

Chapter Five

TECHNÉ

This chapter serves as the validation of the conceptual and the theoretical aim towards the technification of the project and investigates the architectural response towards what the project intends to contribute as architectural intervention.

*Figure 5.1
The ruins of Fort Commeline
(Author, 2018)*

5.1 A heritage and theoretical driven concept

Reflecting on the historical value that this precinct conveys, it is apparent that Fort Commeline, has not officially been declared as a national monument of Pretoria. Thus, its value would be considered debatable after it has been disregarded for so long. However, this majestic ruin is considered as heritage matter and remains under the protection of the 1999 Heritage Act that protects any building older than 60 years.

As Fort Commeline is known as being foreign, or in this case, rather referred to as, royal heritage site, the conceptual approach is hereby aimed as that of which honours the existing heritage identity. It is hereby implemented as contrasted iteration of the existing and the new proposed intercession, where the former built fabric becomes the crafting tool for the narrated memory and which is utilised to create a habitual continuity of identity throughout the site.

The main objective however is that there should be a degree of contrast, in order to segregate the old from the new. The articulation of the design is implemented as a disruption of space between the tectonic and stereotomic. The purpose however is to segregate matter as contrasted continuity between the existing and the new built fabric.

This contrasting approach emphasise on the existing heritage as substance which the new is crafted from, while maintaining the presented articulation of spatial identity throughout the site. As a reflection on the theoretical approach, the mere progression of time transforms heritage fabric and would ultimately be deciphered as a change in its character.

