

Chapter Six

FINAL DESIGN



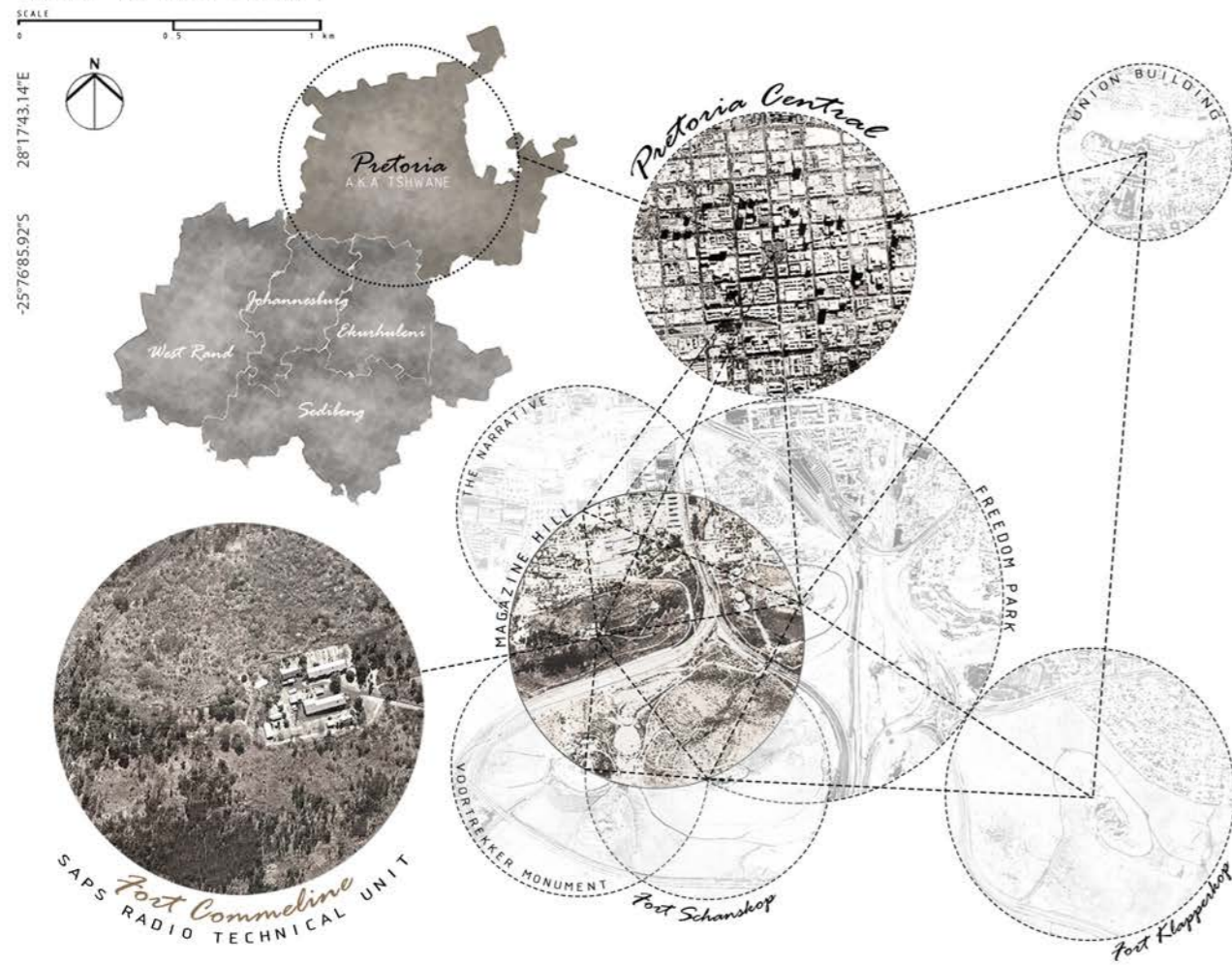
This chapter is a collaboration of the final proposed project.

*Figure 6.1
Final iteration of Fort Commeline
(Author, 2018)*

Context

MAGAZINE HILL, PRETORIA, SOUTH AFRICA
-25°76'85.92"S 28°17'43.14"E

Fort Commeline
URBAN RELATIONSHIP



CONTEXT

This dissertation focuses on the reinterpretation of Fort Commeline, a former British fortification of the 1880's, guarding the "Skietpoort" (valley) of the southern entrance to Pretoria. In addition, it investigates and identifies the fragmented narrative among the historical landscapes of Magazine Hill where it is situated on and poses to address the fragile connection that exist among the historical built fabric and cultural landscape that developed and transformed through the progression of time.

RESEARCH QUESTION

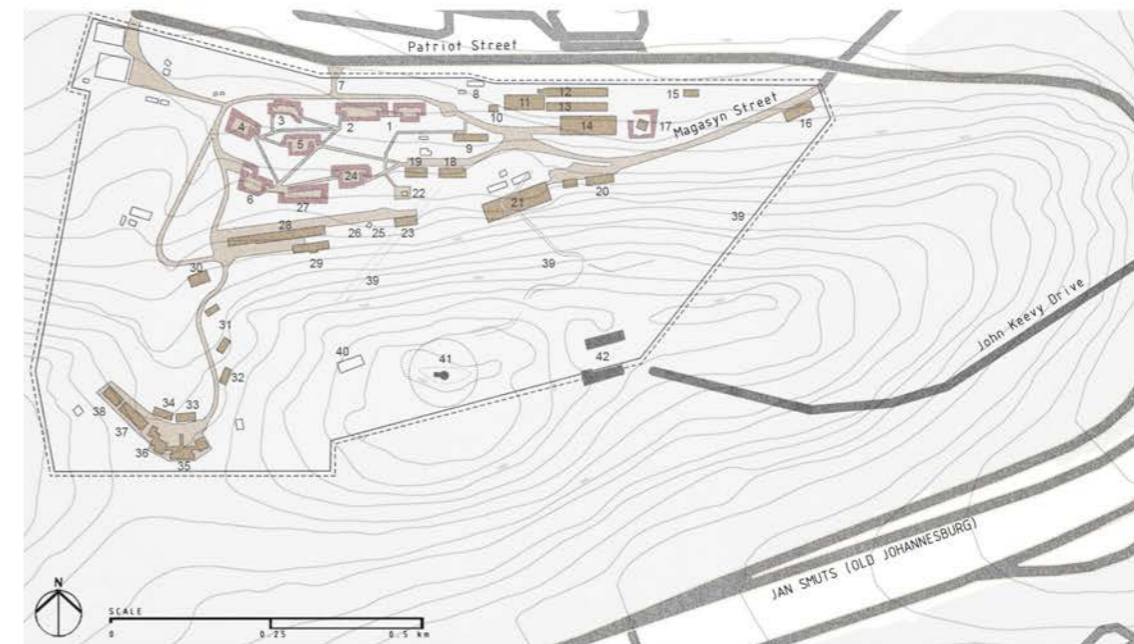
How can Fort Commeline and the narrative its ruins convey be reformed in order to preserve its heritage worth, guarantee its future of heritage worth, and introduce a rehabilitative progression of the time it is bound to, through the narrated construct and defined heritage?

URBAN RELATIONSHIP

Location Informants

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SITE RELATIONS



- MAIN NODES
- 1 | Building no. 1 B-shelter: Cordite magazine
 - 2 | Building no. 2 B-shelter: Decaying bomb shelter
 - 3 | Building no. 3 B-shelter: Bullet filling
 - 4 | Building no. 4 B-shelter: Cordite magazine
 - 5 | Building no. 5 B-shelter: Decaying bomb shelter
 - 6 | Building no. 6 B-shelter: Incendiary ordnance repository (IOR) shot filling room
 - 7 | Existing main entrance
 - 8 | Main cloak room
 - 9 | Office PG
 - 10 | Boiler room
 - 11 | 303 Ammunition capping and vanishing
 - 12 | 303 Ammunition Mint loading bays
 - 13 | 303 Ammunition assembly plant
 - 14 | 303 Ammunition loading fields: weighing, ganging and packaging
 - 15 | Garage workshop
 - 16 | No 1 Main guard room: Magasyn road (closed)
 - 17 | Enclosed Grand magazine laboratory
 - 18 | 303 Ammunition soldering room
 - 19 | Electricians and carpenters workshop
 - 20 | Former Magazine Laboratory
 - 21 | Grand Magazine/Red Magazine/ Centraalmagasyn (1984-1945)
 - 22 | Gunpowder Magazine
 - 23 | Sub Station
 - 24 | 303 Bullet filling shop
 - 25 | Sub station/Mens latrines
 - 26 | MRG3 Kitchen block
 - 27 | Building no. 7 B-shelter: Primary cartridge assembly
 - 28 | Flame Tracer/Assembly building
 - 29 | G3 Armory assembly/Defect center
 - 30 | Green Magazine/Groenmagasyn: Second Primary magazine
 - 31 | Canteen/Offices
 - 32 | Latrines
 - 33 | Old box store
 - 34 | New box store
 - 35 | Guard house administration
 - 36 | Restrooms for work force
 - 37 | Storage yard
 - 38 | Open shed for industrial works: Restorations
 - 39 | Fort trench walls/acces to fort from magazines
 - 40 | Old Fort Camp
 - 41 | Fort Commeline/Magazine Redoubt
 - 42 | South African Police Service (saps) Radio Technical Unit

VISUAL ANALYSIS

GENERAL ISSUE

Currently the South African Society still tends to contest and segregate our heritage according to cultural origin and leads to the exclusion and disregard of most heritage identities. However, it is rather believed that the factual delimitation originates from the difference in heritage perspectives.

HERITAGE ISSUE

The current history of Magazine Hill and the precinct surrounding it is rather considered as abundant value to the South African heritage and forms part of the transformation and progression of our heritage and conservative nation. The art of narration and mystery is valued for its ability to enable and encourage memory and promotes equal participation as transformative progression.

ARCHITECTURAL ISSUE

Where it is aimed at being a rehabilitative and conservative interference, the main theory distinguishes the built environment as a physical implementation of rebuilding matter defined by its past, present and future progression and investigates the retrogression of rehabilitative space, as well as the sustainability of structure among space, matter among space and the being among matter.



THE PRECINCT

Historical Map of Pretoria

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FORTIFICATION NETWORK
SCALE 1:25 000

The Narrative

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LEGITIMIZING THE HERITAGE



Fort Commeline (Du Val, 1880-1881)

SIGNIFICANCE
Fort Commeline is considered as one of the first fortifications that served in protecting the south of the Transvaal. Although it never served as the icon it was intended for, it served as the foundation of heritage birthed from Magazine Hill.

As gunfire could reach the military camp, the purpose of the fort was to prevent the Boer rebellion from occupying the southern mountain range. From here there was also a good view of the surrounding area (Van Vollenhoven, 1992). In addition, the purpose of the fort was also to guard the south-west and to support Fort Tullichewan to the east as well as serving as one of the main guarding posts for the 'Skietpoort' range.

Fort Commeline served as the main communication point that utilised signals to communicate with the military camp to the North of Magazine Hill. Therefore the fort was also used as a signal station. Messages were sent to and from the military camp by heliography.

From these hills, the forts and garrisons had a very good view of Pretoria and the surrounding area further south so as they were also used as viewpoints. During the day there were communicated via heliography as well as flags and at night, lamps were utilised (Fordred, 1996, p. 1133-1137).

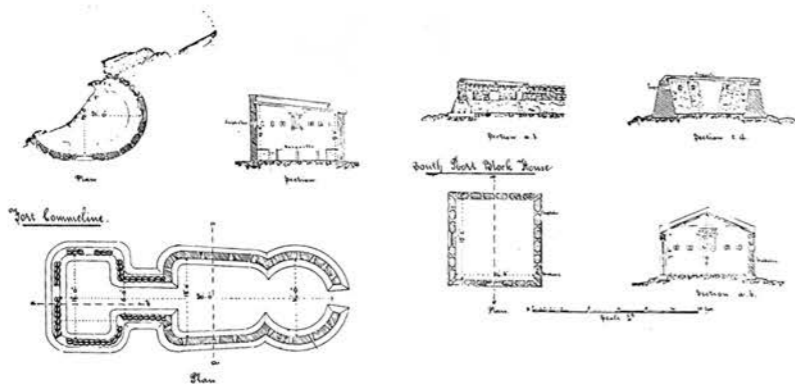
This heliography where used combined with sun and was used to signal messages to different guarding posts. According to Du-Val, this type of communication was described as 'the brilliant flashes of the heliograph, as it caught the sun's rays, and flickered and glittered its dazzling dots and dashes were picturesque in the extreme' (Ploeger, J & Botha, 1968).

SITE HISTORY

GENERAL ISSUE
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Fort Commeline initial plans by Lt. Commeline (Van Vollenhoven, 1992)

BACKGROUND
The perspective of historical landscapes such as the fortifications of Pretoria and its existence as heritage fragments has long been undefined. Where the narrative of memory is left in ruins, heritage and contextual worth remains questioned and its argument around vain and emaciated source of rehabilitation and narrated mystery, marks it as futile. With its contentious conditions and questionable significance as cultural landscape, it is argued that Fort Commeline has ceased to exist. Its purpose to defend was no longer required and its intents no longer valued, giving the impression that it was intentionally abandoned and lost in ruin and isolation.

APPROACH
The proposed program of a Historical Performance Centre forms part of the weathered continuum aimed to re-establish the relationship between the narration of ...ritage, architecture and time. Hereby considering the narrative of architecture towards an evolution, deterioration and revolution of the built fabric, that progresses and deteriorates, or in the case of this study, rehabilitates itself over time.



