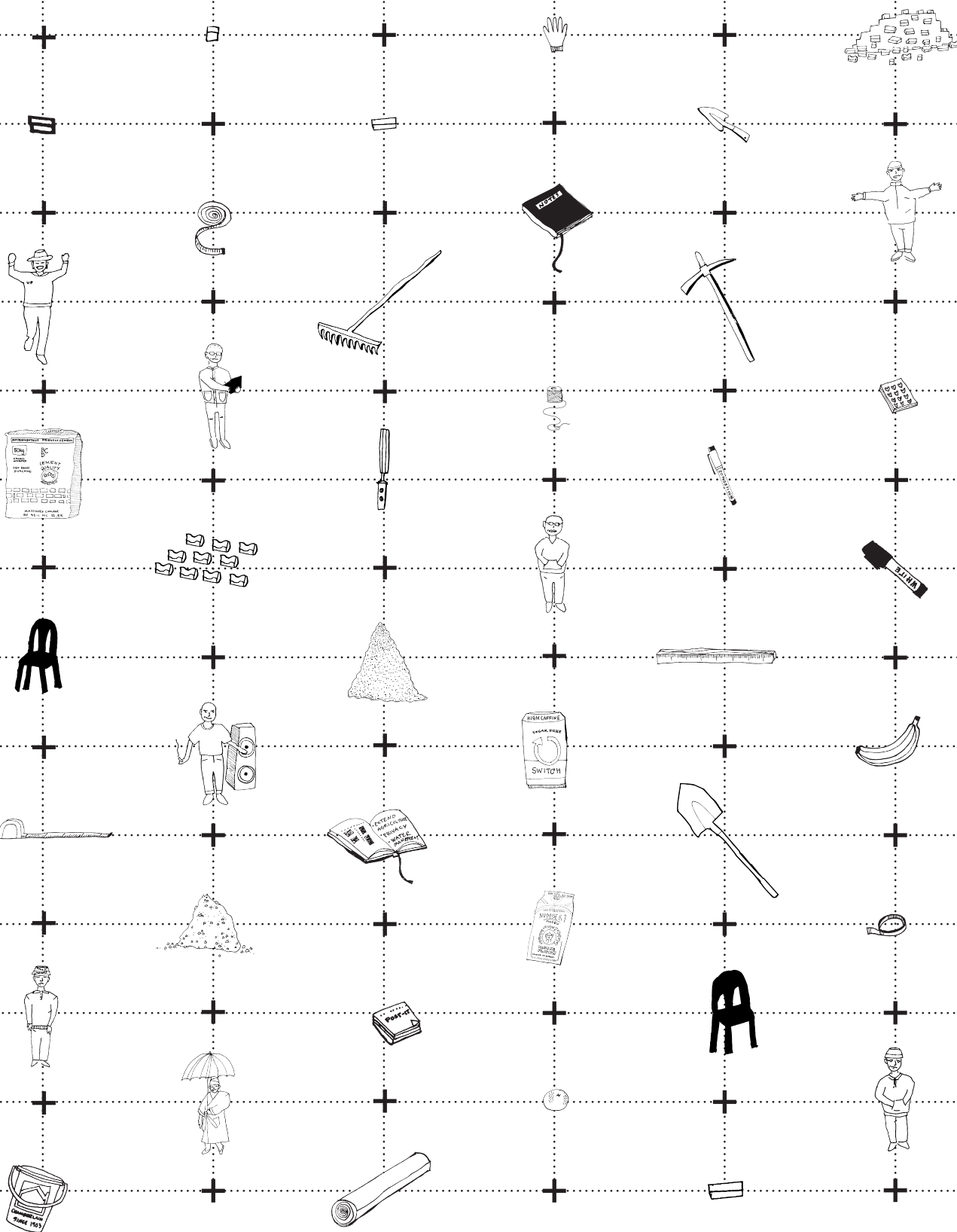
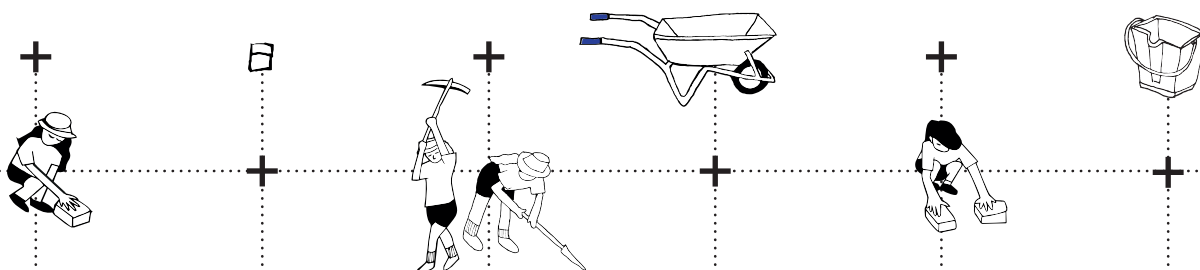




BRICK BY BRICK





Reality Studio is a course at Chalmers University of Technology where architecture and design students work on community-based projects in informal settlements in Kenya and South Africa together with local residents. The course focuses on sustainable development through social, environmental, and economic solutions.



The University of Pretoria has been working in Malusi for several years in collaboration with the local clinic and fieldworkers. Over the last years, architecture students have completed both small and large interventions on site, including the construction of a new waiting area for the clinic last year. UP has also supported our projects with construction equipment.

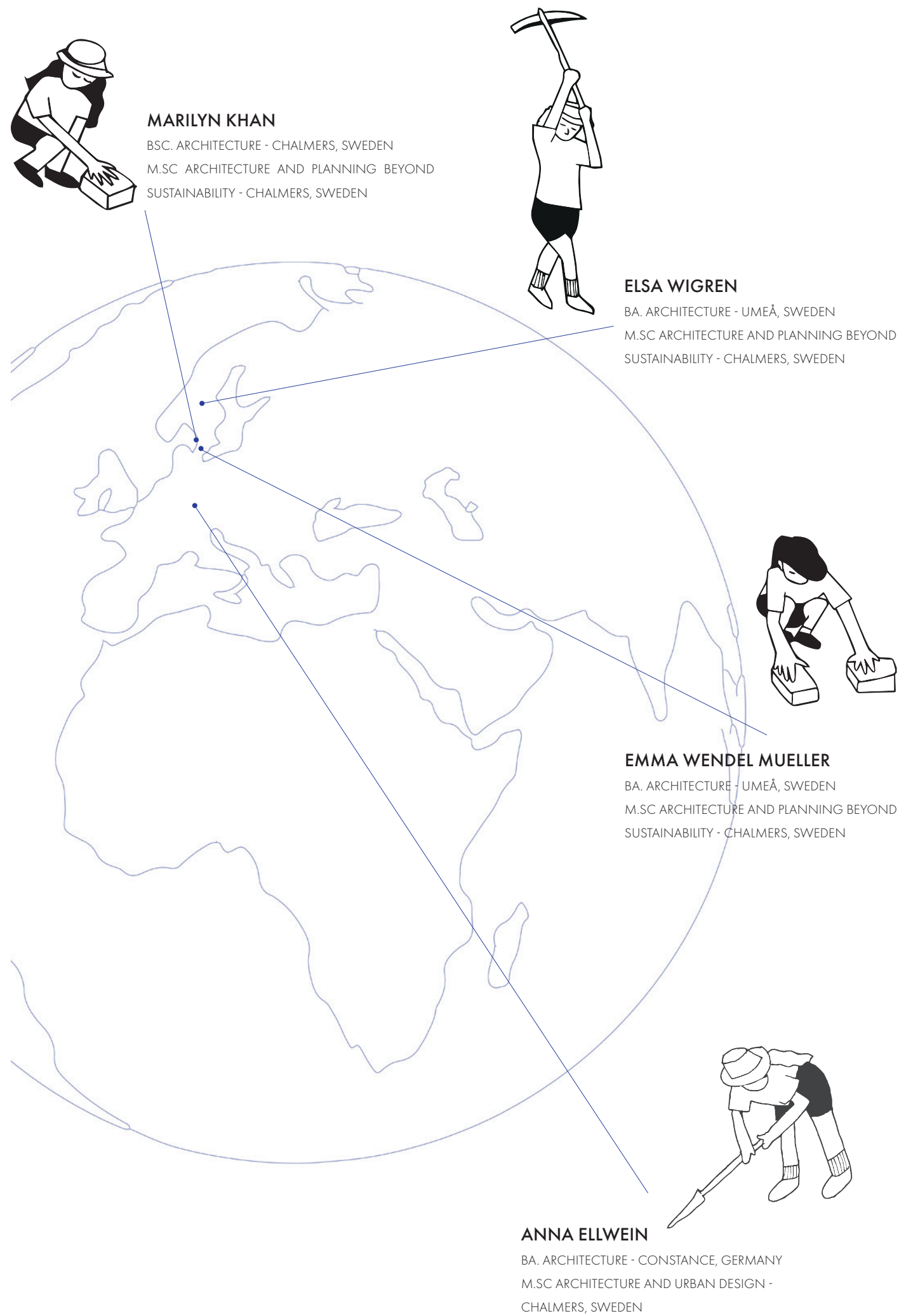
ABSTRACT

The project site is a small primary healthcare clinic located in Melusi, an informal settlement in Pretoria West, South Africa. Funded by the University of Pretoria, the clinic operates two days per week and provides general healthcare services including family planning and maternal health. Supported by fieldworkers, caretakers, and one doctor, the clinic serves approximately 25–35 patients per day and plays an important role in the local community. For many residents, alternative healthcare facilities are located too far away and require transportation costs, making the clinic an essential and accessible healthcare resource.

During the rainy season, large parts of the clinic grounds become muddy and difficult to navigate, limiting access for both patients and staff. In response, a small-scale paving prototype was developed through a process of co-design and co-building with local stakeholders. Workshops, site

observations, and continuous discussions with clinic users informed the design and helped identify priority areas for improvement. Following a frugal design approach, the intervention was constructed using low-cost, locally available, and reused paving materials to improve accessibility, safety, and functionality.

Rather than being a finished solution, the paving intervention is intended as a prototype and a starting point for future development. Designed to be easily extended and adapted, it aims to support long-term community ownership and inspire further improvements to the clinic environment. The project demonstrates how small, collaborative interventions can create meaningful local impact while contributing to broader discussions on health, sustainability, and community-led development.



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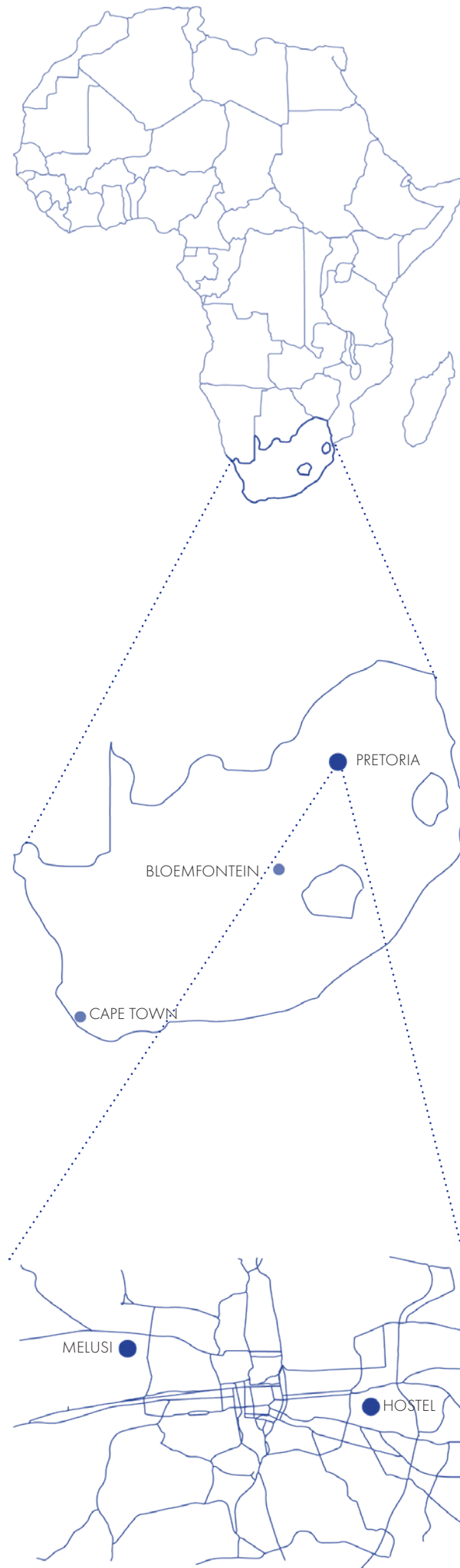
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APPENDIX



BACKGROUND

AFRICA

Africa is the world's second-largest continent and, as of 2026, is home to more than 1.58 billion people across 54 recognized sovereign states. The continent is commonly divided into five subregions: Northern, Western, Central, Eastern, and Southern Africa. Within this context, South Africa occupies a unique position due to its complex history, multicultural society,

and linguistic diversity. Located at the southernmost tip of the continent, the country has a population of approximately 62 million people and recognizes twelve official languages. Although several indigenous languages are widely spoken, English remains dominant in government, education, business, and media (Statistics South Africa, 2024).

