

(re)Constructing the way we build

Skills Development Centre in
Delft

An architectural dissertation report on
the development of essential skills
along Delft Main Road as a means of
societal integration and identity
formation.

MArch (Prof)

Design Dissertation

September 2022

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PLAGERISM DECLARATION

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This dissertation is presented as partial fulfilment of the degree of Master of Architecture (Professional) in the School of Architecture, Planning and Geomatics, University of Cape Town

Date:

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Lastly, I would like to thank Jacobs Parker Architects for their mentorship and guidance over the years and for aiding in my architectural growth. Thank you, Andy Horn, for sharing your vast knowledge of alternative construction methods with me, as well as for allowing me to accompany you to site visits.

P R E F A C E

Research and information are filtered through one's pre-understandings, opinions, biases and personal values, therefore it is critical that I make it my own throughout this dissertation. My interest in my inquiry comes from my passion for construction and from personal interaction with people who live in informal settlements and social housing.

As a child growing up, I was raised by friends of my grandmother, a result of both my parents working full-time jobs. This is where my passion for building began. The people who looked after me were carpenters and their workshop is where I spent most of my time. Throughout my schooling, I would have friends in informal settlements and social housing, but it never registered to me how different their lives were in comparison to mine.

I had two working parents with relatively good jobs, and I assumed that everyone that went to my school lived a similar life to me. It was only when I had to drop a friend off at home that I saw how different our lives truly were. I had the same awakening moment when I had to take our domestic worker to her home in Langa. It was these experiences that left an ever-lasting impression on me, and I always knew that I would want to explore a way of improving housing in less affluent areas.

In 2020, while working on my application for Honours, we were required to write a piece on Travel Study. My initial goal was to travel to Europe and write about the architecture there, but Covid-19 had other plans. Instead, I explored local architecture. I found it interesting that I was struggling to find a good precedent of local social housing. Eventually, I came across the Sandbag Houses in Mitchell's Plain. I was fortunate enough to visit them and this was an experience that I will never forget. The personal impact that these houses had on their residents and their overall design principles has heavily guided me to my topic.

During my honour's year for my sim office project, we explored clay-straw construction. We opted for this form of construction as our building was in a farming town where straw was in abundance. The use of an alternative construction method allowed for community participation and skills development. I was fortunate to consult with Andy Horn of Eco Design Architects & Consultants who is a specialist in alternative construction. It was from this meeting that I knew I would want to explore various alternative construction methods in my future projects. Through these personal experiences begins my journey into my design dissertation.

A B S T R A C T

Identity can be associated with a person, group or place and is defined as the sense of belonging. Thus, a person who doesn't belong and an architecture of placelessness both lack an identity. It can be shaped by history or by the current day. This design dissertation proposes a more situated architectural identity by exploring the relationship between the social and the material in Delft, Cape Town. The strong themes of the temporary and the permanent and formal and informal create a conflict of identity within Delft.

The theory of Critical Regionalism will be the foundation for creating an architecture of identity within the context of Delft. An architecture of place will be achieved by being critical of the context and current construction practices and making use of readily and locally sourced materials. Sandbag construction and local vernacular practices will be combined to create an architecture of permanence, place, and identity within Delft.

This design dissertation tests these themes through the speculative design of a Skills Centre, as there is a strong culture of making and learning within Delft. The Skills Centre will revolve around the idea of making, from alternative construction to the growth and preparation of food. The main concept of the Skills Centre is to act as a catalyst in the upskilling of the community and thus create a new identity for them. The Skills Centre will embed itself within the concept of a circular economy through construction and operation. Sandbag construction will act as the first economic driver; once the Skills Centre is completed, it will act as a catalytic economic driver. Creating an architecture of permanence that is rooted in place should start creating a positive identity and sense of belonging within Delft.

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1 Theory and Technology

Introduction

Identity

Critical Regionalism

- Case study

Sandbag Construction

- Case Study

INTRODUCTION

With a personal interest in alternative construction methods, it became my primary point of departure for this design dissertation. It acknowledges the construction practices found within informal settlements and addresses the monotonous and poor response to housing by the government in Delft. The focus on construction looks to address the temporary identity created for people of informal settlements and recreate them in more permanent and positive light. This master dissertation will look at the recreation of identity and the improvement of construction practices found within the informal settlement of Delft through the lens of upskilling.

The theoretical background of this dissertation will focus on identity and architecture as well as Critical Regionalism. Exploration of sandbag construction as an alternative construction will also be a main focal point throughout.

The provision of housing in Delft is an ongoing issue. Many residents rely on government-funded housing as Delft is seen as a poverty-stricken area. Due to the government's inability to provide housing at a reasonable rate, informal settlements began to spread throughout as temporary housing means. This creates a theme of

temporary and permanent which can be found throughout Delft. The goal of this dissertation aims to address the temporary housing found within informal settlements rather than government-provided housing. Can we change what is seen as temporary into the permanent through a catalytic architecture that spreads through learning and development?

With formal and informal businesses, public institutions, and informal settlements; Delft main road became a key point of entry for locating my intervention. This large urban spine, often activated by temporary activity, is neglected by the public institutional buildings. The buildings turn their back to the street and are often fenced off, creating a juxtaposition between the temporary and the permanent. Thus, creating a main road experience that lacks public interaction and becomes solely a movement route.

IDENTITY

The concept of identity can be applied to the individual or architecture. Christian Norberg-Schulz, a Norwegian historian and architectural theorist, defined an individual's identity as a result of belonging to a place. Our identity is linked to a sense of belonging and is the collective characteristics of an individual (a person) or a collective (a place/organization). By applying this definition to architecture, we start to look at an architecture of place and belonging.

Individual Identity

There are multiple definitions for identity, but all emphasize a common point. An individual's identity is the way in which they are perceived, it is the accumulation of the individual's beliefs, qualities and ideas that make them feel unique and different from others or belong to a particular group. An identity is the collection of fixed practices, customs, shared experiences and traits and an identifiable sociological category. (Yilmaz, M. 2006.)

Architectural identity

Before we can define architectural identity, we need to understand what architecture is. Some would define it as pure art and others would define it as an engineering science. As architects, we play an essential role in the way people think as we can create environments with specific characteristics that define and differentiate them from others. These

environments can be characterised by their geographical formations, social and cultural characteristics, and man-made formations. These characteristics play an influential role in public social life due to the interaction between people's lifestyles and man-made constructions. (Yilmaz, M. 2006.)

Architecture and the built environment behave as key tools in which identity is reflected as they spread cultural identities throughout the generation. The individual identity extends itself into spaces and places and begins to develop a self-identity. The definition of one's "self" is expressed through their relationship with others and the various settings and structure of the everyday. "Self" encapsulates the individual's conscious and unconscious perceptions of their past, daily experiences and future desires.

The development of an individual's identity is strongly influenced by their social environments. The development of the individual's "self" is rooted in the acceptance and incorporation of commonly shared values, expectations, and beliefs. (Yilmaz, M. 2006.)

Based on the idea of self-identity, forms a substructure known as place-identity. Place identity consists of the individual's conceived perceptions of the physical world. These perceptions are representative of ideas, memories, attitudes, preferences, feelings,

meanings and conceptions of behaviours and experiences that define the everyday. (Yilmaz, M. 2006.) There is a strong relationship between architectural identity and place identity. Place-identity consists of two important assumptions:

1. Personal attachment to geographically locatable places creates a sense of belonging and purpose for an individual and gives meaning to their life.
2. The sense of rootedness or centeredness is an unselfconscious state. The essence of a place is rooted in the unselfconscious understanding of places as centres of human existence. Everyone has a deep association with places, whether it be the place they were born, grew up, currently live or had experienced something particular to them. These associations represent the source of both individual and cultural identity.

Based on these definitions of identity of the individual and architecture, it begins to set up the framework for the design of my intervention. It allows for the possibility of the recreation of an identity that was once a result of the negative aspects of life and history.

CRITICAL REGIONALISM

How can we create an architecture that embraces and creates a positive identity and a sense of place and belonging? Through the exploration of the theory of Critical Regionalism, we can start addressing this question. Critical Regionalism is a design proposition that mediates between local and global developments. It is an approach that carries a certain resistance without being regressive. This was theorised by the architecture critic and historian Kenneth Frampton following Tzonis and Lefaivre's coining of the term. (Cutieru, A., 2021.) Frampton's theory creates a framework for designers which allows them to situate and comprehend the tensions between the historical and the contemporary and the local and the global. Frampton believed that mankind's advancements would lead to the subtle destruction of traditions and cultures. Critical Regionalism defines an architecture that is rooted in a critical approach to climate, topography, and tectonics. It is a form of architectural resistance to the ornamentation of post-modern architecture and the placelessness of modern architecture. (Frampton, K., 1981)

Critical Regionalism's critical response to the context allows for an architecture of "place" and "belonging" to immerge. This strikes a balance between the global and the local. The aspects to be critically explored are culture, climatic, geographical, and social contexts. The neglect of these contexts can lead to an architecture that is indistinctive and lacks intimacy is created.

Works such as Alvar Alto, Saynatsalo Town Hall encapsulate the ideologies of Critical regionalism. He achieved this through the amalgamation of modern forms, the critical use of local materials like wood and brick, traditions of Finnish architecture and the recognition of the site's cultural context. Alto is able to create an architecture of place and a symbolic identity (Prabhu, M., n.d.)

By applying the theory of Critical Regionalism in the design of my building I am hoping to create an architecture of a new identity in Delft. An architecture of place which is held in its current context. A building that embraces the temporary identity found in Delft and recreates it into a more permanent one; an architectural and an individual's personal permanent identity.



Figure 1 Elevation of Saynatsalo Town Hall by Alvar Alto. Depiction of modern form and its relation to its context. (Saieh, N., 2022.)

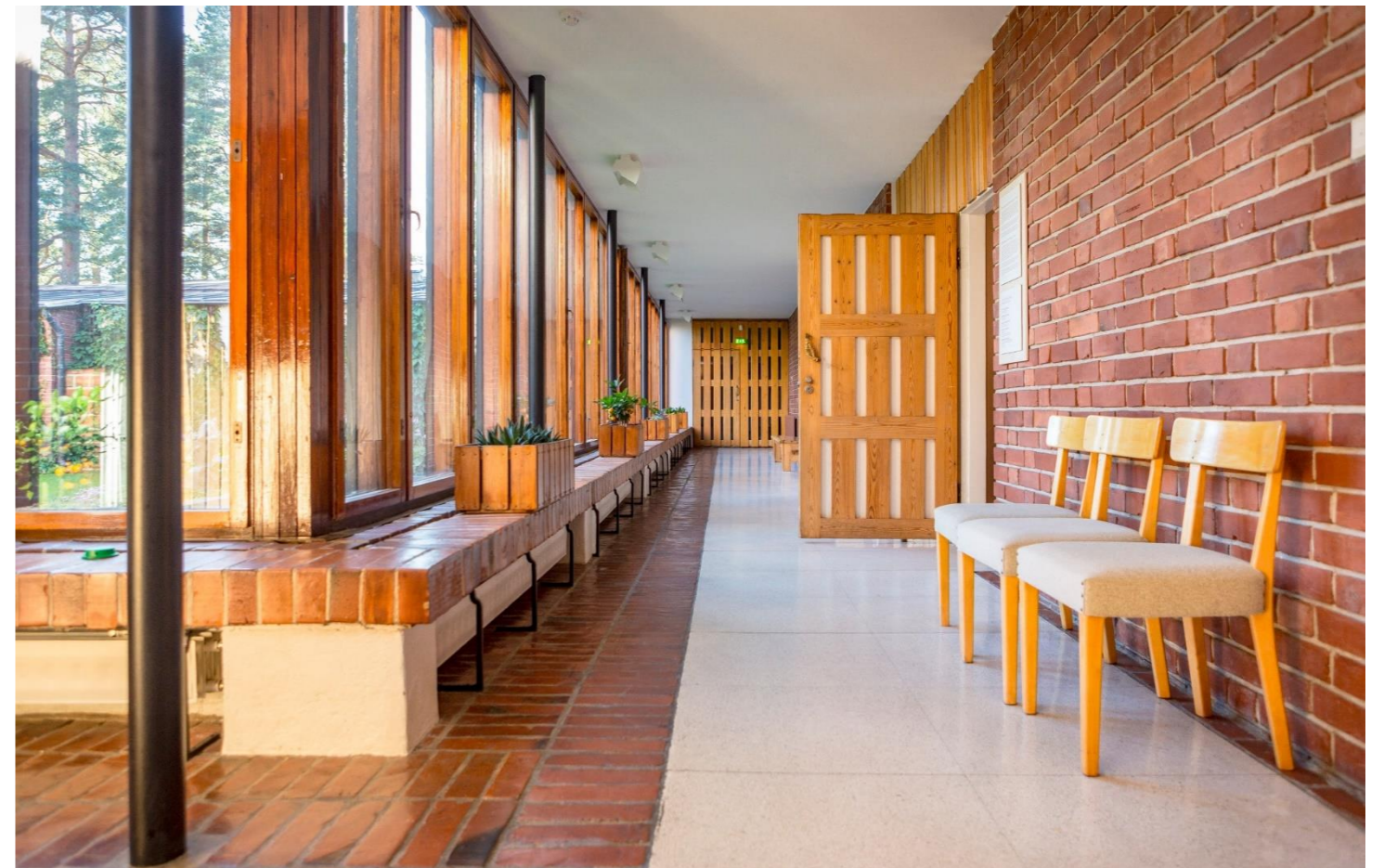


Figure 2 Interior view of Saynatsalo. A synthesis of locally sourced timber and brick. (Takalo-Eskola, T., 2022)

CASE STUDY

Gando Primary School – Francis Kere

The works of Pritzker Prize winner Francis Kere encapsulate the ideologies of Critical Regionalism. The Gando Primary School is the perfect example of how Critical Regionalism can create an architecture with an identity. Kere was from a rural village in Gando, Burkina Faso. The primary school is the antithesis of the placelessness of the current architecture and becomes an example of the recreation of the local identity of Gando. The school establishes itself on the principles of community involvement, and the use of local materials in its construction.

Vernacular

Kere drew inspiration from the local vernacular such as dwellings that are located in the villages of Gando. These compounds were constructed from sundried bricks and made use of concrete blocks in the quadrangular. These compounds would be enclosed with a mud roof. Many new buildings throughout Burkina Faso began to imitate those of the west, resulting in a loss of culture and identity within the architecture. New buildings would be constructed out of concrete, with a single slope metal roof.

Climate and Response

The Sudano-Sahelian climate is characterized by alternating rainy and dry seasons with a strong easterly wind during the beginning and end of the rainy seasons. The climate in Gando led to the use of concrete in construction becoming more common. This was due to the strong eastern rains, causing the rain to hit the mud brick walls which resulted in them eroding. Concrete was used even though it had a poor climatic performance. Kere still opted for the use of mudbricks and addressed the issue of erosion by creating a roof overhang to prevent the rain from touching the school. The school incorporated design principles such as cross ventilation through the roof, ceiling, and classrooms and passive solar design.

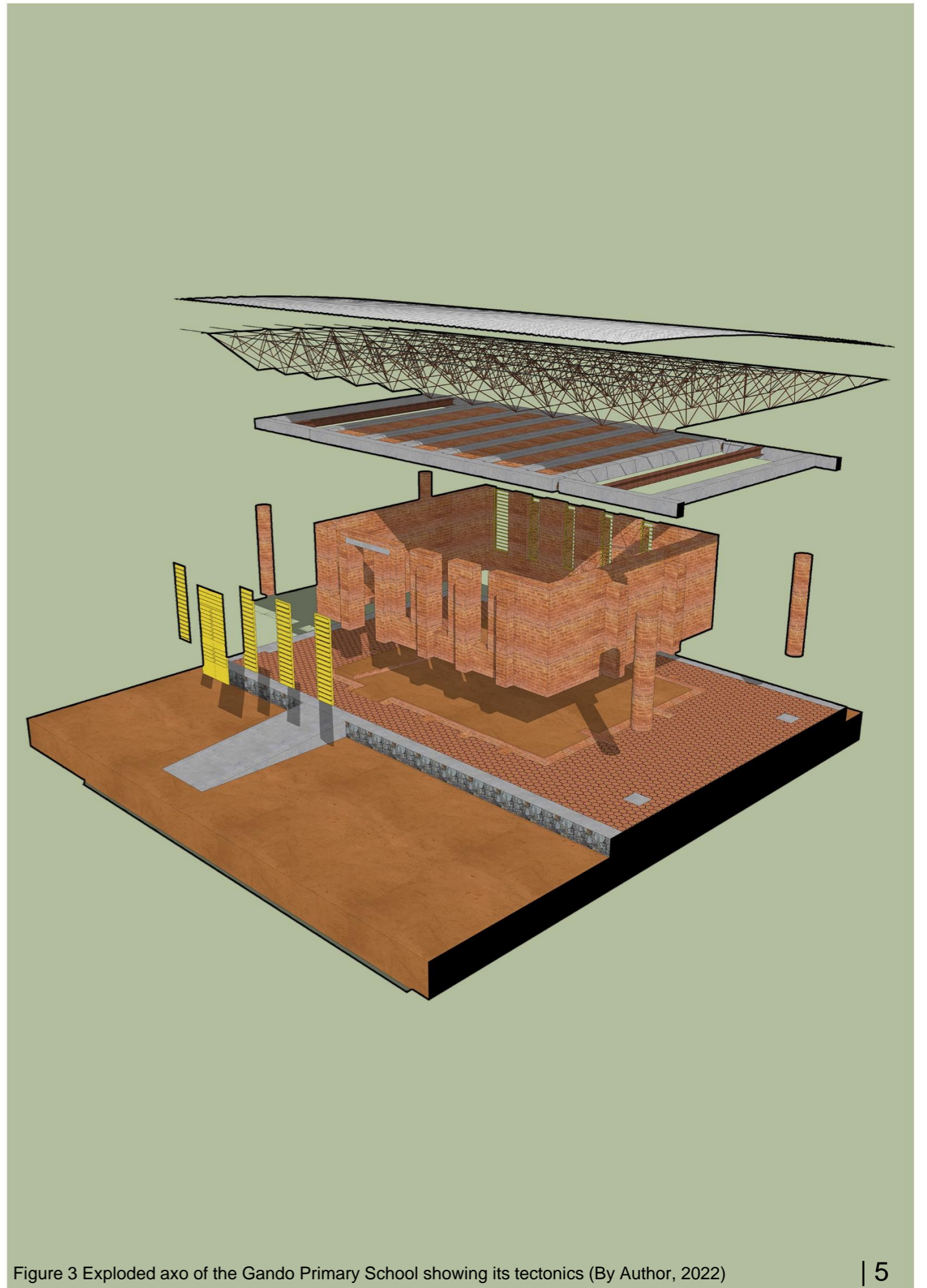


Figure 3 Exploded axo of the Gando Primary School showing its tectonics (By Author, 2022)

Construction and Fabrications:

The construction of the school made use of traditional construction methods and local materials and skills. Due to the lack of education within the village, the construction of the school had to be simplified. Minimal construction drawings were used but instead, Kere opted to make working detail prototypes on-site. The simplification of details allowed for the materials to be expressed in their purity.

Foundations were constructed of stone and concrete. The floors in the classroom were constructed from rammed earth. The rammed earth floor encouraged community involvement as the men would first crush and compact large pieces of earth and afterwards women would smooth them out by hand with a stone and water.

Walls were made from compressed earth blocks. The same material that traditional structures were built from. The use of the earth blocks brought back traditional construction and thus recreating an identity that was lost.

Doors and Windows were constructed out of steel shutters. The use of steel was important because it is a familiar skill for the local craftsmen within Gando. (Veranda, F., 2004). The use of localised labour resulted in fast turnaround times in production as well as encouraging local trade. Shutters allowed for light and ventilation control within the classrooms.

The roof was made up of metal roof sheeting and a space frame truss system made from rebar. This truss design became part of Kere's architectural identity. The use of rebar meant that local builders had to be taught how to weld. This allowed for upskilling to occur.

Conclusion:
The use of local materials, traditional construction methods and the response of the building to the climate all drew on the theory of Critical Regionalism. The construction of the school recreates the identity of traditional architecture within Burkina Faso and becomes an architecture of place. There is a didactic approach between traditional and community involvement. An understanding and appreciation of traditional construction methods were important to the design of this project. This created a sense of pride and ownership over the school and recreated the architectural identity and personal identities. These are important factors that will be incorporated into the design of my intervention.



Figure 4 Construction of the Gando Primary School roof (Cano, E., Duchoud, S. and Ouwerkerk, E., 2022.)



Figure 5 Construction of the mudbrick walls. (Design Indaba. 2022.)



Figure 6 Kids from the village volunteering to help to transport the bricks to site (Youtube.com. 2011.)



Figure 7 Production of earth bricks being pressed on size (How to produce a brick with clay and community. 2014)



Figure 8 village men hand compacting the earth floor of the school (Galiano, L., 2018.)



Figure 9 Village Women smoothing the floor by rubbing it down with water and a smooth stone (Galiano, L., 2018.)



Figure 10 The foundation of the school is constructed from locally sourced stones (Galiano, L., 2018.)



Figure 11 Steel shutters made by local steel craftsman in Gando. (Ouwerkerk, E., 2016.)

ALTERNATIVE CONSTRUCTION

Sand Bag Construction

There has always been a strong connection between sand and construction, from building sand castles on the beach or using it as an aggregate in concrete. Using sand as the main construction material might seem impractical but there are many benefits to its use. Sandbag construction entails the use of sandbags as a walling infill in a timber frame structure. Sand is compacted in bags and packed between a timber frame, using gravity and the sheer weight of the sandbags as an adhesive. The timber frame can vary in thickness and vertical support is provided through timber ladders. These are timber members that are internally cross-braced.

Pros of sandbag construction:

Sandbag buildings have a low carbon footprint, are thermally efficient, bulletproof, and fire resistant. Sandbag construction is a very solid and durable form of construction. Due to its simplicity it allows communities to get involved. The use of sandbag construction allows for the possibility of the formation of micro-enterprises. (Horn, A., n.d.) These micro-enterprises could be eco-friendly timber treatment, sand collection, community agro-forestry, recycling of scrap timbers, bag manufacturing or timber ladder/ Eco-beam manufacturing. The modular system of this form of construction encourages the local community to participate. It is

a lot more expensive to buy premade sandbags than to make them from scratch. The sandbags used in this construction need to be non-woven, geo-textile, polyester like "Spunbond". Sand is a readily accessible material that is often a waste product of construction sites. By using sand as a construction material, we can cut down on construction waste.

Cons of sandbag construction:

The main constraint of sandbag construction is that it isn't very structural, thus limiting the height of your structures. Ideally, you are limited to two storeys especially if you are using a timber frame structure.



Figure 12 Sectional models showing the tectonics of a sandbag wall. (Engineering For Change. 2022.)

CONSTRUCTING A SANDBAG WALL

Making the timber frame:



Figure 13 Tools and materials required to construct a sandbag wall (By Author, 2022)



Figure 14 Completed timber ladder (By Author, 2022)



Figure 15 Fixing the timber ladder to the base (By Author, 2022)

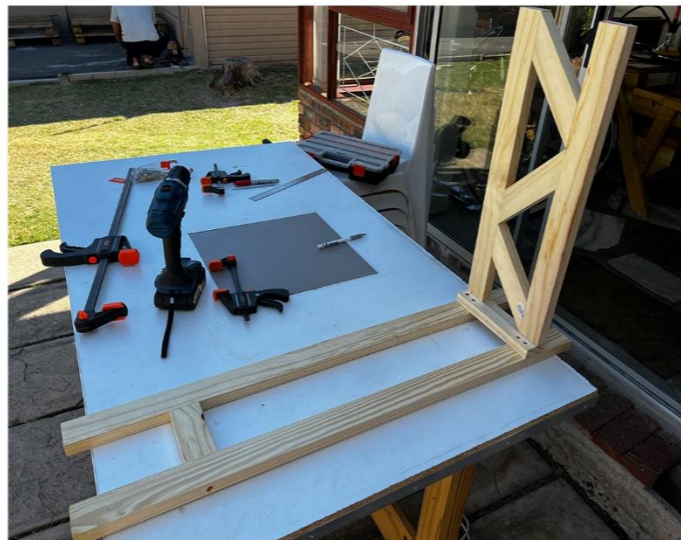


Figure 16 Completed Timber framework (By Author, 2022)

The construction of a sandbag wall starts off with the timber frame. To make the framework you will require a Skilsaw and drill. The framework starts off with the construction of the timber ladders or “eco-beams”.

The ladder is made by cross-bracing two vertical timber members. Once the ladder is completed, fix it to the horizontal members. The horizontal members would first be fixed with on a concrete or masonry plinth.

Making the sandbags:

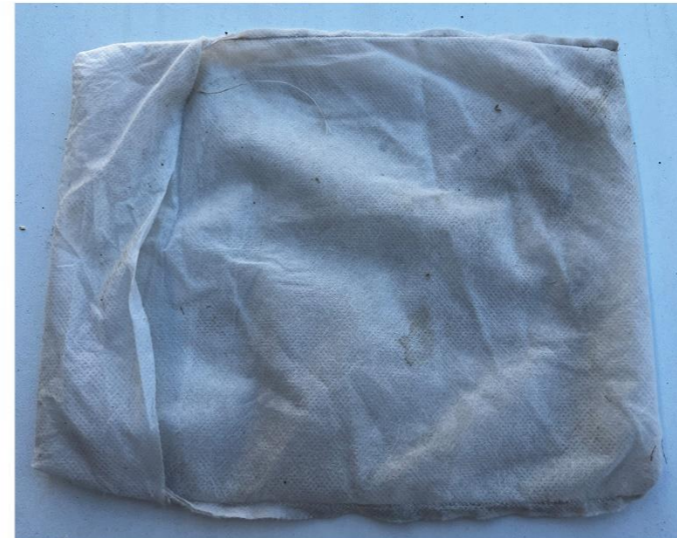


Figure 17 Empty pillowcase stitched sandbag (By Author, 2022)



Figure 18 Sandbag filled with sand (By Author, 2022)



Figure 19 Closed sandbag (By Author, 2022)



Figure 20 Preparations of multiple sandbags (By Author, 2022)

Making sandbags is simple. All you need to do is get the sandbag material and perform a pillowcase stitch. This will allow for a pouch to be formed making it easy to fill with sand and close it off afterwards.

Once you have the bag, simply just fill it with sand and flip over the flap. The sandbag will be placed in the timber framework in a brick bond pattern. Compact the bags flat with a wooden mallet to get an even finish.



Figure 21 Completed Section of a sandbag wall (By Author, 2022)

CASE STUDY

10x10 Sandbag Houses – Luyanda Mphalwa

A project that encapsulates the essence of Critical Regionalism and incrementality design is the 10x10 Low-cost housing Project by Luyanda Mphalwa. The project aimed to stimulate alternative solutions to housing with the objective being to produce an attractive, affordable, and innovative response to the need to house the urban poor. Driven by the ideas of sustainable construction, and design operation principles. 10 of these housing units were constructed in Freedom Park, a township in greater Cape Town. This was an ideal site as it was a barren, sandy wasteland with a lack of identity. (10x10 Low-Cost Housing Project | Design Indaba, n.d.) The context of the site is what starts to give the project an identity.

The identity of this architecture was created through its construction. Luyanda used an alternative form of construction for the houses and opted for the use of sand as the main construction material. This synthesises an identity between the architecture and the surrounding context and intertwined the residents within it. This was achieved through the use of local non-specialised tradesmen such as the residents, being men, women, or children. The houses are made of two-storey timber frame construction, with walls that are reinforced with eco-beams, and sandbags as a wall infill. The sandbags allowed for the community to be involved, as everyone could fill the bags, pack them in the timber frame.

The use of sand from around the site links this architecture back to the theory of Critical Regionalism and aids in the creation of a new identity.

In 2020 I was fortunate enough to visit and tour one of the sandbag houses. I was told that the house I visited was the first prototype built which was used to explain how the others would be. The family experienced a fire within the house but fortunately, no one got harmed and the house only had minor damages.

Reinforcing the fire-proof nature of sandbag construction. Apart from a few sandbags that needed to be replaced and plastered, the main damage was done to a few roof rafters that had to be replaced. The resident was excited to show me a picture frame with multiple images of her mother working on the construction of their house. She explained even in her mother's old age she was always happy to help and be involved, from packing the bags with sand to compacting the sandbags in the timber frame with a wooden mallet. There was a clear sense of identity, pride, and ownership of the house.

Taking me through the house it was clear that the purpose of the rooms has changed from what the architect originally intended to what suited the family the best. As the family grew spaces such as the balcony was converted into a bedroom as well as

the study. The design of the houses allowed for incremental expansion. This aids growing families as it keeps the cost down and gives them the option to grow their property with its own parameters. This demonstrates the benefits of combining the ideas of Critical Regionalism with incremental design. The combination of these two theories allowed for a new sense of identity to be formed among everyone, especially the residents. A cultural identity begins to form amongst the residents.



Figure 23 Members of the community filling up sandbags (Design Indaba, n.d.)



