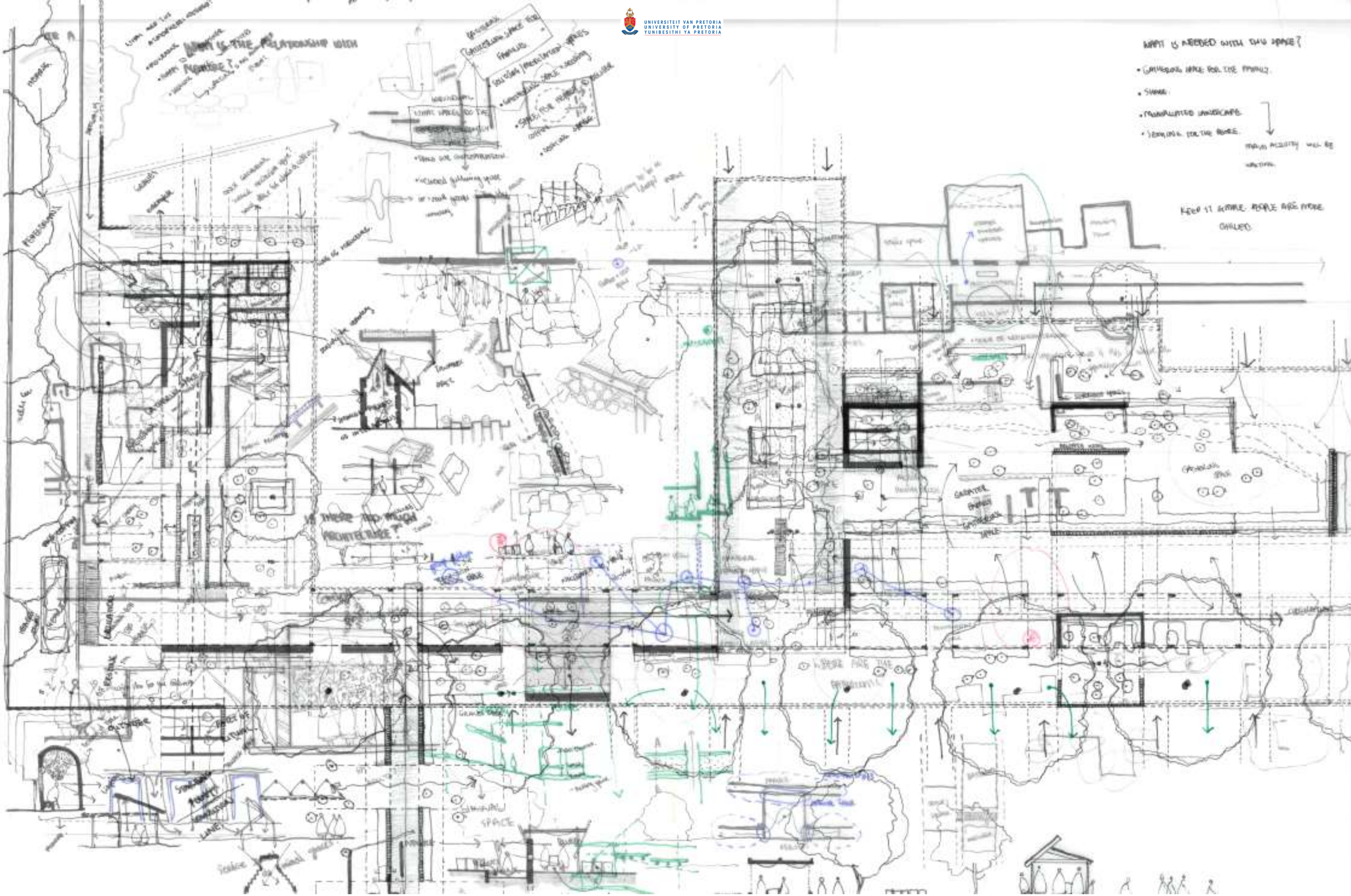


Figure 6.1: Collage of development drawings (Author November 2021)

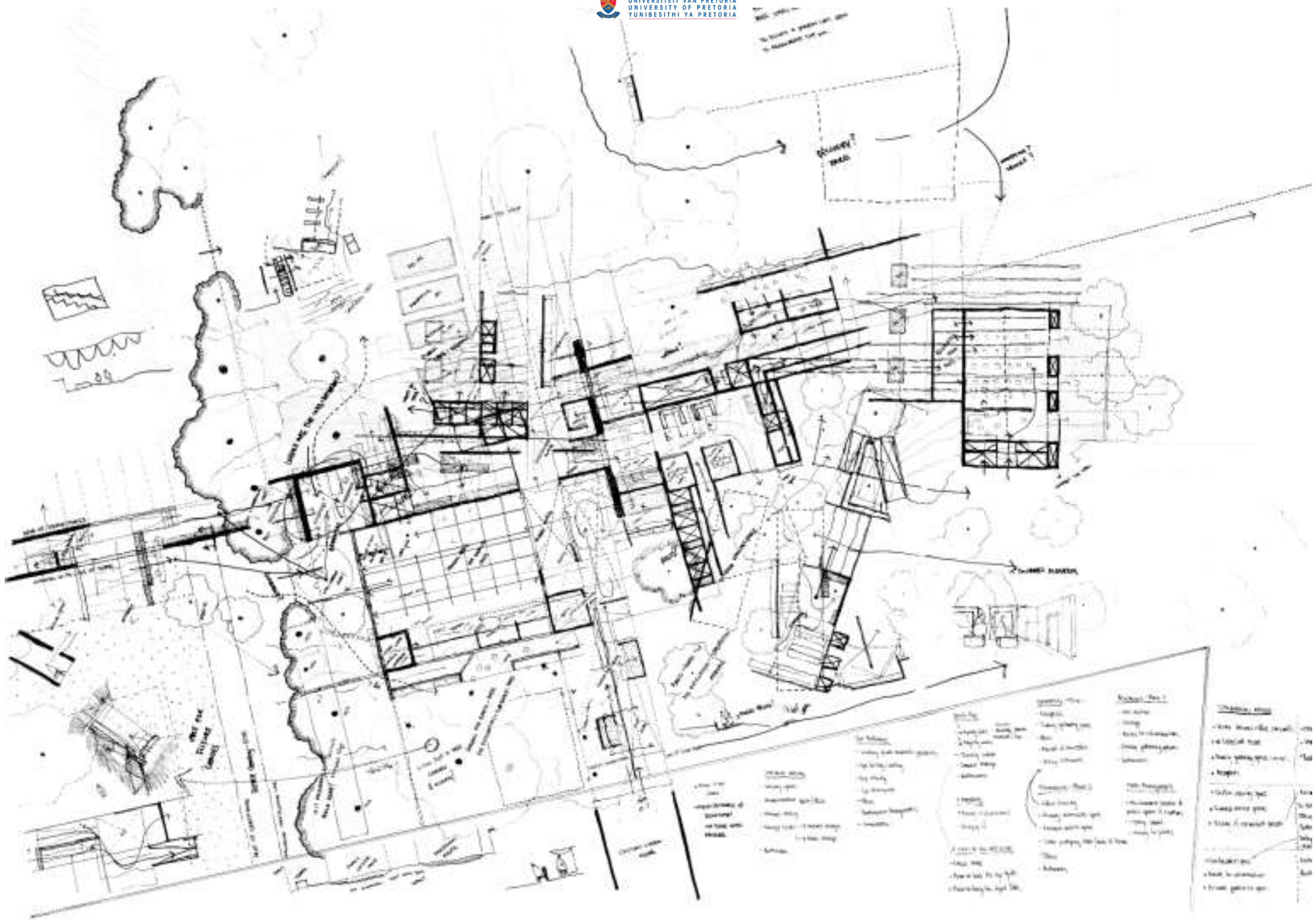


Figure 6.2: First design iteration drawing (Author July 2021)

At the first design iteration (Figure 6.2), the programme was sequentially organised with the leather dyeing facility linking the project with the existing linen store and the resomation route connecting the Silverton Cemetery and the Moreleta Spruit. The two programmes intersecting in overlapping and cross-programmed spaces that allowed the users of each programme to interact with the other programme.

Figure 6.3: Second design iteration drawing (Author July 2021)

A refinement of the original intention to intersect and cross-programme the spaces between the leather dyeing facility and the resomation route streamlined the sequential organisation of both programmes. However, the spaces that was forming did not allow the resomation route to elongate across the site as it was hampered by the spaces created for the leather dyeing facility.

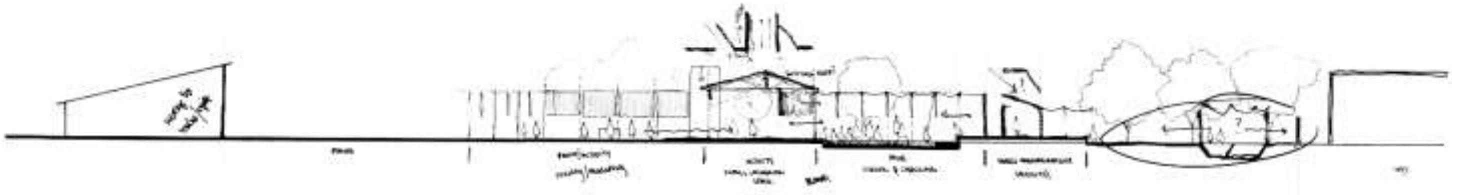


Figure 6.4: First design section iteration (Author July 2021)

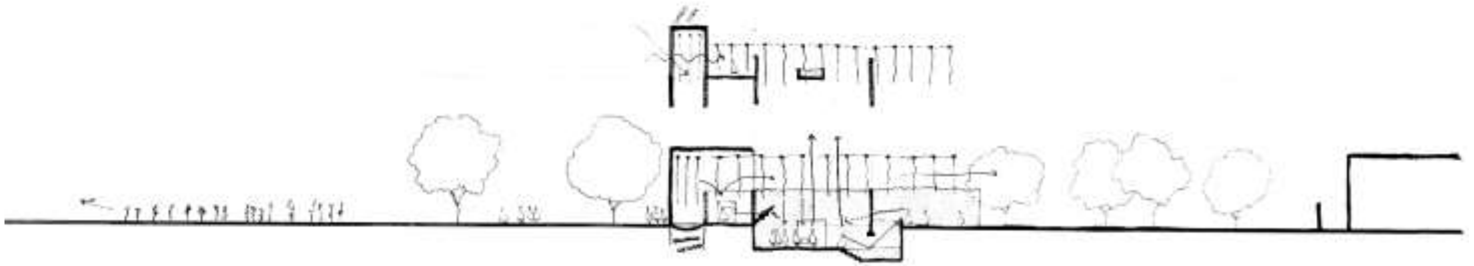


Figure 6.5: Second design section iteration (Author July 2021)

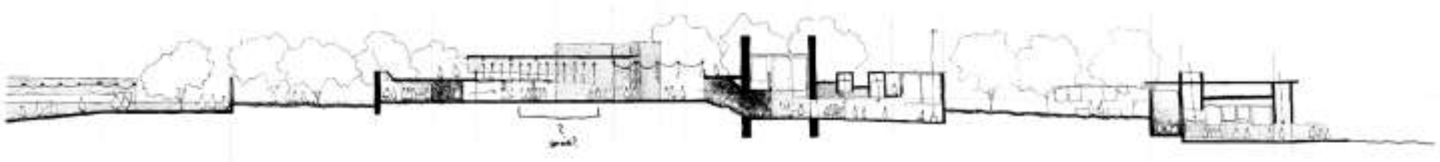


Figure 6.6: Third design section iteration (Author July 2021)

The exploration of the sections showed that the horizontal organisation of programmes limited the explorations of various spatial, formal and structural possibilities. As a project that is situated in and om the landscape of the site, more interaction with the ground plane and landscape of the site was necessary to convey the concept that the industrial and natural processes are changing.

