



An ethnobotany institute in mid-town Bloemfontein

:Altering perceptions of the implicit through imagination
and architecture

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Masters Design Dissertation | M. Arch (Prof.)

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This dissertation is submitted in partial fulfillment of the requirements for the
degree M. Arch (Prof.)

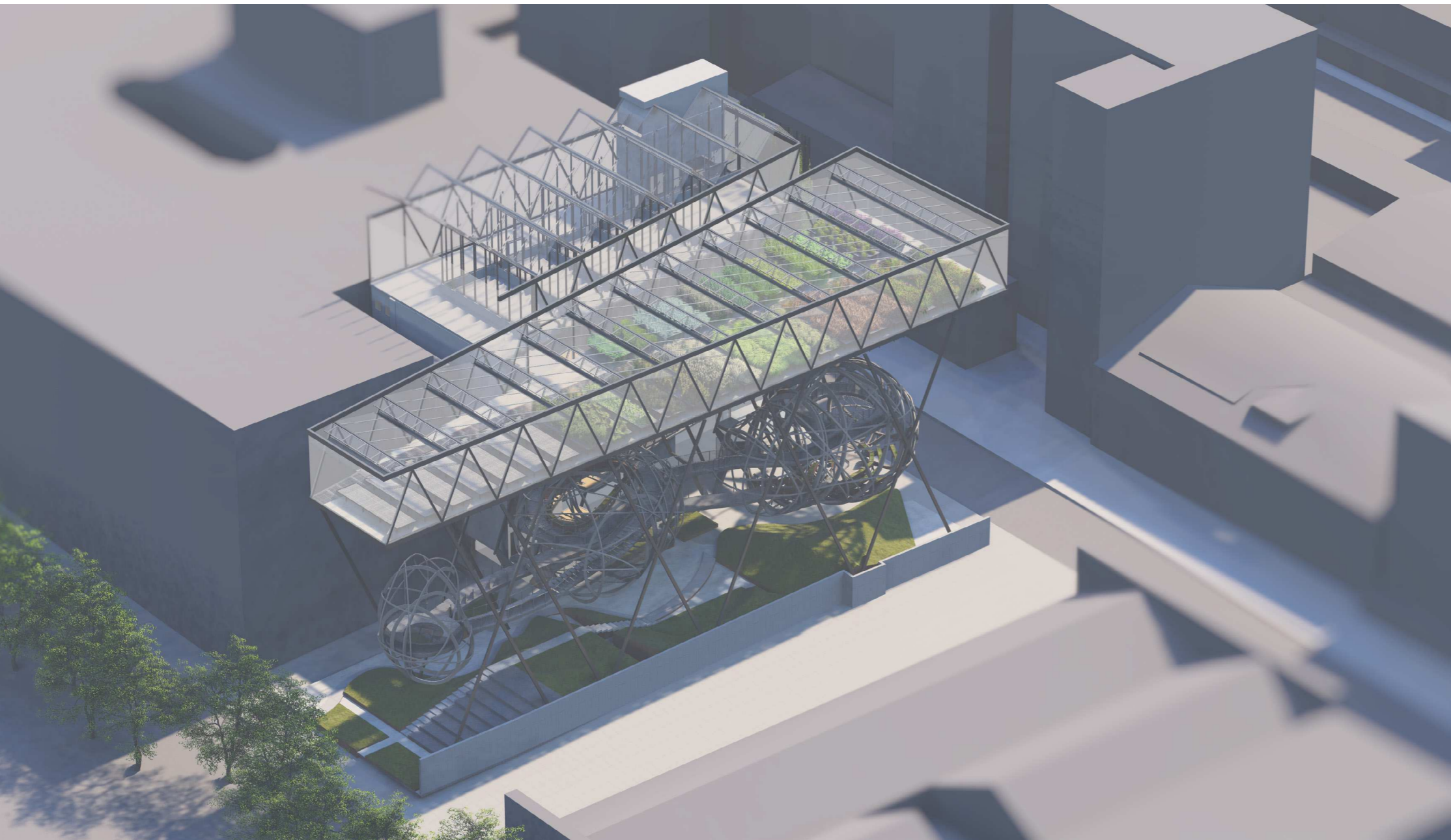
Declaration of original authorship

The work contained in this dissertation has not been previously submitted to meet the
requirements for a qualification at this or any other institution of higher education. To
the best of my knowledge, this dissertation contains no material previously published
or written by another any other person except where due reference is made.

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Acknowledgements:

the sensational people of our cubicle,
the lecturers who have invested in me over the last 5 years,
my ever supportive family



0.0 What and Why?

African Ginger, like many medicinal plants, is extinct in the wild. More valuable plants will become extinct if they are not protected through cultivation. However, cultivation is not traditionally how a herbalist would gather their specimens.

