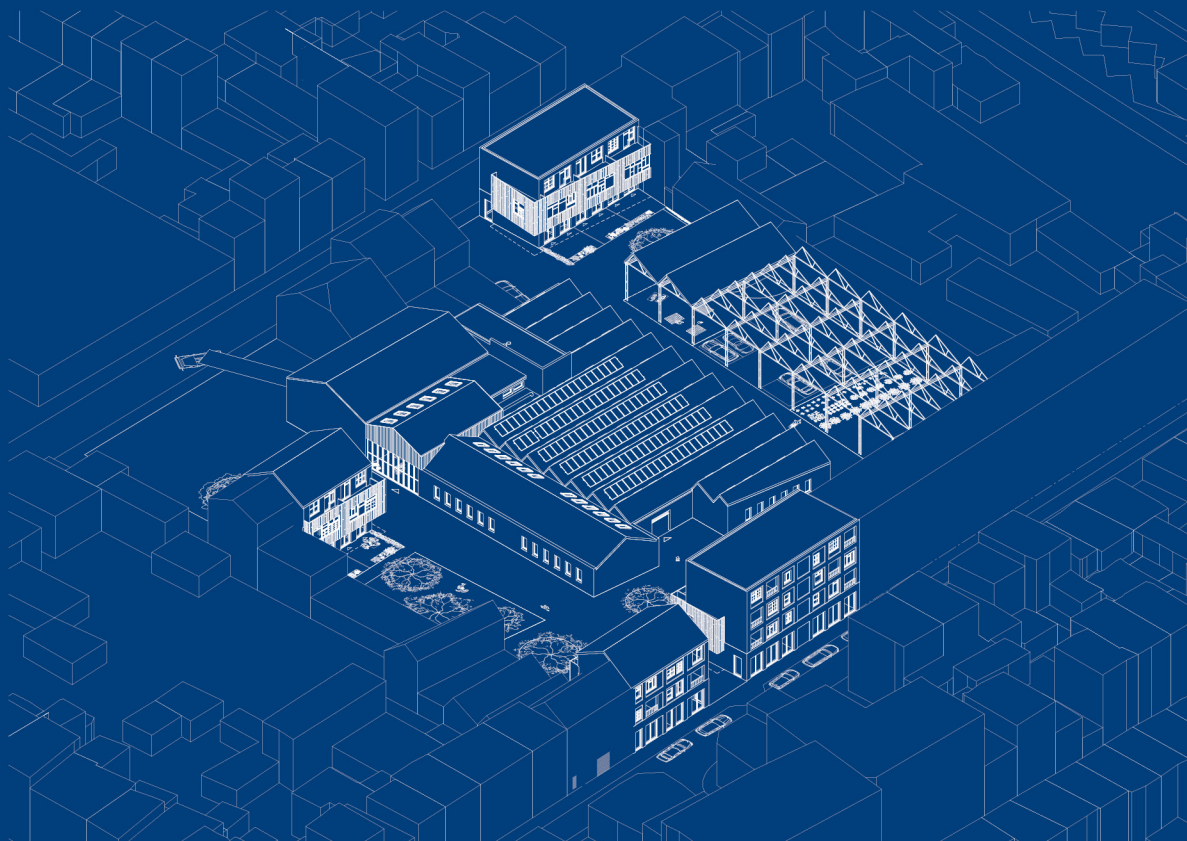


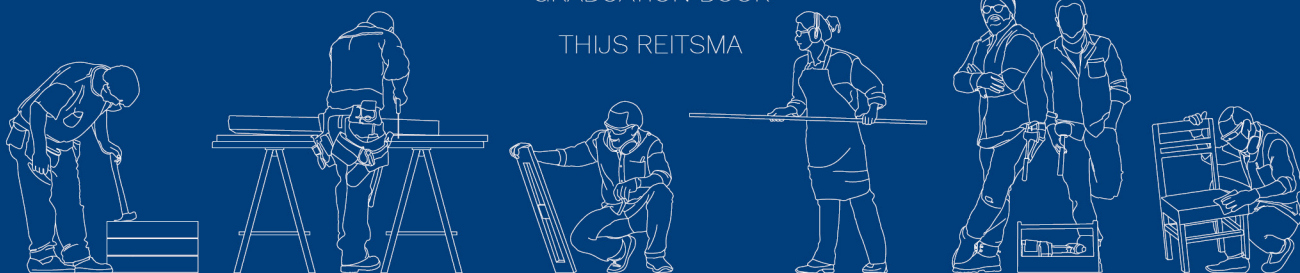
Re:Generation Liège



*Reimagining Local Building Culture as a Showcase
for a Circular Generation of Architecture*

GRADUATION BOOK

THIJS REITSMA



Re:Generation Liège
Reimagining Local Building Culture as a Showcase for a Circular Generation of Architecture

Graduation Book
Thijs Reitsma
July 4, 2023

INSTITUTE
Delft University of Technology
MSc Architecture, Urbanism and Building Sciences
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*"A transformed building may carry a **strong identity** based on previous use or the weathering of materials, and preserving the existing structure **preserves resources** for demolition as well as for the production of a new structure.*

*The same is potentially the case at other scales of reusing materials and this has formed the working hypothesis that reused materials and components **represent a potential value** in terms of **culture, energy, and economy** to be preserved and enhanced."*

Manelius, Nielsen & Kauschen, 2019b, P. 2



In the ever-evolving world of architecture and construction, there is a growing recognition of the urgent need to embrace sustainable and circular practices. As the challenges of climate change and resource depletion become increasingly apparent, architects and designers have a unique opportunity and responsibility to shape the future of our built environment. It is within this context that I followed the Urban Architecture Graduation Studio, leading to my project called "Re:Generation Liège", in which I aim to reimagine local building culture as a showcase for a circular generation of architecture, while revitalizing an abandoned industrial site.

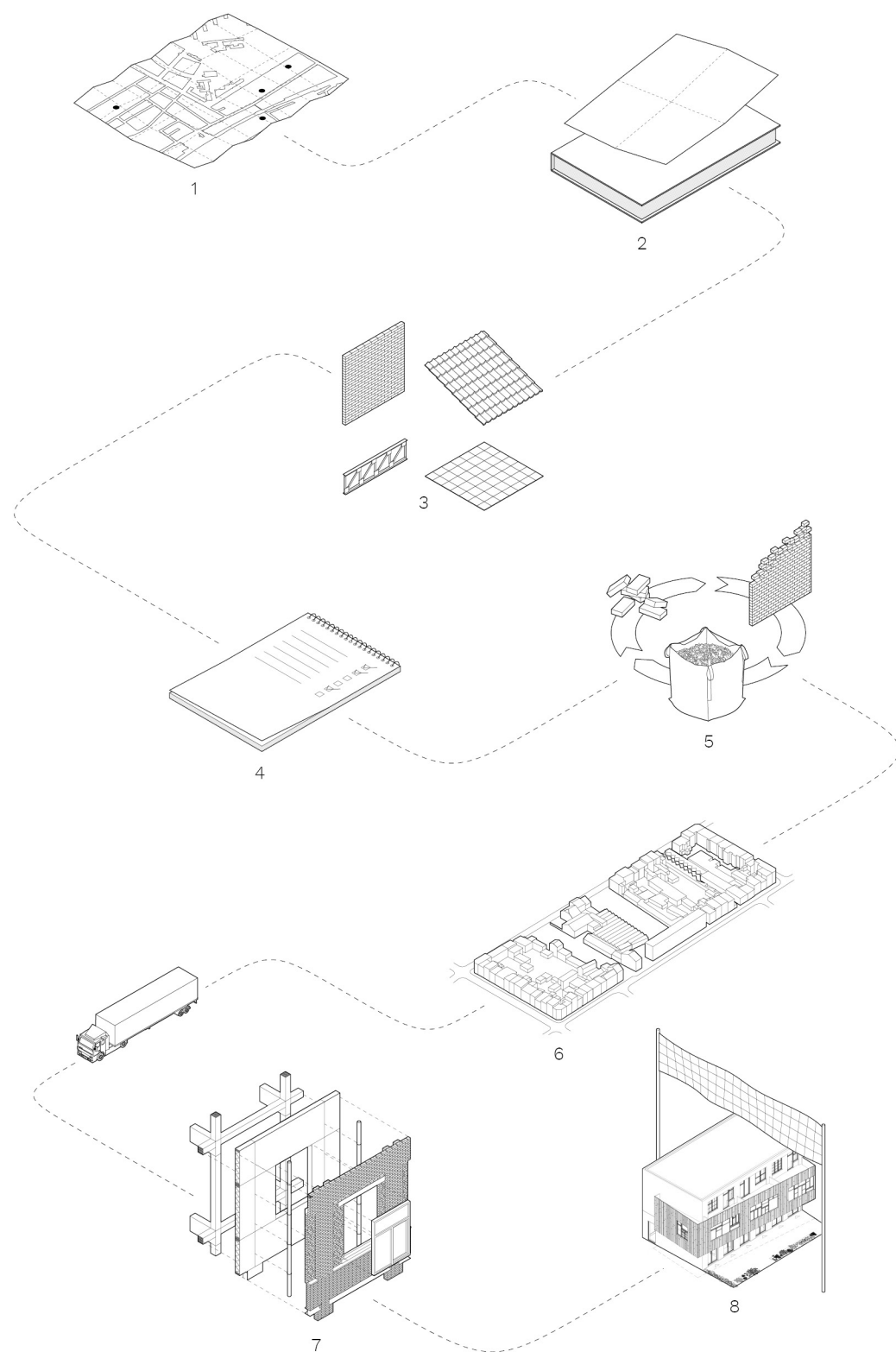
"Re:Generation Liège" is born out of a intrinsic interest for integral sustainability and innovation, and the belief in the transformative potential of the built environment. It is the result of countless long days and late hours of research and design exploration, six trips to Liège, a short but important period of intensive collaboration, a full year of individual work and personal challenges and many gained experiences.

At its core, "Re:Generation Liège" seeks to challenge the prevailing linear model of resource consumption in our field of Architecture, while trying to create architecture that is culturally fitting, encouraging social life and in symbiosis with nature. By harnessing the principles of circularity and sustainability, this project strives to create a harmonious interplay between human habitation, natural resources, and the surrounding environment.

The city of Liège, with its rich architectural heritage and vibrant cultural identity, serves as the backdrop for this project. By leveraging the unique physical, economic and socio-cultural characteristics of the local context, "Re:Generation Liège" aims to demonstrate how a circular economy can be boosted in this specific context, through showcasing the potential of adaptive reuse, component reuse and reuse-focused public program.

This graduation book is an integral part of a comprehensive collection of work that includes the research booklet 'From Decay to Reuse', created in collaboration with Djamo Mastenbroek, as well as a variety of physical products, and the final presentation held on July 4, 2023, at the Faculty of Architecture and the Built Environment of the TU Delft.





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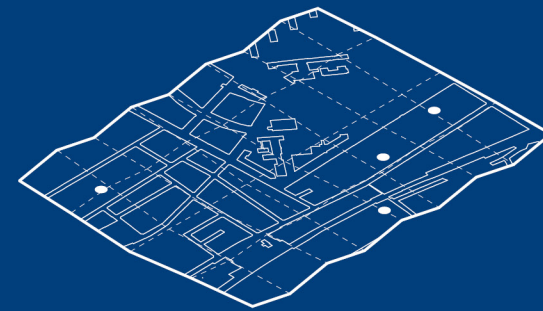
exploration

/ˌɛksplə'reɪʃn/

noun

1. the action of exploring an unfamiliar area.
2. thorough examination of a subject.

(Oxford English Dictionary)



The exploration phase marks the beginning of this project. This phase mainly covered the first quarter of the year and was all about getting to know our fellow students, discovering the qualities and shortcomings of our project site and gaining knowledge on different themes. Most of the exploration phase was done in groups, divided by central themes, except for my personal exploration of my fascination for reuse and upcycling.

The coming pages consist of a photoseries of Liège, covering my observations during the many visits to Liège. The second part of this phase extends these observations with further analysis, conducted as part of the Mining & Making group, which eventually formed the basis of my project.



OBSERVATIONS

CITY OF CONTRAST

The urban fabric of Liège is characterized by a fascinating interplay of contrasts. Within the city, one can witness a juxtaposition of old and new, as historical architecture harmoniously coexists with contemporary structures. The contrast between traditional cobblestone streets and modern boulevards creates a dynamic visual landscape. Furthermore, the cityscape features a blend of architectural styles, ranging from medieval buildings to Art Nouveau facades and sleek, modern designs.



These contrasts extend beyond architecture and encompass the diverse social and cultural fabric of Liège. The city is a melting pot of different communities, where traditional values intersect with a vibrant and cosmopolitan atmosphere.

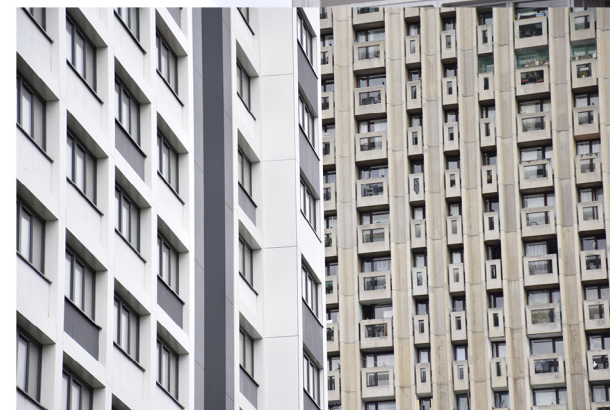


MODERNIST CITY

Strongly contributing to this contrast are the modernist buildings in the district of Droixhe. Built in 1958 following Le Corbusier's modernism, these buildings were set to shape the future form of urbanism in Liège, demanding current structures to be torn down. Even though those plans never fully reached their aim and most of the flats have



already been demolished again, the Atlas building, constructed as the last pillar of this modernist neighbourhood, still serves as a very proud landmark, visible throughout the whole of Liège.



OBSERVATIONS

CAR-DOMINATED CITY

Cars have played a significant role in the history of Liège, shaping its urban development and transportation landscape. As the city experienced industrial growth in the early 20th century, the emergence of automobiles brought newfound mobility and economic opportunities.

The rise of automotive manufacturing and associated industries in Liège fueled employment and contributed to the city's prosperity. However, the increasing presence of cars also presented challenges such as traffic congestion and environmental concerns. Over time, efforts have been made to balance the convenience of car transportation with sustainable urban planning, promoting alternative modes of transport and implementing measures to reduce pollution. The streetscape and river banks however show there is still a world to win in terms of car-domination.



OBSERVATIONS

CITY AMONG THE HILLS

Like numerous other prominent European cities, Liège grew alongside a river, the Meuse, which led to its location within a valley encompassed by verdant hills. While some of these hills retain their natural contours, others bear signs of their artificial origins.



These man-made slagheaps serve as physical reminders of the city's mining history, as they were constructed from mining waste. The presence of these distinct hills adds a unique dimension to Liège's landscape, blending natural and industrial elements in a symbiotic way.

(POST-)INDUSTRIAL CITY

Liege has a rich industrial history that spans several centuries, playing a vital role in the region's economic growth. The city was a hub of heavy industry, with steel production, coal mining, and manufacturing being prominent sectors.



However, as global economic dynamics shifted and industrialization declined, Liege experienced a significant transformation in the post-industrial era. As a result, the city has actively diversified its economy, focusing on sectors such as services, technology, research, and education.



POST-MINING CITY

Intertwined with this industrial past, Liege has undergone significant changes with the decline of the mining industry. Once a prominent mining region, the city has had to adapt to the new reality and find alternative sources of economic growth.



The closure of mines led to a period of economic restructuring and revitalization efforts. Today, the scars of the mining industry are still visible in the landscape, in the form of slagheaps, preserved mining sites, museums, and cultural initiatives that celebrate and commemorate the mining history.

OBSERVATIONS

ANONYMOUS CITY

Walking through the streets of Bressoux, one can't help but notice the numerous closed shutters on buildings, hinting at the area's challenges of criminality and distrust and the need for apparent need for privacy. Due to this strict border between the public and the private and the complete lack of space for own appropriation, it becomes almost impossible for a passerby such as ourselves to gain knowledge on the social or economic activities behind the facades. When conducting interviews with local citizens, it became clear that even residents sometimes do not know what is happening in the neighbouring building.



Occasional glimpses behind open shutters or through narrow alleys, however, unveil a different world within the building blocks. These hidden spaces, full of activity, greenery and personal touches, offer a stark contrast to the lack thereof in the public domain.





CITY IN DECAY

Within, but also exceeding the streets of Bressoux, one cannot ignore the presence of numerous abandoned buildings and decaying structures. These forsaken architectural remnants serve as visible reminders of neglect and disrepair, reflecting the challenges faced by the neighborhood. Some of these structures have already been abandoned for years, leaving the city with a negative image.

CITY IN CONSTRUCTION

Luckily, there are also ongoing construction works in and around Bressoux, indicating a sense of revitalization and development in the area, such as the long-promised tram line connecting the neighbourhood with the city centre, and the Europa Expo building at the edge of Droixhe, set to open in 2023. Additionally, many private and commercial building owners seem to invest in their property by renovating it.



The presence of construction activities signifies a positive transformation and investment in the neighborhood, with the potential to attract new residents and businesses, and contribute to the overall growth and prosperity of Bressoux.

OBSERVATIONS

SCARRED CITY

along with these developments, decayed buildings have to be torn down, often leaving a trace of what was there. In many occasions, these voids were not filled in the same way as they originally, as the function of the plot changed, unintentionally permanently displaying details of its past.





PATIENT CITY

These voids, together with the diverse roofscape, make sure many side facades are exposed. While some are treated with art to provide them with a more permanent look, others are fixed in a very improvisorial way, or even seemingly waiting to be built upon. The majority of 'waiting facades' is covered in the Belgian famous diamond-shaped slate.





Joint result of first observations (own image, Mining & Making, 2022)

The first period of the Urban Architecture graduation studio was characterized by on a joint exploration of the city of Liège. Divided in 5 different groups, each following a different theme, the whole studio contributed to a open source catalogue of information, to be used as a basis to further explore and design upon. As the group of Mining and Making, those two intertwined and consecutive actions became the subject matter of our group research. Positioning it in the context of the post-industrial city of Liège as a result revealed to us the multiplicity of readings of those themes.

At first, both topics seemed conspicuous due to the industrial history of the city. The consequences of the mining activities and steel-making industries were visible everywhere. In the landscape that has been exploited and altered to meet human needs; In the architecture of the neighbourhoods, built to house the workers of those factories.

Nevertheless, during the process of unravelling the past, we decided to shift our focus to different definitions of 'Mining & Making'. Looking at them

through the lenses of the present and the future we dived into the topics of material reclamation (urban mining) and upcycling leaning towards a process of Re-Making.

While remained puzzled by the concept of what it means for a city to be considered (post-)industrial, we tracked the changes in the urban fabric of Liège, focusing on Bressoux and Droixhe. Unveiling the different planning authority approaches as well as the existence of the post-industrial activities on our site became the highlights of the research. Curiosities that we have picked up on; the post-industrial heritage of the site, which currently is largely residential, became visible through the architecture that was born during the golden industrial era. Architecture which was a spectator to the passing of time.

Learning that mining and making are not only consecutive but also circular practices became an overarching theme throughout the coming pages. All of the data, materials and stories which have been 'mined', have also been [re]made into this narrative that tells the urban and industrial story of Droixhe and Bressoux.



With the Flemish work force, Liege mines had to rely on foreigners from further abroad to cover the shortages in local mining companies, mainly Poles (33%) and Italians (31%).

ARRIVAL OF THE FLEMISH WORK FORCE
1923 •

Fédéchar had reached an agreement with the Italian authorities of a mass migration of Italian workers, in exchange for the delivery of Belgian coal, necessary for the recovery of the Italian economy after WWII.

MASS MIGRATION OF ITALIAN WORKERS
1946 •

After the mining disaster of Bois-du-Cazier in Marcinelle (close to Charleroi) in 1956, the Italian government put the official migration towards the Belgian mines to stop.

MINING DISASTER IN MARCINELLE
1956 •

In 1969 a recruitment agreement was reached with Tunisia; a year later a similar deal with Algeria was made. These countries delivered the last batch for the foreign legion, which kept the mining industry in Liege alive until 1980.

RECRUITMENT AGREEMENT WITH TUNISA & ALGERIA
1969 •



• 1952
FLUCTUATIONS ON THE NUMBER OF
FOREIGNERS

The fluctuations from 1952 to 1958 correlated with the yearly coal stocks of the mines. In the fifties as increase in the coal stocks seemed to be accompanied by a decline in the recruitment of foreign workers.

• 1944
THE EMPLOYMENT OF GERMAN
PRISONERS

Because of the growing international pressure, German prisoners of war had to be discharged in 1947, which led to a new substitute labour force mainly found abroad.

• 1964
BILATERAL TREATY WITH TURKEY

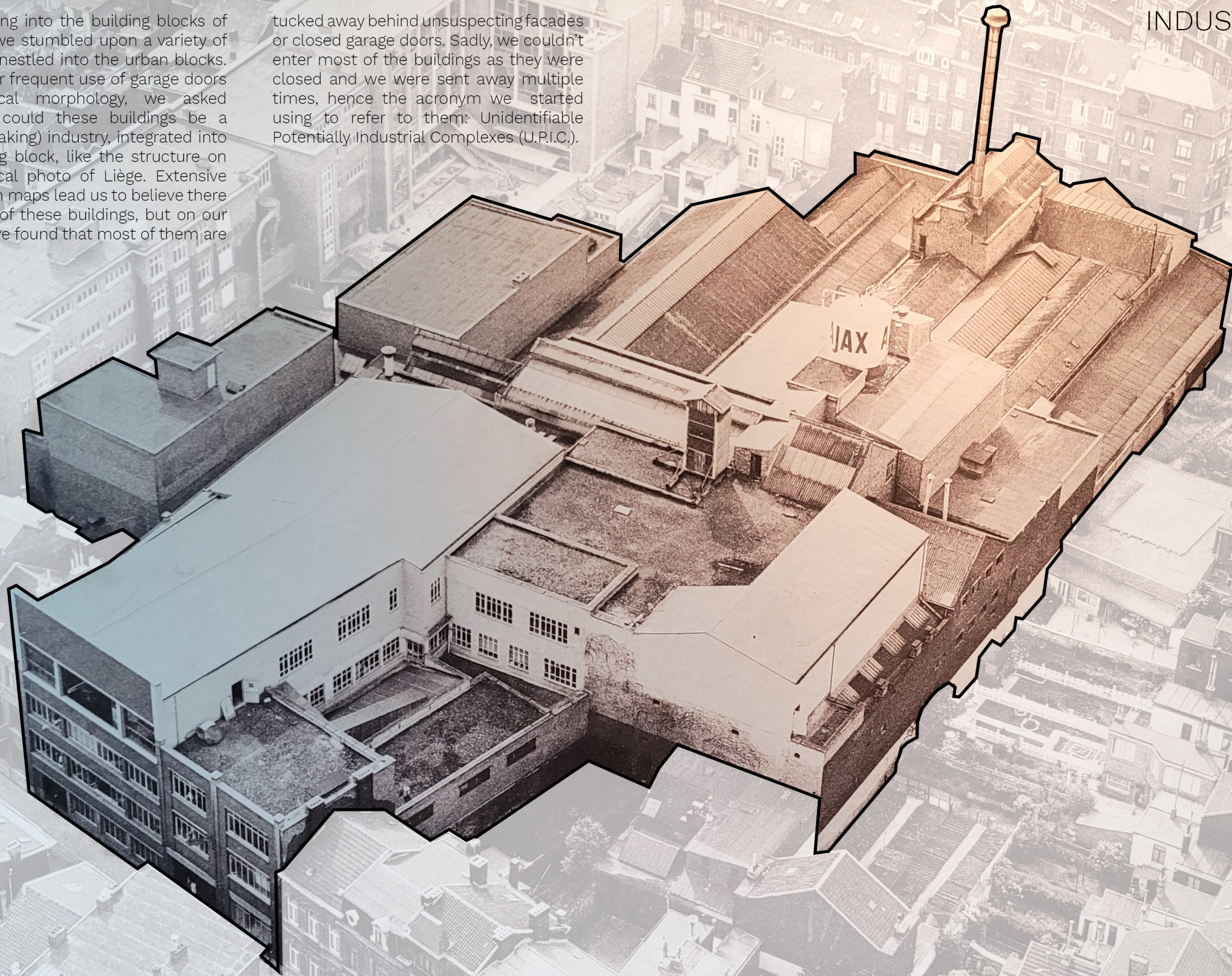
Turks and Moroccans were now systematically recruited. The Turks even took up the second place after the Italians.

