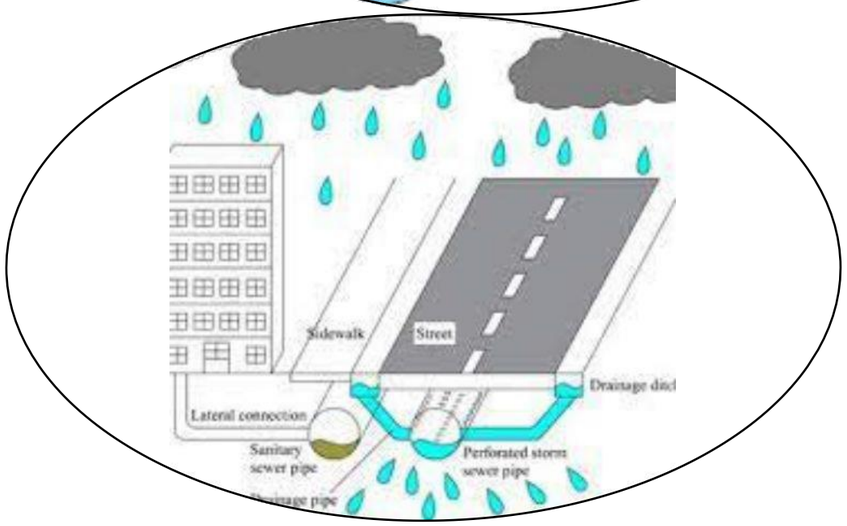


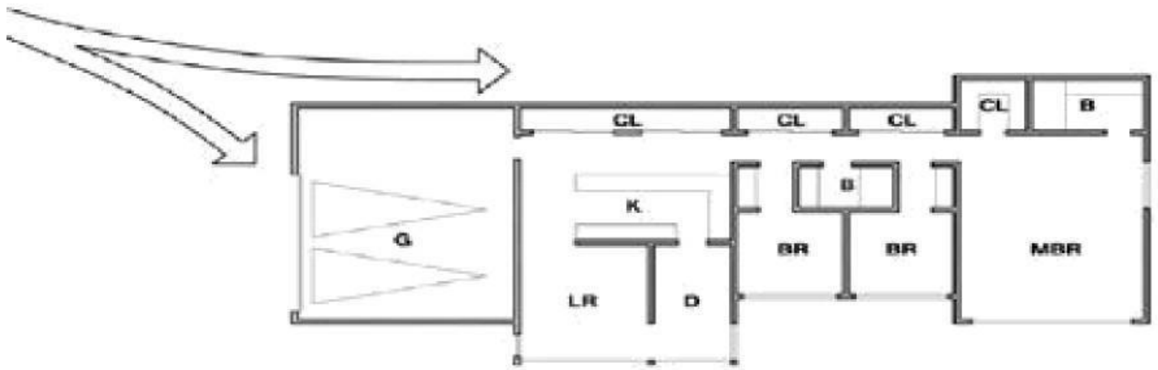
RESPONSES





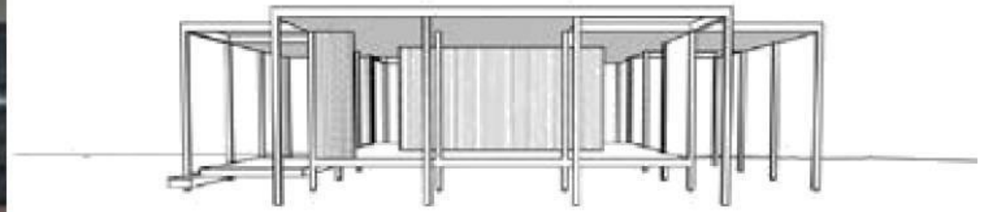






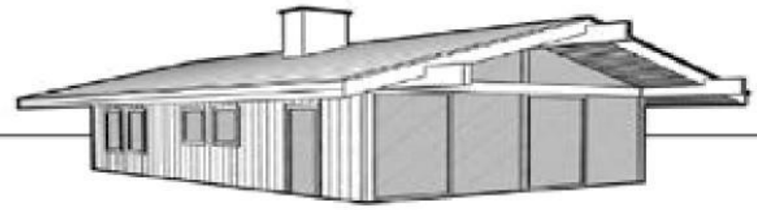
14

Locete gnmgen o r nrorege nrens o‹+ rhe sizfe or the n ui let i‹\ g rnnln g rhe colaeer
wJr1d Eo oeïr:• i‹1s L›late



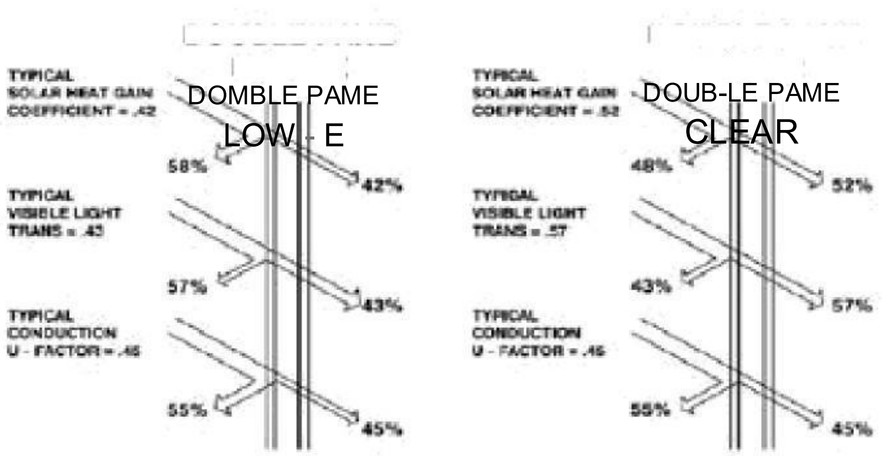
58

Th a is one of the more comfonahle climates. do shade to prevent oyerhezting.



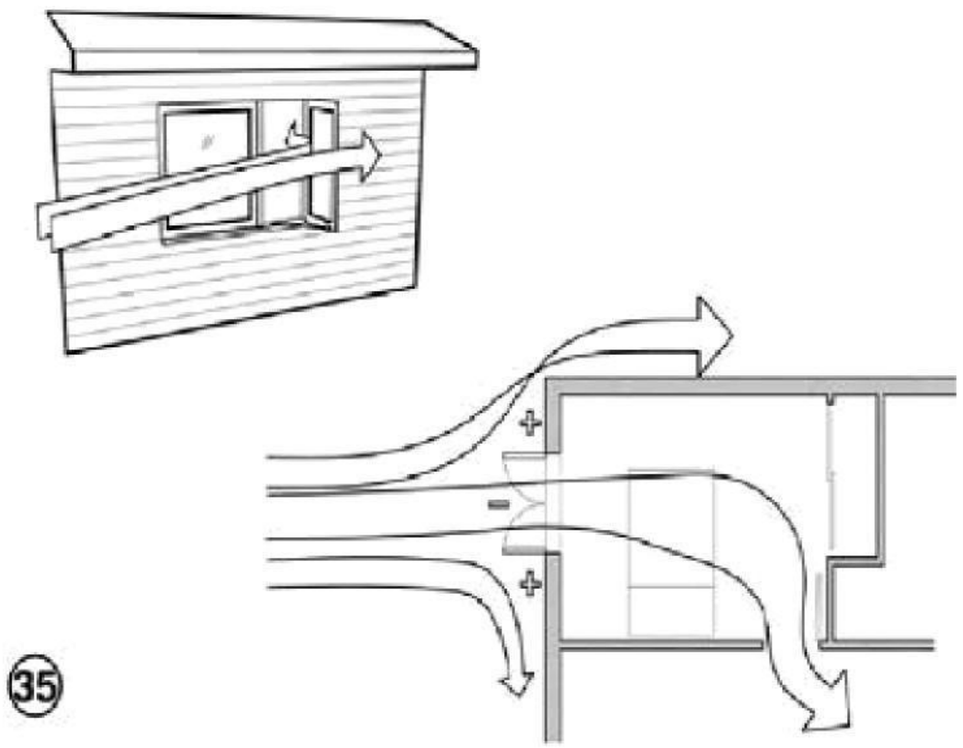
55

Low pitched roofs with wide overhangs works well in temperate climates



20

Pro'zide double pana high perform snce g\s‹ing (Low E} on ma st, south, and ease, b ut clear on n onh for maximum posatve solar g«ir.



35

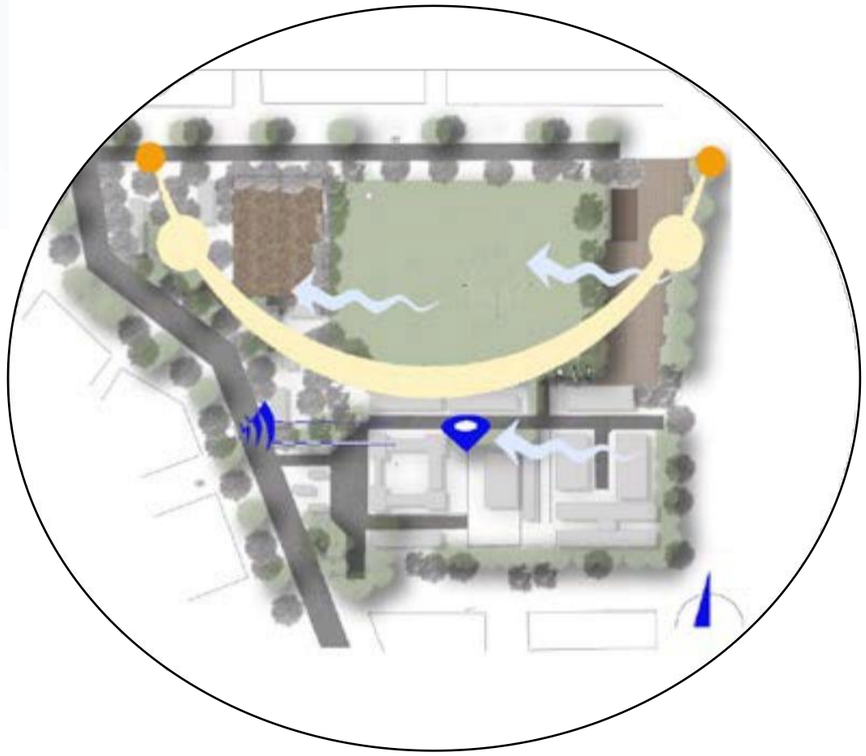
aod natural ven!ilaflD€l Cgn redUEB 0E Blim.nate air cDnditioning .n eruit ”wather,
yrtndons are wall shaded and oriented lo prevailing bieezes

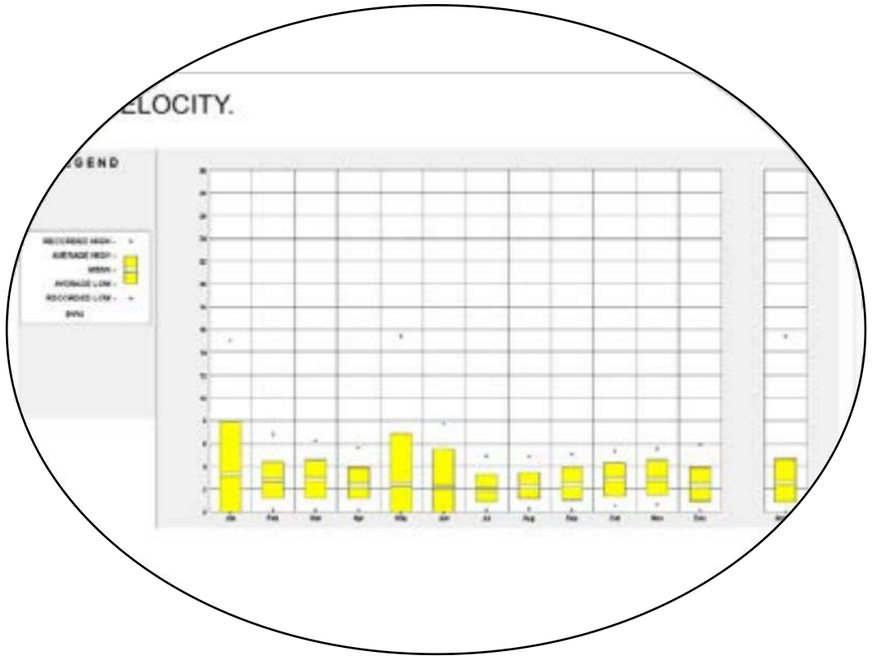
SITE CONDITIONS

WIND DIRECTION AND WIND SPEED

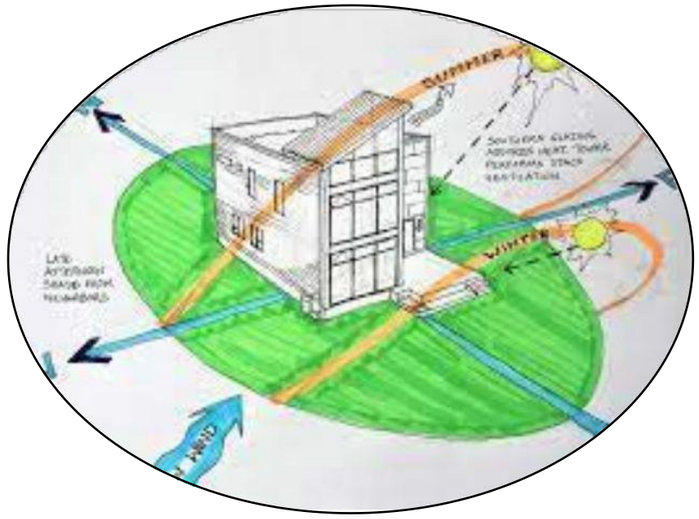
prevailing winds generally come from east to south east
wind speeds are typically mild, averaging around 5 to 10 km/hr , and occassionally increase durng storms

