Reuniting with the Sun:

Choreographing Natural Light in Contemporary Nigerian Architecture through Vernacular Wisdom

by
Oluwatimilehin Olayemi Aremu

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Author’s Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis including any required final revisions as accepted by my examiners.

I understand that my thesis may be made electronically avaliable to the public.

Abstract

Light is one of the most constant forces shaping human experience, yet in contemporary Nigerian architecture it is often treated as a technical problem to solve rather than a medium to engage. In a climate defined by intense sunlight, design decisions frequently revolve around glazing ratios, heat gain, and shading systems, while the emotional, cultural, and sensory dimensions of light remain overlooked. But the sun continues to choreograph daily life, marking time, shaping mood, and defining how buildings feel against the body. Reconsidering its presence opens up new possibilities for architecture that is both climatically responsive and experientially rich.

Across Nigeria's vernacular traditions, builders developed subtle, intuitive ways of working with the sun. Thick earthen walls, small apertures, courtyards, and deep verandas did more than moderate heat, they filtered light into gradients of glow, shadow, and calm. These choices were not framed as "experiential," yet they produced atmospheres that supported rest, community, and cultural rhythms. Their wisdom reveals a form of environmental intelligence that contemporary architecture has largely neglected.

This thesis re-examines light not as neutral illumination but as a sensory and cultural medium. By bringing vernacular intelligence into dialogue with contemporary tools and materials, it argues for an architecture where the technical and the experiential are not opposites but partners. Drawing from the work of architects like Francis Kéré, Demas Nwoko, Tosin Oshinowo, and Louis Khan and from phenomenological thinkers such as Juhani Pallasmaa, Gaston Bachelard, and Jun'ichirō Tanizaki, the research investigates how sun, shadow, and material can shape atmosphere, memory, and embodied experience.

Using precedent analysis, phenomenological observation, and design experimentation, the project explores how the sun's daily and seasonal rhythms might guide form, structure, and spatial sequence. The design component focuses on a contemporary cultural building in Kano, Northern Nigeria, conceived as a site where light becomes an active collaborator, structuring comfort, fostering belonging, and restoring emotional depth to everyday architectural experience.

Ultimately, this thesis calls for a renewed reciprocity between architecture and the sun. It proposes that designing with light is not simply about environmental control, but about creating spaces that allow people to feel time, sense the climate, remember culturally embedded traditions, and imagine new ways of dwelling within the Nigerian context.

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Finally, this thesis represents more than the completion of an academic program. It reflects years of growth, persistence, curiosity, discipline, and learning. I leave this chapter deeply thankful for everyone who contributed to this journey in ways both large and small.

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Preface

I come to this research as a Nigerian who has lived with the sun as a daily companion rather than a distant environmental condition. In Nigeria, sunlight is not something encountered abstractly through diagrams or simulations; it is felt on the skin, negotiated through movement, and anticipated in daily routines. It determines when spaces are occupied, where people gather, and how long one lingers. Growing up in this context has shaped how I notice light; not as background illumination, but as something active, changing, and deeply tied to experience.

Before architecture, my way of paying attention to the world was through photography. Photography taught me to wait for light, to observe how time alters a space, and to notice how meaning emerges through subtle shifts rather than fixed objects. Through this practice, I became less interested in things themselves and more attentive to the conditions that allow things to be perceived. Light became my primary way of understanding atmosphere, memory, and presence.

This awareness sharpened during an early academic exercise that asked me to reflect on memory through objects. I realized that my difficulty was not an absence of meaningful objects, but a resistance to locating memory solely in material things. What stayed with me instead were moments: the quality of light in a room, the softness of shadow at certain hours, the way a space feels different as the day unfolds. These realizations gradually redirected my attention from objects toward environments, and eventually toward architecture.

As a Nigerian studying architecture within an academic context shaped largely by Western references, I am conscious of occupying an in-between position. I carry embodied memories of spaces shaped by climate, informality, and intuition, while also engaging theoretical frameworks developed elsewhere. This dual position allows me to notice tensions between inherited ways of building and contemporary architectural aspirations, particularly in how light is approached, managed, or ignored. My perspective is therefore neither purely nostalgic nor purely technical, but shaped by lived experience, observation, and reflection.

This research grows out of that position. It is motivated not by a desire to prescribe solutions, but by a need to understand why certain spaces feel alive, grounding, or humane, while others feel detached despite technical competence. My engagement with light is personal before it is analytical, rooted in memory before theory. Acknowledging this positionality is essential, as it shapes how I read precedents, interpret spaces, and imagine architectural possibilities.



Figure 1.1
Where the ordinary becomes memorable. Sunlight filtered through the bus stop canopy creates momentary patterns on the ground.

01

dawn

2

Thesis Statement and Aims

Light is one of the most constant presences in Nigerian life and in human experience at large, yet it is also one of the most overlooked.[1] We wake to it, work within it, and prepare for rest as it fades; rarely pausing to consider its subtle authorship of space, emotion, and memory. Light not only makes things visible; it gives texture to the day, marks the passage of time, defines atmosphere, and shapes how people inhabit both interior and exterior worlds.[2] In Nigeria, where the sun is relentless and deeply felt, its presence dictates form, material, and daily habit. Yet this intensity is often treated in contemporary practice as a technical parameter to be controlled rather than a companion in the making of space.

Vernacular builders once engaged the sun intuitively; through courtyards, verandas, earthen walls, shaded thresholds, and spatial orientations that filtered, softened, and choreographed daylight throughout the day.[3] These choices created atmospheres that responded to climate, culture, and rhythm. Today, however, much of this sensibility has faded.[4] Contemporary buildings tend to filter or block the sun rather than collaborate with it, resulting in spaces that are efficient but emotionally thin.[5]

This thesis argues for a renewed architectural language that treats the sun as a partner rather than a problem. It proposes a framework that integrates vernacular intelligence, the lived experience of light, and phenomenological depth to reimagine how light and shadow can shape contemporary Nigerian spaces. Rather than separating the technical from the poetic, the thesis seeks to merge them - to understand light not only as illumination, but as a medium of comfort, belonging, time, and meaning.

The aims of this study are to reveal how vernacular Nigerian architecture choreographed light in culturally and climatically responsive ways;[6] to identify how contemporary practices have become disconnected from these sensibilities;[7] to develop a framework that understands light as experience, not merely performance;[8] and to articulate principles that can guide emotionally resonant, climate-responsive design in Nigeria.

1 Ramos, *Light in Architecture*.
2 Zumthor, *Atmospheres*.
3 ResearchGate, "(PDF) Energy Efficiency in Traditional African Architecture."
4 Samuel, "Hausa Urban Architecture"; Koko, "Exploring the Different Vernacular Architecture in Nigeria."
5 Adebiyi, "From Courtyards to High-Rises"; Ojo-Ibukun, "Does Lagos Have an Architectural Identity Crisis?"
6 Redd, "A Lesson From Vernacular Architecture In Nigeria."
7 Adebiyi, "From Courtyards to High-Rises."
8 Pallasmaa, *The Eyes of the Skin*; Bachelard et al., *The Poetics of Space*; Zumthor, *Atmospheres*.

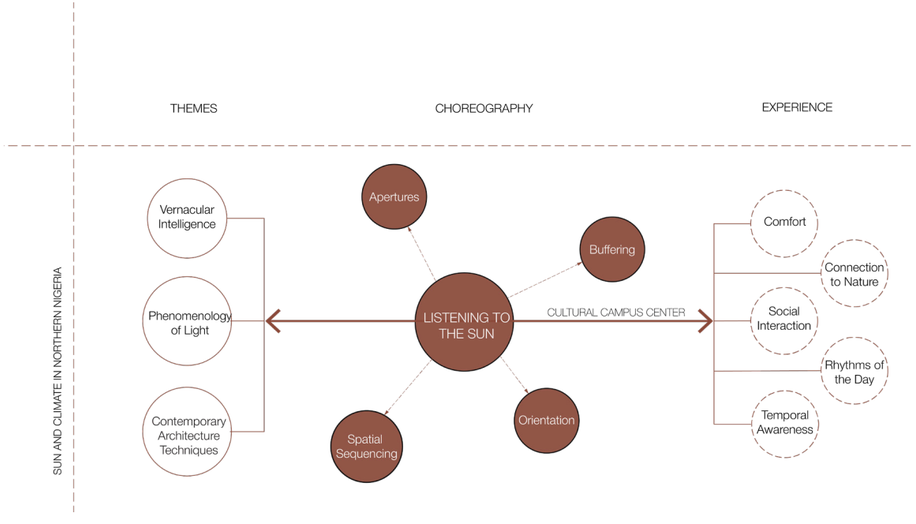


Figure 1.2
Conceptual Flow Diagram – Summarizes the core themes of the thesis, showing the relationship between phenomenology, vernacular intelligence, and contemporary architectural techniques, and how these inform spatial and emotional experience.

Research Gap

Although Nigerian architectural discourse acknowledges the sun's prominence, scholarship tends to focus on technical concerns; thermal performance, passive cooling, daylighting efficiency, and material optimization.[9] These are essential considerations, but they often overlook the experiential, cultural, and symbolic dimensions of light: the very aspects that make architecture meaningful and emotionally grounded. Contemporary buildings frequently prioritize glazing, mechanical systems, or stylistic gestures while ignoring the sun's temporal qualities, its role in shaping atmosphere, and its cultural presence in Nigerian life.[10]

Nigeria's electrical infrastructure remains unreliable, with a significant portion of the population lacking consistent access to grid electricity. Even among connected households and institutions, frequent power outages result in heavy reliance on generators. In northern Nigeria, a large portion of building energy consumption is attributed to mechanical cooling systems responding to high solar exposure and extreme heat. These conditions reinforce the need for architectural strategies that minimize dependence on active cooling and artificial lighting through passive environmental design.[11]

This disconnect becomes more apparent when contrasted with vernacular practices, where materiality, form, and orientation produced intimate conditions of shade, filtered light, and atmospheric comfort. Similarly, phenomenological theorists such as Bachelard, Pallasmaa, and Tanizaki provide conceptual tools for understanding the emotional and sensory qualities of light,[12] yet these ideas have not been meaningfully applied to the Nigerian context.

9 Ochedi and Taki, "(PDF) Energy Efficient Building Design in Nigeria."
10 Ojo-Ibukun, "Does Lagos Have an Architectural Identity Crisis?"
11 Ruqayya Hussaini Mahuta and Idil Erdemir Kocagil, "Climate-Responsive Design Strategies: Utilizing Vernacular Architecture to Design Energy-Efficient Residential Buildings in Nigeria."
12 Tanizaki, *In Praise of Shadows*; Pallasmaa, *The Eyes of the Skin*; Bachelard et al., *The Poetics of Space.*

While contemporary West African architecture has demonstrated the climatic viability of vernacular materials, less attention has been given to how light and shadow can be deliberately choreographed as experiential and cultural agents within contemporary civic architecture in northern Nigeria.[13]

The gap, therefore, is not the absence of technical knowledge, vernacular precedent, or phenomenological theory, but the absence of scholarship that synthesizes these three domains into a unified architectural framework. No existing work brings together climate understanding, vernacular intelligence, and sensory experience to guide contemporary Nigerian architecture. This thesis positions itself within that missing intersection.

Research Questions

Guided by this gap, the thesis is shaped by one central question:
How can Nigerian architecture choreograph sunlight by synthesizing vernacular environmental intelligence and modern techniques to shape meaningful spatial experiences?
Supporting questions include:

- What can be learned from the ways Nigerian vernacular buildings intuitively shaped light, shadow, and comfort?
- How have modern and post-colonial architectural practices in Nigeria altered or diminished the experiential qualities of light?
- How can phenomenological concepts of atmosphere, memory, and embodiment help reframe the role of light in Nigerian spaces?
- In what ways do cultural, symbolic, and spiritual interpretations of light contribute to a deeper architectural language?
- What design principles can guide a contemporary architecture that treats the sun as collaborator rather than constraint in Nigeria?

These questions establish the theoretical and design inquiries that structure the thesis.

Contribution and Scope

This thesis contributes to Nigerian architectural discourse by proposing an architectural framework that joins environmental intelligence, cultural meaning, and phenomenological insight. It argues that designing with light is not only a technical responsibility but also a cultural and emotional one. By reframing the sun as an active agent rather than a threat, the thesis highlights how vernacular principles can inspire contemporary strategies that merge atmosphere with performance and draws on precedents where contemporary African architects engage climate and atmosphere, such as Francis Kéré, Demas Nwoko, and Tosin Oshinowo.[14] It also introduces phenomenological readings of light into Nigerian architectural scholarship and offers principles that integrate shading, materiality, and orientation with sensory depth and temporal resonance.

13 Kéré Architecture, “Kéré | Work.”

14 designboom, “Diebedo Francis Kere”; Fakharany, “Tosin Oshinowo”; Features, “The Pioneering Architecture of Nigerian Artist-Designer Demas Nwoko.”

The scope of the research focuses on contemporary Nigerian architecture where daily rituals, communal life, and embodied experience are most present. The approach is primarily conceptual and interpretive, drawing on vernacular traditions across Nigeria’s climatic regions, post-colonial architectural evolution, phenomenological theory, and cultural understandings of light. Analytical studies are used to examine how orientation, apertures, and spatial buffering influence the behaviour of light. These investigations support the development of spatial patterns and architectural principles that can guide a renewed sensibility toward designing with light, one grounded in climate, culture, and atmosphere.

Structure of the Thesis

The thesis unfolds through five interconnected chapters that move from conceptual grounding to design inquiry. Chapter 1 introduces the central argument, articulates the research gap, and outlines the aims, questions, and contributions of the study. Chapter 2 provides the theoretical foundation through a literature review spanning vernacular intelligence, phenomenological understandings of light, interpretation of light across creative fields, the evolution of Nigeria’s architectural landscape, modern blindness to light, the cultural and symbolic meanings attached to illumination, and contemporary precedents of vernacular materiality and climate. Chapter 3 explains the methodological approach, combining phenomenological observation, cultural analysis, and climatic interpretation of spatial precedents, supported by technical and analytical tools to enrich the study of light in architecture. Chapter 4 applies these insights through design principles and spatial explorations that illustrate how contemporary architecture might re-engage the sun as collaborator. Finally, Chapter 5 reflects on the implications of the research, articulating its contributions and outlining opportunities for further study and practice.

This structure creates a coherent progression from context, to theory, to method, and ultimately to design-based inquiry, centering the renewed understanding of light within the Nigerian environment.

2

light across worlds

THEORETICAL FRAMEWORK

3

This chapter examines theoretical and cultural perspectives that shape the understanding of light in architecture. Rather than approaching daylight solely as a technical phenomenon, the review explores how light has been interpreted across multiple domains, including phenomenology, cultural traditions, and creative disciplines. These perspectives are placed in dialogue with vernacular environmental knowledge and contemporary architectural practice. Together, they establish the conceptual foundation for this thesis, revealing how climatic intelligence, sensory experience, and architectural technique can be synthesized into a renewed approach to designing with light.

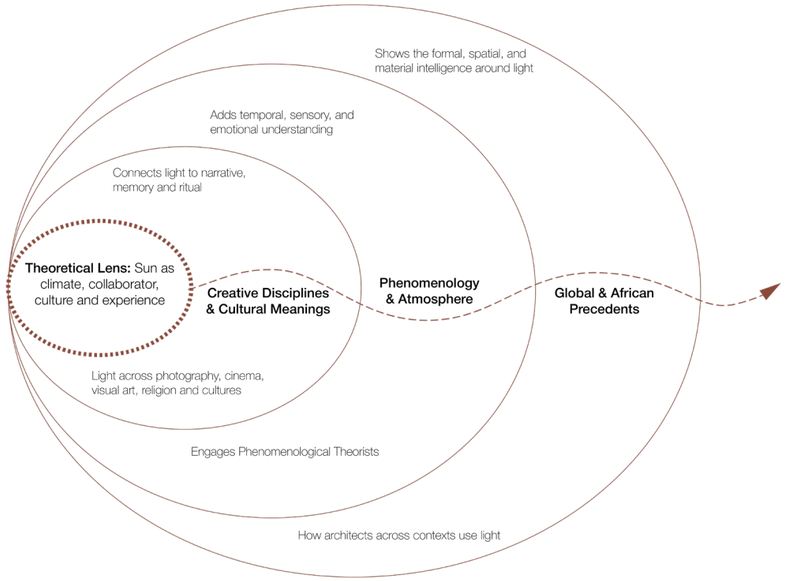


Figure 2.1
Diagram illustrates the theoretical lens of the study, linking global and African precedents, phenomenology and atmosphere, creative disciplines, and cultural meanings, highlighting how each layer contributes to understanding sunlight, space, and experience

Toward a Knowledge of the Sun

Light has long been described as one of architecture's primary materials, however its deeper experiential, temporal, and cultural roles often remain underexamined. While architectural discourse frequently addresses illumination in terms of visibility, efficiency, or thermal comfort, a parallel lineage understands light as something far more profound: a medium that shapes emotion, atmosphere, memory, and human presence.

In global architectural theory, figures such as Louis Kahn, Tadao Ando, Alvar Aalto, and Peter Zumthor have approached light not simply as a technical variable but as a spiritual and metaphysical presence. Artists such as James Turrell similarly explore light as a material capable of shaping perception and emotional experience. Their work positions light not as a neutral phenomenon but as an agent that conditions perception and gives architecture its emotional charge.[15]

15 Ramos, *Light in Architecture.*

Within African contexts, a parallel but less theorized body of knowledge exists. Architects such as Francis Kéré, and Demas Nwoko, demonstrate how sunlight becomes an active collaborator in design; animating surfaces, producing temporal rhythms, and shaping thermal and social comfort.[16] Their approaches reveal an intuitive understanding of light grounded in climate, materiality, and cultural meaning, suggesting that African architectural practices contain a rich but underarticulated knowledge of the sun.



Figure 2.2
The Gando Primary School Library, Francis Kere in Burkina Faso illustrates ceiling apertures formed by embedded clay pots. Light is diffused through vernacular interventions, creating calm, patterned illumination.

16 designboom, “Diebedo Francis Kere”; Features, “The Pioneering Architecture of Nigerian Artist-Designer Demas Nwoko”; Fakharany, “Tosin Oshinowo.”



Figure 2.3
Residence at idumuje ugboko,Demas Nwoko, Nigeria - The residence demonstrates how architectural elements such as an impluvium opening and perforated walls modulate daylight, producing layered illumination and patterned shadows within the interior.

Yet despite such precedents, contemporary Nigerian architecture often appears to treat sunlight primarily as a problem to mitigate.[17] This discrepancy highlights a disconnect between the country’s architectural heritage and its current design priorities, where efficiency and control frequently overshadow experiential and symbolic considerations.[18]

Beyond architectural practice, cultural and cosmological narratives in Nigeria provide another body of knowledge that frames the sun not simply as an environmental condition but as a being with agency. In Yoruba cosmology, ***Olorun*** embodies the sun and the sky;[19] and in Igbo cosmology, ***Anyanwu*** appears as the divine “eye of the sun”.[20] These personifications reveal longstanding cultural attitudes that position the sun as a force intertwined with life, ethics, and social order. Such perspectives introduce a relational understanding of sunlight; one that views the sun as a partner in human experience rather than an external phenomenon to be engineered away.

17 Adebiyi, “From Courtyards to High-Rises.”
18 Elenwoke, “The Evolution of Nigerian Architecture.”
19 Myth Folk. Wiki, “Ọlọrun.”
20 Oma, “Who Is Anyanwu (The Sun God) in Igbo Cosmology?”

While these cultural frameworks are rarely acknowledged in architectural scholarship, they complicate and enrich the discourse on environmental design in Nigeria by foregrounding the sun's ontological significance.

Together, these perspectives suggest that sunlight has long been understood as more than a source of illumination. Across architectural precedent, cultural cosmology, and environmental adaptation, the sun emerges as a force that shapes spatial character, symbolic meaning, and human life. Yet these insights remain dispersed across different domains of knowledge. To understand more clearly how light is perceived and experienced within space, the next section turns to phenomenological theory.

Phenomenology of Light and Atmosphere

Phenomenology offers a language for understanding light not merely as illumination but as an embodied, emotional, and temporal encounter, a quality felt before it is measured. Across phenomenological scholarship, light is described as something that shapes how people dwell in space, how they sense time, and how they form emotional connections to their environments. This literature collectively argues that atmosphere, rather than visual clarity, forms the core of meaningful architectural experience.



Figure 2.4
Light and shadow projected through a domestic window. Subtle lighting transforms ordinary spaces into sites of memory and quiet reflection.

A central theme running through this discourse is the critique of vision-centrism. Pallasmaa's work challenges architectural tendencies to privilege transparency, brightness, and efficiency, arguing instead for multisensoryd-epth in which shadow, texture, warmth, and the gradual transitions of daylight support genuine inhabitation.[21]

21 Pallasmaa, *The Eyes of the Skin.*

Tanizaki's celebration of dimness and filtered light reinforces this counter-argument: he positions shadow not as a deficit but as a cultural and emotional resource, capable of generating intimacy and sensory calm.[22] Together, their writings reveal a shared phenomenological stance, that emotional resonance often arises not from abundance of light but from its modulation.

