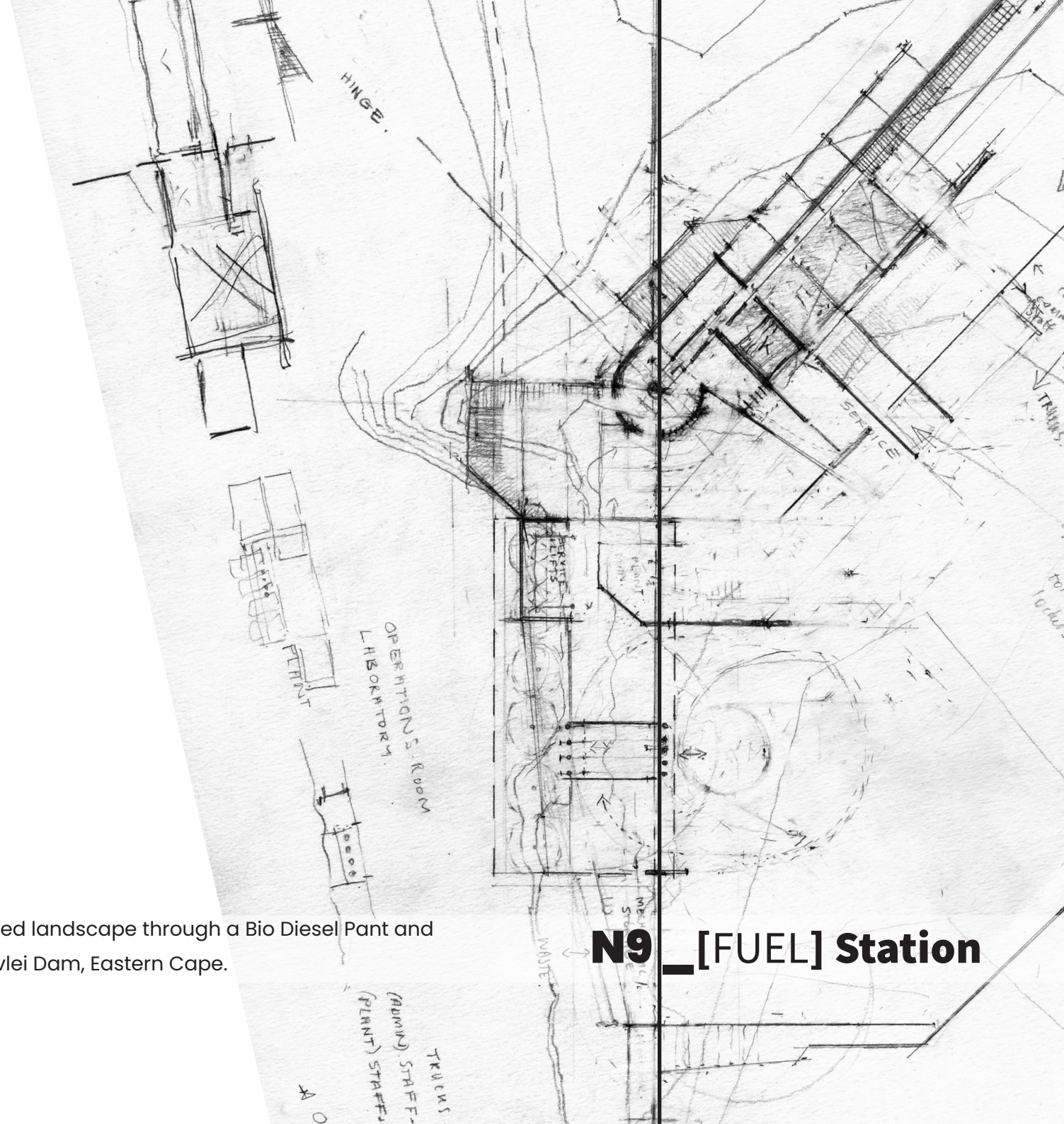
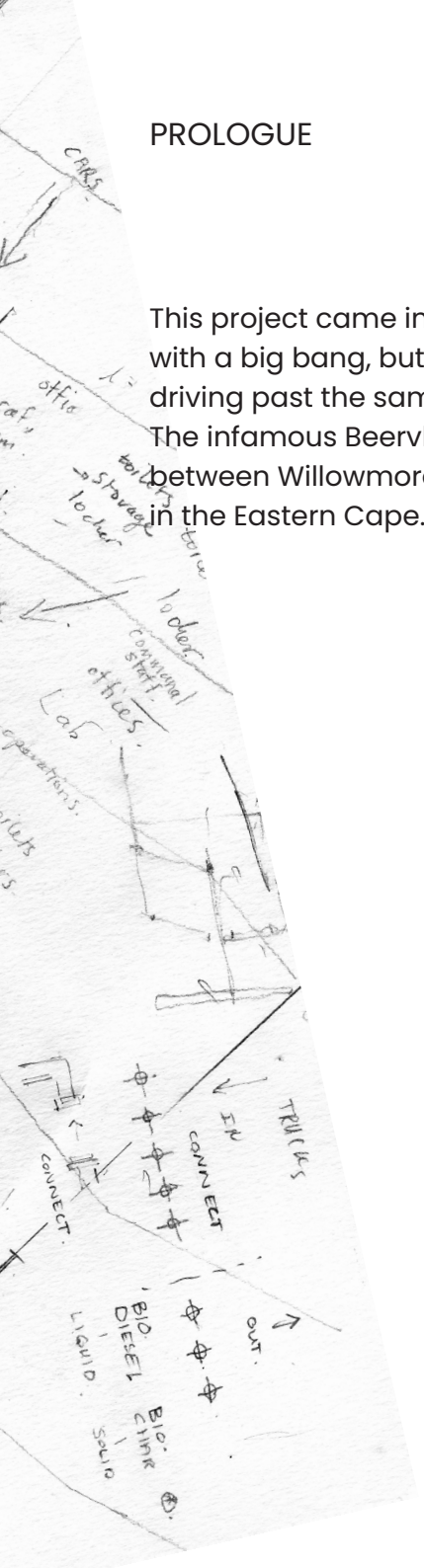


Reclaiming the Mechanized landscape through a Bio Diesel Pant and Re-[Fuel] Station at Beervlei Dam, Eastern Cape.

N9_[FUEL] Station



PROLOGUE

This project came into existence not with a big bang, but from years of driving past the same empty dam. The infamous Beervlei Dam, situated between Willowmore and Graaffreinet in the Eastern Cape.

The opposite edge from the N9, adjacent to which the dam is anchored, piques a burning curiosity in the form of jagged rock outcroppings and monolithic structures planted in the landscape. Wild machinic inventions come to life, perched on this scarred edge looking down at the rat race that is human life. Guardians of the landscape that alone might seem uncanny but emerges from this specific landscape as if it was birthed from it. It becomes obvious that this edge, already a product of human intervention, must be reclaimed with machinic intention. This idea of the machine in the landscape plants the seeds of motivation that takes root as an experiment and is transformed into a dissertation.

JUAN-AMIÉ GUTTER
2021658972

ABSTRACT

Die son gooi miracles in die vaal ou Karoo

- DRAADLOOS DAE, Adam Tas

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PRETEXT

This dissertation is a discourse regarding how to spatially intervene in the terrains of green energy and of extracted futures as consequence of consumption. It proposes the intervention of a Bio Diesel Production plant accompanied with a re-fueling station (padstal) in the harsh landscape of the Great Karoo. Located at the Beervlei Dam in the Eastern Cape, between Willowmore and Graaff-Reinet, the aim is to explore how an altered landscape (mechanized) can be reclaimed through an industrial architectural intervention that is informed by its immediate context.

The research question that can then be asked with regards to this intervention is: how can a sensitized industrial architecture unveil the machinic poetics inherent in the unforgiving landscape of the Beervlei Dam?

FIGURE 1: Author walking on the scarred edge (Gutter, 2023: own photograph)



INTRODUCTION

In this Thesis, a brief history about the Karoo will be explored and how man using the machine to change his context is used as inspiration in developing a theoretical approach to support the design of an industrial architecture within the mechanized context of Beervlei Dam.

Various literary resources will be used to gain a better understanding of the wider context, culture and its architecture and the influences of the machine. Theories from Christian Norberg-Schulz, Lebbeus Woods, Maurice Merleau-Ponty, Anthony Vidler, Rem Koolhaas and Robert McCarter will be used to support design decisions and contextual appropriation to arrive at an accurate architectural response to the complex landscape of Beervlei Dam.

When exploring the site at Beervlei Dam, there are two governing aspects that overwhelm the senses and reveals the ‘genius loci’, which is ‘Place’ and ‘The Machine’. Norberg-Shulz explains that the ‘genius loci’ or ‘spirit of place’ is the character of place that gives meaning to it and enables man to ‘dwell’ within it.

Therefore ‘Place’ and ‘The Machine’ will be used as inspirational guidelines throughout this thesis in order to reach a final proposal.

From above, left to right:

FIGURE 2: Beervlei Dam echoing the Cape Fold Mountain range in the background (Gutter, 2023: own photograph).

FIGURE 3: The mechanism used to control the sluices of the Beervlei Dam (Gutter, 2023: own photograph).

FIGURE 4: The concrete footings where the crushed stood when building the dam in 1954 (Gutter, 2023: own photograph).

FIGURE 5: A view of the edge framed by the concrete footings (Author).











FIGURE 6: The immense scale of the scarred edge up close (Gutter, 2023: own photograph).



FIGURE 7: The clean lines of part of the Beervlei Dam against the jagged backdrop of the scarred edge (Author).

DOCUMENT ASSEMBLAGE

This document is written as if itself is a literary chemical reaction; various 'reactants' (namely 'other' and 'real') are intentionally combined to undergo a process of transformation. At the core of this process is the exchange of energy, from one form into another. This project is intrinsically bonded to this process as not only does its program involve an industrial as well as human chemical reaction concerned with re-fueling, but it also becomes an experiment between the interplay of the machine, landscape and man.

This project intends to act as a chemical reaction for this experiment, in the hopes of discovering the hidden potential of a mechanized landscape.

This hidden potential lies in the "othe[r]eal" quality of this project, a term first coined by Jonathan Noble, a professor of architecture at the University of the Free State. It is the product of the condensed arrangement of 'other' and 'real'. A self-referential couplet that transforms the propensity toward surrealism and realism, respectively, into magical realism (Noble, 2009; 48). This project, although situated in the 'real' has a patina of the 'other' that inspires a fantastical reality with the ability to blur the very real edges.

This blurred boundary between 'real' and 'other' combines both qualities, an intentional act to achieve a reaction which is then refined (re-interpreted) into a final product that can be fabricated. The 'real' is fused with the 'other' and translated into the othe[R]eal. After this process, revelations will emerge and deem this experiment a success or not.

The process of the chemical reaction and how to read the document is shown in the following diagrams:

$$2\,(\mathrm{PT}\mathbf{1})_{\texttt{othe[R]eal}} + 1(\mathrm{PT}\mathbf{2})_{\texttt{Catalyst}} = (\mathrm{PT}\mathbf{3})_{\texttt{Design}}$$

* PT1 > PART 1
* PT2 > PART 2
* PT3 > PART 3

FIGURE 8: A visual representation of the 'othe[R]eal'.

PART 1

READ LEFT PAGE SECOND

READ RIGHT PAGE FIRST

[othe[R] + [R]eal]

+

PART 2

CATALYST

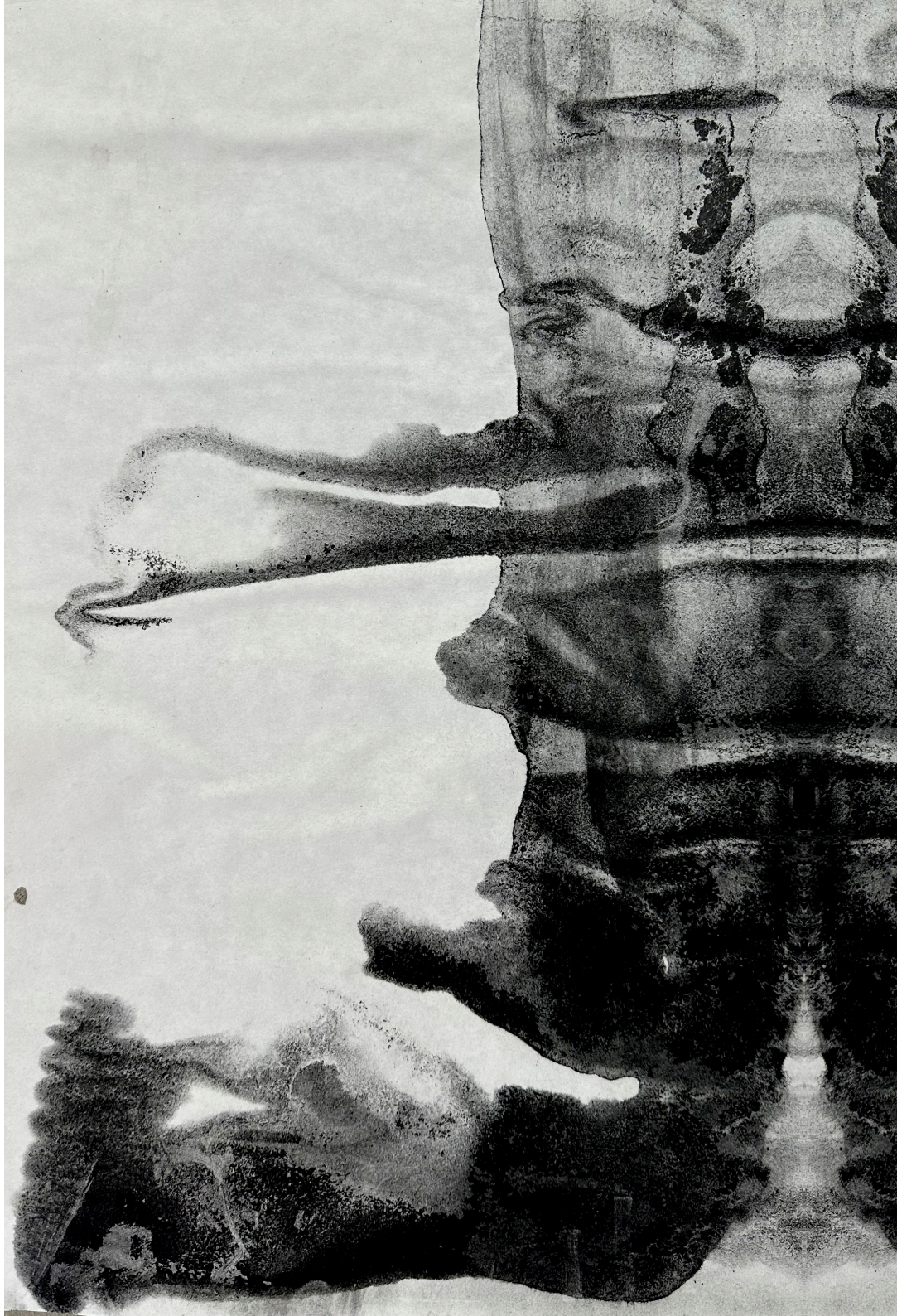
Baptism of the Machine

=

PART 3

othe[R]eal

Design Development



DOCUMENT FRAMEWORK

2 (PT**1**) othe[R]eal

PART 1

- HISTORIC & CULTURAL OVERVIEW
- THE ARCHITECTURE
- THE LANGUAGE OF THE LANDSCAPE
- TECHNOLOGICAL PROGRESSION
- CULTURE OF CONSUMPTION

For Part 1, the right side of the book will be delineated to the 'real' of this project, grounding it in reality. The left, on the other-hand will be delineated to the 'other', enriching the reality with theoretical ideas.

Part 1 explores the grounding of the proposed architectural intervention: looking at the wider context; the immediate surroundings; its inhabitants along with their methods of inhabitation and how the machine was used to change a natural landscape into a mechanized landscape. Focusing on the changing relationship between man, machine and nature.

The reader is led on a journey of discovery that culminates in a warning, and the reason for this specific architectural intervention.

In this post-industrial reality defined by the culture of consumption and domination of nature, man must either attempt to find an alternative source to consume (fossil fuels) or continue down this path toward a future extracted.

+ 1(PT**2**) Catalyst

PART 2

- BAPTISM OF THE (EXPERIMENTAL) MACHINE

For Part 2, the reader may continue reading in the conventional manner - left to right. Part 2 acts as the catalyst in this literary chemical reaction: it is mixed with Part 1 and speeds up the reaction, without being consumed, to produce a useful product (Part 3).

Part 2 summarizes the main revelations of Part 1 and puts forth an argument for the reclamation of a mechanized landscape by invention. Expanding on the idea that in an already 'unfamiliar' landscape, an architectural intervention that is grounded in experience will 'force' man (visitors) to inhabit this landscape (as mediated by the architectural intervention) in a new way. Reconciling man with nature once again.

=

(PT**3**)Design

PART 3

Part 3 is the end product of the literary chemical reaction between Part 1 and 2.

The (experimental) machine is baptized into the eternal servitude of the earth – to act as a reminder to man that they must adapt their ways if they want to survive. The (experimental) machine becomes a guardian of earth.

PART 1

HISTORIC & CULTURAL OVERVIEW

THE ARCHITECTURE

THE LANGUAGE OF THE LANDSCAPE

TECHNOLOGICAL PROGRESSION

CULTURE OF CONSUMPTION

READ RIGHT PAGE FIRST

1. An Unforgiving Landscape[OTHER]

A landscape of extremes can therefore not only be the abstraction of its functional or visual properties, but possesses a character, albeit of a particular 'natural' kind. Thus the Karoo landscape can be described as 'barren'. It is this character, as Norwegian architect and writer Christian Norberg-Schulz(1979) explains, that gives meaning to a space in such a way that it "move[s] us" (Le Corbusier cited in ibid, 6); making it possible for man to 'dwell' in this space (ibid).

However, physical properties does influence man's experience of place and that is why its essence calls for a total quantitative and qualitative, phenomenological understanding. This essence or character of the landscape is referred to as 'genius loci' or 'spirit of place'; "the concrete reality man has to face and come to terms with in his daily life" (ibid, 5). It can then be said that design is the manifestation of this 'concrete reality', of the character of place.

Even though character is a "complex totality" (ibid, 16), it is sometimes possible that a single term can grasp it:

the Karoo landscape is unforgiving.

FIGURE 9: What remains of animals trapped in an empty farm dam (Author).



[1] HISTORIC & CULTURAL OVERVIEW

1. The Karoo[REAL]

The site of the proposed intervention is situated on the edge of the Cape Fold Mountains, before encountering the vast open spaces of the Camdeboo Plains stretching toward Aberdeen and beyond to Graaff-Reinet. This site forms part of one of South Africa's most variegated landscapes, the Karoo, an arid to semiarid geographic region of the East, West, and Northern Cape. Vast open planes extend into the distant horizon, scattered throughout with deep valleys and flat hills and high mountains that merges earth and sky.

This, as well as the unofficial Karoo emblem, the windmill accompanied by a round farm dam, characterize a typical Karoo Landscape. An area devoid of surface water and soil with a high mineral content, the word 'Karoo' is aptly derived from the KhoeKhoe word "karus", meaning "dry, barren or thirsty land" (Kramer & Proust, 2021:17). Although, this barren place consists of contradictory extremes; great heat, great frosts, great floods, and great droughts.

FIGURE 10: The long road between Willomore and Graaff-Reinet (Author).



FIGURE 11: The same long road between Willomore and Graaff-Reinet (Author)



“You arrive and arrive, and once more you arrive – and once more you see the same vast nothing you are coming from”

(Stevens cited in Schoeman, 2013:8).

The emphasis shifts from the landscape as a noun, “as object or scene”, (Corner, 1999: 4) to landscape as a verb that encompasses a “process or activity” (ibid.). This changes the way man encounters the landscape, it is no longer just a pretty picture to look at. It is a continuous process that encompasses “temporal rhythms” defined by “constancy and change” (Norberg-Schulz, 1979: 32). The Karoo landscape is bound by the temporal significance of a “shifting, material field of natural processes” (Corner, 1999: 15).

Maurice Merleau-Ponty (2015: 167), a French philosopher, observes that “to understand is to experience”. Therefore, to know or understand this unforgiving landscape, it must be experienced. It is only once the landscape is “known” (Norberg-Schulz, 1979: 45) by man that he will be able to dwell within it.

“The Karoo chooses you,” and “keeps you here if it wants you here” believed by the Karoo born Jan Theunissen from Beukesfontein

(Theunissen quoted in Oosthuizen,2016:51).



FIGURE 12: A shifting frame of a natural process (Author).

The unforgiving nature of prehistoric Karoo was cultivated over 200 million years; it was a place of glaciers and inland seas, giving way to swampy deltas, huge rivers and flood plains, culminating in deserts and finally, vast outpourings of lava. The Karoo is a lithified and entombed record of the devastating effects of the "mother of all mass extinctions" (Deal, 2007: 14).

The Karoo landscape can thus be considered an archive containing its history and character and continuous becoming as a complex totality.

As Prof. Bruce Rubige (cited in ibid, 14) of the Bernard Price Institute for Paleontological Research promptly states:

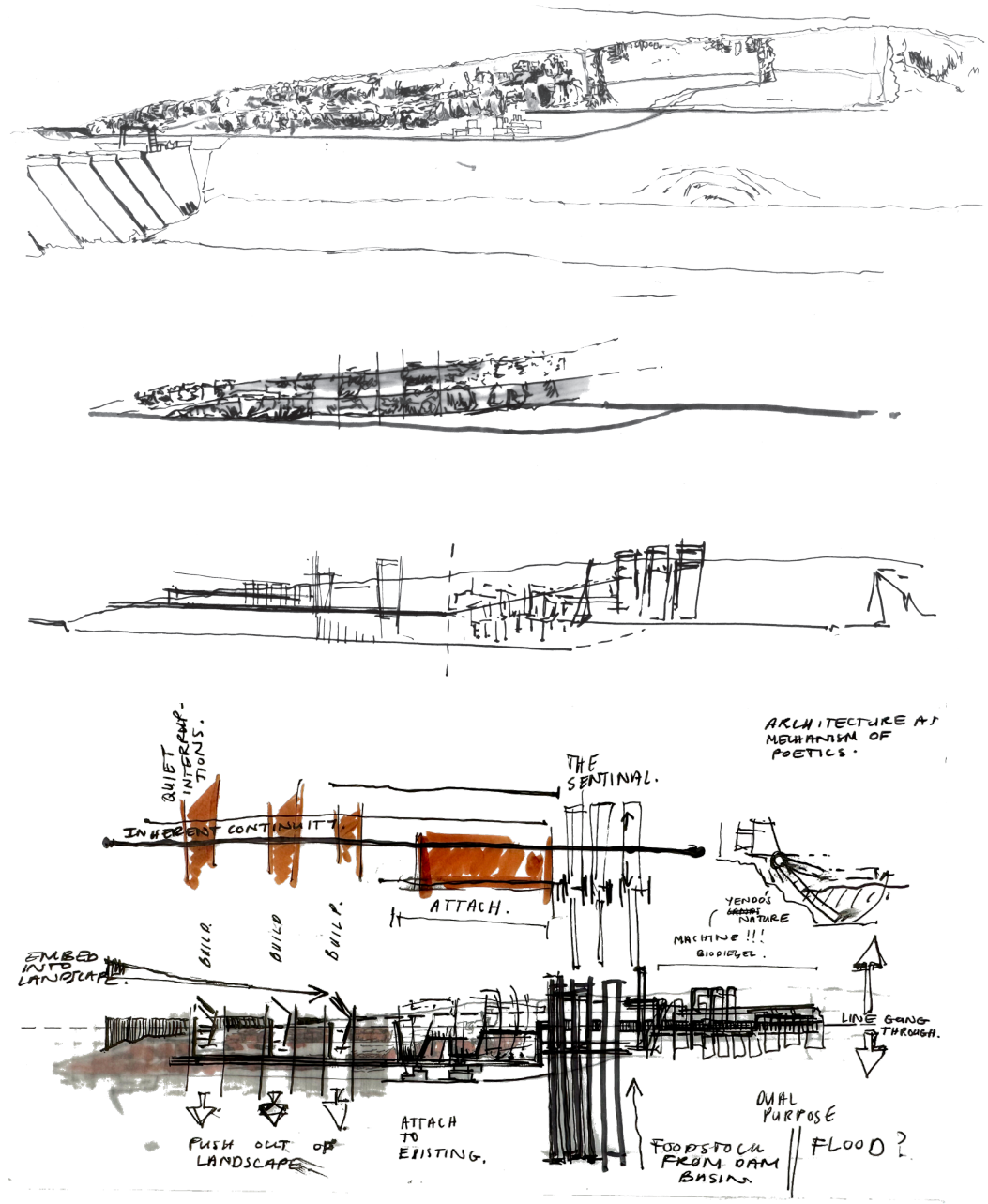
"[i]n paleontological terms, the Karoo is vastly significant"

Sculpted by wind and water, the landscape is eroded away to expose the folding of the earth's crust and bring to the surface its historical processes entombed within the hard rocks that make up the Karoo mountains and 'koppies' of today.

FIGURE 13: Entombed historical processes brought to the surface: the Cape Fold Mountains (Author).



FIGURE 14: Design approach informed by experiencing the site; design as a process of experience (Author).


QUIET INTERRUP-TIONS.
INHERENT CONTINUITY.
THE SENTINAL.
ATTACH.
ARCHITECTURE AS MECHANISM OF POETICS.
YENDOS
NATURE
MACHINE !!!
BIODIESEL.
EMBED INTO LANDSCAPE.
BUILD
BUILD
BUILD
LINE GOING THROUGH.
DUAL PURPOSE
PUSH OUT OF LANDSCAPE
ATTACH TO EXISTING.
FOODSTOCK FROM DAM BASIN.
FLOOD ?

The Karoo's harsh environment and remoteness makes it 'unhomely'. Merriam-Webster online Dictionary defines 'unhomely' as the "lack of intimacy or [lack of] warmth", the 'lack of home'. 'Unhomely' can, therefore, be understood as the 'absence of'. What is it, however, that makes the contemporary man feel at home? The luxury of comfort at the press of a button, a large HD screen television, a controlled air-conditioned interior, breathing humidified air.

The Karoo is absent of these modern day frills and superficial ornamentation, it is absent of flamboyance, of 'junkspace'. A term that was introduced by Dutch architect Rem Koolhaas (2002) to refer to what is left behind once the cycle of consumption starts anew following the latest trends.

'Home' has been interchanged with consumption and has acculturated to Junkspace. This denies man a connection to 'home', "[b]ecause it cannot be grasped, Junkspace cannot be remembered. It is flamboyant yet unmemorable" (ibid, 177)

'Unhomely' can also refer to British architectural historian and professor, Anthony Vidler's (1992) 'unhomely' in its propensity to relate to its German roots, "unheimlich which is the name for everything that [should of] remained… secret or hidden but has come to light" (ibid, 26). In this sense the Karoo can be considered 'unhomely' as it acts as a crucible; "a stripping away of all that is superfluous, gratuitous, and fetishized" (Spiller cited in Smout & Allen, 2007: 4). Exposing those that do not belong.

From right to left:

FIGURE 16: A landscape that does not contend with the weak (Gutter, 2023: own photo).
FIGURE 15: An Unhomely landscape (Gutter, 2023: own photo).



Yet, the Karoo is a primordial landscape that does not contend with the weak. Permitting only a few towns to survive, between which farms extend over several thousand hectares to be able to support livestock on arid land (Kramer & Proust, 2021). As there is almost no prospect of growing conventional crops, except within allocated irrigation schemes. It is a remote place which is further emphasized through the proposed sites isolated existence, situated between two towns, Willowmore and Aberdeen.

In the 1770's land could be issued as a loan place and became the temporary property of one farmer, it was a very simple procedure where the farmer chose a piece of unoccupied land and set up a beacon. His land was that of either side of the beacon within half an hour's walk (Palmer, 1966: 21),

"What was your beacon?" a farmer was asked at an enquiry.

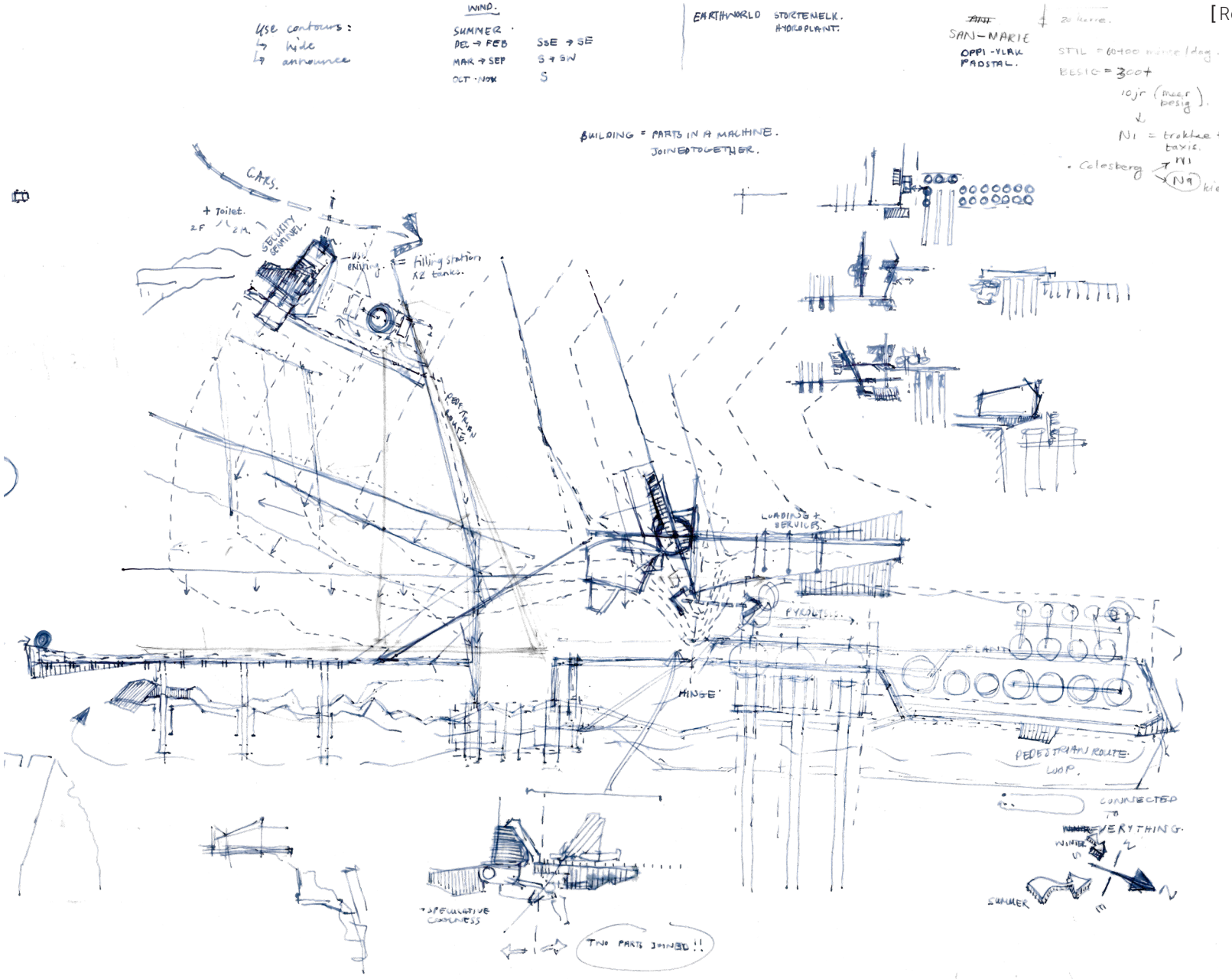
"A bush," he answered simply. "It blew over."



The Karoo "draws its protective mantle close" and only "share[s] its secrets with those prepared to sit quietly to learn its mysteries" (Deal, 2007: 13).

It is in this process of re-contextualization that a deeper existential existence is cultivated between place and those that do belong. By fostering a connection to place by means of an architectural intervention, allows for a temporary feeling of belonging in this unhomely landscape.

FIGURE 17: Figuring out how place informs the design layout; learning its secrets (Author).


Use contours:
↳ hide
↳ announce
WIND.
SUMMER
DEC → FEB
MAR → SEP
OCT - NOV
SSE → SE
S → SW
S
EARTHWORLD
STORTEMELK.
HYDROPLANT.
SAN-MARIE
OPPI-VLAK
PADSTAL.
STIL = 60+00 mince/dag.
BESIG = 300+
10jr (meer besig).
N1 = trokkee + taxis.
Colesberg
N1
N9
BUILDING = PARTS IN A MACHINE.
JOINED TOGETHER.
CARS.
+ Toilet.
2F
2M.
SECURITY SENTINEL.
Use enviring.
= filling station x2 tanks.
PEDESTRIAN ROUTE.
LOADING + SERVICES.
PYROLYSIS.
PLANT
HINGE
PEDESTRIAN ROUTE.
LOOP.
CONNECTED TO
EVERYTHING.
WINTER
SUMMER
SPECULATIVE COOLNESS
TWO PARTS JOINED!!

2. The Uncanny[OTHER]

The unsettling fact that the Beervlei Dam is always empty intrigues man endlessly. Disturbing man's perception of the function of a dam, it leads to the belief that there is something wrong with it. This, together with the fact that it does not follow the conventional form of a typical dam wall evokes unease. The reason for this unease is not entirely realized, it just is. The Beervlei Dam, along with the abandoned architectural artifacts scattered throughout the proposed site is considered to be 'uncanny' objects within an 'unhomely' landscape.

Uncanny is a term that was explored by Anthony Vidler (1992) as it refers to aspects that spatially and architecturally "provoke disquiet and unease" (ibid, x).

Uncanny is a defamiliarization of the known, or the expected. A distortion of man's perception. Interrupting the habitual happenings of everyday life.

This interruption of the norm introduces a new way of inhabiting space. It offers a freedom from the confines of the conventional, crossing the boundary into the unknown where understanding relies on experiencing.



FIGURE 18: Beervlei Dam, one of the uncanny objects in the landscape (Author).



2. Beervlei Dam & Geographic Location[real]

Beervlei Dam, the dam that is always empty, is one of the rare occurrences where engineering is an act of poetics (**FIGURE 18**). To engineering professor/historian David Billington (cited in Jackson, 2009: 137),

> **"[T]he practice of structural engineering constitutes a creative endeavour which, purely on its own terms, can produce socially useful works of art on a monumental scale"**

This multiple arch dam eloquently echoes its natural surroundings, becoming a revered sojourn in many travelers' journey being roughly halfway between Johannesburg and Cape Town. Always a topic of conversation, this enigmatic dam has initiated many lively debates concerning its perpetual state of emptiness, the government strangely enough is always the first to carry the blame. Fortunately, there is a logical reason.

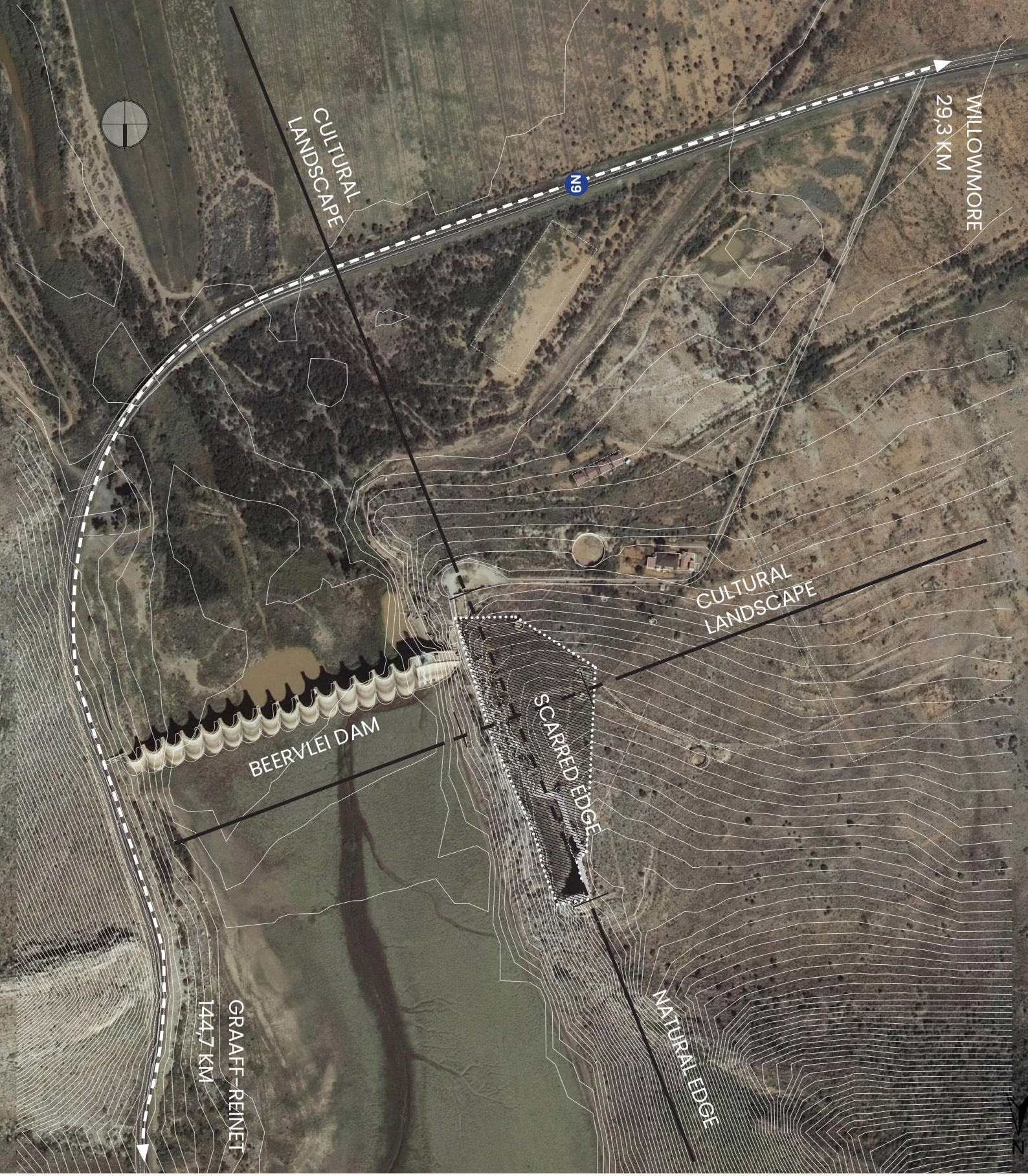


FIGURE 19: Macro Context: Proposed site and immediate context (CFM, 2023: online).



FIGURE 21: Macro Context: Location of Beervlei Dam in South Africa (CFM, 2023: online).



FIGURE 20: Macro Context: Beervlei situated between Willomore and Graaff-Reinet (CFM, 2023: online).

Pg(26) Pt1

[Real]

-33°2'32.64" S, 23°27'56.52" E

Beervlei is situated about 5 km below the confluence of the Groot River with the Salt and Kariega rivers, a site that was first identified by the irrigators downstream of the Groot River, who in 1920 agitated for its construction. But for the purpose of an in-channel storage dam. However, because of the high mineral content and silt load of the rivers and the extremely irregular flow, the government was hesitant. It was only years later in 1946 when the decision was made to construct the Beervlei as a flood control dam. As such, it operates at 0% capacity and if it does flood, the water is released as quickly as possible to prevent further mineral contamination (Van Vuuren, 2011).

In the [Karoo] desert the complexities of our concrete life-world are reduced to a few, simple phenomena:

The infinite extension of the monotonous barren ground;



the immense, embracing vault of the cloudless sky;



the burning sun which gives an almost shadowless light; the dry, warm air, which tells us how important breathing is for the experience of place.

(Norberg-Shulz, 1979: 45)



Sustenance: The semi-arid regions of the Karoo, especially Beervlei, have soil with a high mineral content giving rise to naturally saline groundwater. In addition, the water quality of the river system draining the Great Karoo becomes unacceptable in the Groot River (Le Maitre, D. Colvin, C. & Maherry, A. 2009: online). As such most of the Karoo is not suitable for growing conventional crops.

Flooding: The Beervlei receives overflow water from the Kariega River and Salt River. The Dam was almost at full capacity in 2001 and again at the end of 2021, beginning 2022, after almost 20 years. Due to minimal rainfall and increased weir construction upstream, Beervlei is mostly empty.

Halophytes: However, some plants thrive in these harsh conditions and saline soil. One of these plants is the oldman saltbush (Atriplex nummularia), indigenous to Australia but, already growing at Beervlei. This plant is a salt-tolerant shrub and a halophyte. According to research undertaken by Agronomic Sciences Professor, Manuel Paneque (2018: 56) of the University of Chile, oldman saltbush generates "up to 11.7 times more energy than what is consumed, which makes it an exceptional species for the production of biofuels, also it can capture up to five tons of carbon dioxide per year".

From left to right:

FIGURE 22: A dry Karoo (Author).

FIGURE 23: A full Beervlei Dam beginning 2022 (Author).

FIGURE 24: Oldman Saltbush (Author).

3. The Age of the Human[OTHER]

Human occupation inevitably changes the context. Man's survival relies on his interaction with his environment, "[m]an continues to mark the land" utilizing the machine to "relentlessly shap[e] the surface from wilderness to cultivation" (Smout & Allen, 2007: 6). The demands of inhabitation have introduced a new order, "transform[ing] nature into a cultural landscape" (Norberg-Schulz, 1979: 10).

This cultural landscape is transformed by adding man-made elements, however, still being part of nature, its processes continue irrespective of its transformation. It is bound by the passing of time and in a continuous process of becoming. As such, the way man transforms this changing landscape depends on man's understanding of the landscape in relation to his own existence.

Therefore, inhabitation and cultural appropriation is not only dependent on the context but is also influenced by the worldviews of a people. In this case the "anthropocentric, humanistic, religious tradition of the West/[trekboers]" and the "cosmological, naturalistic, spiritual tradition" (Koh, 2004: 4) of the Khoikhoi tribe.

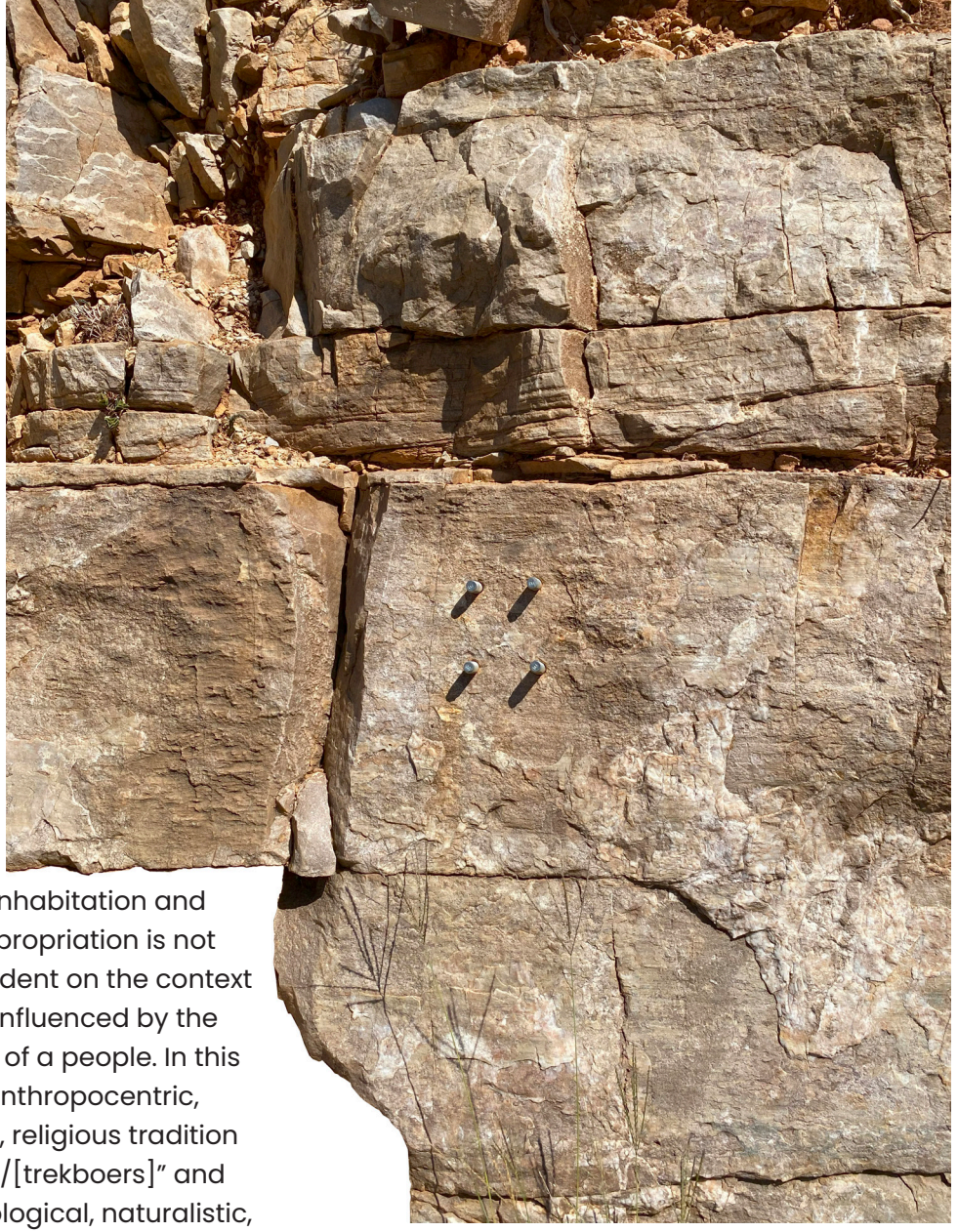


FIGURE 25: (Top) Man marking the land (Author).
FIGURE 26: (Right) A violent history between the indigenous tribes of the Karoo and the trekboers over differing worldviews (NLSA, 2023: online).

3. Spiritual & Occupational Orientation[REAL]

As unforgiving as the Karoo landscape is, the history of its inhabitants is equal in conflict and struggle. Before European settlers made their home in the Karoo, the KhoiKhoi (or KhoeKhoe) and San tribes have been living unchallenged in this arid landscape for centuries. They were the last of the Southern African Stone Age Peoples, the KhoiKhoi were semi-nomadic cattle and sheep herders whereas the San were hunter-gatherers. It was in the mid-1700s when the so-called trekboers moved to the interior of the Karoo after first arriving in the Cape of Good Hope in 1652, when their conflict with the indigenous tribes of the Karoo started (Deal, 2007; Schoeman, 2013).

Their way of life and beliefs differed immensely, causing an outright war between the two groups and resulted in the near extermination of the Khoikhoi. However, both peoples way of living speak of ingenuity and a deep understanding of place, albeit very different.



Spiritual Tradition

The Khoikhoi had a deep reverence for nature that essentially shaped their devotion to a temporal existence. Their worldview being 'cosmological or spiritual tradition', is described by archeologist Timothy Darvill (cited in Campion, 2016: 5) as the "worldview and belief system of a community based upon their understanding of order in the universe".

In other words, the Khoikhoi's "conception of themselves in relation to the heavens" (Gumerman & Warburton cited in ibid, 5). Their cultural and social systems were defined by their dependence on the natural world. Beliefs were based on natural phenomena, translated into a narrative that formed their worldview; the sun and the moon were faces of a supreme deity, nature had guardians and the wind is tied to the phenomenon of life: it is life-giving (Low, 2007; Campion, 2016).



The Khoikhoi experienced their environment "as consisting of definite characters" (Norberg-Shulz, 1979: 18) and that it was of critical importance to understand the 'genius' of this place where their lives unfolded (ibid.). Forming part of this understanding, the Khoikhoi's culture became an expression of "myths, ritual activity such as trance for contacting a guardian, acts of association to ensure its goodwill... as well as thanksgiving, for example by way of particular dances" (Hoff, 2011: 48).

In a lecture given by American architect, Lebbeus Woods (SCI-Arc Media Archive,2018: online), he expands on German philosopher Friedrich Nietzche's notion of myth as that which sustains a culture. That it is a unified understanding and comprehension of the world. The Khoikhoi's deep reverence for and understanding of nature, as represented by their culture, stemmed from their 'myth'. Unifying their "vision" of themselves and their tribe; it was a "myth of universal potency" (ibid, 14:51).

KhoiKhoi Tribe

The KhoiKhoi were descendent from the San (in around 2300 BP, Botswana), and the first pastoralists in Southern Africa who introduced an alternative way of living to the San. In the area that is known as the Eastern Cape today, the KhoiKhoi were the predominant inhabitants and as such the focus will be on them. Their name 'KhoiKhoi' is believed to mean 'Men of Men' which was chosen to show pride in their heritage and culture (Frescura & Myeza, 2016: 103; SAHO, 2020: online).

Their nomadic heritage originated out of a need to find enough grazing land for their animals and themselves, yet still remaining within their 'territory' (Palmer, 1966). It was a people that harbored an immense respect for nature moving with the seasons and only inhabiting a place for a few weeks before moving on. This meant that they had to be able to travel with all their belongings. Their way of living was designed with temporality in mind.

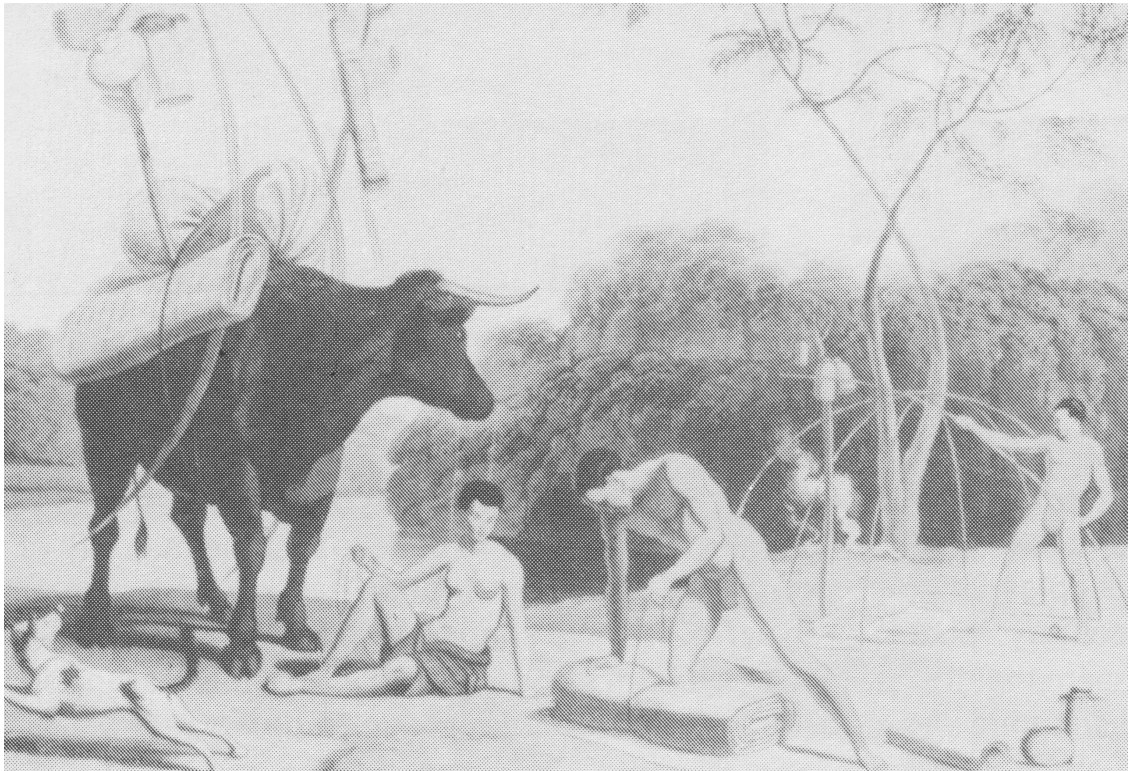
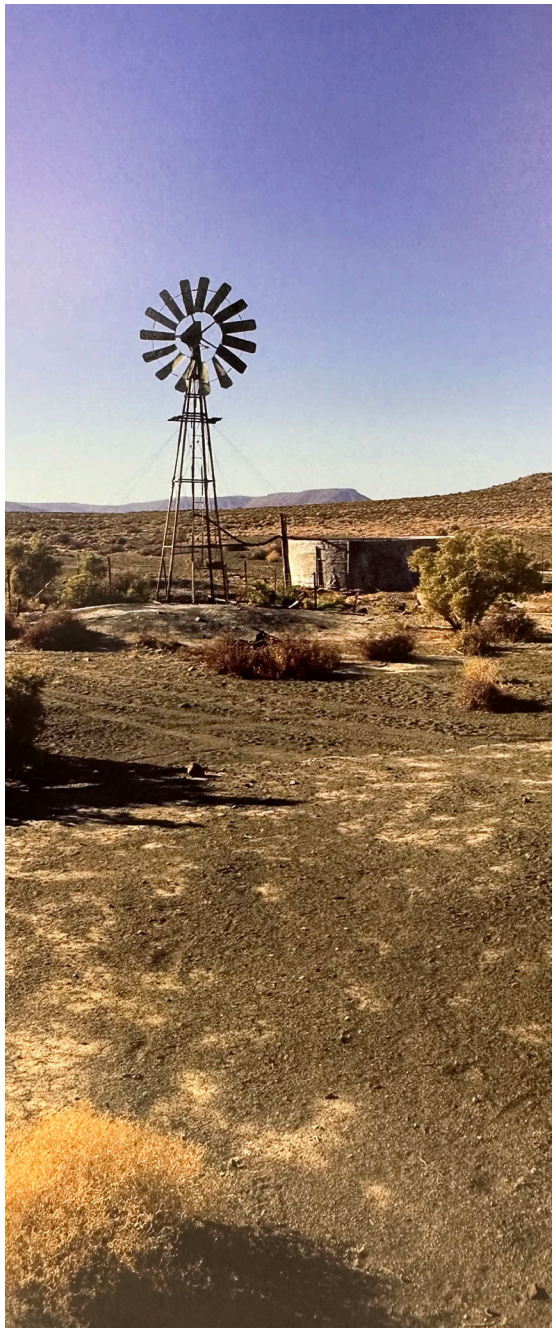


FIGURE 27: (Left) Portion of a strange painting assumed to be a Khoisan ritual dance (Palmer, 1966: 81).