Figure 24 Exposed construction of a sandbag wall (yakhahuis, V., n.d.)



Figure 22 Image of a photo frame showing the residents mother being involved in the construction of her house (By Author, 2022)



Figure 25 Completed the first storey of a sandbag structure (Archigraphy.com, n.d.)

2 Delft

Locality

History

Climate and Geology

Main Road

The Temporary

Tectonics

Housing

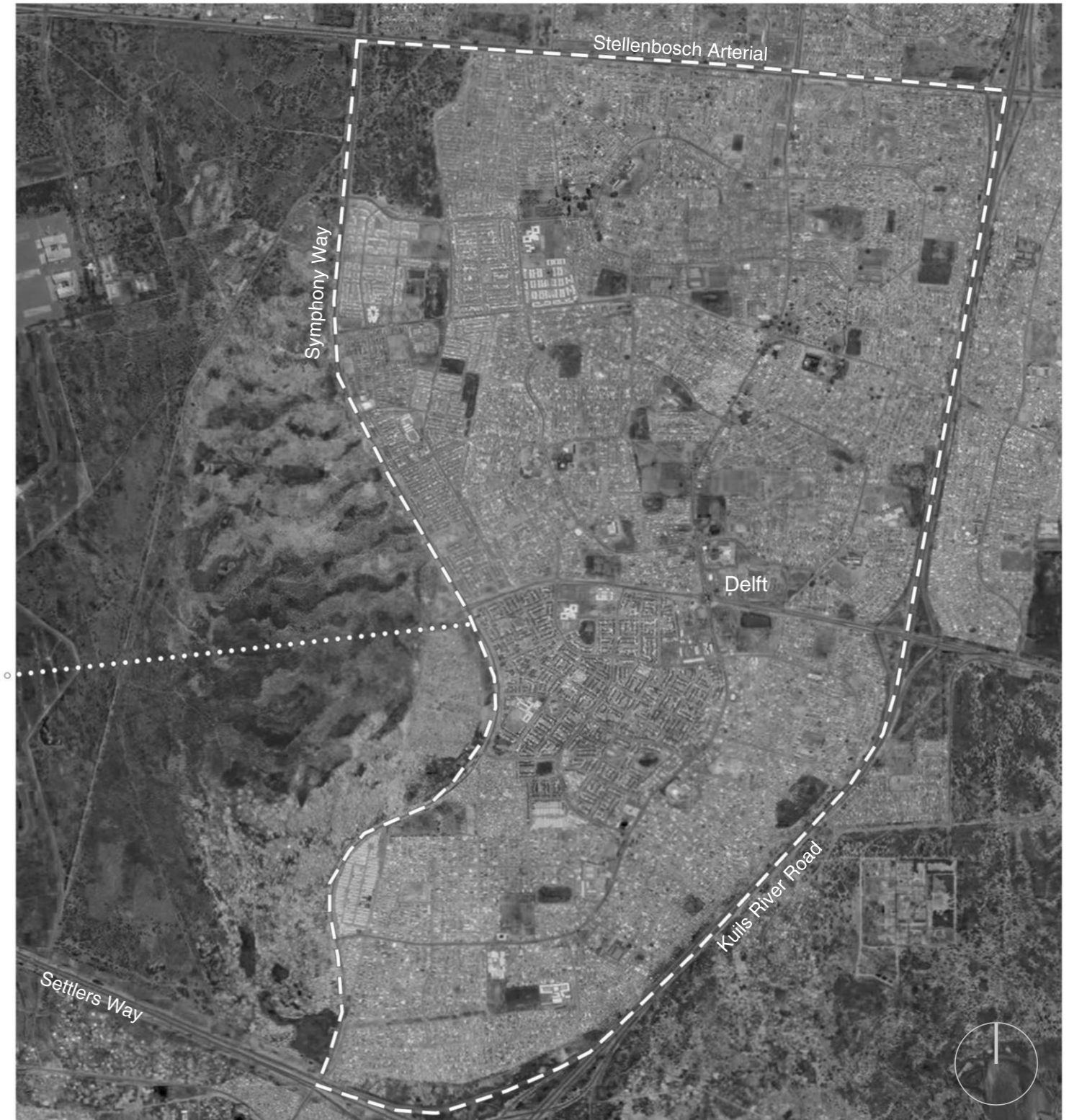
Education

LOCALITY

Delft – Cape Town



Figure 27 Locating Delft in the larger context of Cape Town (By Author, 2022)



Delft is a township in Cape Town. It is located 34km from the city centre and is situated directly next to Cape Town international Airport, in and amongst

existing industrial areas. Delft is defined by Stellenbosch Arterial, Symphony Way, Settler's Way (N2) and Kuils River Road.

HISTORY OF DELFT

Delft is a result of the Apartheid Regime. In 1950 The Group Areas Act led to the displacement of non-whites from the city centre. These people were displaced in townships located on the periphery of the city. (Johnson-Castle, P., n.d)

The most common area for relocation was the Cape Flats. In 1989 Delft was established there (Publicgallery.nl. n.d).

Delft was never designed as a place of positivity. It lacked basic infrastructure and opportunities. This ensured that the lives of the people of Delft were always a struggle. By removing people from their place of home, you are removing their identity, as our identity is linked to our sense of belonging. Under the current condition of Delft, a new identity was created. An Identity that is rooted in the struggle.

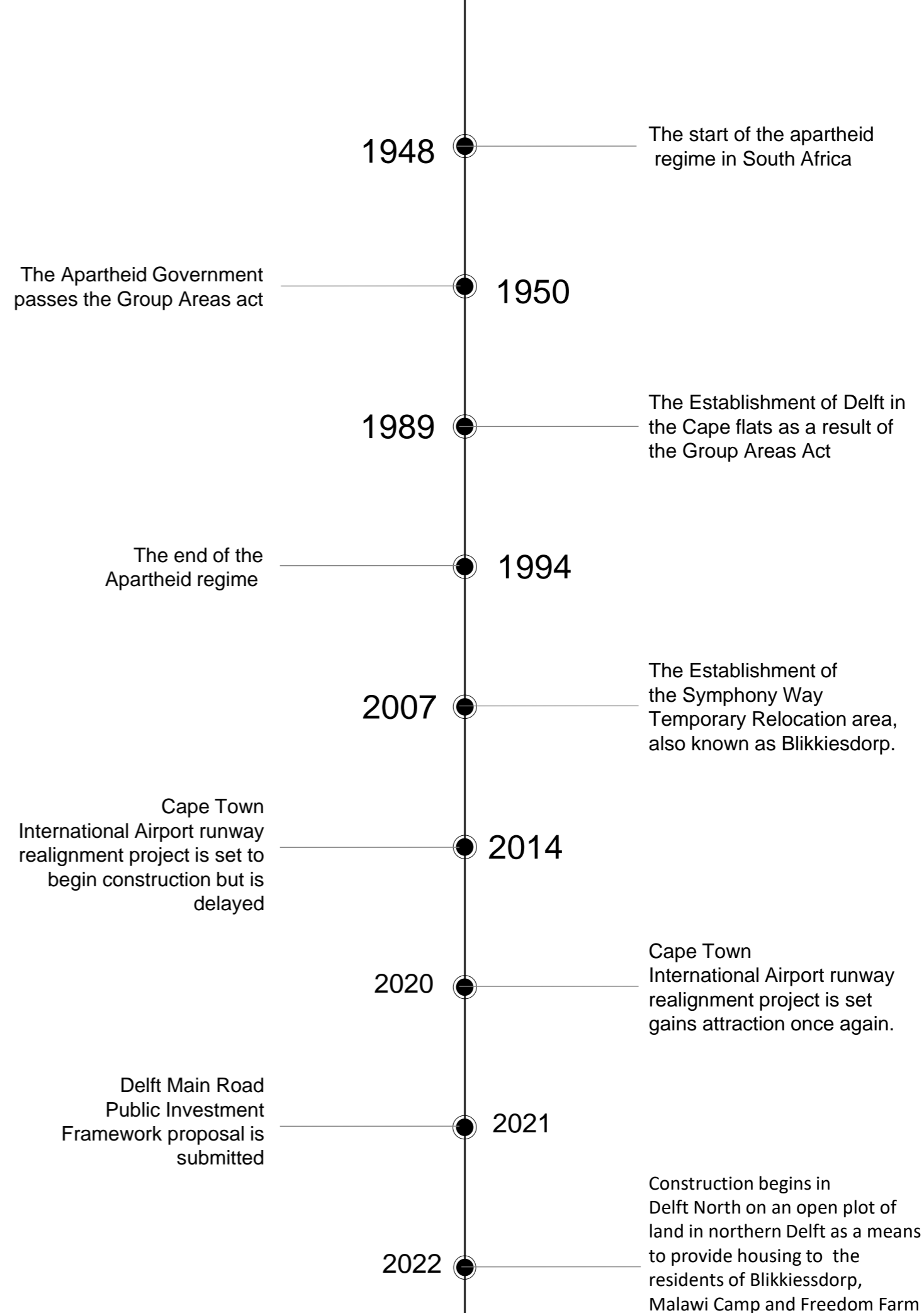
In 1994, after the abolishment of the Apartheid regime, Delft became the site of another displacement project which resulted in another form of identity loss. This was caused by the establishment of Blikkiesdorp in 2007. Blikkiesdorp is known as a Temporary Relocation Area. It is a temporary housing area for people who were awaiting housing from the government. Residents of Blikkiesdorp are currently still. Blikkiesdorp's temporary identity means that its

residents are unable to fully develop an identity because it is difficult to belong to something that isn't permanent.

Blikkiesdorp is located on Cape Town International property and in 2014 The Cape Town International Airport runway realignment project was set to begin. This project would see the residents of Blikkiesdorp being removed once again (Venter, I., 2019.).

There is constant progress by the government to upgrade Delft and in 2021 a Delft Main Road Public Investment Framework proposal was submitted. This aimed to fully develop the entirety of the Main Road. Currently, this year (2022), construction of new government social housing has begun for the people of Blikkiesdorp and two neighbouring informal settlements.

Today, Delft is still currently feeling the effect of Apartheid, with high levels of crime, gangsterism and drug abuse. The compound effect of these factors has led to high levels of unemployment, educational issues and poverty; however, it has also allowed for the emergence of self-initiated practices. These practices allow for economic growth and generation and the ability to survive day-by-day.



CLIMATE AND GEOLOGY OF DELFT

Understanding the climatic and geological context of a site is an important aspect of the theory of Critical regionalism. What architectural potential does the geology of Delft unlock for design?

Delft is in the Cape Flats. The Cape Flats' geological makeup is that of aeolian sand. This is a type of marine sand which was blown up from adjacent beaches over a long period. More specifically Delft geology consists of Springfontein which is characterised by its light grey to pale red sandy soil and Witzand which is characterised by unconsolidated white sand with commuted shells, pebbles, and shells locally along the beach. These soil conditions are perfect for the use of sandbag construction. Delft becomes the perfect site for the implementation of this alternative construction.

Delft has a Mediterranean climate. This is characterised by warm, dry summers and cold, damp winters. The wind is experienced from the north-west in winter and the south-east in summer. During the rainy months, between July and August, there is a possibility of flooding. This makes living conditions difficult for those who are living in inadequate housing. (meteoblue. n.d.)

These climatic characteristics will be critically incorporated into the design of my intervention. Being critical of the context will root the architecture within the concept of place and create an architecture of place. This allows for an identity of belonging to be created.

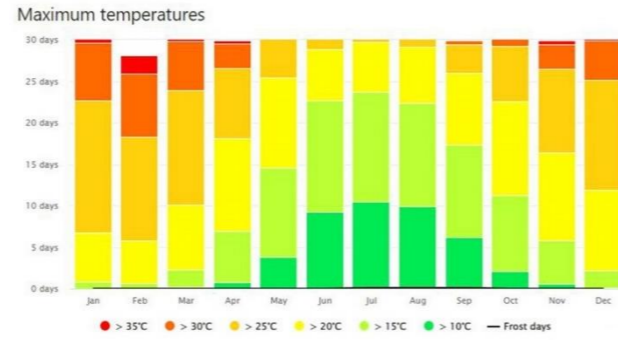


Figure 28 Maximum temperature statistics experience each month in Delft (meteoblue. 2022.)

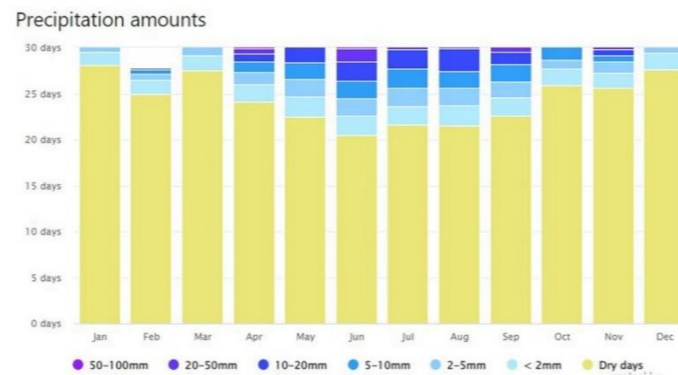


Figure 29 The amount of precipitation experienced each month in Delft (meteoblue. 2022)

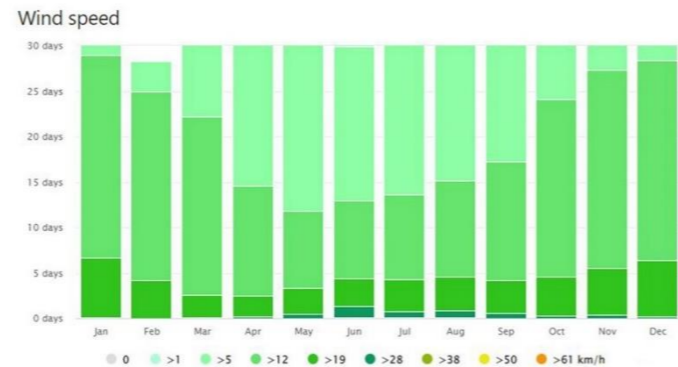


Figure 30 The wind speed experienced each month in Delft (meteoblue. 2022)

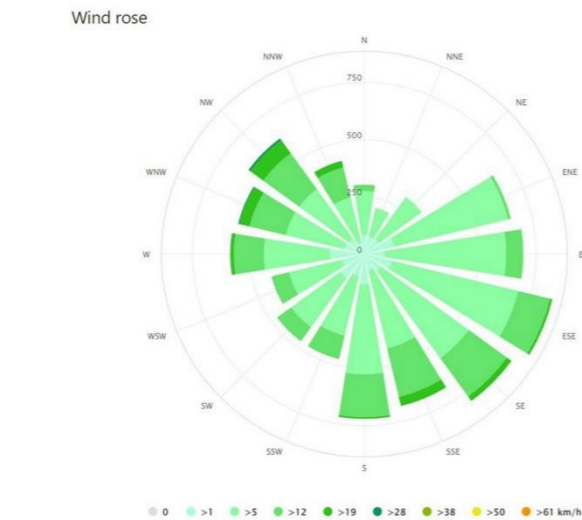


Figure 31 The wind speed and direction experienced in Delft (meteoblue. 2022)

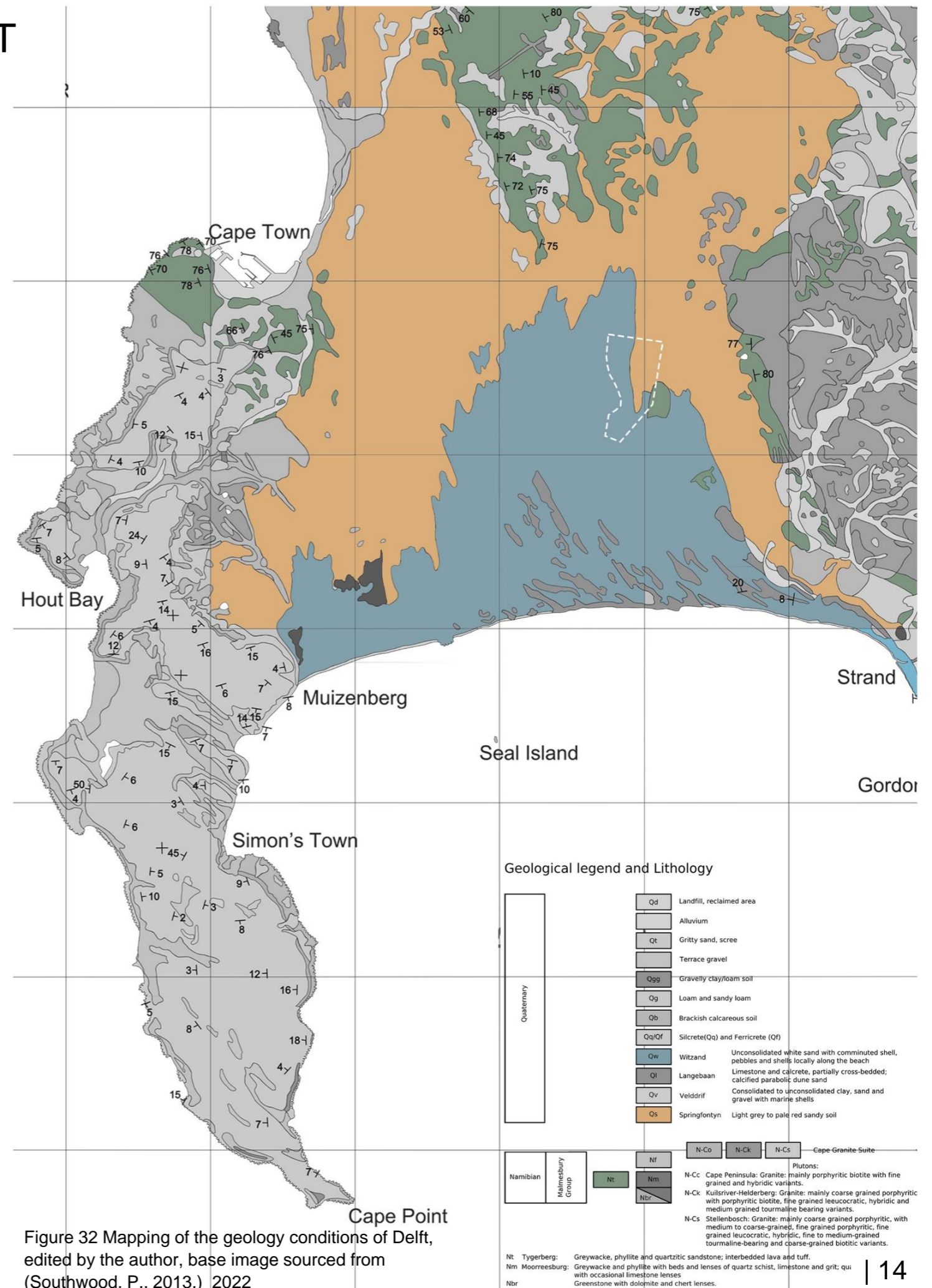


Figure 32 Mapping of the geology conditions of Delft, edited by the author, base image sourced from (Southwood, P., 2013.) 2022

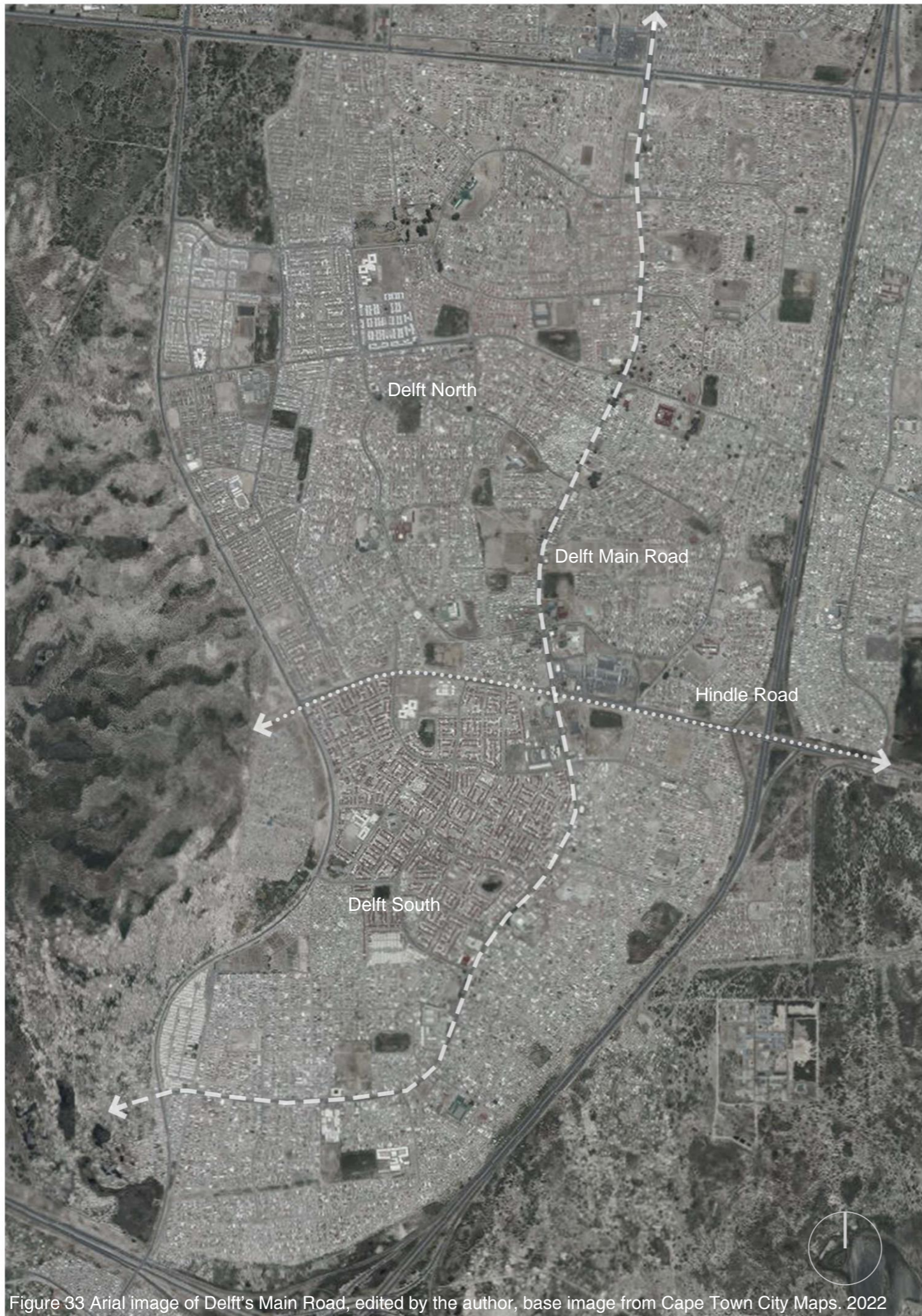


Figure 33 Aerial image of Delft's Main Road, edited by the author, base image from Cape Town City Maps. 2022

DELFT MAIN ROAD

Delft Main Road runs through the middle of Delft. It acts as a connection Between Delft North and Belhar. The planners of Delft Main Road designed it as a long continuous road with asymmetrical ring roads intersecting and attaching themselves to it. These intersections allowed for the creation of nodes along the Main Road. This will become a defining characteristic of the activity. These ring roads encourage both vehicle and pedestrian movement along the Main Road and create a hierarchy among the various roads. Thus, through this hierarchal design emphasis is placed on Delft Main Road making it the most active street. My focus will be on the section of Delft Main Road that runs through Northern Delft and is intersected with Hindle Road.

Along Delft Main Road is situated several institution buildings. These buildings can vary from commercial, community halls, places of worship, petrol stations, police station, library, health facilities and schools. There are two taxi ranks found at either end of Delft, one in the north and the other in the south. These taxi ranks work on both the local and metropolitan scale. Many residents of Delft require the use of public transport to move around. Delft Main Road provides the most opportunities for its people. It has a great potential for economic activity and opportunity.

This has been identified by the community, which takes full advantage of it. Main Road today acts as a bridge that links and embraces the formal with the informal, the permanent and the temporary. Many informal businesses along Main Road revolve around retail or manufacturing. There is a synthesis between the formal and the informal activities. This is best seen at Shoprite, located at the topmost node of Main Road. Shoprite acts as an anchorage point for informal retail activity. This occurs down the main road. Delft Main Road is an asset to the community and can be seen as the heart of Delft.

My focus on the section of Delft Main Road is a result of the underutilisation of its opportunities when compared to the section running through Delft South. There are large, underutilised land parcels located throughout which creates a weak street edge along Delft Main Road.



Figure 34 Delft's planners design of the Main Road (Meyer, S., 2022.)

DELFT MAIN ROAD NODES

Analysis Of The Formal

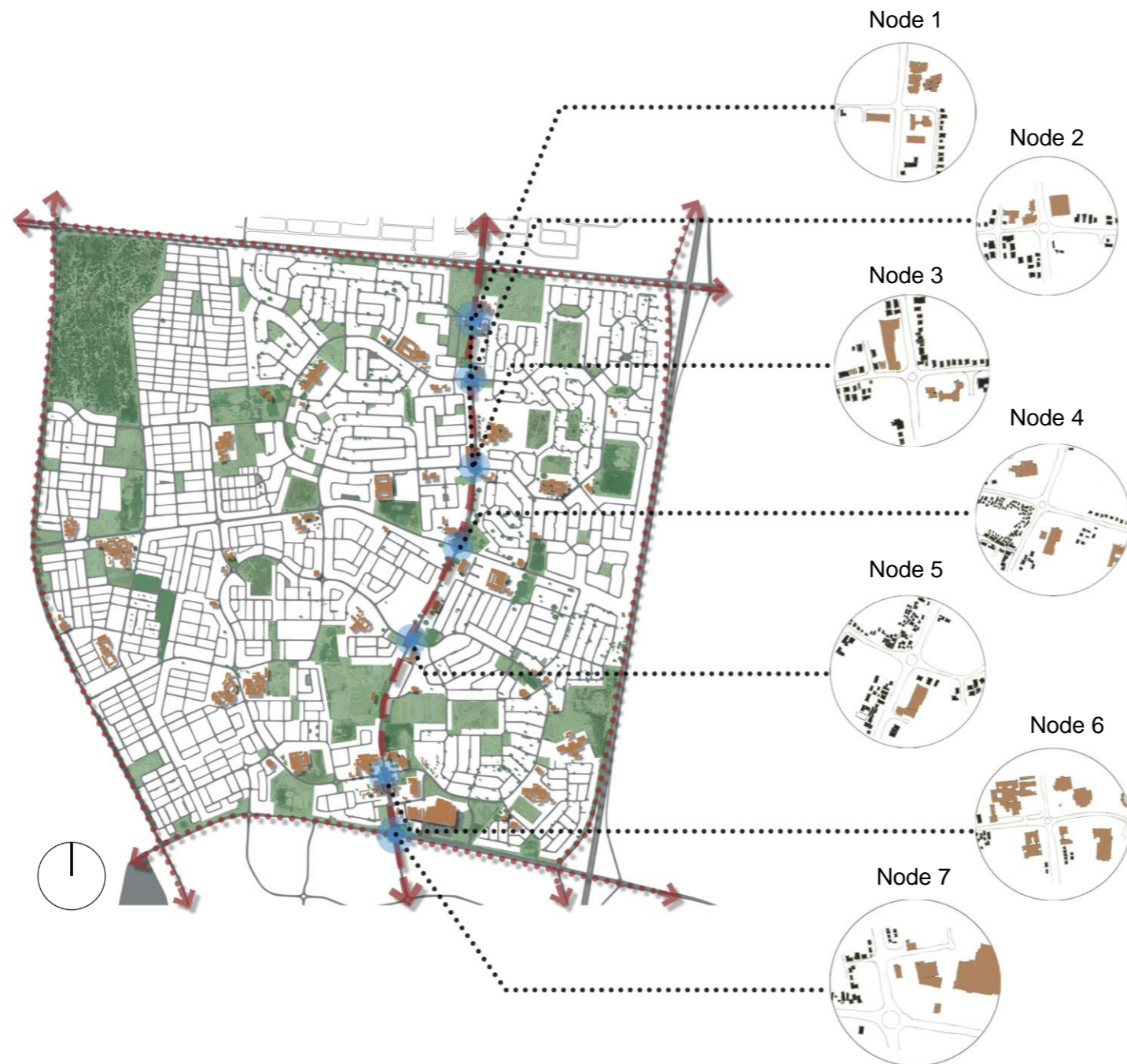


Figure 35 Mapping and analysis of nodes along Delft Main Road (by the author, 2022)

Delft Main Road is made up of 7 nodes. Each node consists of a cluster of institutional buildings ranging from commercial, places of worship, community hall, garages, library, police stations and clinics. Through the analysis of each node, I am hoping that it can help guide me towards a site and define a program. A common trend seems that every institutional function needs to be accompanied by the provision of an aspect of housing.

