

Innovative Roof System for Low-cost Housing



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Low-cost Housing and Climate

- Cost of construction of good insulation
 - Most systems are too hot in summer and too cold in winter
 - Unaffordable for low-income households to use air-conditioning and space heating
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- Ideally a house that is cool in summer and warm in winter



Vaulted Masonry Structures

Used in many ancient buildings

- Pantheon in Rome
- Many structures in the Middle East
- Mosques in North Africa
- Traditional building in North Africa

These structures use baked brick or earth construction



Stabilised Earth

Locally sourced soil with a cement or lime stabiliser

Uses much less cement than cement bricks

Cement and fired bricks use excessive energy in their manufacture, so unsustainable



Stabilised Earth

Mapungubwe Interpretation Centre: winner of the World Architectural Festival Building of the Year 2009



Wits Prototype

Double vault roof of stabilised earth

- Monitoring of indoor and outdoor temperature over the last few years
- Need for more sophisticated thermal modelling
 - Heat flux through roofs
 - Effect of ventilation



Data Available

- Surface albedo
- Seasonal variation
- Ventilation
- Effect of insulation

(see links to published papers)



Visiting the Prototype

This is located on West Campus near the Wits Club

Familiarise yourselves with the layout

Get a sense of the thermal comfort

Benefits of MISG study

- Strong motivation for the use of stabilised earth vaults for low-cost housing
- Improve our understanding of the thermal performance of the vaulted roofs
- Facilitate improvements to the layout



Questions?



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