Introduction
Within the Architectural Engineering graduation studio the main focus is to answer a problem by integrating architecture with technical fascination. The graduation project is divided into two semesters. The focus of the first semester is researching the solutions for the problem and during the second semester the focus shifts to integrating this solutions into a design. At the start of the graduation project three locations were giving with each containing a specific problem. These three locations were the Brettenzone in Amsterdam, The A12 zone in Utrecht and finally the Delta region spread out over the coastline of the Netherlands.

After analyzing the locations a choice is made for the A12 zone in Utrecht. The reasons for this choice were partly driven by the problems of the location and partly by my own fascination. During the location study it was concluded that the A12 zone would be further developed in the future as a new part of the city of Utrecht where citizens can live, work and recreate. However in the middle of the A12 zone is the A12 (inter) national highway situated. In its current situation it will create a disconnecting barrier effect within the city and cause a lot of noise and air pollution. These problems are already threatening and will only increase during the future developments of the A12 zone it nothing is done. From this conclusion the fascination emerged to investigate into what extend the integration of architecture and technology can provide a solution to the problems of noise and air pollution and reducing the disconnecting barrier effect of the highway. Therefore this fascination is formulated as the main theme for the graduation project.

The relationship between research and design
As it was stated before was the main focus of Msc 3 the research part of the project. The first quarter of this semester was used to research the background information about noise and air pollution. During the research the following questions were researched through literature studies:
- What is noise/air pollution?
- Where does it come from?
- What are the different types of?
- What are the existing solutions?

Next to this literature studies were also different case studies analyzed in order to understand the existing solutions. Subsequently, the case studies have driven me to do more literature studies about more specific themes within the theory of noise and air pollution. The results of these studies are concluded in a toolbox, which is used in the further design process.

During the second quarter of Msc3 an attempt was made to use computer simulation programs to analyze different design choices. However there are currently many simulation programs available that focuses on the acoustic quality inside the building, but simulation programs aimed at urban scale are scarce. Furthermore they are mainly focused on the commercial use than for students. Nevertheless, after several attempts with different companies it was clear that testing different design variants with computer simulation programs would not be possible. From this point the plan of approach is reconsidered and the main focus is shift again to the literature studies. Based on the Literature studies basic rules of thumb calculation regarding noise and air pollution is used in order to get more grip on my design process and the effect of my architectural interventions.
To conclude Msc 3 a presentation (p2) is giving and a design strategy is formulated. The design strategy consisted out of an urban and building scale solution. On the building scale the idea was to design various building typologies that are suited for the highway environment and are a part of a
larger urban element. This large urban element is an integrated wall system that connects all the different buildings together and forms a highway canyon.

As planned before was Msc 4 devoted to the design part of the graduation project. At the beginning of Msc 4 the research results and the design strategy from Msc 3 are picked up again and used as a starting point for the final design. In the first quarter of Msc 4 the main focus was on the design of the different typologies of buildings and the connecting urban element, which is an integrated wall system. Finally a choice is made to design three types of dwelling that are based on the results of the toolbox from Msc 3 and are suited for the highway environment. Next to that, on the urban scale an integrated wall system is designed in which it deals with the noise and air pollution and allows building next to the highway without eliminating or keeping their distance from the highway.

The second quarter of Msc 4 was mainly focused on detailing and calculating the final design. During this quarter the structure, climate control and constructions of the design are determined. Also different methods calculations are made in order to map the reduction of noise and air pollution by my design proposal.

At last, it can be concluded that there has been from the beginning a strong relation between the research and the design part of the graduation project. Every design step is based on the research results. When the design direction threatened to go wrong, was the research results used again to steer the design direction in the correct path. Therefore the research results were a profound foundation for the design process. This approach has worked very well and eventually led to a result that offers solutions on different scales to the problems of noise and air pollution. However, what has not worked or could be better done next time was the failed attempt to use computer simulation programs during the start of the project. A lesson from this is to have more option at the beginning of the project in order to have backup plan if the first option does not work.

The relationship between the theme of the studio and the subject/case study chosen by the student within this framework (location/object)

The theme within the architectural engineering graduation studio is based on the integration of architecture with technology. The aim was to identify a problem in the given locations and try to solve this by integrating architecture with technology. In the context of this theme the problem was formulated by analyzing the locations and to find the answer through the integration of architecture and technology. Whereby architecture and technology was not seen as two separate disciplines but as complementary of each other. This approach has led to a coherent design process in which the architectural proposals are often based on technical considerations. Using this approach worked very well because it allows me to base my design proposals on facts and technical considerations instead of vague and dreamy decisions.

The relationship between the methodical line of approach of the studio and the method chosen by the student in this framework

The methodical line of approach of architectural engineering graduation studio consists out of a research and design part. Furthermore the students had the freedom of choosing their own plan of approach. In addition an architectural, technical research and technical tutor tutored the graduation project. This system worked very well for me because I could determine my own plan of approach. Furthermore during the research part in the Msc 3 I had the opportunity to discus my research process weekly with my technical research tutor and make decisions for the next research step. I also had in Msc 3 the opportunity to translate my research findings into an architectural proposals and discus it with my architectural tutor. In Msc 4 the design proposal could be further developed and worked out in detail under the guidance of my architectural and technical teacher. I found the continue feedback and interaction between the different tutors very pleasant, because in this way I could discus every component of my project with the right expertise.
The relationship between the project and the wider social context

The relation between my project and the social wider context is that currently in many cities around the World the highway is a no-go zone where citizens do not want to live next to it. The highway creates also a disconnecting barrier effect that divides or isolates parts of the city. According to the current solutions architects, urban planners and civil engineers have to make concessions and chose often for elimination of the highway within the city by making tunnels or keeping distance from it. However tunneling the highway is very expensive and creates an unpleasant experience for the highway drivers. Also keeping distances from the highway will create empty spaces between the build part of the city and the highway. These empty spaces will be needed in the future for urban expansions. However my project shows that through the integration of architecture and technology solutions can be created in order to bring the city closer to the highway without eliminating on or another. Due to the different dwelling typologies suited for the highway environment together with the integrated wall system a new healthy environment can be created next to the highway.