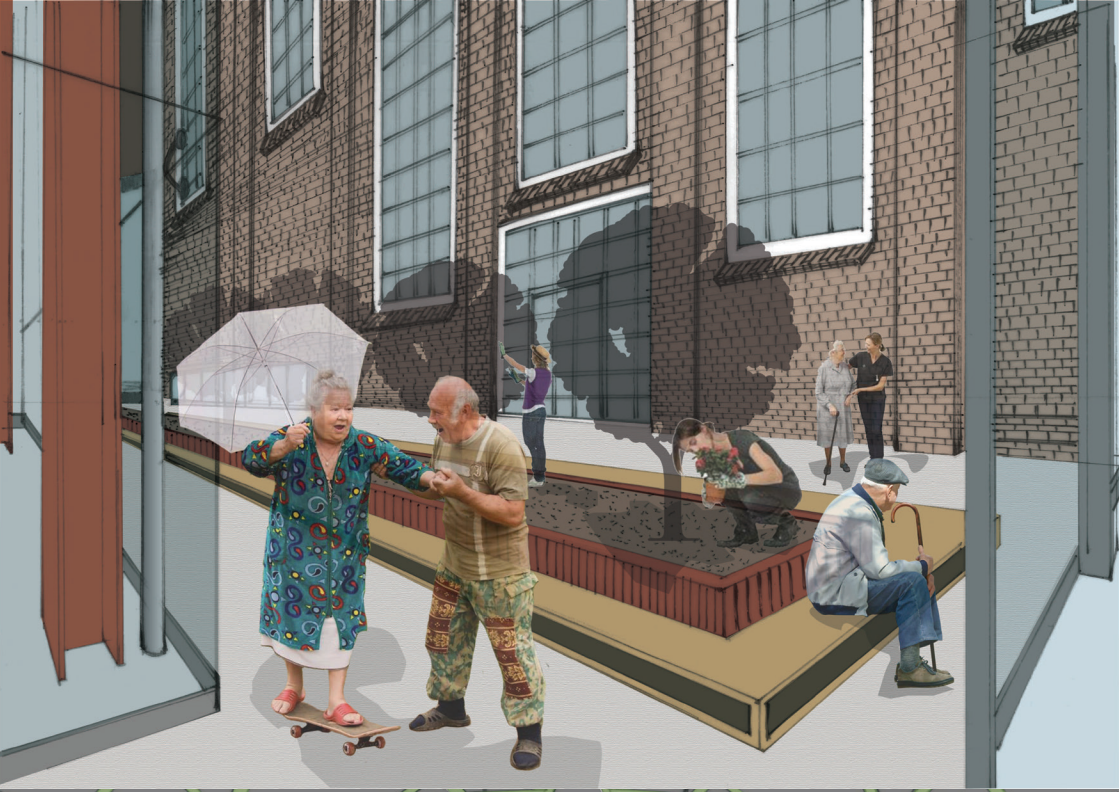

The Hembrug Culinary Arts School

a small community where elderly and young professionals live, study and work together

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Preface

This book chronicles my journey through the graduation studio of Revitalizing Heritage. It journeys through the initial days of contextual analysis, site analysis, research and first design ideas.

Then it goes through my design research and development over the most part of this studio and then concludes with my reflection and final design

"Contrast increases the splendor of beauty, but it disturbs its influence; it adds to its attractiveness, but diminishes its power."

— John Ruskin —

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02 Location

03 Research

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06 Reflection

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01

introduction

Choice of Studio

As more buildings get abandoned in the 21st century, the focus of architects should divert to reusing and transforming these buildings to serve the purpose of the future needs than to make more new buildings. I believe that the future of architecture lies in the repurpose and reuse of older buildings.
Architectural preservation and reuse have always intrigued me, and I have always tried to work in conservation in architecture which as a result directed my choice for this studio. Industrial heritage is a new field which I do not have much experience in, which is why I had selected this studio to learn more about it.

fig-1: The Cathedral

Historical Background

Development of the Site

Located within the former Stelling of Amsterdam. It was divided into three parts, the weapon's factory, the cartridge factory and ammunition factory.
The blue region in the middle was the Cartridge factory at the time of operations in the early 1900s. This is an important part to focus on as the changeover zone ensemble is located within it. It became very dense with buildings due to the production processes here being closely connected and also because of the lack of space available.
Hembrug being a functional site, this region was even more functional with a lot of new buildings added and old ones removed as production patterns and products changed and production processes changed.

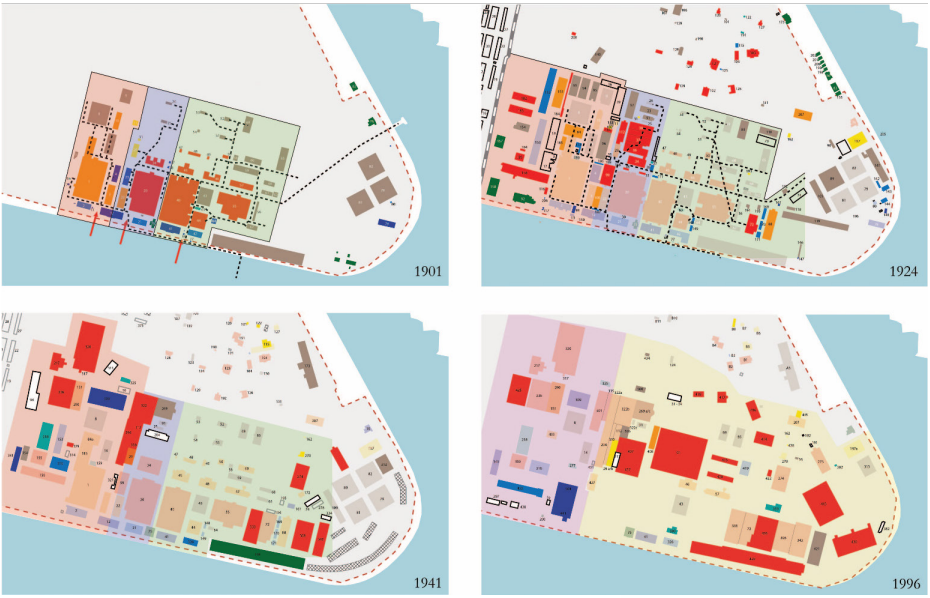
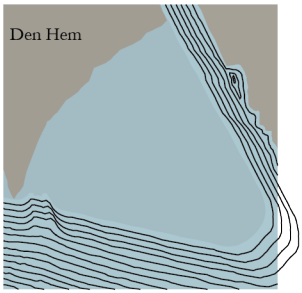


fig-2: development of the site

Historical Background

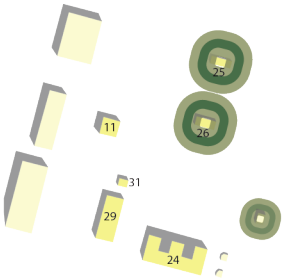
Development of the Ensemble

The site was originally part of the Den Hem neighborhood and was reclaimed from the north sea canal in the 1880's for storage purposes



1882

When the area had just started functioning as the artillery establishment, most of the buildings in the Changeover zone were either warehouses for ammunition or a production building



1901

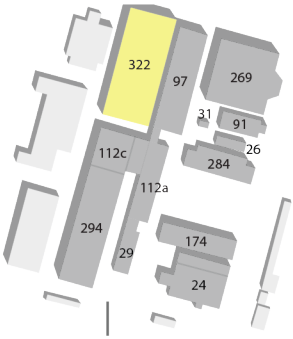
Fresh after WW1, the site was growing extensively with the maximum number of buildings made and the maximum number of people to have ever worked on the site. A lot of the buildings were relocated to this site and new warehouses came up as well as shooting ranges

1924

As more weapons and ammunitions were being developed and manufactured here during the 1920s and 1930s, more storage was required and as a result more warehouses came up on this site

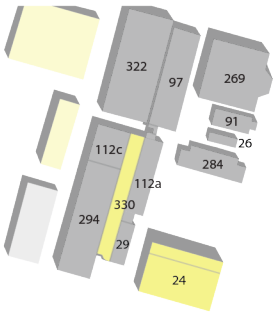
1931

Production had gone down after WW1 and the facilities were not used as much, hence expansion had stopped and more of the existing buildings and warehouses were upgraded of rebuilt



1936

During WW2, the Netherlands was under German rule and weapons and supplies were made for the Germans. Hence a few new buildings were built on site for more storage purposes

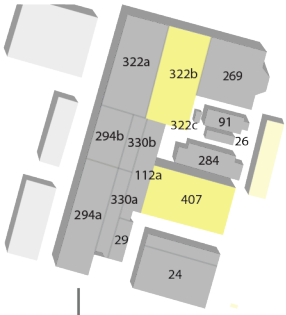


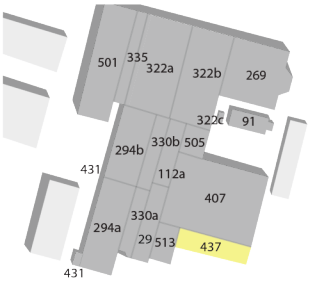
1941

New Buildings Existing Buildings

During the Post War era, the establishment was still in use as it served to produce weapons and ammunitions for various wars, especially the cold war

In 2010 the government decided to redevelop it to give it a new function and sell it to a company to preserve its historic characteristics but give it a new identity



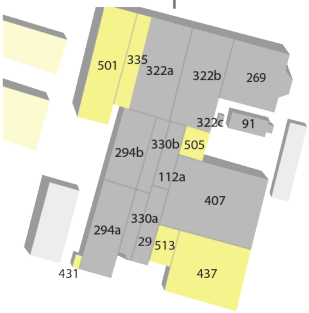


1963

2010

1996

Present



After the site was divided into two in the 1970s, Eurometaal continued its production of weaponry in small scale and the other company made agricultural machines on the site

Many buildings that were of no value were removed and the site was cleaned after 2010 to make it more attractive to potential developers

fig-3: development of the ensemble

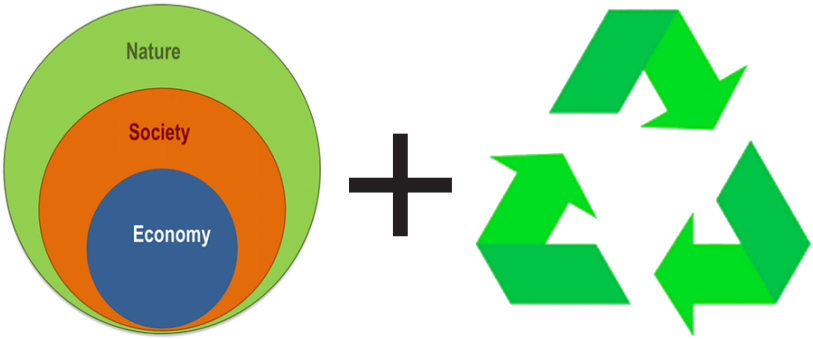
Hembrug today

Hembrug today is a very interesting place to visit as a lot of development is going on at the moment on the site. Today it is sort of an architectural lab where a lot of new ideas are being tried and tested with pop up projects. These pop up projects also attract a lot of people which makes the general public more aware of this site. Several diverse companies from food catering services to furniture studios reside on this site at the moment. The site was recently bought by a developer and they are in talks with several architecture firms to team up and develop the site together. OMA has a community based project which is coming up on the waterside as well.

fig-4: Hembrug Terrain today

Choice of Topic

The topic chosen is very dear to me as I come from a family with a lot of chefs. Therefore, cooking comes naturally to me and am very passionate about it as well.
From a young age I have also been doing a lot of community service where I have been focussing on elderly care. I have worked and voluntered in elderly care homes for more than a decade now and am very passionate about it.
Hence, I wanted to design something that would take into account both these topics that are close to me. A culinary school can be very diverse in the sense that there is no age bar to become a chef and a combination of the young and elderly could be an interesting situation where both groups can help and learn from one another.
This program also has a lot of scope to create and show innovation in terms of sustainability and a well rounded design would be able to portray a harmonious relationship between the young and the old coupled with innovative sustainability approaches.



sustainability

reuse

fig-5: choice of topic

Problem Statement

The site of Hembrug is a former military site which was the main and only Artillery Establishment of the Netherlands for the most part of the 20th century. It was vacated by Eurometaal in 2003 after it had used the site since the 1970s. After this, the central government has been trying to strategically work with the province and Zaanstad municipality for the reuse and transformation of 42.5HA of the Hembrug site. For this project the municipality of Amsterdam was also involved to include Hembrug in the future development plans of the expansion of Amsterdam.

The Hembrug site is an industrial heritage site with several buildings and structures given the status of national or municipal monument. Several buildings are in a state of ruin but have various characteristics that are of high value which need to be preserved. There are several remnants of the past that still exist today which would need to be kept keeping the general spirit of the place intact. The Hembrug peninsula has been visioned as 1 of 4 hotspots for tourists in Zaanstad and will be redeveloped in a way where it retains its own identity and is a connection point between Zaanstad and Amsterdam. The Hembrug peninsula will be transformed into would need to be self-sufficient region of Zaanstad with a focus on residential needs and other various public functions to compliment the area and its residents.

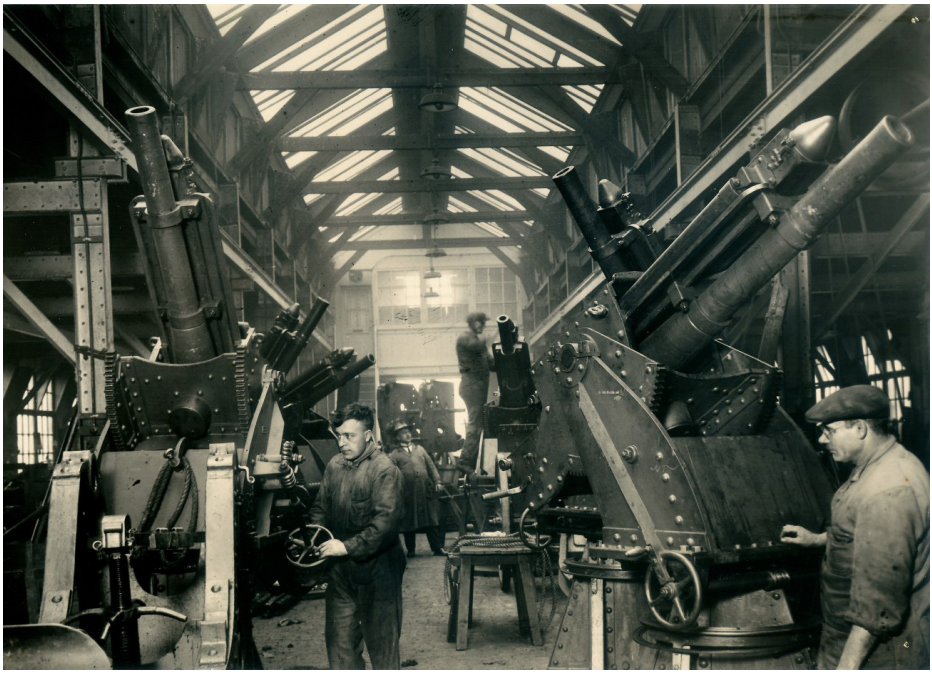


fig-6: Artillery Establishment 1920

Research Question

How can a new Contrasting Intervention help rejuvenate the Changeover Zone Ensemble?

Can this idea of bringing contrasting architecture to Hembrug help provide a long-term solution to attract people to the site? To give visitors something to talk about and return back to?

With the help of this contrasting intervention, can the spotlight be put back on the existing to highlight it and its values?

Design Inspiration

Design was inspired by the several site visits I've done both with the class and on my own over the past one year. Every time I walk around, I get a better understanding of the general language of the architecture of the site. Brick facades, with gabled roofs, or the iconic concrete shell roofs crowd the site and make it the key architectural feature of this site.

I feel that as more and more people visit this site, especially the ones not familiar with the architectural way of thinking or seeing, might find this site boring after a while and as a result, Hembrug could become a one time visit spot and that would be a problem because going forward we want people to be coming back. often. We would need a USP or unique selling point which would ensure visitors returning for years to come.

This glass box shown in the last image to the right is not intriguing architecturally but I like the idea of it contrasting the general language of the architecture present on the site. Therefore, I want to create such a moment of surprise in the changeover zone as well with my intervention which would contrast the existing. I think this could also be a long-term solution for the whole of Hembrug if such regions of architectural contrast are created within Hembrug, it would be an interesting point of discussion and could attract more people to this site in the future.

fig-7: design inspiration

Relevance

The attitude in the field of architecture is changing and will accelerate further towards conservation and reuse rather than the new. The transformation of (old)/unused buildings to serve the needs for future developments will become one of the main approaches in Architecture especially in Europe as mentioned by Wessel de Jonge in his lecture where he states that in Europe alone, the majority (56%) of the architectural developments are focused towards reuse and the rest (44%) are focused on new buildings which already a good start to a sift in focus to conservation architecture.

The context of the Hembrug is very interesting to me, because it is comparable to a lot of former industrial heritage sites in the Netherlands. These industrial sites were built at the edges of cities and were encapsulated within or around that expanding city during the last century. Nowadays there are barely any heavy industries left in and around the major cities. The abandoned areas become vacant islands sometimes with designated monuments in them within the city and offer a lot of potential for future developments without demolishing the existing buildings and structures. This graduation project could be a showcase for the redevelopment of a former industrial area and how it could enhance the outlook of the city it is in (Zaandam) and better connect itself to and improve its relation to a major city (Amsterdam) nearby.

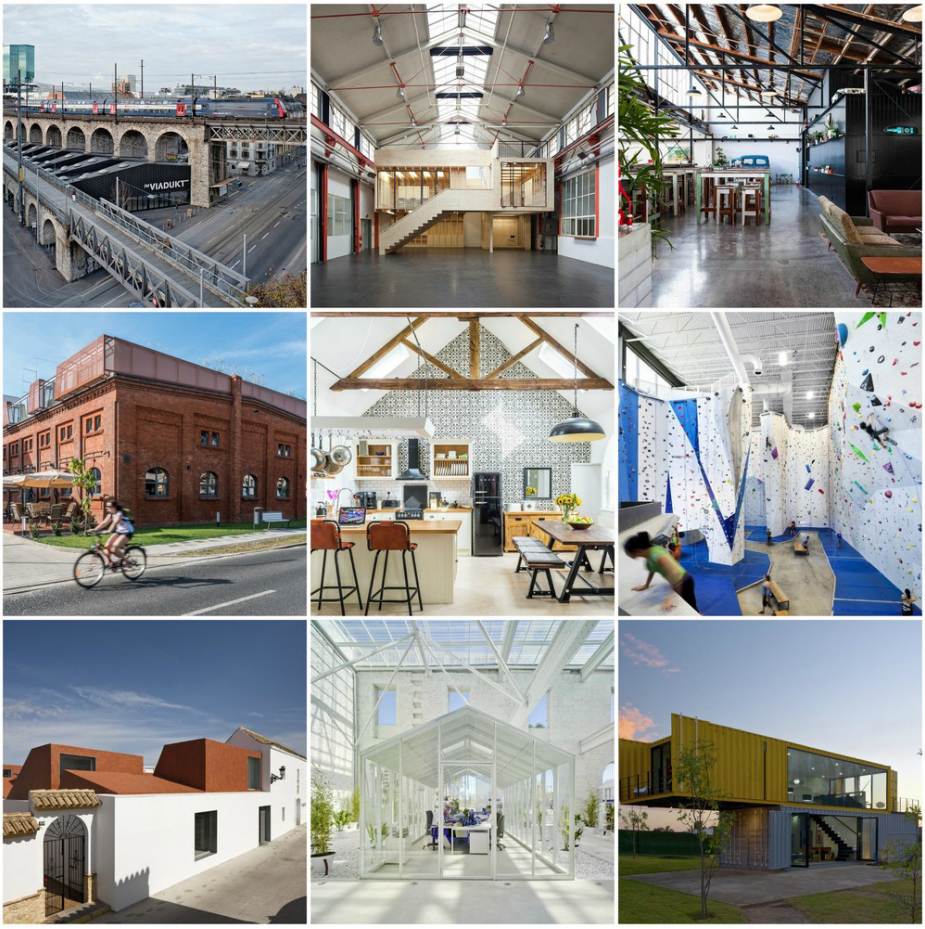


fig-8: adaptive reuse

Method

In Heritage and Architecture, research with respect to context is of the essence and Wessel de Jonge highlights this in his book "Designing from Heritage," where he says that in order to create a well thought out 360 degree design intervention, one needs to do a thorough research first of the context, and defined it as context-led design. But we all do research before we start a design project be it Heritage or not. What distinguishes this field from the rest is the focus on the values of the site, more specifically its cultural values. The value assessment therefore gives the architect a knowledge base which he can then analyze, understand and use to create a meaningful design.

I based my research methodology closely with the heritage value matrix developed by Kuipers and Zijlstra. But as mentioned several times before in many texts and articles about the dilemma's architects face when they value an existing piece of architecture and problem often lies in the subjective nature of the issue because what is valuable to me may not be equally valuable to another.

The approach that Kuipers and Zijlstra take in their value matrix system makes the whole process more objective and generalizes it a little with constraints so that it can be applied more objectively to a range of projects.

An interesting topic of debate is the addition of the economic factor into the design and analysis process. As the viability of a certain project nowadays depends highly on the economic resources, I wanted to add a quantitative layer into my design thinking and therefore touched on the idea of the viability of my design intervention in terms of monetary resources. His principles focus on the rapidly increasing scarcity of raw materials and through his series of works shows us how energy neutral and positive buildings can be designed in innovative ways. Rather than a crisis, he sees this situation as a challenge and thus, shows us how sustainability can be handled and put into practice keeping in mind, economic viability which is and will be extremely important aspect in current and future markets.

Therefore, inspired by his way of thinking I have tried to make my design energy positive by reusing and producing the energy requirements on-site and have also focused on making my raw material cycle more circular and sustainable.

The idea of creating a materials portfolio which helps track the values of materials used and giving a project a life span and renting materials for that duration is inspiring and gives suppliers an advantage and greatly improves the economic viability of the project. This is an approach I am using for my design where I will be making a portfolio for the materials I will be using and also lease them for a period of 20 years after which the design could change or evolve and the materials could be returned to the supplier.

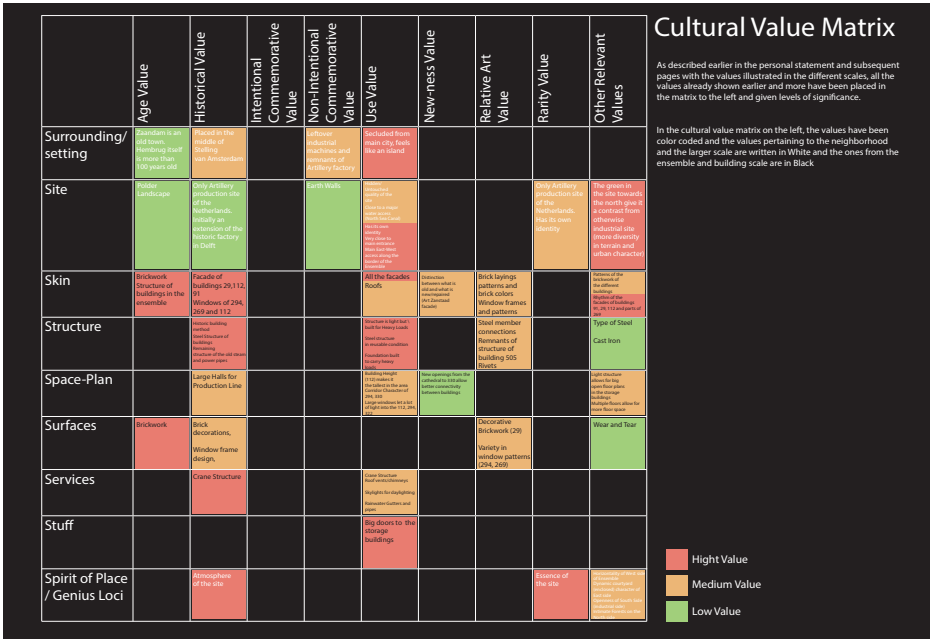


fig-9: cultural value matrix

02

location

Location of Ensemble

The ensemble is centrally located within the site. The street from the main entrance leads straight to the ensemble and runs along the west border of it as well.
The main and historic east west access that once connected all the different factories together still exists and runs along the south side of the ensemble. The north side of the ensemble is quite different and brushed by the green forests of the plots in the wood.

