



UNTANGLED METAMORPHOSIS

A Silk Makers and Community Square for Leonardville, Namibia

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(UN)TANGLED METAMORPHOSIS

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Figure a: Cocoon of the *Gonometta Postica* Moth

DECLARATION

I, Lara Elgru Tolmay declare that the Master's design dissertation that I herewith submit at the University of the Free State, is my independent work and that I have not previously submitted it for qualification at another institution of higher education.

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ACKNOWLEDGMENTS

This dissertation is dedicated to Schalk Willem Burger for his influence on my love and passion for nature and Namibia.

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ABSTRACT

Small communities find themselves tangled in their established routines, with socio-economic challenges in harsh, arid landscapes. The research question asks how the mundane metamorphological cycles of a small community can construct an appropriate architectural language weaved as a makers square for cultural reconciliation in Leonardville, Namibia. In reaction to desired lines on an open site between two historical parts of the settlement, the proposed design reacts as container to create new routines as an economic activator. The proposed design includes a silk makery for the Kalahari Wild Silk Company supported by attachment, concealment and revelation as new routines for a community. Precedents and explorations of the community, social and organism cycles were analysed in Leonardville establish an architectural metamorphosis. The proposed design illustrates how mundane routines of organism and socio-economics can establish an appropriate architectural language, to weave together rural communities.

KEYWORDS: metamorphosis, socio-economic, attachment, concealment, reveal.



Figure b: Cocoon of the Gonometa Postica Moth

PROJECT ABSTRACTION

RESEARCH QUESTION:

How can the established metamorphological cycles of small communities establish an architectural language that weaves a silk makery as a community square for Leonardville in the desert landscape of Namibia?

LEADING THEMES:

- Metamorphosis
- Socio-economic Architecture
- Appropriate Materiality
- Sensitive Design

PROGRAM:

- A silk makers space for the Kalahari Wild Silk company to house their making process (referred to as their metamorphological cycle).
- A retail section weaving the locals, tourists and the Kalahari Wild Silk company together in a retail/ exhibition space.
- A restaurant that further weaves the community together.

SITE:

Leonardville, Namibia

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Figure C: Sketch of Cocoon Connection to Supporting Branch



STAGE 1: INTRODUCTION

INTRODUCTION

Small communities find themselves tangled in their established routines, with socio-economic challenges in harsh, arid landscapes. The harsh, arid landscape of Leonardville in Namibia finds itself tangled in its established routine in search of a developmental adjustment. The analysis of the client and site is approached from a biological viewpoint through the understanding of the town's developmental adjustments as compared to metamorphosis.

Metamorphosis is defined as a sequence of developmental adjustments. The town of Leonardville finds its existence tangled with the sequence of developmental adjustments of the local *Gonometa Postica* moth, which acts as the town's economic activator. The architectural approach tangles itself in the metamorphological cycle of the *Gonometa Postica*, which activates the metamorphosis of the Kalahari Wild Silk company, ultimately establishing itself as a local economic activator in an architectural cocoon inspired by this biological phenomenon. The proposed design illustrates how the everyday routines of organisms and socio-economics can establish an appropriate architectural language by which to weave together the rural community.

1.1 LEONARDVILLE, NAMIBIA

Leonardville is a small town in Namibia, situated approximately 43km North of the Nossob River, approximately halfway between Aranos and Gobabis, and about 500km from Windhoek (refer to Figure 1.3).

Leonardville has an annual average temperature of 26 degrees Celsius, with seasonal averages of 31 degrees Celsius in summer and 20 degrees Celsius in winter. Namibia has very little rainfall during the year, with an average of 100mm during the summer and 0mm during winter. Since Leonardville is situated next to the Nossob River, where the edges of the dried river valley are structured from lime and sandstone, the town finds itself on very sandy earth with red sand covering the entire landscape (World Weather Online, 2022: online).

The town is located in the Omaheke region of Namibia, which stretches all the way into Botswana. This region houses many trees that are home to the local *Gonometa Postica* moths whose cocoons are used by the local inhabitants to create silk products. Along with many silkworms and moths, the area around Leonardville houses German settlers and farmers, as well as the remainder of the Khoikhoi tribe as founders of Leonardville.

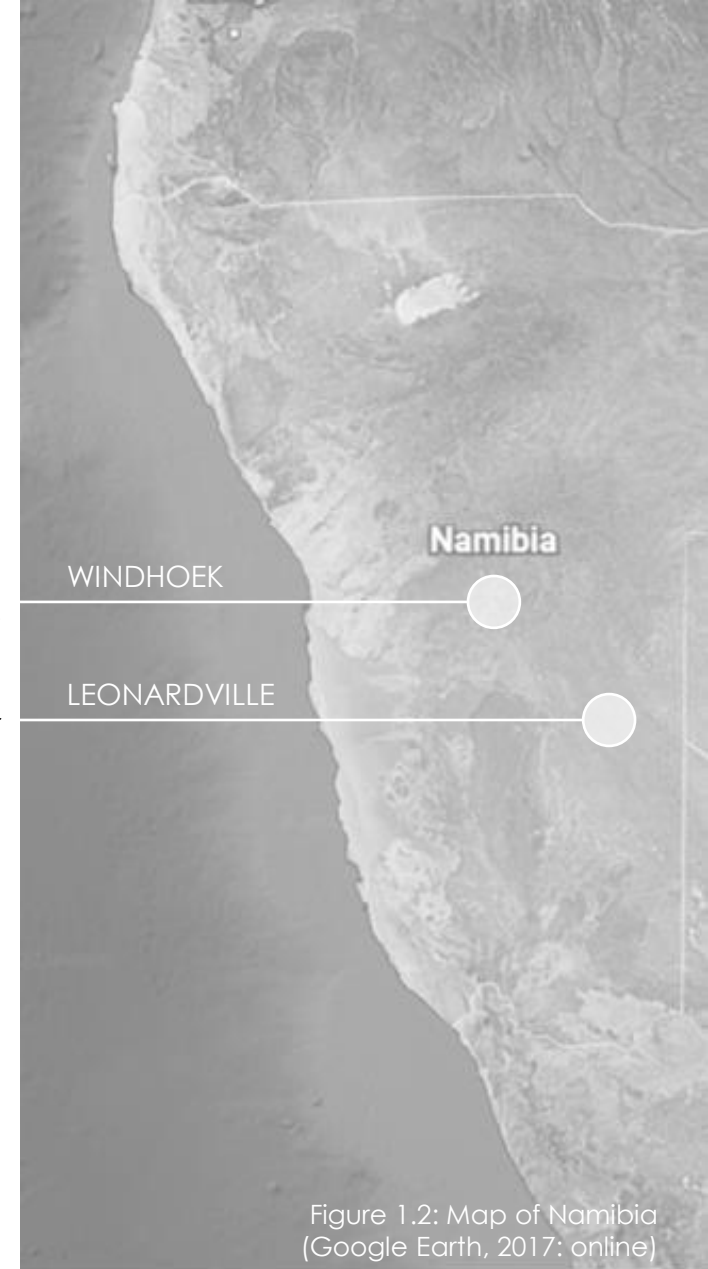


Figure 1.2: Map of Namibia (Google Earth, 2017: online)

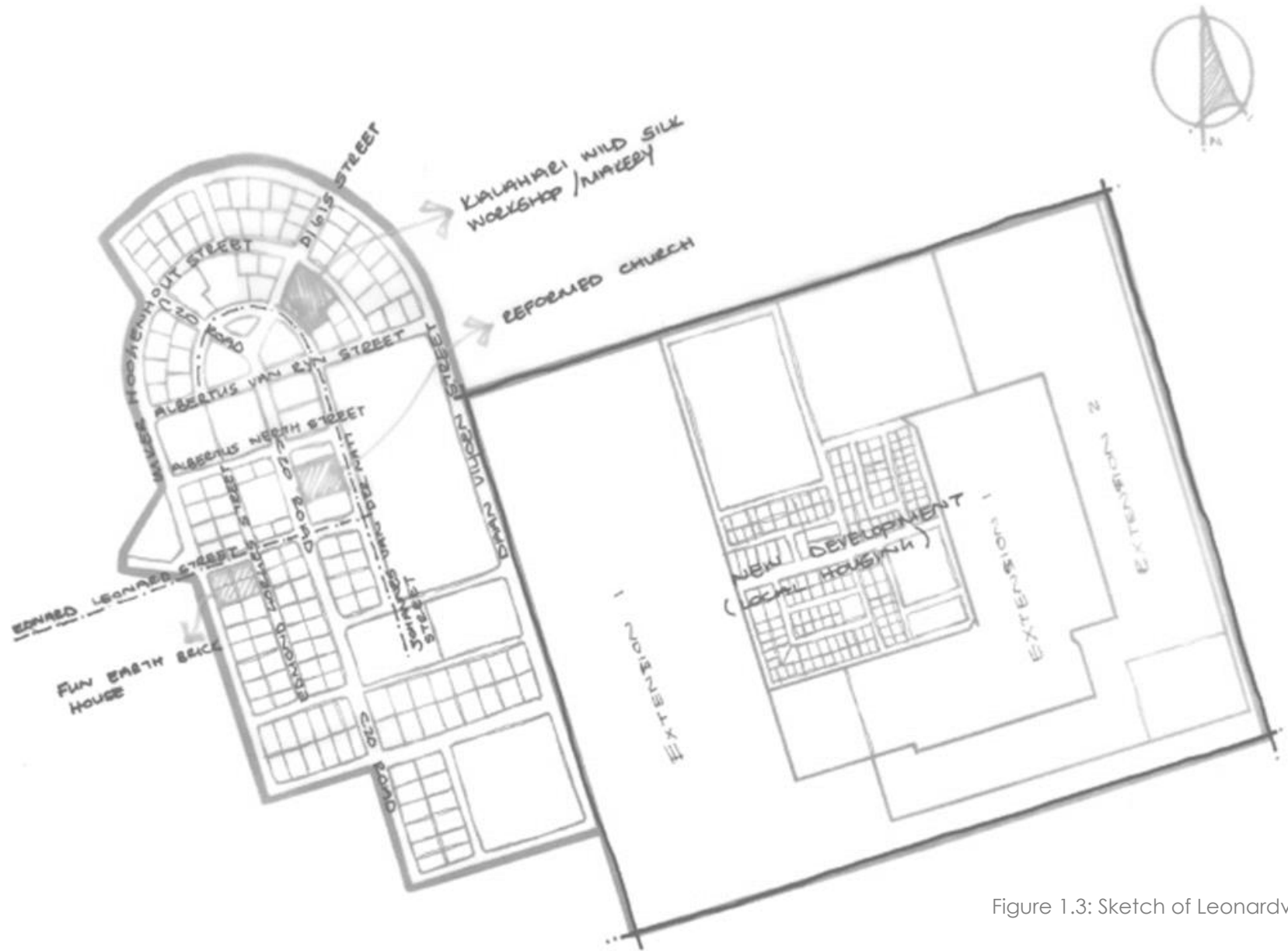


Figure 1.3: Sketch of Leonardville Layout

1.2 THE GONOMETA POSTICA

The *Gonometa Postica* moth (refer to Figure 1.4) emerges from its cocoon in the months of November and December in the Omaheke region in Namibia and part of Botswana. This moth produces a silk cocoon that falls to the ground when empty, and that is eaten by the wildlife in the area for its high salt and calcium content. The problem with adding the cocoon to animals' diets is that it is indigestible, causing a clump of silk in the animal's stomach which ultimately causes it to die of starvation. The community has tried to poison the moths to resolve the issue, but the process had to be stopped due to the expensive, ineffective, and negative impact that it had on the community and the environment (Torbitt, 2006: online).

The ladies of the community of Leonardville started in 2002 to collect cocoons and to process, spin, and weave them into beautiful scarves and garments with equipment sponsored by a very kind man visiting from Madagascar. This new notion aided not only the farmers and local wildlife, but also the community through job creation. The ladies provide community members with the opportunity to collect and gather cocoons (strictly ones that are already opened and without damaging any plant life) in return for payments. After processing, spinning, and weaving the cocoons, the ladies are able to make a profit by selling their goods to townspeople and tourists in a market in Windhoek, or online to places such as Pretoria, Cape Town, Mozambique, and Dubai (Torbitt, 2006: online).

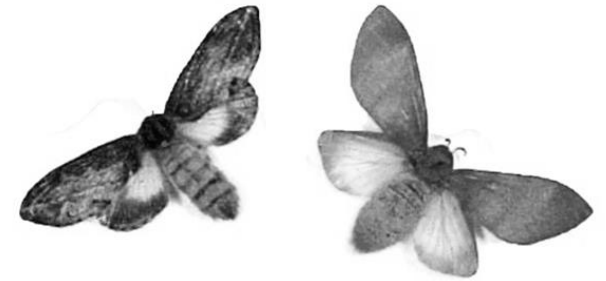


Figure 1.4: *Gonometa Postica* Moths (Veldtman, 2005: online).



Figure 1.5: Silk Products by Kalahari Wild Silk

1.3 CLIENT

In 2002, a man from Madagascar came to visit Leonardville. He discovered the cocoons surrounding the town and realized the potential. The man, named Ian Cunnings, was born in South Africa but spent most of his time in Madagascar where silk has a mystic ritual significance by being used to wrap the dead. He gathered the local women of Leonardville in Namibia and taught them how to morph the cocoons into scarves and beautiful materials. Cunnings donated all the tools needed for the process and went back home, leaving the women to their own process of metamorphosis (Springbok, 2022).

The women continued their process, enjoying every second as a social experience, binding the community. The weaving of silk scarves and materials would attract tourists to this small town, allowing the product to become internationally known. The ladies named their business the *Kalahari Wild Silk Company* and started to contribute to the economy of Leonardville. The business originally received funding from Oxfam Canada as well as from Namibia's Ministry of Agriculture, Water, and Rural Development, but the support has since come to an end, leaving them with very little funding to maintain their business needs. Apart from financial constraints, the women were also faced with resistance from farmers in the area (Torbit, 2006: online), since local workers are paid by the bag load of cocoons, destroying the local trees in order to collect the cocoons (Springbok, 2022).



Figure 1.6: Local Holding Cocoons (Torbit, 2006: online).

It has since become a very strict rule that the ladies only receive and pay for cocoons that have been opened by a moth, so as to not disturb their natural process; only cocoons that have fallen to the ground or have been gently removed from the branches are collected (Springbok, 2022).

The ladies follow a consistent process to achieve quality products (refer to Figure 1,7):

1. The cocoons and other materials (for the colouring process) are gathered.
2. The cocoons are cleaned by hand, one by one, and the materials are prepped for colouring.
3. The cocoons are sorted into bags and boiled for around an hour until they are softened.
4. The cocoons are removed from the bags and placed on wire racks to dry.
5. The cocoons are soaked in a fabric softener. whereafter they become very soft, exhibiting the characteristics of silk.
6. The silk is spun by multiple spinsters into silk thread with a texture that resembles hessian.
7. The threads are measured and braided in preparation for the weaving process.
8. The weaver starts to weave the material.
9. The scarves/materials are placed in pots to be boiled along with colourants such as wood bark, leaves, or truffles to gain their natural shades.
10. The scarves/material sheets are placed in fabric softener for the final time before being hung up to dry and sold either in Leonardville, Windhoek, or online (Springbok, 2022).

AFRICAN WILD SILK

PROCESS:

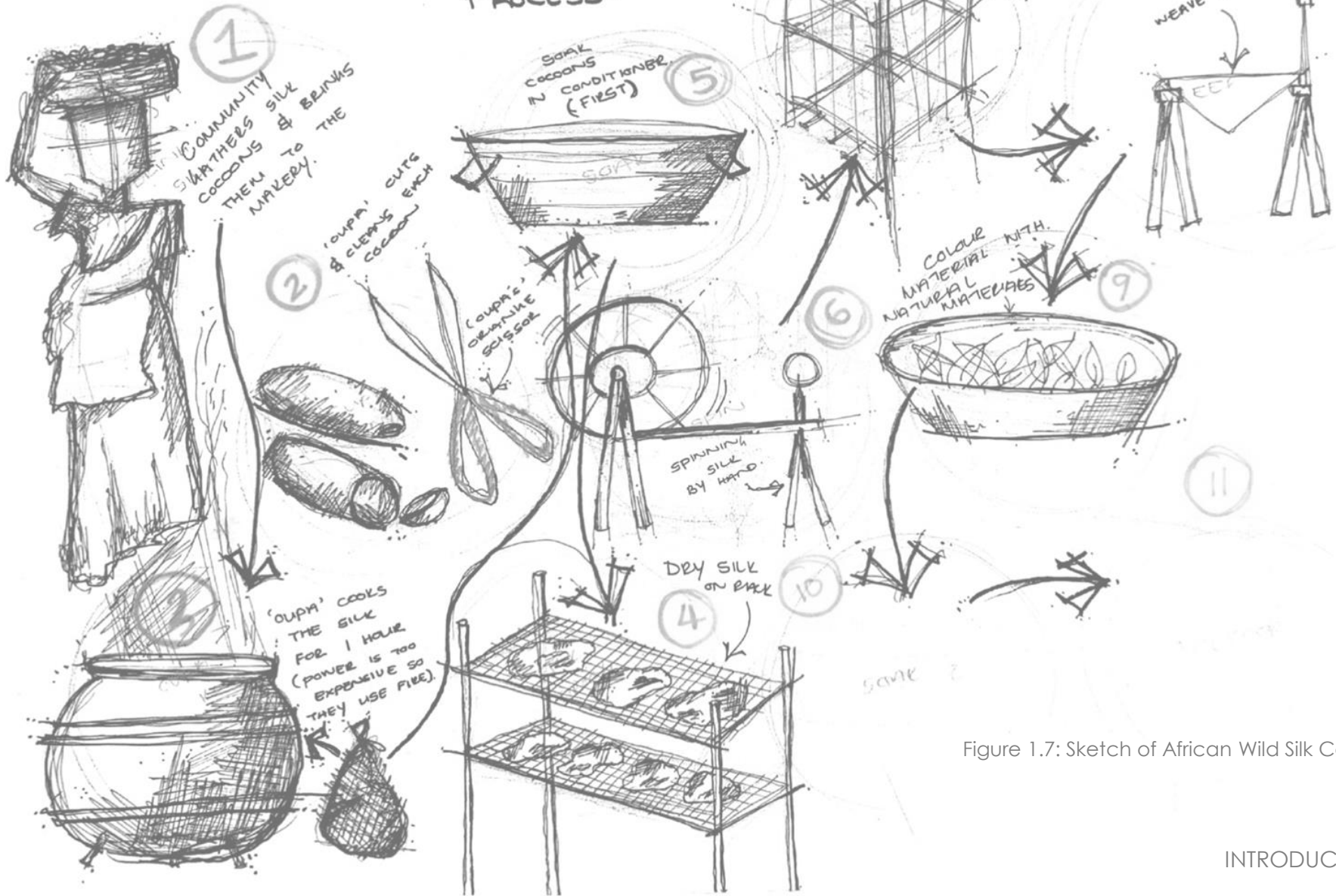


Figure 1.7: Sketch of African Wild Silk Company Process

1.4 BRIEF

The brief of the project is to analyse the metamorphosis of the Gonometa Postica moth, the metamorphosis process of Kalahari Wild Silk in the natural scarf-making process, and the metamorphosis of the town Leonardville to develop a project that binds the many cocoons of Leonardville into one communal space that houses a community square and a small restaurant but, most importantly, to create a space that can be used by Kalahari Wild Silk to house their process.

The site conditions and funding constraints of the business necessitates the use of sustainable building methods that will not only give the community and the business a lasting shared space, but that can also act as a learning opportunity for lower-cost building in the community.

As such, the project, creates a building space that is multifunctional for future use, constructed with natural and local materials, and by means of local construction methods. The project incorporates the use of the many cocoons found in the area in various ways, encouraging a further learning opportunity in terms of the construction, and developing an architectural cocoon that stands connected to her surrounding cocoons.

1.5 THEORETICAL STANCE

The theoretical stance of this dissertation allows for the dissection of the metamorphological study of the *Gonometa Postica* moth to understand the moth's cycle from egg to the creation of a silk cocoon. The theory then develops through the understanding of the *Gonometa Postica* cycle and its influence on the metamorphological cycle of women as they envelop themselves in the silk process. The theoretical stance is thereafter established in an architectural language through the analysis of Leonardville as a town by interpreting the socio-economic influence of the town through the influence of the *Gonometa Postica* and the women.

The dissertation is based on the influence that the different metamorphological processes have on each other, and on the way in which those processes can be woven together into a social architectural metamorphosis that acts as a cocoon to Leonardville. This weaving process aims to develop a bio-textile makery in a communal square in the center of Leonardville that will allow the building to act as a metaphorical tree to the many cocoons of Leonardville.

This leads to the research question that asks: *How can the established metamorphological cycles of small communities establish an architectural language that weaves a silk makery into a community square for Leonardville in the desert landscape of Namibia?*

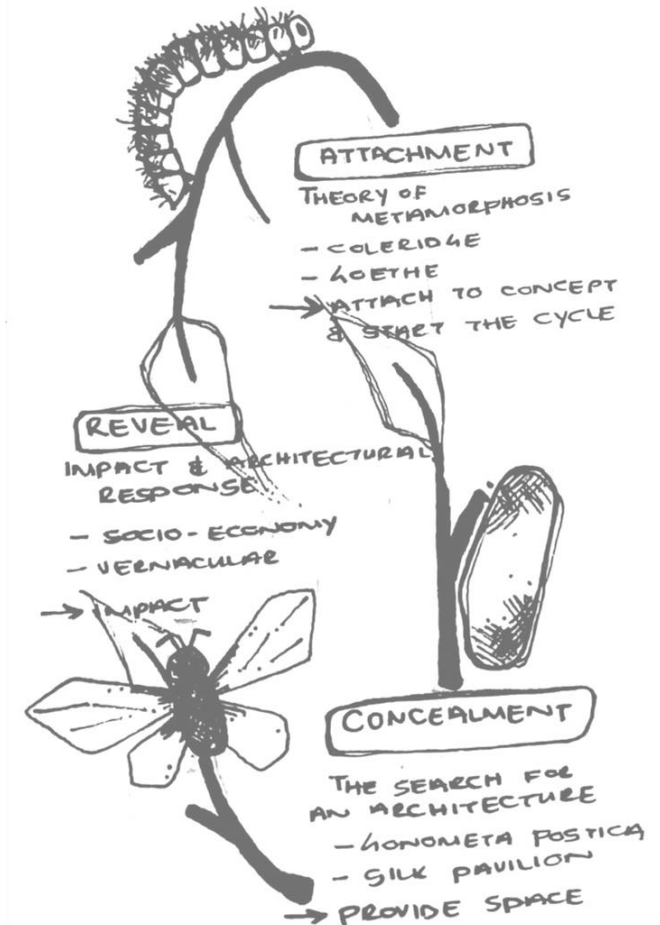


Figure 1.8: Cycle of the Theoretical Chapter



STAGE 2: CONCEPTUAL DEVELOPMENT

2. CONCEPTUAL DEVELOPMENT

The conceptual approach is based on the biological understanding of metamorphosis. The touchstone is based on the contrast between the natural and man-made interpretation of a cocoon structure. The touchstone is a model representation of a cocoon that is attached to a structure that represents the direct architectural analysis of the works of a silkworm. The touchstone is allowed to be explored and further analysed by live silkworms as the true designers and architects of the typology. This interpretation is merely allowed to be witnessed by the designer, as the biological builders deliver critique on the design.

The touchstone inspired the development of the three concepts, which include the three most important phases of the process of metamorphosis, namely: the attachment of the silk cocoon to the chosen tree branch, the concealment of the metamorphological process in a cocoon skin, and the reveal of the final metamorphological stage as a moth emerges from its cocoon.

The three concepts play an important role in the design of the project as they inspired the architectural, theoretical, and construction approaches in many ways.

2.1 TOUCHSTONE: THE ENCAPSULATOR

The touchstone is a small structure built with the aim of encapsulating the impression of silkworms (native South African silkworms due to the location of the study in South Africa) on a manmade structure. The structure makes use of balsa wood, screws, and threads to weave a hanging capsule (representing a manmade cocoon) that is attaching itself to a structural stand (representing a manmade tree).

The touchstone is made from materials that have been cautiously chosen not to overstimulate any senses of the silkworms through the study. The silkworms are placed on the structure when they reach their silk spinning phase, being left to their own interpretation of the device.

The encapsulator allows the architect to observe the process of the silkworm as true designer and as the initiator of the metamorphological processes from which the architectural expression is derived.

The process takes place by means of a gentle approach so as not to harm any natural processes, but simply to study and create an understanding of the silkworm process and interpretation of a man-made structure that allows the architect to instill the influence of their work in the hands of nature.



Figure 2.2: Touchstone Untouched by Silkworms



Figure 2.3: Photo Collage of Touchstone Process

2.2 CONCEPT 1: ATTACHMENT

The concept of attachment refers to the first contact of the silk from the *Gonometa Postica* with the selected tree branch.

The *Gonometa Postica* exerts a specific type of silk that differs slightly from the silk found in the majority of the cocoon to ensure a stable attachment between the branch and the cocoon. This idea supports the designer to articulate the material choice by the silkworm in its construction process.

This idea has mostly inspired the construction phase of the project, allowing the use of articulation between connections, and giving praise to the silkworm as a biological builder.

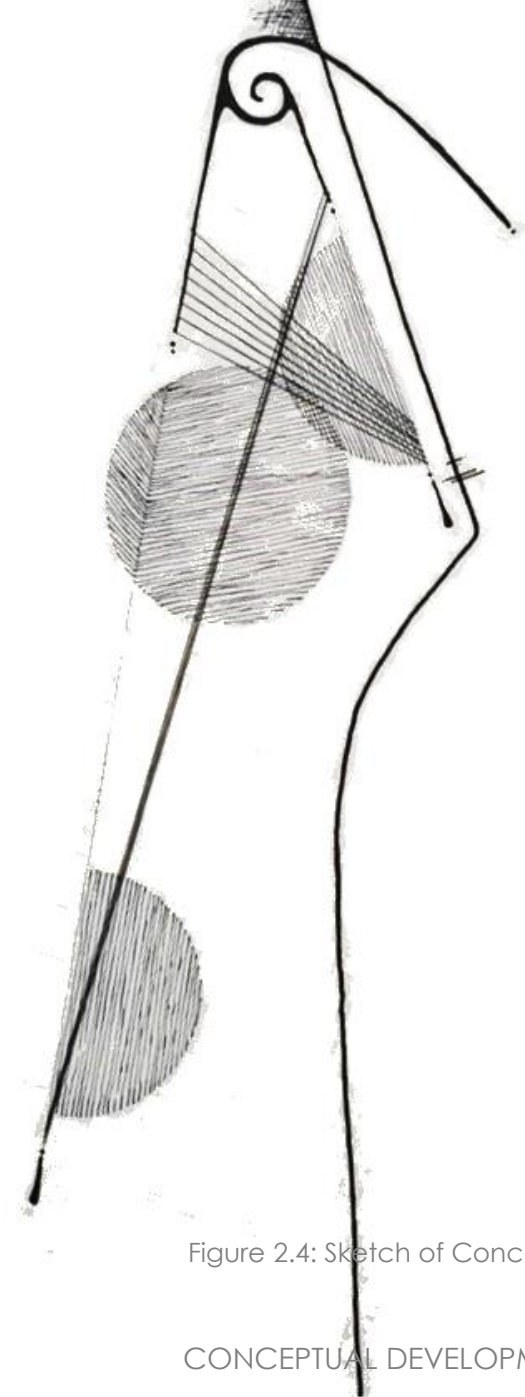


Figure 2.4: Sketch of Concept One

2.3 CONCEPT 2: CONCEALMENT

The concept of concealment comes from the silkworm's act of creating a cocoon with the purpose to conceal the metamorphological process in a third skin. The concept allows the designer to recognize the cocoon as a third skin, mindlessly designed and woven by the silkworm as a manner of habit. This acknowledgment allows the designer to envision a cocoon-like function for the building to allow the same experience of the silkworm to be transferred to the weavers on site.

The concept influences the desired atmosphere of the building in the way that the designer is allowed to observe the essence and presence of a third skin as a means to embrace the metamorphological process.



Figure 2.5: Sketch of Concept Two

2.4 CONCEPT 3: REVEAL

This concept embraces the act of revealing. The concept of reveal, in this instance, refers to the moment when the moth emerges from the cocoon to reveal itself. The notion of reveal inspires the designer to incorporate the essence of metamorphosis into the design through the design of an architectural structure to capsule and reveal all three concepts.

This concept is mostly used as inspiration during the design process, and allows the designer to establish an architectural language that could be used to construct an architecture that translates the process of the *Gonometa Postica* moth as well as the process of Kalahari Wild Silk into a design that in itself acts as a process.

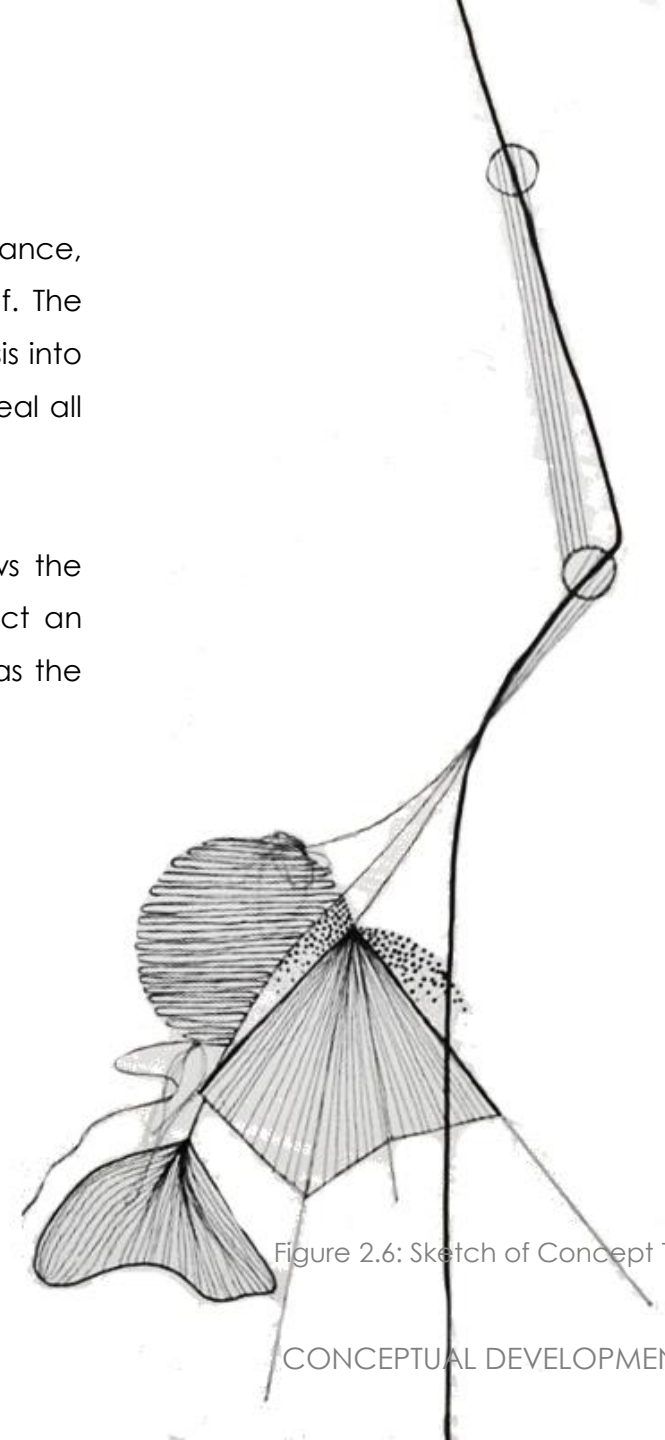


Figure 2.6: Sketch of Concept Three

2.5 CONCEPT MODEL

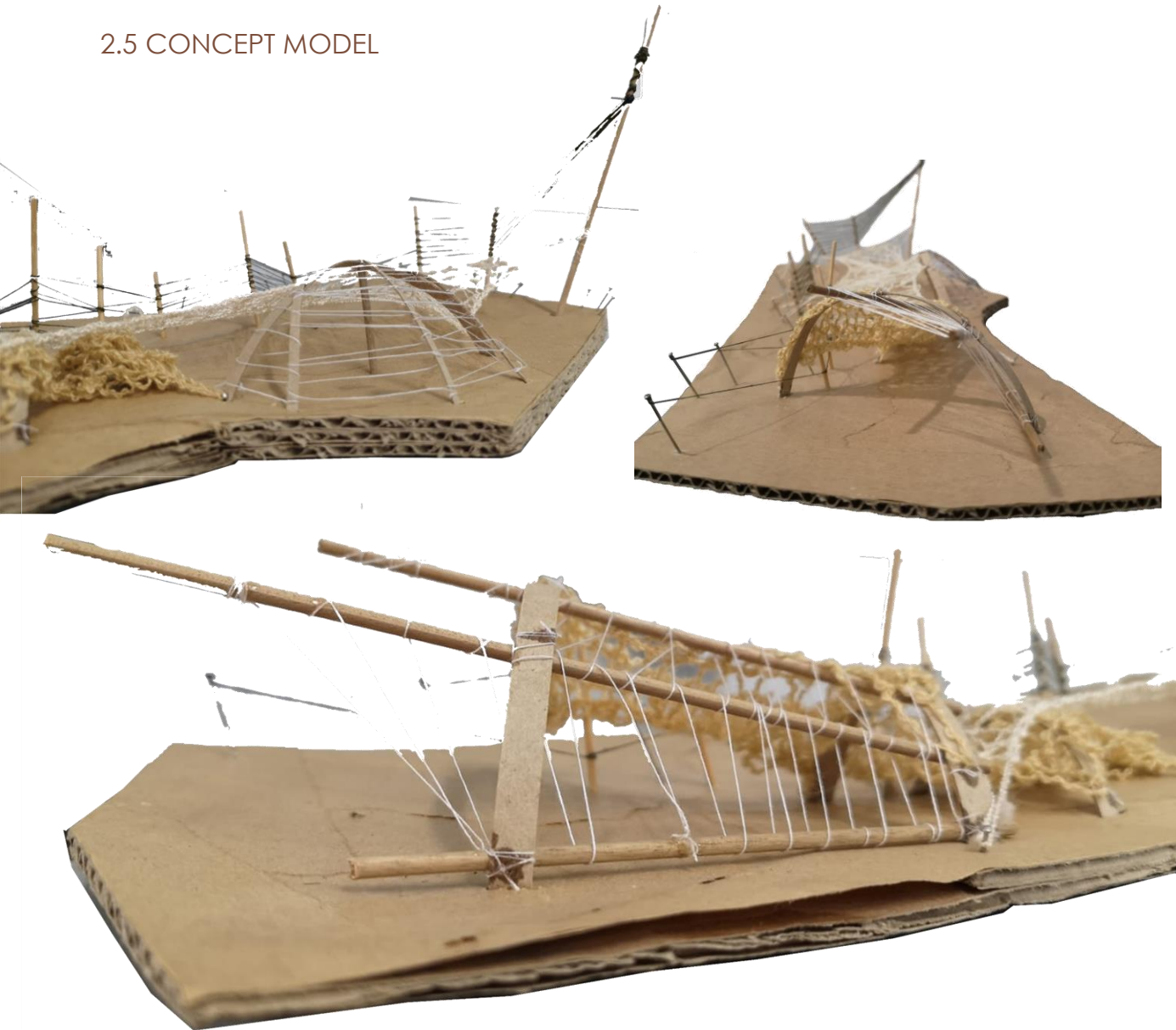


Figure 2.7 – 2.10 (left): Concept Model Details
Figure 2.11 (right): Concept Model Explanation

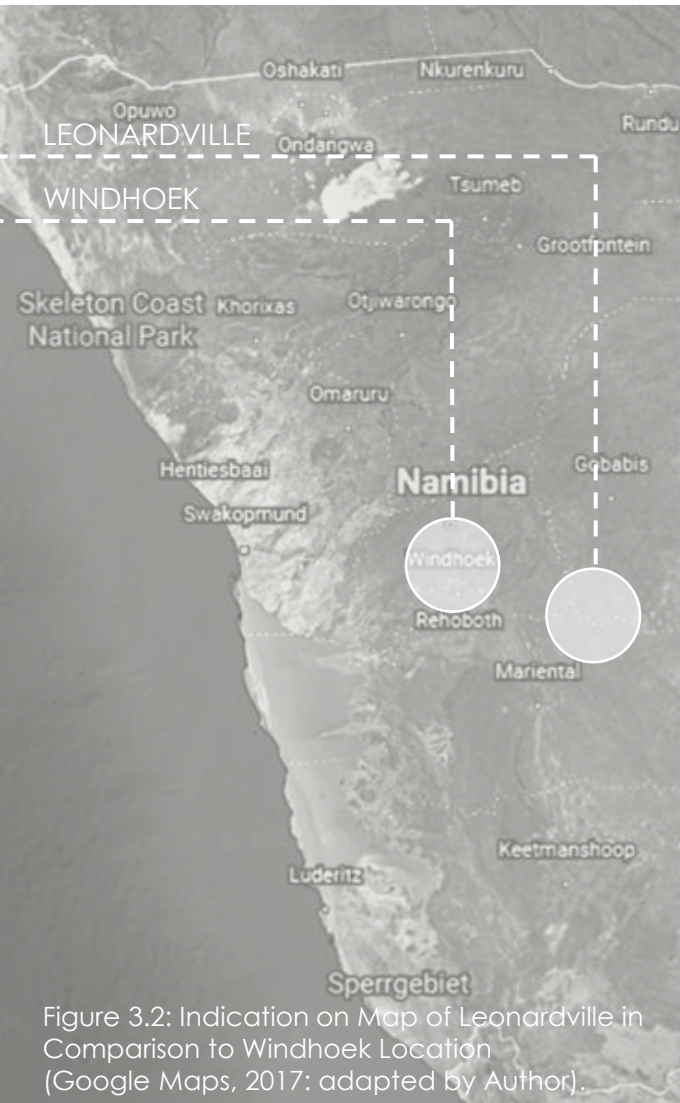


STAGE 3: SITE ANALYSIS

3.1 INTRODUCTION

The site analysis focuses on understanding the layout of Leonardville in the placement of Namibia, the locality of the region of the Gonometa Postica, as well as the chosen site of the women. The site analysis also thoroughly discusses the site conditions and surrounding cocoons that form part of the identity of the town, and that constitutes an integral part of the project from which the design process should be understood. The site analysis is developed as a timeline that captures all the necessary historical happenings as a means of understanding the metamorphosis of the location. This will be of assistance throughout the dissertation as the theoretical stance discusses the metamorphological cycles that develop within the town. The analysis also unearths the introduction of the chosen site for the project, which is further discussed in the development of the design.