FIGURE 28: (Right) Khoikhoi preparing to move (Frescura, 2001: 34).



Anthropocentic Man

The permanent inhabitation of the temporal landscape means introducing man-made elements that are anchored in the earth. Norberg-Schulz (1979: 10) explains that the "man-made parts of the environment are settlements" which serve as "foci" that condenses the character of the environment. These settlements become a physical manifestation of the way man experiences his surroundings, "gather[ing] the multi-farious in-between" (ibid.).

Man dwells when he is able to "settle" in this "multi-farious in-between"; when the man-made environment is experienced as meaningful, man is "at home" (ibid, 50). But what is meaningful differs for each man, which creates an isolated existence. This perspective has been justified, as Lebbeus Woods(2012: online) argues, by man's need for

"existential integrity: [where] each thing must be true to itself, before it can come into a 'true' relationship with other things. A powerful but problematic perspective, to be sure."

This self-centric view saw the birth of a wholly anthropocentric society. Where the anthropocentric man's relationship with nature was abut control and domination; domesticating the natural forces by the utilization of man-made inventions (machines).

FIGURE 29: Man-made inventions used to control nature (Deal, 2007: 162).

The Settlers

On the other hand, the trekboers who started to settle in the Karoo in the mid-1700s (Schoeman, 2013) had a more permanent way of living. "[A] new breed of South African pioneer was born – the Karoo farmer" (Deal, 2007: 15). These farmers had a tenacious spirit adapting to the harsh Karoo environment, even developing a "great, enduring love for the Karoo and its animals" (ibid.).

As the area became more populated, small towns started developing (Schoeman, 2013). Inhabitants used the surroundings as a resource to build their houses and learned to coax what they needed from the land. Their houses employed a technology common in the arid regions of Southern Africa which allowed them to permanently inhabit the Karoo: "brakdak" which translates as "salt roof" and is a construction method characterized by heavy walls and flat roofs (Frescura & Myeza, 2016).



FIGURE 30: A Brakdak home that was built with its immediate surroundings and so disappears into them (Fagan, 2008: v).

The Khoikhoi and the settlers had unique worldviews that influenced their relationship with nature and consequently their way of cultivating the landscape. These differing worldviews ignited a tension between the two groups who used their technological inventions (machines) in the fight over occupation. Consequently, cultural appropriation stemmed from the anthropocentric man whose relationship with nature was about control and domination. The anthropocentric man, together with his machines, has been in an eternal struggle with the forces of nature ever since, reforming the natural landscape to serve his needs.

But man is embedded in nature, "an integral part of the environment, and it can only lead to [further] human alienation and environmental disruption if he forgets it" (Norberg-Schulz, 1979: 23). Which is why an integrated approach to inhabitation might enrich the lived experience of an archived landscape that accepts an anthropocentric approach, but realizes that man is dependent on nature and must "bring into being a new myth" (SCI-Arc Media Archive, 2018., 15:43). Woods clarifies that this new myth will not be a re-interpretation of history but a product of imagination that creates a "form of unity of the diversity of life and the rapidity of its change" (ibid, 16:37).

FIGURE 31: The anthropocentric man does not touch the earth lightly, but embeds himself in the earth as he pleases (Author).



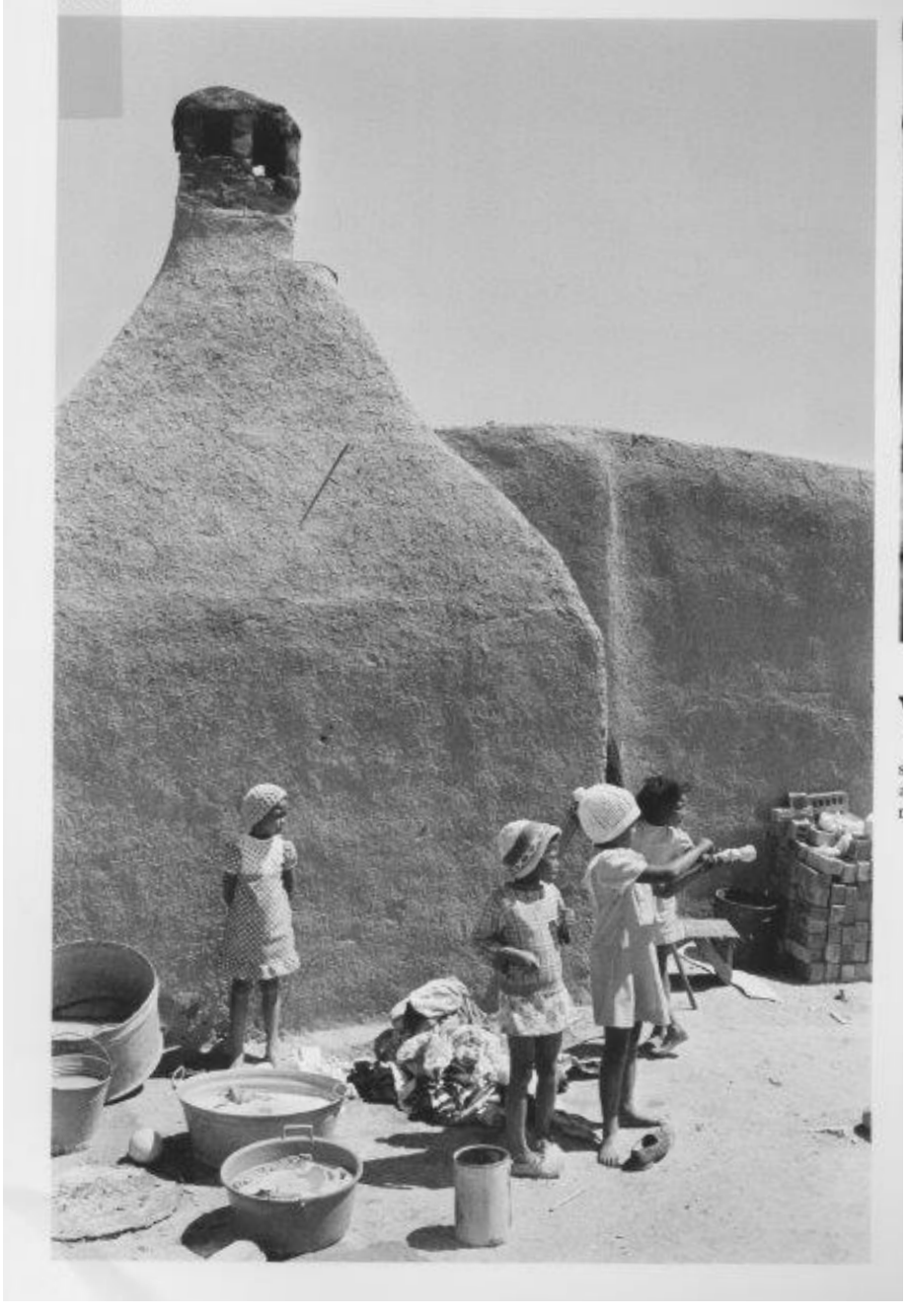
1.Making a place[OTHER]

To remake the contemporary landscape, it is necessary to integrate the temporality of the landscape with the continuity of man. Swiss architect Luigi Sbozzi and protégé Mario Botta (cited in McCarter, 2008: 18) speak of "building the site". In other words, as a cultivation of the land that involves looking backward and forward, learning from the traces of history; agricultural or architectural inhabitation of site. This reveals a "form of true culture" (ibid, 18) that is unique in its response to building traditions and the local climate.

However, in order to reconcile the contemporary anthropocentric man's relationship with nature and himself, it is necessary to learn from the anthropocentric and spiritual man.

1. Structural Mediation[REAL]

However, a brief overview of the building traditions of the people who inhabited the Karoo is necessary to gain insight into the techniques used to survive this ' unhomely' landscape. Focusing on the KhoiKhoi tribe and the European settlers, and how their different worldviews influenced their approach to inhabiting the landscape.



Mud buildings that, with flat brak roofs and mud walls, are in form and materials innate part of their environment"

(Fagan, 2008: 98).

FIGURE 32: A softly moulded mud building, with the finely trodden straw clearly visible (Fagan, 2008: 104).

Temporality

The Khoikhoi's unique understanding of the temporal landscape was represented by their use of tectonics. Deleuze and Guattari (cited in Cantley, 2023:) discusses the relevance of nomadology and places emphasis on the nomadic structures as being collapsible. "Yet the collapse opens up possibilities and creative capacities" allowing for assemblages that become "finely articulated armatures" (Spiller cited in Smout & Allen, 2007: 4). This temporal construction becomes an "interplay between assembly and disassembly" (Cantley, 2023: 124).

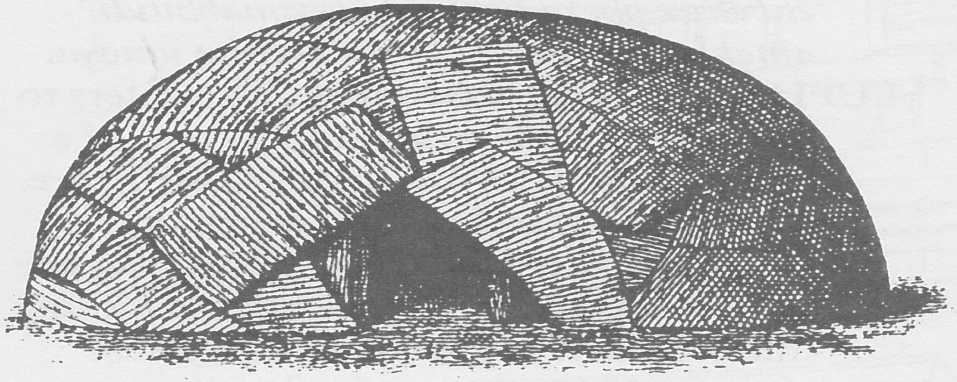
Temporality does not necessarily mean something ceases to exist past a certain time, but rather pertains to its transformation over time, its propensity toward a process of change. The temporality of the landscape is not something that is perceived, "for we do so not as spectators but as participants, in the very performance of our tasks" (Ingold, 1993: 159). Maurice Merleau-Ponty (1962: 483) stated that in experiencing an environment "[I] am at my task rather than confronting it". It can thus be said that the Khoikhoi lived a temporal existence, engaging with the cyclic landscape and fostering a deep connection to its temporality with their light frame construction and nomadic heritage. These systems are representative of a cosmological approach with connotations to sky and dematerialization (Nesbitt, 1996).

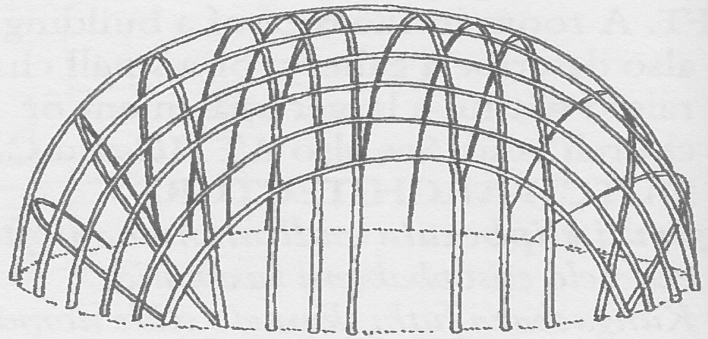
Matjieshuis

The Khoikhoi's homes were designed to offer protection from the elements and to be easily dismountable and portable. Known as 'Matjieshuis' which literally translates as 'small-mat-house' (Frescura and Myeza, 2016: 115). These beehive structures consisted of a structure and cover, all of which was re-usable as it was believed that the Khoikhoi often travelled into areas where building materials were scarce. Making these dwellings unique among the Southern African peoples (Frescura, 2001).



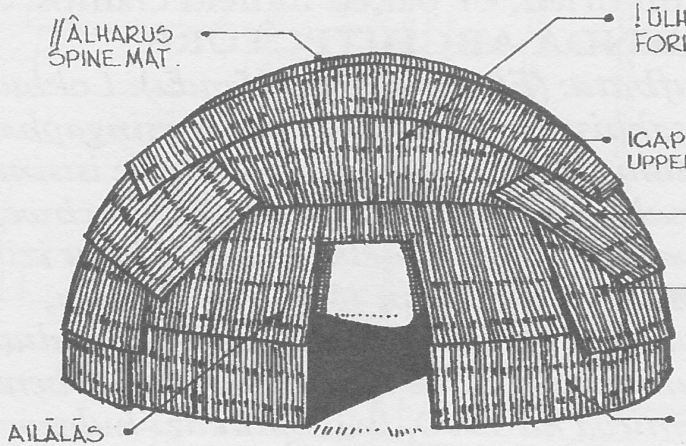
FIGURE 33: Dismountable Khoikhoi dwellings, Kolbe, 1727 (Frescura & Myeza, 2016: 102).



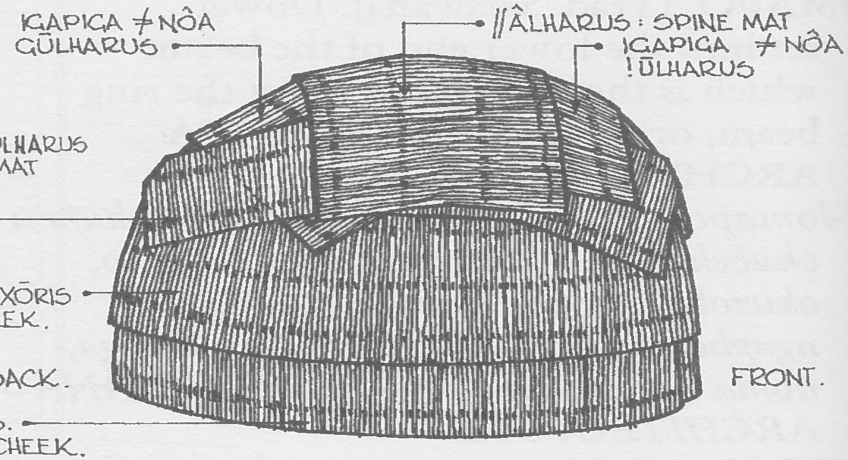


• SAPLING FRAMEWORK.

Construction of a *matjieshuis*.



• FRONT ELEVATION.



• SIDE ELEVATION.

Starting with the light frame structure; vertical members were planted into the ground in a circle of 4.2m diameter and brought radially to a central crown. The uprights are then stabilized with horizontal bracing running parallel to the ground in hoops of diminishing size as they advanced upwards towards the apex. Elements are bound together with grass ropes or more likely leather thongs which would be reusable. The thatching of grass is likewise 'sewn' to the structure with grass rope but at a later stage of development grass matting is introduced to improve waterproofing capacity (Frescura, 2001).

These techniques speak of pure function and utility governed by temporal invention and inspired by nature. Moving with the progression of time and using that which can be harvested from the surroundings, the KhoiKhoi was wholly dependent on nature.

"Structure and cover become identifiable elements of the hut, but there is no definition between the functions of wall and roof. The beehive hut remains to all intents and purposes an extended roof"

(Frescura, 2001:17)



FIGURE 34: (Left) Matjieshuis construction (Frescura & Myeza, 2016: 114).

FIGURE 35: (Right) A nest built between the rocks, made from the surroundings, with no definition between 'wall' and 'roof' (Author).

Permanence

The settlers seeked permanence which speaks of a heavy and stable presence in the landscape. Understanding of place was mediated with heavy walls and 'brakdak' construction that translated the natural environment into built form. It also protected the settlers from the harsh and unforgiving character of the landscape, by utilizing the surroundings as a counter effect against itself. This permanent construction allowed for a "rootedness and connection, for home and belonging" (Corner, 1999: 13).

However, it is the structure of such a man-made environment that embodies meaning and taken as point of departure for its basis is the natural environment. Nature is thus translated into built form, a "megalithic architecture" that makes use of stone and soil from the surroundings "symboliz[ing] the solidity and permanence found in the mountains and rocks" (Norberg-Shulz, 1979: 51). Even the fertile soil is "visualized through agriculture" (ibid, 52) and water is tamed, in other words the natural forces of the cultural landscape are "domesticated" and are built as an "ordered process where man participates" (ibid, 51). These systems are representative of an anthropocentric approach, with connotations to earth and solidity. Man is in control.

FIGURE 36: A survivng brakdak home that was once created with so much care from the surrounding materials, but now in disrepair (Fagan, 2008: 215).



Brakdak

On the other-hand, when the European settlers settled in an area they intended to stay. Their Brakdak, or flat-roofed dwelling has its origins in European architecture and is believed to have been introduced to Africa by the European settlers. Once the settlers (trekboers) started moving inland they found its construction to be ideal for the more arid conditions of the interior. Consequently, the flat roof dwellings were soon identified as the domestic architecture of the Dutch farmers in the Karoo (Frescura, 1989).

Living in quiet harmony with their surroundings, the settlers rooted themselves in the Karoo. Understanding that plundering what the Karoo offered only angered the Karoo to mete out its punishment. The settlers chose permanence and adapted their way of living accordingly, utilizing machines that enabled them to survive in an unforgiving landscape.

"The roof consisted of a series of beams supporting a layer of coarse reeds or timber battens, or slabs of slate. Owing to their differing loads, the choice of this material was contingent upon the size of timber beams available locally. This is then overlaid with a layer of soil, preferably having a high lime or salt content, which tends to repel water. Finally, a layer of ground salt, or brak, which is found naturally in the region, is slaked of impurities, ground to a fine powder and laid over the earth screed to a thickness of 20-30mm. The surface is then sealed with a sprinkling of water, which will be reinforced after the first rains. Because fast water run-off will erode the salt surface, the brak is laid at a fall of 5 degrees or less" (Frescura & Myeza, 2016: 23)

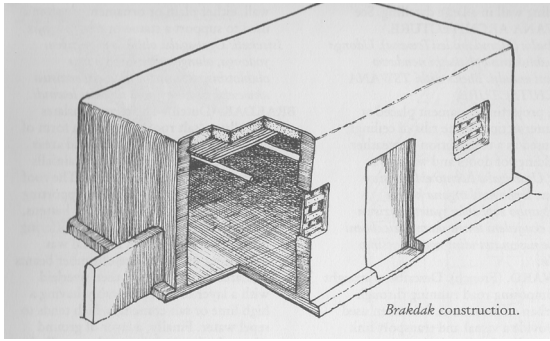


FIGURE 37: Brakdak construction (Frescura & Myeza, 2016: 24).

Temporality has a propensity to keep changing, denying man a rootedness. Whereas permanence is in danger of stagnation, denying man the possibilities inherent in discovering.

Yet, it is absolute that man changes his context and that both people and nature are immensely diverse and continuously changing. It is therefore the structuring of place that mediates man's experience of his cultural landscape. Arnold Berleant (cited in Koh, 2004: 15), an American philosopher, comments on the phenomenology of aesthetic experience :

"The perceived sense of continuity of human being and the dynamic forms and processes of the natural world is a central factor in the aesthetic appreciation of nature"

Making the "purpose of architecture… to make a site become a place" and to "uncover the meanings potentially present in the given environment" (Norberg-Shulz, 1979: 18).

Similarly, as Norberg-Shulz (1979: 15) explains, the character of place is "determined by the technical realization" of building. Thus, it should become an act of "poesies"; a creative act of making (Nesbitt, & Norberg-Shulz, 1979).

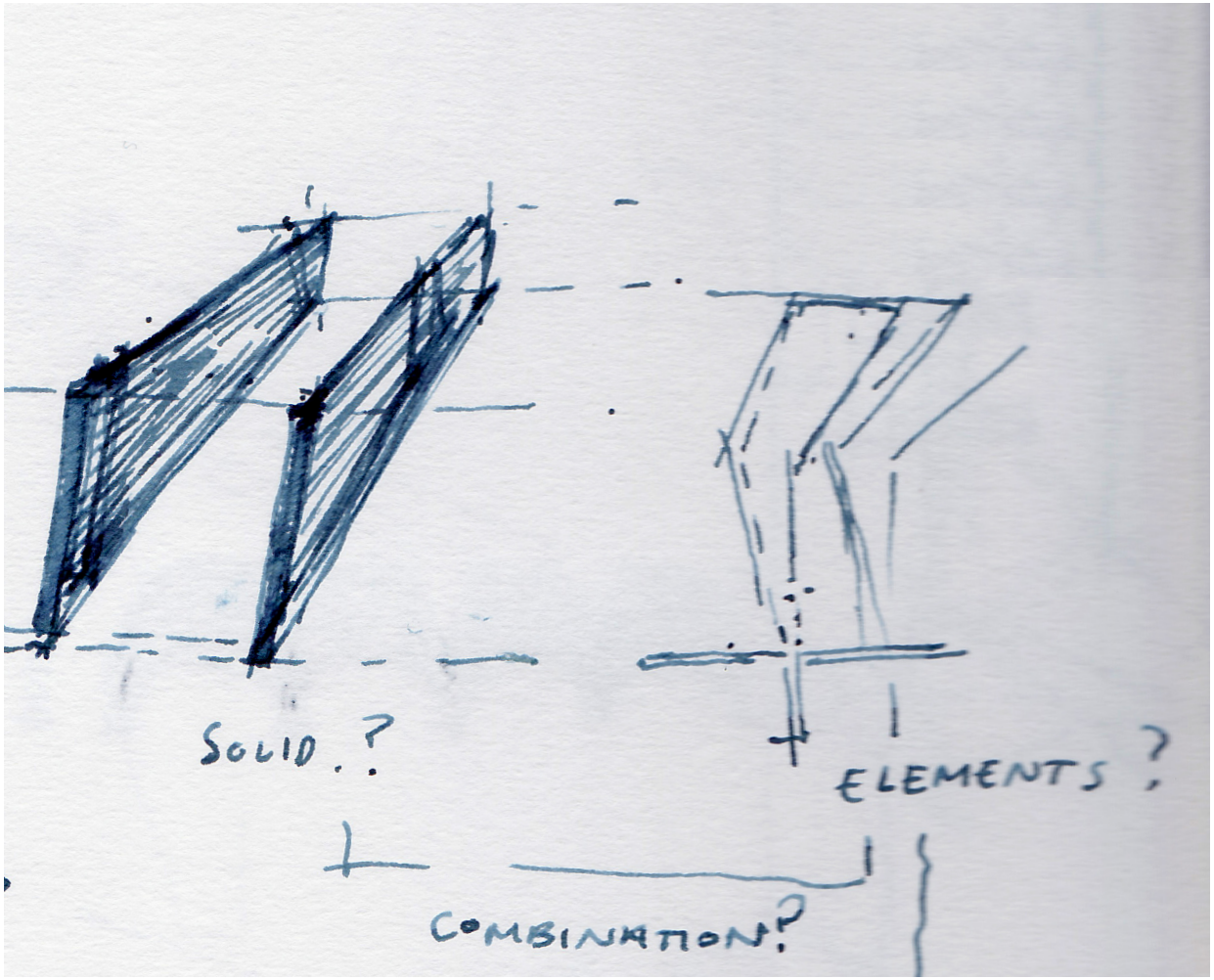


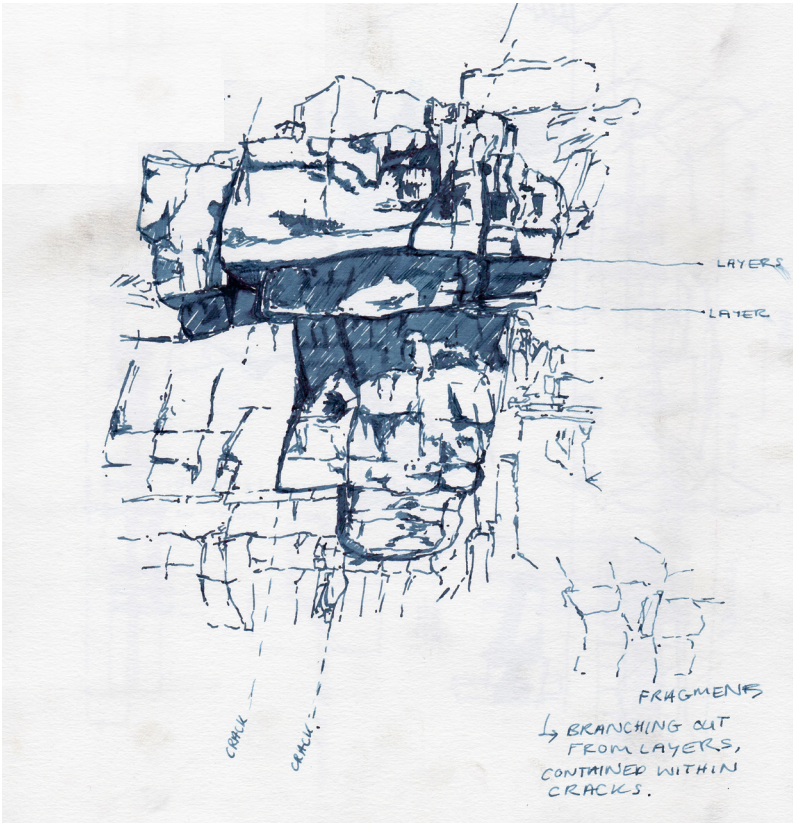
FIGURE 38: A conceptual approach as to how temporality and permanence can be integrated (Author).



FIGURE 39: A translation of the scarred edge (Author).

1. Mechanized landscape[OTHER]

Beervlei has taken on a machinic patination; its surface layer has been transformed. It remains the same place, yet it has gained an unfamiliarity or 'unhomeliness'. With the help of machines man sculpted the scarred rock edge. This destruction was left to be absorbed by the fluid and yielding nature of the surroundings. Alas, it is an unforgiving landscape, and it has not relented. Technology has become a force of nature that has produced a mechanized landscape.



1. Response to landscape[REAL]

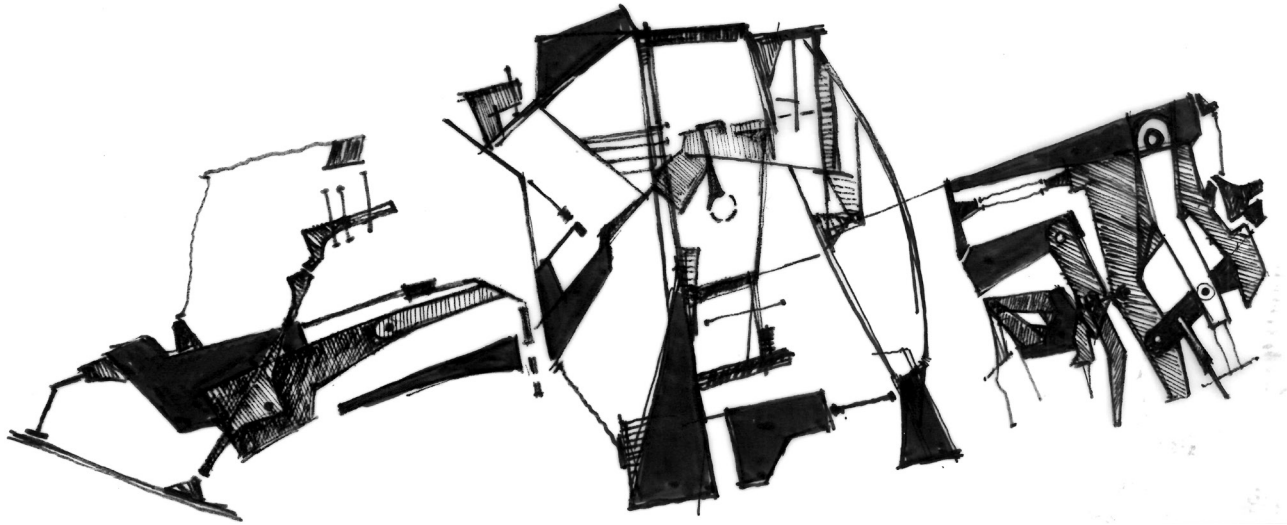
The construction of Beervlei Dam transformed the natural surroundings, where the use of machines has added a 'machinic' character to the landscape. As seen in the jagged edge of rock formations and large concrete foundations along the edge, the gaping quarry and the obvious sculptural presence of the dam itself.

As such, an architectural intervention situated within this 'mostly' natural landscape needs to respond to it, to become of the landscape.



FIGURE 40: The landscape transformed, exposing jagged rock formations (Author).

Mechanized is understood as the introduction of machines to a place or process. It is therefore a verb and refers to a machinic process. The construction of the Beervlei Dam interrupted the natural processes of the environment. As such, the mechanized landscape can be described as "under the influence of nature but under the control of man" (Smout & Allen, 2007:6).



It is, therefore, necessary to understand the machinic character of the landscape, to create its corresponding architectural language.

FIGURE 41: Machinic character of the patinated edge in **FIGURE 42** (Author).

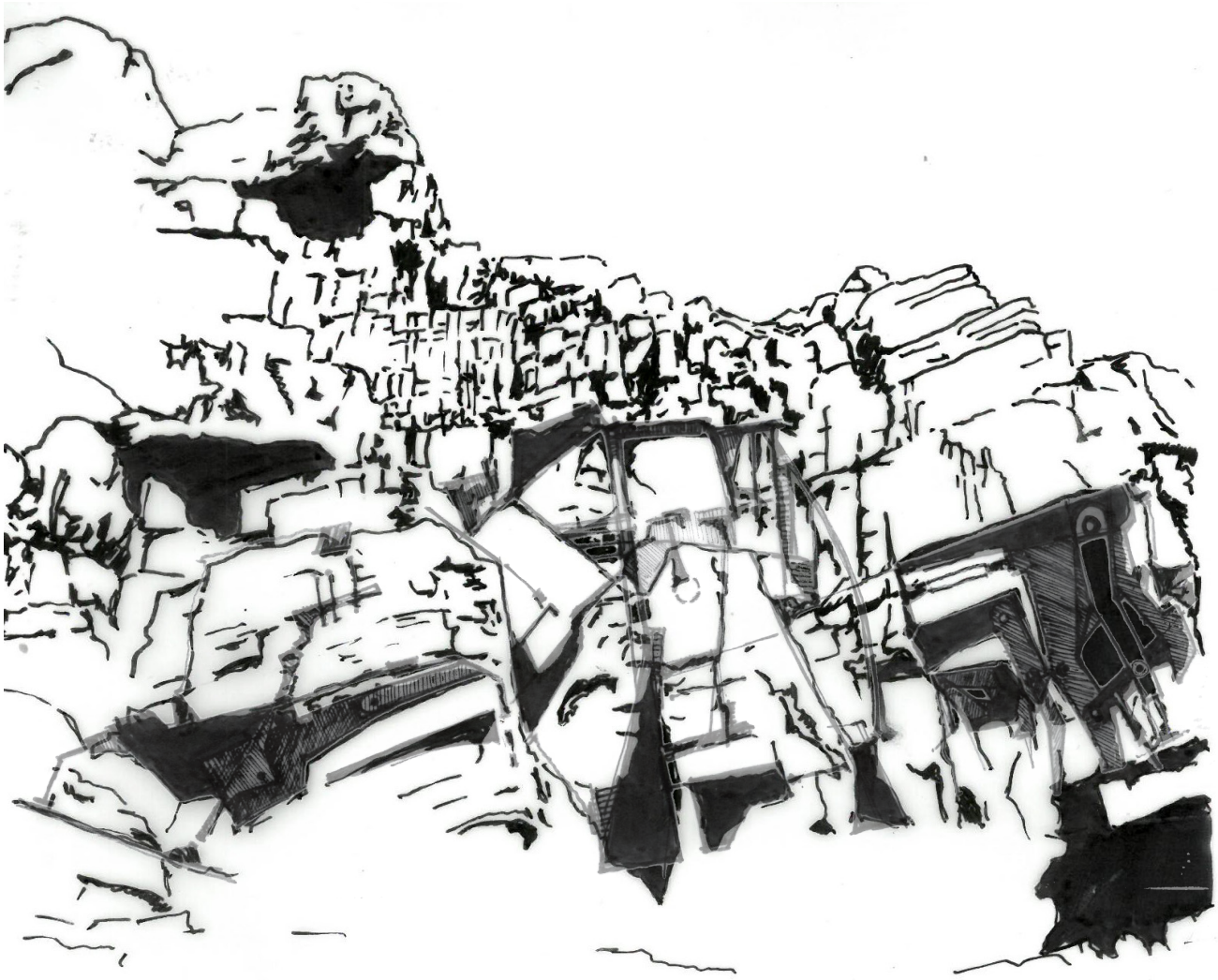


FIGURE 42: A patinated edge (Author).

2. Anthropomorphism[OTHER]

The surfaces translated in the alternative site analysis represent the machinic patination of the site. The scarred edge and the man-made objects implanted and left behind tells the story of a somewhat violent transformation of the natural landscape; traces left behind of the site's artificial memory. The site has a memory and an ability to scar and is unforgiving, all qualities of man. Personifying these natural elements allows man to understand them, this notion is referred to as anthropomorphism (Norberg-Schulz, 1979). Which is the "projection of human traits onto a nonhuman object, including nature at large" (Daston, 1995).

Man humanizes nature to cultivate a meaningful connection, stemming from man's inherent need to identify with and understand his surroundings that he may be able to feel at home (Norberg-Schulz, 1979; Hepburn, 1998; Urquiza-Haas & Kotrschal, 2015). It is no longer just a piece of land, but it is now a place with a meaningful history that must first be understood for man to achieve a "reconciliation" (Norberg-Schulz, 1979: 31) with nature.

2. Alternative site Analysis[REAL]

The alternative site analysis attempts to record the machinic patination of the landscape with another form of patination. A print and a drawing will be taken of a surface that has been sculpted by man.

A clay print is taken to record an echo of the existing, while a machinic device is used to condense a surface of multiplicities into a singular expression, translated as a line. Both, fittingly, require the engagement of man.

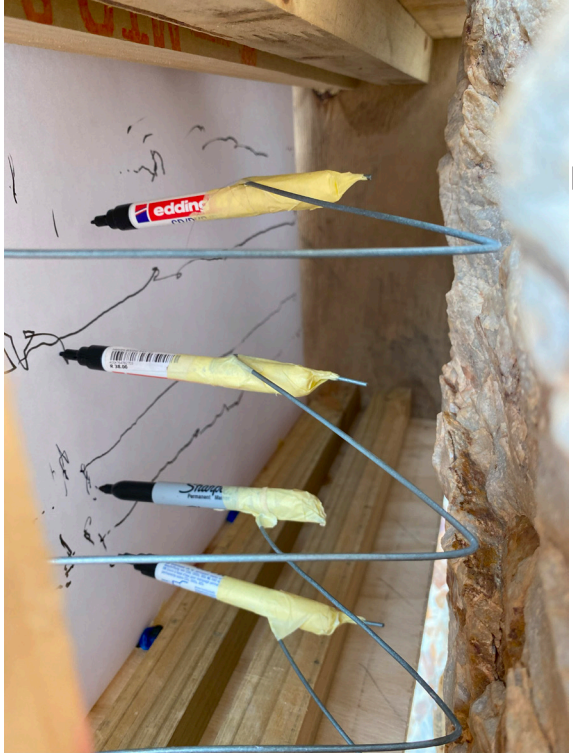


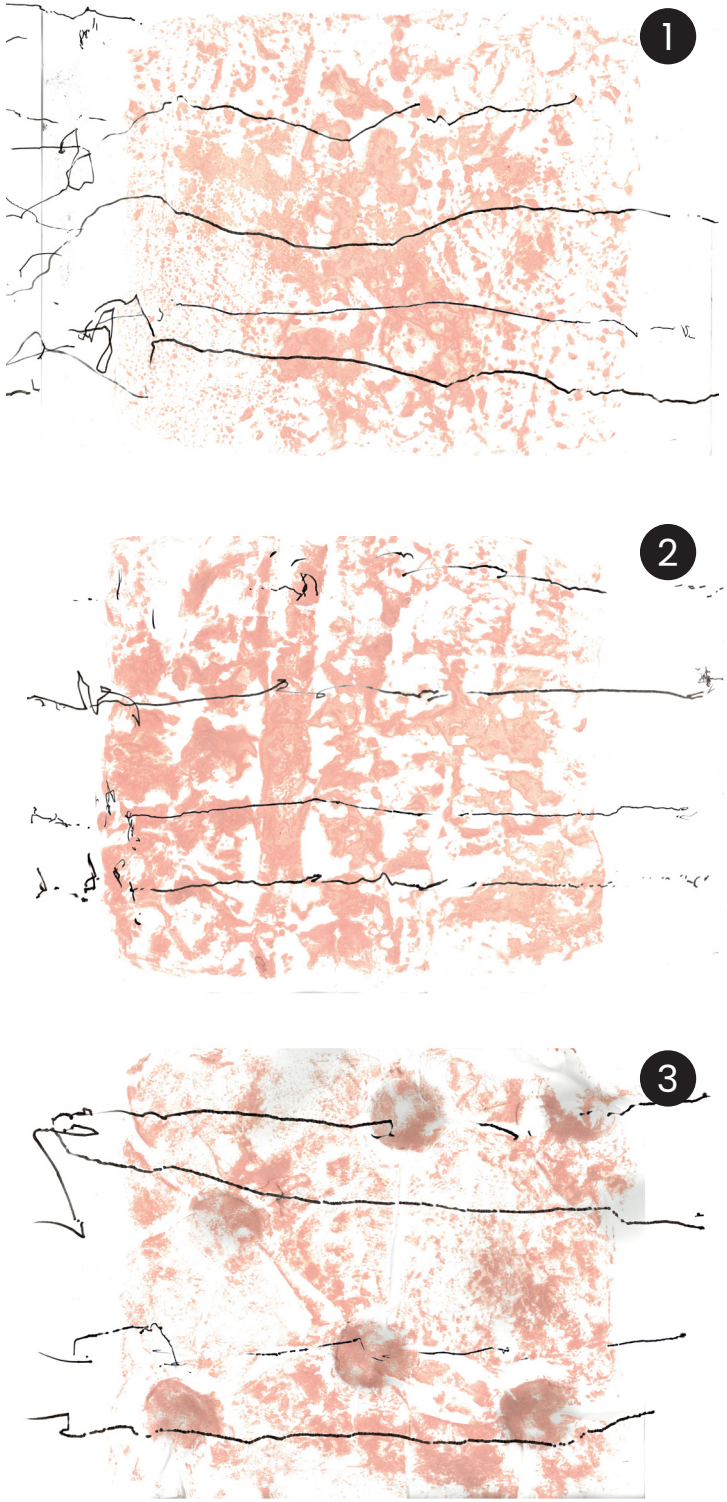
FIGURE 43: Machinic device translating the tactile experience of a sculpted surface (Author).



FIGURE 44: (Left) A clay print taken of a man-made (uncanny) object (Gutter, 2023: own photograph).



FIGURE 45: (Right) The machinic device at work on the same surface as in **FIGURE 44** (Gutter, 2023: own photograph).



The artificial memory of site originate from the man-made changes that have transformed the once natural surroundings into a mechanized landscape. The remnants of this transformation become the sites artificial memory -the scarred edge with its protruding rock formations and abandoned artifacts.

FIGURE 46: 1-3 Line drawing overlayed with the same surfaces' clay print (Author).

FIGURE 47: 1-3 The traces of the site's artificial memory (Author).

FIGURE 48: (Top right) Concrete base of a crusher (Author).

FIGURE 49: (Bottom right) Quarry where rock was mined on site (Author).

The surfaces chosen were specifically identified as traces of the site's artificial memory:

1. The concrete base of a crusher used when mining the innards of the mountain to build the beervlei dam.
2. The vertical scar of the quarry from which the rock was mined.
3. And remnants of rock in the process of being mined – drilled into, but then seemingly forgotten and left as is.



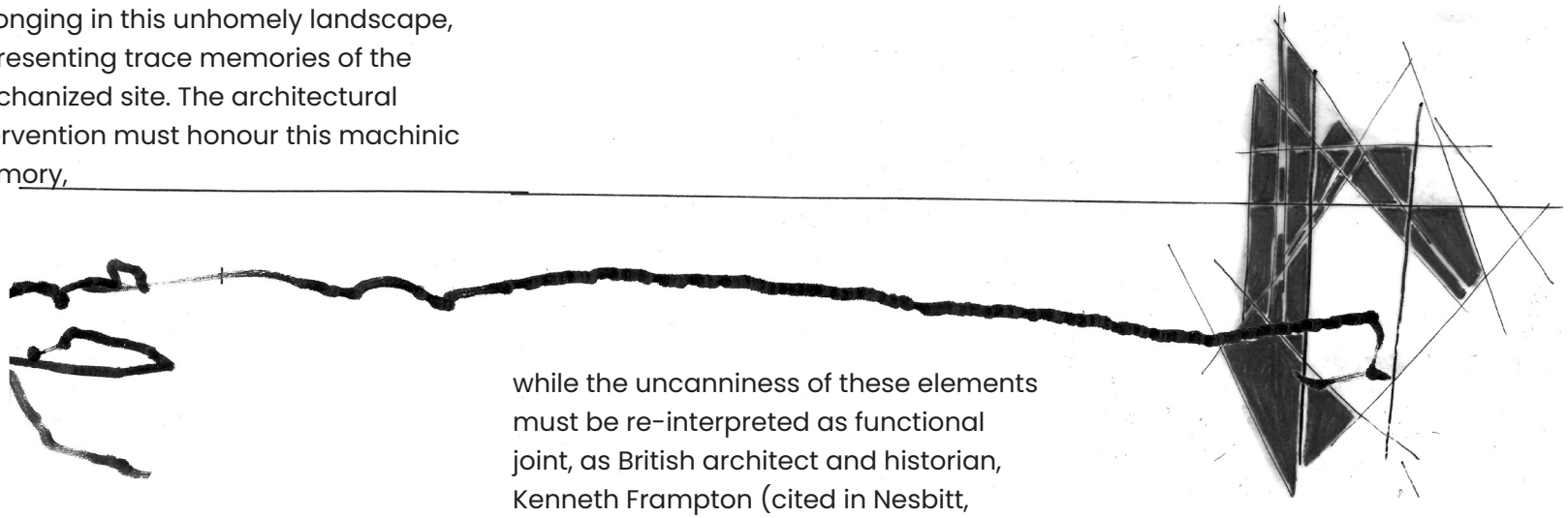








The scarred edge and the found object, or architectural artifact rises from the violent transformation and becomes a part of its history, an almost hero that has survived the ravages of time. These uncanny elements are perceived as belonging in this unhomely landscape, representing trace memories of the mechanized site. The architectural intervention must honour this machinic memory,



while the uncanniness of these elements must be re-interpreted as functional joint, as British architect and historian, Kenneth Frampton (cited in Nesbitt, 1996: 521) explains that the joint must be “articulated as a presence”. In order to fully appreciate the mechanized landscape, the ‘presence’ of these artifacts must be felt (experienced). This tactile experience must then be translated and integrated into the architectural intervention.

So that the mechanized landscape becomes an active agent in the process of fusing the architectural intervention with the landscape.

FIGURE 50: A re-interpretation of a tactile experience (Author).

Retrieving these trace memories of site and overlaying them allows for a re-interpretation; trace memories are translated into a type of pattern language. This iterative process allows for interesting architectural forms to emerge, forms inherent in the landscape. Ultimately, this 'pattern language' can become a mechanism of perceived poetics.

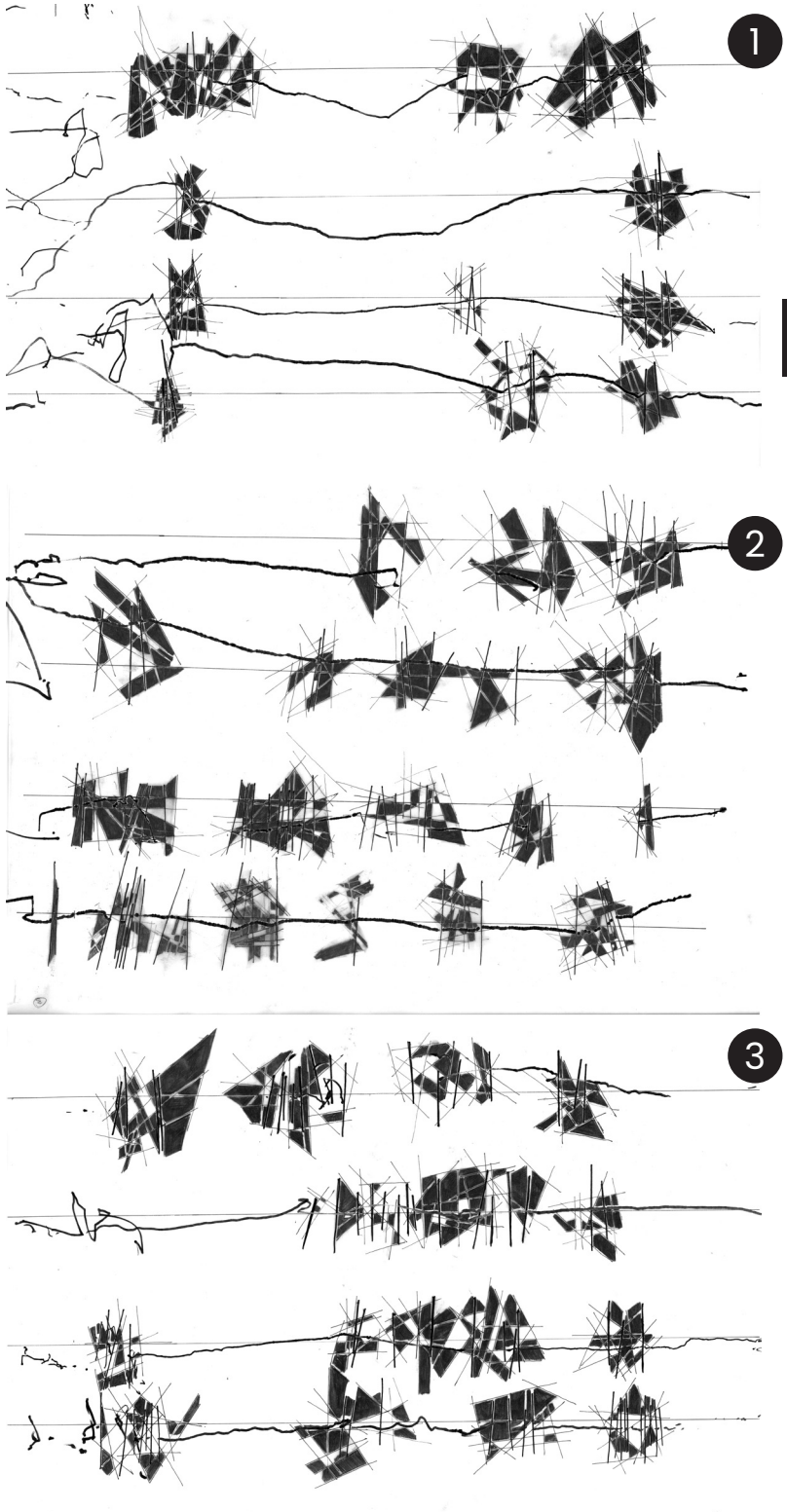


FIGURE 51: The generated 'pattern language' (Author).

FIGURE 52: A conceptual approach to translating the landscape (Author).