Herbalist's resources come from ritualized places of gathering known only to themselves. This journey takes them beyond the realms of what is 'known' by the tribe and into areas only they know. They see these places through a different lens to the rest of society, and has an in-depth knowledge of plants and what each can do. The knowledge of these plants is implicitly rooted in the stories and myth of the specific area. In contemporary society, knowledge is explicit and must be available to all to be embraced. This dictates that the herbalist's lenses must be shared to transform how society sees ethnobotany.

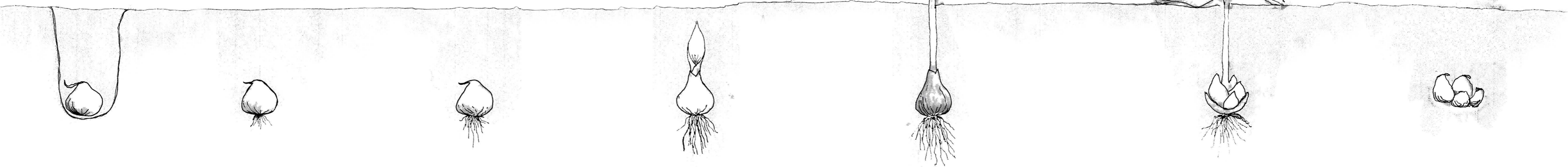
As cities such as Bloemfontein grow, and farms occupy increasing amounts of this landscape, the medicine man has fewer and fewer places to gather his specimens. The realm of the 'unknown' wild is, therefore, further and further diminished. The congestion of the city is the 'new wild' and is brought into being by man.

60% of South Africans use herbalists as their healthcare provider, and there is 40 times the number of herbalists than trained medical doctors in South Africa. This leads to questioning why the government has not provided similar infrastructure for this kind of healthcare. The University of the Free State (UFS) is rectifying this problem by funding the division of Phytomedicine and Phytopharmacology within the Post Graduate School. This is a university research building which incorporates greenhouses and gardens in the Mid-Town of Bloemfontein.



Figure 1.1 - African Ginger (*Siphonochilus aethiopicus*)

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1 Situating the Investigation

1.1 The Client (Who?)

The UFS Division of Phytomedicine and Phytopharmacology

The group investigates the biological effects of regional medicinal plants used in the folkloric medicine of the Eastern Free State. This means that the focus is on that of Sotho medicine. The research is a direct response to the lack of education and scientific knowledge about ethnobotany in South Africa. The group proposes conservation strategies to preserve medicinal plants. Where plants on the South African National Biodiversity Institute's (SANBI) red list are investigated, through micro-propagation and field trials (University of the Free State, 2019). The group works in collaboration with other university departments across Africa (Figure 1.4).

The research at the UFS focuses on the physical properties of medicinal plants. However, this is only part of ethnobotany, while the focus is on the physical, the other aspects are inseparable (Figure 1.2).

Herbalists of the Free State can attend accredited training by the university, thus giving more public credit to their work. Due to the secretive and local nature of herbalists, no single person knows all the remedies available, and they may not pass all their knowledge on to their apprentice. As harvesting space is taken over by farmland and city, the knowledge about that area is quickly lost. Thus herbalist's experience must be recorded and preserved to keep ethnobotany relevant.

Members of the public have a misguided perception of ethnobotany, which has led to western medicine being given priority in the minds of urban citizens. Learning about ethnobotany and what these medicinal plants can do will change this perception.

