WEAVING TEMPORAL THREADS

A wool processing facility at Houtkraal Railway Station in the Karoo, South Africa

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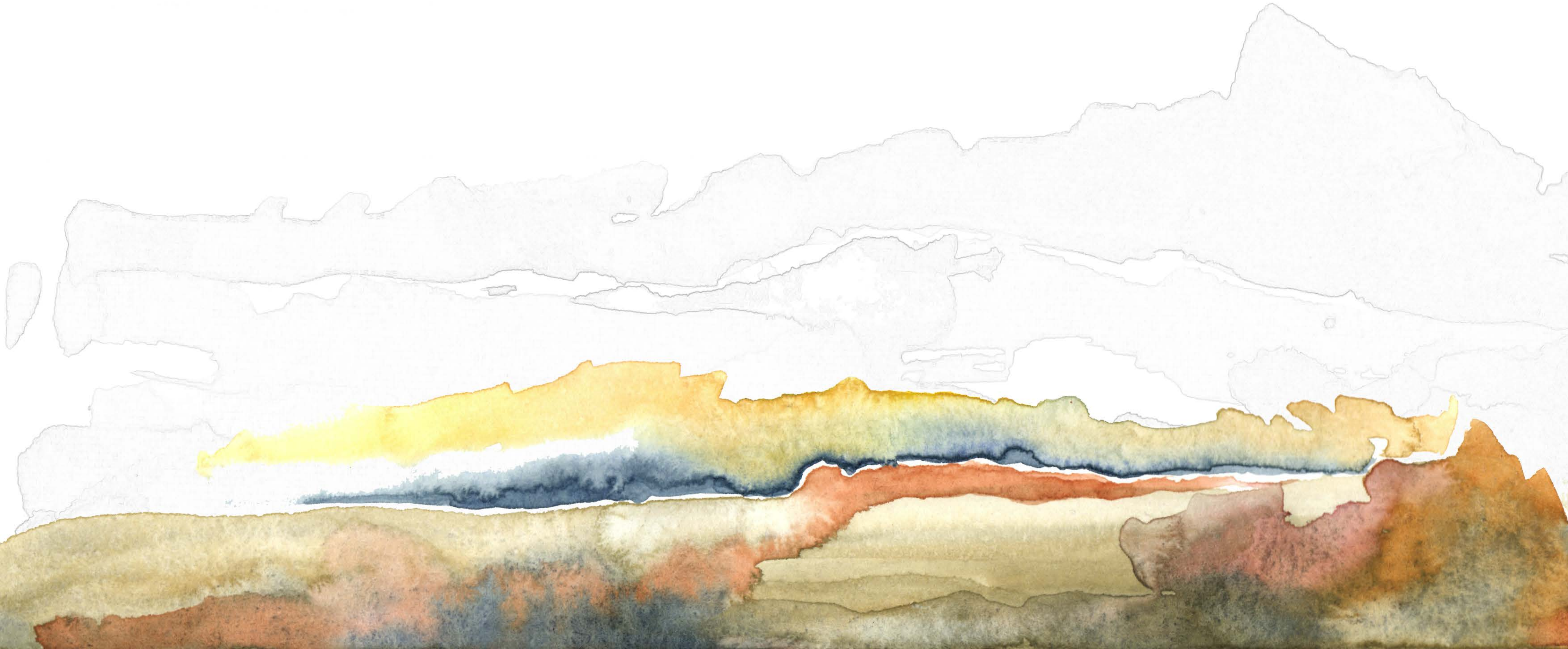
2018194593



DECLARATION OF ORIGINAL OWNERSHIP

This dissertation is submitted in partial fulfilment of the requirements for the degree M. Arch. (Prof) at the University of the Free State. Bloemfontein, South Africa

Department of Architecture, Faculty of Natural and Agricultural Sciences, University of the Free State

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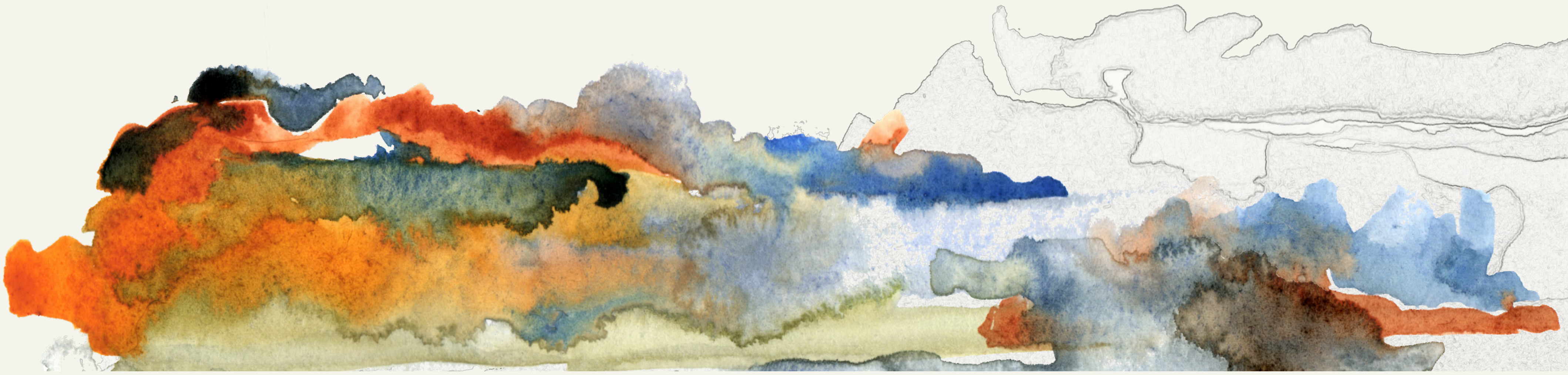
The work contained in this dissertation has not been previously submitted to meet the requirements for a qualification at this or any other institution of higher education. To the best of my knowledge, this dissertation contains no material previously published or written by any other person except where due reference is made.

Supervisors: J. Smit, Prof. J.A. Noble, P. Jooste-Smit, M. Bitzer



Many unused and abandoned railway stations are scattered throughout the Karoo, the site of Houtkraal Railway Station being one of them. The remaining buildings verge on ruin, and slow and deliberate decay has set in, mediating between present, future and past.

The main question is: **How can architecture map temporality through the physical and metaphorical interpretation of patinas and the mindful fabrication of a patina of care in the design of a wool processing facility at the historical Houtkraal Railway Station in the Karoo in South Africa?**

Though the wool industry in South Africa is largely unstable due to outbreaks of cattle diseases, which limits the export of wool to other countries, the local processing of wool has yet to be established. Much research has been done on wool processing and its social, economic and environmental impact, though past research and precedent studies fail to address the possible architecture that may accommodate and balance both the hand-driven processes of wool processing and the industrial nature of a railway line in South Africa. Furthermore, the interpretation of patinas in architecture relies heavily on time, temporality and ruin theories. Along with the theory, investigations are done regarding materiality and promenades, which will attempt to make sense of the experience of passing time. The successful and realistic design and development of a wool-processing facility in the Karoo, next to a railway, may revitalise the railway and the local economy and may change onlookers' perspectives on buildings laid waste over time.

Of the circularity of Time and full circle events:
my first oral presentation in Grade 1

(Author, 2007)

Wol

Wol

Wol

Wol

Wol

Wol

Wol

nommer Een

Hello Juffrou en maats.
Ek prant vandag van wol.
Daar wort 'n skaap geskeur.
Elke krui 'n mens wol.
Dan gaan die wol in 'n baal na Port Elizabeth. en
Dan dan gaan die baal na China toe en China
stuur dit na ons. En dan kruie ons die kruiend
By PE word die wol op 'n veiling verkoop
Die meeste kenan gaan na China toe
Hulle stuur dan vir ons breiwol soos die
Met breiwol brei 'n mens handskoene soos hierdie
skape groot stuk wol
Dankie juffrou en maats

nomer Een

wol

1. GATHERING THE FLEECE

2. CASTING THE FLEECE

3. CLASSING THE FLEECE

4. REFINING THE FLEECE: CONCEPTUAL DEVELOPMENT

5. SPINNING THE GOLDEN THREAD

6. PREPARING THE LOOM

7. WEAVING THE GOLDEN THREAD

1. GATHERING THE FLEECE

RATIONALE

PROBLEM STATEMENT

South Africa is one of the largest wool producers in the world, producing up to 3% of the global wool supply and 12% of the world's apparel-specific wool. South Africa has about 10,000 wool producers, which includes commercial and subsistence farmers, and the industry employs about 40,000 people as farmworkers, sheep shearers and wool handlers. Though the wool industry is one of South Africa's largest agricultural sectors, the wool market is somewhat unstable and holds considerable risk for farmers and producers. In the event of pandemics like COVID-19 and outbreaks of cattle diseases, e.g., FMD (Foot-and-Mouth Disease), bans are often placed on the export of livestock.

The effects of COVID-19 and FMD have taken a severe toll on wool production and processing in South Africa. In April 2022, the outbreak of FMD in South Africa led to a livestock import ban to China, which led to a loss of R734 million in the wool industry. Bans such as this can jeopardise the income of commercial and subsistence farmers and the labour force involved in the wool industry. One of the solutions to stabilise the wool market is to activate the local market, which means that the South African wool industry will not be wholly dependent on income from the international wool market and exports.

Subsistence farmers who do not produce enough wool to access the formal market will benefit most from activating the local market, which includes processing wool locally. In some circumstances, collecting a group of subsistence farmers' wool and processing and selling the fleece together may amount to enough wool to be sold at the formal wool market. Another group of people who will undoubtedly benefit from locally processed wool are designers and artisans with insufficient capital or machinery to handle bulk quantities. Finally, hand-processing wool is relatively simple and easy, which means that uneducated people and people suffering from FAS (Foetal Alcohol Syndrome) an avoidable but irreversible condition caused by the mother's consumption of alcohol during pregnancy, which is prevalent in the area, can also be employed in a wool-processing plant. This will, in turn, address joblessness and unemployment in the area.

INTRODUCING THE CLIENTS

CAPE WOOLS SA

Cape Wools SA forms part of the Wool Board in South Africa and promotes ethically produced wool and the wool industry. Cape Wools SA is the official industry representative organisation of the South African Wool industry. It represents the collective interests of the wool producers, buyers, processors, brokers, and traders. Cape Wools also represents the South African wool industry at the International Wool Textile Organisation, which regulates wool trading internationally. This organisation provides advisory services to all the role players in the wool industry in South Africa, with assistance from the National Wool Growers Association of South Africa.

Cape Wools SA aims to create wealth in wool by supporting the South African wool industry with research, funding, and progressive, independent, and transparent projects to protect and promote the different role players in South Africa. The core values of Cape Wools SA are innovation and creativity, sustainable wool production, transparency and transformation in the wool industry and being socially and environmentally responsible (Cape Wools SA, 2023: online).

NATIONAL WOOL GROWERS ASSOCIATION

The National Wool Growers Association works with commercial and communal or subsistence farmers to improve the profitability and sustainability of wool farming. This organisation also develops a skilled labour force by educating and training sheep shearers and farm workers. One of their main aims is the sustainability of wool production and processing, which is enforced by a “Good Practice” code to which all wool producers must adhere. The NWGA mainly focuses on development, economic growth and job creation.

Figure 1.1: National Wool Grower’s Association Logo

PLACE: HOUTKRAAL RAILWAY STATION

Many unused railway lines and accompanying railway houses and stations cross rural South Africa: remnants of a once-successful railway network. These existing infrastructure pieces can be utilised again with maintenance and repair. At this stage, most wool producers transport raw wool to Gqeberha with trucks, which damages the roads and transport infrastructure, while the railway could be a viable and sustainable option to get wool from the farm to the wool market. Rail transport was mainly used to transport wool from rural areas to the wool market in Port Elizabeth in the olden days. The deteriorated railway system has made that impossible, which seems to be the opposite of progress. Reusing the existing infrastructure near railway stations in rural areas as wool processing facilities means that wool processing can be done in rural areas, which may reverse the effects of urbanisation with job creation. Revitalising the existing railway lines in South Africa and the existing station buildings and goods sheds also means that local commercial and subsistence farmers can easily transport their wool from their farms to the formal market in Gqeberha.

MAP
verb: represent (an area, in this case, time) on a map; make a map of.
plot, draw, delineate, depict, survey

Architecture is investigated as a repository of time

Heidegger: "Being" anchored in space and time
"thrownness, projection, fallenness"

Time and patinas, or even ruin, are connected through continuity and change

HOW CAN ARCHITECTURE MAP TEMPORALITY THROUGH

THEORETICAL DISCOURSE

noun. a fine coating of oxide on the surface of a metal
sheen, veneer, tarnish, gloss, varnish

the action of explaining, understanding or construing the meaning of something.

THE PHYSICAL AND METAPHORICAL INTERPRETATION OF

Patinas as addition *(event)* , subtraction *(enduring object)* and revelation *(process)* through materiality

natural and unavoidable change to a surface due to age and exposure

layering, inscriptions in architecture by means of participation

what does the building contribute?

PATINAS, AND THE FABRICATION OF A PATINA OF CARE IN

a surface appearance of something grown beautiful especially with age or use

sustainability: environmental impact, community and social impact, economy

Function of the building, shearing and wool processing

THE DESIGN OF A WOOL PROCESSING FACILITY AT THE

Design Aim: The design development must balance the hand-made processes and production and the site's industrial nature with the Karoo's proud landscape.

Burra Charter analysis of heritage buildings on site

HISTORICAL HOUTKRAAL RAILWAY STATION IN THE

60 years +

Houtkraal / Houdkraal: what's in a name?
to explore the experiences, realities and narratives that anchor the architecture to the place

What is the future of railway in South Africa?
SANS3000 regulations regarding construction of railways

KAROO IN SOUTH AFRICA?

agricultural context, droughts, harsh environmental conditions, FAS

RESEARCH QUESTION

“How can architecture map temporality through the physical and metaphorical interpretation of patinas and the mindful fabrication of a patina of care in the design of a wool processing facility at the historical Houtkraal Railway Station in the Karoo in South Africa?

This research question also serves as a guide, as illustrated on the left-hand side, and forms the structure of the document. Here is a short structure of the document based on the research question:

Temporality is one of the central themes in this dissertation and is questioned regarding the physical materiality of architecture. The physical and metaphorical interpretation of patinas is discussed in the theoretical discourse, as well as temporality and the experience of passing time. The place and the history of the site are discussed and form a basis of questioning for heritage architecture found on the site. The research question also introduces the programme of the proposed building; a wool processing facility.

DESIGN AIMS AND INTENTIONS

The site, Houtkraal Railway Station, is very industrial, though the proposed programme comprises mostly of hand-driven processes and wool processing techniques. Therefore, the main aim of the design development is to balance the handmade processes and production and the site’s industrial nature with the Karoo’s proud landscape.

Furthermore, sustainability in wool processing and garment manufacturing will also be addressed. Sustainability is not an overused buzzword but should address economic, environmental, and social factors. This dissertation aims to address abandoned railway infrastructure and propose a new function, and through this, open up avenues of discussion to keep the railway and infrastructure from going to waste.

THEORETICAL APPROACH:

The theoretical discourse aims to investigate and explore how different users’ narratives, experiences and realities may anchor the building to the site through the experience of temporality. Similarities will also be drawn between the experience of temporality and the railway and the proposed function of hand-processing wool, which are all characterised by a definite beginning, middle and end. This dissertation aims to link temporality and the possibility of ruin with Patinas’ physical and metaphorical interpretation. Finally, the “patina of care”, as mentioned in the research question, is discussed as mindful preservation through interaction and participation.

DESIGN METHODOLOGY

Given the research question, “How can architecture map temporality through the physical and metaphorical interpretation of patinas and the mindful fabrication of a patina of care in the design of a wool processing facility at the historical Houtkraal Railway Station in the Karoo in South Africa?” the methodology includes a system of methods including the following:

- An in-depth site analysis that places the site within a geographical, historical and cultural context
- A Burra Charter analysis
- A study of Karoo architecture
- Engaging with the wool industry in South Africa
- A theoretical discourse that responds to what is found on the site and focuses on patinas, ruins and temporality.
- Design development, which includes design investigations and explorations, as well as precedent studies which influence the final design.


HOUTKRAAL

2. CASTING THE FLEECE

This chapter places Houtkraal station in its geographical, architectural, and historical context. The site is an abandoned railway station, and it therefore makes sense to discuss the railway crossing the Karoo and the railway architecture found next to it. The site's geographical context and climatic conditions are also discussed, and will later in this document, play an important role in the climatic response of the proposed building. The next part of this chapter addresses the historical nature of the place and again highlights the importance of the railway as a prominent and defining element of the Karoo landscape. Following the historical narrative of Houtkraal and the wider context, including De Aar, a Burra Charter analysis and statement of significance is done, to determine the heritage value of the derelict buildings at Houtkraal Station and helps to form a design strategy for the site. Finally, this chapter introduces the reader to the people who will become either the employees or users in the program, in the surrounding areas and the issues they struggle with.

Figure 2.1: Approaching Houtkraal Station (Author, 2023)

NARRATIVE AND PERSONAL EXPERIENCE:

“Nee, Kleinmies,” sê Ben, een van die werkers op Ryssel, oom Pieter se plaas in die Karoo. Hy hou sy hand naby sy heup, handpalm boontoe.

“Die fokkol groei net so hoog.”

“No miss,” says Ben, one of the workers at Ryssel, my uncle’s farm in the Karoo. He holds his hand close to his hip; palm turned upwards.

“The nothing grows this high.”

Many unused and abandoned railway stations are scattered throughout the Karoo, the Houtkraal railway station being one of them. Traces of a forgotten history can still be found on the site, such as bullet casings, shells, clothing articles and, water bottles, evidence of skirmishes between the English and the Boer commandos. In my mind’s eye, I see a busy railway station, goods being transported from De Aar to Kimberley and back. I see the war, ox wagons tipped over in a rush, horses on the run, and the train mercilessly steaming forward, an iron snake crossing the landscape, immovable lateral undulations left on the landscape.

I look for snakes in the overgrowth; only this morning, we saw the tracks of a big puffadder outside the house. It is summer. The smell of the grass and the Karoo rises in a heatwave, and the air shimmers through a heated haze. We approach the remnants of the old railway houses and disturb an owl, who flies out soundlessly. I will not find snakes here, I decide. The air is thick with stories long forgotten—the building strains under the weight of unbecoming, like a breath held too long. I wonder who lived in the small rooms before the wasps moved in; the metal ceiling, burnt black, hangs listlessly and buzzes as the wasps defend their claim.

Two railway lines pass Houtkraal station. The one is still in use, while the other gathers rust, pieces of the railway long since stolen, the irons missing. The one that remains in use is still shiny, the lack of patina evident on the silver heads of the line.

A bakkie rambles on the R388 and leaves a white dust cloud behind. As the dust settles, so does the relentless silence, and the only thing audible is the heat. . The dry grass yields to my feet as I walk from one railway house to the next. Time has laid waste here, and vandals have broken out anything that might have been of value. A fig tree planted in front of one of the houses lifts a heaviness from my chest as I see the ripe and sweet fruit, almost hopeful as it stills bears fruit in this barren landscape. ‘Vygies’ cover the ground with pink, yellow, and orange flowers. A crow sits on the tattered gate. It tilts its head intelligently and looks at me—a harbinger of the afternoon setting in.

I step onto the railway and in the distance, I see a tortoise shell. Deep down I hope, like the fig tree, there will be another sign of life, but to my dismay, it is empty.

Figure 2.2: Houtkraal Station in context (Author, 2023)

HOUTKRAAL RAILWAY STATION IN GEOGRAPHICAL CONTEXT:

AGRICULTURE AND ACTIVITIES IN THE KAROO:

The site is in the Karoo, an expansive area in South Africa. The Karoo stretches into parts of the Eastern Cape, the Western Cape, and the Northern Cape. The Karoo was once a vast inland sea about 250 million years ago, which explains the expansive plains. The area is not suitable for the production of grains, as the rainfall is low, yet the production of grains is possible where irrigation is available. However, under the wide, windswept skies, the Karoo is known for sheep farming, producing wool, mutton, and mohair.

Sheep farming in the Karoo has become an integral part of the landscape and an important sector of the South African economy. The Merino breed is a dual-purpose breed of sheep, producing mutton and high-quality wool that ranges from medium to ultra-fine wool. This is also true for the specific region in the Karoo, specifically the Northern Cape, where the site, Houtkraal station, is situated (heuningland.com, 2023: online).

The areas surrounding the station are thus mainly used for sheep farming, either the production of wool and the export thereof, or lamb and mutton. Many farmers in the area also farm angora goats for mohair production. In recent years, the addition of solar farms and wind turbines near De Aar have also become prevalent, opening avenues for sustainable energy use. However, the addition of the wind turbines seem to have replaced the traditional, iconic windpumps used to pump water from underground sources and is not doing the landscape any aesthetic favours.

Figure 2.3: Railway Housing to the southern end of the site (google, 2023: online)

Figure 2.4: Behrshoek Halt (Google Maps, 2023: online, adapted by author)

Figure 2.5: Poupan Station (Google Maps, 2023: online, adapted by author)

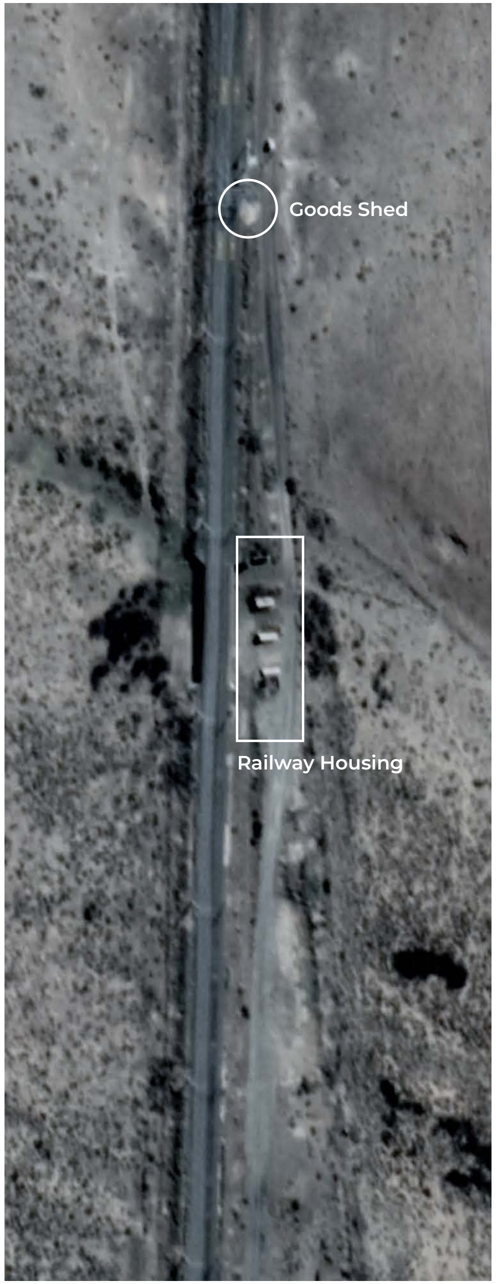


Figure 2.6: Perdevlei Station (Google Maps, 2023: online, adapted by author)

Figure 2.7: Potfontein (Google Maps, 2023: online, adapted by author)

Figure 2.8: Kraankuil (Google Maps, 2023: online, adapted by author)

Figure 2.9: Houtkraal (Google Maps, 2023: online, adapted by author)

RAILWAYS IN THE KAROO:

Many abandoned and unused railway stations are scattered throughout the rural areas in South Africa, with Houtkraal Railway Station being one of them. Houtkraal Station is next to the railway connecting De Aar, Hopetown, and Kimberley. This railway line is also known as the "Steel Kyalami" and is still functional today, though most of the small railway stations next to it are no longer operative. Many small railway stations exist from De Aar to Kimberley along the railway line. Approaching Hopetown along the R388 that runs parallel to the railway line, one finds Perdevlei, Behrshoek Halt, Houtkraal, Baartman, Potfontein, Kalkbult Halt, Poupan, Rooidam, and Kraankuil, between De Aar's railway station and Hopetown. Like Houtkraal station, little remains of Potfontein and Kraankuil, and these stations are also deserted.

These small, deserted stations share some of the same characteristics. Some of these stations are not stations as such but instead mere stops. Yet almost all of these stations have goods sheds, railway accommodations, and concrete platforms on which informal houses were built for migrant workers. One defining characteristic of these small railway stations is how trees are planted around some of the buildings, usually in straight lines. These are not indigenous trees but tall eucalyptus trees. Railway buildings and architecture commissioned by the South African government and railway offices, such as Transnet, are not site-specific and can be described as generic layouts. However, some traces of gardens and planted fruit trees remain on some of these railway stations, showing that the inhabitants of these buildings still made the place their own as they settled there, which shows care and ownership, something that may have saved the derelict buildings from ruin.

Figures 2.3-2.8 show the different stations on the railway line between De Aar and Hopetown. From these images, one can see the similar layout of the railway houses, concrete platforms and the goods shed. Houtkraal Station (Figure 2.8), however, was the most central station on the line, which meant that it had two different typologies of railway housing: bigger houses for the station masters and supervisors, and smaller houses for workers. On the right-hand side of the R388, was another plot of land that also belonged to the railway, which housed a pavilion, tennis courts and locker rooms. The cement dam found there was part of the original construction and is functional to this day.

Figure 2.10: Railway connecting De Aar and Houtkraal Station (Google Maps 2023: online, adapted by author)

GEOGRAPHICAL CONTEXT OF THE SITE

The closest town to Houtkraal Station is De Aar, 37 kilometers away. The area falls under the Arid Interior climatic zone (Architective Publications, 2018, p. 107), which can also be described as a Subtropical Desert Climate (Weather and Climate - The Global Historical Weather and Climate Data, 2023: online). One may experience the following characteristics in these climatic zones: the area is generally warm, with hot summers and cold winters. At the extremes of the climatic range, the temperatures exceed human comfort. Furthermore, the area is quite dry, with low rainfall and humidity.

The area has a hot season from November until the end of March, with an average daily temperature above 28 degrees Celcius. The cold season usually lasts from May to August and has an average temperature of 19 degrees Celsius (Weather Spark, 2023: online). Strong winds are experienced from August until January, while steady winds are experienced from February to July (meteoblue.com, 2023: online). From personal experience, the wind is a constant in the immediate environment, only differing in strength and speed. Mornings are usually quiet, while the wind blows late morning through evening.

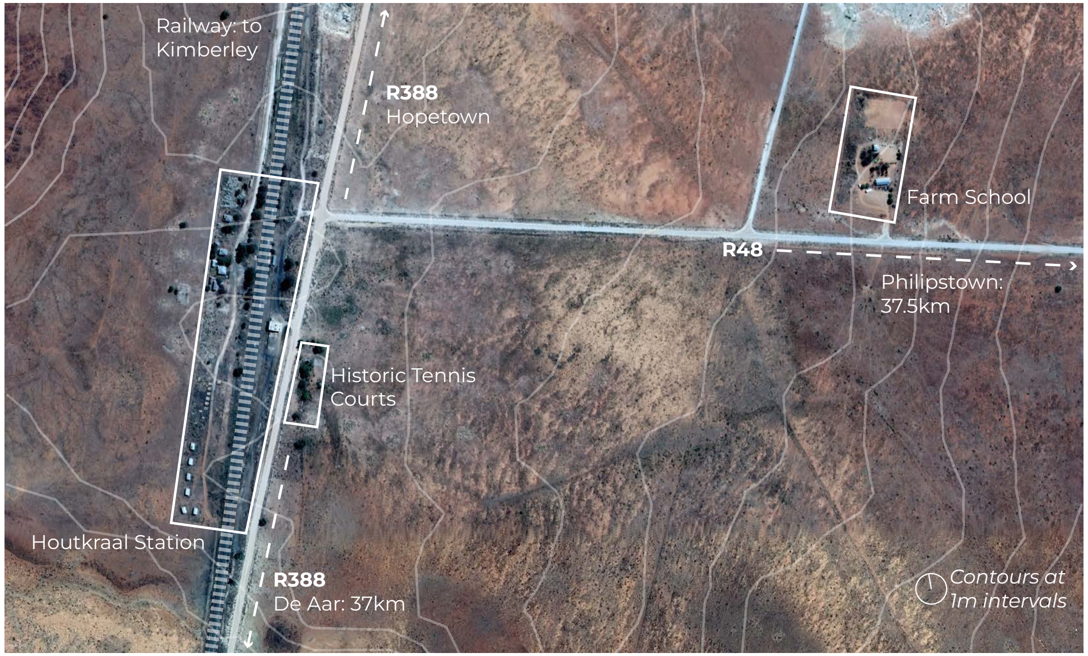


Figure 2.11: Houtkraal Station in broader context, (Google Maps, 2023: online, adapted by author)

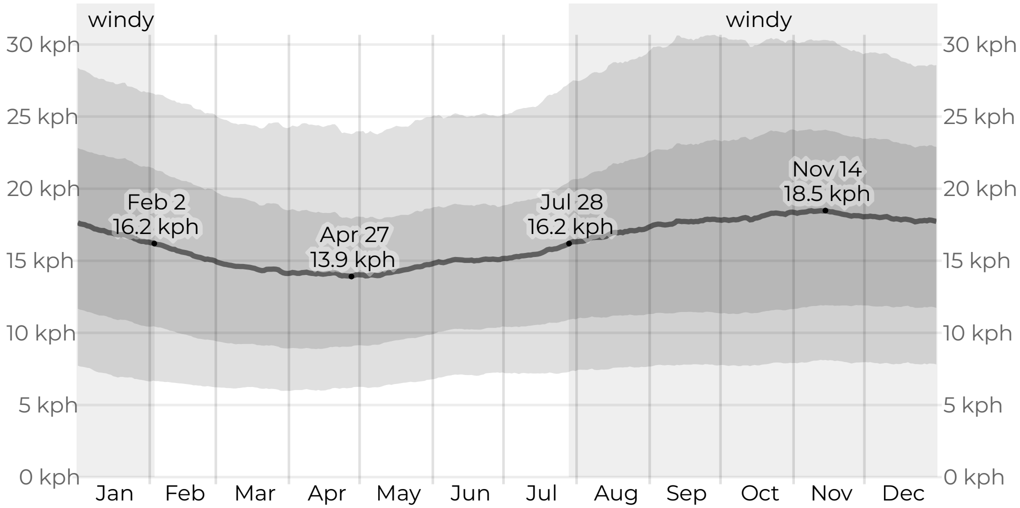


Figure 2.12: Average Wind Speed in De Aar (meteoblue.com, 2023; online)

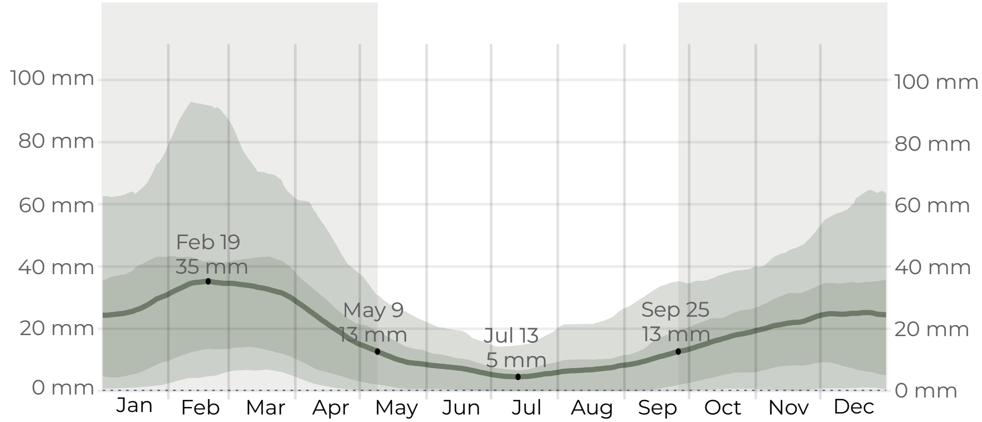


Figure 2.13: Average monthly precipitation in De Aar (meteoblue.com, 2023; online)

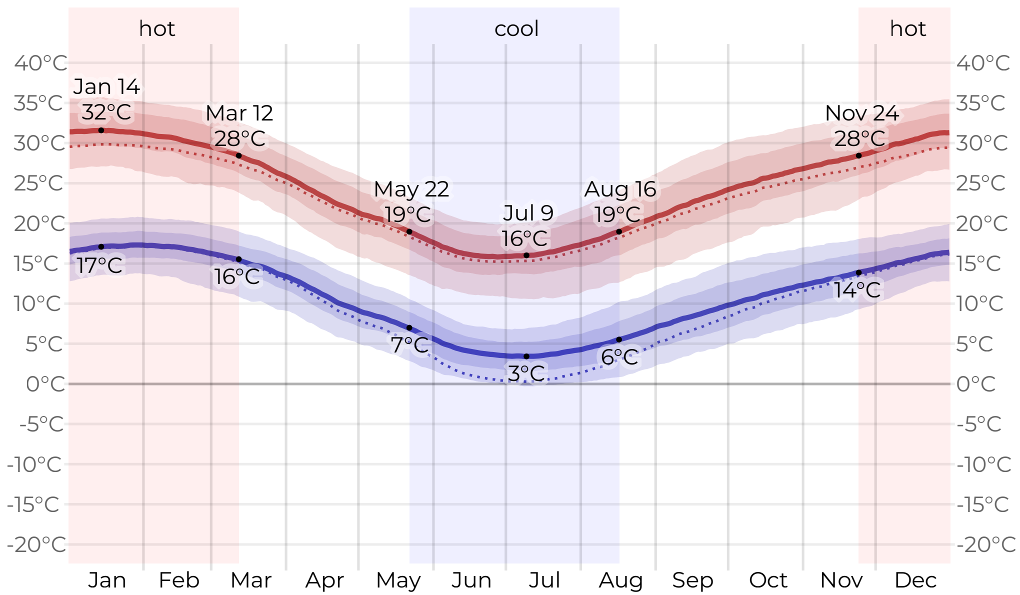


Figure 2.14: Average High and Low Temperatures in De Aar (meteoblue.com, 2023; online)

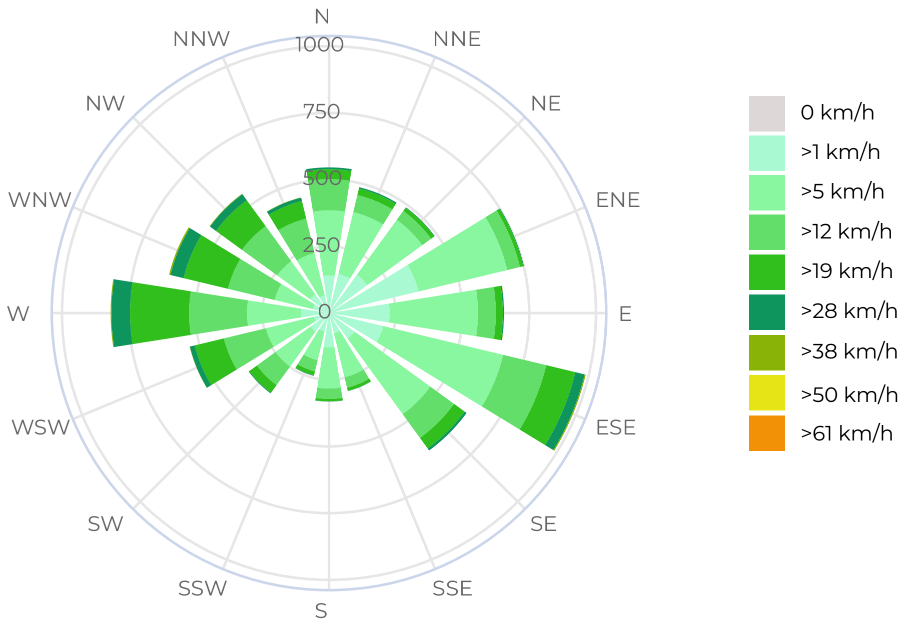


Figure 2.15: Wind rose: speed and direction of wind surrounding De Aar (meteoblue.com, 2023; online)

HOUTKRAAL RAILWAY STATION IN ITS HISTORICAL CONTEXT:

"Oupa, waar was die skooltjie wat Oupa Bok gebou het?"

"Baie maklik; die ingang van die skool was onder die laning groot Bloekombome. Langs die pad was daar badkamers en n pawiljoen by die tennisbane."

"*Oupa, where was the school that Oupa Bok built?*"

"Easy, the entrance to the school was under the row of Eucalyptus trees. On the other side of the road, there used to be bathrooms and a stand next to the tennis courts."

(du Toit, 2023)

Houtkraal translates to "wooden corral" but was called Houdkraal previously, which loosely translates to a corral in which things were kept, retained, guarded, and held. One of the speculations regarding the origin of the name "Houtkraal" is that locals stole the wooden sleepers installed in the railway line extension between De Aar and Kimberley and built corrals to keep livestock in with them. These stories cannot exactly be proven, but they are widely believed. Given that existing corrals can be found near Houtkraal Station, though not constructed of wood, the name "Houdkraal" remains appropriate. It is also possible that the station's name changed because "Houdkraal" and "Houtkraal" sound much the same and can easily be confused.

The site, Houtkraal Railway Station, is situated next to the R388 between De Aar and Hopetown and the railway connecting De Aar and Kimberley. This is an isolated site; the nearest urban settlement, De Aar, is 37km away, and Philipstown is 38km away. According to popular retellings, the area once housed a hotel, tennis courts, a station building, a school, and railway houses. At this point, only the dilapidated railway houses are left, though the foundation walls or slabs of the previously existing buildings still exist. Houtkraal station has four different railway lines, and when the station was in full operation, as many as sixty steam locomotives would pass on the double lines. Two sidelines were also in use. Nowadays, between four and six electric trains pass Houtkraal Station on a single line, which means that one line is no longer in use.

When comparing aerial photography from 2004 and 2018, one can clearly see how the condition of the site has deteriorated. The station building seen in the aerial photography of 2004 has since been demolished, as well as the sideline. The erfs on the site's northern edge are littered full of sleepers, remnants of the once-operational sideline of Houtkraal station and have become graveyards of sleepers.

Five houses were constructed at the northern end of the site for station masters, drivers, and conductors. Today, only four remain. One finds six other houses built for railway workers at the site's southern end. Seven platforms of uniform size were presumably used for migrant labourers and are still found on site to this day.

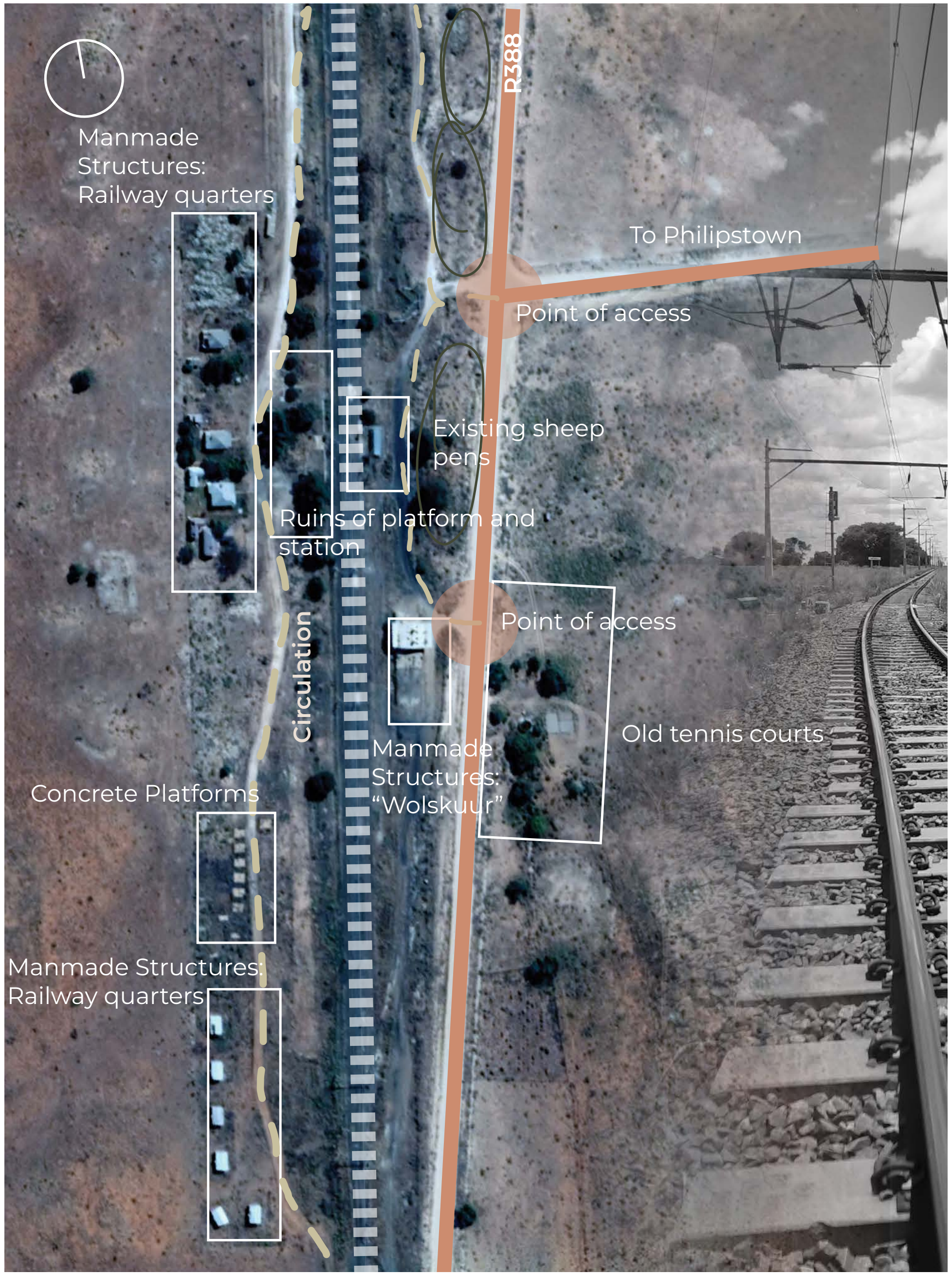


Figure 2.16: Site Analysis of Houtkraal Station, (Google Maps, 2023: online, adapted by author)

Figure 2.17: Aerial Photography of Houtkraal Staion 2018 (Google Maps, 2023: online)

Figure 2.18: Aerial Photography of Houtkraal Staion 2018 (Google Maps, 2023: online)

HISTORY OF THE RAILWAY LINE EXPANSION FROM BEAUFORT WEST TO DE AAR

TO KIMBERLEY

BEAUFORT WEST – DE AAR – *(HOUTKRAAL)* – KIMBERLEY

When considering Houtkraal and its role as a railway station, it is essential to trace its origins back to where the development of the railway line started. An Act of Parliament in Cape Town in 1881 ordered the extension of the railway line from Beaufort West to De Aar and beyond, ultimately to the diamond fields in Kimberley. The first stretch from Beaufort West to De Aar was completed and welcomed the first train at the newly completed station in September 1884.

At the time, De Aar was known as Brounger's Junction, named after William G. Brounger, the colonial railway engineer who oversaw all the railway construction and management in the Cape Colony. Brounger maintained the railway by replacing the wrought iron railway lines, which wore away fast, with steel lines and experimented with different kinds of wooden sleepers. One can still see the wooden sleepers on the railway line near De Aar and Houtkraal Station. Only some of the wooden sleepers have been replaced with concrete sleepers. Brounger's Junction soon changed to De Aar, named after the farm on which the town was initially settled and after the rich underground water sources present in the area. Interestingly, this town, named after a strong underground water vein, would later become a vein through the railway's development. The railway became a vein through which resources entered and exited the town and was distributed across the rest of South Africa. The railway and railway towns like De Aar also acted as mobilising agents during the Second Anglo-Boer War.

HISTORY OF DE AAR

Historically, De Aar was once a farm, a portion of land allotted to Dutch "trekboers". In 1839, the farm was sold to Jan Vermeulen for a span of oxen and a wagon. The arrival and settling of the Friedlander brothers in 1879 and the opening of a trading station with a small hotel sped up the development of De Aar when the station, Brounger's Junction, was established there. Soon the Friedlander brothers also constructed a General Dealer's shop, and another hotel in 1884, constructed with wood and iron. This business venture was successful as trains used in the early expansion of the railway lines did not have dining cars. Thus, the dining room at the De Aar Hotel became known as one of the finest dining rooms besides Cape Town. The railway development in De Aar meant that many conducted their business here instead of in older towns, like Brits town, Colesberg, and Graaff-Reinet. The busy and effective railway also meant a postal service was possible here (karoo-southafrica.com, 2019: online).

In 1899, the Friedlander brothers purchased the farm De Aar from the owner at the time, Mr J.M. Grundling. As time progressed, the brothers also purchased other subdivided plots and additional properties until they had accumulated enough ground to establish a township.

De Aar, a major railway junction, became strategically important during the Second Anglo-Boer War and many Colonial and British troops were garrisoned there. A military hospital was also established here for the duration of the conflict. De Aar, Noupoort and Stormberg, three major railway junctions, were garrisoned as safeguards to the Cape Colony (karoo-southafrica.com, 2019: online). By the end of 1899, the De Aar garrison became a military depot. This means the railways from De Aar to Cape Town and Kimberley were under British control until long after the Second Anglo-Boer War.

Figure 2.19: Train crossing through Houtkraal Station (Hunt, 2023: online, adapted by author).

The De Aar Hotel became the headquarters of the British and Colonial military forces in the area and served as the primary control centre in preparation for many attacks on the Boer forces in the area, Magersfontein, just south of Kimberley in particular, and later also an advance on Bloemfontein in January 1900. The railways played an undeniable role in mobilising the English across the country, and the railway that passes the site, Houtkraal station, carried thousands of British and Colonial troops together with guns, rations, medical supplies and other military supplies to the Orange River towards Kimberley.

(HOUTKRAAL)

There are many traces of skirmishes along the railway lines between the Orange River and De Aar. Some evidence of fights between the English and the Boers can still be found near the site, for example, bullet shells, medicine bottles or steel water bottles, though very few of these battles are adequately recorded.

In December 1900, General J.B.M. Hertzog crossed the Orange River into the Cape Colony. This is about 70km north of De Aar. Therefore, the railway from there to De Aar and the town itself was on high alert in response to this event. Hertzog and his men briefly occupied Philipstown in December 1900 but drew back due to a strong British military presence at Hanover Road. Hertzog's commando attacked an armoured train at Houtkraal before overwhelming four companies of Yeomanry that had been despatched from De Aar to oppose them. There was only one casualty; the stoker Myles Adams was killed by a "penkop", Klaus Havenga when the "penkop" attempted to shoot the driver of the armoured train (Loots, 2017: online).

Other attacks and activities by a commando under the command of General Christiaan de Wet followed in the area following the raid of the armoured train. At the same time, Hertzog also continued with commando actions in the near vicinity of De Aar simultaneously. The attacks on the railways were not meant to be deadly blows but guerilla tactics to annoy the British (Loots, 2017: online).

Many other military movements, like mobile field hospitals and Yeomanry Hospitals, were placed next to the railway lines to easily transport wounded soldiers to more prominent hospitals in towns. One of these, the railway station at Deelfontein, south of De Aar, had this specific function. One may, however, wonder whether field hospitals were not more common near the railway lines, especially when regarding unmarked graves near some of the smaller stations along the railway line.

AFTER THE WAR:

In 1902, after the Second Anglo-Boer War, the Friedlander brothers hired a surveyor from Cape Town to lay out plots for private homes, public buildings, a city hall and municipal buildings, and places of worship, which received their plots free of charge. The town planning made provision for wide streets, still visible today and broad pavements. The town planning also included separate areas that were set aside for the coloured and black communities away from the white community. This is also consistent with the layout of houses in less prominent railway stations along the railway lines between De Aar and the Orange River, which can also be seen at the site, Houtkraal Station, where accommodation for white station masters and conductors are placed about 250 meters from the accommodation provided for black railway workers.

Today, Houtkraal station falls under the De Aar Municipality, established in 1903 with Samuel Cronwright, husband of the author Olive Schreiner, as the Town Clerk, and the first mayor, Dr Harry Baker, who was elected in 1907 (karoo-southafrica.com, 2019: online).

It is almost tragic to see De Aar, a once prominent railway town, be reduced to tatters and potholes, ruins, and dirt, and the same can be said for many of the small railway stations near the vicinity, where rich history is discarded and forgotten.

“...daar was meer as sestig treine wat op n dag op n dubbellyn by Houtkraal Stasie verby gegaan het en gestop het. Daar was twee sylyne, waar treine kon aftrek as n ander een moes verby gaan. Dis alles tot niet. Dit was n besige plek. Daar was passasierstreine en goedere treine.”

“En vandag, Oupa?”

“Daar is miskien drie of vier treine, wat op n enkellyn verby gaan.”

“Word die ander lyne glad nie meer gebruik nie?”

“Die sylyne is jare terug gebruik. Nie vandag meer nie.”

”...more than sixty trains passed or stopped at Houtkraal Railway Station daily on double lines. There were two side lines, where trains stopped when another train had to overtake. There is nothing left, and it used to be a busy place. There were passenger trains and goods trains.”

“And today, Oupa?”

“Perhaps three or four trains that pass on a single line.”

“Are the other lines not used anymore?”

“The sidelines have not been in use for years now.”

(du Toit, 2023)

BURRA CHARTER: STATEMENT OF SIGNIFICANCE

The National Heritage Resources Act 25 of 1999 enables the management of national heritage resources through an integrated and interactive system to empower society to conserve culturally significant heritage resources. This is done through the implementation of general principles for managing heritage resources. One of the guiding principles is the conservation and preservation of buildings older than 60 years. Though no exact date of construction is known for the buildings found on the chosen site, it can be assumed that these buildings might have been constructed shortly after the Second World War, when considering the steel window and doorframes and the use of steel lintels above the windows and doors. Given the style of the houses, metal ceiling plates, brick fireplaces and chimneys. One may conclude that these buildings may have been constructed during the 1950s.

These buildings are, therefore, about 70 years old and fall under the protection of the Heritage Resources Act 25 of 1999. However, when considering the current dilapidated state of these buildings, the question arises whether these buildings should be conserved and preserved, and what cultural significance they may hold. To explore possibilities for the conservation and preservation of the site, one must explore the historical and conservation significance of the existing buildings on the site.

Firstly, it is essential to note that many railway houses in the Karoo and even in the broader context of South Africa are not place-specific and do not necessarily participate in a conversation with the atmosphere of the place. In many cases, these houses do not follow the vernacular style of the place and therefore do not necessarily leave a legacy of a specific building style, except for the building style associated with the construction and expansion of the railways in South Africa. The layout of the railway camp at Houtkraal Railway Station is such that different railway houses, whether different in design or mirrored, were positioned at different angles, and the streets were bordered with trees (Wasserfall, 1989, p. 264).

Many other small railway stations placed next to the railway line between De Aar and Hopetown follow the same layout, and many identical floorplans are utilised repeatedly. The shed at Houtkraal Railway Station is also at Kraankuil and Potfontein.

It is interesting to note the difference between houses built for station masters or managers and houses built for poor white and black railway

Figure 2.20: "here be wasps", railway accomodation at Houtkraal Railway Station (Author, 2023)

Figure 2.21: Railway accomodation at Houtkraal Railway Station (Author, 2023)

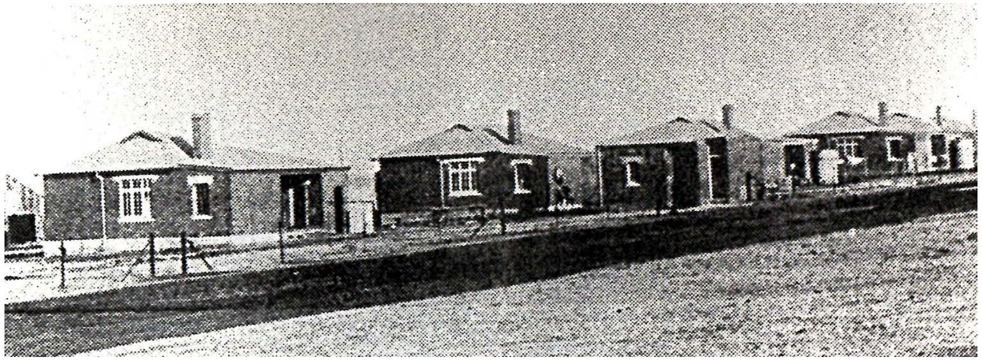


Figure 2.22: Typical Railway Accomodation (Wasserval, 1989)

Figure 2.23: Typical Railway Accomodation, floorplans similar to houses at Houtkraal (Wasserval, 1989)

Figure 2.24: Houtkraal Railway house, similar to Type P3 as illustrated by Wasserval (Author, 2023)

Figure 2.25: Northern Railway accomodation for workers at Houtkraal Railway Station (Author, 2023)

Figure 2.26: Northern Railway accomodation for workers at Houtkraal Railway Station (Author, 2023)

Figure 2.27: Railway accomodation at Houtkraal Railway Station (Author, 2023)

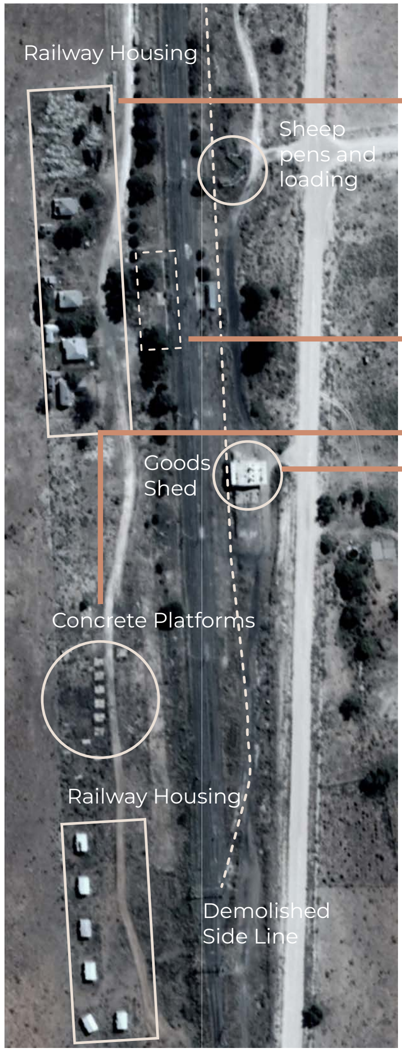


Figure 2.28: Site Analysis of Houtkraal Station, (Google Maps, 2023: online, adapted by author)

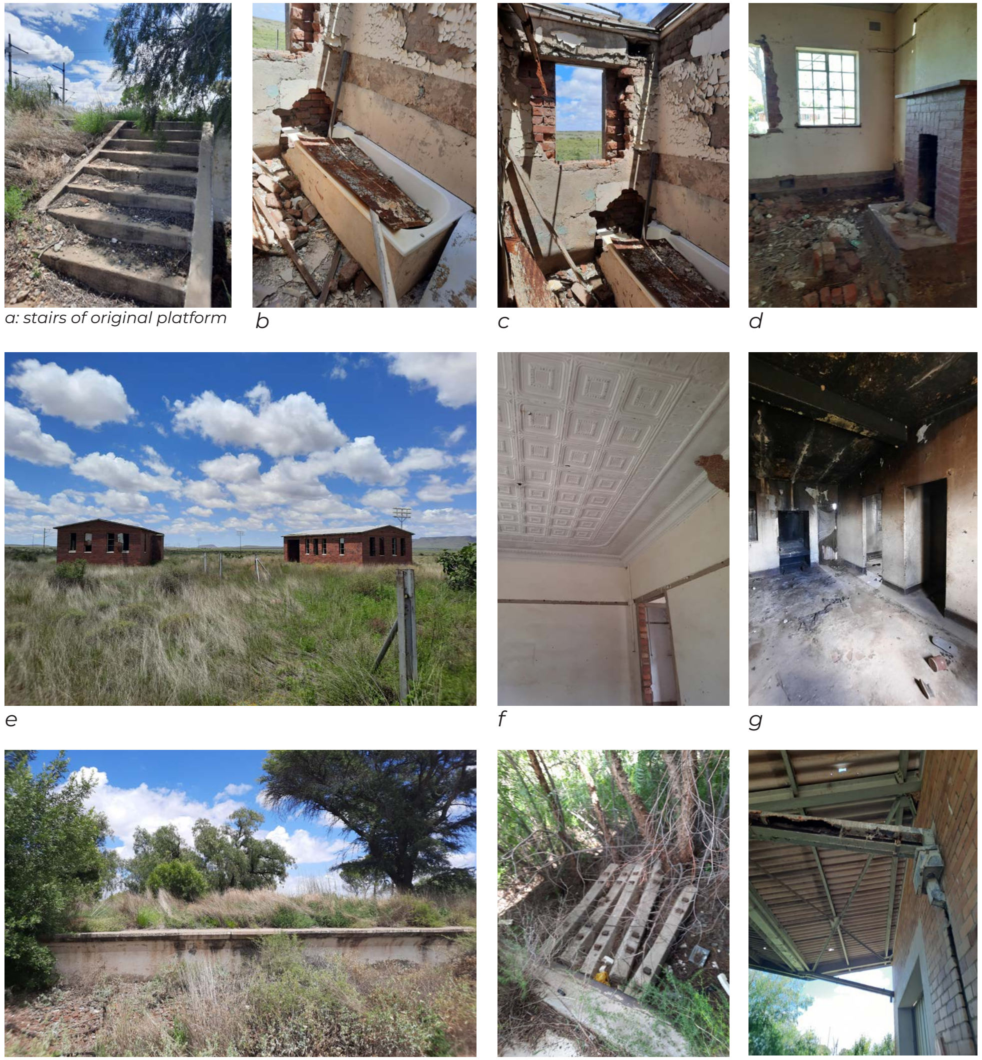
Figure 2.29: Houtkraal Station while still functional (Hunt, 2023: online, adapted by author).

workers on sites near railways, as described by Jaco Wasserfall in his dissertation, “Early Mine and Railway Housing in South Africa: a two-part study of ideology and design in working-class housing” (Wasserfall, 1989).

The existing buildings on the site, Houtkraal Station, include four houses that may have housed station managers, locomotive drivers, and their families to the north-west of the site and ruins of the historic Houtkraal Hotel in the uppermost corner. All the buildings on site have cavity walls, which makes sense regarding the climatic conditions of the Karoo. To the south, one finds six identical houses that probably belonged to black railway workers. The houses at the northern end and the houses at the southern end are about 250 meters apart. The houses to the north of the site have spacious rooms and kitchens with large windows with fireplaces in what can today only be assumed to have been living rooms. Another prominent feature found in these houses is the spacious porches and verandas. On the other hand, the buildings on the site’s southern end are dark lack natural light and accommodate the bare minimum, with substantially smaller rooms and a shared living room, not nearly as big as those found in the bigger houses to the north of the site. This also speaks of the time and political climate in South Africa when this station was operational. However, the construction of the roofs on these buildings is quite interesting, as they consist of what seems to be precast reinforced concrete, with tar on the top as waterproofing.

To the north-east of the site, sheep pens with concrete dams are found. These pens were used while the station was operational. The concrete dams still have functional windpumps maintained by local farmers. A bit more south of the existing sheep pens, an entrance to the site and an old wool shed are found.

One of the questions that must be asked is to whom the building may still be significant. Railway enthusiasts may still be interested in the development of railway buildings and railway stations. The buildings are not protected by any means and are easy to reach.



a: stairs of original platform *b* *c* *d* *e* *f* *g* *h: original platform* *i: discarded sleepers* *j: goods shed*

Figure 2.30: (a- j) Current conditions at Houtkraal Railway Station (Author, 2023)

However, given the current condition of the dilapidated buildings on site, no specific attention was paid in the past few decades. It is unlikely that these buildings will be restored and reused soon. No electrical or sanitary fittings remain, all copper wires have been removed, and bathtubs, toilet bowls and basins are all broken. Strangely enough, many steel ceiling plates remain untouched and near perfect, save for discolouration due to smoke, fire, and rust.

Regarding the existing buildings, it seems that an impasse has been reached. According to the National Heritage Resources Act 25 of 1999, these buildings older than sixty years must be protected. However, given the current condition of the buildings, it seems that these heritage buildings that are supposed to be protected will go to waste without intervention, though intervention is limited to the typology of the buildings. So, if the built structures on the site are left to decay even further, they will eventually disappear, but from a heritage point of view, one cannot speed up this process and construct something in its place.

The railway built these buildings at the time, and the structures on the site can be considered generic and not place-specific as they are erected throughout the country. All the structures were government-issued. One can then further question what architectural impact these buildings have on the specific area they are placed in and whether they are still relevant.

Figure 2.31: Railway Accomodation (Author, 2023)

DESIGN STRATEGY:

The design development strategy is, thus, to develop the site in stages. The first stage entails the construction of a shearing shed and corrals to the northeast of the site, near the existing dams and sheep enclosures. The next stage entails the construction of the wool processing facility between the buildings on the north of the site and the worker's houses on the south of the site. These are about 250 meters apart. The third stage would be to adapt the worker's houses on the southern side of the site into accommodation for sheep shearers and people working at the wool processing facility. Should the site become a place of interest and tourist attraction, the final stage would be to adapt and reuse the buildings on the north of the site to accommodate tourists and visitors of Rovos Rails or accommodation for people visiting Houtkraal Railway station for workshops and crafters breakaways.

This dissertation, however, will only deal with the first stage in creating a new station building and the wool processing facility. From a heritage perspective, sustainability and adaptive reuse are goals that should be strived for, and even if the buildings are torn down, one should still make a conscious effort to reuse some of the elements or materials. The existing goods shed on the east of the site next to the R388 will be torn down as it is ruined beyond repair, and the roof is made out of asbestos, which holds a significant health risk. The rubble will be used in the construction of the proposed platforms. However, the footprint of the old platform and goods shed will accommodate the new station building and ticket kiosk.

Figure 2.32: Design Strategy of Houtkraal Station, (Google Maps, 2023: online, adapted by author)

SOCIAL CONTEXT:

POPULATION AND LANGUAGE:

The total population of De Aar, as recorded in 2011, was 23 760, the main population groups being Coloured people (71.7%), Black African people (16.5%) and White people (10.4%). The main languages spoken in De Aar are Afrikaans (85.9%), isiXhosa (8.8%) and English (2.4%) (Department: Statistics South Africa, 2011: online).

EDUCATION:

Most of De Aar's population has not finished schooling and therefore has not received tertiary education. 27.8% of the population have completed matric, though only 7.5% have received higher education. 34.6% have received some secondary schooling, yet a significant portion of the population (9.5%) has never received any schooling (Department: Statistics South Africa, 2011: online).

FOETAL ALCOHOL SYNDROME IN DE AAR

South Africa has the highest reported FASD/FAS (*Foetal Alcohol Spectrum Disorder / Foetal Alcohol Syndrome*) rates in the world. In De Aar, FAS affects 12.2% of all children born. Foetal Alcohol Syndrome occurs when a foetus is exposed to alcohol during the mother's pregnancy. This is closely related to external factors such as violence, trauma, unplanned and unwanted pregnancies, and the alcohol environment in the area (de Jong, George, & Jacobs, 2021: online). FAS causes brain damage and growth problems in the developing foetus and may also cause physical defects such as deformed facial features, deformities of joints and limbs, vision and hearing difficulties and organ defects (Mayo Clinic, 2023: online). Children affected by FAS are usually born prematurely with low birth weight. This puts the child at risk for infectious diseases and ill health. In severe cases, the baby dies at birth or only lives for a few hours postpartum, as their organs don't finish developing during the pregnancy.

