

VESSELLING THE 'PNEUMA-QUA'

A water appreciation centre near the Baakens River mouth, Gqeberha



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Declaration of original authorship:

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

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ABSTRACT

Water scarcity and pollution is one of the largest looming environmental disasters on earth. However, the nature of this crisis is often misunderstood. Instead of trying to create more efficient reticulation systems or build more dams, the challenge lies in the way people think about water. Somehow, we find ourselves in a time in which water has been demystified to the realm of resource. We take water for granted. In turn, people are stripped of their dwelling nature – those who have evolved and are at home in a world dominated by water – to become mere users of water. In order to combat this forgetting of water – the unthinking way in which we use water – it is essential to recast the way we think about water. This study proposes a community water appreciation centre as a first step in helping us cultivate **hydro-gratitude**. It will be argued that a key aspect of this re-enchantment of water lies dormant in the indigenous knowledge systems that used to regulate the relationship between mankind and water. **How can the latent insights of indigenous knowledge systems contribute to gratefully vesseing an ephemeral architectural experience able to safeguard the rich natural and cultural heritage of the Baakens River and cultivate a deeper appreciation of water?** Water is growing increasingly scarce in Gqeberha. Usually this scarcity is attributed to a lack of infrastructure, maintenance, and planning. Yet, if the argument above is to be believed, it might be that the route to a more robust water system can be found in re-animating ingenious conservation knowledge and drawing on more inceptual forms of care for this vital substance. Through studying ancient rituals and narratives, and by drawing on the insights of experiential learning, a water appreciation centre is envisioned to aid the community to find their way back to noticing the importance and beauty of water. The goal of this study is to create effective, contextually sensitive, water appreciation and ritual spaces. These spaces can act as drivers for social change, by cultivating respect and appreciation for water within the community, allowing for water to be conserved, nature to flourish, and people to once more have a sustainable dwelling relationship with the **hydrosphere**.

“If you want to build a ship, don’t drum up the men to gather wood, divide the work, and give orders. Instead, teach them to yearn for the vast and endless sea.” (Exupéry, n.d.)

“...Mother Earth is me, and I am Mother Earth. And that is one of the deeprooted concepts that no one and no political party or institute or system can overrule.” (Minguzzi, 2021: 20)

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PART 1: PRIMORDIAL WATERS



1.1. Introduction

Water is a resource that is essential to life. This statement holds true, but within it lies a key clue to the mindset of our modern times. Water is treated, quite simply, as a resource. Water is not only a resource, but an essential component of our lives. From the very beginning of humankind, water has been a fundamental source of life. This can clearly be seen in how ancient civilizations favoured settling nearby or next-to bodies of water, the ultimate life-giving substance.

Gqeberha is no exception to this rule, with its recent change in name coming from the river where the VOC first landed and established a city in the Algoa Bay area. Few cities in South Africa have been affected by drought, quite as badly as Gqeberha. This study argues that this is primarily due to a fundamental lack of hydrophilia, and lack of water appreciation that is the root cause leading to the (more visible) shortcomings related to infrastructure maintenance and management.

Considering this, a water appreciation and up-cycling centre is proposed, utilising experiential learning and sustainable practices to incite care and appreciation for water within the community. The aim of the project is to find an architectural response that sheds light on past events and how humanity's focus has shifted from the mortal dwelling (the kind of dwelling that knows its dependence on water), to a calculative, detached, resource-driven mindset. The main aim of the project is to instil care for water and nature within the broader community.

The proposed project will be situated 250 metres upstream of the (now) Baakens River mouth, at the end of the "green lung" (Lear, 2015) that runs right through the city of Gqeberha, separating north from south. The site is widely reckoned to be the epicentre of British colonialism in South Africa. This can be attributed to Fort Fredrick, built in 1799, overseeing the landing of the first British settlers in 1820. The fort is situated atop the hill to the north of the site, visible throughout the entire lower reaches of the valley.

1.2. Site History

The current harbour and industrial area, was once a freshwater lagoon, teeming with life. Feeding this lagoon is the Baakens River, finding its catchment area 23km inland at Sherwood, Hunter's Retreat, and Rowallan Park. It is here where the most easterly Khoikhoi met with the most westerly Xhosa, forming various clans, most notably, the Gonaqua clan (Mellet, 2017). In 1752, a beacon ('baken' in contemporary Dutch) was erected by August Frederick Beutler on behalf of the VOC within the estuary, giving the river the name it currently possesses, the Baakens River. The beacon was placed at the "landing with fresh water" (McClelland, 2018: online) to aid ships in identifying the favourable landing area. This marks the first tangible colonial intervention in the area, initiating the systematic destruction of the way of life practiced by indigenous people in the area.

The beacon was followed shortly by various small dwellings near the lagoon and in 1799 a fort was erected, solidifying the colonial presence in the area. The fort was built to stop the French from landing in Algoa Bay and conquering the Cape Colony during the Napoleonic wars. After these wars, in 1806, the British took control of the Cape Colony and therewith, South Africa. Following the newly instated British rule, the fort was named Fort Frederick (fig. 2), after the Duke of York and Albany, commander & chief of the British Army. The fort was divisive in establishing British rule in South Africa, as the large unemployment problem in Britain encouraged settlers to move to South Africa, in search of jobs. The first group of British to settle in South Africa, known as the 1820 Settlers, landed in the Algoa Bay area, under the watchful eye of Fort Frederick, overseeing their safe landing (McClelland, 2018: online).

The Khoe (also Khoekhoe or Khoena), a pastoralist people, were the indigenous inhabitants of South Africa's south-western Cape, while the Gonaqua (also Gona or Gonah) were a subset of the Khoe who had settled farther east and intermingled with Xhosa who settled further west, inhabiting the region of the Fish, Bushman, and Sundays Rivers prior to European settlement at the Cape (McDonald, 2020).



Figure 2: Fort Frederick overlooking docking ships (McClelland, 2018: online)



Figure 3: Photo showing indigenous women washing wool in the lagoon (McClelland, 2018: online)



Figure 4: Photograph of the Tramways building (McClelland, 2018: online)



Figure 5: Photograph of the flooded Baakens Valley where the chosen site is located (McClelland, 2018: online)

Owing to this settlement pattern, generations of Gonaqua had intermingled with the Xhosa, who were themselves established even farther to the east. One of the great Gonaqua leaders, and a British commander, Andries Botha, is said to have a Xhosa mother. By the mid-nineteenth century, due to these interconnections with the Xhosa, many Gonaqua had family members living on the other side of the colonial frontier within Xhosa chieftaincies. This situation was much to the disapproval of the local British colonial authorities, who aimed to establish a clear boundary between the Gonaqua and Xhosa territories, each inhabited by distinct ethnic groups. However, in practice, this frontier was regularly crossed, especially by the Gonaqua, and functioned more as an area of interaction than a strict border. The Gonaqua's identity, residing in this in-between space, and their strong cultural and ethnic ties with the Xhosa, raised doubts about their complete assimilation as loyal subjects of the British Crown. (Keegan, 1996: 170-171).

After British rule had been established, and a settlement founded, several industrial buildings sprung up around the lagoon, namely wool washeries, as they required large amounts of water to function (fig. 3). The washeries polluted the water to such an extent that it became unsafe to use. This, in conjunction with a large construction project in Main Street in 1864, prompted the filling of the lagoon with rubble and debris (Vermaak, 2016: 1).

The river was canalised and the reclaimed plots of land were cordoned off and sold, using the money to create inner city gardens. The area soon became an epicentre for manufacturing in the 19th century (fig. 4). Almost 50 years later, heavy rains over the catchment area caused the lower Baakens Valley area to flood, destroying the bridge connecting north and south Port Elizabeth, clearly showing that the canal was too narrow (McClelland, 2018: online). After the flood, in January 1913, a scheme to widen and improve the canal was proposed, in an attempt to prevent future flooding (Pike, 1921). This attempt, however, proved to be fruitless, as the area still floods regularly to this day. Hence the open plot of land where the lagoon once was, uninhabitable, due to flood lines and fear of damages (fig. 5).

The Eastern Province, as we know it today, had very few white inhabitants until the 1820 Settlers arrived. Their lives were full of uncertainty and danger, facing threats from both indigenous tribes and wild animals. Despite these obvious risks, numerous indomitable explorers ventured into this hazardous region, including Henry Lichtenstein, a German medical doctor and natural history professor at the University of Berlin, (McClelland, 2016: online).

The use of his accounts as recorded in his book, *Travels in Southern Africa in the years 1803, 1804, 1805 & 1806* (1812), aim to shed light on the milieu of the Algoa Bay area before the arrival of the 1820 settlers. The route followed by Lichtenstein to Algoa Bay was not by sea but rather overland via Swellendam and then through the Langkloof. As they exited the Langkloof, Lichtenstein's party encountered the first of many destroyed farmhouses, the work of the marauding Xhosa bands (McClelland, 2016: online). This highlights the turbulence and hostility of the Eastern Cape at the time.

Along the shoreline, a total of eight 12-pounder guns were strategically positioned to safeguard the nearby buildings, which included barracks, magazines, and guardhouses (McClelland, 2016: online). Towards the west of the hill where the Fort was situated, there lay a deep gulley, through which a small stream flowed, known as the Baakens River. At the river's mouth, to the east, concealed between the rising hills on either side, a wooden blockhouse was stationed (fig. 6).

Finally, as Lichtenstein's party reached the summit of the last hill that descended towards the shore, they were greeted by the sight of an English fortification known as Fort Frederick, which had been built back in 1799. This fortification took the form of a quadrangular wooden blockhouse, enclosed by walls of the same shape (fig. 8). Additionally, a formidable row of palisades and a wide dry ditch further fortified the structure beneath the wall (McClelland, 2016: online).

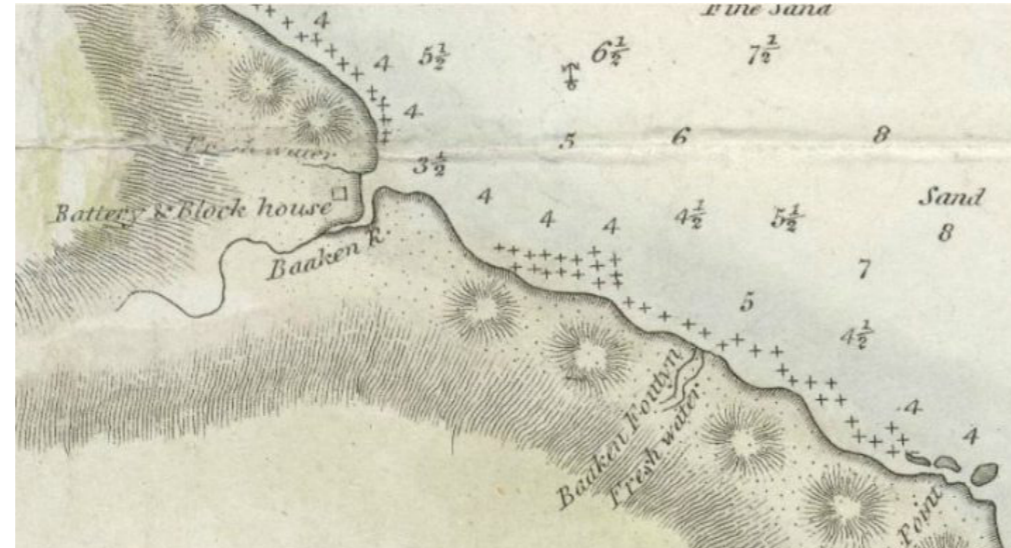


Figure 6: Map showing the position of the blockhouse (McClelland, 2019: online)



Figure 7: (McClelland, 2018: online. Adapted by author)



Figure 8: Aerial photograph of Fort Frederick (Szymanowski, 1988: online)

The wooden blockhouse was a product of Cape Town's craftsmanship, its individual components expertly constructed and then transported by sea to Algoa Bay. This versatile structure served as both a prison and a guardhouse. Scattered across the hills between the blockhouses, extensive barracks were set up to accommodate the soldiers, while a well-stocked magazine held provisions. Another magazine was designated for military supplies and field equipment. Complementing these structures were essential facilities such as the smith's shop, a bake house, a carpenter's workshop, and several other smaller buildings. Within the fort itself stood the robust powder magazine, still present today, offering a glimpse into the historical significance and architectural strength of the area (McClelland, 2016: online).

Several small houses had been constructed in the neighbourhood for the officers among which the house for the Commandant - Alberti - was the most distinguished (fig. 7). It comprised four rooms and was surrounded by a lush garden (McClelland, 2016: online). Lichtenstein, clearly impressed with the biodiversity of the area, noted the following:

"The country about Algoa Bay is by nature so fertile, that even if uninhabited, it would produce wood, game, salt and grass for feeding cattle in abundance. Now since it has been cultivated by Europeans in quiet times, it produces corn and fruits of all kinds, and even wine. The breeding of cattle prospers so much that meat, milk, butter, soap and other articles dependent upon this part of husbandry, are to be had at very low prices. The bay itself, from the plenty of fish that it produces, offers an abundant supply of food to the inhabitants of its shores." (Lichtenstein, 1812).

Because of the indigenous people's aforementioned affinity with nature, there is no doubt that the Baakens Valley was held very dear to them. The following information will aim to detail how the Dutch used the KhoiKhoi's affinity with nature, primarily in the form of water, to squeeze them out of their possessed land.

The indigenous people's deep connection to their land and their refusal to accept the loss of their ancestral territories highlights the profound impact of European colonization on their way of life and cultural identity. Jan Van Riebeeck, in his journal, candidly documented their ongoing discontent and resistance even after the conclusion of peace, it reads as follows;

"They strongly insisted that we had been appropriating more and more of their land, which had been theirs all these centuries, and on which they had been accustomed to let their cattle graze, etc They therefore strongly urged that they should again be given free access to this land for that purpose. At first we argued against this, saying that there was not enough grass for their cattle as well as ours, to which they replied: 'Have we then no reason to prevent you from getting cattle, since if you have a large number, you will take up all our grazing grounds with them? As for the claim that the land is not big enough for us both, who should rather in justice give way, the rightful owner or the foreign intruder? ... eventually they had to be told that they had now lost the land as the result of the war and had no alternative but to admit that it was no longer theirs, the more so because they could not be induced to restore the stolen cattle which they had unlawfully taken from us without any reason. Their land had thus fallen to us in a defensive war won by the sword as it were, and we intended to keep it.'" (Thom, 1954).



Figure 9: Illustration of a trade interaction (Swingler, 2021: online)



Figure 10: Illustration of Andries Botha, a KhoiKhoi descendant British commander (McDonald, 2020: online)

During the seventeenth and eighteenth centuries, European settlers employed a calculated blend of technology and bureaucratic tactics (fig. 9) to displace the indigenous KhoiKhoi and San peoples from significant portions of their inhabited lands in the southwestern portions Africa. Central to the settlers' advantage was their possession of a potent combination of firearms and horses, a formidable fighting technology that enabled them to seize and defend territories taken from the KhoiKhoi.

The Dutch East India Company further legitimized the settlers' occupation of KhoiKhoi lands by granting them exclusive rights to the acquired lands, either through freehold ownership or temporary loans (Shell, 1992: 816). Capitalizing on this accommodating policy and their connections within the Cape Town bureaucracy, the settlers managed to acquire prime, well-watered lands in the interior. Unfortunately, this left the KhoiKhoi pastoralists in a dire predicament, as they found it increasingly challenging to sustain themselves in a land where access to limited water resources was essential for survival.

In a gradual, yet catastrophic process, the KhoiKhoi were gradually pushed out of the lands they had once called home, as European settlers seized control of springs and permanent water courses (Shell, 1992: 804). The survivors of this transformation often found themselves becoming dependants of the European settlers (fig.10), compelled to apply their skills in animal husbandry to the settlers' livestock rather than their own. This shift marked a profound change in their way of life and further underscored the impact of European colonization on indigenous communities in the southwestern portions of Africa.

While the concept of private land ownership was foreign to their cultural understanding, the indigenous inhabitants were resolute in their belief that the European newcomers were encroaching upon their communal claim to land. As it became evident that the European presence was permanent, they responded by taking up arms and engaging in armed conflicts with the Dutch, hoping to reclaim their lost territory. Regrettably, their efforts proved futile, and in 1660, when peace was eventually established, they persisted in their objections (Shell, 1992).

Following their loss, the Khoikhoi people were faced with limited access to water sources and nearby pastures. Consequently, they were forced to venture into the arid interior, triggering a gradual and cascading effect where one group of Khoikhoi displaced another. This process was particularly accelerated in areas with lower land carrying capacity. As the burghers (settlers) secured legal and geographical advantages over the Khoikhoi, they gradually encroached upon and marginalized them, leading to the displacement of the Khoikhoi from significant portions of the communal lands that both groups were supposed to share (Shell, 1992: 812).

The diminishing access to water resources placed the Khoikhoi in a challenging predicament, making it increasingly difficult for them to sustain their traditional nomadic lifestyle. Many Khoikhoi individuals, resolved to remain in their homeland, had no choice but to work for burgher farmers during harvest periods or tend to their livestock. The socio-economic pressures and limited resources compelled them to adapt to the changing circumstances and engage in forms of labour that were foreign to their ancestral way of life. This shift in livelihoods highlights the intricate dynamics of land use, access to resources, and the social interactions between the Khoikhoi and the European settlers during this period of history.

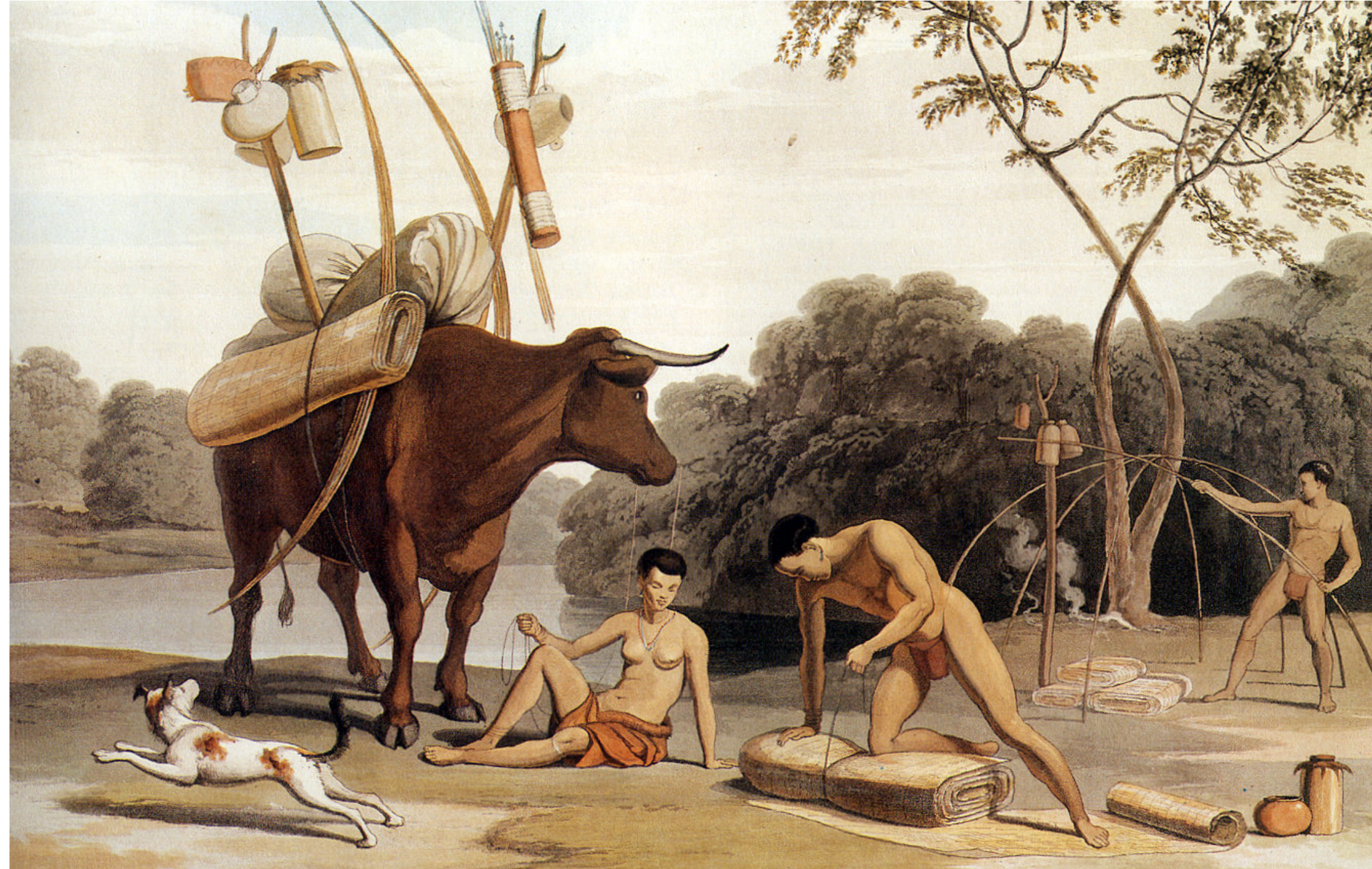


Figure 11: Nomadic Khoekhoe dismantling their huts (Samuel Daniell, 1805: online)

During the timeframe examined in this study, it was observed that the majority of settlers possessed complete control over the water sources present on or coursing through their properties. However, it is worth noting that, akin to the situation in the Netherlands, the Government retained its legal ownership or *dominus fluminis* over the water resources of the entire country. Yet holders of land endowed with a permanent water supply gained *defacto* command of not only the surrounding pasture but also gained hunting advantages by commanding a point at which the game of the region had to converge (Hall, 1934: 7-26).

In a region with limited rainfall, land that featured a spring or even a periodic watercourse held significant value. These water sources were crucial for sustaining life and agricultural activities, making such lands highly sought after and vital for the settlers' well-being and prosperity (Shell, 1992: 816).

1.3. The Green Lung

The Baakens River in Gqeberha (formerly Port Elizabeth) in South Africa has enormous ecological significance for the region. The river's ecosystem, which stretches for 23 kilometers, supports a diverse array of flora and fauna, making it an important component of the local environment. Understanding and appreciating the Baakens River's ecological significance is critical for its conservation and the overall well-being of the region, (Rogers, 2017: online).

First and foremost, the Baakens River serves as a vital lifeline for numerous plant species. Its banks are lushly vegetated, with indigenous trees, shrubs, and grasses. These plants are essential for riverbank stabilization, erosion prevention, and water quality preservation. They also provide habitat and food for a variety of animal species, adding to the river's ecological value, (Grobler, 2012: 139).

The Baakens River is also a haven for wildlife. It is home to a wide variety of aquatic organisms, including fish, insects, and amphibians, all of which rely on the river for survival. Fish species such as yellowfish and tilapia thrive in its waters, contributing to the region's biodiversity. Furthermore, the river and its surrounding vegetation attract a wide range of bird species, making it a popular birdwatching destination, (Muller, 2015: 750-751). The Baakens River is a haven for avian life, home to everything from kingfishers and herons to African fish eagles.

Furthermore, the Baakens River is important in regulating the climate in and around the valley, along with promoting water conservation. The river also serves as a natural filter, purifying the water as it flows and replenishes the groundwater resources beneath it, (Rogers, 2017: online). The availability of clean river water is critical not only for the survival of various ecosystems, but also for meeting the needs of surrounding communities.



Figure 12: Satellite image showing the lush Baakens Valley (Google, 2023: online)

In addition to its ecological importance, the Baakens River has cultural and recreational value for the people of Gqeberha. Hiking, cycling, and picnicking are just a few of the outdoor activities available along the river and in its surroundings. These recreational activities not only promote a healthy lifestyle but also foster a sense of connection to nature and environmental appreciation, (Rogers, 2017: online).

Despite its significance, the Baakens River faces numerous challenges. Significant threats to its ecosystem include urbanization, pollution, and invasive species. Government agencies, conservation organizations, and local communities must work together to preserve and restore the river's ecological integrity. Implementing sustainable land-use practices, improving waste management systems, and raising awareness about the river's significance are all critical steps toward ensuring its long-term conservation.

In conclusion, the Baakens River in Gqeberha is of enormous ecological importance. It is a vital natural asset for the region due to its diverse plant and animal life, water regulation capabilities, and recreational opportunities, (Grobler, 2012: 141). By recognizing and protecting the Baakens River's ecological value, we can ensure its sustainability for future generations and contribute to the overall well-being of the local environment and communities.

One cannot ignore the fact that since the colonial intervention and imposition upon the landscape, flood frequency and intensity has increased (Pike, 1921: online) and is still a relevant problem in modern times. Moreover, the vibrant ecology is being endangered by the lack of human hydrophilia, brought forth by our modern tendency to value gifts merely as exploitable resources. The people who first inhabited the area where pastoralists of semi-nomadic nature, traveling according to the grazing needs of their livestock and the availability of water. Their respect for nature is engrained in their being, as demonstrated in an interview by Magda Minguzzi with Chief Margaret Coetzee of the Khoikhoi descendent, Inqua Tribe:

“Our ancestors have already understood their presence and their responsibility for the womb of Mother Earth. Our ancestors had believed that Mother Earth is me, and I am Mother Earth. And that is one of the deeprooted concepts that no one and no political party or institute or system can overrule.” (Minguzzi, 2021: 20)

It is this deeprooted respect for nature that the project aims to instil within all of its users by creating an architecture that safeguards the rich natural and cultural heritage of the Baakens Valley. This leads to the main question of the project:

How can the latent insights of indigenous knowledge systems contribute to gratefully vesseling an ephemeral architectural experience able to safeguard the rich natural and cultural heritage of the Baakens River and cultivate a deeper appreciation of water?

PART 2: VESSELLING



Introduction

The Baakens Valley is an essential component in the biodiversity of Gqeberha and the Algoa Bay area. It is currently under-appreciated, polluted, and under severe pressure from developments. Through the use of a hydrophilic architecture, how can the community be educated regarding the significance and vulnerability of this unique ecological treasure trove?

This chapter will consider the theoretical approach followed in conceptualising the proposed project, highlighting how different aspects of Indigenous Knowledge Systems might influence design decisions and bring forth solutions able to foster hydro-gratitude within the Baakens Valley. The goal of the project is to create a hydrophilic architecture that incites hydro-gratitude for the Baakens Valley within the community in order to inspire the various levels of water management and infrastructure development that will ensure the conservation thereof for generations to come.

2.1. Indigenous Knowledge Systems

The significance of landscapes to indigenous communities lies at the heart of their knowledge systems, cultural practices, and spiritual well-being. For Indigenous people, nature, forests, and biodiversity serve not only as springs of vital resources such as medicine, shelter, and food but also as reservoirs of profound cultural and spiritual nourishment (Mufamadi, 2021: online).

A crucial aspect in architectural design is understanding the perceptions of indigenous communities regarding the value of forests, animal species, and plants. Evidence from oral traditions and diverse literary sources highlights the long-standing tradition of performing rituals at specific landscapes, such as caves, rivers, water features, and revered trees; deemed to be sacred sites (Barnard, 1988; Chidester, 2000; Minguzzi, 2021; Mufamadi, 2021; Boyce, n.d.).

The significance of landscapes is exemplified in diverse ways, one notable instance being the KhoiKhoi view on land-ownership. Land is regarded as a gift from the supreme being, and not something to be owned (SAHO, 2011: online). This myth not only offers insights into Indigenous perspectives but also shapes their interactions with the environment, such as the ritualistic harvesting of herbs for medicinal purposes. Before gathering herbs, a ritual is conducted to appease the plant and request the sharing of its healing powers for the benefit of the patient, harvested in such a way as to ensure the plant's replenishment and growth (Mufamadi, 2021: online).

Additionally, architectural design in proximity to Indigenous communities necessitates careful consideration, as certain plants are considered taboo when planted near residential areas due to the potential conflicts or misfortunes they may bring. From an Indigenous viewpoint, each element of the landscape, be it a plant, animal, river, or spring, carries inherent lessons and value (Chidester, 2000: 8). The knowledge of flora and fauna extend beyond mere survival, forming an integrated system and philosophy that encompasses spiritual, moral, and practical dimensions, (Mufamadi, 2021).



Figure 14: Traditional Khoikhoi “Kougoed” used for pain and inflammation (Wild, 2015: online)

Architects and developers must recognize the multi-layered relationship Indigenous people have with the land, entwining personal and collective memory, history, heritage, philosophy, and spirituality. This profound understanding has evolved over time through learning, experimentation, and trial and error. Moreover, it interconnects with scientific disciplines such as biology, botany, geography, and cosmology, as evidenced by Augustine, (Augustine, 2005) and Berkes, (Berkes, 2018). Indigenous beliefs, taboos, norms, and knowledge play a pivotal role in biodiversity conservation and landscape preservation, as they draw upon intimate comprehension of local flora, fauna, and other resources.

To address sustainability and climate change challenges, architects and landscape architects must adopt a collaborative approach that embraces indigenous knowledge in design projects. The increasing prominence of integrated landscape approaches underscores the vital importance of incorporating indigenous knowledge systems into landscape architecture and design strategies. These initiatives should center on the foundation of indigenous belief systems and practices, acknowledging the intertwined roles of social, natural, and cultural traditions in landscape conservation, (Mufamadi, 2021).

However, during prolonged colonial and neo-colonial periods, their rich cultural heritage faced systematic erosion, allowing for a more focused examination of the impact. While some cultural elements managed to withstand the colonial onslaught, others sadly vanished over time. In modern times, significant efforts have been and continue to be made to restore, preserve, and promote their invaluable heritage (Minguzzi, 2021). The Khoikhoi's unique cultural identity remains a dynamic and resilient tapestry, shaped by their enduring traditions and their dedication to preserving their cultural legacy despite historical challenges.

Colin Bundy highlights that it was archaeologists who first exposed the falsehoods propagated by the myth of 'empty lands.' This myth, known as *terra nullius*, was deceitfully used to morally justify the colonial invasion. The initial brunt of colonial oppression in South Africa was borne by coastal Khoisan communities, (Bundy, 1988).

A significant war of resistance was later led by Captain Klaas Stuurman (1799-1803) in the Eastern Cape. Unfortunately, the consequence of these land wars was the imposition of Roman Dutch law by the Europeans, where conquered lands became the property of the conqueror. This pattern persisted throughout the successive colonial regimes, the Dutch (1652-1800) and the English (1800-1910), who utilized violence and oppressive laws to dispossess the indigenous people. The devastation caused by these actions affected the traditional economies of both hunter-gatherers and pastoralists, as their livelihoods were closely tied to the land.

Profound conflicts arose due to differing worldviews concerning land. While the Khoisan regarded land as a divine gift from Tsui//Goab / zu:igwa:b/ (the Supreme Being) and not something to be privately owned, the colonists viewed it merely as another commodity to possess. For the Khoisan, a *khoeseb* (chief) did not individually own the tribe's territory but rather administered it on behalf of the community, as usufruct (Boezak, 2017).



Figure 15: Drawing illustrating Khoikhoi dancing ritual (Williams, 1989: online)

Cultural rites and traditions further solidified the tribes' connection to their specific territories. Birth and funeral rituals were intricately tied to the land, and ongoing ceremonies at ancestral graves strengthened the spiritual attachment to these areas. The Khoisan people possessed a green cosmology that emphasized harmony between all living beings, living in close harmony with nature and recognizing the Creator as the source of essential elements like rain, health, and abundance. The arrival of colonial forces severed this sacred bond, leading to far more than the loss of territories and subsistence; it amounted to a profound disruption of their spiritual connection and way of life, (Boezak, 2017).

The Khoikhoi people held a profound reverence for the moon, attributing special significance to its various phases. During the new and full moons, important rainmaking rituals and spirited dancing took place (fig. 15). The moon was perceived as a tangible manifestation of a supreme being, intricately linked to the realms of heaven, earth, and particularly rain—a matter of paramount importance for communities inhabiting arid regions, whose very existence depended heavily on rainfall (Boyce, n.d.: online).

Among the Nama people, their religious mythology featured two notable figures. The first was Tsui//goab, sometimes regarded as the founding ancestor of the Khoikhoi. Revered as "the creator," he was considered the guardian of health, the source of prosperity and abundance, and, most significantly, the controller of rain and its associated natural phenomena, including clouds, thunder, and lightning. By contrast, //Gaunab was 'primarily an evil being, who causes sickness or death.' (Boyce, n.d.: online).

2.2. Ritual

In contemporary society, rituals have evolved to include, not only traditional rites of passage but also repetitive events that adhere to specific schedules. While rites of passage mark significant life transitions and occur at predetermined intervals, modern rituals often revolve around spatial elements. They entail a series of events or actions that follow a prescribed pattern and occupy physical space.

Something as simple as meals themselves, as pointed out by Mary Douglas, hold ritualistic significance, as they structure our social and bodily experiences, dividing the day into various segments like breakfast, lunch, tea, and dinner, each with its distinct food and settings (Douglas, 1972).

Rituals like meals exist on a spectrum, varying from the most elaborate, such as wedding feasts with extravagant delicacies, to the simplest, like sharing a cup of tea with friends. Even seemingly mundane activities, like eating a chocolate bar, can be seen through the lens of ritual, with the act of unwrapping it becoming a symbolic representation of assembling ingredients on a plate.

The result is that contemporary rituals, much like architecture, exist on a continuum between the utilitarian and the ceremonial (Jones, 2016). They are marked by repetition and rules, often serving to bring people together while also setting boundaries to maintain social order. The concept of cleanliness and pollution, as illustrated by Mary Douglas, is an integral part of ritual behaviour, with actions and behaviours being deemed dirty or pure based on cultural norms and symbolism. She explains:

“Dirt is never a unique isolated event. Where there is dirt there is system. Dirt is a by-product of a systematic ordering and classification of matter, in so far as ordering involves rejecting inappropriate elements. This idea of dirt takes us straight into the field of symbolism and promises a connection with more obviously symbolic systems of purity.” (Douglas, 1972: 13).

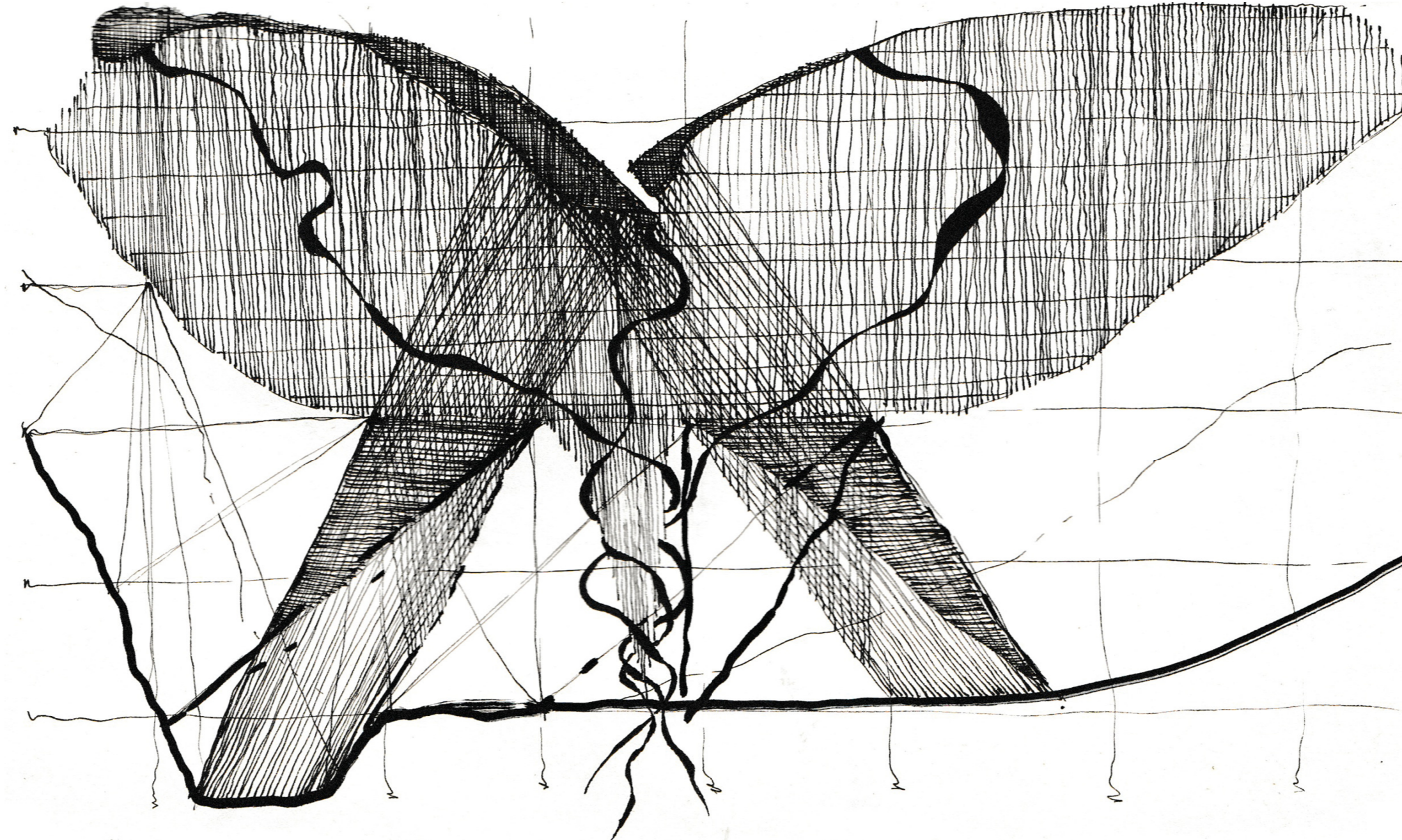


Figure 16: Critical noticing brought forth by the questioning of norms (author)

She illustrates this with familiar domestic examples:

“It is a relative idea. Shoes are not dirty in themselves, but it is dirty to place them on the dining table; food is not dirty in itself, but it is dirty to leave cooking utensils in the bedroom, or food bespattered on clothing; similarly, bathroom equipment in the drawing room; clothing lying on chairs; out-door things in-doors, upstairs things downstairs.” (Douglas, 1972: 14).

In much the same vein, water - in the proposed project - is linked to systems; roofs, flashings, and gutters all aim to keep water out of buildings. Water is, traditionally kept out of a building, and where it is allowed to enter, it is strictly controlled in the form of piping and conduits. By allowing water to enter freely and naturally within a space, it questions the norms of strict water control. It forces one to notice the presence thereof, initiating the hydro-rituals of the space. By exposing (usually hidden) piping within said space, it creates contrast and dialogue between the ordered and free; utilitarian and ceremonial.

Rituals play a significant role as time markers, signifying transitions between distinct pre-ritual and post-ritual states. Whether initiated by individuals or dictated by cultural and social norms, rituals serve as defining boundaries in the sequence of our lives. While the actual impact of a ritual may not always bring about tangible changes, from the perspective of individuals or societies, the person who undergoes the ritual is perceived to experience a transformed state of being. This is what the project aims to facilitate; a changed state of being. From being present, to being present in the hydrosphere, being hydro-aware.

2.3. Embodiment + Ritual

“The timeless task of Architecture is to create embodied existential metaphors that concretise and structure man’s being in the world. Architecture enables us to perceive and understand the dialectics of performance and change, to settle ourselves in the world, and to place ourselves in the continuum of culture.” (Pallasmaa, 2012).

The architectural aspects of rituals associated with ‘rites of passage’ or transitional events are often described in terms of specific stages: separation, transition, and reincorporation, also referred to as preliminal, liminal, and post liminal phases (Boyce, n.d.: online). These terms originate from the concept of the ‘limen,’ the Latin word for threshold, which serves as a defining point in these rituals (Knott, 2008: 1110).

In recent times, there has been a resurgence in interest in spatial theory, or embodiment, particularly regarding its relevance to religion and ritualistic practices. The separation of church and state led to a divergence in the investigation of embodiment, with the primary emphasis during the latter half of the previous century being on geography, and the political climate. During this time, the exploration of embodiment theory shifted away from its connection to religious and ritualistic aspects. However, recently, researchers are once again exploring the intricate relationship between spatial arrangements, and the significance of rituals in shaping human experiences, (Knott, 2008: 1109).

In the realm of architecture, an individual’s connection to space and the ensuing experience can be influenced to some extent. The way we perceive and interact with our surroundings is profoundly influenced by the way the built environment is designed and arranged for experiential purposes. However, it’s essential to recognize that perception is inherently subjective, rooted in individual experiences shaped by cultural and personal backgrounds, leading to varying understandings of a given space. In this regard, the shaping of the environment holds considerable significance in determining the overall experience that it offers to individuals.

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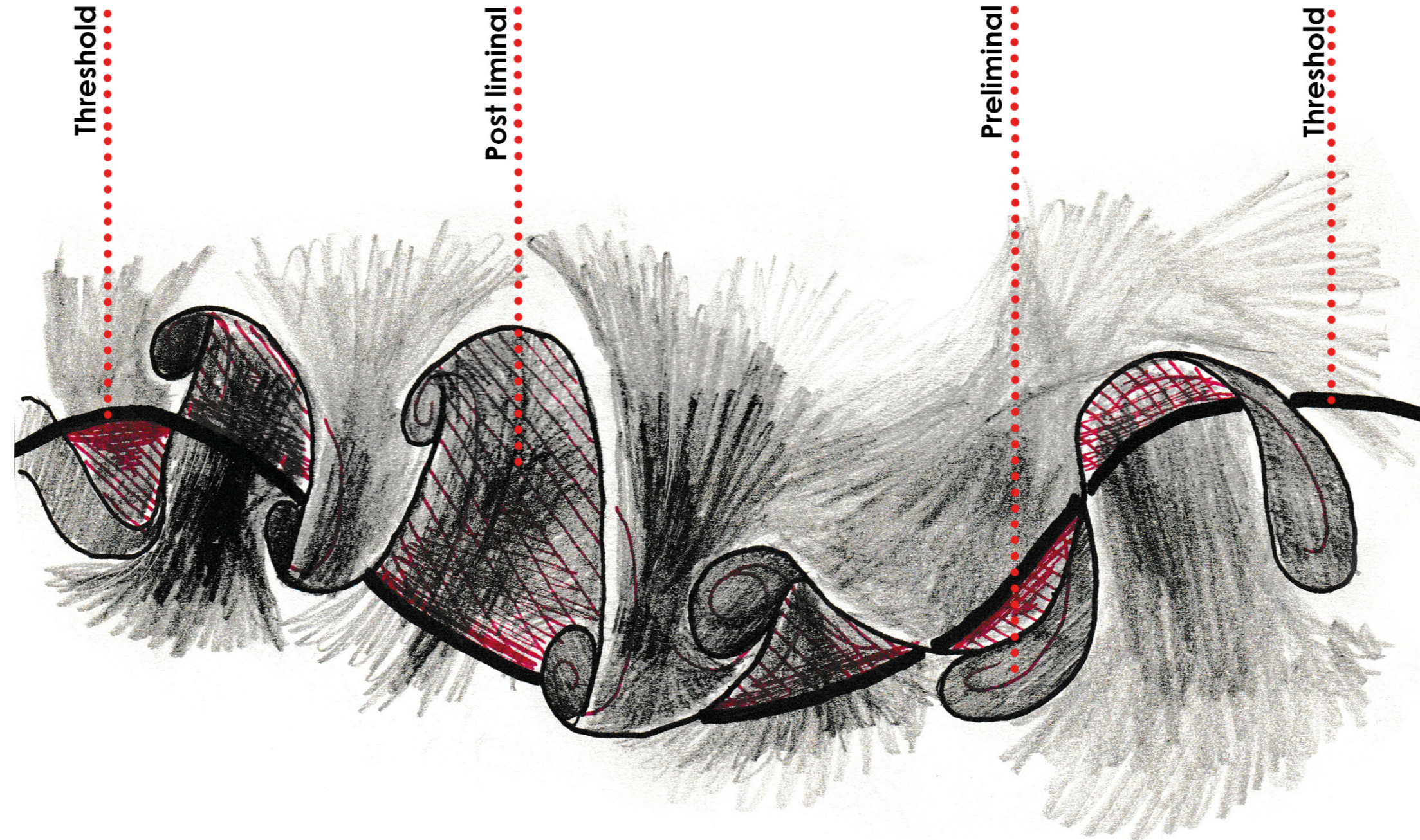


Figure 17: Transitional flow pattern (author)

In rituals, the liminal space represents the crucial threshold period and space that occurs after the initiation has started but before the initiate has completed the ritual. During this significant phase, the individual is neither bound by the social structures they are leaving behind nor by the ones they will soon adopt once the rite of passage is concluded. This intermediate stage allows the initiate to exist in a state of transition, where they are liberated from the constraints of their previous identity while still in the process of embracing their new role.

In Xhosa culture, rivers hold special significance as they represent the liminal space situated between the peaceful and ordered homestead and the untamed and perilous wilderness. Its perception varies among individuals, sometimes considered as good and other times as bad, depending on personal interpretations (Chidester, 2000). This liminality extends to the realm between the earth and the sky, where the horizon serves as a point of exchange between the two. The river, being a non-space, allows individuals to exist without specific responsibilities or expectations, acting as a bridge connecting the spiritual and physical realms, captivating the imagination of both ancient and modern societies.

In the context of architectural experiences, one can liken this liminal space to a transitional circulation area, traversed before entering the main space. Like a threshold, visitors find themselves neither fully inside nor outside the structure, experiencing that in-between state. Conceptually, architecture could express ritual as a threshold, where two distinct realms meet harmoniously. The built environment then becomes a liminal space that facilitates the convergence of two worlds, much like the horizon does for the earth and the sky. Just as the river serves as a symbolic boundary, architecture can embody rituals and foster connections between the sacred and the everyday.

