Introduction

Within this reflection of my graduation process, I will look back on the research and design phase, and the result of the interaction and combination between them. What was the initial approach and how did this work out? Furthermore, I will discuss the relevance of this graduation project within the studio of Architectural Engineering and Technology, and the relevance within a wider social context.

Research & Design

For me, every design assignment starts with research, albeit in different amounts of extensiveness. Every architectural design is a spatial, technical, social, environmental and aesthetical puzzle, the architect influences how well all the actors are integrated and represented.

The relationship between research and design can be described in many ways, I will focus on research by design and design by research. The graduation project, as all other projects, started with research on the location, which in this case is the Marineterrein. What are the possibilities, is there government policy for this plot, is there a certain need within the neighbourhood, within the city? With these simple questions, 4 main ingredients were defined:

- Transformation (abundance of offices in Amsterdam, lack of housing)
- Retrofit (less emission, energy saving)
- Densification (lack of housing as well as physical space)
- The use of wood as main material (light, renewable, recyclable).

Cooking these ingredients into a meal, the initial research question read: how to densify Amsterdam using vacant office space, while improving energy performance with sustainable materials? Later on in the graduation process, I confined this question to better suit the direction I took in the design phase: how to top-up and transform vacant office space for dwellings in Amsterdam using timber construction?

In the first phase I mainly did research to substantiate the assumptions I made earlier on, and to show the necessity of all topics through academic resources. Until so far, the process would be design by research, as not a single line was drawn but a textual framework came together, narrowing down the design options. Three building blocks from the former signal school of the navy seemed fit for bringing my theories in practice. The school, now an office complex, was planned for demolition, while I am arguing not to demolish but to transform and retrofit. By designing a convincing transformation, maybe the local government can be persuaded to keep the buildings. Next to this transformation and retrofit, the building could also showcase one of the strategies for densification: topping up extra levels. This could be done using a light wood construction, minimising both building weight and the carbon footprint of the construction.
With this framework as a starting point, the second phase would in increasing amount be research by design. However, before I could design extra levels on top of the building blocks, calculations were needed to prove whether the extra weight could be supported by the original building structure without much enhancements (to keep the project viable). With the help of structural engineer Dirk Visser, I made assumptions on calculated loads according to building regulations in the sixties, and compared them with regulations now. Using the differences in regulations and a functional change to my benefit, calculations showed that an assumption of 3 to 4 added levels is probably achievable, after inspection of the current state of the structure and its foundation – not in the scope of this research.

Research by design included how to provide access to apartments within an office building – not designed for individual access. Another challenge was how to provide enough daylight within 20m deep spaces, and how to arrange a floor plan for dwellings with a grid size of just 3,8 meters (and again 20m deep). Not only daylight but also an excess of daylight proved to be an important design decision, as the added levels are so lightweight that they have almost no thermal mass – heating up quickly without sufficient sun shading. With every design step, I checked whether the materials used could be recycled easily and without downgrading. Throughout the project, numerous qualities of wood are used for specific design solutions. This was important as the project should be able to serve as an example for other projects, showcasing the possibilities with wood. All wooden elements can be prefabricated to a certain amount, and are sized so that they can be transported by road or water.

**Relevance**

When I defined my topic and the ambition to top up in order to contribute to the densification needed in Amsterdam, many reference projects were little promising. Literature was from the 90’s and most existing top-ups reached one or two levels maximum. This attributes to the general idea that this building principle is expensive. However, my calculations show there might be some perspective, in the building types which need this most of all: old, low performing office buildings – often vacant. Adding two or more levels on a 4 storey building means a floor space increase of over 50%, effectively making the topping-up financially interesting in combination with other building improvements. In my research I showed that there are a lot of vacant offices in Amsterdam where my approach could be applied. By not demolishing these vacant offices, but instead converting them into apartments, we save both construction materials and energy while contributing to the housing market.

Next to its social relevance, I believe the project also fits well within the studio of Architectural Engineering. Focussing on both new and existing buildings, my graduation project touches both fields. The light and layered construction which makes the addition of extra levels possible fits well within the studios focus on innovative technological uses on a building level. All in all the project touches four current-day problems which have to be dealt with, and this is an approach combining all four.
Planning & Process
Looking back at the broad field of interest in several topics I wanted to combine at the start of the project, and maybe therefore a lack of a well-defined field of research and design, I often had the feeling that there were to many actors involved for me to find solutions quick enough. The design process felt too slow, keeping in mind too many aspects which refrained me from sketching freely. Sometimes you have to accept solutions of which you know they cause conflicts elsewhere, to find out a solution for those conflicts later on. In the end, when you have put enough time in understanding the site, the building and the several challenges it has, things finally seem to fall in place. I think of all projects so far, this project made me realise the importance to sketch more instead of trying to design in CAD too soon; especially because of its complexity. It seems a sketch is abstract enough for your mind to comprehend, whereas a 3D CAD drawing leaves no detail unnoticed. I always had the feeling that I could design faster using the computer, but with a certain amount of complexity the opposite is true.

Retake
Because I got the feeling my progress was not fast enough throughout the entire graduation, especially in the beginning, I focussed too much on products for P4. Weeks before the presentation, finally big steps were made in order to put plans onto paper. However, my mistake would be to continue producing without taking enough time too put all products together in a good narrative. The presentation was too much based on P2, with an emphasis on the four research topics instead of the actual design. Therefore many questions about the design remained unanswered. Now, the focus will be towards the design. Many aspects of the building have been improved and more time is spent on the narrative and how to present the design.

Final remarks
In every design step I take, even though it is a fictional assignment, I try to be as thorough as possible. Who knows, one day the municipality decides to transform instead of demolish, or a project developer is interested in the building. It motivates me to think that my approach could be used in practice. I am convinced it would mean a great improvement in the area – and the strategy used could improve many other buildings, without excessive use of resources!

Finally, I would like to thank my mentors for their help and knowledge, and guiding me through the graduation process.