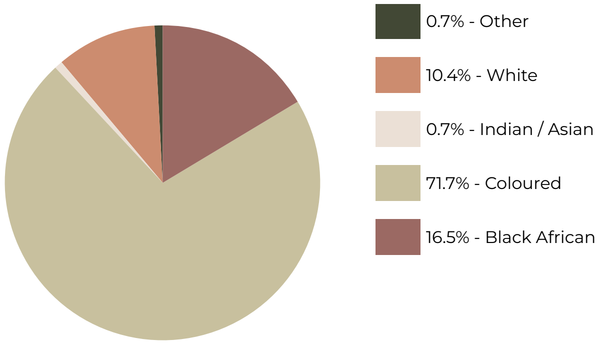


Figure 2.33: Population groups in De Aar (Department: Statistics South Africa, 2011: online)

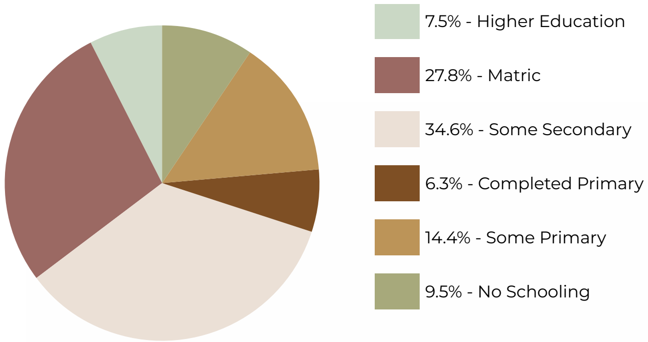


Figure 2.34: Education levels in De Aar (Department: Statistics South Africa, 2011: online)

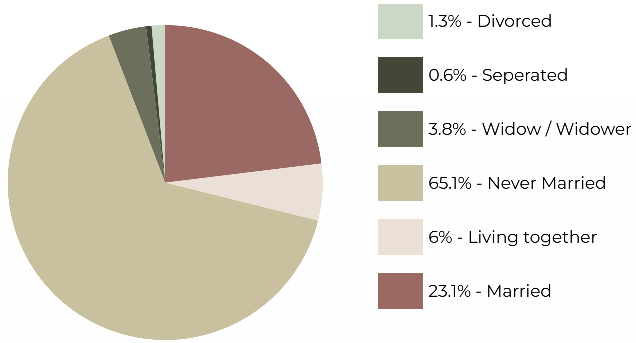


Figure 2.35: Marital status in De Aar (Department: Statistics South Africa, 2011: online)

Unfortunately, this mental retardation, though entirely avoidable, is irreversible, and a child affected by FAS will struggle with neuro-cognitive disabilities throughout his or her lifetime (Solar Capital, 2016: online), which means that they will struggle with education and schooling and will also struggle with joblessness. Though adults with FAS experience vocational challenges, some strengths, skills, and abilities these individuals possess are “curiosity, creativity, tenacity, helpfulness and generosity” and tend to “do well in environments where routines and structures are well established” (Makela, Kapasi, Pei, & McFarlane, 2018, p. 9).

This is a real problem in De Aar, and though groups like FARR (Foundation for Alcohol-Related Research) and Solar Capital try to mitigate the effects of FAS, the circumstances and socio-economic environment are not changing. Those affected by FAS still contribute to the joblessness statistics in De Aar, which is about 80% of the population (Bateman, 2010).

It is suggested that individuals with FAS do well in work environments where they do repetitive tasks with well-established routines and structures. The hand-processing of wool, which includes washing, dyeing, carding, spinning and other functions, should be an appropriate work option or opportunity for people with FAS, provided they are supervised well.

REFERENCING THE SPINSTER

The term “spinster” is a term used to describe “a woman who is not married, especially a woman who is no longer young and seems unlikely ever to marry”, (Cambridge English Dictionary, 2023: online). Though this is a dated term, it still applies to marginalised and vulnerable people, and applies in this context too.

The term “spinster” refers to women who spun thread and yarn for a living. The word describes work done by women but also became associated with women who were single and poor and resorted to lower-status work because they could not afford expensive materials (Gulla, 2020: online).

One can interpret the term “spinster’ in two different ways; either that the spinster is marginalised and cast aside by society (in which a parallel can be drawn to children and people affected by FAS) or that the spinster is doing what she can to survive and take control of her environment and circumstances. The establishment of a wool processing facility is then apt for the modern-day spinsters and outcasts of the society (in this case, De Aar), people who are affected by FAS, which they had no control over and could have been easily avoided.

OF MUD, PLASTER AND SUNBAKED CLAY BRICKS: A STORY OF MATERIALITY

Karoo houses are a source of nostalgia in rushed contemporary times. They can be seen as buildings that have stood the test of time in a harsh environment characterized by scorching summers and freezing winters. It is interesting to see the adaptive relationship between the natural materials used and the extreme temperatures and climatic conditions that the environment offers. Theresa Hardman describes typical Karoo houses as “handcrafted” buildings that display “simplicity, elegance, a sense of space and internal volume from high ceilings and thermal efficiency” (du Toit, 2013: online).

The thick walls of the architecture in the Karoo can be attributed to the material composition of walls: in some cases, the walls were constructed using compacted clay soil. The walls had to be thick enough to stand up vertically. An advantage of thick walls is that they help with insulation. Early Karoo architecture was influenced by the natural materials used in the construction. From the 1860s onwards, corrugated iron was readily available, and flatter roof pitches became more common (Hardman, 1994, p. 133).

The initial architecture found in the Karoo is purely functional and utilitarian in nature and simple in form and expression (Hardman, 1994, p. 135). When Merino sheep were introduced in the Karoo, the economic conditions improved, so the original farm dwellings were often extended and modernized.

Three different architectural typologies developed in the Karoo: the trekboer house, which was simple in nature and usually only temporary; the double-pitched cottage, which was more permanent in nature; and the Victorian or Edwardian type.

THE TREKBOER HOUSE: CIRCA 1790- 1840

These buildings are usually of a much smaller scale. An apt description of these buildings is that they are “crude but immensely solid” (Hardman, 1994, p. 145). The style of this building resulted from materials that were immediately available, which meant that exposed stone walls were often seen in facades. Another feature in this typology is the “opgekleide” walls, a building process in which the clay hardens in situ. The earliest buildings were plastered with clay mixed with cow dung or straw, but later, a limewash was introduced to the clay walls. These clay walls consisted of three parts, sand to 1 part lime, mixed with water, and the continual application of lime provides an irregular texture and softness to the walls in the bright and harsh Karoo light. The white walls were a practical application, as it ensured the reflection of solar heat (Hardman, 1994, p. 154) These houses are long and narrow, usually comprising one to three bedrooms, with a central voorhuis. These buildings are single-storey buildings of modest expression and have no outer adornments.

THE DOUBLE-PITCHED COTTAGE (C1820-1890)

The double-pitched cottage includes a pitched roof, parapeted end gables, and symmetrical facades. Some of these buildings were still constructed using natural materials, but the use of bricks was starting to become prevalent and the buildings were later also plastered. The Cape Dutch buildings strongly influenced this style in the Western Cape. However, these buildings were constructed much simpler than their urban counterparts (Hardman, 1994, p. 166). These were typically mud-walled homes with a limewash as described in the previous section. These buildings were there for permanent inhabitation, in contrast to the trekboer house, and were developed by the generations that lived in these buildings. As the families grew and more generations lived in these buildings, extensions to the original buildings became more common. This is a good example of a patina of addition, which will be discussed in the theoretical discourse.

THE VICTORIAN/EDWARDIAN HOUSE (C1837-C1914)

The most prevalent buildings in the De Aar region is the Victorian/Edwardian type. The English settlers influenced the designs of these houses. This typology differs from the two typologies mentioned above in scale, massing, building materials, and construction techniques (Hardman, 1994, p. 191).

Interestingly, the plans and layouts were influenced by the English settlers, who introduced the importation of building scales, pattern books and pre-cast elements. The most typical layouts were symmetrical and geometric, with the introduction of the full verandah on the front side of the house, which had previously existed only as an extension to the existing buildings. The verandahs are usually L-shaped or U-shaped, and form an important social space of the dwellings. These buildings mostly had pitched roofs of corrugated iron. The introduction of modern building materials and corrugated iron, which is much less of a fire hazard than thatch, meant that some buildings or programs which were confined to outbuildings became part of the main buildings. Later, more asymmetrical plan forms emerged as the lifestyles of the inhabitants changed.

The Victorian farmhouses are of greater height and mass than the previously mentioned typologies, though the rural buildings remained simple, while the Edwardian style is characterised by more elaborate buildings with a comparatively solid architectural expression. These buildings typically rest on a solid stone plinth, about 1 metre in height. Plastered walls are also typical in these building typologies (Hardman, 1994, p. 195). Unlike the previously mentioned trekboer houses and double-pitched buildings, the Victorian/ Edwardian buildings were built using large quantities of industrial and imported materials, like cast iron and pre-cut timber fretwork. This meant that the builders and farmers no longer had to rely on natural materials that were available. However, the wide travelling distances in the Karoo made the transport costs of these industrial materials expensive.

Up until the late 1900s, the bricks were still homemade, made with clay and moulds. Commercially made bricks became available in the early 20^{th} century and were much harder, standardized and of a better quality than the homemade books. The roofs are commonly simple hipped or pyramidal roofs consisting of corrugated iron.

Figure 2.36:Karoo Architecture: A visual essay (Author, 2023) Note the wrap-around verandahs.

Tool is veertien jaar oud. Sy ma werk in Ryssel se huis en hy weet nie waar is sy pa nie. Hy vra of ek binnekort my kar wil verkoop, n stokou-potblou Toyota Corolla. Ek sal sien, sê ek. Ek sal hom eerste laat weet as ek op daai punt kom. Hy ry saam met my na Houtkraal stasie toe, dat ek nie op my eie daar ronddwaal nie. Sy oë is skerp en sy reaksies vinnig.

Hy vra my watter werk ek doen, dat ek die stasie moet ondersoek en afmetings maak. Ek verduidelik aan hom dat dit vir my belangrik is. Ek stop my notaboekie in sy hande en ons stap van gebou tot gebou. Hy bekyk die deurmekaar tekeninge in my boekie, maar hy sê niks. Hy is opgewonde toe ek vir hom die laser-liggie gee om die afmetings te maak. Hy is verlede jaar, in graad 8, uit die skool uit om op die plaas te gaan werk. Ek vra so tussendeur wat hy wil doen as hy groot is. Hy wil net op die plaas wees. Hy kan homself nie indink hoe lewe in die stad moet wees nie. Dis te beknop.

"BY!" skree hy skielik.

"Ek is nou by," verduidelik ek, ietwat uit die veld geslaan. Ek besef te laat wat Tool bedoel.

Maar hy is skoonveld. Een, twee, drie, vier. Eina! Dit brand! Donnerse perdebye! Ek hardloop vir n vale, en die perdebye wil my nie uitlos nie. Vyf, ses, sewe! Tool is n paar honderd meter voor my. Toe die goed my uitlos, staan Tool vir my en lag. Ek verstaan nie wat so snaaks is nie. Ek sê dit ook vir hom.

"Ek is jammer Kleinmies," sê Tool. "Jy vloek nogals goed".

Die bliksem.

Tool is fourteen years old. His mother works as a housekeeper in my aunt's house and he doesn't know where his father is. He wants to know when I'll sell my car, an old, blue Toyota Corolla. I tell him, he'll be the first to know when I reach that point. Hy drives with me to Houtkraal Station, that I don't have to go there alone.

He asks me why we need to go survey the buildings at Houtkraal. It's important to me, I tell him. I give him my notebook, and he carries it for me from building to building. He looks at the confusing drawings and numbers on the page but doesn't say anything. He likes doing the measurements with the laser light. In casual conversation, I ask him what he wants to do when he grows up. He left Grade 8 last year to work on the farm. But he wants to stay on the farm; he doesn't like the idea of the city.

He screams something, and in the midst of a misunderstanding, he leaves in a rush and I'm left standing in the passageway of the old house. One, two, three, four. It stings! Wasps! I run for my life. Five! Six! Seven! Tool is a few hundred meters ahead of me, but he's stopped running. He's laughing at me! I don't know what he finds so funny, and I tell him that.

"I'm sorry," he says. "I just didn't know you could cuss that well".

Figure 2.37: Cavity walls on site (Author, 2023)

Figure 2.38: Cavity walls on site torn apart to retrieve honey from combs (Author, 2023)

INSIGHTS GAINED:

The railway has been highlighted as a defining feature in the Karoo and many dilapidated stations are placed next to railways throughout the Karoo. This chapter discussed the history of these stations and explores possibilities for the future of this site.

The Burra Charter analysis assisted in the design and development of a design and conservation strategy. This chapter also elaborated on the social context of the site, and introduced FAS as a societal pressure to be addressed by the building.

Figure 2.39: The lesser known, and potentially dangerous new chandelier on the market. Excellent for security purposes. (Author, 2023)

3. CLASSING THE FLEECE

Dis sewe uur in die oggend en ons is oppad Middelpunt toe vir die skeer. Ek sit langs Oom Pieter in die bakkie en Estian sit saam met die proviand agter-op. Hy wil nie sy hoed opsit nie, maar elke keer as ek uitklim om n hek oop te maak, sit hy vinnig sy hoed op voordat sy pa met hom raas. Skelm. Vandag gaan n warm dag wees, en die aarde ruik soos die karoo en mens sien amper hoe die hitte van die horizon opstyg. Ek voel uit plek uit, met my spierwit bene in n kortbroek en n BKB-pet bo-op my kop. In die Noord-ooste hang swaar wolke. Oom Pieter sê dit gaan reen, ek knik my kop. Hier wil ek nie onintelligent voorkom nie. Ek weet nie hoe om hierdie land te lees nie.

Die skuur op Middelpunt ruik soos hitte, sweet, lanolien en skaapmis. Dis nie n gejaag nie, maar goed gebeur redelik vinnig hier. Vanoggend se skape is amper klaar geskeer, omtrent 200 van hulle. Ben-hulle is oppad om die skape in die kraal duskant die berg te gaan haal. Bobbejaan-pad. Te voet. Dan moet hierdie skape doseer word en ingeënt word. As dit droog is in die karoo, is daar min kos, maar minder pes. Die teenoorgestelde is ook waar. Die jaar is n nat jaar; in Januarie was daar baie reën en ek het die veld lanklaas so ruig gesien.

Daar word nou gejaag. Daar is reën oppad. Mens kan nie skape skeer as die wol nat is nie. Ek knik weer my kop. Die proses werk so; n assistant gryp behendig n skaap aan sy agterbeen en trek hom tot waar die skeerder gereed staan. Die skaap word dan op sy stuitjie neergesit en die skeerder hou die skaap tussen sy bene vas. Dan word die skaap amper soos n lemoen geskil, eers oor die pens en dan oor die rug.

Daar word n kraletjie in n blikkie plonks! gegooi, om die skape te tel vir elke skeerder. Die kraaltjie binne die skeerskuur het minder bruin skape in, en meer wittes, soos die skape geskeer word. Die wol word op n spesifieke manier opgetel en na die tafel gedra. Daar word dit soos n valskerm oop en oor die tafel gegooi en die pens-wol en die stert-wol, ook bekend as lox, of refuse, word in n ander wolsak gegooi as die wol wat geklas en sorter word. Hierdie jaar is die wol mooi, en my oom hou n stuk wol op sy handpalm om vir my te wys. Hy vertel my van die kartel, en die grein, en dit wat wol sterk maak. AA wol. En hy is trots daarop.

As die sorteerdromme vol raak, word die wol in n wolpars gebaal. Die jong outjies dans-dans in sirkels in die wolpars, om seker te maak dat die wol al die hoekies vol maak. Ritmies. Soms sing hulle. Dan moet hulle uit die baal uit kom, sodat die sak wol toegemaak en, gemerk kan word met Ryssel se besonderhede, gereed vir die jaarlikse veiling in Gqeberha.

Die soet reuk van tabak hang in die lug, waar die skeerders sit en middagete eet. Ek staan teen die deurkosyn en luister af na die gesprekke wat buite plaasvind.

“Ag, gee my tog n long, man,” hoor ek iemand sê. Die “long”, n sigaret, wat sorgvuldig met tabak opgerol word, word van een persoon se hand na n ander toe oorgeplaas.

It's seven o'clock in the morning, and we're on our way to the sheep-shearing at Middelpunt. I sit in the passenger seat in the bakkie, and my cousin, Estian, sits in the back with the day's food. He doesn't like wearing his hat, but whenever I exit the vehicle to open a gate, he puts on his hat again before my uncle scolds him. Sneaky. Today will be hot, and the air smells like the Karoo. It's almost as if I can see the heat rising from the horizon. I feel out of place, wearing a BKB hat that's not my own. Heavy clouds hang in the North-East, and my uncle says that we'll have rain. I can only nod. I don't want to seem unintelligent, but I don't know how to read this piece of earth.

The shearing shed at Middelpunt smells like heat, sweat, lanolin and sheep. Things happen quickly here, though we're not in a rush. This morning's 200 sheep have already been shorn, and Ben and some other workers are on their way to fetch the next group of sheep on the other side of the mountain. They call it "bobbejaan-pad", fetching the animals on foot, not on horseback, and not with a bakkie. When the sheep arrive at the shearing shed, they are dosed. During a drought in the Karoo, the food is little, but there is less disease. However, the opposite is also true. It's a wet year. In January, the Karoo had rain, and I can't remember when I last saw the veld in such good condition.

Everything and everyone are in a rush now. The thunder in the distance has announced the coming of the rain. Wet wool can't be shorn. The process is quick: a sheep is retrieved from the holding pen by a worker who nimbly grabs it by its hind leg. The sheep is handed to the shearer, who rests it on its tailbone and holds it between his legs. Then the sheep is shorn; it reminds me of an orange being peeled. The stomach is shorn first, then the back fleece. The shearers keep count of the sheep they shear by dropping a bead klink! into a small tin. As the workers progress, the once brown sheep are now snow-white without their wool. The fleece is gathered in a specific way and carried to the sorting table. There it's cast, thrown open like a parachute. The refuse wool, or lox, is removed and placed in a different wool bin than the other wool. The wool is exceptional this year, and my uncle explains the classing process to me, holding a piece of wool in his hand. AA-standard Merino wool and he's proud of it.

When the sorting bins fill up, they are pressed in the wool press into bales. The young ones press the wool into the crevices even further by dancing in circles in and on the wool press. Rhythmic. Sometimes, they sing. Then, the bale is removed, labelled with Ryssel's information, stored until the wool auction in Gqeberha.

The sweet smell of tobacco fills the air where the shearing team sits in the shade with their lunch. I stand in the doorframe, eavesdropping.

"Ag man, don't you want to give me a long?" I hear someone say. Then the long ("lung"), a carefully hand-rolled cigarette, makes its way from one hand to the receiving palm.

THE WOOL INDUSTRY IN SOUTH AFRICA

HISTORY OF WOOL PRODUCTION IN SOUTH AFRICA:

Wool has been woven since 4000 BC; its earliest traces and evidence thereof were found in Babylonia. Sheep farming can therefore be considered one of the oldest industries, and sheep were consequently bred to suit human needs in producing wool and meat. The Merino is a sheep breed that contributes well to both these aspects. The first Merinos arrived in South Africa in 1789 for experimental purposes regarding the warm weather. The Dutch East Indian Company brought two rams and four ewes from the Netherlands, donated to King William V by King Charles IV from Spain. However, since Spain controlled the movement of Merino sheep, the Merinos were ordered to return to the Netherlands. Only six Merino sheep were returned to the Netherlands, the amount that was originally exported to South Africa. Still, before the sheep were sent back, a good progeny was established, marking the beginning of wool production in South Africa, the first country outside Europe to farm with Merino sheep (de Beer, 2015: online).

Merino sheep were distributed throughout South Africa due to the Settlers and Voortrekkers and “trekboere”, nomadic farmers of Dutch descent. During the first and second Anglo-Boer Wars, the wool industry suffered severe blows, especially with Lord Kitchener’s “Scorched Earth” policy, which left many farmers without grazing and livestock. Therefore, some farmers hid sheep in Lesotho, meaning the Merino sheep were also introduced there. After the war, a major effort was made to increase the number of sheep again to establish a competitive agricultural sector for wool production (de Beer, 2015: online).

SOUTH AFRICA AS WOOL PRODUCER

South Africa is one of the largest wool producers in the world. It produces up to 3% of the world’s global wool supply and about 12% of its apparel-specific wool. South Africa is home to about 10 000 wool producers, and the wool industry employs about 40 000 people as farmworkers, sheep shearers and wool handlers (Ludolph, 2022: online). South Africa’s biggest customer is China, to whom 80% of all clip or harvested wool is supplied. However, the wool industry fluctuates and changes according to its environment, rain, and droughts, as well as the outbreaks of diseases that affect the animals, the quality of the wool, and the wool market and exports.

At this stage, there are about 15 million sheep farmed in wool production in South Africa, of which 4 million are owned and farmed by the communal sector, which exists of about 4000 communal wool producers, and the rest (11 million) are farmed by the farmers part of the commercial sector. The value of the South African clip per annum amounts to about R5 billion, and about 45 million kg of wool is produced, of which more than 90% is exported. The communal sector produces about 13% of the national clip, which is by no means insignificant (National Wool Growers Association, 2023).

There are growing trends worldwide regarding sustainability in producing goods, with the wool production industry in South Africa being no different. Cape Wools SA, an industry association, encourages and enforces sustainable production, animal welfare audits, and ethical farming practice, which also involves fair labour practices (European Chamber of Commerce and Industry of Southern Africa, 2020: online). There is also an emphasis on a national traceability programme for wool. The National Wool Growers Association and Cape Wools SA have established sustainability guidelines per the “responsible wool standard” (RWS) implemented by an international body, the Textile Exchange, consisting of brands, retailers, and supply chain specialists (Cape Wools SA, 2023: online). This sustainable wool certification means that wool is traceable, and the farming practices are transparent and enforce sustainability. The RWS certification also eliminates the need for an international certification.

Figure 3.1: Sheep dosing at Middelpunt, Karoo (Author, 2023)

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THE WOOL MARKET IN SOUTH AFRICA

In recent years, the wool market in South Africa has been severely impacted by COVID-19, widespread outbreaks of foot-and-mouth disease and the consequent ban on all animal products, including a ban on wool exports. More external factors, like strikes by Transnet workers, the Russia-Ukraine war, and the limited availability of vaccines against animal diseases like bluetongue disease and Rift Valley fever, negatively affect the wool market (Coleman, 2022: online). These external factors mean the wool market is unstable and could fluctuate at any point.

The widespread outbreaks of foot-and-mouth disease in April 2022 resulted in the import ban on cloven-hoofed animals and related products to China. By August 2022, the South African wool sector had lost as much as R734 million due to this import ban. However, no outbreaks were reported in recognised wool-producing areas in South Africa. This is significant because about 70% - 80% of South Africa's wool clip is exported to China annually (Thukwana, 2022: online). Outbreaks, pandemics, and harsh weather conditions are hard to predict, prevent and mitigate. They drastically affect the wool sector when they occur, making the wool market unstable. Commercial and communal wool producers are negatively affected by these bans and risk falling into poverty.

To limit the risk of export and import bans concerning raw sheep wool, Agri SA and the NWGA (National Wool Growers Association) have many protocols in place concerning the regulation of wool storage after shearing, which align with the terrestrial code of the World Organisation of Animal Health, to mitigate and minimise the spreading of diseases in the exporting of wool.

In addition to protocols set in place, farmers are also obliged to adhere to the "Sustainable Cape Wool Standard", which is based on four elements of wool farming; "animal welfare, environmental custody, social ethics and labour relations, and general business or economic aspects" (Ludolph, 2022: online). The certification of wool and the ethical production thereof also mitigates the risks of disease among animals because farmers must comply with certain regulations, which include disease management, to gain certification.

However, the wool market remains largely unstable because, as mentioned previously, many uncontrollable and unpredictable factors influence it. Mr Leon de Beer, from the National Wool Growers Association, asserts that the best way to mitigate the risks accompanying wool exports and the fluctuating wool market is to set up facilities to activate the local market for processing wool locally (Ludolph, 2022: online). However, since about 98% of South Africa's annual clip is exported, locally processed wool will be for a niche market.

Activating a local market, even for wool processing, may help combat joblessness, a real concern in South Africa and, more specifically, De Aar, where joblessness is rife. Furthermore, the hand-processing of wool is relatively easy and simple, making the employment of unskilled labour possible.

Figure 3.2:Wool Bales ready for auction (mohair.co.za, 2023: online)

LOCAL OPPORTUNITIES IN WOOL PROCESSING

About 95% of the annual national clip is exported, of which 80% is exported to China. The dependence on international wool processing, especially in China, means that something like an import ban significantly impacts communal and commercial wool producers in South Africa. To reduce this dependence, the South African wool industry must find ways to process wool locally, albeit on a small scale (Hertantyo, 2022: online).

Establishing small wool processing facilities throughout South Africa can also address the increasing unemployment rates by creating new job opportunities. However, mechanisation in wool processing facilities reduces the need for labour, even though the wool industry can create meaningful job opportunities. It is also difficult for small-scale, emerging, and communal wool producers to access the formal market, as they need more wool to fill up the required number of bales to be regarded as competitive wool producers. Small processing facilities may also help these farmers process their wool and sell it locally, eliminating the need to access the formal market.

South Africa is the highest certified, sustainable wool supplier in the whole world, according to Deon Saayman of Cape Wools (twyg.co.za, 2023: online). South African wool is known for its excellent quality, sustainability, and traceability, yet very little of this fibre is processed locally. However, many local retailers and brands, like Mr Price Group and the Foschini Group (Hertantyo, 2022: online), intend to return manufacturing to South Africa instead of processing wool overseas and increasing import costs. The government plans to have 65% of items sold by retailers to be made in South Africa by 2030. Local manufacturing also means that retailers can manage their environmental impact, job creation and the accompanying labour conditions (twyg.co.za, 2023: online).

Wool is understandably a popular fibre to use in the design of fashion and clothing items, the textile industry, and other sectors. However, emerging designers often need more financial capacity to buy wool in bulk and a production scale that is large enough to work with large quantities of wool (Hertantyo, 2022: online). Small-scale wool processing facilities mean raw wool can be sold in small quantities and are easy to access for entry-level designers.

Many local South African designers and artisans work with wool on a small scale, and much is done to encourage locals' education and skills development in wool processing. Though it is not, at this stage, done in large-scale facilities or numbers, it does not diminish the fact that it is indeed done.

LOCAL OPPORTUNITIES IN WOOL PROCESSING: SOUTH AFRICAN CASE STUDIES

UNIVERSITY OF THE FREE STATE: RUFORUM (REGIONAL UNIVERSITIES FORUM FOR CAPACITY BUILDING) PROJECT

Ruforum is a project by the University of the Free State's Department of Sustainable Food Systems and Development. This project aims to expand the wool value chain in the rural areas of the Free State (Muller, UFS project steels the wool value chain and rural economy, 2022: online). This project aims to enable producers to run their own "profitable, sustainable and renewable enterprises, thereby alleviating poverty and establishing a sustainable way of life" (Muller, UFS project steels the wool value chain and rural economy, 2022: online). This project hosts many workshops that train small-scale farmers and other locals in wool harvesting and processing and the commercial aspects of the wool industry. Training to local, small-scale farmers include practical training regarding feeding, animal health and handling. This training also includes financial training and entrepreneurial skills.

The workshops offer training to students from the University's Agriculture Department and local farmers. Training involves sheep handling, flock management and the health of the animals. A valuable skill that is also taught is the classing of wool, which help the farmers get more value from their clips. Students and farmers are accompanied through the entire production chain to add more value to a product.

For instance, low-quality wool, such as lox, which is discarded during skirting, is still washed, and processed into felt, from which other marketable products are made, without expensive equipment (Muller, UFS wool project invests in women, 2022: online). Paradys Proefplaas, just outside Bloemfontein, on the way to Reddersburg, houses the UFS's Dohne Merino flock, which students and farmers shear. The high-quality wool is baled and sold, while the wool of lower quality is processed by women employed full-time. The women involved in this part of the Ruforum project are empowered, their skills are developed, and they are now earning an income.

The main processing of wool at the Ruforum UFS wool project includes classing the wool, where the higher quality wool is baled and sold and the lower quality wool is washed to be further processed. After the wool is washed, it is dried and carded, and the carded wool is either made into felt fabrics, or it is spun into balls of wool, that can be sold to hobbyists and is stocked in many shops across Bloemfontein. The felt is further used in creating goods, like soft toys or handbags. The spun wool is also used in weaving, knitting and crochet, done by the ladies employed at the Ruforum Wool Project.

Figure 3.3: The ladies at Ruforum Wool Project hard at work (Author, 2023)


Gou Gou Pa

SUSTAINABILITY: AN OVERUSED BUZZWORD?

When one hears of sustainability, the first thing most think of is the environment. While green, naturally ethical, and environmentally friendly practices form a large part of sustainability, they are not the only constituent. An agriculture economist, Michelle Marais, describes sustainability as an equilibrium between the natural environment, the social context, and economics (Marais, 2023).

There are growing global trends concerning sustainability in all industries, which sees the potential for significant growth in the wool industry and a downstream economic impact on producers, which means that the consumer's choices impact the producers. For example, a consumer may choose natural, ethically sourced fibres above synthetic fibres, meaning that a wool producer or farmer must fulfil the need for certified, ethical wool.

SUSTAINABILITY: ENVIRONMENT

Wool has one of the widest geographically elongated value chains of all produced agricultural goods. This means that wool is produced and harvested in South Africa, shipped to Gqeberha or Durban to be shipped internationally to be processed there, where garments are created, and finally shipped back to South Africa, where these goods are sold again. This geographically elongated value chain implies energy use, greenhouse gas emissions, and much of it, accompanied by the costs for transport across borders. Keeping the production and processing of wool on South African soil impacts the environment positively by eliminating transport and the greenhouse gas emissions that come from it.

Moreover, there is a global agricultural trend to return to regenerative farming. Regenerative farming is a low-tech approach, which means that it is accessible to communal farmers as well as commercial farmers. This farming method focuses on the symbiotic relationship between plants, soils, animals, and people (Hertantyo, 2022: online) and to create resilient land systems. Holistic land and grazing management are also effective ways to mitigate climate change and consequential droughts. Regarding wool production, holistic land management and herding are key to the sustainability of the veld where sheep graze. In contrast, sheep farmed commercially consume more maise and emit much more methane gas, a renowned greenhouse gas.

SUSTAINABILITY: SOCIAL CONTEXT

Producing, harvesting, and processing wool is labour-intensive and can use unskilled and uneducated labour, which may positively impact unemployment rates throughout South Africa. Of course, many education and skills development sources are available throughout South Africa, though skills can also be developed through active participation in wool harvesting and processing. One does not need a formal education to process wool; one person can easily teach another simply by demonstrating and doing.

By employing people in this agricultural sector, community members are also empowered through skills development and receiving an income.

In the broader scheme of things, especially in the agricultural sector, small-scale farmers can be empowered by granting them access to the formal market or places where the raw grease wool can be sold and processed. One farmer alone can perhaps not access the formal market. However, when 20 small-scale farmers are grouped, their sheep shorn together, and the harvested wool is baled and sold, they may access the formal market and receive an income. The NGWA (National Wool Growers Association) currently controls the organisation of emerging communal farmers into structured wool growers' associations (Hertantyo, 2022: online). Furthermore, educating small-scale farmers can also contribute positively to regenerative farming, which has a long-term positive impact on the environment.

SUSTAINABILITY: ECONOMY

As mentioned previously, there are great costs involved in transporting wool from place to place, having it processed elsewhere and transporting it back to South Africa in a refined, wearable form. However, processing wool on South African soil means that more people will be employed and that a large part of the South African economy will not depend on bans and other specifications from countries to which wool is exported. In a large sense, processing wool in South Africa means that this agriculture sector can become largely independent and significantly impact the South African Economy.

Unemployment directly causes poverty. This much is clear. Some effects of unemployment on a national economy are associated with low economic growth and high inflation and interest rates (Meyer, 2017). However, some indirect effects of unemployment have both individual and social consequences, which include psychological stress and higher crime rates (du Toit, 2020: online). Of South Africa's entire population, about 32.9% are unemployed (Stats SA, 2022: online).

The intended group, which the wool processing facility at Houtkraal Railway Station will employ, are differently abled in various ways due to alcohol abuse and foetal alcohol syndrome. Members of this group are unlikely to get other education and employment. Job creation in this sphere will positively impact the local economy and simultaneously be advantageous in the immediate social context.

WOOL PRODUCTION CHAIN: HARVESTING WOOL

SHEARING:

The norm for shearing is that sheep are shorn once a year, either by electric shears or by hand. However, shearing intervals, whether sheep are shorn according to a twelve-month shearing pattern or according to six- or eight-month intervals, depending on the producer. The price of six- to eight-month wool is high enough to make the extra handling and shearing costs worth it, and more wool can be produced thrice in two years than can be produced by shearing twice in two years. Another factor that may influence the shearing intervals is the animal's comfort. It makes sense to shear animals in summer in places like De Aar, as the hot, arid climate allows and suggests it. For some animals, especially lambing ewes, shearing is done for the health of the ewe, not to carry too much wool during the lambing period.

The flock is shorn according to the different age groups. For example, lambs, hoggets, and young sheep are shorn in different groups. This also makes sorting the wool easier, which will be elaborated on later. Shearing can be considered a specialised labour, and shearers must be well-trained to prevent injury and unnecessary wounding or cutting of the sheep.

The length of the wool also plays a role in how the fibres will be used: shorter wool, grown over six months or less, will be used to manufacture yarn for machine-knitted garments, while longer lengths can be blended to produce woven textiles (Franz, 2018). Wool bales weigh between 100kg and 200kg, and it takes about 50 sheep if not more, to fill up a bale. A certain number of bales must be filled for a farmer to access the formal wool market (Ludolph, 2022: online).

PICKING UP AND CASTING FLEECE:

The correct casting, or throwing motion, is important for skirting. The fleece must lay on the wool table so that the back and neck wool is identifiable from the breeches, shoulder wool, and neck wool. The dull side of the wool should face upwards so that the second clippings can sift through, paint marks not removed can be easily seen and removed, the appearance of seed is easily observable, and any urine and paint stains can easily be seen.

SKIRTING:

Skirting refers to removing inferior wools or, rather, removing the unsuitable-for-processing bits from the shorn fleece (Kievet, 2021: online), such as locks, short pieces, and matted fibres, also fibres contaminated with vegetable matter, dung, or urine, from the rest of the fleece. The fleece is thrown onto the skirting table, which should have a large surface to lay out the entire fleece. Debris will fall through the openings on the table to the floor, where it can be swept up and disposed of. Fleece must be skirted on merit and according to best judgement to not skirt too much or too little and aim to attain the highest value possible for the fleece.

CLASSING:

Wool is sorted into different groups according to the same type and quality, ready for sale once the bales reach Gqeberha for the wool auction. (mohair.co.za, 2023) This is why it makes sense to shear groups of sheep of the same age. Fibres are sorted according to length and diameter, measured in microns. Fibres with a lower micron figure are of a finer quality. The wool's diameter, or micron count, determines what the wool will be used for. The current average South Africa Merino clip measures around 19.8 microns but ranges between 14 and 23 microns (Franz, 2018: online).

Other important qualities in wool classification, in addition to type, length and quality, include strength and tensile strength. There are many different wool types and classing standards as set out by Cape Wools SA (Cape Wools SA, 2002: online) that deal with different colours of wool, the ages at which sheep are shorn (lamb's wool is much different from the wool from an adult sheep) and the quality thereof. Interestingly, wool is also classed according to the piece of the fleece where it comes from. For example, back wool is sorted differently from face or belly wool.

The wool is sorted into different bins, a bin for each category, to divide one sort of wool from another. The bins are then emptied into separate bales, which are pressed and made ready for selling in Gqeberha.

PRESSING:

As previously mentioned, a certain number of bales need to be filled to access the formal wool market in South Africa. From the classing of the wool, the bales are emptied into wool bags, as specified by Cape Wools SA or the NGWA (National Wool Growers Association). This is also a stage in which wool can be damaged, and most prefer pressing over treading the wool, as treading may damage the fibres. After a bale of wool is pressed, it weighs between 100kg and 200kg and contains the fleece of about 50 sheep. The bales are then marked with a number registered to a farm or farmer, and the wool class is baled within the bag. The wool bales can then be transported to Gqeberha, where the wool undergoes 40 tests to determine the quality of the wool (Hertantyo, 2022: online).

WOOL AUCTION:

After the wool is tested, the price and value of the wool are determined according to the micron, length, clean yield, and strength of the fibre; it goes through an auction process where buyers bid for the wool before it can be exported. Some wool buyers in South Africa include Modiano SA, Standard Wool, Lempriere SA and Stucken & Co. The buyers decide on the wool they want to buy by considering factors such as the length and structure of the wool, as these qualities determine what the wool will be used for, as was mentioned previously (Hertantyo, 2022: online)

Figure 3.4: Shearing (Author, 2023)

Figure 3.5: picking up fleece(Author, 2023)

Figure 3.6: casting fleece(Author, 2023)

Figure 3.7: removing lox and classing (Author, 2023)

Figure 3.8: AA class Merino wool (Author, 2023)

Figure 3.9: Pressing wool into bales (Author, 2023)

WOOL PRODUCTION CHAIN: PREPARATION OF WOOL

After the wool is bought by a buyer for a specific company, it is processed according to the function the intended product will have. As previously mentioned, the wool's specific type, length and quality determine its use. Wool can be processed by machine or hand, but the main processes are roughly the same: wool needs to be washed, cleaned, dyed, spun, or woven before it becomes a garment or the intended product, which may be yarn or felt. However, considering this context and the aims of this dissertation, the focus will be on hand-processed wool. In this context, the raw wool is not sent to auction but directly to the processing facility.

WASHING AND SCOURING:

Raw wool, also known as grease wool, contains many organic contaminants, like seeds, burrs, lanolin, and dirt, and needs to be washed without agitating it too much to remove these contaminants. Wool is washed without much agitation and handling, as Wool can be soaked and moved from hot water (between 55°C and 65°C) to hotter water, but never to colder water, as this causes felting and matting. Water used in soaking can be reused, provided that the temperature is kept the same or made warmer for the next batch (Mossmer, 2023). Not only can the wastewater be reused, but since it contains lanolin and other organic contaminants, it is rich in nutrients. It can be used in gardening and other similar activities. The wastewater can also be processed to remove the lanolin, a valuable constituent in many cosmetic products.

In many hand-made processes, the wool is washed using eco-friendly, biodegradable detergents, rinsed, and dried. In contrast, another process, carbonising, is used in many commercial settings, where stubborn contaminants are removed from the wool by immersing and soaking the wool in diluted sulfuric acid (Franz, 2018: online).

In a commercial setting, wool is dried in racks between 100°C and 120°C, but it can also be dried in the sun.

DYEING:

Since wool is hydrophilic, it can interact with water through hydrogen bonding, so dyeing can easily occur at any stage of the processing process. When the wool is dyed after carding and combing, it is known as "bump-dyed" or "stock-dyed". If the wool is dyed after spinning, it is known as "yarn-dyed"; dyed in woven or knitted form, it is referred to as "piece-dyed" (Franz, 2018: online).

Some prefer to dye wool immediately after washing while still wet, but it can be done at any processing stage (Mossmer, 2023). Wool can be dyed using acid dye and citric acid in water at a PH level of about 3, 3.5 or 4. Afterwards, the dye water can be neutralised using baking soda, making it safe to use outside. If the water remains hot, several batches of wool can be dyed in the same dye.

CARDING AND COMBING:

The next processing stage is carding, where the washed and dried fleece is run through two or more rotating cylinders studded with pins along their diameters to remove more vegetable matter and align the wool fibres. Then the wool is removed from the carding machines and looks like a thick sliver. The wool fibres can be blended with other fibres on the carding machine to produce certain qualities of wool for specific fibres. The fibres from the machine are either made into roving for spinning or slivers for combing. After carding, the wool yarns are more irregular than combed wool yarns, though they are much warmer (Segard Masurel, n.d.: online).

Depending on whether the wool has been dyed or not, the carding machine can also be used as a colour-mixing palette, though wool can be dyed after carding and combing. However, if it is dyed after this process, it should be carded and combed again.

Combing the wool ensures that the remaining impurities not removed during the skirting, washing, and carding are removed. This process also removes wool fibres that are too short (also called "noils") and wool fibres that are too tangled (also called "neps") that were not removed during the carding process (Segard Masurel, n.d.: online). Though combing is not a compulsory process step, the goal is to obtain finer and stronger yarns. Combed wools are more regular and denser than wool that has only been carded, though combed wool is not as warm. This part of the processing depends largely on the type of product that is desired at the end.

Two different products can thus be obtained from this part of the processing: carded yarn and combed, also known as worsted yarn. Combing wool ensures a higher quality yarn that is purer and cleaner than wool that has only been carded. The yarns are categorised according to their physical properties, including the wool's diameter, elasticity, strength, and regularity. Therefore, many varieties of wool depend on the colour of the yarn but also on how it was prepared.

Combing and carding is the last stage of preparing the wool before it gets processed, either in spinning, felting, weaving, or knitting.

Figure 3.10: raw wool (Author, 2023)

Figure 3.11: washed wool (Author, 2023)

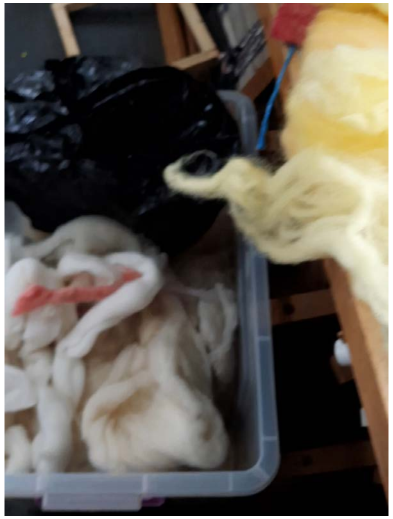


Figure 3.12: washed and dyed wool (Author, 2023)

Figure 3.13: carding wool (Author, 2023)

Figure 3.14: carded wool on the felting bed (Author, 2023)

Figure 3.15: weaving wool on the loom (Author, 2023)

WOOL PRODUCTION CHAIN: PROCESSING OF WOOL

FELTING:

Felting occurs when wet wool is agitated too much. However, it is not the same as matting, which happens when wool placed in warm water is transferred to water of a cooler temperature. Felting is usually done after carding and dyeing if a specific colour is needed. The sliver from the carding machine is placed on the bed of a felting machine, wetted with cold water and then felted. The felting machine has two plates which rub against each other, agitating the wool and interlocking the fibres to create felt, which is much like a piece of fabric. Felt is a product itself, and it does not need further processing. After the felt is dried, it can be used like a piece of fabric to create clothing articles, carpets, blankets, and other crafts.

SPINNING:

Wool can be spun after the carding and or combing processes. As previously mentioned, spun combed wool is usually much more regular than spun carded wool, as noils and neps are removed—however, spinning carded wool results in a much warmer yarn than worsted or combed yarn.

Spinning is the process of turning single fibres into continuous single wool yarns by stretching the fibres repeatedly. Single wool yarns can be twisted to make the yarn stronger. If single wool yarns are twisted twice or more, these yarns are called “twisted yarns.” These yarns are stronger than single wool yarns (Segard Masurel, n.d.: online). After milling and twisting the yarns, the yarn is winded, which gathers the spun wool together. Different types of yarns can be categorised according to the colour, the structure of the yarn (whether it is twisted once or twice, etc.), and the types of fibres blended in the wool processing.

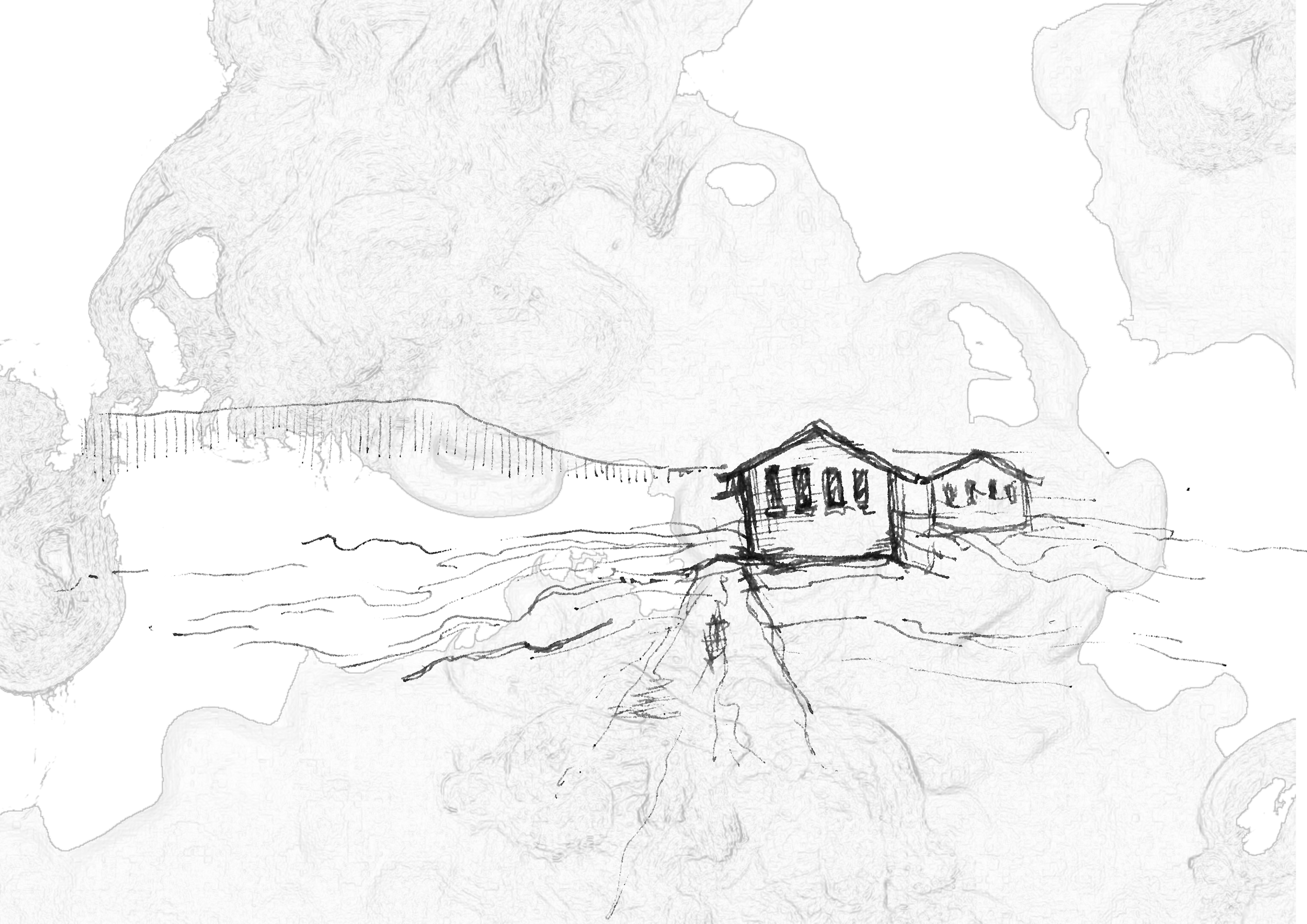
The yarn can now be used in various ways, whether in the textile industry, the furnishing industry, the fashion industry or simply as crafts, to be knitted, woven, or crocheted.

Figure 3.16: at the end of the day (Author, 2023)

INSIGHTS GAINED:

This chapter placed South Africa as a wool producer in a global context, discussed wool harvesting and processing in South Africa, and elaborated on local opportunities for wool processing, like the University of the Free State's RUFORUM project. It highlighted the importance of activating the local South African Market to strengthen our economy and stabilise the wool market. It has been established that there are many local opportunities for wool processing and that these opportunities are worth investigating.

Furthermore, this chapter set out the different processes in wool harvesting, preparation, and processing, thereby introducing the Houtkraal Wool Processing scheme's building program.



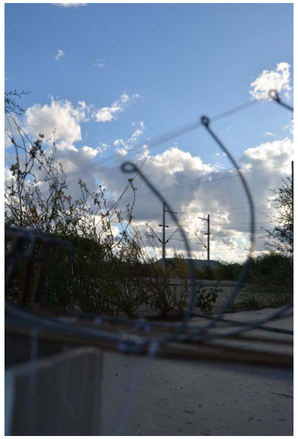
4. **REFINING THE FLEECE:** CONCEPTUAL DEVELOPMENT







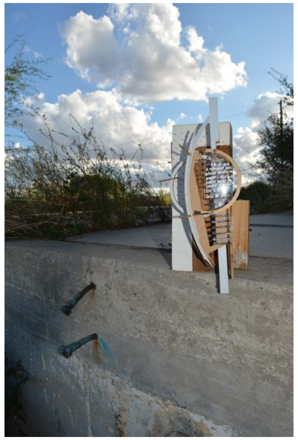




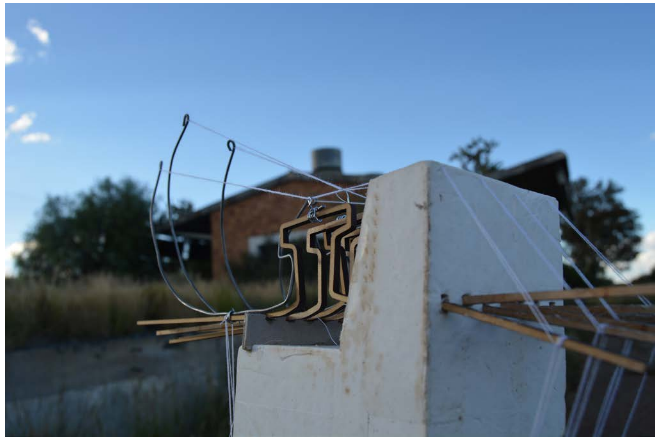












CONCEPTUAL DEVELOPMENT:

As highlighted in the project rationale, the main aim of the design development is to balance the handmade processes and production and the site's industrial nature with the Karoo's proud landscape. The theoretical discourse aims to investigate and explore how different users' narratives, experiences and realities may anchor the building to the site through the experience of temporality. The touchstone aims to highlight the landscape and its relationship with the industrial nature of the railway line and architecture as an integral part of the design development. From the touchstone, three different concepts are derived, namely, "the guardian of the landscape", "the mediator of time" and "the conqueror of forgetfulness". The different concepts address memory, narrative, the Karoo and temporality.

The Guardian of the Landscape, The Mediator of Time and the Conqueror of Forgetfulness are seen on the left-hand side, as photographed at Houtkraal Railway Station, as a means to investigate possible design options, typologies and morphologies that can be derived from the landscape delicately balanced with industrial characteristics and poetics as seen in the objects. The conceptual investigation, including the touchstone and the three concepts, not only serves to ground the design development but also to form a basis for questioning regarding the theoretical discourse.

Figure 4.1: (TOP) Visual essay of "The Guardian of the Landscape" at the site (Author, 2023)

Figure 4.2: (MIDDLE) Visual essay of "The Mediator of time" at the site (Author, 2023)

Figure 4.3: (BOTTOM) Visual essay of "The Conqueror of Forgetfulness)" at the site (Author, 2023)

TOUCHSTONE

“The earth’s firmament rests lightly on the shoulders of the koppies in the Karoo and hangs from the sun like a dome. The world is old here, and time passes quickly in slow fragments. The stories of the Karoo lie over the landscape like old wounds, scars carved into the landscape, interwoven, and stitched together by a railway.”

The touchstone aims to serve as a physical or intellectual measure by which a concept’s validity or merit can be tested. Furthermore, the touchstone is an abstract representation of the proposed building’s aspirations and goals and the conception of various themes that may be investigated and explored. The touchstone also aims to highlight the essence of the design problem.

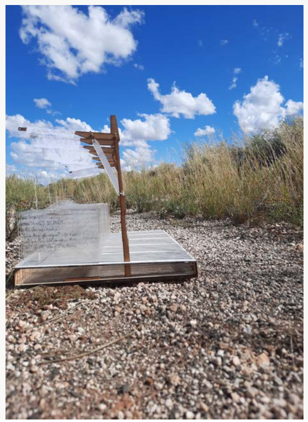
This touchstone consists of moveable Perspex slides on which personal narratives, historical events and popular retellings are written. The Perspex slides also form the physical profile of the site, insinuating that the different narratives and historical events physically form the place. The layering of the different narratives, be it personal experiences, historical records or the lyrics of an evocative song, form the landscape. Still, to understand the landscape better, one must view one slide at a time to have a coherent idea of the place.

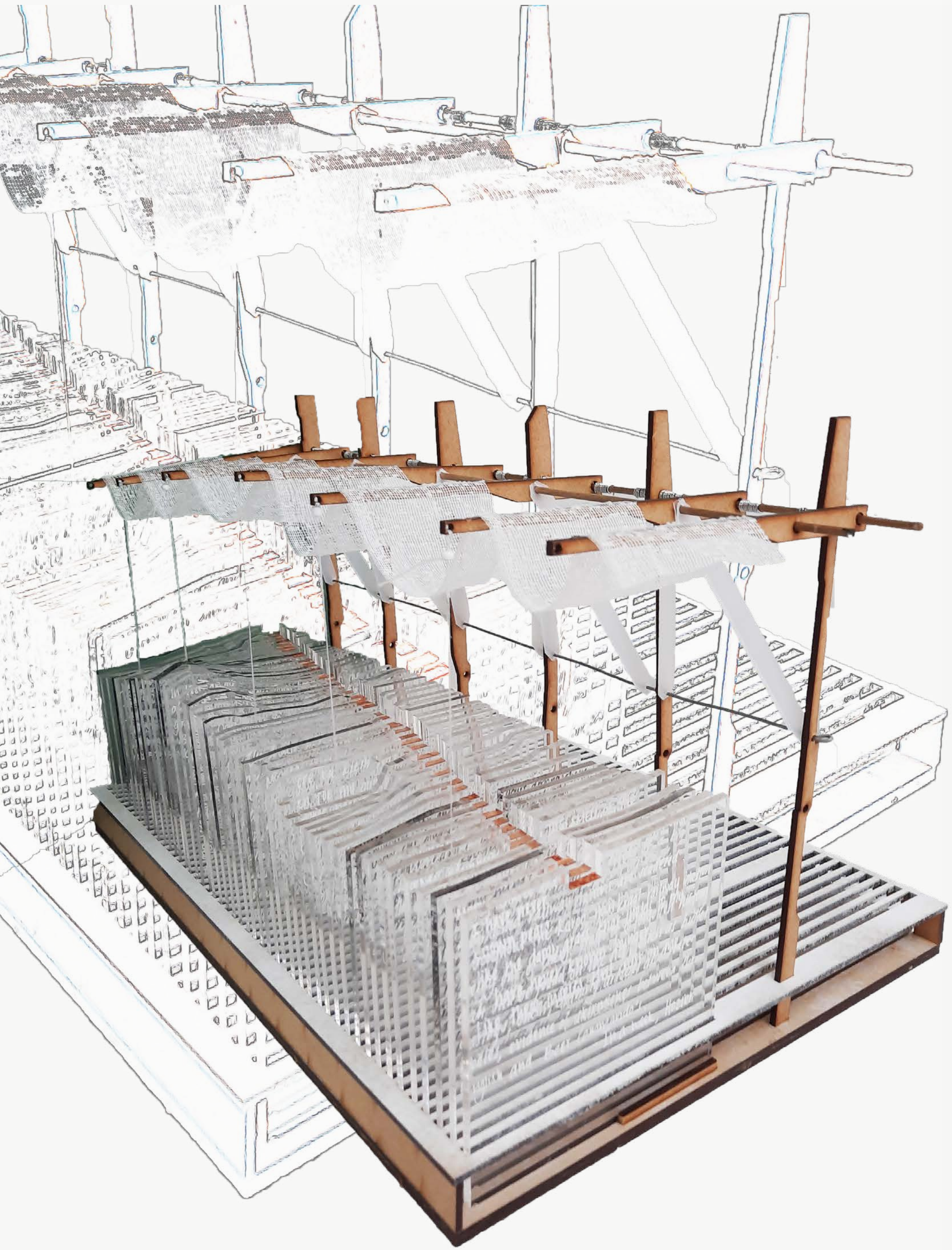
The touchstone also references the railway that ties the Karoo together and the industrial infrastructure commonly seen near railways. The railway is represented as a scar on the landscape, yet it is worth celebrating. The railways in South Africa have significantly impacted the country and the places they cross, in urban and rural areas. These industrial members “draw strings” from the landscape, referencing the different narratives anchoring the buildings to the landscape and simultaneously drawing information from the landscape.

The touchstone references different influences in the Karoo: the grid is reminiscent of the floor of the shearing shed, which is utilised to prevent “vrotpootjie”, an infectious bacterial disease, which causes the rotting and deforming of hooves, especially when animals, sheep in this case, are kept in closed indoor environments, in preparation of shearing. The slatted floors prevent the animals from standing in their waste. In the touchstone, the slatted structure also allows the Perspex slides to move from side to side.

The touchstone aims to pay homage to the railway and the region’s produce, namely merino wool. Furthermore, the touchstone seeks to explore the different narratives, experiences and realities that anchor the building to the landscape. The essence of the building is highlighted, placing more emphasis on the site and how the proposed building will sit in the landscape than the function or program it accommodates. Finally, the touchstone projects three ideals or aspirations for the proposed structure: being anchored in the landscape as a guardian of the landscape, a mediator between times and a conqueror of forgetfulness, whilst creating a new canvas or loom upon which new narratives are woven.

Figure 4.4: The Touchstone at the site (Author, 2023)





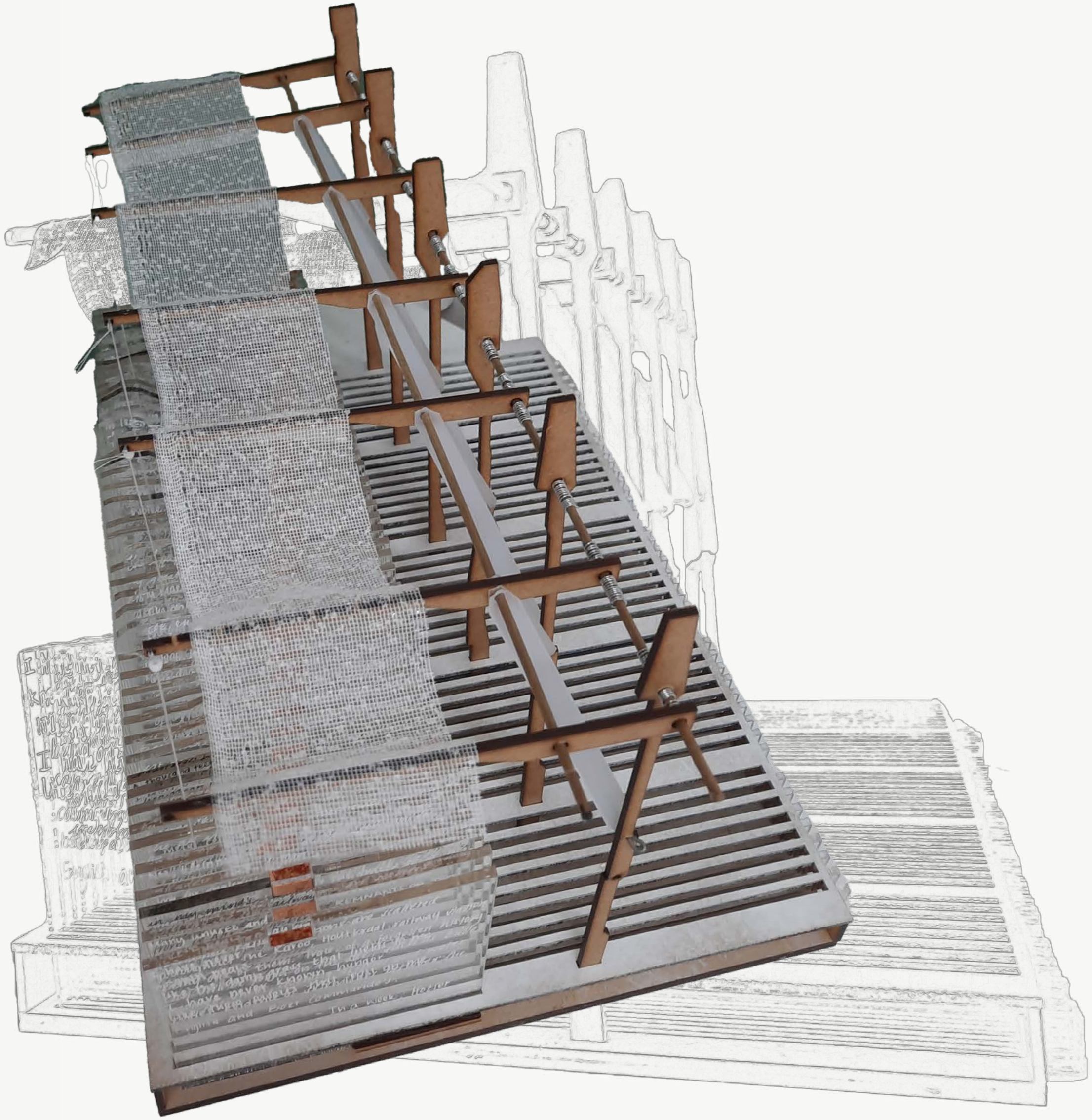


Figure 4.5: The Touchstone (Author, 2023)

THE GUARDIAN OF THE LANDSCAPE

As embodied in the touchstone, the essence of the project is the landscape and how the building fits into it. The first concept, the Guardian of the Landscape, is a reaction and a variation of the touchstone, playing with the well-known idea of “touching the earth lightly” and contrasting it to the typical stereotomic, heavy architecture found in the Karoo, which might be described as “sitting quietly”.

The typical or archetypal image connotated to a guardian is that of a watchtower, a wall, or a prison. However, when one considers narrative theory and the Hero’s Journey by Joseph Campbell, the guardian is also described as hindering the hero’s journey, which the hero must find a way around to carry on. Therefore, the guardian can play a role in a horizontal and vertical plane.

The guardian stewards the memory, narrative, and history of the place and sanctifies the role of the railway, the journey it symbolises, and local produce, namely merino wool.

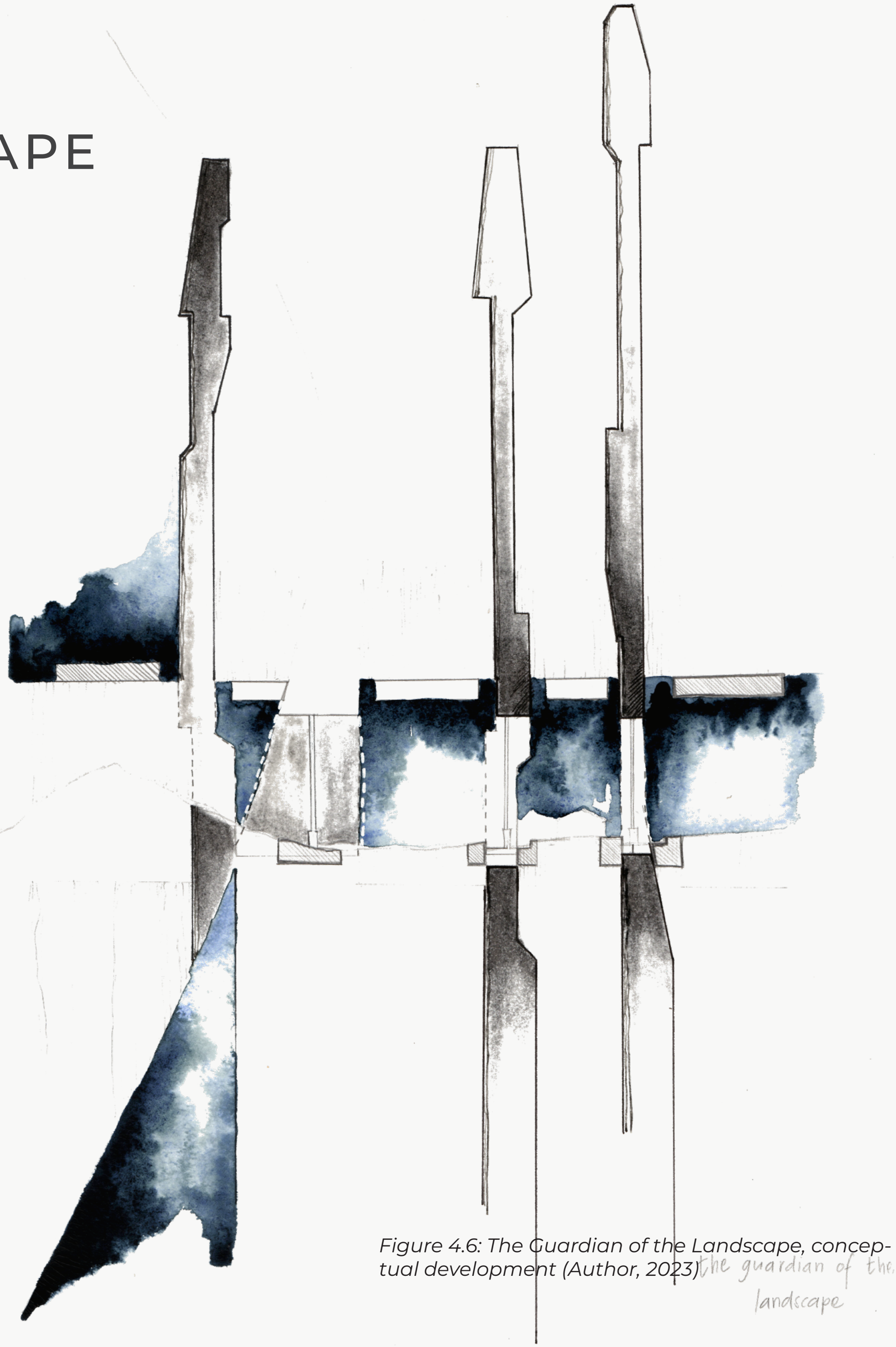


Figure 4.6: The Guardian of the Landscape, conceptual development (Author, 2023)

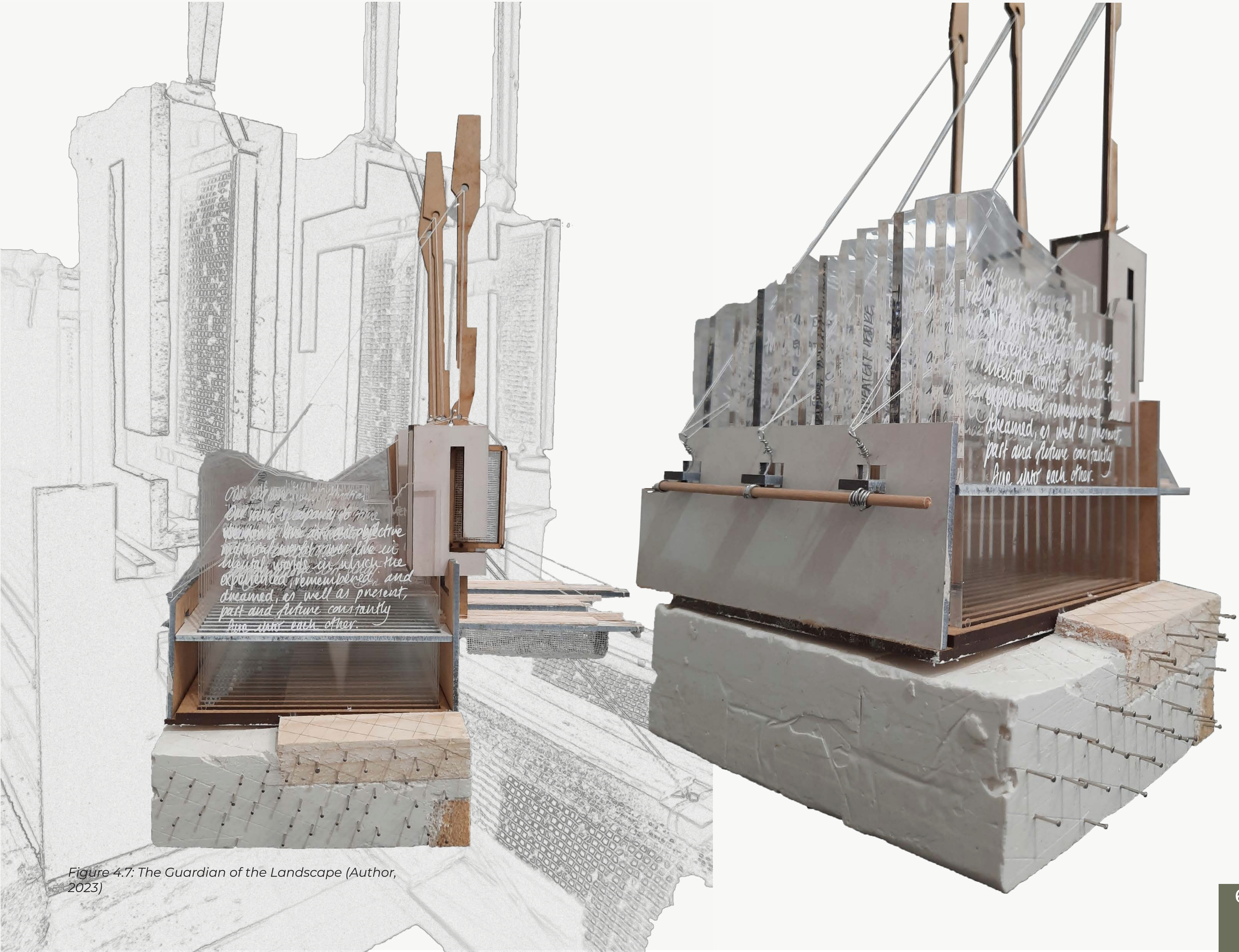


Figure 4.7: The Guardian of the Landscape (Author, 2023)

THE MEDIATOR OF TIME

Mediating time implies bridging a gap between the past and the present. There are two ways in which the terror of time is faced; to deny the passing of time or to strive for timelessness. This concept explores materiality as a witness to the passing of time and aims to create a new loom upon which the tensions of time may be woven to form a new object, which may, in its turn, become a witness itself. The other aspect to consider is that the constantly changing landscape also keeps track of changing times and suggests that space may be used as a building material. This concept model explores the relationship between the made object and the passing of time, which may be seen in ageing things. The idea of an object in space may start hinting at embodiment and the relationship and experience in which one body stands to another.