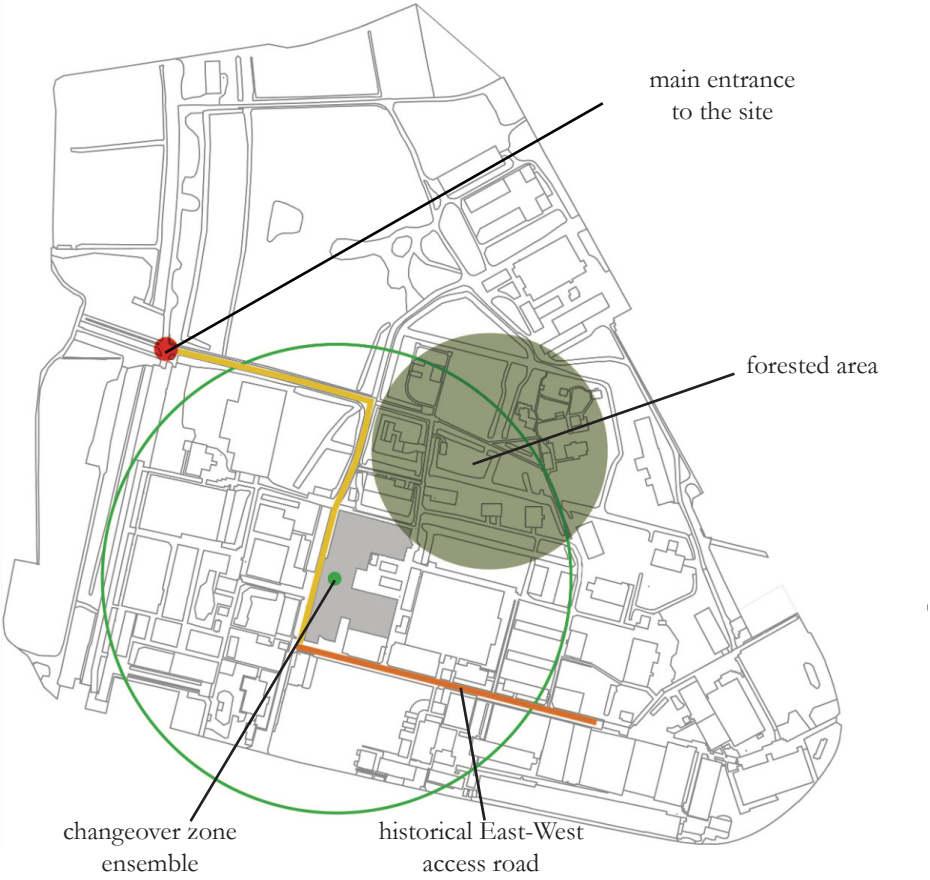


fig-10: ensemble location

Chosen Ensemble

Borders

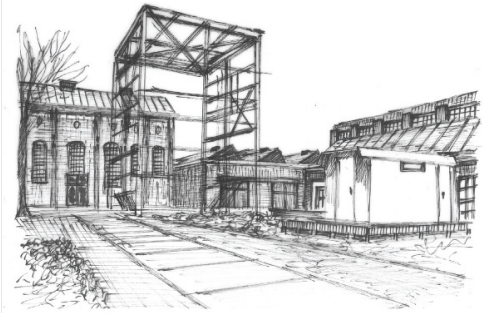
The Northern border of the ensemble is very green with the dense packed trees of the plots in the wood

The Eastern border of the ensemble is closed and intimate with the box building of the plots in the wood and the courtyard in front of the Cathedral

The Southern border is very open with an open space in front of the clean 2 antarctica building and a direct view towards the canal

The Western border is very linear because of the two long buildings (Yada-Yada and Art Zansta-ad) along that edge

northern border



eastern border

southern border

western border

fig-11: borders

Chosen Ensemble

Connections

The image on the right shows all the connections between the buildings. As one walks around the ensemble, all the connections can be seen. Some are still accessible today, while others are visible but closed off due to decades of functional changes to the buildings in the ensemble

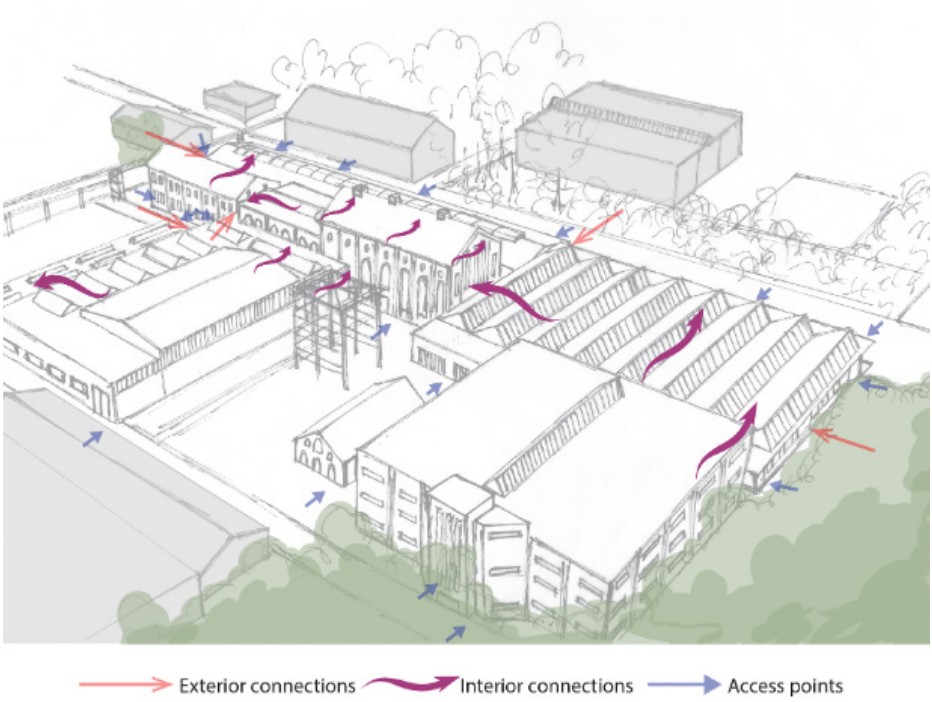


fig-12: building connections

Chosen Ensemble

Typologies

There are several typologies that can be found on this ensemble. The main ones are the Cathedral typology which is the most significant one. Then there are the Barn, Shed, Warehouse and Shack typologies which are all still present and make this ensemble very unique. The barn typology is the most common one of the ensemble.

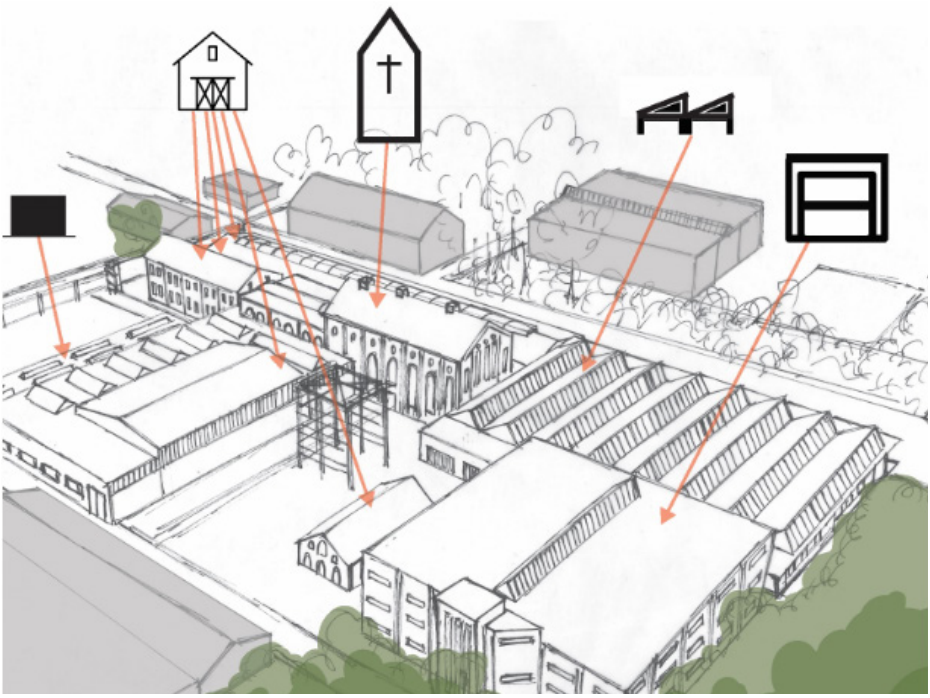


fig-13: building typologies present today

Buildings Present

29 “Clean 2 Antarctica” (1901)
112 “The Cathedral” (1920s)
91 “Water treatment” (1920s)
269 “De Dood” (1920s)
294 former “Yada-Yada” market (1930s)
330 former “Yada-Yada” market (1930s)
322 “Art Zaanstad” (1930s)
407 “Annealing Oven Building” (1960s)
437 “Storeroom” (1990s)

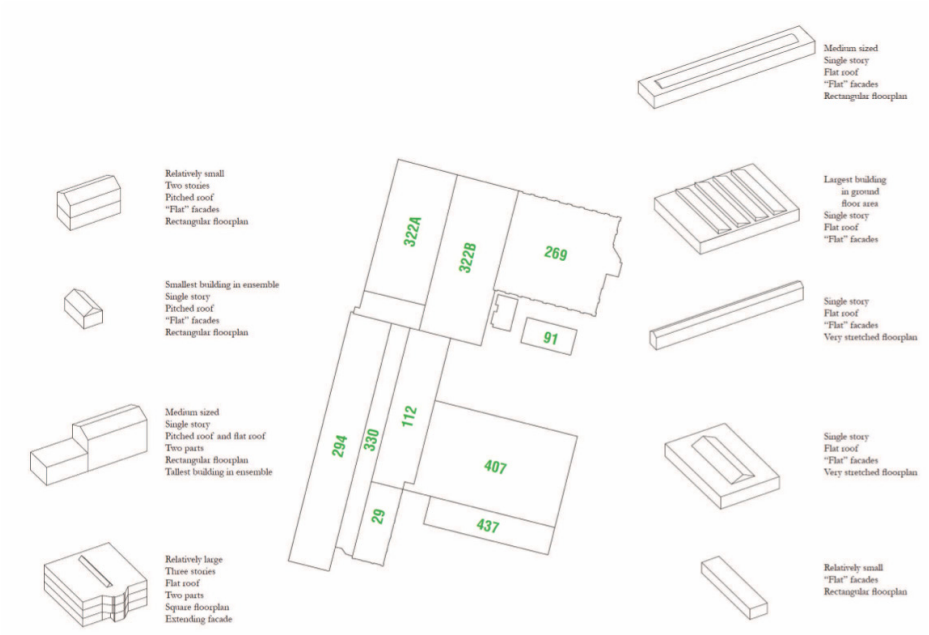
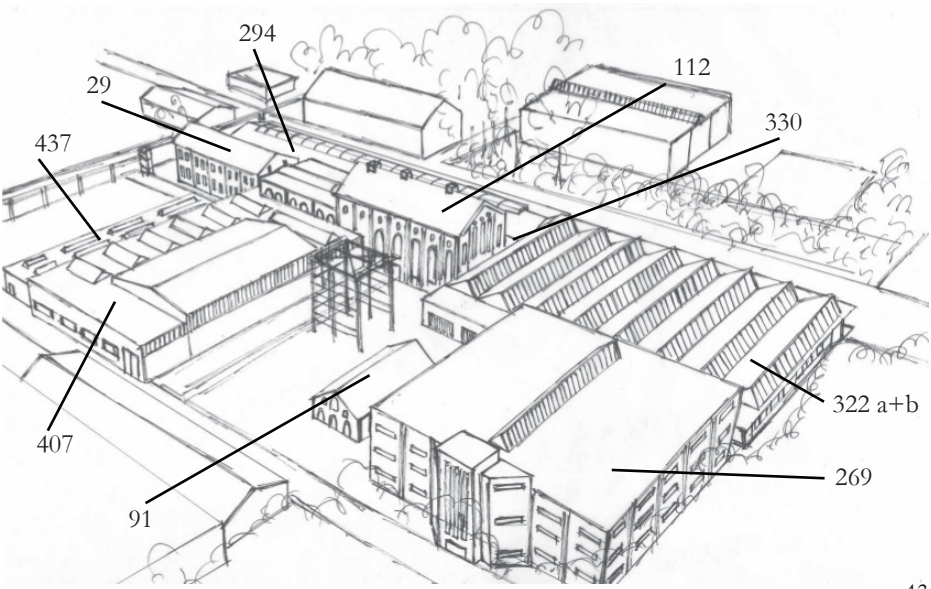


fig-14: building overview

fig-15: bird's eye view of the current building scenario



Current Ensemble Condition

29 used as a storage space for “Clean 2 Antarctica” company
112 used as an event space by the ‘Taets” food catering company
91 used as a furniture fabrication space
269 sparingly used as an exhibition space
294 was used as the “Yada-Yada” market
330 was used as the “Yada-Yada” market
322 “Art Zaanstad” art gallery
407 abandoned and unusable
437 used as a storage space by the ‘Taets” food catering company

fig-16: current building condition

Hembrug in the Future

The Hembrug Terrain has been included as a part of the future expansion of Amsterdam. The government as part of their scheme is urging young professionals working in the Amsterdam area to move to Zaanstad to bring more people to this former industrial region.

A lot of people who used to or want to live in Amsterdam cannot afford it anymore due to rising real estate rates. This area is ideal where one can move to the upcoming residential developments and still be part of greater Amsterdam.

Hembrug has been assigned one of 4 future hotspots for tourists in the expansion plan. A new metro station is coming up and better connection through public transportation is also planned. It is close to the airport and other major train networks.

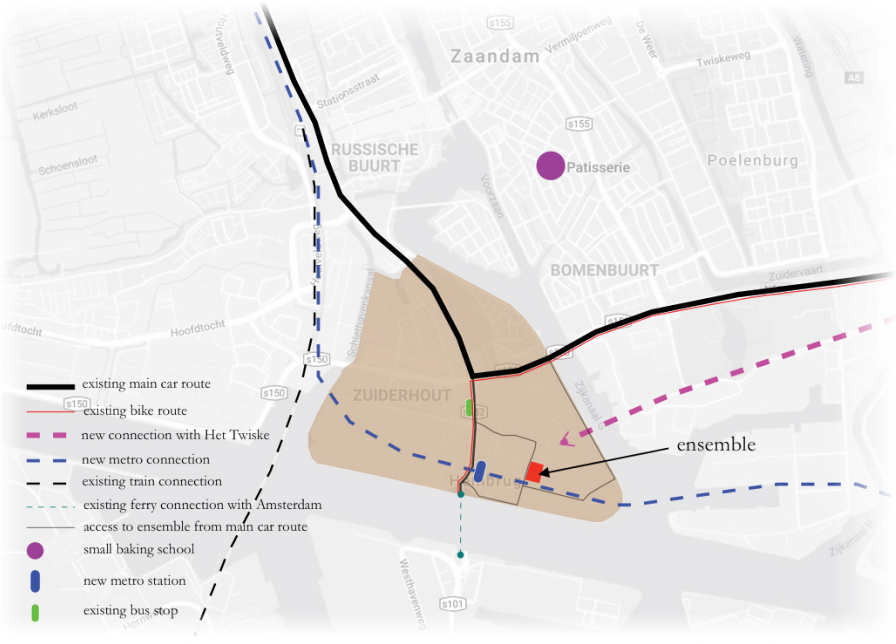


fig-17: future scenarios

03

research

User Groups

Young Professionals

Young professionals in the the modern day have innumerous requirements. They prefer socializing, working together in groups, a lot of physical activities to stay healthy and work hard and long hours.

Elderly

Elderly people contrary to their claims, also have a lot of requirements. They are several groups of elderly, each with different requirements. Some groups prefer to mingle with young and socialize, some groups want privacy and want to live private lives. Elderly sometimes need constant support or companionship. They can be very challenging to deal with sometimes and often require activities to stay busy and occupied during the day.

young professionals

elderly

fig-18: user groups

Coexistence

Young people and elderly can life together effectively helping and benefitting from one another. From research I found out that the two most popular activities for elderly are cooking and farming. Thus involving them in the culinary school would be beneficial for them where they can help out and can keep themselves busy. Young professionals on the other hand can benefit from learning from the often more experienced elderly and take help from them as well. Rent also becomes expensive for young people in today's world, therefore, the young and elderly can live together where the young can pay lower rents and in return help care and support the elderly.

fig-19: coexistence

Interviews

Interviews with current residents

During the analysis of the site, some of us were lucky to interview some of the current residents of the site and understand how they think and view the site. From these interviews we found out that the privacy of the site due to the site being unknown was liked by many. The greenery was loved and the interaction of the site with nature often distracted the residents from the fact that it is surrounded by industry. The architecture of the site is popular and take several older residents down memory lane where they are reminded of the site's past history.

Interviews with culinary experts

I also visited several culinary schools of different scales and was fortunate to interview some of the experts there where they told me about what the requirements of the program are, what they need, what they lack and what could be improved. They gave me insightful knowledge of the technical requirements of a culinary school.

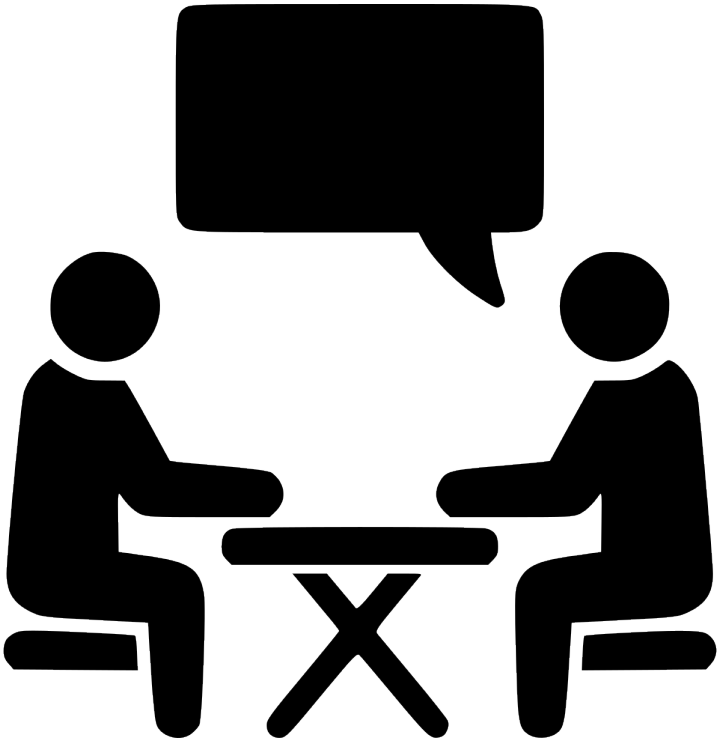


fig-20: interview

Cultural Value Analysis

The Cathedral building, its levels of significance and the cultural values related to it are a good representation of the other cultural values of the other buildings in the ensemble. So it was logical in picking the Cathedral to show how I want to focus on my cultural values for this building and in turn the ensemble.

The cultural value analysis tools helped me understand the buildings well and how a logical and innovative design intervention can be created around them which would make sense in today's context. These tools such as the value matrix provided by the department of Heritage and Architecture at the TU Delft, make designing with heritage a much smoother process.

fig-21: cultural value and its levels of significance

Precedents

fig-22: House in Vexin by Jean-Philippe Doré, France

fig-23: Music School Louviers by Opus 5 Architects, Normandy, France

fig-24: Moritzburg Museum Extension by Nieto Sobejano Architects, Germa-

The Cathedral

The Cathedral is a building that I took to right away. It grabbed my attention from day one and I have stuck to it since. Being the tallest building in its vicinity, it is hard to miss and some of its characteristics (highlighted in the diagram on the right) such as the beautiful rhythm created by the buttresses on the inside and outside as well as the unevenness of the window heights all make this building stand out and distinct from the rest. The heavy load-bearing masonry wall contrasts the light steel roof construction cleverly and the openness of the floor plan coupled with the sheer height of the building truly gives the occupant inside the atmosphere of the nave of a Cathedral as its name suggests.

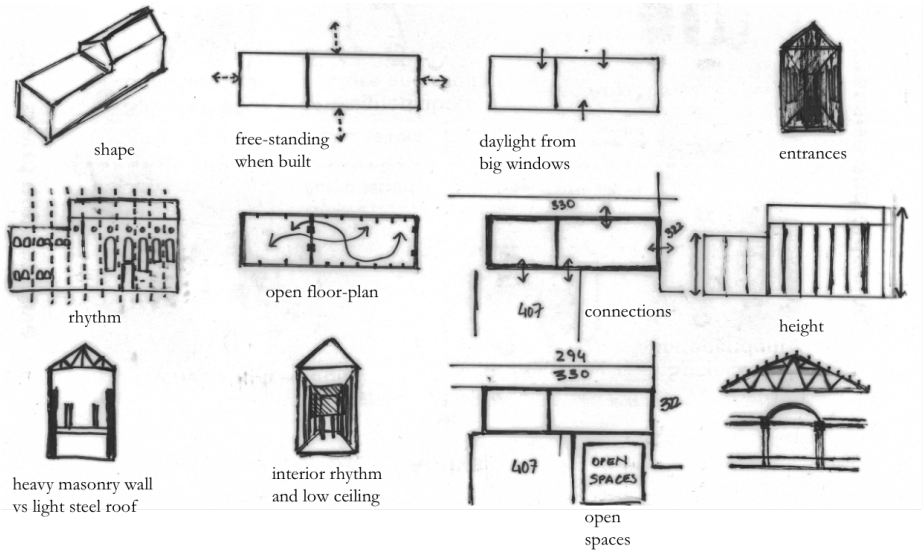


fig-25: characteristics of the Cathedral

fig-26: inside the Cathedral

04

design

Urban Design Strategy

The private functions of the ensemble are concentrated on the more closed off North and East side whereas the public functions are concentrated on the open and public South and West side.

Residences are designed with 2 bedrooms where one can be inhabited by the elderly and the other by students where they can live together. A community center is also present within building 322 where everyone from the ensemble can mingle, socialize, study and relax.

The Hembrug museum is also moved to this building which is the first thing a visitor sees.

The restaurants in the former Yada-Yada market complement the culinary school and helps support the ensemble economically as well. It showcases a changing menu restaurant and as a result, students and professionals can showcase their works from different cuisines there.