2.4. Touchstone

The touchstone acts as a threshold between unknowing and knowing; it aims to capture the essence of the project; using the interplay between the practical and spiritual qualities of water to instil hydrophilia within the community. It also aims to exemplify experiential learning and respect for nature, two of the core aims of the project. The touchstone takes the shape of a deconstructed water filter, with the channels representing education. The blooming flowers represent knowledge and appreciation for the Baakens Valley. The tiers represent the past, present, and future generations. Passing knowledge from one to the next. The way in which the touchstone touches the ground lightly, highlights the respect for nature the project holds paramount. Finally, the leaking container in contrast with the traditional construction technique comments on the deteriorating infrastructure and how the implementation of traditional hydro-gratitude could aid in rectifying the dire drought situation in Gqeberha.

Another outcome of the touchstone is in illustrating the two core parts of the project; the practical and the spiritual. It illustrates how the calculative, detached mindset of our current times lead to faltering infrastructure and a lack of hydro-gratitude. With the touchstone also being a water filter it highlights the practical aspect of the project; water purification. The flowing water and sound of a trickling stream illustrates the hearkening back to the mortal dwelling. To create a dwelling that knows its success and aptness relies on the life-giving substance of water; the spiritual aspect of the project.

Ultimately, the touchstone shows that one can work with the faltering infrastructure to create a meaningful hydro-experience. This experience, not only sheds light onto the current lack of hydro-gratitude, but also instils a sense of hydrophilia.

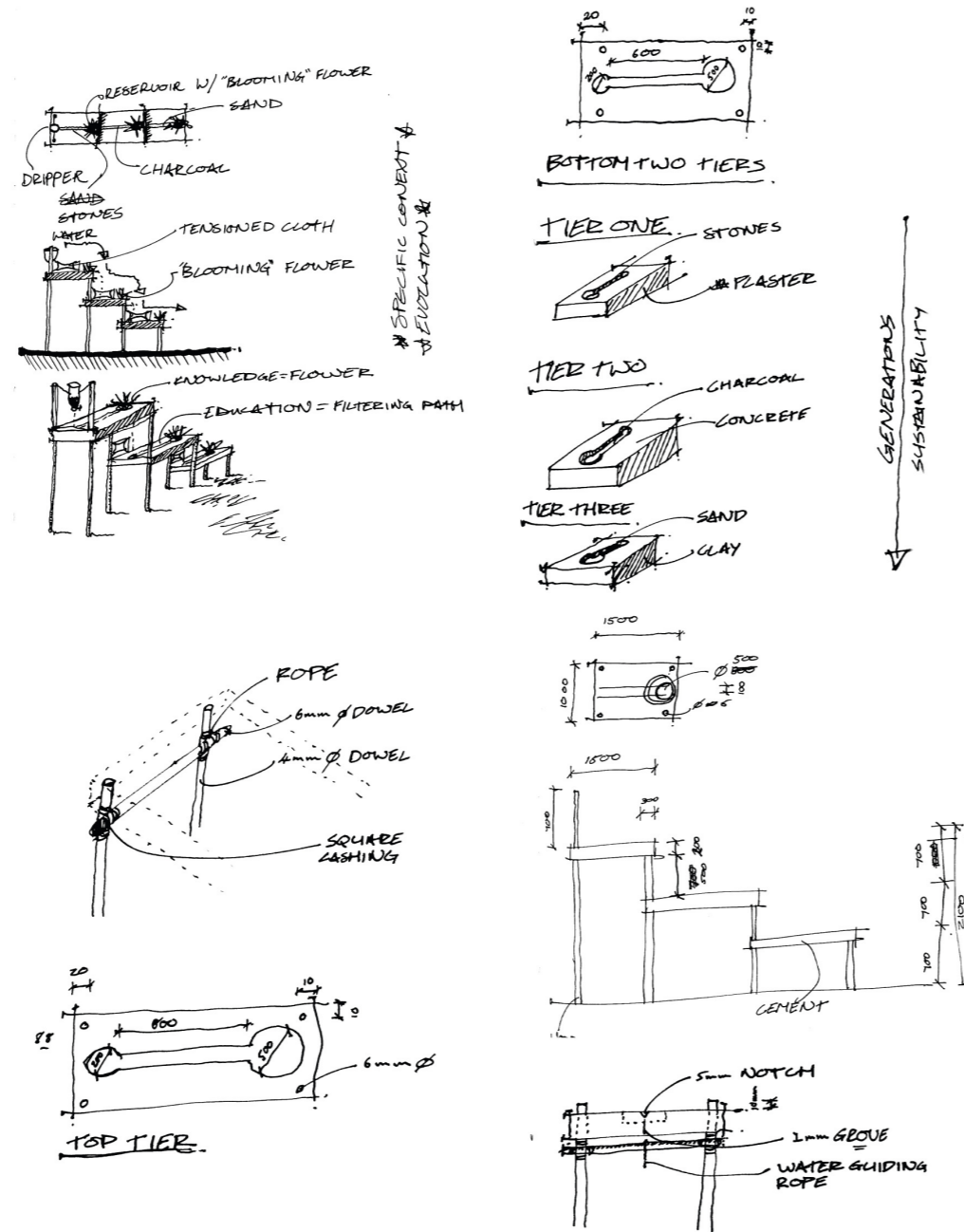


Figure 18: Initial thoughts and conceptual approach (author)

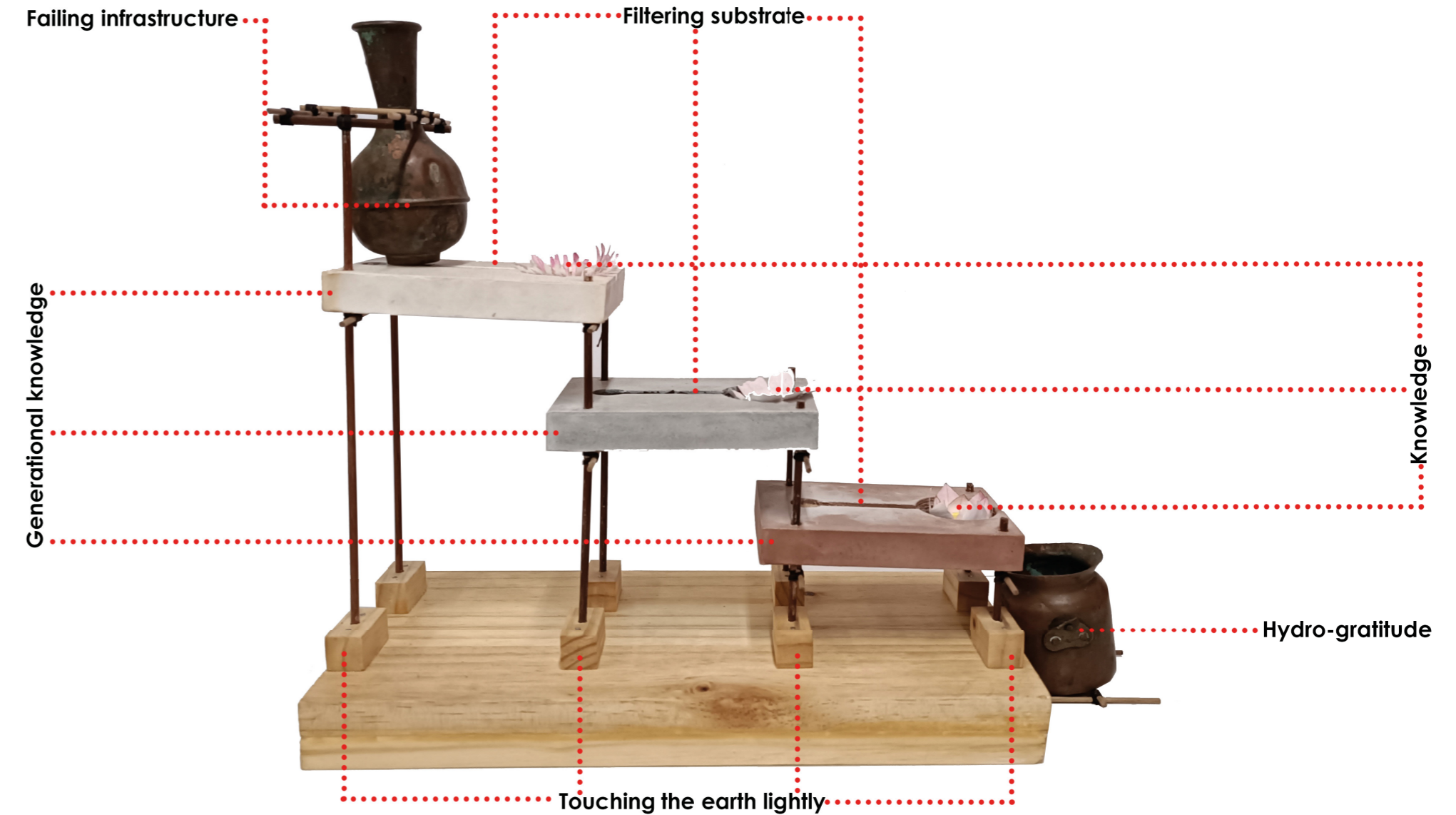


Figure 19: Photograph of touchstone highlighting the meaning of its parts (author)

2.5. Conceptual Development

2.5.1. Hydrophilia

Many South African indigenous people (Khoisan and Bantu-speaking people) have complex beliefs concerning water, river systems, and riparian zones. The spirit world is regarded as the ultimate source of such life-sustaining resources. Water is regarded as the essence of both spiritual and physical life, and the spirit world is thought to be the ultimate source of such life-sustaining abilities (Bernard, 2003: 149). Rivers, wetlands, and the sea are the natural habitats of such manifestations, and they are vital to many African healing traditions and practitioners. Many African religious functionaries regard water as a living force capable of transforming us from one state to another on a spiritual or physical level. It has the power to cleanse and protect from evil, as well as to heal and restore health. As a result, it is an essential component in the performance of many religious and healing rituals, (Bernard, 2003).

This concept focusses on said physical and spiritual attributes of water. It represents the impact that the presence of clean water has on the spiritual and physical well-being of a community. It also highlights how important the presence of water is to traditional ritual practices. By creating, safe, sacred spaces, water can have a far-reaching impact, not only spiritually, but also physically, (MEA, 2005).

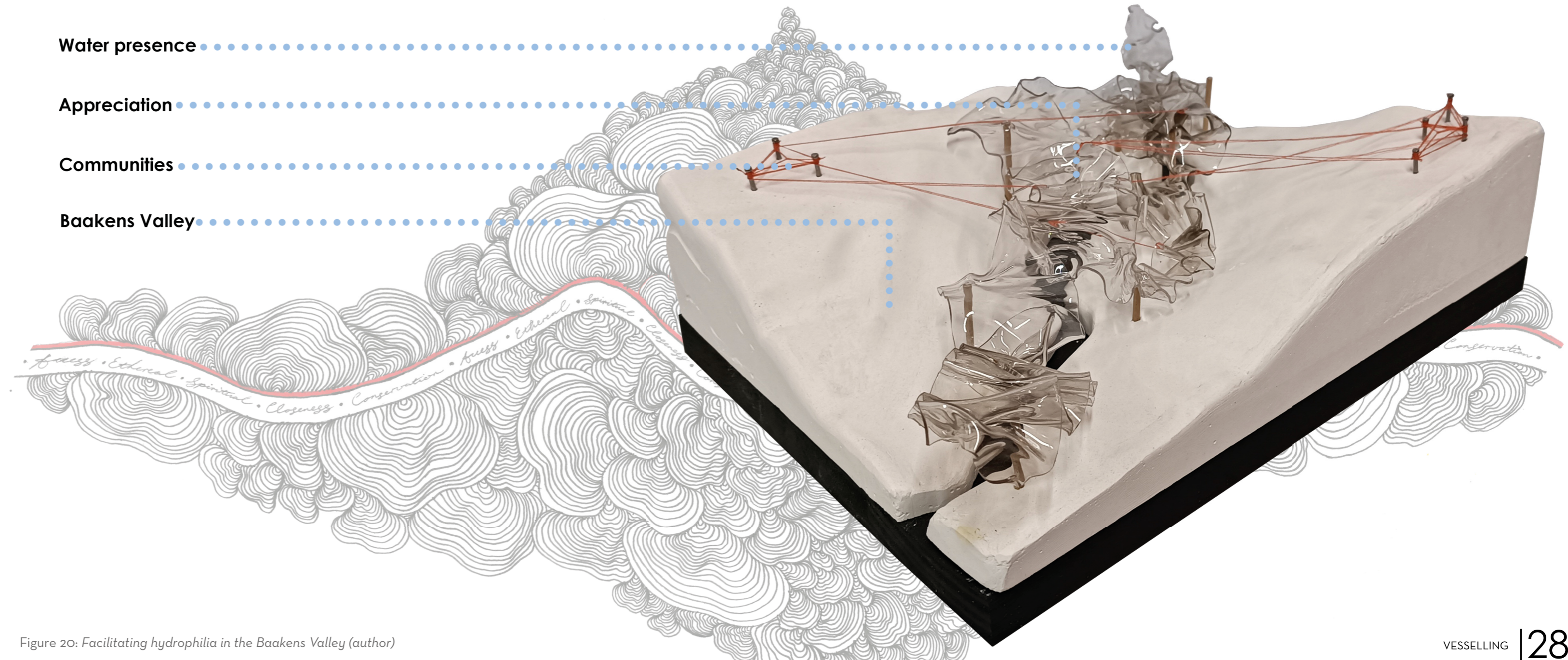


Figure 20: Facilitating hydrophilia in the Baakens Valley (author)

2.5.2. Resuscitate

Gqeberha is one of the South African cities which has been most devastatingly affected by drought in recent times. This is because of a lack of hydro-gratitude, leading to the neglect of infrastructure for the capture and treatment of water. Should we change our resource-mindedness back to a more inceptual form of care for this vital substance, kilolitres of drinkable water would be appreciated, cared for, and conserved instead of being squandered on a daily basis.

Rivers and other wetlands have often played central roles in development plans, but these plans have, all too often, been developed with a single economic goal in mind, (MEA, 2005). This is evident in the example of the lagoon near the Baakens River mouth being used by industries such as wool washeries (erected in 1858) that polluted the water to such an extent that it became unusable. This then led to another development centred around industry, such as steam mills (1877) and sweets factories (1884), leading to the filling of the lagoon and the canalising of the river (McClelland, 2018: online). This is a prime example of how short-sighted development plans tend to be; sacrificing long-term benefits for short-term gain.

This concept focusses on how we can shed light on our past mistakes and learn from them to create meaningful change. By instilling hydrophilia within the community, and informing them on how to properly care for water, the knowledge is passed on from generation to generation. Resuscitating gratitude for the hydrosphere is essential in attaining a prosperous future for Gqeberha.

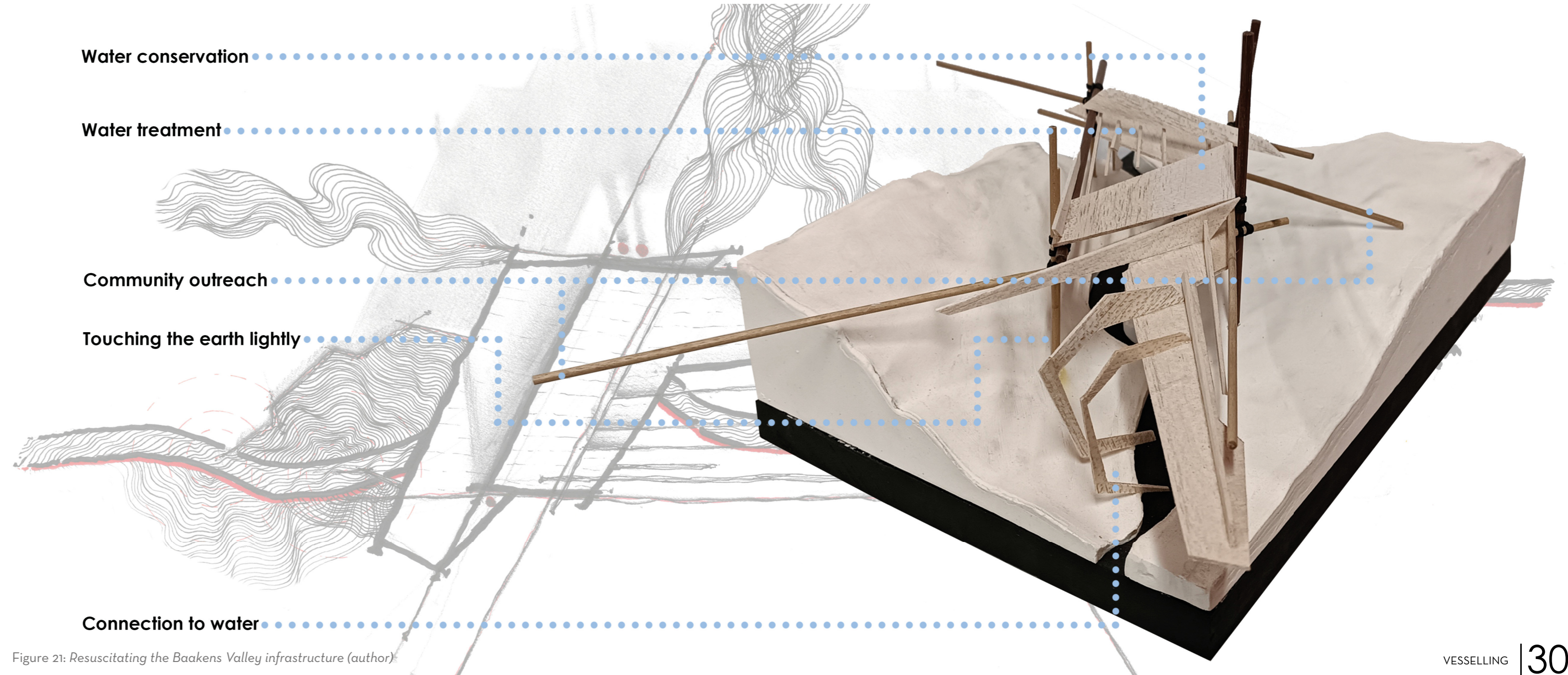


Figure 21: Resuscitating the Baakens Valley infrastructure (author)

2.5.3. Hydro-gratitude

This concept is seen as an amalgamation of both Hydrophilia and Resuscitation; the spiritual and the practical, respectively. With the creation of safe, sacred spaces within the presence of tranquil waters, the land is reclaimed for the use of indigenous peoples. Being in the presence of water throughout the program, while ebbing and flowing with it acts as a ritual in and of itself. It takes one out of their ordinary ways of dwelling and makes a person vividly aware of the beauty and tranquillity of water, as well as its importance in sustaining life. With this ritualistic threshold and circulation, one also perceives, more openly, the various practical water filtration processes occurring within the program.

Being made aware of these processes, it becomes apparent how the current infrastructure is single-minded in its approach, by simply treating water as a resource instead of being grateful for its beauty and life-giving properties. This then spills over into the realisation that the current infrastructure, albeit focussed on the singular goal of filtering and storing, is also being neglected. The new program will, especially with time, show and teach the community that long-term benefits truly outweigh short-term gain. The presence of indigenous vegetation throughout the program will also shed light on the importance of conserving the unique ecosystem that the Baakens Valley offers.

The culmination and amalgamation of these processes and experiences aim to breed hydrophilia, resuscitating the hydrosphere, and lead to hydro-gratitude throughout the community.

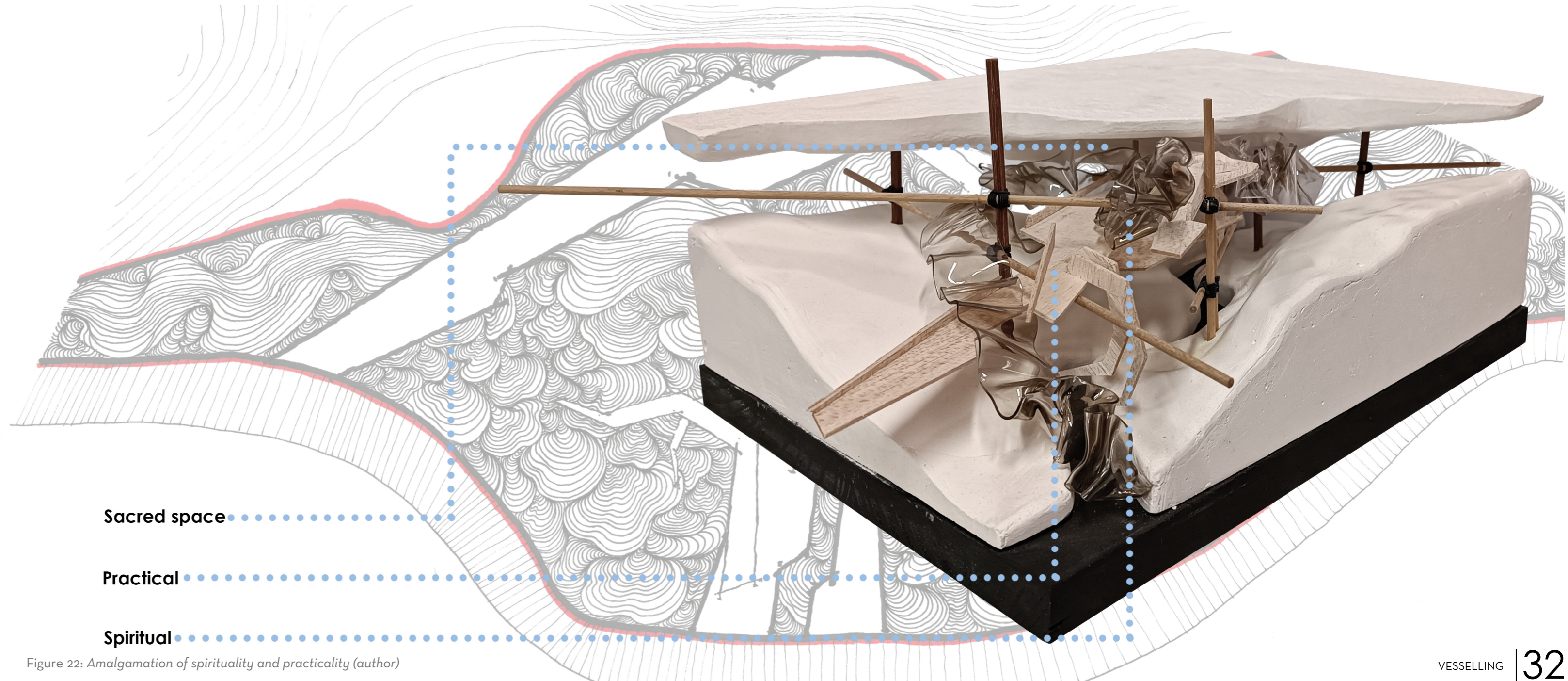
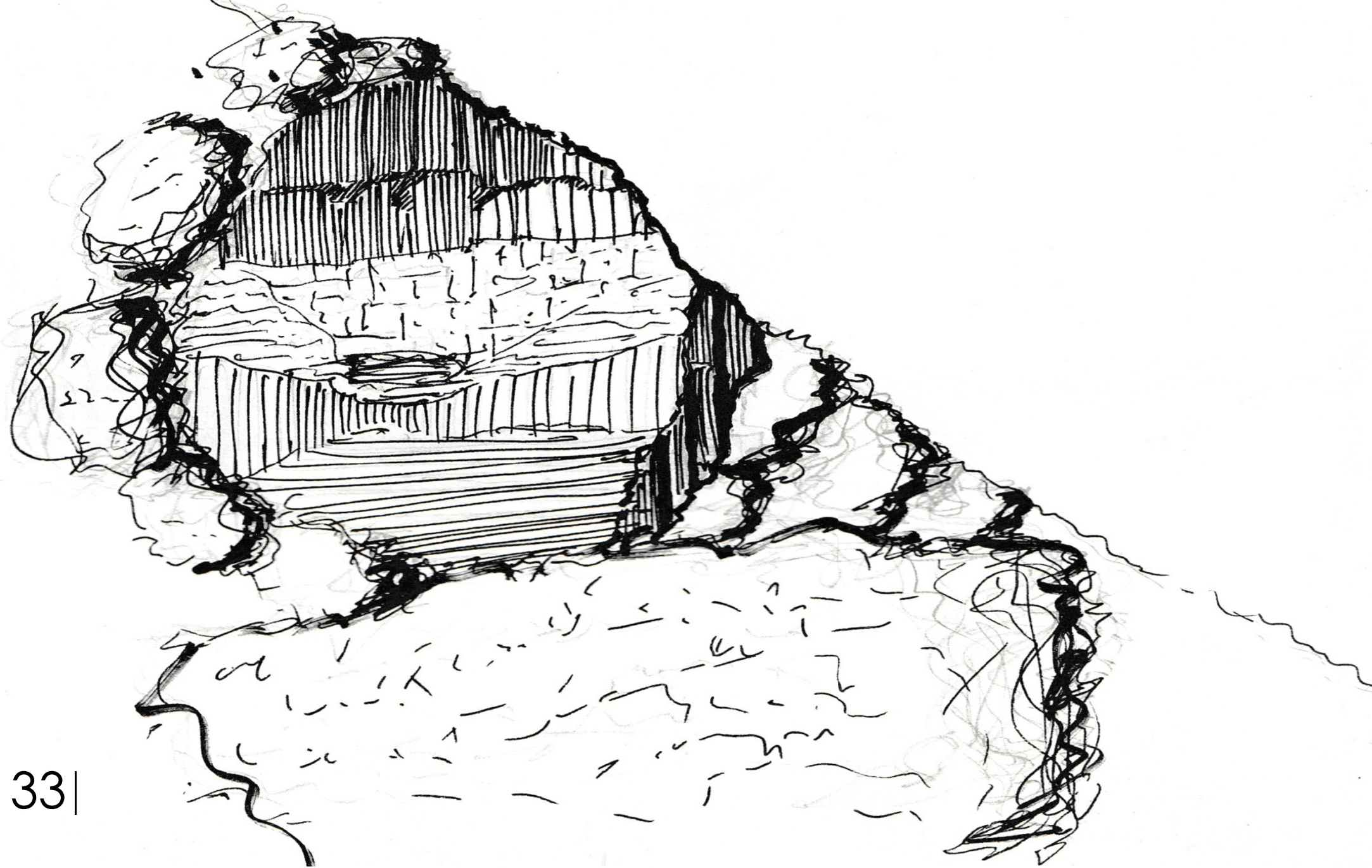


Figure 22: Amalgamation of spirituality and practicality (author)

PART 3: SUBMERGENCE



Introduction

The theoretical grounding of the project provides the basis for the technical exploration that follows, both in the form of structural resolution and theoretical application. The first step in the process of the technical development, is to consider the various influences in and around the site from an analytical perspective, and how they might influence the structural approach of the building.

In an attempt to embed the project into its environment, physically and culturally, the structures of the historical and contemporary buildings in the area are analysed. The purpose thereof is to highlight and conform to the contentious history of the area, finding the intricate balance between traditional and contemporary.

The analysis of various precedent buildings will aid in creating this delicate union, along with solidifying certain important theoretical principles. Following the precedent analyses, a detailed explanation will be given of the technical aspects of the project and how they act as the theoretical catalysts thereof.

3.1. Site Analysis

3.1.1. Macro

The Eastern Cape bears substantial cultural and historical significance, particularly regarding its intricate tapestry of diverse cultures and its conflicting hydro-history. Culturally, the Eastern Cape has been a melting pot of indigenous communities, including the Xhosa-, and KhoiKhoi people, whose heritage and traditions have shaped the region. Water, as an elemental resource, holds historical importance, serving as a locus of economic activity, settlement patterns, and societal interactions. The region's hydro-history, marked by both abundance and scarcity, has influenced settlement patterns and cultural practices. Notably, the city of Gqeberha, formerly known as Port Elizabeth, emerges as a focal point in this narrative, illustrating the confluence of historical water challenges, urbanization, and contemporary, sustainable, water management practices in a region emblematic of South Africa's dynamic cultural and environmental landscape.

Gqeberha, situated on South Africa's south-eastern coast, confronts a pressing issue regarding its deficient water infrastructure, which constitutes a significant dimension of urban development and sustainability research. The city grapples with chronic water scarcity challenges due to a semi-arid climate, population expansion, and historical disparities in access to dependable water services. These deficiencies in its water infrastructure have ramifications that extend beyond the mere inconvenience of water shortages; they impede economic growth, hinder social equity, and pose substantial environmental risks. Gqeberha's water infrastructure deficiencies not only provide valuable insights into the complexities of urban water management but also underscores the urgent need for comprehensive interventions to address these critical shortcomings and foster sustainable urban development in the region.

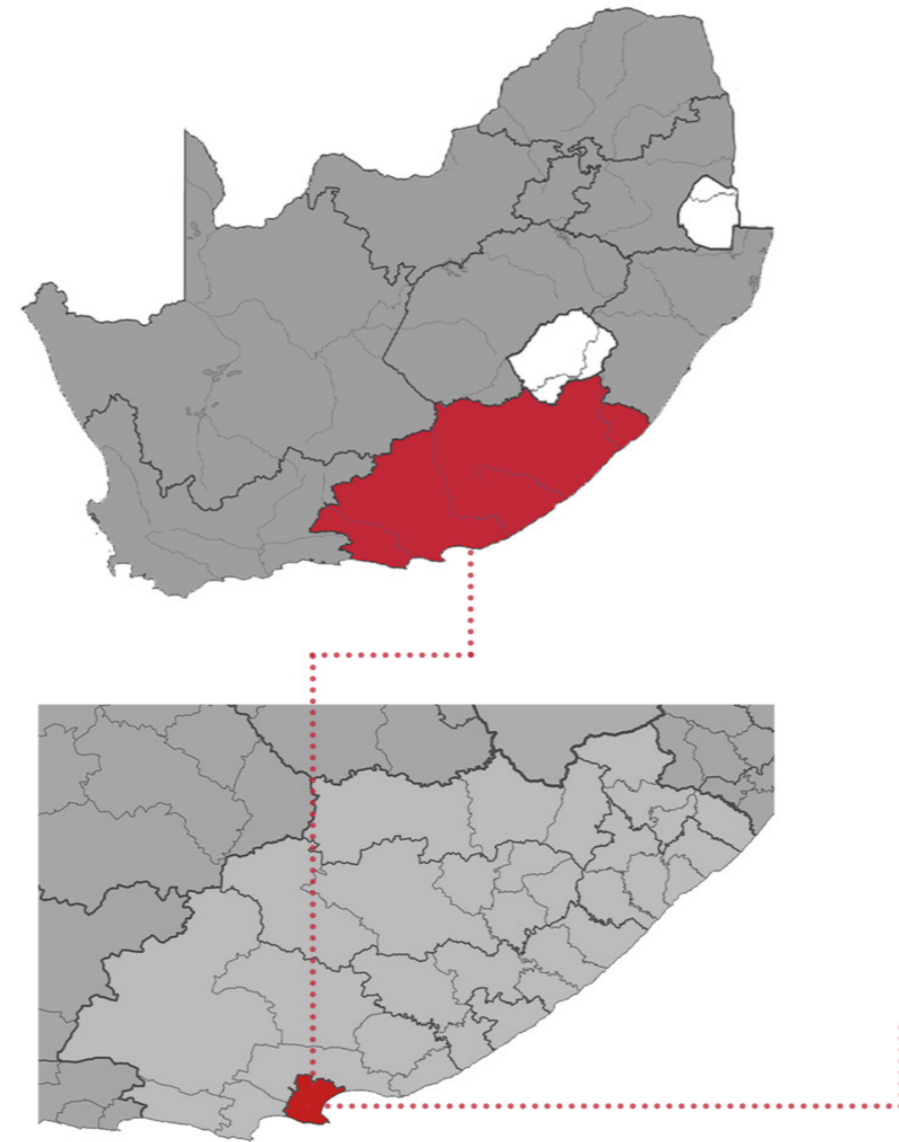
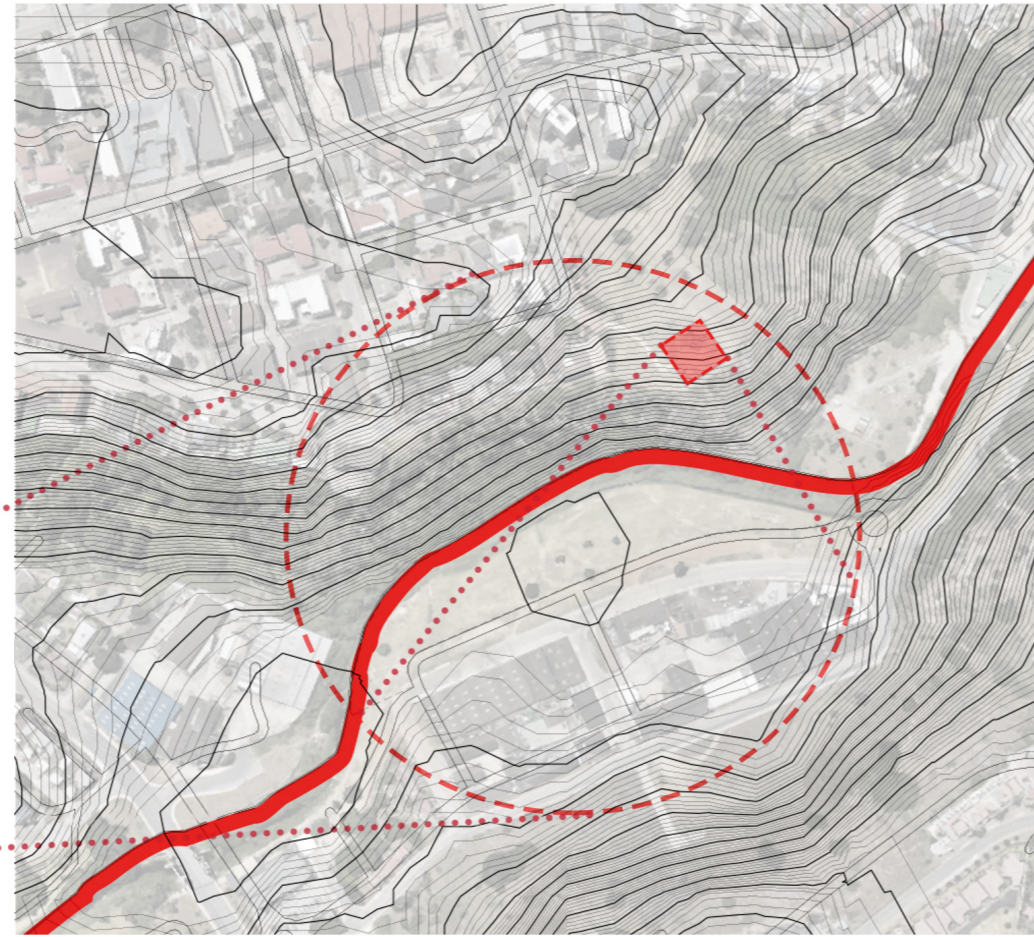
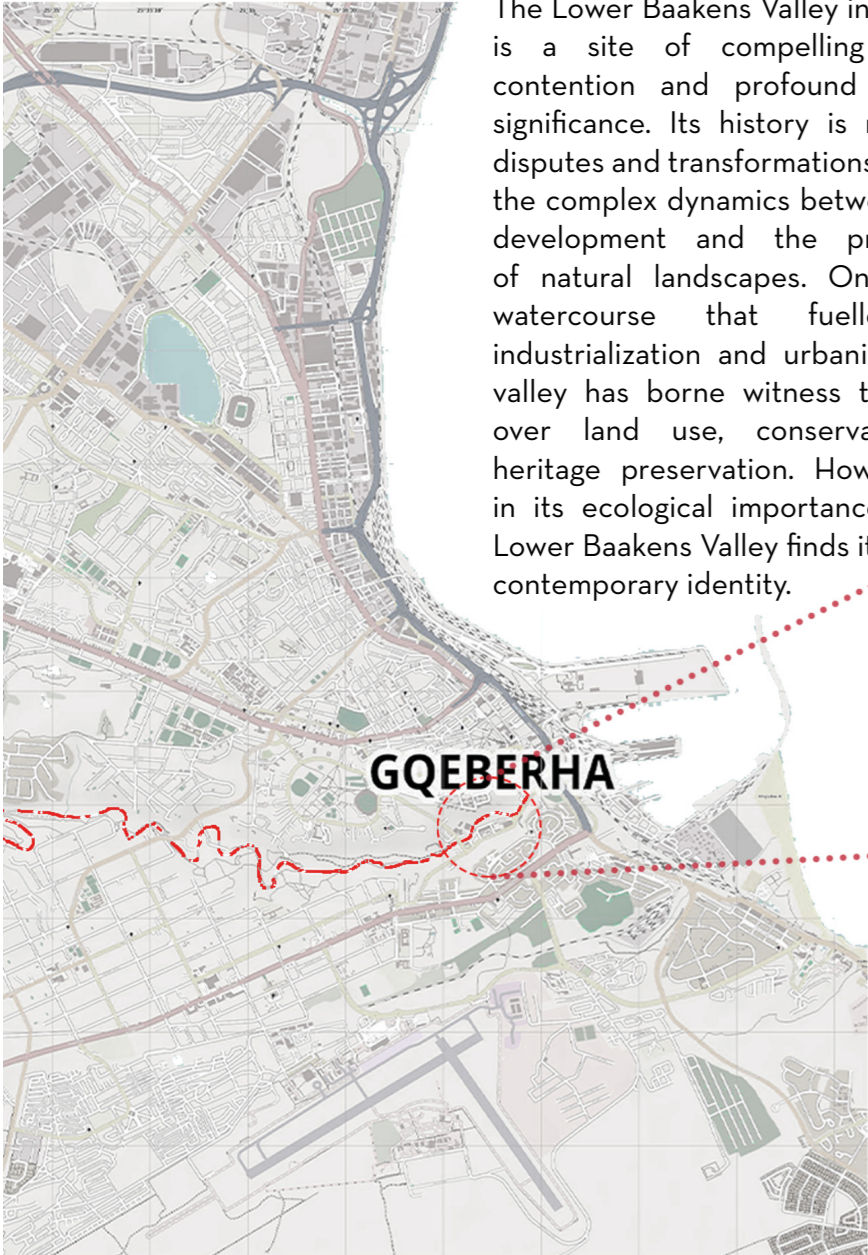


Figure 23-25: Site location (author)



3.1.2. Mezzo

The Lower Baakens Valley in Gqeberha is a site of compelling historical contention and profound ecological significance. Its history is marked by disputes and transformations, reflecting the complex dynamics between human development and the preservation of natural landscapes. Once a vital watercourse that fuelled early industrialization and urbanization, the valley has borne witness to conflicts over land use, conservation, and heritage preservation. However, it is in its ecological importance that the Lower Baakens Valley finds its contemporary identity.



Nestled amidst urban sprawl, it serves as an oasis of biodiversity, housing indigenous flora and fauna that face increasing pressures from urban encroachment. This ecological richness underscores the urgent need to balance urban development with environmental stewardship, turning the Lower Baakens Valley into a focal point of both historical reflection and forward-looking ecological conservation efforts. It stands as a testament to the ongoing discourse surrounding the coexistence of urbanization and nature, exemplifying the intricate challenges and opportunities in achieving a harmonious equilibrium between these seemingly conflicting forces within the urban landscape.

Figure 26: Exact site location (author)

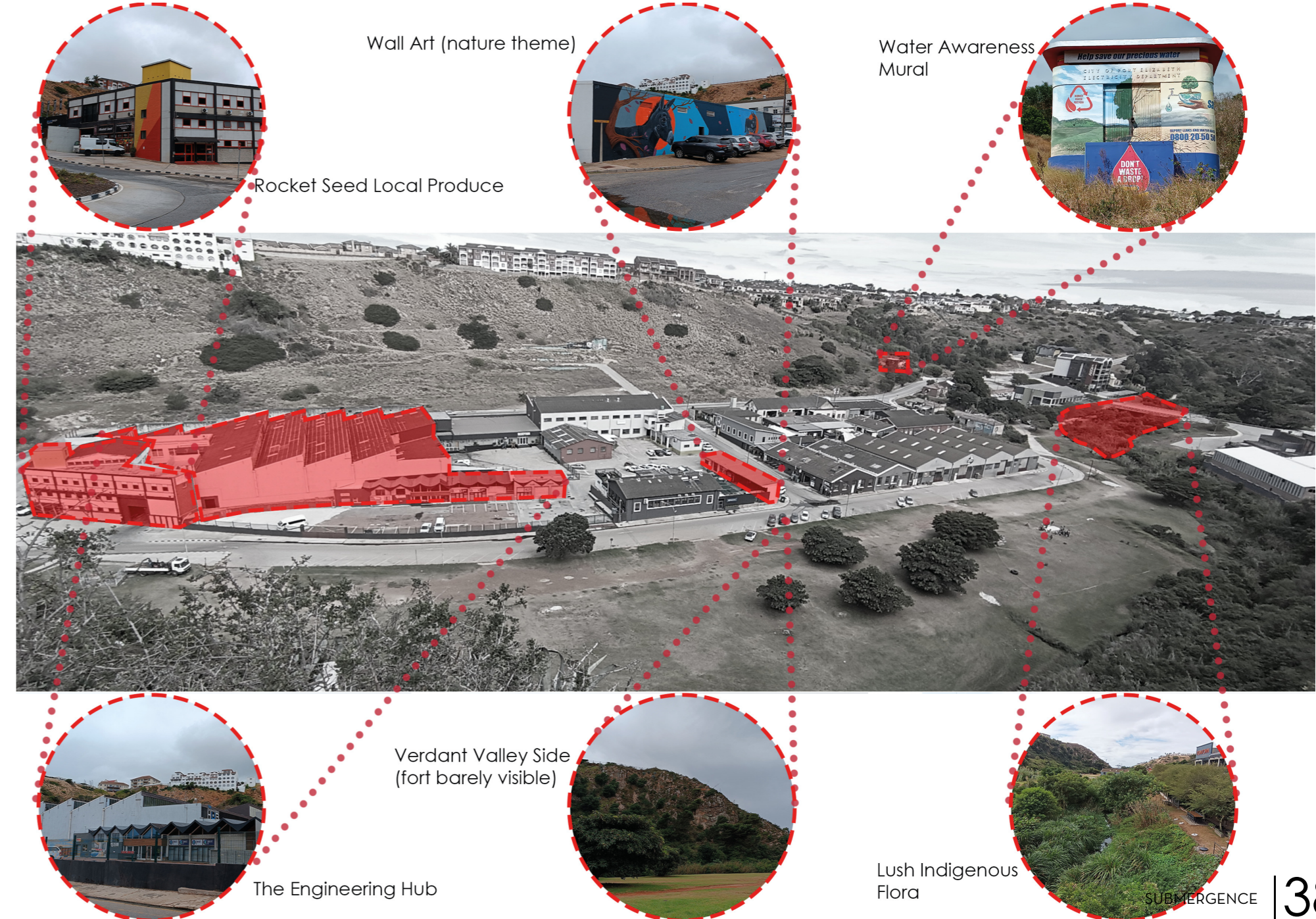
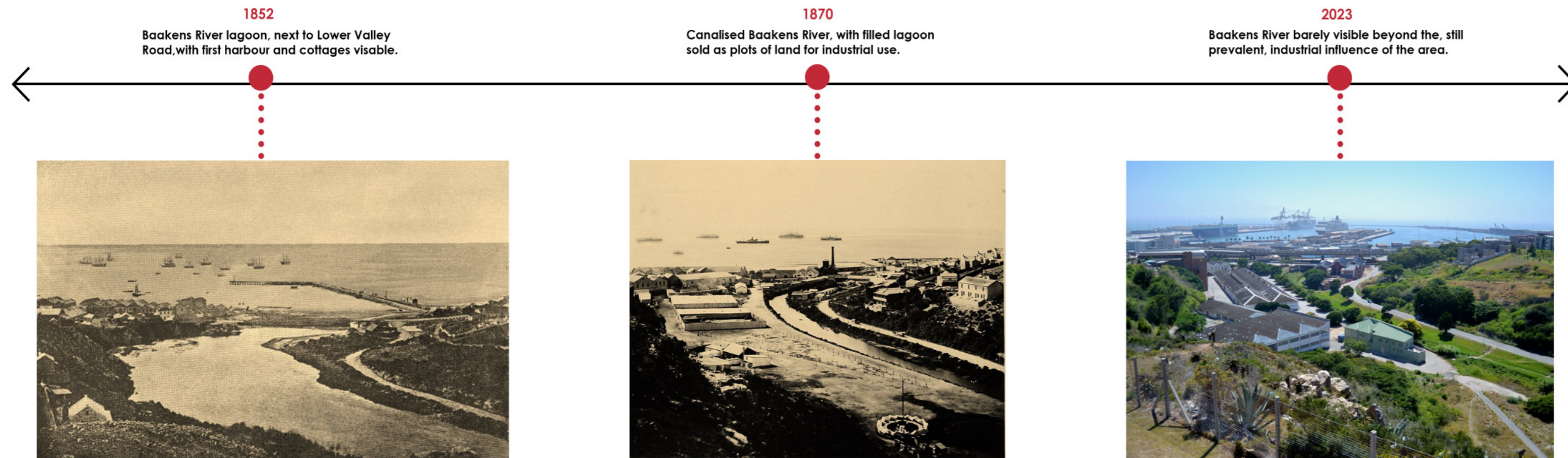


Figure 27: Points of interest around the site (author)

Lush Indigenous Flora

SUBMERGENCE



The industrial past of the Baakens Valley constitutes a pivotal chapter in the historical narrative of Gqeberha, and its enduring influence continues to permeate the contemporary landscape. During the late 19th and early 20th centuries, the valley emerged as a thriving industrial hub, characterized by textile mills, tanneries, and various manufacturing enterprises, significantly contributing to the city's economic prosperity. This industrial legacy is palpable in the architectural remnants, such as the red-bricked factories and warehouses that still dot the valley.

Moreover, the legacy of heavy industrialization has left an indelible mark on the ecological landscape, with historical pollution and land degradation posing persistent challenges for environmental remediation efforts. As a result, the Baakens Valley exemplifies the inextricable interplay between industrial heritage preservation and the ongoing environmental reclamation endeavours, showcasing the intricate dynamics of heritage conservation, urban development, and ecological restoration that characterize the region's contemporary identity.

