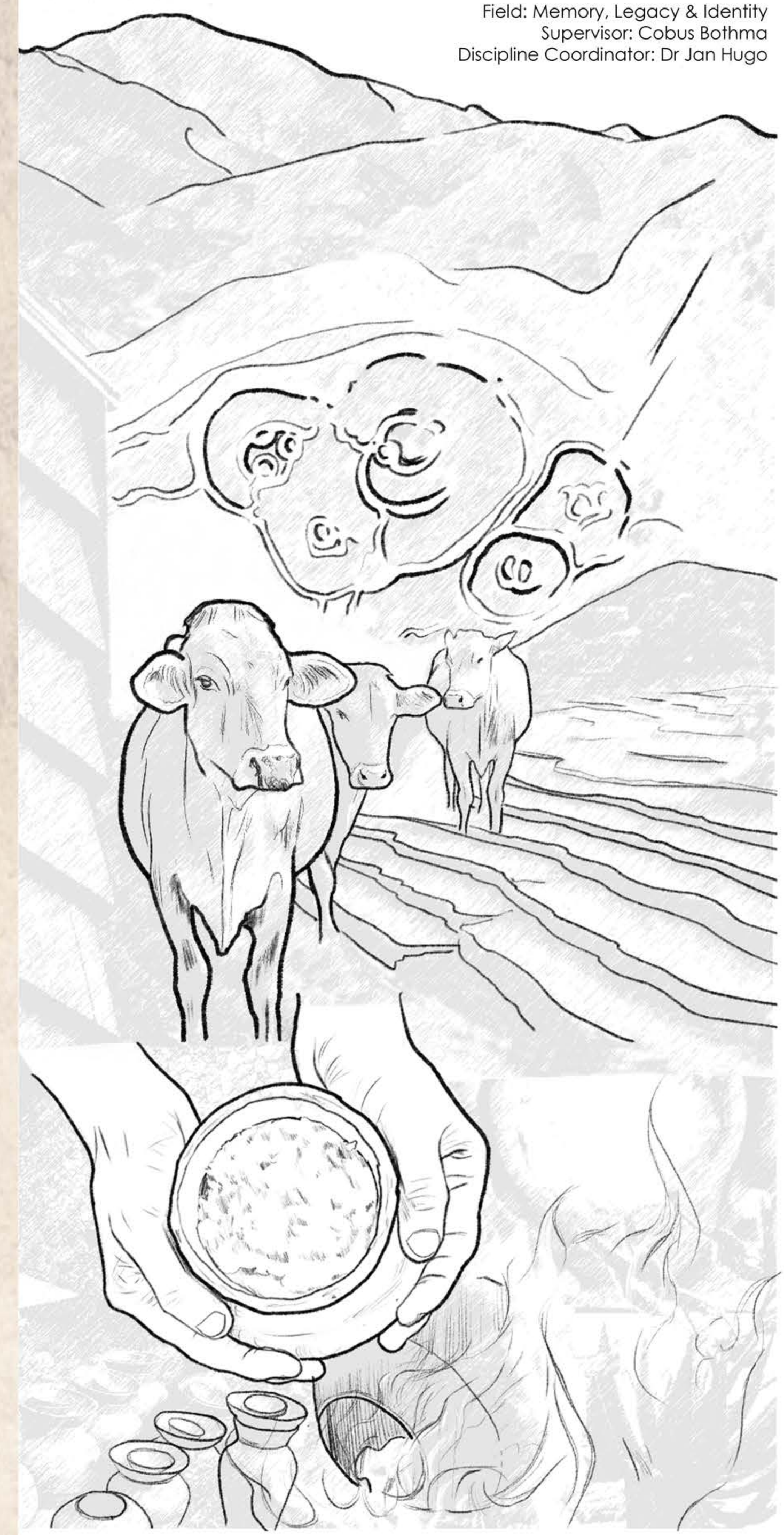
REFRAMING THE RUIN

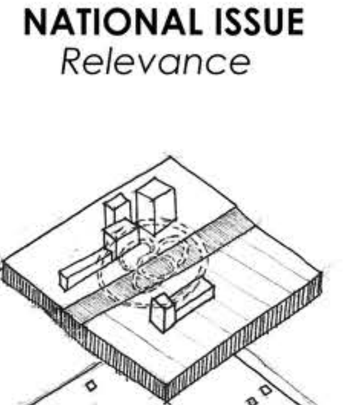
Reinterpreting a Bakoni Ruin Site Through Experimental Preservation

Celine Nel | u19046724

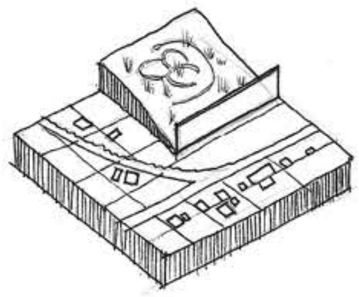
Field: Memory, Legacy & Identity
Supervisor: Cobus Bothma
Discipline Coordinator: Dr Jan Hugo



DESIGN FOCUS

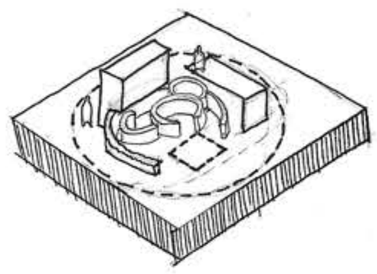


GLOBAL ISSUE
Meaning



NATIONAL ISSUE
Relevance

PERI-URBAN ISSUE
Integration



ARCHITECTURAL ISSUE
Interface

The Bakoni ruins in Mpumalanga, a significant Late Iron Age heritage site, face the threat of unmanaged urban development. ***Nationally***, these ruins, like many Late Iron Age sites, lack connection to contemporary society, leaving them unprotected and vulnerable. The ***peri-urban pressure*** of expanding development encroaches on these sites, diminishing their cultural value and potential for integration into modern life. This situation highlights a ***global issue*** of heritage protection, where the continuity of knowledge and meaning is at risk due to unmanaged change and stagnation.

At an ***architectural level***, programmed spaces must be designed to be technologically and spatially sensitive to the site's historical significance, ensuring that interventions do not exacerbate the risk of loss. The challenge is to design in a way that integrates the Iron Age ruin landscapes into contemporary urban development, encouraging communal value and sustainable inhabitation.

The goal is to foster live heritage production, where preservation techniques ***extend the cultural significance of the ruins beyond mere conservation, turning them into active, meaningful spaces for modern use.***

PROJECT INTENTION

This project seeks to transform the Bakoni ruins into a model of how Late Iron Age landscapes can be reintegrated into modern society, creating a sustainable and communal space that promotes live heritage. By encouraging local involvement, tourism, and education, the project aims to ensure the ruins remain relevant and protected. The design proposal includes reversible, sustainable architectural interventions that respect the site's historical integrity while allowing for modern inhabitation. Sensitive programming will create spaces that foster social value, including links to the heritage and tourism route and Kruger National Park.

In doing so, the project addresses the broader national issue of the disconnection between Late Iron Age sites and contemporary society, proposing a strategy that not only conserves but activates these ruins as part of South Africa's cultural landscape. The intervention will explore how heritage preservation can serve as a tool for sustainable urban development, offering a balance between conservation and modern needs while promoting the long-term value of such historical landscapes.

300-900 AD
EARLY IRON AGE

900-1300 AD
MIDDLE IRON AGE

1300-1840 AD
LATE IRON AGE

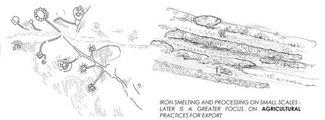
500 AD

PROCESS OF RE-DISCOVERY

1860 | **1918** | **1957** | **1982** | **2014** | **2024**

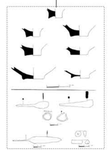
ARTEFACTS

Related to ritual and initiation bury to symbolise ***transformation***



IRON SMELTING AND PROCESSING ON SMALL SCALES - LATER IS A GREATER FOCUS ON **AGRICULTURAL** *PRACTICES FOR EXPORT*

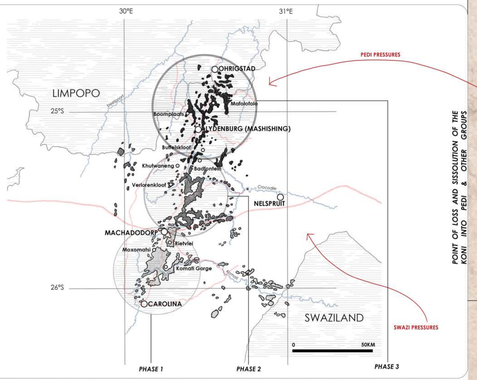
Pijper (1918) Boompiespoort Rock Engraving Complex discovered - dating to 1650AD
Related to the views and experiences of males



(Collett 1982:36)

Ludwig von Beating (1957) found the heads alongside potsherds, iron beads, copper beads, ostrich eggshell beads, pieces of bones and millstones. (Kudzala Antiquity CC, 2011).

MOVEMENT & ROLEPLAYERS



PEDI PRESSURES

SWAZI PRESSURES

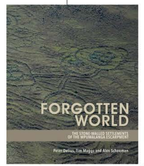
POINT OF LOSS AND RESOLUTION OF THE KONI INYO PEDI & OTHER GROUPS

PEDI POLITIES THEN DOMINATED MOST OF THE LOWVELD REGION

POTTERY MAKING REMAINED AN INTEGRATED ELEMENT OF EVERYDAY LIFE & RITUAL DESPITE POLITICAL CHANGE

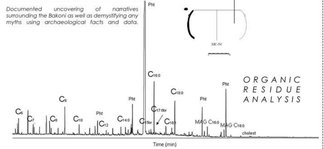
GERMAN MISSIONARIES ARRIVE 1860AD

DOCUMENTATION OF LOST KNOWLEDGE

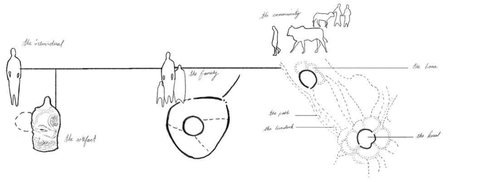


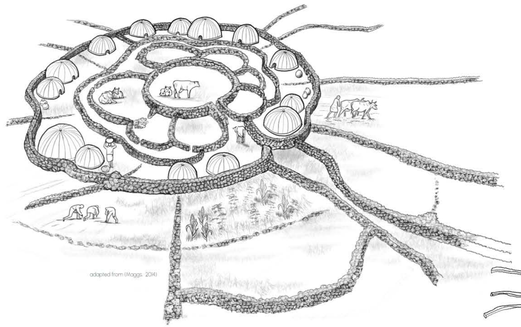
Documented uncovering of narratives surrounding the Bakoni as well as demystifying any myths using archaeological facts and data.

