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	Mikeely Obersi
Student number	5076277

Studio		
Name / Theme	Heritage & Architecture/ Adapting 20C. Heritage: Resourceful Housing	
Main mentor	Lidwine Spoormans Ana Roders	Design tutor Research Paper
Second mentor	Elina Karanastasi	Building Technology tutor
Argumentation of choice of the studio	The choice was made for this studio due to the personal fascination of existing buildings. During the last year of my bachelor's degree, there was a course called Academic Skills 3 Design Reflection, in which you explain, evaluate, and position your design choices in Design 6. In this course, my interest bloomed in combining old architecture with new. In one of the three papers, the idea of heritage and interventions was researched by looking at interventions that strengthen the architectural connection by focusing on two methods: compatibility and contrast. Furthermore, in MSc 2, a history thesis was chosen for the course with the focus on the heritage of buildings in Bonaire and the evolution of the school, house, and church typologies in three consecutive periods. During this history thesis, I realized the importance of preserving existing buildings since they are linked with the island's history. In addition, in MSc 2, I chose the studio Dwelling: Towards an Inclusive Living Environment, where I had to look at the existing housing block and transform it into functional and inclusive dwellings for all ages. All these fascinations have led me to choose this studio Heritage and Architecture Adapting 20th Century Heritage: Resourceful Housing. These fascinations have sparked my interest in continuing my focus on existing buildings but have also opened my eyes to new ways of preserving heritage, such as the idea of adaptive reuse. The choice of transforming a school building instead of a factory or another function in this thesis derives from the fact that I personally have never transformed a school building.	

	Additionally, in Design 6, I transformed a yeast factory into a theater, and in the MSc 2 Dwelling studio, the original function was already a housing function. Therefore, in this graduation course, I have chosen to do my research on something I have never done before and focus on the adaptive reuse of a school building.

Graduation project	
Title of the graduation project	Adapted Spaces: A Typological Evolution Between Schools and Housing
Goal	
Location:	Research: Netherlands Design case: Amsterdam Nieuw West
The posed problem,	Demolition of school buildings; Number of students declining; Housing shortage
research questions and	[Research Question] see text
design assignment in which these result.	To research which scenario would be the best option on three aspects: living quality, cultural value and resourcefulness.

Problem field

The built environment is one of the most pressing issues for sustainable development since the building industry contributes the most to natural resource depletion, the greenhouse effect, and climate change. More than any other sector, the building industry contributes 40% of CO2 emissions (Le et al, 2021; Zimmermann et al, 2020). Therefore, sustainable construction is necessary for future sustainable development. Buildings, in reality, are long-lasting objects, often meant to last 60 years (Le et al, 2021). A study done on the improvement of outdated attempts of modernist post-war planning mentions that due to the age of post-war buildings these modern structures are entering a phase where fundamental questions are being asked about the future viability of these structures (Altrock, 2023). These questions regard energy, building services, and infrastructural requirements, in combination with changing demands for housing, office work, and retail. Therefore, nowadays, the fate of modern buildings constructed after 1945 is particularly troublesome, with the risk of them being demolished and being replaced by buildings as high-rise buildings (Hartmann, 2022; Ragheb, 2021).

Among existing buildings, school buildings in general are in need of renovation due to their age and evolving teaching and learning methods (Le et al, 2021). Besides renovation, existing school buildings facing potential vacancy hold promise for adaptive reuse, especially due to the high-quality interior and exterior layout (Macmillen & Pinch, 2017). However, they also present challenges, with outdated technology affecting ventilation, thermal fittings, lighting, and acoustics. (Le et al, 202; Farsäter & Olander, 2019).

When it comes to demolition and rebuilding a new building, studies show that retrofitting, refurbishing or repurposing a building has less environmental impact and is mostly the economical choice (Bahadır et al, 2022; Sánchez et al, 2023; Zimmermann et al, 2020)

Demolition of school buildings

Hans Korbee, an advisor of the RVO and an expert in circular construction economy mentions that thousands of schools in the Netherlands need to be sustainably demolished to build a new building in their place (Korbee, 2016). Therefore, Post-war schools are becoming scarcer due to them rapidly disappearing by being demolished. Furthermore, In the 'Sectoriale routekaart' for making school buildings more sustainable published by the RVO (Rijksdienst voor Ondernemend Nederland) it is visibly that the schools in the Netherlands have an average of 40 years. This means that post-war schools are the category that is in danger of being demolished now (Rijksdienst voor Ondernemend Nederland, 2021). Just like the post-war churches and other building types, these schools also need protection. Not only because of their architectural-historical significance and financial value but especially because of the inseparable collective memory they hold in many post-war generations (Keminga & Wessel, 2013). The research firm that strives to improve school architecture 'Stichting Mevrouw Meijer'(2019) sees these post-war schools as a great cultural significance and thus worth saving, with great potential to adapt to future use (Keminga, 2020).

