

**VERTICAL STUDIO—CAC.C**  
 SPRING 2009  
**PROJECT OKURASE**  
 team-taught with Ray Huff



**CLIENT GROUP:**

a joint venture of: the Nkabom Artists and Craftspeople (NGO), Ghana; the Gethsemani Circle of Friends (non-profit), Charleston; the Family Services Research Centre, Medical University of South Carolina



**CONSULTANTS:**

Applied Building Sciences, building forensics  
 DesignWorks LC, landscape architects  
 Water Missions International, 4SE structural engineers,  
 Department of Material Science & Engineering, Clemson University



**PROJECT:**

A collaborative effort by a consortium of non-profits, Project Okurase (founded 2006) was created to save the village of Okurase, Ghana: a population of 2500, 1300 of whom were children due to HIV/AIDS. The town had no toilets and no clean water; all water needs were supplied from an open stream that ran through town. Given a cultural tradition of drumming, drum- and brick-making are being developed as the economic engine for the community.



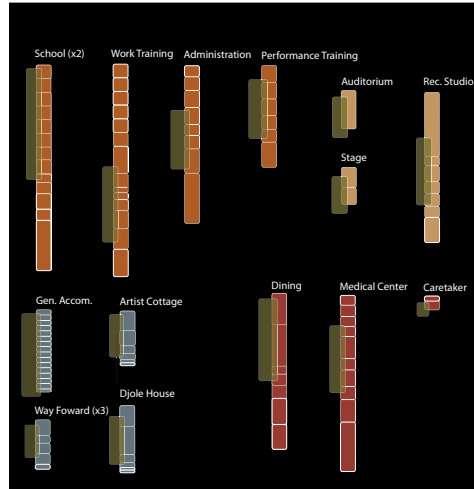
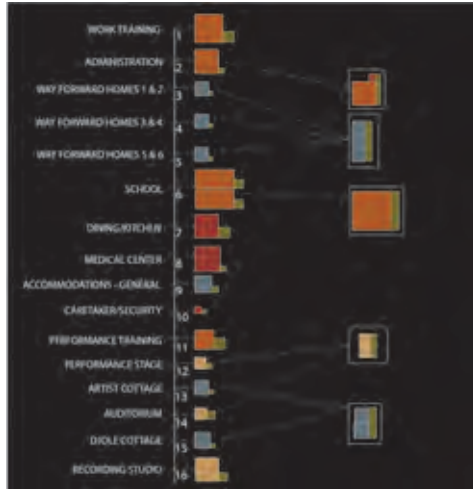
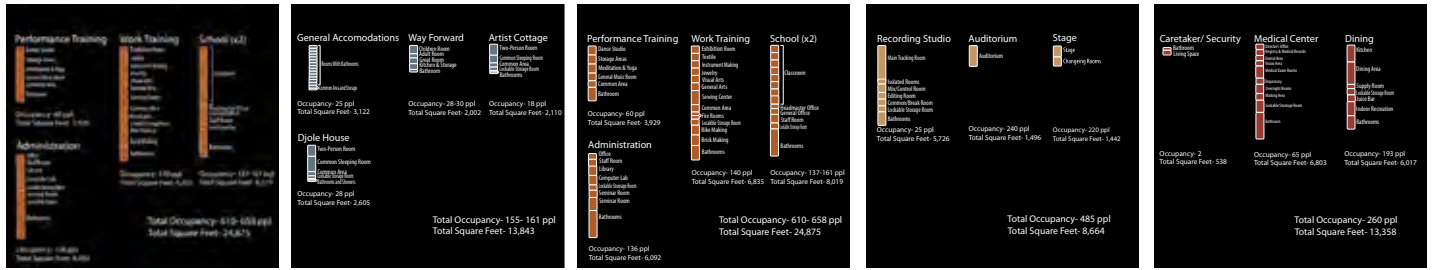
The CAC.C was invited to design the Nkabom Centre for Skills Training and Formal Education, a holistic demonstration village offering education, job training, health services, nutrition, and cultural support.



Programmed to be a sustainable center of sixteen buildings, the project was designed to fit on a star-shaped eight-acre field donated out of tribal lands by the Queen. The project was to serve as a sustainable model for similar centers throughout the continent. Building systems had to be primitive, with no air conditioning, limited electricity and plumbing, and constructed according to local building systems and techniques.

The CAC.C took the project through construction drawings; in late 2009 the client obtained a building permit.



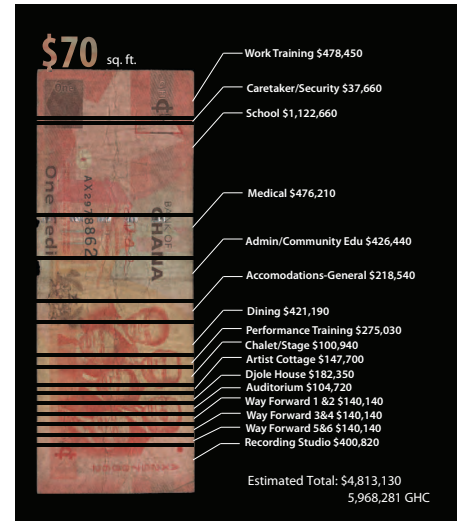
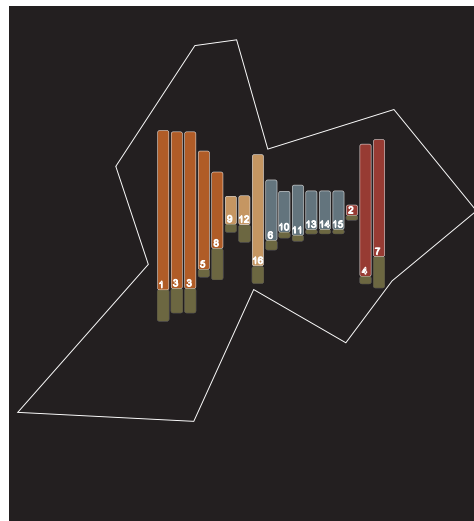
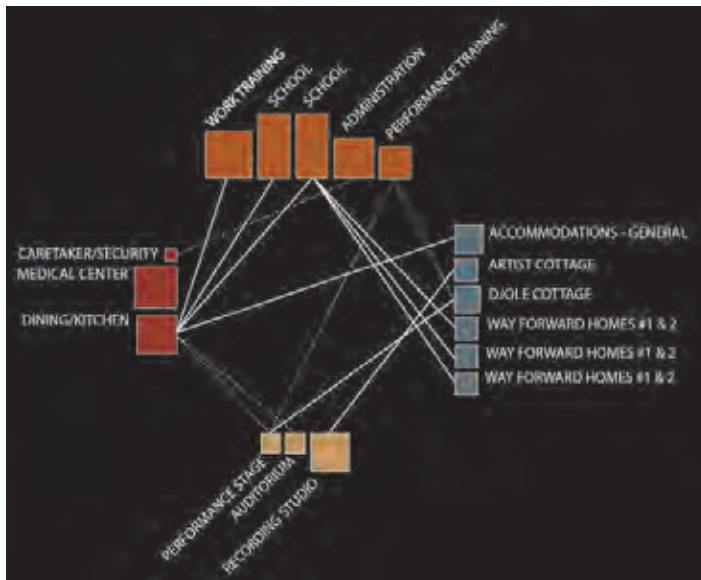


