

# CHAPTER 7 DESIGN DEVELOPMENT

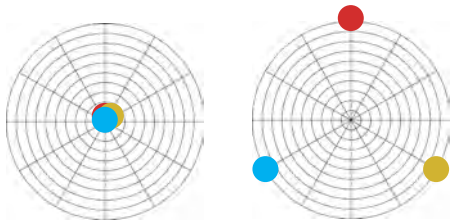


*synthesis of a regenerative intervention*

## 7. DESIGN DEVELOPMENT

The design process and development was an architectural journey to discover the appropriate mix of heritage, ecological and socio-economic value. Its evolution follows the form of a large monolithic structure that housed a transit station, housing and eventually an AMD treatment centre to a more sensitive heritage informed intervention that is scaled to fit individual urban areas along the mining belt.

Iterations and Design Development is done and assessed through A regenerative matrix in which the 3 lenses of Heritage (mustard), Ecology (blue), and Socio-Economic Value (red) are scored and then iterated on to improve the weak areas. The further away from the circles center the higher the score. Thus the goal is to have all 3 nodes on the outer most circle of the regenerative matrix. The matrix is illustrated below with worst score on the left and best score on the right



### 7.1 MONOLITHIC DESIGN

The first part of the design intervention was an unsuccessful product as it did not meet any heritage qualities and rather focused too heavily on socio-economic aspects. This resulted in This monolithic design being iterated in a reformative way to introduce heritage as one of the main threads throughout the design. This is why the main concept only comes into fruition after the monolithic design. The design process unfolded as follows

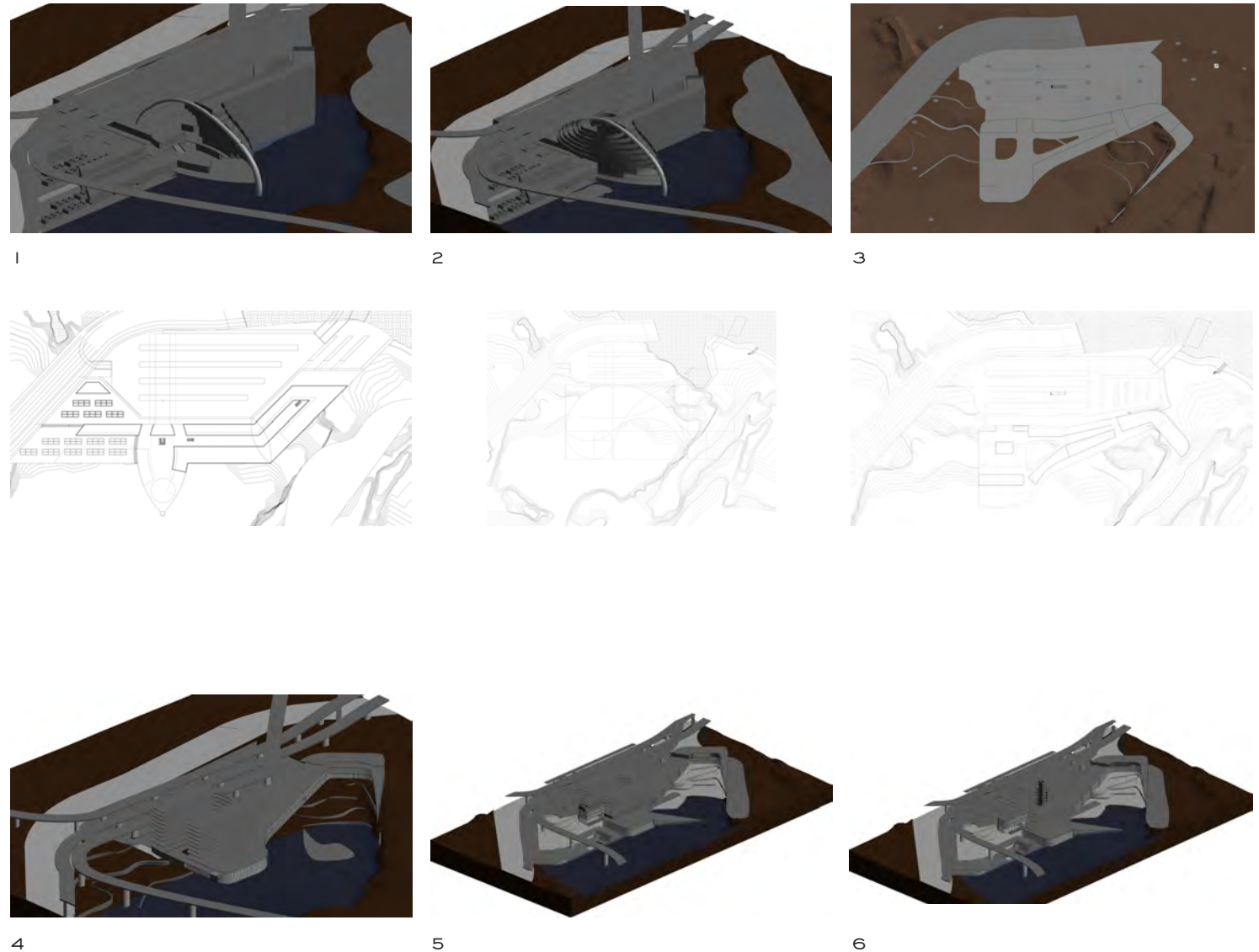


FIG 99 : Formal and Spatial Development Of Monolithic Design 1 (Author, 2017)

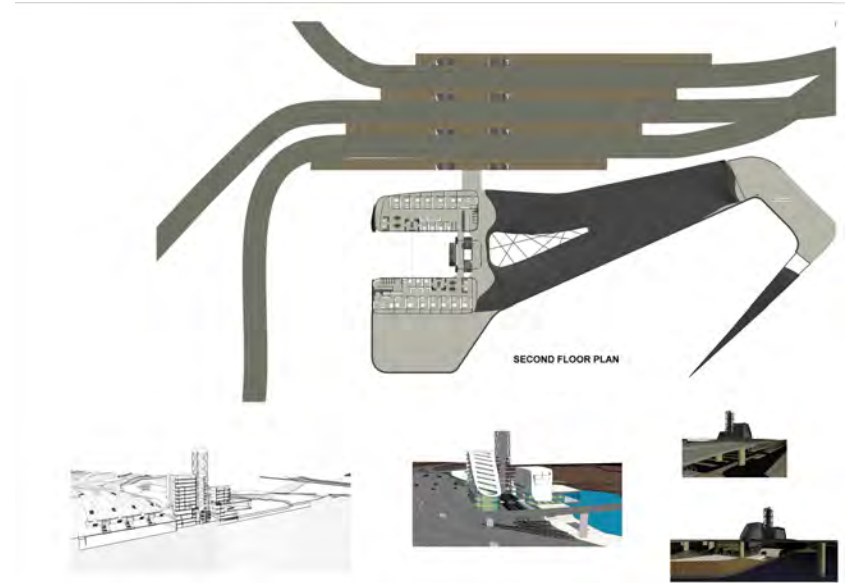


GROUND FLOOR PLAN

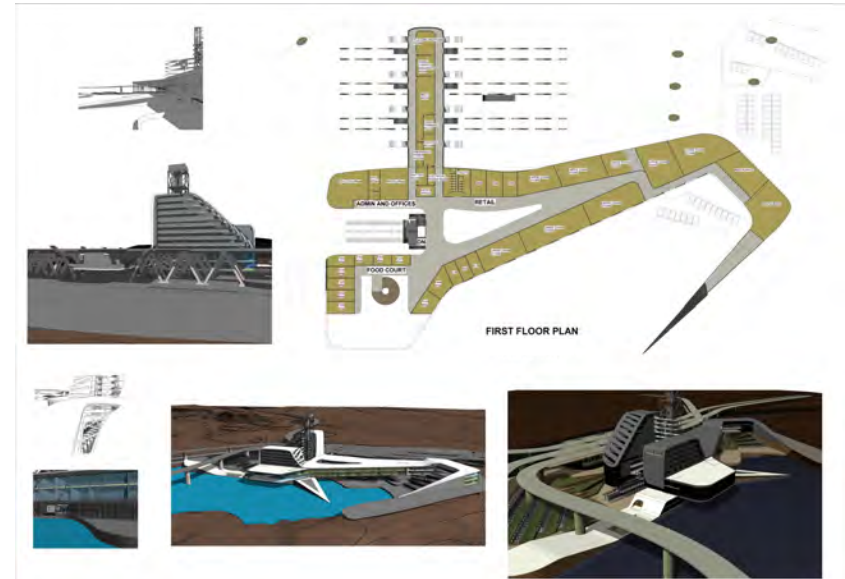


BASEMENT FLOOR PLAN

FIG 100 : Floor plans Of Monolithic Design 1  
(Author, 2017)



