SUPER RESILIENT: FINDING SOLID GROUNDS FOR HLAULEKA SCHOOL IN MOZAMBIQUE

Maged Guerguis
Assistant Professor of Design & Structural Technology
McCarty Holsaple McCarty Endowed Professor
Soft Boundaries Lab
College of Architecture and Design | The University of Tennessee, Knoxville

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SUPER RESILIENT: FINDING SOLID GROUNDS FOR HLAULEKA SCHOOL IN MOZAMBIQUE

ABSTRACT

Each year, schools damaged by natural disasters often leave hundreds of thousands of students with no access to education. Therefore, there is an urgency for design research that responds to the demand for affordable, innovative, resilient, and environmentally sustainable school buildings. Studio Mozambique is an advanced research design studio that focuses on the cultural, economic, political, and spatial history of schools in cities susceptible to natural disasters.

The work presented in this paper serves as a compendium of post-disaster recovery of primary educational institutions. Additionally, it can potentially help answer these fundamental questions: Which factors and parameters inform a more integrated design of a school building? Which processes can be adapted for local fabrication or rapid deployment within the limitations of a remote site? What materials and construction systems are best suited to the limited means of transportation and fabrication (i.e., light-weight, local, reused, weather-resistant, adaptability, resilient)? What strategies could be implemented for the design of school structures for functional integration of sustainable characteristics (i.e., use of local renewable or biodegradable materials and structural optimization)?

As a proposal for an integrated research design curriculum, this report describes the strategy, approach, assessment, and comprehensive planning of a flood-resistant, affordable, resilient, and environmentally sustainable school campus in Chokwe, Mozambique following the 2019 cyclone Idai.

INTRODUCTION

Early education has a significant impact on society. It serves as a platform to gain the necessary knowledge and skills to make rational and informed decisions. It is through education that communities can achieve their goals for growth and development. Every year, natural disasters, such as floods, hurricanes, cyclones, and earthquakes, often cause property damage, including schools and educational institutions, disrupting children's education.

The Mozambique design research studio seeks to examine the multiple aspects in which schools and education as a whole struggle to find solid grounds post natural disasters. In many areas of the world, natural disasters coupled with poverty are not merely a temporal transition or a reversible state. Rather, they have detrimental long-term effects and often results in indefinite school shutdowns.

Tropical cyclones are expected to increase due to climate change, which has contributed to an increase in oceanic hurricane activity (REF). In Mozambique, over 3,400 classrooms were damaged or destroyed in cyclone-affected regions. In some cases, schools require extensive rehabilitation after being used as emergency shelters for children and families displaced by the storm. This research seeks to develop methodologies for school facilities in affected regions of the world to be constructed to withstand recurring natural disasters.

Over 13 years ago, Sybil Baloyi started a children's ministry in Chokwe, Mozambique. Sybil left her home country, South Africa, and moved to Mozambique with the goal of serving small children orphaned or made vulnerable by war, famine, or natural disasters by providing them with permanent shelter and education. Due to increased needs and demands, Sybil's small preschool of only 14 children quickly grew into the private school now known as Hlauleka School which serves over 300 children through the 7th grade. In 2019 the school was hit by cyclone Idai and with limited resources the school was partially rebuilt. However, the same methods of construction used prior to the hurricane were implemented.

While meeting with Sybil, she described her vision of expanding the school to include a high school through the addition of a new campus to be developed on a recently acquired plot of land closely located to the current Primary school. This research design studio focuses on the development of a new master plan for Hlauleka high school in Chokwe, Mozambique in an effort to bring this vision to life (Fig. 1).

Please visit this link below to watch Joy Marshall's short documentry film on Hlauleka School :
https://softboundaries.com/work/studio-mozambique/

Figure 1. Clockwise: Tornado damaged classroom. Credit: Andrea Booher, U.S. National Archives & DVIDS; Cyclone Idai, Mozambique. Credit: Climate Centre; Hlauleka Organization, Mozambique. Credit: Sybil Baloyi; Baloyi, Maged Guerguis, and Hllauleka graduate. Credit: Randall Lind.

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National Organization of Minority Architecture Students (NOMAS) Contribution
Students from the National Organization of Minority Architecture Students (NOMAS) east Tennessee chapter, for which the PI serves as the faculty advisor, contributed to the development of this project. The research created new research opportunities that are offered to underrepresented and minority students, giving them a sense of identity as they contribute to a project with a pressing concern (Fig. 2).

STUDIO MOZAMBIQUE COURSE OUTLINE
Advanced architectural research can have a great impact on the society. Thus, to achieve novel effects in architecture, a degree of expertise in disciplinary methods is essential. Therefore, a series of research methodologies related to contemporary practices address post-disaster recovery of educational institutions were investigated. Studio Mozambique pursues this hypothesis in three phases, each with a set of preconditions, tactics, and goals.

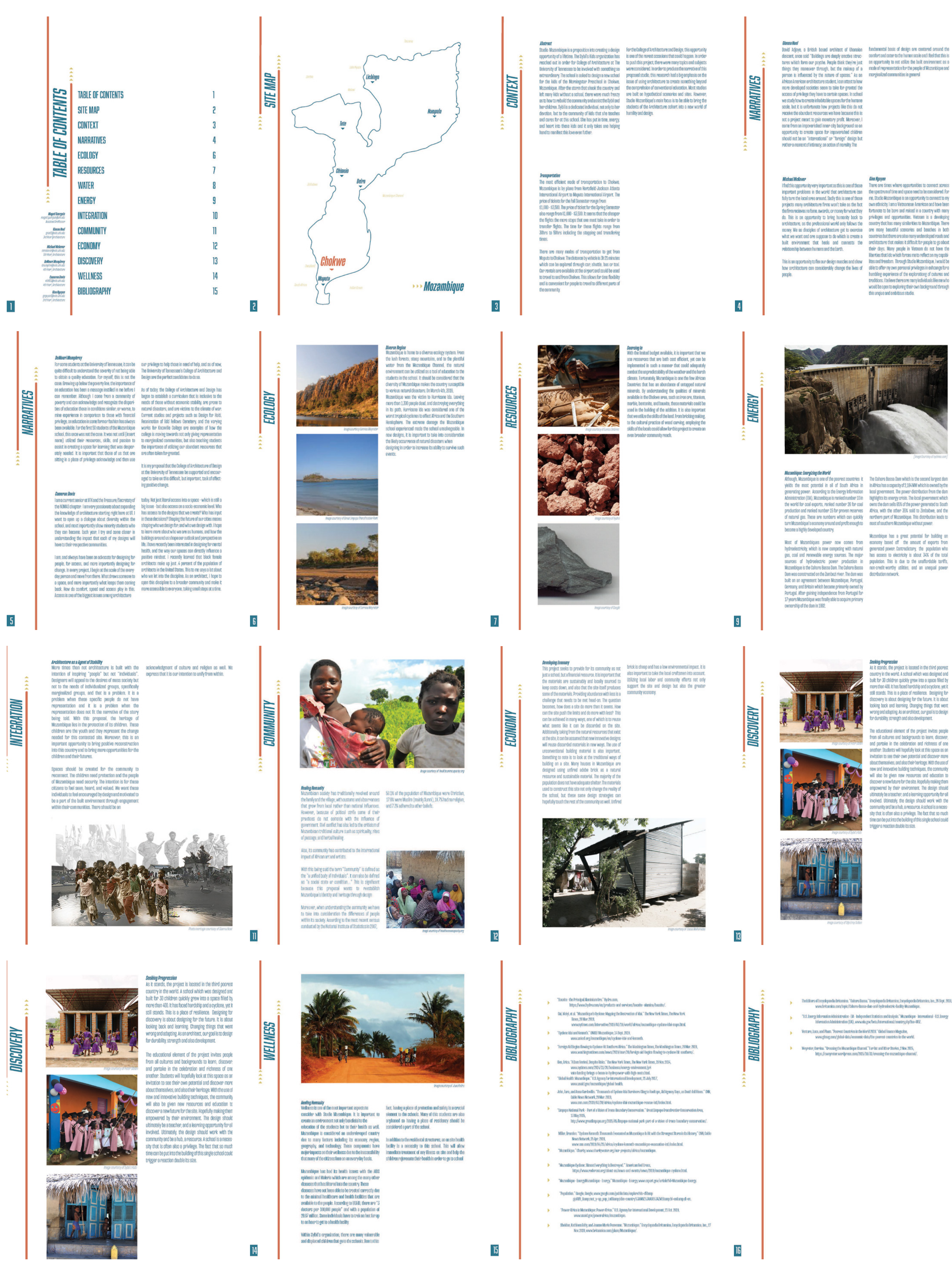
PHASE 1 - NOVEL EFFECTS (HISTORICAL ARCHIVE)
A compendium of 30 school campus and classroom case-studies organized in publication format. Globally-diverse, culturally appropriate, climate resilient, low energy, modest in budget and relied on locally sourced materials and labor-a suitable resource for a broad range of low-income communities in climate-vulnerable locations. In this exercise, The students were essentially guided as they 'wrote' their own reference textbook for the course.