Figure 28: Timeline from lagoon to canal (author)

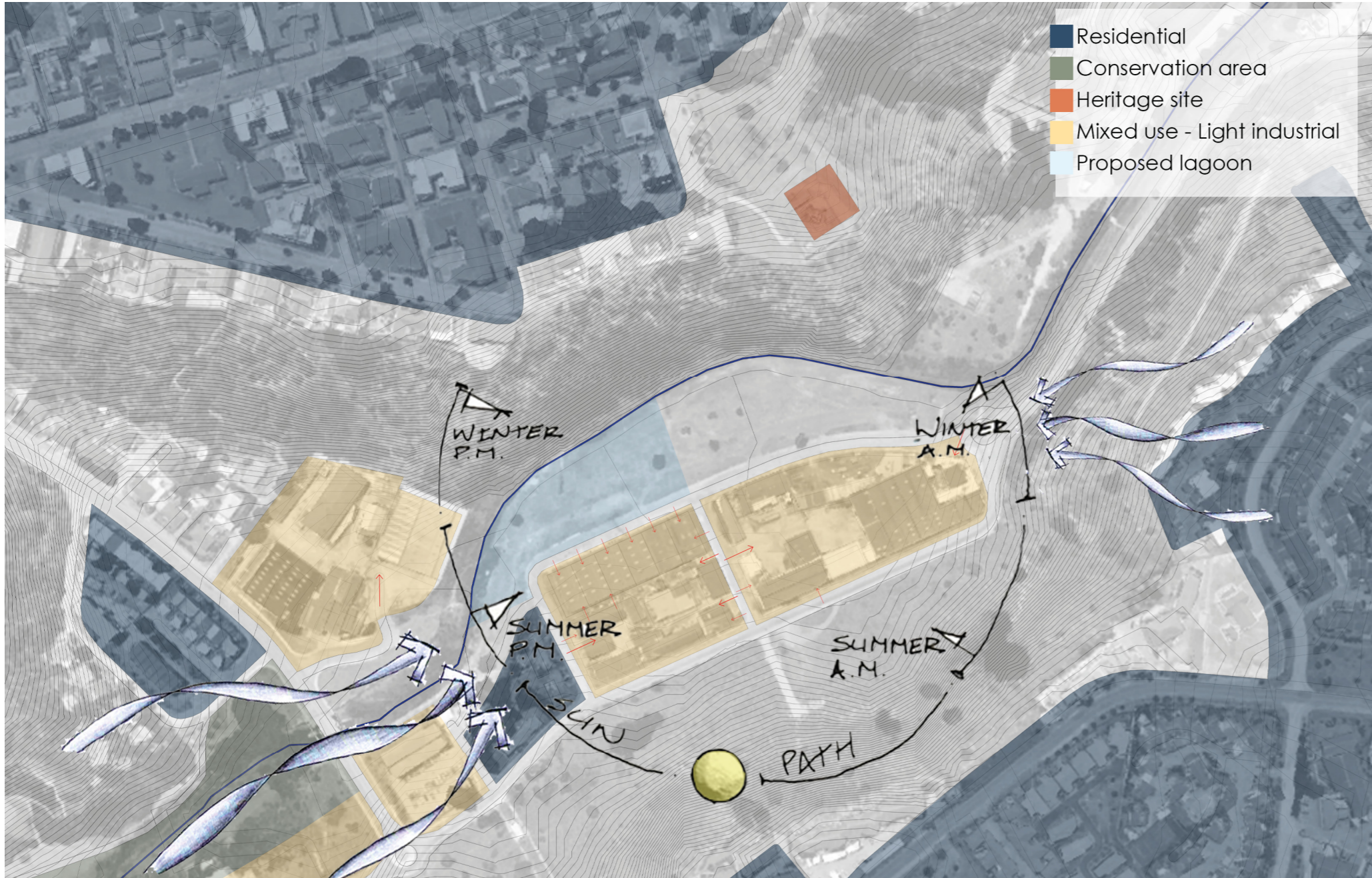


Figure 29: Zoning and weather analysis (author)

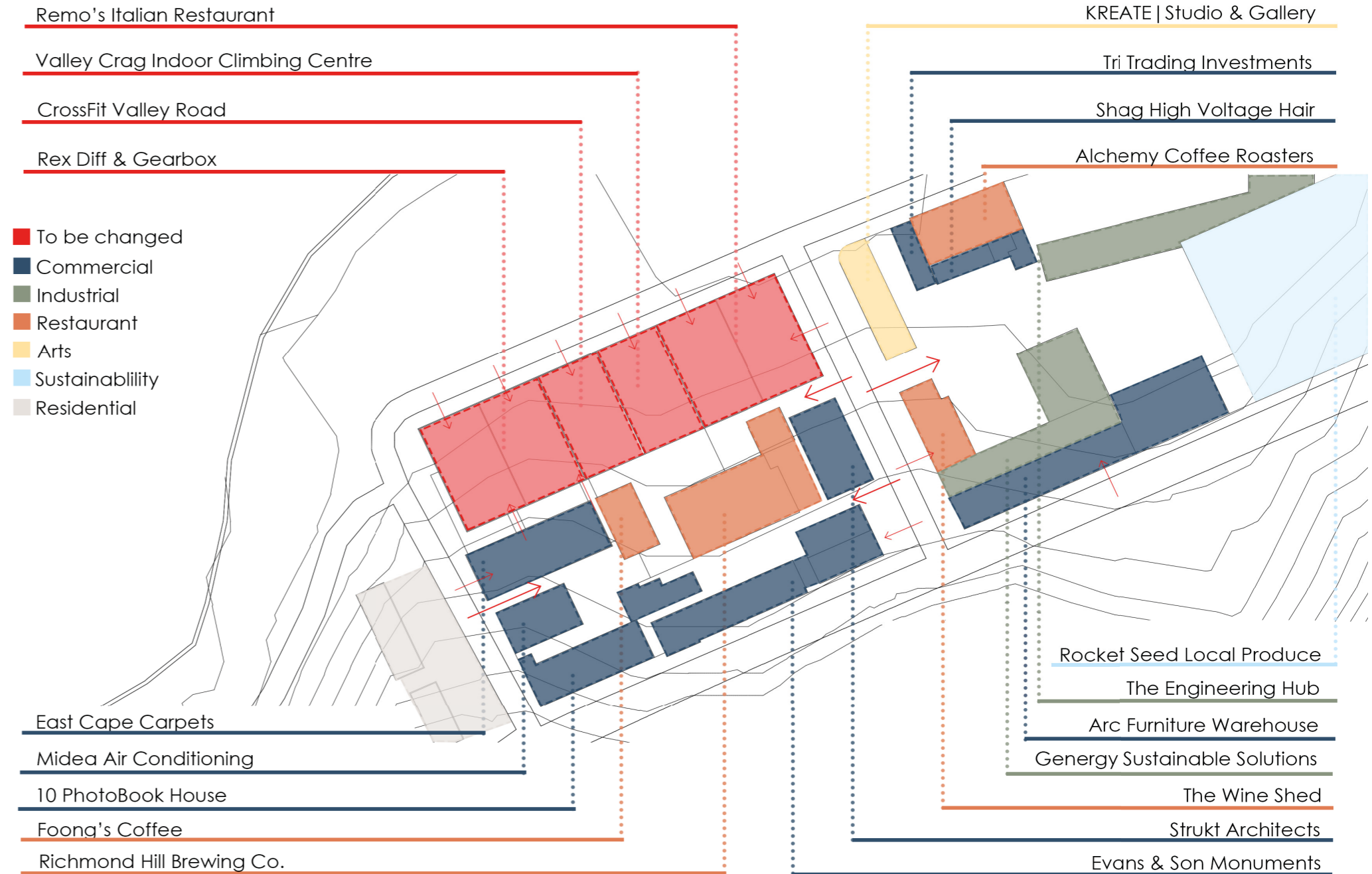


Figure 30: Businesses in the Baakens Valley (author)

3.1.3. Micro

The chosen site is the six warehouses that house various businesses, such as; Remo's Italian Restaurant, Valley Crag Indoor Climbing Centre, CrossFit Valley Road, and Rex Diff & Gearbox. The mixed use and re-use of these warehouses tell the same story as the surrounding context; being a blend of artistic, commercial, leisure, and industrial functions. Most of which function from within old, re-purposed warehouses. The industrial and warehouse archetype is prevalent in this area, owing to the area's strong industrial history.

Despite the largely industrial past of the Lower Baakens Valley region, today, it serves the community with various hiking and mountain biking trails throughout the conservation area to the west. This serves a vital function in creating awareness of the unique biodiversity that the Baakens Valley holds. Along with this awareness, the old industrial buildings in the area are slowly starting to play host to more artistic and conservational functions. There is still a substantial mix of industry and business, however the industrial functions are creeping ever eastward, towards the harbour, making way for more sensitive functions to take their place.

No industrial buildings are more prominent in the area than the six warehouses next to the green zone, and the old factory building that currently houses The Engineering Hub that specialise in precision marine engineering. This highlights the duality of the area in its transitioning phase. Where industrial buildings are either used for their original built purpose, or are completely re-purposed into functions that serve the community.

Apart from the buildings, there is a large lawn bordering the north of the chosen site and the adjacent street block. The lawn acts as a buffer and recreation zone between the canalised Baakens River, with its lush vegetation, and the buildings to the south. Due to the vastness and slope of the lawn, one does not feel particularly invited to approach the river, despite its tranquillity and natural beauty. It is essential to activate this buffer zone to bring greater awareness to the Baakens River, and to enhance the natural engagement of the built environment.



New Warehouses
(Steel construction)



Old Warehouses
(Timber construction)



Vast Lawn

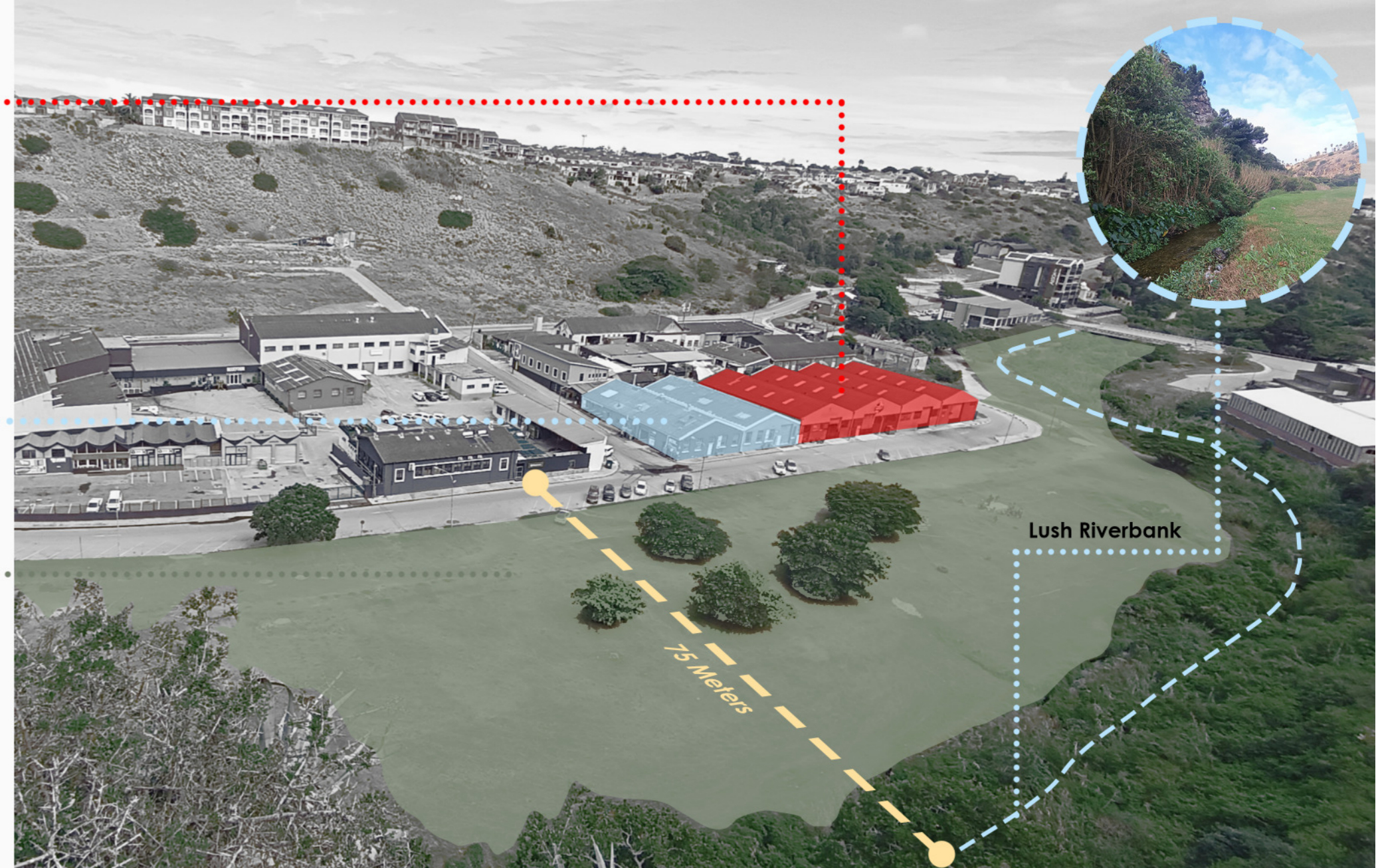


Figure 31: Analysis of warehouses and surrounding landscape (author)

3.2. Reinterpretation

3.2.1. The Matjieshuis

Within the tapestry of Southern African cultures, the Khoikhoi matjieshuis, or matjieshut, emerges as an enduring emblem of historical and cultural significance among the Khoikhoi people (Webley, 1986: 57). This exploration undertakes an analysis of its architectural composition and multifaceted role within the Khoikhoi society.

1. Structural system:

Framework:

The matjieshuis is distinguished by its circular or elliptical framework, meticulously crafted from pliable branches, frequently sourced from the kei-apple tree (Webley, 1986: 58). This framework is robustly anchored to the earth, engineered to withstand the region's capricious climatic forces and endowed with the inherent resilience required to withstand turbulent winds.

Roof:

Characterized by an arrangement of layered woven reeds or grass, the roof serves as excellent insulation, acting as a formidable shield against extreme temperatures, inclement rain, and the scorching Southern African sun. This roofing technique stands as a testament to the ingenuity of the Khoikhoi, who adeptly harness local materials to craft a comfortable dwelling.

Walls:

Mats, painstakingly woven from reeds or grass, fulfil a dual purpose as both ventilation and insulation. The utilization of these mats facilitates efficient ventilation while safeguarding privacy and affording respite from the natural elements. The walls' adaptability extends to regulating airflow, a crucial facet of interior temperature control (Frescura, 1989: online).

Entrance:

A low and narrow doorway characterizes the entrance, engineered for heat retention during chilly nights and the assurance of privacy and security. The integration of additional mats or animal skins provides a practical seal against intrusive winds, precipitation, and wildlife (Webley, 1986: 59).

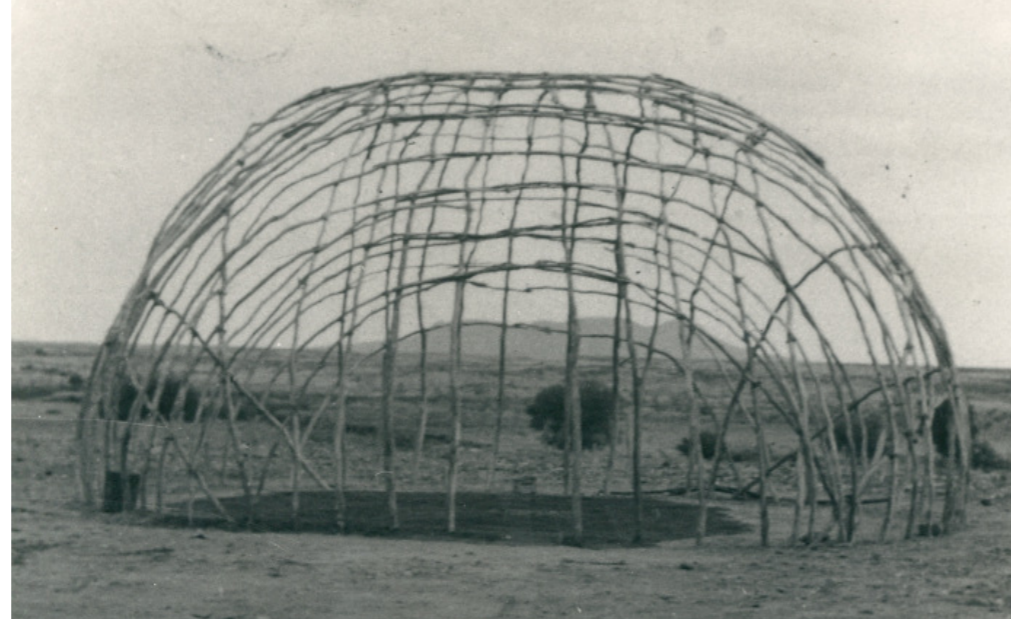


Figure 32: Framework of Khoikhoi matjieshuis (Walton, 1995)



Figure 33: Weaving reeds with hessian rope (Walton, 1978)



Figure 34: Making of hessian rope (Walton, 1978)

2. The primary uses of the matjieshuis:

Shelter:

Predominantly, the Khoikhoi matjieshuis functions as a sanctuary, granting essential refuge from the region's climatic extremities. Its architectural configuration, marked by an insulated roof and walls, bestows it with resilience against formidable winds and extreme temperatures, rendering it an eminently practical choice for nomadic and semi-nomadic communities.

Mobility:

Noteworthy for its easy assembly and disassembly, the matjieshuis embodies mobility, an indispensable characteristic for the historically semi-nomadic Khoikhoi population (Swanepoel, 2006: 87), deeply entrenched in herding practices. This mobility accommodated their seasonal migrations in pursuit of optimal grazing lands for their livestock.

Culture:

Beyond its utilitarian facets, the Khoikhoi matjieshuis holds profound cultural significance within Khoikhoi society. It serves as an embodiment of age-old traditions, the craftsmanship of yore, and the wisdom transmitted across generations. Its characteristic centralised configuration underscores themes of unity and communal harmony (Boezak, 2017: 269), highlighting the importance of familial and kinship bonds.

Storage:

The structure is deftly adapted for storage, accommodating foodstuffs, essential tools, and indispensable commodities. The pliability of the mat walls create versatile storage compartments, enhancing its functional versatility (Swanepoel, 2006: 87).

Conclusion:

In summary, the Khoikhoi Matjieshuis stands as an architectural phenomenon, that reflects not only the pragmatism of its design but also the resourcefulness intrinsic to the Khoikhoi community. Its structural intricacies, in harmony with cultural symbolism, contribute to its role as a haven from the elements, facilitating mobility, and embodying age-old traditions. Delving into the matjieshuis enriches our understanding of Khoikhoi history and cultural heritage, unveiling their ingenious approach to sustainable living amidst a challenging environmental backdrop.

3.2.2. The Warehouse

Warehouse buildings have long been critical elements of industrial landscapes, serving as hubs for the storage and distribution of goods. While their core function remains indispensable, many warehouse structures have undergone adaptive reuse, finding new and diverse roles beyond their original intent. This analysis will explore the different aspects of warehouse building structure and utilization, alongside the compelling concept of adaptive reuse, where these structures are thoughtfully repurposed to meet contemporary needs.

1. Structure:

Size and Layout:

Warehouse structures come in various sizes and layouts, from compact storage facilities to expansive distribution centres. They typically feature open floor plans and high ceilings to facilitate efficient storage and movement of goods.

Roofing and Walls:

Roofs may be flat or slightly sloped, often constructed with materials like pre-engineered steel or concrete to support heavy loads. Walls are typically made of durable materials like concrete, steel, or metal cladding to provide structural integrity.

Loading Docks and Doors:

Loading docks and large doors are essential for the seamless flow of goods in and out of warehouses. Dock levellers and seals help bridge the gap between trucks and the warehouse floor.

Use:

Storage and Distribution:

Warehouses primarily serve for the secure and organized storage of raw materials, finished products, and inventory. They are pivotal in the distribution process, streamlining sorting, packaging, and dispatch of goods.



Figure 35: Steel construction of newer warehouses on site (Earth, 2023: online)



Figure 36: Timber trusses of older warehouses on site (Earth, 2023: online)



Figure 37: Timber columns and beams of older warehouses on site (Earth, 2023: online)

Manufacturing and Production:

Some warehouses incorporate areas for light manufacturing or assembly processes, optimizing operational efficiency by keeping raw materials near production zones.

2. Adaptive Reuse:

Residential Conversion:

Warehouses are regularly transformed into trendy loft apartments, utilizing their spacious layouts and industrial aesthetics to create unique residential spaces.

Commercial Spaces:

Warehouses are most commonly repurposed into offices, co-working spaces, and retail establishments, capitalizing on their distinctive architectural features. The (typically) large scale and uninterrupted floor areas of warehouses allow them to be easily adapted to suit commercial functions.

Cultural and Art Centers:

Warehouse buildings provide ample space for cultural and art centres, including galleries, theatres, and creative studios, enhancing their cultural appeal. Their adaptability and expansiveness cater particularly well to artist's studios and maker-spaces.

Historical Preservation:

Adaptive reuse preserves historically significant warehouse buildings, ensuring their continued contribution to cultural and architectural heritage.

Warehouse buildings, with their adaptable structures, continue to play a vital role in ever-evolving urban environments. Through adaptive reuse, they find new life, serving contemporary needs while preserving their historical and architectural significance.

3.2.3. Synthesis

There is a great level of pragmatism present in both the matjieshuis and warehouse archetypes, both are generated to fulfil specific needs. The two main needs being; storage and shelter. The matjieshuis places lesser emphasis on storage and much more on shelter, whereas the inverse is true of the warehouse. The focal point is made clear by the respective scales of the structures. The matjieshuis is tailored to the human scale, whereas the warehouse is tailored to the industrial scale.

Although the scale of the two structures vary greatly, their structure is surprisingly similar. The matjieshuis framework can be seen as the essence of the modern-day warehouse. Both being designed meticulously with structural efficiency in mind. Most warehouses also consist of a “framework” of columns and trusses, that leave the central floor area unobstructed. Instead of being covered with woven mats, the warehouse framework is covered with a roof finish and the spaces between the columns are filled-in with steel, concrete, or brick. In both cases, the framework serves as the main structural component.

This use of framework and unobstructed floor area make both structures highly adaptable to different needs. The matjieshuis was used by the Khoikhoi for various purposes, including shelter, cooking, and storage. Modern warehouses can be re-purposed for different industries, such as e-commerce fulfilment, manufacturing, or retail. This is aside from the plethora of adaptive re-use possibilities that warehouses present.

This is, however, where the similarities end, as cultural significance and gathering are very far removed from the warehouse archetype. It is through the reinterpretation and integration of the matjieshuis, within a warehouse framework, that this lack of cultural significance will aim to be addressed. This will also shed light, and bring awareness to the first inhabitants of the area. Bringing the events of the past into modern discourse.

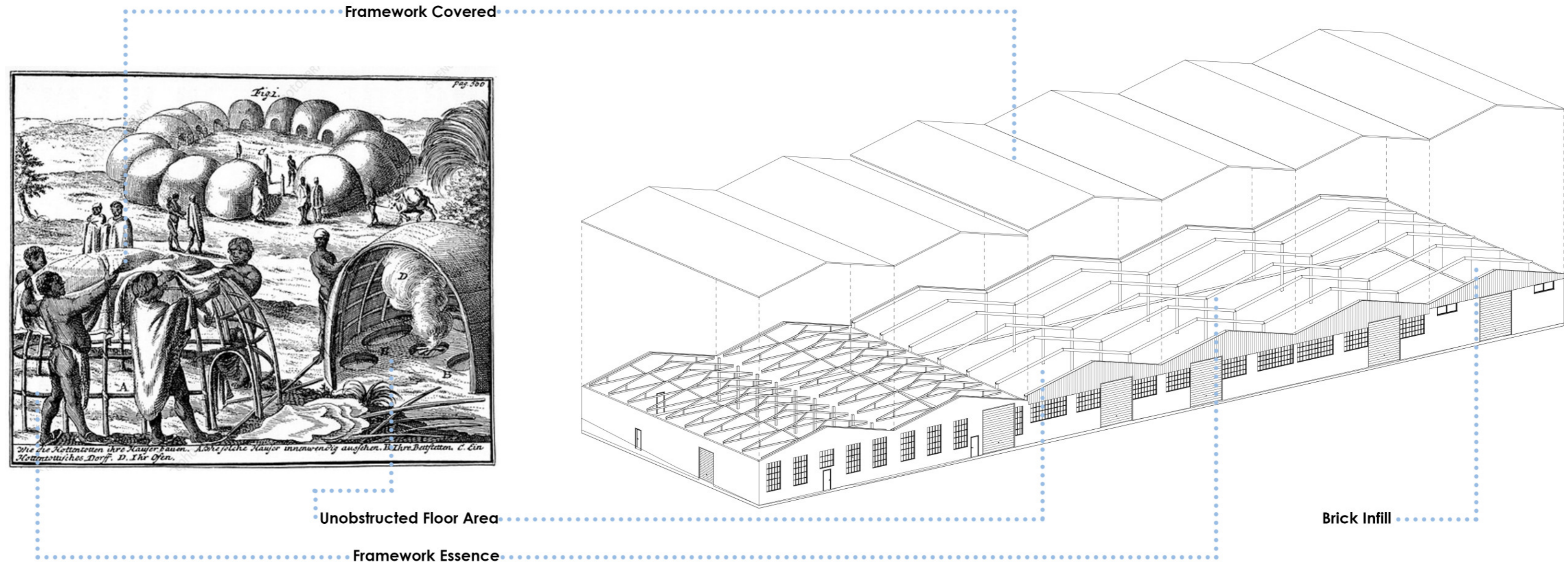


Figure 38: Comparative analysis of matjieshuis and warehouse (author)

3.3. Precedents

3.3.1. Basilica Cistern

This analysis examines the Basilica Cistern, an ancient subterranean structure located in Turkey. Through historical, architectural, and functional lenses, this study investigates the spatial quality and functionality of the cistern.

The Basilica Cistern, also known as the “Yerebatan Sarnıcı” in Turkish, is one of Istanbul’s most remarkable and historically significant architectural structures. Constructed in 542 by Emperor Justinian I, the cistern served as a water storage facility for the Byzantine and Ottoman civilizations (Agency, 2019: online). It is distinguished not only by its historical purpose but also by the ingenious addition of a walkway that has transformed it into a tourist attraction. This analysis delves into the cistern’s function and the architectural modifications that enhance its accessibility and visitor experience.

The primary function of the Basilica Cistern was to store and supply water to the city of Byzantium (later Constantinople and modern-day Istanbul). The cistern was capable of holding up to 80,000 cubic meters of water, collected from various aqueducts (Berger, 2012: online). This reservoir played a pivotal role in sustaining the city during times of siege and drought, making it essential to the city’s survival.

The cistern’s architecture is a testament to Roman engineering prowess. It consists of 336 columns arranged in 12 rows, and these columns support the massive ceiling, creating a mesmerizing forest-like atmosphere. Each column is unique, showcasing various architectural styles, including Corinthian and Doric capitals, revealing the repurposed materials from earlier structures. The cistern’s roof is composed of brick and Khorasan mortar, which was a significant technological advancement during its construction (Agency, 2019: online).

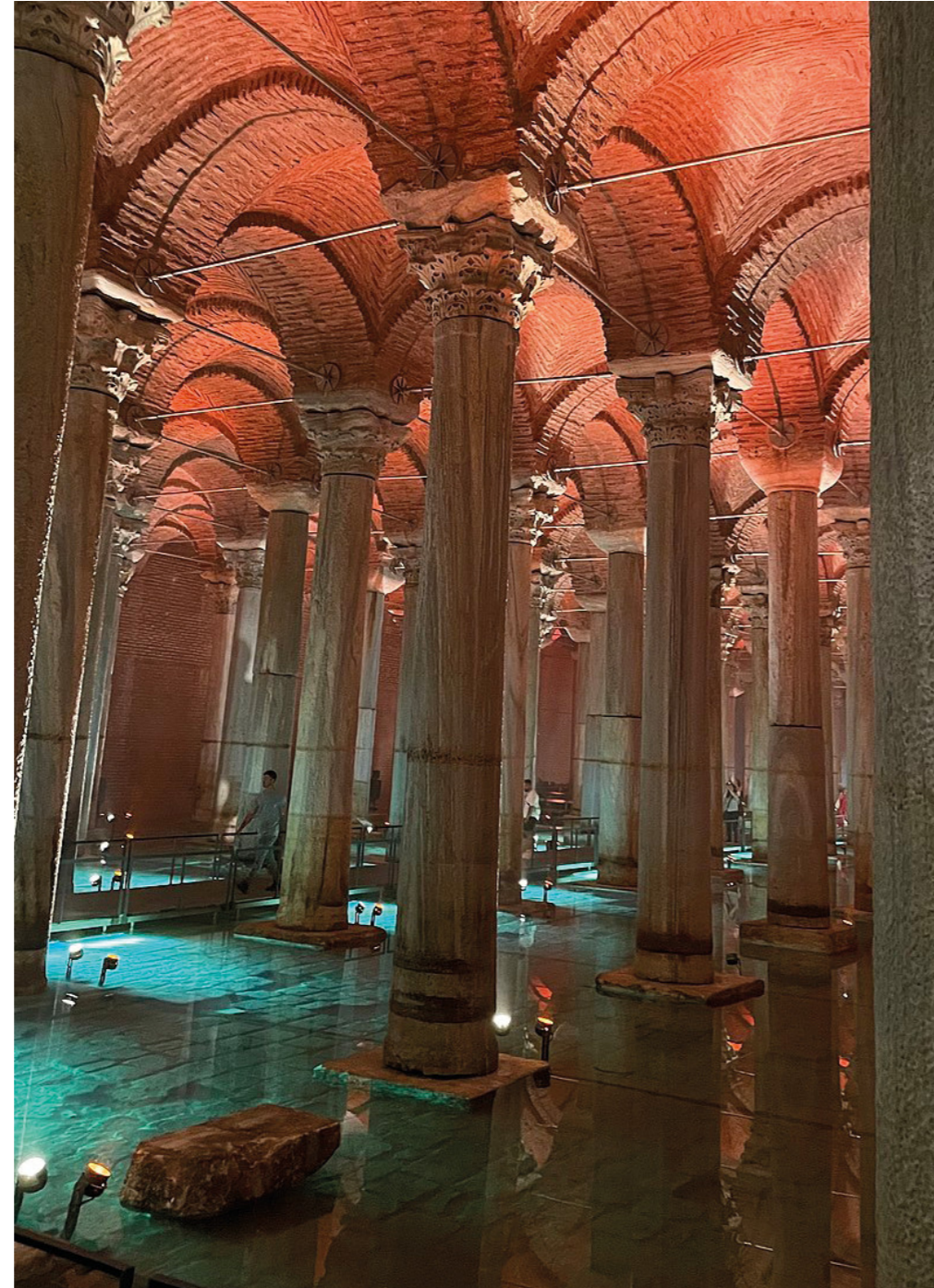


Figure 39: Water covered floor of the Basilica Cistern (Holidays, 2022)

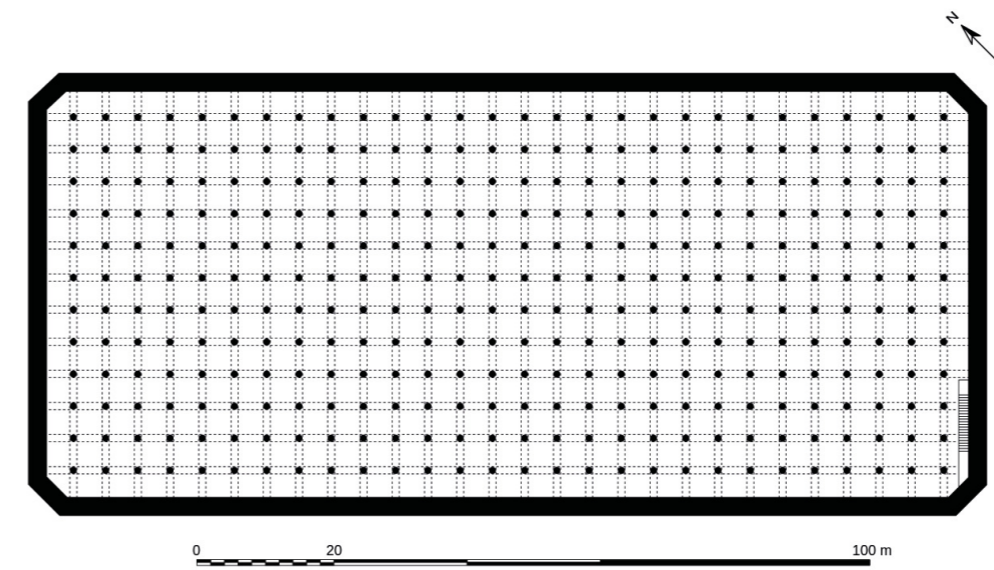


Figure 40: Floor plan of the Basilica Cistern (Zajaczkowski, 1608)

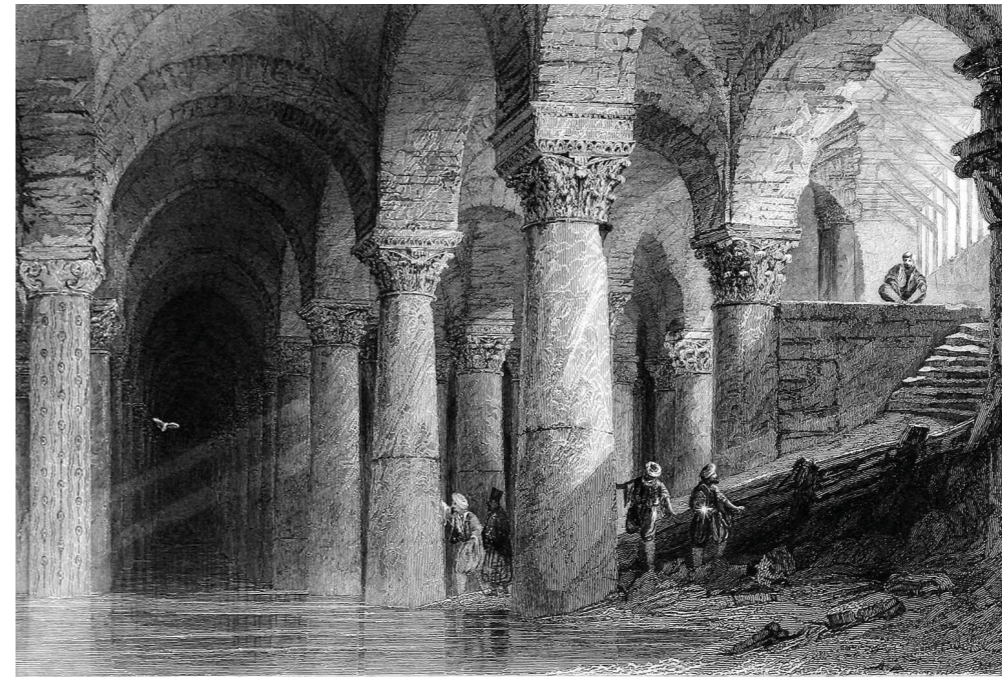


Figure 41: Illustration of original form of the Basilica Cistern (Illustrations, 2023)

Khorasan is the name given to crushed and ground burnt clay as in bricks, roof tiles and pottery. The “khorasan mortar” is a mortar made with khorasan and slaked lime, sometimes with additions of sand. This composition imparts exceptional properties to the mortar, such as remarkable durability, thermal insulation, and resistance to seismic forces (Güner, 1986: 2). Its pliable nature during application allows for intricate architectural detailing and adaptation to diverse construction needs.

Added in 1985, the walkway facilitates tourist access to the cistern, making it a popular attraction in Istanbul (Berger, 2012: online). Visitors can explore the cistern comfortably without wading through the water, and the walkway provides vantage points for admiring the cistern’s awe-inspiring architecture and the famous Medusa heads that form the base of two of the 336 columns. Being mere centimetres above the water level, the walkway amplifies the spatial quality of the cistern, by allowing visitors to feel as if they are walking on the water itself.

The Basilica Cistern stands as a testament to the ingenuity of Roman engineering and the adaptability of historical structures. Its historical function as a water reservoir and its modern role as a tourist attraction, facilitated by the added walkway, underline its enduring importance. Understanding the symbiotic relationship between historical preservation and accessibility ensures that this remarkable piece of history continues to captivate and educate visitors for generations to come.

Principles identified:

- Spatial quality defined by:
- Water covered floor
- Walkway near water level
- Forest-like column grid
- Sound of water dripping
- Verticality of the space

3.3.2. Nest We Grow

Architect: Kengo Kuma & Associates

Location: Hokkaido, Japan

Year: 2014

Nest We Grow by Kengo Kuma is a fascinating architectural project that exemplifies innovative design thinking, sustainability, and a harmonious integration with its natural surroundings. This analysis will focus on the key aspects of circulation, and structural system.

1. Circulation:

The circulation within the building is a crucial element of its design, as it plays a pivotal role in creating a dynamic and interactive space. The project is located in the Hokkaido University Forests, a place of research and learning. The circulation here is intentionally designed to encourage a strong connection between people and nature.

Transparency and Views: The structure features large expanses of glazing that provide panoramic views of the surrounding forest. This transparency not only visually connects the interior spaces with the outdoors but also allows natural light to flood the interior spaces, reducing the need for artificial lighting and reinforcing the connection to nature.

Centralised Design: A tea platform in the middle of the nest creates a gathering space where the community can visually and physically enjoy food around a sunken fireplace.

Stairs and Walkways: The walkways and stairs in the building are not just functional elements for vertical circulation; they are designed to be an integral part of the architectural experience. They wind around the central courtyard and create a sense of discovery as one moves through the space.

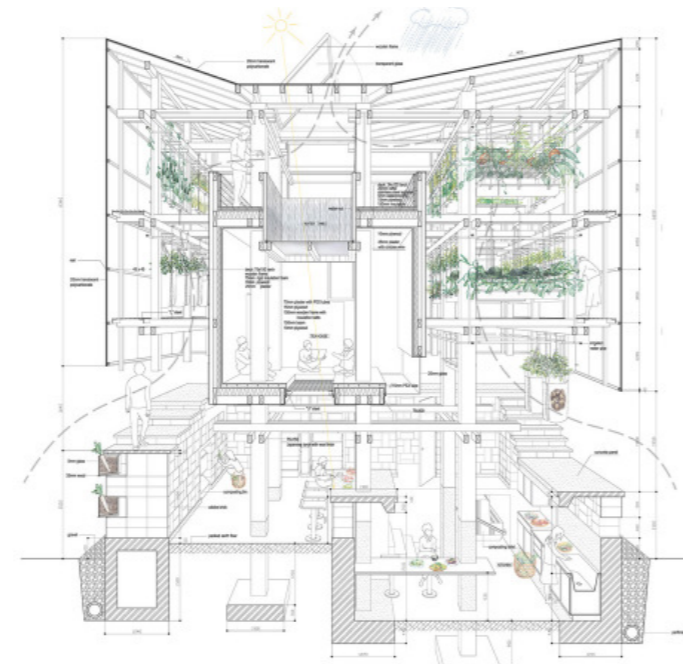


Figure 42: Sectional perspective of Nest We Grow (Sha, 2014)



Figure 43-44: Photographs showing space and connections (Sha, 2014)

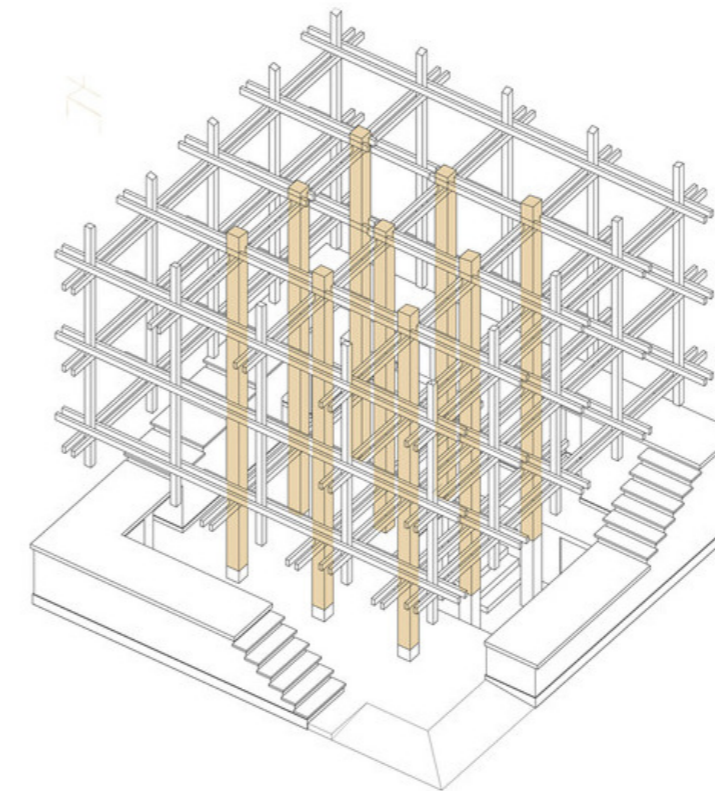
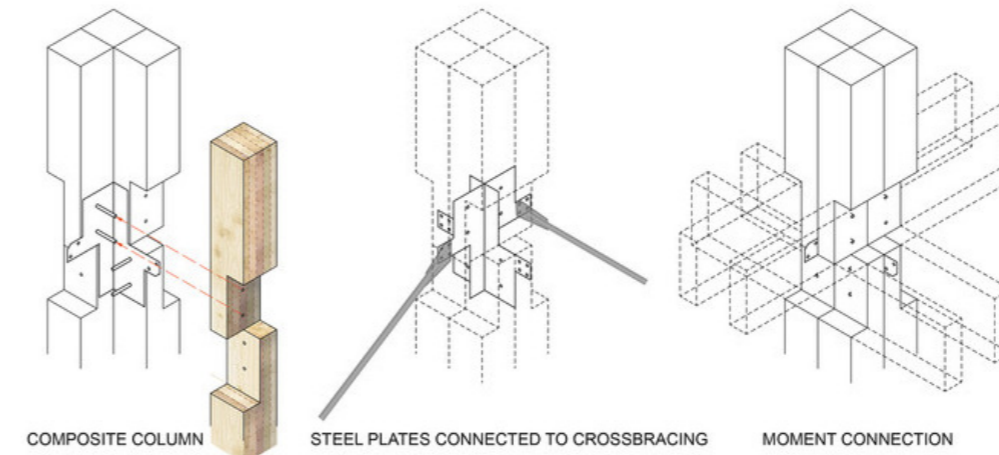


Figure 45: Axonometrics of structural approach (Sha, 2014)

2. Structural System:

The structural system of the building is a testament to the fusion of tradition and modernity, as well as its commitment to sustainability.

Timber Structure: The project prominently features a timber structural system, which is not only a nod to traditional Japanese architecture but also aligns with sustainable design principles. Timber is a renewable resource and sequesters carbon, making it an environmentally friendly choice.

Column-and-Beam Construction: The use of a column-and-beam construction system allows for a flexible and open interior layout. This system is not only functional but also adds to the architectural expression of the space. The building's modular construction is evident in its exposed wooden structural system. This articulation clearly showcases the construction process and also allows for flexibility and adaptability in the future.

Material Palette: The careful selection of materials, including wood, polycarbonate sheeting, rammed earth, and steel, contributes to the articulation of the space. The warm and tactile qualities of wood contrast with the translucent sheeting, and the rammed earth with the steel bracing, creating a harmonious balance between natural and man-made elements.

Principles Identified:

- Circulation as means of discovery
- Views connecting interior with nature
- Central gathering spaces
- Contemporary use of traditional materials
- Exposed, modular structural system
- Balance and contrast between natural and man-made materials

3.3.3. MuttENZ Water Treatment Park

Architect: Oppenheim Architecture
Location: MuttENZ, Switzerland
Year: 2017

The MuttENZ Water Purification Plant, located in MuttENZ, Switzerland, is an excellent example of modern infrastructure that combines spatial efficiency, functionality, and educational outreach. This analysis will delve into these aspects to provide a comprehensive understanding of the plant's design and significance.

Spatial Layout:

The spatial layout of the MuttENZ Water Purification Plant is a testament to efficient land use and thoughtful integration into the surrounding environment. The facility is situated on the banks of the Rhine River, allowing for easy access to a vital water source. The plant is designed to maximize space utilization while minimizing its visual impact on the landscape.

Modular Design: The plant is organized into distinct, interconnected modules, each serving a specific function in the water purification process. This modular approach allows for flexibility in operation, maintenance, and expansion as needed.

Accessibility: The layout emphasizes efficient workflows and access for maintenance and repair. Clear pathways and infrastructure are designed to ensure that personnel can move easily throughout the facility, enhancing operational efficiency.

Functionality:

The functional aspects of the MuttENZ Water Purification Plant are designed with precision and state-of-the-art technology to ensure the highest water quality and operational efficiency.

