

“Connecting the Maassilo”

Reflection paper

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Research & Design

Instead of starting with a blank canvas, the studio of Heritage & Architecture works with existing buildings, structures and surroundings. These all come with their own age, aesthetic, rarity, and other cultural values. The values can be qualities of the building or provide opportunities that may enrich your future design, but they can also pose as problems that make it challenging to realise your ideas for adaptive reuse of the building. An evident example are the technical challenges of a building that was built with less climatic qualities that do not comply with the current requirements for new functions.

In Heritage & Design, research and design are strongly intertwined. Before starting on your design for adaptive reuse, you have to do research on different aspects on all the different aspects of the existing building that you are working with. All its values, its history, the applied building methods and materials, and how the building was used and modified throughout its life. The types of research I conducted on the Maassilo in Rotterdam, mostly during the first semester of my graduation year, were field research consisting of several site and building visits, archive research with the aim of finding as much information as possible on the building in the form of drawings and technical documents, and literary research on articles and publications about the Maassilo. And as could be expected with older, existing buildings, some questions remained unanswered. I had to take some of these uncertainties into account when, for example, I was analysing the structural characteristics of the building. Since the Maassilo is such a functional building with hundreds of silos whose walls are all structurally connected, a critical research and design question for this project is: 'How much of the silos can be carved out to create space for new functions while still keeping the structural integrity of the building?' and 'How much of the silos can be carved out without the Maassilo losing its identity?'

I believe that designing with existing buildings can result in unique architecture where there is a strong interaction between the old and the new, whether they coincide or form a stark contrast. But this can only be done right when research and design are being practiced alongside each other throughout the entire design process, and when the design proposals are reviewed and evaluated on the impact they have on the existing building. Further along in my graduation project the research shifted from analysing the existing building and cultural values to a more functional research into requirements necessary for my new programme. After that, in the detailing phase and when choosing materials, the research went back to reflecting my choices on the building's original values and characteristics.

Design Method & Process

Characteristic to the Heritage & Architecture studio is extensive research on the cultural values of the existing building and site that you work with. During the P1 period at the beginning of the graduation year, I spent a lot of time together with group members, who chose the same building, to identify the qualities and values of the Maassilo. Our research was summarized in a Cultural Value matrix and accompanying value statements. This mandatory part of a heritage graduation project proved to be very useful as it forces you to look closely at all cultural aspects that are involved and because it makes you categorize, compare and, most important, prioritize these values. When discussing the value statements we came to some key discussion points regarding the Maassilo, three of which are shown in figure 1.

These key discussions were useful to summarize the identity of the Maassilo and helped me to set up my problem statement and the subsequent research question and goals for my design: to physically and socially connect the Maassilo to the urban fabric with an integrated sustainable design.

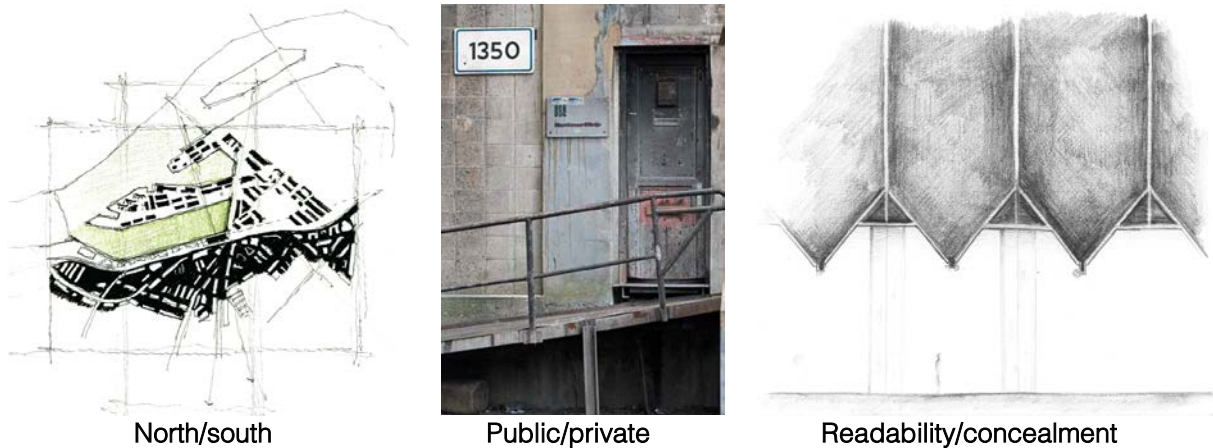


Fig. 1: Three of the key discussion points that identify the Maassilo.¹

Within the Heritage & Architecture studio, there are different design strategies on how to deal with the existing. One is to preserve as much of the original building as possible, another is to rigorously demolish big parts of the building, and then there is every nuance in between. In accordance with the values that I rated as most important, I have tried for example to base my design decisions on preserving as much of the building's closed-off and monolithic character on the outside as possible. This was easier said than done since the façades did need to be opened up to let in daylight for the new functions. In another example, carving out and cutting away parts the silo structures was easier to justify in order to create useful spaces and making the silo structures visible, but it brought along other difficulties like maintaining the structural integrity of the building.

