Reflection Paper

Master of Science Architecture, Urbanism & Building Sciences

Contents

Personal Information	. 3
Studio	. 3
Studio Information	.3
Graduation Project	. 3
Title	.3
Location	.3
Problem Statement	.3
Objectives	.4
Overall Design Question	.4
Thematic Research Question	.5
Reflection on the process and planning	. 5
Methodical lab approach versus student approach	.5
Specific reflection on the student approach	.6
Reflection on the time planning	.8
Reflection on the product	. 8
Relationship between design & research	.8
Theme of the graduation lab and case study chosen by the student	.9
Project versus wider context	.9

Personal Information

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Studio

Studio Information	
Name / Theme	Architectural Engineering
Teachers / tutors	Mauro Parravicini (architecture)
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Graduation Project

Title

INNER LIFE: A GREEN HYBRID ZERO ENERGY COMPLEX

Location

The project is located in Amsterdam, in the borough of "Amsterdam Nieuw-West", also known as the Western Garden Cities. This part of the city was developed during the General Expansion Plan (Algemeen Uitbreidingsplan) in 1934. The neighborhood is called Landlust, named after a farm which existed before the area was redeveloped from rural into a residential neighborhood. The building complex "Koningsvrouwen van Landlust", means the "the king's wives" in Dutch, is named after the streets around the complex which all have names of the wives of different Kings of the Netherlands.

Problem Statement

The Koningsvrouwen van Landlust is a residential complex which consists of two longitudinal building volumes with a courtyard in between. The complex shows peculiar functional, spatial, technical and social problems.

To begin with, functional problems include the malfunctioning size and internal organization of the apartments. The apartments are too small to support the needs of families with four or more members. Besides that, the existing internal organization of the apartment is not suitable for a household of two (starters). The kitchen, bathroom and toilet are too small while the bedrooms are narrow with no space for storage. The building complex is monofunctional and has no space where social interaction or other activities besides living can take place.

Furthermore, the spatial problems are related to the inner courtyard which remains an unused space even if it was designed as a common space for the building occupants. The courtyard is difficult to access from the apartments, meaning that all four apartment levels have to first reach the basement and enter the courtyard from there. In addition, the courtyard has no defined functioning spaces such as quiet, playing or sitting areas or walking paths. The transition between private and public to what . The private outside space of the apartments, the balcony, is rather small for any use.

Technical problems refer mainly to poor energetic performance of the building complex. The performance is influenced by the outdated building skin including single glazing windows, poor insulation and outdated building installations. As a result, the levels of indoor comfort are quite low in terms of thermal comfort and humidity. The building is too hot in summer and too cold in winter.

Socially, different problems have been reported in the area. Some of them include criminality among young people, high percentage of low income residents, high percentage of car thefts and rubbish on the streets.

Objectives

My objective is to transform the Koningsvrouwen van Landlust into a hybrid and zero energy complex while improving its architectural and social value. Bring "inner life" to the courtyard by creating a network of elements and green spaces which solve spatial, social, and functional problems in one design.

Functional Objectives:

- Improvement of the existing housing typologies, aiming to support a mix of target groups (starters, starters with a kid, four and five member families)
- Integration of new functions which can enforce a new community culture for the residents

Spatial Objectives:

- Bring the courtyard in use and make it the central common space of the complex
- Improvement of the circulation in and towards the courtyard
- Transformation of the balconies into a quality space which is the extension of the inside living area

Technical Objectives:

- Transformation into a zero energy building complex
- Creation of a manual regarding the zero energy transformation of the Dutch "Strokenbouw"

Overall Design Question

How to transform the "Koningsvrouwen van Landlust" into a zero-energy complex while creating a new network of green spaces, solving functional and spatial problems and improving the experience and social interaction?

Sub-questions:

- How to redesign the courtyard and network of green spaces in the courtyard?
- How can the new functions be integrated in the courtyard?
- How can the apartments be redesigned in order to meet the comfort and spatial needs of the users?
- How can the groundfloor be redesigned and connected to functions of the lower building volumes?
- How can the housing units be connected with the courtyard?
- How can the private outside space of the apartments transformed?
- How can the implementation of zero energy design systems be expressed in architectural form?

Thematic Research Question

How should a zero energy transformation manual for the Dutch "strokenbouw" typology look like?

Sub-questions:

- How can a zero energy building be defined?
- How to calculate the existing energy demand of a residential building?
- Which are the available technologies which can reduce, reuse, store and produce energy in a building scale?
- Which strategies can be used in order to define the climate design?
- Which building aspects need to be considered in the design process of a zero energy transformation?
- How can the effects of the climatic measures be simulated?

