

Mbesese Build: An Experimental Experience

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Abstract

The Same' Polytechnic College is a proposed vocational training institution in the Kilimanjaro Region of the United Republic of Tanzania to provide supplemental and diversified tertiary educational opportunities which increase human capital and reduce the severe levels of poverty that are endemic in the region. The college is the pilot project for the Mbesese Initiative for Sustainable Design (MISD). MISD has partnered with design firms and Cal Poly-SLO to develop a framework for campus development. The Cal Poly team established overarching planning principles and design goals for buildings and related infrastructure required to support a projected enrollment of 1,200 students.

The project provided a platform for collaboration between faculty, students, and design professionals. The campus proposal encompasses architecture and planning, as well as, a variety of engineering disciplines such as mechanical, electrical, structural, water, and transportation. Students researched an array of topics that are requisite to building; energy usage and generation, water conservation and reclamation, natural ventilation and thermal comfort, natural day lighting and solar exposure, construction materials and structural systems, pedestrian and vehicular traffic patterns, as well as, site access and maintenance. Additionally, the masterplan recommendations are based on computational analysis and design, results from experiments conducted at Cal Poly, and valuable feedback from the design professionals. The students

then developed building strategies for implementing the aforementioned concepts, while learning how those design issues are intertwined.

In 2018, students, faculty, and MISD volunteers constructed a micro structure in Tanzania based on the master plan recommendations. Results from block wall testing, wind tunnel/natural ventilation studies, and a thermal comfort study informed the design and construction methods used to build the structure. The building process allowed the team to better understand how cultural, environmental, and technological considerations influence design and building in developing areas. The linkage between experimental research, design, and construction is a hallmark for the project and has served as a selling point for instituting change in building practices in the rural town where the project will be constructed.

Keywords: Interdisciplinary, Materials and Construction, Structures, Energy and Systems, Design-Build, Computational Design

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