Consequences of Choosing the Maassilo

In choosing the Maassilo as my graduation project, I wanted to challenge myself to work with a different type of building than I was used to. Different in the materials that were used – mainly concrete – and in the building's layout and structure. The Maassilo is a purely functional building, originally designed to serve its one objective: grain storage. The building was never designed for the use of people, only for the optimal storage of grain. This has resulted in a building that consists primarily of 325 adjacent silos in different shapes and sizes, without any floor levels, without any windows, and without installations other than those meant for distributing grain into the silos, see figures 2 and 3. Since these silos make up about 80% of the building, the largest part of the Maassilo

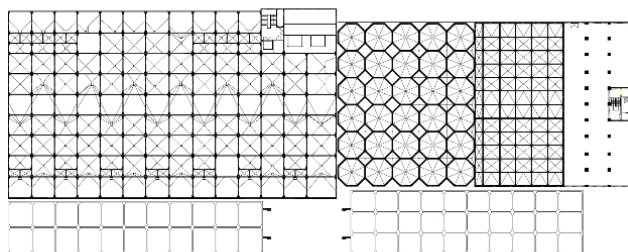


Fig. 2: Typical floorplan on the silo levels.

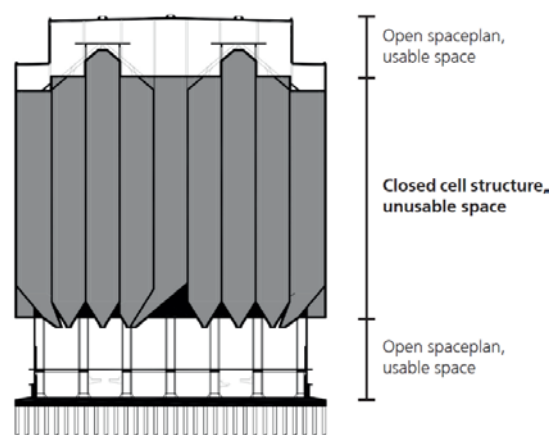


Fig. 3: Schematic cross-section of the Maassilo.

¹ Bruinsma, S., Hoogeveen, K., Stuijk, A., Vatanidis, K. & Van Weeghel, D. (2017) *Maassilo Rotterdam: an Analysis on Architecture, Cultural Value and Building Technology*. Delft: TU Delft.

has become unusable after the building lost its original function in 2003.

By making a design for reuse of the Maassilo, I wanted to see what such an uninhabitable building could transform into and how new functions would change the building's appearance. I got to the main concept of my design and the initial layout of the new functions within the building quite fast. The biggest struggle for me within the graduation studio had to do with the size of the Maassilo complex. Being a bit of a perfectionist and always wanting to hand in finished work, I wanted to make a design for the entire building and site and I wanted to work out all three new functions in the building. Given the size of the Maassilo this is impossible to do in three quarters of a school year. Nearly up till the P3 presentation I found it difficult to choose one function and focus on this one part of the building. This has caused me to dwell on a larger scale in my design too long before finally zooming in on details and materialization of this part so that I had to really speed things up when approaching the P4.

Even though the Maassilo is very big, I was a bit too ambitious in all that I wanted to fit into the building, causing me to almost end up with too little space to fit in all the installations and secondary functions. When this was brought to my attention I changed the scale of my functions and saw that not every inch has to be given a definite purpose. Leaving some spaces open or undefined can actually add value to the design and can make you experience the scale of the building.

Connecting the Maassilo

Next to socially and physically connecting the Maassilo, the other main objective to incorporate in my design was sustainability. This is a topic that I am very interested in and committed to in all the courses that I followed up to my graduation. Sustainability is no longer just a bonus for a design, it has become a necessity in order for buildings to be resilient and adaptive to climate change, limited material resources, and to the depletion of fossil fuels. Working with heritage and taking an existing building to fit current needs and new functions is already the first small step in the right direction for a sustainable project, since you are reusing an entire building. Since sustainability has become more and more popular over the last years, many designers and other people in the built environment are now working with a new standard where buildings at least have sufficient insulation to prevent energy loss, and some solar panels to cover a small portion of the electricity use in a building. But instead of merely putting some of these sustainable 'add-ons' on the Maassilo, I want to have an integrated and all-including sustainable design.

The integrated approach I chose is that of the Circular Economy, as designed by the Ellen MacArthur foundation. In this circular system, displayed in figure 4, the streams of organic and inorganic materials are placed in a cascading system that is designed to keep the value of a material as high as possible at all times and to minimize waste. Materials that have been used for process 1, starting on the outer circle of the diagram, and that have lost their value or have turned into waste in this process, return to the system in the next circle to be recycled or reused and act as a highly valuable resource in process 2. The waste or leftover product of process 2 then continues to process 3 and so on. The processes within the system are powered by renewable energy sources to preserve and enhance nature, and either use as limited finite materials as possible or use them as sparingly as possible.