**PROGRAM**

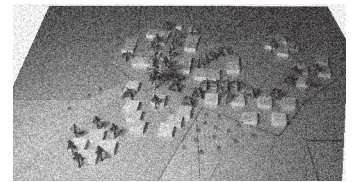
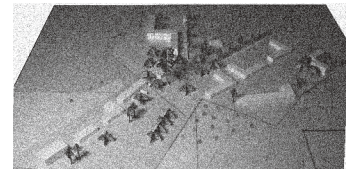
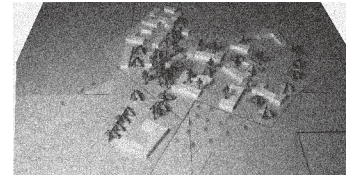
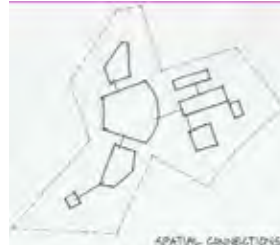
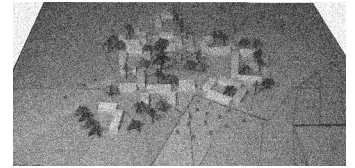
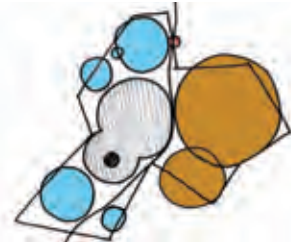
The program was for sixteen buildings of specified uses. The design team grouped uses, diagrammed relationships, calculated associated open spaces that could expand use and reduce built area, and created a phasing schedule.

We then studied the relationship of the program to the site, first in generic area and then in widths governed by the typical span of indigenous building.

Lastly, we created a building budget based on case studies of regional buildings meeting the clients' aspirations.







**URBAN DESIGN PRINCIPLES**

The settlement pattern was derived from indigenous Ghanaian towns, particularly the arrangement of public functions off a main thoroughfare with buildings grouped around courts.

Applied to the star-shaped site, the Centre was organized around two primary courtyards, one public and busy, the other quiet and contemplative.

Off these primary spaces, buildings were grouped around smaller courts according to function. A Commons, the central dining and recreation pavilion, occupies the seam between public and private courtyards.

The urban design principles that underwrite the plan are:

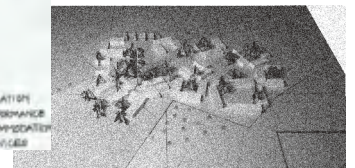
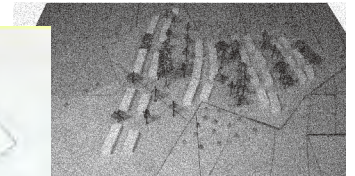
**POROUS/CONTROL:** The Centre should feel like an extension of the village but should allow control access through the site.

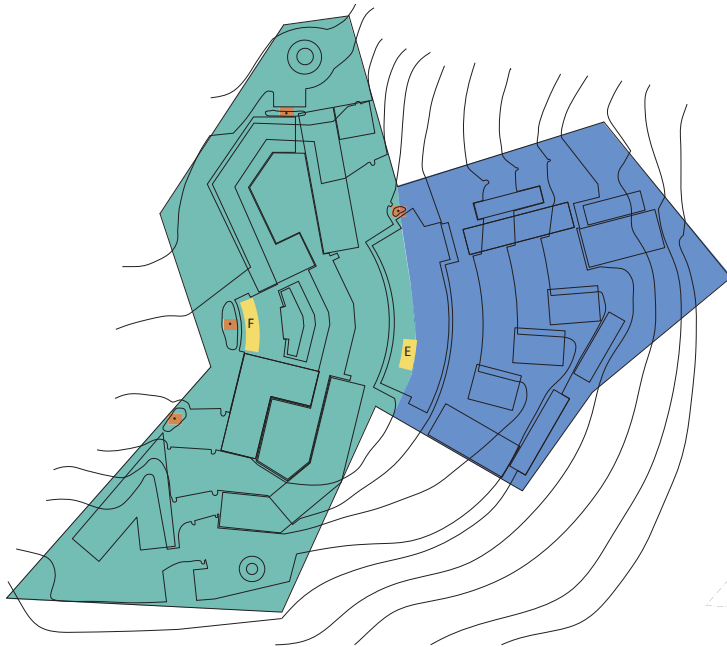
**COURTYARDS:** The fabric of the Centre should be a network of multi-centric courts, graduated for various shades of privacy vs. public use.

**VERNACULAR:** The Centre should be a creative adaptation of Ghanaian vernacular design and organization.

**WATER:** The Centre should celebrate water collection and storage, integrating it into the urban and architectural character.

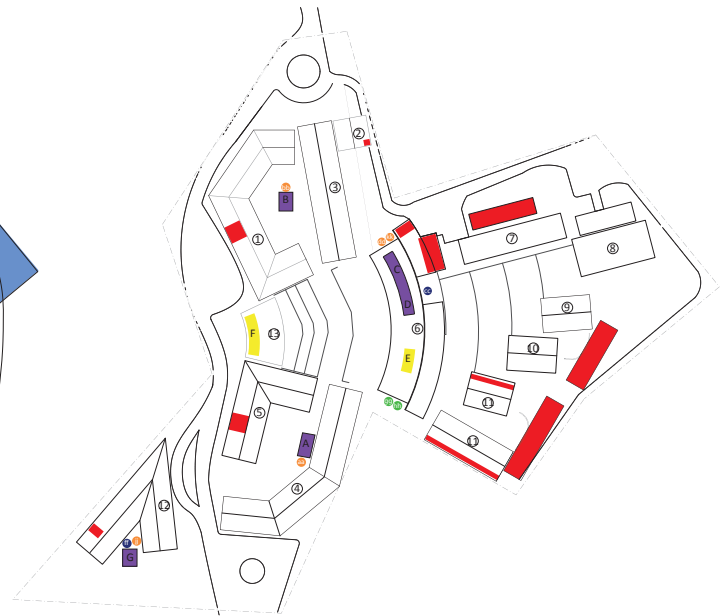
**SUSTAINABLE:** The Centre should be a model of sustainable design. It should be a demonstration and catalyst for similar developments in the country.