SOUTH AFRICA

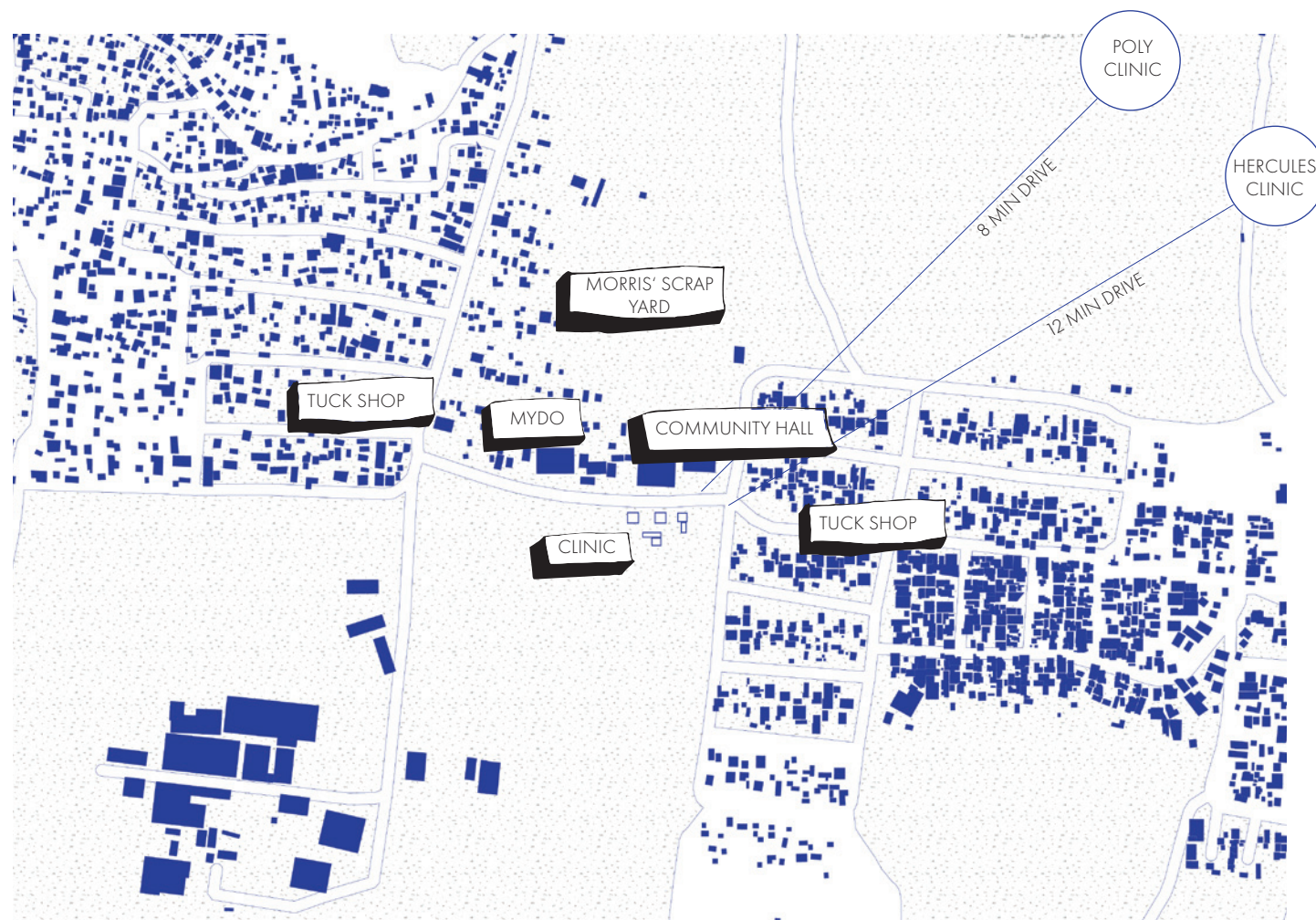
South Africa's contemporary social and economic landscape is deeply shaped by its colonial and apartheid history. European colonization began in the seventeenth century, initiating centuries of political conflict, displacement, and inequality. These injustices were institutionalized through apartheid, a system of racial segregation formally introduced in 1948 that enforced widespread discrimination and

oppression. The country entered a new democratic era in 1994 with the election of Nelson Mandela in the first fully democratic national election. Despite significant political progress since the end of apartheid, the lasting effects of inequality remain evident today, particularly through high unemployment, poverty, and unequal access to healthcare and infrastructure (Statistics South Africa, 2024).

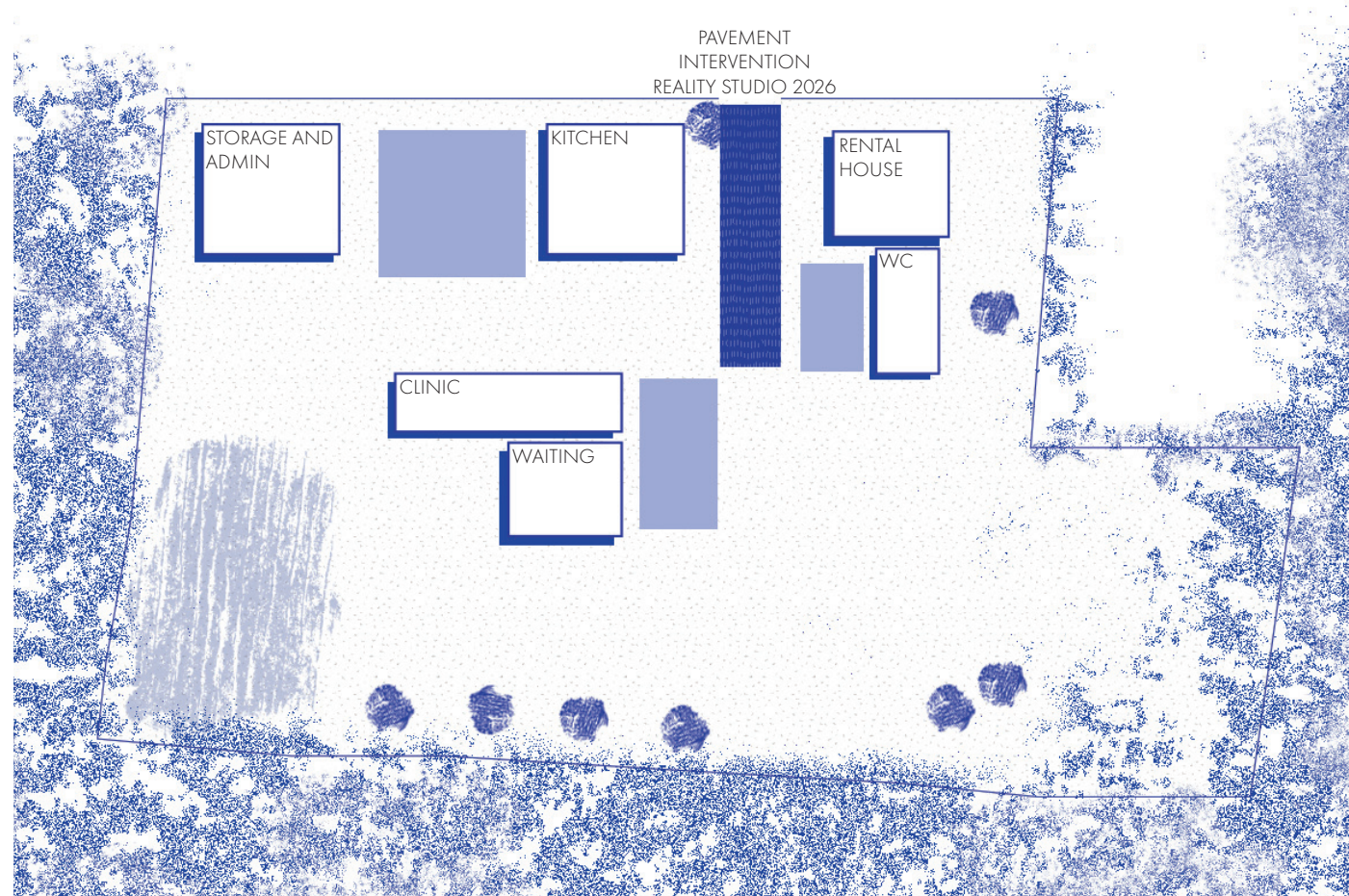
PRETORIA

South Africa has three capital cities: Pretoria, Cape Town, and Bloemfontein, reflecting the country's distributed governmental structure. Located within the City of Tshwane Metropolitan Municipality in Gauteng Province, Pretoria serves as the administrative and diplomatic heart of South Africa and has a population of approximately 3 million people in the greater metropolitan area (Statistics South Africa, n.d.).

The city hosts national government institutions as well as a large number of foreign embassies and high commissions. Pretoria is also an important academic centre and is home to the University of Pretoria (UP), one of Africa's leading research-intensive universities and the largest contact university in South Africa, with a total student enrolment of approximately 56,400 students (University of Pretoria, 2023).



SITE PLAN MELUSI



SITE PLAN CLINIC

INFORMAL SETTLEMENTS

Informal settlements are residential areas that develop outside formal planning and legal frameworks. They are commonly characterized by insecure land tenure, inadequate infrastructure, overcrowding, hazardous environmental conditions, and limited access to basic services. Such settlements often emerge as a consequence of rapid urbanization and a shortage of affordable housing (UN-Habitat, 2018). In South Africa, urban growth has consistently outpaced housing provision, contributing to the expansion of informal settlements throughout metropolitan areas (South African Cities Network, 2011). According to Statistics South

MELUSI

The project takes place in the informal settlement of Melusi, located in Pretoria West. In everyday language, the area is referred to as “Gamorrah,” learned through conversations with local residents. Melusi emerged around 2008 and has grown steadily as a result of migration, urbanization, and the continuing shortage of affordable housing opportunities in the region (Franciscus, 2024). Today, the settlement is estimated to consist of approximately 55,000 inhabitants and around 15,000 households, with a population density of roughly 10,000 people per square kilometre. Melusi is situated approximately 30 minutes from Pretoria’s city centre and is located near industrial areas that provide employment opportunities for residents.

CLINIC

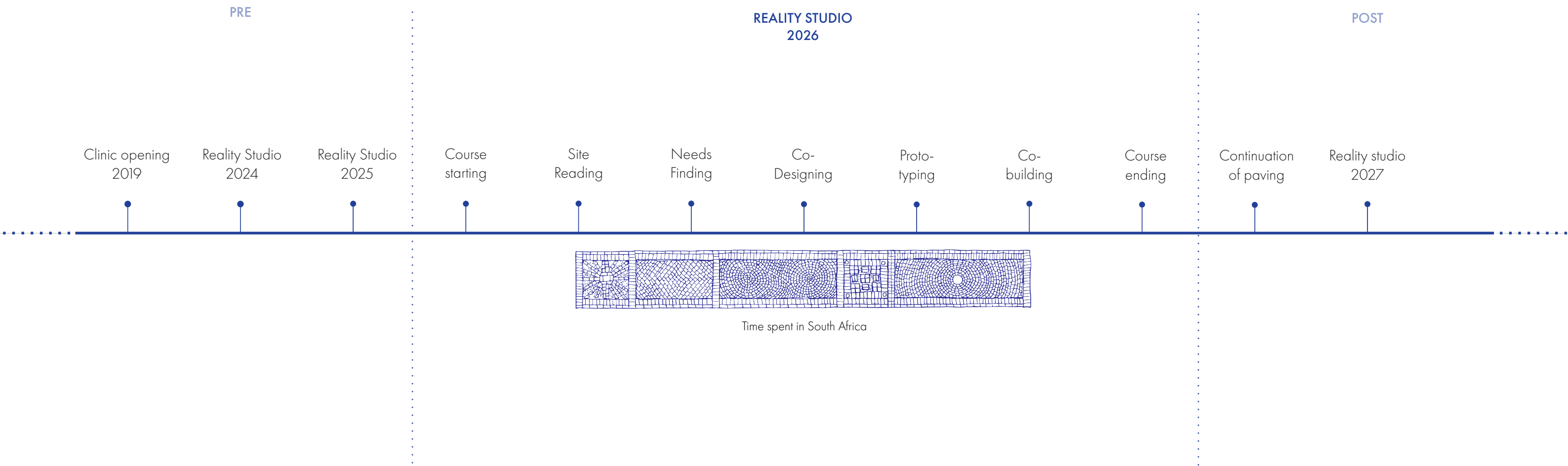
The project site is located within Melusi within the area that has formal access to water but limited access to electricity. The site hosts a healthcare clinic owned and operated by the University of Pretoria provides primary healthcare services to the local community. The clinic forms part of the University of Pretoria’s Community Oriented Primary Care (COPC) initiative, which combines healthcare provision with research, education, nutrition programmes, and community development activities within informal settlements (University of Pretoria, 2021 a). The clinic is part of the broader Melusi Development Programme, which seeks to improve health outcomes and strengthen community resilience through collaborative partnerships between researchers, healthcare professionals, students, and local residents (University of Pretoria, 2021 a, 2023).

Africa (2023), approximately 13% of South African households live in informal settlements. Working within informal settlements requires approaches that recognize local knowledge, existing social networks, and the lived experiences of residents. Architecture Sans Frontières International emphasizes that projects in vulnerable contexts should be developed through participatory processes that promote equity, inclusion, and long-term community empowerment rather than relying solely on externally imposed solutions (Architecture Sans Frontières International, 2022).

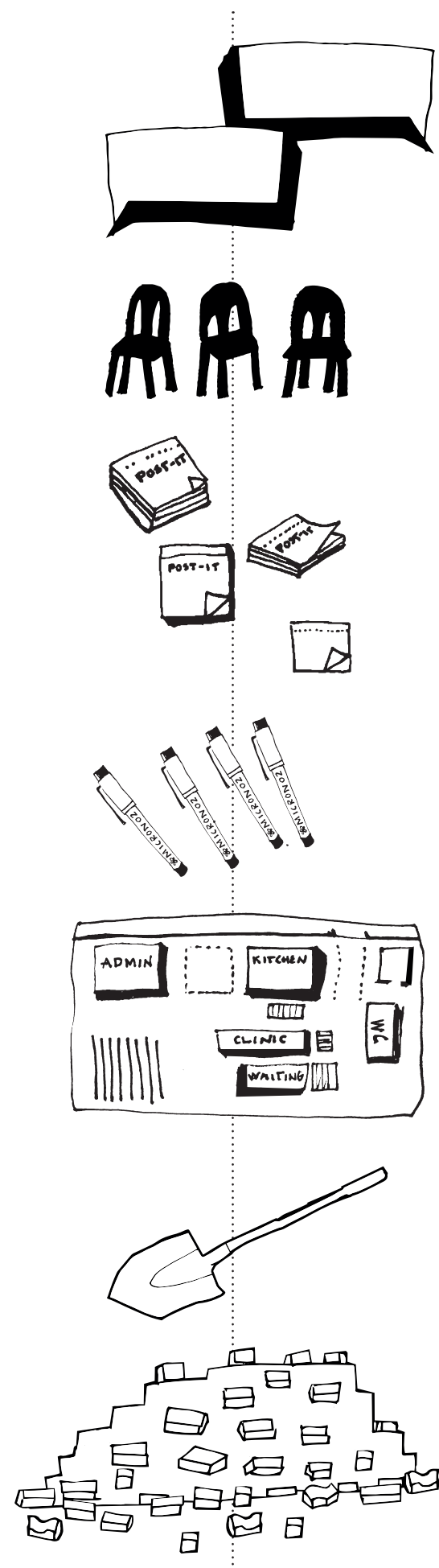
The settlement consists of areas with varying levels of infrastructural provision. One part has formal access to water and informal access to electricity. A second area has formal access to both water and electricity services. The third, and also largest, area has limited access to water and no formal electricity infrastructure. Research conducted in Melusi has identified significant challenges related to public health, environmental risks, and infrastructure provision, while also highlighting strong community resilience and local support networks (Sempe, 2023; Sempe et al., 2025).

This clinic operates two days per week, serving 25–35 patients per day with the support of fieldworkers, caretakers, and one doctor. It is located within a fenced 2,000 m² site containing five main structures: two shipping container converted into one health clinic room, and one as a toilet facility, two prefabricated barrack-buildings, one used for administration and the other as a kitchen, and a small wooden house serving as rental accommodation. Next to the clinic container is a waiting pavilion designed and built by architecture students from the University of Pretoria in 2025. On the site there is also three shading roof structures, concrete seating groups, two water storage tanks, and a small garden.

TIMELINE OVERVIEW



METHODOLOGY



RELATION-BUILDING

Throughout the project, relationships were built with people in Melusi, including patients, stakeholders, and residents. These conversations provided important insights into the local context and helped build trust and a sense of shared ownership for the pavement intervention.

