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	**Fazhong Bai**
Student number	5563372

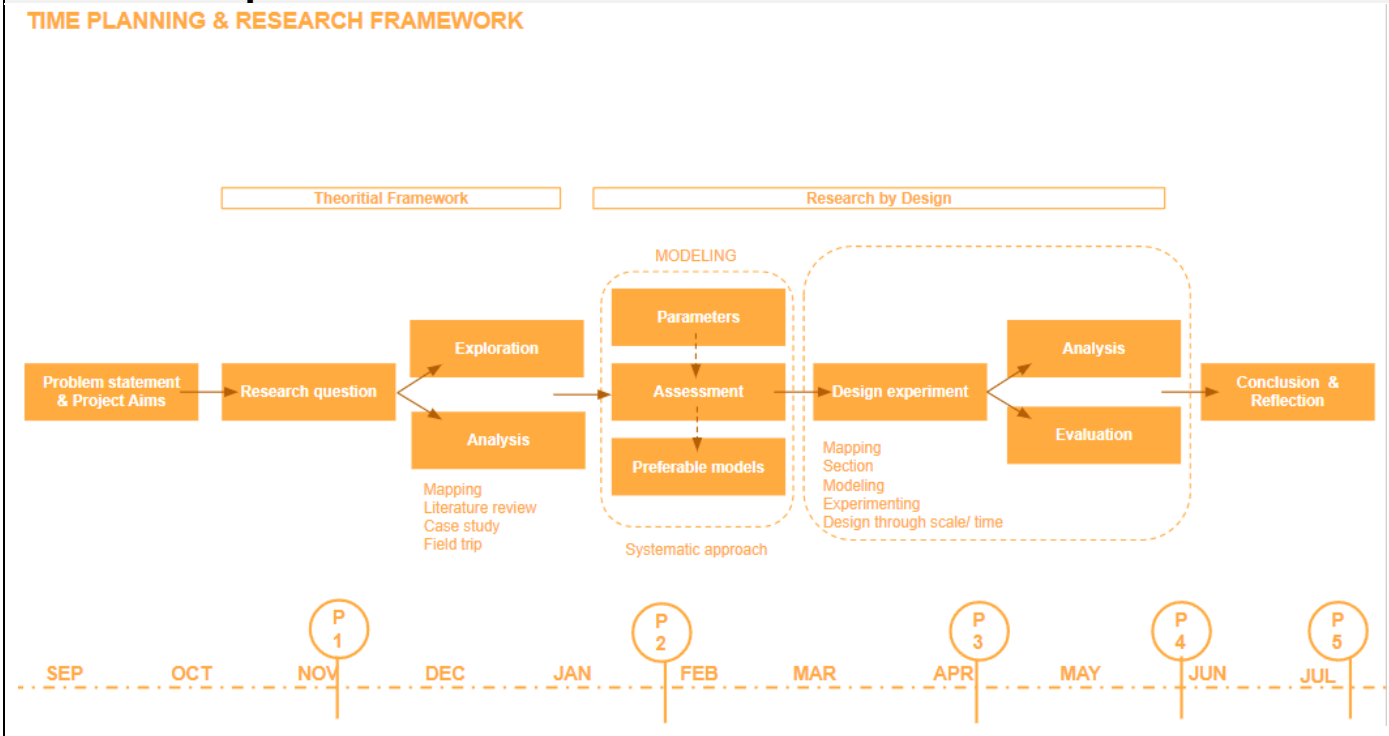
Studio		
Name / Theme	Innovative Infrastructure Implementation	
Main mentor	Adriaan Geuze	Landscape Architecture
Second mentor	Aksel Ersoy	
Argumentation of choice of the studio	Personally I am obsessed with the railway topic and looking forward to explore the possibility of imaging a new viaduct layer above the Dutch cultural landscape. As this is considered as a more civil engineering project, I want to take the challenge to play a more crucial role in the infrastructure implementation work with a landscape architect narrative for a more sustainable living environment, by designing with our unique knowledge of the building technology, nature and ecosystem. Landscape mitigations need to be designed and taken into account not after but before the construction. Landscape architects will eventually become more vocal in the fields of civil engineering.	