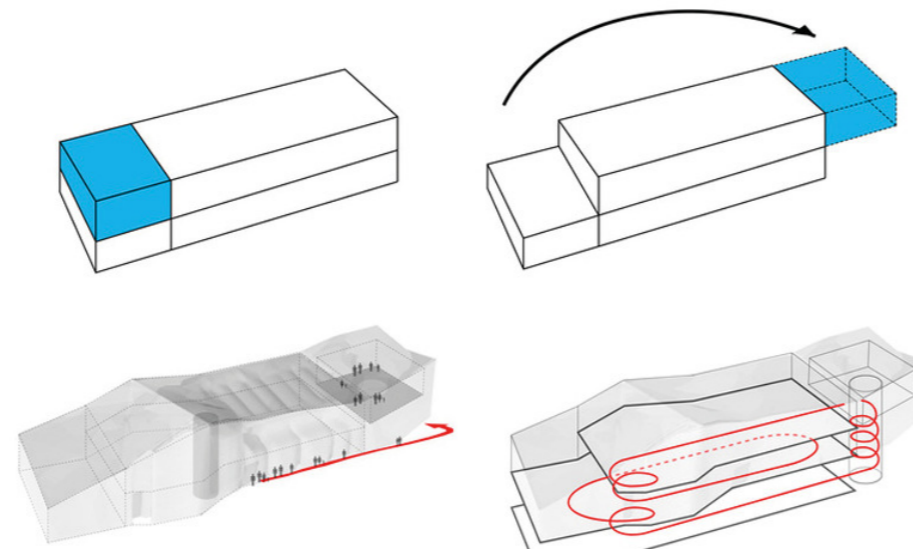


Figure 46: Illustrations showing massing approach (Müller, 2017)

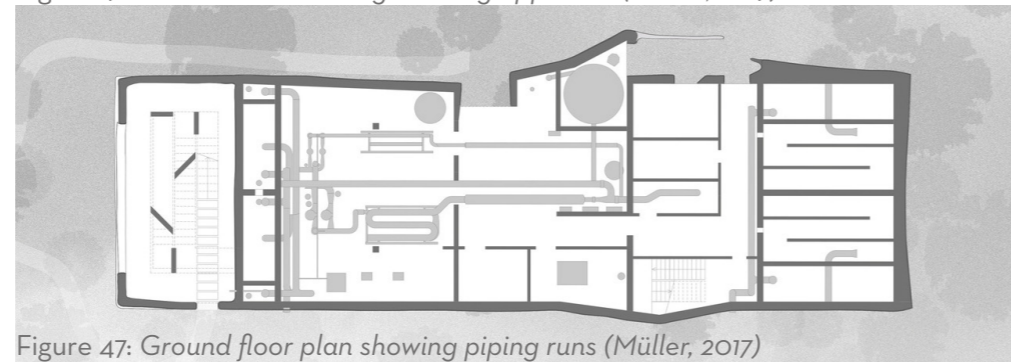


Figure 47: Ground floor plan showing piping runs (Müller, 2017)

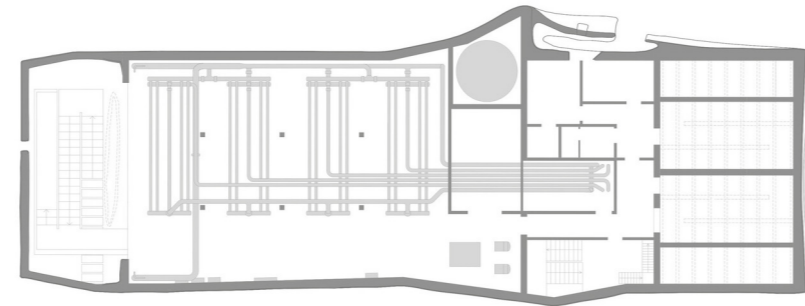


Figure 48: First floor plan showing piping runs and filter room (Müller, 2017)



Figure 49: Section showing piping runs and education space (Müller, 2017)

Figure 50: Photograph showing atmospheric water presence device (Müller, 2017)

Water Treatment Process: The plant employs advanced water treatment technologies, including sedimentation, filtration, chemical dosing, and UV disinfection. These processes are carefully integrated into the facility's layout to optimize the purification process while minimizing energy and resource consumption.

Quality Control: Quality control measures are integrated into the functional design, with real-time monitoring systems and laboratory facilities that allow for constant monitoring of water quality. This ensures that the water leaving the plant meets or exceeds regulatory standards.

Resource Efficiency: The plant incorporates energy-efficient equipment and sustainable practices to minimize its environmental footprint. It also includes sludge treatment facilities to responsibly manage the by-products of the purification process.

Educational Aspects:

One distinctive feature of the MuttENZ Water Purification Plant is its commitment to education and public awareness about water treatment and conservation.

Visitor Centre: The plant includes a visitor centre where the public can learn about the water purification process, the importance of water conservation, and the plant's environmental initiatives. Interactive exhibits, guided tours, and educational programs make the facility an educational hub for students and the community.

Transparency: The architectural design promotes transparency by providing viewing platforms and windows that allow visitors to observe various stages of the water treatment process. This transparency fosters trust and educates the public about the safety and reliability of their water supply.



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Figure 51: Photograph showing education space and filter room (Müller, 2017)



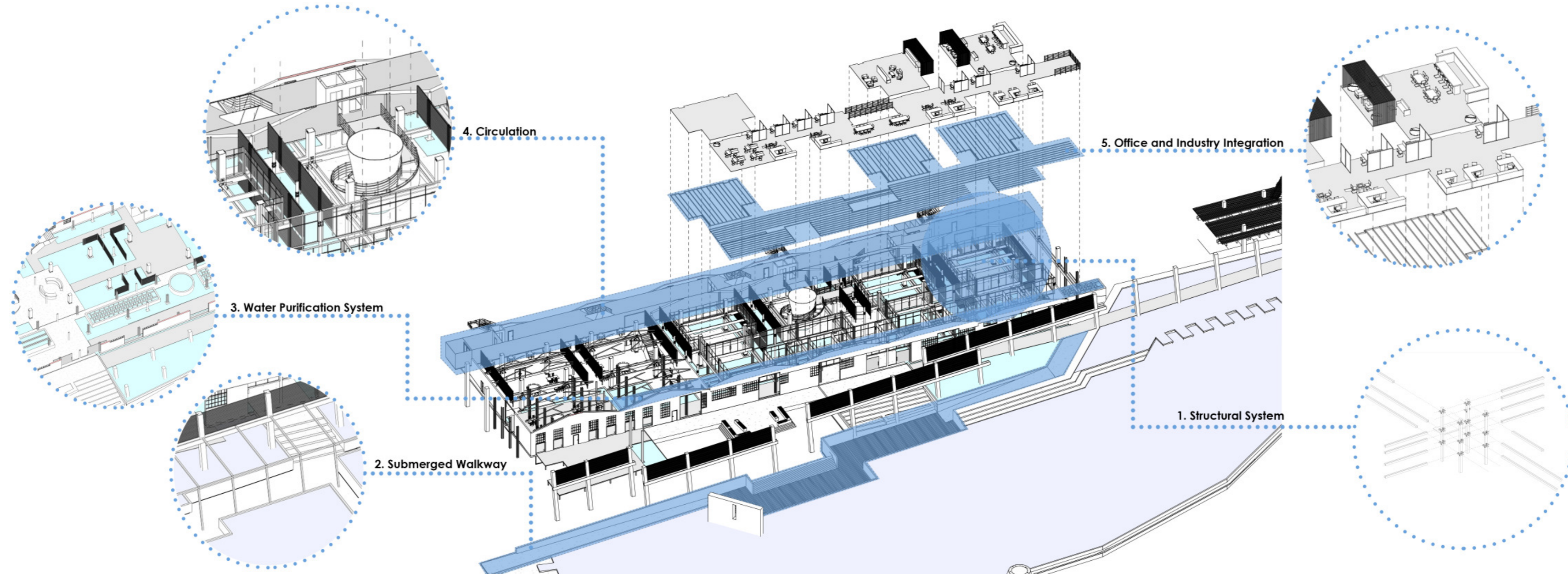
Figure 52: Photograph showing water covered floor at the entrance (Müller, 2017)

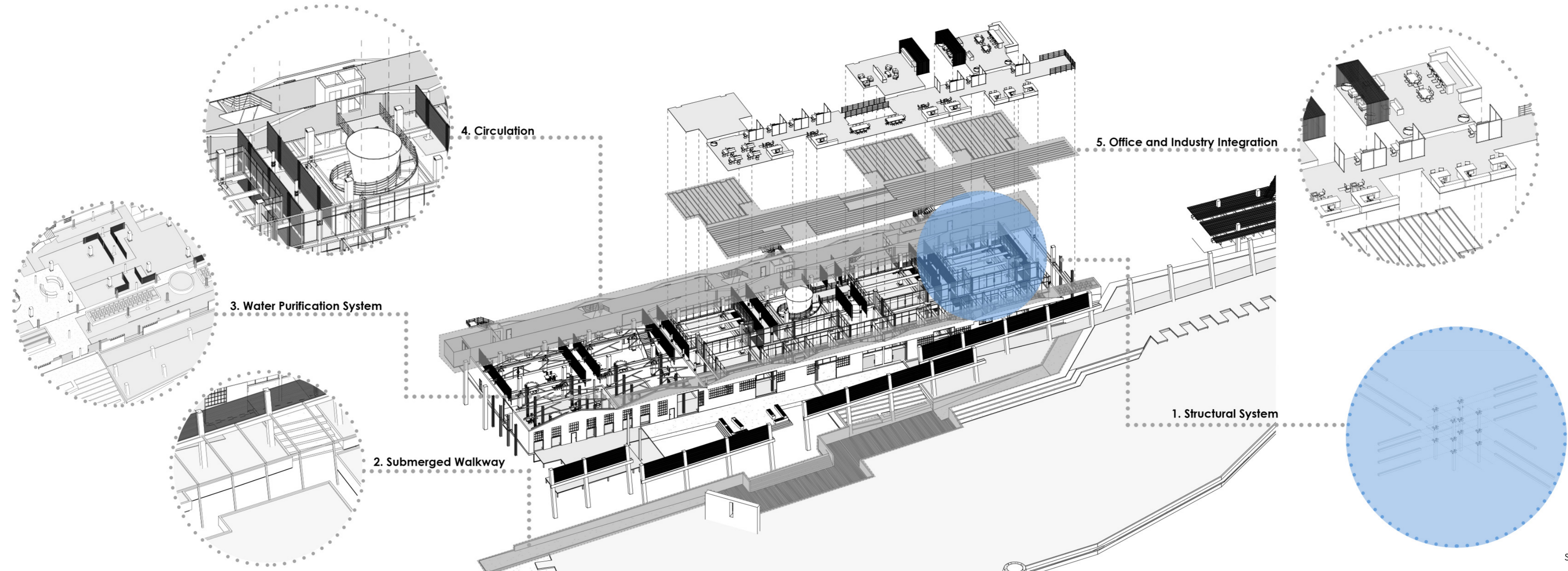
In conclusion, the Muttentz Water Purification Plant's architectural design is an outstanding example of how spatial layout, functional efficiency, and educational outreach can be seamlessly integrated. Its modular design, environmental considerations, and commitment to public education make it a model for sustainable infrastructure that not only provides clean water but also enriches the community's understanding of water resources and their importance

Principles identified:

- Rainwater capture and filtration
- Water presence to create atmosphere
- Sensory engagement
- Visibility of processes
- Community education
- Modular design
- Low impact purification processes
- Constant quality monitoring
- Laboratory integration
- Proximity to nature

3.4.Acquisition





3.4.1. Structural System

This section will highlight how the new addition responds to the existing building in terms of structural composition. It will also offer a detailed explanation of how the new structure will function..

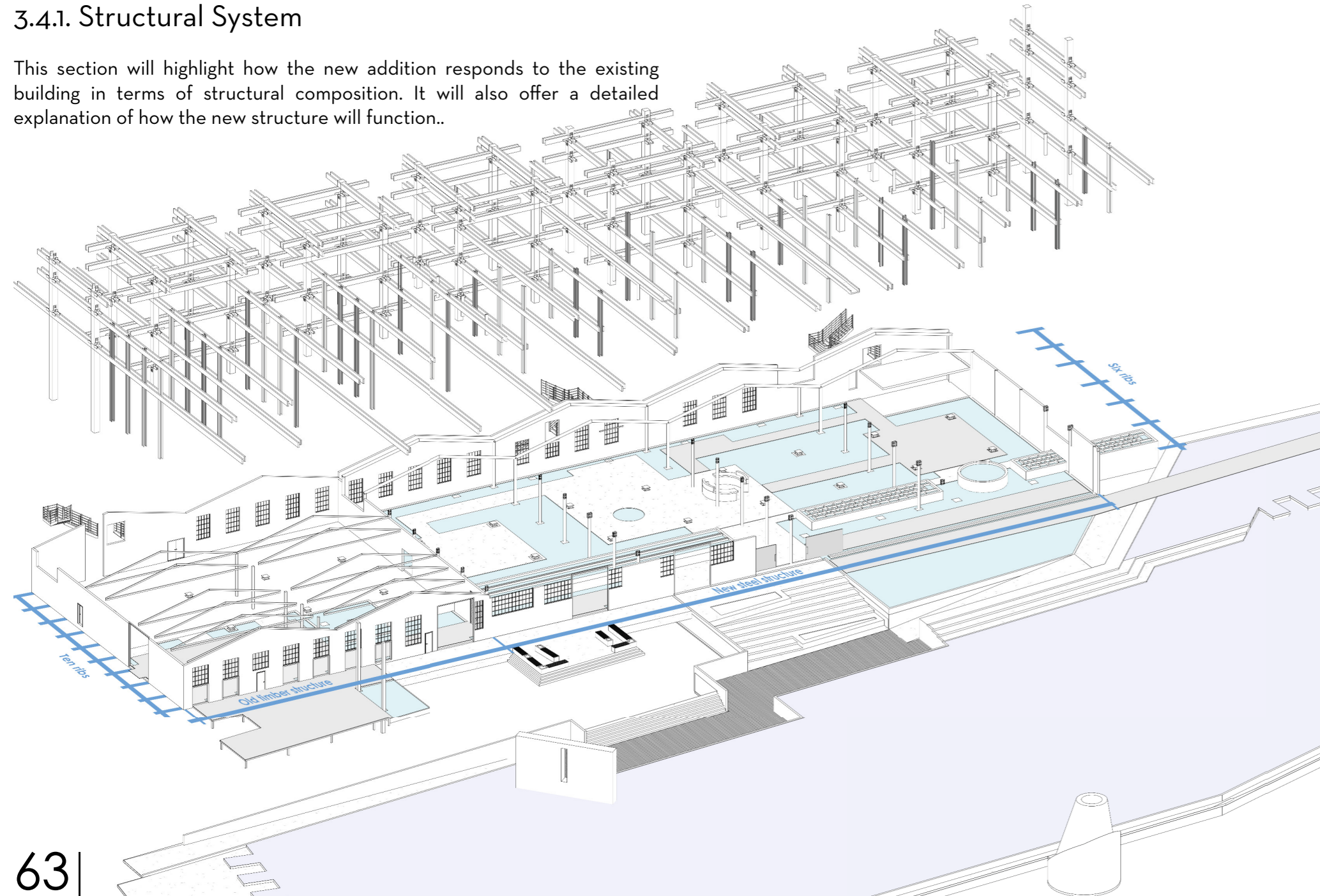


Figure 55: Axonometric showing existing and new structural system (author)

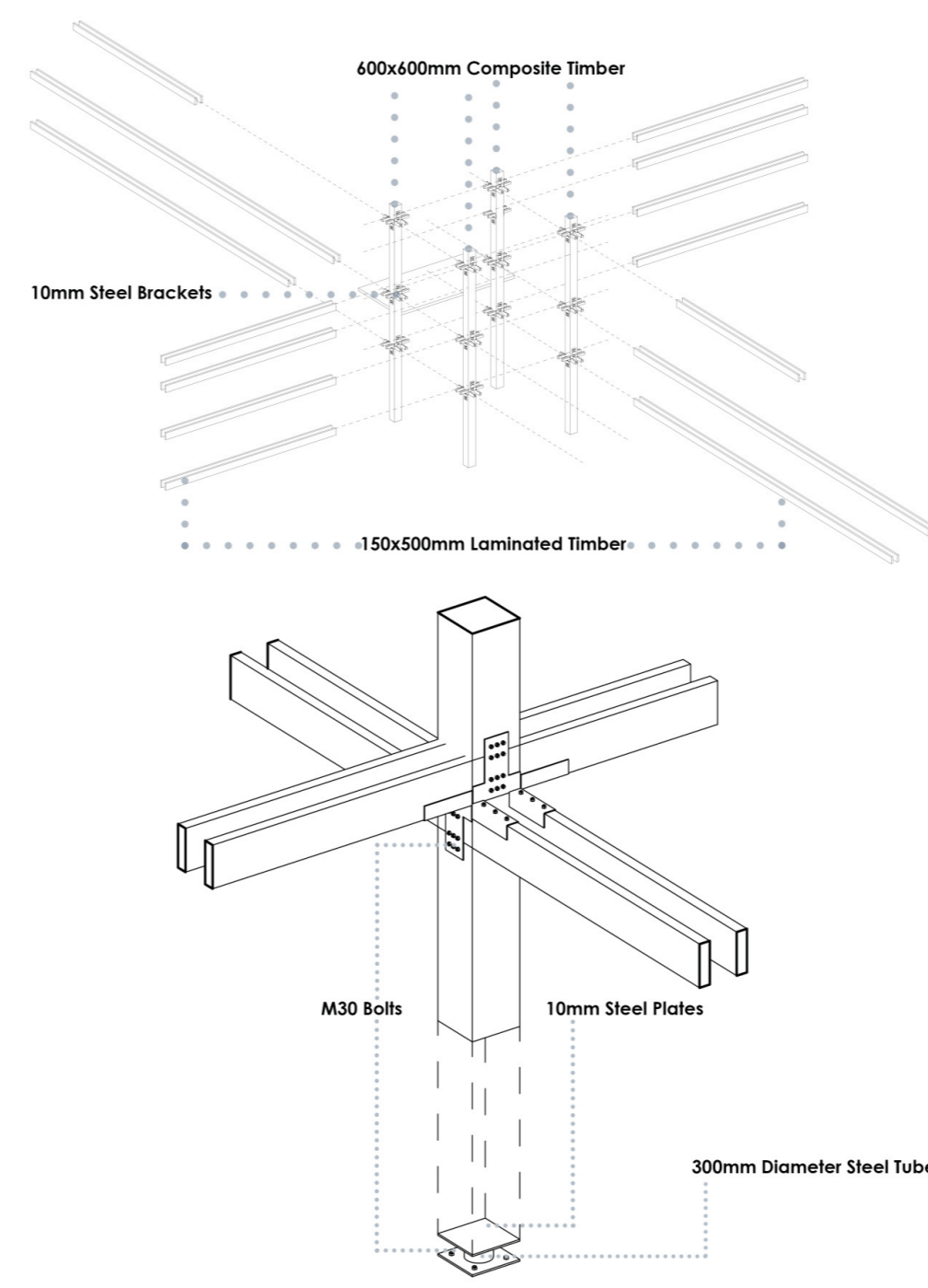


Figure 56-57: Axonometric showing new structural system and its connection detail (author)

The structural system of the existing warehouses possesses a very strong rhythm, front-to-back and side-to-side. The longitudinal rhythm is owed to the six warehouses being built conjointly, making them appear as a unit, along with the fact that they are of equal size. These factors lead to a rhythmic spatial division, and divides the site into six equally sized modules.

Within these six modules, occurs another rhythm. A rhythm caused by the regular intervals at which columns have been placed. These are not exactly the same for all of the modules, as the eastern two are older, and make use of timber columns, trusses, and load-bearing brick walls. Where the four newer warehouses make use of steel trusses and columns, with brick infill between them. The older warehouses, thus, require the columns and trusses to be spaced more closely. This leads to the new warehouses having six ribs, and the old warehouses having ten.

The proposed structural intervention will draw from this distinct rhythm to guide in the composition of the structure. The six distinct modules are preserved and highlighted by the unique structural system, that is placed within the existing column grid. Further strengthened by the protruding towers, that also act as the most direct reinterpretation of the matjieshuis.

The modules and existing structure are also highlighted by the water management system of the building. This is achieved by lengthening the existing columns, and placing large, concrete gutters onto them. These gutters are visible throughout most of the building, and one crosses them at multiple points in the journey through the building. This water presence aids in creating hydro-awareness, and highlighting the modular, systematic approach to the structure.

Additionally, the proposed system is greatly inspired by *The Nest We Grow* by Kengo Kuma, with its strong column and beam network. The system is also synthesised from analysing the touchstone and concepts, all of which make use of some form of column and beam system. The main reason for adopting this approach is the adaptability that it presents, staying true to the warehouse and matjieshuis.

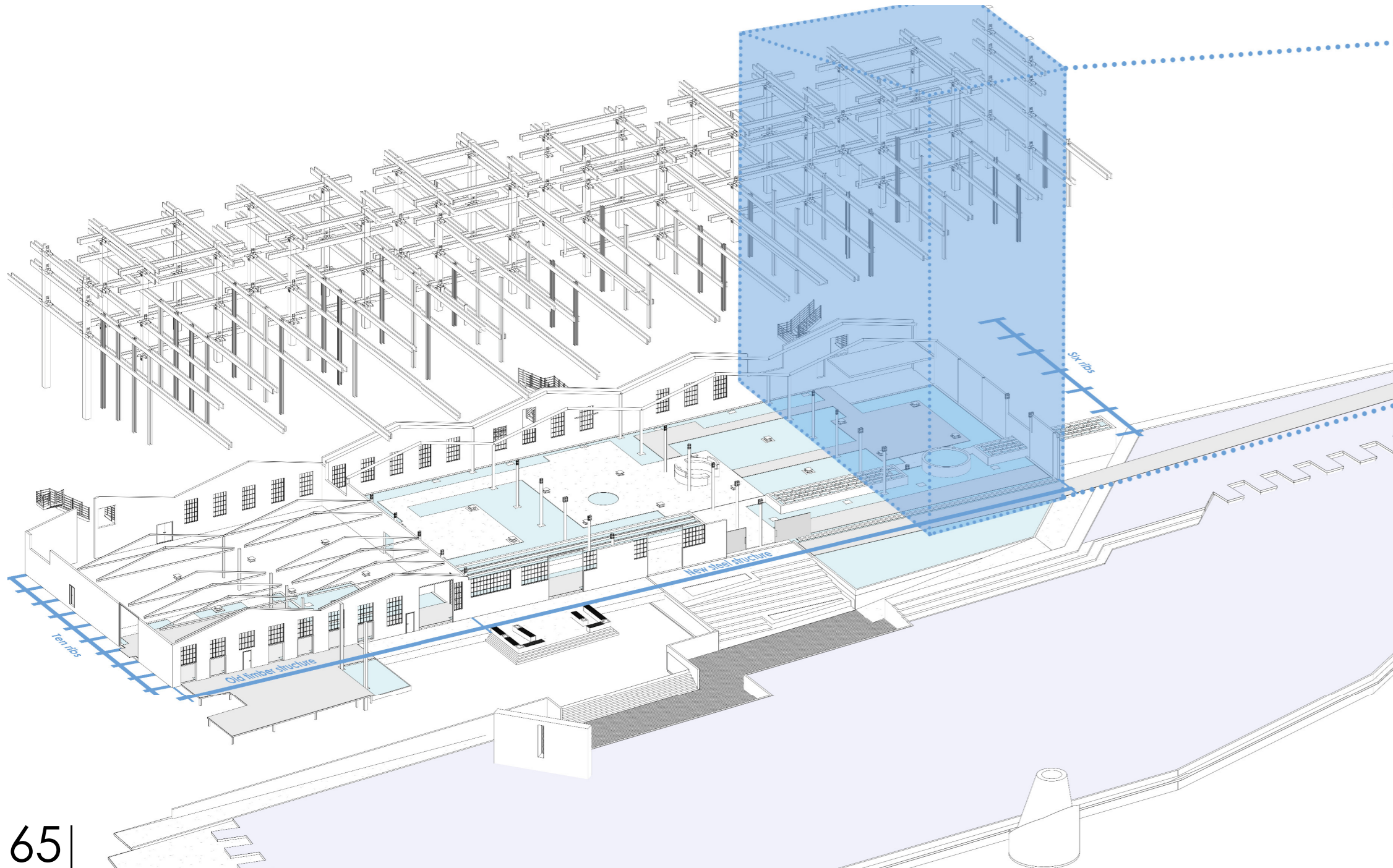


Figure 58: Axonometric highlighting a module of the new structural system (author)

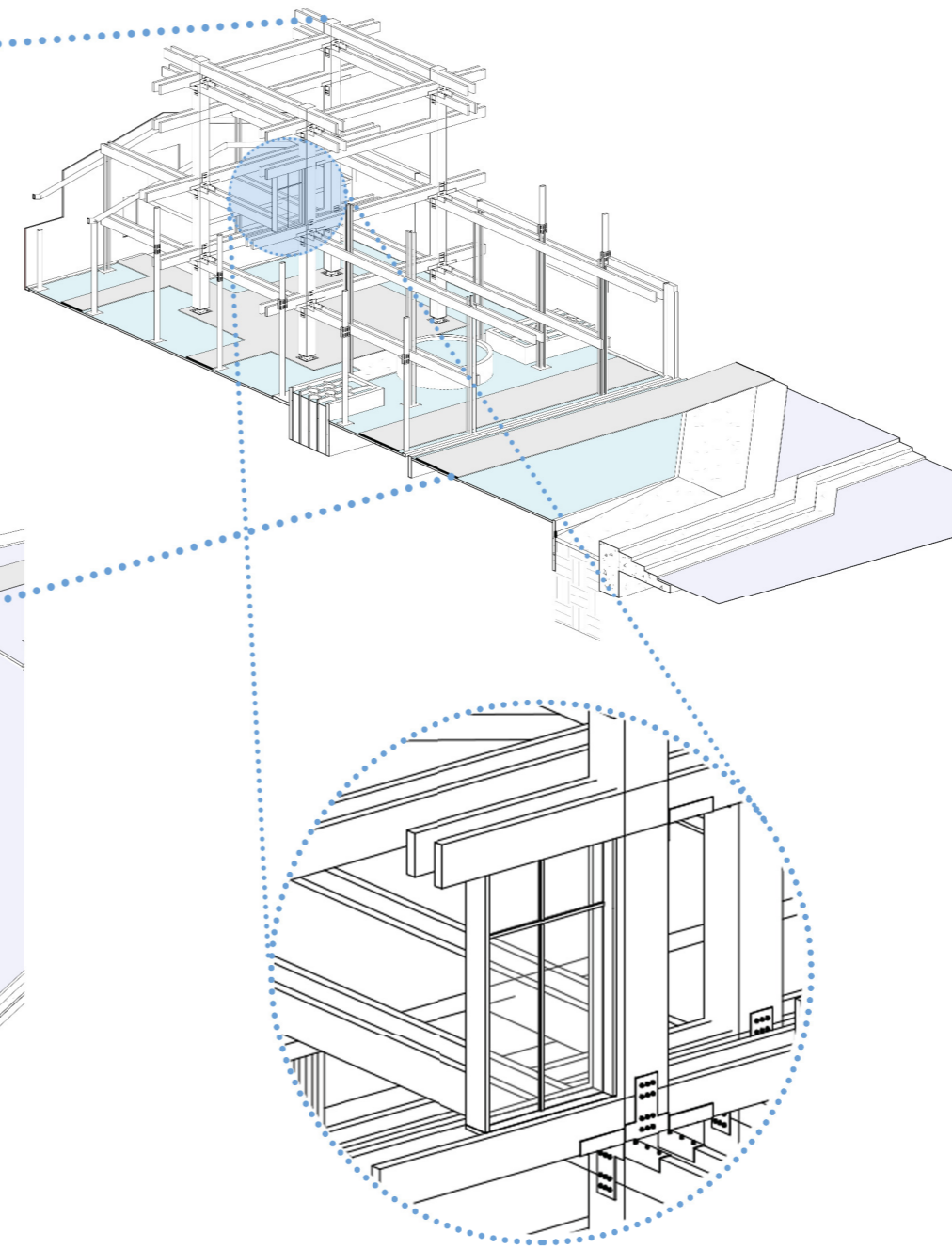
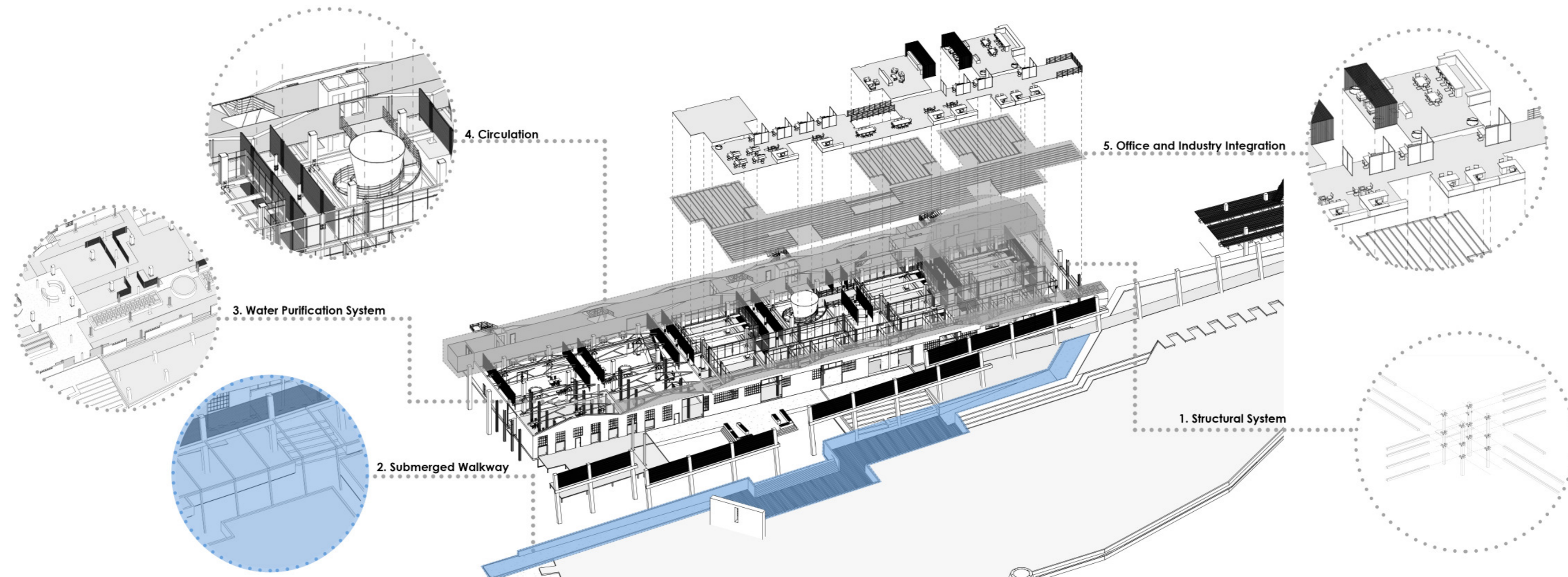


Figure 59: Module of new structural system and how curtain walls fit between beams (author)

To achieve the proposed system, large, composite timber columns form the basis, from which the structure emanates. Grooves are cut into either side of these columns, just large enough for the laminated timber beams to nestle into, creating a double beam system. The beams are held in place with steel brackets bent and bolted into place, on site. Onto these beams, joists are placed to support the floor covering, and the spaces are enclosed with curtain walls, whose frames fit precisely into the space between the double-beams.

To enhance the lightness of the structure, smaller columns are used where the beams require additional support, nearer the northern façade. These columns are placed where the existing column grid intersects the new grid. They are placed in a quad-formation, for maximum strength and minimum visual weight. The formation is dictated by the space between the double-beams and the size of the existing columns. These smaller columns have the added benefit of highlighting the existing structural system, preventing it from vanishing in the complex structural addition.

This systematic structural approach lends itself to flexibility, with such a strong grid, spaces can be choreographed between it to suit any need the users might have. This systematic approach not only strengthens the rhythm of the existing warehouses, by drawing from it, but also contrasts with it. The spaces contrasts with the rhythm, by flowing between the rigid grid, and bridging gaps between the clearly defined modules. It is this contrast that accentuates, but also challenges the rigid, grid-like approach, creating a “fluid rigidity”.



3.4.2. Submerged Walkway

While the interior of the building largely speaks of fluid-rigidity, the exterior and approach speak of fluidity. Fluidity, in the sense of being in proximity to water, but also in appearance, and how the exterior breaks away from the rigid system within the building. The main driver of this fluidity, is the sunken walkway.

This walkway not only doubles as the memorial space, but also grants an unobscured view over the reinstated lagoon. It achieves this by creating a form of ha-ha fence, with the wall bordering the water, being lower than the southern wall. This enhances the hydro-experience of the users within the building, and also brings walkway users as close to the water as possible.

The northern water-retention wall is at such a height that the average walkway user's eye level is only 250mm above the water level. This creates the illusion that the expanse of water is much larger than it actually is, .

To facilitate the sunken walkway, inspiration is taken from the *Moses Bridge* by RO&AD Architecten. The proposed walkway is sunken in-between two concrete walls, with a timber floor covering. The gaps in the timber members, facilitate the necessary drainage, should strong winds lap water over the low edge, or should rain drench the walkway. Hidden below the timber is a concrete basin, sloped to the centre, where the excess water is collected by a sump-pump. This pump transports the water to the rapid mix unit, where it integrates with the water purification system. This effectively makes the walkway a water collection device.

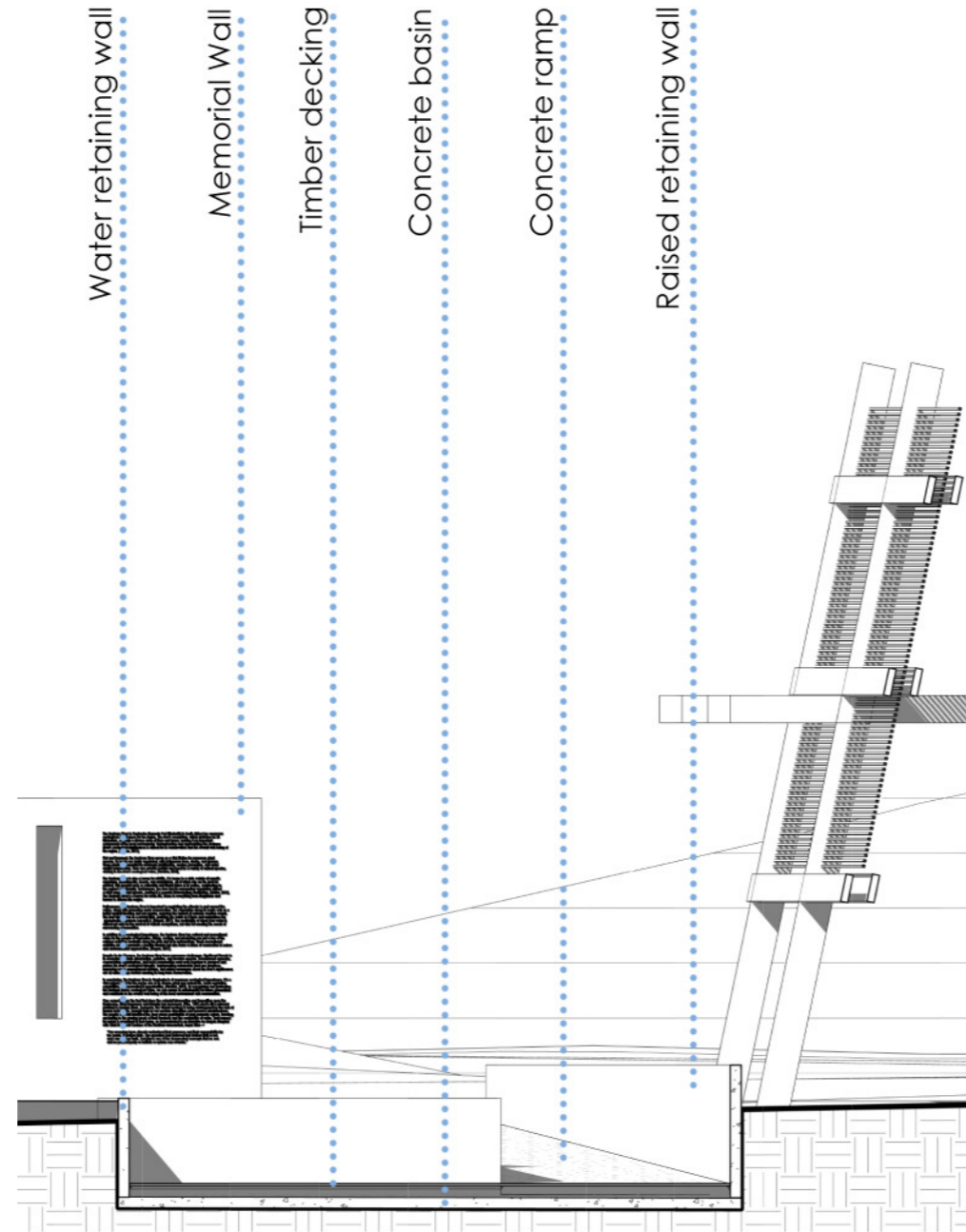


Figure 61: Section through submerged walkway (author)

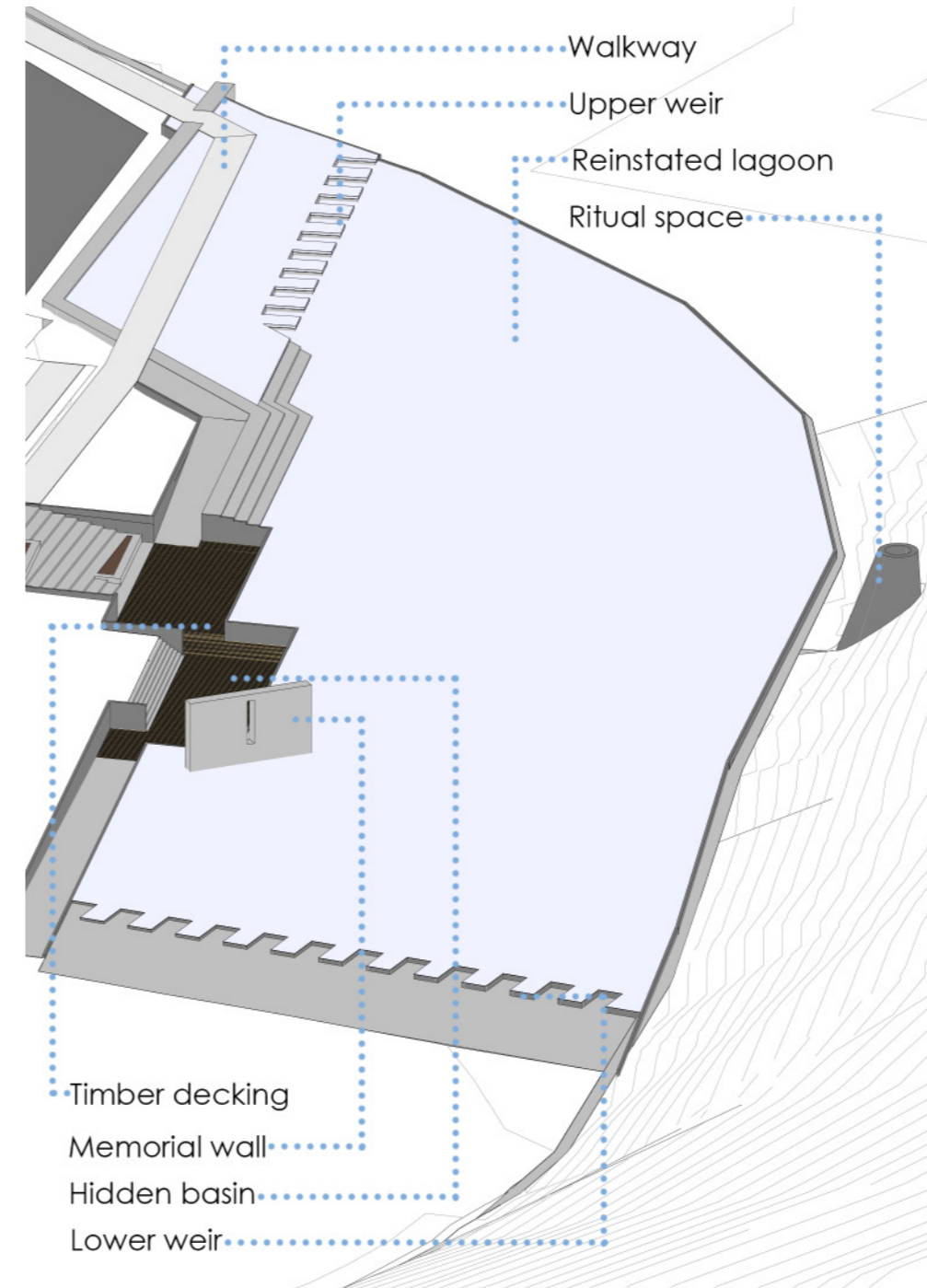


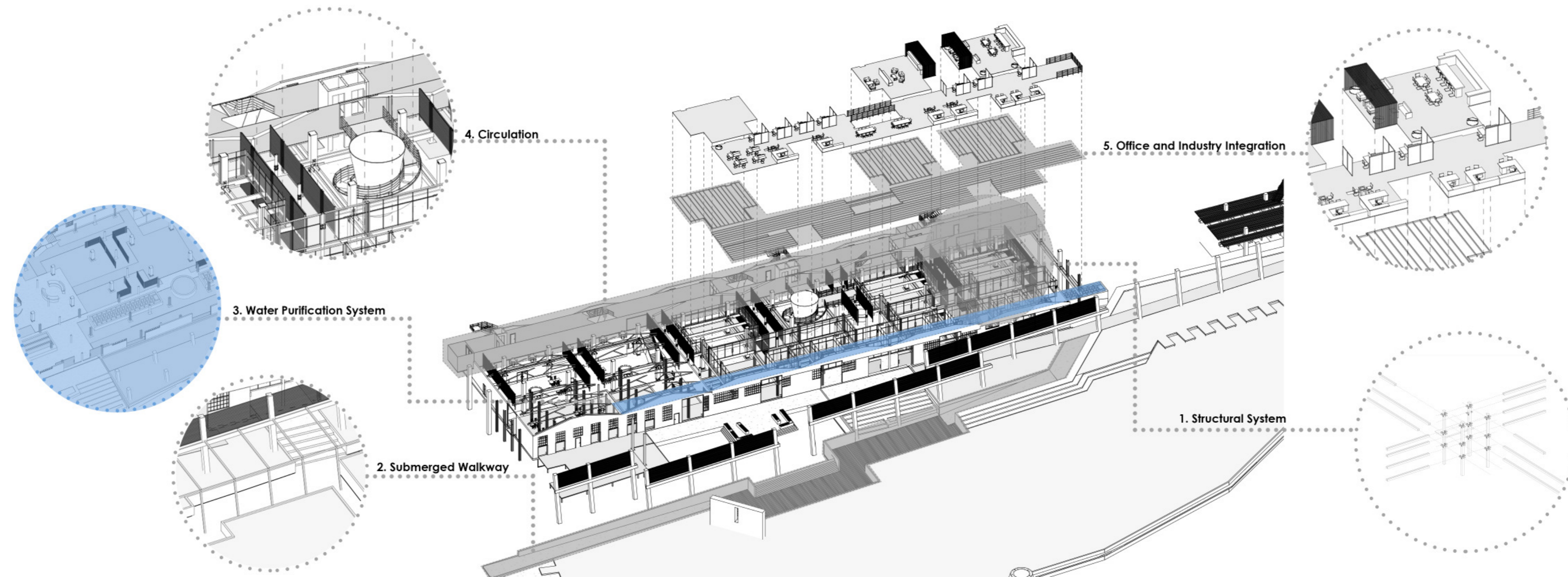
Figure 62: Bird's eye view of submerged walkway (author)

To prevent the water from spilling over the edge of the wall into the walkway, the water level is passively controlled by weirs at the eastern-, and western end of the reinstated lagoon. These weirs are 100mm lower than the level of the retaining wall, thus ensuring that the water level does not rise above the level of the wall.

In the case of a flood, however, the walkway will be allowed to flood, as the retained water can be integrated into the purification system. This serves an ecological purpose, as the water from floods is rarely captured and utilised to its full potential. The stormwater in the Lower Baakens Valley is primarily channelled into waterways, that deposit the, often polluted, water into the harbour.

The walkway will not solve the problem of polluted stormwater entering the ocean, however, it will aim to mitigate some of the harmful effects. This aims to be done by processing as much of the stormwater as possible, minimising the environmental impact of the flood. Moreover, it will bring awareness to the proper treatment of such unpredictable events that, with the proper care and infrastructure, can be made a thing of the past.

Lastly, the walkway strengthens the ritual of entering the building. This is because it not only guides one over and next to the life-giving substance, but also widens the building's threshold considerably. The habitable threshold provides ample seating space for the public and users of the building alike. Allowing users to have a closeness to water, necessary in developing hydro-gratitude. It also creates a space in front of the building that can be used as a spill-out space for the occasional event occurring on the lawn. Most notably, *Food Truck Fridays*.



3.4.3. Water Purification System

Integrating a water purification system into a multifunctional office building involves several processes and considerations. Below, the exact processes and space requirements for such a system will be discussed.

1. System Components:

Raw Water Intake: This is where water from the municipal supply or another source enters the system. In the case of the proposed project, it is captured before flowing over the first set of weirs. From here, it is directly deposited into the rapid mix unit.

Mixing: Rapid mixing is typically done using mechanical agitators or impellers that disperse chemicals evenly in the water. It is in these tanks where chemicals (coagulants and flocculants) are added to the water to destabilize particles and encourage their aggregation. In this particular case, the selected flocculation chemical is aluminium sulphate, which is an odourless, white or colourless, crystalline solid.

Flocculation: After rapid mixing, gentle stirring promotes the formation of larger, settleable floc particles. This is often achieved by pumping the water through a series of baffles, that gently agitate the water, allowing the floc particles to settle to the bottom of the tank.

Sedimentation: These tanks allow the remaining, smaller floc particles to settle to the bottom, leaving clarified water at the top. This clarified water flows over small weirs into a channel that leads it to the filtration system.