MATERIALITY

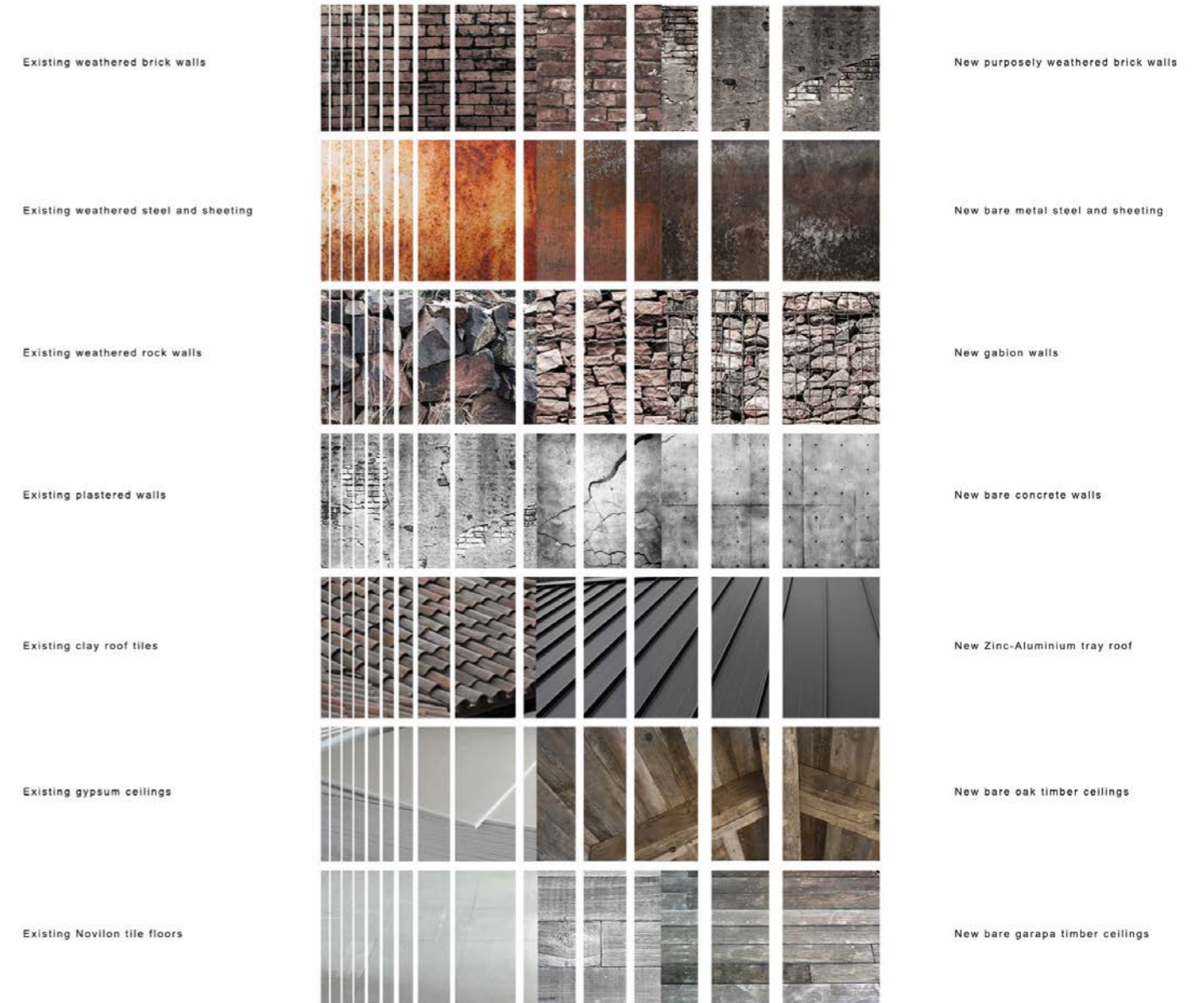


Figure 5.2
The Materiality (Author, 2018)

5.2 Tectonic and Stereotomic as catalyst

It is hereby argued that the degree of contrast throughout the architecture would be determined by the spatial comprehension of each intervention. Though, heritage value as well as the architectural scale and form fluctuates throughout the site, consequently the materiality of each intervention becomes imperative detail as distinction between the old and the new.

5.2.1 The Tectonic

It is well known that the Greek term "tectonic" is derived from the term "tekton" that refers to a form of craftsmanship in the form of carpenter or builder. This term originates from the sanskrit term "taksan", which refers to carpentry. The poetic connotation of this specific term first appears in the writing of the Greek poet Sappho where the carpenter assumes the characteristics of a poet "tekton" (Frampton, 1990).

This meaning undergoes further evolution as the term passes from being something specific and physical to the more generic notion of theory and poetry, an association of machination and false things. Hereby referring to the Ontological vs. Representational (Frampton, 1990).

Finally, the Latin term 'architectus' derived from the Greek archi (a being of authority) and tekton (builder or craftsman). The earliest appearance of the term 'tectonic' in English dates from 1656 where it appears in a glossary meaning 'belonging to building', almost a century after the first English use of the term 'architect' in 1563 (Frampton, 1990).

According to Frampton, the term 'tectonic' can never be separated from the 'technological'. As a result, a certain ambivalence arises. In this regard, it is possible to identify three distinct conditions:

1. The technological object, which arises directly out of meeting a physical need.
2. The scenographic object, the character or nature which may be used equally to allude to an absent or hidden element.
3. The tectonic object, which appears in two methods. We may refer to these two methods as the ontological and representational tectonic.
 - Ontological: Constructional elements that is shaped to emphasise its static role and cultural status. (The tectonic as it appears in Botticher's interpretation of the Doric column) (Grassi, Summer 1980)
 - Representational: Involves the imitation of the above constructional which is present but considered as hidden marionette.

Today tectonic architecture is known as an approach to architecture which, at the outset, anticipates merging some philosophies or theories that possibly have the capacity to resist the seemingly negative influences of these archetypes. It is therefore designated to address the subject of tectonic form in this project, though least of which is the current tendency to reduce architecture to scenography.

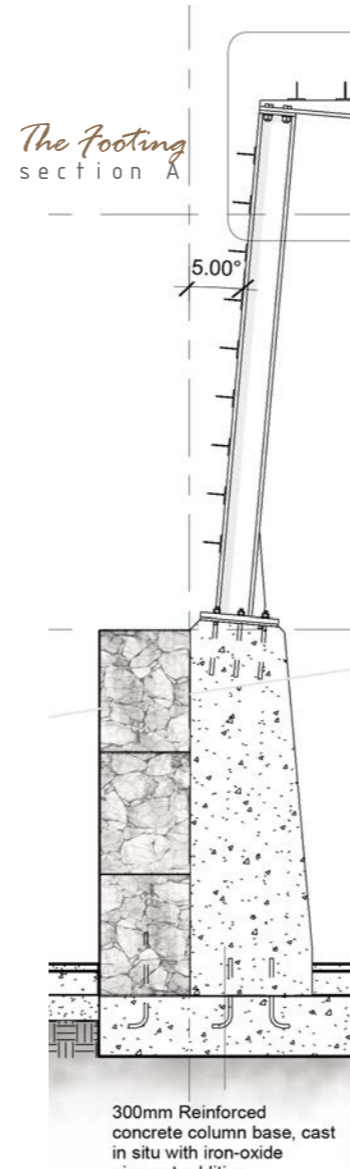


Figure 5.4
A detail of the Fort Commeline's footings
(Author, 2018)

5.2.2 The Stereotomic

The consideration of built fabric reflects on the site scattered with substantial built fabric that could stand as vernacular design implementation from which the sustainable architecture could be crafted from. By simply implementing strategies such as rehabilitation as well as consideration of possible future program, this site could be rejuvenated into a prosperous valued response in relationship of man and nature.