Fort Royal, 1880 (Du Val, 1880-1881)

Fort Tullichewan (Du Val, 1880-1881)

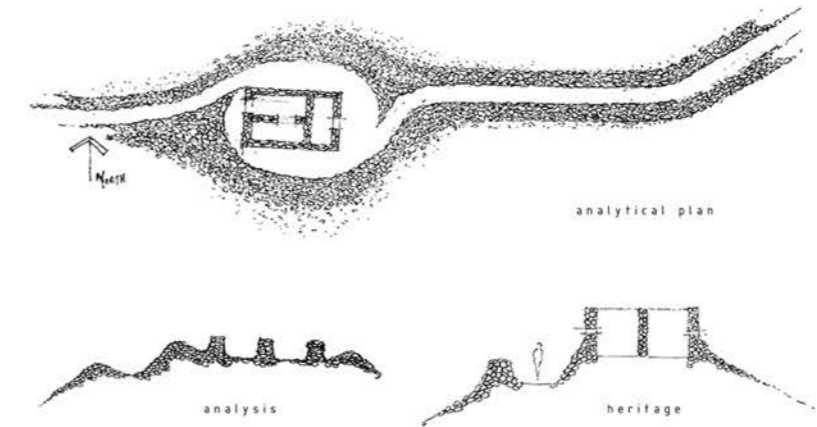
Heliography (Du Val, 1880-1881)

THE HISTORY

Site Study

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ANALYSIS



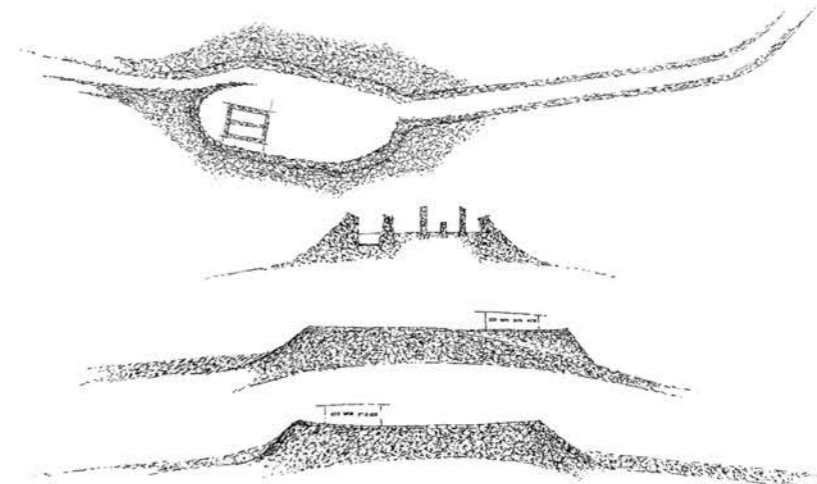
Fort Commeline initial on-site analysis (Author, 2018)

IDENTIFYING THE HERITAGE

Fort Commeline is considered as one of the first fortifications of Pretoria. Today, only a portion of its remains are still to be found on Magazine Hill, north west of the Voortrekker Monument. This Fort was once the protector of the valley between Magazine and Monument hills southern entrance to Pretoria, also known as the 'Skietpoort' or 'South Poort'.

Though, it is important to state that the information in terms of proposed plans, data and built works thereof, is not accurate. This thesis is therefore aimed at documenting and analyzing the structure architecturally as well as archaeologically.

SITE DEPICTION



Fort Commeline As analysed and depicted by the Architect (Author, 2018)

SITE INTERPRETATION

Previous archeologic studies conducted by Panagos (Panagos, 2006, p. 1-7) and Anton an Vollenhoven (Van Vollenhoven, 1992) is considered to be the only accurate documentation of the site.

Throughout the studies, it was found that Fort Commeline was mainly considered as a small, rough stone fortress that consisted of rough field works and stone foundations. It also constituted of a blockhouse for twelve men to guard the entrance to the 'Skietpoort' (pass) (Panagos, 2006: 1-7).

But, what is left of it, is but a mound of stone, only defining and outlining the landscape.

DESIGN INTERPRETATION

In this study, the emphasis is however placed on the first fortifications of 1880 and due to this aim, the British fort known as Fort Commeline is analysed. Contrary to the traditional historian that emphasize on events, this study aims at studying the structure and architectural history of Fort Commeline as well as the narrative it conveys.

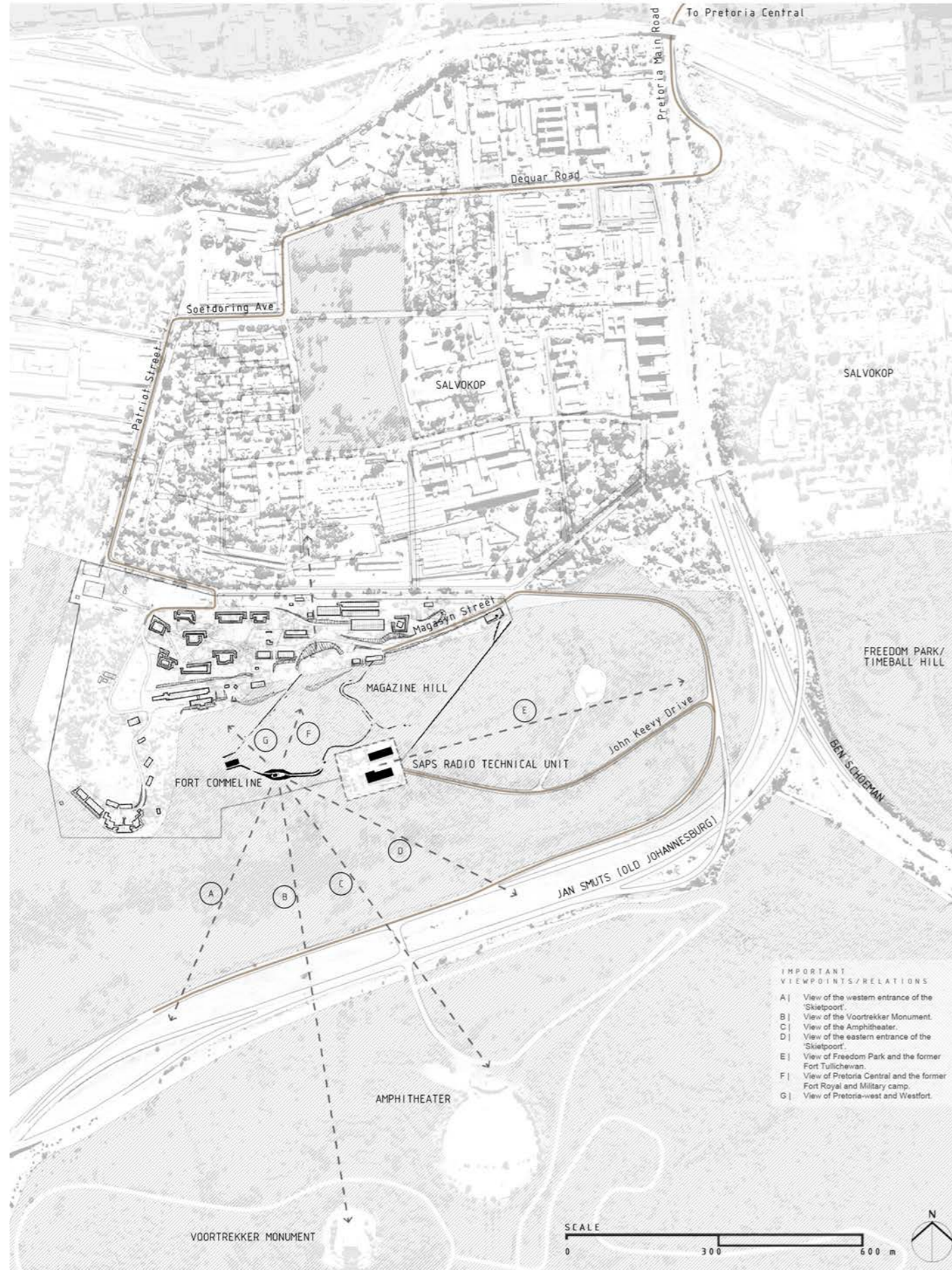
Present studies conducted by the author would therefore allow for a visual and contextual understanding of the historical context of the ruins and the development over time, serving as the bridge between heritage and context as a result of reflection.

Fort Commeline As analysed and depicted by the Architect (Author, 2018)

INTERPRETATION

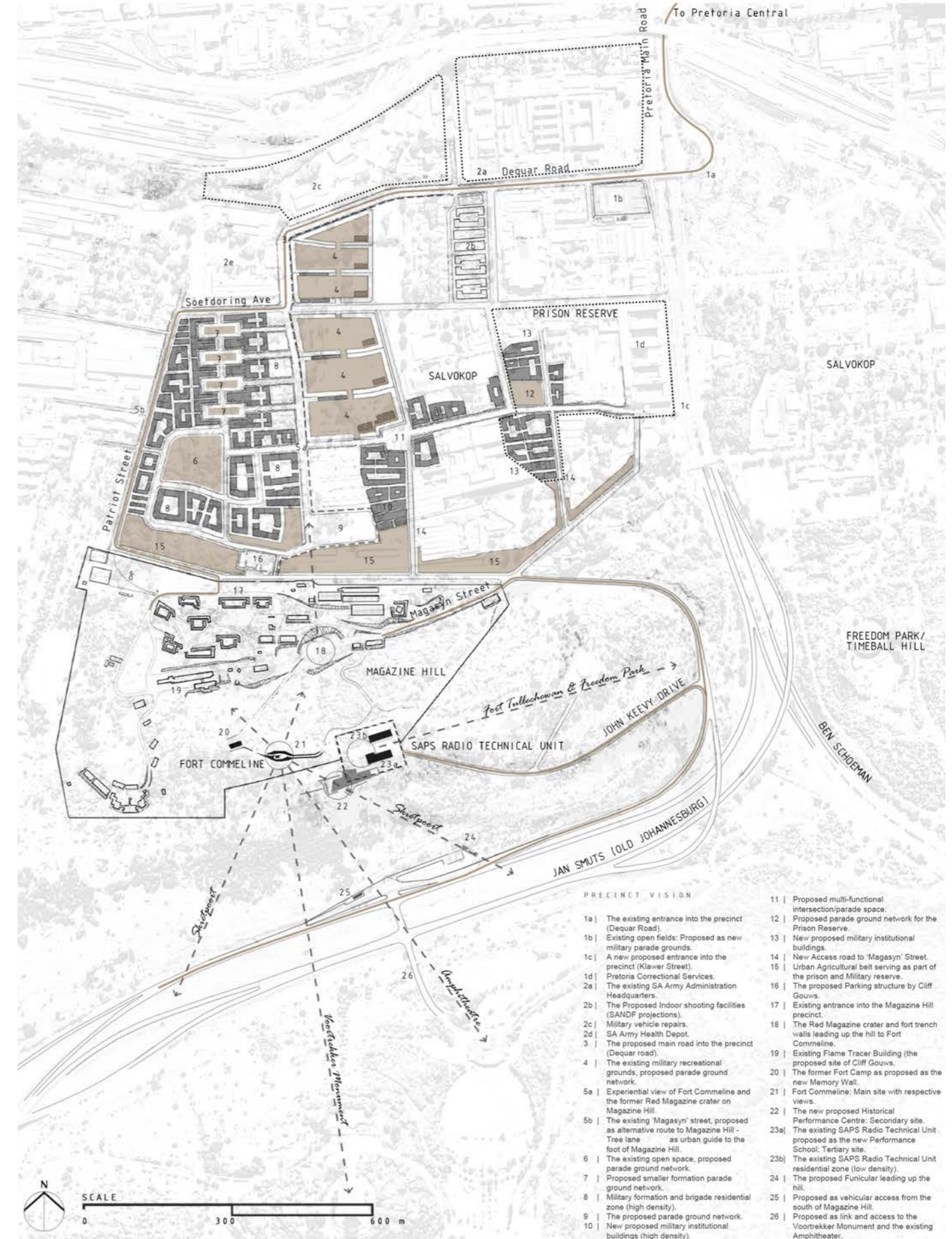
Heritage Relations

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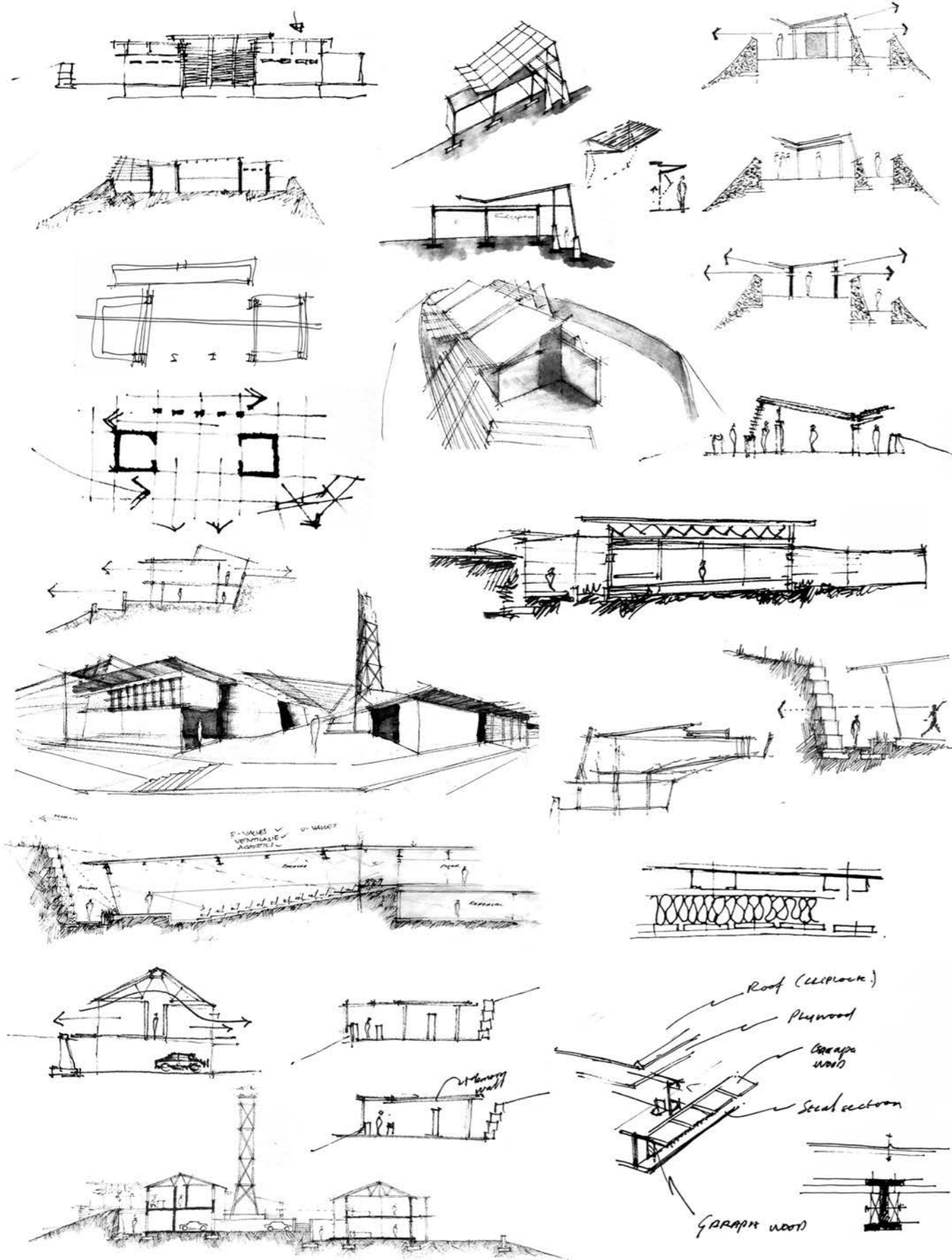
Precinct Vision