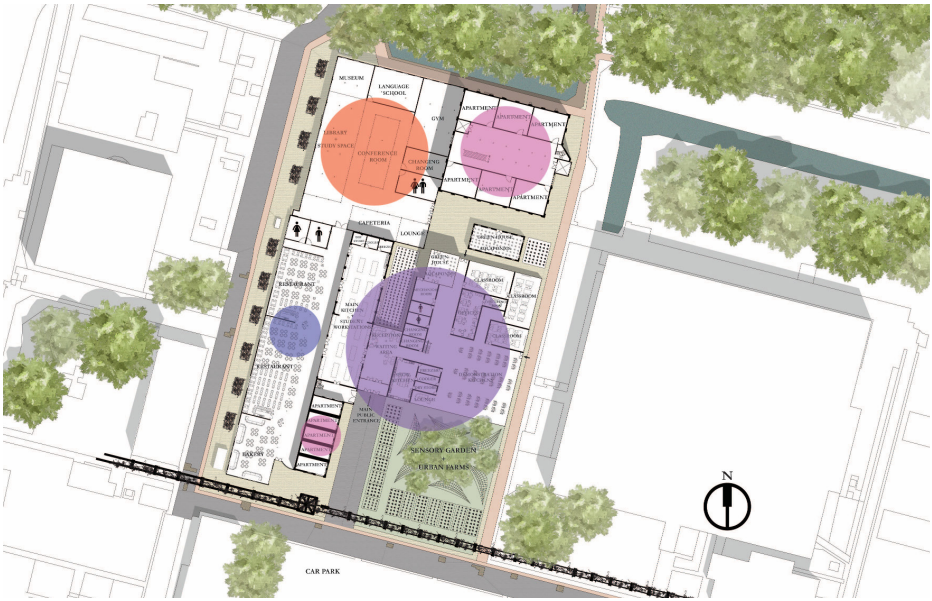


fig-27: urban plan of the ensemble

- culinary school
- residential
- restaurant
- community center

The Culinary School

The first part of the culinary school is the open space on the South side where there is a sensory garden stimulating the senses of the visitor before he/she enters the culinary school.
The main kitchen which is also the advanced classrom is housed in the Cathedral whereas the intermediate kitchens and classrooms are in the new part. There are urban farms spread out across the ensemble and the roof of the new part.
Service access is possible from the extension in front of the Cathedral which also houses the mechanical room for this building.
The intermediate kitchens and the show kitchen is on the public side, whereas the classrooms and offices are on the private side.

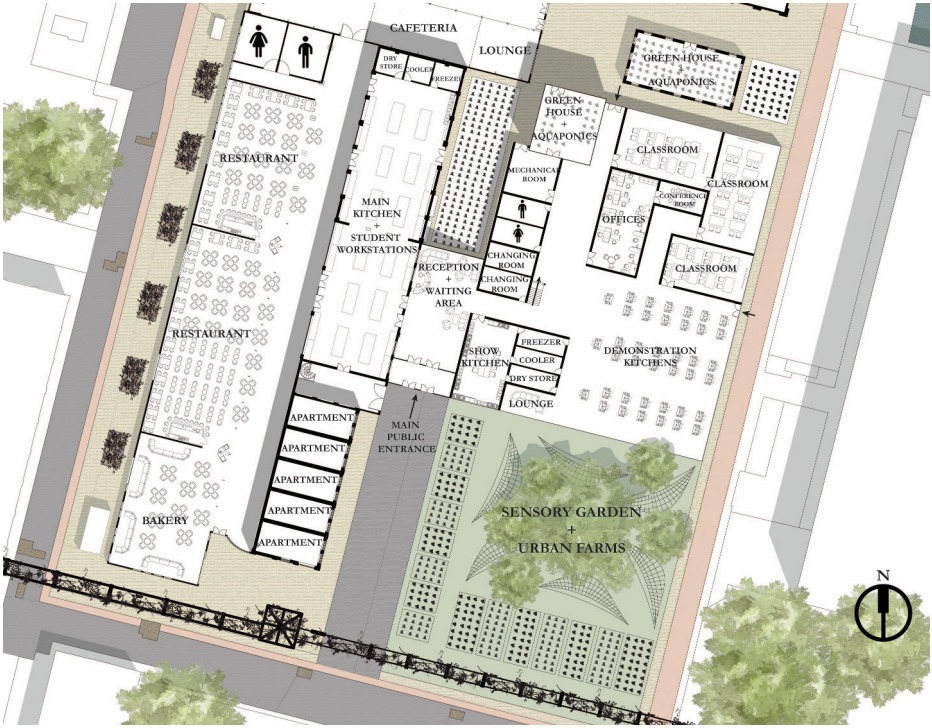


fig-28: plan of culinary school

The Cathedral

One of the main values of the Cathedral is the high ceiling height which gives the visitor the Cathedral like experience. The left half of the Cathedral has a lower flat roof which diminishes this effect. Which is why, in order to make this experience more consistent, I raised the roof with a new structure which supports a new metal roof and new openings.
On the inside, there are cooking islands for the kitchen with exposed ductwork to maintain the industrial character of this building

fig-29: Cathedral in section

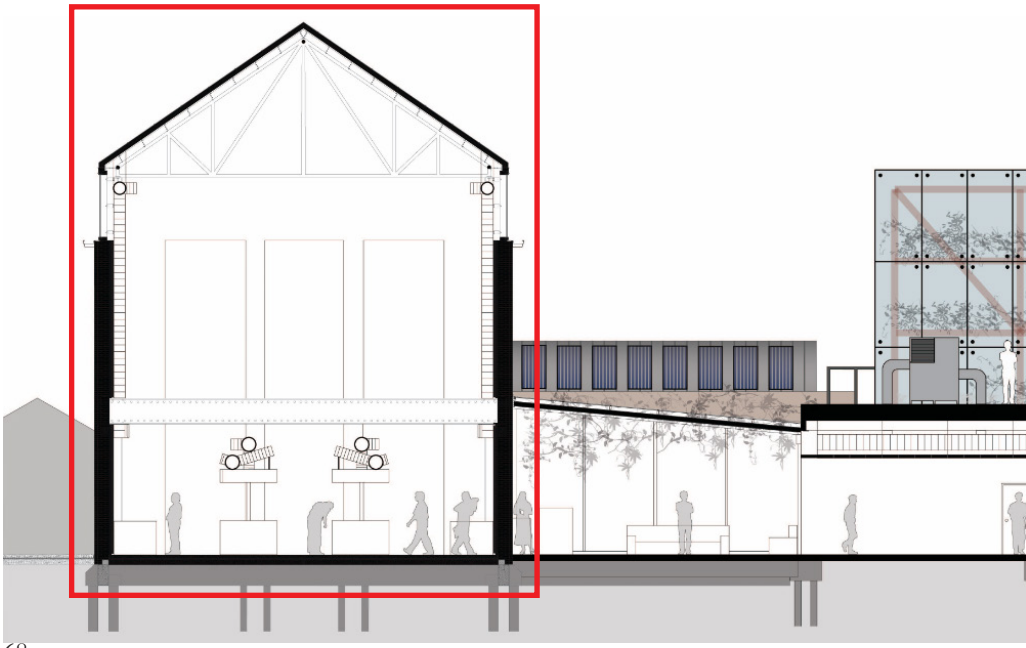
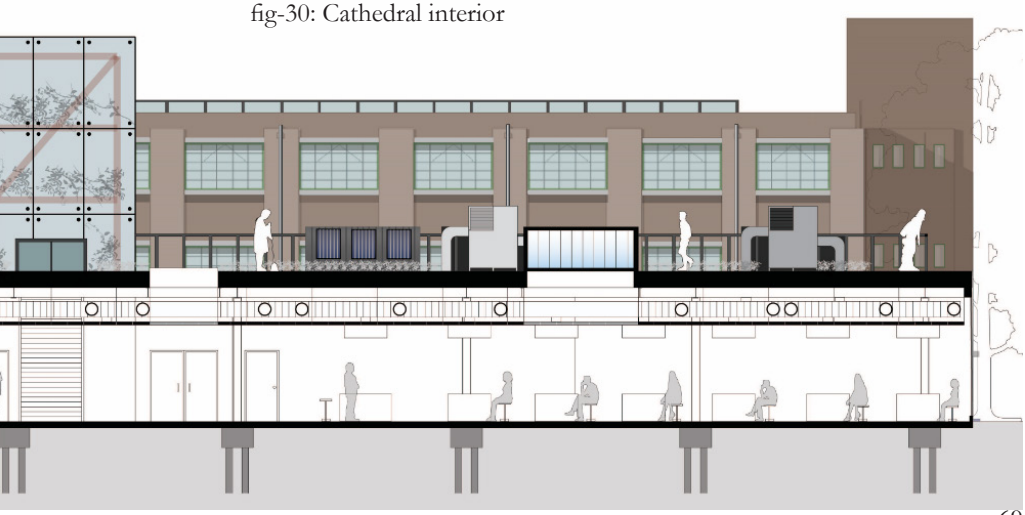


fig-30: Cathedral interior



The Cathedral (Roof)

fig-31: Cathedral roof design

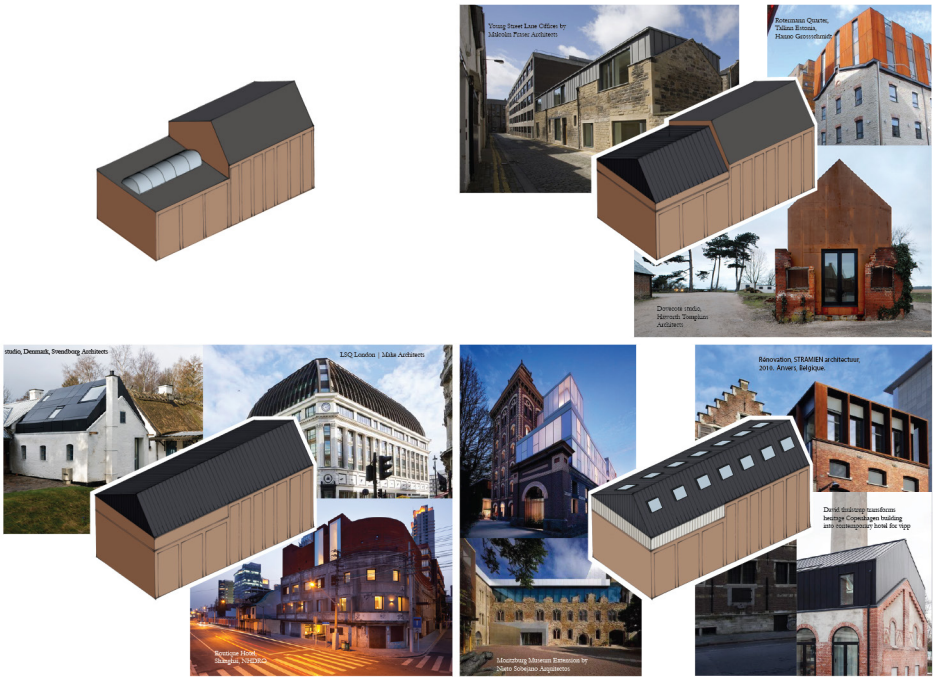


fig-32: Cathedral roof design process

I did several experiments with the roof design where I looked at several precedents to understand how each iteration affected the overall design. I did try iterations where I kept the higher part of the Cathedral to its original and only made a new metal roof on the lower part. But I see the roof as an element that holds all the different eras of the building together, hence, I finally decided to make one complete roof made of metal.

The Cathedral (Insulation)

fig-33: Cathedral new insulation

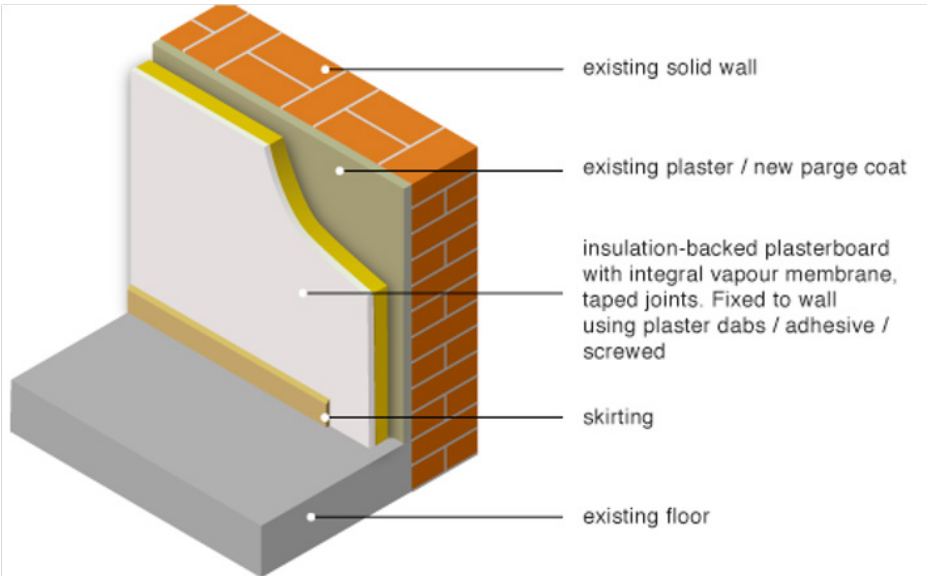


fig-34: Cathedral insulation idea

Since the production of ammunition produced a lot of heat, heating was not a problem but excess heat within the building was a problem in the summer. The Cathedral has no insulation but only a very thick load bearing masonry wall.

To make the Cathedral more thermally efficient and to make the building envelope more energy neutral, I added a layer of insulation on the inside.

The Cathedral (Window)

The window design of the Cathedral is iconic but the window itself is not important and very inefficient with its single glazing package. I replace the old windows with new ones with the same design and same thickness. The new windows are double glazed and a part of it is operable to help cool in the summer months.

fig-35: Cathedral window design process

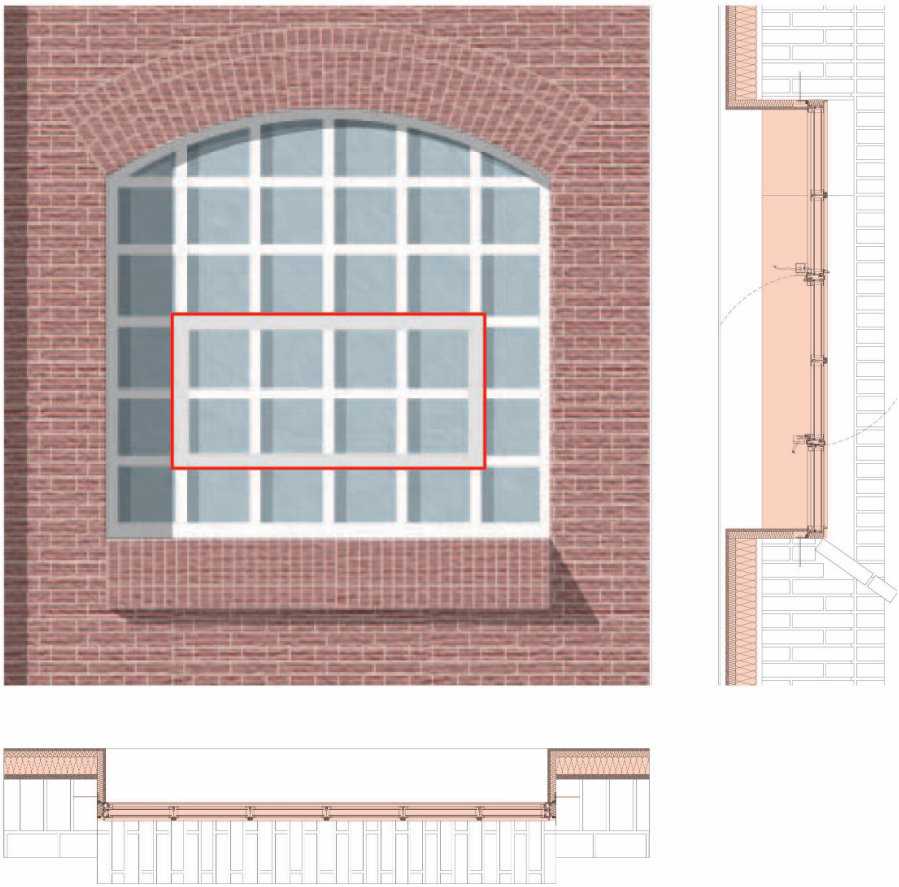


fig-36: Cathedral window design

The Glass Box

The glass enclosure/box is the connecting element between the old and new. I wanted to make it transparent so that one could see the old and new at the same time. This part of the façade is currently closed off by the old unused 407 building which is in front of it but I opened up this facade so that the values of the facade of the Cathedral can be seen again.

fig-37: glass-box in section

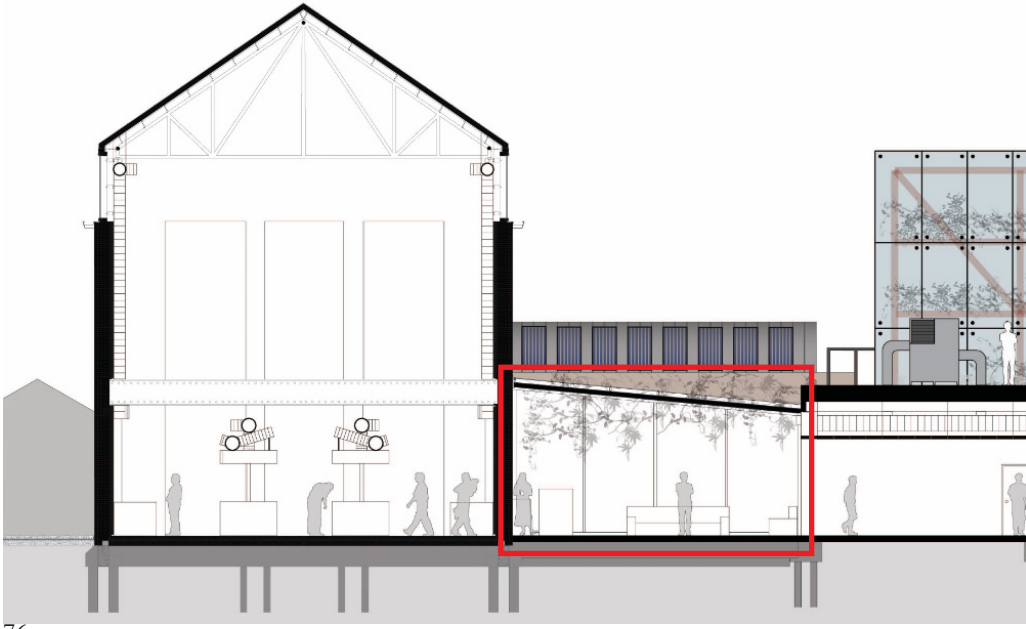
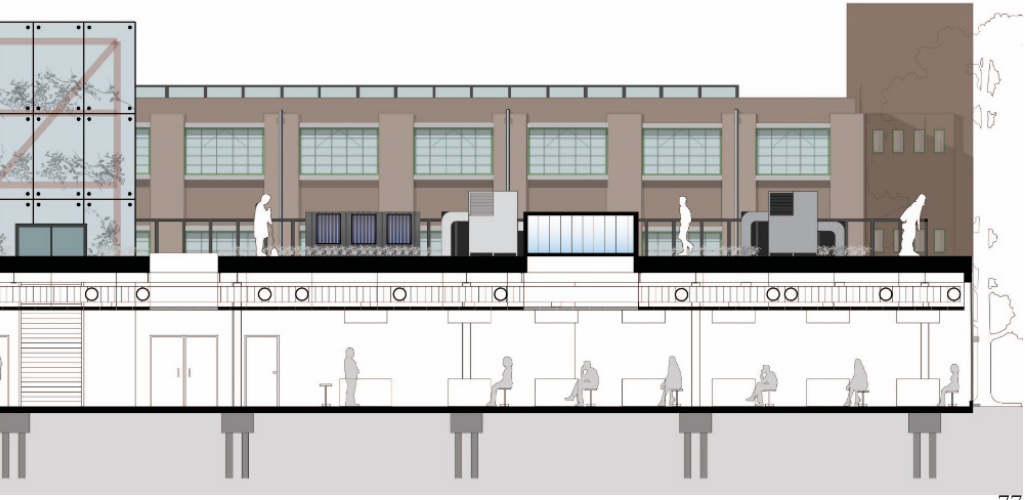


fig-38: glass-box interior



The New Extension

With the new extension I wanted the experience of this space to contrast that of the Cathedral. The overall look is clean with technical systems hidden away in the ceiling.
The architecture of the spaces mimic contemporary styles and the façade is very transparent to allow the program to be showcased unlike the Cathedral. This also contrasts the heavy masonry walls of the cathedral
and the heavy green roof with its big steel beams contrast the light steel truss roof construction of the Cathedral.

fig-39: new extension in section

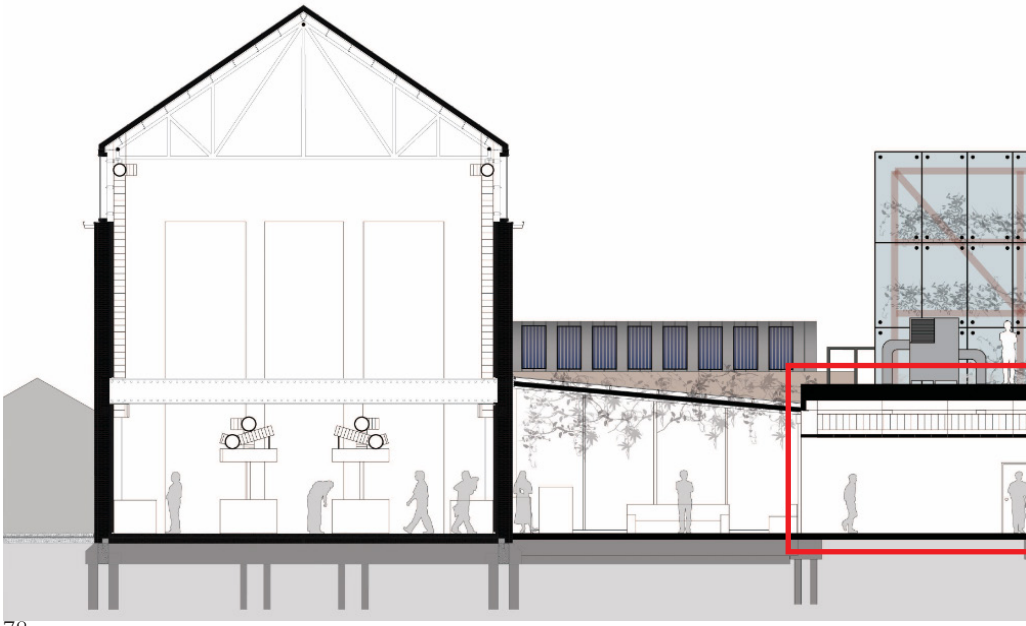
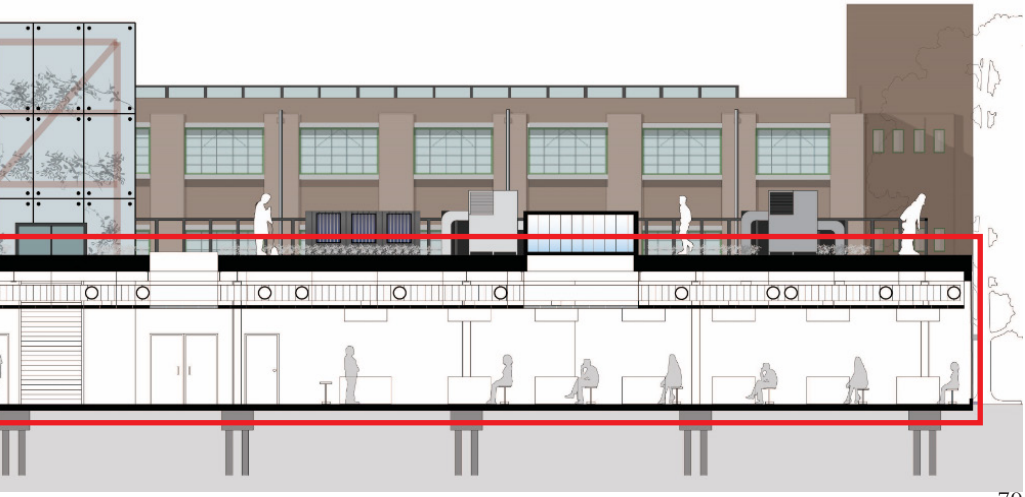


fig-40: new extension interior



Old & New

Bringing the old and new together, the visitor first walks into the glass lobby and then on one side you see a very classic Hembrug style architecture in the Cathedral with its industrial character and exposed systems.
On the other side you see a building made in contemporary style very clean and transparent
In the middle you have an element that connects them and makes it possible to experience both at the same time.

fig-41: old and new together

Sustainability Approach

Thomas Rau shows us how sustainability can be practiced in architecture and that the energy crisis is solvable with the right attitude going forward. He focuses mainly on reducing our carbon footprint through CO2 neutral and energy positive designs. He speaks of his two main principles.