Reflection on the process and planning

Methodical lab approach versus student approach

The general method proposed by the graduation lab suggests that the students focus on the research on the first semester and on the design on the second semester. In the beginning of the year each student had to choose a technical topic and conduct a thorough research on it. At the end of the semester a complete research had to be presented in combination with a preliminary design. In order to continue on the design the lab approach introduced the requirement of a graduation plan where all the methods used by the student had to be clearly defined.

Focusing completely on the research on the first semester meant that most of the available time was dedicated to that and a very satisfying result could be achieved in terms of completeness of the report and depth of exploring the chosen topic. However less time was dedicated in the development of the preliminary design, and that resulted in a less successful integration of design and research. The goal of implementing the research results remains an important topic in the second semester. It would be better if more time and attention was spent on the implementation in the first semester. The integration of the different disciplines of technology and architecture in the project demands the use of clear scientific methods or approaches which indicate how the integration should be questioned and explored during the different project phases. The lab approach which proposes the division of focus on technical research on the first semester and architecture on the second is in my opinion not complete. A more specific approach has to be implemented in the process in order to put emphasis on the implementation of technology and architecture since this has to be the essence of this particular graduation lab of " Architectural Engineering". The design process is mainly influenced by two sides: the students themselves and the tutors. So on the first hand, the student has to be continuously reflecting on how the different disciplines and studies he or she makes are related to the integration. And on the other hand, the tutors have to enforce the implementation process by reflecting on this topic throughout the whole semester.

I suggest that the implementation of technology and architecture as explicit goal of the graduation plan should be enforced by proposing scientific approaches and by adding a specific rituals in the tutoring sessions. The tutors have to question and reflect together with the student continuously on this topic so that innovative and high end projects can be created.

Specific reflection on the student approach

For the design research part, various methods have been utilized in order to meet the project objectives. This part of the reflection would mention explicitly if the chosen methods have worked, how and why.

Design Part

Urban analysis

The analysis of the urban situation is considered crucial for the design. The goal of analyzing the configuration of the complex and its surroundings is to define a design strategy which influences and works in both urban and building scale. Furthermore, the analysis will result in different starting points for the design. Urban characteristics which are going to be analyzed are: the existing use of exterior space, vehicular and pedestrian circulation patterns, exterior lighting patterns, views through and around the site, noise, activities and meeting points and vegetation.

Reflection: The method of urban analysis has given input in the design. The focus on the placement of the building in the urban fabric and the spaces around it helped to define the concept of accessibility of the courtyard. The larger urban scale of the neighborhood and district have been important for the design, mainly in the definition of the relationship between the cultural value of the existing situation and the addition of new elements. Therefore, this analysis has been part of the cultural and historical analysis and supported the decision making regarding which elements to keep and which elements to disregard.

Analysis of the existing building

The analysis of the existing building is considered crucial as well. The understanding of the underlying ideas and design elements is important when designing new elements in the

structure or when decisions have to be made regarding which elements will have to be removed. The plans, the internal organization, the used materials, the construction elements, the courtyard, the style and the proportions are some examples of the building characteristics which will be analyzed.

Reflection: The analysis of the existing has been indeed crucial for the manipulation of the building transformation steps and redesign.

Literature Study/ Cultural Historical Analysis

The conduction of literature study has initially the goal of gathering information regarding the history and culture of the complex and its urban plan, the neighbourhood and the architect. Furthermore, the literature study will include books or articles related to transformations of existing buildings some of which have monumental status. At last, the study will include texts related to architectural theory and urbanism theory in general.

Reflection: This method did not work initially because the literature choice was too general. The chosen literature was not specifically chosen for this neighbourhood and building. This fact was communicated by the external examiner during the P2 presentation. After that, the literature study has been made specific and lead to a cultural and historical analysis report and finally to important conclusions regarding the design concept.

Research by design

This method refers to hand drawings, collages, and 3D models. The perceived ideas will have to be translated into drawings which will be then analyzed. The aim is to bring new insights for the design by continuously trying out different options.

Reflection: This method has been thoroughly used in order to communicate the design with the tutors. However, the lack of accuracy has diminished the use of some drawings and could not help in finding solutions for complex matters within the expected time. There has been an effort to improve that throughout the process and the more proper drawings the faster the decision making and design elaboration could proceed.

Design by research

This method refers to the integration of the technical research results. That implies that the design will be influenced by the research output and findings. For example, when the zero energy design research will impose certain climatic measures which have to be applied, the design will be influenced by that and will have to follow a certain direction.

Reflection: The implementation process could have been made more explicit in each design step, mainly in the second semester. However, the result could still be favorable because of having completed a very detailed research during the first semester.