PHASE 2 - EXTRAORDINARY METHODS (TECHNIQUE)
A development of extraordinary methods is divided into two parts: First, a workflow of self-education exercises designed to introduce students to a process for careful consideration of local customs, practices, and organization of educational space (interior, exterior and mediating spaces like porches, walkways, and shade) at a campus and classroom level. The selection of the 30 case studies shaped this research workflow and analysis criteria applied in the NOVEL EFFECTS compendium. By inclusion of a client educator in the studio who introduced cultural practices of education (Sybil Baloyi in the Mozambique Studio). Through critical guidance as students selected appropriate strategic and organizational responses to climate, culture and resilience for classroom and campus space from the compendium.

Second, development of a coordinated set of construction techniques and a 'card-deck' that a construction manager could shuffle through on-site to select a card that visually communicated desired assemblies, details, and installations to workers well-versed in construction practices, but not necessarily the conventions of a westernized working drawing set or climate-resilient response.

PHASE 3 - APPLICATION (PROJECTIVE DESIGN)
Knowledge is nothing without a process for application and example. In the third phase of Studio Mozambique the students were guided through a well-organized application of research generated by previous phases to the specific location, community needs and conditions. In this phase students developed a campus plan and classroom building prototype manuals for local builders for easy construction (Fig.3). The research presumes that the novel effects of educational building typology are the result of the tactful application of modern building technology.

Figure 2. Opposite: Preliminary research report by National Organization of Minority Architecture Students (NOMAS) East Tennessee, Credit: Michael McKever, Gina Nguyen, DeMauri Mumphrey, and Cameron Davis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FLOOD MITIGATION STRATEGIES

An additional focus of the research was flood control including developing strategies for floodwalls, seawalls, floodgates, levees, and evacuation routes. Such novel methods would be used to extend the organizational principle to other aspects of the project, beyond architectural style to embody ecology, heritage, and culture. The students were asked to document the result of the research as a series of construction tactics simplified manual cards for local builders.

FINDING SOLID GROUND FOR HLAULEKA NEW SCHOOL

For the first stage of the studio, case studies of vernacular and contemporary school buildings were analyzed and documented. For Mozambique, strategies from both vernacular and contemporary types could be innovatively combined to create an inspiring educational experience on the new campus. Simple strategies, such as using paint to activate spaces, vibrant textiles crafted by local artisans, and furnishings that support varied approaches to learning and discovery in ways that embody the ideas being realized in contemporary educational settings, all held unique possibilities for implementation in Mozambique.

Bordered to the east by the Indian Ocean, Mozambique is highly susceptible to hurricane and cyclone devastation. Located in Chókwè, a district of the Gaza Province in south-western Mozambique, the site lies about 130 miles north of its capital city, Maputo. In the second stage of the studio, the students conduct site analysis distributed into five categories: 1) site plans and physical models; 2) programming and interior; 3) environmental analysis and sustainable strategies; 4) materials and construction details; 5) master planning and landscape (Fig.3).

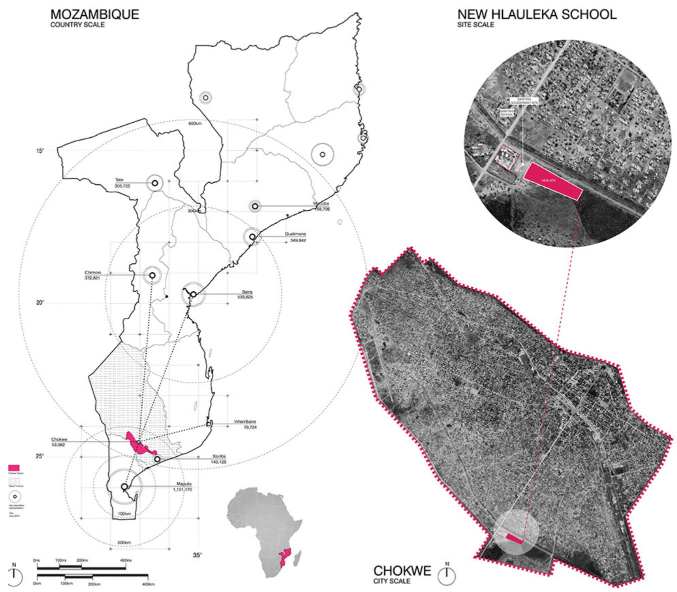
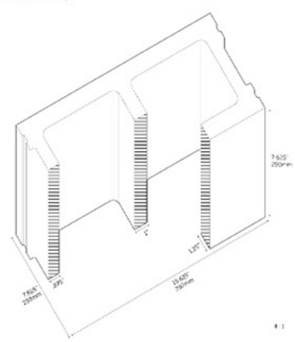


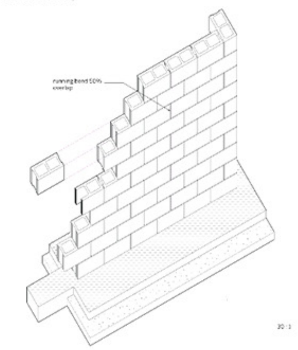
Figure 3. Top: Site analysis. Credit: Kristin Pitts; Opposite:Construction tactics simplified manual cards for local builders. Credit: William Nix; Flood mitigation strategies. Credit: Matthew Crow.