Nodal analysis:

- Node 1 consists of a commercial building that houses various activities, a garage and the Ngo Hope and housing
Housing | Commercial |
- Node 2 consists primarily of a Shoprite and housing
Housing | Commercial
- Node 3 consists of an Educare facility, housing and a commercial building that houses multiple commercial activities
Housing | Education | Commercial
- Node 4 consists of a community centre and a mosque
Housing | Place of Worship | Recreation

- Node 5 consists of a commercial building with various retail activities, housing and a taxi rank
Housing | Commercial | Transportation
- Node 6 consists of a police station, clinic, housing, library and petrol station.
Housing | Health | Security | Education | Commercial
- Node 7 consists of Delft shopping mall, Cash build and housing.
Housing | Commercial

Through this analysis, it becomes clear that Node 4 is an outlier as it is the only node that lacks a commercial function. Node 4 could be an ideal site for my intervention.

DELFT MAIN ROAD

Analysis Of The Informal

Further scrutiny of each node revealed open land parcels of underutilised space. These spaces include the sidewalks along Delft Main Road. They allow for informal activity to form and flourish, creating a unique character and spatial definition for Delft Main Road. Informal commercial activities would take place in shipping containers, on the back of bakkies or in temporarily erected structures.

Nodal analysis:

- Node 1 lacks any form of informal activity even though there are large open land parcels. This may be due to the current development that is currently taking place.
- Node 2 consists of a fruit and veg vendor, an aluminium door and window manufacturing shop, an electrical repair shop, a tuck shop, a shoe repair shop and a general shop.
- Node 3 consists of an informal clothing shop which is set up in a shipping container as well as a portable food kiosk

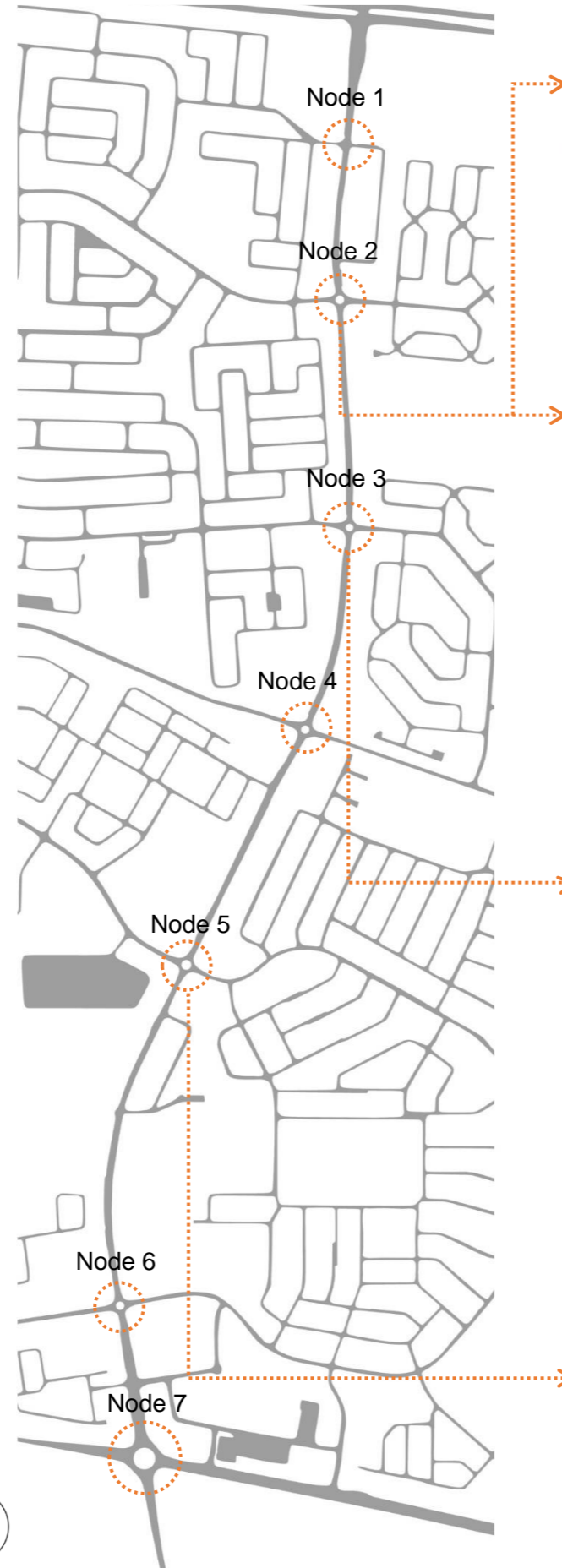


Figure 36 Drawing of Delft Main Road (by the author, 2022)



Figure 37 Informal trade located at Node 2 along Delft main Road highlighting skills such as craftsmanship and electrical repairs, image edited by the author, base image sourced from google earth, 2022



Figure 38 Informal trade located at Node 2 along Delft main Road highlighting the sales of fruit and veg, image edited by the author, base image sourced from google earth, 2022



Figure 39 Informal trade located at Node 3 along Delft main Road highlighting the sales of fruit and veg, image edited by the author, base image sourced from google earth, 2022



Figure 40 Informal trade located at Node 5 along Delft main Road highlighting the sales food from a cart, image edited by the author, base image sourced from google earth, 2022

DELFT MAIN ROAD NODES

Analysis Of The Informal

- Node 3 consists of an informal clothing shop which is set up in a shipping container and a portable food kiosk
- Node 4 lacks any form of informal trade activity.
- Node 5 consists of a commercial building with various retail activity
- Node 6 consists of multiple fruit and veg vendors and food carts.
- Node 7 consists of multiple fruits and veg vendors and other general retail activity.

Through the analysis of the informal activity around the nodes on Delft Main Road, it became clear that the possible sites for my intervention need to occupy one of the nodes that lack any informal activity. Node 1 or 4 begins to stand out. Based on my previous analysis of the activity at node 4, it will be an ideal site for my intervention. With the intention of my intervention to upskill the community and create an identity of permanence amongst informal, it should have elements of learning and manufacturing and retail. It needs to be a facility that accommodates the local informal craftsmen and the fruit and veg vendors.



Figure 41 Drawing of Delft Main Road (by the author, 2022)



Figure 42 Informal trade located at Node 3 along Delft main Road highlighting the use of shopping containers as stalls, image edited by the author, base image sourced from google earth, 2022

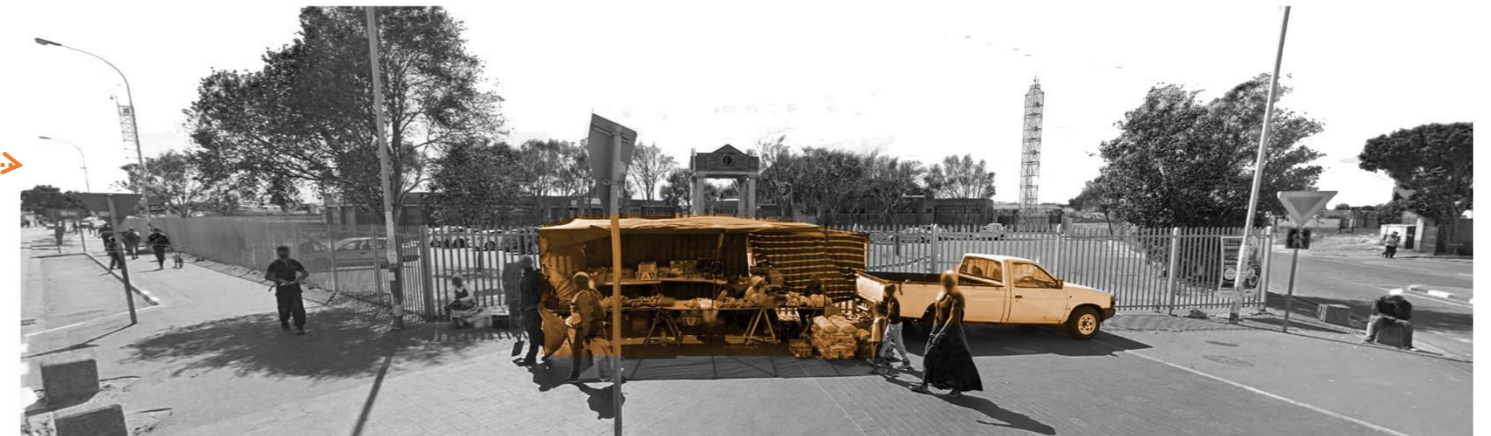


Figure 43 Informal trade located at Node 6 along Delft main Road highlighting the sales of fruit and veg, image edited by the author, base image sourced from google earth, 2022



Figure 44 Informal trade located at Node 6 along Delft main Road highlighting the sales of fruit and veg and food trucks, image edited by the author, base image sourced from google earth, 2022



Figure 45 Informal trade located at Node 7 along Delft main Road highlighting the sales of fruit and veg and goods, image edited by the author, base image sourced from google earth, 2022

THE TEMPORARY IN DELFT



Figure 46 The juxtaposition of the themes of the temporary and the permanent as well as the formal and the informal along Delft Main Road, image edited by the author, base image sourced from google earth, 2022

The themes of temporary, permanence, informal and formal are evident throughout Delft. These themes are strong juxtapositions of one another. The themes of informal and temporary go hand in hand, similarly the formal and permanence are connected. The goal of my intervention is to blur the boundaries between them. The introduction of a new construction method that adds to the existing tectonics of Delft can help blur these boundaries.

A look down Delft Main Road highlights the juxtaposition of permanence and temporary. This is expressed through their tectonics. On the left, we can see an institutional building, a church, constructed out of face brick. This encapsulates the theme of permanence. On the opposite side of the road is an informal settlement constructed from sheet metal. This encapsulates the theme of the temporary.

It is interesting how the church steps back from the pavement and encloses itself with a permeable boundary wall whereas the informal settlement interfaces directly with the pavement. The permanent close off while the temporary opens up.

THE TEMPORARY IN DELFT

Informal Settlements

The informal strongly links itself to the temporary nature of Delft, whether it be through informal economic activity, housing, or the growth of informal settlements. Informal settlement development is prominent throughout Delft. Through a mapping exercise, we can see the informal settlement pattern spread within Delft. These patterns reveal the various densities of these settlements and that they can occur anywhere there is open space. Once one shack is erected, it does not take much time before multiple follows. The sprawl and densification of informal settlements within Delft is a result of the government's inability to provide sufficient housing. This highlights the need for housing in Delft and an entry point for my architectural intervention. Housing within informal settlements is often seen as temporary structures, that over time become permanent. Often linked to financial instability.

Can we address the housing issue in Delft without directly focusing on housing design? Is there a way we can create a more intentional permanent identity within these informal settlements?

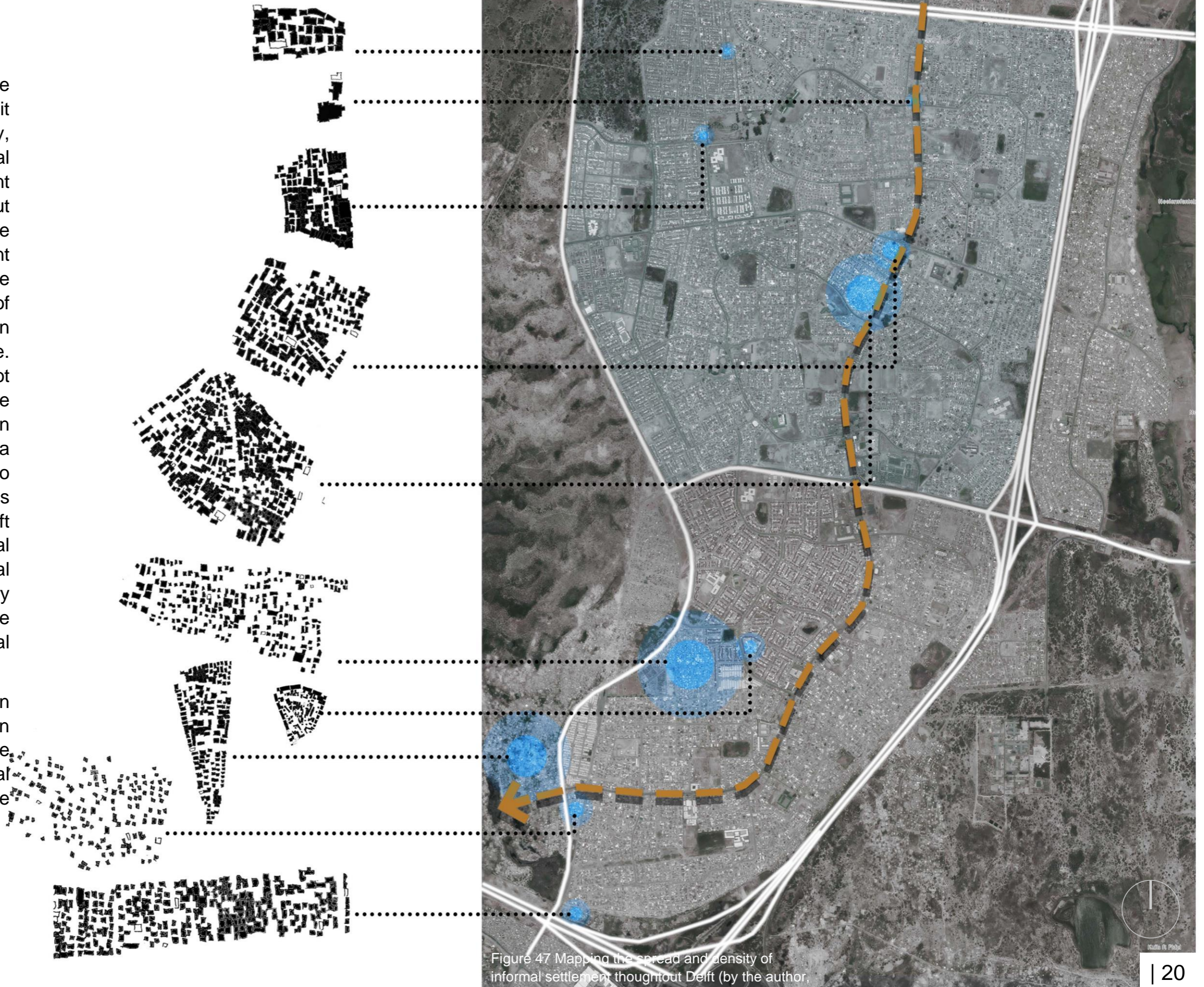


Figure 47 Mapping the spread and density of informal settlement throughout Delft (by the author).

THE TEMPORARY IN DELFT

Blikkiesdorp

Themes of the temporary are prevalent through Delft, and none is more prevalent than that of Blikkiesdorp. The idea of temporary is closely linked to identity. Post-Apartheid we can still see acts like that of the Group Areas Act is carried out. Blikkiesdorp, Cape Town (alternatively known as “Tin Can Town”) is located within Delft and is directly adjacent to Cape Town International Airport. Blikkiesdorp is a Temporary Relocation Area (TRA) formed in 2007. (urbanNext site. 2016). It was supposed to be a temporary solution for people with housing problems, now the temporary has now turned into permanent. There has been no communication with the residents as to where and when they will be relocated. The residents of Blikkiesdorp have been removed from more centralised areas such as Sea Point, Salt River, Woodstock, and Athlone, where their access to opportunities such as employment was greater. (Oderson, K. 2015) This temporary solution has stripped these residents of their identity. Our identity is our sense of belonging and it is hard to belong to something that isn't permanent. A negative identity begins to form because of their current context.

Residents are living in one-roomed, metal sheet houses. A single house could have up to 10 occupants, without access to water or sanitation. The residents would have to occupy a shared outside toilet. House houses are poorly insulated. This leads to it either being extremely hot or extremely cold. The lack of sound insulation means that the residents are suffering and are being affected by the noise of the aeroplanes as they are closely located on the aeroplane runway. (Oderson, K. 2015)

The failed housing attempt at Blikkiesdorp lends itself as a site of intervention. Proper adequate housing can create a new positive identity amongst its residents.

The shacks found in Blikkiesdorp string resemble that of the Better Living Challenge. The Better living change is a Western Cape government initiative which looked at ways of constructing a safer shack. Its main critique is that it was a glorification of the people's poverty.

Cape Town International Airport development is the cause that the people of Blikkiesdorp are once again going to fall victim to the act of displacement. The airport wants to realign its runway over Blikkiesdorp.



Figure 48 A collage of the urban texture of Blikkiesdorp (by the author, 2022)

THE TEMPORARY IN DELFT

Tectonics of the Informal

The shack and the temporary tectonics found within the informal settlements of Delft. Shack construction is one of the most common forms of construction in Delft. It makes up the majority of the built environment within the informal settlements. Often constructed out of whatever materials are available, usually being timber pieces or steel sheets.

To gain a better understanding of how shacks are constructed, I modelled a typical shack that is found in Blikkiesdorp. Through the modelling process we can see the simplicity of its construction.

These shacks are single-roomed timber frame structure, fixed down onto a concrete slab. There is allowance in the framework for a single door and window opening. The timber frame structure is usually clad in corrugated steel sheet and on the odd occasion will have plasterboard on the inside. The sheeting used to clad the façade and for the roof.

The local government was pushing for this form of construction within informal settlements as away to create a safe “home”. These structures respond poorly to the climate. During summer the heat causes them to get unbearably hot and in winter they get extremely cold.

The tectonics of these structures comes across as temporary as they are designed in a way that they can be easily removed. Shacks are void of climate and context and form out of urgency.

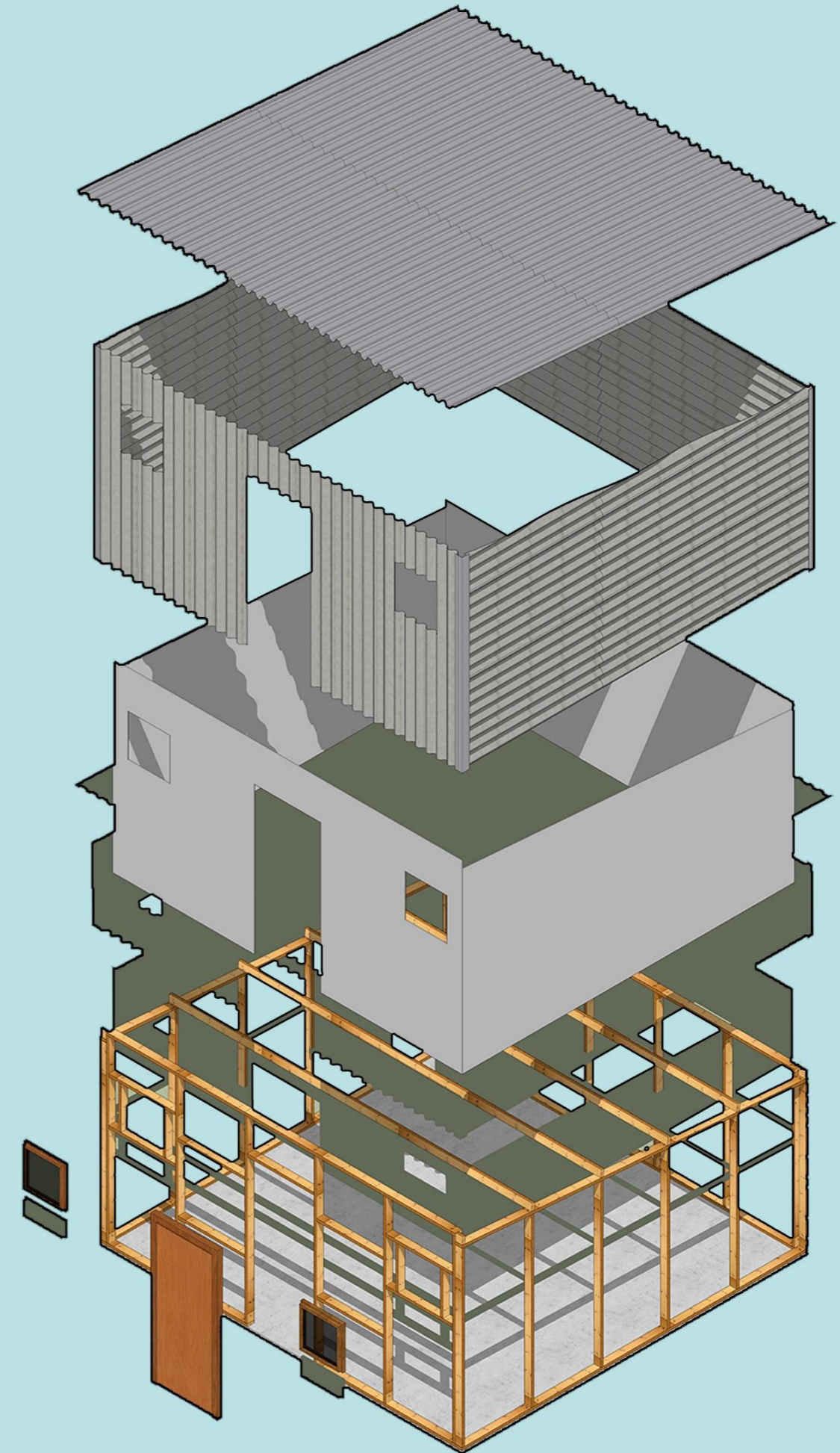


Figure 49 Tectonics of the standard shack (by the author, 2022)

THE TEMPORARY IN DELFT

New Tectonics of the Informal

How can we address the temporary identity of a shack and change it into something more permanent? Through the application of the theory of critical regionalism, we can start to address this issue. Through critical analysis of the context in which these shacks are to be constructed, we can make use of a readily found material within Delft. That material is sand.

Sandbag construction translates well into the current construction method of a shack, as both make use of a structural timber frame. The main difference is that sandbag construction requires the use of structural timber ladders. These timber ladders are two vertical timber members that are internally braced either with steel or timber. Once the timber frame is set up, sandbags are filled and placed between the ladders. No bonding is required between the bags as the sheer weight and gravity keep the bags together. The sandbags can be plastered afterwards or cladded.

The benefit of using sandbags is that sand is a readily available material in Delft. Sandbag shacks will have a better climatic performance than typical shacks. Sandbag shacks can improve the living conditions of the occupants. Sandbag construction will start to create a new positive identity of place within Delft and a tectonic of permanence for the temporary.

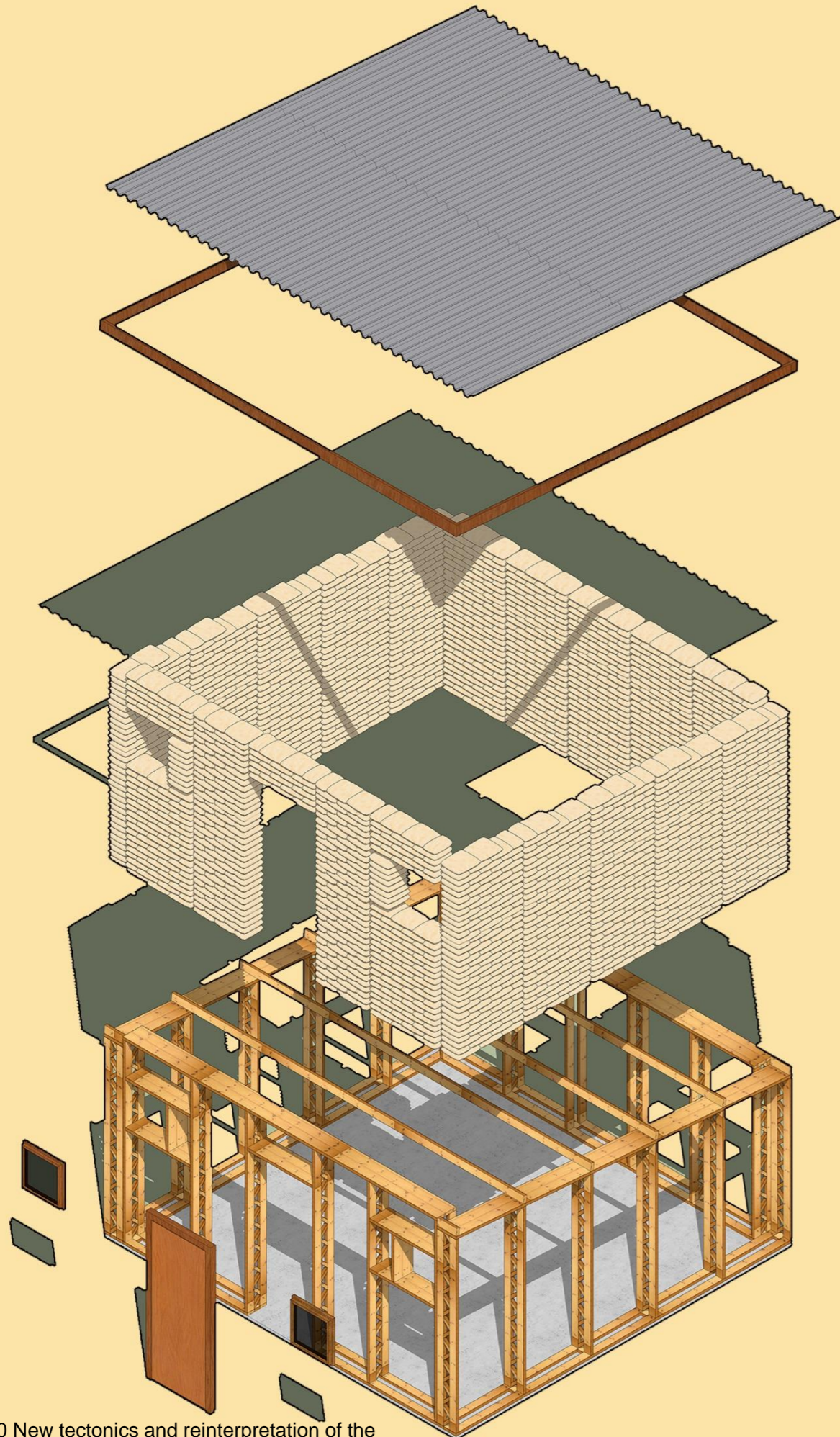


Figure 50 New tectonics and reinterpretation of the standard shack (by the author, 2022)

THE TEMPORARY IN DELFT

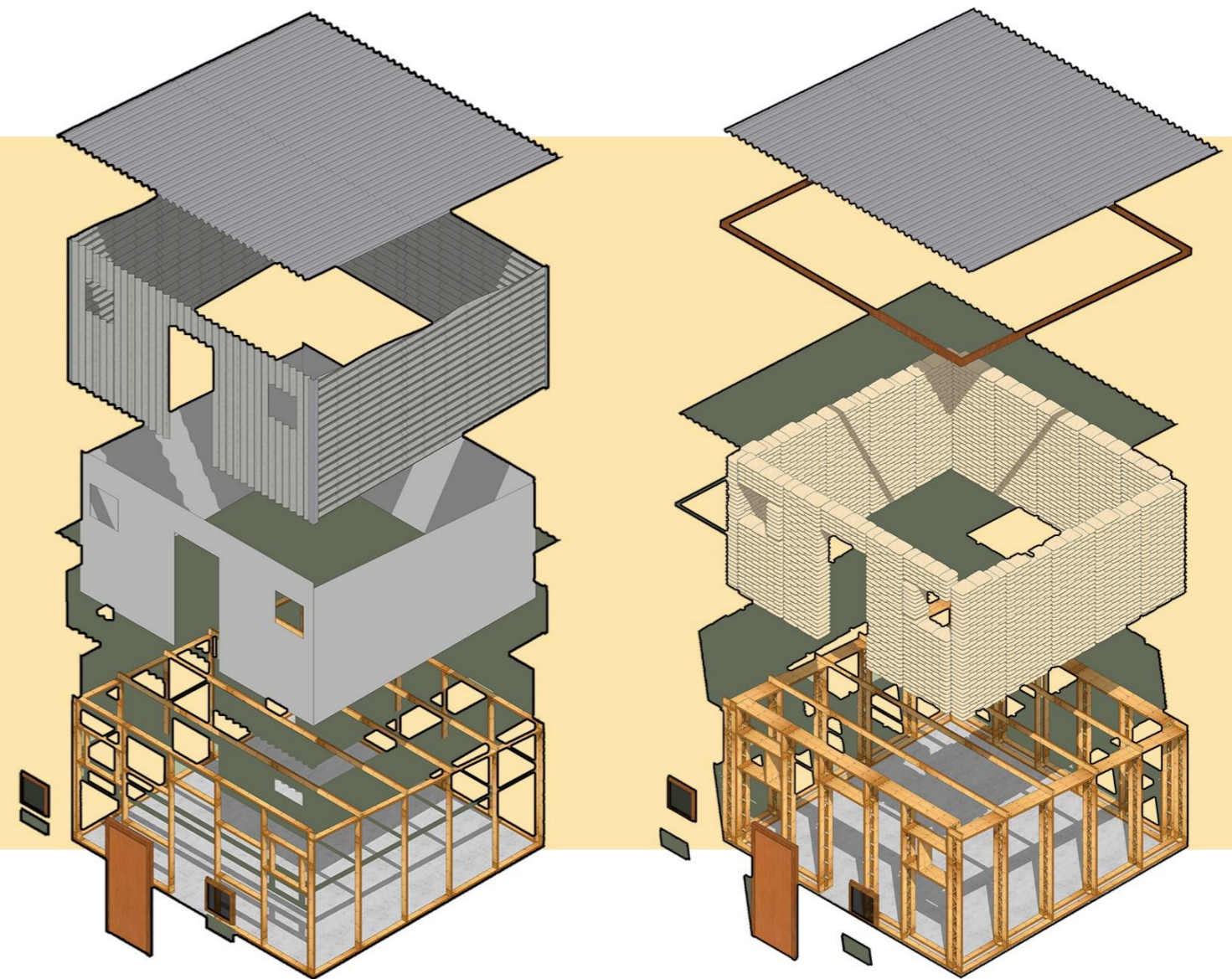
Synthesis of Tectonics



Figure 51 A synthesis of new and old tectonics of the shack (by author, 2022)

There is a consistent construction language being developed when comparing the two methods. The goal of the sandbag shack is to improve the current living conditions through small changes that are a critical response to its existing context. The goal is to recreate the negative connotations and identity of a shack and transform it into something more positive yet

familiar. A benefit of sandbag construction is that it can happen incrementally. When building the shack you need to ensure that the framework is constructed with timber ladders. This allows for the exterior to be cladded immediately and the sandbags to be filled and placed into the walls whenever necessary. The sandbags can be placed incrementally



overtime or during the construction of the shack. There is a synthesis between the current construction of shacks and the sandbag construction method. This is the first step in bridging the gap between the temporary and the permanent.