Filtration and Disinfection: Filtration is facilitated by pumping the water through increasingly fine substrates, to remove any remaining suspended particles. These substrates are commonly integrated into the disinfection processes, where the water passes through the filters directly into the disinfection units.

Water Purification System

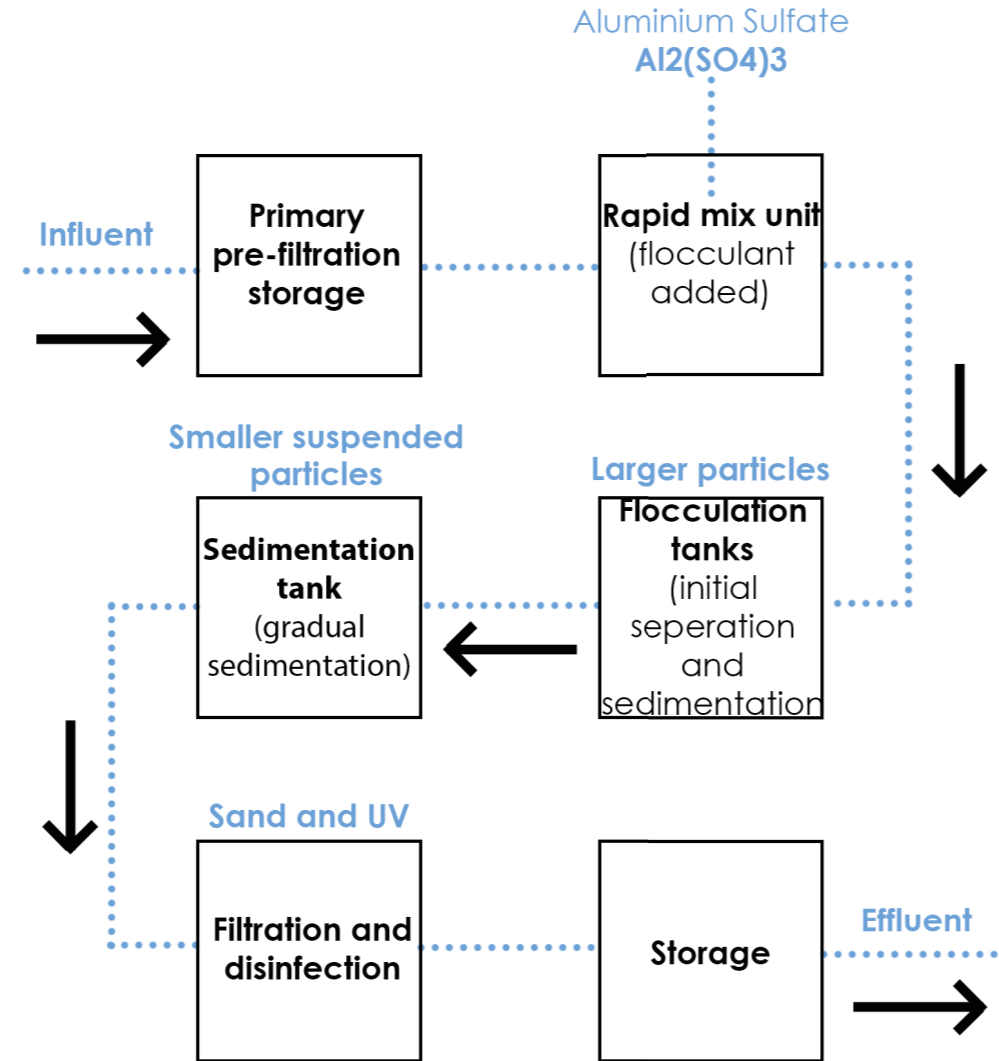


Figure 64: Flow diagram of the chosen water purification process (author)

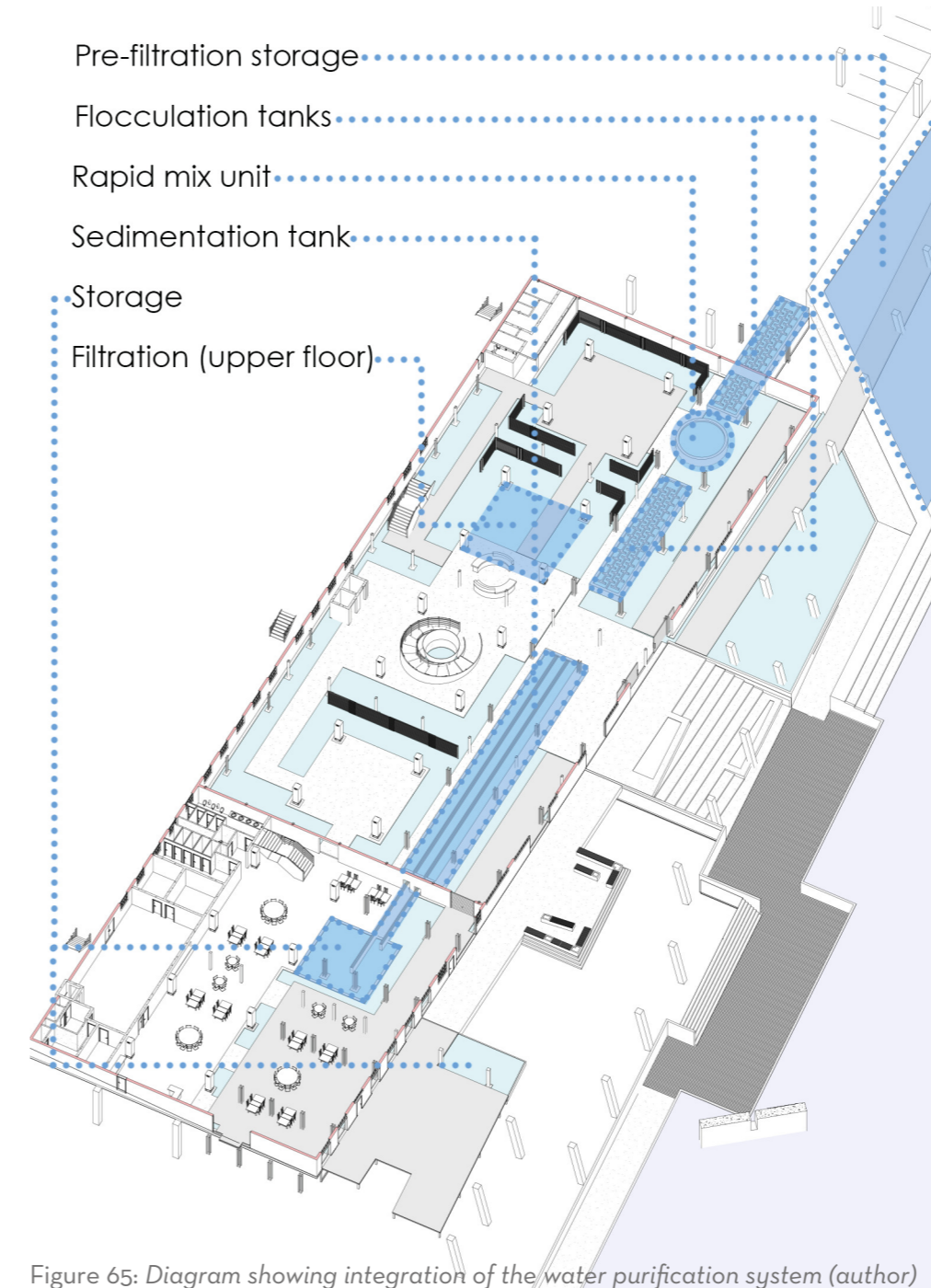


Figure 65: Diagram showing integration of the water purification system (author)

This can be UV, chlorine, or another method to kill pathogens. In this particular case, UV disinfection has been selected to mitigate any unpleasant smells from permeating throughout the building.

2. Space Requirements:

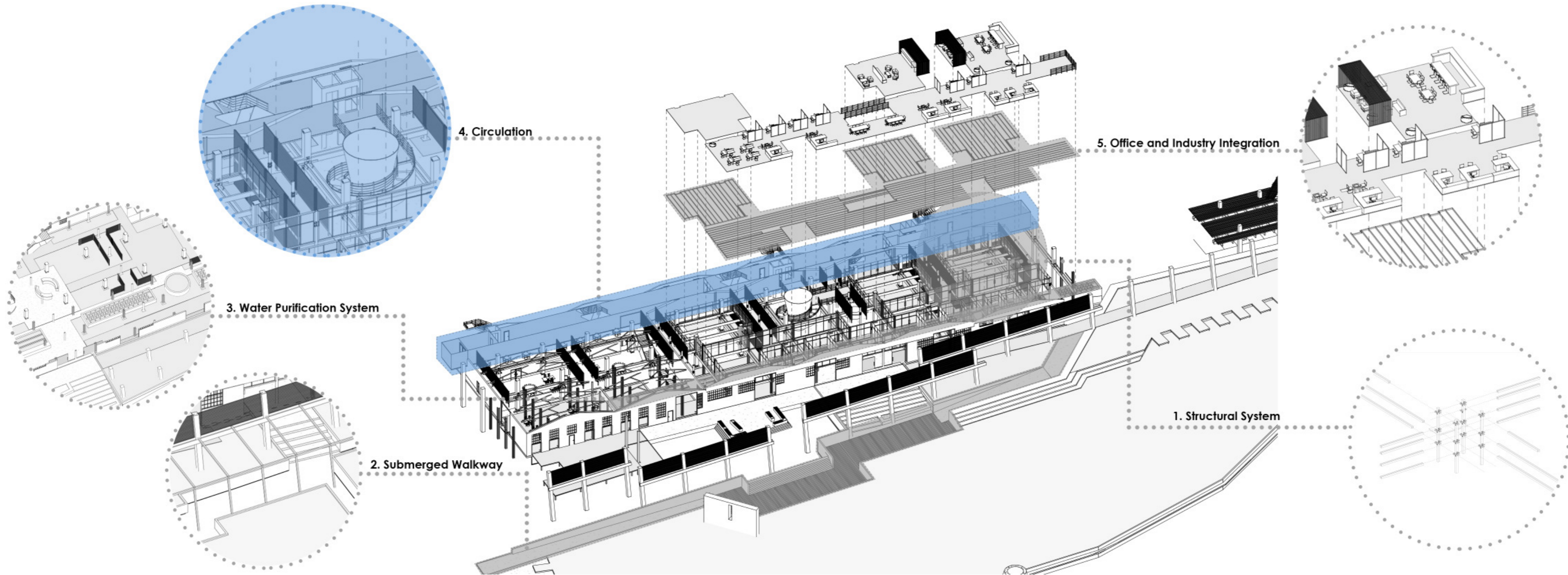
The space required for a rapid mix flocculation water purification system can vary based on the building's water demand, but it typically includes dedicated rooms or areas for each component. In this case it has not been confined to a room, but it rather runs the length of the building, arranged in a linear fashion. This has been done to filter users into the building, further broadening the threshold. The spaces required for the various components are as follows:

Mixing Mechanism: A rapid mix tank is typically no larger than $8m^3$, with the depth of the liquid being between 1.1 and 1.5 times the width of the tank. The impeller diameter is between 0.3 and 0.5 times the diameter of the tank. In this case, the footprint of the tank is 4300mm in diameter, leading to a floor area of approximately $3m^2$ (Florida, n.d.: 6).

Flocculation Tanks: Flocculation tanks can vary greatly in size, depending on specific flow rate, however their length must be equal to 4-5 times the width. With a minimum width of 2 metres. The depth should also be, between 0.8 and 1.2 times the width (Ghawi, 2019: 444). In this particular case, the tank is 14500x3150x2750mm, giving it a floor area of $45.6m^2$.

Sedimentation Tanks: These are typically larger and require significant floor space. The length of the sedimentation tank should be 4-5 times the width of the tank, and the depth should be between 2.5-4.5 meters (Constructor, 2021: online). The tank in this case, is 20000x4000x3000mm, giving it a floor area of $80m^2$.

Filtration and Disinfection Units: These are much more compact than the various tanks, with one integrated unit being 2000x1500x2000mm in size. The system at hand makes use of four integrated filtering/disinfection units to accommodate the necessary volume of water.



3.4.4. Circulation

The circulation system employed by the building is rather unique, in that it creates a pronounced circulation and service core. Upon entering the building, and being filtered through the water purification system, users are presented with the circulation system, visible throughout the entire interior of the building. The circulation core stretches the entire length of the program, connecting the six modules, allowing them to function as a unit. The monolithic core is constructed from weathering steel, to contrast with the extensive use of timber, further strengthening its visual presence, having it act as a datum of circulation. It further contrasts with the building by being a claustrophobic space, with no views towards the outside, except through the various openings that lead outward to the functions of the building.

Having such an enclosed circulation approach, in contrast with a very tectonic structure strengthens the ritual of circulation. It punctuates the experience of circulating through the building, moving from open to enclosed, and vice versa. Entering or exiting the core makes one aware of the ritual of circulation, by contrasting so greatly with the rest of the building. It also signifies the threshold between knowing and unknowing, moving from obscurity into enlightenment. With this ritualistic threshold and circulation, one also perceives, more openly, the various practical water filtration processes occurring within the program.

The liminal space of the circulation core is representative of the harmonious meeting of two realms, the practical and the spiritual. Moving from one to the other, making one markedly aware of the transition between realms, whilst simultaneously connecting them. Much like the river, that serves as a symbolic boundary, architecture can embody rituals and foster connections between the sacred and the everyday.

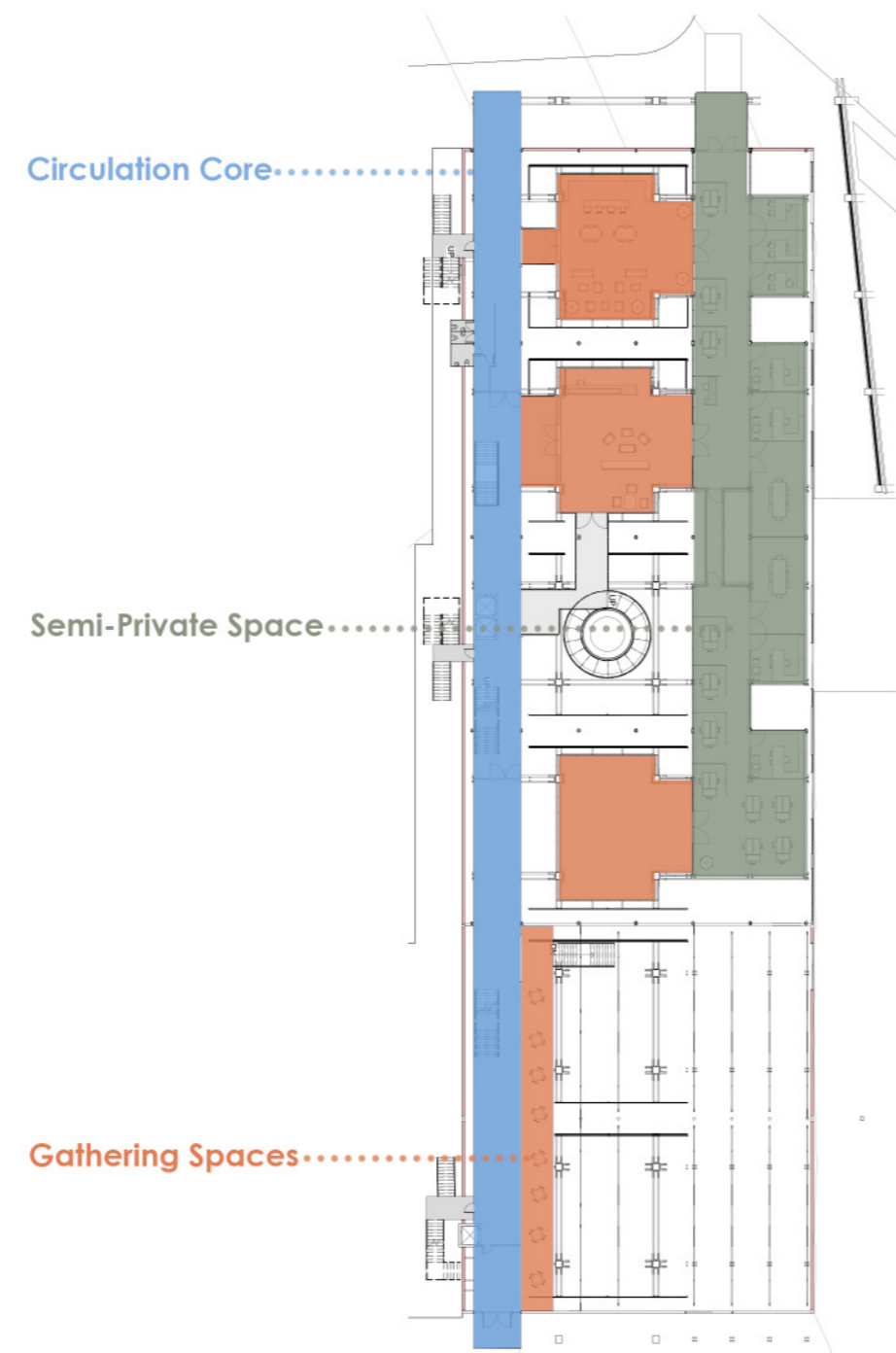


Figure 67: Diagram highlighting spatial uses (author)

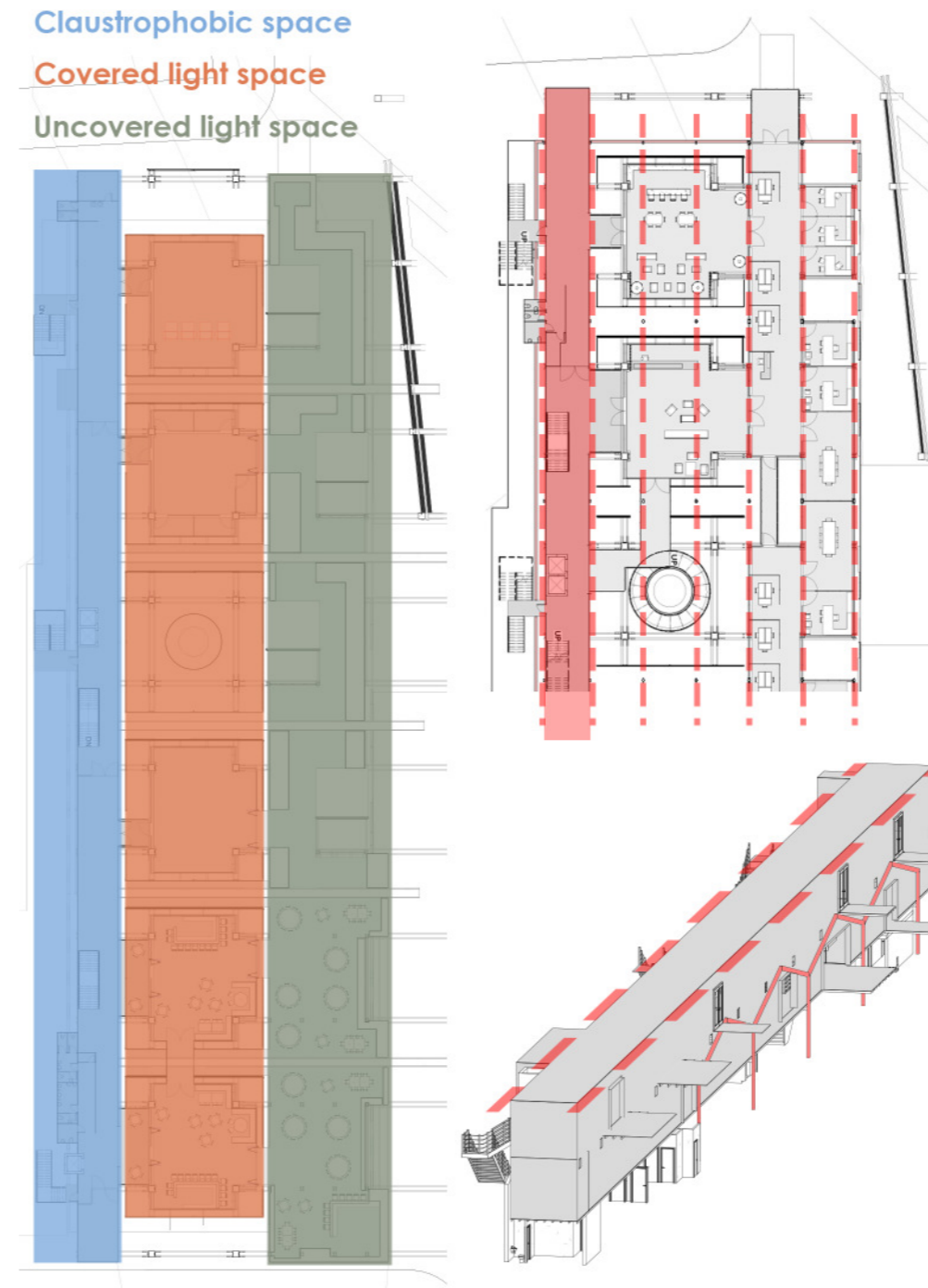


Figure 68: Diagram highlighting spatial division and transition (author)

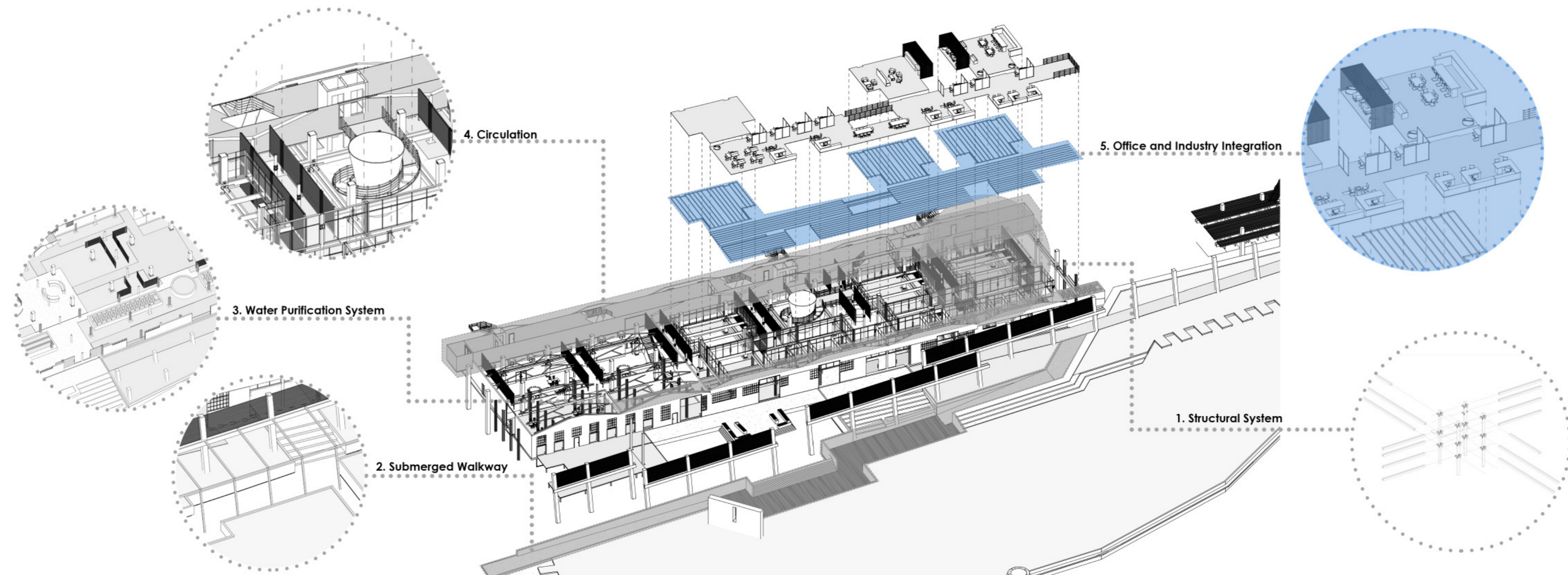
At the two extremities, the circulation core rests on load-bearing concrete structures, that house their own respective services. Because the circulation and services are confined to the rear of the building, within the floating circulation core, it makes sense to not break this continuity in approach. The rest of the circulation core is supported by the beams of the new structural system. Small composite timber columns are used at the southern ends of these beams to ensure adequate strength and support for the circulation system. These small columns are placed in the spaces between the double-beams, much like the quad-column approach mentioned previously.

The width of the circulation system is determined by the spacing of the existing columns. The core is effectively “sandwiched” between the rear-most columns and trusses, with steel beams being inserted between the existing columns to aid in bearing the load of the new addition. This integrates the new structure with the existing, by still making use of the existing columns for their load-bearing capacity. It also creates contrast with the existing, by placing the new system directly adjacent to the existing system.

The circulation core plays host to the various services of the building. These services include:

- Ablutions
- Bar storage
- Fire lobbies
- Fire escapes
- Pause spaces
- Service elevator
- Office/laboratory access control
- Restaurant kitchen and public ablutions situated underneath the circulation core

The circulation core serves as the connective tissue of the project, linking the various spaces and services of the building. It also highlights the theoretical approach taken by the project, and makes circulation throughout the program a ritualistic experience. Ebbing and flowing through it, like water meanders through the Baakens Valley, making users aware of the beauty and tranquillity of nature, instilling hydro-gratitude within the users.



3.3.5. Office and Industry Integration

The integration of industrial and office uses within a mixed-use commercial building necessitates a meticulous consideration of sound and smell management. Industrial activities often generate varying levels of noise and emissions, which can potentially disrupt the work environment in adjoining office spaces. Careful consideration of the specific processes and spatial planning is thus required to mitigate these potential disruptions.

The main catalyst of potentially unpleasant odours in water purification systems are the flocculation and disinfection chemicals. The chosen system makes use of aluminium sulphate, which is an odourless, white or colourless, crystalline solid for the flocculation chemical. The chosen disinfection method, being UV disinfection, also produces no smell. These processes have been selected in order to prevent the creation and propagation of unpleasant smells.

The main cause of potential auditory disruption is the pumps required to transport the water from one process to the next, or into storage. Here, the type of pump used plays the largest role in sound mitigation. In the proposed project, centrifugal pumps are used, because they typically create the least noise, due to not having any reciprocating parts. They are also the most common type of pump used to pump water against the force of gravity, making them the perfect choice for the project.

The spatial planning is also conducted in such a way as to mitigate potential disturbance by placing the pumps above the reception area of the offices and not the office floor itself. The floors of the various spaces within the towers are also lined with mineral wool between the joists, acting as sound deadening and insulation. This serves to create a disruption free office environment for comfortable working.

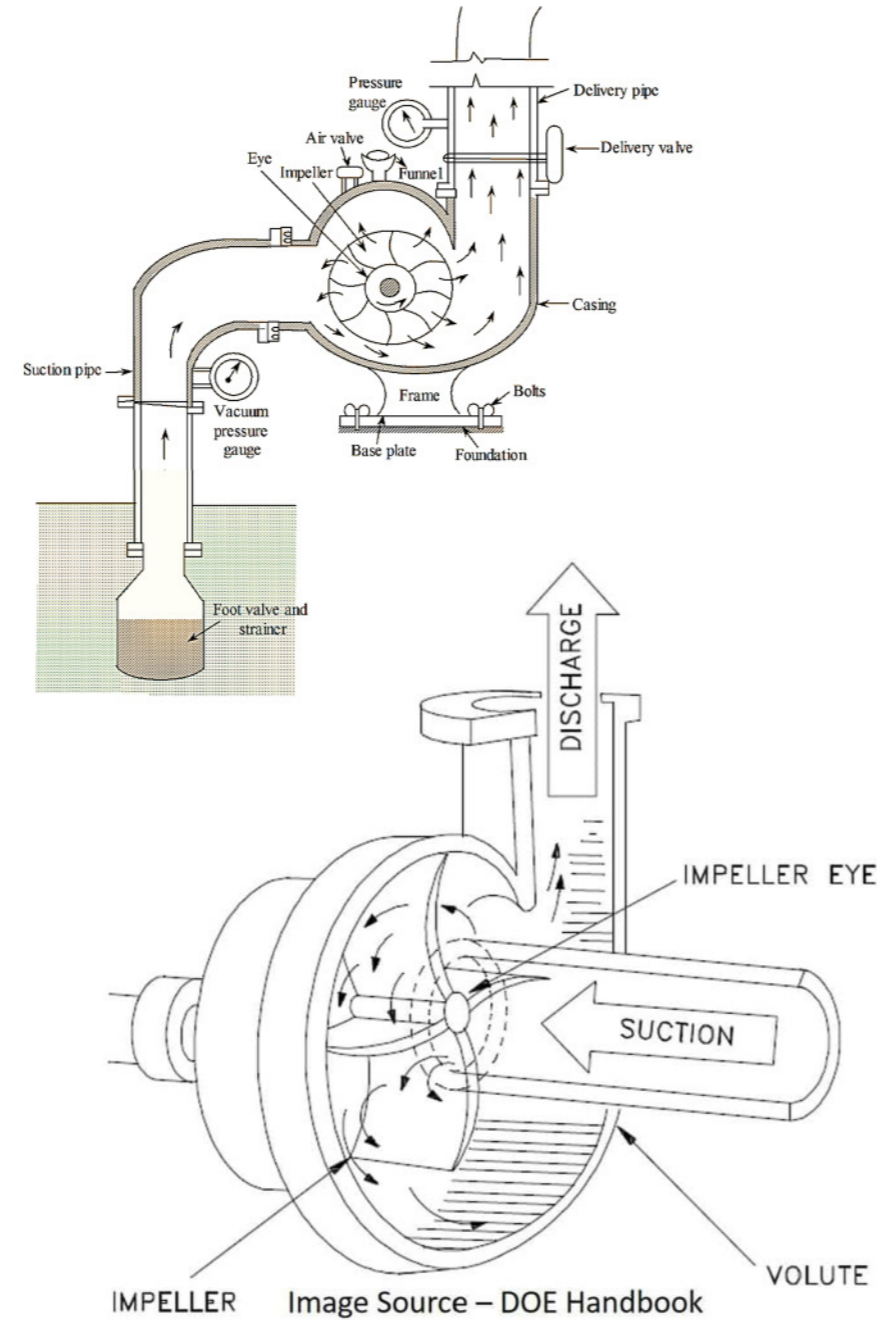


Figure 70: Diagram showing the workings of a centrifugal water pump (Workbook, 2022)

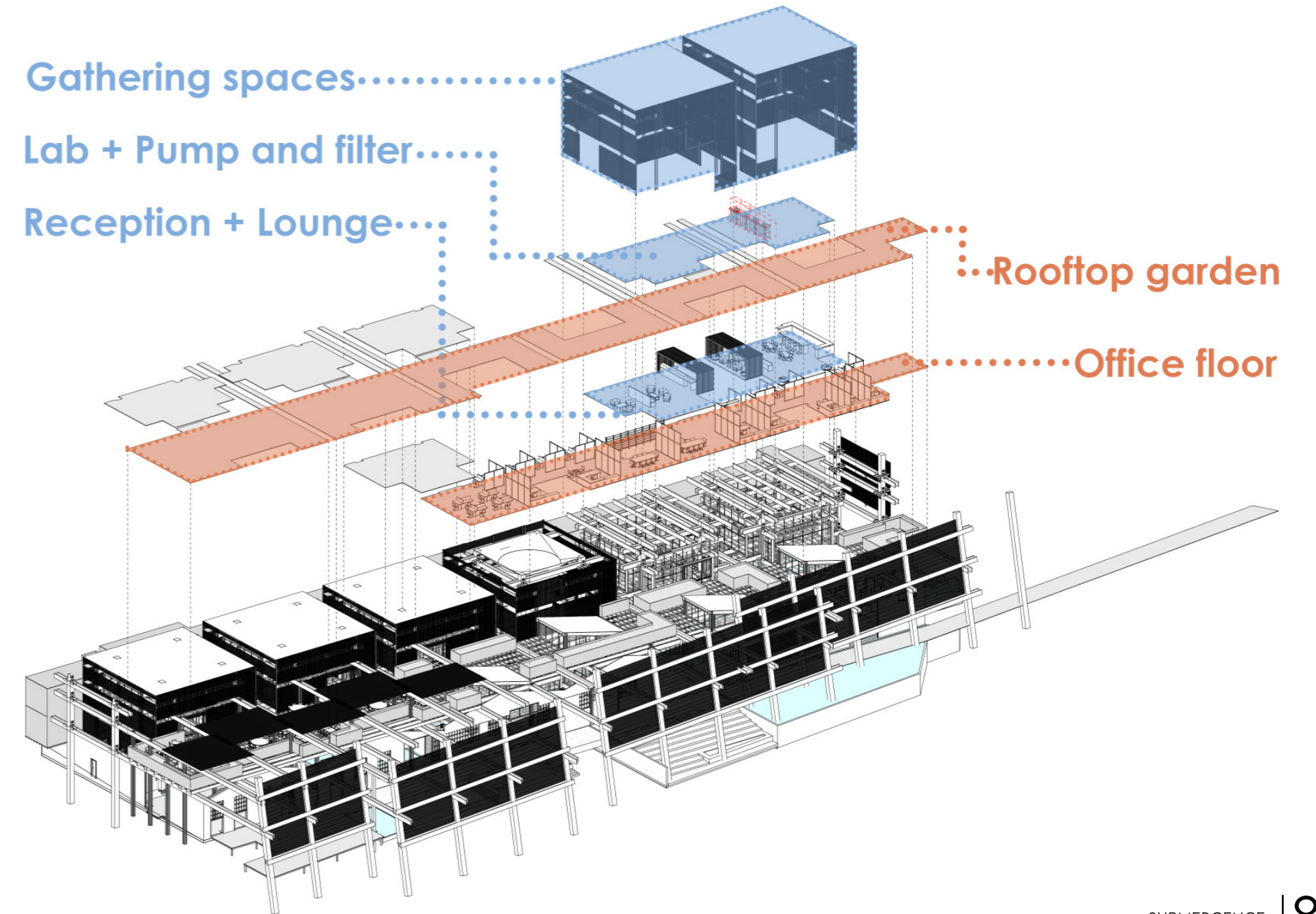


Figure 71: Diagram showing spatial planning to minimise disturbance (author)

3.3.6. Tower Structures

The hierarchical focal point of the project is the six “towers” highlighting the six modules of the existing structure. In addition to being in discourse with the existing structure, there is another important reason for the specific placement of the columns; the matjieshuis. More specifically, the characteristic centralised configuration that lends itself to gathering. This underscores the cultural themes of unity and communal harmony, brought forth by the Khoikhoi matjieshuis and its spatial arrangement. The towers that are created between the large columns are symbolic of the matjieshuis and its cultural function of gathering, and kinship.

The function of these towers reflects this symbolism in that they house the gathering functions of the building. They act as hearths and pause spaces, where one would gather to eat, drink, and relax. They also house the essential functions required to maintain the water purification system, such as the pumps, filters, and laboratory.

Along with playing host to essential functions and gathering spaces, the towers act as a narrative device, by drawing great inspiration from the matjieshuis. Perhaps the most direct interpretation is the solar screen. This screen, giving the towers volume, and making them habitable is an interpretation of the woven mats used to cover the matjieshuis. The screen consists of many small timber slats, that act as louvres, “woven” together to form a coherent unit.

The screens are held in place by timber columns joined to the inside of the double-beam system. These columns form the edges and centres of the four sides to the tower. It is at the centres and edges where the slats overlap to strengthen the notion of being woven together. The northern-, and western sides of the screens make use of a double system, joined to the interior and exterior of the supporting columns, to shield from the harsh Gqeberha sun.

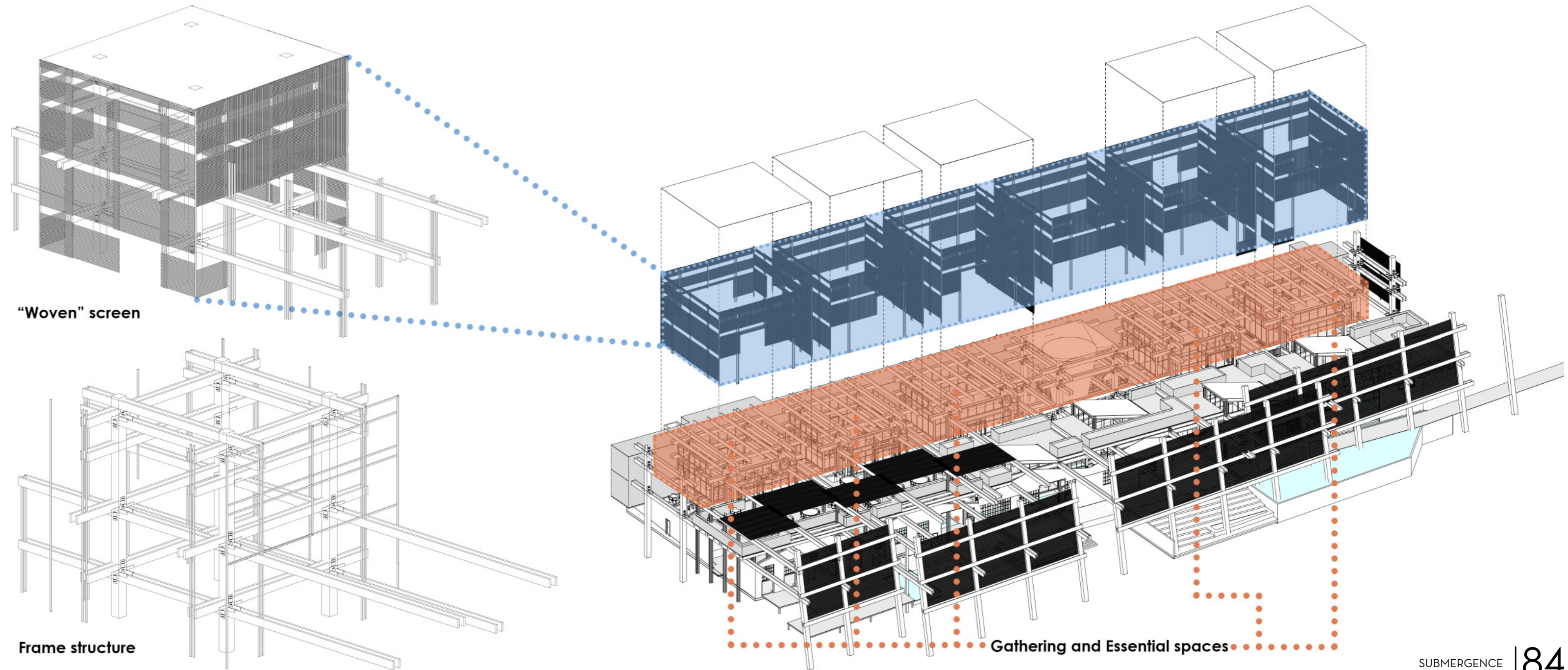
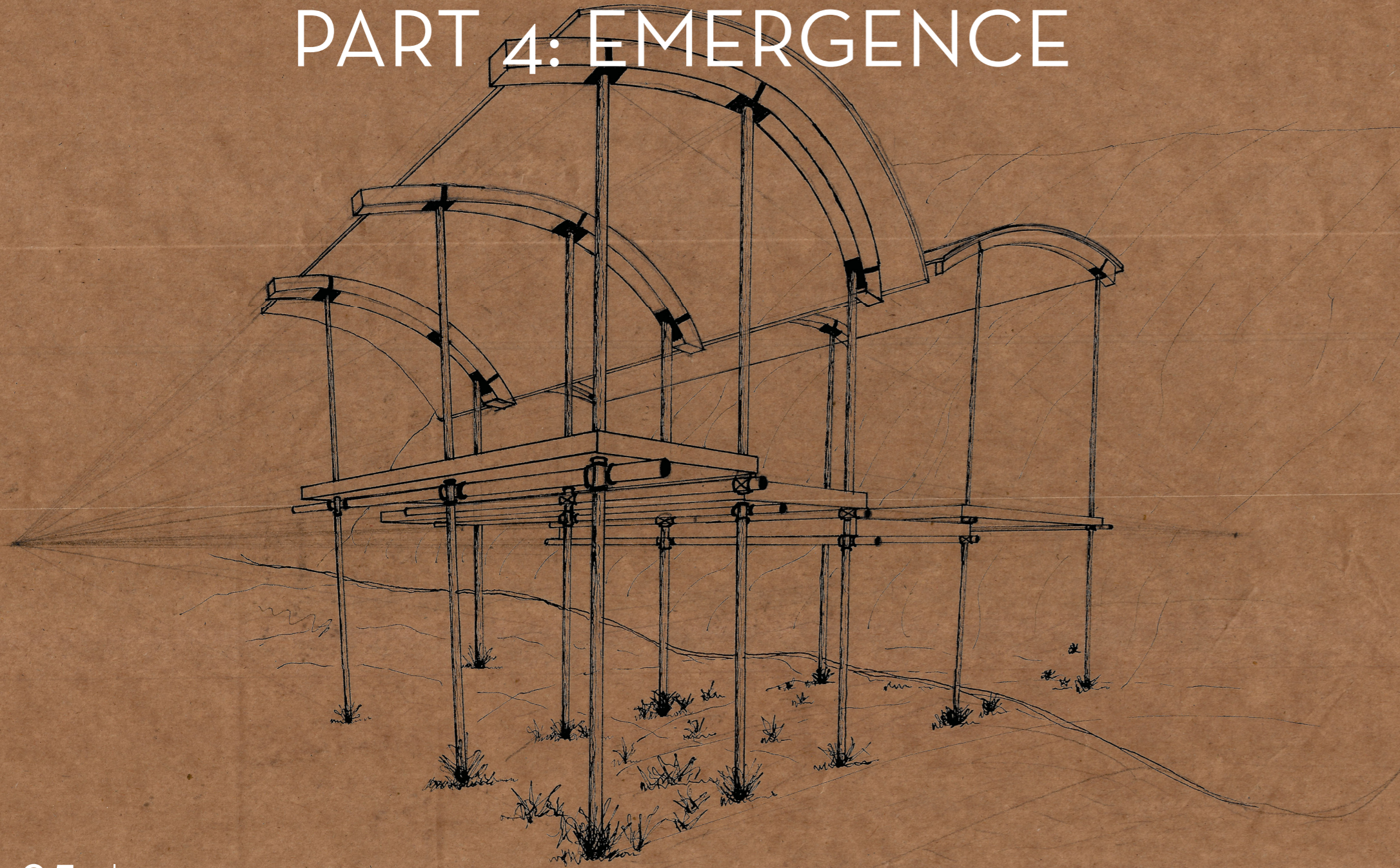


Figure 72-74: Diagram showing tower structure and use (author)

PART 4: EMERGENCE



Introduction

After having completed the site analysis and technical development, this section will highlight the various decisions taken in reaching a holistic final design outcome. It will show the thinking process behind the various design strategies, being critical of the successes and shortcomings throughout the design development journey. Ultimately it will showcase the final design outcome through a series of plans, sections, elevations, and renders.

