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	**Femke Groot**
Student number	4550862

Studio		
Name / Theme	Architectural Engineering / Harvest	
Main mentor	Annebregje Snijders Jos de Krieger	Architecture Research Paper
Second mentor	Ger Warries	Building technology
Argumentation of choice of the studio	The studio Architectural Engineering is in my opinion a good way to complete my education in architecture. It covers a wide scope of topics including sustainable, ecological, societal and technical challenges. Extreme scenarios and out-of-the-box thinking are encouraged, but the results are still realistic and practical. I admire the strong integration of building technology, research and design within the studio. I would like to design architecture with high sustainability goals and a strong concept through all scales. Furthermore, this studio has a lot of possibilities for transformation of the existing build environment. I think this studio offers a good balance between freedom and structure within the graduation project and will challenge me.	

Graduation project	
Title of the graduation project	**De Centrale** *(Zwembad en Datacenter bij de oude hemwegcentrale)*
Goal	
Location:	West Haven Amsterdam
The posed problem,	- Industry and city have grown apart over the years, due to health hazards and conflicting needs. The lack of space for growth demands for a symbiosis between industry and city program in a sustainable and future oriented way.

	- The municipality of Amsterdam and Port company want to realize an ‘’Energyhub’’ but have no idea what this would look like. - The threat of the growing datacentre sector (within the city and countryside) architecturally, spatially and environmentally. The port of Amsterdam wants to realize 500MW capacity of datacentres.
research questions and	How can connection between flows of a datacentre and public swimming pool increase sustainability and restore the relationship between port and city? The used method is Metabolic Flux Analysis, focusing on heat-flows.
design assignment in which these result.	An example of a decentralized datacentre/microgrid in a public building; an indoor swimming pool heated by a datacenter in the same building. Located at the boundary of the West Port and Havenstad. This is a start of a ‘new industry’.

[This should be formulated in such a way that the graduation project can answer these questions.
The definition of the problem has to be significant to a clearly defined area of research and design.]

Process

Method description

Research:

- Metabolic Flux Analysis.
- Interviews with experts.
- In depth research to the cooling and heating system of pools and datacenters.
- Analysis of 3 reference datacentres.
- Creating a calculation model to predict the required size of the datacentre for the design.

Design:

- Modelling in different scales.
- Site visits (West Port, Hemwegcentrale, Schakelgebouw, reference indoor swimming pools).
- Reference studies.
- Sketching, computer modelling, collages etc.

Literature and general practical preference

Literature for the research paper can be found in the chapter References. During the design research, reference projects have been used. These consist of pool references (Freeman School in Ashtead from HawkinsBrown, Noorderparkbad from Cie architecten and Païcherou Aquatic Center from Taillandier Architectes Associés). Large span wood construction have been investigated in order to develop my own construction design from glulam and clt. Extra small researches have been performed to gain knowledge on water purification and materiality.

Reflection

1. My graduation project focusses on a symbiosis between industry and recreational urban programs. This symbiosis consists of an architectural relation, but also the technical aspect of climate design and heat exchange. The technical and architectural symbiosis is a direct result of the focus in the studio Architectural Engineering. The method (MFA) is related to the studio topic (Harvest) through which in my case energy is harvested. The design project will result in an architectural project, as result of the master track, but part of the project is also its manifestation within the port and city as well as the generic concept of decentralized datacentres in public buildings.

2. The relevance of this graduation work is a new perspective on urban planning and architecture; by looking at buildings in terms of consumer and producer, new possibilities for symbiosis can be found. This results in a new sustainable design strategy on the architecture scale (minimizing transport of heat, direct integration of two programs in one) and the urban scale (the heating network as a guide for urban planning). Furthermore, this project advocates for a re-evaluation of the industry and datacentre sector from an urban and architectural perspective and is an example of how valuable energy can be recovered (without the loss of valuable space) from a sector that will inevitably grow in the coming decades.