UNIT 01
concrete masonry



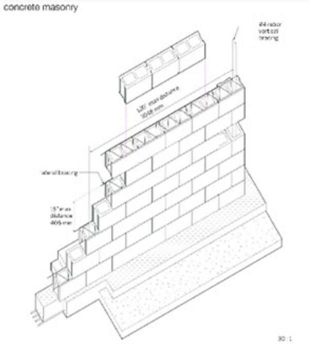
Standard Concrete Masonry Unit

WALL 01
concrete masonry



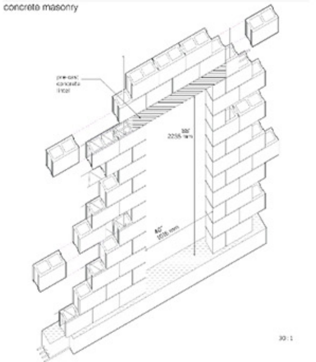
Standard CMU Wall Assembly

WALL 02
concrete masonry



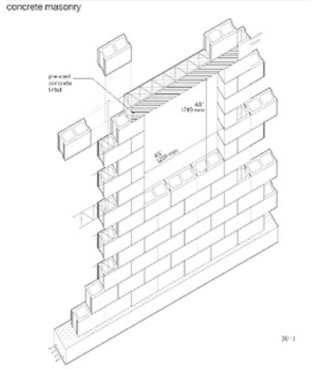
Standard CMU Wall Reinforcement

WALL 03
concrete masonry



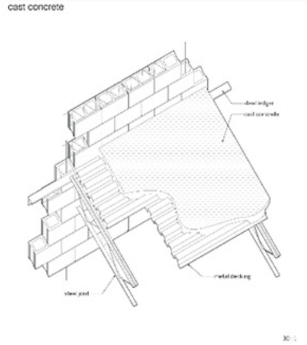
Standard CMU Door Opening

WALL 04
concrete masonry



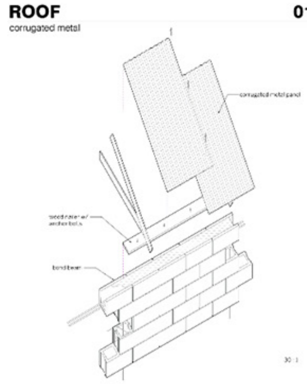
Standard CMU Window Opening

FLOOR 01
cast concrete

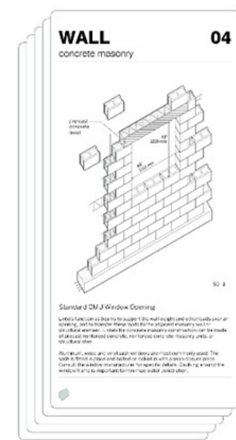


Standard Cast Concrete Floor

ROOF 01
corrugated metal

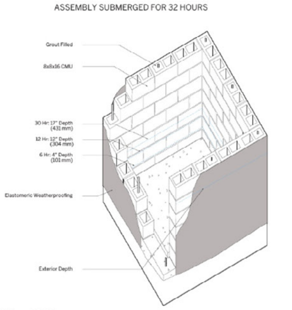


Standard Corrugated Metal Roof



FLOOD MITIGATION 03
Floodproofing | Dry Floodproofing

ASSEMBLY SUBMERGED FOR 32 HOURS



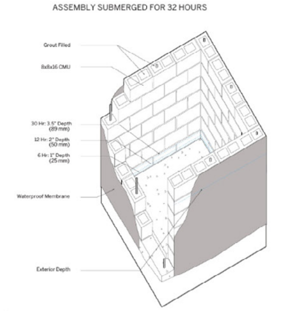
Typical Characteristics:
Water Resistance: Low to Moderate
Cost: Moderate
Maintanence Cost: Low toModerate

Weatherproofed Block Assembly

The weatherproofed block assembly is standard CMU construction with the addition of a elastomeric weatherproofing. The water levels during flooding in the assembly reached a maximum level of 17 inches after 32 hours of being submerged. At this rate, the assembly would only mitigate flood waters for up to 72 hours before internal and external levels meet equilibrium.

FLOOD MITIGATION 03
Floodproofing | Dry Floodproofing

ASSEMBLY SUBMERGED FOR 32 HOURS

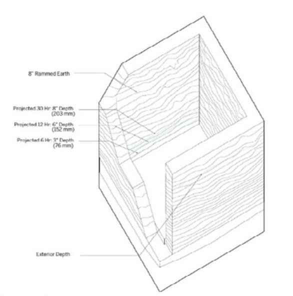


Typical Characteristics:
Water Resistance: Moderate to High
Cost: Moderate
Maitanence: Low

Sheet Membrane Block

The sheet membrane block assembly uses a waterproof membrane to help mitigate flood levels on the interior spaces. Each CMU hole is filled with grout creating less air space in the assembly and creating more material for the water to transition. The assembly maintained a low interior water level through the 32 hour submersion and would reach equilibrium with external levels after 200+ hours.

FLOOD MITIGATION 03
Floodproofing | Dry Floodproofing

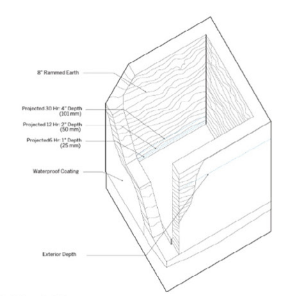


Typical Characteristics:
Water Resistance: Moderate
Cost: Low to Moderate
Maitanence: Low

Rammed Earth Walls

Rammed Earth Walls can be resilient to flood impact but seem to loose structural stability the longer they reside in the water. The density of the material can be an important factor when designing for floods. As seen in the CMU example, the Sheet Membrane Block resist water partly because of the grout filled into the holes in the units.

FLOOD MITIGATION 03
Floodproofing | Dry Floodproofing



Typical Characteristics:
Water Resistance: Moderate to High
Cost: Low to Moderate
Maitanence: Low

Waterproofed Rammed Earth Wall

Waterproofing the exterior of the rammed earth can also help resist water entry into interior spaces. It is recommended that if you know the project is going to flood then you should use another material for the lower portions. At a minimum, use waterproofing paint or coating on the exterior of the rammed earth to assist it.

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SITE DESIGN AND MASTER PLAN FOR THE NEW CAMPUS

Emerging from a ministry founded to aid vulnerable and orphaned children of Chokwe, Mozambique, the Hlauleka School was established as a private preschool that also provided permanent shelter and education for those it aimed to serve. This project focuses on the future expansion of the school through the development of a master site and design proposal that embraces and celebrates the unique characteristics of the region, ecosystem, and site.

Anchored by its three prominent programs, the proposal embeds openness, engagement, and longevity into the master plan. Building program acts as the generator for organizational logic and architectural form and works in tandem with prior research that informs methodologies and typologies to shape the project's identity. Phase-based planning strategies are implemented to maximize opportunities for future growth and sustainable development without compromising its spatial and adaptive qualities. Related functions are located within close proximity to each other creating zones of connection and interaction.

With a primary focus centered upon creating an elevated learning experience that promotes flexibility, health, and interaction, architecture and landscape are creatively engaged in the development of a unique and efficient campus plan. With the northwest area of the site being the closest to the existing school campus, the goal of the site design for the high school was to concentrate the majority of the school's programs as close as possible to the existing primary school to provide efficiency through proximity. The site design also promotes health beyond the aspect of construction as varying opportunities for healthful choices and activities are included such as raising livestock, school farm, and gardens while increasing spaces available for recreational use (Fig. 4).

MASTER PLAN DEVELOPMENT ROAD MAP AND CONSTRUCTION PHASES

To accommodate a sustainable and gradual approach to the campus's construction as resources become available, a series of phasing plans were developed. For phase 1, programs considered most critical were included to ensure the campus could function even at its most elementary stage. Phase 2 includes the library and the computer lab along with only one additional grouping classrooms. Phase 3 includes the remaining educational buildings, support spaces, and the pool. Phase 4 adds the large gym and health center. Due to its scale of construction, the gym receives its own phase. The health center is included within the last phase but as it is an optional program not originally requested, it is reserved for last or may be included in an additional phase (Fig. 5).