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Design Development

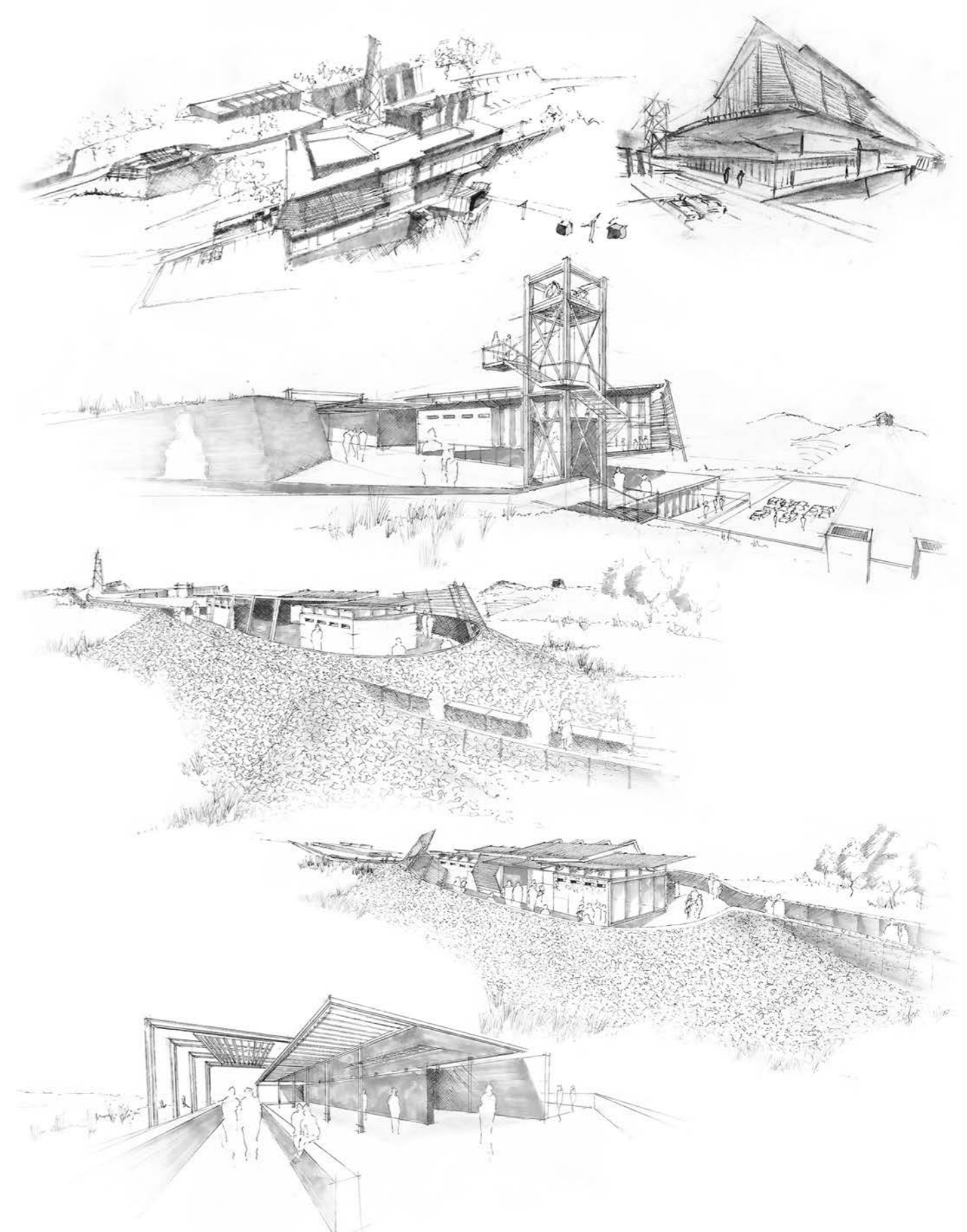
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-25°76'85.92"S 28°17'43.14"E



CONCEPTUAL DRAWINGS

Conceptual Design

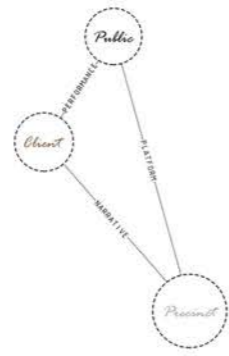
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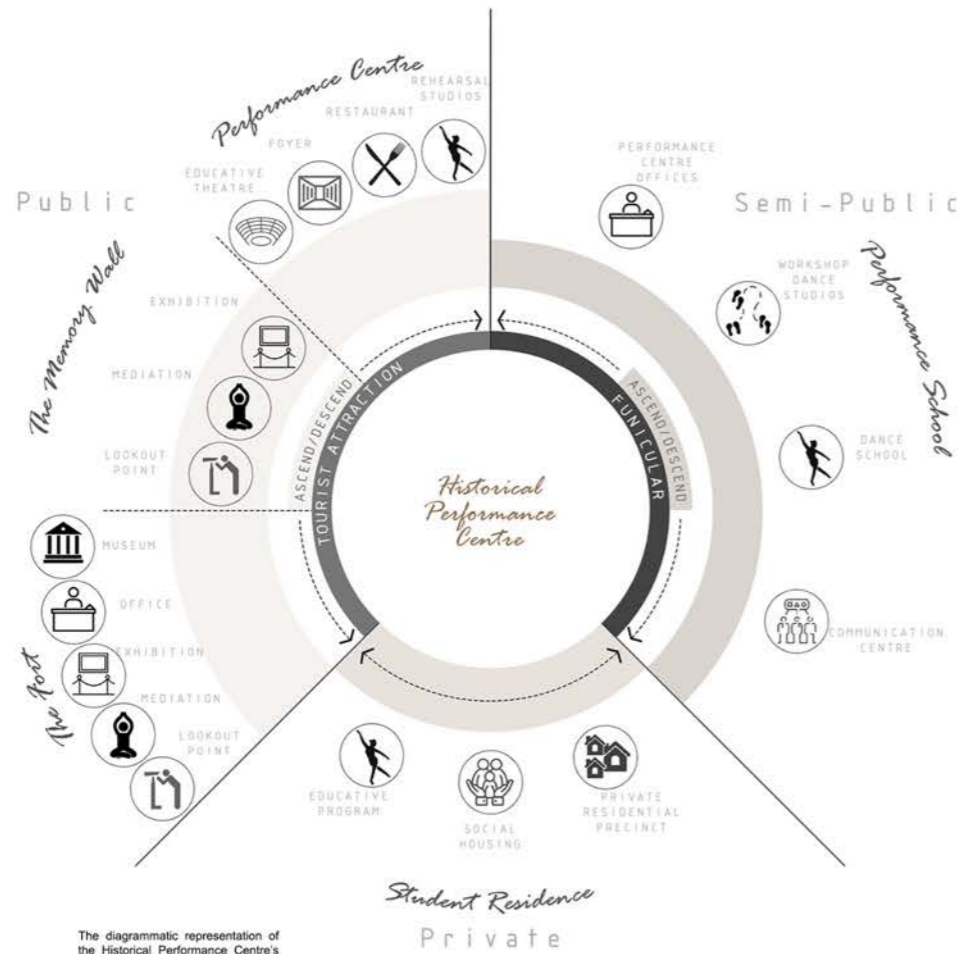
CONCEPTUAL ITERATIONS

Programme

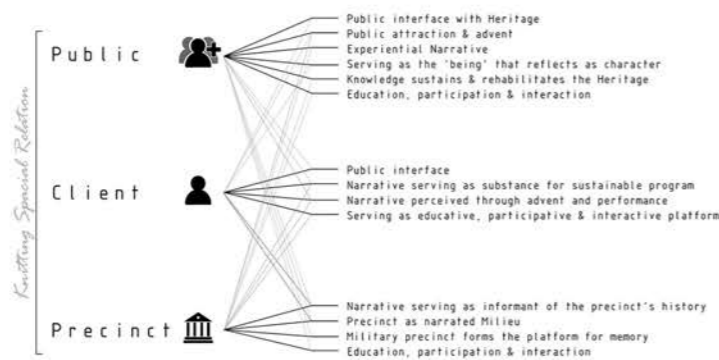
MAGAZINE HILL, PRETORIA, SOUTH AFRICA
-25°76'85.92"S 28°17'43.14"E



The diagrammatic representation of the Public, Client and Precinct relation proposed by the Intercession (Author, 2018)



The diagrammatic representation of the Historical Performance Centre's main program (Author, 2018)



The diagrammatic illustration of the knitting of spatial relation of the Public, Client and the Precinct (Author, 2018)

PROGRAMMATIC DIAGRAMS

Concept

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THEORETICAL APPROACH

The Life-Cycle of "Architecture"



Defining "invisible space"



DEFINING ARCHITECTURE

The argument concerning architecture supposes the mediation between the being, material and the symbolic structure. It is hereby acknowledged that character is the main foundation of the body of architecture and as a result, defines the barrier between character, structure and undefined space.

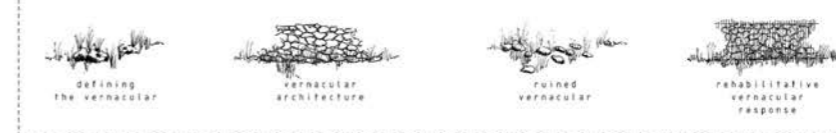
UNDERSTANDING SPACE

It is hereby implemented as a poetic understanding of identifying space, both physically and spatially. Ideally utilising matter as the objective architectural catalyst and acknowledging its origin from the earth. It also reflects on the human being that preserves the character of architecture through being placed among it, resulting in the disturbance of its surroundings.

DISRUPTIVE ARCHITECTURE AS CATALYST



REHABILITATIVE VERNACULAR AS CATALYST



DISRUPTION

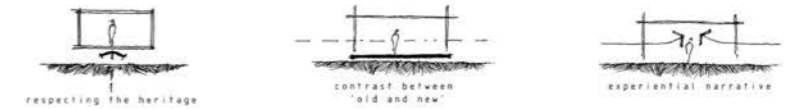
Subsequently the destruction of the earth directly assimilates with the spirit of the human being. It is known that the past is inevitable, and the uncertain future only determined by those who lived among it. The vision is hereby introduced as "disruptive architecture" as implication for "disruption" caused by architecture, but also a need for enormous change amongst its complex humanity. It is where adaptive re-use as a product is understood and used as a method in referring to the altering of the old in order to introduce the new.

REHABILITATING MATTER

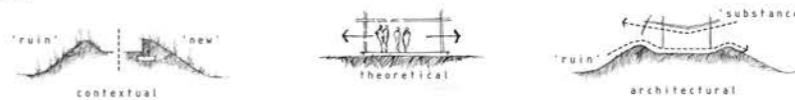
Rehabilitative vernacularity is hereby introduced as the collaboration of organic design within the rural context, where matter would be re-purposed. Available resources from the site are particularly important for this execution.

DESIGN APPROACH

DEFINING THE DESIGN CONCEPT



DEFINING THE CONTEXTUAL, THEORETICAL AND ARCHITECTURAL APPROACH



THE PURPOSE

The purpose of this intervention is to re-establish the relationship between the historical built fabric and cultural landscape that transforms through the progression of time. Where amidst this matter among the site, it would be agreed as transitional space, forming a series of thresholds knitting the old and the new.

THE POETRY AMONG THE TECTONIC & STEREOTOMIC

In order 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 (vertically) among space (horizontal) of the landscape. It is however important to state that due to the fragile state of the existing built fabric, the proposed design attempts exhumate the structure in order to recreate former form from existing ruins.

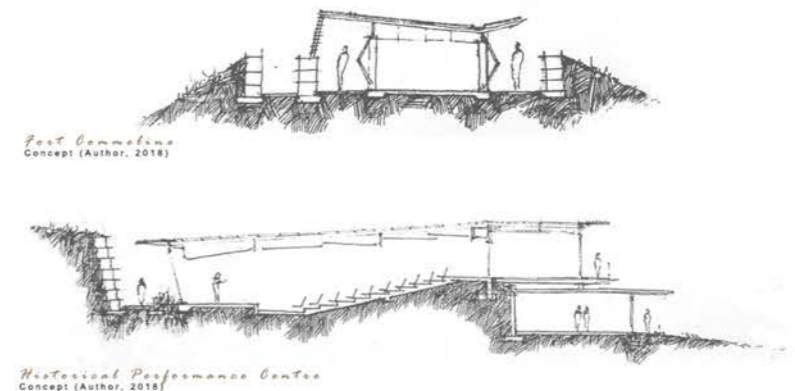
TECHNICAL APPROACH

STRUCTURAL APPROACH

It is argued in this dissertation that the natural life cycle of architecture and decay of built fabric forms 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 the fort'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 narrative.