Using the existing framework proposed in and local materials within its vernacular, a sustainable architecture could be crafted. The method however is to preserve where it is possible and to refine the site thoroughly to become the social and ecological hub it wants to be. Adaptive reuse is used as a means of justifying alterations made to the existing heritage fabric, with the guidance to change as little as possible while attaining the most desirable effect.

The intention is to preserve the structural form of the existing envelope, but to subtly intervene architecturally where new programmes require change. Furthermore, to create a new intervention within the landscape, which relates to the programmatic requirement of providing facilities for the research of African plant species and crops under the threat of extinction and in this way preserving the heritage of the land.

5.2.3 The poetry among the tectonic and stereotomic

To craft a contrast between the old and the new, the ideal is to create a tectonic perception to the space. Serving as the progressive mediator and thresholds of character (verticality) among space (horizontal) of the landscape. It is however important to note that, due to the fragile state of the existing built fabric, the proposed design attempts to ex-hume the structure in order to recreate former form from existing ruins.

Though the structure proposes an emphasis on the tectonic form, it does not necessarily favour either constructivism or de-constructivism, but rather unembraced and considered as sense of the temporary transition among space.

Fort Commeline's Roof
section A

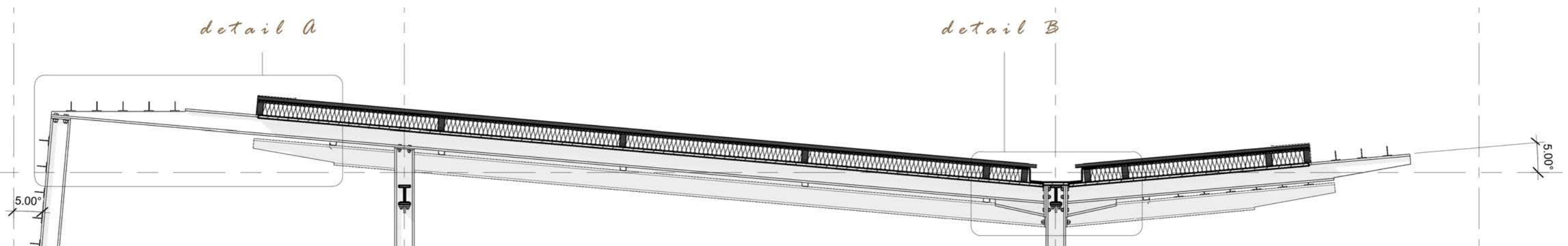


Figure 5.3
A detail of the Fort Commeline's roof
(Author, 2018)

5.3 Structural Systems

It is argued in this dissertation that the natural life cycle of architecture and decay of built fabric form a continuity among space. By utilising the vernacular materials as a cradle-to-cradle attempt, places one in the continuum of time and contributes to the narrative of use, over time. Materiality therefore becomes an imperative characteristic that contributes to the contrast between the old and the new and the conception of narrative over time.