Timeline of the mining history in relation to the foreign work forces. (Alice Chau, Mining & Making, 2022)

While looking into the building blocks of Bressoux, we stumbled upon a variety of structures nestled into the urban blocks. Due to their frequent use of garage doors and atypical morphology, we asked ourselves: could these buildings be a form of (making) industry, integrated into the building block, like the structure on the historical photo of Liège. Extensive research on maps lead us to believe there were a lot of these buildings, but on our site visits we found that most of them are

tucked away behind unsuspecting facades or closed garage doors. Sadly, we couldn't enter most of the buildings as they were closed and we were sent away multiple times, hence the acronym we started using to refer to them: Unidentifiable Potentially Industrial Complexes (U.P.I.C.).

INDUSTRIAL ACTIVITY



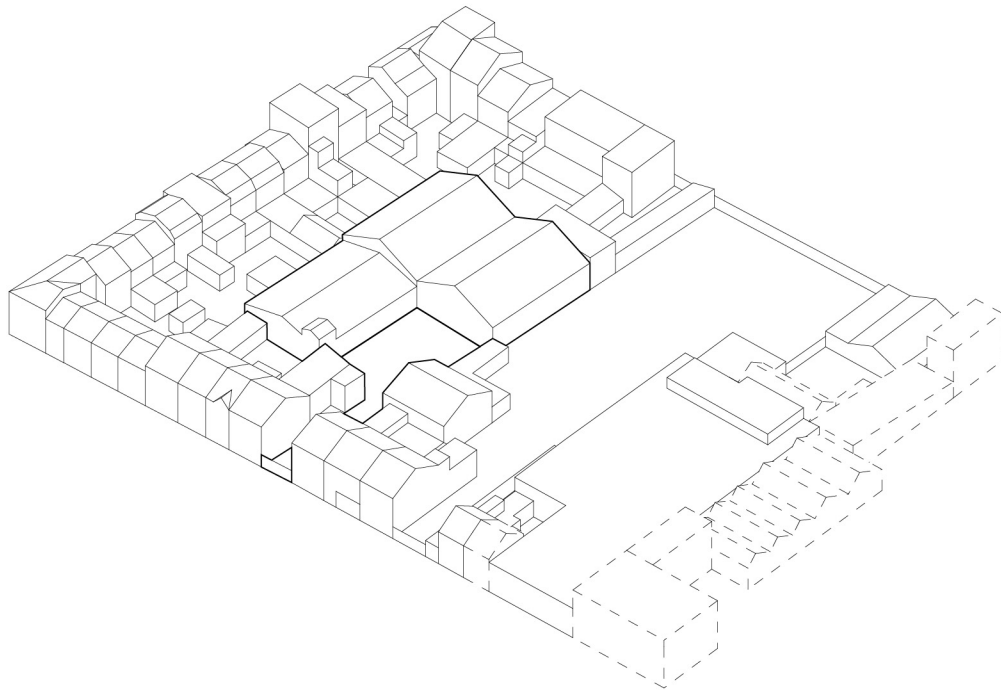
AJAX/Palmolive factory, embedded in the building block, in between Rue des Champs and Rue Laïresse (adapted from Maison de la Métallurgie et de l'Industrie de Liège, date unknown)

Through more thorough investigation on Google Maps, we eventually identified many of those U.P.I.C.'s, varying in size, shape and visibility from the street. Many of the smaller plots mainly consisted of a extended ground floor area, accessible from the street through a large garage door. The larger structures were mostly accompanied with a terrain, also serving as a parking and driving lane to access the interior program.

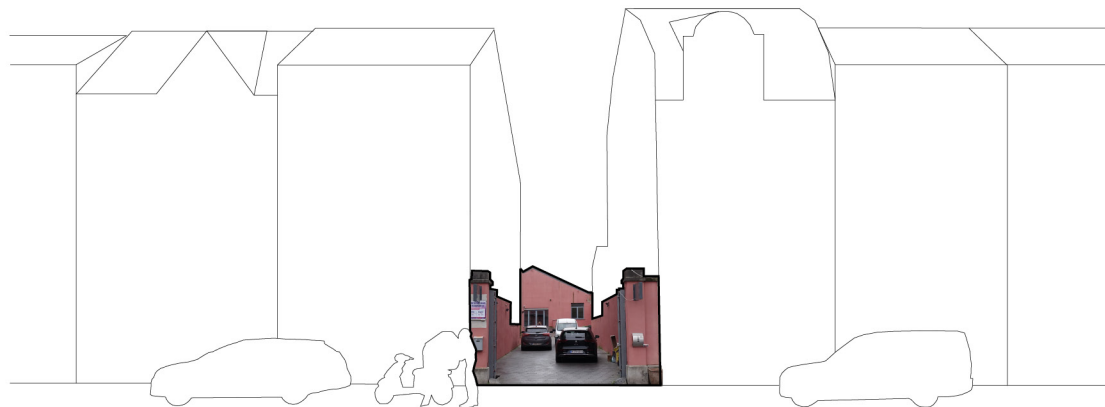
As can be seen on the map, there is a clear difference in the scale of the potentially industrial complexes in relation to their location. While the smaller complexes mainly developed in the centre of a building block, expanding over time with the growth of the company, the companies with the largest footprints clustered around the rails.



As can be seen on the diagram on the left, this example of a UPIC is formed by three relatively large linked buildings, directly adjacent to almost twenty backyards. Although it strongly influences these backyards, it is almost invisible from the street, being tucked away between houses.

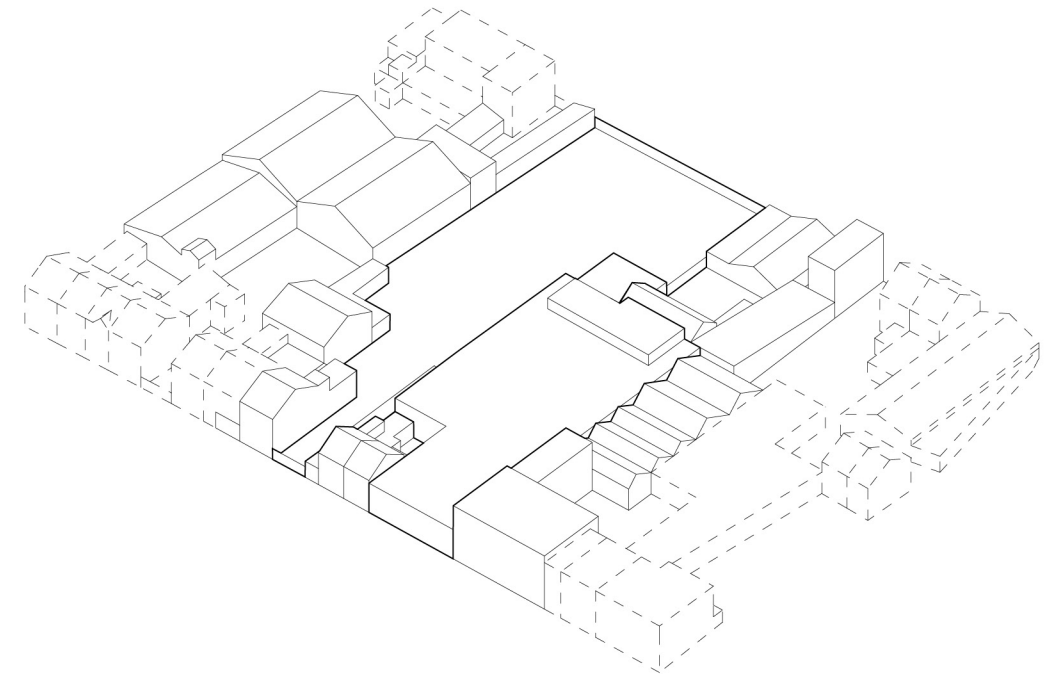


*Isometric diagram of Avenue de la Croix Rouge 284 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

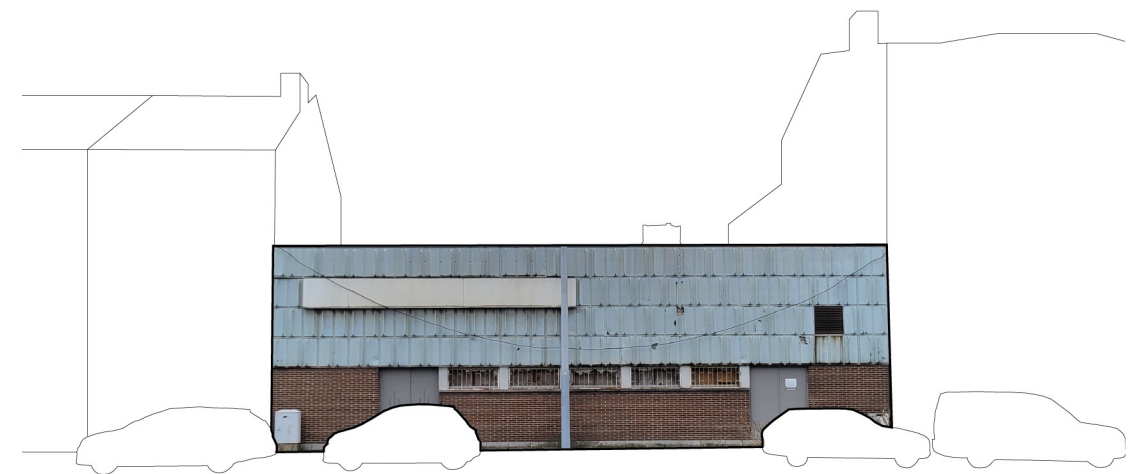


*Street view diagram of Avenue de la Croix Rouge 284 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

This closed facade defines the relation between the street and this building, which reaches 55 metres into the building block. It is adjacent to two backyards and a large open field on one side, while the other sides are completely enclosed, forming a cluster with neighbouring UPIC.

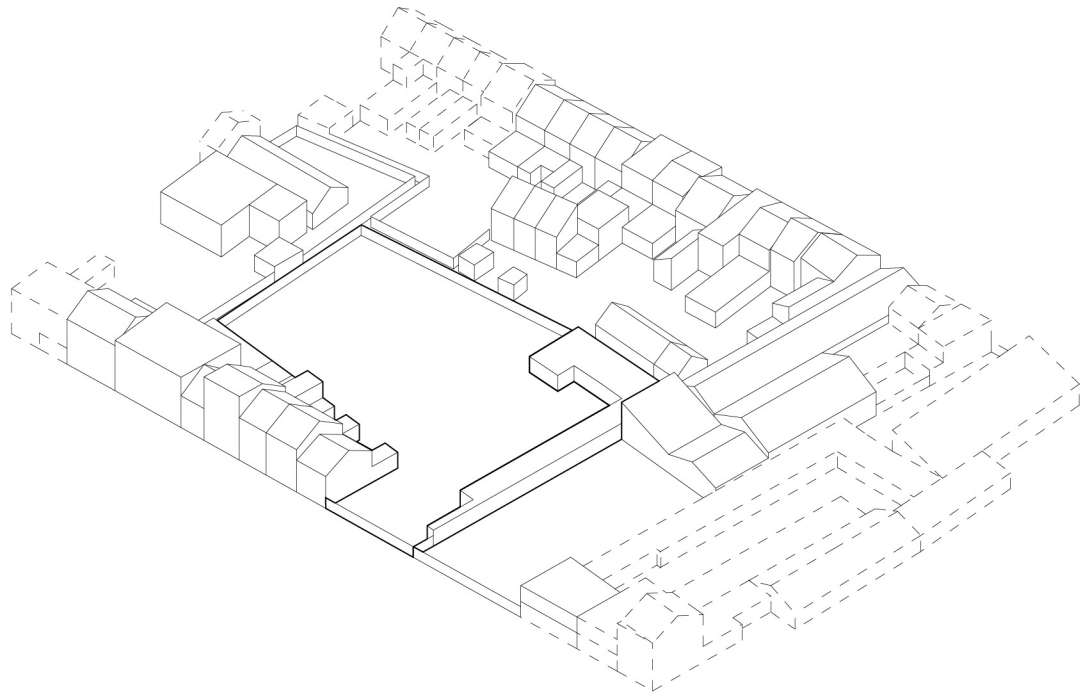


*Isometric diagram of Avenue de la Croix Rouge 266-270 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

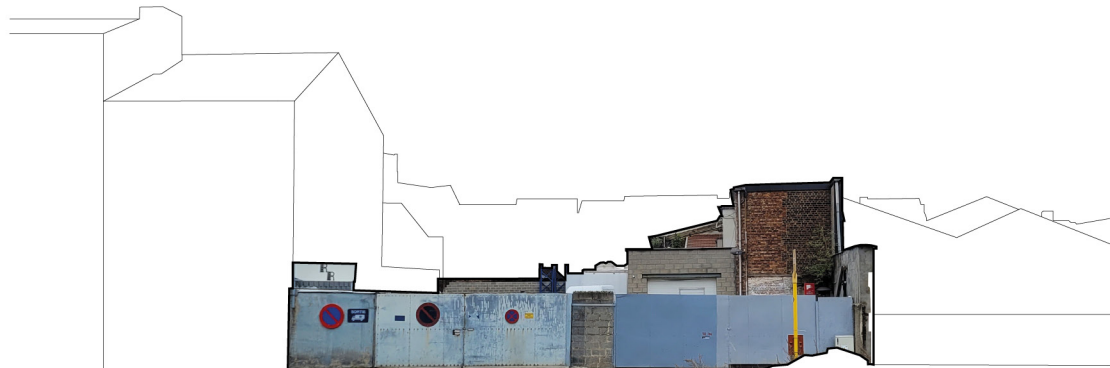


*Street view diagram of Avenue de la Croix Rouge 266-270 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

The closed fences and small buildings don't give a clear view of what happens behind them, but research on maps reveal a large industrial terrain, currently used to park trucks. Its high walls obstruct views from the adjacent alleys, where its large surface occupies large parts of the block.

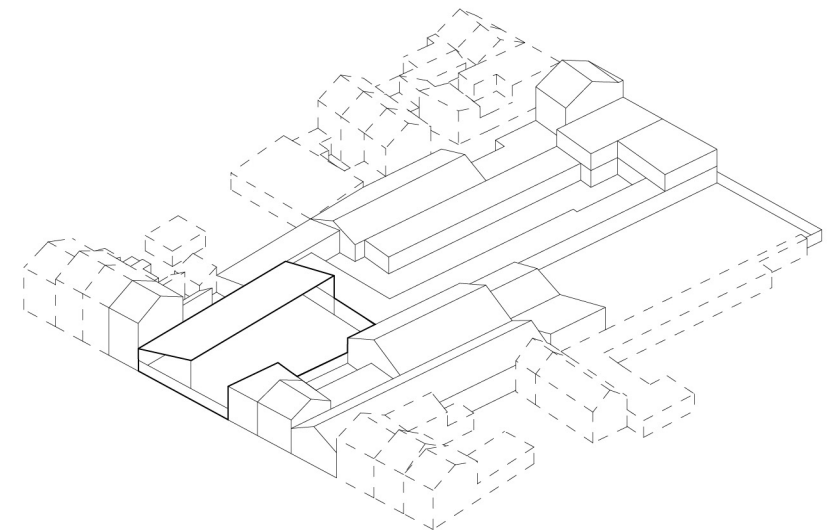


*Isometric diagram of Avenue de la Croix Rouge 196 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

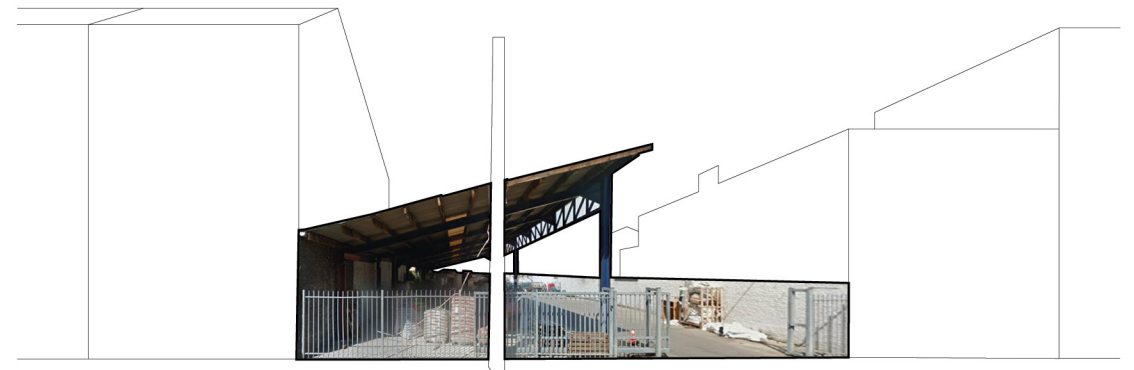


*Street view diagram of Avenue de la Croix Rouge 196 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

This shed-like structure currently houses an enterprise that sells fuels. The open structure and fences provide an insight in the activities, but also increase noise pollution for direct neighbours, although most of them are closed-character UPIC that might experience less disturbance.



*Isometric diagram of Rue du Moulin 293 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*



*Street view diagram of Rue du Moulin 293 in its direct context
(adapted from Teun van Dillen, Mining & Making, 2022)*

URBAN DEVELOPMENT

After our endeavours to identify the potentially industrial complexes in the urban blocks, we were curious when these structures appeared here. Were these structures already intertwined in the building blocks since the beginning? Or did they form gradually? To research the development of the urban blocks, we approached different archives. Especially Département de l'Urbanisme of Liège provided us with many maps of Bressoux and Droixhe. When we visited them, they also taught us a few important things about urban planning in Liège that we didn't realise before.

Bressoux was first an independant municipality, and in 1977 they became part of Liège. Therefore, according to the archivists, a number of maps might have gotten lost during the 'transfer', although there is also a possibility that there were simply no more developed plans than these. According to Jean-Pierre Ers, one of the employees at the archive, collective vision is also harder to accomplish in Belgium than in the Netherlands. Especially in Bressoux, developments in the neighbourhood have mostly covered the scale of a few plots.

To make the information on the historical maps more readable, we distilled the important ones into line drawings. The following timeline is composed of all the historical maps of of our site or its parts available. The maps show the gradual growth of the Bressoux as a neighbourhood and the development of Droixhe, which have had different destinations in the past. From manoeuvre field into an exhibition area, and finally, whatever is left today of the former modernistic towers complexes.

To clearly display these historical layers in the P1 exhibition, our first object consisted of five extendable perspex drawers that each show a different era in the history of the making culture in Bressoux and Droixhe. All together, they highlight the large urban interventions that changed the structure of the building blocks. The sixth layer, fixed on top of this historical analysis, shows a result of those urban interventions: the unidentifiable potentially industrial structures that arose within the urban blocks. The bottom layer of the object, the backdrop of the top-down view through the historical layers, shows the geographical ground layer on which all other layers were built; pure soil, with traces of mining.



Exhibition object 1, showing the different historical layers of Bressoux (own image, Mining & Making 2022)



1858

Land parcellation plan that presents largely uninhabited area as of yet. The army's Manoeuvres Field is implemented regardless of existing parcellation.

1. Bressoux parcellation plan, scale 1:15.000 (1858)

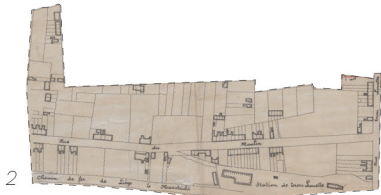


1903-1930

The number of houses in Bressoux increases, including incipient ribbon development along Rue du Moulin. In 1930, the Manouvres Field was replaced by pavilions of L'Exposition Internationale de Liège.

2. Plan of the urban block between Rue de Moulin and Avenue de Croix Rouge, Droixhe, scale 1:10.000 (1903)

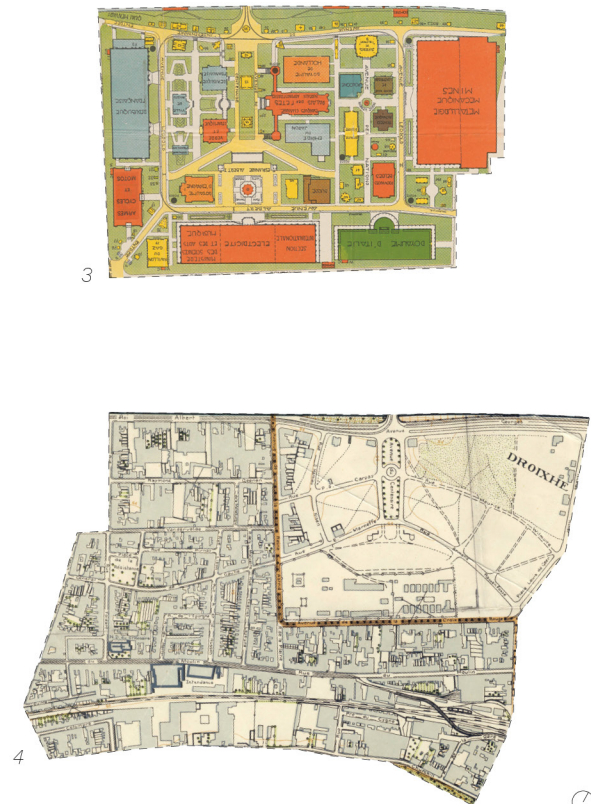
3. Site Plan of the International Exhibition in Liège, scale 1:10.000 (1930)



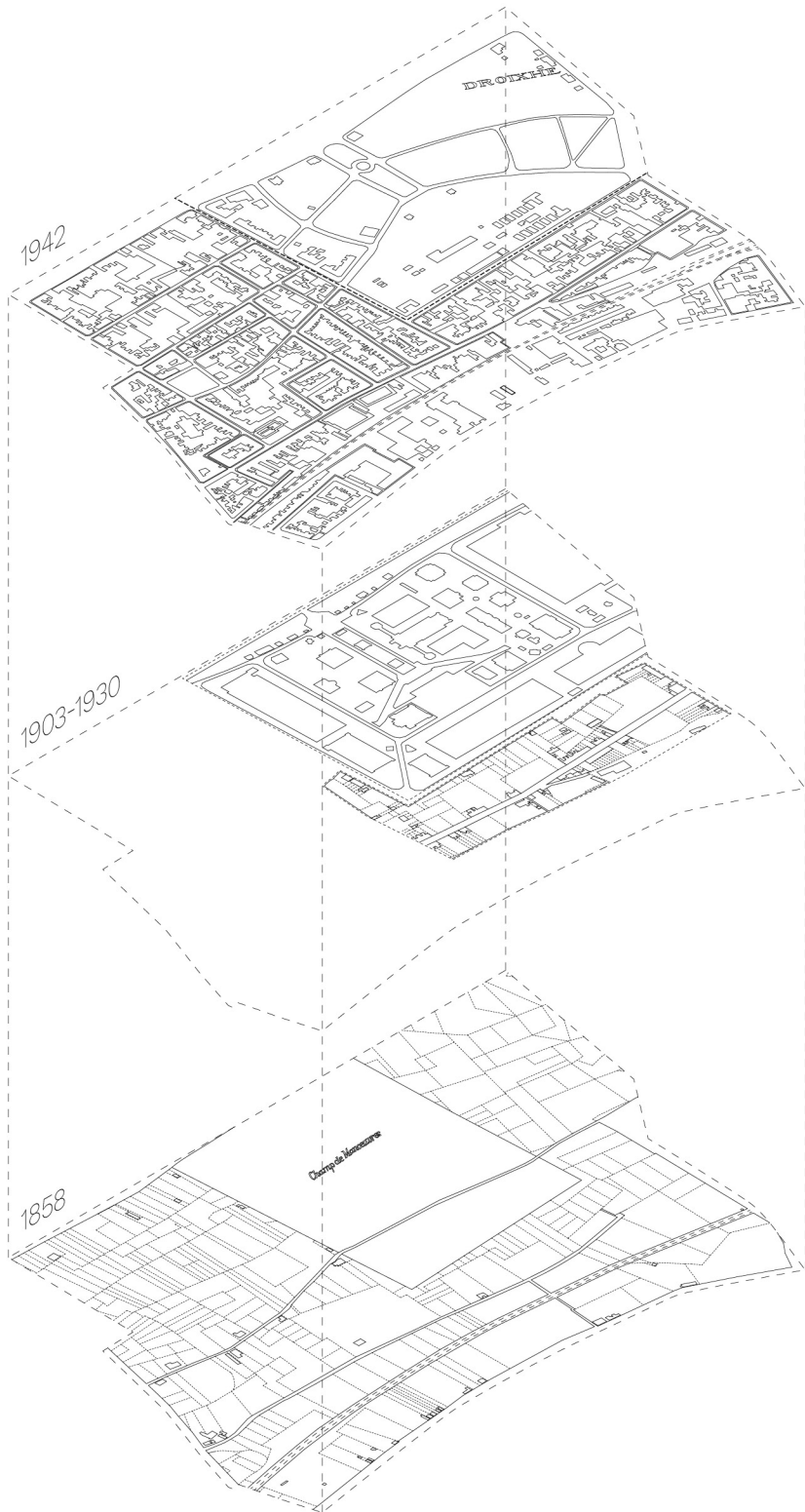
1942

The plan shows the differences in the results of planning approaches; Droixhe was a part of the city of Liège while Bressoux was outside the city's borders. The focus lies here on the enclosed residential urban blocks of Bressoux.