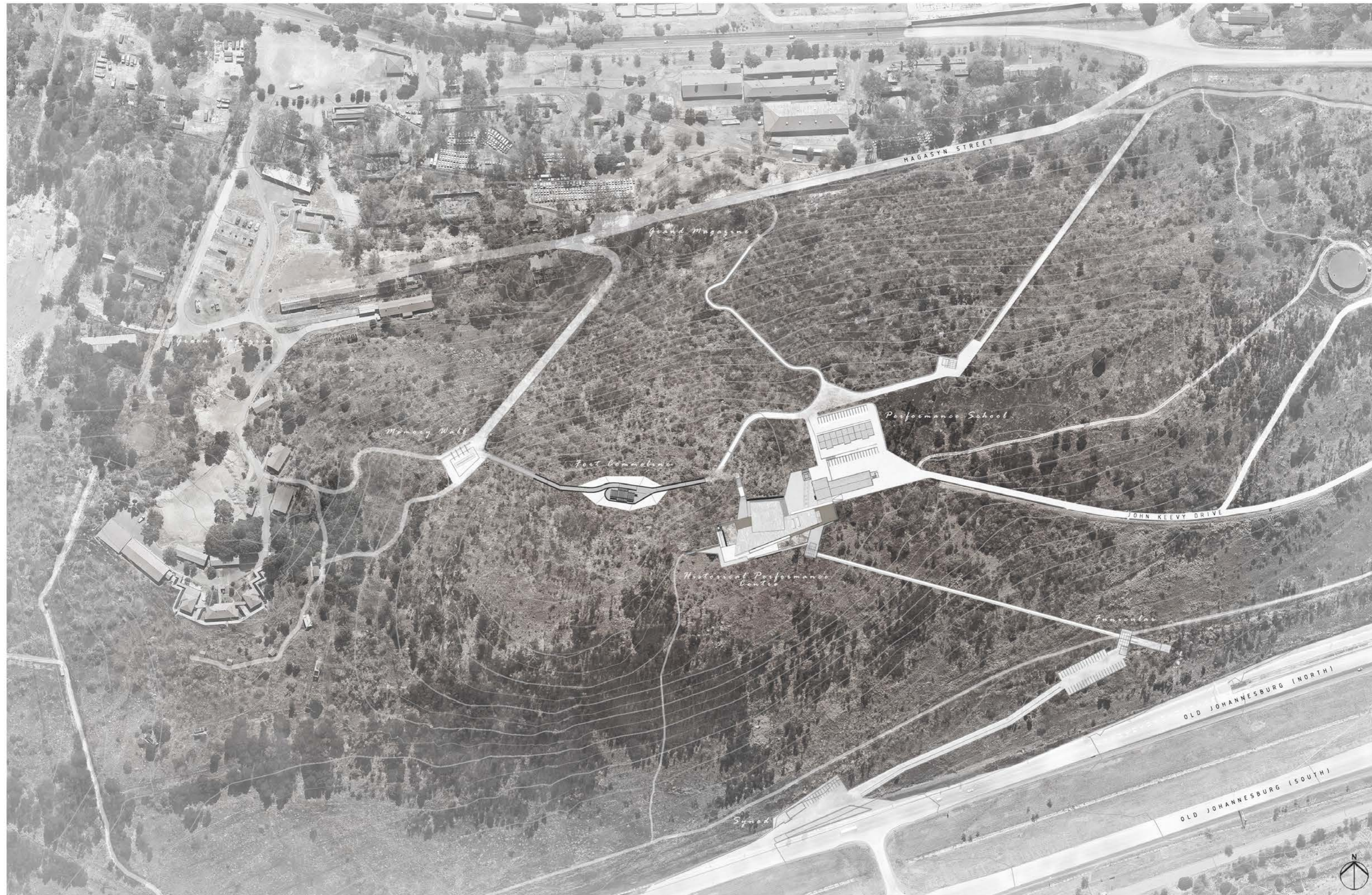


THEORY-DESIGN-TECHNICAL

Magazine Hill

MAGAZINE HILL, PRETORIA, SOUTH AFRICA

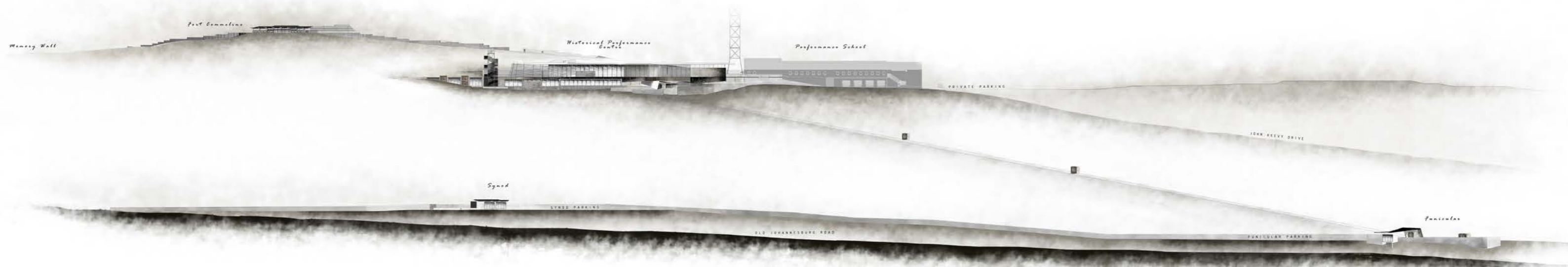
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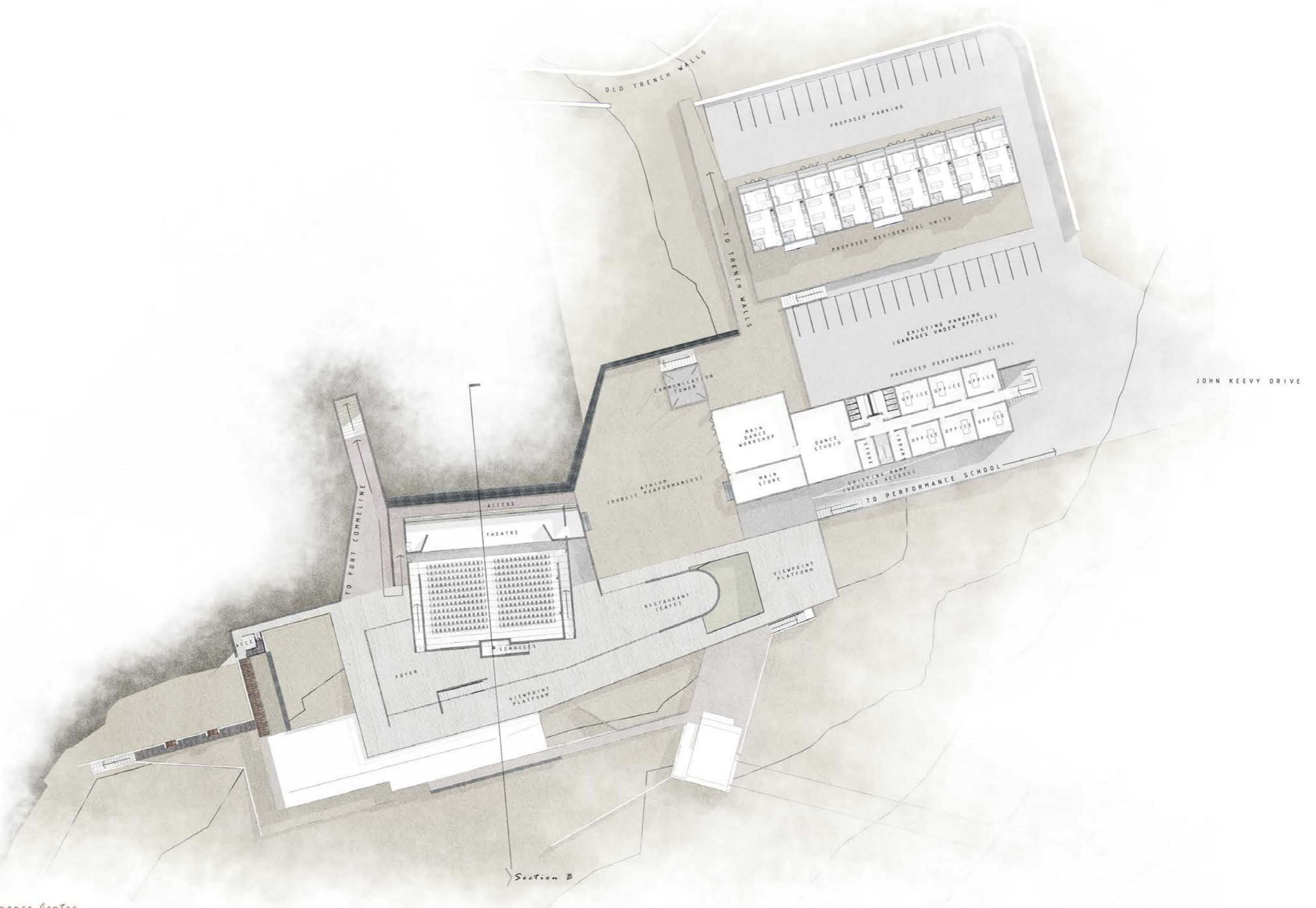


SITE PLAN
SCALE 1:1000

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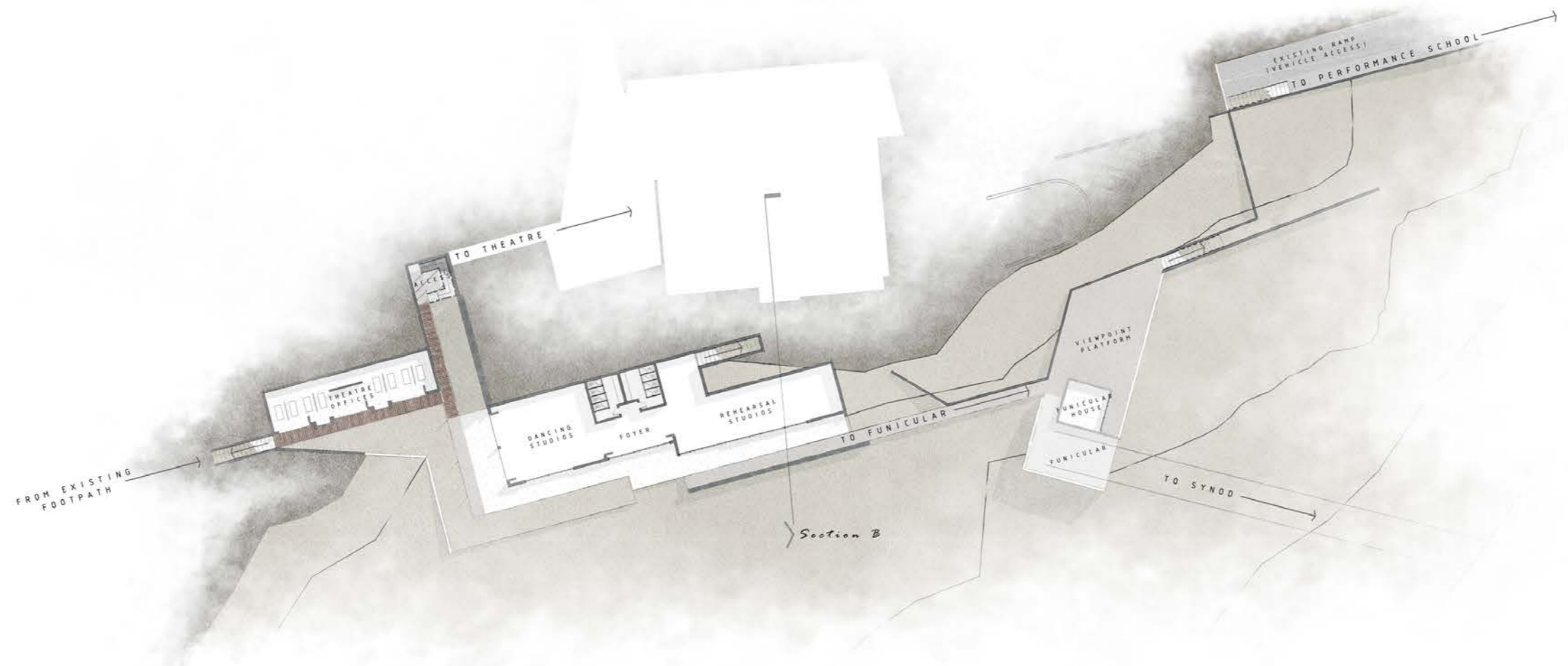