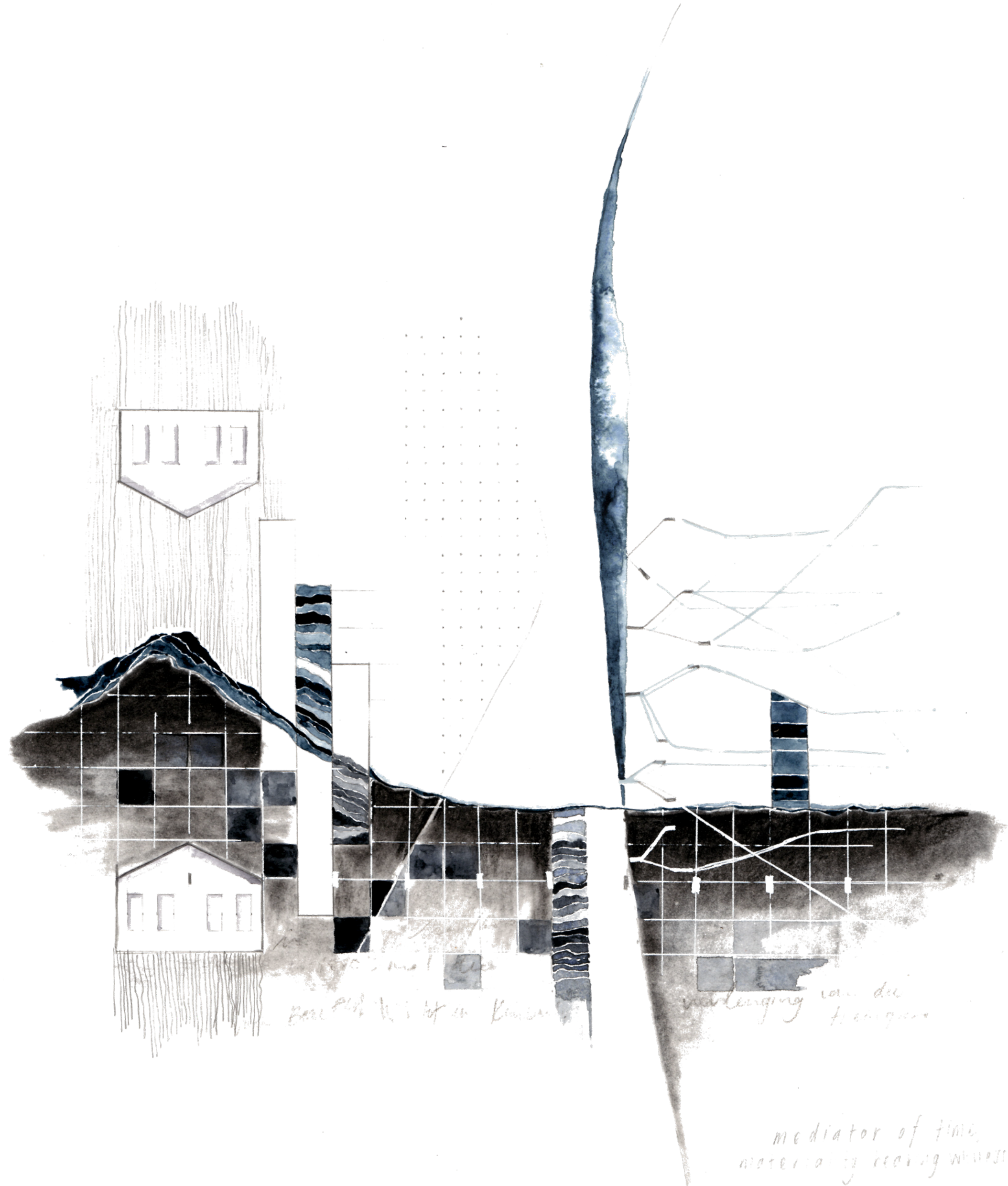


Figure 4.8: The Mediator of Time concept drawing (Author, 2023)

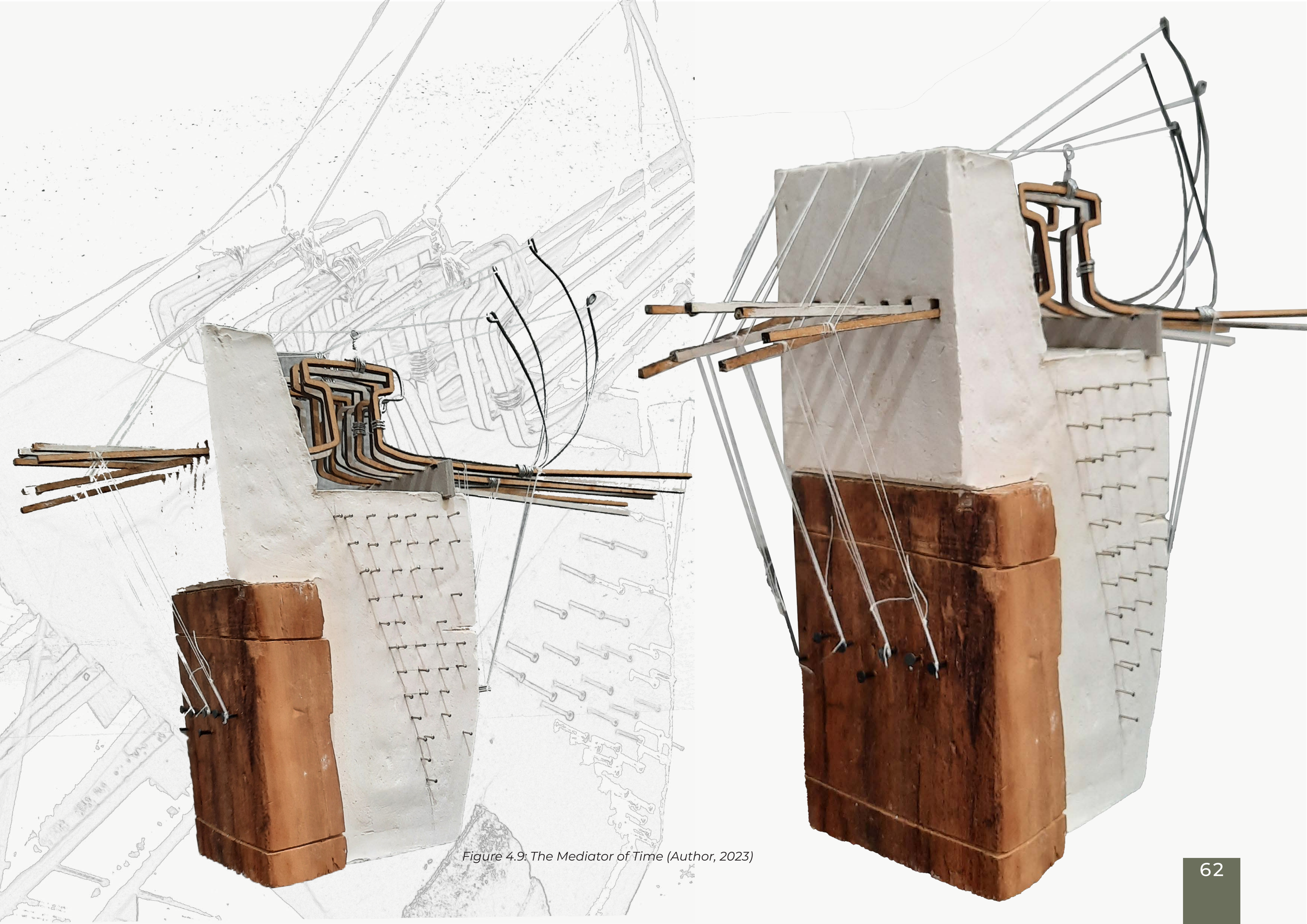


Figure 4.9: The Mediator of Time (Author, 2023)

THE CONQUEROR OF FORGETFULNESS:

Time can be seen as an ordering principle, as it is either experienced as linear or cyclical. We experience the passing of time in nature through cycles, especially in the immediate environment. This passing of time is seen in the passing seasons, rainy seasons, the cycles in which sheep are shorn, and how the sun rises and sets. The conqueror conquers forgetfulness by anchoring memory to the landscape through ruins or artefacts and placing events in context as part of a larger narrative. Therefore, a promenade can be used as an architectural tool to facilitate the experience of both time and place while simultaneously symbolizing the journey and the beginning and end of a process

Figure 4.10: The Conqueror of forgetfulness (Author, 2023)

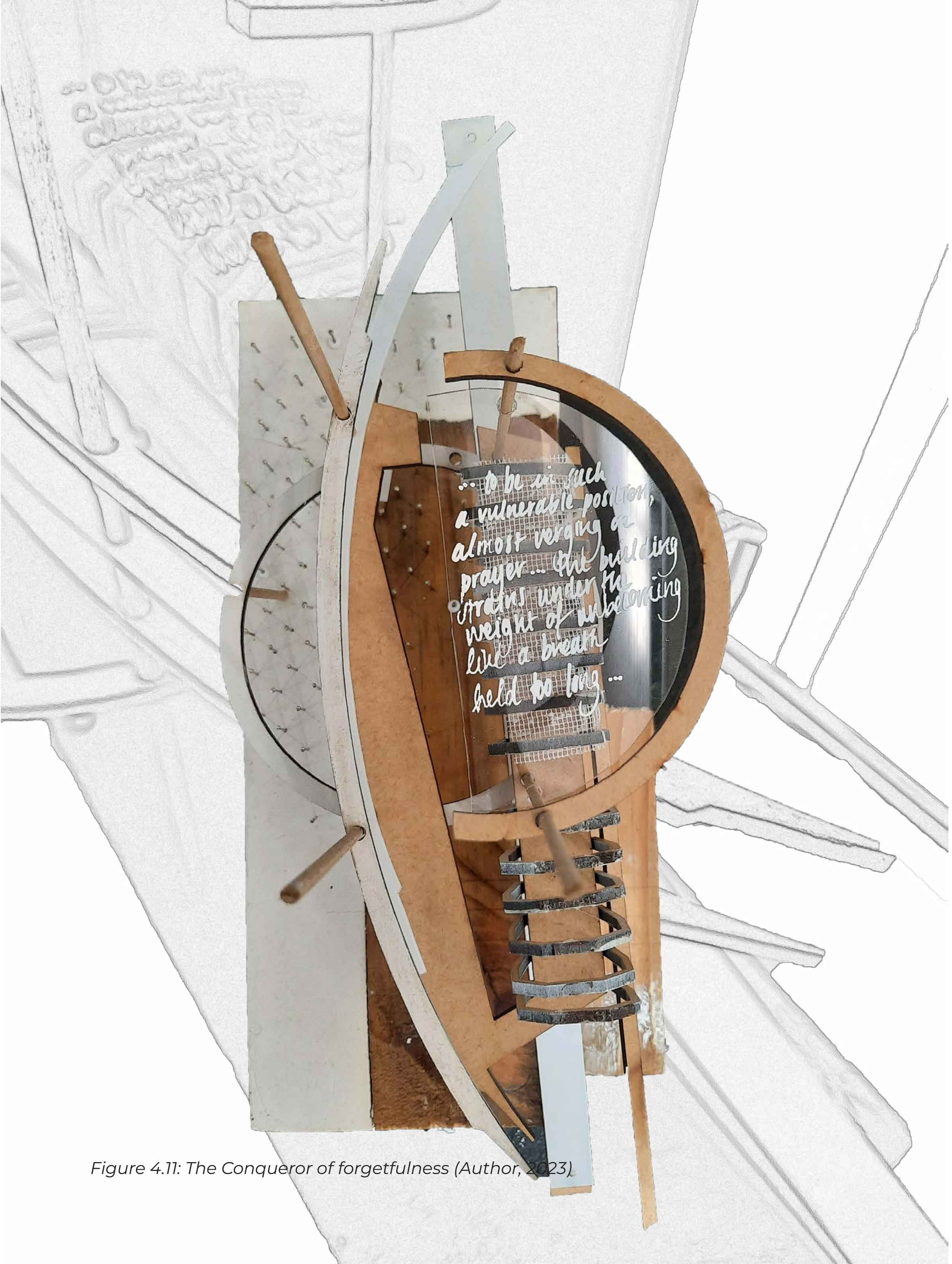
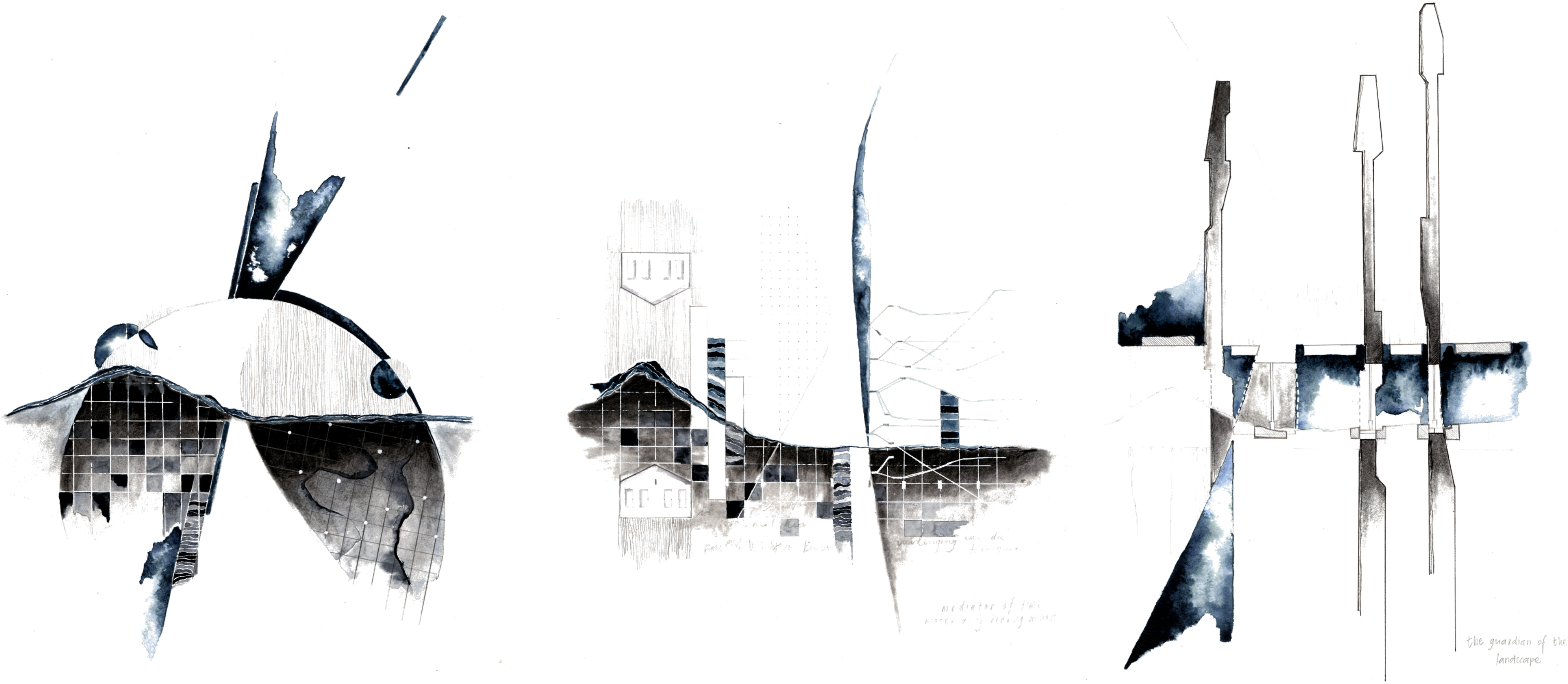


Figure 4.11: The Conqueror of forgetfulness (Author, 2023)



mediator of time
the guardian of the
landscape

CONCEPTUAL DEVELOPMENT: INSIGHTS GAINED

The process of concept development is intuitive in nature and allows a certain amount of play, which is an interesting way to engage with creativity.

The Touchstone established the focus of the dissertation and acted as a plot of fertile ground for conceptual development to grow from. The concept models revealed architectural qualities that can be incorporated into the final design and sections, like beacons, anchors, elements in tension and promenades.

The ideas that inspired the concept models and the concept models themselves became good bases for questioning the type of architecture that can be rooted in temporality, narrative, reality and, of course, the Karoo.

Figure 5.1: Unraveling: A patina unraveling

5. SPINNING THE GOLDEN THREAD

INTRODUCTION:

How can architecture map temporality through promenades, the physical and metaphorical interpretation of patinas, and the fabrication of a patina of care in the design of a wool processing facility in the Karoo in South Africa?

This chapter elaborates on the nature of time and the experience of time, both that has to do with Karsten Harries, the philosopher's notion of the "terror of time", or the human being's knowledge and consciousness of their own mortality. This chapter also focuses on architecture's ability to map temporality and the passage of time through the physical and metaphorical interpretation of patinas as decay and ruining agents, but also of architecture as a process, event and enduring object. The "Patina of Care" is also explained as mindful preservation through interaction and participation.

The Heideggerian "Dasein" is described as "being there", and "place" as the "there" is further explained as "the product of lived space and lived time". The architectural promenade mediates and or manipulates space and time. The architectural promenade is questioned regarding the experience of time, which has either an "absencing" or "presencing" effect on the present moment and how it may affect the onlooker's experience of time and space.

OF THE NATURE OF TIME

"This thing all things devours; birds, beasts, trees, flowers; gnaws iron, bites steel; grinds hard stones to meal; slays king, ruins town, and beats mountain down..." – Gollum, the Lord of the Rings

The answer to Gollum's final riddle in the book The Hobbit by JRR Tolkien is time. Yet, time remains a riddle in itself: the contradictory elements of, firstly, the absolute certainty of passing time and the concept of mortality linked to it, and secondly, the absolute uncertainty of what passing time and what the future will bring. As a rule, people are comfortable with metricised time, as time, though inevitable and uncontrollable, seems easily understood and managed in smaller, bite-sized moments. However, the experience of time can not be limited to the metricised mundane routines that people create to try to overcome their fear of passing time.

The point of this chapter is not to try to understand or to explain the complexities of time but rather to acknowledge that it does exist to approach a place where the "terror of time,"[1] as described by Karsten Harries (Harries, 1982), can be seen in a different light, as the "liberation of time[2]". Perhaps the liberation of time can be experienced visually by the use of materiality revealed through patinas.

A good place to start regarding temporality may be to consider people's perceptions and experiences of time. Our consciousness of time can be separated into quantitative experiences, where time is measured in days, months or years, and qualitative experience, which occurs in the reflection on the quality of experiences (Louw, 2016). Time can be experienced in many ways. One of the ways time is perceived or experienced is in a linear[3] way. There is a start and end point, like embarking on a journey with a specific point of departure and decided destination. Perhaps this is the easiest way to make routines from their mundane everyday lives and handle or understand time in bite-sized pieces. This perception of time also applies to processes such as wool processing and the journey by railway, with a definite start and finish and a journey in between.

1 The "terror of time" is explained by Karsten Harries as the human's consciousness of their mortality (Harries, 1982, p. 60). The "terror of time" places a person, or the Heideggerian "Dasein" in time, aware of their own past, present and future, and aware that the past will overtake every present.

2 The liberation of time does not try to control time, or to attempt to weather it, or understand it. The concept of the liberation of time is to accept time and its' role in our being.

3 Time is experienced and measured in past, present and future, with a definite beginning and ending.

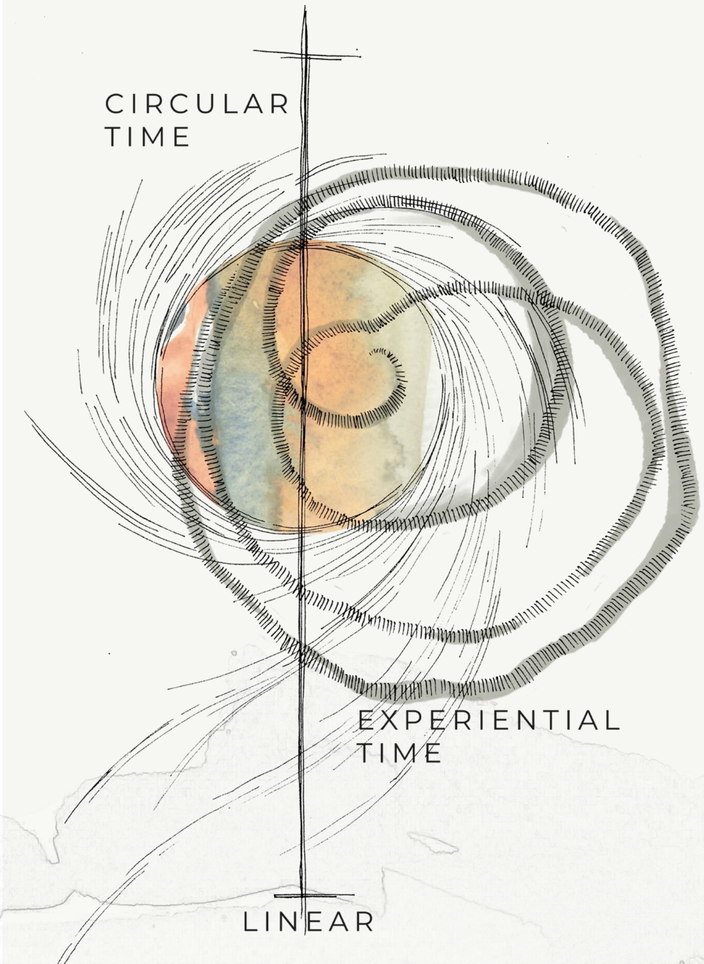


Figure 5.2: The experience of time (Author, 2023)

Another way in which time is experienced is cyclical or in a circular way. This is mostly seen in nature, where the sun rises and sets, the seasons come and go and the cycles of the moon and planets. It can be related to droughts and wet seasons and the season-specific growth of specific plants and shrubs in the karoo. It can further be related to sheep shearing and wool production, where wool is grown, and sheep are shorn in one-year cycles until the wool has grown to its maximum length. Regarding the perception of time as a linear or cyclical process, an architectural element, the promenade, can be investigated to manipulate space to alter the time experience for a user or an onlooker. Time as experienced as a series of moments, means that time is a process and can therefore not be limited to only past, present and future. Perhaps time, as Antiphon explained, does not exist at all, but instead a way to "measure the world" (Thomson, 2022: online).

Finally, time can also be experienced as a series of "now" or present moments, following the notion that nothing can occur in the past or future. Buildings are not built in the past or future tense: buildings are constructed in the now, which is ever awaiting in the future and unchangeable in the past. However, this does not necessarily mean that the past and future should be separated from the present. To attempt to understand temporality and the relationship between the present, future, and past, we may consult works by the German philosopher Martin Heidegger. Things or beings matter to us not only when they exist in the present but also when they are in the "past and future dimensions of the mysterious phenomenon called time" (Collins & Selina, 1998:3).

Furthermore, the idea of presence can be questioned regarding the present, past and future. In a way, we can't say that the future does not exist, and the possibilities it carries with it may come to be or never realise. Yet, it doesn't seem reasonable to say these possibilities do not exist. The same applies differently to the past. The event or the moment no longer exists, yet the past is remembered. The memory is investigated (Collins & Selina, 1998:3). Following the notion that our being is not only tied to the present moment, but it is also further explained that we are "neither present substances nor present objects, not present subjects: we are beings whose past and future collaborate to let us deal with all the other beings we encounter around us" (Collins & Selina, 1998: 5).

As such, presence and being are not equated, and the experience of time and the present moment, though it happens in a series of present moments, can not necessarily be separated from the past or future. As human beings, we are intertwined in time, which, according to Heidegger, can be structured into care in three different categories. Firstly, "thrownness"[4] places a human being, or Dasein[5], as "already in the world", dealing with what has occurred in the past. Secondly, "projection"[6] places Dasein as "ahead of itself" and living its projections onto future possibilities. Lastly, "fallenness"[7] describes Dasein's encounters with the now and the present moment (Collins & Selina, 1998: 79). This challenges the notion that time is experienced linearly. Yes, every past will somehow overtake every present. Still, Dasein deals with the present moment with projections of possibilities in future and experiences rooted in the past, which is more "everything, everywhere, all at once" than a linear unfolding of events. Ultimately, understanding

4 Thrownness (also facticity) is linked to the notion "already in the world", which finds Dasein always already concerned. Dwellers always already find themselves in a certain mood or attunement. Dwellers have no control over where or how they are thrown into the world. This thrownness determines how dwellers interact with the world they find themselves in (Auret, 2015, p. xxxv).

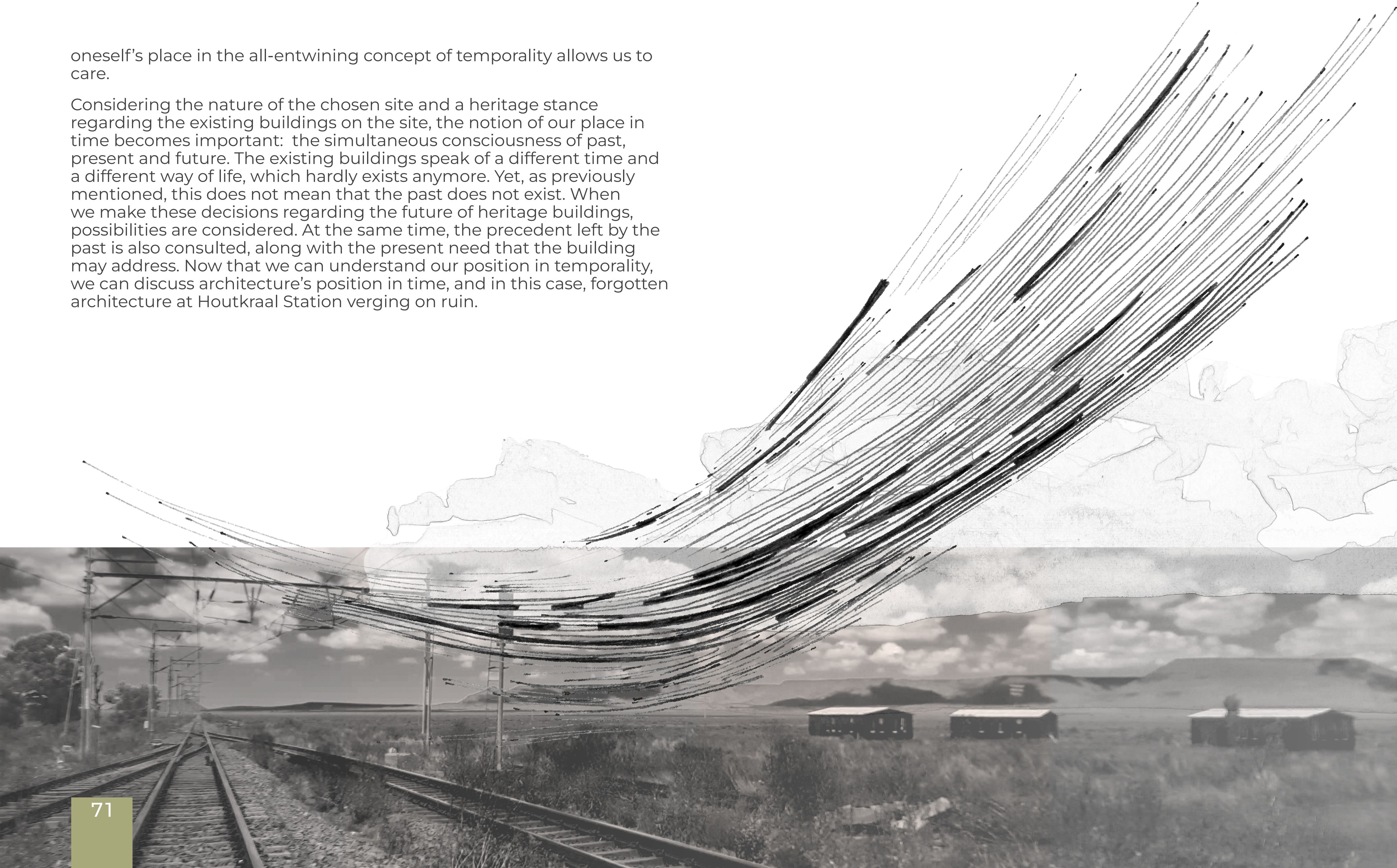
5 Heidegger defined Dasein as the "being concerned about its very being" and places him within historicity, which places Dasein, or the being within time. "Dasein" translates to "there-being", which places the being of care within place and within time (Auret, 2015).

6 Projection (or existentiality) refers to Dasein's future and the potentiality of being and places Dasein as "ahead-of-oneself" (Auret, 2015, p. 174)

7 Fallenness can refer to an inauthentic Being, falling into rhythm or mundaneness. The opposite of this is authentic being and "Being-in-the-world"(eternalisedofficial.com, 2021: on-line).

oneself's place in the all-entwining concept of temporality allows us to care.

Considering the nature of the chosen site and a heritage stance regarding the existing buildings on the site, the notion of our place in time becomes important: the simultaneous consciousness of past, present and future. The existing buildings speak of a different time and a different way of life, which hardly exists anymore. Yet, as previously mentioned, this does not mean that the past does not exist. When we make these decisions regarding the future of heritage buildings, possibilities are considered. At the same time, the precedent left by the past is also consulted, along with the present need that the building may address. Now that we can understand our position in temporality, we can discuss architecture's position in time, and in this case, forgotten architecture at Houtkraal Station verging on ruin.



ARCHITECTURE AND TEMPORALITY:

The need for architecture, or simply shelter, arose from a need to domesticate and tame space and time. Architecture establishes place by placing boundaries and creating regions of concern. These boundaries serve to separate space and place in an attempt to control our environments. Interestingly, spaces do not need human intervention to be controlled. The same applies to the site, placed in the expanse of the Karoo. The spirit of the Karoo is not self-conscious, yet we, as humans, find it necessary to place boundaries to feel safe within spaces. We need places where we feel at home and where we feel safe. Though intimidating, the expanse calls one to either explore or understand it. Therefore, the "terror of space" (Harries, 1982) refers to the unknown and things that may endanger us physically.

The "terror of time" accompanies the "terror of space" (Harries, 1982) and both inspire people to create shelters that protect them from the expanse and physical dangers, and art, to lead time astray, to fabricate objects enduring in time. The terror of time is instilled in us because of our consciousness of our own mortality, the very rational fear that every present and future moment will one day be part of our pasts. Ruin and deterioration may remind us of our own mortality. However, a pitfall of the terror of time would be to curtail ourselves to the past and to curtail ourselves to fear.

The Karoo landscape is expansive, and the sky is like a dome stretching from one horizon to another. When one places oneself in the middle of this expanse, it seems as though the loneliness embraces one. It is the loneliest place one can go to, and still doesn't feel lonely enough. In light of this description, the invitation stands to consider this landscape outside the confines of terror and to change the perspective from terror to the liberation of time and the wonder and beauty of space found in the unknown.

One of the ways we can address the terror of time and space is to acknowledge its existence and accept it, not that time passes or that the expanse is an ever-unfolding entity, but to attempt to understand how it occurs.

CHANGE AND DECAY

Change accompanies time, in an inevitable promise. As everything is always in a state of becoming, as described previously, change is an essential aspect of temporality. It is too obvious to see patinas as physical change, though that is exactly what they are. Instead, patinas, enabled by decay, may be viewed as measuring devices to keep track of time and change.

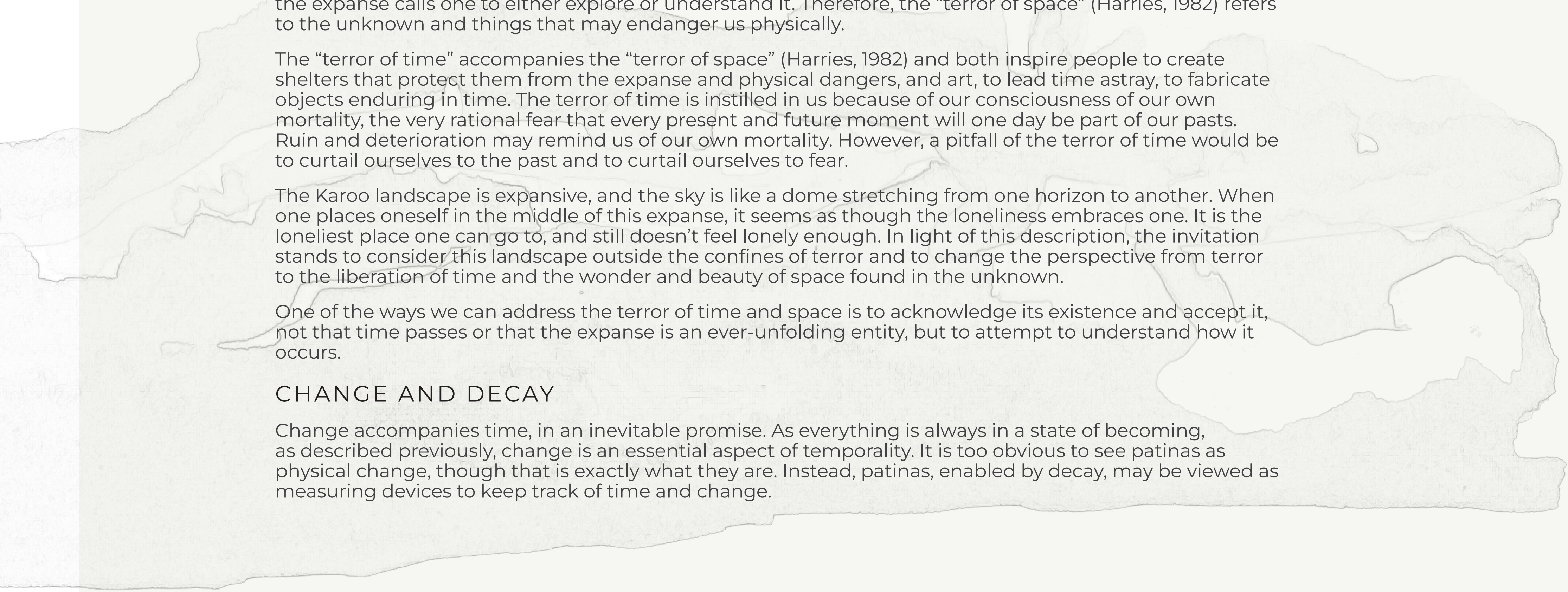


Figure 5.3: The inevitable effects of time (Author, 2023)

ARCHITECTURE AS REPOSITORY OF TIME

"Architecture emancipates us from the embrace of the present and allows us to experience the slow, healing flow of time. Buildings and cities are instruments and museums of time. They enable us to see and understand the passing of history. And to participate in time cycles that surpass individual life (Pallasmaa, 2012).

It is important to note that the act of care requires agency. It is not difficult to imagine that architecture, which is not a living thing, can not take care of itself. The "Patina of Care" in this case, does not refer to a material patina that is formed, but instead, the mindful preservation of architecture. The patina of care is dependent on the being of care and is formed through interaction and participation with the place.

Architecture can become a repository of time through materiality and ruin. Architecture as a repository of time means that buildings can express time in certain ways. Architecture expresses cultural time through "historic referencing or craft", cosmic time, which places emphasis on seasonality and light through the materiality and form-giving of a building, biological time by means of the human consciousness and metaphorical experiences of dark and light, and experiential time where the passing of time can be interpreted by means of the materiality of a building (Louw, 2016, p. 17). Different traces and impressions of time hide beneath carefully constructed patinas, and building facades become canvases on which time and decay can paint. Decay, central to patinas and ruin, becomes the mediator between present, past and future. It is not the decay of things that matters. It is how they decay that makes all the difference. Given the previous statement that architecture becomes a repository of time, it implies a material quality that can contain time and its reverberations.

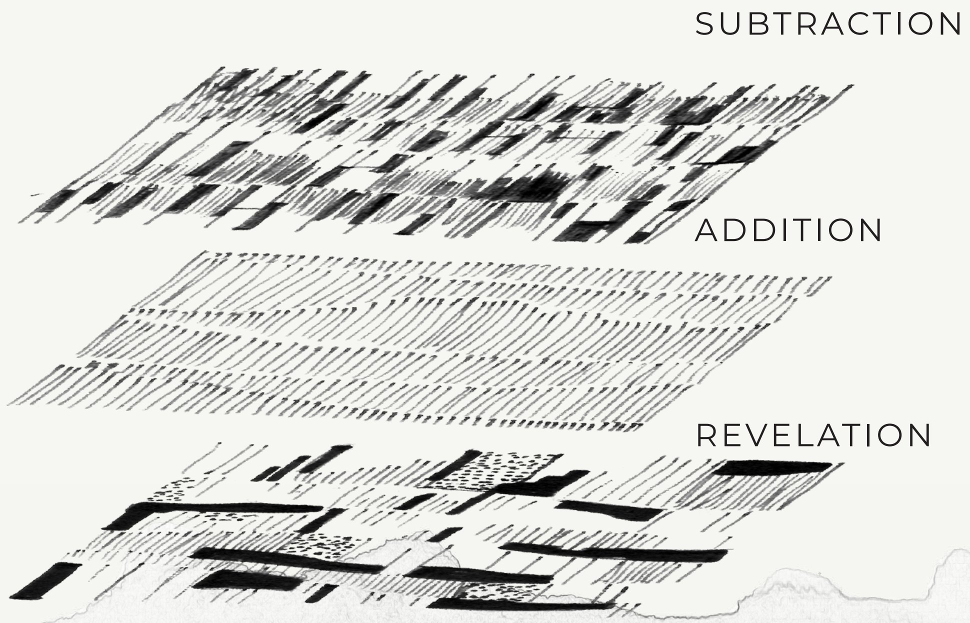


Figure 5.4: The Formation of patinas (Author, 2023)

CREATING A PATINA OF CARE

Patinas will be discussed in a physical sense as well as a metaphorical sense. Physically, patinas refer to how materials or things age. Patinas are thin layers that form on the surfaces of copper, brass, bronze and other similar metals that are natural and that seen the ageing or weathering of a surface. The patinas found on site have seen use, misuse, and age. Some of these patinas include rust, burn marks on the tracks, perhaps paint chipping off, and organic patinas, such as lichens, and burn marks on the walls. Patinas can either be seen as “addition”, layers that accumulate, or “subtraction”, where the accumulation of layers leads to the destruction of a surface. Though different in “function”, the patinas of addition and subtraction have in common that both are caused by extended exposure to the elements.

Patina’s, interpreted in a metaphorical sense, can be used to describe tracing temporality in existing architecture, ruins, typology and local vernacular, to name a few. Physically and metaphorically, patinas describe accumulated layers of experience, history and character that develop over time, adding to an object’s complexity. The same can be said for architecture: as time passes, as buildings get tarnished by time, an accumulation of layers adds to its complexity.

Another type of Patina can be added to the Patina of Addition and the Patina of Subtraction: the Patina of care. It sounds like a contrast: How can a patina that translates to the accumulation of layers or the destruction of an object be translated as care? Lanolin, a type of oil or grease found in sheep wool, keeps sheep warm and watertight in unfavourable weather conditions and, in a way, seals the exterior of the wool on a sheep’s body. In this way, the concept of a patina can be construed as a mode of care, especially regarding ruins. A patina, evidence of ruination, can become the very thing that protects the physical body or piece of architecture from further destruction by outward forces. In terms of architecture, this type of patina may translate to the use of building skins to protect the building from the sun, a covering of sorts and the use of layers, in whichever way it may be used. Yet, the proposed patina of care also suggests the revelation of latent characteristics in the materiality through patinas.

Up to this point, three different types of patinas, interpreted either physically or metaphorically, have been identified:

- Patinas of Subtraction
- Patinas of Addition
- Patinas of Care through revelation and reflection

It seems reasonable to try to link these three concepts of patinas to time: the patina of subtraction to the future, the patina of addition to the present moment and the patina of care, or mindful preservation to the idea of reflecting on the past. In fact, this is a way of making sense of time and temporality, to place time in measurable and understandable portions. Though some of the characteristics of these patinas can be linked to the respective tenses, the formation of a patina is due to chemical and natural processes, which cannot be limited to a definite past, present and future tense.

These three patinas, of addition, subtraction and care, will be further discussed in terms of ruin, inscription and trace, respectively. It remains true that nothing can happen in the future or past, though the possibility still exists in the future, and the memory still remains in the past. Things happen in the now, and the past and future are dictated by what happens in the present moment. Still, these different patinas can be viewed through the different lenses of time. Furthermore, architecture is perceived according to the determination of time as an event, a process or an object.

PATINAS OF SUBTRACTION:

As previously mentioned, the physical formation of patinas are due to processes and cannot be liked to time. Time encapsulates the process and is a process in itself. Still, the metaphorical interpretation of a patina of subtraction may be grounded in the future. The strongest buildings ever built are those that are never built at all. In every building is the inherent possibility of ruin. Long before a building is constructed, the possibility of ruin already exists, though the ruin and decay do not attack the idea. The possibility is protected from physical and outward forces. No, ruin and decay await the materialisation of the idea before they set in. Though we place ruin as a possibility in the far future, the act of subtraction occurs in the present. In this context, it is important to note that ruin does not refer to what's left after time has laid waste to the existing but rather as a projected possibility or an inescapable promise of time and change.

Objects may resist the temptation of time by being embedded in care. After all, it is not time that brings buildings to their knees but the inescapable possibility of ruin coupled with prolonged exposure to the environment without participation and preservation.

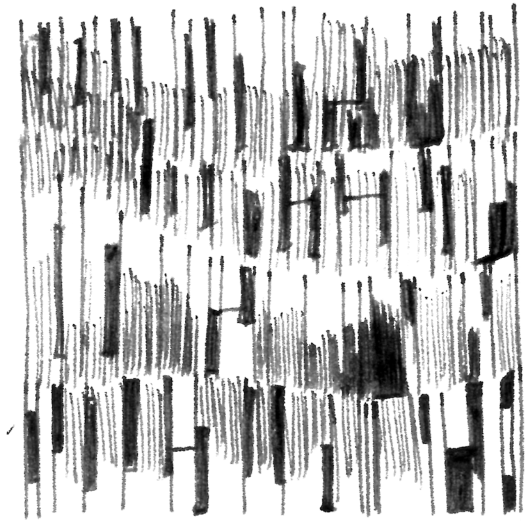
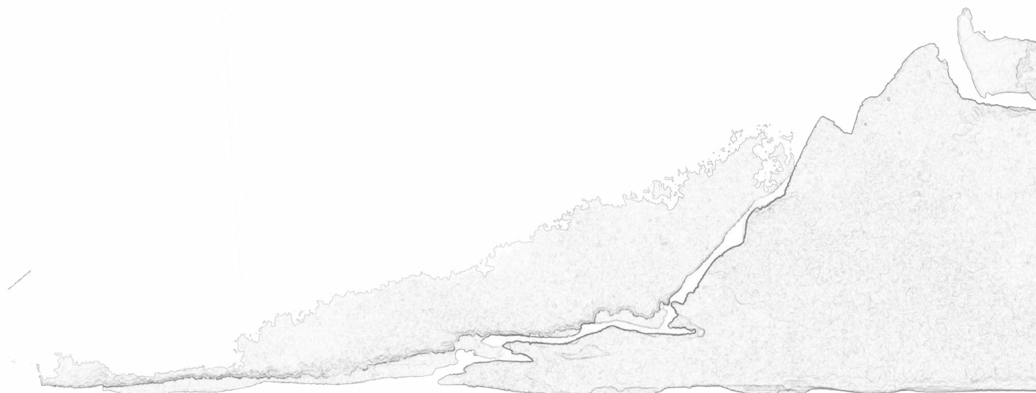


Figure 5.5: Patina of subtraction, unraveling (Author, 2023)



PATINAS OF ADDITION:

Given the process of the formation of a patina and the concept of the present moment, or the present "now", the patina of addition is defined by what we, as beings of care, (aware of our past and future, or "thrownness" and "projection" as Heidegger describes (Collins & Selina, 1998)) experience and do in the current place. Again, this does not limit the patina of addition to the present only.

We have established that things occur in the present or exist as memories or possibilities. We have also established that the present is defined by a consciousness of the past and an awareness of future possibilities. From the previous point, it also makes sense that change happens in the present moment, not the projected or remembered moment. Paul Ricoeur describes cities as " (an) architectural place(s) that discloses readable structures as inscriptions" (Meraz, 2016: online), which can describe the continuous addition of layers of personal memories, perceptions and intuitions which influence our understanding of places by means of our own projections of our realities on places.

The next thing that can be described as addition in this context is the fact that change also happens in the present tense. As described here, the change is the reciprocal relationship between place and onlooker. The onlooker or user projects their own intuitions, memories and experiences onto the place. This changes the place for the individual, but the individual also "changes" through their experience of the place. In this way, an unseen patina is added to the place. Secondly, a patina of use or misuse is also applicable.

Here, architecture is perceived as an immediate event that occurs in the present moment. The bodily experience and perception of architecture means dealing with the constant "now", an unchanging state in the present moment. It has already been established that things only occur in the present moment. One can understand architecture in the grasped or seized present moment in temporality and in its materiality. However, the "now" materiality is always subject to time and exposure, which implies that it is also subject to change. The instant, or moment, is seen as an individual moment. The event of architecture as a patina looks at the past and future tense, where the promise of ruin as minus or patina as addition is imminent. Through temporality, architecture evolves from an environment where different relationships and systems exist to an object. In interaction with an environment, one may become part of the systems and relationships, while the interaction with an object merely makes one an observer and the architecture becomes a seen object. This may hint at the fact that the dominance of the visual perception of the seen object overwhelms the fact that the individual is merged and involved with a place.

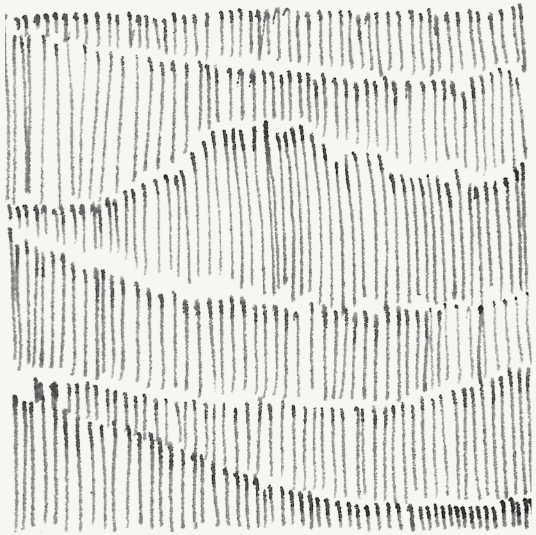


Figure 5.6: Patina of addition (Author, 2023)

PATINAS OF REVELATION THROUGH MATERIALITY:

Patinas, through materiality, sometimes reveals a latent characteristic previously unseen. Though this does not directly refer to the past tense, it does imply referring to the past to learn from it and attempt to understand it. For example, copper turns green over time. From first impression, one would not expect the red tinge to become green over time. This patina, therefore, reveals a latent characteristic of the material. The same applies to rust, though this, on one hand, can be considered a harmful patina. The idea of something existing to unbecoming also highlights the idea of temporality and transcience. On the other hand, rust is actually a beneficial patina, which strengthens the surface of the host material. Corrosion, in some cases, improves a material's durability (Nutt, 2021: online).

Architecture as a process can be understood as the search for meaning and significance, which links with the traces and inscriptions that form part of readable structures that form environments. Architecture as a process is concerned with consulting history, the human quality of being placed in historicity, and lastly, temporality in order to learn from the past. In this way, architecture as a repository of time may serve as a source of memory. However, the latent promise of ruin may cause a place to become a piece of archaeology, which becomes sterile and quiet. The question, then, is how to keep the spirit of a place alive. Yet, one should remember that patinas act as enduring memories, traces of life, and temporality.

Architecture as inhabited art, or the made thing, endures long after we have gone. Art and the made object both contribute to the liberation of time instead of facing the terror of time. Art is the preservation of truth in the work and the constant becoming and happening of truth. Still, this truth is objective, both to the artist and the observer. This links to the idea that everything is constantly in a state of becoming: humans, architecture and art. Everything happens in the present moment, though the future and past conspire to help us deal with the present moment. Creating a link between the notion of architecture as a process and the past means that preservation becomes important, and preservation invites us to participate in the revealing of the truth, however objective it can be, especially in the reflection of the past, in order to learn from it. Earlier, I stated that a person's participation in their environment and interaction with things opens a person up to change. The environment and the person play reciprocal roles in influencing each other, and as the one changes, the other changes in step. Therefore, the preservation and conservation of architecture depends on a person's active participation, hand-in-hand with the place. Preservation of the past and of the buildings on site, is an invitation for us to participate in the unveiling of truth, to acknowledge and view patinas as revelations of the "now", though this is facilitated through materiality.

Figure 5.7: Patina of revelation (Author, 2023)

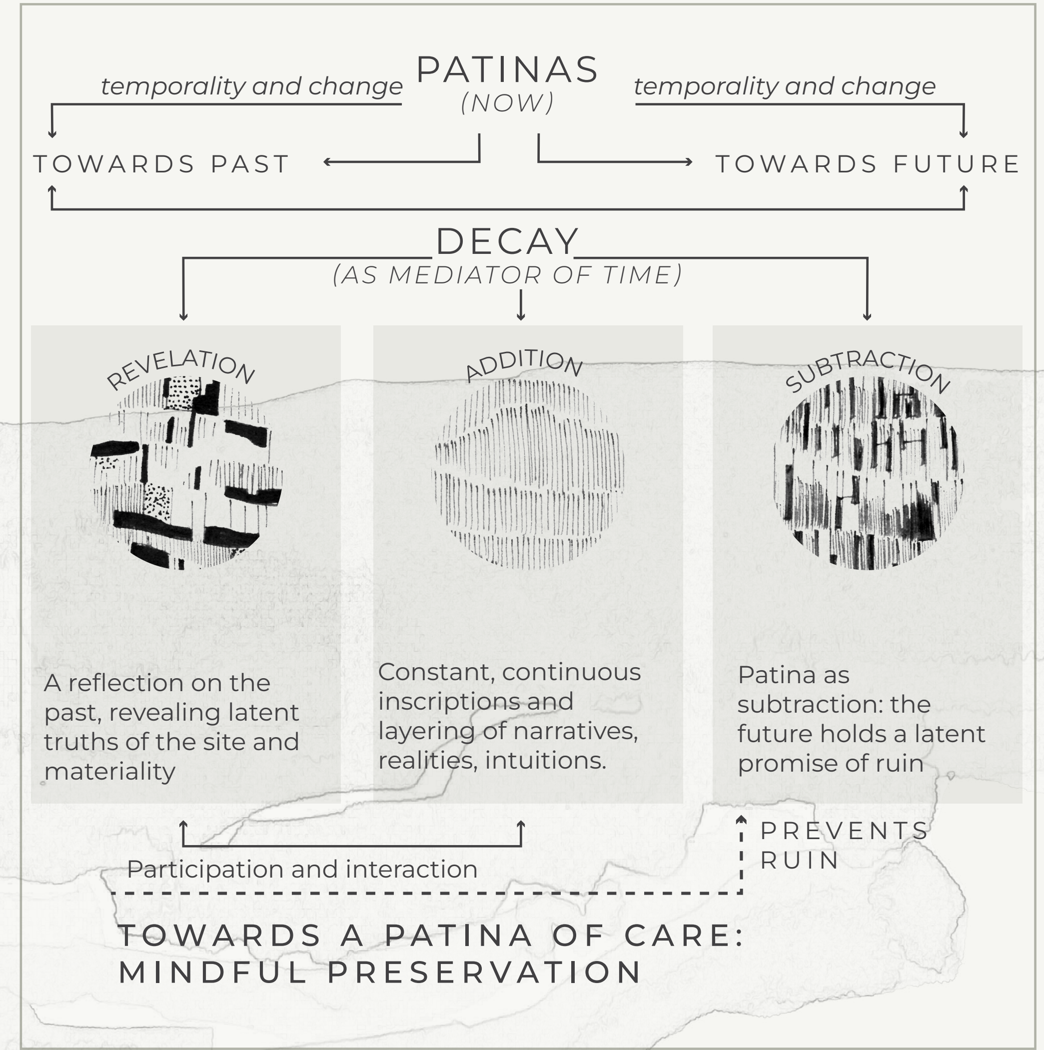


Figure 5.8: Summary: Towards a patina of care (Author, 2023)

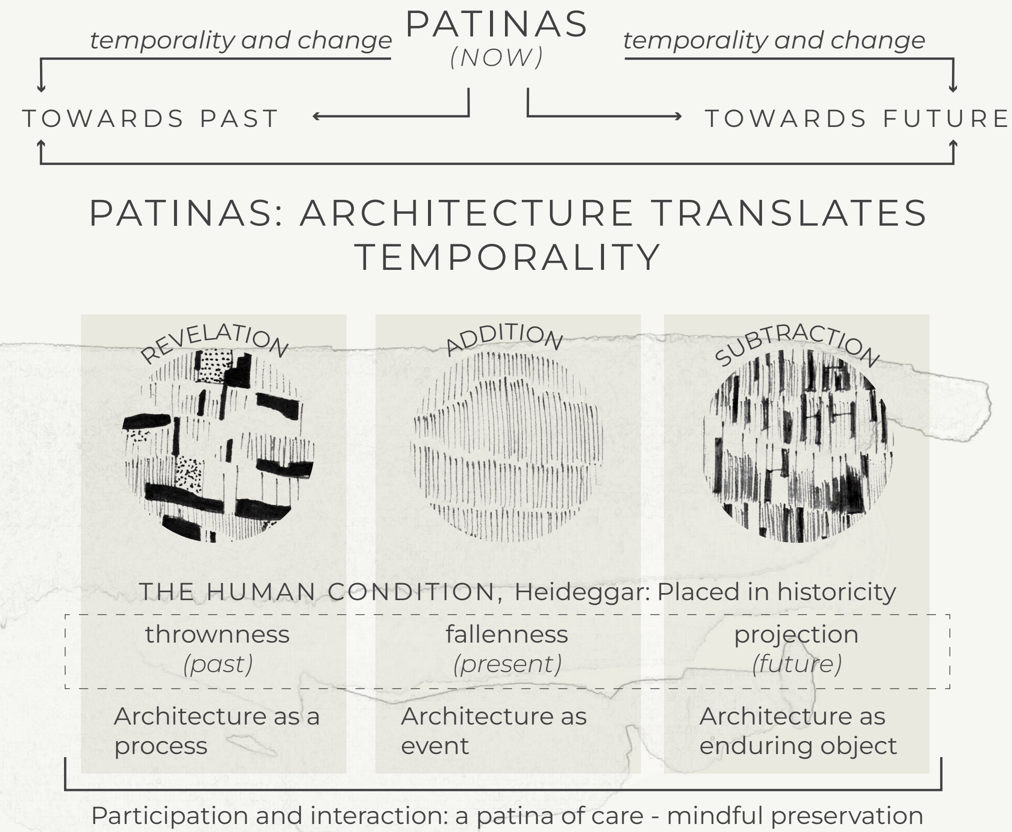


Figure 5.9: Summary: Architecture translates temporality (Author, 2023)

ARCHITECTURE AND THE PROMENADE

Up to this point, architecture and patinas have been discussed as a mediator between time, process, and temporality. Next, the manipulation of the experience of time through the architectural element of promenades and walkways will be discussed. As mentioned in Part 1, which elaborates on the nature of time, time is experienced in either a linear, circular or cyclical way or passing moments. In part 3, which elaborates on patinas, time can also be seen as a way to measure the world or to measure change. Now, the promenade, which may embody the linear passing of time, will be discussed as an architectural element that can manipulate the experience and perception of time.

Firstly, we return to the Heideggerian concept of “Dasein”, the being of care. “Dasein” directly translates to “there-being” or “being-there”, which combines the ideas of being and place. Place, according to the German architect and writer Gunter Nitschke, is “the product of lived space and lived time” (Aamodt, 2017: online). Being and place now happens within another dimension: time. Nitschke’s concept of place implies that “all experience of space is a time-structured process, and all experience of time is a space-structured process” and that time can be described as “space in flow”. Time is, therefore, also a dimension of space and essential to the experience and the perception of a place (Aamodt, 2017: online).

The promenade, an architectural element, may two-dimensionally reflect the linear passing of time. Having discussed the relationship between being, place and time, we can now establish that “time is gained by compressing space” and “space is created by slowing down time” (Aamodt, Killing time in Japanese Space, 2017: online). The notion of the promenade may establish this fact.

Architecture is a subjective experience, and the layering of our own experiences, prejudices and realities as a patina of addition affects how we experience time within buildings. However, the experience of time in buildings and the temporal consciousness within buildings relies on the passage of chronological time as much as it relies on the transcendental meaning or quantitative time. Promenades, with the main aim to remove a person from the present time or moment, as described by Micael Louw, does so by creating an increased awareness of passing time or a specific narrative to be followed instead of striving towards clinical timelessness. Promenades that aim to highlight the present moment in the present space tend to create a heightened experience of space and place by focusing the attention of the onlooker on the defining elements of the place, like the visual cues of passing time.

A person’s experience of time depends on their situation, both their mental state and where they are situated in space. Therefore, time is experienced differently in different situations, depending on sensory stimulation; the duration of an event with less sensory input subjectively feels longer than the duration of an event with a lot of sensory input or distractions (Louw, 2016, p. 15). Promenades utilise movement in space and time, and spatial orientation and proximity become important in the design of these elements. Interestingly, how people experience spaces also corresponds to the way in which people mentally experience time (Louw, 2016, p. 16). Architecture, when not considered merely a static experience, can amplify the experience and perception of time through the embodied experience of movement through space.

Promenades, through movement, may play a part in “absencing present time” or “presencing present time” (Louw, 2016, p. 19). To “absence” present time means to take the onlooker out of the present moment by evoking emotions, memory and imagination. A good example of this would be a movie in a cinema or certain types of literature. The architectural piece evokes a sense of narrative by evoking memory and emotions. The railway line’s narrative and the wool processing may be embodied in the architectural promenade through storytelling and removing the onlooker from the “now”, thereby “absencing” the present time.

It has been mentioned that time can be experienced as a series of passing moments. The “presencing” of the present time depends on this and focuses the onlookers’ attention on the “now”. This type of promenade emphasises and “heightens the sensory experience of time”

(Louw, 2016, p. 26). The present moment is emphasised by the current situation and the characteristics that define it, like light quality and the season, and does not refer to the past or the future. Every moment is considered unique depending on the person and the situation. To place focus on the present moment, this promenade employs a definitive rhythm and regular pattern and removes all distractions. Furthermore, natural elements that indicate time, like sun, is also emphasised as well as the natural deterioration of time (Louw, 2016, p. 29).This architectural promenade, through movement, reveals the present moment as truth in quantitative time[8].

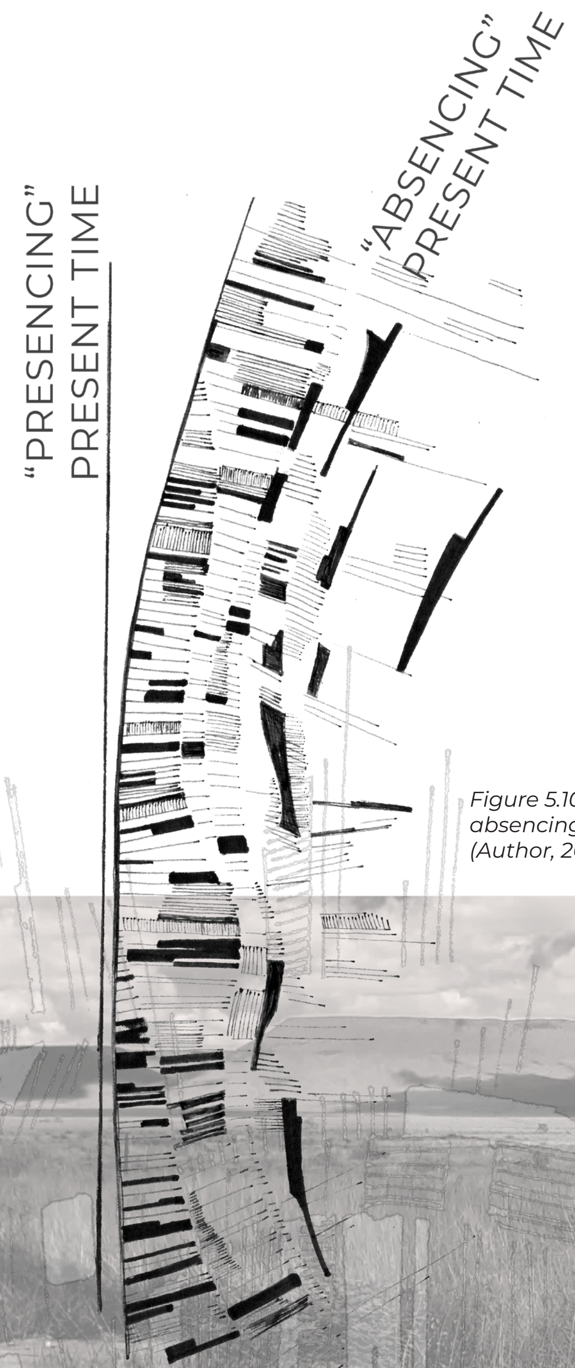


Figure 5.10:The promenade as absencing and presencing time (Author, 2023)

8

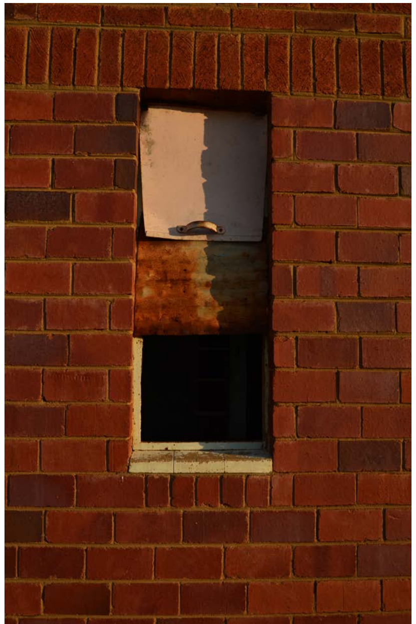
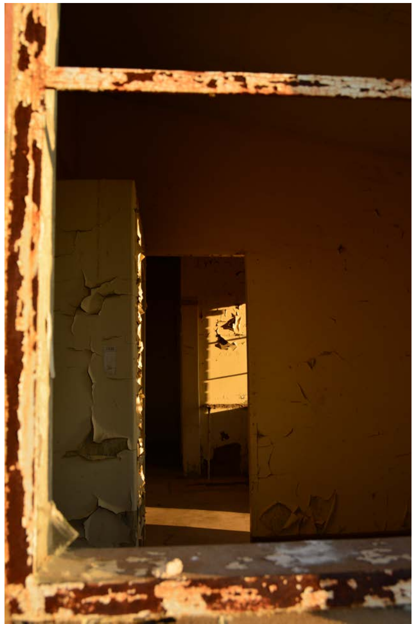
Quantitative time, as opposed to qualitative time, does not measure time, but instead reflects on the quality of the experience.