4. Urban plan of Bressoux and Droixhe, scale 1:15.000 (1942)



URBAN DEVELOPMENT



1:10.000
Isometric view of stacked historical urban layers of Bressoux, 1858-1942 (own image, 2023)

1957-1972

Fragments of the neighbourhood urban plans that accounted for the creation of public space. Involving the expropriation of private land, plots embedded in the city blocks were created.

- 5. Plan particulier No. 8 Expropriations, scale 1:5000 (1957)
- 6. Plan particulier No. 9 Expropriations, scale 1:5000 (1957)
- 7. The urban plan of land expropriation for a public playground: Cour Jacquet, scale 1:5000 (1957)
- 8. Exhibition on urbanism and housing Liège '58, scale 1:7500 (1958)
- 9. Destination alignment plan and town planning prescriptions, scale 1:10.000 (1972)

2022

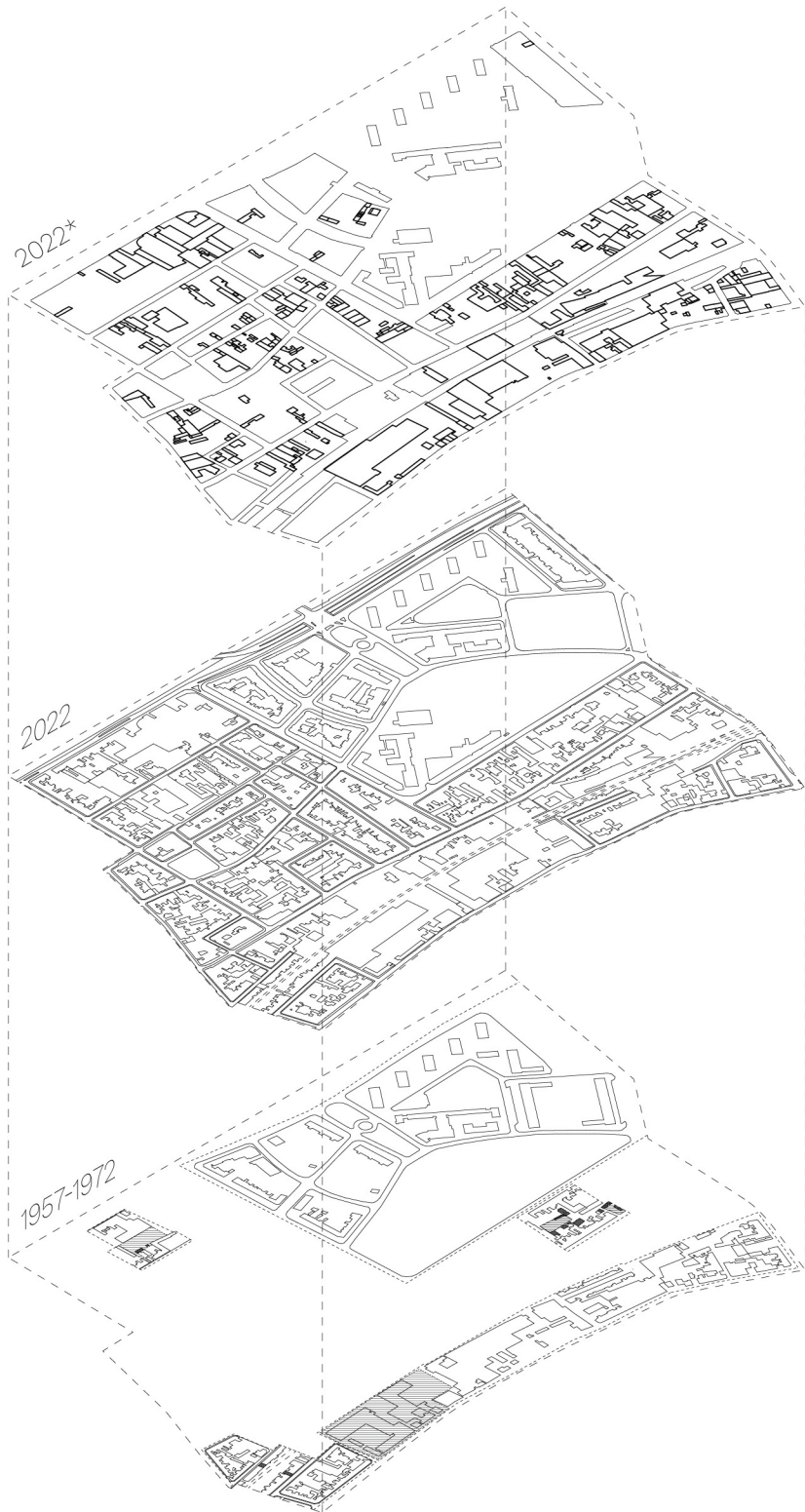
The current state of the district shows how the previously emptied spaces for public purposes have been housing unidentifiable structures

2022*

Exposure of the number of spaces and buildings embedded in, primarily residential, urban blocks qualified as potentially functioning as small-scale industries and making enterprises.



URBAN DEVELOPMENT



1:10.000
Isometric view of stacked historical urban layers of Bressoux, 1957-2022 (own image, 2023)

Mining generally refers to harvesting raw material, often coming from the ground. Shifting from the industrial aspect of the mining, we engaged in 'urban mining', meaning to reclaim waste, loose, leftover organic and inorganic materials from building sites, vacant and deconstructed buildings for the purpose of reusing.

In the context of Liège, we conducted a twofold research: on one

hand, we regarded slag heaps and vacant/abandoned buildings in Bressoux as a source, to answer the question "What materials can be mined directly from Bressoux and Droixhe?". After making an inventory of vacant buildings, and exploding 3 of them, we summerized the potentially minable local resources into a simple catalogue and material flow chart.

MATERIAL POTENTIAL

1:5000

Map of vacant or abandoned sites in Bressoux (own image, 2022)

- vacant/abandoned building
- associated terrain



MATERIAL POTENTIAL

On the other hand, to answer the question “What can be made from raw materials that are mineable in Bressoux and Droixhe?”, we gathered and catalogued sand, rubble, stones, parts of tiles and other left behind pieces of raw material, as can be seen in the following pages.

1. hops



2. ceramic tiles



3,11. brick rubble



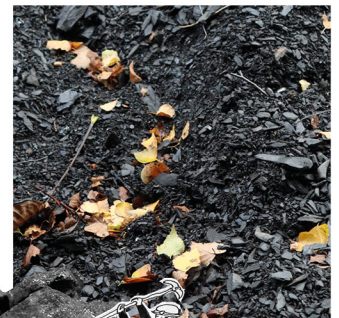
4. branches



5,6,7,9. stone rubble



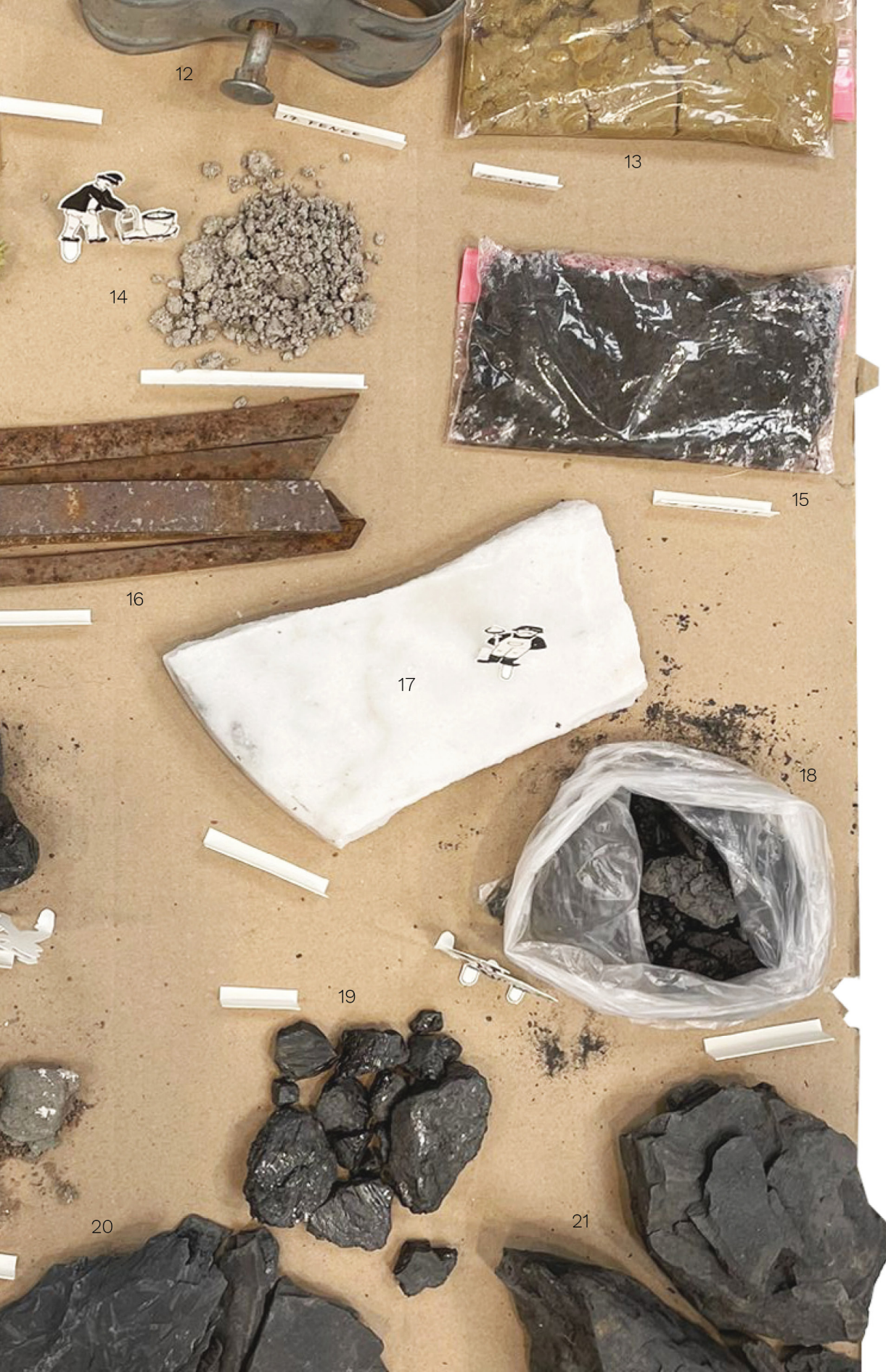
8. coal



10. andesite rubble



Material board and finding places, part 1
(own images, 2022)



Trying to understand their origins and potential, we documented the location of each found object and determined what exact material it was or used to be. To explore the potential of the materials, we used those materials as a source for new construction materials, such as terrazzo tiles made from demolition waste and rammed earth from mining waste.

MATERIAL POTENTIAL

12. fence



13. sand



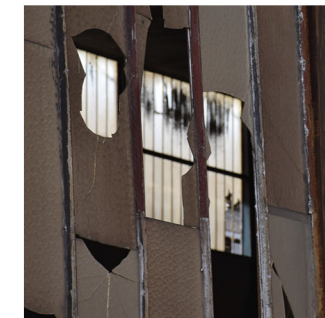
14. sand & asphalt mix



15. asphalt



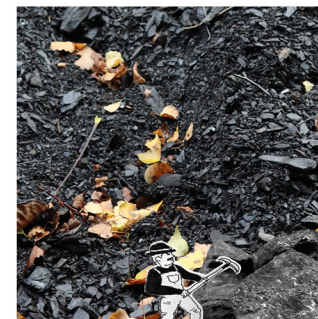
16. rusted steel



17. marble



18,19. coal rubble



20. slate rubble



21. stone rubble



Material board and finding places, part 2
(own images, 2022)

The history of the city is embedded within the soil. Re-using the ingredients of what once was, was the aim for creating new materials. Elements like broken bricks and tiles as well as sand and soil were gathered from the site. Materials were collected from significant historical places such as the Terril de Belle-Vue (a slag heap) and the remains of the demolished flats in Droixhe as well as from the rest of Bressoux. These new potential building materials, composed of soil and rubble, show not just the mining potential of Bressoux, but also how construction waste can be upcycled into pristine material.

For the P1 exhibition, we made a second object, exhibiting a variety of materials which we mined from the site and its surroundings, together with the product of our exploration of their potential as new building material. By displaying both above one after, separated only a clear layer of perspex, a direct relationship between the mining and making - between source and outcome - becomes clear.



1



5



2



6



3



7



4



8

1. Coal and slate collected from the slag heaps of Liège used as aggregates
2. Mix water with soil for coloring of the tile. A slight greyish tint
3. Filter the water
4. Add water and coaldust to gypsum and let rest for 2 minutes before stirring thoroughly

5. Add the aggregates to the mix
6. Make sure to reserve a few for placement in the mold
7. Pour in the gypsum mixture and vibrate / tap the mold to prevent air bubbles from settling
8. Let it dry for at least 4 hours before sand it. Sand the tile and wash it afterwards.

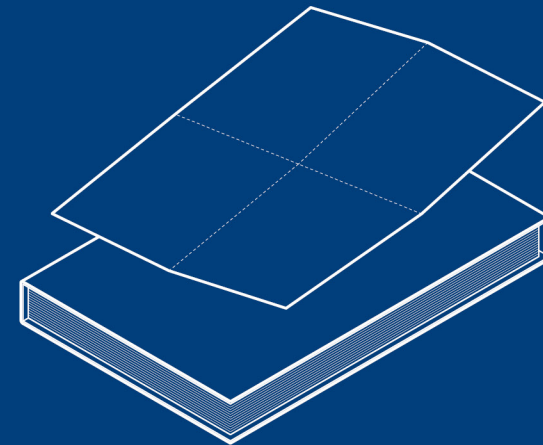
Process of making the coal tile
(Daan Kok, Mining & Making, 2022)



Exhibition object 2, showing new materials made from materials found in Liège (own image, Mining & Making, 2022)

*definition**/ˌdɛfɪˈnɪʃn/**noun*

1. a statement of the exact meaning of a word, especially in a dictionary.
2. the degree of distinctness in outline of an object, image, or sound.

(Oxford English Dictionary)

The observations and further explorations in the first phase brought to light several prominent issues in Liège. Motivated by my personal interests and ambitions, I defined the following problems as the main problems to tackle within my project; the abundance of vacant and decayed sites resulting from economic challenges, the scarcity of public greenery and spaces for appropriation in the public domain due to concerns regarding privacy and safety, and the construction of gentrifying architecture, contradicting to its context in both physical tissue and its residents.

By focussing on the topic of reuse, I aim to adress the potential of revitalizing vacant sites, while reclaiming the potential of both the sites, buildings and the materials they consist of. By using locally sourced materials, architecture can be created that is not only sustainable, but also fits the local building and material culture. Furthermore, I intend to tackle the need for public green spaces and personal appropriation by developing a public program that is visible, accessible and respectful of privacy, while providing sufficient space for appropriation and productive landscape. The overall project goals are therefore defined as follows:

- *reclaim **physical & cultural potential** of vacant sites and buildings*
- *create **culturally fitting & sustainable architecture***
- *introduce **visible & accessible public program***
- *provide **space for appropriation & nature***

In a combined effort to meet these goals, I formulated the overall goal: *“Reimagining Local Building Culture as a Showcase for a Circular Generation of Architecture”* To achieve this, I propose to revive one of the vacant sites in Bressoux, by introducing the central theme of reuse in both architecture, landscape and program. By bringing together different users that contribute to the field of reuse into a publically accessible program, the aim of this project therefore is to not only exhibit the physical potential of reclaimed materials, but also create a valuable network of knowledge and skills that can evoke a local circular economy. The three scopes of reuse I will further elaborate upon in this project are therefore:

- **program** (people, knowledge & network)
- **building & site** (adaptive reuse)
- **materials** (component reuse).

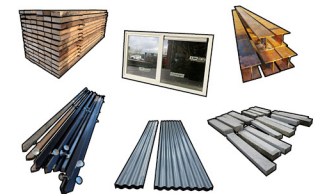
Within the scope of material reuse, this project is limited to locally sourced materials - or materials that are prominently used in the local building culture, in order to achieve culturally fitting architecture. Within the scale of the program, I defined the main target groups I envision to participate, along with the vehicles that are inherently linked to these groups. Finally, a selection of vegetation types have been defined, suggesting beneficial applications of greenery within the project site.



PROGRAM



BUILDING & SITE



MATERIALS

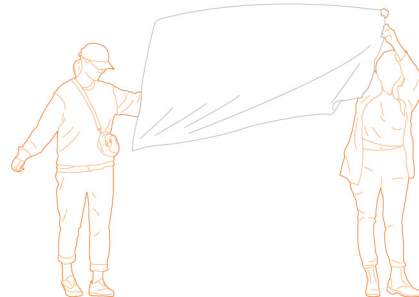
CREATIVE ENTREPRENEURS

This group consists of people that have (or have plans to start) a small creative business in the field of reuse. Members of this group could, for example, engage in repairing or refurbishing furniture or electronic devices, manufacturing design products out of discarded fire hoses or trapaulins, or making clothes out of reclaimed fabric. It is desirable that members of this group are willing to collaborate and share knowledge, skills and tools with other members.



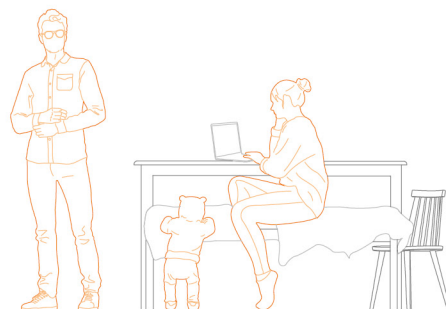
WORKSHOP USERS

This group consists of people that attend workshops around the theme of reuse or individually explore working with reclaimed materials, possibly hosted or guided by the group of creative entrepreneurs or other skilled professionals. Members of this group include schoolchildren and students, or local residents that wish to get introduced to the world of reuse. Workshop users might end up being a creative entrepreneur.



RESIDENTS

This group consists of people that live within or on the boundaries of the project site. Members of this group are expected to contribute to the central program, and thus form a community around the theme of reuse. At least one person of every household is also part of the first group. It is important a healthy relationship is established between this group and the first two groups, especially in the case of clashing activities and schedules.



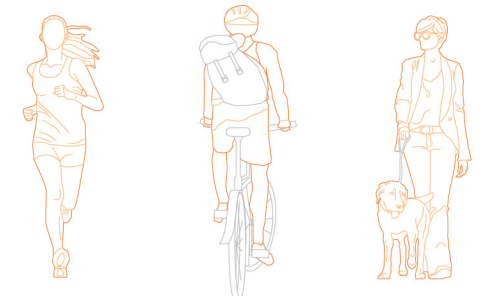
OUTDOOR SPACE USERS

This group consists of people that, in any way, use the public or communal space that is defined within the boundary of the project. These activities include: practicing sports or meditation, gardening, hosting a public event or community barbeque, playing games, reading and relaxing. Members of this group might overlap with people of the first three groups, either by being part of the resident community or by also taking part in one of the activities around the theme of reuse.



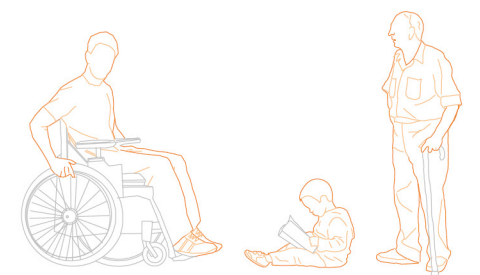
PASSERSBY

This group consists of people that use the public space, as defined within the boundary of the project, with the purpose to cross it. Activities done by members of this group include: walking (a dog), cycling and jogging. Members of the group generally do not spend much time within the boundary of the project, but nevertheless need to enjoy it. Members of this group therefore benefit from a public space that looks inviting and clear in its structure.



EXTRA CARE

This group consists of people that, in some way, need extra attention, whether concerning accessibility, visibility or safety. Members of this group can be members of any other group. It is therefore important to take measures regarding these issues in every part of the project. This may include the minimalization of height difference, separation of clashing activities regarding safety, clear structure of the building and public space, and good visibility from the street.



PEOPLE

CARS

This type of vehicle is generally used by the creative entrepreneurs, workshop users and residents for the purposes of personal transport from or to the site. It is desirable that this type can be parked within or very close to the defined boundary of the project site. Occasionally, this type of vehicle might need closer access to the building for the purpose of unloading materials or equipment.

VANS

This type of vehicle is generally used by the creative entrepreneurs for the purposes of transporting materials or equipment. It is therefore desirable that this vehicle can be parked within the defined boundary of the project site, with the possibility of unloading at close distance to its targeted program. The dimensions of this vehicle often exceed that of a car, thus needing more space for maneuvering.

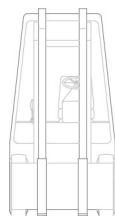
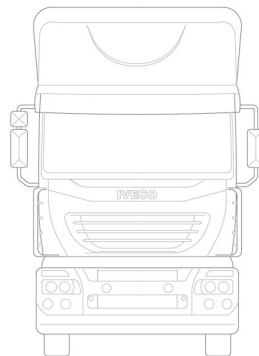
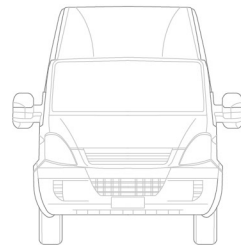
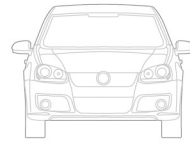
TRUCKS

This type of vehicle is generally used by a transport company for the purpose of transporting a large variety of goods. In the case of this project, trucks are probably used to deliver reclaimed materials to the project site. For safety reasons, it is desirable that the logistics regarding this vehicle are separated from the public, communal and personal spaces. This type requires a large manoeuvre space.

FORKLIFTS

This final type of vehicle is generally used by the creative entrepreneurs for the purpose of transporting small quantities of materials, within the boundaries of the project site. Preferably, this type is used indoors, but can occasionally be used to assist with loading or unloading materials or other goods from one the other types. The forklift has the capacity to relocate materials from or to higher places.

VEHICLES



TREES

This type of vegetation generally consists of a single element, that can be planted in solitary, or among other types. Vegetation within this type can vary in height, circumsized and appearance. Due to their often larger size, in comparison to other types of vegetation, trees are very capable of keeping the surroundings cool, by holding heat and casting shadows. It is desirable for this type to have a conveniently-sized area of uncovered soil at its base, to provide for sufficient water supply.

HEDGES, BUSHES & SHRUBS

This type of vegetation generally consists of a large variation of plants medium height, that thrive when placed within close distance of each other. Due to their limited height, plants within this type can function as a natural boundary between private and public terrain, without visually obstructing the view.

CLIMBING PLANTS

This type of vegetation consists of plants that have the tendency to grow along walls or other vertical structures. Because of this characteristic, plants of this type can be used to cover up existing hard surfaces that define the boundaries of a plot, or other structures that benefit from a more inviting appearance.

CROPS

This type of vegetation generally consists of plants that are either partially edible or that, in some way, produce edible products, such as (root)vegetables, fruits and herbs. Plants within this type require more intensive care than other types and generally need to be replaced every season.

NATURE



inventory

/ˈɪnv(ə)nt(ə)ri/

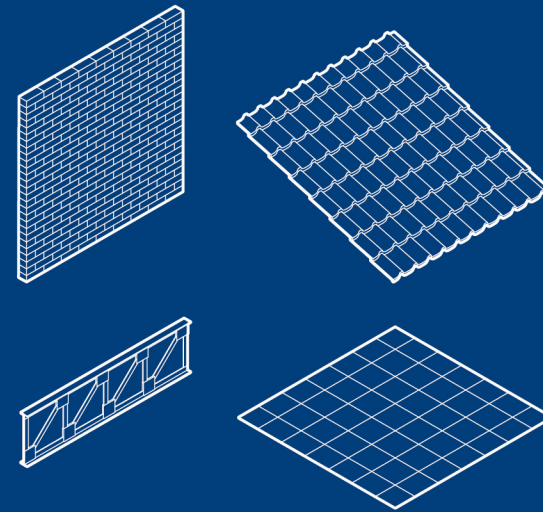
noun

a complete list of items such as property, goods in stock, or the contents of a building.

verb

make a complete list of.