Number of students declining and vacancy

Another problem surrounding schools is the decline in the number of students in both primary and secondary schools in the Netherlands. Since 2008 there has been a student decline of 170.000 in primary schools and between 2016 and 2031 there will be a student decline of 130.000 in secondary schools (Rijksoverheid, 2023). Even cities like Amsterdam predict a shrinkage in the number of students in primary and secondary schools. In the upcoming 5 years, the number of students in primary school will decrease from 60.945 to 58.109 students, and in secondary schools there will be a total decrease of 5.8%. This decrease is mainly caused by the expected departure of families with children from the city (Gemeente Amsterdam, 2023). When zooming, Amsterdam Nieuw-West (figures 1 and 2) also experiences a decrease in the number of students (Gemeente Amsterdam, 2023). Additionally, Rijksoverheid (2023) suggests that merging 2 or more schools can be a way of solving problems caused by student decline. When doing so one or more schools will be empty and can house a new function, making it possible for an adaptive reuse project. Currently the Netherlands have a few vacant educational buildings with around 50 in North Holland (figures 3 and 4) (CBS, 2022). In the last known data from 2016 regarding school buildings in Amsterdam Nieuw-West shown in figure 5, it is visible that 14 schools are closed or have moved making it possible that the building is now vacant or has a temporary use (Nio et al, 2016).

Housing shortage

Finally, the last problem is that the Netherlands is dealing with a shortage on housing with almost 400.000 dwellings short. 'The Programma Woningbouw' describes the approach to increase the construction of dwelling with the aim to realize 900.000

homes by 2030 whereby 52.500 are expected to be built in Amsterdam by 2025 (Rijksoverheid, 2022, p.5; Gemeente Amsterdam, 2018).
Therefore, the current housing crisis asks for more typologies and room for these houses. By combining the preservation of (post-war) school buildings with the housing crisis problem, a new typology can be created by applying adaptive reuse strategies to transform heritage school buildings into housing.

Research questions
This research aims to gain more understanding of adaptive reuse approaches of various case studies and to then add to the research gap regarding the transformation of school buildings into housing and the gap on assessing age and aesthetical values. It is therefore important to obtain knowledge of adaptive reuse projects to fill in this gap. The research question is: 'What strategies can be used to adapt schools into housing while preserving their cultural value, and how does the typology evolve between these two functions?' The following sub-questions must be regarded in order to answer this research question:

- How have previous adaptive reuse projects tackled the transformation of a school building into housing and what strategies can be concluded?
- What design protocols should be followed in creating a new housing typology?
- Which cultural values are important for Rendorpschool?
- Which adaptive reuse strategy is more suitable for Rendorpschool?

Design assignment in which these result
To answer the research question it can be concluded that for the Rendorpschool the values and attributes that are especially mentioned are about the exterior building fabric. The design assignment therefore will be to focus on the three housing typologies and the strategies shown to be used for these typologies in the research done prior. These housing typologies will be seen as three separate scenarios. The goal of the design assignment is to research which scenario would be the best option on three aspects: living quality, cultural value and resourcefulness. With resourcefulness, sustainability will be linked.

When it comes to cultural value, the preserving of the exterior building fabric is seen as a priority since repurpose is about the preservation of the building fabric and not so much of the modification of this building fabric. The functions (building typologies) linked to this repurpose approach will be chosen as scenarios. Therefore, from the strategies listed per housing typology the ones with least adaptation to the exterior building fabric will be chosen.

The aspects will be tested quantitatively vs qualitative on what is kept, demolished and added. And these will serve as reasoning on which scenario can be the best option.

Process

Method description

This research applies a mixed-method approach.

Case study, Methods, Sources and Scope

For question one a general comparative case study will be done using the four approaches to transform a building by Hans Ibelings & Diederendirrix (2018). This framework will be used to classify and analyze the research data. The following criteria will be used to make the decision: 19 school buildings in the Netherlands are selected by using websites like: gebouwdin.amsterdam.nl, herbestemming.nl and architecture firm websites. To ensure that the strategies discovered are not confined to a single region, cases from various parts of the nation are chosen (Appendix 1). The cases need to be post-war adaptive reuse projects with a new dwelling function. The chosen projects are of varied sizes. The data collected will be the following: Picture, Name, Construction Year, Transformation Year, Size, Location, Original Floorplan, and New Floorplan.