Although the intersection and cross-programming of spaces is conceptually a rich exploration of spatial liminality, the programmatic requirements for each of the programmes were not being met with the horizontal organisation. The resomation route needed private gathering spaces that could function as funeral service spaces and meditation spaces, whereas the leather dyeing facility needed an unimpeded floor surface to move the leather from one station to the next.

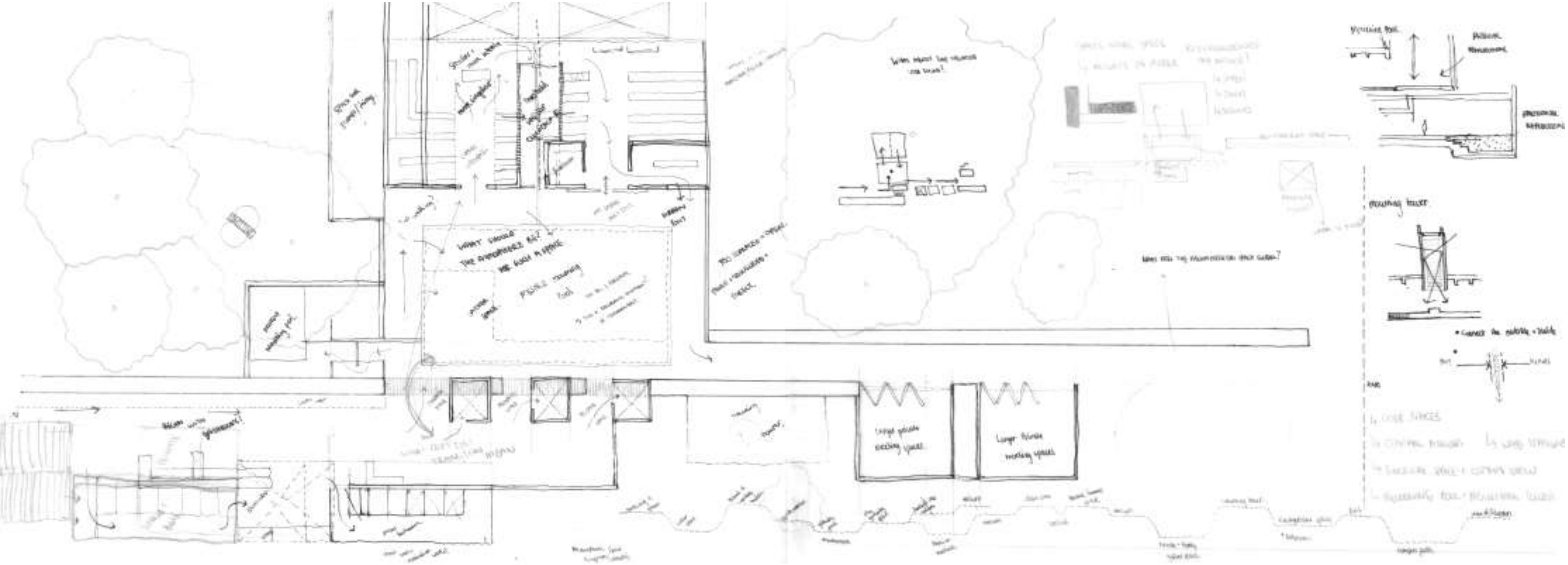


Figure 6.7: First iteration of the underground resomation route (Author September 2021)

Ground Floor Plan –Resomation

In order to separate the two programmes but still integrate them into one whole, the resomation route was pushed below the ground and under the leather dyeing facility. However, this required the underground resomation route to be re-explored for spatial possibilities and spatial sequencing (Figure 6.7).

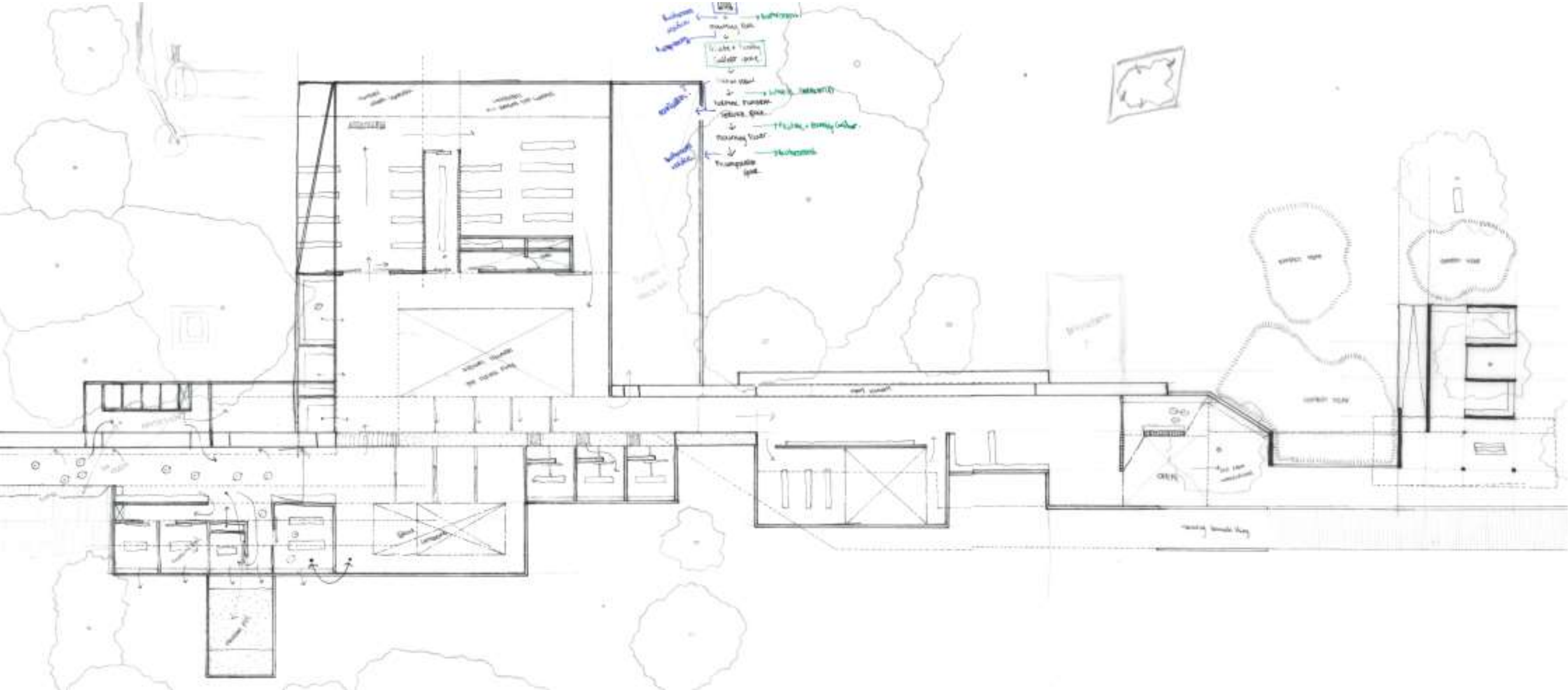


Figure 6.8: Second iteration of the underground resomation route (Author September 2021)

With the resomation route organised, it can function independently as per the programmatic and spatial requirements from the leather dyeing facility, creating two conditions to be mediated by a third liminal space. The third liminal space integrating the two overlayed programmes is formed by the puncturing and disruption of the leather dyeing facility in order to vertically integrate the two programmes.

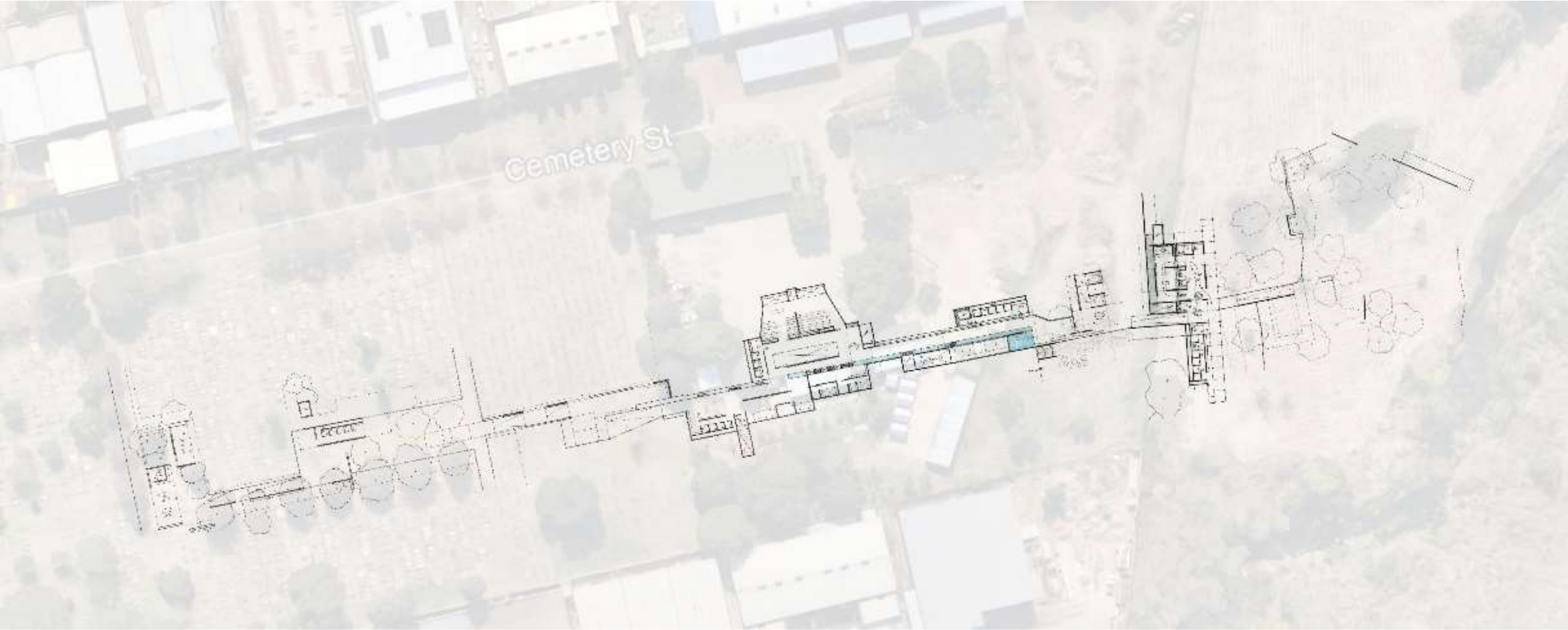


Figure 6.9: Latest iteration of the underground resomation route (Author September 2021)

The revision and relocation of the resomation route called into question the manner in which liminality is to be handled on a programmatic and spatial organisational level. A sequential spatial development is proposed that allows for a third liminal space to develop between each programmed space, creating the final route from the Silverton Cemetery to the Moreleta Spruit where the ashes are to be scattered.