SECOND FLOOR PLAN



FIRST FLOOR PLAN

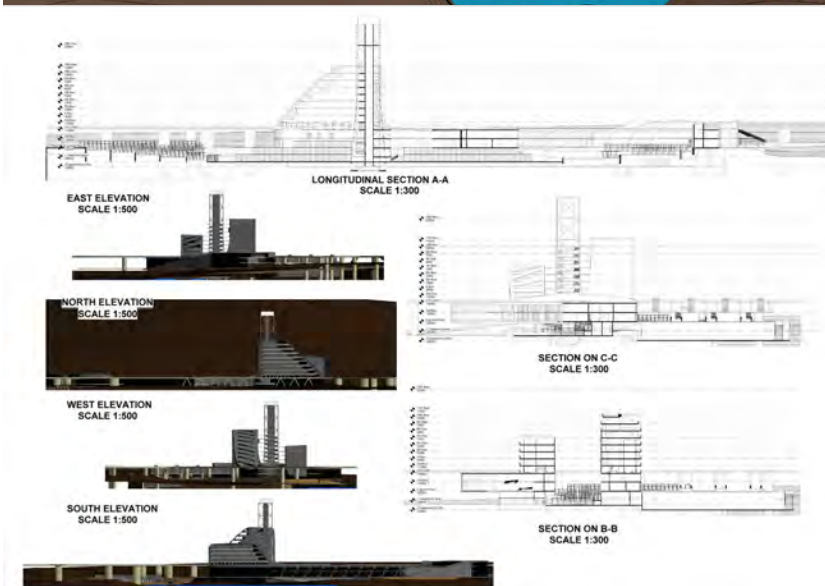
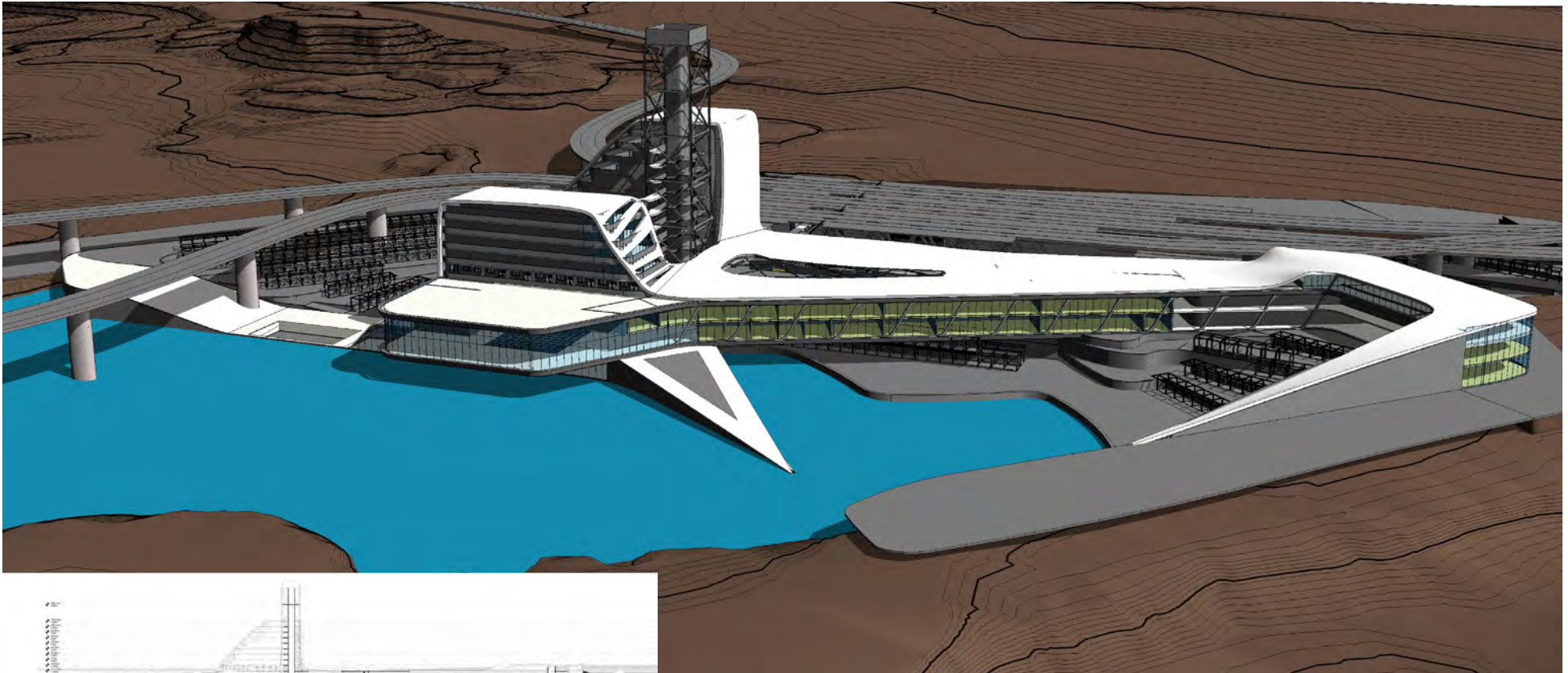


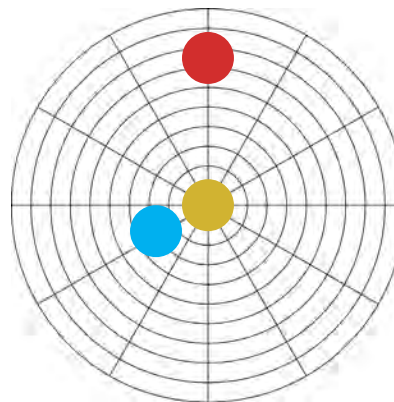
FIG 101 : 3D and elevations Of Monolithic Design 1  
(Author, 2017)

### 7.1.1 MONOLITHIC DESIGN REFLECTION

This design was out of scale in accordance with its surroundings and was an alien form, sitting in an industrial belt. The main issue was that it met no heritage value and for that reason it was not a regenerative response but rather a globalized iconic form

The good attributes of this design was its formation from and inspired by the topography as well as its programmatic functions

This ideas was then iterated with a more formative concept and inclusive regenerative response.



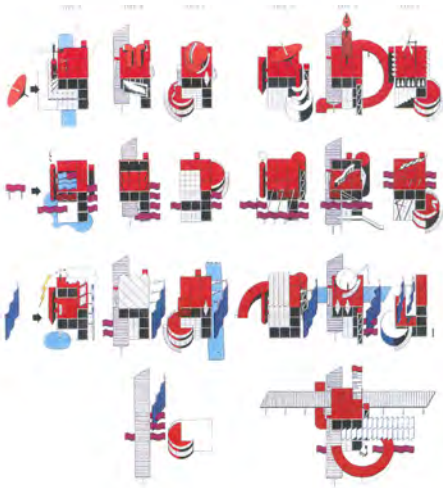
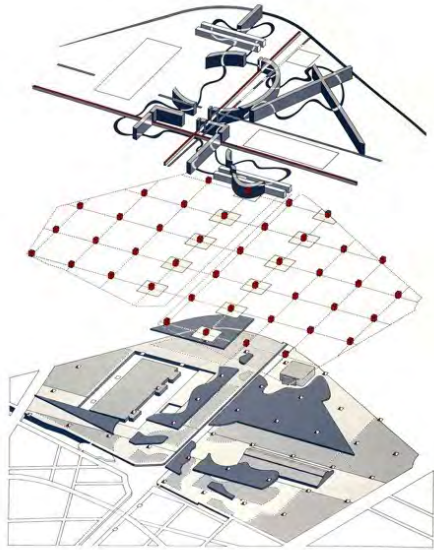


FIG 102 : Spatial organization using simple points lines and planes (Eduardo Souza, 2011)

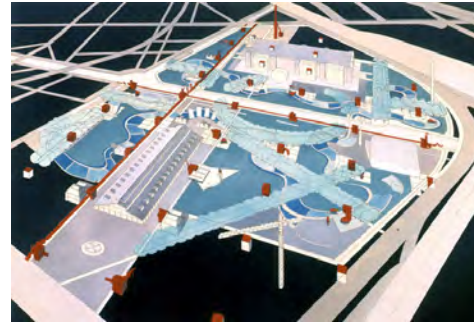


FIG 103 : Pictures depicting tectonic expression and spatial distribution of follies along the landscape(Eduardo Souza, 2011)

## 7.2.1 SPATIAL REGENERATION CONCEPTUAL AND SPATIAL PRECEDENT

PARC DE LA VILLETTE,  
PARIS

ARCHITECT: BERNARD TSCHUMI  
BUILT: 1987

In 1983 a competition took place to revitalize abandoned land from a slaughterhouse and market in Paris. The project was won by Bernard Tschumi who envisioned the landscape as more than just a landscape and rather a site of cultural significance where the natural and artificial are in a constant state of flux.

It was meant to be explored and interacted with evoking a sense of freedom within points of reference, the follies (Souza E, 2011). In this journey Tschumi envisioned these places being used as a play-scape, for meditation and relaxation.

A simple ordering system of points, lines and surfaces were implemented over a 35 point grid. This deconstructivist intervention is meant to provide a sense of place. Some criticism that faces this design is its lack of respect for the heritage of the site. This is an important precedent for using follies as a driver to tell a story of heritage with regards to the mining belt while being multi-functional spaces that evoke a sense of place. This ordering system relates directly to the mining landscape which was comprised of points lines and planes, in the form of markers, shafts and landscape.

## 7.2.2 SPATIAL CONCEPT

The concept of this design evolved from the Regenerative theory developed in Chapter 5. This theory was translated into programmatic needs and developed into a concept of Active Regeneration. All the activities on site contribute to different lenses of regeneration that is actively happening. This is a regenerative precinct which encapsulates change in motion through not only the substantial movement through the transport hub but also the treatment of AMD and production of art through the skills workshop.

The intention of this study was to regenerate the mining belt. This process addressed three parameters to achieve this regeneration. Conceptually the three lenses of heritage, ecology and socio-economic-value became the drivers for the intervention and it is the dialogue between these aspects that will determine how successful the scheme is going to be. The lenses were used in a dialogue to generate the design through analysis and iteration.

The organizational programme was based around nodal points within the precinct that represent socio-economic and ecological interventions joined together by the thread of heritage as a journey-based-story through the precinct. Much Like Parc de la villette used follies to orient a person in space, This precinct consists of a grid with nodal points representing the lenses of ecology and socio-economic value, connected by the thread of heritage. This heritage thread is expressed in a landscape of follies which are used to orientate a person in space as well as time, taking the user through narratives, time-lines, effects, processes and exhibitions. Originally this concept was quite linear in thought, with an initial socio-economic node followed by an ecological node and ending with another socio-economic node, all joined by a Heritage Thread. However, when overlaid with site conditions and programme this evolved into a more complex matrix



of interdependency with socio economic nodes, ecological nodes and Heritage threads forming a Web-like circular pattern within the site. This spatial concept finally evolved into layers of interdependent and overlapping landscapes with 5 main processes, that being An activation, documentation, production, regeneration and exhibition.

