



TECHNÉ

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- 7.2 TECTONIC CONCEPT
- 7.3 STRUCTURAL INTENTIONS
- 7.4 MATERIAL PALETTE
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- 7.7 STEAM DISTILLATION
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- SBAT RATING
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CHAPTER

07

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This chapter discusses the technical resolution of the design based on the theoretical and programmatic requirements. The technical concept underpins all tectonic decisions regarding structure, materiality, systems and technology.

Thresholds are spatial components of landscape and architecture that provide integrated, subtle, and complex transitions through landscape and architecture (Dee 2011:69). This chapter aims to translate the theoretical and design intention into a coherent technical resolution. The technical concept underpins all technical design decisions regarding the structure, materiality, systems and technology. The application of environmental strategies and passive systems is discussed as it relates to the building and its surrounding context.

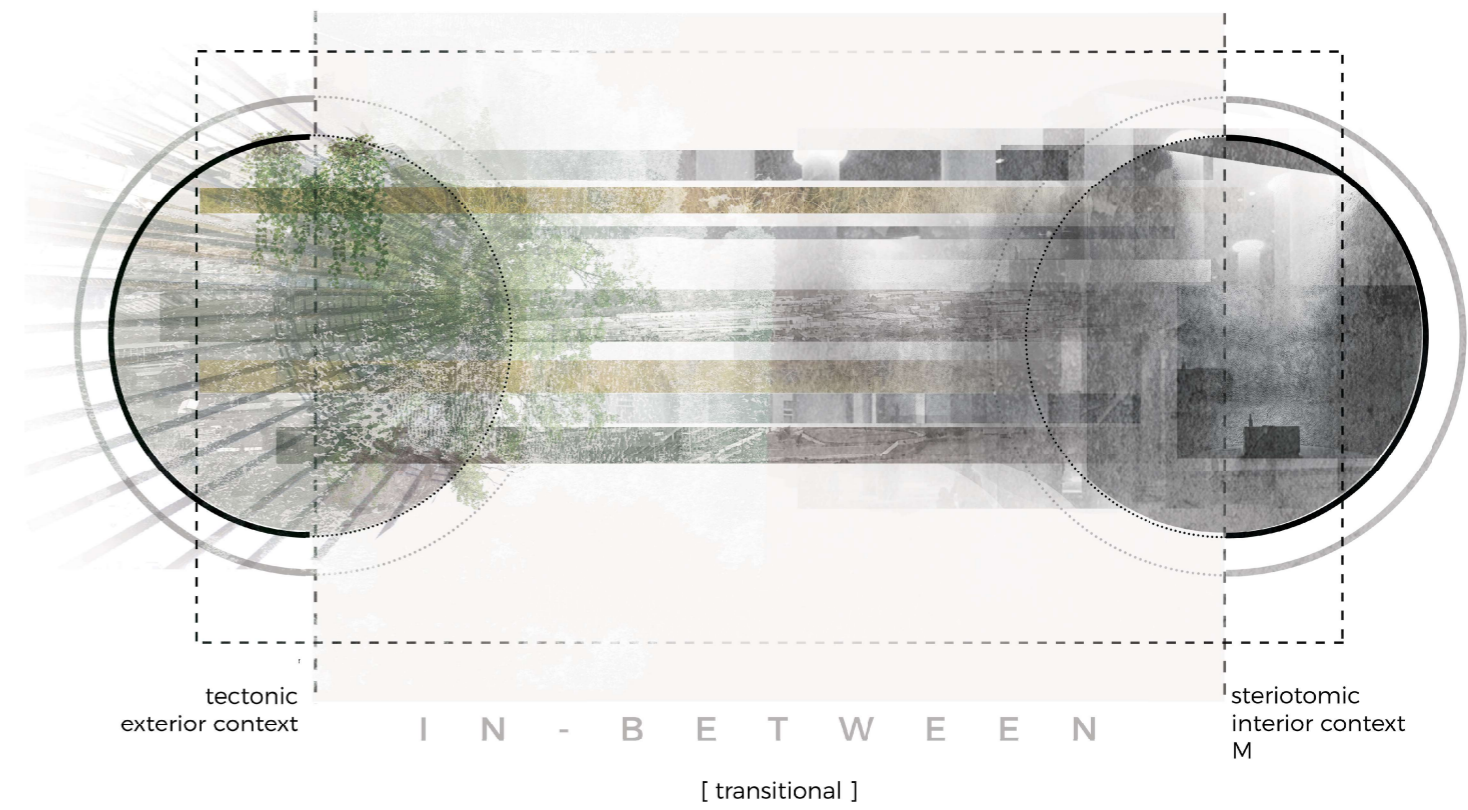


Figure 7.1: Conceptual diagram of tectonic intention (Author: 2018).

TECTONIC CONCEPT

The technical approach is rooted in the theoretical background as it echoes the primary consideration of the design, which considers the threshold conditions. Framed within the themes of liminality, as suggested by Van Gennep (1960), the symbolic value of the rites of passage represents three stable states: the state of separation, the state of transition and the state of integration. The first (separation) and the last (integration) are considered to be two distinct opposites. The structural investigation, based on the theory, aims to resonate with a similar theoretical premise within the field of architecture. German architect, Gottfried Semper (1803–1879) in his book

‘Die Vier Elemente der Baukunst’ (Four Elements of Architecture), argued that architectural composition can be divided into two distinct opposites: the stereotomic and the tectonic. The stereotomic relates to solidity and the tectonic defines dematerialisation (Semer 1995:3). Kenneth Frampton (1990) best defined the stereotomic and the tectonic. According to Frampton (1990:518) the inherent opposites in architectural materiality are cosmological opposites of each other, where the tectonic symbolises the sky and the stereotomic the earth.

The technical concept therefore considers the tectonic and stereotomic within the themes of liminality in order to define each state. In the design the state of separation (beginning state) is represented by the tectonic, the state of integration (final state) is represented by the stereotomic and the state of transition (in-between state) is represented by the relationship between the two opposites of the tectonic and the stereotomic. The adaptive re-use project of the water reservoir utilizes the main architectural elements of the granolithic concrete basement floor with the monolithically cast concrete walls, the concrete roof and concrete columns as the primary

structural elements which provide the context to define the stereotomic. Through this understanding of the typology of the stereotomic, an appropriate typology for the tectonic language, as the state of separation can be established. The use of steel, timber and organic shaped rammed earth walls is chosen to express a ‘lighter’ typology.



Figure: 7.2: Photograph showing the stereotomic of the existing abandoned structure in natural context with tectonic urban fabric. (Author: 2018)

7.3

STRUCTURAL INTENTIONS

The structural intention is seen as an extension of the design concept.

The reuse of an existing structure as a transition device allows movement, change and conversion of the elements within and moving through the building.

The structural qualities of the adapted building harness attributes of both the original and the new.

Furthermore, the project utilises adaptive spatiality through architecture of the monolithic, flat and enclosed structure to

transition to a lighter and 'open' structure.

The adapted Magalies Reservoir now has a series of public and recreational spaces at the lower level, that of the original basement floor. Also on this level, a series of water channels reinstates the original function of the building.

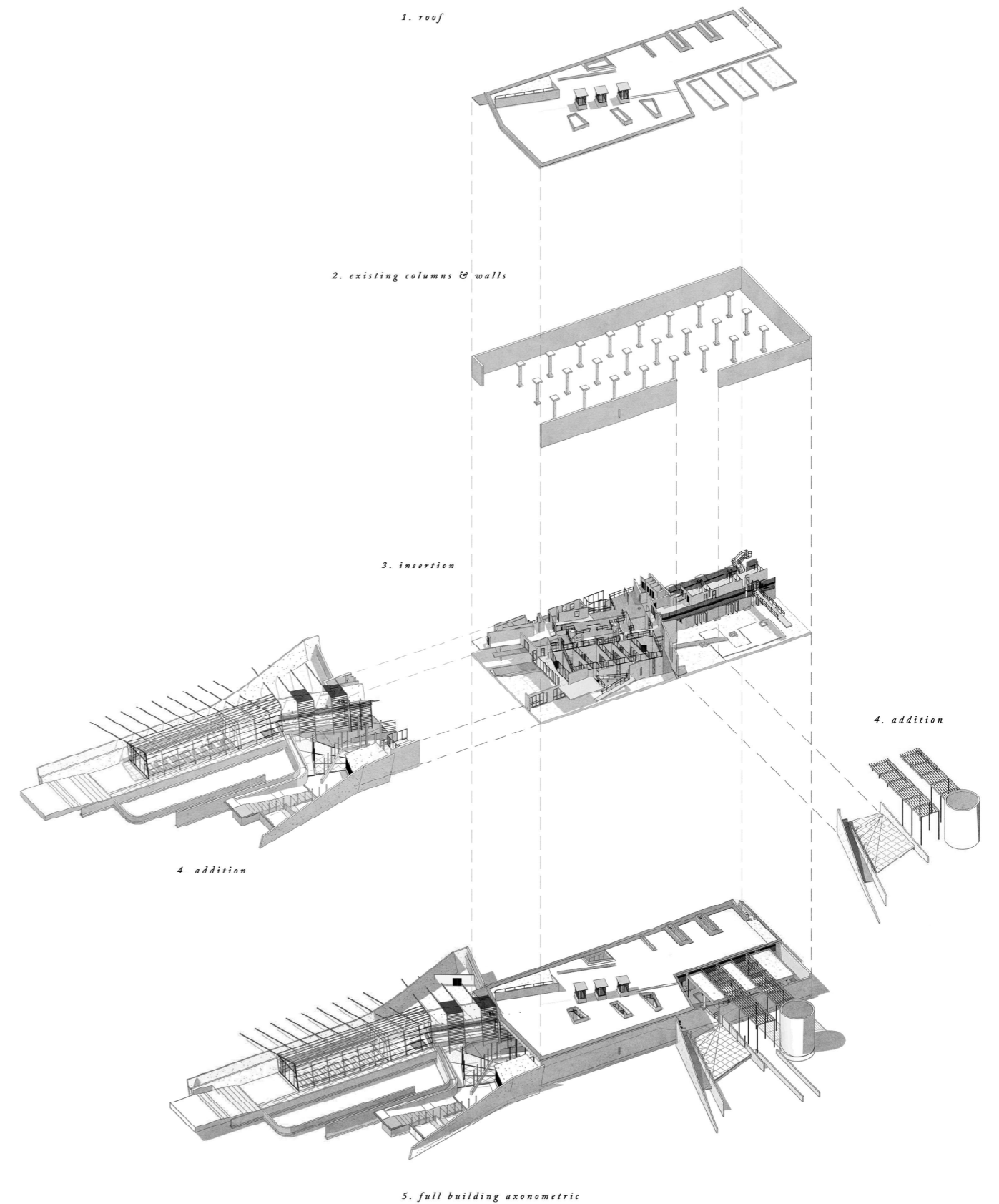
Through a process of natural filtration systems, the water channels suggests the circulation and separation of public activity and private activity of the building.

ROLES

Tectonic = (state of separation) [preliminal]

Stereotomic / Tectonic = (state of change) [liminal]

Stereotomic = (state of integration) [postliminal]



AXONOMETRIC

axonometric diagram highlighting key parts and responses to existing water reservoir

Figure 7.3: Axonometric: Structural Intention (Author: 2018).

7.4

MATERIAL PALETTE

The material palette responds to the qualitative and quantitative attributes in order to satisfy the experiential and functional requirements of the scheme.

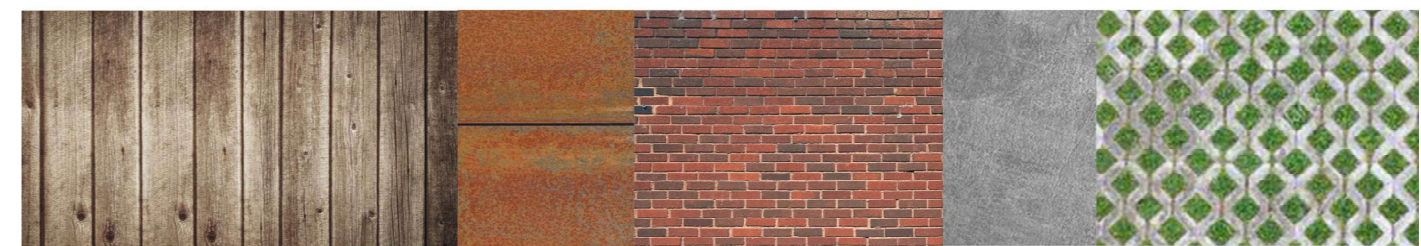
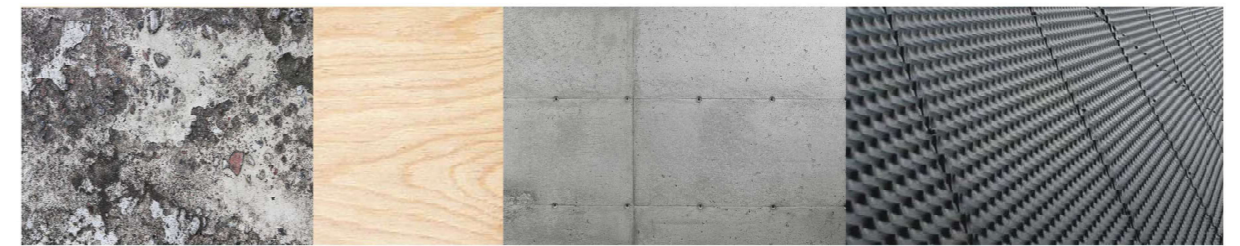
As part of the tectonic concept, a robust material palette of three materials for the eastern chamber of- steel, aluminium and concrete as contemporary partners of the historic concrete was chosen to match the stereotomic aesthetic.

In contrast the western chamber of the host three lightweight roofs floats above the entrance leading

to the original basement floor. The entry points to the reservoir are guided with organically shaped landscape walls feeding from the surrounding landscape. The rammed earth walls from reclaimed earth in combination with indigenous planting soften the approach to the structure. A lighter quality of steel and timber were chosen for the tectonic language of the western chamber.

The reservoir roof blends in with the surrounding landscape with the simple gesture of a gently inclined grasses plane with indigenous species.

Tectonic = timber + steel + new concrete (state of separation) [preliminal]
Stereotomic / Tectonic = existing+ new concrete + timber (state of change) [liminal]
Stereotomic = existing concrete (state of integration) [postliminal]



preliminal
[familiarity]

liminal
[transition]

postliminal
[integration]

Liminality

7.5
WATER

Water in this scheme is a main agent for in the design. The integration of water harvesting, filtration and circulation through the building enhance the architectural experience through the regenerative and corrosive qualities of water. Furthermore, the sensory experience of water is expressed within the circulation of people and processes in the building. The synergy of water and energy systems in the building is seen as an extension of the project concept. Water and energy systems are combined in the transitional moment of the distilling of plants to essential oils.

The primary system in the building is water specifically the circulation and treatment of water.

This system of water in the building can be explained through the water diagrammed. The on-site treatment of surface runoff to usable and potable water is understood through using the Advanced Grey water treatment (AGT) system .

> **WATER DEMAND**

- a. Grey water
 - Irrigation for the greenhouse and orchid and vegetables.
 - Flushing of toilets

b. **Potable water**

- Essential oil Distillation
- Restaurant
- Hand wash basin
- Washing of vegetables and herbs.

Potable water is required for the essential oil distillation process as well as domestic use in the kitchen and hand wash basins. Rainwater is collected

> **WATER HARVESTING**

The storm water management plan includes the harvesting and filtration of rainwater, which will then be used in the building for domestic and production purposes.

Rainwater is harvested from the surface runoff from the South sloping mountain hill. The northern retaining wall of the service yard is designed as a berm wall (point B) with a constructed swale for storm water harvesting. Excess water at this point will overflow as runoff into the street and handled as storm water. From B water is fed into the system, where it is throttled (allowing a maximum and controlled amount of water flow).

The water then flows into the Stack Bio-filter (sand filter) that removes the organic and degradable wastes. Between B and C the water is used for the greenhouse, and fruit orchard, then the runoff is still collected and pumped back into the biofilter.

The bio-filter uses bio-reactors containing living material to capture and biologically degrade pollutants) From the bio-filter, water is pumped into

and stored in a tank, where it moves through a sand filter system, then through a UV treatment and into a clean water storage tank for domestic use. The water for the essential oil distillation process is stored on the mezzanine level as the system does not require a lot of pressure.

Grey water is recycled from the hand wash basins in the building and cleaned through the constructed wetlands in the building.

Blackwater and other water that cannot be recycled cannot be reused as grey water, will be sent into the municipal sewer system.

the Multimedia Filter at point D - the multimedia filters have different media of: plants and reeds and fish and sand that are used to filter the water.

At point E the effluent then enters a deep bed multimedia filter to remove the very fine particles and organic materials.

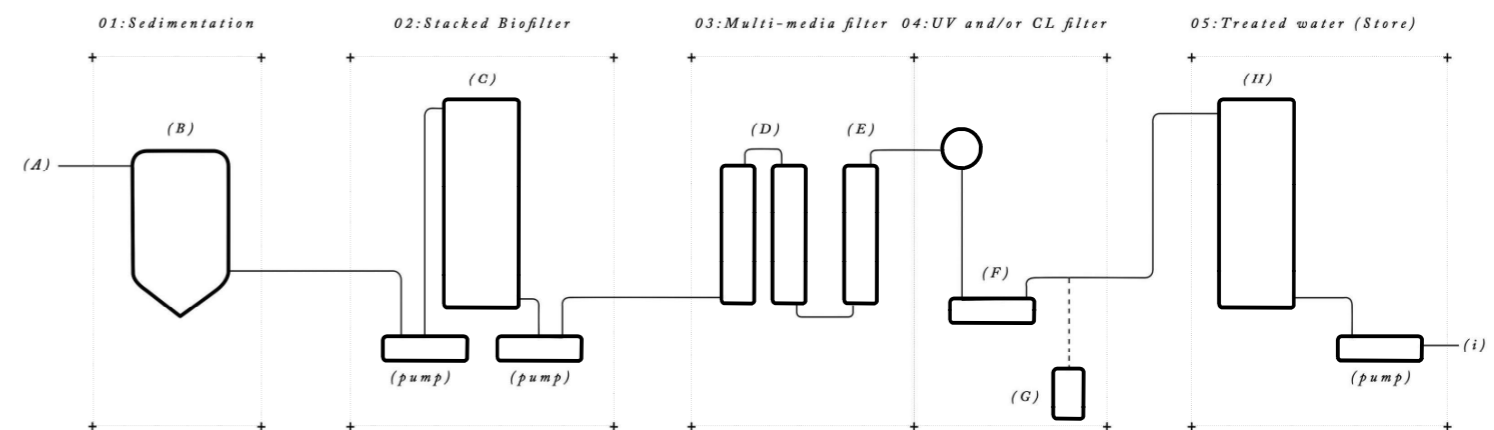
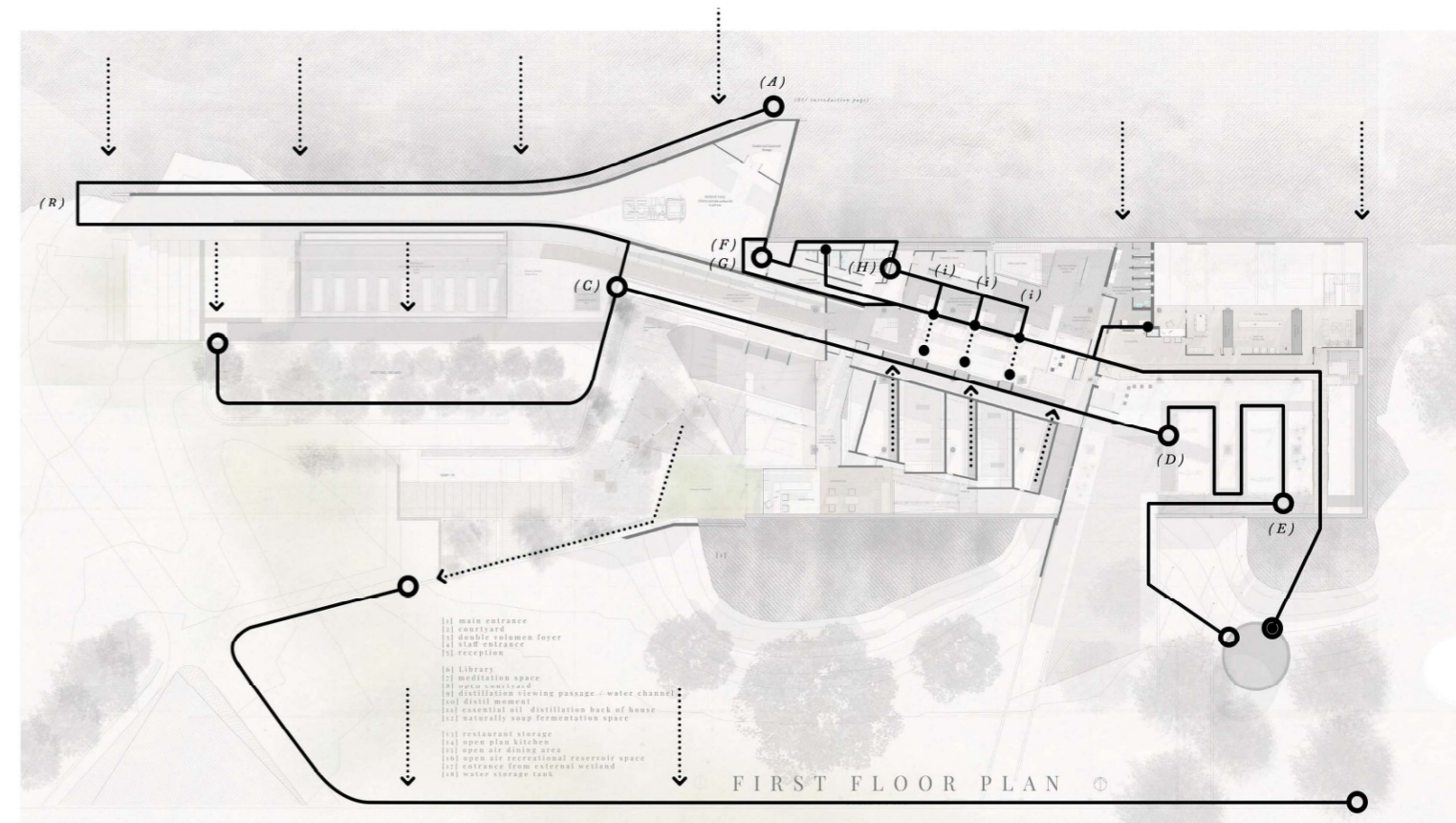
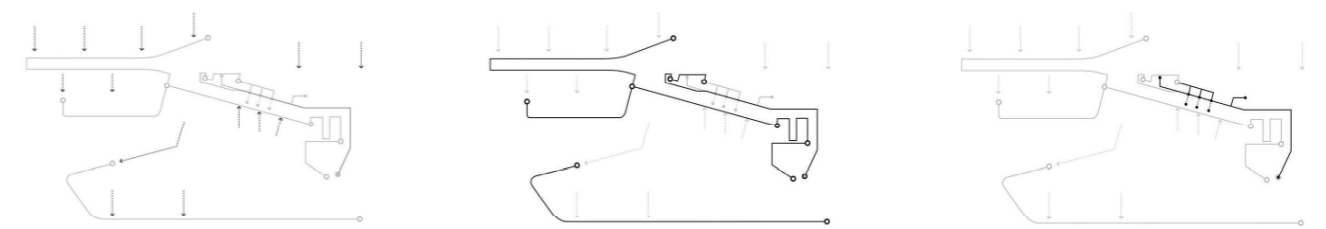
From there the water is now treated where it can now be used as grey water but it is not yet potable.