Processing of dairy products *- represents secondary milk products, such as sour milk and curds of milk. Processing of ruminant carcass fats & non-ruminant carcass fats Use of a ricinoleic acid containing plant which may point towards medicinal purposes vanilla processing for medicinal or*

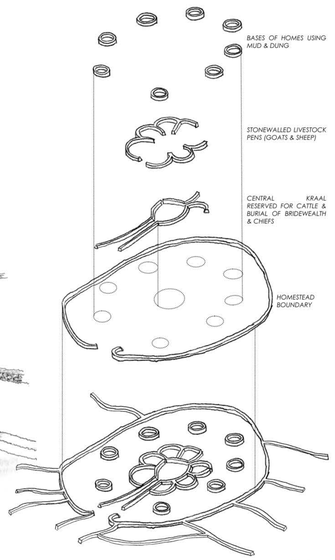


BUILDING MATERIALS





adapted from (Maggs, 2014)



BASES OF HOMES USING MUD & DUNG

STONEWALLED LIVESTOCK PENS (GOATS & SHEEP)

CENTRAL KRAAL RESERVED FOR CATTLE & BURIAL OF BRIDEWEALTH & CHIEFS

HOMESTEAD BOUNDARY

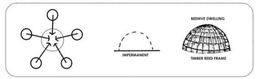
LOW STONEWALL TERRACES FOR AGRICULTURAL USE & PATHS FOR BOTH PEOPLE

WOMEN TASKED WITH AGRICULTURE MAINTENANCE, COOKING AND POTTERY MAKING. WITH AN INTRINSIC CONNECTION BETWEEN FOOD, RITUAL AND CLAY.

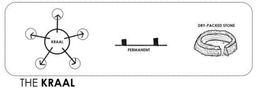
USING TIMBER TOOLS TO SMOOTH THE POTS

YOUNG MEN AND BOYS TASKED WITH CATTLE CARE

MEN CREATING ART IN THE FIELDS WHILE TAKING CARE OF THE CATTLE AND ALLOWING THEM TO GRAZE



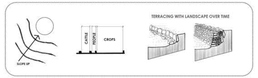
THE **HOME**



THE **KRAAL**

THE **PRODUCTION**

VARIOUS BURNISHING TECHNIQUES AND STYLES ETCHINGS - DIFFERENTIATING BETWEEN EVERYDAY USE, RITUAL USE & GUESTS



THE **TERRACE & PATHS**

CHARACTERISTICS OF THE KONI LIFE & BAKONI HOMESTEAD

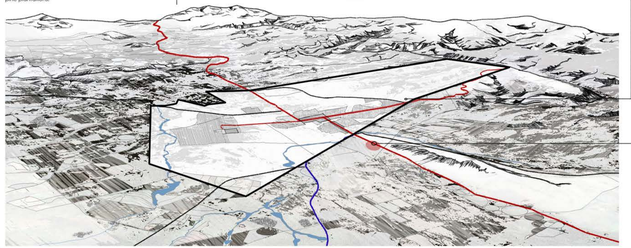
MACRO SITE ANALYSIS | LYDENBURG, THABA CHWEU MUNICIPALITY, MPUMALANGA

The main economic sectors are forestry, agriculture, mining, business services and tourism.

The western half (Lydenburg Town) is dominated by agricultural and farming activities, while forestry is the main economic activity of the eastern half (Sable and Graskop Towns).

Lydenburg: oldest town in the province, and a hub of heritage where the famous Lydenburg Heads.

Graskop is home to the three Rondavels, The Blyde Canyon, Potholes, God's Window, The Pinnacle, Berlin, Lisbon, and Graskop Falls, all of which are World Heritage Sites, and form the Panorama Route. In the Sable area, when travelling east of Mashishing through the Long Tom Pass, there are hectares of pine plantations.



BOOMPLAATS ROCK ENGRAVING SITE

The Boomplaats Site has been declared a **national heritage site** in terms of Section 27 of the National Heritage Resources Act No. 25 of 1999 (NHRA).

LYDENBURG MUSEUM

Replicas of the Lydenburg Heads housed in the Lydenburg Museum alongside other artefacts including ceramics, cutting tools, historical grains and a rock engraving found near the site - which was taken into the safecare of the museum due to a proposed mall development which has ceased since 2014 due to the significance and cultural value of the site.

ROOIDRAAI 34JT PORTION 7

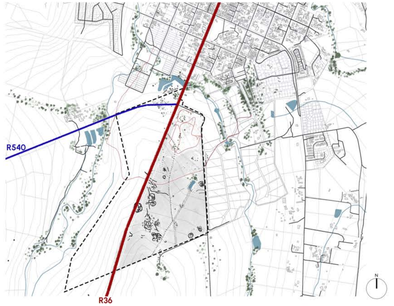
Traditional museumification approaches often fall short in capturing the dynamic nature of heritage. These methods, focused on a "retrospective memory" (Harvey, 2013), simply preserve past events (Fig 4.6). In contrast, the concept of "prospective memory" (Harvey, 2013) emphasises linking the past, present, and future, creating a metaphorical pathway. This suggests (via Harvey, 2013), heritage can make the material past an "active" and "co-present" element in ongoing landscape processes.

Liana Muller (2009), citing Frank Prothcan, expands on this idea. Prospective heritage connects past, present, and future by acknowledging that practices, knowledge, and skills may have originated in the past but are actively carried forward in the lives and minds of present and future communities (Muller, 2009).

In essence, living is a proactive heritage such as the bridge that unifies past, present, and future.

PROJECT SITE FOCUS

RDR 1 is of mixed significance. It extends over a very large area and comprises of reasonably
well preserved stone walled enclosures, terrace walling and cattle tracks.



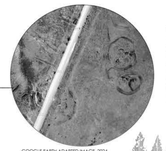
EXISTING LOCATION OF TOWN
OPPORTUNITY TO USE AS A MEANS OF MAINTAINING THE RUINS

CLOSEST TIMBER SUPPLIER & MANUFACTURER (LABA TIMBER (PTY) LTD)
OPPORTUNITY FOR LIGHT WEIGHT SENSITIVE CONSTRUCTION

MARKET GRAIN FARMS IN MASHISHING
OPPORTUNITY FOR THE REINTRODUCTION OF HISTORICAL GRAINS FOR EDUCATIONAL PURPOSES - CLOSE SUPPLY OF FOODS

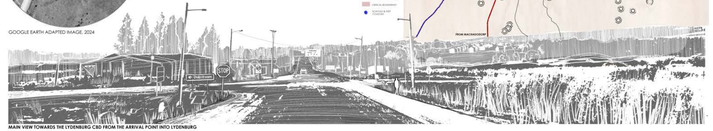
MASHISHING KNOWN FOR ITS 'BOSE' KOMS
OPPORTUNITY TO LEVERAGE WETLAND CONSTRUCTIONS FOR SUSTAINABLE WATER TREATMENT

MESO SITE ANALYSIS | ROOIDRAAI 34JT & SURROUNDS

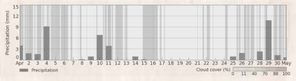


GOOGLE EARTH ADAPTED IMAGE, 2024

Although the ruins are scattered along the escarpment, many remain close to main roads and rivers, enhancing accessibility. Rooidraai is especially unique, as the R36 road cuts directly through one of its settlements. This prominent feature, often overlooked by travellers, becomes evident through a detailed analysis, revealing how the main road from Machadodorp bisects a historic ruin homestead at the proposed project site.



MAIN VIEW TOWARDS THE LYDENBURG CBD FROM THE ARRIVAL POINT INTO LYDENBURG

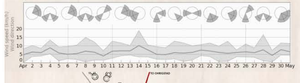


ZONING

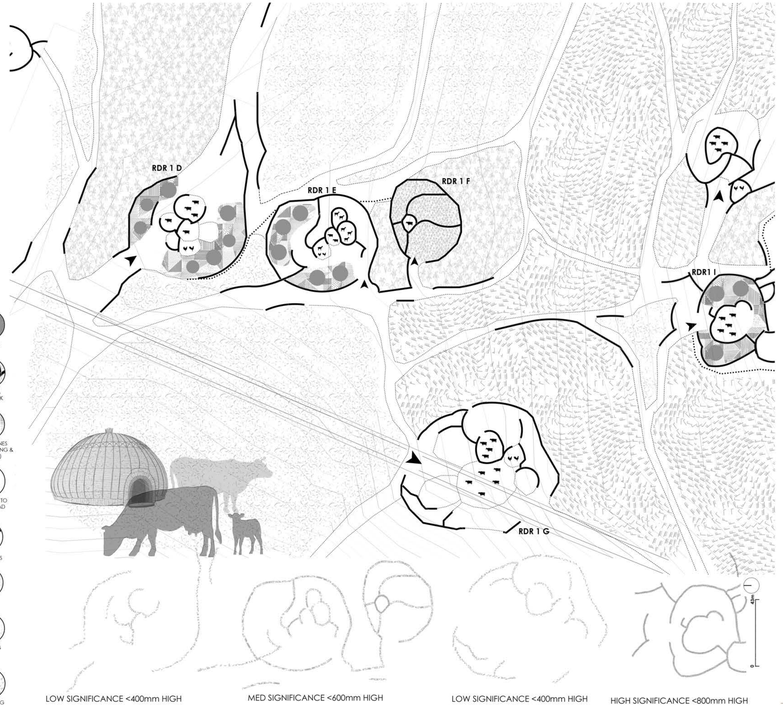
OPEN SPACES

DESIRE LINES

ACCESS & INTERFACE NODES



MICRO SITE ANALYSIS | RDR1 OF THE ROOIDRAAI RUINS



LOW SIGNIFICANCE <400mm HIGH

MED SIGNIFICANCE <600mm HIGH

LOW SIGNIFICANCE <400mm HIGH

HIGH SIGNIFICANCE <800mm HIGH

ROCKY OUTCROPS LOOKING TOWARDS RDR1 E & F

SEASONAL VELD BURNING, REVEALING THE RUINS - EXISTING ROADS ON SITE

STONE WALLS OF D, E AND F ARE INTERLINKED. WALLS ARE GENERALLY NO HIGHER THAN 600mm WITH SOME TALLER INSTANCES.

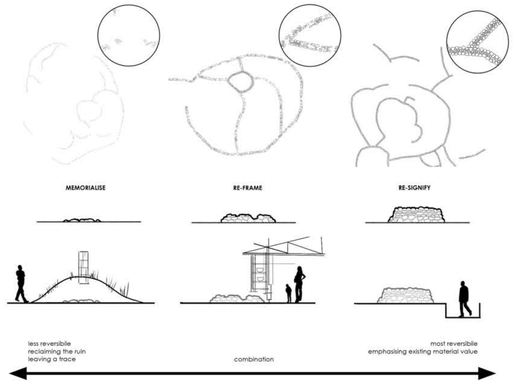
LARGE FOUNDATION STONES OF ENCLOSURE E.

COMPLEX RDR I IS THE MOST WELL PRESERVED AND DISTINCT WALLED CLUSTERS ON THE SITE. FOR THIS REASON - NO PERMANENT ARCHITECTURE WILL BE IMPLEMENTED.
THIS ALSO ALLOWS FOR RITUAL USE OR ROOM FOR INTERPRETATION OF USERS.