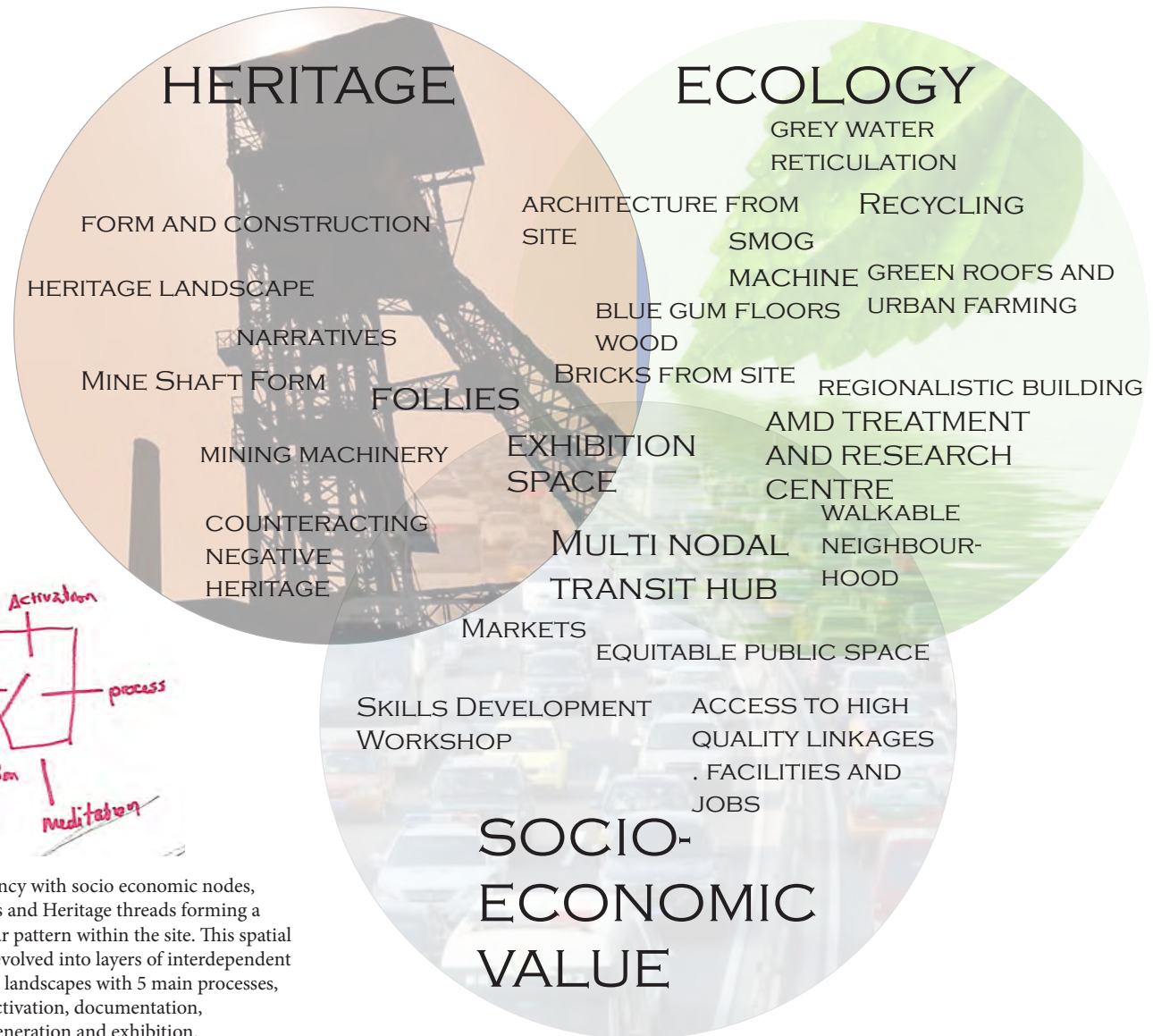
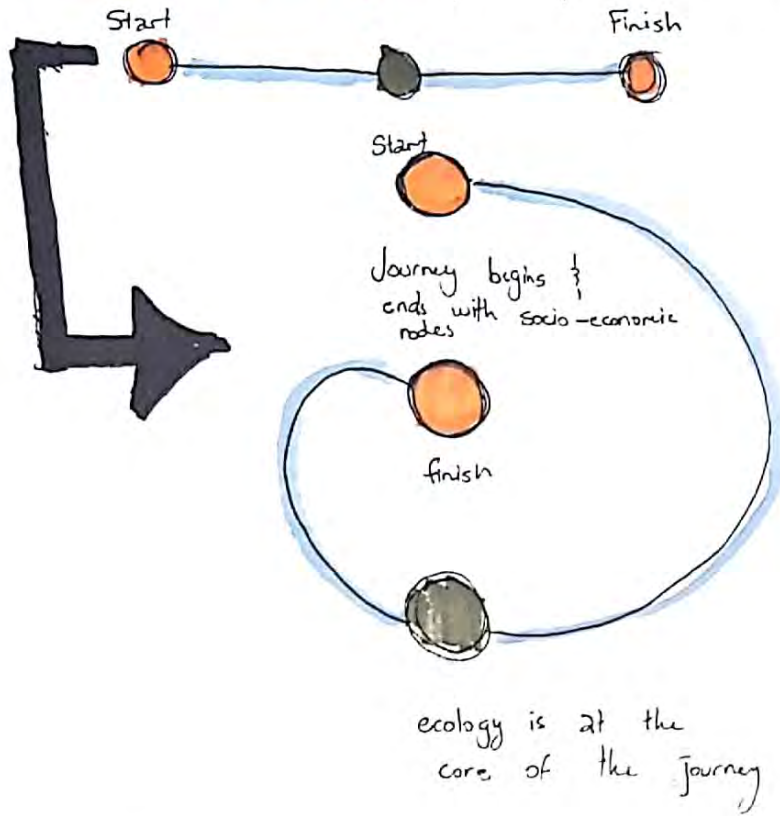


FIG 104 : Bubble diagram of Heritage, ecology and Socio economic intentions(Author, 2017)

# CONCEPT

"ABSTRACT IDEA"  
Spatial implications of an idea



IDEA : REGENERATIVE THEORY

## ACTIVE REGENERATION

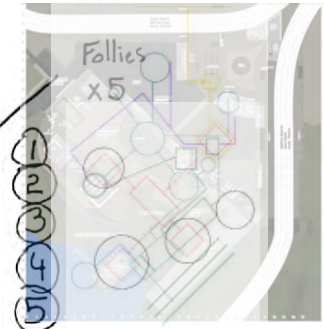
TO FACILITATE CHANGE-IN-MOTION.

Using 3 Drivers

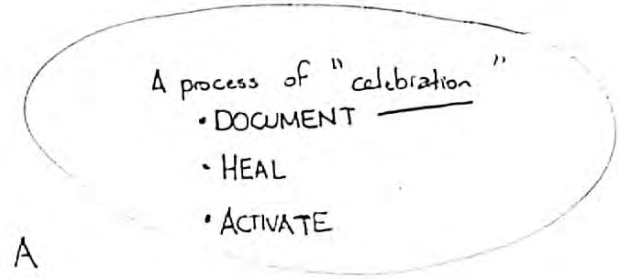
AMD Treatment  
" Centre Architecture from site "



Skills Workshop



The thread of heritage to connect through a journey



## NODES ALONG A JOURNEY

\* an active heritage journey through targeted socio-economic programmes in an ecologically ~~rehabilitative~~ rehabilitative landscape

## "A JOURNEY OF CHANGE IN MOTION"

SPATIAL ARRANGEMENT & FORMAL IN

- MINING LANDSCAPE
- REGULAR GRID

ORTHOGONAL / REGULAR GRID ORGANIC VOYAGERESQUE

development

SPATIAL ORDERING SYSTEM

PLANES LINES

POINTS

TO ENABLE FORM-MAKING

THE MINING LANDSCAPE

INDUSTRIAL

EXCAVATIONS

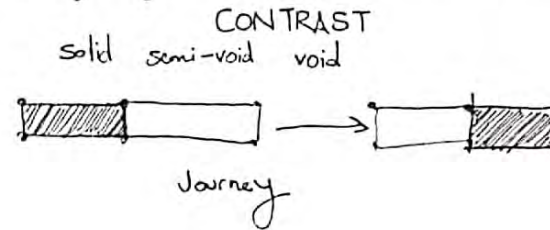


FIG 105 : Concept exploration (Author, 2017)

7.2.3 CONCEPTUAL DEVELOPMENT

- 7 series of catchments

metro-gautrain colab -carts  
Soweto Park  
Germiston  
TUEFFENTEN COF

Skills development - practical skills  
- creative-writing  
- recycling centre  
- Neo management

Industrial domestic  
Active heritage  
folly museum  
treatment centre

pollution  
Landscape  
Trapped  
Captive  
Hurt  
Harsh

2) Socio - Economic  
Two opposing stories / Narratives  
+ reaching Johannesburg

3) Ecology  
Polluting tension  
Landscape  
Trapped  
Captive  
Hurt  
Harsh

4) Mining Process  
hanging explanations  
Still Mill Press  
water

Star/Folly

5) Exhibits space  
Organic  
Celebratory!