While Pallasmaa and Tanizaki emphasize the experiential and sensory dimensions of light, Zumthor extends phenomenology into architectural practice. For him, atmosphere is not an aesthetic effect but a condition produced through the interplay of luminous qualities, materiality, temperature, sound, and texture.[23] His reflections demonstrate that light is inseparable from spatial character; it is a material that carries emotion. These insights clarify how architects compose atmospheres intentionally rather than treating them as by-products of form. The phenomenological tradition also situates light within time. Bachelard's writings foreground memory and imagination, describing light as a temporal medium that anchors daily rituals; morning light as awakening, evening light as closure.[24] This temporal sensitivity reframes architecture as an instrument that registers the passage of time. Buildings, in this view, become environments that choreograph the sun's movement, shaping how occupants feel and remember their day.

Norberg-Schulz's concept of genius loci adds another layer by linking phenomenology to place. He argues that authentic dwelling emerges when architecture responds to the essential character of its environment; its rhythms, climate, atmosphere, and cultural meanings.[25] Under this lens, light becomes part of place-identity: the specific intensity, color, and angle of sunlight contribute to how a region is understood and inhabited.

This perspective holds particular relevance for Nigeria, where the sun's presence is not only climatic but cultural, shaping daily life and spatial habits. Across these theorists, several points of synthesis emerge. First, light is understood as a medium of atmosphere rather than simply a technical variable. Second, shadow and modulation are just as important as illumination in producing emotional resonance. Third, the experience of light is inseparable from time and place. And fourth, architecture must engage these dimensions intentionally if it hopes to create spaces that support meaningful dwelling.

Phenomenological thinkers therefore position light as a medium through which architecture becomes felt rather than simply seen. Atmosphere emerges through the careful modulation of brightness, shadow, texture, and temporal change. These insights expand the architectural role of light beyond illumination alone, suggesting that luminous conditions can be intentionally composed to shape emotional and spatial experience.

While phenomenology clarifies how light shapes perception, memory, and atmosphere, architectural discourse is not the only field that has grappled with its experiential power. Visual and creative disciplines have developed parallel languages for staging, modulating, and interpreting light. Examining these perspectives expands the theoretical foundation for understanding how luminous conditions evoke mood, narrative, and emotional resonance

22 Tanizaki, *In Praise of Shadows.*
23 Zumthor, *Atmospheres.*
24 Bachelard et al., *The Poetics of Space.*
25 Norberg-Schulz, *Genius Loci Towards a Phenomenology of Architecture.Pdf.*

Light in Visual and Creative Disciplines

Across visual and creative fields, light emerges not as a neutral condition but as an expressive agent; a material that can whisper, intensify, conceal, reveal, or transform the atmosphere of a scene. In film, photography, and visual art, light is not only illumination; it is a storyteller, an author of mood, and a shaper of meaning. Examining these practices provides insight into how light constructs experience—insights that complement and deepen architectural discourse.

In film theory and cinematography, light is often described as a silent narrator. Its role extends beyond visibility to the orchestration of tone, tension, and emotional response. Cinematic lighting manipulates contrast, direction, and color to signal intimacy, danger, revelation, or ambiguity.[26] These choices are never neutral; they carry narrative weight. Whether diffused to soften a moment or sharpened to heighten drama, filmic light imprints atmosphere onto space, guiding viewers toward an emotional reading of a scene. The subtlety with which audiences respond, often unconsciously, demonstrates how deeply light shapes perception, making cinematic practice a valuable parallel for understanding atmosphere in architectural space.



Figure 2.5
Woman in the Window, Cinematography Still – Highlights the use of directional natural light in film to create narrative tension, mood, and spatial depth, emphasizing light as an expressive and compositional tool.

26 Torchstar Light., “Analysis of Movie Lighting”; Morton, *The Psychology of Cinematography*.

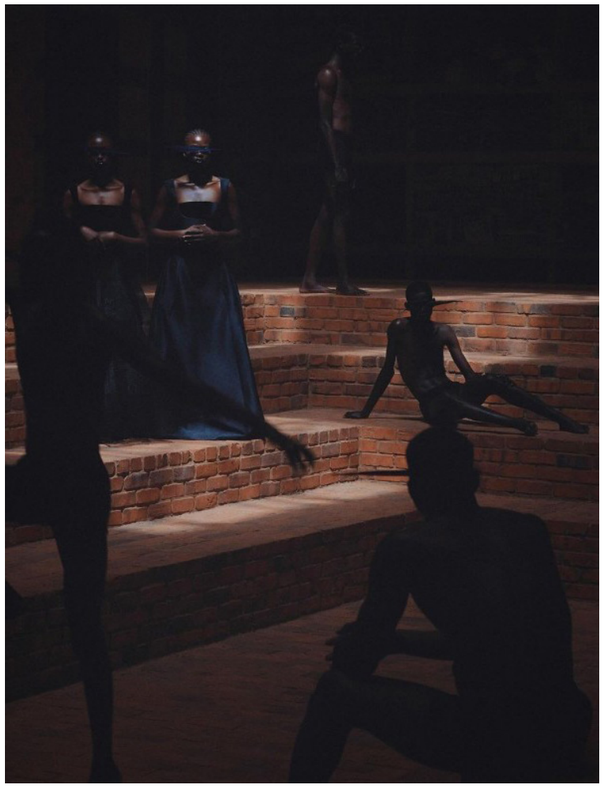


Figure 2.6
Shutter Island, Cinematography Still – Shows how subtle overhead light guides perception through architectural spaces, reinforcing the interplay of shadow, focus, and atmosphere in storytelling.

Photography further extends this sensitivity to light by offering a rich vocabulary of luminous experience in which light becomes both medium and subject. Photographers describe light as “magic,” a force capable of animating surfaces, revealing texture, and evoking emotional resonance.[27] Natural or “available” light, in particular, is celebrated for its warmth and unpredictability, producing atmospheres that feel intimate, temporal, and alive. The direction of light plays a crucial role: front light offers clarity, while side light introduces depth, shadow, and dimensionality. Small shifts in illumination can transform the perception of materiality; textures appear, dissolve, or thicken depending on how light touches them. These transformations mirror architectural concerns, suggesting that the way openings, surfaces, and volumes interact with light fundamentally shapes how space is felt, remembered, and inhabited.[28]

27 WhiteWall, *The Importance of Light in Photography.*
28 *How Light Affects Photography – Where Light Becomes Art.*

Figure 2.7
Minimal Light Source, Photography – Emphasizes the narrative and atmospheric power of low-intensity light, showing how shadow and selective illumination shape attention, mood, and storytelling.



Visual art provides another lineage for understanding the expressive agency of light, particularly through techniques such as ***chiaroscuro*** and ***sfumato***. Chiaroscuro uses bold shifts between brightness and darkness to generate drama and three-dimensionality, while sfumato employs soft, blended transitions that create an ethereal, smoky atmosphere. Both techniques reveal that form is never understood independently of light; rather, light reveals form, and shadow gives it emotional resonance.[29] These artistic traditions highlight light's temporal and affective qualities; its ability to create tension, calm, ambiguity, or poignancy through even minor adjustments in intensity or direction.

While chiaroscuro and sfumato demonstrate how strong contrast and subtle tonal transitions can produce depth and atmosphere in painting, architecture must adapt these effects to inhabited environments. Unlike static artworks, architectural spaces must maintain visual comfort, safety, and spatial legibility for occupants moving through changing light conditions. Rather than reproducing abrupt contrasts, architecture often moderates light through spatial sequencing, filtered apertures, and material surfaces that diffuse illumination. Transitional spaces such as courtyards, verandas, and shaded corridors allow the eye to gradually adjust between brightness and shadow, while textured materials soften glare. In this way, architectural strategies reinterpret the expressive potential of contrast while maintaining environmental comfort.

29 ArtRewards, *Chiaroscuro in Renaissance Art*.



Figure 2.8
The Night Watch, Rembrandt – Exemplifies chiaroscuro, illustrating how dramatic contrast between light and dark defines form, guides focus, and conveys emotional intensity in visual composition.



Figure 2.9
The Salk Institute by Louis Khan in San Diego, California - The building demonstrates architectural *chiaroscuro* through strong contrasts between illuminated surfaces and deep shadow, emphasizing spatial depth and the sculptural presence of light.



Figure 2.10
Mona Lisa, Leonardo da Vinci - Demonstrates sfumato, showing how soft, blended transitions between light and shadow create depth, subtlety, and a sense of ethereal atmosphere.

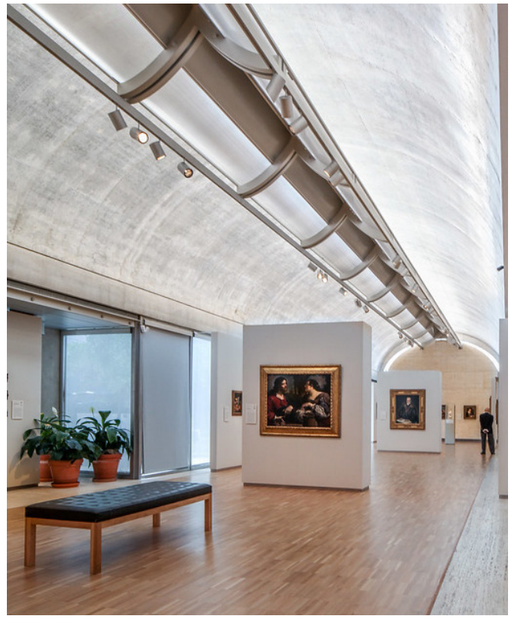


Figure 2.11
The Kimbell Art museum by Louis Khan in Fort Worth, Texas softly diffused daylight enters through vaulted skylights, where narrow light slots are paired with curved reflective panels that bounce and spread incoming light evenly across the concrete vaults. This system reduces glare and creates gradual tonal transitions across interior surfaces, illustrating an architectural parallel to the visual technique of *sfumato*.

The creative disciplines also illuminate the relationship between light, memory, and multisensory experience. Patterns of brightness and shadow become imprinted in the mind, contributing to how places are recalled and emotionally registered. Light flickering across a wall, shadow shifting with the hour, the dimming of a space at dusk; these are not simply visual phenomena but atmospheric cues that evoke feelings, seasons, and cycles of time. In this sense, light becomes part of the cognitive and emotional mapping of place, reinforcing its significance as a temporal and experiential medium.[30]

Across film, photography, visual arts, a shared understanding emerges: light is never neutral. It carries narrative weight, shapes emotion, reveals texture, and anchors human experience across time. These disciplines consistently emphasize modulation over brightness, atmosphere over clarity, and meaning over mere visibility. They treat light as a medium that directs attention, constructs mood, and forms lasting memory traces.

A further relevant dimension can be found in theatre, where light operates as a spatial and temporal structuring device within a lived environment. Unlike film or photography, which fix light within a frame, theatre lighting is experienced in real time by performers and audiences sharing the same spatial field. Light is used to define zones of attention, shift emotional tone, and guide perception through staged transitions without necessarily altering the physical set. In this sense, theatre occupies a middle ground between representation and inhabitation: light is still designed and controlled, but it is also experienced spatially and temporally within a shared environment. This makes it particularly relevant to architectural thinking, even though it still retains a level of intentional staging that differs from environmental light.

The comparison between creative disciplines and architecture also reveals an important distinction. In photography, painting, and cinema, light is typically staged or captured within controlled conditions, allowing artists to manipulate illumination to evoke specific emotions or atmospheres. Architecture, however, must engage with real sunlight, an environmental force that is intense, variable, and closely tied to issues of heat, comfort, and visual performance. This complexity often makes the architectural use of light more challenging. Nevertheless, the sensitivity with which creative disciplines choreograph light suggests valuable ways of thinking about how lighting conditions can shape spatial experience. These insights offer a broader lens through which contemporary architecture, particularly in sun-intensive climates such as Nigeria, might reconsider how buildings engage natural light.

Cultural & Religious Meanings of Light

Across cultural and religious traditions, light is consistently understood as more than a physical phenomenon: it is a symbol, a guide, and a marker of meaning. Studies in anthropology, religious history, and cultural theory describe light as a carrier of spiritual significance, associated with revelation, purity, protection, and moral clarity. Darkness, conversely, often evokes mystery, uncertainty, and introspection. These symbolic associations have shaped human spatial practices for centuries, influencing how communities design, decorate, and inhabit places of gathering and ritual.[31] Here, light is not only illumination; it is presence.

30 O'Hare, "The Phenomenological Interrogation of Light as Material Weight in the Visual Perception of Architectural Space."
31 Gupta, "Light in Religion and Spirituality."



Figure 2.12
Crucifix cutout in the Church of Light, Tadao Ando in Osaka, Japan- Light transforms a simple cutout into a contemplative, symbolic experience. Demonstrates how filtered sunlight can define spatial experience and evoke emotional resonance, showing light as a medium that shapes perception and atmosphere in architecture



Figure 2.13
The interior of the Cathedral of San Sabino in Bari, Italy. Sunlight through the rose window sculpts the interior, emphasizing form and spirituality

Scholars note that cultural responses to light are rarely arbitrary. Instead, they reflect adaptations to environmental realities filtered through shared beliefs and historical experience.[32] Throughout religious traditions, light structures rituals: guiding daily prayer rhythms, emphasizing sacred focal points, and marking transitions from one state of being to another. Sacred architecture often frames light as revelation; filtered and staged to heighten emotional or contemplative attention.[33] Even when practices differ, a common thread persists: light is treated as a mediator between the human and the transcendent.

These perspectives are particularly relevant in contexts like Nigeria, where climate and culture jointly shape luminous experience. Across different regions, light influences daily rhythms, social habits, and spatial expectations: shaded gathering spaces, softened interiors, thresholds of light that signal privacy, and moments of brightness that frame celebration.[34] In domestic space, for example, the gradual dimming of daylight at dusk can signal rest, reflection, or communal closeness. In public settings, bright open spaces may signify welcome, visibility, or safety. Such conventions reveal that cultural meaning is embedded within everyday luminous patterns, even outside explicitly religious settings.



Figure 2.14
Perforated walls with dynamic sunlight patterns. Sunlight interacts with surfaces, creating animated, playful, and intimate spatial experiences that engage occupants with light.

32 “Cross-Cultural Light Perception □ Term.”
33 Home, “The Role Of Light In Religious Spaces.”
34 Madan, “Light Cultivates Culture, Culture Cultivates Light.”

The literature also highlights how patterns of light and shadow become part of memory. People recall places not only for their form but for how they were lit: the warmth of a courtyard at noon, the hush of dusk filtering through timber slats, the cool shade beneath a veranda. These sensory experiences shape emotional attachment and belonging.[35] Meaning, in this view, is produced through atmosphere; how light feels, not merely how it functions. This reinforces that light participates in cultural storytelling at the most domestic and intimate scales.

Recognizing light's cultural and religious significance therefore becomes essential to a more holistic architectural approach, one that aligns environmental realities with the emotional and symbolic dimensions of life in Nigeria

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Vernacular Choreographies of Light in Nigeria

Vernacular architecture in Nigeria demonstrates a longstanding, climate-responsive intelligence that shaped luminous comfort long before the emergence of daylighting metrics or mechanical systems.[36] Across the country's diverse ecological zones, builders developed spatial forms that moderated solar intensity while creating atmospheres attuned to social life and daily ritual.[37] These practices reflect a deep cultural and environmental knowledge in which light was not simply admitted but choreographed. Although these strategies emerged primarily from climatic adaptation and cultural practice rather than formal aesthetic theory, the result was an architecture in which light, shadow, and social life became intertwined; producing atmospheres that felt intuitive, grounded, and emotionally warm.



Figure 2.15
Hausa Compound, Northern Nigeria - Exterior view of a vernacular compound illustrating thick earthen walls and modest openings that regulate solar exposure while admitting controlled daylight.

Historically, architecture in Nigeria developed sophisticated spatial strategies in response to this climate. Thick walls moderated heat through thermal mass, while small apertures and deep recesses controlled the entry of sunlight. Courtyards acted as climatic lungs, balancing shade, ventilation, and reflected light, while shaded transitional spaces mediated movement between inside and outside. These buildings did not eliminate the sun; they filtered it, transforming intensity into comfort and atmosphere.[38]



Figure 2.16
Interior view of traditional architecture in Northern Nigeria - illustrating the spatial enclosure created by thick earthen walls and a protective roof structure, emphasizing how vernacular construction relies on mass and enclosure to moderate interior environmental conditions

In the Hausa regions of the arid north, thick earthen walls and small punched openings minimize heat gain while allowing daylight to enter indirectly. Light reaches interior spaces after reflecting off earth-toned surfaces, producing soft luminance that reduces glare and creates thermal stability.[39] Research highlights that the courtyard typology in the southwest region serves not only environmental performance but also social cohesion; the central space supports communal activities, storytelling, and evening gatherings, with light and shadow shaping patterns of interaction.[40]

In the humid southwest, Yoruba compound housing uses verandas and deep overhangs to filter sunlight and encourage airflow.[41] These intermediate spaces blur the boundary between inside and outside, allowing occupants to remain connected to the public realm while protected from solar exposure.[42] Scholars note that such thresholds embody both climatic adaptation and cultural practice, creating zones for craft, rest, and observation where light is constantly mediated through shade and movement.

35 O'Hare, "The Phenomenological Interrogation of Light as Material Weight in the Visual Perception of Architectural Space."
36 ResearchGate, "(PDF) Energy Efficiency in Traditional African Architecture."
37 Obiamaka, *What Can Nigerian Architecture Be?*
38 Lodson et al., "(PDF) A Lesson from Vernacular Architecture in Nigeria."
39 Anuma, A*rchitectural Designs in Nigeria*.
40 Adebiyi, "From Courtyards to High-Rises."
41 Ògúnyemí, "The Expressive Dimensions of Yoruba Architecture."
42 Ayomide et al., "Expression and Communication in Architecture Philosophy of Vernacular Architecture of the Yorubas in Nigeria."



Figure 2.17
Hausa Compound, Yoruba Veranda, Southwestern Nigeria – Shows how transitional, shaded spaces like verandas support social interaction, craft, and communal life while regulating sunlight and ventilation.

A shared characteristic across these regional traditions is the material palette: earth and timber,[43] which absorb and soften light rather than reflecting it harshly. This yields interiors that feel warm, tactile, and grounded. Diurnal shifts in sunlight become visible events: morning light grazing floors, midday light diffusing through shaded passages, and sunset light casting amber tones on textured surfaces. Literature emphasizes that these rhythms anchor a sense of time and belonging, supporting emotionally resonant dwelling rather than mere survival.[44]

These vernacular environments reveal an architecture in which sunlight was carefully mediated through spatial form, material depth, and social practice. Courtyards, shaded thresholds, thick walls, and calibrated apertures worked together to transform intense solar conditions into inhabitable atmospheres. Rather than eliminating the sun, these buildings choreographed its presence, allowing light and shadow to structure gathering and rest. Vernacular architecture therefore demonstrates that environmental performance and atmospheric richness were historically inseparable within Nigerian building traditions.

43 Lodson et al., "(PDF) A Lesson from Vernacular Architecture in Nigeria."
44 Bachelard et al., *The Poetics of Space.*

Colonial & Modern Blindness to Light

The architectural landscape of Nigeria underwent significant transformation during the colonial period as external building traditions were introduced through trade, missionary activity, and European administration. One early hybrid expression emerged through Afro-Brazilian returnee communities in the nineteenth century, whose architecture blended Brazilian stylistic elements with local materials and climatic adaptations. These buildings often retained features such as deep verandas and shaded thresholds that continued to moderate sunlight while introducing new ornamental and spatial expressions.



Figure 2.18
Afro-Brazilian architecture reflects a transitional phase in Nigerian building traditions, combining imported stylistic influences with climatic adaptations such as shaded openings and articulated façades

However, later colonial and modernist architectural models increasingly prioritized standardized forms, industrial materials, and visual modernity over environmental responsiveness. Architectural languages developed in temperate climates were frequently transplanted into Nigerian contexts with limited adaptation to local solar intensity and thermal conditions. As a result, many contemporary buildings emphasize transparency, uniform glazing, and image-driven design, disrupting the spatial moderation of light characteristic of vernacular traditions. In these cases, environmental comfort is often maintained through mechanical systems rather than through architectural form.[45]



Figure 2.19
Example of Contemporary architecture in Nigeria – Illustrates "modern blindness to light," with continuous glazing, white walls, and overexposure, highlighting the contrast with vernacular strategies that modulate and choreograph sunlight

This shift introduced what many authors describe as a blindness to light: the sun became a problem to exclude rather than a collaborator to engage. Glass façades, white walls, and sealed interiors increased glare and heat gain, prompting dependence on artificial lighting and mechanical cooling. The result is overexposure; spaces flooded with harsh daylight, and erasure; spaces where curtains, and reflective glazing suppress shadow, texture, and temporal variability while also flattening cultural identity and disconnecting occupants from daily solar cycles. In both cases, architecture becomes visually flat and thermally unsustainable.