The history of Leonardville evolves in three distinct locations, namely, Pretorius, where Leonardville originated (it is currently a ghost town), the actual town of Leonardville as it is known today, and the township, which is an ongoing development to ensure adequate housing for all inhabitants (Springbok, O, 2022) (refer to Figure 3.3).



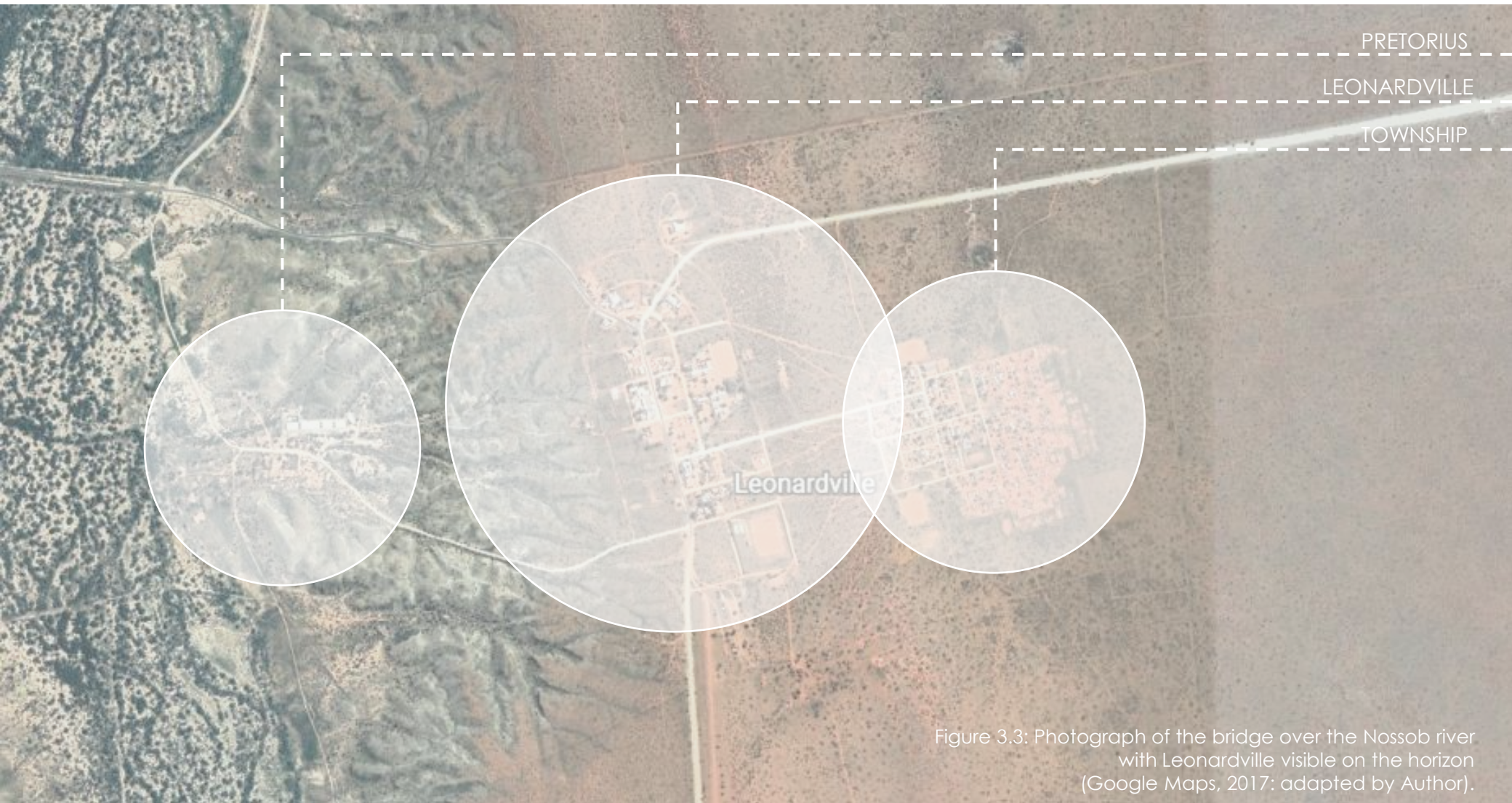


Figure 3.3: Photograph of the bridge over the Nossob river with Leonardville visible on the horizon (Google Maps, 2017; adapted by Author).

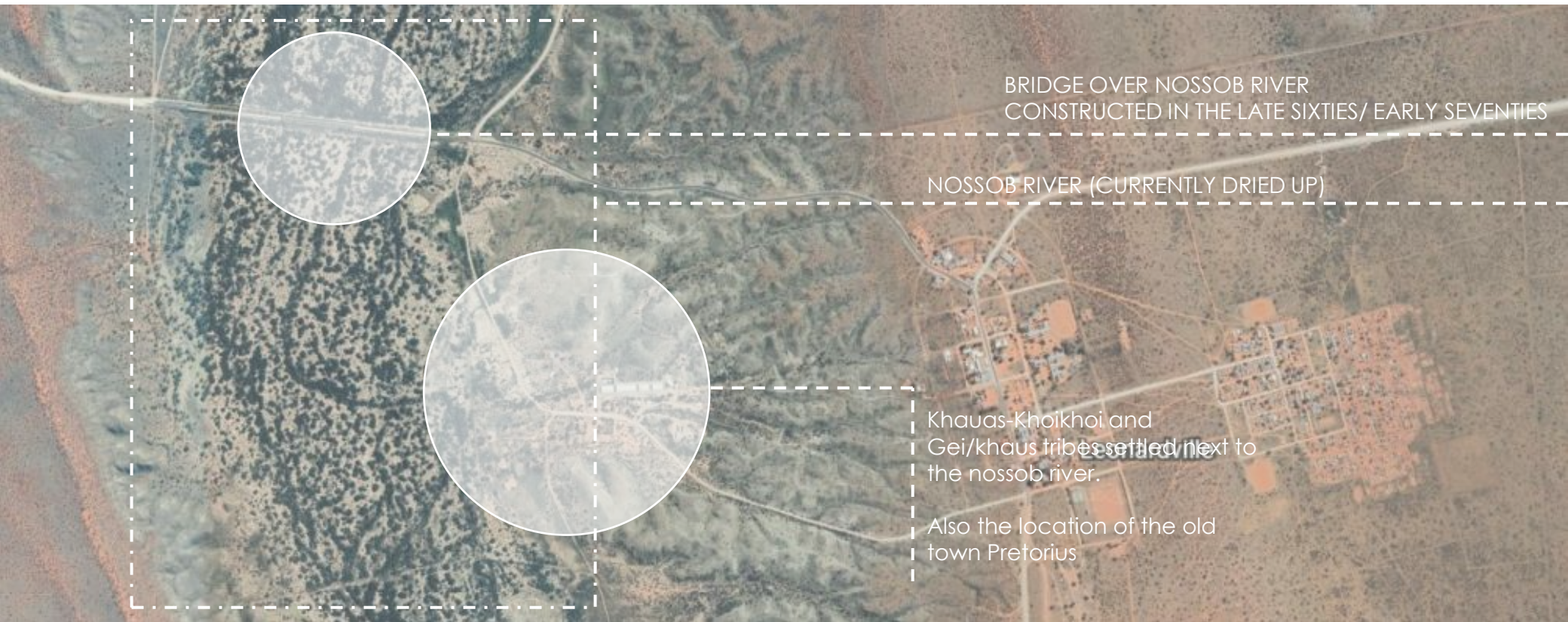


Figure 3.4: Photograph indicating the origins of Leonardville (Google Maps, 2017: adapted by Author).



Figure 3.5: Photograph Indicating the Strict Geometry of Leonardville
(Google Maps, 2017: adapted by Author).

3.2. METAMORPHOSIS OF LEONARDVILLE, NAMIBIA

Leonardville is a small town that is situated approximately 43km North of the heart of the *Verenigde-Nossob* river (the United Nossob river) (refer to Figure 3.6) that formed at the junction between the Wit-Nossob River, which originated in the Windhoek mountains, and the Swart-Nossob River, which originated in the Okahanja district (Auret, 1994: 8). The Nossob river is currently dried up, but its impact can still be seen in the valley of approximately 200 feet deep that formed from its original flow into the Orange river (Auret, 1994: 9). Both edges of the valley are structured from lime and sandstone that blend into a plateau of sand dunes, which are overgrown with vegetation. These overgrown dunes are compared to ocean waves (Auret, 1994: 9) as they flow into the town.

In the early 1800s, the Khauas-Khoikhoi lived on the edge of the Nossob River and called the place Nosannas (or Noasanabis) (refer to Figure 3.4). In 1815, the Gei/khaus tribe from Cape Town moved to the area. The name of the tribe comes from *Gei*, meaning 'big', which is derived from the fact that they had a very large tribe, and from *khausi*, meaning 'to be torn apart', since the tribe had to be torn apart or separated at one point before moving.

After some time, a large number of white missionaries, including a man named Tindall, built a station that provided employment to the Gei/khaus tribe.

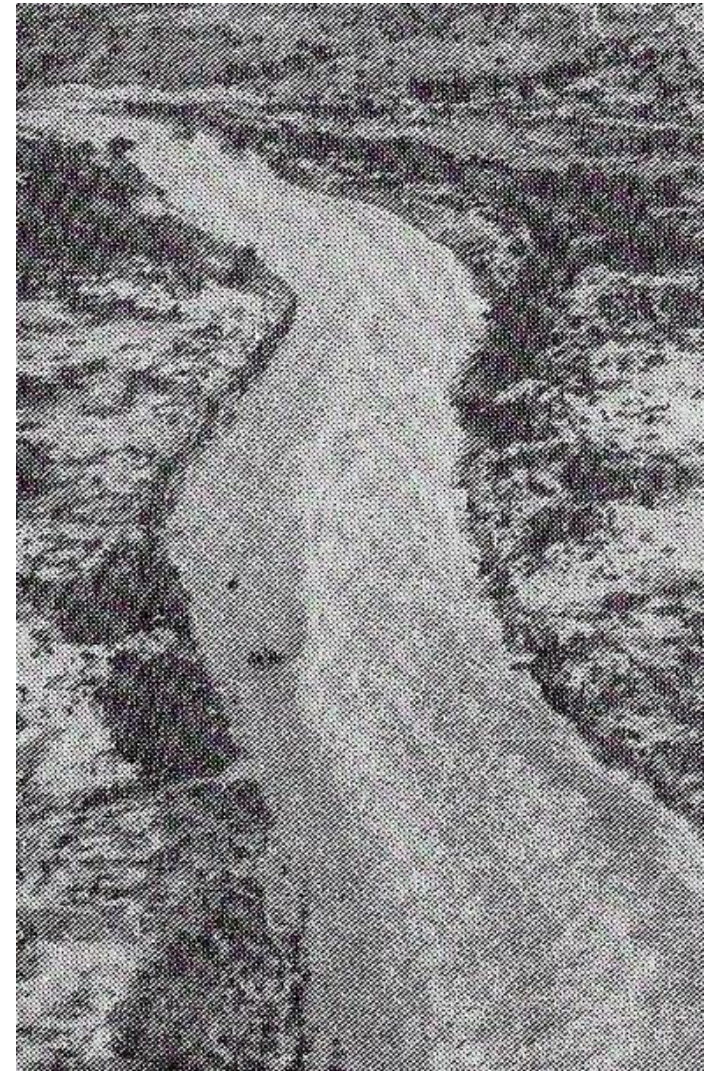


Figure 3.6: The Nossob River Full of Water (Auret, 1994: 8).

Tindall built a small house, a blacksmith shop, and a small uncomplicated church, which formed the missionary station known as Wesley Vale. In 1855, the missionary Egert was sent to Wesley Vale, where he started working with zeal. However, water was limited due to Wesley Vale's weak fountain, prompting him to move to Gobabis in 1856 thus ending the missionary work in Wesley Vale (Auret, 1994: 9). Two travellers discovered the town in the 1850s, but the Dutch only settled in the area in 1884 (Auret, 1994: 9 – 10).

3.2.1 FIRST RESIDENTS

Around the year 1912, a number of German families settled next to the Olifantsriver. The new residents were met with a few other residents in the area, including Hermann Schach von Wittenau who lived on the oldest farm in the town of Leonardville (Auret, 1994: 10), where the house still stands today. Between 1920 and 1922, Afrikaans families started moving to the town and became the pioneers of Leonardville (Auret, 1994: 10).

The layout of the town was drawn up by local surveyors and valued by the country council (Auret, 1994: 118), and has a recognizable German-influenced grid structure (refer to Figure 3.5). However, the new residents desired an area for church gatherings and, since the town did not have any space or money for a church within the community, they had to resort to having sermons underneath a specific camel thorn tree (Auret, 1994: 118) (refer to Figure 3.7).

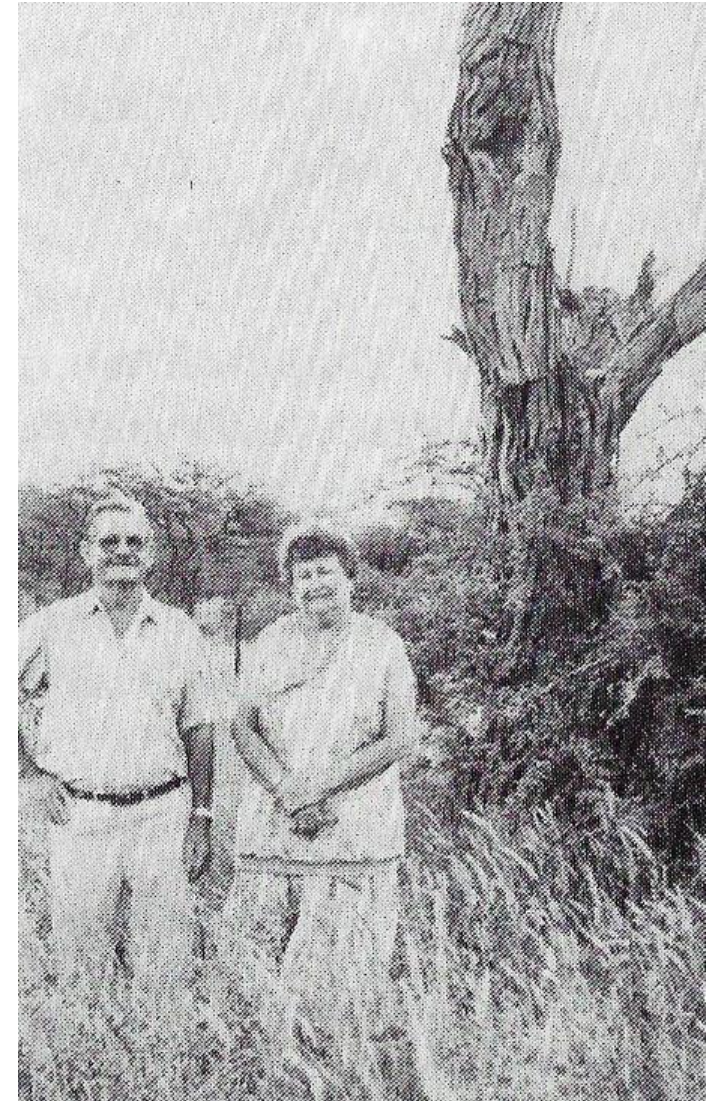


Figure 3.7: The First "Church"
(Auret, 1994: 14).

Mr. Isak Buys, who was one of the earliest residents of Leonardville and who made a significant contribution to the history of the place, bought a farm in Pretorius in 1924 and built himself a house between 1925 and 1926 (refer to Figure 3.8). This house would be the building used by the community as a church gathering space in 1940 (Auret, 1994: 118). The community started expressing the need for the construction of a town as early as 1951 (Auret, 1994: 119). On 27 April 1954, the town Leonardville was proclaimed by the community (Auret, 1994: 120).

3.2.2 TOWN DEVELOPMENT

The school building and hostel were the first buildings constructed in the town in 1955, followed by the new church building in 1958 and the clinic in 1961. These buildings were built long before any houses were built in town (refer to Figure 3.13). The rest of the buildings followed: the parsonage was built in 1967, the police station in 1968, and the post office, business enterprises, and garages followed thereafter (Auret, 1994: 120 - 121).

The school was finished in 1954, and the need developed for the church to be built closer to the town (Auret, 1994: 25). On 18 February 1956, the community decided to build a church. The cornerstone was laid by Ds S. Murray on 6 July 1957 and the church was officially opened a year later on 5 and 6 July 1958 (Auret, 1994: 26) (refer to Figure 4.9).

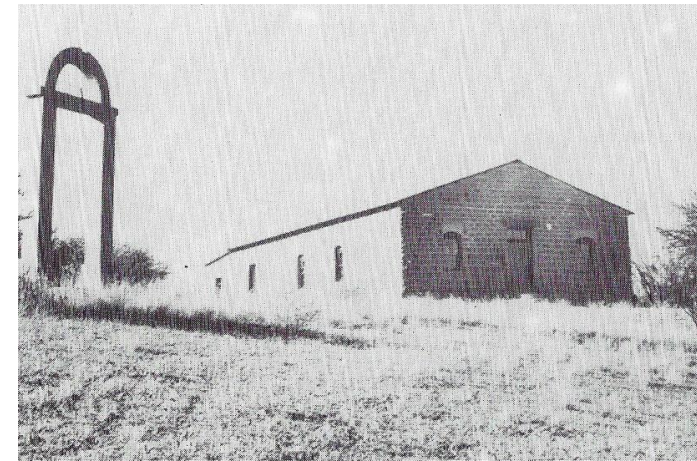


Figure 3.8: The House of Mr. Buys (Auret, 1994: 16).

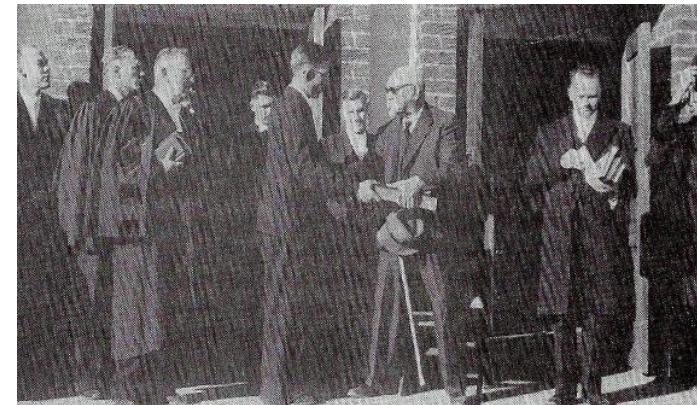


Figure 3.9: The Opening of the New Church (Auret, 1994: 26).



1875



1880



Figure 3.10, 3.11 & 3.12: Photographs of the Church, Corporation and the School (Auret, 1994: iv) & (Author, 2022).

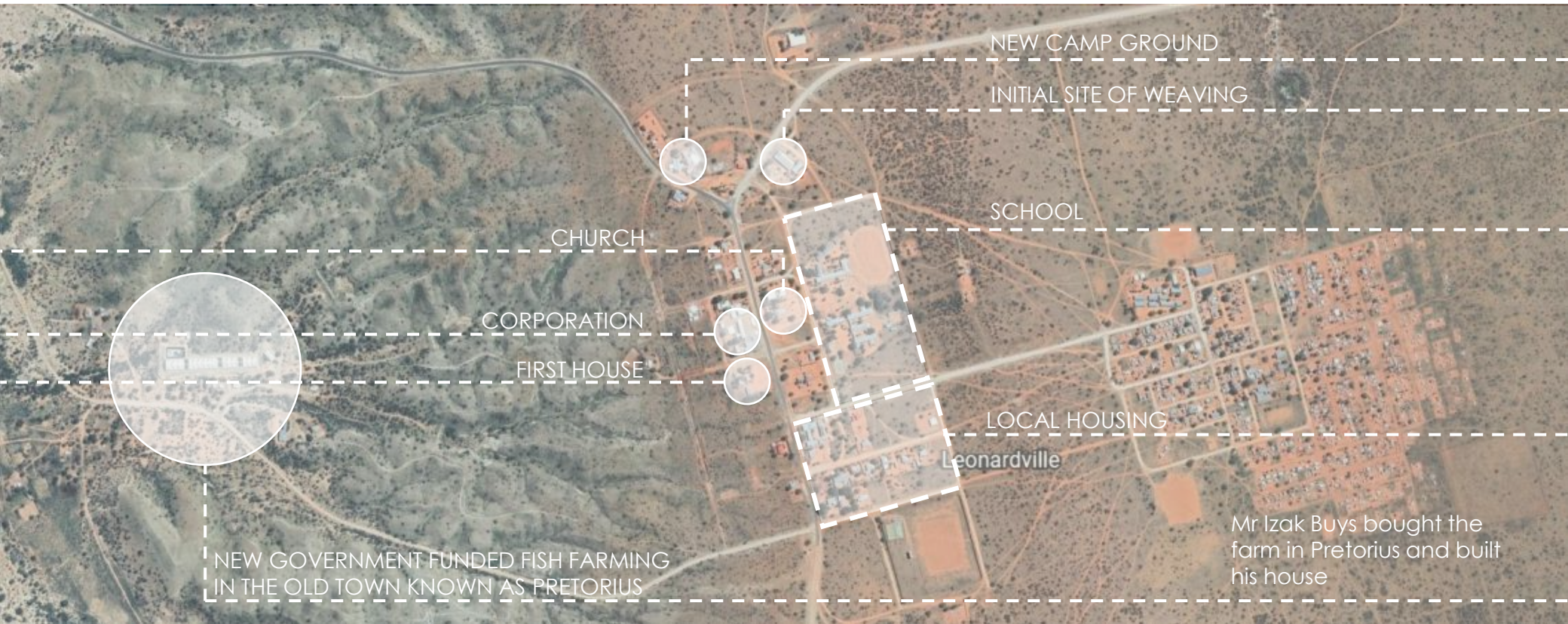


Figure 3.13: Photographs Indicating the Cocoons of Leonardville
(Google Maps, 2017: adapted by Author).

The clinic was the next building to be opened in Leonardville on 2 June 1961 after years of the community asking for a clinic to be closer to town. This was followed by the construction and opening of the parsonage in 1967 (Auret, 1994: 37 – 38), the discussion of restoration work to be done to the church during the year 1967 (Auret, 1994: 39), and the actual restoration work being completed between 1971 and 1973. During the time of restoration, the church sermons were held in the old church hall, the house of Mr. Buys, in Pretorius. The church organ was also constructed during 1973 (Auret, 1994: 39).

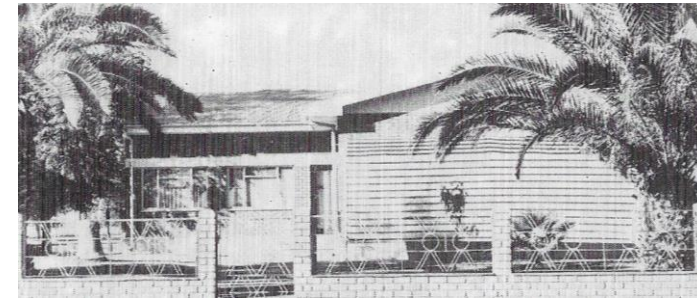


Figure 3.14: The Parsonage (Auret, 1994: 38).

During the late nineteen-sixties and early nineteen-seventies, Leonardville was the site of many construction projects, with the following projects all being built during that time: the police station, the post office, two garages, the BKB offices, the corporation, tennis courts, and the bridge over the Nossob river (Auret, 1994: 40 – 41). Around the year 1976, a new garage and slaughterhouse were built by the church to be used by the community (Auret, 1994: 45). These buildings are currently being used by the weavers to make, store, and sell all their products.

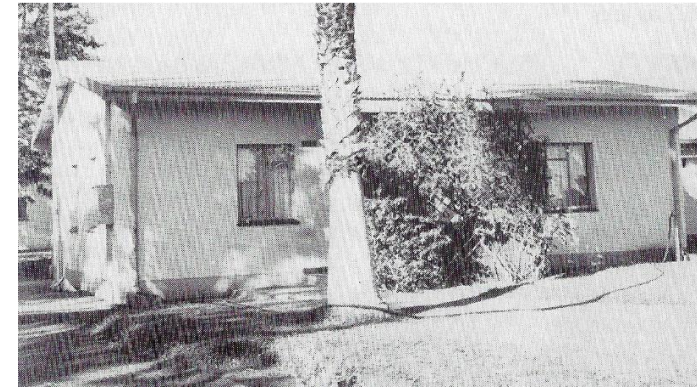


Figure 3.15: The Clinic (Auret, 1994: 29).

The need for a church hall has been part of the conversation since the settlement the community. The church bazaar was held on the school grounds with nets being put up as shade coverings. The establishment of a church hall would also aid in the need for space for Sunday school gatherings (Auret, 1994: 53). In 1980, the church, along with the farmer's forum, decided to build a community hall that was officially opened in 1987. The hall was used for a number of functions such as community gatherings, bazaars, conferences, and others. (Auret, 1994: 54).



Figure 3.16: The Community Hall (Auret, 1994: 54).

On 20 April 1980, an old age home was opened in nearby Gobabis for Leonardsville's pensioners since the town did not have the required accommodation (Auret, 1994: 72). In 1992, a building, based on a steel structure, was constructed with help from the community for the Oruano-community in Aminuis (Auret, 1994: 79).

3.2.2.1 WATER-SUPPLY AND ELECTRICITY

Mr Isak Buys drilled the first borehole in 1925, whereafter he administered the establishment of a number of new boreholes throughout the town. In 1968, the department of water installed a water pipe system to allow distribution of water to the houses in town (Auret, 1994: 121).

The town made use of a generator for many years as a means of electricity, and had a total of seven generators in the later 1970s. In 1989, the town was provided with electricity, to excitement of the entire community (Auret, 1994: 121).

3.2.3 EDUCATION

A number of schools were built around the town of Leonardville, such as De Waal and Wilheben in 1922, Esselen and Blumfelde in 1923, Westfalen in 1931, and Doringfontein and Springbokvlei in 1932.

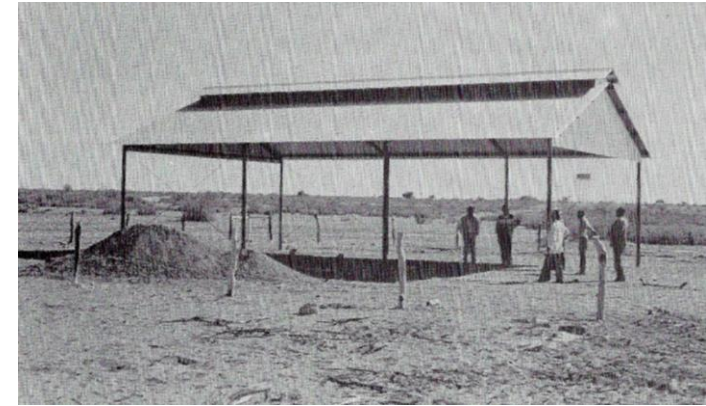


Figure 3.17: The Steel Structure (Auret, 1994: 79).



Figure 3.18: Leonardville Seen from the School (Auret, 1994: 121).

3.2.3.1 LEONARDVILLE PRIMARY SCHOOL

1929 – 1930: The primary school was established in 1929 with approximately 70 learners. The school was not very big at the time, and the use of tents for accommodation and classrooms was of the ordinary (Auret, 1994: 123).

1931 – 1933: This period was characterised by a depression (during the same time as the Global economic depression (Grynberg & Singogo, 2018: online)) due to the drought in the area. Salaries were lessened and parents did not have the funds for school or hostel payments. During December of 1933, it rained so much that the Nossob river flooded nearby roads and railways, forcing the school to lengthen the Christmas break. In 1935, three new classrooms were added to the school building (Auret, 1994: 124).

3.2.3.2 NEW SCHOOL AND HOSTEL

For 26 years, from 1929 to 1955, the school had a total of 640 learners. In September 1955, the school opened a new school building and hostel, which was regarded as the most modern developments in the country. The school was known as *Laerskool Leonardville*, but the name changed to *Laerskool Isak Buys* in 1984. In 1994, the school had a total of 64 learners who were all originally from Windhoek (Auret, 1994: 124).

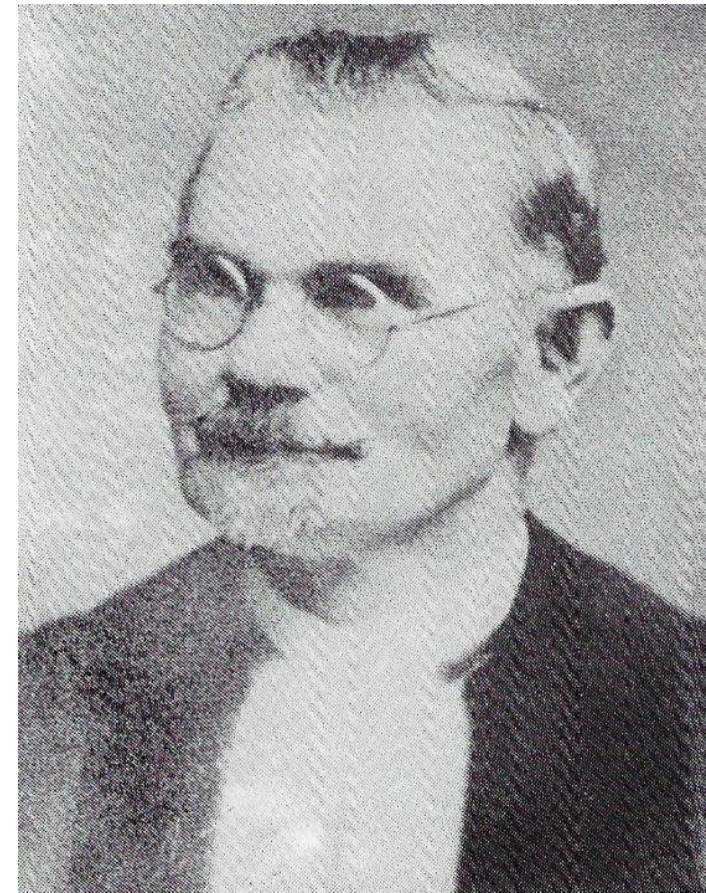


Figure 3.19: Edward Leonard (Auret, 1994: 13).



Figure 3.20: Photographs Indicating the Site and Surroundings (Google Maps, 2017; adapted by Author).

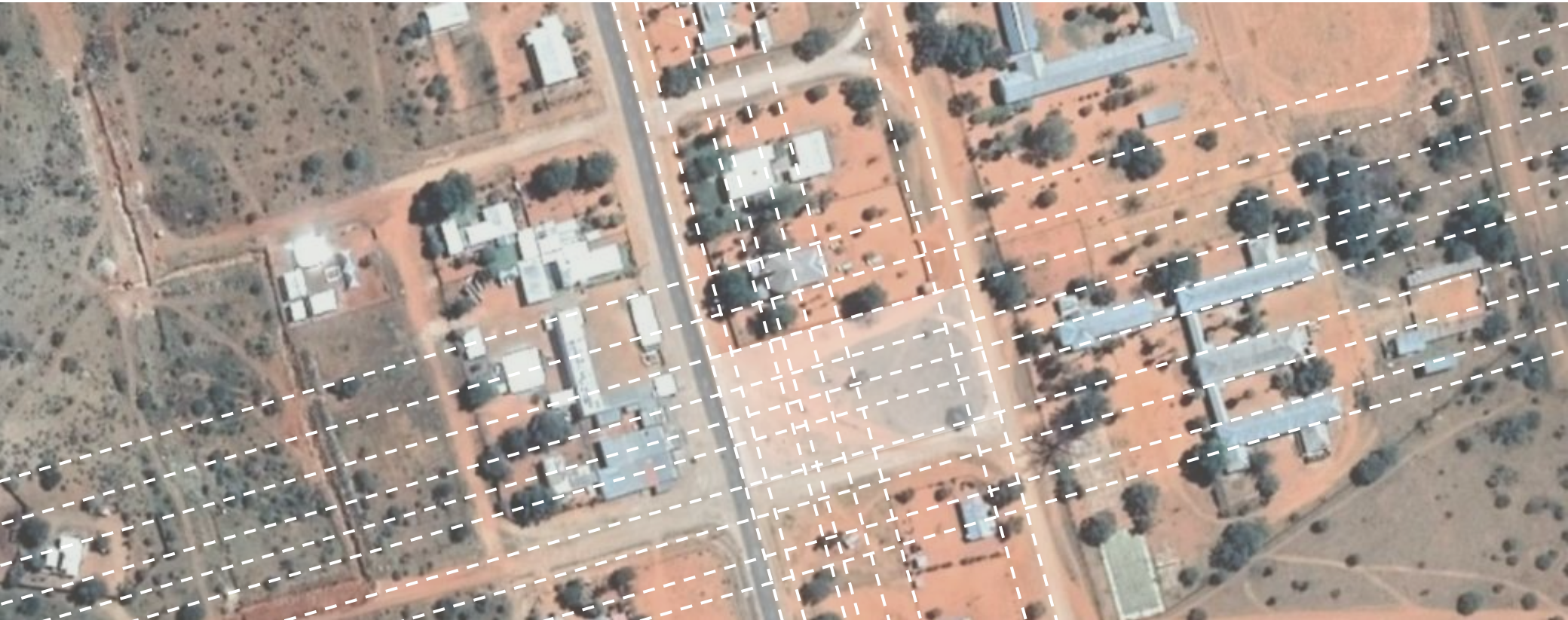


Figure 3.21: Photographs Indicating the strict lines identified and used in design (Google Maps, 2017: adapted by Author).

The town of Leonardville is still mostly as described through the few available historical documents. The town is still making use of the strict geometric grid layout to determine the placement of new buildings, and the addition of desire lines walked by the large koikoi tribe, who are still resident in the area, create a beautiful impression of the lives that are visible in the topography of Leonardville.

The chosen site for this research is church property that is situated next to the church and that was originally kept for the construction of a church hall. The site finds a number of desire lines traced on its surface, as it is used by townspeople to wander to and from the church on the Northern side, or to and from the corporation on the Western side.

An interesting note was that the town is laid out at approximately 15 degrees West of North, allowing most buildings to be facing 15 degrees West. Discussions with the townspeople made it apparent that this angle is preferred for houses to be fronted towards: Namibia is so close to the equator that the sun is mostly directly above them during summer, only fostering the need for shading from above, but during winter it gets so cold that they prefer their living spaces to be placed West for optimal sun and heat.



Figure 3.22: Designated Site Taken from in the Church Boundary Wall

3.3 CONCLUSION

The site analysis revealed the significance of understanding the development as part of the design process. The site analysis assisted in establishing the need for the town as a developmental unity and the ways in which architecture is used as a language in the surrounding area.

The information gathered about the macro and mezzo context of the chosen site assists in formulating the grid that was used throughout the design, in combination with the desire lines of the Khoikhoi tribe.

The significance of the site analysis allowed for the identification of the many cocoons scattered through the town, and inspired ways in which to incorporate their prominence into a design that embraces the connection that is established in Leonardville between the German and the Khoikhoi residents. The theoretical stance establishes an attachment towards this approach.



Figure 3.23: Street View of Church and Site on the Right-Hand Side of the Church



Figure 3.24: Perspective Sketch of Church of Leonardville (Low & Low Architects, 1938).



STAGE 4: THEORETICAL APPROACH

4.1 INTRODUCTION

Metamorphosis is defined as a sequence of developmental adjustments, a significant concept in small, rural communities finding themselves tangled in their established routines with socio-economic challenges in harsh arid landscapes. The metamorphosis of Leonardville in Namibia, is a sequence that is paired with the natural metamorphological process of the *Gonometa Postica* moth, local to the area, in search of new options within the community. The exploration of architectural metamorphosis, in the form of a silk makers space and community square, is supported by the three concepts of attachment, concealment, and reveal. The concept of attachment is discussed through the investigation of the concept of metamorphosis and the theoretical application by Poets and Philosophers Samuel Taylor Coleridge and Johann Wolfgang von Goethe to attach the larva to the initiation of the sequence of developmental adjustments. The concept of concealment is analysed through the biological investigation and architectural conceptualisation of the metamorphosis of the *Gonometa Postica* moth, as well as the investigation of the *Silk Pavilion* by MIT Medialab's Mediated Matter Group to fully comprehend the abilities of a natural builder, as the larva starts constructing its cocoon. The concept of reveal is interpreted through the investigation of the metamorphosis of the weavers at Kalahari Wild Silk company, as well as the rest of the community, in an attempt to reach a socio-economically appropriate vernacular architecture as the *Gonometa Postica* ultimately reveals itself (refer to figure 4.2).

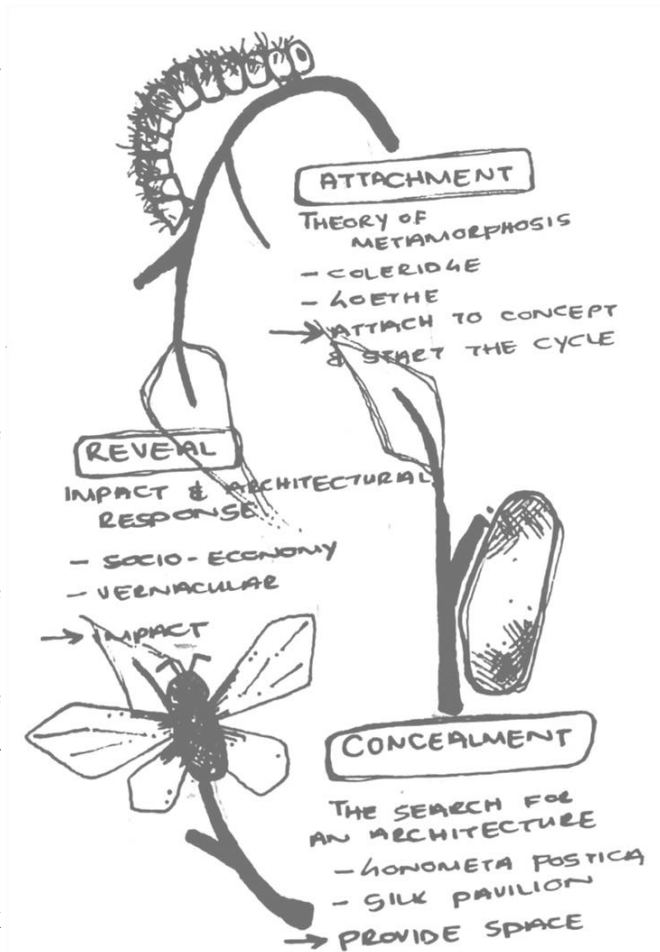


Figure 4.2: Cycle of the Theoretical Chapter

4.2 ATTACHMENT

Attachment is the first stage of the sequence of developmental adjustment, which allows the concept to act as initiator of the development of a metamorphological cycle. Bishop and colleagues, an associative professor of biology at St. Francis-Xavier University in Canada write in a journal article titled *What is Metamorphosis?* "that the basic shape, form, and structure of an organism emerges as a result of a sequence of developmental adjustments" which form part of the organism's morphogenetic sequence. This process, through which an organism's final established pattern and form are reached, is termed metamorphosis (Bishop, Erezyilmaz, Flatt, Georgiou, Hadfield, Heyland, Hodin, Jacobs, Maslakova, Pires, Reitzel, Santagata, Tanakay & Youson, 2006: 657).