STORM WATER

- ZONE 1: COLLECTION TO CISTERN E
- ZONE 2: COLLECTION TO CISTERN F
- CULVERT
- GROUND WATER STORAGE



ROOF WATER

- ROOF WATER STORAGE
- GROUND WATER STORAGE
- WATER USE



FILTRATION

- QUALITY I -drinking water
- QUALITY II -grey water only: showers, sinks
- QUALITY III -irrigation/reserve



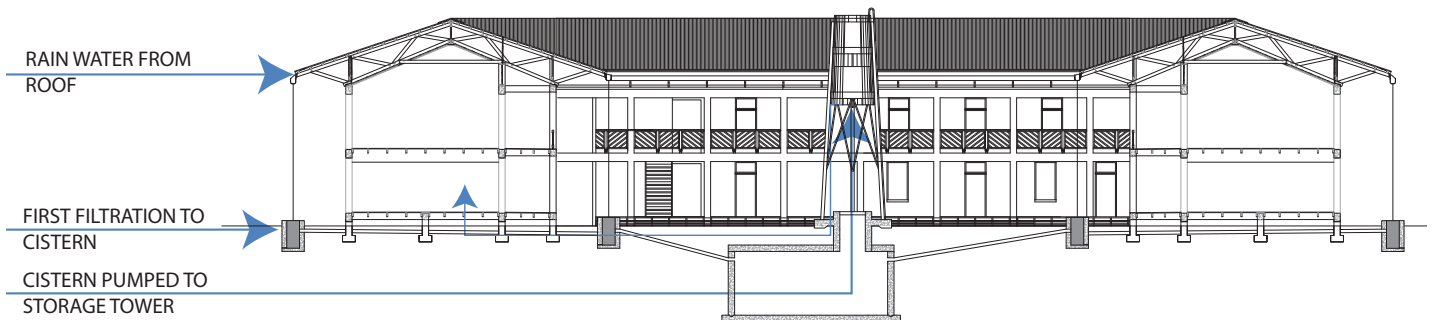
**WATER**

All water that falls on the site will be harvested—every drop.

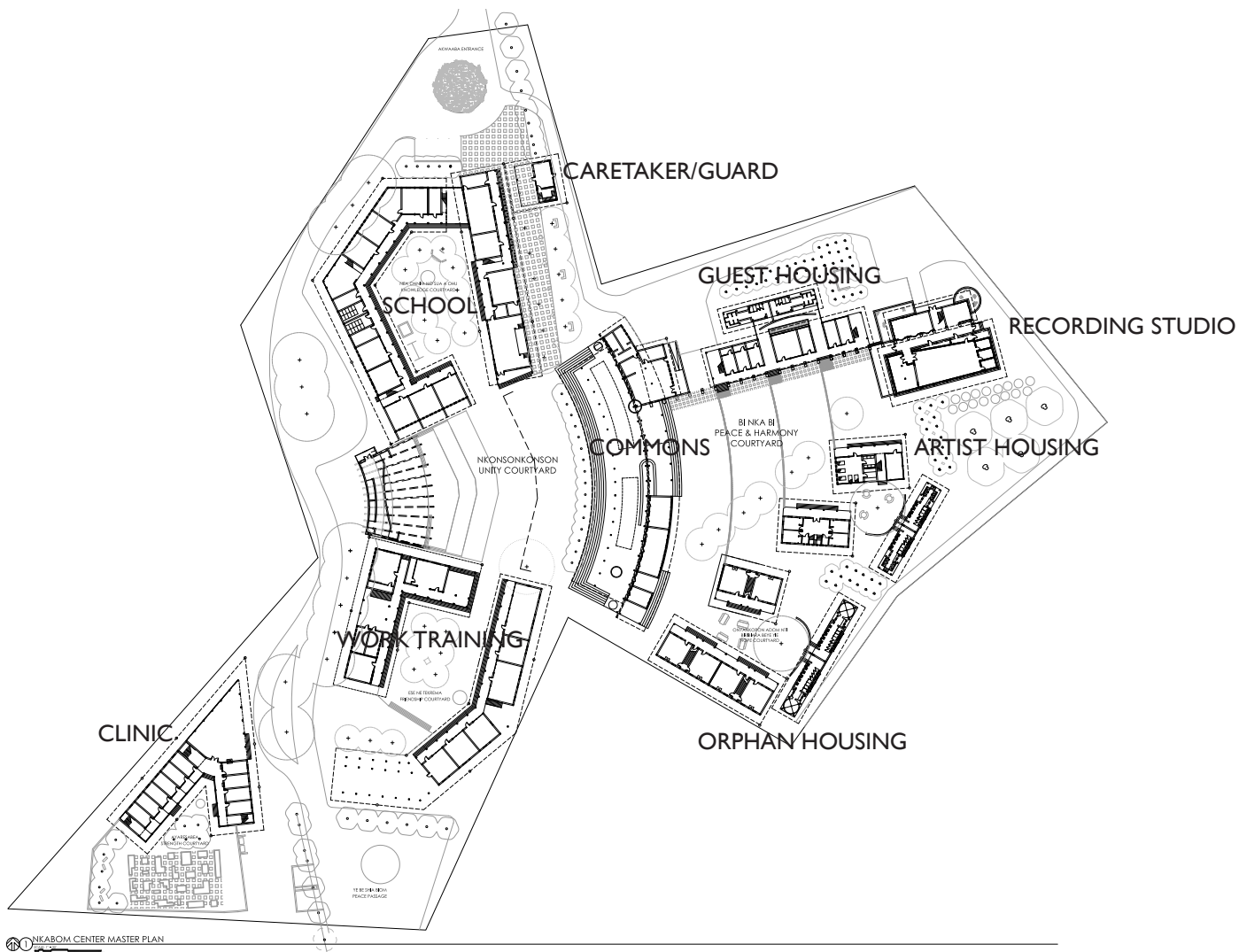
Water from roofs will be stored for drinking. It is carried from gutters, down chains, through filtration basins,

and collected in underground cisterns. Approximately one day's supply is pumped into small water towers strategically located around the secondary courts for way-finding. An aqueduct brings water from the large roofs of the General Accommodations building and Recording

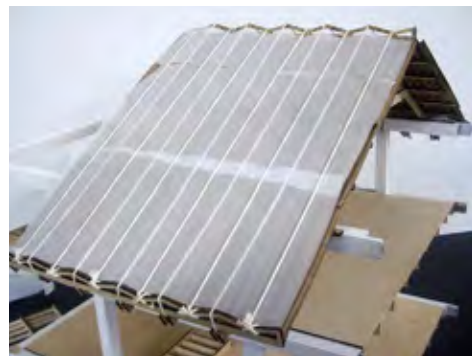
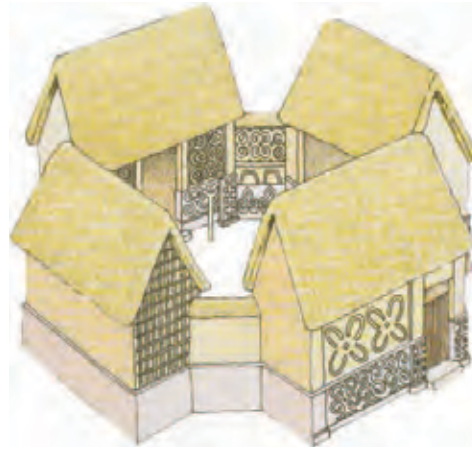
Studio to the Commons cistern. Run-off is stored for agricultural use in two large cisterns, one under the Commons and another under the outdoor theater.











### ARCHITECTURAL PRINCIPLES

The architecture was a hybrid of ancient and current building systems. Every building was two stories to optimize space per area cost; all were organized in traditional courtyards. Stucco over hand-made bricks was the construction type for solid walls, exterior and interior.