1) History of mining belt → pictures collaborative tensions (Opposite)  
2) Mining Process → critical  
3) Narratives (Randall's & miners) → personal (constraining)  
4) Ecological Effect → harmful  
5) Future of mining belt → liberative

Technology's  
Mining Process  
our water

Timeline (Johannesburg)  
Stair case  
pictures  
TURING WHEEL STOP ACTION MANNING  
hanging exhibitions

Folly IN BUILDING

Ecology in cage

DESIGN  
HERITAGE  
LINK

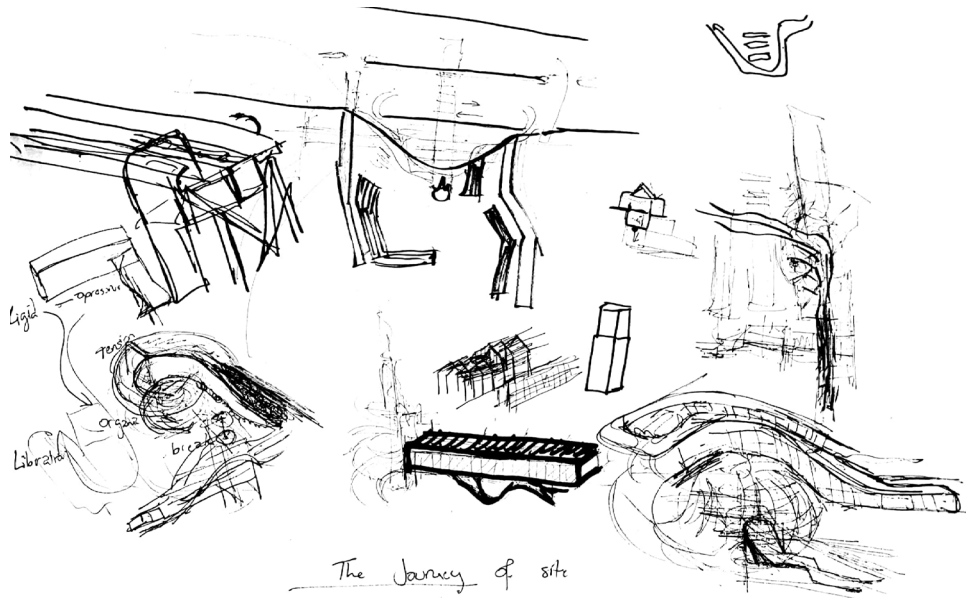
1) Mining History  
2) Transition on the bridge  
Narrative  
3) Mining Process  
- meditative space  
stones  
aqueducts  
pump

4) Ecological Follies  
IND WATER  
farming

5) Exhibits space

FIG 106 : Conceptual follies exploration (Author, 2017)





The Journey of site  
 Oppressive Rigid → tension → organic → " → " → Libration Organic

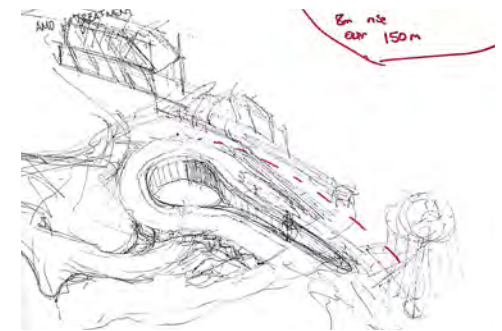
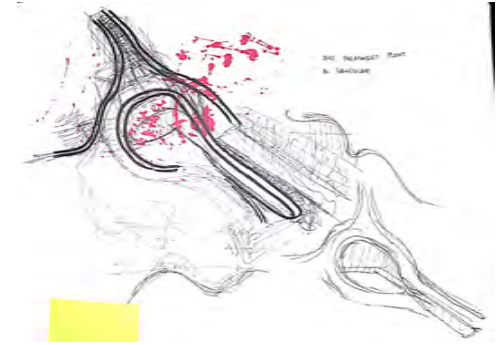
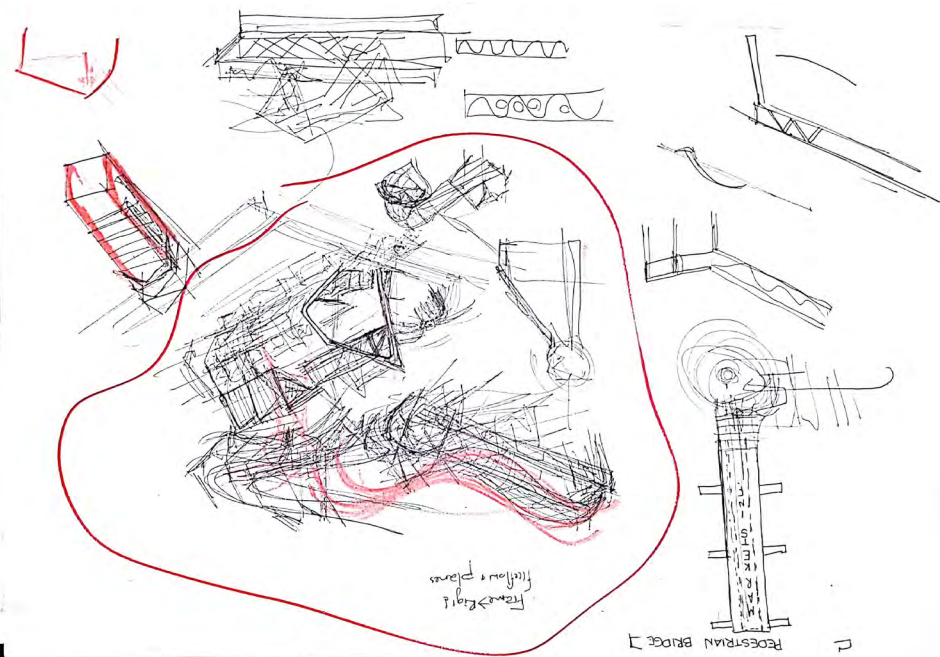
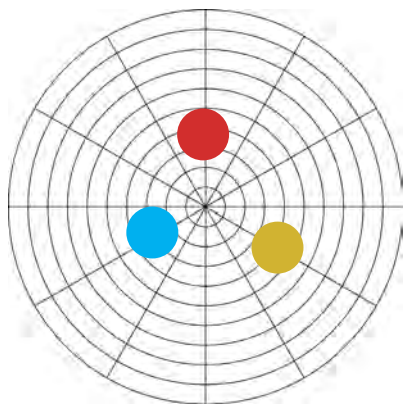
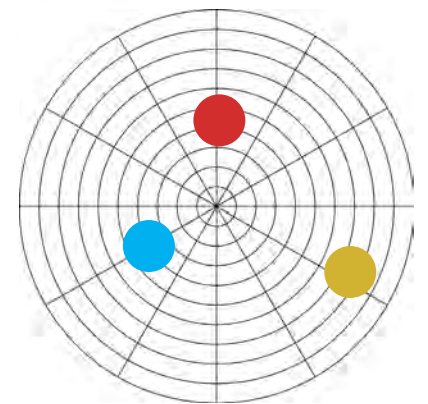
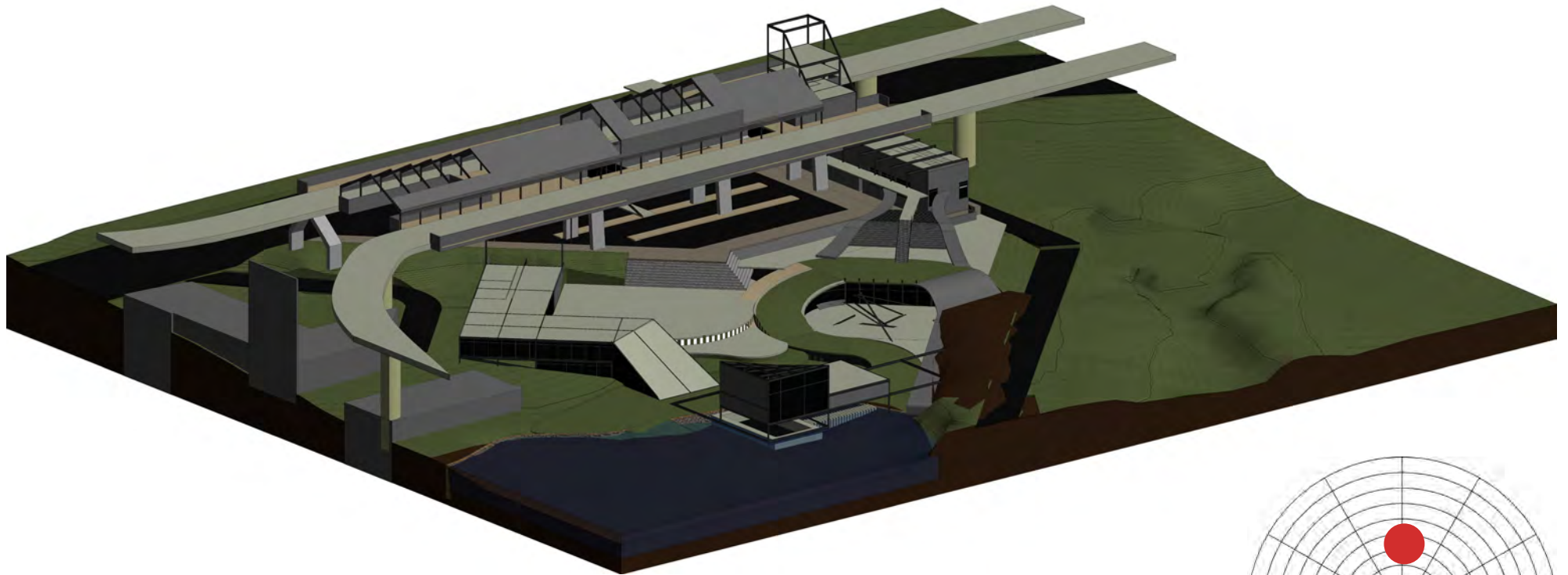


FIG 107 : Conceptual formal exploration (Author, 2017)

## 7.2.4 DESIGN 2 ITERATIONS



**FIG 108 :** First Heritage based Design at a much smaller more contextual scale, topography inspired design missing. Iteration 2 (Author, 2017)



**FIG 109** : Iteration 3, Formal qualities are better but the raised railway presents a huge infrastructural problem(Author, 2017)