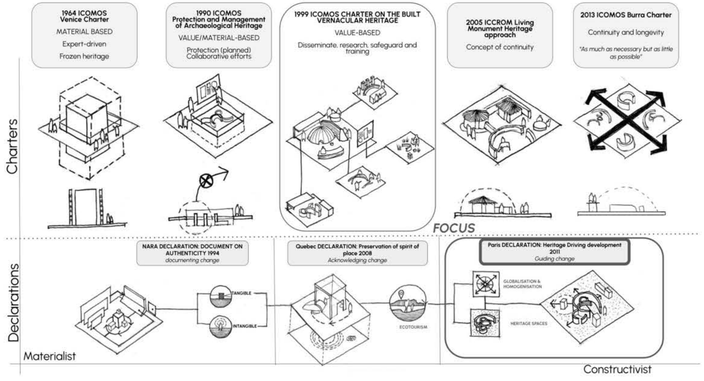
CLEAR ENTRANCE INTO CLUSTER RDR I.

SITE IMAGES

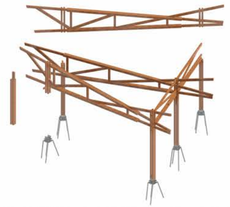
CONCEPTUAL APROACH | NEGOCIATING HERITAGE, STRUCTURE & PROGRAM



Guided by the Burra Charter (1979) and ICOMOS heritage principles, this project prioritises reversible interventions to ensure future adaptability. Constructions are designed for assembly, disassembly, and reuse, preserving the historical integrity of the site while enabling new functions and respecting the ruins as dynamic, integral parts of both heritage and contemporary life. Aligning with the Paris Declaration of 2011, which views heritage as a driver of development rather than a static identity marker (ICOMOS, 2011), the goal of the proposal is to, "reconnect these isolated heritage sites with current community life through a 'living heritage' approach" (Wijesuriya, 2018).

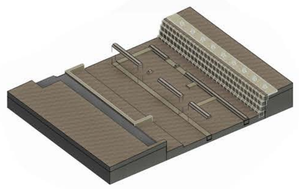


DRY JOINERY TIMBER AND REED DWELLING CONSTRUCTION (ADAPTED FROM DU PLESSIS, 2020: 43).



TIMBER CONSTRUCTION THAT REFLECTS THE IMPERMANENCE OF THE HOUSEHOLD STRUCTURES.

DRY JOINERY STONEWORK USED FOR BOUNDARY WALLS, TERRACES & KRAALS.



GABION STRUCTURES USED AS RETAINING WALLS FOR AREAS FURTHER AWAY FROM THE RUIN - DIFFERENCIATED FROM THE EXISTING BY WIRE BASKET AND STONE TYPE.

RE-INTRODUCTION OF THE TERRACES AS A LAYER THAT REMAINS

USING EXISTING SKILLS IN THE COMMUNITY TO SHOWCASE EXPRESSIONS OF HERITAGE AND CULTURE

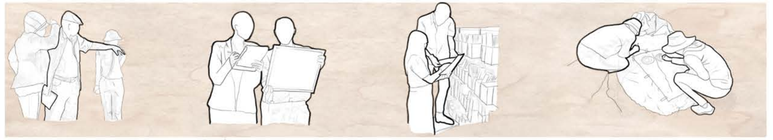
BUT ALSO EXTEND SKILLS TOWARDS THE CREATION OF HAND BASED TILES USED ON THE POTTERY WORKSHOP ROOF

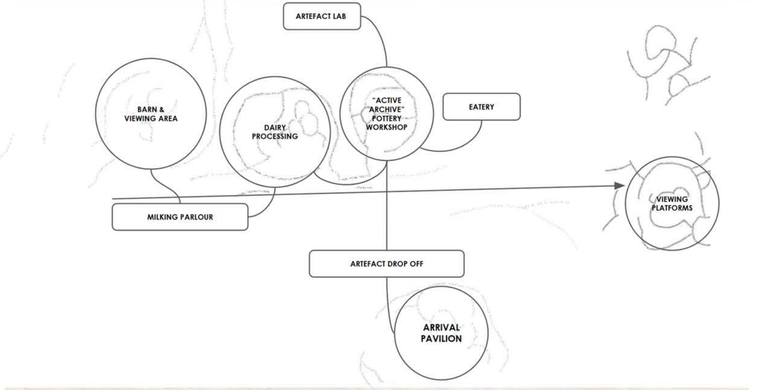
TOUR GUIDES
INITIAL VISITOR ORIENTATION
EDUCATION OF PAST & CURRENT SITE PROCESSES
GREATER HERITAGE ROUTE TOURS

CURATORS (COLLABORATIVE)
CURATION OF ARCHIVES ON EXHIBIT
DEPENDS ON PUBLIC ENGAGEMENT

ARCHIVISTS
MANAGEMENT OF PRESERVATION OF ARTEFACTS

THE COMMUNITY, STUDENTS & TOURISTS
PARTICIPATE IN ACTIVE PRESERVATION ACTIVITIES, REFLECT, DISCUSS AND RELAX





FOOD SCIENTISTS/TRADITIONAL COOKS
ASSIST IN NATURAL FERMENTATION PROCESSES & NEW DAIRY INFUSIONS
ASSIST IN PUBLIC EDUCATION

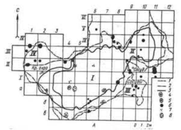
LOCAL FARMERS
ASSIST IN DAIRY PRODUCTION, CONTROLLED GRAZING OF THE SITE & CROP MAINTENANCE
ASSIST IN PUBLIC EDUCATION

COMMUNITY ARTISANS
CONTINUED PRACTICE OF RELATIVELY HIDDEN CRAFT CREATING ACTIVE PRESERVATION

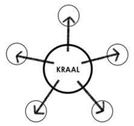
ARCHAEOLOGISTS
ARTEFACT ANALYSIS, DISCUSSION & INTERPRETATIONS, IN COLLABORATION WITH THE PUBLIC

DESIGN DEVELOPMENT & TECHNOLOGICAL INTEGRATION |

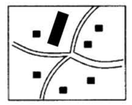
Materialisation, consequently the link between design and construction of the design, was important from the onset due to the sensitivity of the site. However, it was important to first start with conceptual models that evoked a sense of interacting with and responding to the ruin. The iterations involved looking at the design with a multi-scalar lens, allowing for reflexive design to ensure appropriate solutions. Throughout each iteration, a combination of spatial attitudes was adopted, informed by archaeological excavation processes, the existing spatial logic of the ruins and the concept of activity along paths.



GRID ORGANISATION
AS IF I WAS AN ARCHEOLOGIST ABOUT TO EXCAVATE EACH CLUSTER

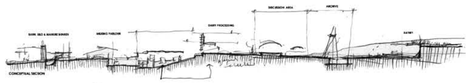


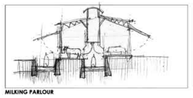
RADIAL ORGANISATION
CENTRALISATION AROUND EACH KRAAL WITH DIFFERENT PROGRAMMED ZONES

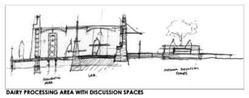


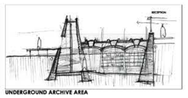
SCATTERED ORGANISATION
LOCATED ALONG TERRACES & PATHWAYS

SPATIAL ATTITUDES DERIVED FROM THE RUIN

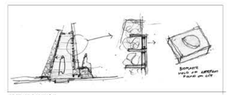

CONCEPTUAL SECTION

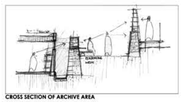

MILKING PARLOUR

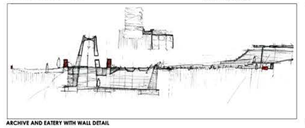

DAIRY PROCESSING AREA WITH DISCUSSION SPACES

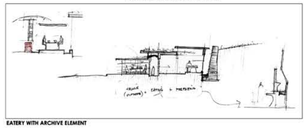

UNDERGROUND ARCHIVE AREA


UNDERGROUND COLD STORE

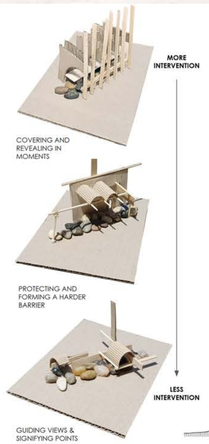

ARRIVAL PAVILION

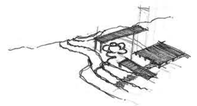

CROSS SECTION OF ARCHIVE AREA

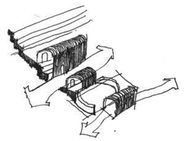

ARCHIVE AND EATERY WITH WALL DETAIL


EATERY WITH ARCHIVE ELEMENT

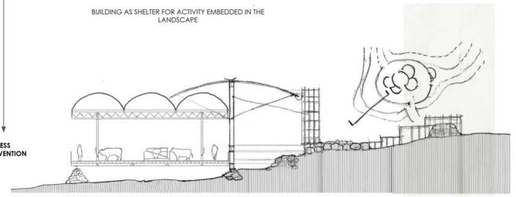
INITIAL CONCEPT ITERATIONS



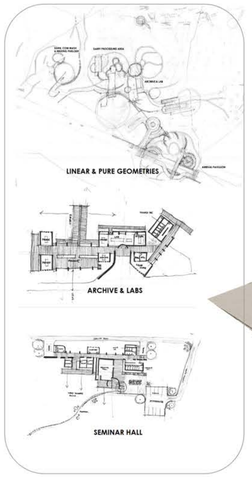

BUILDING AS PLATFORM FOR ACTIVITY


BUILDING AS BOUNDARY AND THOROUGHFARE


BUILDING AS SHELTER FOR ACTIVITY EMBEDDED IN THE LANDSCAPE

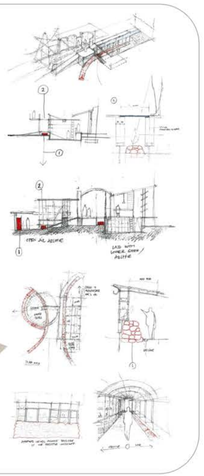

LANDSCAPE ANIMAL HUSBANDRY ACTIVITIES SUSPENDED ABOVE THE RUIN

ITERATION 1

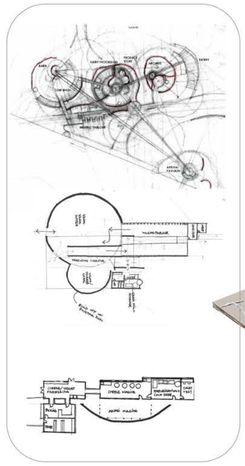


The initial iteration involved exploring linear and pure geometries as a means of contrasting the existing irregular forms on site. 1:200 sketch plans were developed and then subsequent 1:200 maquettes were made to envision the build form and its interaction with the ruin. Sketches of potential interfaces were then drawn from these models.

Both the archive and reception areas were combined in this iteration, however, their clustered nature overwhelmed the existing, informing the next iteration to be more spread out.

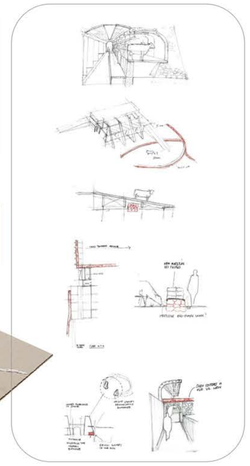


ITERATION 2



The next iteration focused on spreading the program out more onto the site, with more landscape and labour intensive processes such the milking parlour to be located further away from the ruins, adopting a linear form. The dairy processing space was positioned within the ruin to symbolise the home-scale productive dairy processing activities that would have occurred in this zone.