The concept of attachment, in a biologically morphological sense, refers to the initial attachment made by the larva to a branch using a specific type of silk that is stronger than the rest of the cocoon (refer to figure 4.4). This initial attaching silk forms the foundation of the morphological process, and is therefore seen as a very important step in the cycle as an establisher of the final form. This search for form and a morphogenetic sequence is a common quest of a large variety of disciplines such as biology, poetry, music composition, architecture (Hellmuth, 1986: 1), and entomology. Architects, therefore, have their own sequence of developmental adjustments [morphological cycle] known as the design process, which assists their metamorphological process in search of morphology.

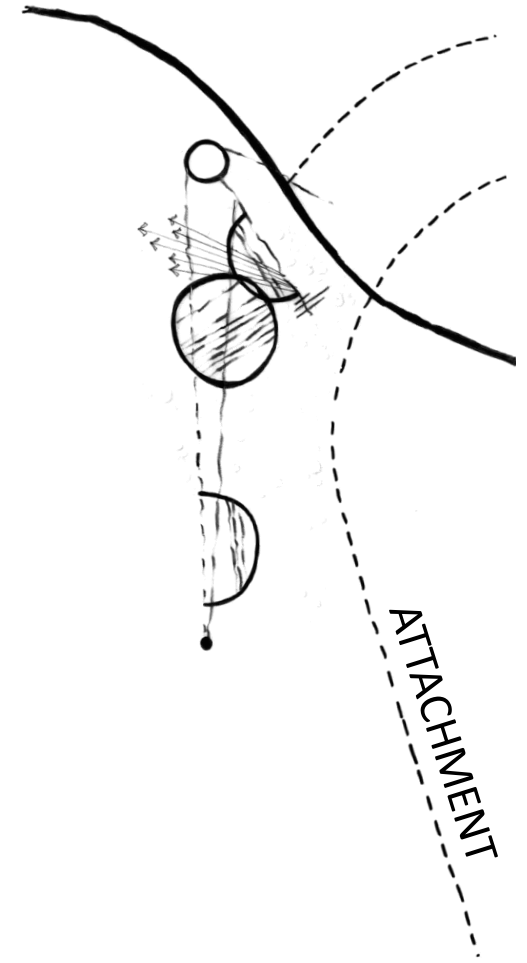


Figure 4.3: Early Design Concept Sketch of Attachment

This anchoring foundation in terms of the design process could be regarded as the theoretical application through an understanding and interpretation of chosen philosophies to strengthen the conceptual design in order to achieve architectural form.

4.2.1 SAMUEL TAYLOR COLERIDGE

Samuel Taylor Coleridge, poet, and philosopher (1772 – 1834), discussed the difference between a mechanic and organic form as two different ways in which architectural form can be reached. This theory allows an understanding of the architectural search of form in organic architecture as an architectural style that uses nature as a means to determine morphology.

Coleridge stated that when we impress a pre-determined form on a material that does not necessarily stem from the properties of the material, the form is mechanic. He explained this through the understanding of a lump of clay that is shaped to achieve the required properties when hardened, achieving mechanic form. Coleridge stated that organic form, however, is innate, as the shape develops itself from within (refer to figure 4.5). This notion of organic architecture explains the works of architects such as Hugo Haering, Hans Scharoun, Rudolf Steiner, Alvar Aalto, Louis Sullivan, and Frank Lloyd Wright, who paved the way in the exploration of organic architecture (Hellmuth, 1986: 1).



Figure 4.4: Cocoon Attached to a Branch

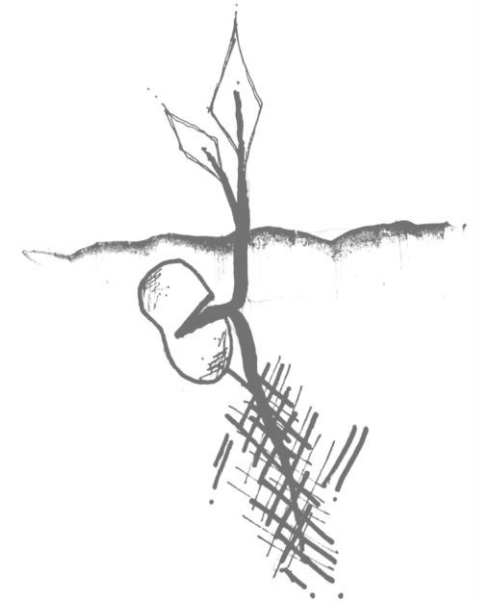


Figure 4.5: Organic Form Developing from Within

A deeper understanding of the works of this group of architects suggests that they are all inspired and influenced, to varying degrees, by the relationship between man and nature. Each of them developed an architectural approach, with the main focus on this theoretical discipline combined with their own cultures and personalities (Hellmuth, 1986: 2). This could be termed as their own morphogenetic sequence, that allows them to establish their own architecture.

4.2.2 JOHANN WOLFGANG VON GOETHE

Johann Wolfgang von Goethe was a German poet, scientist, and philosopher who established the term *morphology* and focused most of his life studies on determining an understanding of morphology and form as an interactive whole. One of the many studies by Goethe in search of true understanding included his fascination with form in plant life (Hellmuth, 1986: 7). This theory, therefore, acts as an introduction to the development of morphology from a natural source such as the *Gonometa Postica* moth's metamorphological cycle in Leonardville Namibia through Goethe's understanding of polarity.

Goethe stated that form is the result of a dynamic equilibrium between the inner characteristics of the type and external conditions, a notion which he calls polarity. Goethe argued that external forces such as light, climate, and soil in interaction with internal forces produce the outward form of the characteristics of a plant in terms of both its area and genus.

He felt that the changing nature of this balance produces an external transformation of form which he termed metamorphosis. Metamorphosis forms a key principle in the study of morphology, since it conceptually relates diverse outward forms back to the original form. This provides a line of continuity throughout the various stages of growth (Hellmuth, 1986: 7 - 9).

Metamorphosis itself follows a pattern in the growth of a plant. Goethe divided the stages of the metamorphosis of a plant into a threefold alternating process: seed to leaf, leaf to flower, and flower to seed, which together form a complete cycle. Goethe termed this process augmentation (Hellmuth, 1986: 9).

In a series of essays called *Simple Imitation of Nature, Manner, Style* published in February of 1789, Goethe highlighted parallels between the characteristic vocabulary of art and architecture, and established three levels in the production of art (Hellmuth, 1986: 145):

- a. Simple imitation of nature – outer appearance of an object reproduced without interpretation (Hellmuth, 1986: 145).
- b. Manner – the architect's own developing language based on his interpretation of nature (Hellmuth, 1986: 145 - 146).
- c. Style – measured according to the appropriateness of its environment as it surveys the entire range of forms and can juxtapose and imitate various characteristics (Hellmuth, 1986: 147) (refer to figure 4.6).

Goethe used these three principles to establish a guideline for appropriateness in the arts. In terms of architecture, his three principles could be used as a way to establish a morphology for the building typology on site in the hope of achieving an appropriate building. This principle of metamorphosis and the search for an appropriate morphology is a biological concept that is not only used by human artists or architects, but also by the *Gonometa Postica* moth who acts as the architect for his own morphogenic sequence.

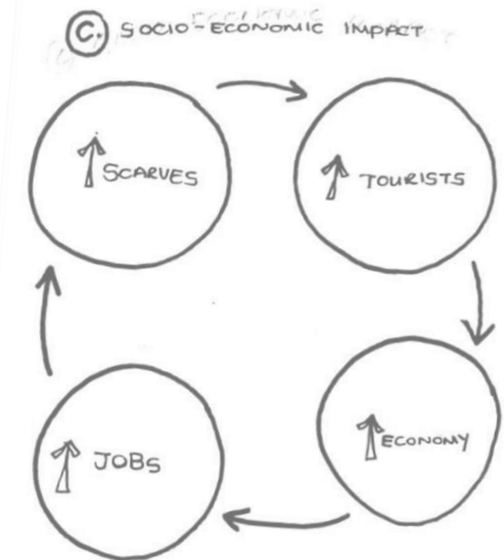
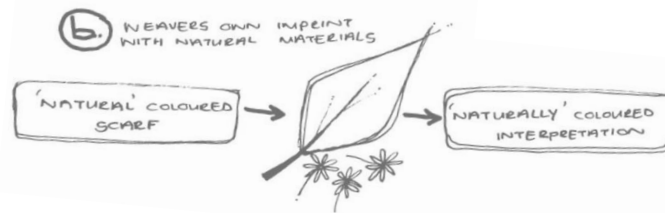
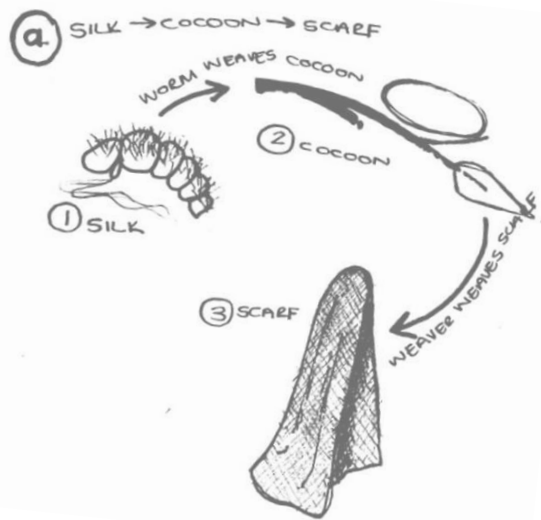


Figure 4.6: Analytical Diagrams of Goethe's Three Principles

4.3 CONCEALMENT

Concealment is the second stage of the sequence of developmental adjustments, and acts as the third skin, concealing the metamorphological process. Biologically, this stage refers to the period in which the *Gonometa Postica* moth would be inside the cocoon, awaiting its moment of revelation. Architecturally, this is the strongest stage as it is based on the actual morphology of the architecture that acts as concealment for its typological motive.

The *Gonometa Postica* is a moth that is native to the Omaheke region of Namibia and Botswana. It undergoes a beautifully intricate biological metamorphosis cycle from the egg stage to eventually emerge as a moth. The morphogenic sequence of this organism is analysed as the natural architect and dweller of the Namibian landscape.

4.3.1 METAMORPHOSIS OF THE GONOMETA POSTICA

The life cycle of the *Gonometa Postica*, locally known as the *haarwurm*, consists of four stages: eggs, larvae, pupae and the adult stage. The length of each stage depends on the season and climatic conditions. Temperature and light play a significant role in the stages of the *Gonometa Postica*. A higher temperature influences the larvae to moult earlier, while a lower temperature allows the larvae to moult at a later stage (Van der Merwe, 2015).

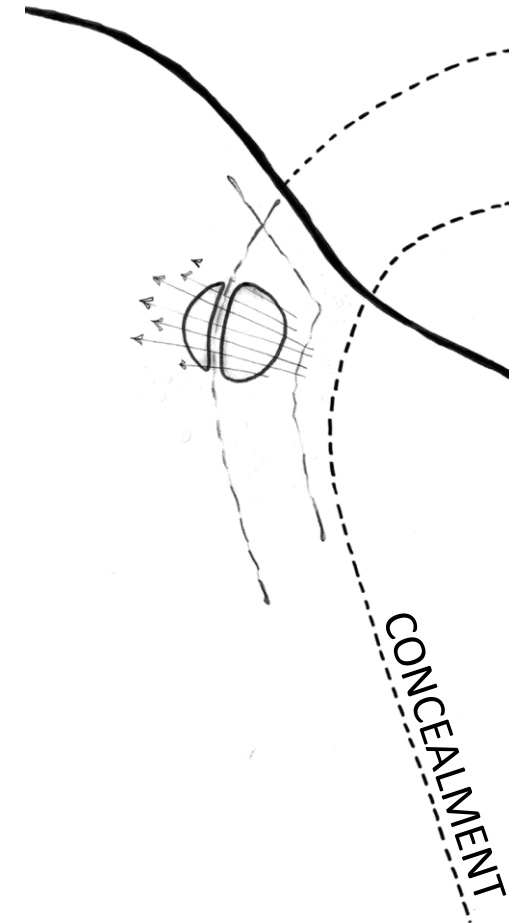


Figure 4.7: Early Design Concept Sketch of Concealment

In comparison to architecture, the control of temperature and the presence of light play an important role in the overall experience of a building, while also strongly influencing its users. This overall experience, generated by an architectural response, therefore has a major impact on the metamorphological sequence of natural and its human counterparts.

The larvae have the main purpose of feeding to become large enough for the production of cocoons and strong enough to survive the metamorphosis stage. The larvae and mature worms are armoured with poisonous spikes or "hair" that sting when touched (Van der Merwe, 2015). These hairs act as the worm's second skin, leading to its distinct local name. The use of a protective skin is common among many insects in the biological realm. It also influences humans, who can utilise such a second skin as a man-made type of protection. This second skin is required by humans and insects to assist in their metamorphological processes, which for the *Gonometa Postica* would be to spin a cocoon.

After the worm has reached the limits of its growth, it ceases to eat, changes colour, diminishes in weight and starts spinning a cocoon. The silk glands are structured like tubes divided into posterior, middle and anterior sections. The anterior is very thin and leads to the spinneret in the head of the larvae, where the silk is excreted. Fibroin is secreted in the posterior and transferred by peristalsis to the middle section, acting as a reservoir.

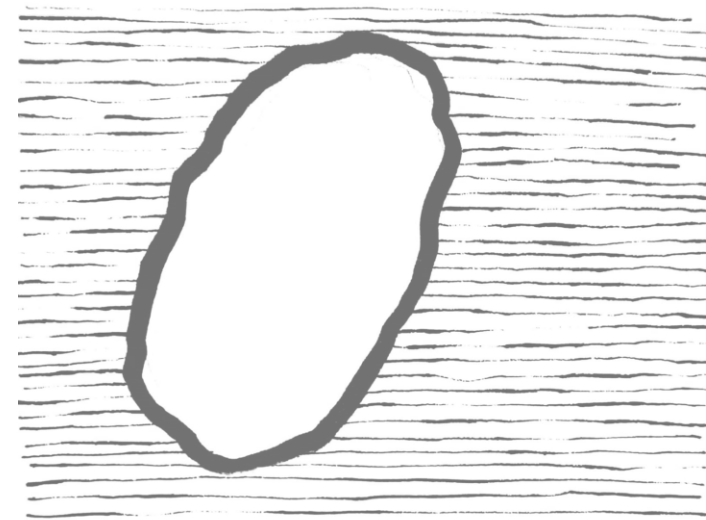
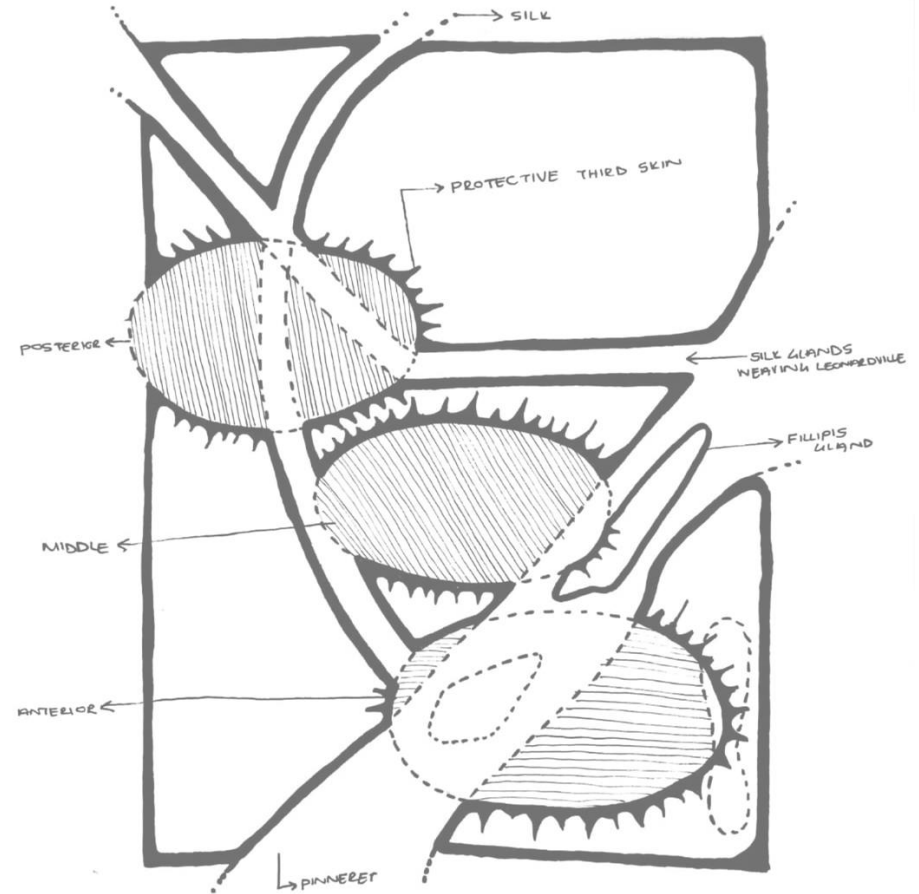
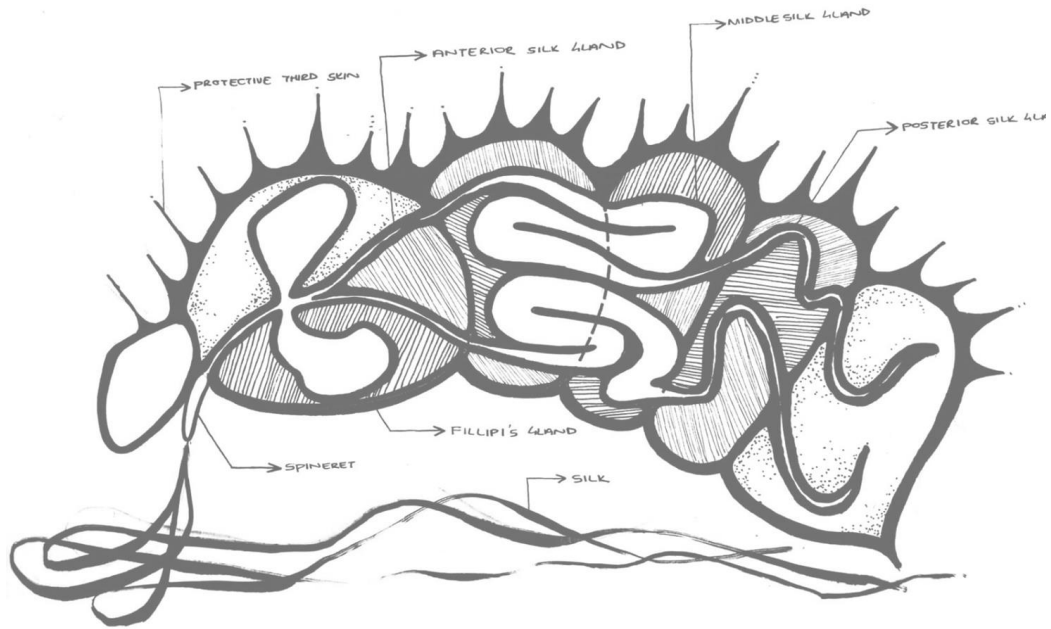


Figure 4.8: Cocoon Concealing the Metamorphosis Cycle

The silk is stored in the reservoir as a viscous aqueous solution until it is required for spinning. The majority of the sericin is created within the walls of the middle section. The fibroin is stored in a weak gel state, and when it is spun it changes into a solid state with a liquid-crystalline order. The fibroin and sericin are reserved side by side in the middle section without mixing. The Fillips glands discharge a liquid protein, and consist of two long thick-walled sacs that run along the sides of the body and open in a common orifice (the spinneret or depositor) on the under-lip of the larvae. The spinning process starts when the worm draws out the thread of liquid protein (Van der Merwe, 2015). The biological layout of the *Gonometa Postica* consists of a number of chambers, service corridors and openings, allowing the biological body of the worm to be analysed as a building structure [or first skin] that is used to weave silk strands into architecturally woven cocoons.

The worm makes multiple back-and-forth movements with its head in the shape of a figure-eight to weave the cocoon, which is ultimately built up of many layers of silk. The fluids are hardened when they come into contact with air, and form a composite thread. It takes the silkworm three days to construct its cocoon with a single continuous silk strand, with a length ranging between 1000 to 1500m. After the cocoon has been completed, with the larvae encased in it, the larvae moult a final time, transforming into the pupa stage. The cocoon acts as a protective and comfortable layer [a third skin] that protects the moth pupae against microbial degradation and desiccation during metamorphosis.



Figures 4.9 & 4.10: Comparative Sketch between the *Gonometa Postica* and an Early Concept Sketch

The ellipsoidal cocoon has the smallest thickness at its two ends to allow the moth to break through after the metamorphosis cycle has ended, which lasts about two weeks. If the pupa is not destroyed, it secretes an alkaline solution that weakens the silk fibres, allowing the cocoon to be easily broken so that the moth can push its way out of the cocoon, leaving an opening in one end (Van der Merwe, 2015).

The *Gonometa Postica* moth is an egg-eating moth with brown forewings with a defence system of poisonous hair on its body. The moths are nocturnal and emerge without functional feeding mouthparts. Their brief lifespan usually lasts between three to five days, after which the cycle repeats itself (Van der Merwe, 2015). The end of the worms' cycle acts as the catalyst for the beginning of the social cycle, since the weavers start their sequence when the first empty cocoon hits the red sand.

The lifecycle of these worms has been studied by MIT Medialab's Mediated Matter Group, where the team was fascinated with the ability of the worms to '3D-print' structures. They investigated the possibility of the design and construction of a pavilion by thousands of worms.

4.3.2 SILK PAVILION BY MIT MEDIALAB'S MEDIATED MATTER GROUP

The Silk Pavilion by MIT MediaLab's Mediated Matter Group explores the relationship between digital and biological fabrication.

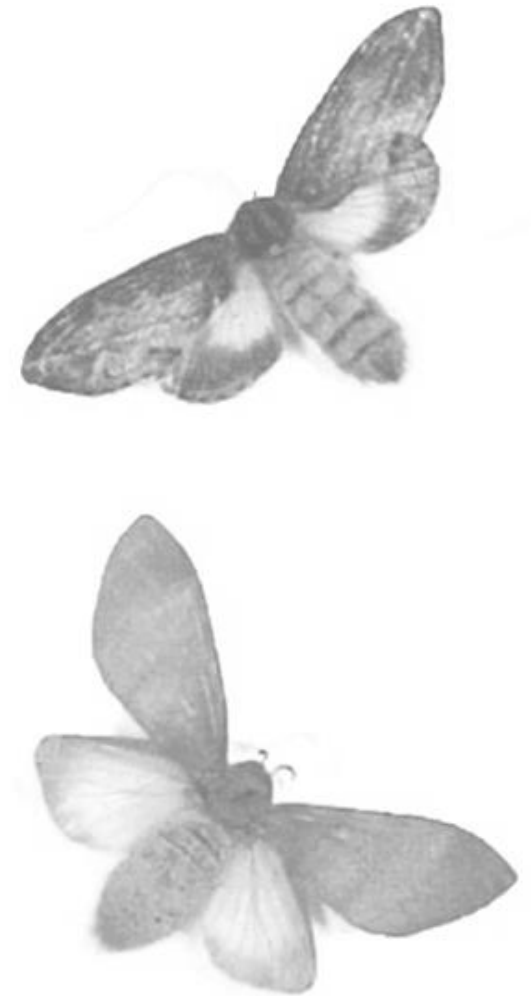


Figure 4.11: *Gonometa Postica* Moths
(Veldtman, 2005: online)

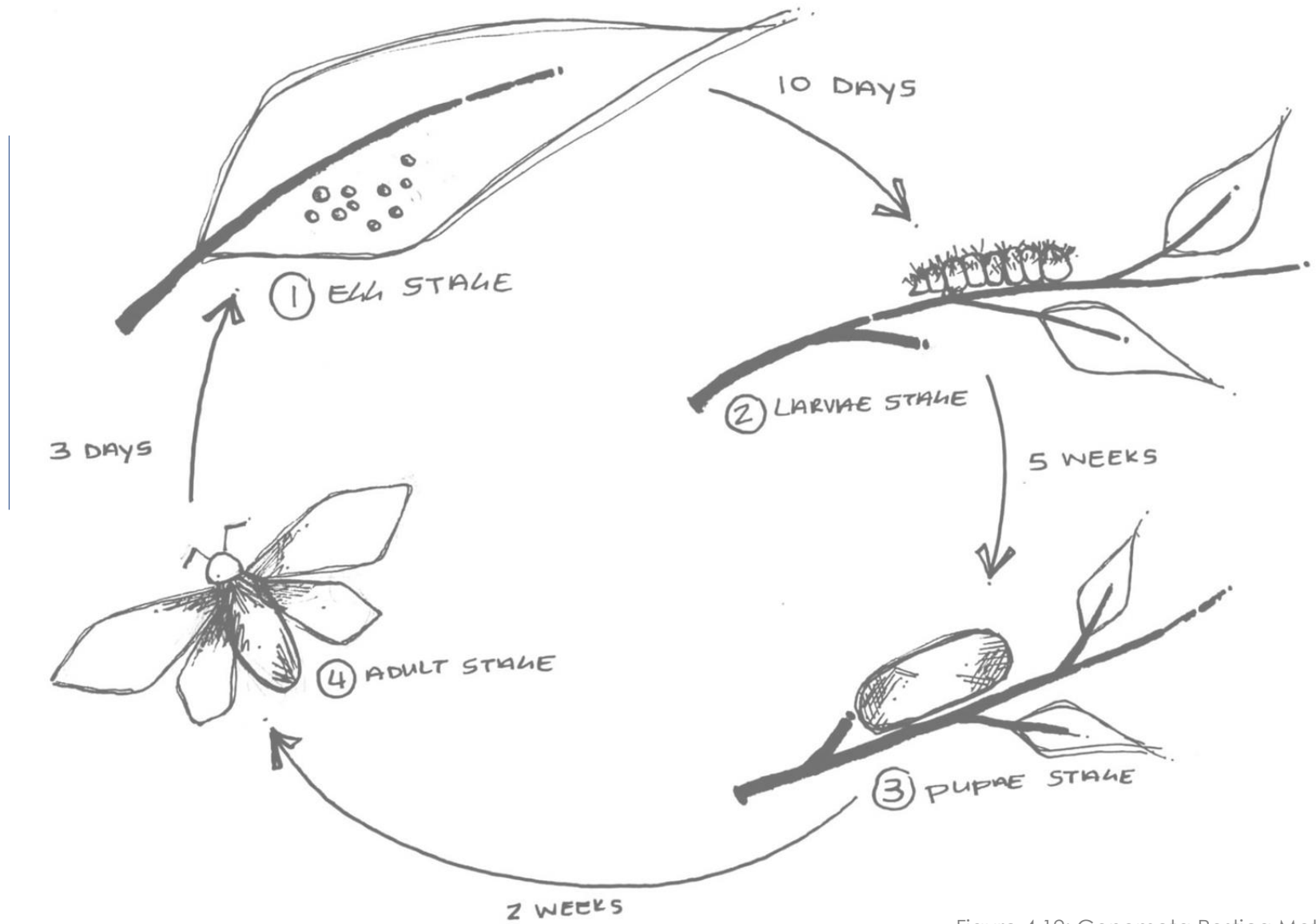


Figure 4.12: Gonometa Postica Moth Lifecycle

The design was created through an algorithm that assigned a single thread across patches with varying densities. This structure was then further reinforced through the silk from 6 500 silkworms (Hu, 2013).

The pavilion has a dual purpose. It is used to demonstrate the feasibility of using silkworms to spin raw material at such a large scale without doing any harm to the natural process of the silkworm in the form of traditional sericulture, and to explore biomimetic architecture (Hu, 2013).

The inspiration for the pavilion emerged from the question of how to extract silk without boiling cocoons to sustainably enable methods for spinning, weaving, making, and building in the Anthropocene age. The pavilion, therefore, aimed to answer the question of how we as humankind can collaborate with other species, such as silkworms, to construct objects, products, and buildings (Oxman, 2020).

The pavilion was spun through the design of an integrated kinetic mandrel that simulated the natural spinning motion of silkworms in a clockwise rotation to fuse together the natural and technological aspects of silk spinning. The second pavilion made use of 17 532 silkworms (Oxman, 2020).

The pavilion was initially constructed horizontally, with constant mechanical manipulation allowing the structure to rotate clockwise. The fibre density across the surface of the structure varied depending on local environmental factors such as the direction, duration, and intensity of heat and light, and the topology of the kinetic hyperboloid, guiding the movement of the silkworms.



Figure 4.13: Silk Pavilion Process (Stott, 2013: online)



Figure 4.14: Silk Pavilion Construction Detail (Stott, 2013: online)

The pavilion's primary structure is made of one-dimensional, braided steel-wire ropes, and is covered in an intermediate knit yarn layer that supported the silkworms during their spin cycle. The silkworms were placed on the rotating structure to manipulate the distribution of their silk. The holes present in the outer layer of silk happened because of a chemical reaction between the silk and the yarn (Oxman, 2020).

The design team further strengthened their study by doing a number of experiments to analyse each factor that influenced the quality and density of the silk (Oxman, 2020).

“How might we invent technologies to enable co-design, co-manufacturing, and co-habitation across species?” The team argued that their silk pavilions demonstrated how structures can influence silkworms to spin in sheets, allowing them to produce the same quantity of silk but in a way that did not disrupt their natural process. “The project illustrates how these compact and unique insects can act not only as living looms but as co-designers collaborating with humans to design and construct architectural-scale structures embodying co-fabrication for cohabitation” (Oxman, 2020).



Figure 4.15: Silk Worms Weaving The Silk Pavilion
(Stott, 2013: online)



Figure 4.16: Silk Pavilion in Progress
(Stott, 2013: online)

4.4 REVEAL

Reveal is the final stage of the sequence of developmental adjustments. It ends the cycle with a new beginning that restarts the entire process. In a biological context, the reveal stage refers to the moment that the *Gonometa Postica* moth emerges from the cocoon, revealing its newly developed morphology and restarting the cycle. Applying this stage to the architectural approach refers to the socio-economic impact that a design could have on developing new routines for the community of Leonardville, acting as an economic activator. The most important aspect of this stage is the metamorphological process of the weavers of the Kalahari Wild Silk Company.

The Kalahari Wild Silk Company uses its own cycles to produce silk scarves from the cocoons of the *Gonometa Postica*. The cycle of these weavers takes place in Leonardville in Namibia in a small shed-like structure that was built to be a storage unit for the church of Leonardville. The space has been developed by the ladies of the community in a way that allows them to conceal their metamorphological cycle within the building elements of their cocoon.

4.4.1 METAMORPHOSIS OF THE KALAHARI WILD SILK COMPANY

The metamorphological cycle of Kalahari Wild Silk starts with locals in the area gathering cocoons in large quantities and bringing them to the makery for which they are remunerated.

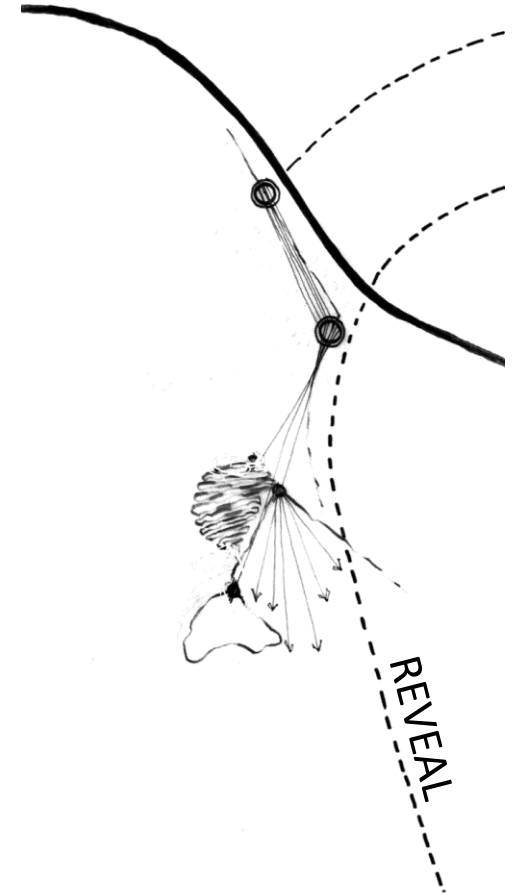


Figure 4.17: Early Design Concept Sketch of Reveal

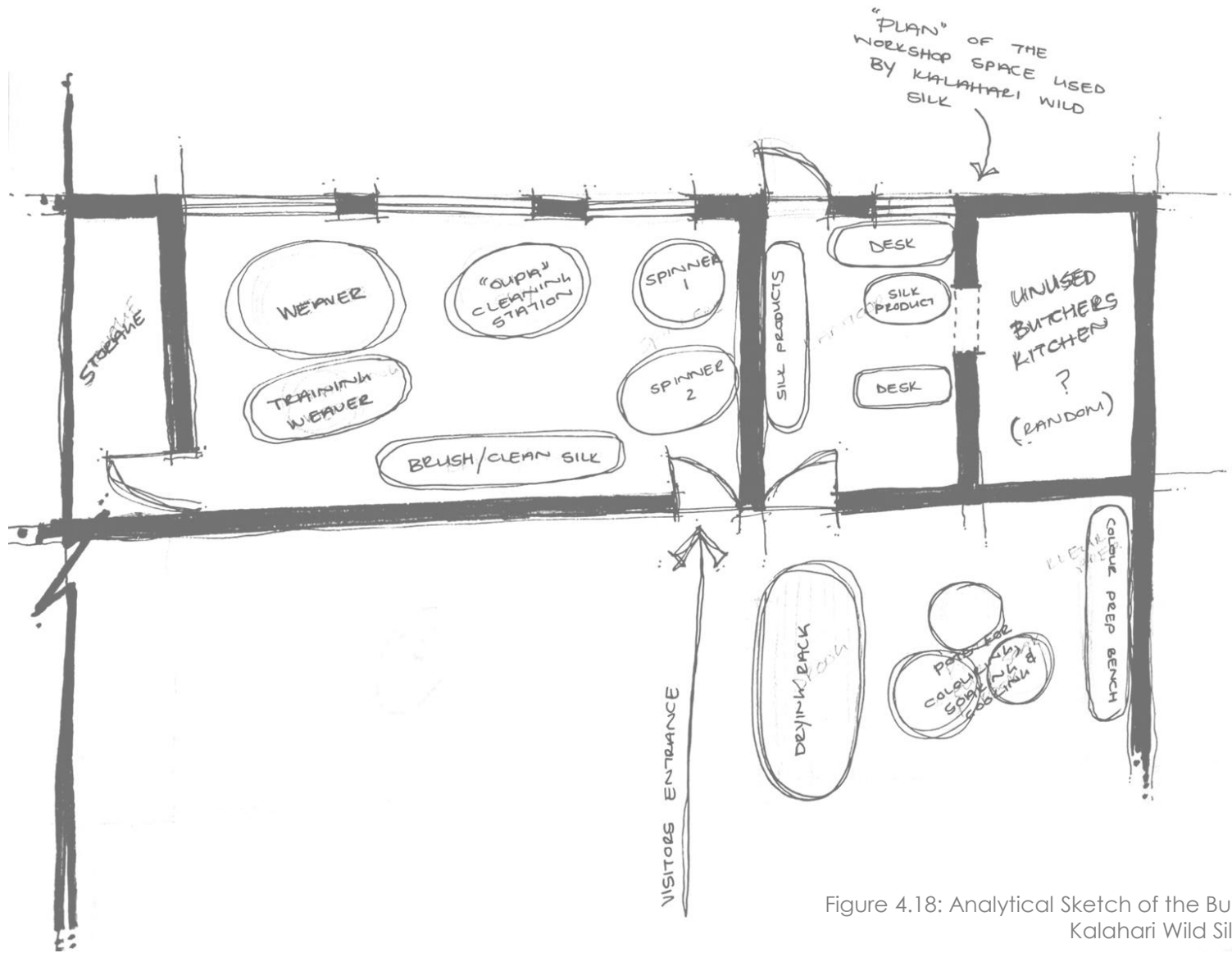


Figure 4.18: Analytical Sketch of the Building of the Kalahari Wild Silk Company

The makers have instilled a rule within the community that they do not accept any cocoons that have been broken off of trees or are still alive, but they will only accept cocoons that have fallen to the ground or carefully picked from low-hanging branches when it was clear that the cocoon was empty. The makers feel strongly about this rule to ensure that the low impact of the metamorphosis process is not disturbed by human intervention. They have decided to care for nature and act as gently upon it as the *Gonometa Postica* has done.

The cocoons of the *Gonometa Postica* are stocked in a small storage room connected to the main making space, where most of the process takes place. Cocoons are cut open with scissors and tapped to the side of a cardboard box to clean out the insides that have become filled with sand and leftover debris from the metamorphosis process. The clean cocoons are then placed in small mesh bags and boiled on an open fire in a large pot. After this, the wet cocoon bundles are placed on a wire rack to dry. The dried cocoon husks are then soaked in fabric softener to allow the cocoons to become workable by the spinners, who spin the silk into a thread that can start the process of human interpretation [their own version of the simple imitation of nature as discussed under heading 2.2]. The threads are braided into workable loads, which are then woven by a weaver who is able to weave three scarves in one day. This entire process is done in a shared space by ten women working together in a sociable manner.