TECTONICS IN DELFT

Understanding the tectonics of Delft is important as tectonics is one of the key aspects of the theory of Critical Regionalism. The theme of temporary and permanent Tectonics is evident within the existing tectonics of Delfts' current context. Through a critical analysis of construction within Delft, a few construction methods begin to stand out. Four main construction materials were observed:

1. Concrete blocks
2. Brickwork
3. Timber (as cladding or structure)
4. Steel (shipping containers or cladding)

The use of Concrete blocks and brickwork defines the permanent built fabric in Delft. Concrete blockwork is used in the construction and extension of homes. The use of brickwork is often used in the construction of civic buildings but there are exceptions where few houses make use of it.

The self-built nature of Delft results in the extensive use of steel and timber. Shipping containers are placed onsite and used as a market space whereas the use of timber and steel are found in the construction practices of the informal settlement or the self-built extensions of residents' homes. These construction practices result in a temporary feeling within Delft's current built environment.

Based on these factors my goal is to introduce a new alternative construction method that bridges the gap between the permanent and temporary nature of Delft which is critically explored within its context. Sandbag construction is the method going forward.

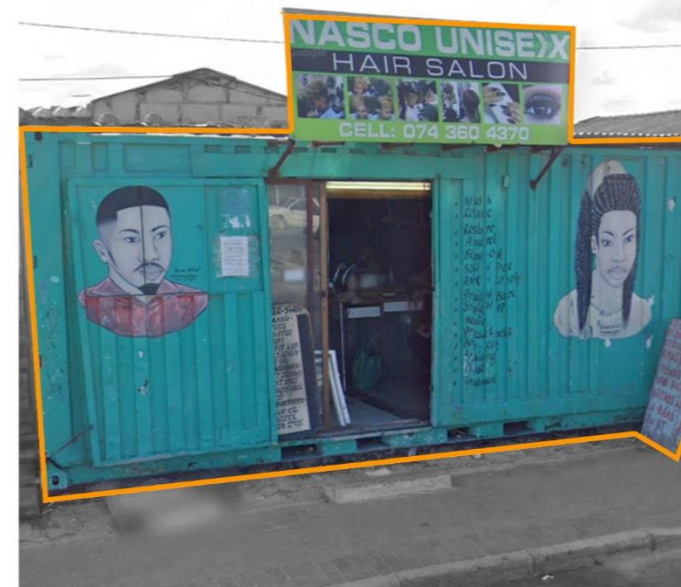


Figure 52 The use of steel shipping containers as spaces for trade (by the author, 2022)

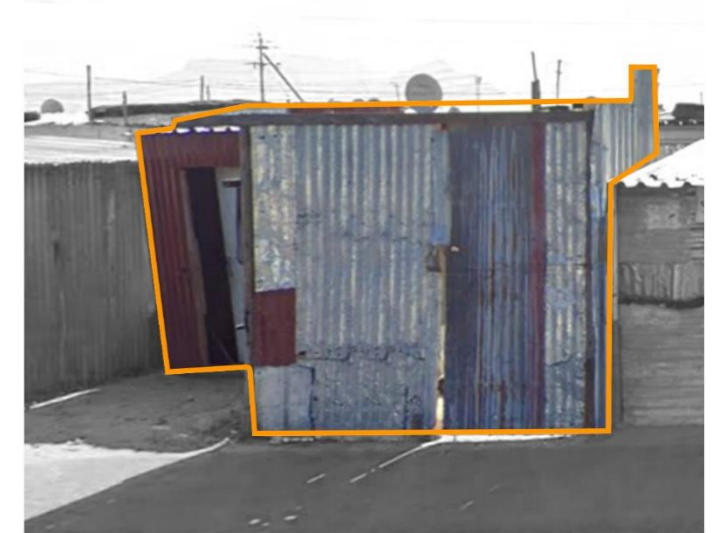


Figure 53 The use of steel sheets in the construction of home (by the author, 2022)



Figure 54 The use of concrete blockwork in the construction of buildings (by the author, 2022)



Figure 55 The use of concrete brickwork in the construction of buildings (by the author, 2022)

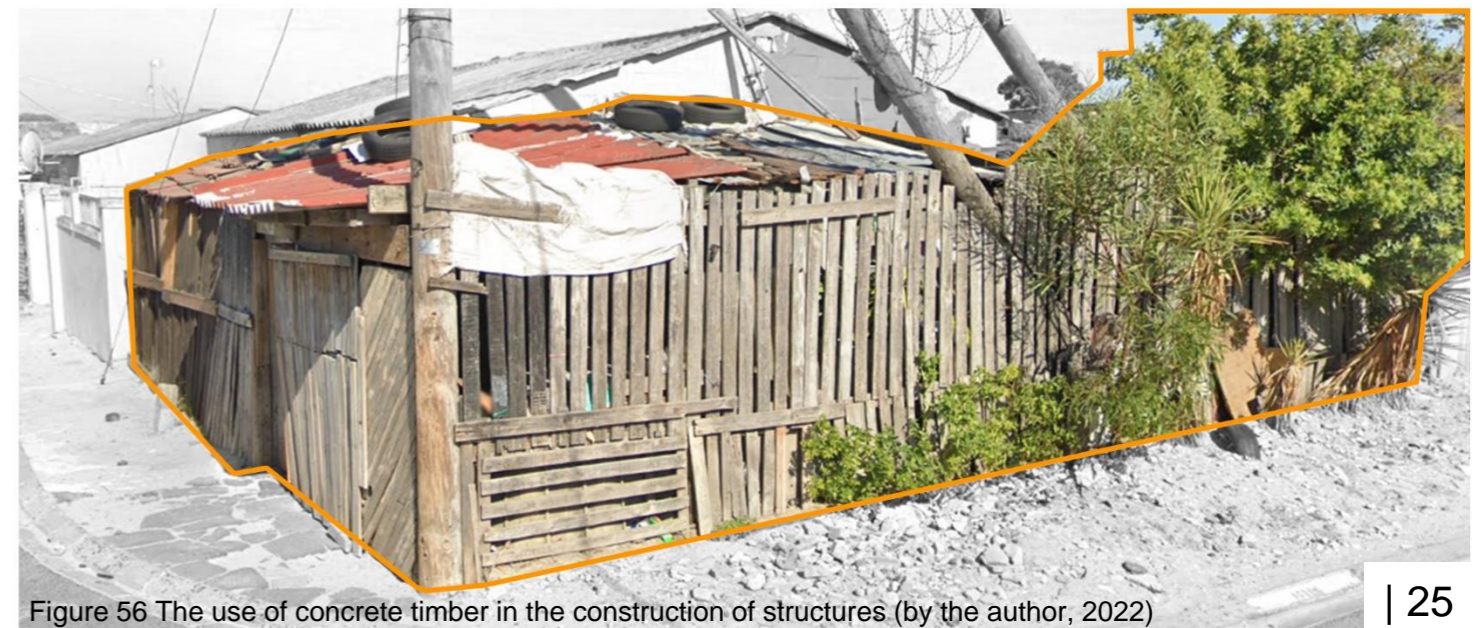


Figure 56 The use of concrete timber in the construction of structures (by the author, 2022)

HOUSING FABRIC IN DELFT

Northern Delfts built fabric consists mainly of residential buildings with institutional facilities located along the main road. Many institutional buildings that are located away from Delft's Main Road are education facilities. The housing fabric as highlighted by blue makes up the majority of Delft's built fabric. It is important to note the placement of the informal settlements highlighted in orange. We can see that there aren't many informal settlements within Delft North, but it won't take much for new ones to appear. Previous analysis has shown it doesn't take much for informal settlements to form and rapidly expand, as it took two years for the informal settlement along the Main Road to be constructed. It is important to note all the open land spaces which are highlighted by the green as these can act as possible locations for future informal settlements.



Figure 57 Mapping of the housing fabric in Delft North (by the author, 2022)



Formal Housing Fabric



Informal Housing Fabric



Open Land Fabric

HOUSING DEVELOPMENT IN DELFT

2020



2022



Figure 58 Unoccupied land parcels in 2020, image edited by the author, base image sourced from google earth, 2022

Figure 59 Dense occupation by an informal settlement on the once unoccupied land parcels in 2020, image edited by the author, base image sourced from google earth, 2022

Development of housing in Delft varies between informal settlements and those which the government provides. If we look at a development pattern between 2020 and 2022, we can see how rapid informal settlements can erect on a site. Over two years, two densely compacted informal settlement was able to construct themselves. At the same time, government were only able

to produce a few new houses. Informal settlements' main issue is that they are erected on sites without any permission. This lead to them being demolished further down the line as they could be occupying government developmental land. These reinforce the theme of what is permanent and what is temporary in delft.

2020



Figure 60 Open land parcels prepped for the construction of housing, image edited by the author, base image sourced from google earth, 2022

2022



Figure 61 Completion of the housing construction, image edited by the author, base image sourced from google earth, 2022

DEVELOPMENT IN DELFT

Delft is a township that is under constant development. The main type of development that takes place is aimed at addressing the housing issue within Delft. There is currently a housing development underway on a large open site in the top left corner of Delft where Settlers Way intersects Stellenbosch Arterial. The goal of this housing development is to provide housing for the people of Blikkiesdorp who have been waiting since 2007. The housing crisis was my initial first step into Delft, but after realising the slow production and abundance of similar projects, I opted to take a different route. Houses are being provided at a slower rate than the growth of informal settlements. This makes a housing project in Delft inadequate as it takes too long for people to benefit from it. Instead of designing and providing new housing, I opted to look at the way of formalising informal housing through construction. By addressing the informal, we can narrow the gap between informal and formal and ultimately produce an architecture that aids in the production of permanent housing. During a visit to the construction site, I was able to get a hands-on experience of the soil conditions found within Delft and to my liking, it was the perfect sand to use in sandbag construction.

The site made me aware of all the construction waste as there were trucks loaded with sand ready to be taken to a dumping site. But by incorporating sand as a primary construction material, we would be able to cut down on construction waste and pollution.



Figure 62 Image of the site under construction (by the author, 2022)



Figure 63 Image of the site under construction (by the author, 2022)

colour	proposed zoning	proposed land use	unit numbering	number of units	area (ha)	percentage
yellow	single residential zoning 2: incremental housing (SR2)	single residential (±135 units/ha)	1 - 1511	1511	11.20	37.40
orange	mixed use subzoning 1 (MU1)	mixed use	1512 - 1513	2	1.16	3.85
light blue	single residential (SR2) or Mixed Use (MU1)	single residential or mixed use	1514 - 1595	82	0.61	2.04
light green	utility zoning (UT)	detention facilities	1596 - 1598	3	1.04	3.46
light purple	utility zoning (UT)	pump station	1599	1	0.01	0.03
light blue	transport zoning 2: public road & public parking (TR2)	public road	1600 - 1602	3	8.81	29.42
light purple	transport zoning 2: public road & public parking (TR2)	electrical sub-stations (see notes)	1603	1	0.02	0.08
light green	open space zoning 1: environmental conservation (OS1)	wetland	1604	1	4.79	15.99
light green	open space zoning 2: public open space (OS2)	public open space	1605 - 1607	3	2.19	7.31
light green	open space zoning 2 (OS2): hard surface	public open space	1608	1	0.13	0.42
	total			1608	29.96	100.00

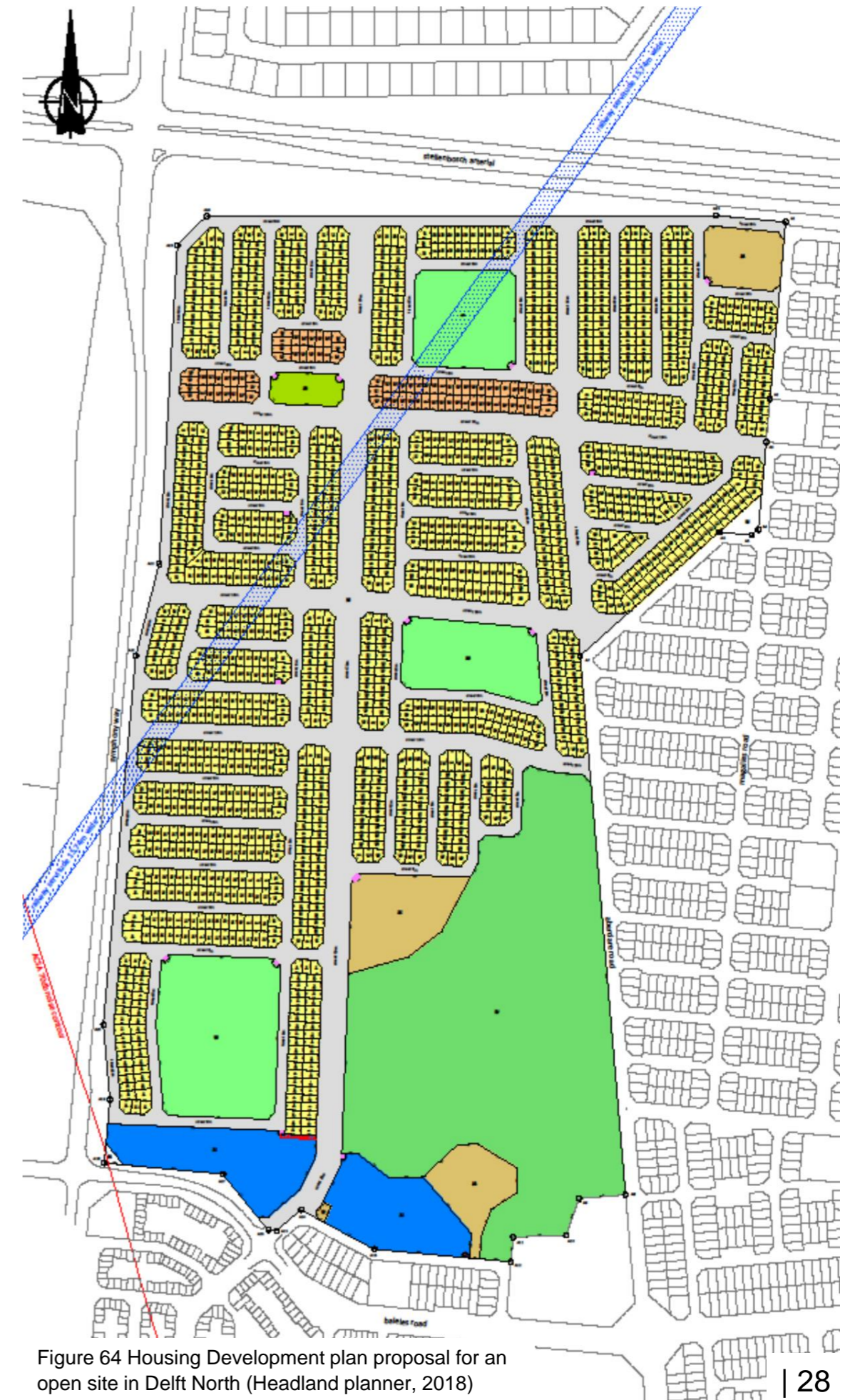


Figure 64 Housing Development plan proposal for an open site in Delft North (Headland planner, 2018)

EDUCATIONAL FABRIC IN DELFT

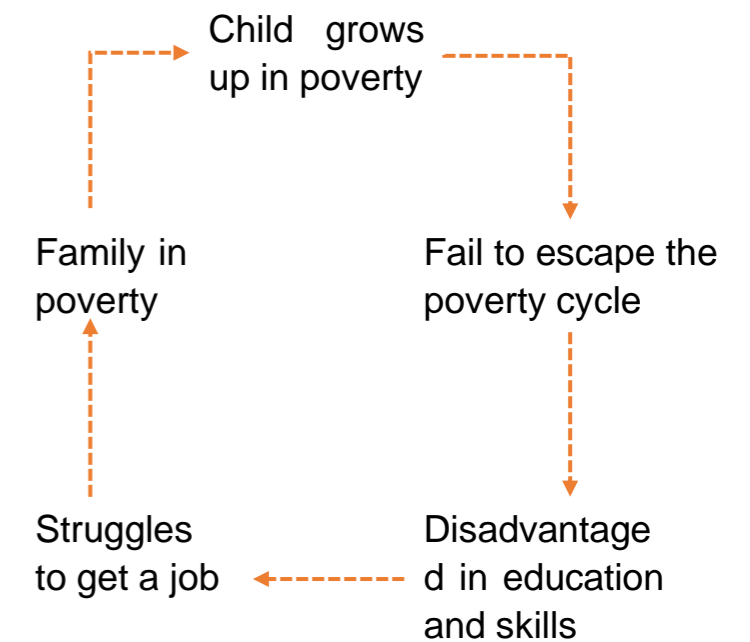
- - Educare
- - Secondary school
- - Primary school



Figure 65 Mapping of educational facilities throughout Delft North (by the author, 2022)

Emphasis is placed on education within Delft. Through a mapping exercise of educational facilities within Delft, we can see a lot of these facilities are made up of primary and secondary schools as well as educare facilities. Clearly emphasising the development of youth in the Delft, as the youth are seen as the future. A critique of this is that Delft lacks any form of educational facilities that are aimed at adults. The role of an adult in a poverty-stricken area such as Delft is critical, as it is them who create the overall characteristics of the community of Delft. As an adult, money becomes your main necessity and by lacking education or any basic skill being able to make money becomes extremely difficult. This adds to the poverty rate and can easily lead to an increase in crimes and gangsterism as people become desperate to earn an income. My goal is to address this issue and provide a space that allows for the development of skills and can positively reintegrate people into the community and economy of Delft. Through the provisions of skills development aimed at uneducated members at Delft, I am hoping that it can be a catalyst which can break the poverty trap. At this level, the provision of a skills centre is more crucial than that of housing.

Poverty Diagram



3 Program & Siting

Program

Precedents

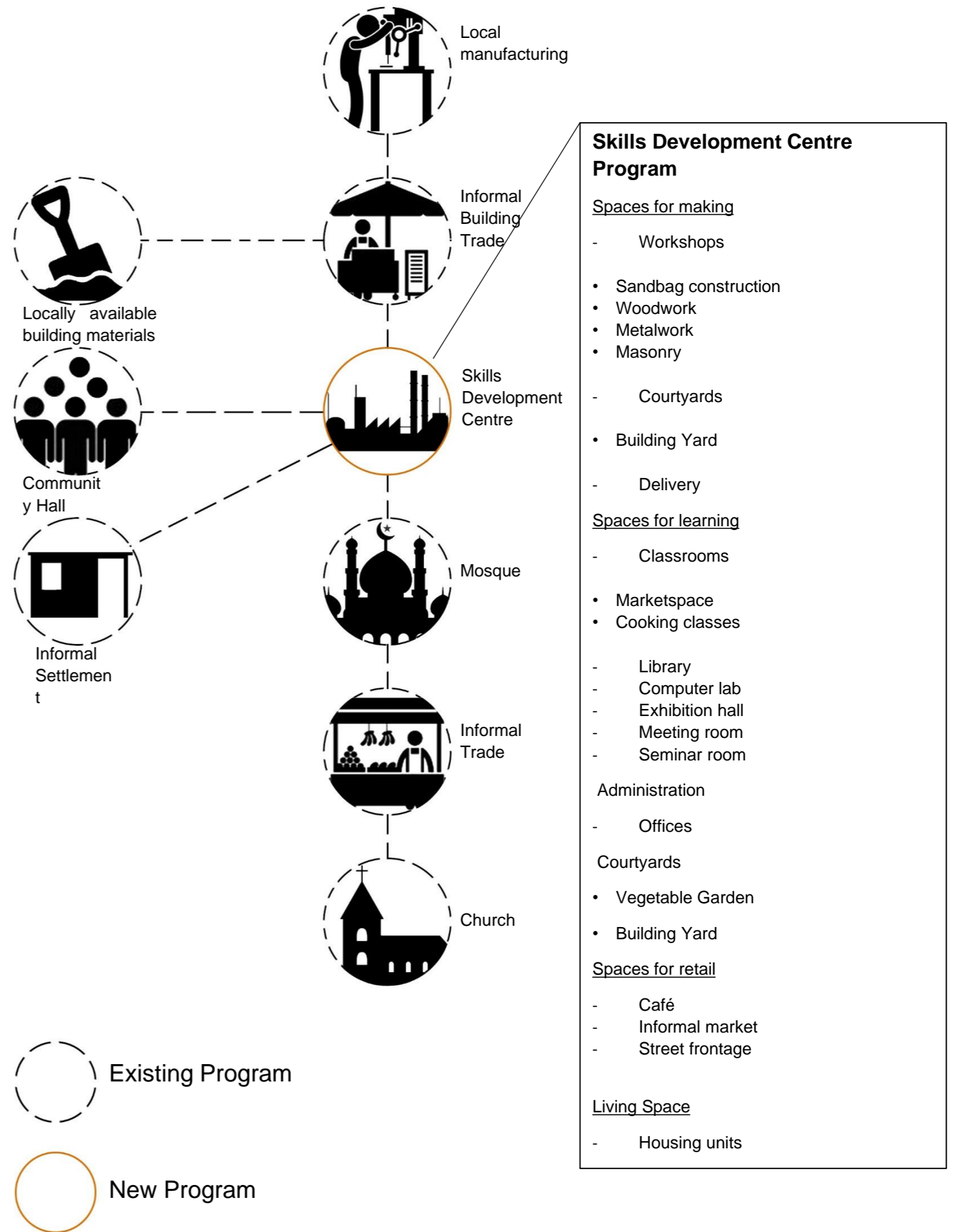
Concept

Site Selection

PROGRAM DEVELOPMENT

Based on my nodal analysis of Delft's main road, I have identified a site for my intervention. The site chosen was an open plot of land located at Node 4. This site was chosen due to the lack of informal trade activity. There is an informal settlement located on the opposite corner. The Skills Development Centre focuses on two key aspects, upskilling and trade. The building will be programmed around these two aspects. The building will provide space for informal trade. Provision for informal trade is important as it will get people from the informal settlement involved. The Skills Development Centre will focus on construction (more specifically sandbag construction) and the building trade as well as the preparation and growth of food. These two skills were chosen as they are the two most common drivers of the informal economy in Delft.

Accommodation will also be provided for people who travel far to attend the Skills Development Centre. The arrangement of these spaces should create an active building that encourages the community of Delft to begin their journey of bettering their lives through the development of their skills.



PRECEDENT STUDIES

Usasazo Secondary School – Wolf Architects

Usasazo Secondary School was chosen due to the site sharing similar characteristics to mine. The school is located in Khayelitsha and is surrounded by an informal settlement. The school creates a market edge with the public and the informal settlement using multifunctional classrooms that double up as market stalls.

The market edge was kept as a single-storey as a means to scale down the building and not impose its presence over the informal settlement. Movement through the school is captured by a green corridor and classrooms are articulated around courtyards.

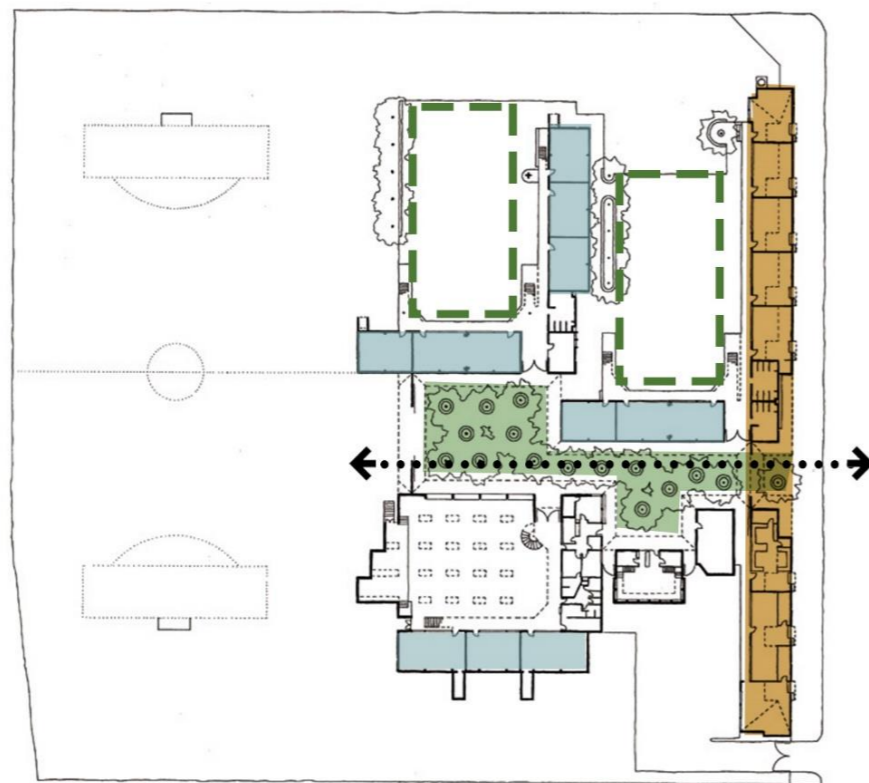


Figure 66 Plan of the school highlighting the market edge, green corridor, courtyards, main access and classrooms, image edited by the author, base image sourced from (Wolff, H., n.d.)

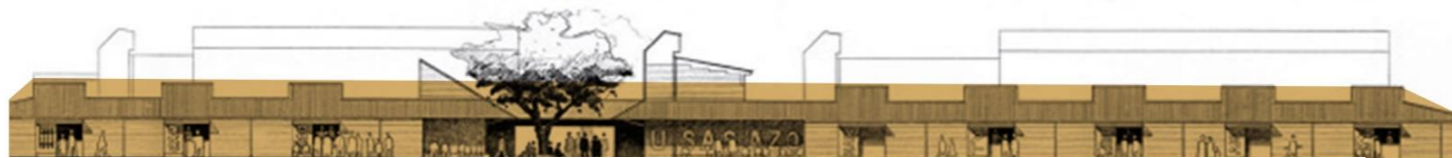


Figure 67 Elevational view of the multifunctional classroom/market spaces on the street edge highlighted in orange, image edited by the author, base image sourced from (Wolff, H., n.d.)

