Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Daniel P. Halman
Student number	4348036

Studio		
Name / Theme	AR3AE100 Architectural Engineering	
Main mentor	Thomas Offermans	Architecture
Second mentor	Paddy Tomesen	Building Technology
Argumentation of choice of the studio	My fascinations in Architecture lie with: biophilic design, bioclimatic design, ZEB, culture, participatory design, construction techniques, bio-based materials, farming construction materials, vernacular materials, artistic detailing and craftsmanship. This studio is the perfect environment to develop skills with these fascinations as it promotes the experimentation with materials and .	

Graduation project	
Title of the graduation project	Teranga
Goal	
Location:	Kholpa, Senegal
The posed problem,	Urban expansion in the Dakar region is displacing and excluding low income groups through neo-liberal urban restructuring developments. Urban planning styles are displacing these groups by targeting middle and high income groups through market-driven development. Carbon intensive materials such as concrete and steel are the predominant materials used for this expansion which will lead to large scale emissions in the coming decennia.

research questions and	The research in my graduation will consist of four scales: The urban plan (P2) - *How can village compounds inform the housing typology of urbanizing areas in Dakar?* Individual buildings (P3) - *How can the building demand as little energy as possible, while maintaining indoor climate comfort?* Material (P3) - *How can materials be grown and sourced in the direct environment?*
design assignment in which these result.	

Urban scale:
The location was chosen in a village where the government is planning to build a satellite city adjacent to Dakar. The local traditional style of spatial planning is not being considered much in these developments. Therefore this design is seeking a midway between the modernizing efforts of the government and the traditional lifestyle of the local population living in Kholpa.
Building scale:
A site visit to the village was taken from 1 – 26 December. My approach to the program, was to explain my expertise and thereafter asking what they would like to use my design skill set for. Their conclusion was housing and a sports stadium.
Material scale:
The design will primarily be focused on materiality. Rammed earth, bamboo and African reed are chosen as primary materials to start with as they can be sourced locally in the design location. My ambition is to work with biologists who I've met during my minor in Biodiversity at Leiden U, to find a way to reverse engineer cement through biological processes. This research will seek to find ways to produce lime and use other industrial waste products to produce cement (has already been proven). Furthermore, my design will focus on the formwork used for rammed earth. Much has been learned through physical tests made in Senegal where the locals of Kholpa and I built a 1:1 15 by 3 meter wall with an entrance port as a first physical test and encounter with the material during the site visit to Kholpa.

Process

Method description

Urban scale:
Literature review on rural social networks, mapping through satellite imagery, in situ observation, shadowing of individuals, surveys and interviews.
Building scale:
Literature review, research by design, case studies and data analysis.
Material scale:
Literature review, 1:1 testing, lab research, construction testing, formwork design testing and probably more.

Literature and general practical preference

Urban scale:

- Netto, (2017). *The social fabric of cities*. New York: Routledge.
- UN reports
- Government reports
- Review papers on African urban growth over the past century.

Building scale:

- Recently built rammed earth projects
- Historic rammed earth buildings
- Building physics

Material scale:

- Personal experience building with rammed earth.
- Literature on bamboo & Reed species distributions in Senegal & Africa
- The geological studies to determine available rocks in Senegal fit for construction.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?
   - This graduation topic relates to the studio through the design with materials with low or negative carbon emissions and bioclimatic design. In relation to the master program, the research seeks to find the genius loci of a place and design architecture in accordance with that place.
2. What is the relevance of your graduation work in the larger social, professional and scientific framework.
   - The west has a long track record in carbon emissions which it is now trying to mitigate through the development of circular economies. Developing countries such as Senegal are currently following similar tracks as the west did in its own development which will lead to additional large scale carbon emissions if this method persists. We all live on one planet. We therefore need to develop a circular planet, not individual economies. This graduation project seeks to find a strategy to create a circular living style which adheres to the culture in Senegal and thereby allows for good standards of living, while making the best of the environment in terms of people and nature.