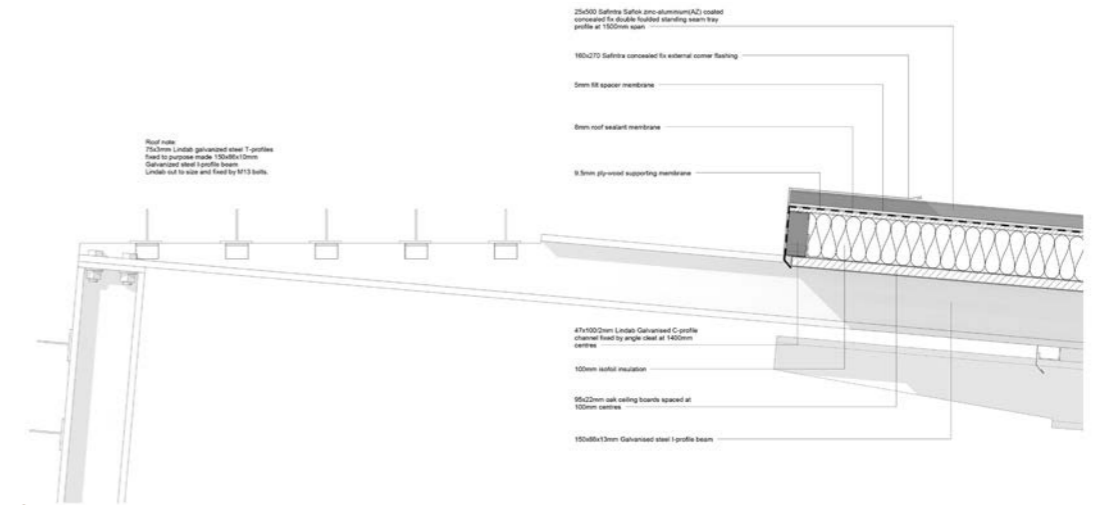
The concept draws from Fort Commeline's natural and existing typology as projected reference. The existing roofless redoubt, a regarded stereotomic structure, assimilates itself as grounded material, planted as mediator of both the earth and sky. As the existing built fabric is but ground and stone, defined only by the outlines of the mound, the fortification remains undefined. Gabion walls will therefore be utilised to re-form the fortified structure, and a tectonic steel structure would cut through the landscape, informing the new.

In support of the poetic concept that aims to contrast the new from the former built fabric, the proposed theatre is celebrated as acting mediator among the fort and SAPS radio technical headquarters. This new intervention will become a representative narration of identity, utilising materials such as I-beams and concrete, that have a historical value to the Magazine Hill precinct, representing the intersection of old and new as well as the continuity of narration.

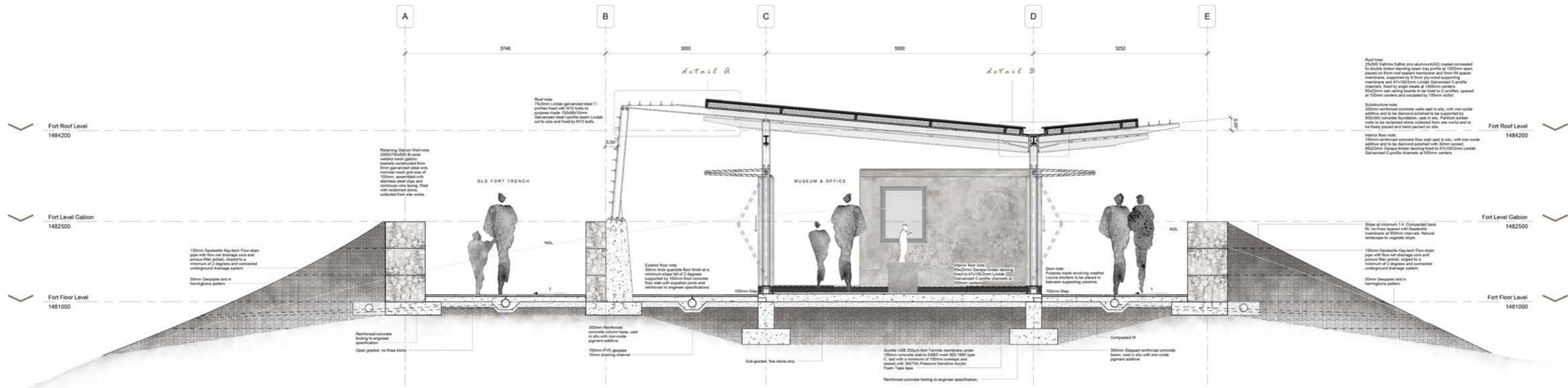
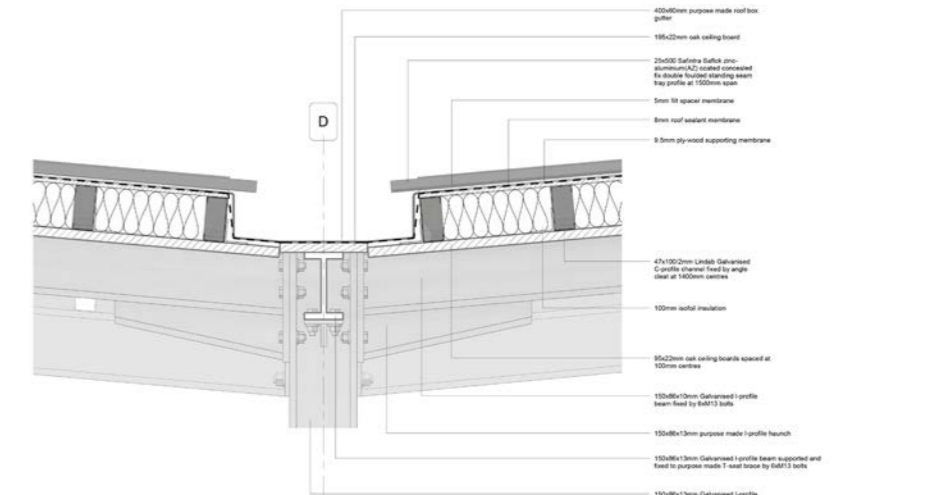
Figure 5.5
Opposite: Detail A (Author, 2018)