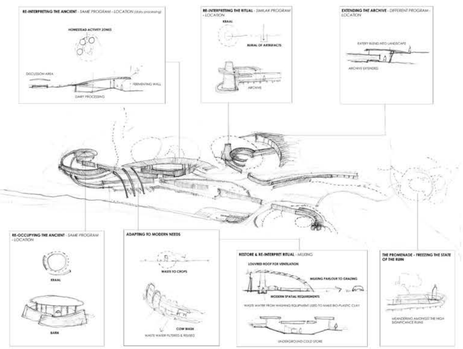
Sketches of potential interactions between the dairy processing and barn speaks to a more permanent architecture, memorialising the past but resignifying past use for contemporary inhabitation. However, the architecture at this stage was too heavy and insensitive.



ITERATION 3

This iteration aimed to have more tectonic interventions in the landscape, marked by buildings that were positioned in areas that are complementary to both contemporary and past programmatic use as seen in the axonometric interpretation of the model. A main axis was defined moving north to south, as the ruins indicate that this was a main pathway. A secondary axis was developed to link the arrival pavilion to the barn, which are both areas characterised by low significance ruins - following a memorialisation approach. It was decided that this axis was too insensitive in the landscape and more organic pathways were needed to link programs.

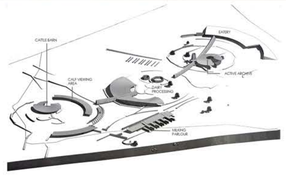

SCALE 1:2000



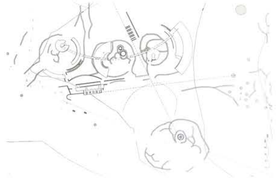
ITERATION 4

The concept and importance of terracing and working with the landscape became very important in this iteration, where an emphasis on simple forms combined with landscape interventions were prioritised. The arrival pavilion was developed further on the 1:100 scaled model to mark the entrance and reclaiming of the highly damaged ruins. When translating the physical model into a digital model, certain elements were lost and it became clear that the building footprints themselves were disproportionate. It then became important to zoom into each programme and define how much building there would need to be in order to complement the ruin without overpowering it.


SCALE 1:1000

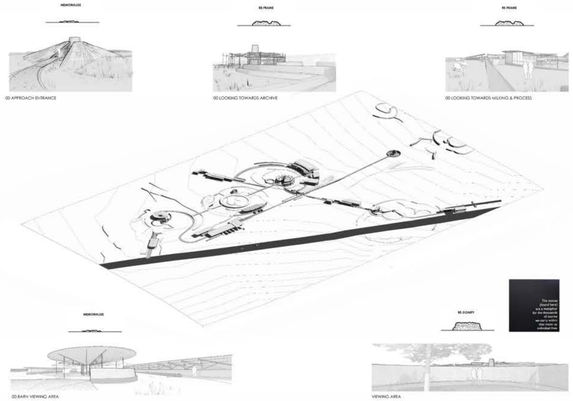


A connective walkway was envisioned between the programmes, however, it didn't follow the logic of natural pathways on-site and would interfere with the ruins too much. The next iteration therefore needed to respond more sensitively to past movement routes.



ITERATION 5

Reversibility principles were applied to each program in correspondence with the spatial requirements, resulting in the following axonometric model being produced with its respective perspectives. Building footprints and roof planes were minimised, however, the contrast between more reversible versus semi-reversible, relating to spaces further away from the ruins was not clear enough, resulting in the negotiation between the architecture and the ruin being too blurred. It became important to play more deliberately with the roof and ground plane so that the ruin would be highlighted in the centre.



1. **Guardhouse Arrival**
2. **Arrival Pavilion - Memorialise:** Visitors enter a pavilion set within vegetative berms, evoking the ancient landscape. Molded artifacts are displayed, and an open "Sky Space" invites reflection on history and transience.
3. **Artefact Drop-off Zone- Reframe:** This transitional area allows visitors to leave offerings or artefacts, contributing actively to the site's history. It serves as both a symbolic and functional space for community participation and initial artefact processing.
4. **Active Archive - Reframe:** A pottery workshop and kiln reframe the past as visitors engage in traditional pottery-making. Movable timber displays and the kiln embody the site's evolving narrative and blend of permanence and adaptability.
5. **Eatery with Fermented Goods Shop - Resignify:** Visitors witness traditional dairy processing using pots from the archive, culminating in the eatery where food is served in these vessels, linking ancient practices with sensory, contemporary experiences.
6. **Artefact Labs, Discussion, Seminar Hall & Secure Underground Archive - Reframe:** The labs assist in the organic residue analysis and various testing of artefacts found on site and in the surrounds, allowing for the exploration of experimental preservation processes in collaboration with the public in a controlled manner.
7. **Sour Milk, Yoghurt & Cheese Making Areas - Reframe:** Small-scale dairy product production with viewing panels into these spaces as well as enough room for interactive workshop sessions centred on low-tech manual dairy processing.
8. **Pasturisation Area & Dairy Test**
9. **Milking Parlour with Semi-underground Cold Store & Staff Change/WC:** Milking parlour designed to allow for both manual & machined milking. Passive cooling systems implemented in the semi-underground cold store in combination with minimal off-grid HVAC systems.
10. **Covered Kraal - Memorialise**
11. **Calf Viewing Area - Memorialise:** Adjacent to the dairy area, a viewing space offers a glimpse into pastoral traditions, connecting visitors to the heritage of livestock farming.
12. **Machine & Tool Store**
13. **Biogas Generator & Composting**
14. **High Significance Ruins - Conclusion:** The journey ends at the preserved ruins at the site's highest point. The architecture here recedes, allowing the ruins to resonate as a cultural monument.

FINAL SITE PLAN

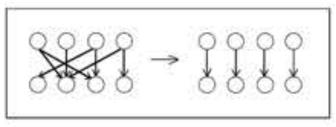
SCALE 1-250

ASSESSMENT INDICATORS AND RECOMMENDED PRINCIPLES

Focusing on the "active archive" space, the report explores strategies such as functional independence, systematisation, and relational dependency to develop a detailed section of the facade, aligning it with design for assembly and disassembly principles to ensure reversibility and respect for the historical context. The project thus aims to assess how technological interventions can be appropriately implemented by considering their impact on the ruins through their assembly.

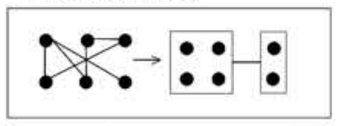
Each component (foundation, floor-to-wall connection, and wall-to-roof connection) will be assessed using a scale of 1 (minimal compliance) to 5 (perfect compliance) of each indicator.

1 Functional Independence: Opt for a higher degree of separation of components and function.



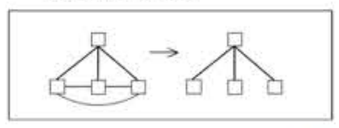
total dependency		1
unplanned integration		2
planned integration		3
modular zoning		4
no dependency		5

2 Systematisation: Group elements into independent modules based on their function, ease of assembly/disassembly, and expected lifespan.



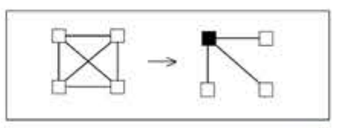
low	Element (profile)	1
basic	Component (facade frame)	2
moderate	Assembly (facade fragment)	3
high	Chunk (facade module)	4
very high	building	5

3 Relational Dependency: Minimize the **number** of connections that represent dependencies between different elements in a building.



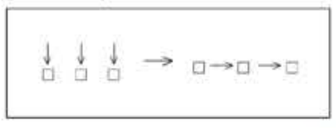
closed assembly		1
layered		2
stuck		3
table		4
open		5

4 Base Element of the Configuration: Design a key element that acts as an intermediary between other elements in the structure.



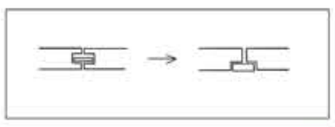
whole building		1
load-bearing structure		2
frame		3
intermediary connective element		4
accessory		5

5 Assembly/Disassembly Sequencing: Enable more parallel rather than sequential assembly to improve efficiency.



sequential		1
interlock		2
closed circle		3
parallel		4
gravity		5

6 Interface Geometry: Design product edges so elements can be recovered without damage, making them suitable for reuse.



closed		1
asymmetric/ closed on one side		2
overlapping on one side		3
symmetric		4
open		5

7 Connection type: Use connections that allow for easy separation and recovery of elements, focusing on decomposition rather than just composition in reversible structures.

material bond		1
direct with connecting device		2
interlock		3
intermediary		4
gravity		5

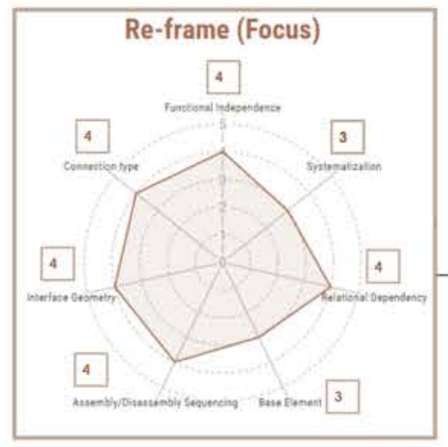
Reversibility framework (Author, 2024) adapted from Design Strategies for Reversible Buildings Durmisevic(2019:52-71)

BENCHMARK IDEALS

guided by the conceptual approach, degree of reversibility required in each ruin condition and informed by precedents

Memorialise

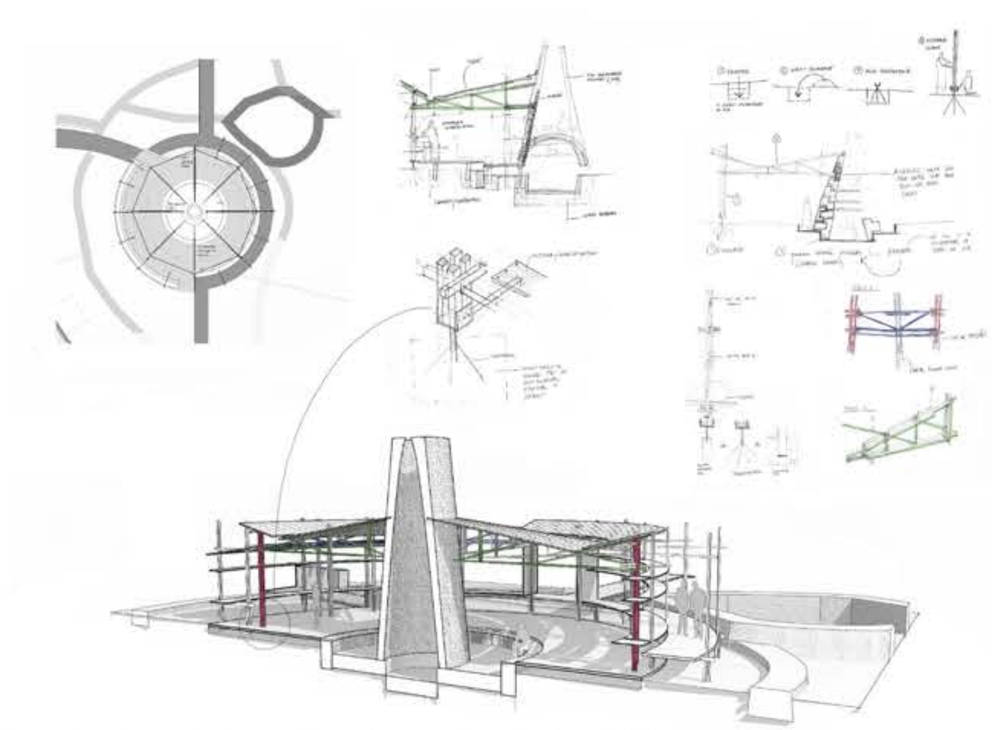
Re-frame (Focus)