Model making

The making of physical models in different scales: 1:500, 1:200 or 1:100. This method can bring new design insights and is therefore an excellent way to try the impact of a design

choice. Furthermore, this method supports a more hands-on approach which can motivate me to consider even more design options.

Reflection: This method has finally not been used as much as expected. A model of 1:500 was made during the first semester and has been vital for the understanding of the neighborhood but it was not used later in the process. A 1:200 model helped in order to start the design on the courtyard facade but has not been extensively used.

Case study analysis

The case studies have to be related to retrofit projects, refurbishments, energy efficient upgrade, and examples of coping with existing and new, residential buildings which combine public functions.

Reflection: Several case studies have given an impulse of new inspiring ideas regarding the redesign of the balconies, courtyard and roof. It was helpful to reflect each time on the design elements were relevant or not for the specific context and materialization of the existing building.

Reflection on the time planning

This paragraph is a reflection on the time planning from the first semester until now. During the first semester, time planning was successful and the most of the goals were achieved within the expected period. Not only the graduation project was going well based on the planning but two extra courses as well. The reason why the schedule worked is because of naming explicitly the specific tasks which had to be done and setting specific personal deadlines. The time planning in the period between the P2 and P3 presentation was less successful for several reasons. To begin with, the fact that I had to retake the P2 during the first week of the new semester meant a less powerful start of the semester. The retake was quite demanding and instead of having a clear idea of the continuation of the design I have been quite confused. The real project was not there yet. This process took a lot of time which was initially planned for the elaboration of a detailed design and P3 preparations. The design could be improved, the time planning was though insufficient because it lacked specific deadlines regarding the new design steps such as building a 3D model or making more design details. Finally health issues the two last weeks before the P3 influenced negatively the process as well. The two weeks after the P3 have been extensively used to redefine the new revised concept of the project and the final design goals. The design process proceeded towards the making of final decisions and working out the different design elements. A planning and a list of actions has been made for the P4 preparations. The time has been used to the fullest in order to result in a complete and well argued design project. However, the first attempt towards a completion of the P4 presentation was not successful. Apparently, more time was needed in order to take several more precise decisions, work out details and create a coherent and complete project.

Reflection on the product

Relationship between design & research

Research has played a crucial role in the graduation process. Firstly because it was the main goal of the first semester but secondly because it influences the design. The main research

topic was zero energy design, but there were also other topics, the exploration of which had the goal to provide additional input data for the design. The other topics include research on the history and culture of the area, the urban configuration, the architect of the building complex and the values which can be found on the existing building. The conduction of the research itself was quite successful, the implementation however was challenging. In the technical research, the application of the chosen climatic measures did not apparently lead to an innovative design because of having the limit of the cultural value of the building. That implies that the most climatic measures are not expressed in the architectural interventions but they are applied in the interior and cannot be seen. The only element which expresses the implementation of measures is the overhanging energy producing roof. The conduction of research regarding the history and culture mostly helped on the decision making regarding the facade design and the choice of specific interventions on the courtyard.

Theme of the graduation lab and case study chosen by the student

One of the proposed themes of the graduation lab is regarding the " existing building stock". The case study I have chosen is quite representative since it refers to the renovation of an outdated residential building in the Netherlands, built in the 1930's. The residential stock of the Netherlands takes 90% of the total building stock of the country. It is therefore crucial to develop a strategy which can be applied in similar residential buildings which need to be improved in functional, technical and spatial levels. My graduation project is therefore well-fitted in the graduation lab goals which are regarding the strategy development for the existing stock.

Project versus wider context

The demand for energy efficiency in the building sector is a fact. The need for zero-energy buildings in the future would not only be more relevant than today, it will be obligatory for all buildings in use. Professionals in the building sector, including architects, managers, building engineers and academia, have to respond in the need to change the ways of construction, designing, choosing certain materials in order to contribute in a more sustainable society. The more examples of realized energy efficient or even zero-energy building retrofits the faster the knowledge will grow. The importance of my thematic research lies in the need of creating manuals on how to transform existing residential buildings into zero energy buildings and even beyond that.

The value of the overall project is that it will illustrate the integration of sustainable technology as a means to create a new architectural language. Integrating a sustainable transformation measures in buildings will be no longer seen as a hidden value but as a tool for expression. Architecture possesses the power to trigger the senses when the users will experience the space. Architecture has the power to serve the functions and solve spatial problems while improving the social interaction of between the users. This graduation project aims to illustrate that the power of architecture in combination with sustainable energy technology will prove that architecture has also the power to contribute to a sustainable and environmental conscious society.