Figure 5.6
Opposite: Detail B (Author, 2018)

detail A
section A



detail B
section A



Fort Commeline
section A

Figure 5.7
Fort Commeline - Section A
(Author, 2018)

5.4 Structure and Materiality

5.4.1 Materiality

Reflecting on the theory of Chapter Three as well as the transformation of heritage in Chapter Four, it is apparent that restoring the built fabric to its former "historical" state would not be possible. Consequently, altering the remnants of the ruins in order to construct the "new" from the former.

It is with this regard that the rehabilitative vernacular would serve as resource in crafting the "new" and would illustrate the aging of these elements, both the sub-structure and super-structure over time. Placing the 'being' and character thereof within the continuum of time and allowing the new narrative to be articulated throughout the use of these natural materials.

5.4.2 Sub-structure

It is articulated within this proposed scheme that the sub-structure would serve as the "new" narration of the existing. The stone trench walls running on the brim of the hill were used as elements segregating space but mediates the ruin and structure. These ruins are hereby reinterpreted as the fragmented narrative, acting as chaperone of the site, guiding the 'being' throughout the site and essentially becomes an extension of the heritage.

These former protective barriers of trench-like walls are hereby translated as either ascending element throughout the narrated site or considered as retaining structures, as the sub-structure is essentially lowered into and fixed unto the earth. Consequently, the new intercession of space becomes the re-interpretation of this royal identity. However, utilising matter that has a rehabilitative nature would effectively ensure the South African perception of the built environment.

It is intended that the sub-structure would serve as stereotomic language and be articulated as the rehabilitated vernacular, becoming a natural cycle of decay and structure. Forming a continuity throughout the use of ruined matter, placing the 'being' in the continuum of time and crafting the new narrative as a result.

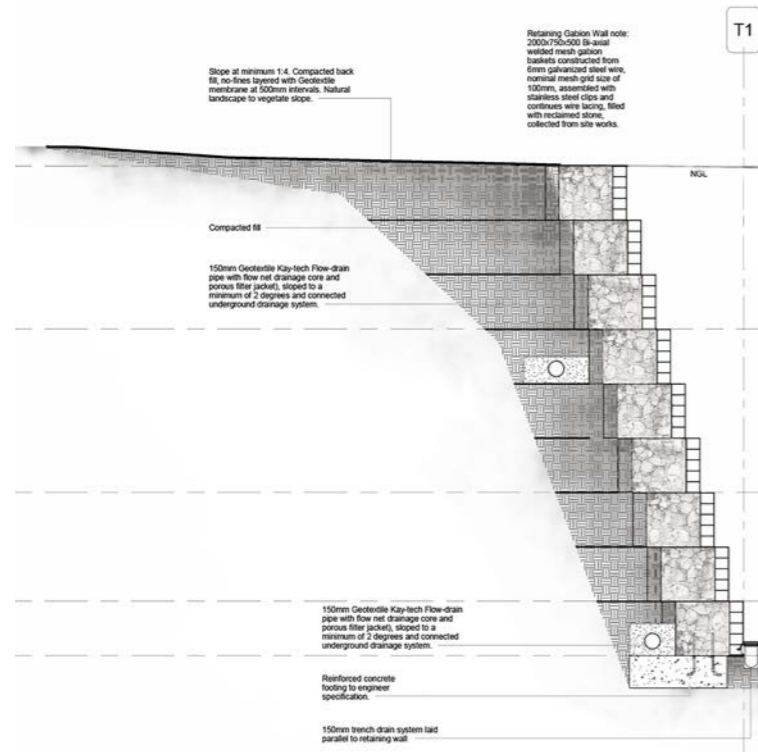


Figure 5.8
A detail of the Theater's retaining wall
(Author, 2018)