Figure 4.19: Cocoons in Boiling Bags



Figure 4.20: Spinners of Kalahari Wild Silk

AFRICAN WILD SILK

PROCESS:

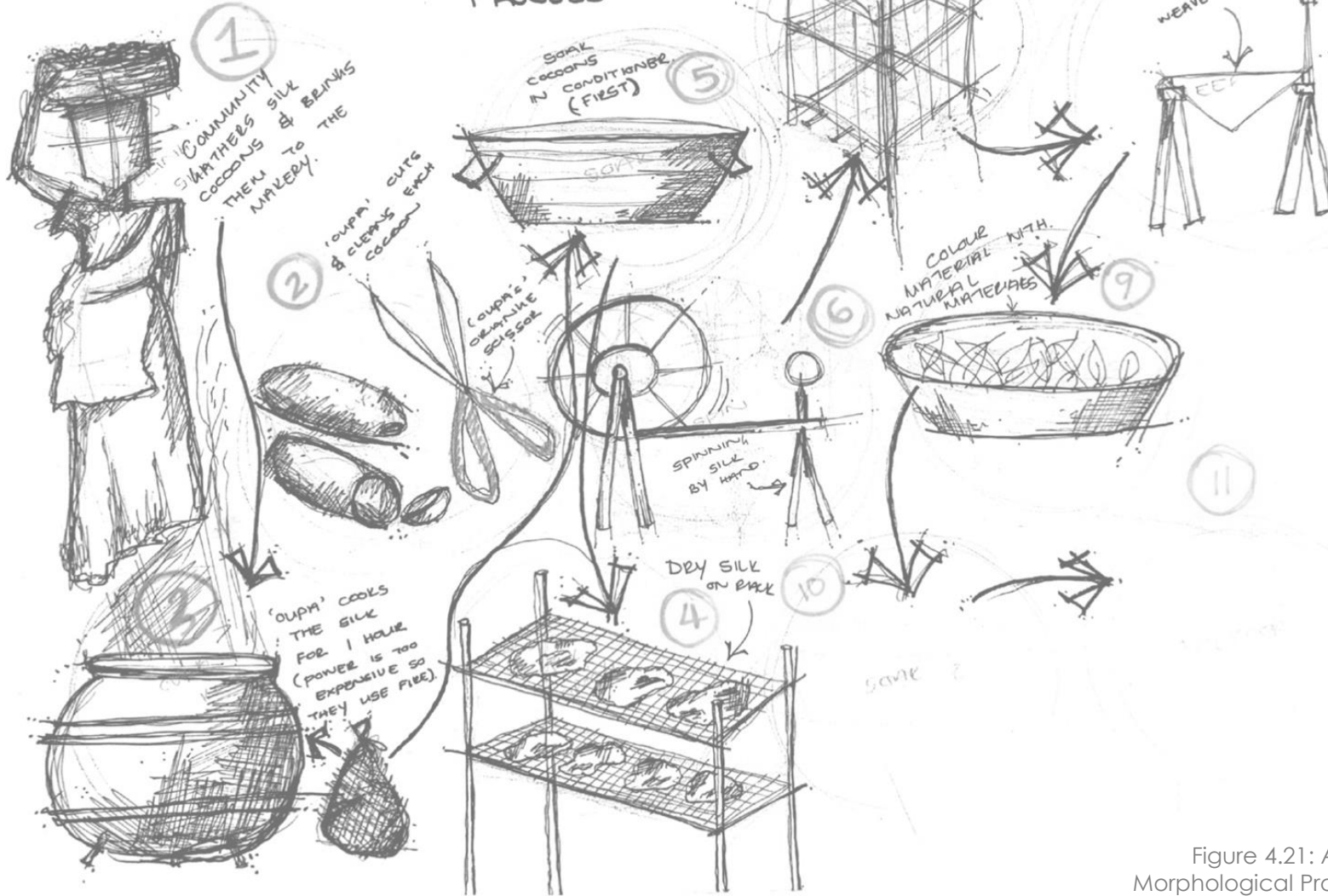


Figure 4.21: Analytical Sketch of the Morphological Process of Kalahri Wild Silk

The process then proceeds to the second level of art production, which is the manner in which the artist tangles their own interpretation into the artwork. This stage starts with the scarves being returned to the boiling room where different ingredients such as sage leaves and wild truffle flowers are prepared and boiled beforehand to lightly colour the water. The scarves are soaked for a third time, this time in naturally tainted water that adds a very light natural tint to the scarves. The scarves are then soaked in fabric softener for the second time before being hung to dry for the final time before being placed on display.

This discussed morphogenic sequence is echoed in the metamorphological cycle of the Kalahari Wild Silk Company and the Gonometa Postica, as both entities make use of an established cycle to design and construct a morphology. Both the process of Kalahari Wild Silk Company and the Gonometa Postica takes place in the town of Leonardville, Namibia, where the two disciplines form part of a larger metamorphological cycle that acts as a catalyst in the development of a sustainable design with the aim of an improved socio-economic state.

4.4.2 SOCIO-ECONOMIC INFLUENCE

Nina Maritz, writer and principal founder of Nina Maritz Architects in Windhoek, spoke about the meaning of sustainability in an online session titled *Design, Construction and Sustainable Spatial Processes*.



Figure 4.22: Braided Silk Threads



Figure 4.23: Woven Silk Scarf on Loom

She states that the dictionary definition of sustainability is “to strengthen or to support physically or mentally”, or “to be able to be maintained at a certain rate or level.” In order to achieve a sustainable design, one has to understand the impact that a building has on the economy, its users, the environment and the building's durability (Maritz, n.d.).

Socio-economic sustainability is a broad topic which needs to be approached from different dimensions such as socio-economic principles, the economy, the efficient use of local materials and the economic impact on local development. The use and establishment of certain socio-economic principles could benefit a sustainable development through encouraging the use of local materials and labour, and through sustainable local production. Economic aspects of a sustainable design require attention towards a design that is constructed through the combination of specific needs and values. The promotion of sustainable development would ensure an ecological balance through its influence on for example the revival of small industries of traditional local materials, and reducing the energy and transportation needs of certain materials. All of these can contribute to an overall positive impact on local development (Alcidor, Correia, Gomes, Juvanec, Lima, Mileto & Vegas, 2014).

Maritz states that conventional materials are not necessarily less sustainable, as sustainability is dependent on the typology, the user and the topology. She argues that a building might not necessarily be entirely sustainable. She argues that sand, as a widely available material in Namibia, could be used to construct walls and other design

features, but that there would still be a need for factory-produced items such as plumbing fixtures, glazing, door handles, etc. (Maritz, n.d.). A building is therefore not expected to be 'completely sustainable' to the extent that it would degrade within a couple of centuries due to natural materiality. The aim is rather to produce a building that takes into consideration the needs and requirements of its users, and its local conditions and resources, to design a structure that barely impacts the environment but highly impacts the local socio-economic state.

Maritz concludes her discussion by providing a thorough definition of adequate housing [or adequate architecture to my interpretation] by stating that it should provide security and services, be cost-efficient, habitable, accessible and well-located, and also culturally appropriate. She continues by stating that Namibia has an aesthetic prejudice that is often present in conversations about informal settlements. She further argues that 'it is very important that we do not apply our preconceived ideas of what things look like aesthetically to the performance [of architecture]' (Maritz, n.d.). I agree that aesthetic architecture has a tendency to be appreciated above functionality, but I would like to argue that in correspondence with sustainable and socio-economic developments, an architecture that is constructed through local materiality, with local participation and an appropriate response to the environment, should aim towards a local aesthetic standard.

In agreement with Maritz, this standard should not be developed from a preconceived idea, but I argue that architecture should meet a local aesthetic requirement that is enhanced through the beauty of its functionality.

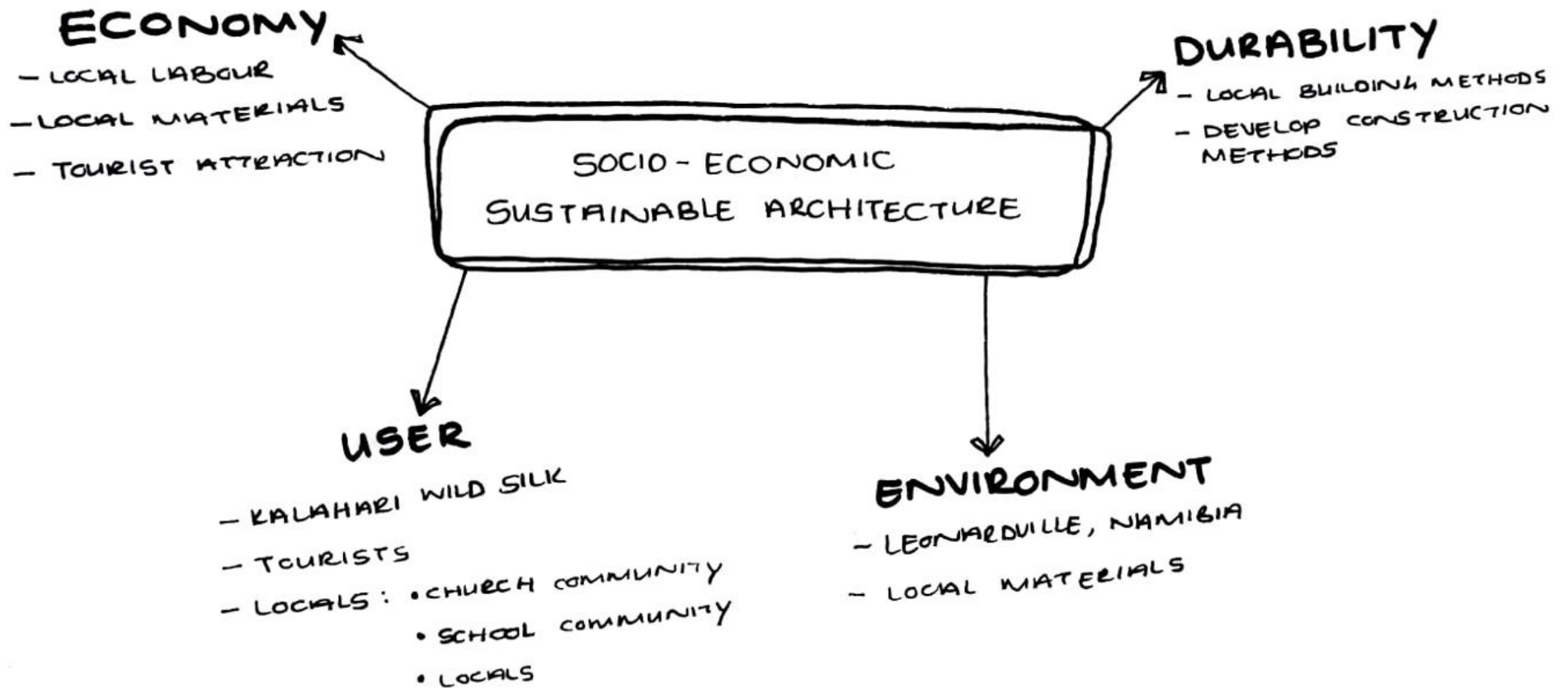


Figure 4.24: Diagram of Understanding of Socio-Economic Sustainable Architecture

4.5 CONCLUSION

The metamorphosis of a local aesthetic, sustainable and appropriate architecture begins its sequence of developmental adjustments with the metamorphological cycle of the *Gonometa Postica* moth, which influenced Kalahari Wild Silk and ultimately influenced the development of an architectural cocoon. The sequence of developmental adjustments required the attachment of the design process to a theoretical basis that could facilitate the understanding of metamorphosis and the development of a morphogenetic sequence in organic movement. The comprehension of such an attachment revealed three concepts that are required for the design of appropriate art. These in turn developed into the next stage of concealment, in this case the morphological stage. Concealment focused on understanding the *Gonometa Postica*'s morphological essence as a being in collaboration with the weavers of Kalahari Wild Silk and an architect, with a first and second skin in the developmental process of establishing a third. The reveal stage dissects the morphological processes of the weavers at Kalahari Wild Silk as an important factor in the understanding of the users' needs in order to achieve an appropriate architectural language that weaves the rural community of Leonardville together through metamorphosis.



Figure 4.25: Cocoons of the *Gonometa Postica*



STAGE 5: CONSTRUCTION PRECEDENT STUDY

5.1 CASA BALLENA ART CENTER BY RIMA DESIGN GROUP

The Casa Ballena Art Centre was built in Mexico in San Jose Del Cabo by the RIMA Design Group in 2019. The building is designed to be used as a studio and exhibition space for Mexican as well as international artists (Ott, 2021: online).

5.2 CONTEXTUAL RESPONSE

The design of Casa Ballena was greatly influenced by the topography of the landscape. Casa Ballena emerges from the excavation of earth on site, which allows the design to play with a variety of heights, thus enhancing the landscape by framing different views through a contrast between internal and external spaces.

5.2.1 ENVIRONMENT AND MICRO-CLIMATE

The excavated earth was reused through the construction of rammed earth walls (Ott, 2021: online), allowing an introduction of sensitivity within the design. The use of rammed earth walls in an area such as Mexico does not only introduce the unique colour and texture on site to the building, but also allows for the creation of micro-climates that are necessary for climatic control. The walls further add a sound isolation barrier to the studios and workshops (Ott, 2021: online).

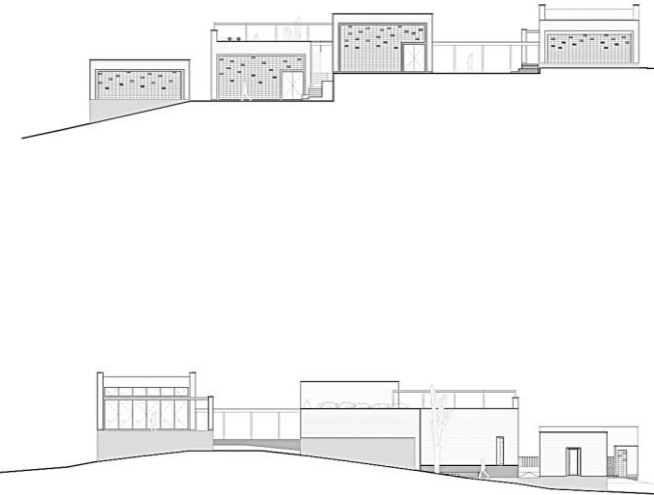


Figure 5.1 & 5.2: Casa Ballena Art Center Elevations (Ott, 2021).

The design is strongly focused on the relationship with nature. It includes the terrain within the design by allowing the formation of internal and external spaces, thus bringing privacy to the required functions (Ott, 2021: online).

5.3 FUNCTION

The building houses three workshops, an exhibition space, multi-purpose patios, an administrative area, dining and living halls, warehouses, and a large natural area that allows native vegetation to be sheltered (Ott, 2021: online).

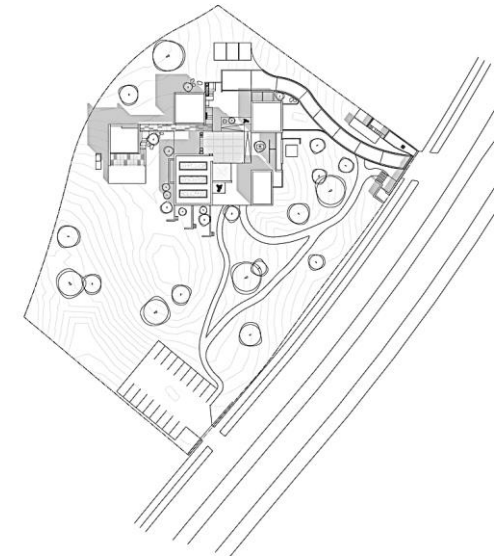


Figure 5.3: Casa Ballena Art Center Site Plan (Ott, 2021).

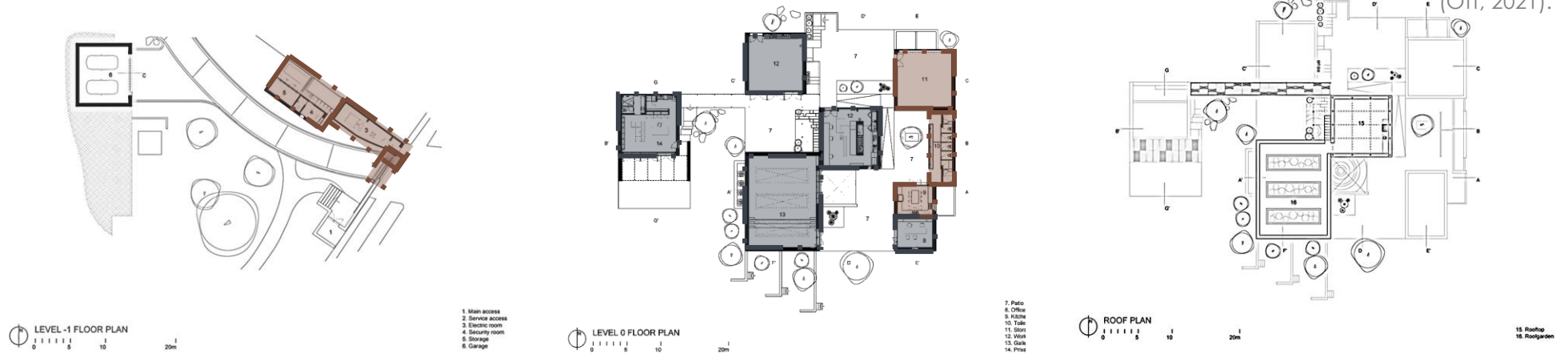


Figure 5.4, 5.5 & 5.6: Casa Ballena Art Center First Floor, Second Floor and Roof Plan (Ott, 2021).

The orientation of the building is designed according to its various functions. The workshops are positioned north while the living and dining halls, the administrative area, and future residences face south. The variety of zones within the design provide shade through different patios, and respond to the privacy needs and requirements for each public or private designated area (Ott, 2021: online).

5.3.1 USER BEHAVIOUR

The gallery is North-South oriented, with the design of the roof allowing for natural overhead lighting, which provides the desired lighting for the exhibited art works. The design further allows the same lighting to be present within the artists' workshops to assure the artists the same quality of light during the creation and exhibition process (Ott, 2021: online). The workshops provide for a variety of artforms to be practiced, such as painting, typography, and print (Klein, 2020: online).

The main patio is enclosed by the workshops and gallery, and includes a work and contemplation space that enhances the user-friendliness of the space through the inclusion of a water mirror. The patio allows access to the gallery's rooftop, which acts as a lookout point and botanical garden. The layout design of endemic grass planters acts as a structure that enhances the light quality within the gallery (Ott, 2021: online).

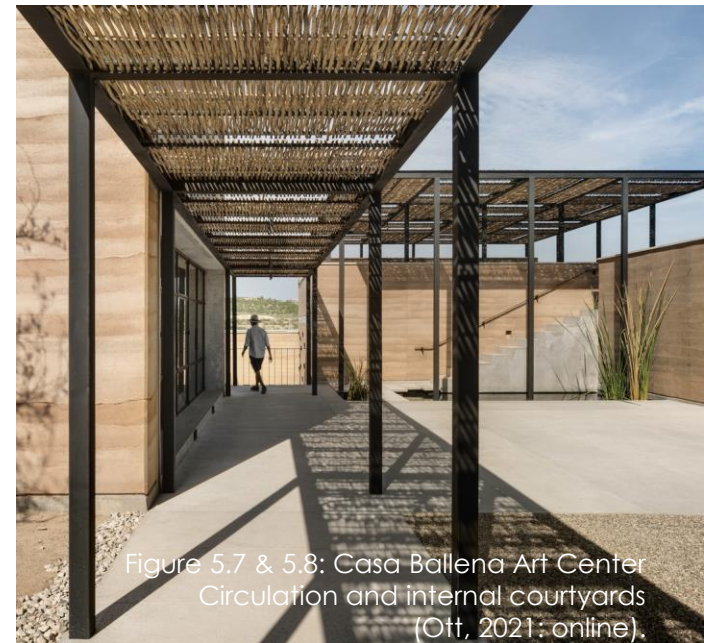


Figure 5.7 & 5.8: Casa Ballena Art Center
Circulation and internal courtyards
(Ott, 2021: online).

5.3.2 CIRCULATION

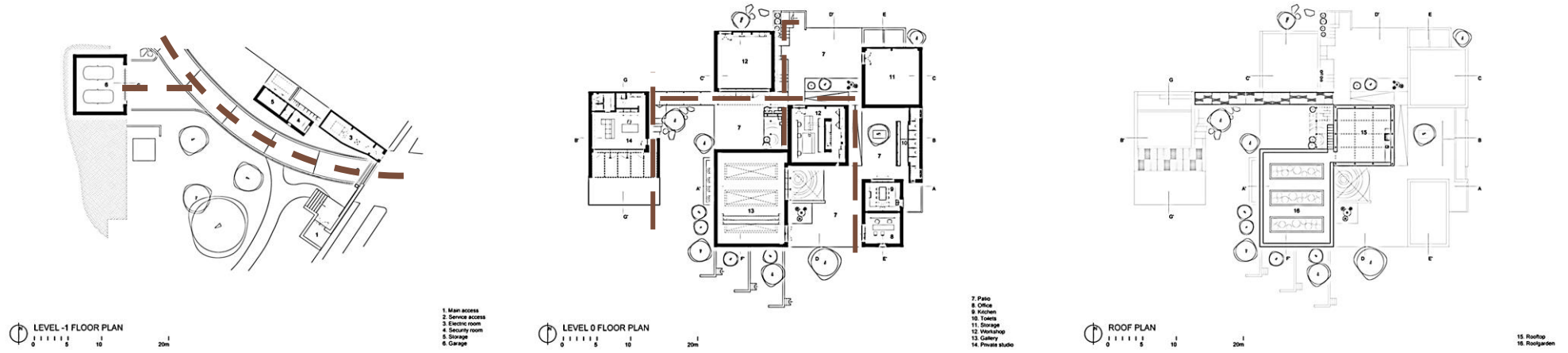


Figure 5.9, 5.10 & 5.11: Casa Ballena Art Center Circulation (Ott, 2021).

5.4 STRUCTURAL SYSTEM DETAILS AND MATERIALITY

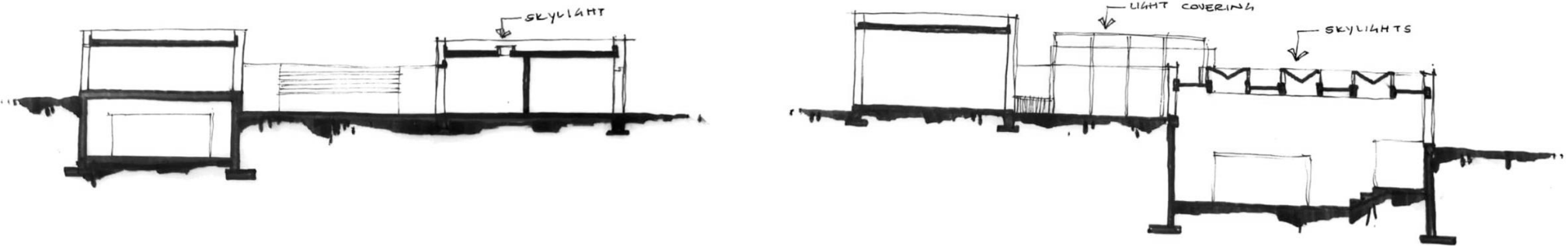


Figure 5.12 & 5.13: Casa Ballena Art Center Sectional Investigation



Figure 5.14, 5.15 & 5.16: Casa Ballena Materiality (Ott, 2021).



Figure 5.17: Casa Ballena Art Center (Ott, 2021).

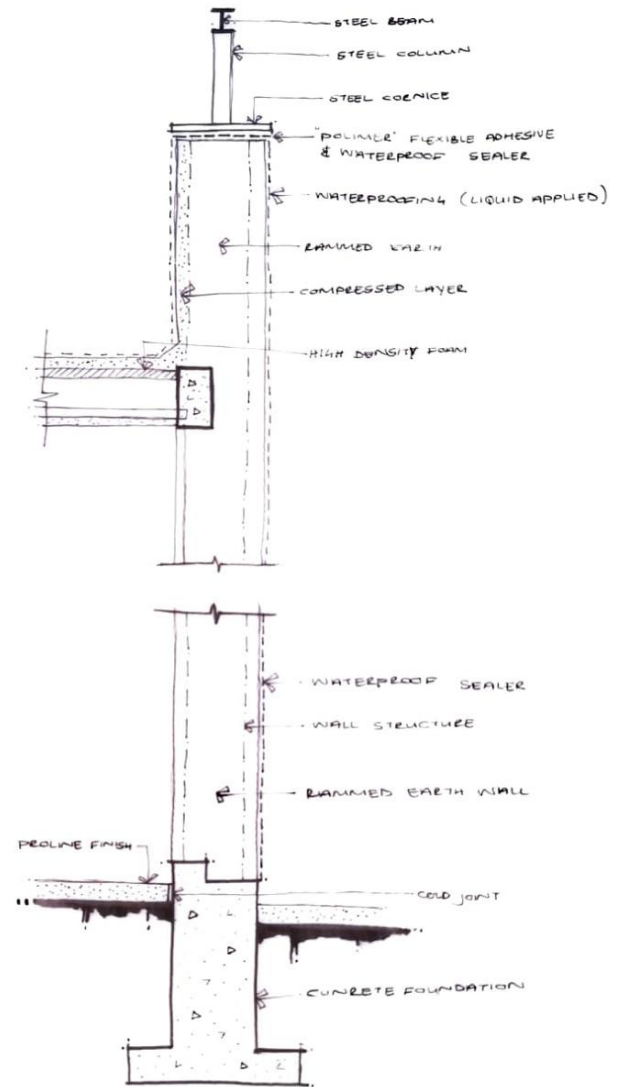


Figure 5.18 & 5.19: Earth Construction Detail of Casa Ballena



STAGE 6: DESIGN PRECEDENT STUDY



Figure 6.2: Cassia Coop Training Centre
(Cifuentes, 2012:).

6.1 CASSIA COOP TRAINING CENTRE BY TYIN TEGNESTUE ARCHITECTS

The design of the Cassia Coop Training Centre started with a story from a businessman who carried his briefcase filled with cinnamon to the architects in Indonesia and told them of an area in Sumatra, where he is from, that supplies 85% of the cinnamon consumed worldwide. He told them about underpaid workers without rights in unsanitary and unsafe factories, and of the need for a sustainable cinnamon school for the local farmers and workers.

The project focused on the basis of ethics, inspiring the design team to incorporate the same concept into the design of the building (Cifuentes, 2012: online).

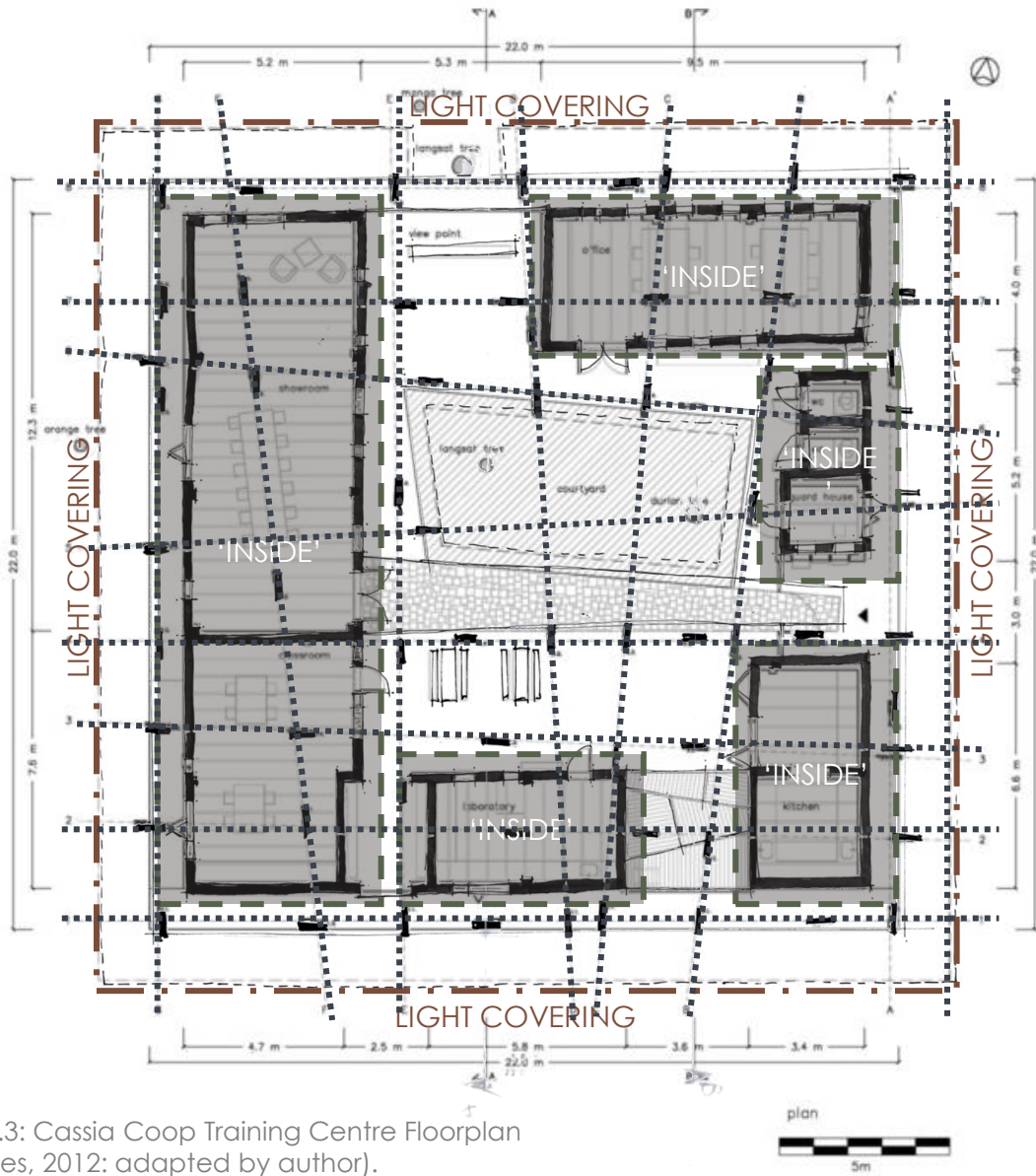


Figure 6.3: Cassia Coop Training Centre Floorplan (Cifuentes, 2012: adapted by author).

The design focuses on the concept of a lightweight wooden construction, replicating the feeling within a cinnamon forest, fixed to a heavy base of concrete and brick. The design makes way for two big durian trees in the courtyard of the building, adding to the scenic quality of the building in its environment.

The design team strongly focused on creating a naturally ventilated climate beneath the roof through the use of thermal mass and the reduction of sunrays and maximised eaves.

The building is constructed through the use of mainly two materials, namely, locally crafted brick and the trunk of the cinnamon tree, which is not a popular material of choice in the area. However, the design team decided to incorporate the use of this by-product within a variety of elements of the project (Cifuentes, 2012: online).



Figure 6.4, 6.5 & 6.6: Cassia Coop Training Centre Interior (Cifuentes, 2012).

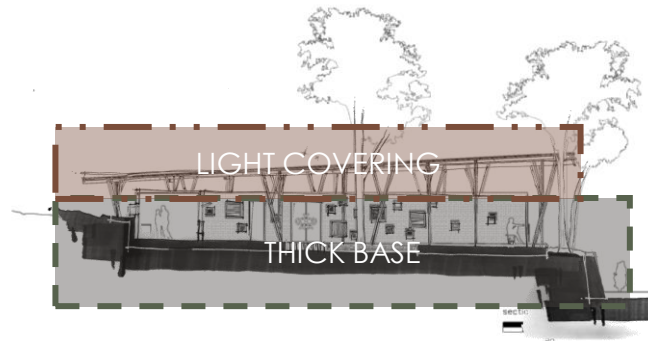
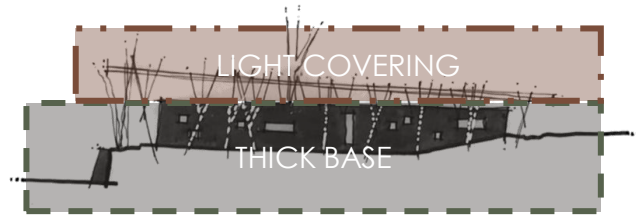
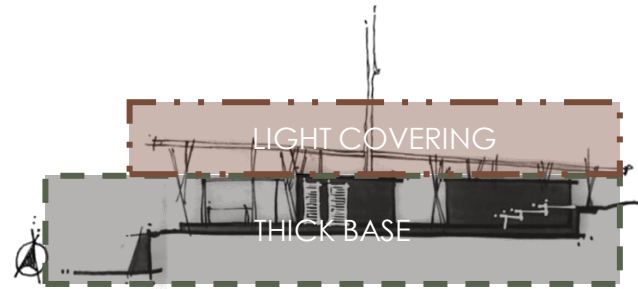


Figure 6.7 & 6.8: Cassia Coop Training Centre Elevations (Cifuentes, 2012: adapted by author).

The main element of construction is a mass-produced Y-pillar that is bolted down on a concrete footing and placed throughout the design. The pillars secure other construction elements to each other and keep the entire roof surface in place. The roof structure acts as a covering for five brick buildings that house a small laboratory, classrooms, offices, and a kitchen (Cifuentes, 2012: online).

The construction of the building was its largest challenge, as the workforce comprised seventy people from the area and eight water buffalo. The design of the project therefore had to accommodate these constraints, which resulted in an uncomplicated project design through ten simple details that was constructed through a basic programmatic approach (Cifuentes, 2012: online).

6.2 GAME LODGE

BY SLEE & CO ARCHITECTS

Slee & Co Architects strive towards built structures that reflect simplicity and honesty and that echo the vernacular of the local buildings. The game lodge greets its user with a red earth wall. The building emerges out of the red earth as a solid mass, casting shadows and simple lines into the surrounding veld scattered with thorn trees (Abdel, 2020: online).

The red sand found on the farm is mixed with cementitious plaster to render the walls of the same colour as the landscape. The wall is textured with horizontal lines that create a shadow play to draw the eye into the landscape (Abdel, 2020: online).

Figure 6.9: Game Lodge
(Abdel, 2020).

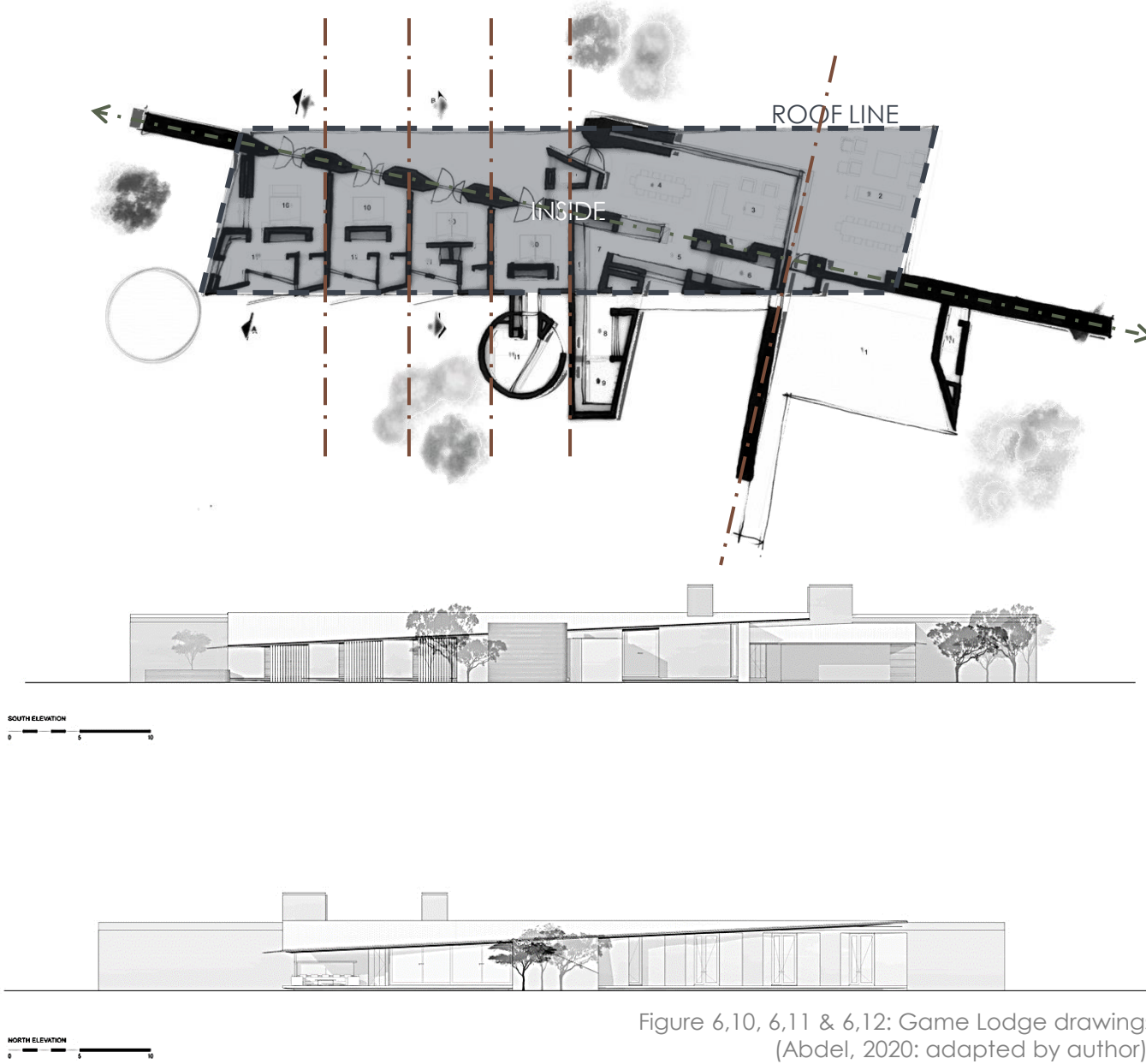


Figure 6,10, 6,11 & 6,12: Game Lodge drawings (Abdel, 2020: adapted by author).

The design makes use of a cantilevered roof that folds over the building to protect an oversized verandah. The materials of the lodge include corrugated roof sheeting, natural red sand-coloured plastered walls, cement floors, and glass doors that disappear into the walls when opened up (Abdel, 2020: online). The incorporation of oversized verandahs and penetrated walls allows the boundary between interior and exterior to be blurred, creating a coherence between nature and man-made elements within the site.