WORKSHOPS

Different workshops were conducted to ensure that the project was shaped together with the community. Through the participation of Sarah, the patients and local residents, needs were identified and a broader understanding of local challenges and knowledge was developed.

CO-DESIGNING

The collaborative framework of co-designing was crucial in enabling the project to be developed together with stakeholders and end users. This approach supported collective decision-making and ensured that the design responded to local needs and perspectives.

CO-BUILDING

The co-building method made it possible to construct and develop the project together with the community. This approach enabled knowledge sharing and supported the potential for future development and continued local engagement in the project.

OBSERVATIONS

The observation involved mapping and analyzing the site both during clinic operating hours and when the clinic was closed. This included identifying movement flows and how they changed in response to weather conditions. These observations influenced the direction of the project. We also analysed at site characteristics (Appendix fig. 1).

FRUGAL DESIGN

Frugal design aims to achieve more with fewer resources. It was key to extending the project's lifespan and encouraging the local community to adopt and continue the approach independently. All materials were sourced within a 200-meter radius of the clinic, and only 500 ZAR was spent in total, showing that design does not need to be expensive to be sustainable, efficient, and impactful.

PROTOTYPING

By continuously testing, experimenting, and evaluating together with stakeholders, the understanding of the project evolved throughout the process. This enabled the final prototype to function well and be specifically adapted to the spatial and material conditions of the site.

PROJECT AIM

The aim of the project was to improve access to and everyday use of a healthcare clinic in Melusi through a small, co-designed intervention. An initial NAIL matrix (Appendix fig. 2), developed prior to the field trip, was used to frame project objectives and early assumptions. The need for paving was identified by Sarah during our first workshop. This need has been highlighted by previous Reality studio students working in Melusi, as an important future development for the site. Working closely with the local community, the project sought to create a practical paving solution that responds to challenges such as accessibility and safety caused by heavy rainfall. Central to the process was fostering community participation

and a sense of ownership. Rather than delivering a finished product, the project focused on creating a prototype that can be adapted, extended, and continued by local stakeholders over time. In this way, the intervention demonstrates how small-scale architectural actions can improve accessibility, safety, and comfort while creating opportunities for future growth and development.



UNSDG

At the beginning of the project, the Sustainable Development Goals (SDGs) were introduced as a framework to understand architecture in a wider global context, especially how small-scale interventions can relate to bigger global challenges. The UNSDGs aim to address issues such as poverty, inequality, health, and sustainability (United Nations, n.d.)

During the process, we did not use them as strict rules, but more as a background for reflection. Since they have been present throughout our studies, they also influenced our thinking in the background. The project showed that even a small local

intervention can be connected to larger global questions and contribute to long-term sustainable development.

The project Brick by Brick can be connected to many of the SDGs, creating an indirect positive impact through its outcomes and approach. The main focus, however, lies on four goals: Good Health and Well-being (UNSDG 3), Clean Water and Sanitation (UNSDG 6), Sustainable Cities and Communities (UNSDG 11), and Responsible Consumption and Production (UNSDG 12).



"Ensure healthy lives and promote well-being for all at all ages"
Improving the facility of the health clinic, so that the clinic can provide health care to more people in Melusi.



"Make cities and human settlements inclusive, safe, resilient and sustainable"
The intervention supports inclusive and resilient community spaces through small-scale infrastructure improvements in the form of prototyping.

"Ensure availability and sustainable management of water and sanitation for all"
Improving the pipe system can enhance water management on site. Better paving and drainage improve access to sanitary facilities and reduce muddy conditions around the clinic.

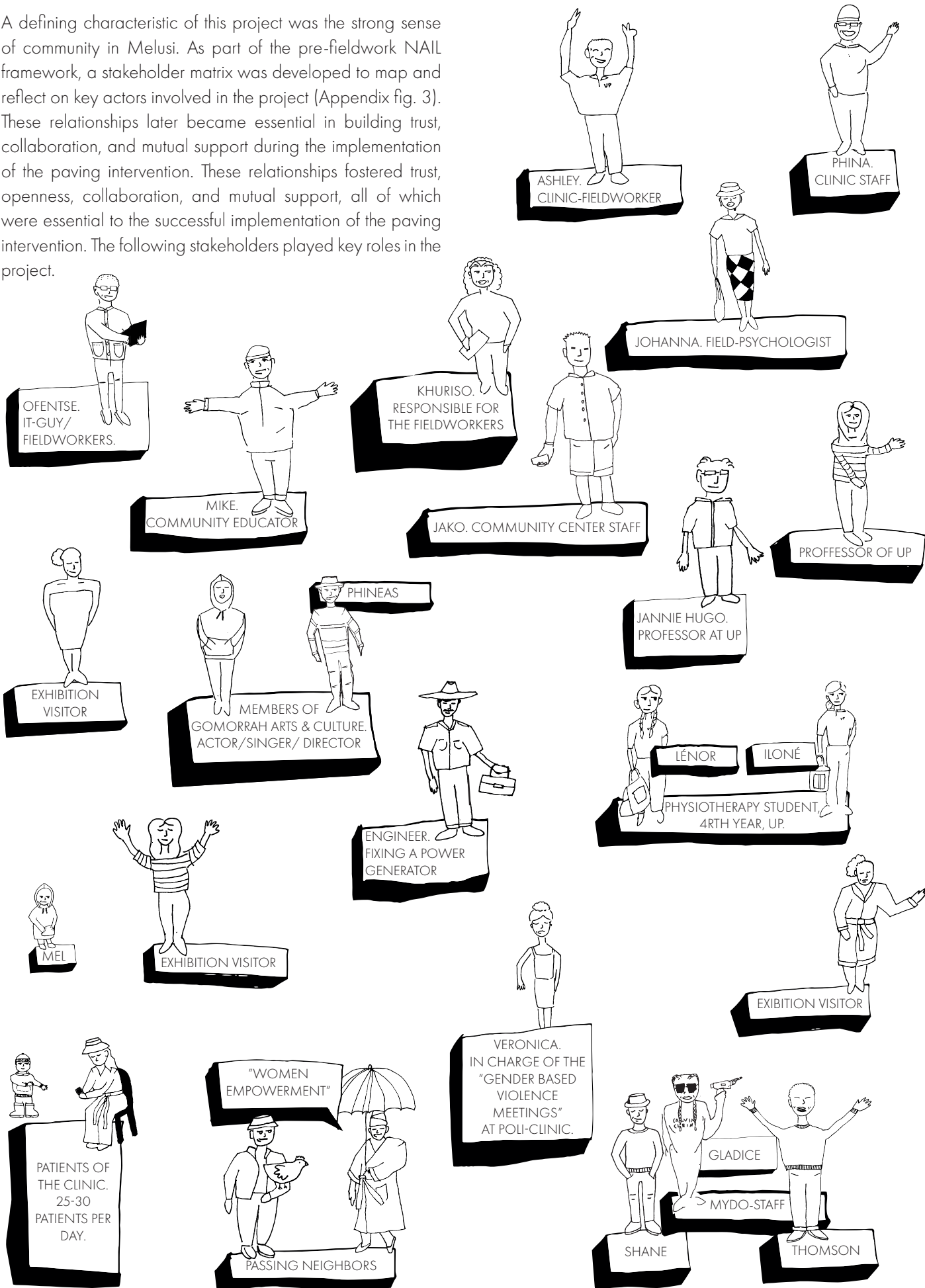


"Ensure sustainable consumption and production patterns"
The project supports sustainable construction by reusing local and recycled materials, such as bricks and scrapyard materials, to create low-cost and low-waste solutions.

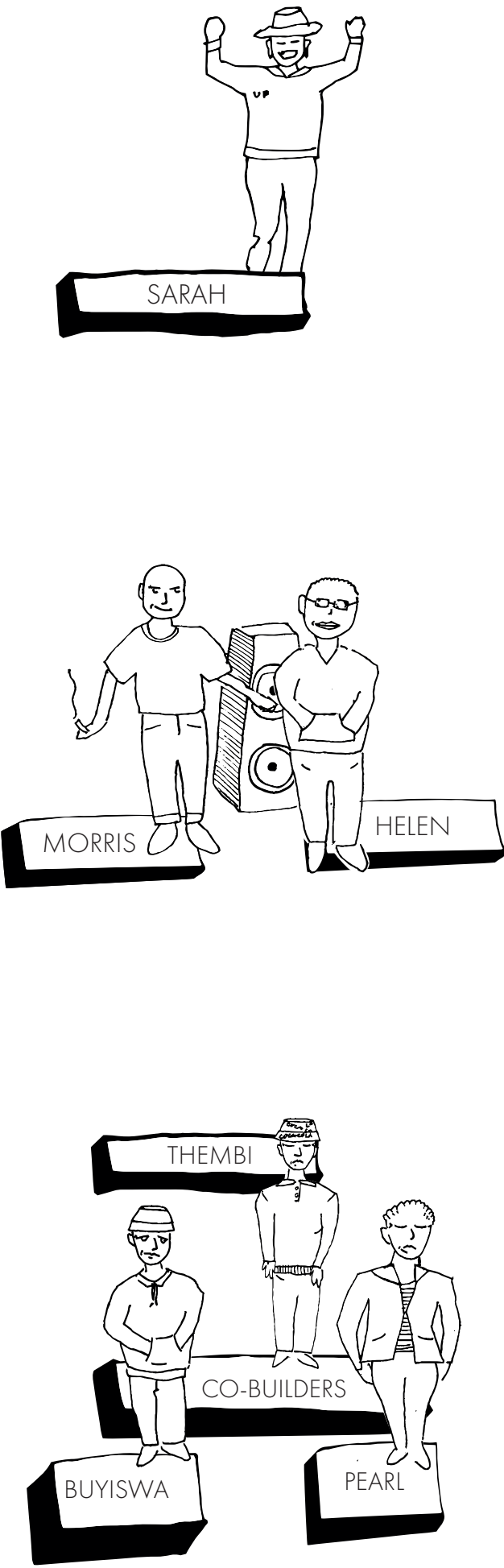


PEOPLE OF MELUSI

A defining characteristic of this project was the strong sense of community in Melusi. As part of the pre-fieldwork NAIL framework, a stakeholder matrix was developed to map and reflect on key actors involved in the project (Appendix fig. 3). These relationships later became essential in building trust, collaboration, and mutual support during the implementation of the paving intervention. These relationships fostered trust, openness, collaboration, and mutual support, all of which were essential to the successful implementation of the paving intervention. The following stakeholders played key roles in the project.



STAKEHOLDER OVERVIEW



SARAH - PRIMARY STAKEHOLDER

Sarah was the project’s main stakeholder and initiator. She manages both healthcare activities and the clinic’s facilities and agricultural land. Her daily presence, local knowledge, and community network were essential in supporting the project and connecting the team with key stakeholders.

MORRIS AND HELEN – LOCAL MATERIAL SUPPLIERS

Morris and Helen live close to the clinic and run an informal scrapyard. Introduced through Sarah, they became important contributors to the project by supplying locally sourced materials that supported the project’s frugal design approach.

PEARL, THEMBI AND BUYIZWA - CO-BUILDERS

Several local community members joined the paving process to learn and assist. All participants were women, challenging local gender norms where construction work is typically male-dominated. The project emphasized participation, learning, and confidence-building through hands-on involvement.

MIKE - COMMUNITY EDUCATOR

Mike is a volunteer community educator who leads daily health awareness sessions at the clinic, focusing on HIV/AIDS and teenage pregnancy. He also provided valuable insights into local social challenges, especially the stigma that discourages many men from seeking healthcare services, as rumours and social assumptions often influence their willingness to attend the clinic.

CLINIC STAFF AND FIELD WORKERS

Clinic staff and field workers regularly use the site and contribute to healthcare delivery within the community. Their experiences and knowledge provided valuable insight into daily operations and user needs, informing the design and implementation of the intervention.

PATIENTS

As the primary users of the facility they are directly affected by the intervention and contributed valuable local knowledge and feedback.

RESIDENTS

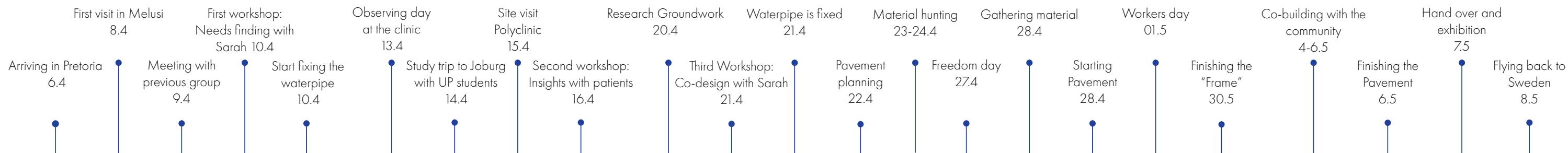
As the clinic is the only healthcare facility within the settlement, the wider Melusi community is directly affected by any improvements made to the site. Residents contributed valuable feedback and local knowledge throughout the project.

UNIVERSITY OF PRETORIA

The University supported the project through research, funding, equipment, and institutional resources. Its long-term partnership with the clinic facilitated implementation and supported ongoing community development.

PROJECT TIMELINE

This timeline shows our five weeks on site. Before initiating the project, we made a schedule with different focus areas for each week (Appendix fig. 4). While it was important to stay flexible and adaptive, these weekly themes helped us maintain an overview of the project (Appendix fig. 5).



WEEK 1: SITE READING

During the first week, we focused on getting to know Melusi, the clinic, and Sarah, our main stakeholder. We also began repairing the broken water pipe at the clinic.



WEEK 2: NEEDS FINDING

During the second week, we continued identifying needs at the clinic through workshops with Sarah and the patients. Through site visits, we also learned more about the local context.



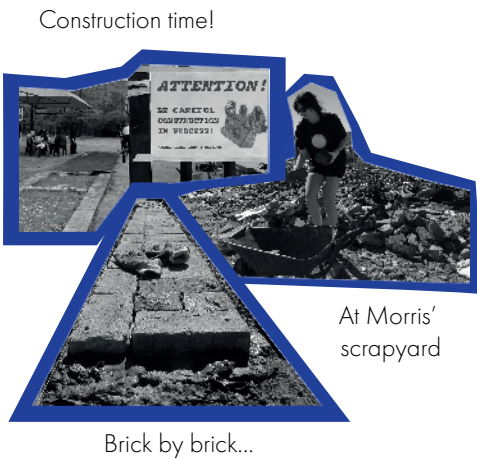
WEEK 3: CO-DESIGING

Based on the identified needs, we decided to focus on paving. Together with Sarah, we began developing the design while learning about paving construction and sourcing materials



WEEK 4: PROTOTYPING

During the fourth week, we started prototyping, learning throughout the process. At the same time, we went back and forth to Morris' scrapyards, gathering materials.