5.4.3 Super-structure

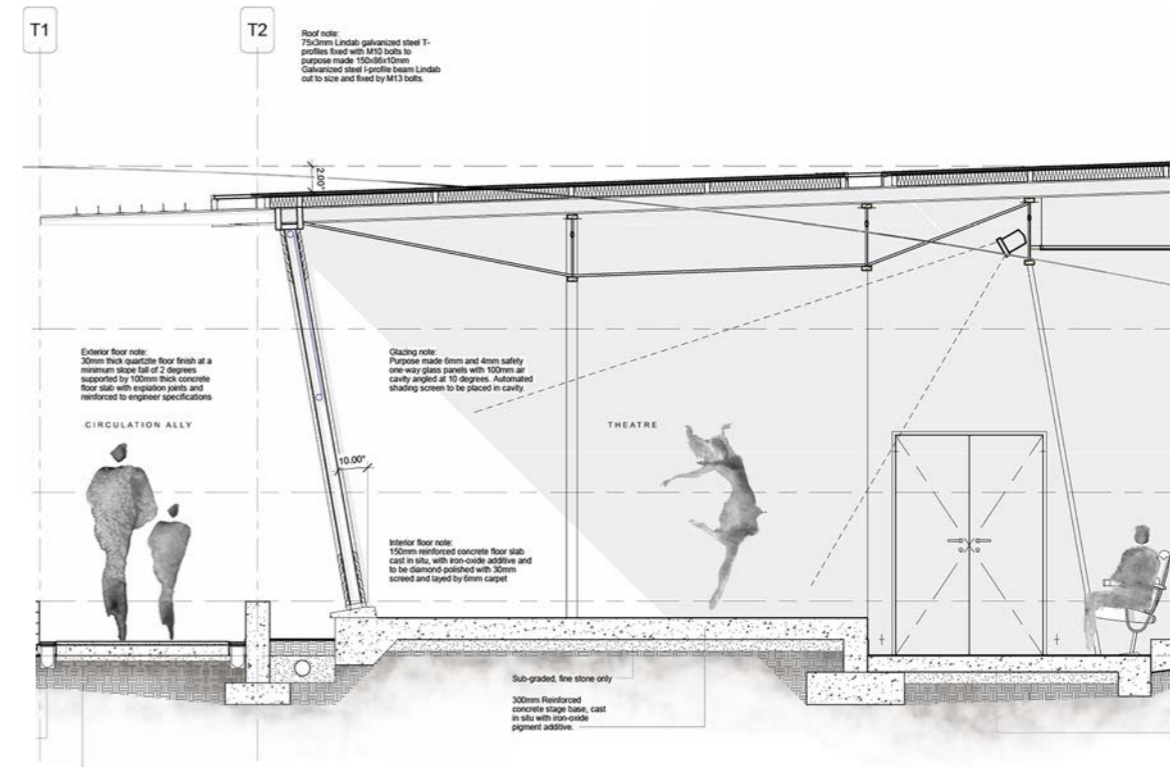
Matter therefore becomes a vital characteristic of contrast between former and 'new'. It is hereby understood as the super-structure would serve as deciphering the 'new', graciously flowing over the landscape, serving as an extension of the sub-structure, a translation of theory and poetry that the heritage conveys.

The super-structure further progresses as a tectonic language and utilises matter as an extension of space and the landscape it is situated in. As a reflection of Turning to Ruins in Chapter Two, heritage becomes the poetic narration of heritage over time, by using steel frame I-beam structure and steel roof.

5.4.4 Experiencing the Site

The aim of this architectural intercession within its considered built heritage is to gracefully mediate where the transition of space as discussed in the theory chapter. The relationship among the former and the 'new' intercession becomes an imperative element, in order to convey the perception of continuity of space.

With the new intercession of these spaces initially presented as a subtle transition between the former and the 'new' but would become more superficial and dramatic as one ascends through the site.



The Theatre
section B

Figure 5.9
The Historical Performance Centre - Section B
(Author, 2018)

5.5 Environmental Strategies

As a reflection to the history of Fort Commeline as well as the Magazine Hill precinct celebrated for its stories, as well as it being a self-sustained community, it is imperative to create architecture that responds to this intangible and rather isolated heritage of the site. This is achieved by implementing passive design strategies such as the use of natural lighting, natural ventilation and acoustics control.

