URBAN ARCHITECTURE FOR RURAL EAST AFRICA: A Sustainable Solution

For Development Efforts in East Africa

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Order of Presentation

Introduction
Lessons Learned
Implementation of Knowledge
Past Experience
Current Project
Questions
Introduction

Knowledge Transfer on Their Terms

Not Ours
Collaboration Between

ACADEMIA

NGO

INDUSTRY
Introduction

Architectural Engineering
Architecture
City & Regional Planning
Construction Management
Landscape Architecture

The Mbesese Initiative
Lessons Learned

First Develop Relationships
First Discover the Culture
Second Determine Resources
Third UNDO Western Thinking
(labor vs machines)
Inquire and Problem Solve for
Long Term
Recognize You Are in for the
LONG Haul
Implement
Assess
Implementation of Knowledge Transfer

A Sustainable Solution
for
Urban Spaces
of
Rural Areas
Implementation of Knowledge Transfer

A Sustainable Solution

is defined as adaptation of technology to the resources (materials, skills, and culture) of a local population, and in such, allow the technology to be incorporated directly into the culture where betterment of life; self-empowerment; and growth can occur without continued outside influence. In the bush area of rural East Africa the resources and minimal (compared to the standards of a developed nation)
Implementation of Knowledge Transfer

A Sustainable Solution

adaptation  technology

resources  local

incorporated  culture

betterment of life; self-empowerment; growth

without continued outside influence
Implementation of Knowledge Transfer

Urban Spaces of Rural Areas
Past Experience - Kenya

Nyumbani

- Republic of Kenya
- Kiswahili word for “home”
- Est. 1992
- Children’s Home
- Diagnostic Laboratory
- Village Project
Past Experience - Kenya

Nyumbani Village
- Eastern Province
- AIDS Affected Community
- “Two Forgotten Generations”
- 1,200 Target Capacity
- 1,000 Acre Site
- Sustainability Model
Past Experience - Kenya

Nyumbani asked for specific help (find solutions)

Senior Project

• Cement Stabilized Soil Blocks
• Impact Loading
• Medical Supplies
Past Experience - Kenya

**DESIGN+ HOPE**
- Cal Poly Arch. Student: Matthew Ridenour & David Aine
- Cal Poly Arch. Eng. Students
- Church from O.C., Calif.
- Namanga, Kenya
- Rural Maasai people in Malai Tisa, Kenya (20,000 pop.)
- 2 hr. Walk to Nearest Clinic
Current Project - Tanzania

- United Republic of Tanzania
  - Kilimanjaro Region
  - District of Same

- Catholic Diocese of Same
  - Primary Schools
  - Secondary Schools
  - Medical Clinics
  - Orphanage
  - AIDS Education
Current Project - Tanzania

Where do you start?

Undoing what you know!
Current Project - Tanzania

• Establish Relationships
  • Western Ways don’t work.
    □ Schedule and Tasks
    □ Money and Materialism
  • Rural African Ways
    ▪ Trust and Friendship
    ▪ No clocks

• Determine Resources
  • Materials
  • Skill Sets
  • Lots of Labor
  • Little Machinery

• Discover the Culture
  • What is important?
  • What is the need?
  • What is success?
  • What is happiness?
Build a sustainable Polytechnic School

- To Serve
  - Local Area
    - Rec. Fields
    - Commerce
  - Extend Rural Area
    - All Religions
    - Non-Commuter
- To Demonstrate
  - We May Be Poor
  - But Look What We Can Accomplish
- To Educate
  - Source of Learning
  - Source of Pride
• **Degree Programs**

  - Accounting & Finance
  - Administration & Management
  - Agriculture Technology
  - Auto Mechanics
  - Computer & Electronic Repair
  - Construction Management
  - Development & Social Work
  - Hotel Management & Hospitality
  - Nursing
  - Teacher Certification

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• **Educate in Terms of Life in Rural East Africa**

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**Year 1 & 2**

**Relationships Defining and Understanding Culture**

**Resources**
The Same Polytechnic
Design Team

- Cal Poly at SLO
- Arup
Design Goals

- Performance
  - Serviceability
  - Life Safety
  - Thermal Comfort
  - Energy Efficiency
  - Energy Independence

- Constructability
- Affordability
- Replication Model
Design Challenges

- Available Building Materials
  - Masonry units
  - Cement
  - Aggregate
  - Reinforcement
  - Steel
  - Timber
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Design Challenges

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Design Challenges

• Work Force
  • Reasonable skill level
  • Available tools
  • Labor cost
Design Challenges

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Design Challenges

• Climate
  • Arid/Semi-Arid Land
  • Dry & Rainy Seasons
  • High Temperatures
  • Humid Conditions
  • Solar Radiation
Proposed Systems

- Natural Ventilation – Thermal Comfort
Proposed Systems

• Natural Ventilation – Thermal Comfort
• **Thermal Mass – Thermal Comfort**

![Graph showing the comparison between external temperature, thermal mass (cooling), and no thermal mass. The graph illustrates how thermal mass can help maintain a more comfortable internal temperature despite fluctuations in external temperature.](image-url)
Proposed Systems

Daylight – Energy Efficiency

Location: Yol
Latitude = 33.3
Sun-time

Diagram showing the position of the sun at different times of the year and different months.
Proposed Systems

Confined Masonry

- To prevent the appearance of air pockets in columns, use a concrete mix with less stone in the first batch.
- Vibrate concrete with a long rod to prevent air pockets.
- Lightly hit the form externally with a rubber hammer.
- Use braces to hold the forms.
- Use a plumbbob to verify that the formwork is vertical.
Forward Progress

• Conceptual Design
  • Space programming
  • Site survey
  • Master planning
  • Design narratives
Questions