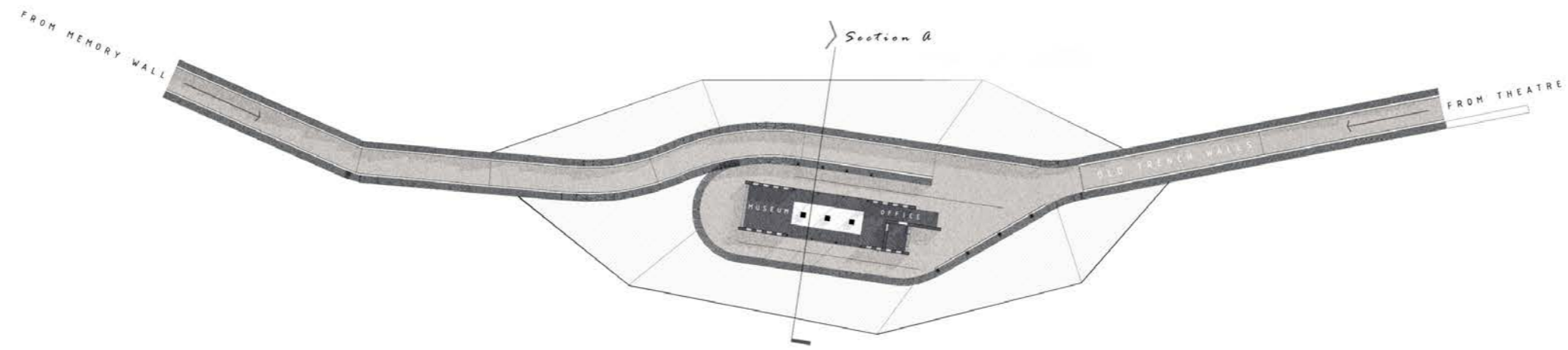


Historical Performance Centre
GROUND FLOOR PLAN



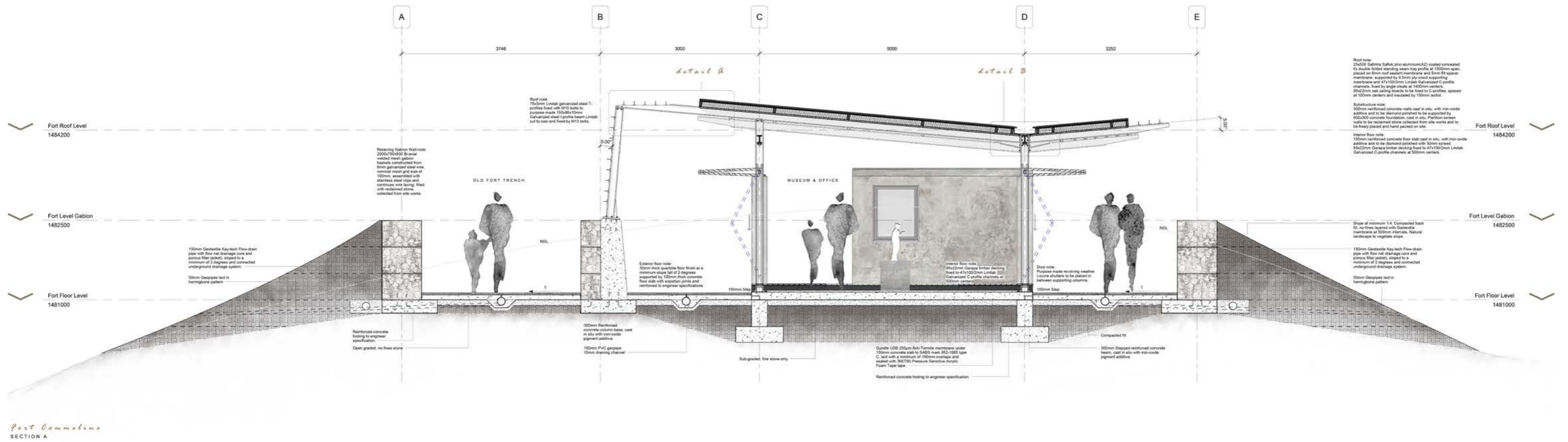


Historical Performance Centre
 LOWER LEVEL FLOOR PLAN

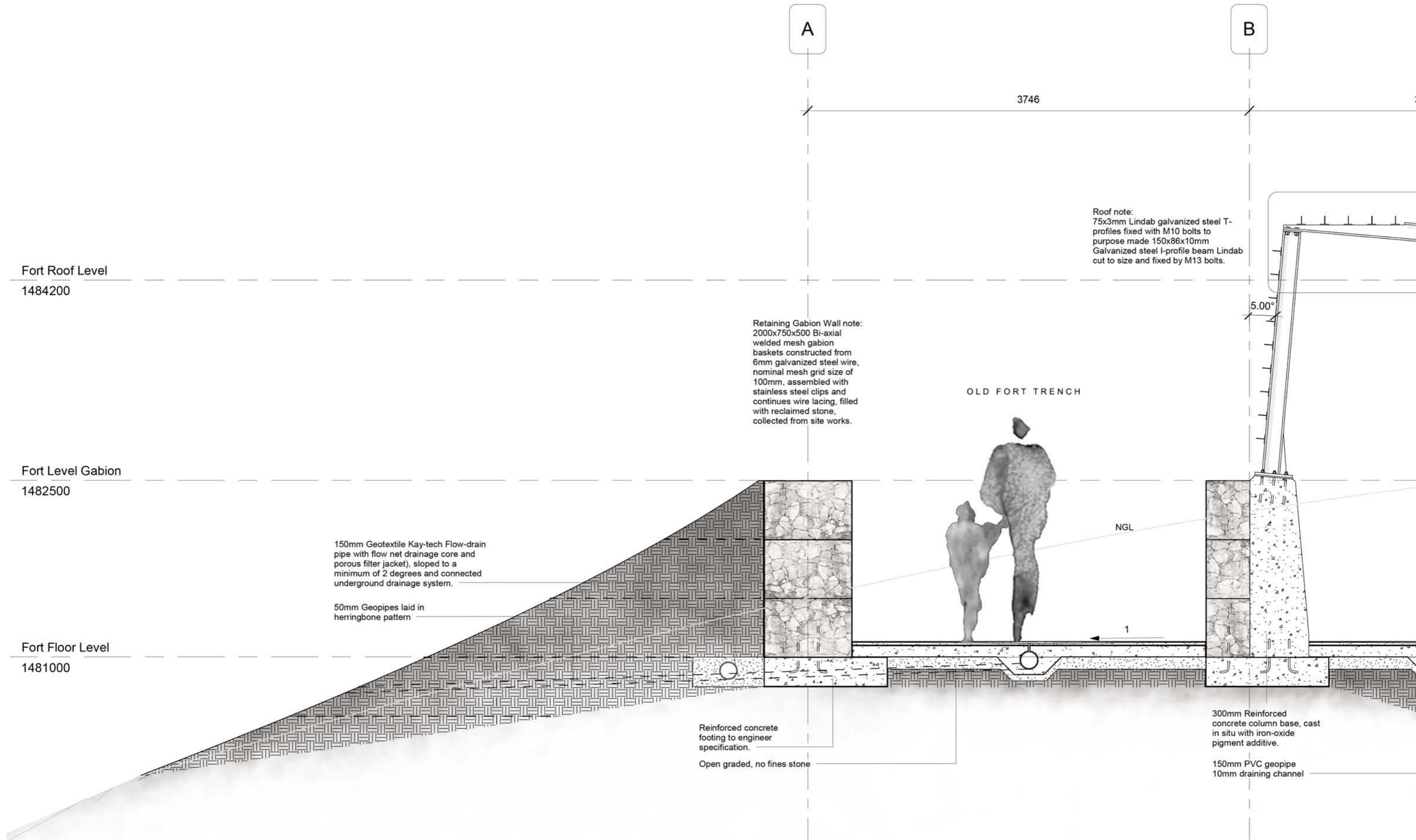


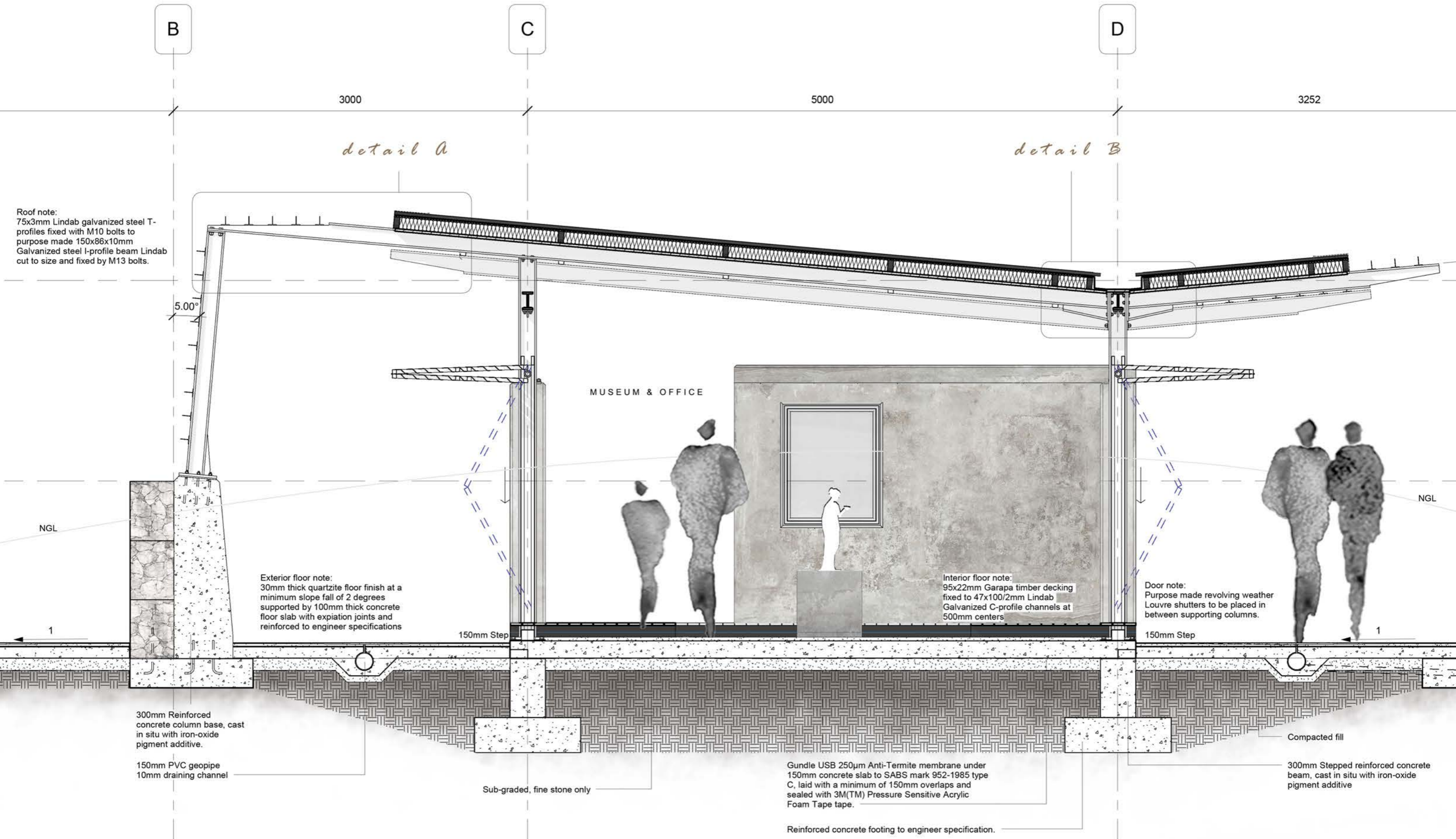
Fort Commelino
 GROUND FLOOR PLAN

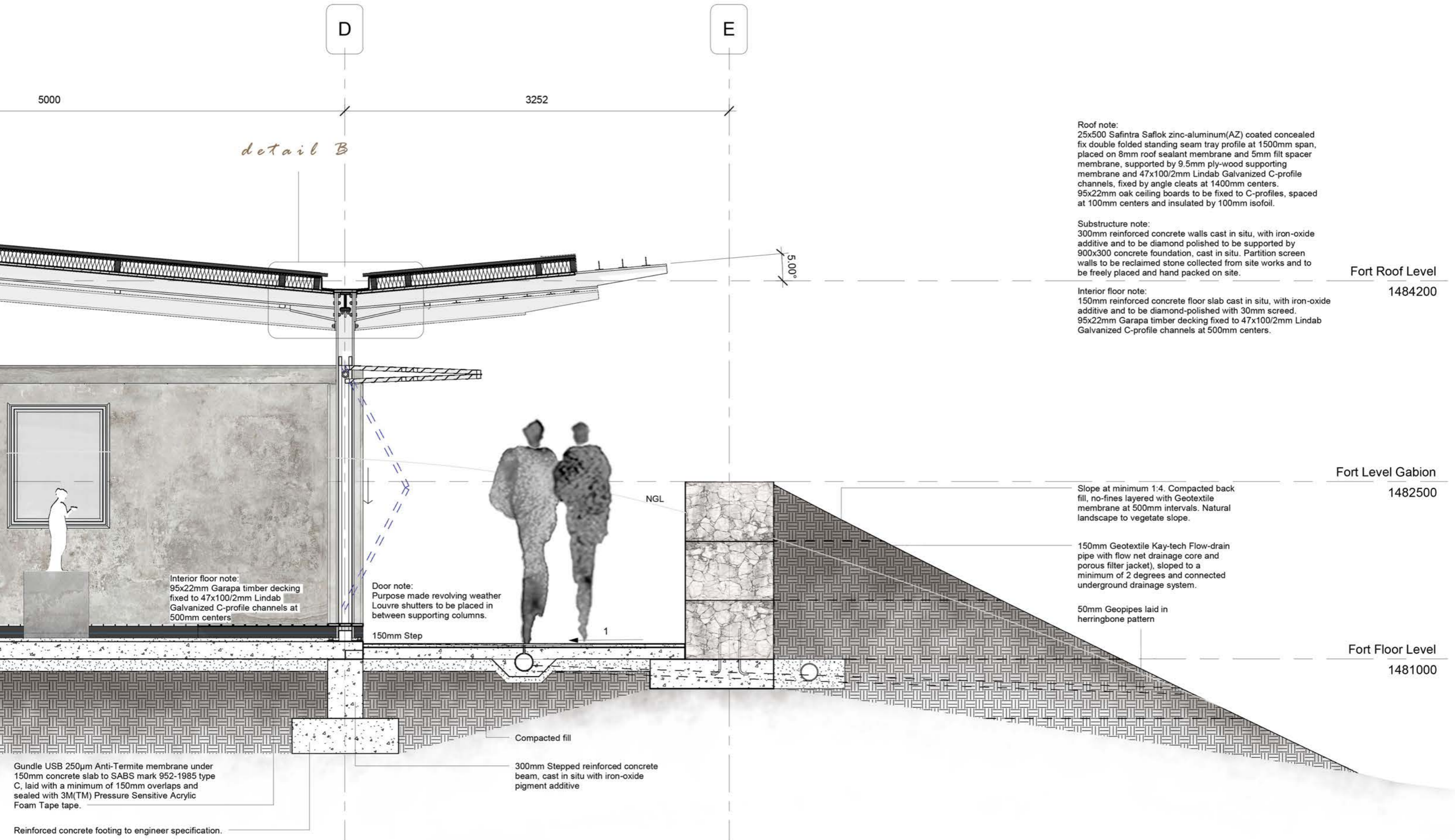




CONCEPT DRAWINGS









Technification

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Existing weathered brick walls