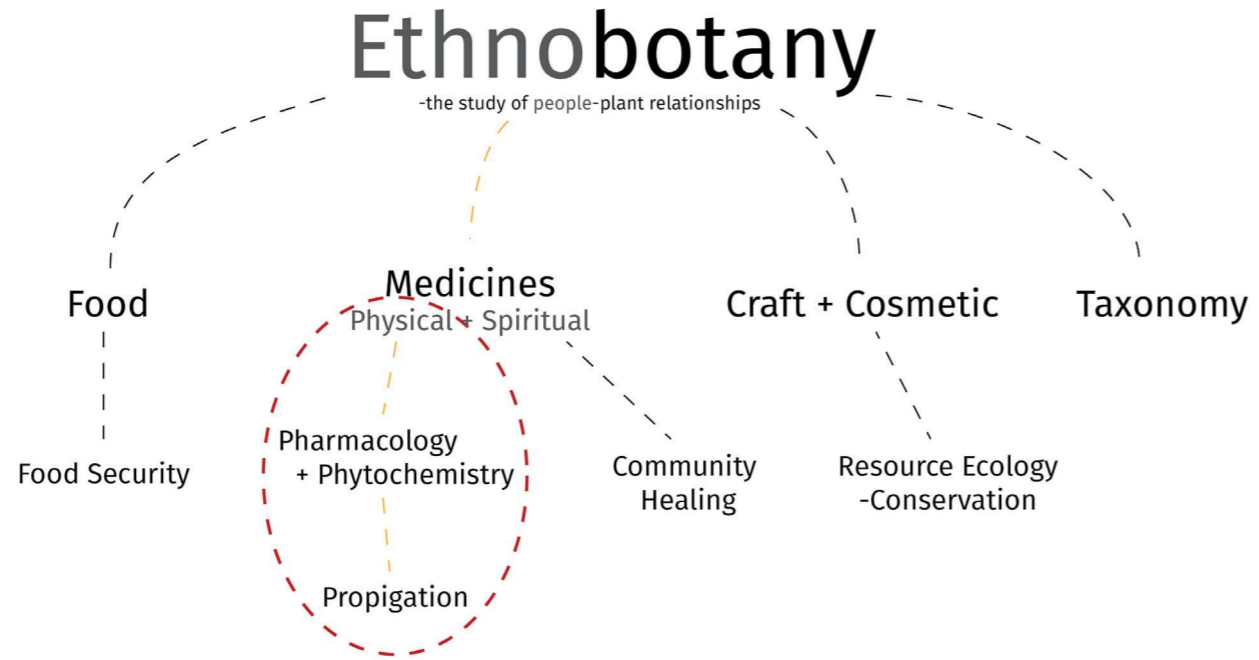


Figure 1.2 - Focus area

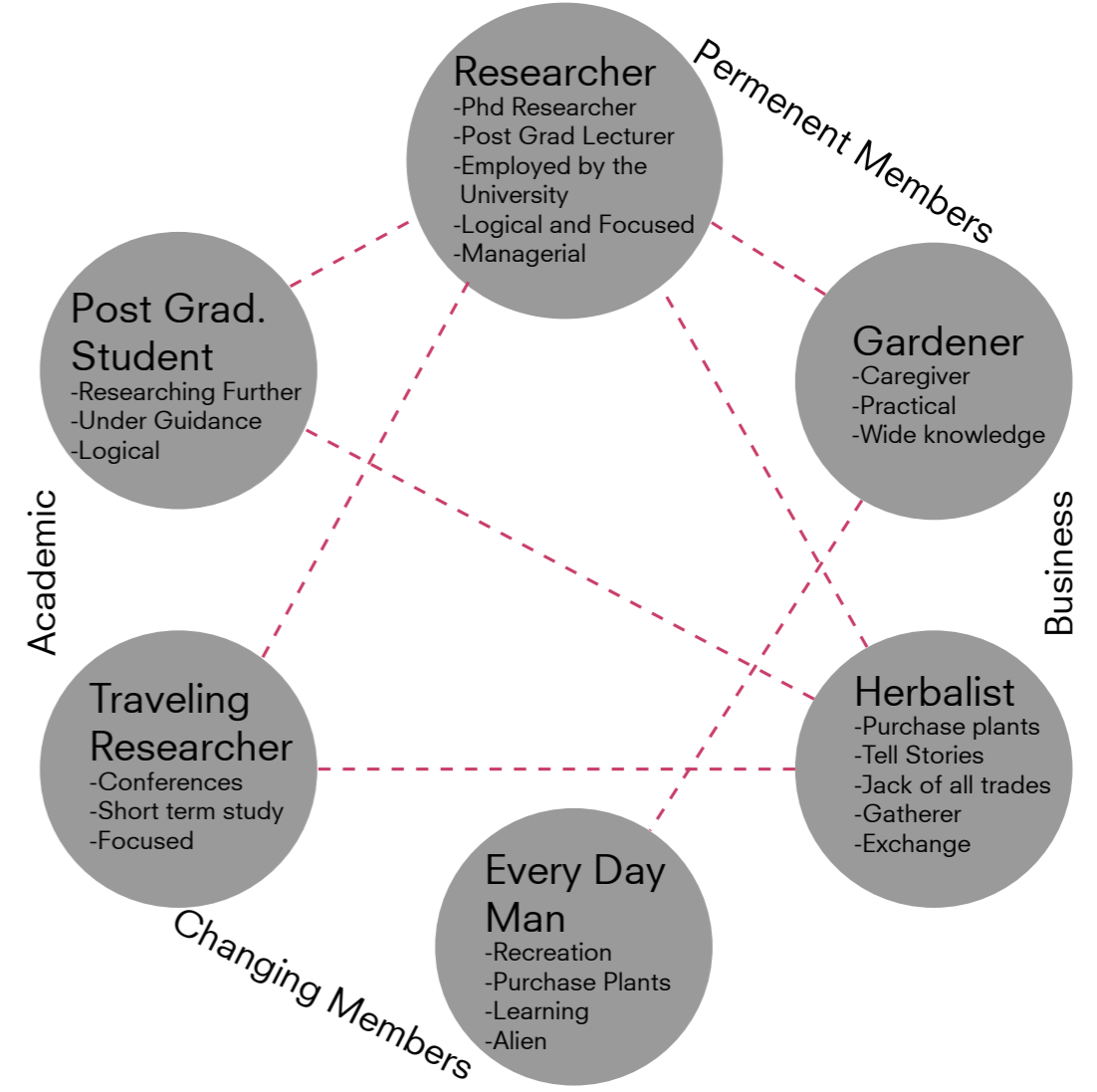


Figure 1.3 - Occupants

1.2 The clients needs (What?)

The building is an expansion of the current university department functions of Ph.D., Masters, and Honors research (Figure 1.3). It provides researchers with access to improved research capabilities and educational scope.