Against this traditional building approach, contemporary cast-in-place concrete (ubiquitous in this region) was used for a structural frame—wood of any size is rare. The scale and venting characteristics of shed structures were adapted. Floors were raised above grade for cooling, water collection, and erosion control.





### NATURAL COOLING

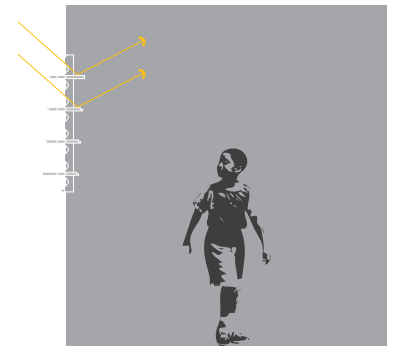
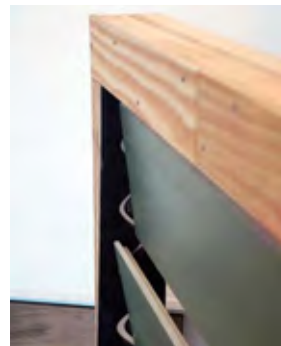
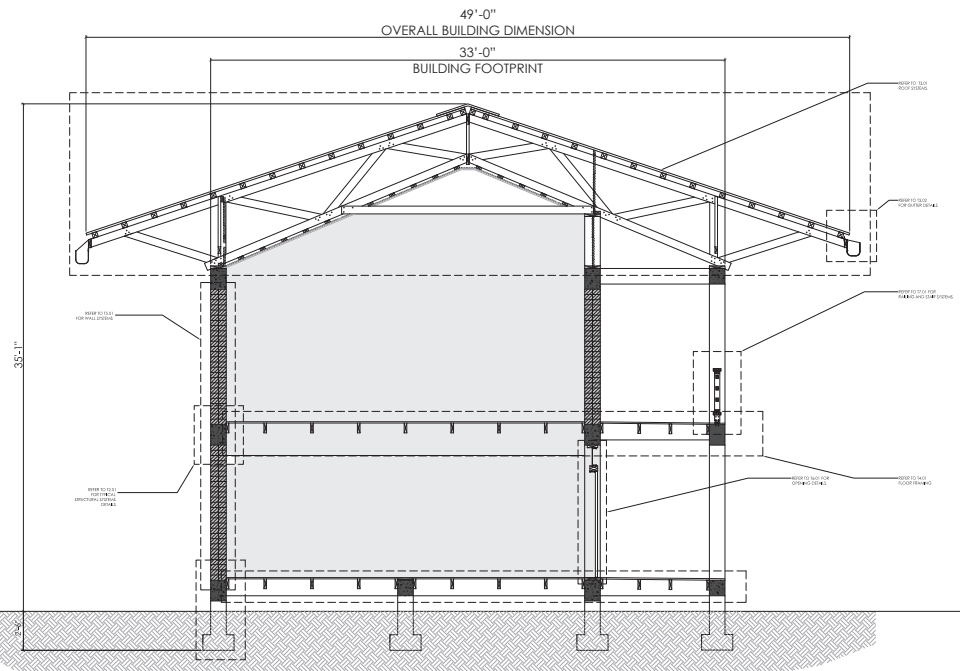
In a climate of severe heat, monsoons, and no air conditioning—not to mention a contemporary practice of tin roofs—natural environmental control became a goal for this demonstration centre. The only real innovation in our architectural proposal was a double ventilated roof to mitigate the extreme heat: an upper layer to stop the sun, an air space between to allow radiant heat to escape or be blown away before reaching the interior.

We tested several versions of the principle: a bamboo/fabric sheath, a deep ventilated joist, and finally a scissor-truss. In our final version, an upper weatherproof roof of tin (or clay tile, if budget allows) shades a ventilation zone that leads to a ridge vent. The interior ceiling could be stucco or fabric—tall ceilings allow some heat dissipation even within the enclosed cavity. Two-storey buildings optimize interior area-to-shell expense and minimize radiant transfer.

Walls are made of Okurase's hand-made laterite bricks, which cannot be exposed to weather. Extensive overhangs both shade the building and protect the stuccoed masonry.

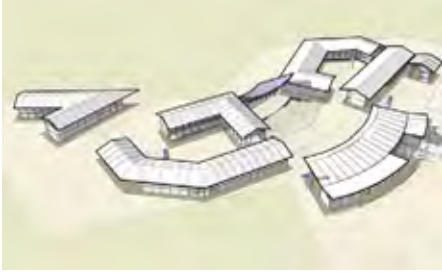
Building on a local tradition, window openings, and sometimes whole wall panels, are non-hardware operational wood louvers.

Power for task lighting, fans, computers, and other essential equipment will be solar.









