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:

<table>
<thead>
<tr>
<th>Personal information</th>
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<tbody>
<tr>
<td>Name</td>
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<tr>
<td>Student number</td>
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<td>Telephone number</td>
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<td>Private e-mail address</td>
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<table>
<thead>
<tr>
<th>Studio</th>
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<tbody>
<tr>
<td>Name / Theme</td>
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<tr>
<td>Teachers / tutors</td>
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<tr>
<td>Argumentation of choice of the studio</td>
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<tr>
<td>The second is the geographic motivation. The geographic research context of this report is Amsterdam region, the design city is Almere. On the one hand, Netherlands is considered to be the most well-prepared country for automated vehicles according to the Autonomous Vehicles Readiness Index (KPMG, 2018). As the economic and technologic driver for the country, Amsterdam is the most reasonable base for transportation innovation. On the other hand, responding to the population growth pressure, Amsterdam spread the housing to its surrounding cities, which makes the whole region the busiest commuting area and cause sever congestion problem. Suburban area is unsustainable in both traffic condition and land use pattern.</td>
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**Graduation project**

| Title of the graduation project | Embrace urban growth, avoid urban sprawl |

**Goal**

<table>
<thead>
<tr>
<th>Location:</th>
<th>Almere, the Netherlands</th>
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<tbody>
<tr>
<td>The posed problem, research questions and design assignment in which these result.</td>
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**Problem statement**

The concrete problem is trying to solve the urban sprawl. Urban sprawl is synonymous with unplanned incremental urban development, which causes the inefficient usage of land and soil resource, traffic congestion, air pollution, etc. The negative impacts of urban sprawl have direct effects on the quality of life and sustainability of future development. With the pressure of population growth, as the economic driver, the planning vision of AMA still shows the sprawl trend. To embrace the urban growth and avoid urban sprawl, efforts need to be made to live within the limits of urbanized land. To a large extent, automated vehicles will change both transportation system and travel behavior which can either promote or ease sprawl speed. With the liberation of transportation ability, city is likely to expand further. However, the impact of automated vehicles can contribute to redevelopment both on street and urban block. The urban transformation in the era of automated vehicles need to be guided and controlled to generate to sustainable urban development.

**Research question**

How to design a compact Almere in the era of automated vehicles and contribute to urban sustainability?

**Aim**

The final goal of the project is to embrace urban growth and avoid urban sprawl. The project aims to design a compact Almere in the era of automated vehicles and contribute to improve living quality and which can be described from three aspects as below:

- **Research aim** — explore the theory and strategy of compact city. Since automated vehicles may bring the positive effects and negative effects, compact city can be applied to reinforce the positive and eliminate the negative.
- **Analysis aim** — combine data and space. During the whole process, the project will explore the different ways to practice the combination (data and space) in understanding the current situation, imaging the future challenge, and testing urban design.
- **Design aim** — design the compact Almere. On street level, the project will explore the impact of automated vehicles on the built environment and redesign the street space. On city level, the project will focus on the redesign of urban block to improve the space utilization rate.

**Expected output**
As explained previously, the project will focus on street design and urban design. Design strategy — anti-sprawl strategy. Based on the current compact city strategy, the anti-sprawl strategy aims to explore redevelopment opportunities and improve space utilization efficiency, in the era of automated vehicles.

Street design — automated mobility. The project will come up with new hierarchy and design for street based on automated transportation system. Traffic activity, social activity and leisure activity will also be included.

Urban design — compact city. On city level, there will be the urban design focus on redevelopment of urban block to improve urban density and space utilization rate. Urban sustainability will be improved from three aspects: traffic sustainability, social sustainability, and living sustainability.

<table>
<thead>
<tr>
<th>Process</th>
<th>Method description</th>
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<tbody>
<tr>
<td></td>
<td>Current problem: urban sprawl (before P1)</td>
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<tr>
<td></td>
<td>1. How to evaluate the current urban sustainability of Almere, in the context of</td>
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<tr>
<td></td>
<td>sprawling Amsterdam?</td>
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<tr>
<td></td>
<td>Method: literature review, mapping</td>
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<tr>
<td></td>
<td>Content: Since the initial motivation of this project is urban sprawl problem, I</td>
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<td></td>
<td>have to fully understand the causes and consequence of urban sprawl. This part can</td>
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<tr>
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<td>be done through literature review. Once the theory base of urban sprawl is completed,</td>
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<td>it can be used as the guidebook to better understand the historical development and</td>
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<td></td>
<td>current city role of Almere in the context of Amsterdam expansion.</td>
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<tr>
<td></td>
<td>Besides the theory research, spatial understanding is needed. This part can be</td>
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<td>achieved by group mapping. The group atlas collects information from AMA and present</td>
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<td></td>
<td>in three aspects: infrastructure and mobility, socio-economic and environmental</td>
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<td>condition, and physical environment. It provides the initial fully understanding of</td>
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<td>AMA and helps to stimulate the further research direction. The project traffic</td>
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<td>sustainability.</td>
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<td>Future pressure: urban growth (before P2)</td>
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<td>2. How to measure the urban growth pressure of Almere through statistical and</td>
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<td>spatial analysis?</td>
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<tr>
<td></td>
<td>Method: data analysis, mapping</td>
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<tr>
<td></td>
<td>Content: To understand the future growth pressure, efforts need to be done both</td>
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<tr>
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<td>from data analysis and spatial measurement.</td>
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<td>- Population amount: number of residents live in Almere including historical data of</td>
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<td></td>
<td>gender, age, nationality, physical condition, career, marriage, income, etc.</td>
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<td>- Population density: there are two kinds of density in the project. Municipal</td>
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<td>density, which is operated based on full-scale including natural land, water area,</td>
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<td></td>
<td>etc.</td>
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</table>
Community density, which is operated based on community range merely focus on built environment.