New purposely weathered brick walls

Existing weathered steel and sheeting



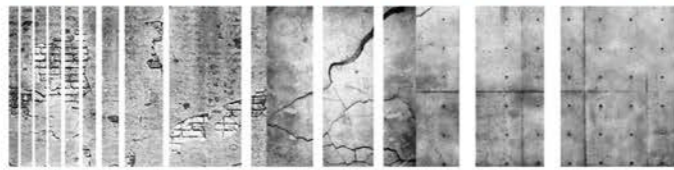
New bare metal steel and sheeting

Existing weathered rock walls



New gabion walls

Existing plastered walls



New bare concrete walls

Existing clay roof tiles



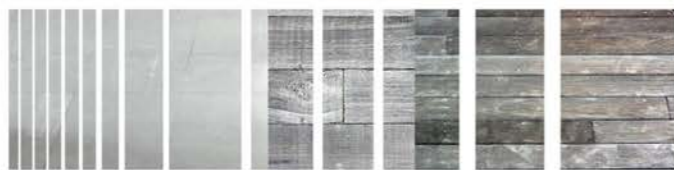
New Zinc-Aluminum tray roof

Existing gypsum ceilings



New bare oak timber ceilings

Existing Novilon tile floors



New bare garapa timber ceilings

STRUCTURAL SYSTEMS

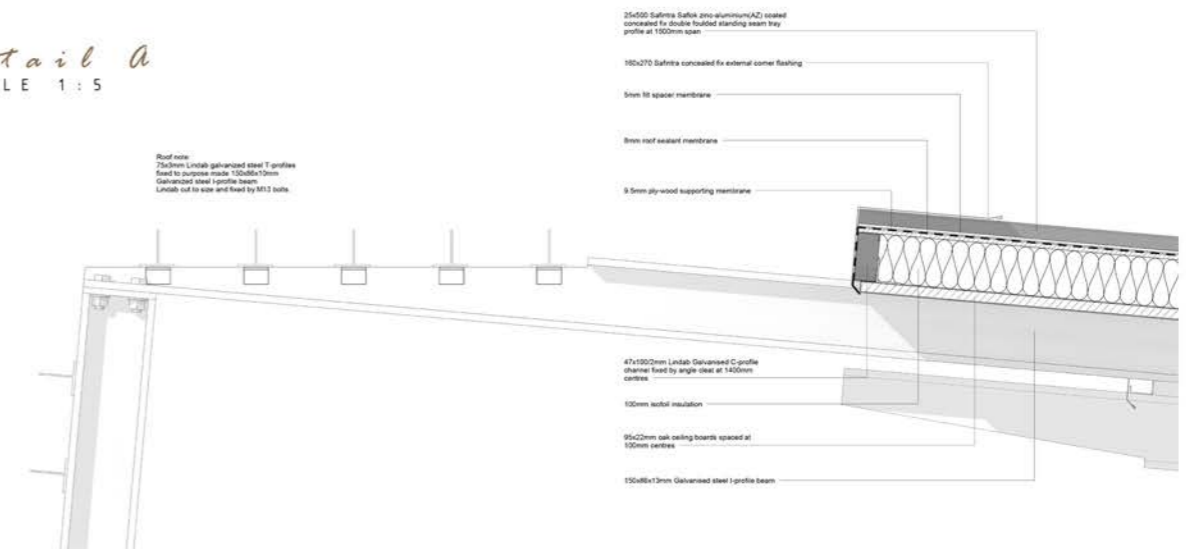
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MATERIALITY

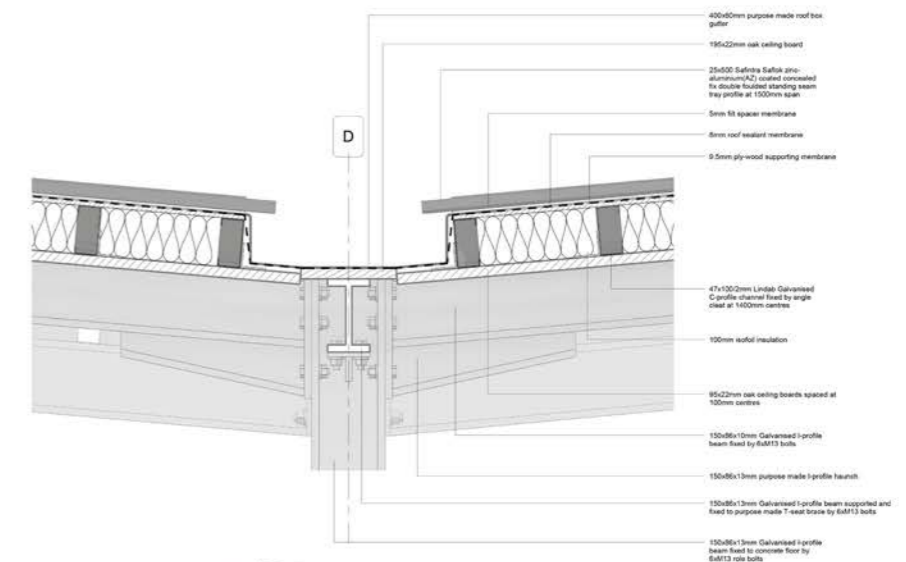
Details

MAGAZINE HILL, PRETORIA, SOUTH AFRICA
-25°76'85.92"S 28°17'43.14"E

detail A
SCALE 1:5



detail B
SCALE 1:5

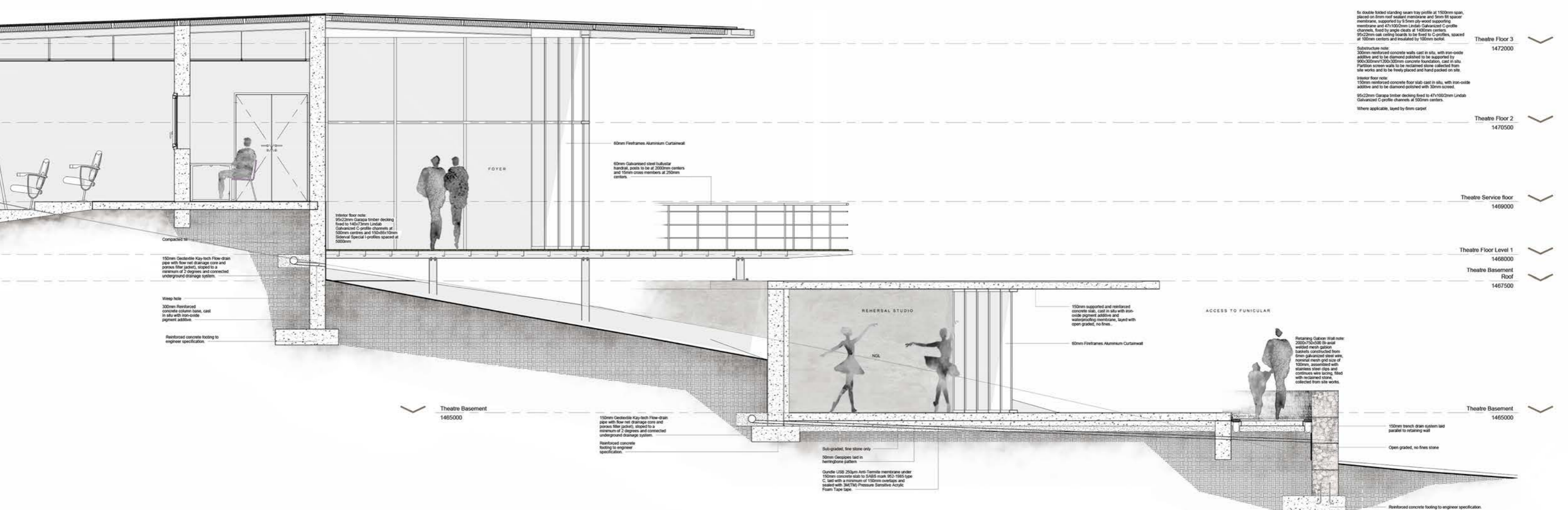
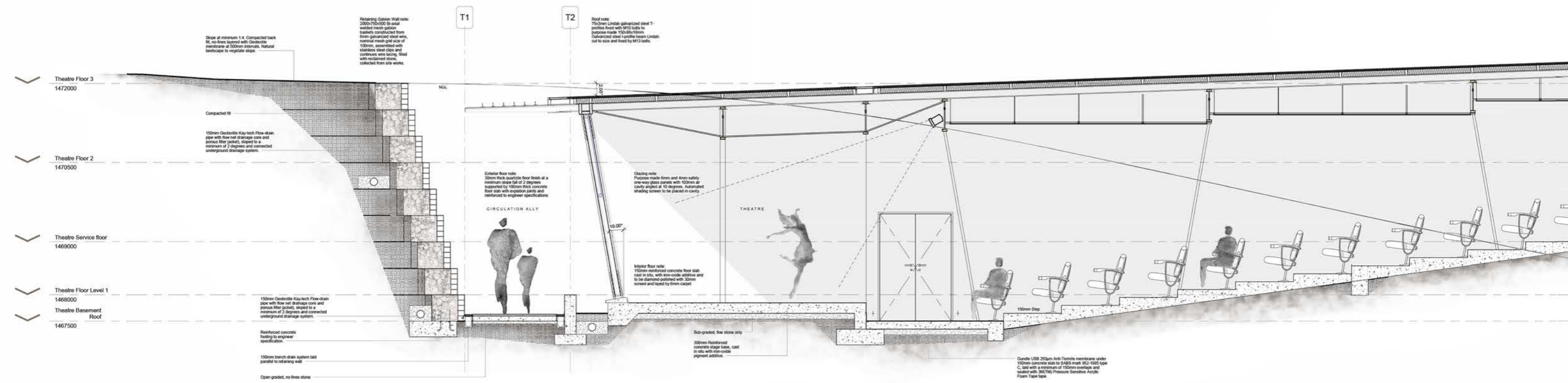


DESIGN DETAILS

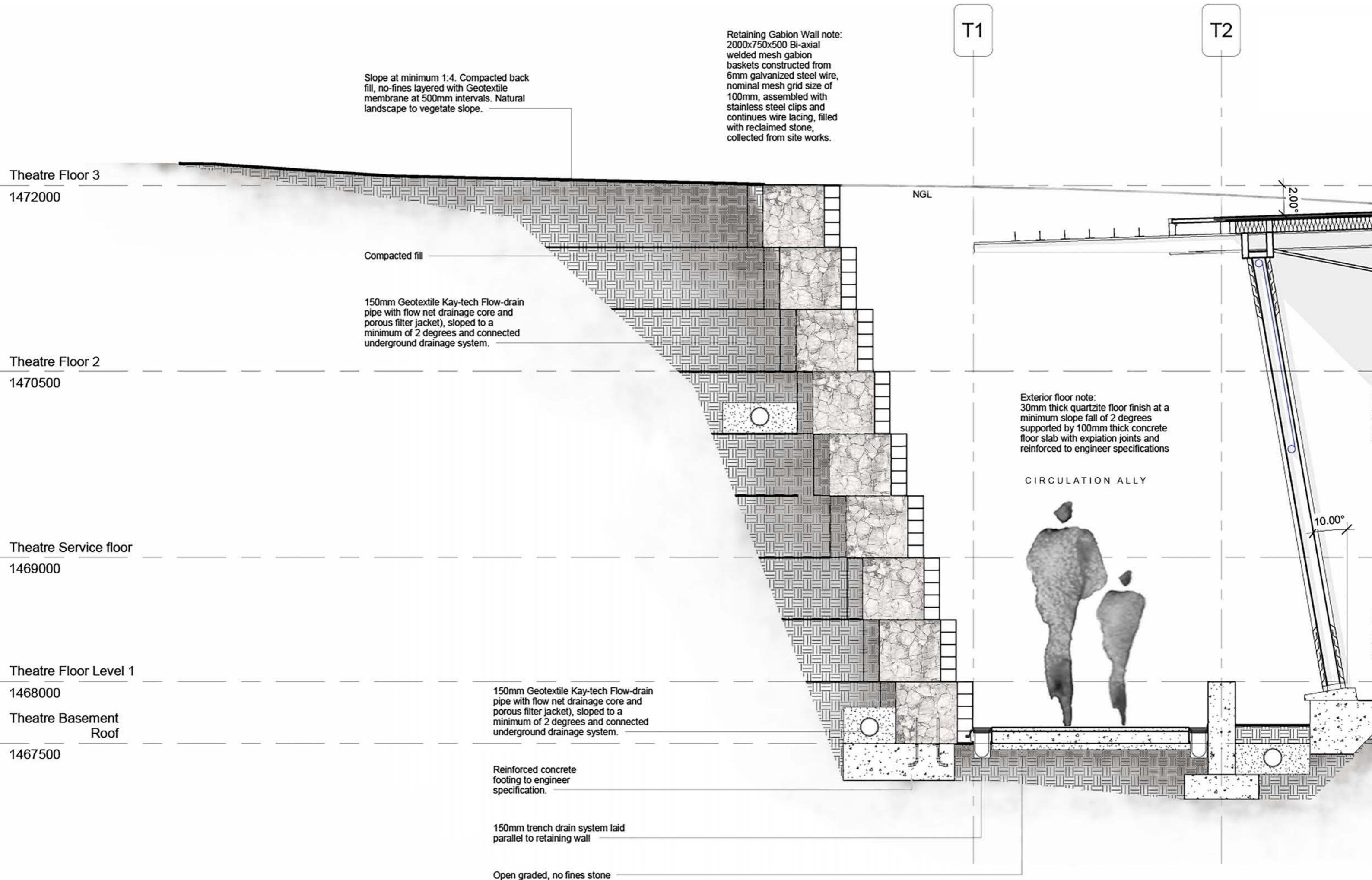
Historical Performance Centre

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-25°76'85.92"S 28°17'43.14"E



DETAIL SECTION
SCALE 1:25



T2

Roof note:
75x3mm Lindab galvanized steel T-profiles fixed with M10 bolts to purpose made 150x86x10mm Galvanized steel I-profile beam Lindab cut to size and fixed by M13 bolts.