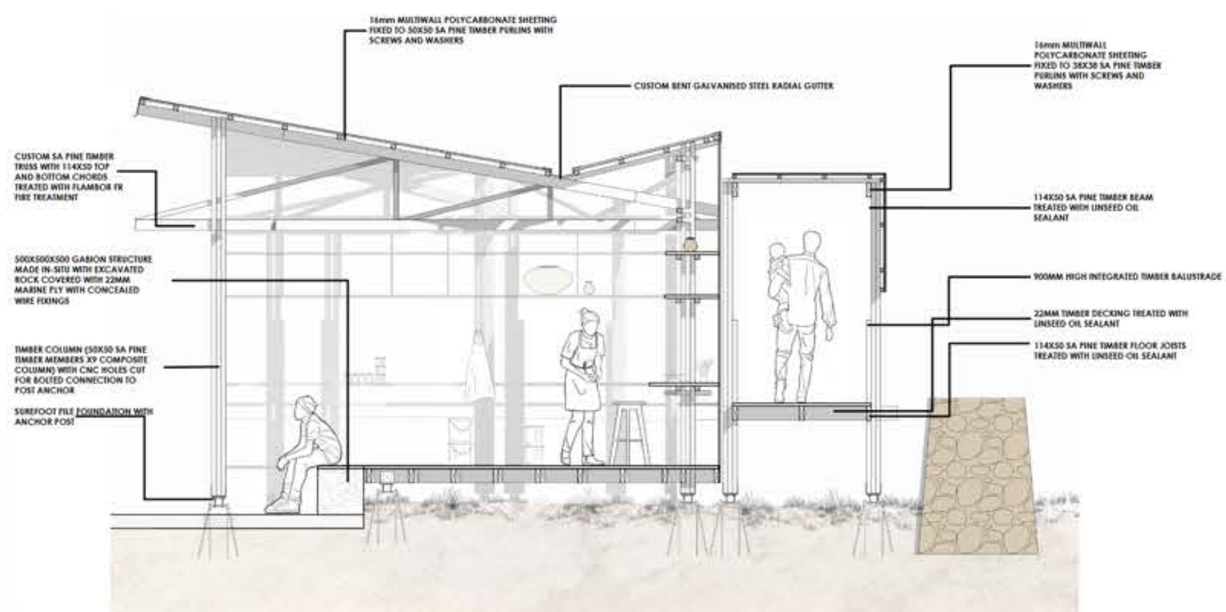
Re-signify

Degrees of reversibility required for each ruin condition (Author, 2024)

ACTIVE ARCHIVE | POTTERY WORKSHOP ITERATIONS



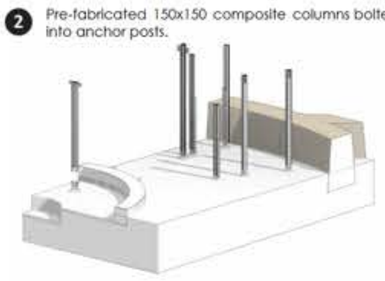
Initial sectional exploration of the active archive(Author, 2024)



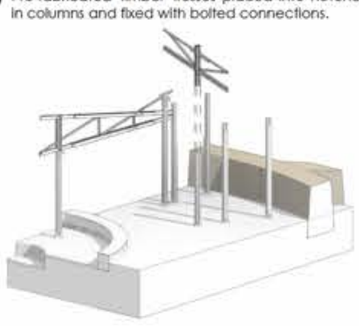
Initial technification of the active archive with improved more reversible foundations (Author, 2024)

1 Site excavated by archaeologists - pits prepared for precast foundation units with gravel backfill.

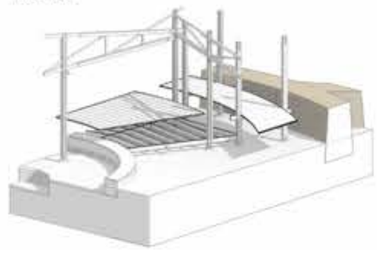
2 Pre-fabricated 150x150 composite columns bolted into anchor posts.



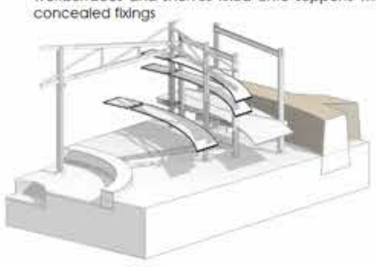
3 Pre-fabricated timber trusses placed into notches in columns and fixed with bolted connections.



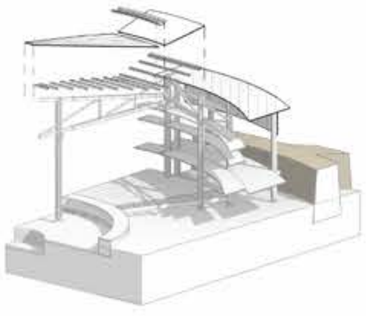
4 Floor joists placed and bolted through notches in column system and bolted onto anchor post footings



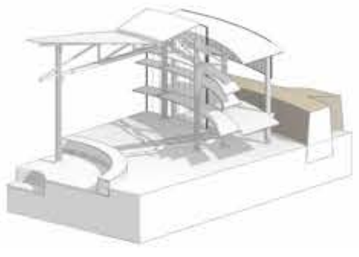
5 Shelf and work table supports notched and bolted into column structure - 22mm linseed oil treated worksurfaces and shelves fixed onto supports with concealed fixings



6 50x76 SA Pine timber purlins fixed onto notches in truss. 0.53mm corrugated roof sheeting fixed with screws and washers to purlins.

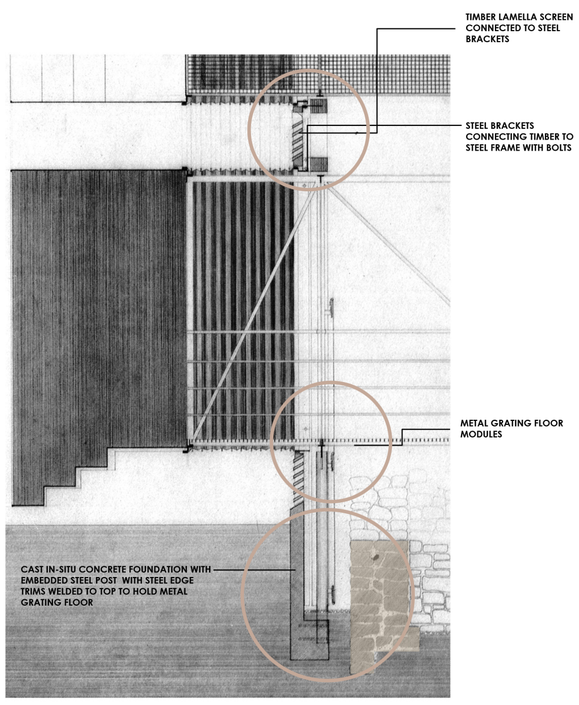


7 16mm multiwall polycarbonate fixed to framed structure with screws and matching washers. Aluminum edge trim strips connecting panels allowing for maintenance/servicing. Aluminium drip trim edge closures on all exposed edges.



1. **<u>Suboptimal Interface Geometry & Connection Type of Foundation:</u>**
   - **Rigid and Complex Connections:** The geometry of the foundation connections likely hinders ease of disassembly. Instead of opting for simplified, modular, or mechanical connections that can be easily separated, the current design uses materials and methods that create permanent bonds, making future alterations challenging.
   - **Impact on Site:** The prefabricated pile foundation may cause a higher impact on the site, especially during excavation and installation, contradicting the DfD principle of minimal site disturbance. This could affect the historical ruins and compromise the reversibility of interventions.
2. **<u>Limited Separation Between Roofing and Truss Elements:</u>**
   - **Layered Relational Dependency:** the layered nature of the assembly of the roof to wall connection reduces the ability to recover elements without damaging the the timber elements - mainly due to notched connections that are screwed together.

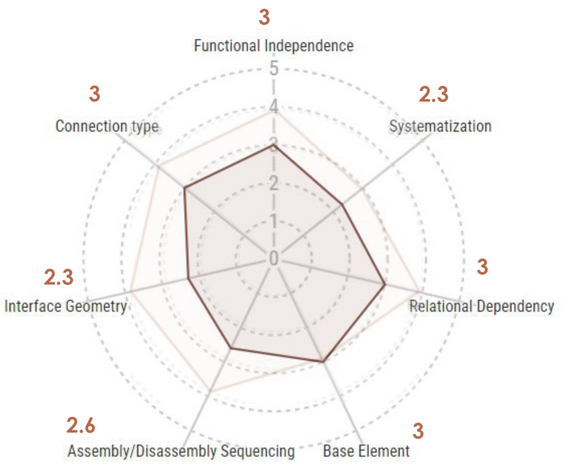
Shelter for Roman Archaeological Site | Atelier Peter Zumthor & Partner AG 1985–1986



Section of entrance (Zumthor, 1985) annotated by Author (2024)