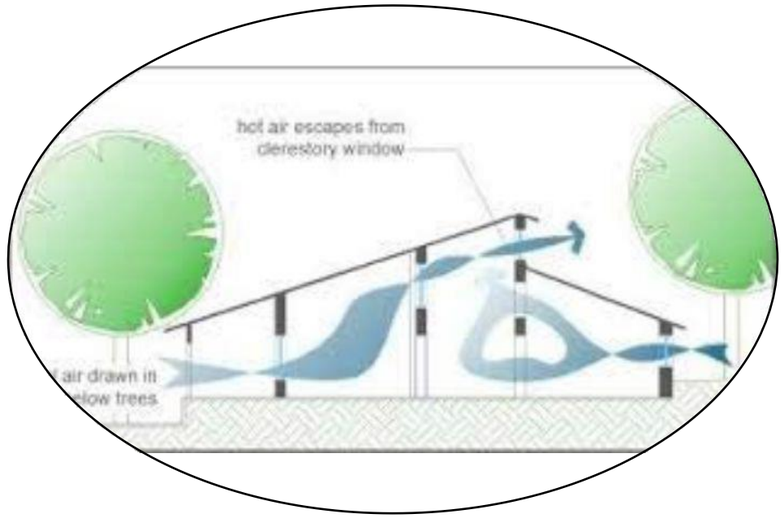
SITE CONDITIONS

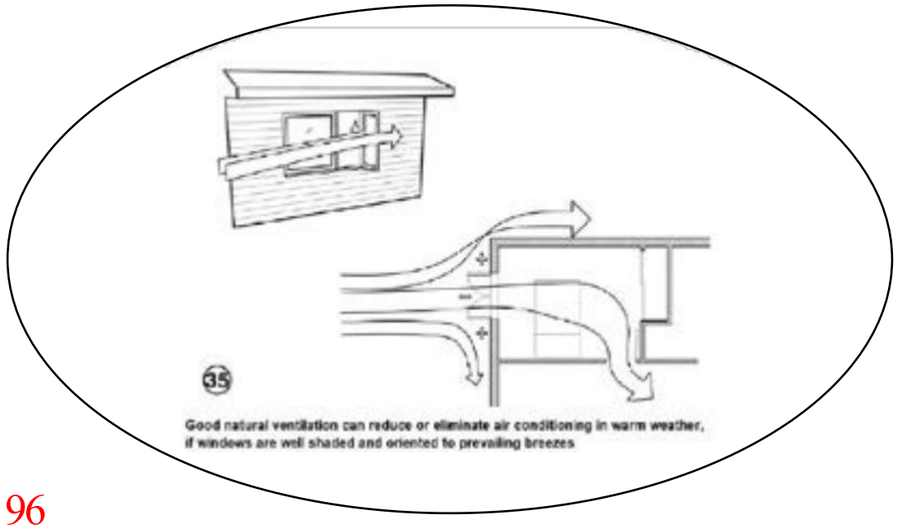




RESPONSES





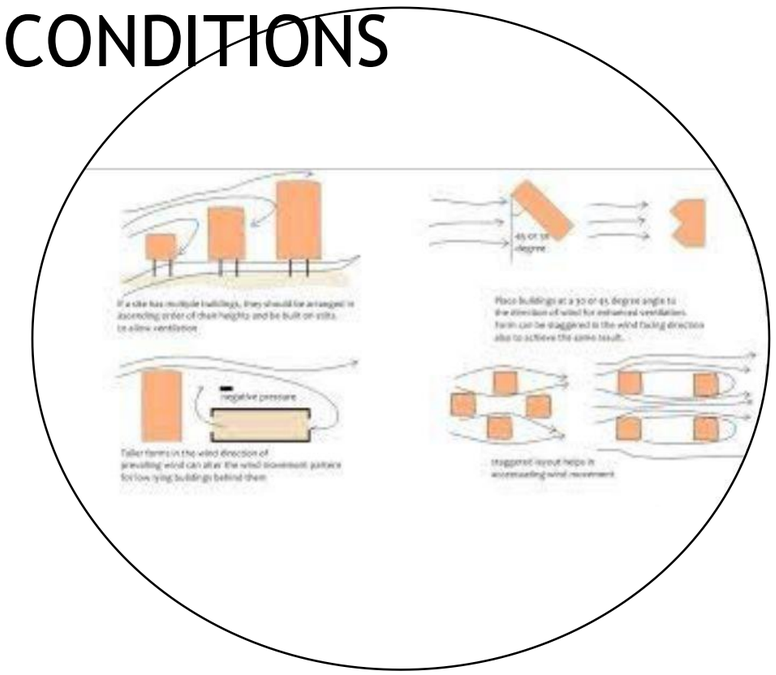


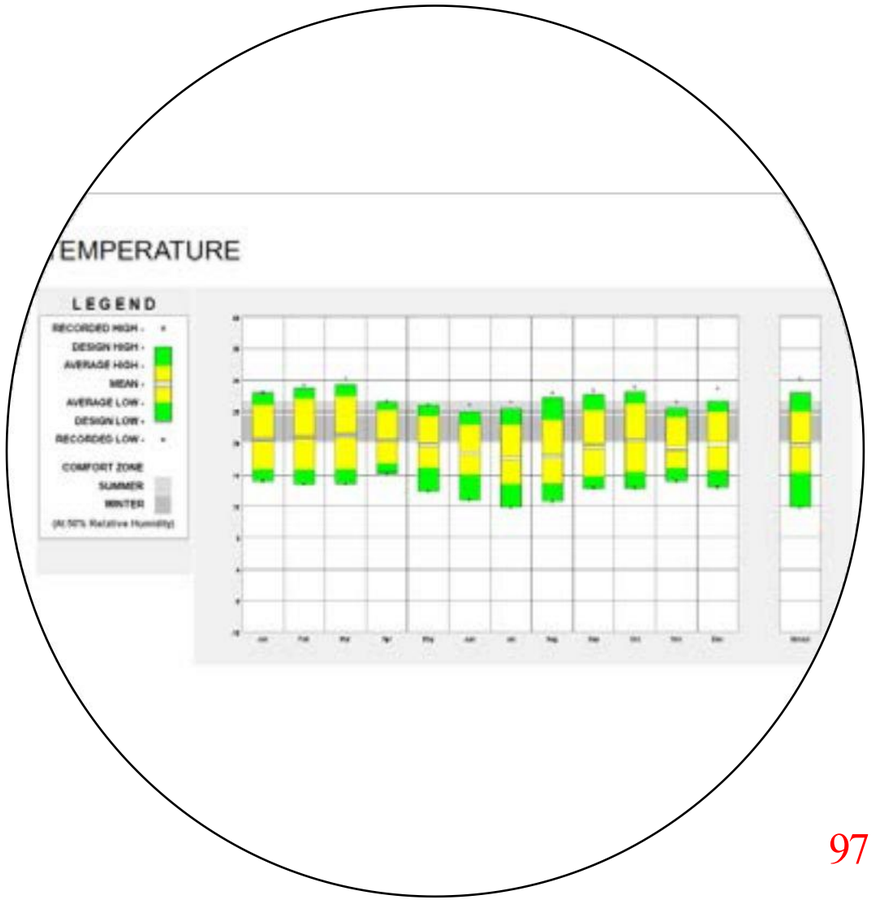
SITE CONDITIONS

TEMPERATURE

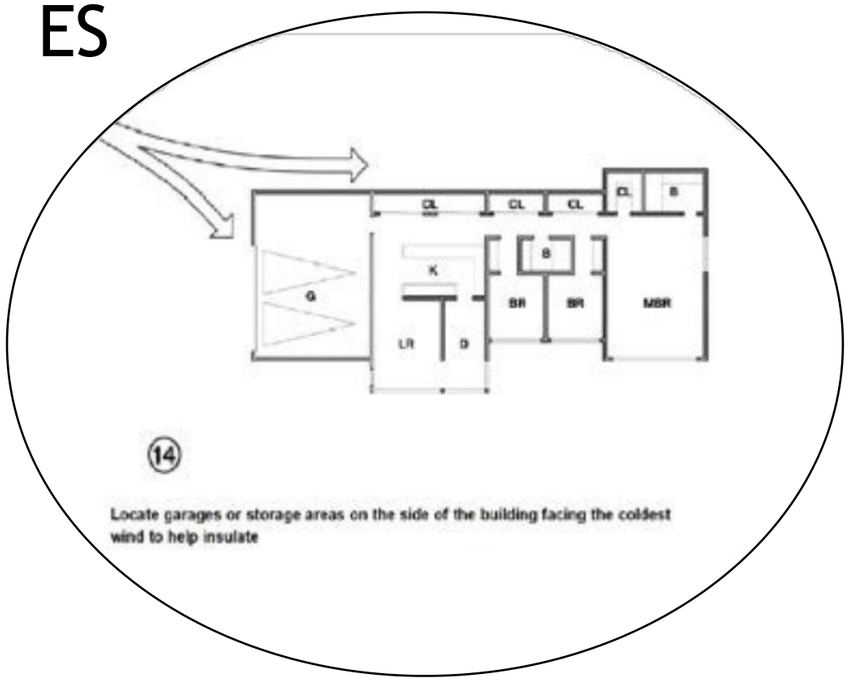
jamhuri lies in the tropical climate, mostly characterised by a good amount of sunshine temperatures can range from 27 deg february to 12 degrees july

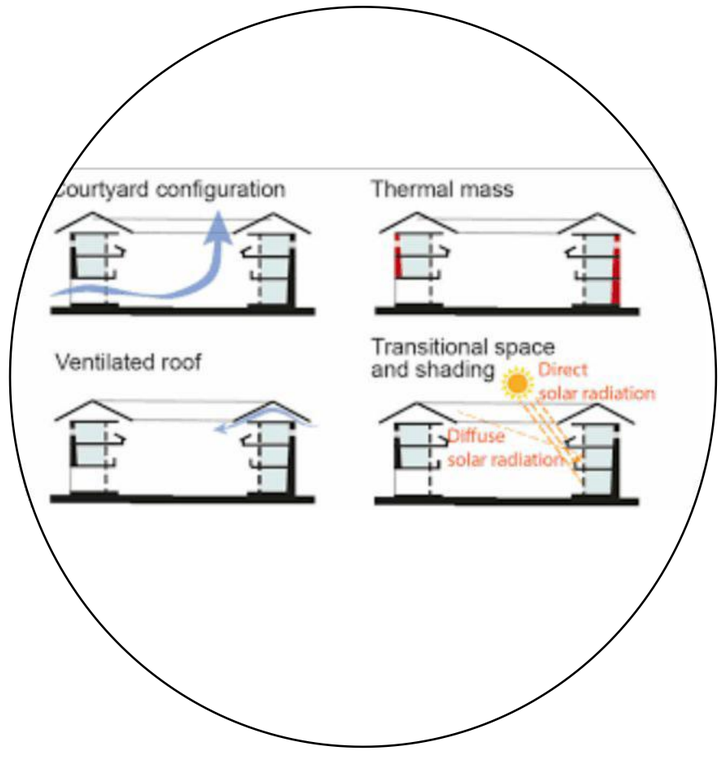
SITE CONDITIONS



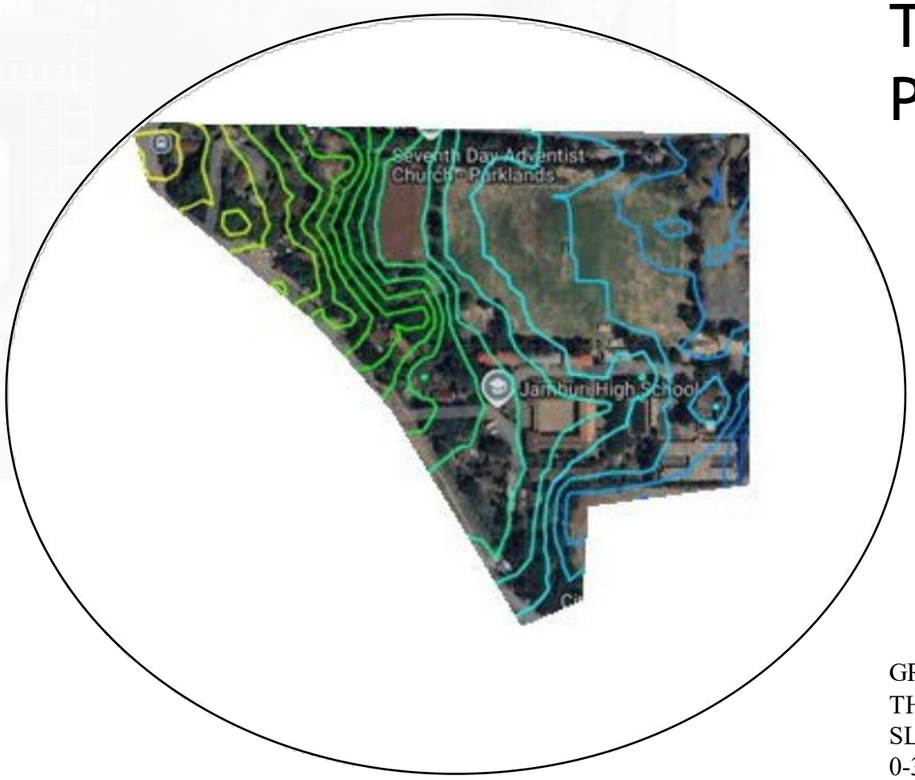


RESPONSES





TOPOGRA
PHY



GRANDIENT
THE GRADIENT OF THE SLOPE OF THE SITE IS 2% .
0-3%(ALMOST NO SLOPE)

SOIL

SOIL TYPE IS BLACK TO DARK GREY-BROWN CLAYS.
HERE ARE SOME CHARACTERISTICS :
-POOR PERMEABILITY:DARK CLAY SOILS GENERALLY HAVE VERY LOW PERMEABILITY,MEANING WATER MOVES THROUGH THEM SLOW- LY,WHICH CAN CAUSE DRAINAGE PROBLEM .
-NUTRIENT-RICH:DUE TO THEIR FINE STRUCTURE AND ABILITY TO HOLD NUTRIENTS,SO THE SOIL CAN BE FER- TILE.
-SOIL STABILITY:THESE CLAYS CAN PRESENT CHALLENGES IN CON- STRUCTION DUE TO THEIR INSTABIL- ITY.