Academics
Both climate controlled and regular greenhouses provide adequate growing space for both the propagation trials and plant study. Included are conferencing facilities for symposiums with the partner universities. The library holds both plant specimens as well as a full catalogue of relevant study material.

Herbalists
Workshop/seminar facilities provide herbalists the opportunity take part in short courses engaging with the UFS's mandate to engage with the city.

Public
The city of Bloemfontein's residents require leisure space. Most days every bench along the length of the spruit is occupied by residents enjoying their evenings. Redesigned for the 2010 world cup this artery through the city was revitalized with trees and wide sidewalks. This space has no barriers to entry and serves the entire population of the city. While this space has been enhanced, many of the squares across the city have been lost over time to development (Figure 1.5). This loss of public space within the city leads to poor living conditions within the CBD. Poor living conditions encourage expansion to where the living conditions are 'better'. Encroaching on the surrounding landscape, exacerbating the problems already faced by herbalists.



Figure 1.4 - Partner Universities

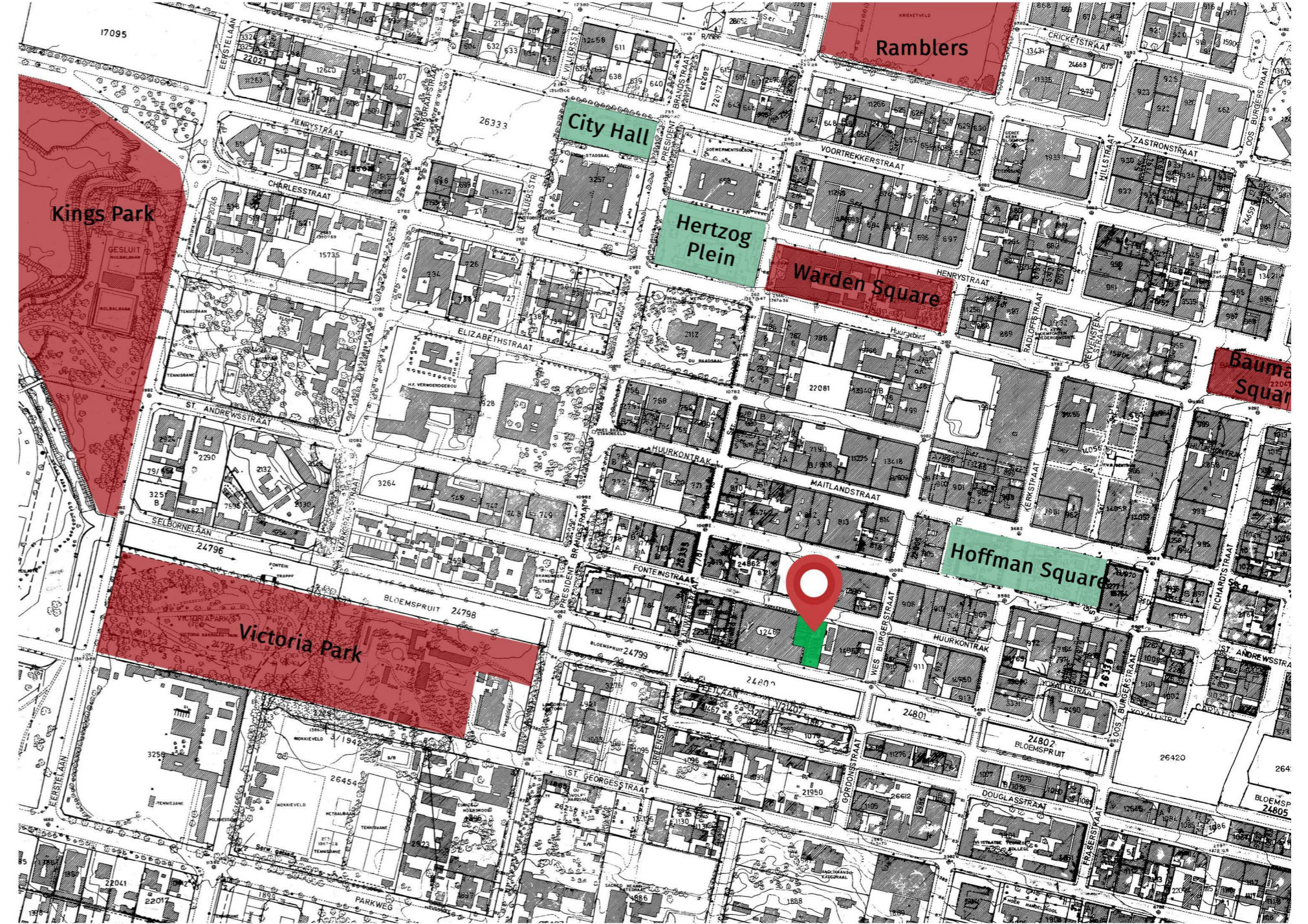


Figure 1.5 - Lost public space

1.3 Identified Site (Where?)

Process Used:

The site (25-27 Fountain Street) is selected by using a process of elimination. Areas are selected and eliminated based on the needs of the occupants on a macro, mezzo and micro scale (Figure 1.6-1.13). The most important needs are considered earlier in the process.