Phenomenological theorists help articulate the consequences of this shift. Pallasmaa's critique of visually dominant modernism highlights how brightness without sensory modulation suppresses atmosphere and embodiment.[46] Tanizaki's appreciation of shadow suggests that eliminating darkness removes emotional nuance and inhibits calm.[47] These arguments reveal that the problem in Nigerian contemporary architecture is not the presence of light but the absence of its choreography. Therefore, the literature calls for an approach that merges vernacular intelligence with contemporary capability—where buildings can be advanced yet still feel alive in the sun.

45 Elenwoke, "The Evolution of Nigerian Architecture"; Uzor, "The Evolution of Nigerian Architecture."
46 Pallasmaa, *The Eyes of the Skin.*

The Technical and the Poetic

Scholarship across vernacular studies, phenomenology, and creative fields reveals an enduring tension in architectural discourse: the divide between light as a technical factor and light as an experiential medium.[48] Contemporary architectural discourse increasingly recognizes that environmental performance and atmospheric experience cannot be separated. Light influences thermal comfort and visibility, but it also shapes mood, perception, and social interaction. Understanding sunlight therefore requires an approach that treats technical performance and spatial experience as interdependent rather than opposing concerns. Vernacular Nigerian builders intuitively understood that performance and atmosphere are inseparable; adapting wall thickness, orientation, and aperture placement to create comfort while also shaping luminous character and social life.[49] Their work demonstrates that technical knowledge can coexist with sensory depth, even without formal measurement.

Across the literature, a shared gap emerges: while studies frequently document Nigerian climatic adaptation or technical solutions, they often overlook the experiential and cultural value of light—the way atmosphere, rhythm, and emotion contribute to belonging and memory.[50] Conversely, theoretical discourse on atmosphere rarely addresses Nigeria's specific climatic realities or vernacular intelligence.[51] This thesis intervenes in the space between these two strands: proposing that sunlight must be understood simultaneously as climate and culture, performance and experience. By reframing the sun as an active collaborator, the research seeks to restore depth to contemporary Nigerian architecture, where apertures become gestures, shadows become spatial language, and technical decisions become instruments for crafting experience.

Contemporary Practices of Vernacular Materiality and Climate

Recent architectural practice in West Africa has shown that vernacular materials can remain relevant within contemporary construction when they are engaged as climatic and technical systems rather than as symbolic references. The work of Francis Kéré offers clear evidence that earth-based materials, when combined with modern construction techniques, can support complex programs while responding effectively to heat, ventilation, and environmental comfort. These contemporary projects demonstrate how vernacular material intelligence can evolve within modern architectural practice. Rather than replicating traditional forms, they reinterpret climatic strategies through contemporary construction techniques, revealing new possibilities for integrating environmental performance with spatial atmosphere.

47 Tanizaki, *In Praise of Shadows.*
48 Ramos, *Light in Architecture.*
49 Lodson et al., "(PDF) A Lesson from Vernacular Architecture in Nigeria."
50 Ochedi and Taki, "(PDF) Energy Efficient Building Design in Nigeria."
51 Zumthor, *Atmospheres.*

At the ***Startup Lions Campus in Turkana County, Kenya***, passive ventilation is the primary environmental driver of the design. Inspired by the cooling mechanisms of local termite mounds, the buildings incorporate tall ventilation towers that generate a stack effect, drawing warm air upward and expelling it through roof openings. Fresh air is introduced at lower levels, allowing interior spaces to remain thermally comfortable despite extreme external temperatures.



Figure 2.20
Startup Lions Campus, Turkana County, Kenya. The use of locally available masonry and earth-based materials establishes high thermal mass and durability in an extreme climate, supporting passive cooling strategies while minimizing reliance on imported construction systems. Photo by Kinan Deeb for Kéré Architecture.



Figure 2.21
Startup Lions Campus, Turkana County, Kenya. Tall ventilation towers generate a stack effect by drawing warm air upward and releasing it through roof openings, reinterpreting vernacular cooling logic inspired by termite mounds into a contemporary architectural system. Photo by Kinan Deeb for Kéré Architecture

Materiality and ventilation are similarly intertwined at the ***Burkina Institute of Technology (BIT) in Koudougou***. Here, thick clay walls provide thermal mass, stabilizing interior temperatures throughout the day. Repetitive roof profiles form chimney-like voids at the rear of each module, allowing accumulated warm air to escape naturally. Lightweight timber ceilings are suspended beneath the roof, brightening interior spaces while separating occupied zones from heat buildup above.



Figure 2.22
Burkina Institute of Technology, Koudougou, Burkina Faso. Thick clay walls provide thermal mass that stabilizes interior temperatures, while repetitive roof profiles form chimney-like voids that allow accumulated warm air to escape, coupling earth construction with modern roof systems. Photo by Kéré Architecture.



Figure 2.23
Burkina Institute of Technology (BIT), Koudougou, Burkina Faso. The central courtyard functions as a climatic buffer, promoting cross-ventilation and shaded outdoor circulation while reducing heat gain to adjacent interior spaces. Photo by Kéré Architecture.

The project illustrates how earth construction and modern roof systems can work together to produce comfortable learning environments in hot climates.

A more intimate application of these principles appears in the ***Centre for Health and Social Welfare in Burkina Faso***. The building employs clay bricks, laterite stone, and eucalyptus wood to create a layered environmental response. Window openings are positioned according to bodily experience; standing, sitting, and lying; allowing controlled ventilation and visual connection while minimizing direct solar exposure. Deep roof overhangs further protect the walls and openings from excessive heat. Rather than relying on uniform glazing, the project demonstrates how carefully calibrated apertures and material thickness can regulate interior conditions.



Figure 2.24
Centre for Health and Social Welfare, Laongo, Burkina Faso. Clay brick walls, laterite stone, and deep roof overhangs form a layered envelope that moderates heat gain and filters daylight, demonstrating how material thickness and shading work together to regulate interior conditions without mechanical systems. Photo by Kere Architecture.



Figure 2.25
Centre for Health and Social Welfare, Laongo, Burkina Faso. Window openings are positioned according to standing, sitting, and lying viewpoints, allowing controlled ventilation and visual connection while minimizing direct solar penetration. Photo by Kere Architecture.

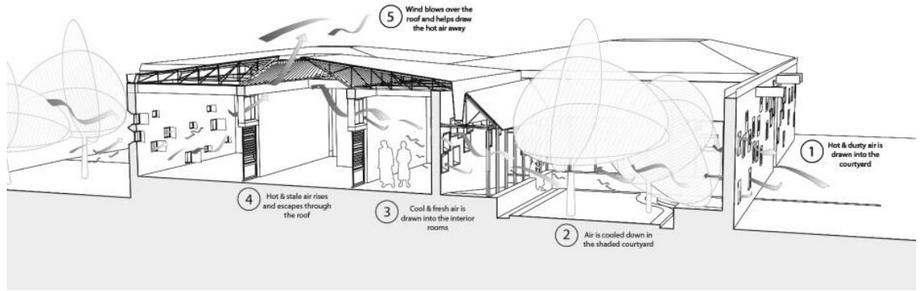


Figure 2.26
Climate Diagram of the Centre for Health and Social Welfare. Photo by Kere Architecture illustrating passive environmental strategies, including ventilation paths, and thermal performance, demonstrating how architectural form can respond to climatic conditions.

Across these projects, vernacular materials are not treated as static traditions but as adaptable systems capable of engaging contemporary needs. Clay and laterite are valued for their thermal performance and availability, while modern construction methods, such as steel-supported roofs and engineered ventilation strategies, extend their effectiveness. Importantly, these works respond to climatic conditions similar to those found in northern Nigeria, where heat, solar intensity, and airflow shape everyday spatial experience.

These precedents establish that a productive synergy between vernacular material practices and contemporary architectural techniques is both technically viable and environmentally responsive. This body of work provides supporting evidence that climate-driven design grounded in local material intelligence can operate at a contemporary architectural scale, forming a contextual foundation for the design inquiry developed in this thesis.[52]

52 Kéré Architecture, “Kéré | Work.”

3

listening to the sun

ANALYSIS AND FINDINGS

4

Lessons from Vernacular light strategies

While the literature review establishes vernacular light strategies as a cultural and theoretical framework, this chapter shifts toward architectural analysis. Through spatial and formal examination, it investigates how sunlight is oriented, admitted, and mediated within vernacular buildings.

Across many Nigerian vernacular architectures, light is not treated as a neutral resource to be maximized but as a condition to be moderated and shaped. Rather than relying on large glazed openings, traditional buildings employ a range of architectural strategies that regulate how sunlight enters, softens, and settles within interior space. These strategies respond directly to climate, orientation, and patterns of inhabitation.

This section examines three primary mechanisms through which vernacular architecture mediates light: orientation, aperture design, and architectural buffering. Together, these strategies reveal how light can be guided and moderated through architectural form rather than technological intervention.

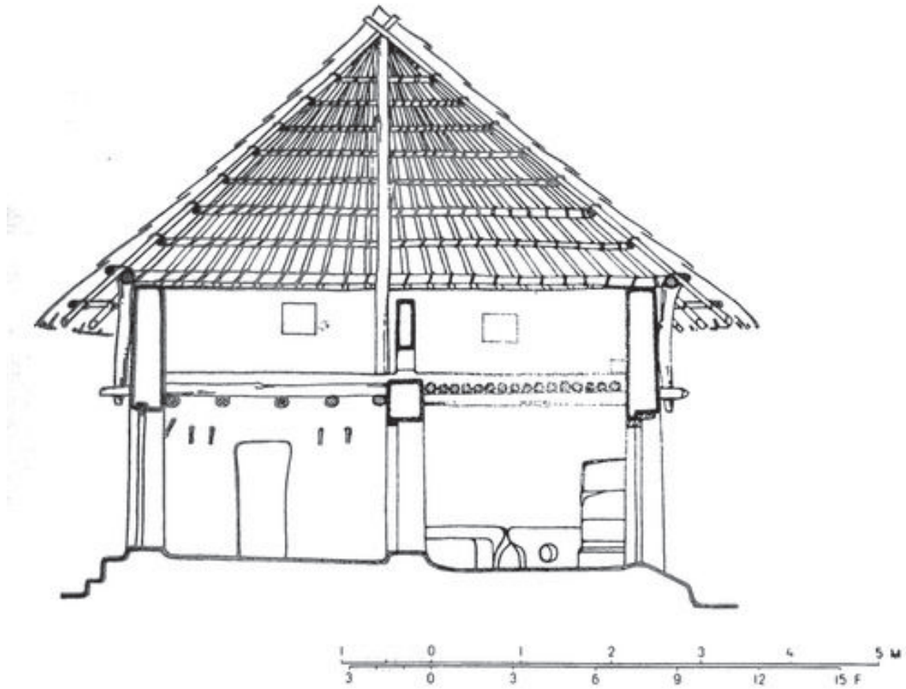


Figure 3.1
A typical section of a traditional vernacular architecture highlighting the spatial logic of vernacular dwellings, including thick walls, modest apertures, and a protective roof form that moderates sunlight and interior climate.

For this analysis, the south and west orientations are used as representative conditions to illustrate sunlight behavior across orientation, aperture design, and architectural buffering, capturing the most significant variations for Kano's Sahelian climate. South-facing façades receive high-angle, intense midday light, producing sharp contrasts and thermal loads that vernacular architecture traditionally moderates through mass, shading, and spatial

sequencing. West-facing façades capture low-angle afternoon light, warmer in tone and casting long, directional shadows, highlighting strategies for filtering and diffusing sunlight before it reaches interior spaces. North and east façades, by contrast, receive predominantly diffuse or brief morning light, producing softer illumination with less impact on interior conditions. Because north and east exhibit qualities similar to south and west, they are omitted from the illustrations for clarity. This approach emphasizes meaningful differences in light behavior while capturing the key environmental conditions that inform vernacular strategies.

A. Orientation and Solar Response

Located between approximately 4° and 14° north of the equator, Nigeria experiences high solar exposure throughout the year. In northern regions such as Kano, the sun's high altitude and intense western exposure create conditions where controlling solar penetration becomes a central architectural concern.[53]Vernacular settlements often demonstrate a careful awareness of solar orientation. Building forms are frequently arranged to minimize exposure to harsh west-facing sun while maximizing access to softer daylight from more favorable orientations. Courtyards and open spaces are typically positioned to receive controlled sunlight during parts of the day while remaining shaded during peak heat periods.

This orientation strategy allows sunlight to be introduced gradually into occupied spaces, preventing excessive glare and heat buildup. Rather than allowing light to enter indiscriminately from all directions, vernacular buildings position openings and spatial volumes in relation to the daily movement of the sun.



Figure 3.2
Hausa Vernacular Courtyard, Northern Nigeria – Illustrates how building orientation and courtyard configuration mediate solar exposure, promoting shaded communal spaces while allowing indirect daylight penetration.

53 Evelyn L. A. Allu-Kangkum and Ekele Ochedi, *SUSTAINABLE URBAN BUILT ENVIRONMENT FOR NIGERIA: A FRAMEWORK APPROACH.*



Figure 3.3
Interior view showing how daylight enters through a central courtyard, illuminating surrounding circulation spaces while maintaining shaded conditions within adjacent rooms.

Findings:

Orientation plays a foundational role in shaping interior light conditions. By aligning buildings with solar movement, vernacular architecture reduces direct solar penetration while allowing daylight to enter in a moderated and predictable manner.

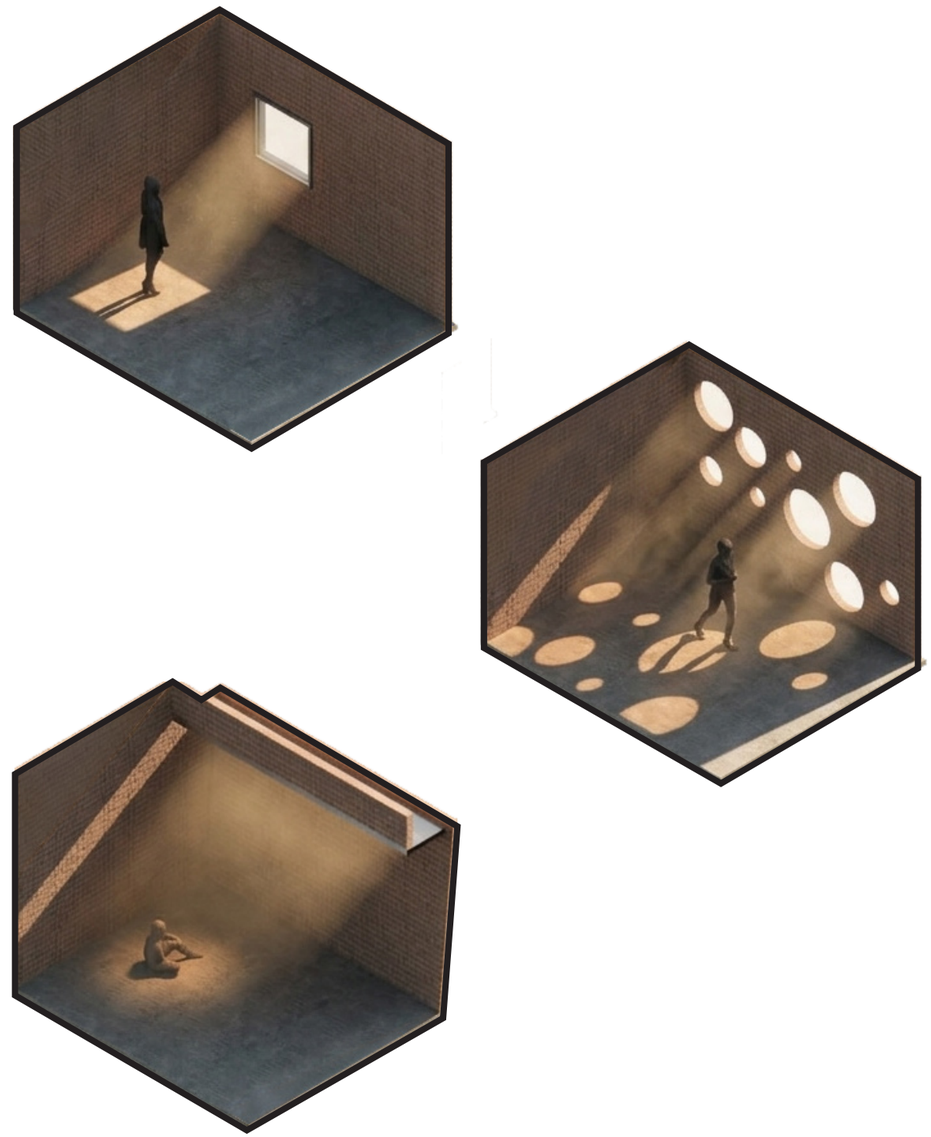
Design implication:

In the design inquiry, orientation should be treated as the first mechanism for regulating sunlight. Program placement, courtyards, and openings can be strategically aligned to take advantage of softer daylight conditions while minimizing exposure to intense western solar gain. Ceiling height and enclosure proportions further influence how daylight settles within interior space, allowing warm air to rise and light to disperse more gradually.



Orientation analysis – south facing facade

Figure 3.4
Under south-facing conditions at midday, sunlight arrives at a high angle, producing intense illumination. Lateral apertures admit only minimal direct light, resulting in diffuse illumination that softly models interior surfaces. The skylight, however, captures overhead sun, creating a concentrated pool of brightness that animates the floor and walls with sharper shadow edges. Light interacts subtly with the other openings, producing gentle gradients across clay brick walls, which diffuse glare while emphasizing texture. For an occupant, this produces a calm, contemplative atmosphere where light rhythms subtly mark the passage of time and enhance spatial perception, guiding movement and attention through the interior.



Orientation analysis – west facing facade

Figure 3.5
West-facing façades receive low-angle late afternoon sunlight, entering laterally through vertical apertures. Lateral openings cast long, warm beams onto the floor and walls, creating dynamic shadows and accentuating surface texture of clay materials. The skylight contributes minimal direct light under this orientation, reinforcing lateral dominance. Occupants experience a more dramatic interplay of light and shadow, with elongated forms moving across the space, producing a sense of depth, temporal progression, and engagement with spatial volume. This contrast between diffuse and directional light highlights the importance of aperture type and orientation in shaping interior atmospheres.

B. Aperture Size and Placement

In many vernacular dwellings, apertures are deliberately modest in size and carefully positioned. Openings are often recessed, shaded, or elevated, allowing daylight to enter while reducing direct glare and solar intensity. These apertures do not function primarily as view frames but as calibrated points of light entry.

Rather than flooding interiors with uniform brightness, these openings allow light to arrive selectively. Sunlight entering through controlled apertures produces gradients of brightness across interior surfaces, generating subtle shifts in light and shadow throughout the day.



Figure 3.6
Interior of St. Bartholomew Anglican Church, Kaduna state, Nigeria - Interior view showing how daylight enters through apertures, producing controlled illumination within the nave and demonstrating how opening size and placement shape interior light conditions.



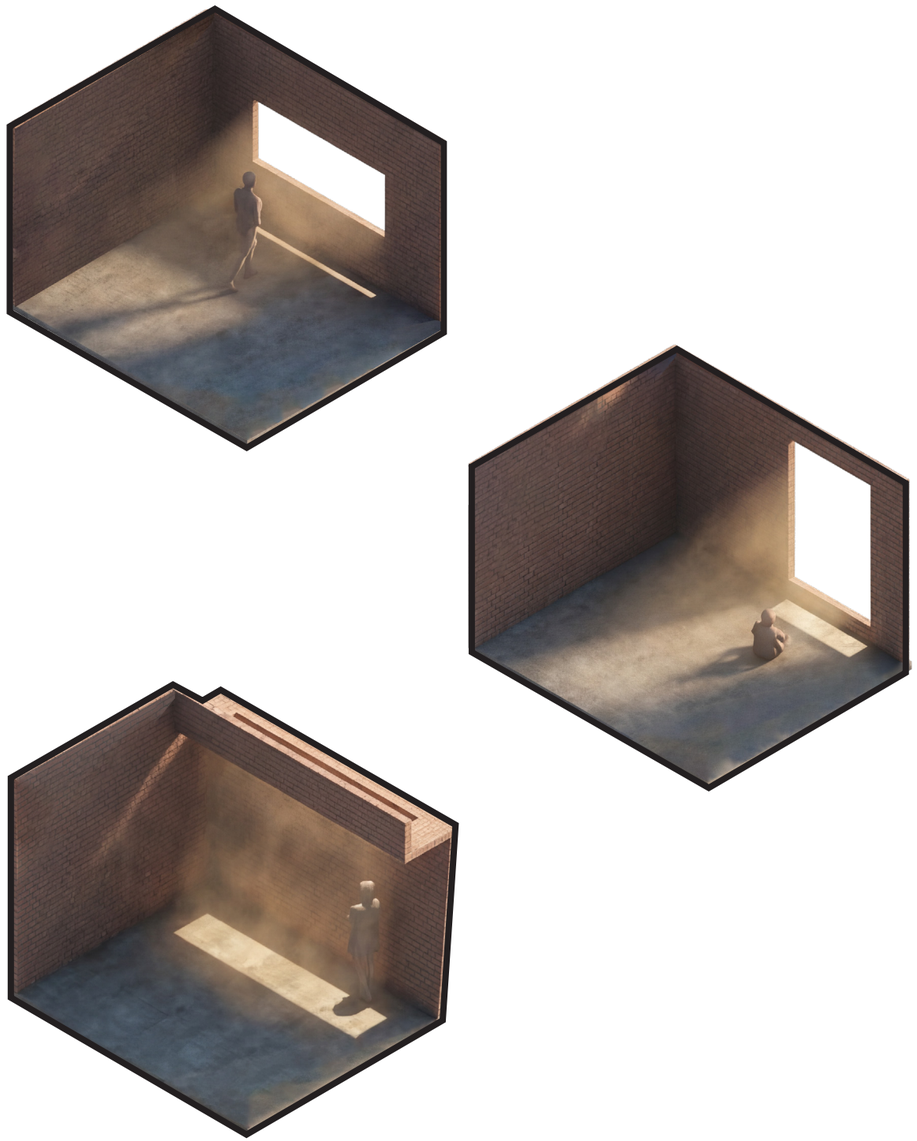
Figure 3.7
Exterior view of St. Bartholomew Anglican Church, Kaduna state, Nigeria - Exterior view illustrating the placement and scale of apertures that regulate daylight entry while maintaining substantial wall enclosure.