Figure 6.10: Sequencing iteration of the leather dyeing house (Author September 2021)

Ground Floor Plan – Leather Dye

After the separation of the two programmes, a similar sequencing process had to be undertaken with the leather dyeing house. The sequencing focussed on the development of the manifestation of the industrial process of leather dyeing, whilst simultaneously attempting to create outdoor spaces in nature.

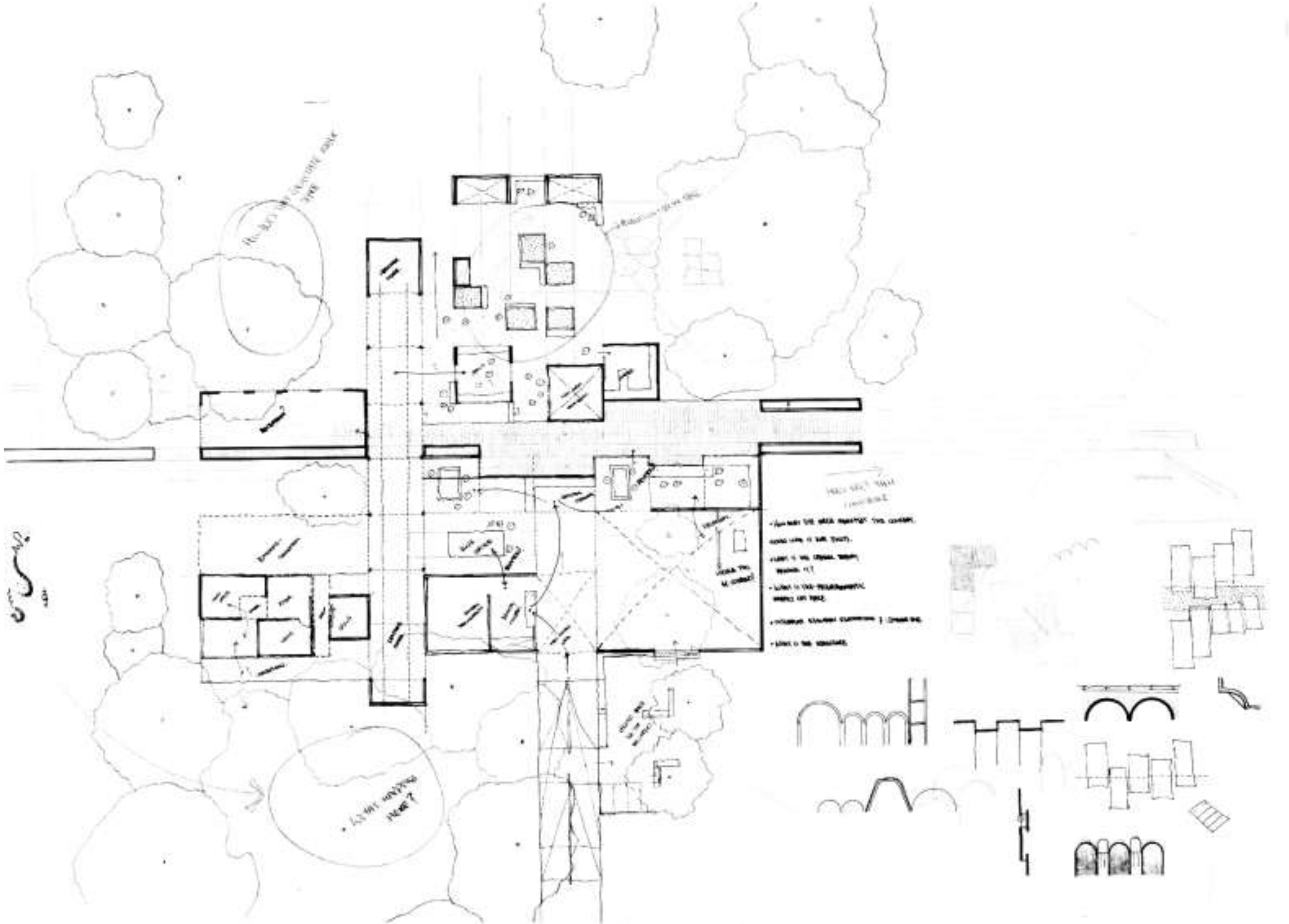


Figure 6.11: First design plan of the leather dyeing house implementing the sequencing of processes (Author September 2021)

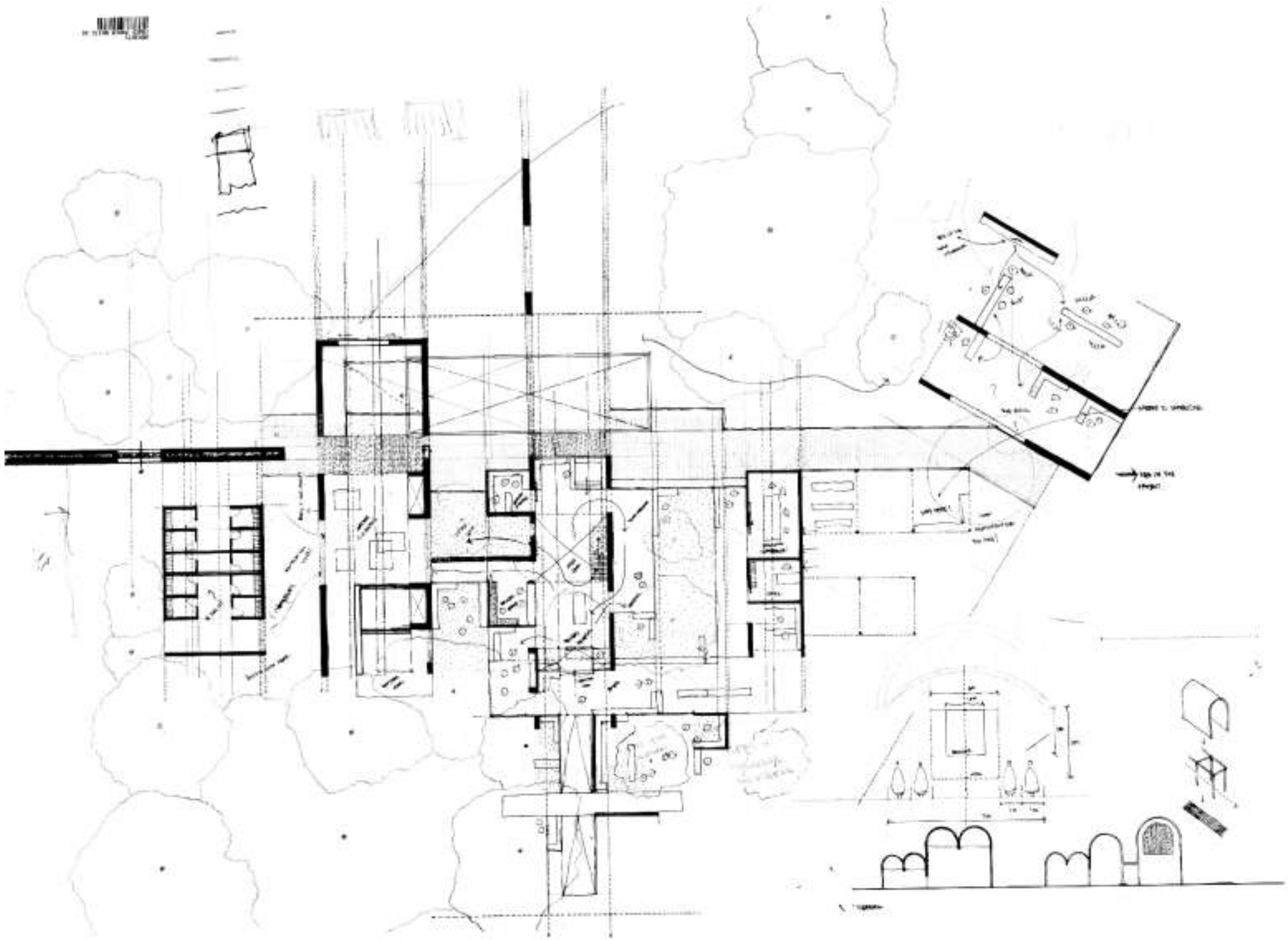


Figure 6.12: Second design iteration attempting the organisation of the plan around the industrial processes (Author September 2021)

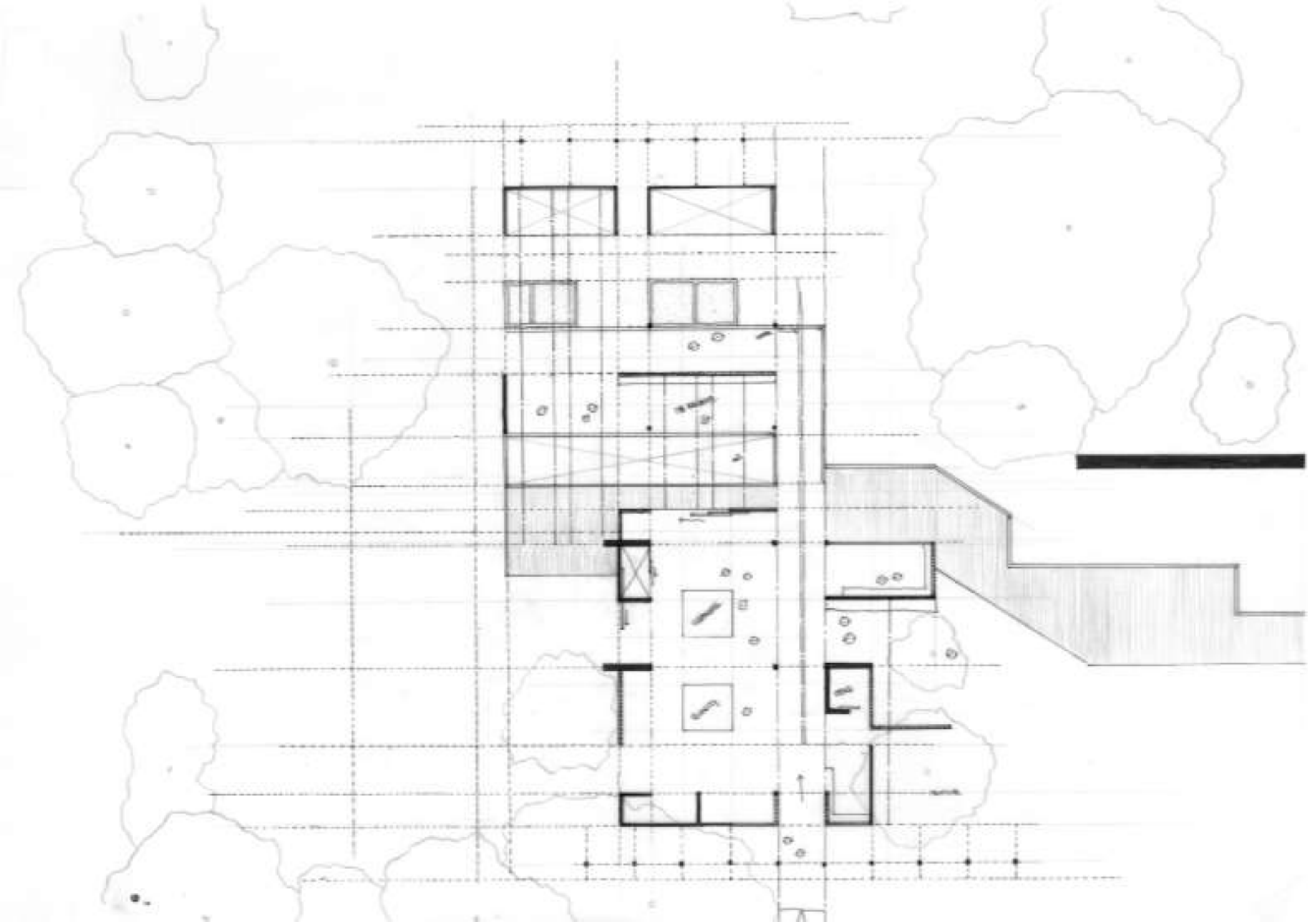


Figure 6.13: Third design iteration showcasing the implementation of the leather dyeing process spatially (Author September 2021)

Figure 6.14: Latest iteration of the leather dyeing house (Author September 2021)

As the resomation route was moved below ground, more space was allocated for the organisation of the leather dyeing facility. A central line mimics the route taken by the resomation route and acts as the ordering principle for the leather dyeing process. Sequentially, the programmatic organisation resembles a factory with various separate stations housing a specific programmatic and spatial requirement. The sequence moves from the linen store adjacent to the site, to the delivery and quality checking are and then to the leather dyeing facility.