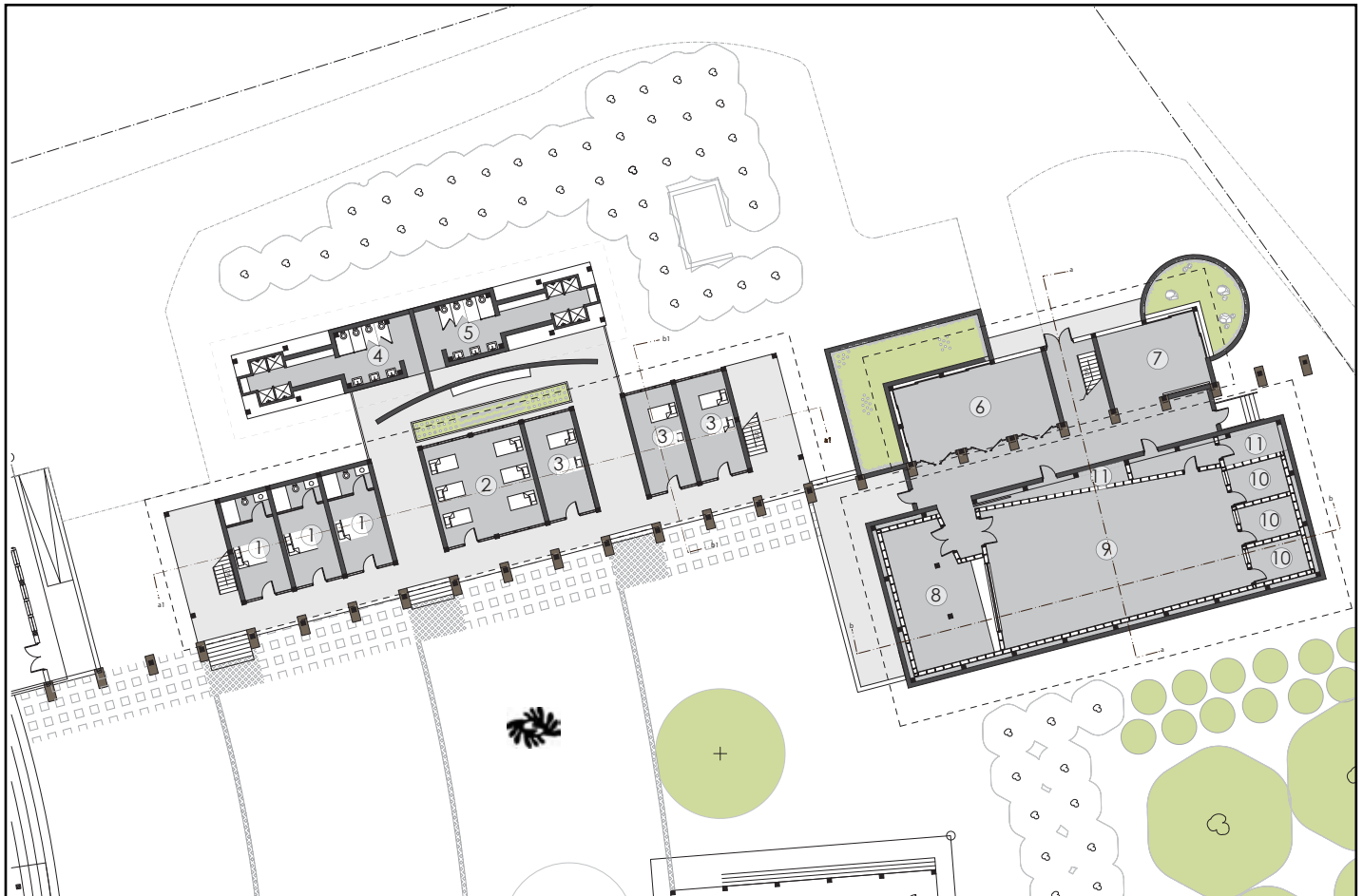
### PUBLIC COURT

This project institutionalizes a public path meanders that currently connects farm lands in the south to the village of Okurase to the north. A parallel vehicular route outside the complex to the west proves a thoroughfare while a service road to the east provides site additional access to composting toilets, garbage collection, and food service.

From the north, approaching visitors encounter a circle of trees before meeting a caretaker's station. The footpath through the Centre, passing between the Caretaker and the School, is controlled from this checkpoint and the Clinic to the south.

The NKONSONKONSON, or Unity Courtyard, is the public meeting place, hosting a market and serving as an amphitheater.