4.1. Accommodation List

Reception	95sqm
Main circulation.....	155sqm
Pause space.....	100sqm
Offices	
Reception.....	160sqm
Kitchenette and lounge.....	160sqm
Server and filing room.....	160sqm
Office floor.....	350sqm
Private offices.....	130sqm
Boardroom 1.....	44sqm
Boardroom 2.....	44sqm
Staff ablutions.....	8sqm
Water purification	
Rapid mix unit.....	30sqm
Flocculation tanks.....	45sqm (x2)
Sedimentation tank.....	128sqm
Reflection pool (storage).....	55sqm
Pump and filter room.....	160sqm
Laboratory.....	160sqm
Restaurant	
Kitchen.....	112sqm
Cold store.....	15sqm
Dry store.....	18sqm
Office.....	10sqm
Locker rooms and staff bathrooms.....	40sqm
Main floor.....	660sqm
Outside deck.....	200sqm
Ablutions.....	70sqm
Mezzanine seating.....	90sqm

Bar	
Bar lounge 1.....	160sqm
Bar lounge 2.....	160sqm
Outside seating.....	160sqm
Storage.....	35sqm
Ablutions.....	22sqm
Event space	
Rooftop garden.....	365sqm
Ritual space	
Reinstated lagoon.....	8000sqm
Sunken walkway.....	810sqm
Outside seating.....	330sqm
Parking.....	690sqm

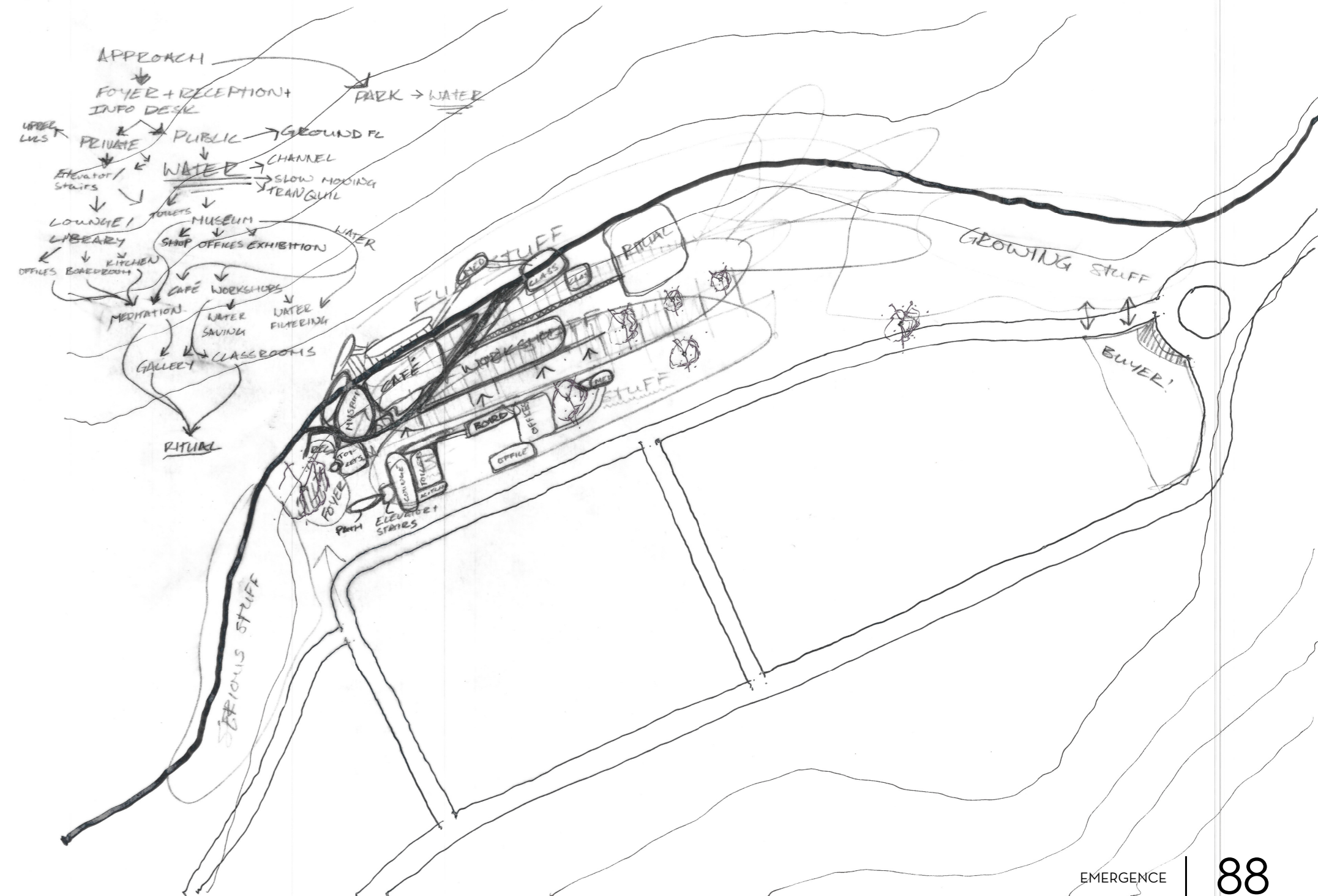
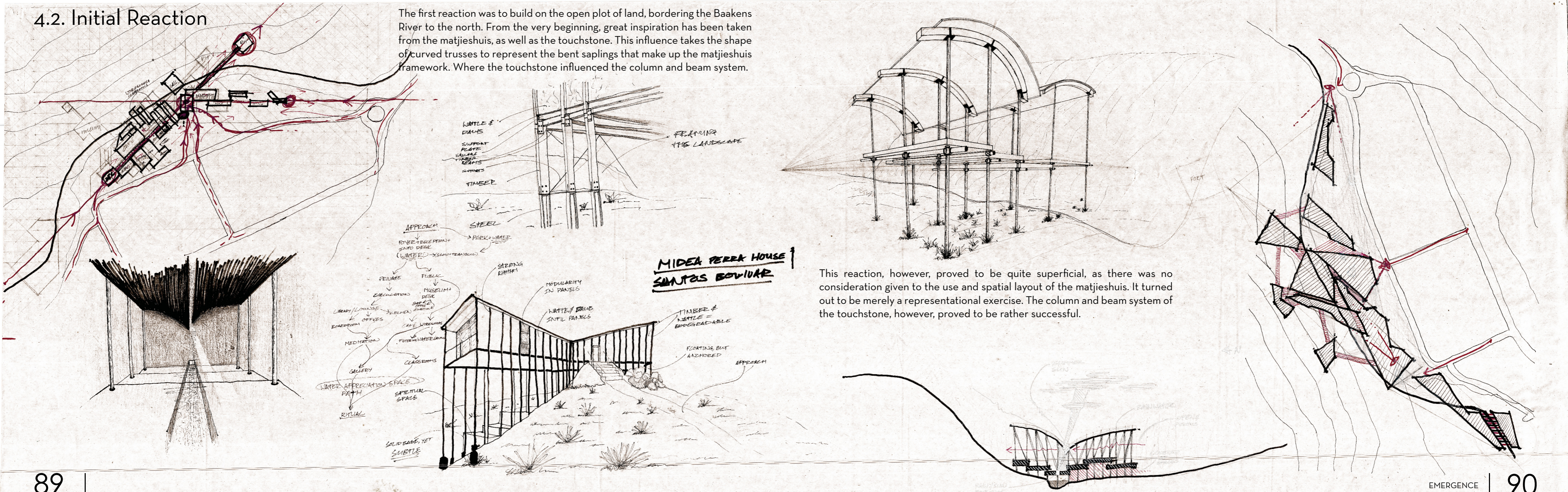


Figure 75: Diagram showing first planning reaction (author)

4.2. Initial Reaction

The first reaction was to build on the open plot of land, bordering the Baakens River to the north. From the very beginning, great inspiration has been taken from the matjieshuis, as well as the touchstone. This influence takes the shape of curved trusses to represent the bent saplings that make up the matjieshuis framework. Where the touchstone influenced the column and beam system.



This reaction, however, proved to be quite superficial, as there was no consideration given to the use and spatial layout of the matjieshuis. It turned out to be merely a representational exercise. The column and beam system of the touchstone, however, proved to be rather successful.

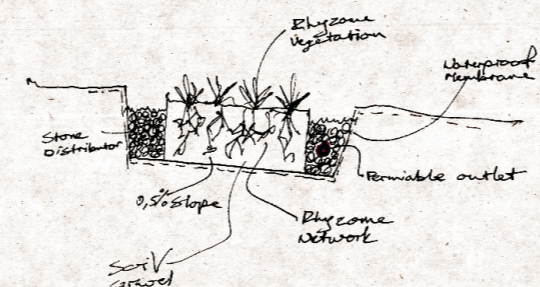
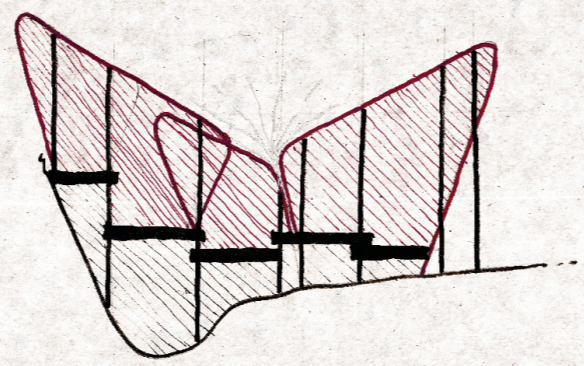
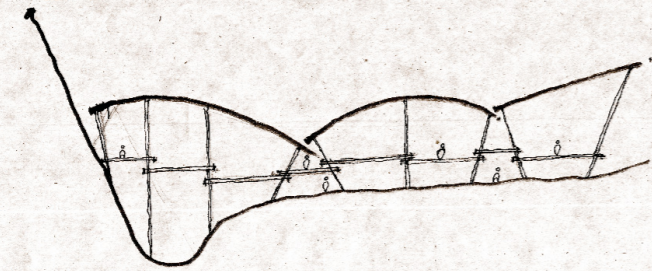
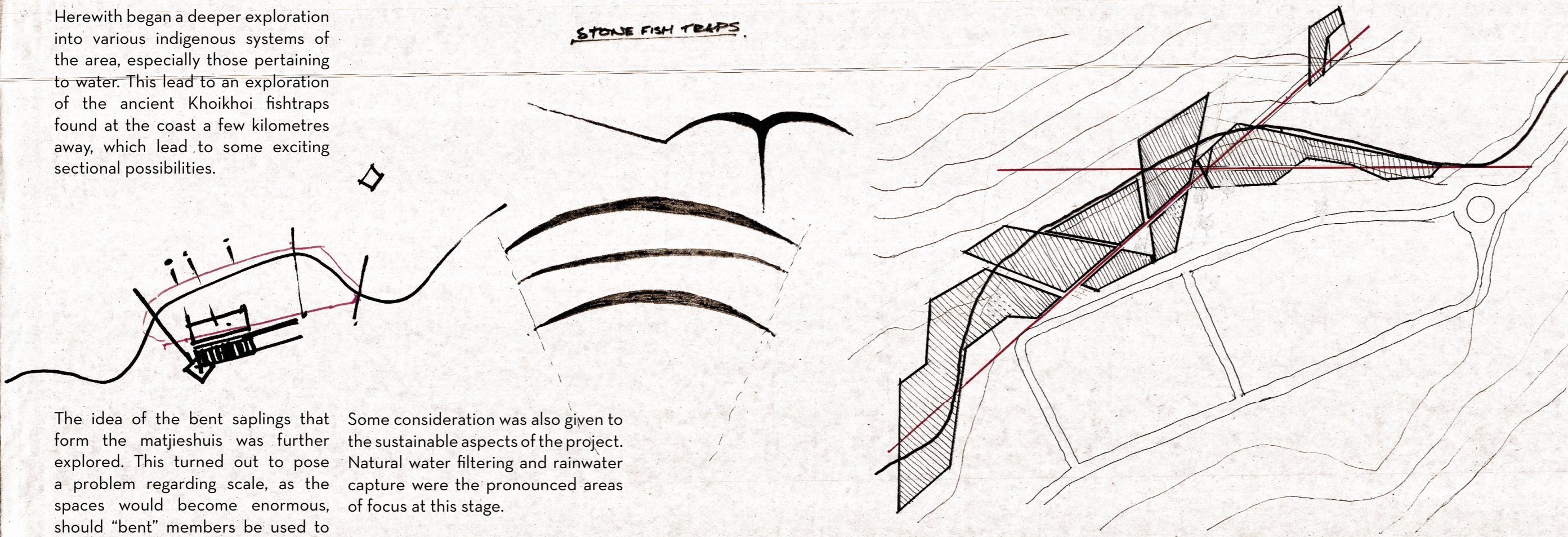
Herewith began a deeper exploration into various indigenous systems of the area, especially those pertaining to water. This led to an exploration of the ancient Khoikhoi fishtraps found at the coast a few kilometres away, which led to some exciting sectional possibilities.

The idea of the bent saplings that form the matjieshuis was further explored. This turned out to pose a problem regarding scale, as the spaces would become enormous, should "bent" members be used to construct the project.

A further focus was also placed on spatial and layout planning of the project. This predominantly took the shape of identifying points of hierarchy, and attempting an axial layout approach.

Some consideration was also given to the sustainable aspects of the project. Natural water filtering and rainwater capture were the pronounced areas of focus at this stage.

STONE FISH TRAPS

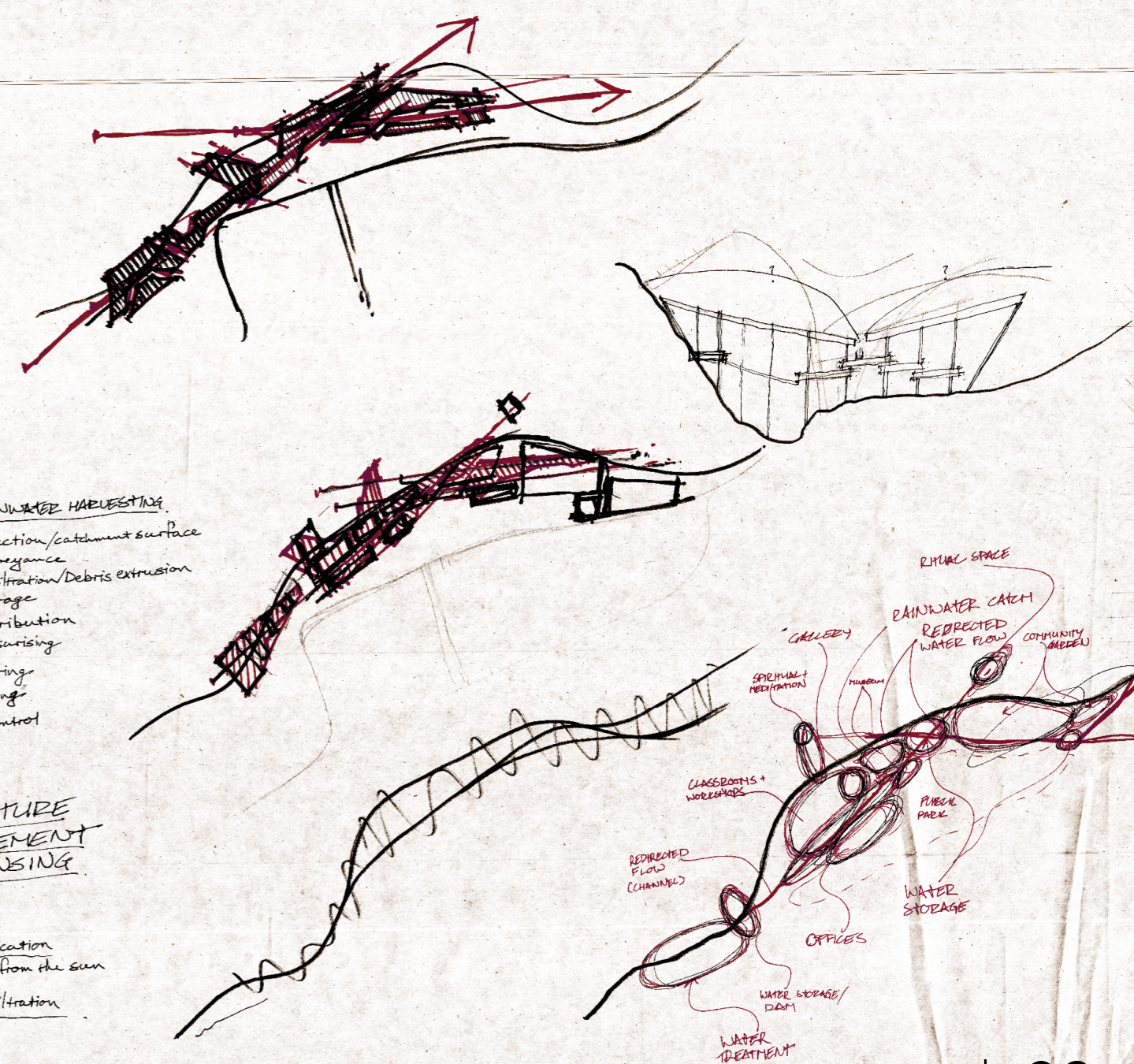


RAINWATER HARVESTING

1. Collection/catchment surface
2. Conveyance
3. Perforation/Debris extrusion
4. Storage
5. Distribution
 - L Pressurising
 - L Filtering
 - L Treating
 - L Flow Control

CAPTURE MOVEMENT CLEANING

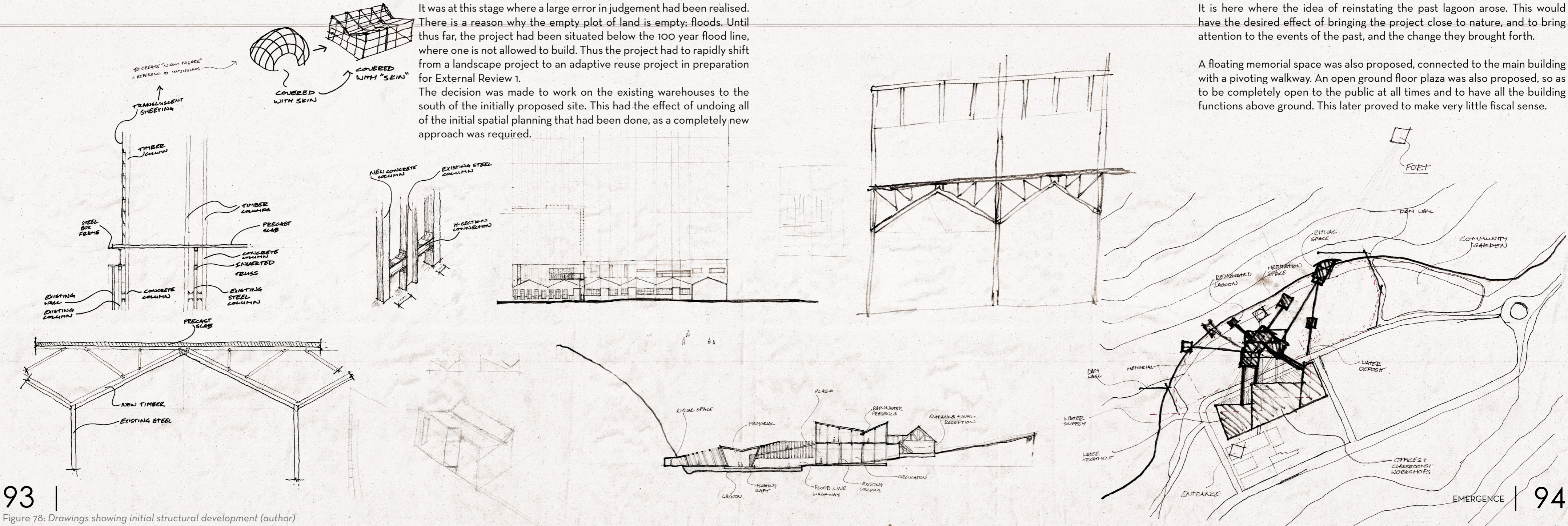
- Solar purification
- LUV exposure from the sun
- Clay Vessel Filtration



It was at this stage where a large error in judgement had been realised. There is a reason why the empty plot of land is empty; floods. Until thus far, the project had been situated below the 100 year flood line, where one is not allowed to build. Thus the project had to rapidly shift from a landscape project to an adaptive reuse project in preparation for External Review 1. The decision was made to work on the existing warehouses to the south of the initially proposed site. This had the effect of undoing all of the initial spatial planning that had been done, as a completely new approach was required.

It is here where the idea of reinstating the past lagoon arose. This would have the desired effect of bringing the project close to nature, and to bring attention to the events of the past, and the change they brought forth.

A floating memorial space was also proposed, connected to the main building with a pivoting walkway. An open ground floor plaza was also proposed, so as to be completely open to the public at all times and to have all the building functions above ground. This later proved to make very little fiscal sense.

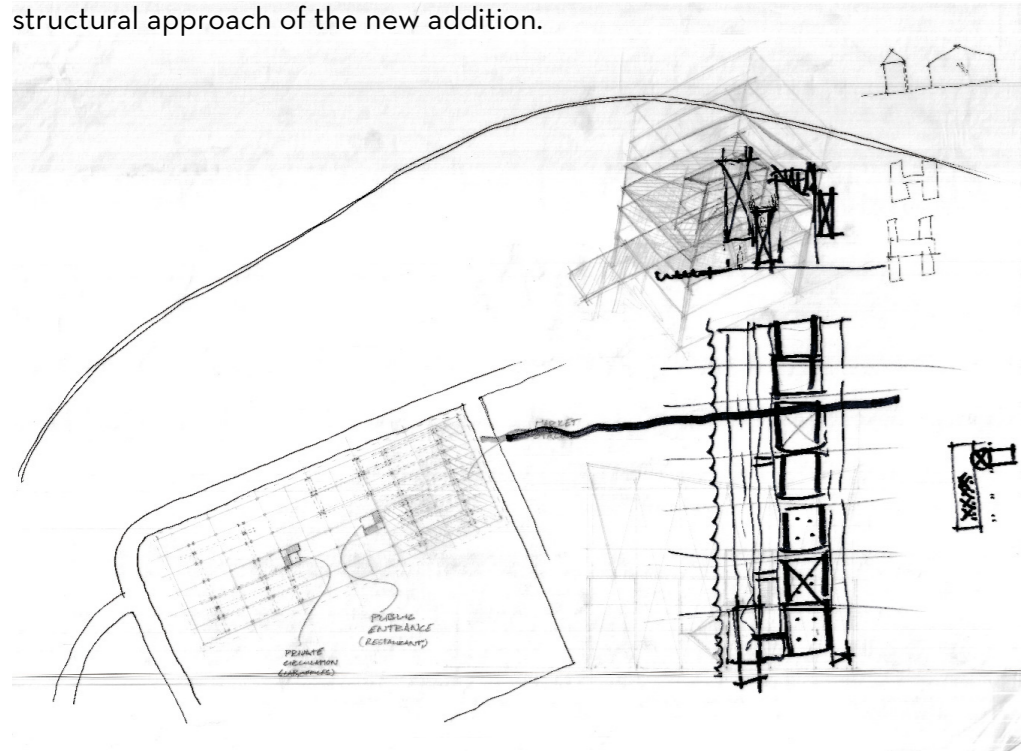


93 | Figure 78: Drawings showing initial structural development (author)

A large emphasis has clearly been placed on the fort as axial reference point, with various iterations of planning being centred around this approach. This, however, proved highly problematic for the integration of the new addition with the existing warehouses. Fighting the existing grid of the warehouses lead to awkward angles and spaces that would be difficult to populate and inhabit, let alone construct.

It was when actual investigation into the structural system of the existing warehouses took place, that the planning seemed feasible for the first time. This approach lent itself to a linear resolution, stretching outward over the newly instated lagoon.

At this stage a structural resolution had to be reached, so as to be able to produce a structural touchstone for External Review 1. This meant that the design development had to be halted for a short time to focus on the structural approach of the new addition.



95

Figure 79: Drawings showing working with the grid of the warehouses (author)

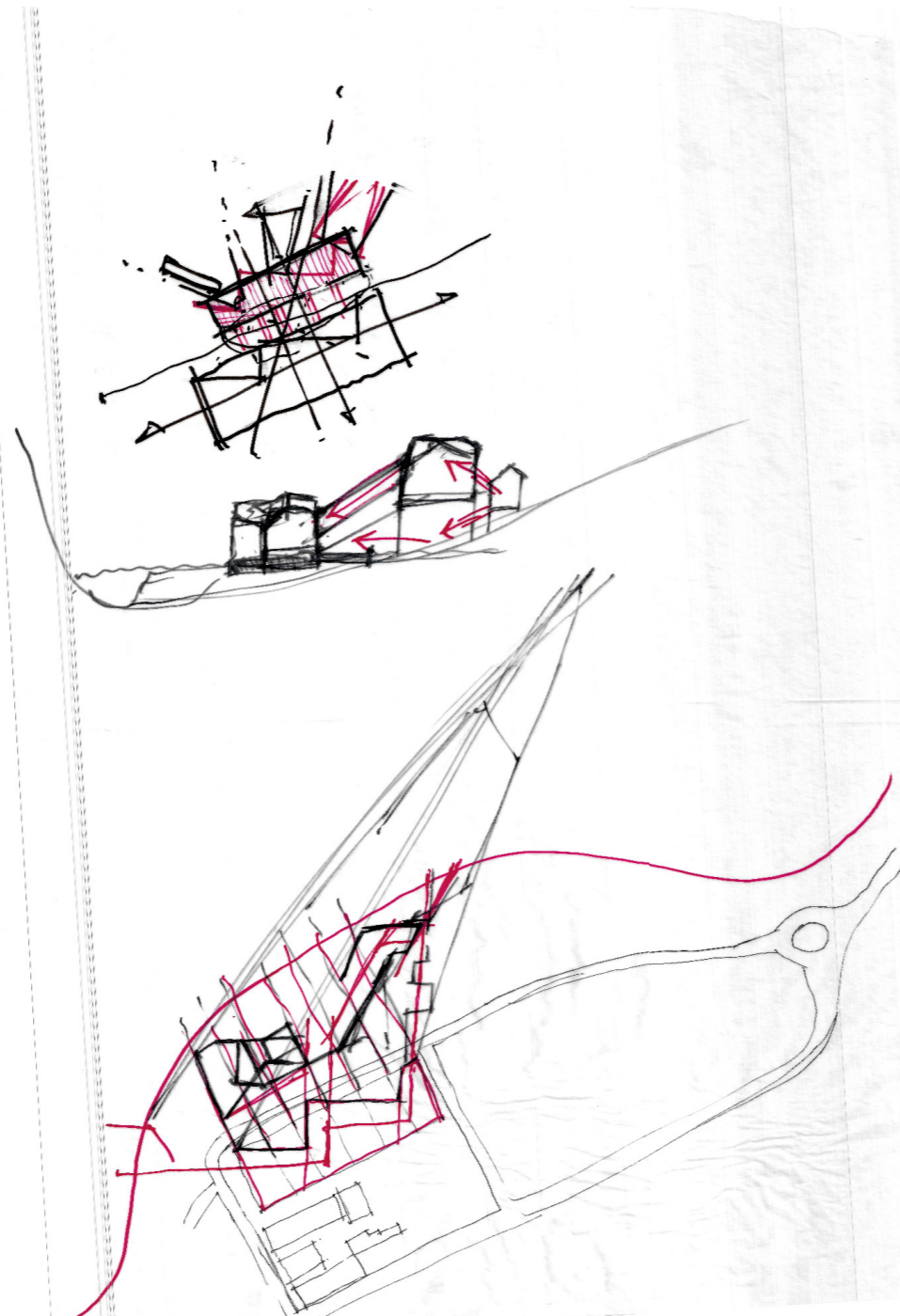


Figure 80: Drawings showing how the fort influenced the axial arrangement (author)



Figure 81: Drawings showing axial arrangement and open ground floor (author)

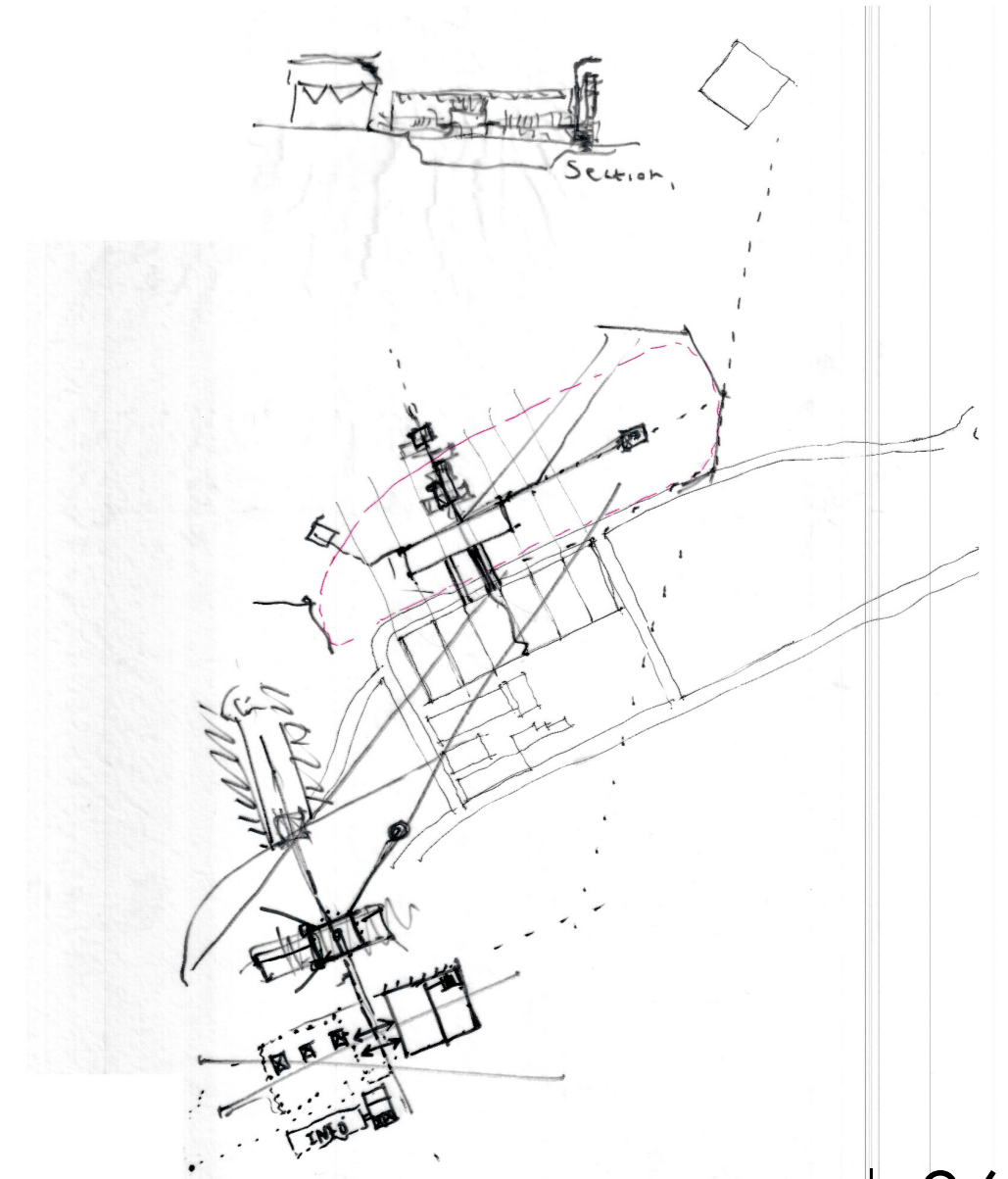


Figure 82: Drawings showing the move from axial arrangement to warehouse structure integration (author)

4.3. Structural Touchstone

The aim of the construction touchstone and approach was to pay homage to the Khoikhoi who first inhabited the area, as well as contrast the new with the existing in a sustainable manner. The proposed construction is timber and concrete, contrasting with the existing steel and brick structure. The new addition is an interpretation of the traditional matjieshuis, with a translucent skin made of recycled polycarbonate materials, the greatest pollutant of the sea. The sheeting also allows the building to have a "Day and Night facade" alluding to the Khoikhoi who's personification of God is the moon, bringing rain and good fortune.

Another important structural aspect at this stage was the inverted truss to support the floor. This idea was, however, impractical, as it would mean that the first floor would be more than 10 metres in the air. It also did not allow for much room for a mezzanine floor, thus a different structural solution had to be found in order to be a commercially viable project.

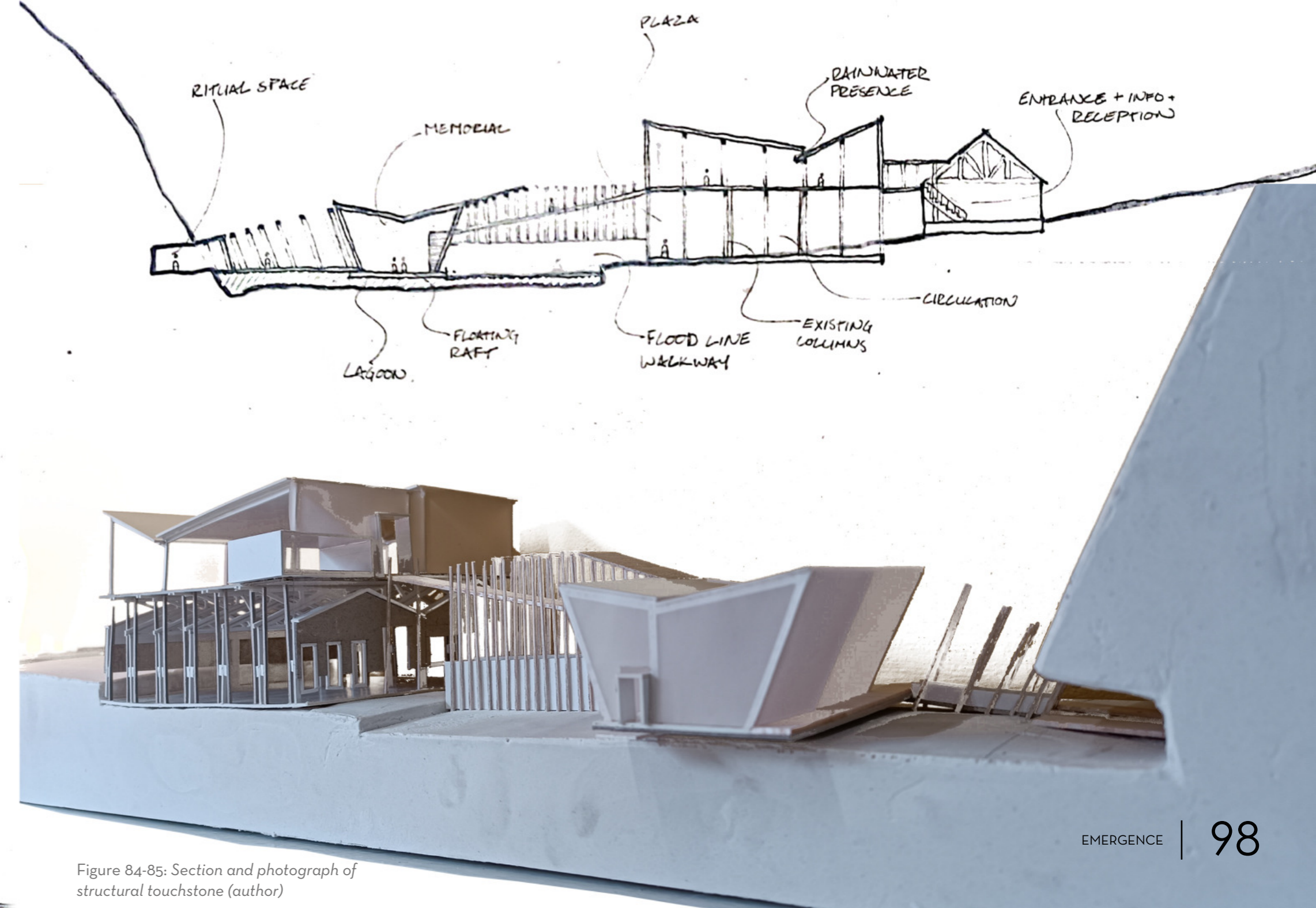
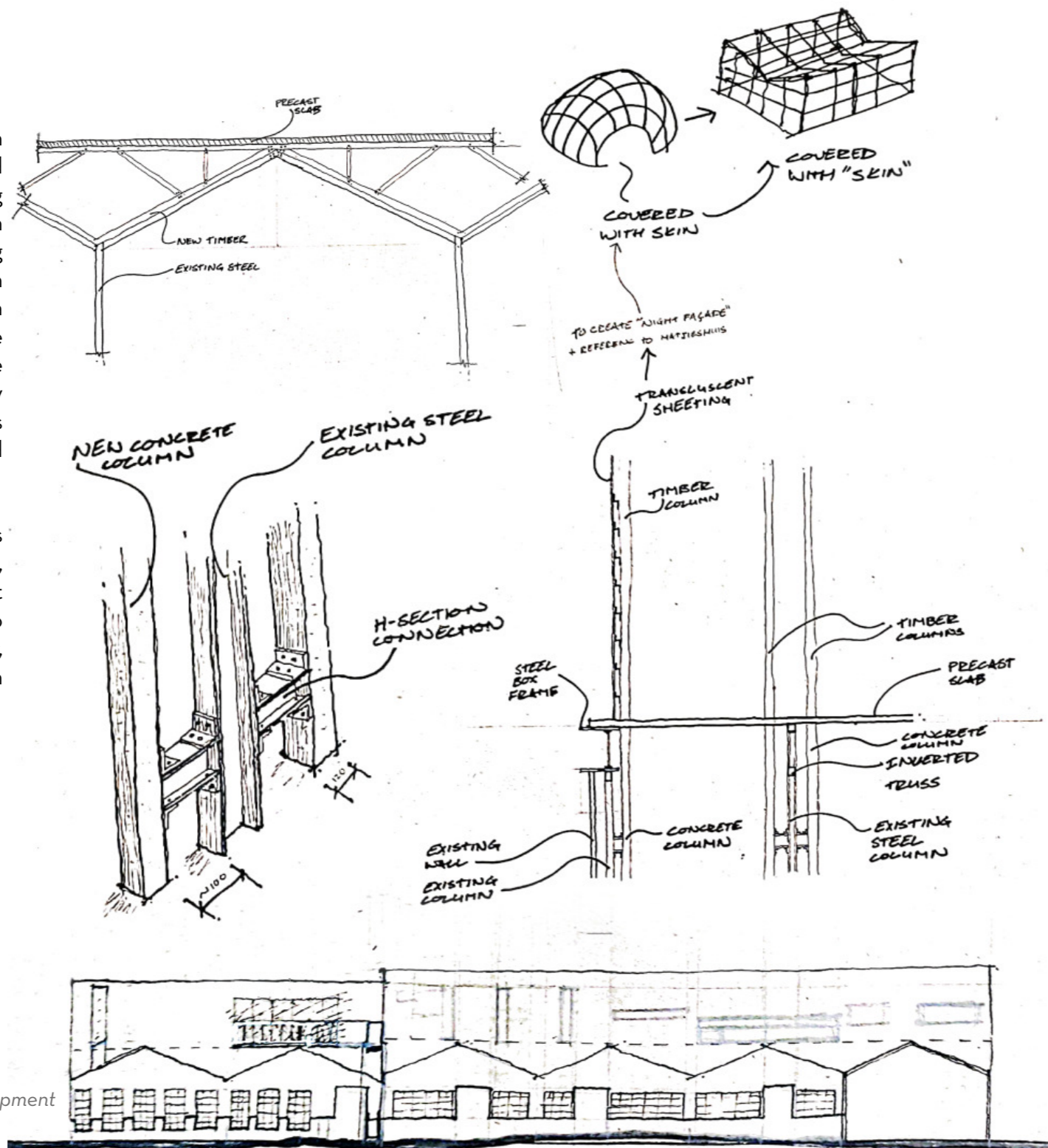
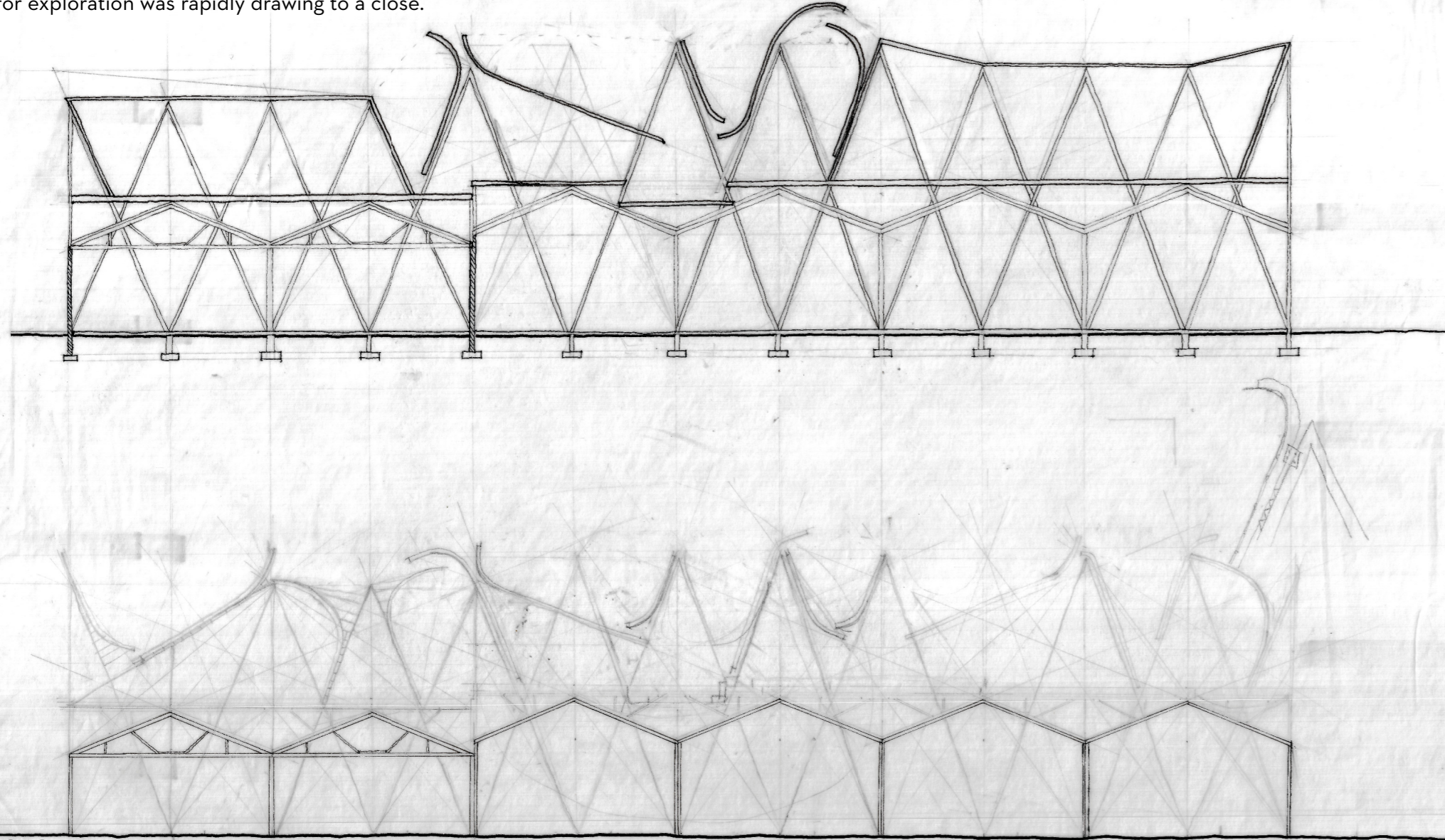


Figure 84-85: Section and photograph of structural touchstone (author)

4.4. Plan and Section Development

It was at this stage in the project where specificity was needed and the time for exploration was rapidly drawing to a close.

In an attempt to be more direct with the reinterpretation of the matjieshuis, "bent" roof elements were reintroduced. This, however, led to an arbitrary, "gymnastic" roof structure, subtracting from the meaning, rather than adding to it.



99

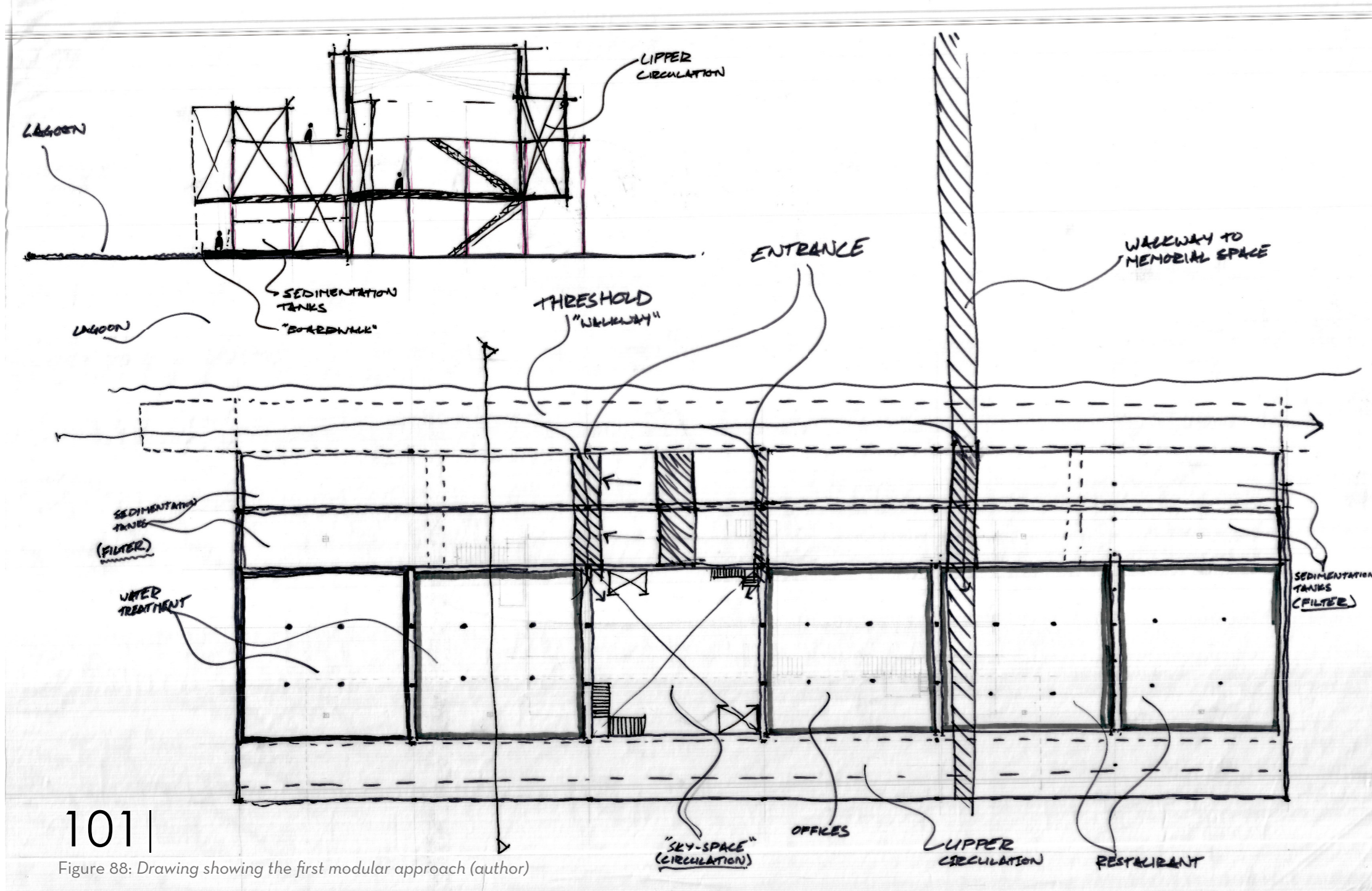
Figure 86: Drawings showing roof structure investigation (author)

The memorial space, along with the memorial walkway, also did not speak the same language as the rest of the project. Defining this language was the next big step in the project.