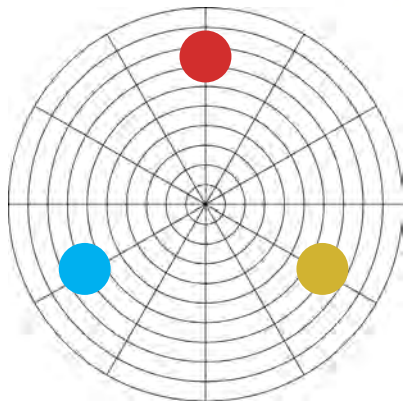
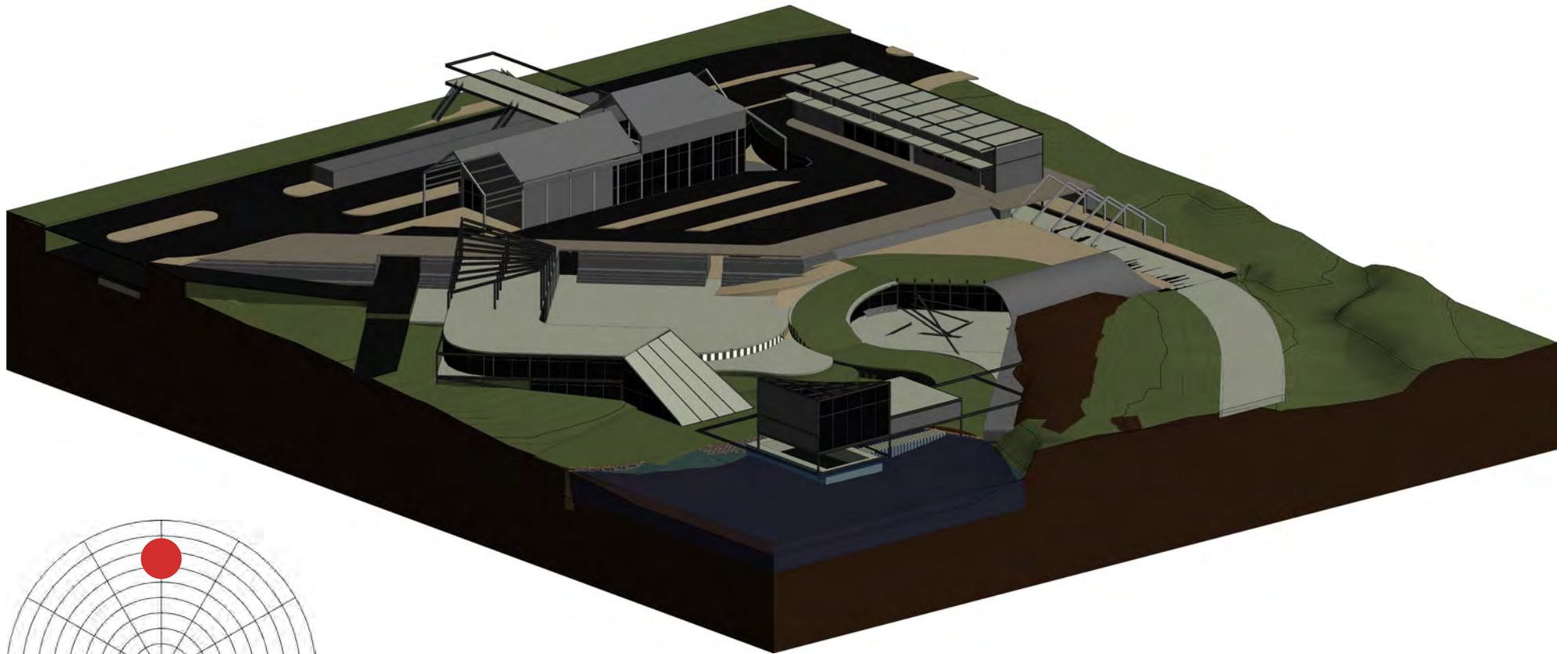


FIG 110 : Iteration 4 Railway sunken below ground, follies developed(Author, 2017)

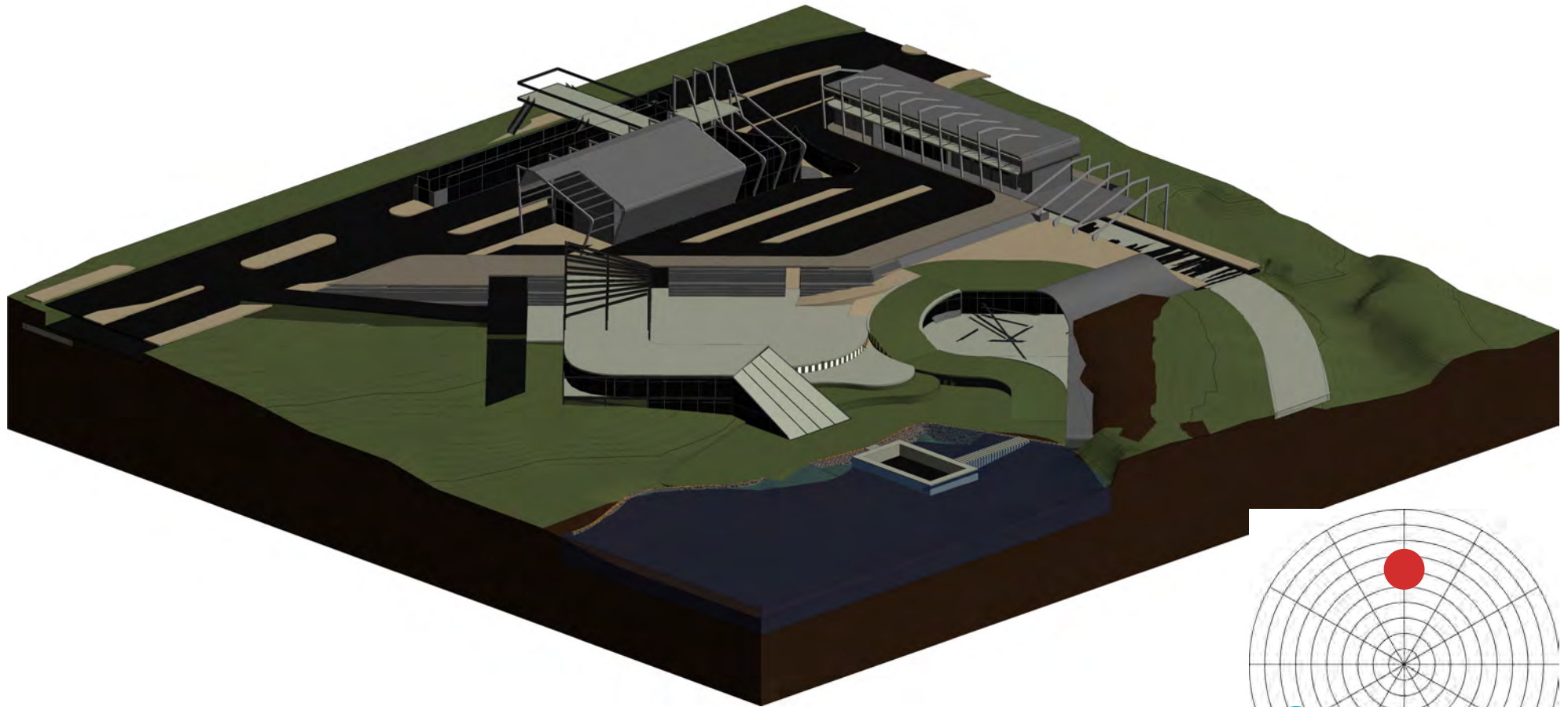
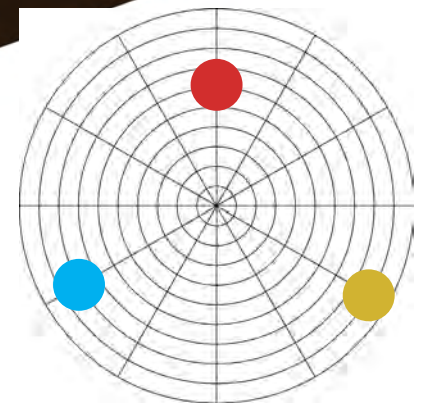


FIG 111 : Iteration 5 Formal concept of tension and portal frames takes shape (Author, 2017)



## 7.2.5 FINAL ITERATION (6)

Following from the concept, the design process was informed by a network of generators that being the aforementioned established regenerative theory, a keen understanding of the context, an interpretation of the site conditions and programmatic requirements. This approach should ultimately be in line with the main intentions of the project which is ultimately to regenerate the mining belts socio-economic activity, ecology and heritage value.

### 7.2.5.1 SPATIAL DESIGN

The initial form making resulted from site analysis of major features with a focus on topography. The topography was one of the main site generators, identifying ridges and planes which formed specific zones of activities. Considering the 8m drop on site 4 main levels of activities were identified. Although topography was a major factor in developing space-form there was also the factor of heritage which needed to be apparent. A harsh rigid mining belt contemporized and eventually melting away into the landscape. This tension is a formal and spatial concept which is representative of the sites opposing needs of ecological and heritage value. In essence all the remaining toxic topsoil will have to be removed therefore there only cut and no fill from a sectional standpoint and the building is sunken into the ground, revealing itself where the previous topography lines ran. Thus the buildings and landscape echo the topography of the now to-be-removed toxic soil.

From this point a regular 5x5 grid was placed onto the site to match planes and ridges. This was done in order to easily form the transit hub and resulting services. This spatial approach is similar to Parc De la Villette's Conceptual approach of laying down a grid in which planes and lines can move freely between of on. This method echoes the mining landscape in a sense as a mining landscape is made up of points lines and planes with the mining presses, shafts, camps, warehouses and carousels. From this grid a spatial layout could be formed with the spatial intention in mind.