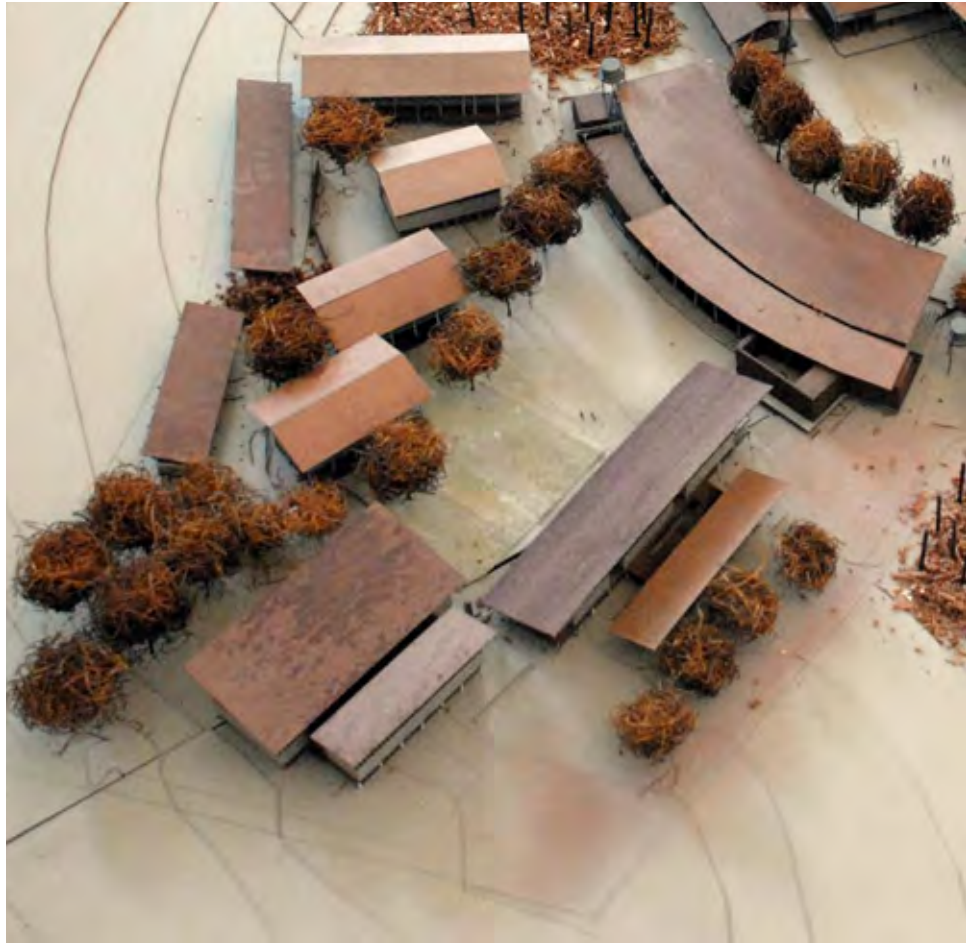


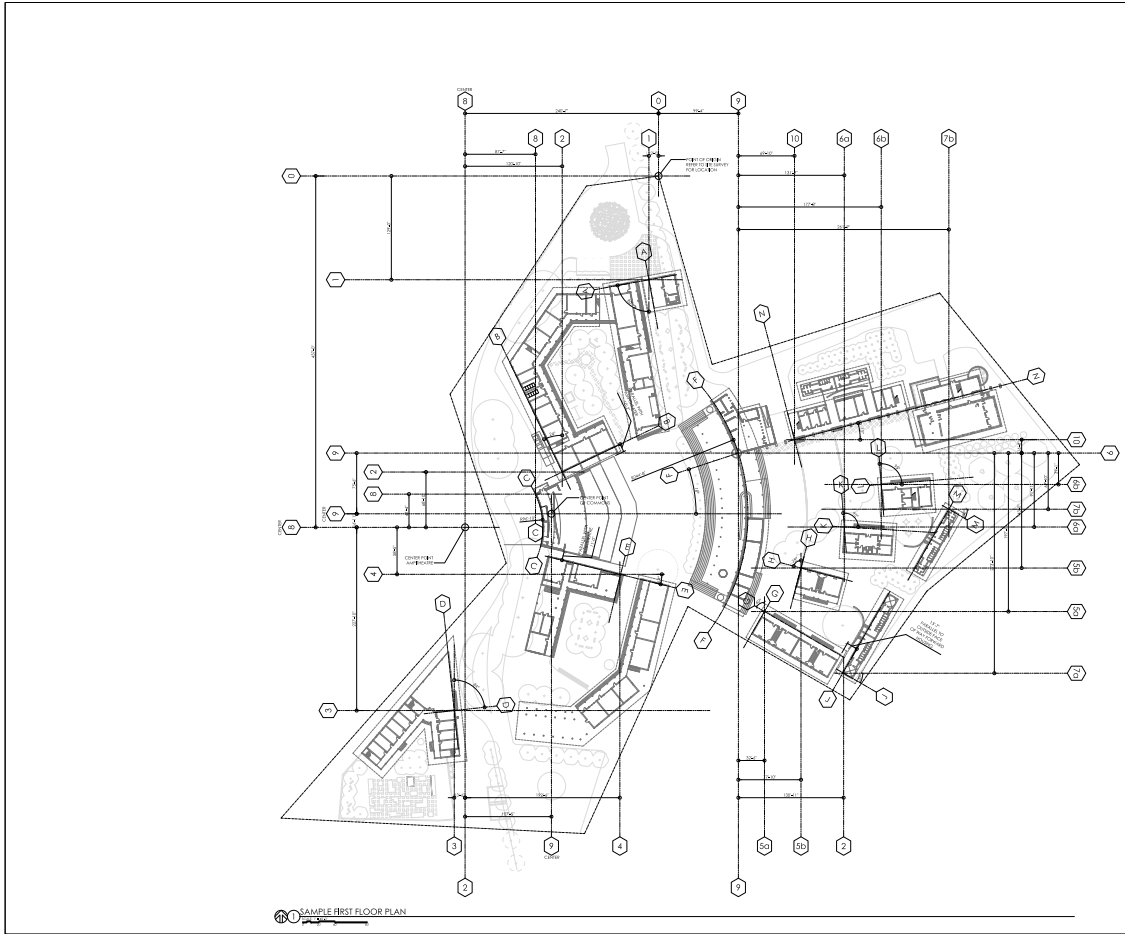
### PRIVATE COURT

The eastern part of the site was given to the BI NKA BI, or Peace & Harmony Court, because of its seclusion. Around this court are gathered all the living units and the recording studios—all things that require quiet.

The BI NKA BI has three stepping terraces down to the Commons; the northern edge is lined by an aqueduct that carries water from the Recording Studio and General Accommodations down to the Commons cistern.

The Centre will have three kinds of living facilities. Guest accommodations in the long northern building will allow the Centre to raise money by hosting cultural- and eco-tourism. A small building near the recording studio will house artists in residence. The smaller scale clusters of housing to the south are foster homes for orphans.





KEY NOTES

GENERAL NOTES

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.

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BUILDING LAYOUT PLAN  
L2.01

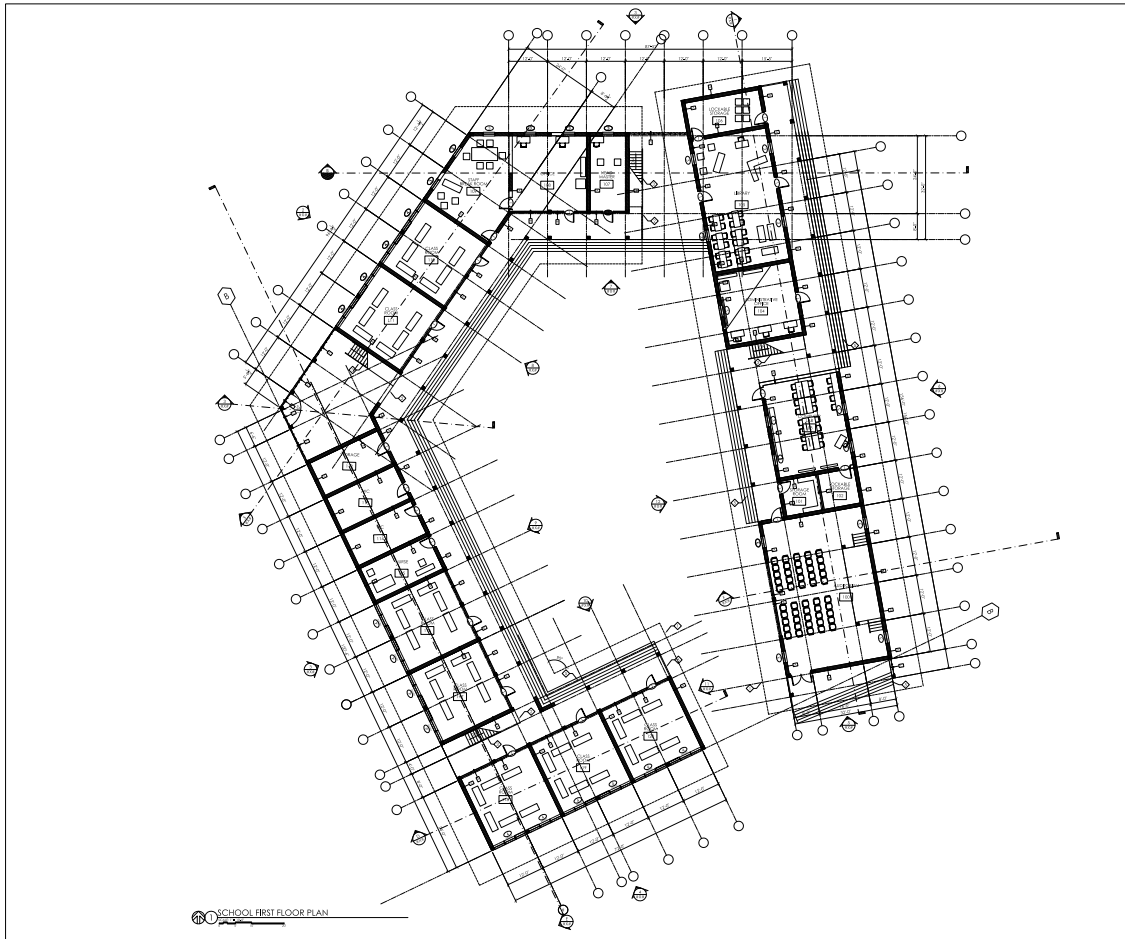
Project Kurase

NKABOM CENTER  
for the Integrated and Formed Education  
Oshana West Akribelli Oshana