PRINCIPLES LEARNT:

- Ablution Layout
- Service Layout
- Design in a Namibian Landscape
- Design with Diagonal Lines
- Layout in Diagonal



STAGE 7: BRIEF DEVELOPMENT AND PROGRAM

7.1 BRIEF & PROGRAM DEVELOPMENT

This dissertation is divided into two parts. The first phase of the project focuses on the design of a silk makery for the ladies of the Kalahari Wild Silk Company who were in need of a maker space that embraces their metamorphological process as well as a retail unit that encourages the growth of their business.

The second part of the project is the community square which, in combination with the restaurant on site, attract local inhabitants and tourists to the area in a shared communal space in the center of the town.

The entire project requires a design that is focused on the sustainability thereof, since resources are scarce and there is very little allowance for maintenance.

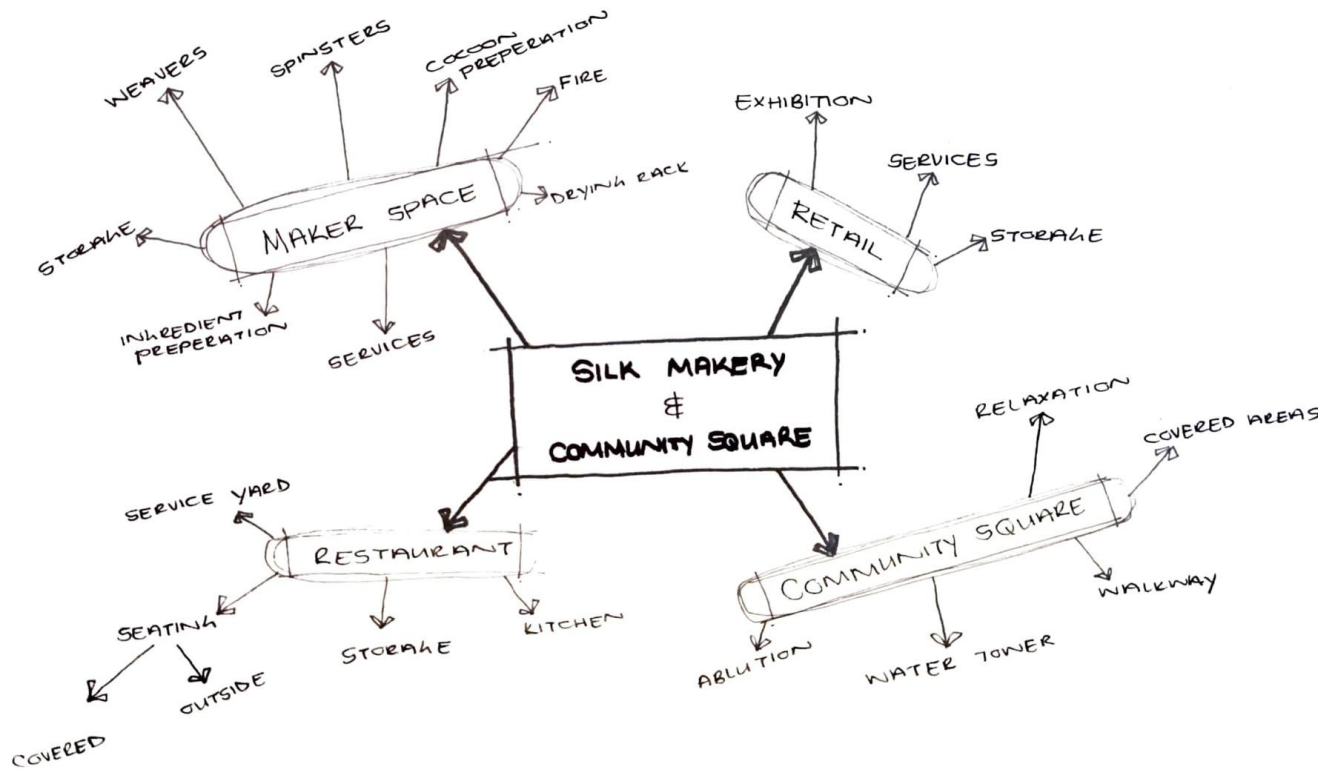


Figure 7.2: Brief Development and Program Diagram



STAGE 8: DESIGN DEVELOPMENT

8.1 INTRODUCTION

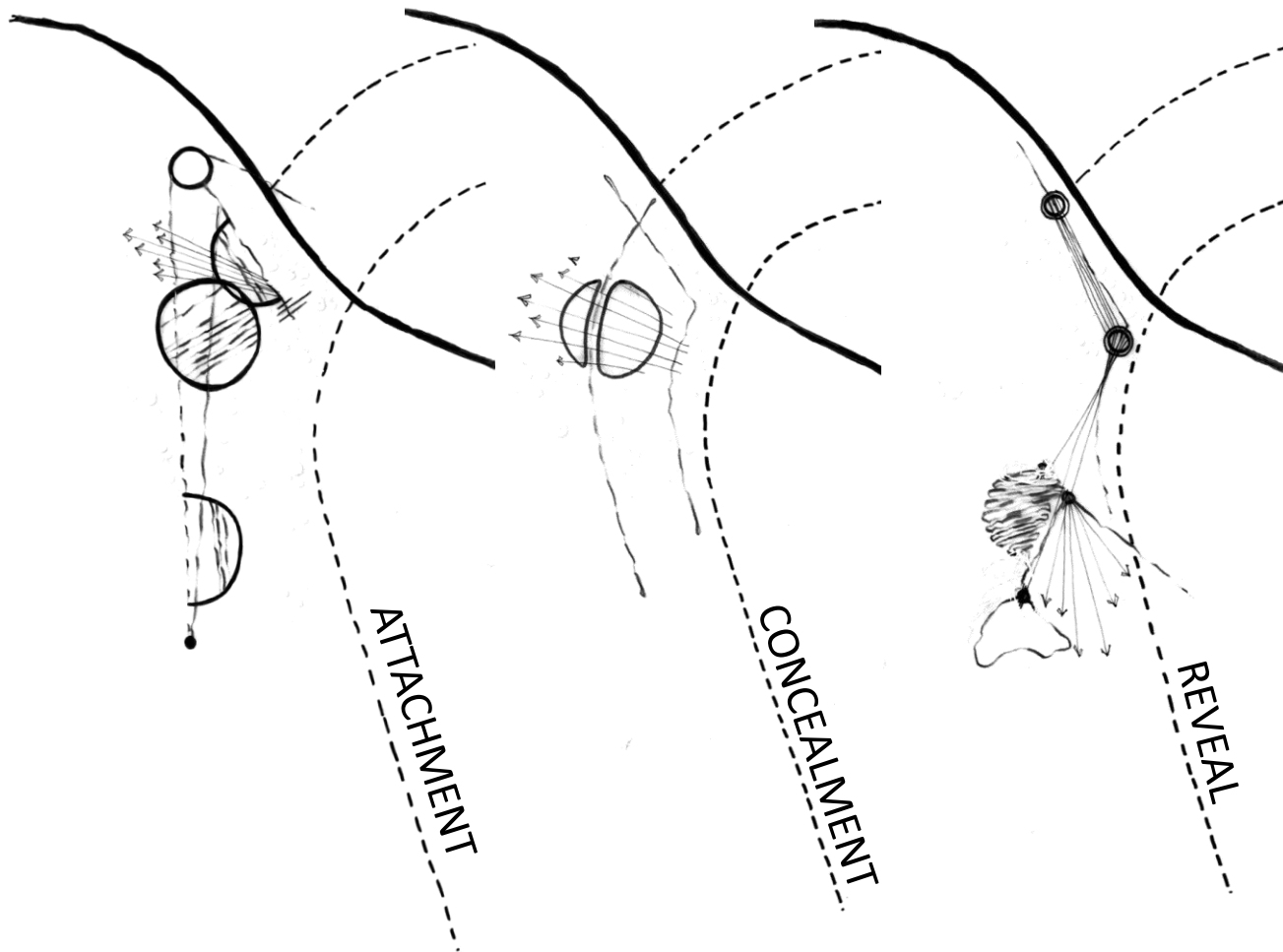
The design of the project was strongly influenced by the metamorphological cycles of the *Gonometa Postica* and the ladies of Kalahari Wild Silk, and establishes the design development of a building as a metaphor for the metamorphological cycle thereof. This section of the dissertation explains the process of metamorphosis for the project as a whole, as inspired by the three concepts of attachment, concealment, and reveal (refer to Figure 10.3).

8.2 FIRST APPROACH

The dissertation started with a client and a brief. These two elements were decided long before a site was chosen for the project, which meant that the choice of site would become a crucial part in the development of the project.



Figure 8.2: Photograph Indicating the Site and Surroundings (Google Maps, 2017; adapted by Author).



The first site was located on the North Western edge of Leonardville on a large open field with a view over the valleys of the Nossob River (refer to Figure 10.2).

The site would enhance the three concepts of the dissertation by allowing the theoretical presence of each concept to be visible in the design.

The cocoon-like building would be attached to the town layout as a cocoon would attach to a tree. The cocoon would then conceal the maker space inside of it, embracing it through the metamorphological process of Kalahari Wild Silk. The reveal takes form in a metaphorical way through the exhibition-based identity of the building, as well as through the influence of the building typology (refer to Figures 8.4 to 8.14 for the first development).

Figure 8.3: Three Concept Sketches

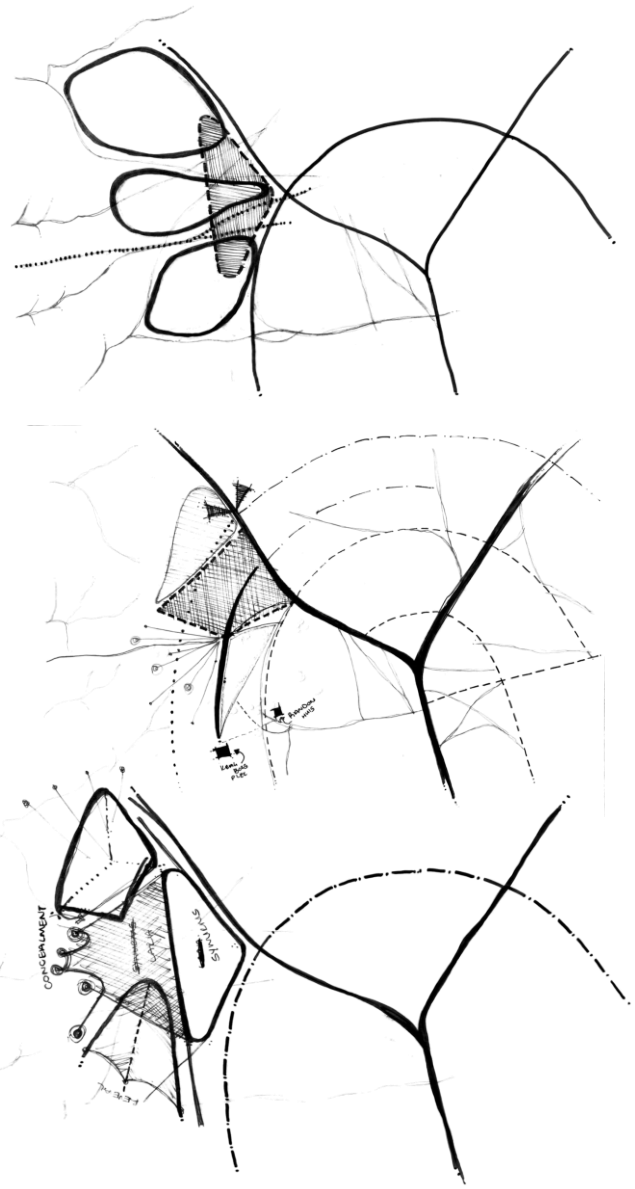


Figure 8.4 – 8.6: Site Development Sketches

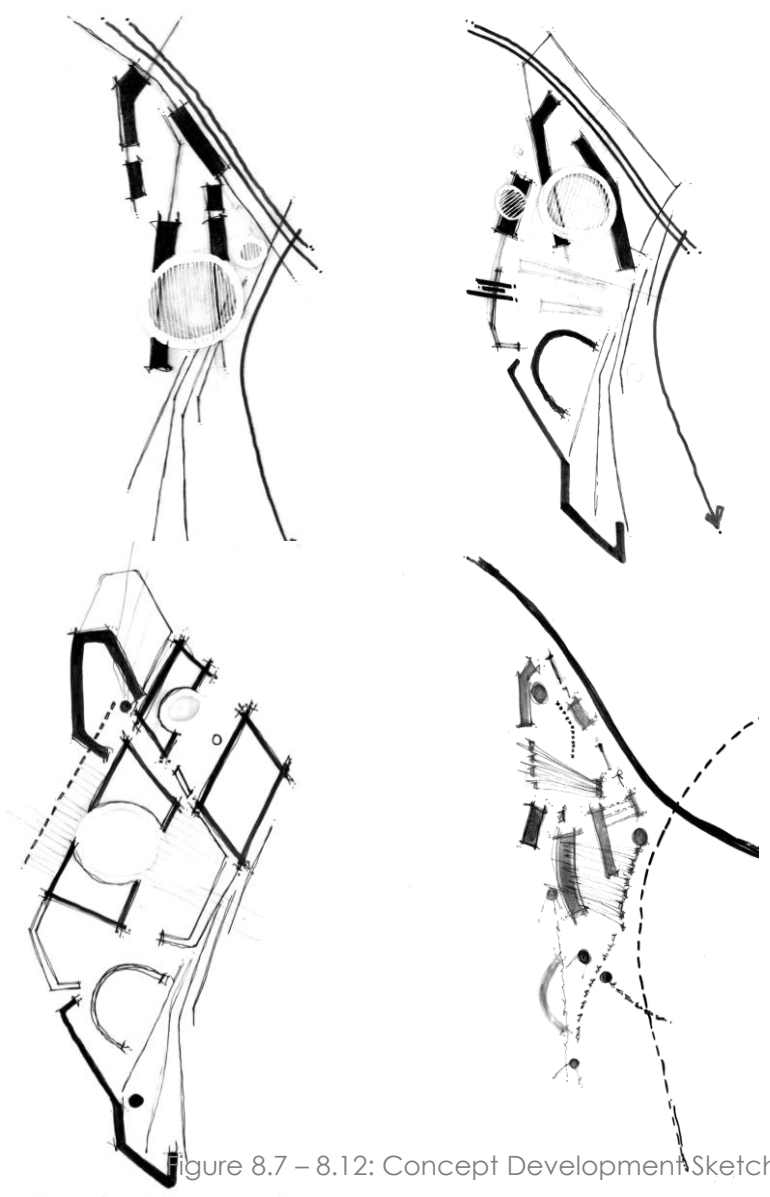
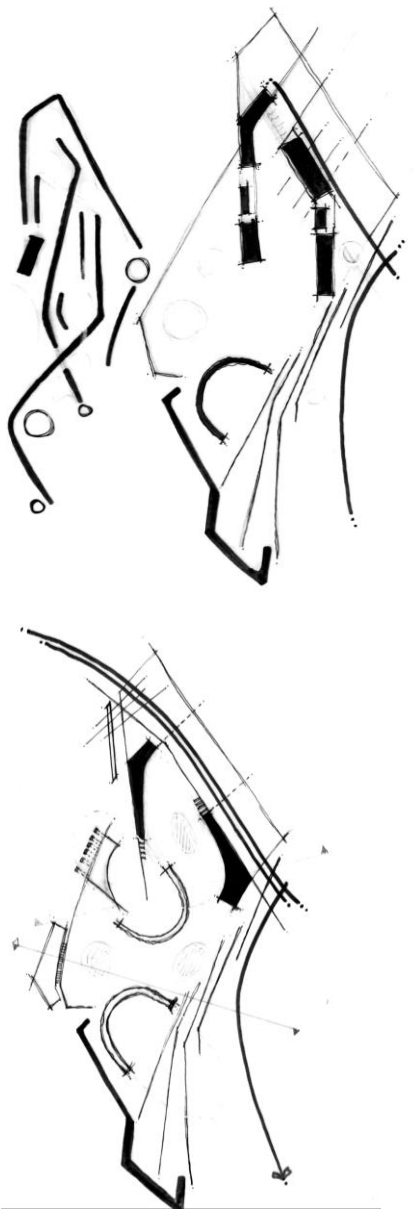
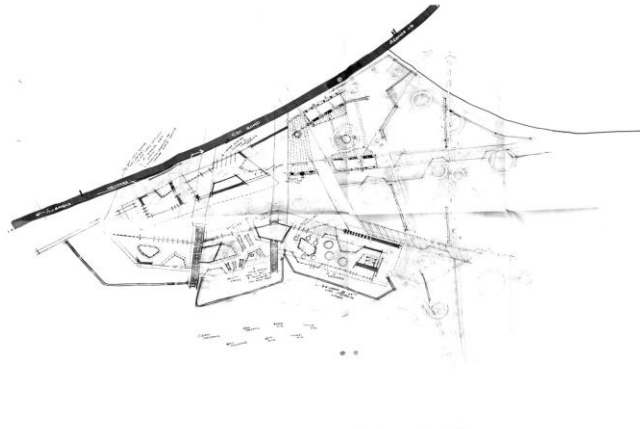
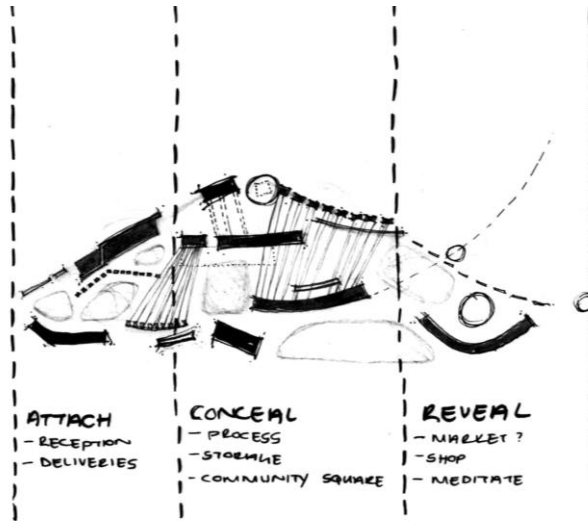
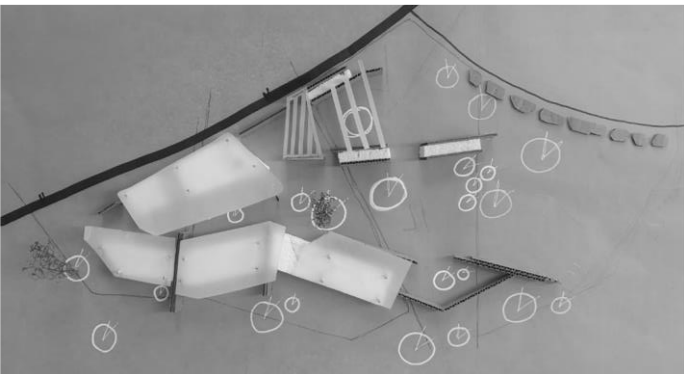
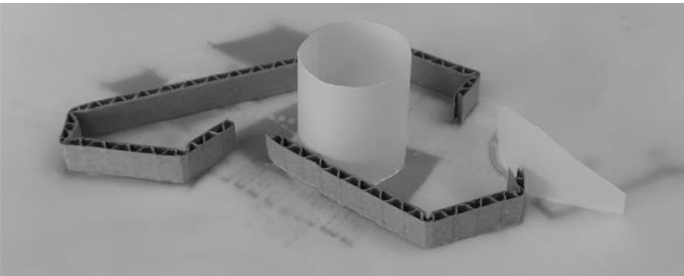
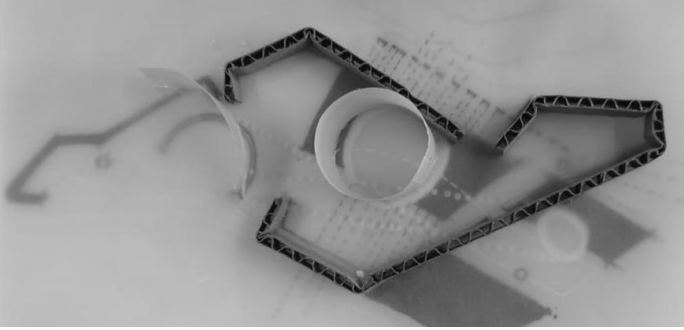


Figure 8.7 – 8.12: Concept Development Sketches



The first attempt was successful in the manner in which it made way for the inclusion of all three concepts in the design application of the building. This strong notion was kept throughout the dissertation and applied to the final project as well.

It became apparent during the design process of the first attempt that, although the project has come to a conclusion on the spatial requirements and program, it was at too grand a scale to be accommodated in Leonardville, which rendered the design insensitive.

The program of the project also started adding the accommodation of a community square that was too far out of the town's center to be useable or practical. The design was therefore moved to a different site.

Figure 8.13 - 8.17: Development of the First Design Approach

8.3 SECOND APPROACH

The final site (refer to Figure 8.18) was chosen due to its locality within the town. The site is located next to the church, and across the street from the school and the corporation.

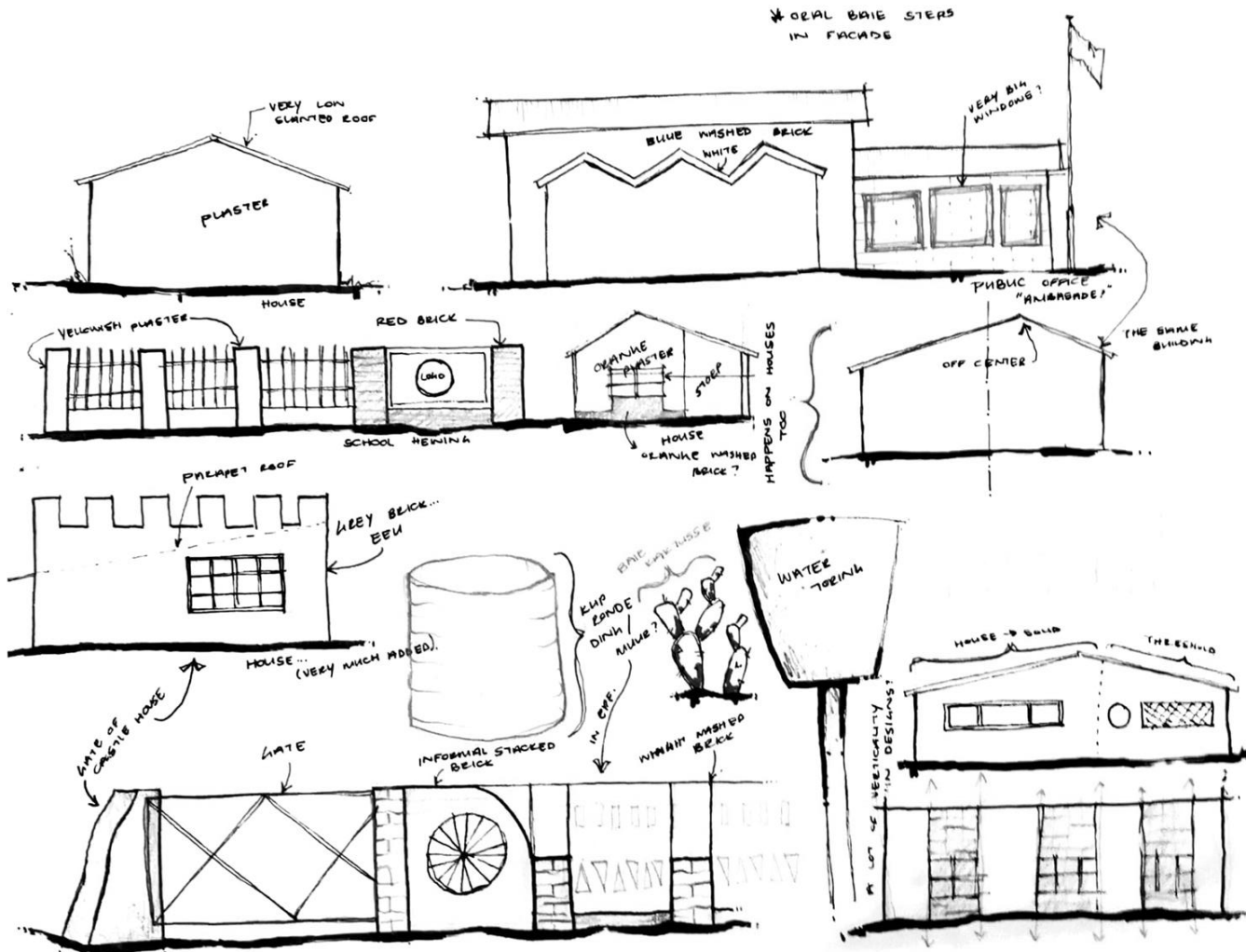
The design of the second attempt was based on a more urban approach to include all necessary surrounding developments into the design due to its very central location.

The chosen site allowed the project to be more inclusive of the rest of the town, creating a tree-like development attaching itself to the numerous cocoons found within Leonardville.



Figure 8.18: Photographs Indicating the Site and Surroundings (Google Maps, 2017; adapted by Author).

8.4 MORPHOLOGICAL ANALYSIS



The design of the project required the analysis of the contextual architecture to allow a deepened connection between the new building and its existing surroundings.

The analysis of the surrounding context allowed for the identification of specific factors that aided in the morphological development of the project:

- Elevated base
- Off-center roof eaves
- Water towers/ tanks
- Vertical elevational elements
- Earth construction

Figure 8.19: Analysis of Local Architecture

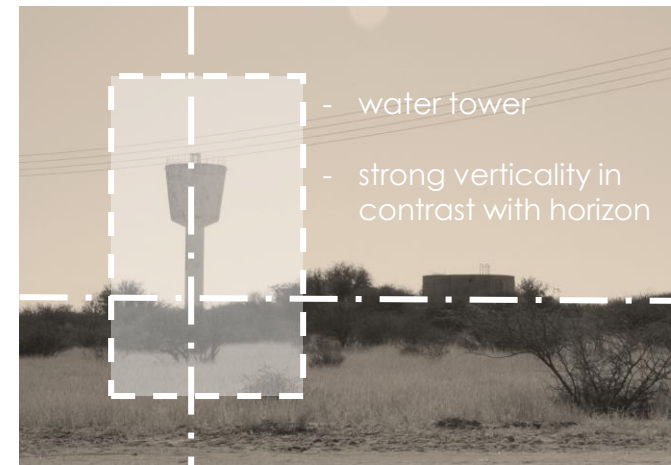


Figure 8.20 – 8.25: Photographs of Local Architecture

8.5 CHURCH OF LEONARDVILLE

The site is located on the Southern side of the church of Leonardville, which was constructed in 1950. The church building played a big part in the development of the design, since the appropriate response had to be made in order to allow the two neighboring buildings to be in communication without having the new building overpower the existing church.

Vertical and horizontal lines and axes were measured from the church in order to keep the eye drawn to the church and to allow for that constant communication in terms of architectural language.

Appendix A at the back of the dissertation contains all the drawings of the church that were used during the design process.



Figure 8.26 – 8.28: Photographs of the Church



8.6 CONSTRUCTION CONCEPT

The construction concept was built to assist the design development of the project and to allow the designer to analyse the constructional influence of the metamorphological cycle in architectural terms.



During this analysis, the concept model did not aim to develop a language influenced by local architecture, but rather to develop an understanding of the impact of the three concepts of attachment, concealment, and reveal in an architectural sense with the use of local materials.

In essence, the construction concept model is a coherent development between the touchstone and the three concepts.

Figure 8.29 – 8.31: Photographs of the Construction Concept Model

8.7 MORPHOLOGICAL CYCLE

The morphological analysis of the architecture in Leonardville inspired a variety of details throughout the metamorphological cycle of the project.

The design development was cocooned in a structure made from precedent studies and the morphological analysis, and resulted in a long search for the appropriate architectural response that does not only respond to the local architecture, but also gives the community a tree branch within which to entangle its morphological everyday cycles. The design development aimed toward an architectural cocoon that embraces the community of Leonardville by providing them with a place, whilst simultaneously educating the community on possible construction techniques.

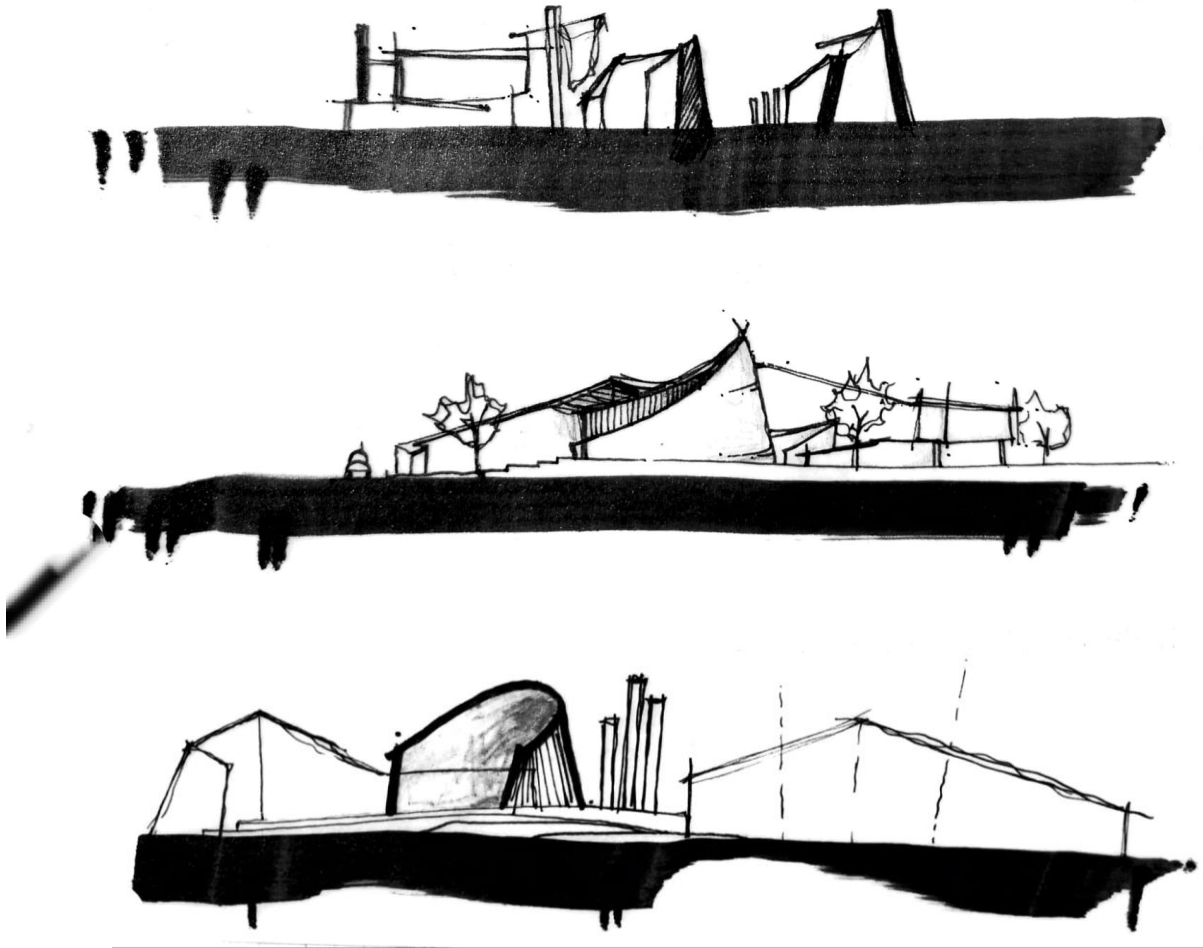


Figure 8.32 - 8.34: Development of the First Design Approach

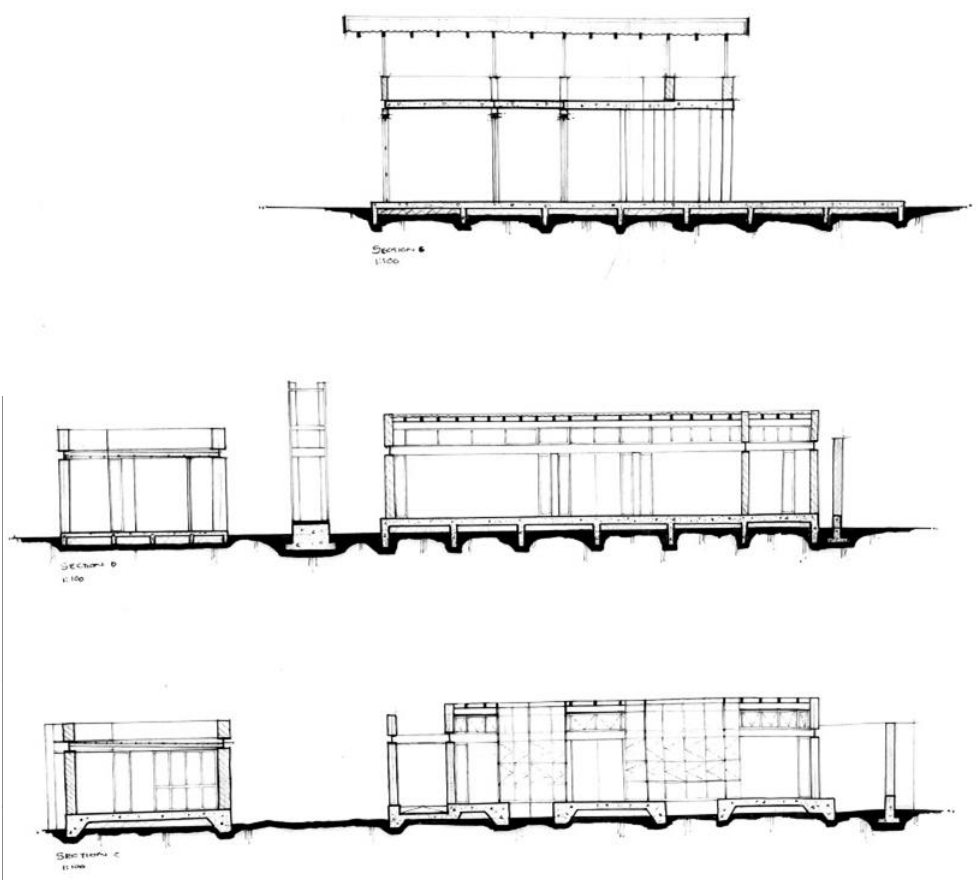
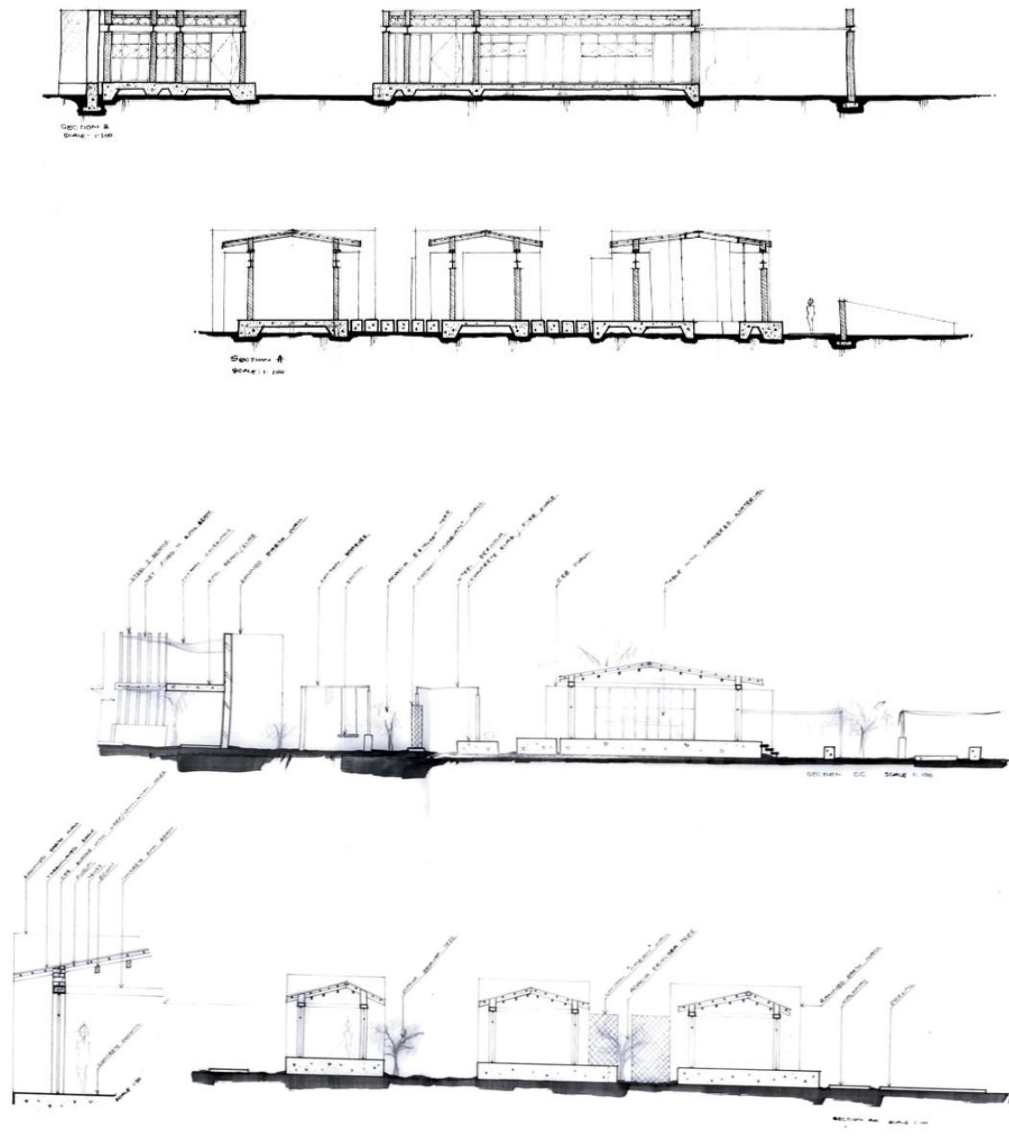


Figure 8.35 - 8.41: Development of the First Design Approach

8.8 SPATIAL DEVELOPMENT

The spatial development of the project was strongly focused on the surrounding town layout, the desire lines on site (refer to Figure 8.42), and on the spatial requirements of Kalahari Wild Silk.

The town of Leonardville is covered in desire lines walked by local population to and from their destinations. The desire lines were a great inspiration during the design of the project, as they allowed the architect to understand the use of the site by the local inhabitants and aided in further developing the site analysis. The spatial development was derived from both the desire lines on site and the strong geometrical grid of the town (refer to Figure 8.43 – 8.48).

