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 Delegateof the Board of Examinersone week before P2 at the latest.

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

Personal information	
Name	RayLin Liu
Student number	5514371

Studio		
Name / Theme	Heritage Architecture/ Revitalising Heritage	
Main mentor	Alexander de Ridder Ivan Nevzgodin	Design Research
Second mentor	[Appointed before P2 by studio coordinator]	Buiding Technology
Argumentation of choice of the studio	In MSc2, I joined the course Future Envelope to do case studies of sustainable buildings in the Netherlands. The cases we did inspired me in the integration of engineering and design field. One of the cases we had was a factory re-use construction, light-weight Fenix I, along the Maas. And through the studying and research we were introduced to the sustainable practices and concepts of open building and build to be deconstructed. We also had a small following assignment to make a relocation proposal for the deconstructed office building de Satellite. In the assignment we tried to apply the concept we learned to make the relocation plan sustainable. I liked very much in the process was the scale of the work that enabled the concept to be applied in between building elements composing to detailing, and the sustainability topic throughout it. I'm fascinated with the idea of making the material of a church eternal while at the same time sustaining the place in new function/program. I'm looking forward to explore ways to achieve it. And it will also be a challenge for me to design with delicate churches that were carefully pondered by Arthurs before. I wish I will be able to have careful understandings to these built churches and their values, and carefully respond through design in the graduation project.	

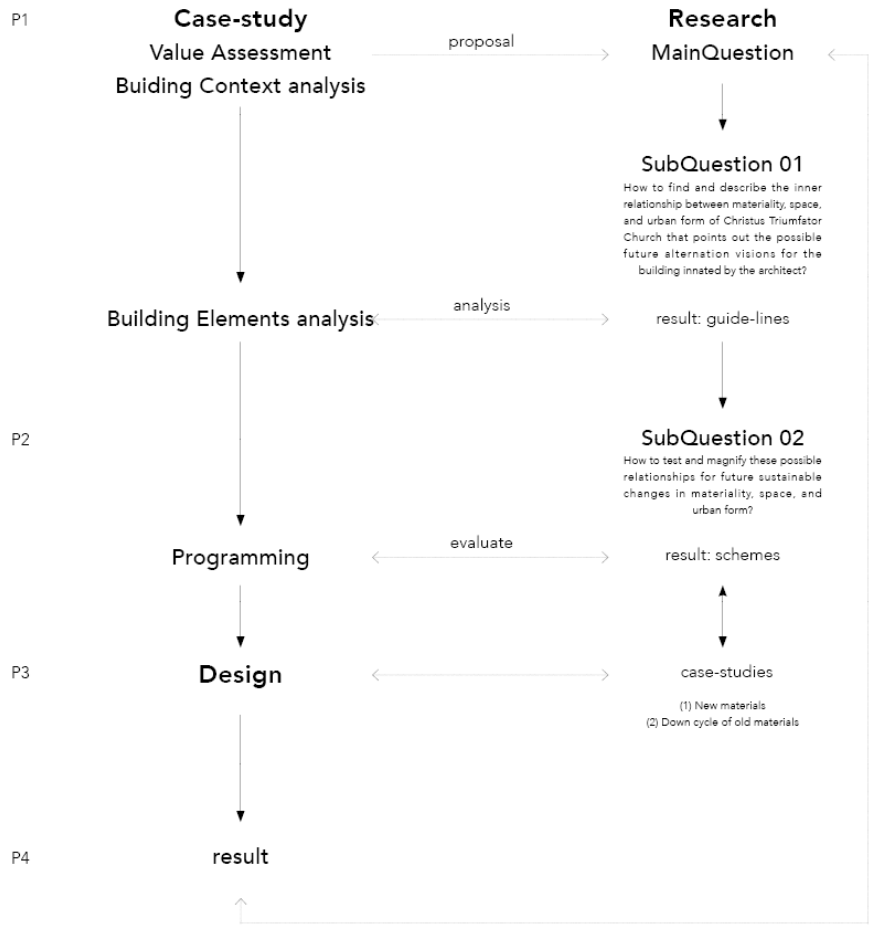
Graduation project	
Title of the graduation project	Zero Waste Church - Christus Triumphator Church
Goal	
Location:	The Hague, the Netherlands
The posed problem,	Geert Drexhage's three protestant churches are with special values feature the way how material were combined in order for complex uses in the urban context and predicted future. However, two of the churches have been demolished for new development without a clarifying process of the designs and their tangible and intangible values. In contrast with the other two churches that had undergone direct demolitions, Christus Triumphator Church under the protection of its status and an alive church community started to show the resilience that was given in its urban form, characterized space, and diverse materials. With its site arrangement and plans of function clusters, small to large groups of different people are able to be integrated into the building with activities in overlapping schedules. The composition of the envelope of the church gives a dynamic to the street and evolves creative activities within. The industrialized and hierarchal material enables alternations of layers that are in accord with the changes. The building becomes a dynamic boundary sustaining and provoking sacred to secular activities. However, as church communities shrunk rapidly in the past decade, the complex technology-equipped church designed for 500-750 people became unaffordable for the smaller Parishes with less than 100 people and shrinking neighborhood. The remaining Christus Triumphator church is facing maintenance and financial issues that a new preservation of zero-waste design for the church is in need.