(Oxford English Dictionary)



To get a grip on the material scale, it is important to know which materials and elements are available for reuse. Therefore, it is necessary to acquire sufficient knowledge about where to find them. According to Geerts, Ghyoot and Naval (2020), three main sources for reclaimed construction elements can be defined:

1. **The same site** as the new project: construction products are dismantled from the building that undergoes transformation, and reused in the new project. This is a case of same-site reuse (or 'in-situ' reuse).
2. **Another demolition site:** construction products are dismantled from a building undergoing demolition and transferred to a new project where they are re-installed. This option usually aims to minimise any necessary storage and transport.
3. **The reclamation market:** construction products supplied by professional companies specialised in this trade.

Since I had not yet decided on the site of my project, the first two are in this phase considered as one: vacant industrial sites in Bressoux.

For the inventory of available materials, I collaborated with Djamo Mastenbroek in a joint effort to collect on- and off-site information about specified case studies and comparable reference projects, and execute extensive analytical modelling, of which the result is collected in the research booklet 'From Decay to Reuse'. Through this intensive process of analysis and modelling, we were able to understand the main structure of the building, and subsequently make a rough estimation of the characteristics and quantities of the most prominently present materials and elements. Following the 'Shearing Layers', as defined by Steward Brand, (1994) we categorized those materials, predominantly focussing on 'structure', 'skin', and 'space plan'.

Site

This is the geographical setting, the urban location, and the legally defined lot, whose boundaries and context outlast generations of ephemeral buildings. "Site is eternal."

Structure

The foundation and load-bearing elements are perilous and expensive to change, so people don't. These are the building. Structural life ranges from thirty to three hundred years (but few buildings make it past sixty for other reasons).

Skin

Exterior surfaces now change every twenty years or so, to keep up with fashion or technology, or for wholesale repair. Recent focus on energy costs has led to re-engineered skins that are air-tight and better-insulated.

Services

These are the working guts of a building: communications wiring, electrical wiring, plumbing, fire sprinkler systems, HVAC (heating, ventilating, and air conditioning), and moving parts like elevators and escalators. They wear out or obsolesce every seven to fifteen years.

Space plan

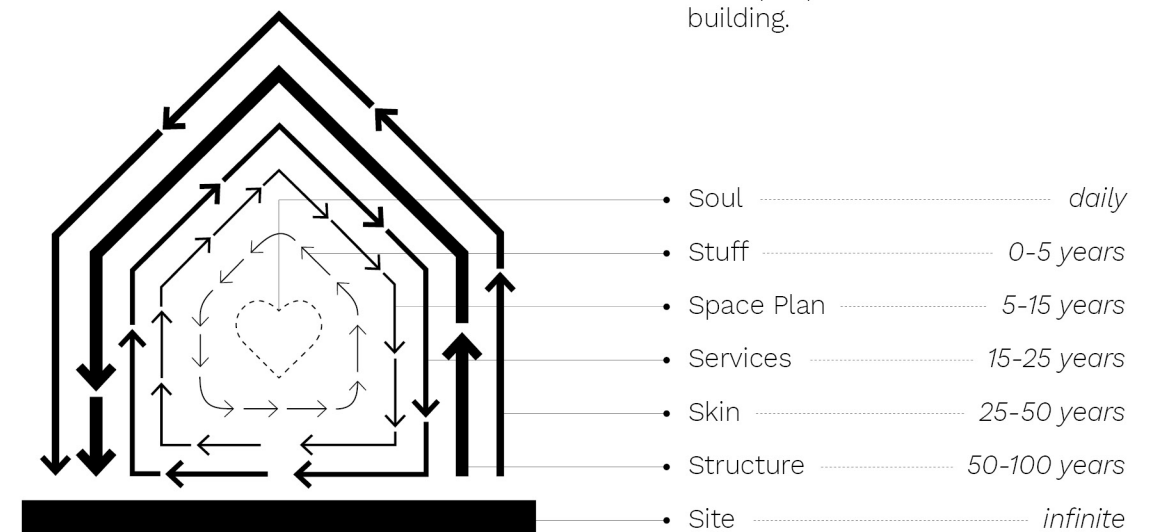
The interior layout, e.g. walls, ceilings, floors, and doors. Turbulent commercial space can change every three years or so; exceptionally quiet homes might wait thirty years.

Stuff

Chairs, desks, phones, pictures; kitchen appliances, lamps, hairbrushes; all the things that twitch around daily to monthly.

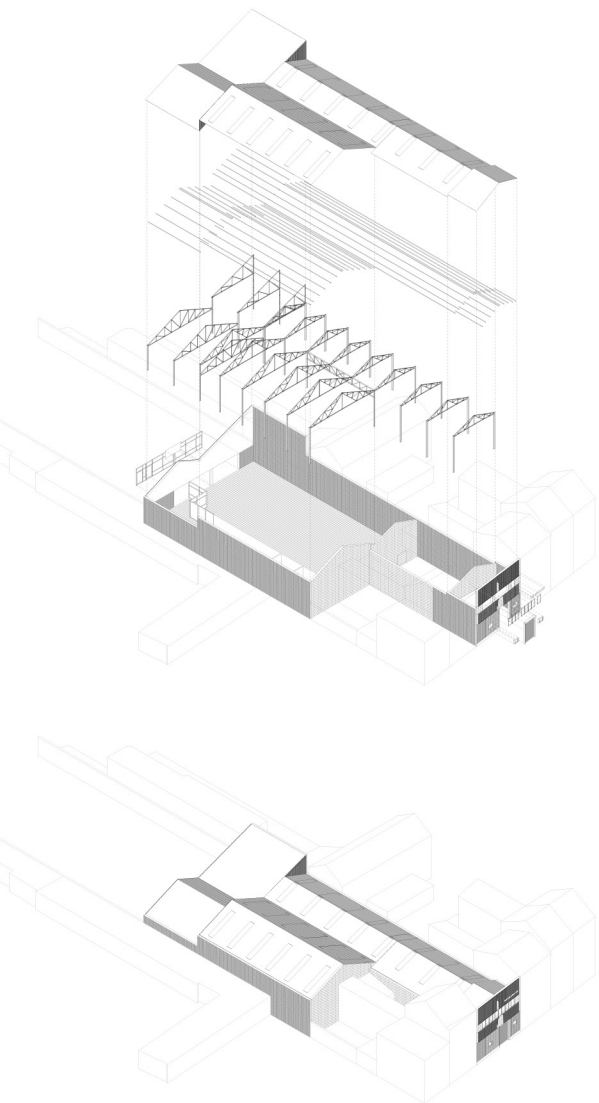
Soul

The people, the users of the building.



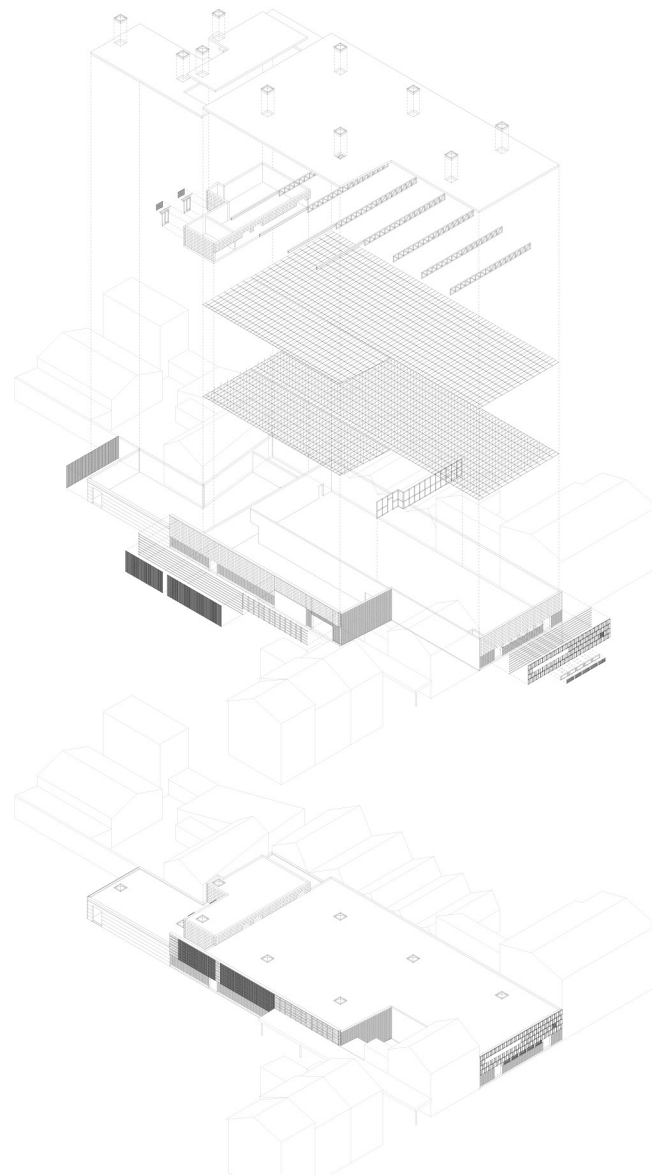
AV. DE LA CROIX ROUGE 190

The building on Avenue de la Croix Rouge 190 was originally a metallurgical workshop. Throughout the years the building served multiple functions such as a warehouse, workshop, butcher and a building material store. The building is currently occasionally used by the Church of Pentecost. In the 1980s the building went through a transformation where the roof construction and the facade facing Av. de la Croix Rouge was replaced. The part of the building facing Rue de Moulin was struck by a fire and left damaged to the facade. As far as known this part of the building is currently vacant.



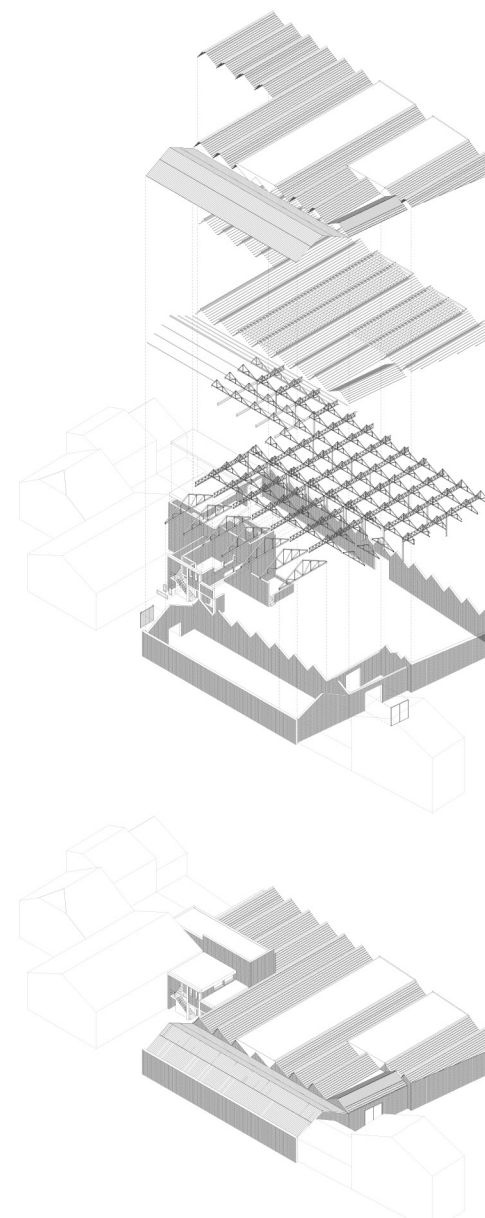
AV. DE LA CROIX ROUGE 266-270

The building on Avenue de la Croix Rouge 266-270 is an old warehouse for Union coopérative, a department store that was located in the centre of Liège. The plot is located on both Av. de la Croix Rouge and Rue du Moulin whereas Rue de Moulin is the back entrance to the plot that is accessible for vehicles. The facade at Av. de la Croix Rouge is, apart from small window frames, completely closed off and gives no hint of what is happening inside. The main building is a one story building with a big span width construction in order to create the most useable square metres for storage.



RUE DE PORTO 139

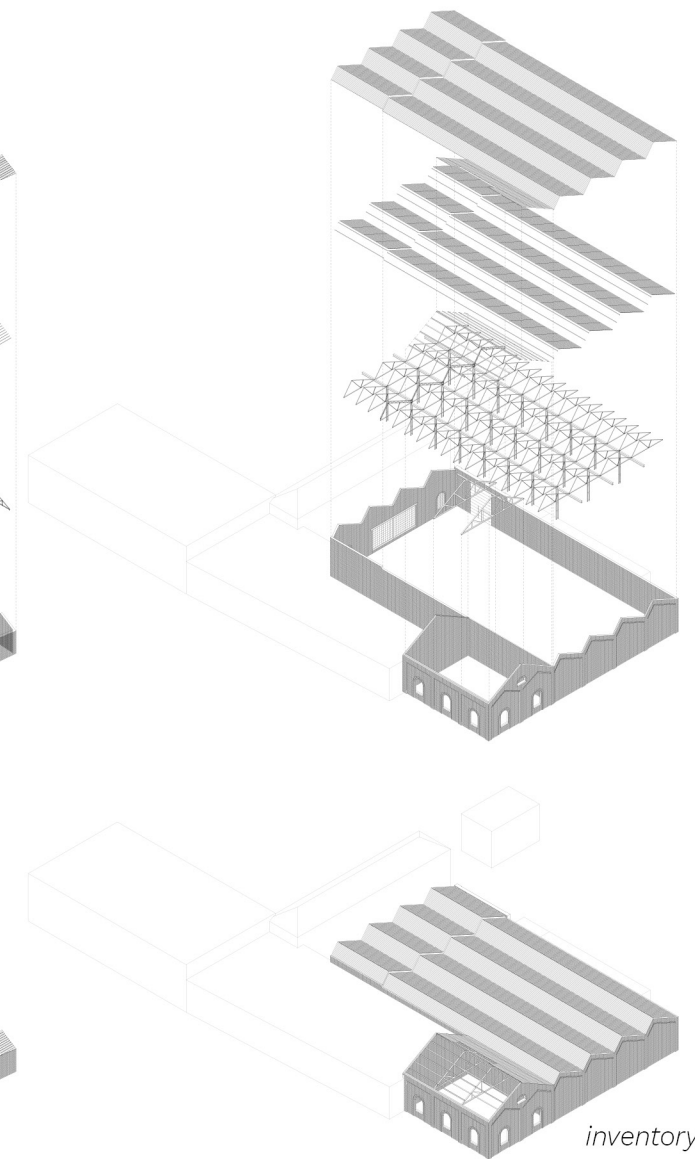
The building on Rue de Porto 139 is an old metal foundry that also served as a warehouse and car storage. The building is centred between Rue de Porto and Rue Raymond Geenen and is identifiable by a typical saw tooth roof structure. From both streets you can only get a glimpse of the building from different angles. The plot has also served a timber factory and distributor which unfortunately was burned down causing damage to the roof structure of the building. Although the building is currently vacant objects such as tables and chairs do show a sign of occupation.



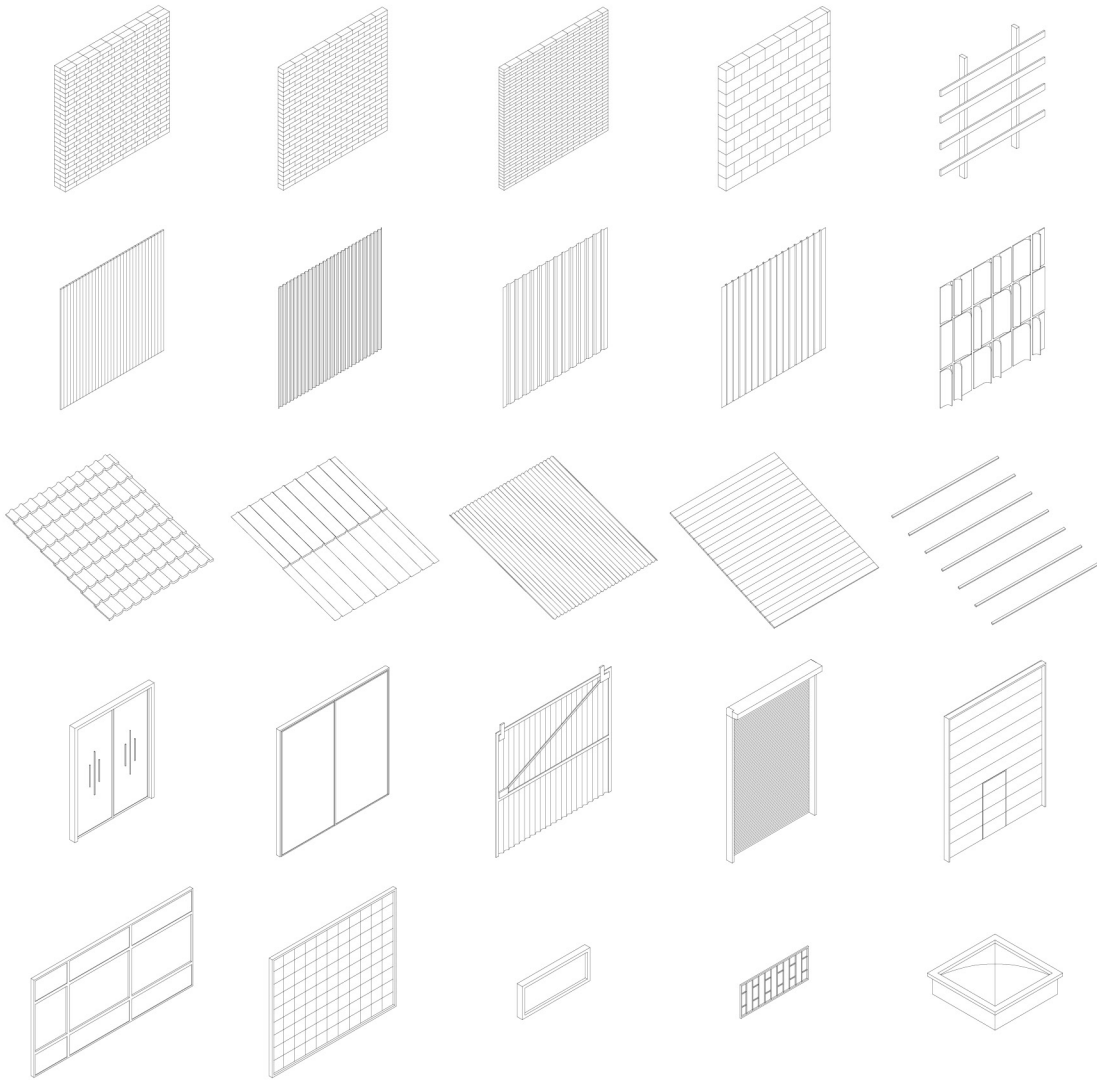
VACANT INDUSTRIAL SITES

RUE WINSTON CHURCHILL 229

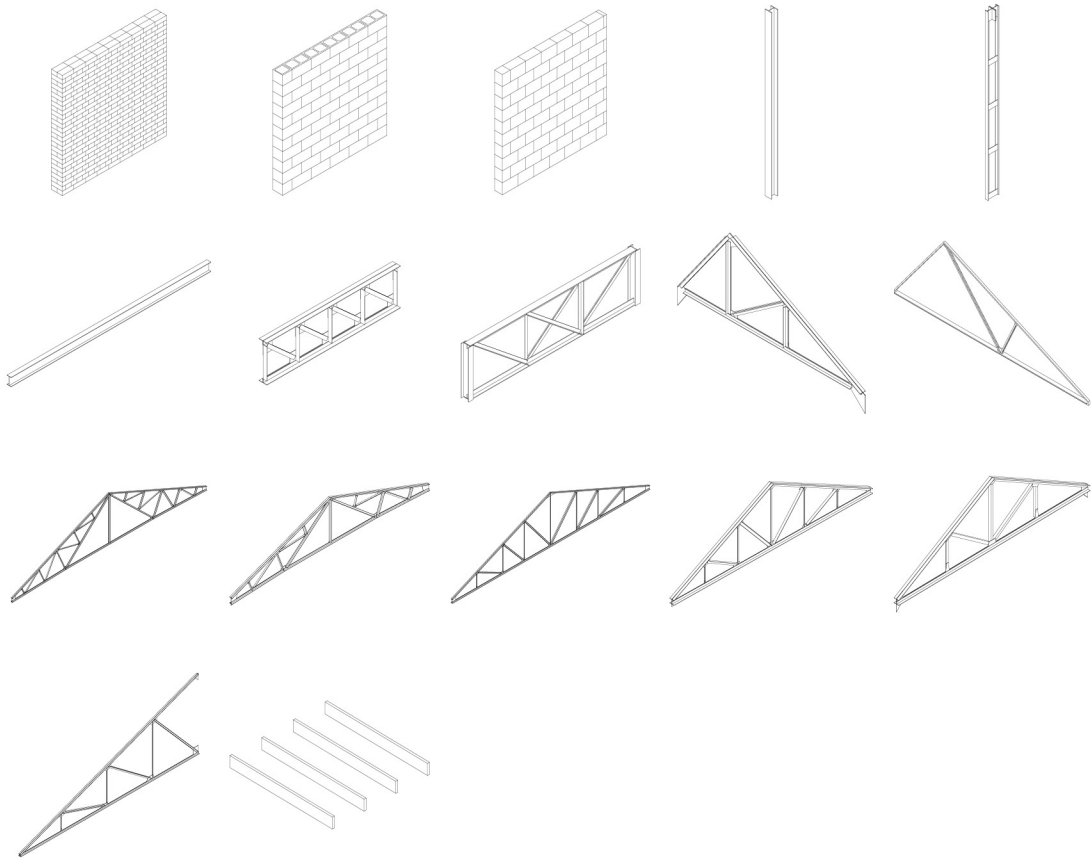
The building at Rue Winston Churchill 229 is an old copper foundry that was owned by J & J Dewandre. The building is characterised by its saw tooth roof construction, brick work and its windows. In its current state the building is decaying whereas a part of the roof from the bigger building is missing. While there seems no sign of activity the building is still in use as a storage space.