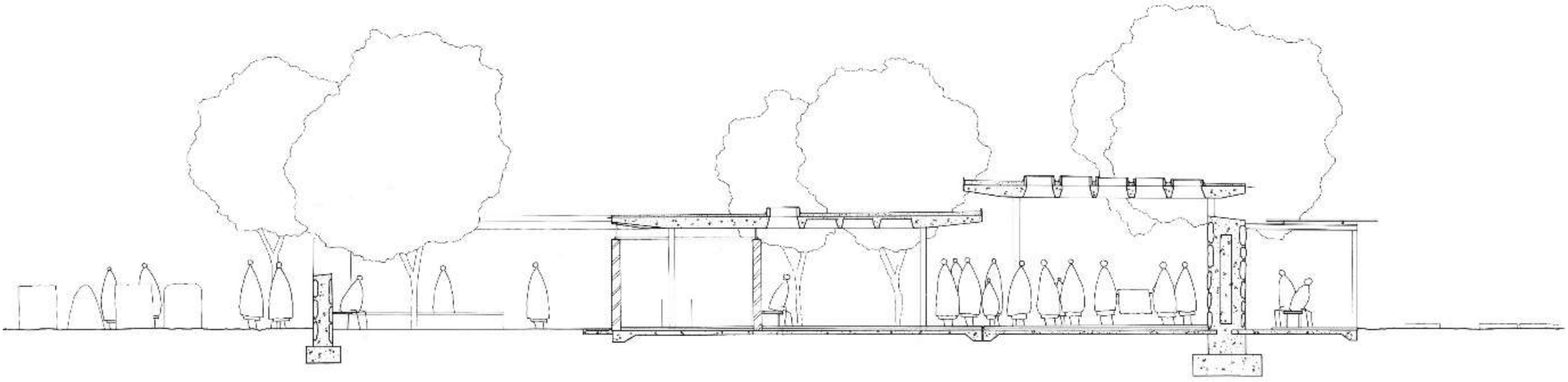


Figure 6.15: 1:50 Section of the coffin receiving space (Author September 2021)

Technological Integration

1:50 Section – Coffin Receiving

With the development of the coffin receiving space, it became important to establish a language of architecture that responds to the gravestones and nature that surrounds this design. As such, a gradient of responses was created, namely: an enclosed courtyard providing private space for the families visiting the cemetery, an administration office, a shaded space for receiving the coffin and, finally, a steel roof to, delicately, relate to the graves of children.

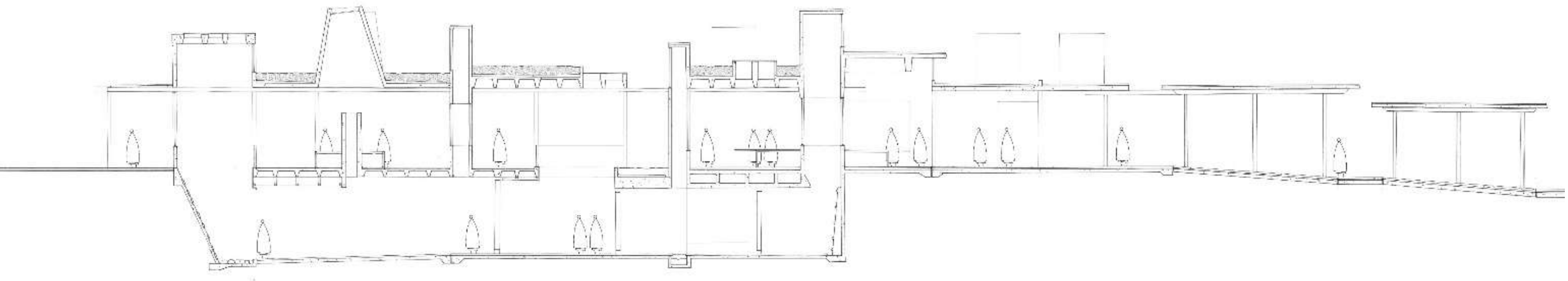


Figure 6.16: 1:50 Lateral section through the project (Author September 2021)

1:50 Section – Main Section

Cutting laterally through the site, the section showcases the relationship between the resomation route and the leather dyeing facility , as well as the bridging, puncturing, disrupting and sliding methods employed to connect the horizontal and vertical spaces together.

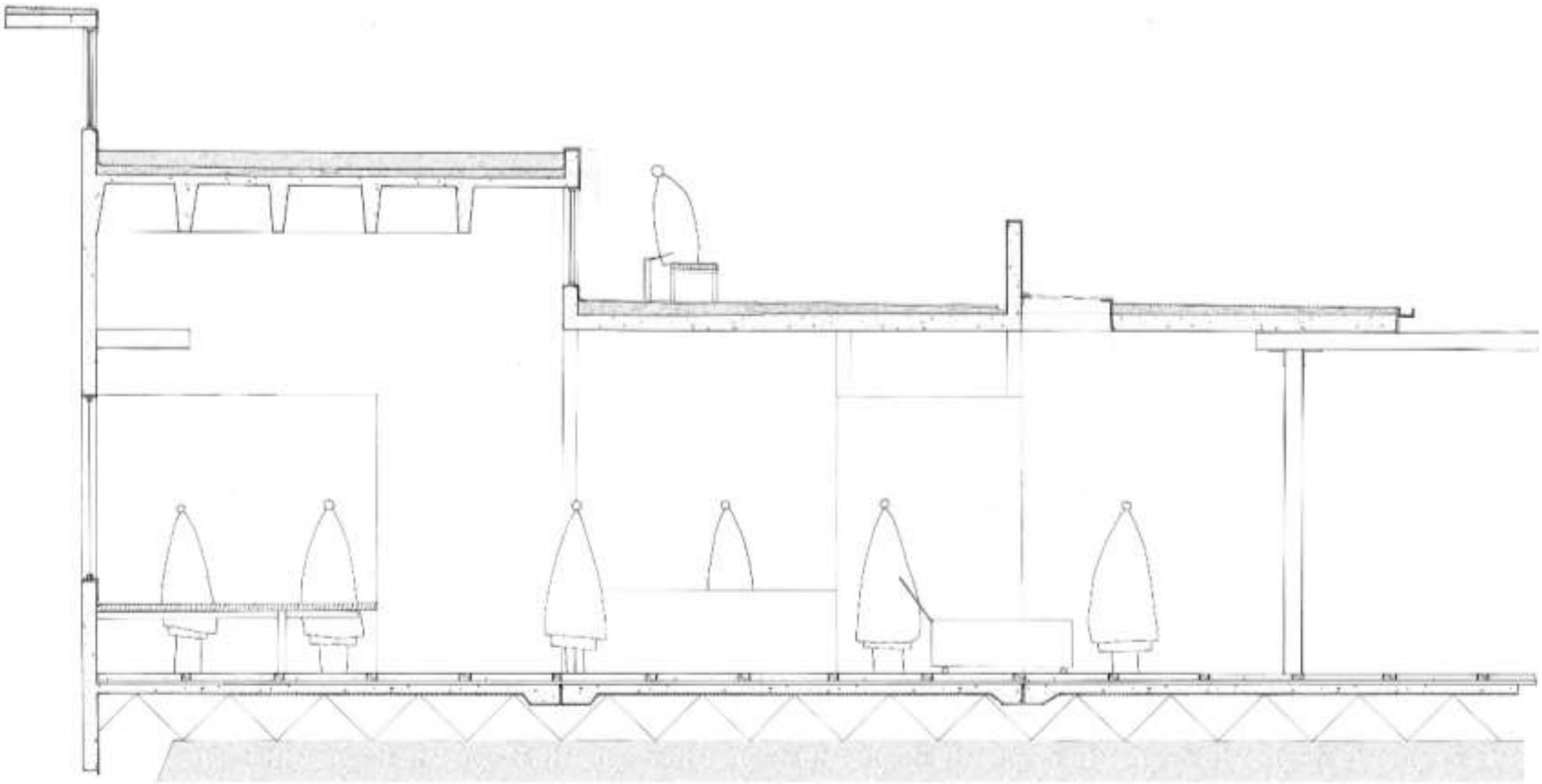


Figure 6.17: 1:50 Lateral section through the project (Author September 2021)

1:20 Section – Reception and Quality Checking space

Focussing on the connection between the linen store and the delivery and quality checking spaces, this section employs sliding and bridging of horizontal roof planes to define and articulate the connection from the linen store. This space will also be the main focus of the daylighting study.

Structural System

The initial exploration of the project was done in brick to firstly, re-use the bricks of the existing structures that is to be demolished. Secondly, ERA Bricks is located close to the site, allowing for the structure of the architecture to link to the quarry that is currently run-down and depleted. Although it metaphorically linked to the context of Silverton, it was unresponsive to the typologies of industries and light factories as found in the direct context of the site.

Revising the concept showed possibilities for the structural system and material finishing to be articulated as one element to further define the concept of liminality already present in the project. In this case, the internal and external condition of the architecture is defined as two opposing conditions, with the concrete structural system mediating in between. Furthermore, methods such as bridging, puncturing, disrupting and sliding can manipulate the structural system to enhance and further develop the internal condition of the architecture.

Concrete is a suitable material as it can act as both a structural system and a finishing material that is also pliable to the methods of bridging, puncturing, disrupting and sliding, imperative to the liminal concept articulation of the architecture.