Findings:

Controlled openings transform sunlight from a dominant presence into a moderated atmospheric condition. Smaller or controlled apertures allow light to be experienced gradually, producing luminous variation rather than uniform illumination.

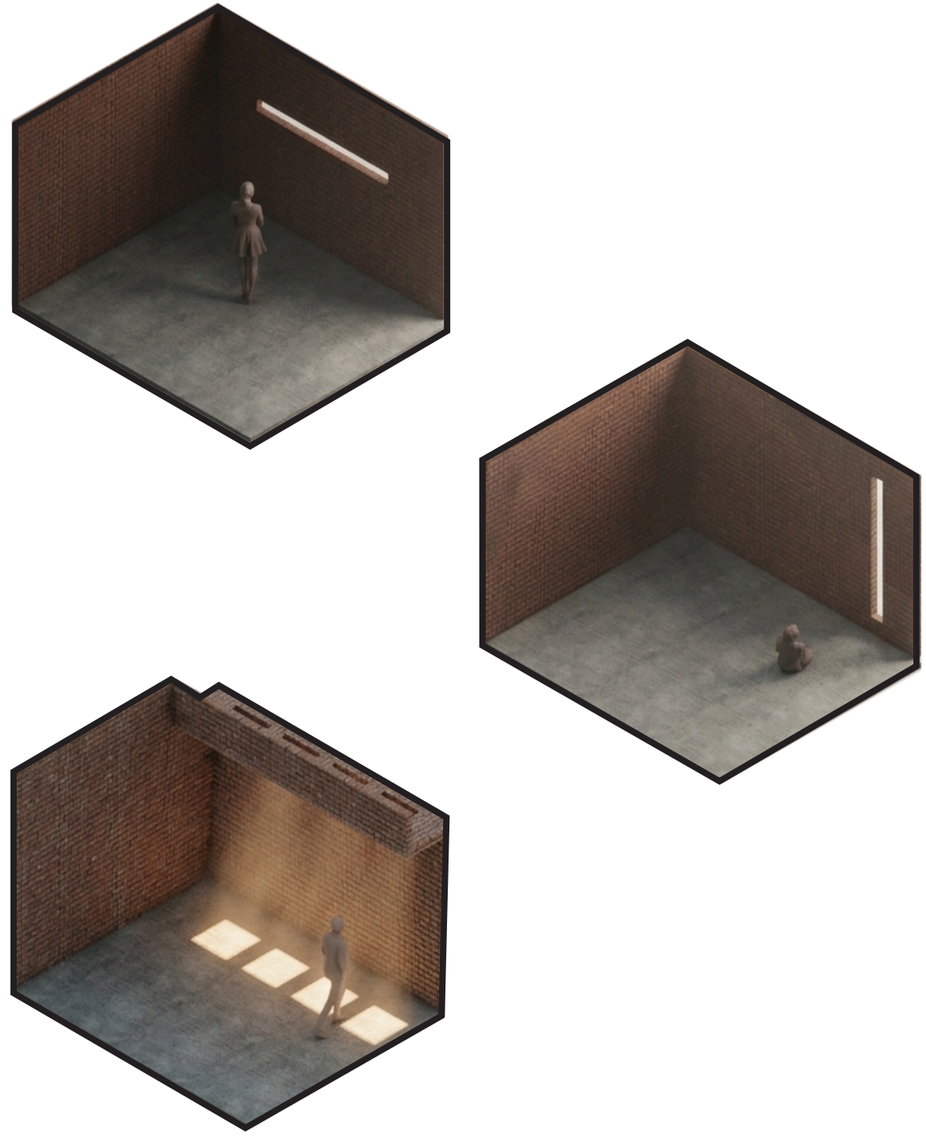
Design implication:

Within the design proposal, apertures should be treated as calibrated architectural elements rather than standardized windows. Varying their placement, size, and degree of shading can allow sunlight to be introduced selectively, supporting different spatial atmospheres for gathering, exhibition, and rest.



Aperture study 1 – south facing openings

Figure 3.8
Large openings admit soft, filtered daylight under high-angle sun, producing evenly diffused illumination that gently models clay wall surfaces without harsh glare. The continuous skylight introduces overhead light, generating a concentrated brightness that enhances verticality and spatial depth. Light subtly interacts across openings, creating gradients that animate the interior and guide the occupant's perception of space. The effect balances intensity, warmth, and rhythm, producing a calm, reflective interior environment



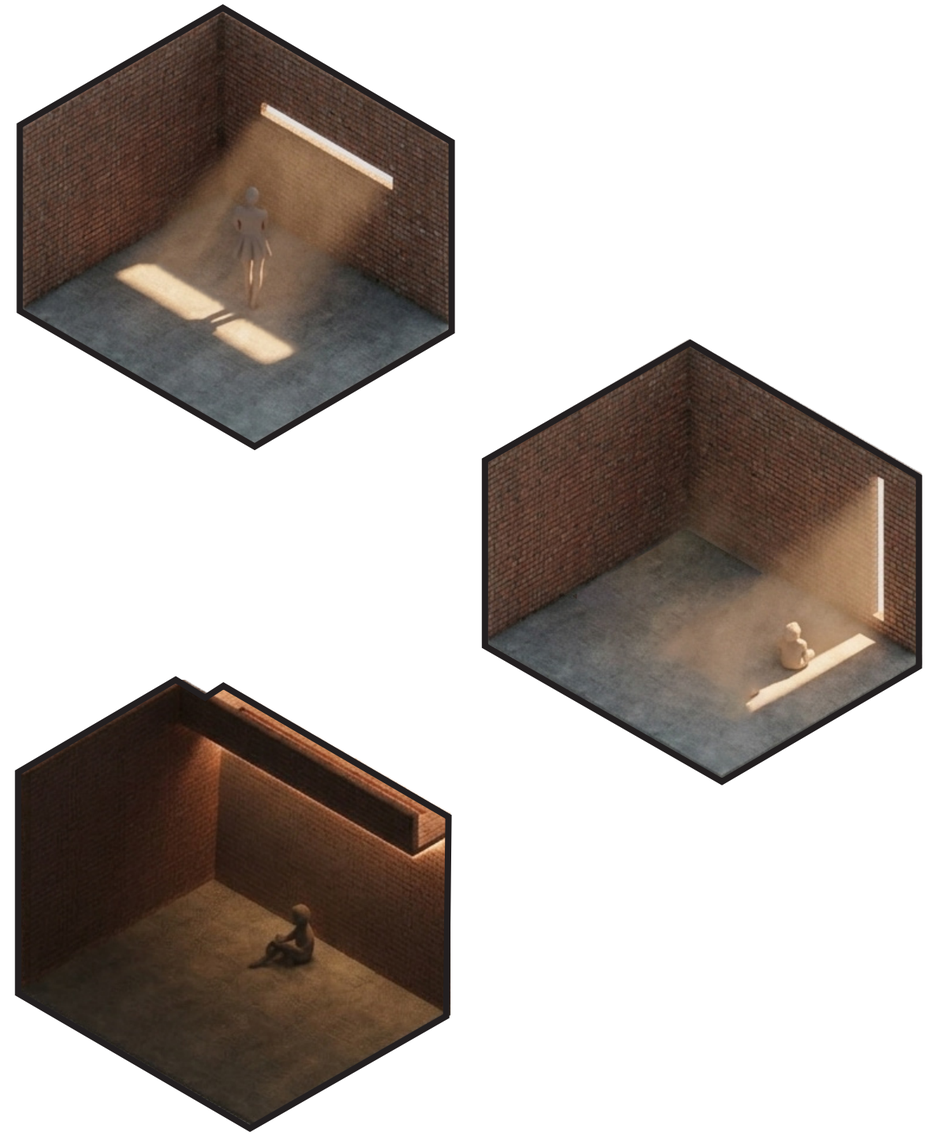
Aperture study 2 – south facing openings

Figure 3.9
Small openings restrict daylight, producing subtle, narrow bands of light that reinforce enclosure and material depth. Overhead skylight arrays cast patterned light patches, articulating walls and floors with geometric rhythm. The combination of vertical and overhead apertures shapes a nuanced interior atmosphere, where occupants perceive gradual movement of light and layered shadow, supporting quiet, contemplative activities



Aperture study 1 – west facing openings

Figure 3.10
Low-angle afternoon sun passes through large vertical openings, producing strong, directional light and clearly defined floor projections. Shadows elongate across clay surfaces, highlighting texture and spatial sequence. The skylight contributes little, allowing lateral beams to dominate. Occupants experience a dynamic play of contrast and warmth, with light animating the interior and emphasizing volumetric depth and movement through space.



Aperture study 2 – west facing openings

Figure 3.11
Slim vertical apertures filter sunlight into narrow beams, producing controlled, rhythmic light patterns. Skylight arrays add subtle overhead illumination, but lateral light remains dominant. This configuration emphasizes pattern, surface, and rhythm, producing a space that feels alive yet controlled, where occupants experience gradual progression of brightness and shadow, enhancing spatial awareness and interaction.

C. Spatial Buffers and Sunlight Modulation

Beyond orientation and openings, vernacular architecture frequently employs intermediate spatial elements that buffer sunlight before it reaches interior rooms. Verandas, courtyards, shaded walkways, and perforated screens create transitional zones between exterior brightness and interior shade.

These elements act as environmental filters, reducing solar intensity while allowing air movement and diffused daylight to enter. Instead of a single boundary between outside and inside, vernacular buildings often create layered thresholds that progressively soften light. Courtyards, for example, introduce daylight into interior zones while allowing surrounding spaces to remain partially shaded. Verandas and overhangs create shaded perimeters that protect walls and openings from direct solar exposure. Screens and latticework further diffuse incoming light, producing patterned illumination and reducing glare.



Figure 3.12
Yoruba Veranda with Shaded Corridor and Perforated Dwarf Walls – Shows spatial buffering strategies, including verandas and partially perforated walls, which modulate sunlight and create transitional, comfortable microclimates.



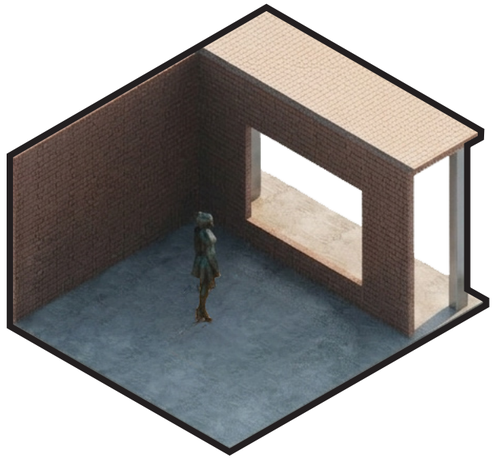
Figure 3.13
Veranda as Transitional Space - Example of a shaded veranda acting as a spatial buffer between exterior sunlight and interior rooms, illustrating how transitional spaces moderate solar exposure before light reaches interior areas.

Findings:

Buffer spaces mediate the transition between intense exterior sunlight and calmer interior environments. Through layered thresholds, vernacular architecture transforms direct sunlight into filtered and habitable light.

Design implication:

The design inquiry can employ architectural buffering elements; such as shaded verandas, perforated screens, and courtyard edges, to regulate daylight conditions. These intermediate spaces allow sunlight to be filtered before reaching primary interior areas, creating more comfortable and atmospherically rich environments



Buffering strategies - south facing overhang

Figure 3.14
High-angle midday sun produces limited direct penetration through vertical apertures. Unshaded openings admit only a narrow strip of light, softly diffused across interior surfaces. Overhangs block direct sun completely, producing a fully shaded environment. Clay wall textures interact with residual light, subtly emphasizing depth. Occupants perceive calm, stable interiors with minimal glare, highlighting the efficacy of horizontal shading in moderating light intensity and interior comfort.



Buffering strategies - west facing perforated screen

Figure 3.15
Low-angle west sun enters perforated wall, projecting warm, directional beams across the interior. Perforated screens diffuse light into patterned shadows, maintaining brightness while reducing glare and heat. Clay walls capture the subtle patterns, creating a visually rich, textured environment. Occupants experience dynamic, animated interiors where light and shadow create rhythm, guide movement, and heighten engagement with the spatial volume.

Material analysis

Earth-based construction has long been present across West Africa and continues to influence contemporary projects by architects such as Francis Kéré and Demas Nwoko. Compressed earth blocks (CEB) are identified as the primary wall material for this project due to their climatic performance, local availability, and capacity to mediate light through mass, texture, and depth. Manufactured from compressed local soil mixed/ stabilised with small amount of cement, sand and water. In Kano's hot, dry climate, CEB walls would provide substantial thermal mass, slowing the transfer of heat during the day and releasing it gradually as temperatures drop at night.[54] This temporal behavior aligns with the thesis's interest in architecture that responds to the sun's daily cycle rather than attempting to neutralize it.

Alternative materials such as concrete block and laterite brick were considered; however, their higher embodied energy and greater reliance on industrial processing made them less aligned with the climatic and atmospheric intentions of this research. Earthen construction offers lower environmental impact while maintaining strong thermal mass and material continuity with vernacular building traditions. Beyond thermal performance, compressed earth also shapes the quality of light within interior space. Its matte, textured surface absorbs and diffuses daylight rather than reflecting it intensely, producing softer illumination and gradual shadow transitions. Unlike smooth or reflective materials, the rough texture of earth registers light as variation; revealing time through subtle shifts in tone, warmth, and shadow.[55] These material qualities support an architectural experience where light is felt atmospherically and bodily, rather than perceived as uniform brightness.



Figure 3.16
Stabilized compressed earth blocks that naturally diffuse daylight while stabilizing interior temperatures, forming a foundation for climate-responsive construction.

When sourced locally and stabilized appropriately, compressed earth blocks offer a durable enclosure system that minimizes embodied energy and reliance on imported materials. Recognizing their sensitivity to moisture, the material is employed in conjunction with architectural protection strategies, including raised plinths, deep roof overhangs, and shaded courtyards, rather than chemical dependence.[56]



Figure 3.17
Building with Overhangs and Raised Plinths – Illustrates vernacular-inspired techniques where overhangs and elevated walls protect earthen structures from excessive sun and rain, while shading façades and apertures.

Recognizing the structural limits of earth construction, compressed earth walls are paired with a contemporary steel roof structure. Steel trusses allow wider spans across earthen walls while supporting a raised and ventilated roof assembly. In this configuration, the height of the walls establishes the interior volume, while the roof structure enables clear spans and ventilation above the occupied space. The roof construction itself plays a critical environmental role, as its material layers, ventilation gaps, and overhangs help mitigate solar heat gain while allowing warm air to rise and escape. Steel therefore functions primarily as a structural support system that enables a lightweight roof and improved air movement within the building.[57]

Together, compressed earth and steel operate as a hybrid material system in which vernacular intelligence and contemporary construction techniques reinforce one another. Earth provides mass, texture, and atmospheric depth; steel provides structural efficiency and environmental control. The findings from this material study establish that light in this project is shaped less by transparency and more by thickness, porosity, and spatial sequencing. These insights directly inform the design inquiry that follows, where architecture is conceived as a mediator between sun, material, and lived experience rather than as a sealed enclosure resisting climate.

The proposed building does not rely on conventional transparent façade glazing systems, instead prioritizing material depth, filtered openings, and controlled light admission in response to Kano's intense solar conditions. Extensive vertical glazing in hot climates often produces excessive heat gain, visual glare, and uniformly illumi-

54 Al-Sakkaf et al., "Advancing Sustainable Compressed Earth Blocks Practices."
55 Glen-Gery, "How Lighting Affects the Color and Look of Brick."
56 "Compressed Earth Blocks and Sustainability: Where They Work and Where They Fail | ArchitectureCourses.Org."
57 "Kéré Foundation – Architecture."

nated interiors that diminish shadow depth and atmospheric variation. Rather than relying on glazed surfaces, the project introduces daylight through calibrated apertures, recessed openings, perforated earth screens, courtyards, and controlled roof separations that respond directly to climatic intensity and spatial requirements. These strategies allow daylight to enter indirectly and in moderated conditions, reinforcing the depth of wall assemblies, the thickness of openings, and the changing temporal qualities of light throughout the day.

Polycarbonate is used in place of glass selectively only within skylight and roof light-slot conditions where controlled overhead illumination is required. Rather than functioning as a conventional transparent surface, the material diffuses and softens incoming sunlight, transforming harsh solar exposure into ambient illumination that enhances spatial atmosphere without overwhelming interior conditions. This allows daylight to penetrate deep into interior spaces while maintaining the project's broader strategy of filtered, indirect, and carefully moderated light.

The rejection of conventional façade glazing is therefore not treated as a technological absence, but as a deliberate architectural position. By relying on depth, shadow, porosity, thermal mass, and controlled apertures instead of glass façades, the project reinforces a climate-responsive approach rooted in vernacular intelligence while simultaneously producing richer atmospheric and phenomenological spatial conditions.

Synthesis

The analyses presented in this chapter indicate that vernacular architecture does not treat sunlight as a quantity to be maximized, but as a condition to be moderated through architectural form. The orientation studies demonstrate how building alignment influences the duration and intensity of solar exposure, while the aperture investigations reveal how the size and placement of openings regulate the depth and quality of daylight penetration. Spatial buffering elements such as verandas and transitional spaces further illustrate how layers of enclosure temper direct solar impact before it reaches interior environments. Together, these observations suggest that climatic intelligence in vernacular architecture is embedded within spatial organization rather than applied through technological correction.

The examination also highlights how these strategies produce interior environments characterized by gradual transitions between brightness and shade. Through courtyards, verandas, recessed apertures, and screened thresholds, sunlight is filtered and softened before reaching interior rooms. Rather than creating uniformly bright or artificially dark spaces, these spatial arrangements maintain a dynamic balance between illumination, shadow, and thermal comfort. Architecture therefore operates as an environmental mediator, translating the intensity of the exterior climate into inhabitable interior conditions.

The contrast with many contemporary buildings in Nigeria further reinforces the significance of these observations. Building models that prioritize transparency and continuous glazing frequently intensify solar exposure, often requiring mechanical systems to maintain comfort. In such cases, environmental performance becomes separated from spatial and atmospheric experience.



Figure 3.18
Traditional Northern Nigerian Architecture - Example of traditional Nigerian architecture characterized by thick walls, shaded openings, and spatial layering that moderates sunlight and interior climate.



Figure 3.19
Example of Contemporary Architecture employing extensive glazing and smooth façades, illustrating a shift toward transparency that can intensify solar exposure in tropical climates.

The material analysis undertaken in this chapter demonstrates that vernacular principles of light and climate mediation continue to inform present-day architectural practice. The use of compressed earth blocks introduces mass, texture, and opacity that diffuse daylight while supporting thermal stability. Contemporary architects such as Francis Kéré demonstrate how earth construction can be paired with elevated roof systems that encourage ventilation and controlled daylight entry. This approach illustrates how climatic responsiveness can evolve within

contemporary architectural contexts without directly replicating vernacular forms.

By learning from vernacular strategies while employing contemporary construction techniques, architecture can once again operate as a mediator between climate, material, and human experience.