CONSULTANT

SEAL

CAC



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KEY PLAN

KNOWLEDGE COURTYARD PLANS  
A2.01

Project Kurase

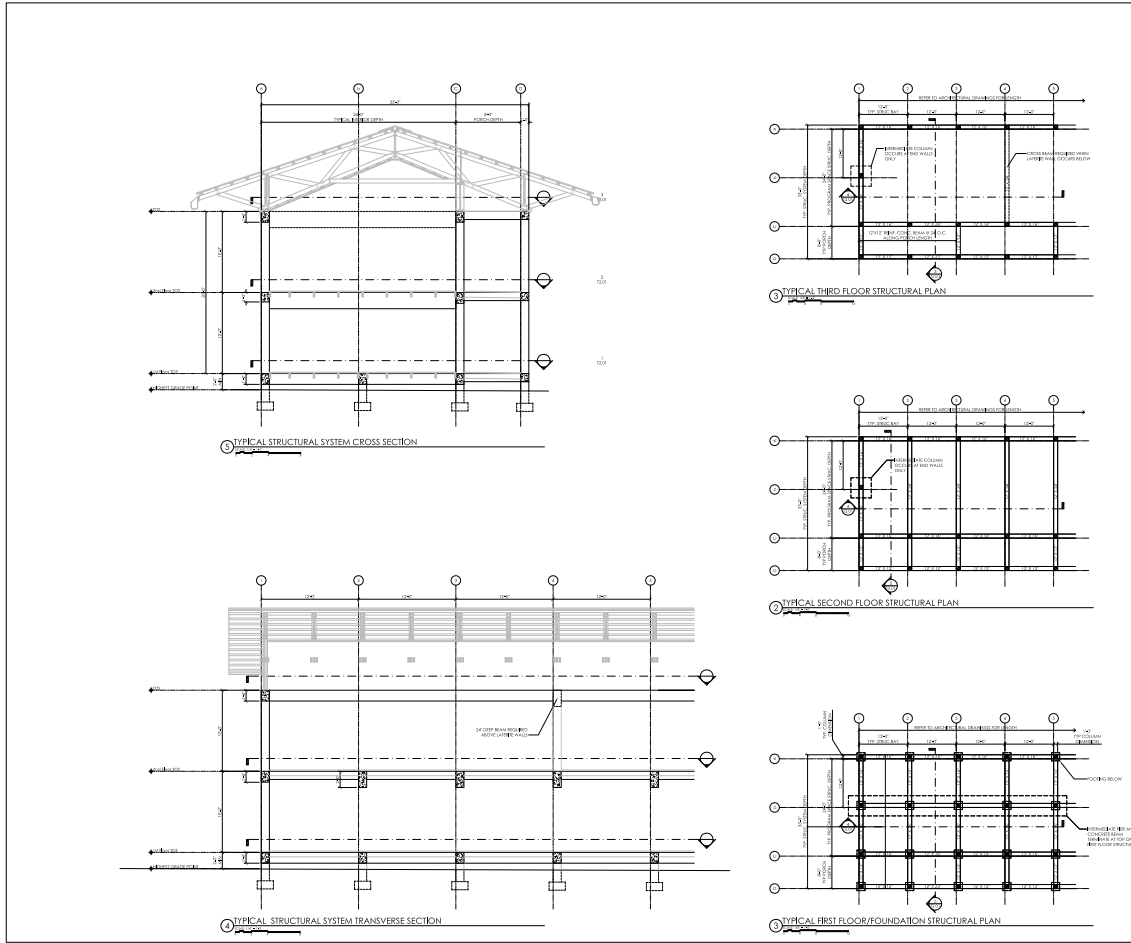
NKABOM CENTERS  
for the Integrated and Formed Education  
Oshana West Akribelli Oshana

CONSULTANT

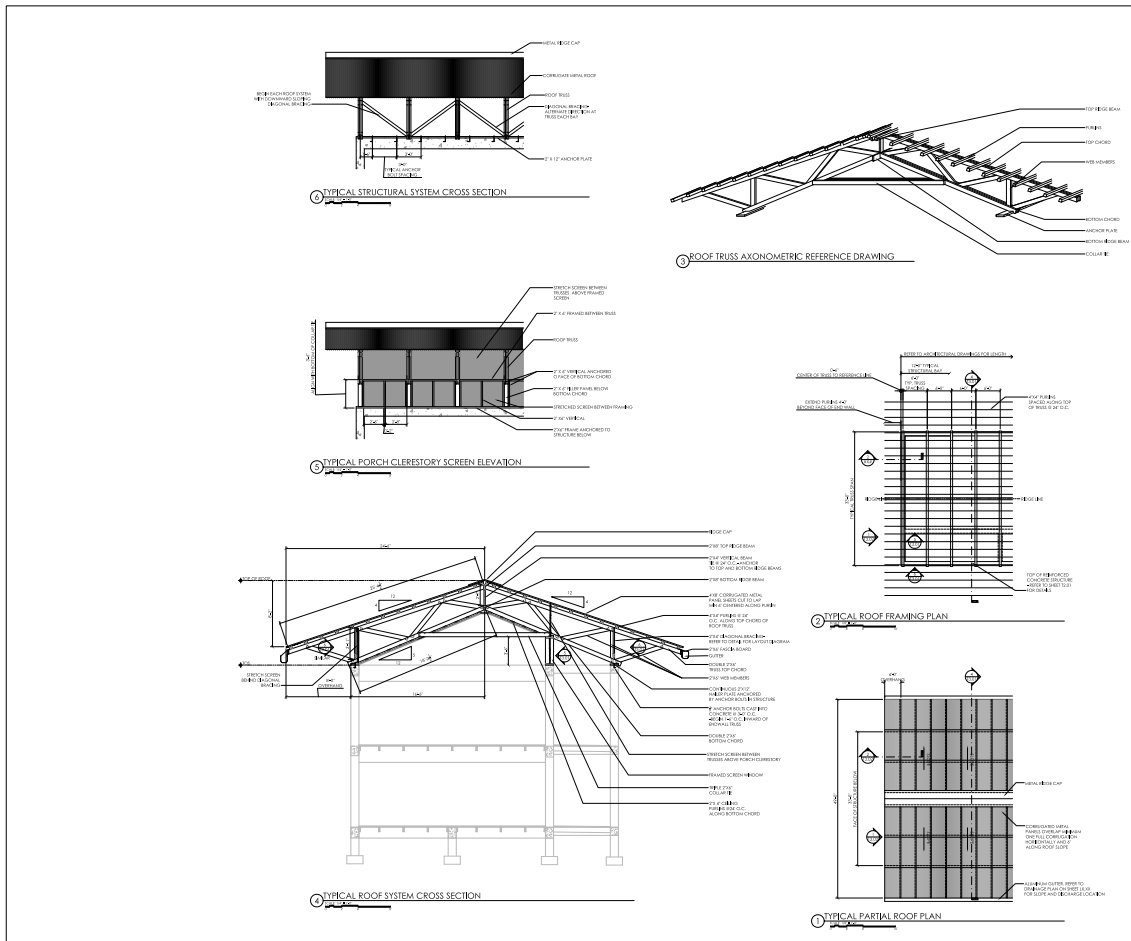
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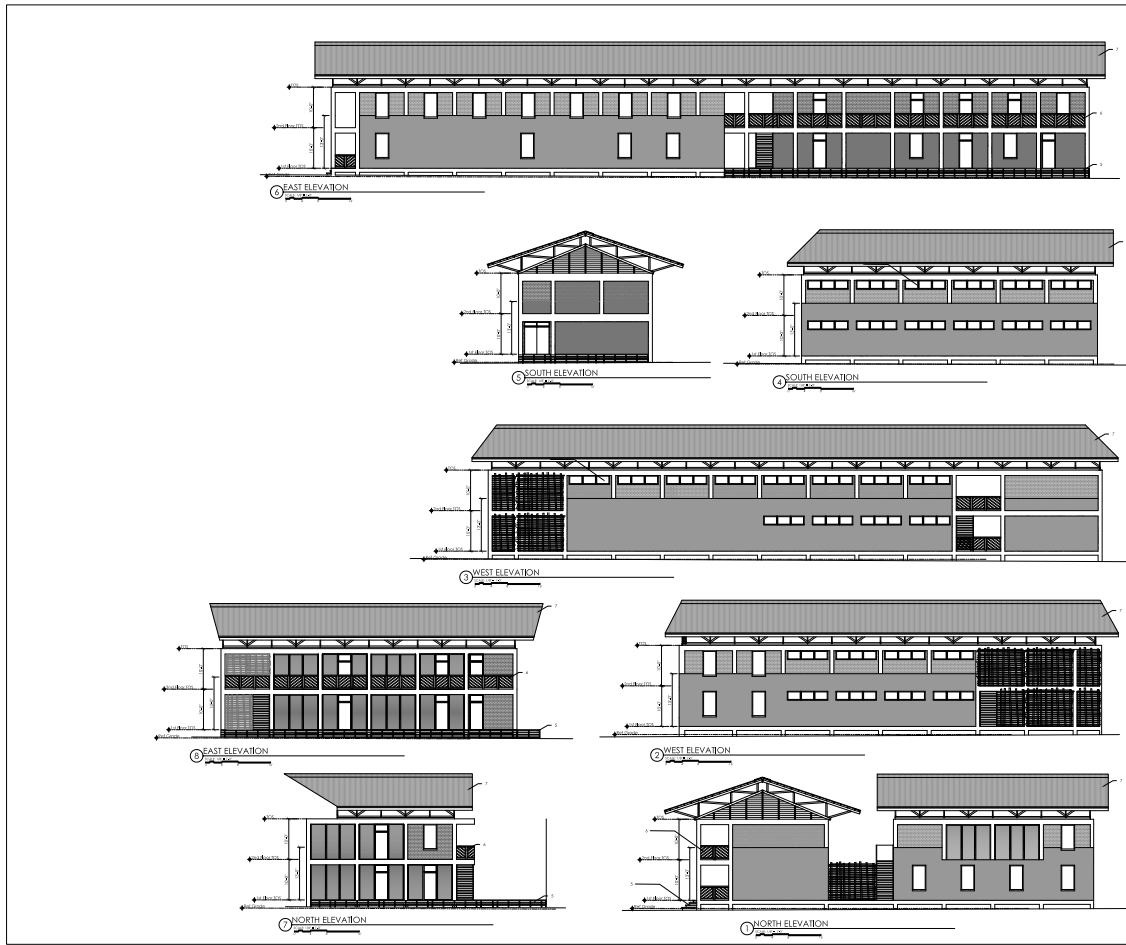