Figure 4. Top: Site program distribution, Opposite: Environmental analaysis, zonning, circulation and landscape stratgageis.
Credit: Kristin Pitts and Hollywood Conrad

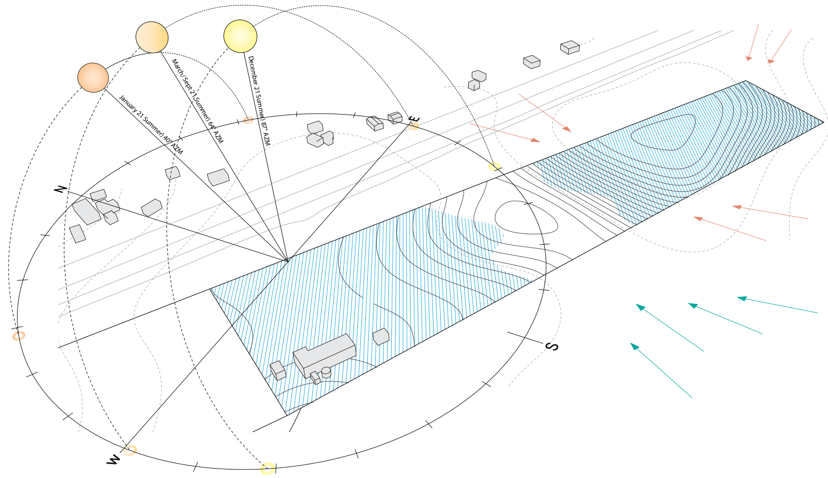
Existing + Environmental Conditions

Existing conditions in context to the site

Flood Plane

Prevailing Summer Winds

Prevailing Winter Winds



Zoning

The site is informally partioned into zones of use creating efficient adjacencies driven by program functions

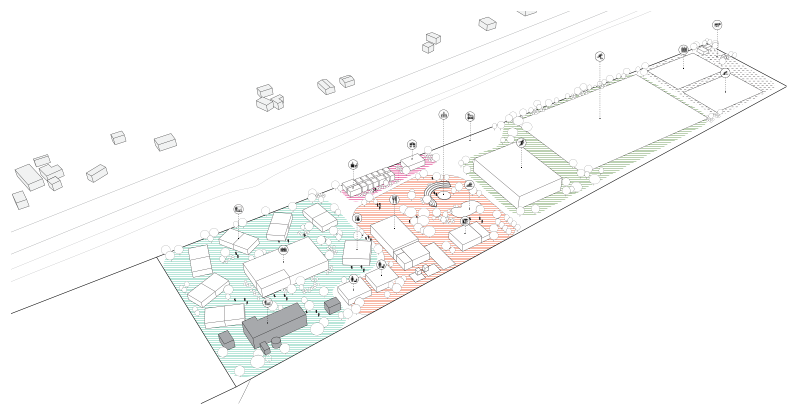
Academic

Administrative | Support

Congregative | Shared Space

Athletic

Agriculture | Farming



Site Circulation

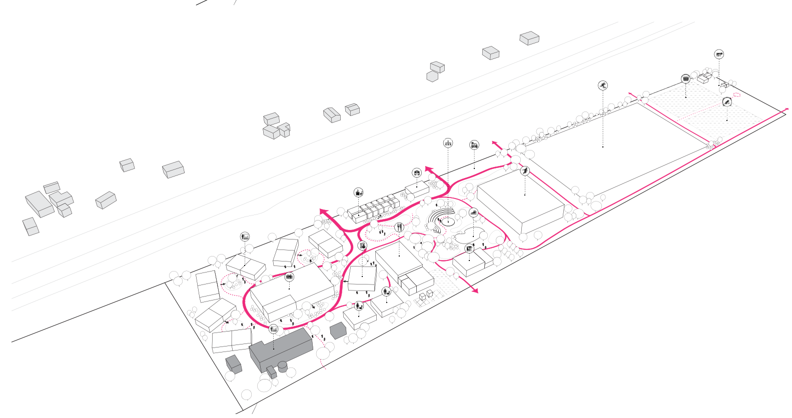
Depicts likely routes of primary and secondary circulation patterns and possible site access locations.

Primary Vehicular Route

Primary Pedestrian Way

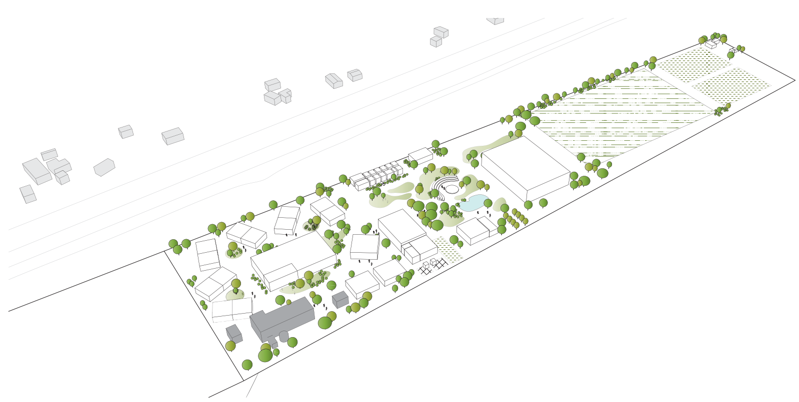
Secondary Pedestrian Way

Pathways



Landscape

Native plant species are proposed to create generous areas of greenscape providing the site with shade and areas for enjoyment.



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LEARNING VILLAGE: SITE PROGRAMMING AND CIRCULATION
Upon entering the site, all administrative functions are placed directly at the entrance to allow for ease of access for visitors and staff. A health center is adjacent to administration. A large dining hall is centered within the site with kitchen, large storage, and staff dressing rooms. A community garden area and accommodations for small animals are near for direct kitchen access. Within the academic zone, a large central library containing a computer lab nested in a radial array of classroom spaces creating a "learning village". A science laboratory and the existing classroom building completes the arrangement. Restrooms are strategically placed for ease of access to all students from both the academic and recreational wings. To the opposite side of the dining within the central portion of the site, a maker's space that is separated from the academic wing for noise reduction. A pool and amphitheater are located within the center of the site offering spaces for interaction and recreational activities. This also serves as a transition into the athletic zone which includes a gymnasium and sports fields. Within the gym, a stage, locker rooms with toilets, storage, and multipurpose spaces are provided. Space for farming and accommodations for larger animals are located at the most remote end of the site (Fig. 5).