The strategies used in the redesigns will be identified using primary sources about the interventions, by looking at the difference between the original and new floor plans. Additionally, cases with no data on either the original or the new floorplans are filtered out. The cases will be grouped based on their strategies and interventions. An overview is built for each instance, based on the interventions in each case study and the before and after these transformations. This enables the creation of a general overview of all interventions

The number of groups established will dictate the extent of the analysis. Within each group, one case will be deliberately chosen, and a more comprehensive quantitative vs qualitative analysis will be conducted, with a specific focus on the keep, removed, and added aspect of the volume of the building linked to the function, interior and exterior building fabric. Consequently, a more detailed transformation overview is generated, and the effects across all features become visible.

Furthermore, to be able to answer the second question a literature study will be done on the existing design protocols in the Netherlands to link to the reasoning of certain intervention. Finally, various unique and new design strategies overviews will be created.

This new design strategies will be tested out on the design case, Rendorpschool located in Amsterdam Nieuw-West.

Prior research will be done on the Rendorpschool. Fieldwork and research with (architectural) drawings from the archives will be done. For the selected design case the cultural value will be assessed using the values framework by Pereira Roders (2007) by using the monumental description documents provided by the municipality of Amsterdam.

Together with the cultural value assessment by Pereira Roders (2007), the design strategies overviews will shape and help answer the last question regarding the choice of a suitable adaptive reuse strategy for Rendorpschool.

Literature and general practical references

[The literature (theories or research data) and general practical experience/precedent you intend to consult.]

Theoretical Framework

Ibeling & Diederendirrix framework

A general comparative case study will be done using the four approaches to transform a building by Hans Ibelings & Diederendirrix (2018). This framework will be used to classify and analyze the research data.

Ibeling & Diederendirrix position the cases on first thought rather then scientifically in the axes. Therefore, cases overlap and positioning them on their way seems subjective. To start, the definitions are further defined in table #. When using the Ibelings & Diederendirrix (2018) guidelines to clasify the cases based of four approaches, it is discovered that three key features can be extracted from these four approaches: function, interior buildings fabric, and exterior building fabric. Furthermore, further defining these four approaches with showing the interior and exterior interventions, and function changes are with a +, -, and =.

To make the research objective rather then subjective a grid and spectrum system is designed to help position and classify the research cases.

Yellow Red analyses

By further analyzing a case the "black/yellow/red" method will be used to show the adaptations of the building. This color code used in applications for building permissions, was then used to facilitate the communication between countries. The colors are used to differentiate the remaining parts of a building – *black*, for demolition – *yellow*, and for new construction- *red* (Boesch et al, 2022).

Values framework by Pereira Roders (2007)

A value frame work mentioned by Spoormans & Pereira Roders (2020), is the values framework (figure 8) by Pereira Roders (2007). This framework is seen as a broad and simple classification of most values. The definitions of the values shown in this framework are added in figure 9. This values framework will act as a guidance to identify primary values of cultural heritage assets of the chosen research case to analyze in depth and for the Rendorpschool (Tarrafa Silva & Pereira Roders, 2012).

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)?

Firstly, the graduation (project) topic looks at the most resourceful way to adapt a building into housing while preserving its cultural value, this is directly linked to the studio's title "Adapting 20C. Heritage: Resourceful Housing". I feel that my graduation topic correlates quite nicely with the studio's topic, and to add to that,

the chosen design case is a post-war school building that dates back to 1955 (so 20th century).

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

The objective of using this design strategies overviews is to determine whether it can serve as a new research and documentation tool for architects and researchers in the field of heritage and architecture, in addition to providing answers to the research questions mentioned above. It might be a useful addition to the heritage as vector approach and the current biographical research methodologies, especially for those engaged in the design process.

Most disciplines are more text orientated while architects are more visually orientated. The school building intervention strategies may be useful for obtaining a concise, visual overview of all interventions and may serve as a starting point for evaluating the comparative qualities of the various interventions. It makes it simpler for designers to quickly understand what they are dealing with and may be a more effective way of communicating research. Additionally, it forces the compiler to at the very least confirm that data for all features is available.

For the design assignment the results will help visualize the effects of each scenerio: apartment, maisonette and studio. Each scenerio shows with quantitative vs qualitative date what the impact is. This can help future designers that are dealing with the adaptive reuse of a school building into housing make a decision on what is more resourceful/sustainable while keeping the cultural values.