1.3.1 Bloemfontein:

The group focuses on plants endemic to the Free State, and Bloemfontein is a central location which currently houses the main campus of the University of the Free State. Transport is often a limiting factor for the herbalists and researchers involved. The public transport and road infrastructure are good in Bloemfontein. Ethnobotany often has the stigma of being a rural practice, where Bloemfontein has the Free State's largest population, and so has the most significant possibilities to reverse this stigma.

Further, it has a history and culture of cultivation within the town, through its many parks and squares (Figure 1.5). This means of thinking about gardens and cultivation can be challenged through the way this department operates.

1.3.2 Mid-Town:

Currently the UFS is seen as an 'island', completely fenced off and away from the city center (Figure 1.6). The UFS has a mandate to 'open' its gates and make education available to the city (Appendix A). Bringing a department into the city is a physical manifestation of that goal and will allow more citizens to engage with the university programs.

As is the case with most cities, Bloemfontein's many hospitals have commandeered the city's spaces for years (Figure 1.7) whereas the herbalists work on street corners and back yards. This offers the opportunity to see healthcare in the town differently.

Figure 1.8 demonstrates four main criteria identify opportunities for a potential

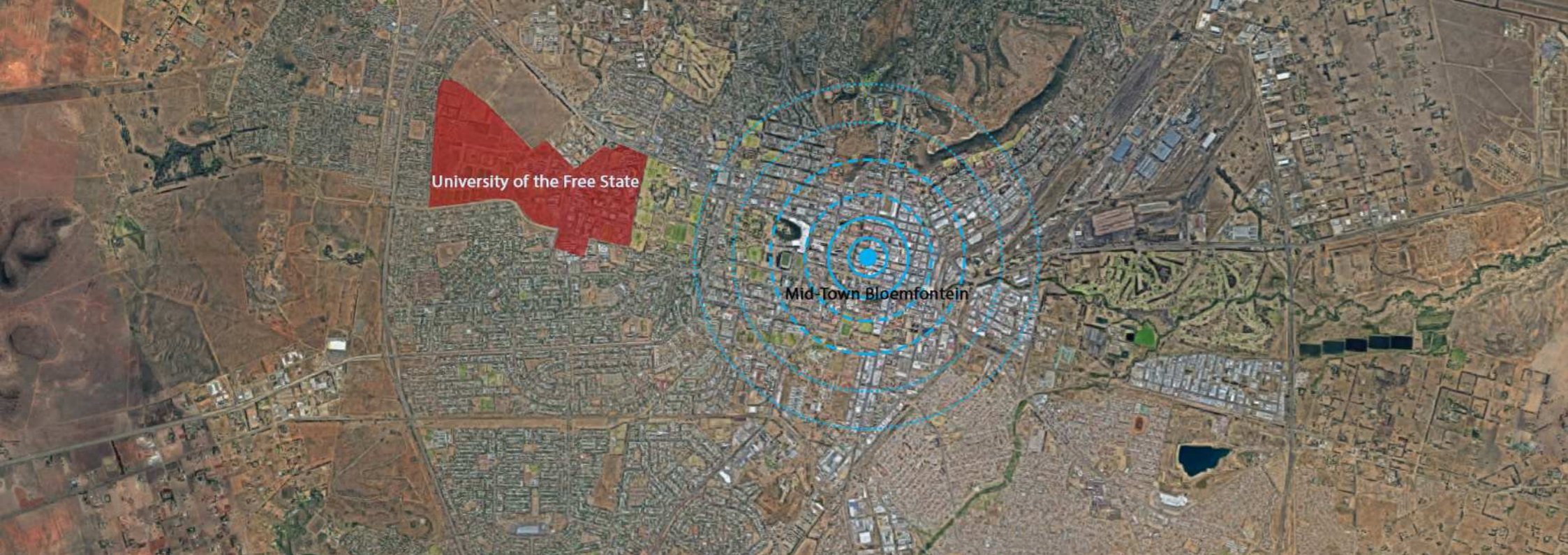


Figure 1.6 - Separation of university and city

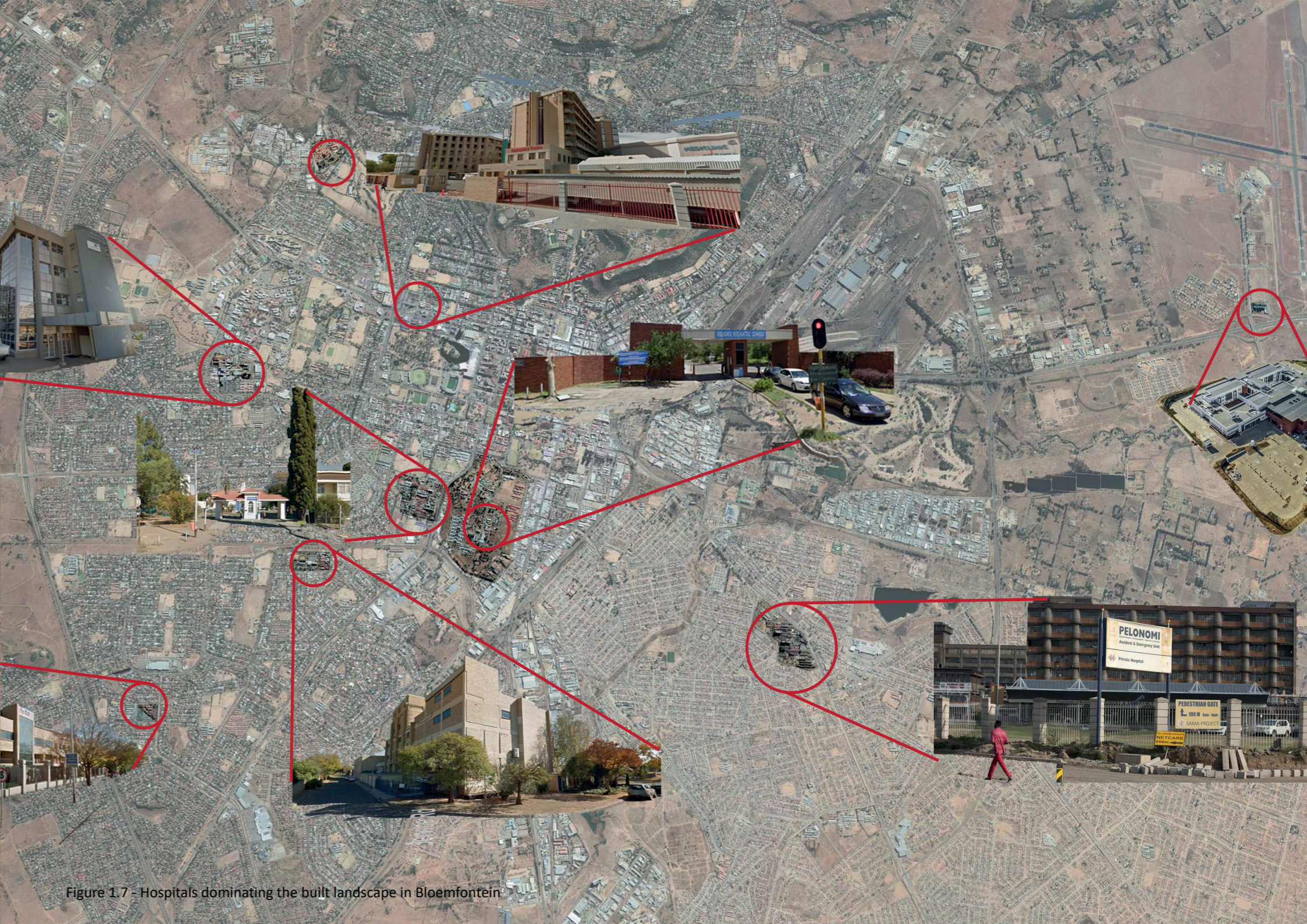


Figure 1.7 - Hospitals dominating the built landscape in Bloemfontein

location within the mid-town:

1. Should be within 5 minutes' walk of the herbalist market.
2. Should not be noisy or disturbing for researchers.
3. Should not be fully utilized.
4. The surrounding city should not shade its northern façade.

5 Minutes' Walk

Currently, the herbalists sell their goods in Fichardt's Street, outside the bus terminal known as 'Central Park.' The yellow dashed lines indicate a 5-minute walk from Central Park.

Noise Level

Researchers need relative quiet to focus on their projects. Noise pollution across the midtown is shown in red.

Occupancy

The project should add to the city in terms of social networks and environmental equality. It must, within reason, avoid disturbing existing systems of people. The current use of buildings was evaluated and documented.

Sun Light

Growing plants effectively requires that each plant gets at least 6 hours of sunlight each day. The surrounding city structures should not prohibit sunlight from reaching the site.

From this list of possible sites in figure, with each is discussed individually and the benefits of each considered (Figure 8).