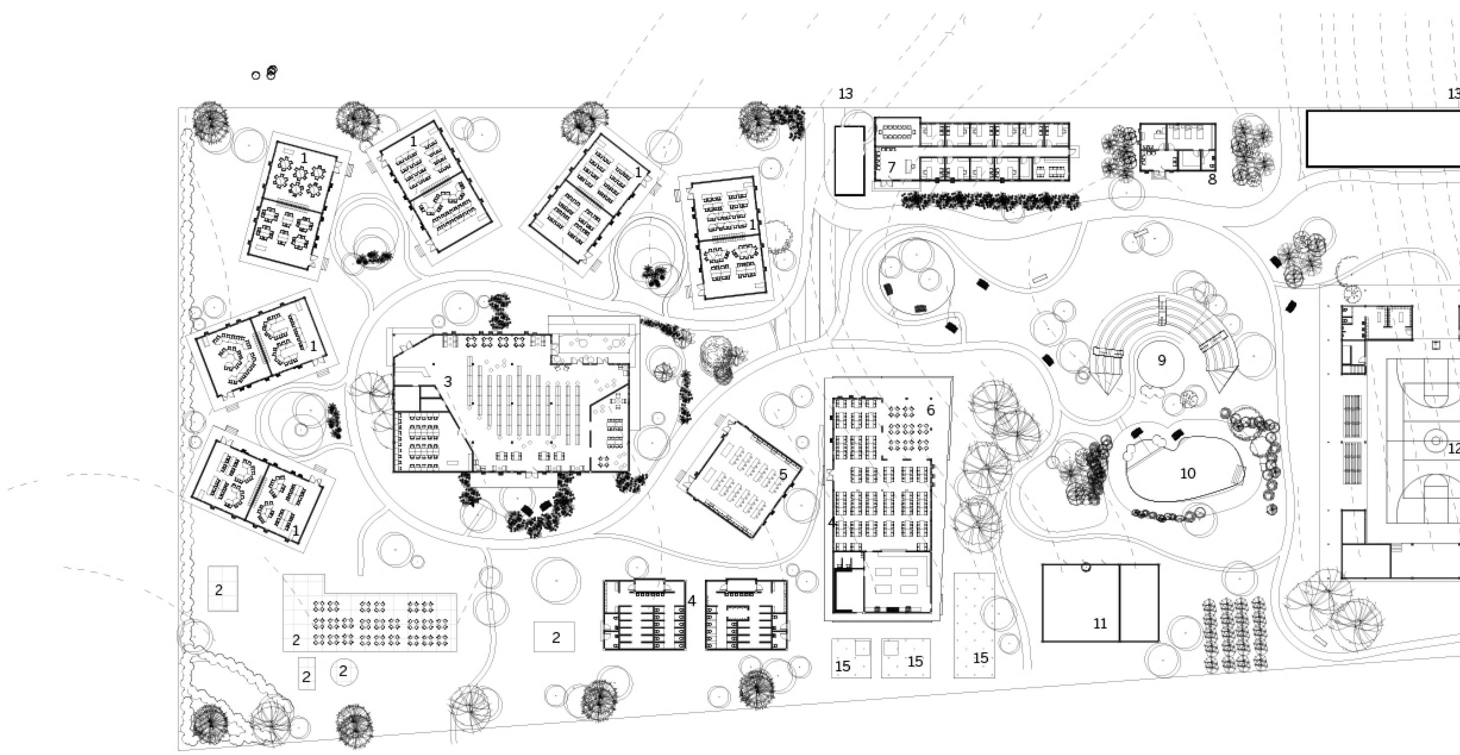
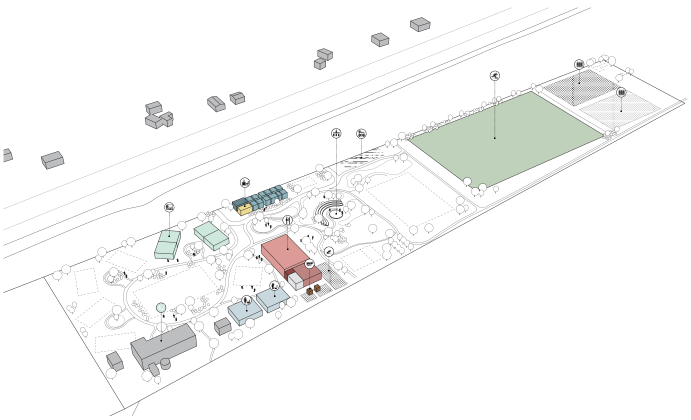
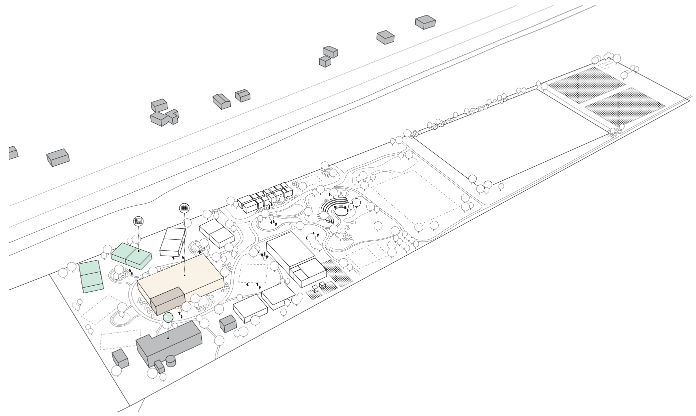


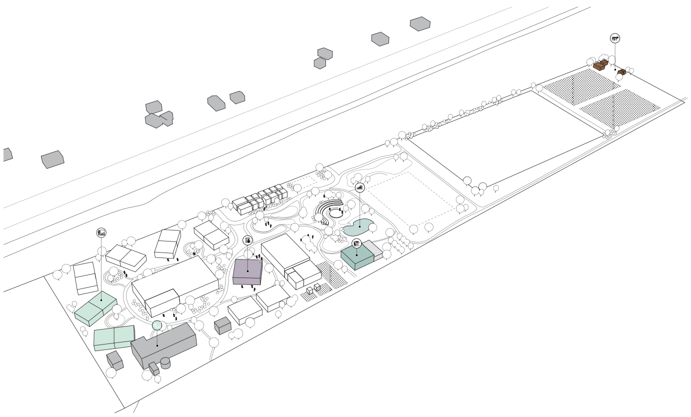
Figure 5. Top: Construction phases. Bottom: New Hlauleka high school site plan. Credit: Kristin Pitts and Hollywood Conrad.



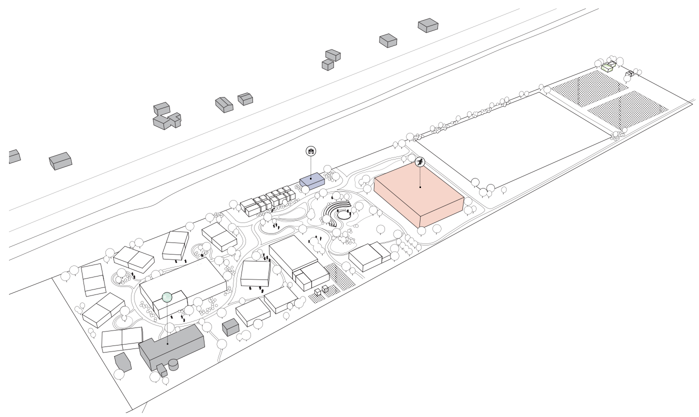
Phase 1



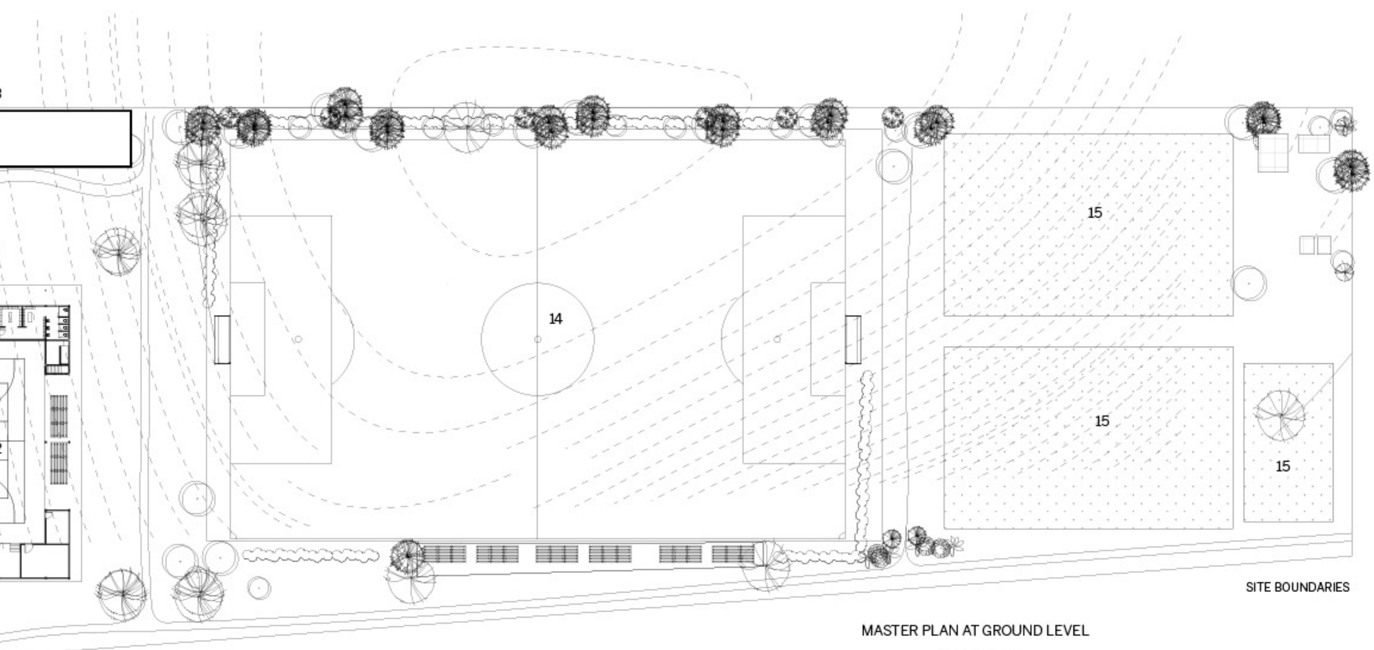
Phase 2



Phase 3

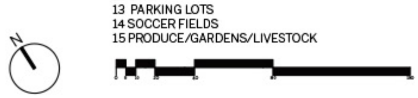


Phase 4



MASTER PLAN AT GROUND LEVEL

1 CLASSROOMS
2 EXISTING STRUCTURES
3 LIBRARY
4 LOCKER ROOMS/TOILETS
5 LABORATORY
6 KITCHEN/DINNING ROOM
7 ADMINISTRATIVE OFFICE
8 NURSE OFFICE/FIRST AID
9 AMPHITHEATER
10 POOL
11 WORKSHOP
12 GYM
13 PARKING LOTS
14 SOCCER FIELDS
15 PRODUCE/GARDENS/LIVESTOCK