From the storage point the treated water can be used. From this point the water can be pumped back into the building where it then meets the uv and chlorine filter at point F. Here the water flows to the granular Activated carbon Filters to remove dissolved organic materials and dissolved salts. This system and the uv filtration system is located in the mechanical room on the ground floor.

The potable water is then pumped to point H which is a storage tank located on grade of the existing roof.

SYSTEM: WATER

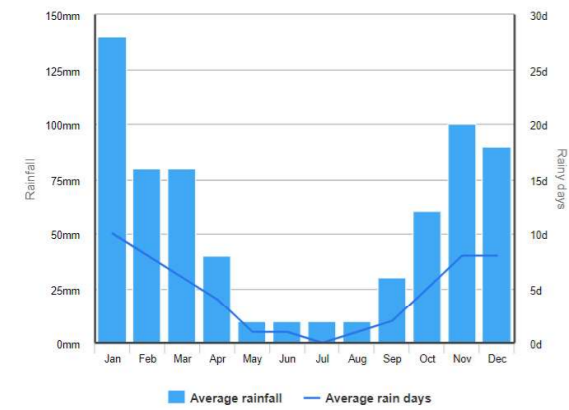
the on-site treatment of surface runoff to usable and potable water standards using the Advanced Grey Water Treatment (AGT) system



- (B) A water-driven centrifugal separator removes large particles and solids and then enters an Equalization Tank.
- (C) A Stacked Bio-filter can be employed to remove any organics/degradable wastes.
- (D) + (E) Effluent then enters a deep-bed Multi-Media Filter to remove very fine particles and organic materials.
- (F) Water then flows to Granular Activated Carbon (GAC) Filters (or nano-filtration deionization) to remove dissolved organic materials and dissolved salts.
- (G) UV (or Ozone) Disinfection is used for the final stage of treatment to remove pathogens, colour and produce extremely highly treated water.

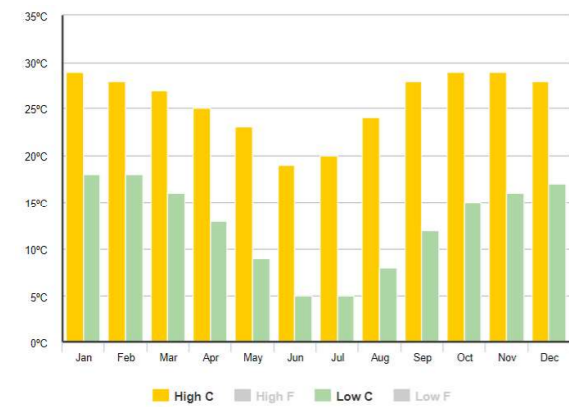
KEY

7.7 STEAM DISTILLATION



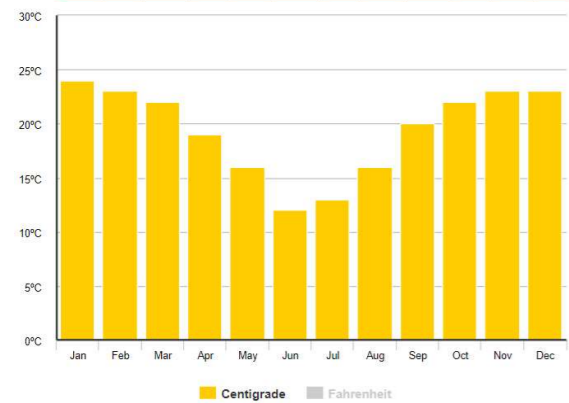
Average Rainfall: Pretoria

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
mm	140	80	80	40	10	10	10	10	30	60	100	90
Days	10	8	8	4	1	1	0	1	2	5	8	8



Average High/Low Temperature: Pretoria

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High °C	29	28	27	25	23	19	20	24	28	29	29	28
High °F	84	82	81	77	73	66	68	75	82	84	84	82
Low °C	18	18	16	13	9	5	5	8	12	15	16	17
Low °F	64	64	61	55	48	41	41	46	54	59	61	63



Average Temperature: Pretoria

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High °C	29	28	27	25	23	19	20	24	28	29	29	28
High °F	84	82	81	77	73	66	68	75	82	84	84	82
Low °C	18	18	16	13	9	5	5	8	12	15	16	17
Low °F	64	64	61	55	48	41	41	46	54	59	61	63

From this point the water system **transitions** though to the energy system for the essential oil distillation process. The energy of heat source for the process is generated through the use of parabolic trough collector that uses the energy from the sun. these are located on top of the existing concrete roof, facing north at 26 degrees.

From point H the water is heated through the parabolic solar collector system and fed into the steam line connected to the three stainless steel distillation units (i) inside the building.

1. ESSENTIAL OIL DISTILLATION PROCESS > Process of steam distillation

There are various types of distillation processes available to produce essential oils. Some of the common types include Hydrodistillation (HD), Steam distillation (SD), Solvent extraction, Enfleurage, Cohobation, and Maceration which are the roughly traditional and generally used method.

Steam distillation is the chosen method for essential oil production as this is the most common method. It is a more modern version of the traditional technique that follows the same principle.

The process of steam distillation involves the flow of steam into a chamber holding the raw plant material. The steam causes small sacs containing essential oil to burst. The oil is then carried by the steam out of the chamber and into a chilled condenser, where the steam once again becomes water. The oil and water are then separated; the water referred to as a 'hydrosol', can be retained as it will have some of the plant essences.

Advantages apparent in this method such as the controllability of the amount and quality of steam, there is a lower risk of thermal degradation as temperature generally is not above 100°C, it is a widely used process, therefore employability is easier, it produces a high quality of essential oil and it is the most cost-effective method.

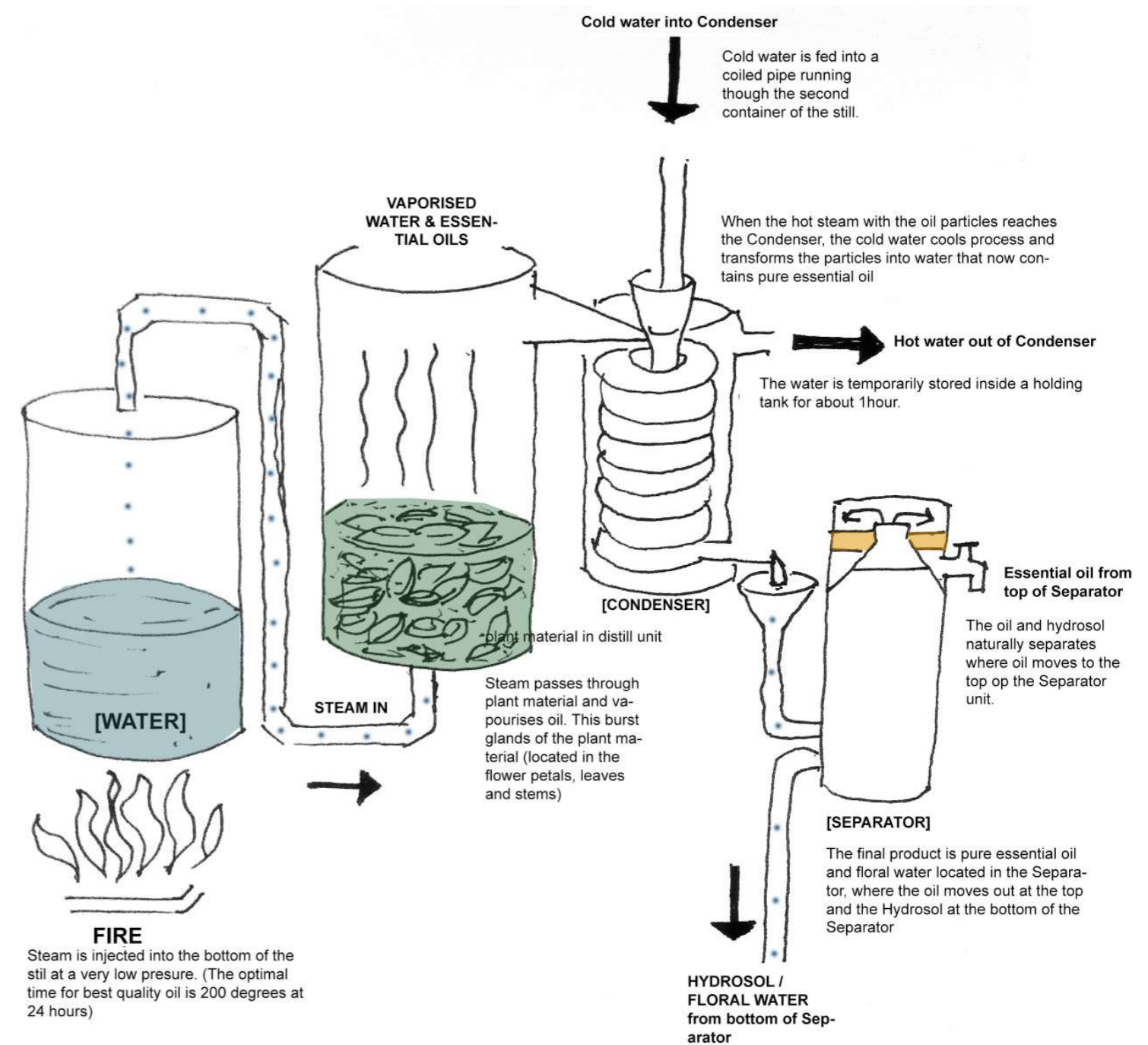


Figure 7.5: Essential oil distillation process (Aubor 2018).

7.8
ENERGY

> Products from the PLANTS and ESSENTIAL OILS

i) Essential oil

The essential oil is the primary product of the distillation process. The oil is bottled and stored where it is used in the food at the restaurant, sold for pharmaceutical purposes.

ii) Hydrolate

The Hydrolate or hydrosol (floral water) is the distilled water enriched with plant volatiles that is the by-product generated when the water and oil have been separated in the condenser. This by-product is bottled and stored.

iii) Value Adding products identified as soap and candles.

iv) Medicinal and herbal teas

> Steam Distillation Components

> A steam generator

> Still / Condenser

The still is where the oil is displaced from the biomass material placed inside by the steam coming from the steam generator. The still is made of food grade stainless steel (SS304 or SS316). It consists of a round

steel column, inside it has a perforated grid where the plants are placed on and steam from the bottom of the still is injected and passes through the plants. At the top of the still there is an outlet for the steam to move to the condenser.

> Condenser

The condenser cools down the steam carrying the essential oil water mixture to separate the water from the oil particles.

> Separator

The Separator separates the oil and hydrosol. Designed for the machine's flow rate and oil properties of plant material used. The separators are available for oils lighter and/or heavier than water.

The synergy of water and energy systems in the building is seen as an extension of the project concept. Water and energy systems are combined in the transitional moment of the distilling of plants to essential oils.

> Parabolic trough collector

The energy system of a Parabolic trough collector is used to generate steam for the essential oil distillation process.

A parabolic trough is made up of long parabolic-trough mirrors, each with a heat-collecting tube when sunlight is reflected by the silver mirror to the central heat-collecting tube it heats up the synthetic oil composites inside the tube. The temperature at the focal point is 70 times higher than normal sunlight. The thermal energy collected is used to heat up the liquid oil composites. The high temperature liquids flow into the exchanger from the tubes, through a water chamber, causing the water to boil at an extremely high temperature, thus generating steam as it passes through the water chamber and through to the steam line to the distillation units- where the steam then passes through the distiller units filled with plant materials. The steam passes through the plant material and vaporizes water and essential oil. When the hot water and the oil particles reach the condenser, the cold water cools down the process and transforms the particles into water and pure essential oil.

The final stage is the separator where hydrosol or floral water is tapped from the bottom of the separator and the essential oil from the top of the separator.

The reasons for using this system as the energy source for the distillation process is that there is a lot of challenges and safety issues when a furnace as the heat source is placed inside the building, and economically, the gas is too expensive.

> Photovoltaic Panels

The secondary energy system utilises Photovoltaic Panels (PV panels) for supply of electricity to the building.

Energy uses is for artificial lights, cooking and mechanical equipment such as fridges. The PV panels are located on top of the greenhouse structure and angled at 26 degrees to the north to maximise the available solar gain.

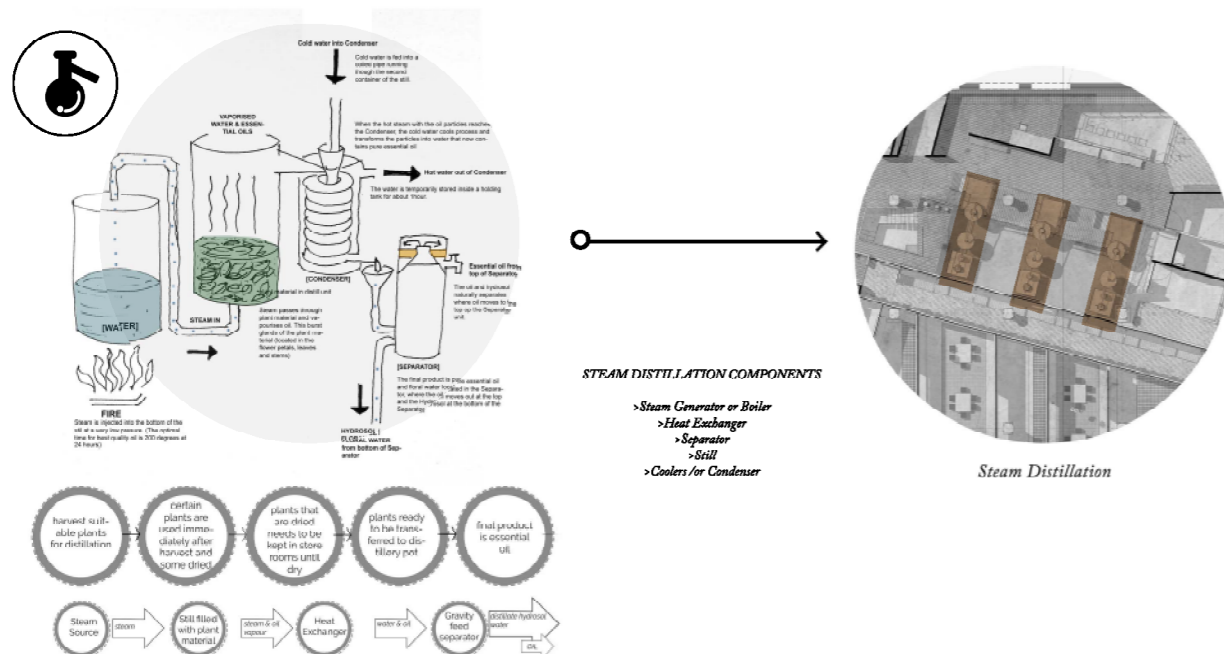


Figure 7.6: Process illustration and Location of essential oil distillation units (Author: 2018).

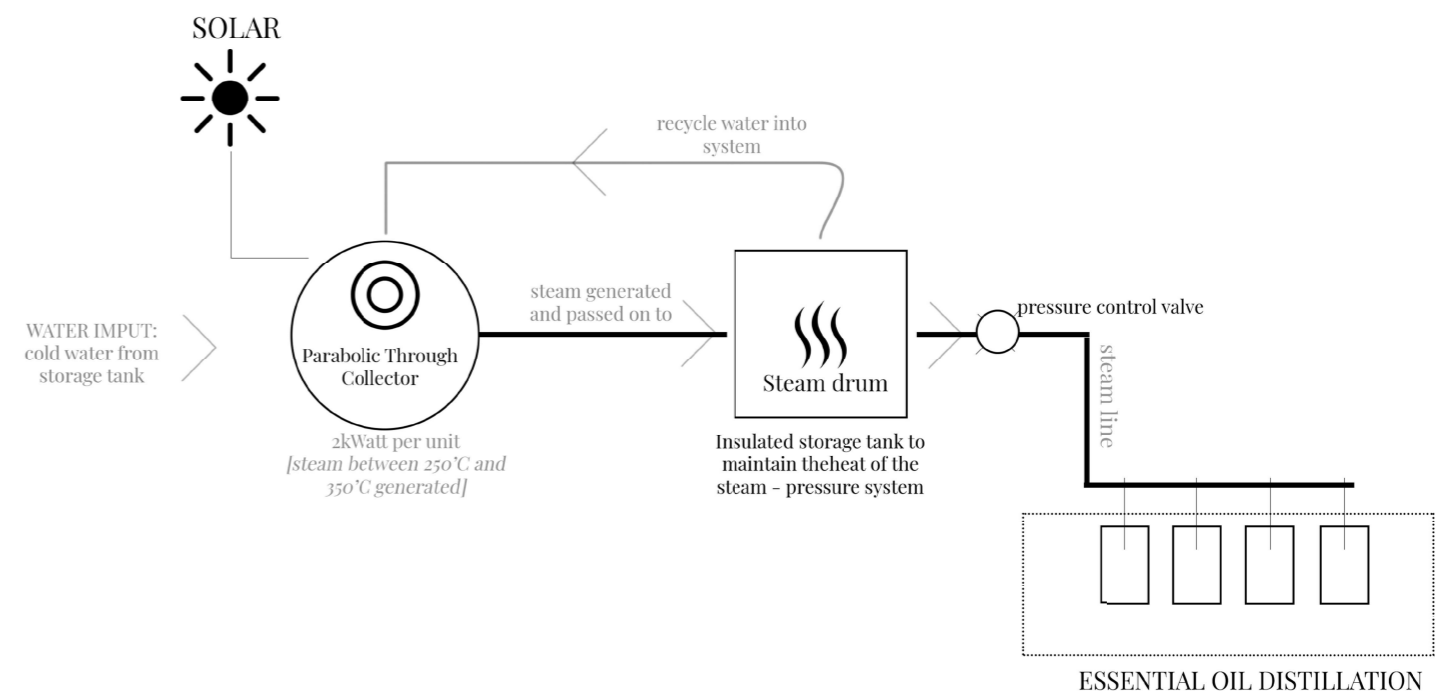
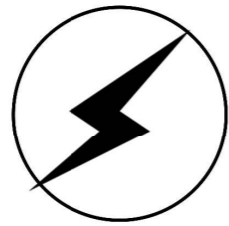


Figure 7.7: Parabolic Trough Collector Strategy (Author: 2018).



ELECTRICITY

USE
LIGHTS
WATER PUMP
APPLIANCES

DISTILL ENERGY CALCULATIONS										SOLAR DEMAND CALCULATION						
appliances	WATT (W)	KW	USAGE (H/DAY)	QTY	SPEC	AREA	total kWh/day (t)	kWh/month	kWh/year	total kW/y	solar array (pts) (L)	Solar panel Wattage (M)	(N) kW -solar array (H/L)	panels required (N/(M/1000))	panels total (ave)	
streetlights (independent lighting)	30	0,03	8	50	BEKA SOLAR	parking, sidewalk	12	7,2	86,4	4320	8,8	300	1,363636364	4,545454545	5	
interior lights	3	0,003	4	100	LED Solar Solution	unit building zones	1,2	0,36	4,32	432	8,8	300	0,136363636	0,454545455	0,5	
garden lights	30	0,03	8	45	BEKA BEACON LED 30W, OPAQUE OR FLUTED 45 DIFFUSER	site light	10,8	7,2	86,4	3888	8,8	300	1,227272727	4,090909091	4	
computer	180	0,18	4		Generic (Desktop & 2 monitor)	FF: study area	1,44	21,6	259,2	518,4	8,8	300	0,163636364	0,545454545	0,5	
refrigerator	90	0,09	19	2	energy saver 250 L	GF: Kitchen	3,42	51,3	615,6	1231,2	8,8	300	0,388636364	1,295454545	2	
freezer	105		4	2		GF: Kitchen	0,84	12,6	151,2	302,4	8,8	300	0,095454545	0,318181818	0,5	
water pump for potable water to solar heater	300	0,3	8	1				72	864	864					1	
pump- wetland circulation	450	0,45	8	2		pump room	7,2	108	1296	2592	8,8	300	0,818181818	2,727272727	3	
pump - storm water to irrigation taps	650	0,65	8	2		pump room	10,4	156	1872	3744	8,8	300	1,181818182	3,939393939	4	
Bundu Power 300 Watt, 30V Solar Panel											total solar panels required: 39					
TOTAL:											46,46	351,66	4219,92	16725,6		

Figure 7.7 Electricity Calculations (Author: 2018).