Reversibility Assessment: Shelter for Roman Archaeological Site

	Criteria	1 Functional Independence	2 Systematisation	3 Relational Dependency	4 Base Element of the Configuration	5 Assembly/Disassembly Sequencing	6 Interface Geometry	7 Connection type
A) foundation	Scale	2	2	3	2	2	1	1
	Description	unplanned integration Insitu concrete strip foundation with embedded steel post	basic The concrete foundation acts as an independent module element	stuck Embedded steel post suggests a fixed or semi-permanent connection between the concrete and steel, indicating that these components are somewhat difficult to separate.	load-bearing The composite steel concrete foundation functions as a foundational, structural component designed to bear significant loads and transfer them to the ground.	sequential Steel post is embedded within the concrete foundation in-situ and left to cure before additional fixings are welded onto the steel post.	**closed** Due the steel post being embedded in the concrete - one cannot remove the post without completely damaging the concrete.	material bond Due to the steel post being embedded in the concrete - one cannot remove the post anchor without completely damaging the concrete.
B) floor-to-wall connection	Scale	4	3	4	4	3	3	4
	Description	modular zoning The floor-to-column/post connection is characterised by the placing of metal grating into the steel edge trim strips that are welded onto the steel post of the foundation.	moderate The flooring system is treated as a separate component to the whole structure due to the modular nature of the components.	table Metal grating sits on steel edge trim strips connected to the steel posts of the foundation (dry joinery) and is mostly independent. Timber framing attached with steel connector plates.	intermediary connective element Steel edge trim strips act as connective element between wall and floor	closed circle The floor structure consists of individual steel components placed into steel edge strips, suggesting they can be installed independently of each other without a strict sequence, however, the reinforced steel timber frames would need to be assembled sequentially to allow for structural stability - moving from each frame component to the next.	overlapping on one side Most of the connections have overlapping geometric interfaces (steel edge trim connecting floor and wall).	intermediary Use of steel bolted connections between steel & timber elements
C) wall-to-roof connection	Scale	3	2	2	3	3	3	4
	Description	planned integration Reinforced timber components are able to function independently but are restricted to specific orientations based on the connector plate placement.	basic timber & steel cross-bracing as primary structural frame with concealed internal knife plate connectors which can be installed as modules.	layered The connections between the timber wall frame and roof are secured with concealed knife plate connectors, allowing the components to be separated, adjusted, or replaced. however, it needs to be done carefully as the whole structure could be compromised.	frame The wall-to-roof timber elements are designed as frames to accommodate and allow for facade connections.	closed circle the reinforced steel timber frames would need to be assembled sequentially to allow for structural stability - moving from each frame component to the next.	overlapping on one side Most of the connections have overlapping geometric interfaces (concealed steel connector plates connecting wall and roof structure)	intermediary Use of steel bolted connections between steel & timber elements
Average		**3**	**2.3**	**3**	**3**	**2.6**	**2.3**	**3**

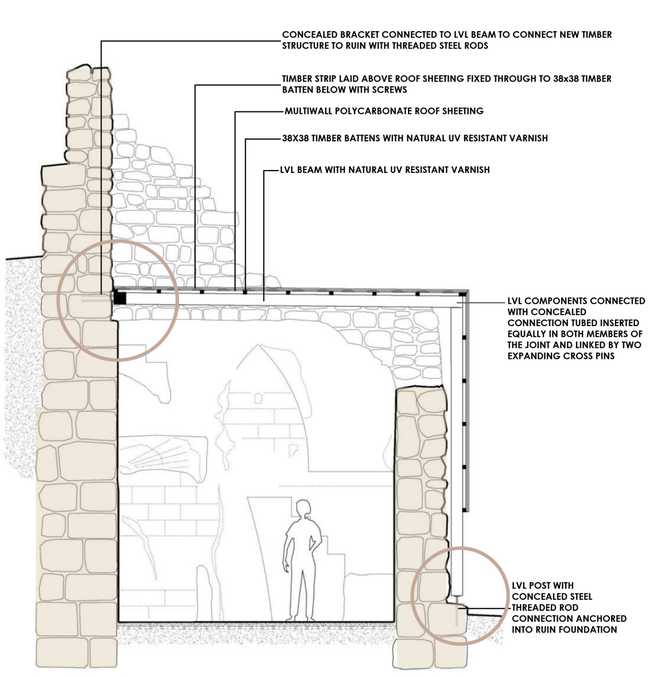


Looking back towards the entrance (Binet, 2018)

KEY TAKEAWAYS:

- Interface geometry and connection type regarding foundations are critical to adaptability.
- Integrated connective plates allow for easier assembly

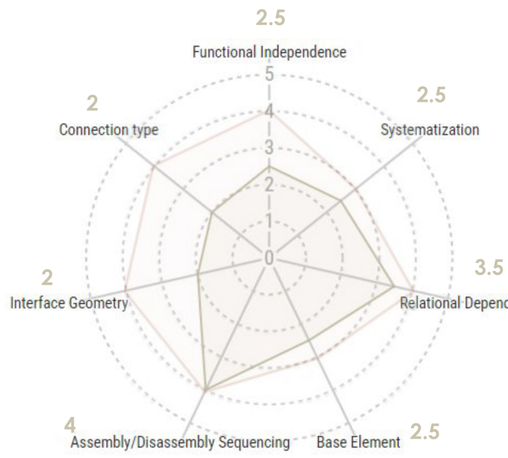
Landscape adaptation of the walled enclosure and chapel of Jorba Castle | Carles Enrich Studio 2019-2020

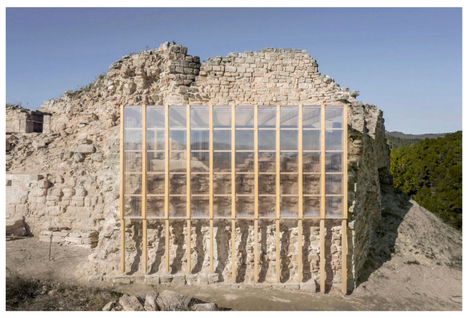


Section of walled enclosure (Enrich, 2021) annotated by Author (2024)

Reversibility Assessment: Landscape Adaptation of the Walled Enclosure and Chapel

	Criteria	1 Functional Independence	2 Systematisation	3 Relational Dependency	4 Base Element of the Configuration	5 Assembly/Disassembly Sequencing	6 Interface Geometry	7 Connection type
A) foundation	Scale	2	3	3	2	4	2	2
	Description	unplanned integration Steel threaded rod embedded into timber post and anchored into existing ruin foundation and earth.	moderate The steel threaded rod acts as a connective element but due to its embedded nature, it creates one structural facade component	stuck Embedded threaded rod suggests a fixed or semi-permanent connection between the timber and steel, indicating that these components are somewhat difficult to separate.	load-bearing The composite steel timber pinned "foundation" functions as a structural component designed to bear loads and transfer them to the ground.	parallel Steel rod is threaded into the timber post (pre-fabricated) and then installed as is on site, which allows for parallel construction and assembly of other components.	closed on one side The threaded rod connection into the timber post to form the pin connection to the ruin foundation/ground is symmetrical in nature,however, due to their direct impact and connection to the ruin, there is irreversible damage caused to the ruin itself.	direct with connecting device Due to the steel rod being embedded in the timber post-one cannot remove the rod without some sort of damage to the post. Similarly, the rod goes directly through the ruin, causing irrepairable damage.
B) floor-to-wall connection	Scale	N.A NO FLOOR	N.A NO FLOOR	N.A NO FLOOR	N.A NO FLOOR	N.A NO FLOOR	N.A NO FLOOR	N.A NO FLOOR
	Description							
C) wall-to-roof connection	Scale	3	2	4	3	4	2	2
	Description	planned integration Concealed bracket connected to LVL beam to connect new timber structure to ruin with threaded steel rods.	basic composite timber & steel LVL beam acts as a frame	table LVL components are connected with concealed connection tubes inserted equally in both members of the joint and linked by two expanding cross pins.	frame The wall-to-roof timber elements are designed as frames for future connections.	parallel Due to the modular nature of each component - the construction of each wall-to-roof connection can be done in parallel without compromising the overall assembly of the structure. However, the roof sheeting is a seperate element which would need to be the final component assembled and the first to be disassembled.	closed on one side Most of the connections have symmetrical geometric interfaces (concealed steel connector plates connecting wall and roof structure), however, due to their direct impact and connection to the ruin, there is irreversible damage caused to the ruin itself.	direct with connecting device Due to the steel rod being embedded in the timber post-one cannot remove the rod without some sort of damage to the post. Similarly, the rod goes directly through the ruin, causing irrepairable damage.
Average		**2.5**	**2.5**	**3.5**	**2.5**	**4**	**2**	**2**





Front elevation of the walled enclosure (Goula, 2021)

KEY TAKEAWAYS:

- Although the pinned connections generally have a much lower site impact, the integration of them directly onto the ruin could have been avoided.
- Concealed fixings allow for easier assembly between timber units and allow for easy transportation of elements as there are not large prefabricated facade components used.

Dovecote Studio | Haworth Tompkins 2010

Section of design (Tompkin, 2010) adapted by Author (2024)

Reversibility Assessment: Dovecote Studio

	Criteria	1 Functional Independence	2 Systematisation	3 Relational Dependency	4 Base Element of the Configuration	5 Assembly/Disassembly Sequencing	6 Interface Geometry	7 Connection type
A) foundation	Scale	1	2	1	2	1	1	1
	Description	total dependency Insitu concrete slab laid over existing foundation	basic The concrete foundation acts as an independent module element	closed The concrete foundation acts as an independent module element	load-bearing Concrete slab acts as the loadbearing base element of the design.	sequential No other works can occur on-site until the slab is cast and cured.	**closed** **The foundation cannot be removed without breaking itself and damaging the existing slab below**	material bond There is a direct connection between the new and old concrete slab through the wetworks
B) floor-to-wall connection	Scale	4	5	2	3	3	4	4
	Description	modular zoning The floor-to-wall connection is pre-determined in the digital realm where the steel framed system is designed to fit onto pre-fixed steel tracks on the new concrete slab.	very high Due to the design being a box module that is fitted with cranes into the existing ruin, there is a very high level of systematisation between all of the components.	layered The design is layered in nature where each component relies on the other for function. One would need to assemble/disassemble the structure layer by layer for repairs/maintenance.	frame The steel frame acts as the base element, allowing for wall to floor and roof to wall connections.	interlock The steel framed unit locks into the steel tracks on the floor slab guided by crane manipulation into place. A crane would need to be used to assist with the disassembly in the same manner.	symmetric The floor-to-wall connection is symmetric - allowing for easy disassembly/removal with the use of a crane.	interlock The steel framed unit locks into the steel tracks on the floor slab guided by crane manipulation into place. A crane would need to be used to assist with the disassembly in the same manner.
C) wall-to-roof connection	Scale	4	5	1	2	2	4	4
	Description	N.A same as above due to continuous geometric nature of the module	N.A same as above due to continuous geometric nature of the module	N.A same as above due to continuous geometric nature of the module	N.A same as above due to continuous geometric nature of the module	N.A same as above due to continuous geometric nature of the module	N.A same as above due to continuous geometric nature of the module	N.A same as above due to continuous geometric nature of the module
Average		**3**	**4**	**1.6**	**2.6**	**1.6**	**3**	**3**

KEY TAKEAWAYS:

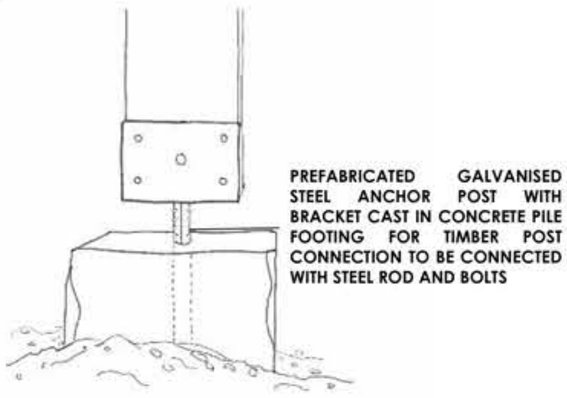
- Large prefabricated and pre-assembled units assist in high systemisation but can perform poorly if using cranes are the only option for assembly and disassembly
- It is clear that throughout all three precedents, the foundations used were low ranking regarding reversibility. For this reason, a large portion of the authors efforts will be focused on optimising the foundation assembly.