WEEK 5: CO-BUILDING

In the fifth week, we completed the paving with help from Sarah and her friends. We celebrated the final project by having an exhibition, inviting the community and everyone who helped make it possible.



1. WORKSHOP: WALK AND TALK

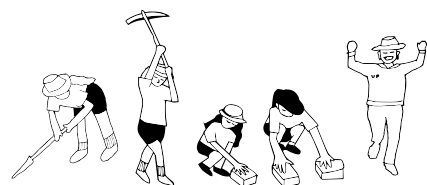
AIM

Understand the clinic site and identify needs with Sarah.

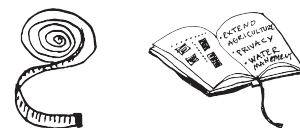
Sarah guided us around the clinic site and explained how the clinic works and what changes she would like to see. She strongly highlighted the need for paving, since the ground becomes very muddy during heavy rain and sometimes makes it difficult or impossible to keep the clinic open. Sarah also shared her plans to expand the garden area and grow more sweet potatoes at the back of the site.

PARTICIPANTS

Sarah, Anna, Elsa, Emma, Marilyn



MATERIAL



KEY TAKEAWAYS

- Paving is one of the most urgent needs at the clinic.
- Mud and flooding affect access to the clinic during rain.
- The garden is important for the clinic and may expand in the future.



2.WORKSHOP: INSIGHTS WITH PATIENTS

AIM

Understand the patients’ backgrounds and how the clinic space is used.

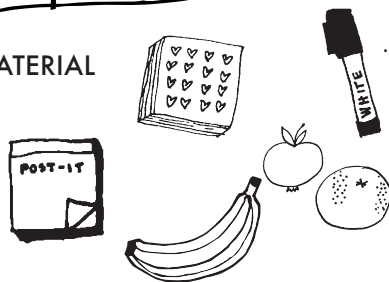
The aim of this workshop was to learn more about the patients and understand how people use the clinic space. Questions regarding comfort, weather and their relation to the clinic, were written on large papers, and participants answered by placing stickers on scales depending on their opinions and experiences. (Appendix fig. 6) We also mapped movement patterns to see how the clinic functions during an open day.

PARTICIPANTS

Anna, Elsa, Emma, Marilyn and 23 patients (22 women + 1 man)



MATERIAL



KEY TAKEAWAYS

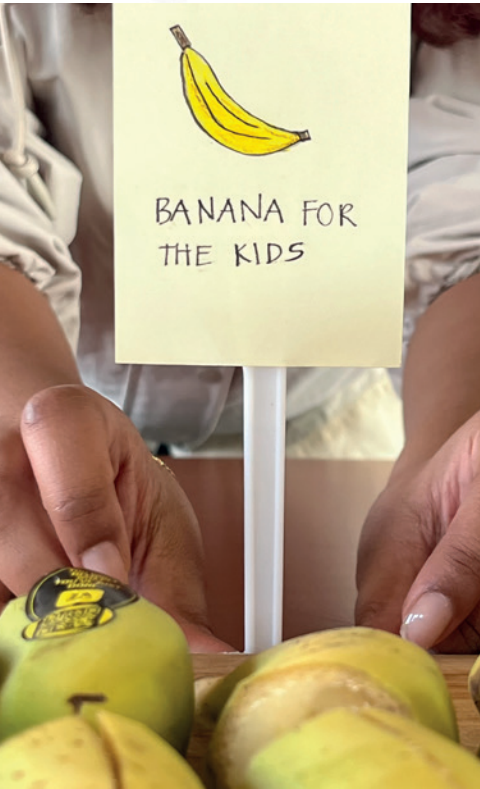
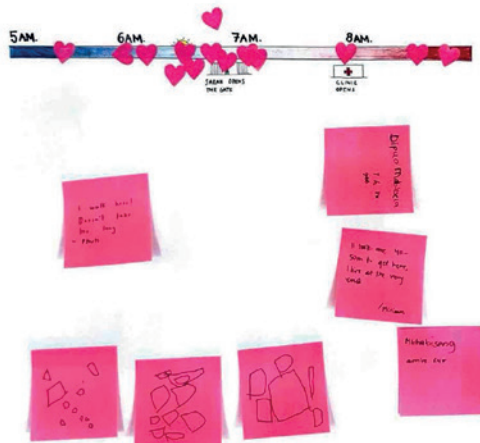
- Many patients have a long way to come to the clinic, often more than 30 min.
- Rain affects accessibility to the clinic, many patients choose not to come when it rains because of muddy conditions and uncertainty if the clinic will open.
- Waiting times can feel long and uncomfortable for some patients, especially when waiting outside.



HOW LONG DID IT TAKE FOR YOU TO GET TO THE CLINIC TODAY?



WHEN DID YOU ARRIVE AT THE CLINIC THIS MORNING?



3. WORKSHOP: PAVING CO-DESIGNING

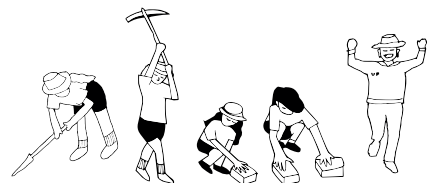
AIM

Co-design and identify paving priorities with Sarah.

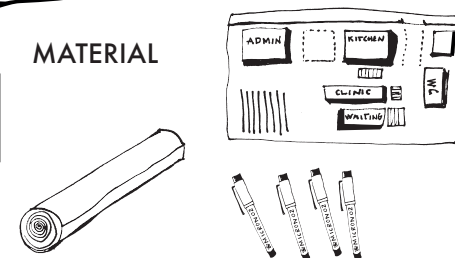
We prepared an interactive map of the clinic site showing all buildings and potential paving areas. Together with Sarah, we used coloured sticky notes to identify paving priorities. Key areas included the space in front of the clinic container, the path to the bathrooms, and the administration building.

PARTICIPANTS

Sarah, Anna, Elsa, Emma, Marilyn



MATERIAL



KEY TAKEAWAYS

- The main priority is paving the two entrance paths from the street to the clinic to improve safe access for patients and cars during rainy weather.
- Flexible and locally available materials, such as red bricks and paving stones, were preferred for the intervention.
- Connecting the different clinic buildings with paving would improve movement and accessibility across the site.



4. WORKSHOP: DESIGN BRAINSTORM

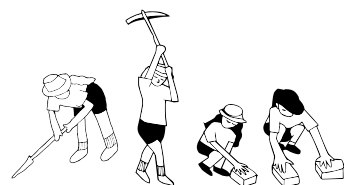
AIM

Design brainstorm session based on site readings and workshops.

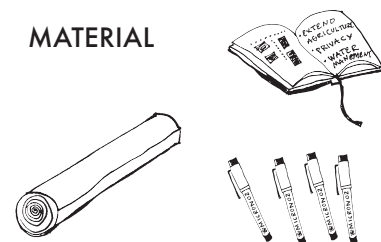
While sketching and testing out ideas happened continuously throughout the project. We had one dedicated day to brainstorm design iterations. A site plan and 3d model of the clinic space was made, and an approximate estimation of needed material was conducted. Based on our reading of the site and movement flows, together with workshop takeaways, we started to sketch of potential paving design.

PARTICIPANTS

Anna, Elsa, Emma, Marilyn

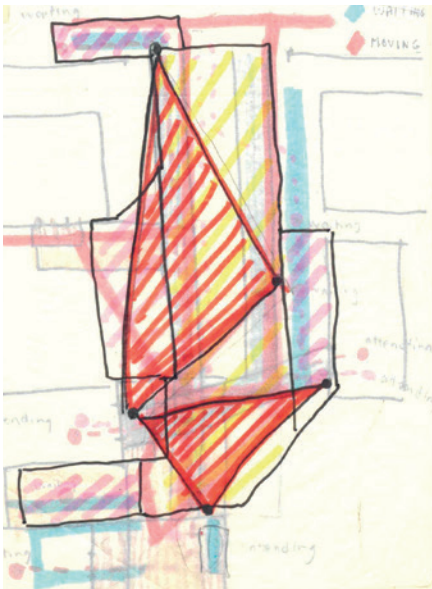
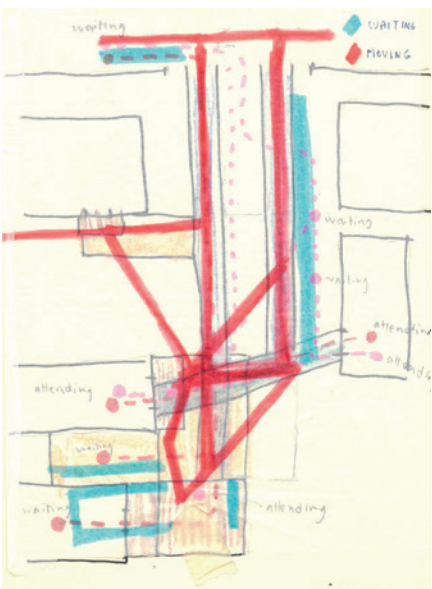
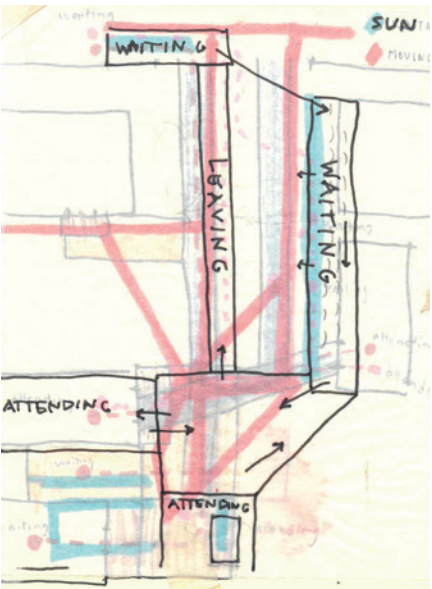
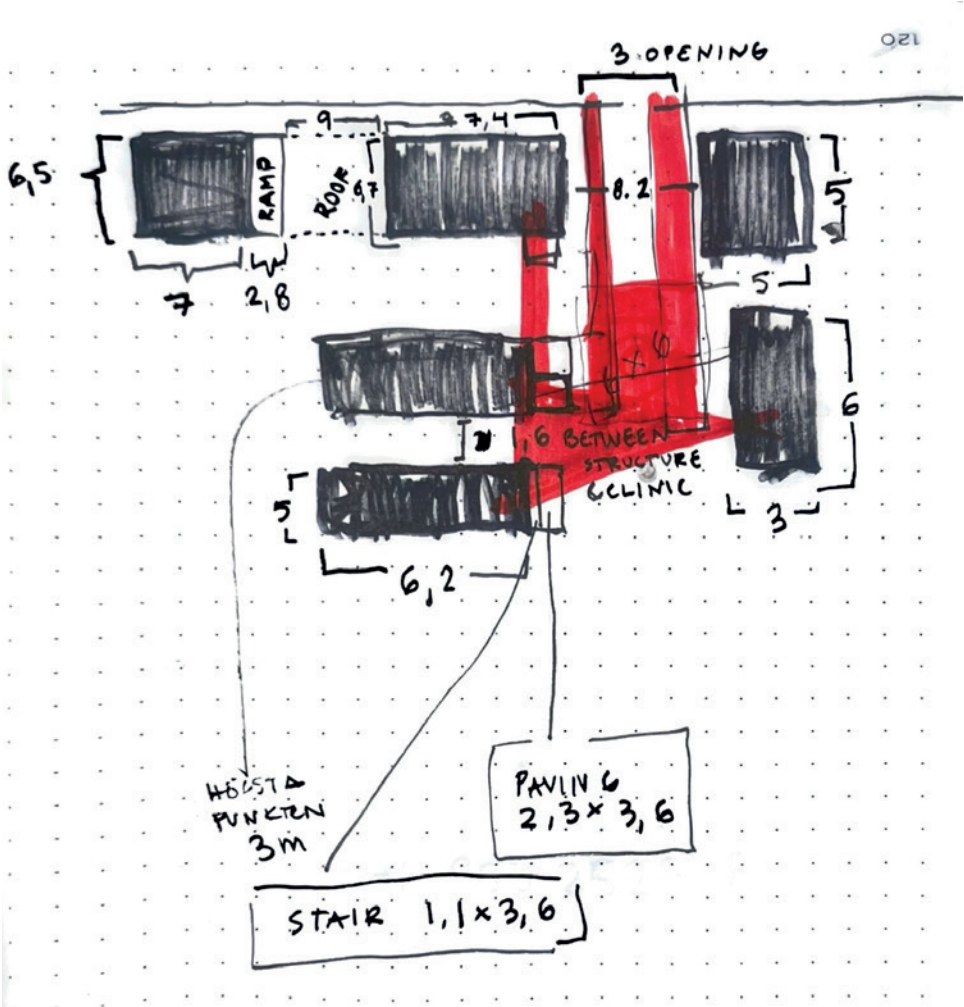


MATERIAL



KEY TAKEAWAYS

- The entering passage of the clinic is where most movement happens.
- The project requires prioritization and a phased implementation approach due to time constraints.
- The paving design should reflect how use of the space changes with different weather conditions.

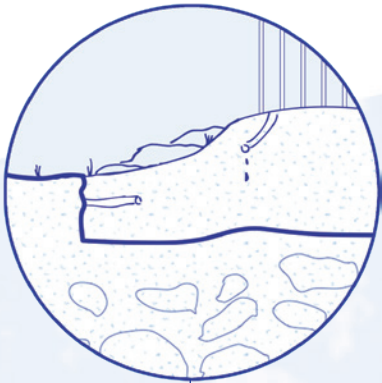


CONSTRUCTION OVERVIEW

The construction of the prototype pavement required significant physical effort. The clinic site consisted of uneven ground filled with rocks, making the leveling process both labor-intensive and time-consuming. Throughout the work, special care was taken to avoid damaging existing infrastructure, such as underground cables and water pipes.

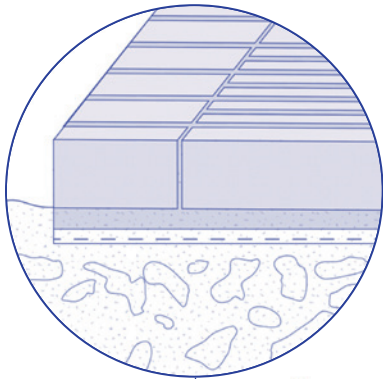
This section drawing provides an overview of the site conditions during construction. The work area was located directly beside the entrance gates leading to the main road, where vehicles and pedestrians passed continuously. As a result, the team carried out the construction in a highly visible and active environment while adapting to the site's physical constraints.