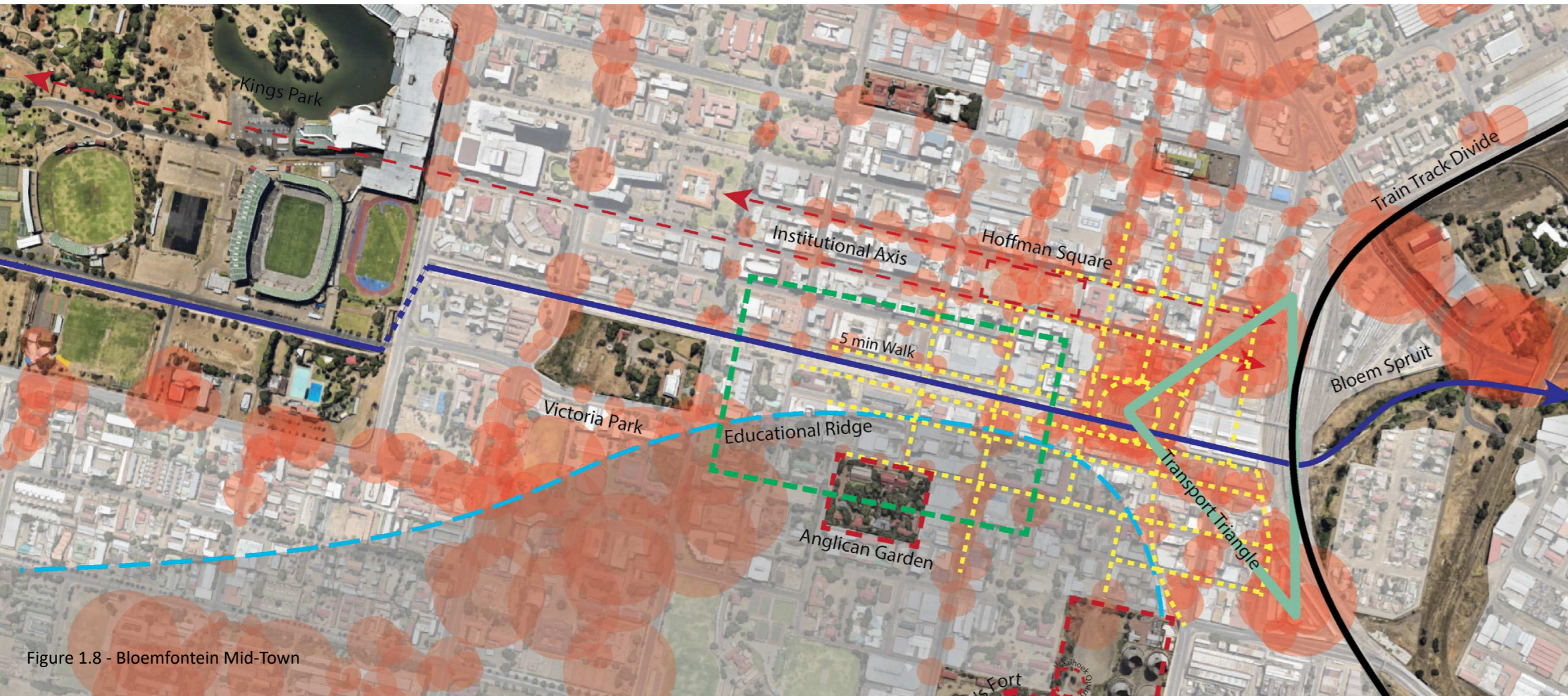


Figure 1.8 - Bloemfontein Mid-Town

Potential Sites:



Figure 1.9 - Focus area site analysis

Existing Higher Education/Research Site Potential Site

1.3.4 Fountain Street (25-27):

This selected site consists of three erven and two structures. The western building covers two erven (Erf 2271 and 2272). It consists of a co-working office space/coffee shop known as Green Express Café (Figure 1.13). This establishment occupies the front half of ground its floor. The building's upper level is abandoned, filled with rubble and poorly kept. The second erf (11335) stretches between Fountain Street and Selbourne Avenue (Figure 1.12). It consists of two stories of basic student accommodation. The development is characterized by a rambling set of additions such as carports and extra rooms.