In my case the circular system is the Maassilo. The building parts that will contain the new functions will all be insulated to reduce the thermal energy need. The streams that I included in my scope for sustainability are shown in figure 5: water, organic material, energy and building materials. The central point in my circular economy is the new function that will take place in phase 1 of the Maassilo: a beer brewery. This brewery uses water, organic material (grain, hops, and yeast) and energy in the brewing process. The excess water and energy are to be used in the rest of the building.

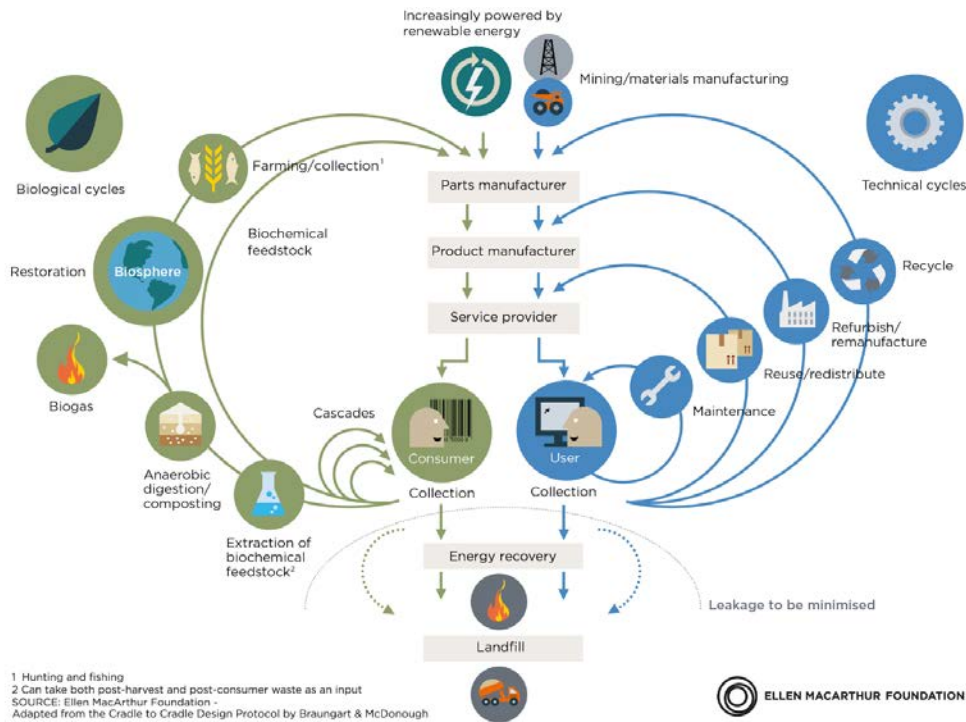


Fig. 4: Circular Economy System Diagram.²

In the perfect circular economy, all streams are connected, materials are optimally used and reused and there is no waste. I tried generating as much energy and useful products as possible (rainwater, electricity, heat-cold storage in water silos), re-use as much as possible (heat-exchangers, spent-grain bakery) and process waste as much as possible (waterfilters) all on the own site of the Maassilo. With one exception: if I could reuse a material on site but at low efficiency or if the material could be reused elsewhere in Rotterdam at a higher value, than I chose the second option. This in accordance to the EPA scheme shown in figure 6. This doesn't make the Maassilo completely self-sufficient and autonomous but it connects with other parties for a better result, which complies with the concept of 'sharing' in the circular economy, is preferable for the environment, and fits with my design concept of 'Connecting the Maassilo'.

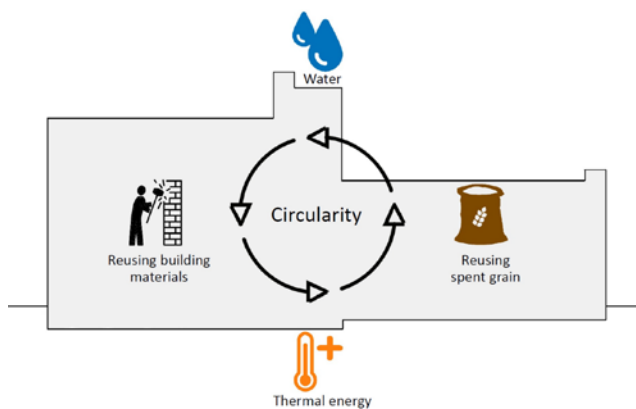


Fig. 5: Sustainability topics within the Maassilo.



Fig. 6: EPA Recovery Hierarchy.³

² Ellen MacArthur Foundation (2015) *Circular Economy System Diagram*. Retrieved from <https://www.ellenmacarthurfoundation.org/> on 23 May 2017

³ EPA (2016) *Food Recovery Hierarchy*. Retrieved from <https://www.epa.gov/> on 28 November 2017