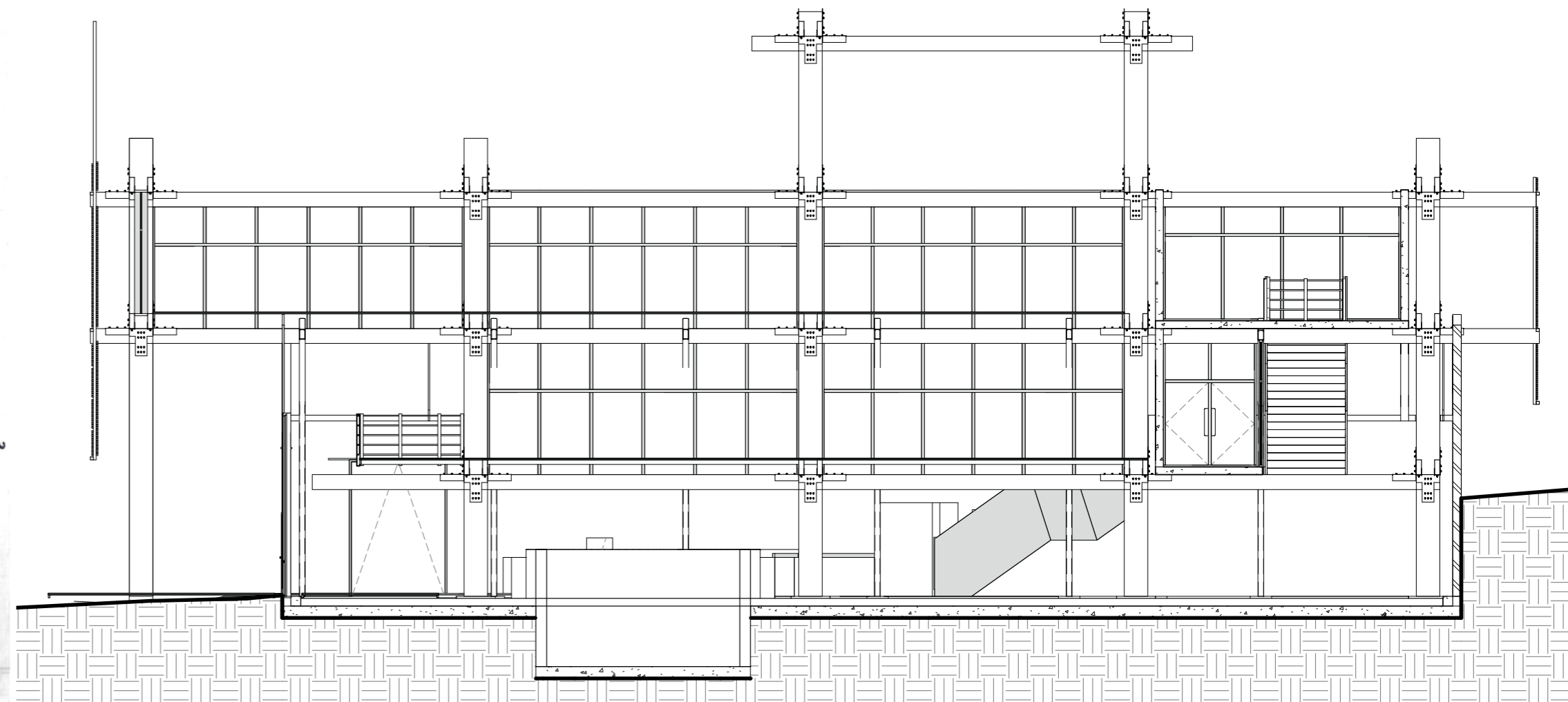
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Figure 87: Initial project language definition (author)



101 |

Figure 88: Drawing showing the first modular approach (author)

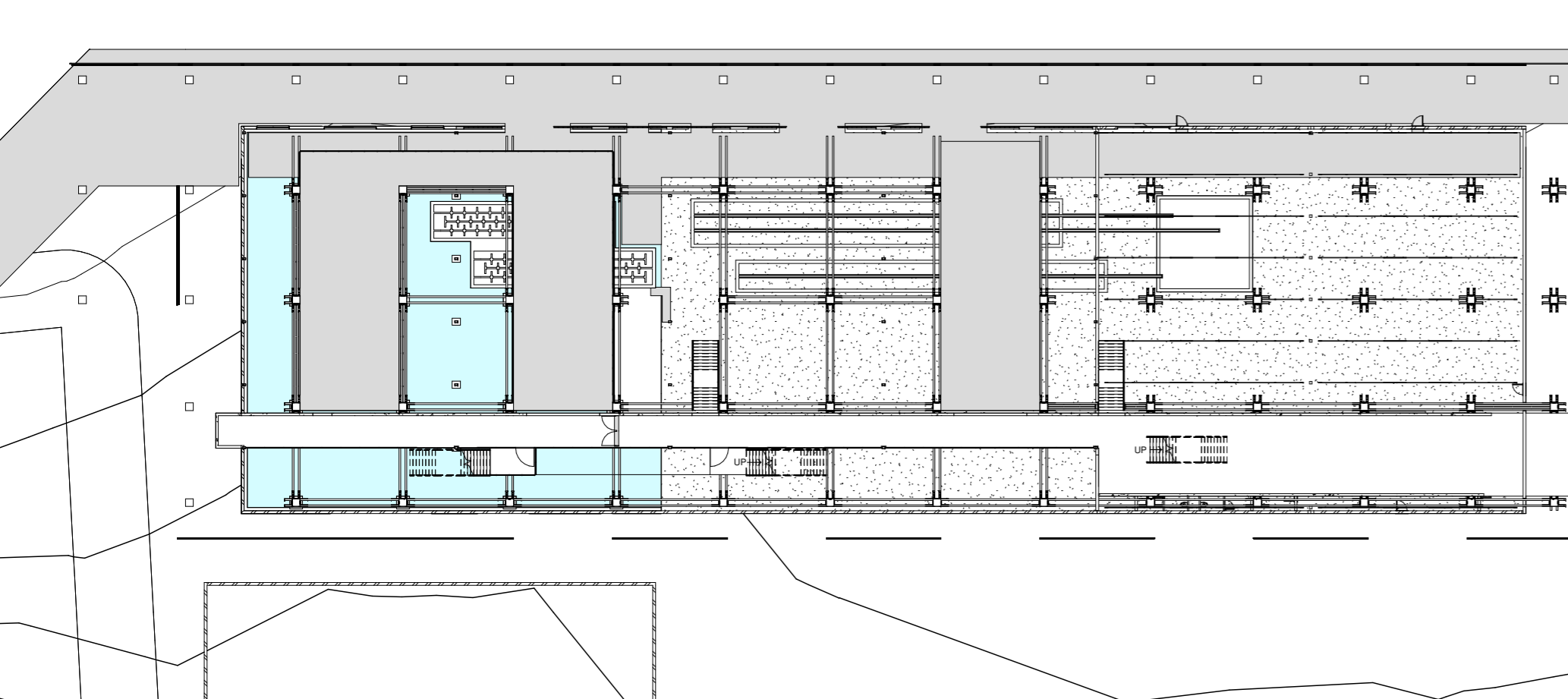


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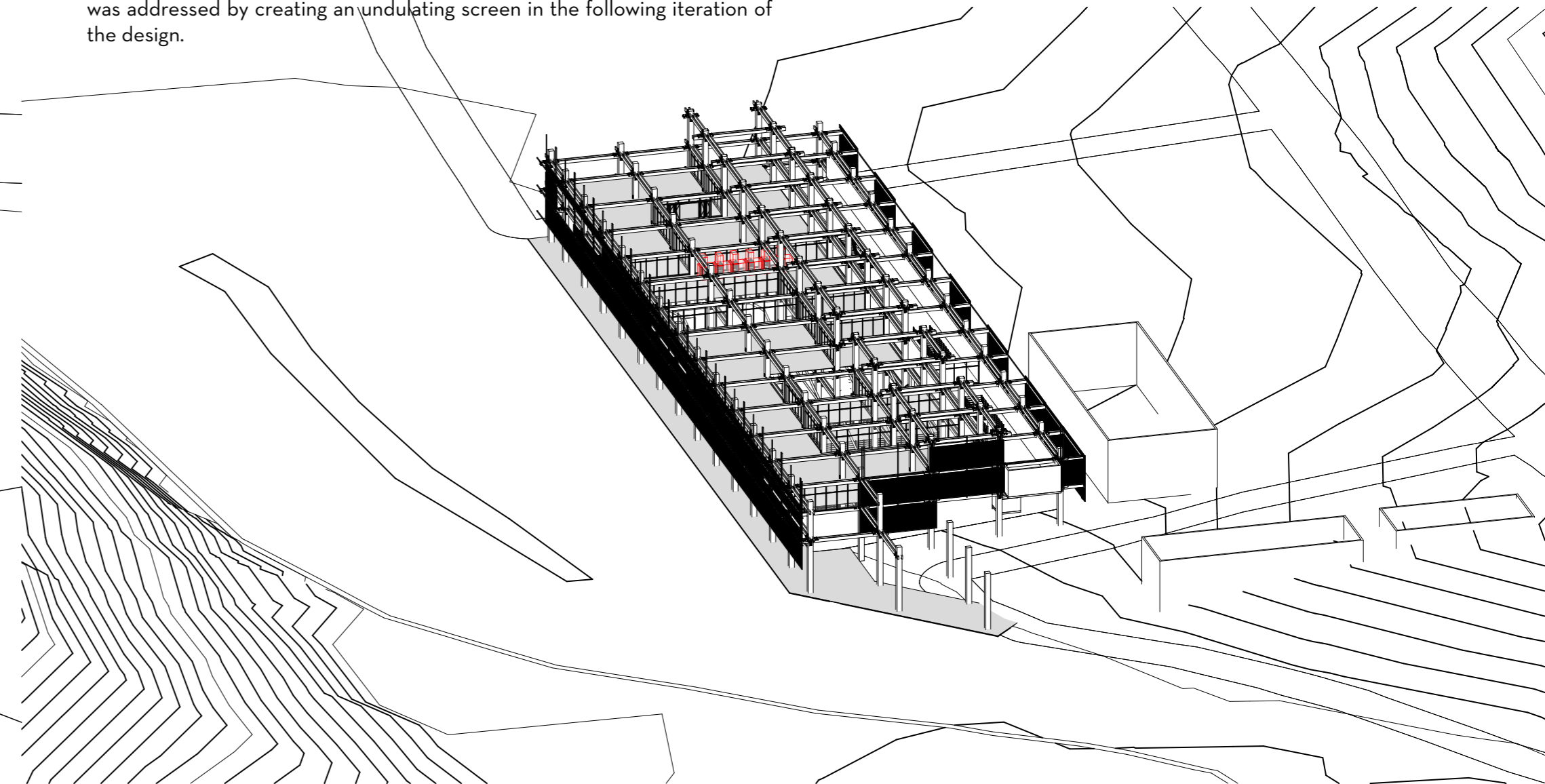
Figure 89: Section showing the approach is too bulky (author)

At this stage, the idea of accentuating the six existing modules was explored further. Along with this exploration, the application of embodiment and ritual also took place. It took the shape of a waterside boardwalk, water purification systems “filtering” users into the building, and the circulation core. All of which strengthen the ritual of inhabiting the building. Having a water covered floor to strengthen this ritual was also explored at this stage.

Where the building was lacking, however, was in massing, and spatial intricacy. This is largely due to the use of the 600x600mm columns throughout the entire project, making it bulky. Along with making it bulky, it also did the opposite of what was intended. It hid the six modules of the existing structure, instead of accentuating them. The building was still very rigid at this stage in the design process.



Further compounding this lack of spatial intricacy was the rigid screen in front of the northern façade. The screen echoed more of the same, with the interior and exterior being possessing the same spatial quality. This lack of dynamism was addressed by creating an undulating screen in the following iteration of the design.



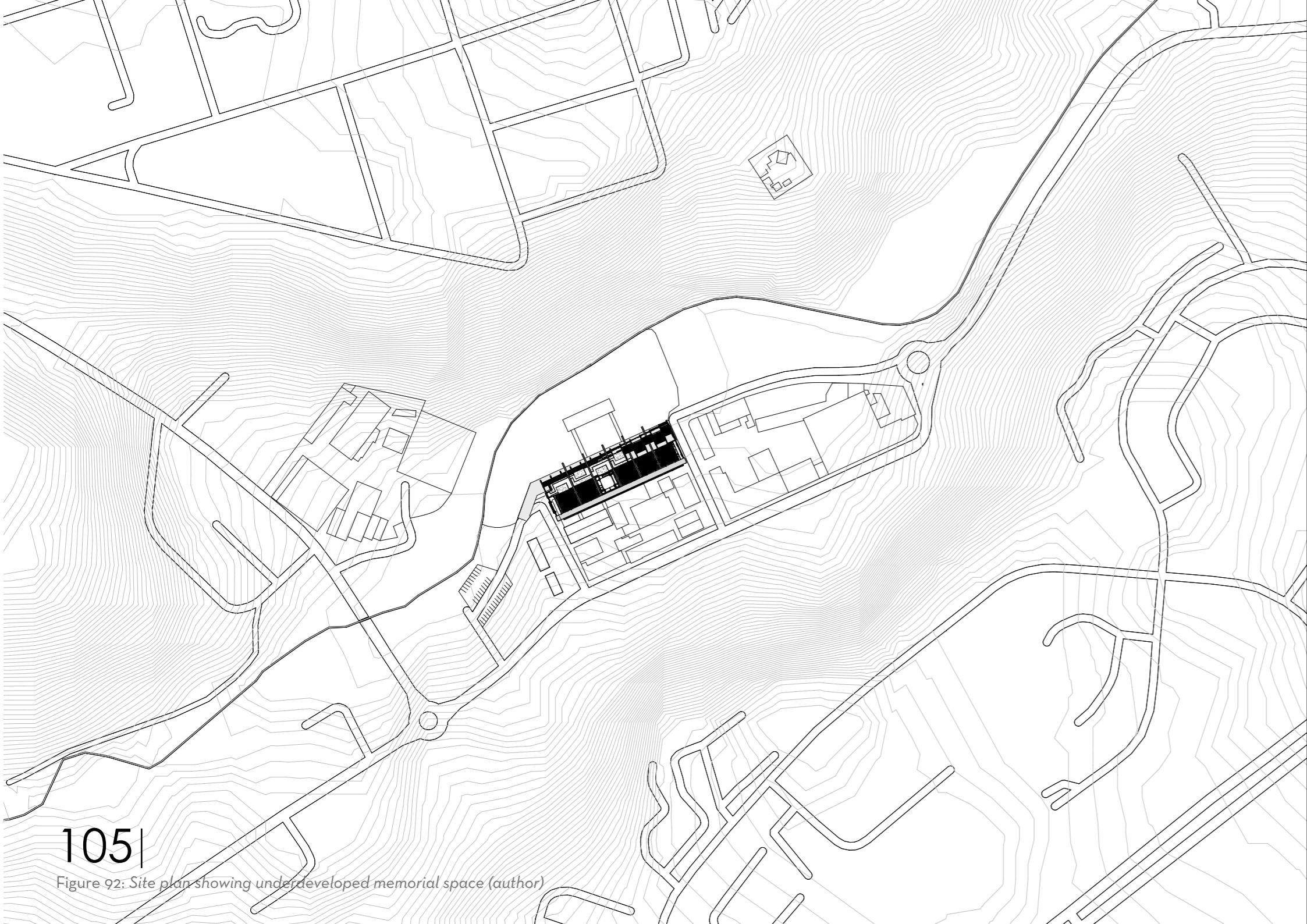
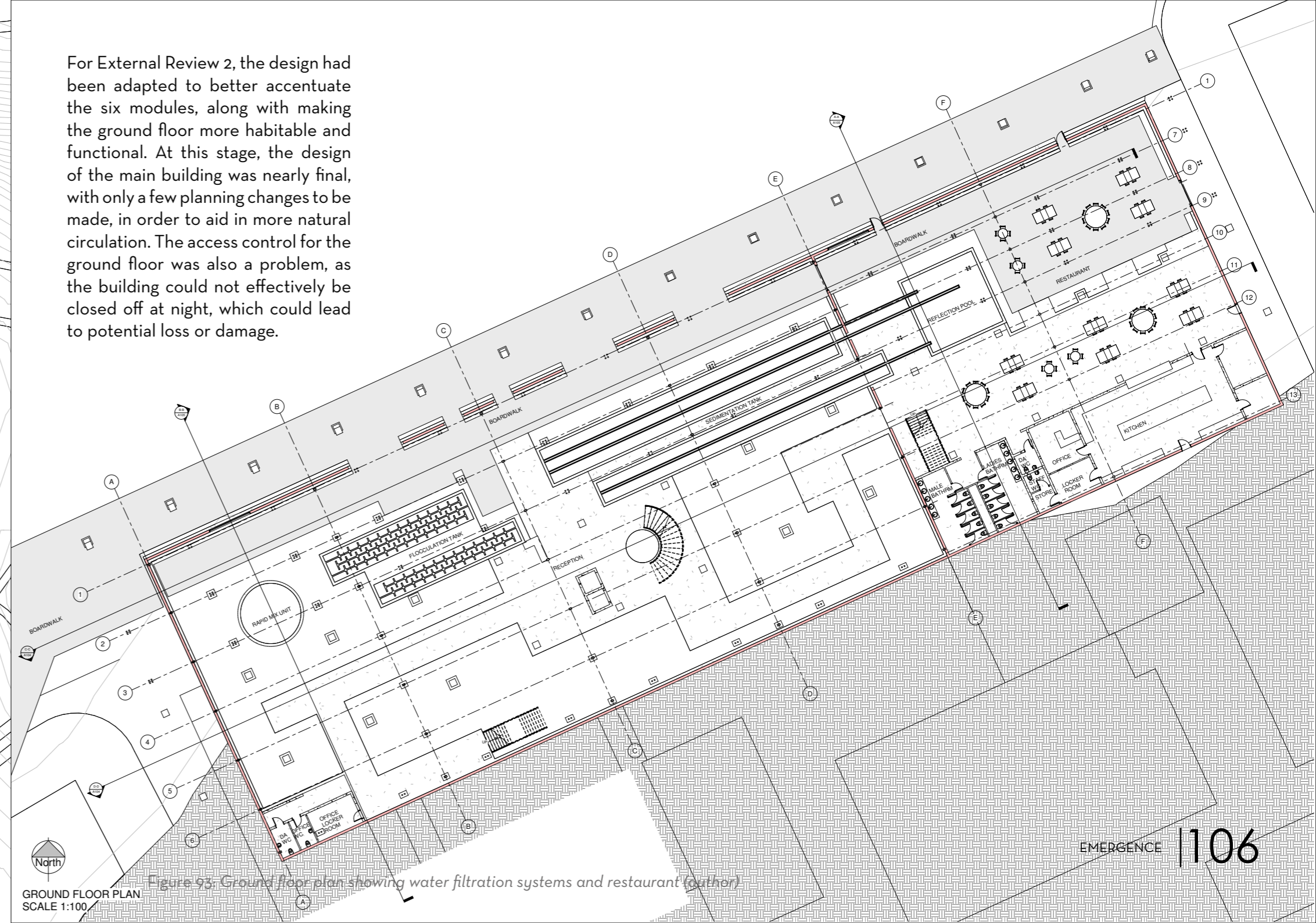


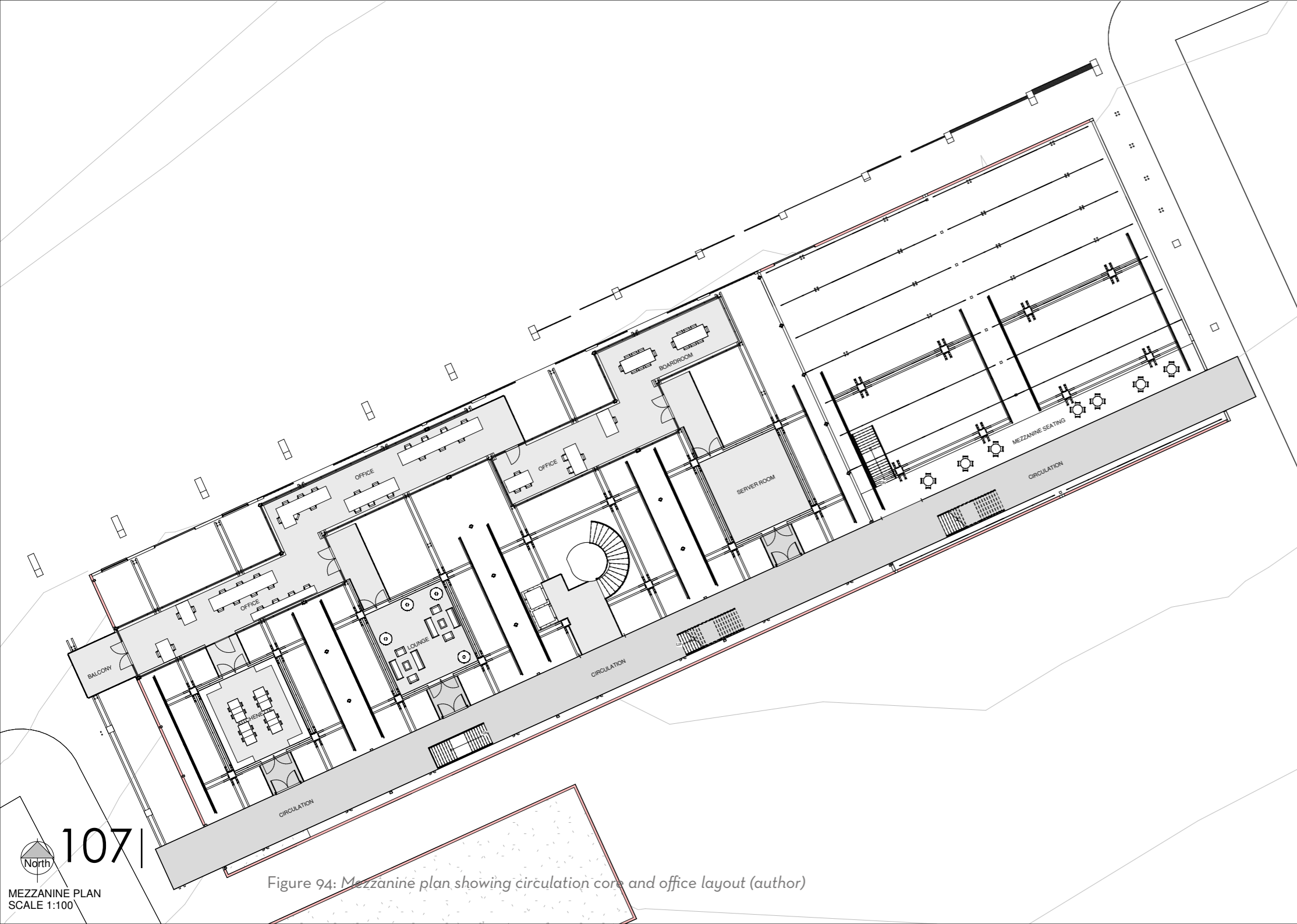
Figure 92: Site plan showing underdeveloped memorial space (author)

For External Review 2, the design had been adapted to better accentuate the six modules, along with making the ground floor more habitable and functional. At this stage, the design of the main building was nearly final, with only a few planning changes to be made, in order to aid in more natural circulation. The access control for the ground floor was also a problem, as the building could not effectively be closed off at night, which could lead to potential loss or damage.



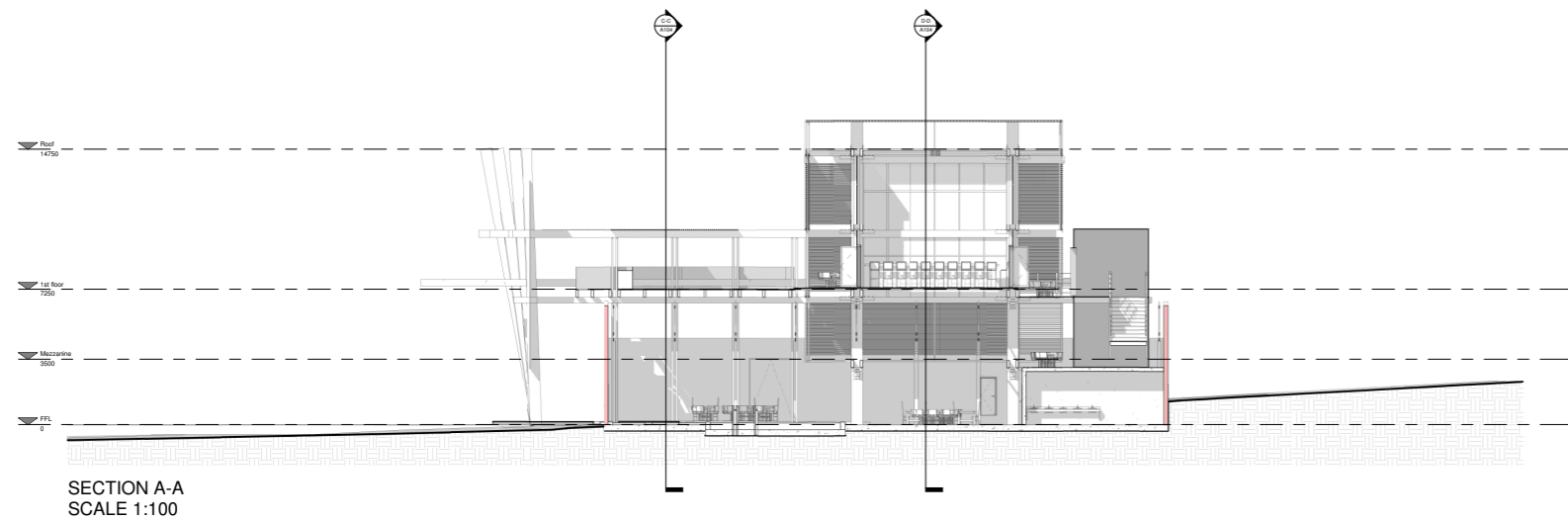
GROUND FLOOR PLAN
SCALE 1:100

Figure 93: Ground floor plan showing water filtration systems and restaurant (author)

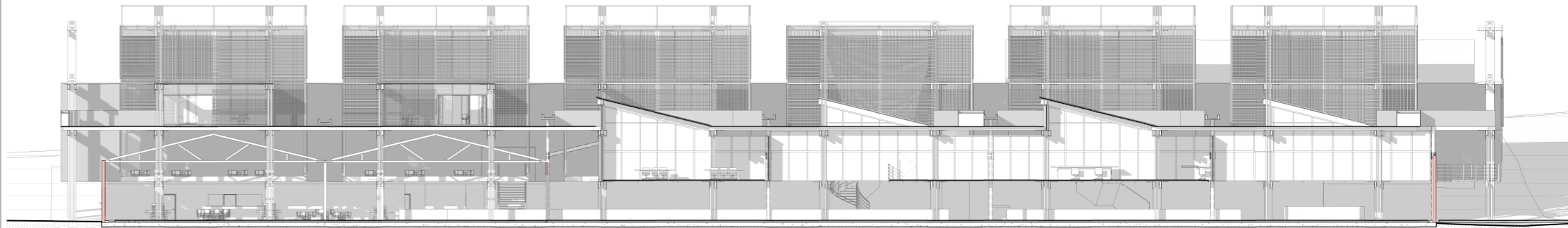


The undulating screen also achieved its goal in creating a more dynamic experience of approaching the building, however it started leaning towards being gymnastic. Hereafter, the decision to keep the screen at a constant angle and break it up into various planes proved to be the most successful.

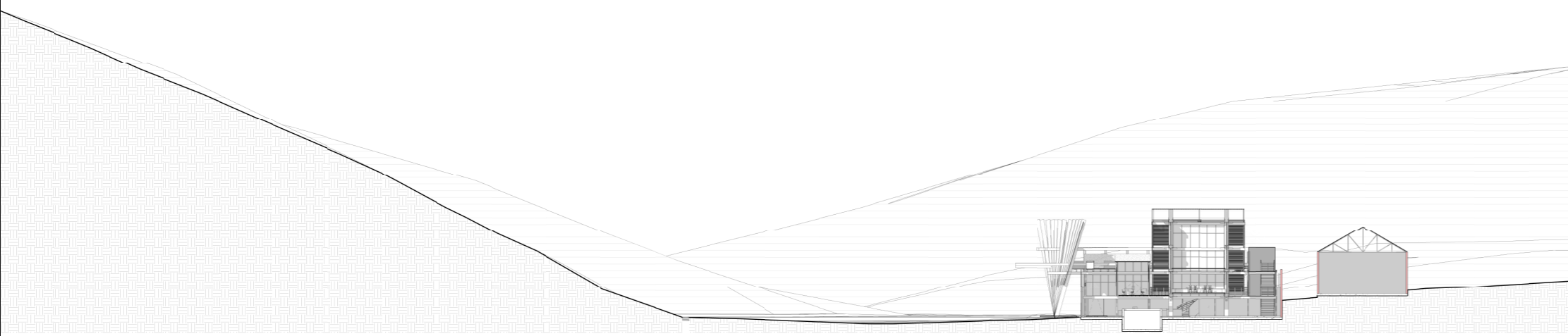




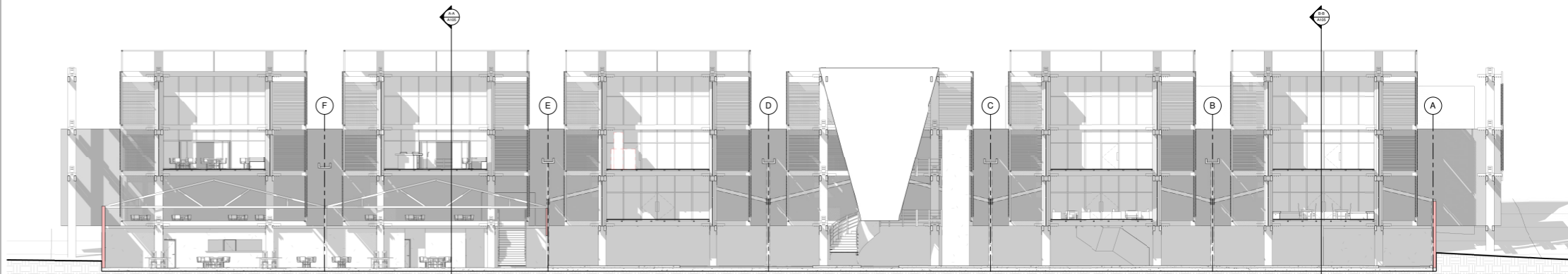
At this stage in the design process the towers were too tall, making the interior spaces intimidating, instead of inviting. It also had the effect of making the building challenge the height of its context, instead of blending in with it. The exterior walkway and memorial space was also underdeveloped and needed to be more fleshed out.



SECTION C-C
SCALE 1:100



SECTION B-B
SCALE 1:200



SECTION D-D
SCALE 1:100

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4.4. Final Design



Figure 99: Site plan showing the render view and the position of the fort (author)

1. Boardwalk
2. Main entrance
3. Reception
4. Main Staircase
5. Elevators
6. Workshop
7. Rapid mix unit
8. Flocculation tanks
9. Sedimentation tank
10. Reflection pool
11. Restaurant
12. Office
13. Locker rooms
14. Kitchen
15. Cold store
16. Dry store
17. Pause space
18. Restaurant deck
19. Memorial space
20. Weirs
21. Ablutions

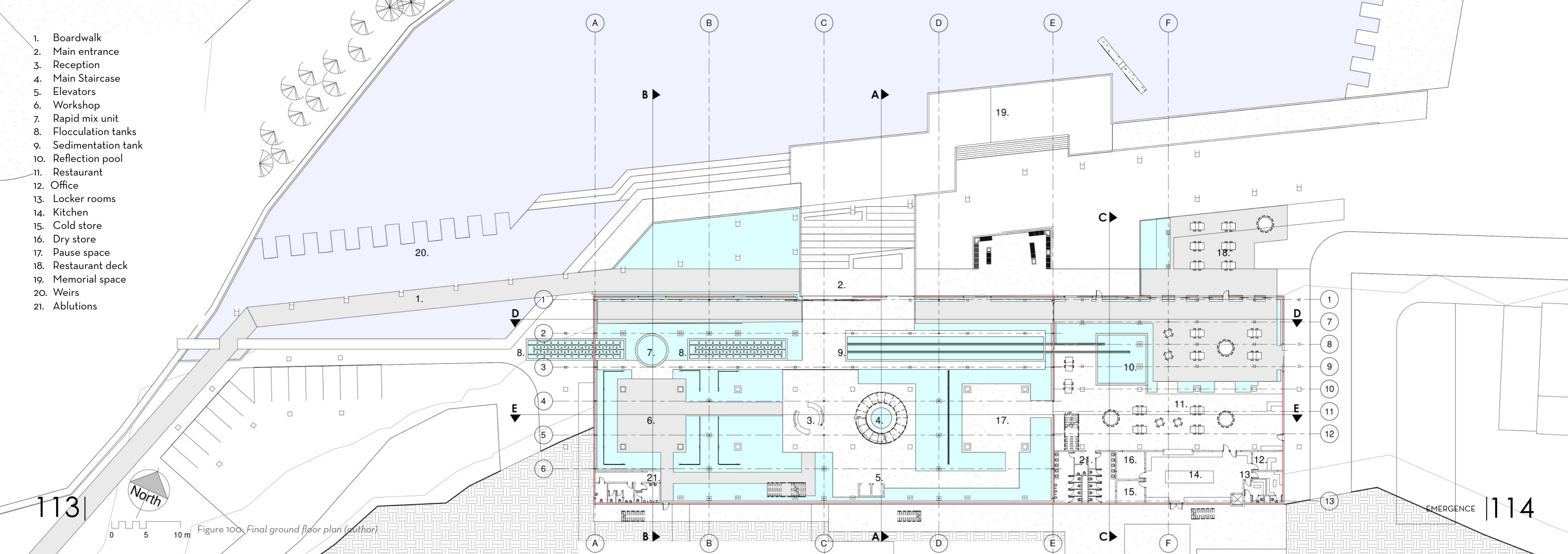


Figure 100. Final ground floor plan (author)

- 1. Reception
- 2. Lounge
- 3. Kitchenette
- 4. Balcony
- 5. Office cubicles
- 6. Junior offices
- 7. Executive offices
- 8. Executive assistant
- 9. Boardroom
- 10. Open office
- 11. Filing and server room
- 12. Mezzanine restaurant seating
- 13. Storage
- 14. Main circulation
- 15. Elevators
- 16. Fire lobby
- 17. Ablutions
- 18. Circulation
- 19. Fire escape

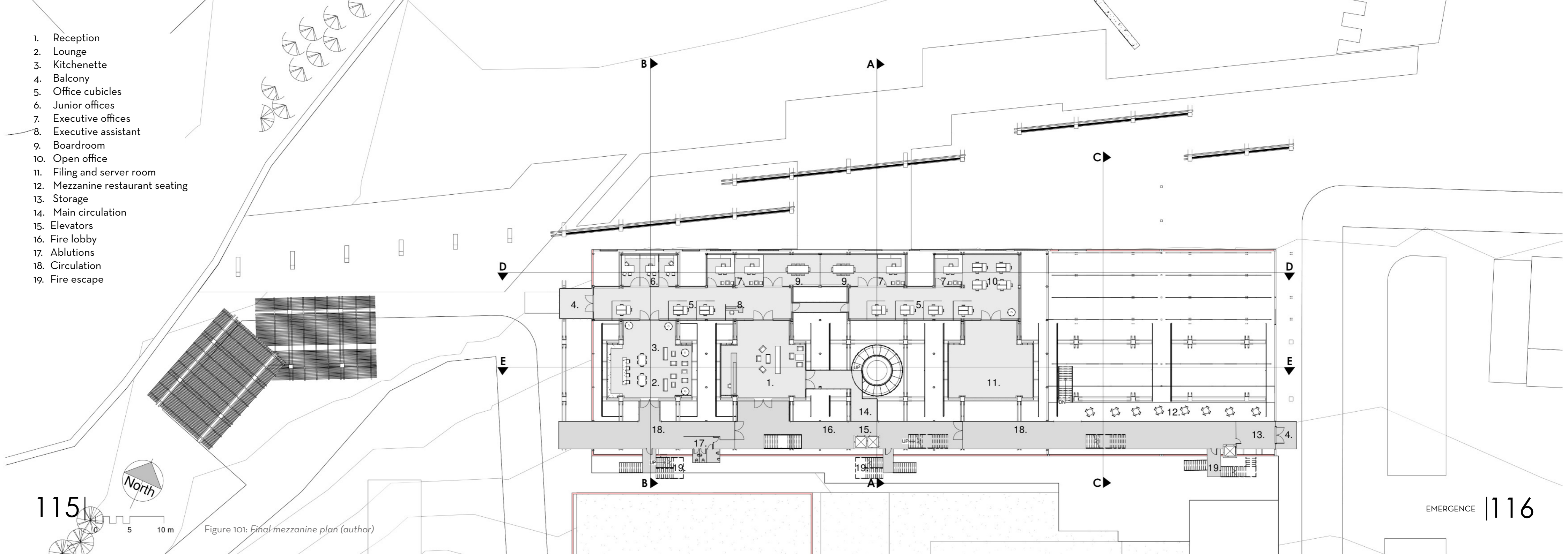


Figure 101: Final mezzanine plan (author)

- 1. Laboratory
- 2. Pump and filter room
- 3. Rooftop garden
- 4. Event space
- 5. Bar lounge
- 6. Outside seating
- 7. Outside bar
- 8. Bar storage
- 9. Ablutions
- 10. Elevators
- 11. Fire lobby
- 12. Fire escape
- 13. Circulation

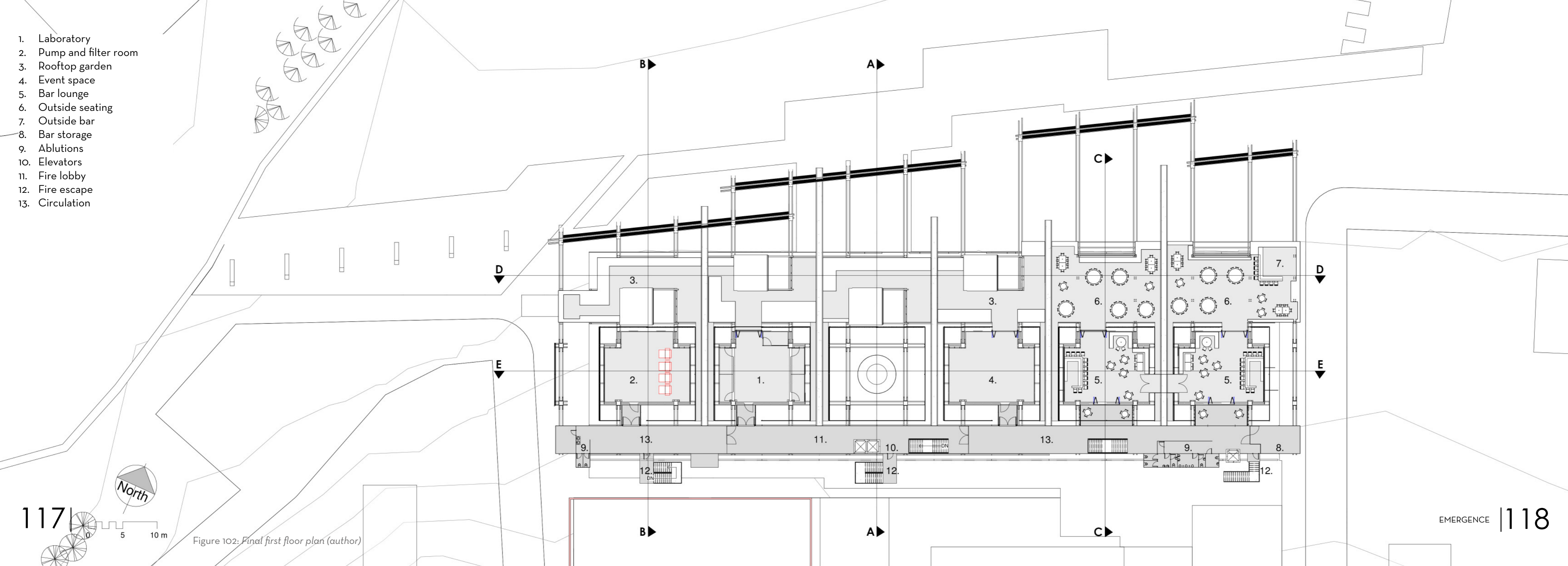
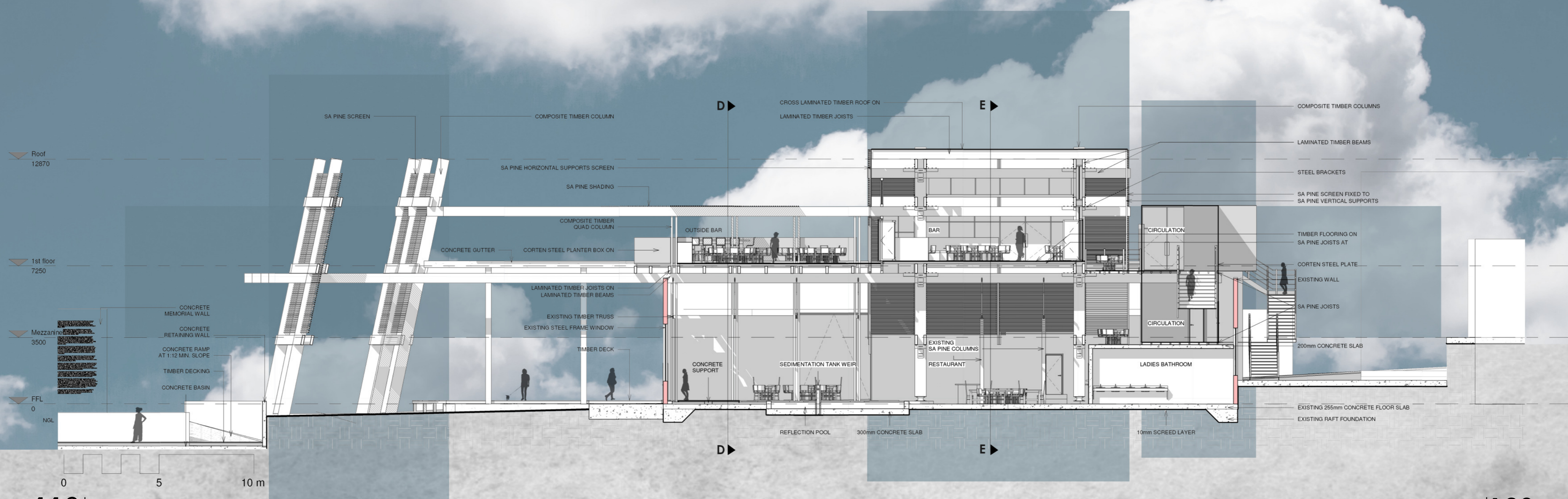
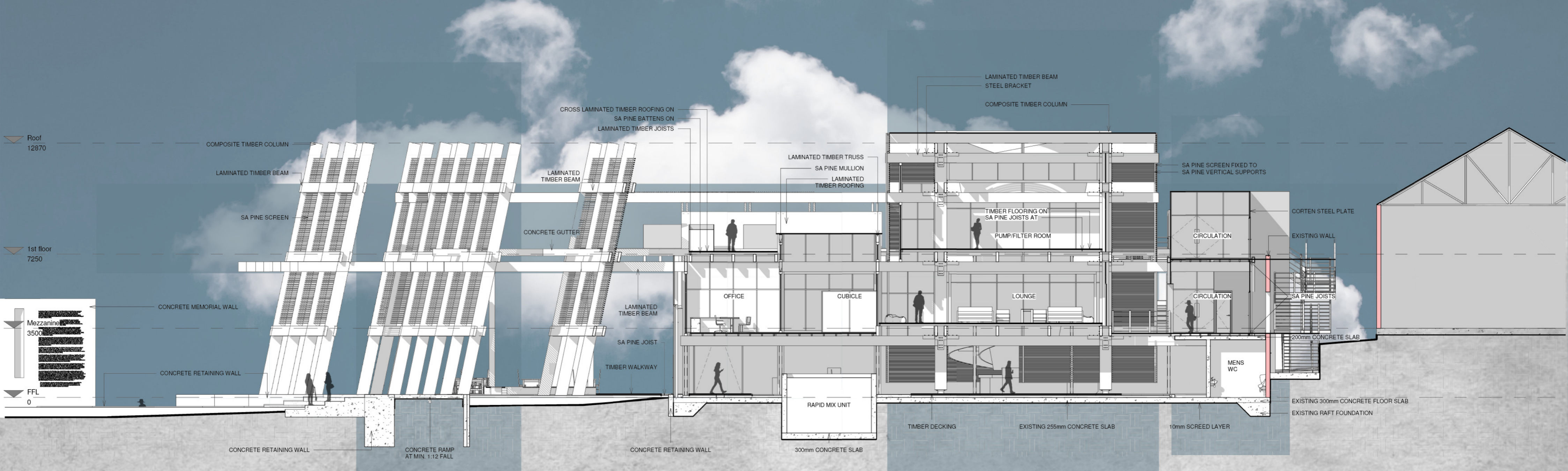
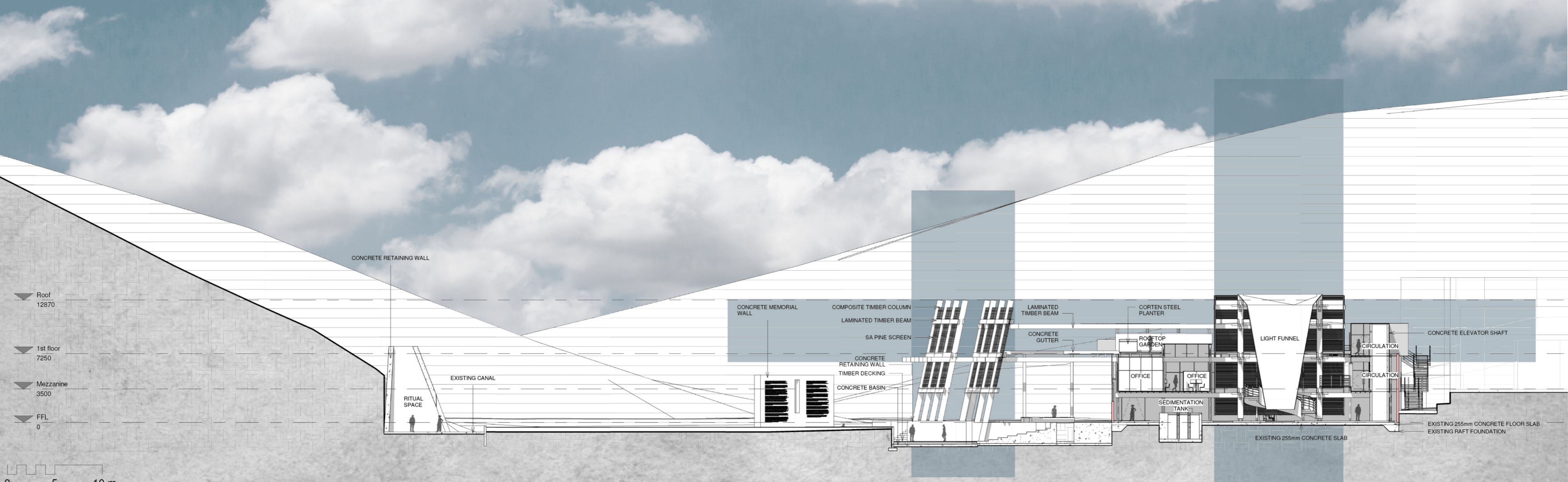