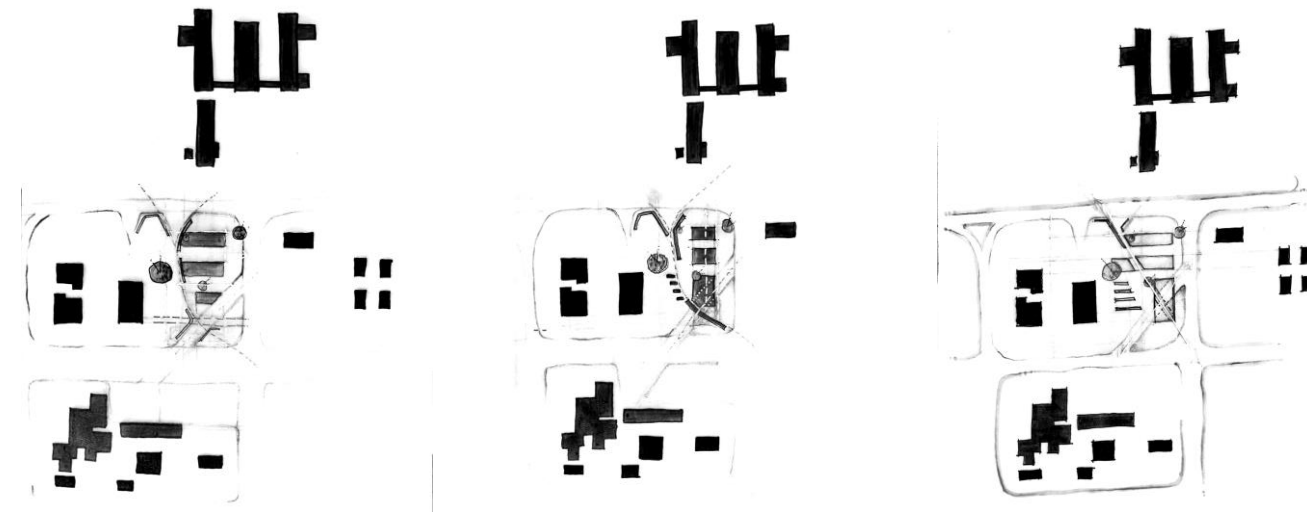


Figure 8.42 (top): Desire Lines on Site
Figure 8.43 – 8.45 (bottom): Spatial Development

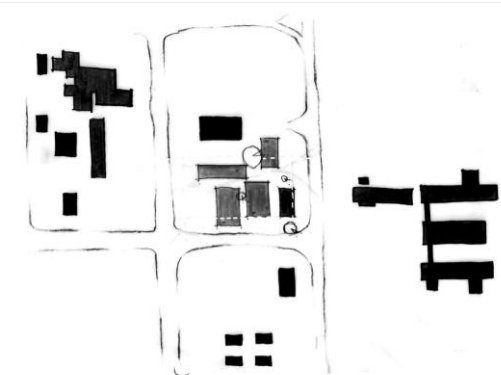
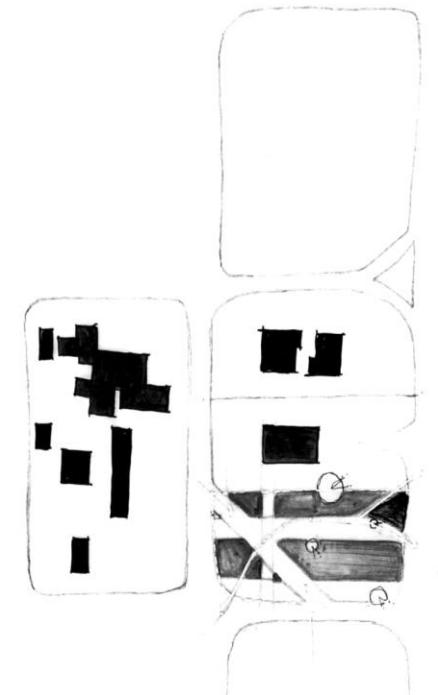
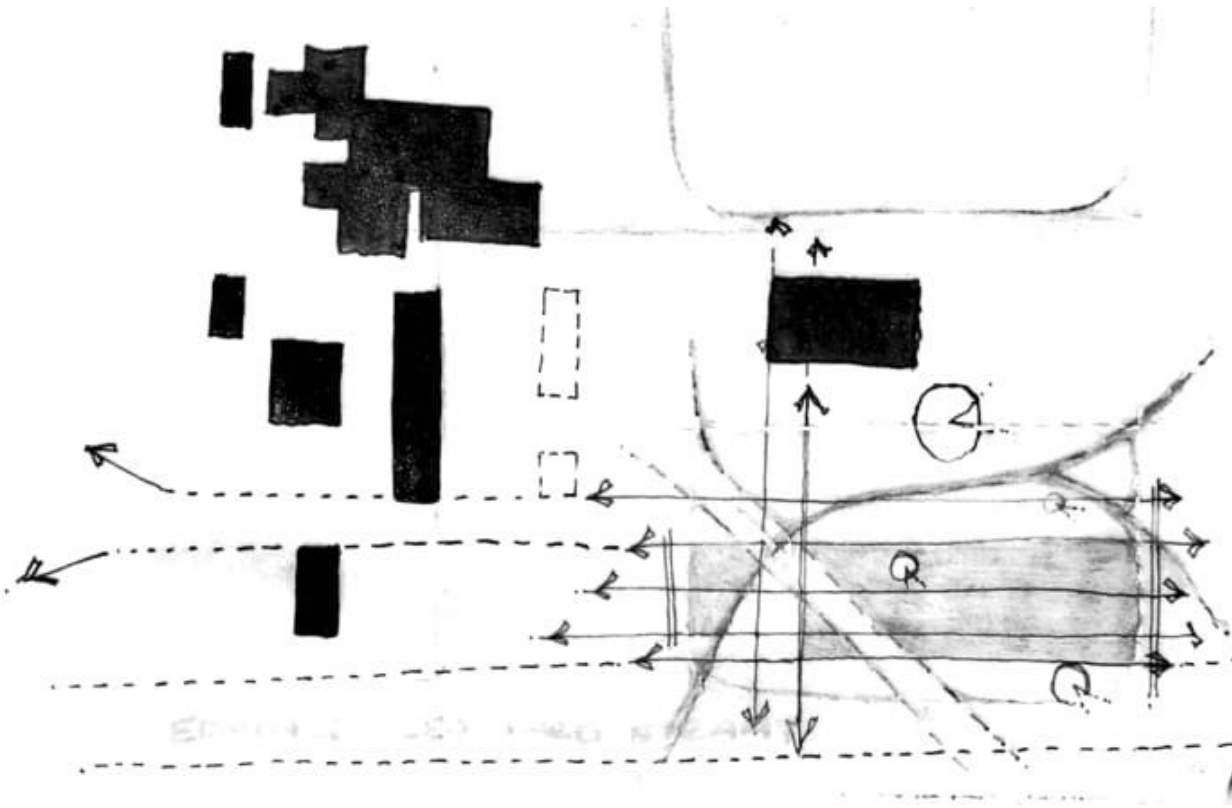
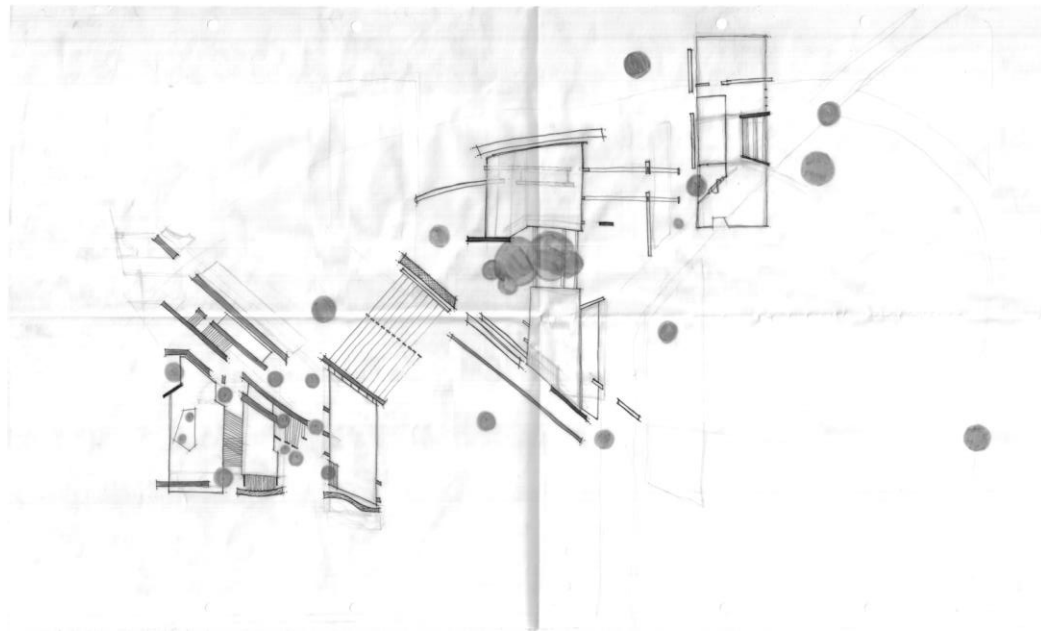
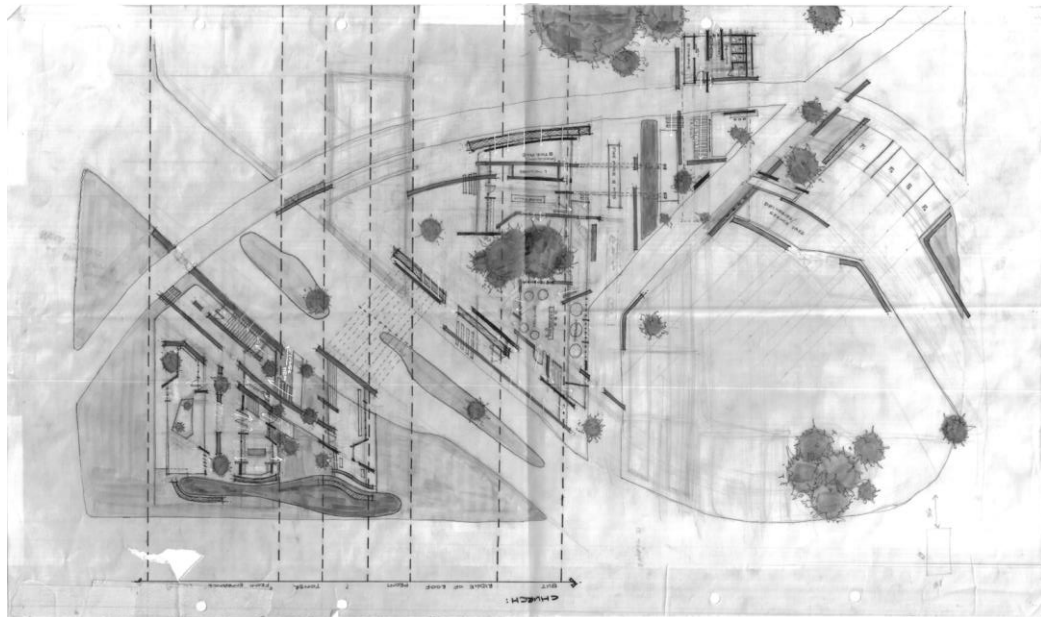


Figure 8.46 - 8.48: Spatial Developmental Sketches of Surrounding Area and Desire Lines

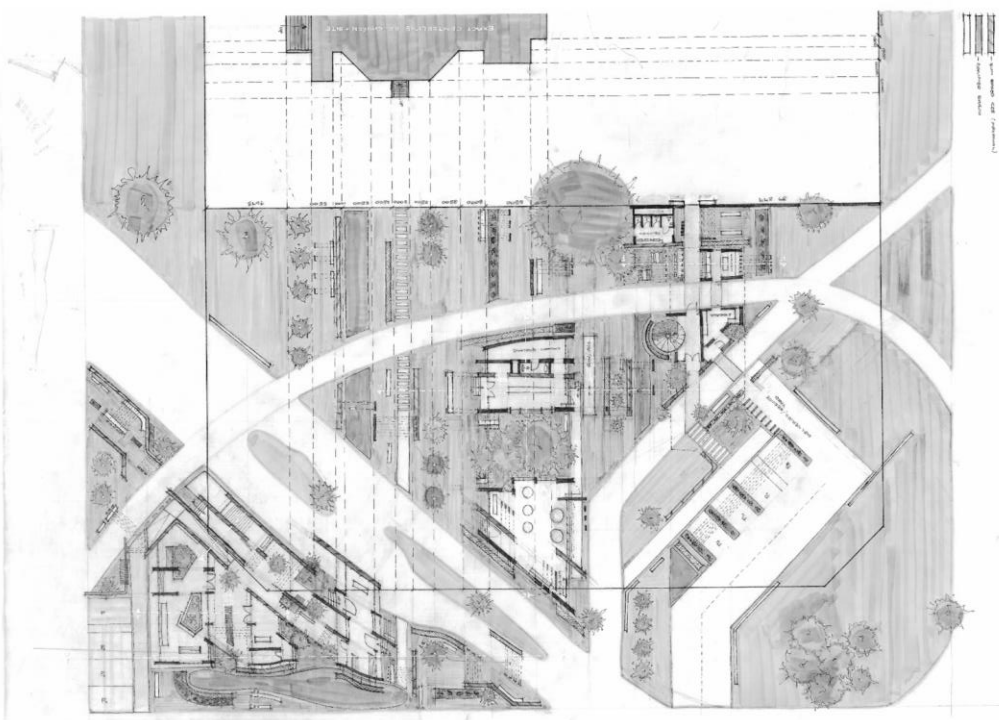


The first design approach was derived from the initial analytical sketches of the site (refer to Figure 8.46). The sketch in Figure 8.46 allowed for an analytical understanding of the site in terms of the surrounding context and the visible desire lines marked in the red sand by inhabitants.



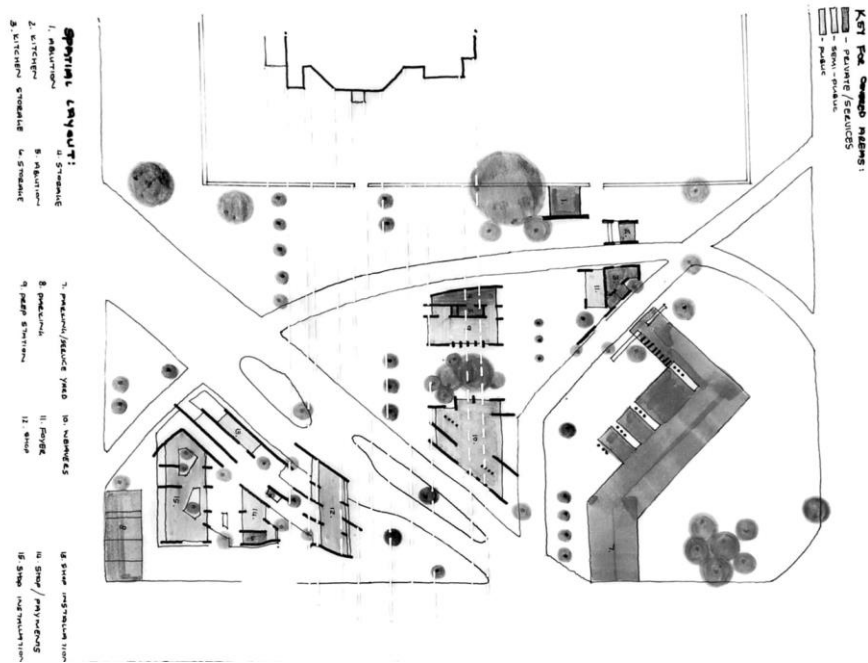
The first design attempt aimed toward a spatial plan that did not intersect with any desire lines, as seen in Figure 8.50. The design plan also took care not to remove any existing trees or add any new vegetation that was not already on site. The development made allowance toward the church entrances and the tower, so as not to place any architectural hierarchy points in competition with the church building or surrounding context out of respect towards the existing, inspired by the respect of a worm towards its existing tree.

Figure 8.49 - 8.50: Development of the First Design Approach



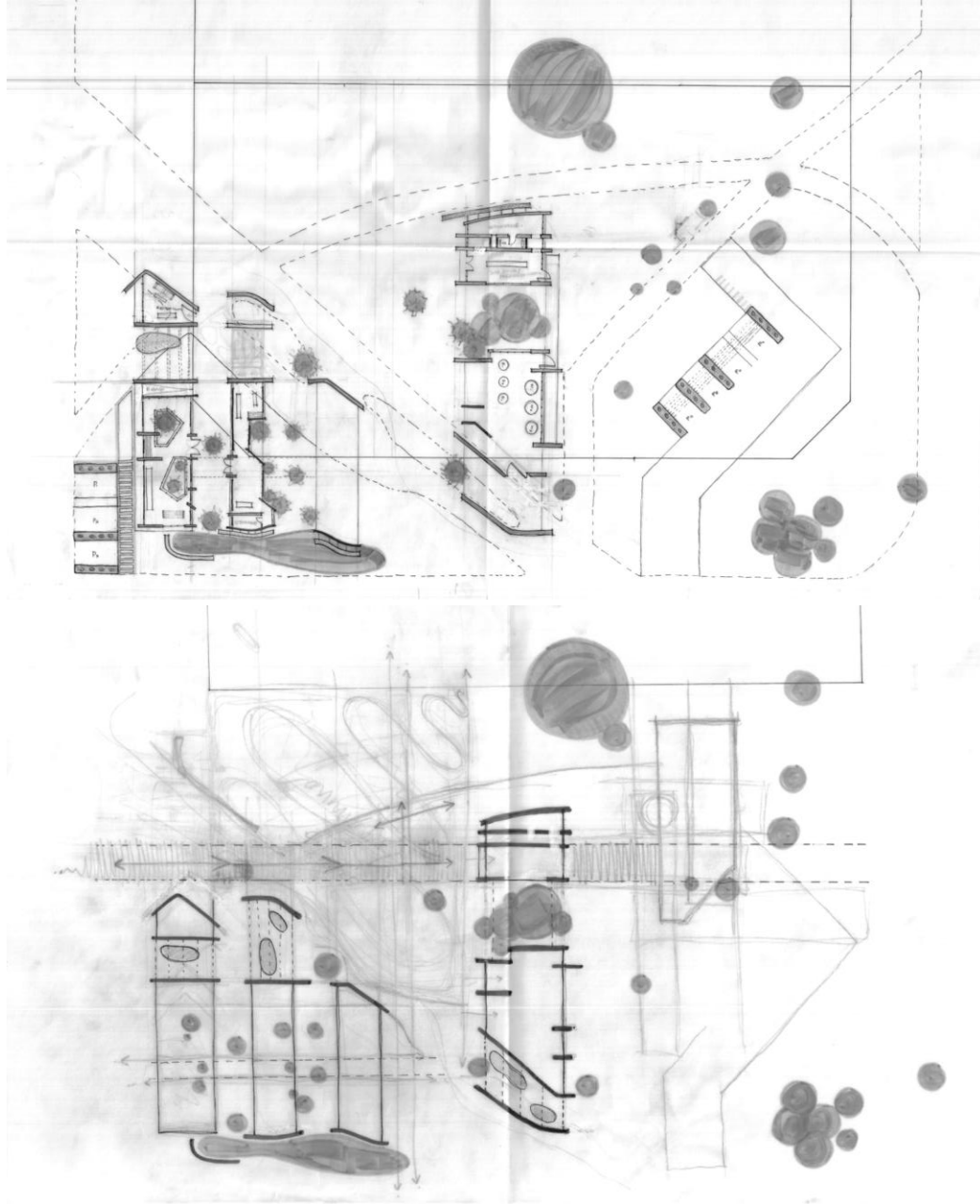
The second design attempt focused on the landscaping of the project, by understanding the Namibian architectural response in terms of the surrounding site and weaving that together with the user requirements.

The Kalahari Wild Silk Company stated that the town was filled with trees inhabited by the *Gonometa Postica*, but that they were all damaged and removed due to their initial 'insensitive' approach to collecting cocoons. As such, the design, includes the planting of new trees on site that will be inhabited by the *Gonometa Postica* to allow the user and visitors to the site to enjoy the natural process on display.



The newly planted trees will be maintained through regular, sensitive cocoon collection by local people and the Kalahari Wild Silk Company.

Figure 8.51 – 8.52: Design Attempt 2



The third and final design approach developed from a variety of critique sessions into an understanding that the desire lines could be intersected as they are merely form a representation on site of the local interaction. This understanding greatly developed the design as it influenced the intersection of the architecture onto the site, resulting in a deepened entanglement between the site and architecture.

The landscaping also developed through the precedent analysis of Namibian architecture (refer to stage 6 section 6.2) that allows the natural Namibian landscape to continue in its being and to embrace the architecture without intervention. The beautiful Leonardville red sand was therefore allowed to be left on display as is, allowing her visitor to fully understand the Namibian landscape (apart from the newly planted trees).

Figure 8.53 – 8.54: Design Attempt 3

8.9 CONCLUSION

The design development of the project shows the metamorphological process that the design went through in order to achieve the final design. The use and analysis of the three concepts enabled the conceptual approach of the project to establish an architectural language that allows the building to attach itself as a cocoon in Leonardville, thus concealing the metamorphosis of the town. Through a deepened understanding of the surrounding architecture, the morphology of the design was developed to further deepen the attachment to the surrounding area, allowing for a final building proposal that accommodates all the cocoons of Leonardville in a community square and makery.

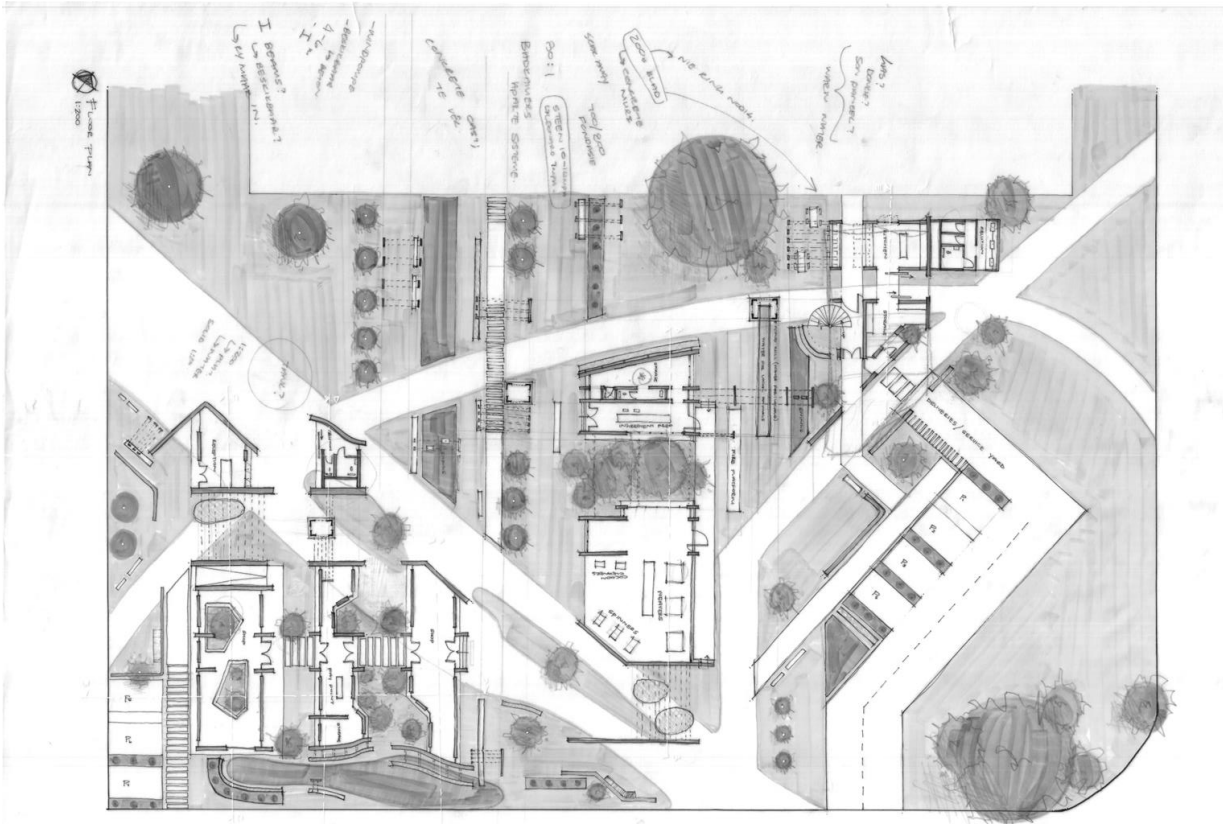


Figure 8.55: Final Design Attempt



STAGE 9: DESIGN SYNTHESIS

9.1 SOUTHERN STREET VIEW





9.2 LOCALITY PLAN

SCALE 1:2000



01 – parsonage

02 – school of Leonardville

03 – church

04 – corporation

05 – silk makery and community square



9.3 SITE PLAN

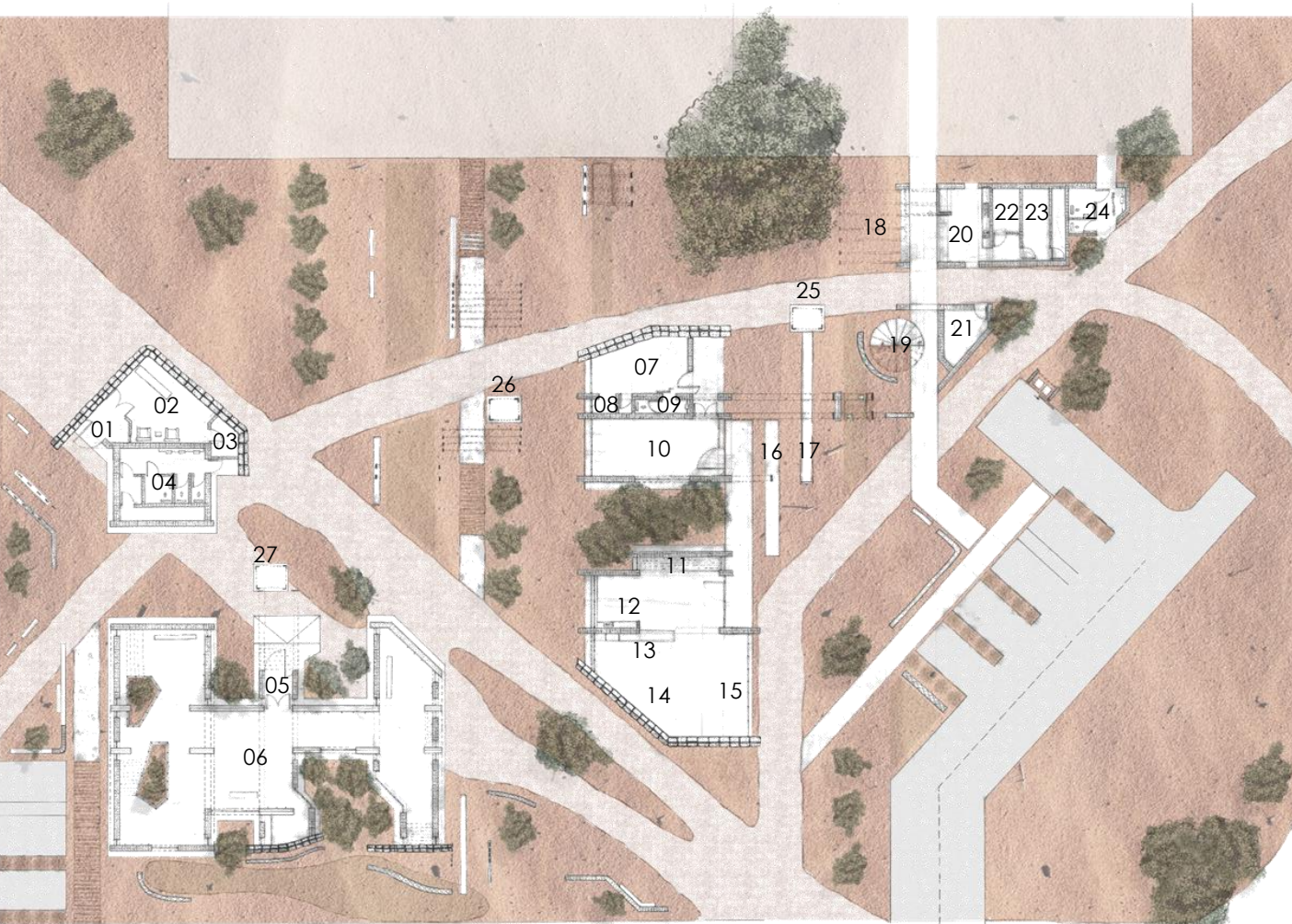
SCALE 1:1000



- 01 – parking
- 02 – reception
- 03 – retail/ scarf exhibition
- 04 – natural landscaping
- 05 – paved existing lines of flight
- 06 – cocoon storage and preparation
- 07 – weaving and spinning studio
- 08 – restaurant
- 09 – greenhouse
- 10 – parking and service yard
- 11 – natural landscaping

9.4 GROUND FLOOR PLAN

SCALE 1:500



- 01 – wind lobby
- 02 – reception
- 03 – storage
- 04 – ablution
- 05 – wind lobby
- 06 – retail
- 07 – cocoon storage
- 08 – admin storage/ till
- 09 – ablution
- 10 – colour preparation & order packaging
- 11 – cocoon drying rack
- 12 – kitchenette
- 13 – cocoon cleaning
- 14 – spinners
- 15 – weavers
- 16 – fire platform for boiling and soaking
- 17 – water channel
- 18 – restaurant seating
- 19 – stairs
- 20 – kitchen
- 21 – cleaner storage
- 22 – cold storage
- 23 – dry storage
- 24 – ablution
- 25, 26 & 27 - towers

9.5 FIRST FLOOR PLAN

SCALE 1:500



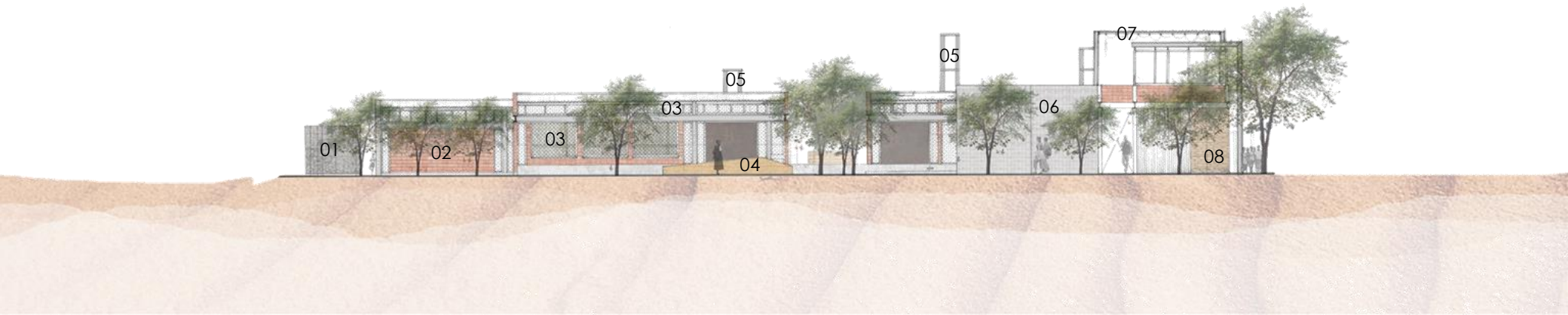
01 – restaurant seating

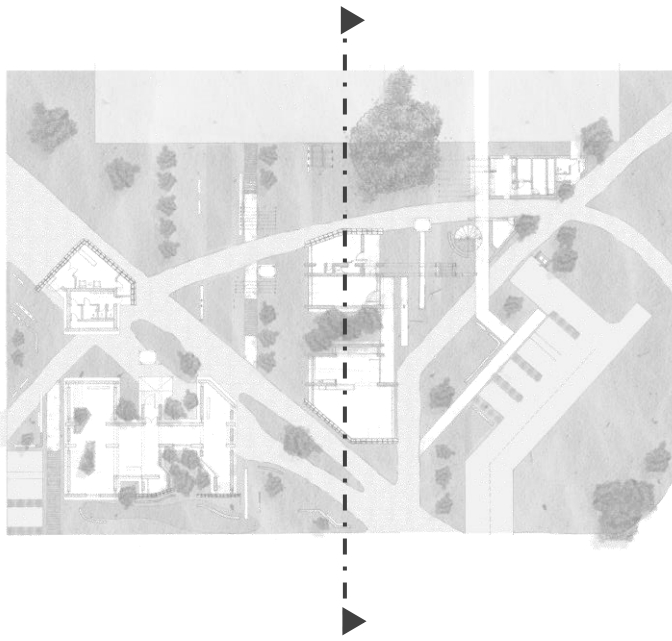
02 - greenhouse



9.6 SOUTH EAST & SOUTH WEST ELEVATIONS

SCALE 1:200





9.7 SECTION A

SCALE 1:200

01 – COCOON GABIAN WALL

02 – STABELISED EARTH BRICKS

03 – SILK SCARF WINDOW SCREEN

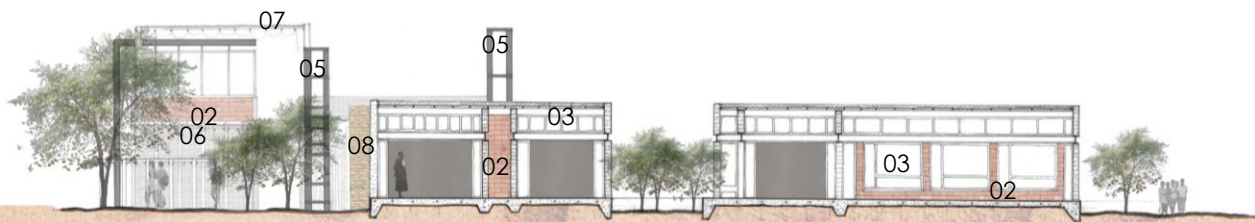
04 – SUN BAKED EARTH BRICKS

05 – STEEL TOWER

06 – LOCAL CEMCRETE BLOCKS

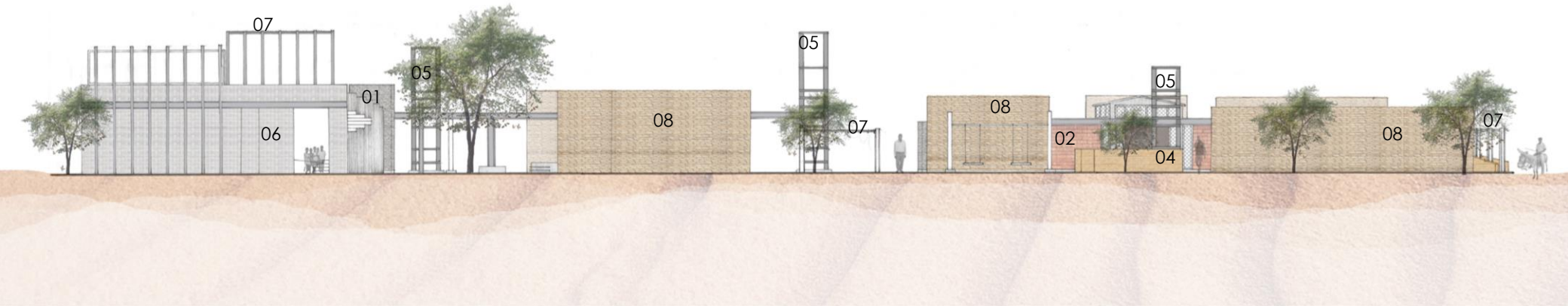
07 – STEEL AND SILK SCARF COVERED PERGOLA

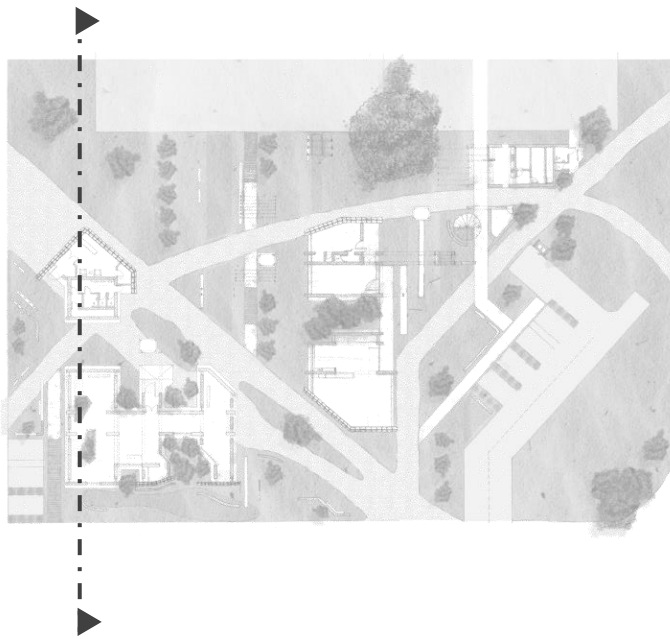
08 – SAND BAG WALL



9.8 NORTH WEST & SOUTH EAST ELEVATIONS

SCALE 1:200

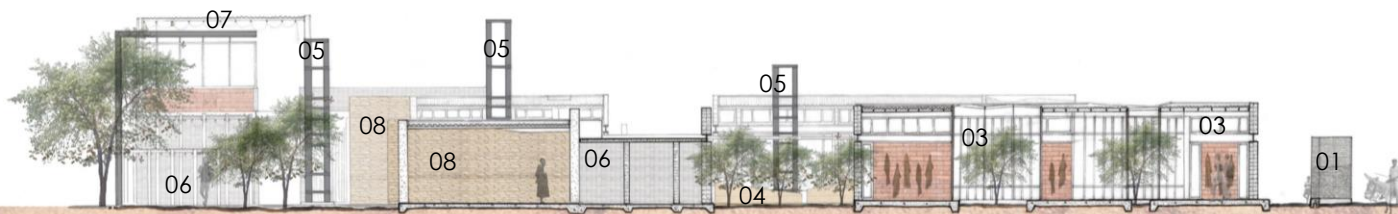


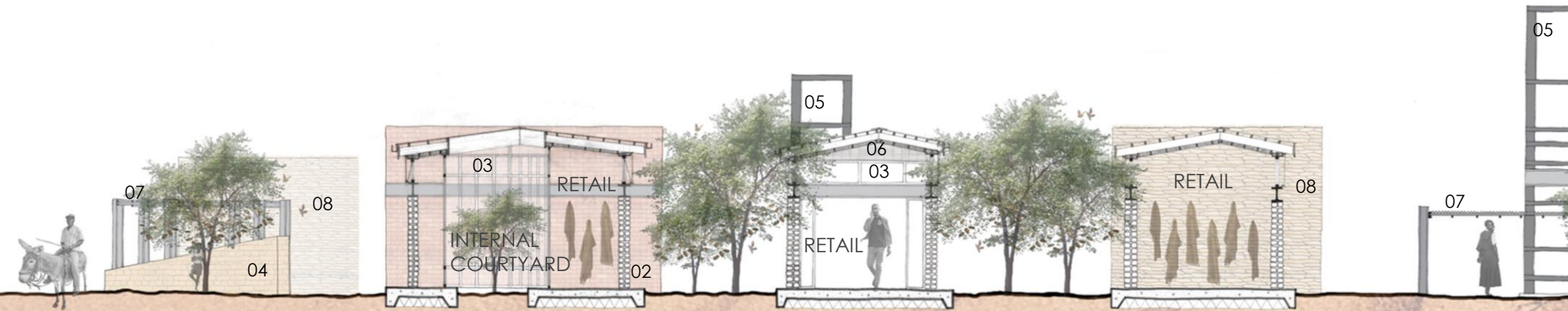
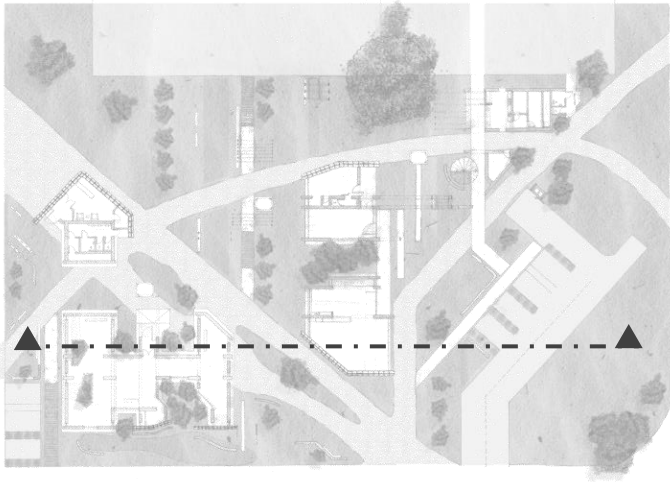