PIPE REPERATION

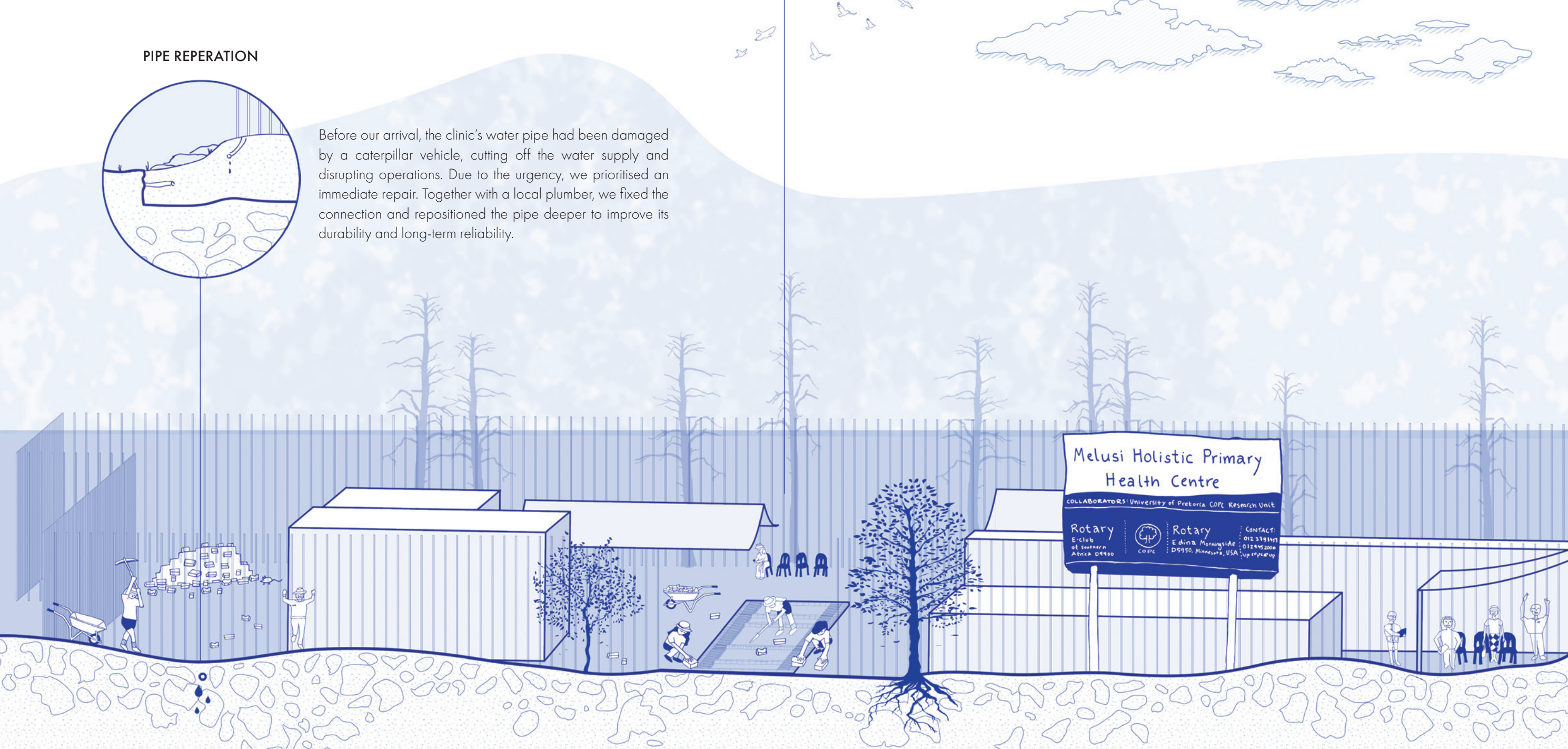
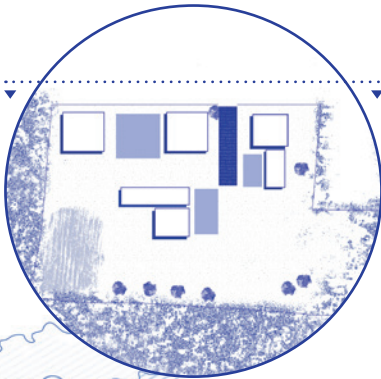


Before our arrival, the clinic's water pipe had been damaged by a caterpillar vehicle, cutting off the water supply and disrupting operations. Due to the urgency, we prioritised an immediate repair. Together with a local plumber, we fixed the connection and repositioned the pipe deeper to improve its durability and long-term reliability.

PAVEMENT ZOOM IN



CONSTRUCTION SITE



BUILDING STRATEGIES

STRATEGIES FOR PAVING

As a result of mapping the site, areas within the clinic with the greatest need for paving were identified. Given the limited time, careful consideration was given to where to start in order to avoid leaving unfinished areas. The analysis concluded that work should begin at the main entrance, where the site connects to the main street through a gate. The pavement plan was divided into sections, allowing the process and workflow to develop over time, leaving room for trial and error while also developing an understanding of the time and effort required for each stage, brick by brick.

The first step was to understand the tools, materials, and techniques required for the intervention. The aim was to use only locally sourced materials to make the paving process more accessible and to inspire community members to apply similar methods on their own properties. At the same time, this approach demonstrated how reused materials can be given new life through thoughtful design.

MATERIAL SOURCING

Building the pavement required paving stones, different grain sizes of sand, weed-control fabric, and cement. (Appendix fig. 8-10) The social network and local knowledge of the main stakeholder, Sarah, provided valuable insights into identifying people and places in the nearby area that might have the required materials. Information about an informal scrapyards close to the clinic site, owned by a community member within Sarahs’ social network named Morris, became the main material source. Materials already available on the clinic site from a smaller pavement project completed by Pretoria

University students the previous year were also used, along with a collection of bricks gathered by Sarah.

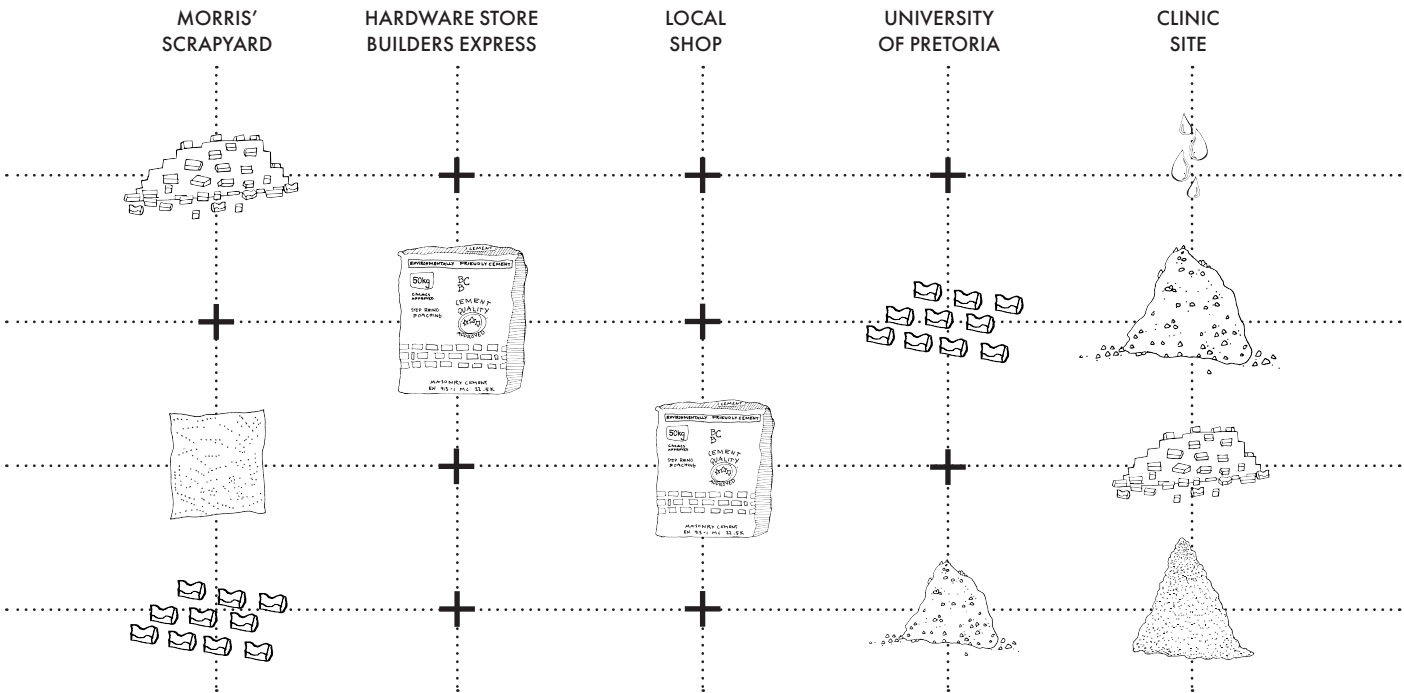
To understand the volume of available materials on the clinic site, the piles were roughly sorted by size and color to assess what kinds of designs could be achieved. The condition of the bricks varied, but most were broken into two or more pieces. From this inventory, it became clear that additional paving stones from Morris scrapyards would be necessary to achieve the intended vision.

MATERIAL AGENCY

The limited material access guided how the paving could be structured. The varying dimensions of the stones created a process where every decision had to be made mindfully. The vision for the pathway was to go beyond a traditional pavement pattern and instead tell a story about the site through the ground’s design, while also fulfilling rainwater management requirements and serve as a rigid pathway to walk and drive on top of.

BUILDING (AND) RELATIONSHIPS

Building trust and establishing a personal relationship was crucial to gain access to materials in the scrapyards. Also explaining the aim of the project and its connection to Sarah. The intention of contributing to a stronger community and an improved health clinic was important in gaining Morris’ approval of the project. After an introduction of the group and the project proposal, an agreement was made to pay 500 ZAR for access and to collect materials at any time from piles not already allocated to others.



SOURCES FOR ACQUIRED MATERIALS

TOOL SOURCING

To transport materials from the scrapyards to the site and begin hands-on construction, the necessary tools had to be gathered. A list of required tools was compiled.

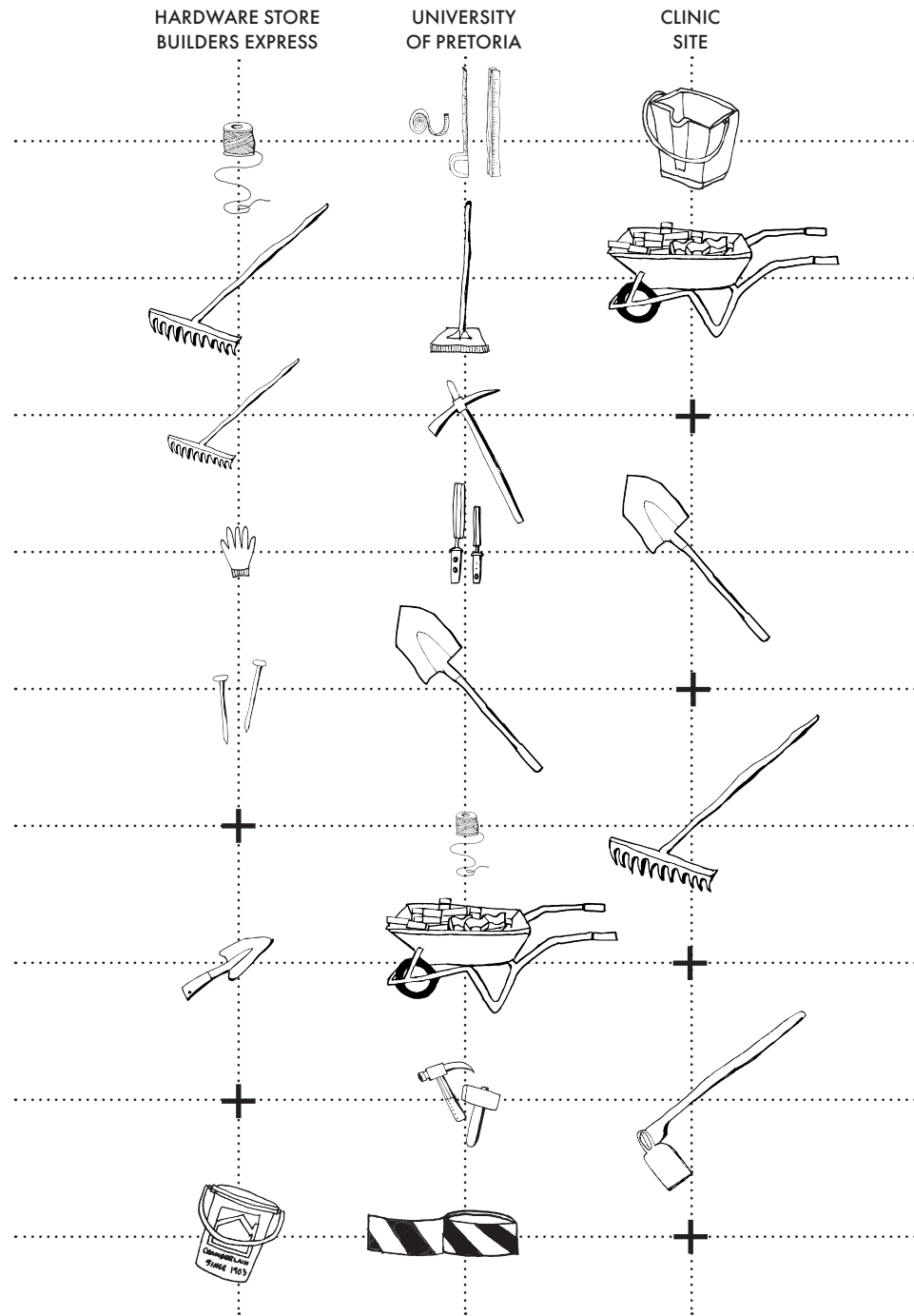
CONSTRUCTION STRATEGY

The design strategy began by selecting the most intact paving stones to form a border around the planned pathway. This straight edge created a structured frame and a consistent visual base, giving the area a calm and coherent expression. When bricks of the “border” shifted colour or texture, orthogonal dividing lines were introduced to mark transitions between these sections. The lines were also following the

mapped out site-geometries. In total, four dividing lines were created, resulting in five fields. These fields were later used as canvases, filled with patterns made of the broken bricks reflecting different stories, uses, and qualities of the site.

WORKFORCE AND LEARNING PROCESS

The construction was mainly carried out by the project group and Sarah, with additional help from friends of Sarah who also were part of the local community. Initially, no one involved had prior experience with this type of construction. The group therefore learned through trial and error, gradually improving the process over time. Day by day, step by step, brick by brick, the work became more efficient.



SOURCES FOR ACQUIRED TOOLS

BUILDING PROCESS



21. APRIL



22. APRIL



28. APRIL



28. APRIL



30. APRIL

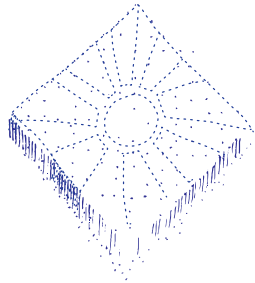


4. MAY



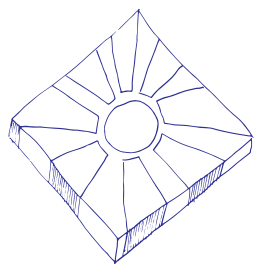
5. MAY

CONSTRUCTION STEPS



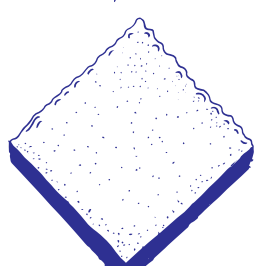
STEP 7

To improve the rigidity and structural durability of the pavement, a dry mixture of one-third cement and two-thirds sand was spread and brushed across the completed surface.