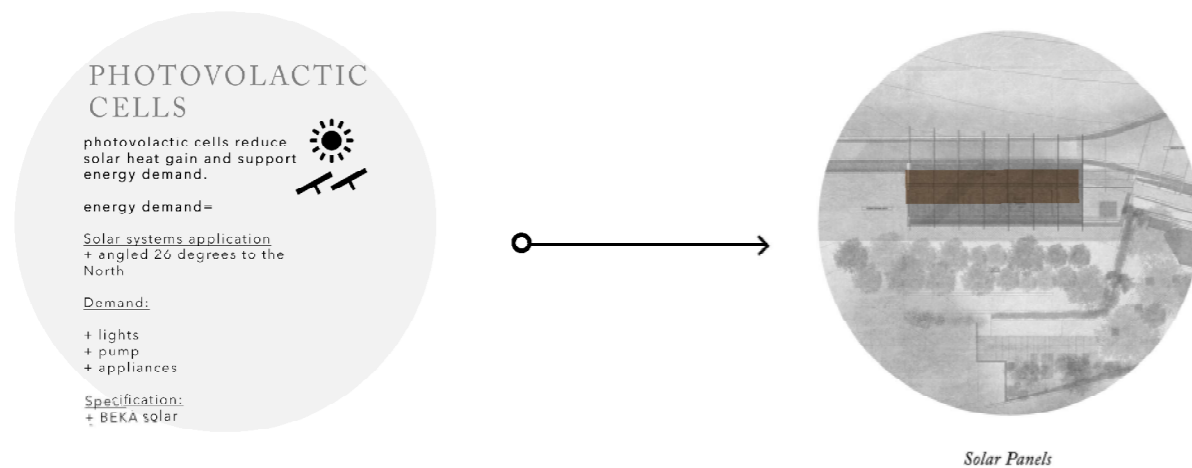


Figure 7.8: Solar Panel location (Author: 2018).

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7.9 ENVIRONMENTAL PERFORMANCE

SBAT RATING

Sustainable Building Assessment Tool

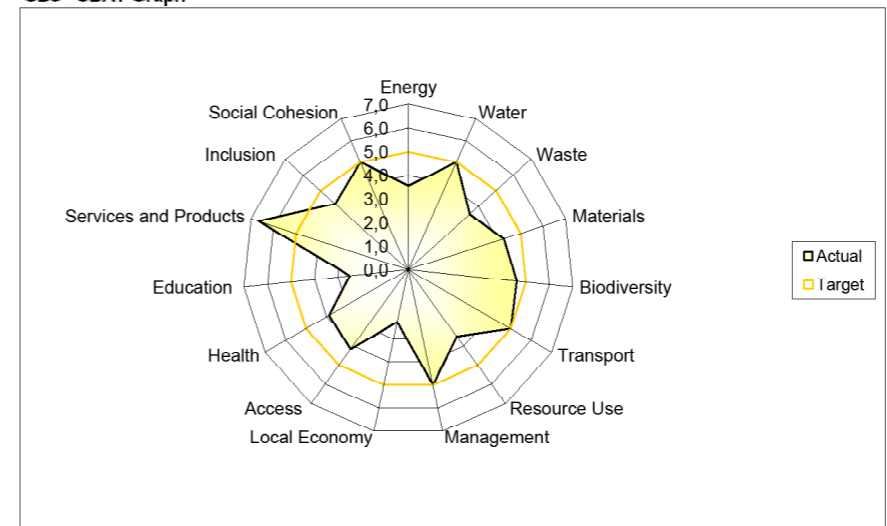
In order to establish the effects of the proposed intervention within the threshold in terms of sustainability the SBAT analysis tool was used. The diagram illustrated the study that was made to identify that numerous social, economic and environmental issues have been improved though the proposed intervention.

The areas that show the most successful that either meet or exceed the target is the service and products, social cohesion, water, transport, management, access and health. The greatest rating of it all is the service and products as a major part of the program includes cultivation of plants and herbs, as well as small scale agriculture to supply the building with produce. The building target is met in terms of water, social cohesion and transport. The achieved Environmental, Economic and Social overall rating of 4.2 is very successful as it is 0.8 from the target. In conclusion, the project is successful in creating synergy between social and environmental performance.

SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL 1,04

SB SBAT REPORT Achieved 4,2

SB1 Project Distil
SB2 Address Threshold between End Street and Magaliesberg, Mamelodi West
SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance	Score
Environmental	4,2
Economic	4,0
Social	4,4
SBAT Rating	4,2

SB5 EF and HDI Factors	Score
EF Factor	4,4
HDI Factor	3,2

SB6 Targets	Percentage
Environmental	84
Economic	80
Social	89

SB7 Self Assessment: Information supplied and confirmed by
Name _____ Date _____
Signature _____

SB8 Validation: Documentation validated by
Name _____ Date _____
Signature _____

SB9 Validation Report Version _____ IVR _____

ADAPTIVE REUSE
Adaptive reuse architecture is a special form of refurbishment that poses a number of sustainable implications, as well as clear economic, environmental and social benefits (Gewirtzman, 2016). These include advantages of significantly lower impact on the environment when compared to the development of new structure as well as the amount of energy consumed is significantly less than that of a new building.

DAYLIGHTING
Adequate day lighting into the interior spaces is achieved through the opening of the existing structure's perimeter walls on the Western edge and a portion of the Southern edge. The entrances to the entrance threshold of the building allows for ample amounts of natural light into the interior space. Furthermore, the existing roof is opened at specific spaces in order to allow for natural daylight into deep internal spaces of the building.

Figure 7.9: SBAT Rating (Author: 2018).

CONCLUSION

In conclusion, the initial intention of the creation of architecture as enabler resulted in the re appropriation of an abandoned infrastructure to facilitate transition and connection.

In memory of the original function of the abandoned building the role of water takes on the role as the main agent to enable change.

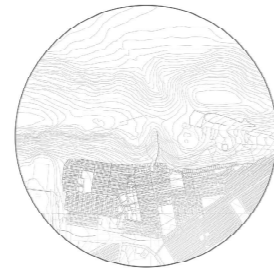
Though which the way water naturally moves though the site, and is harvested and utilized in the building, aids in the transition of the physical place, elements of place and people. Architecture of transition harnesses the intangible, social, and environmental opportunities of the specific context to distil values by defining the liminal space.

CONCLUSION

- 8.1 FINAL DESIGN PRESENTATION
- 8.2 LIST OF FIGURES
- 8.3 REFERENCES
- 8.4 ARTICLE



(01 / introduction page)



"liminal"

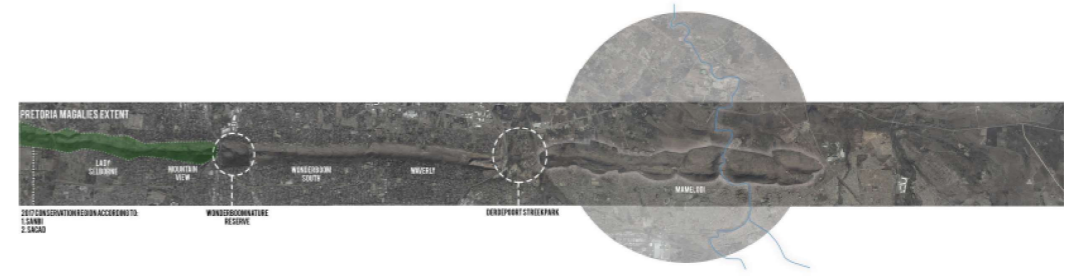
occupying a position at, or on both sides of, a boundary or threshold.

*Adaptive reuse of an abandoned water reservoir at the limen between
the urban and natural environments*



DISTIL

*Marni van der Hoven
12136728*



GENERAL ISSUE

Magalies Mountain range conservation regiao stops eastwards from Wonderboom gateway



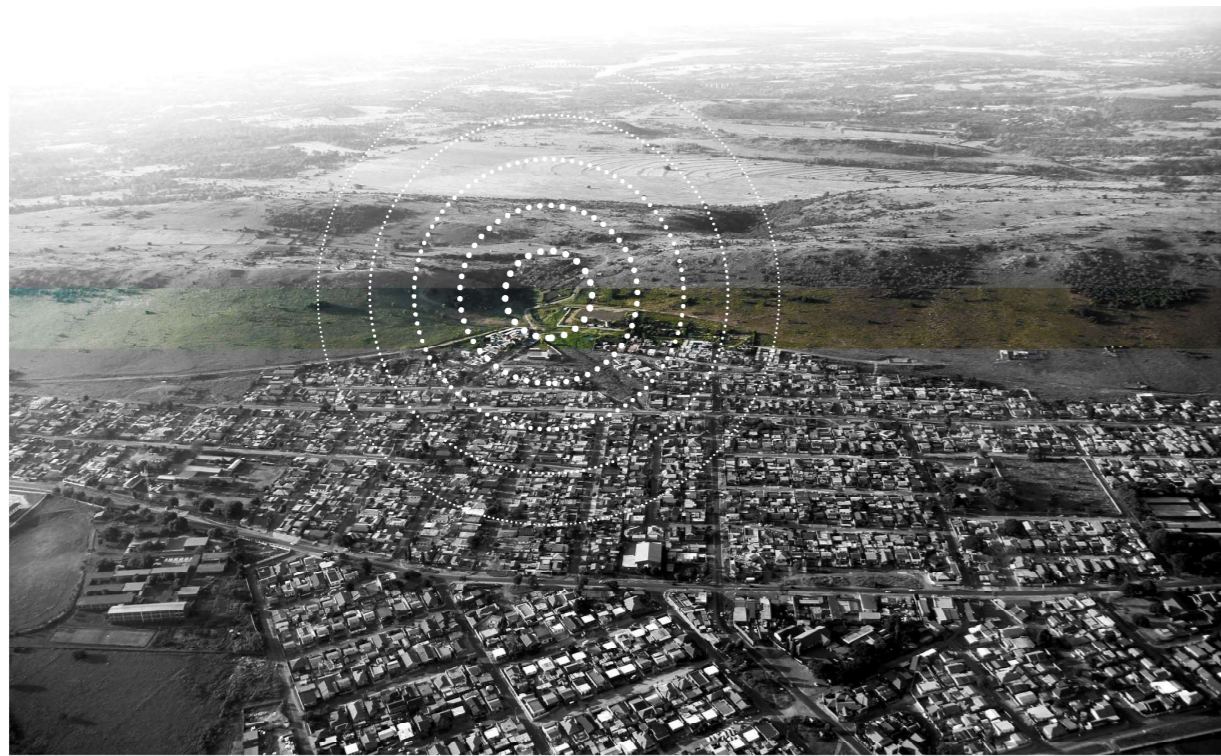
URBAN ISSUE

Urban encroachment threatening the biodiversity of the natural environment



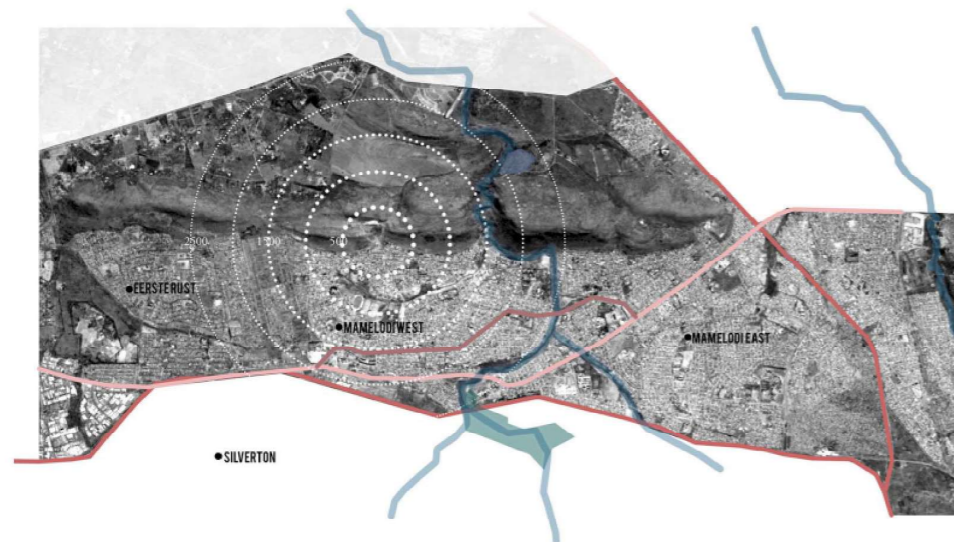
ARCHITECTURAL ISSUE

The threshold in-between the urban and natural environments



MACRO MAPPING

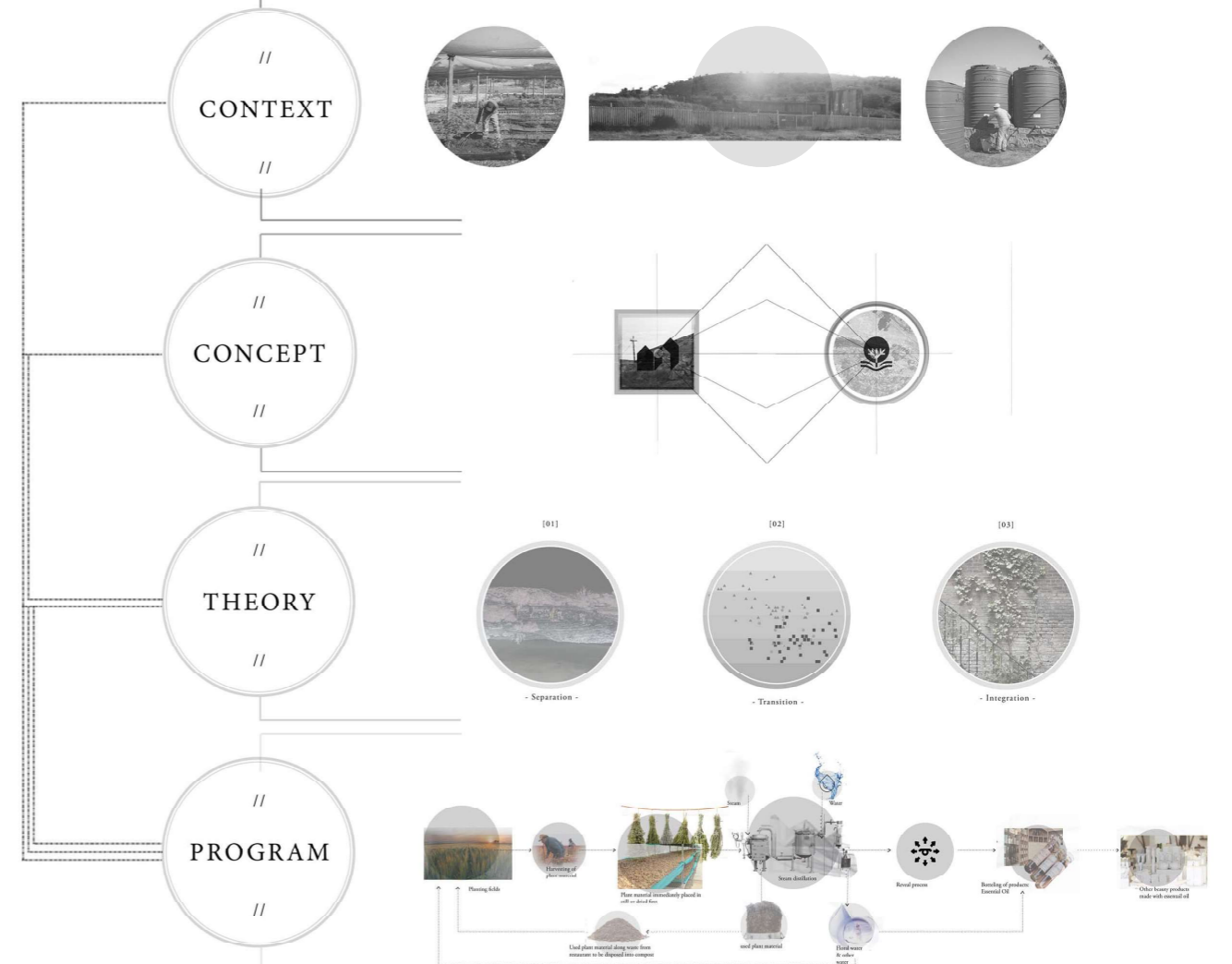
Mamelodi West & Magalies Mountain Range



- | | |
|--|--|
| <i>Road Legend</i> | <i>Network</i> |
| █ Railway Line | █ Existing Wetlands |
| █ Solomon Mahlangu Dr | █ Existing River (Pinaars River) |
| █ Shabanga Avenue | █ Water Treatment Plant |
| █ Hinterland Avenue | |

MACRO MAPPING

study area in relation to surrounding urban precinct



INFORMANTS

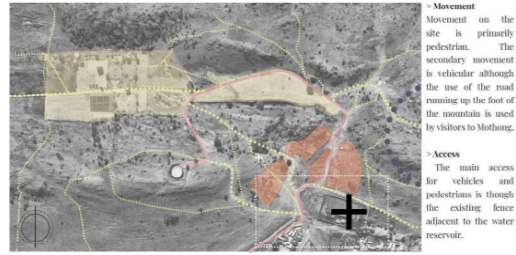
hierarchy of design informants



SITE CONDITIONS

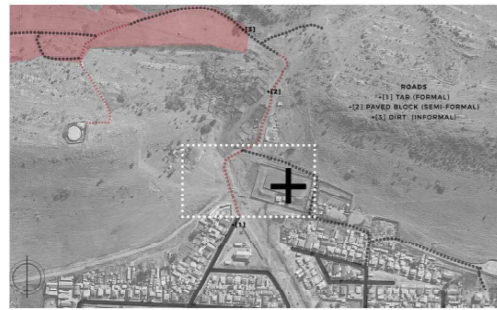
hand drawings of activities at Motbong

+ Abandoned Water Reservoir
Identified threshold marked
at focus area



> Movement
Movement on the site is primarily pedestrian. The secondary movement is vehicular although the use of the road running up the foot of the mountain is used by visitors to Mothong.

> Access
The main access for vehicles and pedestrians is through the existing fence adjacent to the water reservoir.



> Topography
The site has a steep slope towards the north and gradually becomes flatter towards the south as it is on the foot of the mountain. The topography slopes to the south towards the wetland in front of the site.



> Drainage
There is insufficient infrastructure in place for storm water catchment or site drainage. Water runoff is towards the south of the site, that runs into the northern edges of the residential patches and partly into the wetland.



(page number/sub category)

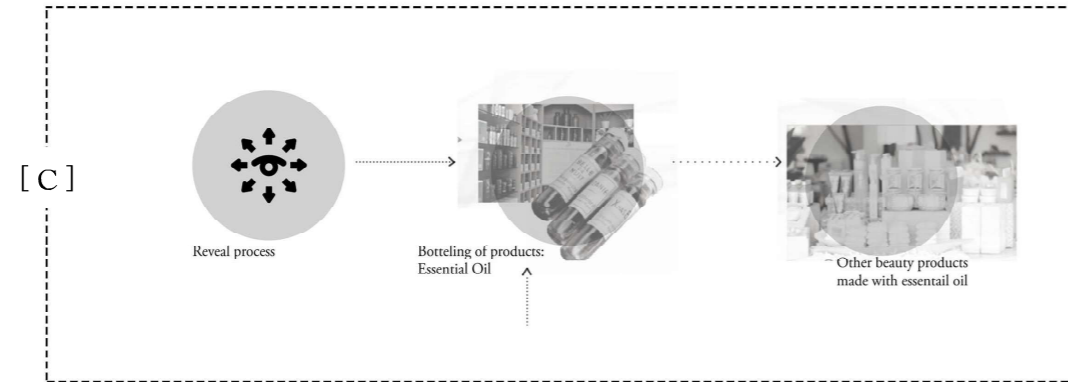
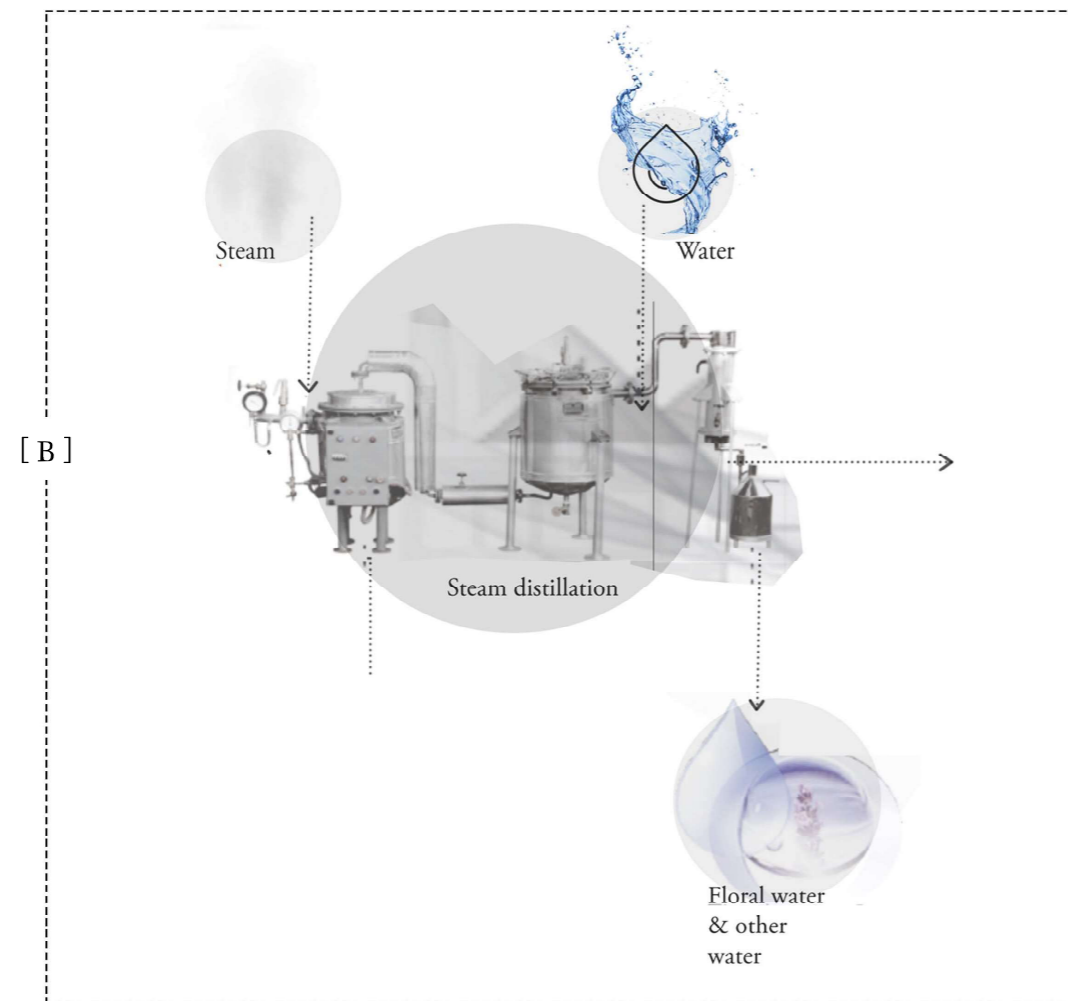
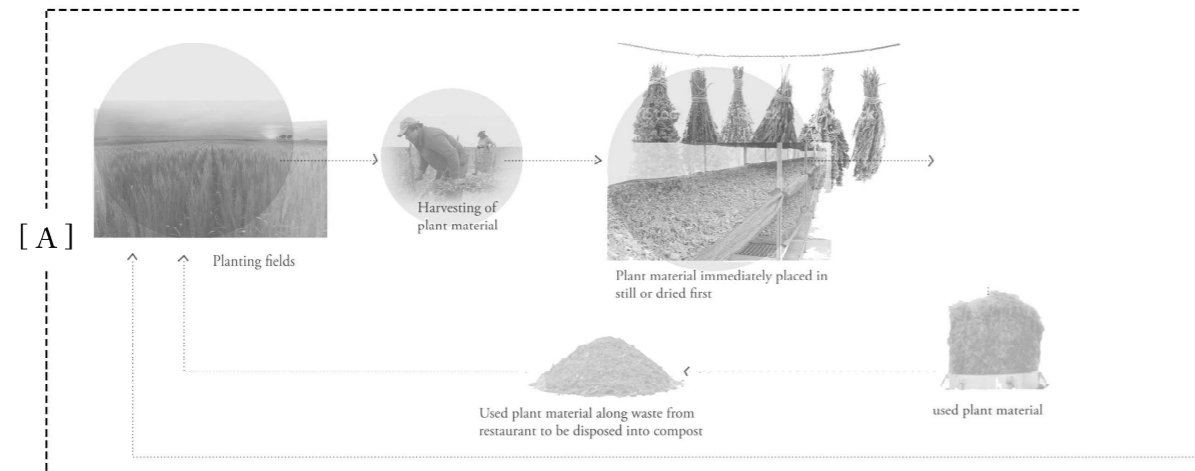