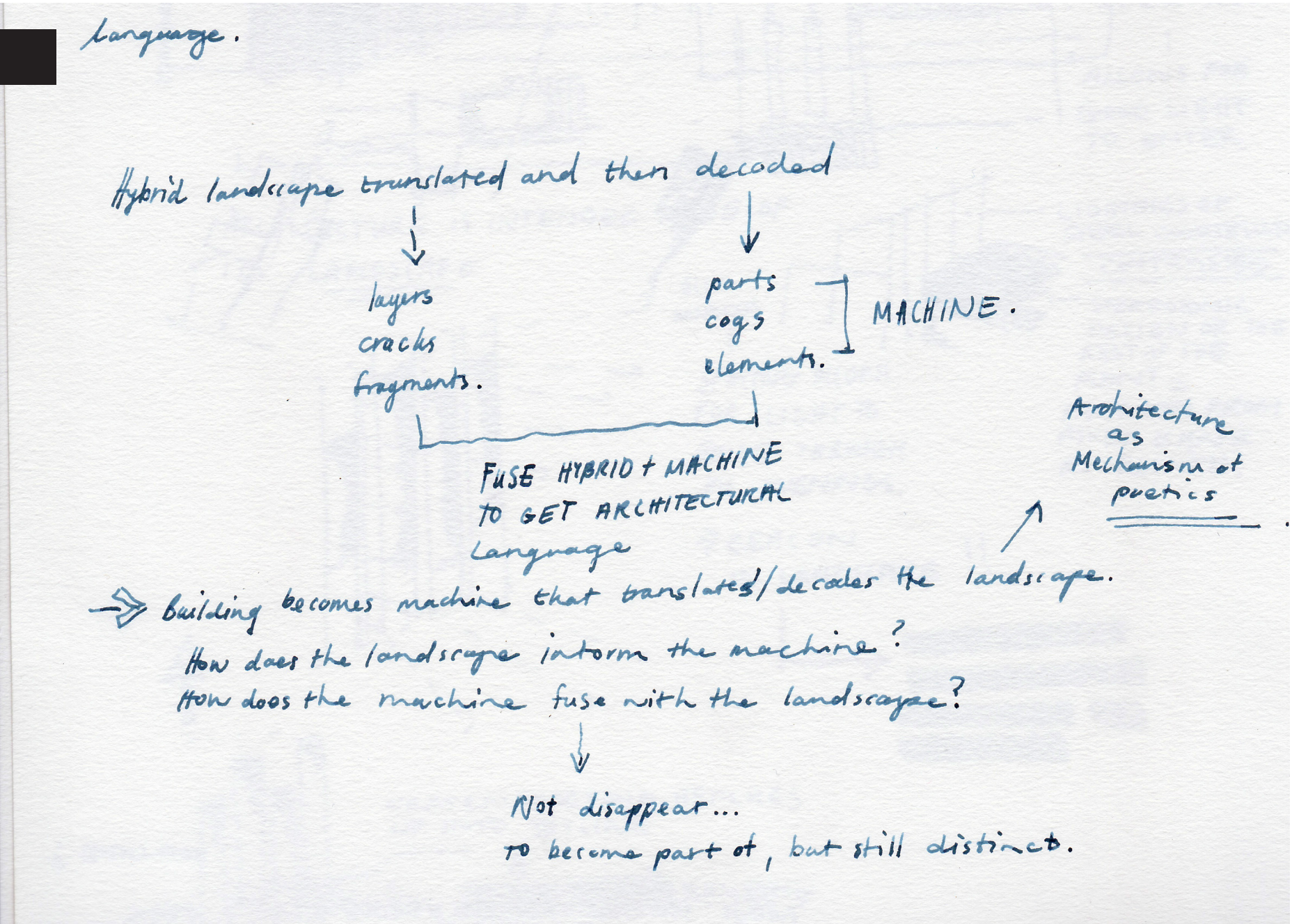
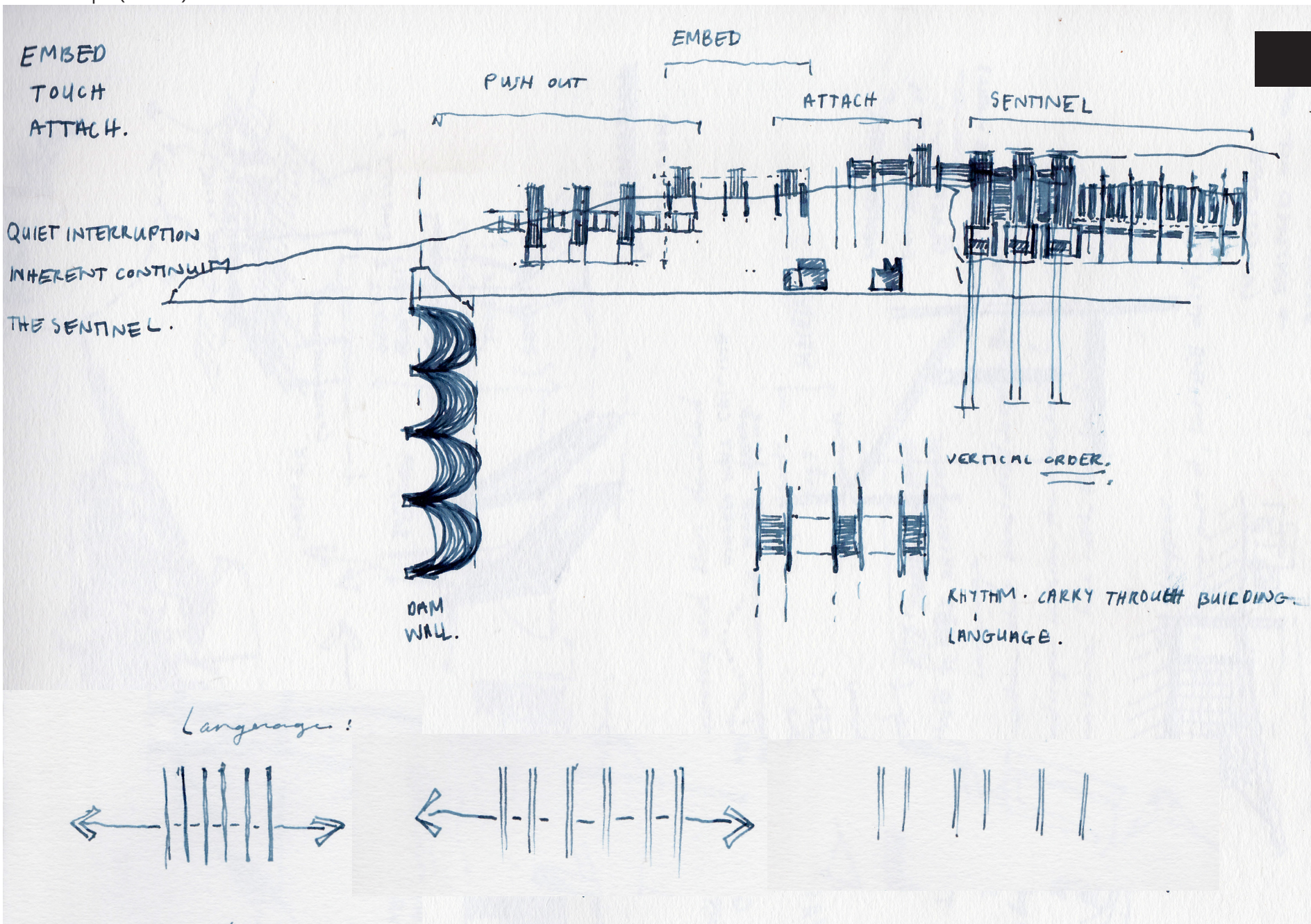


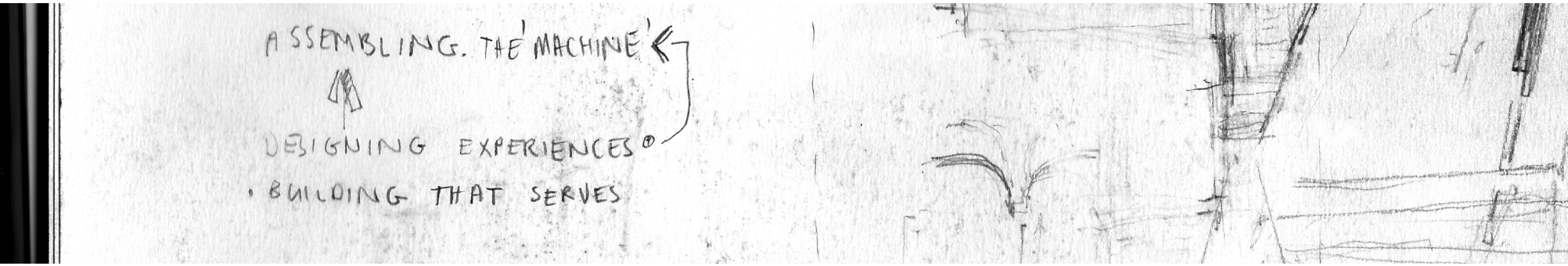
FIGURE 54: A conceptual approach to visually represent the language of the mechanized landscape (Author).



1. The Age of the Machine[OTHER]

Technological thinking is characterized by man's intention of controlling and dominating nature. Which, according to American architect and professor, Robert McCarter (1986: 7) has led to technological progression and scientific thinking culminating in "utilitarian and economic determinism", which has filtered through to all aspects of human life. This progression was originally fueled by innovation and creativity, but has been stripped into pure utility, Heidegger (cited in ibid, 7) refers to this calculated determinism as "an act without an image". The world has become mesmerized by the "endless cycle of fashion" (ibid, 7) and has become accustomed to uniformity and regularity as determined by mass production and automation.

Man's relationship with his fellow man, the machine and consequently nature has evolved along with technological progression. It is, therefore, necessary to investigate how the evolution of the machine has impacted the experiential quality of man's lived reality and consequently his relationship with his fellow man and with nature.



[4] THE MACHINE

1. Technological Progression[REAL]

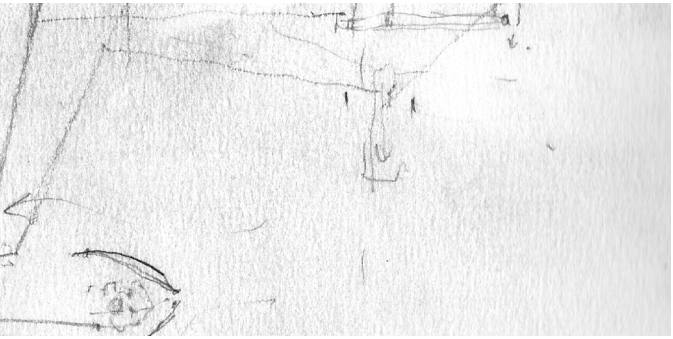
The mechanized landscape was sculpted by man, but with the help of machines. There is, however, a misconception that the Industrial Revolution (IR) is the age of the machine, but alas, man have survived with the help of machines since the dawn of time. The industrial revolution only fast tracked the endless possibilities inherent in machines – enabling man to dominate natural forces. Early machines were experimental in nature, a creative invention. Machines today have, however, lost this nature, "a calculating, optimizing, economizing intention has taken over" (McCarter, 1986: 11).

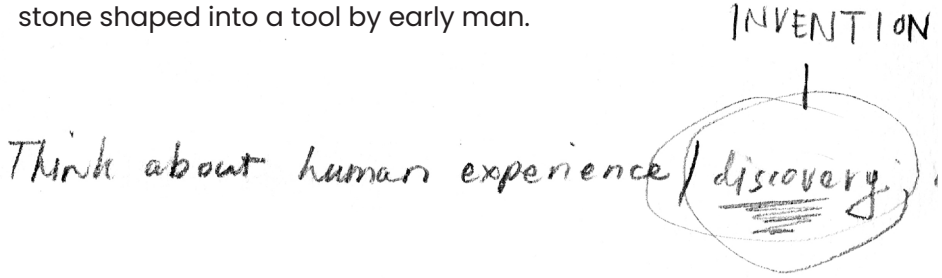
[An] old South African farmer ... when asked whether he had seen any changes on his farm over his lifetime, replied, upon serious reflection,

"I think the rocks are growing"

(Vanclay cited in Archer, 2000: 675).

And to think it all began with a piece of stone shaped into a tool by early man.





2. Archaic Machine[OTHER]

Tools of man were thus, the first machines used. Purely for utility and survival, but experimental in nature engaging man's interaction in discovering the world. Inspired by the simple acts of man's everyday life, these inventions were motivated by human values. Not only did they require human engagement to operate, but their creation also called for an "engagement of making, a poetic act of revelation directly related to experience" (McCarter, 1986:11,12).

Lebbeus Woods (2010: online) uses writing as an example, stating that all the great works of Western thought were "formulated by putting a handheld stylus to parchment or, later, to paper". 'Formulated' being the keyword, as it delineates that the act of writing is essentially an act of thinking.

It is in the acts of engagement, of experience that holds the potential for discovering.

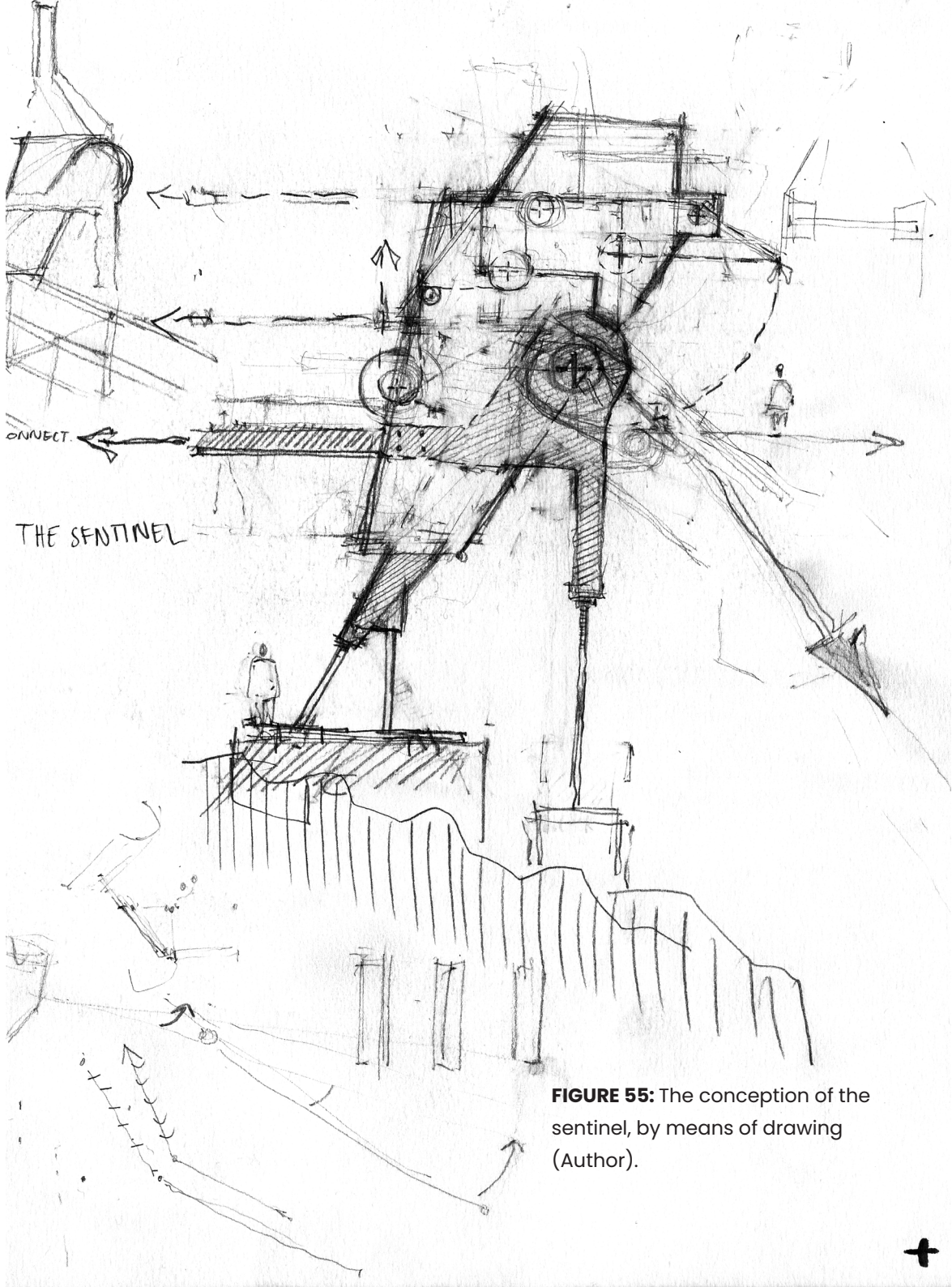


FIGURE 55: The conception of the sentinel, by means of drawing (Author).

2. Tools of Man[REAL]

Technological innovation started with the humble tool: an object that made the lives of man easier. The history of technology begins about 3.3 million years ago when a shard of sharpened stone was used as a knife and large unsharpened stones were used as hammers. The Khoikhoi were the last Stone Age peoples, which meant that their weapons and tools were made of stone, wood and bones (SAHO, 2020: online).

Technological inventions continue to transform the lives of man. Stone tools, Clay pottery and bricks, agriculture, clothing made of woven fabric, the wheel and on it goes. (Gregerson, 2023: online). These tools were shaped and created by man from nature and required the interaction of man to operate; it was a conscious act with intention. Man was in control of the tool and used it to cultivate (discover) an untamed landscape.

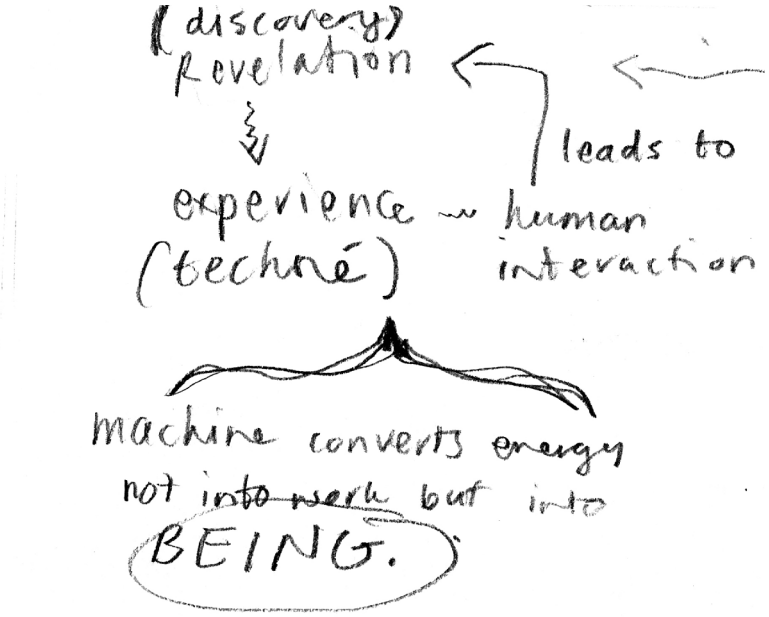


FIGURE 56: Understanding the experimental machine and how it integrates into the conceptual approach of the architectural intervention (Author).

The act of drawing was used throughout this project as a tool to think and formulate ideas.

We feel, upon entering the drawings, as though we have found an entire world, whose exploration will take us away from our familiar one, but eventually bring us back to it, our perceptions enriched, our imaginations stimulated and expanded, the better to appreciate the familiar in new ways.

(Woods, 2011a: online)

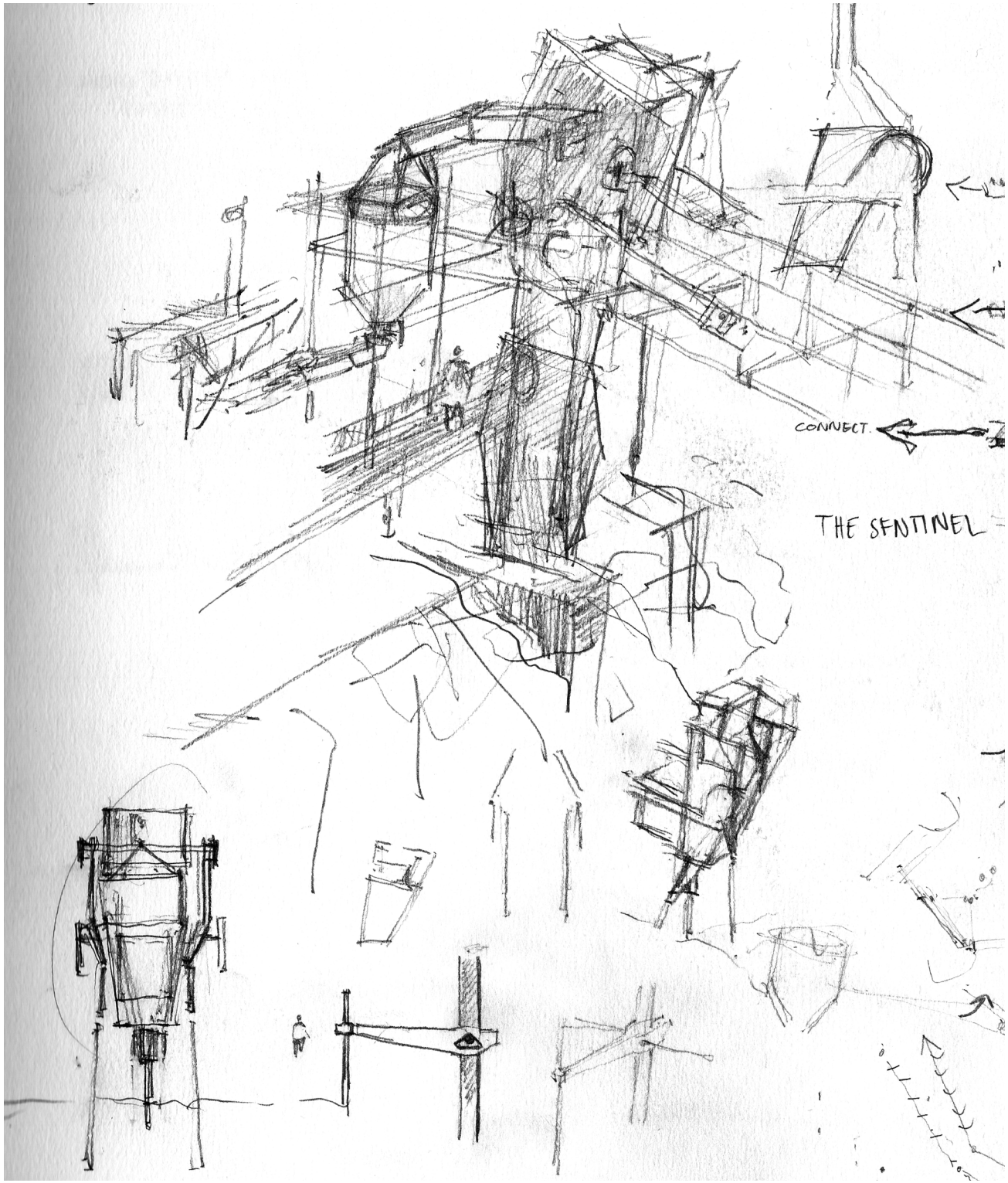
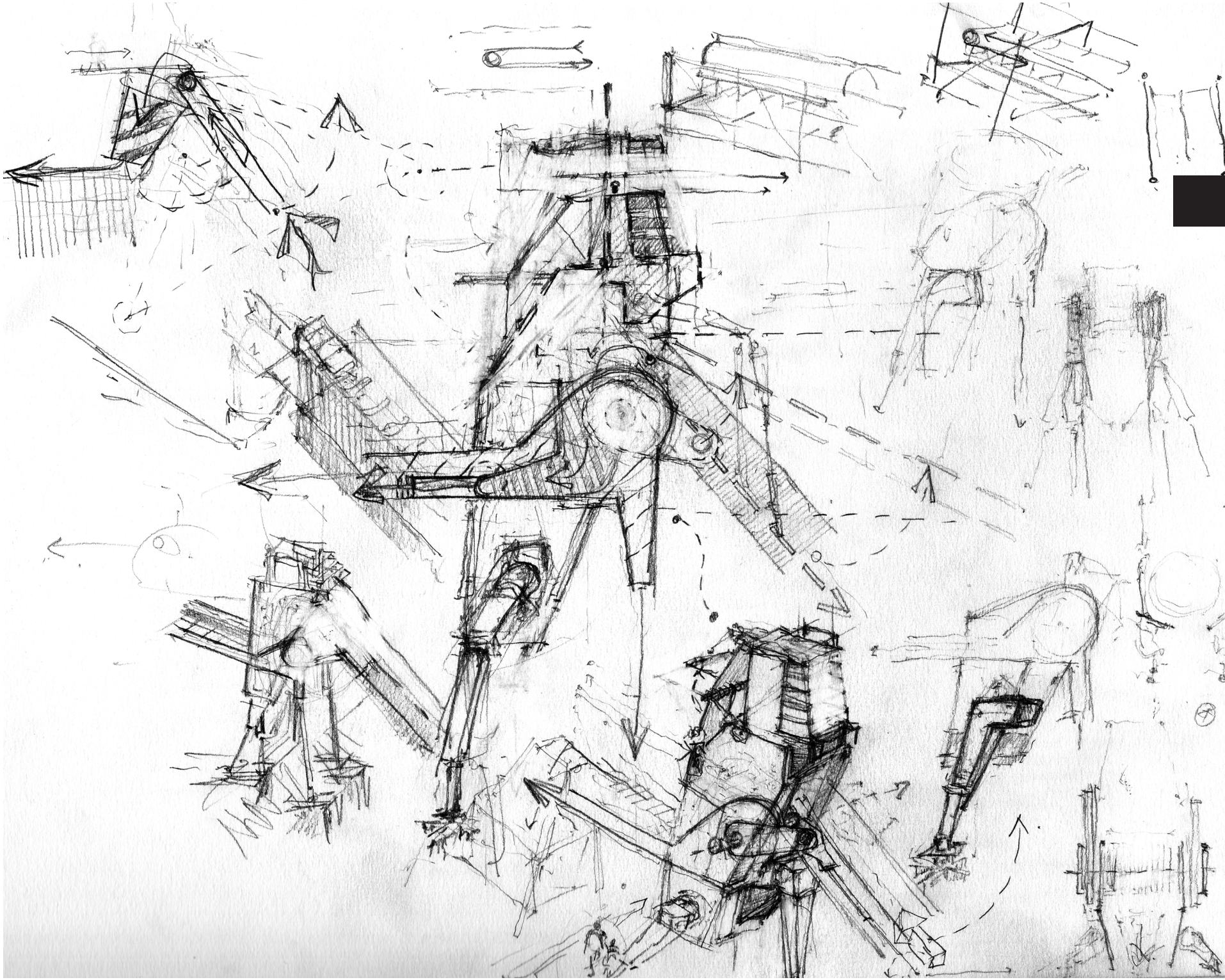


FIGURE 57: Formulating the sentinel as inspired by the landscape; thinking by drawing (Author).



3. Giant Powers of Man[OTHER]

As technology continued to develop, “efficiency, economy, and utility became ends in themselves rather than means to some other end” (McCarter, 1986: 8). Motivated by usability and pure function the industrial machine left behind its experimental nature and adopted production as an end.

The optimum use of universal processes in the quest for pure functionality has resulted in the standardization of the most basic human acts, technology is no longer experienced, “only operated” (ibid, 9).

This impoverished “realm of experience” (ibid, 8) is dictated by the “standardization of artificial lighting, climate control, building components, structural systems…” (ibid, 8). Which eliminates the need to respond to a variegated context. There is no more intention behind man’s gestures. The propensity toward standardization brings up the question of authenticity, what is truly unique in a world where everything is made to be the same?

Lebbeus Woods (2010: online) states that the first impulse of Western civilization or the anthropocentric man, is toward standardization, “in the same spirit as industrialization, mass-production, and consumerist conformity”. Although this enforces a homogeneity of understanding that favours commonality and community, it raises a very important question:

“What do we lose in the process of homogenization and standardization? Is it anything important for us to know, to experience?” (ibid.)



FIGURE 58: The result of mass production; there is no difference between each sentinel, they are the same. However, in this instance they were formulated from an original sketch (Author).

3. Industrial Machine[REAL]

Technological progression evolved beyond its humble beginnings, having had a major impact on man's daily lives the Industrial Revolution of the 19th century was aptly considered one of the most profound revolutions in human history. The machine has completely transformed not only man's physical environment, but his mental landscape too. This technical innovation brought about new tools and machines, merging technology with industry. This dominoed into almost every existing sector of human activity, while creating new industries (Wilkinson, 2022: online).

The Industrial Revolution was the transition from creating goods by hand to using machines; man became an employee instead of a craftsman. Australian writer and historian, Kerryn Higgs (2021: online), describes this transition:

[T]he traditional objective of making products for their self-evident usefulness was displaced by the goal of profit and the need for a machinery of enticement.

This new industrialized world saw to the rise of corporate giants, who had the resources to implement "assembly-line production of commodities, powered by fossil fuels" (ibid.). Standardizing the production process by producing standard, interchangeable parts and products allowed for mass production at a scale and rate that was unprecedented (Wilkinson, 2022; Holstein & Tanenbaum, 2023). Replacing man with machines made this feat possible.

Machines were able to do the tasks of man, faster and more efficiently. Denying man the experience of creating something with their hands. They still, however, had to engage with the machine to an extent. But with each technological improvement, man is pushed out further in the act of creating.

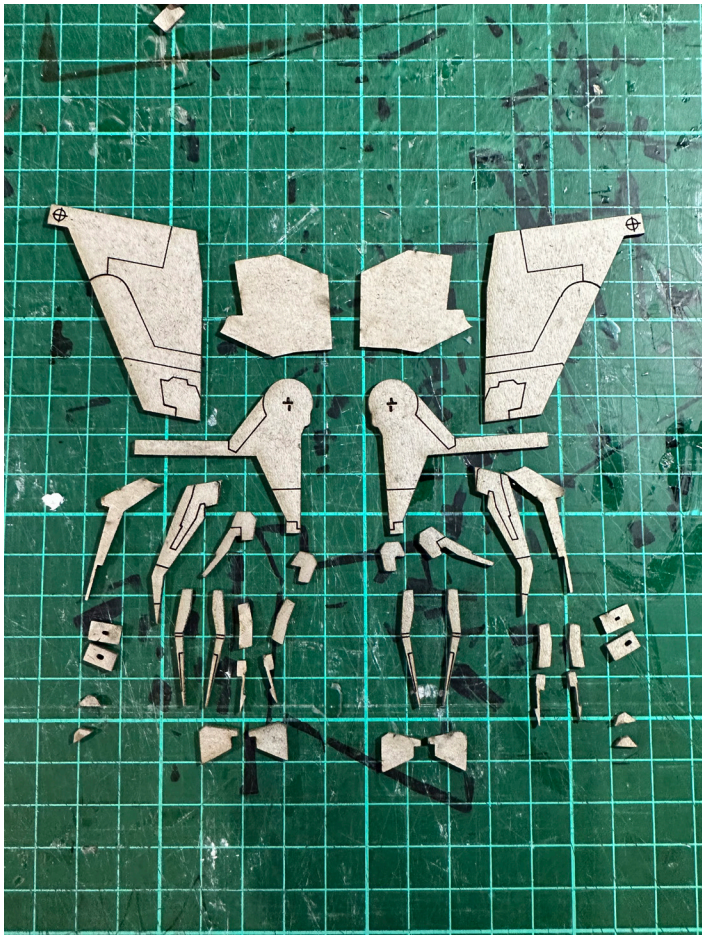


FIGURE 59: The standard parts of the sentinel as a process of mass production (Author).

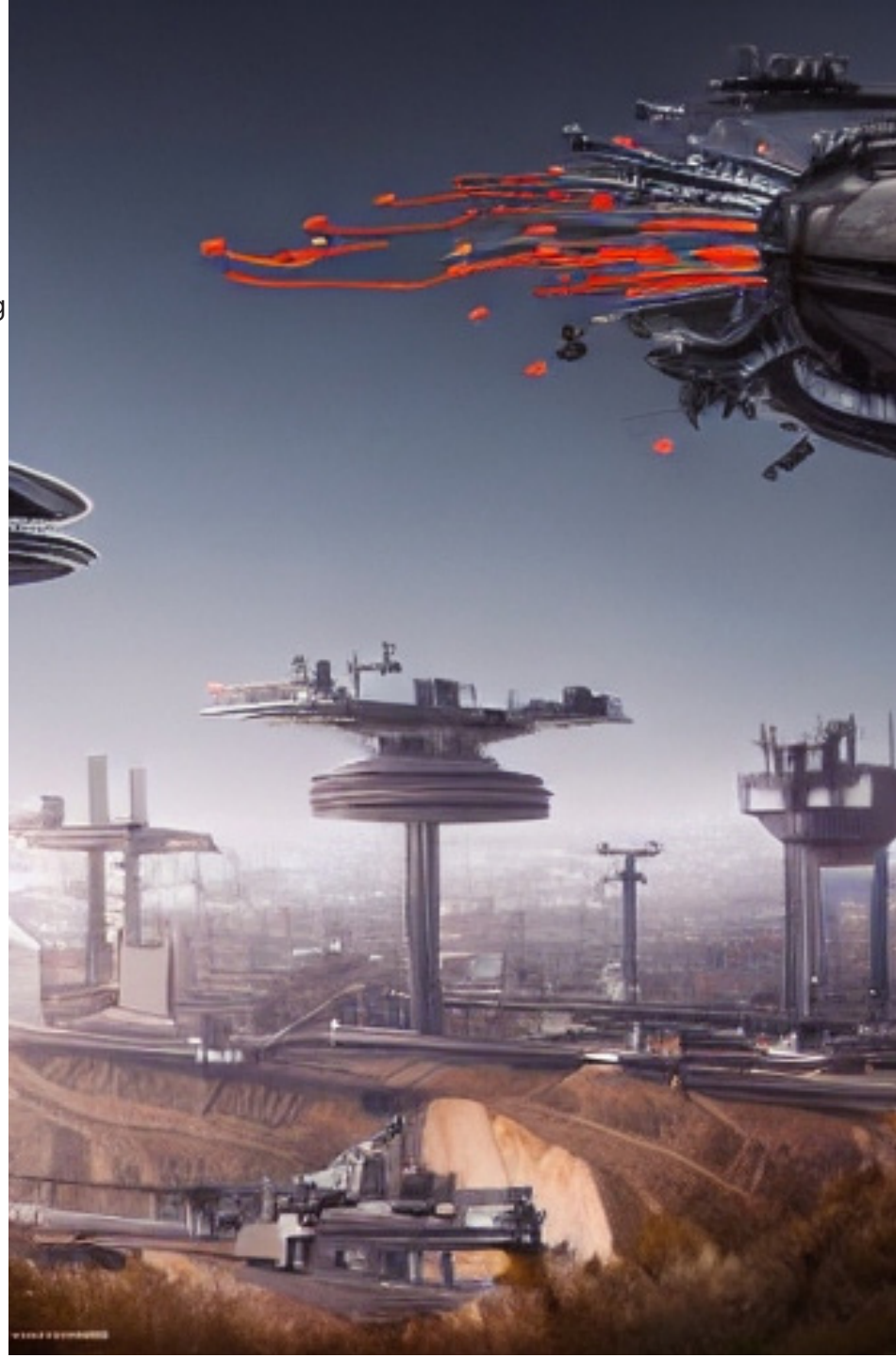
4. Age of Alexa/Siri[OTHER]

The machines most representative of today's day and age – television, computer, and smart phone – all deal with the transfer of information. These machines deny man all "but the most emaciated form of human experience" (McCarter, 1986: 8), revealing the degree of man's destitution. Technology is no longer experienced, "only operated" (ibid, 9) through voice control to one 'Alexa' or 'Siri'.

Man is no longer creating with his hands, the creative potential in thinking by doing (writing or drawing or making) remains dormant. The impulse to create is smothered by the blinking screen that promises instant gratification.

Man's life is predicated on experience, however, the information age has automated the "real present movements that result from human inhabitation" (ibid, 8), deeming these acts as banal. These simple acts, however, allows man to make a connection to place and denying man these small every day acts, disassociates him from his lived-world. Numbing man to his environment.

Life has become a standardized and automated process where a machine is in control, resulting in a sterile reality void of the wonder felt by discovering the world through the intentional engagement with it. And not through those hyper realistic Virtual reality headsets, while sitting on the couch.



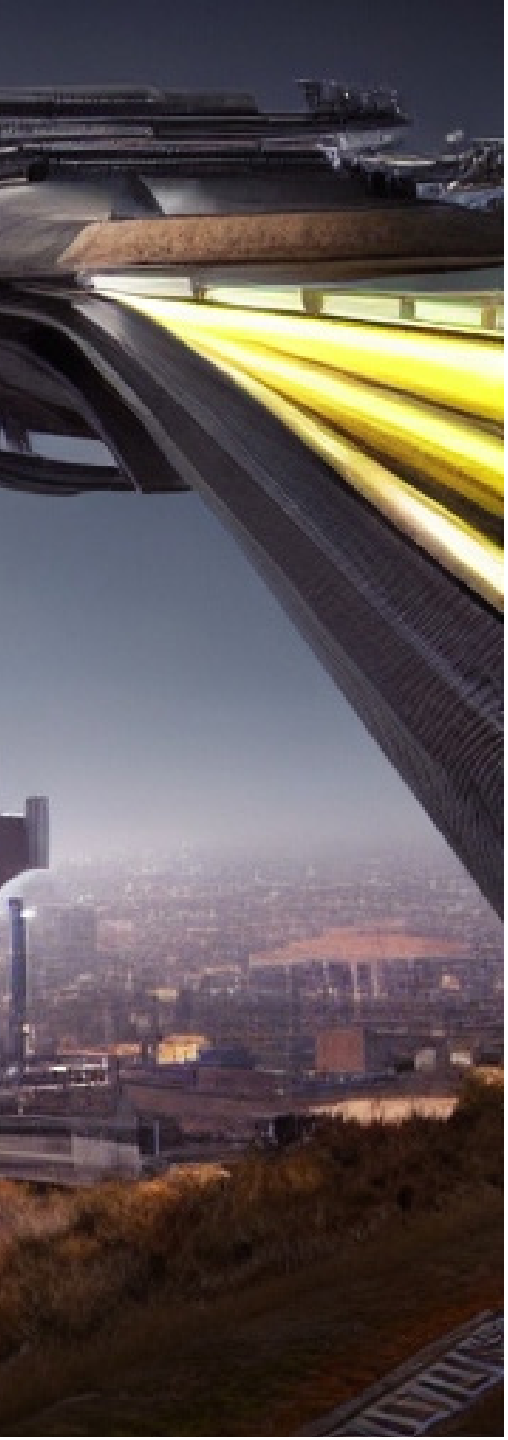


FIGURE 60: A wonderfully complex image generated by a machine from a few prompts (DeepAI).

4. Information Age[REAL]

Yet, technology keeps on changing. The past sixty years have seen to a technological advancement never experienced before. The invention of the silicon microchip in the late 1950s, followed by the development of the personal computer in the early 1970s "sparked a cultural revolution" (Baldwin & Cantley in Cantley, 2023: 202). Forever changing man's relationship with technology; altering how he spends his time and the environment he inhabits. (Baldwin & Cantley in Cantley, 2023; Mccarter, 1987)

The most prominent innovation of the information age is the internet – radically changing life, but man as well. Any information, service, entertainment is accessible by the click of a button or tap of a finger, without any contact with another human being. Man has become glued to the screen. Living their lives from the comfort of their home nay, their couch, alone.

The following AI generated images, **FIGURE 61** - **FIGURE 63**, took approximately 10 minutes for the entire process, including downloading the images. The prompt consisted of various interpretations of:

A lone mechanized sentinel that functions as a conveyor belt situated on the edge of a quarry within a landscape, inspired by Lebbeus Woods.

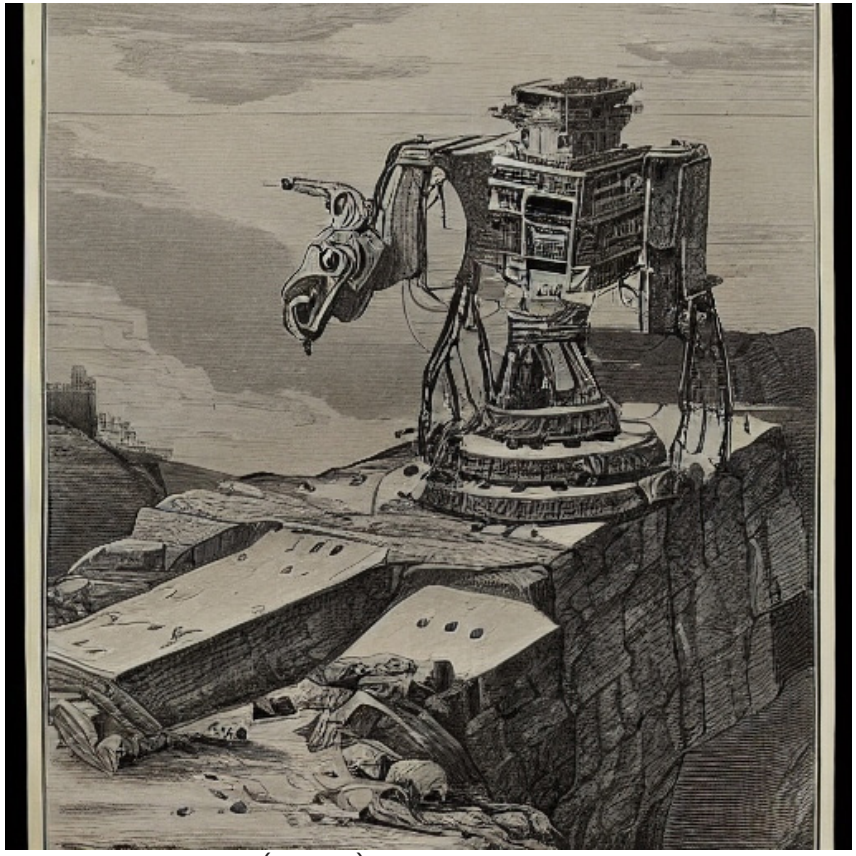


FIGURE 61: Variation 1 (DeepAI).

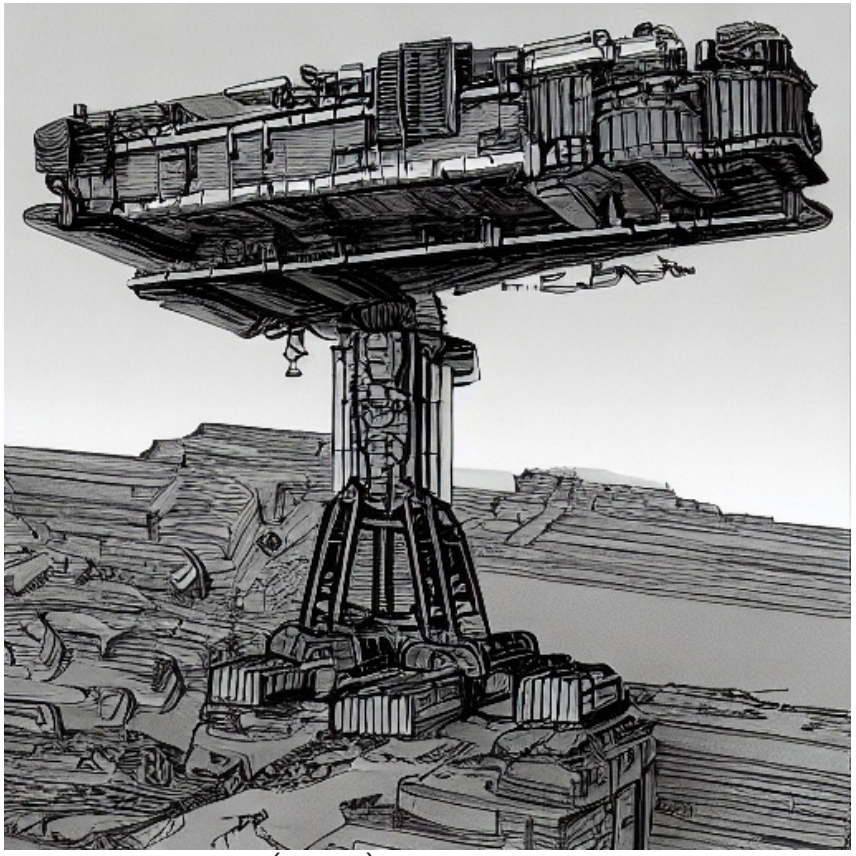


FIGURE 62: Variation 2 (DeepAI).

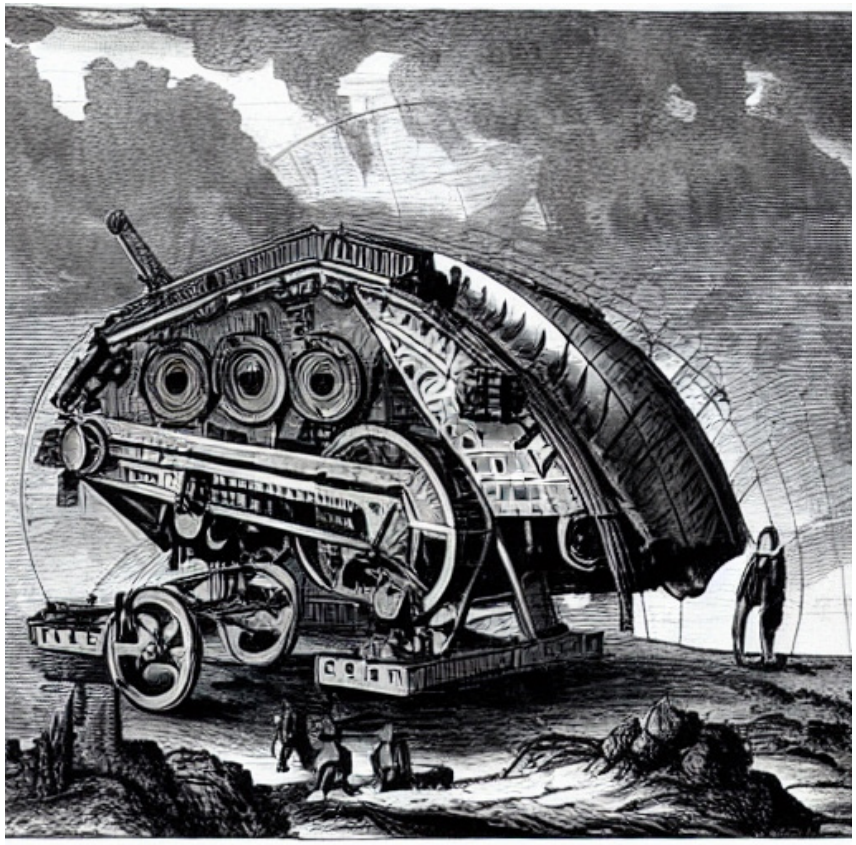


FIGURE 63: Variation 3 (DeepAI).

What is the difference between a computer generated drawing and a hand drawn one, considering the drawing only - as a product, as an object? The sure answer of Lebbeus Woods (2011b: online) is "absolutely none".

But, if the drawing is thought of as a process - as a process of thinking and making - well, the difference is vast.

> **"In the hand-drawn image, every mark is a decision made by the architect, an act of analysis followed by an act of synthesis, as the marks are built up, one by one." (ibid.)**

Whereas the computer-drawn image is likewise based on decisions made, by software of course. It does not involve man at all. He is a bystander to a process controlled by the machine and learns only from the end product.

But by drawing with hand, man experiences the method of making, gaining an understanding of the intimate connections between making and the result, "a knowledge that is essential to the conscious development of both" (ibid.).

The continuous progression of technological invention has created a dissonance between man, the machine and nature. Limiting man's interaction with the world around him. The machine has, however, allowed man to make wonderful discoveries in various fields that have saved and enriched countless lives. But, the creativity and innovation inherent in creating something by hand has been standardized and automated.

Man is 'processed' through his life, the simple act of opening or closing a door has become obsolete, it does so automatically. Man doesn't even need to open a window, by pressing a button the air-conditioning can cool the room down in a few minutes.

Robert McCarter (1986: 11) places emphasis on this type of technology that has gained a calculating and optimizing intention, an economic determinism:

Contemporary technology and the machines it produces are unrelated to the human values that motivated the early inventors

Machines have essentially lost their experimental nature,

and man being blinded "by the electric sunshine and television glare" (Biljon, 2010: 42) are so consumed by the screen that man is living in an age emaciated from experiences and nature.

The endless cycle of progress and production cannot be stopped, but it is possible for man to escape. A re-engagement of experience and technology is necessary for man to re-discover this new age world.



Machines have helped humans cultivate the 21st century, transforming the natural world into a cultural landscape defined as the information age. For example, how many times have you, the reader, checked your phone while reading this document, or been interrupted by an incoming call or email? Man cannot escape what he has invented, and progress cannot be stopped. A re-invention of the way man thinks of technology is required to return to the experimental nature of the machine.



FIGURE 64: (Right) Viewing the site through a screen (Gutter, 2023: own photograph).

FIGURE 65: (Left) Climbing the scarred edge as a way to experience the site (Gutter, 2023: own photograph).

1. Future Extracted[OTHER]

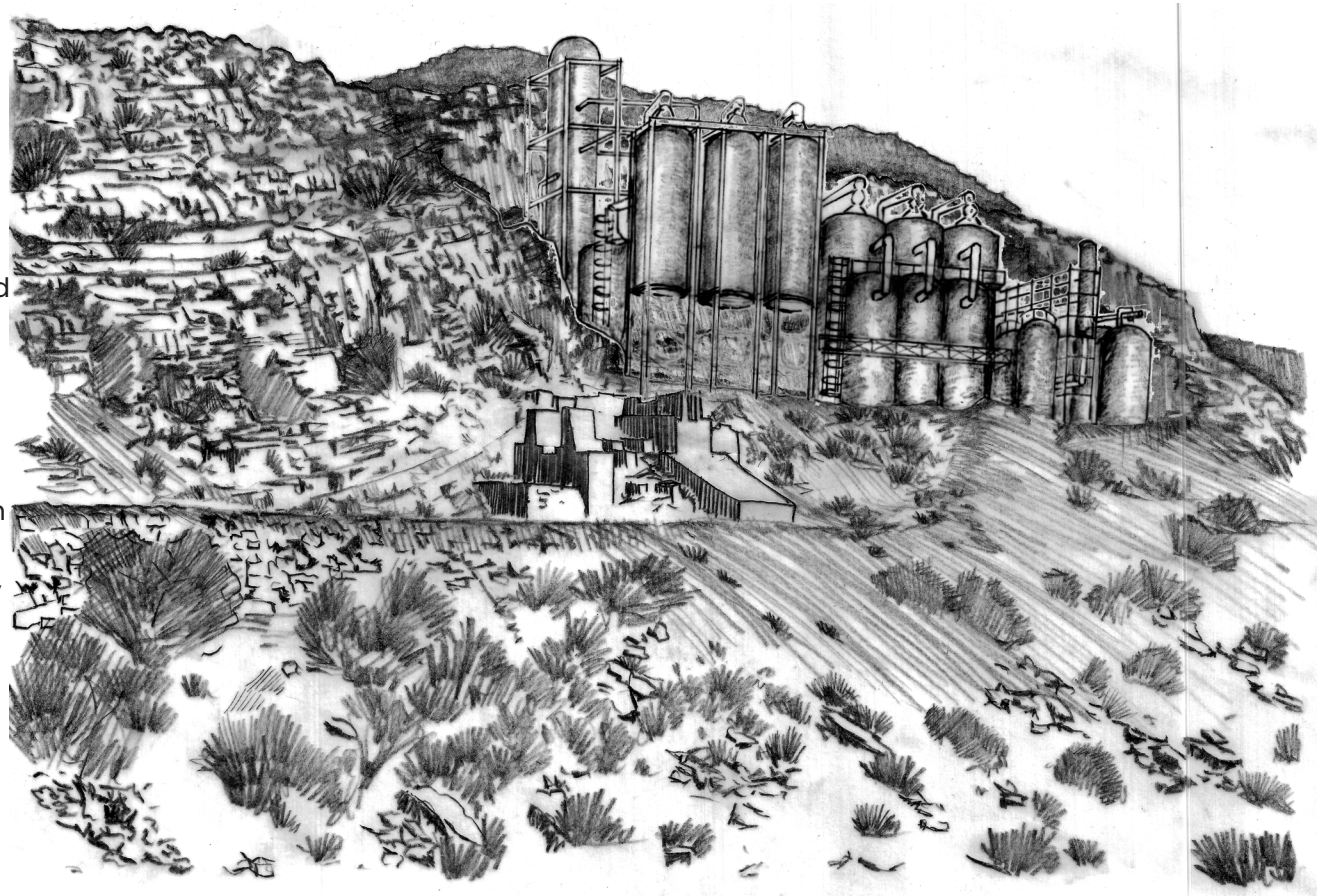
Today's society is concerned with the latest fashions and trends. Living in the 'Information Age', a big part of these trends is technological production, the need to have the latest tech. But, like nature, technological production is constantly changing, based as it is on the concept that progress is "both inevitably and inherently good" (McCarter, 1986: 8). This type of production is only concerned with the next improvement, denying "continuity with the past" and existing solely in an "impoverished present destined for rapid replacement" (ibid, 8).

This results in something cyclical, endless in its lack of actual meaning. Meaning has, unfortunately been replaced with pure utility and as Hannah Arendt (cited in ibid, 10), German-born American philosopher, suggested "utility established as meaning generates meaninglessness".

Robert McCarter (ibid, 8) states that if progress is purely defined by its end product, it "loses any sense of direction", as the endless cycle of fashion demands 'new' and "products are produced only to be consumed".

Or, as retail analyst Victor Lebow remarked in 1955 (cited in Higgs, 2021: online):

Our enormously productive economy demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption.… We need things consumed, burned up, replaced and discarded at an ever-accelerating rate.



1. Crisis of Culture[REAL]

The information age of today can be characterized by instant gratification, the lure of technological progression is happiness in stuff.

The mass production of goods are defined by "efficiency, economy, and utility" which have "become ends in themselves rather than means to some other end" (McCarter, 1986: 8). It is an efficient process where 'demand' dictates production; products are made to be consumed. The aim is consumption.