-SHRINK-SWEEL BEHAVIOR:CAN CRE- ATE PROBEM FOR FOUNDATIONS,PAVE- MENT,AND SLAB,WHICH MAY CRACK OR SHIFT OVER TIME DUE TO UNEVEN SET- TLEMENT.
-CRACKING DUE TO DRYING

RESPONSES

-USE DEEP FOUNDATION TO MINIMIZES THE EFFECT OF THE EXPANSIVE OR SKINK- AGE.
-INSTALL PROPER DRAINAGE SYSTEMS WILL HELP REDUCE WATER RETENTION.
-DESIGN FLEXIBILITY REDUCE RISK OF CRACKING
-AVOID EXCAVATION DURING WET PERI- ODS TO AVOID WORKING WITH ATURATED CLAY.

VEGETATION

Crataegus paenopyrum this a tree :

-often used in landscapingpro- duces attractivewhite flow- ers there fore it has aesthetic value.

-biodiversity by providing food for birds.

Tolerant in high wearther condition.

-wind breaker. Response:

-the building footprint should be atleast 6m away from the tree.

Agave americana marginata this tree:

-requires minimal watering

-it can survive hostile weath- er conditions.

-requires lowmaintenance- and has aesthetic appeal

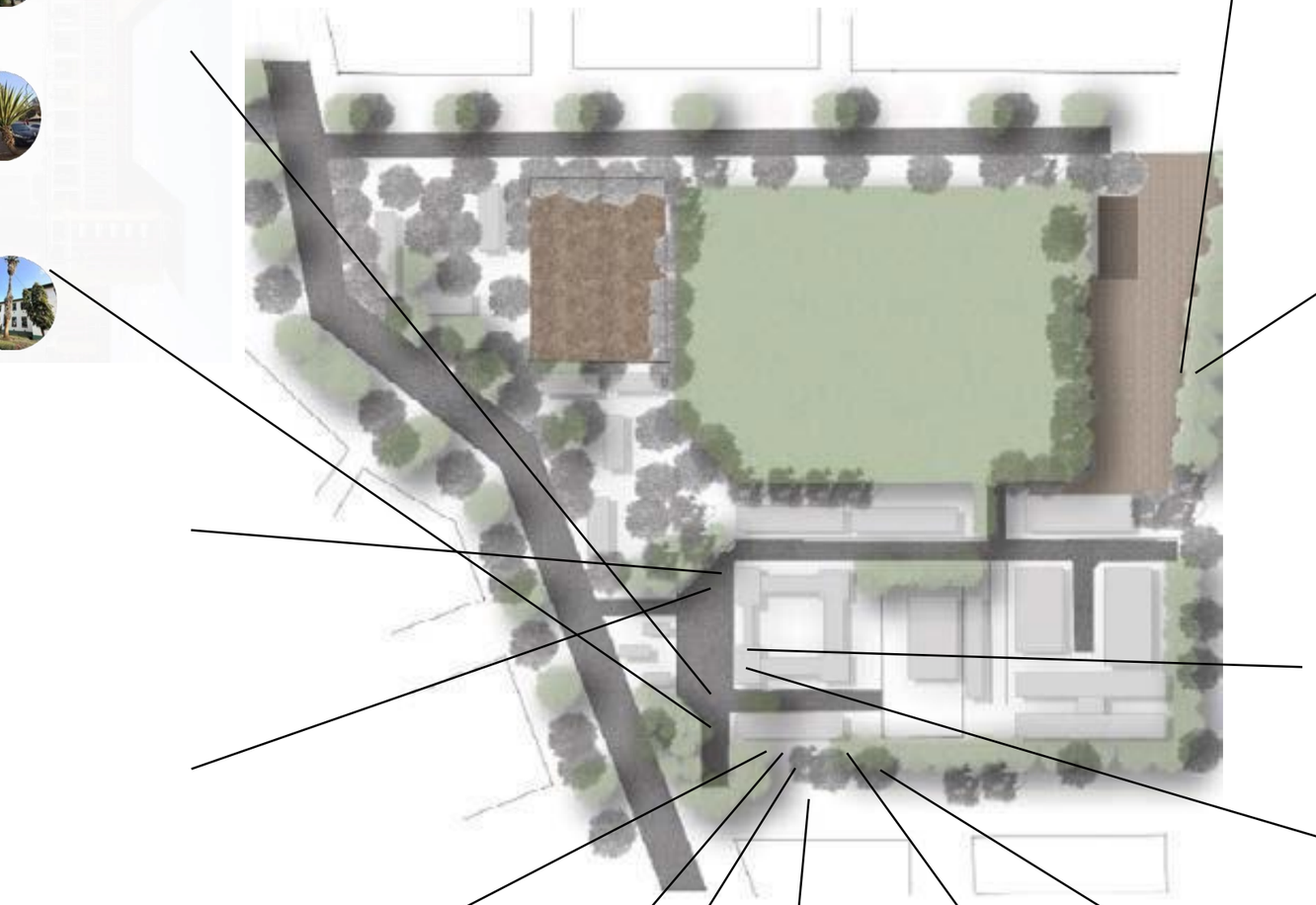
-thorns. Responses:

-it should out reach of child- enbecause of its toxicity and can irritate the skin.

Palm tree

This tree provides:

-aesthetic appleal , culture importance and contextual. Responce:the tree should be maintain for its con- textual benefits.



BANANA PLANTS
THIS TREE:
-HAS NUTRITIONAL VALUE AS IT IS RICH IN VITAMIN C,POTASSIUM,..
-EASY TO GROW AND MEDICINAL USES.
-PRONE TO DISEASES LIKE PANAMA DISEASE.
-REQUIRES LARGE AMOUNTS OF WATER.
RESPONSE:
CAN STAY IN THE SITE TO HELP IN (CBC)EDUCATIONPURPOSE AND NU-
TRITIONAL IMPORTANCE.

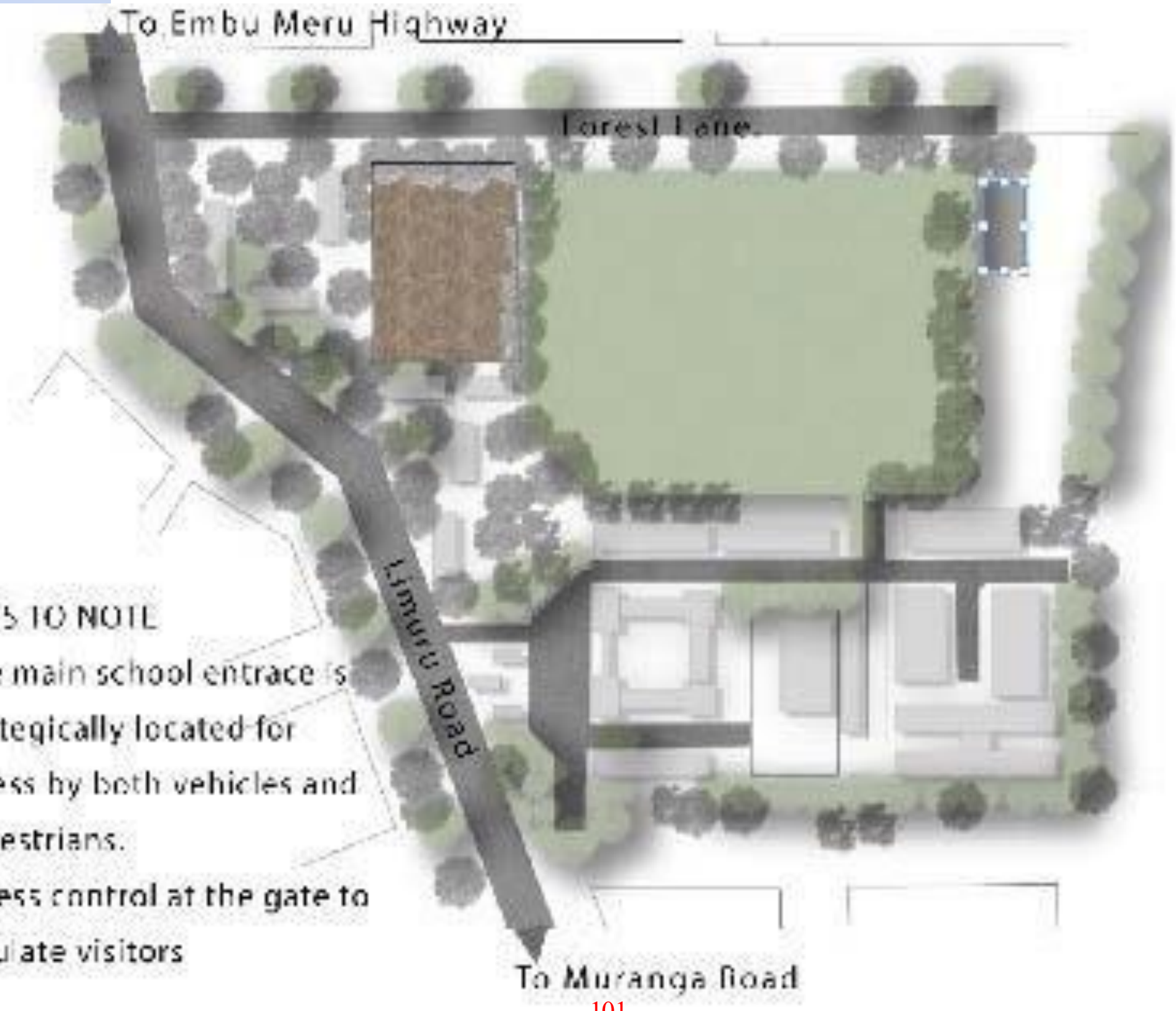
JACARANDA
THIS TREE :
-PROVIDE PURPLE FLOWERS WHICH CREATE A BEAUTIFUL ENVIRON- MENT.
-IT GROW LARGE AND SPREAD WIDE ,ATTRACTS BIRDS.
-DOES NOT REQUIRE HIGH WATER QUANTITIES AND PROVIDE AIR QUALITY IMPROVEMENT.
-THIS TREE HAS LARGE ROOTS AND REQUIRES HIGH MANTEANCE RESPONSE
MAINTAIN TO PRESERVE AESTHET- IC QUALITY AND EDUCATION PUR- POSES.

RHAPHIOLEPIS BIBAS
THIS TREE :
-PRODUCES EDIBLE FRUITS.
-HAS MEDICINAL BENEFITS AS ITIS USED IN TRADITIONAL MEDICINEPARTICULARLY FOR RESPIRATORY HEALTHAND DI- GESTION.
-HAS AESTHETIC QUALITIES AND CAN GROW IN A VRIATY OF SOIL.
`RESPONCE
-TE SHOULD BE MAINTAINED AND CONSERVED TO KEEP ITS BENEFICIAL QUALITIES.

POLYANTHA LONGIFOLIA
THIS TREE:
-HAS AESTHETIC APPLEAL.
-PROVIDE GOOD SHADE DUE TO ITS DENSE FOLIAGE
-NOISE AND DUST REDU. CTION AND PURIFY AIR.
-WIDE ROOT SYSTEM.
RESPONCES:
-ALLOW SUFFICIENT SPACE FOR ROOT EXPANSION.
-MAINTAIN TO PRESERVE AESTHETIC.

ACCESS FROM CBD

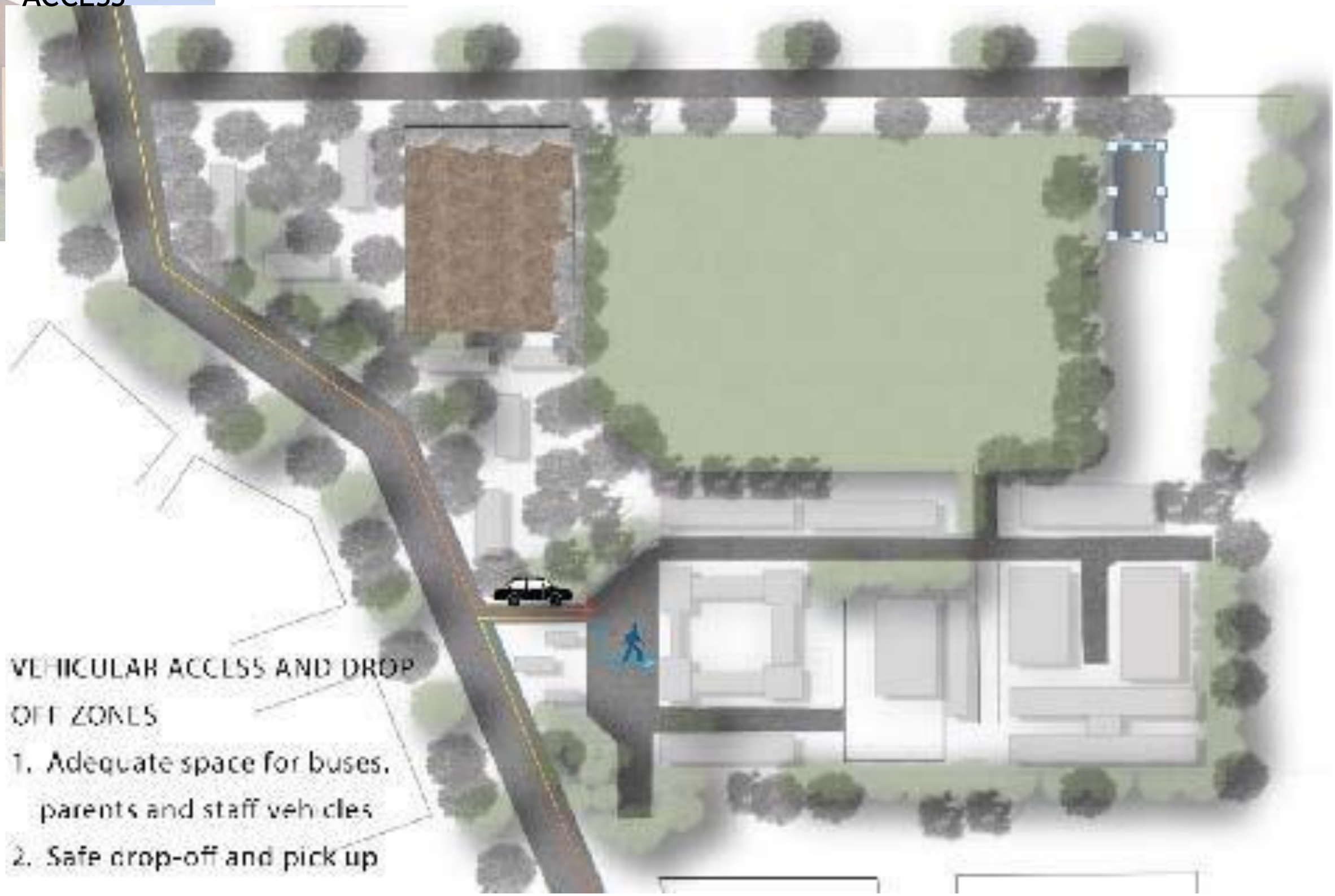
CIRCULATION WITHIN THE SCHOOL



POINTS TO NOTE

1. The main school entrance is strategically located for access by both vehicles and pedestrians.
2. Access control at the gate to regulate visitors