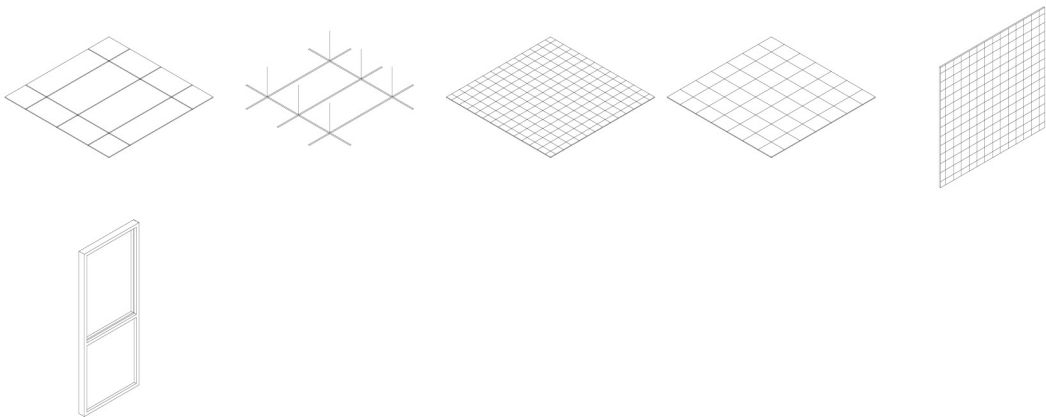
SKIN



STRUCTURE



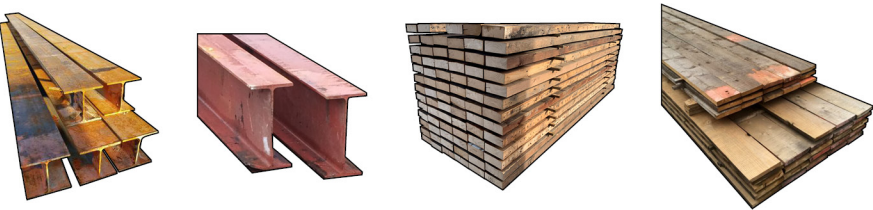
SPACE PLAN



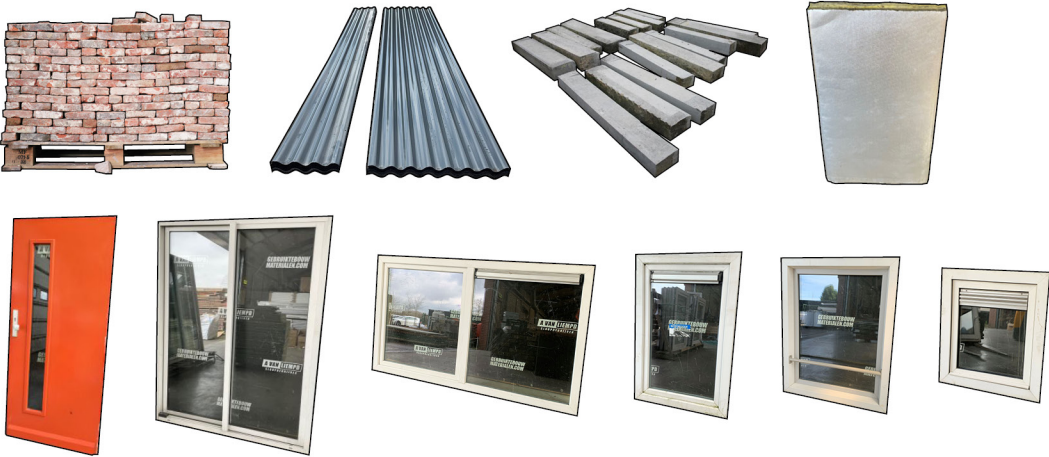
SITE



STRUCTURE



SKIN



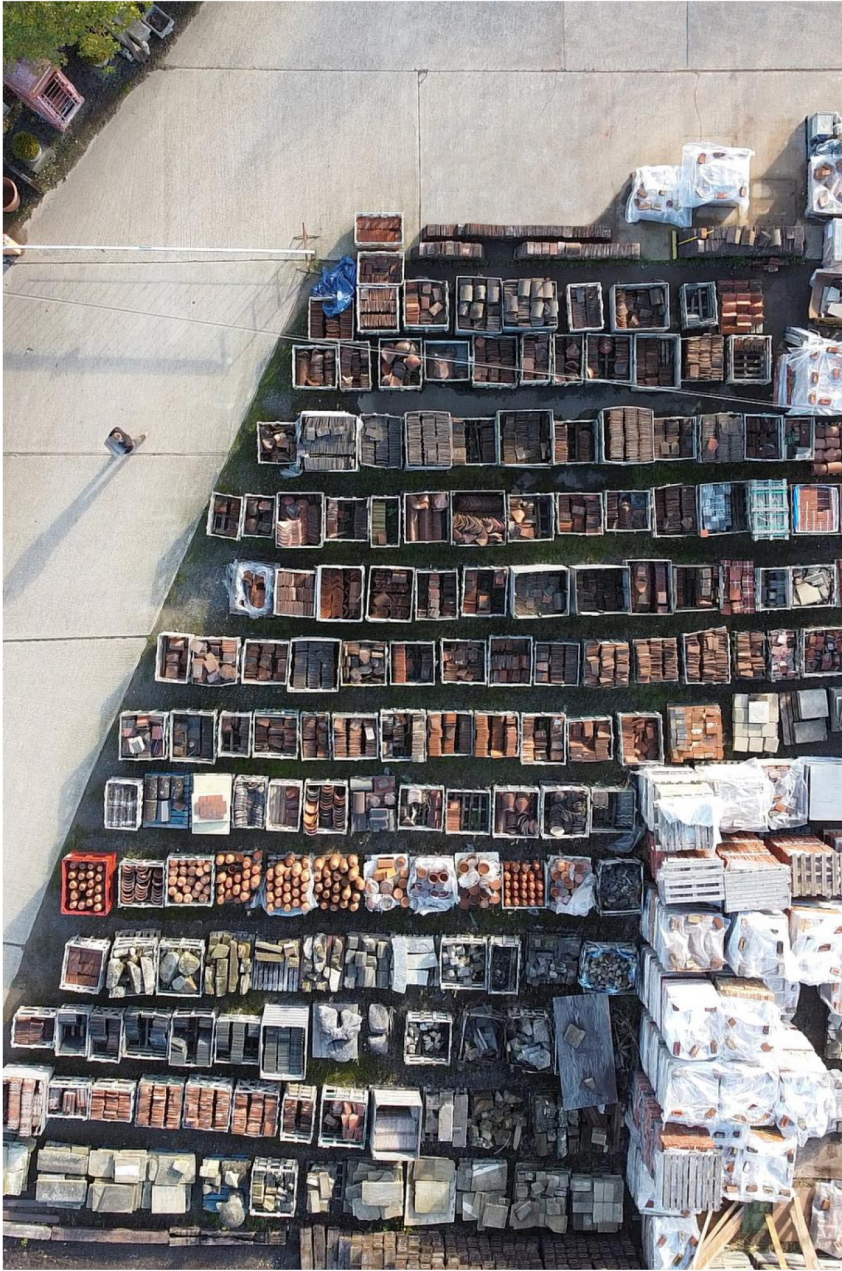
SPACE PLAN



STUFF



RECLAMATION MARKET



Opalis

4

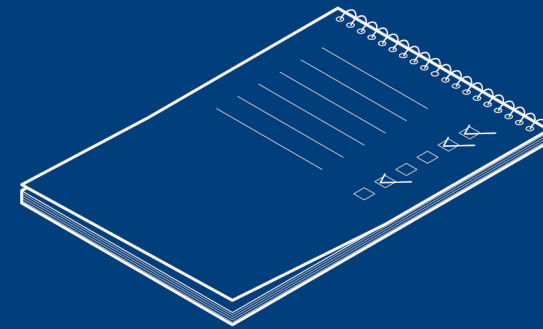
assess

/ə'ses/

verb

evaluate or estimate the nature, ability, or quality of.

(Oxford English Dictionary)



ASSESSMENT

In order to know which materials can be considered part of the local building culture, and thus worth taking into account in the scope of this project, this fourth phase is centered around evaluating the cultural value materials. According to Arlotta (2019) this consideration of heritage values is an integral part of preservation decision making. This way, places and objects whose fabric is not inherently valuable, but rather valued for its associations, can be preserved, adding to the cultural value of the city (Arlotta, 2019).

To do this, the urban tissue Bressoux was thoroughly analysed in a search for commonly used materials or building techniques. This was predominantly done by taking an abundance of pictures of facades. This chapter therefore mainly consists of images, portraying similarities and deviations in the architecture of Bressoux. Due to the very distinct differences between the residential and industrial buildings, these will from now on be referred to as the 'residential archetype' and the 'industrial archetype'.





The residential archtype can be defined by extensive use of brown-red brick, and bluestone plinths, sills and occasionally additional elements above the windows. The composition of the facades generally shows vertical aligned windows, following the vertical lines in the brickwork. Horizontally, no such guides seem to exist, generally resulting in a playfull distribution of bluestone elements along the facades.



In the occasional case of a garage, shop or other function in the plinth, this is often emphasized by a change of material or color, and the presence of roller doors.





While the front of the buildings within the residential archtype are predominantly showing brickwork, the sides of the building are often covered up with slate, either made out of natural stone, asbestos or other composite. Quite often, parts are missing, exposing the layers underneath.



INDUSTRIAL ARCHITYPE



The industrial architype clearly shows different era's of construction. The buildings from the early 1900's are predominantly constructed with bearing brick facades, a steel structure and sawtooth roofs, with ceramic tiles facing the sun and translucent corrugated sheets facing the opposite direction. While some buildings, constructed in more modern times, seem to have copied this principle,



most buildings show quite a different appearance. In most cases the modern 'industrial architype' can be defined by a bottom layer of brick or other hard material, and a top layer of corrugated steel sheets. While the roof shape often varies, it is also covered in corrugated steel sheets and lifted by a steel structure.

process*/'prəʊses/***noun**

a series of actions or steps taken in order to achieve a particular end.

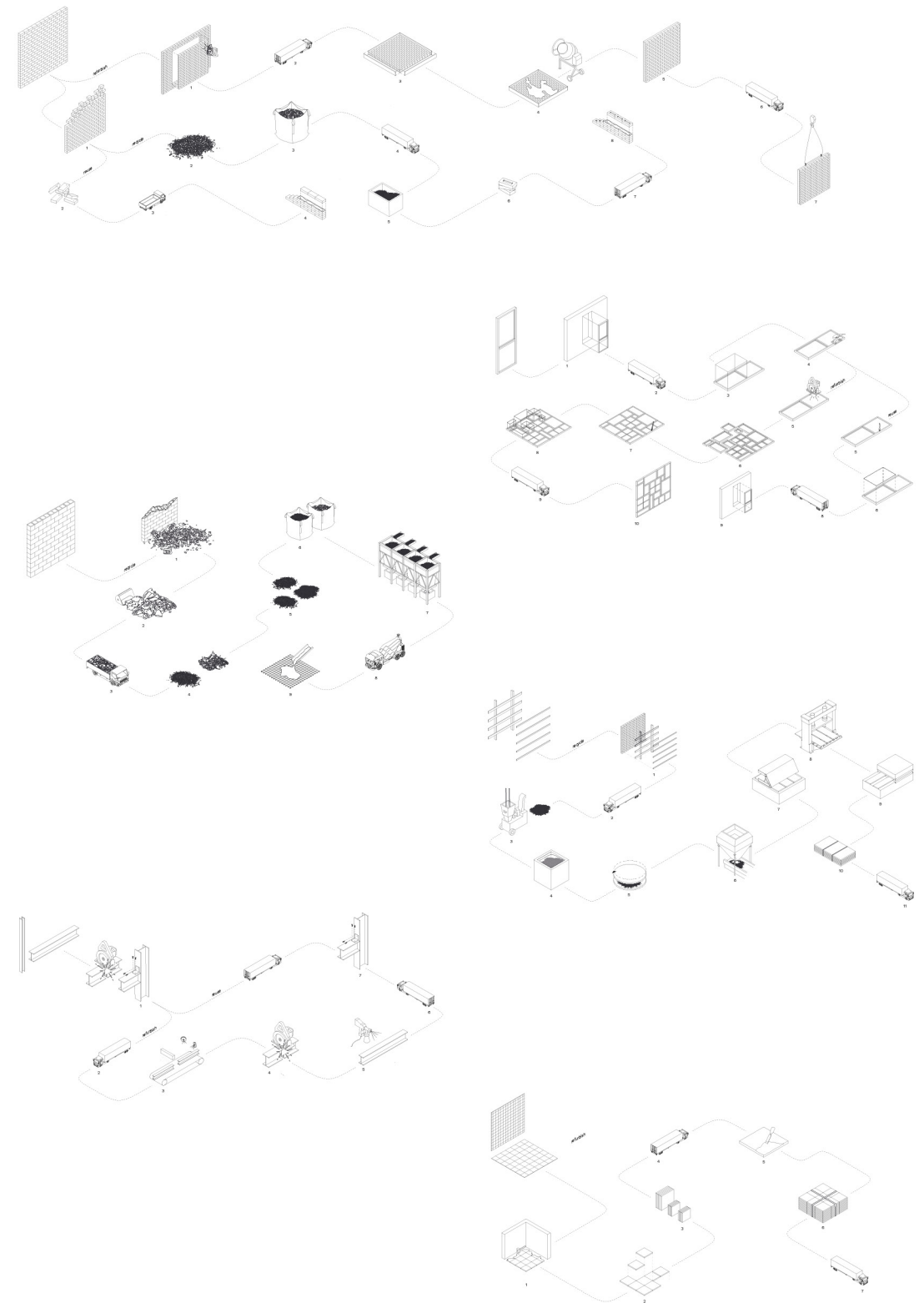
verb

perform a series of mechanical or chemical operations on (something) in order to change or preserve it.

(Oxford English Dictionary)



To find out what actions needed to be undertaken to reuse the most prominent materials, as evaluated in the inventory phase, the technical processes of reuse needed to be investigated. The predominant activities in this 'process' phase therefore included: conducting interviews with, and visiting companies in the field of reuse and recycling, and evaluating literature and online sources. This was all done in close collaboration with Djamo Mastenbroek, of which the results are published in the 'From Decay to Reuse' booklet. For the purpose of clear exhibition of the outcomes of this research, a visual manual was created for each material, displaying their process of regeneration in a universal and playful style, as if it were a IKEA manual.





Sorting of bricks on site (© FCRBE)



The smart liberator at concrete recycling facility, Rutte Groep, Zaandam, The Netherlands (© New Horizon)



Cutting out a brick panel for Resource Rows, Copenhagen (© Lendager Group)



Sandblasting of steel elements (© coating.nl)



Assembly of a variation of window frames into one element (© Opalis)



Removal of ceramic tiles (© RotorDC)

DESIGNING WITH RECLAIMED MATERIALS

However valuable the outcome of this research, it became evident that the purely technical point of view within the scope of material reuse proved insufficient basis to design upon. To create architecture out of reclaimed materials, it is necessary to not only know the technical implications, but also understand the architectural implications that come with it.

*“In one respect, designing buildings to incorporate reclaimed products and materials is **fundamentally different** from conventional design methods.”*

*“In **conventional design**, the designer conceives the elements and systems of a building and then specifies the materials and components needed to achieve the desired building performance and quality. ...”*

*“When designing buildings to **incorporate reclaimed products and materials**, ... It becomes virtually essential for the project team to identify the source of suitable materials and products before detailed design can commence, ...”*

(Addis, 2006, p. 1)

While trying to take the inventory from the vacant industrial sites as the basis for the design, it however became clear that the elements offered by those case studies did not merely represent the elements that were demanded by the envisioned program. By extending the inventory towards the reclamation market, however, new issues occurred. Throughout this inventory, it became clear that, without an established donor building of significant scale, often only small quantities of identical elements could be found. Additionally, the supply of materials and elements often fluctuates in terms of appearance, dimensions and quantity, resulting in many uncertainties to take into account.

The reclamation does however also offer a continuous supply of specific materials and elements, due to their universal dimensions. Among these are bricks, pavement tiles and steel profiles. These materials however only seem to be sold in a perfect state, raising the question: Where do the broken and imperfect pieces go?



VARIOUS DIMENSIONS
UNCERTAIN SUPPLY

UNIVERSAL DIMENSIONS
CONTINUOUS SUPPLY

This led me to the following questions, which I explored during the design process:

- What **alternative uses** can be applied while designing with reclaimed materials and elements?
- How to design with an **uncertain material supply**?
- How to design while incorporating **imperfections**?

DESIGNING WITH RECLAIMED MATERIALS



Drystack method for brick masonry (© Hagemeister GmbH & Co. KG)



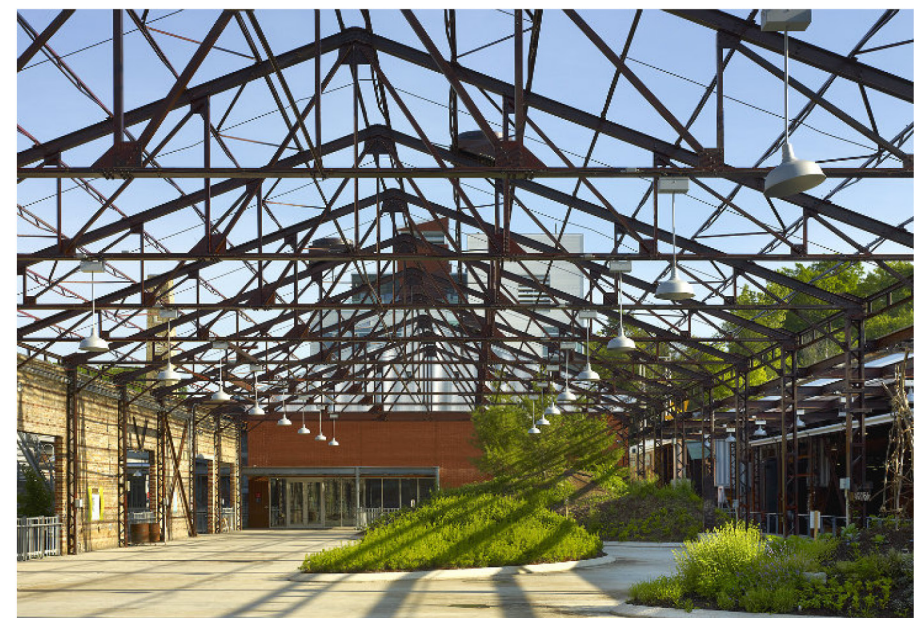
Varied reclaimed wood cladding (© André Warnier, Opalis)



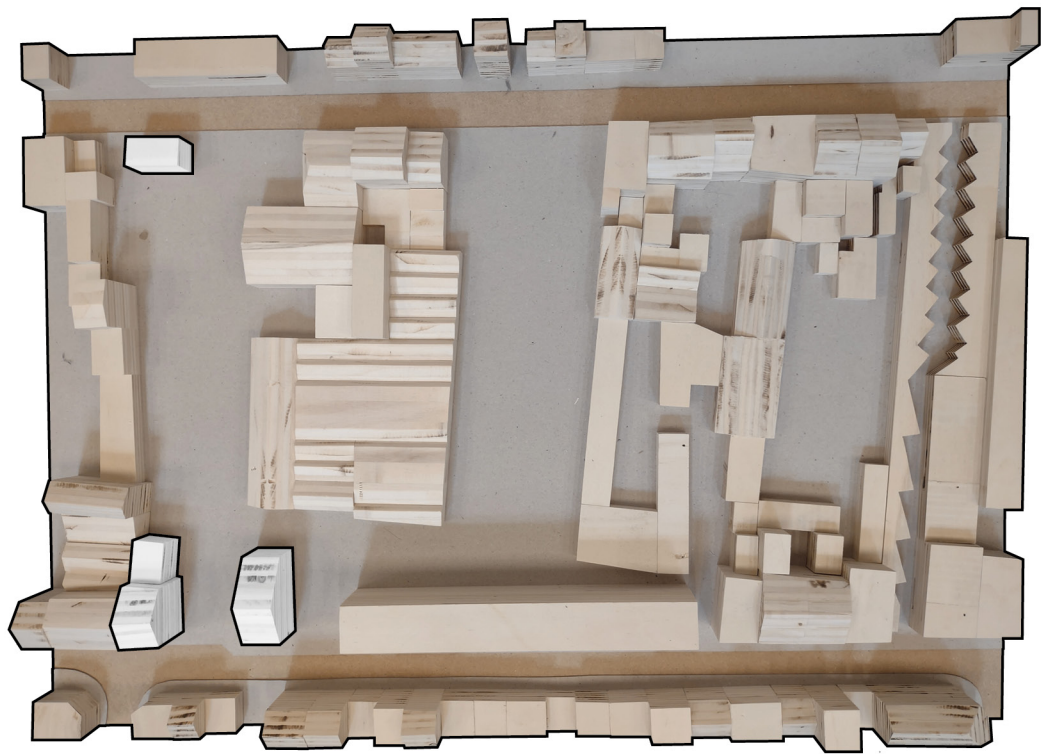
Pavement tiles as cladding, MFA De Boezem & Co by RoosRos Architecten, Oud-Beijerland, The Netherlands



Collage of various windows, Kamikatz Public House by Hiroshi Nakamura & NAP, Tokushima, Japan



Alternative use of steel structureCentre for Green Cities by Diamond Schmitt, Toronto, Canada



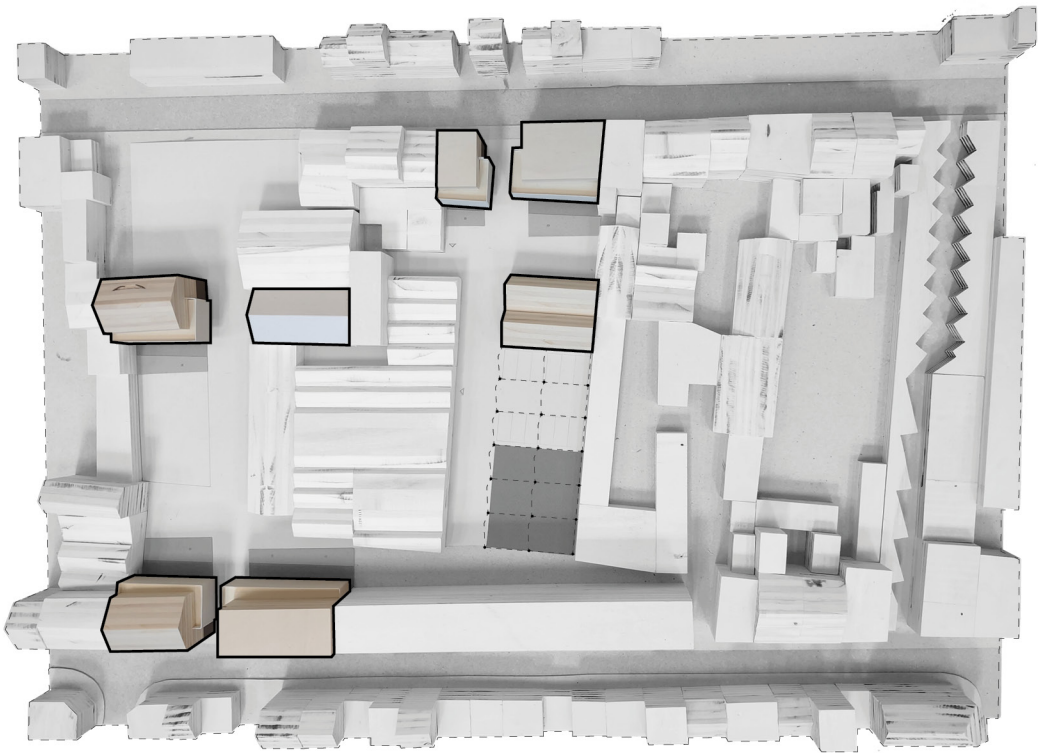
Top view of 1:200 model; structures on site to demolish (own image, 2023)



Top view of 1:200 model; P2.5 volume proposal (own image, 2023)



Top view of 1:200 model; P1 volume proposal (own image, 2023)



Top view of 1:200 model; P3 volume proposal (own image, 2023)

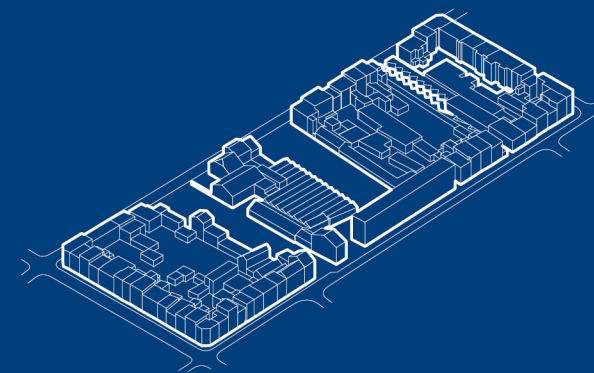
implementation

/ˌɪmplɪˈmeɪntʃən/

noun

the process of putting a decision or plan into effect; execution.