The term 'demand' is understood as the want of something as determined by own free will. In the case of consumerist culture, 'demand' is a state that is cultivated. Kerryn Higgs (2021: online) plainly states:

Over the course of the 20th century, capitalism preserved its momentum by molding the ordinary person into a consumer with an unquenchable thirst for more stuff.

This inherent need to have the latest technological product has been cultivated in man by the utilitarian determinism characterized by technological thinking.

Humans continued greed and consumption of more and more without concern for the destruction left behind has left the earth and its valuable resources in a vulnerable position. The fuel source to power all these wonderful technological inventions (fossil fuels) are being mined and extracted from the earth with no regard to the environmental damage.

Fossil fuels are a finite source, and environmentally unfriendly. An exploration into alternative fuel sources might be the solution to alleviate the pressures on the earth. And return a society living in the information age to adopt a technological thinking characterized by the experimental machine.

FIGURE 66: The machine is the answer to man's alienation from nature (Gutter).

Future Extracted:

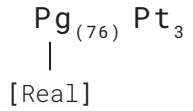
As the world is littered
by junkspace debris and
the anthropocentric man
continues to extract what he
needs from the earth to build
and power his latest machine.
He does not realize that what
he has invented has surpassed
him. He continues to extract
what the machine needs,
slowly destroying the world
he needs to survive. Man has
become a slave to technology
without realizing it.

The world has reverted to
the dark ages, stripped of its
resources it has nothing more
to give. Man is struggling to
survive in this truly barren
place.

But, the machine is thriving.

It is made of the darkest parts
of the earth.

- Author.


Pg(76) Pt3
[Real]

Continue reading normally

PART 2

BAPTISM OF THE MACHINE

[6] ALCHEMICAL LABORATORY

- The Karoo is an unforgiving landscape that acts as a crucible, stripping away the unnecessary and superfluous. This unhomely landscape reveals those that do not belong.
- The proposed site, Beervlei Dam can be considered uncanny, it is perceived as strange, creating an opportunity for a new way of inhabiting space.
- Man changes the context no matter what, but the question should be how does man change the context? The anthropocentric man wants to control nature, whereas the spiritual man believes in the guardians of nature, myths and rituals. Woods (SCI-Arc Media Archive, 2018) introduces the notion of myth as that which unifies a people and in so doing, sustains a culture and calls for a 'new' myth as a product of imagination.
- Man cultivated the natural landscape into a mechanized landscape (Beervlei Dam), with the help of machines. It is still the same landscape, yet it is unfamiliar, unhomely. The language of this mechanized landscape can only be discovered by translating the machinic patination.
- The machine has helped man survive since the dawn of time, but has lost its experimental nature and is characterized by a utilitarian determinism. Man is 'processed' through life - everything has become standardized and automated. Doing away with experimenting and thinking by doing.
- The information age has led to a culture of consumption, where products are made to be consumed with no regard to the environmental impacts.



It is necessary to rediscover the primal drive for creation, rather than consumption. Continuing down this path of consumption will result in a crisis of culture.

Woods argues that a myth generated from imagination and based on experience can sustain a culture. To experience is to understand, and man understands the landscape through the mediation of architecture. As such, this new myth will be concretized as a mediation of place and adopt the intention of the experimental machine - revelation through discovery.

This architectural intervention aims to reclaim the mechanized site, not by tradition in the sense of replicating what existed. But learning from the current landscape and translating it into an experimental building. Where programs are fragmented and stretched to persuade movement between each part... movement to discover. Connected by a path...a journey of discovery.

The machine is baptized into the eternal servitude of the earth – to act as a reminder to man that they must adapt their ways if they want to survive. The machine becomes a guardian to earth.

- Author.

PART 3

DESIGN DEVELOPMENT

Refuge from constant progression of outside world

- Rat race

[7]INSPIRATION GENERATORS

1. Touchstone

The site: Beervlei Dam, a previously natural landscape that has been transformed by man, a scarred edge that has not yet been absorbed by the unforgiving landscape. Stretching between the two scarred edges is a monolithic man-made sculpture that somehow becomes a “gather[ing of] the multi-farious in-between” (Norberg-Shulz, 1979: 10), growing out of the landscape.

The intervention, a bio diesel production plant and fuel station situated in the karoo landscape places emphasis on how an industrial architecture must become of the landscape, a physical re-interpretation of its natural surroundings.

Context becomes a driving force, natural and man-made. Its machinic character inspires experimenting. Process is celebrated, allowing for discovery and wonder in something that is usually hidden.

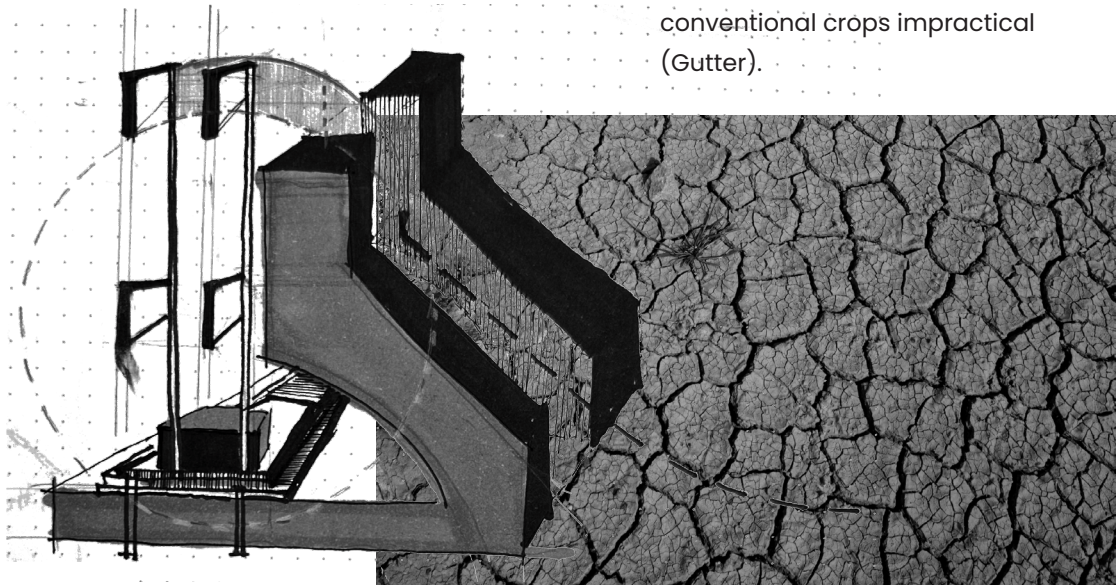


FIGURE 67: The harsh environment of Beervlei Dam and the high mineral content of the soil makes growing conventional crops impractical (Gutter).

To represent the essence of this intervention - a technical mechanism is situated within a monolithic artefact (representative of Beervlei Dam). The experimental nature and process that follows is representative of the design intention. Through engagement and the ‘experience of’, discoveries are made and a connection established. **A new way of doing something old is identified.**



FIGURE 68: Beervlei Dam is perceived as a monolithic structure in the landscape (Gutter).

AN ALTERNATIVE SOURCE – SALT WHICH SPEAKS TO THE SPECIFICITY OF THE PROPOSED SITE.

THE SOURCE OF THE OLD WAY OF DOING – WHICH IN THIS CASE IS FOSSIL FUELS

THE PROCESS:

WATER IS ADDED TO BOTH, AND THE MECHANISMS TIPPED

LIGHT STAYS ON

LIGHT GOES OFF

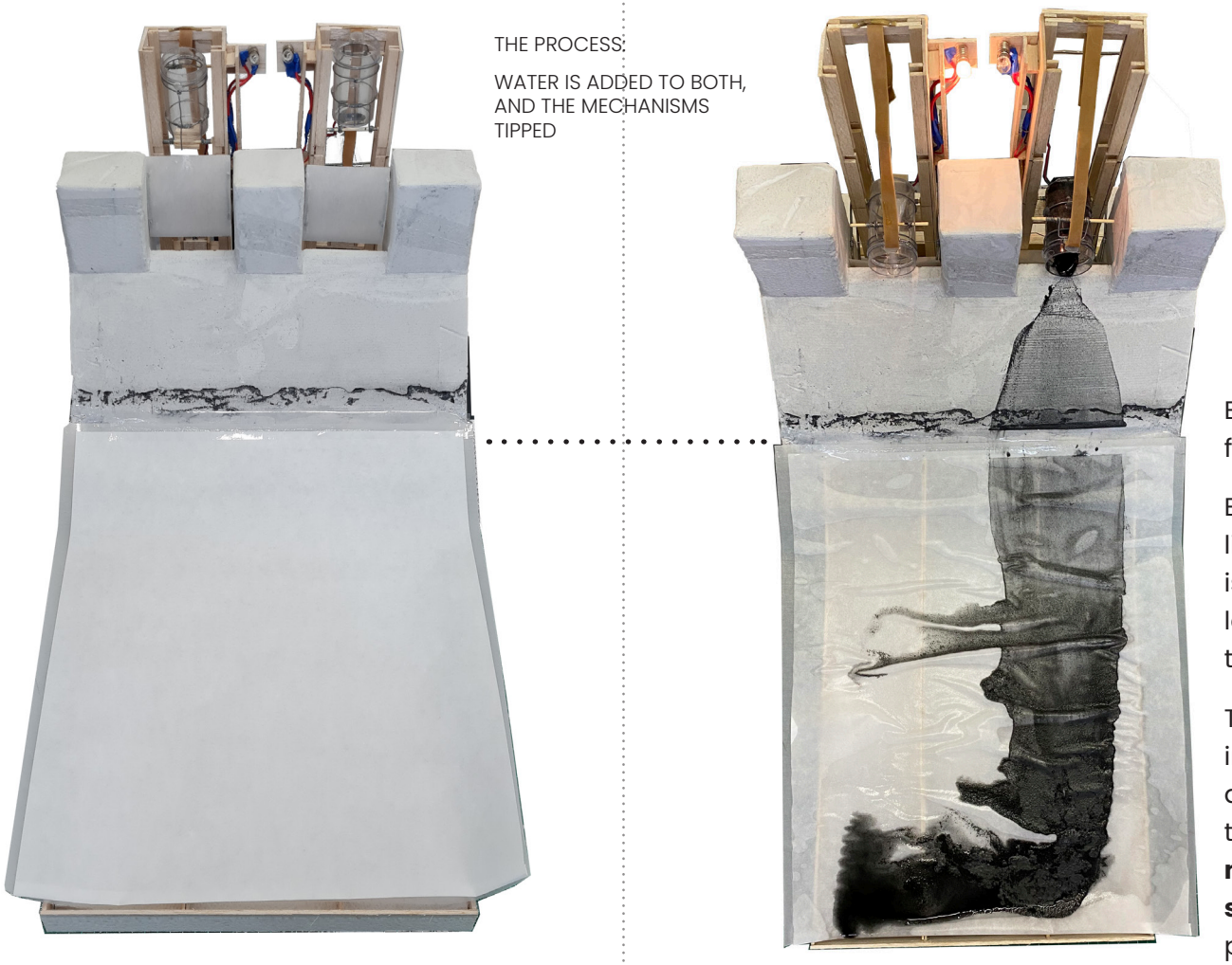


FIGURE 69: The process of the touchstone experiement explained (Gutter).

Both serves the same function – energy.

But, the one ruins that which lies in its path, until nothing is left... the other does not leave a mark and continues to serve its purpose.

This architectural intervention calls for an architecture that responds to its context and **allows a new way of inhabiting the site.** An architecture that is perceived as a mechanism of poetics.

FIGURE 70: (Top) The end result of the touchstone experiment: salt mixture makes no mark, while the fossil fuels mark the page. Yet, the boundary between them is not definite...Nothing is just good (Gutter).

FIGURE 71: (Bottom) An ominous mark on the monolithic artefact, left behind from the fossil fuel mixture (Gutter).



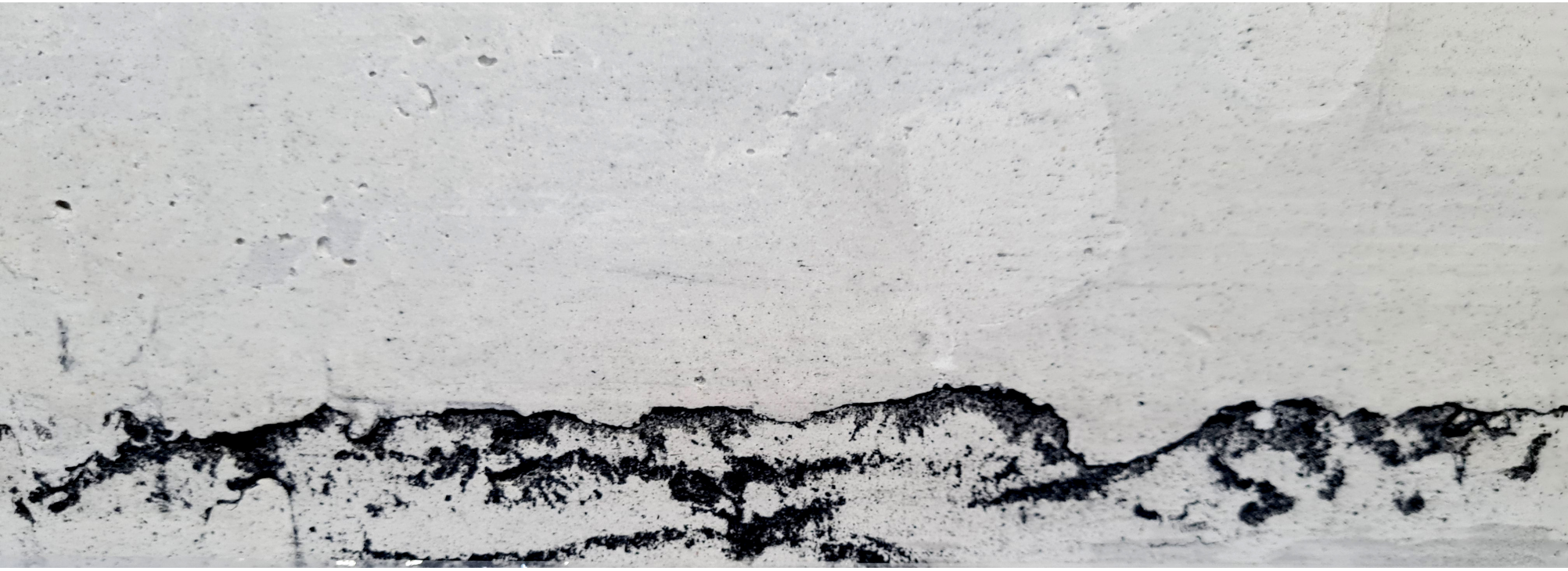


FIGURE 72: A line that runs along the touchstone, coincidentally echoing the Cape Fold Mountains (Gutter).

2. Mechanism of Poetics:

A QUIET INTERRUPTION

The Karoo landscape is vast planes, interrupted by Karoo 'koppies' or mountains that merge land and sky. The windmill protrudes from the flat horizon, becoming a beacon that announces its own importance. The Beervlei Dam, roughly 300m in length and 31m high, sits quietly within the landscape, between two karoo koppies. The koppies interrupt the flat horizon, creating an opportunity where the introduction of a man-made intervention is not considered alien. The scale of Beervlei also matches its' surroundings, which is why it is perceived as a quiet interruption in the landscape.



FIGURE 75: The quiet folds of the Beervlei and the Cape Fold Mountains (Author).

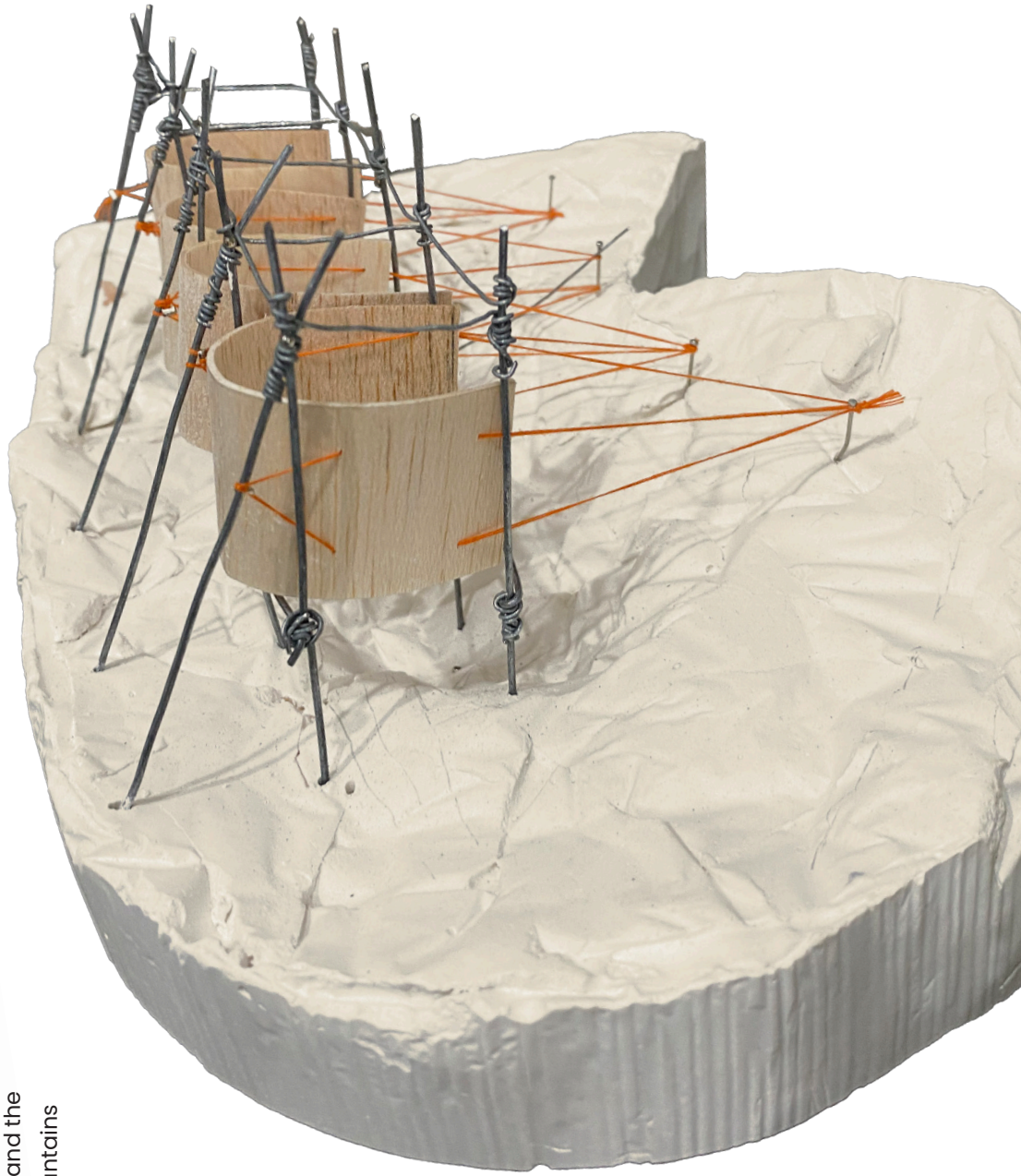


FIGURE 73: (Top) The model lightly touching its base, a quiet interruption in the landscape (Author).

FIGURE 74: (Right) Beervlei Dam (Author).



INHERENT CONTINUITY

A contrast of surviving. The Karoo is known for its brakdak flat roof houses. Square shape, thick walls. Heavy within the landscape. Techniques used to survive in a climate that reflects the landscape – humble. But the indigenous inhabitants of this area were actually nomadic pastoralists and as such their shelters were easy to erect and take apart. Thin poles and woven mats, sitting lightly on the earth. This concept is a study of contrasts, heavy and light, an architecture in submission to place.



FIGURE 76: Top View of concept model representing 'Inherent Continuity' (Gutter).

INSPIRED BY THE TECTONIC ASSEMBLAGE OF THE KHOIKHOI DWELLINGS -TEMPORALITY.



INSPIRED BY THE HEAVY PRESENCE OF THE BRAKDAK - PERMANENCE.

FIGURE 77: Front View

FIGURE 77 - **FIGURE 80** shows various details of the concept model (Author).



FIGURE 78: Tectonics - tension

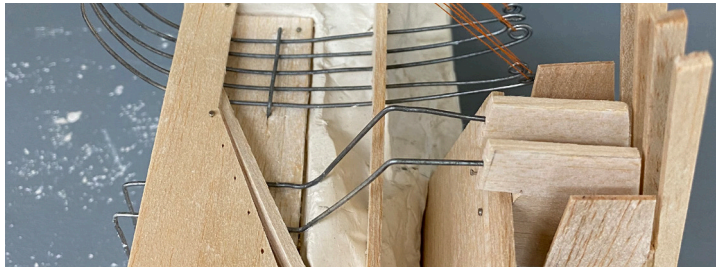


FIGURE 79: Detail



FIGURE 80: Detail

THE SENTINEL

In an unforgiving place like the Karoo, it is necessary to observe how life manages to survive here – it can be the way that plants twist their leaves in the course of the day to present their thinnest profile to the sun in order to conserve moisture, or the unofficial emblem of the karoo – die windpomp, these slow-moving, efficient machines operate only when the wind blows. A delicate relationship to the environment is created and the genius loci is revealed.



FIGURE 81: Front view of concept model representing 'The Sentinel' (Gutter).

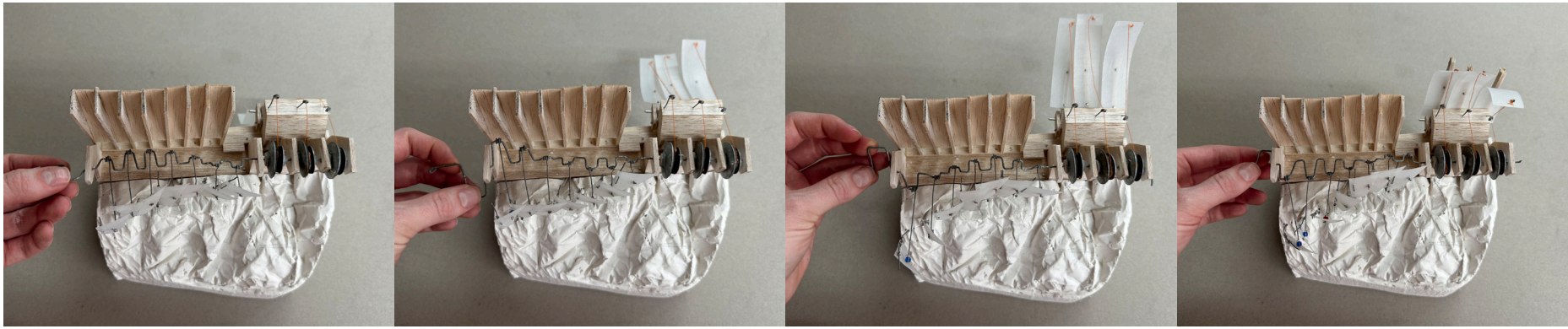


FIGURE 82: 'The Sentinel' in action (Gutter).

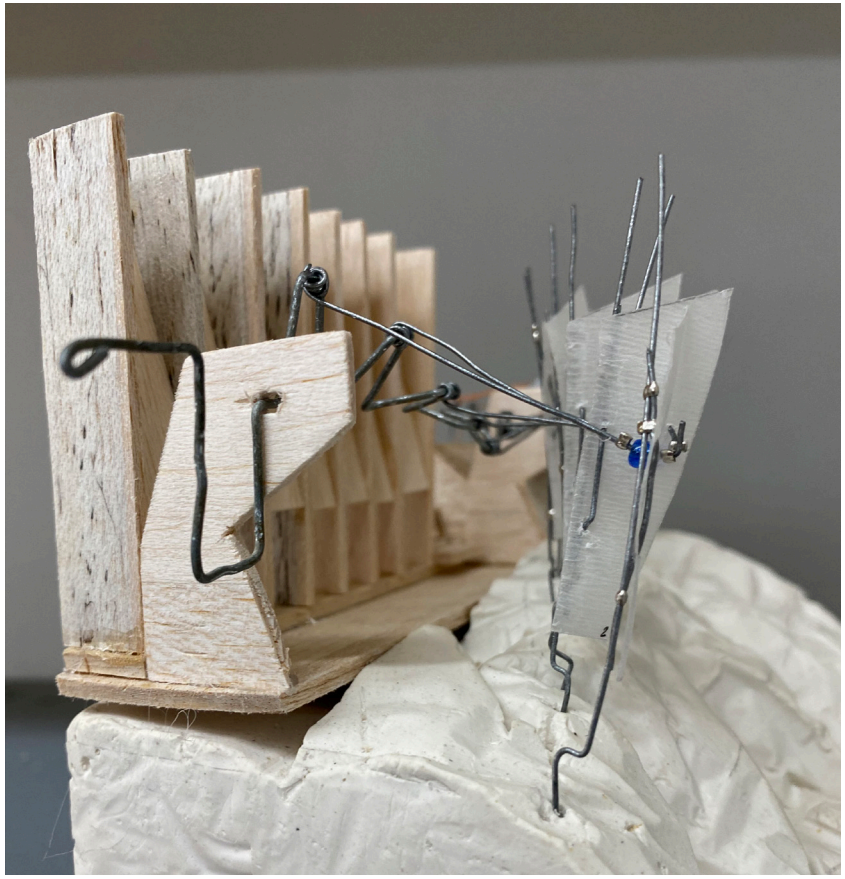
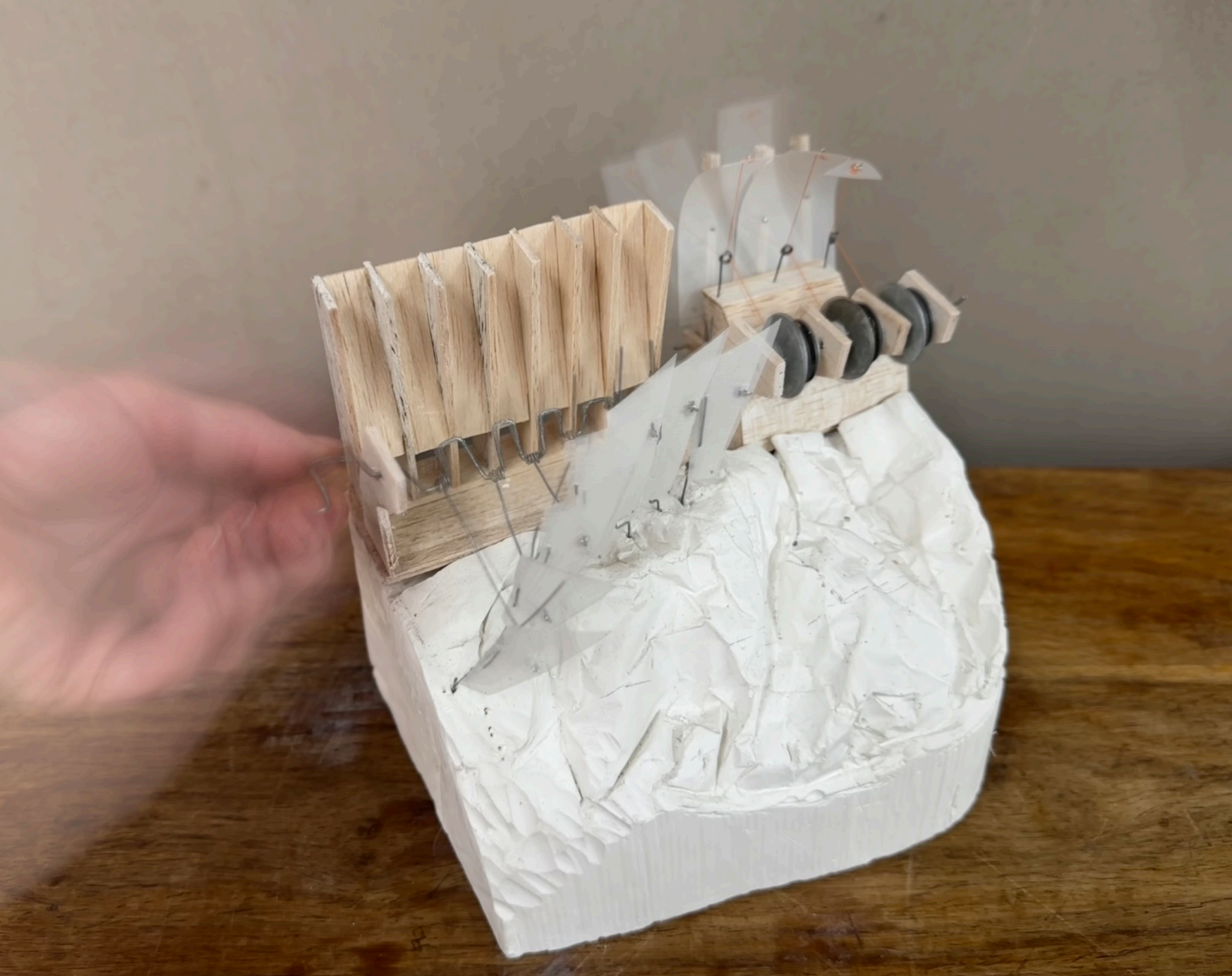


FIGURE 83: The Sentinel: detail (Author).



FIGURE 84: The Sentinel: detail (Author).

FIGURE 85: (Right) The Sentinel: the experimental machine (Author).



1. A Brief History of Beervlei Dam

Water is scarcity in the Karoo, as such the Karoo's inhabitants will grab at any opportunity to ensure its availability. Arguing for the construction of an in-channel storage dam, but due to the high mineral content of the soil, Beervlei Dam was built as a flood control dam and operates at 0% capacity.

Construction started in 1953 and was completed in 1957, at the time, it was Union government policy to make use of black convict labour on large public infrastructure projects and so a large prison labour camp was constructed at the site (**FIGURE 86**). Approximately 400 convicts worked on the dam (Van Vuuren (ed.), 2011).

This distinctive multiple arch structure comprises 15 cylindrical arches with gravity sections on its flanks. This type of technology surpassed the traditional gravity designs, yet it was not as popular and considered unsafe.

Multiple arch dams do not need a lot of material; employing its shape instead of weight to resist the water load. Reducing concrete quantities by 80% compared to gravity designs. As a leading pioneer and prominent proponent of the multiple arch dam, civil engineer John S. Eastwood (cited in Jackson, 2009: 139), phrased in a 1915 promotional pamphlet:

"Bulk does not mean strength".

Although the Beervlei Dam was built for function, its innovative structural form can be considered structural art, "exhibiting a lightness, even a fragility" (ibid, 144) in spite of its sheer bulk.

FIGURE 87: (Right) Beervlei Dam as viewed from the scarred edge of the site (Author).

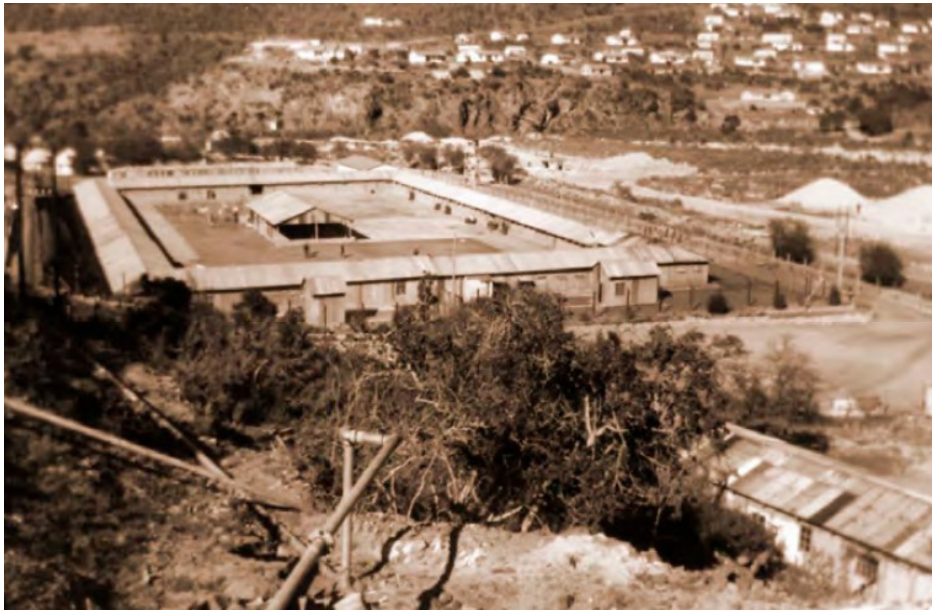


FIGURE 86: Prison labour camp at Kouga Dam, similar to the one constructed at Beervlei (Van Vuuren (ed.), 2011: 23).





FIGURE 88: View from N9 heading to Willowmore (Author).

FIGURE 89: Proposed site and immediate context (CFM, 2023: online).





FIGURE 90: View of scarred edge from ontop of Beervlei Dam (Author).



FIGURE 91: Proposed site (CFM, 2023: online).



FIGURE 93: The Quarry (Author).



FIGURE 92: The 'natural line' of the quarry edge (Author).



FIGURE 94: Protruding rock formations make up the scarred edge (Author).

[9] ACCOMMODATION & BRIEF

The aim of this thesis was to translate the language inherent in a changed (mechanized) landscape in an attempt to arrive at an appropriate architecture.

The architectural intervention includes a Bio Diesel Production Plant, Fuel Station and 'padstal'. The program is a mutually beneficial system, as each benefits from the other. A future proposal will include accommodation located on the existing foundations of the prison labour camp.

Feasibility of multi-program:

Fuel Station:

- Every padstal needs a fuel station.
- Can sell the bio diesel manufactured on site.
- Promote alternative fuel source

Padstal:

- Beervlei is located on a popular route, roughly half way, between Bloemfontein or Johannesburg to Cape Town.
- 'Opi-Vlak' padstal, situated 30km from Beervlei, receives approximately 300 visitors/ day in busy season.
- Beervlei Dam is a point of intrigue.

Bio Diesel Production Plant:

- The landscape is already altered from man-made interventions. A large quarry is evident of this.
- The soil of the Karoo has a high mineral content, which makes growing conventional crops unsuitable.
- Beervlei Dam is a flood absorption dam operating at 0% capacity.
- Beervlei Dam is mostly empty, only flooding every 20 years.
- A halophyte plant (oldman saltbush) is already growing at Beervlei. This specific plant is a viable candidate to be used as biomass in bio diesel production.

FUEL PUMPS

ABLUTIONS

TELLER

SECURITY (FOR PADSTAL SERVICE ENTRANCE)

STATION SHOP (SELLING TAKE AWAY COFFEE & SNACKS)

BAKERY (TAKE AWAY KAROO 'VETKOEKE'AND SANDWICHES.

KAROO TEST KITCHEN (A KAROO DINING EXPERIENCE)

ABLUTIONS

OFFICES

KITCHENS

TANK FARM (CHEMICAL PROCESS TAKES PLACE)

MAINTENANCE SHED

LOCKERS & ABLUTIONS

LABORATORY

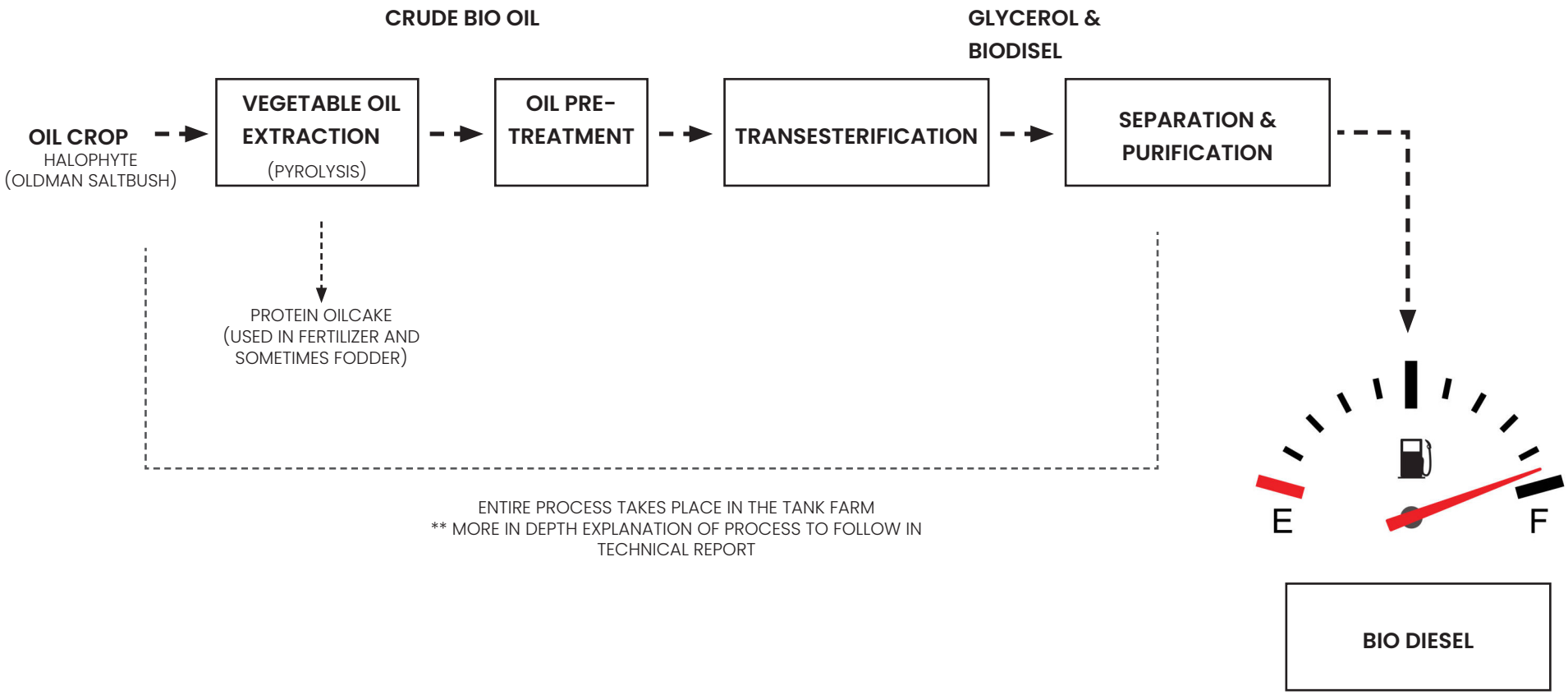
OPERATIONS ROOM

OFFICES

CAFETERIA

BIO DIESEL PROCESS

'Earth to engine'



ENTIRE PROCESS TAKES PLACE IN THE TANK FARM
** MORE IN DEPTH EXPLANATION OF PROCESS TO FOLLOW IN TECHNICAL REPORT

2. Client



Shell is an integrated energy company, focused on providing energy sources that are economically, socially, and environmentally responsible (Shell, 2023: online). They have however been targeted as untruthful:

> **Shell is not a green saviour. It's a planetary death machine (Manbiot, 2019: online)**

Shell aims to turn over a new leaf, so to speak, and really invest in sustainable energy sources. Thus, Bio-Diesel will now be added to the resume.

Natural justice is an organization of lawyers and legal experts that specializes in environmental law in pursuit of environmental justice. As such, they focus on the governance of natural resources (Natural Justice, 2023: online).

Partnering with shell in this sustainable energy venture will ensure Shell remains devoted to their environmental goals.

Green Peace Africa is an independent campaigning organization that fights to protect the environment and expose environmental injustices (GreenPeace, 2023: online).

With Shell having been in their cross hairs previously, Green Peace has decided to join this partnership in their aim to discover new solutions to a green future. And to ensure Shell remains accountable for their actions.

FIGURE 95: Bio Diesel Production Plant (SDG Investro Platform, 2021: online)



[10] DESIGN DEVELOPMENT

CONCEPTUAL APPROACH

1.

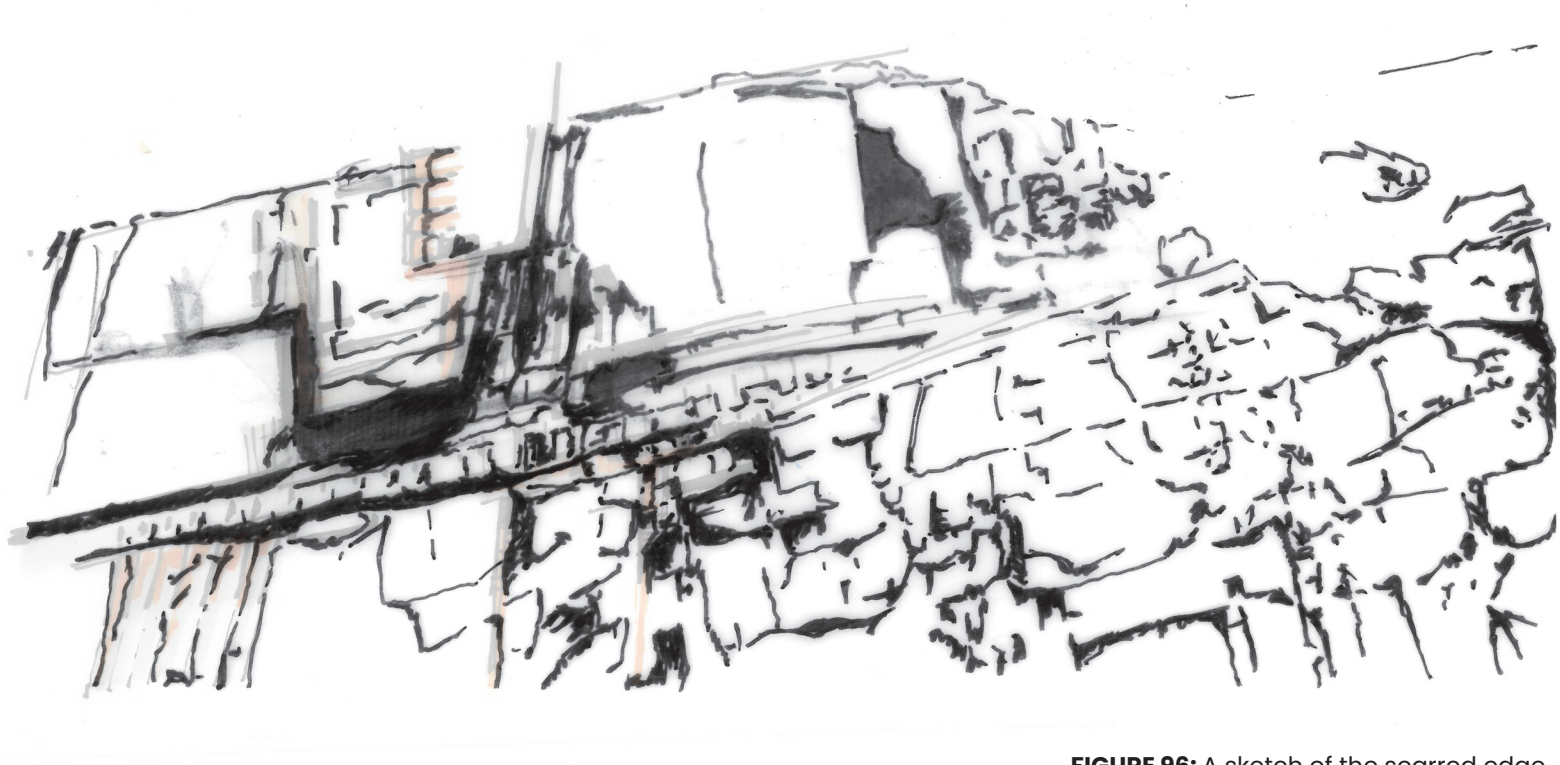


FIGURE 96: A sketch of the scarred edge, over-layed with its 'language' (Author).

The Architectural intervention aims to be a response to the mechanized landscape, as such the process as identified in the 'language of the landscape' (Part 1 no. [3]) is used as a conceptual generator.

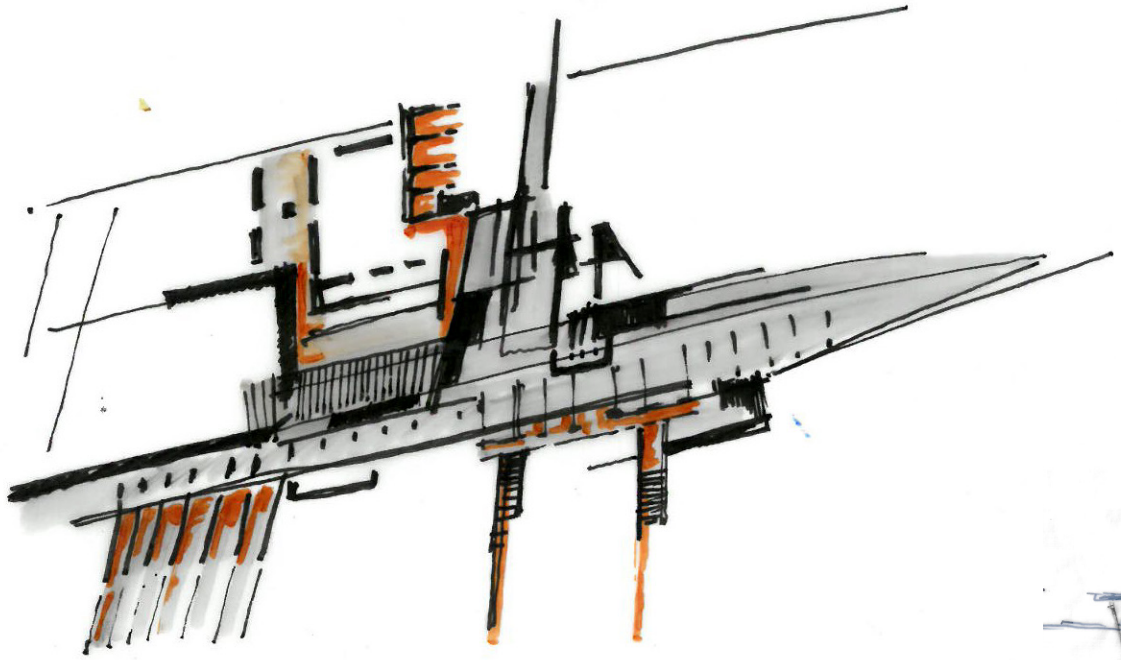


FIGURE 97: The language as translated from the scarred edge in **FIGURE 96** (Author).

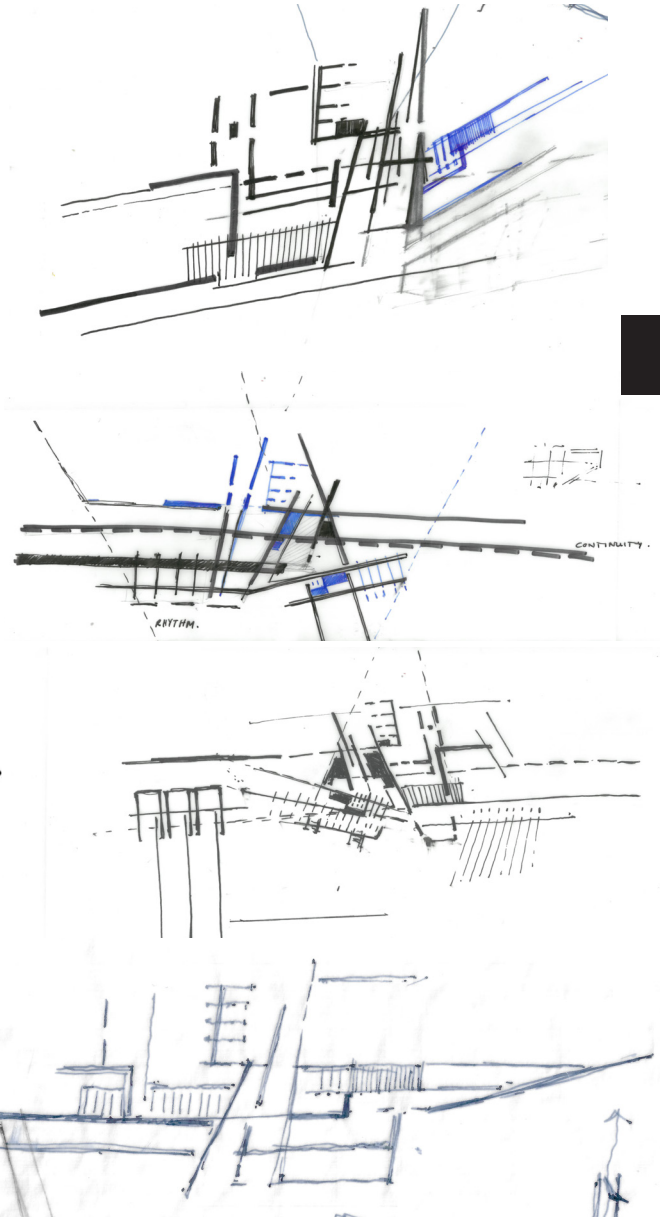


FIGURE 98: An iterative process in search of a plan generator (Author).

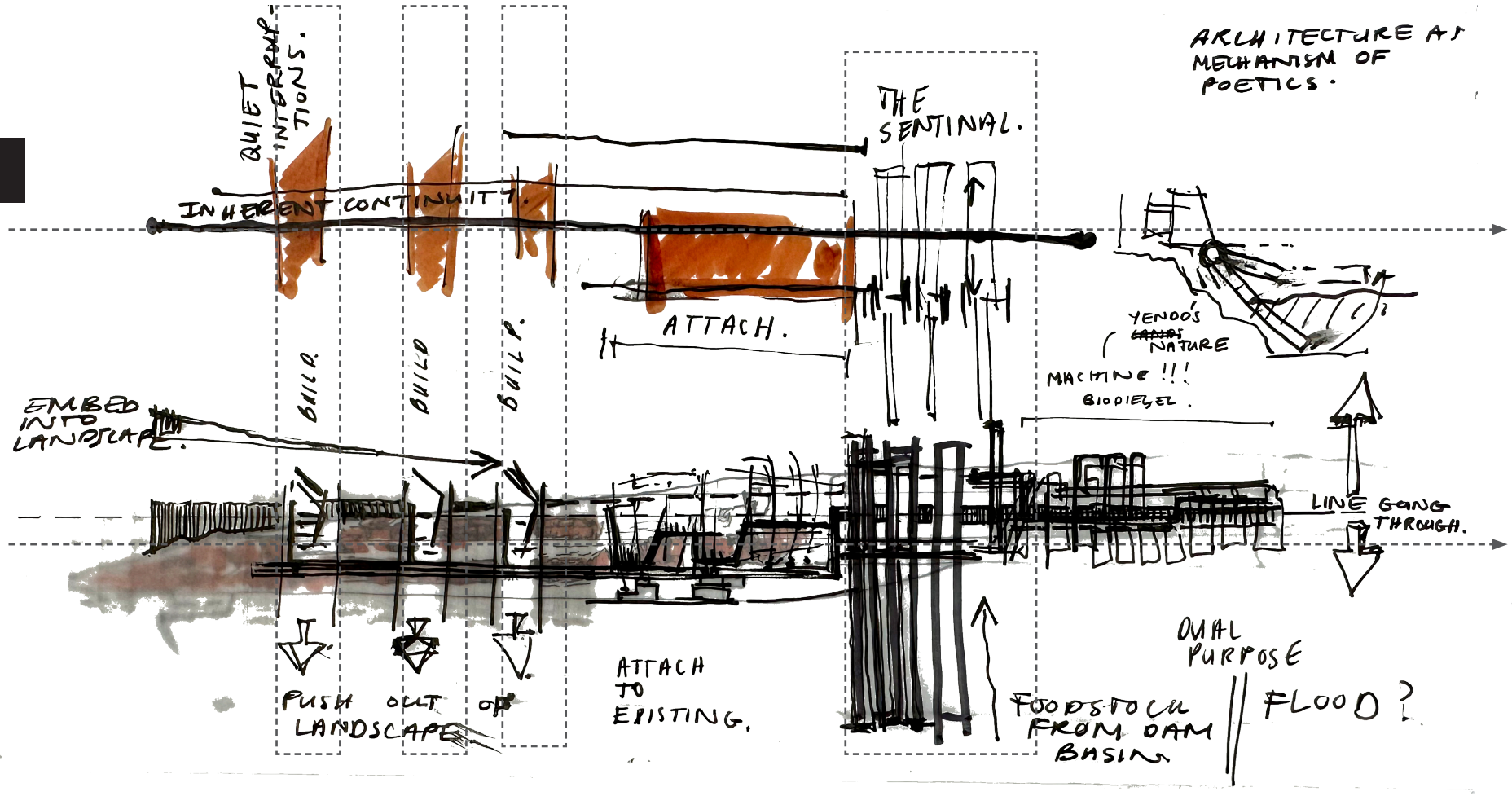
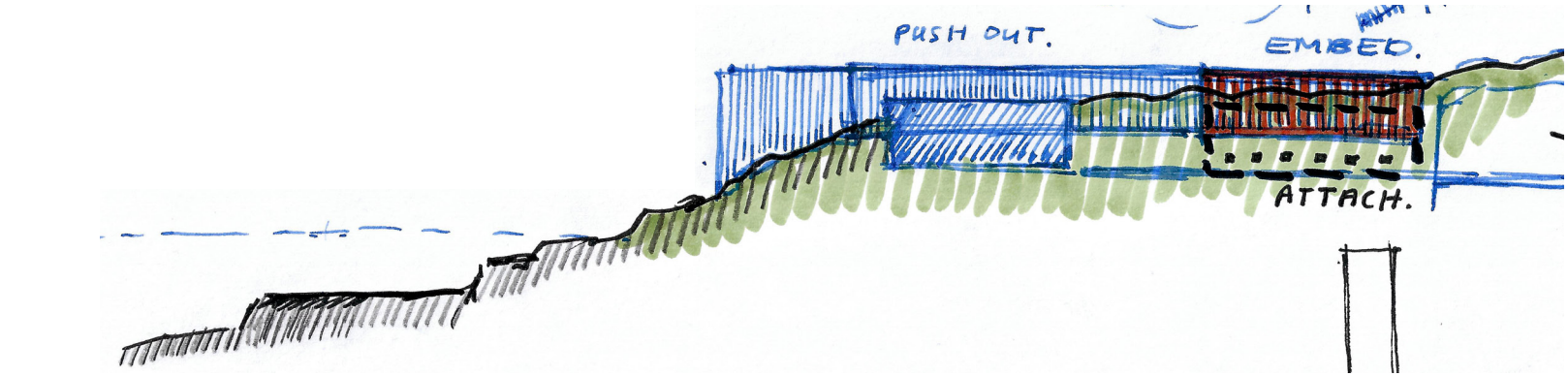


FIGURE 99: Taken from **FIGURE 14.** The conceptual approach of the architectural intervention as influenced by the concepts and theoretical explorations of part 1 (Author).