MAPPING PATINAS

As mentioned earlier, Patinas can reveal the latent material qualities and truths in objects, whether it is the passing of time or the continuous formation of layers of patinas, which, in turn, become repositories of time. The patinas found on the site also reveal the latencies of the site, function, and purpose, and how people interact with the place. The railway line itself reveals patinas of use and misuse. The railway line still in use is shiny, while rust has accumulated on the surface of the unused line. Yet, even the lack of patinas on the railways shows a need for more maintenance. Rust accumulates in the cracks in the railway line, which are caused by too much heat as the trains take off or by friction caused when the trains brake.

The discolouration and texture of the materials, as the patinas form, form a palette for design development and material use. The material use in the design development may include weathering steel like Corten steel, which forms a layer of oxidation, or rust, that protects the material's surface by inhibiting corrosion in the steel. This oxidation is a prime example of a patina of care or preservation.

The discolouration seen in the rust almost seems to be in conversation with the natural quality of the afternoon light in the specific region of the Karoo, which refers to the experience of the passing of time in natural cycles as mentioned previously. Another interesting aspect of the discolouration is the contrast between the colours, complementary colours, like reds and greens, and tonal value, which ranges from light to dark.

The other interesting thing regarding rust is that it repels other materials, like paint. As soon as the protective layer, namely the paint, cracks and allows water to encounter the steel, the corrosion creeps under the paint, forms rust, and the paint cracks further and falls off. Rust and other patinas are unafraid to claim their places in either preservation or decay.




Figure 5.11:Visual essay: Mapping Patinas on site (Author, 2023)

6. PREPARING THE LOOM

BUILDING PROGRAM

HARVESTING WOOL

Shearing shed

Shearer's amenities

Sheep holding pens: covered and open

Wool storage

Loading platforms and zones for wool bales

PROCESSING WOOL

Supervisor's Office

Wool sorting and storage

Dyeing

Wool washing and drying yards

Carding

Felting

Spinning

Weaving

Multifunctional crafting center

Bathrooms and locker rooms

TEXTILE ENGINEERING

Admin Offices

Textile Engineering

Textile Design

Storage

Display Area

Boardroom (including a kitchenette)

Bathrooms

USERS:
Educators from BKB and NGWA for sheep shearing and classing
Small-scale farmers
Sheep
Shearers, handlers
Trucks: transport for wool
Workers: Washing processing wool, carding, felting, washing etc.

RAILWAY

Railway Platforms

Restaurant

Bathrooms

Tickets Kiosk

Information Desks

New agricultural courtyards

USERS:
Railway passengers:
ROVOS Rail
Tourists
Locals

COMMUNITY ENGAGEMENT

Doctor's Rooms: Medical Train

Agricultural Courtyards

Community Hall / Cafeteria

Promenades

VISITOR ENGAGEMENT

Information Kiosks

Multifunctional Crafting hall

Factory Shop

USERS:
Doctors: Medical Train
Visitors, tourists
Workers

DESIGN DEVELOPMENT

As stated in the grounding chapter, the design aim and intention is to balance the handmade processes and productions and the site's industrial nature with the proud landscape of the Karoo. The theoretical discourse addresses patinas, ruin and time, given the dilapidated state of the buildings found on site.

The site's programme, as seen on the left, which includes wool harvesting and processing, determines the typology of the buildings on the site. The scheme is developed with the users in mind, even considering the sheep as expected users.

Following the design strategy as set out by the Burra Charter, the design development happens in four stages. The first stage entails the design and construction of a shearing shed. The second stage entails the development of a wool processing facility that includes hand-driven processes like washing wool and refining it into a usable product. The third and fourth stages address the existing accommodation on the site, with the aim to reuse some of these buildings for accommodation for shearers and visitors alike. However, this dissertation is only concerned with the development of the first and second stages.

CONVERSATIONS WITH THE INEFFABLE: QUALITATIVE SITE ANALYSIS

Upon first interaction with the site, Houtkraal Station in the Karoo, one may experience a wide horizontal plane and see this expanse as a piece of earth brimming with nothing, the silence a conversation with the unutterable. If nothing could speak, what would it look like? The first attempt at the alternative site analysis involved a loom, flaccid grass, and the unyielding, obstinate Karoo bossie. It failed. Without the cooperation of the Karoo bossie, the woven work would become generic, like any field in the Free State.

Upon investigation into the history of the place, it was found that the original name of the site and the neighbouring farm was once “Houd Kraal”, not Houtkraal as it is now known and indicated on official documentation. The Dutch word “Houd” translates to keep, gather, protect, or retain. As such, meaning or truth goes missing over time. This opened new possibilities to explore the site’s latencies and see what fragments of truth regarding the place may again be gathered here.

Different plant species that are endemic to the Karoo were harvested, tied, or gathered into a brush. Next, it was dipped into ink and tied to the ultimate gathering device, a border collie. In a game of fetch, the dog would return again and again to the same spot, and the brush would then make marks on a canvas. The prints were then interpreted as another gathering device, and the negative spaces were highlighted as the gathered areas on the canvas. The different splatters, evidence of rigid movement and smooth dynamism were then interpreted horizontally. The negative space was highlighted as possible gathered or enclosed areas to find and explore possible form-giving qualities from the “spoken image” of the place.

This study had much to do with understanding the place. It resulted in a possible spatial organisation and confirmed the act of gathering as place-making based on the understanding of the site and the relationship between the environment and the way of being or the letting-be of the place. In reflection, this study of the landscape reflected notions of Norberg Schulz’s language of Architecture, especially regarding topology, which references understanding, orientation, spatial order, and spatial interrelationships primarily dictated by rhythmic expressions of the brushes. Further studies may be done to explore the morphology and typology of the place.

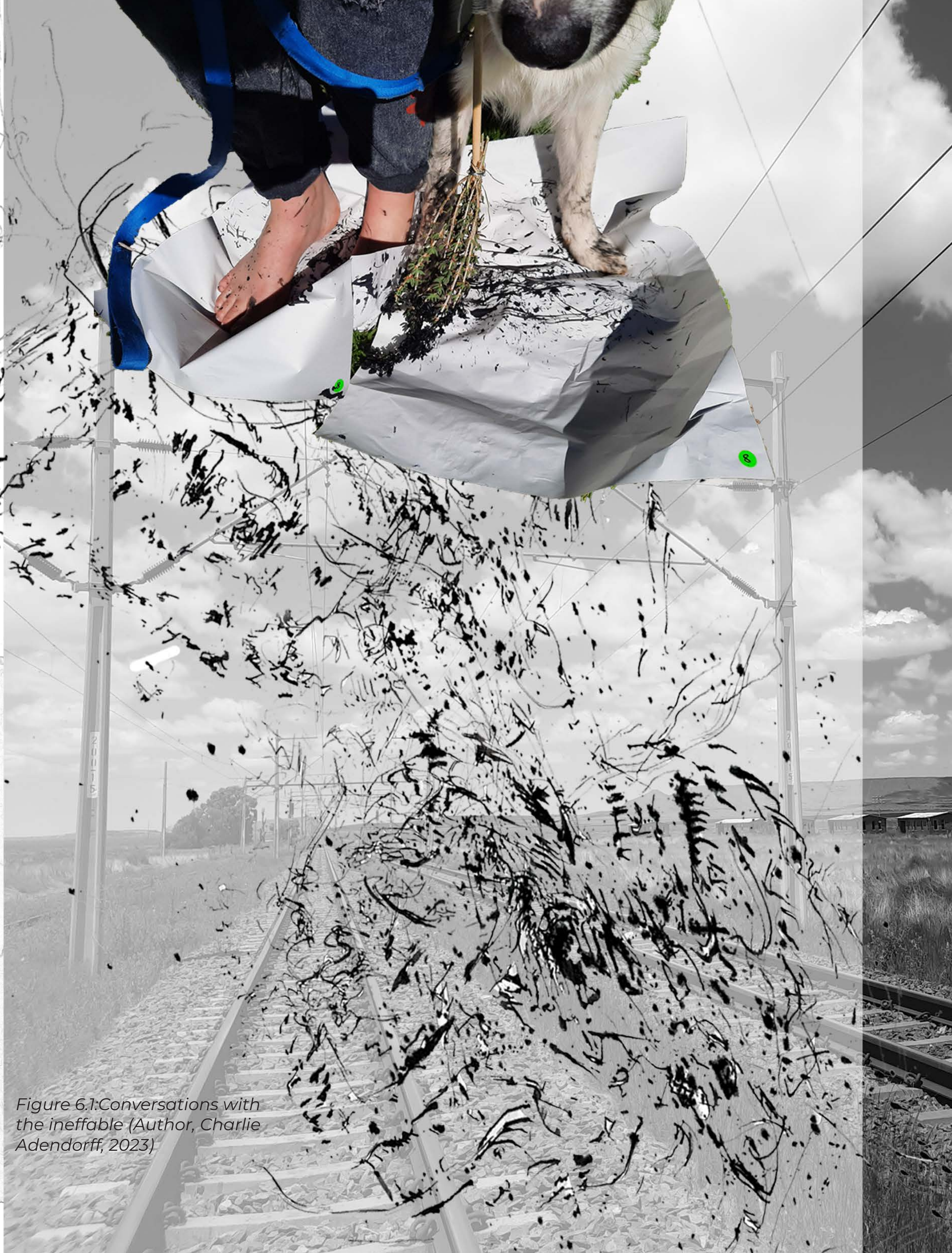


Figure 6.1:Conversations with the ineffable (Author, Charlie Adendorff, 2023)

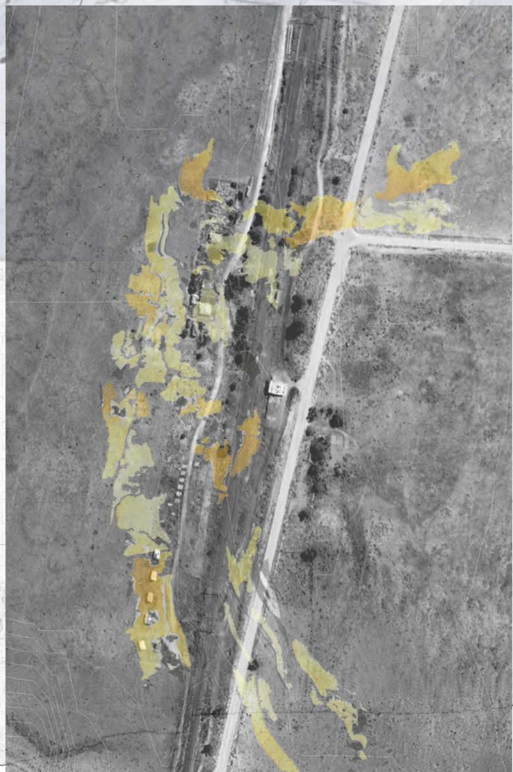
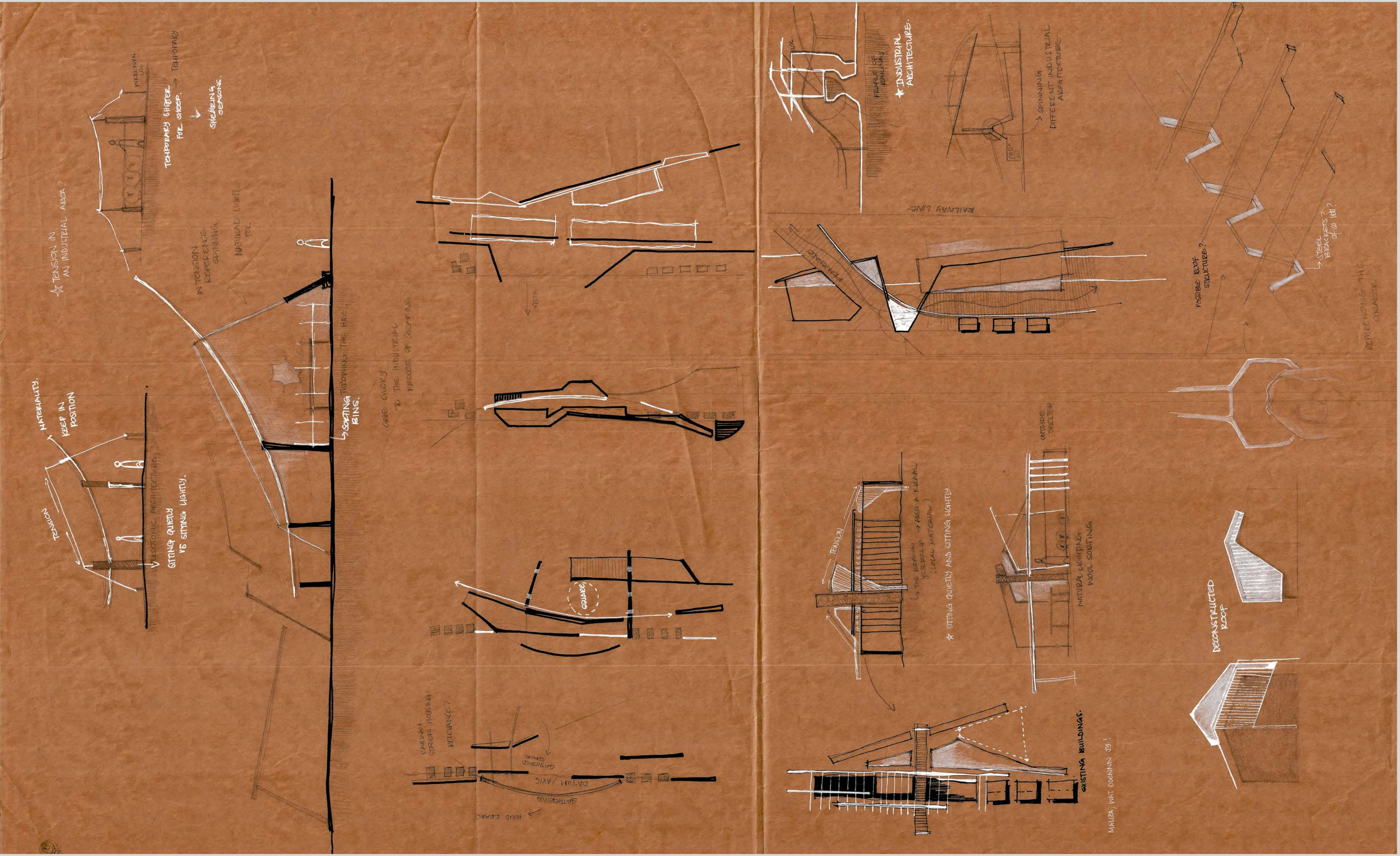


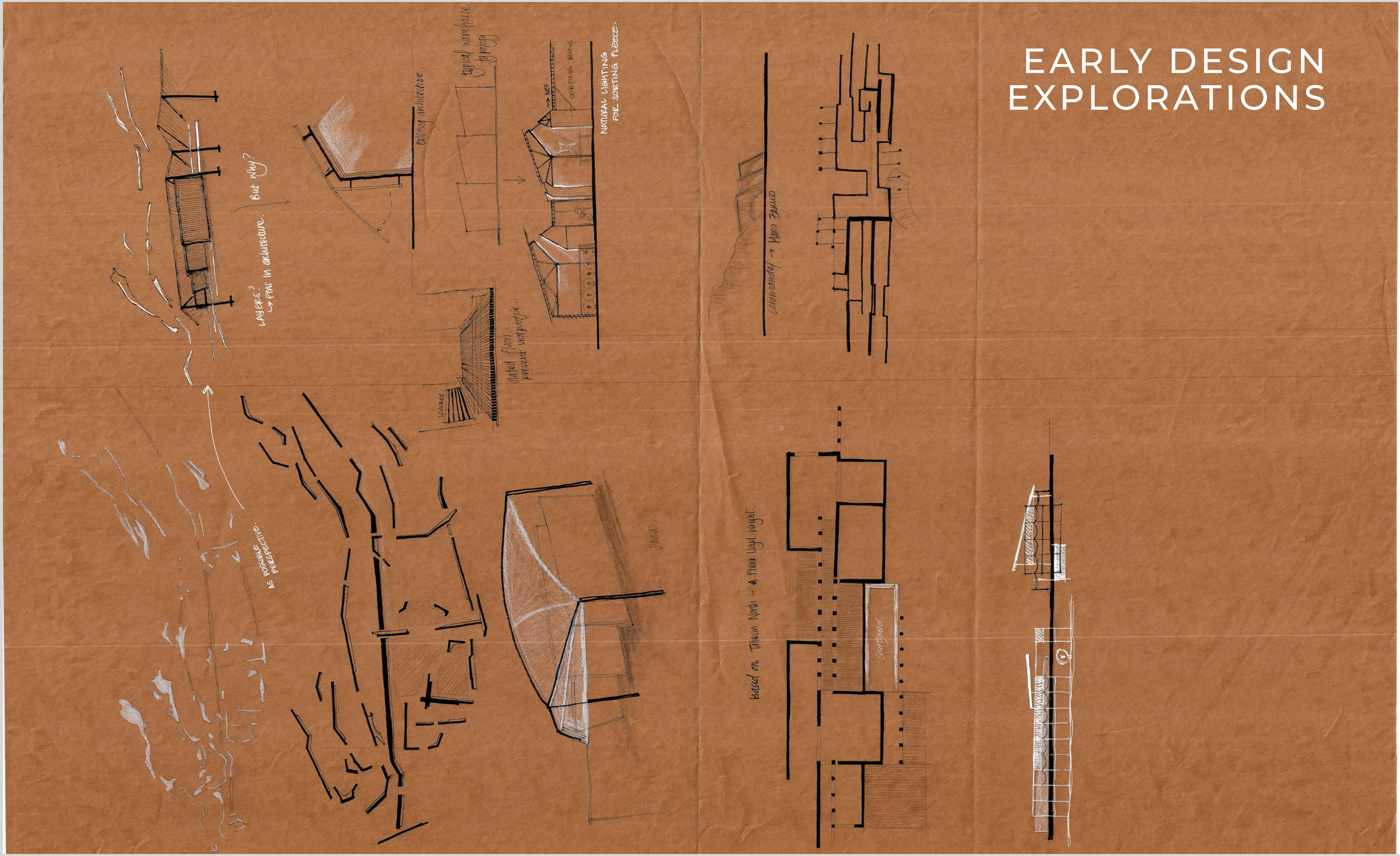
Figure 6.2:Conversations with the ineffable Variation 1 (Author, Charlie Adendorff, 2023)

Figure 6.3:Conversations with the ineffable Variation 2 (Author, Charlie Adendorff, 2023)

Figure 6.4:Conversations with the ineffable Variation 3 (Author, Charlie Adendorff, 2023)


TEMPORARY SHELTER FOR SHEEP. → TEMPORARY
SHEARING SEASONS.
TENSION IN AN INDUSTRIAL AREA?
IN TENSION. REFERENCE SPINNING.
MATERIALITY.
KEEP IN POSITION
TENSION
SITTING QUIETLY VS SITTING LIGHTLY.
THROWING THE HIDE
SORTING BINS.
GIVE GLORY TO THE INDUSTRIAL PROCESS OF SHEARING
SQUARE
RAILWAY STATION HOUSING
RELEVANCE?
DATUM / AXIS
GATHERING
PROFILE OF RAILWAY
INDUSTRIAL ARCHITECTURE.
SPINNING DIFFERENT INDUSTRIAL ARCHITECTURE
RAILWAY LINE
POSSIBLE ROOF STRUCTURE?
REFERENCING THE SHEARER
OUTSIDE SHELTER
NATURAL LIGHTING. WOOL SORTING.
SITTING QUIETLY AND SITTING LIGHTLY.
DECONSTRUCTED ROOF
EXISTING BUILDING.

EARLY DESIGN EXPLORATIONS



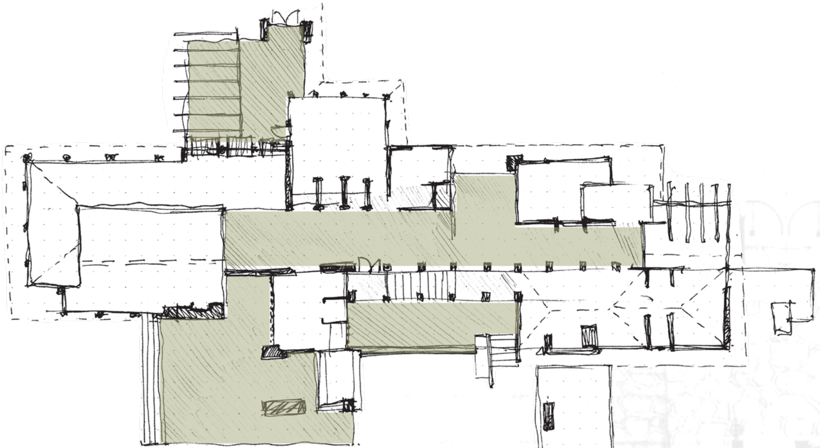


Figure 6.5: Taliesin North Floor Plan, spaces connected by courtyards (Author, 2023)

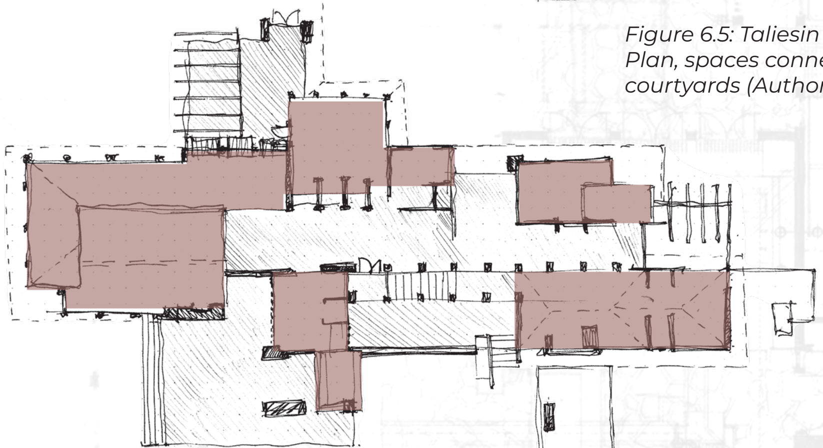


Figure 6.6: Taliesin North, under-roof spaces (Author, 2023)

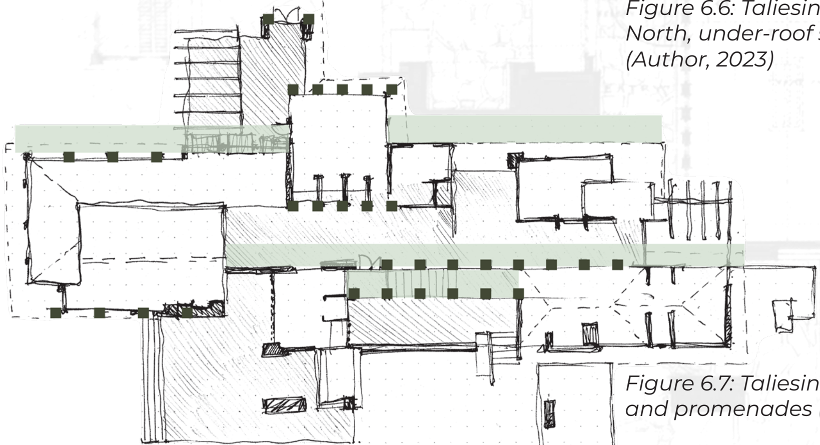


Figure 6.7: Taliesin North rhythm and promenades (Author, 2023)

TALIESIN, FRANK LLOYD WRIGHT

Frank Lloyd Wright built Taliesin North and West as residential homes which later became architectural schools. Taliesin North, near Wisconsin, was originally built in 1911 but was rebuilt in 1914 and 1925 after two fires (Kaufmann, 2023: online). Taliesin North is situated near Wisconsin, and three different versions of floor plans were developed and constructed to rebuild Taliesin after the destructive fires.

Taliesin North is discussed in terms of its floor plan and layout, while Taliesin West is discussed in terms of its climatic response to its environment. Both buildings have strong geometric forms and layouts, and thick outer walls are present in both plans. However, regarding the theoretical discourse regarding time and the experience of temporality, the layout of Taliesin North corresponds with the use of the architectural element of promenades to manipulate the experience of time.

PROMENADE OR WALKWAY AS AN ARCHITECTURAL ELEMENT:

The central promenade of Taliesin North 2 forms the axis and datum of the plan and stitches different courtyards together. The courtyards form different “exterior” rooms. The promenade is also implemented in the plan of Taliesin West and connects the different buildings that make up the scheme. Both buildings, or schemes, are less of singular buildings than they are series of spaces that are connected by means of promenades, walkways, terraces and gardens.

Application: At Houtkraal Station, the promenade and designed courtyards stitch together the different buildings in the wool processing facility along the railway. The railway can also be considered a promenade through the Karoo. The railway line and the new proposed platforms also become a datum of the site.

CLIMATIC RESPONSE:

Interestingly, the climates of Wisconsin and Arizona in America are vastly different. Wisconsin is known as one of the coldest states in the United States, while Arizona is known for its desert climate and high temperatures. However, in the plans of both Taliesin North – and West, very thick walls are used, and these walls are constructed using different methods using rock. The thick walls may be used as a climatic response but serve well as a design element as well.

Taliesin West’s walls are constructed through wooden casing and desert rocks. The flat edges of the rocks are placed on the exterior of the casing to conserve concrete. The same method can be used in the construction of the platforms, where rubble on the site can be used with concrete to construct platforms (Kroll, 2011: online).

Thick walls, constructed using bricks or concrete, have high thermal mass. This refers to the material’s ability to absorb and release heat (Reardon, McGee, Milne, & Marlow, 2020). Therefore, strategically placed thick walls can contribute to an interior space’s thermal comfort.

Another design feature in the drafting room is the use of a translucent canvas as a roof. However, it was later replaced with translucent plastic sheeting because of wear due to UV rays.

RHYTHM IN DESIGN:

One of the defining features of time is rhythm. The rhythm in the design of this building is seen in the interior and the exterior. Rhythm is also created on a two-dimensional plane, where the negative spaces between solid areas on the plan create different courtyards. Another interesting design detail in Taliesin West is the use of frames over the roof, which reflects the rectangular spaces shown on the plan. It also seems that the entire floor plan of Taliesin West is designed with a specific unit in mind and varying proportions of that unit.

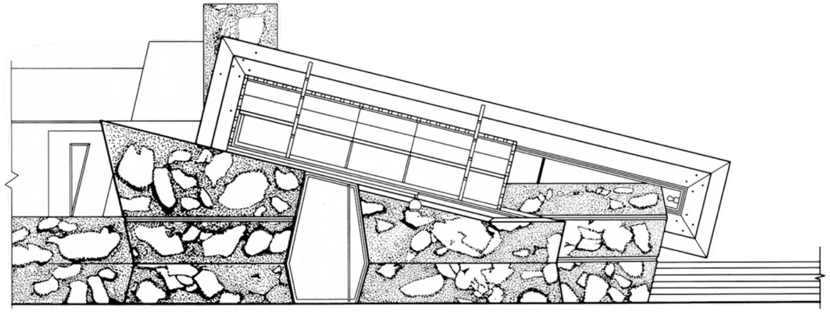


Figure 6.9: Taliesin West: rhythm expressed in frames on the roof (Frank Lloyd Wright Foundation, 2017: online)

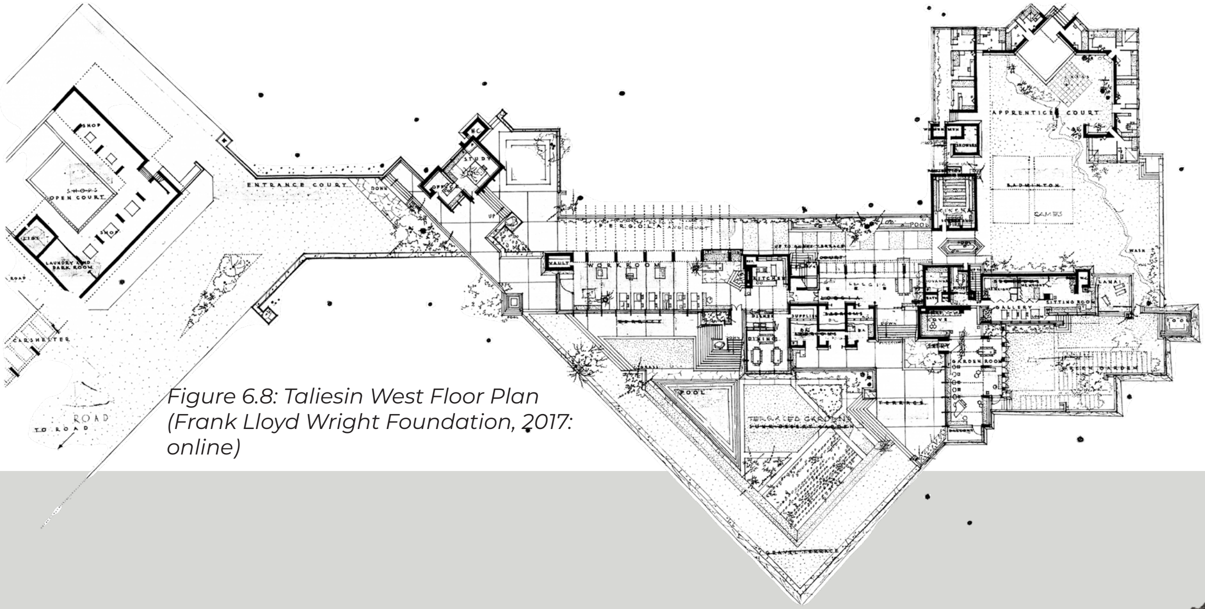


Figure 6.8: Taliesin West Floor Plan (Frank Lloyd Wright Foundation, 2017: online)

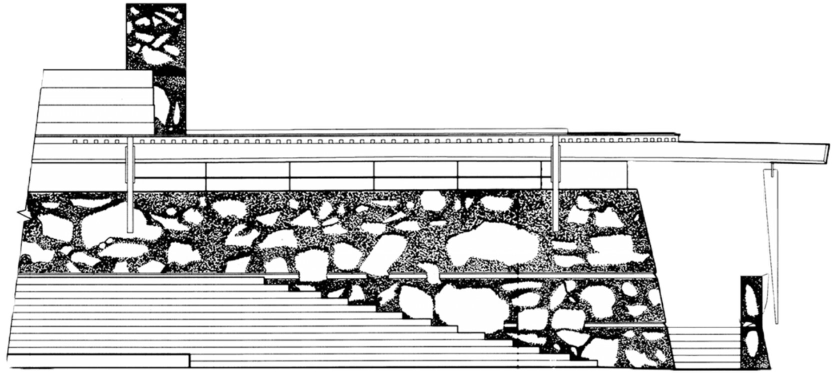


Figure 6.10: Taliesin West: utilisation of stone walls in (Frank Lloyd Wright Foundation, 2017: online)

Figure 6.11: Taliesin West: rhythm as seen in the roof of the building (Frank Lloyd Wright Foundation, 2017: online, adapted by author)

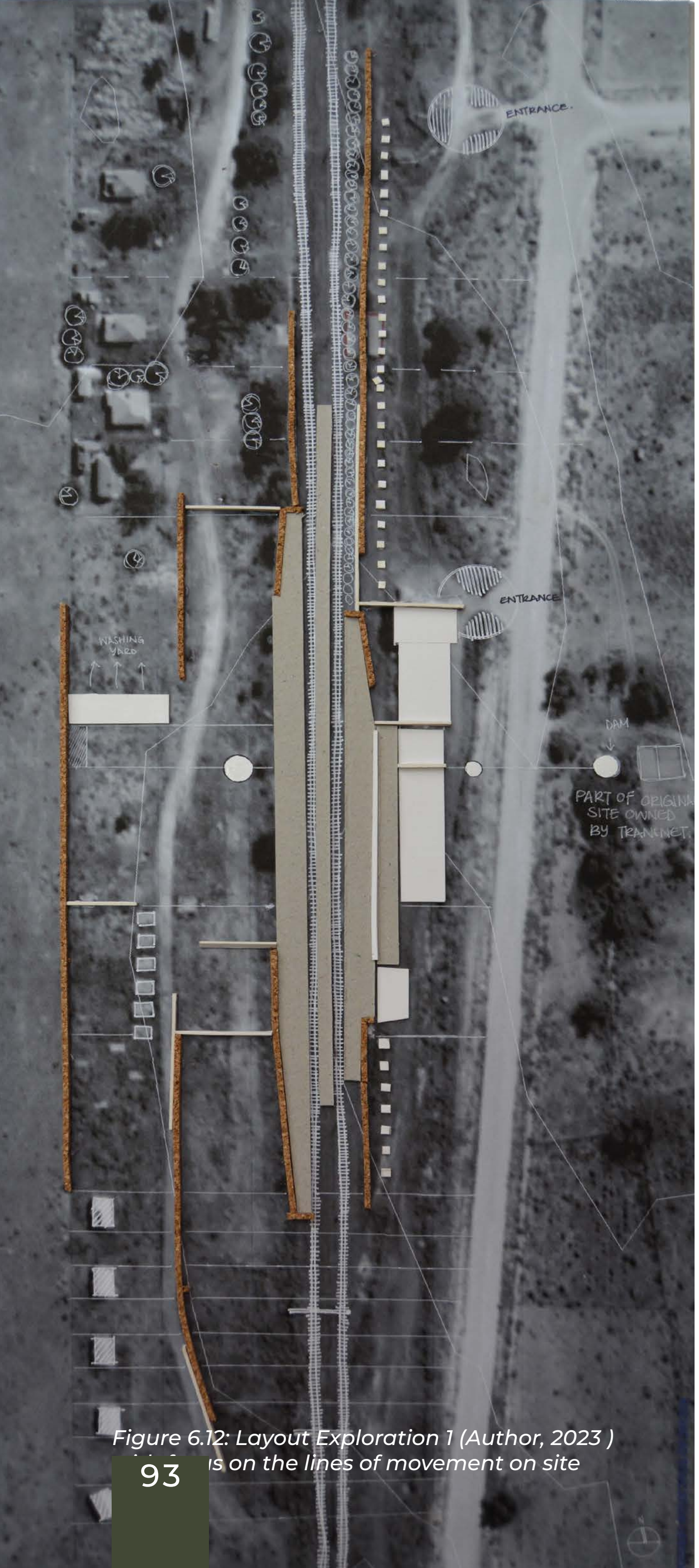


Figure 6.12: Layout Exploration 1 (Author, 2023) ... us on the lines of movement on site

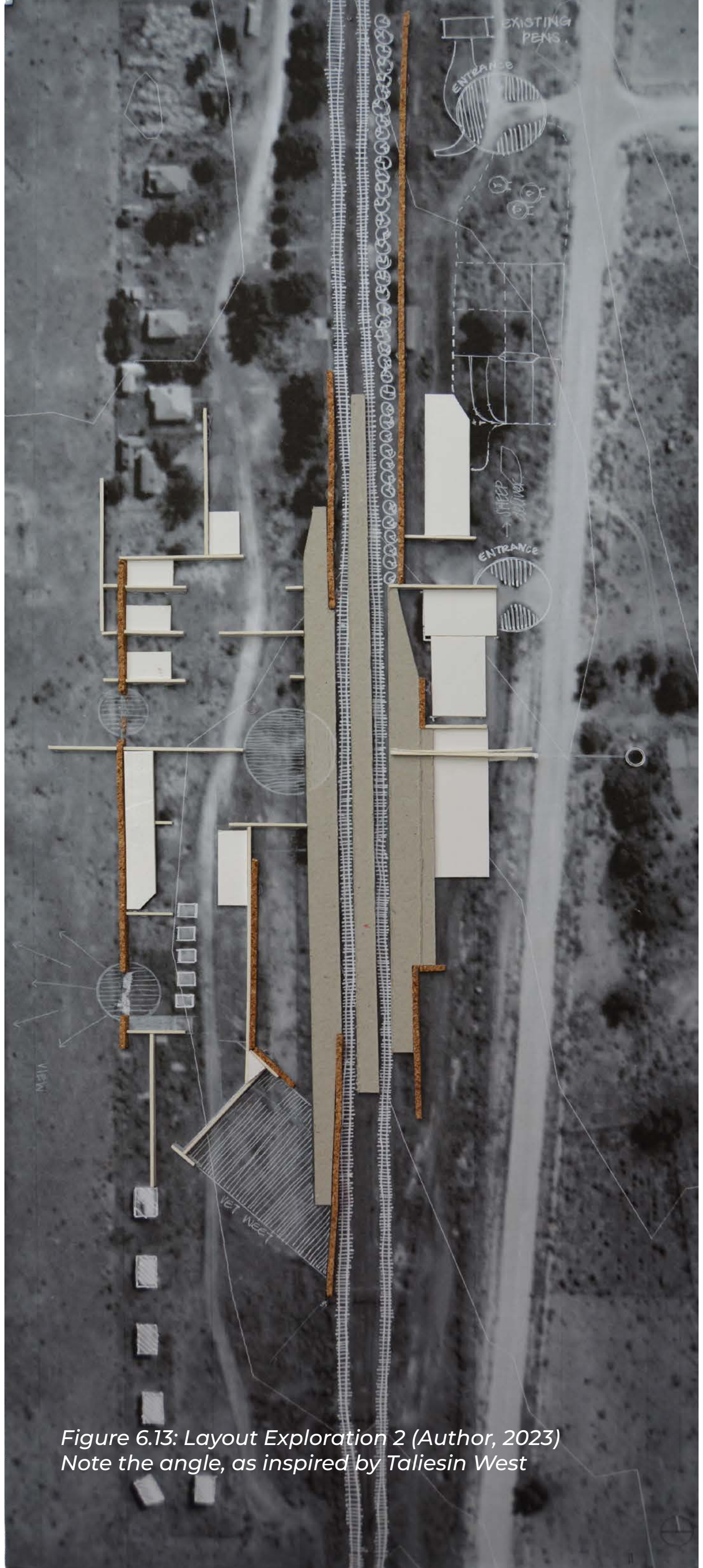


Figure 6.13: Layout Exploration 2 (Author, 2023) Note the angle, as inspired by Taliesin West

Figure 6.14: Layout Exploration 3 (Author, 2023) The plan has started to develop to open up to the landscape

LAYOUT EXPLORATIONS

Figure 6.15: Layout Exploration 4 (Author, 2023)
Note the interaction with the railway

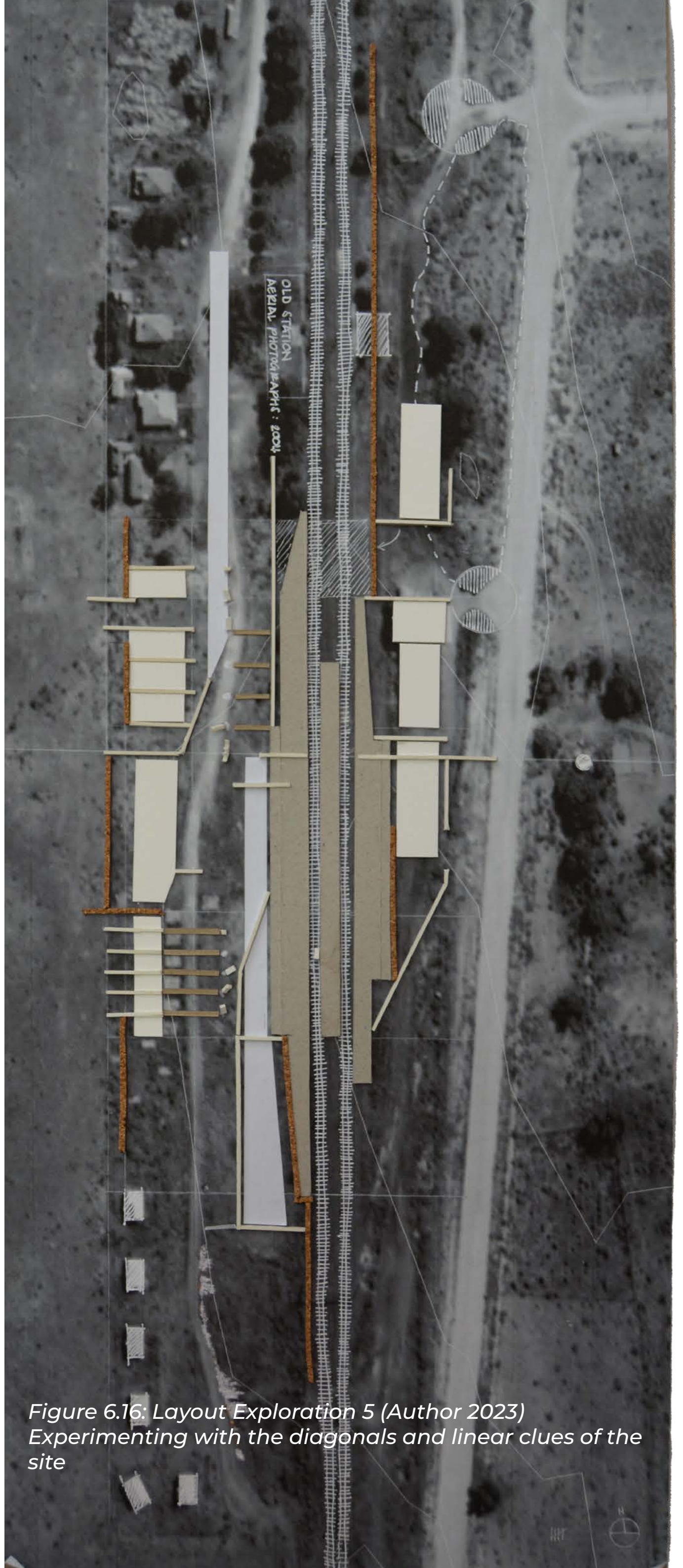


Figure 6.16: Layout Exploration 5 (Author 2023)
Experimenting with the diagonals and linear clues of the site

Figure 6.17: Layout Exploration 6 (Author, 2023)

DEVELOPMENT OF LINEAR LAYOUTS AND PROMENADES

Figure 6.18: (Above) Initial Floor Plan development and massing

The railway line is a definite ordering principle on the site, which complicates things and, in a certain sense, limits the design possibilities. The historic nature of the site, and the “erfs” that were laid out for railway accommodation also contribute to a grid that forms on site. These grids initially formed the basis along which the layout was organised. Yet, at this stage, the massing of the buildings on site still felt fragmented and like objects in the landscape that did not participate in a dialogue with the site and place.

The newly proposed platforms next to the railway lines become dominating features on this site. Here again, the notion of promenades, which were discussed in the theoretical discourse, is established on site. From a poetic point of view, the platforms facilitate horizontal movement and, because of the height difference, vertical movement, as

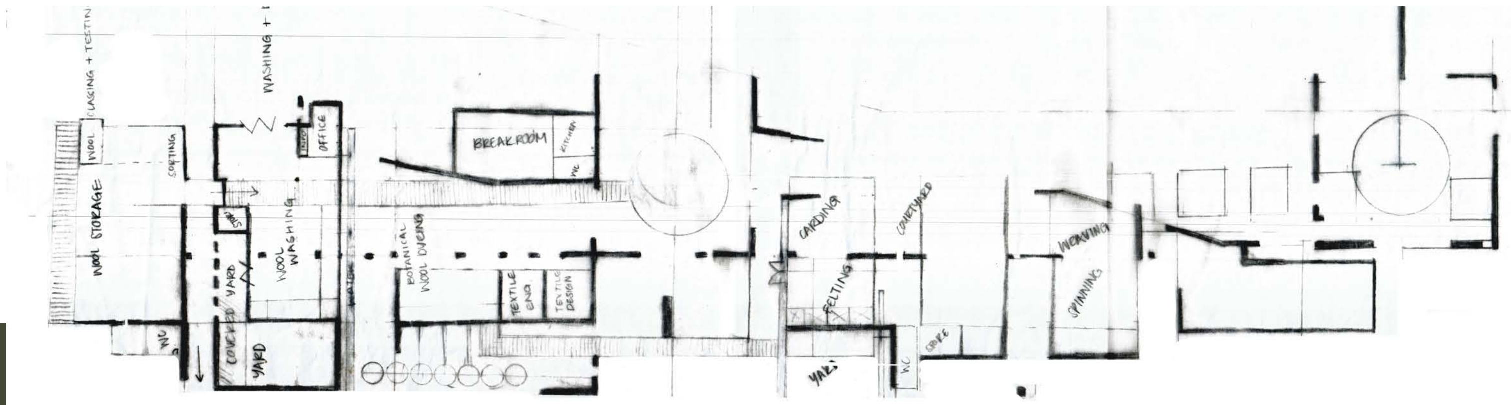


Figure 6.19: (Left) Initial Floor Plan development and massing

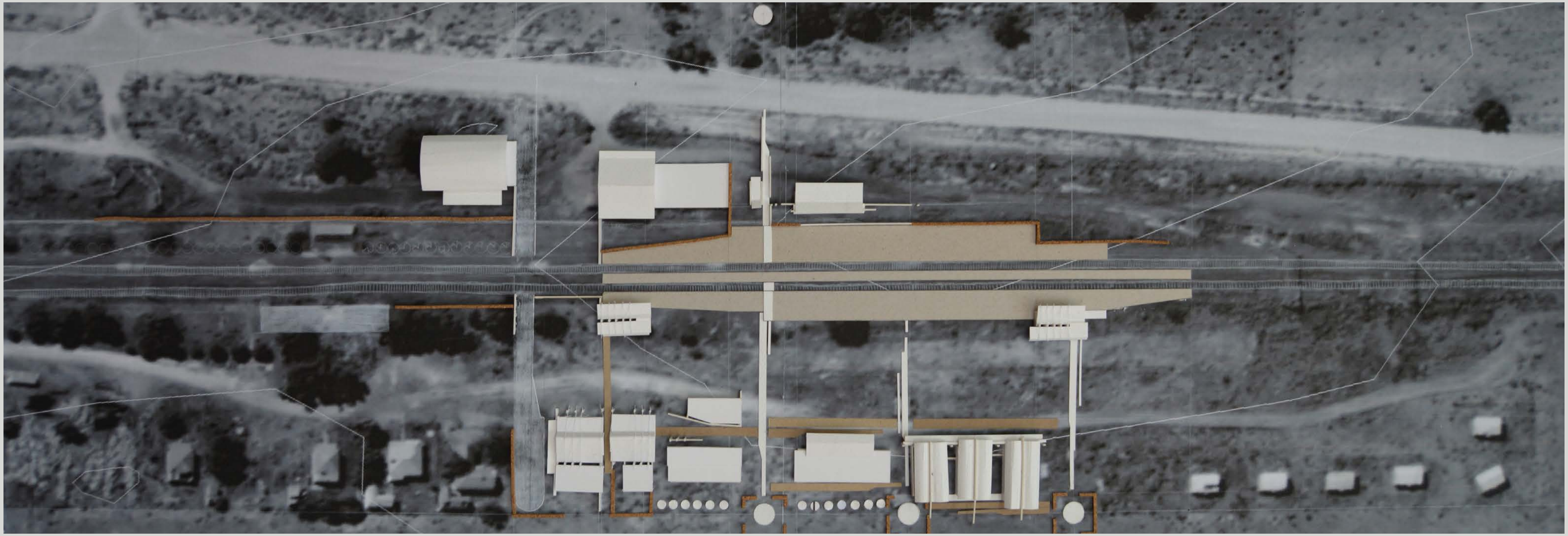
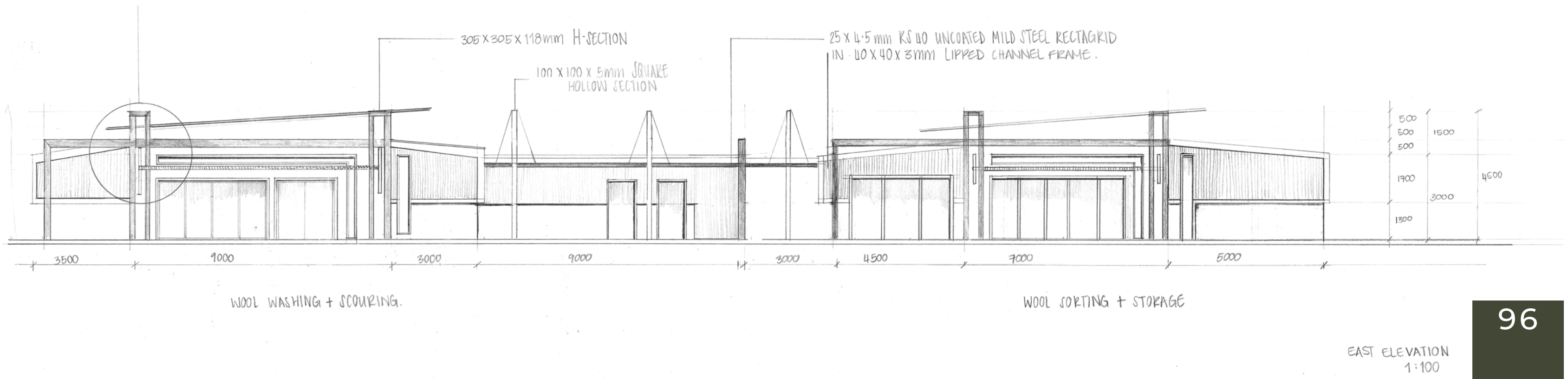


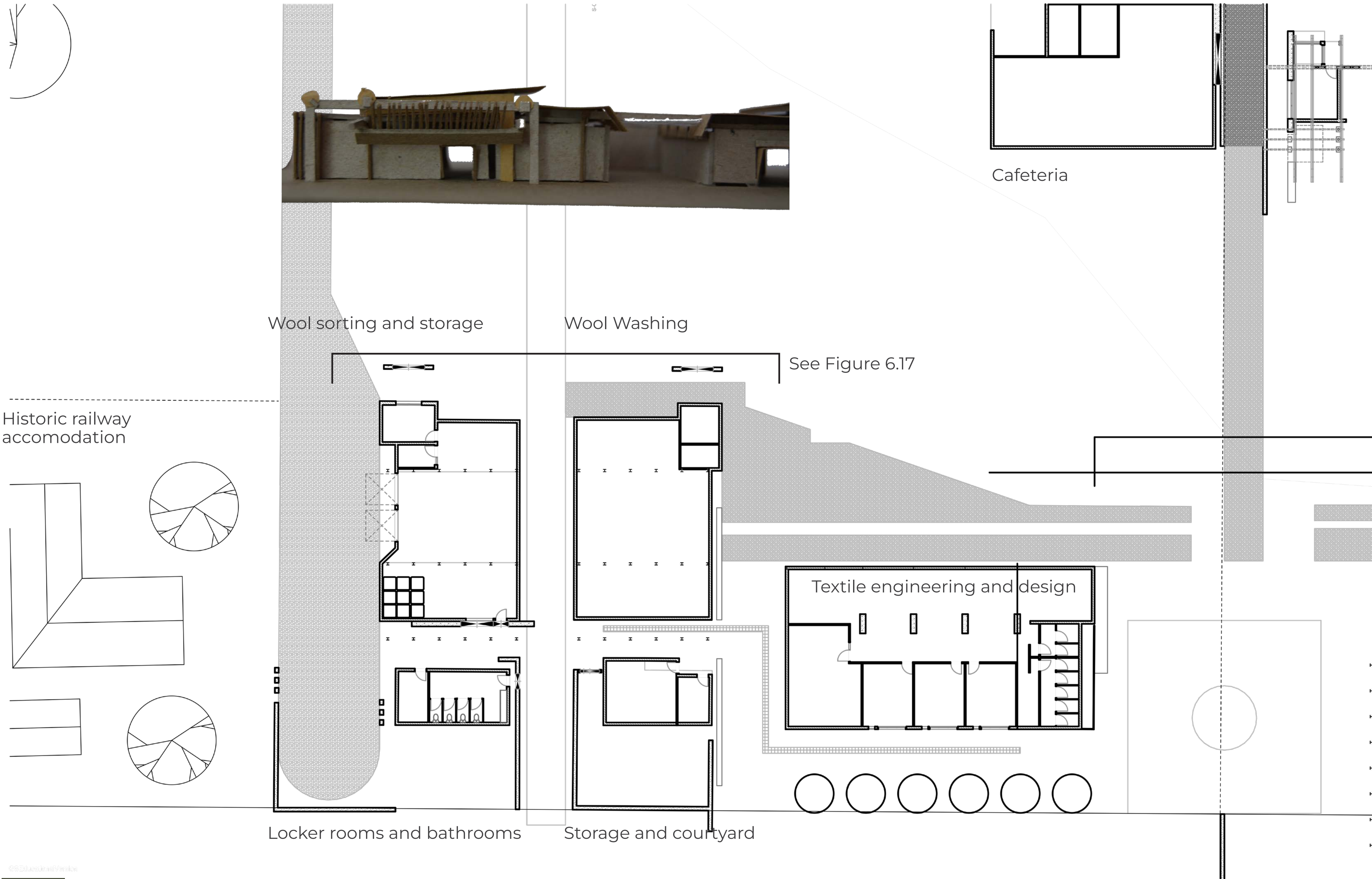
Figure 6.20: Initial Floor Plan and development and massing 2 (Author, 2023)

well as being an in-between space where a visitor or passenger will wait before boarding the next train.

These initial design responses attempted to mimic the journey by train by showing definite start and end points and following the linear journey of the processed wool. It is also important to remember when considering the section in Figure 6.17 that the architecture of the Karoo shows restraint and simplicity. Industrial architecture shares some of these qualities, especially in spatial organisation, though these buildings may be much more complex structurally and regarding detail. The question is, how can these two styles be married?

Figure 6.21: Initial Floor Plan and development and massing 2 (Author, 2023)




Cafeteria
Wool sorting and storage
Wool Washing
See Figure 6.17
Historic railway
accomodation
Textile engineering and design
Locker rooms and bathrooms
Storage and courtyard

PRELIMINARY PLAN 1

The massing in this iteration was placed within the grid created by the boundaries of the erfs, and followed the linear layout of the platforms. However, this floor plan runs the risk of becoming as generic as the railway architecture found in the Karoo at the time, as it does little to interact with the railway and the site. As mentioned previously, the massing also seems fragmented and not coherent with the rest of the plan. The box gutter was introduced as a possible ordering element and attempted to emulate the effect of the railway in the landscape.

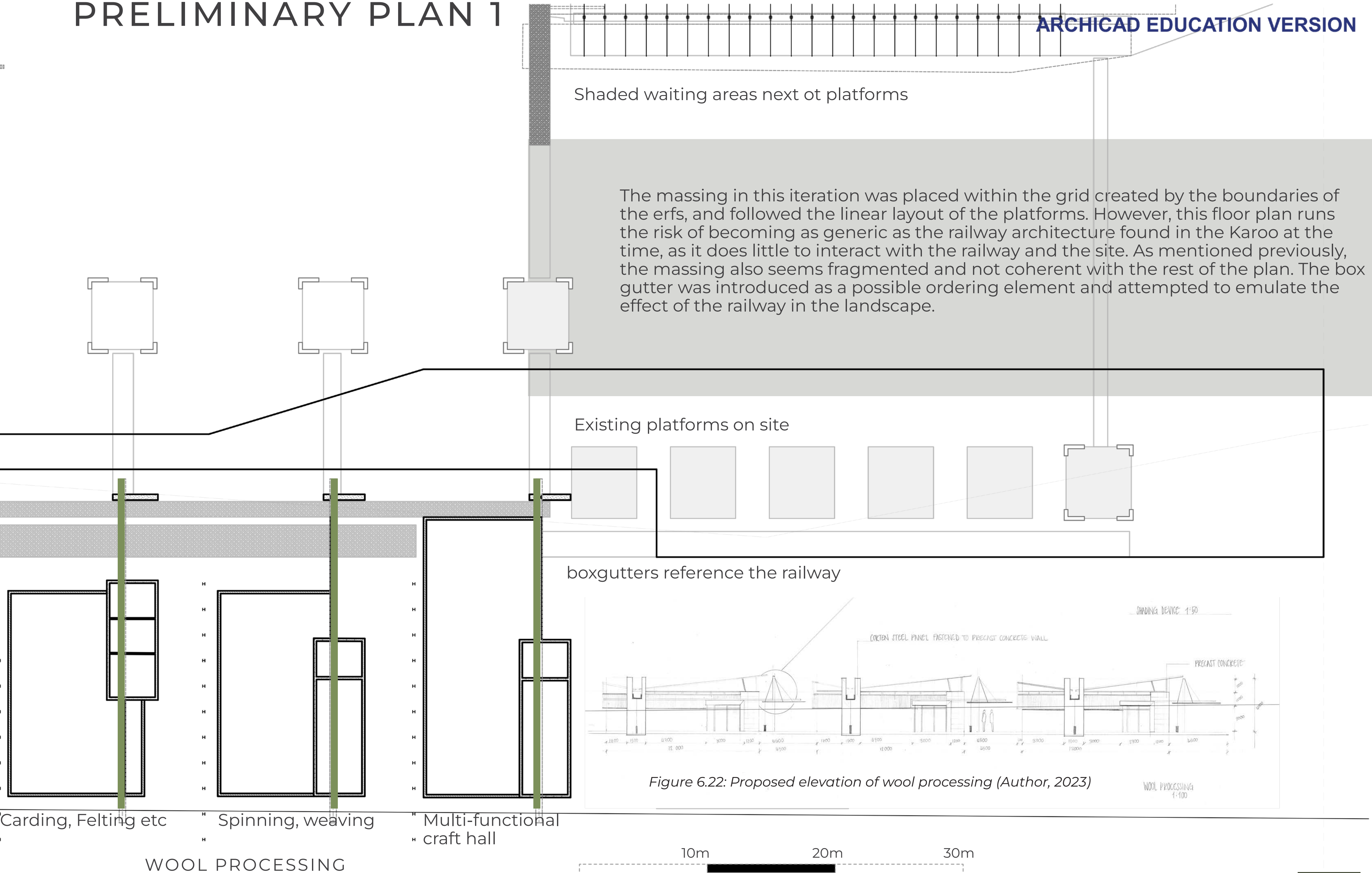
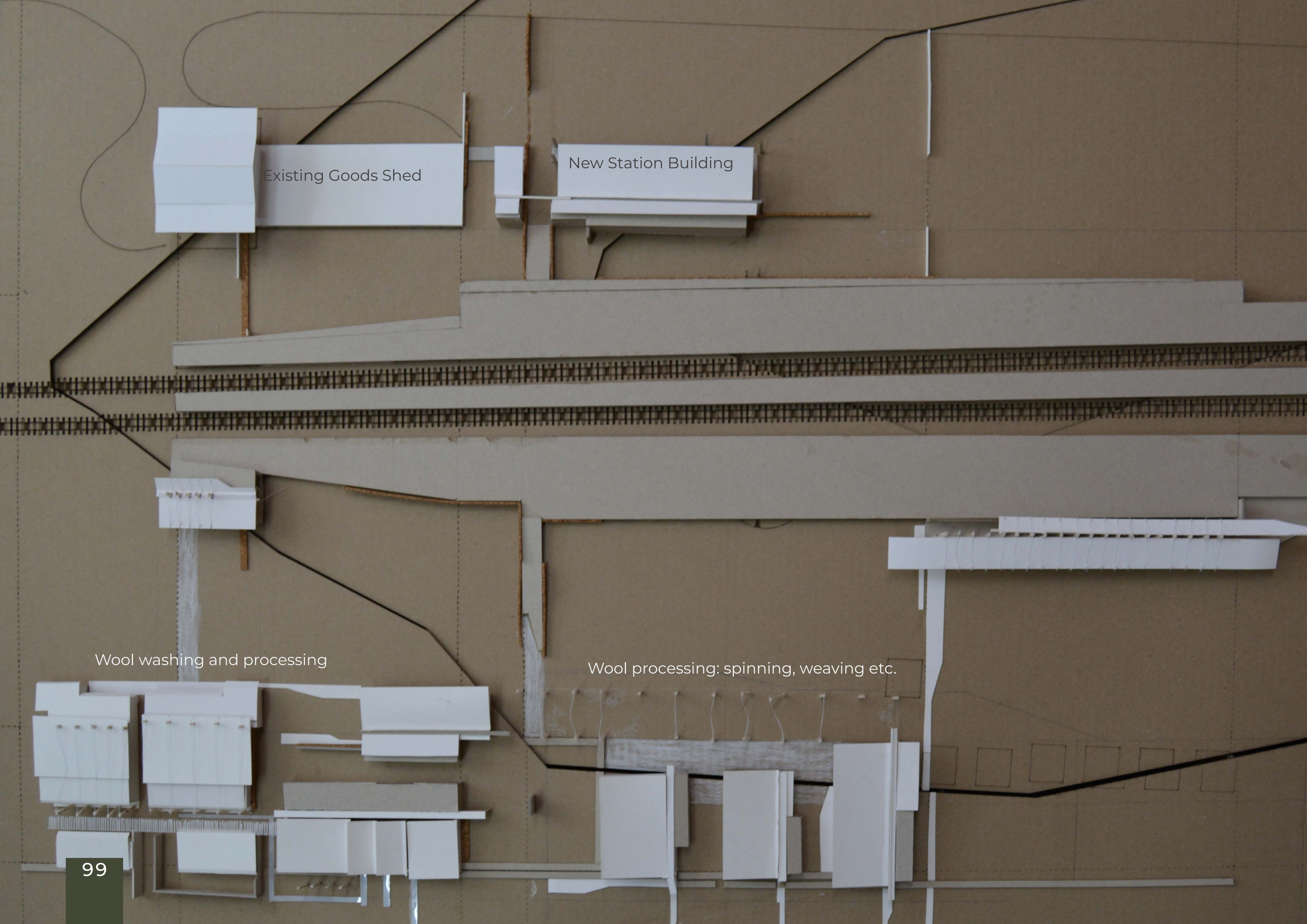
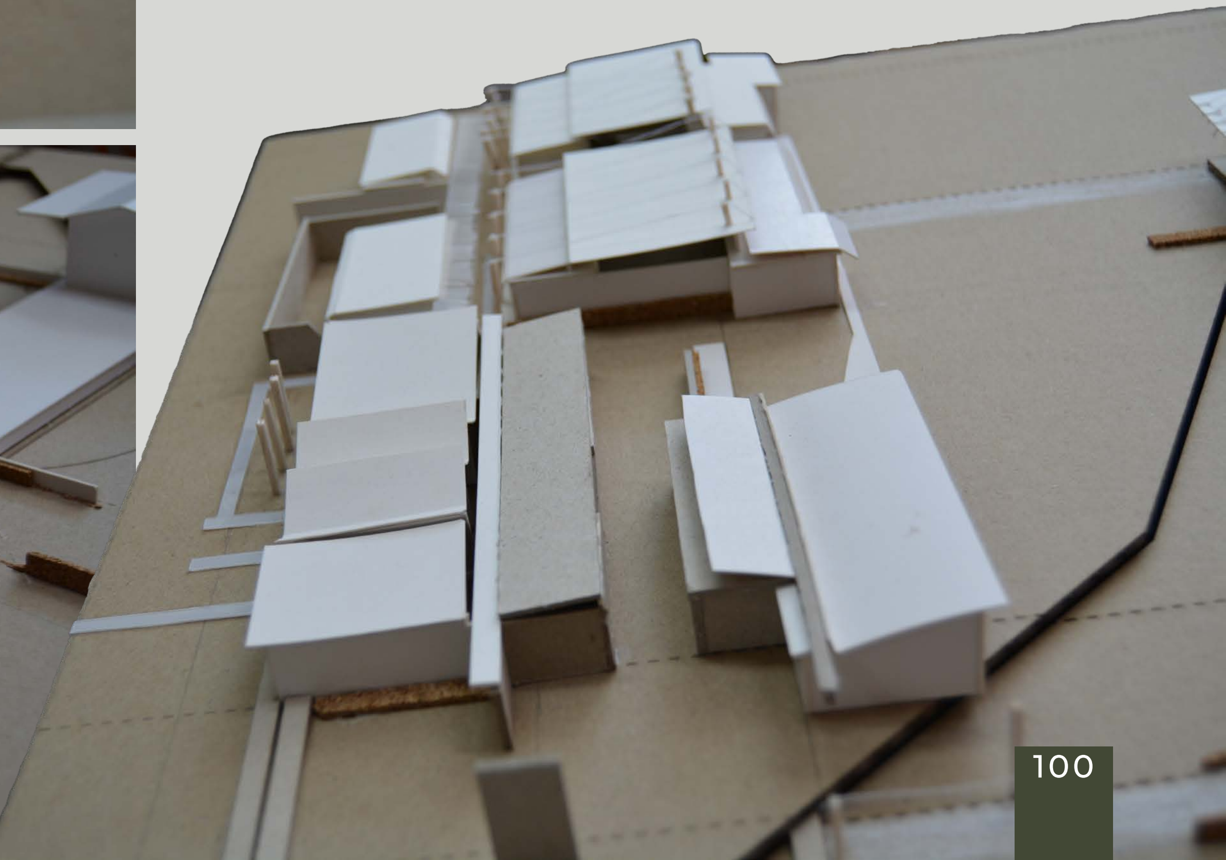


Figure 6.22: Proposed elevation of wool processing (Author, 2023)


Existing Goods Shed
New Station Building
Wool washing and processing
Wool processing: spinning, weaving etc.