The structural system consists of four cumulative stages, namely: an initial stage where the ground plane is manipulated to define the Resomation Route from the Silverton Cemetery to the Moreleta Spruit. Secondly, a horizontal concrete structural system separates the Resomation Route from the leather dyeing facility to create clear boundaries between sacred and profane. Thirdly, an overhead

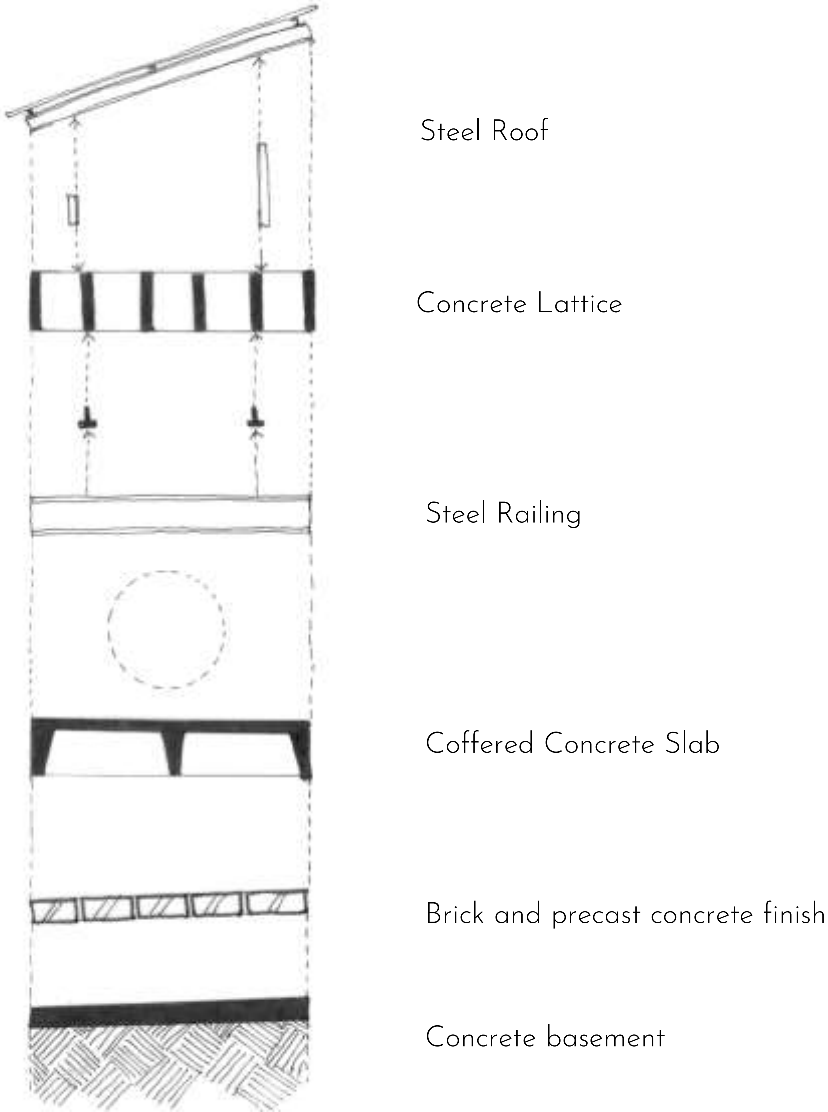


Figure 6.18: General structural system in the project
(Author September 2021)

concrete plane articulates the leather dyeing facilities' internal condition and connects it to the existing linen store, whilst also defining the external spaces of the Resomation Route. Lastly, the concrete structural system is manipulated to integrate the Resomation Route with the leather dyeing facility by means of bridging, puncturing, disrupting and sliding.

Learning from the natural symbiotic relationships of the site, the structural system consists of various smaller and individual structural systems, namely: a concrete basement structure, a two-way spanning waffle-slab, a structural steel member for supporting the leather dyeing house, a concrete lattice-beam structure acting as the main backbone of the leather dye house and lastly, a steel roof responding to the context. In this way, each structural system supports the other, creating a tiny symbiotic eco-system that form one larger structure.

Materials

The application and choice of materials is seen as an extension of the design and technology concept. The choice of materials stem from the mediation between industry and nature, with the act of mediation being done through the introduction of a third element that has characteristics of both nature and industry.

Concrete

The main structure of the architecture consists of a concrete column and lattice-beam system. Given the unsustainability of concrete, mainly the usage of Portland cement, certain strategies are being followed to increase the sustainability of the concrete in the project, namely: substituting 50% of the Portland cement used with fly-ash and decreasing the volume of concrete needed by increasing the amount of recycled aggregate, such as reclaimed bricks, and larger pieces of stone from the site.

Structural steel members

A galvanisation factory is located close to the site, allowing for the reduction in transport costs of the structural steel members that are to be galvanised. The structural steel members are mainly used as a mediating element between nature as the site and the intervention as industry.

Non-ferrous metal sheeting

Recyclable non-ferrous metal sheeting is a pliable material that can be used as a flashing and capping material. As such the material can be used as a mediating element between two conditions that needs to be bridged.

Brick

Reclaimed from the demolition of the existing structures on the site, the recycled bricks are to be mainly used as a floor pattern finish. Newly acquired bricks are to be used as infill material in the construction of bricks screens.

Stone

Dug from the site, the stone is to be used in the construction of concrete walls as aggregate, with larger pieces of stone exposed from the concrete walls. This is done to align the industrial concrete process to the natural site the project is located in.

Recycled granite

A similar process to the stone is to be followed however, the granite is gained from the nearby stone warehouse. Offcuts and excess pieces of granite is to exposed from the concrete walls as a textural and experiential element.

Glass

Double-glazed glass is to be used as a means to improve the thermal efficiency of the intervention whilst gaining a visual connection to the natural site surrounding the intervention.

Technological Detail

Technological Detail concept

The development of the concept for the technical detail is a further extension of the technological concept by exploring methods of articulating the way that two elements are related to one another through methods such as bridging, puncturing, disrupting and sliding.

Technical Detail Development

The two details that is to be discussed is focussed on the methods of bridging and sliding. The mediating material is the copper and brass sheeting that is folded and shaped to slide over the in-situ cast concrete and bridge the internal and external conditions together.

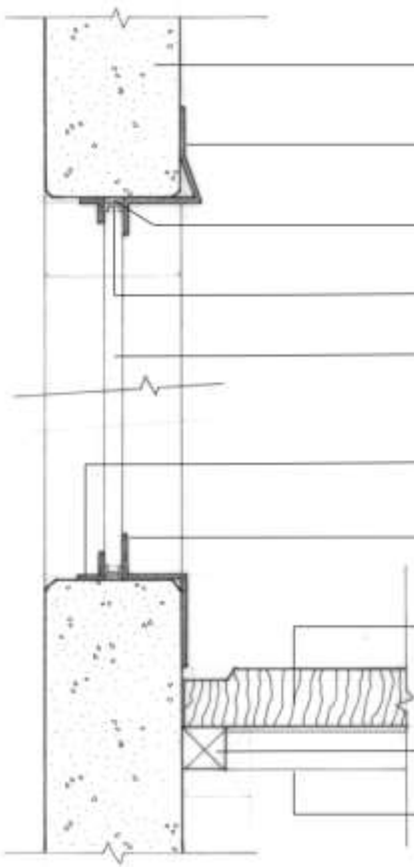


Figure 6.19: Danpalon window detail (Author September 2021)

Detail 1 – Danpalon Window

With the need to introduce even and consistent light at the quality checking desk, Dampalon, an opaque material, was identified. However, this created two conditions: one is the highly technological and synthetic Dampalon and the other is the natural wooden quality checking desk. The Dampalon window was bridged to relate to the wooden desk by introducing a third element, the brass sheeting that could be slid over the concrete to mediate between the Dampalon window and the wooden quality checking desk.

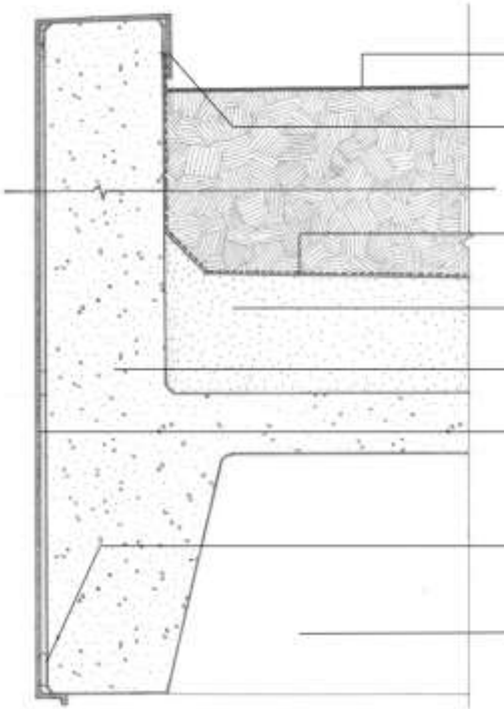


Figure 6.20: Concrete upstand detail (Author September 2021)

Detail 2 – Concrete Upstand

Located at the green roof cantilevering over the central atrium, a way of connecting and articulating the central atrium and the green roof into one space was achieved on a detail level by bridging and sliding a third element of copper sheeting over the upstand and into the central atrium space. With the copper sheeting sliding over the torch on waterproofing it acts as flashing, continuing to cap the upstand and clad the external side of the upstand beam finally, sliding onto the ceiling of the central atrium space.

Environmental systems

This project deals with the changing of natural and industrial processes to work more efficiently with water. As most of the programmes in the project deal with water on some level, the efficient collection, cleaning and distribution of the water is essential.

Disrupting the sequential organisation of the leather dyeing factory and the resomation route is a central water collection point, in the form of a green roof acting as a bio-swale ,that allows water to be captured and then re-distributed to the rest of the project. The sustainable system is seen as a third space that is introduced into the project to mediate between the defined spaces of the physical leather dyeing facility as well as conceptually bridging the gap between the industrial programme and the natural processes.

Most aspects of the leather dyeing facility utilise water to clean and dye the leather. As such a system is required that will circulate the dye water back into the system for future use in the leather dyeing facility. Looking at the resomation process, the water used is again usable after the process has been concluded, allowing the water to be immediately recycled back into the system.

Water Systems

Roof collection

To maximise the amount of water gathered by the intervention, the roof is to act as the main method of collecting water. With the water runoff from the roof, it is gathered in a green roof acting as a bio-filter that filters the debris and sediment from the water. Afterwards it is stored in water tanks and circulated through UV filters, to be either used in the bathrooms for flushing or for supplementing the water used in the dye making or the leather dyeing house.