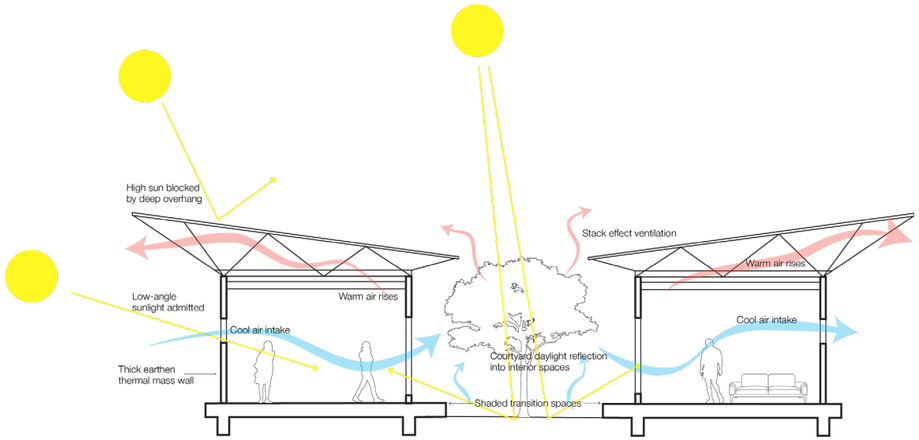


Figure 3.20
Sectional Diagram of Sunlight and Airflow – A synthesis of vernacular strategies showing solar angles, daylight penetration, stack-effect ventilation, courtyards, and thermal mass, demonstrating how climate, form, and material interact to shape interior

The sectional synthesis diagram illustrates how vernacular and climate-responsive strategies can regulate sunlight, airflow, and thermal comfort within hot climatic conditions. High-angle solar exposure is moderated through deep overhangs and shaded transitional spaces, while lower-angle daylight is admitted through calibrated openings to provide softer interior illumination. Thick earthen wall systems function as thermal mass, slowing heat transfer and stabilizing interior temperature fluctuations throughout the day.

The diagram also demonstrates passive airflow strategies in which cooler air enters through lower openings and shaded courtyard conditions before warmer air rises and exits through elevated roof zones, generating stack-effect ventilation. Courtyards operate simultaneously as thermal moderators, airflow distributors, and daylight reflectors, while verandas and covered circulation spaces buffer direct solar exposure and create intermediate microclimatic zones.

Together, these interconnected strategies demonstrate how environmental performance, materiality, spatial organization, and atmospheric experience can operate as integrated architectural systems rather than isolated technical devices.

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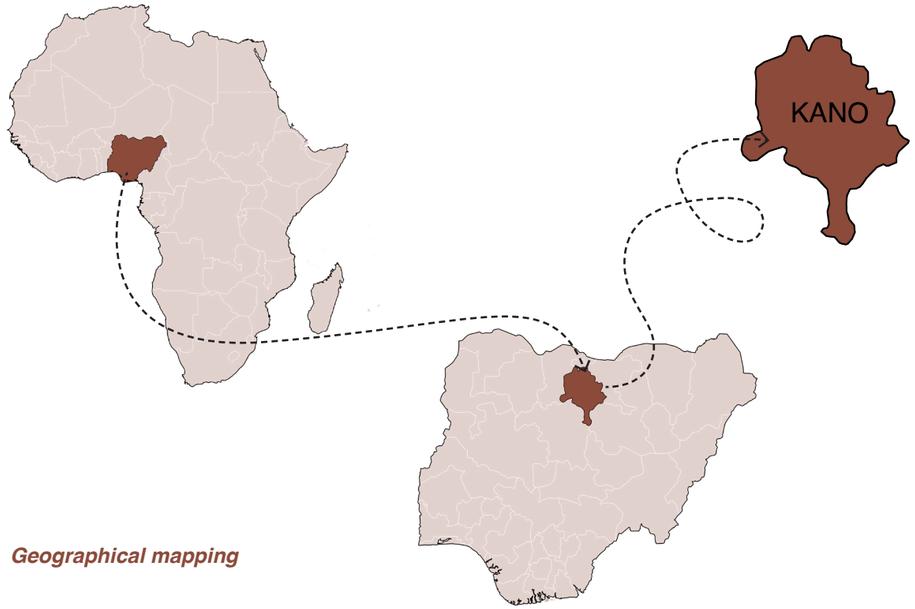
designing with sunlight

DESIGN INQUIRY

5

Site Context

Nigeria lies within the tropical belt of West Africa, a region characterized by high solar intensity, long daylight hours, and marked seasonal shifts between dry and wet periods. Located between approximately 4° and 14° north of the equator, Nigeria experiences high solar exposure throughout the year. In much of the country, particularly northern Nigeria, the sun is not just a backdrop, it actively shapes daily routines, social life, and architectural form. Light arrives intensely and often from a high angle, making shade, enclosure, and thermal moderation essential design considerations.



Geographical mapping

Figure 4.1
Geographical mapping illustrating the location of Kano State within Nigeria and Africa

The site for this design inquiry is located in Kano, northern Nigeria, a city whose climate, architectural traditions, and daily rhythms are shaped by an intense and persistent relationship with the sun. Situated within the Sahelian Hot and Semi-Arid Climate, Kano experiences long periods of high solar exposure, limited rainfall, and significant temperature variation between day and night.[58] These conditions make the management of light and heat not optional design considerations, but fundamental architectural concerns.

Average daytime temperatures in Kano typically range from 28–35 °C, while nights are cooler, dropping to around 20–22 °C. Sunshine duration is high, with long dry periods providing abundant daylight. Rainfall is minimal in the north, averaging around 500 mm annually, concentrated in a short wet season, while humidity remains relatively low. These climatic conditions make solar exposure and heat management critical drivers for architectural design, influencing the placement of courtyards, apertures, and shaded transitional spaces.[59]

Metric	*Northern Nigeria*
Sunshine/day (Dry)	Up to ~10 hours
Sunshine/day (Rainy)	~6 hours
Midday Temperatures	~33-35 °C
Night time temperatures	~20°C
Diurnal Variation	High

Figure 4.2
Summary of Solar Exposure, Temperature, and Daylight Conditions in Kano, Nigeria

In Kano, sunlight is constant and assertive. Morning light arrives sharply, casting defined shadows across the ground, while midday sun becomes vertical and unforgiving. By evening, long shadows stretch across walls and courtyards, marking the transition into cooler hours. These daily cycles create a heightened awareness of time, where light does not simply illuminate space but structures patterns of use, rest, and gathering. Understanding the site through these temporal shifts is essential to designing architecture that works with the sun rather than against it.

The surrounding urban fabric further shapes light conditions. Traditional Hausa settlements are typically compact, with closely spaced buildings and narrow streets.[60]



Site location

Figure 4.3
The site sits within Kano's peri-urban fabric; low rise residential buildings and open land creating a hybrid condition of partial shade and full solar exposure. This context makes it an ideal setting to test strategies of light modulation, shadow, and solar choreography.

58 O.M et al., *Monitoring Climate Extreme Events Trend in Nigeria Using Climpact2 Software.*

59 "Blue Green Atlas - The Climate of Nigeria."

60 Ruqayya Hussaini Mahuta and Idil Erdemir Kocagil, "Climate-Responsive Design Strategies: Utilizing Vernacular Architecture to Design Energy-Efficient Residential Buildings in Nigeria."

At this site, the peri-urban context presents a hybrid; low rise, fine grain housing provides partial shading, while adjacent open land exposes the building to direct sunlight for longer durations. This combination allows the project to observe light behaviour in both filtered and fully exposed conditions, making it an ideal setting to test strategies of modulation, reflection and shadow.

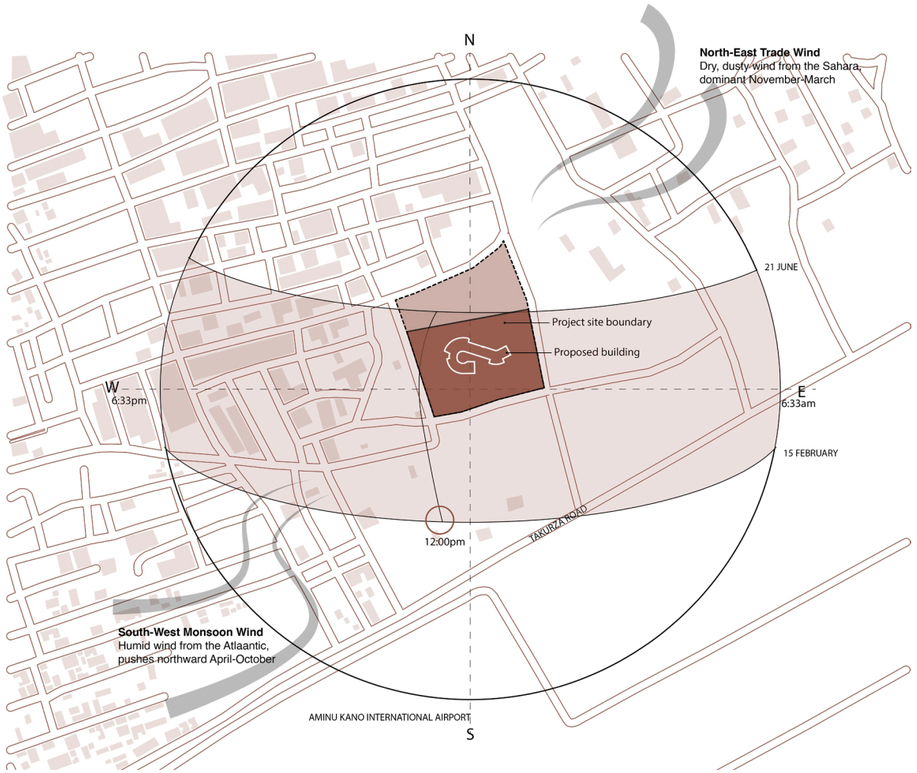


Figure 4.4
Seasonal Sun Paths and Prevailing Winds
Sun path ribbon plotted for Kano at 12°N across three seasons — February south zenith, March equinox, June north zenith. No facade is permanently safe from direct sun across the year — this drives the fundamental decision to orient each cluster toward its specific solar moment.

While this thesis is primarily concerned with the sun as an architectural driver, wind is acknowledged as a secondary but significant climatic force. Kano receives two prevailing wind conditions across the year; the dry northeast Harmattan wind during the dry season, carrying fine dust and low humidity from the Sahara, and the southwest monsoon during the wet season, bringing moisture and occasional rain from the Atlantic. The building responds to both conditions passively; the courtyard acts as a sheltered wind buffer, the roof overhang protects CEB walls from southwest driven rain, and the fine wire mesh across the perimeter gap filters Harmattan dust while maintaining airflow for stack effect ventilation. Wind is not choreographed in this building the way the sun is, but it is listened to, and the design is honest about its presence.

To evaluate and represent the building's light and climatic performance, three seasonal moments are used consistently throughout this thesis; February, March, and June. These dates were not selected solely for their solar geometry but because they each represent a distinct climatic and atmospheric identity of Kano that no single date could capture alone.

February falls within the height of the Harmattan dry season. The sun sits clearly south of zenith at Kano's latitude of 12°N, producing low angle morning and evening light and high angle intense midday sun from the south. The atmosphere carries the characteristic golden dusty quality of the Harmattan, fine particulate suspended in the air softening the light and giving the city its most distinctly northern Nigerian atmospheric character. This is the season most associated with Kano's identity and the one in which the building's south facing strategies are most critically tested.

March represents the transitional moment when the sun crosses almost directly overhead at approximately 78 degrees altitude at solar noon. Neither fully dry nor fully wet, this in-between season captures the building at its most climatically neutral moment, serving as the baseline condition against which February and June are read. It is also the moment of greatest overhead solar intensity, making it the most demanding condition for the building's shading and roof protection strategies.

June marks the height of the wet season. The sun has crossed north of zenith, sitting clearly north of overhead at Kano's latitude, reversing the solar logic of the building entirely. Facades that were shaded in February now receive direct sun. North facing openings that were safe are now exposed. The atmospheric quality shifts dramatically; the Harmattan dust is gone, the sky is deeper, the light is cleaner and more blue-toned. This is the season in which the building's north facing strategies are most tested and where the full complexity of Kano's bidirectional solar geometry becomes most apparent.

Together these three seasonal moments reveal the building not as a fixed object but as a living instrument, one whose character, light quality, and climatic performance shift across the year in direct response to the specific solar and atmospheric conditions of northern Nigeria.

Cultural Campus: Design Intent and Program Organization

The proposed cultural campus is conceived as a place of learning, making, gathering, performance, and cultural exchange within the climatic context of Kano, Nigeria. Rather than functioning as a singular object, the project is organized as a network of interconnected programmatic clusters shaped by movement, environmental responsiveness, and varying conditions of light and social interaction.

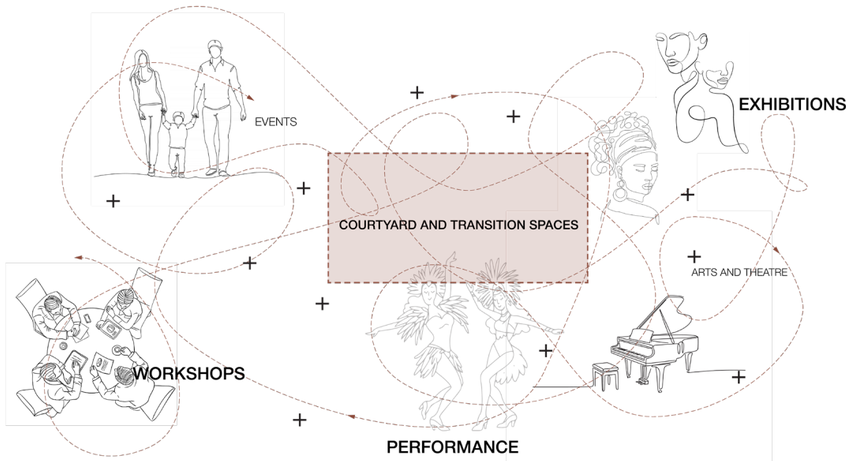


Figure 4.5
Diagram showing program clusters and their spatial relationships, connected through transitional and courtyard spaces. The abstract representation emphasizes circulation, adjacency, and the layering of activity and light across the site

The campus brings together spaces for creative production, exhibition, education, performance, informal gathering, and outdoor activity. These include workshop spaces, co-working and learning environments, galleries, performance areas, pavilions, courtyards, outdoor gathering spaces, and recreational zones. Together, the programs support both structured and informal cultural engagement while encouraging interaction between making, performance, storytelling, and community life.

The design intent emerged from an interest in understanding how architecture can choreograph environmental forces rather than merely protect against them. Light, shadow, airflow, thermal mass, and transitional space operate as active spatial generators throughout the project. Instead of relying on sealed interior environments, the proposal embraces filtered daylight, layered thresholds, shaded circulation, and naturally ventilated gathering spaces to create an architecture that remains responsive to climate and time.

Spatial organization across the campus is informed by both environmental and social considerations. Public and collective programs are positioned around courtyards and shaded gathering spaces, while quieter learning and reflective spaces are arranged to support more controlled lighting and atmospheric conditions. Transitional spaces act as environmental buffers between interior and exterior conditions, moderating heat, daylight intensity, and movement throughout the site.

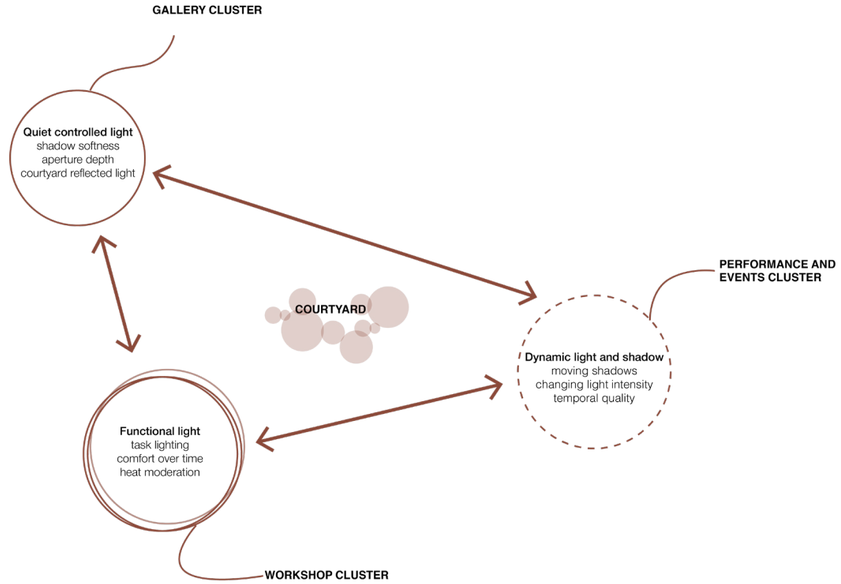
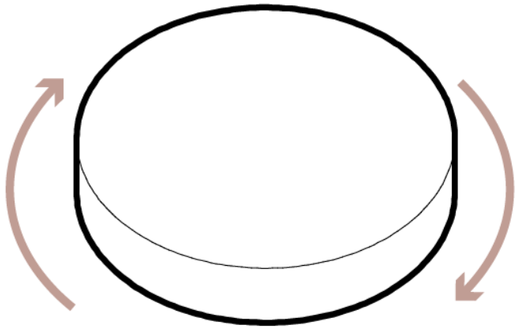


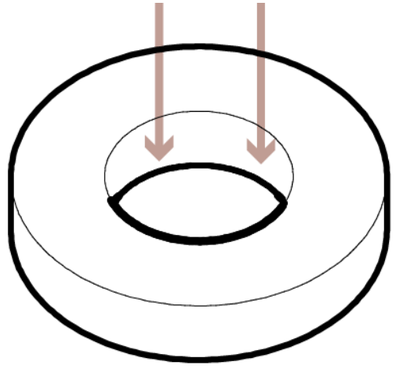
Figure 4.6
Conceptual diagram mapping proposed lighting strategies across program clusters, highlighting how sunlight, shading devices, and daylight modulation will be orchestrated to create atmospheric and functional conditions in the cultural center

The architectural language of the project draws from vernacular spatial principles found within northern Nigerian architecture, including deep wall conditions, perforated surfaces, shaded outdoor rooms, and layered circulation sequences. These principles are reinterpreted through contemporary structural and environmental strategies to create a campus that responds to both climatic performance and cultural atmosphere.



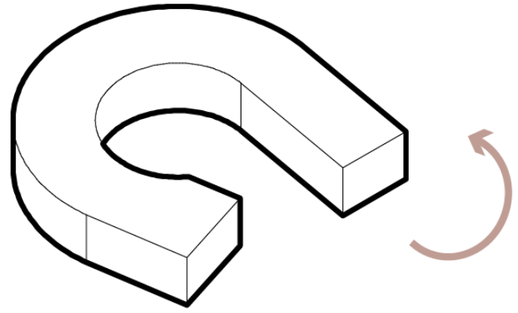
Unified Mass

The initial massing begins as a compact circular form; introverted and climatically defensive. Programme and orientation have not yet begun to shape it.



Courtyard Introduced

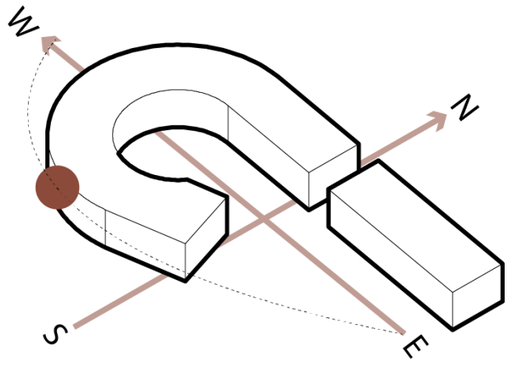
A central void is carved from the mass; the courtyard becomes the climatic and social heart, drawing cool air in and providing shaded communal space.



Mass tilt

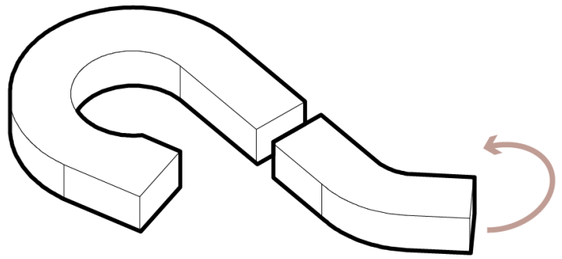
The circular form is titlted at the east; creating an entry sequence that extends the building form.

Figure 4.7
The initial building mass is positioned to establish a strong relationship with the site.



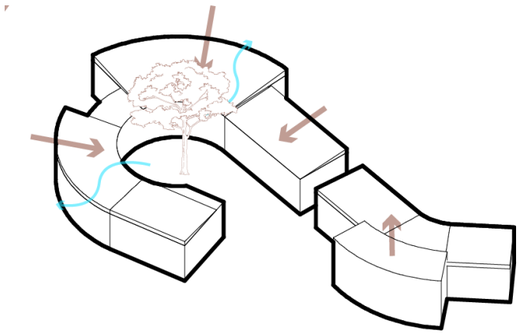
Solar Response

Programme clusters are distributed around the courtyard in response to solar orientation; each cluster facing the light condition most appropriate to its activity.