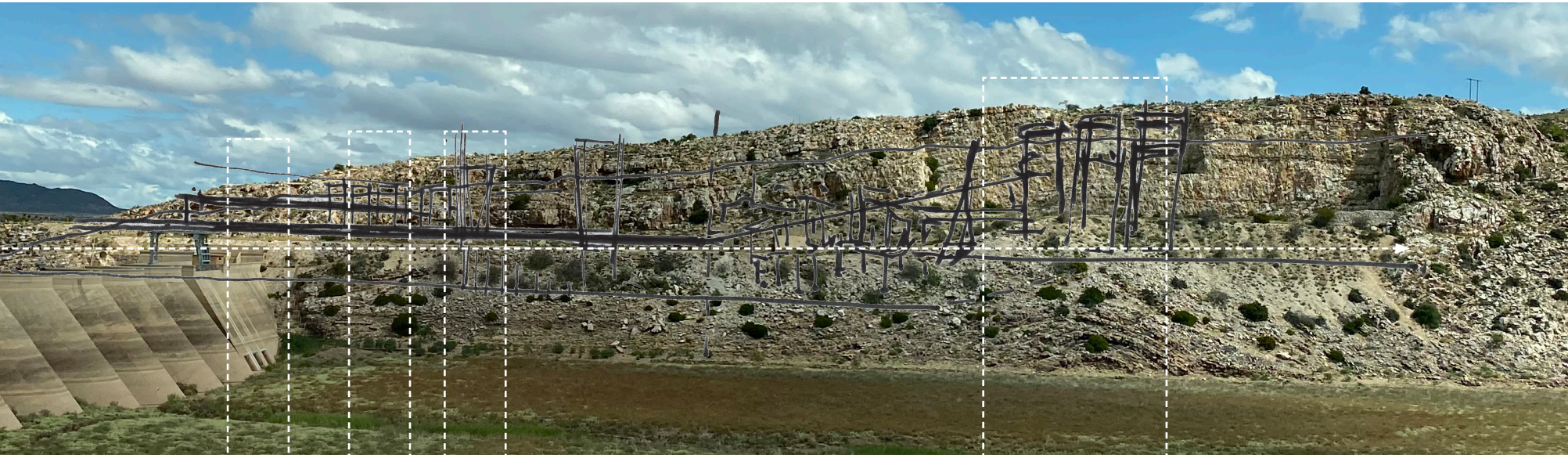


FIGURE 100: Conceptual explorations (Author)

SITE ALLOCATION: EXPLORATIONS

Beervlei Dam has a complex landscape of misleading scales. Making the placement of the various functions extremely important to allow for an overall cohesion.

It was decided to split the various functions depending on private/public relations and ease of access. As such the padstal and fuel station are grouped together, separate from the production plant and facilities.

Existing conditions and elements on site was used as guidance for the placement of the following programs:

1. Tank farm - quarry
2. Production Facilities & Offices - on the edge of the quarry overlooking the tank farm
3. Padstal - along the length of scarred edge, subtly announcing the building to the drivers on the N9.
4. Fuel Station - situated on existing foundations found on site, close to an empty farm dam.

The relationship between the massing of each function was explored. Elements that are visible in all three approaches and also the final design resolution:

- Look-out points that pushes out of the rock formations of the scarred edge
- Conveyor belts (sentinels) that sit on the edge of the quarry transporting the harvest from the basin to the production plant.

The third iteration was developed for the final design resolution.

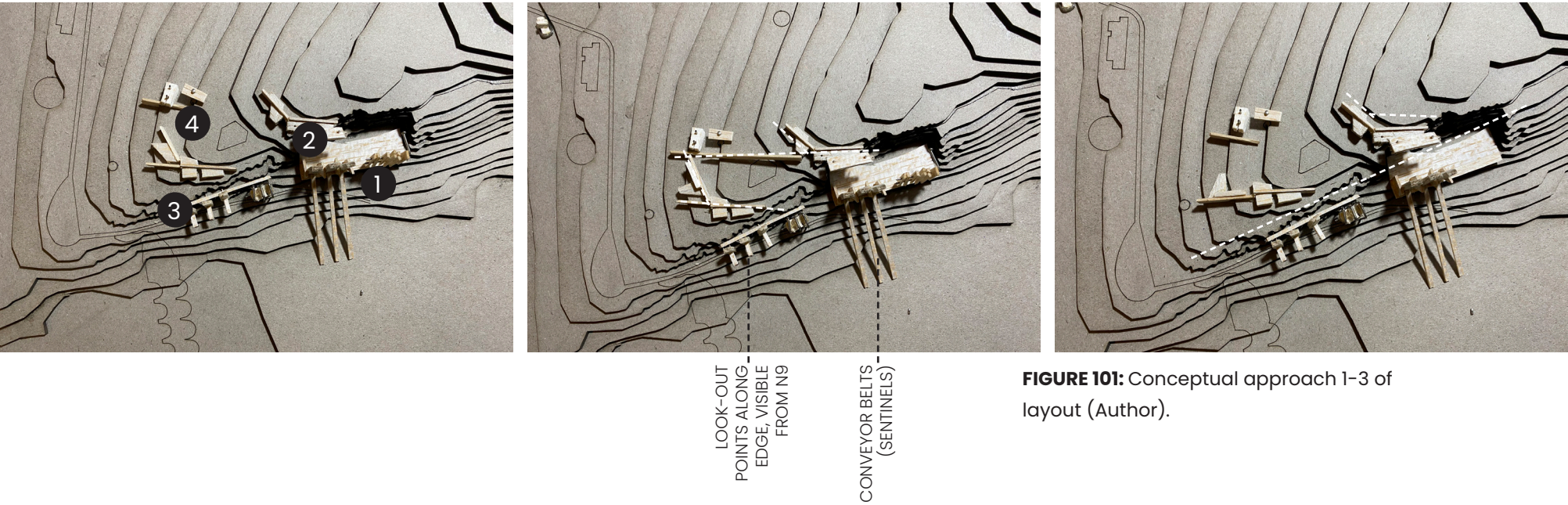


FIGURE 101: Conceptual approach 1-3 of layout (Author).

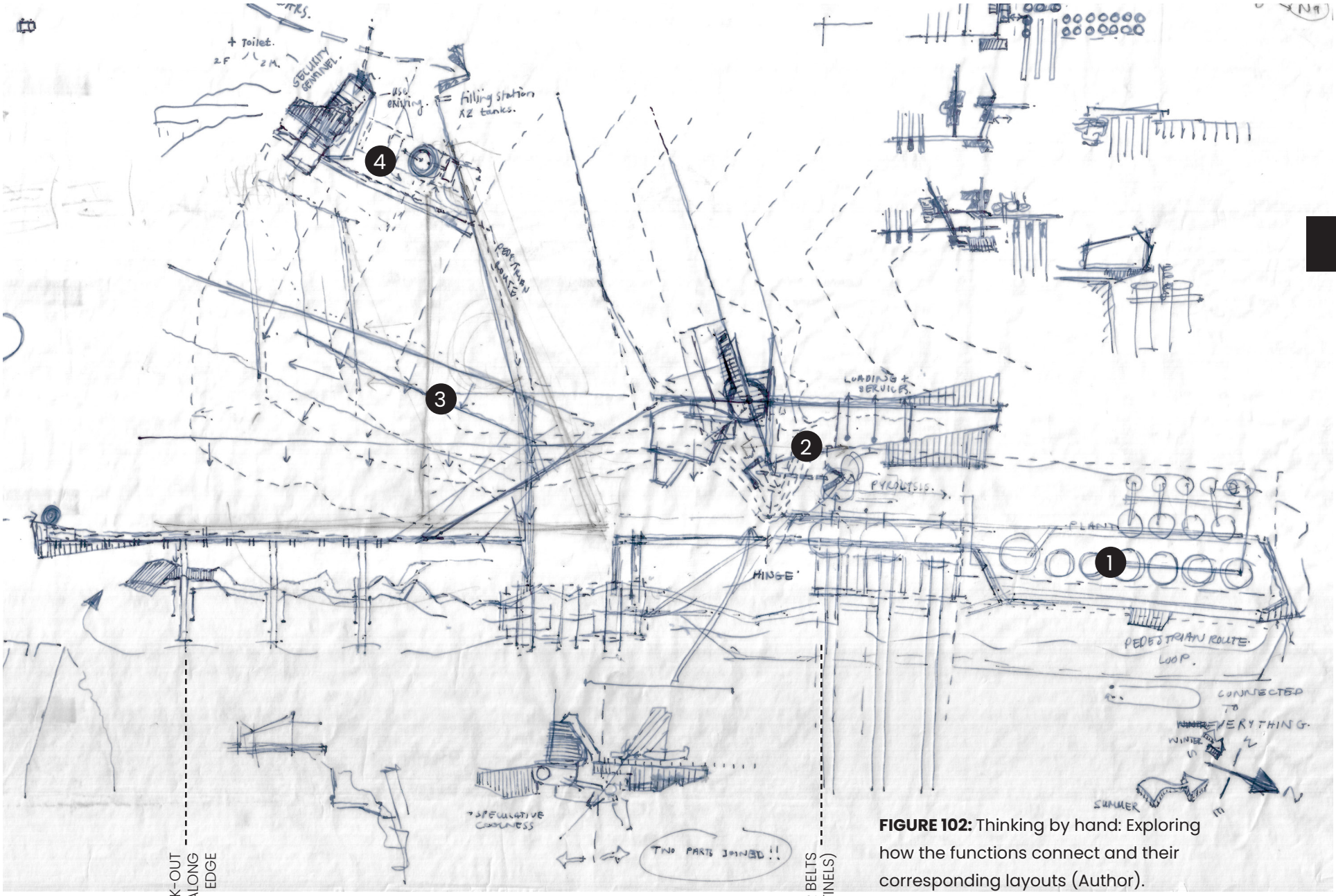


FIGURE 102: Thinking by hand: Exploring how the functions connect and their corresponding layouts (Author).

LOOK-OUT POINTS

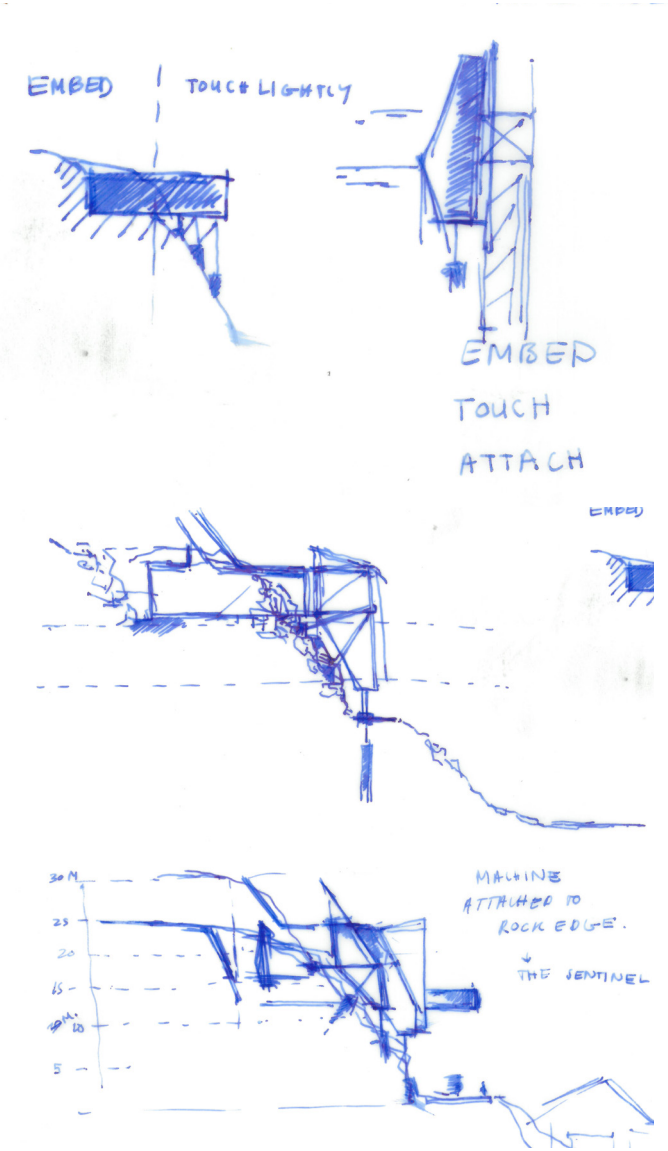


FIGURE 103: Exploring the idea that the look-out point must attach to the edge (Author).

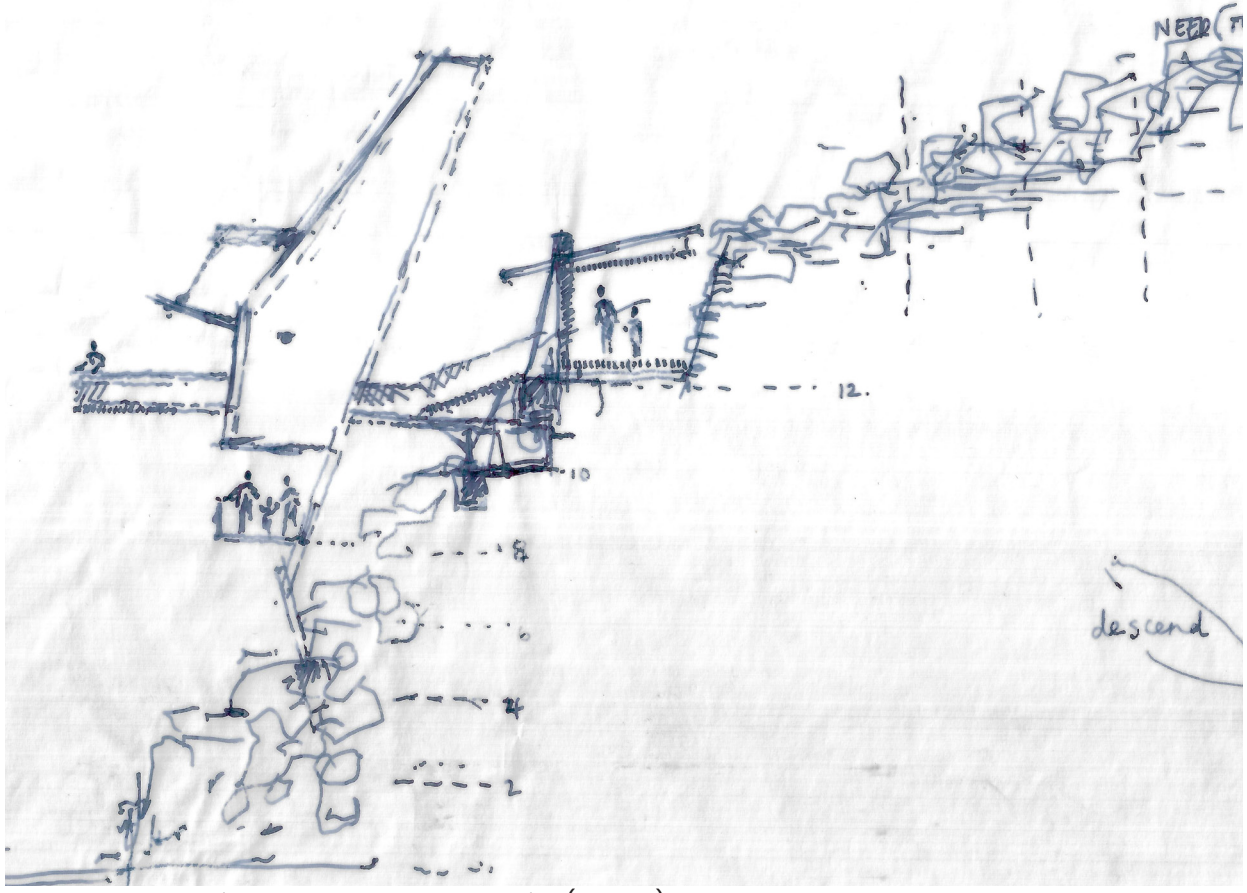


FIGURE 104: A section through a look-out point (Author).

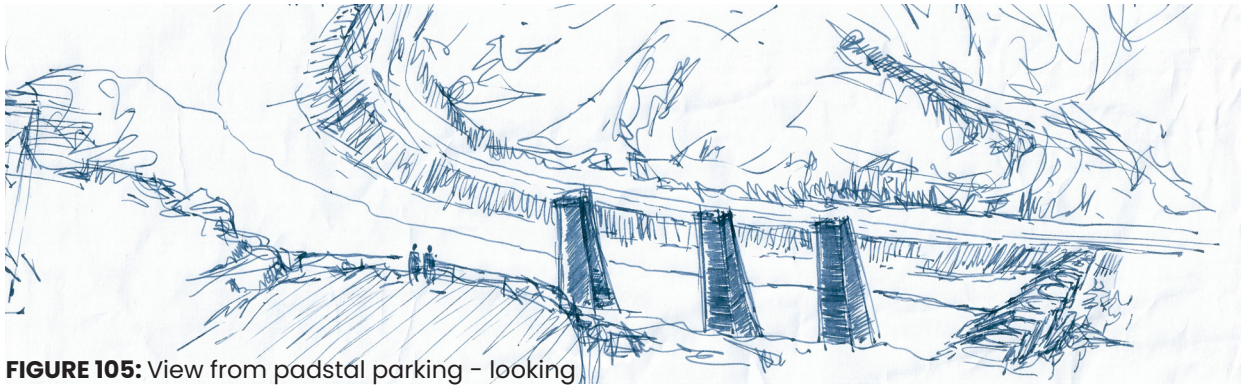
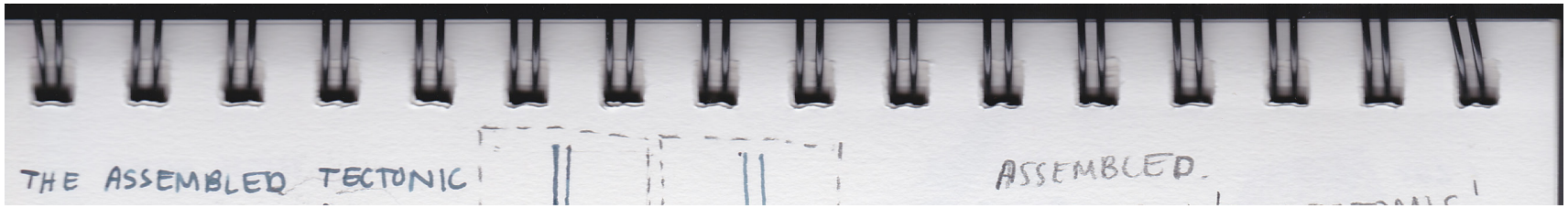


FIGURE 105: View from padstal parking - looking over Beervlei with the tops of the look-out points just visible(Author).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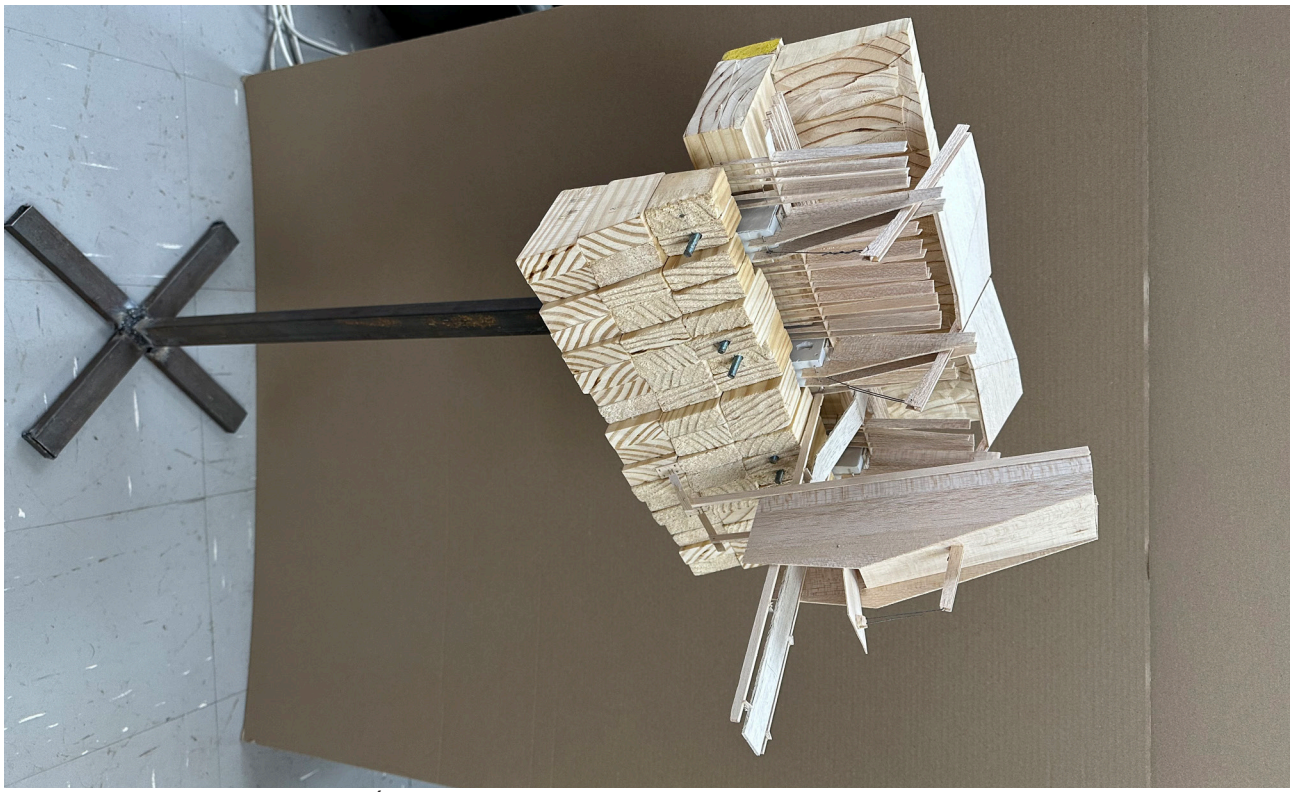


FIGURE 106: The look-out point (construction touchstone) (Author).

FIGURE 108: Detail (Author).

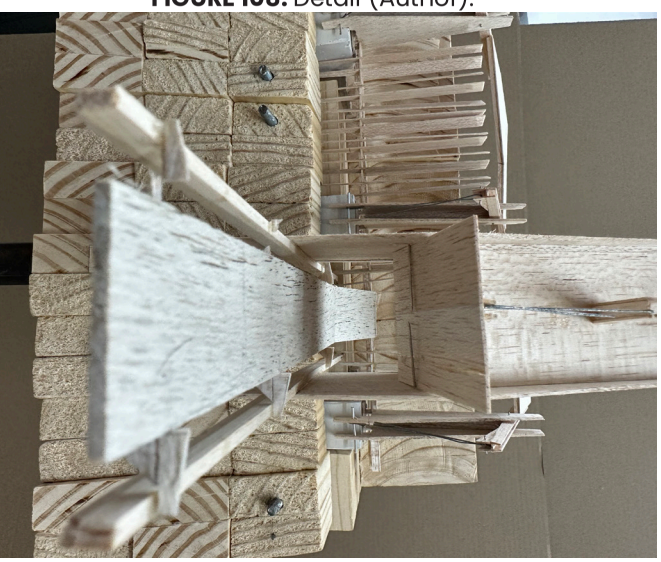
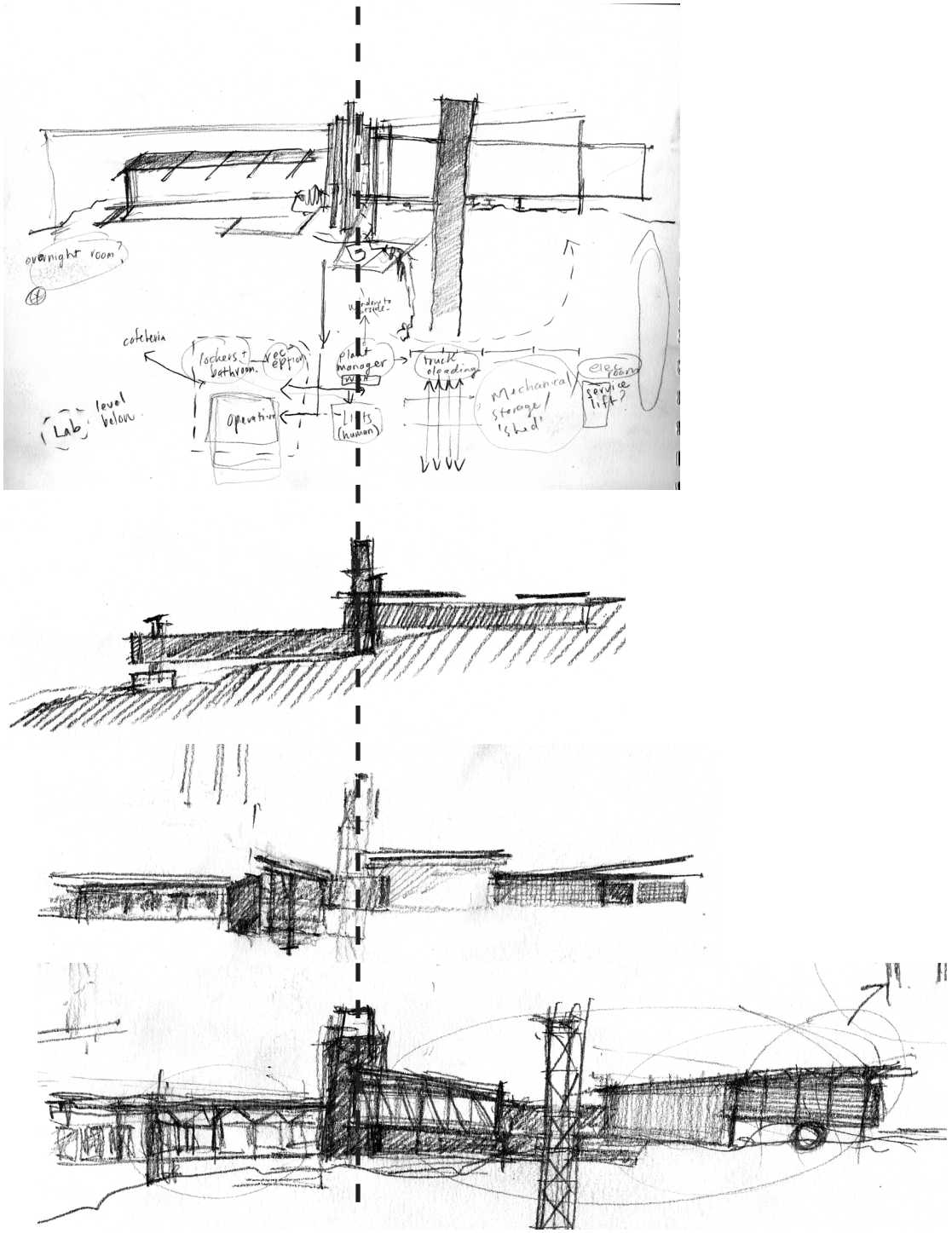


FIGURE 107: Detail (Author).





PROCESS: PRODUCTION FACILITIES

FIGURE 109: Exploration of the Elevation as seen from the N9 (Author).

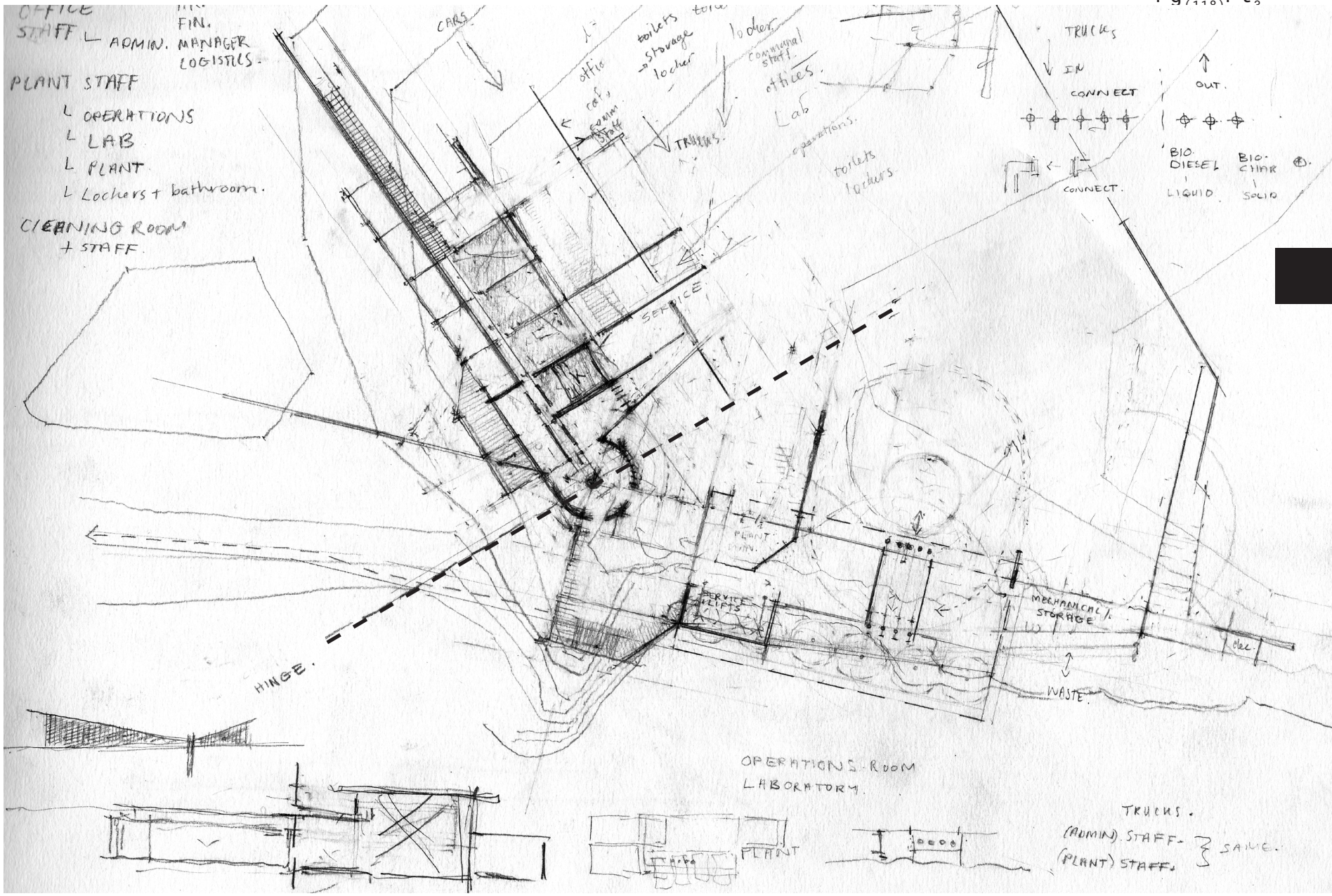


FIGURE 110: Plan development of the Production facility and offices (Author).

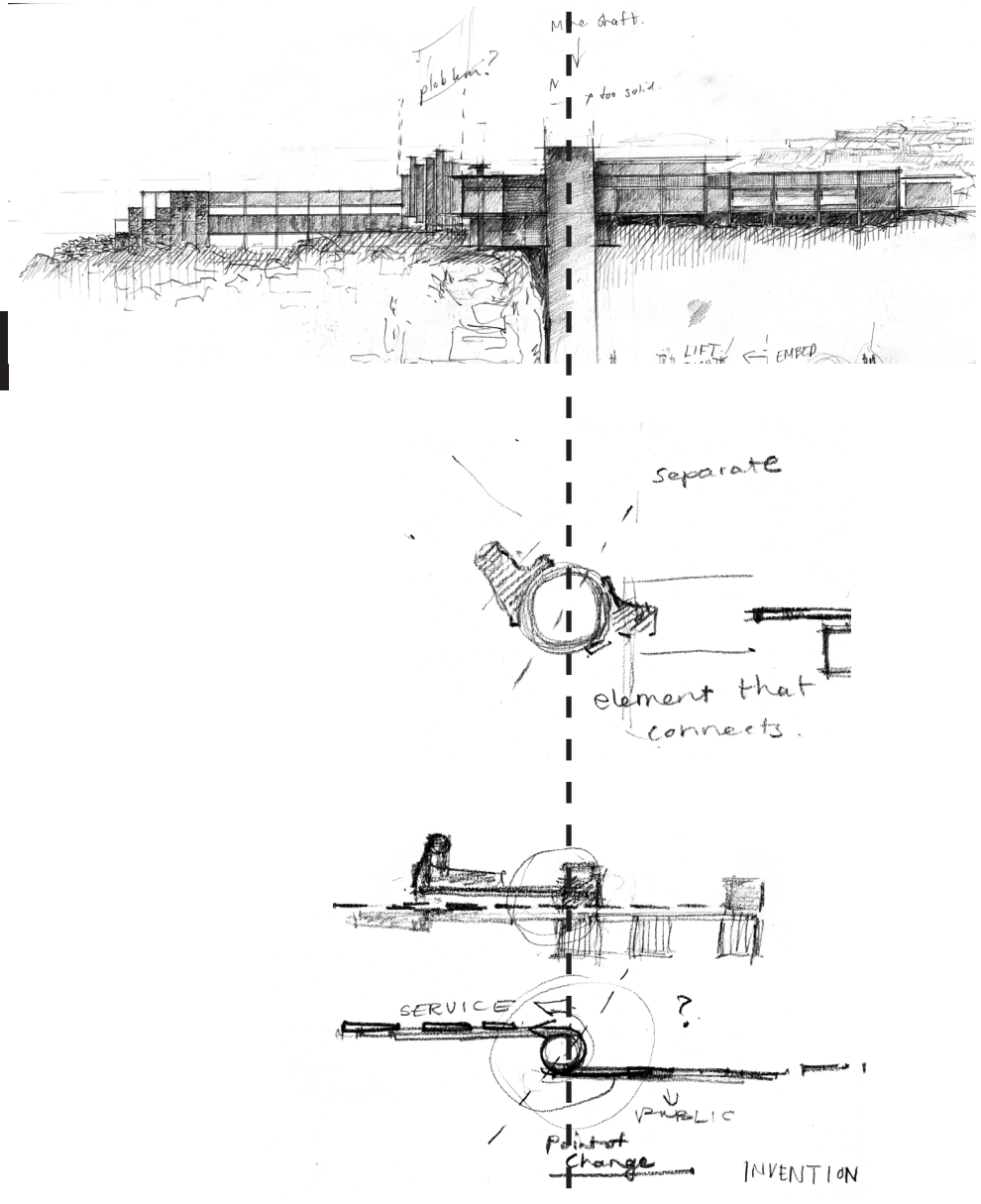


FIGURE 111: A moment of change (level change) should be celebrated (Author).

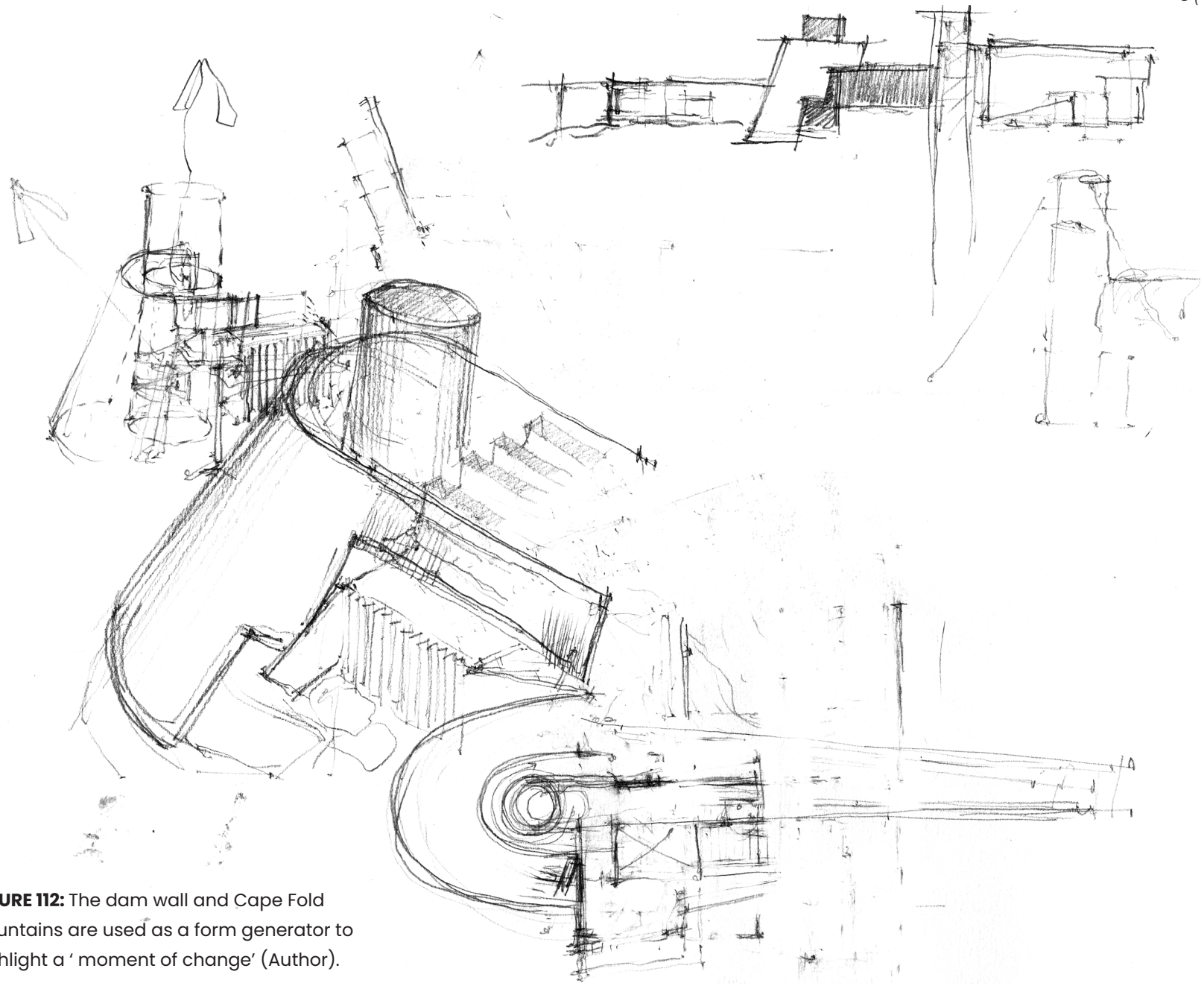
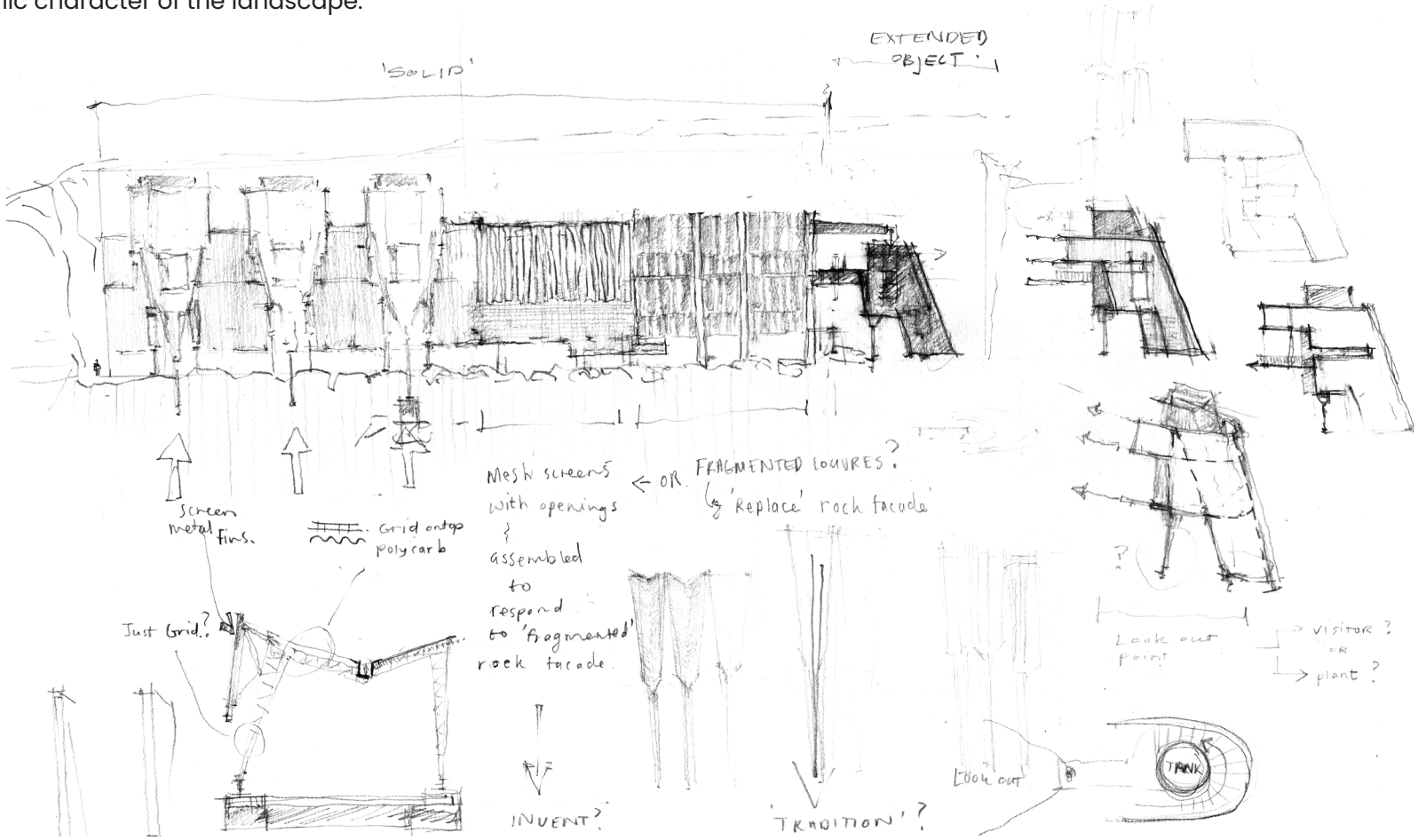


FIGURE 112: The dam wall and Cape Fold Mountains are used as a form generator to highlight a ' moment of change' (Author).

PROCESS: TANK FARM

The initial idea was that the entire tank farm would be housed in a permeable structure, but this detracted from the natural beauty of the quarry. It was decided that exposing the tank farm could allow for an interesting interplay between industrial poetics and the machinic character of the landscape.

FIGURE 113: The tank farm hidden behind screens (Author).



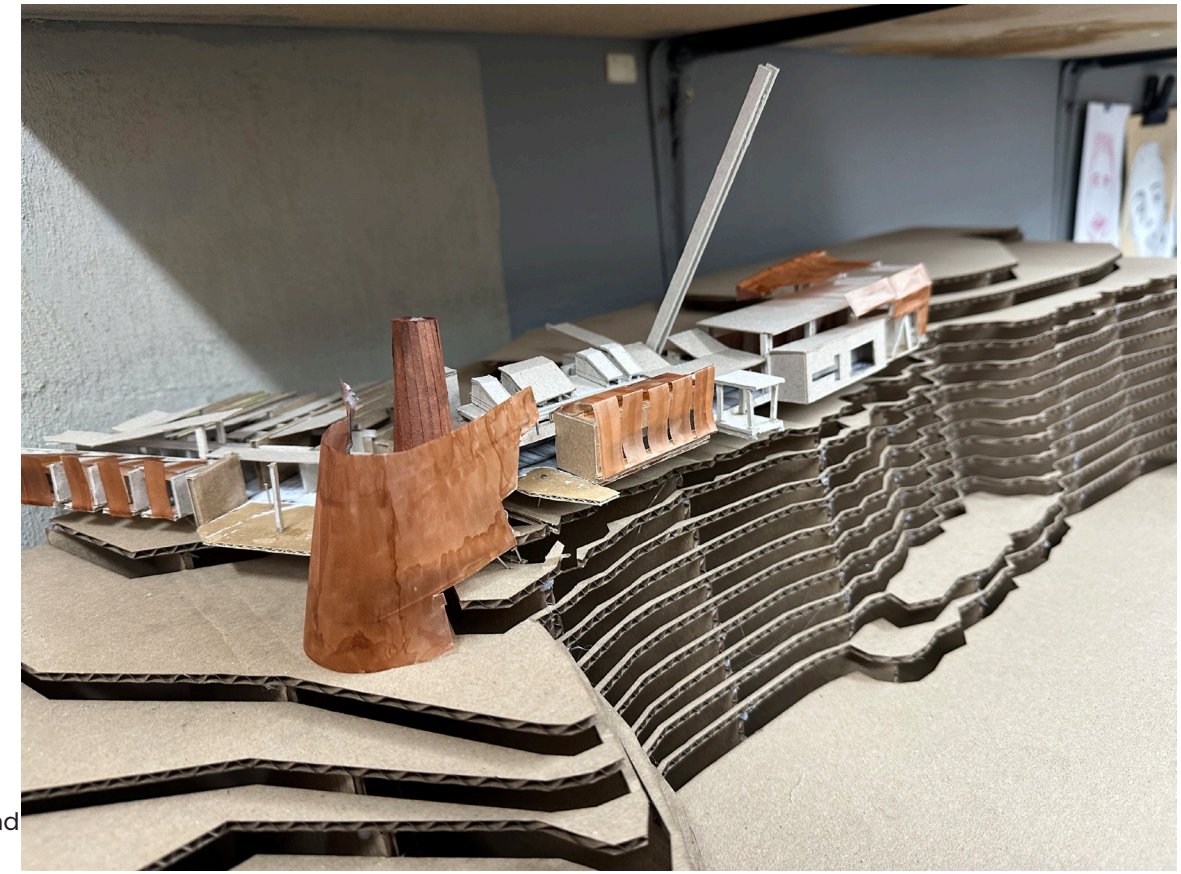


FIGURE 114: Process model of the production facility and offices (Author).

PROCESS: PADSTAL



FIGURE 115: Iteration 1: Process model of the padstal (Author).

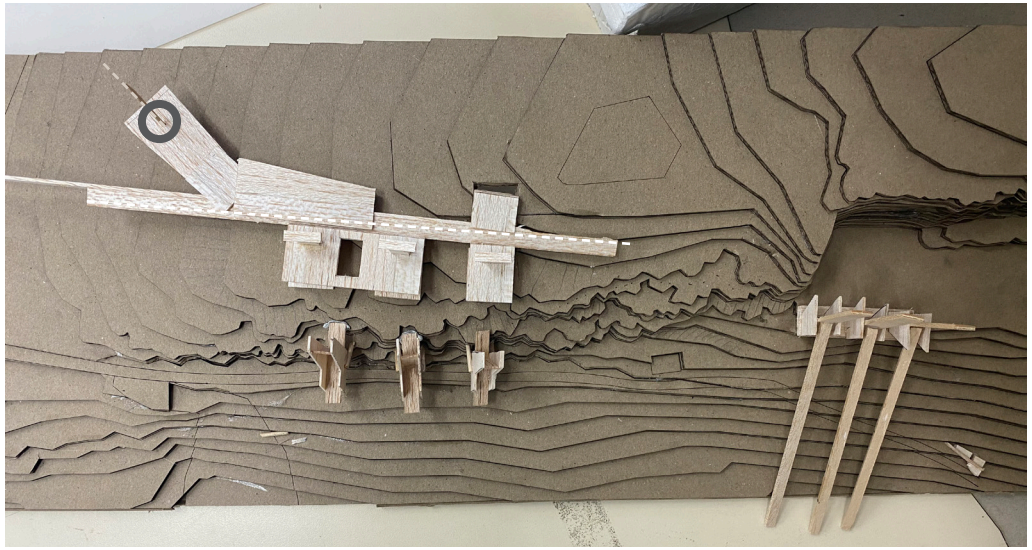


FIGURE 116: Iteration 2: Process model of the padstal (Author).

The layout of the padstal was influenced by the scarred edge and the existing infrastructure on site (empty farm dam).

Iteration 2 was developed for the final design resolution.



FIGURE 117: Process model of the padstal (Author).