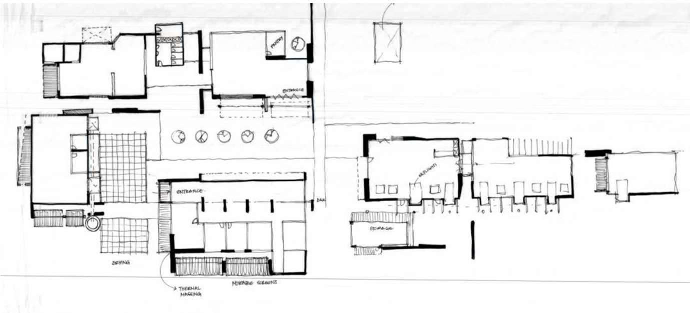

Wool processing: spinning, weaving etc.

Exploration of promenades in the scheme




New Station Building

PRELIMINARY PLAN 2



The architecture of the Karoo lends itself to thick and heavy walls due to the harsh climate. Typical Karoo Architecture is stereotomic and geometric with high ceilings, much like desert architecture. This contrasts with the famous saying by Glenn Murcutt, that Architecture should "touch the earth lightly". However, in the Karoo's case, the architecture sits quietly, perhaps even resolutely.

Rhythm is important in terms of the promenade, which can alter a person's experience of temporality, and it is latent in terms of the railway. Steam-driven locomotives had a very distinct rhythm as the wheels moved. However, today, most trains in South Africa are electrical, which means that the rhythm of the railway is not as prominent anymore. The skylights in the Wool Processing areas are visual clues to rhythm, and is only visible to someone either standing on a platform, or someone who is passing in a train.

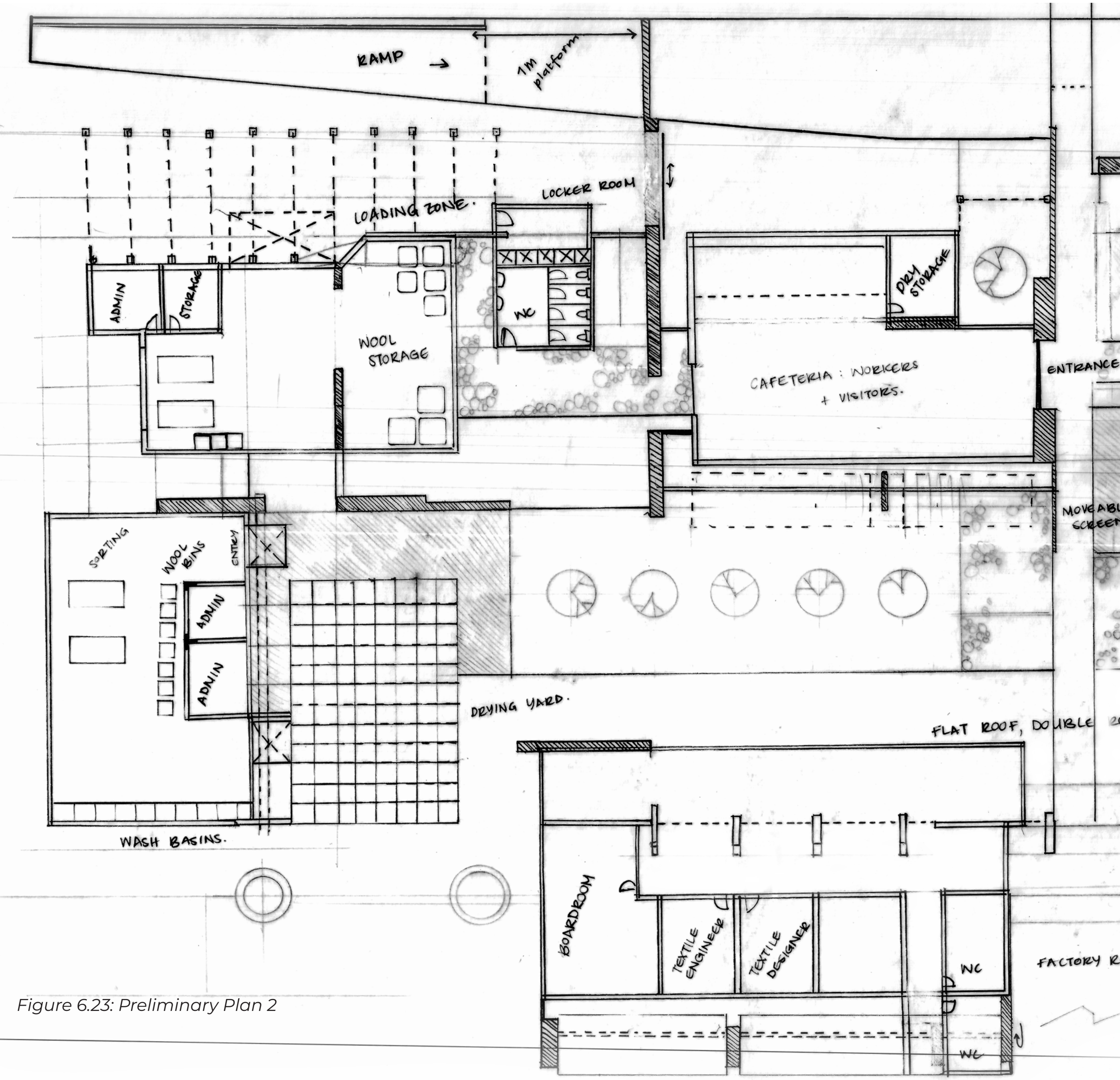


Figure 6.23: Preliminary Plan 2

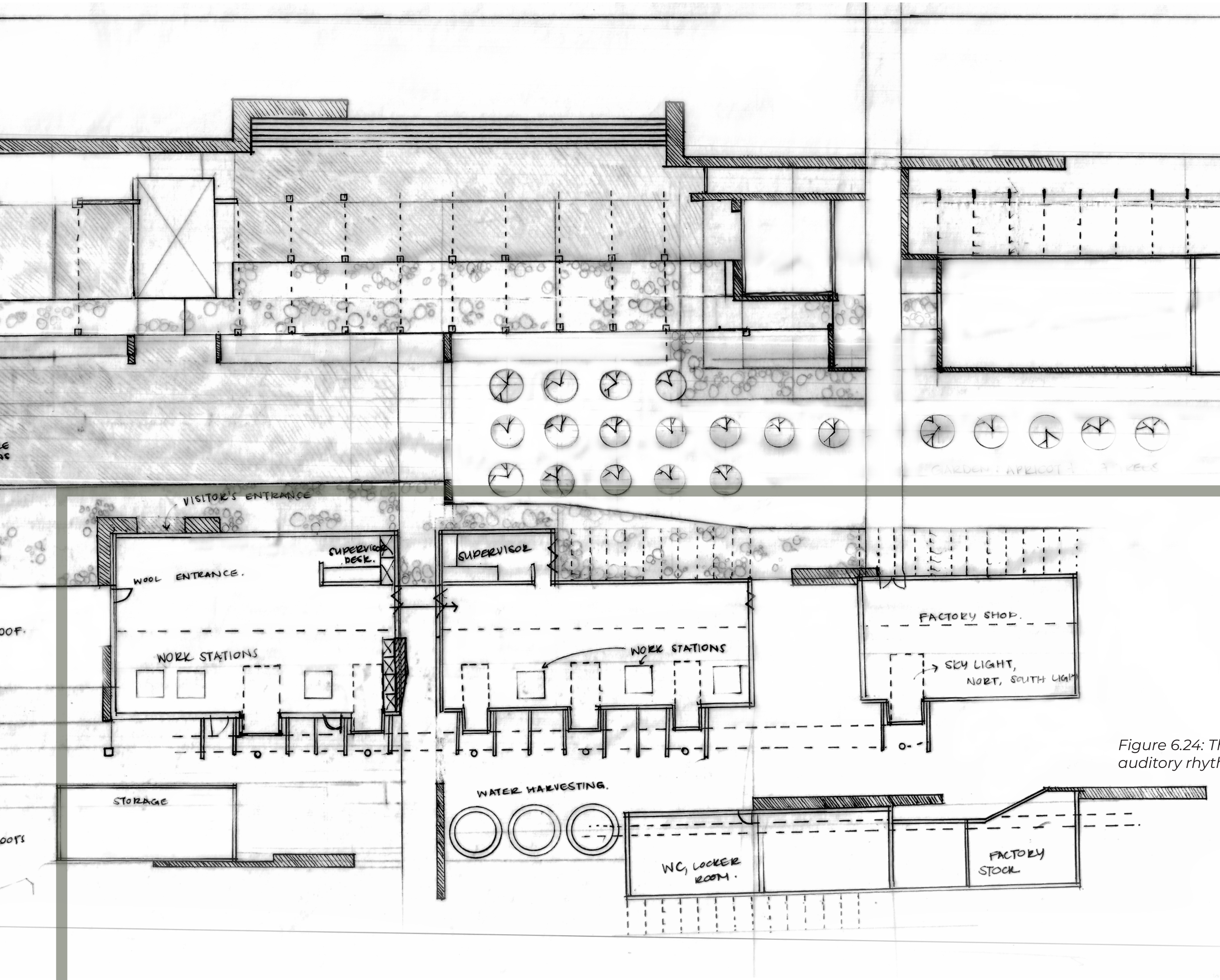
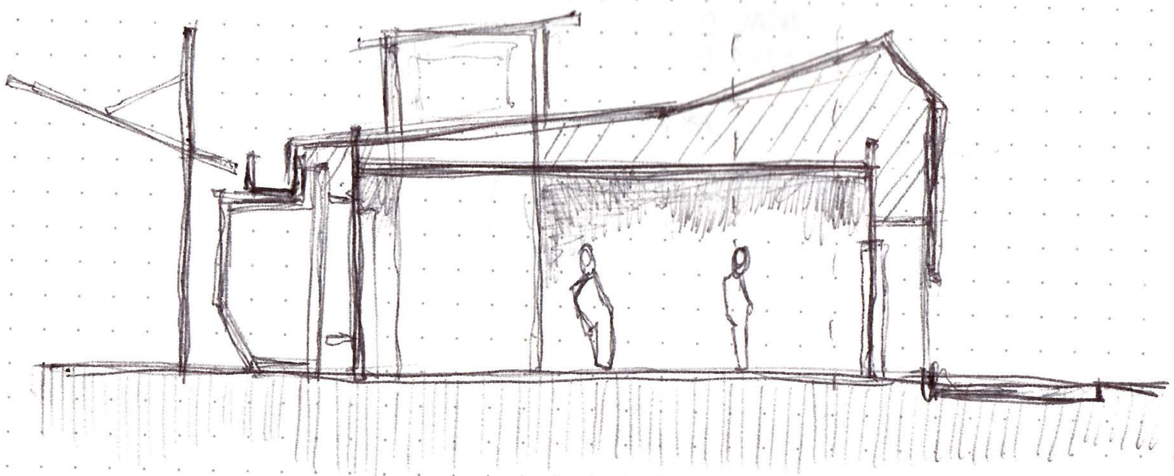
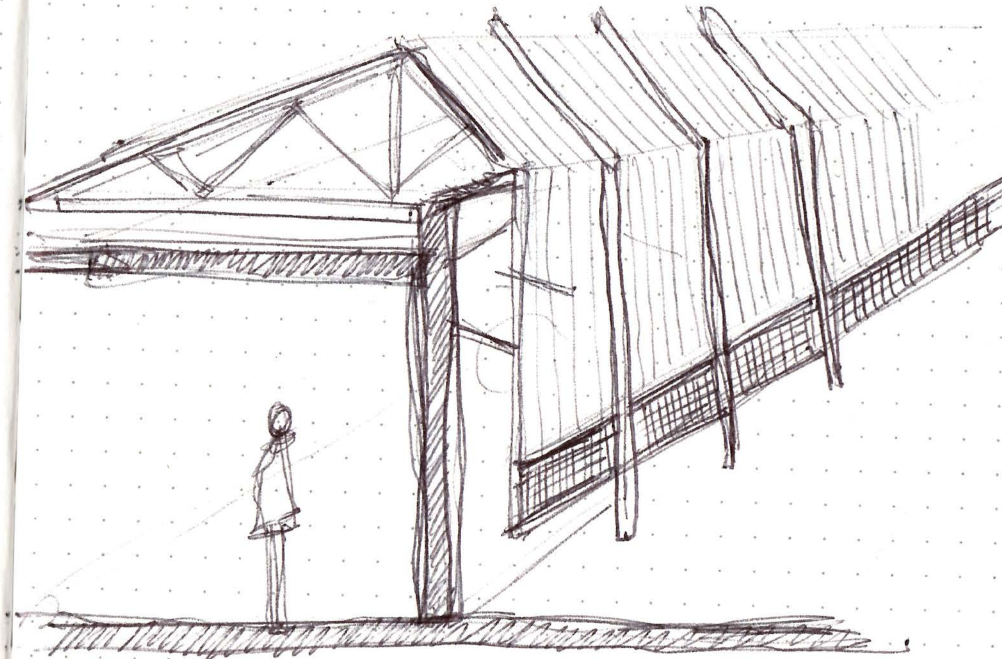
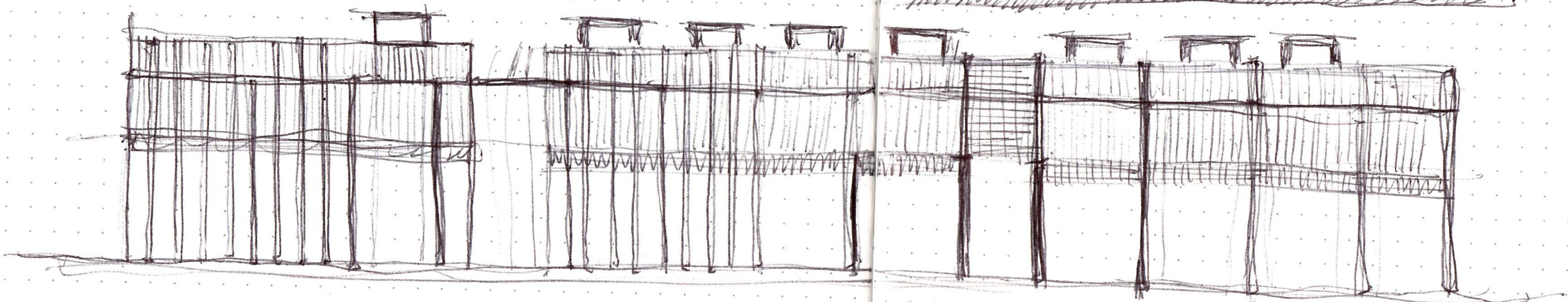


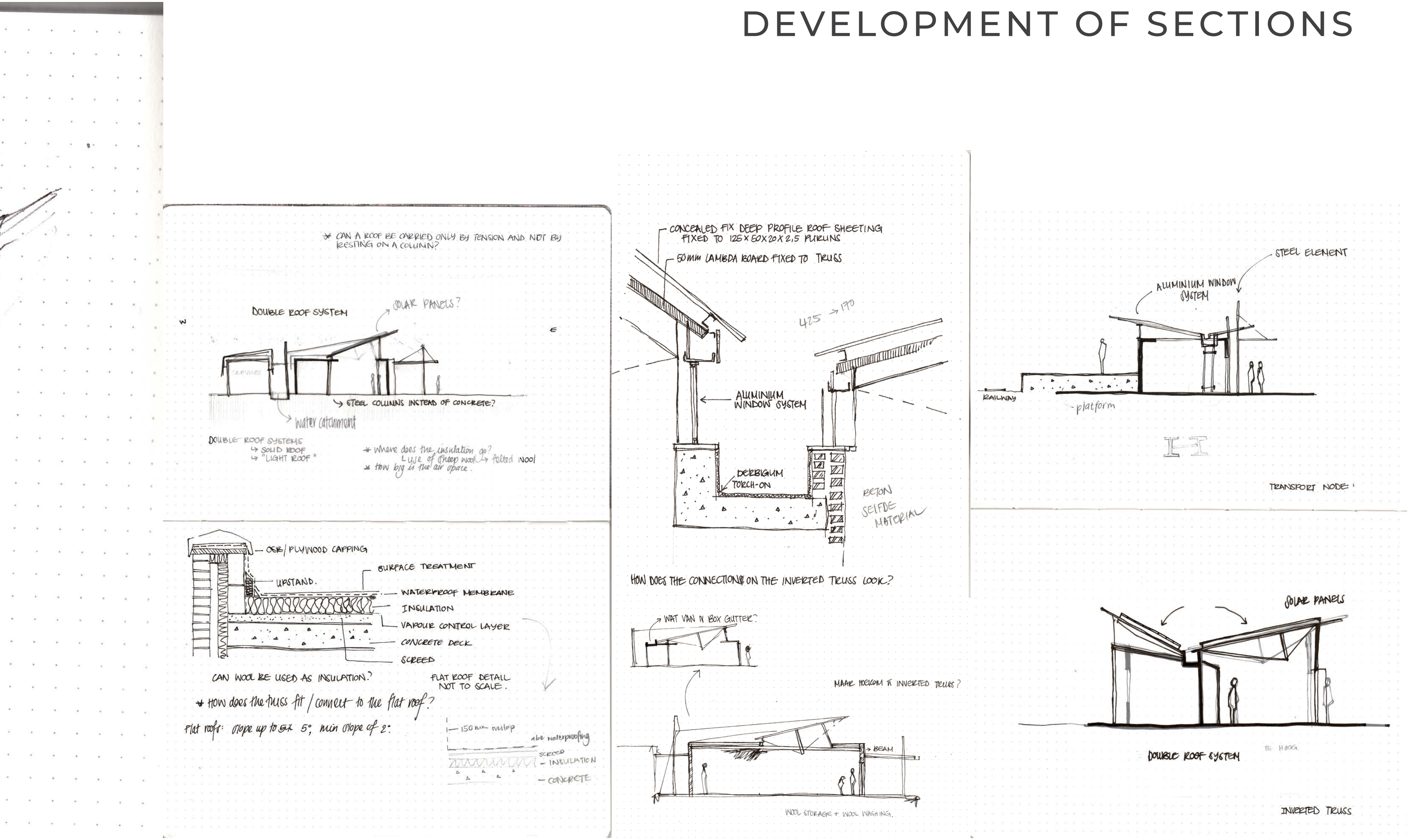
Figure 6.24: The embodiment of auditory rhythm (Author, 2023)

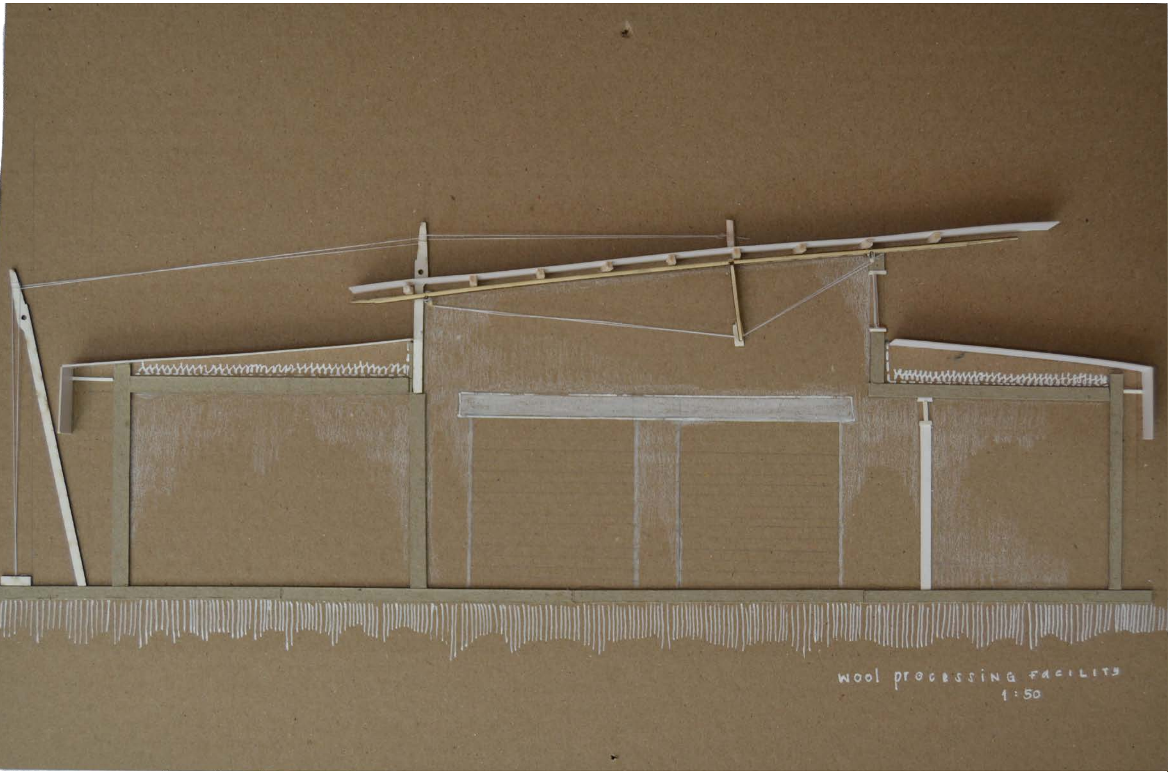


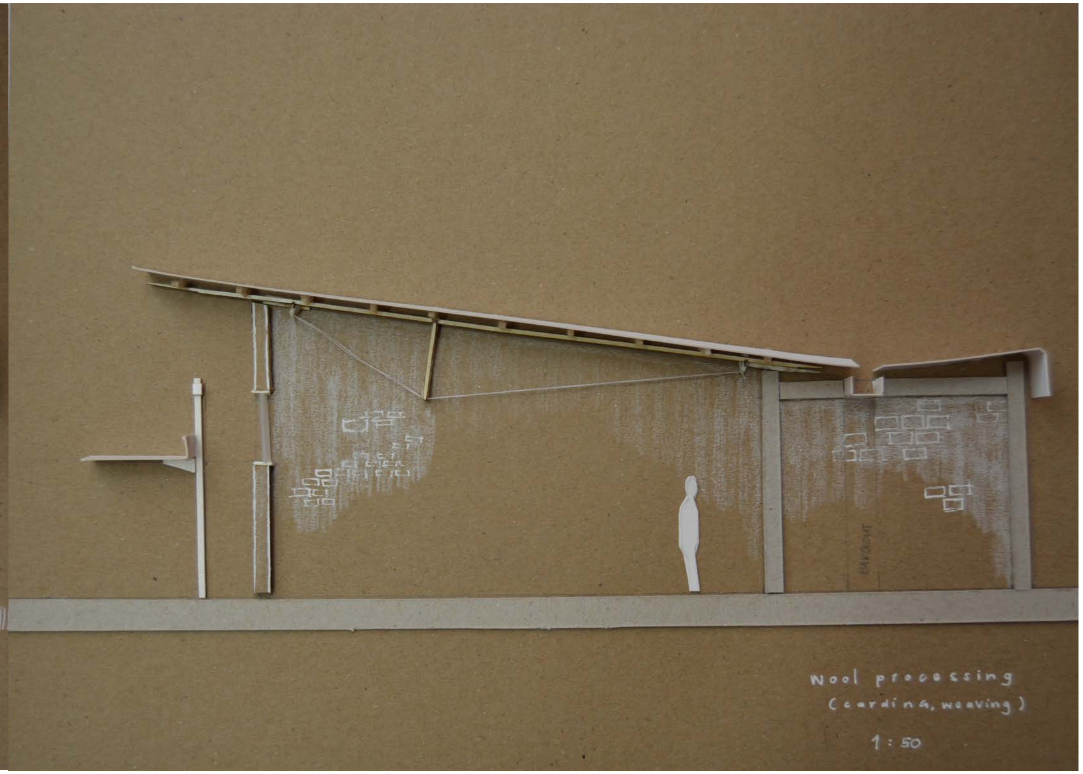




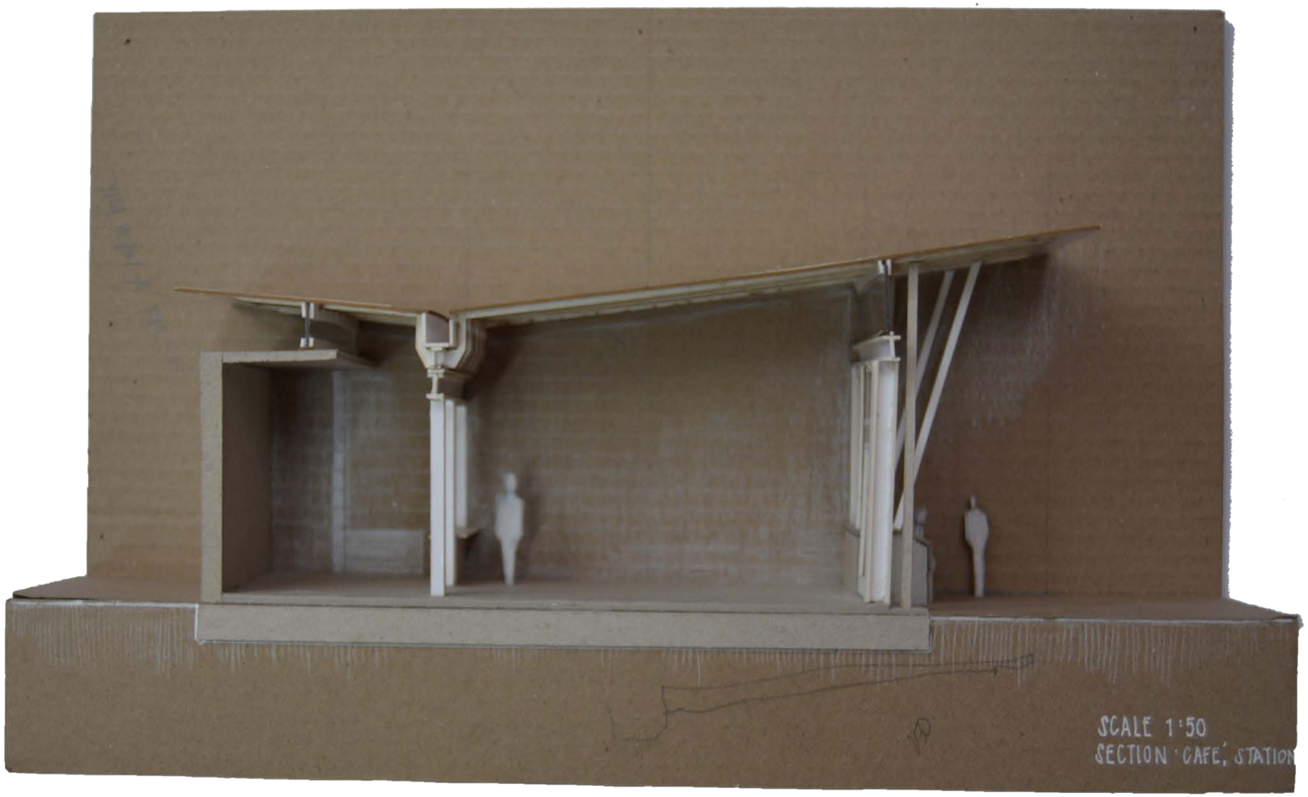
DEVELOPMENT OF SECTIONS




wool processing facility
1:50


Wool processing
(carding, weaving)
1:50


Transport hub
1 : 50


SCALE 1:50
SECTION 'CAFE, STATION

DEEPWATER WOOLSHED

WAGGA WAGGA, 2005, PETER STUTCHBURY ARCHITECTS

The Deepwater Woolshed is in Australia, with a similar climate to South Africa. The accommodation of this woolshed is also identical to the proposed wool processing facility at Houtkraal station. This shearing shed responds to its harsh environment with spatial moves such as orientation, form-giving and materiality. The building emphasises the shearers' working conditions and the sheep's comfort using the efficient planning and layout of the shed.

BUILDING PROGRAM

The Deepwater shearing shed implements two important innovations; firstly, holding pens are underneath the building. This means that there is more space on the shearing floor and that the building is cooled as the wind passes under the building. Furthermore, this keeps the sheep dry, as wet sheep cannot be shorn. Another innovation implemented in the Deepwater woolshed is the raised shearing platforms. This makes it easier for the roustabout (handler) to move the shorn fleece from the shearing platform to the skirting table (Nicholson, n.d.: online).

Strip skylights provide natural lighting, the southern walls are used for natural lighting, and light-diffusing materials are utilised on the northern walls to avoid glare from the direct sunlight on the shorn wool. Translucent sheeting can be used instead of the strip skylights, but unfortunately, it can raise the shed's interior temperature.

This building remains industrial, with moveable elements, like the windows, contributing to cross ventilation to contend with high temperatures. Some of the climatic strategies in use include large overhangs of a portal frame roof, which provides shade to the walls and a covered area for the sheep, and an irrigation system which sprays water onto the roof. Furthermore, mesh screens have been hung to the southwest, which creates a wind barrier. Water also cascades through these suspended surfaces, simultaneously utilising the breeze and evaporative cooling, further cooling down the building. Another practical attribute of this building is the flooring. The floors are slatted planks and spaced close enough to each other to prevent sheep from getting stuck but far apart enough for dung and urine to fall through the floor to the underside of the building, where it can be cleaned and used again as manure. The shed is constructed from lightweight steel and ventilated throughout (McKay, 2016: online).

DESIGN INSIGHTS

The building's program, including the design of the catch pens, can influence the design development of the proposed shearing shed at Houtkraal Station. The catch pens and holding pens are designed so that the sheep's handling and movement are effectively and easily done. About 1.5m x 1.5m is allowed for each shearer.

Figure 6.25: holding pens outside the wool shed (Google Maps, 2023: online, adapted by author)

Figure 6.26: Woolshed elevation with large eaves (McKay, 2016: online)

The focus of the design development in the Deepwater Woolshed is how the function of the building translates aesthetically. According to Peter Stutchbury, the architect, “the functional decisions were providing the aesthetic qualities” (Stutchbury, 2015). The functional decisions were also made with the environment and climate in mind. For example, the shearer’s amenities were placed in the Northeastern corner of the building, which provides morning sun but not necessarily the western sun, which can be uncomfortably hot. The big eaves, 5m in size, act as a designed feature and provide shade.

The Deepwater Woolshed is designed with the users, the sheep, and the landscape in mind. The functional, industrial building is placed in the landscape with understanding and respect for the climate. This means that the building negotiates and balances the challenges of place and function.

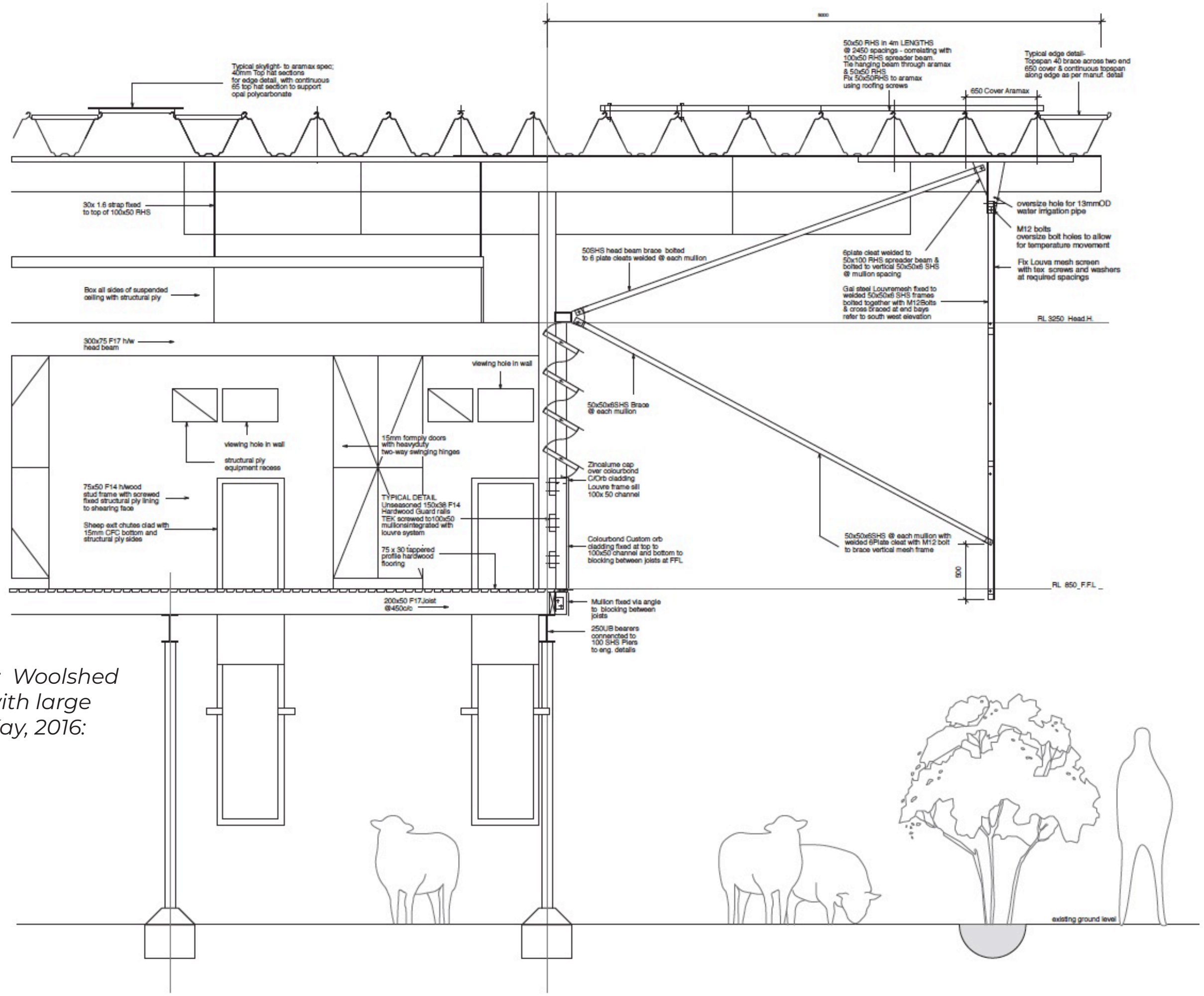


Figure 6.28: Woolshed elevation with large eaves (McKay, 2016: online)

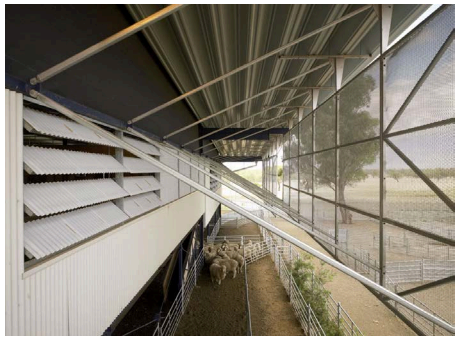


Figure 6.27: Woolshed elevation with large eaves (McKay, 2016: online)

Figure 6.29: Woolshed elevation with large eaves (McKay, 2016: online)

Figure 6.30: Woolshed elevation with large eaves (McKay, 2016: online)

PROGRAM: SHEEP SHEARING

There are valuable insights to be gained from the Deepwater Woolshed regarding the programme and developing and designing such a building for the comfort of the sheep and the shearers alike. When the shearing shed's space is planned and utilised well, the process of sheep shearing and wool handling becomes more effective and requires less labour.

It is important to remember the following practical design features, like the different spatial requirements of holding-, catching-, and filling pens, as well as circulation and movement when designing a shearing shed. Grating is also used in the pen areas of the shed to allow sheep droppings to pass through and to keep the sheep as clean as possible.

Sheep should have plenty of room to enter and exit the shed. In cases where the shearing board is raised, the maximum gradient for a ramp is 1 in 3 (NSW Government, 2023: online). The movement of the sheep is made easier through the use of filling-, catching-, and holding pens in the veld, under covered shelter and in the shed itself. Another important design feature in the shearing shed is the grating used in the different pens in the shed. The grating is used to keep the sheep as clean as possible during the shearing time by allowing sheep droppings to fall through the gaps. In a shed where the pens are close to the ground, the grating is placed on a moveable frame to allow cleaning underneath the frame. Timber battens of 50 mm x 40 mm are often used in grating.

The shearing shed should be a comfortable space for workers and sheep alike to ensure efficiency. For this reason, the workers should have breakaway spaces and amenities.

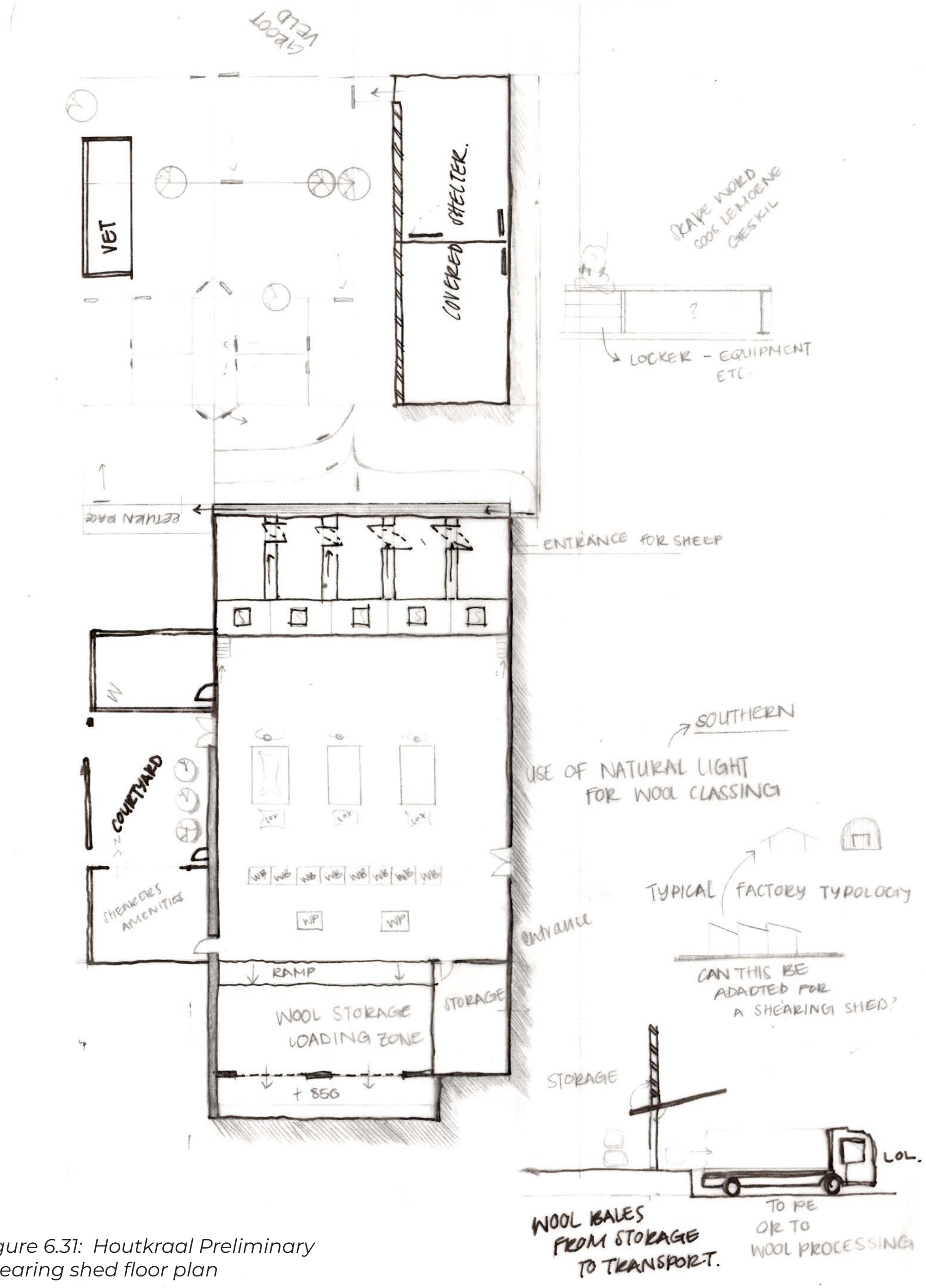


Figure 6.31: Houtkraal Preliminary Shearing shed floor plan

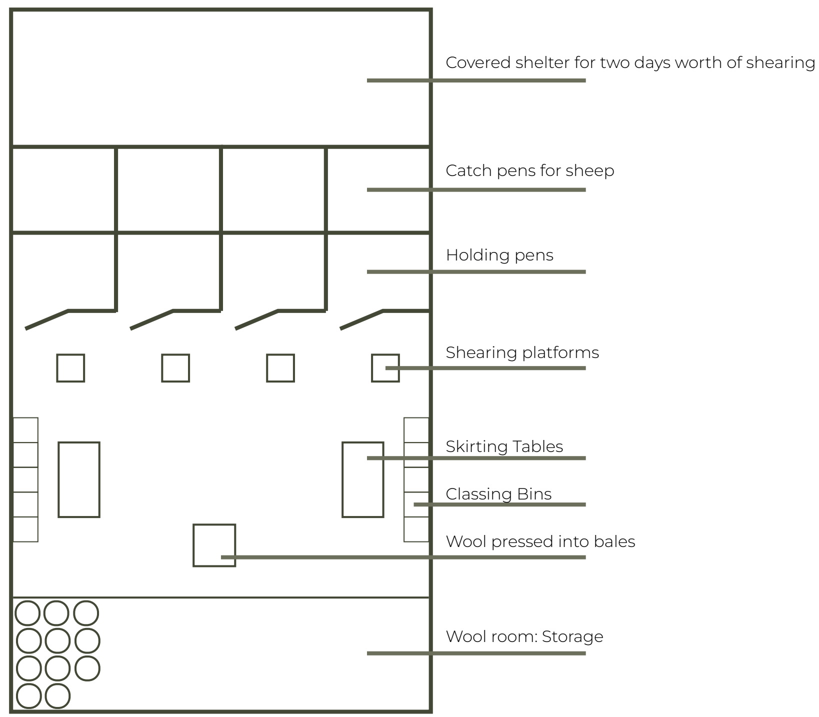
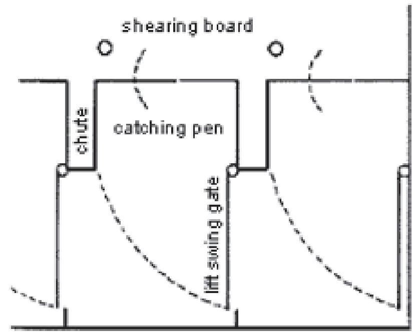
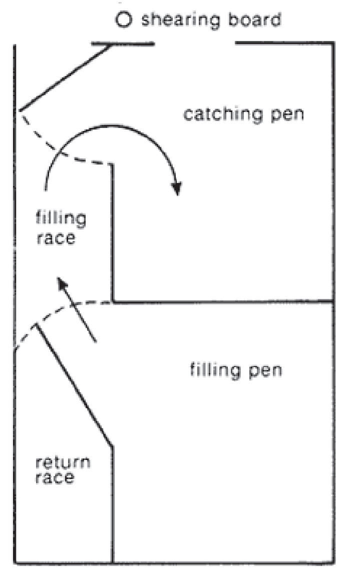


Figure 6.32: Houtkraal Preliminary Shearing shed floor plan (Author, 2023)

Figure 6.33: (Right) Use of a return race catching and filling pen (NSW Government, 2023: online)

Figure 6.34: (Below) Houtkraal Preliminary Shearing shed catching pens and shearing boards ((NSW Government, 2023: online)





GLENBURN HOUSE

Sean Godsell, 2008, Yarra Valley

This building is a residential home. The plan is simple and is described as a "tectonic thumbprint for living" (Godsell, 2008: online). The layout is simple, and different spaces are placed in a linear layout. The building is embedded in a landscape on the hilltop to shield the building from the weather conditions and the harsh western sun.

The building, though it seems simple, responds to the climate, by means of passive environmental management. The building has a double glazing and roofing system which regulates the interior temperature, coupled with rainwater harvesting. The building's outer envelope, or skin, includes solar panels for electricity and hot water. This building has a range of interesting inside-outside spaces, which invite the environment into the living spaces.

Patinas were previously highlighted as an important part of the design development, and for this very reason, the materiality of the outer shell of the building becomes a valuable reference in the design development. The outer shell is constructed of a rectagrid-like weathering steel structure with moveable elements. The interior of the building also consists mainly of weathering steel and timber, with wooden floors. Light and different light qualities can also be considered as a material in this case. The bright light is filtered into the building and reflects on the weathering steel when the moveable screens are down. A completely different effect is created when the the light is not filtered.

Figure 6.35: (Godsell, 2008: Online)

Figure 6.36: (Godsell, 2008: Online)

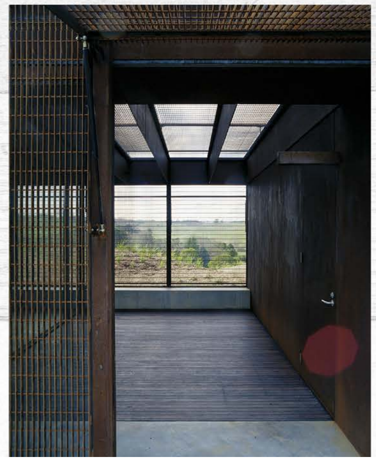
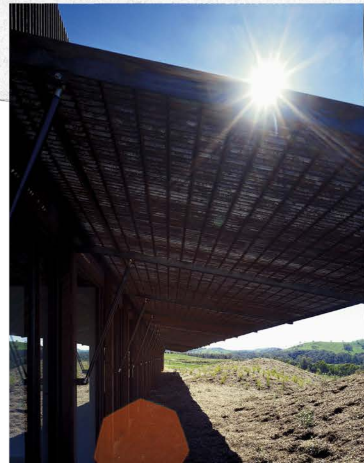


Figure 6.37: (Godsell, 2008: Online)

Figure 6.38: (Godsell, 2008: Online)

Figure 6.39: (Godsell, 2008: Online)



The simple material palette complements the simple layouts, but the nuances of the weathering steel's discolouration make a significant difference in the feel of the building: the weathering steel on the interior and the exterior emphasizes the merged inside-outside spaces. What weathers on the exterior, weathers on the interior as well. These inside-outside spaces provide the viewer with framed views of the landscape and make it a part of the building. The way that the landscape is treated correlates with the aims and intentions set out by the Design Touchstone.

The moveable elements have an industrial nature, which can be explored further in the design development as well. Since rectagrid is quite heavy, the focus should be on how these screens and double roofs are connected to the structure.

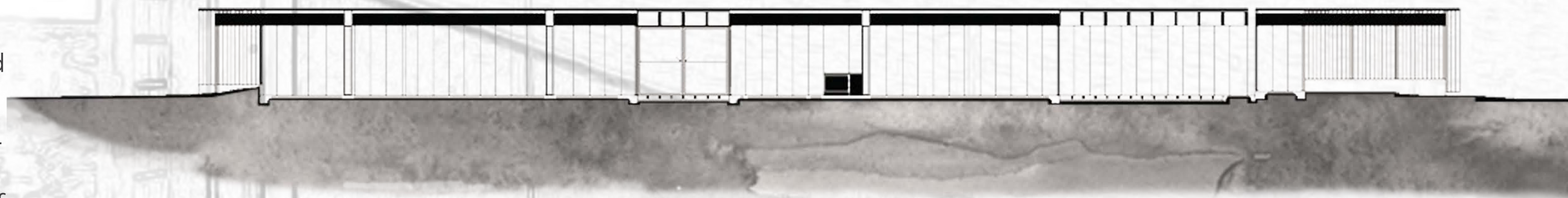


Figure 6.41: Longitudinal section (Godsell, 2008: Online, adapted by author)

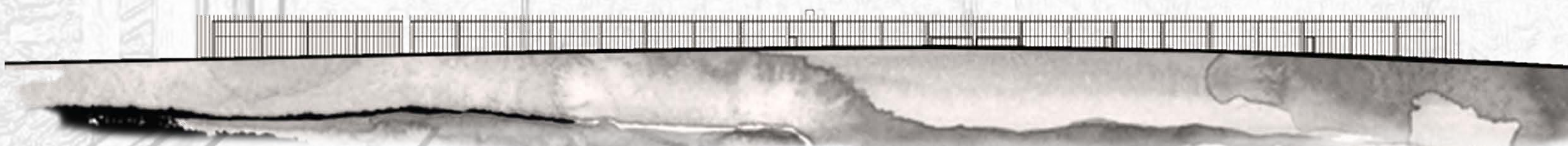


Figure 6.42: Elevation (Godsell, 2008: Online, adapted by author)

Figure 6.40: (Godsell, 2008: Online)

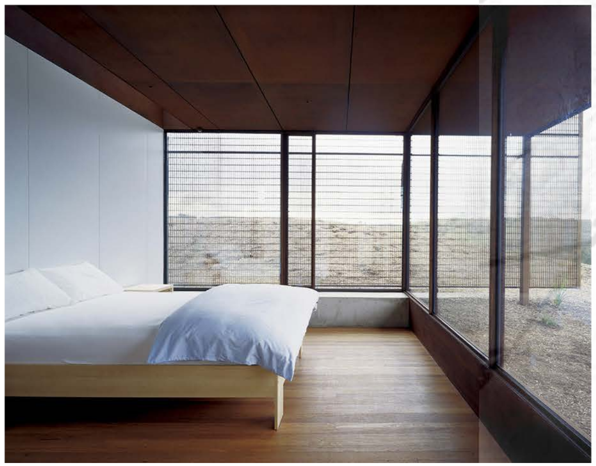
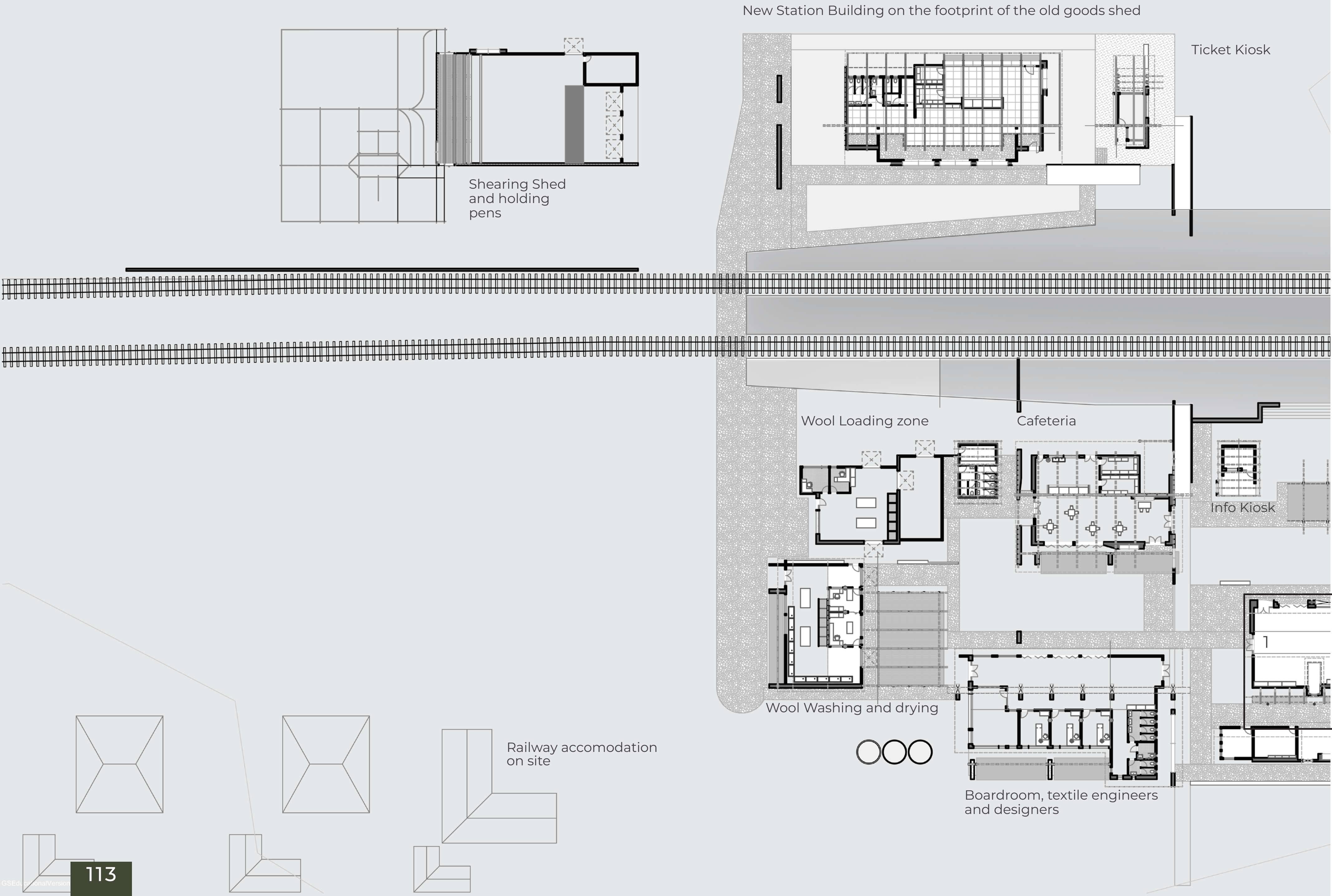
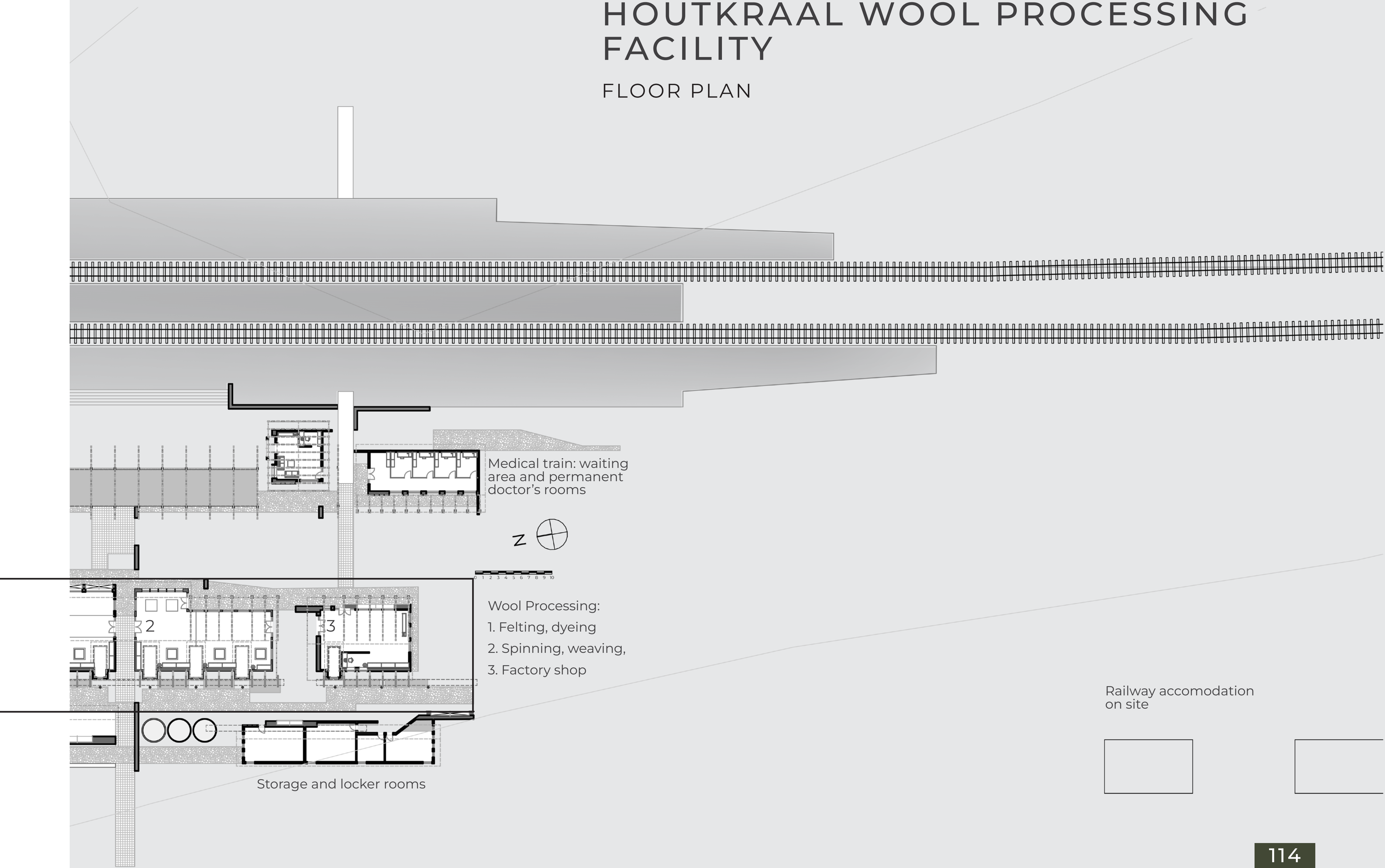


Figure 6.43: Floor Plan (Godsell, 2008: Online, adapted by author)


New Station Building on the footprint of the old goods shed
Ticket Kiosk
Shearing Shed and holding pens
Wool Loading zone
Cafeteria
Info Kiosk
Wool Washing and drying
Railway accomodation on site
Boardroom, textile engineers and designers

HOUTKRAAL WOOL PROCESSING FACILITY

FLOOR PLAN



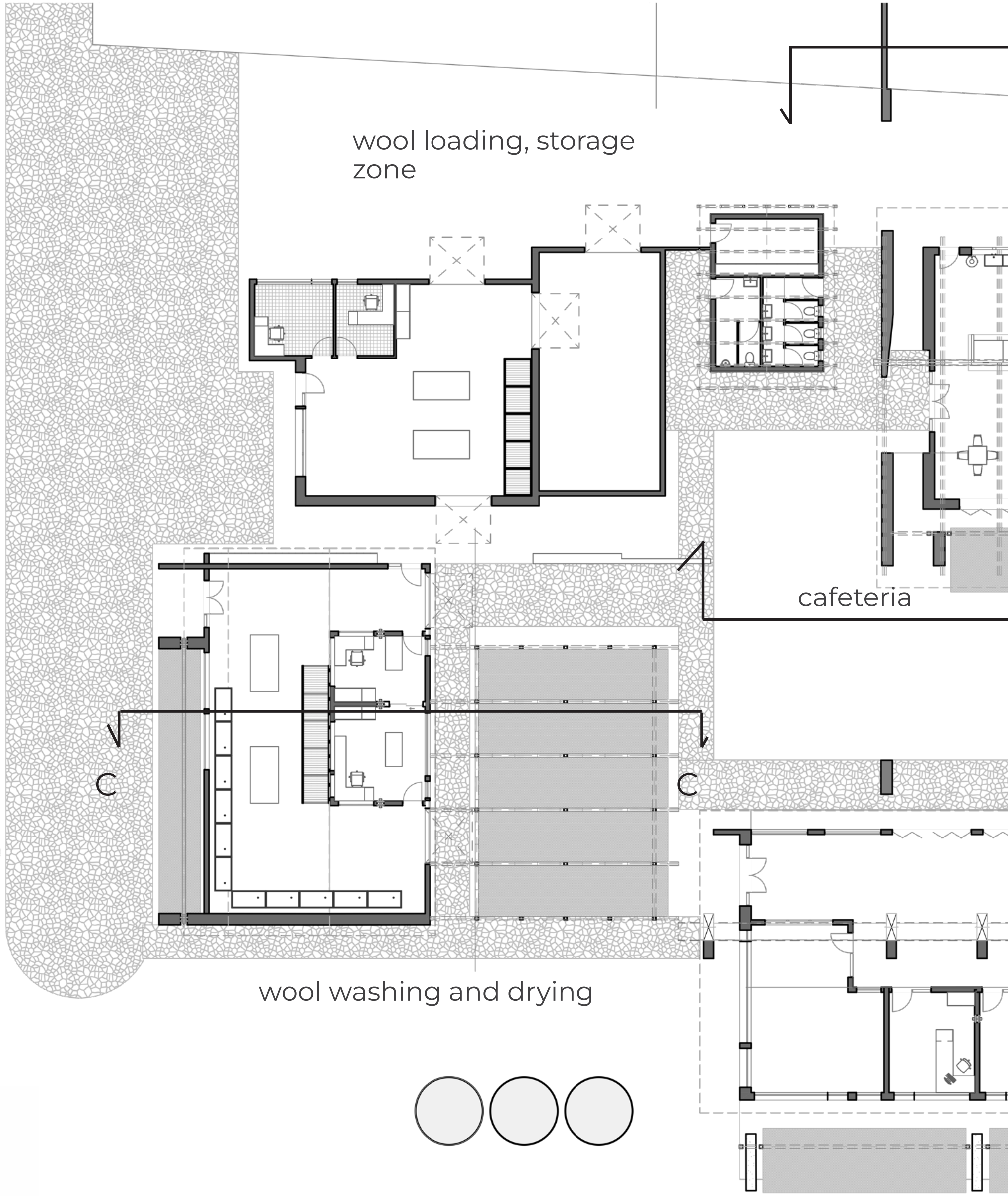
HOUTKRAAL WOOL PROCESSING FACILITY

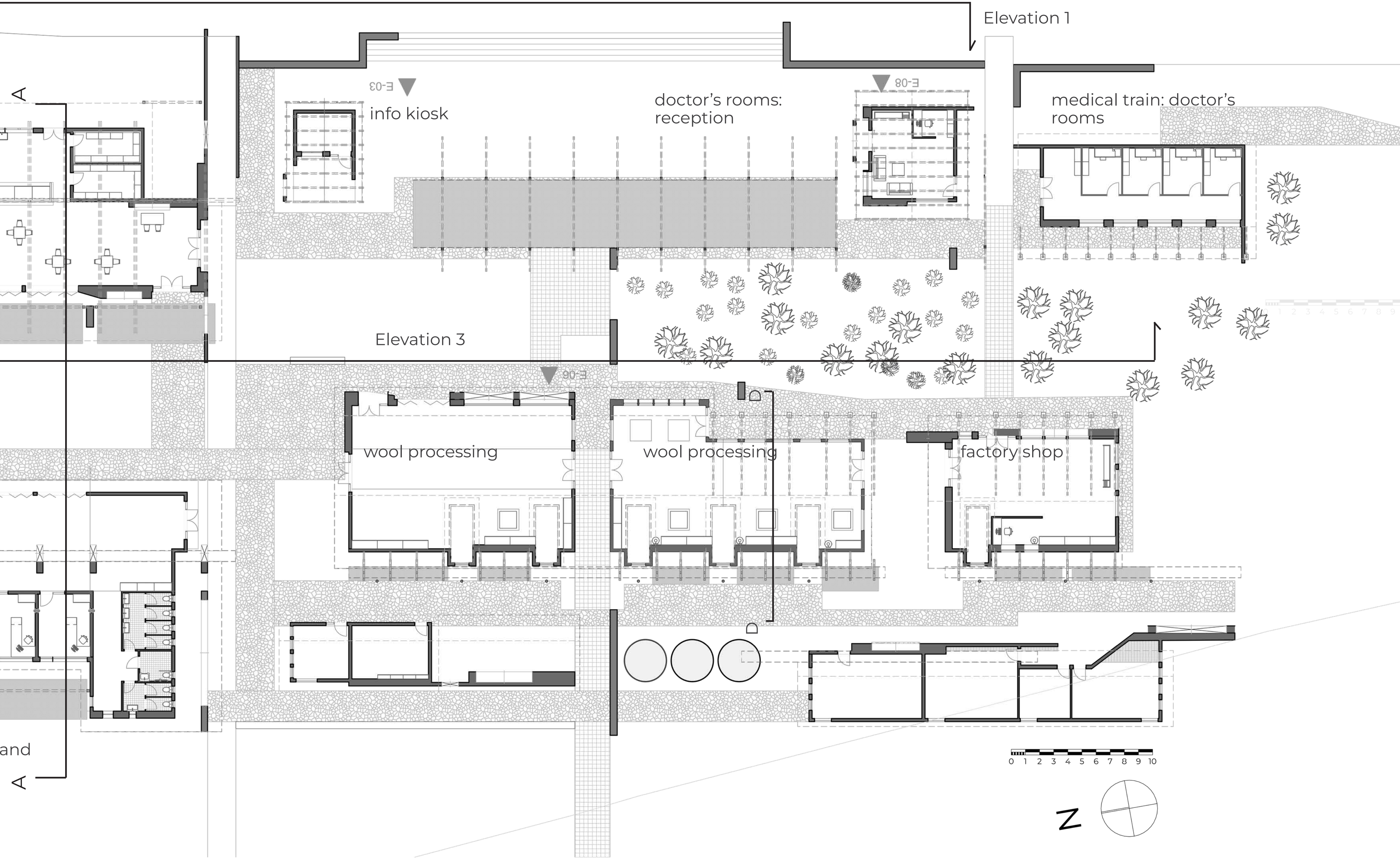
FLOOR PLAN

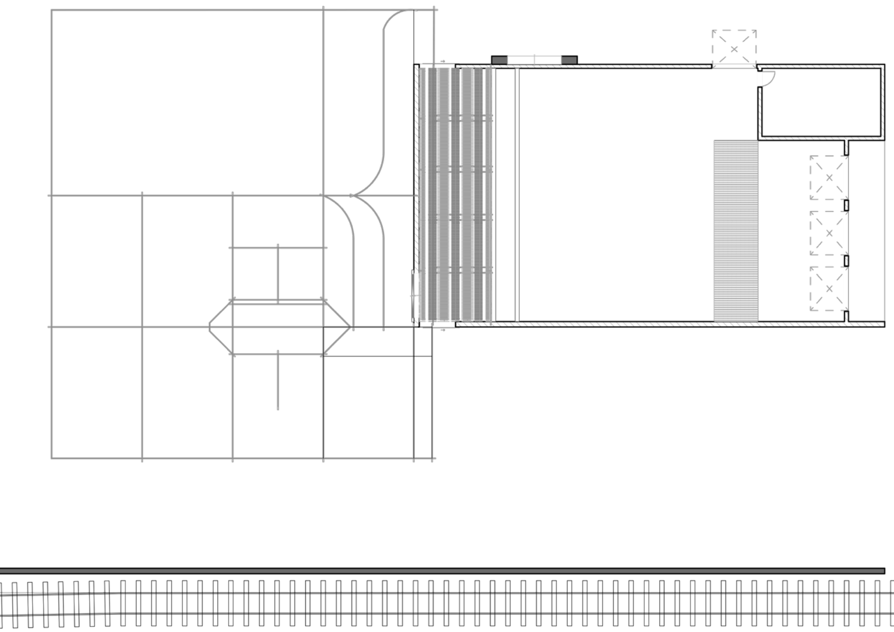
Section AA

Section CC

Section DD




Elevation 1
info kiosk
doctor's rooms: reception
medical train: doctor's rooms
E-03
E-08
Elevation 3
E-06
wool processing
wool processing
factory shop
and
A
A
0 1 2 3 4 5 6 7 8 9 10
N