MESO MAPPING

MESO MAPPING

INTENTIONS

connection / transition / harness



PROGRAM

approach and application

LIMINALITY

The three phases of Liminality in Rite of Passage

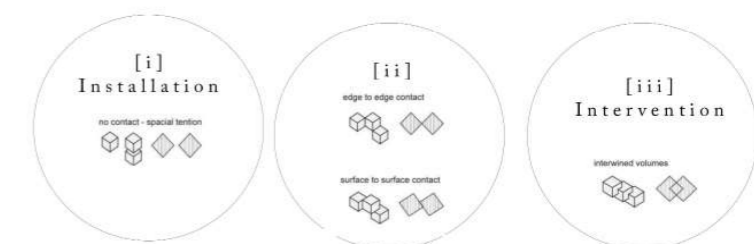
Arnold Van Gennep (1977)
Victor Turner (1960)



ADAPTIVE REUSE

Approaches to remodeling existing infrastructure

Graeme Brookner and Sally Stone (2004)



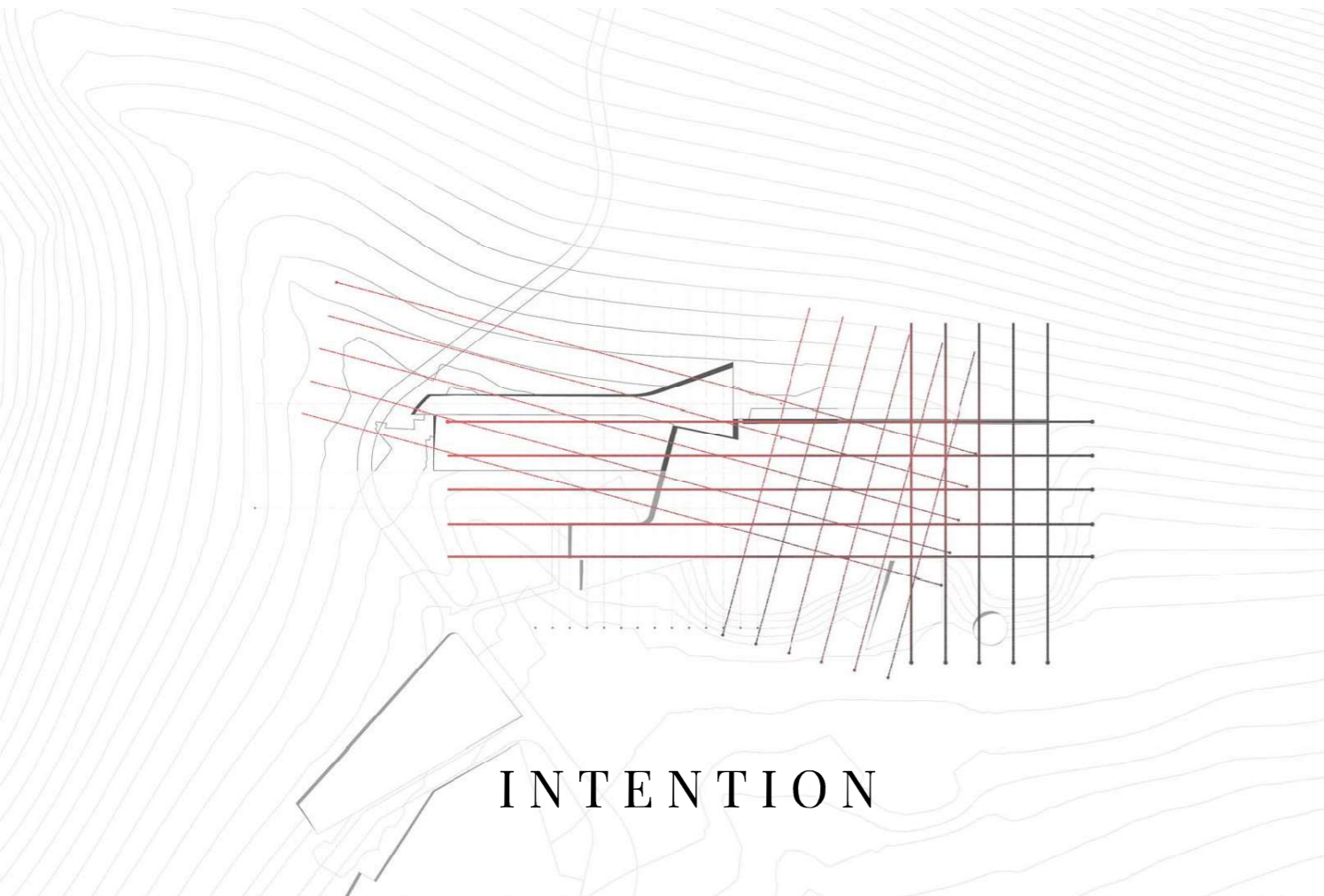
THEORY

sub-heading in lower case - elaborate on main heading



INTENTION

parti diagramme of builing in embeddedness & distilling moment

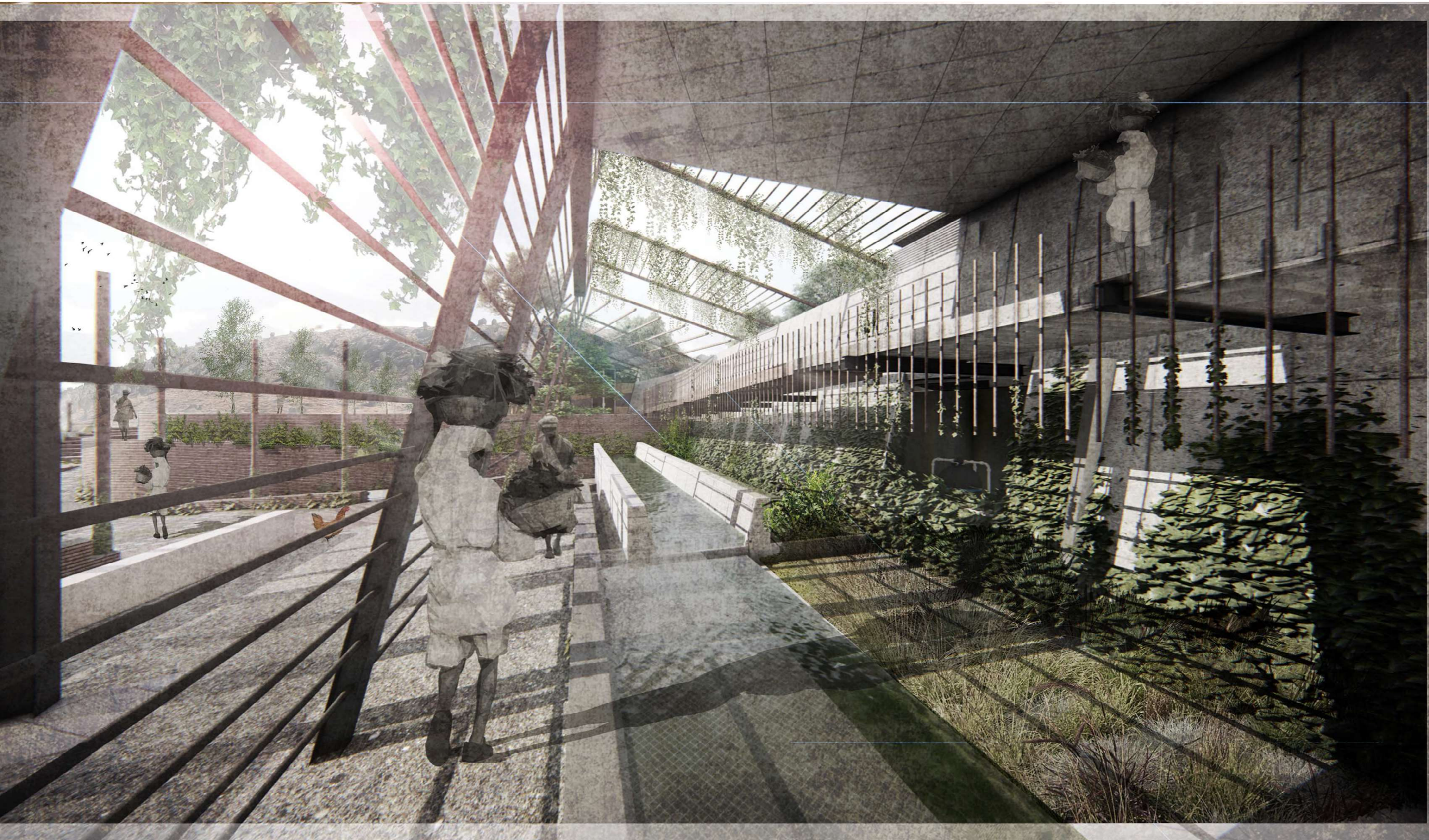


INTENTION

new layer - change in grid : design approach to existing grid to new grid

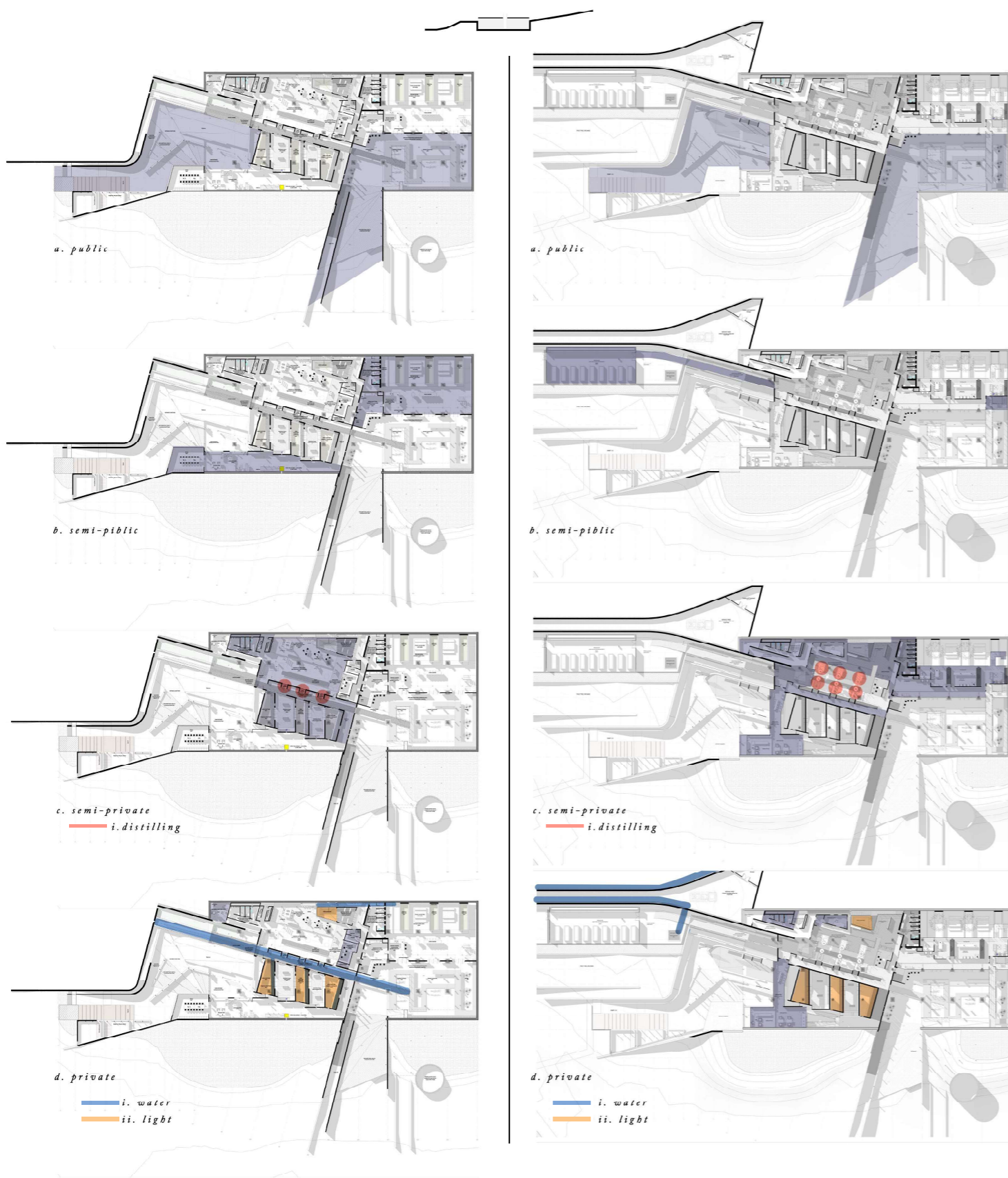






HARVESTING PASSAGE

PERSPECTIVE : water channel and secondary entrance from Western side of buidling



OPEN COURTYARD

internal open courtyard with water channel and planting

AXONOMETRIC

zones



ENTRANCE leading into recreational space

PERSPECTIVE 03: Southern Entrance

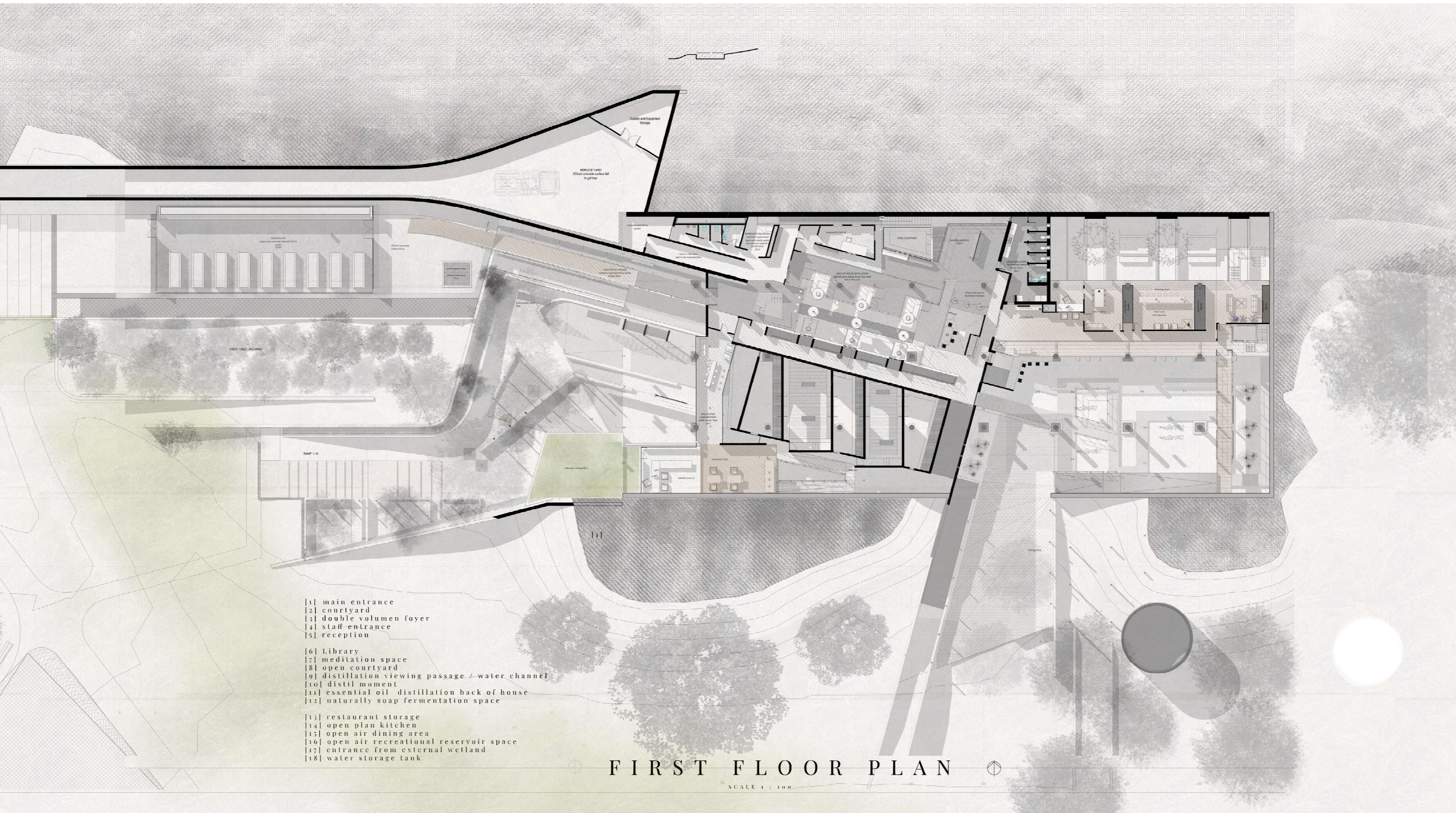
- 1| main entrance
- 2| courtyard
- 3| double volumen foyer
- 4| staff entrance
- 5| reception

- 16| Library
- 17| meditation space
- 18| open courtyard
- 9| distillation viewing passage water channel
- 10| distil moment
- 11| essential oil distillation back of house
- 12| naturally soap fermentation space

- 13| restaurant storage
- 14| open plan kitchen
- 15| open air dining area
- 16| open air recreational reservoir space
- 17| entrance from external wetland
- 18| water storage tank