9.9 SECTION B

SCALE 1:200

- 01 – COCOON GABIAN WALL
- 02 – STABELISED EARTH BRICKS
- 03 – SILK SCARF WINDOW SCREEN
- 04 – SUN BAKED EARTH BRICKS
- 05 – STEEL TOWER
- 06 – LOCAL CEMCRETE BLOCKS
- 07 – STEEL AND SILK SCARF COVERED PERGOLA
- 08 – SAND BAG WALL

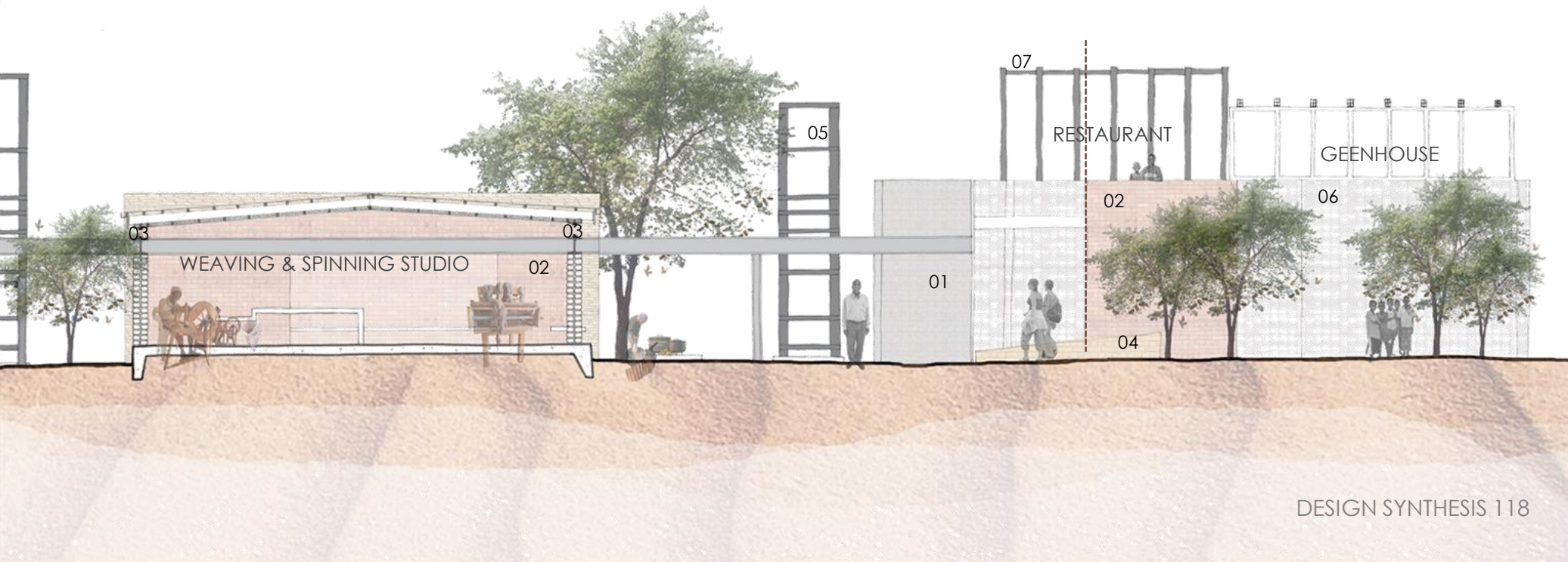




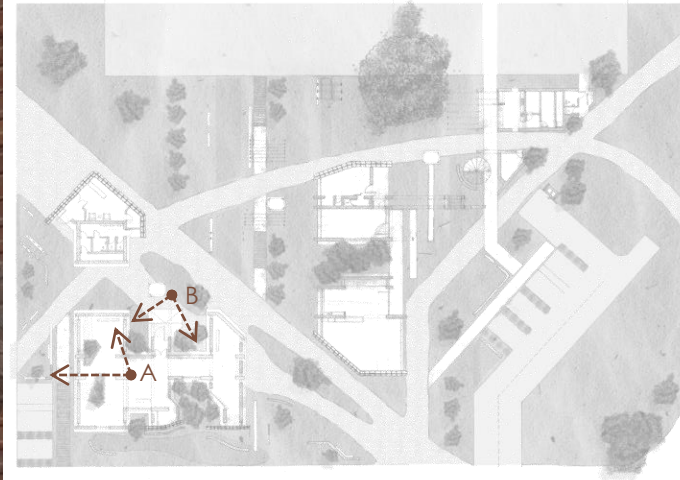
9.10 SECTION C

SCALE 1:100

- 01 – COCOON GABIAN WALL
- 02 – STABELISED EARTH BRICKS
- 03 – SILK SCARF WINDOW SCREEN
- 04 – SUN BAKED EARTH BRICKS
- 05 – STEEL TOWER
- 06 – LOCAL CEMCRETE BLOCKS
- 07 – STEEL AND SILK SCARF COVERED PERGOLA
- 08 – SAND BAG WALL



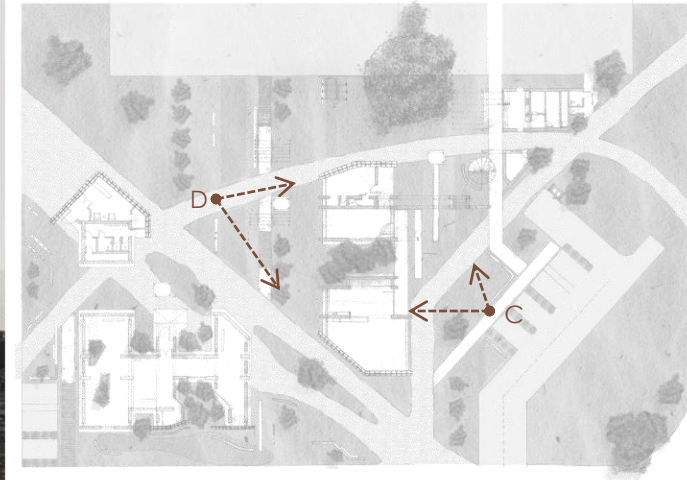
9.11 RETAIL INTERIOR PERSPECTIVE (A)





9.12 RETAIL EXTERIOR PERSPECTIVE (B)

9.13 MAKERY EXTERIOR PERSPECTIVE (C)

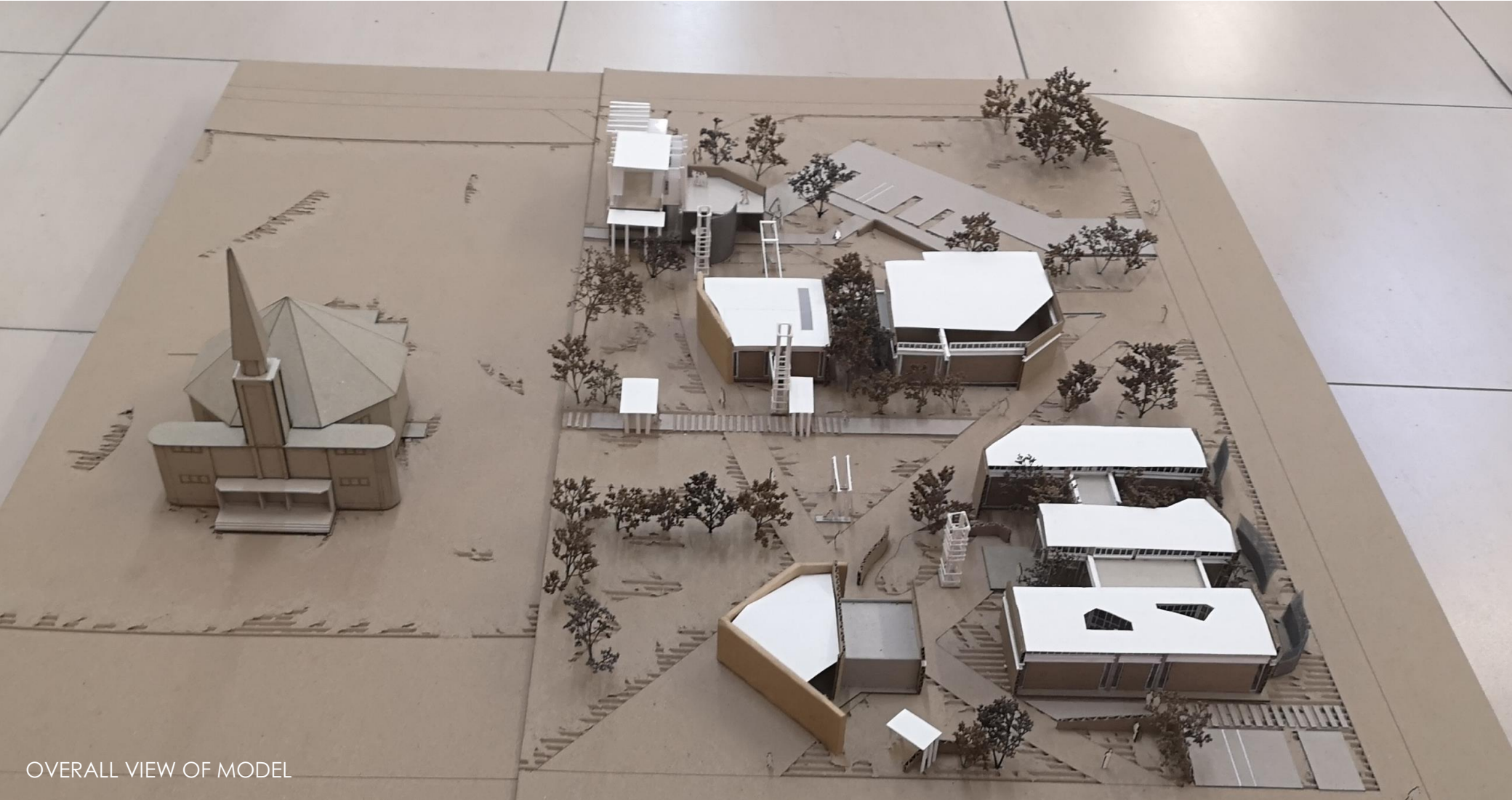




9.14 MAKERY EXTERIOR PERSPECTIVE (D)



STREET VIEW OF COMMUNITY SQUARE AND SILK MAKERY



OVERALL VIEW OF MODEL



STAGE 10: TECHNICAL INVESTIGATION

10.1 INTRODUCTION

The technical section explores the site and the variety of challenges that the project design had to address. It explores the materiality of the project, the vegetation and landscaping of the surrounding area, and climate control design features.

10.2 MATERIALITY

The town of Leonardville is situated approximately halfway between Aranos and Gobabis (about 200km each way) and approximately 500km from Windhoek. The distance from nearby industries results in a shortage of available material, resulting in inhabitants having to rely heavily on local products and construction methods. The choice of materiality played a very important role in the design, as it strives to act as a structural inspiration in the community.

10.2.1 EARTH CONSTRUCTION

Namibia has always been known for its abundance of sand. Sand has therefore always played a big role in the construction industry in Namibia, as it is readily available in nearly every town. Leonardville is no exception.

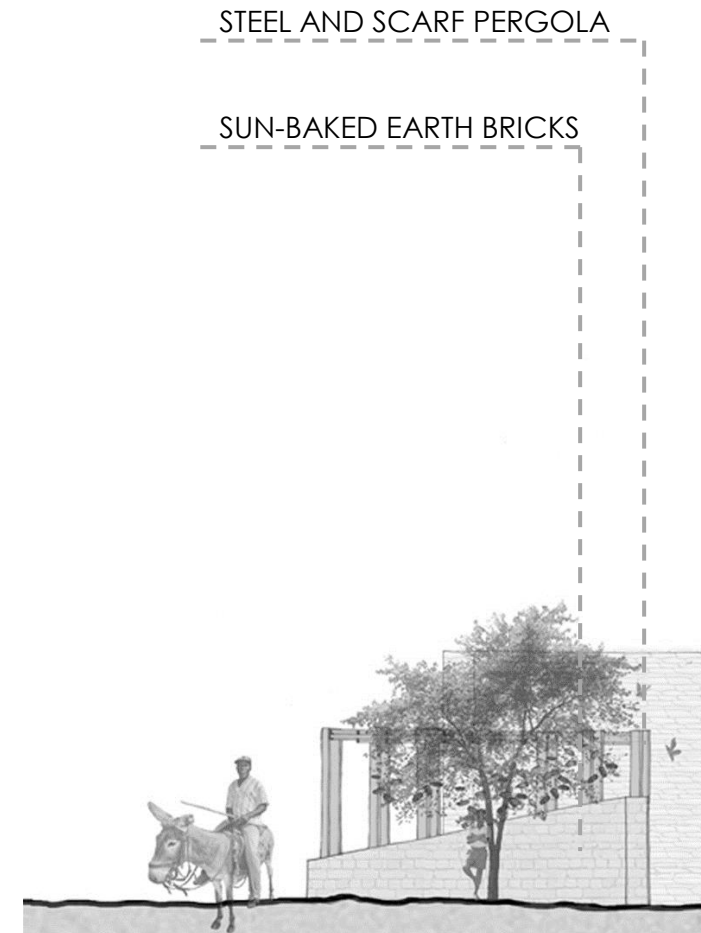


Figure 10.2: Sun-baked Earth Bricks & Steel Pergola

The use of earth construction was inspired by the precedent studies in Stage 6, and allowed for a construction method that was true to the Namibian landscape with a sensitive approach towards a socio-economic design. The town of Leonardville, as discovered during the site analysis, makes use of two types of earth bricks: sun-baked earth bricks and stabilised earth bricks. The use of these two brick types was therefore included in the design in order to showcase the two methods used by the community and to act as a local structural inspiration.

Both types of earth bricks make use of cut-up cocoons (which are available in abundance) as a substitute for regular grass or aggregates. This construction detail allows the community to learn from the cocoons in their environment and to adopt another way of using the many cocoons on hand.

10.2.2 COCOONS

The cocoons of the *Gonometa Postica* (refer to Figure 10.3) represent a unique material found within the Omaheke region. The town of Leonardville, located in the Omaheke region, has a seasonal overflow of cocoons that are collected by community members to prevent them from killing the local wildlife. The cocoons are eaten by animals in the area and, due to their indigestibility, the cocoons kill the animal. The cocoons are therefore long-lasting, local elements that can be manipulated in a variety of ways and are used as follows:

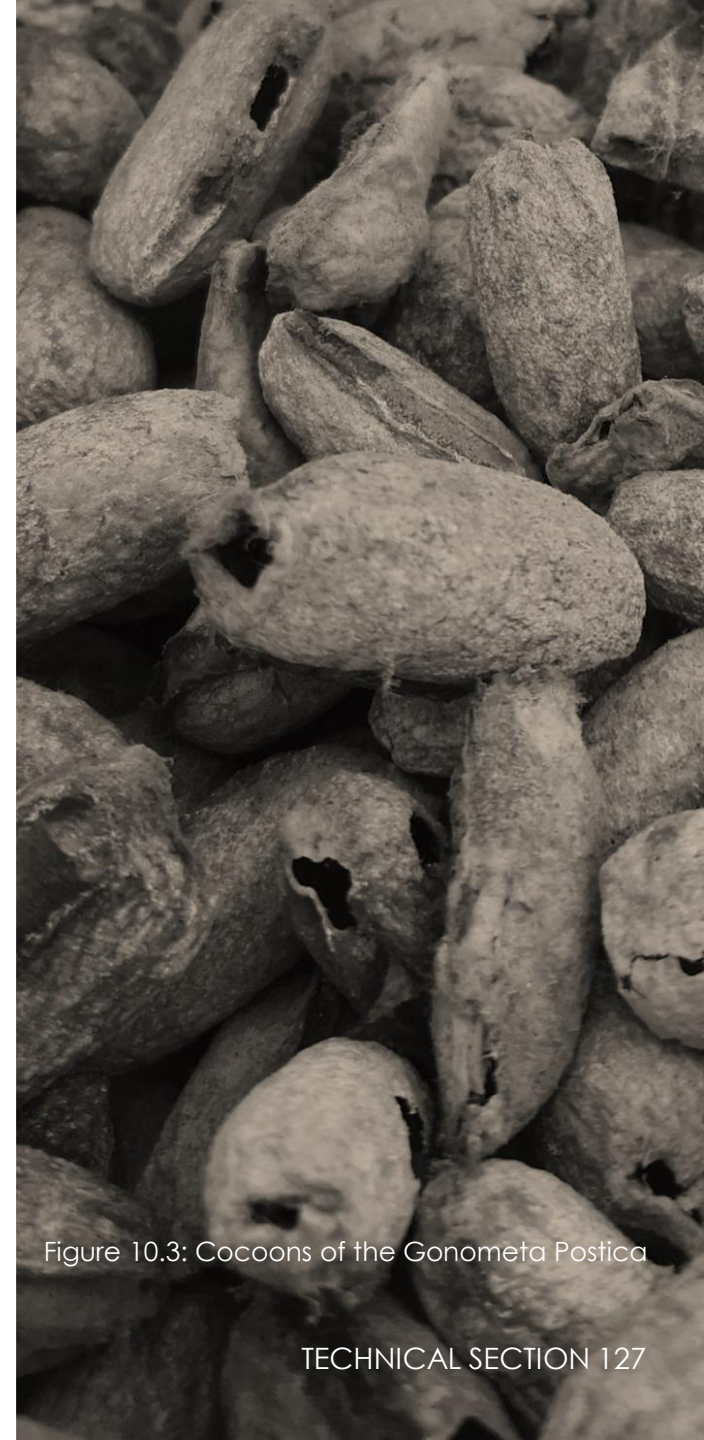


Figure 10.3: Cocoons of the *Gonometa Postica*

a. SILK SCARF PERGOLA COVERING

The initial design approach was to use the silk scarves as pergola coverings without any additional cover, to allow the sun to run its course on the durability of the scarves. However, the decision was made to design a corrugated roof over the walkways and to allow silk scarves to be draped on a pergola structure beneath the corrugated sheeting. This allows for the romantic atmosphere produced by the scarves, whilst still protecting them from the harsh Namibian sun (refer to Figure 10.2).

b. COCOON GABION WALL

The idea of a cocoon gabion wall was developed to incorporate the local cocoons in a functional manner that will place them on display. The cocoon gabion walls are placed strategically in front of windows or stairs to allow a shaded courtyard experience in response to the harsh climate.

c. INSULATION

The cocoons can be manipulated in a variety of ways to suit many material needs. The idea to incorporate the use of cocoons into the insulation was inspired by the stage of the silk weaving process where the cocoons have been boiled and soaked in a fabric softener, resulting in a very soft pillowy textile which is then used to spin the silk threads. This insulation is very low cost, readily available, and environmentally friendly, contributing to the sustainability of the design.

d. EARTH CONSTRUCTION AGGREGATES

As mentioned above, the cocoons will be used in the earth construction mix to act as natural and local aggregates to bind the earth construction bricks (refer to Figure 10.2).

e. SAND BAG WALL

Sandbag walls are a common material choice in Namibia. The Kalahari Wild Silk Company are able to make three scarves per person per day. The use of hand-woven silk sandbags to store the sand used in the sandbag wall would allow another way of weaving the local cocoons into the architecture.

10.2.3 CORRUGATED ROOF SHEETING

Corrugated roof sheeting is used by all people in the area, with almost every building being constructed with corrugated sheeting. This material is easily available and lightweight, making it easy to transport to the site and resulting in minimal effort to construct the roof, as it is a locally known material.

10.2.4 CONCRETE & STEEL

The use of concrete and steel was discussed with an engineer who is familiar with Namibian architecture, and it was decided that it is possible to deliver all the steel and concrete required to the site without a large impact on the sustainability of the design.

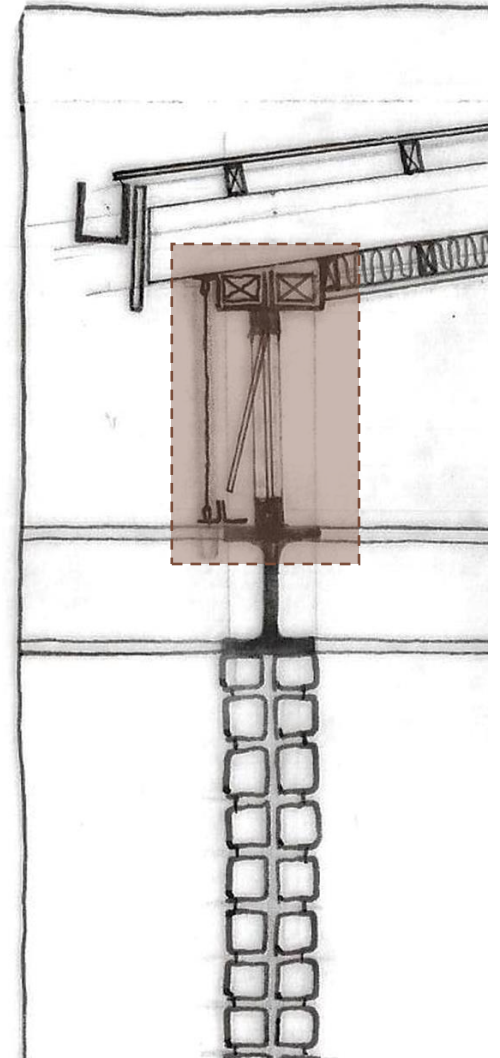


Figure 10.4: Scarf Screen Detail

10.2.5 GLAZING

Namibia is known for its harsh climatic conditions, and large window openings are therefore not used in the design without a screen covering as protection against the harsh sun and sand storms. The screens are simply designed, and are constructed using a steel frame with a silk scarf attached to all corners. This screen does not prohibit the windows from opening, but does act as protection against the sun and sand storms (refer to Figure 10.4).

10.2.6 CONCRETE BLOCKS

Concrete blocks are used by local contractors to construct buildings that require more stability, and seem to be the main construction method in the community due to their ease and durability. It is therefore used in the double story restaurant and throughout the rest of the design as load-bearing structures supporting the steel ring beams.

10.3 FOUNDATION

The sandy earth conditions require a raft foundation that is used throughout the project (refer to Figure 10.5).

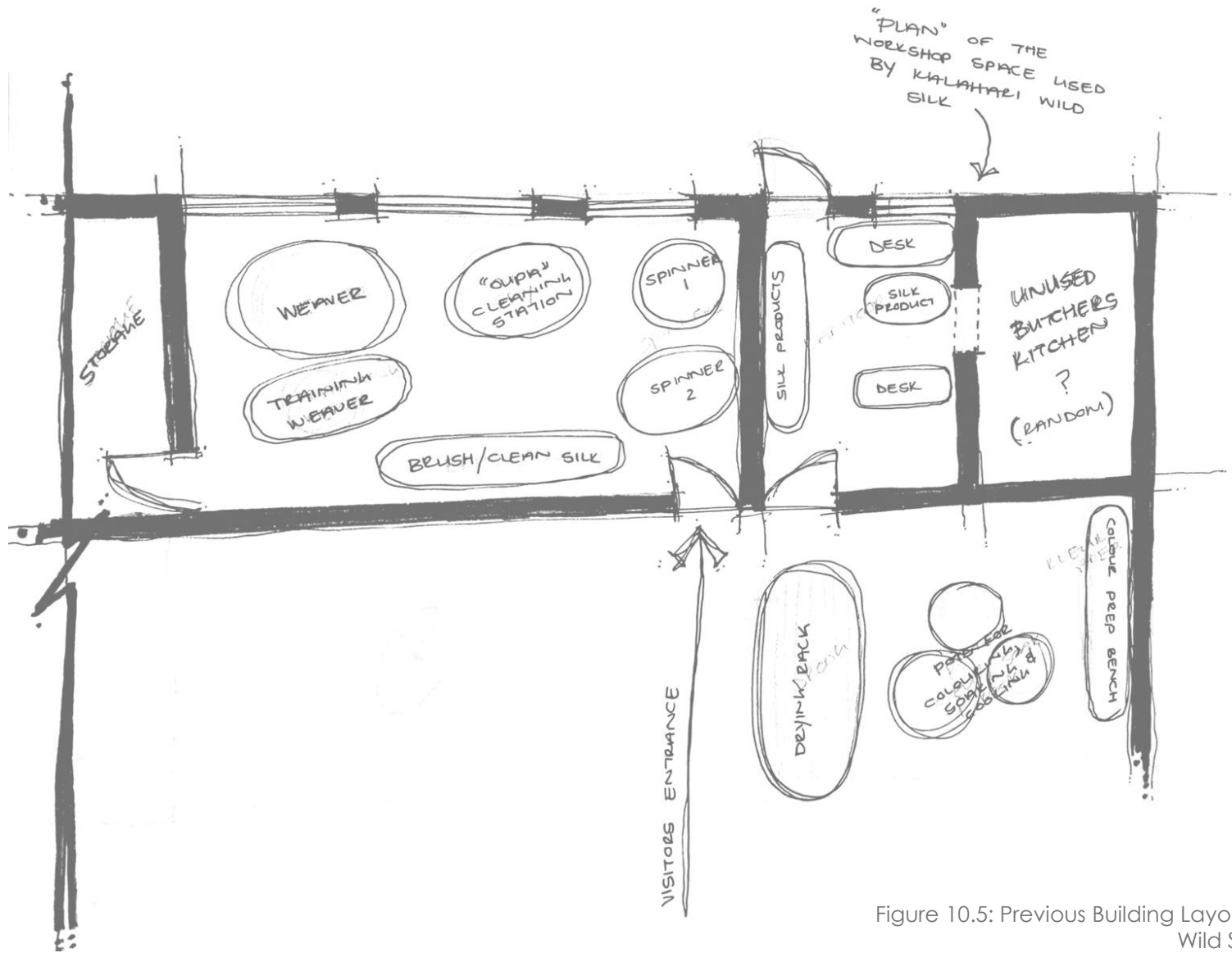
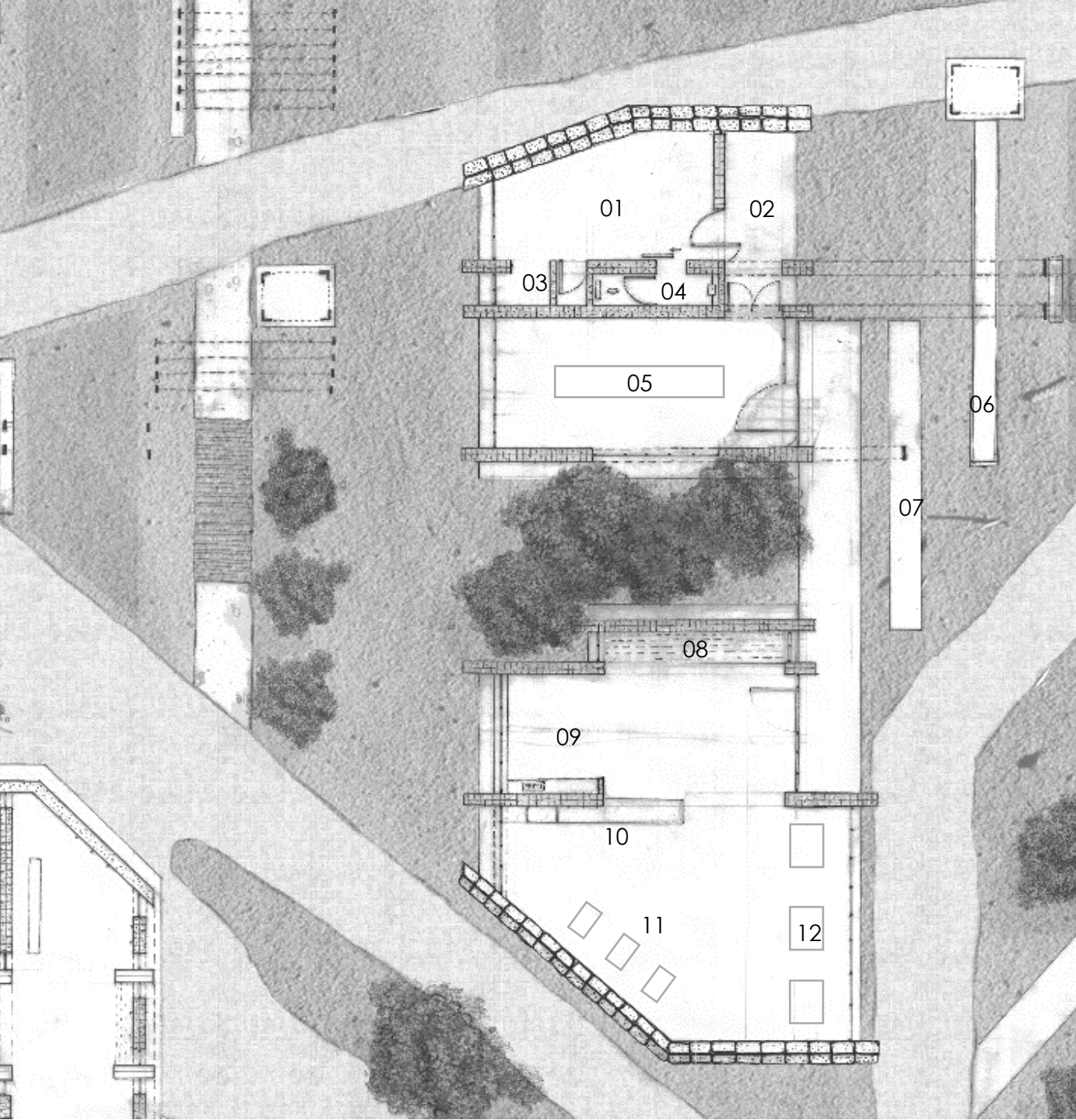


Figure 10.5: Previous Building Layout of Kalahari Wild Silk Company



10.4 SPATIAL ANALYSIS

- 01 – COCOON STORAGE
- 02 – COCOON ARRIVAL
- 03 – DESK AND TILL
- 04 – PRIVATE ABLUTION
- 05 – NATURAL COLOUR PREPARATION
- 06 – BORE-HOLE WATER STREAM
- 07 – FIRE PLATFORM
- 08 – DRYING RACK
- 09 – KITCHENETTE
- 10 – COCOON CLEANING
- 11 – SPINNERS
- 12 - WEAVERS

Figure 10.6: Current Layout of Kalahari Wild Silk Company



STAGE 11: CONCLUSION

11.1 CONCLUSION

The metamorphosis of a local aesthetic, sustainable, and appropriate architecture begins its sequence of developmental adjustments with the metamorphological cycle of the *Gonometa Postica* moth, which influenced Kalahari Wild Silk and ultimately the development of an architectural cocoon.

Stage one of the architectural metamorphosis process introduced the architect to orientate the project in terms of her client, site, and project requirements. Stage two attached itself to the concepts and touchstone of the project, introducing the three main phases of metamorphosis as project orientation. Stage three untangled an understanding of the site and history of Leonardville, while stage four discussed the theoretical stance as the project aims towards an understanding of the architectural impact of the concept of metamorphosis. Stages five and six wove an understanding of different architectural approaches through precedent studies as they assisted in the final reveal in stages seven, eight, and nine.

The reveal stage dissected the morphological processes of the weavers at Kalahari Wild Silk as an important factor in understanding users' needs in order to achieve an appropriate architectural language that weaves the rural community of Leonardville together through metamorphosis.



STAGE 12: REFLECTION

12.1 REFLECTION

The project was inspired by the Kalahari Wild Silk Company and their metamorphological process as a way of interpreting the process of the *Gonometa Postica*. The dissertation aimed at analysing this sensitive notion and at untangling a way of architecture with the same sensitivity as the inspirational metamorphosis of both its inhabitants and the site locality.

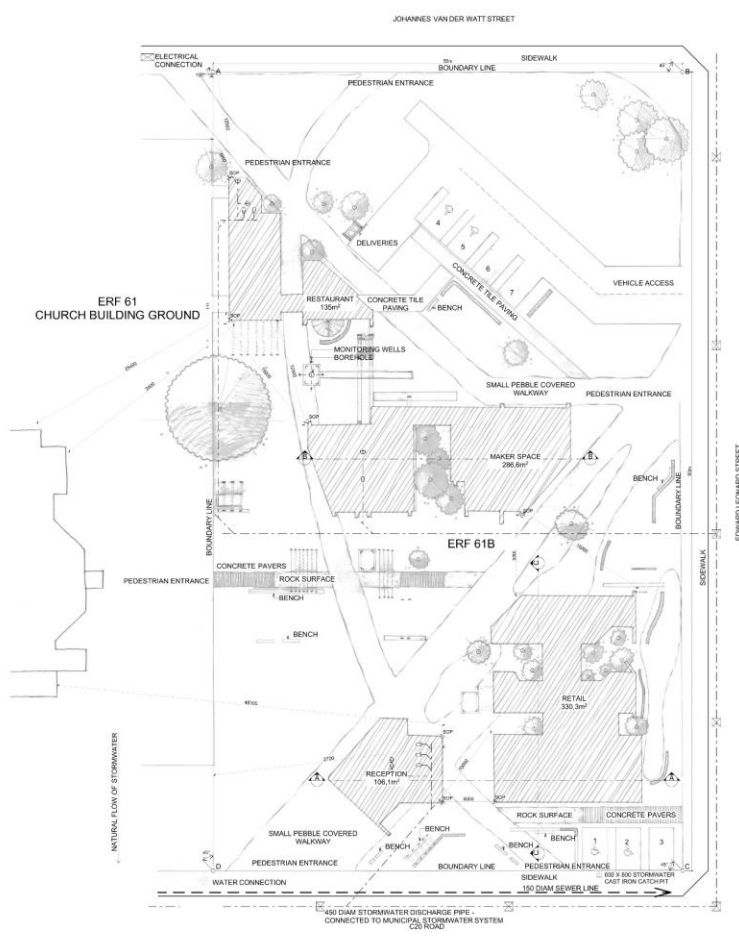
The project was therefore a true research approach in discovering an architectural language that will tangle the metamorphosis of Leonardville.

I personally struggle the most with the design process. I found it hard to establish a language that was appropriate and useable on the specific site. I found there to be many different approaches towards a design but decided to use the final approach due to all site analysis attempts resulting in a similar spatial layout.