(Oxford English Dictionary)

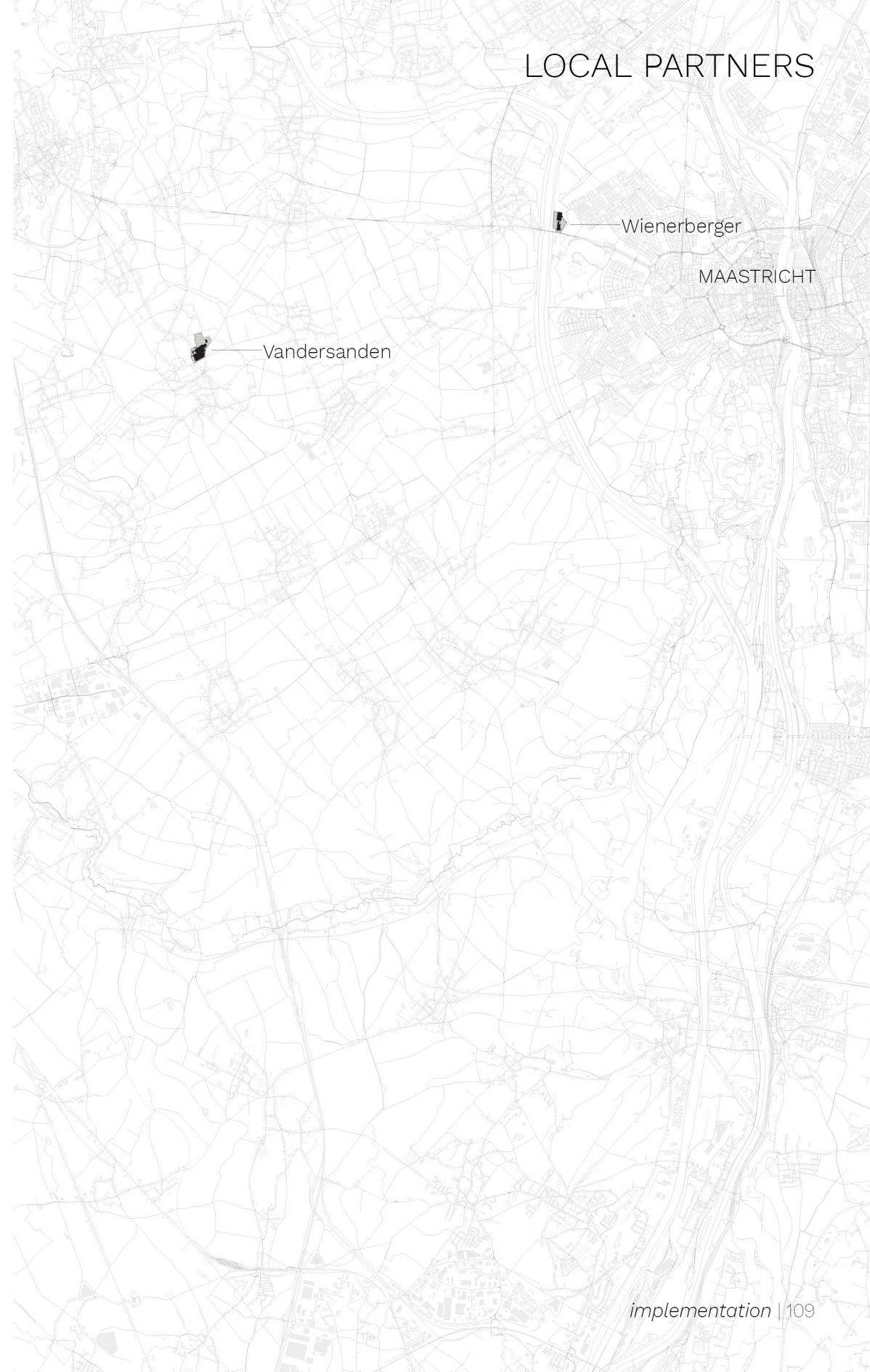


In order to apply the acquired knowledge, this phase revolved around integrating research and design strategies into the specific context of Liège. In terms of research, this involved conducting an inventory and evaluation of local companies engaged in the manufacturing or processing of the established key materials. The aim was to identify companies with the potential to adapt their processes to incorporate material regeneration activities. Moreover, these companies could eventually contribute to the project's realization during the assembly phase.

Regarding design, this phase provided an opportunity to explore the implementation of design strategies within Liège's urban fabric, while aligning with the goals established in the definition phase. As the culmination of this phase resulted in the final design, the majority of this chapter focuses on showcasing the design outcomes.



Keilewerf, Rotterdam (own picture)



LOCAL PARTNERS

Wienerberger

MAASTRICHT

Vandersanden



The “ideal” project of re-use and thus the main goal of regeneration is to **transform a dead site** (decayed because without possible use) into a living system, to be managed as a **living organism**, i.e., an organism capable of continuous adaptation to a changing/dynamic context through learning, re-organizing, repairing, and self-regulating **in coherence with its “memory”**, and therefore capable of being resilient.

(Fusco & Vecco, 2021)

The chosen site for this project consists of a cluster of vacant industrial volumes, surrounded by multiple separated terrains. The central building was once built as a metal foundry, and later served many other functions. After serving as a second hand car dealer, it has been without use for a couple of years. Due to a fire around 2015, several other buildings on the terrain were severely damaged, resulting in partial demolition years later. The volume with the white roof is still occupied by a company specialized in grease, but is integrated into the project site to ensure safe logistics and supply additional space for program.

Just like many other industrial sites in the urban context of Bressoux, the site is situated in the middle of the building block, hidden behind residential buildings and accessible from 3 sides. The site is located near the central square of Bressoux, and close to all sorts of facilities: a supermarket, cultural and religious centres and a school. Although both roads that enclose the site are one-way streets, they lead directly to the main roads of the neighbourhood, and offer bus stops for direct public transport.





PROGRAM

The masterplan encompasses various areas of focus, with the first being the central cluster of existing buildings on the site. Through the approach of adaptive reuse, these buildings have been revitalized and repurposed. The central cluster primarily houses a public program centered around creative activities within the field of reuse by either facilitating or promoting reuse related practices. Through this program, facilities, tools, knowledge and skills can be shared, creating a community connected to reuse.

The outdoor space of the site is thoughtfully divided into distinct zones to cater to various needs. There are separate areas designated for public and private use, logistics and parking, as well as a communal garden and a wadi. All of these elements are integrated into a landscape that seamlessly blends industrial and natural aesthetics, creating a unique and harmonious environment.

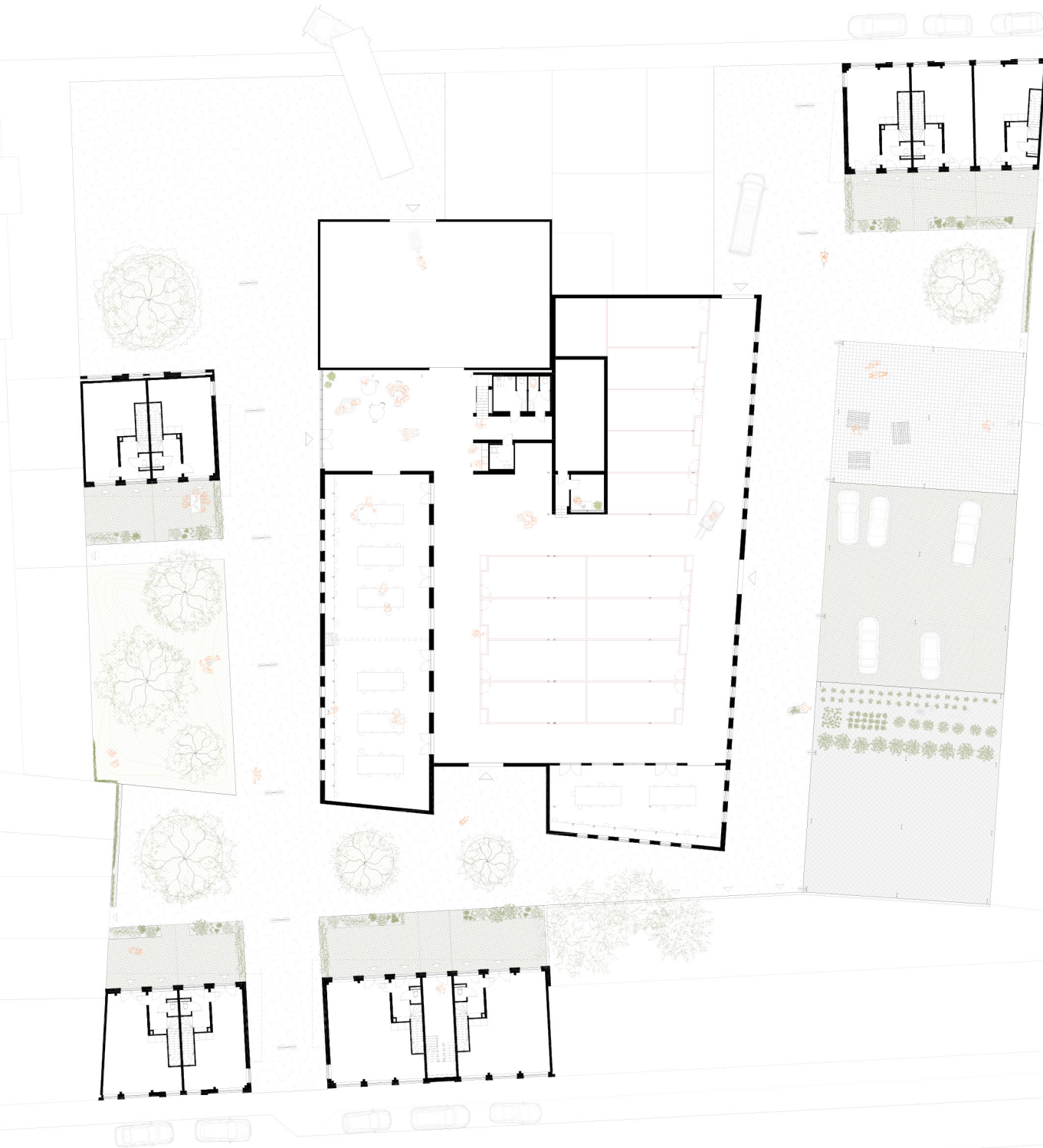
The site is enclosed by thirteen atelier dwellings, inhabited by users of this program, ensuring a well balanced use of the site throughout the day. While the majority of these dwellings feature a spacious atelier area on ground floor level, internally connected to the associated dwelling above, a few others do not have their own atelier space. However, they have the option to rent a plot within the central building, accommodating a diverse range of entrepreneurs and residents.

The entrepreneurs hall comprises a clear grid of conveniently-sized plots, interconnected by spacious alleys that ensure safe maneuverability and function as an indoor street. While the design of the plots is open for individual appropriation by the entrepreneurs, each plot is required to have an exhibition space and a front window, allowing for visibility into the activities taking place within.

The entrance hall of the central building is strategically positioned in the former “armpit” area between the three main buildings, which has been accommodated by the addition of a new volume. This entrance area also serves as a canteen and provides covered access to the toilets and meeting spaces, located in the existing two-layered small volume at the end of the hall.

The three workshop spaces are situated around the entrepreneurs hall, creating a visible and functional connection between the workshops, the entrepreneurs hall, and the exterior through numerous added doors and windows. These workshop spaces offer shared and individual workspaces for both the entrepreneurs renting a plot and external individuals or groups interested in engaging with the field of reuse.

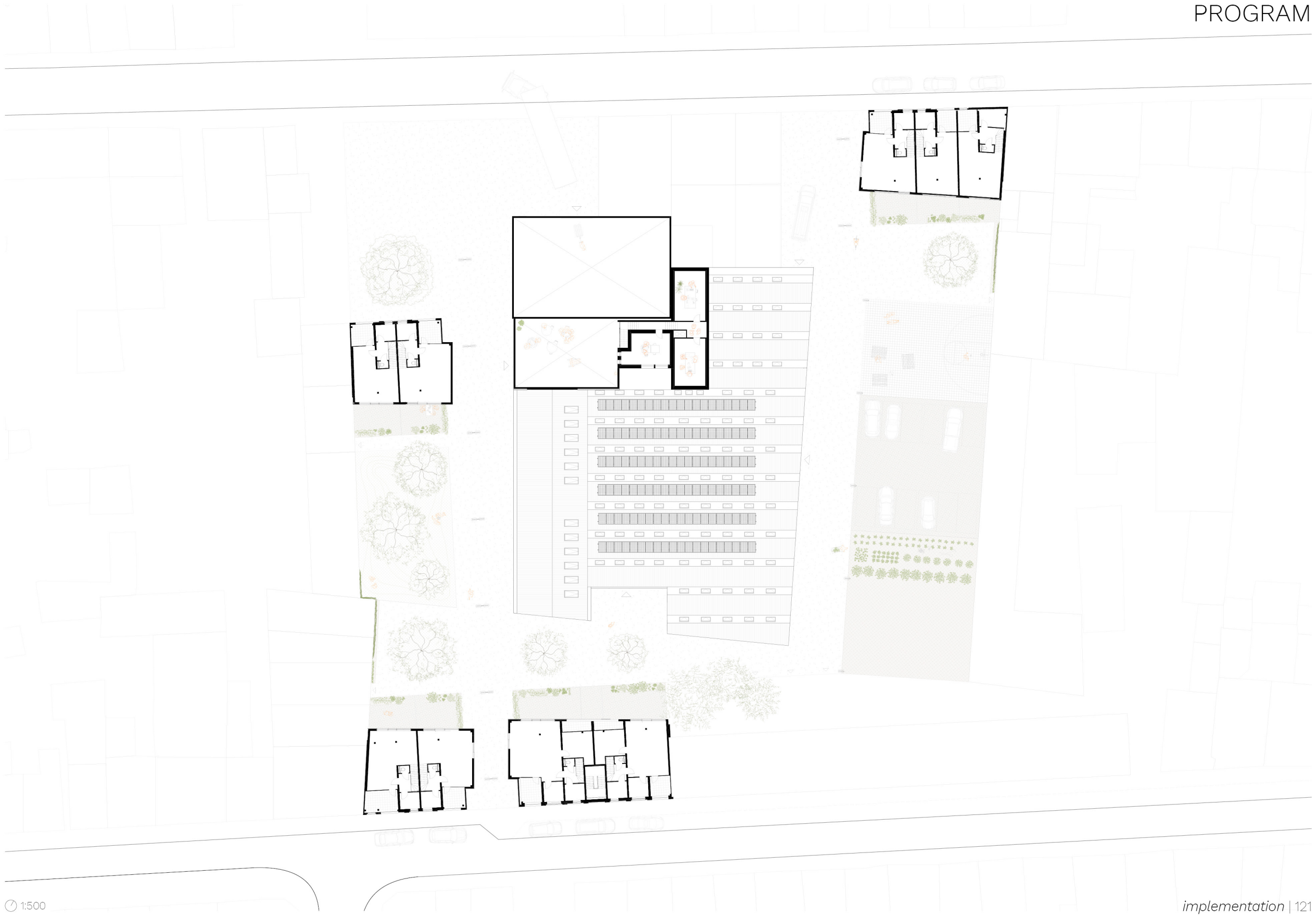
The large hall in the North of the site functions as a storage area for materials. By using this hall as the logistical entrance, logistics activities can be effectively separated from other activities on the site and within the building, ensuring a safe relationship between the different uses of the site.



The outdoor space of the site offers multiple access points, connecting the surrounding streets and encompassing the central building. Careful planning has resulted in designated areas for logistics and parking, creating a predominantly slow-traffic zone, emphasized by strategically placed trees and lantern posts have. The majority of the terrain retains its original pavement, but specific interventions have been made, including the use of reclaimed pavement or exposed soil, to accommodate new functions. These additions include a climate-responsive wadi for rainwater management, a communal garden, and a multifunctional square sheltered by a canopy. Additionally, each atelier space has its own enclosed outdoor area enclosed by low greenery, ensuring both privacy and visibility.

By introducing alternative use of a reclaimed structure from a ‘donor building’ the communal garden, parking zone and multifunctional square are naturally demarcated, additionally enhancing the theme of reuse and the industrial character of the site.

In order to enhance the ambiance and ecological aspects of the site, climbing plants have been carefully incorporated on the walls that define its boundaries. Furthermore, in anticipation of future connectivity with neighboring plots, certain pathways have been intentionally left open, allowing for potential connections and engagement with the site.



ENTRANCE HALL



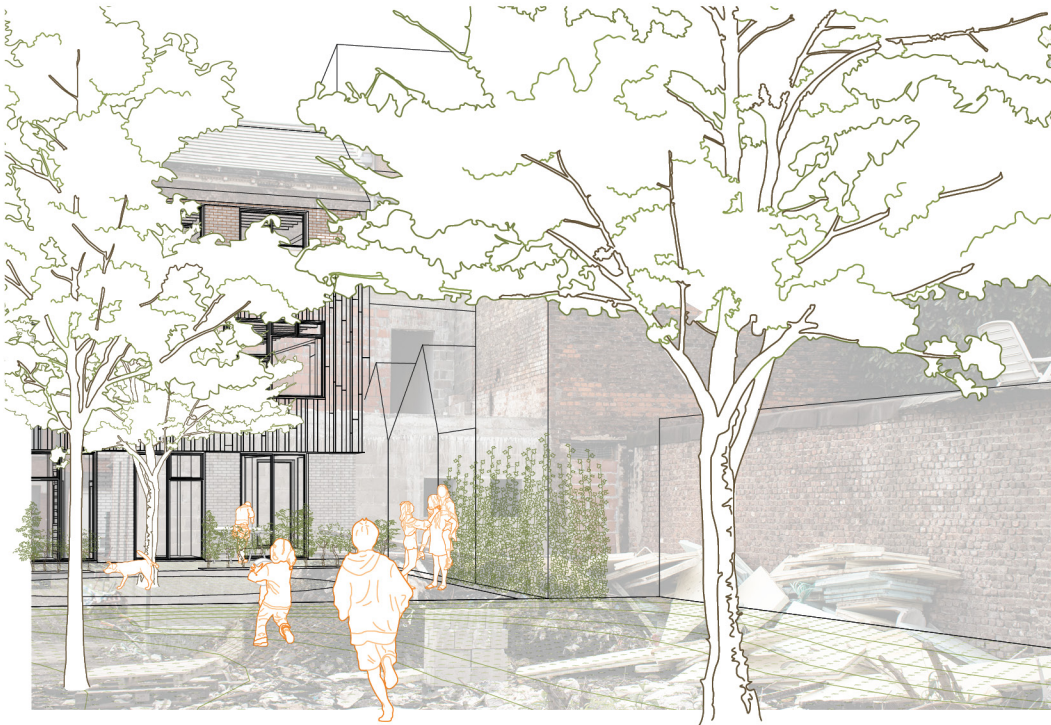
ENTREPRENEURS HALL



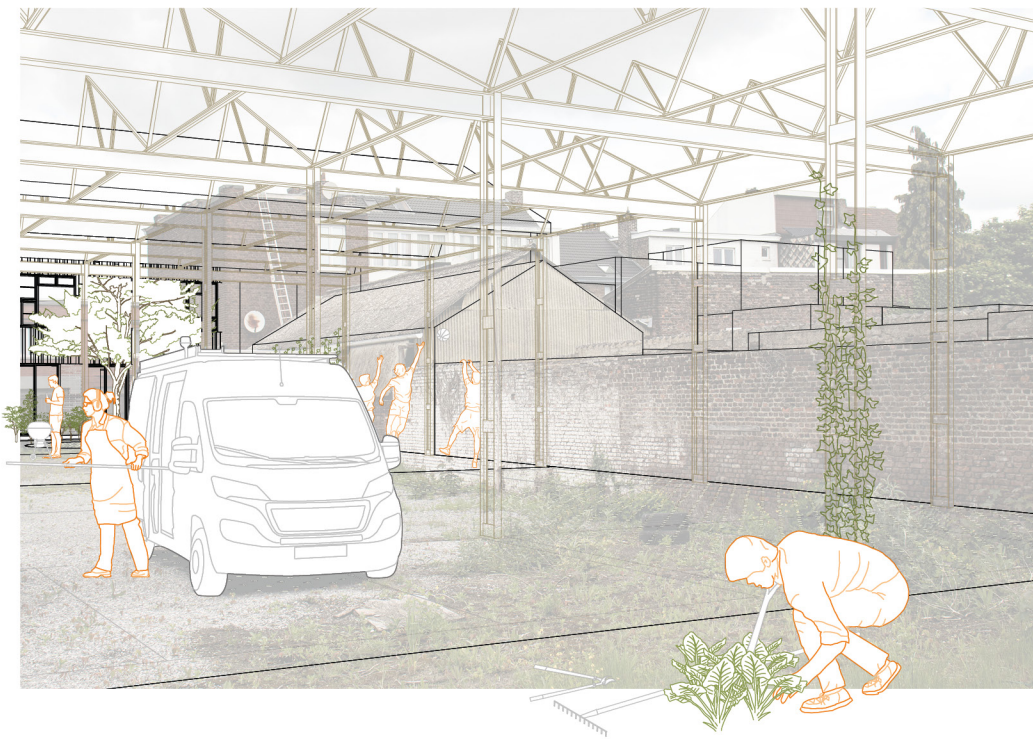
SLOW-TRAFFIC STREET



COURTYARD WITH WADI



COMMUNAL GARDEN, PARKING ZONE & MULTIFUNCTIONAL CANOPE

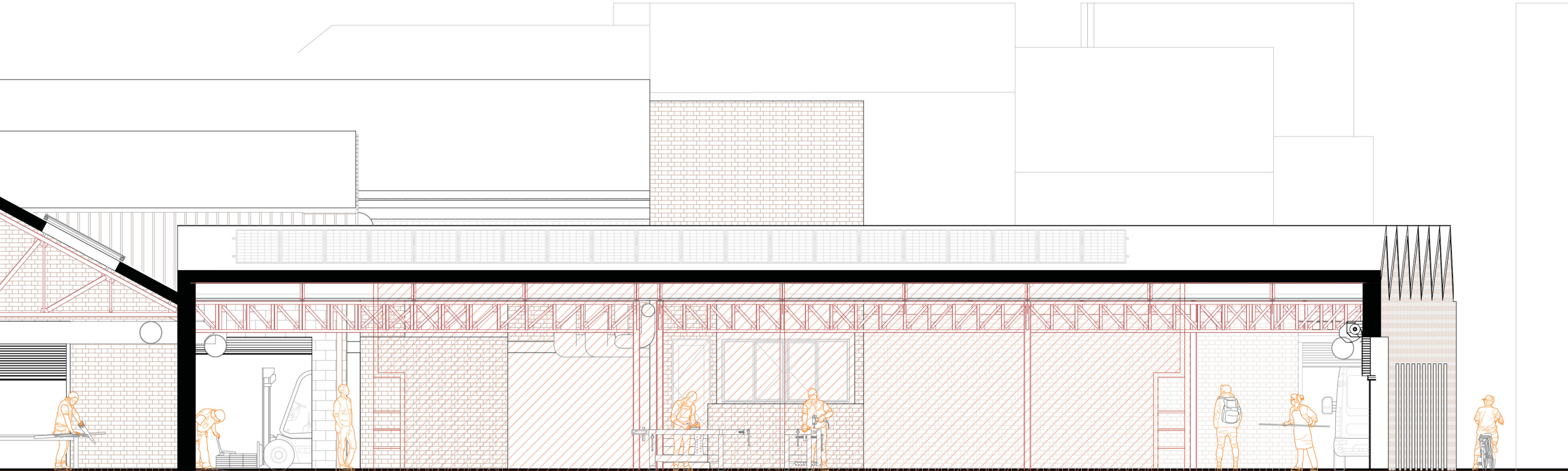


STREET VIEW OF ATELIER DWELLINGS



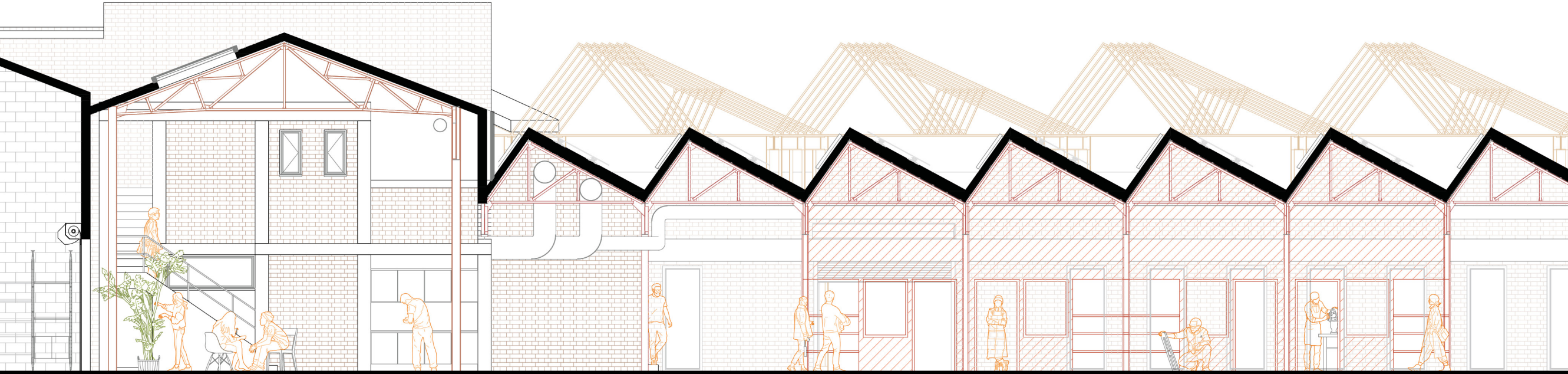


1:2000





1:2000





1:2000



1:100



1:2000





1:2000





1:2000



Given the central building’s existing character and aesthetic value, despite its limited economic value, the primary objective of its revitalization is to introduce a function with minimal interventions. This approach aims to preserve its cultural value and allow for potential future changes of use. Therefore, careful consideration must be given to what elements should be retained, removed, and added. In light of this, three key strategies have been defined for the central building:

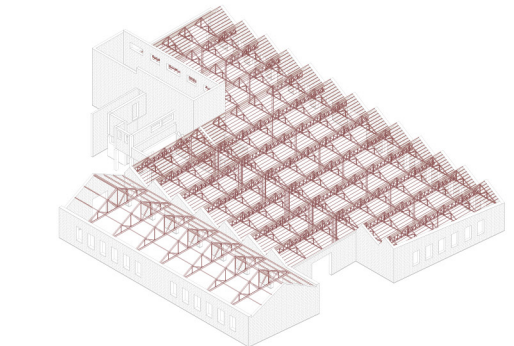
- adaptive reuse, component reuse if possible*
- maximal usability, minimal intervention*
- maintain characteristics & aesthetic quality*



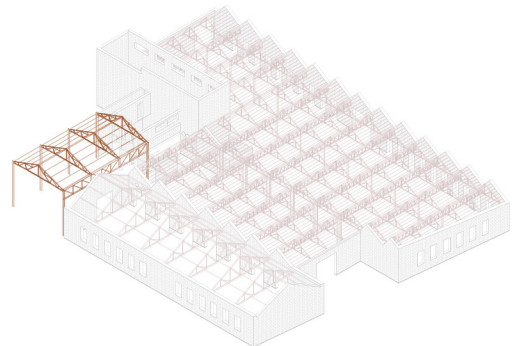
STRUCTURE

The structure of the building, accentuated by its thick structural brick walls and steel elements, played a defining role in the adaptive reuse process. These features not only contributed significantly to the building’s character and aesthetic quality but also posed certain limitations in terms of dimensions. Given the assumption of the structure being in good technical condition, the aim was to maximize the

building’s usability while minimizing interventions, thus preserving the existing structure. For the newly added volume, a part of the structure from one of the analysed ‘donor buildings’ was used, subsequently also defining the extensions dimensions accordingly. This approach ensured a harmonious integration of the new volume with the existing structure while maintaining the building’s original character and minimizing the need for extensive modifications.