First, the building is given a lifespan of say 20 to 30 years, after which the function could change or be updated. Then the materials being used from suppliers for the duration of the life span are leased or rented.

Secondly, a portfolio of the materials being used is made so that their values can be monitored better so after the life-span of the building, you get a better value for materials when removed

What this does is you have a definite future of the materials being used and knowing what will happen to it after its life at this project. This creates a more circular system, and also introduces a quantitative angle for the project where suppliers get better value for the materials. which sometimes gives them the incentive to make more tailor-made sizes to suite the respective project

RAU

fig-42: Thomas Rau

fig-43: Triodas Bank, Netherlands

fig-44: Brummen Town Hall, Netherlands

05

building technology

Climate Design of the Cathedral

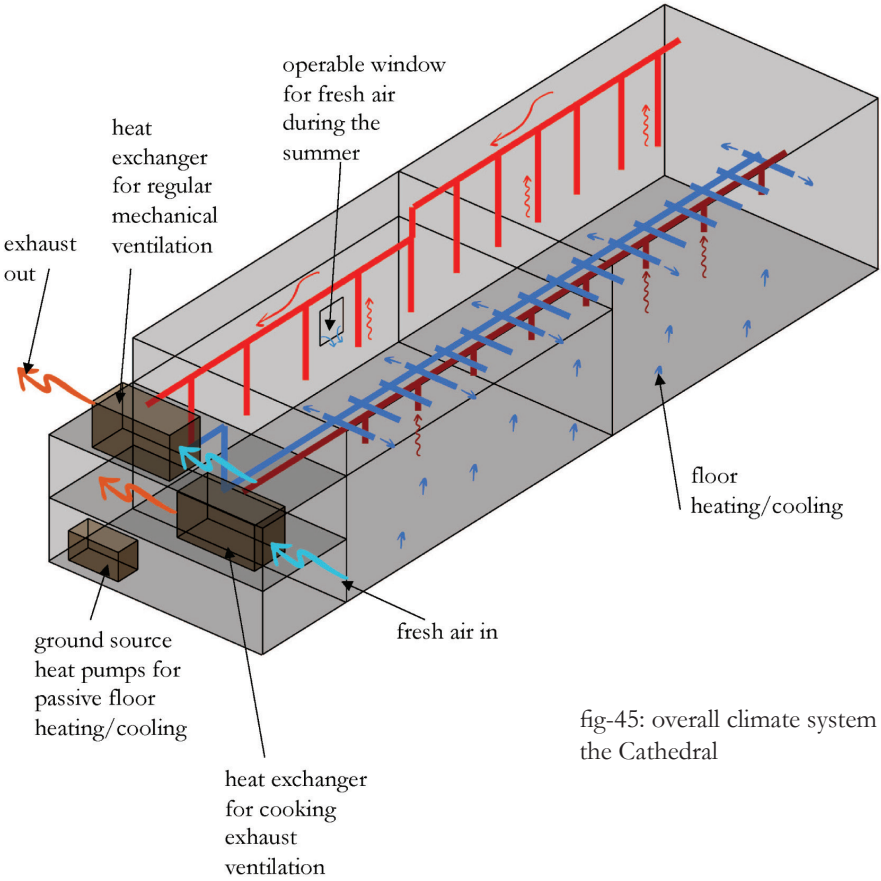


fig-45: overall climate system of the Cathedral

The ventilation system for the Cathedral is a critical system because commercial kitchens require very advanced systems in order to give the occupants a comfortable environment as well as take out exhaust gases created during cooking. Therefore, the system has been designed to have 3 parts.

The main ventilation system is concentrated near the bottom of the room for maximum efficiency. There is one system providing fresh ventilated air and sucking out used air out of the system. Another system is to suck out the cooking exhaust gases and a passive system provides for a climate floor

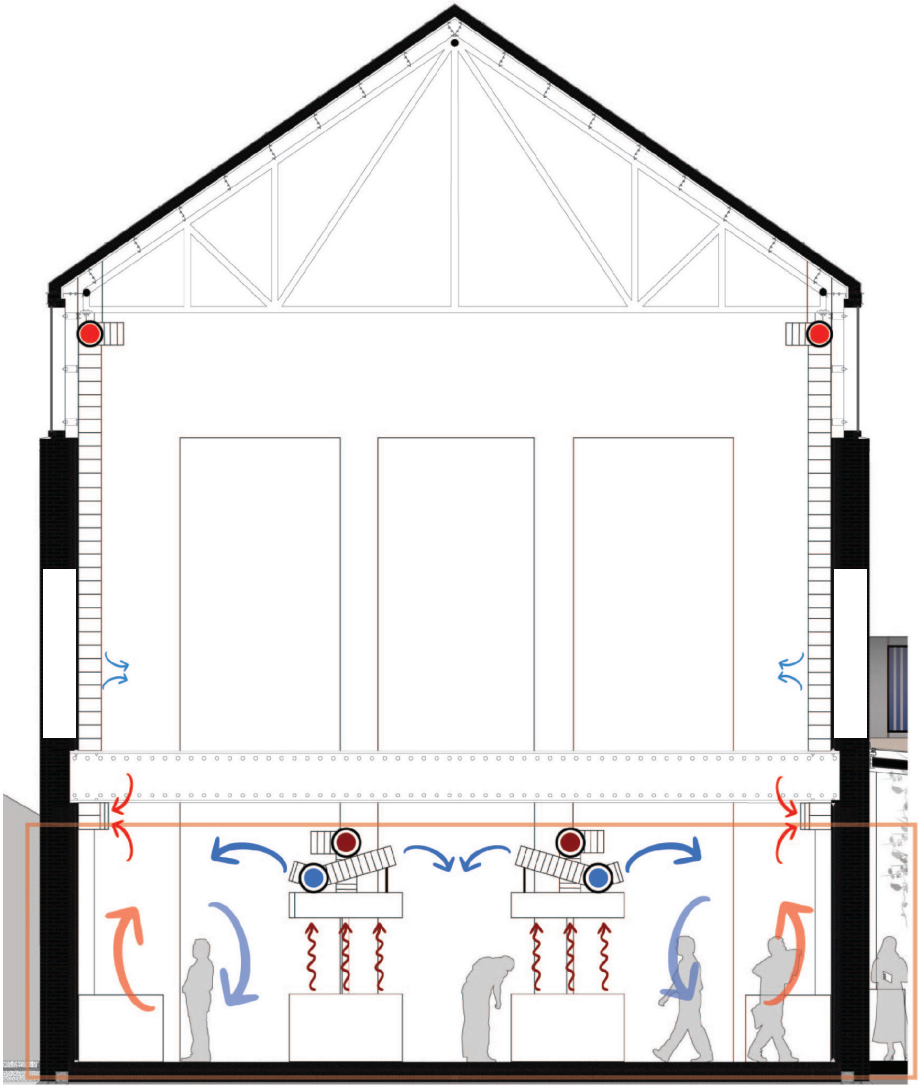


fig-46: ventilation system of the Cathedral

Daylighting Design of the Cathedral

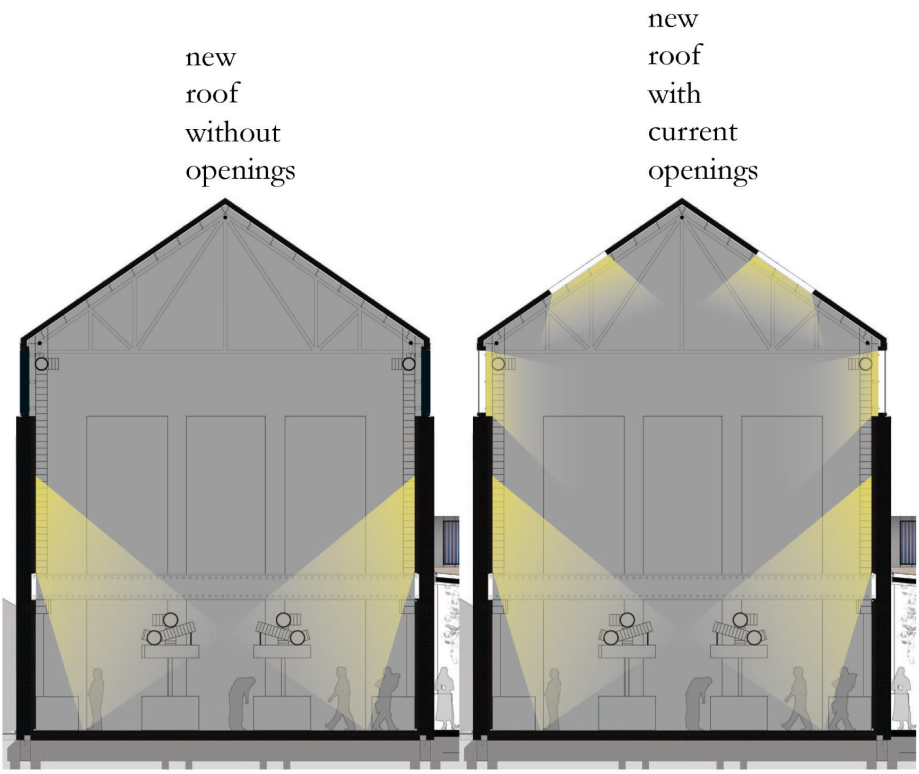


fig-47: daylighting diagram of the Cathedral

I did a quick daylighting study with a model as shown to the left. The right side of the Cathedral with all its openings, still felt a little too dark for the new Kitchen program, hence I added skylights to that side. On the left side of the Cathedral, due to the addition of a new roof, the volume of that side increases but the existing openings are quite small, which hinders daylighting a lot. In addition to skylights, I also add a transluscent opening where the roof is raised on the sides, thus adding more daylight to the interior spaces.

daylighting in existing conditions

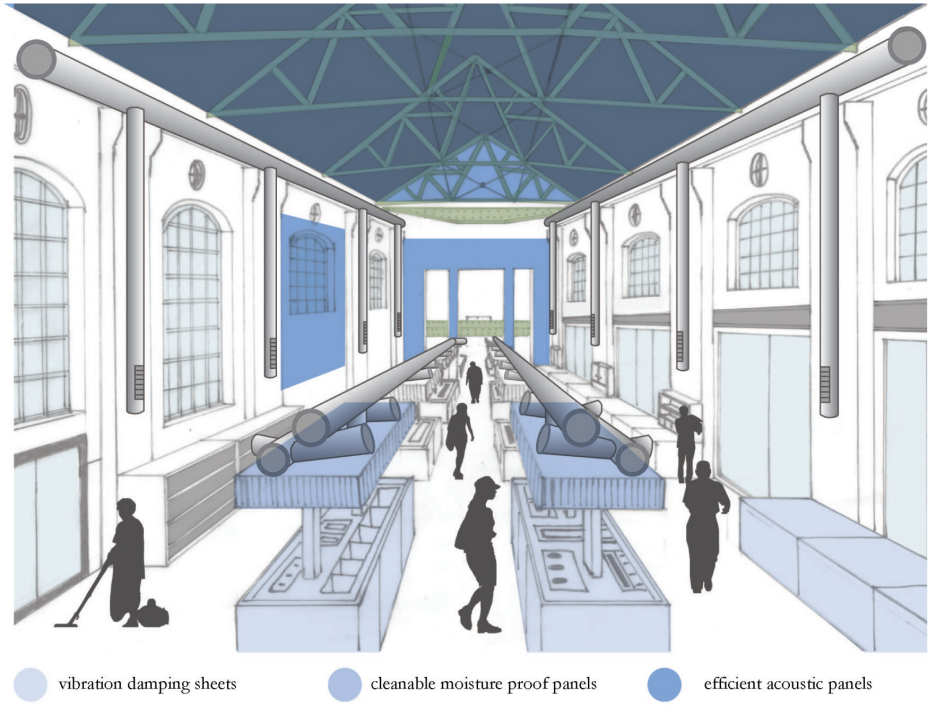
daylighting with roof lights

daylighting with transparent opening on the side of the new roof

daylighting with translucent opening on the side of the new roof

fig-48: daylighting study of the Cathedral

Acoustical Design of the Cathedral



α - 0.8 (absorption coefficient)
A - ~650 m²

fig-49: acoustical design diagram of the Cathedral

Acoustics was an interesting challenge, as a new kitchen in the Cathedral would mean a lot of sound would be produced during normal functioning. Due to the first 2m from ground up is a clearance zone where all the materials should be cleanable, good acoustic material could not be added, hence sound dampening sheets were added to the region. Next all the acoustical material was concentrated in the 2m to 8m region but the surface area was not enough, therefore, the rest of the acoustical material was placed in the roof of the building.

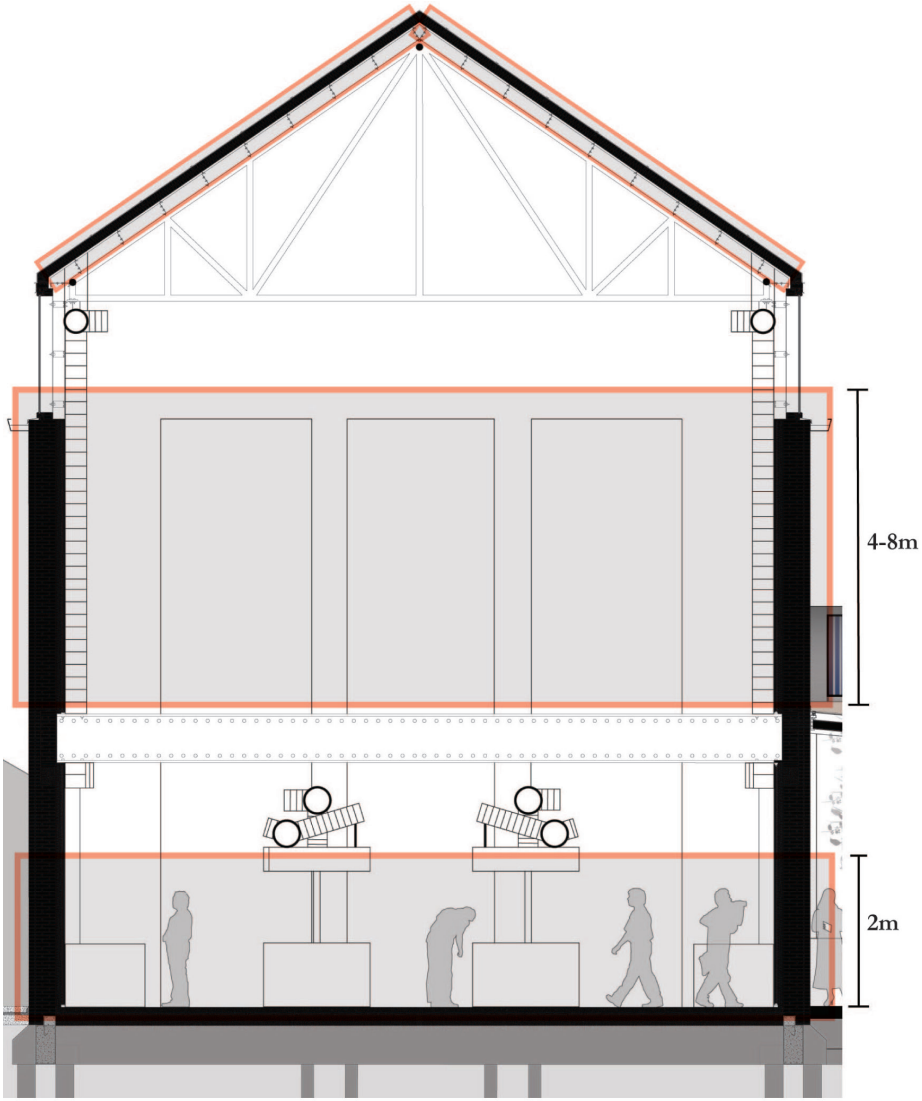


fig-50: acoustical design diagram of the Cathedral

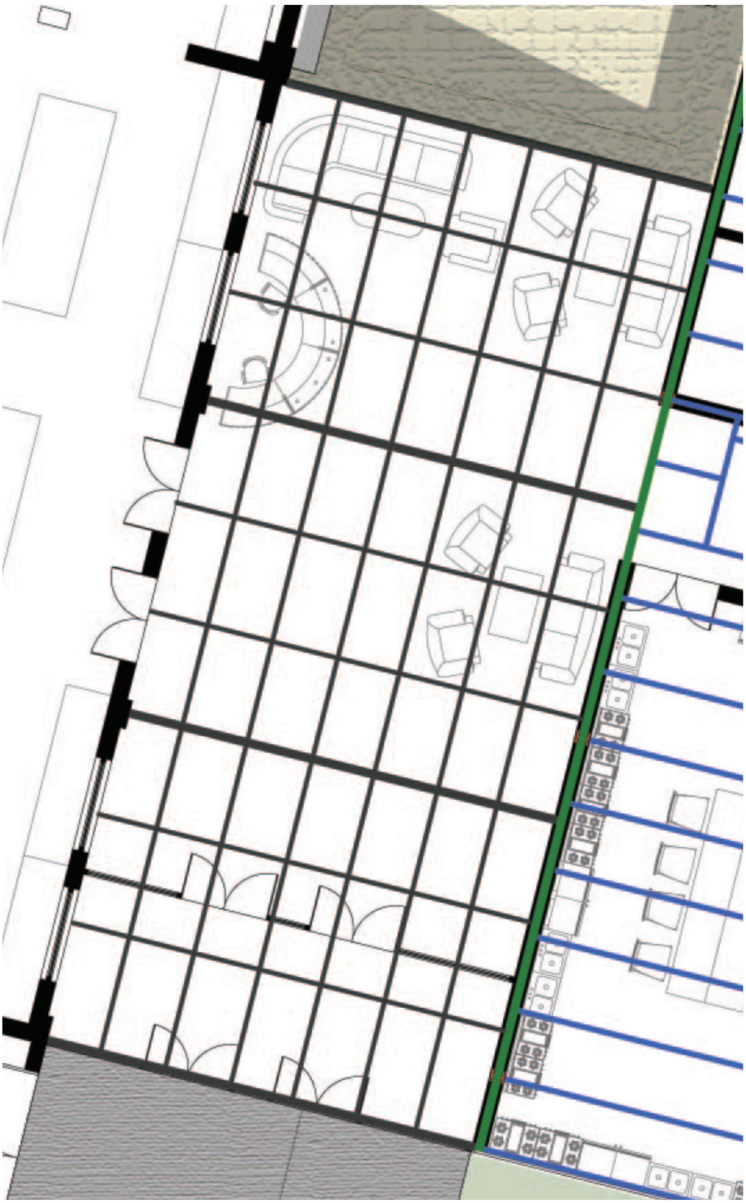


fig-51: structure of the glass box

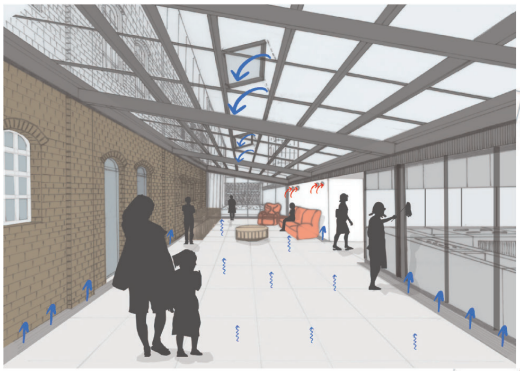


fig-52: ventilation diagram of the glass box

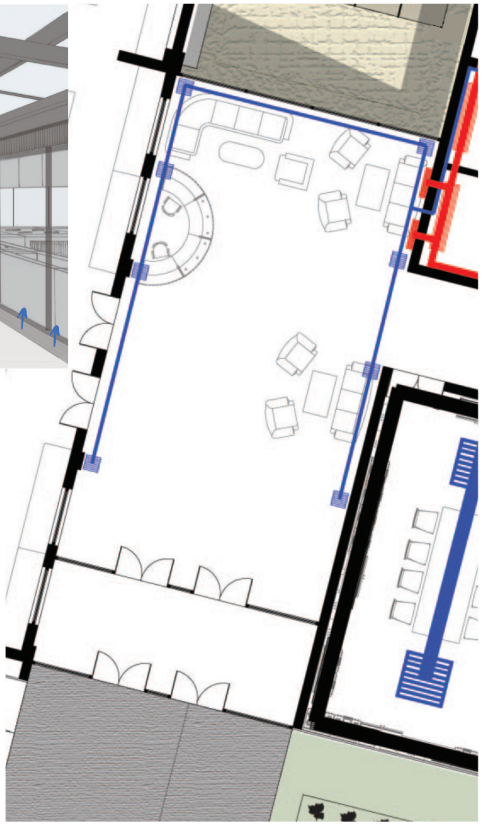


fig-53: ventilation diagram of the glass box

The structure of the glass box is made of steel and is connected to the Cathedral on one side and the new building on the other side.

A ventilation system for this structure was crucial as it is essentially a green house gathering a lot of heat. Therefore, its ventilation system was connected to the new building and is placed under the ground and on the walls. Additionally, the hatches in the roof can also be opened especially during the summer to let the excess heat out and let fresh air to come in.