5.5.2 Acoustics

It is well known that this scheme aims to explore the poetic characteristics utilizing certain natural elements such as water, light and shadows. In addition, it also addresses the practical and effective use of acoustics, where experiencing the theatre as a poetic and communicative platform, it becomes an imperative aspect of the design.

As the principle of acoustics relies mostly on the directive analysis and planning of the space, it poses to be addressed as conceptual approach towards understanding the poetic experience that would be birthed from the theatre. However, due to the theaters posture in the landscape, the theatre explores not only the directive control of acoustics but would also address the analytical analysis.

From the conceptual approach, it is proposed that the retaining walls would serve as damper of excessive sounds influencing the spatial experience of the fort. The glazed façade would serve as window to the poetic experience of the space as well as directing the reflective sound waves rebounded from the rear of the theatre. Lastly, the theatre would be acoustically controlled by the adequate damping and reflective panels, directing and controlling the acoustics.

5.5.1 Natural Ventilation

It is apparent that the predominant wind comes from the north-west and north-east. Reflecting on the posture of the fort and the theatre, it is argued that the fortification as an open structure would be protected by slatted screens and provide passive direct ventilation, whereas the theatre would be obscured by the landscape and would only be exposed by the defused ventilation. It is therefore argued that the buildings are orientated and critically placed in such a way that the façades are orientated within this range of wind direction, in order to increase the effectivity of cross ventilation within these spaces.

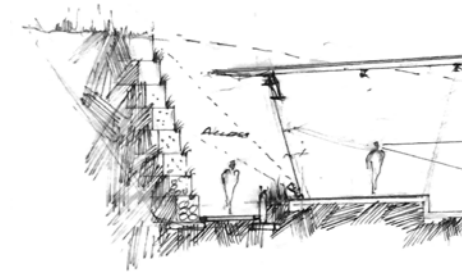
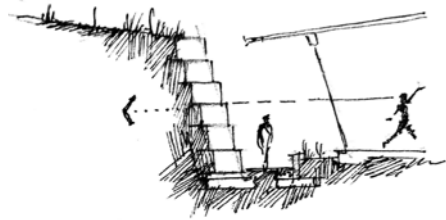


Figure 5.10
A conceptual iteration of the sustainable acoustic absorption (Author, 2018)

Construction Element or Zone Area	Material Description	Quantity	L (m)	W or H (m)	Area 'S' (m ²)	α Absorption Coefficient (at 250 Hz)	Sound Absorption per Element Area	Total Absorption (Sabins) (Empty) (m ²)	Total Absorption (Sabins) (Occupied) (m ²)
Ceiling	12.7 mm Gypsum board, on Brandering, Slatted Ceiling	1	25.915	21.215	549.79	0.1	54.98		
Walls	6 mm Plywood panel, 60 mm air gap Glass Wool filled, mounted on concrete	2	20.65	3.5	144.55	0.25	36.14		
Floors	10 mm Carpet on concrete	1	25.915	20.65	535.14	0.08	42.81		
Wall (Back)	6 mm Plywood panel, 60 mm air gap Glass Wool filled mounted on concrete	1	20.65	2.5	51.63	0.25	12.91		
Wall (Front)	4 and 6 mm Sealed Double Glazing 100 mm air gap	1	20.65	3.5	72.28	0.3	21.68		
Seats (Empty)	Open Weave Upholstered (Empty)	286				0.25	71.50		
Seats (Occupied)	Open Weave Upholstered (Occupied)	286				0.37	105.82		
								240.02	274.34

Note: Effect of air volume neglected

Sabine's Equation: Calculation of Reverberation Time

$$RT_{60} = 24 \cdot (\ln 10) \cdot V / c_{20} \cdot Sa$$

where: RT₆₀ = Reverberation time to reduce 60 Db (s)

V = Internal volume of lecture hall (m³)

1605.43425

c₂₀ = Sound velocity at 20 °C = 343.202 m.s⁻¹

343.202

RT₆₀ (building empty) (s)

1.077

RT₆₀ (building occupied) (s)

0.942

Note: Calculations assumes the speed of sound as the value of 343.02 m / s.

Results:

The proposed acoustic treatment will be satisfactory, providing Reverberation time durations within the 1.0 second guideline for standard lecture halls, for both the occupied and empty cases during use of the theatre hall.