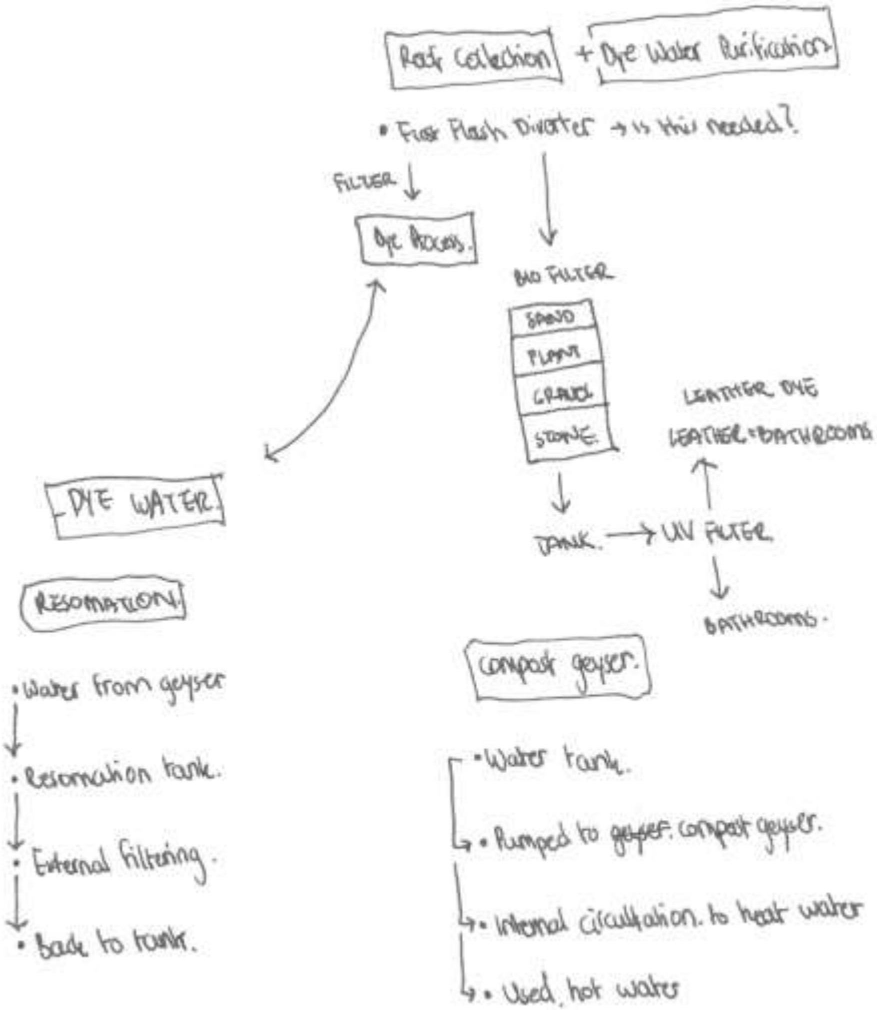


Figure 6.21: Diagram of the water system concrete upstand detail (Author November 2021)

Resomation
Hot water circulated through the compost geyser is used in the resomation process. Given the intense heat and pressure that the resomation process supplies, bacteria, DNA and viruses are completely destroyed, leaving behind nutrient-rich distilled water. This is then filtered through a bio-filter in the form of a green roof where it can either be used for irrigation or recycled back into the system to be used in either dye making or leather dyeing.

Compost geyser heating the water
An alternative to the conventional geyser, the compost geyser provides a method of utilising the heat created from the natural process of decomposition to heat water. This is done by circulating water through an internal water tank in the compost mound. Over time, this becomes a sustainable method of extracting heat from the decomposition process.

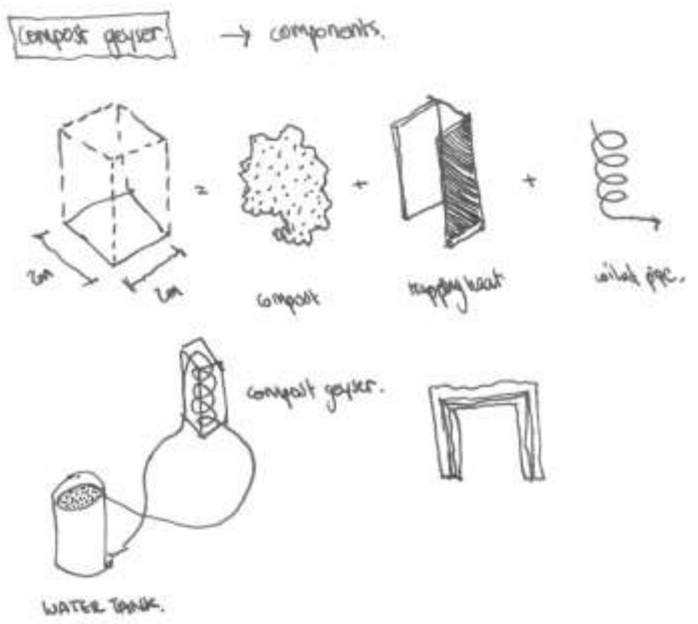


Figure 6.23: Diagram of the compost geyser process (Author November 2021)

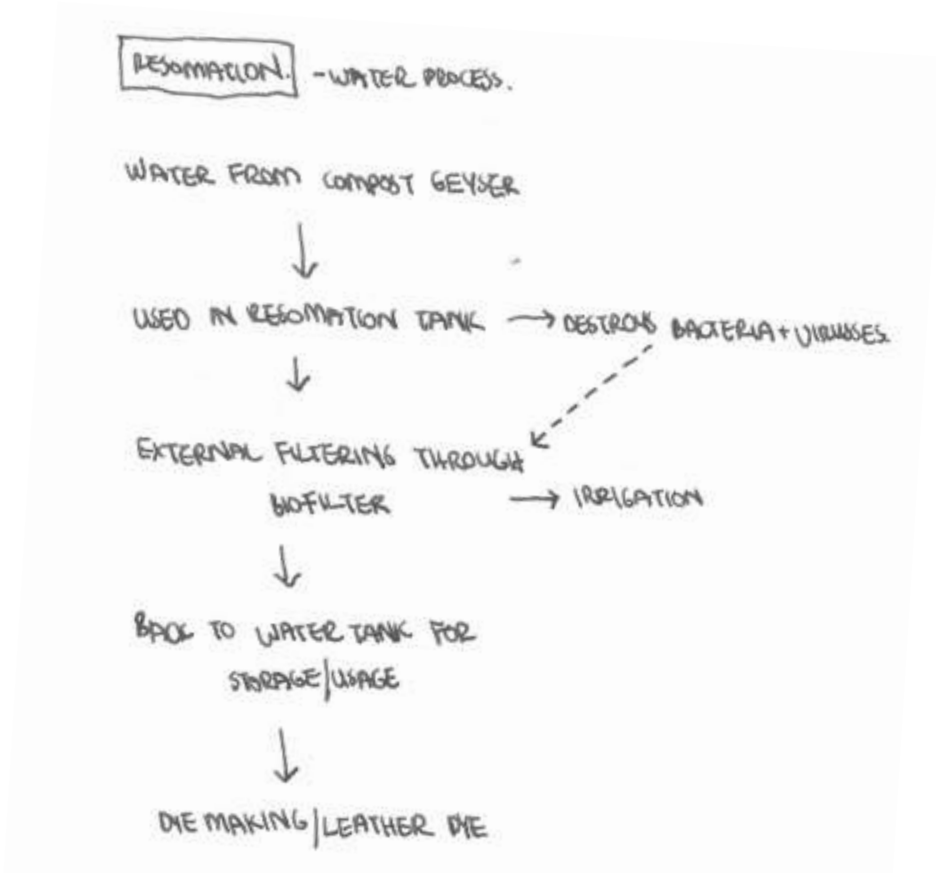


Figure 6.22: Diagram of the resomation system (Author November 2021)

Biodegradable System

Composting

With the Silverton Parks Management maintaining the public spaces of Silverton, the plant material can be collected and sorted into type to be composted in mounds. These mounds are further supplemented by the by-products of the dye making. This is where the compost geyser can be utilised to extract hot water. When the composting process has finished, the product can be used again in the public spaces of Silverton for fertilizer and compost.

Dye Making

With suitable plant material gathered, the plant material is boiled and strained, with the excess plant material integrated into the compost system. The strained dye is to be used in the leather dyeing house.

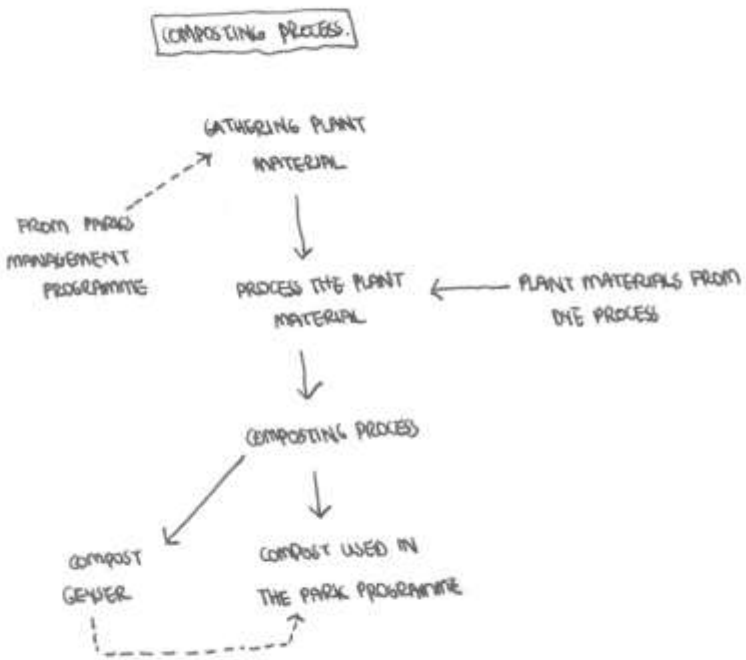


Figure 6.25: Diagram of the composting process (Author November 2021)

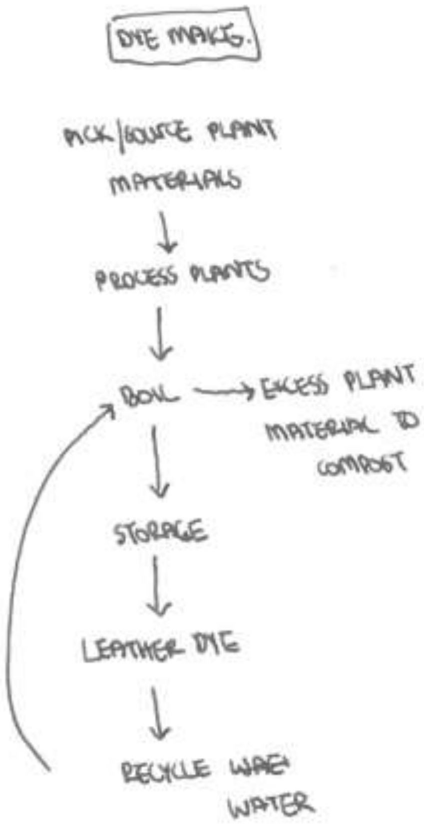


Figure 6.24: Diagram of the dye making process (Author November 2021)

Environmental Strategies

The structural system consists of various horizontal planes that define the internal spaces. Methods for introducing adequate daylight into the intervention had to be developed as to support particular functions and experiences. In particular, the quality checking space in the leather dyeing house requires adequately bright daylighting to service the space.

The aim of this investigating the daylighting of this space is to achieve an even 1000 lumen at workspace level. The analysis has been done in Sefaira, with the simulation measuring the illuminance and the daylight factor of the spatial iterations. The metrics used in determining the viability of each iteration is illuminance and daylighting factor. The illuminance of the space measures the amount of light reaching a specific height level, whilst the daylight factor provides a ratio that compares the internal and external conditions as a measurement of brightness.

Daylighting

Iteration 1

With only a flat slab, not enough light was allowed to enter the quality checking space, only managing an average of 100 - 200 lumens, not nearly enough to facilitate the quality checking space.

Looking at the daylighting factor, at 2,61%, it is clear that the space is not well lit, neccessitating the additional use of electrical lighting, negating the attempt to include daylight in the design.