Structural Design of the New Extension

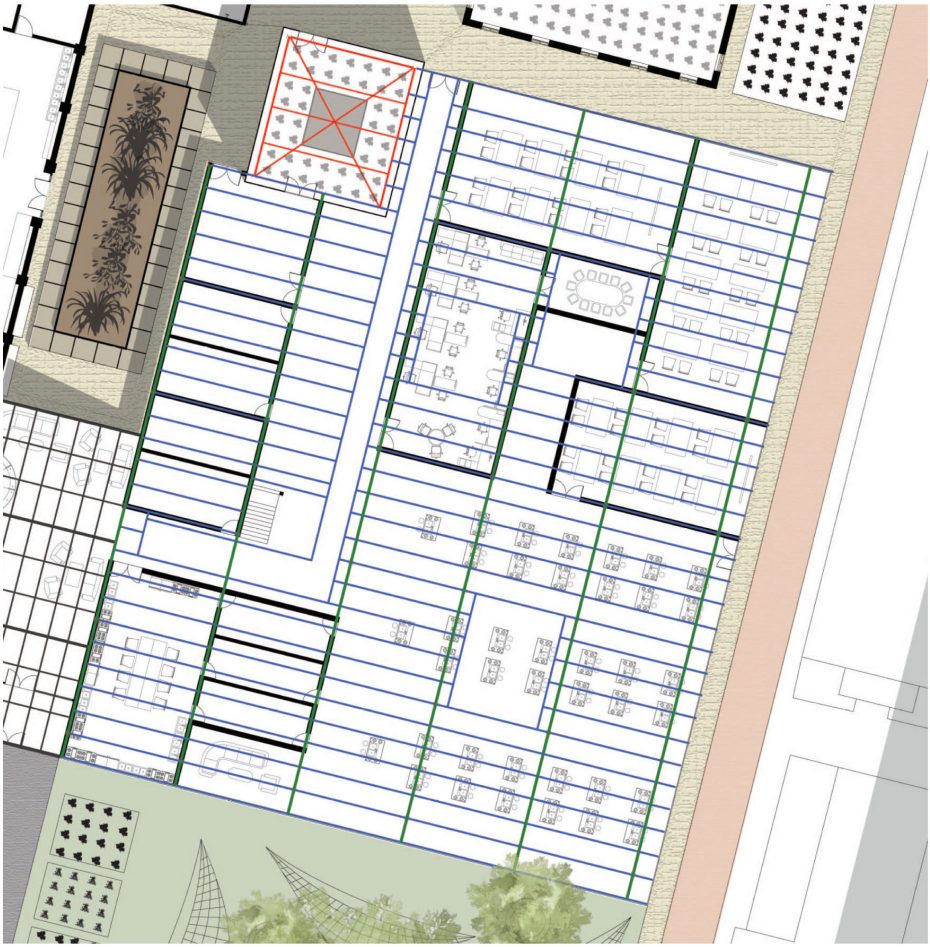


fig-54: structural plan of the new building

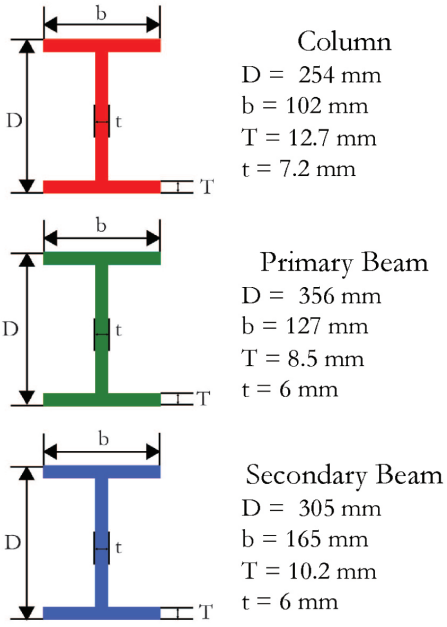


fig-55: structural components of the new building

Standard structural steel columns, primary beams and secondary beams were used to support heavy green roof. The grid used is a 7/7 metre square grid. The existing steel structure of the now demolished building is also integrated into the new structural grid

Ventilation Design of the New Extension

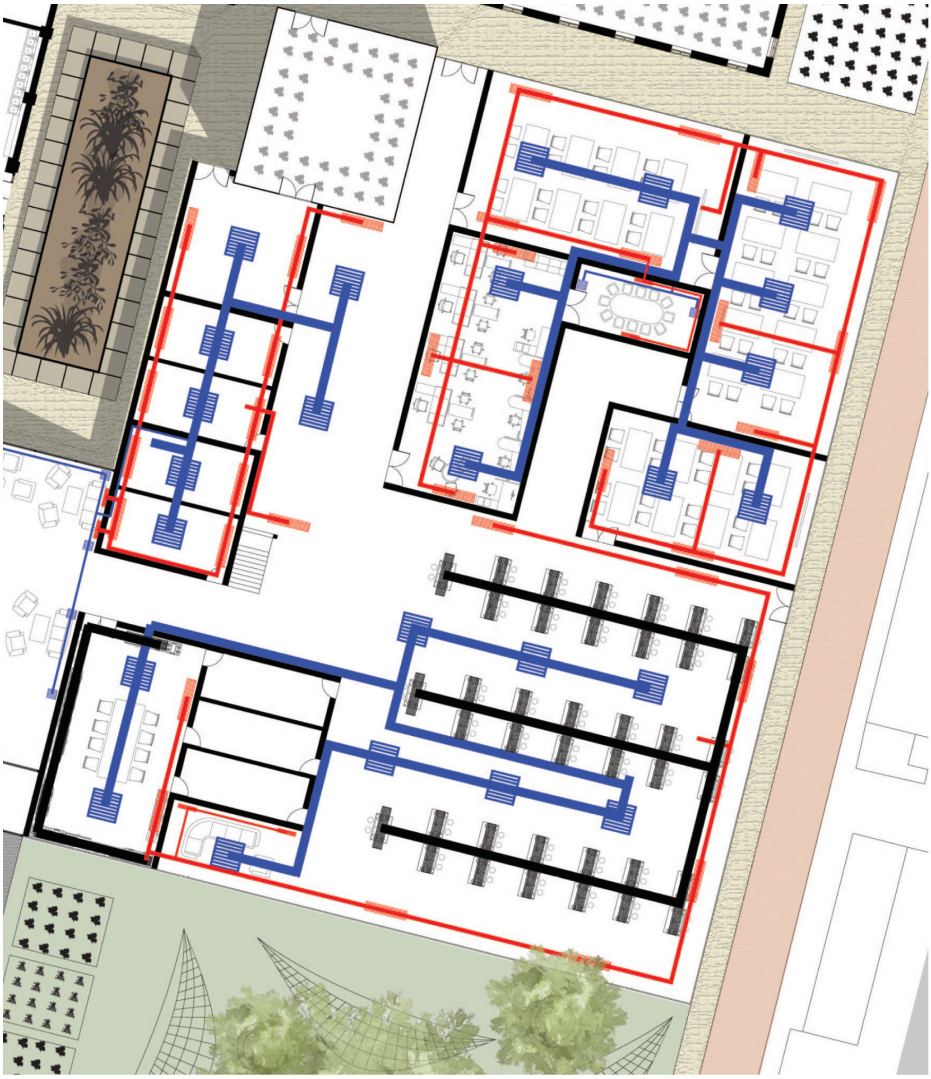


fig-56: ventilation layout grid of the new building

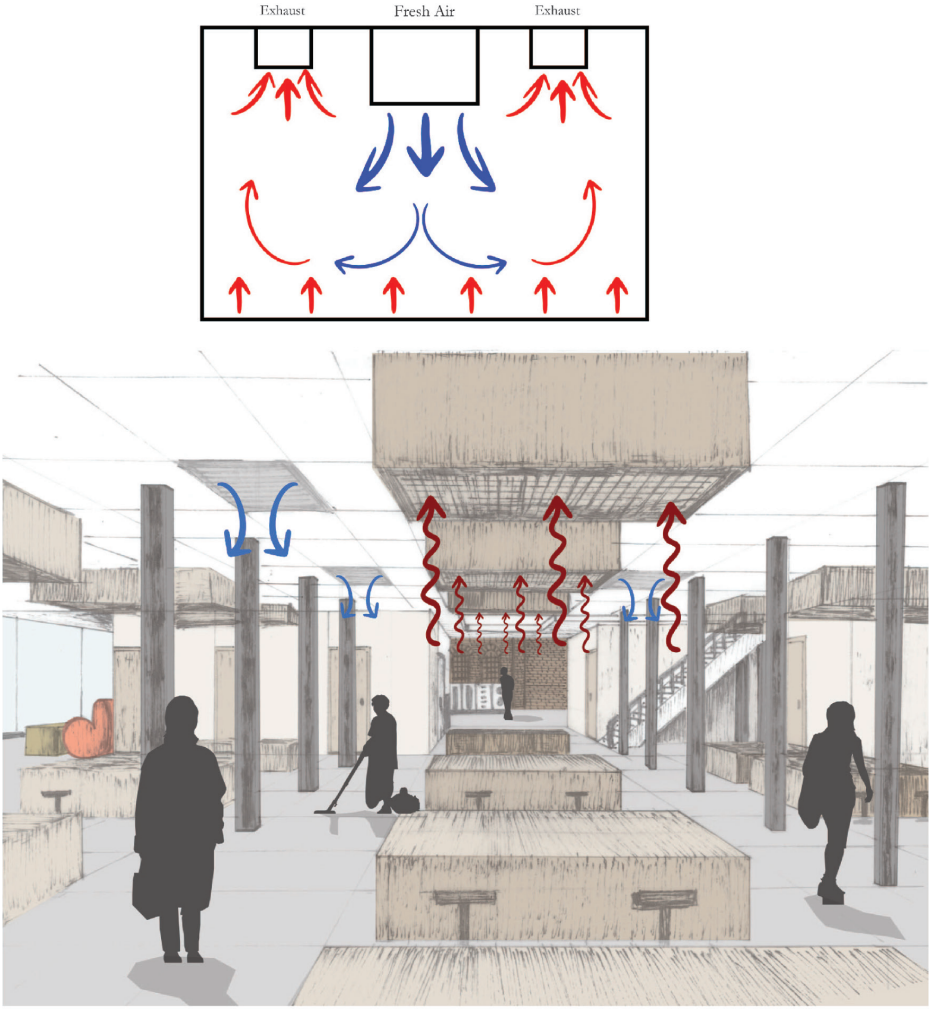


fig-57: ventilation diagram of the new building

There are 3 heat exchanging systems installed in the new building due to its size. Two of them cater to the normal inflow and outflow of ventilated air. The third one caters only to the cooking function and handles the exhaust gases

Daylighting Design of the New Extension

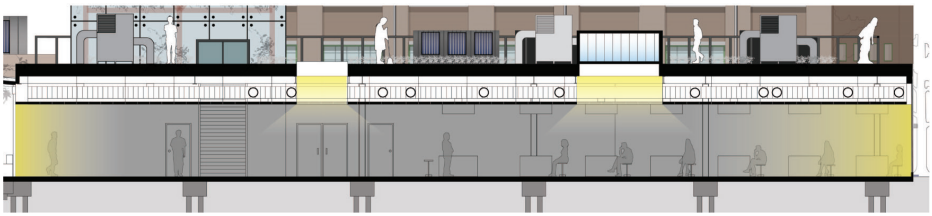


fig-58: daylighting diagram of the new building

The facades of the new building are glass curtain walls allowing a lot of light in from the sides, but due to the size of the building, the interior spaces of the building lacked daylighting. I experimented with a model and came up with the idea of adding skylighting to help daylighting into the middle of the building. The skylights are North facing to prevent overheating especially during the summer

Acoustical Design of the New Extension

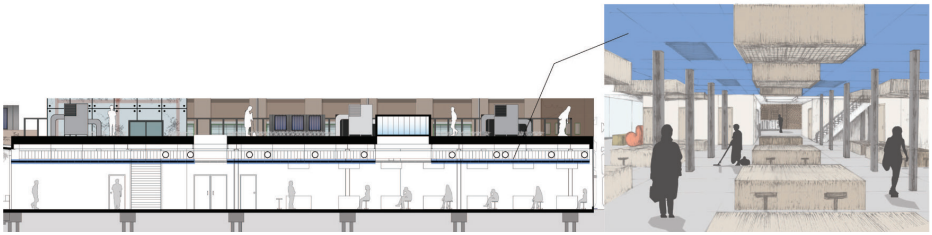
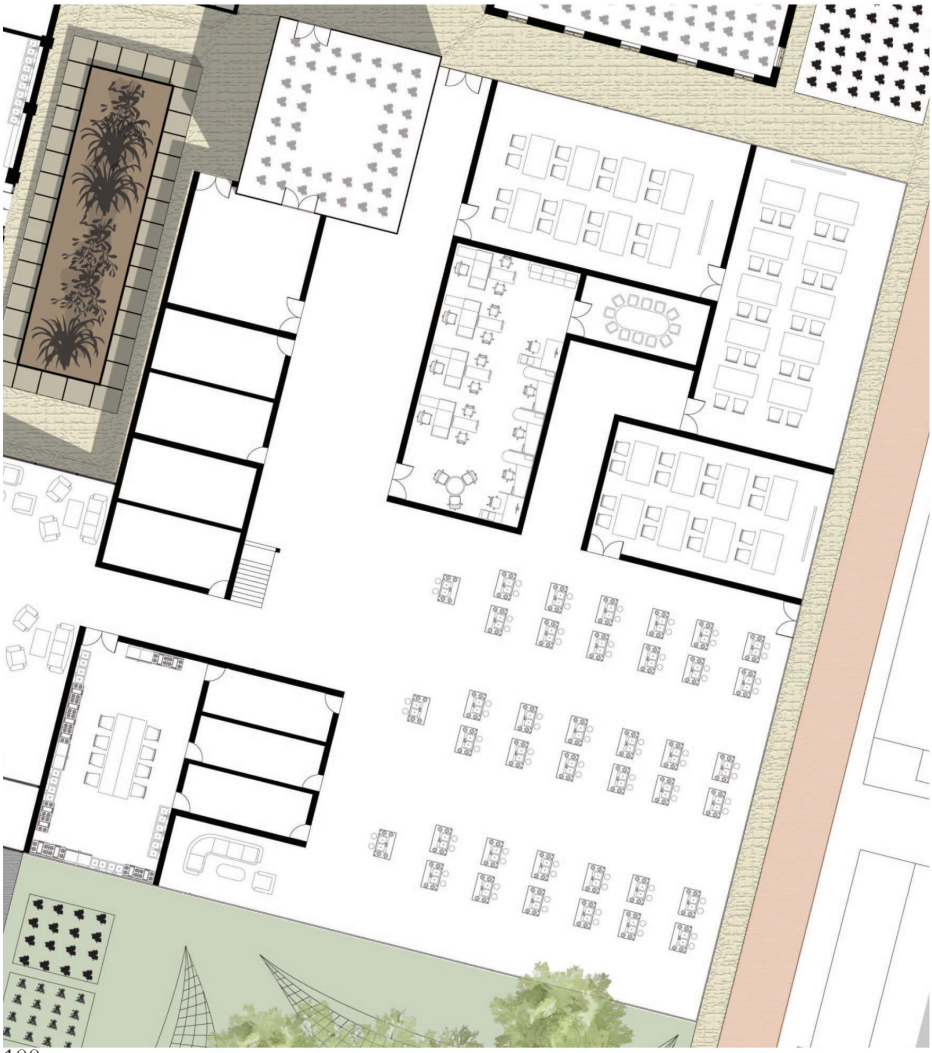


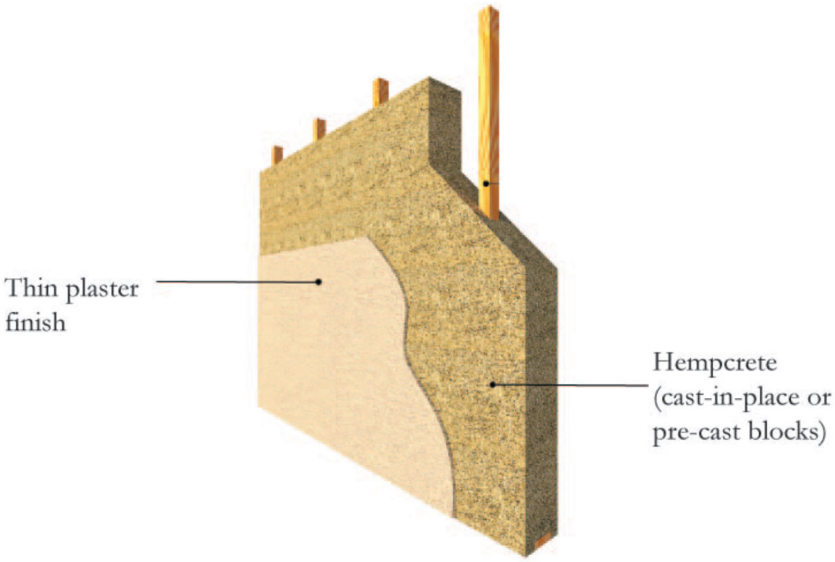
fig-59: acoustical design diagram of the new building

The acoustical design of the new building was not very difficult as the this building has a double hanging ceiling which means, there was enough surface area on the hanging ceiling where acoustical panels could be added

Hempcrete

fig-60: interior wall layout of the new building





- Hempcrete partition walls add thermal mass to the building
- It is a carbon negative product
- Can be easily installed and removed making the spaces flexible

fig-61: hempcrete properties

Hempcrete is used for the internal walls of the new building. It is a highly sustainable building material which is carbon positive material which is used just like concrete and adds a lot of thermal mass to a building making it the spaces better for living and working in.

Green-roof

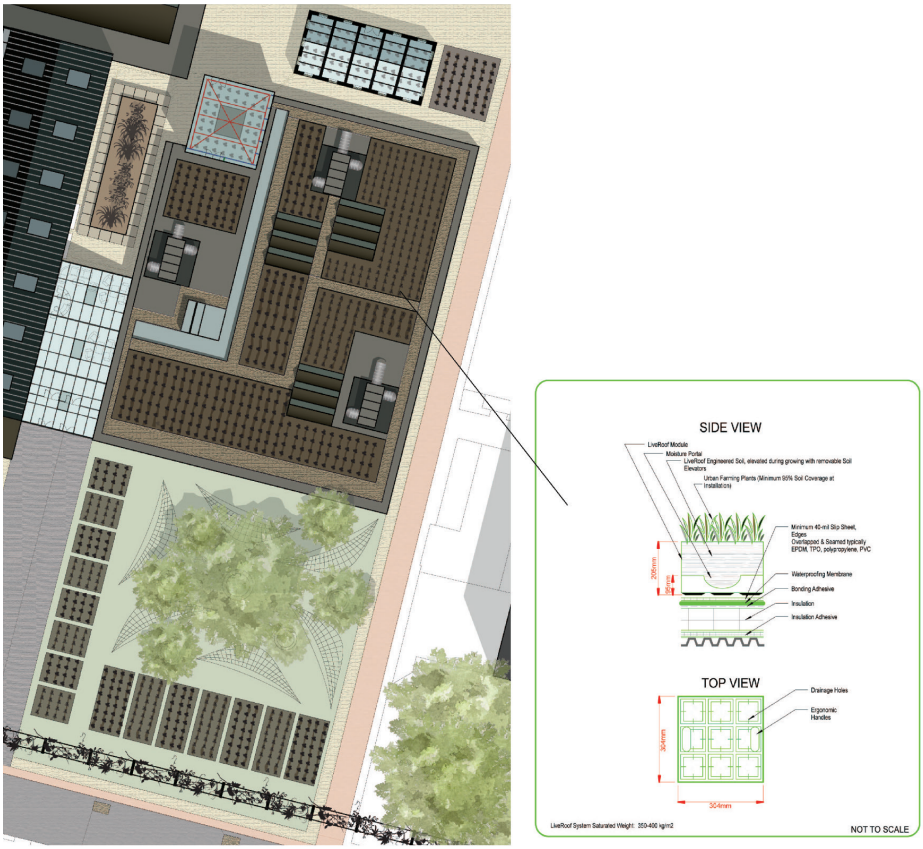
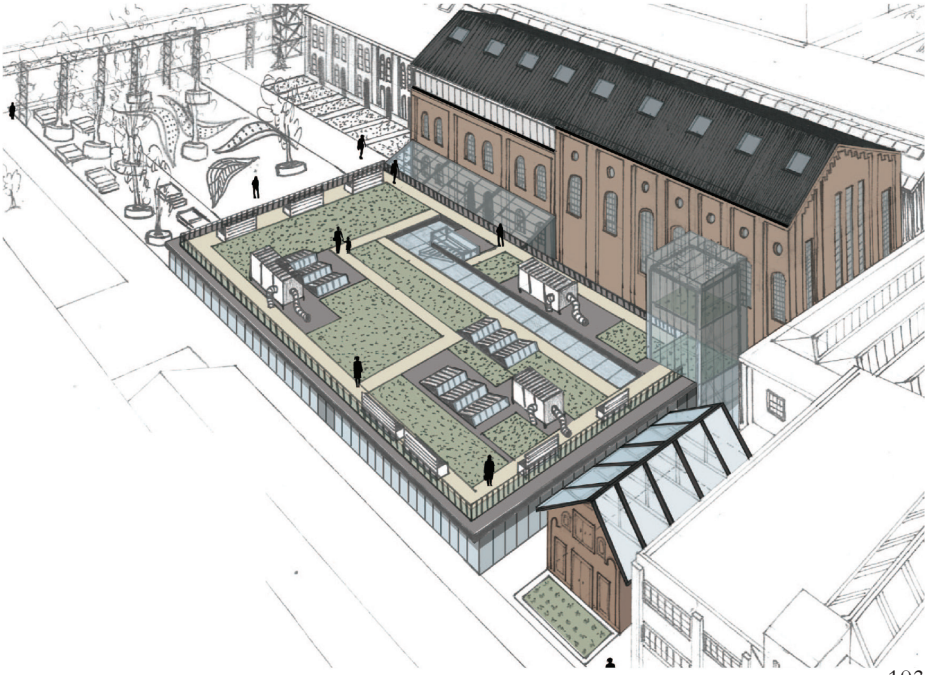


fig-62: green-roof modules are used for urban farming on the roof

Green-roof modules are used for urban-farming on the roof of the new building. These modules come packaged with its own irrigation system and have all the necessary layers for optimum plant growth. Since they are packaged in a module, they can be easily removed, maintained and replaced

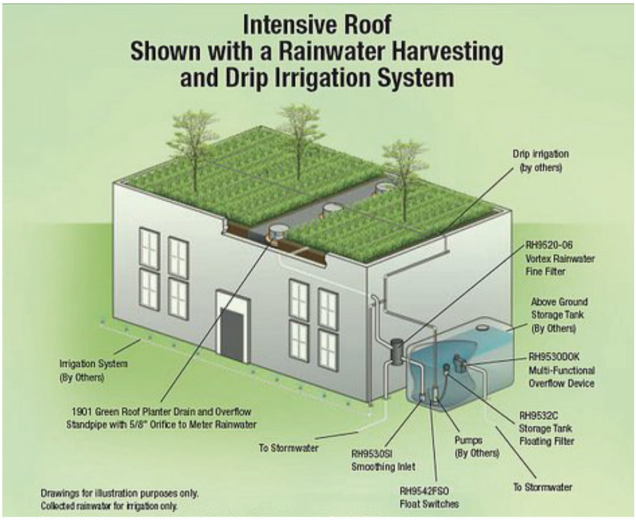
The green-roof of the new building is used as an outdoor space for the residents to use as a recreational spot and for urban farming. The urban-farms are integrated with a pathway, sitting areas, skylights and the machinery for the heat exchangers

fig-63: green-roof layout of the new building



Water Management

The rain water falling on the roofs of the buildings is collected, stored and reused as greywater for toilets and cleaning as well as watering the plants of the urban-farms. As the main program of this ensemble is a culinary school, water is a major requirement for this program, hence, conserving and reusing water is essential