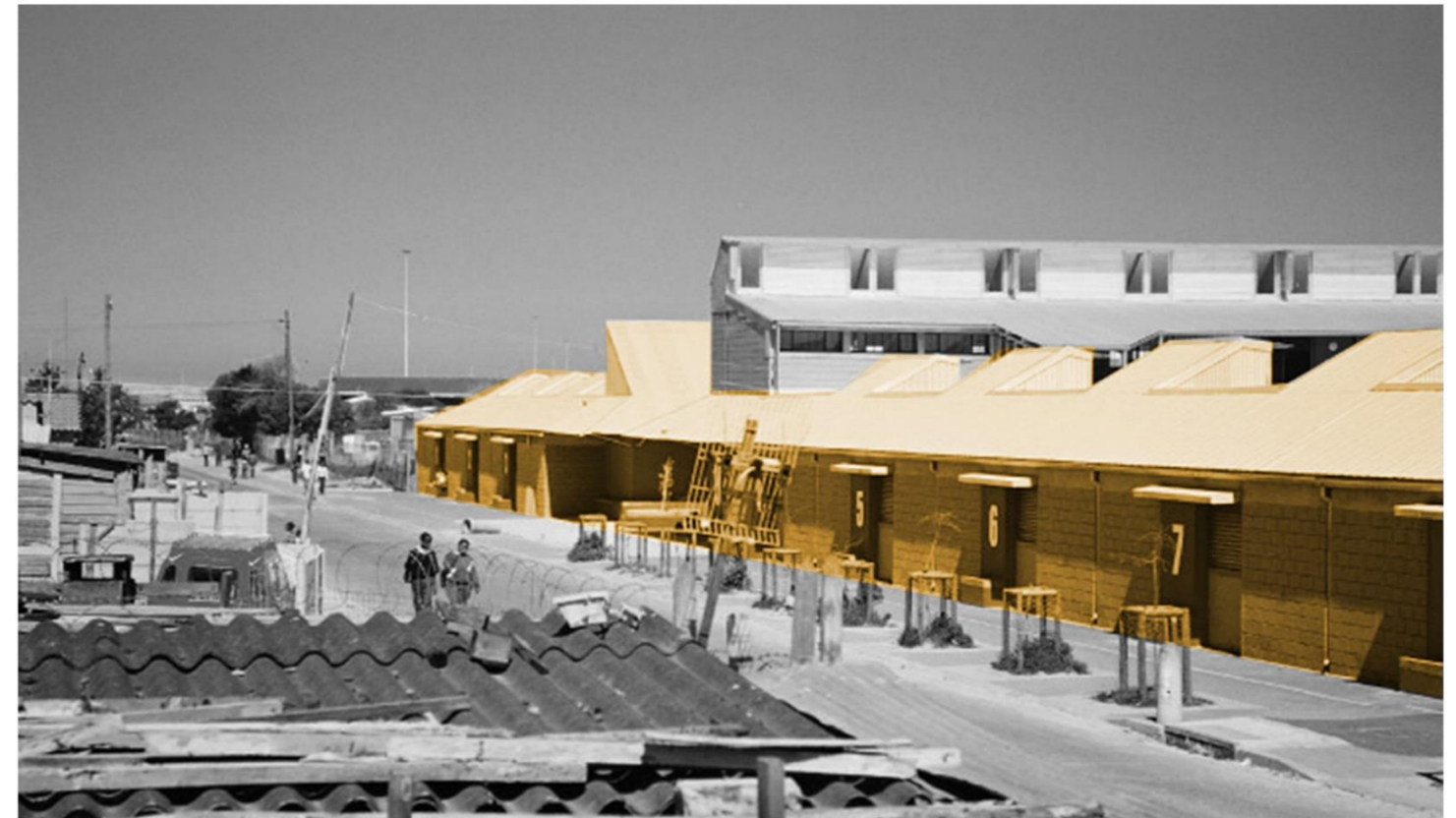


Figure 68 View of the multifunctional classroom/market spaces on the street edge highlighted in orange, image edited by the author, base image sourced from (Wolff, H., n.d.)



Figure 69 Internal view of the green corridor as highlighted in green, image edited by the author, base image sourced from (Wolff, H., n.d.)

PRECEDENT STUDIES

Taxi Rank Number 2 – 2610 South Architects

The Taxi rank is in the informal settlement of Diepsloot. The project was conceived as a veranda. Through a series of retrofitting spaces, additional functions, and steps to the existing taxi rank. The taxi rank integrates an existing market into the public edge of the taxi rank. Similarly to my site, this taxi rank is located at a node. The rank activates this node through

the market and waiting space. The waiting spaces are created through a series of steps and are held by the expression of the mono-pitch roof.

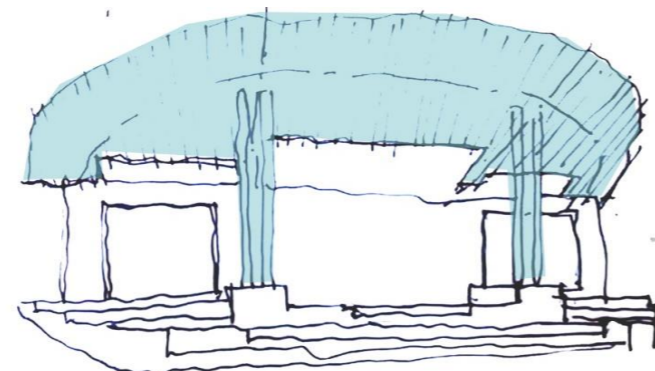
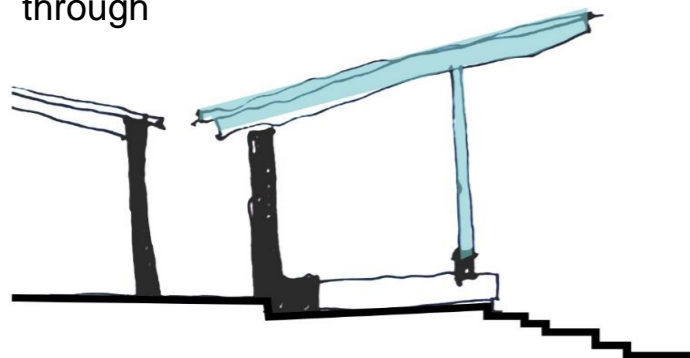


Figure 70 Section and perspective of the taxi rank exploring the expression of the roof (by the author, 2022)

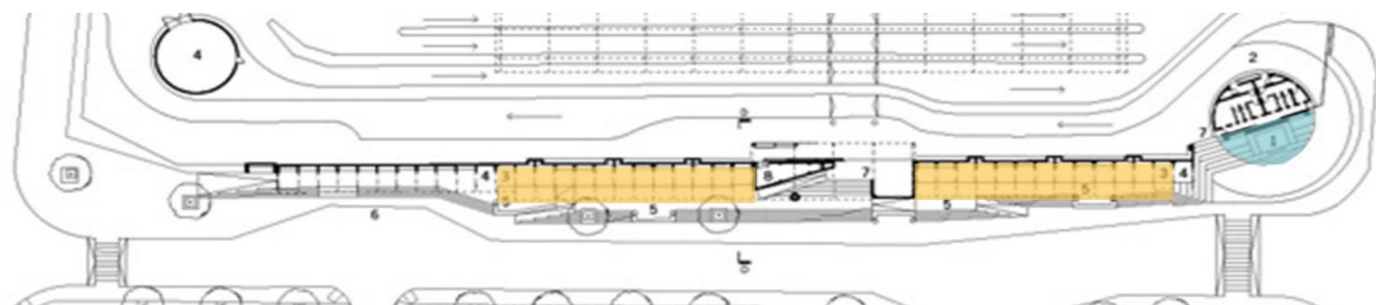


Figure 71 Plan and perspective views of the roof structure highlighted in blue and the market spaces highlighted in orange which is used at Taxi Rank Number 2, image edited by the author, base image sourced from (2610south.co.za. n.d)

St. Cyprian's School, Loggia – Noero Architects

Wynberg Girls High School (WGHS), Pavillion – Noero Architects

Inspiration for a roof form came through the analysis of the works by Jo Noero. More specifically St, Cyprian's School, Loggia and WGHS, Pavilion. The Pavilion at WGHS makes use of a cantilevering flat roof supported by steel columns. The steel supports allow for a floating effect to be achieved and keep the roof structure that is independent of the space below. At St,

Cyprian's School, Loggia, a covered walk is created with a series of independent stepped roofs. This allows for the datum under the roof to remain consistent as the ground levels begin to change.

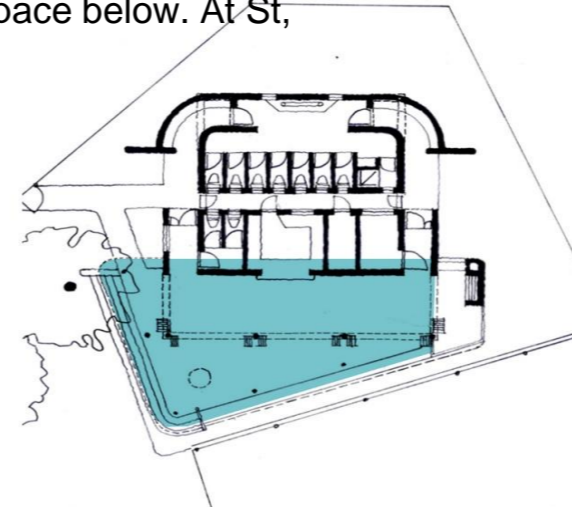


Figure 72 Plan and perspective view of roof used at the Wynberg Girls High School Pavilion highlighted in blue, image edited by the author, base image sourced from (Noero, J., n.d.)

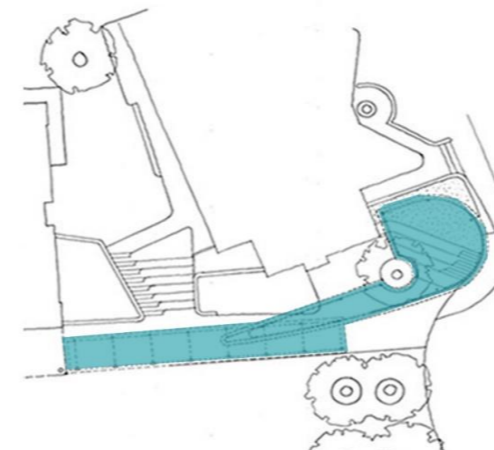


Figure 73 Plan and perspective view of roof used at the St Cyprians School highlighted in blue, image edited by the author, base image sourced from (Noero, J., n.d. .)

BUILDING CONCEPT

Circular Economy

The concept of my building is to create a circular economy through construction and operations. The Skills Centre will focus on the development of basic building skills, sandbag construction and food growth and preparation. Building, manufacturing, and the sales of food are common the most common practices that were identified in Delft's informal economy. The Skills Centre will act as a place of trade, allowing for not only the building but the people as well to generate an income. The goal is that people will use the skills learnt at the centre to bring in some money. The focus on sandbag construction will act as an economic driver within the building and the community as it comprises its own set of micro-enterprises. The building will combine the construction practices of Delft with sandbag construction to create a new tectonic identity.

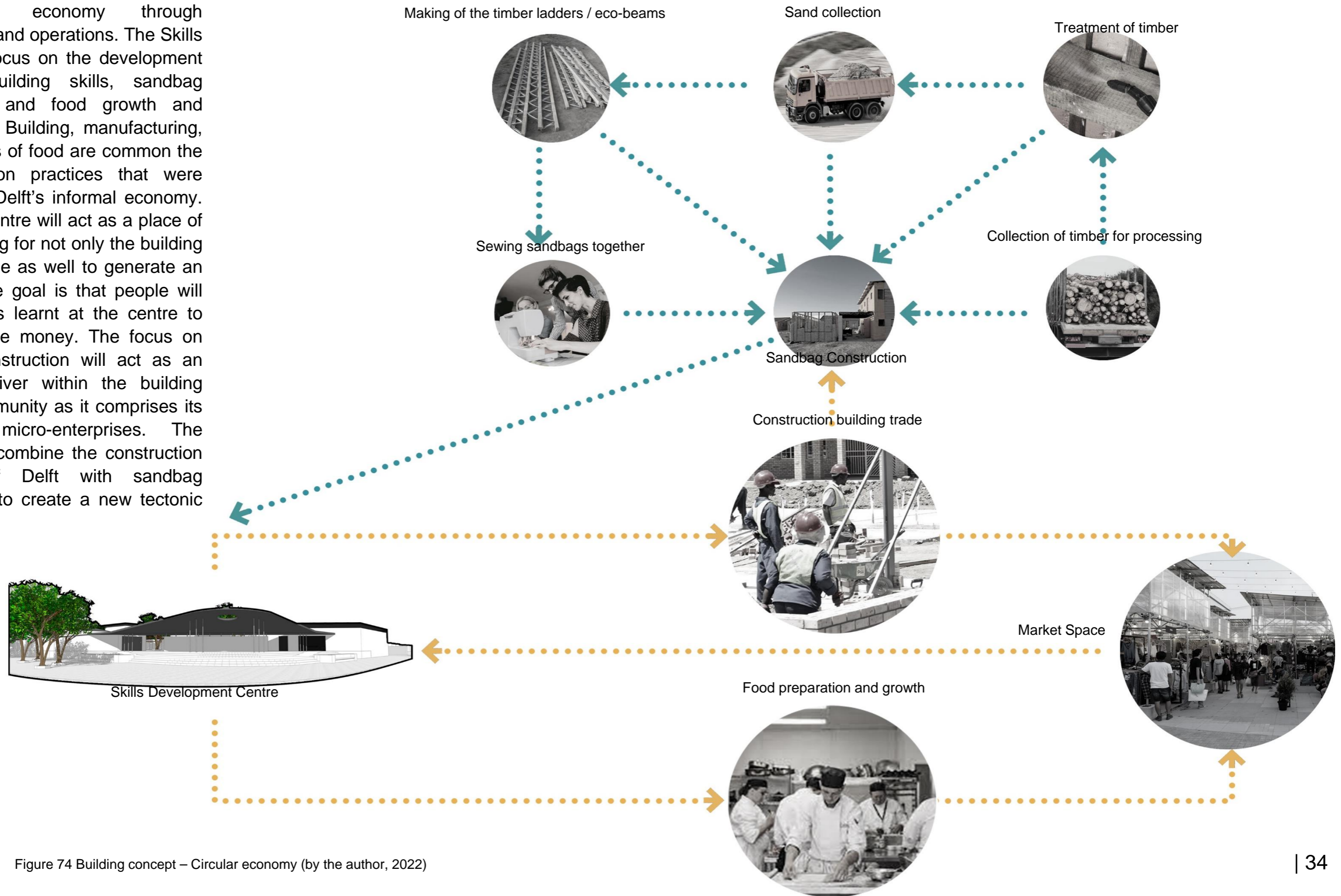
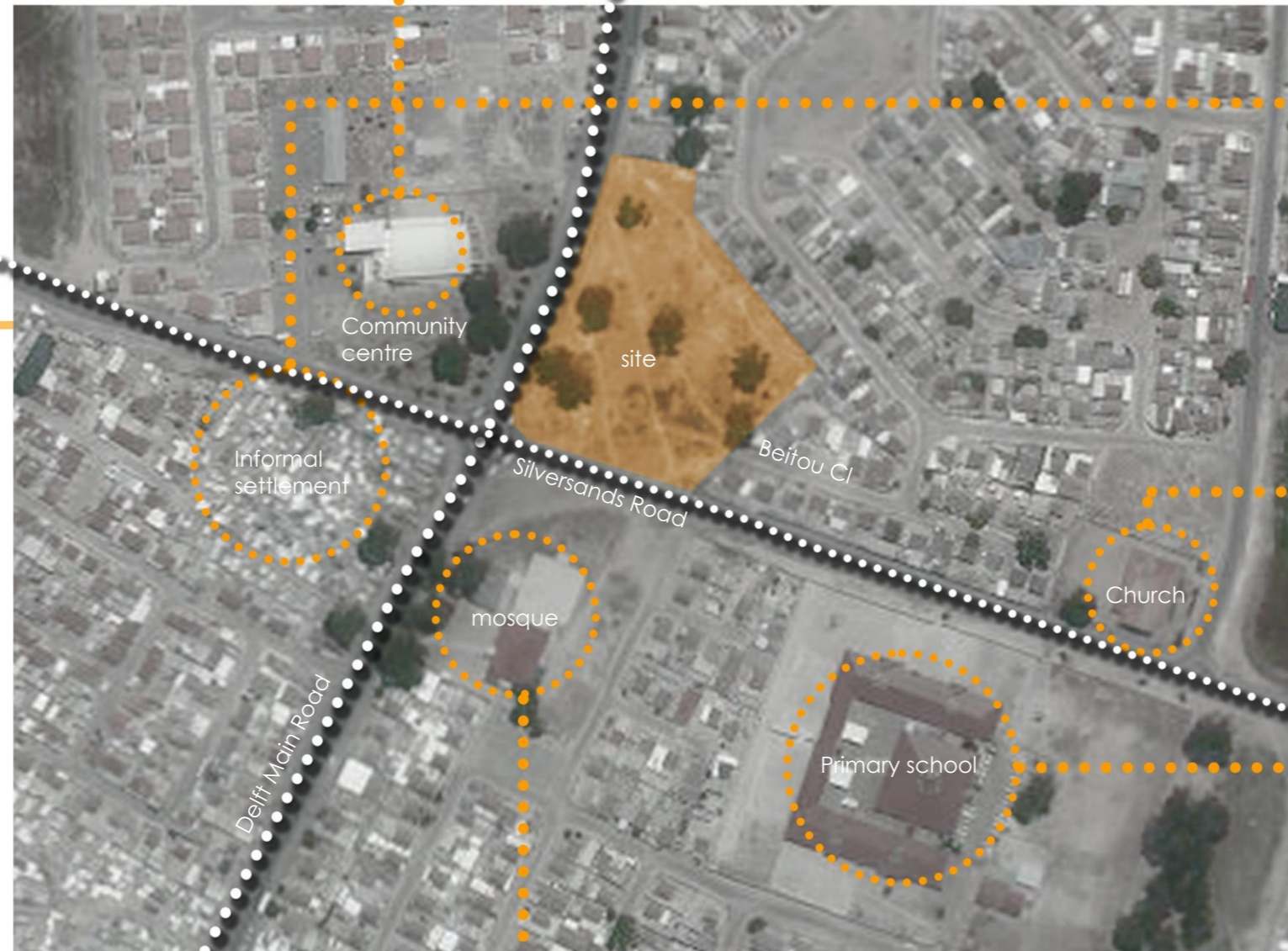
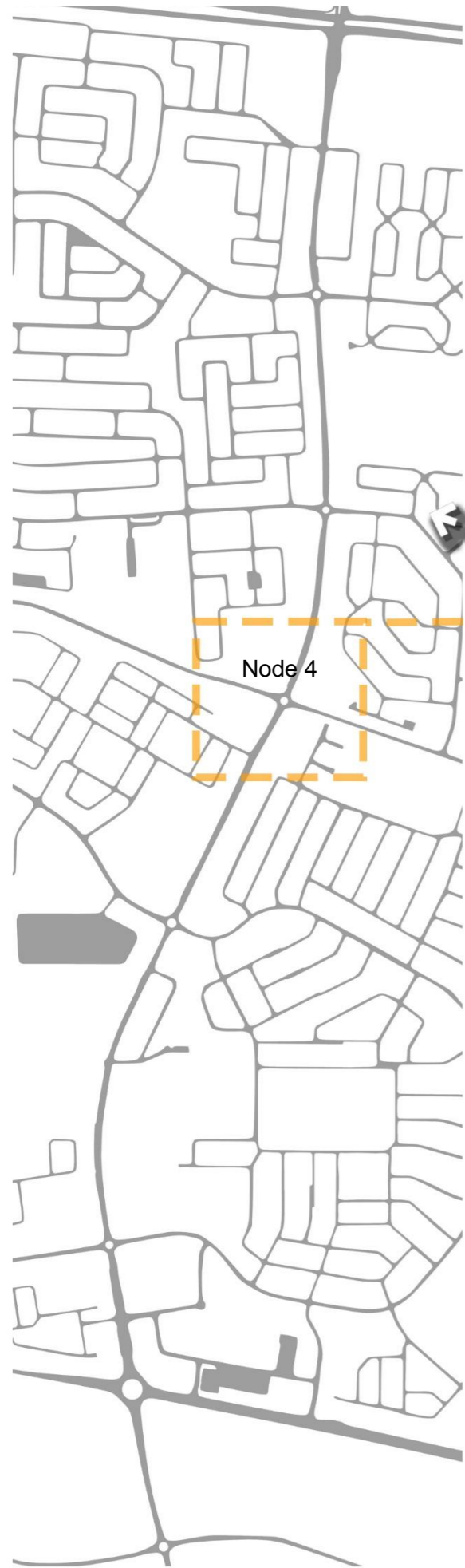


Figure 74 Building concept – Circular economy (by the author, 2022)

SITE SELECTION



Community Centre



Informal settlement



Church



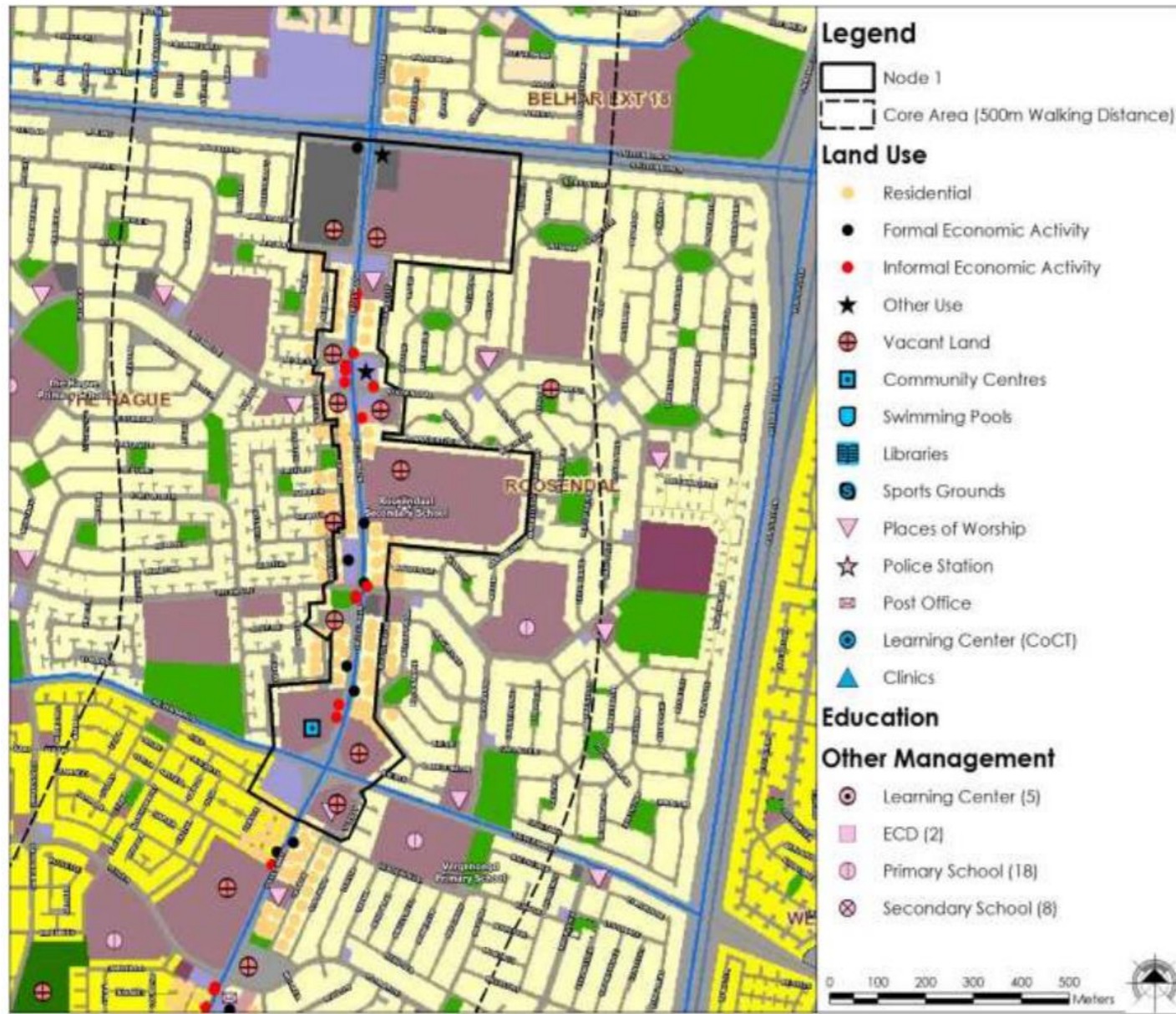
Primary school



Mosque

Based on the previous analysis of Delft Main Road nodes, Node 4 was chosen because of its lack of informal activity yet is surrounded by a rich public institutional landscape

ZONING



The site is a vacant land parcel that is currently zoned as Community zone 1 – 9.1 Community Zone 1: Education (C1). Based on the current zoning scheme by the city of Cape Town, it would make sense to design an intervention that fits within it. Instead of rezoning it to accommodate housing the placement of a Skills Development Centre is best suited.

SITE VIEWS



Delft Main Road Elevation



Silversands Road Elevation



Looking Down Silversands Road



Looking Down Silversands Road

4 Design Development

Site Analysis

Urban Scheme

Design diagrams

Plans, Sections, Elevations

Construction

Renders

Conclusion

SITE ANALYSIS

Upon the selection of a site, analysis took place in the form of mapping of the everyday conditions. Diagrams, drawings, ariel views and google aids were used to further interrogate the existing fabric along the Main Road. The intention was to obtain an understanding of the site and be able to unpack it in such a way that design drivers and opportunities become visible.

General site analysis was done which looked at boundaries, views, and climatic analysis such as wind and rain direction, sun Paths and the existing built fabric. Analysis of pedestrian and desire lines and motor routes was done as well as a mapping exercise of trade that happens along the Main Road was done.

General Analysis

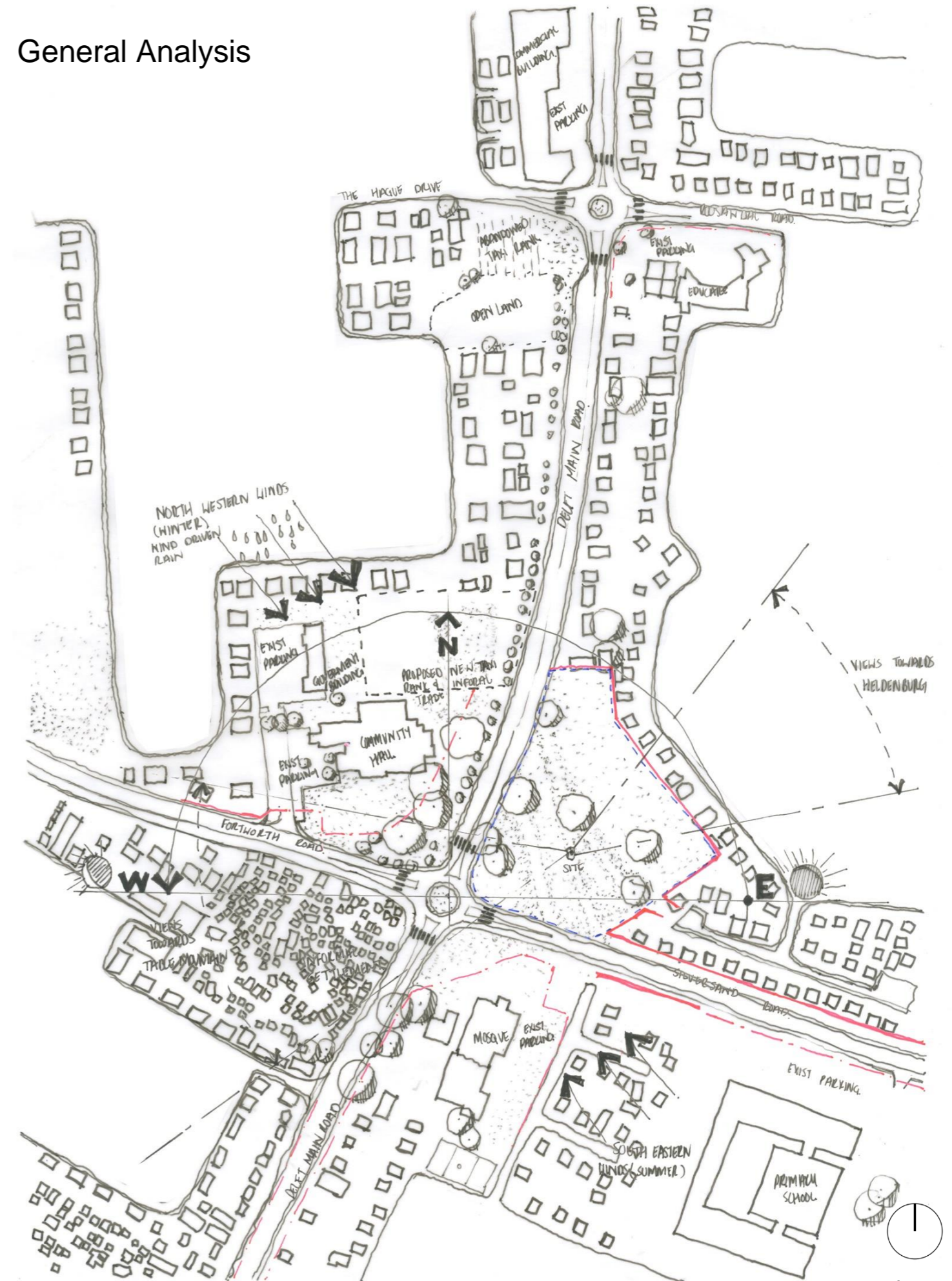


Figure 75 General Site analysis (by the author, 2022)

Commercial Analysis

- Tuck Shops
- Building Materials
- Skill-based trades



Figure 76 Trade analysis (by the author, 2022)

Routes Analysis

- Vehicle routes
- Pedestrian routes



Figure 77 General Routes analysis (by the author, 2022)

URBAN CONDITION



Legend

- A – Community Hall
- B – Mosque
- C – Primary School
- D – Church
- E – Hall
- F- Church
- G- Site
- H - Educare

Figure 78 Urban condition (by the author, 2022)

BOUNDARY CONDITIONS

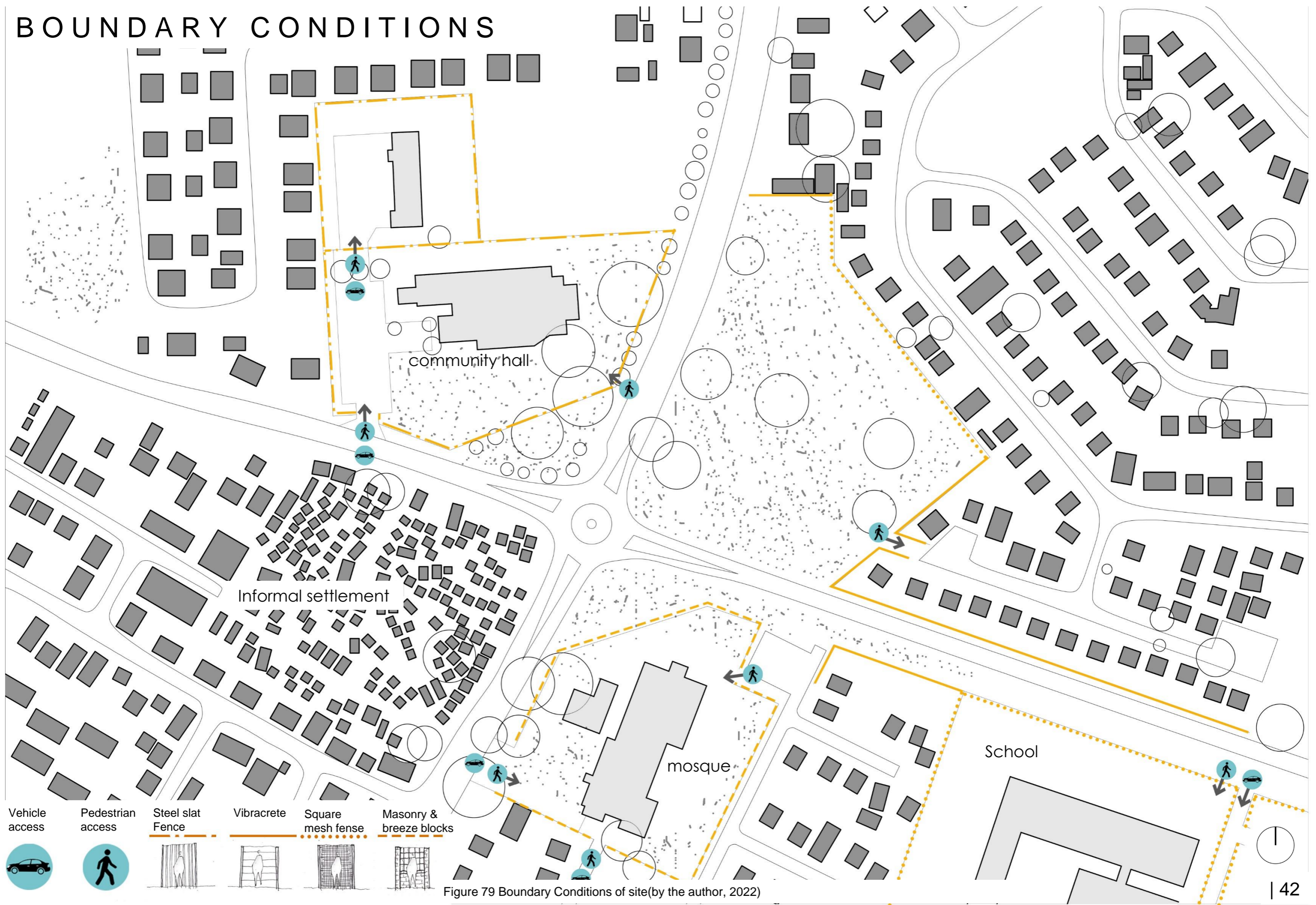


Figure 79 Boundary Conditions of site (by the author, 2022)

DESIGN PRINCIPLES

Based on the analysis of the previous case studies and precedents and the implementation of the theory of critical regionalism, I have set up a series of design principles. Five design principles influence the design of the Skills Development Centre. These are:

1. Community involvement through construction.
2. Catalyst for development
3. Knowledge Enterprise (learn, make, sell)
4. Critical Examination between design and context
5. Didactic, rational and construction methods.