VEHICULAR ACCESS



CIRCULATION WITHIN THE SCHOOL

1. Newly built block
2. Newly built block
3. Schoo s canteen
4. Dining Hall
5. new dining hall
6. Pool
7. Parade ground
8. Newly built dormitory
9. Laboratories

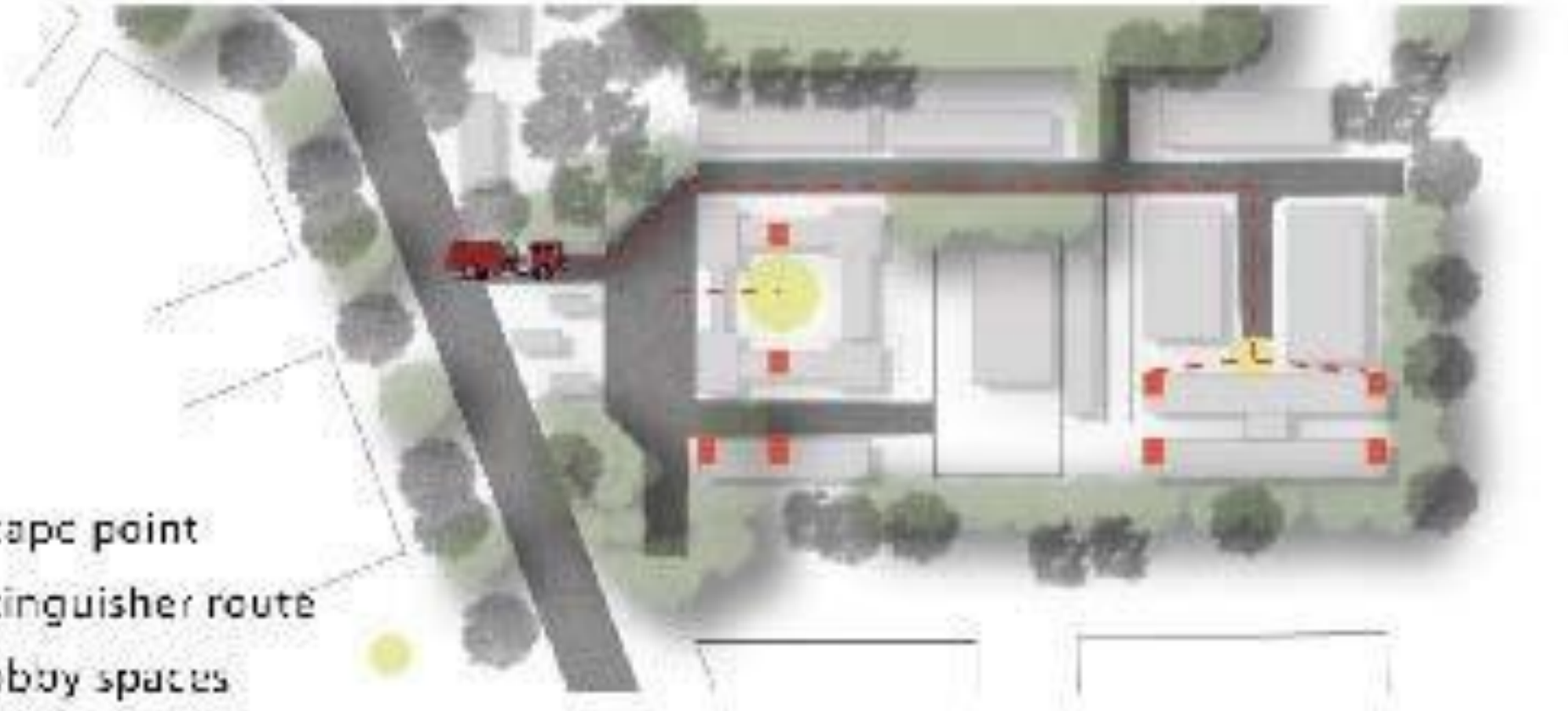
Things to note:

1. Smooth transitions between functions
2. Efficient access to shared spaces
3. Proper master planning to accommo date change

Circulation inside the School

POINTS TO NOTE

1. Clear and well marked fire escapes and escape routes
2. Distance from classrooms, dormitories etc to the nearest exits
3. Clear escape routes to avoid stampedes and confusion.



DRAINAGE

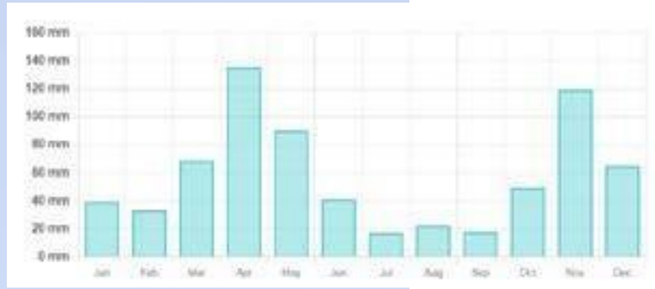
HYDROLOGICAL ANALYSIS

APRIL RECIEVES THE HIGHEST RAINFALL -138mm/

-CALCULATION OF SURFACE RUN OFF BY SCS CURVE NUMBER METHOD.

SOIL TYPE

DARK GREY-BROWN CLAY
-HIGH WATER RETENTION.
-LOW INFILTRATION .
-POOR DRAINAGE - WATERLOGGING
-CURVE NUMBER 70-85



formula.
:

$$Q=\frac{(P-0.2S)2}{P+0.8S} \qquad S=\frac{25400-254}{CN}$$

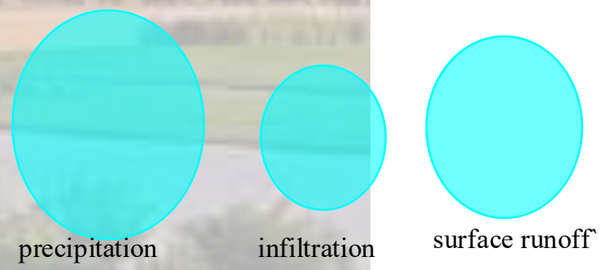
WHERE :

THEREFORE

$$S=\frac{25400-254}{85}=44.82$$

$$\text{therefore } Q=\frac{(138-0.2*44.82)2}{138+0.8*44.82}$$

surface runoff Q= 95.77mm
where : Q- surface runoff (mm)
P-precipitation (mm)
S-potential retention



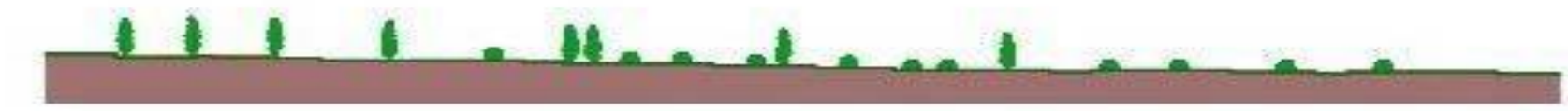
CONCLUSION

HIGH PROBABILITY TO FLOODING

SITE DRAINAGE INFRASTUC-TURE IN RESPONSE TO FLOOD-

STORM WATER MANAGEME INFRASTRUCTURE

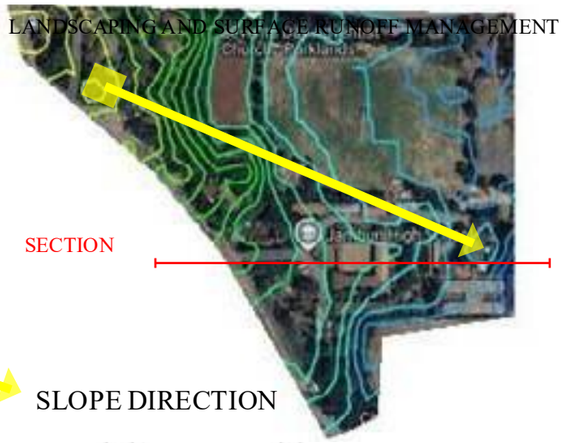
DRAINAGE



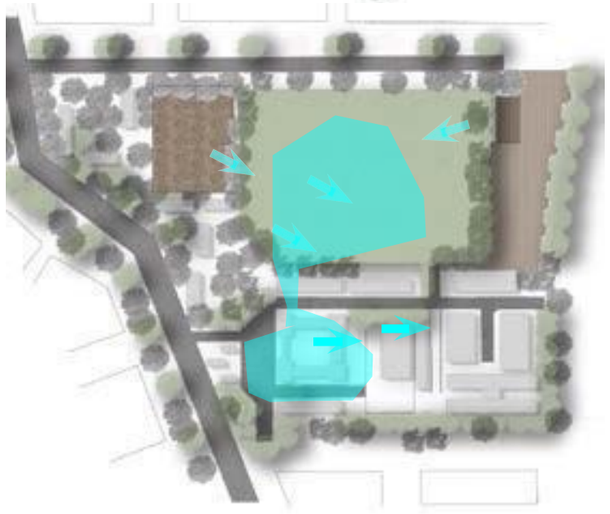
-SLOPE GRADIENT OF THE SITE IS 2%

SLIGHTLY GENTLE TO NO SLOPE

LANDSCAPING AND SURFACE RUNOFF MANAGEMENT



SLOPE DIRECTION



FLOODS PRONE ZONES

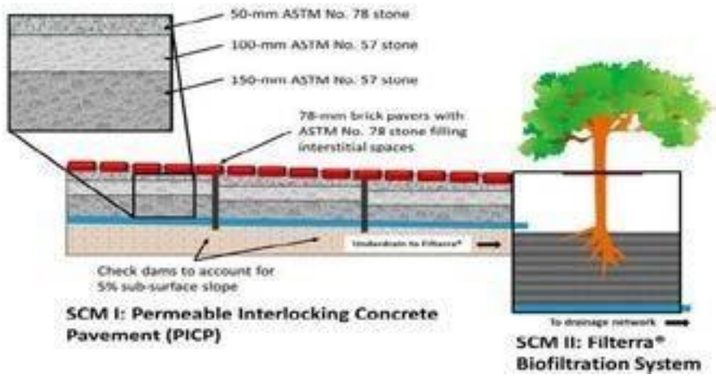
SURFACE RUNOFF FLOW DIRECTION

SUGGESTED SURFACE RUNOFF CHANNEL FLOW DIRECTION

RESPONCE

PERMEABLE PAVEMENT

SUSTAINABILITY MEASURES



STORM WATER STORAGE FOR IRRIGATION IN DRY SEASONS

DEVELOPMENTAL RULES AND ZONING REGULATIO

SITE INFORMATION

Site is located within st[illegible]b-county hence falling under the starehe sub county zoning [illegible]nations.

The area is classified as a commercia[illegible]ntial highrise area.

The site covers an area of 40 acres wh[illegible]t 161874 m².

ZONING REGULATIONS

Building line

A set back of between 6 to 9 meteres is required from the main road for future road expansion, utility lines and pedestrian pathways.

Building height

The allowed building height withing Starehe sub-county is 25 storeys.

Ground coverage

The ground coverage within Starehe sub-county is 80% of the entire plot size.
For schools, ground coverage of 50% of the entire plot size is recommended to provide enough space for playgrounds and open areas.

Plot ratio

The plot ratio within Starehe sub-county is 150% of the entire plot size.

GROUND COVERAGE
50% of 162000m2
Hence ground coverage is 81000m²

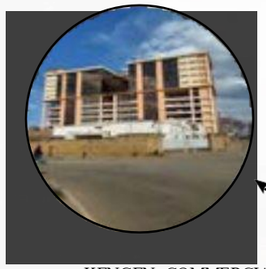
PLOT RATIO 150%
of 162000m2
Hence total floor area is 243000m²

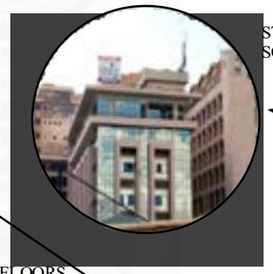
RESPONSES

Development of low rise buildings which blend in with the existing building heights of the school.

Design of open spaces which provide adequate lighting and ventilation to spaces.