Figure 102: Final first floor plan (author)

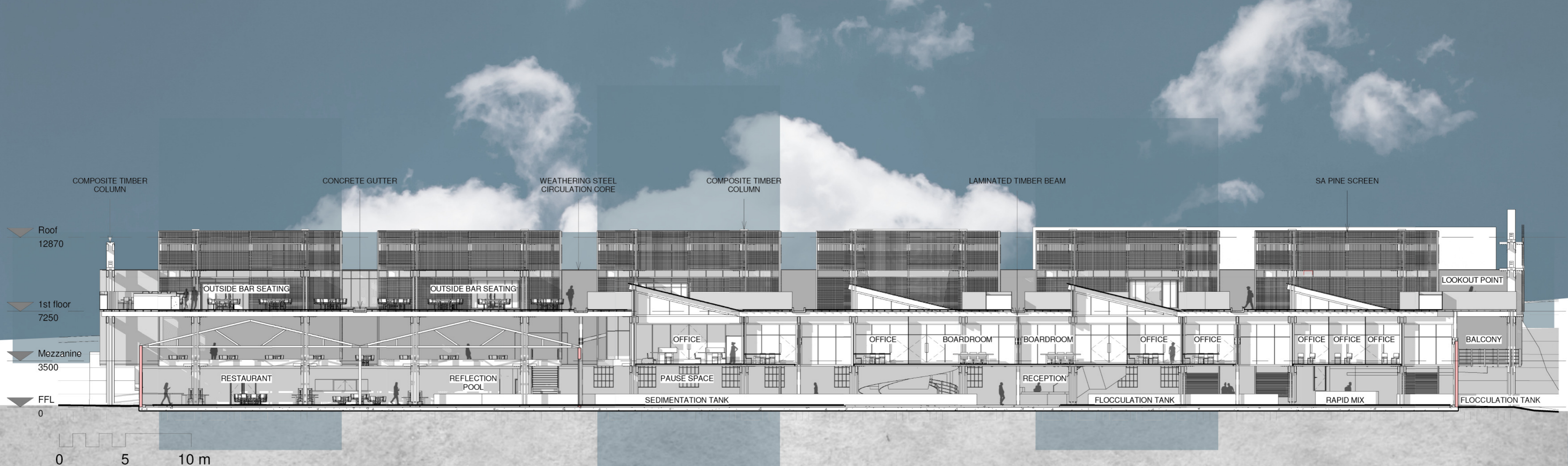


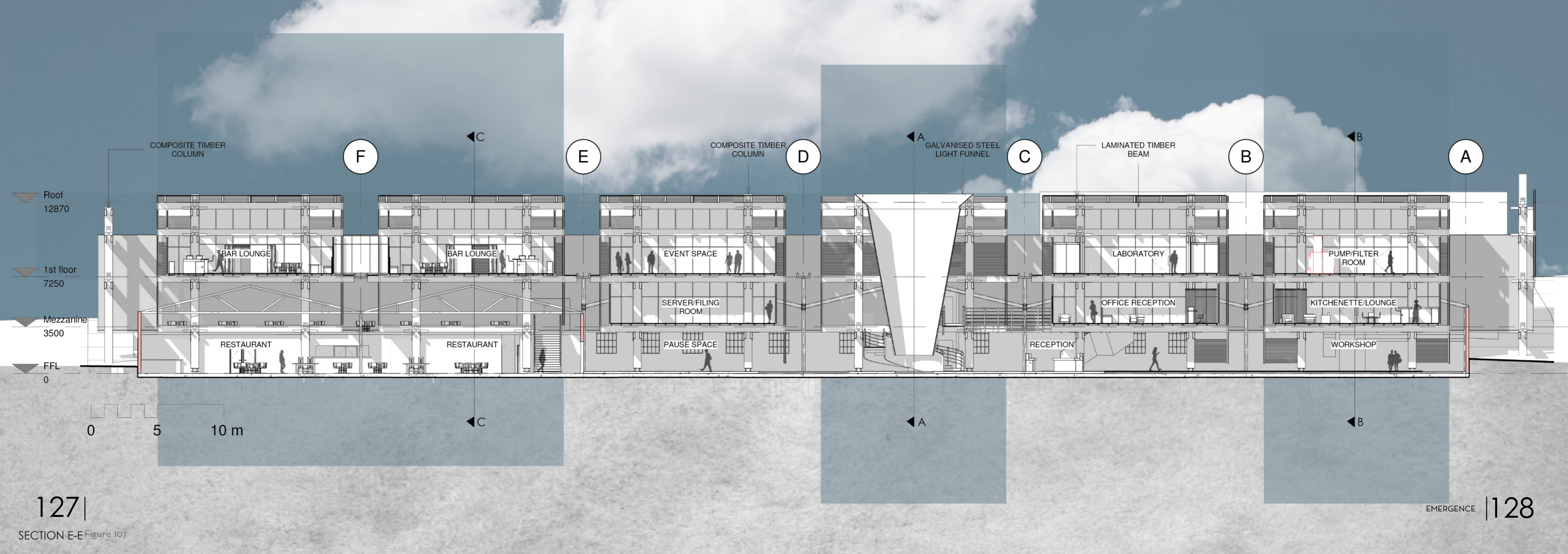


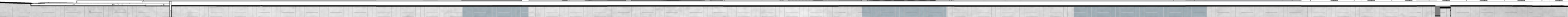
SECTION B-B Figure 104



123 | SECTION C-C Figure 105





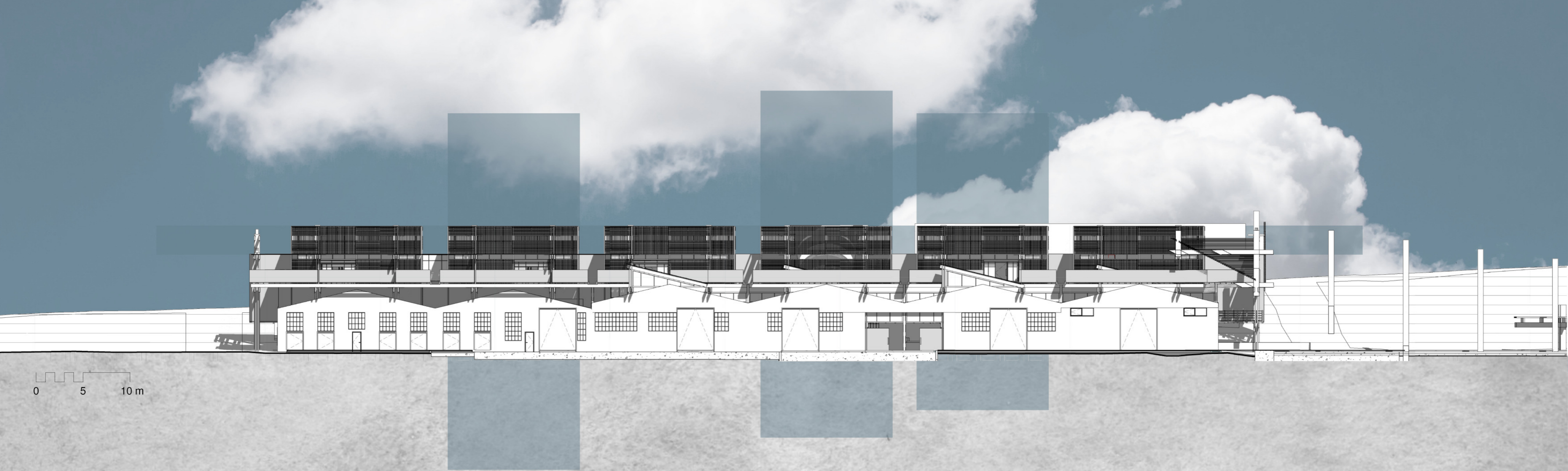


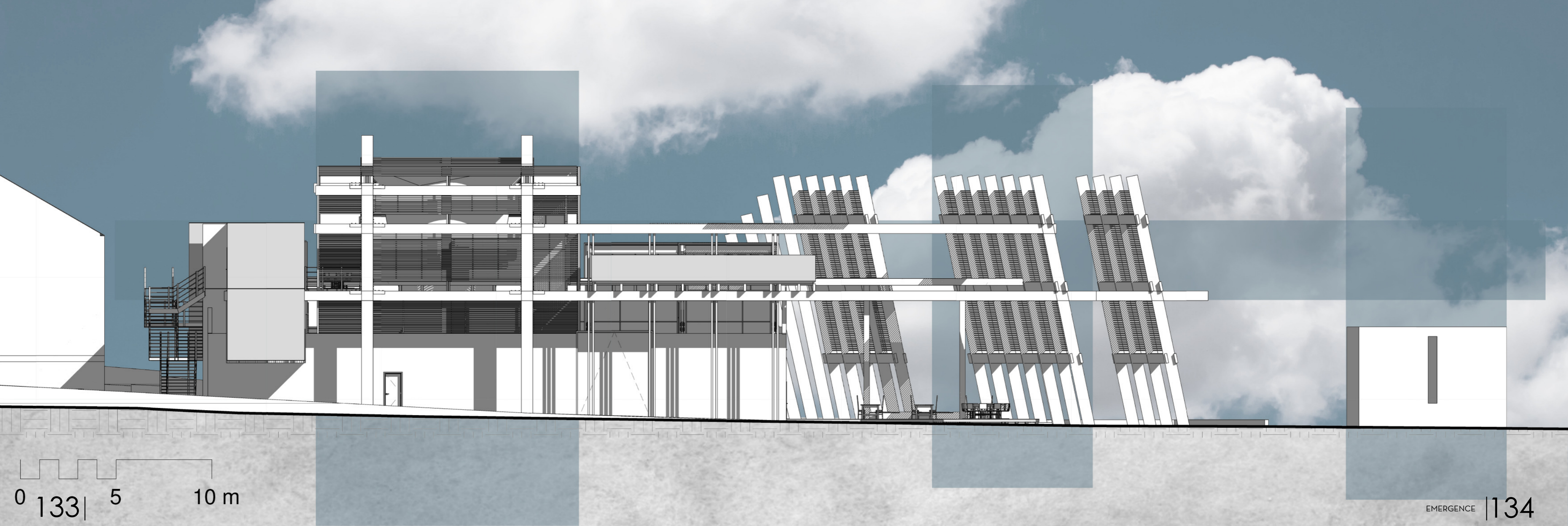
0 5 10 m

129 |

NORTH ELEVATION Figure 108

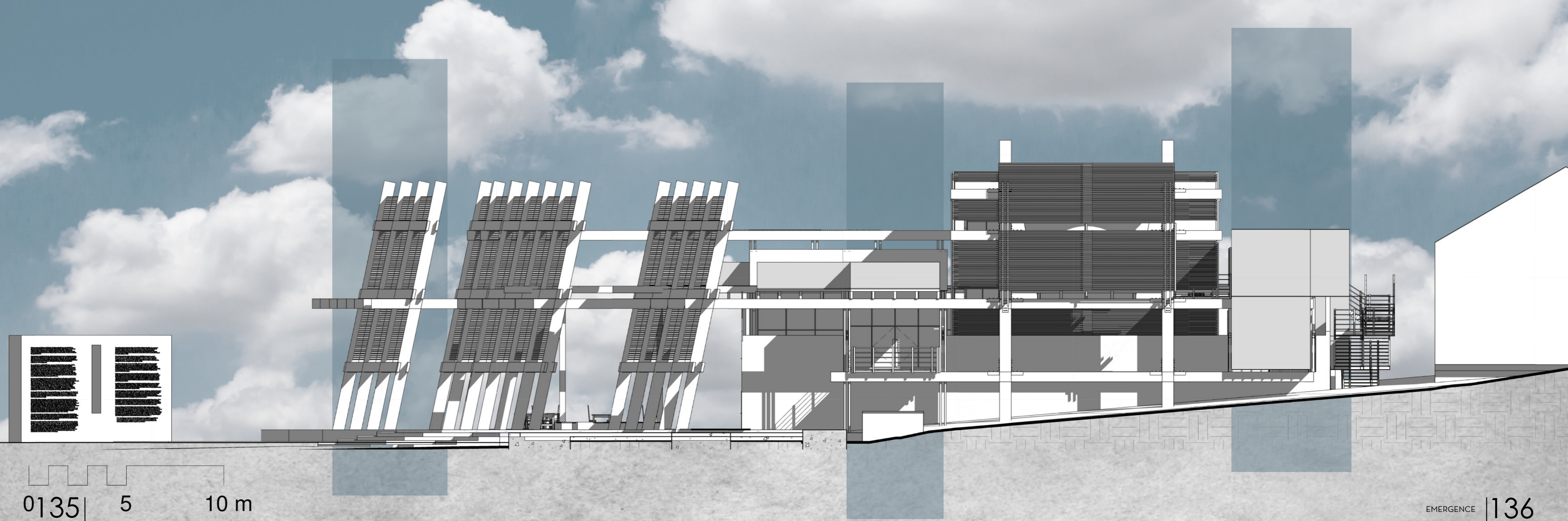
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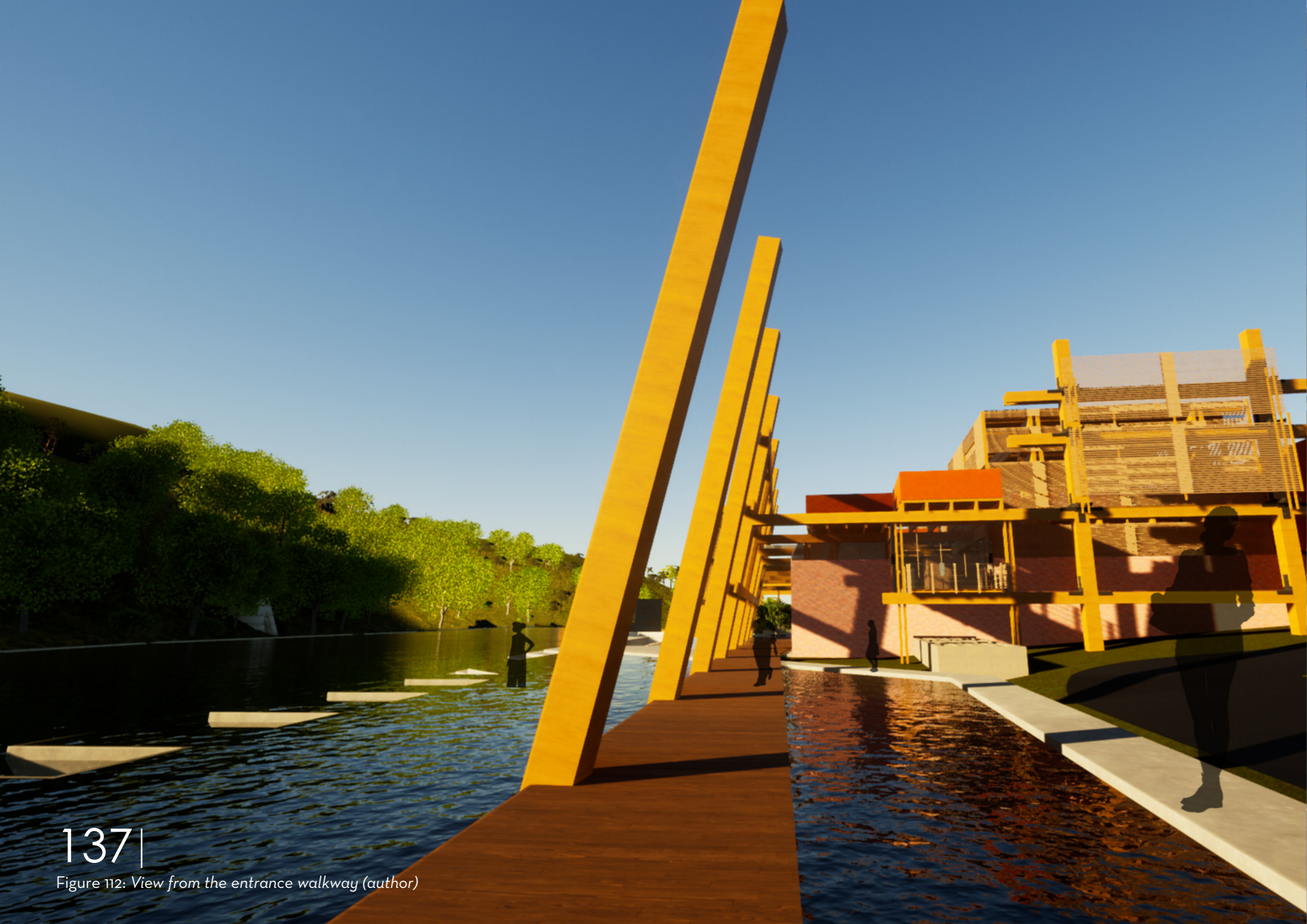
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EAST ELEVATION Figure 110



0 | 35 | 5 | 10 m

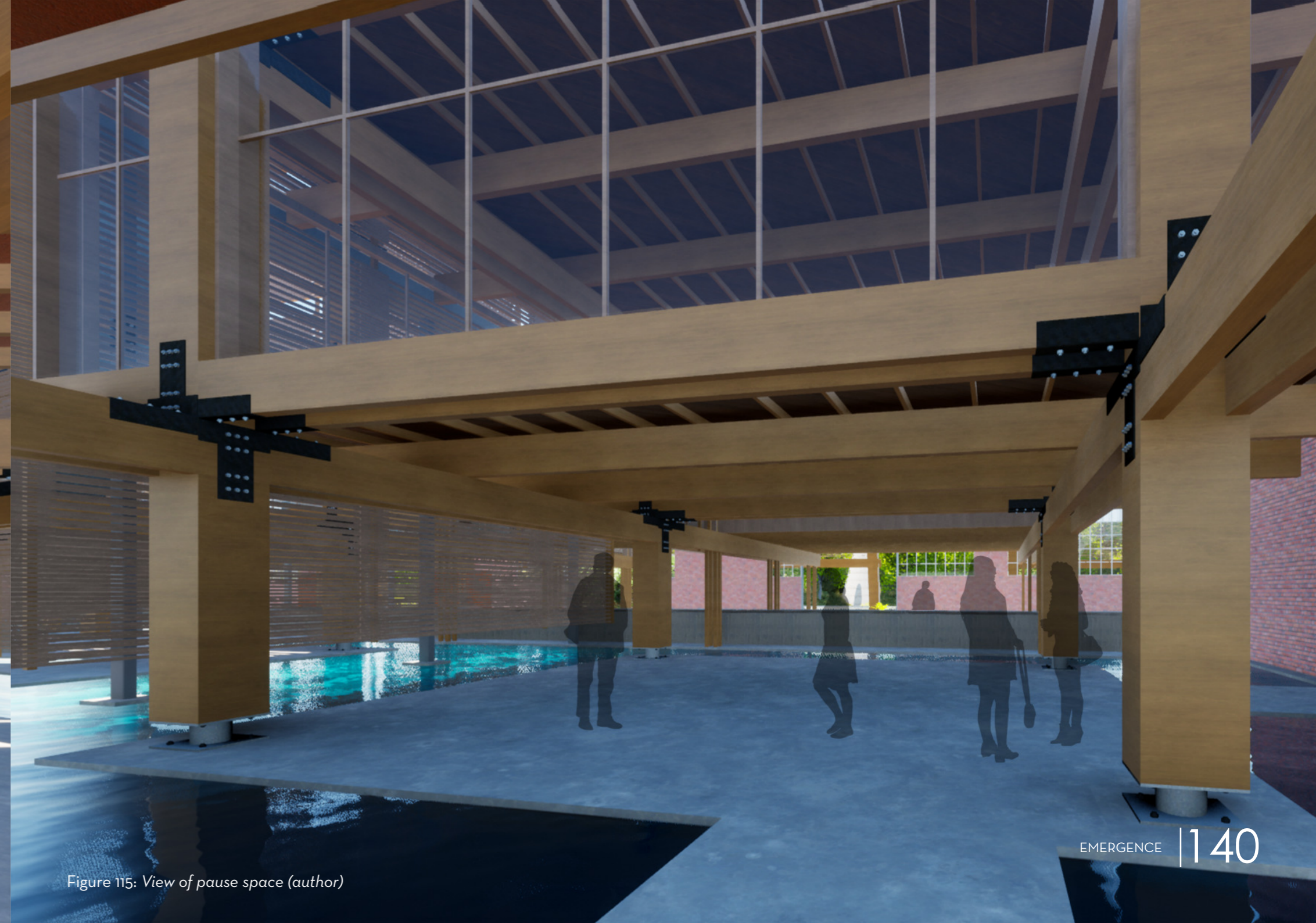
WEST ELEVATION Figure 111





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Figure 114: View of reception and main entrance (author)



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Figure 115: View of pause space (author)

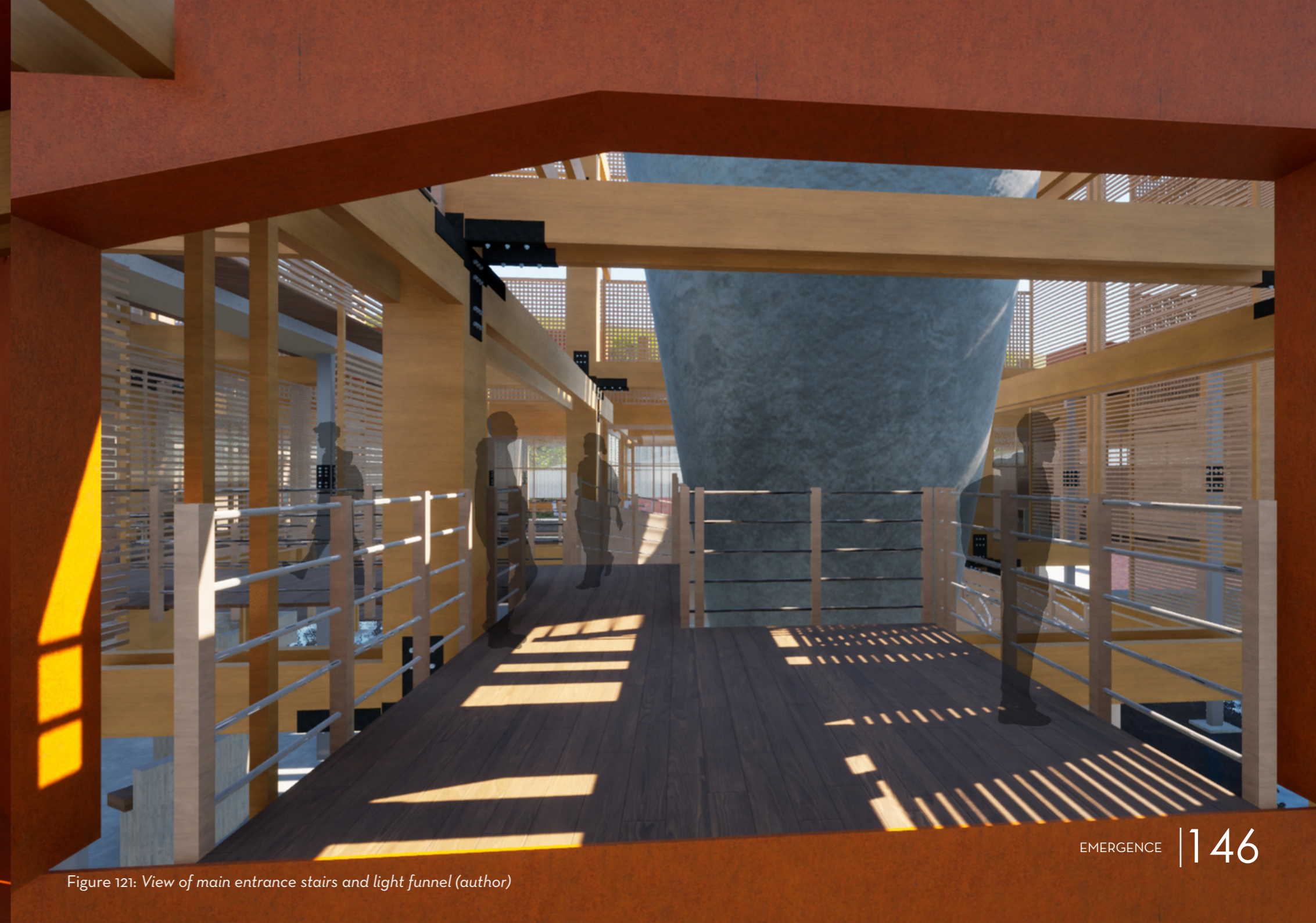






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Figure 120: View of mezzanine seating area and bar stairs (author)



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Figure 121: View of main entrance stairs and light funnel (author)



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Figure 122: View of office reception space from secondary staircase (author)



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Figure 123: View of office reception desk (author)



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Figure 124: View of office kitchenette and lounge (author)



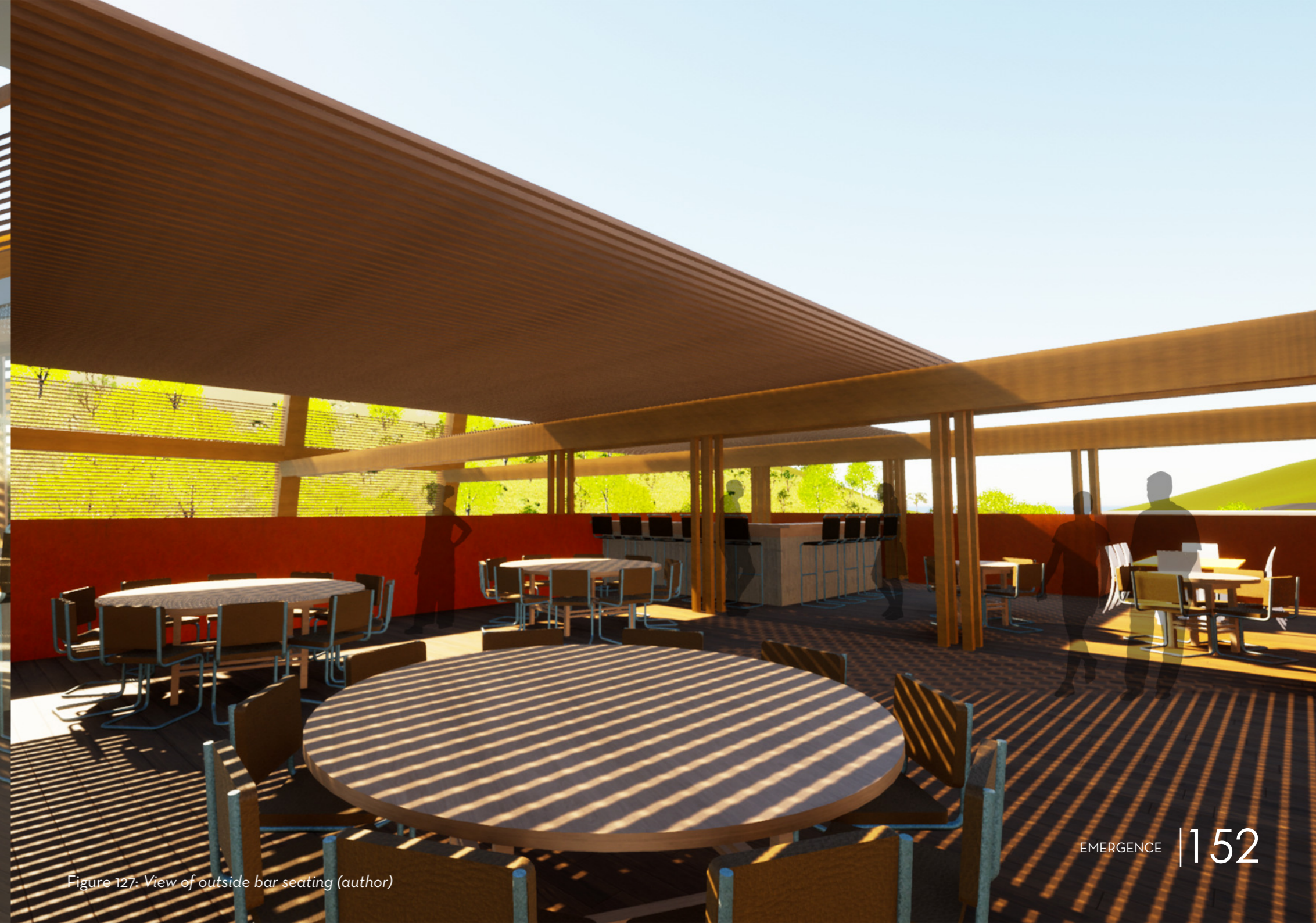
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Figure 125: View of office and boardroom (author)



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Figure 126: View of bar lounge (author)



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Figure 127: View of outside bar seating (author)

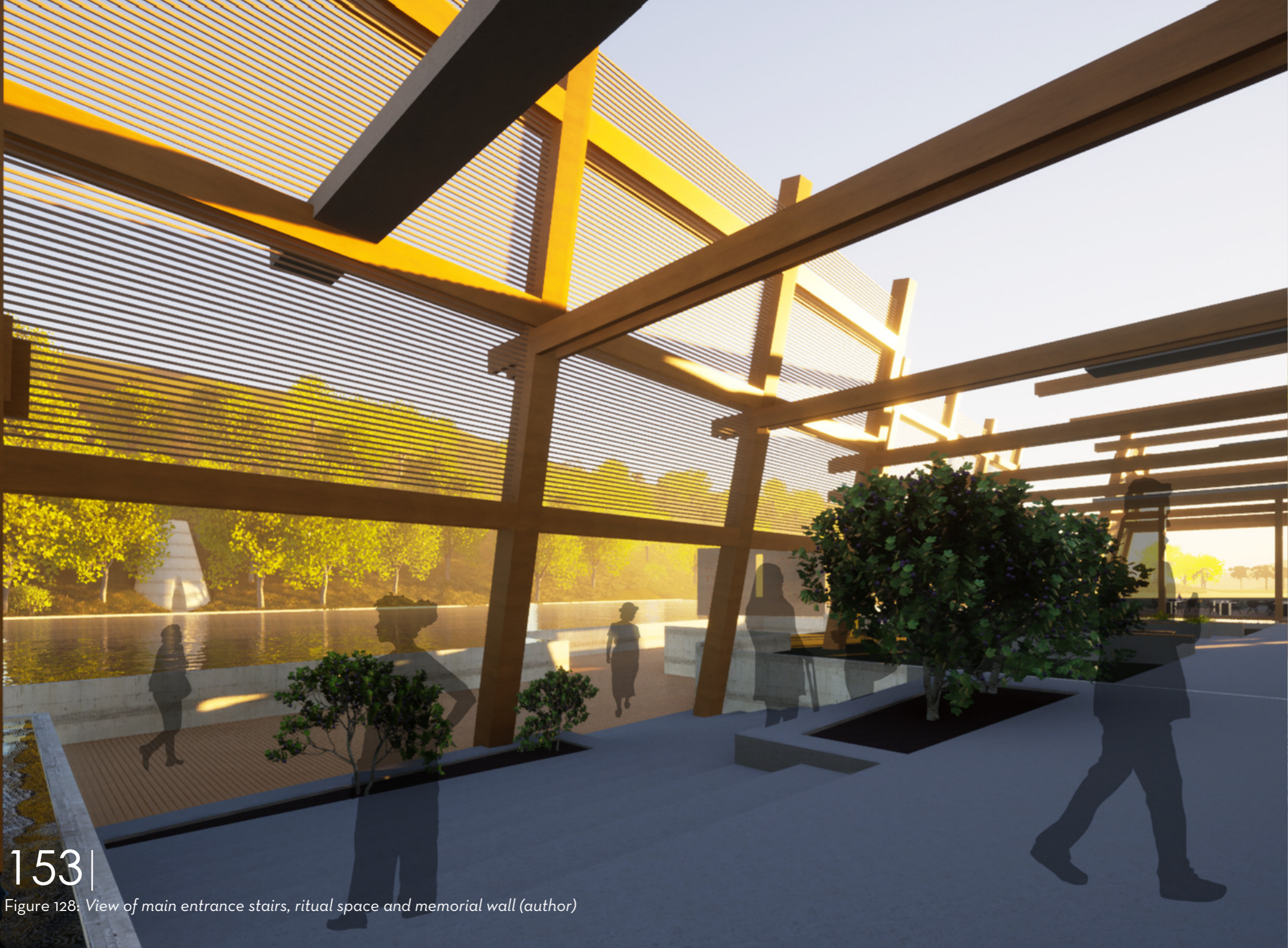
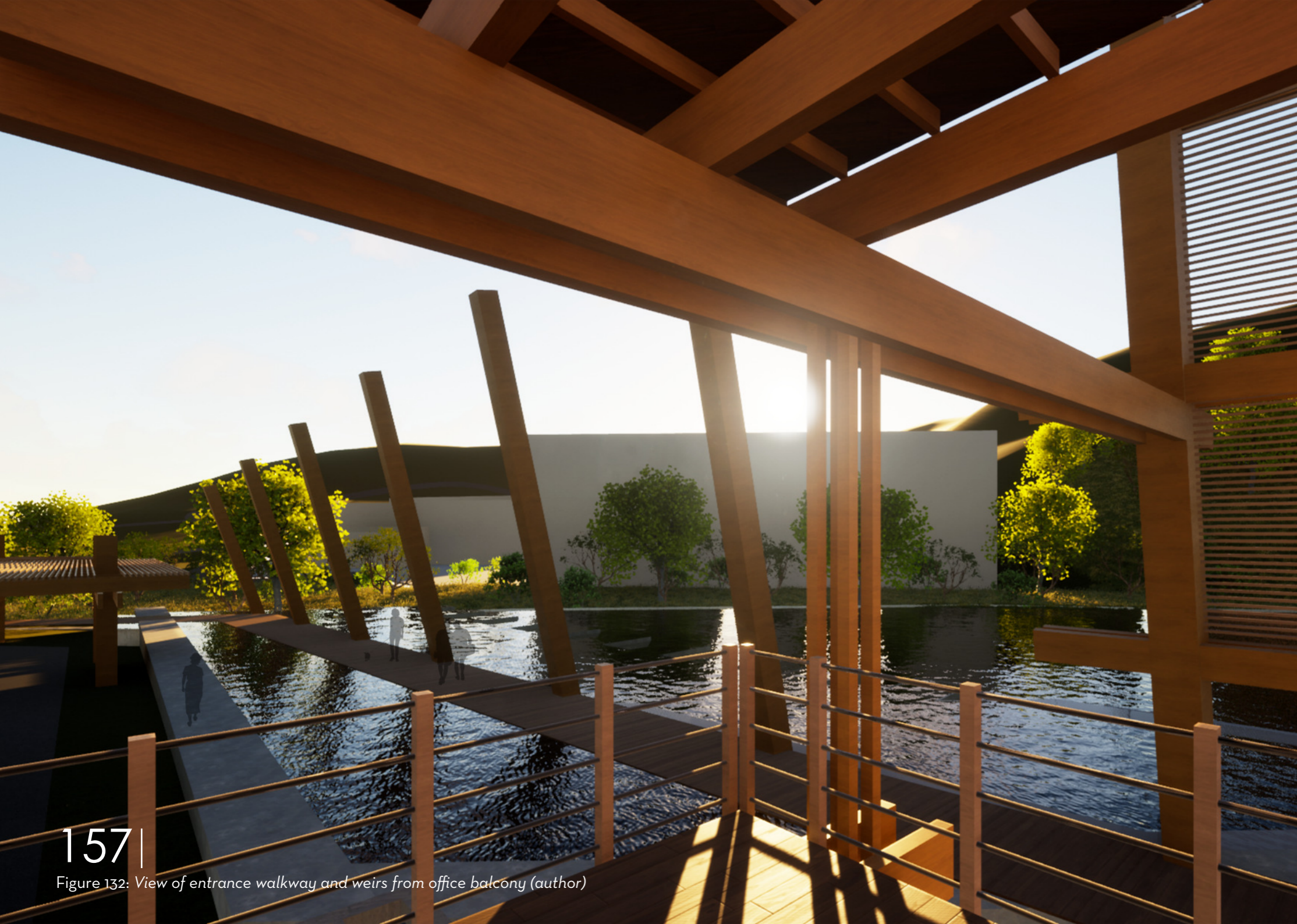


Figure 128: View of main entrance stairs, ritual space and memorial wall (author)



Figure 129: View of memorial wall (author)







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Figure 134: Eastern bird's eye view (author)



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Figure 135: Western bird's eye view (author)



Conclusion

This thesis underscores the critical importance of re-evaluating our perception and treatment of water as a precious resource facing increasing scarcity and pollution. The prevailing notion of water as a mere commodity has led to a disconnect between humans and their intrinsic relationship with water. The proposed solution, a community water appreciation centre, offers a path towards rekindling our connection with water, and the rejuvenation of indigenous knowledge systems may hold the key to achieving this.

The study emphasizes that the water crisis in Gqeberha should not solely be attributed to infrastructural shortcomings, but rather to the neglect of the deeper, intrinsic value of water. By delving into ancient knowledge, narratives, and experiential learning, this research seeks to revive a sense of hydro-gratitude within the community. The envisioned water appreciation centre, through its contextually sensitive design, can serve as a catalyst for social transformation, fostering respect and admiration for water.

Ultimately, the goal of this thesis is to facilitate a shift in mindset, one that encourages conservation, environmental flourishing, and sustainable coexistence with the hydrosphere. By reimagining water as more than just a resource, and by tapping into the wisdom of indigenous knowledge systems, we can aspire to cultivate a society where water is cherished, protected, and integrated into the fabric of daily life. In doing so, we can pave the way for a future where water scarcity and pollution are challenges addressed with the reverence and care they truly deserve.

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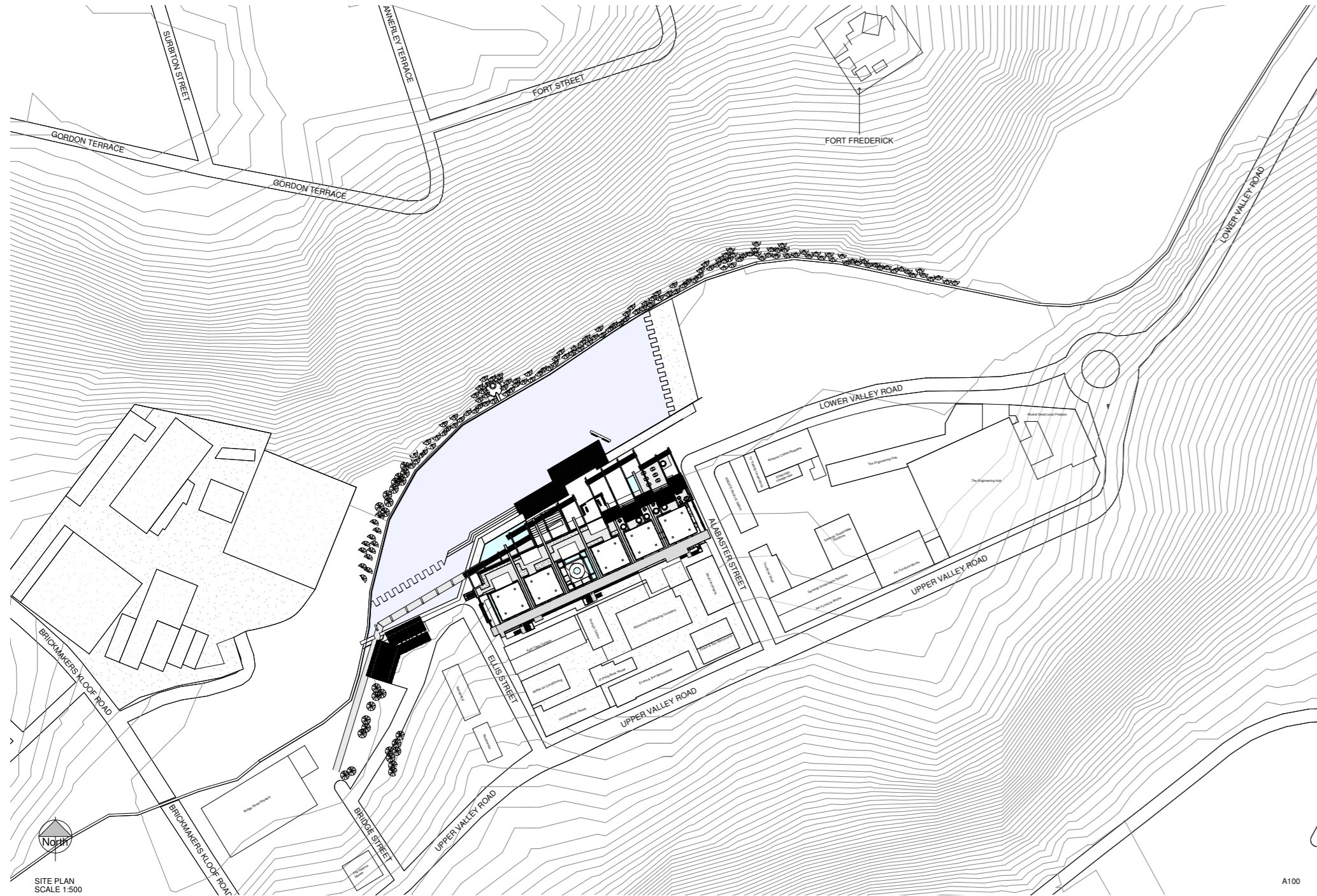
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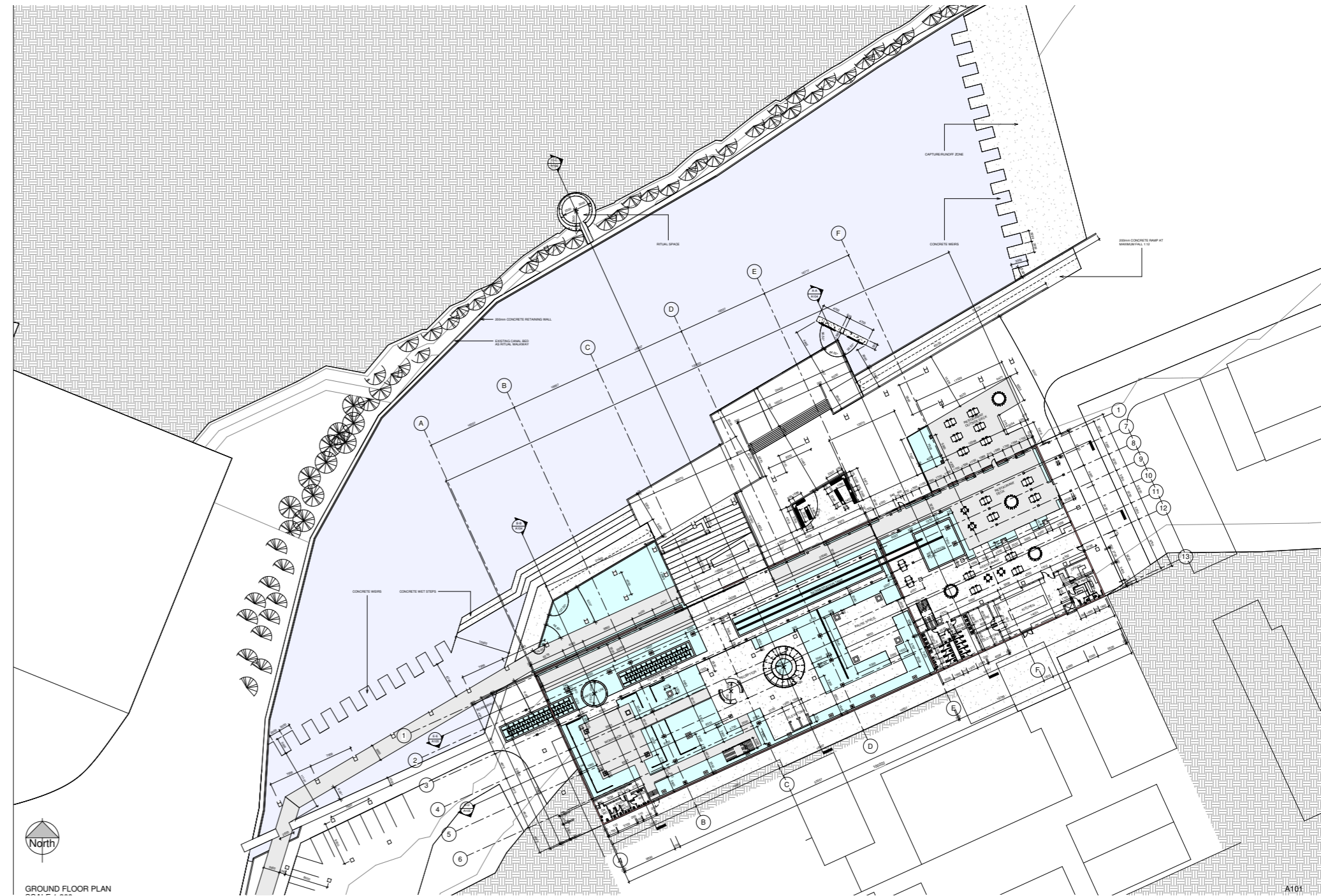
APPENDIX

CONSTRUCTION DRAWINGS

(Note, drawings are not to scale)



A100



A101