Dovecote studio (Vile, 2010)

IMPROVED ITERATIONS

Learning from precedents and unpacking the relevant improvements needed from the initial design

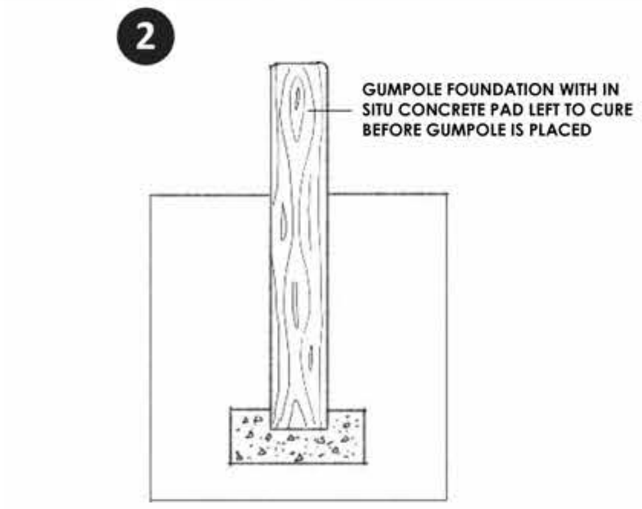
1



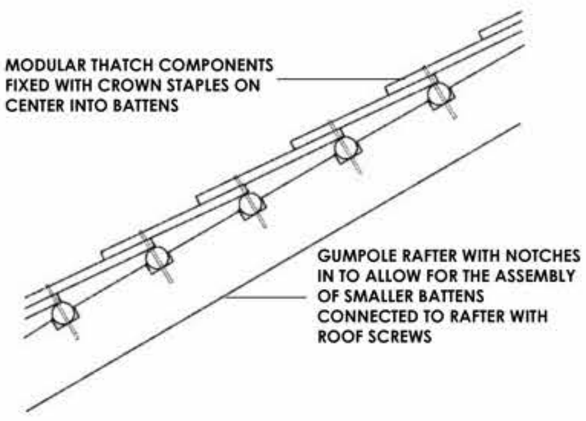
The use of steel rods and bolts ensures easy disassembly, while the modular nature of the components allows for adaptability and reuse. The overall system ranks highly in terms of relational dependency and interface geometry, making it suitable for reversible and sustainable construction practices. However, the system generally has a higher footprint and site impact due to the concrete.

Moderate degree of systematisation with modular zoning and layered relational dependency. The intermediary connective element between the columns and trusses ensures structural integration, while symmetry in the notches and bolted joints contributes to the system's stability. The closed-circle assembly sequencing means that the structure is self-supporting when all parts are in place.

2

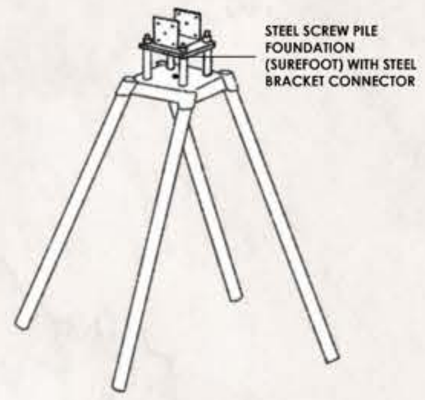


Lower degree of flexibility and reversibility. It has unplanned integration, basic systematisation, and a layered relational dependency, making the system difficult to adapt or disassemble without significant structural intervention. The use of a material bond in the connection and a closed interface geometry further limits the adaptability and reuse potential of this foundation system. However, due to less concrete use, there is a lower footprint and thus site impact.

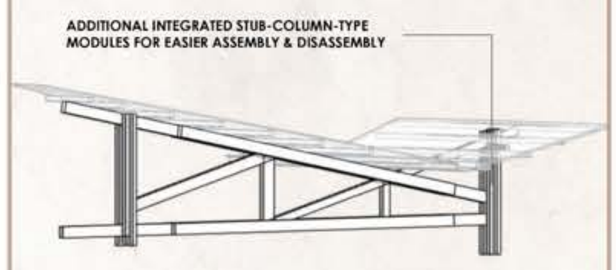


Planned integration of elements, providing structural stability with a moderate degree of systematisation. The connections between elements are layered, with a sequential assembly process. While the notched rafters offer an overlapping interface, the direct mechanical connections via screws and staples suggest that disassembly may be more difficult, requiring significant manual effort.

3



The prefabricated steel screw pile foundation with a steel bracket and bolt connections provides a well-optimised modular system. Its high level of systematisation and modular zoning makes it efficient and flexible, allowing for independent assembly, disassembly, and future adaptability. The interface geometry is symmetric, enhancing its reusability, and the direct connection type ensures stability while maintaining some ease of disassembly.



By incorporating additional timber stub column-type modules, the design facilitates easier installation and bolted connections. This allows for the removal, repair, or maintenance of individual trusses without damaging other components. The emphasis on modular construction and bolted connections enables each element to function independently and be assembled or disassembled without disrupting other parts of the structure. This approach enhances flexibility and adaptability, simplifying repair or replacement while preserving structural integrity through careful systemisation and relational dependency.

ASSESSMENT OF IMPROVED DESIGN

Reversibility Assessment: Improved Iteration

	Criteria	1 Functional Independence	2 Systematisation	3 Relational Dependency	4 Base Element of the Configuration	5 Assembly/Disassembly Sequencing	6 Interface Geometry	7 Connection type
A) foundation	**Scale**	1 2 3 4 **5**	1 2 3 **4** 5	1 2 3 4 **5**	1 **2** 3 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5
	Description	no dependency Due to the nature of the steel surefoot foundation pile- each element is able to be interchanged and adapted for future use.	high The pile foundation acts as an independent modular element that is easily assembled on site by hand. It is able to be installed and removed without damage to connective elements and the site itself.	open Due to the completely dry connections found in the surefoot pile itself and the subsequent bolted connections, it acts as an independent element that allows for multiple connective elements to build off of itself.	load-bearing The prefabricated steel screw pile functions as a foundational, structural component designed to bear significant loads and transfer them to the ground.	parallel Due to the modular nature of each component - the construction of each wall-to-roof connection can be done in parallel without compromising the overall assembly of the structure. However, the roof sheeting is a seperate element which would need to be the final component assembled and the first to be disassembled.	**symmetric** **Symmetric geometric interfaces are used to ensure structural stability as well as ease of future assembly & disassembly.**	intermediary The connection between the steel bracket of the screw pile foundation and the timber columns make use of steel rod and bolts.
B) floor-to-wall connection	**Scale**	1 2 3 **4** 5	1 2 **3** 4 5	1 2 3 **4** 5	1 2 **3** 4 5	1 2 3 **4** 5	1 2 **3** 4 5	1 2 3 **4** 5
	Description	modular zoning The floor-to-column connection is pre-determined in the digital realm where notches are made in the column system for the floor joists to be placed through and bolted together.	moderate Floor joists are individual components placed into larger column notches with adjustable brackets to accommodate different floor heights and connected with bolts. The columns are prefabricated modules that are bolted to the bracket on the surefoot pile foundation.	table The floor joists are individually placed into column notches and fastened with bolts. indicating that the components are easily separable and can be adjusted or replaced without disturbing the entire structure. The prefabricated columns being bolted to anchor post brackets further indicates a level of modularity and flexibility, with components that can be disassembled or reconfigured relatively easily.	**frame** **The column is designed with notches to accommodate the floor joists and other structural members. Thus, the frame is the base element.**	parallel The floor joists are individual components placed into notches. suggesting they can be installed independently of each other without a strict sequence. The prefabricated columns being bolted to anchor post brackets indicates modularity, which often allows for components (like the columns and joists) to be assembled or disassembled concurrently or in a non-linear order.	overlapping on one side The floor joist-to-column connection is bolted together, overlapping on one side.	intermediary use of steel rod and bolted connections between timber elements
C) wall-to-roof connection	**Scale**	1 2 3 **4** 5	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5
	Description	modular zoning The wall-to-roof connection is pre-determined in the digital realm where notches are made in the column system for the pre-fabricated and pre-assembled trusses to be placed through and bolted together in critical areas.	moderate The pre-assembled and pre-fabricated nature of the timber trusses lean towards moderate systemisation as they contain column elements that allow it to connect to columns but also function independently.	table The pre-determined digital design with notches in the column system and the use of pre-fabricated trusses suggest a precision-based connection, where elements fit together closely but can still be separated if necessary due to adjusted truss and column design that allows for independent structural stability and assembly.	intermediary connective element The notches in the column system and the pre-fabricated trusses indicate that the connection point between the wall and roof serves as a key interface allowing the structural elements to come together. Since the column system and the trusses are connected through bolted joints, the notches and bolts act as an intermediary, facilitating the transfer of loads and ensuring structural integrity.	parallel The trusses and columns are interlocked in such a way that their assembly forms a cohesive and self-supporting structure but both elements are able to function independently. This allows for parallel assembly of the columns and trusses at any point.	symmetric Most of the notches and connections require symmetric geometric interfaces to ensure structural integrity with some instances of open geometry in the case of dry joinery without bolted connections.	intermediary use of steel bolted connections between timber elements with some material to material bonds without fixings

Benchmark		4	3	4	3	4	4	4
Initial design		3.3	2.3	3	3	3	2.6	3
Average (Improved)		**4.3**	**3.3**	**4.3**	**3**	**4**	**3.6**	**4**
% Improved		**30.30%**	**43.50%**	**43.30%**	**0%**	**33.30%**	**38.50%**	**33.30%**
Total improvement		**31.74%**						

High level of systematisation: The modular nature of the prefabricated steel screw pile foundation and bracket connections ensures efficient, systematic assembly and disassembly, allowing for future adaptability.

Independent assembly/disassembly: The modular zoning allows each component to function independently, making it easier to remove, repair, or maintain specific parts without affecting the overall structure.

Flexibility and adaptability: The use of bolted connections and additional timber stub-column-type modules enhances the structure's adaptability, making modifications or repairs simpler and less intrusive.

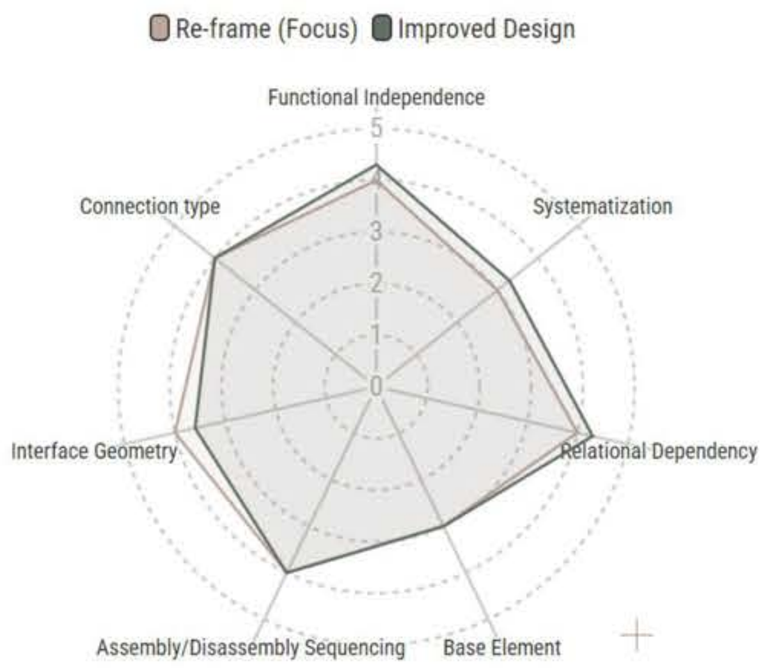
Reduced site impact: Compared to concrete pile footings, the steel screw pile foundation minimizes the footprint and environmental impact on the site, making it a more sustainable option.