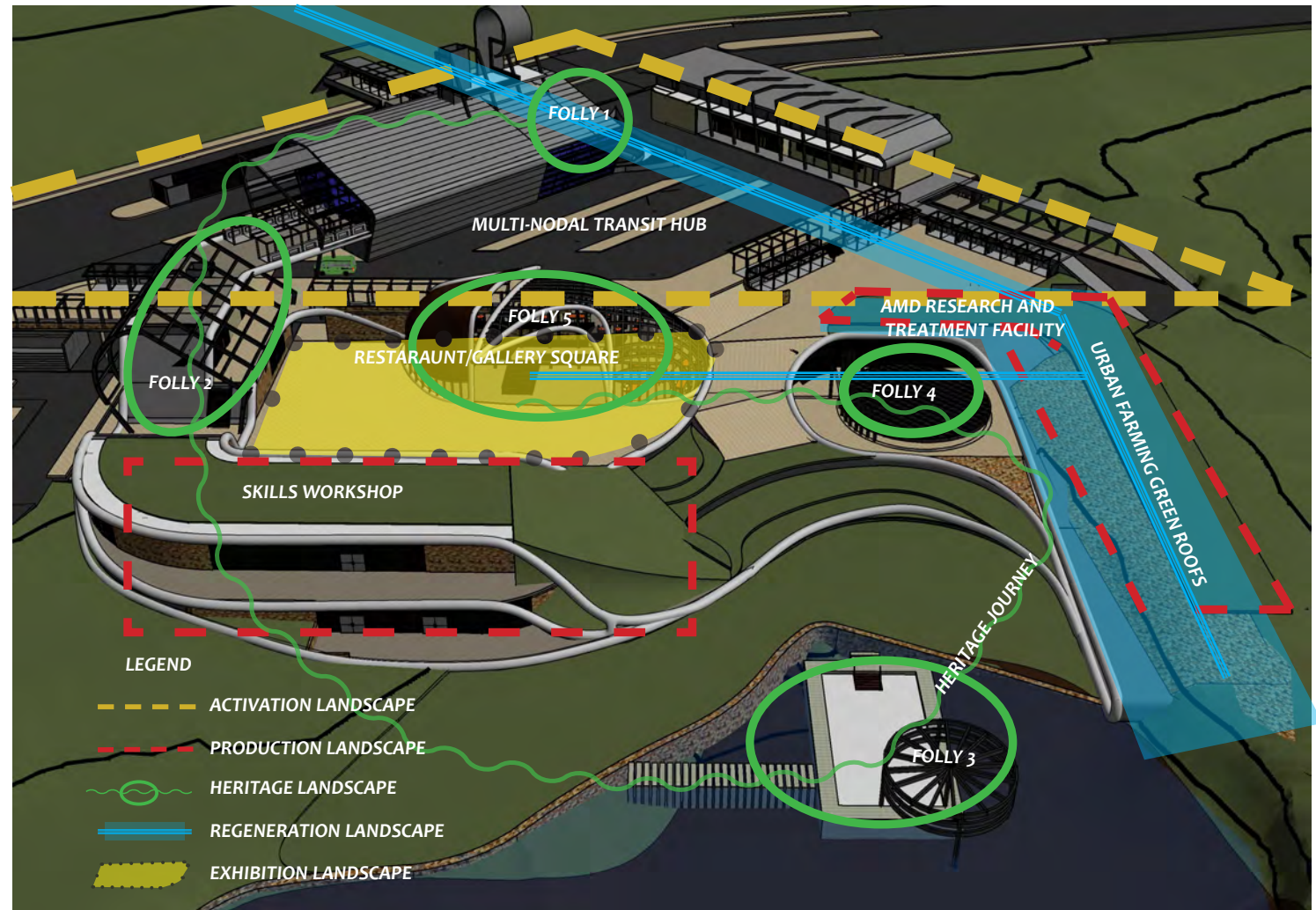


FIG 112 : 3D DEPICTING CONCEPTUAL LANDSCAPES' INTERACTIONS AND LAYOUT (Author, 2017)

### 7.2.5.2 DESIGN INTENTIONS

The intentions of this project were to establish a regenerative precinct using these lenses and intentions

The Heritage lense- The past is important to understand where we came from and why things exist in their current state. This understanding forms a basis of understanding problems and opportunities within the present day to develop a vision into the future the intention of the heritage journey is to not only document the rich mining heritage of Johannesburg that was explored in chapter 2 but also acknowledge the role it played in negative spatial, ecological and socio-economic issues. It is in documenting the narratives and data from this period that fosters understanding and a path to move progressively into a better narrative for the mining belt. The Heritage journey must incorporate a chronological history of the mining belt, narratives of mine workers and Randlords, the ecological impact of the mining belt, mining procedure and exhibit the vision of the future of the mining belt and this precinct. One of opportunity, equality, sustainability and bustling economic and social activity

The ecological lense- in such a harmed landscape it is hard to justify keeping the toxic soil as a cultural asset while trying to rehabilitate the precinct because it is a hazardous ecological feature . However a token of the past-state of the mining belt is needed, which will be fulfilled in the heritage landscape. The main intention deals with a critically regionalistic precinct which has a focus on its connection to the site (topography and water). This site speaks to the treatment of AMD as well as treatment of land, so it's success will be benchmarked according to

1. Its reticulation and articulation of water, in the form of systems and services.
2. Its treatment of topography and the built forms connection to the ground, focusing on how that is articulated from the heritage based, steel driven response to a recessed non-building that forms part of the landscape.



FIG 113 : 3D of final iteration (Author, 2017)

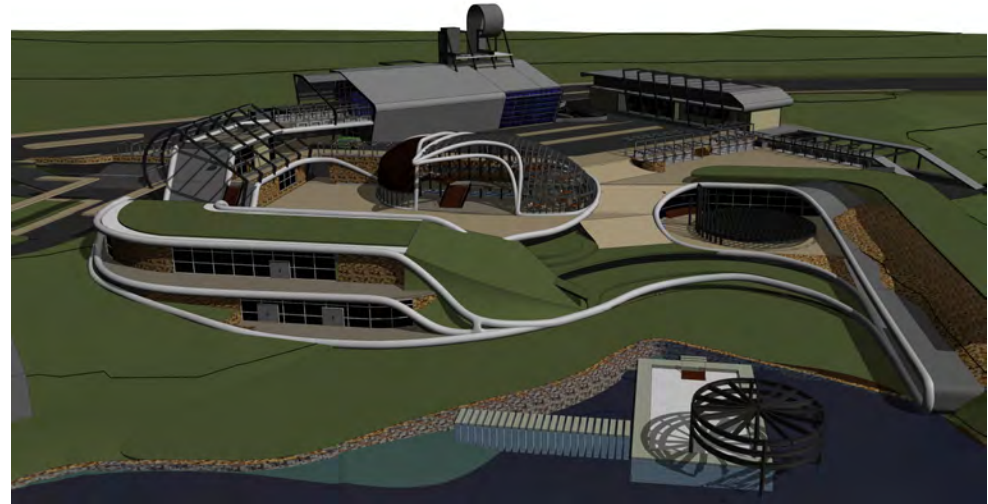


FIG 114 : 3D of final iteration (Author, 2017)

The Socio-Economic lense- the intention of this lense is to create a socially just and contextually based economic space that reactivates activities in the area as well as engages with community needs thus counteracting the role the mining belt had to play in the injustices of the past, such as the conditions of migrant labour and spatial disparates. This is done through two functions, a Multi-Nodal transit hub and the Skills Workshop. The main goal is to have contextually based responses that contribute to a high quality of public space and services, empowering and activating the area. This intervention will give the land lost to the mining belt back to the city and its users. This public space allows connections both economic and social to be made and fostered. This is expressed in the form of markets and exhibitions. Public transit should be equitable in the sense that it should provide high quality service so that people of all different economic backgrounds, high and low use it. This was the main intention of combining Metro and Gautrain waiting areas. The skills development workshop is a targeted intervention that is meant to empower and create positive effects within the community.

### 7.2.5.3 DESIGN CONSOLIDATION

The journey through the precinct is explained through the 5 landscapes, which are developed from the 3 main drivers. Landscapes refers to areas or spaces within the precinct which share the same or similar functional and conceptual compositions. These landscapes encapsulate the intentions of each programmatic activity.

\*REFER TO FIG 112 FOR FURTHER CLARITY ON SPATIAL LAYOUT OF LANDSCAPES\*

The first is an activation landscape which features the main entry and exit into and from the site. That being the Multi-Modal transit station which is supplemented by informal markets, start-up businesses. It has been established this is an upgrade of the non-functional Booyensens station, taking it from a