GROUND FLOOR PLAN

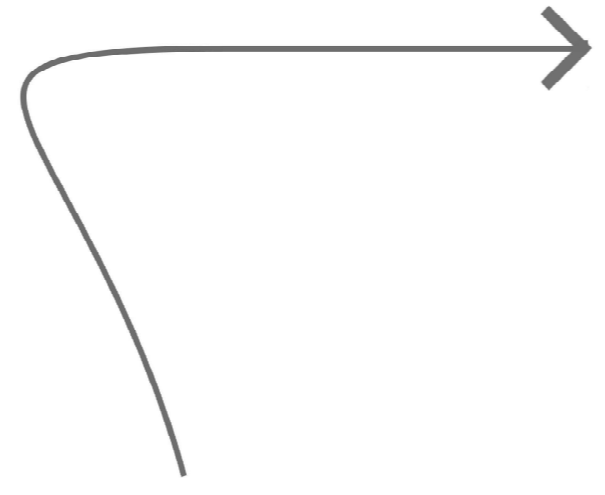
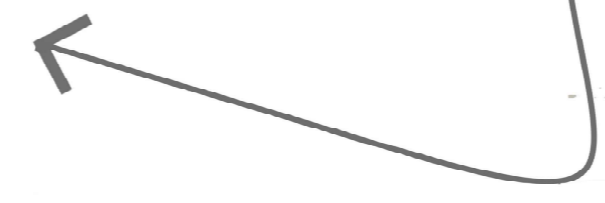
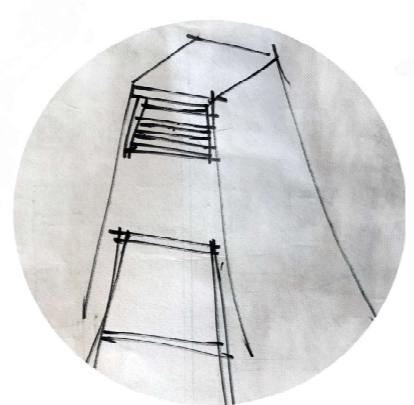
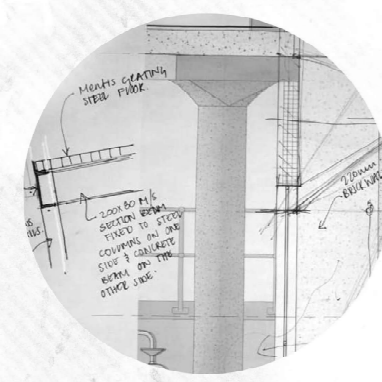
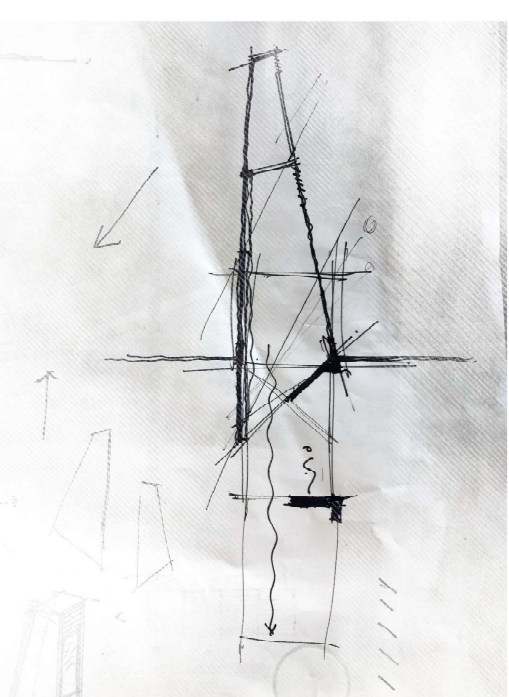
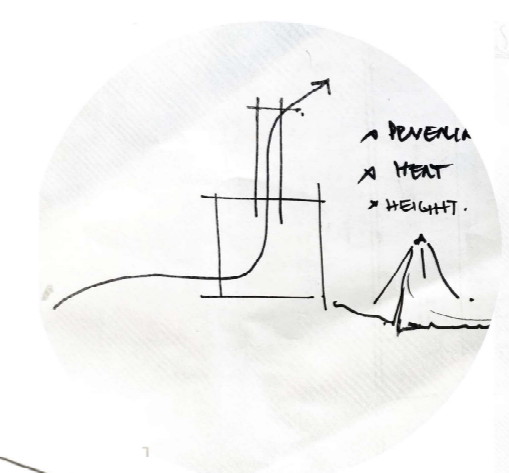
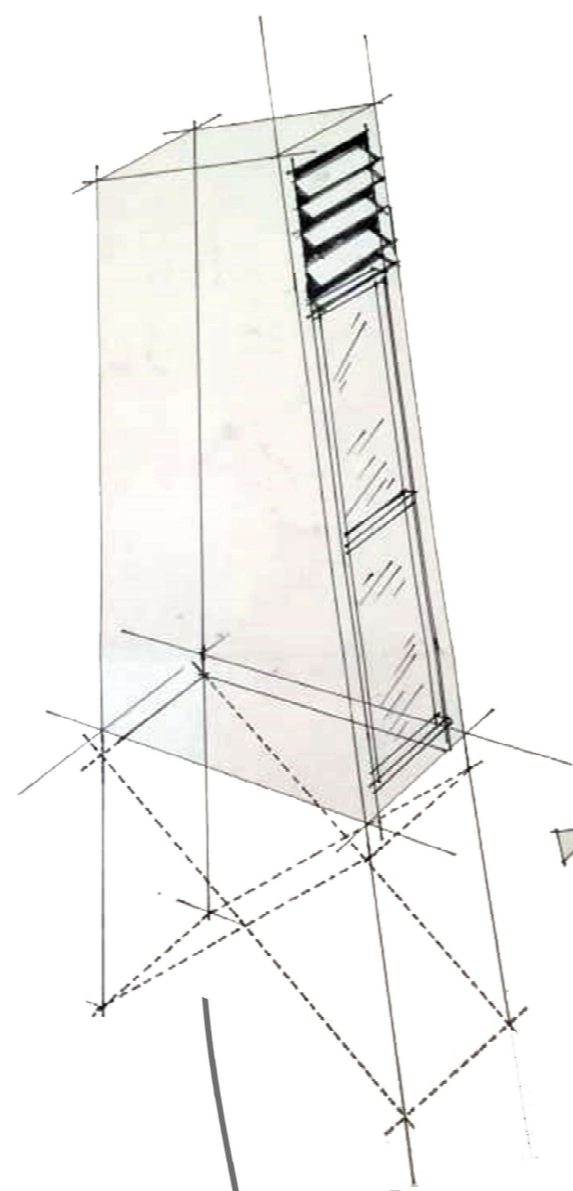
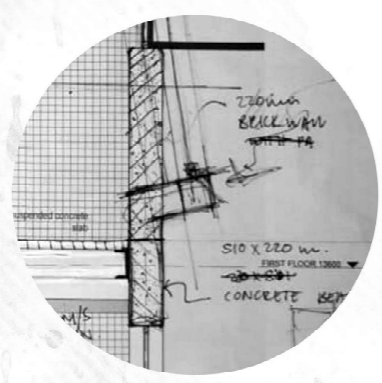
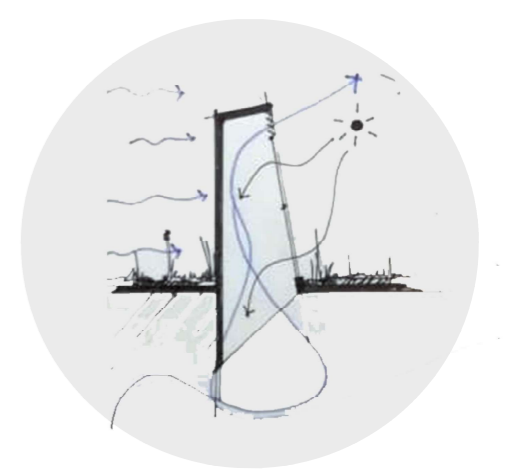
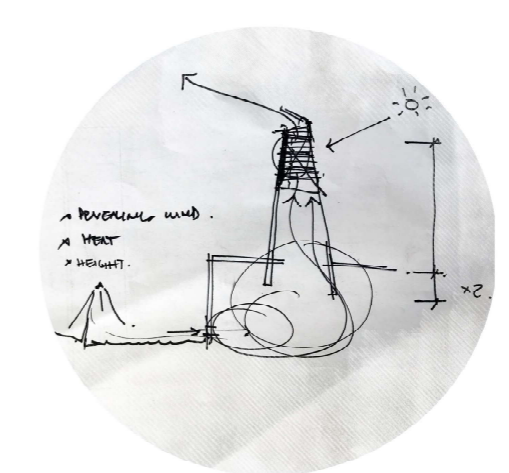
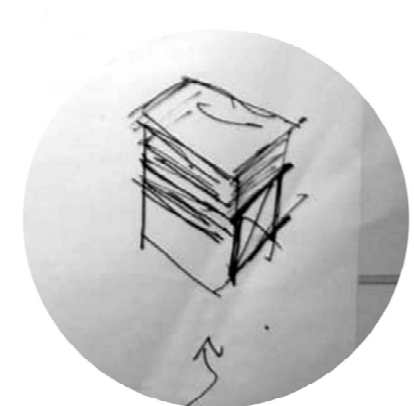
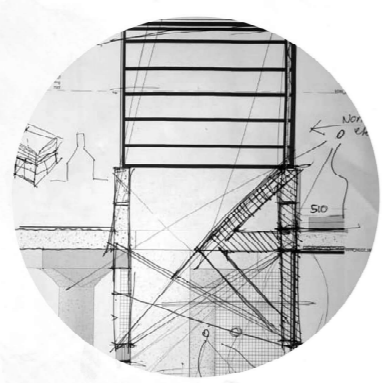
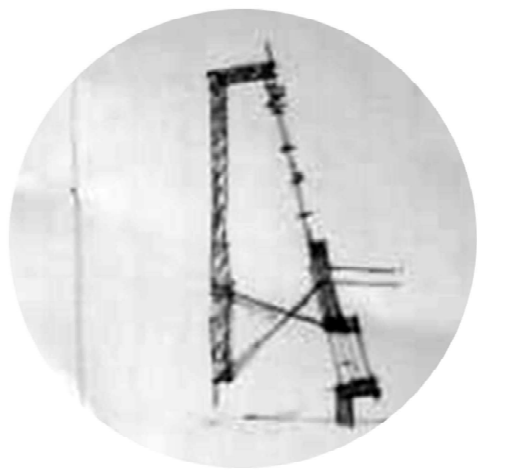
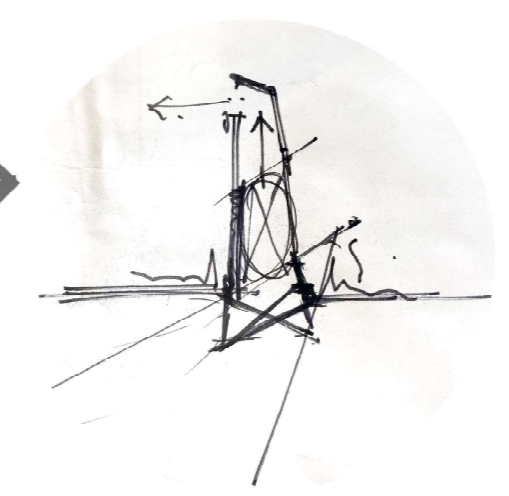
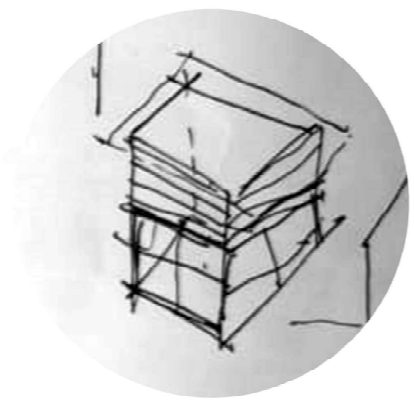
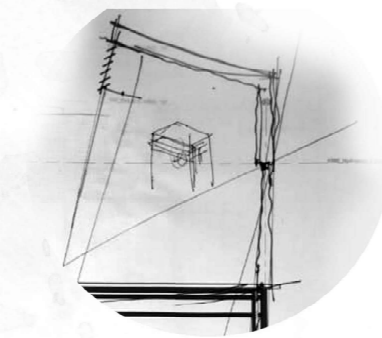
SCALE 1 : 100



- [1] main entrance
- [2] courtyard
- [3] double volumen foyer
- [4] staff entrance
- [5] reception
- [6] Library
- [7] meditation space
- [8] open courtyard
- [9] distillation viewing passage / water channel
- [10] distil moment
- [11] essential oil distillation back of house
- [12] naturally soap fermentation space
- [13] restaurant storage
- [14] open plan kitchen
- [15] open air dining area
- [16] open air recreational reservoir space
- [17] entrance from external wetland
- [18] water storage tank

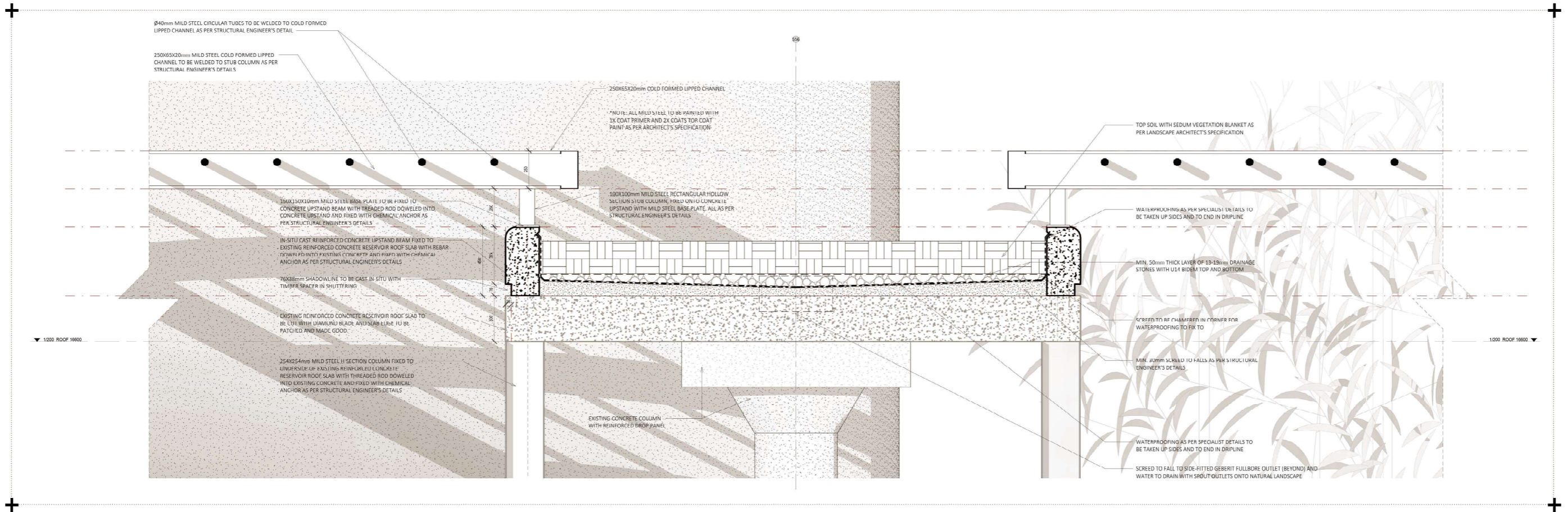
FIRST FLOOR PLAN

SCALE 1 : 100



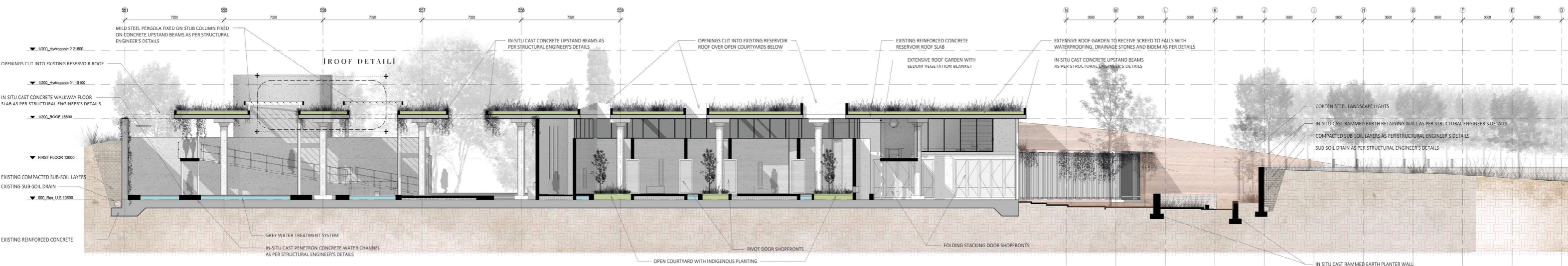
SECTION DEVELOPMENT

section 1:20 conceptual development



ROOF DETAIL

SCALE 1:10



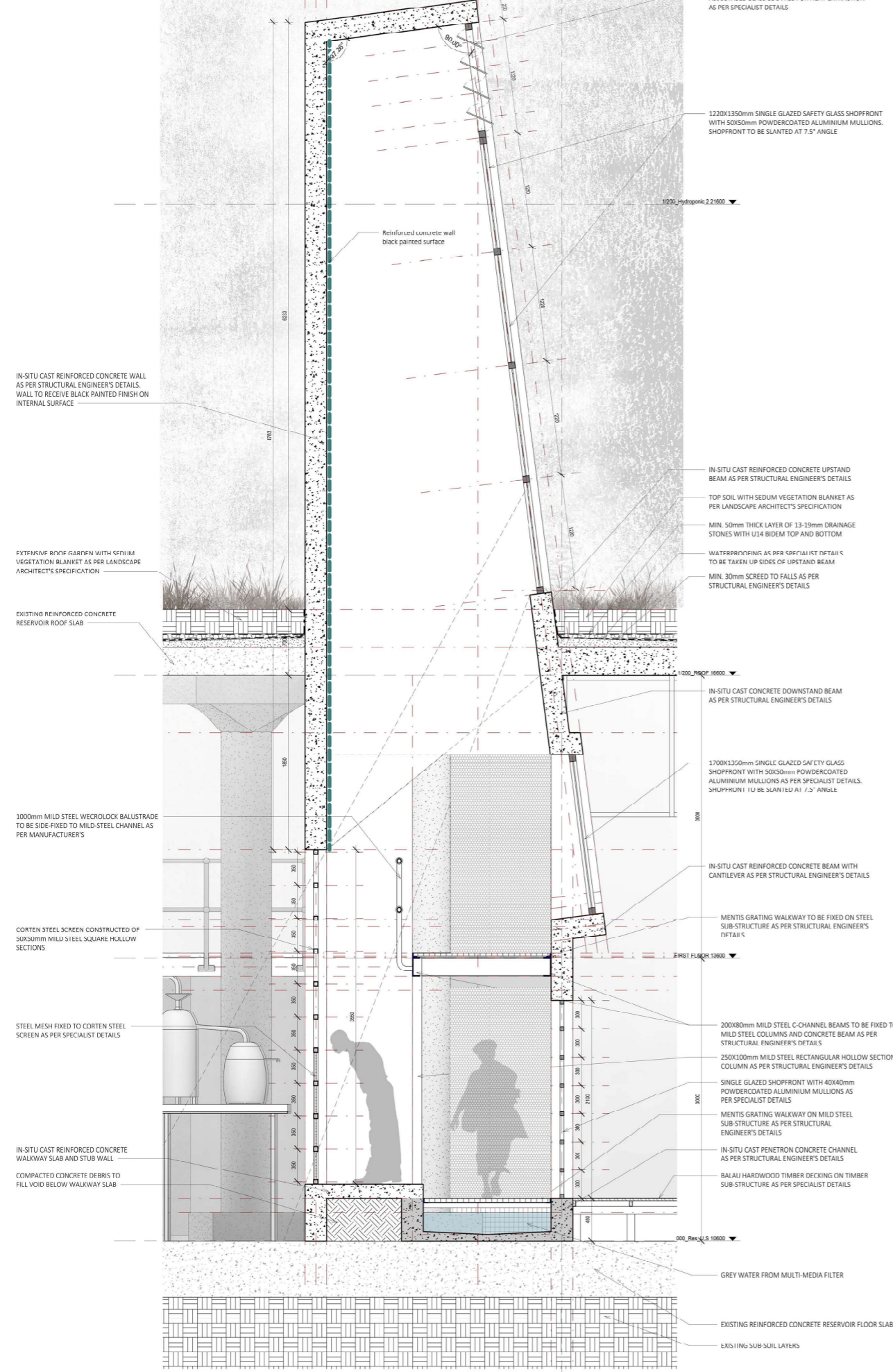
SECTION A-A

SCALE 1:100



IN MEMORY

tectonic and stereotomic relationship at opening of reservoir perimeter wall and roof

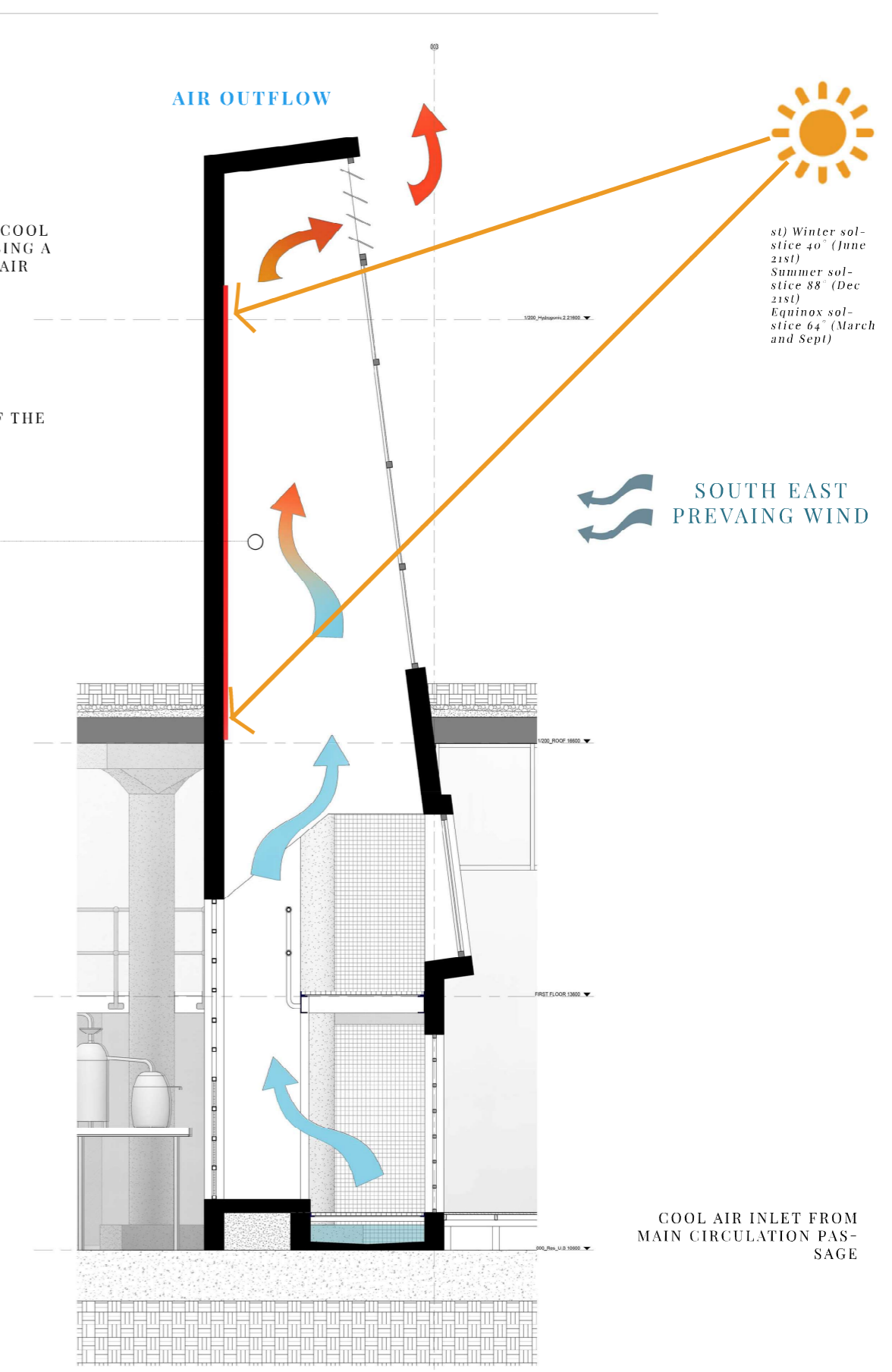


1 : 20 SECTION DETAIL

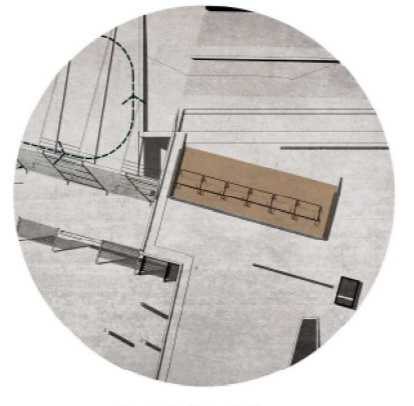
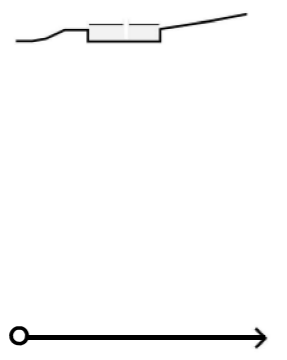
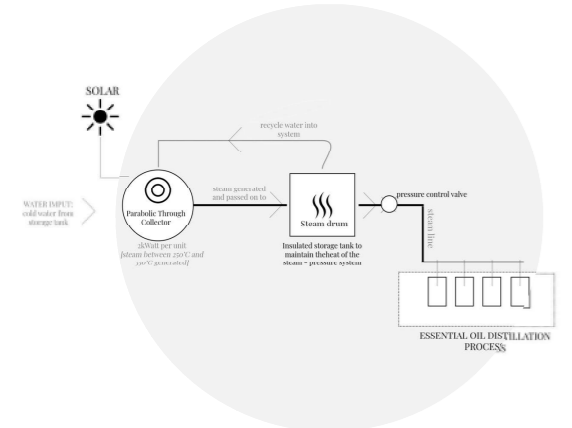
SUNLIGHT HEATS UP THE COOL AIR IN THE CHIMNEY, CAUSING A VACUUM AND ALLOWS THE AIR TO RISE