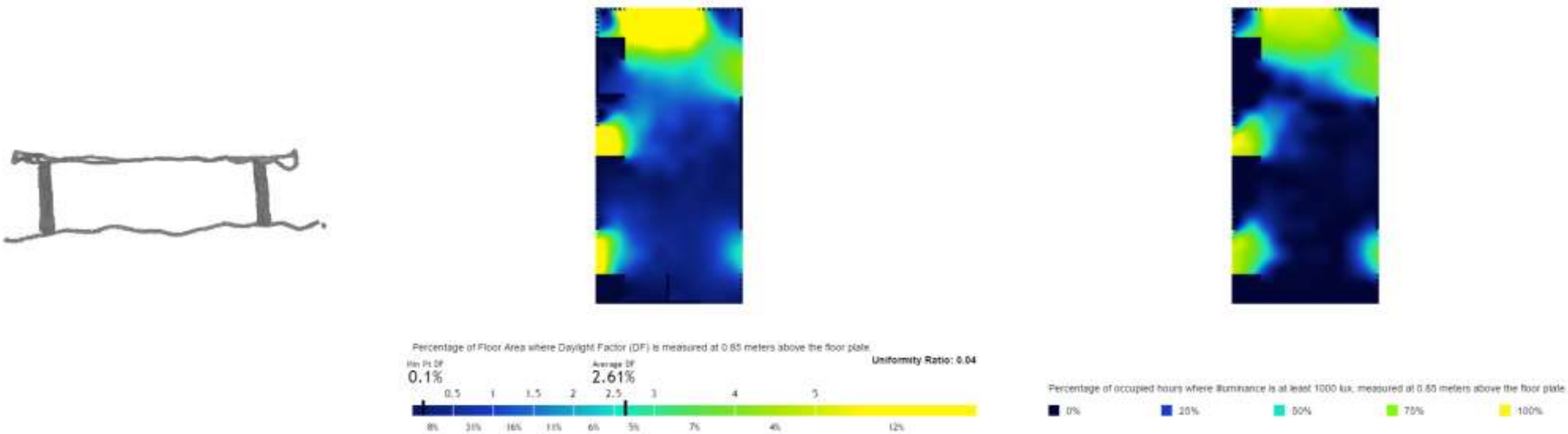


Figure 6.26: First iteration of the daylighting design (adapted from Sefaira November 2021)

Iteration 2

Following on the method of including more light into the quality check space, the roofs were angled upwards to emulate the contextual industrial sawtooth typology. This allows for more southern daylight to be introduced into the space. The result was a very evenly lit space that ranged between 700-800 lumens. Although this is slightly below the required amount of daylight, the even distribution is more important to the experience and functionality of the space.

The daylighting factor was reduced to 4,79% from the previous iteration, showcasing that the space is bright and well lit as compared to the external condition.

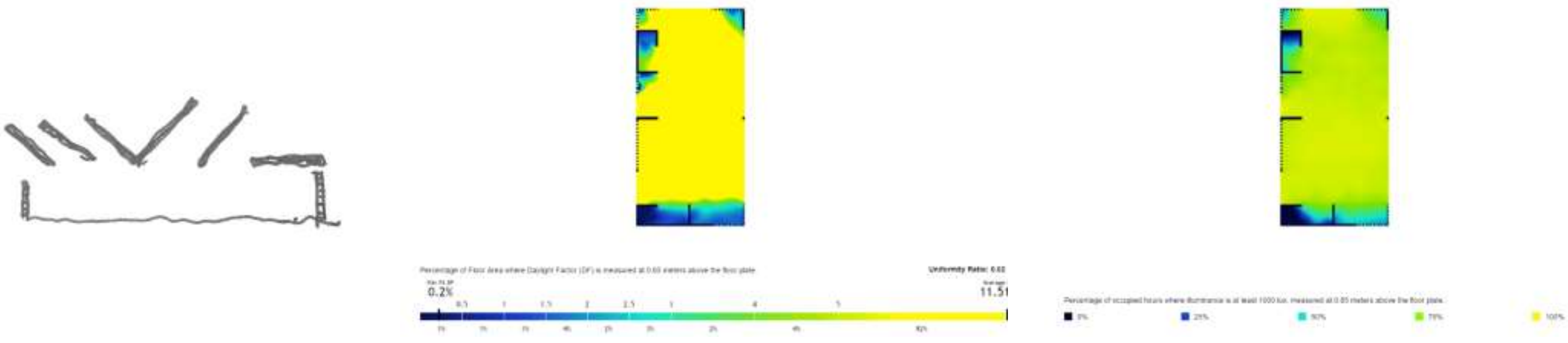


Figure 6.27: Second iteration of the daylighting design
(adapted from Sefaira November 2021)

Iteration 3

The continued iteration of the scheme introduced a lattice beam structure that acts as the support to the roof structure. This allowed the roofs to be independently shifted vertically, introducing more light to the quality checking space. In this iteration the illuminance increased to 850 – 950 due to the increased amount of light that was entering the space. Importantly again, is that the light is evenly distributed in the space.

Shifting the heights of the roofs independently allowed for each part of the space to be tailored to the function and experience that is needed. As such the daylight factor increased to 5,5%, pointing towards a bright space, with the brightest space at the quality checking space.

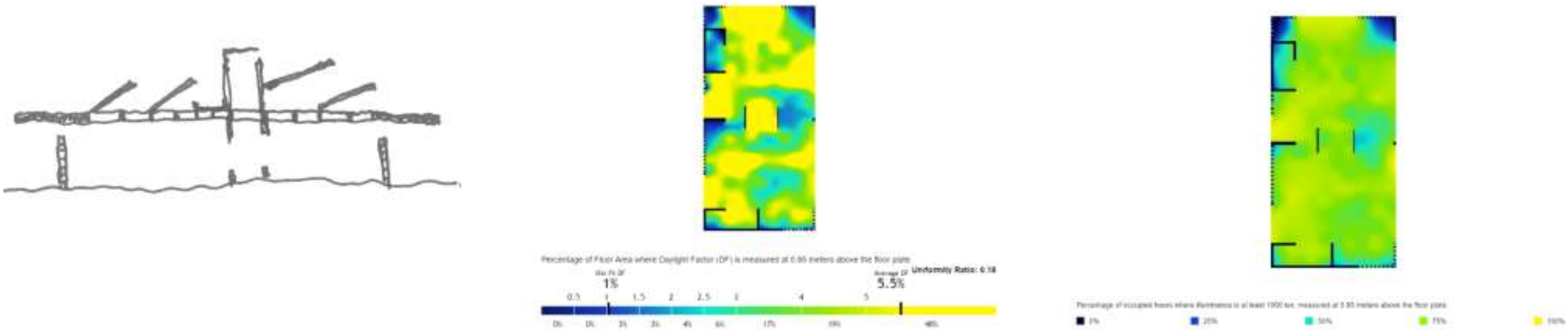


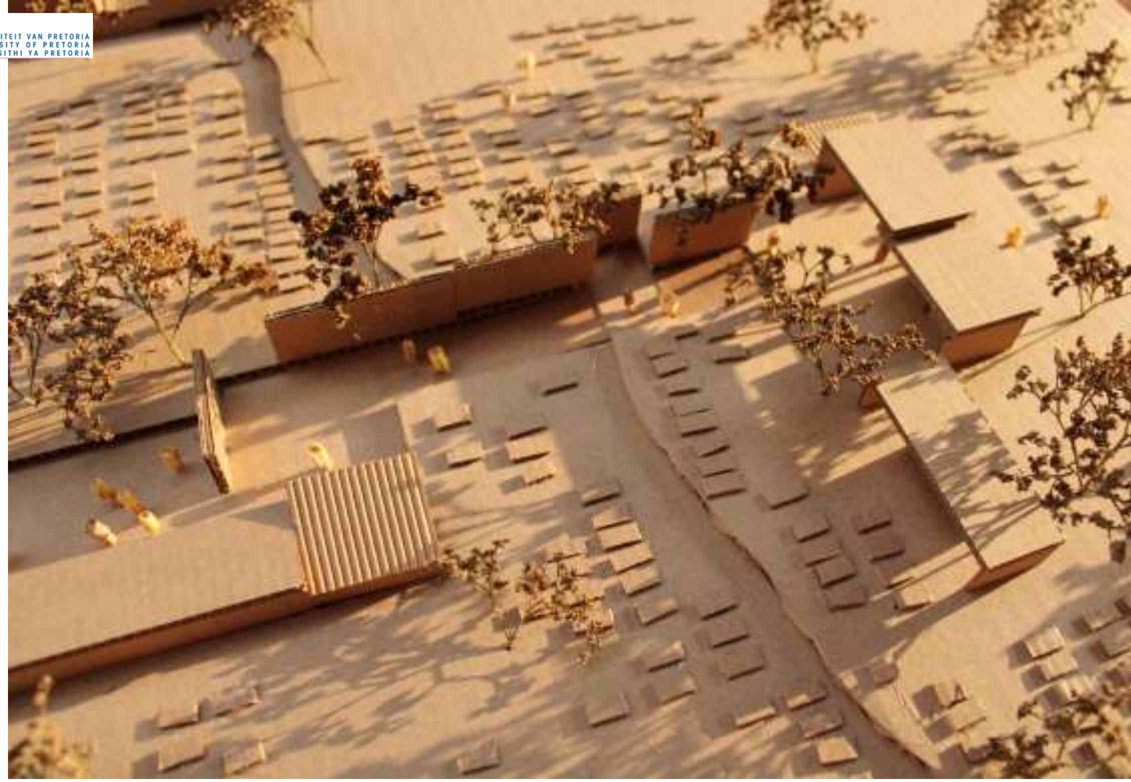
Figure 6.27: Final iteration of the daylighting design (adapted from Sefaira November 2021)


SQUARE
C
LEATHER DRYING
LEATHER DRYING
STORE
LEATHER DYEING
LEATHER DRYING
LEATHER ATRIUM
INTERNAL GREENSPACE
LEATHER CLEANING
QUALITY CHECKING
ADMIN
LOCKERS
LOCKERS
COURTYARD
STORE
DYE MAKING
STORE
EXTERNAL MEETING SPACE
OFFICE
PLANT PROCESSING
OFFICE
STORE
RECEPTION
MECHANICAL ROOM
SITE STORAGE
TREE NURSERY
COMPOSTING
COMPOST GEYSERS
A
A
B
B
C

B
ADULT GRAVES
GATHERING SPACE
ADMIN
A
COFFIN PASS
CHILDREN'S GRAVES
B
COFFIN REST
PRIVATE SPACE
STORE
RITUAL WASHING
RECONCILIATION POOL
STORE
C
COFFIN VIEWING
FUNERAL SPACE
LEATHER ATRIUM
STORE
C
MOURNING TOWER
STORE
WATER FILTRATION
REFUSE SPACE
ADMIN
RESOMATION SPACE
FAMILY SPACE
CREMULATOR
CONNECTING SQUARE
WELCOMING HAND
OUTDOOR GATHERING SPACE
A