In both case studies, the involvement of the community in the construction of the building is what made it successful. Through their involvement, you start to create a sense of ownership and pride. This is important in creating an architecture that is accepted by the community.

The skills Development Centre should act as a catalyst which spreads its teaching through and beyond the context of Delft. The goal is to teach sandbag construction within the Skills Development Centre, which can eventually spread into the construction practices found within informal settlements.

Emphasis is placed on creating a knowledge enterprise. This is an architecture that focuses on learning, making and selling. Thus, creating a circular economy. Provisions of spaces and programmes that encourage these activities are critical to the design of the Skills Development centre.

The Skills development centre needs to be critical to its context and roots the architecture in place and can create an architecture of identity within Delft.

Sandbag construction method used with the Skills Development Centre. This construction method was chosen as it makes use of locally sourced material. Sand can be found in abundance within Delft. The use of sand roots the architecture within its context. The Skill Development Centre will be didactic through its construction and will teach the people of Delft how to build with sand.

Implementing these design principles creates an architecture that is rooted within its context. This type of architecture has a positive influence on the community of Delft, as it creates a new positive and permanent identity. This new identity can begin to spread through and beyond the context of Delft.

URBAN SCHEME

The site is full of design informants. This is due to its location along a node on Delft Main Road. Around the site, there is an informal settlement, a mosque, a community hall, a school, and a residential fabric. Through site analysis, it became clear that the mosque, school, and community hall isolate themselves from the existing urban context. They are all set back from the street edge with a solid boundary around them. They have played boundaries towards the edges. This results in a piece of land that is vacant and unprogrammed.

My urban response is to propose an additional housing unit, a residential block and a mixed-use building along the Main Road as seen in the top left. This aims to address the need for housing within Delft. These buildings can become the first place where sandbag construction is implemented outside the Skills Development Centre.

The Skills Development Centre creates a market edge on both Main Road and Silversands Road. An informal market is located on the corner which addresses the informal settlement across the road. Based on existing desire lines a new pedestrian route is incorporated into the scheme. This route connects people moving along the Main Road with the residential fabric on the right.

The vacant land on the corners of the mosque and community centre is designed to allow for additional informal markets to form. They focus on movement routes and create spaces for people to slow down and relax.



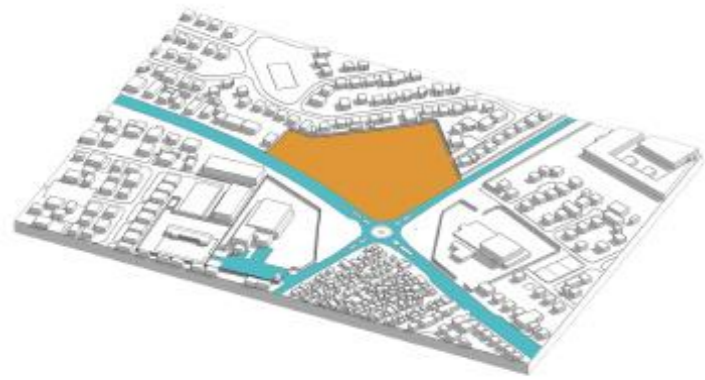
Figure 80 Urban Development Scheme of the Skills Centre (by the author, 2022)

ARIAL VIEW OF URBAN SCHEME



Figure 81 Aerial view of Urban Development Scheme of the Skills Centre (by the author, 2022)

DESIGN DEVELOPEMENT



1 - Identifying site



2 - Creating a direct interface with the street edge and creating an urban edge.



3 - Breaking the mass with an existing desired route, creating a direct link between site and the residential fabric to the back.



4 - Adding a mass to define the new edge of the new internal street.



5 - Placing a mass as a way to creating and hold a courtyard



6 - Creating two new courtyards by dividing the original one up.



7 - Adding a second storey at the back of the site only, as a way of scaling the building down



8 - Completing the edge of the new internal street with a double storey mass.

Figure 82 Massing development of the Skills Development Centre (by the author, 2022)

The massing begins with the creation of an urban edge. This functions as a multi-functional space where retail activity and learning can occur. The urban edge allows for an architecture which speaks directly to the busy streets and holds the site. The urban edge starts off as a solid L-shape but is later split into two by an existing desire line. Maintaining this desire line is an important part of this scheme. The introduction of the desire line creates a

new internal pedestrian thoroughfare. This route connects the Main Road with the residential fabric. An additional mass is added along the new pedestrian route as a means of defining it. A series of courtyards are used in the back of the site as a way of scaling down the spaces. A double-storey block is introduced at the back of the site as it helps create a human scale along Main Road.

BASIC PROGRAMMING

The programming of the Skills Development Centre focuses on 5 basic programs:

1. Spaces for learning, making and selling.
2. Spaces for making and learning
3. Residential
4. Courtyards
5. Informal markets.

Spaces for retail are located along the street edges. Spaces for making and learning are located towards the back of the site. Courtyards are important as it helps scale down the building and creates spaces of relief. The residential blocks are located closer to the existing residential fabric and the informal market is located on the corner of the site. The intent of placing it there is that it would spread to the existing vacant corners across the roads.

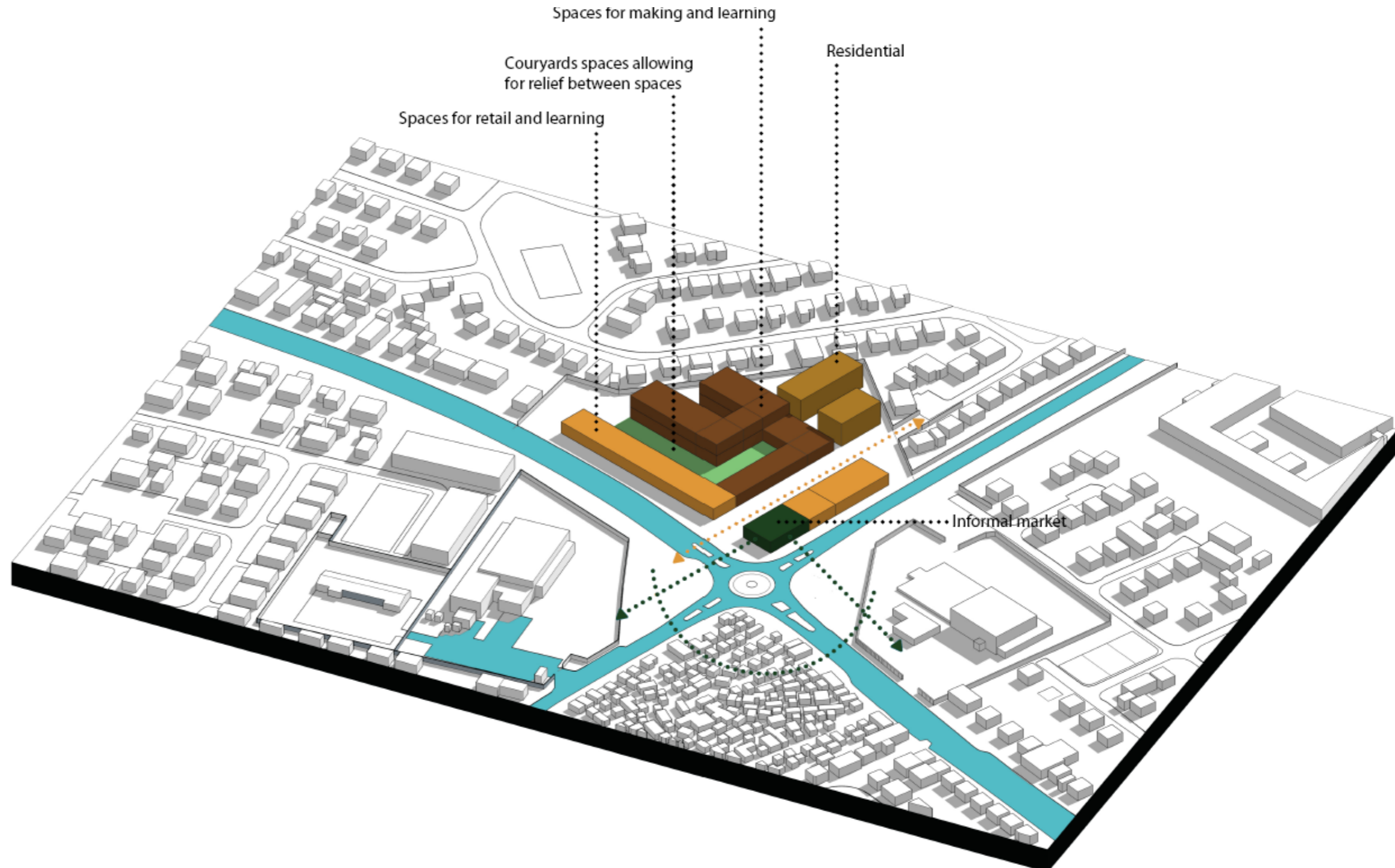
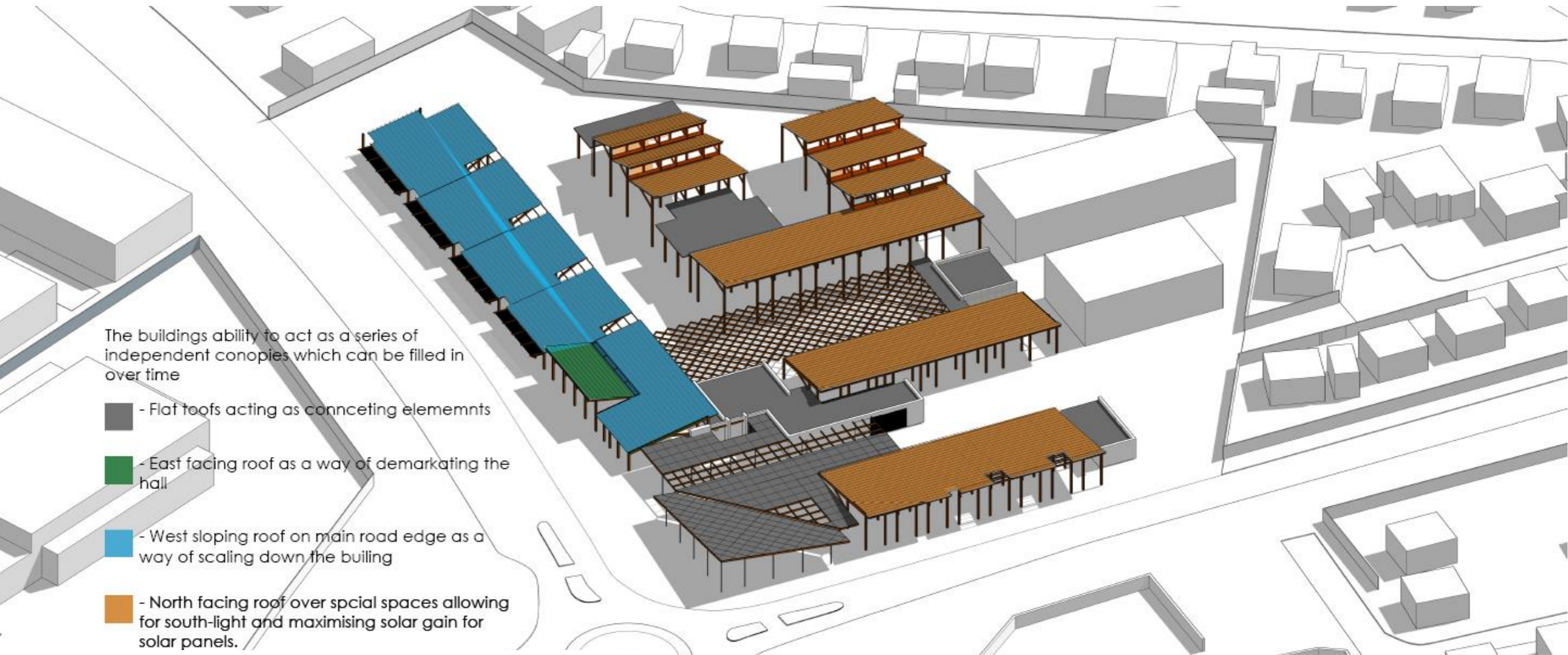


Figure 83 Program development of the Skills Development Centre (by the author, 2022)

ROOFSCAPE



- The buildings ability to act as a series of independent conopies which can be filled in over time
- Flat roofs acting as conncting elememnts
 - East facing roof as a way of demarkating the hall
 - West sloping roof on main road edge as a way of scaling down the builing
 - North facing roof over spcial spaces allowing for south-light and maximising solar gain for solar panels.

Figure 84 Roof development of the Skills Development Centre (by the author, 2022)

The roof is a crucial design element of the Skills Development Centre. It is conceptualized to be the primary structure instead of the walls. This was done because sandbag walls aren't load-bearing. By building the roof first, the Skills Development Centre can be seen as a series of roof canopies. These canopies mimic the informal markets along Main Road. The canopies define spaces but not

programs. If spaces need to be programmed and enclosed, it can be done by creating walls from sandbags. The roofscape consists of a series of mono-pitched roofs. Each slope defines a specific space. In the diagram above the blue roofs are west-sloping, this was done to scale down the building along Main Road. The brown roofs are north-facing and indicate spaces of learning. By having

these roofs face north it allowing for maximum solar gain for solar panels. The grey roofs of flat roofs act as linkages between the various spaces, On the corner is a roof which pitches up towards the informal settlement across the road. This acts as a welcoming gesture as well as an identification marker along Main Road.

PLANS



- 1 – Informal Market
- 2 – Cafe
- 3 – Cooking school
- 4 – Vegetable Garden
- 5 – New Internal Road
- 6 – Green Spaces
- 7 – Ablutions
- 8 – Entrance Foyer
- 9 – Individual Workshops
- 10 – Storage
- 11 – Classrooms
- 12 – Exhibition Hall
- 13 – Workshop
- 14 – Lounge/Study Area
- 15 – Offices
- 16 – Staff Room
- 17 – Special Workshops
- 18 – Staff Courtyard
- 19 – Building Yard
- 20 – Exhibition Courtyard
- 21 – Meeting Room
- 22 – Green Corridor
- 23 – Proposed Housing Expansion
- 24 – Parking
- 25 – Operations Manager
- 26 – Spaza/Tuck Shop
- 27 – Forecourt

Informal Settlement

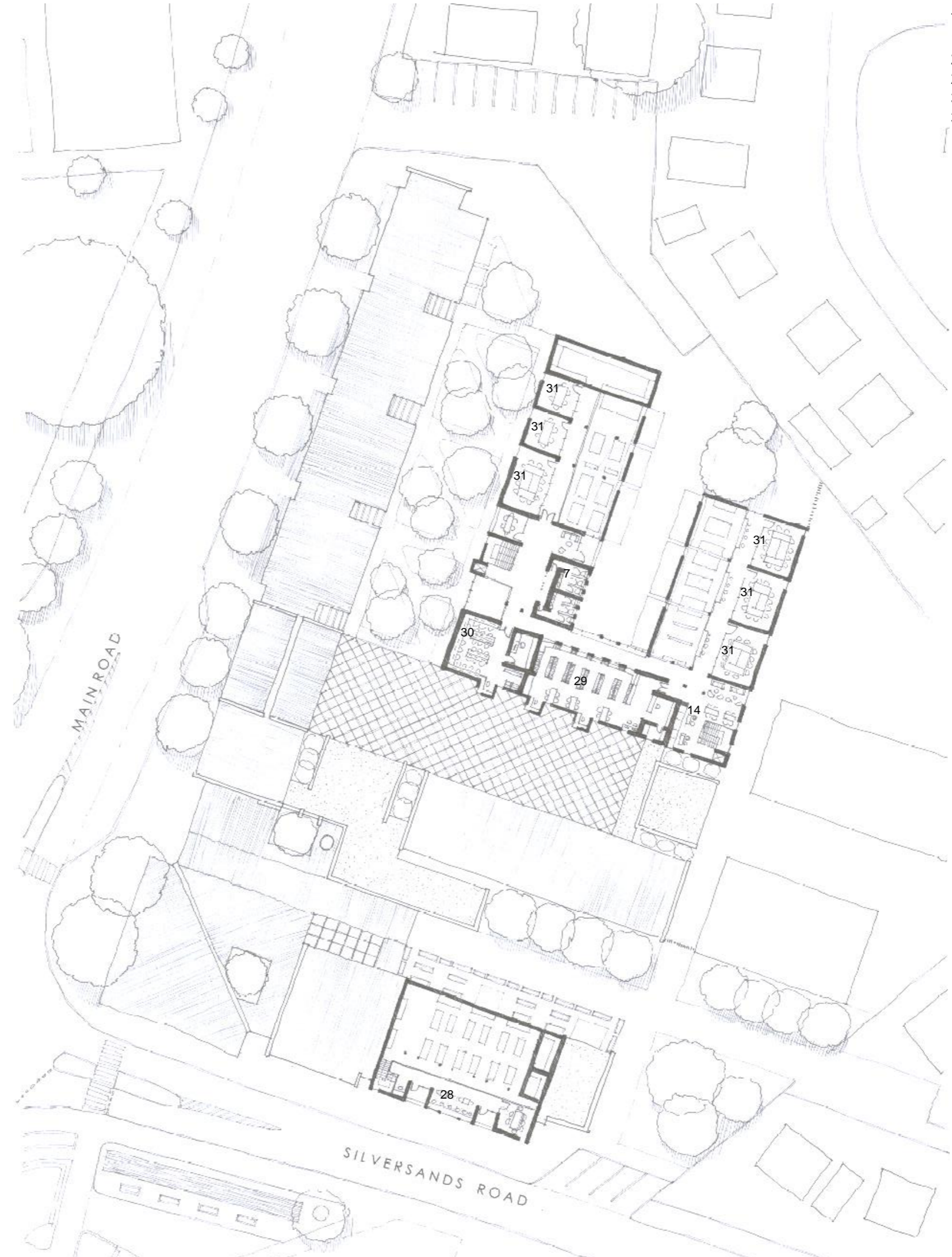
Community Hall

MAIN ROAD

SILVERSANDS ROAD

PLANS

- 7 – Ablutions
- 14 – Lounge/Study Area
- 28 – Workspace
- 29 – Library
- 30 – Computer Lab
- 31 – Meeting Rooms



⊕ First Floor Plan

COURTYARD DEVELOPEMENT

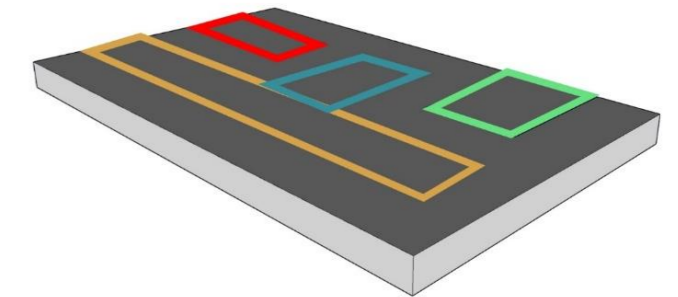
Courtyards play an integral role in the scheme of the Skills Development Centre. Courtyards create a sense of relief between built fabric as well as having a relaxing nature. With gangsterism and crime running wild In Delft it allows for space for relaxation and contemplation. Courtyards allow for flexibility of activity within my scheme. There are four courtyard typologies:

1. Green Corridor
2. Exhibition Courtyard
3. Prototyping Yard
4. New pedestrian route and green spaces

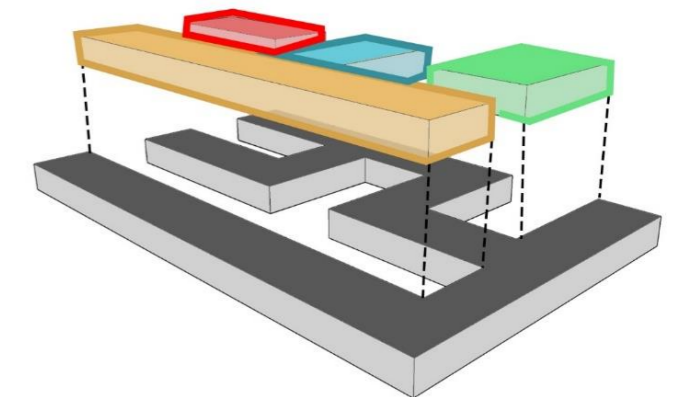
The green corridor allows for breaks between the built fabric and allows them to breathe. The prototyping yard is an exterior workshop space where materials can be stored and large items can be constructed. This courtyard has direct access to deliveries. The exhibition courtyard is a covered courtyard that allows for exhibitions to spill out from the hall and for smaller workshops to open up onto it. The new pedestrian route acts as a thoroughfare which allows people to access the residential area on the right of the site from the Main Road. This pedestrian route is activated with informal market activity and green park spaces,



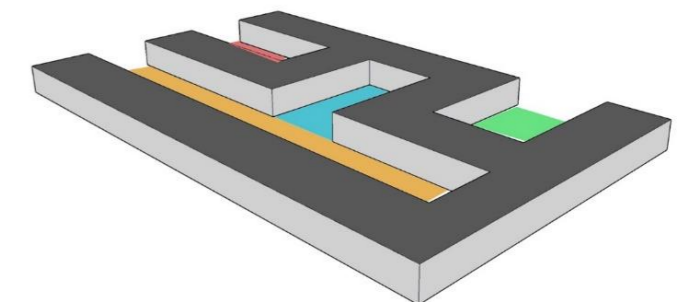
Figure 85 Courtyard development of the Skills Centre (by the author, 2022)