STAGE 13: CONSTRUCTION DOCUMENTATION

ERF 60 SCHOOL BUILDING GROUND



ERF 61
CHURCH BUILDING GROUND

ERF 61B

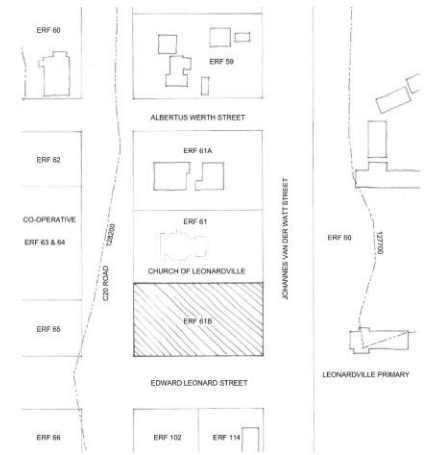
ERF 64

ERF 65

ERF 114

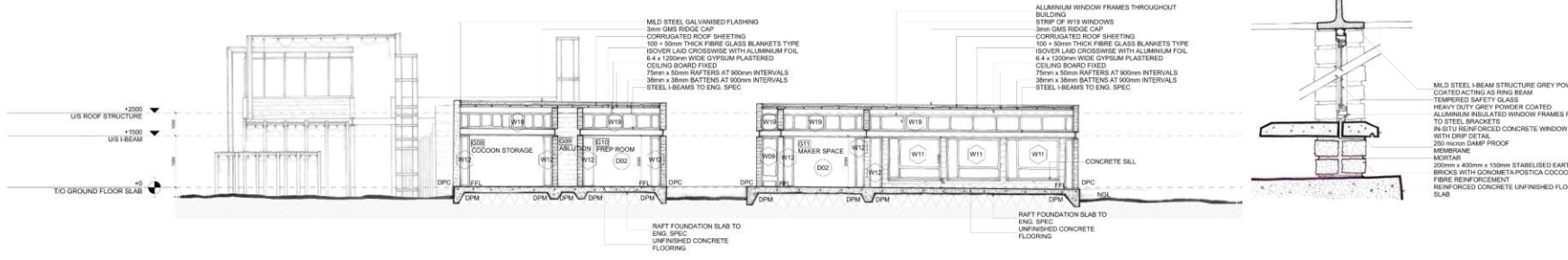
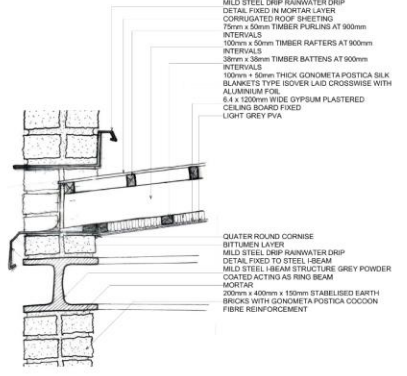
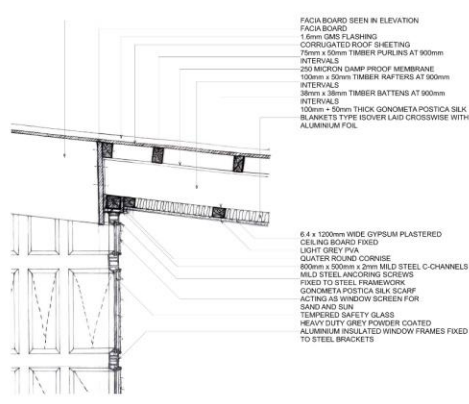
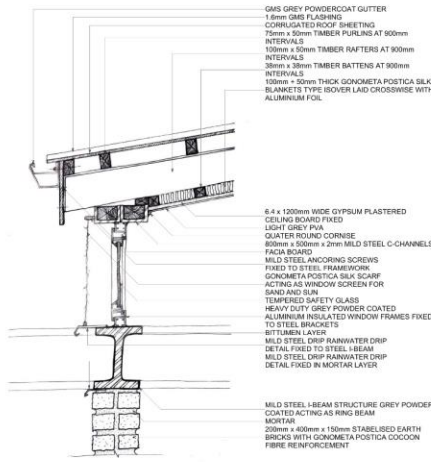
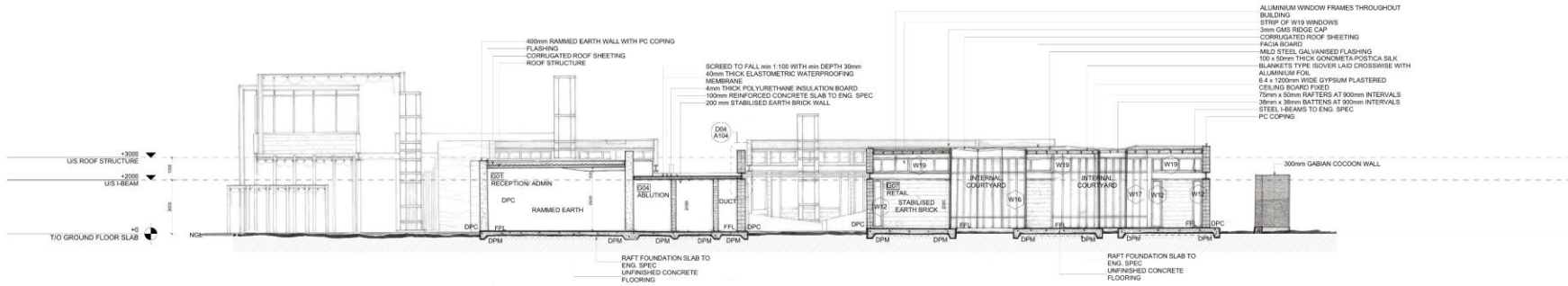
ERF 102

ERF 66



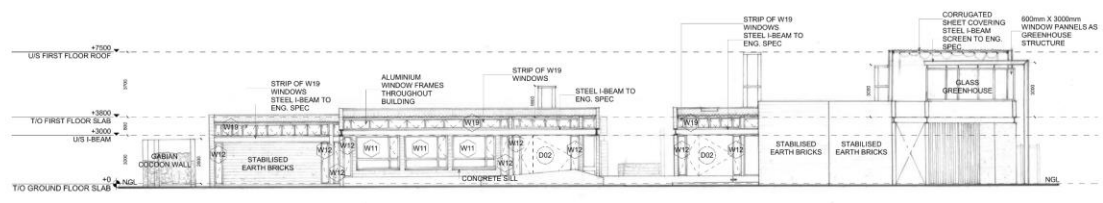
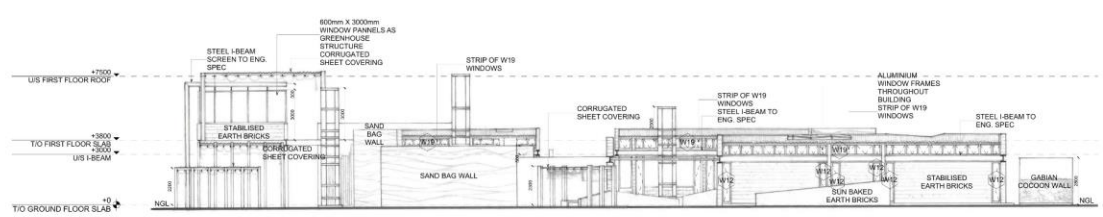
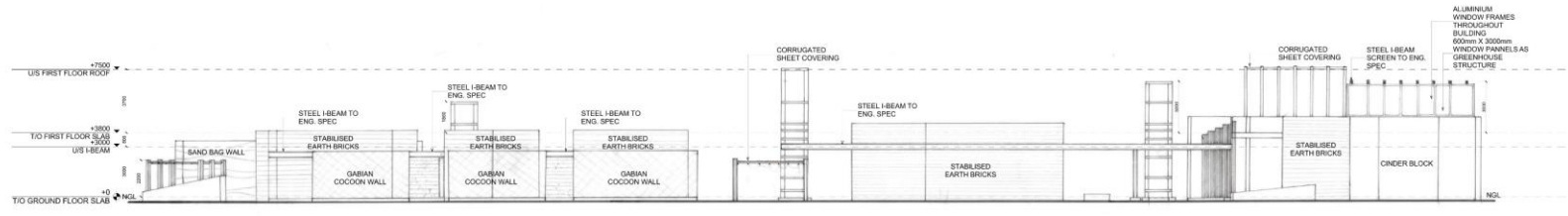
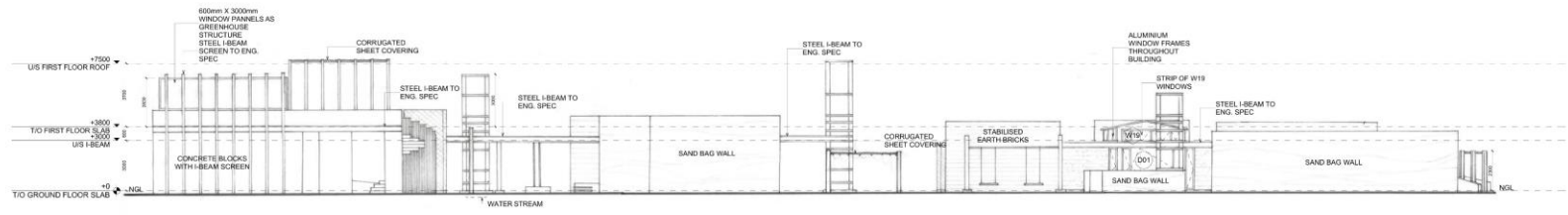
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Project Details	
Topic / Subject	
Client	
Student Name	
Student Number	
Drawing Name	
Drawing Scale	Drawing Format

Kalahari Wild Silk
COMPANY



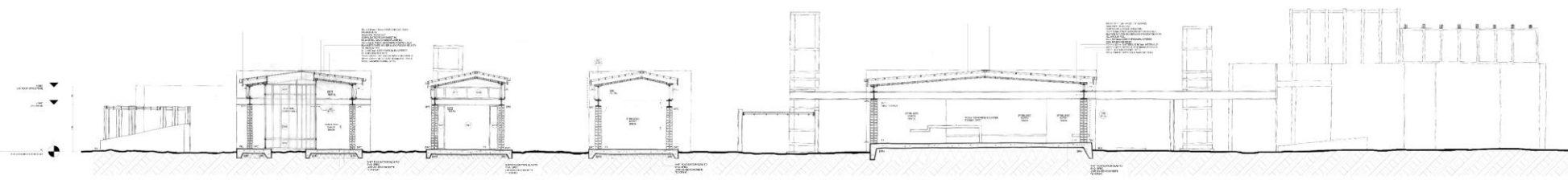
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Student Number	
Drawing Name	
Drawing Scale	Drawing Number





Architectural drawing details and specifications, including a vertical list of text on the right side of the page.



APPENDIX A

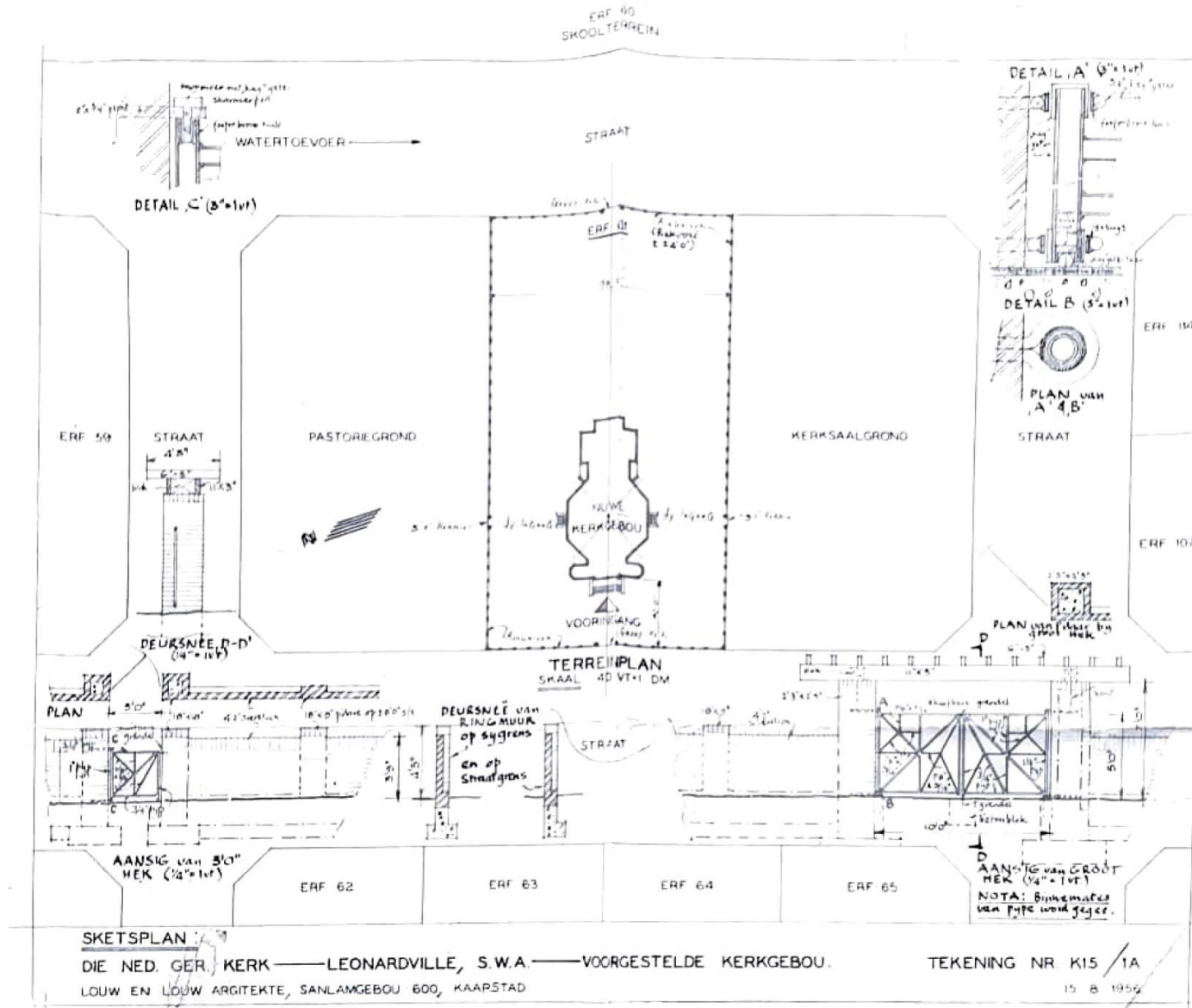


Figure A.2: Site Plan of Church A (Louw & Louw Architects, 1938).

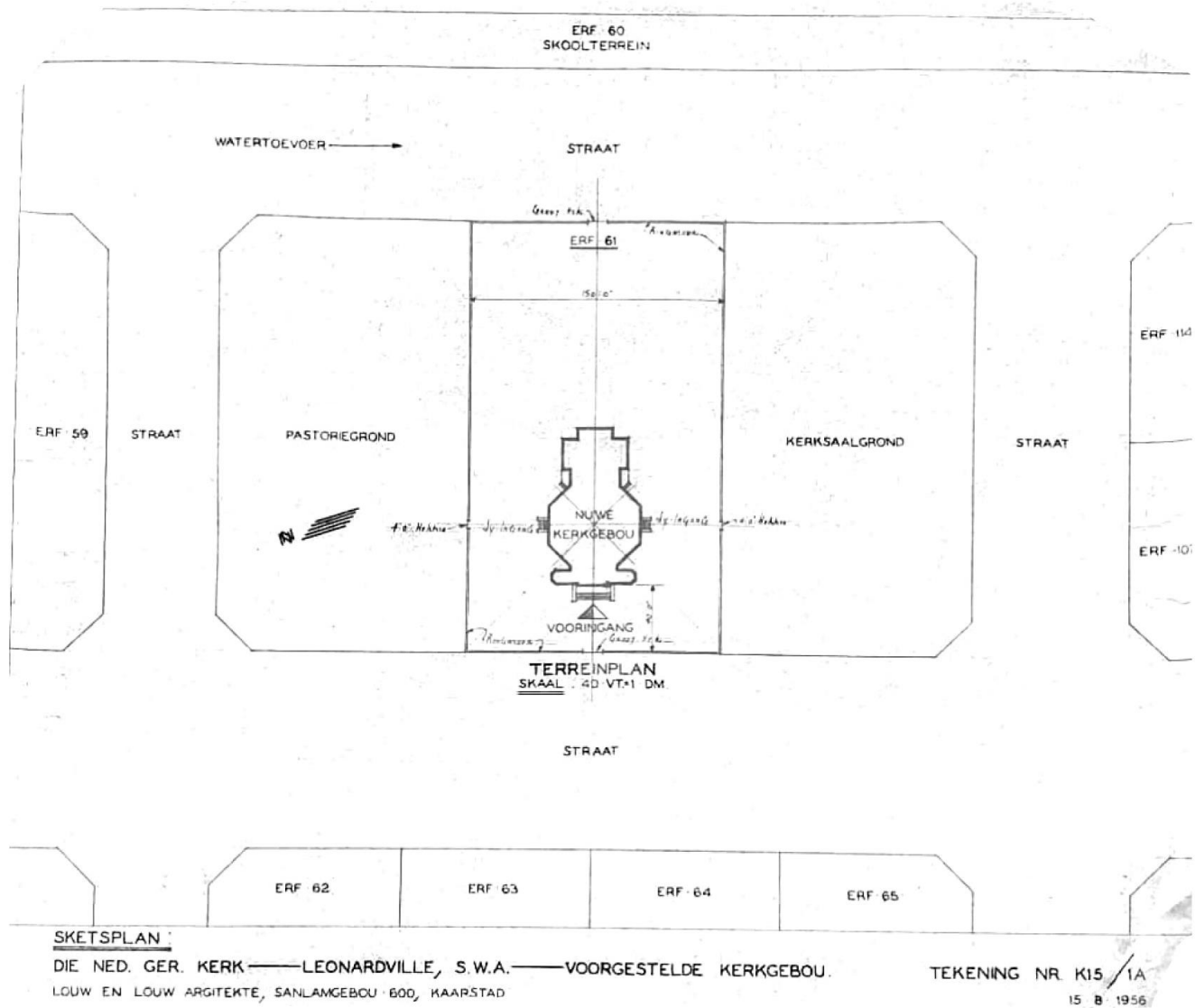


Figure A.3(Louw & Louw Architects, 1938).
: Site Plan of Church B

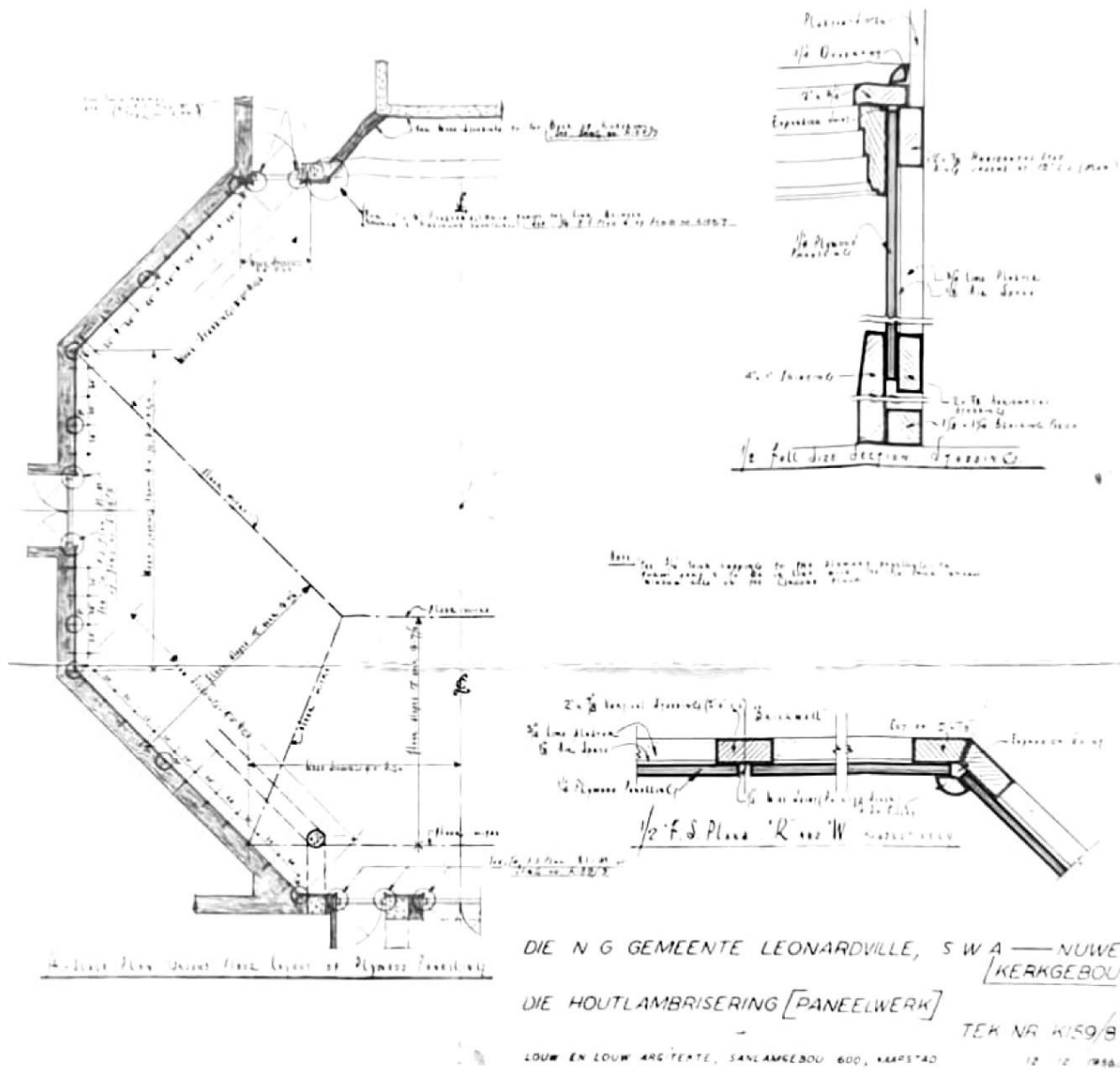


Figure A.4: Floor Plan (Louw & Louw Architects, 1938).

DIE N.G. GEMEENTE LEONARDVILLE, S.W.A. — NUWE KERKGEBOU
 UITSETTINGSPLANNE VAN DIE KERKBANKE
 TEK NR. K159/9
 LOUW EN LOUW ARCHITECTE, SANLAMSBODU 600, KAAPSTAD
 1 DESEMBER, 1938

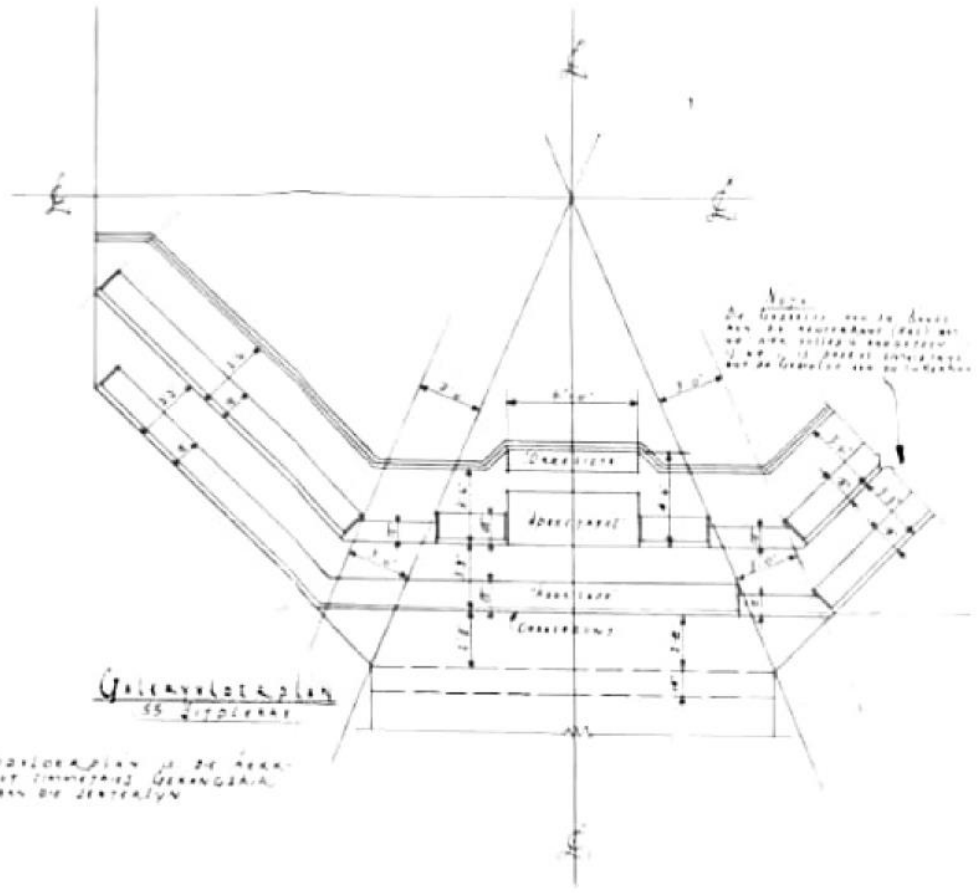
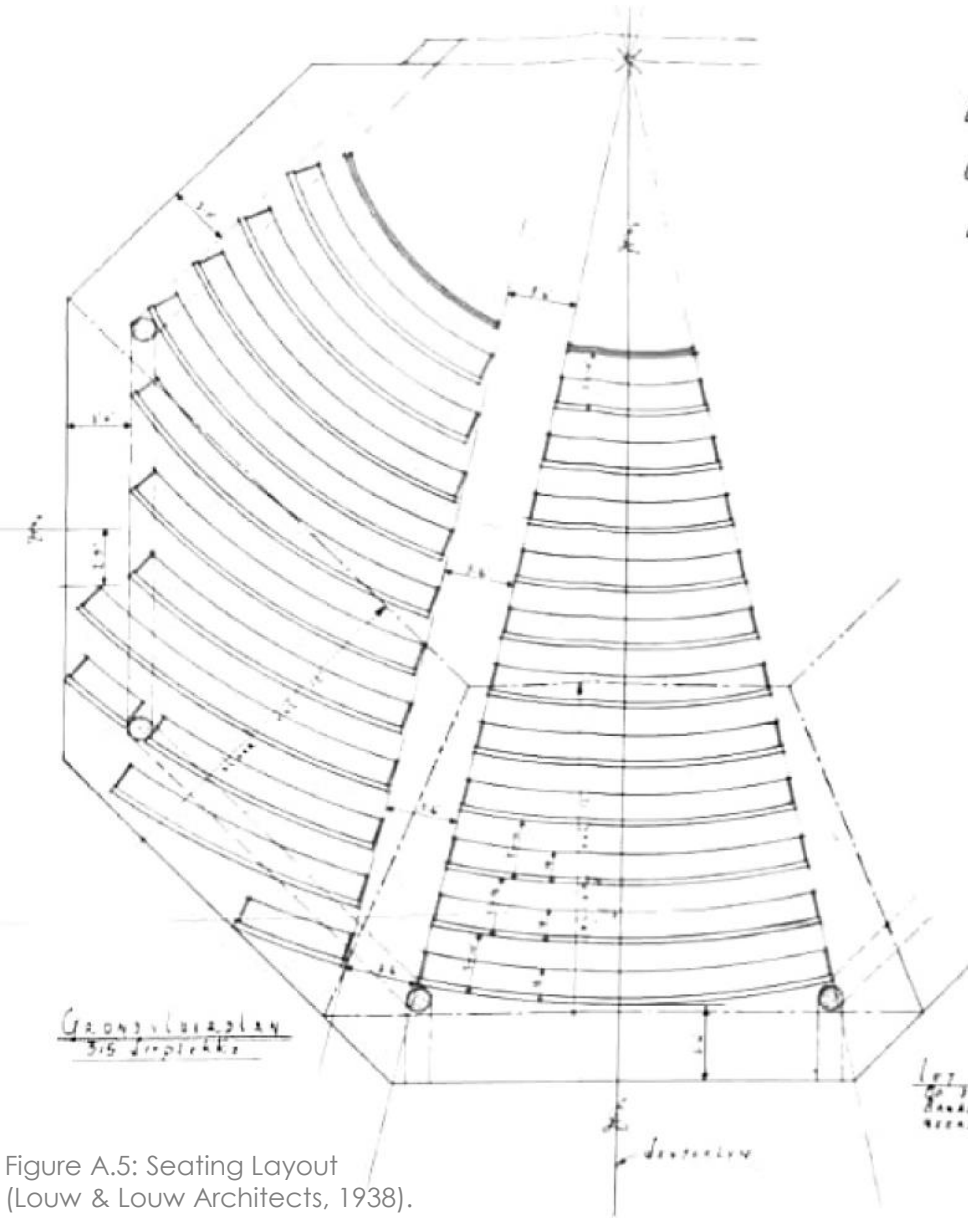


Figure A.5: Seating Layout (Louw & Louw Architects, 1938).

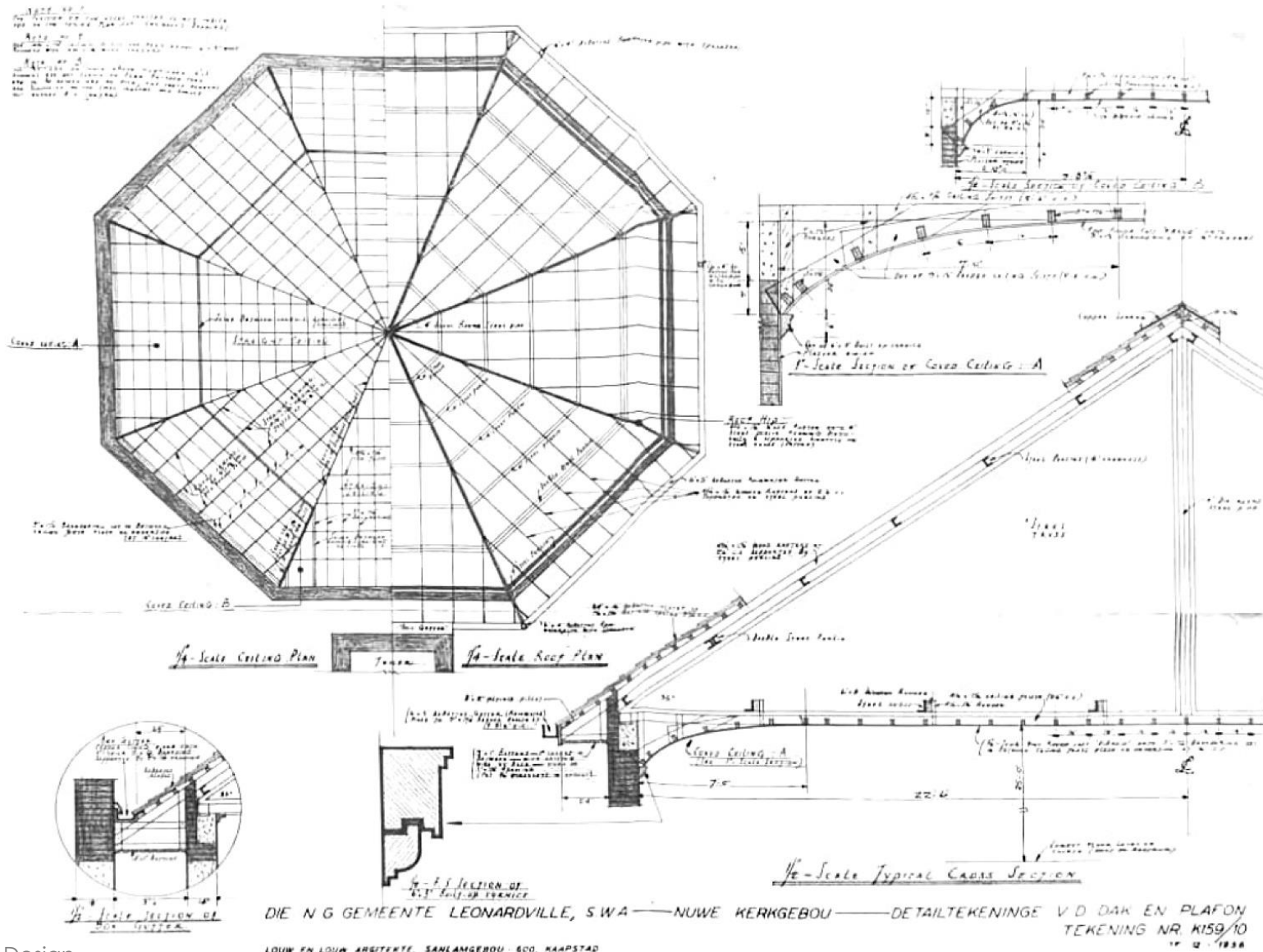


Figure A.6: Roof Design (Louw & Louw Architects, 1938).

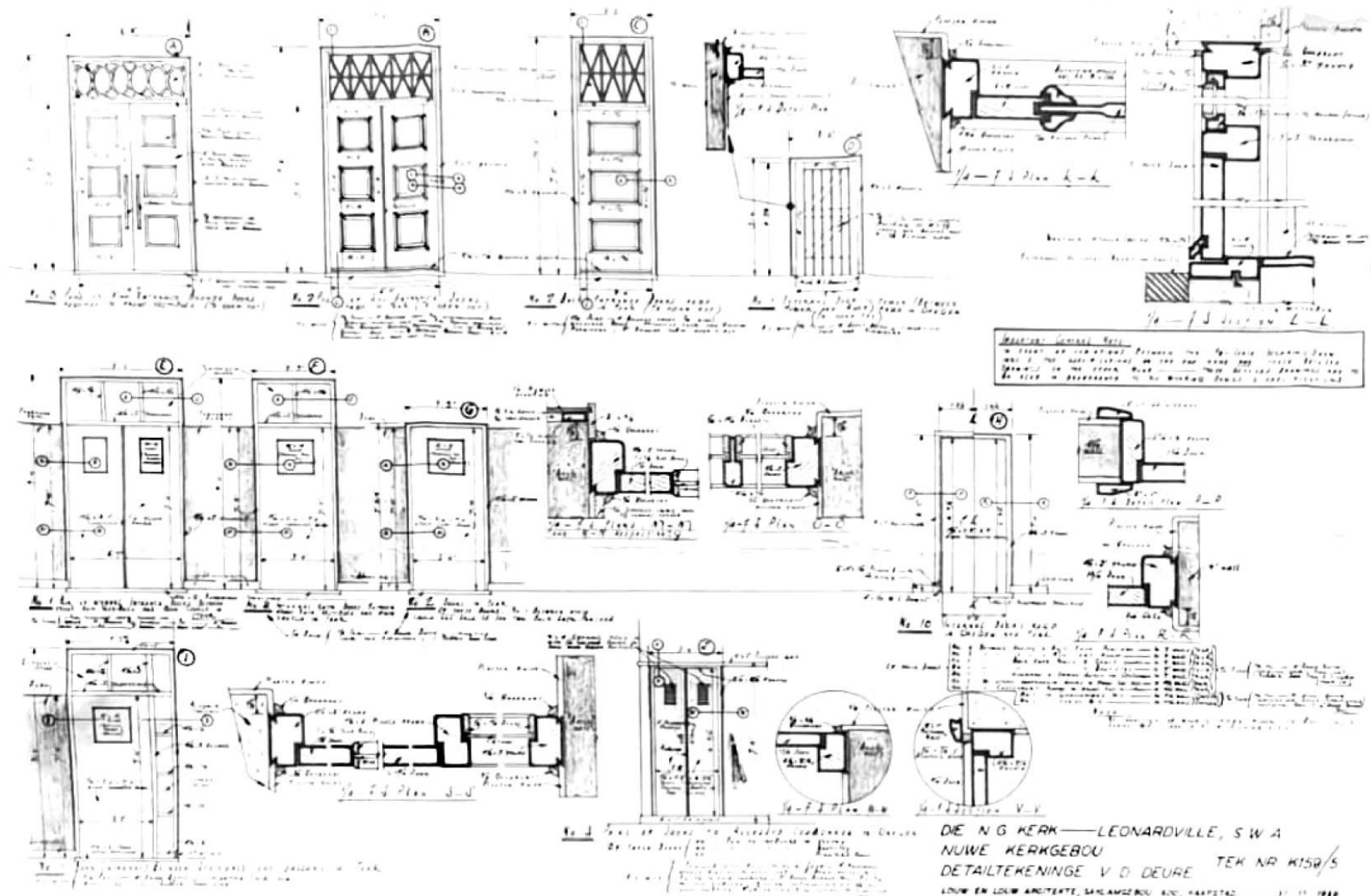


Figure A.7: Door Schedule (Louw & Louw Architects, 1938).

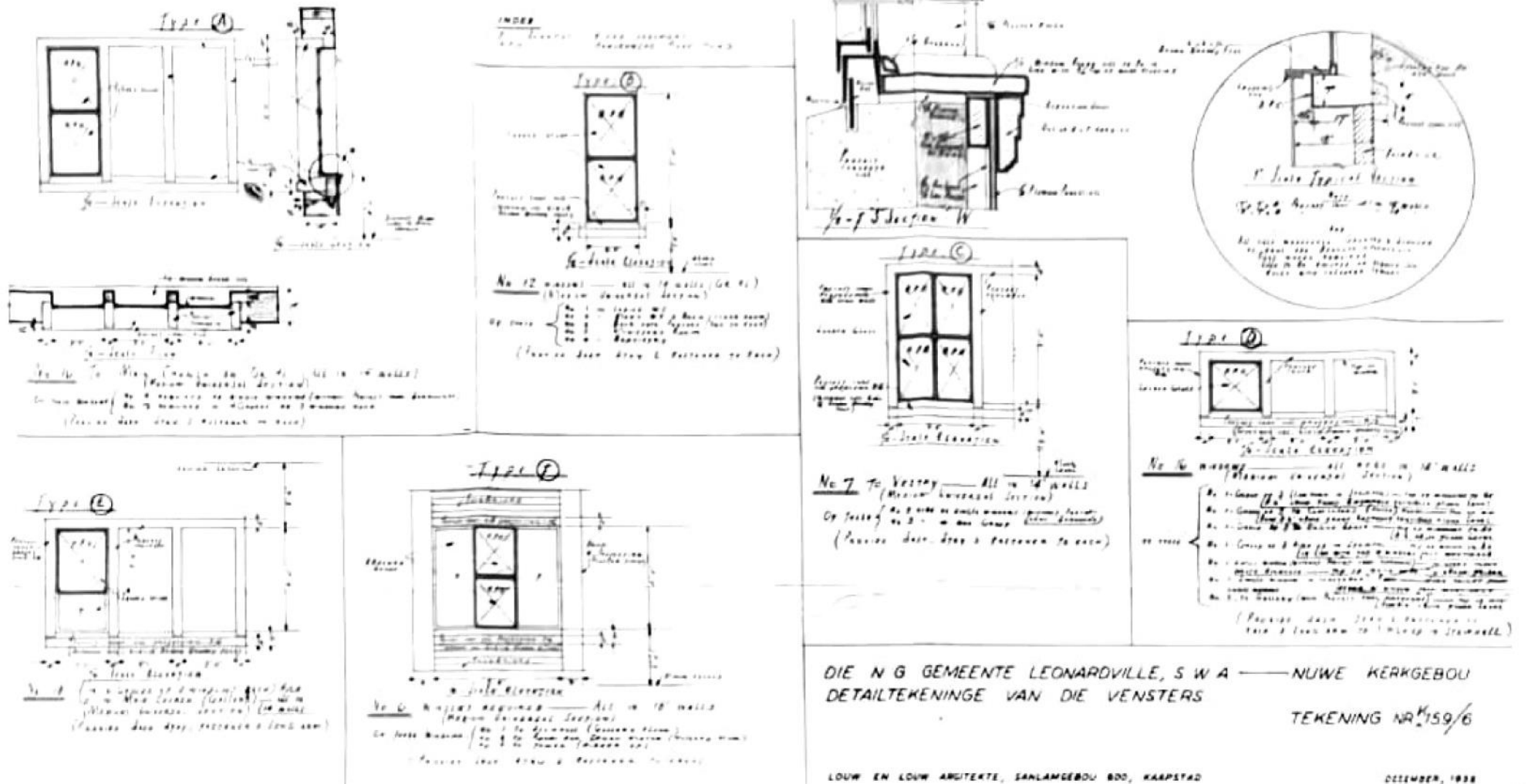


Figure A.8: Window Schedule (Louw & Louw Architects, 1938).



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