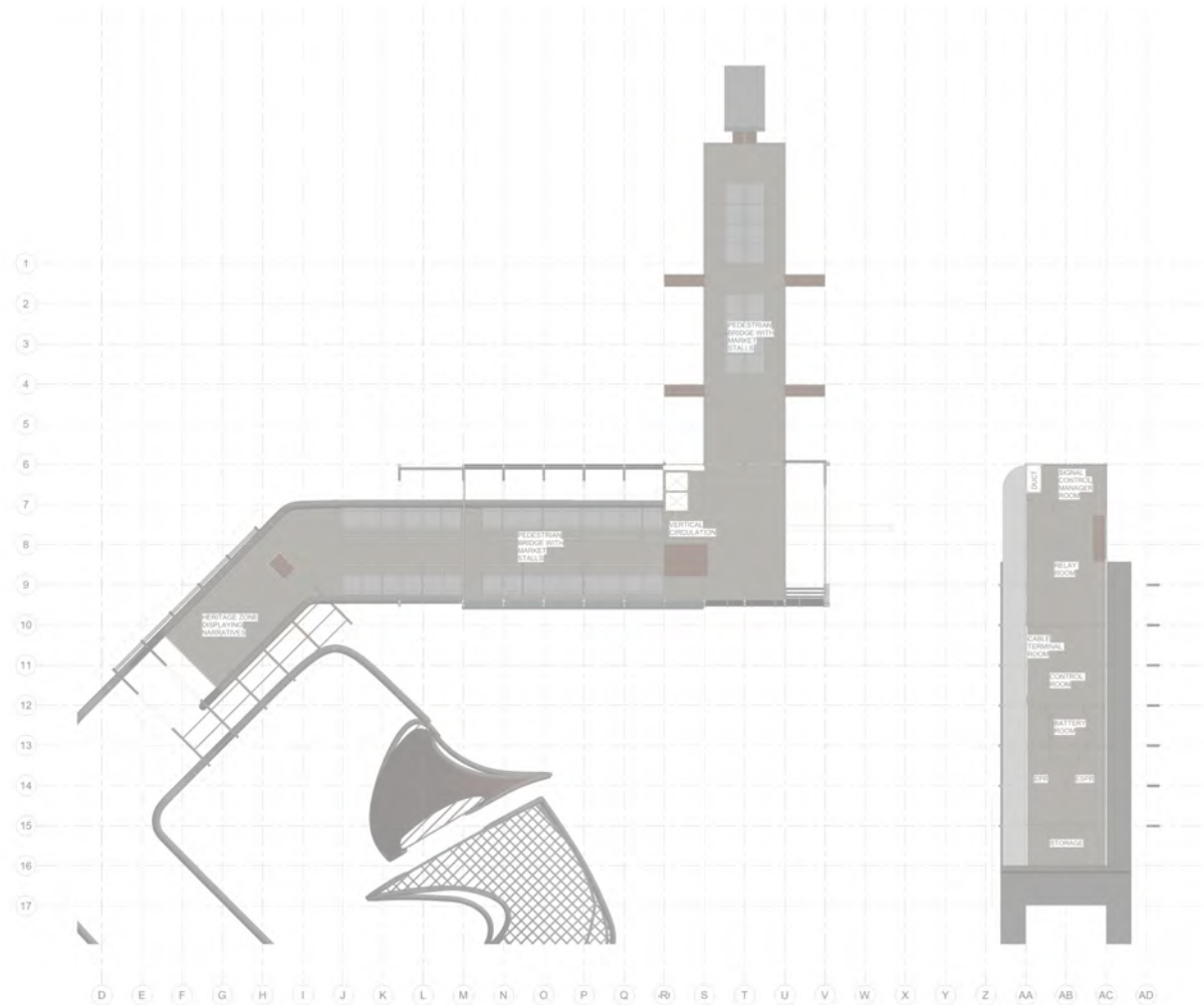


FIG 115 : FIRST FLOOR PLAN (Author, 2017)





mono-functional train station to a multi-modal efficient transit precinct. The intention of this transit node is to build off of the momentum of the Gautrain and make rail a more prominent, safe and equitable feature in Johannesburg, This includes other forms of public transport such as a Rae Vaya BRT connection that feeds off the new proposed road linkage and a metro, Gautrain bus station. There is also large taxi rank that can hold up to 40 taxis and transport 20000 people daily. The transit station also holds 3 levels of basement parking with a total of 320 parkings to allow for precinct activity as well as parking facilities through the day for public commuters such as in a typical Gautrain station model. There is a bike center where you can hire or leave your bicycle if you cycle to the precinct as well as free showers and change-rooms to use for those commuters. The bicycle lanes provided are 2.5meters and also double as trolley pusher lanes in order to facilitate safe and easy navigation through the precinct for trolley pushers. The bus system is designed to carry 20000 people daily and the train system is designed to carry 40000 people daily (Johannesburg SDF 2040, 2016). The site itself is very walkable with a series of ramps leading through it. The Transit hub connects North and South across the road with a large pedestrian bridge that houses market stalls. This bridge can be used to access the Rae Vaya or main transit station directly.

The stations services are located to the east of the site with the train operating rooms, site management services and ablutions all being located there with a few small start-up business shop openings. This is due to the fact that it is the edge of the site and urban precinct because of the large ecological ridge feature that is beyond it, interspersed with vegetation and trees this zone is to be left untouched. The site management offices will manage the market and various transit ticket offices as well as the small start-up business opportunities. The intention of the small start-up business ) business openings is for informal traders or locals who have attended



FIG 116 : GROUND FLOOR PLAN (Author, 2017)

the skills workshops can use their skills to form a start-up business with a reduced rental rate thus allowing for a jump from the informal economy to the formal economy.

The train station is sunken below the ground for 2 reasons. The first major issue is spatial flow on site, and with the intention of making This Urban precinct a walkable city train infrastructure would be a huge hindrance to this. As well as the fact the North-South Gautrain Line falls naturally to a point where it emerges at ground level. There are 2 separate lines, a Metrorail and Gautrain line which share the same waiting areas but different platforms to ensure a fair mix of socio-economic classes while attracting economic movement South of the city. These 2 lines are parallel to each other but fall and rise 3m respectively over a distance of 100m to cross over each other. At the platform they are on the same level.

The transit waiting area which is a level below ground and is supplemented by a food court and courtyard which draws natural light into portions of the platforms and waiting area. This courtyard houses a large reservoir for the AMD water that is pumped onto site. These pumps are to be suspended above of the reservoir so the courtyard becomes a public pumping station that will contribute a sensory experience through the form of the sound of churning water being pumped. This is the first point of entry for the infected water on site. It is pumped from the Rand Mines connection located across the road and travels above the pedestrian bridge through the stations double volume waiting space and out into the reservoir. This activation landscape is not only where the Socio-Economic lense and Ecological lense is being activated but also the heritage landscape and the reservoir which is raised 4m above the courtyard forms the backdrop for the chronological time-line of the mining belt. This circular concrete mass will be supplemented by a perforated steel catwalk to provide the sufficient space to give a historical overview over the mining belt.



FIG 117 : -1 BASEMENT FLOOR PLAN (Author, 2017)



has targeted the trolley pushers, the informal community, practitioners, artists and the local government.

This initiative looks at paying trolley pushers for their collected trash with a variety of different means. They can be paid in cash, with free transit tickets (rail, taxi or bus) or free food from the site restaurant. The payment option also involves a free training programme for the trolley pushers to attend night time skills development courses in a variety of different options such as business and practical skills such as metal and wood working. These skills will serve them well considering this precinct is located within an area currently zoned as industrial.

This trash is then sorted to established what materials can be used in which programmes. This is managed by the Skills Development workshop. This workshop is a new initiative developed from the theoretical discourse in which targeted role players within a community are picked to participate within this workshop where they live and work for a period of time in line with a practitioner or professional of the arts or relevant skill. This allows for a higher success rate and a real world learning experience where people exiting this programme have really learned and gained the intended skills. Upon leaving they will receive a certificate to certify the fact that they are proficient artisans within their specific course and thus make it easier to find a job. In certain situation job placement opportunities will be available in collaboration with the community. So skilled practitioners can use this platform as an interview process to hire new and upcoming talent.

Once selected they will begin their relative courses within the skills development workshop. living on the lowest level with the workshop a level above that.

The Workshop is a multi-functional space with rows of work benches with a maximum capacity of 50. This feeds off of an open assembly space and lastly a machine zone which houses all the electronic drills, saws presses and machinery.



FIG 119 : 3D SKETCH OF FINAL ITERATION (Author, 2017)

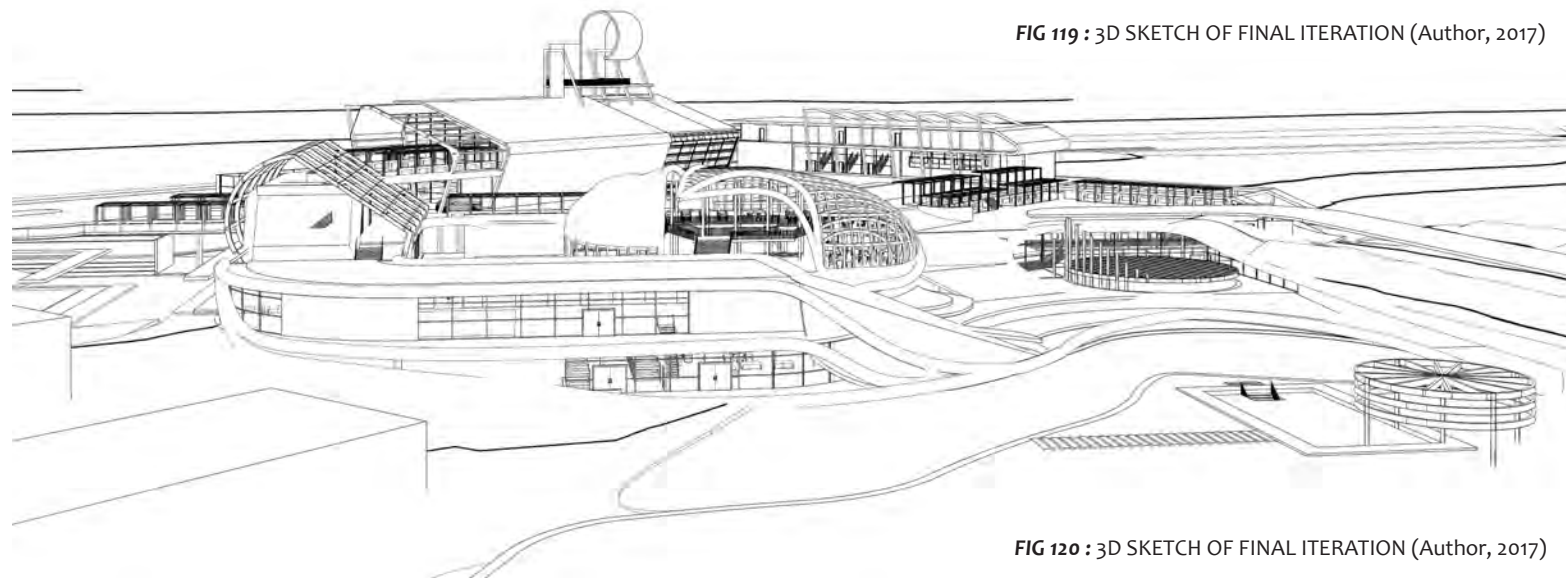


FIG 120 : 3D SKETCH OF FINAL ITERATION (Author, 2017)

These spaces open up to the public square and makes the workshop process very visual. Following this space is a wet zone where cleanup and washing takes place. Then a staff room offices and storage are located west of that. This space is optionally naturally cross ventilated or can also tap into its own mechanical evaporative cooling system

The formal intention of the workshop space was to mediate the point between building and non-building, rigid to a more organic landscape. It in essence represents that tension or transition between the formal concept. This production landscape is actually located a level below ground level but is covered by a flat green roof that is a walkable path. The green roofs form part of the production landscape, producing fruits and vegetables for the restaurant to use. This aesthetic helps create the illusion of landscape as building. This building runs east to west longitudinally and falls 8m to meet the ground to the east. The building completed the transition by literally falling away into the ground through an terraced space. The materials used to construct this space are a mix of concrete steel, natural stone, glass and vegetation. With the natural stone and vegetation being prominent features and the steel and concrete being less pronounced. To the West of this landscape the building transitions from the activation landscape of the transit station to the production landscape through a series of exposed portal frame that house the second heritage folly.