Optimized reusability: The symmetric interface geometry and bolt connections allow for easier reassembly, ensuring the structure can be reused or adapted for future needs.

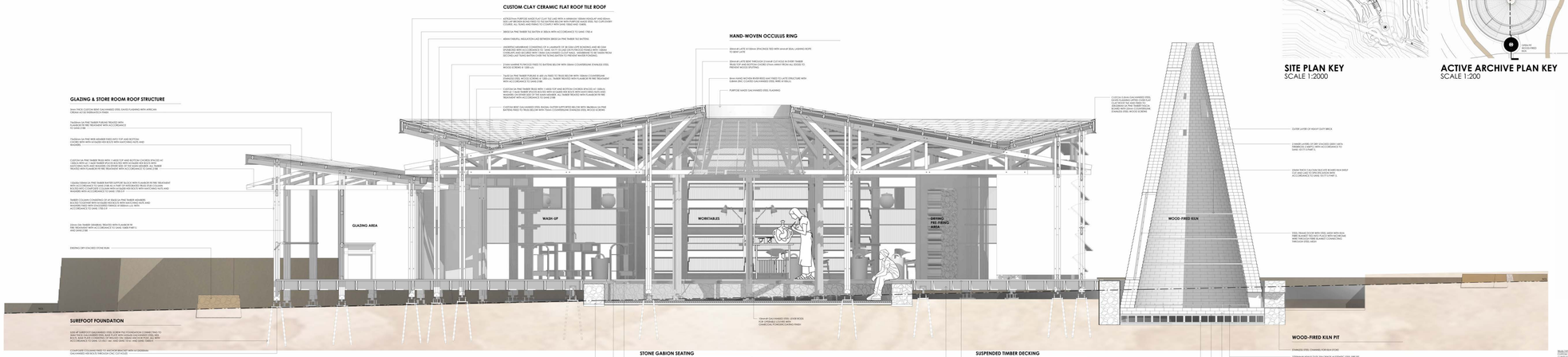
Ease of repair and replacement: The emphasis on modular construction with easy bolted connections simplifies maintenance, allowing individual trusses to be removed and repaired without damaging other components.

Structural integrity: Despite the ease of disassembly, the system maintains strong structural stability through thoughtful systemization and relational dependency between elements.

Efficient installation: The prefabrication and use of screw piles streamline the installation process, reducing construction time and complexity while maintaining stability.

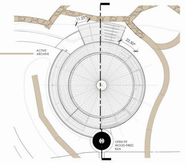


REVERSIBLE CONSTRUCTION | THE ACTIVE ARCHIVE POTTERY WORKSHOP

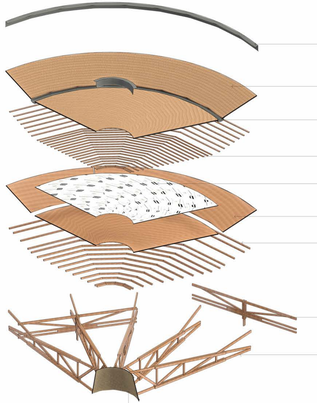


ACTIVE ARCHIVE POTTERY WORKSHOP
SCALE 1:20

SITE PLAN KEY
SCALE 1:2000



ACTIVE ARCHIVE PLAN KEY
SCALE 1:200

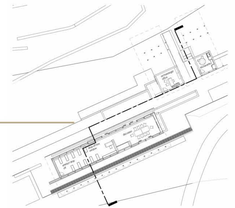


ASSEMBLY PROCESS
SCALE 1:100

EXPLODED AXONOMETRIC
SCALE 1:50

SEMI-REVERSIBLE CONSTRUCTION | ARTEFACT DROP-OFF ZONE

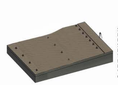
SITE PLAN KEY
SCALE 1:2000



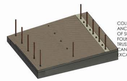
ARTEFACT DROP-OFF PLAN KEY
SCALE 1:200

ARTEFACT DROP OFF
SCALE 1:20

ARCHAEOLOGIST, ENGINEER & GEO-TECH SPECIALIST EXCAVATIONS - EXCAVATION WORK DONE THROUGH CONSTRUCTING A TEMPORARY CANOPY. THE MEMBERS WILL BE REUSED IN THE POTTERY WORKSHOP



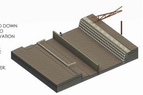
SITE SURVEY CONDUCTED BY SPECIALISTS TO DETERMINE THE BEST SUBROOT PLACEMENT. THE LINE OF SUBROOTING ON THE SITE WILL BE REMAIN. THE OTHERS WILL BE REUSED IN THE POTTERY WORKSHOP CONSTRUCTION.



COLUMNS BOLTED INTO ANCHOR POST BRACKETS OF SUBROOF. CONSTRUCTED TO RECEIVE TRUSSES FOR TEMPORARY CANOPY FOR EXCAVATIONS.

TRUSSES BOLTED INTO TIMBER COLUMNS TO CREATE THE TEMPORARY CANOPY FOR THE EXCAVATION CANOPY.

A TARP WILL BE TIED DOWN OVER THE TRUSSES TO PROTECT EXCAVATION WORKERS AND ARCHAEOLOGISTS. TEMPORARY STONE RETAINING WALLS WILL BE BUILT AS EXCAVATING LOWER.

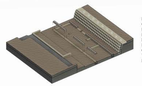


STRUCTURE AND FOUNDATIONS, RETAINING WALLS REMOVED). GUARDING REMAIN. ALL TRUSSES AND COLUMN MEMBERS DESIGNED TO BE REUSED IN THE CONSTRUCTION OF THE POTTERY WORKSHOP.

ALL EXCAVATED MATERIAL IS TO BE SIEVED FOR ANY HISTORICAL ARTEFACTS. ARTEFACTS FOUND WILL BE USED TO CREATE EXHIBITION PIECES FOR THE ARRIVAL PAVILLION.

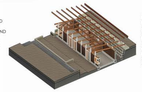
ALL SOIL TO BE USED IN THE CONSTRUCTION OF THE CEB BLOCKS

ASSEMBLY PROCESS
SCALE 1:100

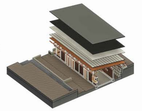


PRECAST REINFORCED CONCRETE PLINTHS PLACED ON REINFORCED FOUNDATION CAGES TO FORM A LEVEL AND SOLID BASE FOR THE CONSTRUCTION OF THE CEB BLOCK AND CEB BLOCK WALLS

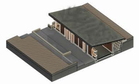
CEB WALLS CONSTRUCTED WITH SUPPORTIVE TIMBER FRAMES FOR DOORS AND WINDOWS TO BE PLACED IN WITHIN THE CONSTRAINTS OF THE TIMBER COLUMNS SPACED @ 1500c/c

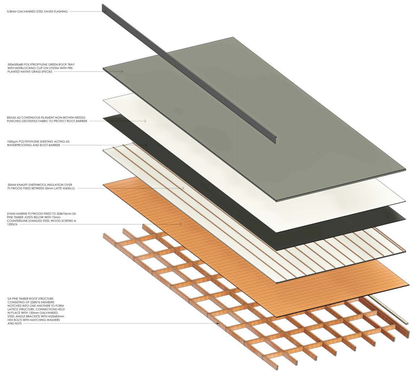


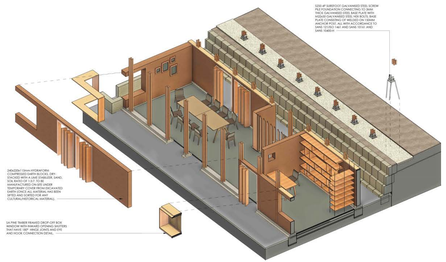
TIMBER RAFTERS NOTCHED TOGETHER TO FORM ROOF LATTICE SRTUCTURE AND BOLTED SECURELY TOGETHER WITH M20x60mm GALVANISED BOLTS, WASHERS AND NUTS THROUGH GALVANISED STEEL EQUAL ANGLE BRACKETS.



ROOF LAY UP CONSISTING OF 100MM DIA LATTE ON TOP 50MM DIA LATTE ON TOP 50MM KNAUF INSULATION TO BE LAID IN BETWEEN LATTE BEAMS & 12MM WATERPROOF PLY OVER. ON-WOVEN GEOTEXTILE TO BE PLACED ON TOP OF DPM TO PROTECT FROM ROOTS THEN FINALLY THE MODULAR PLANTER UNITS ARE SECURED AND SLOTTED INTO ONE ANOTHER TO FORM A CONTINUOUS GREEN ROOF.







EXPLODED AXONOMETRIC
SCALE 1:50

ACTIVE ARCHIVE POTTERY WORKSHOP

ARTEFACT DROP-OFF

CRITICAL REFLECTION

THE DESIGN PROCESS
Due to the research being focused on materialisation, the planning and design of how this building would be put together is at the forefront. For that reason, there was a reflexive connection between the conceptual underpinnings of the project and the practical design and assembly of the proposal, which should be very site sensitive.

THE FINAL DESIGN OUTCOME
The goal of the project was to renegotiate the relationship between oneself, building and the ruin in order to reinterpret and understand the ruin from a more intimate point of view. The scalability, from closer and completely reversible, to further away and more earthbound, naturally allows for a spatial experience that is reflective of both the shape, past use and potential, embedded in the ruins. Spaces were designed to welcome areas of collaboration and discussion but also reconnection and reflection regarding ruin potential and heritage preservation through this more intimate relationship to the ruin. The biggest challenge was in determining how much one should intervene, and focusing on building technology allowed the manifestation of the design to be reflective of the required sensitivity when being in closer proximity to something that is ancient and undefined.

As an initial point of departure, the project focused on the interface between the building and the ruin at an architectural level. This approach fosters a deeper understanding and sensitivity toward the ruin, which can then be expanded to a broader scale. By providing a meaningful contemporary experience—one that allows individuals to engage intimately with the site and form their own perspectives—there is potential to influence the larger context. This can lead to a greater appreciation for the value of these ruins, encouraging people to reconsider what might otherwise be overlooked, such as a pile of stones by the roadside, which could represent the remnants of a home from the past.

VALUE WITHIN THE DISCOURSE OF SOUTH AFRICAN ARCHITECTURE
The project aimed to provide more insight into a portion of our history which is lesser known, through which architecture can act as a vehicle to understand and safeguard these narratives. There is a need for re-identification and sensitivity towards the South African landscape and this project aims to do this through sustainable architectural construction typologies and relevant programmatic decisions that can aid in communal revitalisation and cultural knowledge exchange.