Figure 5.11
Acoustic calculations: Assisted by Gert Jansen van Rensburg (Author, 2018)

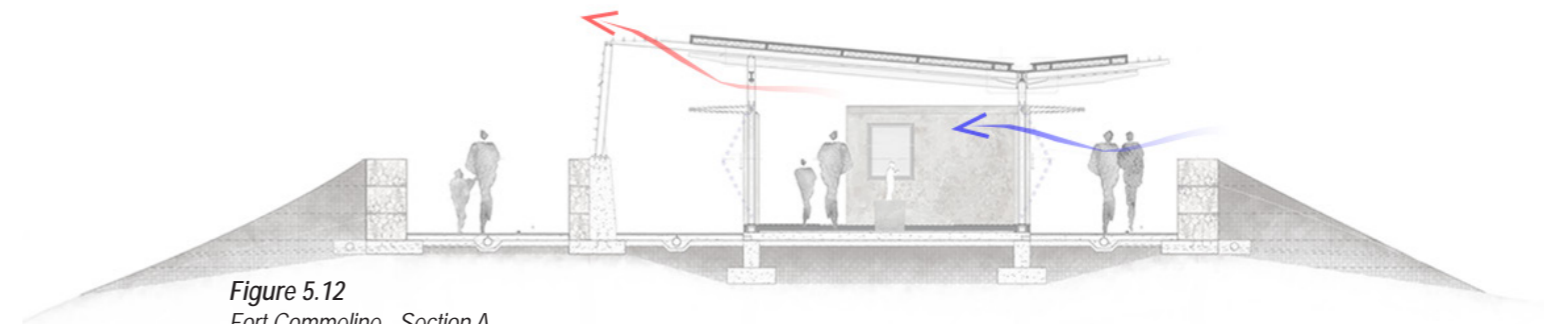


Figure 5.12
Fort Commeline - Section A (Author, 2018)

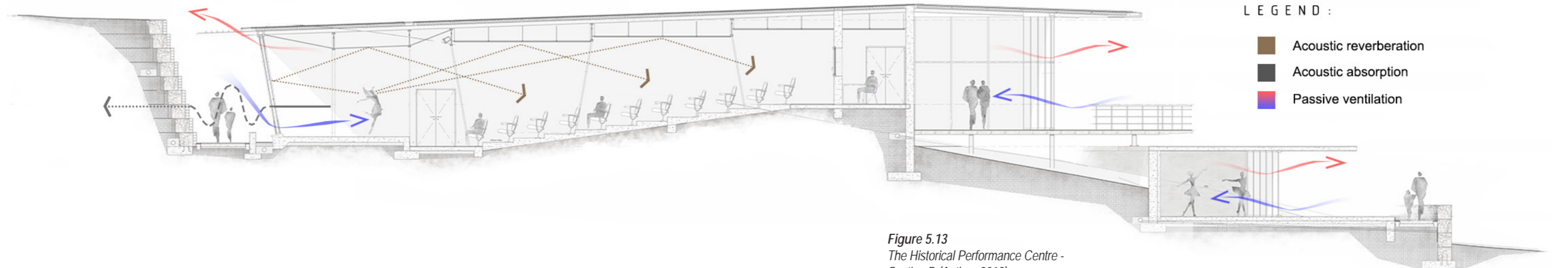


Figure 5.13
The Historical Performance Centre - Section B (Author, 2018)

5.53 SBAT Analysis

The SBAT analysis was considered as a useful tool in order to illustrate the current problems and opportunities that Magazine Hill is facing. Illustrated in the first graph is a representation of the current SAPS Radio Technical Unit situated on top of Magazine Hill.

With the implementation of the rehabilitation of Fort Commeline and the proposed Historical Performance Centre, the second graph represents the ideal outcomes of the presented project.

The results illustrates that there is the possibility to host a thriving community, however the overall connection to services due to being situated among a hill is considered absent. Though by activating the site through re-establishing its urban relation to surrounding sites, it generates the socio-economic activation of the site.

5.54 Daylighting

As the building is mainly angled to the east and south, being placed as a response to the existing heritage of Fort Commeline, it is therefore imperative that the theatre allows for naturally controlled light from the north. Thus, the glazed façade, serving as the window of the poetic experience in the theatre would be exposed to possible harsh eastern and northern sun. However, it is proposed that due to the theatre's posture in the landscape that it would only be exposed to defused light and will be shaded by the natural grass and slatted screens.

Figure 5.5
Bottom: SBAT Analysis (Author, 2018)

Figure 5.6
Opposite: Daylight analysis (Author, 2018)