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CLASSROOMS DESIGN

While not the largest of the buildings, the classrooms in many ways are one of the most important building types. Each academic cluster has two separate classrooms which share a wall extending to structure to mitigate sound transfer. Each cluster face each other creating a small courtyard. The courtyard design was purposeful as, by decreasing the amount of hardscape and increasing the amount of vegetation, it decreases and combats the dust that is traditionally associated with this climate. Elevating the classrooms increases their usability during periods of flooding. Multiple configurations of the seating allows a fluid and dynamic environment. This provides more opportunities for growth, learning, and interactions among the students.

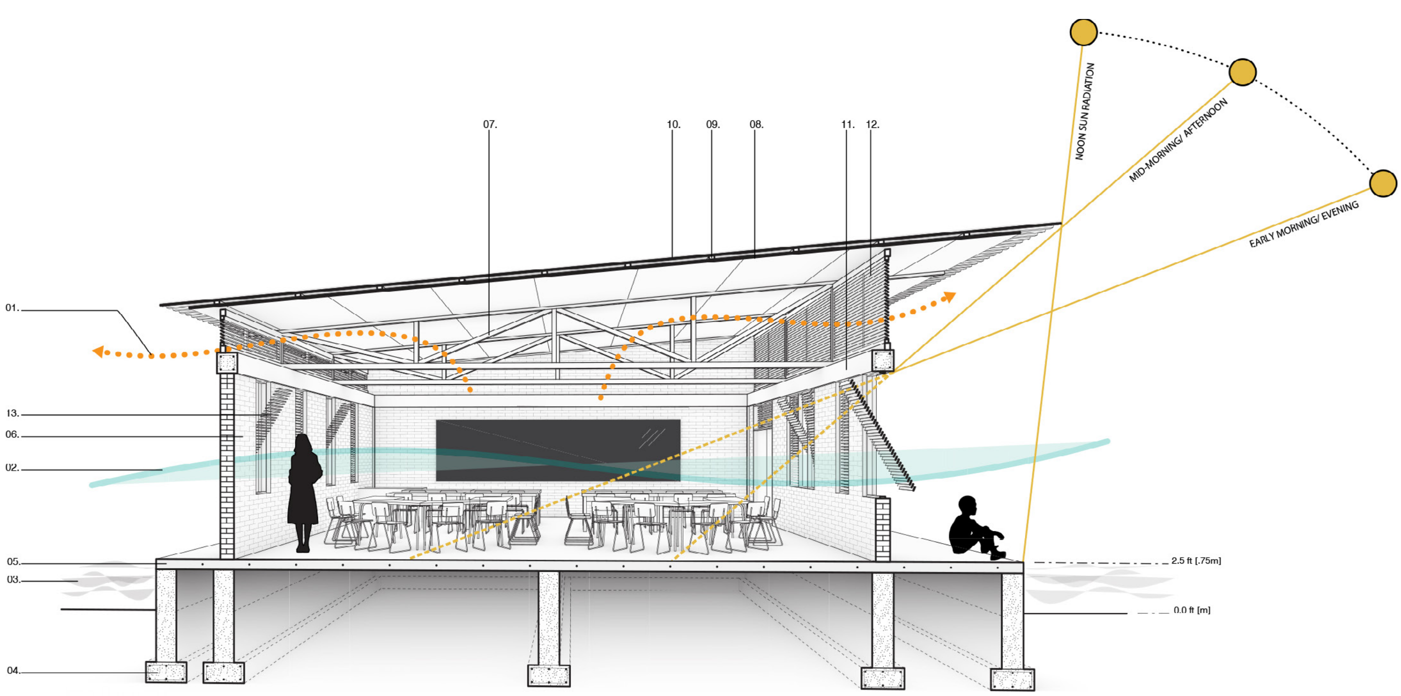
INTERIOR MODULARITY FOR ACTIVE - LEARNING

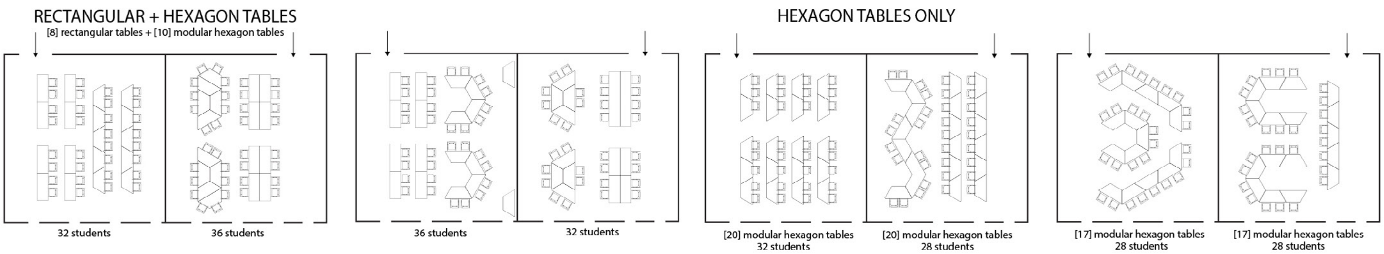
Inspired by the active and flexible approaches to learning environments implemented within contemporary educational contexts, custom furnishings innovatively integrate these ideas into the project's context. Through furniture design, classrooms have the potential to be configured to support varying approaches of active learning, embedding flexibility into each classroom. By introducing a highly configurable modular desk design, teachers and students are empowered with the freedom to craft and elevate the learning experience. Both the interiors and exteriors are transformed using local resources creating a sense of refinement .