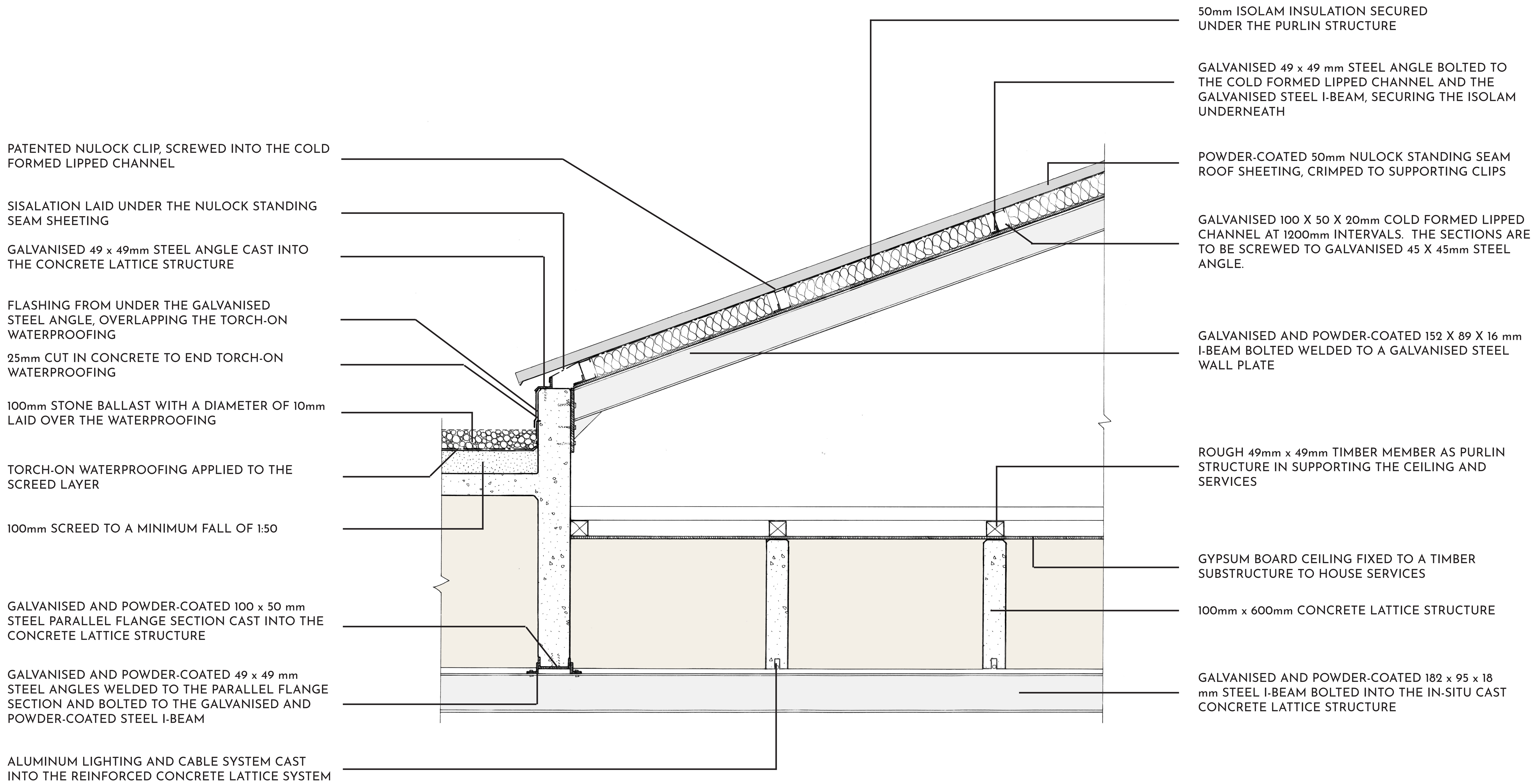

COURTYARD
ADMINISTRATION
COFFIN HAND OVER
CHILDREN'S GRAVES


LEATHER DRYING
LEATHER DYE HOUSE
LEATHER DRYING
LEATHER CLEANING
QUALITY CHECKING
RECEPTION
WALKWAY
LEATHER STORE CONNECTION
SPACE FOR PARKING
LEATHER
ATRIUM
FUNERAL SPACE
PRIVATE
MOURNING SPACE



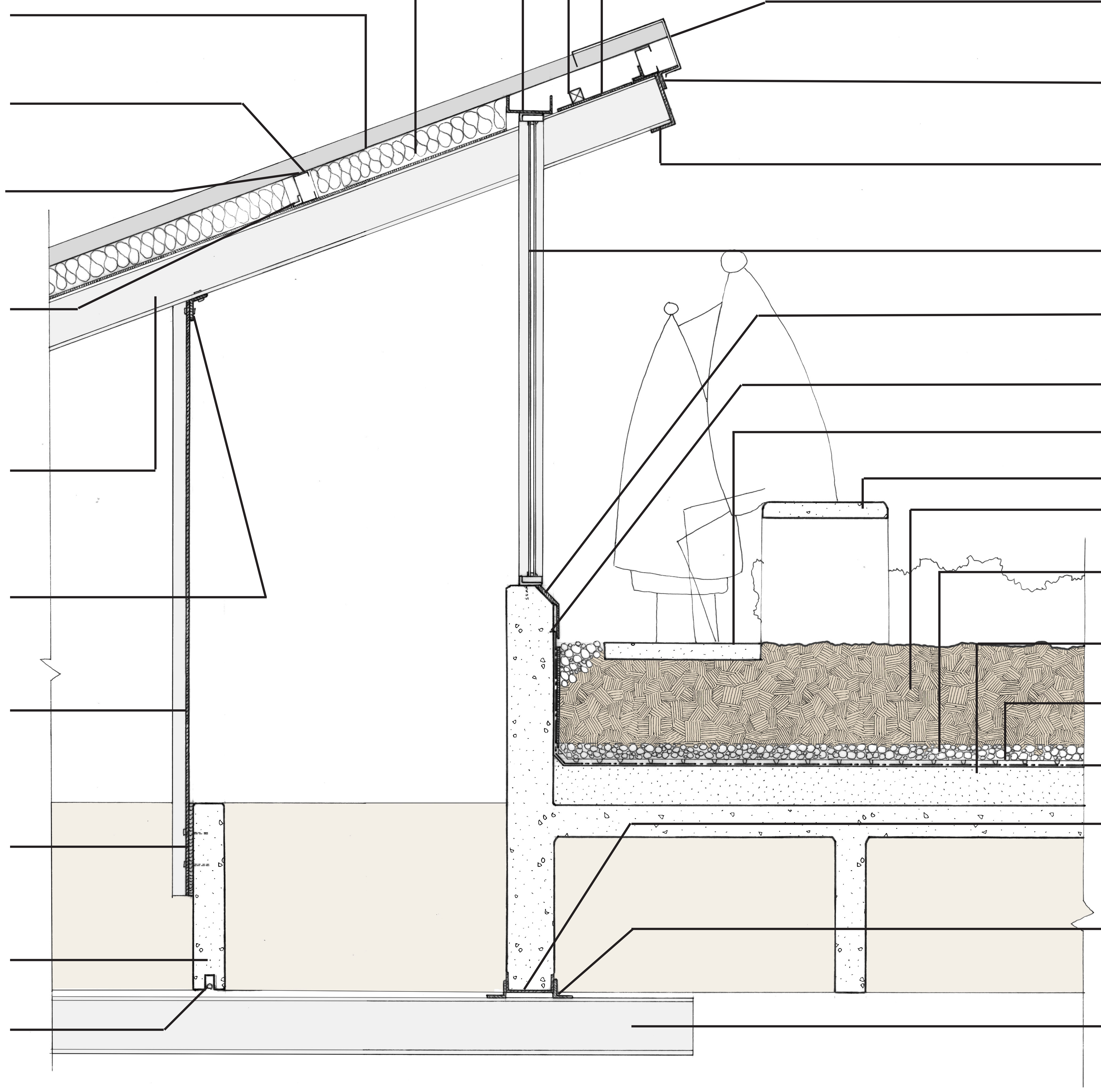
CONSTRUCTION SECTION - LEATHER QUALITY CHECKING

SCALE 1:20



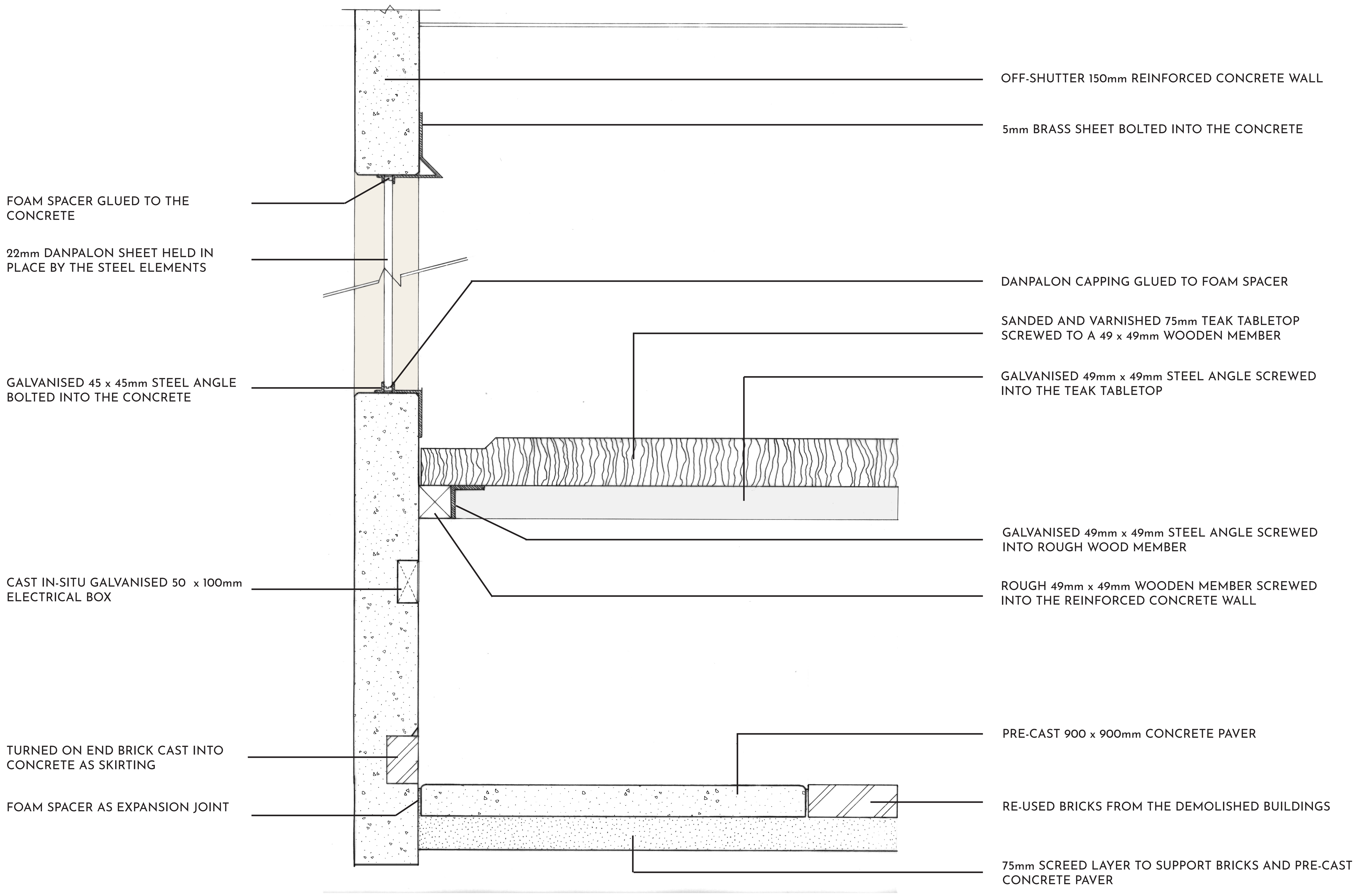
DETAIL 1 - ROOF MEETING GUTTER

SCALE 1:10



DETAIL 2 - ROOF WINDOW

SCALE 1:10



DETAIL 3 - DANPALON WINDOW

SCALE 1:5