This transitions into the 3rd landscape which has been partially covered already. This is the Heritage Landscape Which runs throughout the site as a linkage thread. This heritage landscape is conceptually based on the idea of functional follies. Masses within the landscape which tell a story. This idea developed into variations of heritage nodes that are integrated into the building and landscaped at different levels. There are 5 different follies with the main intent to document the full heritage of the mining belt with a focus on the lost sectors or ecological impact and narratives of migrant labourers and

randlords. The first folly has been explored in the aforementioned Activation paragraph which is the chronological history of the mining belt. The second Folly is on the first floor outside the transit station, just beyond the market space. Located in a series of portal frames which will display alternative narratives and pictures. This is an outdoor space which creates a relationship with the sky by hinting through horizontal slats which filter light into the space. This space looks over the entire site and market spaces brings a perspective of 3 different narratives the, 2 located in the past and one active narrative happening as the site is being regenerated. The materiality of this space is strictly steel and blue-gum wood. The aesthetic falls within the transition zone between building and non-building.

The third folly is a meditative space that has a connection to the ground and water. It is set within the water-scape and speaks to a subterranean journey. This space is a organic concrete bunker that has cut out of the landscape to produce a space that showcases the technical process of mining through exposed machinery equipment joinery and members. A steel structure will host this display and will also house the dam's reticulation outlet, putting water back into the system in a very visual way falling out of the top of the steel structures circular head.

The fourth folly is an ecological folly which displays the ecological effect the mining belt had had. This structure is a steel platform set in the courtyard of the AMD treatment facility. It is a raised circular steel platform set on a grid of steel beams and columns. In the center below the perforated steel walkway is a mound of the old toxic removed soil which has been sprayed with a hardening material to ensure it does not move or spread on site. The outer edges are flanked with a glass walkway that gives the user a glimpse into the Treated potable water storage tank. This is due to the fact the ecological folly is set over this tank. The folly has alternating columns which display pictures, diagrams, graphs and data that show the influence the mining belt. The west facing edge of the AMD treatment plant and east



edge of the folly incorporates a layer of flowing water outside and over the curtain wall to form a thermal gap between the harsh west sun and allow for a cooler space within the treatment plant. This folly incorporates evaporative cooling through the use of cooling mist installations. All the outdoor spaces have this system including the 2nd narrative folly and the last folly.

The 5th and last folly is a celebration folly that is made up of space defining elements rather than an actual building. This folly actually forms the last landscape as well which will be discussed separately. This folly is the termination of this Heritage landscape and has no particular documentation of the mining belt but rather speaks to the future vision of the mining belt and precinct as a whole. This structure mediates form between the rigid defined station and the landscape creating a space with the theme of celebration.

The 4th landscape is the Regenerative Landscape of which the main intention is to regenerate AMD. This is done through an AMD treatment and research facility. The facility hosts an upper floor with offices, storage, a lab and conference room as well as reception and toilets. This space feeds off of the facilities courtyard where the ecological folly is housed. Below this submerged further under the ground is a lab, control room and pump room as well as the treatment floor where the KNeW treatment process takes place. The treatment floor is a series of filters and treatment tanks, with the filtration process being quite visible through the west facing curtain wall. The treated water is stored in underground reservoirs next to the facility. The water comes from a Rand Mines connection next to the site and is stored in a reservoir in the transit station. Then it is mixed in a holding tank with grey water on site and then treated. This treated water is then reticulated on site in many different forms. This forms a closed system of reticulation and treatment. Excess waste water will be fed back into the municipal system. This process is a daily operation only being closed on weekdays so the capacity of each reservoir would only have to be a 7 day supply

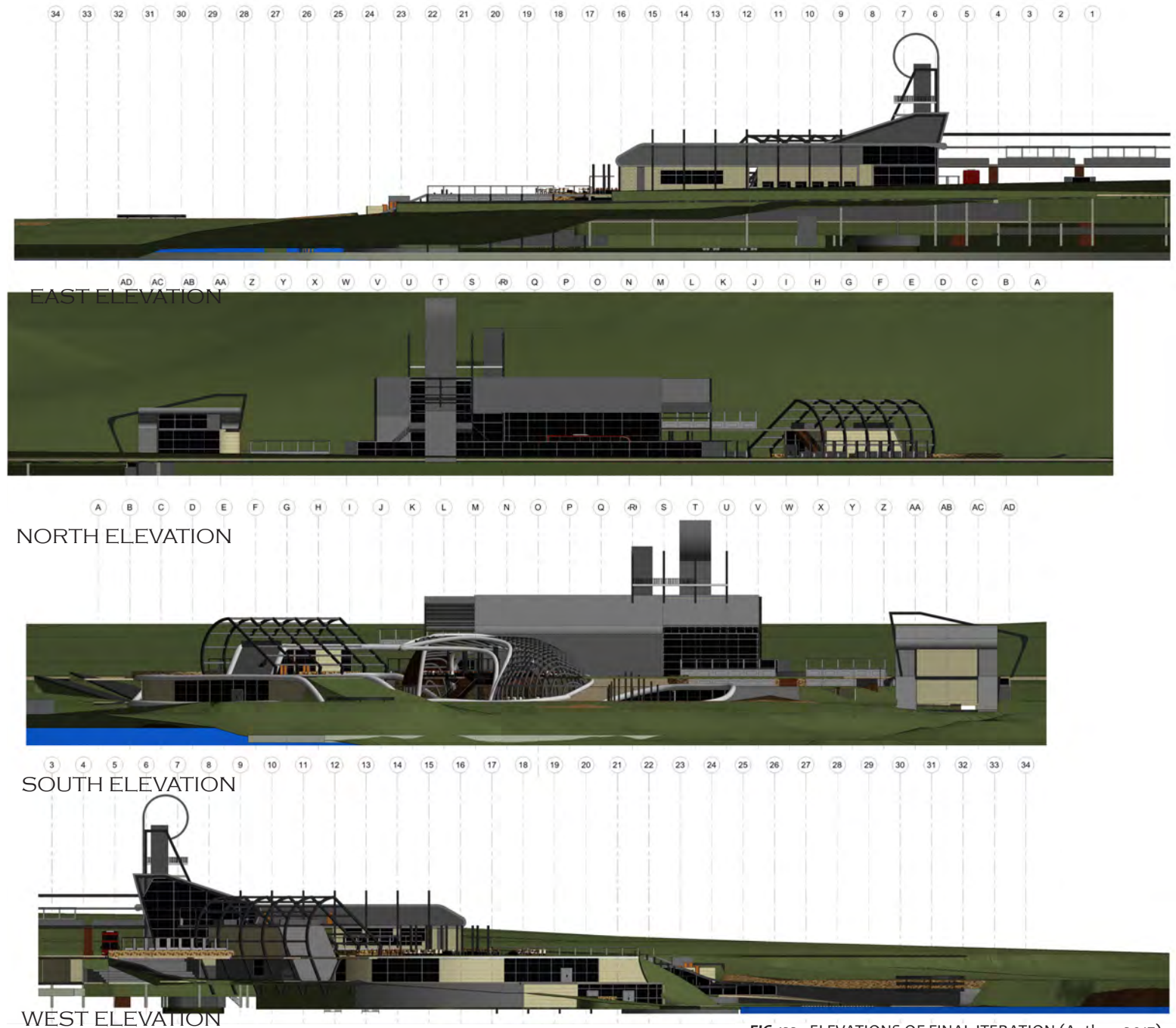


FIG 122 : ELEVATIONS OF FINAL ITERATION (Author, 2017)



maximum, the scaling has been done according to this estimate,.

The aesthetic of this facility is located on the other end of the conceptual spectrum. It being an organic form set into the landscape almost appearing as a “non-building.” This sweeping mass peaks out onto the ecological courtyard and is walkable on all spaces above the facility even hosting a green roof. This represents the ecological vision of the future precinct something very understated, sensitive and contributory. Even though it is constructed using steel and reinforced concrete it hosts greenery and is finished with natural stone to complete the natural appearance, echoing a healed iteration of a to-be-removed toxic landscape that once stood in its place

The Final landscape of this precinct is the Exhibition landscape which has the main intent to exhibit the regeneration or change in motion within a celebratory space. This space is the central nodal point and the conceptual culmination of this journey. This space is supplemented by a restaurant and the intent is to rather have a space defining element than a closed building. This space will be open to the public and large amounts of foot traffic displayed the treated AMD water through glass walkways, pools, fountains and cooling misters. It will display items from the productive landscapes such as food and art that can be purchased on site. This exhibition space is multi-functional and can host community events and private exhibitions as well as day and night time markets, feeding off of the public square it has the potential to become a very activated and bustling space.

The design is spatially resolved however the formal and aesthetic quality needs more resolution which will be done for final presentation.

FIG 122 : RENDER OF FINAL ITERATION (Author, 2017)