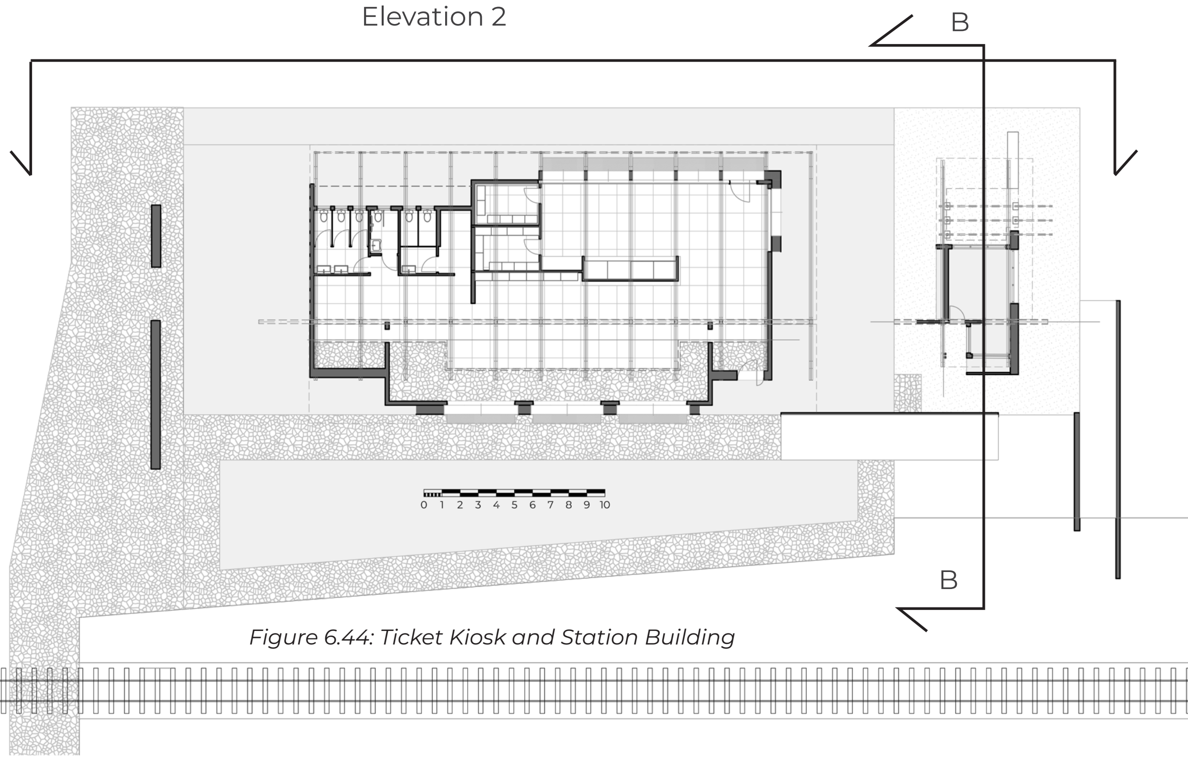


Figure 6.44: Ticket Kiosk and Station Building

HOUTKRAAL SHEARING SHED AND STATION BUILDING FLOOR PLAN

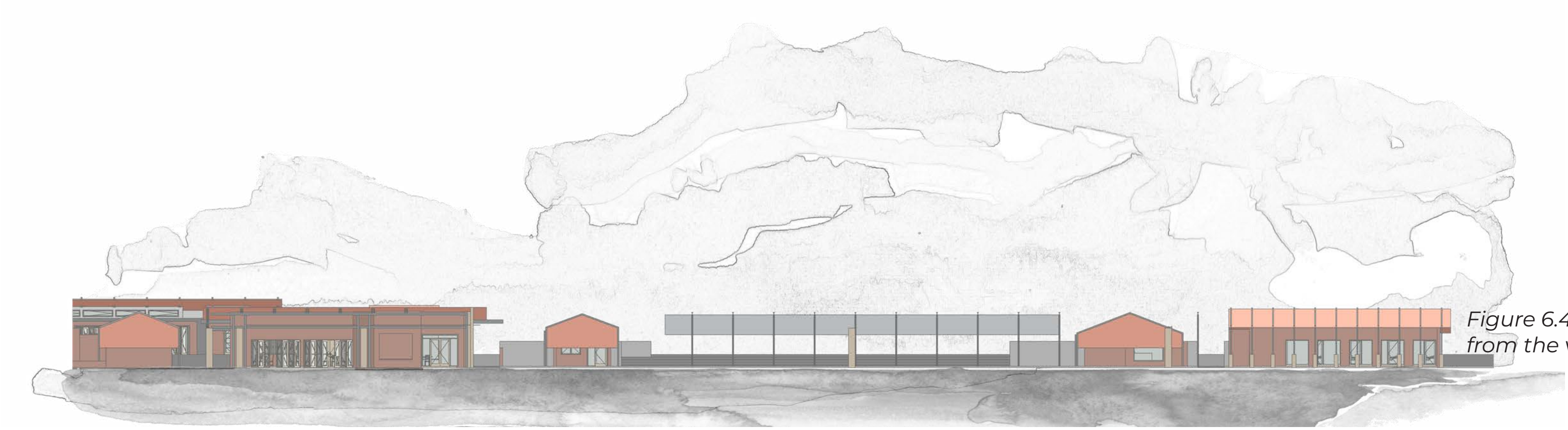
Figure 6.45: Section BB, Ticket Kiosk and Station Building

Elevation 1

Figure 6.46: Elevation of the wool processing plant , (Author,2023)

Elevation 2

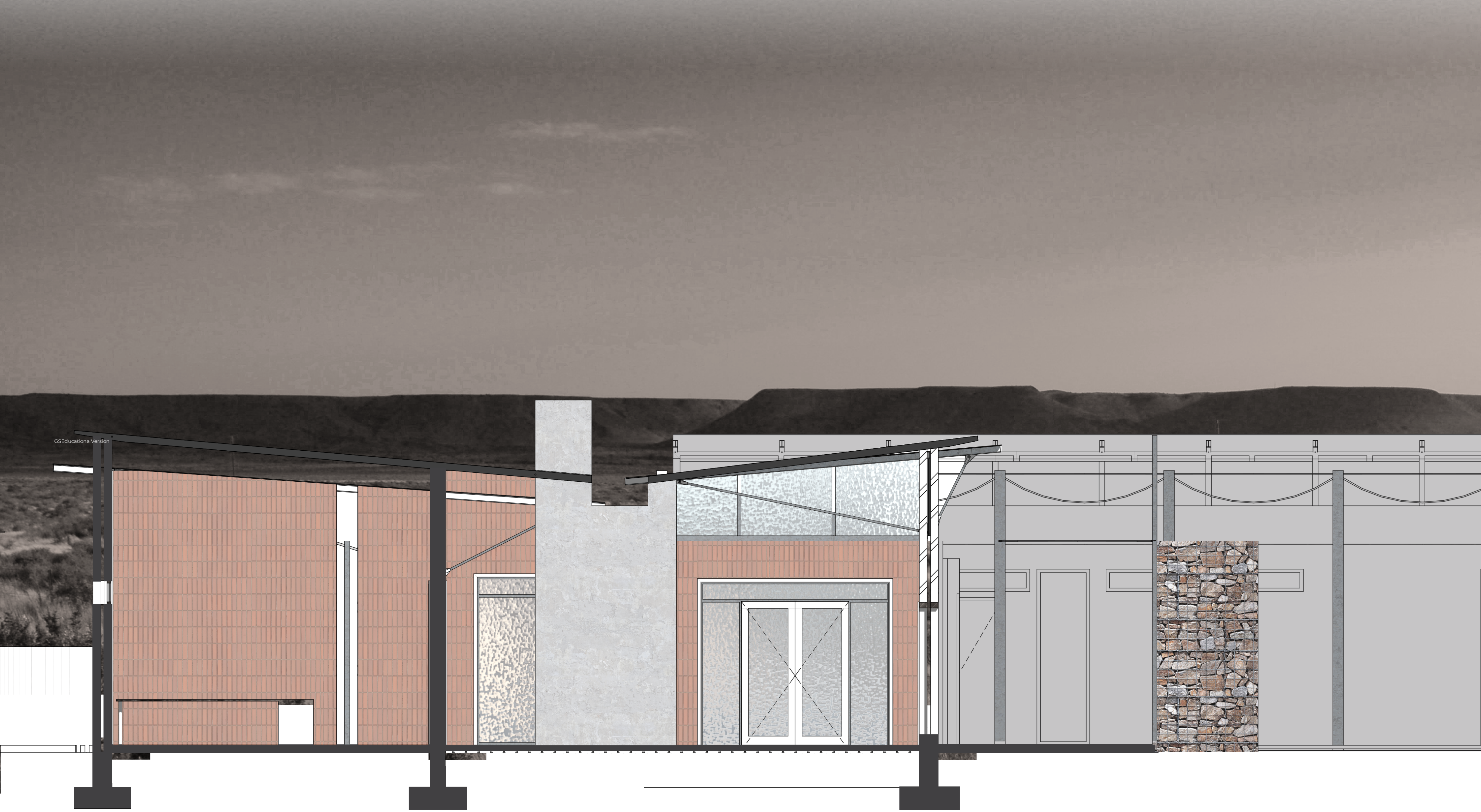
Figure 6.47:West Elevation of the station building (Author, 2023)



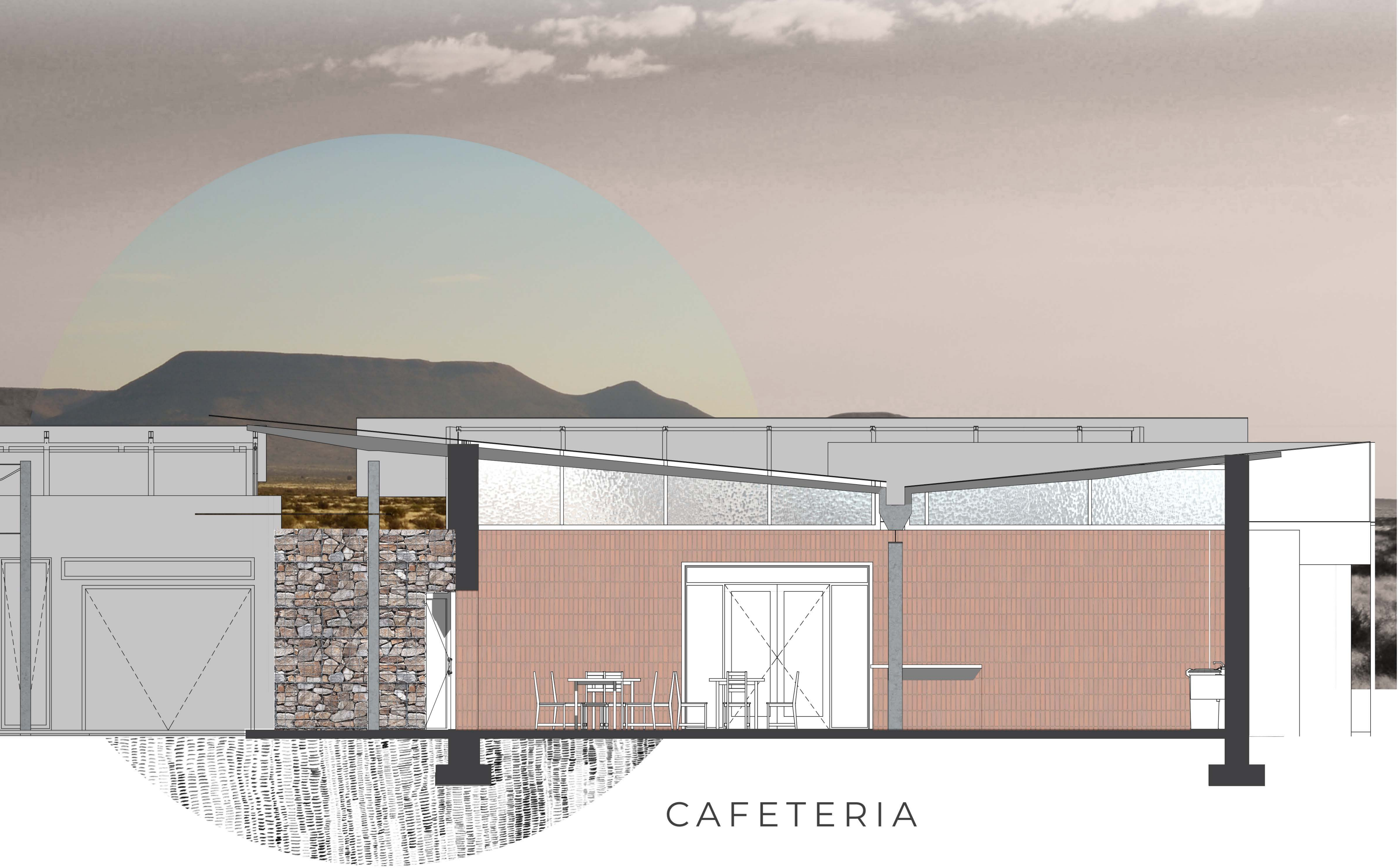
Elevation 3

Figure 6.48:East elevation of the processing plant from the view from the platform

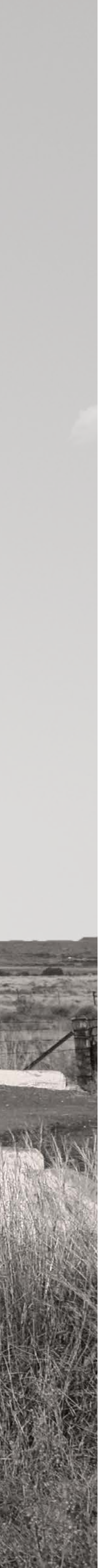

HOUTKRAAL WOOL PROCESSING FACILITY
FLOOR PLAN
1:200
N
Shearing Shed
Wool Storage
Admin
Storage
NEW STATION BUILDING
Kitchen
Entrance
Ticket Kiosk
WOOL SORTING
Wool storage
LOADING ZONE
WOOL WASHING
WOOL DRYING
CAFETERIA
WOOL PROCESSING
CRAFTING AND DESIGN SHOP
WAITING ROOM



TEXTILE DESIGN



CAFETERIA



MATERIALITY:

(In reference to the Mediator of time, as described in the conceptual development)

Materiality: the quality or character if being material or composed of matter

Temporality can be experienced through materiality, as materials and textures inevitably bear witness to the passing of time. Materiality and weathering is what bring the reality of the “terror of time” closer. Temporality is often placed in a past context and rarely explained in the present or future tense.

THE PROMENADE:

(In reference to the Conqueror of Forgetfulness, as described in the conceptual development)

The experience of passing time is described as either cyclical or linear, though there is no exact science or philosophical determination of what time is. Given the site’s context and being placed next to a railway line, the promenade also becomes a significant symbol of a journey taking place and, in this case, becomes a way to order space to combat the “terror of space”.

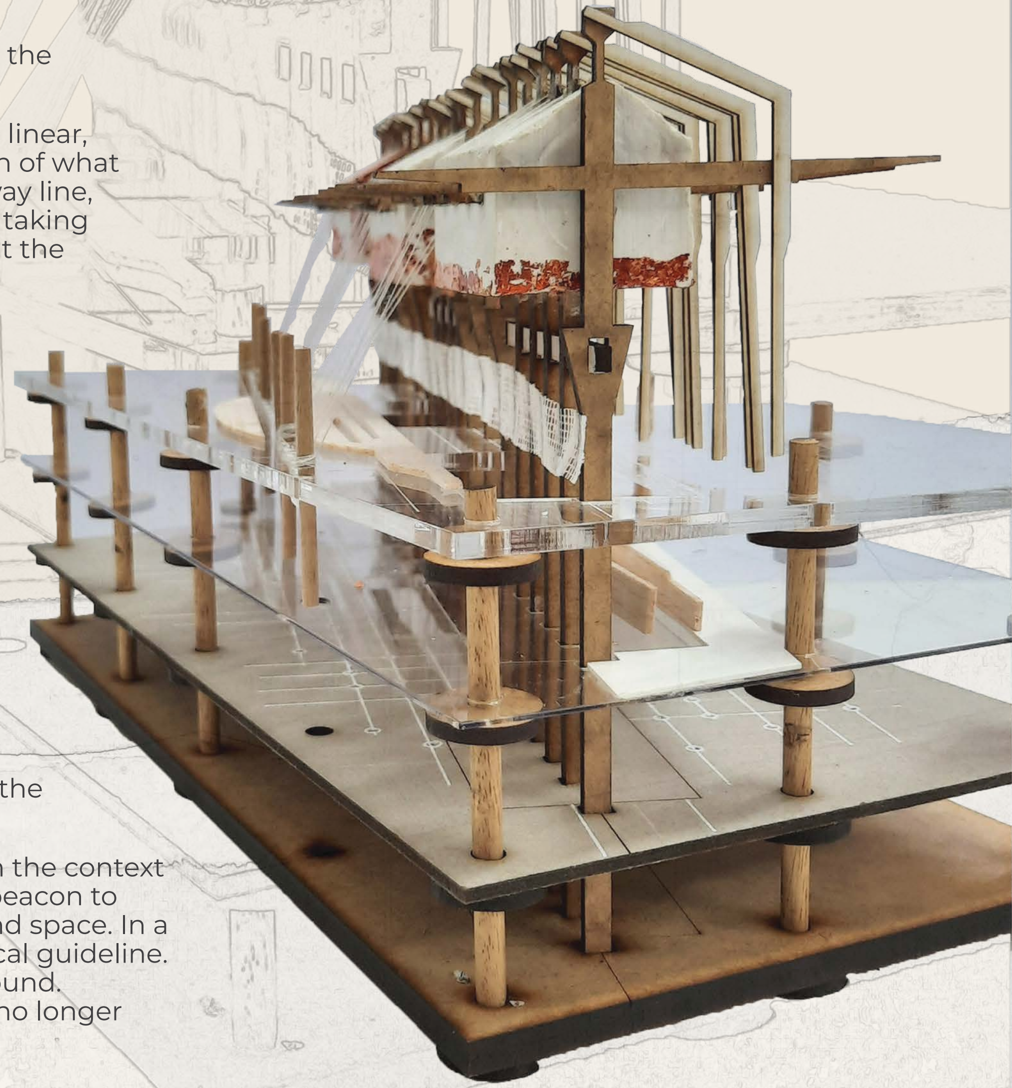
TECTONICS:

A conversation takes place between tectonics and stereotomics on the site. Though tectonics suggest “touching the earth lightly”, the character of the place and the typical Karoo Architecture suggest “sitting quietly”. These two contrasts converse through rhythms and contrast in weight and, therefore in materiality. Temporality is also experienced in the changing tensions, either the tightening of tensions or tensions loosening due to the passing of time.

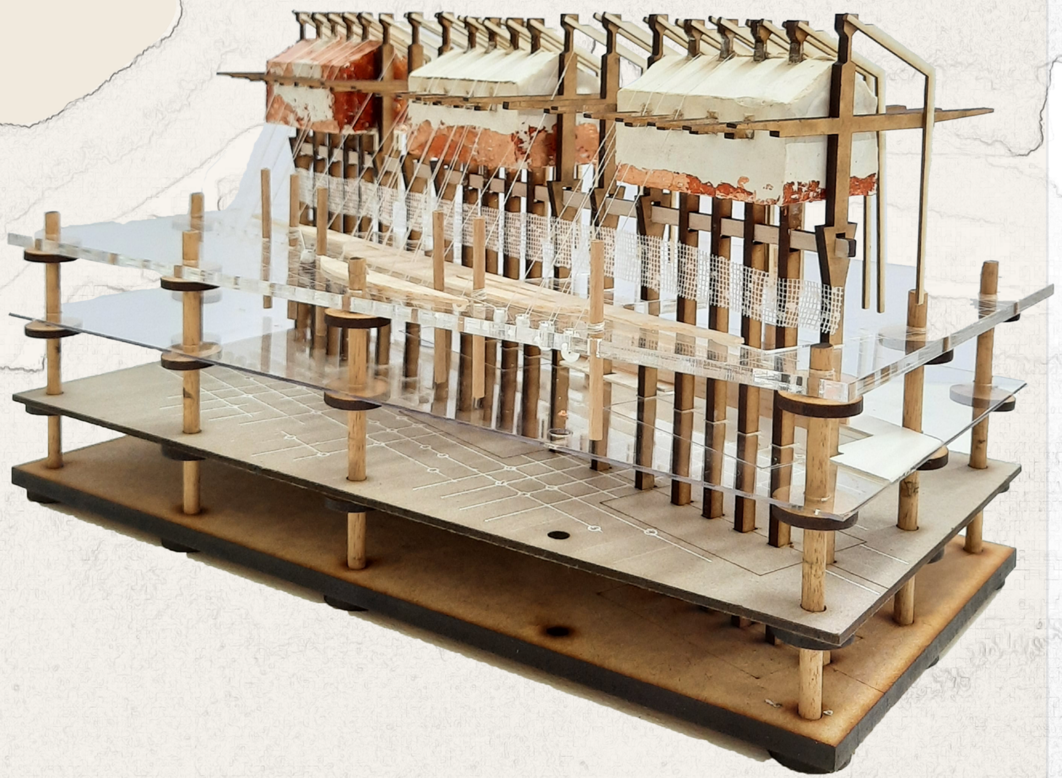
THE BEACON

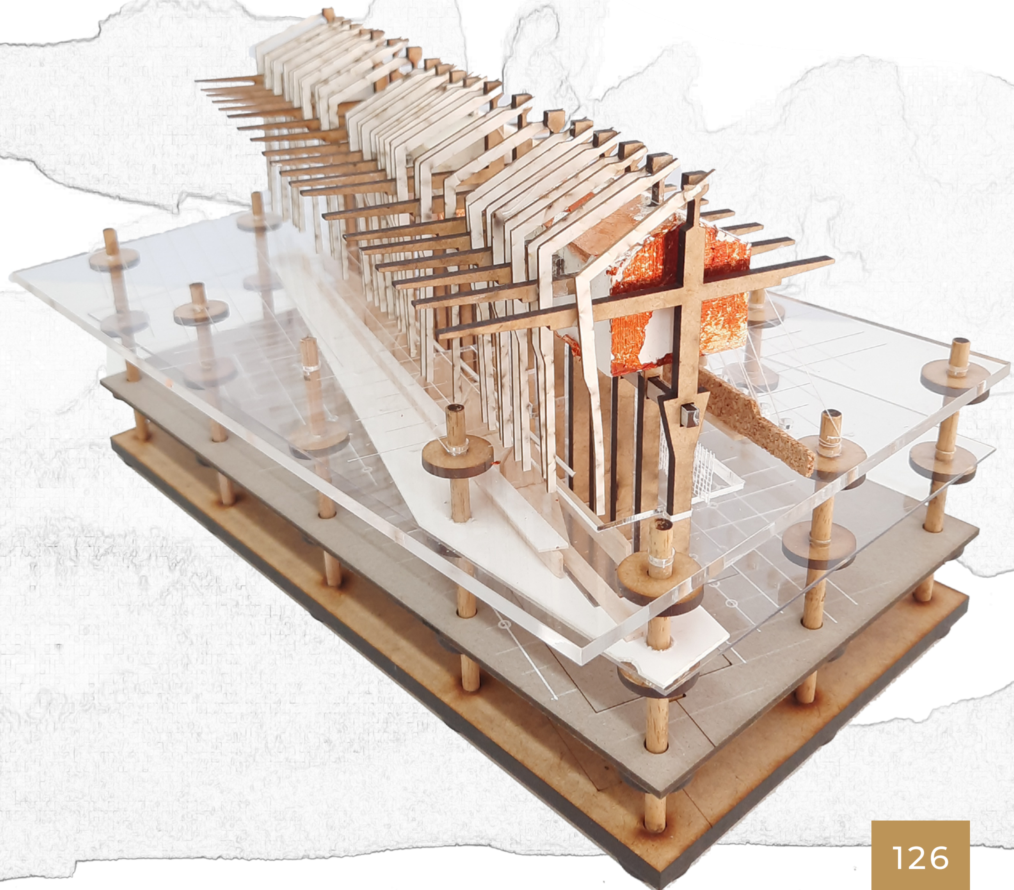
(In reference to the Guardian of the Landscape, as described in the conceptual development)

Many objects found on the site are of an industrial nature, given the context of the site. This aspect references the railway and the idea of a beacon to orientate and order space, to stand against the terror of time and space. In a sense, the railway line is already an ordering device and a physical guideline. The rhythm of moving steam locomotives had a very distinct sound. However, modern trains are electric, so the distinctive sound is no longer there. Still, the auditory rhythm can be emulated visual cues.



CONSTRUCTION TOUCHSTONE





HOUTKRAAL RAILWAY STATION, THE RAILWAY AND TEMPORALITY

Many unused railway stations are currently in the Karoo, especially along the R388 between De Aar and Kimberley. What was once a bustling railway, which saw up to 60 trains pass from place to place per day, is now on the verge of ruin, and between 2 and 4 trains pass there daily, though a medical train passes the station once a week. The railway's architectural legacy is industrial in nature, which may inform new architectural interventions. The proposed programme is sheep shearing and wool processing, which is mainly hand-driven. The design development must, therefore, balance the handmade processes of the program and the site's industrial nature within the Karoo's proud landscape.

Figure 7.1:The use of counterweights in railway infrastructure at Houtkraal Railway Station (Author, 2023)

ARCHITECTURE OF THE KAROO:

The different typologies of architecture in the Karoo are described in Part 2: Casting the Fleece. Three typologies are identified: the Trekboer House, the Double Pitched Cottage, and the Victorian or Edwardian House. The most prevalent typology found in the De Aar region is the Victorian/ Edwardian type. However, the common denominator between the three typologies is that all three are utilitarian by nature, and the buildings are developed according to the needs of their inhabitants. Other characteristics of these buildings are the thick walls and high ceilings. The use of thick walls in the early Karoo architecture is due to the material composition of these walls: the walls were constructed using compacted clay soil, and the walls had to be thick enough to stand up vertically. Still, the thick walls remain effective in climate control.

The Karoo's architecture and the industrial rail infrastructure are utilitarian in nature, which becomes a thread that binds the two seemingly contrasting typologies together. The stereotomic architecture found in the Karoo contrasts with the tectonic elements used in industrial buildings. The existing infrastructure, like the catenary and pantographs, gives clues regarding counterweights and tension keeping things in place, which can also be used in the architecture.

Though not impossible to reach, the site is still isolated, 30km from the closest town. Because the site is so isolated, reparations and maintenance of the buildings must be possible with little effort. This means that the construction of elements should be as low-tech as possible.

The Chicken Point Cabin by Tom Kundig is a valuable precedent study regarding implementing mechanical systems in architecture. In this case, simple pulley systems and counterweights can be used throughout the buildings for climatic purposes.

The pulley and counterweight systems not only influence the form-giving of the scheme but are also used throughout the building in the wool processing. Systems are designed to assist workers with the loading of the wool and the storage of the wool, and these systems also feature in the design of the wool washing facility. Wool is highly absorbent, which means that wet wool is immensely heavy. Employees who wash wool risk occupational injuries. To prevent this, the pulley systems will lower the raw wool into one bath or sink, lift it, and move it to the next water bath. The pulley system should also help prevent felting in the wash by preventing too much turbulence.

CHICKEN POINT CABIN

OLSON KUNDIG ARCHITECTS, NORTH IDAHO

Tom Kundig is renowned for using clever pulley systems and other industrial features in buildings, especially in opening facades by rotation or vertical movement. These moveable facades are usually made from glass and steel and are quite large. The façade on the Chicken Point Cabin is no different. As previously mentioned, the design aim of this dissertation is to balance the hand-driven processes that the scheme's programme comprises with the industrial nature of Houtkraal Railway Station and the proud landscape of the Karoo. Buildings found in the Karoo are usually stereotomic and heavy. However, what these buildings and industrial infrastructure share is that both typologies are utilitarian in nature.

Chicken Point Cabin in North Idaho features a large moveable glass façade, which opens the interior up to the landscape and subtly allows the landscape to be part of the interior (Franklin, n.d.: online). As was discussed in the theoretical discourse, the interaction and participation of people and places protect places from ruin and decay. The kinetic pulley system adds a dynamic edge to the building and strengthens the industrial aesthetic of the building. The material palette of this building includes wood on the interior, glass, steel and concrete, which are all industrial in nature and relatively easy to maintain (Souza, 2023: online).

Figure 7.2: Moveable Facade (Souza, 2023: Online)

Figure 7.3: Industrial Material Use (Souza, 2023: Online)

Figure 7.4: Moveable Facade (Souza, 2023: Online)

Figure 7.5: Moveable Facade (Souza, 2023: Online)

Figure 7.6: Side elevation
(Franklin, n.d.: online)

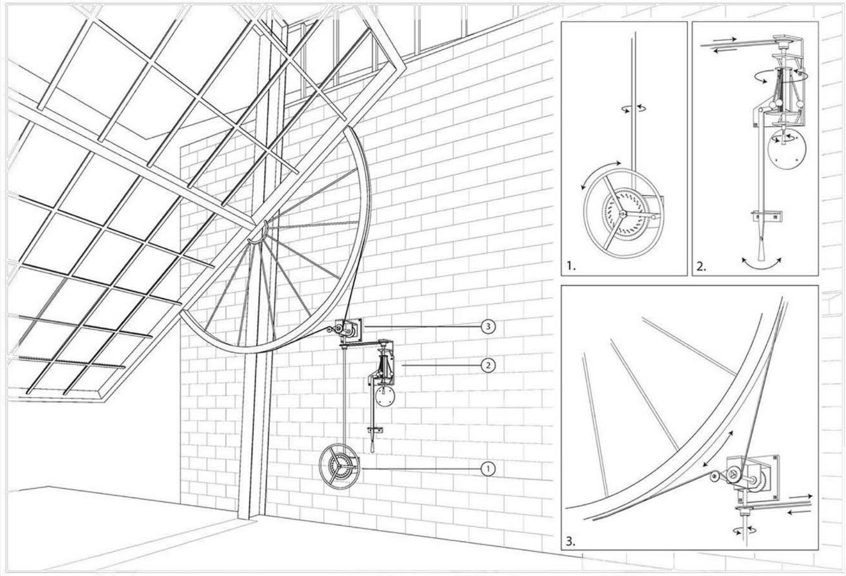


Figure 7.7: Moveable Facade
(Souza, 2023: Online)

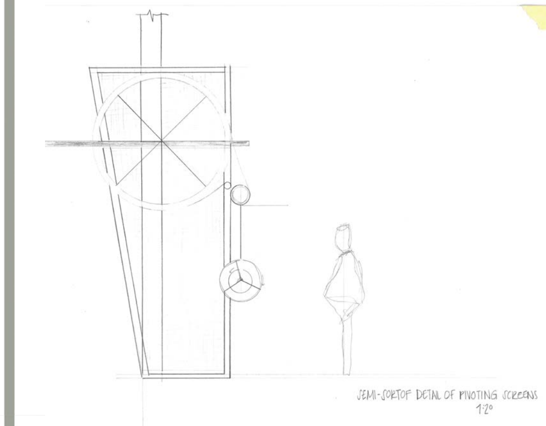
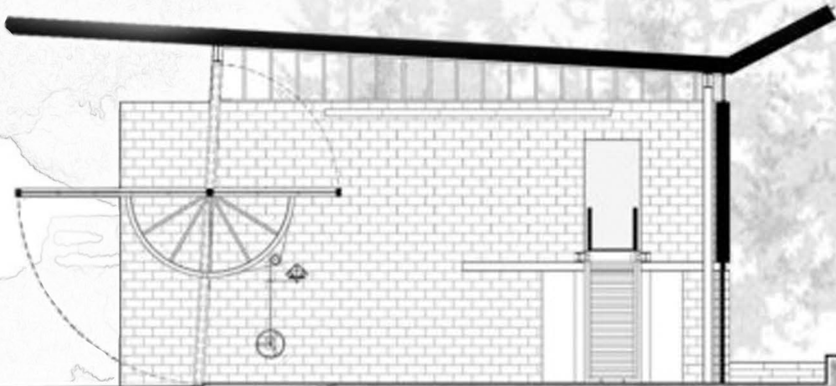
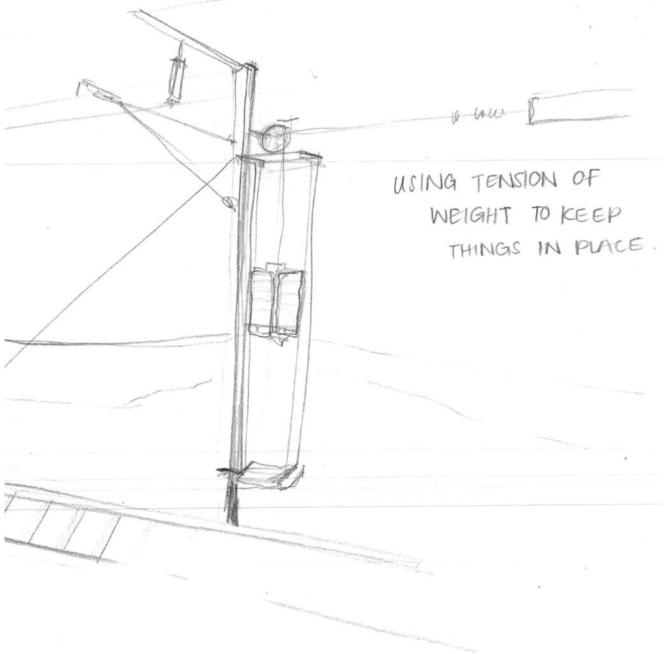
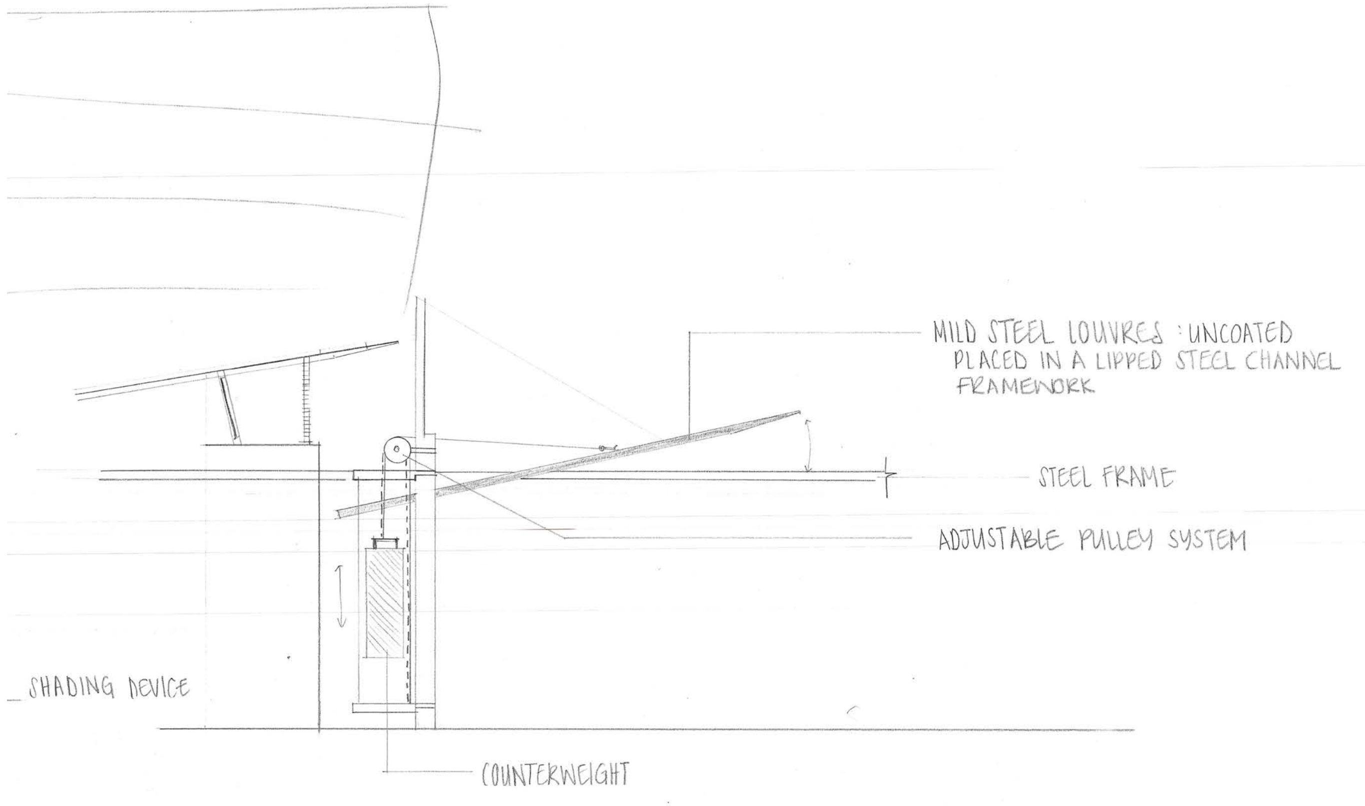


Figure 7.8: Section featuring the moveable facade (Souza, 2023: Online)

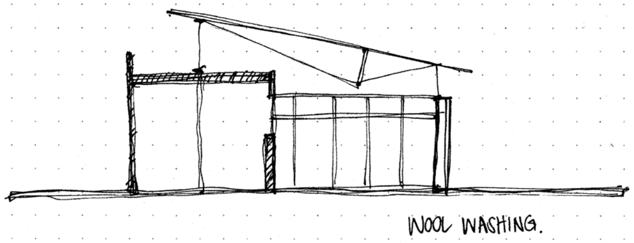


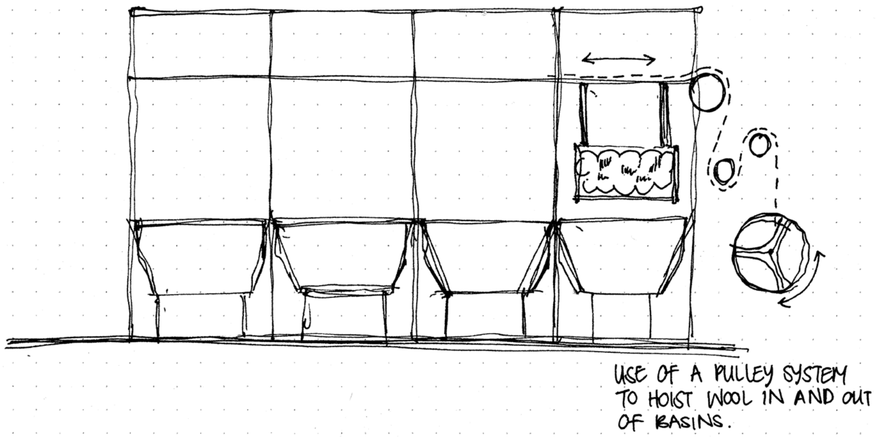




SHADING DEVICE 1:50

The design insights from the Chicken Point Cabin by Olson and Kundig were applied to shading devices throughout the site. Because the climatic conditions at the site are quite harsh, the shading devices are mechanised to control the amount of light that enters the buildings. The counterweight systems used in these systems are low-tech and can easily be fixed and maintained. The same mechanised system is used in the wool washing room, where the wet wool is washed and hoisted from one sink to another as will be elaborated later in this chapter.





As seen from left to right:

Figure 7.9: Moveable shading device (Author, 2023)
Figure 7.10: Explorations of moving shading devices (Author, 2023)
Figure 7.11: Implementing mechanised pulley systems in washing wool by hoisting wool up and down into basins (Author, 2023)
Figure 7.12: model and exploration of moveable screens based on Chicken Point Cabin by Tom Kundig (Author, 2023)

HERITAGE BUILDINGS: CONSTRUCTION STRATEGY

Heritage buildings, in essence, buildings in South Africa that are older than 60 years, are protected by law. Part 2 of this dissertation discusses the heritage stance and design strategies. A Statement of Significance, based on the Burra Charter Analysis, is also made and establishes different phases of development concerning the site. These different phases are shown in the figure on the left. This dissertation is only focused on the development of phases 1 and 2, which include the development of a shearing shed and the wool processing facility.

The typical railway architecture in South Africa can be described as generic. A copy-and-paste strategy has been followed in the construction of railway buildings and accommodation, which means that the buildings found at Houtkraal are similar to, and in some cases, identical to buildings at other small stations in the environment, but also in the wider South African context. These buildings are different from the typical Karoo Architecture. They can be built anywhere in the world without necessarily speaking of the environment and the context in which it is placed. In this light, the buildings found at Houtkraal Railway Station are not of historical or heritage significance.

The decision was made to demolish the existing goods shed and construct the new station building and ticket kiosk in its place. Yet, the goods shed and the platform on which it is placed are referenced in the development of the new station building. As will later be elaborated upon, the rubble of the goods shed will be used in the construction of new platforms.

Figure 7.13:Heritage Strategy, site to be developed in phases (Google Earth, 2023: online, adapted by Author)

THE INFLUENCE OF TEMPORALITY AND THE INTERPRETATION OF PATINAS ON THE DESIGN OF A WOOL PROCESSING FACILITY IN THE KAROO

PATINAS:

Architecture maps temporality through textures, found especially in materiality and the development of patinas over time. Patinas are developed through prolonged exposure to the elements and address the materiality of the constructed building. The mapping of patinas on the site revealed patterns of use, misuse, weathering, and exposure. Some materials used in the scheme that act as witnesses of the passing of time are structural steel, weathering steel, Cor-Ten steel, and concrete. The use of brick also references the existing architecture on the site.

PROMENADES:

A promenade is another architectural element that can facilitate or manipulate a person's experience of passing time. Furthermore, the promenade also relates the passing of time to wool processing; both have a definite start and end. As discussed in the theoretical chapter, the promenades can either "presence" or "absence" the current moment. "Presencing," the current moment, is based on the natural passing of time, while "absencing" time is based on imaginary experiences. Distinct rhythms and monotony either slow down the experience of passing time, while the opposite is achieved by introducing the visitor to a wide variety of stimuli.

RAILWAYS AND RHYTHMS IN THE KAROO:

There is a distinctive rhythm of time passing in the Karoo, which is experienced through the cyclical passing of days, seasons, and other natural cycles, like the rising and setting of the sun. The rhythmical movement of trains on the railway and the passing of time in the Karoo, as described above, is another correlation that can be drawn between the railway and the experience of the passing of time.

Since contemporary trains in South Africa are electric and not steam-driven, the characteristic sounds of the steam locomotives are no longer heard. However, this rhythm can be emulated visually by using visual cues.

TOWARDS SENSITIVE DESIGN SOLUTIONS: WATER USE, MATERIALITY, AND CLIMATE

Water use on site: De Aar, the closest nearby town, was called De Aar because of the strong presence of water underground. Getting water to the site is relatively easy, as many functioning windpumps are nearby. The water will be used to wash the wool and other processes. Since water is a sensitive subject in the Karoo, a plan must be made to reuse it and not pollute it. The water can also be used in the cooling of the building and used as a passive cooling method. Evaporation ponds are also used in courtyards.

If the wool is washed or soaked with a biodegradable and non-toxic detergent, the water can be released back into the environment. Therefore, a French drain system will lead the water from where the wool is washed back into the environment. The used water is rich in lanolin and other organic matter and, therefore, rich in nutrients, which is beneficial to vegetation. The box gutter is an important element used in water harvesting and consists of stainless steel with a galvanised plate that rests on additional frames, walls or in a specifically designed butterfly truss. The form-giving of the butterfly truss is informed by the harnesses that shearers use when shearing sheep.

MATERIALITY:

As previously mentioned, using materiality with specific characteristics in architecture and this building can elucidate the effects of passing time to onlookers and users of the building. The best material to show aging would be weathering steel or Corten steel. An example of material use in architecture is the Glenburn House by Sean Godsell, described in the Design Development and “Groenhuis” in Pretoria, South Africa. “Ysterklip,” or dolerite, is readily and abundantly available on the site and can be used in certain aspects of the construction of this building. The existing buildings on the site are constructed with face brick. A common use in the Karoo is to whitewash buildings using lime. However, the buildings on site are not whitewashed, though some are plastered on the exterior. Later on, passive climate control and thermal massing will be discussed. Materials with good thermal massing properties include concrete and bricks, making them ideal for the scheme’s construction.

As mentioned previously, one of the main design aims is to balance the industrial nature of the site with the handmade processes used in the proposed programme of the site. A suitable precedent study in this regard is the Rosendal Hideaway by Carmen Dickens.

It is also worth mentioning that trains still pass Houtkraal Railway station when travelling between De Aar and Johannesburg. Though the site is isolated, transport of building materials should be easy.

CLIMATE:

INSULATION:

Insulation is essential in areas with extreme temperatures in the winter and in the summer. Though using sheep's wool in insulation is still relatively new in South Africa, its advantages far outweigh the disadvantages. Sheep's wool, being an organic material, is more sustainable and environmentally friendly than other types of soft insulation.

Sheep wool has proven to be an excellent insulator in terms of temperature and waterproofing. Loose sheep wool used in insulation is not compacted into blocks, and one cannot exactly regulate its thickness when placed. However, wool used for insulation does not have to be of the finest quality, and lox, the lowest quality wool, could be used for insulation, provided it is washed and treated with a borax solution to protect the wool from moths. Though this method is cheaper than contemporary insulation, it is much more labour-intensive.

The wool insulation is used with the double roof system as a climatic strategy. The loose wool is placed in waterproof bags and held in place by wires on top of the concrete flat roof.

Another design strategy commonly used in arid areas with extreme temperatures is courtyards, which foster microclimates and encourage air movement from high (cold air) and low-density (hot air) zones. Courtyards, especially inner courtyards, aid in passive cooling and are very effective when combined with water features, covered spaces, and shade.

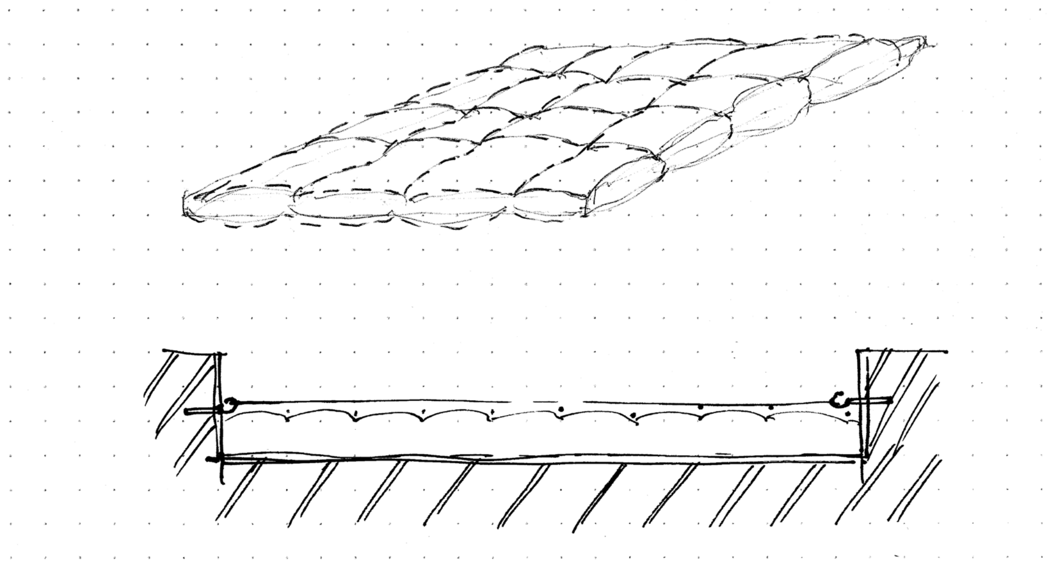
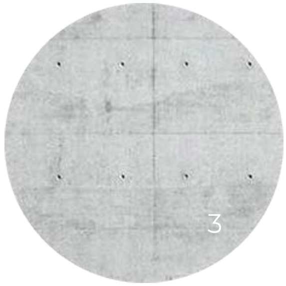


Figure 7.14:Wool is used as an insulation device on some of the flat roofs of the buildings on site. A wool "duvet" is made by filling waterproof bags with wool and managing the equal distribution of the fleece by keeping it in place with sewn seams. This method, in contrast to using felted wool, still has air space between the fleece which contributes to the insulation of the building (Author, 2023)

THERMAL MASS:

Some distinctive characteristics of old Karoo houses are the thick walls and high ceilings. The thick walls have thermal mass , which means that the walls can absorb, store, and release heat. For example, rocks or bricks can absorb sunlight, heat energy, and ambient temperature during the day. Thermal mass can contribute to the thermal comfort of a space if used correctly. In winter, direct sunlight, or heat energy, is absorbed by thermal mass during the day, re-radiating this warmth into the home at night (Reardon, McGee, Milne, & Marlow, 2020). In summer, provided that the building is well-shaded, the thermal mass will absorb heat from inside the building and release it to the outside via convection.

In practical applications, thermal mass should be placed in areas that receive direct sunlight for passive heating. For passive cooling, the thermal mass should be protected from the sun with shading and or insulation. This is more effective when a cool night breeze and air currents pass over the thermal mass to draw out stored energy. When applying these principles to the site and the plan, it makes most sense to place the thermal mass in the form of concrete, thick walls, or stonework to the western walls of the scheme and to north-facing rooms with good solar access. The wind direction at the site is mostly northwest, and the building is exposed to cooling night breezes. Still, these facades must also be protected from sunlight in summer for effective cooling. This is done by adjustable metal screens and windows placed in deep recesses within the walls. Interestingly, the existing buildings on the site have cavity walls, which may inform the construction of the rest of the scheme. Throughout the rest of the building, cavity walls are used.



Materials with good thermal mass: brick, rock and concrete

DOUBLE ROOF:

A double roof system consists of two roofs. One roof, placed directly over the other, protects the lower roof from sunlight and heat energy. Therefore, shading a roof from direct sunlight reduces the heat energy that enters a building (Holder, 2022: online). The two roofs are usually two separate skins. The top roof is lightweight, while the bottom roof usually consists of a flat concrete roof. The double roof system is effective because of the air gap between the top and bottom and because no direct solar energy reaches the bottom roof. However, ventilation should be allowed between the top and bottom roofs.

The practical application of the double roof system in the proposed building at Houtkraal Station is to use enclosed flat concrete roofs of 170mm thickness, with at least 600mm air space between the concrete roof and the top roof, which consists of KlipLok, held in place by structural steel trusses placed on top of the concrete flat roof. Because the double roof system is used and the top roof shields the flat roof from rain, the concrete roof needs minimal waterproofing. The concrete roof is insulated with a combination of Isoboard and sheep's wool.

The double roofs also have large eaves or free-standing shading devices that shade openings, especially on the western facades of the buildings.

Figure 7.15: 1) 'Fynbos Rooi Satin' facebrick (corobrik.co.za, 2023: online)
Figure 7.16: 2) Gabion wall between Phillipstown and De Aar (Author, 2023)
Figure 7.17: 3) Concrete (vecteezy.com, 2023: online)

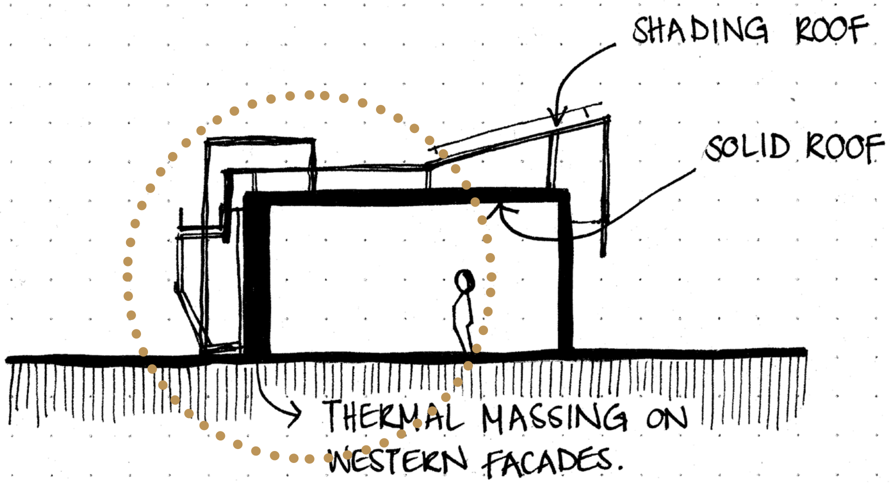


Figure 7.18:Exploration of the double roof system and a free standing box gutter (Author, 2023)

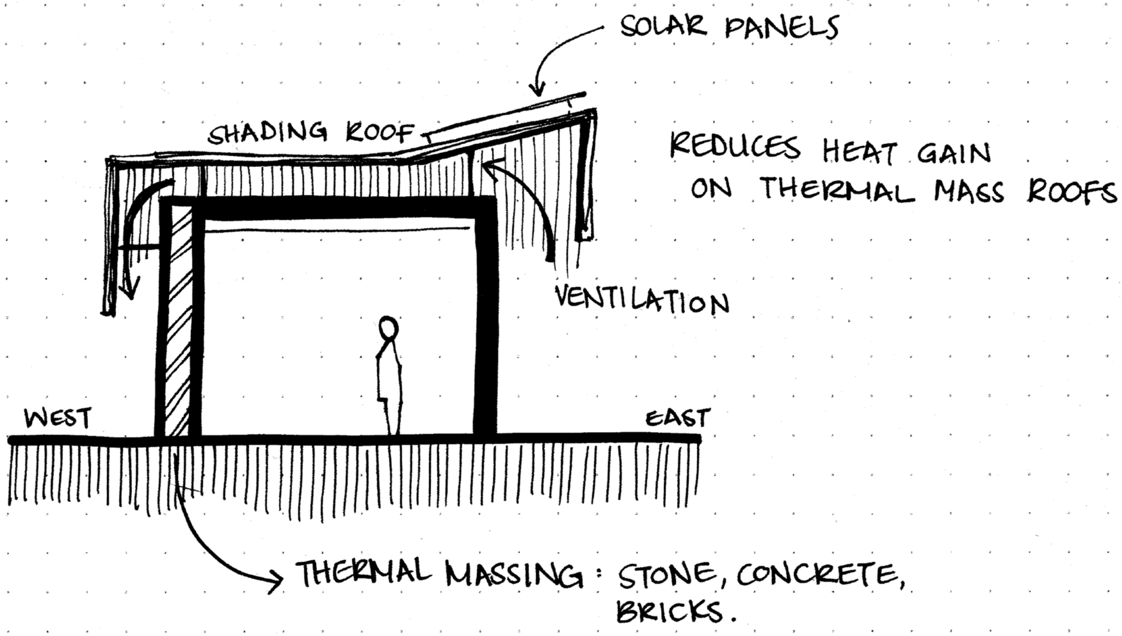


Figure 7.19: Thermal Massing and the double roof system (Author, 2023)

Figure 7.20: Form-giving influenced by the conceptual development (Author, 2023)

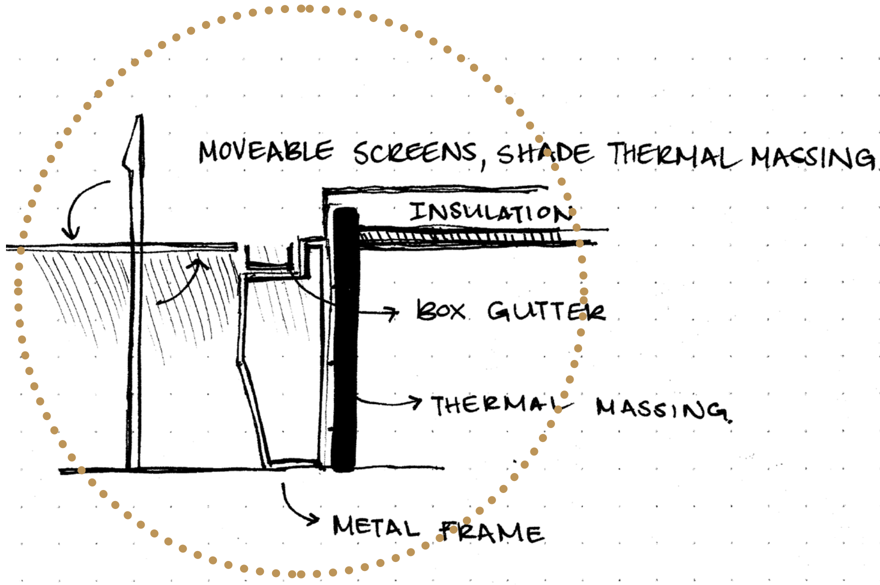


Figure 7.21: Free- standing box gutter steel structure (Author, 2023)

ROSENDAL WEEKEND HIDEAWAY

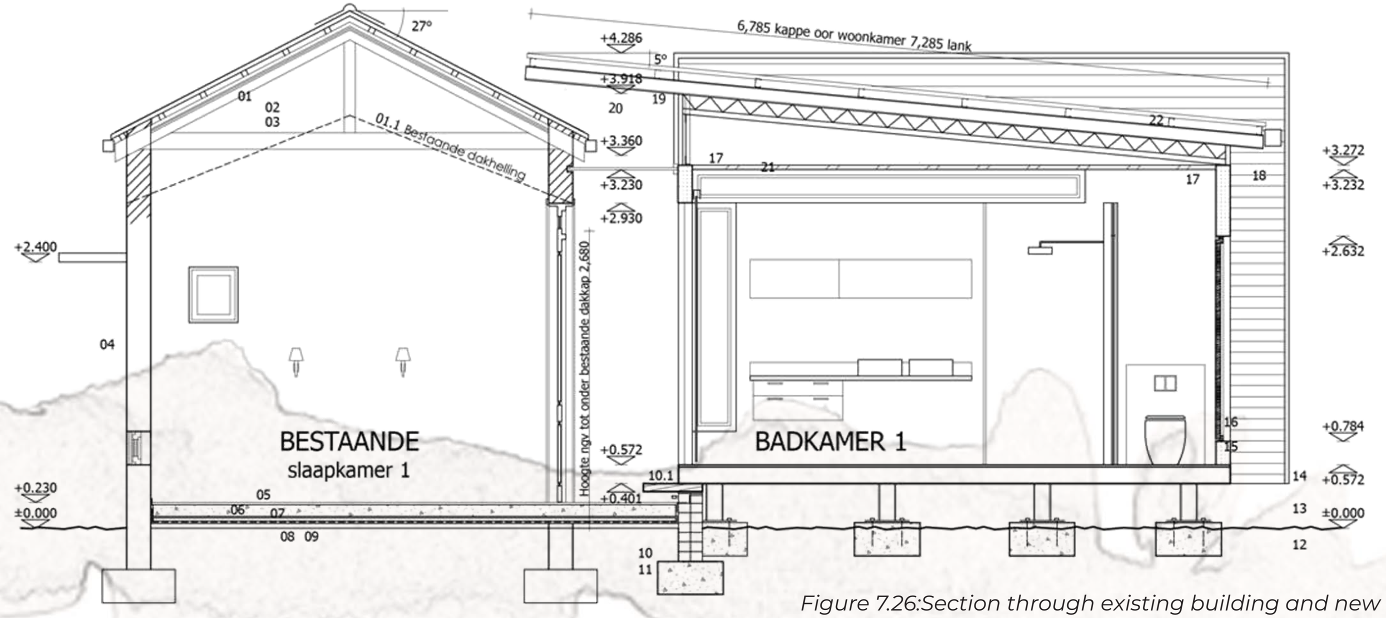
Carmen Dickens, Rosendal

This building is residential and small in scale and basically consists of three different masses constructed using lightweight steel construction and decks. This building is a good example of combining existing architecture and contemporary steel construction and may inform the use of steel, and the connections of the steel to the existing structure. The steel construction is lifted slightly from the ground, contrasting with the existing structure's solid structure. The existing structure is a small brick building with a pitched roof, which was lifted by about a meter during the construction of the building. This precedent study is important in terms of the construction and the connections of the new buildings to the existing buildings, as well as informing the material palette used in the development of the new proposed scheme.

The material palette includes KlipLok, structural steel and white plaster. Though simple, this material palette creates contrasts and emphasises the role of the landscape. The building is situated in the picturesque eastern Free State, and the steel structures are cleverly used to frame the different views of the landscape.