THE INTERNAL SURFACE OF THE WALL IS PAINTED A DARK COLOUR

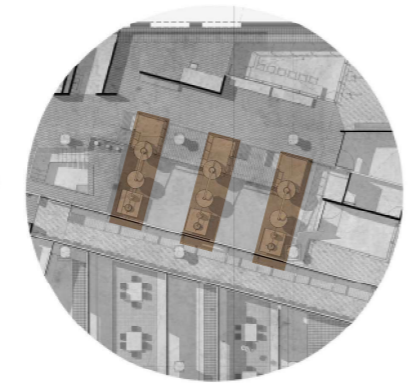
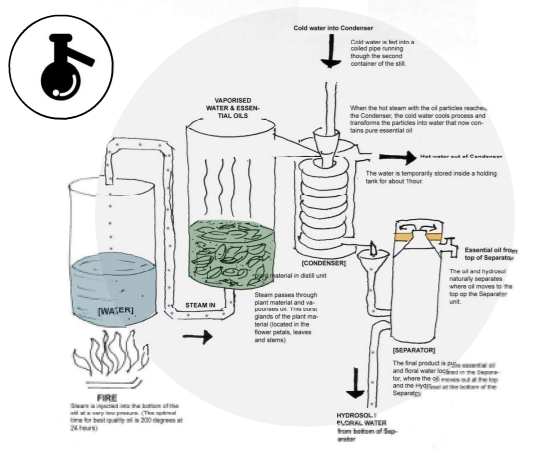
HEAT BUILD UP WITHIN CHIMNEY



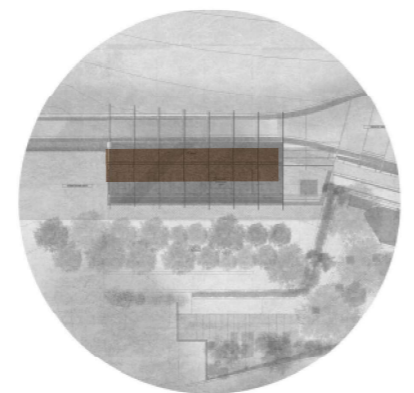
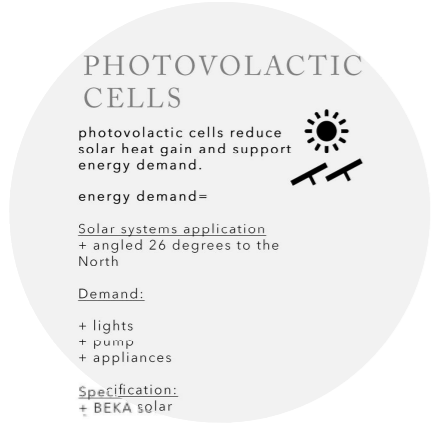
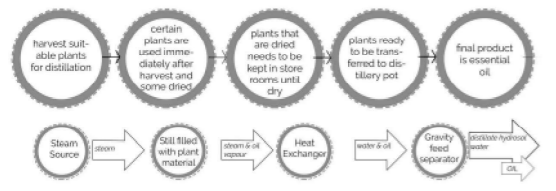
HYBRID STACK SYSTEM
SOLAR CHIMNEY AND LIGHT SHAFT



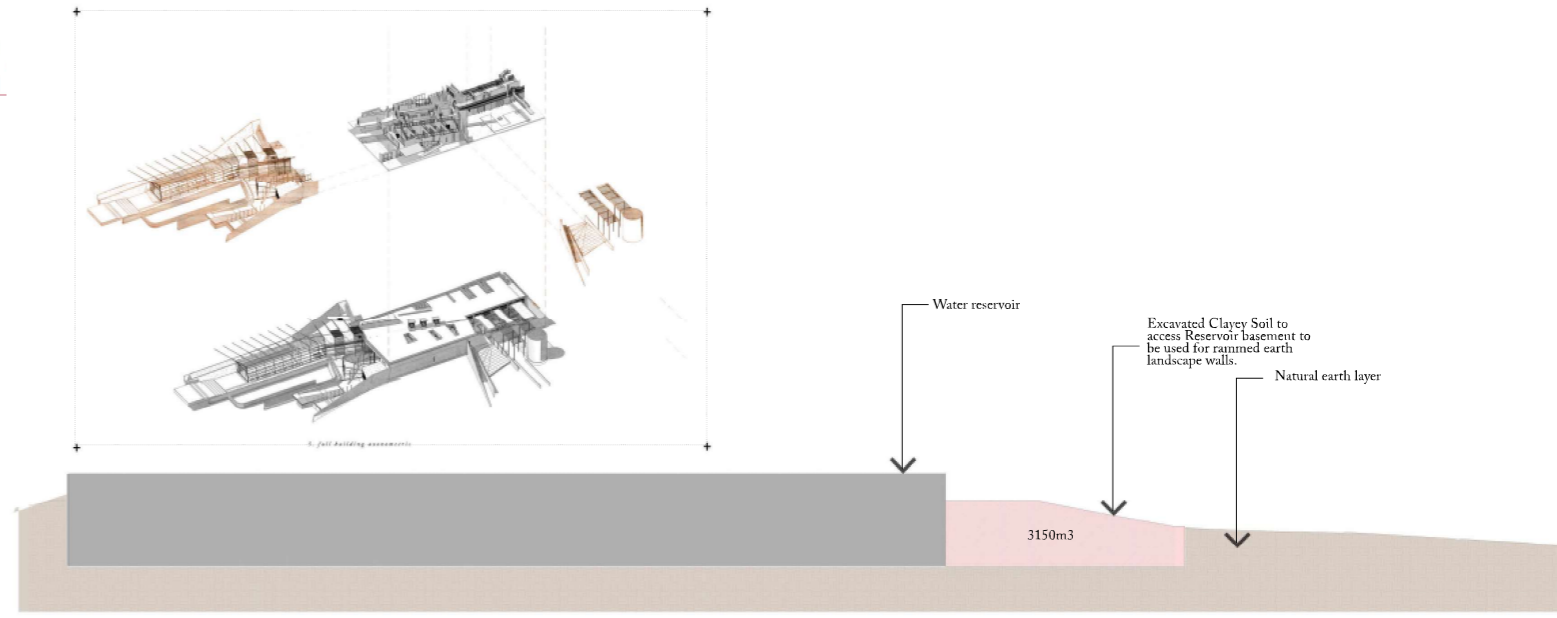
Parabolic Solar Reflector
This system is used to generate steam for the essential oil distillation process as well as warm water for the building.



Steam Distillation



Solar Panels



Rammed earth is a mixture gravel, clay and concrete. Rammed earth construction has a long history of being used especially during economically challenging times.

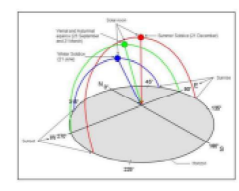
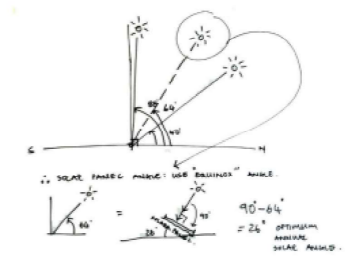
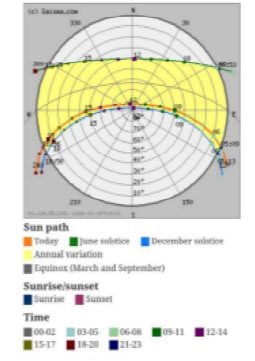
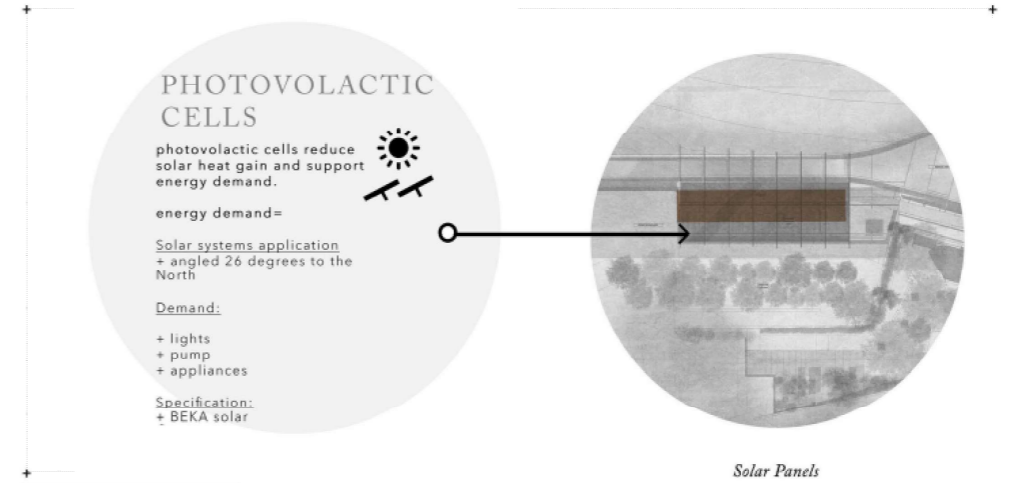
ADVANTAGES:

High thermal mass, low embodied energy, thermal reequation, fire resistance, strength and load bearing qualities and pest deterrence (Edmunds 2015).

The addition of Portland cement (adding to surface hardness), damp proof course and concrete or masonry footings and plinths and the addition of water based silicon water repellent, adds to the durability and low maintenance of rammed earth walls (Madobwa.com).

Silane/siloxane aqueous based waterproofing admixture (Techdry.com 2015) minimises water penetration and eliminates using external waterproofing coating and future surface maintenance the rammed earth walls to not need any finishes. Steel reinforcement is often used in the foundations and walls for extra strength. Plywood is usually used as formwork.

RAMMED EARTH WALLS
APPROACH: CUT AND RECYCLE



Solar Panels

SOLAR PANEL
ENERGY SUPPLY

ENVIRONMENTAL

SYSTEM

essential oil distillation process and strategy

Natural and Artificial I.
444 I



C WATER BUDGET

TANK CAPACITY (m³): 650
MIN VOLUME (m³): 0

C1 WATER BUDGET INNIATION PHASE

MONTH	YIELD (m ³ /month)	DEMAND (m ³ /month)	MONTHLY BALANCE	POTENTIAL VOLUME (m ³)	VOLUME IN TANK (m ³)
September	71.1	153.8	-82.7	0.0	0.0
October	206.0	153.8	52.2	52.2	52.2
November	293.1	153.8	139.3	191.4	191.4
December	304.3	153.8	150.5	341.9	341.9
	874.5	615.3	259.2		



C2 WATER BUDGET YEAR 1

MONTH	YIELD (m ³ /month)	DEMAND (m ³ /month)	MONTHLY BALANCE	POTENTIAL VOLUME (m ³)	VOLUME IN TANK (m ³)
January	374.6	153.8	220.8	562.7	562.7
February	235.7	153.8	81.9	648.6	648.6
March	248.1	153.8	94.3	742.9	650.0
April	147.0	153.8	-6.9	736.0	643.1
May	34.6	153.8	-119.3	616.7	523.9
June	23.3	147.3	-124.0	492.8	399.9
July	22.1	147.3	-125.2	367.6	264.7
August	17.7	147.3	-129.6	238.0	135.1
September	71.1	153.8	-82.7	145.2	52.4
October	206.0	153.8	52.2	197.4	104.5
November	293.1	153.8	139.3	336.7	243.8
December	304.3	153.8	150.5	487.2	394.3
ANNUAL AVE.	2374.6	1386.4	948.2		



DISTILL ENERGY CALCULATIONS

DESCRIPTION	WATT	PH	WAVELENGTH	TYPE	SPEC	AREA	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH	WAVELENGTH
LED lighting	30	0.03	4	30	LED lighting	30	0.03	4	30	LED lighting	30	0.03	4	30	LED lighting	30	0.03	4	30
LED lighting	1	0.001	4	30	LED lighting	1	0.001	4	30	LED lighting	1	0.001	4	30	LED lighting	1	0.001	4	30
LED lighting	30	0.03	4	30	LED lighting	30	0.03	4	30	LED lighting	30	0.03	4	30	LED lighting	30	0.03	4	30
LED lighting	100	0.1	4	30	LED lighting	100	0.1	4	30	LED lighting	100	0.1	4	30	LED lighting	100	0.1	4	30
LED lighting	100	0.1	4	30	LED lighting	100	0.1	4	30	LED lighting	100	0.1	4	30	LED lighting	100	0.1	4	30
LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30
LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30
LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30	LED lighting	400	0.4	4	30



SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL 1.04

SB SBAT REPORT Achieved 4.5

SB1 Project: Distil

SB2 Address: Threshold between End Street and Magaliesberg, Mamelodi West

SB3 SBAT Graph

SB4 Environmental, Social and Economic Performance Score: 4.3

Environmental	4.3
Economic	4.8
Social	4.8
SBAT Rating	4.5

SB5 EF and HDI Factors Score: 4.7

EF Factor	4.7
HDI Factor	4.8

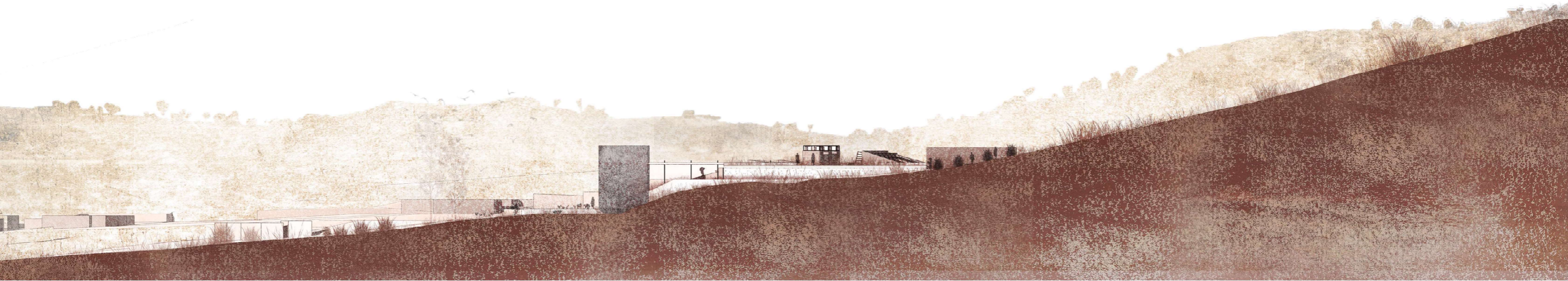
SB6 Targets Percentage: 96

Environmental	96
Economic	96
Social	97

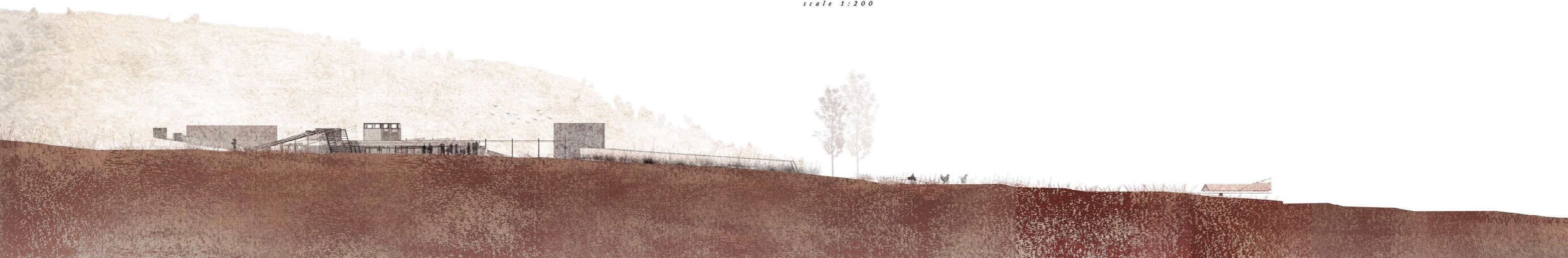
SB7 Self Assessment. Information supplied and confirmed by: [Name], [Signature], [Date]

SB8 Validation: Documentation validated by: [Name], [Signature], [Date]