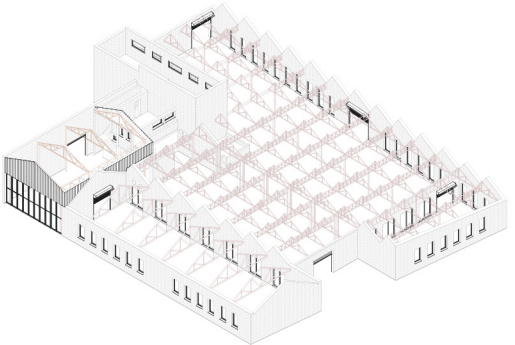
existing structure



reclaimed structure

SKIN

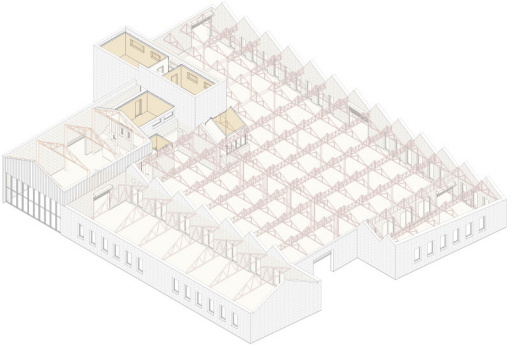
In order to enhance functionality, several significant interventions were made to the building’s exterior. Around the entrepreneurs hall and workshop spaces numerous windows were added, necessitating openings in the structural walls. These windows were strategically positioned between the structural grid, and minimized in width to ensure the integrity of the load-bearing structure



interventions in the skin

CLIMATE DESIGN

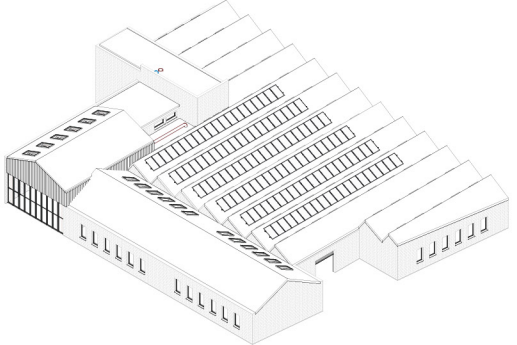
The introduction of a new function brings forth new requirements, including the need for climatization. The spaces intended for longer stays, such as meeting rooms and the manager’s office, were strategically placed within the small central building. Applying the “box within a box” principle, these spaces can be insulated internally, ensuring that the exterior aesthetic quality remains unaffected.



heating

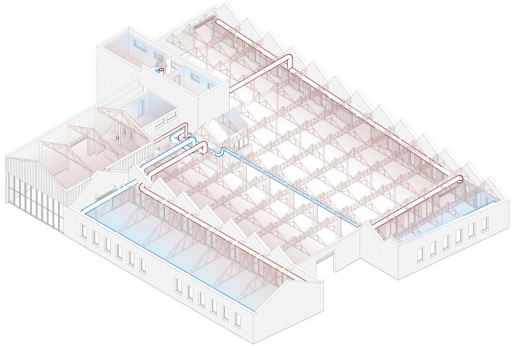
BUILDING

while preserving the solid aesthetic of the brick walls. The installation of roller doors was limited to areas where pre-existing doors were already present, eliminating the need for additional modifications. Furthermore, a replacement roof, including PV panels and roof lights, was installed to replace the deteriorated existing roof, and the new extension was added to improve the total functionality.



new roof

Additionally, to ensure sufficient fresh air in the meeting rooms and workshop spaces, ventilation type D was implemented. For the entrepreneurs hall and entrance hall, a type C ventilation system proved sufficient, with automatically openable windows in the roof. The arrangement of ventilation ducts required careful consideration to maintain maximum free height, as they had to navigate through and around the existing structure



ventilation

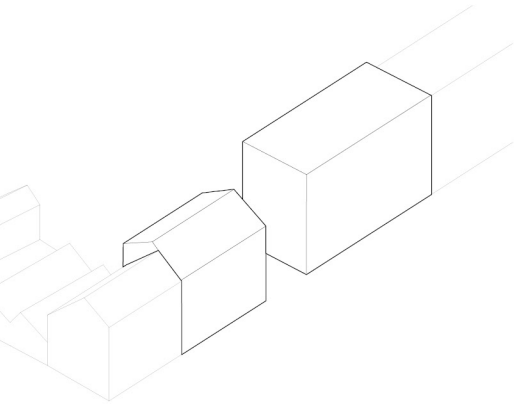
As new constructions, the atelier dwellings offer greater flexibility compared to existing buildings, making them ideal for experimenting with the application of reused components and materials while adhering to a recognizable archetype. However, the absence of a clear “donor building” posed challenges in sourcing large quantities of reused materials. Therefore, the implementation of reuse in the atelier dwellings is based on the following principles:

- component reuse if possible, otherwise biobased*
- allow for variation & imperfections*
- alternative use of materials*

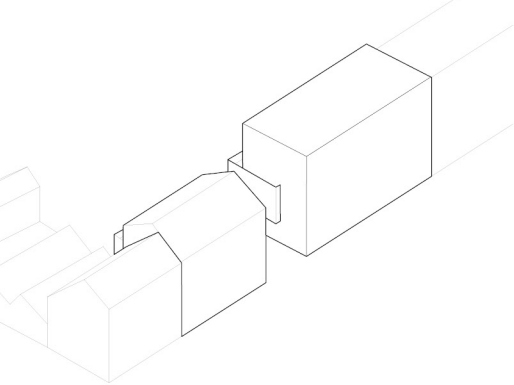
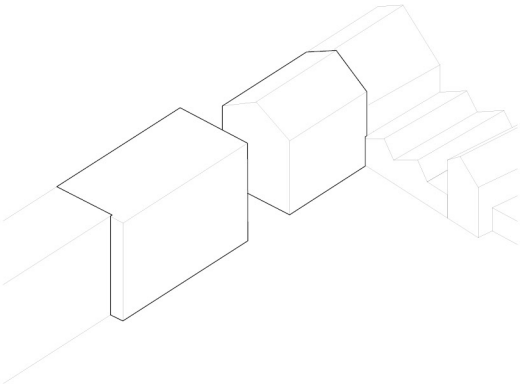
VOLUME

In order to achieve culturally fitting and sustainable architecture, the project incorporated methods of reuse while considering the architectural integration with neighboring buildings. This approach

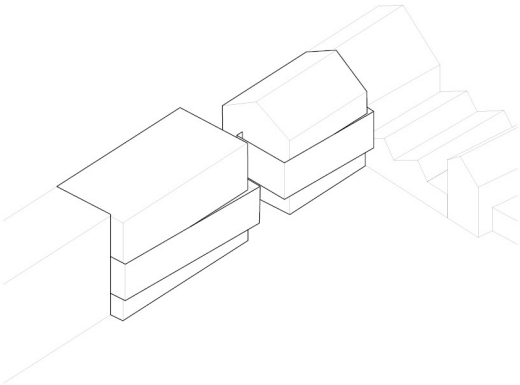
resulted in volumes that initially mirrored the height, shape, and rhythm of the adjacent structures. By introducing cantilevered volumes, the buildings became more inviting from the sides, departing from the closed side facades typically found in Belgian houses.



main volumes



architectural extension

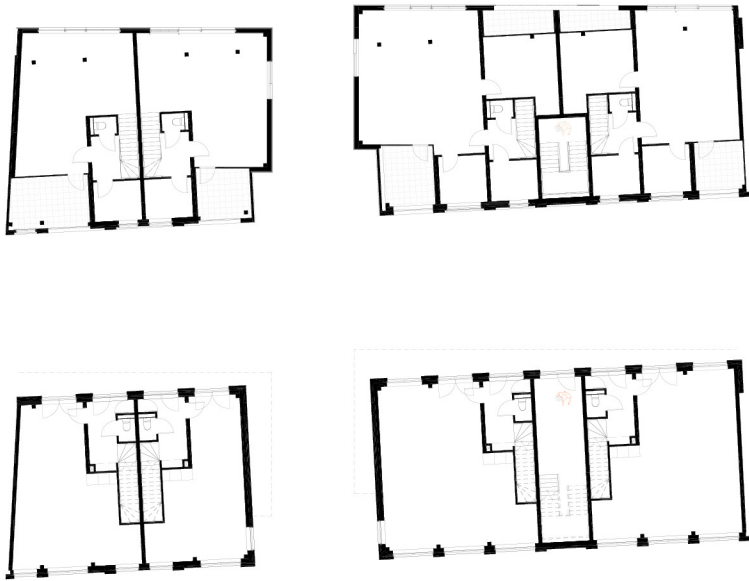


TYPES

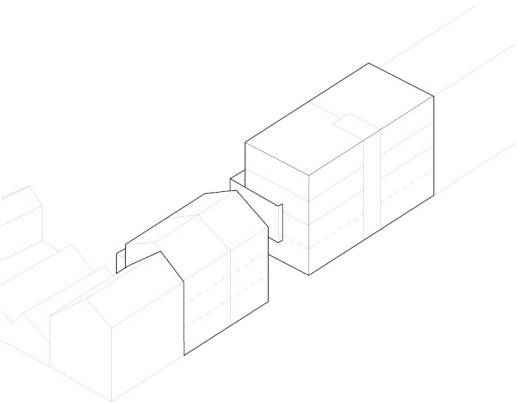
The volumes accommodate a range of typologies, offering diverse housing options to cater to different residents. Among these typologies are family houses and apartments with an atelier on the ground floor, as well as standalone apartments without an atelier. The typologies featuring ateliers share similarities, with an entrance hall providing access to both the atelier and

MATERIALS

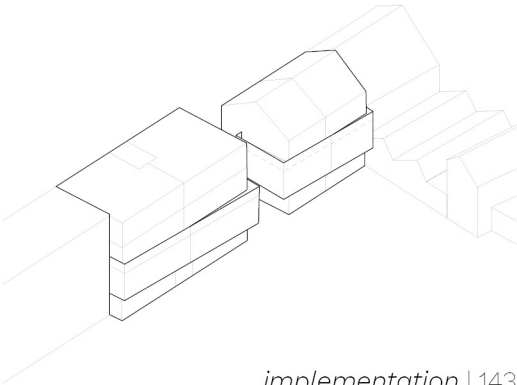
the dwelling above. On the first floor, there is a spacious open living and kitchen area, along with a generous loggia on the street side, allowing for personal engagement with the surroundings. Additionally, there is a smaller room on this floor. In the case of family houses, the remaining rooms are located on the second floor, while in apartments, the master bedroom and bathroom are situated on the same floor.



1:400



configuration of typologies



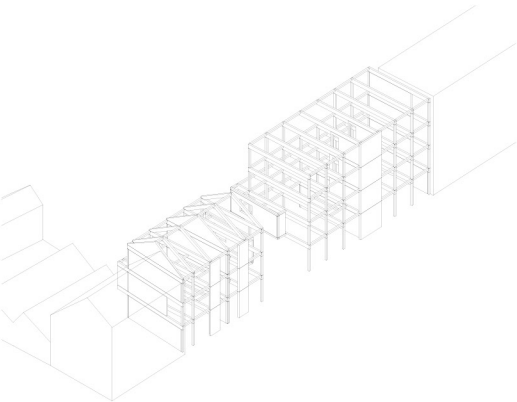
STRUCTURE

Due to the often limited dimensions and load bearing capacity of reclaimed timber, this is only used as secondary structure. By choosing a grid size of 2700mm, most of the sourced components should fit. In order to maintain an open space plan and allow for future flexibility, the inclusion of structural beams capable of spanning long distances, such as glulam, is desirable. While glulam itself is

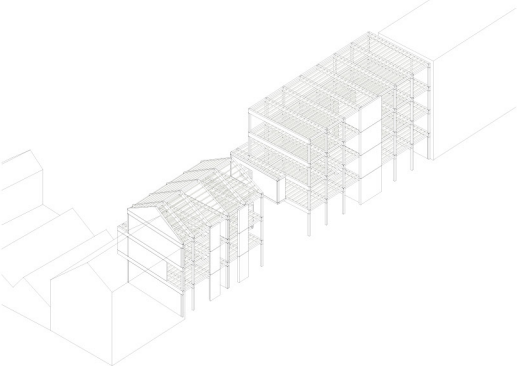
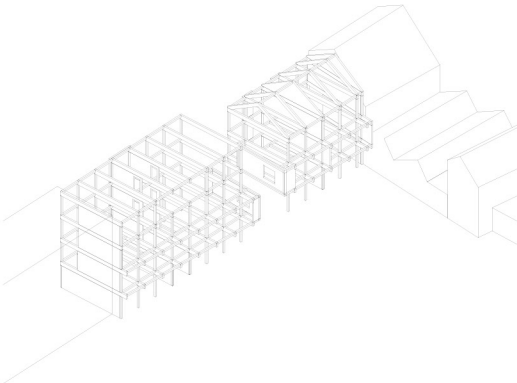
not reclaimed, it provides crucial support to the overall structure and can be easily reclaimed in the future. Moreover, successful experiments by Buckland Timber have demonstrated the viability of using reclaimed timber for producing glulam, making it an ideal solution for similar projects in the future.



© Simple Works, Buckland Timber



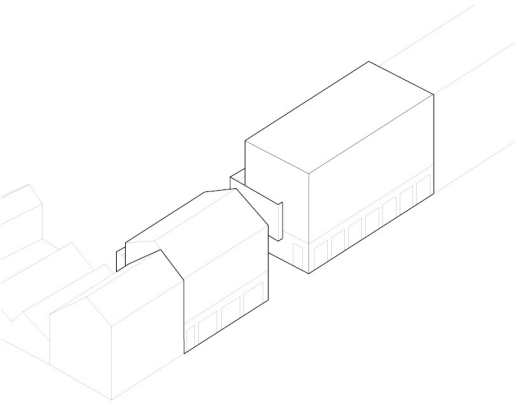
primary structure



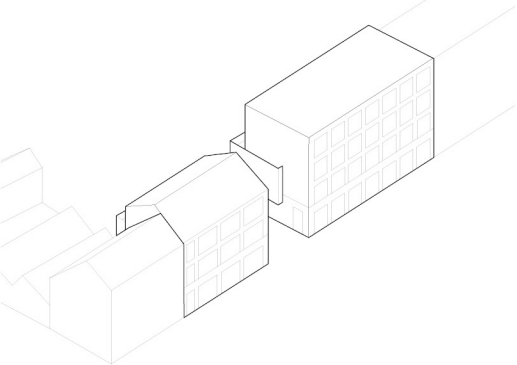
primary & secondary structure

FACADE COMPOSITION

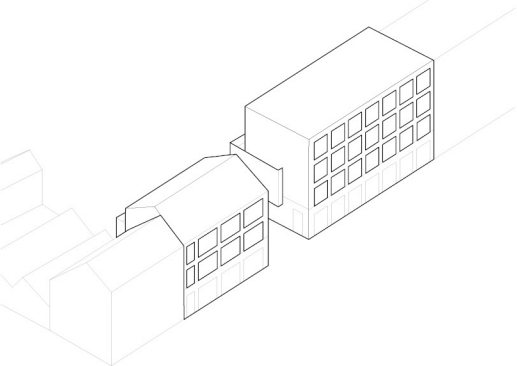
Regarding the facade, various strategies have been employed to incorporate reclaimed materials. To highlight the program on the ground floor, a distinct material cladding has been applied, using elements with universal dimensions but in an alternative manner. This includes reclaimed pavement tiles as cladding and reclaimed steel profiles as lintels.



activation of the plinth



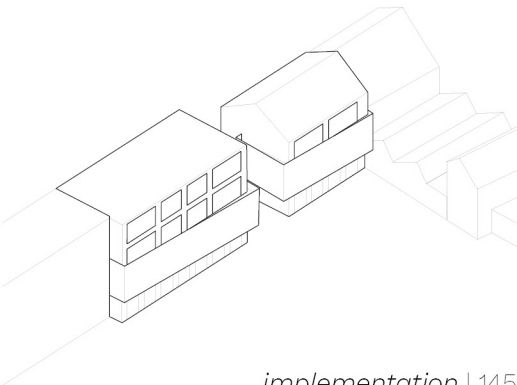
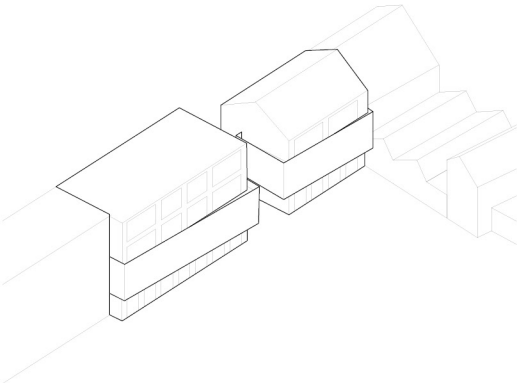
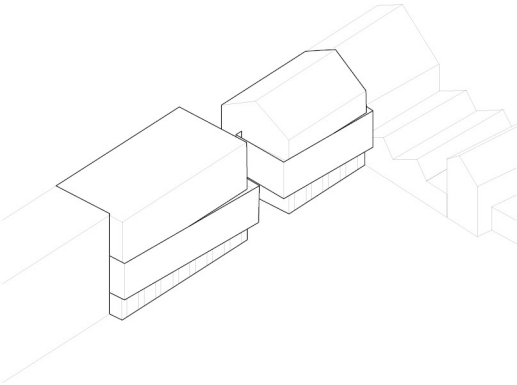
architectural framework

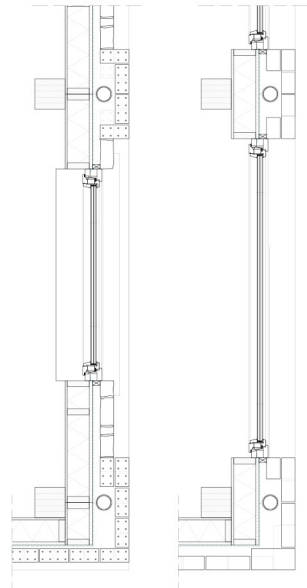


infill

MATERIALS

For the upper floors, an architectural framework has been established using modified reclaimed bricks, enabling the application of the Drystack method. The infill within this framework is dependent on the available supply of materials, including their dimensions. Furthermore, the function of each space behind the frame may influence the type of infill required.





HR++ glazing if possible within limits window frame

reclaimed window frame, various dimensions

interior window sill

reclaimed bluestone window sill, various dimensions⁽¹⁾

sandwich panel, Metisse Cotton insulation, 22-145-13mm⁽²⁾

wall tie

vapour barrier, membrane

reclaimed brick fragments, various dimensions⁽³⁾

reclaimed full bricks, module format, Drystacked, 190x90x50mm⁽⁴⁾

glulam column, 200x200x3020mm⁽⁵⁾

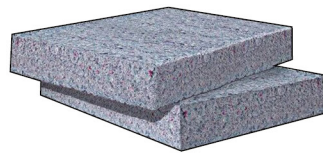
aluminum profile

cut reclaimed pavement tiles, 100/200x300x40mm⁽⁶⁾

reclaimed steel HEA profile, 200x190x2300mm⁽⁷⁾



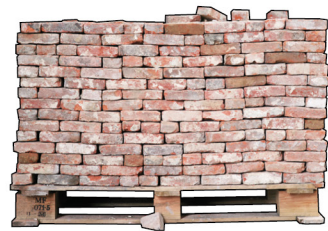
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4



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6



7



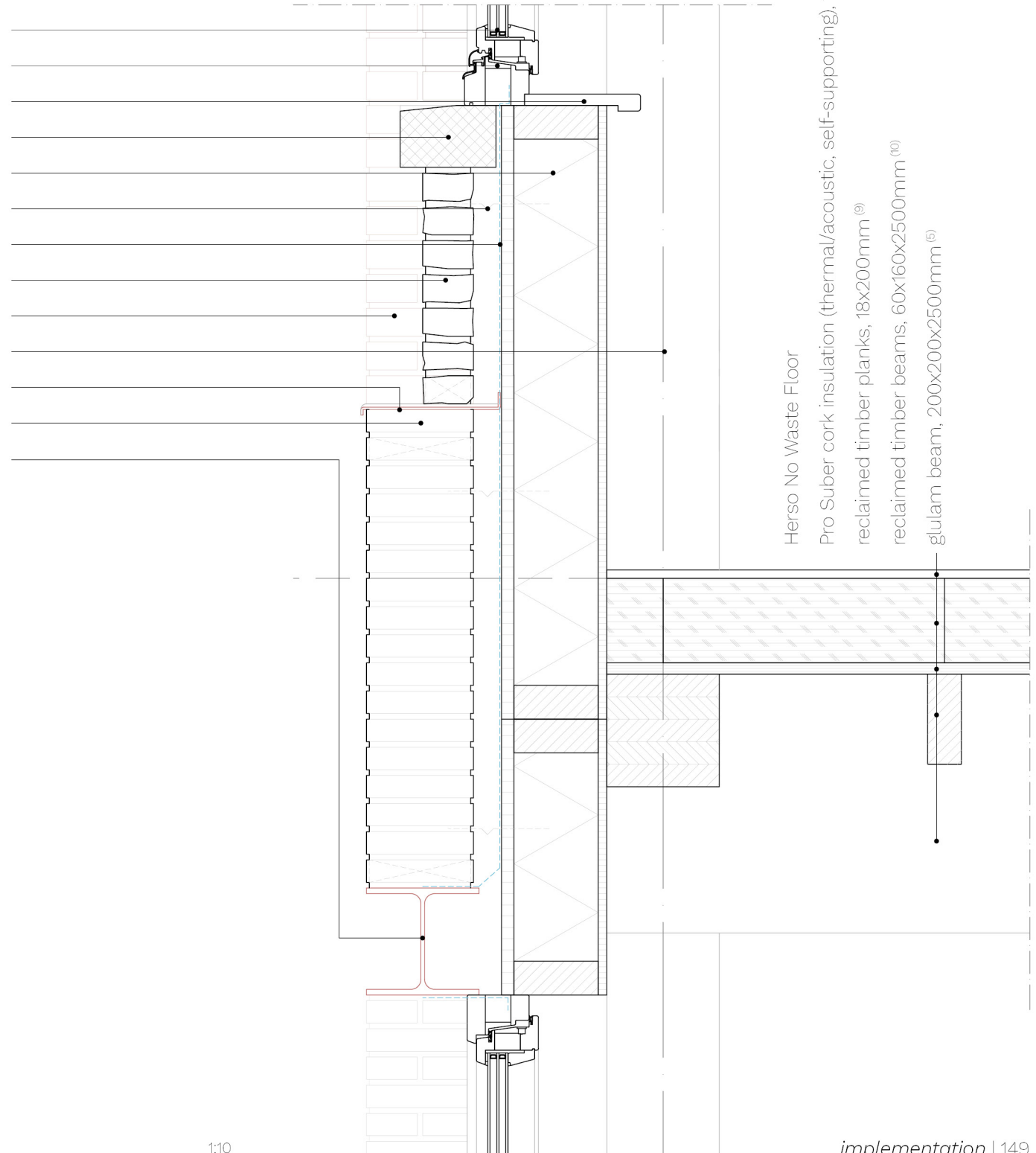
8



9



10



1:10

MATERIALS

reclaimed timber planks, 18x200mm⁽⁹⁾

reclaimed terrazo tiles, 300x300x40mm⁽⁶⁾

water resistant layer

thermal insulation, 120mm with slope

Pro Suber cork insulation (thermal/acoustic, self-supporting), 100mm⁽⁸⁾

reclaimed timber planks, 18x200mm⁽⁹⁾

reclaimed timber beams, 60x160x2500mm⁽¹⁰⁾

glulam beam, 200x480x8700-10400mm⁽⁵⁾

glulam column, 200x200x2520mm⁽⁵⁾

aluminum profile
reclaimed balustrade
gutter
vapour barrier, membrane
wall tie
sandwich panel, Metisse Cotton insulation, 22-145-13mm⁽²⁾
glulam beam, 200x200x2500mm⁽⁵⁾
reclaimed full bricks, module format, Drystack, 190x90x50mm⁽⁴⁾
lintel, steel L-profile, 200x200x2400mm
reclaimed window frame, various dimensions
reclaimed brick fragments, various dimensions⁽³⁾
HR++ glazing if possible within limits window frame
glulam column, 200x200mm⁽⁵⁾

7

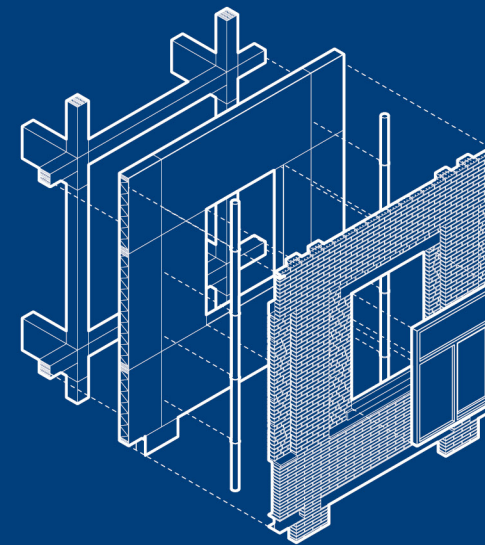
assemble

/ə'sembl/

verb

1. (of people) gather together in one place for a common purpose.
2. fit together the separate component parts of (a machine or other object).