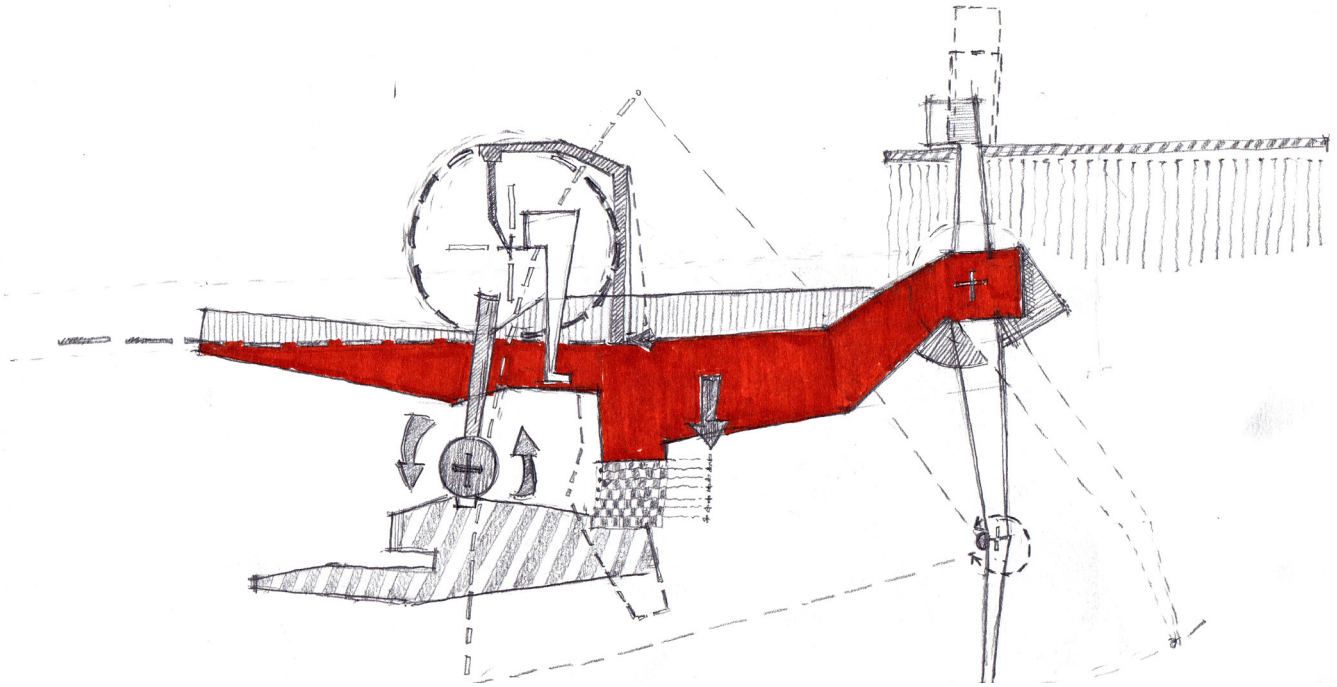


FIGURE 118: Exploring the machinic character of the landscape, inspired by Bryan Cantley (Author).

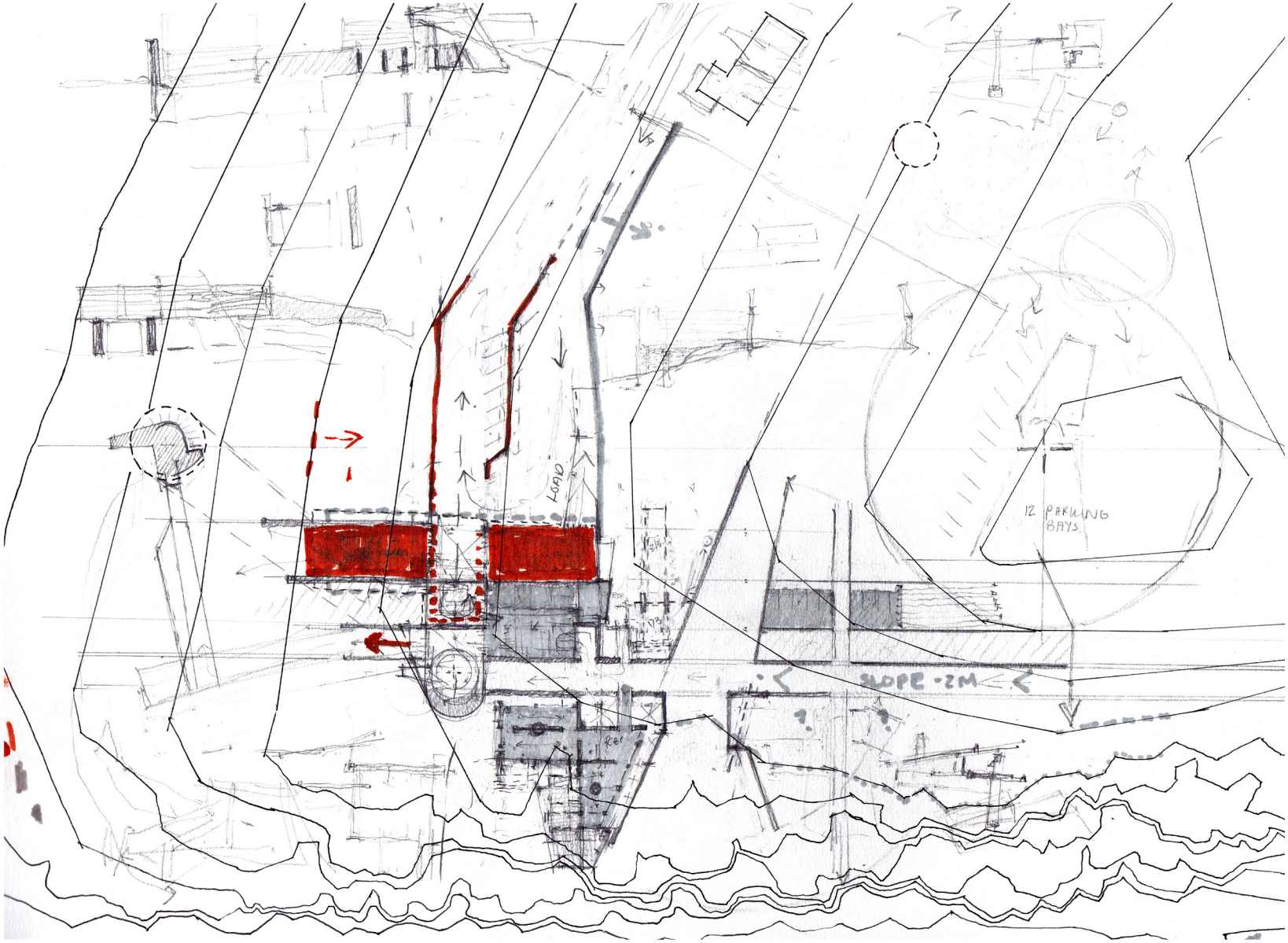


FIGURE 119: Plan Development of the padstal (Author).

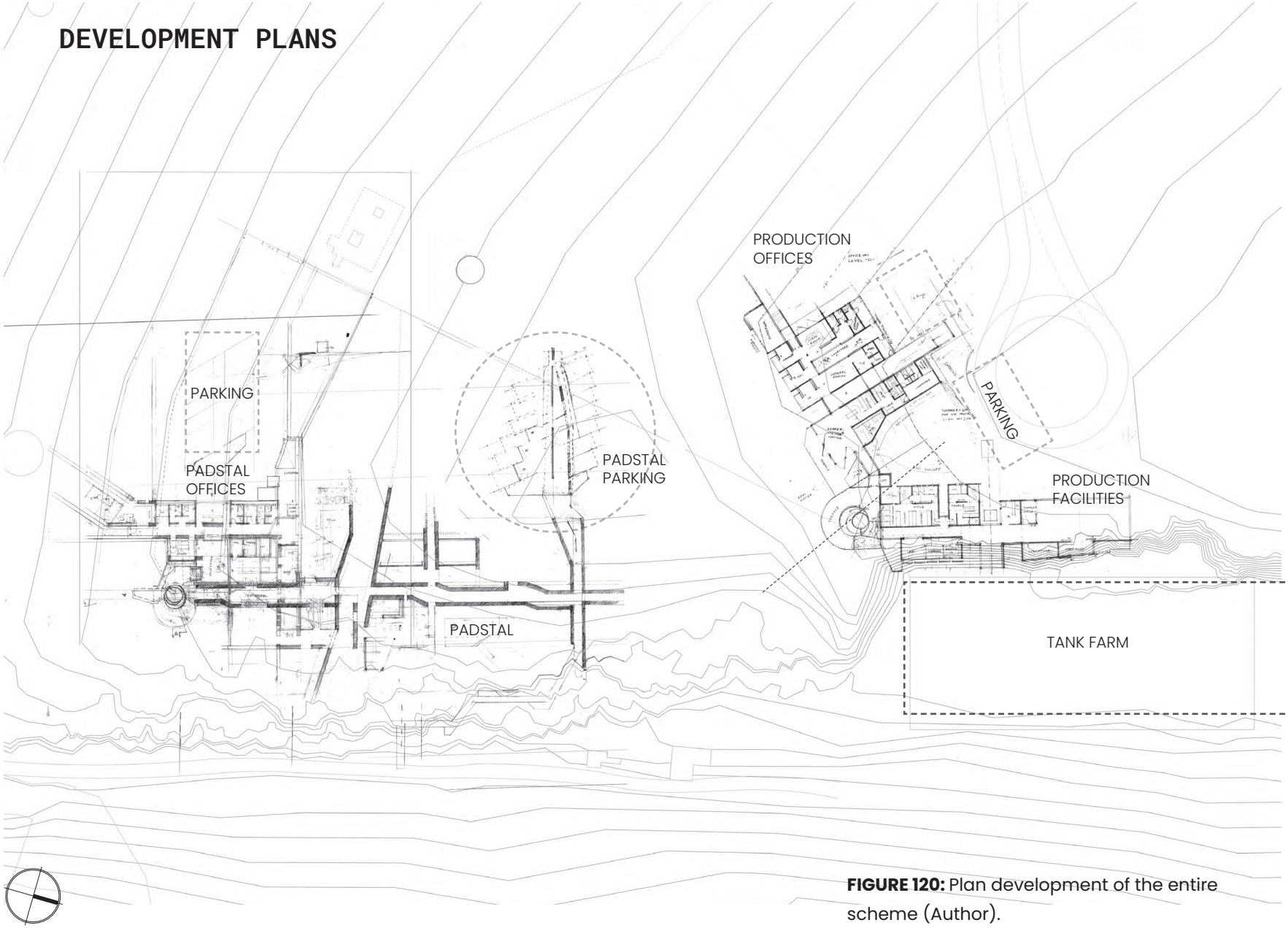


FIGURE 120: Plan development of the entire scheme (Author).

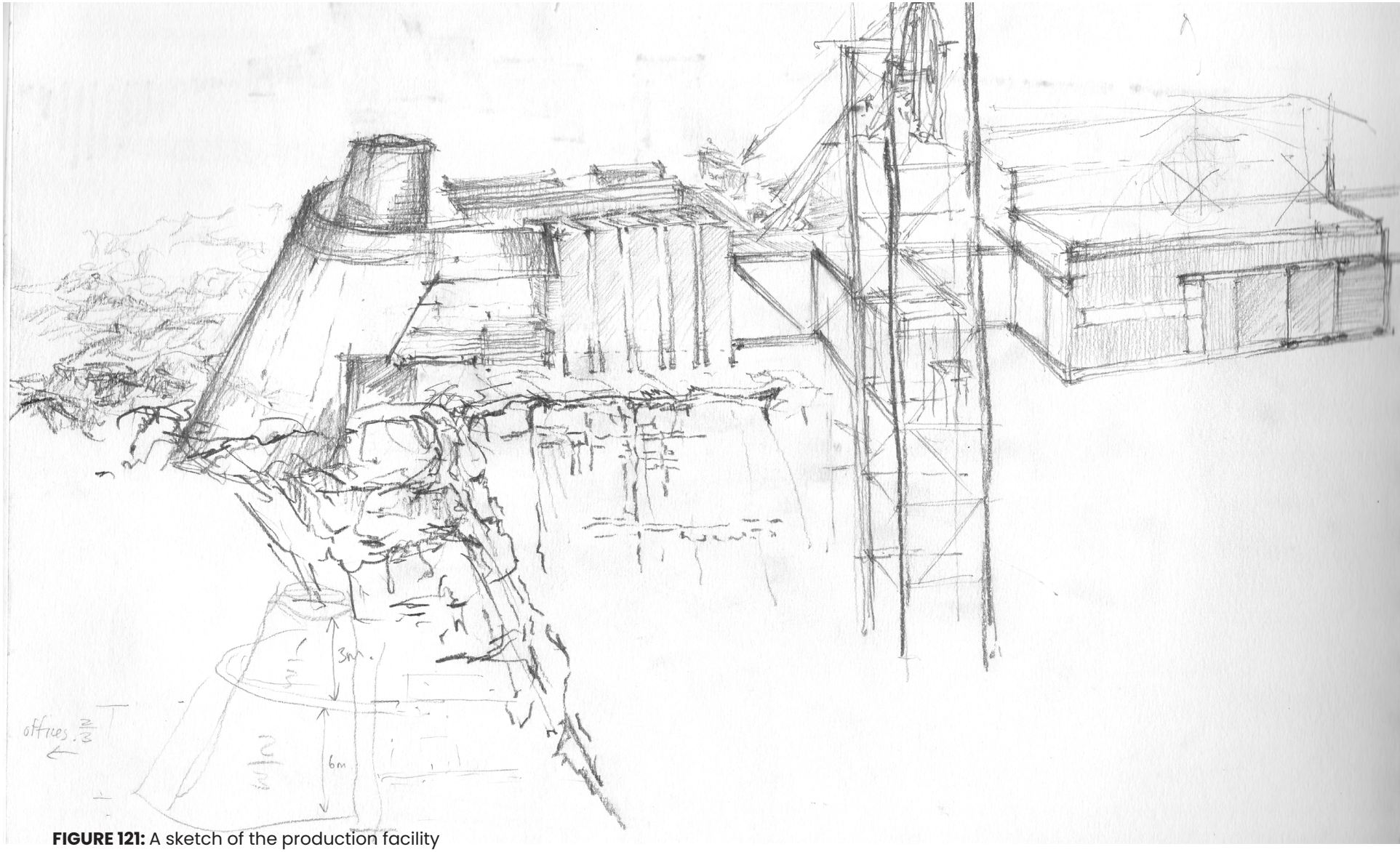


FIGURE 121: A sketch of the production facility perched on the edge of the quarry (Author).

[11] FINAL PROCESS DESIGN



FIGURE 122: Locality plan(CFM, 2023: online, adapted by Author).

FIGURE 123: A perspective of N9_[fuel] Station in its totality as seen from the N9 (Author).



LOWER FLOOR PLAN OF PRODUCTION FACILITY - OFFICES (LEVEL 742)

1. RECEPTION
2. OFFICE
3. GENERAL ADMIN
4. STAFF ROOM
5. BOARDROOM
6. ABLUTIONS
7. CLEANER'S ROOM
8. FILE ROOM
9. STORAGE
10. ELECTRICAL ROOM
11. KITCHEN
12. DRY STORAGE
13. COLD STORAGE
14. CAFETERIA
15. COURTYARD

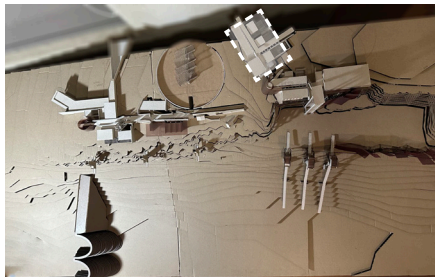




FIGURE 124: Floor plan of the Production plant offices (Author).

UPPER FLOOR PLAN OF
PRODUCTION FACILITY - SHED
(LEVEL 746)

1. RECEPTION
2. LABORATORY
3. OPERATIONS ROOM
4. STAFF ROOM
5. MAINTENANCE SHED
6. BIO DIESEL GENERATOR
7. CLEANER'S ROOM
8. LOCKERS & CHANGING ROOMS
9. STORAGE
10. PLANT MANAGER'S OFFICE
11. MINE SHAFT LIFT
12. LIFT

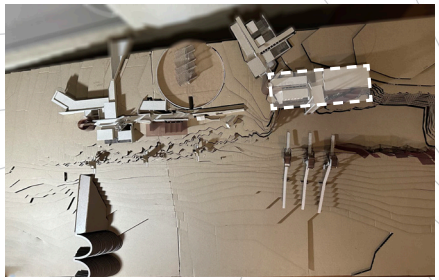


FIGURE 125: Floor plan of the Production plant Shed (Author).

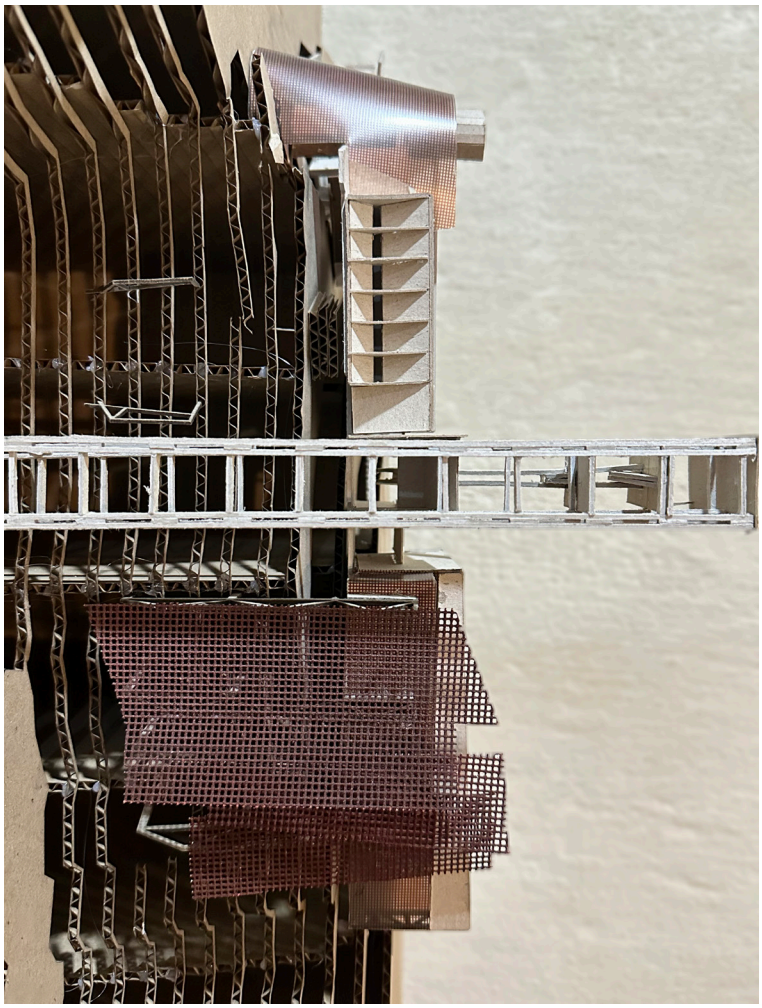
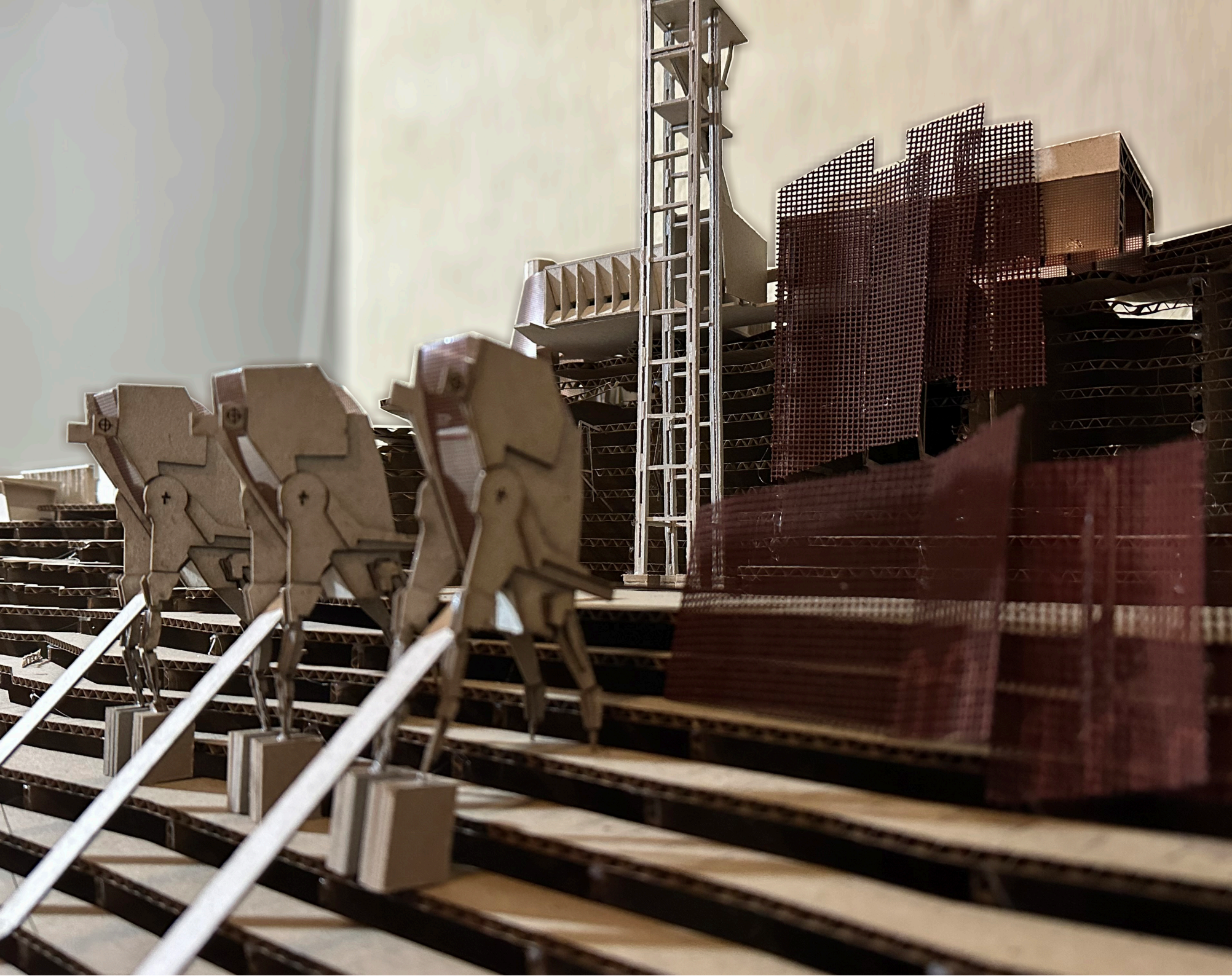


FIGURE 127: Production facility - shed (Author).



FIGURE 126: View from Beervlei dam (Author).



LOWER FLOOR PLAN OF PADSTAL - OFFICES (LEVEL 726)

1. RECEPTION
2. OFFICE
3. GENERAL ADMIN
4. STAFF ROOM
5. ABLUTIONS
6. TOILETS
7. CLEANER'S ROOM
8. PRINTERS
9. STORAGE
10. ELECTRICAL ROOM
11. KITCHEN
12. DRY STORAGE
13. COLD STORAGE
14. WASH UP AREA
15. COURTYARD
16. RESTAURANT
17. PRODUCE STORAGE

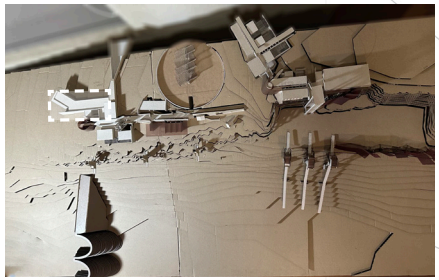


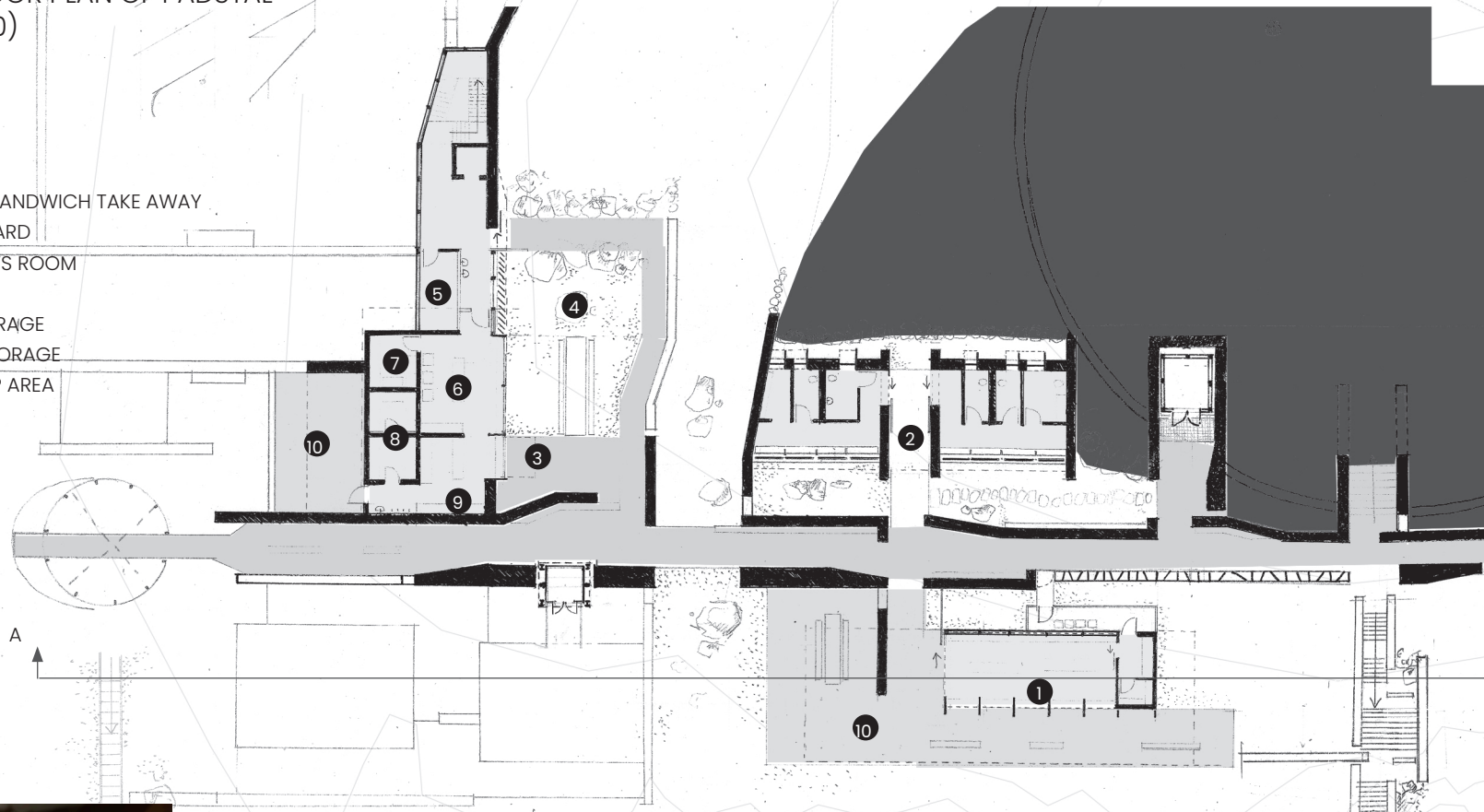
FIGURE 128: Floor plan of the padstal - offices (Author).



FIGURE 129: View of padstal from Beervlei Dam (Author).

UPPER FLOOR PLAN OF PADSTAL
(LEVEL 730)

1. SHOP
2. TOILETS
3. KAROO SANDWICH TAKE AWAY
4. COURTYARD
5. CLEANER'S ROOM
6. BAKERY
7. DRY STORAGE
8. COLD STORAGE
9. WASH UP AREA
10. TERRACE



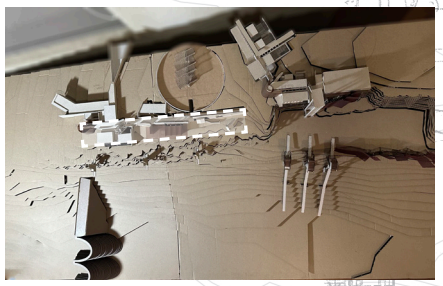
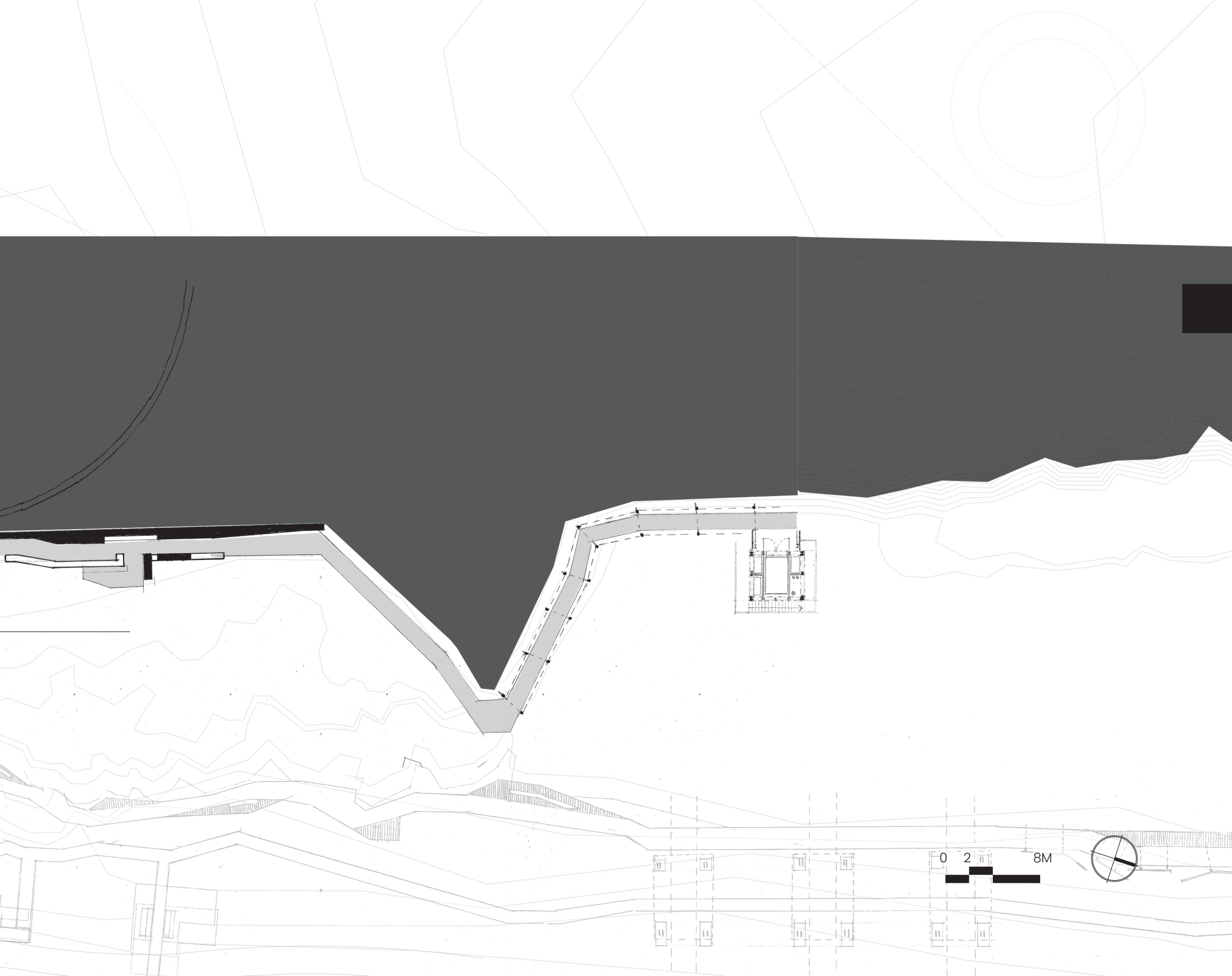


FIGURE 130: Floor plan of the padstal (Author).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PEDESTRIAN ROUTE



FIGURE 131: Floor plan of the pedestrian route (Author).

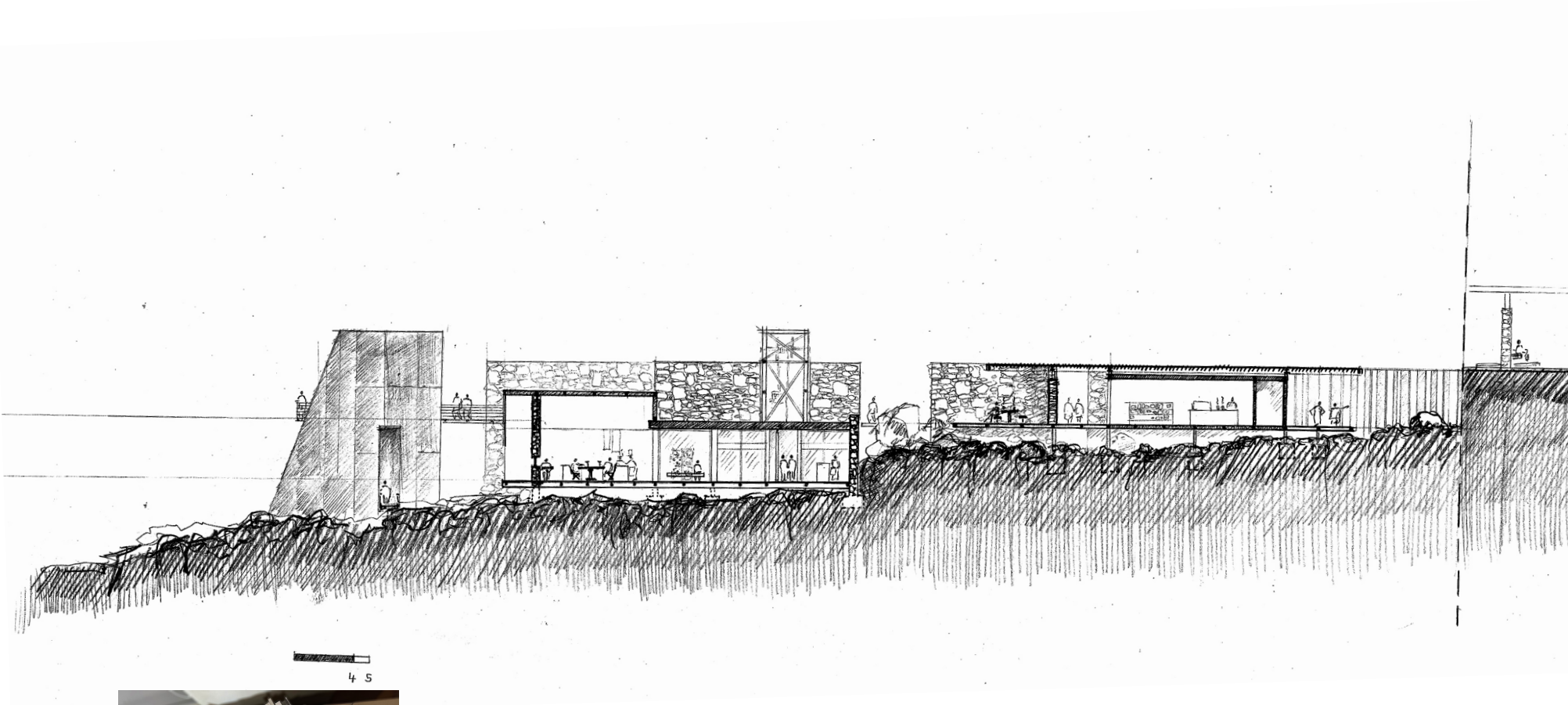

TOP PATH ALONG
LEVEL 724
LOWER PATH
ALONG LEVEL 720
0
4
10M

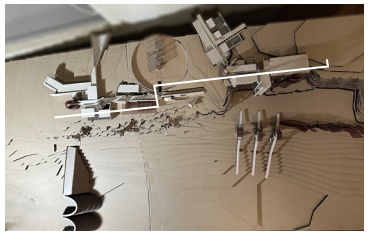


FIGURE 132: Photomontage of the pedestrian route along the scarred edge (Author).



FIGURE 133: Photomontage of the pedestrian route along the tank farm (Author).


4 5



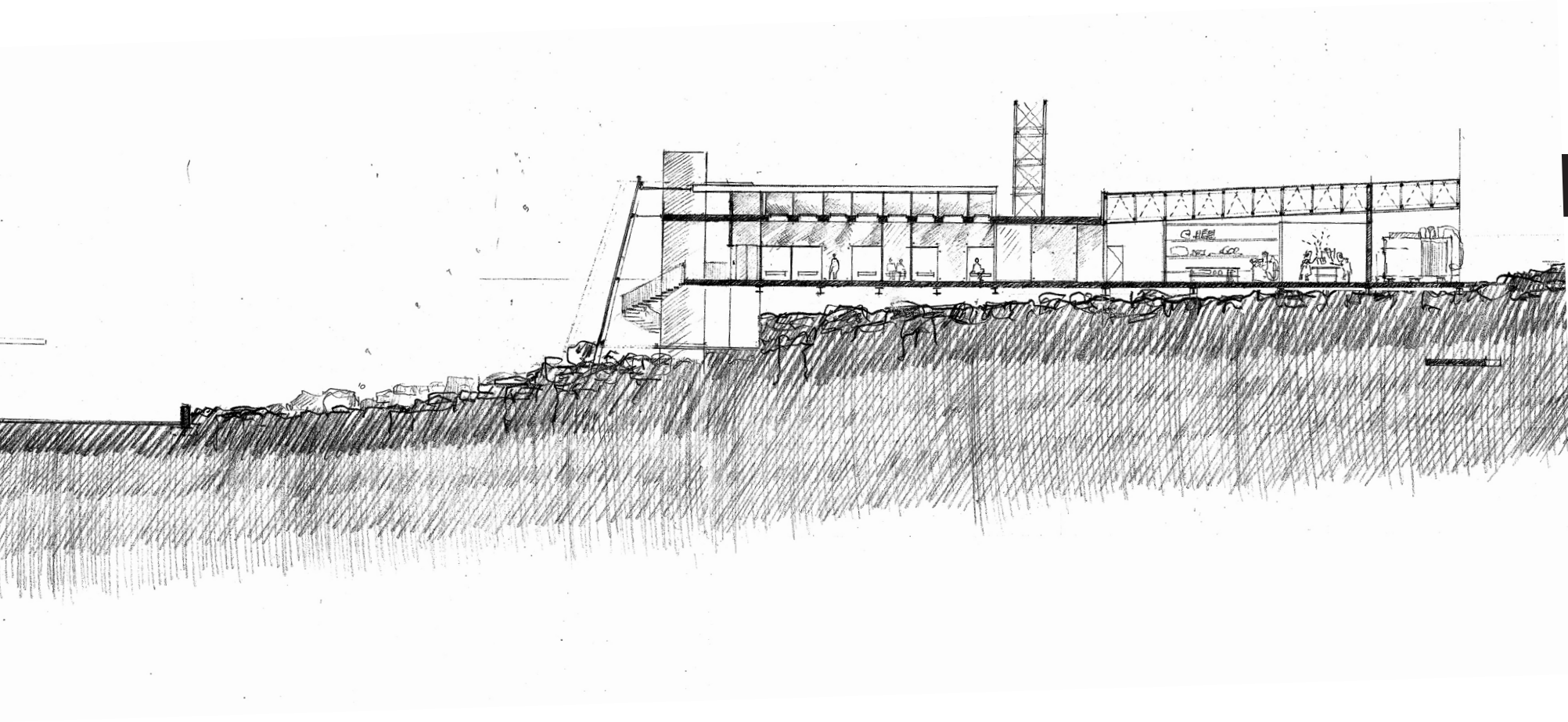


FIGURE 134: Section A (Author).