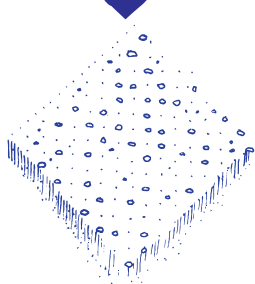
STEP 6

The paving stones were placed and continuously checked during construction to ensure correct leveling and allow water to drain toward the outer edge of the pathway.



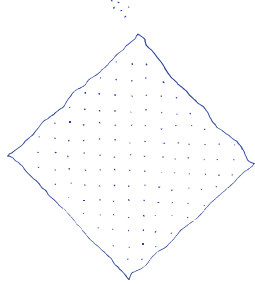
STEP 5

Before laying the paving stones, a workable bedding layer of water and fine sand, known as “geggamoja,” was prepared to bond and stabilize the bricks beneath the surface.



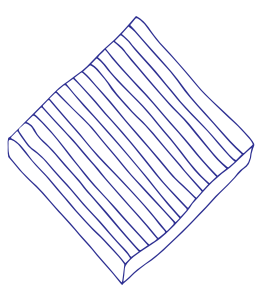
STEP 4

The plastic sheet was covered with a layer of gravel and sand of different grain sizes, functioning as a permeable layer for rainwater infiltration.



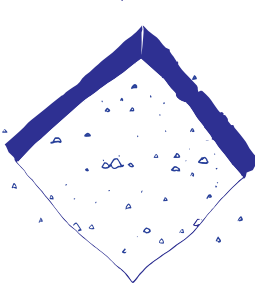
STEP 3

A plastic sheet was placed over the leveled ground and perforated with a rake to allow water drainage and prevent moisture from accumulating beneath the pavement.



STEP 2

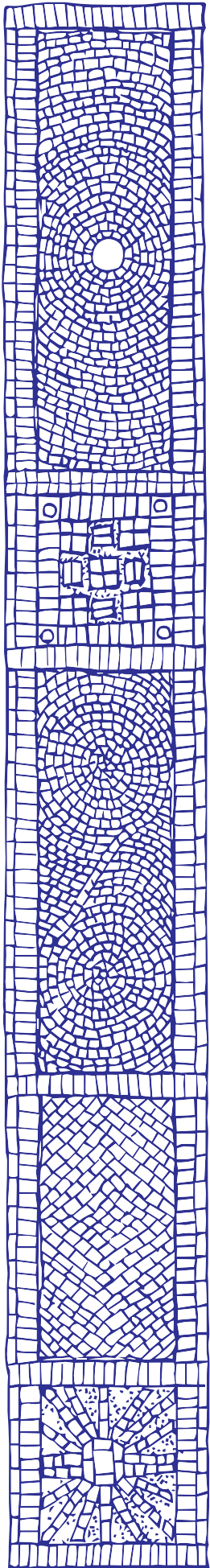
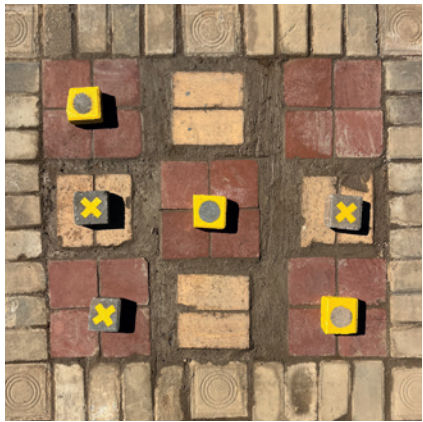
The excavated ground was compacted and carefully leveled with a ground tamper to create a stable and even foundation for the paving layers above.



STEP 1

A measured and sketched portion of ground was excavated with shovels and pickaxes, then smoothed and leveled using a rake to prepare the surface for construction.

FINAL PROTOTYPE



KNOWLEDGE

A small stage creates space for the educational morning health talk while the clinic is open. The expanding circle pattern symbolises the spread of knowledge and the movement of people gathering to learn and share.

PLAY

“Tic Tac Toe” introduces a playful element that makes waiting time at the clinic more enjoyable and engaging. The game encourages interaction, participation, and small moments of joy for the waiting patients. The instructions were left on site (Appendix fig. 7)

CONNECTION

The spiral symbol represents community, togetherness, and the strong social spirit within Melusi. It also reflects the spiral of life, a balanced connection to nature, and the philosophy of Ubuntu: “I am because we are.”

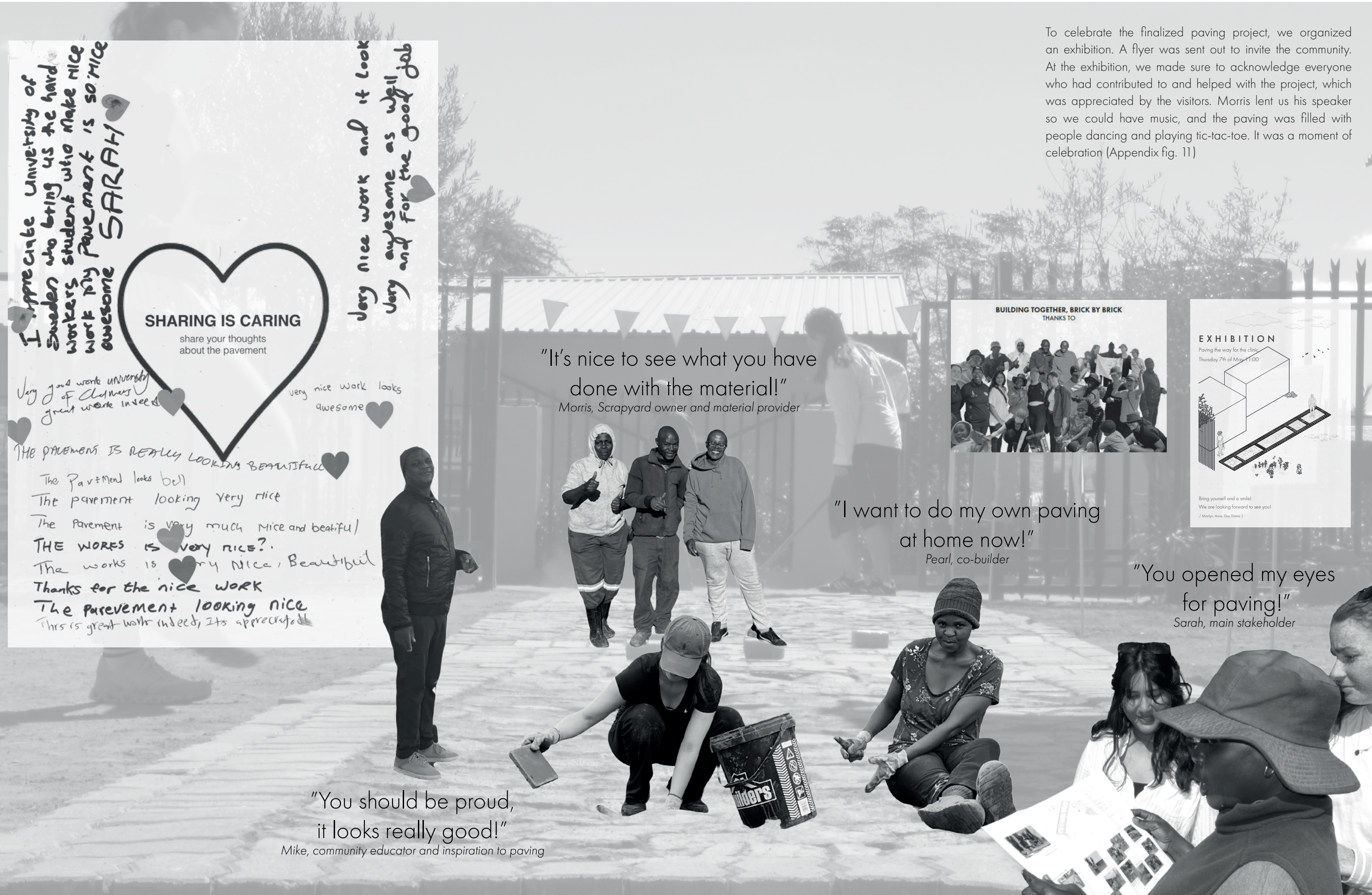
MOVEMENT

The route guides visitors naturally toward the clinic on arrival and leads them outward when leaving. It also creates moments to pause, reflect, and connect with the surrounding environment.

THE SUN

The pavement design was inspired by the local weather conditions and helps improve ground conditions during rainy periods. The sun symbol welcomes everyone with warmth and positive energy, reflecting Sarah’s optimistic spirit.

EVALUATION



To celebrate the finalized paving project, we organized an exhibition. A flyer was sent out to invite the community. At the exhibition, we made sure to acknowledge everyone who had contributed to and helped with the project, which was appreciated by the visitors. Morris lent us his speaker so we could have music, and the paving was filled with people dancing and playing tic-tac-toe. It was a moment of celebration (Appendix fig. 11)

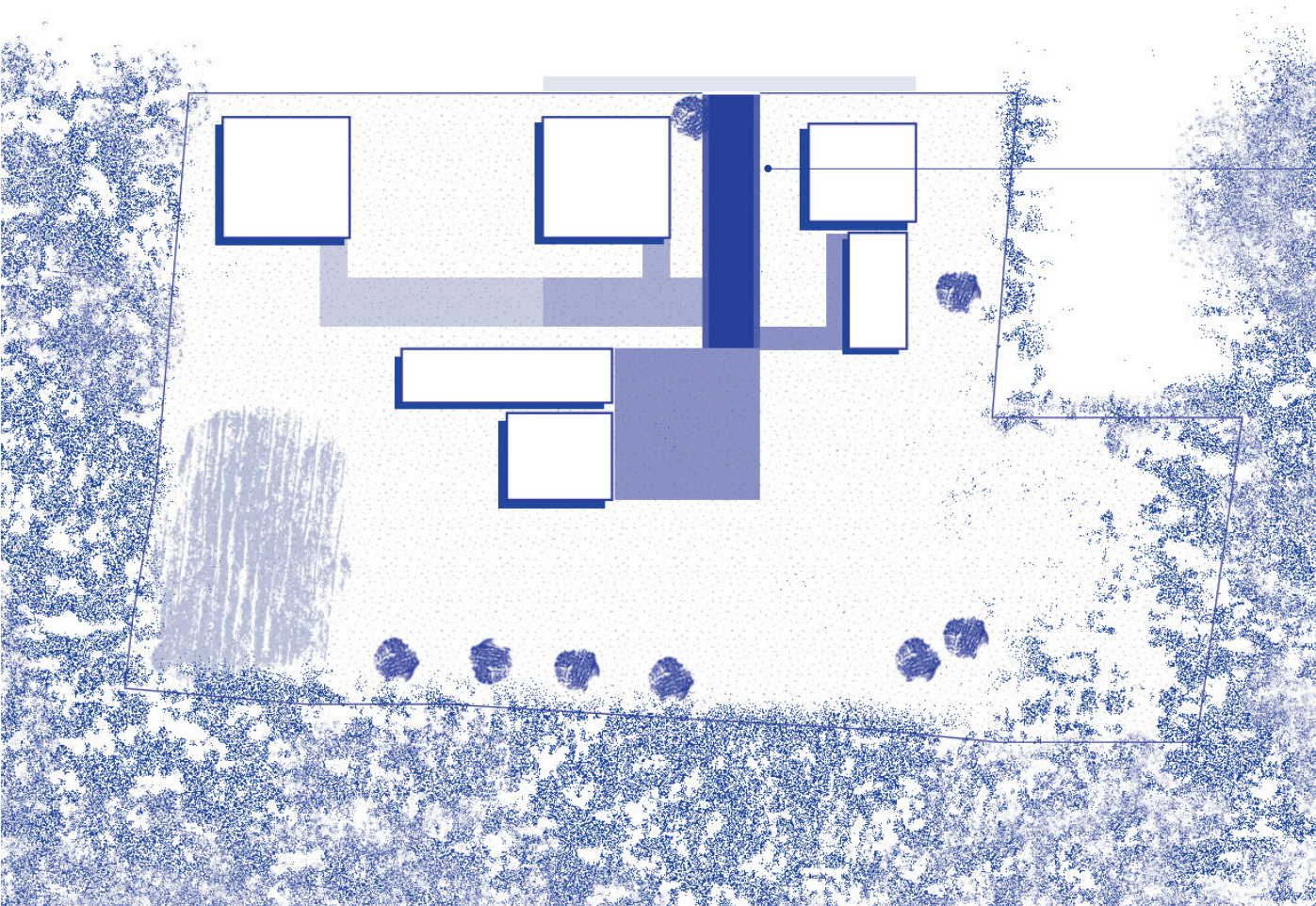
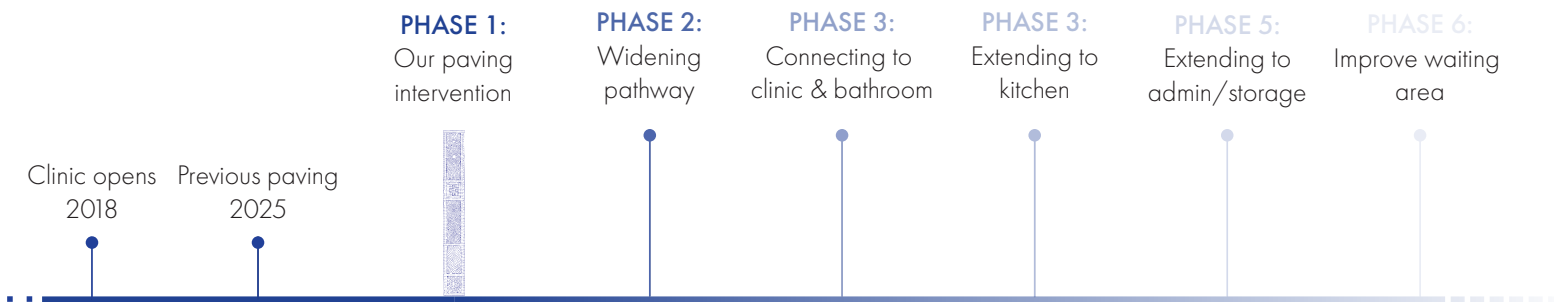
FUTURE DEVELOPEMENT

Inspired by the project, Sarah expressed a strong interest in continuing the paving work at the clinic, either by extending the prototype developed by our group or by creating new paved areas elsewhere on the site. Already 10 days after we left Melusi, we recieved the first picture of her continuation of the pavement.