research questions and	Main question: How to develop a renewal guideline for Christus Triumfator Church according to its innate architectural concept and values? Sub-questions: 1)How to describe the inner relationship between materiality, space, and urban form of Christus Triumfator Church that points out the possible future alternation visions for the building? 2) How to test and magnify these possible relationships for future zero-waste changes in materiality, space, and urban form in a nowadays context?
design assignment in which these result.	

The first sub-question of the research will be done by archive research, literature research and analysis of drawings. The second sub-question of the research will be done by case studies and scheme makings for the final design project.

1)How to describe the inner relationship between materiality, space, and urban form of Christus Triumfator Church that points out the possible future alternation visions for the building?
- Do archival and literature research about the churches designed by the architect to understand their design background and characteristics.
- Do analysis in three main scales of the churches: urban, space and materiality to compare and document.
- Do value assessment and visualize them.
- Do Building/Elements analysis of Christus Triumphator Church and visualize them.

2) How to test and magnify these possible relationships for future zero-waste changes in materiality, space, and urban form in a nowadays context?
- Point out the elements to be kept and the elements could be substituted of the church. Make schemes for changes to evaluate the meanings of changes. Start within an urban scale.
- Make schemes which direct integrated changes that highlight the possibilities and limits. And describe them into programs with a social-historical context finding.
- Select a program that fits the social-historical context the most.
- Design draft of space.
- Focus on these parts: the chapel envelope, division and its energy system, acoustic and aesthetics; the service building envelope and its relationship with the structural system and inner division wall. Basement load bearing system and its addition.
- Case study the new adding in materials and define their relationships with the old elements.
- Describe the demounted old materials and their further life-cycle.



Process

Method description

The process of the research and the design project will be explained in the following seven points:

1.Archival and literature research:
Research into Archive the New Institute DSBV 110288477, DSBV 110289179 , DSBV 110289179 and the relevant literature of Drexhage and his design. Collect articles and photos for further use. Redraw the specific drawings for further use.

2.Value assessment:
The value assessment draw resources from different aspects to understand and measure the main values of the heritage and their attributes. The result of the assessment will be used for further observing the building from its social context, physical context, to space and materiality aspects.

3.Building context analysis (ABC analysis)
The analysis focuses on understanding the building relationships in its surrounding context. Firstly, an overview of the historical development of the site will be researched following with a documentation of the nowadays site. Drawings and diagrams of urban scale, site master plan, street sections and elevations are the main objects of the analysis.

4.Building and element analysis
The analysis focuses on understanding the building as a group of space and material elements in the urban and building settings. Firstly, interpretations for space elements in the urban environment will be visualized and leveled that their importance can be accorded with the value assessment. Then in the second part of the analysis into the materiality of the building, a detailed documentation will be for each defined space.