0 2 8M

[12] FINAL DESIGN



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794000

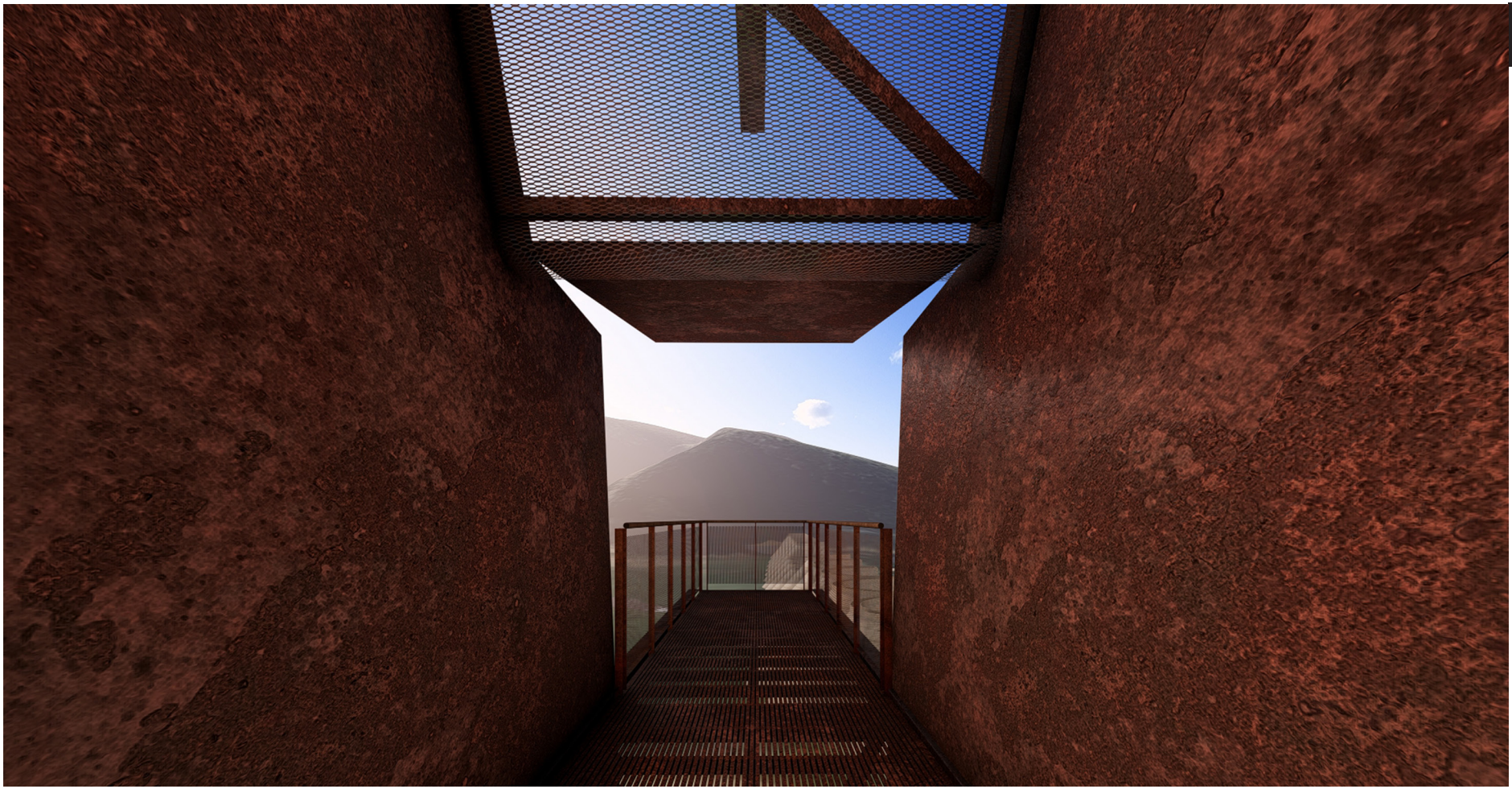








$Pg_{(151)}Pt_3$



















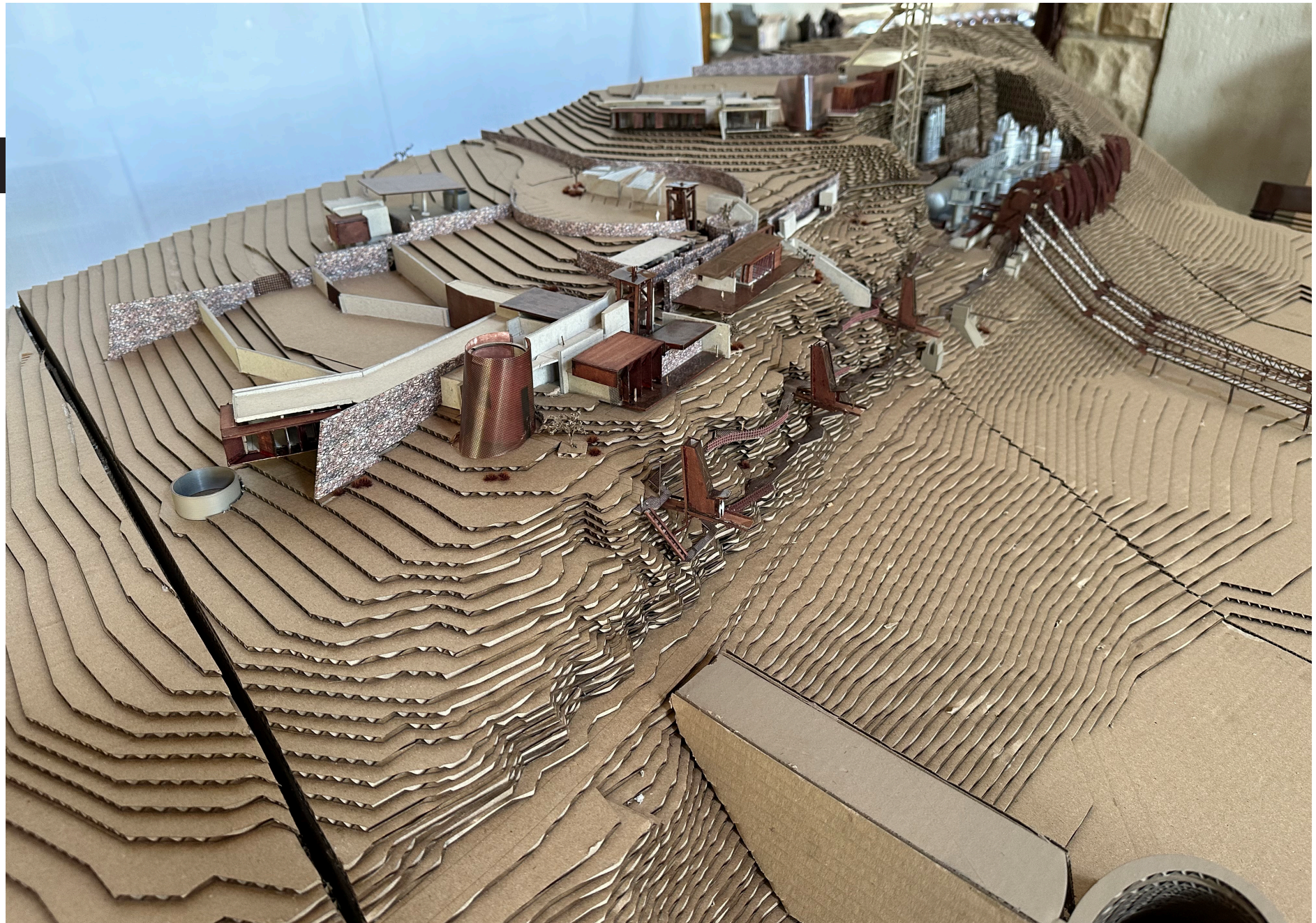


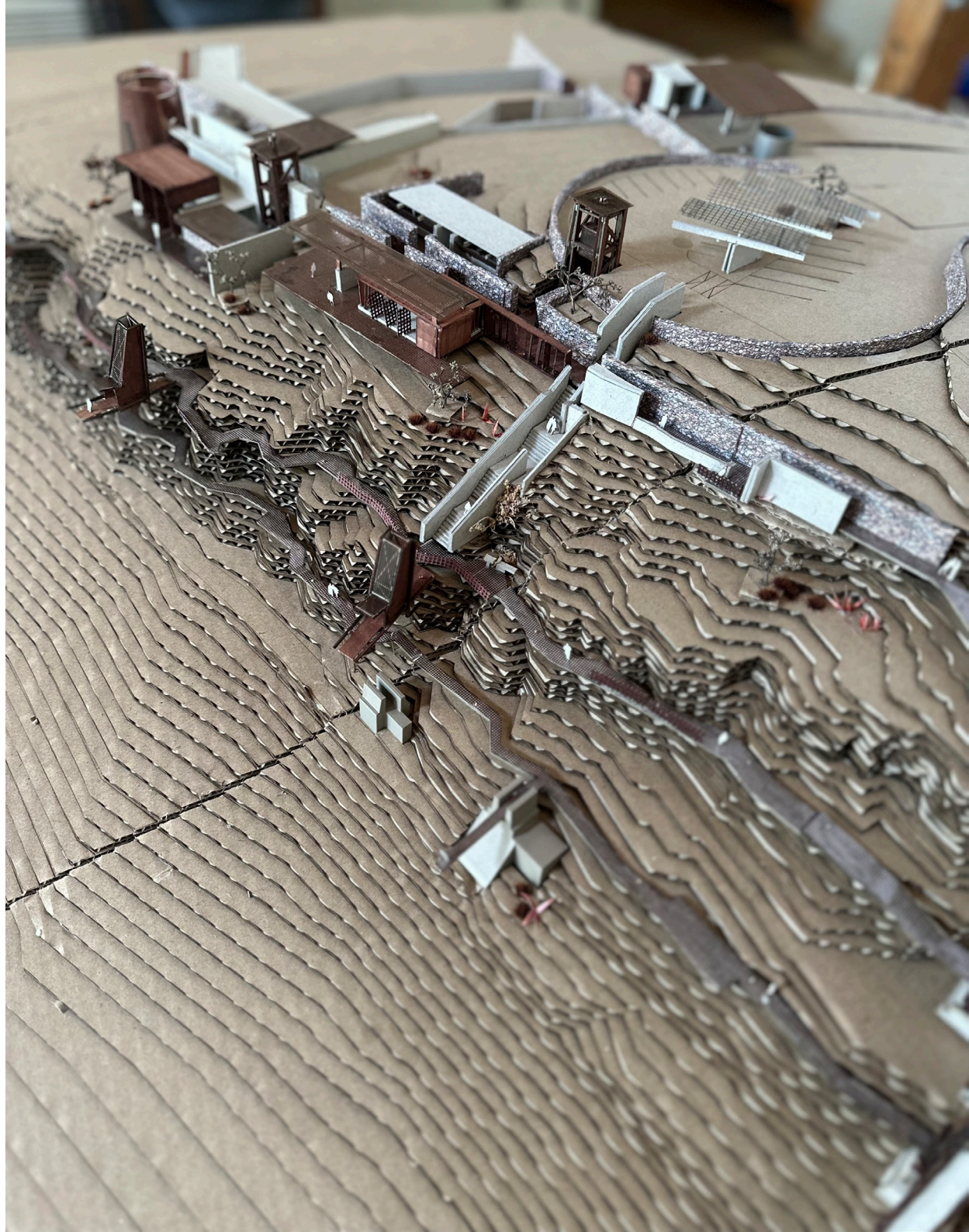


$Pg_{(159)}Pt_3$

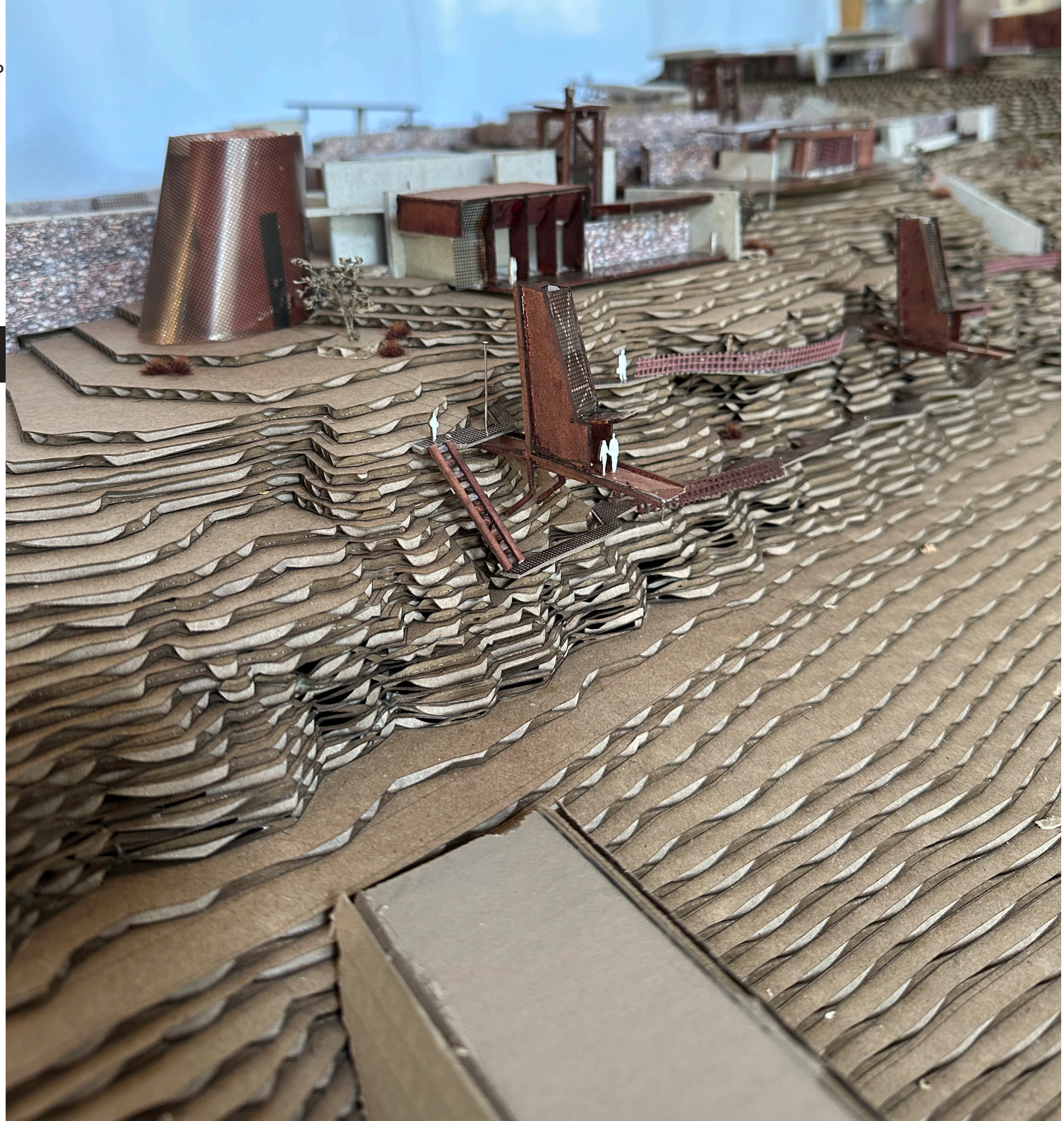


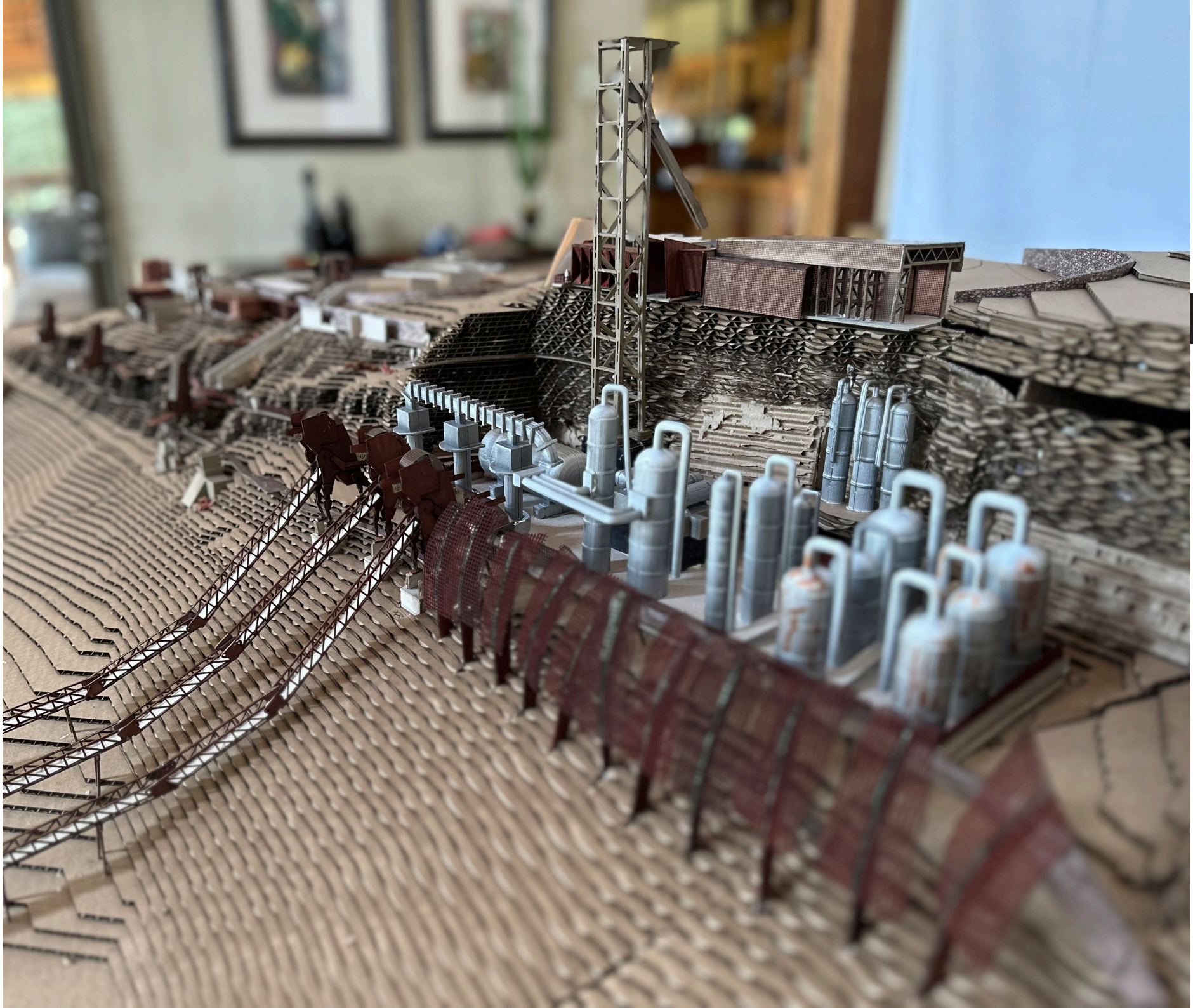
[13] FINAL MODEL



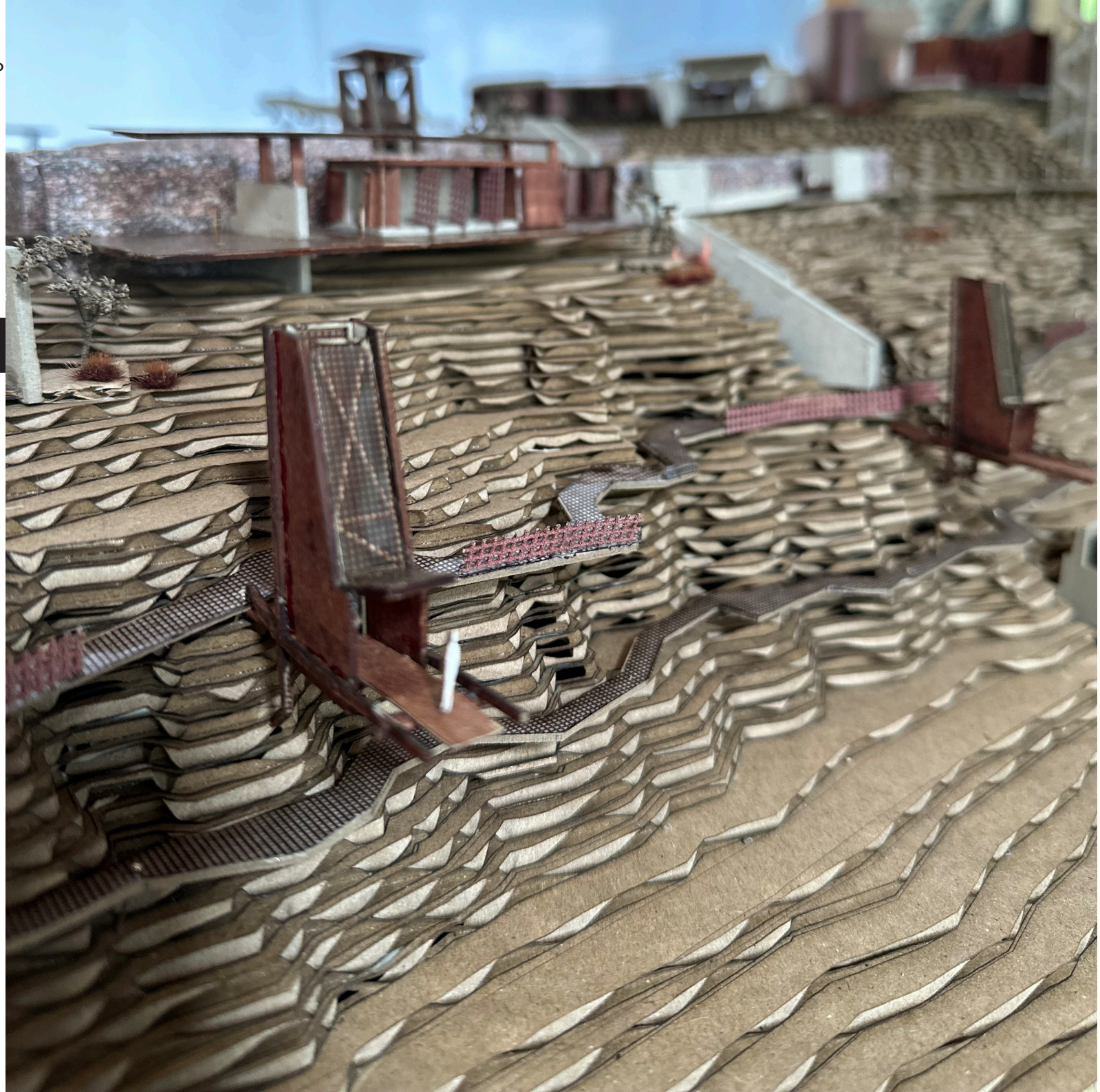


P





P



PART 4

LOCATION & SITE

PROPOSAL

INDUSTRIAL PROCESSES

MATERIALITY

SITE DESIGN & LAYOUT

PASSIVE DESIGN

SERVICES

LOCATION & SITE

-33°2'32.64" S, 23°27'56.52" E

Beervlei Dam is situated in the Eastern Cape, on the N9 about 20km north of Willowmore, in the direction of Graaffreinet. Being located about 5km below the confluence of the Groot River with the Salt and Kariega Rivers, Beervlei was constructed as a flood control dam, protecting the valley downstream from floods. With the soil having a high mineral content, the water is unsuitable for irrigation purposes and as such whenever the dam is full, water is released as quickly as possible.

Located in an arid to semi-arid region, Beervlei is prone to wide variations in temperatures, between 5°C to 33°C and little to no rainfall, receiving roughly 319mm annually (Weather Atlas, 2023; Weatherspark, 2023). This harsh environment is made up of extremes; heat and colds, droughts and floods. A landscape of vast flat planes interrupted by folded mountain ranges and typical karoo 'koppies' that merges earth and sky. It is a place that makes man realize his insignificance.



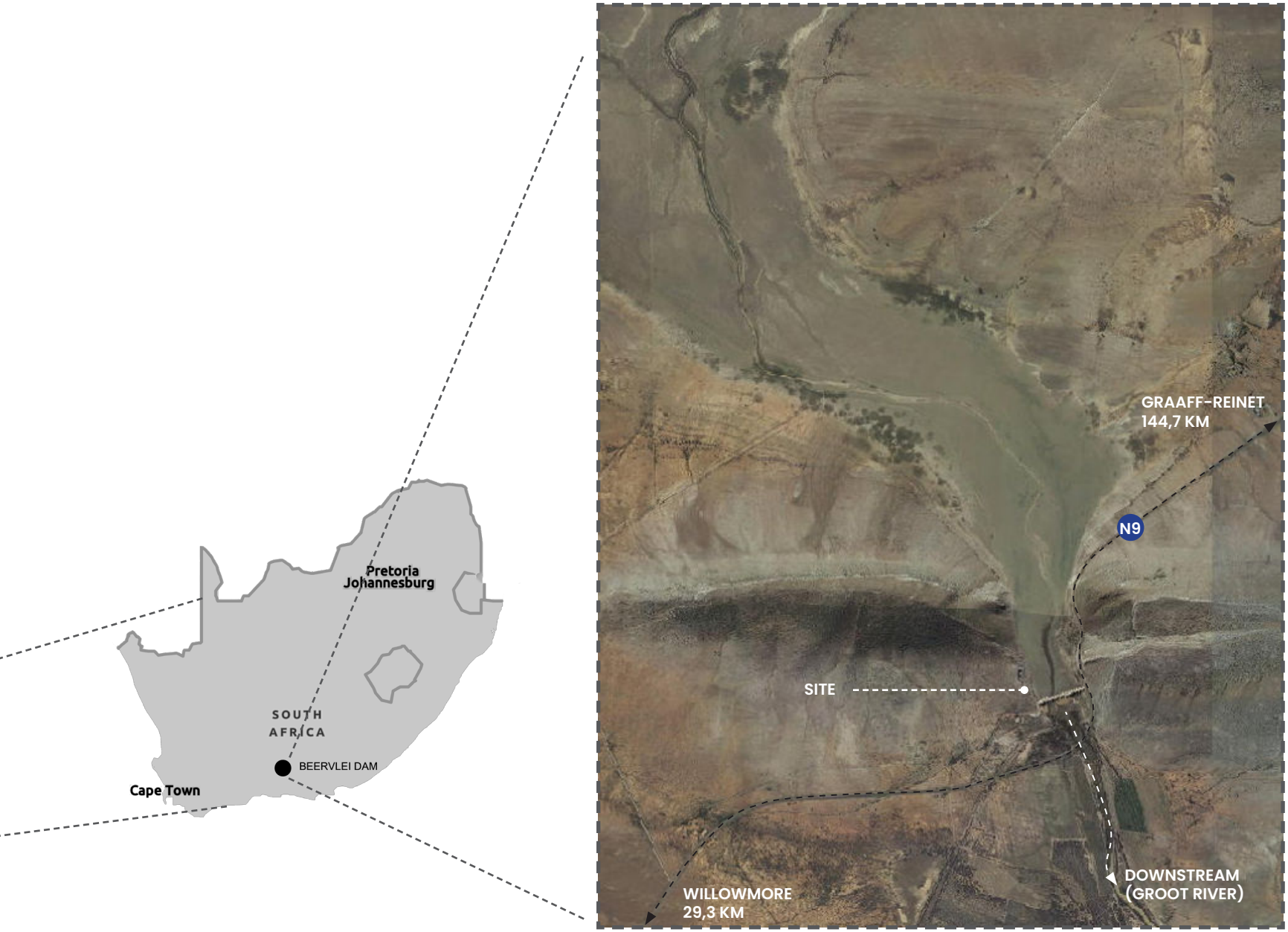

Pretoria
Johannesburg
SOUTH
AFRICA
BEERVLEI DAM
Cape Town
GRAAFF-REINET
144,7 KM
N9
SITE
WILLOWMORE
29,3 KM
DOWNSTREAM
(GROOT RIVER)



FIGURE 135: The mechanized landscape not yet absorbed by nature - the quarry (Author).

The site reveals the unforgiving character of the Karoo: a previously natural landscape transformed by machines into a mechanized landscape that has not yet been absorbed by nature. This machinic patination is a result of Beervlei Dam's construction – excavating the edge to make way for an access route and quarrying rock that was crushed and used as aggregate in the concrete mixture of the dam wall.

The site is littered with abandoned infrastructure (found objects) that hints at the uncanniness of the site, which creates an opportunity for a new way of inhabiting place and reclaiming the mechanized landscape.

Existing infrastructure on site:

1. Concrete footings for the crusher.
2. Rugby poles that demarcate a field of dust.
3. Concrete foundations in close proximity to an empty farm dam.
4. Various sized concrete farm dams (empty) scattered across the site.
5. Remnants are still visible of the labour camp that was built to house the convicts who worked on Beervlei dam.
6. An old abandoned farmhouse.



FIGURE 136: Site Plan showing larger context (CFM, 2023: online, adapted by author)



FIGURE 137: Concrete footings for the crusher (Author).



FIGURE 138: Rugby poles that demarcate a field of dust (Author).



FIGURE 139: Concrete foundations in close proximity to an empty farm dam (Author).



FIGURE 140: Various sized concrete farm dams (empty) scattered across the site (Author).

FIGURE 141: Site Plan showing immediate surroundings (CFM, 2023: online, adapted by author)



PROPOSAL

N9_[Fuel] Station is an ensemble of various programs that operate in symbiosis. The main program is the bio-diesel production plant accompanied by a small filling station and padstal, with a future proposal of accommodation built on the existing footprint of the prison labour camp. This scheme not only serves to promote green energy, but offers an oasis for the weary traveler.

This scheme originated from various contributing factors:

- The rising demand for energy and the anticipated fossil fuel shortages have made energy security an increasingly critical issue for most countries. In addition, the impacts of climate change has forced governments to limit greenhouse gas emissions. It is precisely these concerns around environmental degradation that have led to the development of alternative energy sources and "caused the South African government to start considering the introduction of biofuels into the transport fuels market" (South Africa. Government Gazette, 2020: 3).
- Feedstock and raw material contribute 80% of the manufacturing cost, while transport costs are the second biggest contributor. Therefore plant location is very important and can significantly reduce costs. The plant must use locally produced feedstock and be located close to the feedstock source.
- For this scheme, bio-diesel will be produced from a halophyte plant that is already growing at Beervlei - oldman saltbush. The significance of this plant is that it thrives in saline soil and harsh conditions and it can be irrigated with brackish water. This plant will be grown as a bio-diesel feedstock crop in the Beervlei basin. Once it is harvested it will be transported via the sentinel (the conveyor belt) up to the production plant where it will undergo various processes to be converted into bio-diesel. An advantage of halophytes is that they may be used to reclaim saline soil for conventional crops (Hendricks & Bushnell, 2008).
- Other factors have been mentioned in Part 3 [9] Accommodation & Brief.

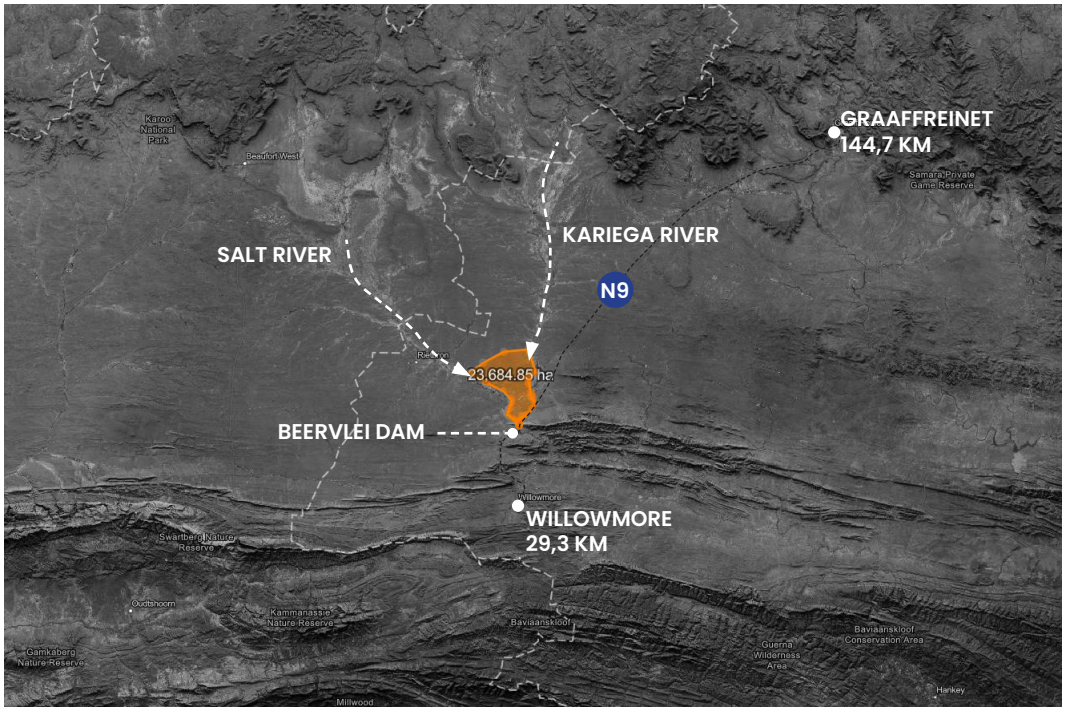
Production plant capacity:

According to research done on the feasibility of commercial biodiesel production in South Africa (Nolte, 2007), the optimum biodiesel plant size in South Africa ranges between 1500 kg/h - 3000 kg/h. As such, the design of the production facilities and area requirements will be based on a biodiesel production plant with capacity of 2500 kg/h (22.5 mil. litres/annum).

The following calculations are rough estimates based on research done by the author (therefore, purely theoretical):

1 ha (halophyte) feedstock produces roughly 950l biodiesel (Centofanti & Banuelos, 2019: 334)

Therefore, 22.5 mil. l/950l = 23 684 ha of feedstock required.



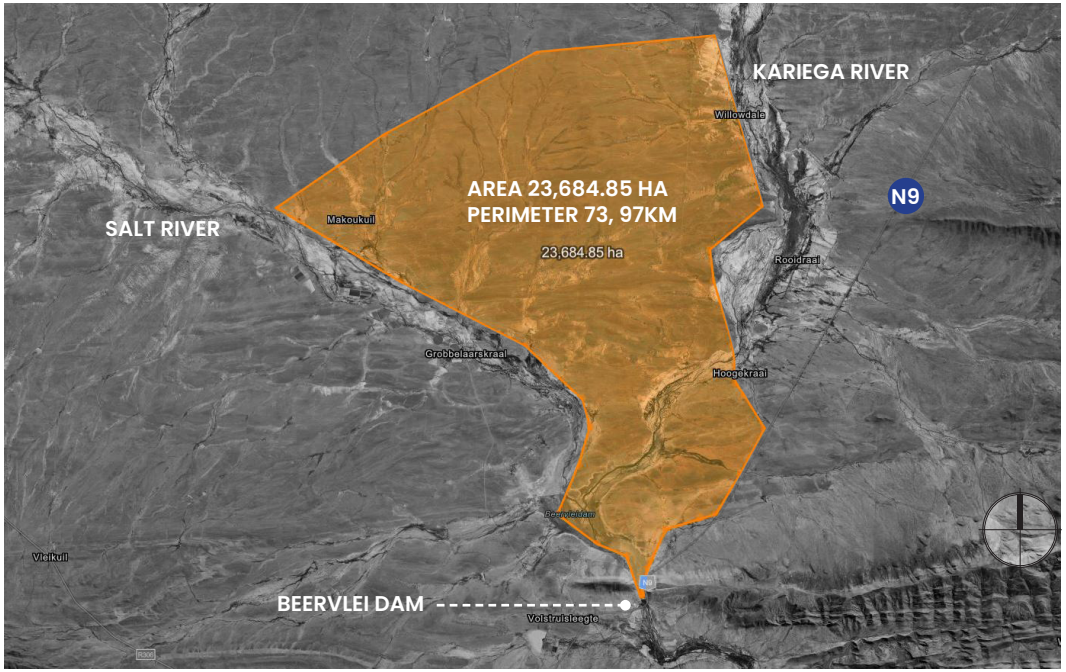


FIGURE 142: (Top) Feedstock area requirement (ha) shown in relation to larger context (CFM, 2023: online, adapted by author).

FIGURE 143: (Bottom) Feedstock area requirement (ha) shown in relation to Beervlei's immediate surroundings (CFM, 2023: online, adapted by author).

FIGURE 144: N9_ scheme as seen from N9 Highway (Author).

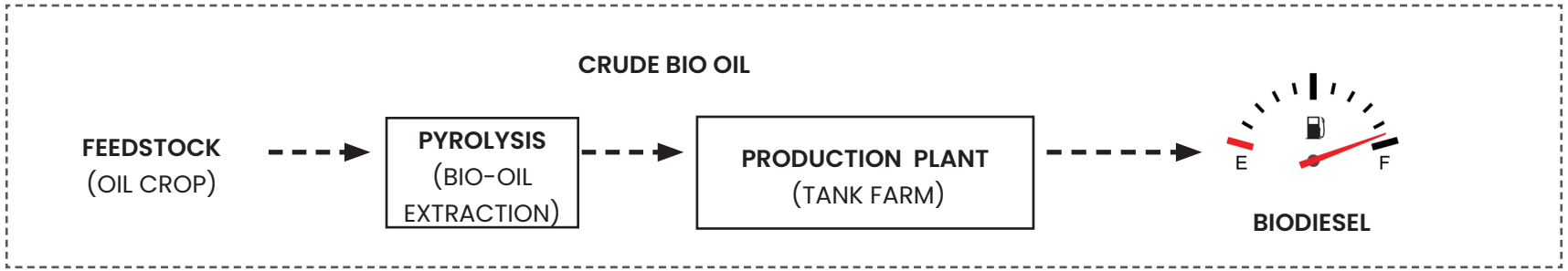


FIGURE 145: Locality Plan showing entire N9_ scheme (CFM, 2023: online, adapted by author)



INDUSTRIAL PROCESSES

The entire process in the production of biodiesel for this specific scheme is simplified in the following diagram:



Pyrolysis

A pyrolysis plant is designed for the thermochemical processing of biomass (feedstock - dry matter of the plant) to produce energy-rich products, that can be further used (bioenergy-concept, 2023).

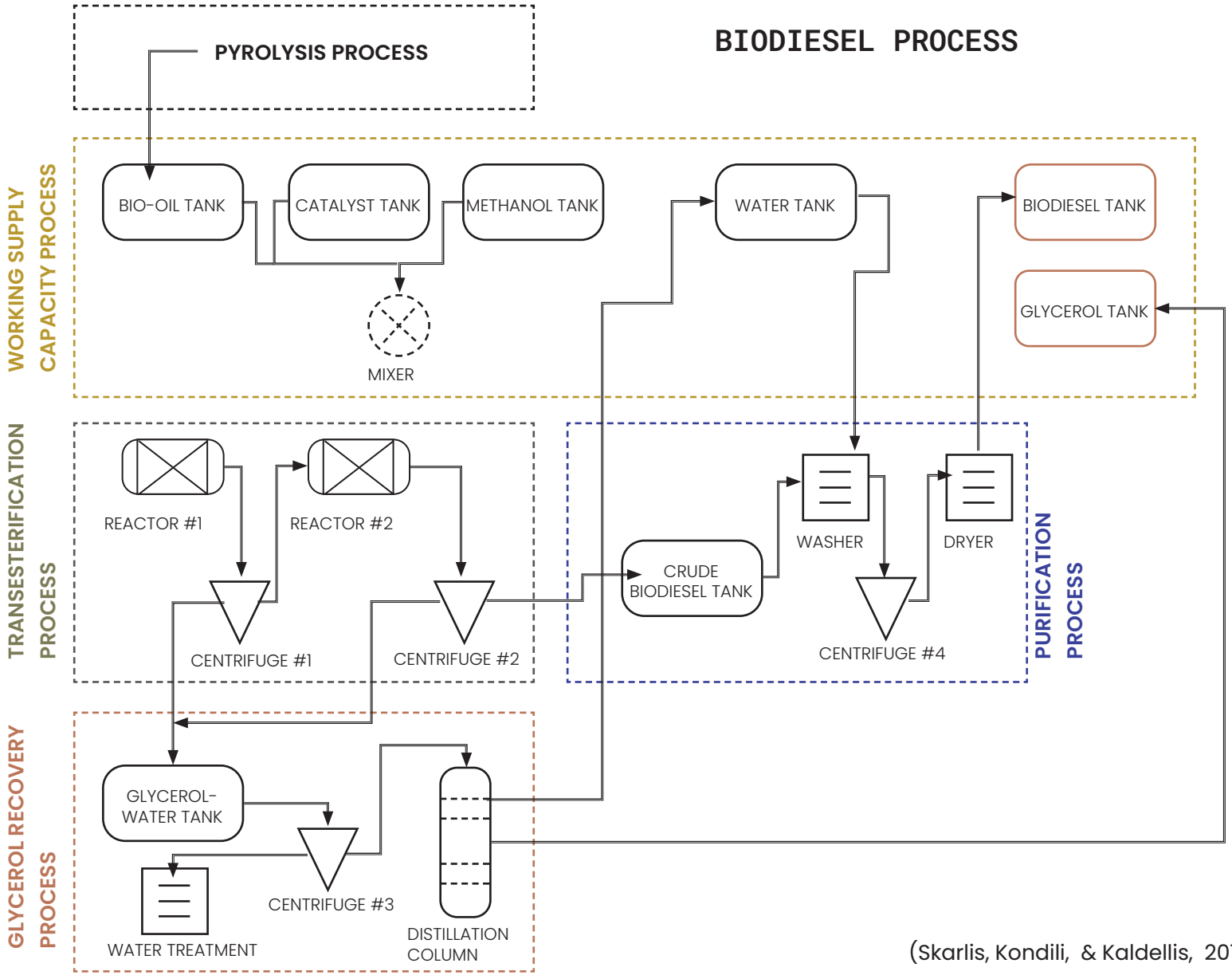
The energy-rich products include:

- Coke (bio-char): excellent for briquetting, energy use and for usage in agriculture (fertilizer).
- Pyrolysis Oil: bio-oil, further refined to make biodiesel fuel.
- Pyrolysis Gas: consumed by the plant to generate heat energy for the process.

Bio-Diesel

Biodiesel is a biodegradable fuel produced from either vegetable oils, animal fats or recycled grease. It can be used as is in cars or it can be blended with conventional 'fossil' diesel.

Although, biodiesel reduces net carbon dioxide emissions by 78% (Car and Driver, 2023: online), making it a more sustainable source of fuel.



(Skarlis, Kondili, & Kaldellis, 2012)

MATERIALITY

Materials available on site, that allow for eco-camouflage and materials able to support industrial processes dictated design decisions:

Stone:

The stone excavated on site will be re-used, fusing the landscape with the man-made. In addition, stone is a good material to use in the Karoo as it is an excellent natural thermal insulator, keeping spaces cool in summer and warm in winter.

Beervlei's Geology consists of mainly flat-bedded sandstone and mudstone (Ecca Group & Dwyka Formation).

Concrete:

Similar to the existing infrastructure on site, concrete will be used in isolated instances (foundations and industrial buildings). It is an extremely durable material that can withstand the Karoo's extreme environment. In an aesthetic sense, concrete is a smooth surface that contrasts with and highlights the fragmented rock formations.



FIGURE 146: Existing stone retaining wall built from stone extracted from site (Author).



FIGURE 147: Existing concrete footings of the crusher used to crush stone from the quarry (Author).

Corten

Corten steel is a zero-maintenance material and has good machinability and welding properties making its assembly easier on a complex site. Its weathering process allows the steel to change from a orange-brown to a dark brown, reflecting the ever changing Karoo landscape with the progression of the sun and seasons.

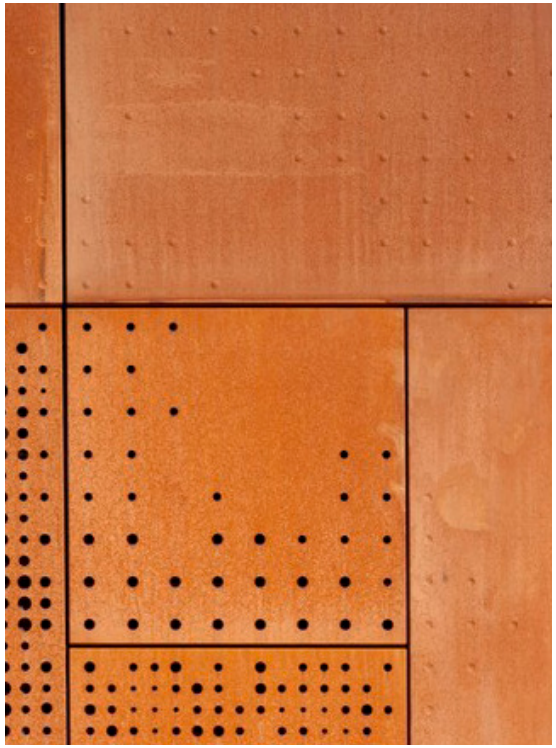




FIGURE 148: The weathering process of corten steel as it is exposed to the elements (Author).



FIGURE 149: The discoloration of Beervlei's rock formations similar to that of weathered corten (Author).

FIGURE 150: Stone walls within the mechanized landscape of Beervlei Dam (Author).



FIGURE 151: Corten walls within the mechanized landscape of Beervlei Dam (Author).



SITE DESIGN & LAYOUT

Roads & Access

Existing roadways are upgraded and used as far as possible. A large turning circle that can accommodate a typical tanker truck (tons) will be provided just off the N9 where a service pump station will be situated. This station will service the production plant and pump up the necessary liquids as well as pump down the products for collection. This will prevent large tanker trucks from traversing a steep slope.

To keep the roads as eco-friendly as possible and integrate them into the landscape, the product – Ecoroads – will be utilized. It is a proven, innovative multi-enzyme based soil stabilization product that not only increases the strength, density, and durability of roads but reduces the carbon footprint of the road construction by 75% per kilometer. This multi-enzyme based liquid hardens the local soil into a solid and durable road base (ecoroads, 2023: online). An added benefit is that the Karoo dust will also be suppressed.

Diagrammatic overview of functions

The layout of the N9 Fuel Station was determined by the slope of the site, existing artefacts and the division of public and private. The entire scheme consists of the production plant facilities and offices, the padstal and its offices and a small filling station.

Production Plant & facilities:

The tank farm is situated in the quarry as a way to mechanically build up this excavated hole. Whereas the facilities sit on the edge of the quarry looking over the tank farm. The production offices wraps around the ridge, following the slope of the site.

Padstal:

The padstal extends along the scarred edge leading up to the quarry. Parking is set above the actual padstal so visitors enter by descending down into the mountain side before emerging onto the main walkway. A linear layout is followed to accommodate the slope of the site. The walkway acts as a directional axis from which assemblages branch. These assemblages frame specific views and moments in the landscape.

Filling Station:

The filling station is situated before the padstal and utilizes an existing foundation together with an empty concrete farm dam.

1. TANK FARM
2. PRODUCTION FACILITIES
3. PRODUCTION OFFICES

4. PADSTAL
5. PADSTAL OFFICES
6. FILLING STATION

FIGURE 152: Locality Plan showing roads & access for the entire N9_ scheme (CFM, 2023: online, adapted by author)

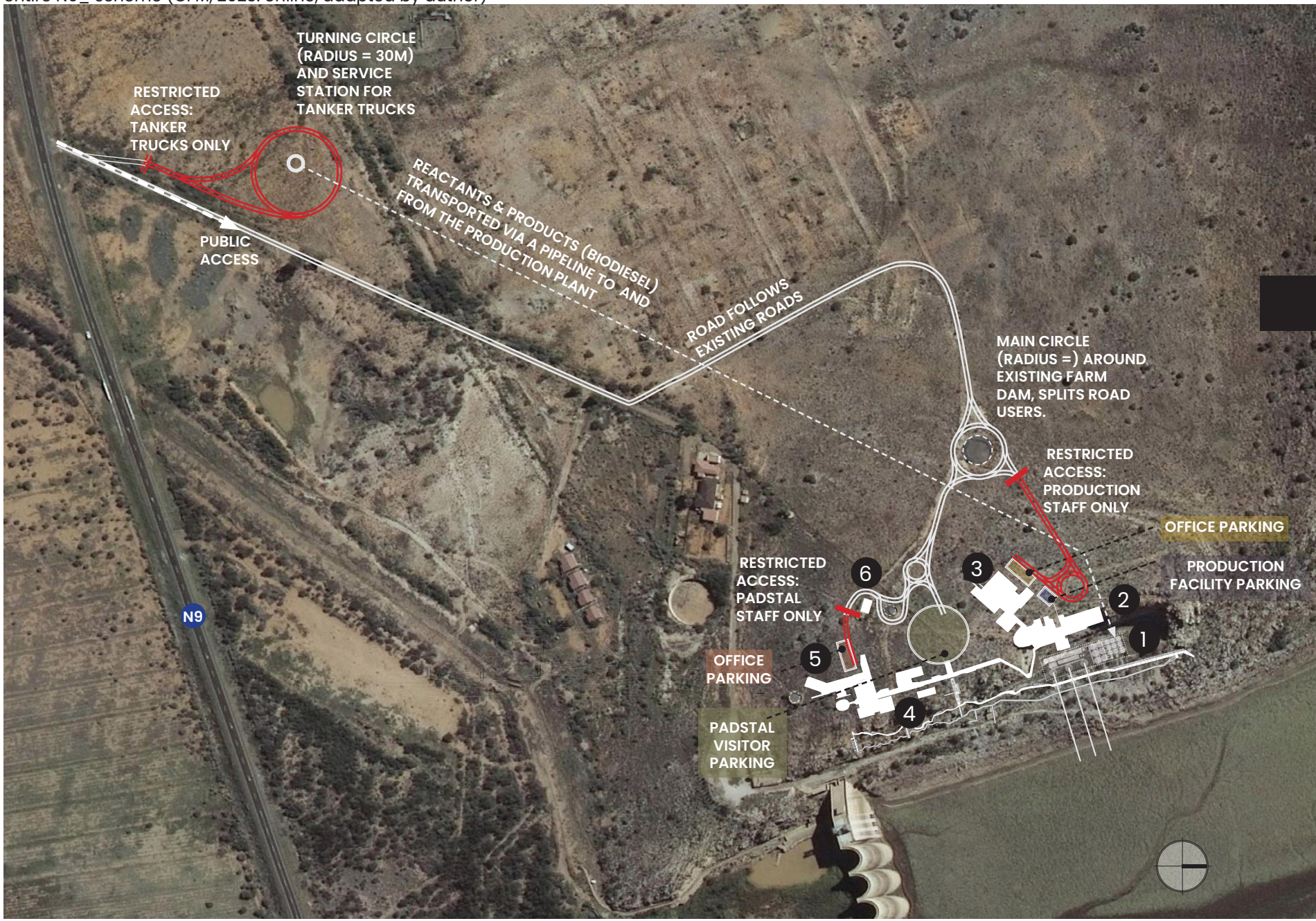


FIGURE 153: Section through Karoo test kitchen (Author)

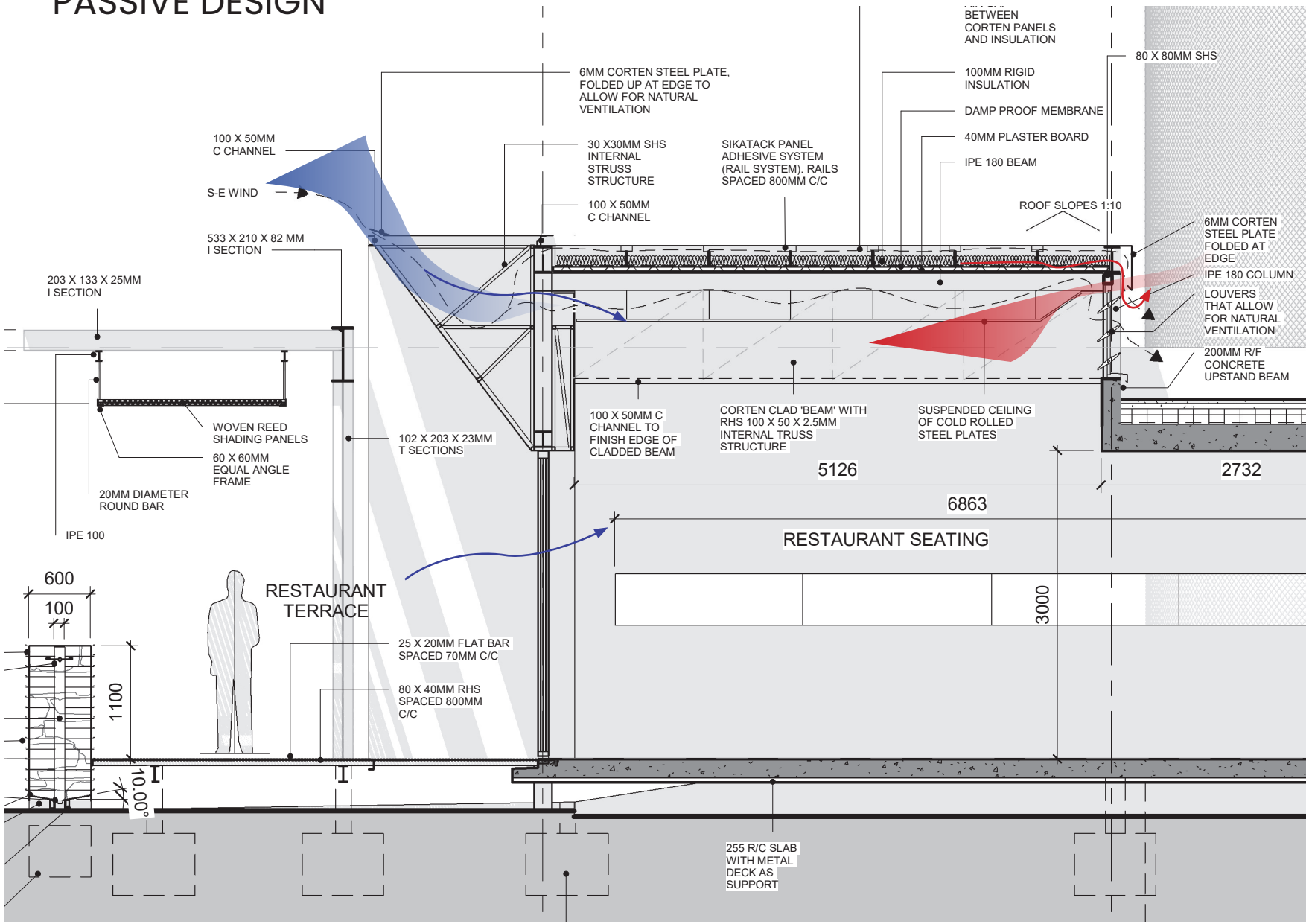
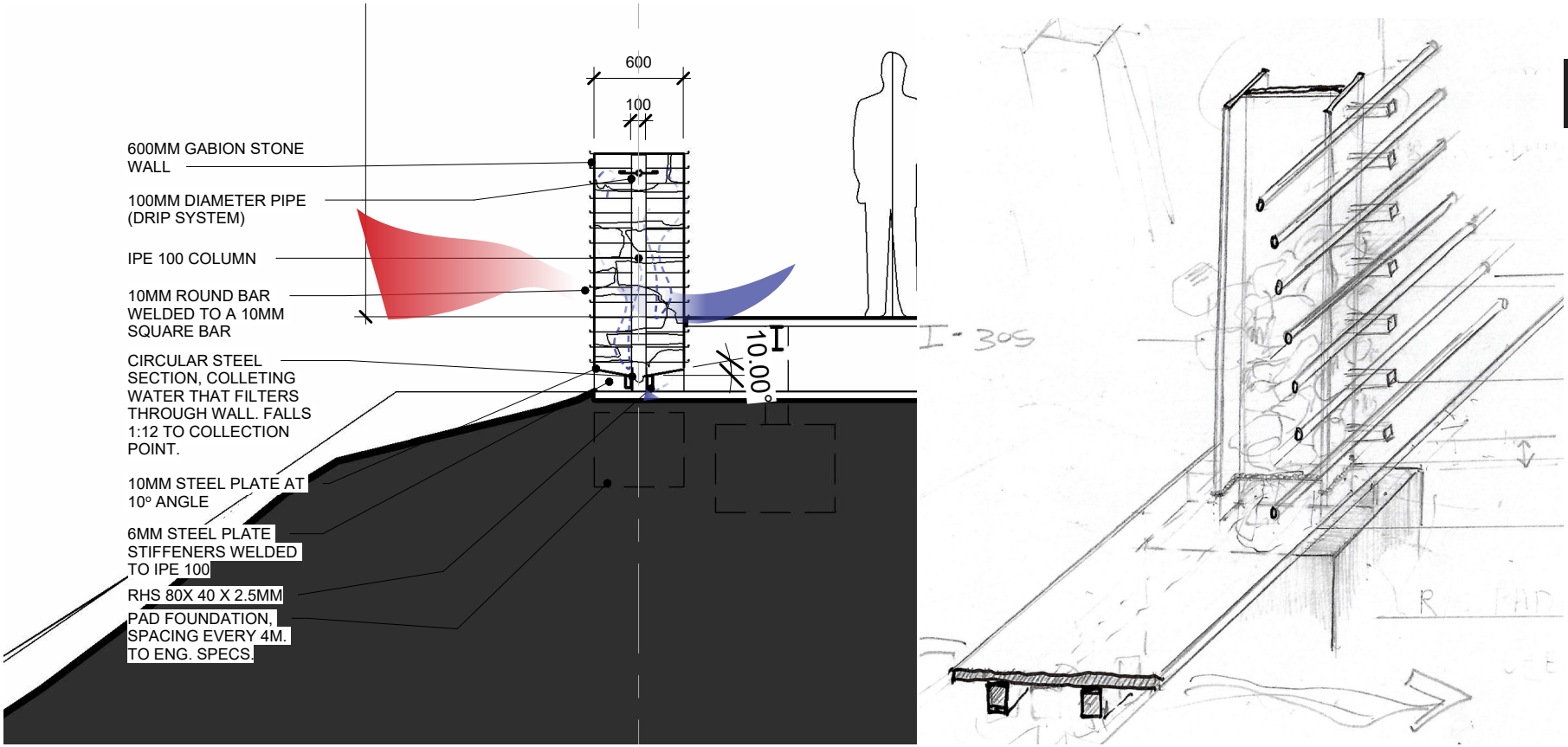


FIGURE 154: Gabion wall cooling system (Author)



SERVICES

Water

1. Stormwater Harvesting: Beervlei receives roughly 300mm of rainfall a year, which makes rainwater harvesting unfeasible. As such, rainwater will not be collected.
2. Stormwater drainage: The construction of the building will allow water to run its natural course, by lifting the building off the ground level and where this is not possible the water will be channeled away from the building to its natural path. However due to little to no rainfall in the area, the infrastructure built to manage stormwater drainage is not extensive.
3. Water Source: The Karoo is rich in underground water sources, which is evident from the multiple concrete dams scattered throughout the site. Therefore, the building as well processes that require water will make use of a borehole. Its use will be governed by sustainable practices to ensure its longevity.
4. Additional water source: an appropriate portion from the Groot River will be channeled and stored in Storage tanks for non-potable use .

Sewage

1. Due to the remote location of the site and for the fact that the architectural intervention is concerned with green energy, sewage will be collected and processed into biogas, which can be converted into electricity and heat. A small-scale biogas plant, situated at the lowest level of the scheme, will allow for disposal and energy recovery to be economically successful and ecologically sustainable.

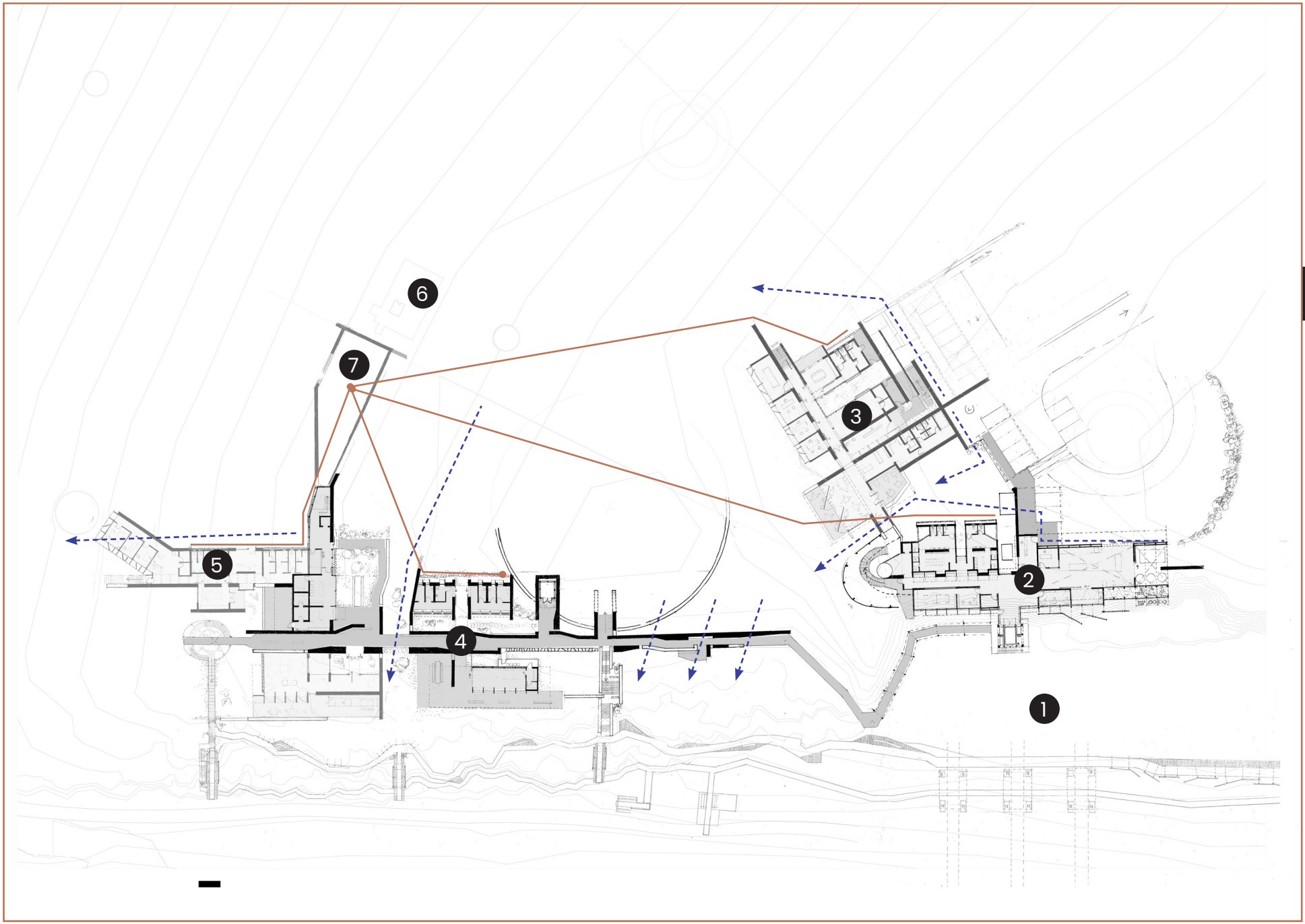
Electricity

1. Electricity will be sourced from Eskom, however a small portion of the electricity demand will be alleviated by the biogas and to ensure the 24-hour operation of the production facility, a generator will be installed that operates on the biodiesel produced. So, when loadshedding strikes, production can continue.