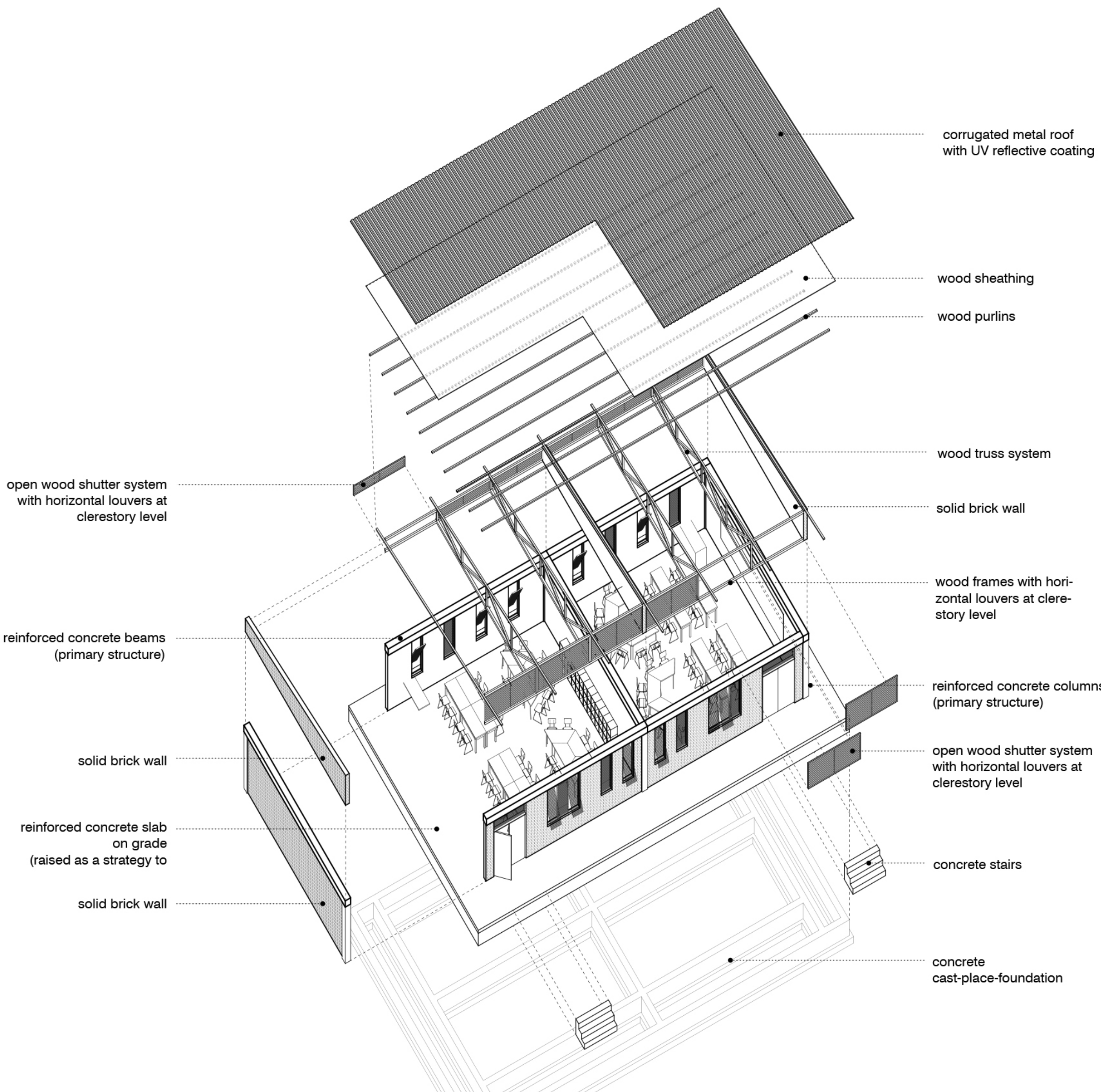
ENVIRONMENTAL DESIGN AND SUSTAINABLE STRATEGIES

The site experiences a range of extreme conditions due to Chokwe's warm, tropical climate and monsoons flooding from the coast. Using the previous research, resilient building design strategies are implemented for the structure, ventilation, lighting, and shading of the buildings to improve thermal comfort levels and mitigate the impact of adverse environmental conditions experienced on the site.
Using passive ventilation strategies, interior spaces are more easily cooled and ventilated. Natural lighting is maximized reducing energy needs. Lofted roofs allow heat to rise and escape through perforated clerestories while masonry walls and partitions reduce heat gain through the building envelope. Cantilevered roofs provide exterior shading for the occupants and decrease the amount of direct sunlight into the building's openings. The elevated building structures help to both address the site's propensity to flooding and impede the access of pests commonly encountered on the site (Fig. 6).

Figure 6. Bottom: Environmental and sustainable design strategies; Oppsite: Adaptable classroom furniture arrangements and construction material. Credit: Kristin Pitts.




RECTANGULAR + HEXAGON TABLES
[8] rectangular tables + [10] modular hexagon tables
32 students
36 students
36 students
32 students
HEXAGON TABLES ONLY
[20] modular hexagon tables
32 students
[20] modular hexagon tables
28 students
[17] modular hexagon tables
28 students
[17] modular hexagon tables
28 students


corrugated metal roof
with UV reflective coating
wood sheathing
wood purlins
wood truss system
solid brick wall
wood frames with hori-
zontal louvers at clere-
story level
reinforced concrete columns
(primary structure)
open wood shutter system
with horizontal louvers at
clerestory level
concrete stairs
concrete
cast-place-foundation
open wood shutter system
with horizontal louvers at
clerestory level
reinforced concrete beams
(primary structure)
solid brick wall
reinforced concrete slab
on grade
(raised as a strategy to
solid brick wall

The adaptable classroom interior is driven by active learning strategies and utilizing local resources

Classroom interior rendering
Credit: Kristin Pitts.

SUPER RESILIENT: FINDING SOLID GROUNDS FOR HLAULEKA SCHOOL IN MOZAMBIQUE

BUILDING TYPOLOGIES: RESILIENT AND FLEXIBLE DESIGN METHODOLOGIES

Informed by the prevalent and reliable construction techniques of the region and relevant case studies, the proposal seeks to implement simple and resilient building designs and construction materials for optimal performance. All primary structural elements are comprised of reinforced concrete with clay bricks serving as the infill wall material. The roofs are lofted above the structure with wooden trusses and their ceiling areas are enclosed by a slatted wood window system at the clerestory level. Operable window shutters allow controlled levels of light to filter through while simultaneously providing the passage of air. The majority of all the campus building structures follow similar design principles establishing a cohesive architectural language throughout the site. Alternative strategies for the building envelopes that provide comparable performance were also explored offering further flexibility to the design. Overall, the proposed buildings design utilizes design principles that are technically simple, but utilize research-based design to enhance the building tectonics. Traditional construction methods are elevated by employing innovative strategies that reinterpret familiar materials and building techniques common to the area. In all cases, the design responsibly utilizes humble resources in thoughtful ways that enable efficient site development. Though simple materials and construction methods form a basis of design, creative variations generate a cohesively unique design language (Fig.7).

ECONOMY OF MATERIALS AND RESOURCES

The materials proposed were chosen based on their availability and common construction practices in Chokwe. Supplemental research into construction practices and materials for similar buildings in comparable climates also guided the project selections. It was important to propose construction materials and building techniques that were not only applicable and successfully used in similar conditions and regions. but also those that were accessible to the site and familiar to those involved in the building efforts. Informed by the prevalent and reliable construction techniques of the region and relevant case studies, the project implements simple and resilient designs and materials for optimal performance.

LEARNING LANDSCAPES AND ECOLOGICAL STRATEGIES

Since learning is not limited to a classroom and can be facilitated in multiple environments, the proposed landscape design explores this idea by providing multiple areas to gather for both learning and leisure. Garden spaces, intimate courtyards, and shaded porches offer alternative learning environments while an open-air amphitheater, pool, and open spaces create places of leisure and interaction. Dense areas of vegetation create quite areas and hinder sound travel across the site. Throughout the landscape the senses are more fully engaged as green spaces and architecture of the site are intricately layered using a variety of tones, textures, and arrangements from a grove of mango trees to small groupings of edible species. Fruit trees and onsite crops provides sustainable source of nutrition as they are incorporated into meals served for the students.

This project was designed to conserve the ecosystem by focusing on enhancing the living environment around it through an incorporation of local and native vegetation which maximizes softscape with a strategic use of hardscape. By increasing the variety of native species and increasing the abundance of the species, an ecosystem that would reach stabilizing populations quickly and efficiently is proposed. This approach would also provide habitats for the native species, and niche environments. Through the construction of courtyards and strategic placements of plantings, the high levels of dust often experienced on site would be substantially reduced. By increasing the amount of vegetation, the amount of surface area available for runoff is decreased as well. Introducing native grasses provide further benefit to the site's natural ecosystem. Additionally, the use of trees to provide windbreaks and buffer zones, simultaneously increase carbon absorption while preventing soil erosion.