- Population growth: number of residents will increase in the future. The project compares the population prediction report from Almere government, AMA municipality, and the future scenario of Netherlands to come up with the most likely population growth curve.

Trigger: automated vehicles (P3-P4)

3. How will automated vehicles impact the transportation system and urban block pattern in Almere?

Method: literature review, scenario building, mapping

Content: The implementation of automated vehicles is the futuristic trend, which means the impact is the uncertain factor. To achieve the realistic planning as much as possible, literature review and scenario building is both needed. The literature review is done on the possible impacts of automated vehicles on automobile dependency, street design, parking pattern, travel behavior, etc, as the ideal element. When applied on the real city system, the problems such as national policy, ownership, accessibility, insurance should be considered. Despite the political issue and social acceptance, the scenario of this project is built on the issue of ownership (public/ private) and accessibility (limited/ unlimited).

However, the literature review and scenario building can provide the general knowledge not specific for Almere. Mapping is needed to understand transportation system and street hierarchy of Almere, then possible impacts can be draw. The spatial changes need to be tested and modified.

4. How can automated vehicles contribute to redevelop opportunity in street and city scale?

Method: literature review, scenario building, mapping, field trip

Content: The impact of automated vehicles will be fully analyzed in four scenarios. This sub question is in the context of "best" scenarios (public ownership & limited accessibility). In this scenario, the impact of automated vehicles is controlled by government, and can be applied in limited urbanized area to avoid uncontrollable route sprawl.

The spatial redevelop opportunity will be explored in different scales, inspired from literature study, field trip and tested by mapping, to suit the specific Almere condition. Using automated vehicles as the trigger to define redevelop site and space, then the design strategy and activity strategy need to be further defined with the functional planning of Almere. This need to be combined with the proposal of compact Almere design.
Proposal: compact city (P4-P5)

5. What is compact city and how can it impact the development of automated mobility system?

Method: literature review, mapping, design, field trip

Content: This sub question is committed to research on the compact Almere design, which is the extension from scenario building (sub question No.3). The develop principle and design strategy for compact city need to be fully understand and researched. The work process is roughly divided into the following steps. Firstly, the project will conclude from the empirical experience to summary the compact design methods. Secondly, Almere mapping will be done to analyze the street system, transportation system and urban pattern. Thirdly, the research will combine the design site and space (from sub question No.5), from micro to macro, explore how can the automated vehicles contribute to the compact urban space. After which, from macro to micro, reflect the urban design on the street scale and revise the automated mobility system.

6. How can automated vehicles be applied to improve the land use efficiency and contribute to urban sustainability?

Method: mapping, design, policy design

Content: This sub question represents several aspects to further define the effective urban planning. In terms of design, it includes the final adjustments and experience summary. In terms of policy, the stakeholder analysis will be included. Considering about the function position of the design, the duration of implementation, policy development and the involvement of stakeholders, the whole design projects will be arranged in the timeline from short-term, medium-term to long-term proposal.

Literature and general practical preference

**Theory for Urban growth and Urban sprawl**


Theory for automated vehicles


Theory for compact city


Reflection

This project aims to solve the urban sprawl problem by designing the compact city. Why choose to develop the compact city? Nowadays, to accommodate growing residents, cities tend to expand the city range by developing the brown field, open land, green land in low quality. However, if we can achieve the urban growth within the urbanised land, there is no need to transform the natural land since the transformation is not irreversible. Cities choose to sprawl means they give up the future possibilities. Besides, the compact city is more “interesting”. People live closer to each other not only physically but also mentally. The compact city provides more possibilities for social interactions. Within the service radius, more people can benefit from the educational institutions and medical institutions. The government can also save
budget, since the infrastructure do not need to be built in the new urban land. With the

The urban sprawl problem is an ignored challenge in Europe. In Europe every year more than 1000 km² of land are taken for housing, industry, transport or recreational purposes. Such long-term changes are difficult or costly to reverse, and nearly always involve trade-offs between various social, economic and environmental needs. To live with the limits of urban space, the Seventh Environment Action Programme (7th EAP) includes an objective that land is managed sustainably and promotes the objective of no net land take by 2050. One main direction of future urban planning is to protect natural land, improve urban efficiency, and avoid unnecessary sprawl. Since the urban sprawl problem is the worldwide problem, the compact Almere design can be set as an example for what is possible in other cities facing similar challenges.