KEY NOTES	 CONSULTANT
GENERAL NOTES	
<ol style="list-style-type: none"> <li>1. STRUCTURAL SYSTEM</li> <li>2. FOUNDATION</li> <li>3. FIRST FLOOR</li> <li>4. SECOND FLOOR</li> <li>5. THIRD FLOOR</li> </ol>	 Seal
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<p>TYPICAL STRUCTURAL FRAMING</p> <p>T2.01</p>	 Seal



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<p>TYPICAL ROOF SYSTEM</p> <p>T3.01</p>	 Project Kurate



**KEY NOTES**

- 1. ROOF OVERHANG ABOVE
- 2. FINISH ABOVE
- 3. SIDE FINISH
- 4. FINISH ABOVE
- 5. FINISH ABOVE
- 6. FINISH ABOVE
- 7. CORRUGATED METAL PANEL ROOF

**GENERAL NOTES**

**KEY PLAN**

**CONSULTANT**

**SEAL**

**PROJECT** Knowledge Courtyard Elevations & Sections

**CLIENT** Nkabom Centers for the Arts

**ADDRESS** 1000 West 10th Street, Okla. City, OK 73106

**DATE** 10/2009

**SCALE** 1/8" = 1'-0"

**PROJECT #** A2.03



**KEY NOTES**

**GENERAL NOTES**

**KEY PLAN**

**CONSULTANT**

**SEAL**

**PROJECT** Artist Cottages Elevations & Sections

**CLIENT** Nkabom Centers for the Arts

**ADDRESS** 1000 West 10th Street, Okla. City, OK 73106

**DATE** 10/2009

**SCALE** 1/8" = 1'-0"

**PROJECT #** A6.02



<p>DJOLE COTTAGE SECOND FLOOR PLAN</p> <p>ARTIST'S COTTAGE SECOND FLOOR PLAN</p>	<p>DJOLE COTTAGE FIRST FLOOR PLAN</p> <p>ARTIST'S COTTAGE FIRST FLOOR PLAN</p>	<p>KEY NOTES</p>	<p>CONSULTANT</p>	<p>SEAL</p>	<p>GENERAL NOTES</p>	<p>KEY PLAN</p> <p>COTTAGES PLANS</p> <p>A6.01</p>
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<p>DJOLE SECTION</p>	<p>DJOLE EAST ELEVATION</p>	<p>DJOLE SOUTH ELEVATION</p>	<p>KEY NOTES</p>	<p>CONSULTANT</p>	<p>SEAL</p>	<p>GENERAL NOTES</p>	<p>KEY PLAN</p> <p>COTTAGES ELEVATIONS &amp; SECTIONS</p> <p>A6.02</p>
<p>DJOLE SECTION</p>	<p>DJOLE WEST ELEVATION</p>	<p>DJOLE NORTH ELEVATION</p>	<p>CONSULTANT</p>	<p>SEAL</p>	<p>GENERAL NOTES</p>	<p>KEY PLAN</p> <p>COTTAGES ELEVATIONS &amp; SECTIONS</p> <p>A6.02</p>	
<p>ARTIST'S COTTAGE SECTION</p>	<p>ARTIST'S COTTAGE EAST ELEVATION</p>	<p>ARTIST'S COTTAGE SOUTH ELEVATION</p>	<p>CONSULTANT</p>	<p>SEAL</p>	<p>GENERAL NOTES</p>	<p>KEY PLAN</p> <p>COTTAGES ELEVATIONS &amp; SECTIONS</p> <p>A6.02</p>	
<p>ARTIST'S COTTAGE SECTION</p>	<p>ARTIST'S COTTAGE WEST ELEVATION</p>	<p>ARTIST'S COTTAGE NORTH ELEVATION</p>	<p>CONSULTANT</p>	<p>SEAL</p>	<p>GENERAL NOTES</p>	<p>KEY PLAN</p> <p>COTTAGES ELEVATIONS &amp; SECTIONS</p> <p>A6.02</p>	

CAC CONSULTANTS ARCHITECTS

CONSULTANT

SEAL

NKABOM CENTER  
of the  
Nakabom Center  
Customer: Project Management - Chicago

Project Kurase

CAC CONSULTANTS ARCHITECTS

A6.02



### BRICK MAKING

The primary strategy for revitalizing the village has been manual brick-making. Using a borrowed machine, local villagers were trained in manufacturing bricks and were making 1000 unites/day (above). The architecture was designed to use this resource.

Subsequently, Clemson's Department of Material Science & Engineering analyzed the Okurase bricks and offered improvements to the mix. Meanwhile, the borrowed brick machine was reprocessed.

Starting FALL 2009, the CAC.C purchased plans for a CINVA RAM. We redesigned the machine, first to the Okurase brick module and then to make two units at a time. We are building four two-brick rams to restart Okurase's economic engine.