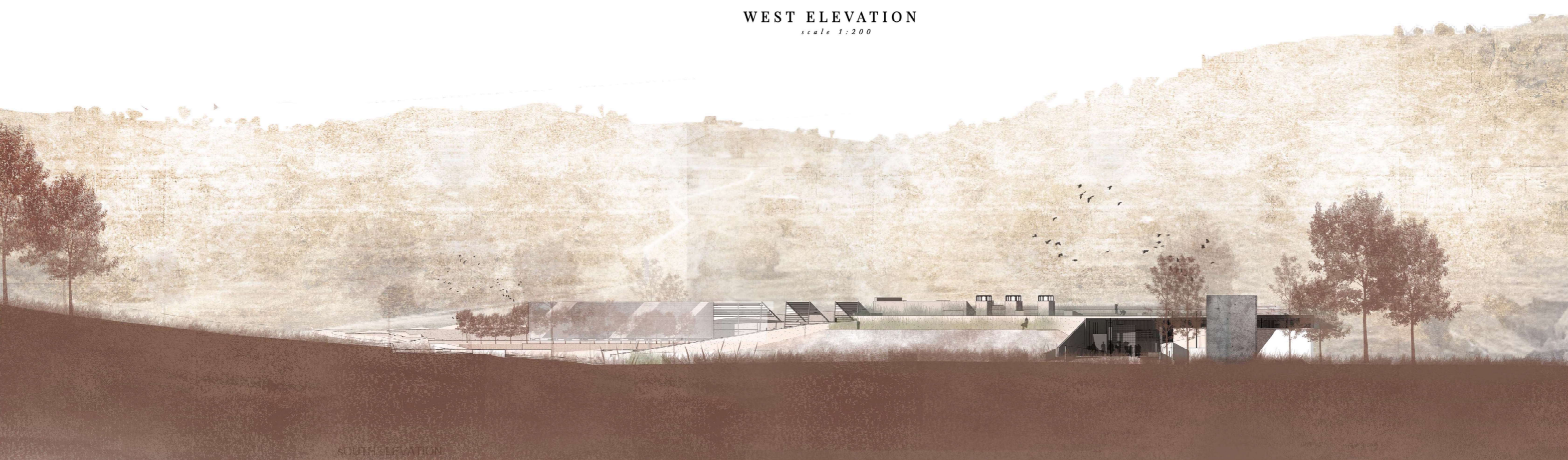
SB9 Validation Report Version: IWR



EAST ELEVATION
scale 1:200



WEST ELEVATION
scale 1:200

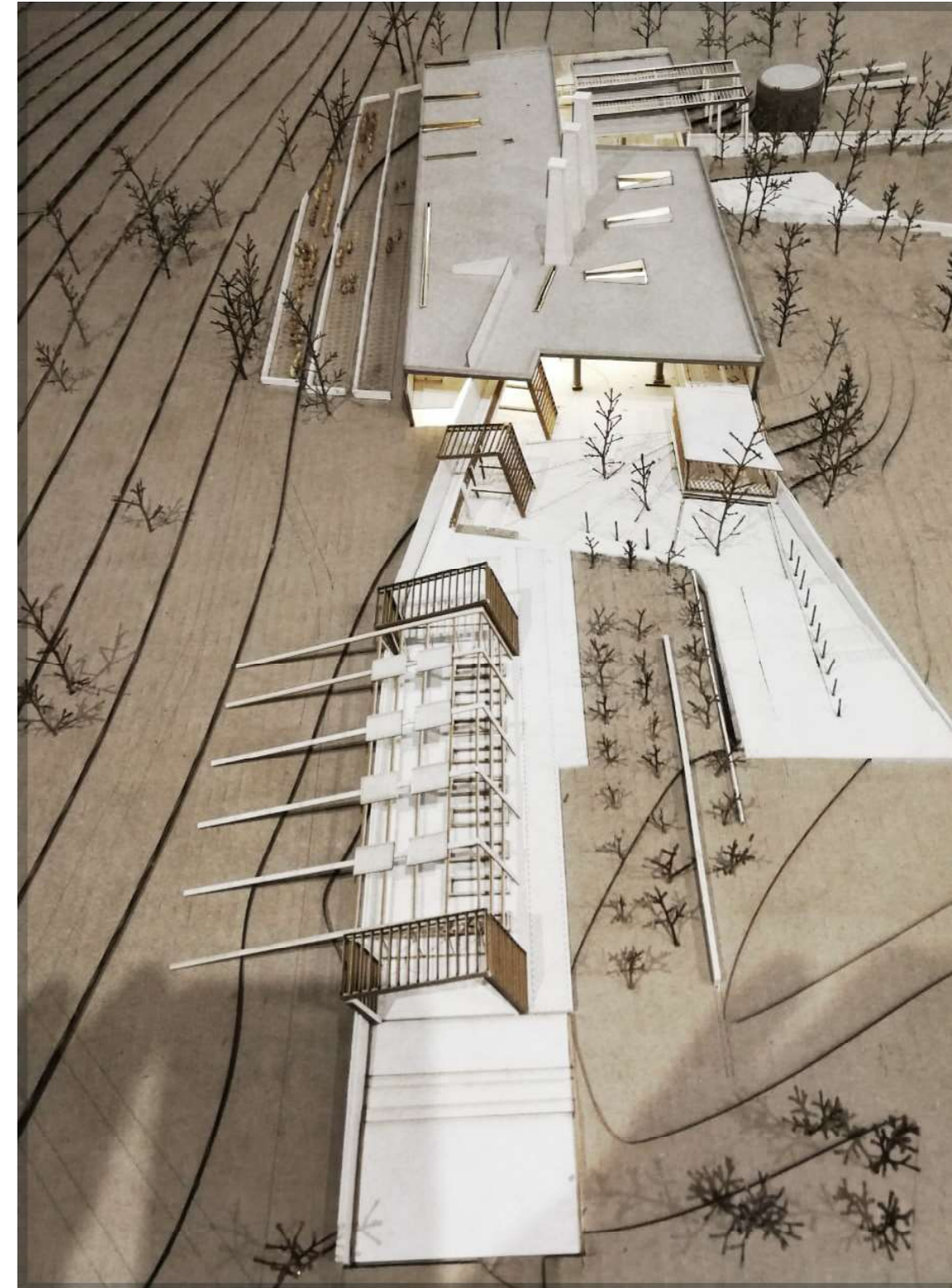
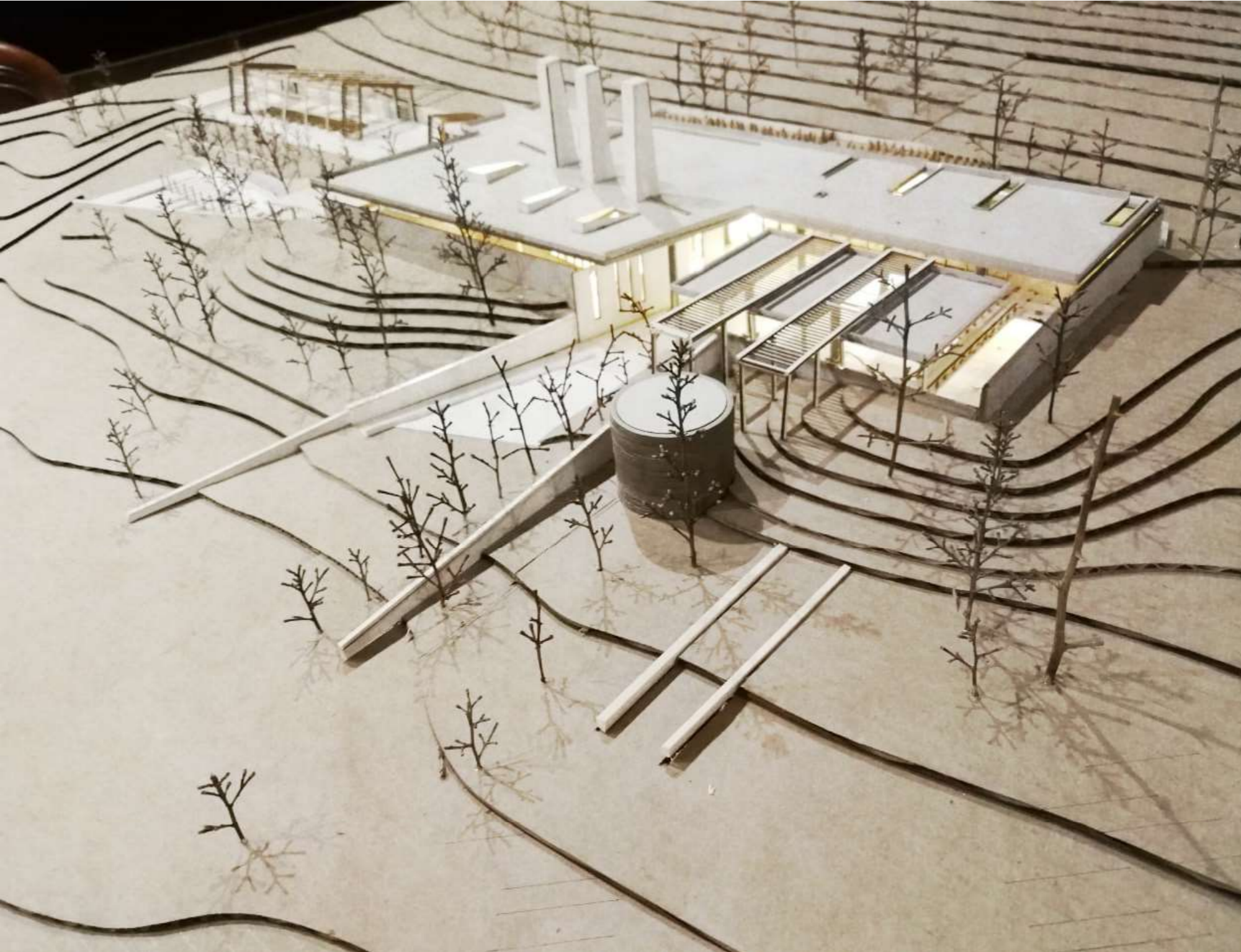


SOUTH ELEVATION
scale 1:200



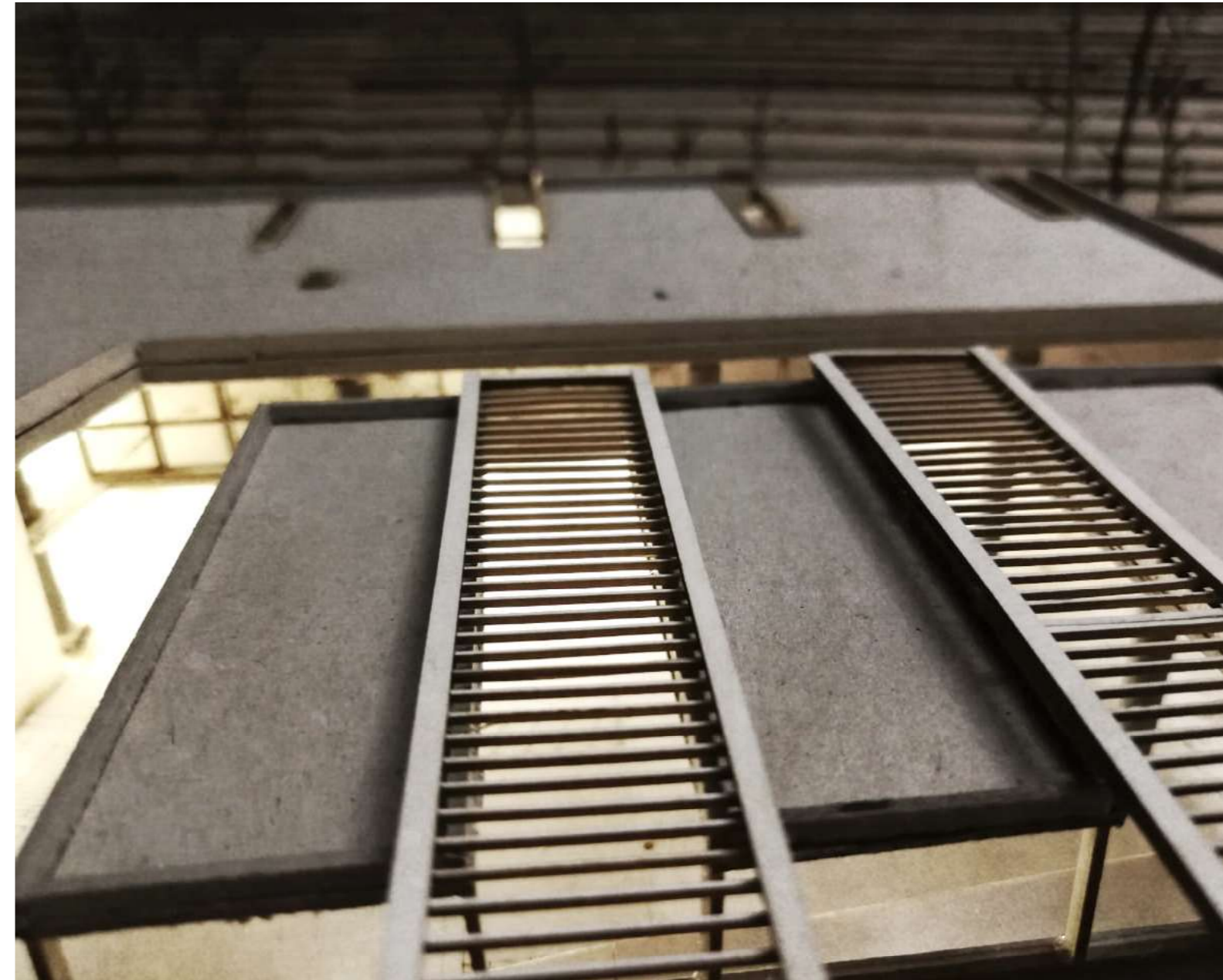


FINAL MODEL











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- ...
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8.3
APPENDIX
8.3.1 // ARTICLE



Marni van der Hoven

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**Represent-
ing *limen***

Spatial manifestation of liminality through architectural representation.

Marni van der Hoven

R

Representing limen

This theoretical article discusses modes of spatial manifestation of liminality through architectural representation through the lens of anthropology. The architectural term of 'limen' or threshold has been adopted into the field of anthropology. It has been extended in thought and vocabulary, complexified in concept, and re-presented within the socio-cultural realm, although it has not found its way back into the architectural realm. Therefore, it is necessary to utilize this extension of the 'limen', back to its origin in order to derive an architectural vocabulary. This extended architectural vocabulary may expose insight and opportunity to derive modes of architectural representation of the abstract concept. From this viewpoint, a qualitative study of thematic data analysis through a descriptive double narrative method is used that analyses sets of data from anthropology on liminality as well as its application in architectural examples. The contribution lies in providing a framework, consisting of a set of main themes, explanations and attributes through which liminality can be represented architecturally.

KEYWORDS

Liminality; transition; incorporation; separation; threshold; transition; experience

INTRODUCTION

The etymology of liminal comes from the Latin root word "limen", which means threshold and or relating to a sensory threshold, or being an intermediate state, that has characteristic of being an in-between condition. The in-between condition is that is the limen as the "realm of conscious and unconscious speculation and questing - the 'zone' where things concrete and ideas are intermingled, taken apart and reassembled - where memory, values, and intentions collide" (Koetter 1969).

The threshold in is essentially an architectural element, which is substantially ambiguous, is temporary and located in the transitional zone between fixed conditions.

This concept, which has arguably been purchased by the discourse of anthropology from its origins as an architectural feature. The discussion of threshold or limen is fascinating through the way it has been extended in thought, complexified in concept and represented through anthropology in the social-cultural realms of ritual and rites. Liminality is a state of being that is fundamentally abstract as it is characterised by being on a threshold or boundary as Robert Venturi (1966) states in *Complexity and Contradiction in Architecture* the 'both-and' condition in which a space has multiple readings, meaning it is both one thing and at the same time another'. From this viewpoint, the limen has

very specific possibilities in the architectural realm.

It is the aim of this article to derive a vocabulary through which liminality can be interpreted architecturally and represented through modes of spatial and physical elements. Therefore the research question is posed: 'What are the modes of spatial and physical constructs of liminality in the discipline of architecture?'

The paper argues that it is possible to derive modes of architectural representation of the abstract condition of liminality through its extension in anthropology as well as expand the architectural vocabulary through repurchasing the concept back to its origins.

This article is synthesised through the lens of anthropology on liminality theory. Additionally, by means of providing a background of historic constructs investigating the concept of liminal rites through architectural precedents, a spatial and physical understanding is brought to light. Through the viewing of a set of selected historic architectural examples in which the notions of liminality have been experimented with, it can be taken into modern architectural examples. These will be analysed through thematic analysis process of photographs and illustrations to derive principles that will be able to illustrate the physical representation of liminality. In support of this study, literature regarding space and place of the in-between condition in architecture will be discussed. An unpacking and capturing of these definitions and

architectural precedents provide a set of themes, attributes and characteristics that will assist in fabricating a concluding framework. A limitation of the framework is the inclusion of only a few selected buildings, and literature. Further study can be done to extend the framework through including more of the creative disciplines, such as music, sculpture and art. The contribution lies providing a framework, consisting of a set of main themes, explanations and attributes through which liminality can be consciously constructed through architectural representation.

METHOD

The interpretive paradigm is selected as framework for the article which is grounded in an understanding of reality through subjective experiences of the external world. Reeves and Hedberg (2003: 32) stresses that there is a need to put analysis in context within this type of paradigm. Thus, a descriptive double narrative method for data analysis is chosen by which background of a historic construct of liminality is analysed. As Mitchell and Egudo (2003) argue, the narrative approach is an interpretive approach that has a theoretical underpinning in order to ground and support the interpretation of the information. The double narrative is done through existing theory in anthropology as the lens through which the selected architecture precedents is analysed. In qualitative studies the data analysis supports in discovering and analysing patterns, main concepts and ideas of the qualitative data. Thematic analysis is used as the method for data analysis that offers a theoretically flexible approach for identifying, analysing and recording on main concepts and ideas within the data (Braun, Virginia & Clarke 2013: 4-5). The thematic analysis considers the double narrative method of analysis. The first narrative analyses existing theory within the discipline

of anthropology. In support of this research another layer of existing theory is analysed and discussed which forms part of the theoretical framework that anchors the analytic process with specific themes that will be focused on in the analysis process. This constructs the platform on which the second narrative is analysed. The second narrative utilizes real world cases of architecture related to history and modernism, where ideals of liminality have been explored by the architects.

The selected precedents are analysed according to the three main themes of liminality theory namely state of separation, state of transition and state of integration. The selection criteria for the precedents are limited to design projects that demonstrate notions of liminality that has been experimented with conceptually in the architecture. From this, the architecture should have great consideration for the design of threshold spaces, as this is the main element of liminality theory. These threshold spaces can be positioned within or outside of the building, or between the building and the city or the building and its surrounding context. The threshold spaces are analysed according to scale, intimate or public, the choice of materiality for its historical use, symbolism, or what the material represents as well as the haptic qualities of the material. Furthermore, the relationship between interior to exterior space and exterior to interior space is analysed in conjunction to the natural light quality contributing to the spatial experience. The spatial experience of the movement and circulation routes are considered important to analyses as this is considered one of the most liminal spaces in architecture. Within these spaces moments of pause and physical objects are also considered. These principalities formulate the criteria of the main themes, established from the theoretical framework, used to analyse and

interpret four design projects. The understanding of liminality gained through the analysis can influence an approach to architectural design. The insight through the analysis provide the findings of attributes and guidelines

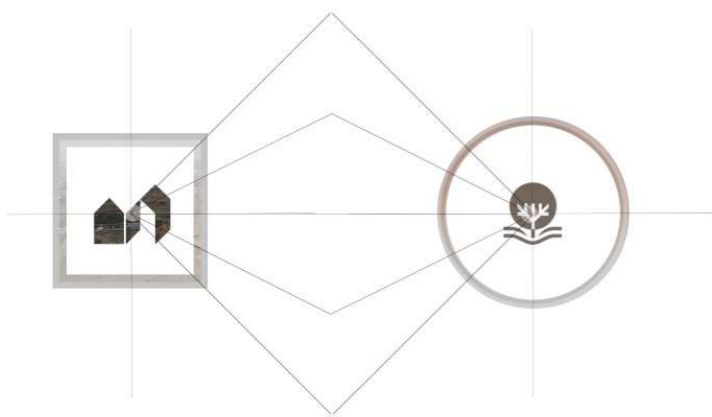


Figure 8.1: (Above) Conceptual composition of the in-between representation (Author:2018)

act as catalyst to generate architectural design solutions that can create an appropriate design set within a liminal environment. The process of data analysis in this article is guided by an interpretation of Braun, Virginia & Clarke's six step guide (Braun, Virginia & Clarke: 2013: 4-5) to apply thematic analysis.

Rigorous data analysis is presented when the assumptions are congruent with the conceptualised manner (Reicher and Taylor 2005:549). The theoretical constructs is synthesised though looking at the first part of the double narrative methodology where liminality is discussed through anthropology. Arnold van Gennep's (1960) work in 'Rite de Passage' in 1908, serves as the lens though the socio-cultural realm which the theoretical data is explored, where after the work of Victor Turner (1960) provides further development and deeper insight into rites in liminality. This anthropological discussion creates the platform of knowledge for the selection criteria for precedents. The discussion forms the second part of the double narrative method where the selected precedents are analysed. From these findings, further analysis on modern examples of architecture is done. Through unpacking the analysed themes, a better understanding of the liminality theory and its relevance within the architectural discourse is provided. From this viewpoint, the results of this analysis directs toward common attributes and characteristic within the architectural realm that represent a liminal approach of form and space making.

THE LIMEN ADAPTED INTO ANTHROPOLOGY

Arnold van Gennep: Rite de Passage (1690)
Van Gennep(1960) distinguishes amongst rites that mark the passage of a social group from one status to another which mark transition in the passage of time, whereupon he went on to explore "the basis of characteristic patterns in the order of ceremonies" (Gennep 1960:10). He discovered that during these cultural ceremonies, a person going through the transition process, he or she occupies a state of in-between-ness. Emphasizing the significance of transitions in any society, van Gennep favoured rite of passage as a distinct category, consisting of three sub-categories, namely rite of separation, rite of transition and rite of incorporation. He notes that the structure of rites of separation, transition and incorporation are not equal and often all the rite can be present in the transitional period. Thus, the liminality discussion implies that there is a distinct moment of transition within the state of flux which is

positioned within the in-between-ness of two clearly distinct and stable states.

The intermediate stage in a rite of passage a liminal period as stated by van Gennep(1960), what he calls 'transition rites' as liminal rites, and he calls 'rites of incorporation' as postliminal rites. He distinguishes a state as being a fixed or unwavering condition and transition as the process of transforming and becoming; therefore implying that it has a time frame. The transition from one stage to the next, or from the profane to the sacred, is so great that there must be an intermediate stage – the liminal stage (Turner 94).

Van Gennep (1960) calls rite of separation as the pre-liminal rite, which metaphorically the "death" of a person, thus he or she are obligated to strip themselves from all things of their bounding them to their former condition or routine and symbolically this rite signifies the initiation of individual to detach themselves from a former fixed point in their social structure, to be able to continue to the next rite being the liminal state. Secondly, van Gennep (1960) defines the 'liminal rite' as a state, which implies a stable condition. He states that during the "liminal" stage the state of the individual is ambiguous, due to the absolute detachment from both its former and following positions, and an attachment to the nothingness in this realm of transition. In the ritual condition, the individual becomes nameless or identity-less, therefore the power of the state to influence the perception of the individual is greater than any other state (Thomassen, 2006, p.22). The person in the liminal rite is disconnected and disassociated from anything he she knew and their future is uncertain. Tough this a person becomes much more aware of themselves and their actions as that are the only thing that can determine their future (van Gennep, 1960, p.20-21). Thirdly, the postliminal rite is as a state of integration back into society with a new identity, as a "new being" (Gennep: 1960, p.21). Here the individual is "consummated in a stable state once more and by virtue of this gains rights and obligations of a clearly defined and structural type (personae), and is expected to behave in accordance with certain customary norms and ethical standards" (Gennep: 1967, p. 4-5).

It is important to note that liminality in Rite of Passage not only relate to special or cultural rituals of transitioning its definition has degrees which include physical markings, such in the field of architecture that will be discussed later in the article. Liminality in historical architecture,

according to van Gennep (1960) is 'about differentiating between', what he calls, the 'profane and the sacred world' (Turner 1960: 94). Furthermore, in any rite of passage the 'incompatibility between the profane and sacred world is so great that man cannot pass tough one to the other without going through an intermediate stage'.

Victor W. Turner: Betwixt and Between (1963)

Van Gennep (1960) calls rite of Victor Turner is the one who re-discovered the importance of the liminality discussion and builds on van Gennep (1960) understands of rites of passage. He discovered van Gennep's work on Rite of Passage in the summer of 1963 that inspired him to write the essay "Betwixt and Between The Liminal Period in Rite of Passage", the famous chapter in his 1967 publication, The Forest of Symbols. He confirms Van Gennep's definition of society as a structure of positions of which each marks a change in an individual's status. Turner (1960) states that 'liminality refers to any betwixt and between situation and object', it is evident that this understanding opens up the discussion for possible uses of the concept far beyond that Turner himself had suggested.

"We must regard the period of margin or 'liminality' as an inter-structural situation between states. By 'state' I mean here a relatively fixed or stable condition. I prefer to regard transition as a process, a becoming or even a transformation" Victor Turner.

Fundamentally, a liminal stage is transitional; it acts as a transition between two fixed states, while a state is a relatively fixed or stable condition" (Turner: 1967:93). Turner stresses that the scale or significance of status at which the transition occurs is not as important as the transition itself (Turner 196: 96). In his chapter 3 of his book Turner (1967) says that 'during the intervening liminal period, the characteristic of the ritual subject is ambiguous, as he or she passes though cultural realm that has few or none of the attributes of the past or coming state'. The person's status is ambiguous, where he or she may feel confused, dislocated, lost and vulnerable, therefore this stage has the power to be destructive or constructive. This is the moment where the greatest potential for change can occur. This liminal stage bridges the two states of profane to sacred and it must be transformative on order for the rite to be complete" (Turner 1960, p. 1). The metaphor of dissolution or dissolution is often applied in the liminal stage (Turner 1967). as these stages are accompanied by growth, transformation, and reformulation.

IDENTITY, SPACE AND PLACE

The elements of space that the in-between zone possess contributes to the making of place according to Yadin Pandya. These elements constitutes the basic identifiable parts of the built environment. The inherit attributes of 'spacemaking' elements such as floor, column, wall, door, window, roof, stairs (Pandya) possesses morphological constructs which provide them as particular spatial properties. Elements of space making as a bridging theory provides the potential for their use and design in architectural representation. The elements, therefore, form part of the criteria to analyse precedents later in the article.

In addition insight to the spatial characteristic of the *limen* is provided by philosophers, such as Michel Foucault(1984), Kent Bloomer (1977) and Yi-Fu Tuan (1977).

The French philosopher Michel Foucault (1984) introduces the idea of 'heterotopia, as the space that lives in-between other spaces' in his article "Of Other Spaces" (Foucault, 1984). Foucault describes heterotopia as a real, defined space that is completely different from all the spaces it reflects', yet it connects the spaces. It exists as its own defined experience, thus giving a tangible articulation to the in-between.

"We do not live in homogeneous and empty space...we live in a set of relations that delineates sites which are irreducible to one another and absolutely not super-imposable on one another" (Foucault, 1984). Through this it is seen that the space we live in is full of social; historical and cultural potential that architects can use as a guide to define the in-between space.

Kent Bloomer (1977) suggests is his book Body, Memory and Architecture, that architecture is "an incitement to action, a state for movement and interaction." An emphasis on the visual form of architecture and not so much the transitional space within the architecture, often leads to the disconnection of user experience (Bloomer 1977). A space that lacks identity and sense of place is when architecture discourages movement and interaction with the space, often experienced with monolithic or civic architecture. The movement becomes more of passing though than a defined experience or becoming part of. The shift in scale becomes more pedestrian oriented. The idea of path of travel and experience of the journey transmits to how the user experiences the liminal qualities of the given space. Bloomer (1977) acknowledges that when an individual have to make decisions about their route of travel they remain more acute to sense of their place and time. When the user partakes in the circulation and movement of the space, a greater

understanding and acknowledgement of the spatial experience is achieved, as Bloomer suggests. Although, the space should allow for a 'moment of pause' in order for attain a liminal spatial experience. Movement and transformation though space of place can be understood. The place of pause represents the liminal state or in-between state of the cultural ritual.