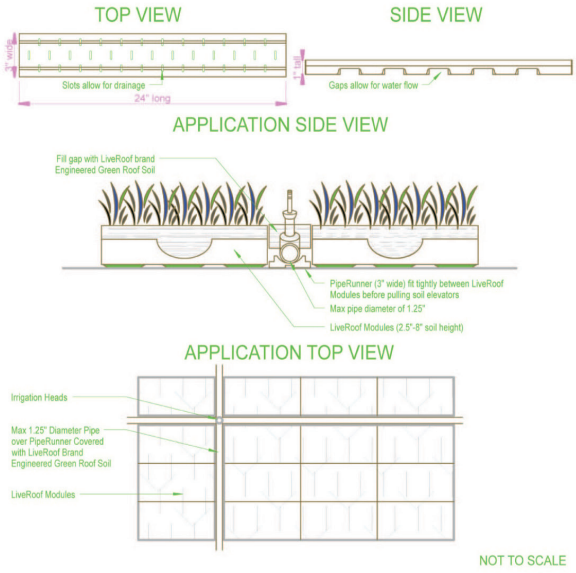


fig-64: water management diagram of the new building

Drainage of the green-roof which is flat is paramount. Hence, the modules come with its own drainage system and additional drainage is added to roof edges and sides of the pathways on the roof

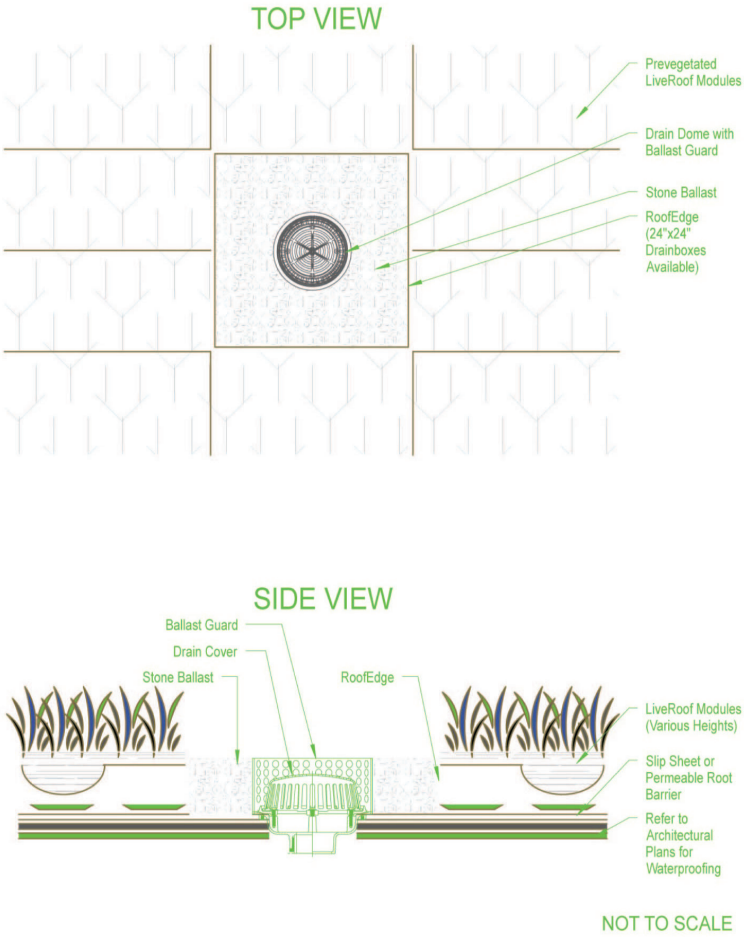


fig-65: drainage system of the green-roof of the new building

Solar Heat Collection

fig-66: solar heat collection layout of the ensemble

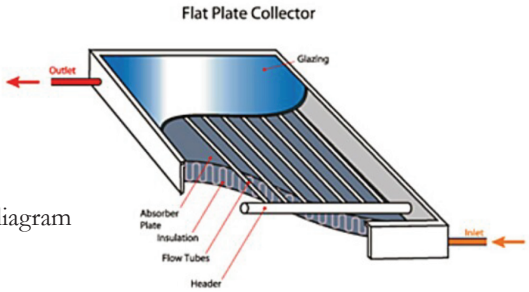
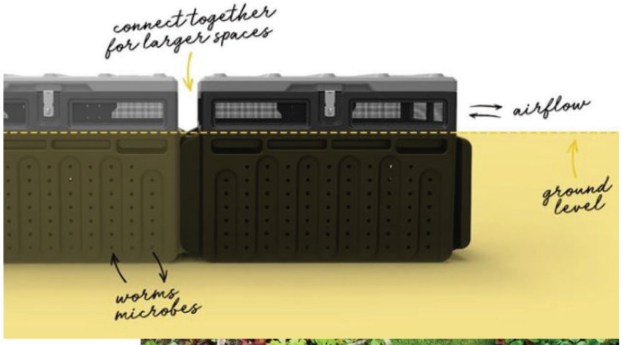


fig-67: solar heat collection system diagram

- The setup consists of two main components, plastic storage tanks made of recycled plastic, that hold the chemicals and a unit designed to charge and discharge the contained heat. The storage tanks contain the sodium hydroxide mixed with water.
- During the charging process, heat energy harvested from a renewable source, such as a solar thermal collector, is directed to the sodium hydroxide solution. As the solution absorbs the heat, the water evaporates.
- The sodium hydroxide solution becomes more concentrated and can be stored like this for months or even years. What's more, its heat storage capacity is five-times that of a hot water tank, which greatly reduces the space needed to contain the heat.
- When water is added back into the condensed solution, the absorbed heat is released. That heat can be transported via pipes into the building's main heat system, delivering warmth to the rooms.

Waste Management

fig-68: organic waste management



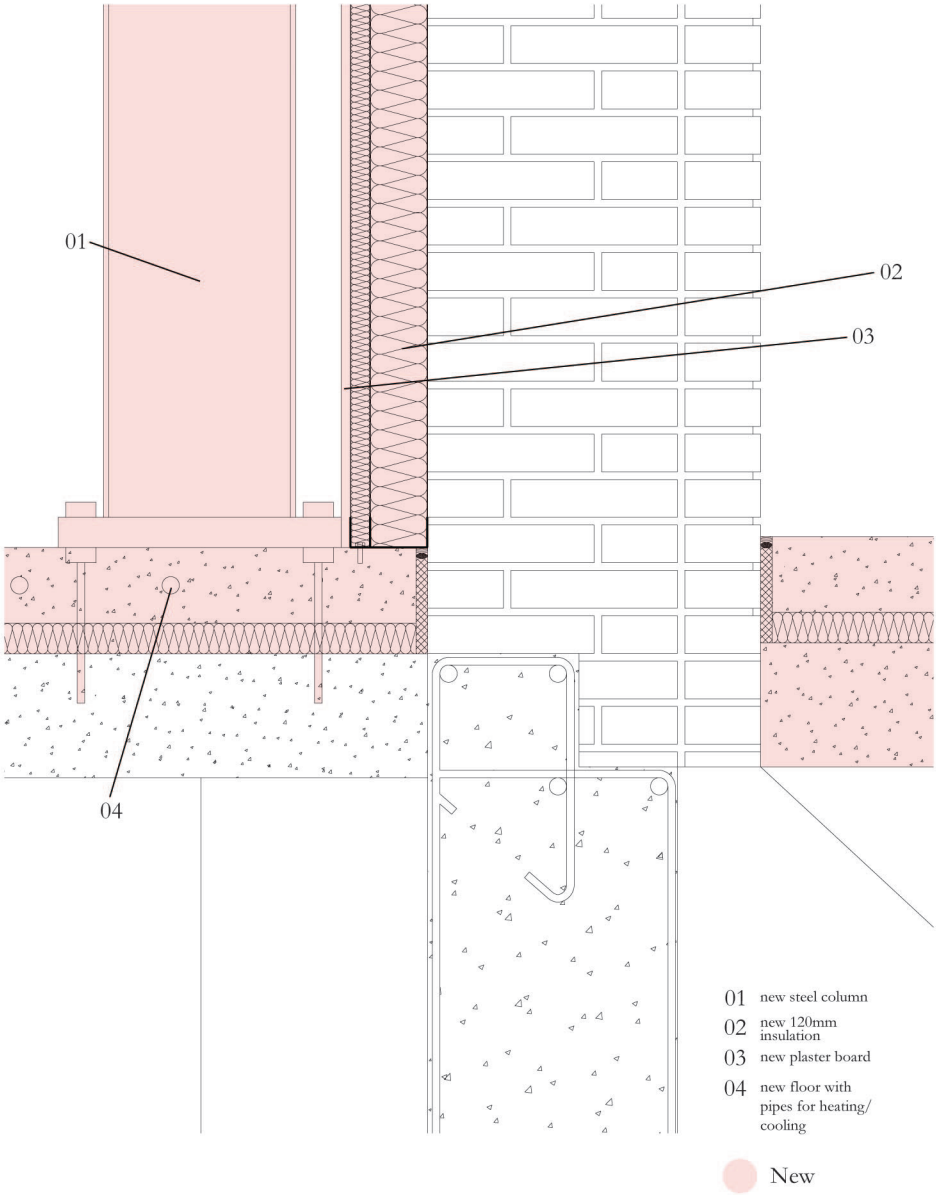
SubPod

Size/pod: 75cm x 45cm x 43cm / 29.5 in x 17.7 in x 16.9 in
Weight: 9.4kg / 20.7lbs
Chamber Capacity: 85 Litres
Lid Weight Capacity: Up to 200kg / 440.9lbs
Composting Capacity: 15kg / 33lbs per week

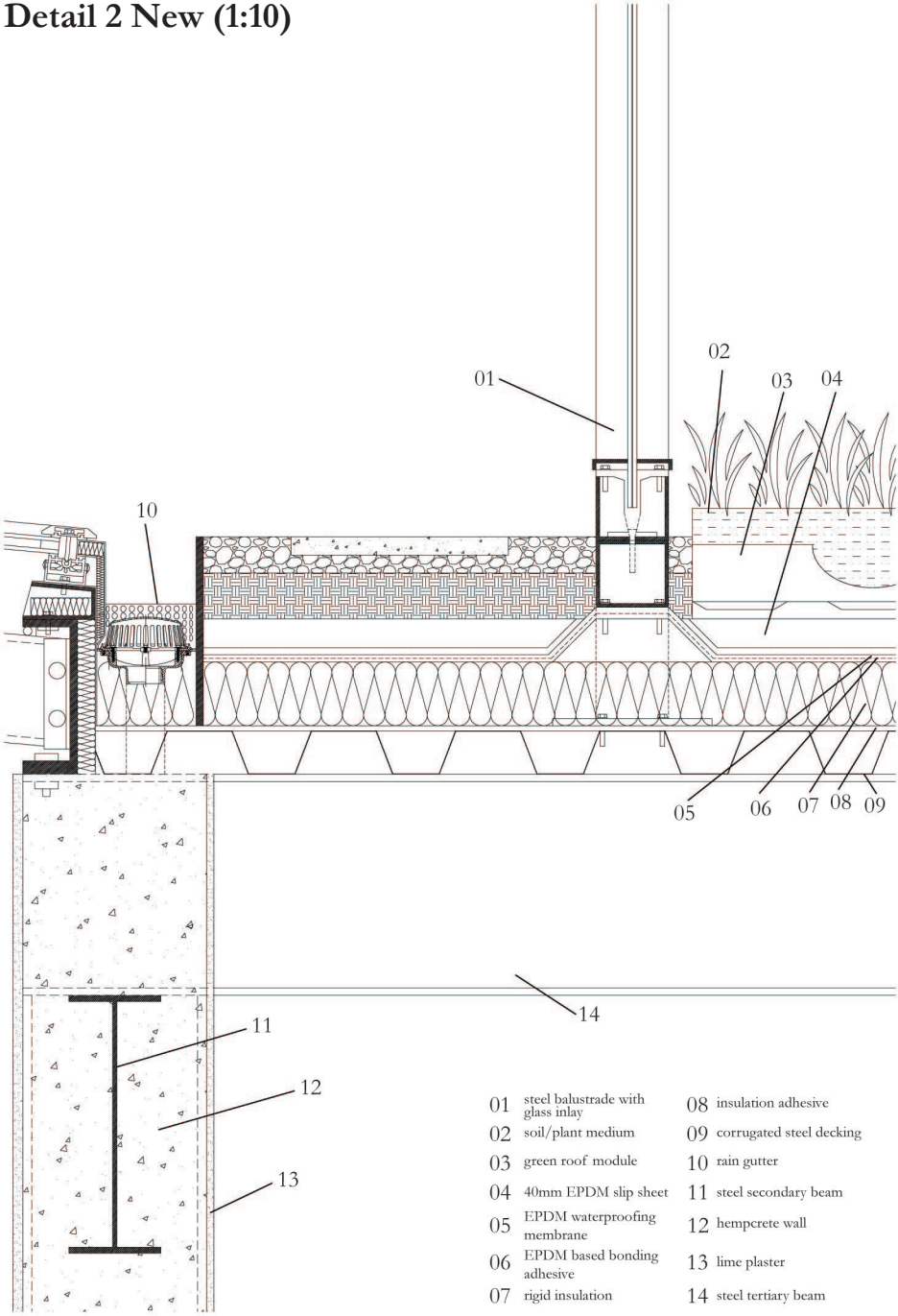
fig-69: organic waste management system

As a culinary school and restaurant, a lot of organic waste is produced on the site. A efficient waste system would only be logical. Since we have a lot of urban farms on the site, the organic waste is converted into manure for the farms

Detail 1 (1:10)

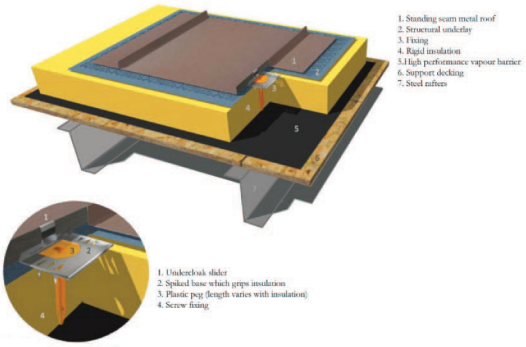

01
02
03
04
01 new steel column
02 new 120mm insulation
03 new plaster board
04 new floor with pipes for heating/ cooling
New

Detail 2 New (1:10)

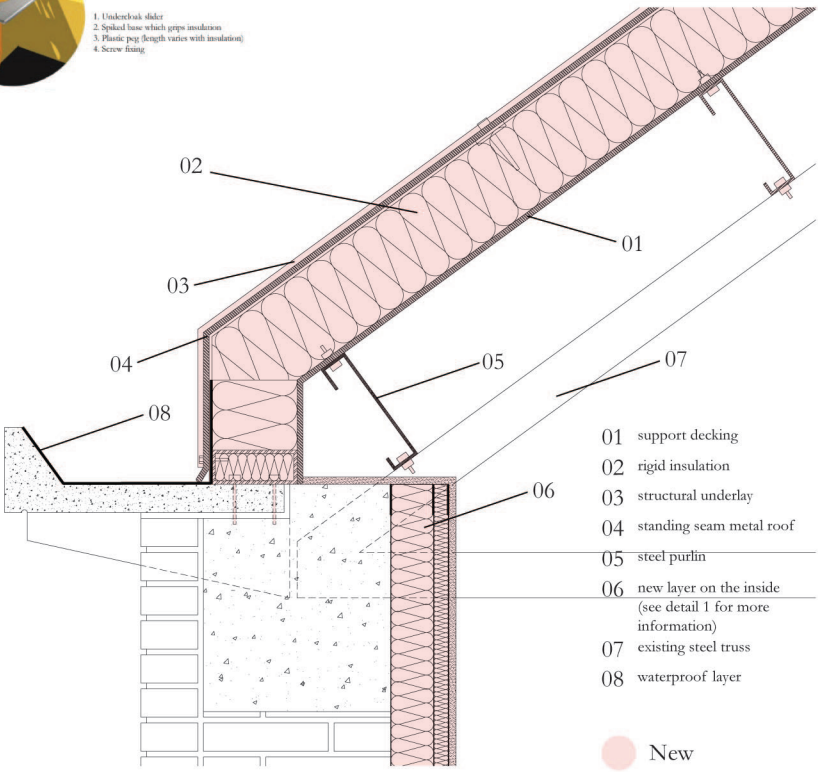


01 steel balustrade with glass inlay
02 soil/plant medium
03 green roof module
04 40mm EPDM slip sheet
05 EPDM waterproofing membrane
06 EPDM based bonding adhesive
07 rigid insulation
08 insulation adhesive
09 corrugated steel decking
10 rain gutter
11 steel secondary beam
12 hempcrete wall
13 lime plaster
14 steel tertiary beam

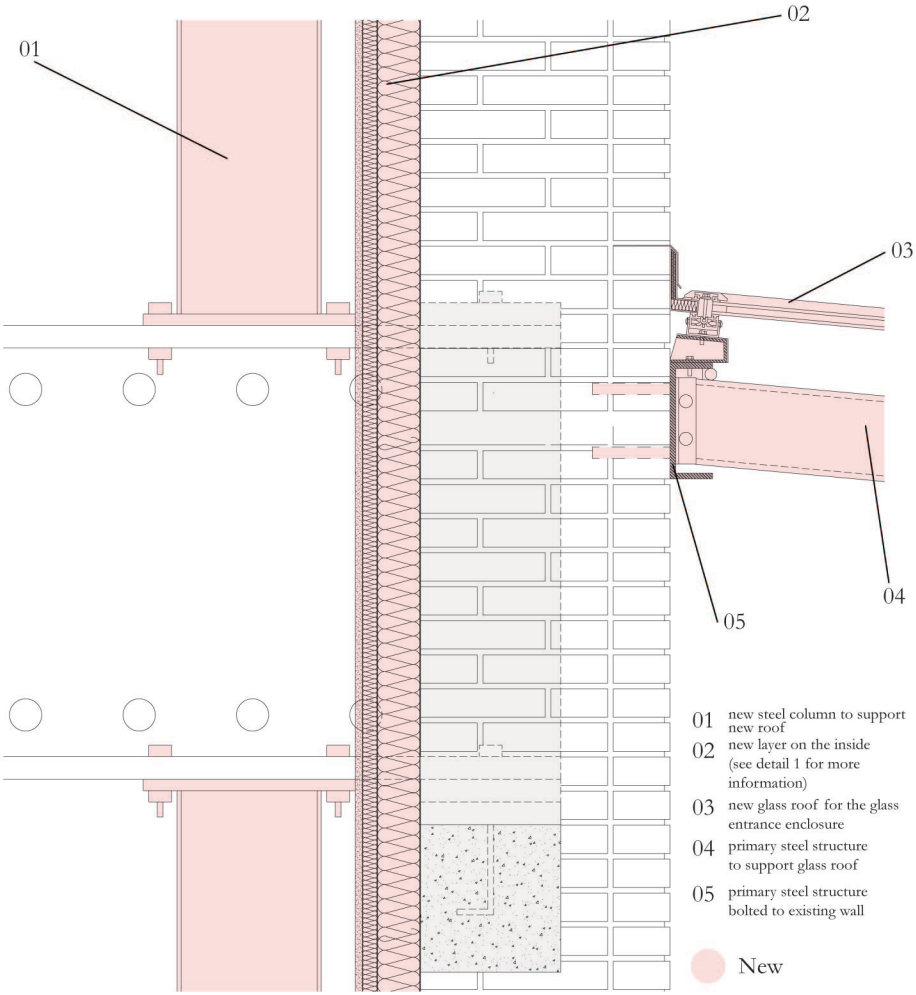
Detail 3 (1:10)


1. Standing seam metal roof
2. Structural underlay
3. Fixing
4. Rigid insulation
5.High performance vapour barrier
6. Support decking
7. Steel rafters

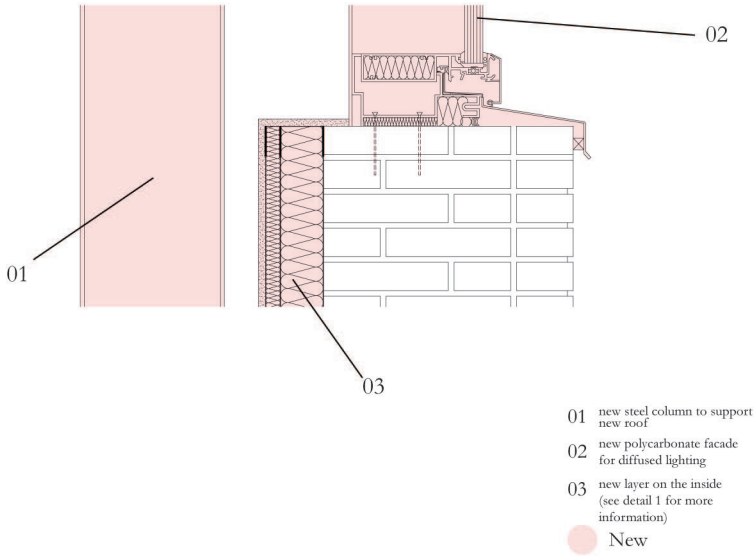
1. Undereloak slider
2. Spiked base which grips insulation
3. Plastic peg (length varies with insulation)
4. Screw fixing


02
01
03
04
05
07
08
06
01 support decking
02 rigid insulation
03 structural underlay
04 standing seam metal roof
05 steel purlin
06 new layer on the inside (see detail 1 for more information)
07 existing steel truss
08 waterproof layer
New

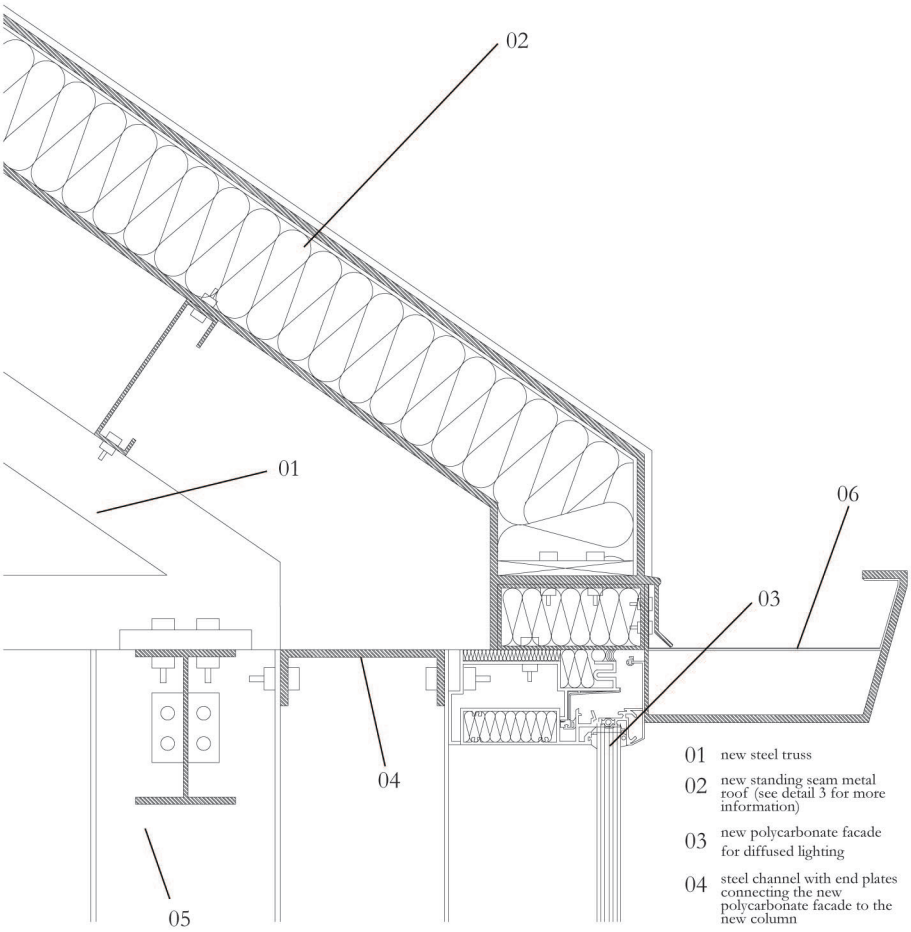
Detail 4 (1:10)


