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	Gaspard Marteau
Student number	6048382

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Dafne Swank	Design
Second mentor	Paddy Tomesen	Building Technology
Third mentor	Mo Smit	Research
Argumentation of choice of the studio	I have a strong technical fascination with circular strategies to meet the urgent needs concerning climate change and sustainability. The Architectural Engineering Graduation Studio is the most advanced and innovative in exploring material solutions. It is also a technical studio which I believe is highly relevant in the path of becoming an architect.	

Graduation project	
Title of the graduation project	From water to structure: Reconnecting floating architecture and aquatic ecosystems through regenerative design
Goal	
Location:	Port of Amsterdam, the Netherlands
The posed problem,	Industrial ports regeneration projects realised to densify cities offer opportunities for sustainable urban development, particularly in addressing the environmental damages caused by polluting industries. Renaturation to restore local ecosystems can be integrated into the redevelopment strategies. Additionally, former dock areas present the potential for implementing flood-proof floating buildings. Yet, current construction methods of floating structures reliant on concrete and steel are unsustainable and contribute significantly to global CO2 emissions. A shift toward circular construction using renewable bio-based materials is essential. There is a possibility to combine local material harvest with the regeneration of the aquatic ecosystems. However, the topic of bio-based materials sourced from aquatic environments suitable for floating

	buildings remains largely unexplored. This highlights the need for a holistic approach to integrating locally sourced materials into a floating building typology.
research questions and	How can bio-based materials sourced from local aquatic ecosystems be used to build a circular floating building? Sub-questions: Q1. What are the material requirements of a floating building? Q2. Which bio-based materials can be sourced from riverine, estuarine and wetland ecosystems? Q3. How are bio-based materials used in vernacular floating buildings? Q4. What technical innovations are emerging in the use of aquatic bio-based materials? Q5. How can bio-based materials sourced from aquatic environments be used in a floating building? Q6. What are the life-cycle considerations for bio-based materials in a floating building?
design assignment in which these result.	How can bio-based materials sourced from local aquatic ecosystems be integrated in the design of a floating public building that positively impacts the environment and the future communities of Amsterdam's Haven Stad?

The graduation project focuses on designing a circular floating building with bio-based materials sourced from the local aquatic ecosystems of Amsterdam's Haven Stad area. The hypothesis is that most of the floating building elements can be built using locally grown materials. Through the regenerative material sourcing for its construction and maintenance needs, the design will contribute to depolluting the waterway and restoring its ecosystems. Implemented on the water surface of one of the port's basins, the design of a cultural and community center will aim to foster social and cultural engagement for the communities of this future dense district. This function will be the opportunity to experiment the application of such materials on a larger scale than individual floating houses.

Process

Method description

The research methodology is based on Stewart Brand's shearing layers concept, adapted to the requirements of a floating building to be used as a framework for the research and the design. In addition to the use of literature studies and case studies, five semi-structured interviews were conducted to get additional knowledge and insights from experts and professionals. The design will base itself on the research output that combines the possible applications of local materials for each layer of the building. Additional choices will be made according to other influencing parameters such as the program and the design concepts.

Literature and general practical references

Islam, S. & Moatazed-Keivani, D. (2023). Wetlands and Construction: An opportunity for Berlin-Brandenburg. Material Cultures + Bauhaus Earth, in collaboration with Experimental. https://experimental-foundation.org/wp-content/uploads/2024/04/be-fellow-material-cultures-wetlands-and-construction-report-en.pdf

Material cultures. (2022). Material Reform. Mack Books.

Nordic Blue Building Alliance & Arup (2024). Marine Biobased Building Materials Technical Playbook. Nordic Innovation. https://www.arup.com/globalassets/downloads/insights/m/marine-biobased-building-materials.pdf

Smit, M. et al. (2022). Bouwtuin Foundation, Towards a New Regional Architecture. Regional Building Manual. https://bouwtuin.nl/onderzoek-ontwikkeling/

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)?

The topic of floating buildings and bio-based materials are inscribed in a technical approach to architecture aligning with the methods and ambitions of the Architectural Engineering studio. The practical design guide resulting from the research and the implementation in the project act together as key theoretical examples to guide the future works in that field.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

The project aims to democratize the use of bio-based materials for the entirety of a floating building's structure by creating knowledge and a proof of concept. It proposes a new comprehensive framework guiding the application of locally sourced bio-based materials in a floating building. This is relevant for stakeholders involved in the construction sector and especially architects, to accompany them in the current development of the floating typology with a new circular and systemic approach. The regenerative focus of the project has a wider social impact on rethinking the way (floating) cities are built and maintained.