Gallery Orientation

The gallery arm extends eastward to receive morning raking light; the low angle illumination most suited to revealing texture and form in art and fabric.



Roof System

The elevated roof is introduced; steel trusses raising the roof above the wall head to create the perimeter gap that drives stack effect ventilation throughout the building.

Mass Evolution

The following drawings document the cultural centre as a built argument — each spatial decision traceable to the climatic and experiential principles established in the preceding chapters

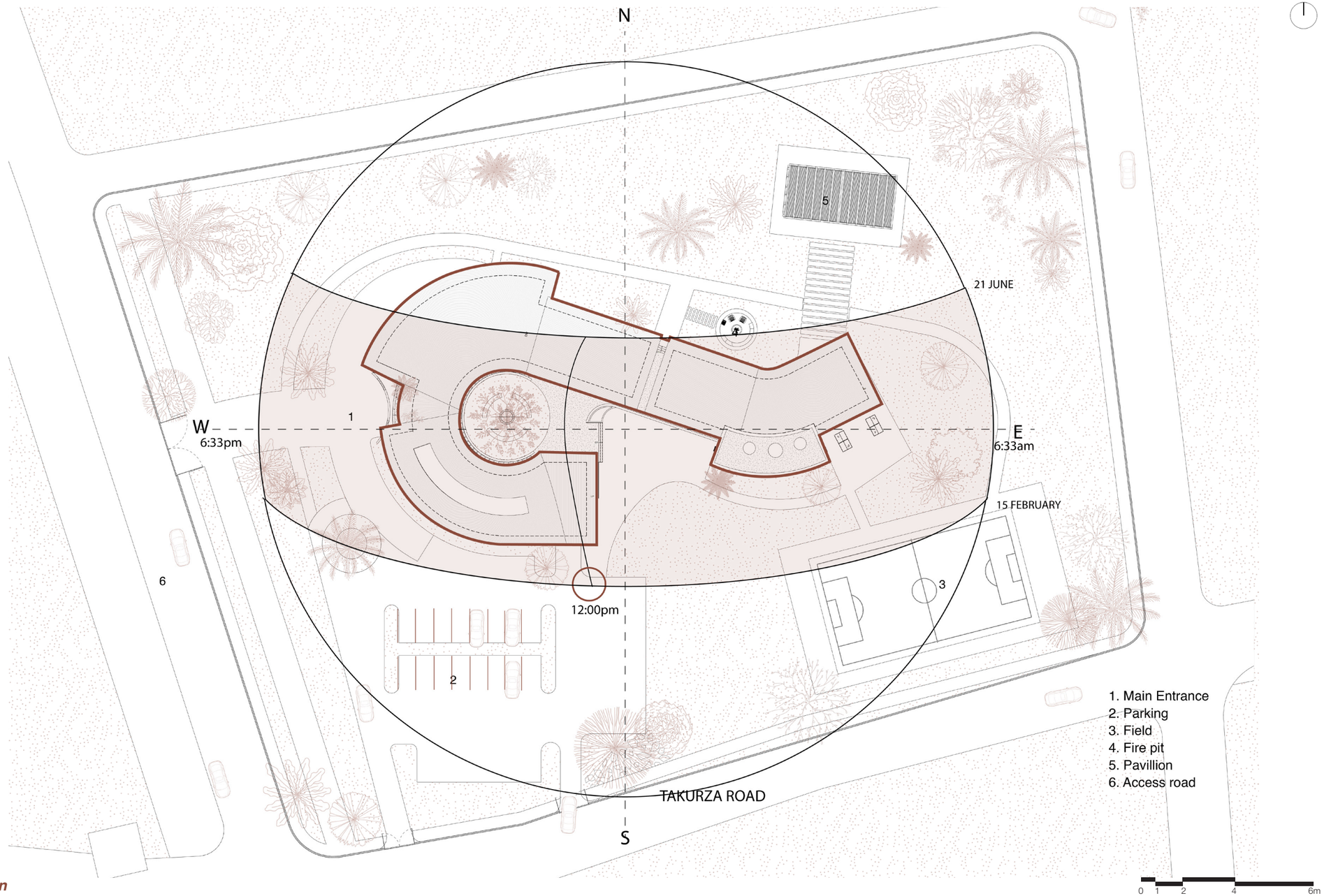


Figure 4.8
The building is oriented with gallery facing east, performance facing west, and coworking facing south, each cluster aligned to its solar condition. The roof overhang wraps the full perimeter protecting CEB walls while throwing direct sun clear of wall openings.

Site plan

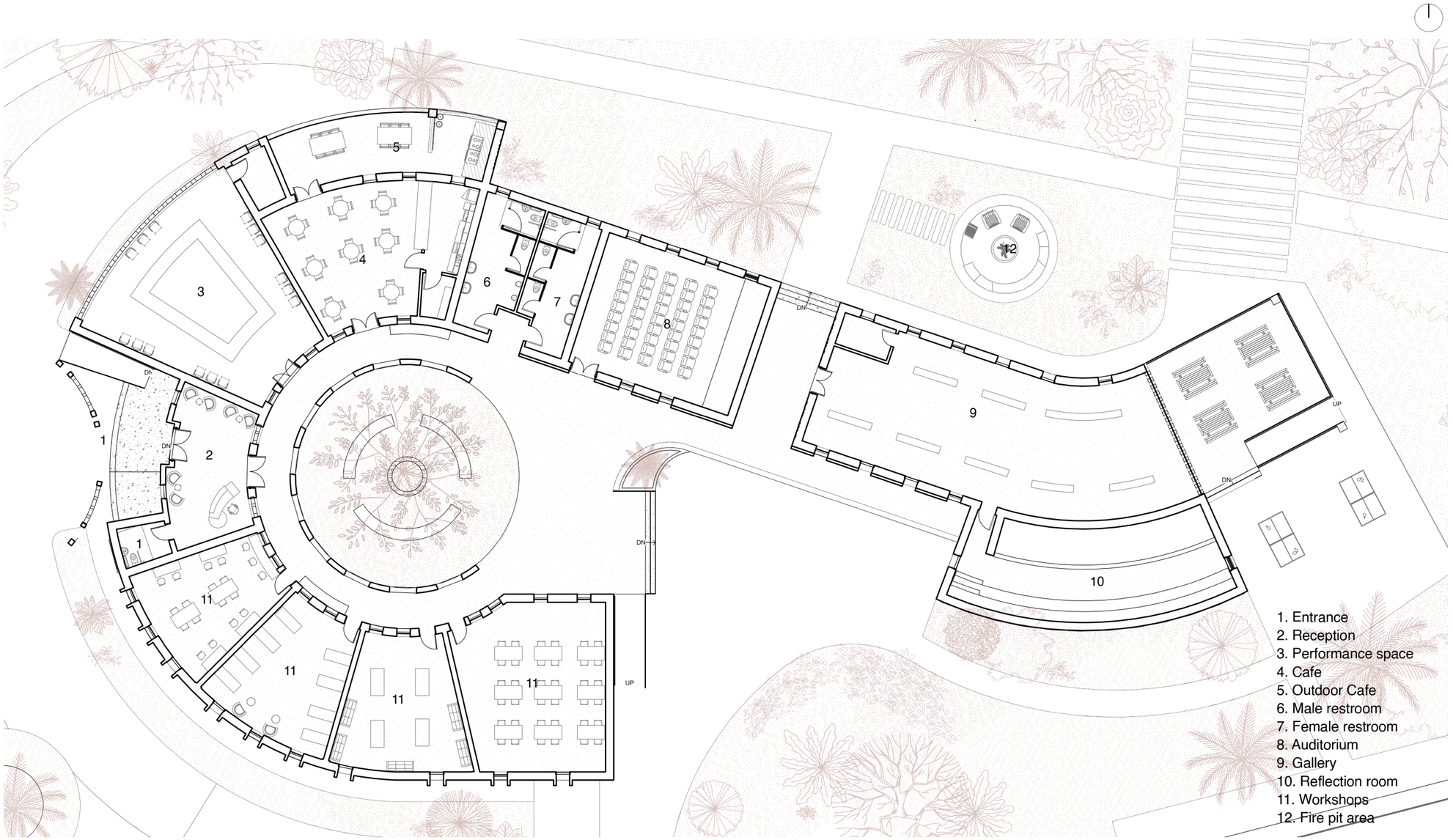
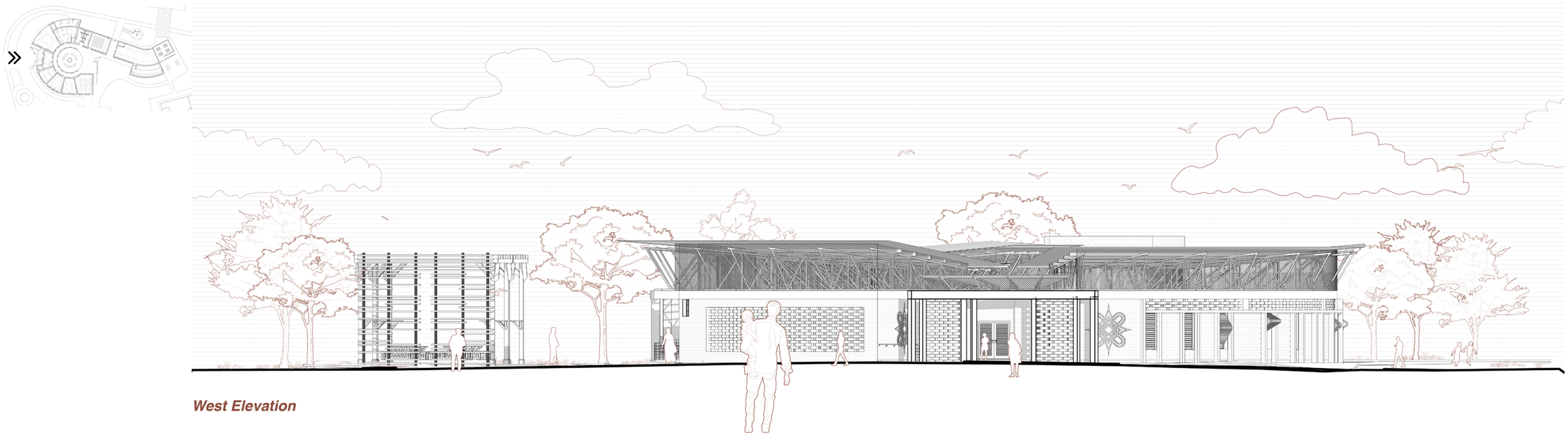


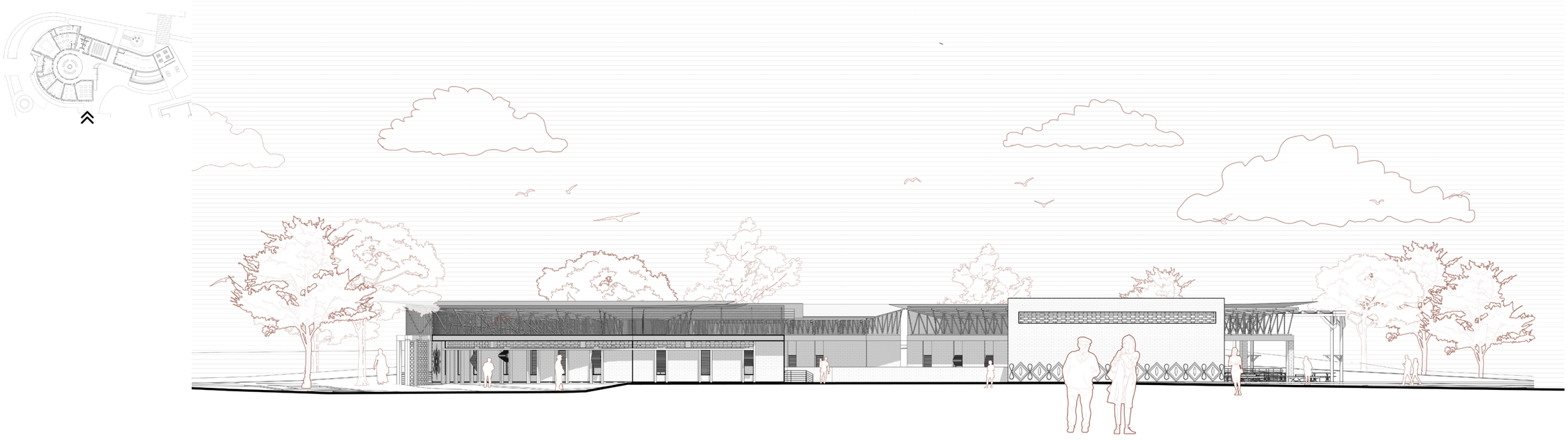
Figure 4.9
The spanner shaped plan organises three programme clusters around a central circular courtyard, connected by a shaded corridor and entered from the west. The spatial sequence from entry through courtyard to each cluster constitutes the choreographed light journey of the building.

Floor plan



West Elevation

Figure 4.10
Entry and Performance;The building's most theatrical face. Entry threshold, expressed steel trusses, and perforated screen filtering harsh western sun into dynamic shadow. The perimeter gap reads as a deliberate horizontal shadow band between wall and elevated roof.



South Elevation

Figure 4.11
Thermal Mass and Shading; The roof overhang blocks high angle midday south sun from wall openings while the CEB wall texture absorbs and diffuses light into soft shadow gradients.

Figure 4.12
Transition Corridor ; Midday Horizontal radial beams filter overhead south sun into rhythmic shadow patterns across the floor and occupants below. The body registers the passage of time through shifting shadow — architecture as sundial

Figure 4.13
North Facing Cafe; Diffused Light The north facing cafe receives consistently diffused sky light throughout the day — no direct sun, no glare, no harsh contrast. People gather and linger in conditions of calm even illumination.



Figure 4.14
East Facade; Morning Light, low angle east morning light rakes across the wall surface and ground plane. The gallery cluster is most alive at this hour — the moment the building was designed for.

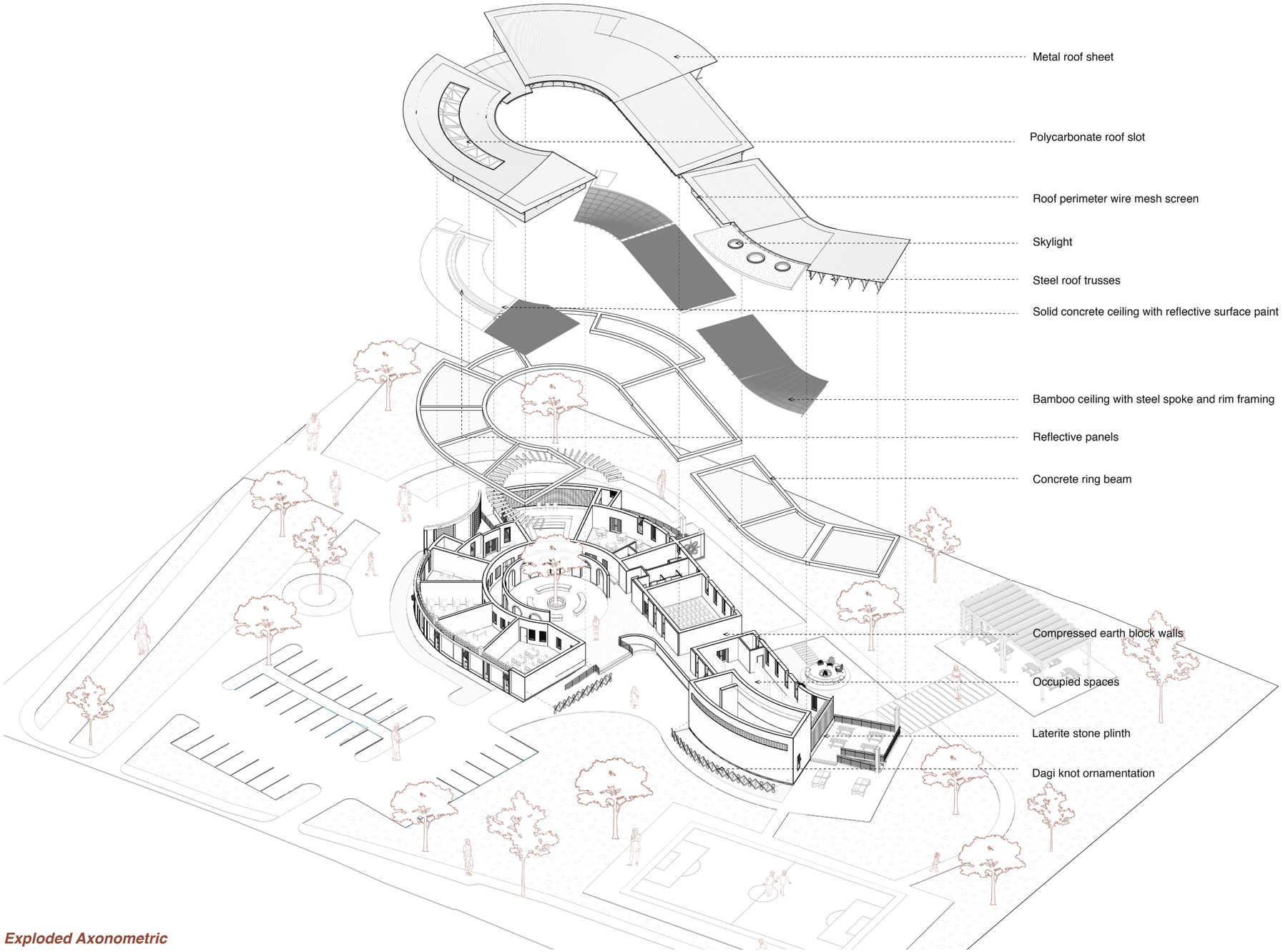




Figure 4.15
South Facade; Overhang Shadow The roof overhang casts deep shadow across the south wall at midday - direct overhead sun completely blocked. The CEB wall texture reads in soft reflected light, warm and grounded.



Figure 4.16
Courtyard Corrido; Midday sun filtered through horizontal members produce geometric shadow patterns across the ground plane. The patterns shift continuously, the floor becomes a record of solar time.



Exploded Axonometric

Figure 4.17
Layered Environmental Logic The building decomposed into its constituent layers, laterite plinth, CEB thermal mass walls, ring beam, permeable bamboo ceiling, elevated steel trusses, and metal roof. Each layer performs a distinct climatic and experiential function — together they form a unified passive environmental instrument.

Figure 4.18
Section through the entry threshold showing west solar condition at 6pm across three seasons. The perforated screen intercepts low angle afternoon sun before it reaches the interior, the deep CEB wall reveal compresses the visitor before the space opens beyond

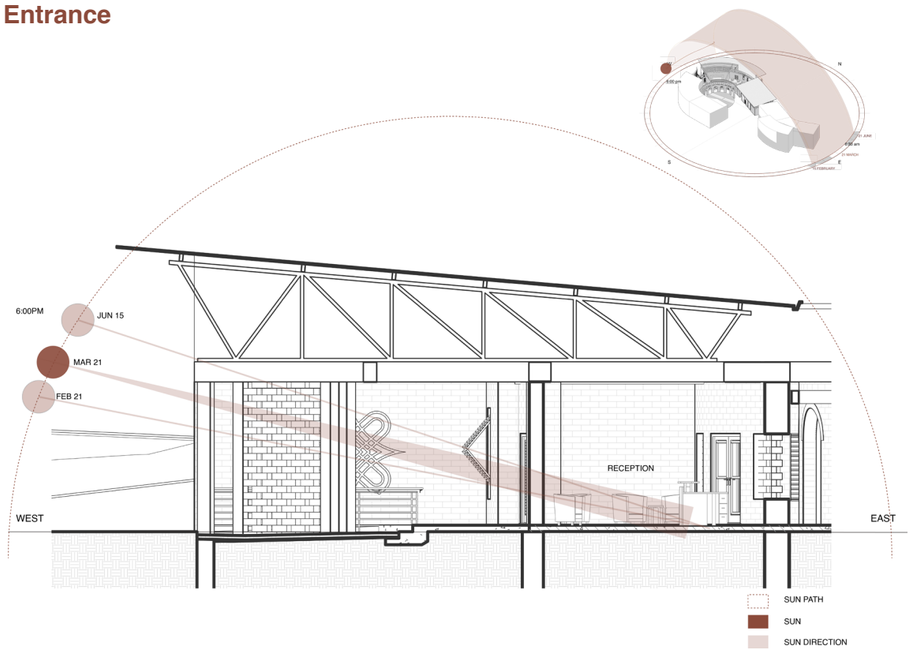


Figure 4.19
Sectional perspective reveals the spatial sequence from entry through threshold ; light filtered by the perforated screen into shifting geometric patterns across the floor. The contrast between filtered light and the deep shadow of the solid wall defines the threshold experience

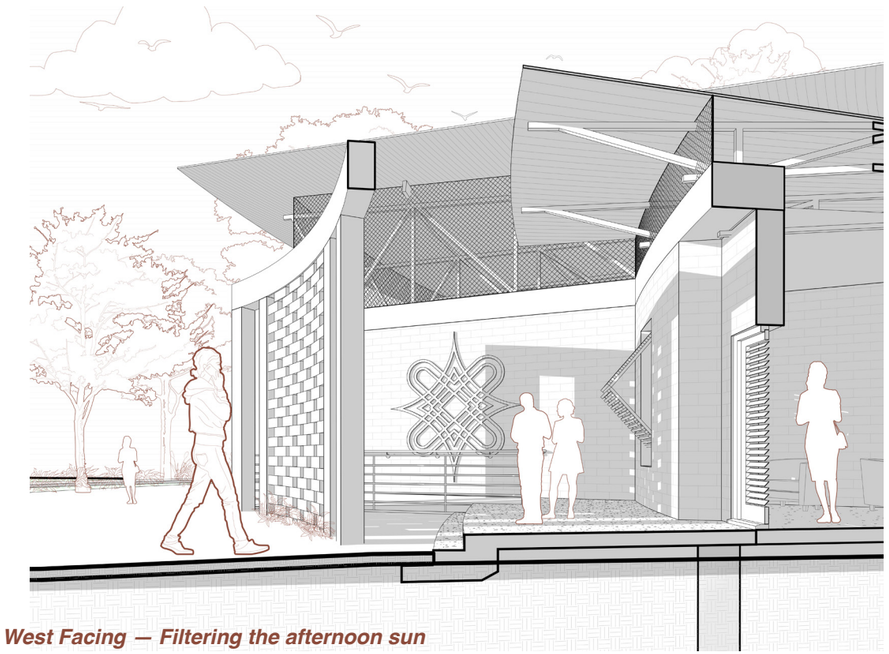




Figure 4.20
The entry at late afternoon; west sun at its lowest angle casting the longest shadows through the perforated screen. The visitor enters the building through this light event; architecture experienced as a sensory threshold before it is understood as space.