Figure 7.22: (Top) "Stoep" at Rosendal Hideaway by Carmen Dickens (Author, 2020)
Figure 7.23: (Middle) Industrial nature of the steel structures used at Rosendal Hideaway (Author, 2020)
Figure 7.24: (Bottom) Existing building on site (Author, 2020)
Figure 7.25: (Right) Moveable screen and frame on the North Facade at the Rosendal Hideaway (Author, 2020)



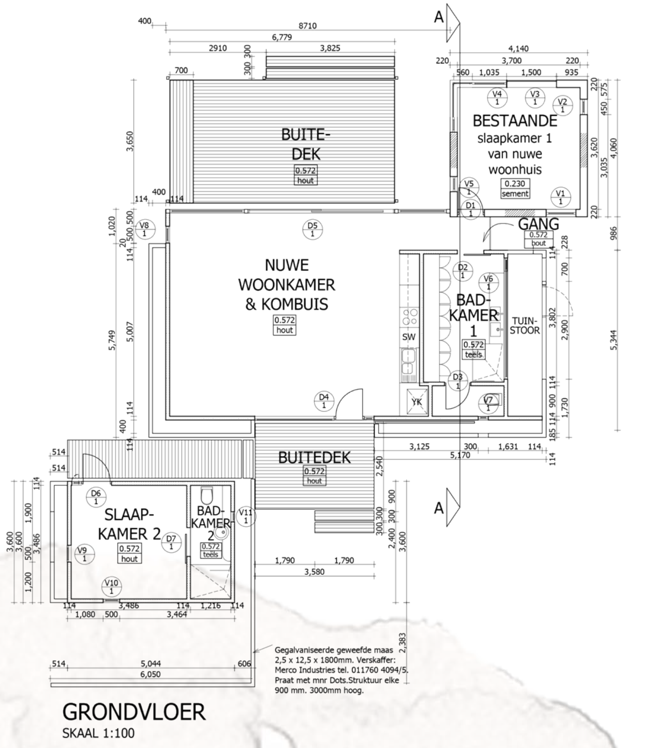


Figure 7.26:Section through existing building and new addition (Dickens, 2015: personal correspondence)
Figure 7.27: Ground Floor (Dickens, 2015: personal correspondence)

REGULATIONS OF RAILWAY CONSTRUCTION:

This railway line is still in use, and trains regularly use this route when travelling between Cape Town and Johannesburg. ROVOS rails also travel on this route, and a medical train also stops at this station regularly. The medical cart serves as a mobile clinic. The R388 that passes the railway station is a well-maintained gravel road that is easy to access. Therefore, transport to and from Houtkraal Station is easy, though it is isolated.

The trains used in the South African railway system are about 145m long, and the proposed length of newly constructed platforms is 160m, according to specifications set out by SANS-3000 (SABS, 2009: online), though some exceptions to the rule are based on the traffic on and around the site, in essence, how the rail is used and by how many people it is used. For instance, in urban areas with busy stations, where rail transport is used, the regulations for the construction of platforms differ from regulations for station buildings in quiet rural areas (RSR, 2016: online). The height of these platforms is specified to be 1 meter high, with at least a 30cm allowance between the train and the platform. The platforms should also have a 1:50 fall towards the railway line. Station buildings and other surrounding buildings must be at least 8 meters from a railway line in case a train derails. This influences the platform's width and the placement and layout of the surrounding buildings.

The construction of these platforms, especially of that size, is expensive. The proposed construction method for these platforms would be to use casings and fill the casings up with rubble, like broken sleepers and rubble of demolished buildings found on the site. Then, concrete is cast in 400mm, 300mm, and 300mm levels until the desired height is reached.

Other functions that need to be accommodated on the platforms and new station building are new loading zones for raw and processed wool to be transported to Gqeberha to the wool auction and private rooms where doctors on the medical trains can see nearby patients.

The SANS3000 regulations concerning height restrictions stipulate that new structures may not interfere with the catenary and the pantographs, which limits the height of the proposed buildings close to the station. The catenary line and, therefore, the pantographs' height is between 5.8m and 6.2m. SANS3000 regulations specify that a clearance of at least 2m above and below the catenary line must be maintained. For this reason, it does not make sense to construct a bridge over the catenary lines over the platforms but rather to use a level crossing to access the buildings on either side of the railway line.

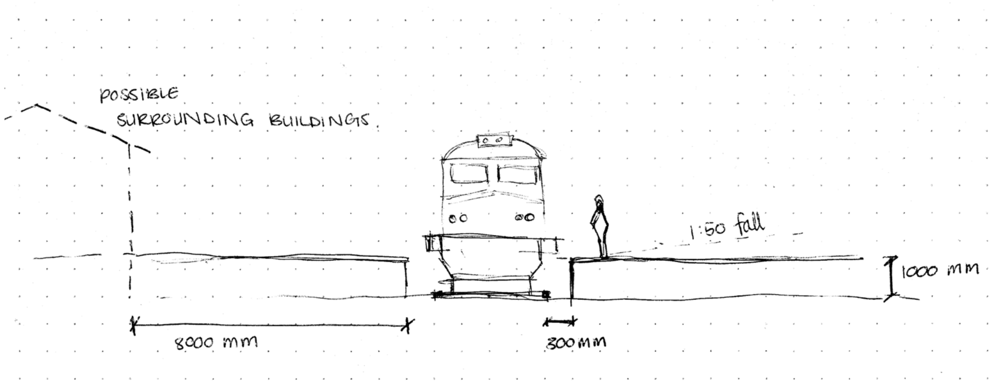


Figure 7.28: Clearances as stipulated by SANS 3000 (Author, 2023)

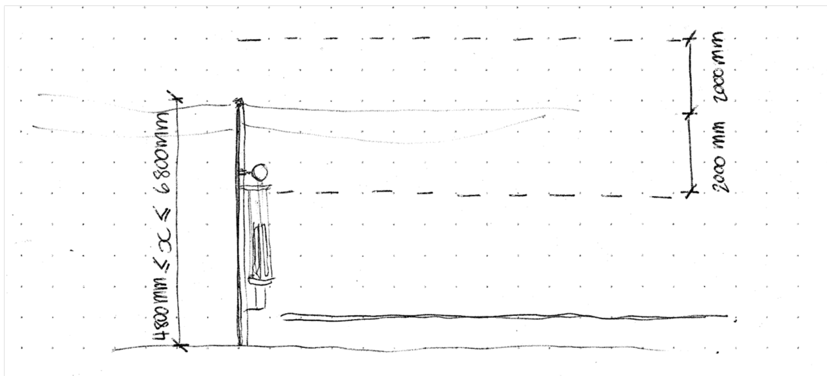


Figure 7.29: Height clearances as stipulated by SANS 3000 (Author, 2023)

DESIGN PROGRAMME: SHEARING

The design programme regarding the sheep shearing shed is discussed in the design development, along with the analysis of the Deepwater woolshed in Australia by Peter Stutchbury, found on page 106.

The shearing shed and holding pens are situated to the north of the site, placed between the railway line and the R388 to ensure easy access and transportation of livestock to and from the site. The sheep must be kept on one side of the railway to prevent accidents between the animals and the passing trains. The shearing shed can also be used as storage in between shearing seasons. The shearing season depends on the farmer; usually, sheep are shorn once a year, though some farmers shear every 6 to 8 months, depending on the length and quality of the wool and the time or season of the year.

There are no specific guidelines regarding the sizing of holding pens and the shearing shed itself. However, representatives from the National Wool Growers Association and BKB both suggest using guidelines set out by the agriculture departments of New Zealand or Australia.

Most shearing sheds are constructed using a raised shearing board, which makes the movement through the shed more effective and eliminates unnecessary traffic between the floor workers and shearers. Secondly, using a raised board system mitigates the risk of occupational injuries, especially for floor workers who carry the wool from the shearing board to the skirting table.

The following design and construction guidelines are set out by New South Wales' Department of Primary Industries:

ENTRANCE:

Given that a raised platform will be used in the shearing shed, an entrance ramp will be used, of which the maximum gradient is 1:3. The ramp floor may be constructed using wood or concrete. A wide opening of about 2.4 -3m can be used as an entrance, facilitating the sheep's movement into the shed. Sliding doors are the most suitable for the entrance to the shearing shed.

HOLDING PENS

The pen capacities throughout the shed should preferably be multiples of catching pens. For example, if the catching pen holds 18-21 full wool sheep, the forcing pen should hold 18-21 or 36 -42 wool sheep, and the holding pens should hold 72- 84 sheep (NSW Government, 2023: online). A rule of thumb is calculating the required area to allow 2,7 sheep per square meter. Undercover holding pens should hold at least one day of shearing in bad weather, as wet wool cannot be shorn.

In this dissertation, the number of sheep that will be shorn in a day is estimated to be about 100 – 200. For a holding pen for this number of sheep, 33-37m^2 should be enough.

FILLING PENS

The pens next to the catching pens are called filling pens. Sheep are moved from here into the catching pens. These pens can also be used as general holding pens. The filling pens hold double the number of sheep as the catching pens, meaning the catching pen is filled once in each shearing run.

CATCHING PENS

The shearers catch the sheep out of the catching pens; therefore, the catching pens' main objective is to facilitate the easy handling of the sheep. The size of the catching pens determines the size between the shearing stands, though a minimum of 1.8m should be allowed between stands. Penning of the sheep is made easier if the pens hold about half a run of sheep.

The rule of thumb regarding the capacity of the catching pens is to allow 3.5 sheep per m^2. In most cases, especially when the shearers are paid per shorn animal and not hourly, shearers prefer individual catching pens.

GRATING

The pen areas in the shearing shed utilise grating floors to allow sheep droppings to pass through and ensure a hygienic shearing area. In sheds close to the ground level, the battens of the grated floor should be on removable frames to easily remove manure and waste. The direction of the grating affects the movement of sheep through the shed and works best when the grating is laid at right angles to the movement through the shed. The grating should also be laid at right angles to the shearing board. The grating, made from about 40mm x 35mm timber, is laid on hardwood bearers 100mm x 75mm x 50mm hardwood joists at 450mm centre to centre. In lifted platforms, it is suggested that bevelled grating is used to ensure that sheep do not see through the floor (NSW Government, 2023: online).

LIGHTING AND VENTILATION

Good lighting and ventilation improve the working conditions and efficiency in the shearing shed. Light sources can be either natural or artificial, and good lighting is necessary for the shearing and classing of the wool.

Natural light is preferred in the shearing shed, though direct sunlight should not be used as natural light because the glare causes eye strain for both the shearers and the handlers. Therefore, in the shearing shed, the best option is to use southern light. In some cases, translucent sheeting can also be fitted to the shed's roof. Though this is relatively easy to install, these roof panels may direct too much heat into the shearing shed, which is a significant disadvantage in the Karoo region. Still, natural southern light eliminates the need for translucent sheeting because direct sunlight will not be a problem. In addition, shutters and louvres can also be installed to supplement other light sources.

On the other hand, artificial lighting, like fluorescent lights, can also be used to keep the light distribution throughout the shed even. However, fluorescent lights are hung parallel to the board, about 1.5m from the shearers towards the wool room, to reduce shadows on the sheep during shearing. Still, natural light remains the best option for wool classing, while colour correction is necessary in the use of fluorescent lights.

VENTILATION:

The harsh climate in the Karoo, especially during summer, requires good ventilation to reduce condensation within the shed and to provide fresh air. The wall openings' location and size can contribute to efficient ventilation. Other ventilation options include open extended eaves and ridge vents.

For temperature control in the shearing shed, corrugated iron in conjunction with foil-type insulation can lessen the high temperatures when sheep are shorn in summer.

THE WOOL ROOM

The wool room refers to the area where the wool is skirted, classed, baled and shorn. The wool room accommodates the wool tables, bins and the wool press. This working environment should allow enough room for movement while still limiting traffic and rehandling wool. The shearing shed accommodates four shearing stands, and the suggested floor area of the wool room is 80m^2, excluding the storage. The floor is constructed from reinforced concrete that is sealed to facilitate easy cleaning.

Wool table: 2750mm x 1500mm x 850mm with wooden slats spaced 50mm from centre to centre.

Wool storage bins: 1200mm x 2400mm x 1850mm.

ANIMAL WELFARE AND THE RAILWAY

The current railway traffic around the site is twice daily, once in the morning and once in the late afternoon. Creating a comfortable environment for the sheep is necessary since the animals already experience stress with handling and treatment. the added stress may cause health issues in animals. Therefore, a proposed solution to eliminating noise is to create a sound barrier using gabion walls and planting indigenous shrubs.

Indigenous trees are also planted near the pens to provide shade for the

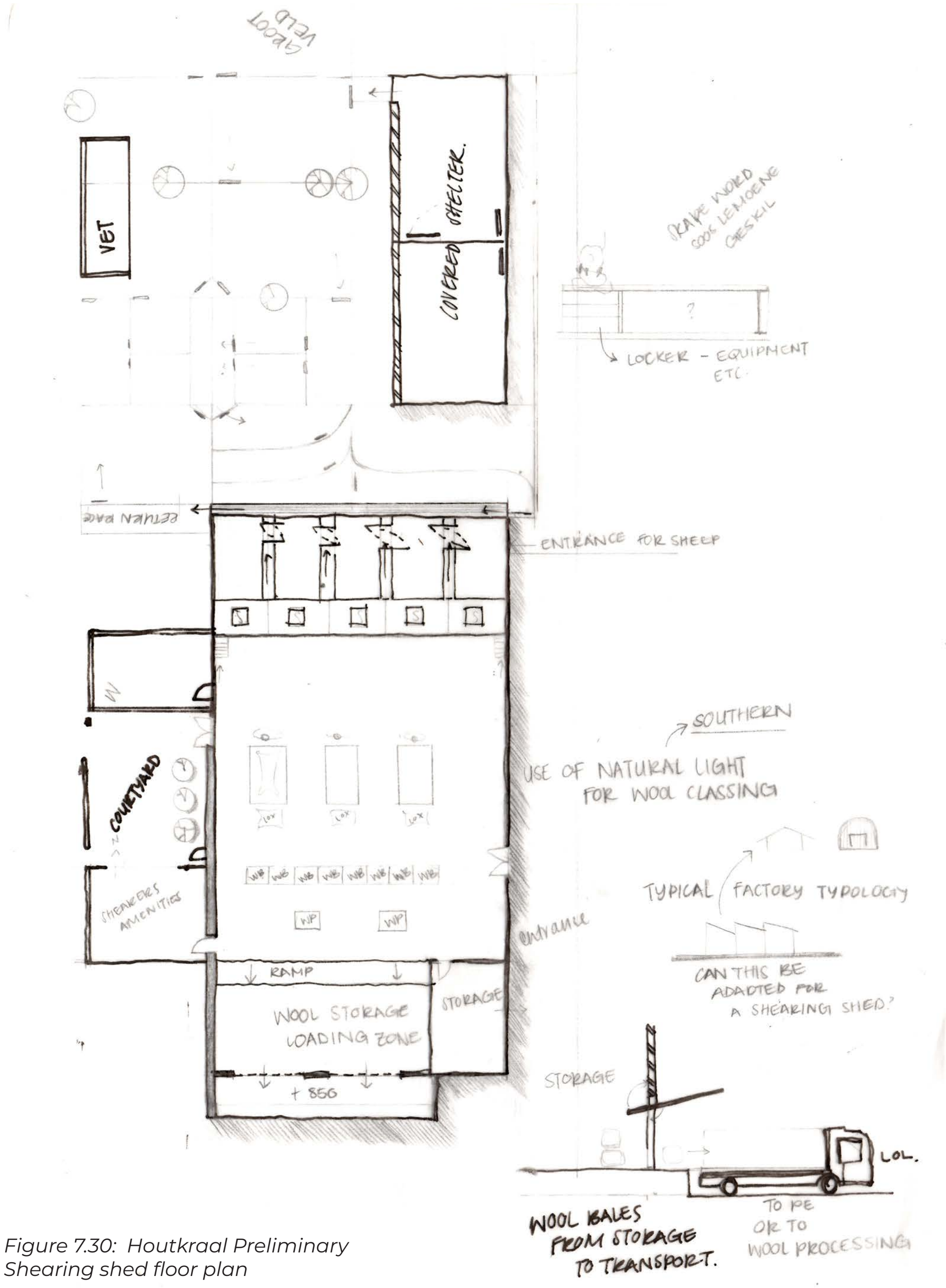


Figure 7.30: Houtkraal Preliminary Shearing shed floor plan

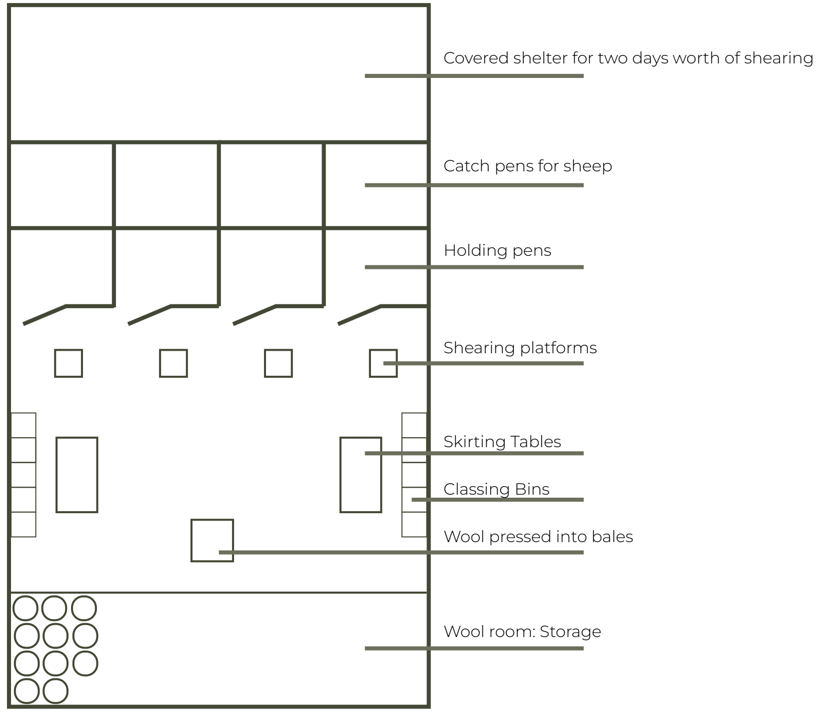
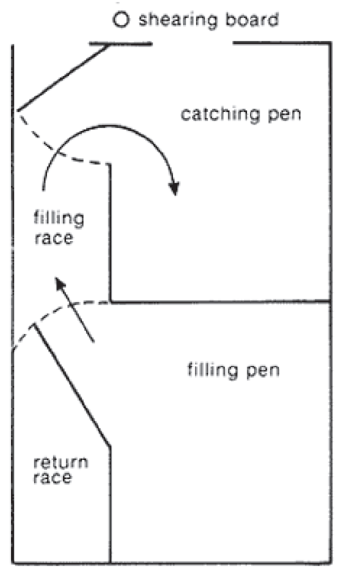
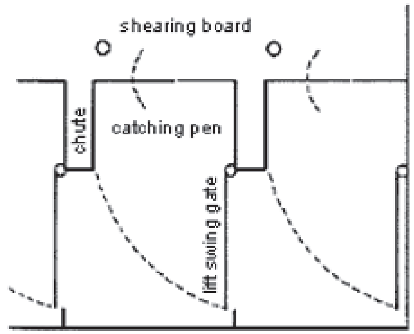


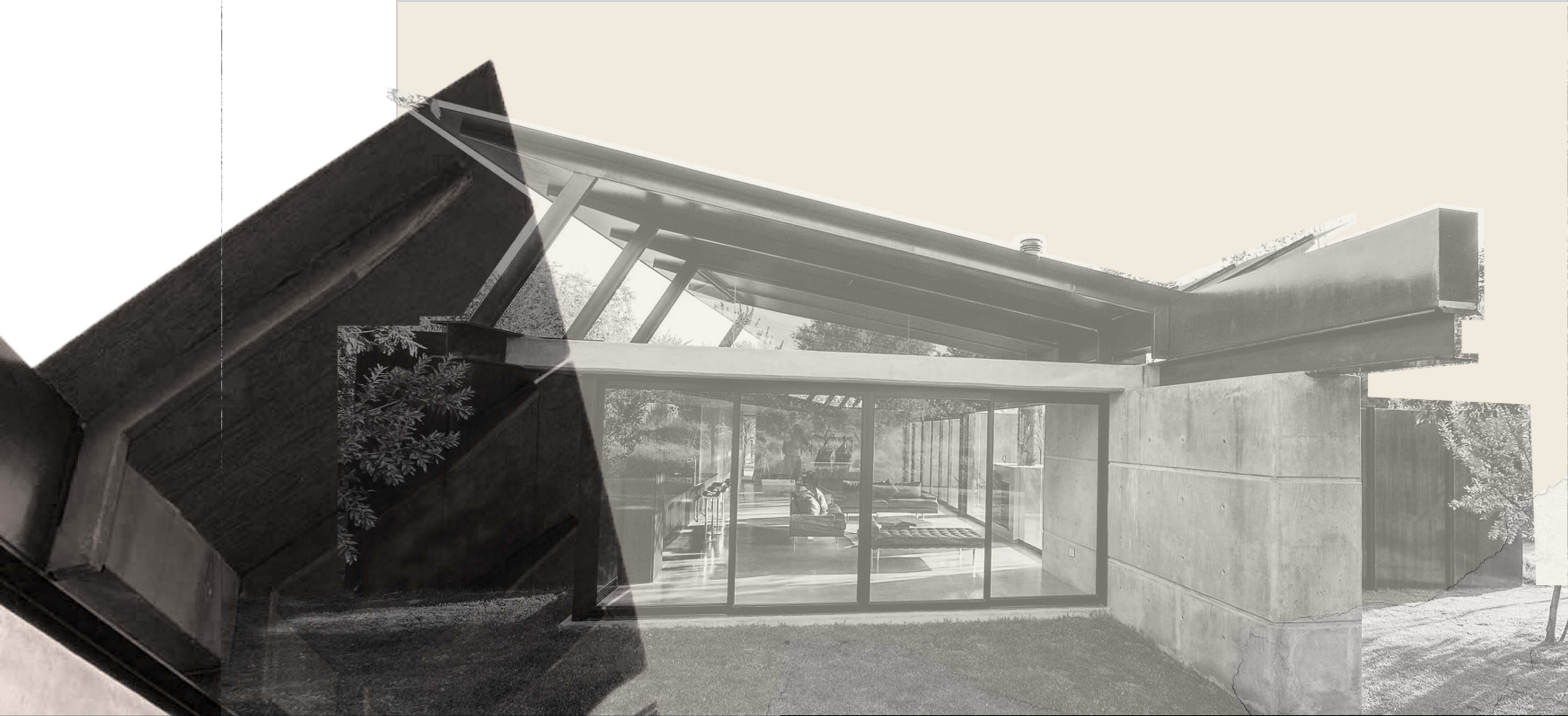
Figure 7.31: Houtkraal Preliminary Shearing shed floor plan (Author, 2023)

Figure 7.32: (Right) Use of a return race catching and filling pen (NSW Government, 2023: online)

Figure 7.33: (Below) Houtkraal Preliminary Shearing shed catching pens and shearing boards ((NSW Government, 2023: online)







1. east sun
2. west sun
3. studio - open
4. cooking - closed
5. west courtyard
6. east clerestorey
7. grove of trees
8. bush
9. mickey guzenick sculpture

vaal estate studio

conceptual section

1. link to existing house
2. entrance
3. studio
4. looking
5. bathing
6. fire place
7. west courtyard + deck
8. existing garage
9. service + security
10. sunsets + bush
11. north bay
12. sunrise + grove of trees
13. eduard villa sculpture
14. mickey guzenick sculpture
15. winter sun
16. views over estate

vaal estate studio

conceptual plan

VAAL ESTATE STUDIO

ELPHICK PROOME, 2007

This precedent study was chosen because of the interesting way the roof was constructed. Using the box gutter in conjunction with the designed butterfly trusses references the shearer in his harness while shearing sheep. The material use in the Vaal Estate Studio by Elphick Proome consists of weathering steel in the structural elements and on the facades. In this case, the box gutter is placed on the edge of the building and, with the thick walls, forms a datum to the floor plan as seen in the figure (Elphick Proome Architects, 2007: online). The building responds to the climate by using thick walls and large windows to the north. The floor plan is simple: the gutter divides the building into a large open "public" or entertaining space, and services are hidden on the other side. In this way, the design of the roof orders the programme within the building (archidatum.com, 2023: online).

Natural light, as will later be discussed, plays an important role in the proposed programme at the Houtkraal wool processing plant. Given that the main axis on the chosen site runs from North to South, most of the new buildings will mainly receive West and East sun on the largest facades. This precedent study proves valuable in allowing natural light to the inside of a building.

Figure 7.34: (Left) The butterfly roof at Vaal Estate Studio by Elphick Proome (eparch.co.za, 2023 :online).
Figure 7.35:Sectional development of the Vaal Estate Studio (archidatum.com, 2023: online)
Figure 7.36: Floor plan of the Vaal Estate Studio (archidatum.com 2023: online)
Figure 7.37: (Right) Referencing the shearer carried in a harness (Author, 2023)

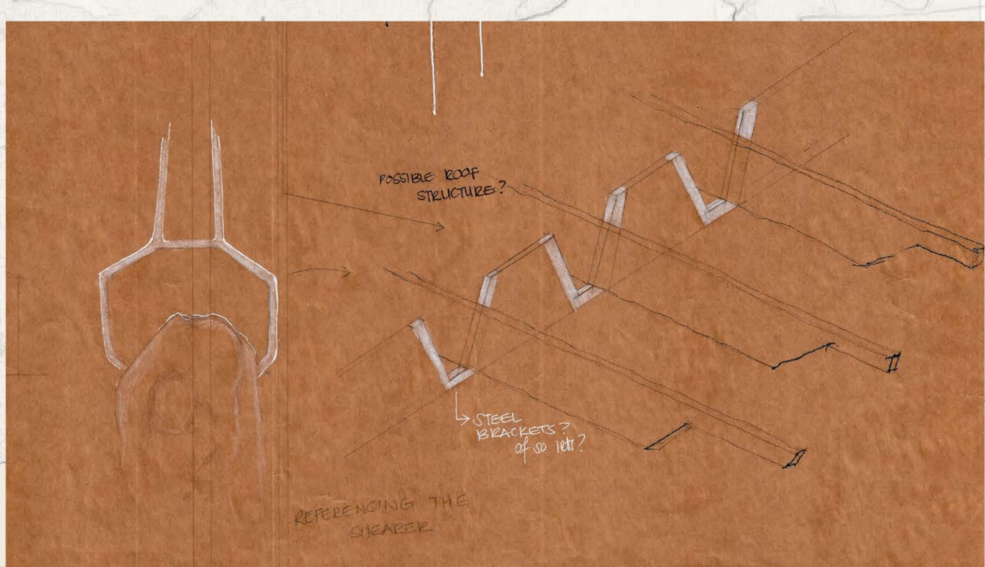



Figure 7.38:Side elevation of Vaal Estate Studio (archidatum.com, 2023: online)


Figure 7.39: Materiality as seen in Vaal Estate Studio (archidatum.com, 2023: online)


Figure 7.40: Public spaces (archidatum.com, 2023: online)


Figure 7.41: Use of concrete (archidatum.com, 2023: online)

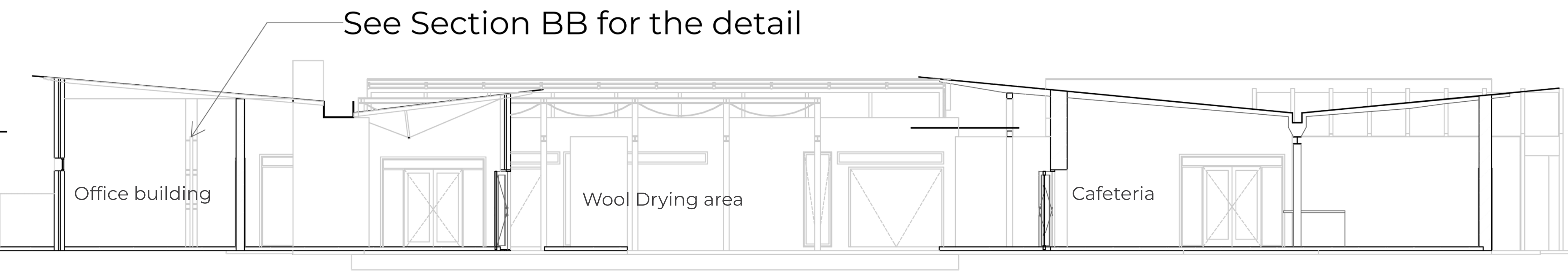


Figure 7.42:Butterfly roofs used in the public spaces in the development of the Houtkraal Wool Processing Facility

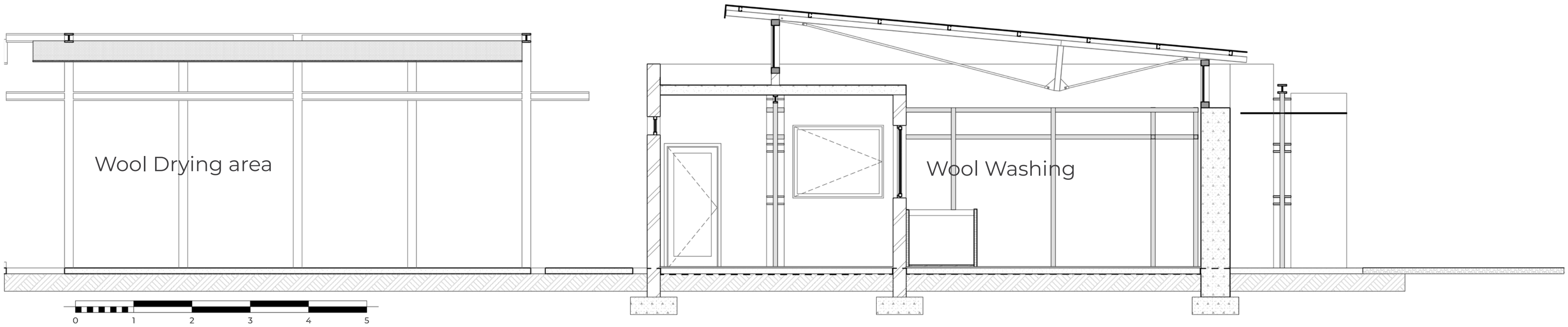


Figure 7.43:The monopitch roof used in the shearing shed and the washing facilities (Author, 2023)

DEVELOPMENT OF TYPOLOGIES USED AT THE HOUTKRAAL WOOL PROCESSING FACILITY

The limitations set out by the rules and the regulations of SANS-3000, which deals with the construction of infrastructure near railway lines, significantly impact the design of the buildings near the railway line. As described earlier, the Karoo's infrastructure and architecture are simple and solid and sits quietly on the earth, in contrast to Glenn Murcutt's famous design methodology of letting buildings "touch the earth lightly".

In the development of the wool processing facility, the design and construction goal was to marry the landscape, realities, narratives and typical Karoo architecture to the industrial nature of the railway line. Referencing the conceptual development and the Construction Touchstone, guidelines like rhythm, tension and tectonics, the promenade and materiality were derived. From this, three different roof typologies were developed, each of which houses a specific function that forms part of the wool processing cycle.

The sections of inverted trusses are usually slender and can span long distances (Pereira, 2018: online). The use of an inverted king post truss coupled with tension cables, as seen below, references the railway line's industrial nature and the processing of wool, spinning the fleece into thread, for example.

The mono-pitch roofs also allow southern light to enter the building, which is appropriate because it is a softer light that causes less eye strain and glare on the wool. The natural light also accurately depicts the quality and colour of wool. The first section is a typical section that is used in the shearing shed, wool sorting area, and wool washing room.

The butterfly roof and the box gutter are used in public areas, like the cafeteria and the new station building, while the skylights are utilised in the processing areas. Since the datum of the design development runs longitudinally over the site, it means that the buildings mostly receive eastern and western light during the day. As seen in the section, the skylights allow indirect north and south light into the building. The skylights also contribute to the effect of the visual rhythm, that is only visible when viewing the building from a train of from a platform.

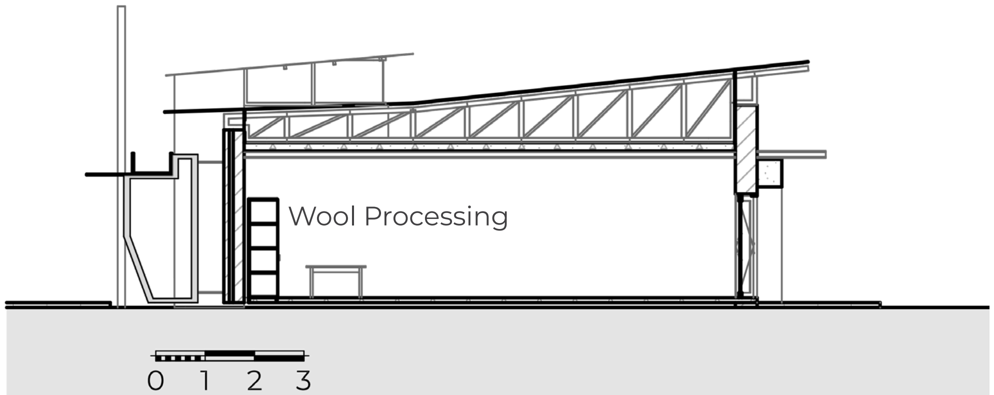
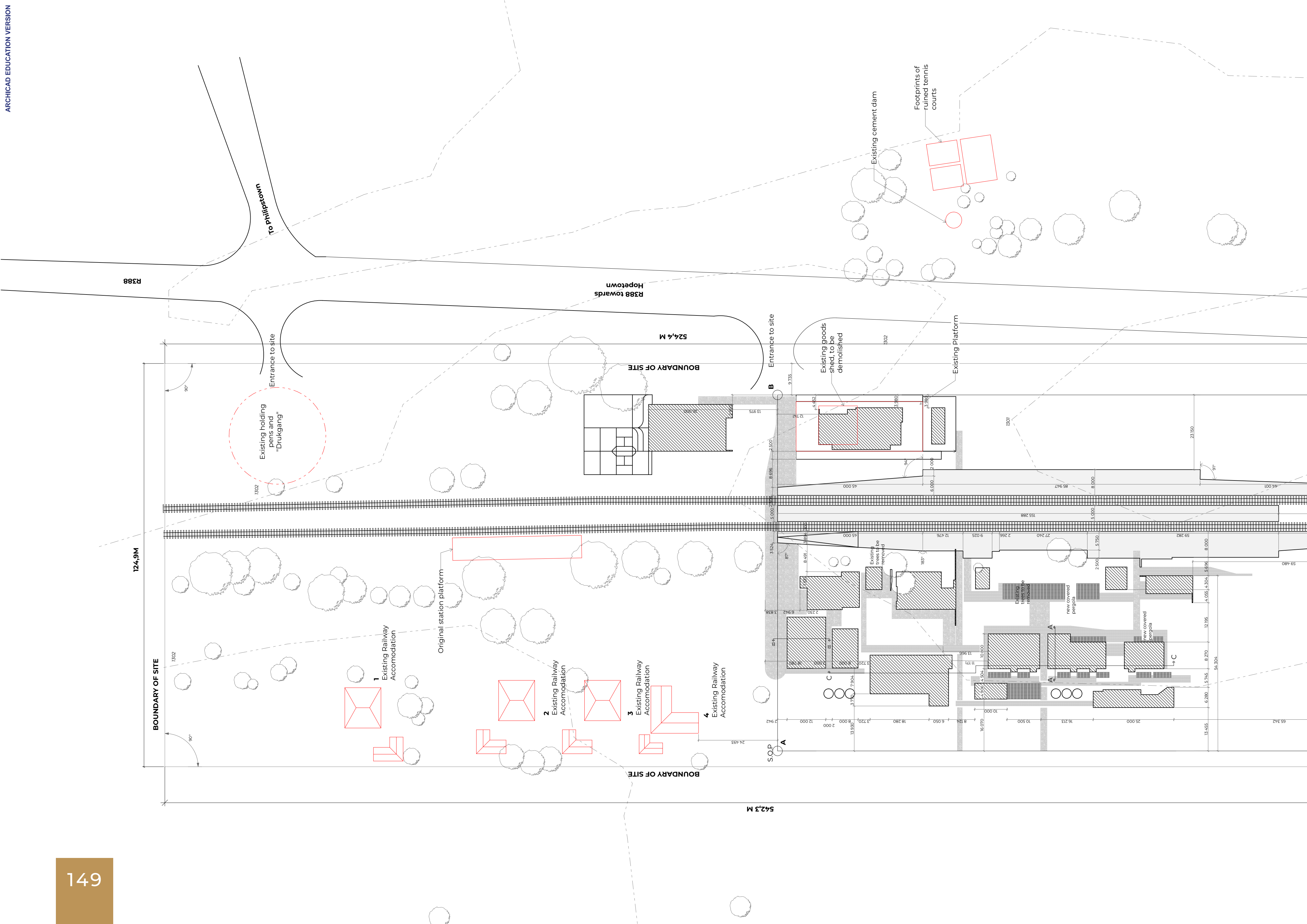
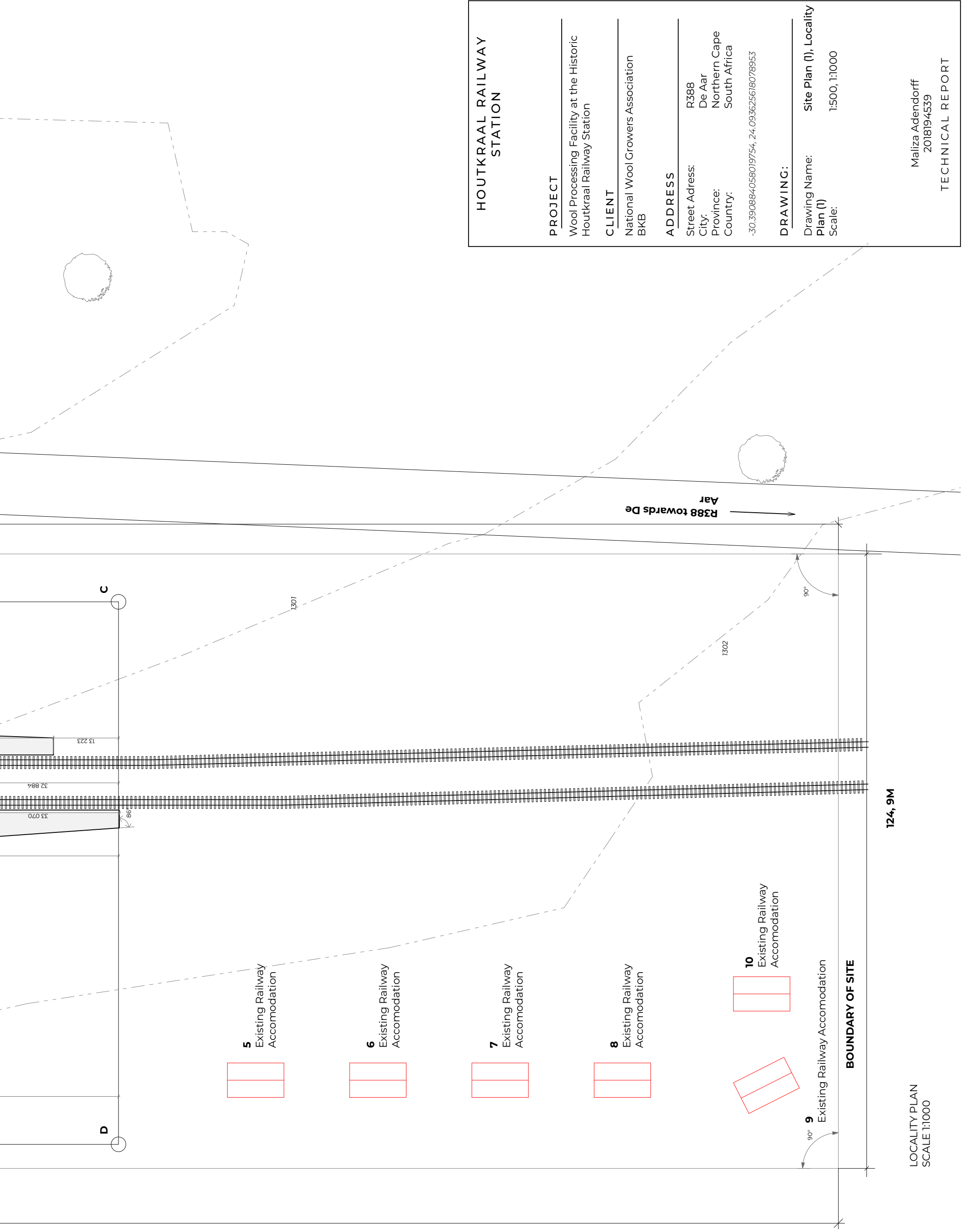
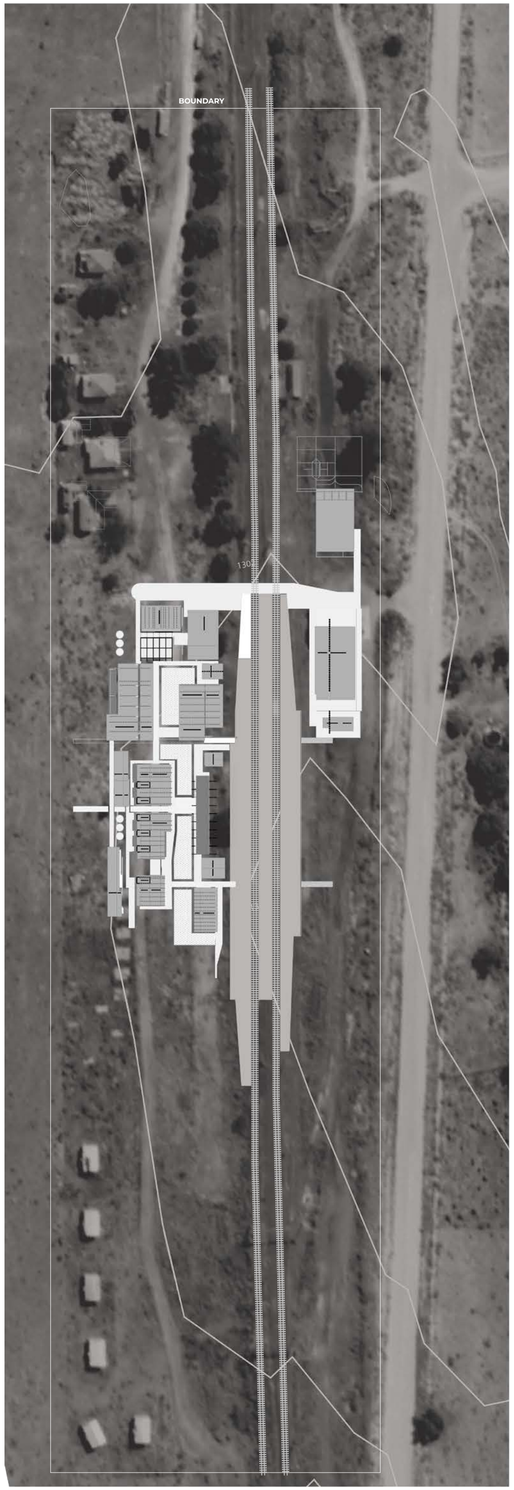


Figure 7.44:Skylights as used in the wool processing buildings (Author, 2023)

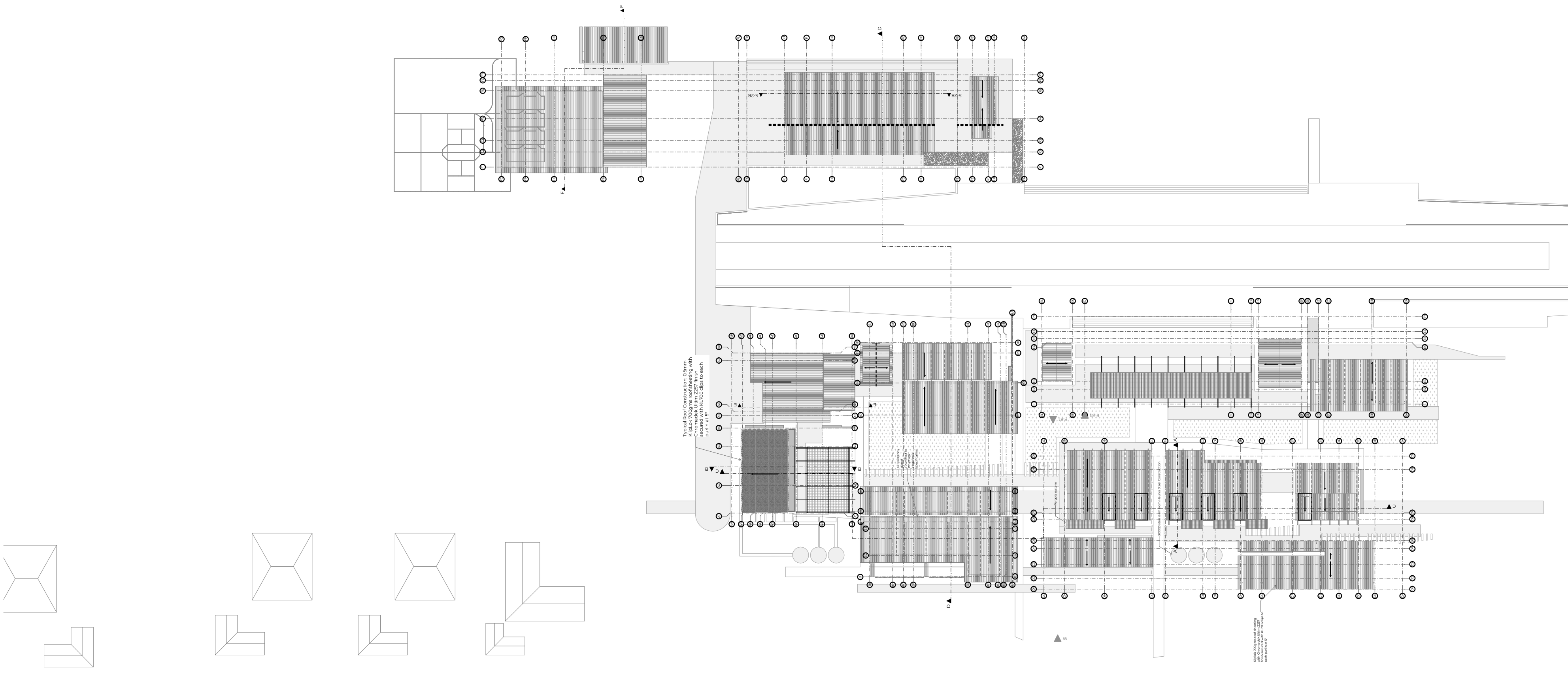


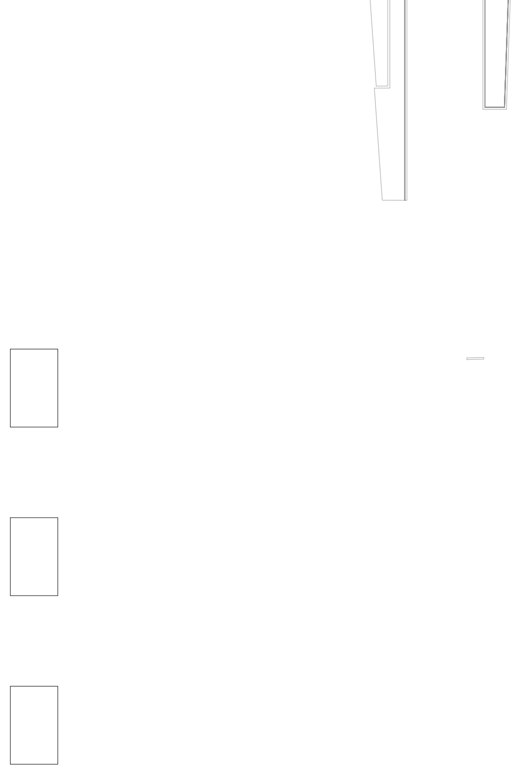
To Philipstown
R388
R388 towards Hopetown
524,4 M
BOUNDARY OF SITE
Entrance to site
Existing holding pens and "Drukgang"
Entrance to site
Existing goods shed, to be demolished
Existing Platform
Existing cement dam
Footprints of ruined tennis courts
124,9M
BOUNDARY OF SITE
Original station platform
1 Existing Railway Accomodation
2 Existing Railway Accomodation
3 Existing Railway Accomodation
4 Existing Railway Accomodation
Existing trees to be removed
new covered pergola
S.O.P
BOUNDARY OF SITE
542,3 M





LOCALITY PLAN
SCALE 1:2000





HOUTKRAAL RAILWAY STATION

PROJECT

Wool Processing Facility at the Historic Houtkraal Railway Station

CLIENT

National Wool Growers Association
BKB

ADDRESS

Street Adress:	R388
City:	De Aar
Province:	Northern Cape
Country:	South Africa

-30.390884058019754, 24.093625618078953

DRAWING:

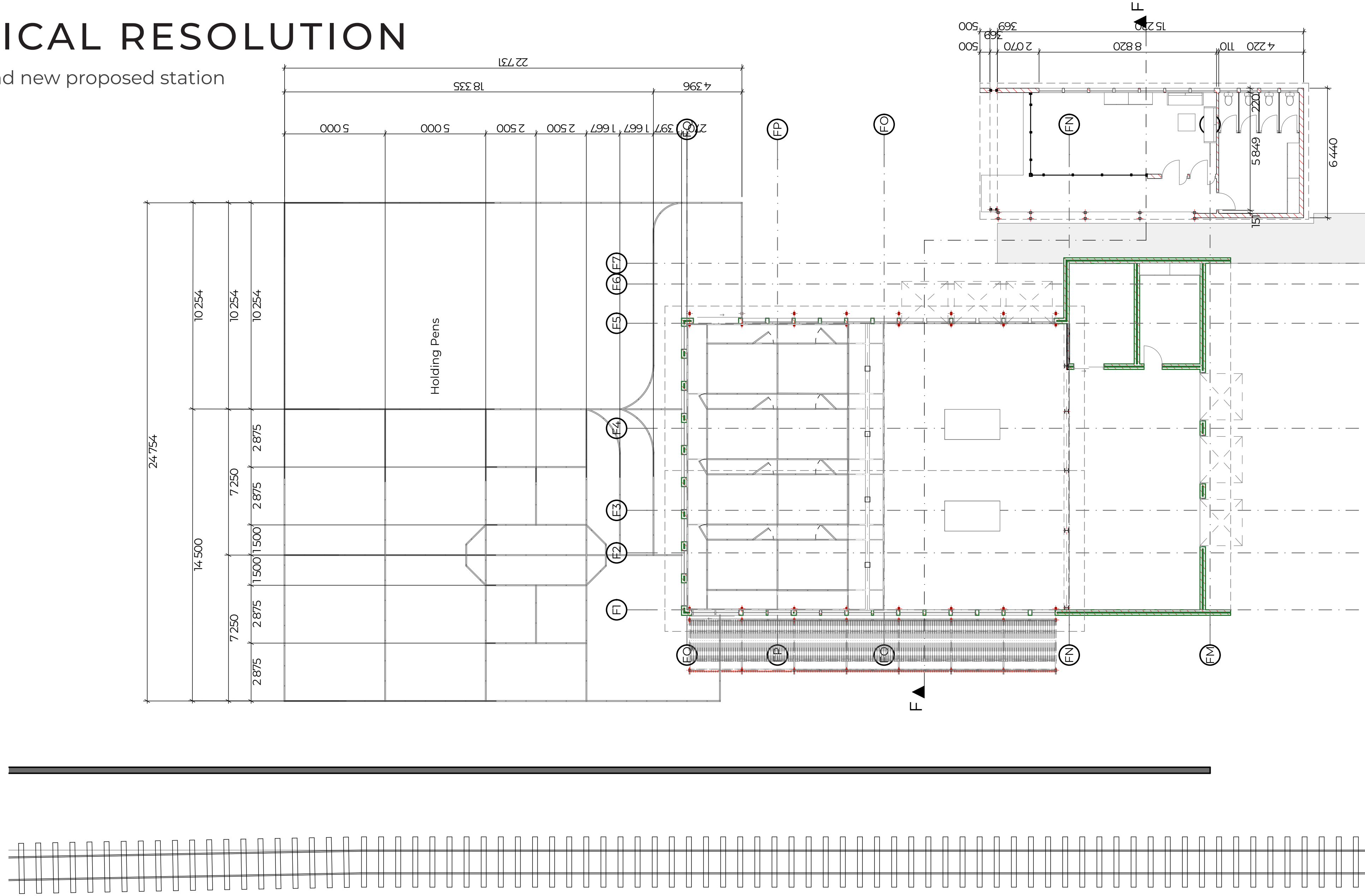
Drawing Name:	**Roof Plan**
Scale:	1:500

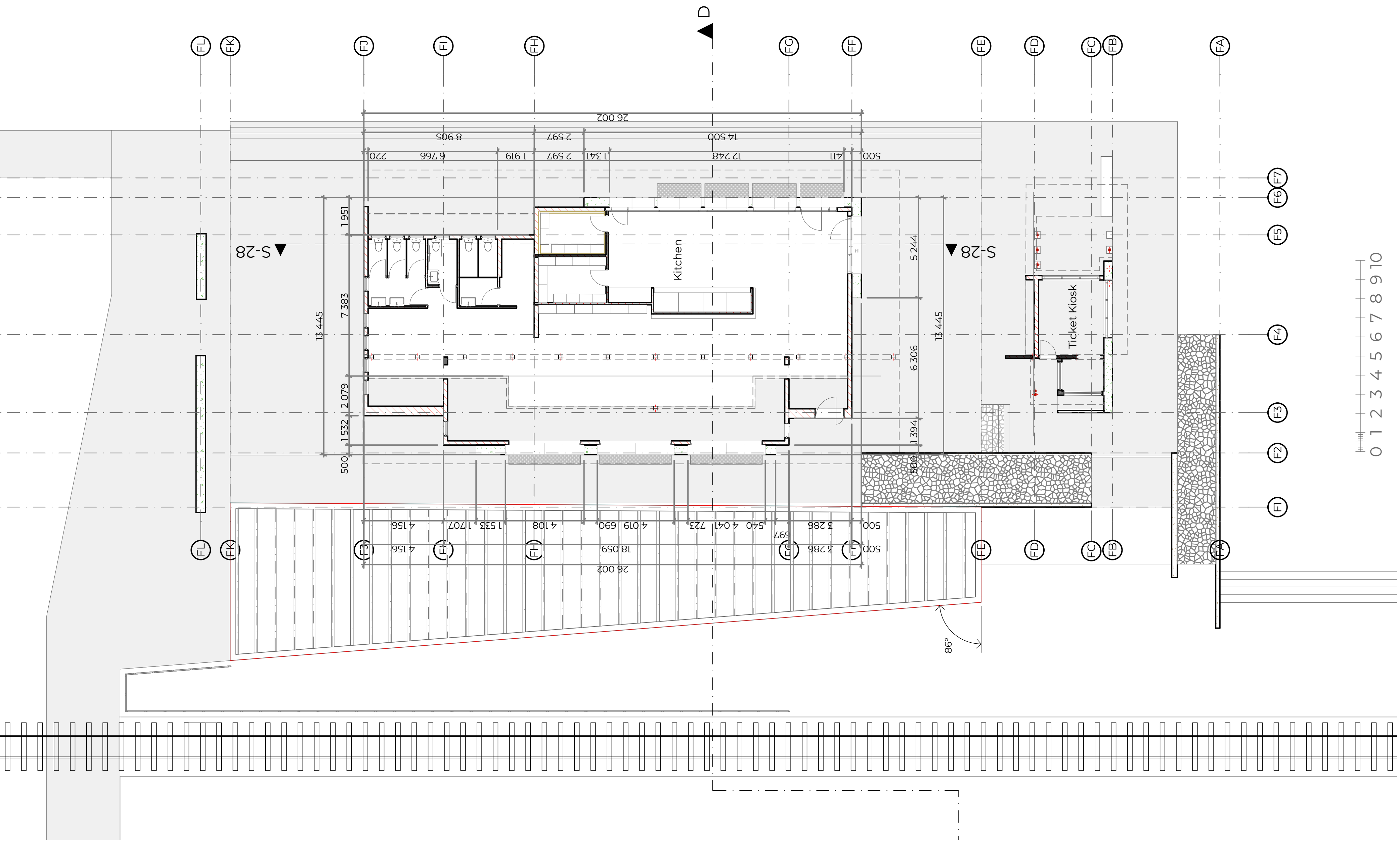
Maliza Adendorff
2018194539

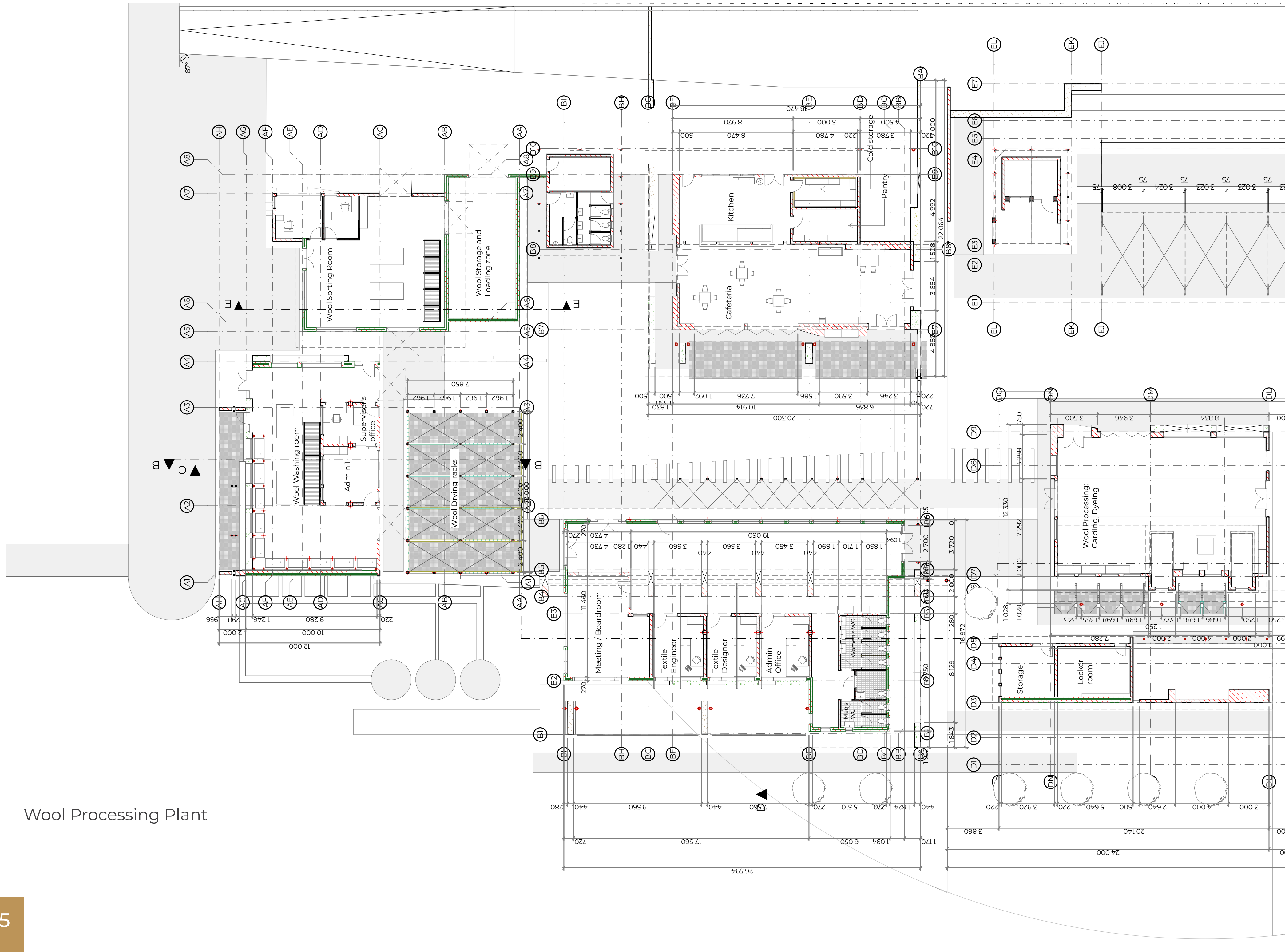
TECHNICAL REPORT

TECHNICAL RESOLUTION

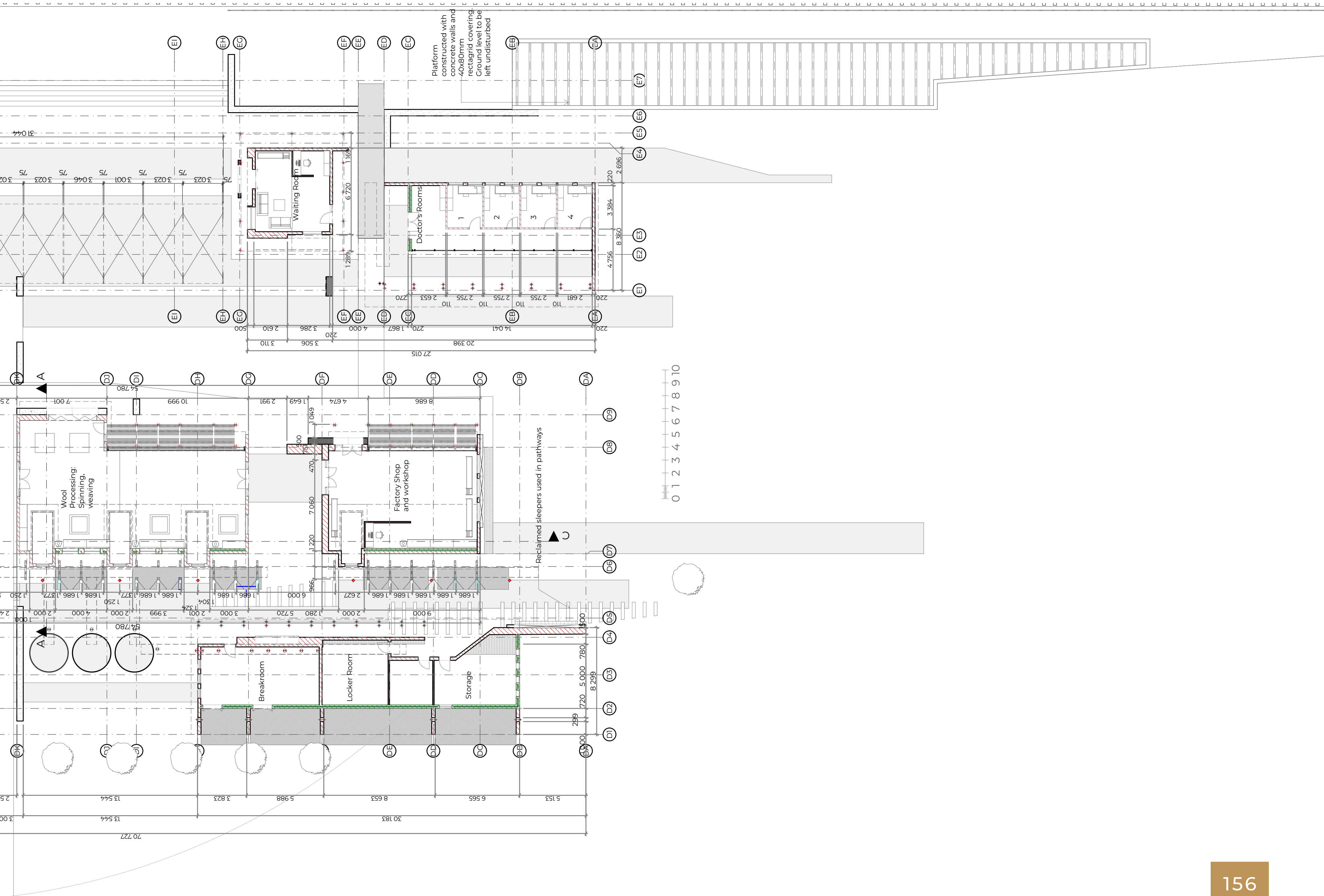
Holding pens and new proposed station building