To support this process, a printed step-by-step guide explaining the paving method and construction layers was left at the clinic. Through the co-building process, knowledge was shared directly with community members, increasing the potential for the paving to be continued and adapted locally.

For future Reality Studio students, there are several opportunities to build on the project. The paving could be extended towards the clinic entrance to improve the experience of patients who arrive early and wait outside before opening hours. Additional pathways could also connect key areas of the site, including the kitchen, administrative building, waiting area, and clinic facilities.

Beyond paving, future projects could focus on strengthening the cultivation areas in the back of the clinic site, improving privacy for patients while waiting, or creating a more comfortable waiting environment inside and outside the clinic.



PHASE 1
Beginning from the gate as a pathway towards the clinic. For pedestrians and cars. (Reality Studio 2026)

PHASE 2
Widening the pathway for bigger vehicles to be able to enter the site. Sarah has already started this phase and sent some pictures of the progress. (In progress)

PHASE 4
Connecting Clinic & Bathroom. To improve the accessibility to the clinic and the bathroom for the patients and the clinic staff. Especially when it's raining.

PHASE 4
Extending to the kitchen entrance.

PHASE 5
Connect to the admin/storage in the back of the clinic. The cars of the fieldworkers are driving back and parks here.

PHASE 6
With improving the waiting area outside the clinic, the clinic becomes more visible from the street. It's also a hint for the existing infrastructure, e.g., the waterpipe, and could help to protect it. Also, it makes the waiting area more comfortable.



REFLECTION AND KEY TAKE AWAYS

One strength of our group was the time we spent reflecting together, discussing our experiences, and supporting each other throughout the process. We quickly realized that a project like this cannot be fully prepared through reading or research alone. Instead, we learned to stay open, flexible, and ready to adapt to new situations and insights.

BRICK BY BRICK

During the project, we learned the importance of trusting the process and taking it day by day. Rather than starting with a complete plan, the project developed through prototyping, testing ideas, and responding to needs as they emerged. “Brick by Brick” became not only the project title but also our working method: learning by doing, adapting continuously, and using the irregularity of the reused bricks to our advantage. This reflects Hamdi’s (2004) emphasis on action, experimentation, and learning through practice.

UBUNTU

During one of our many taxi rides to Melusi, we were introduced to the philosophy of Ubuntu, often summarized as “I am because we are.” This captured much of our experience. Despite limited resources, the sense of community was strong, and the project would not have been possible without the relationships built through trust, openness, and consistent presence on site.

WOMEN EMPOWERMENT

Throughout the paving process, only women were involved in the construction, creating a positive and supportive working environment. Sarah’s energy and leadership were especially inspiring. Seeing women carry out work often done by men in Melusi also challenged local expectations, making the project not only a physical intervention but an opportunity for empowerment and confidence-building.

Another important realization was understanding Melusi as a functioning ecosystem with its own structures and everyday infrastructures. Working alongside the UP student also made us become more aware that there are different ways of approaching projects in this context. Their work was

organized through shorter site visits, while our process involved a more continuous presence on site, with a flatter hierarchy and a less data-driven approach. For us, this created a more collaborative way of working with both the community and each other. This resonates with Tovivich’s (2009) argument that designers can learn from informal settlements by adapting to local realities rather than imposing external solutions.

UP-SCALABILITY

The frugal design approach challenged us to achieve more with fewer resources. By using locally sourced and reused materials, we aimed to create a paving method that was accessible, easy to maintain, and replicable. The fact that Sarah has already started extending the paving demonstrates its potential for local ownership and future growth, aligning with Hamdi’s (2004) view that meaningful change often begins with small, practical actions.

Looking back, an additional community workshop on paving techniques could have strengthened the project’s long-term impact. Many residents showed interest in the construction process, and a hands-on workshop could have increased local ownership and supported future replication. This reflects Hamdi’s (2004) emphasis on participation and capacity-building.

We would also reconsider the use of cement. While it improved durability, it reduced the natural character of the reused bricks, represented the largest material cost, and was not the most sustainable option. Exploring more affordable and environmentally friendly alternatives could make the method even more accessible to the community. Initially we planned to seal the edges with cement as well. But for the upscalability and adaptability, we decided not to do it.

Overall, the project showed us that meaningful change does not require large budgets or large-scale interventions. As Hamdi (2004) argues, development can begin with small actions that respond directly to local needs. Similarly, Easterly (2006) highlights the value of adaptive, locally responsive approaches that learn through experimentation. Through this paving intervention, we experienced how a simple prototype can improve daily life, inspire others, and create opportunities for future development.



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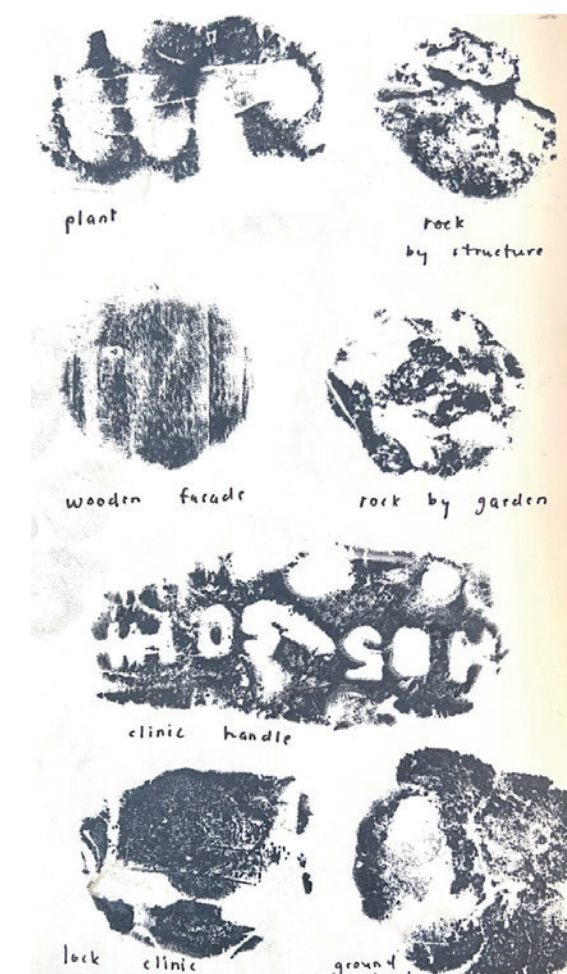
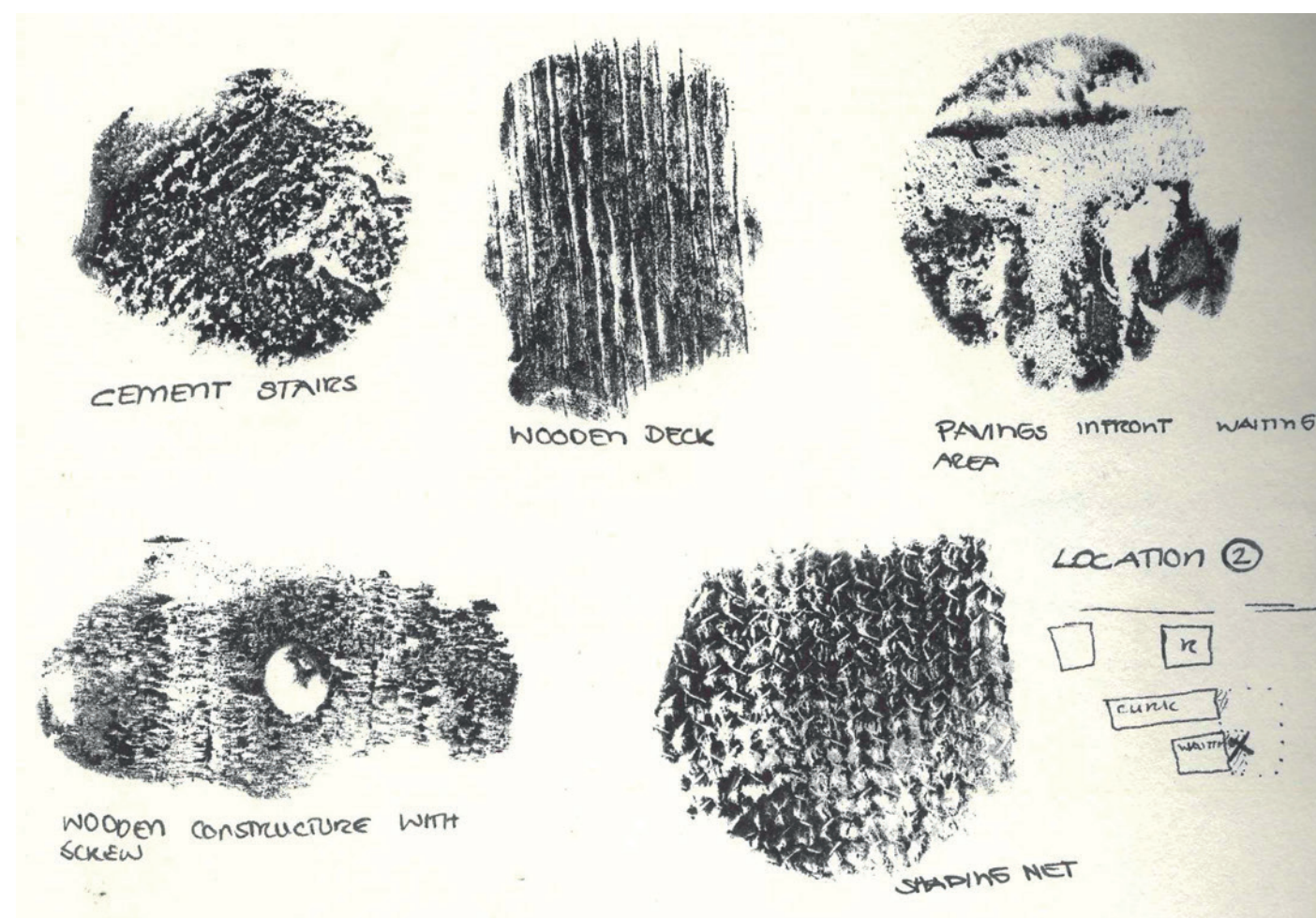
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APPENDIX



Chalmers University of Technology
ACE570 Reality Studio 2026
Master's Programme Architecture and Planning Beyond Sustainability

Examiner/teacher: Liane Thuvander
Course coordinator: Jessica Lundin
Tutor: Marli Swanepoel



This textures were used in the site plans and in the project time line.

Figure 1: Textures from the site

	Project Description (Strategy of Intervention) What the project intends to do (strategy of intervention)	Performance Indicators Indicators measure whether the objectives on each level are achieved	Monitoring (Means of Verification) Means of verification indicate where and in what form information on the achievement of objectives/indicators can be found	Assumptions (Risk Assessment) Assumptions are conditions which could affect the progress of the project but which are not under direct control of project management.
Overall Objective	What is the over all objective that the project will contribute to? The main objectives of this project is to get to know the community, build up relationships on site and learn from people from the site. According to the expressed needs of the local stakeholders, work together with the community in the clinic facility. For a long-term social benefit perspective this project aims to support social well being, dignity and efficient care. Definition: How is the Project important to society in terms of the long-term benefits? Our project aims to, in collaboration with the local stakeholders and community, develop the health care clinic. By strengthening the health care clinic, we also aim to also empower the community in Malusi.	What indicators are linked to the overall objective? By prototyping we will test how well our ideas alight with the main objectives. The use of workshops with the community will reassure the use and satisfaction of the intervention	What are information sources for the indicators? Iterative prototyping Workshops and interviews, both formal and informal. Laws, regulations, statistics and local knowledge relating to the chosen topic. Project report from previous years.	Not required for overall objective
Project Purpose	What is the purpose of the project (to be realised by the project)? The purpose of the course is to find out with the help of participatory design methods, how to understand local challenges and how to try to understand the needs. Through engaging with the local stakeholders as Sarah, the clinic staff, the patients and the residents of Melusi the project seeks to get a deeper understanding of the daily challenges and processes in the clinic.	Indicators showing the extent to which project purpose has been achieved? Immediate feedback from the stakeholders and the community. Consistency of engagement, participation and communication. How well we manage to respond to the initial intention and aim of the project, defined by both us and the engaged stakeholders.	What are information sources for these indicators? A combination of informal and formal conversation, workshops and interviews.	Factors and conditions not under direct project control, but necessary to achieve the overall project objective? The site's circumstances are changing.

Results (Outputs)	What are concrete , visible results to contribute to the realisation of project purpose? The project could result in design proposals, spatial improvements or if possible build a prototype on site together with the local community. This may include the waiting area, the kitchen or other parts of the clinic. The importance of not leaving something half finished on site, we don't want to create more work for the local stakeholders. Long lasting project, which stays longer than our stay.	What are the indicators showing whether expected results have been achieved? Direct feedback How well we manage to respond to the initial intention and aim of the project, defined by both us and the engaged stakeholders. Short term: The project sparks inspiration and vision of the future. Long-term indicator: how the project sustain in the future	How will the quantity and quality of each result/output be measured? The amount and depth of feedback we receive. Evaluation of our initial intention and aim, using an evaluating matrix formulated in the beginning of the project.	Factors and conditions not under direct project control, but necessary to achieve the project purpose? Transport, infrastructure, weather, health related issues, language barriers, time availability.
Activities	What activities are required and in what order to achieve the expected results? Interviews workshops co-designing receiving stakeholders feedback on prototyping	What resources are required for implementation of each listed activity? Materials for workshops and prototypes Engagement and time schedule	What are the costs for each of the means, if any? Recycled materials = no cost Workshop material, potentially bought by us Costs for cooking for the stakeholders	Factors and conditions not under direct project control, but necessary for results to be achieved as planned? Risk for low participation Unheard voices Permission from involved stakeholders.