01
02
03
04
05
01 new steel column to support new roof
02 new layer on the inside (see detail 1 for more information)
03 new glass roof for the glass entrance enclosure
04 primary steel structure to support glass roof
05 primary steel structure bolted to existing wall
New

Detail 5 (1:10)


01
02
03
01 new steel column to support new roof
02 new polycarbonate facade for diffused lighting
03 new layer on the inside (see detail 1 for more information)
New

Detail 6 New (1:10)



01 new steel truss

02 new standing seam metal roof (see detail 3 for more information)

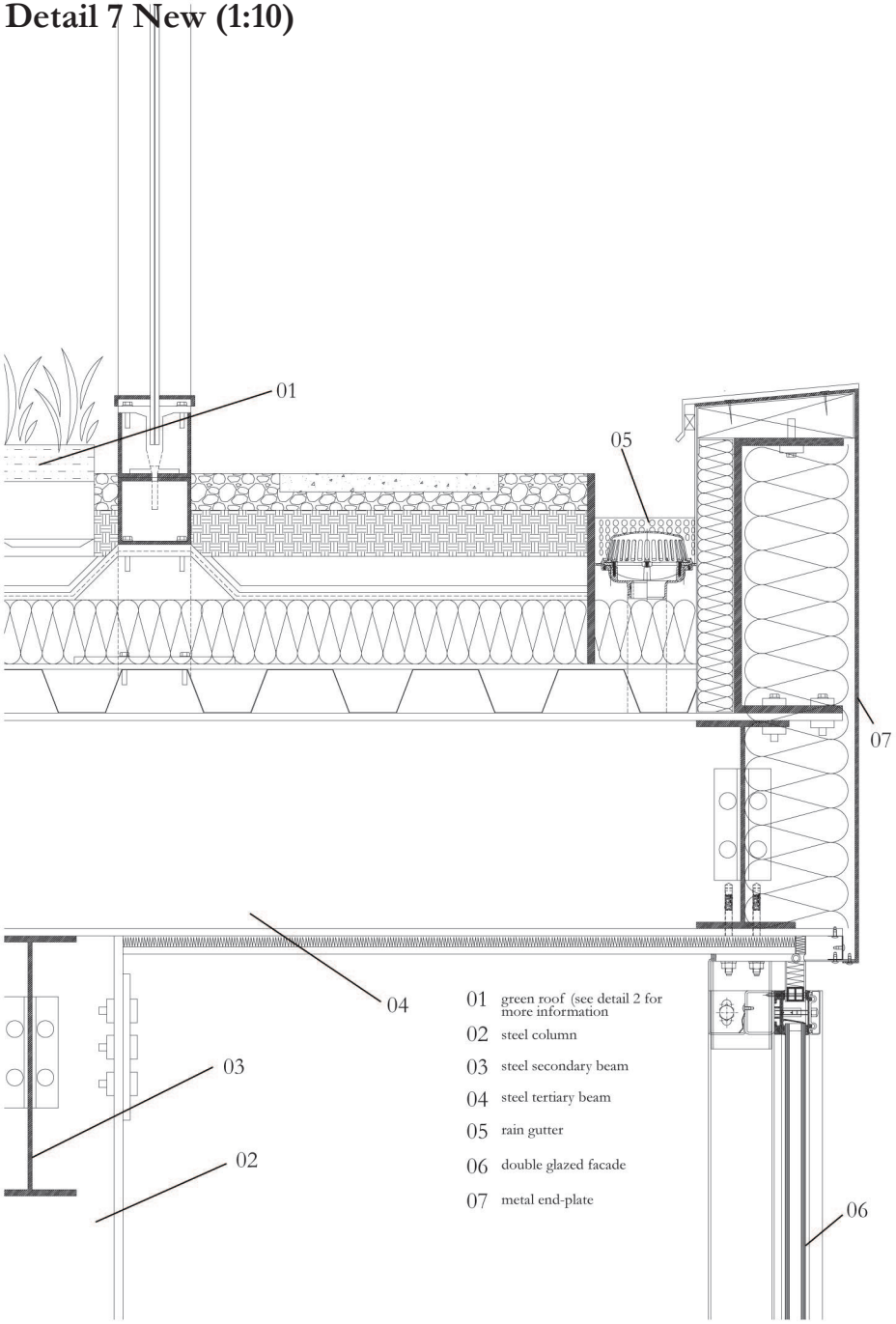
03 new polycarbonate facade for diffused lighting

04 steel channel with end plates connecting the new polycarbonate facade to the new column

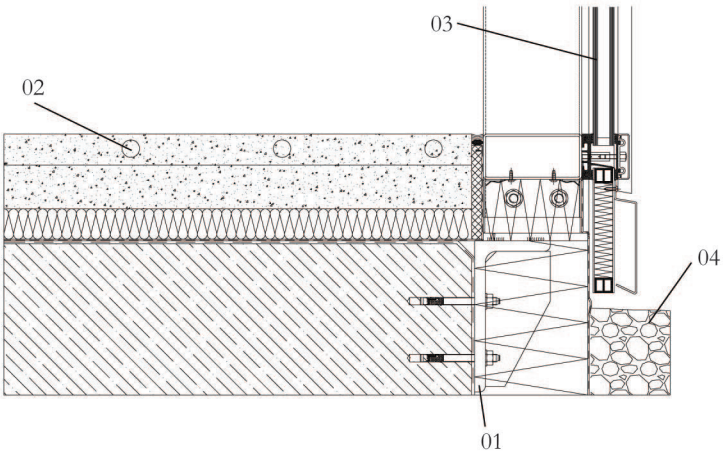
05 new steel column to support new roof and new polycarbonate facade

06 new roof gutter

Detail 7 New (1:10)



Detail 8 New (1:10)



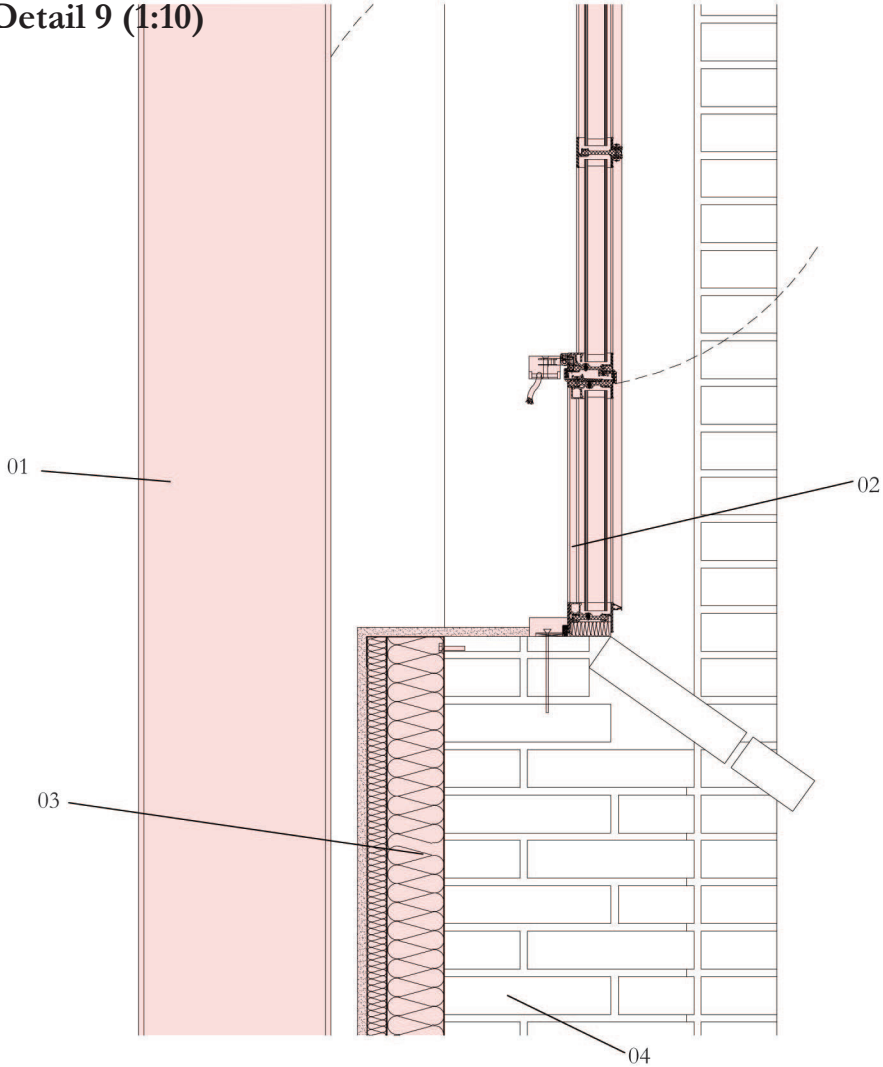
01 anchoring in front of base plate

02 floor with pipes for heating/cooling

03 double glazed curtain wall

04 exterior grade

Detail 9 (1:10)



01 new steel column

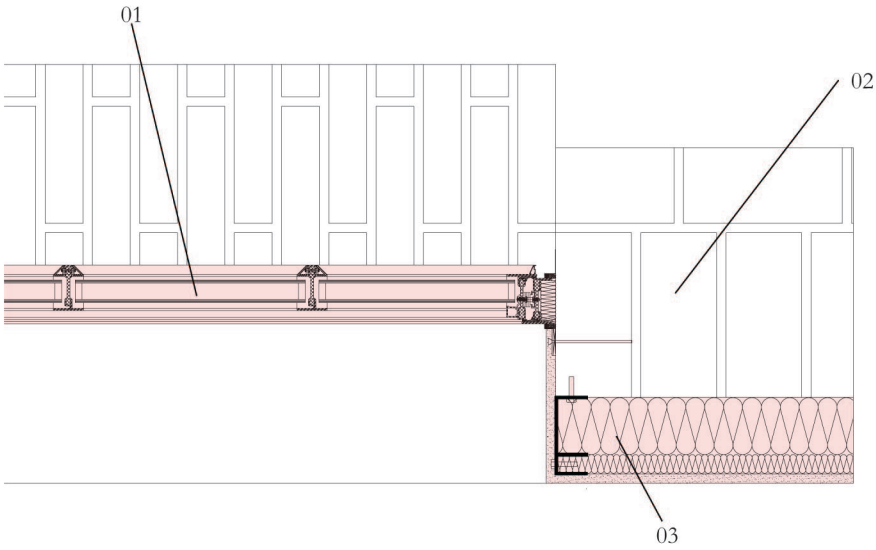
02 janisol arte operable (pivot) double glazing

03 new layer on the inside (see detail 1 for more information)

04 existing wall

New

Detail 10 (1:10)



01 janisol arte operable (pivot) double glazing

02 existing wall

03 new layer on the inside (see detail 1 for more information)

New

06

reflection

Reflection Paper

Introduction

This reflection paper is part of my graduation studio at the TU Delft faculty of Architecture, Urbanism and the Built Environment within the chair of Heritage and Architecture. It serves as a rumination on my journey through research and design. In this paper I will first describe the theme of this studio and how it is related to my project. Then I will reflect on how I have integrated research and design. After that, I will touch on the topic about the general approach of the chair of Heritage & Architecture towards restoration and reuse and the methods I have adopted. Finally, I will discuss how my project addresses the wider urban and social context. To conclude I will reflect on my design thinking and why and how I have made the choices for the design of my project.

For my graduation project "Revitalizing Heritage" I am focusing on redesigning the former Artillery Establishment in Hembrug in the Netherlands. According to plans by the Dutch government and as part of the expansion of Amsterdam, Hembrug will soon be transformed into a green zone and will become a major tourist attraction. There is a plan to make 1000 new dwellings on this site. The general theme is to bring a level of contrast to the site with my design. I have picked the Changeover Zone ensemble where I am designing a small community for elderly and young professionals living, studying and working in a Culinary Arts school which will be at the heart of this ensemble. In my project I also delve into a very debatable theme in today's world of Heritage and Architecture, that is, " sustainability + reuse" Sustainability is always an interesting challenge especially when we reuse existing architecture because like we think about the future of the materials we use in new projects, creating or designing a system for the reuse of existing materials in an existing project is a big aspect of adaptive reuse and one of the main challenges when it comes to reusing architecture.

Hence, I did research into ways I can make my design sustainable and have developed a very interesting system of renting materials inspired by Thomas Rau's pioneering ways and methods.

The ensemble I have chosen is quite centrally located within Hembrug, with existing buildings that range from the early 1900s to the late 1990s. That also means that their architecture of the ensemble portrays the evolution of the site through its lifetime. Another characteristic of the ensemble is the fact that all the buildings in it are connected to each other. This unique feature is attributed to the fact that, as the site developed over time, due to a lack of space, the buildings were built within limited available space and over time several buildings were built and demolished as per the requirements because Hembrug has always been very functional and buildings that were not required were removed and new ones were built in its place. The Cathedral lies in the heart of this ensemble and is quite possibly the most important and significant building in the ensemble because of its age, characteristics, features and shear height compared to other buildings in and around the ensemble. Therefore, for my project I have decided to focus on the Cathedral and create a new intervention connected to it which would contrast it in a way where the new building and its contrasting characteristics will help put the focus back on the cathedral.

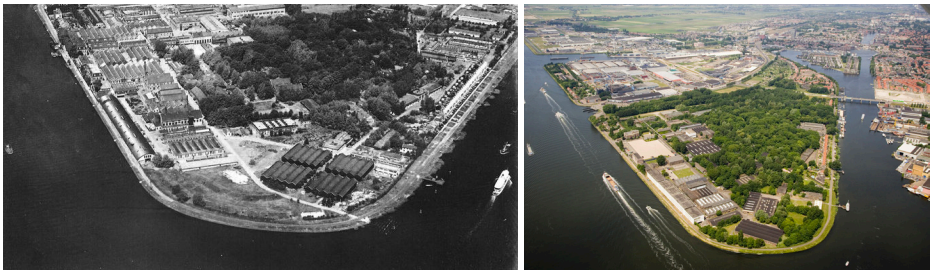
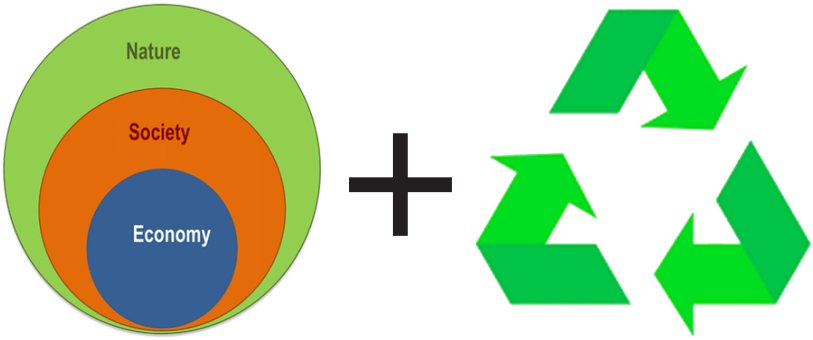


fig-70: Hembrugterrain in 1956 (left) and now (right); source: Hembrug

I chose this studio specially for my graduation project because, to me working with existing buildings and repurposing and reusing them is the right way to go into the future. I believe that very soon especially in urban cities around the world, due to real estate growing exponentially, new architecture would be impossible to make, unless existing ones are demolished. And as cities expand and take over more rural and industrial land around them, a better more sustainable way to step foot into the future would be to reuse rather than to demolish. Working with existing buildings is also interesting because when you do so every building or site has a unique history linked to it and learning about them and designing with an existing historical background to me gives a project more depth and perspective. A particularly interesting project that I have been studying for a while now and is a good precedent to Architecture and Heritage in general is the Van Nelle factory in Rotterdam, Netherlands.

The Van Nelle building was part of a former tobacco factory which existed in the early 1900s, it was a very modern factory for its time which had architecture that was quite different from the generic industrial architecture of its time. Ever since it was unused there were several plans for it including to demolish it to make a new building. It was the first such industrial reuse project in the Netherland of such a scale and heritage experts fought long and hard to keep the building and reuse and restore it rather than demolish it. Today it is a UNESCO world heritage site and will always be a pioneer for industrial heritage restoration in the Netherlands. This project is also a very popular study example because of its scale, and that meant that it could be studied in a considerably short time and is quite well documented to be understood comprehensibly.



sustainability reuse

fig-71: ensemble location

fig-72: Van Nelle factory

Relationship between Graduation project and Studio Theme

When I was in Ljubljana, Slovenia for a DOCOMOMO conference and site visit for my MSc1 project in the chair of Heritage and Architecture, I remember having a very thoughtful conversation with Wessel de Jonge about this field of Architecture and he said to me and I quote, "it is all about designing through analysis and analysis through design." It is a phrase that I will always remember and apply in my projects because indeed this field is based on designing through research. And a huge part of that research is indeed the analysis of the existing context. Going in depth to analyze an existing building or site and to gain a 360-degree understanding of it is necessary to create a meaningful design intervention.

Walking around the Hembrug site quickly gave me an idea of the general architecture and characteristics of this site and made me understand the importance of careful, well thought out interventions that would be required to rejuvenate this site.

As I was walking around, I also found the general architecture unexciting at times and repetitive in nature. At the same time as people familiarize themselves with this site further and as they have been since it was opened in 2010, one could say that it could get boring or uninteresting very soon and the idea of inviting people and turning this into a residential and tourist hub in the future would be hampered. This according to me was also the main problem in Hembrug. Since the general architectural language of this site is quite similar with the characteristic load bearing masonry facades or heavy steel structures with light steel or wood roofs, every building seemed to look similar if you walk around the site for a while. Some of the newer architecture such as the shell roof buildings were a little different with the concrete shell structure, but the same brick facades meant that it was similar again to the classic older masonry buildings.

Therefore, due to the inherent industrial style of using brick, the general style was not dissimilar from one another. Hence, in my opinion an architect would probably understand and appreciate the repetitive industrial style with brick, but if we want to design the site for a broader demographic and people who are not familiar with architectural thinking, then one could say that the site needed a USP or unique selling point as one would say in the real estate world.

To me, that uniqueness factor on the site which would be the potential highlight for Hembrug and would be the edge this area needed to attract people to it for a long time in the future would be to add moments of surprise to the site where the intervention that is designed is contrasting architecturally to the existing style of architecture.

Therefore, the core idea of my project is to bring an element of contrast into the site (ensemble) with my intervention which would complement the existing and even highlight it to remind one of the important heritages this site carries within itself. Hence derived from this idea was my research question, "**How can a new Contrasting Intervention help rejuvenate the Changeover Zone Ensemble?**" And if you think about it, by answering my question through my research and thesis, I would also be addressing the bigger question of how one could introduce the uniqueness factor this area needed to attract people on a long-term basis.

fig-73: the first 5 images (anticlockwise) show the repetitive architecture, the last image on the bottom right shows a contrasting piece of architecture on the same site

Relationship between Research and Design

A key part of this graduation studio lies in the relationship between the research and design. A big part of the research process is to determine the values of the existing context and in our department, it is called the cultural value report. In order to make the right decisions for the design, a value assessment is made which eventually tells us the importance of the values of the existing and also helps us decide on whether the intervention would call for reuse, repair or demolition.

The way my graduation studio is designed is very methodical and easy to follow. Step one consisted of analysis reports. We made a contextual analysis report with the entire group where the research was focused on the surrounding context of our site in Hembrug. We looked into the past history and also took a peep into what the government has in mind for the future of this site. Looking into the future plans also gave me an insight of how specialists and experts are thinking when it comes to giving this site a fresh paint of life.

Then the site was divided into several zones or ensembles based on a report by Palmbout about Hembrug and its future. Then each of us in the ensemble we had selected, made another detailed report on the ensemble itself and its surrounding context. This research along with the contextual analysis became the steppingstone for my design.

The design phase started just before the P2, and since then I have always kept the analysis report close, going back to it frequently as I continued to design. Understanding the values and characteristics of the site also dictated my decision to demolish the newer but decaying industrial buildings 407 and 437 which actually contributed to decreasing the value of the site and more importantly affecting the value and characteristics of the Cathedral building which is the most significant building in the cluster of buildings present in the Changeover zone ensemble today.

Another important aspect of the research and design relationship is the understanding of the intangible aspects of an existing heritage site like Hembrug. Intangible aspects mostly mean the ambience and atmosphere and the experience one gets by being present at the site and that is a key factor to incorporate in a design intervention. The several site visits with the class and individually also helped me research and analyze the tangible and intangible parts of Hembrug and the Changeover zone. Visiting the site was also helpful in seeing the changing seasons in action as the dense forest behind the Changeover zone changed from bare in the winter to a lush green in the summer. This showed me the importance of not just looking at the immediate context but also incorporating the surrounding context while designing.

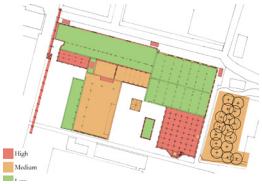


fig-74: value assessment of the ensemble

The removal of a couple of decaying buildings brought in the possibility to design a new one in connection with an existing one. The new contrasting building that I am designing has been carefully thought out and it was important to study and analyze the Cathedral first in order to create something that would contrast it. The key characteristics of the Cathedral such as its enormous height of about 16m (being a single-story building), its beautiful rhythm in the façade and interior, the steel trusses, gabled roof, open floor plan, heavy load bearing masonry walls and its shape and volume were studied. And in the new intervention, these qualities, atmosphere, materials and characteristics were contrasted. The important and meaningful connection was also needed to connect the new and the old which led to the idea of creating a transparent glass box in between where one could clearly experience the old and the new and also understand how the new relates to the old.

fig-75: the four borders of the ensemble give the ensemble 4 distinct spatial qualities

Relationship between Methodology of the studio and Methods used

In Heritage and Architecture, research with respect to context is of the essence and Wessel de Jonge highlights this in his book "Designing from Heritage," where he says that in order to create a well thought out 360 degree design intervention, one needs to do a thorough research first of the context, and defined it as context-led design. But we all do research before we start a design project be it Heritage or not.

What distinguishes this field from the rest is the focus on the values of the site, more specifically its cultural values. The value assessment therefore gives the architect a knowledge base which he can then analyze, understand and use to create a meaningful design.

I based my research methodology closely with the heritage value matrix developed by Kuipers and Zijlstra. But as mentioned several times before in many texts and

articles about the dilemma's architects face when they value an existing piece of architecture and problem often lies in the subjective nature of the issue because what is valuable to me may not be equally valuable to another. The approach that Kuipers and Zijlstra take in their value matrix system makes the whole process more objective and generalizes it a little with constraints so that it can be applied more objectively to a range of projects.

An interesting topic of debate is the addition of the economic factor into the design and analysis process. As the viability of a certain project nowadays depends highly on the economic resources, I wanted to add a quantitative layer into my design thinking and therefore touched on the idea of the viability of my design intervention in terms of monetary resources.