NEIGHBOURHOOD AND CONTEXT



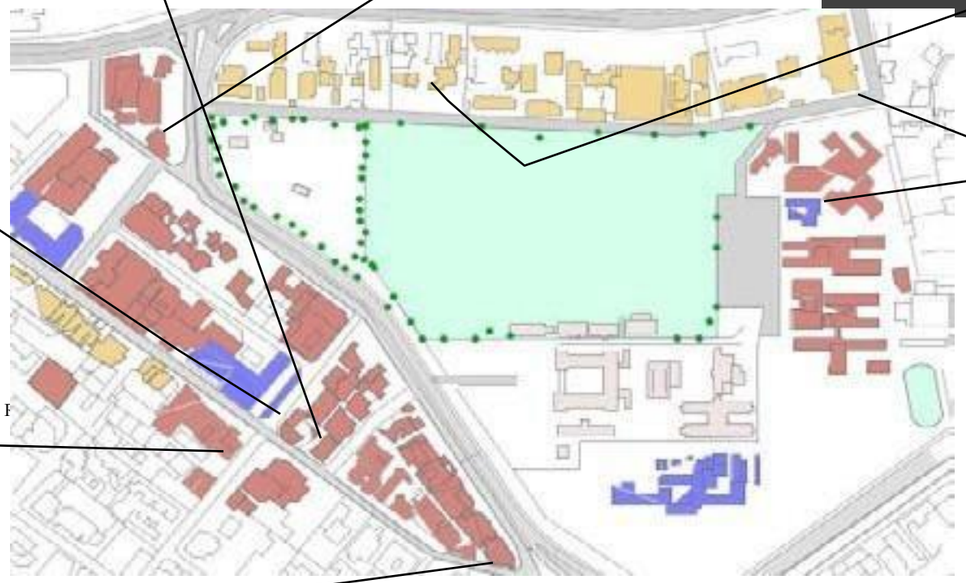


STIMA PLAZA ANEX-COMMERCIAL SOUTH SIDE

KENGEN- COMMERCIAL, 11FLOORS SOUTH WEST SIDE

A RESIDENTIAL BUIDING SOUTH SIDE

NAROBI TRANSIT HOTEL COMMERCIAL, 5 FLOORS, OUTH WEST SIDE



LEXON HOUSE-COMMERCIAL-9 FLOORS,WESTERN SIDE

RESIDENTIAL-NORTH EAST SIDE

KENYA INSTITUTE OF CURRICULUM DEVELOPMENT- INSTITUTION-8 FLOORS, NORTH WEST SIDE

RESIDENTIAL-NORTH WEST SIDE

RESPONSES

VEGETATION- SOUTH SIDE

LEGEND -

INSTITUTIONS

COMMERCIAL

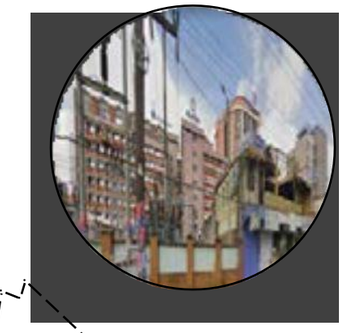
RESIDENTIAL

VEGETATION

- THE OLD RESIDENTIAL BUILDINGS IN THIS NEIGHBOURHOOD WERE BUILT AROUND 1930 & 40 (ART DECO AND MODERNE STYLE)
- CURRENTLY, THE NEIGHBOURHOOD COMPRISES OF RESIDENSE, INSTITUTIONAL AND MAJORLY COMMERTIAL BUILDING
- MODERN HOUSES ARE ARTICULATED WITH CLEAN LINES, SIMPLE FORM, OTHERS WITH RYTHMICALLY PLACED HORIZONTAL WINDOWS, VERANDAS
- SOME OLD BUILDING EXPRESS SYMMETRY, GEOMETRY,RICH COLOUR AND FLAT ROOF.

INTRICATE GEOMETRIC DESIGN

BUIDINGS IN ROW-MAINTAINING SAME LEVEL PLACEMENT OF ELEMENT



BUILDING HEIGHTS

- HIGH RISE BUILDINGS SPAN BETWEEN 9-13 FLOORS
- MID RISE IS BETWEEN 5-8 FLOORS
- THE HEIGHT OF THE STRUCTURES IN THE PROPOSED SITE IS WITHIN 3 FLOORS
- MORDERN HIGH RISES ARE RAPIDLY GROWING IN THE NEIGHBOURHOOD

SIGNIFICANT BUILDINGS

- JAIN SHWETAMBER MUNISVRATSWANI TEMPLE- THE MOST PROXIMATE INDIAN TEMPLE TO THE SITE
- LOCATED NORTH SIDE OF THE SITE-BEARING INTRICATE GEOMETRIC SHAPE
- EXPRESSES THE RELIGIOUS HERITAGE OF THE ASIAN COMMUNITY

- DESIGN WILL RETAIN THE NEOCLASSI- CAL STYLE OF ARCHITECTURE OF MAIN BLOCK WHILE ADOPTING ALSO MODERN STYLE IN OTHER DESIGN RESPECTING THE CONTEXT
- POSSIBLE RETAINING OR INCREASING OF THE FLOORS OF THE PROPOSED DESIGNS
- THE DESIGN CHOOSE NOT TO RESPECT THE CHARACTER OF THE TEMPLE DESIGN BASED ON FORM OR OPENNESS TOWASRDS IT BECAUSE OF PROXIMITY

NEIGHBOURHOOD AND CONTEXT

STRONG VEHICULAR AND TRAFFIC GENERATORS

FIG TREE PARK/ MARKET

USERS OF THE SIDE WALKS HEADING TOWARDS THE PARK AFTER WORK

- SITE BENEFITS FROM ITS PROXIMITY TO THE PARK (5 MINS WALK)
- THE PARK AND MARKET IS A POSSIBLE TRAFFIC CONTRIBUTOR AT LIMURU ROAD

SIDE WALK

PATH ROAD

LANDSCAPING

1

HEDGES ALONG FOOT PATH

2

EXISTING FOOTPATH IN THE SITE

3

VARIETIES OF PLANT WITH- IN AND AROUND THE SITE

- VEGETATION ENHANCES HOMELY ENVI-RONMENT, GOOD AIR QUALITY, NOISE REDUCTION,MENTAL AND PHYSICAL HEALTH
- FOOT PATH-PROPER CIRCULATION

RESPONSES

- RETAIN THE SCHOOL GATE IN ITS POSITION SINCE IT DOES NOT DIS-TURB THE FLOW OF VEHICLES
- SUFFIENT PARKING SPACE TO ACCO-MODATE EXPECTED CARS
- CREATE SIDE WALK PATH FROM THE GATE TO ENHANCE EASY MOVE-MENT OF USERS

- CONSIDER DESIGNING AN ARBO-RATRIUM AT THE NE SIDE OF THE SITE FOR THE COMMUNITY
- MAINTAIN FOOTPATHS, RETAIN AND MAINTAIN HEDGES TO HELP MOVEMENT
- RETAIN TREES ANS SHRUBS

NEIGHBOURHOOD AND CONTEXT

ROOF TYPES

HIP ROOFING

FLAT ROOF

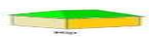
- HIP ROOF-VISUAL APEALING, ENHANCES RAIN WATER HARVESTING
- FLAT ROOF- MORE SUITABLE FOR HARNESS- ING SOLAR ENERGY AND CREATING GREEN ROOF

FENESTRATION AND MA- TERIALS

BUILDING WITH SLID- ING WINDOWS

UNIQUE BOTTOM HANGED IN THE SITE

RESPONSES



- ADOPT BOTH FLAT AND HIP ROOF IN OTHER TO CREATE SPACES FOR HAR- NESSING SOLAR ENERGY
- DESIGN WILL NOT ADOPT RAIN WA- TER HARVESTING BASED ON REGULA- TION

- ENCOPERATE CASEMENT WINDOWS TO ENHANCE LIGHTING
- RETAIN THE BOTTON HUNG WINDOW IN THE SITE A

- ADOPT STEEL TO ENSURE SPACES AND OPENESS, CONCRETE FOR THERMAL CONFORT AND STONE FOR ADAPTATION TO THE SURROUNDING

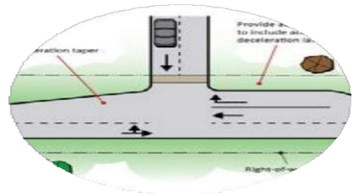
HUMAN AND CULTURAL ASPECTS

SAFETY CONCERNS

Environmental safety

- The neighbourhood is generally safe.Adequate street lighting along Limuru road and also along Forest lane create safe conditions especially during early mornings or evenings, making commuting students to be safe.

- The integration of commercial spaces with residential areas leads to more people in the are which provide natural surveillance and increasing visibility deterring criminal activity.



forest lane:provision of more street lights to enhance security.

limuru road:presence of commercial and residential area.This a vibrant environment.

limuru road:provision of more street lights to enhance security.

Traffic hazards

- Limuru road being a major thoroughfare,sees heavy vehicle traffic,especially during major events being carried out in the school as well as opening and closing days.

- The school has around 200 students day-scholars and most of them walk to their homes hence less vehicular traffic from the school.

- Lack of pedestrian safety measures such as pedestrian crossings for students crossing the busy Limuru road.

- Presence of well maintained pedestrian pathway leading to the school encouraging safe walk.

provision of zebra crossing and a pedestrian island on limuru road for safe crossing of students

inadequate parking the school premises leading to traffic and congestion during peak hours.

Behavioural and Psychological aspects

- High expectations and workload can lead to stress.
- The school has overcrowded classrooms with around 50 students per classroom due to the growing number of students leading to feelings of discomfort and stress.
- Peer relationships and bullying can contribute to anxiety.

- Incorporation of biophilic design elements such as water features and plants to enhance mood and reduce stress.
- Well designed classrooms that maximize natural light to enhance mood.
- Incorporation of ramps to ensure all areas are accessible to all students hence reducing anxiety related to physical barrier.

Sociological aspects

- The school often engages with the surrounding community through sports and cultural activities creating a sense of belonging and col-

- Incorporation of outdoor areas that serve as green spaces for both students and residents such as community gardens or picnic areas.

JAMHURI HIGH SCHOOL - GROUP FOUR PERSPECTIVES

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

SITE ANALYSIS

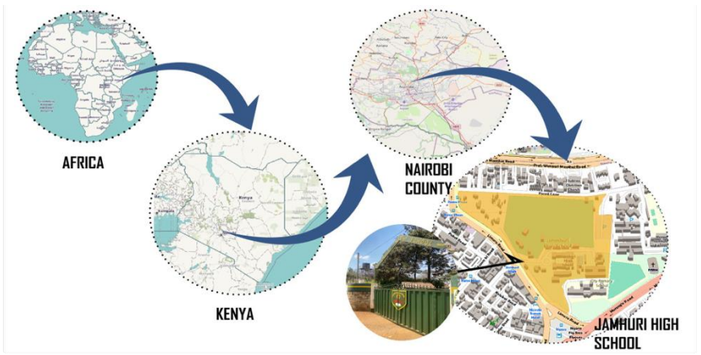


Diagram showing the site
Source: Author 2023

Jamhuri High School is located in the Ngara area,Starehe Sub County within Nairobi County. Jamhuri High School is accessible through several key roads:

Limuru Road: The school is located directly along Ngara Road, making it the primary access route. Ngara Road connects to major parts of Nairobi and links to other important roads.

Murang'a Road: This road runs perpendicular to Ngara Road directly from CBD and connects to the Thika Superhighway, providing easy access from areas like Pangani, Parklands, and further north.

Professor Wangari Maathai Road: Though not directly connected, Prof. Wangari Maathai Rd. is nearby and links to Limuru Rd. as it exits from Embu-Nairobi highway. It offers an alternative route for those approaching from the west of Nairobi.

Forest Lane: This connects backend of the school and exits from the Prof. Wangari Maathai Rd. It is a less busier road. These roads make Jamhuri High School easily accessible from different parts of Nairobi.

1. ACCESS & CIRCULATION

VEHICULAR ACCESS

Diagram showing the site
Source: Author 2023

Vehicular Access is mainly off **Limuru Road**. Which is mainly a two way road. The road provides direct access to the Main Gate of the school. It is a class B road as from road classes by Kenya National Highways Authority. A national trunk road.

CHARACTER OF LIMURU ROAD

Dual carriageway: The road is divided into two lanes for traffic moving in opposite directions. This enhances traffic flow and separates vehicles for safety.

Median Barrier: The road is divided by a median strip (central barrier), likely to control vehicular movement and reduce head-on collisions.

Pedestrian Sidewalk: There's a paved sidewalk on the left, which accommodates pedestrian traffic alongside vehicles.

Street lighting: Street lamps are present, indicating that the road is illuminated at night, contributing to safety.

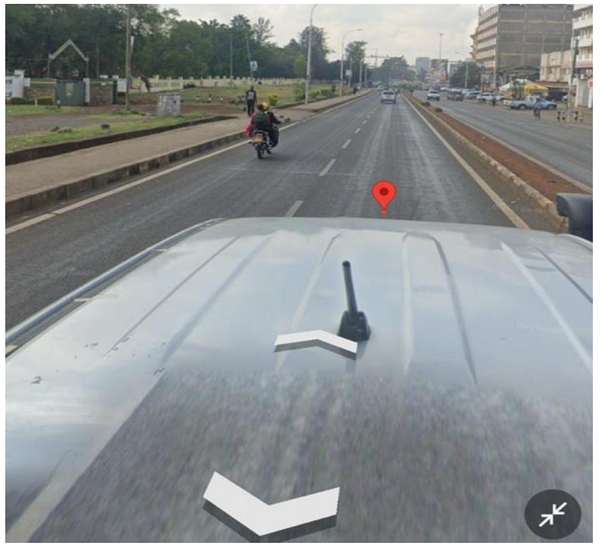


Diagram showing limuru road
Source: googleearth.com ,2023

Diagram showing the different paths accessing the site.
Source: Author 2023

Diagram showing the different roads accessing the site.
Source: googleearth.com ,2023

The other possible access is through forest lane. Forest lane is a less busier path and is the backend access of the site. It is a better alternative. It is a link road and comes off Prof Wangari Waathai Rd. and connects to Limuru Road.

CHARACTER OF FOREST LANE

Single carriageway: Forest Lane is a narrow, two-way street with no clear lane markings. it is a low-traffic road designed primarily as a link road to access residences.

No sidewalks: There is no distinct pedestrian walkway or sidewalk, meaning pedestrians have to share the road space with vehicles, which is common for smaller lanes in many residential areas.

Low traffic volume: The road not busy most of the time, hence this road experiences light traffic, typical for a residential area.
The road measures 8 meters which is wide enough for two vehicles to pass, but not designed for heavy traffic or large vehicles.

Secluded: The road is secluded as it has a very little flow of pedestrians. Mostly there are cars and both sides of the road have fences to individual properties. The road is secluded and this may be an opportunity to design for increase in pedestrian movement within this road.