Yi-Fu Tuan (1977) explains that "space is experienced directly as having room in which to move. "Space" is more abstract than "place." Undifferentiated 'space' becomes 'place' as we familiarise ourselves with it and endow it with value. The ideas of "space" and "place" are dependant on one another for definition.

"Place is a type of object. Place and object define space" (Tuan: 1997, p.17).

"Moreover, by shifting from one place to another, a person acquires a sense of direction. Forward, backward, and sideways are experientially differentiated, that one, known subconsciously in the act of motion" (Tuan: 1997, p.12). He states that space is given by the ability to move, therefore, space constitutes movement. If we think of space as that which allows movement, then 'place' is pause; each pause in movement makes it possible for location to be transformed into 'place' (Tuan, 2018:6).

To conclude the elements of space making though the understanding of the characteristics of an in-between space guides the framework for architectural representation.

PRECEDENT ANALYSIS

The following section provides the historical paradigms of the concept through architecture.

Liminality in historical sacred architecture: The Acropolis

In order to comprehend how architecture can enable a contextually liminal understanding, the transition of an individual though the space is analysed. This is done though a study of the Acropolis where the concept of liminal rites has been applied to spatial knowledge. As mentioned before, a liminal state alters a user's perception of space though movement and transition from the profane to the sacred worlds. The word Acropolis, originates from Greek meaning 'acros', that denotes to 'high' or 'upper' and 'polis', meaning 'city', of Athens is a steep-sided hill housing numerous temples, precincts, and other buildings (Sacred Spaces, n.d.).

"When guardians of the threshold take on monumental proportion, as in Egypt, they push the door and the threshold into the background, and prayers and sacrifices are addressed to the guardians alone. A rite of spatial passage has become a rite of spiritual passage."- Van Gennep (1960, p. 40).

The route leading to the Acropolis is in zigzag-shape ascension to sacred space though a series of thresholds. This space becomes transitional, as the pilgrim moves through a series of thresholds that creates a layered effect, while ascending to the sacred space. In addition, the change in elevation contributes to a heightened the awareness of this transition for the pilgrim. . The Propylaea (Figure 3) is the gateway to the sacred realm on the Acropolis (figure 4) which creates a transformative transition between the city and the temple precinct, or the profane and the sacred. The Propylaea marks the separation zone from the profane world as the two arms of the Propylaea reach out as if to pull the pilgrim into the space of separation. This zone of separation also becomes transitional as

	Liminality theory	Themes in liminality		
		[State of separation]	[State of separation]	Post liminal [State of integration]
Definition: anthropology	Limen / threshold	Preliminal	Liminal	Post liminal
Primary data: Authors in anthropology				
Van Gennep (1960)	Profane and sacred world are two opposing states and the liminal or intermediate state should extend on the contrasting nature of the two opposing worlds. All three zones can also be found in the liminal zone.			
Sub-themes		Isolation Bareness detachment	Ambiguous Disassociation detachment	Reintegration
Characteristics:		initiation stage 'death to former self' detachment from previous situations	Disorientation namelessness, identity-less detachment individual is unstable no rules and structure	New identity or new being
Turner				
Sub themes		Isolation Start point	- Stage of dissolution - State of dissociation - state of transition Mid-point	Accumulation End point
characteristics		Own identity	Ambiguous atmosphere Odd space <i>Growth, transformation, and reformulation.</i> Own identity Take on characteristic of neighbouring spaces, therefore having hybrid identity, while still remaining separate the states.	Own identity
Secondary data: Philosophers	Space, Place And Identity of the limen-space			
Architectural thinking	Liminality in architecture, the transition, and elements that make-up the transitional space is fundamental to the spatial experience, regardless of program and function. For example, the threshold at the entrance to a cathedral can have as profound an impact of the threshold at the door of a domestic building. Thus, universally, in a threshold space, an individual is positioned within a transitional stage in which he/she is part of the space they have left or the space they are about to enter. In the threshold space, they an individual is part of the in-between, in an ambiguous condition. 2. Arnold van Gennep and Victor Turner on liminality concludes to liminality as in-between condition that has an start and end point in which each must be theatrical enough to recognise that a transition has occurred.			
Themes and findings CRITERIA	<ol style="list-style-type: none"> The space in between two fixed states Character of states: the social, cultural or historical potential Materiality Light quality: abundance or lack Physical objects in space Design of circulation space vs. design of objects in space – establish hierarchy Identify unique character of space: social, cultural, imagined, civic or communal space Static vs. dynamic architecture Static vs. dynamic space Objects having a hybrid identity in the transitional space. Blurring inside and outside space Volume: high or low interior volume Start point, mid-point and terminating point in route/journey 			

Figure. 02. Above; Table 1: Findings summary and criteria for analysis. (Author: 2018)

The zone includes the element of time as the pilgrim has to move through another series of columns and steps (figure 3) to reach the next stage (figure 4). As the pilgrim ascends through the Doric and Ionic colonnade of the Propylaea, they have entered another zone of transition, but still remain separated from the sacred realm, although now removed from the profane world. The threshold into the portico that leads to the Acropolis, the pilgrim has now entered a zone of incorporation, where one is within the sacred realm of the gods.

The change in elevation through steps between the zones of separation and transition and between the zones of transition and incorporation are used to accentuate the threshold from the profane to the sacred space (figure 5). The pediment of the Propylaea building is stepped (figure 6), which acts as a marker to the transitional space, where these elements portray the zones of separation, transition, and incorporation (figure 7) that are included in order to enrich the spatial experience and to change the perception of the pilgrim before they enter the sacred space.

The concept of blurring is created in the Parthenon on the Acropolis through the use of columns (figure 6). Both the Doric and Ionic orders are utilized that creates in an ambiguous reading of the building. The Doric order was mainly used on mainland Greece, furthermore, it was typically used on the exterior of the building to symbolize masculinity (activities performed on the outside, such as fighting and building). On the other hand, the Ionic order was used in Asia Minor, it was used to represent a femininity (activities performed inside such as philosophising, cooking or other luxuries regarded as feminine), it was typically placed on the interior of buildings. The Parthenon keeps the Doric order on the exterior peristyle, but also uses it at the two-story peristyle in the 'cella' and four Ionic columns in the rear 'cella'. The irregular spacing of the Doric columns takes on the character of the Ionic columns, a spacing usually reserved for the Ionic. The combination of the columns illustrates how perceived use of architectural representation and symbolism can be dissociated and re-purpose.

"Elements are withdrawn from their usual settings and combined with one another in a totally unique configuration" (Turner 1986: 105).

In conclusion, the Doric and Ionic (figure 8) columns in the Propylaea: the concept of blurring is introduced to create an ambiguous space as the combination of the different columns results in an ambiguous reading building. Furthermore, the Acropolis depicts visual access and protracted procession into a threshold that separates the experience of an individual from the outside (profane) and the (inside) (sacred) world. The concept of layering is created through the ascension in elevation together with moving through a series of thresholds.

APPLICATION OF HISTORIC KNOWLEDGE TO MODERN ARCHITECTURE:

Mill Owners' Association Building (1954) Le Corbusier

The Mills Owners' Association Building (1954) architectural style combines the repetitive rigidity of Villa Savoye with the curvilinear forms of Ronchamp. "The rectilinear plan and grid expressed on the building's exterior stand in contrast to the interior spaces, which are characterized by convex and concave volumes. As one moves through the interstitial space, the intersection of curvilinear and orthogonal planes creates an experience of compression and release" (Archdaily: 2014). Therefore, the building in its architectural expression becomes the metaphor for liminality that captures the moment of transitioning between two dominant realms.

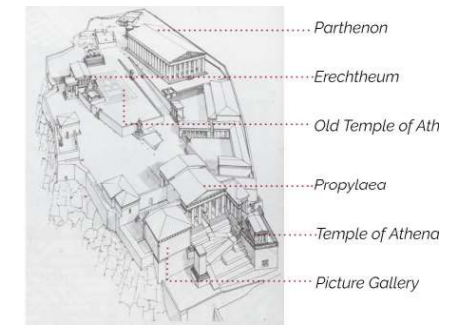


Fig. 03. Above; Entrance to the Acropolis through the winds of the



Fig. 04. Above; View of the Acropolis from the north west. The Clepsydra fountain is seen in the front.

Source: (Regueiro)

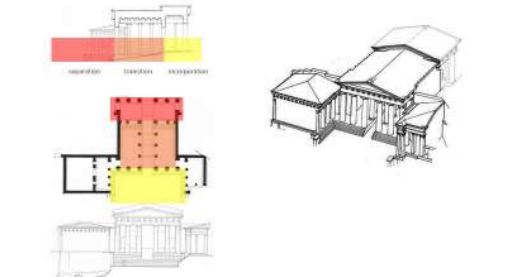


Fig. 05. Above; Liminal zones: Separation, Transition, incorporation in the plan of the Propylaea (Author:2018)

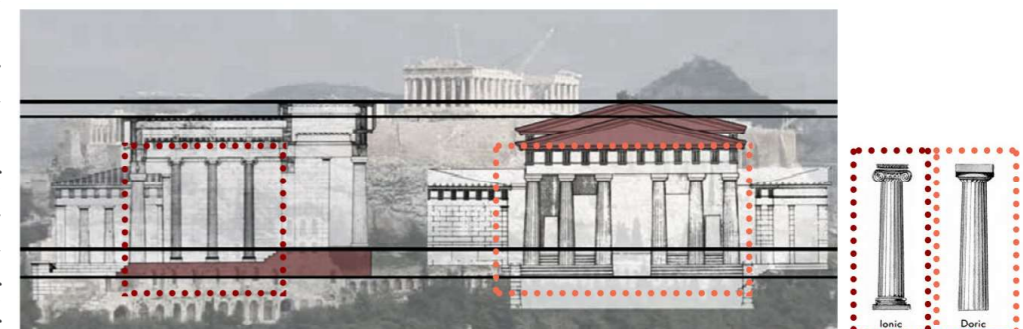


Fig. 06. Above; Elevation of the Propylaea and use of columns (Author:2018)

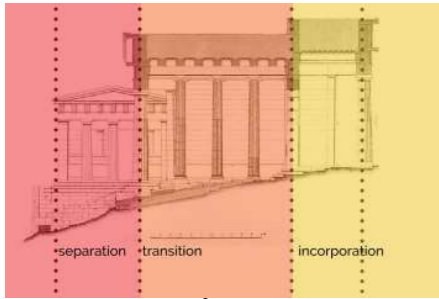


Fig. 07. Zone of Separation, transition and incorporation in the sec-

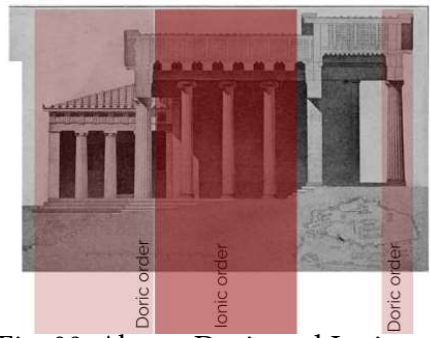


Fig. 08. Above; Doric and Ionic order in the Propylaea. (Author 2018)

h the building, similar to the route leading to the Propylaea. As a visitor to the building transitions between floors on the staircases, the visitor moves back and forth through the zone of separation (figure 10). The zone of transition or liminal state occurs once the individual have moved past the briese-soleil façade into the next space. Within this space there is a blurring between the interior spaces of the office building and outside spaces of the city, including the main assembly room on the top floor. The blurring between the exterior and interior space in the Mills Owners' Association Building creates the experience in which the occupant might question whether they are inside or outside of the building, when in fact they are within both. This space read (figure 12) as neither inside nor outside, but becomes blurred though the spatial articulation. This is achieved through architectural elements such as wall, roof and volume. The use of natural elements such as vegetation (figure 11) further contributes to the blurring between inside and outside space.

The postliminal state or zone of incorporation, are the thresholds that allow entry into the separate rooms (Figure 09 - blue), and have been designed as intimate

spaces (figure 12), as opposed to the zone of separation. In this building, the visitor is continually transitioning between these three zones, constantly blurring the threshold and occupation of the building. Through this use of threshold and transition, le Corbusier transforms a space of work and thus transforms the spatial experience of the worker. Through this understanding we see that the transition that takes place in the liminal stage is "not a mere acquisition of knowledge, but a change in being" (Turner 102). Correspondingly, in architectural space, the threshold functions to alter the consciousness of the occupant, so it is not merely an alteration of the space that is occurring.

Furthermore, though extending the atrium and seating walls (figure 13), the combination of a long seating space directly connected to the circulation space. There is a place of pause connected to a circulation route. The person sitting has its back to the atrium space, which also houses another movement route; therefore this creates a feeling of vulnerability for the person sitting. The movement route is accentuated with a series of frames that creates the idea of moving through thresholds. The east and the west façades (figure 10) of the building function as both enclosing and porous elements, depending on where the visitor is positioned, it can read as closed at times or open at times (figure 14). It is not until the assembly room The experience of Mill Owners' building never truly becomes separated or integrated, but these zones constantly occur within the transformative space of the building, due to the constant questioning whether they are inside or outside the building.

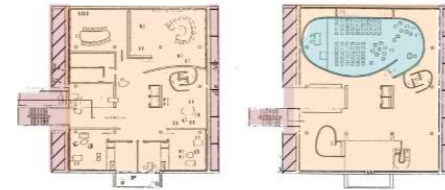


Fig. 09. Three liminal stages conceptually applied to the Mill Owner's building on ground, second and third floor plan (Author 2018)

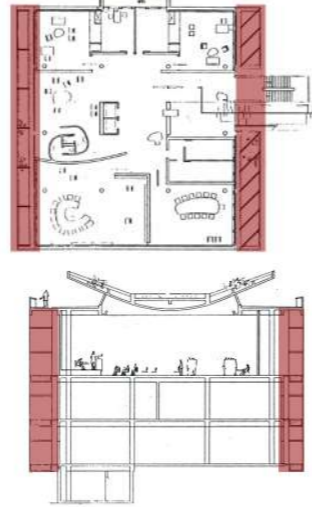


Fig. 10. Above: Mill Owners' Floor Plan and section, showing briese-soleil porous/enclosing elements (Author 2018).



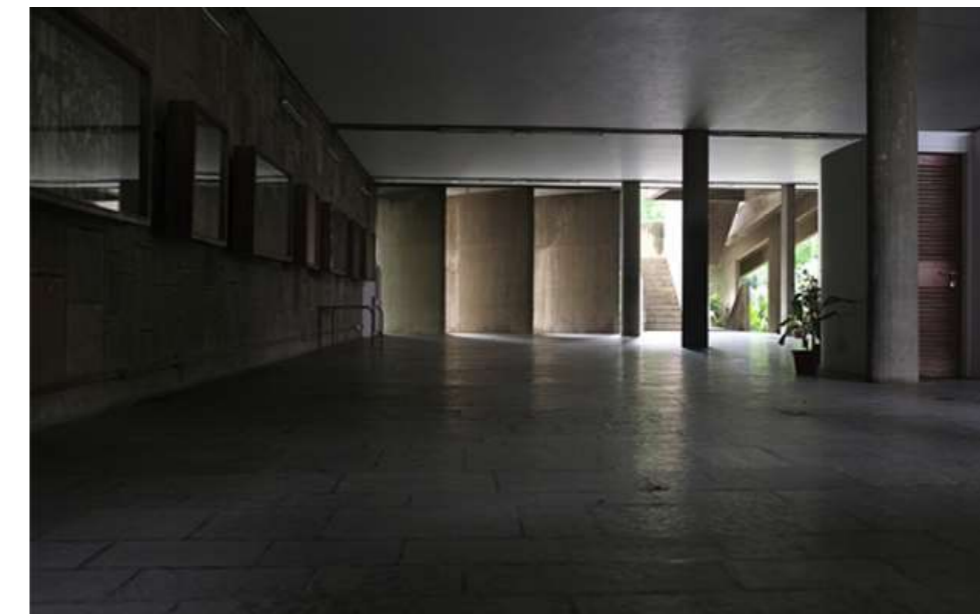
Fig. 11 Above: Photograph of Briese-soleil facade of building



Fig. 12. Above: Photograph of interior of Mill Owner's Association office building, (Source: afa-siaarchzine.com).



Fig. 13. Below (left): Photograph of interior of Mill Owners' Association office building showing 'blurred' liminal space: relationship between interior and exterior space (ArchiSHOTS 2017)



Memorial to the Murdered Jews of Europe completed in 2004

The Memorial to the Murdered Jews (figure 11) in Europe by Peter Eisenman is completed in 2004. The Holocaust Memorial is constructed of massive stone blocks (figure 12) arranged on a 19,000 square meter (204,440 square foot) plot of land between East and West Berlin. The 2,711 rectangular concrete slabs placed on a sloping stretch of land have similar lengths and widths, but various heights. Eisenman constructed the memorial through a layering of the three elements: the city grid, the typography of the site and a structured typography is memory of the deceased. He overlaid city grid to the open sites' typography and from the overlapping conditions, the monolithic concrete blocks were birthed, that created a continuously transformative space in which meaning is merged and therefore blurred. Peter Eisenman combines the elements of blurring and dissociation in this architectural design. Eisenman refers to the slabs in the plural 'steale', which have been used as an ancient architectural tool to honour the dead. The use of material representation and symbolism contributes to the ambiguity of the liminal space. The pathway between the seas of concrete slabs creates a platform for the visitors to the memorial to voyage through the labyrinth. This is another tool used in Greek mythology to create a transformative experience for the visitor, which caused confusion and disorientation (Craven, 2018). "When designing physical spaces, we are also designing, or implicitly specifying distinct experiences, emotions and mental states. In fact, as architects we are operating in the human brain and nervous system as much as in the world of matter and physical construction. I dare to make this statement as science has established that environments change our brains, and those changes in turn alter our behaviour." (Pallasmaa)

To conclude this analysis it is found that the architect utilizes symbolism through materiality to create an ambiguous spatial

one thing and at the same times another, therefore it is an ambiguous atmosphere. Anthropology gave deeper meaning to liminality by applying it to the understanding of cultural ceremonies and initiation of individuals in such communities. Therefore, liminality is seen as an approach to space making that has impact on the human experience and emotion towards a space in architecture. Sacred architecture has clear distinction between what is sacred and profane, as well as the combination of uncharacteristic elements into one space; prolonged procession into a threshold as well as creating build-up for the stages to come. Liminality in modern architecture expressed the power of materiality to express emotion of space, the alternative use of material, as well as contrasting geometry and layering of different grid types, allowing intangible to create the tangible elements in a liminal space. The design of a liminal space in architecture can be achieved through a series of processes applied at different scales, with different materials, and light quality.

A critical element of *state of liminality* in architecture is that the product never has to be final, as it is hosts a state of flux and transition. The architecture can be ever-changing, it can become kinetic, it can become alive. Within this thinking of architecture to have the ability to represent a liminal experience, it gives power to the architect to create and express their own definition of something that previously has no definition. A liminal condition becomes much less of a static experience of spaces, and much more about the living, breathing movement of space, place and context.



Fig. 15. Above: Photograph of Memorial to the Murdered Jews of Europe completed in 2004



Fig. 16. Above: Photograph of 'Steale' - 2,711 rectangular concrete slabs placed on a sloping stretch of land.

experience, furthermore, he uses Greek mythology of the labyrinth to create a feeling of disorientation for the occupant in the space. The architect experimented with repetition of similar elements that has been articulated slightly different. This contributed to a state of blurring.

It was the aim of the architect to create a sense of disorientation and loss for the user within the space. Eisenman also considered an alternative use of the material 'steale'. Typically it is used in memorial projects, and the material represents the dead, where the names of the deceased are engraved on the stone, but Eisenman, on the other hand, left the stones black, and placed the names underneath the stones. This alternative use amplifies the experience of disorientation and feeling lost in the concrete landscape.

The liminal space in each of these projects is one of ambiguity, due to the "undefined" spatial quality. The individual moving through the transformative zone can

experience constant uncertainty of where they are within the process of transitioning through the building or object in the liminal space.

CONTRIBUTION
Application of liminal rites in the architectural discourse

In holistically combining the findings of the literature review, precedent studies the common themes that contribute to the liminal spatial experience, the modes of architectural representation become evident. These common themes are developed into a set of design attributes placed into the main categories of liminal rites, namely separation, transition and integration and sub-categories of blurring, layering,

dissolution and dissociation. The following section of the article assembles the discussion into table (figure 18) that guidelines for the practical application of the conceptual theory on liminality in design as well as selecting a site (figure 19).

CONCLUSION

Liminality is a state of a ritual process. In ritual liminality is an in-between condition that has a clear starting and terminating point that must be dramatic enough to mark that transition has occurred. The character of the in-between space between the two states is peculiar and causes disorientation for the person experiencing that state. The in-between space has multiple readings, meaning it

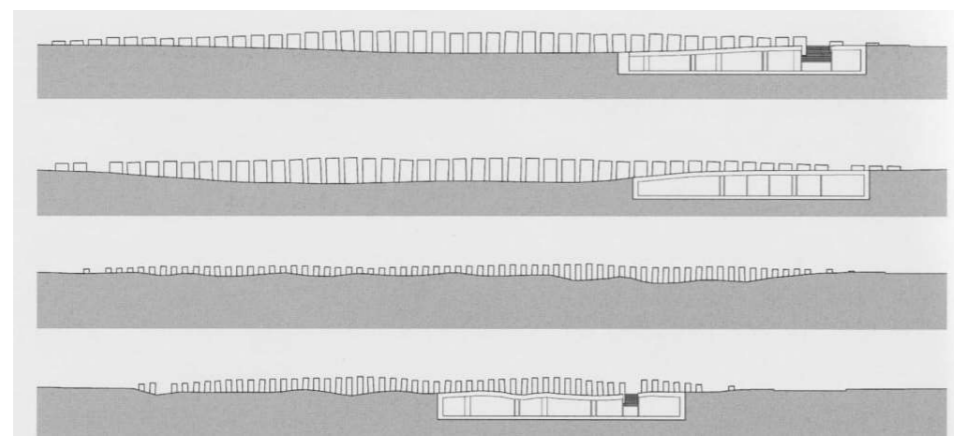


Fig. 17. Left Memorial to the Murdered Jews, Sections (Source: Flickr)



Fig. 19. Above (left): Table 3: Selecting a site in which liminality occurs (Author: 2018)

Fig 20: Below (left): Example of a liminal site (Author: 2018)

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