His principles focus on the rapidly increasing scarcity of raw materials and through his series of works shows us how energy neutral and positive buildings can be designed in innovative ways.

Rather than a crisis, he sees this situation as a challenge and thus, shows us how sustainability can be handled and put into practice keeping in mind, economic viability which is and will be extremely important aspect in current and future markets. Therefore, inspired by his way of thinking I have tried to make my design energy positive by reusing and producing the energy requirements on-site and have also focused on making my raw material cycle more circular and sustainable.

The idea of creating a materials portfolio which helps track the values of materials used and giving a project a life span and renting materials for that duration is inspiring and gives suppliers an advantage and greatly improves the economic viability of the project. This is an approach I am using for my design where I will be making a portfolio for the materials I will be using and also lease them for a period of 20 years after which the design could change or evolve and the materials could be returned to the supplier.

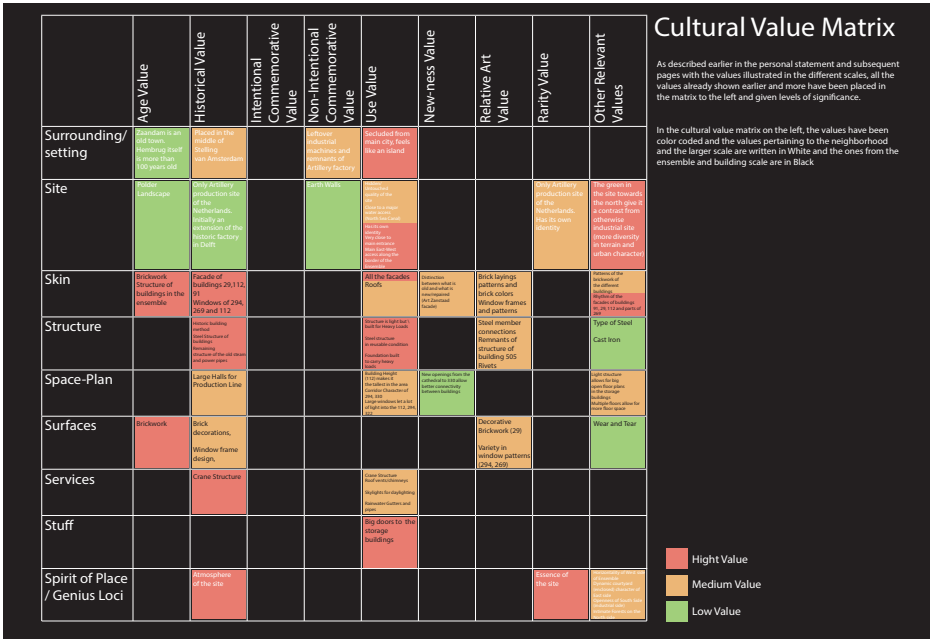


fig-76: cultural value matrix

Relationship with the greater Social Context

An interesting challenge that has risen recently is the huge number of industrial sites that were in use during the early to mid 1900s are not functional anymore and lay in decay in and around major cities around Europe. A common dilemma the governments are facing is the future of such sites and whether they are going to reuse such sites, or it would be more economical to demolish it. Germany has several such sites that are being reused beautifully to cater to new functions such as several industrial sites in Hamburg. A particularly interesting project I looked into was the Elbphilharmonie. It is located on the historic site of Sandtorhafen, which was Hamburg's old working harbor for centuries. The Kaiserspeicher is Hamburg's biggest warehouse on the water and was built in 1875. It was destroyed in the Second World War, and then rebuilt and renamed Kaispeicher. It was a storage facility of Cacao, tea and tobacco until the 1990s. Redesigned by two of the very

famous household names in the world of adaptive reuse, Herzog and DeMeuron, this building is a great example of the balance we as architects seek between old and new. Where we reuse an old project, a main underlying debate is always "where is the tipping point at which the new overpowers the old? How can be balance the old and the new in harmony?" The Elbphilharmonie was also part of an old industrial port area which is being developed for future use, like Hembrug, and similar to Hembrug the Elbphilharmonie was also designed to enhance the cultural and social quality of the site.

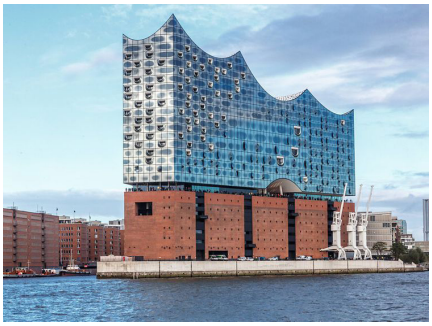


fig-77: Elbphilharmonie an adaptive reuse project by Herzog & DeMeuron

fig-78: elderly care in conjunction with student housing

Amsterdam like every other major metropolitan city around the world is ever growing and expanding. Surprisingly more people know the Netherlands by Amsterdam than the other way around. Since it is a major hub and the northern gateway to the Netherlands, it is a very important city for the government. This city indeed is one of the main point of attractions in the Netherlands and as it grows, it develops neighboring cities with it. Zaandam being a historic city itself is very close to Amsterdam and hence a part of the expansion of Amsterdam. As tourist traffic grows, the government's plan is to spill some of that traffic into Zaandam and similarly a major gateway to Zaandam is the Hembrug area sitting just north of the North Sea canal and Amsterdam.

Therefore, Hembrug is becoming a more and more important site as we speak as it gets integrated into the developments of Amsterdam. Hembrug, a former ammunition factory in itself has several redevelopment projects underway, hence, a careful plan needs to be put in place because as this is a site which could be a future tourist hotspot and to be included in the future expansion of Amsterdam needs to have an element that would attract people to it. My project has been set up in a similar way where I am researching and designing an intervention which has that element (mentioned above) taken into consideration within the design. As I was experiencing the site through my several site visits I realized how important it would be for new interventions to not just work harmoniously with the existing but also add an element of surprise within the site which could potentially be a point of attraction for the future visitors of the site. My intervention which is a flat roof transparent glass box of sorts is designed to contrast the cathedral building in the changeover zone ensemble and this intervention can then go onto not just add a new layer to the ensemble but the contrasting features could also put the focus on the cathedral thereby reminding the audience of the relevance and past history of this site. With the idea of the elderly co-living and working on my ensemble with other students of the culinary school, this adds an interesting social aspect to my project where an existing problem of a lacking elderly care system is addressed in big urban cities.

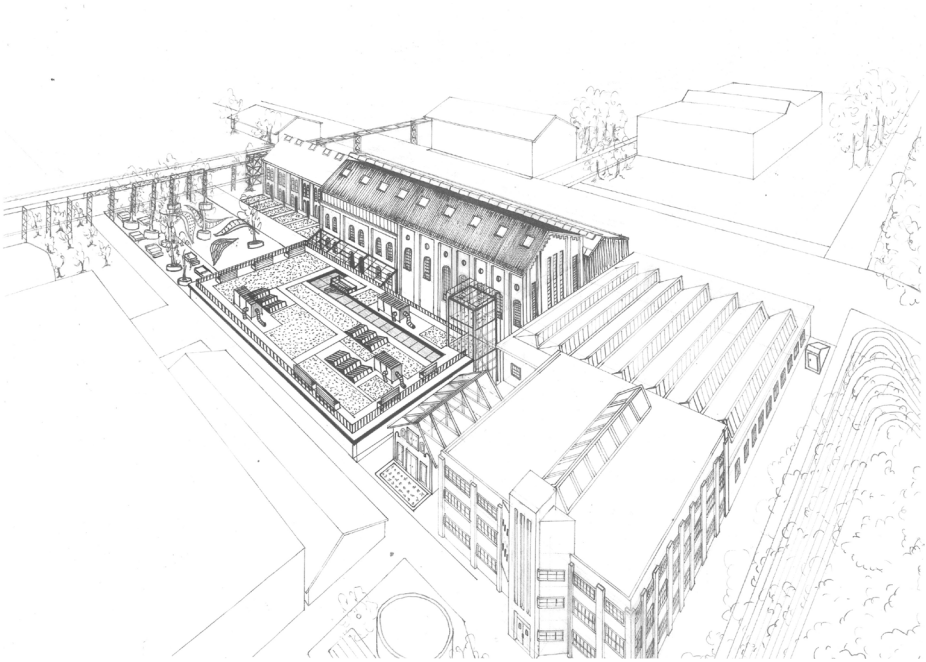


fig-79: bird's eye view of my design intervention with the contrasting new building in front of the cathedral

07

conclusion

Conclusion & Final Design

The final iteration of my design is shown to the right. The journey through this graduation project has been incredible with every step filled with learning and challenges. The development of my design was an inspiring process with a lot of ups, downs and critical thinking. Designing with respect to Heritage was a relatively new experience for me where I had to think about an added aspect of cultural value. I was also able to push myself beyond my comfort zone and delve into the idea of 'contrasting architecture' and also integrate a social aspect to my project.

Designing a contrasting new intervention which would complement the existing often made me think hard about what I was contrasting, why I was contrasting it and what the consequences of my design were. Integrating a Culinary school with an elderly residential care system taught me a lot about how a social aspect in today's world can be beautifully integrated within architecture and how architecture can be used to solve social issues.

Finally, sustainability has always been a key aspect of my design and I could greatly improve my design with a sustainability angle focusing on passive systems, recycle and reuse which was inspired by Thomas Rau and his works on a sustainable future and how awareness, care and intelligent thinking can make a huge difference in improving and eventually creating a more carbon positive and energy neutral future for ourselves.

fig-80: bird's eye view of my design intervention

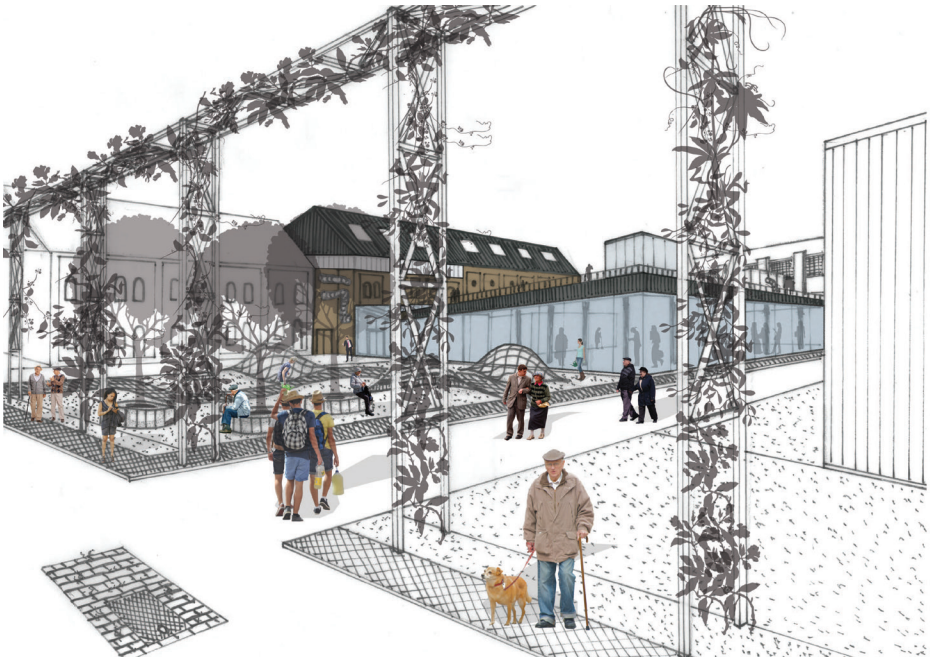


fig-81: south-east corner of the ensemble

fig-82: south side of the ensemble

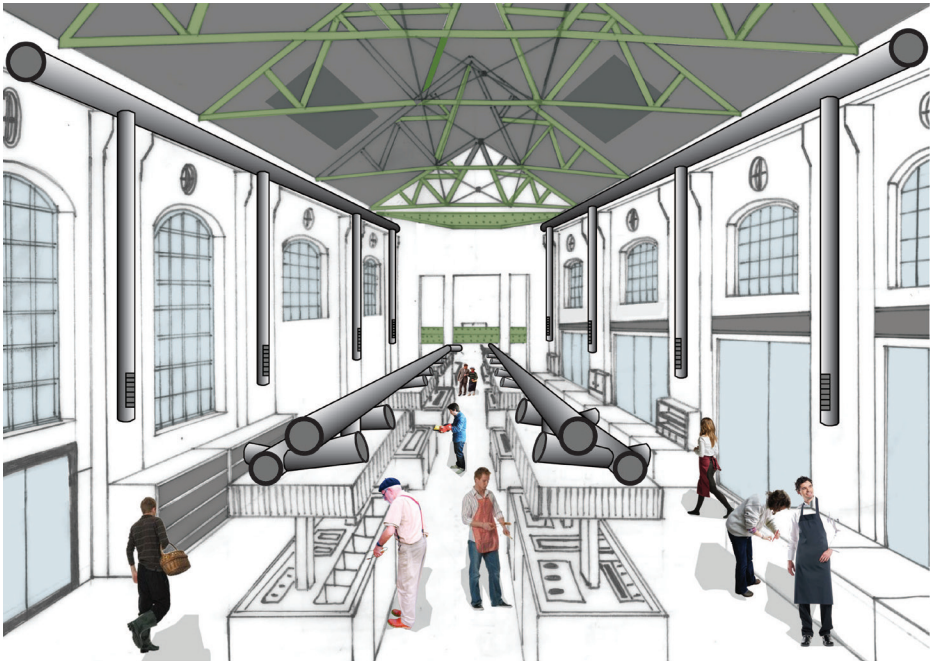


fig-83: right side of the new kitchen in the Cathedral

fig-84: left side of the new kitchen in the Cathedral

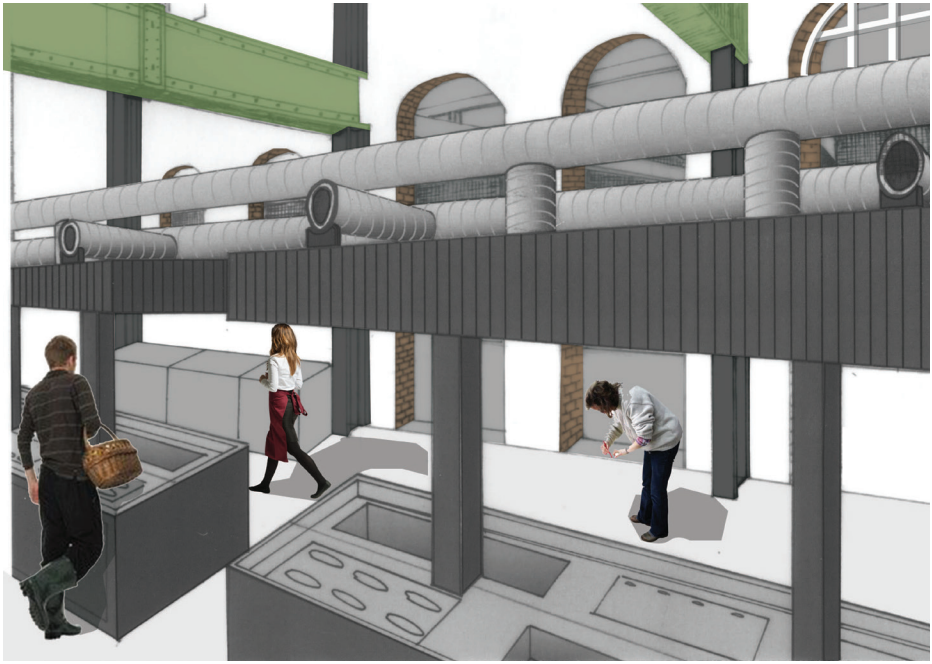


fig-85: left side of the new kitchen in the Cathedral, seen here overlooking the glass box

fig-86: the glass box connecting the old and the new

fig-87: the walkway in the new building

fig-88: new kitchen in the new building

fig-89: outdoor space within the ensemble

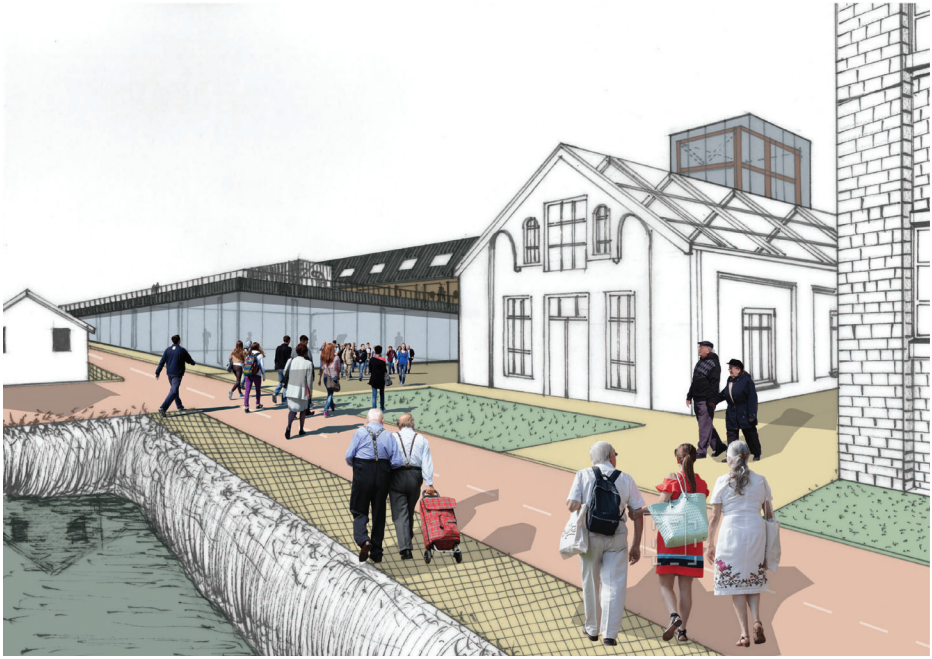


fig-90: north side of the ensemble overlooking the new building

08

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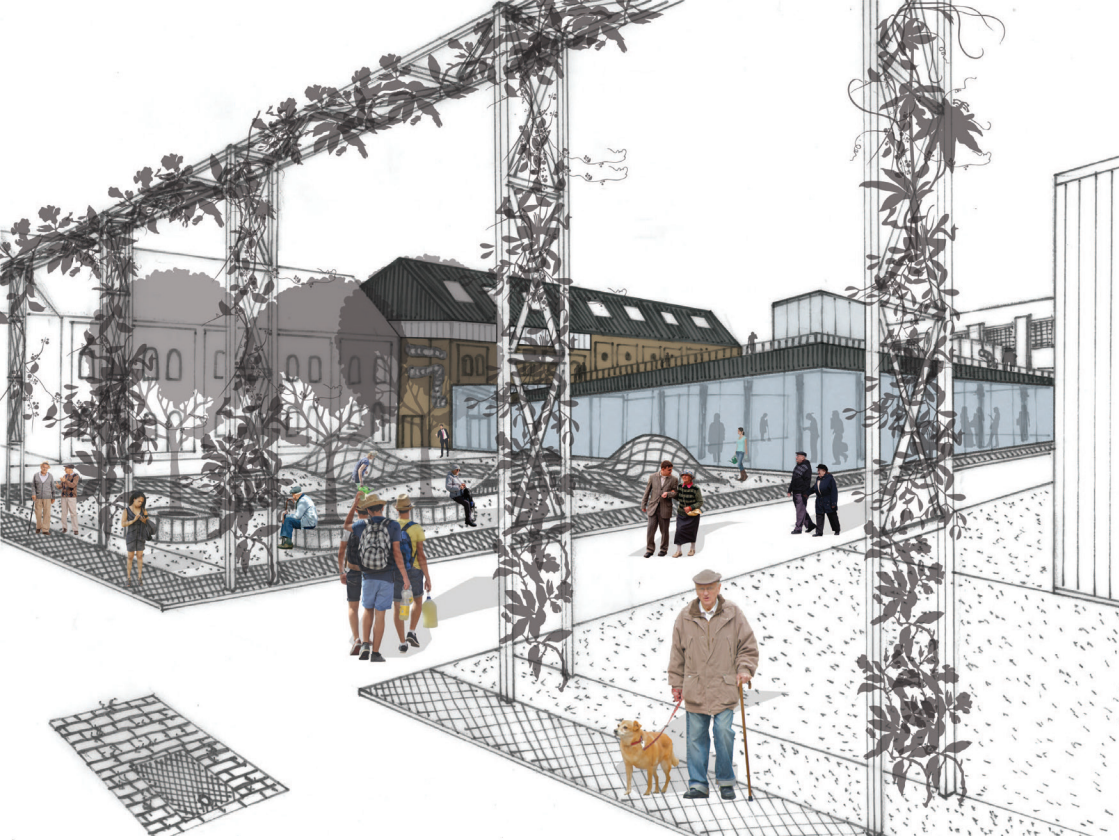

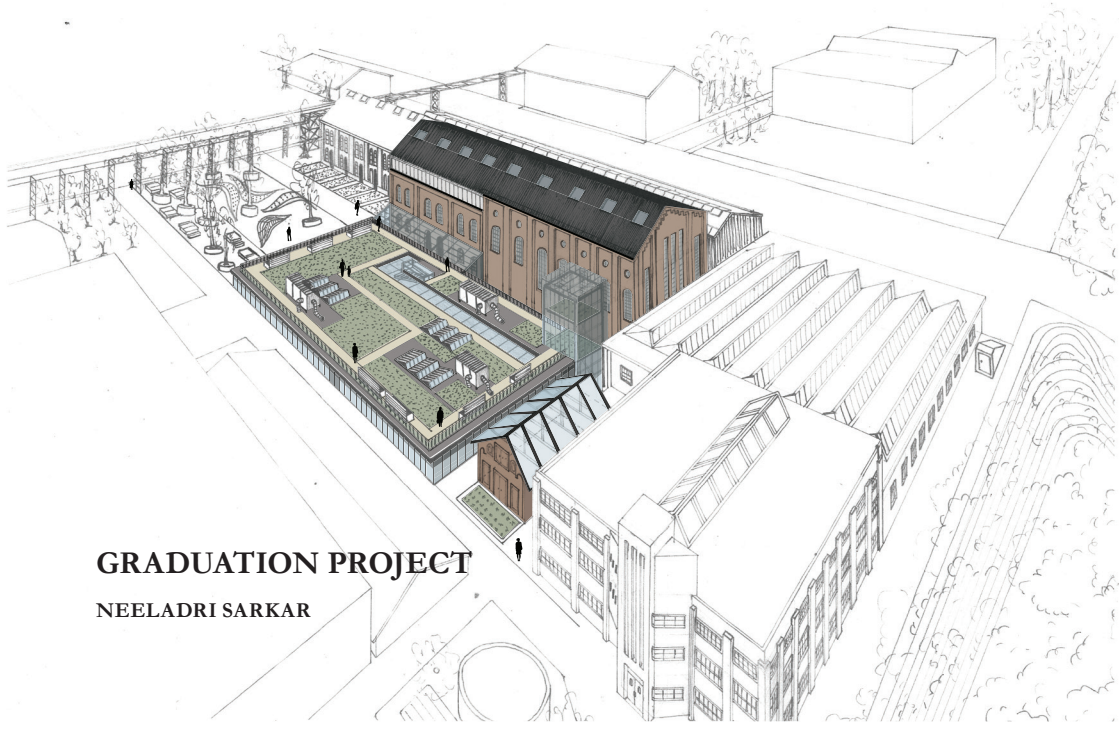

GRADUATION PROJECT

NEELADRI SARKAR