Forest Lane
Source: google earth, 2023

PROBLEMS FACED BY THE ABOVE ACCESS POINTS:

High traffic volume: Limuru Road is a major route connecting the city center to neighborhoods like Westlands, Parklands, and further towards Limuru.

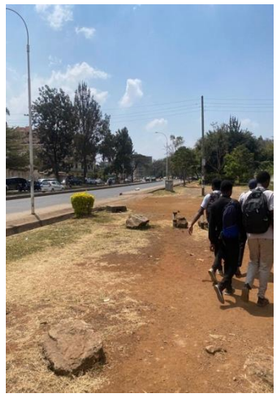
During peak hours (morning and evening), the road experiences significant traffic congestion, particularly near the junctions of Chiromo Road and Waiyaki Way and also the junction joining Thika Road.

The bus station poses a big challenge as it is a place of constant movement and inherent stops by fast moving matatus along the Limuru Road during rush hours causes a lot of congestion.

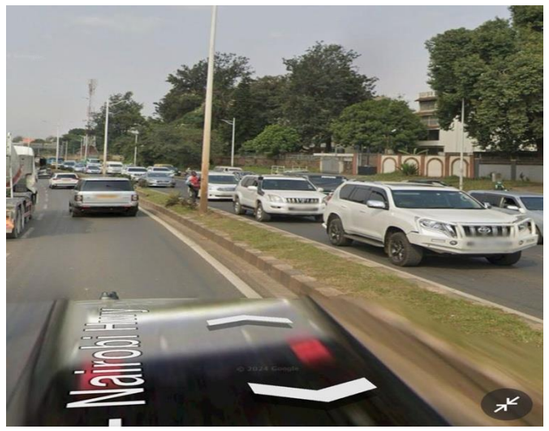
In case of events at school such as the upcoming 120th celebration of the school will pull a large number of private cars to the school. This will therefore impair greatly the smooth floor of motorists who are travelling along Limuru Road and may lead to several accidents.

There are no crossing paths for pedestrians who alight from the bus stop opposite the school gate. From students to staff and other members of the public having no designated path for crossing poses a great danger.

Traffic congestion from matatus at Ngara bus stop impacting entry to Limuru road from Murang'a road



Limuru Road
Source: author, 2024



Meru-Nairobi Highway
Source: google earth, 2023

Ngara Bus Station, Aerial view
Source: pond5.com , 2023

REMEDIES

1. Proposal for access through Forest Lane during school events; Forest Lane is a better alternative for entry into the school especially during these human-traffic intensive times. The parents and guardians can even have better space for parking from that side.

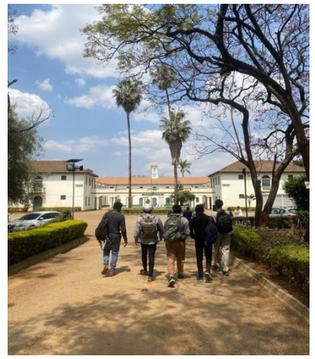
2. Proposal to install zebra crossing and speed bumps on Limuru Road in order to ensure slowing of motorists and allow easy crossing by students and staff into the school.

3., Ensure strict rules which restricts haphazard stopping by matatus long the Limuru Rd and only allow at bus stops where they are dedicated for that purpose.

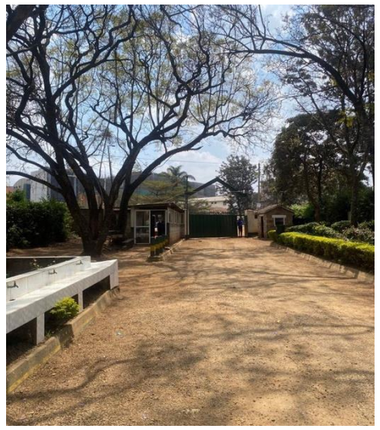
4. Proper road signage to guide motorists on the speed of approach and also alert them about crossing students in order to reduce their speed. This will minimize greatly the chances of accidents occurring.

Zebra crossing
Source: dcrainmaker.com ,2023

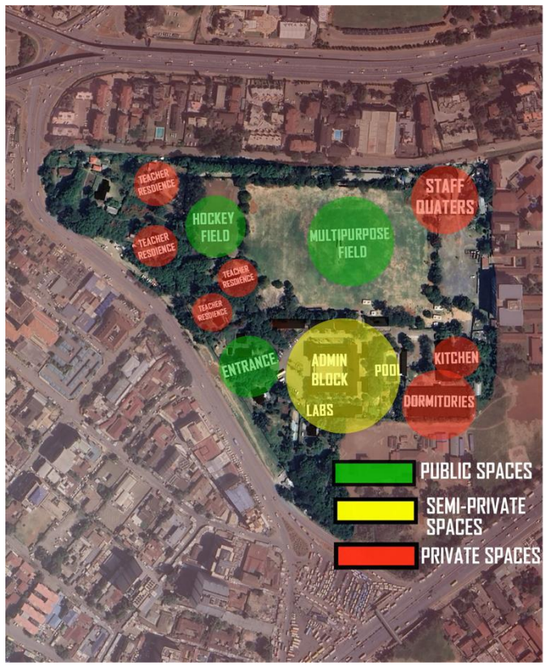
Zebra crossing and signages
Source: provostandpritchard.com



Entry to the school from the main gate
Source: Author 2023



The entrance to the school showing the gate, the path, the greeneries on the sides as barriers for the students. It also shows the sinks at entrance as remnants of the covid response.
Source: author 2023



Limuru Road
Source: author, 2024

Pedestrian Movement/ Circulation
Source: author, 2024

PEDESTRIAN ACCESS

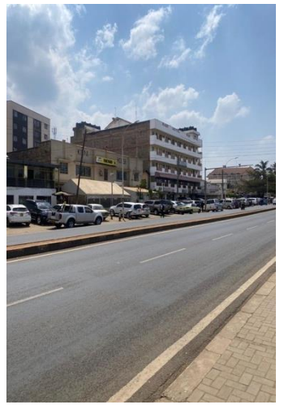
Pedestrian access is majorly from Limuru Road also. There are two main bus stops close to the school and are the most convenient for students and staff who commute to the school. There are those that alight from Ngara and those from town can alight directly opposite the school gate.

PROBLEMS FACED BY PEDESTRIANS ON THIS ACCESS ROUTE

The main problem being faced by the pedestrians is the lack of proper crossing paths that are dedicated to them solely. This is a great risk for the students and staff faced daily as they show up to their places of business.

The image on the right is that of the Limuru Road and directly opposite is the entrance to Jamhuri High. There are no stop signs or even slower speed signages. A zebra crossing and bump would really help with the access of the school by pedestrians.

The other problem is that the students have to walk a long distance to access the zebra crossing or points where the traffic is calmer to allow them cross safely to the school or from the school.



Limuru Road
Source: author, 2024

CIRCULATION WITHIN THE SCHOOL
At the entrance to the school, there is a pedestrian gate. It is controlled in such a way that one passes through a security check. There is a metal detector which regulates entry into the school. A security person is stationed here for security.

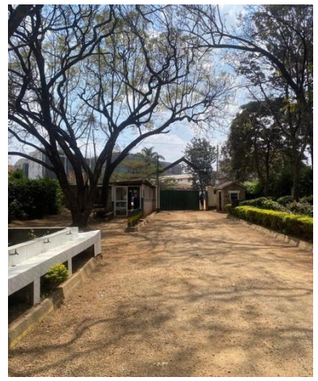
This control of entry ensures safety as the public cannot easily access the school grounds. Being that the school is located in an urban area, it poses a great issue and therefore this improves the security of the school.The fencing also plays a huge role in regulating entry into the school uncontrolled.

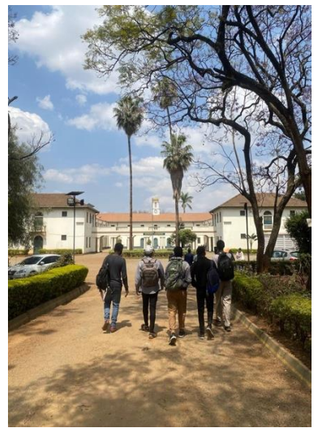
Controlled Pedestrian entrance into the school
Source: author, 2024

Fence to the school preventing unauthorised entry into the school
Source: author, 2024

ANALYSIS OF CIRCULATION WITHIN THE SCHOOL

HORIZONTAL CIRCULATION
Upon entry, one flows into the driveway that serves both vehicle and pedestrians. There is no demarcation/separation of movement. The entryway is covered with a mixture of rocks and soil. This is the largest part of circulation and covers most of the site.



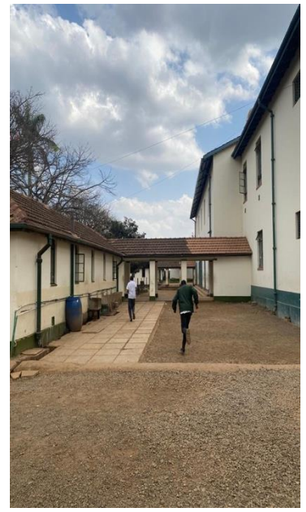


Pictures showing different access point and pedestrian paths for people to walk through the school.
Source: author, 2024

CHALLENGES
Unpaved Walkways:The paths are unpaved, which could become problematic during the rainy season, leading to muddy surfaces, waterlogging, and reduced accessibility for students, especially those with mobility challenges.

Accessibility Challenges: the school lacks ramps or accessible pathways for students with disabilities. The stepped areas in the school especially close to entry of buildings may pose challenges to those who have limited mobility, reducing inclusivity in circulation.

Lack of Clear Signage: there are not enough clear signage guiding students and staff on where to go. This can be problematic, especially for new students or visitors, leading to confusion and inefficient movement within the school.



Different Paths
1. No ramps on different level step areas.
2. Pavings are not maintained at all.
3. The other parts that are not maintained are left bare exposed and limit those who are abled differently.
Source: author, 2024

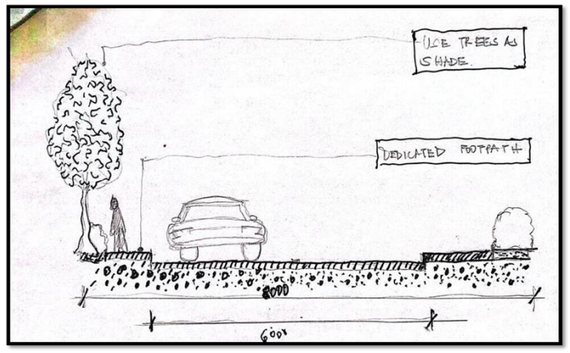
SOLUTIONS

Separation of Pedestrian and Vehicular Traffic: There is no clear distinction between pedestrian paths and areas where vehicles may move (e.g., school transport, service vehicles). Without designated zones, the safety of students may be compromised, leading to potential accidents or safety issues.

Accessibility Improvements: Implement ramps and accessible pathways for students with disabilities, ensuring that circulation is inclusive for all.

Traffic Management: Designate specific areas for vehicles and pedestrians to minimize conflicts between different modes of movement.

Paving and Drainage: Pave the main circulation routes and ensure there are proper drainage systems to manage rainwater and prevent muddy, slippery conditions..



Separation of pedestrians and vehicle movement
Source: author, 2024

Accessibility improvement
Source: Shutterstock, 2024

Diagram showing well demarcated traffic management
Source:Kabarak High School, 2024

Diagram showing paving and drainage
Source: 1) Behance.net, 2024 (2) www.bradfords.co.uk

VERTICAL CIRCULATION

Jamhuri High School is made up of different buildings of different heights and levels. The most noticeable building is the main admin and classes building which is a two storey of Neoclassical architecture.

CHALLENGES

Potential Congestion on Stairs: at the dormitories, the staircases are small in width measuring around 1200mm which can be a great hazard during emergency situations which may lead to far worse consequences.

Lack of Elevators or Ramps:the buildings have no elevators or ramps to facilitate vertical movement for students or staff with disabilities or mobility issues thereby limiting the inclusivity of the school, making it challenging for them.

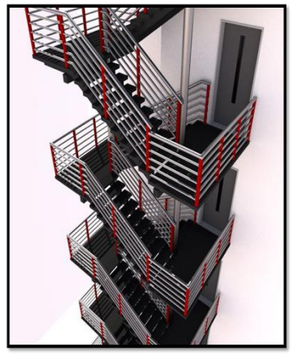
Lack of fire escape stairs; the buildings in the school apart from the dormitory have only one central access point posing a great emergency escape threat.

Main building staircase providing access to the classes.
Source: author, 2024

Emergency escape staircases of the dormitories
Source: author, 2024

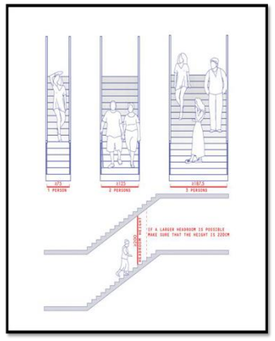
SOLUTIONS

Emergency Evacuation Considerations: In case of emergencies, these staircases are essential for evacuation. The school should ensure there are enough exit points



Model of stair escape that can be applied
Source:Pinterest.com

Wider Staircases: Consider widening the staircases or adding additional stairs to accommodate the volume of students using them during peak times and emergencies.



Stair Width dimensions.
Source: postdigitalarchitecture.com

2. VEGETATION

Vegetation plays a crucial role in shaping the microclimate, aesthetic quality, and ecological health of any site. At Jamhuri High School, located in the urban context of Nairobi, the existing vegetation reflects both natural and human-influenced growth patterns. Understanding the types, distribution, and condition of vegetation on and around the school grounds is essential for evaluating environmental performance, identifying opportunities for green infrastructure, and informing sustainable site planning.
This vegetation analysis aims to assess the ecological value of existing plant life, its spatial relationship with built forms, and its impact on outdoor comfort and student well-being within the high-density urban setting of Nairobi.

Map of Jamhuri High School showing the different trees in the site.
Source: author, 2024

Ravenala madagascariensis, commonly known as the ***Traveller's Tree or Traveller's Palm***, is a striking plant native to Madagascar.

In tropical regions, the Traveller's Tree is often seen as a symbol of hospitality and protection, due to its water-storing ability and towering presence.