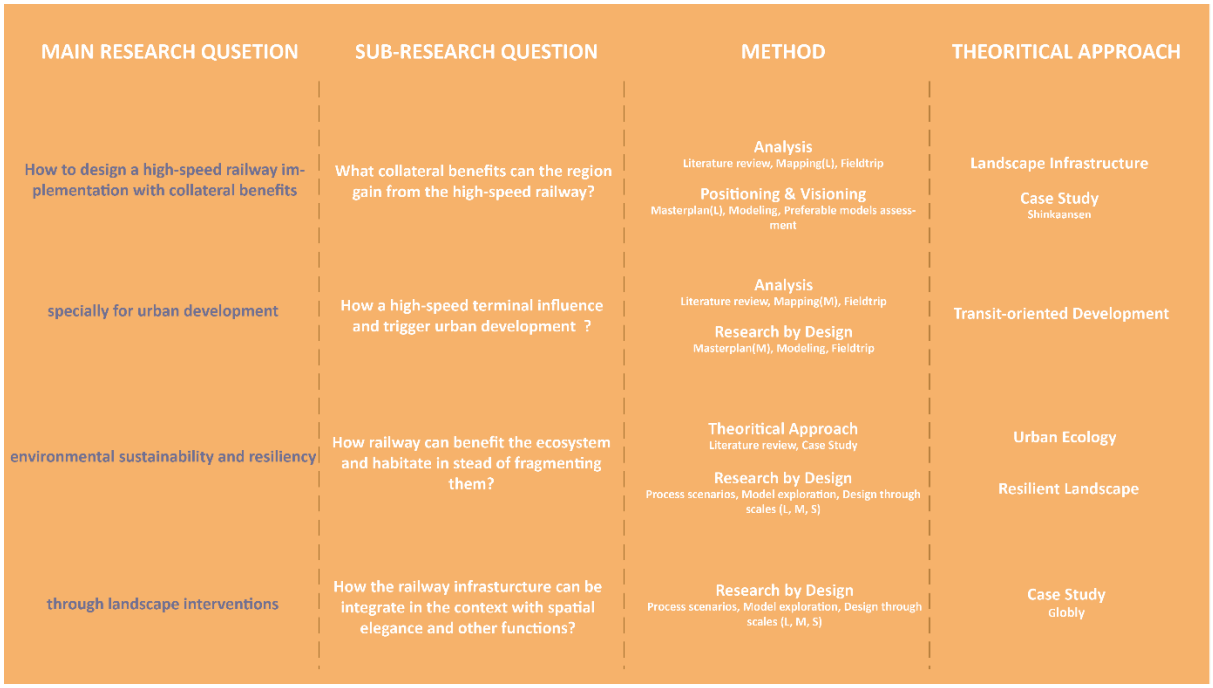
Graduation project	
Title of the graduation project	TU-Delft Alternative Lely Line: High-speed Railway Infrastructure as Landscape Bonanza----a case study from Zwolle to Groningen
Goal	
Location:	from Zwolle to Groningen, Netherlands
The posed problem,	The Netherlands had built a high density and comprehensive national railway network since 1839, which benefited both economically and socially in the past centuries. It is highly embedded in the rich Dutch cultural landscape, however, nowadays, the railway infrastructure is becoming not efficient enough to meet the increasingly high punctuality less time consuming commuting demand. And the government of the Netherlands had proposed a railway implementation project from Groningen to Amsterdam named the Lely-Line, which still takes the old-fashioned engineer headed way who only focus on the railway itself. So TU Delft, we want to explore the alternatives. The design research will be based on the innovative engineering of a self-extending railroad line elevated 8 m at least, each module of the viaduct will be built from the previous. The construction promotes a maximum of repetition. As such, the line needs to be aligned in long linear stretches.

	These parameters will offer the opportunity for a new railroad typology that can be fast, cheap and innovative.
research questions and	Main Research Question: How to design a high-speed railway implementation with collateral benefits for urban development and environmental sustainability through landscape interventions from Zwolle to Groningen? Sub Research Questions: 1. What collateral benefits can the region gain from the proposed high-speed railway? 2. How can a high-speed terminal influence and trigger urban development? 3. How can railway benefit the ecosystem and habitat instead of fragmenting it? 4. How can the railway infrastructure be integrated in the Dutch landscape context with respect of cultural landscape and spatial elegance?
design assignment in which these result.	1. A study about the existing public transportation in the Netherlands 2. Series of testing models from Zwolle to Groningen with parameters evaluation and a large amount of sections analysis 3. A collaborative vision making and spatial strategies and prototyping based on preferable models 4. Detail design within a few critical points along the railway line

Process

Method description





Literature and general practical preference

Books:

Appleyard, D., Lynch, K., & Myer, J. R. (1965). *The View from the Road*. The MIT Press.