5.Program research
The program research will be done by understanding the challenges and possibilities for maintaining and elevating the role of the church building from its nowadays social background into a future vision. The data will be from observing the real church use in situ and from documentations of the church organization.

6.Form studies for design scheme makings
The scheme makings intersect the former researches into a new design. At this point, a balance for values of preservation, problem solving, new program, and new add-in/taken away material shall be decided from former researches.

7.Design draft, Detail design, New/old material research (material bank)
Make plans, sections and details to indicate the intention of the researched design strategy. The design will be combined with building technology research and case studies from the building systems and layers, to the new add-in and taken away materials.

Literature and general practical preference

1. Archival and literature research:
Archive the New Institute, DSBV 110288477, DSBV 110289179 , DSBV 110289179
Hammer W., (1995) *De Architect Geert Drexhage,* Delft University of Technology

2. Value assessment:
Roders P., Gonçalves D.,(2021) Contributions to a Revised Definition of Sustainable Conservation, Delft University of Technology
Roders P., (2012) Cultural Heritage Management and Heritage (Impact) Assessments, Delft University of Technology

3. Building context analysis (ABC analysis)
Zijlstra H., (2009) *Analysing Buildings from Context to Detail in time*, IOS Press under the imprint Delft University Press
Eisenman, P., (2008) *Ten Canonical Buildings 1950-2000*, Rizzoli International Publications

4. Building and element analysis
COP26, e79 manifesto- Accelerating Climate Action through the Power of Arts, Culture and Heritage, UN Climate Change Conference UK2021

Brand S., (1994)How Buildings Learn, Penguin Books
Ford, E., (2003) *The Details of Modern Architecture*, MIT Press Ltd, Cambridge, Mass.USA.

5. Program research
Christus Triumfator Church Website, https://www.ctkerk.nl/

6. Form studies for design scheme making
Online Lectures EECBE1 Circularity for Educators, Delft University of Technology
Wang MH, (1988) Lectures on Space, Design and Form, Design Lectures in NCKU

7. Design draft, Detail design, New/old material research (material bank)
Knaack, U., Chung-Klatte, S., Hasselbach, R. (2012). *Prefabricated systems Principles of construction*.Birkhäuser Basel.
Knaack, U., Chung-Klatte, S., Hasselbach, R. (2018). *Building Physics of the Envelope*. Birkhäuser Basel.
Smith, R.E. *Prefab Architecture: A Guide to Modular Design and Construction*; John Wiley& Sons: New York, NY, USA, 2011.
Boswell, K. (2013) *Exterior Building Enclosures: Design Process and Composition for Innovative Facades*, John Wiley & Sons Inc.New York, NY, USA.
Hebel D, (2014) *Building From Waste*, Brikhauser

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

The research will contribute to findings on the churches by Geert Drexhage, and a renewal framework suggestion for Christus Triumfator Church will be the design result.
The renewal framework shall be examined under a Zero-Waste topic which will be achieved by:
1) carefully re-examined the design intention of the architect in 3 churches for a guideline of preservation,
2) redesign discussions for new program meaning under the guideline, and
3) discussions on the materiality of new/salvage materials.

The zero-waste goal of the redesign is described in a tangible-intangible order:
Tangible
Urban scale:
- preserve architect's intention for composition
-open the most of the master plan to urban activities.

Building & space scale:
-Keep the mixed-use character of the building developed in time and clarify by redesign

-Reuse most of existing structural level elements and seek energy upgrading alternations

Material scale:
- demount in redesign the most recyclable elements (roof truss> façade> concrete> brick)
- discuss the reuse possibilities in the new design or the material bank
- add in redesign demountable, lightweight and eco-friendly materials

InTangible
- observe and document architect's design character in research, reflect in redesign
- join the material bank to form a material landscape with other churches

-keep the church's original religious meaning and form with acceptable changes
-intertwine the original narrative with new ones that have been evolving in the building

-seek inspirations from protestant tradition of space abstraction, light creating, and material use

The zero-waste principles for my redesign:

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