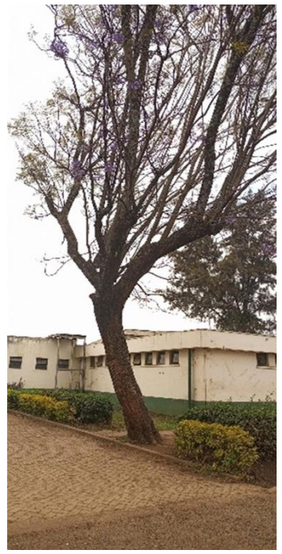
Palm trees are iconic symbols of tropical and coastal regions, adding an exotic and elegant touch to landscapes, parks, resorts, and private gardens.
Their distinctive shape and often towering height make them an attractive choice for landscaping projects.
Cultural Significance: Palm trees have deep cultural and religious significance in many parts of the world.

For example, they are symbolic of peace, victory, and abundance in various traditions. In Christianity, palm branches are used during Palm Sunday, symbolizing victory and triumph.

The Ashoka tree is important for
Noise Reduction: In urban environments, rows of Ashoka trees can serve as sound barriers, helping reduce noise pollution.
Religious Importance: The Ashoka tree has spiritual significance in Indian culture and is often associated with places of worship and as a symbol of love and peace.

Grevillea Robusta It is highly prized for its durable and attractive wood, which is used in furniture, flooring, veneers, and construction.
Often planted as a shade tree in agroforestry systems, it protects crops like coffee and tea from excess sunlight and acts as a windbreak in agricultural settings.

The wood and sawdust from Grevillea robusta can cause allergic reactions or skin irritations in some people, making it less suitable for furniture or interior use unless properly sealed.
Grevillea trees, while fast-growing and useful for shade, can pose challenges such as allelopathic effects they release chemicals into the soil that may inhibit the growth of nearby plants.



Jacaranda known for its striking purple-blue flowers, it is widely planted for ornamental purposes in parks, streets, and gardens.

The tree's broad canopy provides excellent shade, making it a popular choice for landscaping

Cherry laurel features glossy, dark green leaves and produces fragrant white flowers, making it an attractive ornamental plant for gardens and landscapes.
It can be used as a shrub, hedge, or even as a specimen plant in landscapes, making it versatile for various design applications.

Euonymus Japonicus Its dense, glossy green foliage makes it an attractive choice for hedges, topiaries, and landscaping.

Variegated varieties provide additional visual interest with yellow or white-edged leaves.

Weeping bottlebrush
With its bright red bottlebrush-like flowers and graceful weeping branches, adds significant ornamental value to gardens, parks, and streetscapes.
The blooms attract attention and provide vibrant color, especially in spring and summer.

RESPONSES

1. Remove invasive or unhealthy plants and introduced species that thrive in the local ecosystem and fit the design vision.
2. Plan for future growth to avoid overcrowding or infrastructure damage.
3. The school would need to invest in regular maintenance to manage the mess from the flower drop and prune any weak branches, especially before stormy seasons

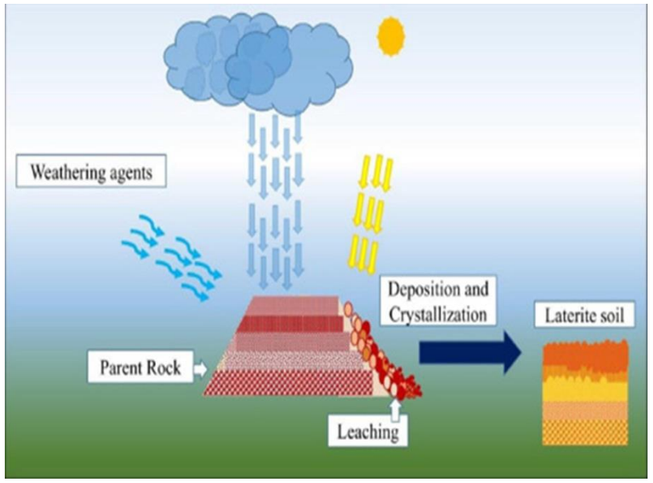
1. SOIL AND TOPOGRAPHY

A) SOIL

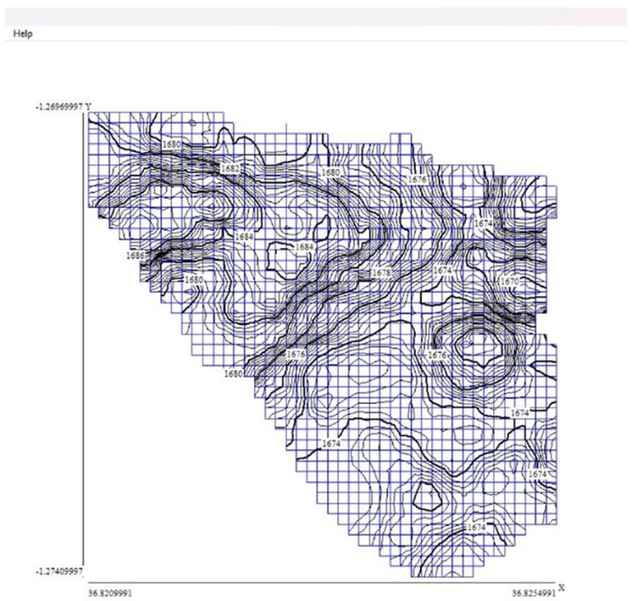
The type of soil found in Nairobi city is mainly pyroclastic volcanic rocks that were deposited during the formation of the East African Rift valley. Our site is in Starehe constituency and the soil type found in this region is the laterites.

Characteristics of Laterites

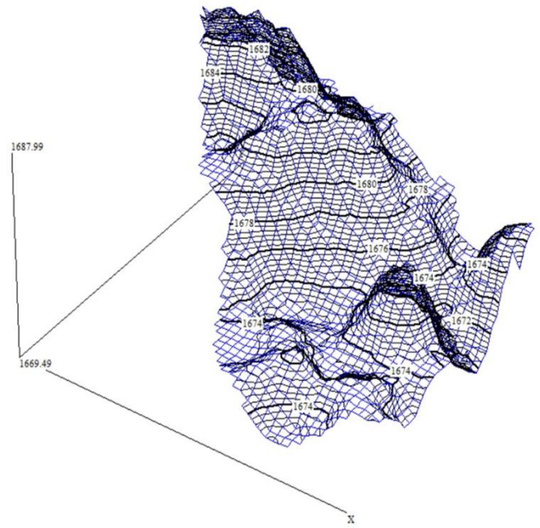
Has high concentration of iron oxides and aluminium oxide,hence its red colour. Formed due to weathering of volcanic rocks.
Porous and hardens upon drying.
Has good drainage but loses strength when overly saturated with water. Its vulnerable to erosion.



1) Showing the weathering process and formation of laterite soil.
2) Diagram showing the different layers
Source: Sciencedirect.com ,2024



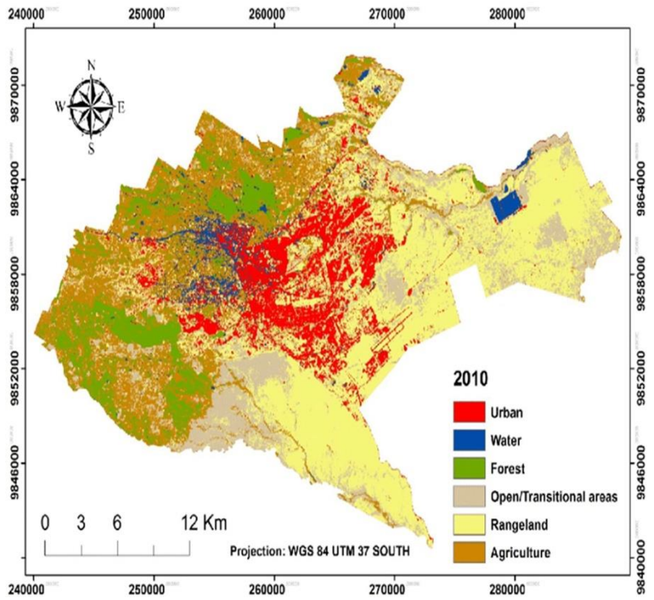
Topographical diagram
Source: author, 2024



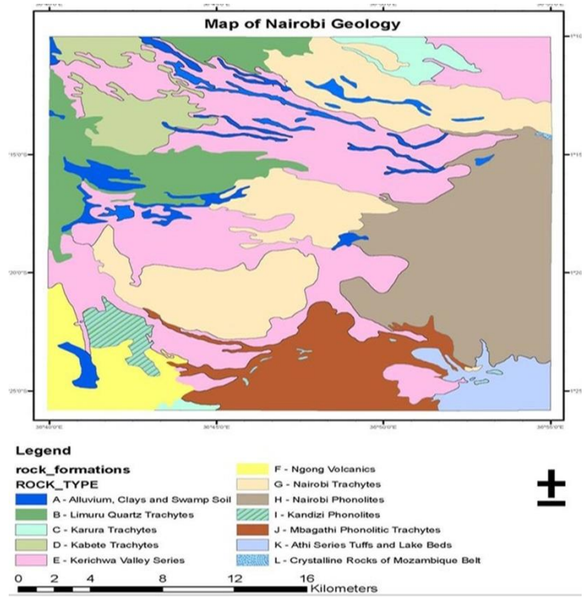
Topographical diagram
Source: author, 2024

LANDUSE AND GEOLOGY OF NAIROBI

This map shows the Land Use plans of Nairobi. It is unique based on the type of soils and its characteristics.

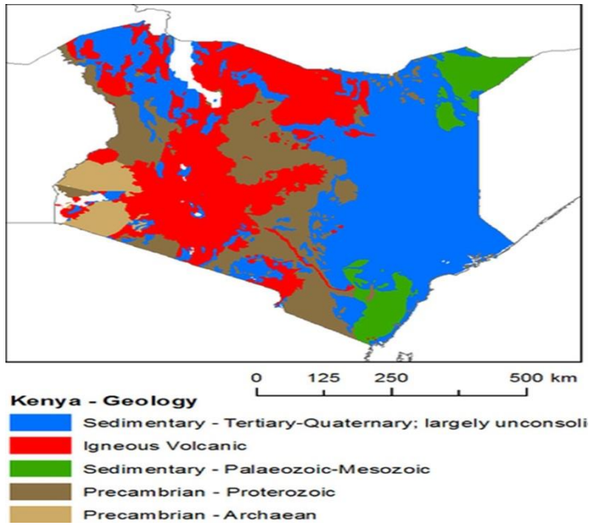


Topographical diagram of Nairobi county
Source: Researchgate.com

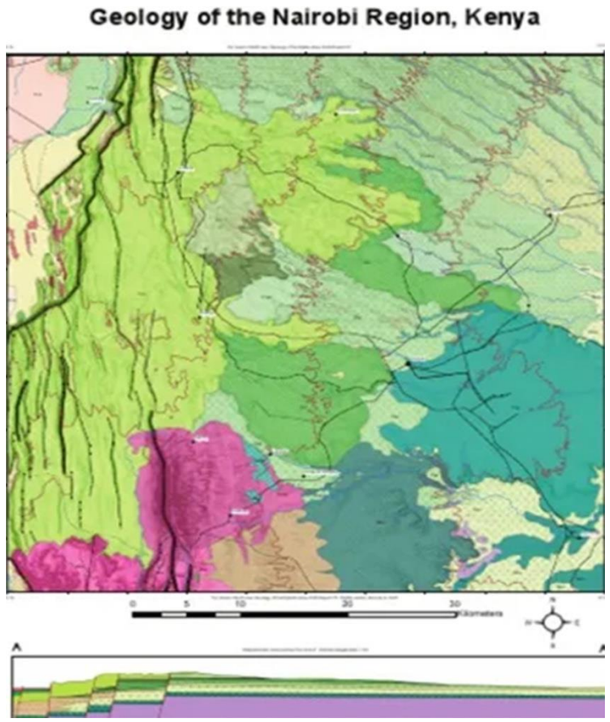


Topographical diagram
Source: researchgate.com

COMPARISON OF THE GEOLOGY IN KENYA AND NAIROBI



Comparison of geology
Source: researchgate.com



Comparison of geology
Source: researchgate.com

SOIL SAMPLES IN NAIROBI

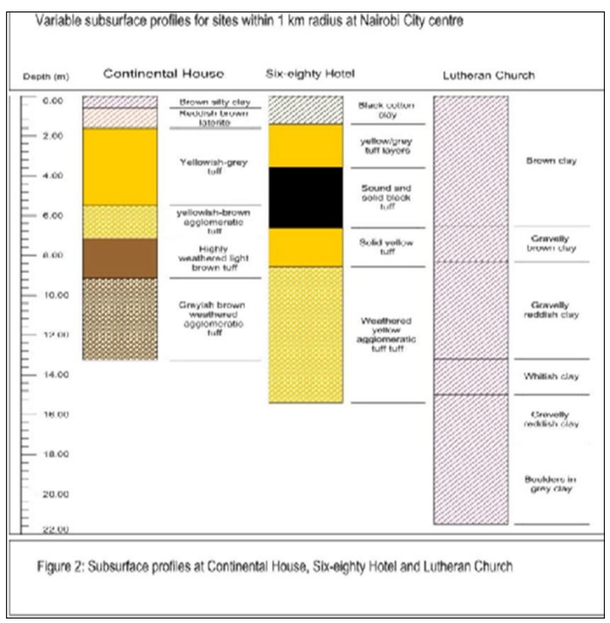


Figure 2: Subsurface profiles at Continental House, Six-eighty Hotel and Lutheran Church