Frank, V. D. H., Nijhuis, S., & Daniel, J. (2016). *Flowscapes: Designing infrastructure as landscape* (1st ed.). TU Delft.

Shannon, K., & Smets, M. (2010). *The Landscape of Contemporary Infrastructure*. nai010 publishers.

Swaffield, S. (2002). *Theory in Landscape Architecture: A Reader (Penn Studies in Landscape Architecture)*. University of Pennsylvania Press.

Corner, J. (2015). *The High Line* (First Edition). Phaidon Press.

Vogt, G., & Kissling, T. (2020). *Mutation and Morphosis: Landscape as Aggregate*. Macmillan Publishers.

Czechowski, D., Hausladen, G., & Hauck, T. (2017). *Revising Green Infrastructure: Concepts Between Nature and Design*. Amsterdam University Press.

Dittmar, H., & Ohland, G. (2012). *The New Transit Town: Best Practices In Transit-Oriented Development*. Amsterdam University Press.

Forman, R. T. T. (2014). *Urban Ecology: Science of Cities*. Cambridge University Press.

McHarg, I. L. (1995). *Design with Nature* (1st ed.). Wiley.

Borda-De-Água, L., Barrientos, R., Beja, P., & Pereira, H. M. (2018). *Railway Ecology* (Softcover reprint of the original 1st ed. 2017). Springer.

Reports:
Waggoner, F. (20009, June 2). *Design Guidelines for High-Speed Train Aerial Structures*.

Websites:
Lead, M. Э. O. [. (2018, March 9). *How Nature and Green Infrastructure Benefits the Railway*. https://www.linkedin.com/pulse/how-nature-green-infrastructure-benefits-railway-mike/

A choice for 2050: The Netherlands more compact, more polycentric, or. (2021, February 2). PBL Netherlands Environmental Assessment Agency. https://www.pbl.nl/en/blogs/a-choice-for-2050-the-netherlands-more-compact-more-polycentric-or-more-diffuse

Railways Explained. (2021, October 9). *Dutch Railways: How All Railways Should Look*. YouTube. https://www.youtube.com/watch?v=gB5Ndn7CbpA

Taichung Green Corridor. (n.d.). https://www.mecanoo.nl/Default.aspx?tabid=424&error=An%20unexpected%20error%20has%20occurred&content=0

Dataset:
OpenStreetMap. (n.d.-b). [Dataset]. https://www.openstreetmap.org/#map=10/52.8658/6.3693

TU Delft. (n.d.). *TOP10NL* [Dataset]. https://www.tudelft.nl/library/collecties/kaartenkamer/kaartencollectie/topografische-kaarten/top10nl

PDOK. (n.d.). [Dataset]. https://www.pdok.nl/

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 studio of innovative infrastructure implementation focus on taking a research by design approach to study alternative solutions for urban development and infrastructure. My project is a sub-topic within the context of the unique cultural landscape from Zwolle to Groningen.
   From my personal opinion, the master program of MSc AUBS in general dedicated to educate and inspire students design for better human living environment, and the track of landscape architecture is more focus on the relationship of human and nature.
   The graduation project will also present what I have learned during the master program: how to read the landscape, how to diagnosis the landscape and how to design the space in landscape.
   Lastly, I hope that by the end of the graduation the thesis work can help me orient myself in the real world of landscape architecture practice.

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

   Social relevance:

   The future of Dutch Metropolitan landscape needs innovative solutions for urban design and infrastructure. In my case, the railway will go through the municipality of Overijssel, Drenthe and Groningen which have a large area of national parks and nature reserves. The context of the cultural landscape very much determines the strategy and design measures I will apply to the site. Also, the public awareness of innovative infrastructure is an important issue I need to discuss and reflect in the research.

   Scientific relevance:

   Firstly, this research is highly related to the discipline of civil engineering. Each module of the viaduct will be built from the previous. The construction promotes a maximum of repetition. I am trying to provide solutions with comprehensive consideration of the urban development and nature preservation. Landscape mitigation alongside the railway need to be designed and new stations area need to be proposed. The future innovative infrastructure need to be efficient, elegant and sustainable.
   Secondly, because of the unique position of the study area, the knowledge gap of soil science, geography and ecology are necessarily need to be filled. The solution should respect the genius loci and enrich the biodiversity of the preserved land.