Figure 4.21
Entry; threshold
The interior of the entrance zone looking back toward the perforated screen; filtered western light casting geometric shadow patterns across the threshold space.

Performance

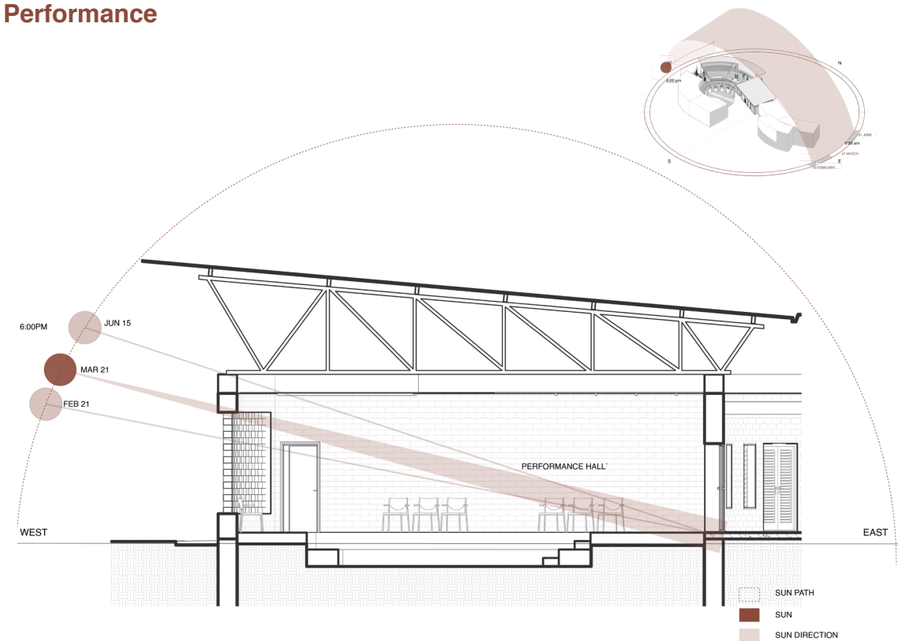


Figure 4.22
Section through the performance space showing west solar conditions. The perforated screen intercepts direct western sun while the solid wall behind provides acoustic separation and thermal mass. Sun angles at 6pm for February, March, and June.

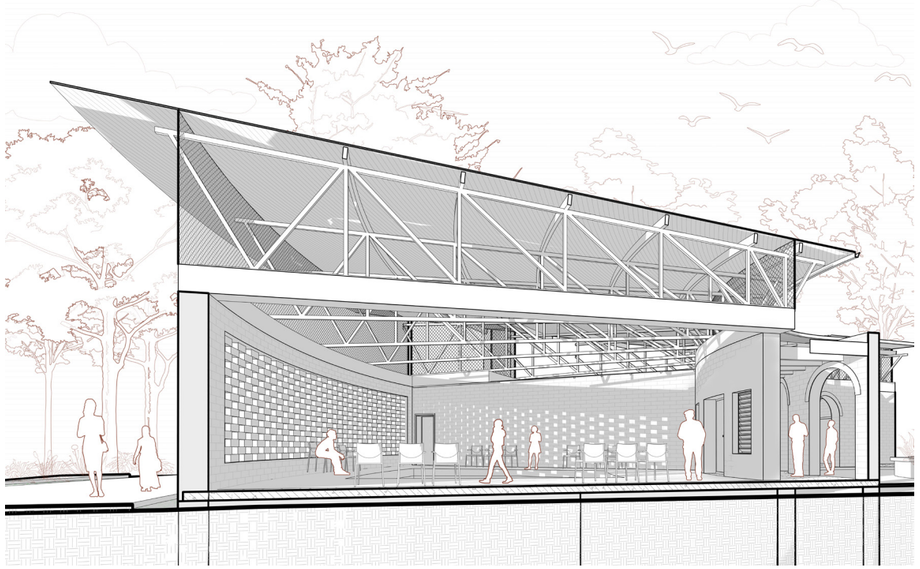


Figure 4.23
Sectional perspective reveals where Western afternoon light animates this in-between space with shifting shadow before the performance begins.

West Facing — Light as co-performer



Figure 4.24
Late Afternoon Shadow Play. West late afternoon sun filtered through the perforated screen produces dynamic shifting shadow patterns across the interior. As the sun descends the patterns elongate and move; the building performs before the performance begins.



Figure 4.25
Performance; Community Gathering The performance space in evening use,Community gathering under the last filtered western light. Enclosed by thick CEB walls, animated by filtered light, ventilated passively; the space belongs to its climate and its community simultaneously.

Workshop

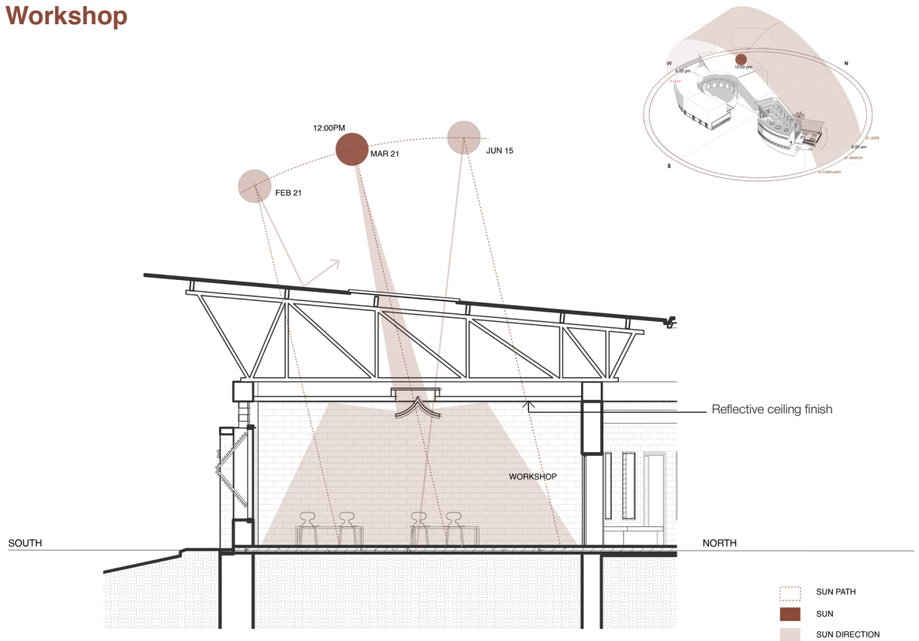


Figure 4.26
Section through the coworking cluster showing the Kimbell inspired ceiling slot system and south solar condition. The polycarbonate roof slot admits diffused overhead light to the curved reflector below, bouncing light laterally across the white painted concrete soffit. S un angles at nidday for three seasons.

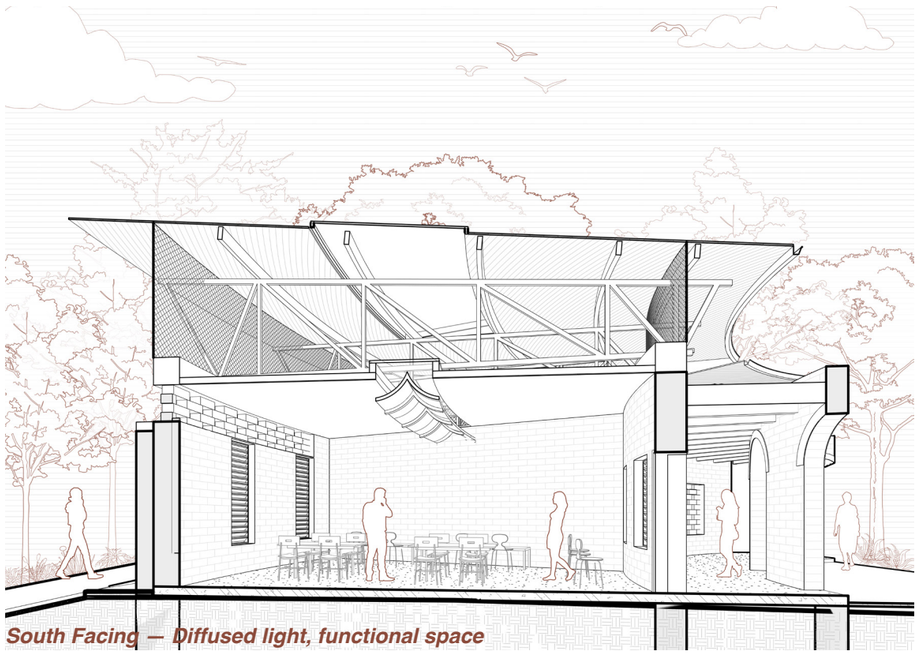


Figure 4.27
The sectional perspective reveals the polycarbonate slot and truss zone through ceiling slot onto curved reflector



Figure 4.28
Diffused Ceiling Light. The workshop interior under Kimbell slot light - soft, even, calm. People work and make in conditions calibrated for focus. This is Zumthor's rightness of atmosphere, when light is so well resolved that it disappears into the quality of the space



Figure 4.29
South Window Light South facing windows with deep CEB reveals admit diffused working light across the workshop surface. The overhang blocks direct midday sun, only reflected sky light enters, warm and without glare.

Gallery

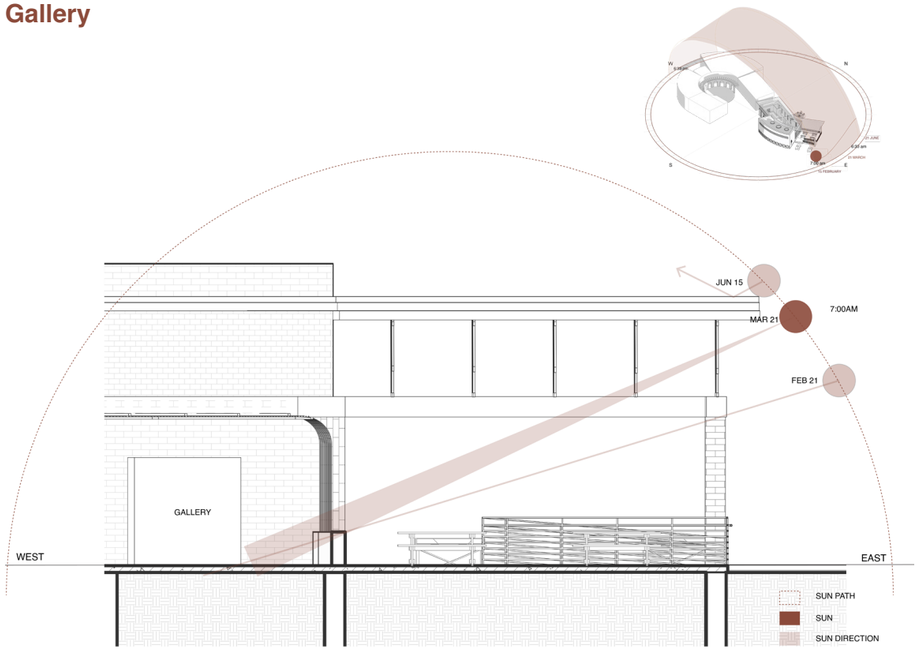


Figure 4.30
Section through the gallery showing east solar condition at 7am across three seasons. Low angle morning light enters through high east wall openings; raking across surfaces, revealing material texture and spatial depth. Sun angles for February, March, and June overlaid.

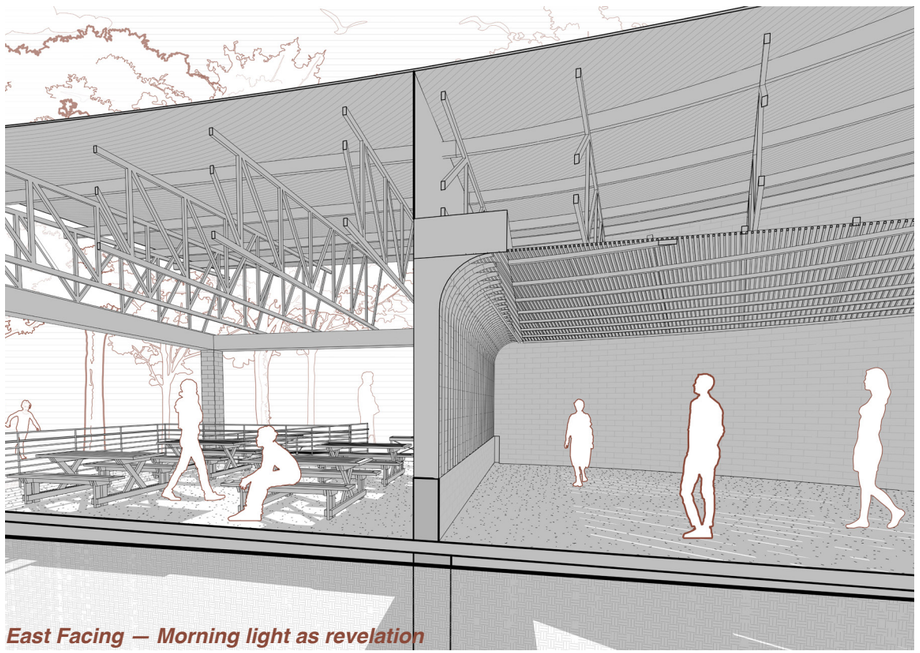


Figure 4.31
The sectional perspective reveals the gallery as a space shaped by raking morning light; east openings admitting low angle sun that travels deep into the space, and casting long shadows that define form.

East Facing — Morning light as revelation



Figure 4.32
Gallery Morning Light East morning light rakes across the gallery interior at low angle- sculpture revealed in three dimensions by lateral illumination. Shadow defines form as much as light. This is the moment the gallery was designed for.



Figure 4.33
Gallery Morning Light Low angle east light reveals the texture and weave of Nigerian textile on display - every thread and pattern made legible by the quality of this specific morning light. Light as the medium through which material culture is experienced

Figure 4.34
Section through the sector shaped space showing circular glazed skylight, and water body. South sun falls vertically through the skylight at midday onto the water body - reflected light animating the curved wall.

Gallery - Reflective room

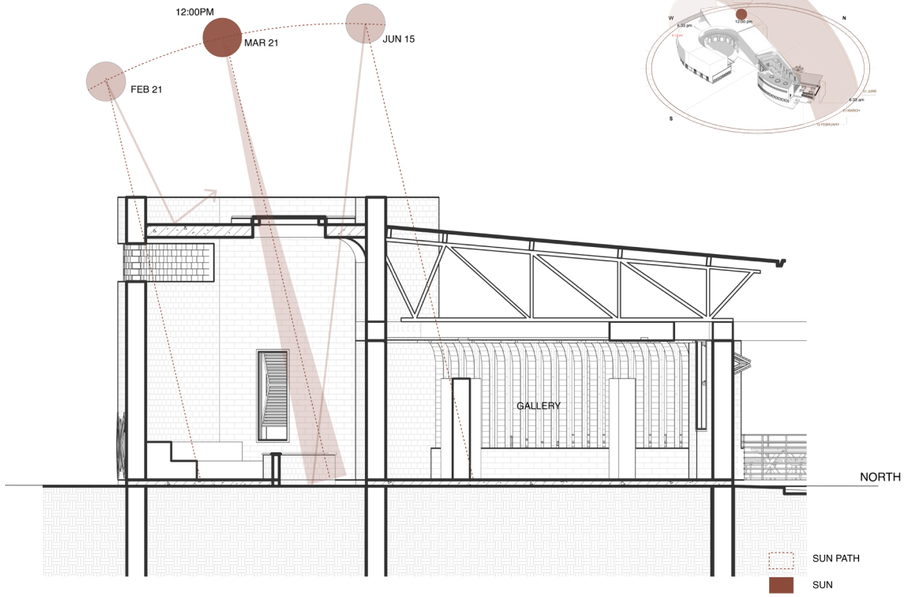
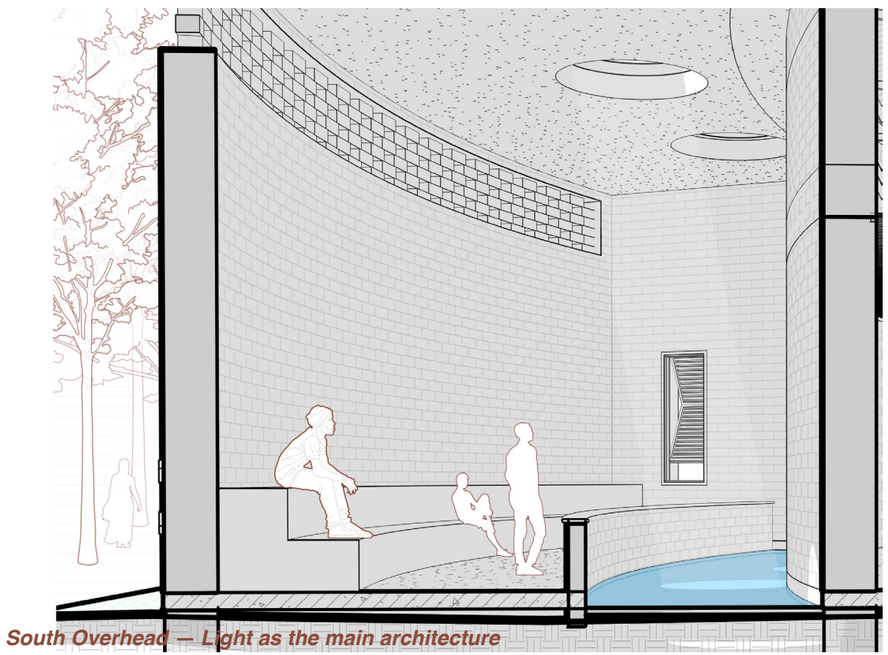


Figure 4.35
The sectional perspective reveals the singular spatial logic of the reflective room; one source of overhead light, one water body, one curved wall. Compression, darkness, and a single shaft of south sun produce the most intense experiential moment in the building.



South Overhead — Light as the main architecture



Figure 4.36
The reflective room is conceived as the building's most emotionally singular space; a dark sector shaped room where south sun, water, and curved wall produce an ever changing light event by day.



Figure 4.37
South sun falls through the circular skylight onto the water body below; reflected light animating the curved sector wall in constantly shifting patterns. Light as the architecture. The sun over Kano as the only collaborator.

Performance and Atmospheric Evaluation

The environmental strategies developed within the project are intended not only to improve thermal comfort and climatic responsiveness, but also to shape the sensory and atmospheric experience of the campus. Rather than separating environmental performance from architectural experience, systems of ventilation, shading, materiality, and daylight control are integrated directly into the spatial organization and construction of the project.

The building responds to Kano's hot and seasonally extreme climate through a combination of passive environmental strategies. Courtyards play a central role within this system, operating as environmental, social, and spatial moderators across the campus. Positioned between programmatic clusters, these open transitional spaces facilitate airflow, provide shaded gathering areas, reduce heat buildup around occupied spaces, and create moments of visual and thermal relief within the dense climatic conditions of the site. The courtyards also support the gradual transition between interior and exterior environments, reinforcing the layered spatial sequences found in vernacular northern Nigerian architecture.