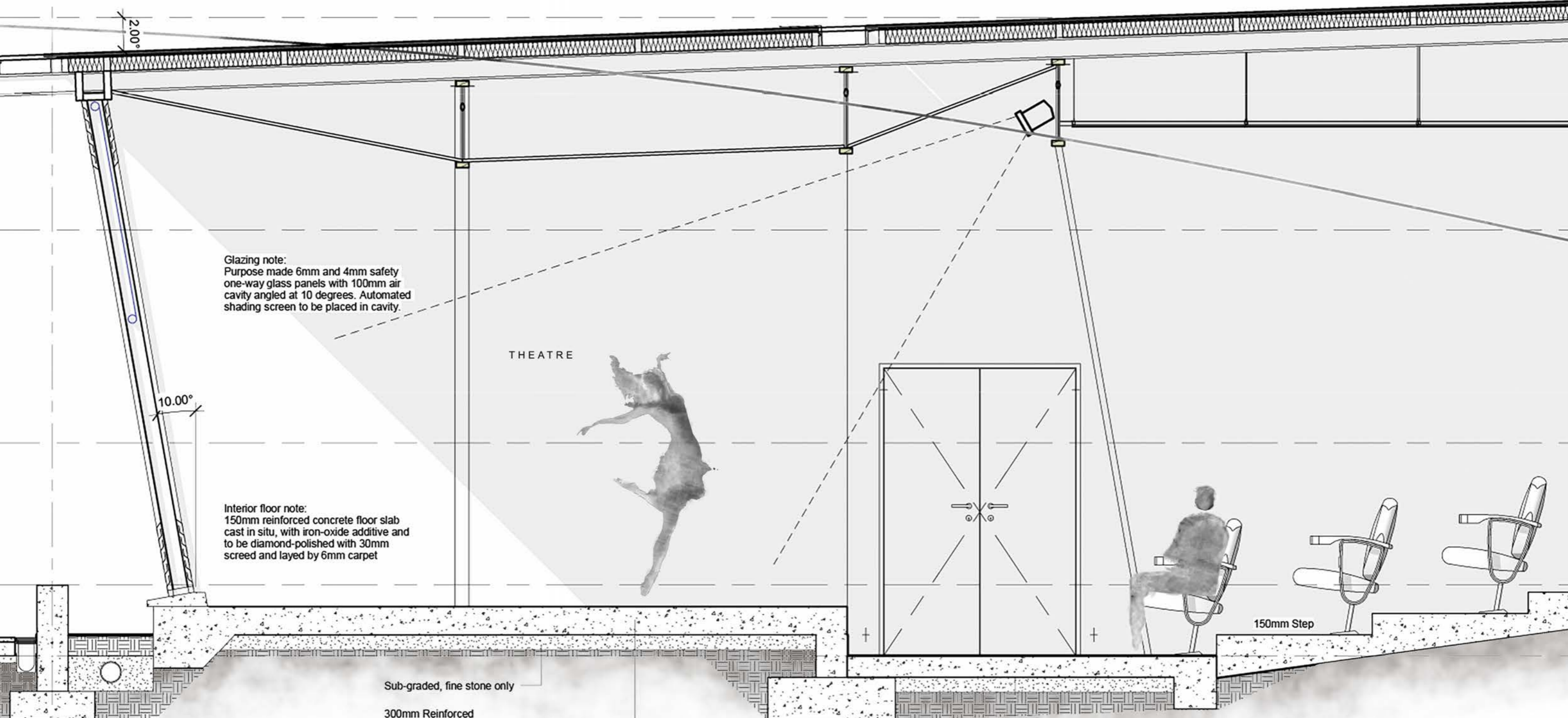
Glazing note:
Purpose made 6mm and 4mm safety one-way glass panels with 100mm air cavity angled at 10 degrees. Automated shading screen to be placed in cavity.

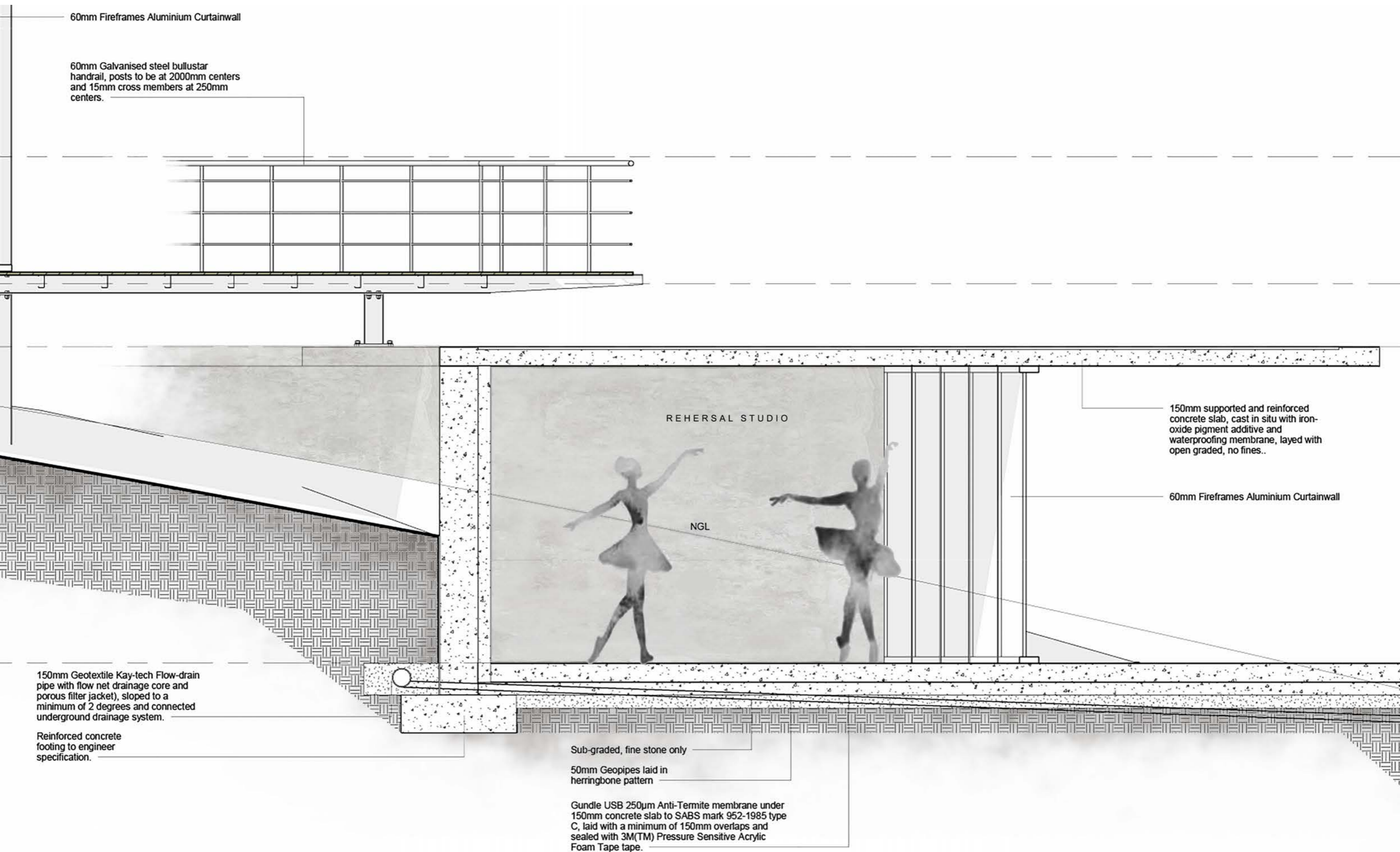
Interior floor note:
150mm reinforced concrete floor slab cast in situ, with iron-oxide additive and to be diamond-polished with 30mm screed and layed by 6mm carpet

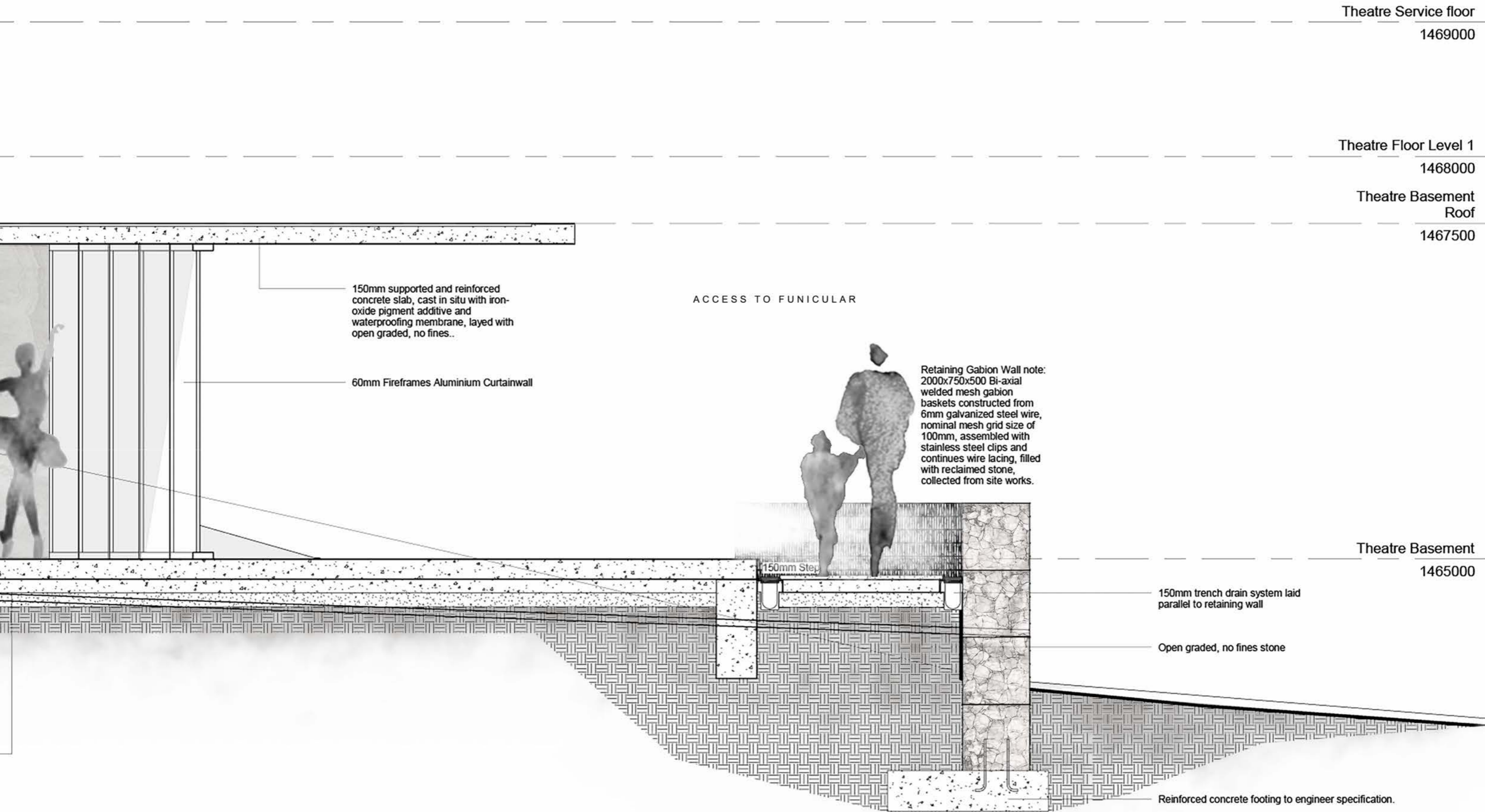
Sub-graded, fine stone only

300mm Reinforced concrete stage base, cast in situ with iron-oxide pigment additive.

Gundie USB 250µm Anti-Termite membrane under 150mm concrete slab to SABS mark 952-1985 type C, laid with a minimum of 150mm overlaps and sealed with 3M(TM) Pressure Sensitive Acrylic Foam Tape tape.







Acoustics & Passive design

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ACOUSTIC CALCULATIONS

Construction Element or Zone Area	Material Description	Quantity	L (m)	W or H (m)	Area S _i (m ²)	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 Branding, Standard 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	536.14	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

$$RT_{60} = 24 \ln(10) \cdot V / c_p \cdot S_a$$

where:

- RT₆₀ = Reverberation time to reduce 60 Db (s)
- V = Internal volume of lecture hall (m³) 1605.43425
- c_p = Sound velocity at 20 °C = 343.202 m.s⁻¹ 343.202
- S_a (building empty) (s) 1.077
- S_a (building occupied) (s) 5.842

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

Result:

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.

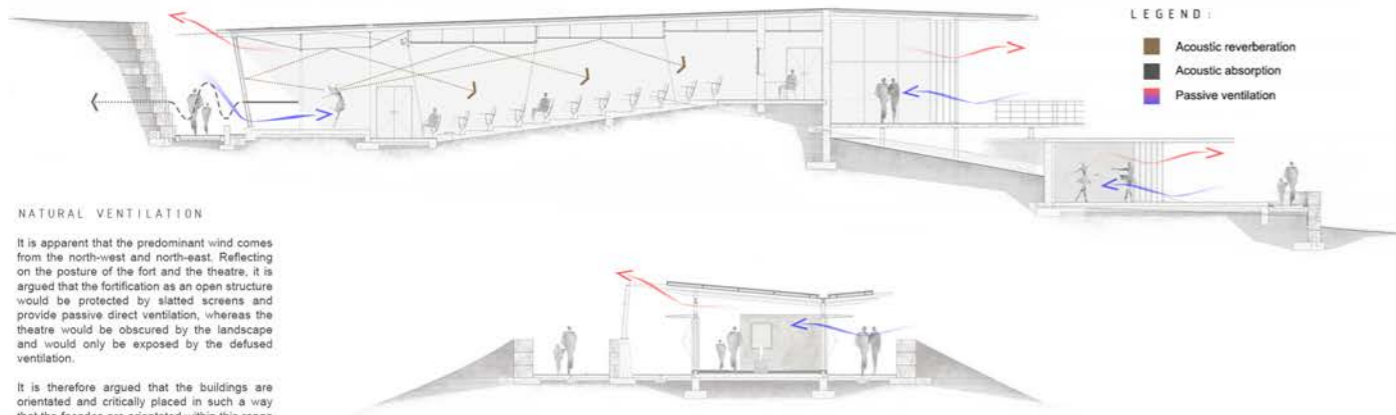
ACOUSTICS

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 affective 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.

PASSIVE DESIGN



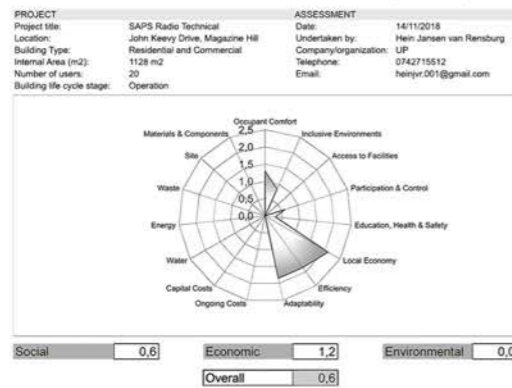
SBAT ANALYSIS

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.