Soil samples in Nairobi
Source: researchgate.com

Table 1: Classification of soils from the grading curves and plasticity charts

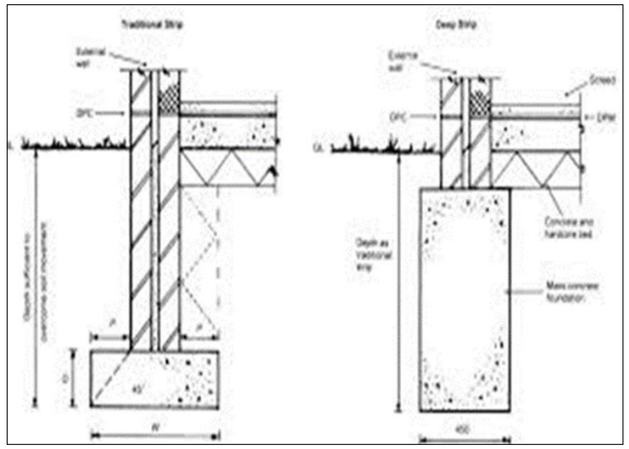
Site	Soil class	Plasticity term	Group symbol (BS 5930:1981)
Manchester outfitters	Clayey sandy silt	High	CH
KIHBT	Silty clay	Intermediate to high	CI to CH
NSSF Karen	Clayey silty sand	Intermediate to high	CI to CH MI to MH
Country Bus station	Silty clay	Intermediate to extremely high	MI to MV
Kileleshwa	Silty clay	Intermediate to high	CI to CH
Univ. of Nairobi Sports Field	Clayey sandy silt	High	CH
Onyonka Estate	Silty clay	High to very high	CH to CV
Garden Estate	Silty clay	Very high to extremely high	CV to CE
Sonning Road Kibera	Clayey SILT	Intermediate to high	MI to MH
Site and Service Scheme	Clayey sandy silt	Intermediate to high	MI to MH
Kyuna	Sandy silt	High	MI to MH
Westlands Motors	Sandy clayey silt	Intermediate to high	MI to MH
Lutheran Church	Silty clay	Extremely high	CE
GSU Ruaraka	Silty clay	intermediate to extremely high	CI to CE
PSC Club	Sandy clayey silt	High to very high	CI to CV
Kitisuru NSSF Estate	Clayey SILT	High	MH
Kazora Flats	Silty clay	High	CH
Mathare 4A	sandy clayey Silt	Intermediate to high	CI to CH
Madaraka Pri. Sch.	Silty clay	Very high	CV
Kabete Armed Forces	Silty clay	High	MH

Soil samples in Nairobi
Source: researchgate.com

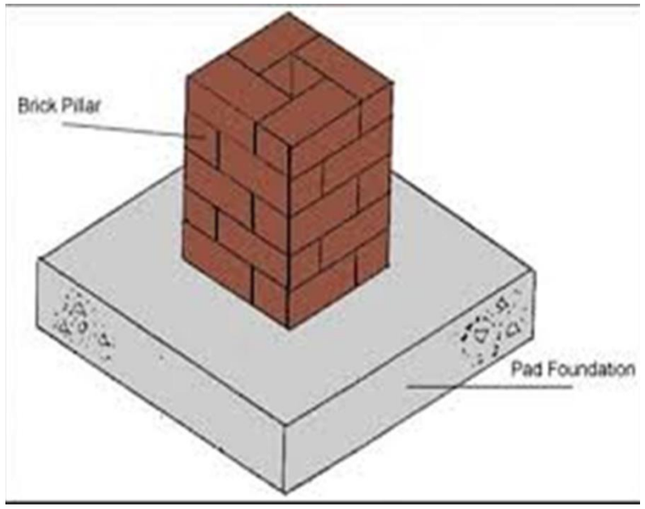
SOIL STRENGTH

From, Hannah Nyambara Ngugi, Stanley Shitote, Nathaniel Ambassah, Victoria Okumu, John Thuo. Influence of Variation in Moisture Content to Soil Bearing Capacity in Nairobi Area and Its Environs.
Seven soil samples were collected from:
Kariobangi near Mathare river-Water seepage.
Githurai near Gatharaine-Ngare river-Dumped material.
Kiambu KIST near Riara river-Rocks.
Kiambu town near Riara river-water seepage.
Compressive stress
It increases by 35.3% when the soil moisture content was increased from 30% to 75%.Increasing the soil moisture content to 50% and above would lead to structural instability resulting in structural failure of the building.

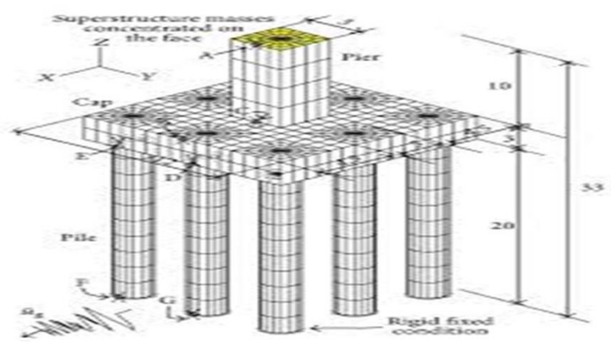
TENSILE STRESS
Increases by 65.9% when the soil moisture content was increased from 30% to 75%,this increases the tensile stress in the structure leading to structure failure.



Strip foundation
Source: pinterest.com , 2024



Pad foundation
Source: Pinterest.com , 2024



Pile foundation
Source: pinterest.com , 2024

Load bearing capacity
Laterite soil has moderate bearing capacity and can support light to medium weight structures. However its capacity reduces significantly when wet.

DRAINAGE
Laterite soils are prone to water retention, which weakens their load-bearing capacity. Good site drainage is crucial to prevent water accumulation.
Perimeter drains or French drains should be installed around the foundation to direct water away from the structure.

Roof Drainage:
Direct roof runoff through proper gutters and downspouts, leading the water away from the foundation to minimize water accumulation around the structure.

Image Showing the drainage channels from the roof
Source: author, 2024

4. NEIGHBOURHOOD

The site is surrounded by a mix of residential and commercial areas having small businesses, market place and a bus stop. This mixture of uses increases traffic thus heightened security around the school.

1. EASS_Temple_Nairobi

Buddhist architecture characterised by dome shaped facades having intricate curves, features towering decorative spires having intricate patterns and motifs that symbolise ascent of the divine use of circular shaped columns, large windows that maximise daylighting and use of symmetry.

Image showing the temple
Source: author, 2024

2. KICD building
It is a storey building, emphasis on clean geometrical lines, symmetry is used, use of large expansive windows,extended balconies that act as horizontal sun shading elements, incorporate use of open floor plans, use of aluminium cladding showing a repeated pattern around the windows.

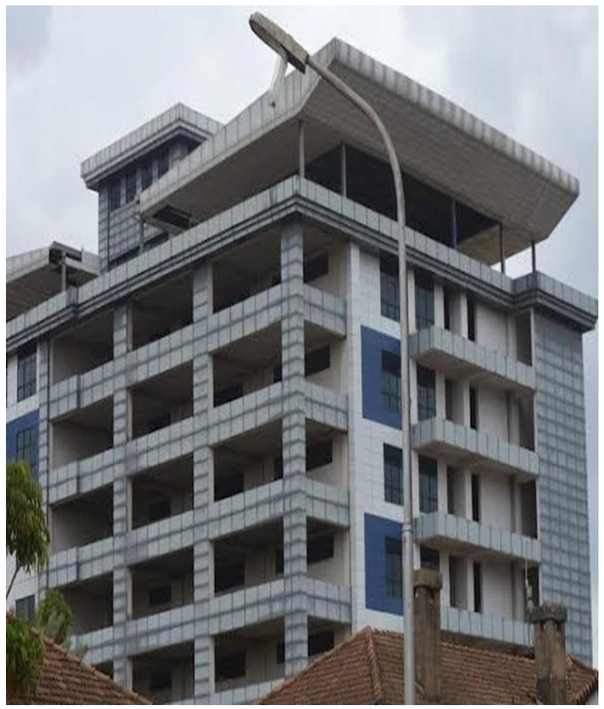
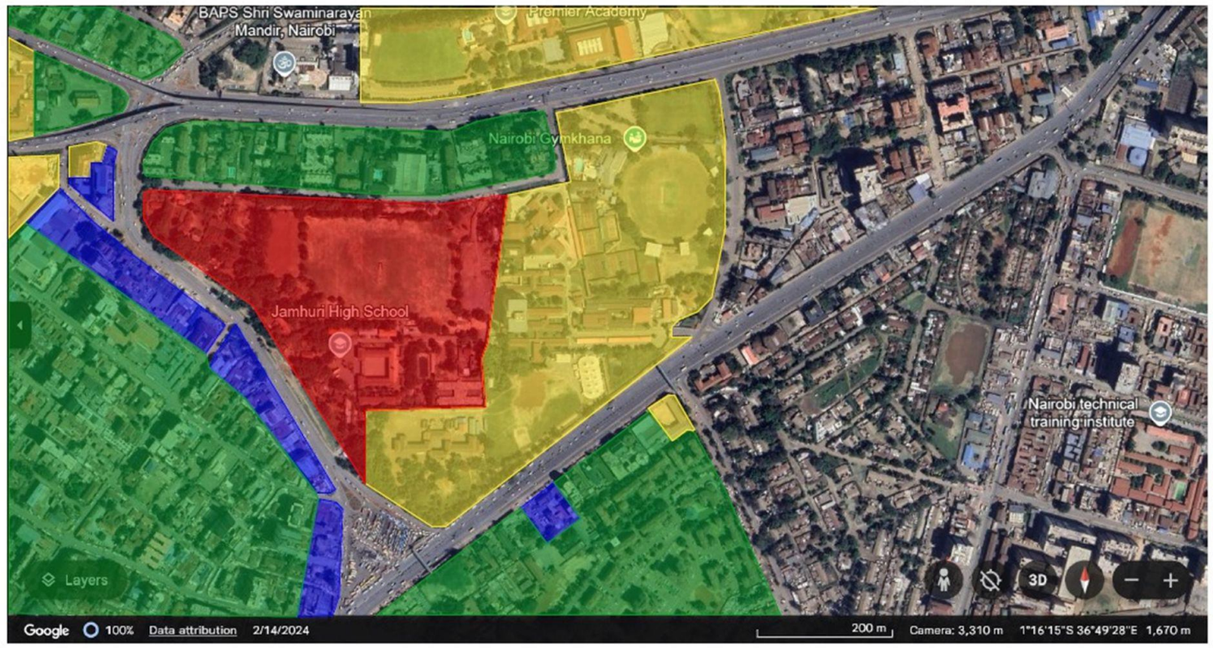


Image showing the KICD building
Source: author, 2024

A MAP SHOWING DIFFERENT ZONES AND LAND USES IN THE NEIGHBORHOOD



LEGEND:

- COMMERCIAL SPACES
- RESIDENTIAL SPACES
- EDUCATIONAL SPACES
- SITE- JAMHURI HIGH SCHOOL

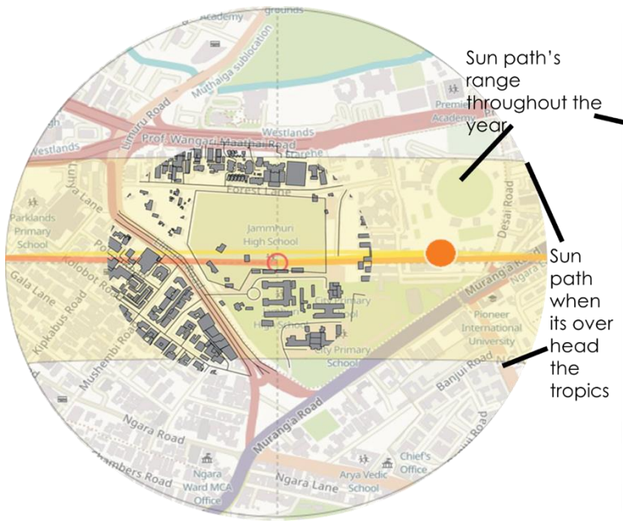
BY LAWS AND CODES

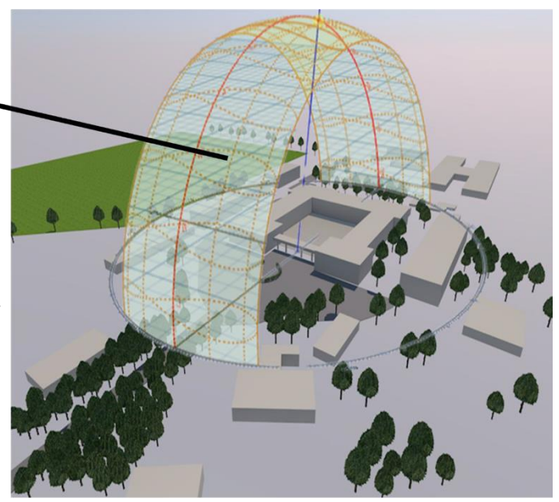
An open area shall be left on each plot for the purpose of servicing the building. Part of a building shall not be erected 1.5m from the sides and back of a building
Height of enclosure not to exceed 2.4m.
Public building having a courtyard of minimum of 35m2 and a width of not less than 4.5m .
Dormitories. Number of persons to be determined in a habitable room shall be determined on the basis of 3.5m2 per person.

For public buildings, minimum dimension of a lobby and landing shall not be less than the width of the staircase
Main staircase of a building exceeding 4 floors shall be continued to the roof unless a fire escape is provides
Minimum width of stair in public buildings is 1200mm, having no more than 16 stair in flight without landing
The stair should have a clear height of 2m

CLIMATE

The buildings are oriented with the long axis facing North-south
Most openings are on north south facing
faces Trees as sun shading devices for buildings facing east west





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

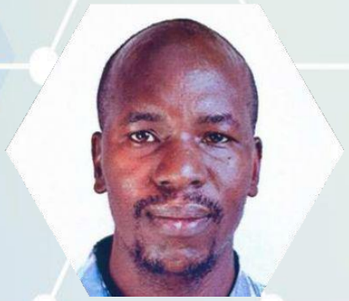
He is an Adjunct Professor of Architecture and Planning at JKUAT, KU and UoN, with 36 years of academic and professional experience. He has taught various courses, published widely, and served as editor for academic journals, and research books. Maringa has also worked as a consulting architect/planner 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.

Google Scholar: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Paul+Mwangi+Maringa&oq= Orcid: https://orcid.org/0009-0007-3471-8028.

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 Two: Site Analysis

9 789966 541062