DESIGNING FOR WATER

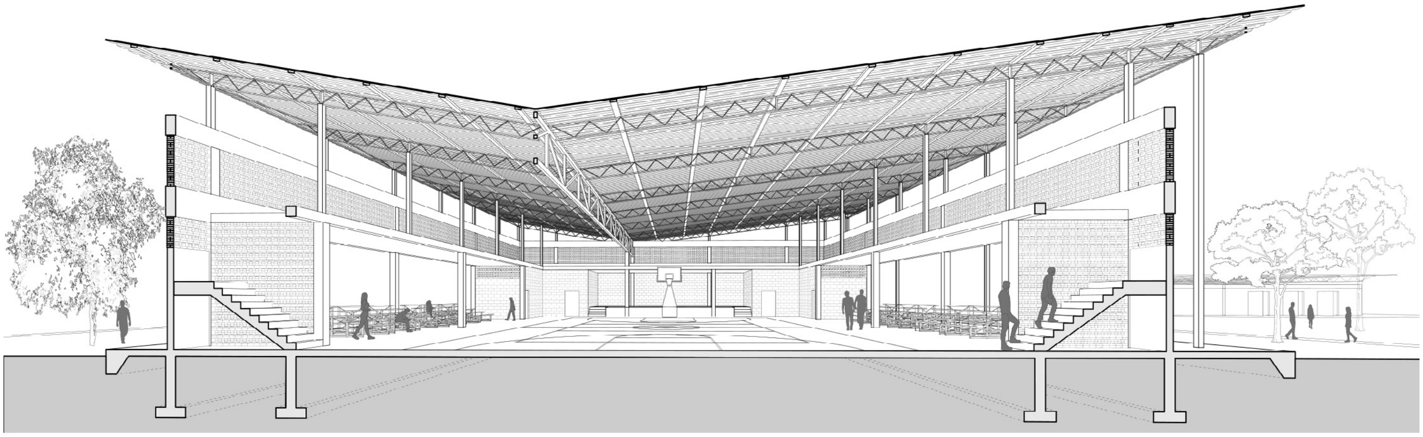
The roofs are designed to support rainwater collection as the continuity of their surface areas and pitches provide the opportunity to capitalize upon periods of significant rainfall. Water is key to the site, as it alternates between periods of scarcity and abundance. Rainwater collected during the wet season can be stored for future use in crop irrigation and water for livestock.

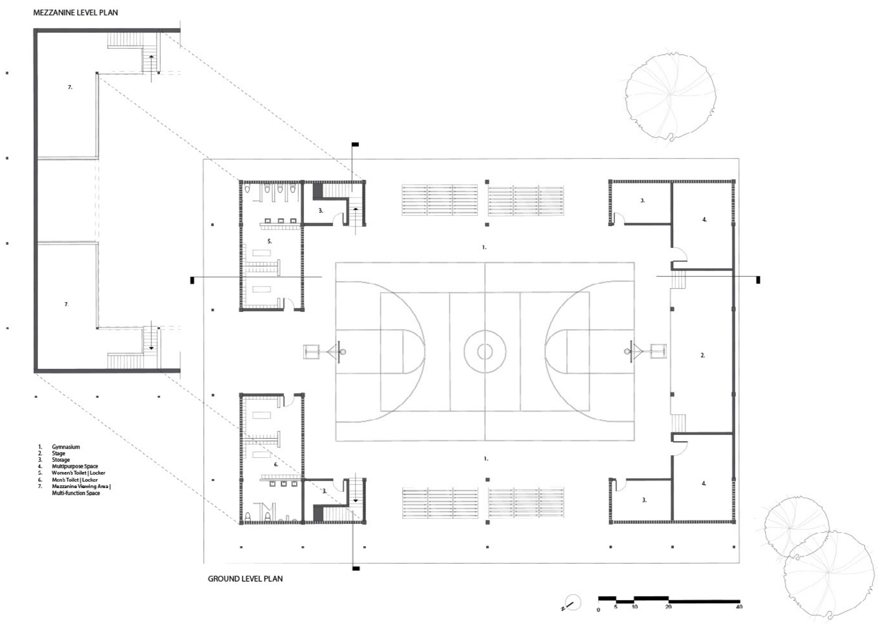
CONCLUSION

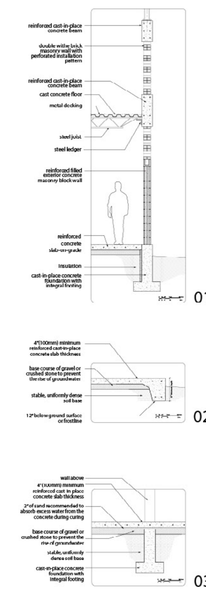
By exploring the potential of the Hlauleka school through precedent, site context, program analysis, and projective propositions, the course challenges concepts of responsible and purposeful architecture, and advocates for sensible architecture solutions rooted in resiliency and resourcefulness which promote dignity and longevity. The course reinforces the vital linkage between interdisciplinary, investigative learning, and real-world practice while simultaneously accommodating imaginative and pragmatic expectations.

We considered this project as the first step toward a novel, fully integrated approach to construction driven by the material economy and have the potential to transform the current practices and decision making and planning of flood-resistant, affordable, resilient, and environmentally sustainable school buildings in cities susceptible to natural disasters.

Figure 7. Opposite: Gymnasium plan, section, construction and materials details. Credit: Kristin Pitts.




MEZZANINE LEVEL PLAN
GROUND LEVEL PLAN
1. Gymnasium
2. Stage
3. Storage
4. Multipurpose Space
5. Women's Toilet | Locker
6. Men's Toilet | Locker
7. Mezzanine Viewing Area | Multi-function Space


reinforced cast-in-place concrete beam
double withe brick masonry wall with perforated installation pattern
reinforced cast-in-place concrete beam
cast concrete floor
metal decking
steel joist
steel ledger
reinforced filled exterior concrete masonry block wall
reinforced concrete slab-on-grade
insulation
cast-in-place concrete foundation with integral footing
01
4"(100mm) minimum reinforced cast-in-place concrete slab thickness
base course of gravel or crushed stone to prevent the rise of groundwater
stable, uniformly dense soil base
12" below ground surface or frostline
02
wall above
4"(100mm) minimum reinforced cast-in-place concrete slab thickness
2" of sand recommended to absorb excess water from the concrete during curing
base course of gravel or crushed stone to prevent the rise of groundwater
stable, uniformly dense soil base
cast-in-place concrete foundation with integral footing
03

A learning Village: the design responsibly utilizes humble resources in thoughtful ways that enable efficient site development. Though simple materials and construction methods form a basis of design, creative variations generate a cohesively unique design language across the new campus

New Hlauleka High School
campus rendering
Credit: Kristin Pitts.

Quotes by Studio Mozambique Students

"The studio dissolved boundaries and provided a lasting framework of responsive design approaches for the future of a thriving community."

"In this instance, it is especially raw and powerful. potential to improve lives and provide dignity through the design and construction process in a very palpable way profoundly resonated with me."

"Our studio was fundamentally about achieving insights into the social, economic, political and spatial qualities congruent with extreme climate conditions and disaster relief for the community."

"We were provided with a unique opportunity to communicate with the local school administration to more thoroughly understand the needs and vision of the school."

"Direct access to those involved with the school and surrounding communities established a clear framework for site and structure potentials."

"Each student team took its own unique approach in confronting these issues, but at the core, we were all working toward flexible and resourceful strategies for the malleable needs of the school."

"The design resolves both as it seeks to capitalize upon local, accessible resources and familiar building methods in the construction of resilient structures that support the needs, performance and longevity of the Hlauleka school."

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