Figure 2: NAIL Logical Framework Matrix (modified for RS)

Stakeholder and basic characteristics	How affected by the problem(s)	Interests (and possible actions to address)	Potential (Capacity and motivation to bring about change)
Sarah Our main stakeholder and project initiator. Sarah takes care of both the inside and outdoor areas connected to the clinic site in Melusi. Previous years Sarah also provided and cooked food for the staff and patients.	High It's her workspace, receiving direct feedback from the community and patients.	High Direct communication to us/ University/ Financial supporters.) Well connected to the community, takes action by reaching out to stakeholders.	Medium Capacity is low due to limited time and resources. The motivation to change is high.
Patients Residents of Melusi that come to the clinic to get health care. It's mostly women with young children coming to the clinic. The majority came for family planning related topics, and check ups.	High Already vulnerable	Medium Temporary presence at the site, but directly affected by the conditions of the clinic.	Medium There is high potential and motivation in bringing change, but they are limited by their vulnerable state.
Staff The clinic staff is present at the clinic Mondays and Thursdays, the amount of workers varies. They are also sometimes coming on other days for educational seminars for the fieldworkers	High Workspace receiving direct feedback from the community and patients	High Direct communication to us as well as indirect contact via Sarah Being able to provide quality care for the patients.	Low time limitations, focus on providing care
Residents of Melusi The residents of Melusii are dependent on the COPC clinic where it is the only health care clinic within the settlement.	High	Medium	Medium
Melusi Youth Center (MYDO) The Melusi Youth center is situated across the road to the COPC Clinic.	Medium	Medium	Medium
Immediate neighbours	Medium	Medium	Medium
Material/Tool providers	Low	Low	Low
Pretoria University - Financial Partner	Low	Medium	Medium

Figure 3: NAIL Stakeholder Analysis Matrix

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5
ACTIVITY	Arriving to Pretoria Site visits Meeting Sarah Improve timeline	First workshop: identifying needs	Second workshop: with residents	Start prototyping on site	Continuing developing and finish building on site
MAIN AIM	Getting to know the area and the stakeholder(s) Clarify aim	Mapping the needs, identifying potential projects with Sara	Getting to know the community	Developing the project	Presentation, handover, evaluation

Figure 4: Estimated Timeline from NAIL

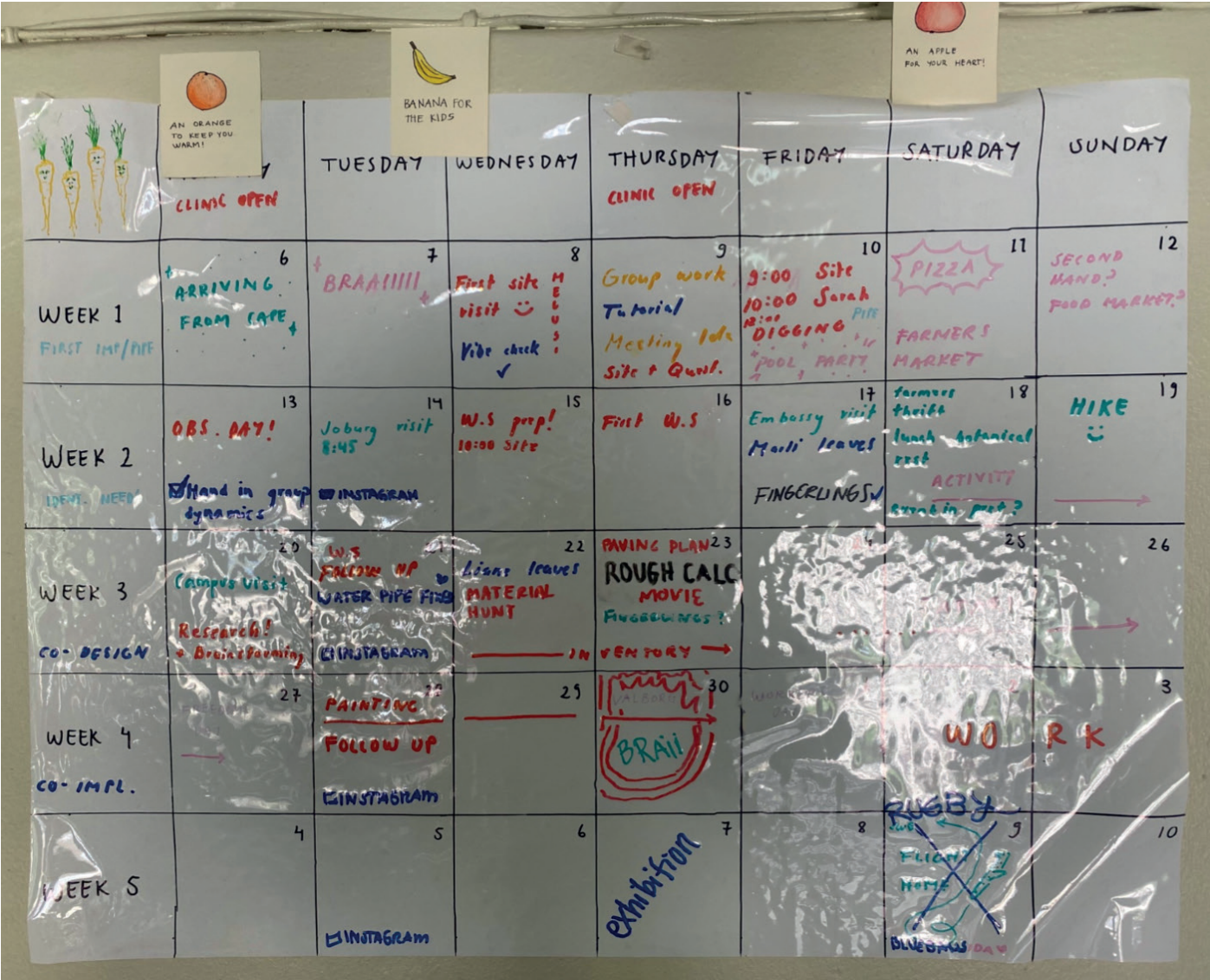


Figure 5: Weekly overview in Pretoria

HOW LONG DID IT TAKE FOR YOU TO GET TO THE CLINIC TODAY?



WHEN DID YOU ARRIVE AT THE CLINIC THIS MORNING?



HOW DOES RAINY DAYS AFFECT YOUR STAY AT THE CLINIC? ☔



HOW DOES HOT AND SUNNY DAYS ☀ AFFECT YOUR STAY AT THE CLINIC?



HOW DID YOU FIND OUT ABOUT THE CLINIC?



HOW COMFORTABLE ARE YOU WHILE WAITING?



WHAT IS YOUR OPINION ABOUT THE CLINIC?

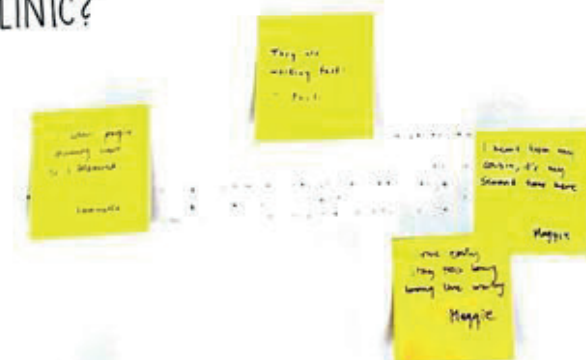


Figure 6: Workshop

HOW TO PLAY TIC TAC TOE

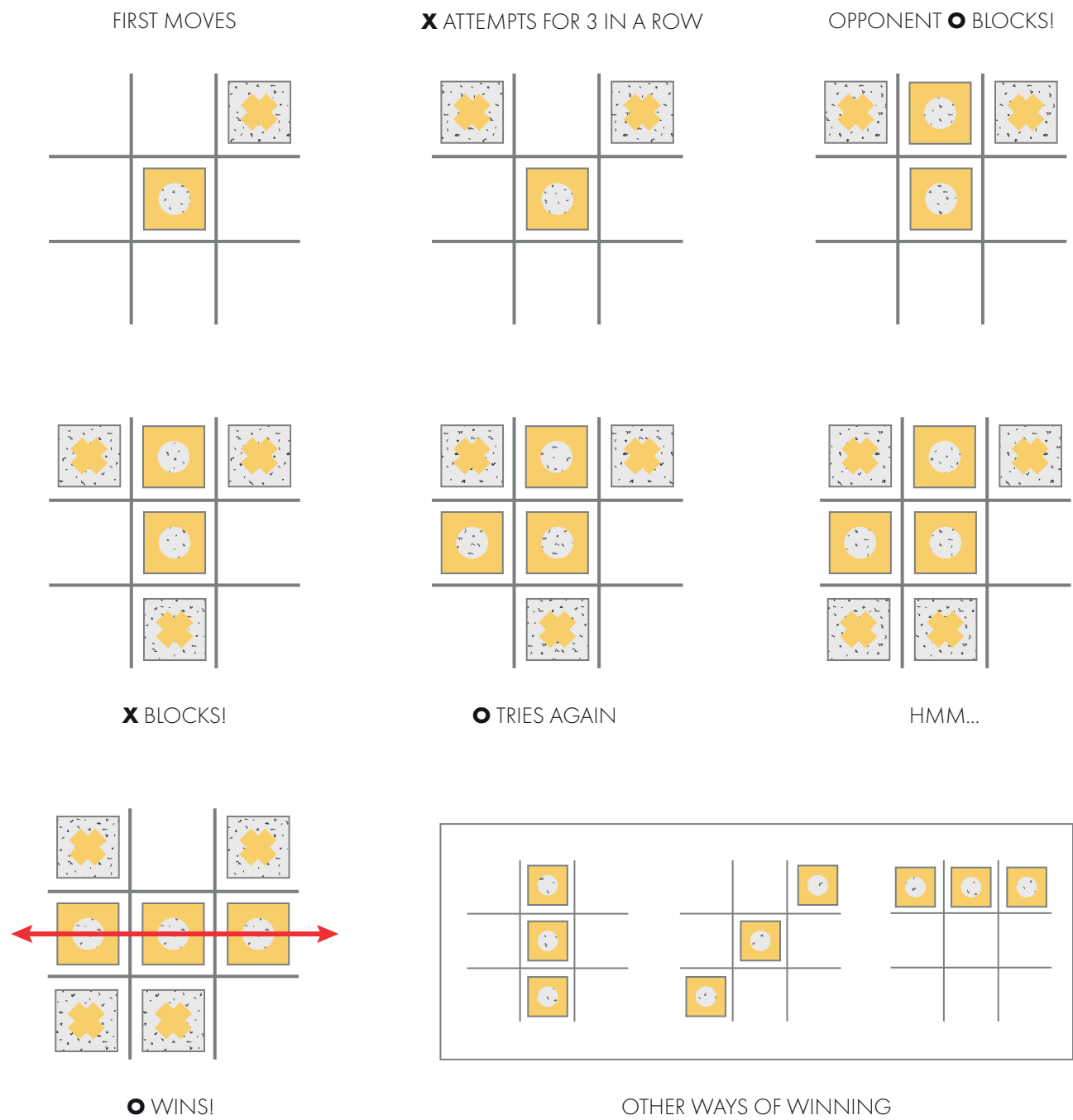


Figure 7: Instruction Tic tac toe



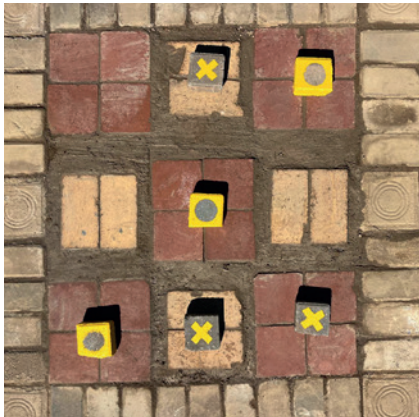
The guests chatting and enjoying



The guests using the pavement



The how-to-play-tic-tac-toe



The tic-tac-toe in action



The photos of the process



The opening of the exhibition



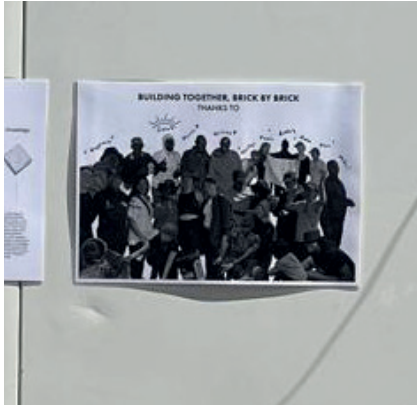
The proud moment with Sarah



The happy and strong women of Melusi



The final day with our main stakeholders



The wall of fame



The student team in action



The drinks and snacks

Figure 11: Exhibition

ITEM	COST (ZAR)	COST (SEK)	COMMENT
Bricks (~1750)	500	286.5	Reclaimed bricks sourced from a local scrapyard and site
Cement	188	107.7	Two bags of cement used for pavement construction
Sand	0	0	Sand sourced directly from the site at no cost
Gravel	0	0	Gravel collected locally and from the scrapyard
Water and miscellaneous materials	0	0	Water and miscellaneous materials provided on-site
Tools and equipment	922	528.3	Purchase and use of tools and equipment required for construction
Total Cost:	1610	922.5	

* The total cost does not include transport of materials and tools to and from the site.

Figure 8: material costs

FACTOR	DECRPTION	COMMENT
Sunny days	Increased heat exposure, dehydration risk, more frequent water breaks required	
Rainy days	Slower construction process, muddy site conditions, more difficult material handling	One rainy afternnon it was not possible to work
Physical effort	Repeated lifting, carrying bricks and gravel, digging, mixing, and laying materials	
Material sourcing	Reclaimed bricks from a scrapyard and locally sourced gravel reduced material costs but increased collection effort	

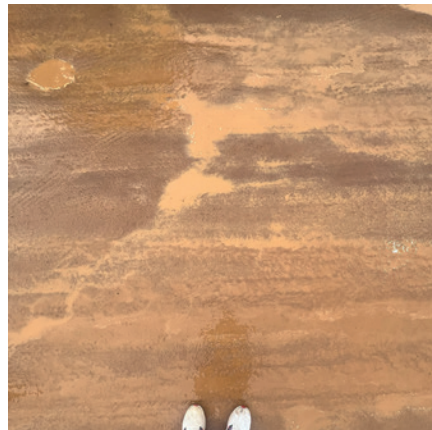
Figure 9: Environmental and physical conditions

CONSTRIBUTION	ESTIMATE	COMMENT
Participants	4 students + 3 co-builders + 1 stakeholder = 8 participants	We were most of the times 4 students and 1 stakeholder
Construction period	5 days	
Average workday	6 hours/day	Without breaks
Activities	Material collection, site preparation, excavation, leveling, mixing cement, laying bricks, finishing pavement	
Labour type	Manual physical work	
Community participation	Collaborative construction with local partners and residents	

Figure 10: Time and labour contributions



The edge between formal and informal settlements



The ground meet rain



The group working hard on the tic-tac-toe



The very much needed break



The amazing help from Sarah



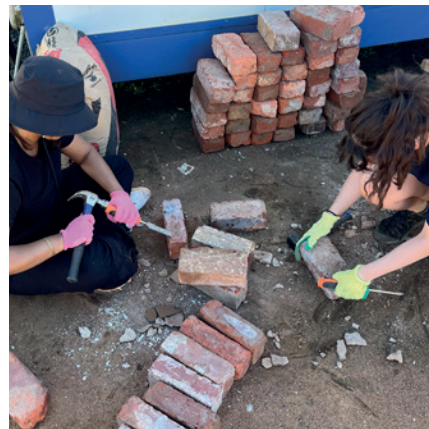
The previous year's intervention



The patchwork



The broken and exposed pipe



The process of making the bricks pretty



The placement of the first bricks



The hunt for good cement



The first walk-and-talk with MYDO Gladys



The first section of digging



The chairs we used for rest and chats



The collection of bricks in the scrapyard



The process of perforation of reused plastic



The digging of the ground around the pipe



The tools used for digging



The pumpking and ochra garden