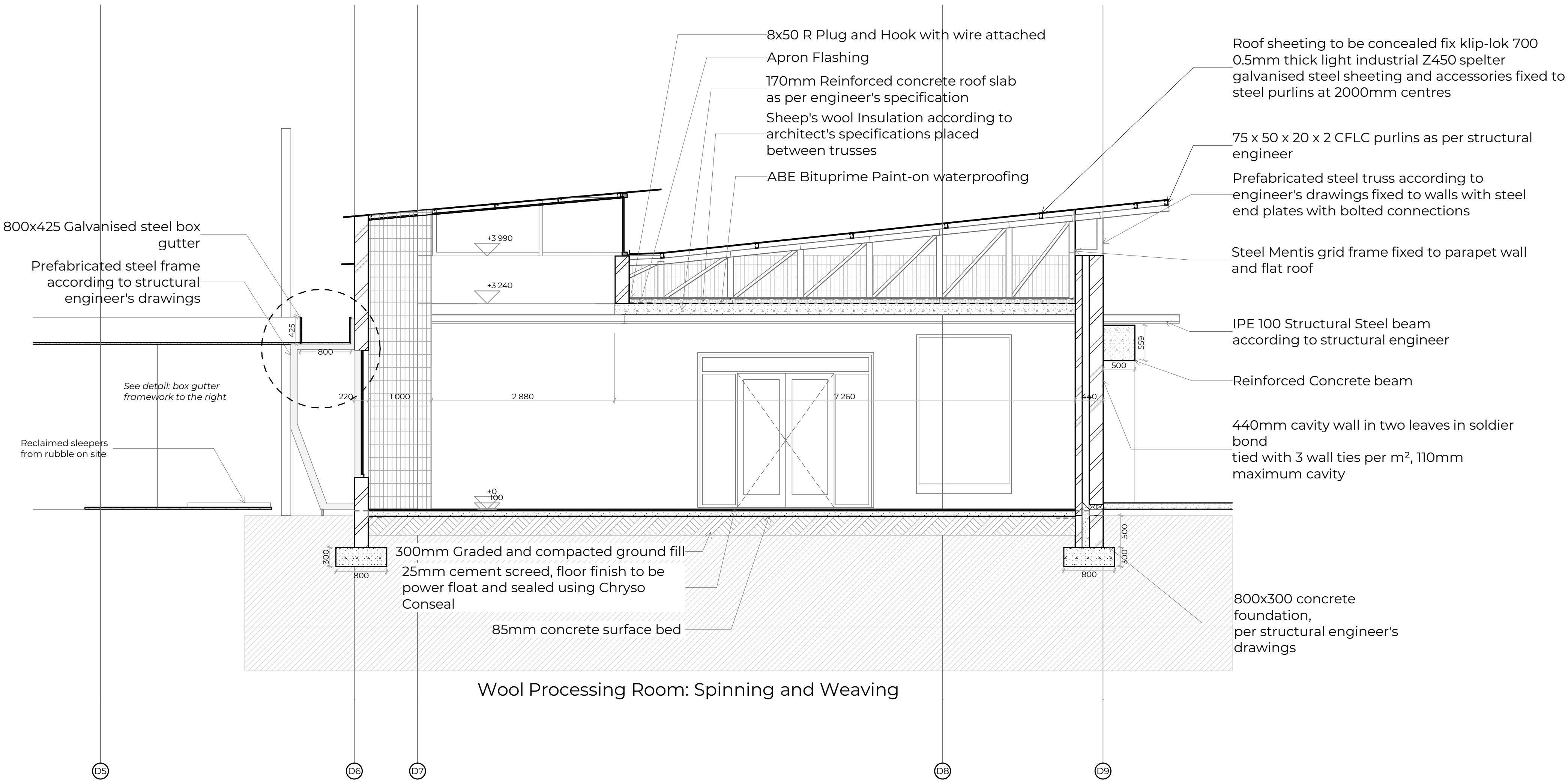



D
S-28
S-28
Kitchen
Ticket Kiosk
26 002
8 905
2 597
14 500
13 445
86°



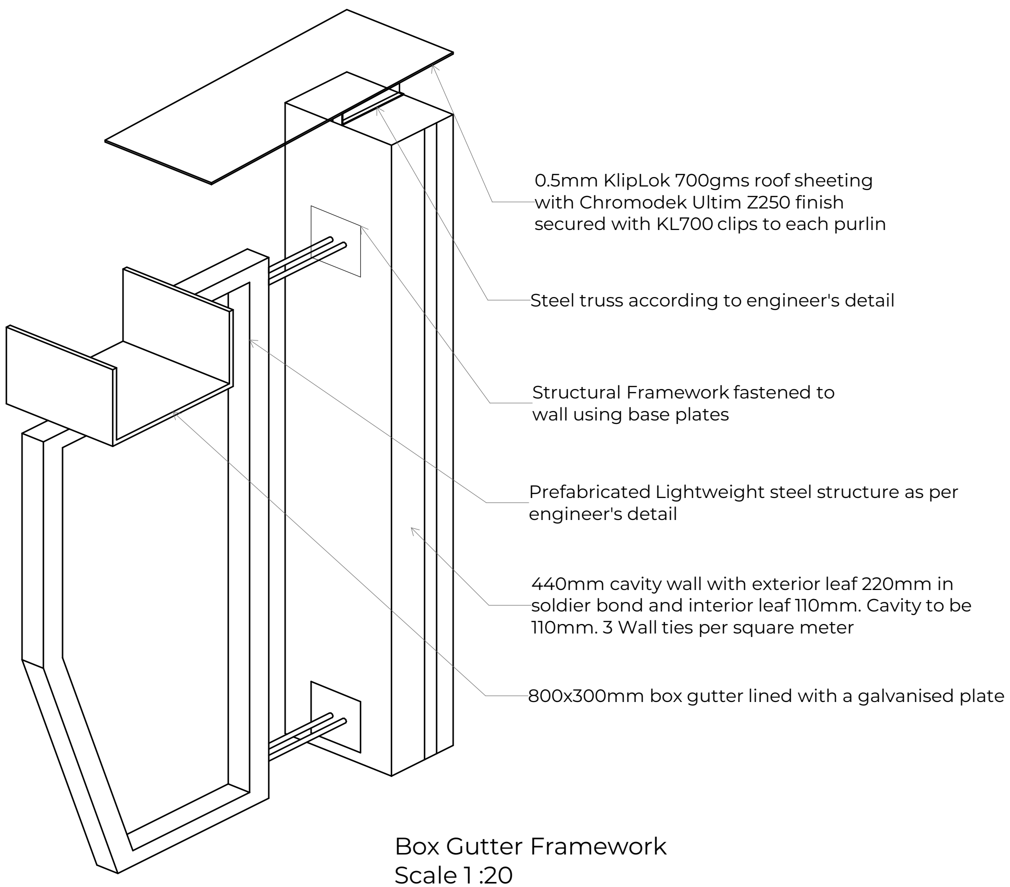
Wool Processing Plant


Platform constructed with concrete walls and 40x80mm rectagrid covering. Ground level to be left undisturbed
Waiting Room
Doctor's Rooms
1
2
3
4
Wool Processing: Spinning, weaving
Factory Shop and workshop
Reclaimed sleepers used in pathways
Breakroom
Locker Room
Storage
0 1 2 3 4 5 6 7 8 9 10

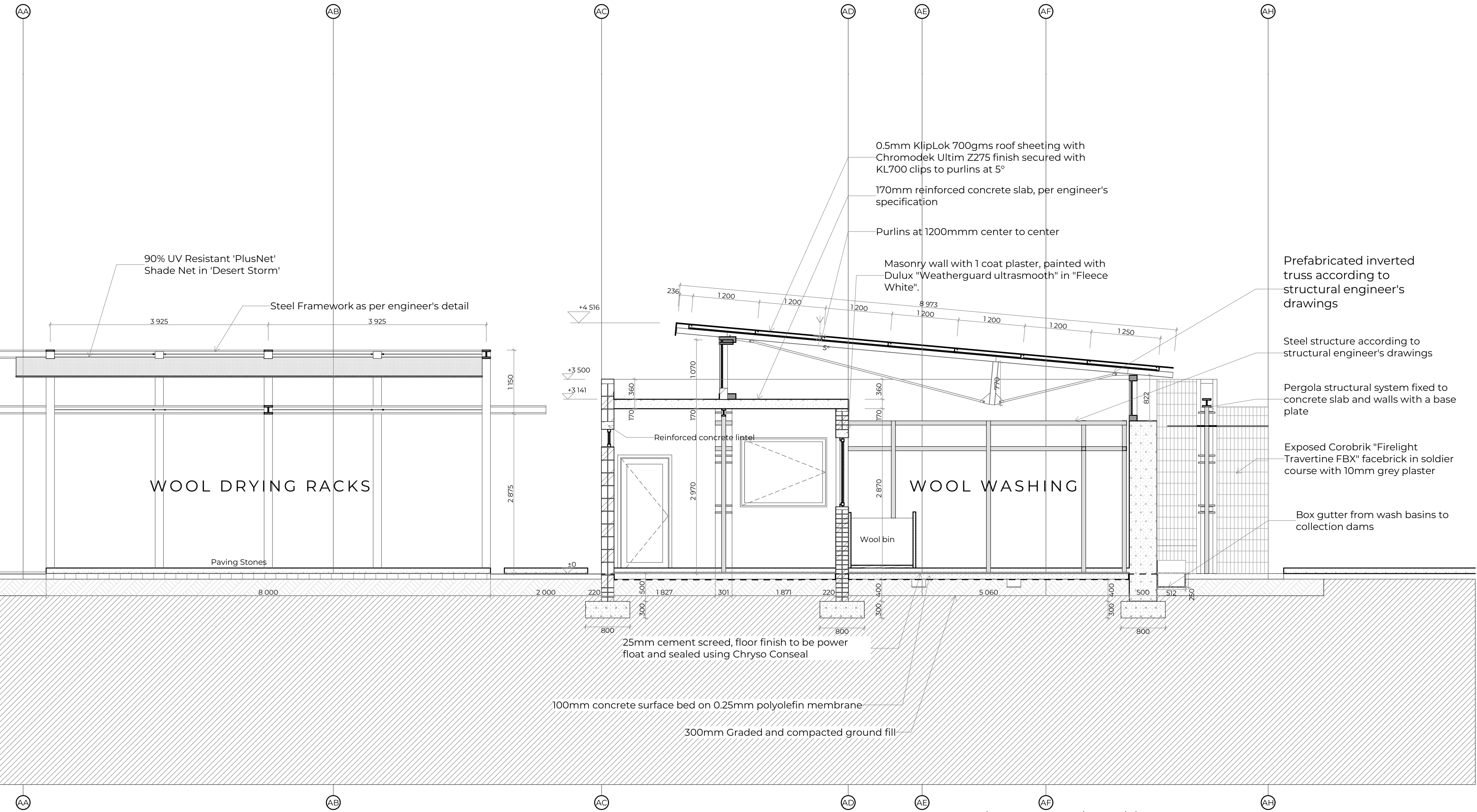


Wool Processing Room: Spinning and Weaving

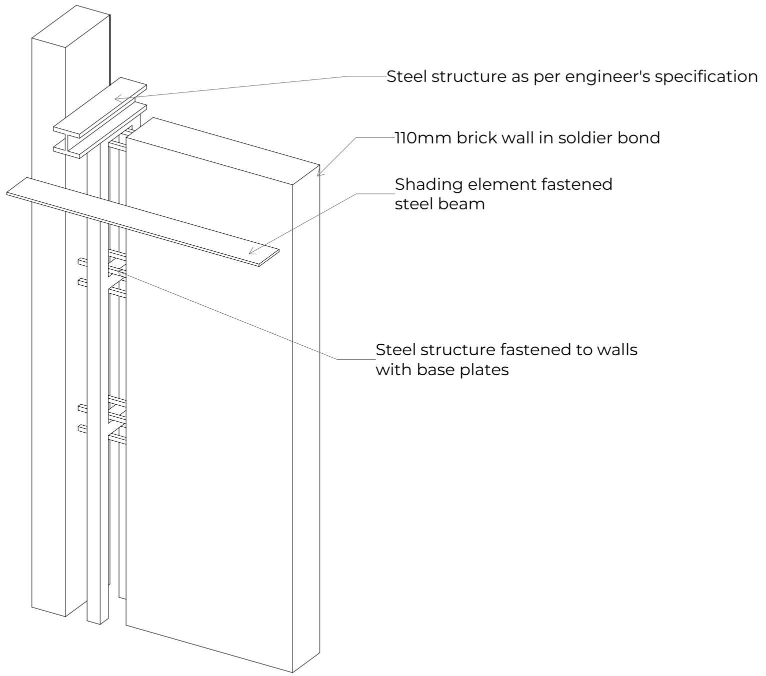
Section AA: Wool processing
Scale 1 : 50

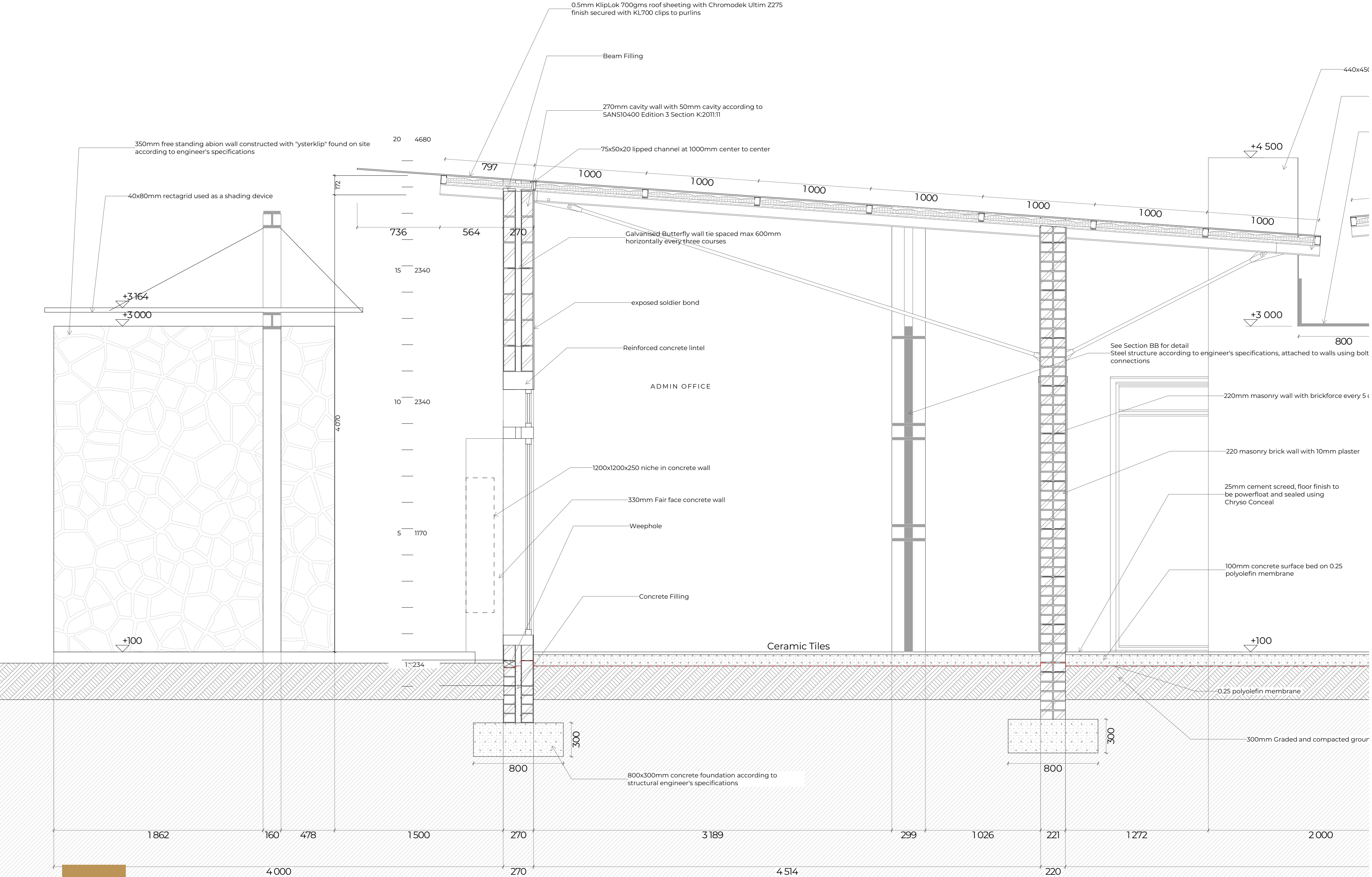


Box Gutter Framework
Scale 1 :20

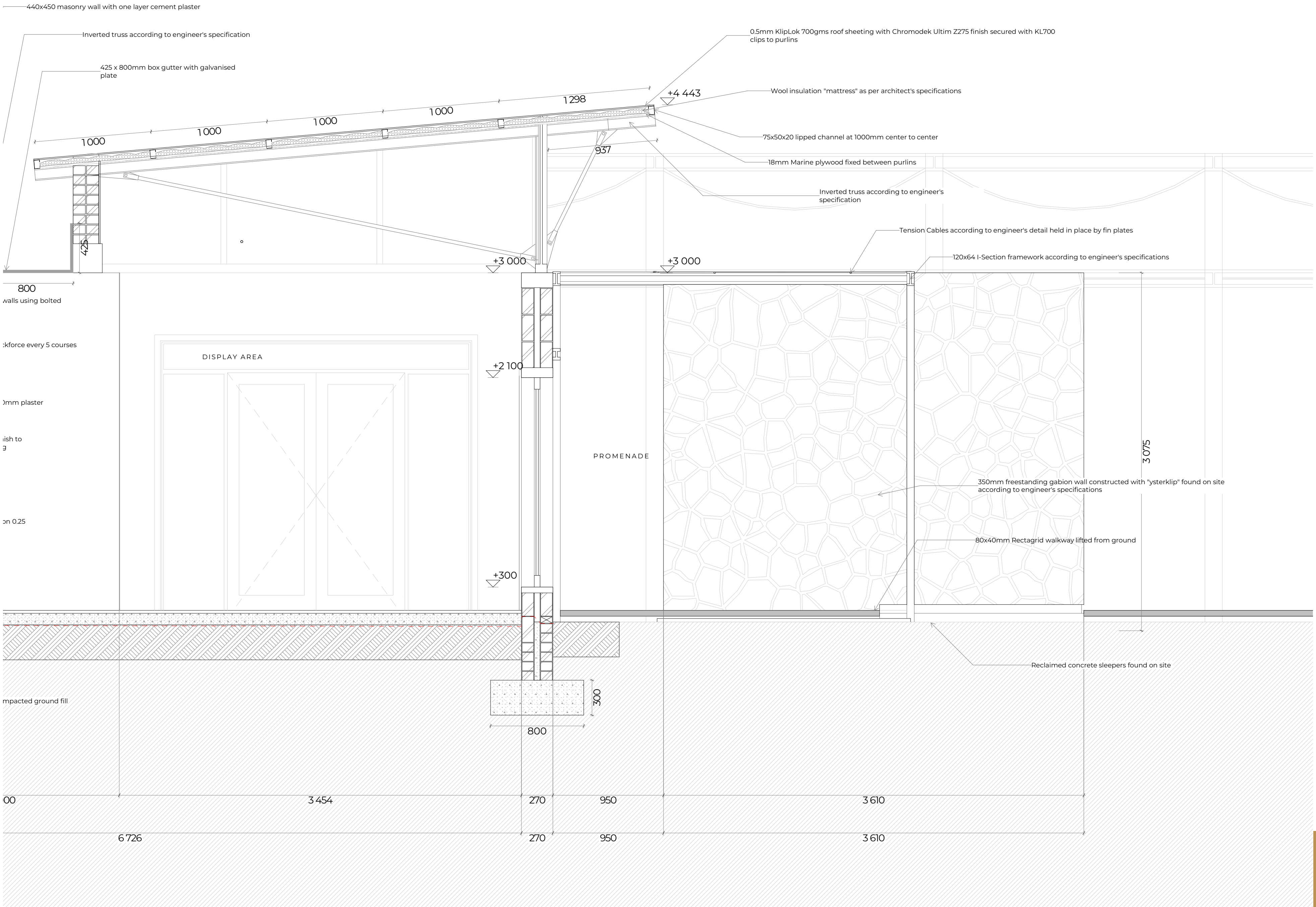


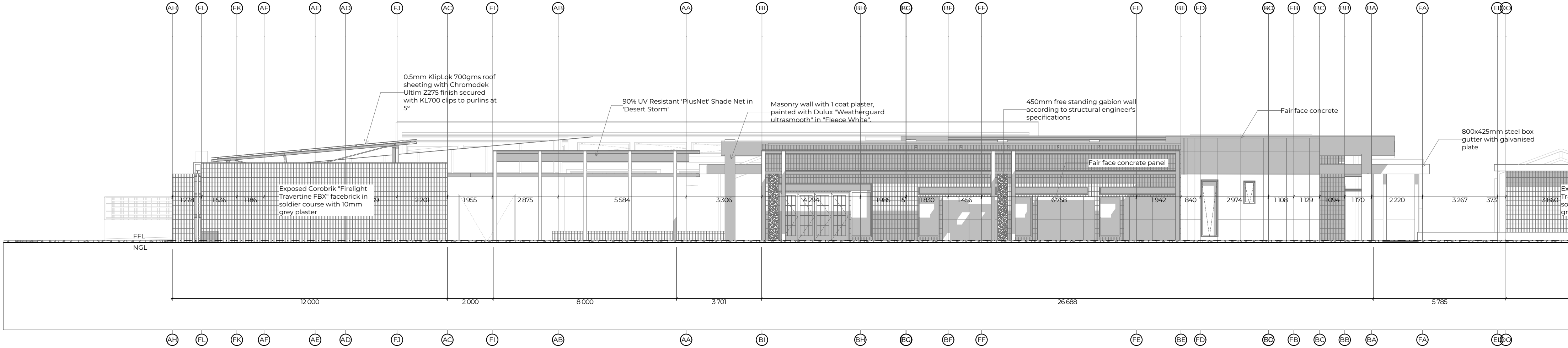
Section BB: Wool Washing
Scale 1 : 50


Steel structure as per engineer's specification
110mm brick wall in soldier bond
Shading element fastened
steel beam
Steel structure fastened to walls
with base plates



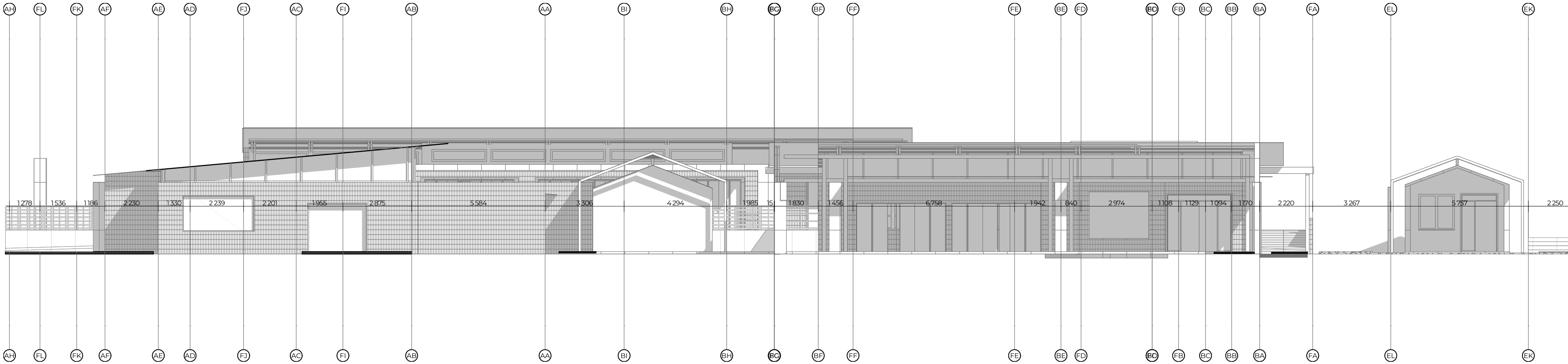
0.5mm KlipLok 700gms roof sheeting with Chromodek Ultim Z275 finish secured with KL700 clips to purlins
Beam Filling
270mm cavity wall with 50mm cavity according to SANS10400 Edition 3 Section K:2011:11
75x50x20 lipped channel at 1000mm center to center
350mm free standing abion wall constructed with "ysterklip" found on site according to engineer's specifications
40x80mm rectagrid used as a shading device
Galvanised Butterfly wall tie spaced max 600mm horizontally every three courses
exposed soldier bond
Reinforced concrete lintel
ADMIN OFFICE
See Section BB for detail
Steel structure according to engineer's specifications, attached to walls using bolt connections
220mm masonry wall with brickforce every 5 c
220 masonry brick wall with 10mm plaster
25mm cement screed, floor finish to be powerfloat and sealed using Chryso Conceal
1200x1200x250 niche in concrete wall
330mm Fair face concrete wall
Weephole
100mm concrete surface bed on 0.25 polyolefin membrane
Concrete Filling
Ceramic Tiles
0.25 polyolefin membrane
300mm Graded and compacted groun
800x300mm concrete foundation according to structural engineer's specifications
440x450
+4 500
+3 164
+3 000
+100
797
1000
736
564
270
800
300
1 862
160
478
1 500
3 189
299
1 026
221
1 272
2 000
4 000
4 514
220


440x450 masonry wall with one layer cement plaster
Inverted truss according to engineer's specification
425 x 800mm box gutter with galvanised plate
0.5mm KlipLok 700gms roof sheeting with Chromodek Ultim Z275 finish secured with KL700 clips to purlins
Wool insulation "mattress" as per architect's specifications
75x50x20 lipped channel at 1000mm center to center
18mm Marine plywood fixed between purlins
Inverted truss according to engineer's specification
Tension Cables according to engineer's detail held in place by fin plates
120x64 I-Section framework according to engineer's specifications
350mm freestanding gabion wall constructed with "ysterklip" found on site according to engineer's specifications
80x40mm Rectagrid walkway lifted from ground
Reclaimed concrete sleepers found on site
walls using bolted
:kforce every 5 courses
)mm plaster
ish to
g
on 0.25
mpacted ground fill
DISPLAY AREA
PROMENADE
+4 443
+3 000
+3 000
+2 100
+300
1 000
1 000
1 000
1 000
1 298
937
425
800
3 075
300
800
00
3 454
270
950
3 610
6 726
270
950
3 610


0.5mm KlipLok 700gms roof sheeting with Chromodek Ultim Z275 finish secured with KL700 clips to purlins at 5°
90% UV Resistant 'PlusNet' Shade Net in 'Desert Storm'
Masonry wall with 1 coat plaster, painted with Dulux "Weatherguard ultrasmooth" in "Fleece White".
450mm free standing gabion wall according to structural engineer's specifications
Fair face concrete
800x425mm steel box gutter with galvanised plate
Fair face concrete panel
Exposed Corobrik "Firelight Travertine FBX" facebrick in soldier course with 10mm grey plaster
FFL
NGL
12 000
2 000
8 000
3 701
26 688
5 785

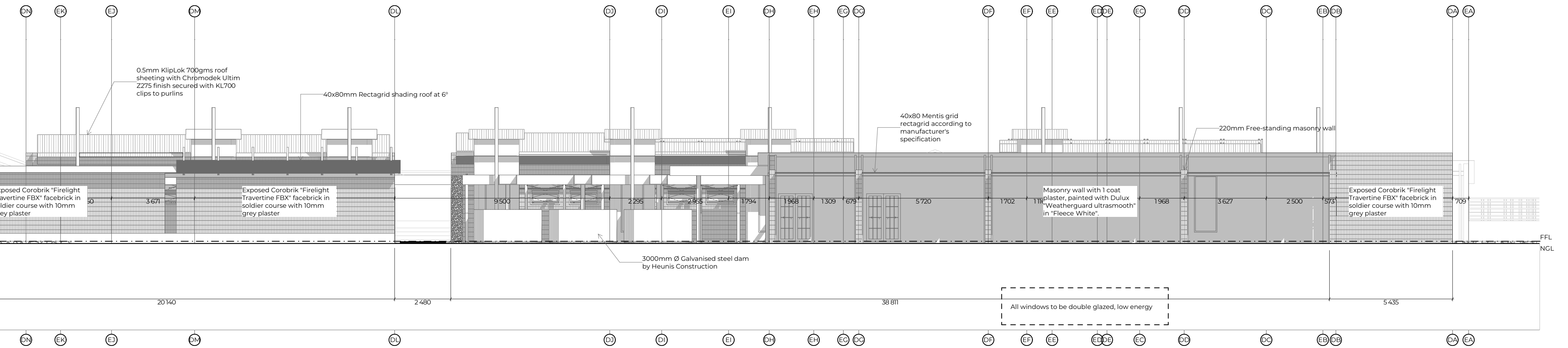
W

West

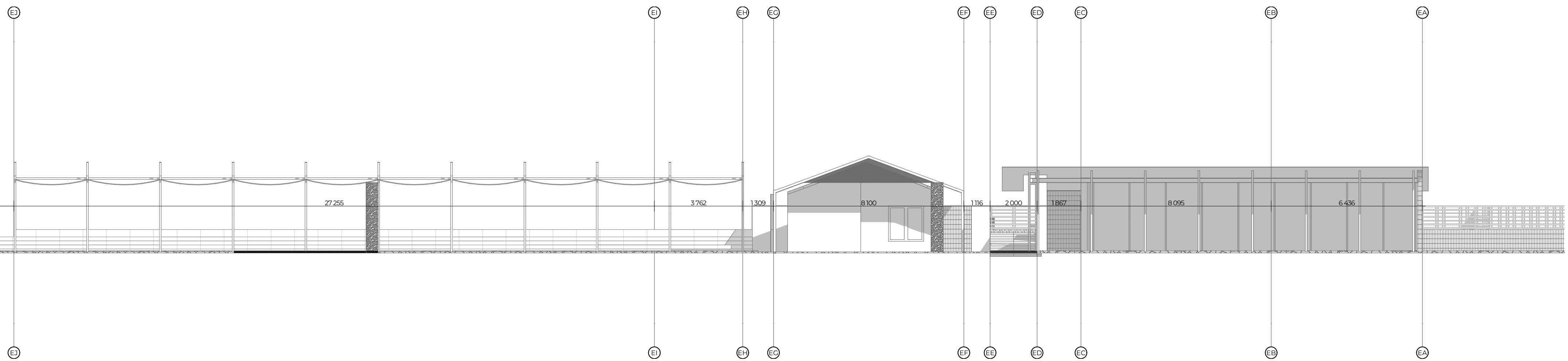


E-63

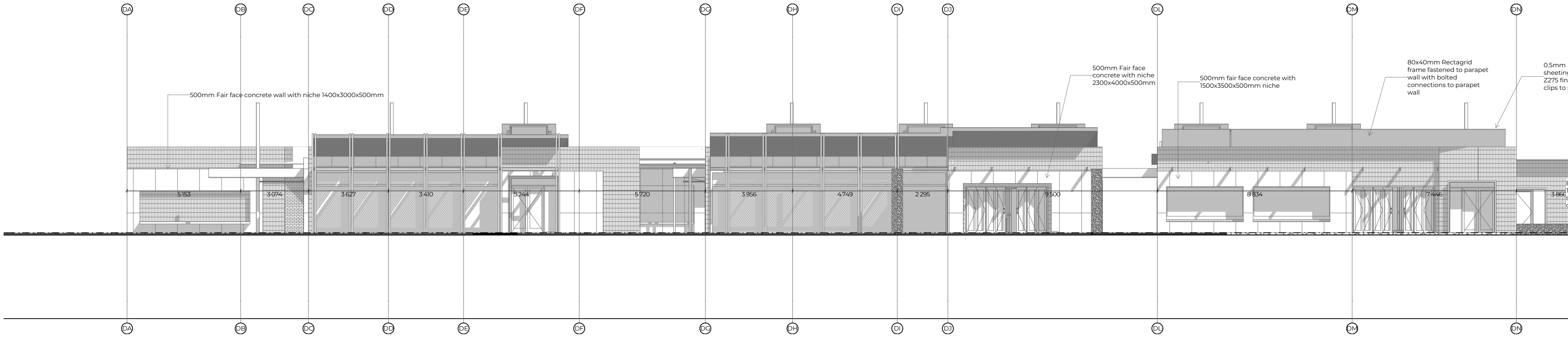
El



: Elevation 1:100



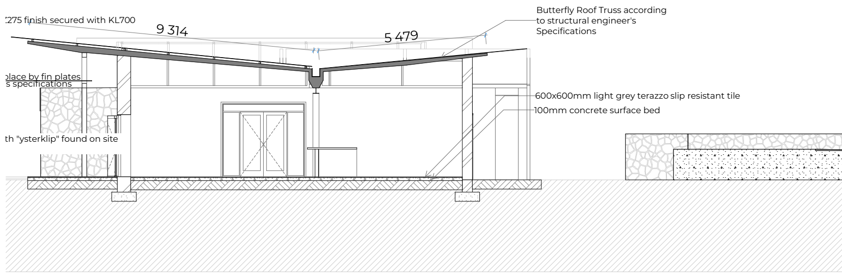
evation 1:100



E-61

Elevation

PUBLIC CAFETERIA



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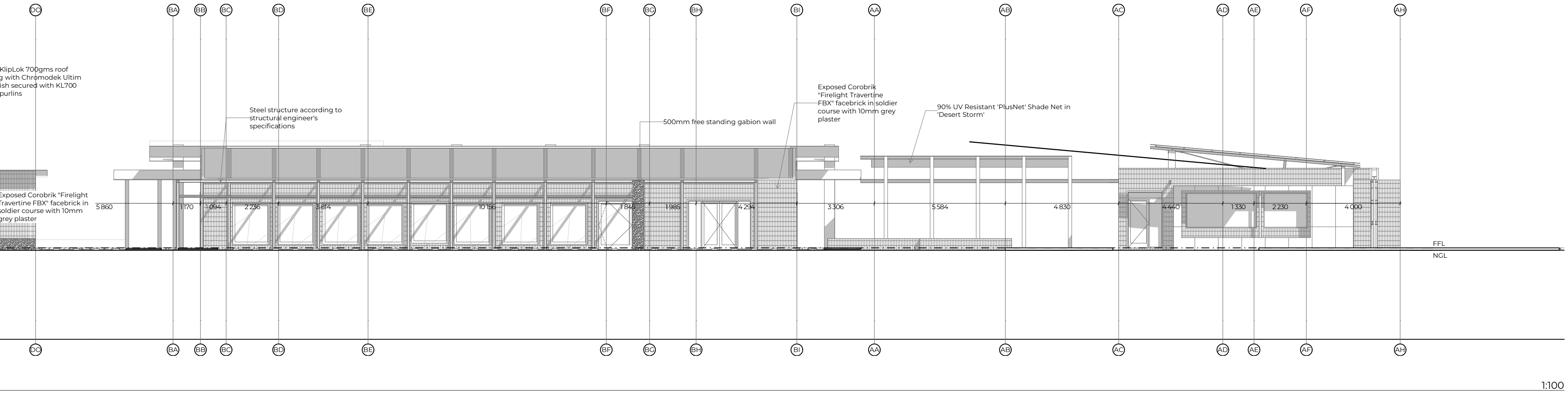
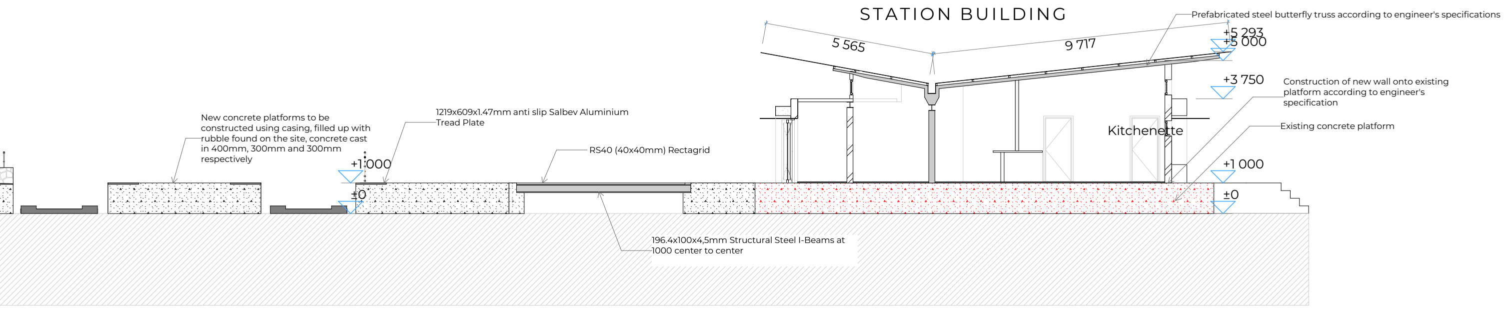




Building Section (4) 1:100

HOUTKRAAL RAILWAY STATION

PROJECT

Wool Processing Facility at the Historic Houtkraal Railway Station

CLIENT

National Wool Growers Association BKB

ADDRESS

Street Adress:	R388
City:	De Aar
Province:	Northern Cape
Country:	South Africa

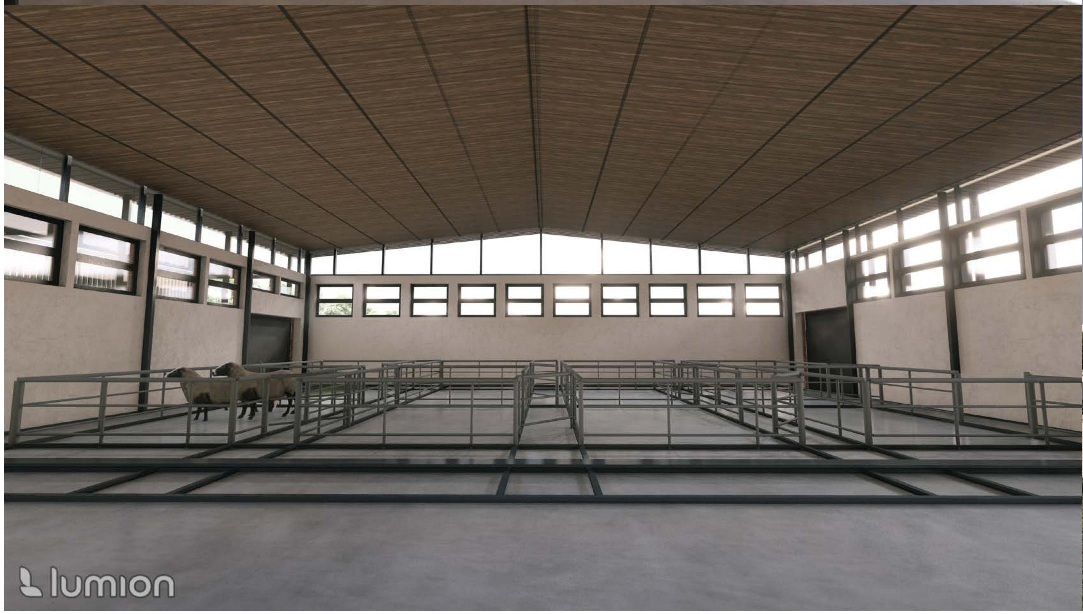
-30.390884058019754, 24.093625618078953

DRAWING:

Drawing Name: **West Elevation, Elevation, Building Section (4)**
Scale: 1:100

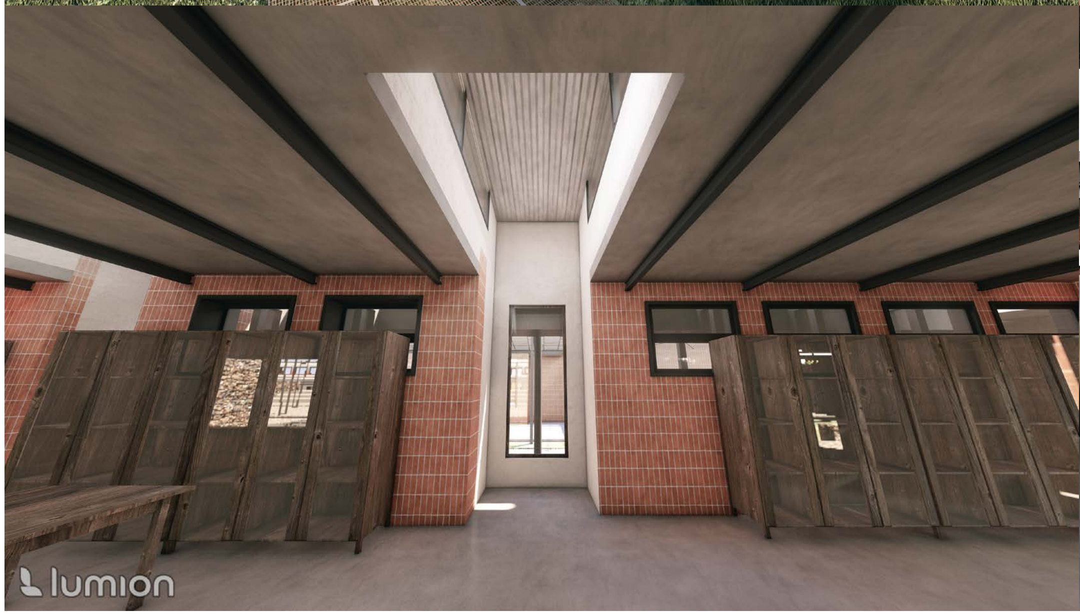
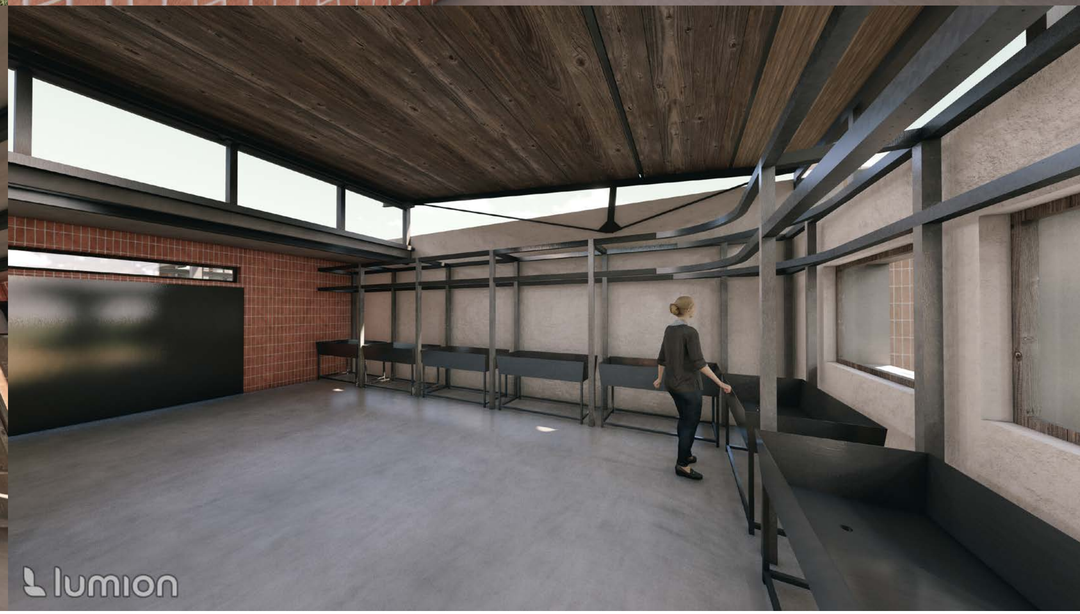
Maliza Adendorff
2018194539

TECHNICAL REPORT





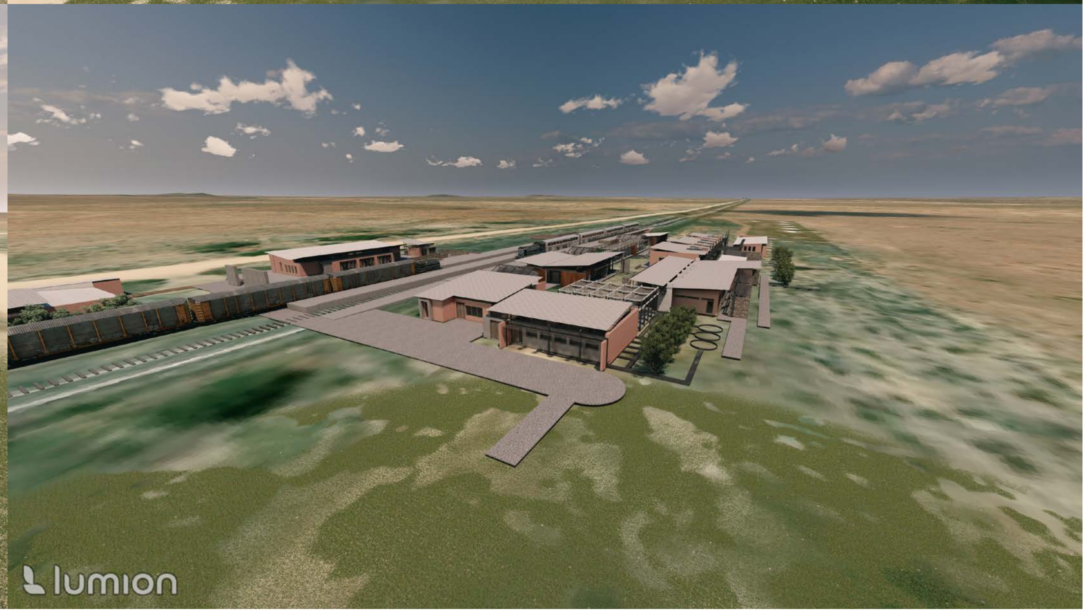














lumion

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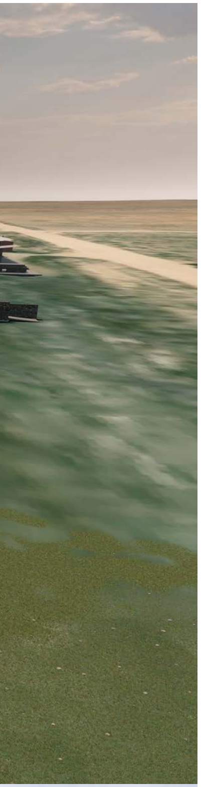

TYING UP LOOSE ENDS

CONCLUSION AND REFLECTION

The act of sheep shearing is an old and simple tradition, yet the shearers carry this dignity of a day's hard work in their bones and in their bodies like a sheep carries lanolin, a patina of care. The Patina of Care, now established as careful and mindful interaction and participation with a place, had no more grateful recipient than myself, with my city attitude and the BKB cap that did not belong to me. I found that the meaningful interaction with places and with the rituals, narratives and realities makes one a part of the place and layers that place with one's own ideas and experiences, as was also described as the "patina of addition".

Regarding the Karoo vernacular, the design process focused on the restraint of the Karoo Buildings "sitting quietly" and the relationship that this architectural stance could have with the industrial and dynamic nature of the site. This was explored in the development of the sections. The railway and the historic site were challenging to design because of all the existing axes that seemed to limit the plan's development. In retrospect, the conceptual development aided in the formgiving of certain elements in the development of the building.

In conclusion, this project taught me a lot about the architecture of the Karoo, the rituals and narratives and struggles that happen here on a daily basis, and the agricultural sector of South Africa. It has taught me to observe, listen, and wait for the revelation of place. As I formed my patina of care, and my personal patina of addition of the place, I daresay, the Karoo has changed me as well.

TYING UP LOOSE ENDS: FIGURE LIST

TYING UP LOOSE ENDS: BIBLIOGRAPHY

Aamodt, M. (2017, May 26). *The Metaphysics of Time, Space and Architecture*. Retrieved September 11, 2023, from slowspace.org: <https://www.slowspace.org/metaphysics-time-space-and-architecture/>

Allied Health Professions Council of South Africa . (2018). *AHPCSA*. Retrieved October 10, 2022, from <https://ahpcsa.co.za>

Architective Publications . (2018). *Architective*. Johannesburg: Architective Publications .

artefacts.co.za. (n.d.). *Rhodes Harrison, William*. Retrieved October 11, 2022, from <https://www.artefacts.co.za/main/Buildings/archframes.php?archid=704>

Auret, H. (2015). *Care, Place and Architecture*. University of the Free State.

Australia ICOMOS. (2013). *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. Retrieved Septermber 4, 2022, from <https://australia.icomos.org/publications/burra-charter-practice-notes/>

Australia ICOMOS. (2013, October 10). *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. Retrieved October 9, 2022, from <https://australia.icomos.org/publications/burra-charter-practice-notes/>

Bachelard, G. (1964). *The Poetics of Space* . New York : Penguin Books.

Bateman, C. (2010, November). *FASD: De Aar mums get beyond the 'tippling point'*. Retrieved July 1, 2023, from SAMJ: South African Medical Journal: <http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-95742010001100010>

Batzofin, D. (2012, January 11). *"Walking the Road"...no longer*. Retrieved August 14, 2022, from Travel and Things: <https://travelandthings.co.za/2012/01/walking-roadno-longer/>

Cambridge English Dictionary. (2023). *Meaning of "spinster" in English*. Retrieved July 1, 2023, from dictionary.cambridge.org: <https://dictionary.cambridge.org/dictionary/english/spinster>

Cape Wools SA. (2002). *Classing Standards*. Retrieved July 4, 2023, from National Wool Growers Association: <https://www.nwga.co.za/file/5ac4988518ed1/classeng2rotate.pdf>

Cape Wools SA. (2023). *Our Heritage*. Retrieved July 27, 2023, from Cape Wools SA: <https://www.capewools.co.za/content/our-heritage>

Cape Wools SA. (2023). *South African Sustainability Standards for a Comfier, Woolly Future*. Retrieved July 6, 2023, from capewools.co.za: <https://www.capewools.co.za/article/south-african-sustainability-standards-for-a-comfier-woolly-future>

climatetrade.com. (2023, May 11). *The world's most polluting industries*. Retrieved July 10, 2023, from climatetrade.com: <https://climatetrade.com/the-worlds-most-polluting-industries/>

Coleman, A. (2022, December 29). *New hopes and challenges for SA wool value chain*. Retrieved July 5, 2023, from farmersweekly.co.za: <https://www.farmersweekly.co.za/agri-news/south-africa/new-hopes-

and-challenges-for-sa-wool-value-chain/>

Collins, J., & Selina, H. (1998). *Heidegger for Beginners.* (R. Appignanesi, Ed.) Cambridge: Icon Books Ltd. .

corobrik.co.za. (2023). *Fynbos Rooi Satin FBS*. Retrieved October 26, 2023, from corobrik.co.za: <https://www.corobrik.co.za/clay-face-bricks/fynbos-rooi-satin-fbs>

de Beer, L. (2015, February). *History of the NWGA and the Wool Industry*. Retrieved July 4, 2023, from National Wool Grower's Association: <https://www.nwga.co.za/file/5f8fdc7c37beb/history-of-the-wool-sheep-industry-feb-2015.pdf>

de Jong, M., George, A., & Jacobs, T. (2021, September 10). A scoping review of the determinants of foetal alcohol spectrum disorder in South Africa: an intersectional perpective. *Health Policy and Planning, 36*(9), 1463-1466. doi:<https://doi.org/10.1093/heapol/cab101>

Department: Statistics South Africa. (2011). *Statistics by Place: De Aar, Emthanjeni*. Retrieved June 30, 2023, from Stats SA: <https://www.statssa.gov.za/?page_id=4286&id=6950>

du Toit, J. (2013, Spetember 23). *Restoring Karoo Architecture*. Retrieved July 11, 2023, from Karoo Space: <https://karoospace.co.za/karoo-style/>

du Toit, J. D. (2023, June 24). Mr. (M. Adendorff, Interviewer)

du Toit, M. (2020, February 20). *The pain of being unemployed in South Africa*. Retrieved July 10, 2023, from BusinessTech: <https://businesstech.co.za/news/lifestyle/373994/the-pain-of-being-unemployed-in-south-africa/>

eternalisedofficial.com. (2021, February 66). *Facticity, Existentiality, Fallenness – Heidegger*. Retrieved September 11, 2023, from eternalisedofficial.com: <https://eternalisedofficial.com/2021/02/06/care-structure-heidegger/>

European Chamber of Commerce and Industry of Southern Africa. (2020). *Oppurtunities in the South African Cotton & Wool Value Chains*. Retrieved July 2, 2023, from euchamber.co.za: <https://www.euchamber.co.za/news/opportunities-south-african-cotton-and-wool-sectors/>

Frank Lloyd Wright Foundation. (2017, April). *About Taliesin West*. Retrieved October 2, 2023, from <franklloydwright.org: https://franklloydwright.org/taliesin-west/>

Franklin, S. (n.d.). *Architectural Details: Olson Kundig's Chicken Point Cabin*. Retrieved from architizer.com: <https://architizer.com/blog/inspiration/stories/architectural-details-olson-kundig/>

Franz, U. (2018, July 12). *The ABC's of Wool Processing*. Retrieved July 4, 2023, from agriorbit.com: <https://agriorbit.com/the-abcs-of-wool-processing/>

Ginsberg, R. (2004). *The Aesthetics of Ruins.* New York: Rodopi.

Godsell, S. (2008, June 18). *Glenburn House / Sean Godsell*. Retrieved 2023, from archdaily.com: <https://www.archdaily.com/2517/glenburn-house-sean-godsell>

Greig, D. (1971). *A Guide to Architecture in South Africa*. Cape Town: Howard Timmins.

Gulla, E. (2020, February 14). *A brief history of the word "spinster" and how it's still used today*. Retrieved July 1, 2023, from Cosmopolitan: <https://www.cosmopolitan.com/uk/love-sex/relationships/a30868873/spinster/>

Hardman, T. (1994). *An Investigation into the Factors Influencing the Future of Historic Farmhouses in the Cradock District*. Port Elizabeth: University of Port Elizabeth.

Harries, K. (1982). Building and the Terror of Time. *Perspecta, 19*, 58-69.

Hass, A. (2015). *William Morris and the Arts & Crafts Movement*. Retrieved 10 July, 2023, from BC Campus Open Education: <https://opentextbc.ca/graphicdesign/chapter/chapter-2/>

Heiddeger, M. (1962). *Being and Time* (10 ed.). Cornwall: Blackwell Publishers.

Hertantyo, S. (2022, July 5). *Regenerative farming is the future of farm-to-fashion wool systems in South Africa*. Retrieved July 4, 2023, from Twyg.:<https://twyg.co.za/regenerative-farming-is-the-future-of-farm-to-fashion-wool-systems-in-south-africa/>

heuningland.com. (2023). *DESERT FARMING: THE VALUE OF THE KAROO*. Retrieved June 24, 2023, from heuningland.com: <https://heuningland.com/desert-farming-the-value-of-the-karoo/>

Holder, H. (2022). *Using A Double Roof To Make Your House Cooler*. Retrieved September 23, 2023, from architropics.com: <https://architropics.com/double-roof-for-cooler-house/>

Hunt, J. (2023, January 19). *Soul of a Railway Part 6: Orange River to De Aar*. Retrieved April 23, 2023, from <https://sites.google.com/site/soulorailway/soul-of-a-railway/system-2-cape-northern/part-6-orange-river-to-de-aar>

karoo-southafrica.com. (2019). *History of De Aar*. Retrieved June 25, 2023, from karoo-southafrica.com: <https://www.karoo-southafrica.com/eastern-upper-karoo/de-aar/history-of-de-aar/>

Kaufmann, E. (2023, August 8). *Taliesin and Taliesin West*. Retrieved October 3, 2023, from britannica.com: <https://www.britannica.com/topic/Taliesin-and-Taliesin-West>

Kievet, A. (2021, April 6). *Skirting Your Fleece*. Retrieved July 4, 2023, from Junction Fiber Mill: <https://www.junctionfibermill.com/blog/skirting-your-fleece>

Kroll, A. (2011, March 29). *AD Classics: Taliesin West Frank Lloyd Wright*. Retrieved October 3, 2023, from Archdaily.com: <https://www.archdaily.com/123117/ad-classics-taliesin-west-frank-lloyd-wright?ad_medium=gallery>

Kurir, M. (2019). Modernist Architecture and Ruins: On Ruins as a Minus, Neoclassicism and the Uncanny. In *Modell und Ruine* (pp. 12-16). Dessau.

Loots, H. (2017, December 20). *Anglo-Boer War Forum*. Retrieved June 25, 2023, from On This Day: 20 December: <https://www.angloboerwar.com/forum/16-on-this-day/1720-december-20th?start=6>

Louw, M. (2016, September). The architectural promenade and the perception of time. *South African Journal of Art History, 31*, 13-33. Retrieved April 14, 2023, from <https://researchgate.net/publication/342657325>

Ludolph, N. (2022, July 19). *Agro-processing: A look into the wool industry*. Retrieved from Food For Mzanzi : <https://www.foodformzansi.co.za/agro-processing-a-look-into-the-wool-industry/#:~:text=South%20Africa's%20wool%20industry%20is,sheep%20shearers%2C%20and%20wool%20handlers.>

Makela, M., Kapasi, A., Pei, J., & McFarlane, A. (2018, September). *Supporting Employment In Individuals with FASD: A Guide for Employment Professionals and Final Report*. Retrieved July 1, 2023, from CanFASD: <https://canfasd.ca/wp-content/uploads/2018/09/Guide-and-Final-Report-Supporting-Employment-Success-in-FASD.pdf>

Marais, M. (2023, July 7). Sustainability and regenerative agriculture. (M. Adendorff, Interviewer)

Mayo Clinic. (2023). *mayoclinic.org*. Retrieved June 30, 2023, from Fetal alcohol syndrome: <https://www.mayoclinic.org/diseases-conditions/fetal-alcohol-syndrome/symptoms-causes/syc20352901#:~:text=Fetal%20alcohol%20syndrome%20is%20a,alcohol%20syndrome%20are%20not%20reversible.>

McKay, G. (2016, January 8). *The Sheep Shed*. Retrieved April 19, 2023, from Misfits Architecture: <https://misfitsarchitecture.com/2016/01/08/the-sheep-shed/>

Meraz, F. A. (2016, September 29). *On the Experience of Temporality. Existential Issues in the Conservation of Architectural Places*. Retrieved 2023, from UWE Bristol Research Repository: <https://uwe-repository.worktribe.com/index.php/preview/899400/Meraz%20JM%20-%20FINAL.pdf>

Merleau-Ponty, M. (1993). Eye and mind. In G. Johnson, & M. Smith, *The Merleau-Ponty aesthetics reader: philosophy and painting* (pp. 121-130). Evanston: Northwestern University Press.

meteoblue.com. (2023, April 18). *Simulated historical climate & weather data for De Aar*. Retrieved from meteoblue.com: <https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/de-aar_south-africa_1011632>

Meyer, D. F. (2017). An Analysis of the Short and Long-Run effects of Economic Growth on Employment in South Africa. *International Journal of Economics and Finance Studies, 9*(1), 177. Retrieved July 10, 2023, from <https://dergipark.org.tr/tr/download/article-file/440328#:~:text=The%20impact%20of%20high%20levels,low%20levels%20of%20economic%20growth.>

mohair.co.za. (2023). *Directory*. Retrieved from mohair.co.za: <https://www.mohair.co.za/suppliers-buyers/stucken-co>

Mossmer, T. (2023, June 13). Hand Processing wool . (M. Adendorff, Interviewer)

Muller, C.-L. (2022, September 30). *UFS project steels the wool value chain and rural economy*. Retrieved June 15, 2023, from agriorbit.com: <https://agriorbit.com/ufs-ruforum-project-steels-the-wool-value-chain-and-rural-economy/>

Muller, C.-L. (2022, November 21). *UFS wool project invests in women*. Retrieved from agriorbit.com: <https://agriorbit.com/ufs-wool-project-invests-in-women/>

National Wool Growers Association. (2023). *National Wool Growers Association*. Retrieved July 4, 2023, from SA Wool Industry Statistics: <https://www.nwga.co.za/>

Nicholson, M. (2008). *Deepwater Woolshed*. Retrieved November 28, 2022, from oz.e.tecture.org: <https://www.ozetecture.org/deepwater-woolshed>

Nicholson, M. (n.d.). *Deepwater Woolshed*. Retrieved 2023, from OZ.E.TECTURE: <https://www.ozetecture.org/deepwater-woolshed>

Norberg-Schulz, C. (1971). *Existence, Space & Architecture*. New York: Praeger Publishers.

NSW Government. (2023). *Shearing shed design - sheep storage and movement*. Retrieved 2023, from Department of Primary Industries: <https://www.dpi.nsw.gov.au/animals-and-livestock/sheep/yards-equipment/general-information/movement#:~:text=As%20a%20guide%2C%20allow%203.5,wide%20by%203%20m%20deep.>

Nutt, D. (2021, October 11). *Corrosion can improve materials' durability*. Retrieved October 4, 2023, from phys.org: <https://phys.org/news/2021-10-corrosion-materials-durability.html#:~:text=When%20it%20comes%20to%20the,sometimes%20be%20a%20good%20thing.>

Pallasmaa, J. (2011). *The Embodied Image* (1 ed.). Chichester: John Wiley & Sons Ltd.

Pallasmaa, J. (2012). *The Eyes of the Skin: Architecture and the senses*. London: Academy Editions.

Pereira, M. (2018, November 15). *How Inverted King Post Trusses Allow for Large, Elegant Open Spaces*. Retrieved October 26, 2023, from Archdaily.com: <https://www.archdaily.com/905527/how-inverted-king-post-trusses-allow-for-large-elegant-open-spaces>

Polt, R. (1999). *Heidegger: an Introduction*. Ithaca: Cornell University Press.

Rafferty, J. P. (2017, September 30). *The Rise of the Machines: Pros and Cons of the Industrial Revolution*. Retrieved July 7, 2023, from Encyclopaedia Britannica: <https://www.britannica.com/story/the-rise-of-the-machines-pros-and-cons-of-the-industrial-revolution>

Reardon, C., McGee, C., Milne, G., & Marlow, A. (2020). *Thermal Mass*. Retrieved September 23, 2023, from yourhome.gov.au: <https://www.yourhome.gov.au/passive-design/thermal-mass#:~:text=Thermal%20mass%2C%20or%20the%20ability,material%20by%201%C2%B0C.>

Renauld, M.-M. (2020, July 24). *The Effects of The Industrial Revolution vs. Arts & Crafts Movement*. Retrieved July 7, 2023, from The Collector: <https://www.thecollector.com/industrial-revolution-arts-and-crafts/>

RSR. (2016, September). *RSR 00-2-7:2016* . Retrieved April 2023, from Regulator Standard Railway Safety Management: <https://www.rsr.org.za/wp-content/uploads/2020/11/RSR-00-2-7-Stations-Edition-1.0-v20160912.pdf>

SABS. (2009). *SANS 3000-1: 2009.* Retrieved April 2023, from www.sabs.co.za: <https://www.yumpu.com/en/document/read/44204527/sans-3000-12009-railway-safety-regulator>

Segard Masurel. (n.d.). *The manufacturing process of wool yarn*. Retrieved July 5, 2023, from segardmasurel.com: <https://www.segardmasurel.com/en/manufacturing-process-wool-yarn/>

Segard Masurel. (n.d.). *What is wool combing?* Retrieved July 5, 2023, from segardmasurel.com: <https://www.segardmasurel.com/en/what-is-wool-combing/#:~:text=The%20purpose%20of%20combing%20wool,despite%20the%20previous%20carding%20stage.>

Singh, S. (2022, April 4). *How the Arts and Crafts Movement Rebelled Against the Machine Age*. Retrieved July 7, 2023, from Owlcation: <https://owlcation.com/humanities/How-The-Arts-and-Crafts-Movement-Reacted-Against-the-Machine-Age>

Solar Capital. (2016, June 8). *Reducing Fetal Alcohol Specrum Disorder in De Aar*. Retrieved July 1, 2023, from Solar Capital: <https://www.solarcapital.co.za/reducing-fetal-alcohol-spectrum-disorder-in-de-aar/>

South African Council for the Architectural Profession. (2021, February 19). *Code of Conduct*. Retrieved May 22, 2023, from sacapsa.com: <https://www.sacapsa.com/documents/uploads/WGxnWxu4FdvIwr6S-0.pdf>

Souza, E. (2023, May 9). *Olson Kundig and the Ingenuity of the Moving Parts in Their Architecture*. Retrieved October 9, 2023, from archdaily.com: <https://www.archdaily.com/1000621/olson-kundig-and-the-ingenuity-of-the-moving-parts-in-their-architecture>

Stats SA. (2022). *Beyond uneployment - Time-Related Underemployment in the SA Labour Market*. Retrieved July 10, 2023, from Stats SA: <https://www.statssa.gov.za/?p=16312#:~:text=South%20Africa's%20unemployment%20rate%20in,the%20fourth%20quarter%20of%202022.>

Stutchbury, P. (2015). Different Country. (S. Carter, Interviewer) Retrieved October 5, 2023, from <http://architecturebulletin.com.au/spring-2015/different-country/>

Thomson, J. (2022, August 1). *A Brief History of (Linear) Time*. Retrieved September 10, 2023, from Big Think: <https://bigthink.com/thinking/a-brief-history-of-linear-time/>

Thukwana, N. (2022, August 2). *South Africa's wool industry has bled over R700 million since China's sick sheep ban*. Retrieved March 22, 2023, from news24.com: <https://www.news24.com/news24/bi-archive/wool-industry-losses-at-over-700-million-rand-following-china-foot-and-

mouth-disease-related-ban-2022-8>

twyg.co.za. (2023, June 19). *New Collaboration brings the farm to your wardrobe in local, ethical production process*. Retrieved July 5, 2023, from twyg.co.za: <https://twyg.co.za/new-collaboration-brings-the-farm-to-your-wardrobe-in-local-ethical-production-process/>

University of Maryland. (2010). *Arts and Crafts Movement*. Retrieved July 10, 2023, from University of Maryland Libraries: <https://exhibitions.lib.umd.edu/williammorris/morris-influence/arts-and-crafts-movement#:~:text=The%20core%20characteristics%20of%20the,simplicity%2C%20utility%2C%20and%20beauty.>

vecteezy.com. (2023). Retrieved October 26, 2023, from vecteezy.com: <https://www.vecteezy.com/free-vector/concrete-wall-texture>

Wasserfall, J. (1989). *Early Mine and Railway Housing in South Africa: a two-part study of ideology and design in working-class housing.* Cambridge: King's College.

Weather and Climate - The Global Historical Weather and Climate Data. (2023, April 18). *De Aar, Northern Cape, South Africa Climate*. Retrieved from Weather and Climate - The Global Historical Weather and Climate Data: <https://tcktcktck.org/south-africa/northern-cape/de-aar#:~:text=De%20Aar%20Climate%20Summary,higher%20than%20South%20Africa's%20averages.>

Weather Spark. (2023, April 18). *Weatherspark.com*. Retrieved from Climate and Average Weather Year Round in De Aar: <https://weatherspark.com/y/90475/Average-Weather-in-De-Aar-South-Africa-Year-Round>

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