Courtyard layouts

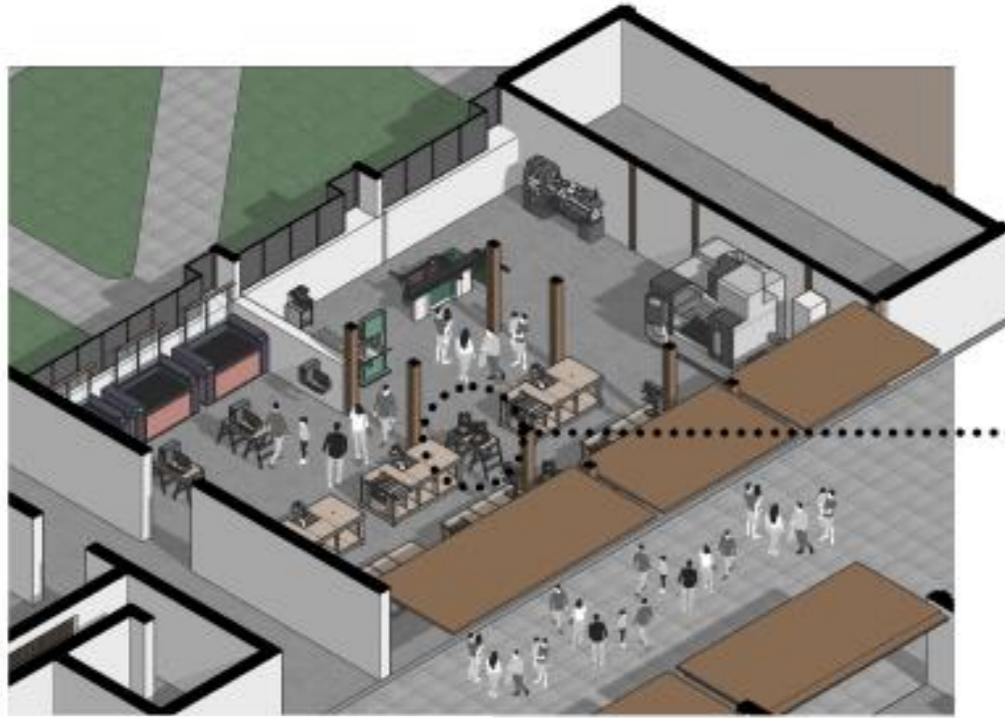


Removing courtyards to create a massing

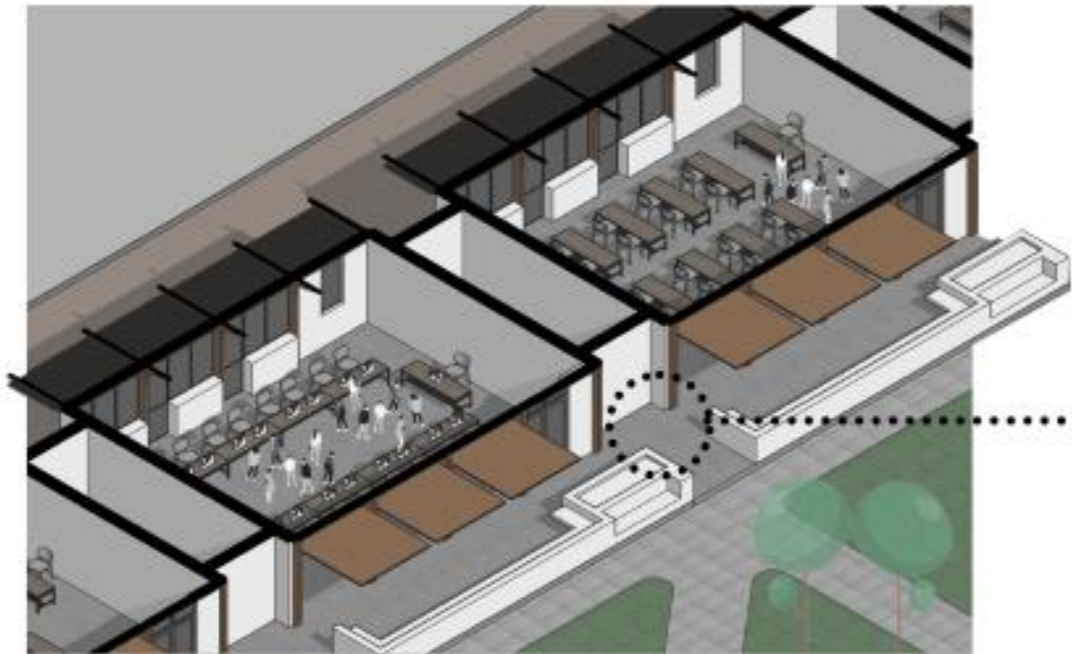


Massing around new courtyard spaces

INTERIOR PROGRAM

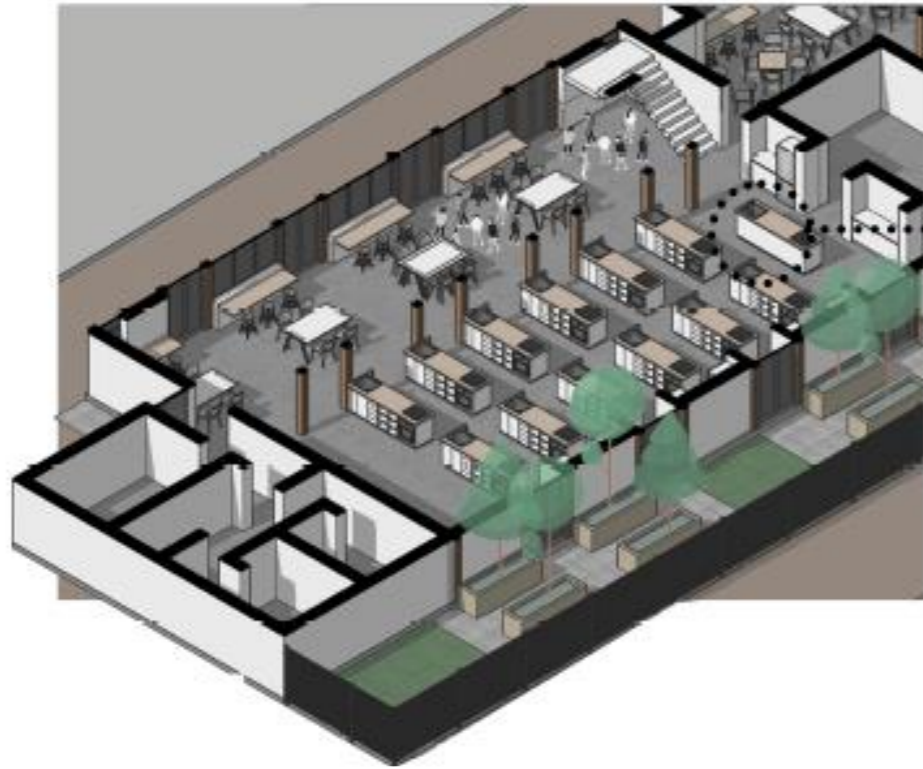


13 – Workshop

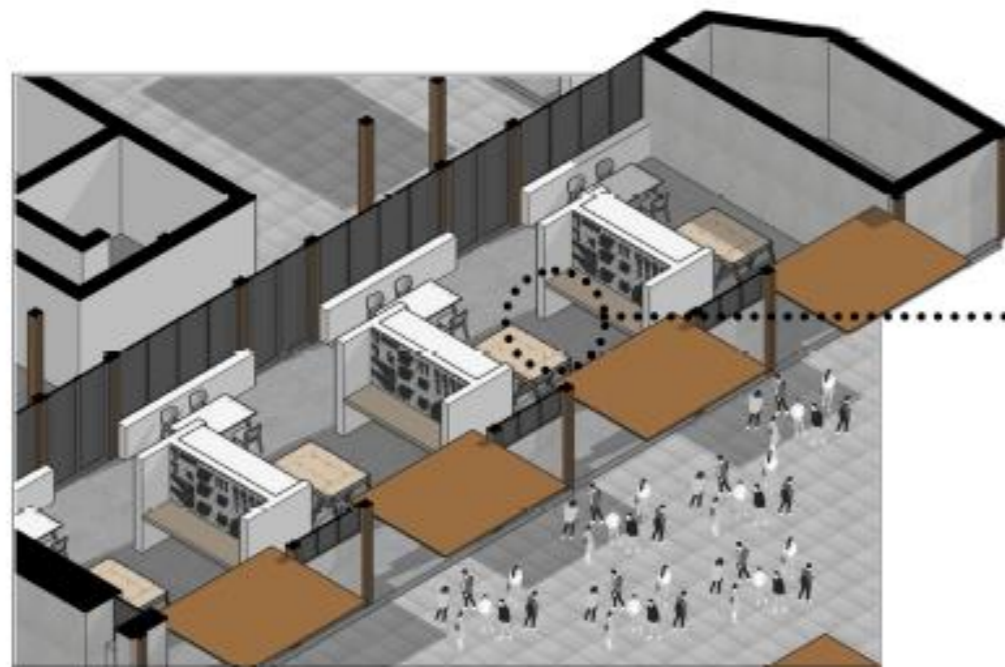
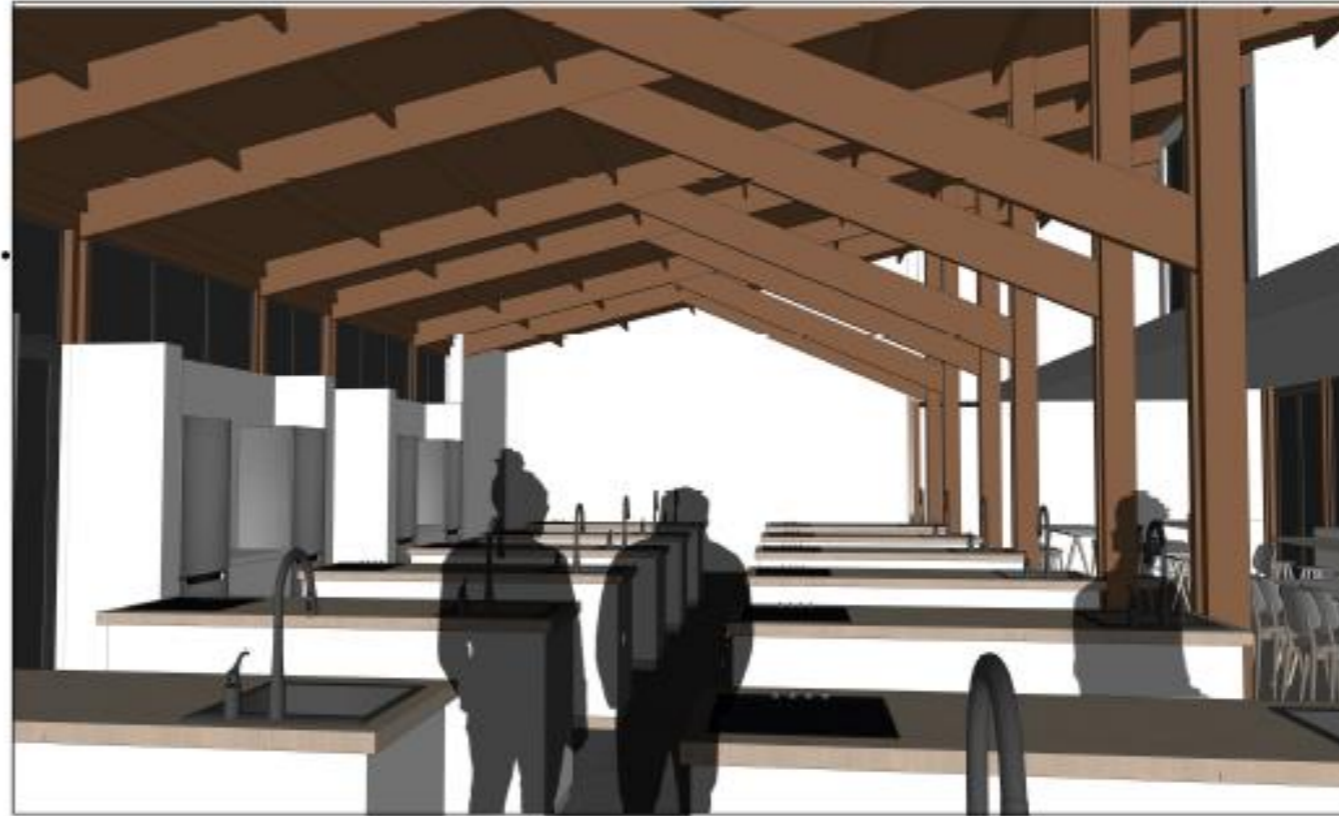


11 – Multi-functional Classrooms

INTERIOR PROGRAM



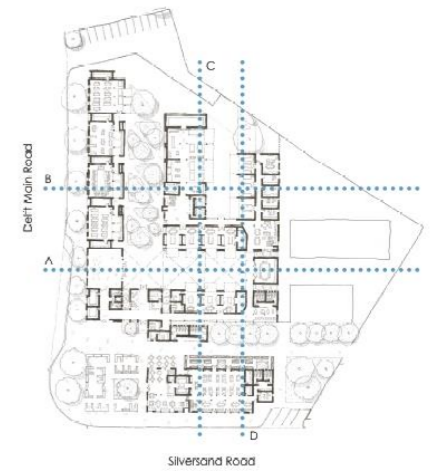
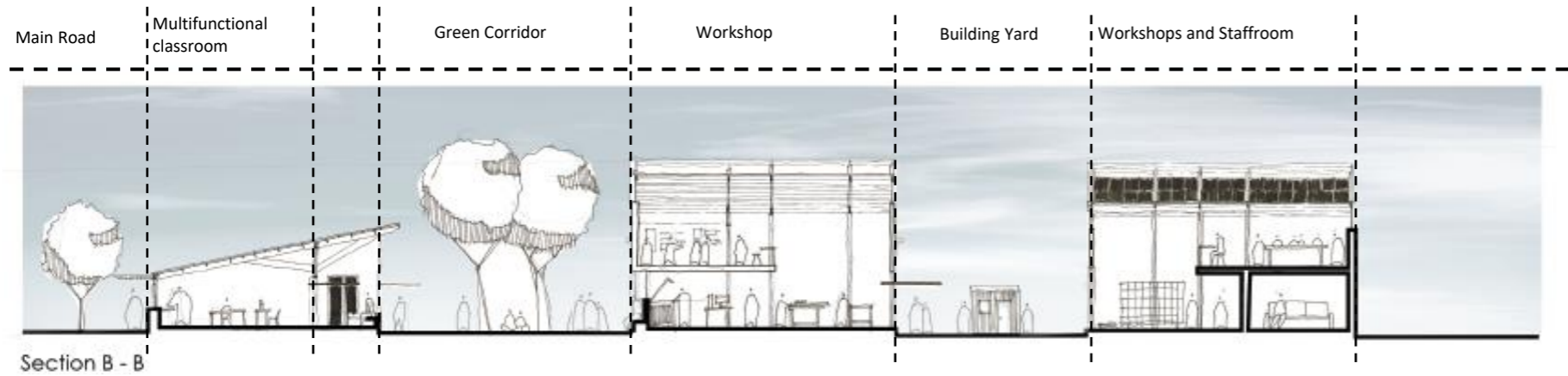
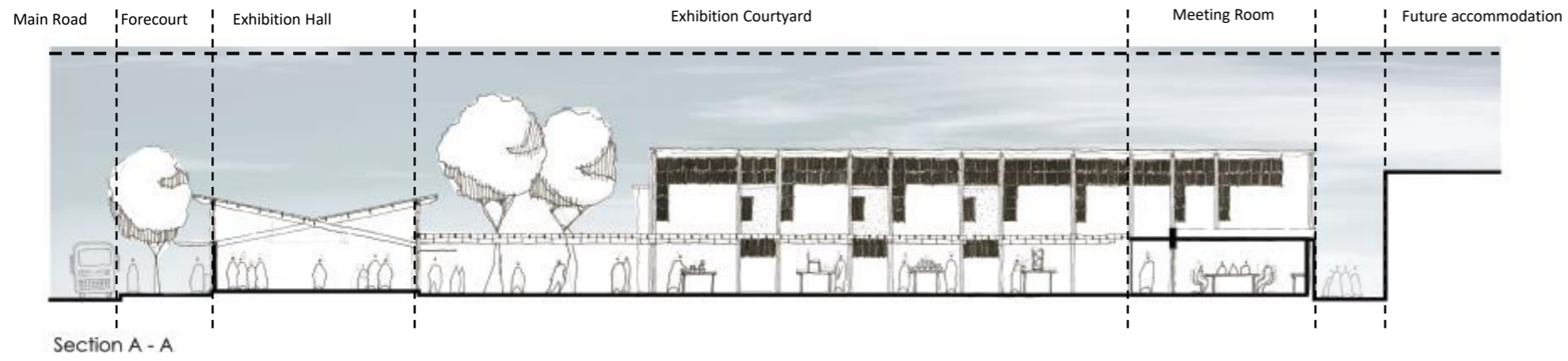
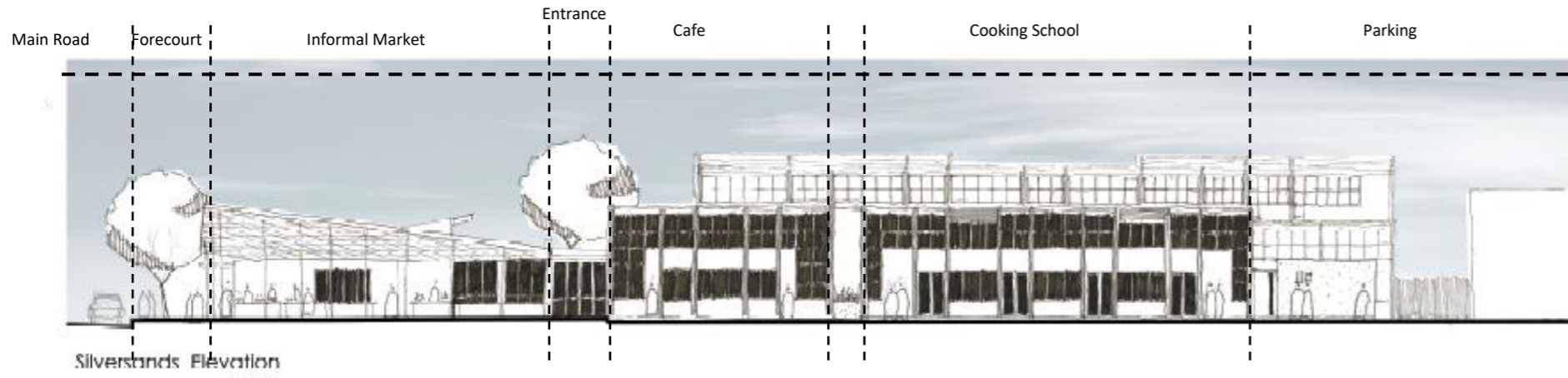
3 - Cooking School



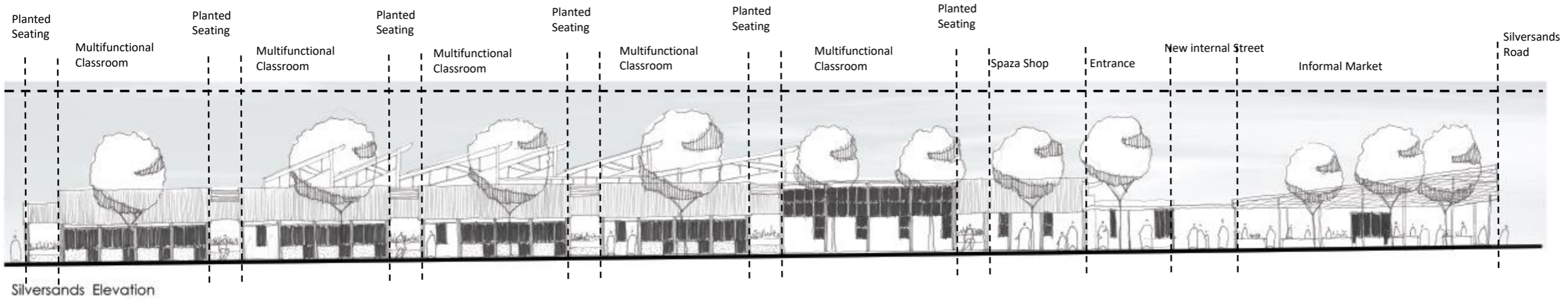
9 - Industrial Workshops



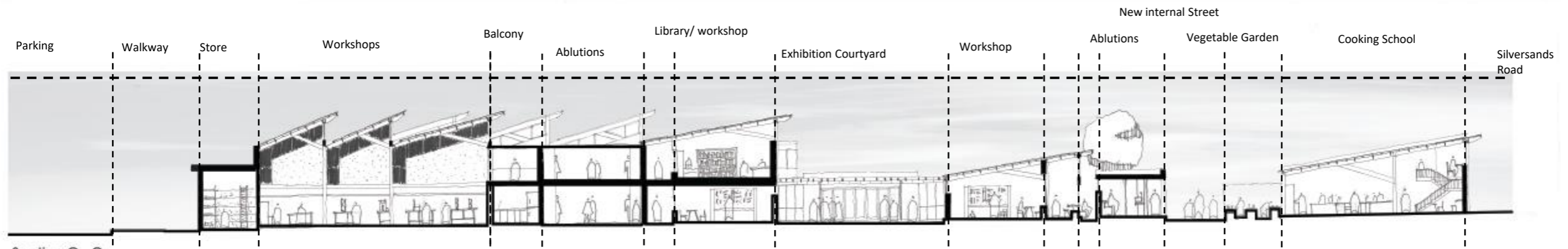
SECTIONS & ELEVATIONS



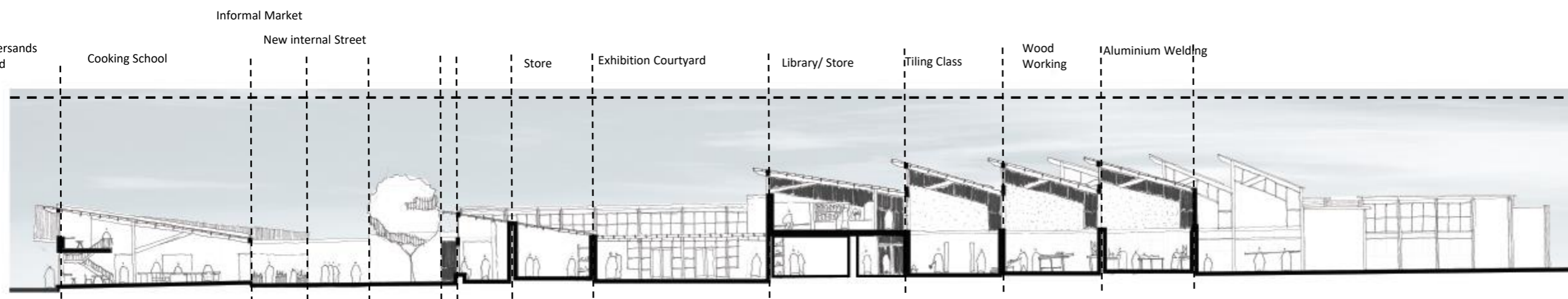
SECTIONS & ELEVATIONS



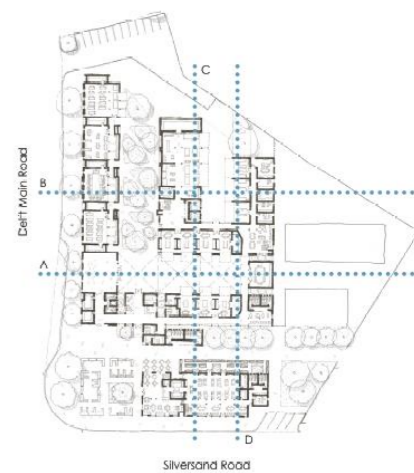
Silversands Elevation



Section C - C



Section D - D



PERSPECTIVE FROM DELFT MAIN ROAD



Figure 88 Perspective of the Skills Development Centre from Delft Main Road (by the author, 2022)

PERSPECTIVE TOWARDS THE INFORMAL MARKET

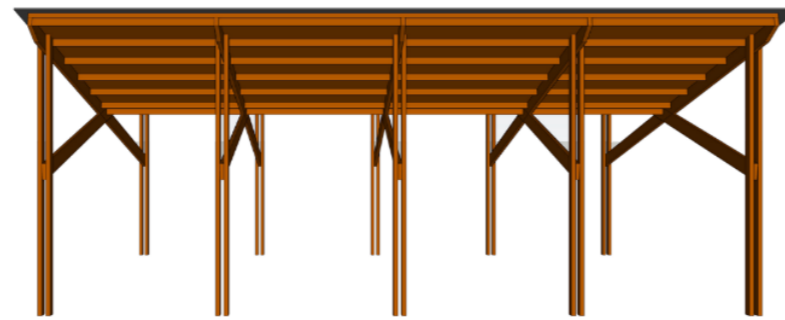
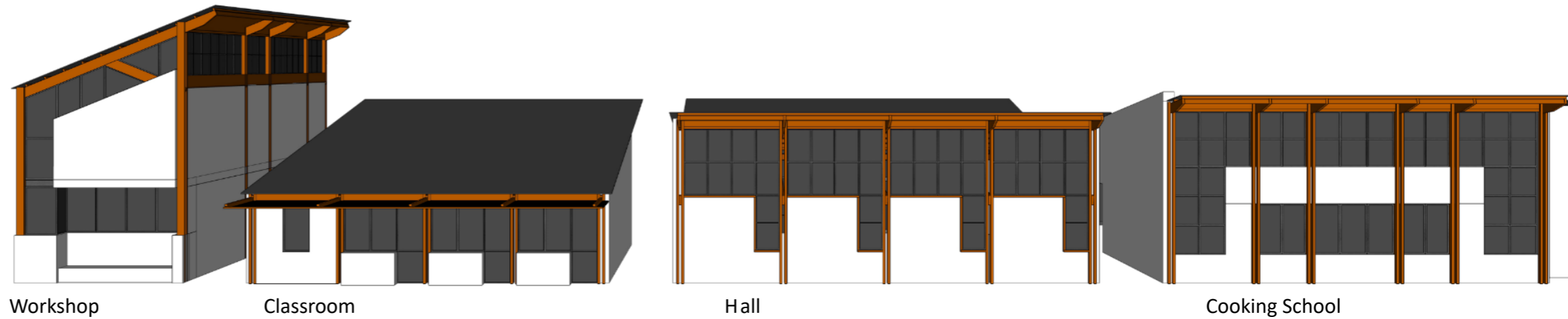


Figure 89 Perspective of the Skills Development Centre from intersection of Delft Main Road and Silversands Road (by the author, 2022)

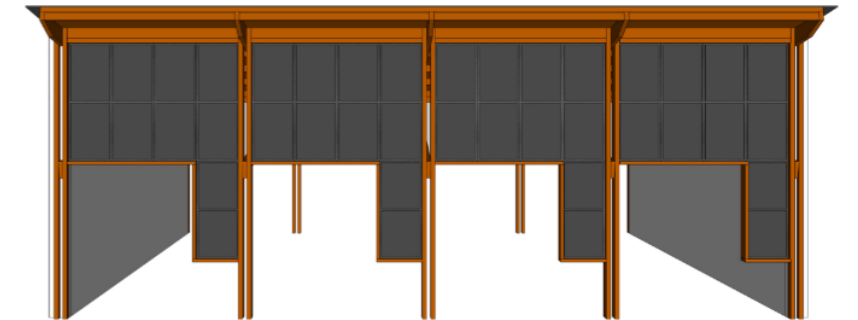
FACADE DEVELOPMENT

The design language of the façade is influenced by the roof, as the roof is the primary structure of the Skills Development Centre. The Skills Development Centre can be seen as a series of canopies and through this, a relationship between my architecture and the sky is formed. The use of sandbags creates a relationship between my architecture and the earth. Thus, it becomes important to emphasize these elements.

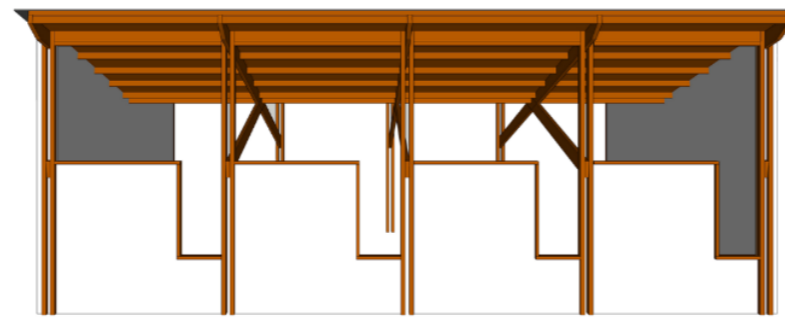
In order to emphasize the roof, clearstories are used as a way to create a clean break between the roof and the walls. Glazing extends downwards from them the clearstories as seen in the diagrams on the right. Any sandbag walls extend upwards to the clearstories. This approach was used for each façade. Thus creating an architecture that encapsulates the earth and the sky.