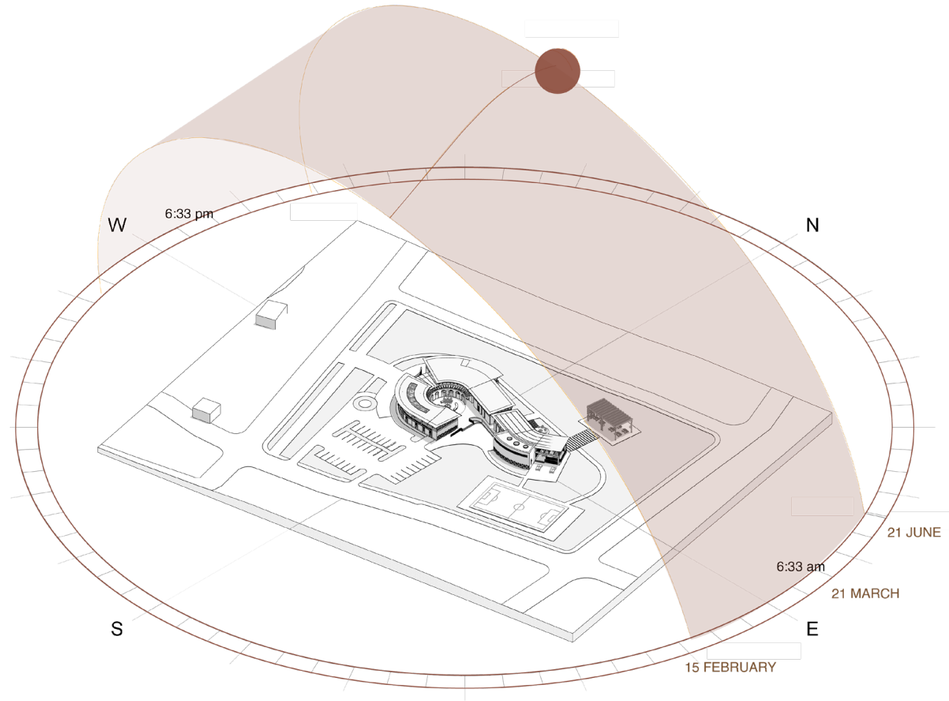
Cross ventilation is supported through calibrated openings positioned to encourage continuous airflow across occupied spaces, while stack ventilation operates through elevated roof conditions and roof separation zones that allow rising hot air to escape naturally from interior spaces. Together, these systems reduce heat accumulation while maintaining air movement throughout the campus.

Thermal mass is incorporated through the use of earth-based wall systems, which moderate internal temperature fluctuations by slowing heat transfer throughout the day. To protect these earthen surfaces from moisture and seasonal rainfall, the walls are elevated on plinth conditions and shielded through extended roof overhangs that reduce direct water exposure. The lightweight metal roof further contributes to thermal performance by reflecting a significant portion of solar radiation away from occupied spaces while remaining structurally separated from interior ceiling systems to reduce heat transfer.

Sunlight is treated as a dynamic environmental condition that is selectively admitted, filtered, redirected, or blocked depending on programmatic and atmospheric requirements. Harsh solar exposure is moderated through recessed openings, overhangs, perforated surfaces, transitional spaces, and controlled apertures that diffuse incoming light while preserving shadow depth and spatial contrast. In spaces requiring softer and more controlled illumination, daylight is introduced indirectly to maintain visual comfort while reinforcing atmospheric variation across the day.

These environmental strategies operate simultaneously as phenomenological devices. Shifting patterns of light and shadow, changing air conditions, material textures, and transitions between compression and openness contribute to a spatial experience that evolves temporally throughout the day. The architecture therefore responds not only to climate as a technical condition, but also to atmosphere as a lived and sensory experience.

Artificial lighting further extends this atmospheric continuity beyond daylight conditions.



Seasonal solar migration diagram

Figure 4.38
Seasonal Solar Migration February to June sun path ribbon over the building massing. The building responds not with a uniform strategy but with three distinct orientations, each cluster choreographing its specific solar moment.

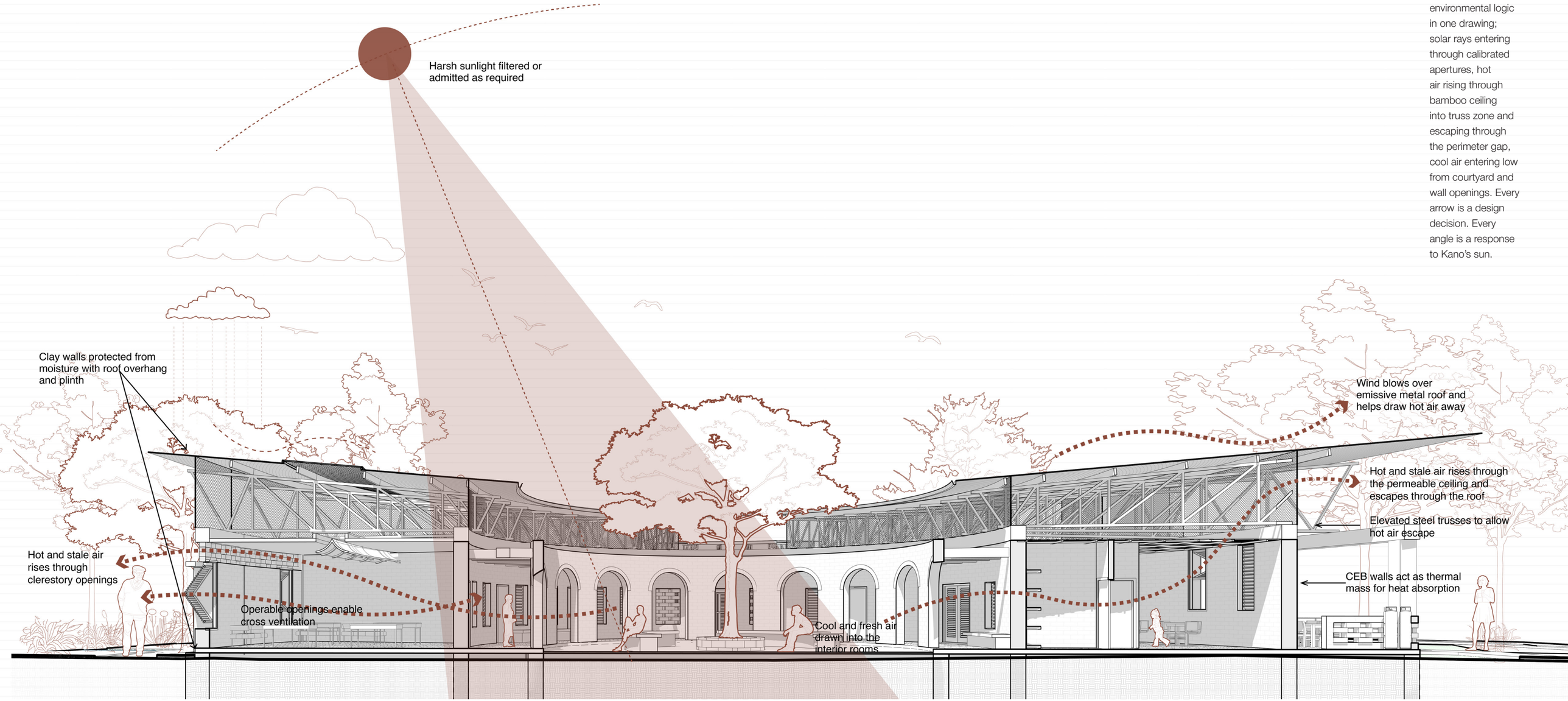
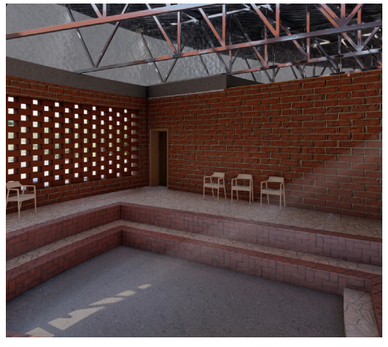


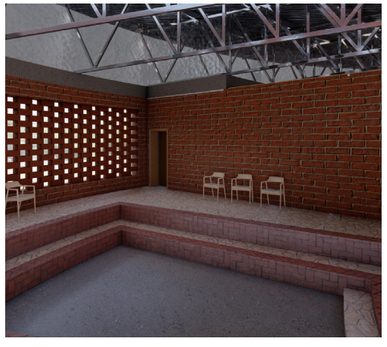
Figure 4.39
Sun and Airflow The building's complete environmental logic in one drawing; solar rays entering through calibrated apertures, hot air rising through bamboo ceiling into truss zone and escaping through the perimeter gap, cool air entering low from courtyard and wall openings. Every arrow is a design decision. Every angle is a response to Kano's sun.

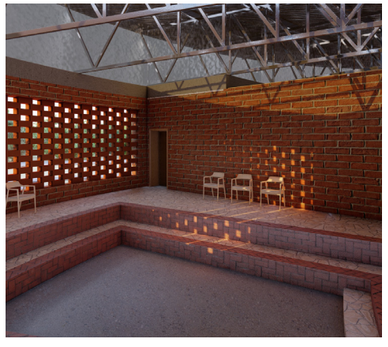
9AM

12PM

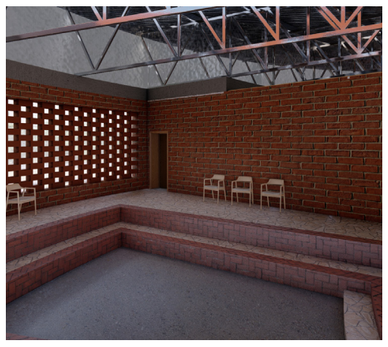
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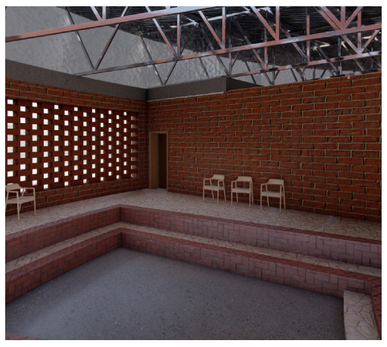






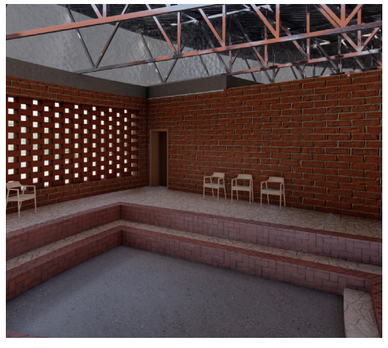
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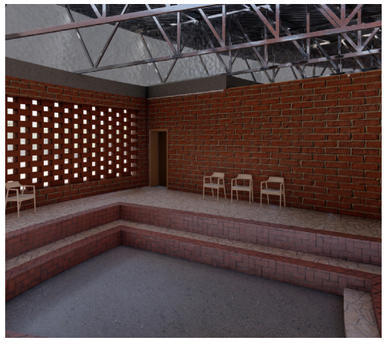


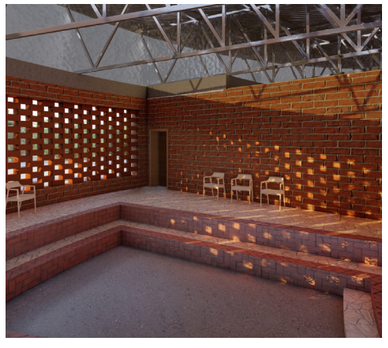




MAR 21







JUN 21

Figure 4.40
West facing light across three seasons and three moments of the day - 9am, 12pm, 6pm for February, March, and June. The building's most theatrical moment happens every evening at when the perforated screen is most activated - only the angle and warmth of the light shifts between seasons

Performance - temporal and seasonal light study

9AM

12PM

6PM







FEB 15







MAR 21







JUN 21

Figure 4.41
South facing working light across three seasons and three moments of the day. The ceiling slot system maintains consistent diffused working conditions at midday across all seasons while the sun is still up - the passive system performing its most important role in the space where functional light reliability matters most.

Workshop - temporal and seasonal light study

7:00AM

12PM

6PM







FEB 15







MAR 21







JUN 21

Gallery - temporal and seasonal light study

Figure 4.42
East facing light across three seasons and three moments of the day. The gallery is most alive at 7am - low angle morning light at its most raking and revelatory. The building makes an argument about when Nigerian art deserves to be seen.

9AM

12PM

6PM







FEB 15







MAR 21







JUN 21

Reflective room - temporal and seasonal light study

Figure 4.43
South skylight light across three seasons and three moments of the day. At 12pm the light shaft is most direct and the water reflection most intense. Across seasons the angle shifts - the same space, the same sun, the same water, and yet rarely exactly the same experience twice.

Lighting Strategy: Integrated Artificial Illumination

Lighting in this thesis is treated as a continuous spatial system that extends from day into night. The primary source of atmospheric control is natural daylight, shaped through architectural devices such as apertures, perforated facades, elevated roof slots, and filtered threshold conditions. These systems define the daytime spatial quality, allowing light to be diffused, reflected, and moderated across interior surfaces rather than entering as direct glare. Artificial lighting is introduced not as a separate layer, but as a continuation of the same atmospheric intention after sunset. It ensures that the spatial experience of the building does not end with daylight, but transitions into a nocturnal condition that preserves warmth, clarity, and emotional depth.

Different lighting types are used to support this continuity across the three clusters. In the workshop and coworking spaces, task lighting and focused spotlights provide functional clarity for individual work surfaces; purposeful and direct without overwhelming the atmospheric quality established by the daytime ceiling slot system. In the performance space, theatrical spotlights treat illumination as a compositional tool, using directional and layered light to create depth, contrast, and spatial emphasis that mirrors the dynamic shadow play of the afternoon perforated screen. In the gallery, low intensity warm lighting suspended in locally crafted basket woven chandeliers casts a soft ambient glow across the interior; culturally resonant objects in their own right, maintaining the intimate raking quality of the morning east light that defines the gallery's daytime character.

Across all conditions, artificial lighting is carefully controlled to avoid competing with the natural lighting strategy. Instead, it complements it, ensuring the building maintains a consistent experiential quality across different times of day. Ultimately, lighting in this thesis operates as a unified system where daylight and artificial light are not separate conditions but two expressions of the same architectural intention: the creation of atmosphere, depth, and cultural resonance through light.

Yet the building's most meaningful acknowledgement of evening life requires no electricity at all. Positioned at the edge of the cultural centre, the campfire space marks the threshold between the designed and the elemental, where architectural illumination gives way to firelight. Beyond its role as a source of warmth and light, the campfire holds deep cultural significance as a traditional gathering place where stories, histories, and collective knowledge are shared across generations. Within many communities, evenings around the fire have long served as moments of social exchange, oral storytelling, music, reflection, and community bonding.

In this thesis, the campfire extends the cultural centre beyond the building envelope and into the landscape, supporting forms of gathering that are rooted in memory, tradition, and collective experience. As daylight fades and artificial lighting recedes, community members gather beneath the open Kano sky around the glow of the fire. The cultural centre therefore continues its role after sunset, not only as a place of learning and exchange, but as a setting where cultural narratives are preserved and passed forward. It becomes the final moment in the building's daily choreography: a space illuminated not by technology, but by a timeless source of light that has brought people together for generations.



Figure 4.44
Workshop; Evening Illumination. Oil lamp task lighting and focused spotlights illuminate individual work surfaces - purposeful, direct, and minimal. Artificial light serves function without overwhelming the atmospheric quality established by daylight. The workspace remains productive into the evening on its own terms.



Figure 4.45
Warm low intensity lighting suspended in basket woven pendant lights, locally crafted, culturally resonant casts a soft ambient glow across the gallery interior. Art is lit gently from above and beside, maintaining the intimate quality of the morning raking light that defines the space by day. The pendant lights themselves become objects in the gallery - craft and light as one.

Figure 4.46
An evening gathering as the last light fades and firelight takes over. The building's solar choreography is complete, its passive systems at rest. People remain. The thesis argues that architecture should make people feel time and remember cultural tradition. The sun has set. The building has done its work. The people stay.

4

5

dusk

CONCLUSION

6

Contributions to Architecture

This thesis contributes a spatial framework for understanding architecture in hot climates as an atmospheric system rather than a façade-driven or glazing-dependent condition. It proposes that environmental performance can be embedded within architectural form through the controlled manipulation of openings, material depth, and structural separation.

The work also contributes a reading of light as an active design material, where illumination is not simply admitted or blocked, but composed through layered conditions of entry, reflection, and shadow. This shifts the role of daylight from a passive environmental factor to a generator of spatial hierarchy and experience. In addition, the project extends architectural discourse on night-time environments by treating artificial lighting as a continuation of spatial logic rather than a separate technical layer. This establishes a continuous atmospheric condition across day and night, where illumination systems maintain coherence rather than switching design languages after sunset.

Beyond the scale of the cultural campus itself, the project also operates as a demonstrative framework for how climate-responsive spatial strategies can be reinterpreted within contemporary Nigerian architecture more broadly, including at the domestic scale. While the thesis develops these ideas through a public cultural program, many of the environmental principles explored including calibrated daylight admission, shaded transitional spaces, courtyard organization, stack ventilation, thermal mass, and filtered apertures are intentionally legible, adaptable, and transferable beyond the institutional context.

In this sense, the proposal functions not only as a singular architectural intervention, but also as a proof of concept for re-engaging climatic and atmospheric design intelligence within everyday building practices in Nigeria. The project argues that environmental responsiveness need not rely on technologically intensive systems or fully sealed glazed environments, but can instead emerge through spatial organization, material logic, and a renewed attentiveness to the sun as a generative architectural force.

Finally, the thesis situates these strategies within a Nigerian context, reinforcing the relevance of climate-driven spatial intelligence and proposing how local environmental and cultural conditions can inform broader architectural methodologies.

Conclusion + Reflective note

This thesis explores how architecture can be shaped through a deep engagement with light, climate, and cultural memory within the context of northern Nigeria. Rather than treating environmental forces as constraints to be mitigated, the project positions sun, air, and atmosphere as primary design collaborators that actively generate spatial form, material decisions, and experiential qualities.

Through the investigation of vernacular precedents, climatic analysis, and spatial experimentation, the project develops a strategy where daylight is carefully choreographed rather than uniformly admitted. Light is filtered, redirected, and softened through calibrated apertures, perforated earth screens, roof separations, and controlled openings. The result is an architecture defined not by transparency, but by depth, shadow, and variation. The proposed building does not rely on conventional transparent façade glazing systems Polycarbonate is used selectively, primarily in skylight conditions, reinforcing the importance of zenithal light as a means of introducing controlled overhead illumination while maintaining the integrity of the façade as a climatic buffer.

Ventilation strategies operate in parallel with this light logic. Cross ventilation and stack-driven air movement are integrated into the spatial organization of the building, particularly through roof separation zones and elevated structural systems. These environmental systems are not treated as technical additions, but as generators of spatial atmosphere, shaping how spaces are experienced across time.

The project further extends its environmental logic into artificial lighting, which is understood as a continuation of architectural atmosphere beyond daylight hours. Rather than competing with natural light, artificial illumination reinforces spatial depth and cultural resonance through layered lighting conditions, including lantern-inspired exterior lighting, oil lamps, fire pits, task-based interior illumination, and patterned light effects created through perforated and textured surfaces. In this way, the building maintains continuity between day and night, ensuring that atmosphere is not dependent on sunlight alone.

Reflecting on the process, this thesis became an exploration of how architecture can operate simultaneously as environmental response, cultural expression, and atmospheric construction. Working through the complexities of climate, structure, and light reinforced the importance of systems thinking, where ventilation, daylight, materiality, and spatial organization are inseparable rather than independent concerns.

At a personal level, the project also became a means of engaging with questions of identity and representation. It offered an opportunity to work from a Nigerian perspective within a global academic setting, and to use architecture as a way of expressing the richness of climate, tradition, and spatial culture in that context. This positionality shaped both the conceptual direction and the design outcomes of the thesis.

Ultimately, the work suggests that architecture in extreme climates is not defined by resistance to environmental forces, but by their careful orchestration. Light becomes material, air becomes structure, and atmosphere becomes the primary medium through which space is understood.



Figure 4.47
The west facing outdoor pavilion at the building's edge - fabric shade, informal gathering, filtered light. Architecture as backdrop rather than monument - creating conditions for human community rather than demanding attention.



Figure 4.48
Children play in the open ground adjacent to the building. The CEB facade marked with cultural Dagi knot ornamentation sits quietly in the background - earthen, textured, grounded in the culture and geology of Kano. A building that belongs to the people who live beside it

Figure 4.49
The Social and Climatic Heart; Radial beams filter the Kano sun into dappled shifting patterns across the gathering spaces below. The shadow pattern marks the time of day, the courtyard as sundial, the building as clock. Vernacular compound intelligence recovered and made contemporary.

AID Statement:

Artificial Intelligence Tools: Gemini, Claude, Luw.ai, and ChatGpt; Writing – Review & Editing: The revision and editing of the manuscript; Visualization: The creation of graphical representation of the data.

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