(Oxford English Dictionary)



ASSEMBLY

Once the implementation in Liège is assured, the next step is to bring all the elements together. This phase involves determining the order and strategy for assembling the different components. Initially, digital 3D modeling was employed for this purpose, but it was later found that physical modeling was much more effective. As a result, a 1:10 scale model of the facade fragment of the atelier dwellings was created, showcasing the efforts made to create architecture amid uncertainties.

A key concept in the assembly of the project revolves around the significant role of windows in the overall process and composition. The dimensions of everything surrounding the windows are defined by them. Additionally, the broken bricks effectively fill the gaps created by the windows, embracing their imperfect dimensions.

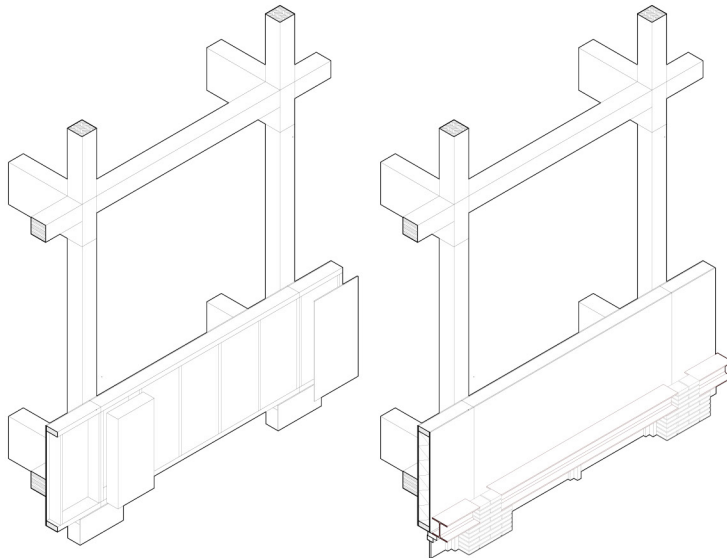
*“The building’s **form, aesthetics, and details** are directly influenced by the materials available at the time. Thus, the architect must freely move between the steps for continuous refinement and adaptation, especially during the construction process.*

*This requires the architect to remain involved in the construction administration phase, finalizing details based on materials available and unexpected problems that may arise, given the **inherent imperfections of used materials.**”*

(Josefsson & Thuvander, 2020, p. 5)

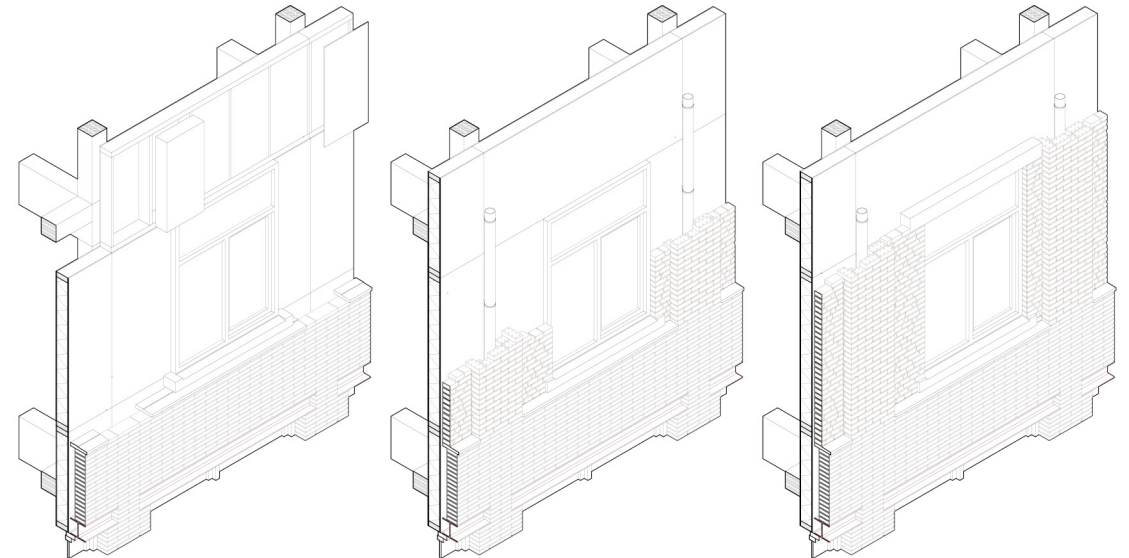


Avasara Academy by Case Design, Pune, India



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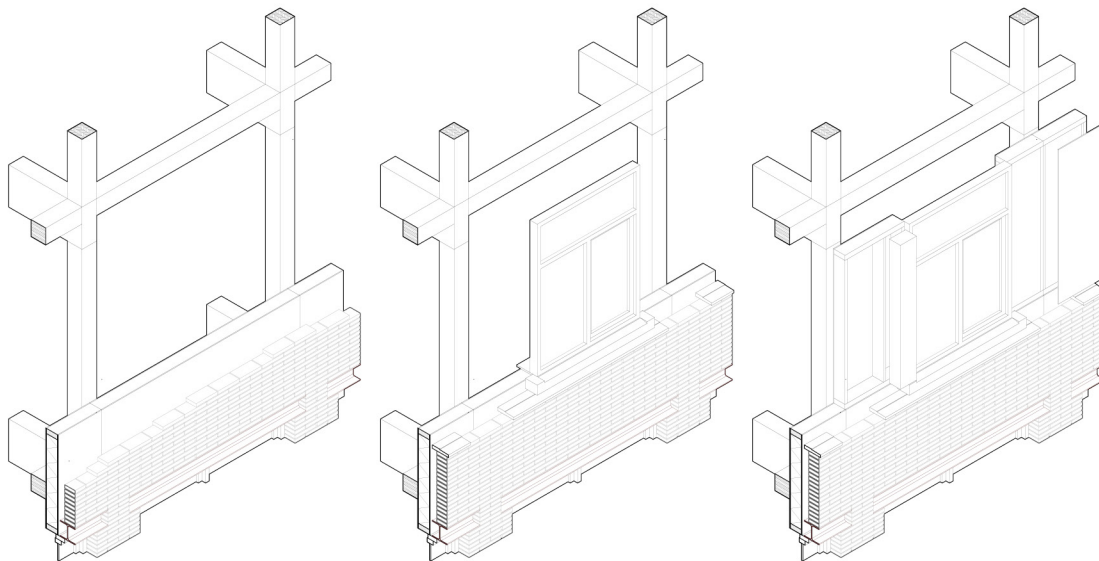
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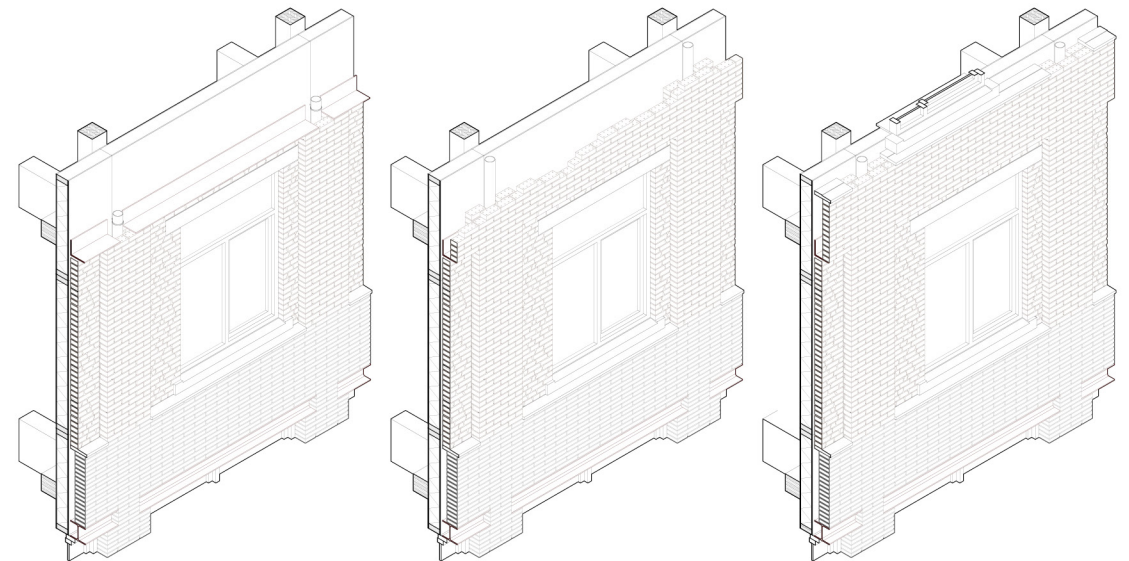
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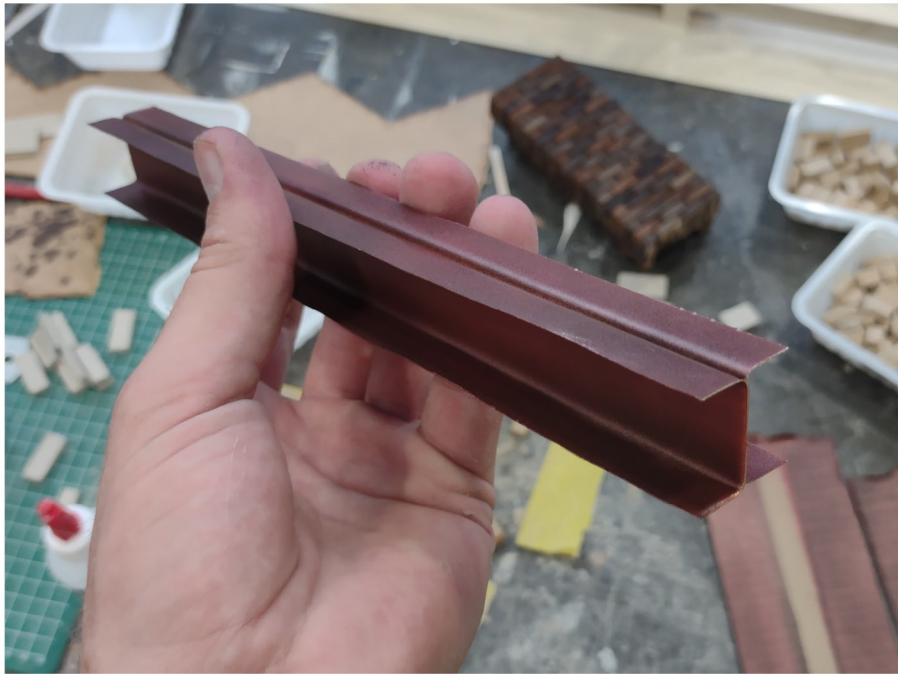
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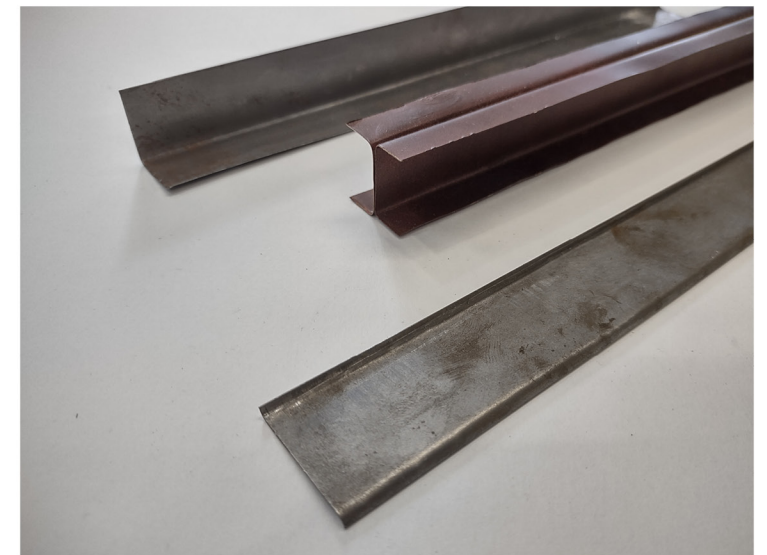
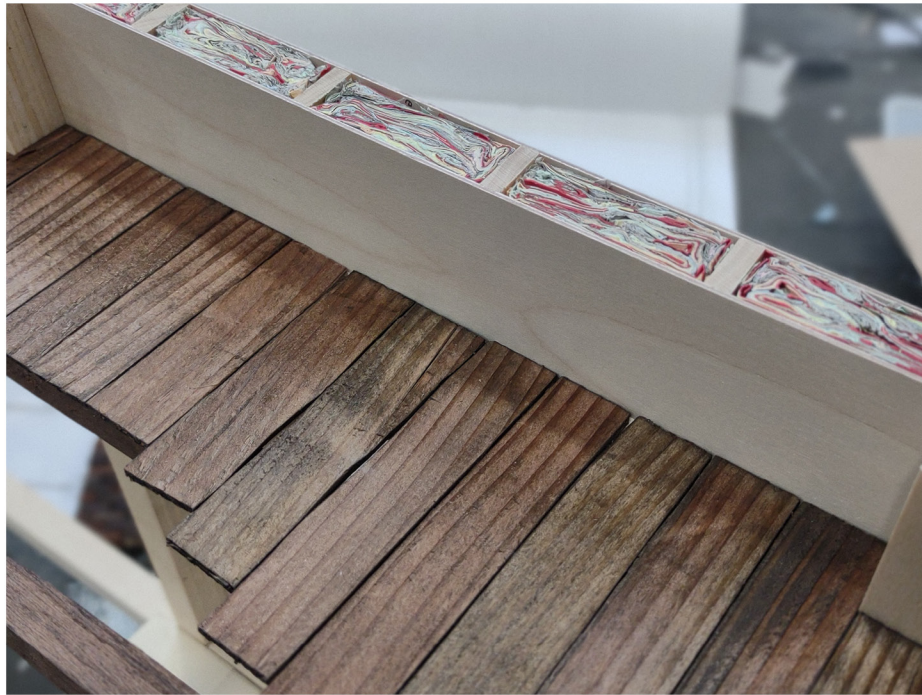


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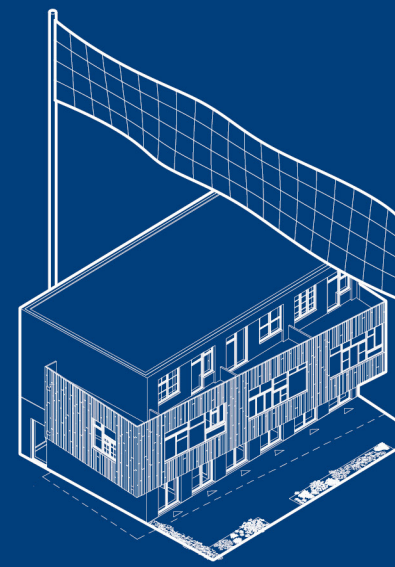
conclusion

/kən'kluːʒn/

noun

1. the end or finish of an event, process, or text.
2. a judgement or decision reached by reasoning.

(Oxford English Dictionary)



CONCLUSION

How did your research influence your design/recommendations and how did the design/recommendations influence your research?

Initially, my research predominantly revolved around quantitative analysis and literary research. Through exploring the potential of material reuse as a sustainable alternative for new construction, I aimed to investigate how both the cultural and technical values of these materials could be preserved, while using this as an argument and tool to create sustainable and fitting architecture. However, this initial direction of research tended to lean towards a more technical approach, which posed a challenge given the studio's emphasis on an urban perspective.

Joining forces with Djamo Mastenbroek in our shared aim to explore the potential of reusing locally reclaimed materials and elements, allowed me to elevate this analysis to a more comprehensive level. Through consulting literature, conducting site visits and arranging excursions to companies involved in reusing materials, we augmented the previously quantitative nature of our inventory, gaining a deeper understanding of material reuse and providing us with a solid foundation to base our design strategy on.

At this stage, however, I had not yet defined the program and thus no strong connection between research and design was established, aside from the implementation of reclaimed elements. Additionally, it became evident that the link between the technical research and the urban character of the studio needed improvement. This realization, guided by constructive feedback, led to a shift

towards a more urban-scale approach to material reuse, both in research and design.

Through definition of the program as a showcase of the potential of reusing materials, it became clear that designing with reclaimed elements involved more than just technical considerations. It necessitated a socio-cultural approach that involved establishing the local material- and building culture, identifying local stakeholders and fostering a sense of community, leaving their mark on the reclaimed materials and building techniques to be incorporated in the design.

Finally, throughout the design process and research towards designing with reclaimed materials, it became evident that a comprehensive knowledge of the available material supply is essential for effective design. However, limited access to the case study sites and data regarding the current material stock throughout Belgium presented significant challenges, proving it really hard to design with so many uncertainties. Moreover, online material banks often provided a wide array of materials and elements, but frequently only in small quantities. In response, the design strategy underwent another important shift, from the conventional way of designing based on available reclaimed materials towards constructing a clear architectural framework capable of accommodating a diverse range of elements and dimensions, discarded materials and imperfections.

How do you assess the value of your way of working (your approach, your used methods, used methodology)?

Based on my personality, I initially anticipated my process to follow a systematic and linear sequence of gathering data, deriving conclusions, and translating them into a design vision. While this approach might have been suitable for the a technical oriented research, the Urban Architecture Graduation Studio emphasizes a slightly different focus, encouraging a more socio-cultural approach. This presented a challenge for me as I was less familiar with this scope of research. Moreover, the language- and culture barrier arising from studio assignment's location in Liège further compounded my struggle to fully grasp the socio-cultural context I had to deal with, being practically unable to conduct interviews and maintain qualitative contact with stakeholders.

Nevertheless, the tutors encouraged me to broaden my horizon in terms of research- and design methods, shifting my focus from the technical to the more cultural perspective, and expanding from the material scale to the urban scale. In response, I ventured

into alternative methods of displaying material, beyond the conventional digital architectural drawings, such as sketching, making collages and experimenting with actual reclaimed materials.

Subsequently, the graduation book also follows a less conventional sequence of products than I initially imagined. It follows a metaphorical process of designing with reclaimed materials, sometimes contradicting to the actual chronological order of my process. Moreover, it reflects the organic and cyclical nature of the process, just like the envisioned material cycle within my project.

In assessing the value of my way of working, I recognize the importance of embracing new perspectives, pushing beyond my comfort zone, and exploring unconventional methods. This shift broadened my understanding of socio-cultural aspects and enabled more creative and engaging design outcomes, even though I think I could have pushed my boundaries a lot more.



How did your project contribute to understanding the complications of designing with reclaimed materials?

Throughout the design process, I encountered multiple challenges regarding the lack of knowledge of available reclaimed elements. This lack of certainty presented difficulties, especially in defining the architectural design. Shifting my focus towards designing to incorporate those uncertainties, however, raised many new challenges.

During this process, it became evident that establishing a set of rules was crucial to shaping an architectural framework that could accommodate variations and imperfections while maintaining control over the overall composition of the building. Consequently, I had to adopt multiple strategies for incorporating reclaimed materials, distinguishing between elements with fixed dimensions and a consistent supply, and elements with varying dimensions and uncertain availability.

Furthermore, it became evident that varying supply does not only affect the architecture, but also has a large contribution to the building process, by defining the order of assembly.

Lastly, I discovered that certain materials posed limitations in terms of available dimensions or technical requirements such as load-bearing capacity and insulation. In instances where these limitations arose, such as in the main structure and insulation, I felt forced to opt for alternative biobased materials to ensure a reduced carbon footprint.

What is the relation between your graduation project and the main themes of the Urban Architecture Graduation Studio?

One of the overarching themes of the Urban Architecture Graduation Studio 2022 is 'Scar', referring to the notion of something that once was healed, but somehow still shows marks of its wounded history. In some occasions, a healing process even demands additional donor tissue to be used, leaving behind not only traces of the past, but also of the process of healing.

By introducing new life and material value to an abandoned site, the aim of my project is to create an architectural scar; a place that is living proof of its potential to recover from damage and embrace imperfections, rather than covering up or creating something detached from its context.

What is the relation between your graduation project topic, your master track (Ar, Ur, BT, LA, MBE), and your master programme (MSc AUBS)?

By looking at architecture through different scales and approaches, from urban- to material scale and from sustainability to social design, the project fits perfectly within the wide scope of the Architecture master track, but simultaneously touches the fields of Building Technology and Urbanism. Even though the primary focus remains in the field of Architecture, I believe that successful architecture goes beyond its physical manifestation, requiring a deep understanding and integration of both tangible and intangible factors. By considering the physical context, socio-cultural influences, and sustainable practices, my project demonstrates the holistic approach that reflects the master programme of Architecture, Urbanism and Building Sciences.

How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

Academically, my project contributes to the field of architecture by exploring innovative approaches to sustainable design and the reuse of reclaimed materials. It expands knowledge and understanding of the potential benefits and challenges associated with incorporating such materials into architectural practice. In my project, I have developed design strategies that can be further explored and refined by future researchers and practitioners. The academic value mainly lies in the alternative approach towards alternative construction materials and resource management.

On a societal level, my graduation project addresses pressing issues related to environmental sustainability, resource depletion, and urban revitalization. By stimulating the use of reclaimed materials and the revitalization of abandoned sites,

it promotes a more circular economy. The project also considers the social and cultural dimensions, involving local stakeholders and fostering community engagement. It seeks to create architecture that not only meets functional needs but also enhances identity of the community it serves.

Ethically, my graduation project emphasizes responsible and conscientious design practices. By reusing materials, it contributes to minimizing waste and reducing the demand for virgin resources. This approach aligns with principles of sustainability and responsible resource management. Moreover, by engaging with local stakeholders, I respect the importance of community involvement, ensuring that the project responds to their needs and aspirations, including inclusivity and accessibility.

How do you assess the value of the transferability of your project results?

Throughout the process, I aimed to develop a design approach that can not only be applied in the specific context of Liège but offers a framework and set of principles that can be adapted and implemented elsewhere.

The value of transferability lies in the potential for broader impact and the ability to inspire positive change beyond the boundaries of my specific case study. Overall, I believe that the transferability

of my project adds value by enabling the adaptation and implementation of the defined design principles in diverse contexts. By sharing my insights and experiences, I aspire to contribute to a more sustainable and resilient built environment, inspiring other practitioners, researchers, and communities to embrace similar approaches and make a positive impact.

The following list contains a selection of sources that are either used during the year or relevant to the topics discussed during the research and design process. The sources that are used in this book are highlighted in bold.

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