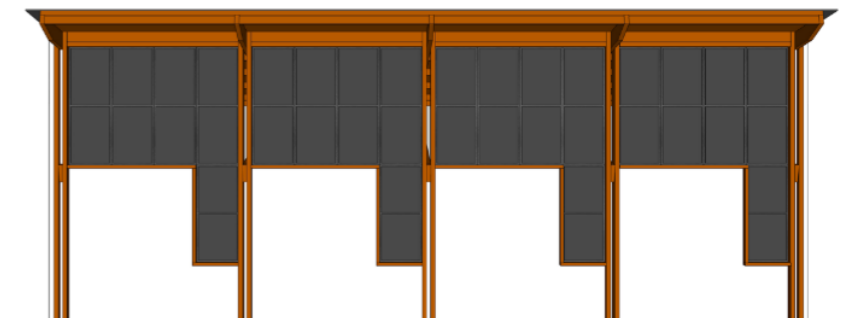
Architectural relationship between roof and sky through the construction of canopies



Maintaining the architectural relationship between roof and sky through the use of clearstory



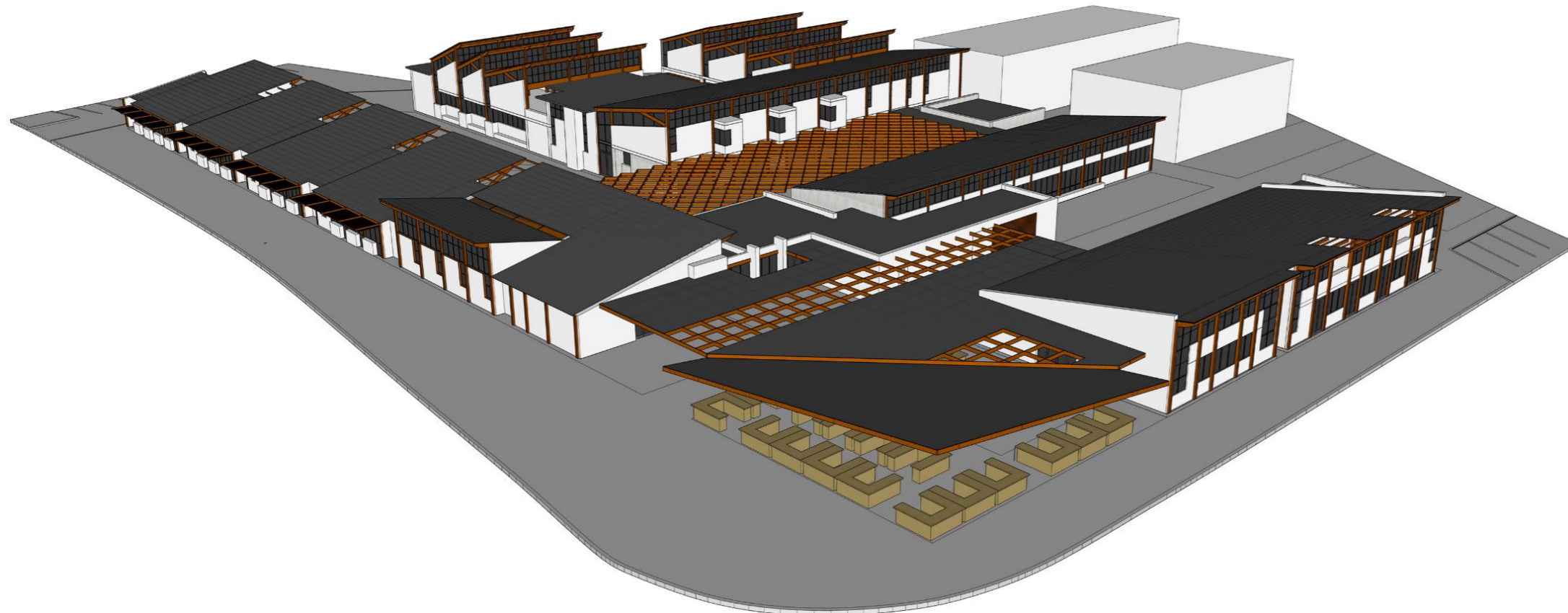
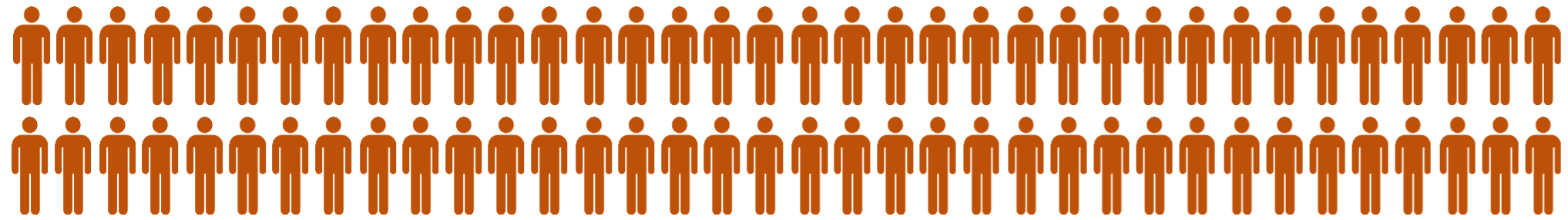
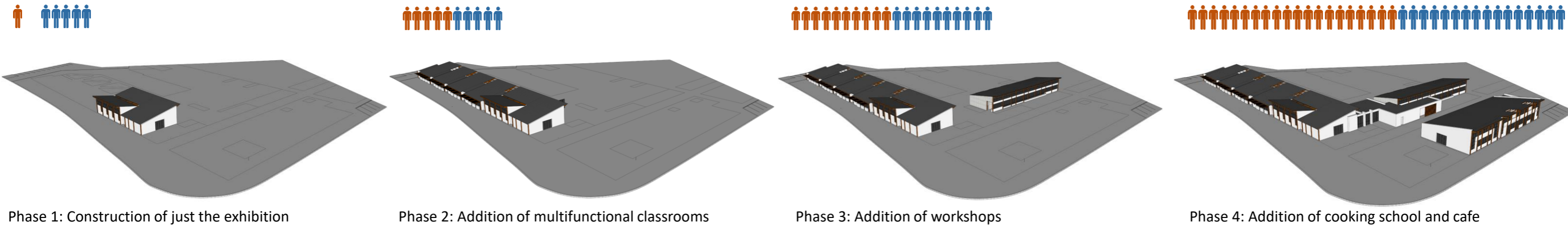
Architectural relationship between walls and earth through the use of sand



A facade that encapsulates an architecture of earth and sky

Figure 90 Facades of the various spaces within the Skills Development Centre and the language created for it (by the author, 2022)

INCREMENTAL CONSTRUCTION



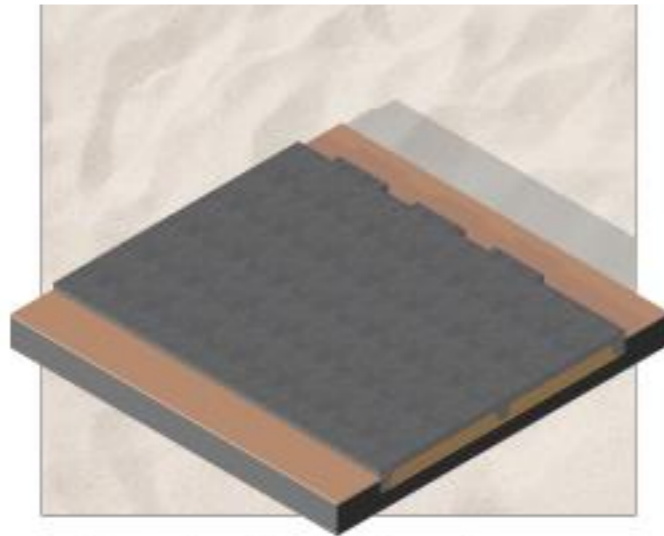
Phase 5: Completed Skills Development Centre with the knowledge of sandbag construction increased and spreading throughout Delft

Figure 91 Incremental phases of construction of the Skills Development Centre and the spread of knowledge through it (by the author, 2022)

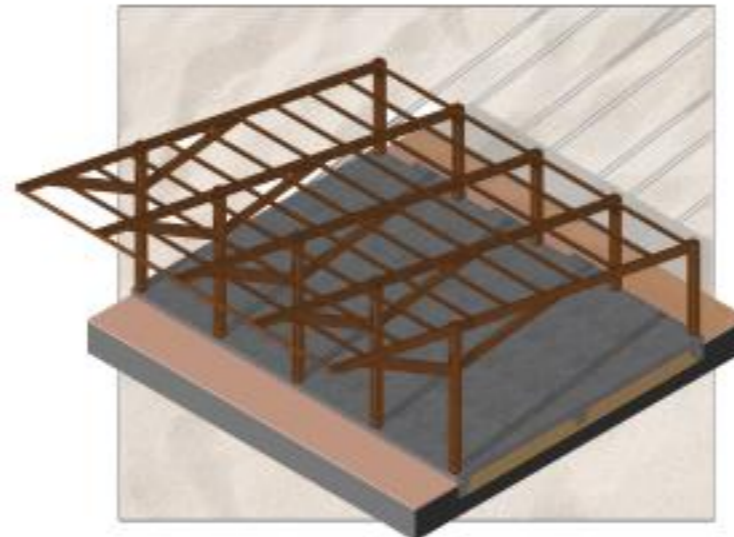
The Skills Development Centre is didactic through its construction. Instead of providing a singular space which teaches sandbag construction, it teaches it through its own construction. The spaces are designed in such a way that the Skills Development Centre can be built incrementally. The incremental construction is highlighted in the diagrams to the left.

In the diagrams, there are orange and blue people. The orange people indicated people who understand sandbag construction and the blue, people who don't. The idea is that I can arrive on-site and teach a few people in Delft how to build with sandbags. As more people learn about sandbag construction they can apply it to the Skills Development Centre and hopefully, the knowledge can spread throughout Delft. The more people who learn, the quicker the Skills Development Centre can be built. This allows for the Skills Development Centre to be a catalyst of construction within Delft.

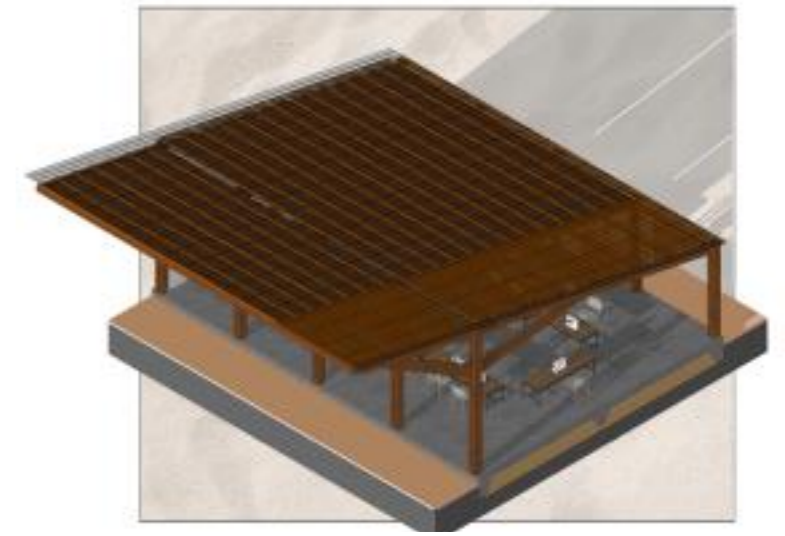
SEQUENCING OF STRUCTURES



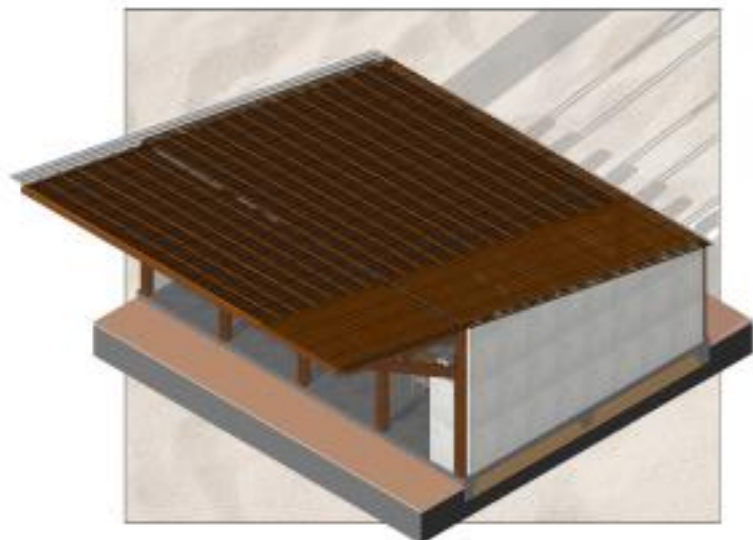
1- Concrete raft foundation cast on prepared groundwork



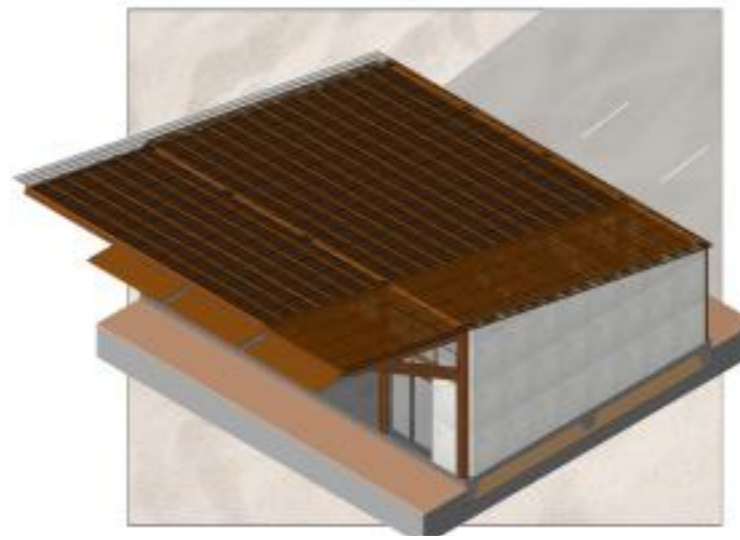
2 – Primary roof structure and rafters erected and fixed to the foundation



3 – Roof substructure, ceiling and roof sheeting fixed to the primary structure in order to create a canopy. Space underneath can be used as required.



4 – Addition of sandbags as a walling infill between the primary structure in order to create an enclosure



5 – Addition of windows and doors to completely enclose the structure



6 – Extensions and auxiliary substructures such as pergolas can be added to the primary structure if needed

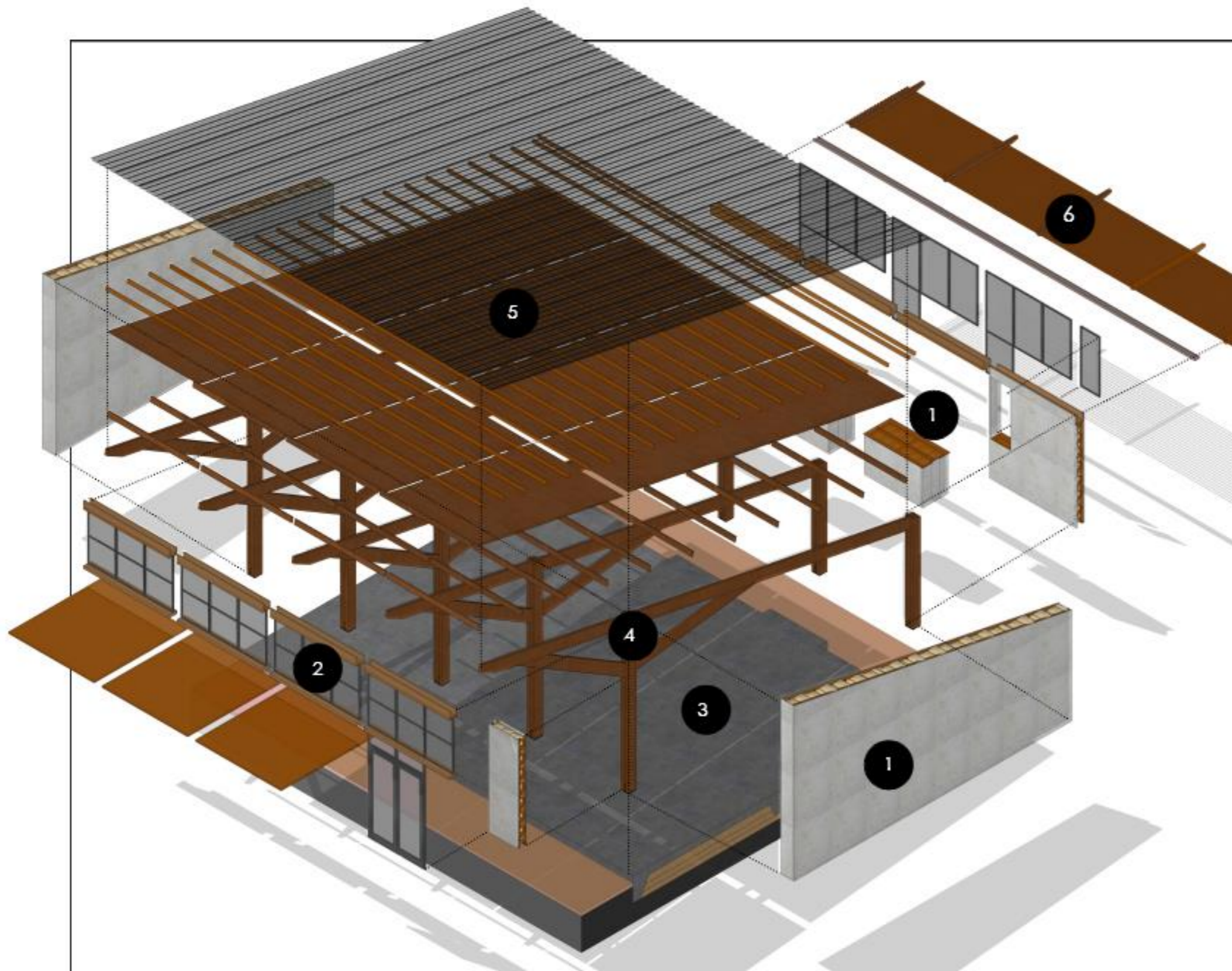
Figure 92 Diagrams showing the sequence in which the building is constructed (by the author, 2022)

The sequence in which the building is constructed is important to the concept. The construction of the Skills Development Centre begins with a roof structure. By beginning with the roof structure you allow for a covered space to be created. This covered space becomes a canopy for people to build and trade under, similar to the informal markets along the Main Road.

Sandbag walls aren't the best at carrying and transferring loads. Thus the Skills Development Centre can be defined as a series of roof canopies rather than walls.

Once spaces are required to be enclosed then a sandbag walling system can be used as infill. The infill can take place incrementally over time.

CONSTRUCTION AXO



1 – Sandbag Walls: 38x50 timber frames with bracing between vertical timber members, filled with 350mm sandbags, enclosed with chicken wire and finished with a lime-plaster

2 – Pivot timber doors and aluminium windows

3 – Concrete Raft foundation as a result of the unstable soil condition

4 - Primary sandwich timber columns, 228x76, fixed to the foundation via a steel plate. Columns supporting 300x76 laminated timber members. Columns made rigid with 114x50 timber members between them.

5 – Steel roof sheeting fixed to 76x50 timber purlins. 8mm ceiling board between columns fixed to the underside of purlins

6 – Timber Pergola constructed from 38x38 timber members fixed to a 114x50 spayed timber member

Figure 93 Exploded construction axo of a multifunctional classroom (by the author, 2022)

CONSTRUCTION SECTION

Section Through a Multifunctional Classroom

Roof:

Corrugated steel sheeting fixed to 75x50 timber purlins with 8mm ceiling board fixed on top of 114x50 timber members between primary timber structure.

Structure:

Sandwich double timber columns of 228x76 timber members fixed together with a steel C-channel and bolted into the concrete raft foundation

Foundation:

Concrete raft foundation on a damp-proof membrane on 150mm layers of well-compacted earth

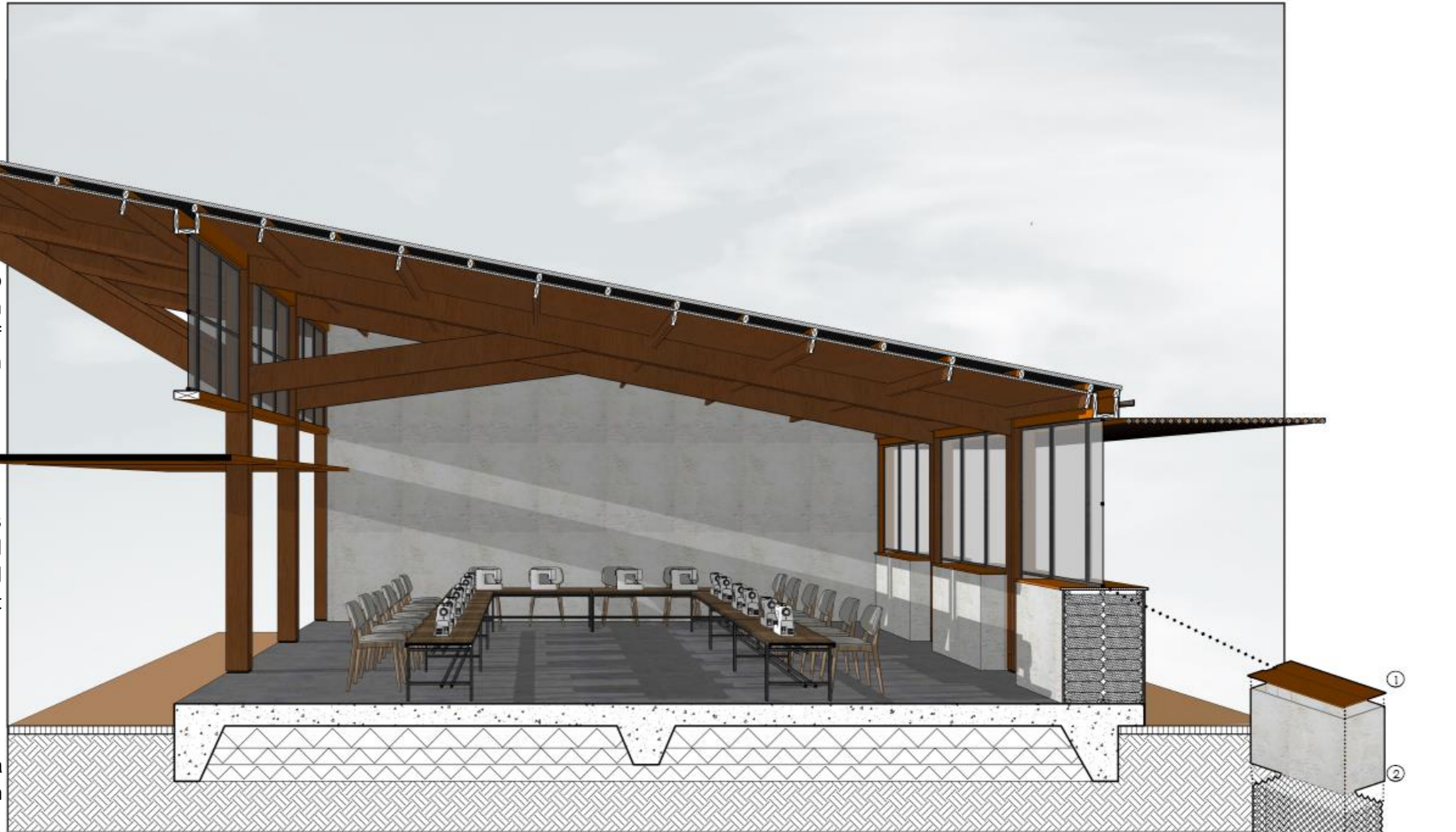


Figure 94 Detail section of a multifunctional classroom (by the author, 2022)

Sandbag Walls:

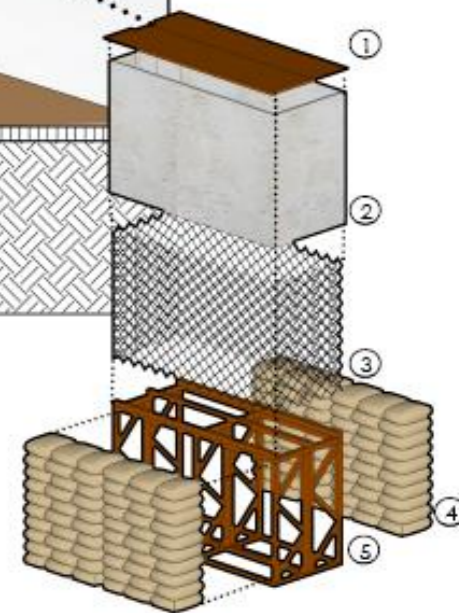
1 – Timber window sill

2 – 20mm limecrete Plaster

3 – Chicken wire cage around sandbags

4 - Sandbags

5 – 38x50 timber framework fixed to raft foundation



SECTIONAL MODEL

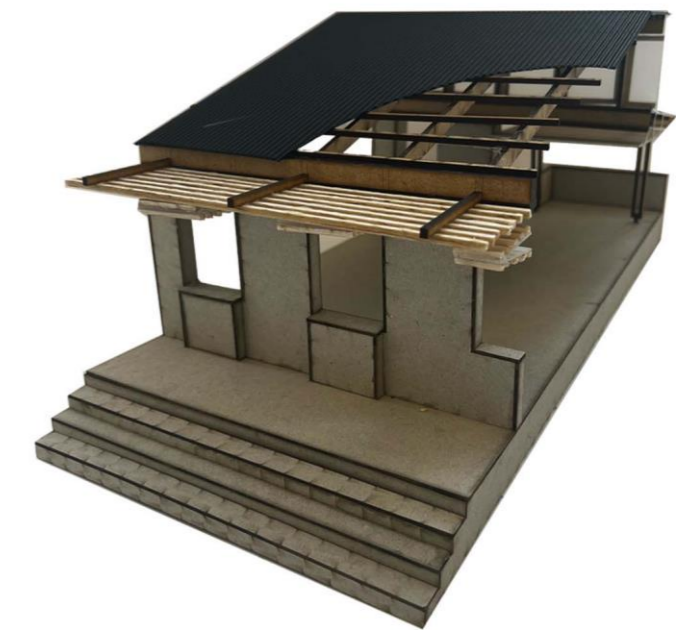
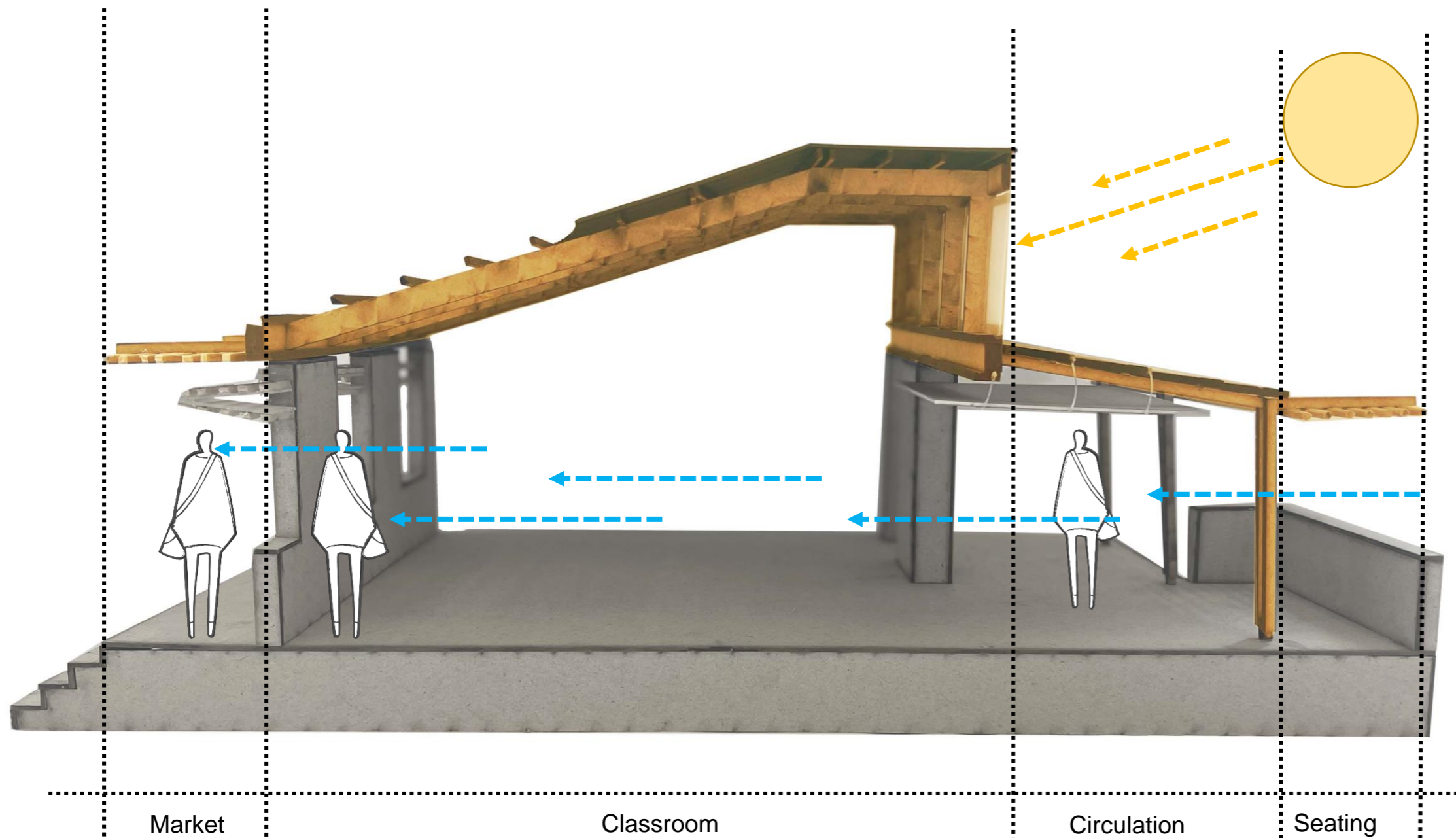


Figure 95 Models (by the author, 2022)

A sectional model was used to explore the roofscape of the classroom spaces. The classroom spaces are important because it acts as a frontage to the Main Road as well as being connected to the internal green corridor. The roofscape is a mono-pitch that slopes away from Main Road to scale down the building.

A clearstory is added to maximize the light that enters the classroom. The classroom can be completely opened. Thus, becoming one space and allowing for circulation space to be programmed. The ability for the classroom to be opened allows for the cross ventilation through the space. The classroom was designed to work

in tandem with the climatic conditions of Delft. The roofscape makes use of pergolas on the furthestmost ends with clear sheeting over the circulation space and regular roof sheeting for the classroom. This creates a gradient of transparency through the roof scape.

NEW INTERNAL STREET AND INFORMAL MARKET



Figure 96 Internal perspective of new pedestrian route and informal market (by the author, 2022)

EXHIBITION COURTYARD



Figure 97 Internal perspective of the exhibition courtyard(by the author, 2022)

GREEN CORRIDOR



Figure 98 Internal perspective of the green corridor (by the author, 2022)

CONCLUDING THOUGHTS

Delft has yet to immerse from the injustices and negative effects of the apartheid system. Delft's identity is defined by gangsterism, unemployment and poverty. However, despite their issues, they are well on their way to creating a new positive identity. This new identity can be created or at the very least assisted through architectural intervention. The people of Delft try their best to survive day-to-day by any means possible. Thus creating an identity of strength and determination. It is this determination of the community that can make a project such as a Skill Centre extremely beneficial.

The people of Delft are already resourceful and by teaching them new a new tectonic that is rooted in its context, a new identity can be forged. Through this Delft can begin to immerse from their struggle-ridden past. The introduction of sandbag construction attempts to ground the temporary identity that is found throughout Delft into an identity of permanence.

There is endless potential for economic generation and job opportunities in Delft which can be aided by the introduction of this new tectonic. Sandbag construction could be the catalytic device that springboards them out from the shadows and break the cycle of poverty within. There is a potential for this knowledge to spread through and beyond just the context of Delft.

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PRE-SCREENING QUESTIONNAIRE OUTCOME LETTER

STU-EBE-2022-PSQ000058

2022/08/18

Dear Imaad Soeker,

Your Ethics pre-screening questionnaire (PSQ) has been evaluated by your departmental ethics representative. Based on the information supplied in your PSQ, it has been determined that you do not need to make a full ethics application for the research project in question.

You may proceed with your research project titled:

(re)Constructing the way we build.
Skills Development Centre in Delft

Please note that should aspect(s) of your current project change, you should submit a new PSQ in order to determine whether the changed aspects increase the ethical risks of your project. It may be the case that project changes could require a full ethics application and review process.

Regards,

Faculty Research Ethics Committee