1 TANK FARM
2 PRODUCTION FACILITIES
3 PRODUCTION OFFICES

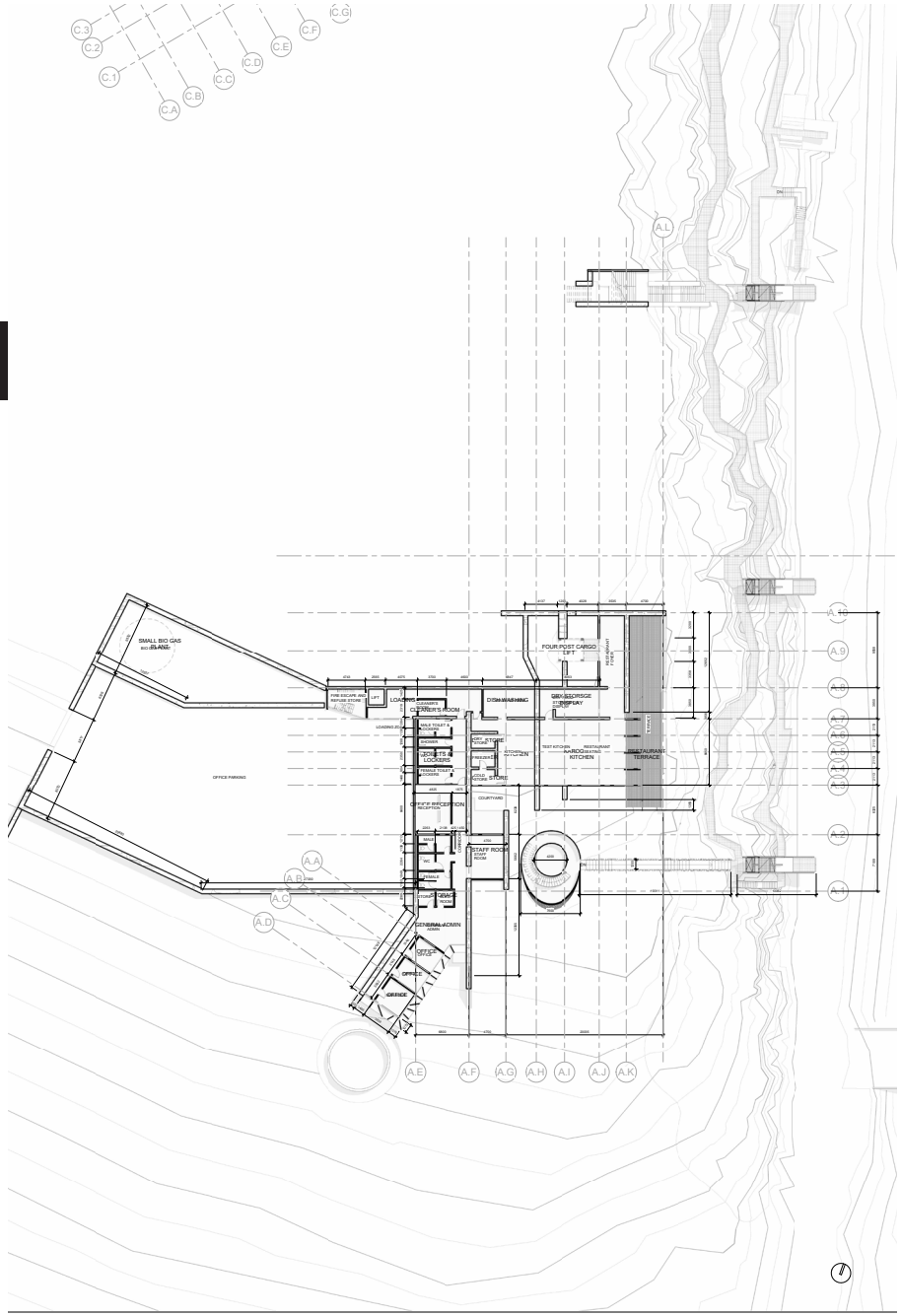
4 PADSTAL
5 PADSTAL OFFICES
6 FILLING STATION

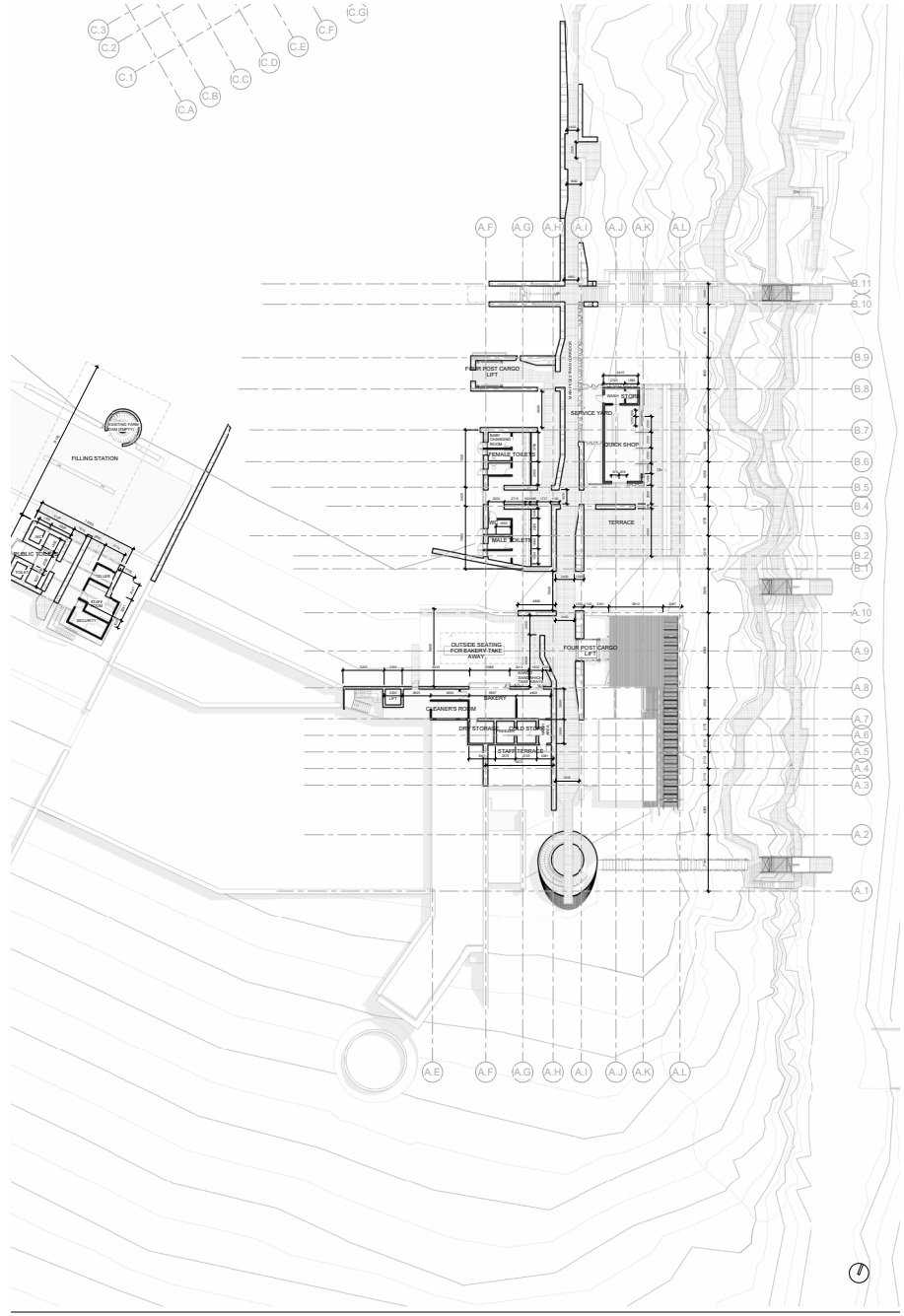
7 SMALL BIOGAS PLANT


6
7
3
5
2
4
1

FINAL DESIGN

PADSTAL
LOOK-OUT POINT
PRODUCTION FACILITY
THE SENTINEL (CONVEYOR BELT)
TANK FARM
PEDESTRIAN ROUTE, HIDDEN BY SCREENS THAT FUSE THE MAN-MADE WITH THE MECHANIZED LANDSCAPE


SMALL BIO GAS PLANT
OFFICE PARKING
FOUR POST CARGO LIFT
DISH WASHING
DRY STORAGE DISPLAY
LOADING
CLEANER'S ROOM
MALE TOILET & LOCKERS
JOINERS
LOCKERS
FEMALE TOILET & LOCKERS
OFFICE RECEPTION
COURTYARD
STAFF ROOM
GENERAL ADMIN
OFFICE
DRINKS
STORE
KITCHEN
RESTAURANT TERRACE
A.A
A.B
A.C
A.D
A.E
A.F
A.G
A.H
A.I
A.J
A.K
A.L
A.1
A.2
A.3
A.4
A.5
A.6
A.7
A.8
A.9
A.10


FILLING STATION
PUBLIC TOILETS
FOUR POST CARGO LIFT
SERVICE YARD
STORE
DRINK SHOP
FEMALE TOILETS
MALE TOILETS
TERRACE
OUTSIDE SEATING FOR BAKERY TAKE AWAY
BAKERY
CLEANER'S ROOM
DRY STORAGE
COLD STORE
STAFF TERRACE
A.E
A.F
A.G
A.H
A.I
A.J
A.K
A.L
A.1
A.2
A.3
A.4
A.5
A.6
A.7
A.8
A.9
A.10
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B.3
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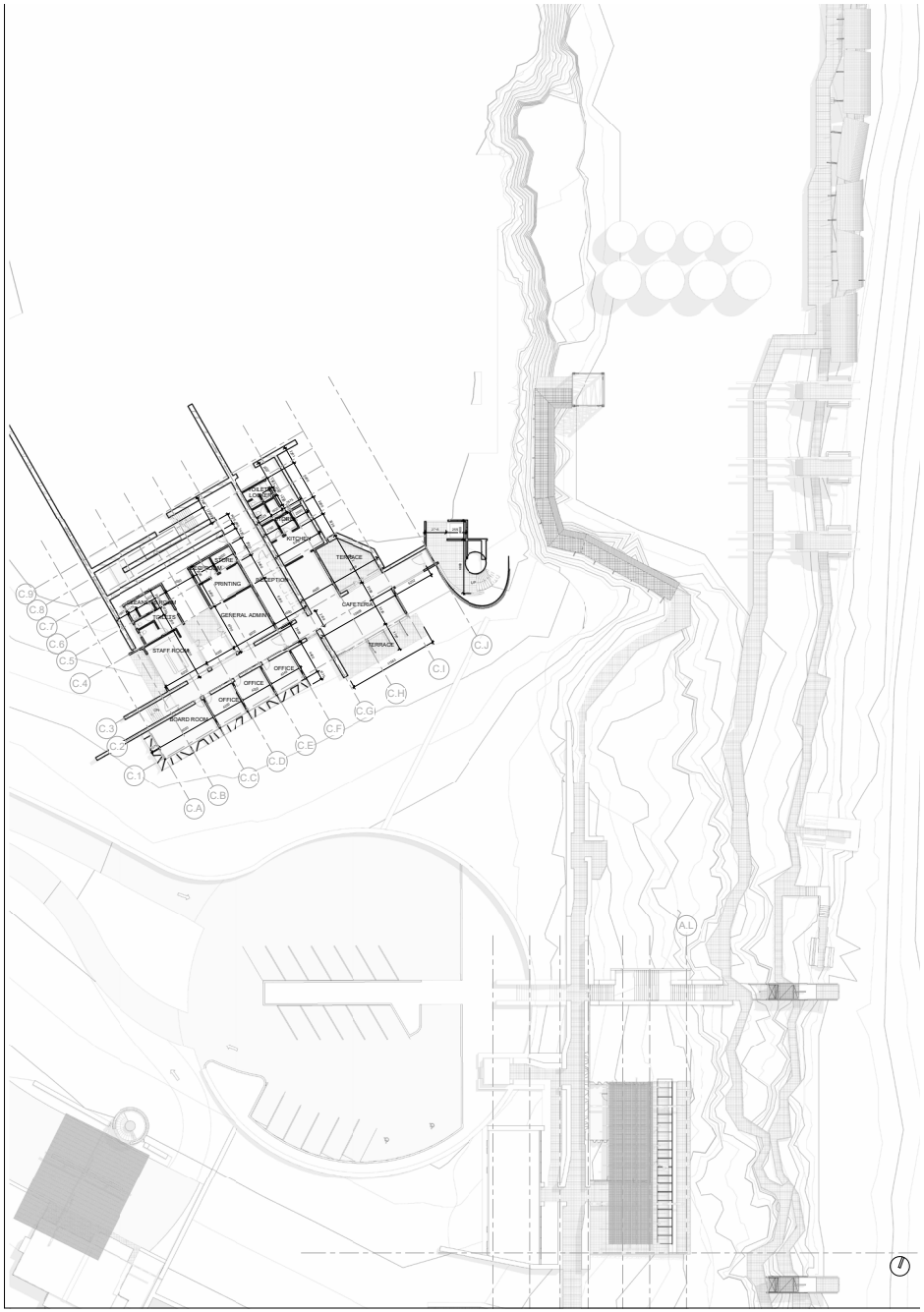
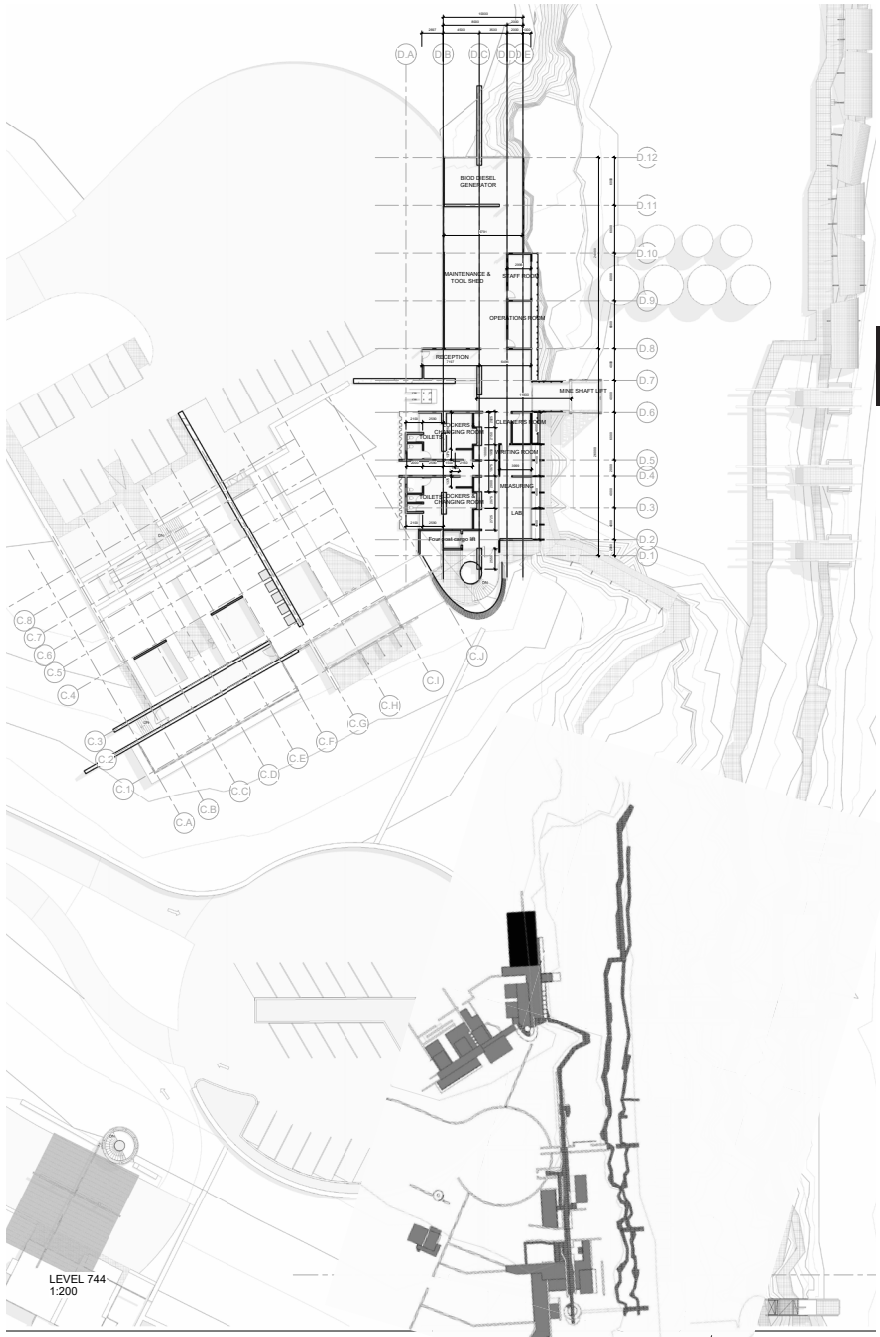
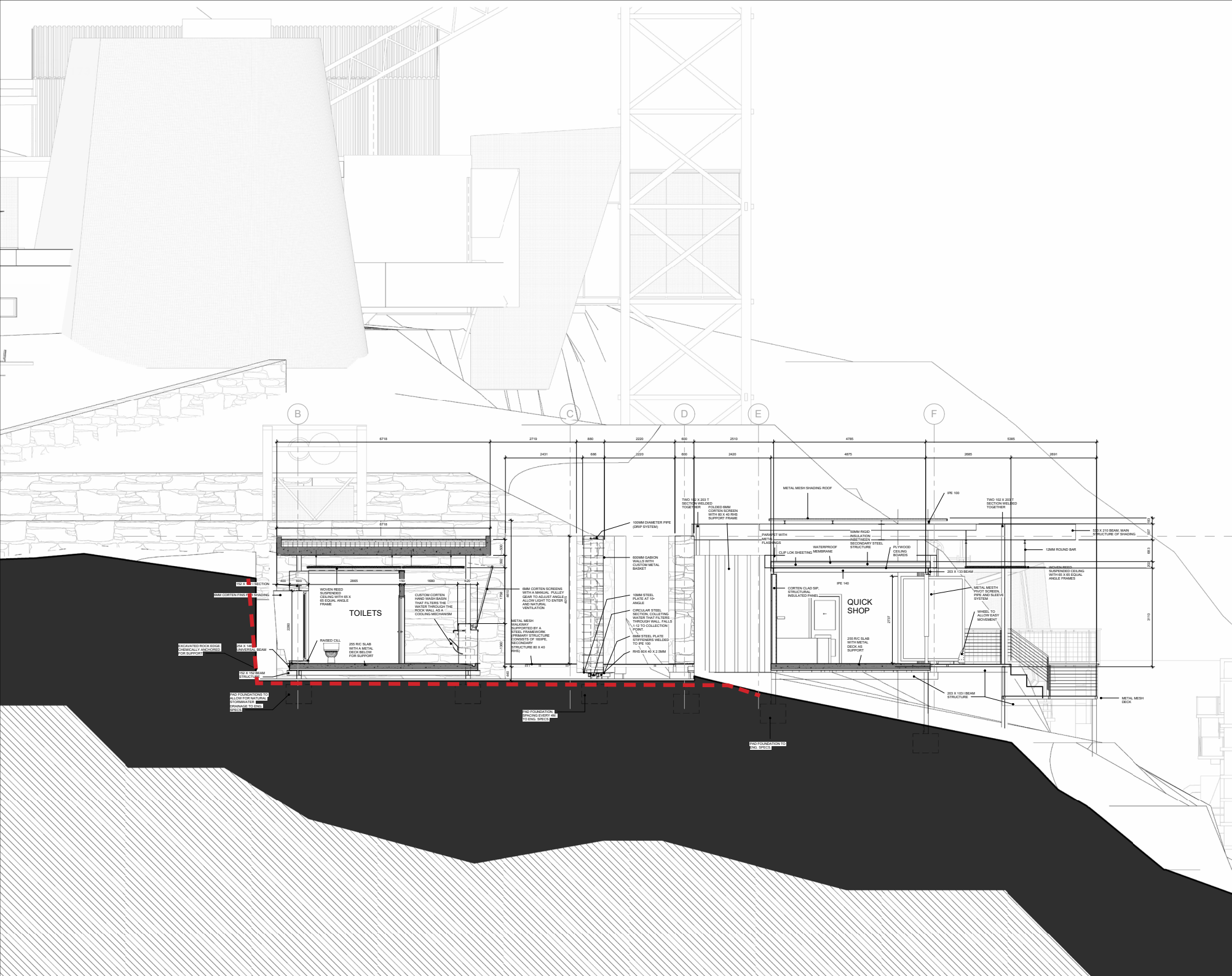
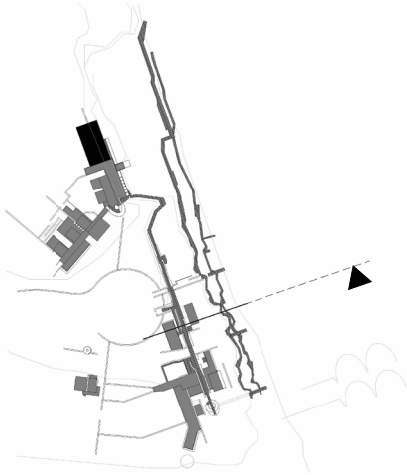
B.6
B.7
B.8
B.9
B.10
B.11



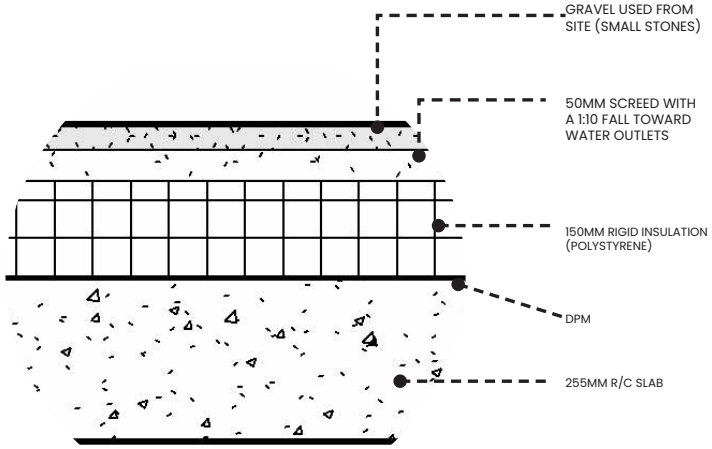


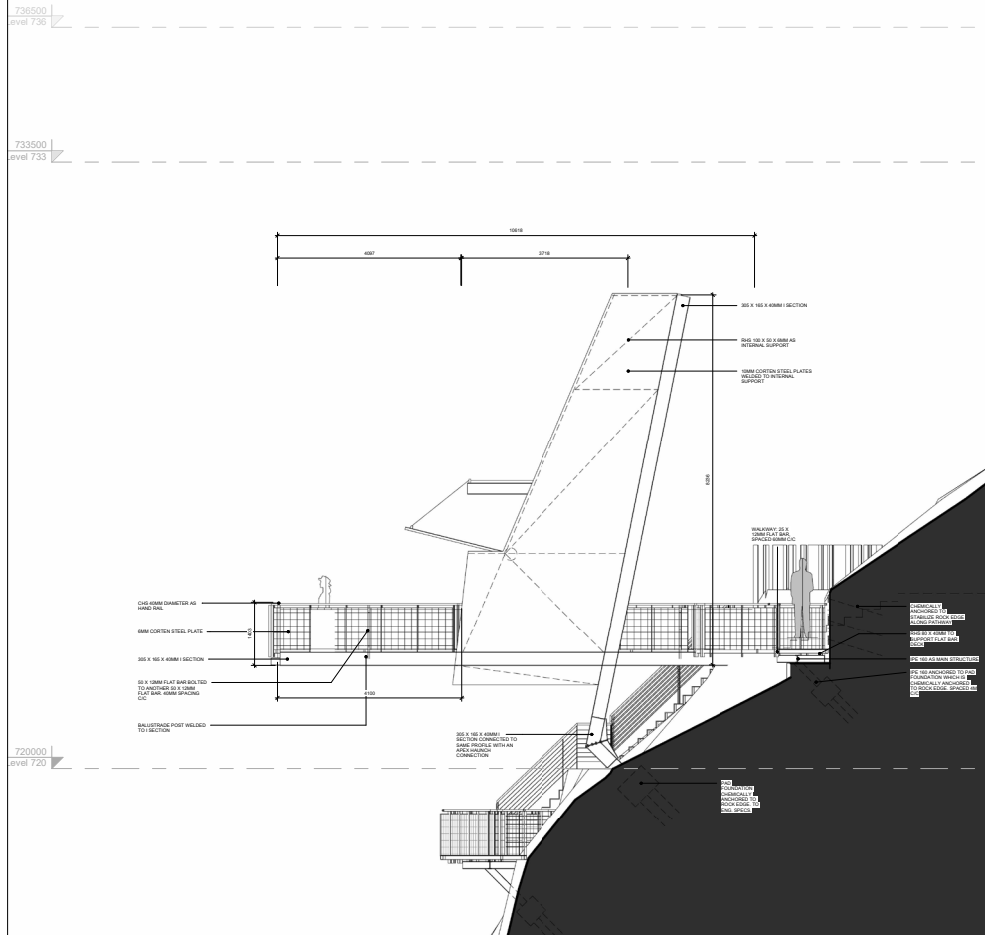
LEVEL 744
1:200

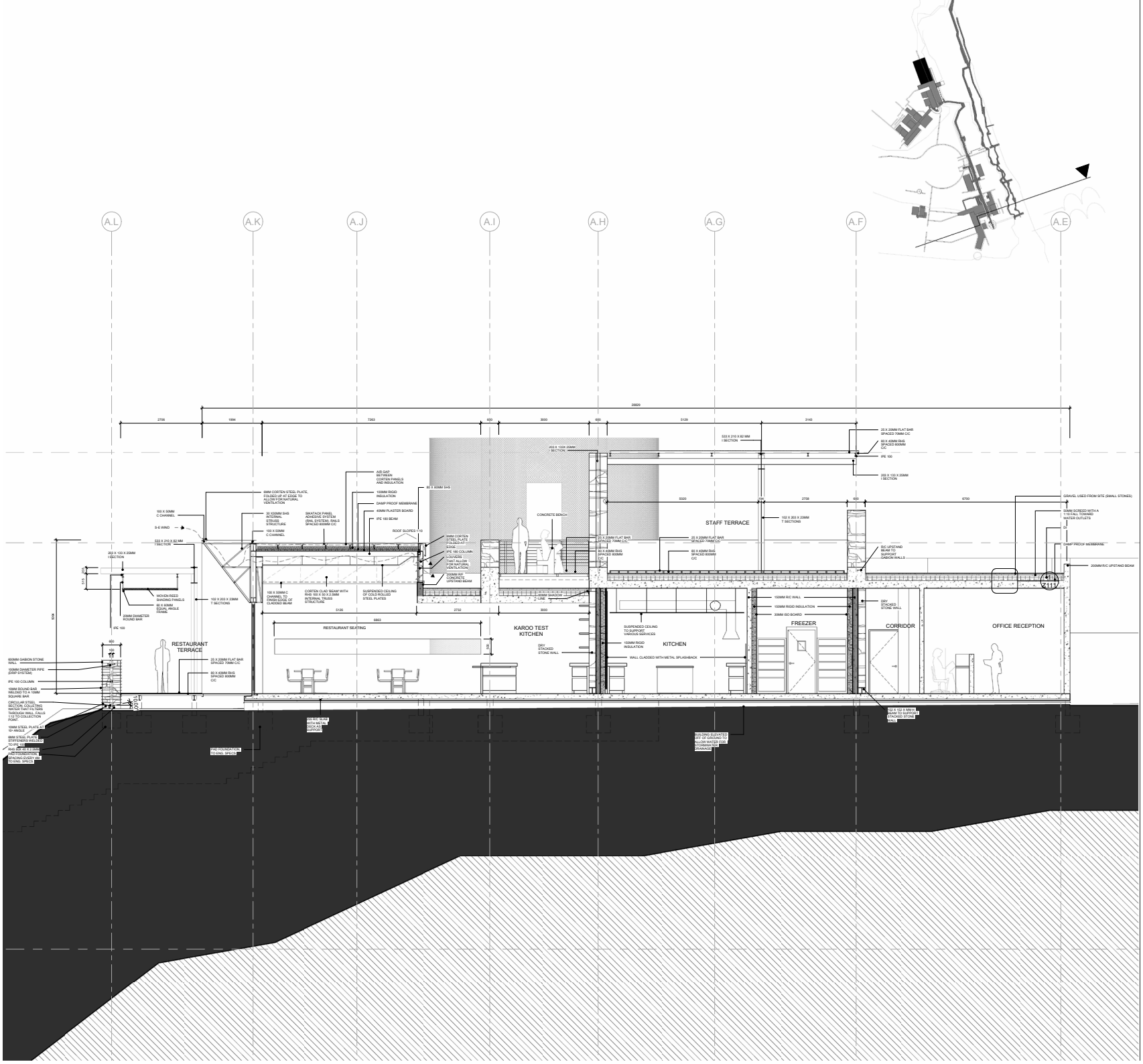

B
C
D
E
F
TOILETS
QUICK SHOP
WOVEN REED SUSPENDED CEILING WITH 65 X 65 EQUAL ANGLE FRAME
CUSTOM CORTEN HAND WASH BASIN THAT FILTERS THE WATER THROUGH THE ROCK WALL AS A COOLING MECHANISM
6MM CORTEN SCREENS WITH A MANUAL PULLEY GEAR TO ADJUST ANGLE TO ALLOW LIGHT TO ENTER AND NATURAL VENTILATION
METAL MESH SCREEN SUPPORTED BY A STEEL FRAMEWORK (PRIMARY STRUCTURE CONSISTS OF 160IPE, SECONDARY STRUCTURE 80 X 40 RHS)
RAISED CILL
255 R/C SLAB WITH A METAL DECK BELOW FOR SUPPORT
EXCAVATED ROCK EDGE CHEMICALLY ANCHORED FOR SUPPORT
254 X 146 UNIVERSAL BEAM
152 X 152 BEAM STRUCTURE
PAD FOUNDATIONS TO ALLOW FOR NATURAL STORMWATER DRAINAGE TO ENG. SPECS
PAD FOUNDATION SPACING EVERY 4M TO ENG. SPECS
PAD FOUNDATION TO ENG. SPECS
100MM DIAMETER PIPE (DRIP SYSTEM)
600MM GABION WALLS WITH CUSTOM METAL BASKET
10MM STEEL PLATE AT 15° ANGLE
CIRCULAR STEEL SECTION, COLLETING WATER THAT FILTERS THROUGH WALL FALLS \ 12 TO COLLECTION POINT.
6MM STEEL PLATE STIFFENERS WELDED TO IPE 100
RHS 80X 40 X 2.5MM
TWO 152 X 203 T SECTION WELDED TOGETHER
FOLDED 6MM CORTEN SCREEN WITH 80 X 40 RHS SUPPORT FRAME
METAL MESH SHADING ROOF
IPE 100
TWO 152 X 203 T SECTION WELDED TOGETHER
PARAPET WITH METAL FLASHINGS
CLIP LOK SHEETING
WATERPROOF MEMBRANE
50MM RIGID INSULATION SHEETWEEN SECONDARY STEEL STRUCTURE
PLYWOOD CEILING BOARDS
203 X 133 BEAM
IPE 140
CORTEN CLAD SIP, STRUCTURAL INSULATED PANEL
255 R/C SLAB WITH METAL DECK AS SUPPORT
152 X 210 BEAM, MAIN STRUCTURE OF SHADING
12MM ROUND BAR
WOVEN REED SUSPENDED CEILING WITH 65 X 65 EQUAL ANGLE FRAMES
METAL MESTH "PIVOT SCREEN, PIPE AND SLEEVE SYSTEM
WHEEL TO ALLOW EASY MOVEMENT
203 X 103 I BEAM STRUCTURE
METAL MESH DECK
6718
2719
880
2220
600
2510
4785
5385
2431
686
2220
600
2420
4875
2685
2691
400
600
2665
150
1680
520
2300
1780
600
1680
600
2707
3110
600
600
600

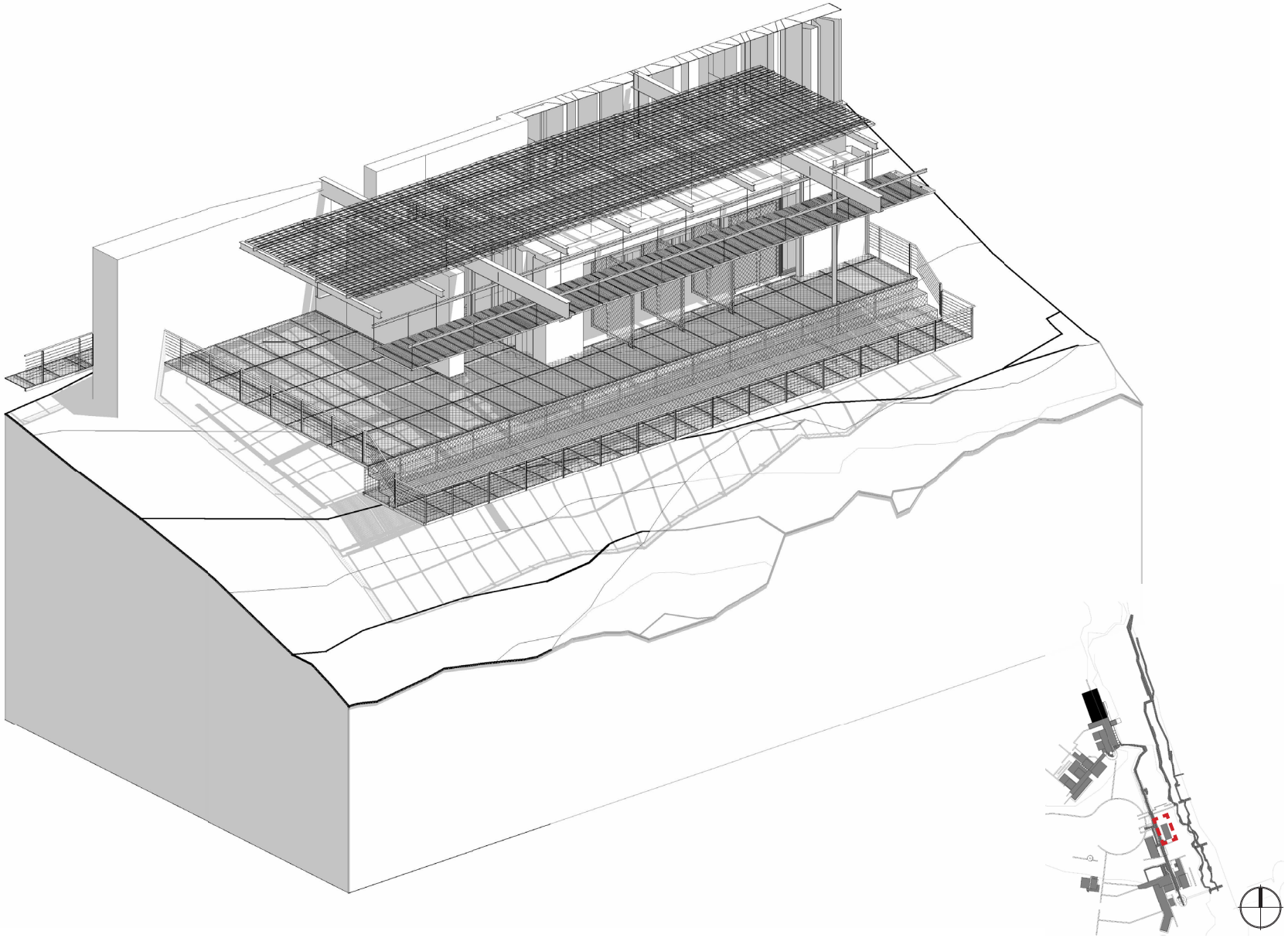


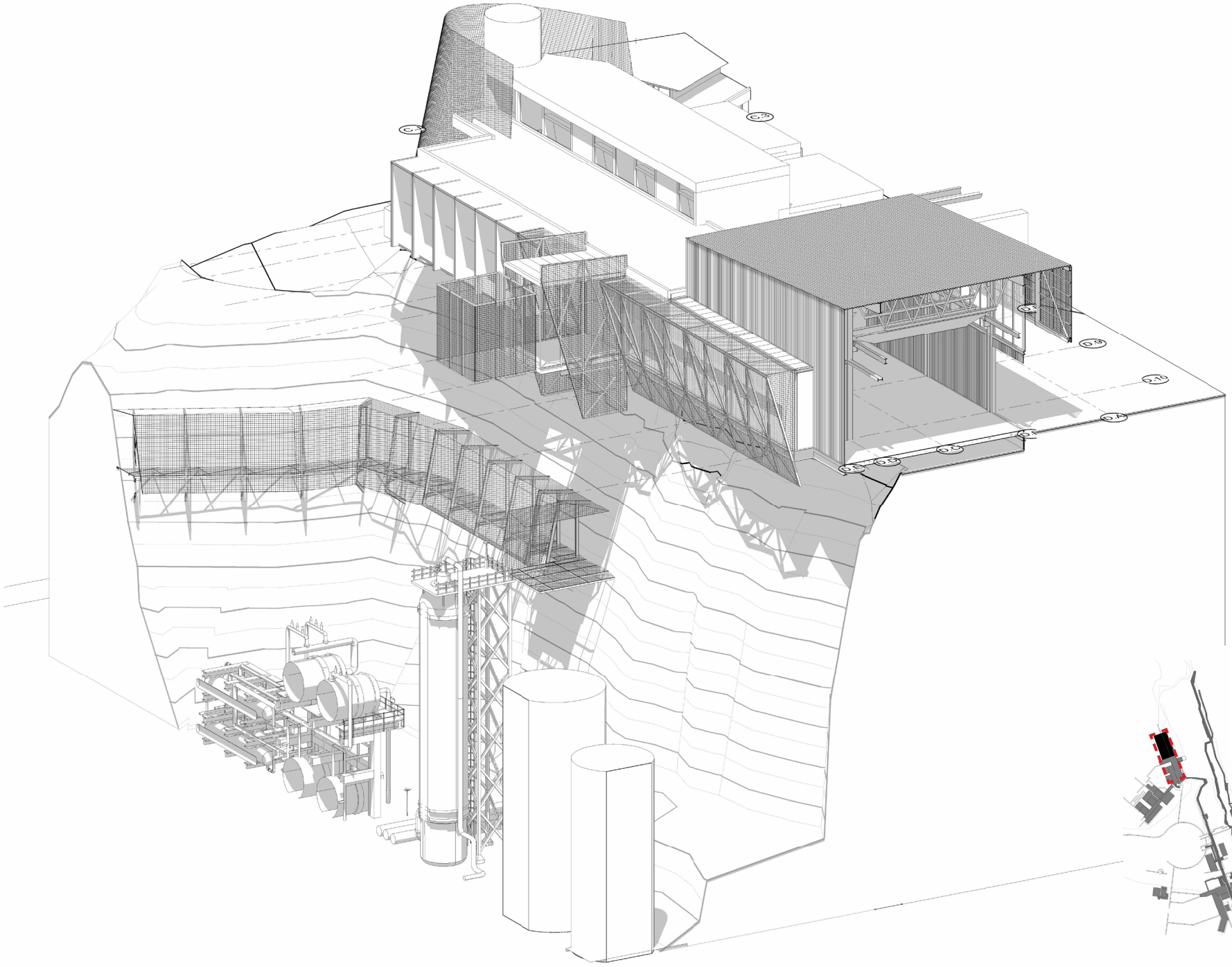

736500
Level 736

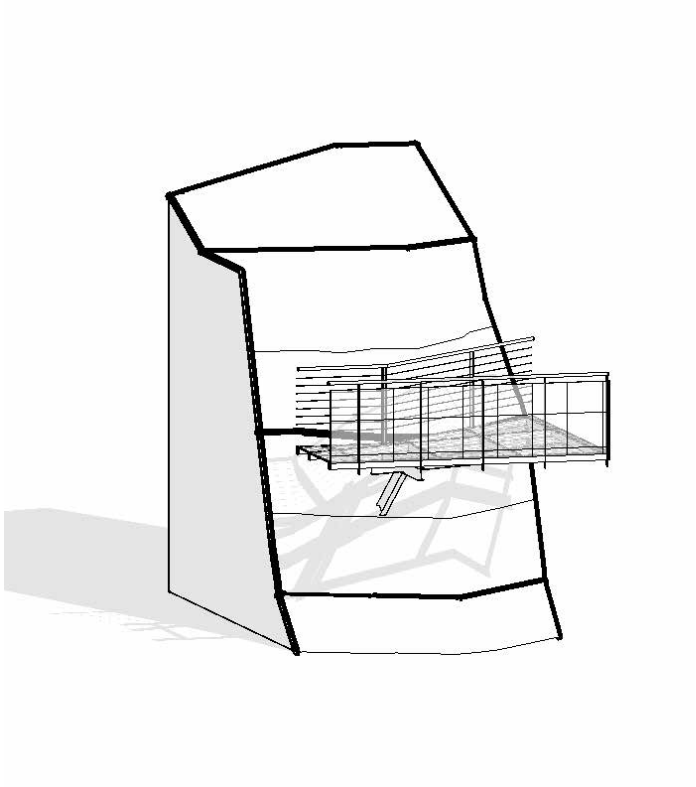

GRAVEL USED FROM SITE (SMALL STONES)
50MM SCREED WITH A 1:10 FALL TOWARD WATER OUTLETS
150MM RIGID INSULATION (POLYSTYRENE)
DPM
255MM R/C SLAB

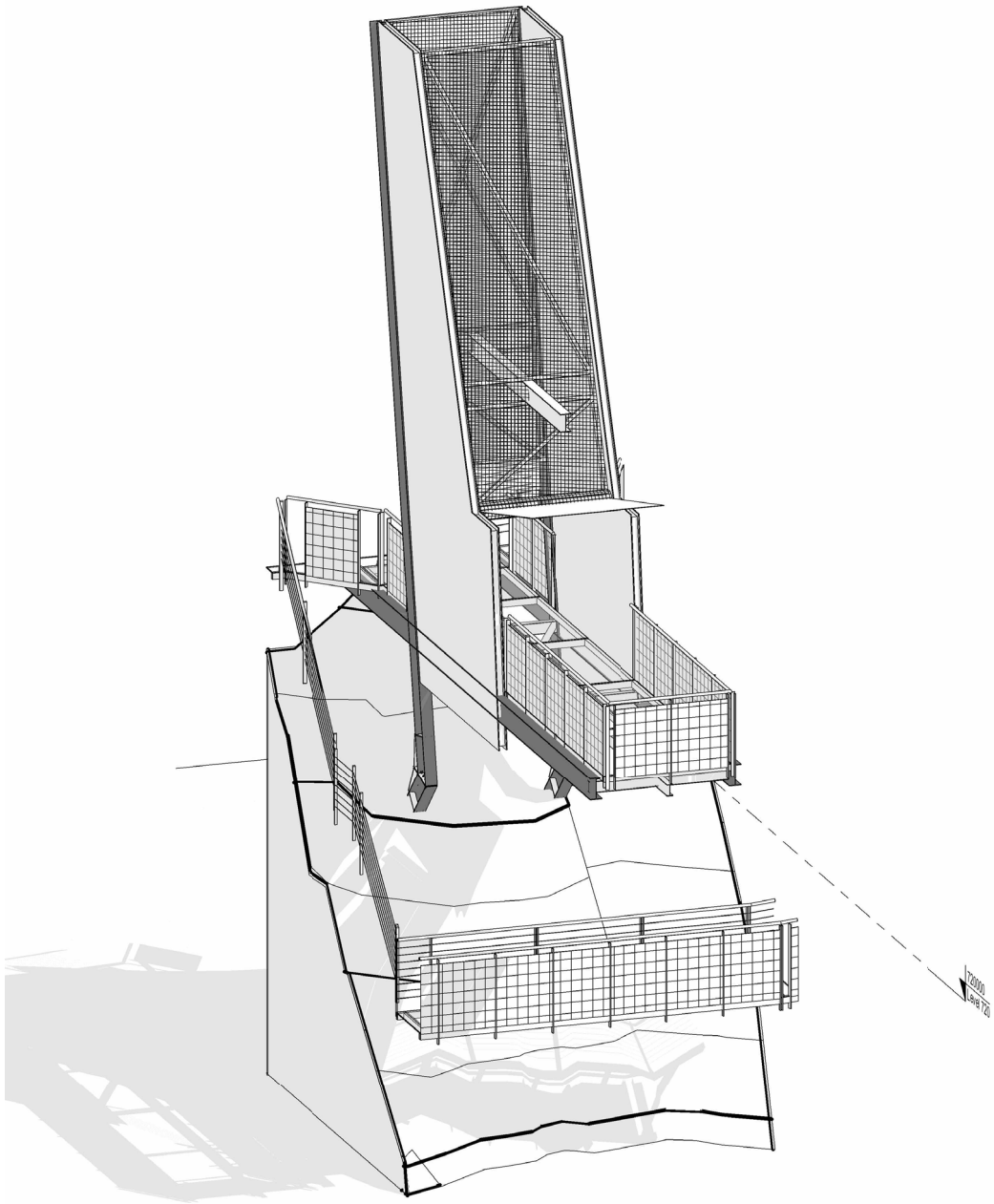

736500
Level 736
733500
Level 733
720000
Level 720
10618
4087
3718
305 X 165 X 40MM I SECTION
RHS 100 X 50 X 6MM AS INTERNAL SUPPORT
10MM CORTEN STEEL PLATES WELDED TO INTERNAL SUPPORT
WALKWAY: 35 X 10MM FLAT BAR, SPACED 80MM C/C
CHS 40MM DIAMETER AS HAND RAIL
6MM CORTEN STEEL PLATE
305 X 165 X 40MM I SECTION
50 X 10MM FLAT BAR BOLTED TO ANOTHER 50 X 10MM FLAT BAR, 40MM SPACING C/C
BALUSTRADE POST WELDED TO I SECTION
4150
305 X 165 X 40MM I SECTION CONNECTED TO SAME PROFILE WITH AN APEX HAUNCH CONNECTION
CHEMICALLY ANCHORED TO STABILIZE ROCK EDGE ALONG PATHWAY
RHS 50 X 10MM TO SUPPORT FLAT BAR DECK
PIC 160 AS MAIN STRUCTURE
PIC 160 ANCHORED TO PAD FOUNDATION WHICH IS CHEMICALLY ANCHORED TO ROCK EDGE, SPACED 80 CM
PIC 160 ANCHORED TO PAD FOUNDATION CHEMICALLY ANCHORED TO ROCK EDGE, SPACED 80 CM

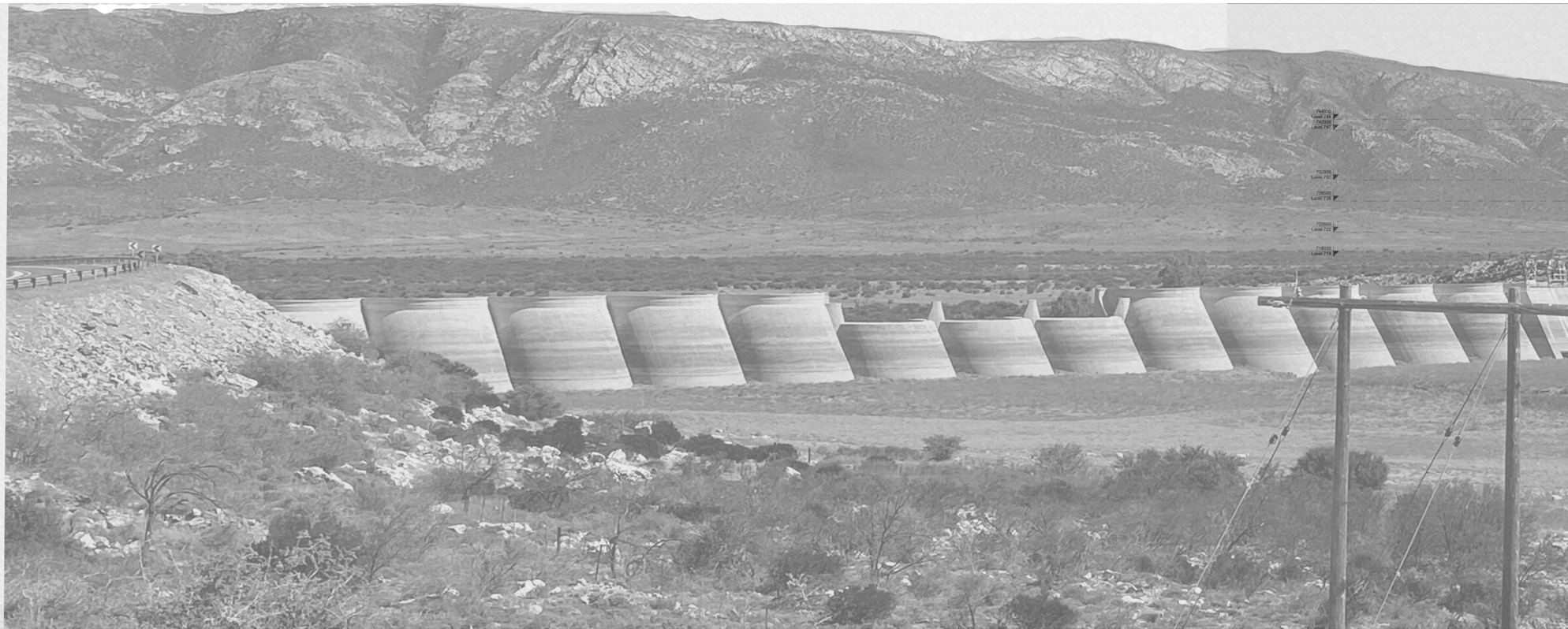

A.L
A.K
A.J
A.I
A.H
A.G
A.F
A.E
RESTAURANT TERRACE
RESTAURANT SEATING
KAROO TEST KITCHEN
KITCHEN
STAFF TERRACE
FREEZER
CORRIDOR
OFFICE RECEPTION
CONCRETE BENCH
SUSPENDED CEILING TO SUPPORT VARIOUS SERVICES
150MM RIGID INSULATION
WALL CLADDED WITH METAL SPLASHBACK
DRY STACKED STONE WALL
150MM R/C WALL
300MM ISO BOARD
R/C UPSTAND BEAM TO SUPPORT GABION WALLS
GRAVEL USED FROM SITE (SMALL STONES)
50MM SCREED WITH A 1:100 FALL TOWARD WATER OUTLETS
DAMP PROOF MEMBRANE
200MM R/C UPSTAND BEAM
8MM CORTEN STEEL PLATE, FOLDED AT EDGE
IPE 180 COLUMN
LOUVERS THAT ALLOW FOR NATURAL VENTILATION
300MM RF CONCRETE UPSTAND BEAM
CORTEN CLAD BEAM WITH RHS 160 X 80 X 3 MM INTERNAL TRUSS STRUCTURE
SUSPENDED CEILING OF COLD ROLLED STEEL PLATES
AIR GAP BETWEEN CORTEN PANELS AND INSULATION
100MM RIGID INSULATION
DAMP PROOF MEMBRANE
40MM PLASTER BOARD
IPE 180 BEAM
SKATACK PANEL ADHESIVE SYSTEM WITH 100 X 50MM RHS SPACED 600MM C/C
30 X 30MM SHS INTERNAL TRUSS STRUCTURE
100 X 50MM C CHANNEL
S-E WIND
ROOF SLOPES 1:10
WOVEN REED SHADING PANELS
80 X 80MM EQUAL ANGLE FRAME
25MM DIAMETER ROUND BAR
IPE 100
102 X 203 X 23MM T SECTIONS
25 X 20MM FLAT BAR SPACED 70MM C/C
80 X 40MM RHS SPACED 600MM C/C
533 X 210 X 82 MM I SECTION
203 X 133 X 25MM I SECTION
203 X 133 X 20MM I SECTION
600MM GABION STONE WALL
100MM DIAMETER PIPE (DWP SYSTEM)
IPE 100 COLUMN
10MM ROUND BAR WELDED TO A 10MM SQUARE BAR
CIRCULAR STEEL SECTION, COLLETING WATER THAT FALLS THROUGH WALL, FALLS INTO COLLECTION POINT
10MM STEEL PLATE AT 50° ANGLE
6MM STEEL PLATE STIFFENERS WELDED TO IPE 100
RHS 400 TO 2 NOS. PAD FOUNDATION SPACING EVERY 3M TO ENG. SPECS
2M2 RETENTION TO ENG. SPECS
300 R/C SLAB WITH 2 NO.T16 BAR SUPPORT
BUILDING ELEVATED OFF OF GROUND TO ALLOW WATER FOR NATURAL DRAINAGE
120 X 102 X 6MM H SECTION STEEL SUPPORT
STACKED STONE WALL
28829
2756
1994
7263
600
3000
600
5129
3143
5320
2758
600
6700
7111








720000
Level 720


Level 732
Level 728
Level 722
Level 718







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