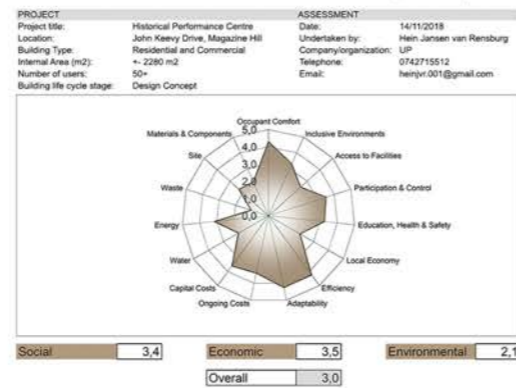
With the implementation of the rehabilitation of Fort Commeline and the proposed Historical Performance Centre, the second graph represents the ideal outcomes of the presented project.

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.

SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1



SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

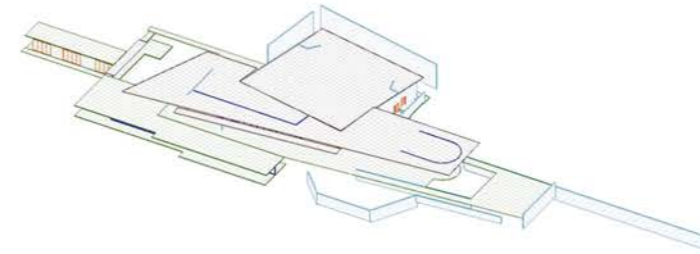


ANALYTICAL DIAGRAMS

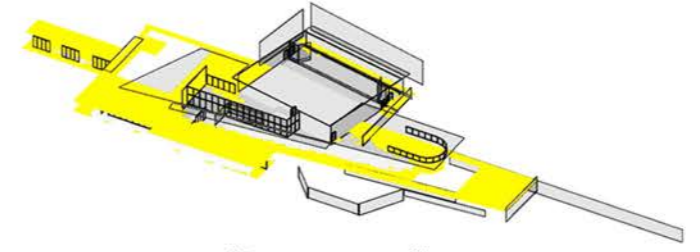
Environmental Strategies

MAGAZINE HILL, PRETORIA, SOUTH AFRICA
-25°76'85.92"S 28°17'43.14"E

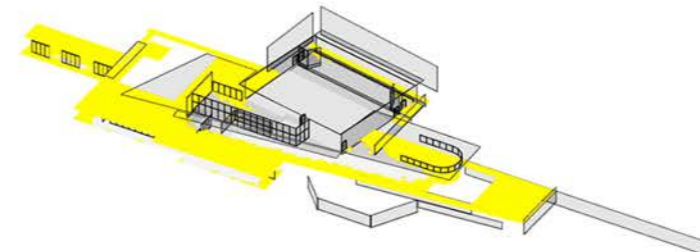
SEFAIRA MODEL



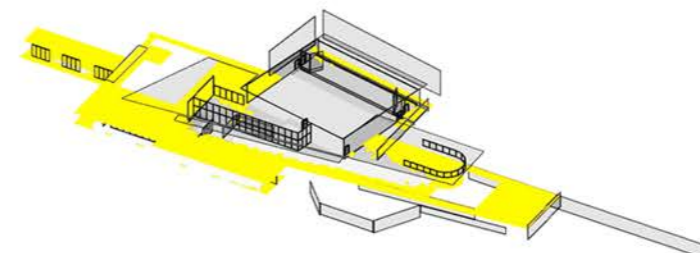
OVER AND UNDERLIT



ILLUMINANCE



DAYLIGHT FACTOR



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.



Daylighting % of floor area (annual)	
Underlit:	0
Well Lit:	37
Overlit:	63

DAYLIGHTING



Figure 6.2
Final presentation: Tech crit
(Author, 2018)



Figure 6.5
Initial contour model planning
(Author, 2018)



Figure 6.3
Final presentation: Design crit
(Author, 2018)



Figure 6.6
Model building (Author, 2018)

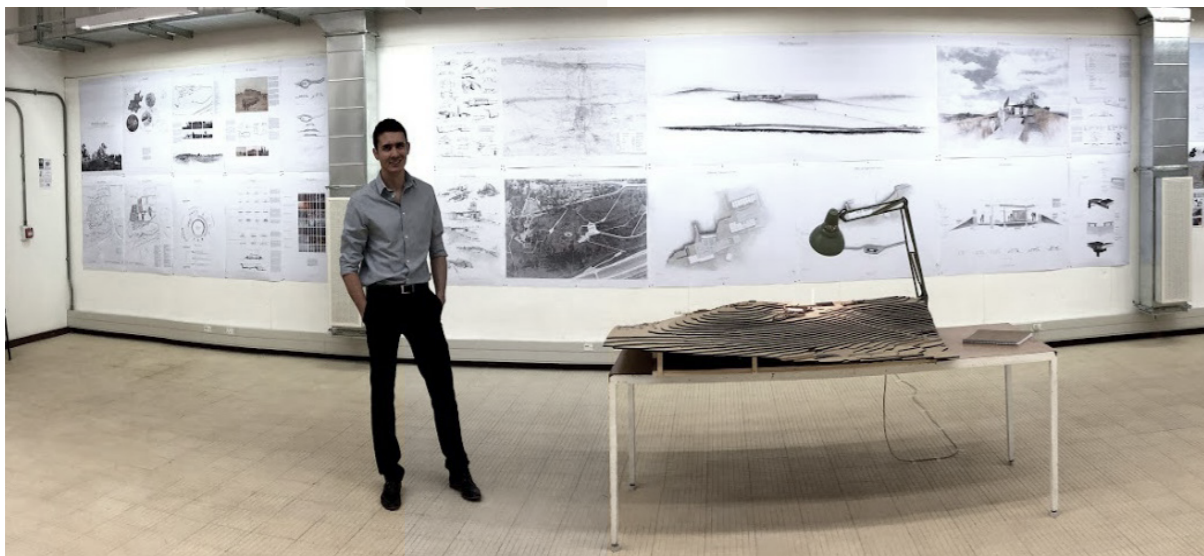


Figure 6.4
Masters exhibition and presentation
(Author, 2018)



Figure 6.7
Finalised model (Author, 2018)

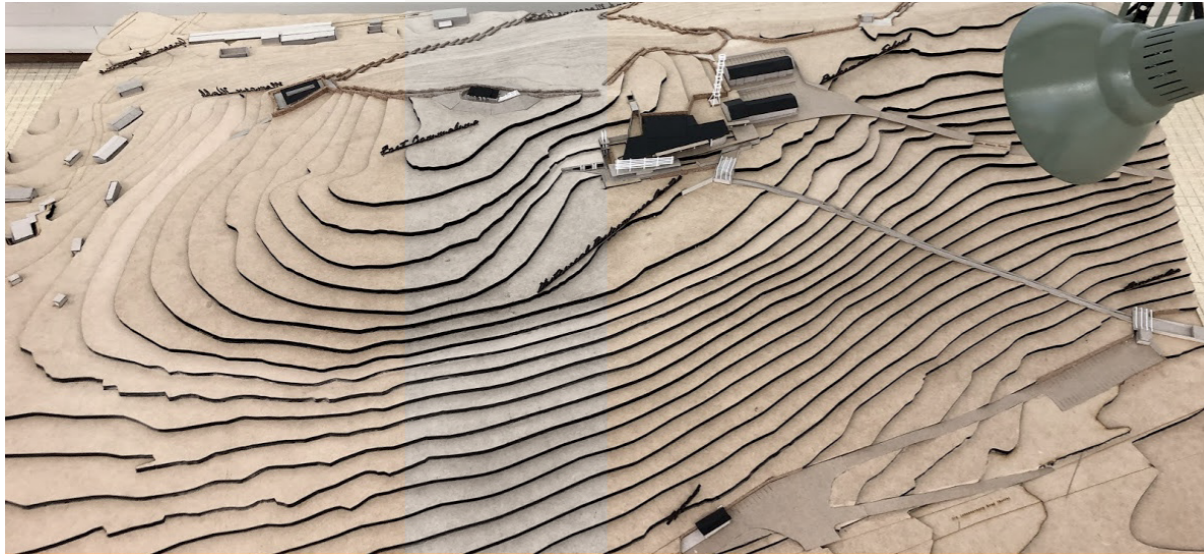


Figure 6.8
Final model scale 1:500
(Author, 2018)

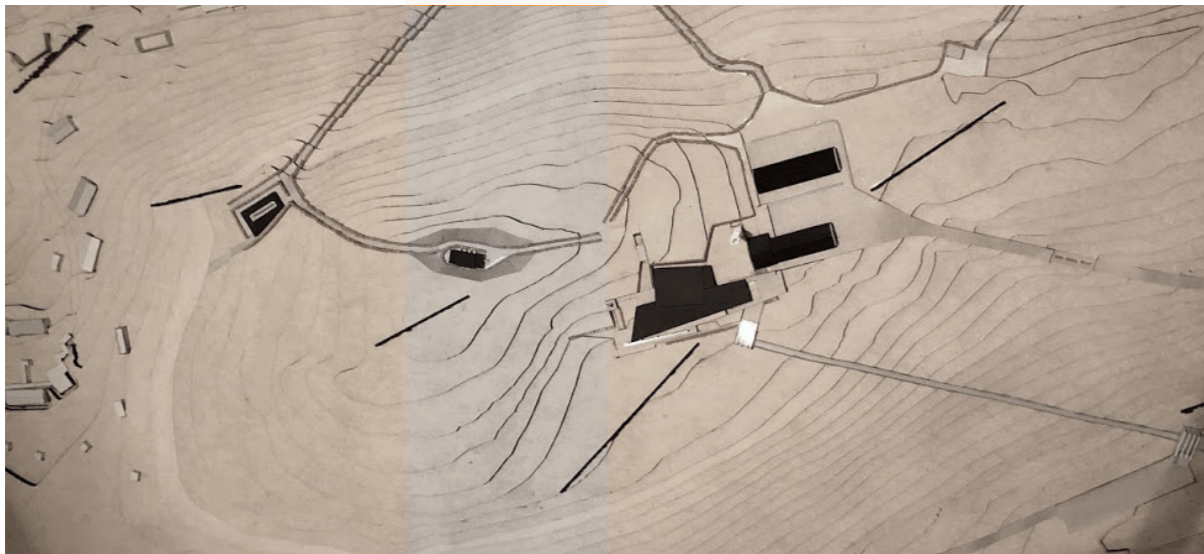


Figure 6.9
Final model scale 1:500
(Author, 2018)



Figure 6.10
Marquette model scale 1:1000
(Author, 2018)

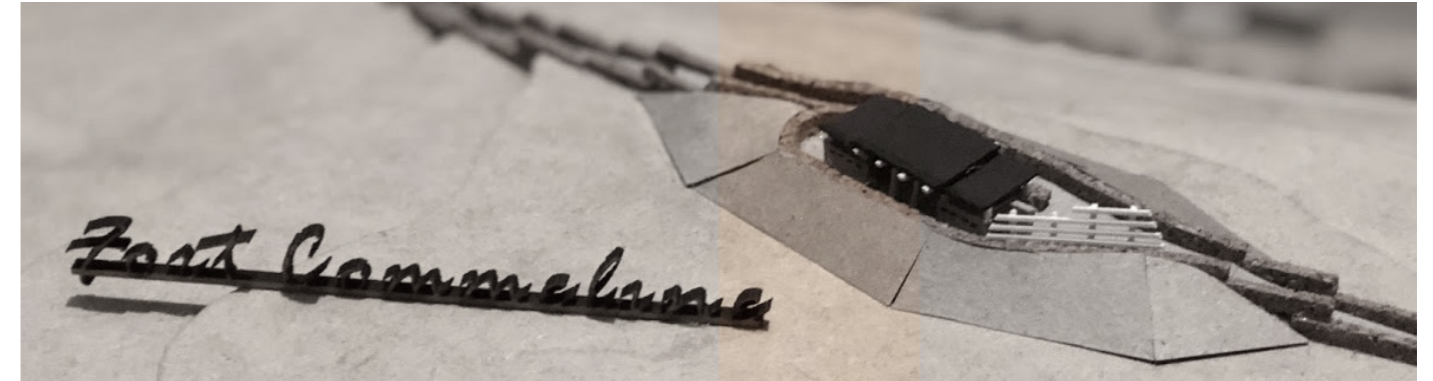


Figure 6.11
Fort Commeline
(Author, 2018)



Figure 6.12
Historical Performance Centre
(Author, 2018)

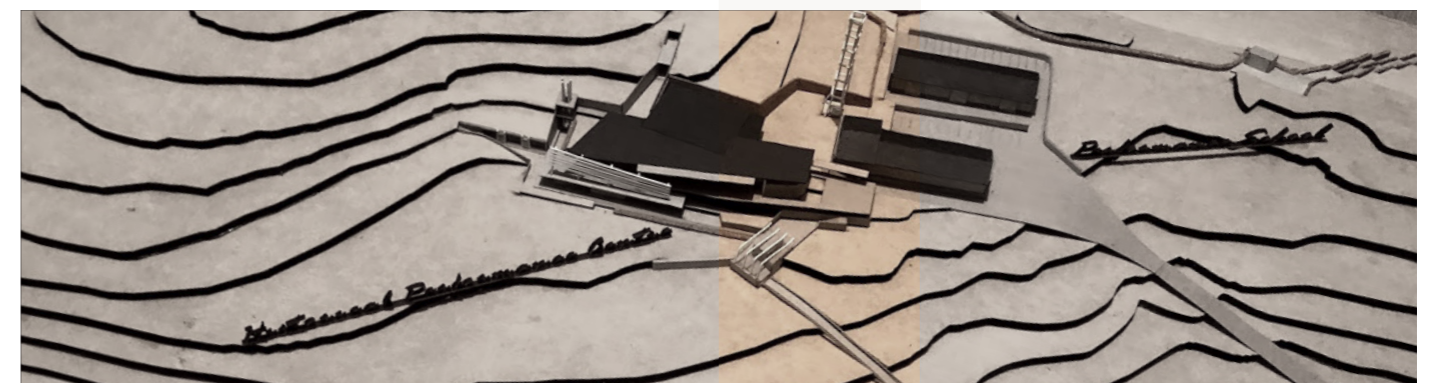


Figure 6.13
Historical Performance Centre and
Performance School (Author, 2018)



Figure 6.14
Memory Wall
(Author, 2018)