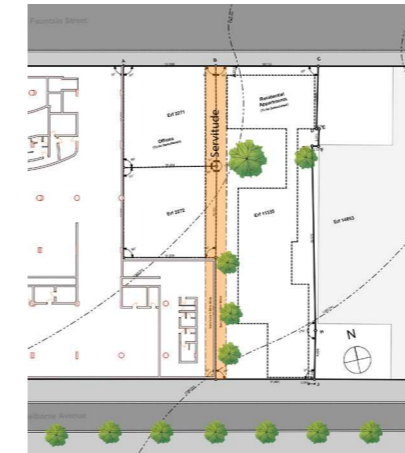


Figure 1.10 - Servitude

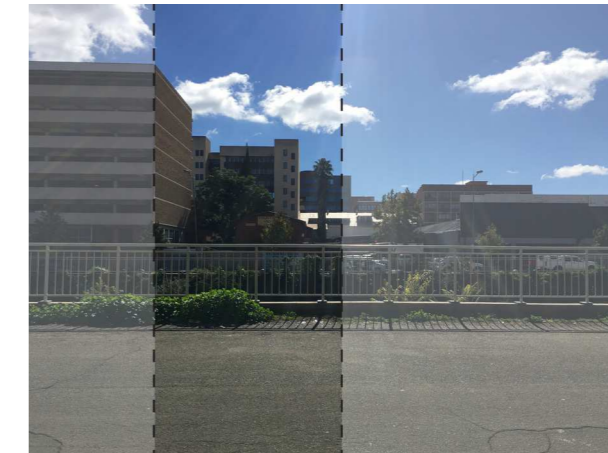


Figure 1.11 - Descrete southern street front

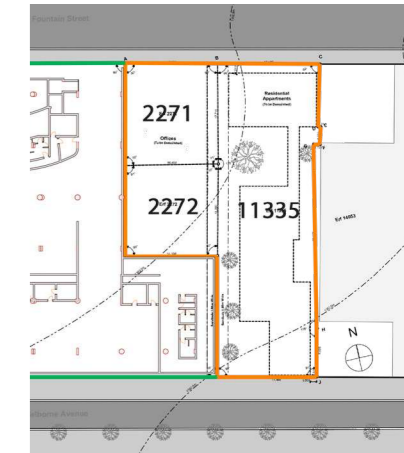


Figure 1.12 - Boundaries in orange

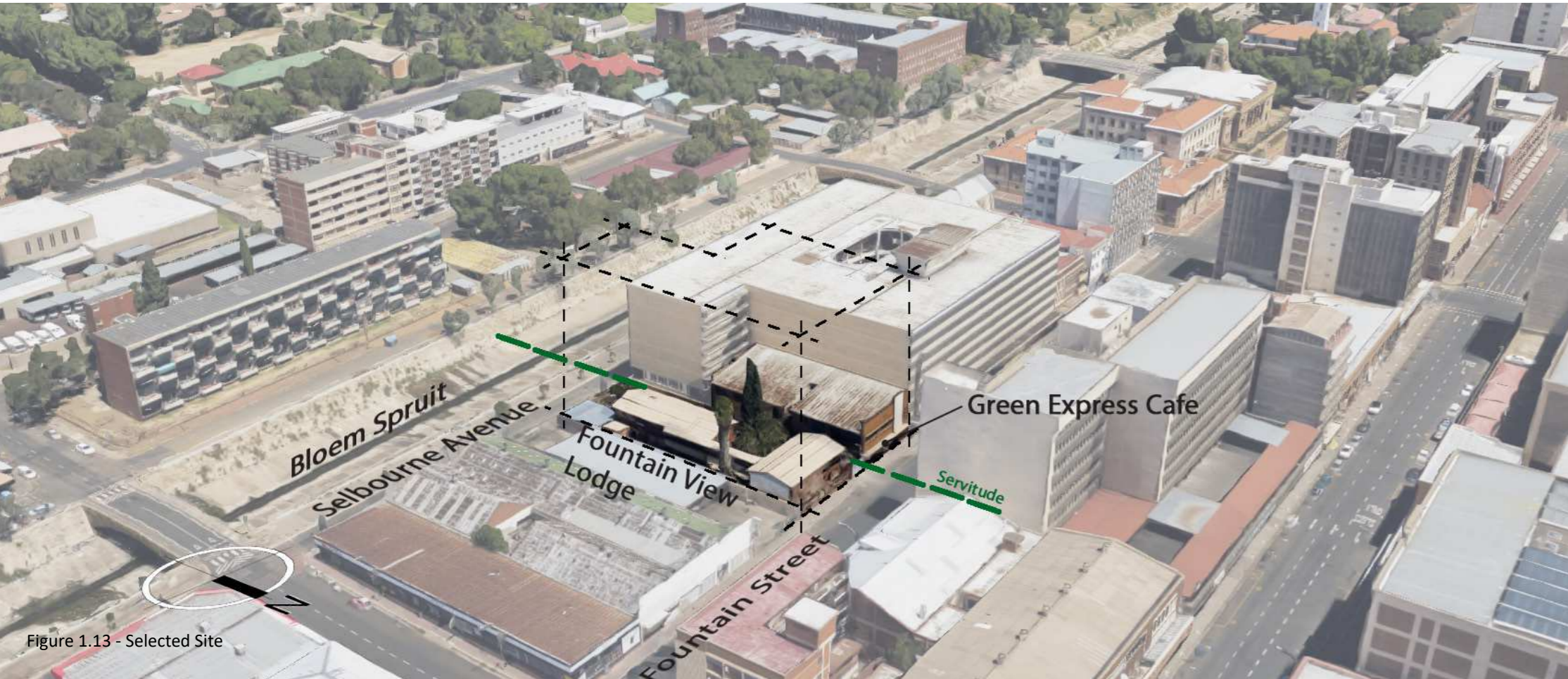


Figure 1.13 - Selected Site



Figure 1.14 - View from fountain street

1.4 Conceptual Approach?

1.4.1 Touch Stone

Rarely do we as people see plants solely for their physical form, we attach memories, landscapes, uses, myths, and our preconceptions or understandings to them. The touchstone represents this by having the plant placed on a sterile plate lit from below to show the fact that it is removed from its context and is under scrutiny. The glass plates then explain our layers of projection, in the case of the soetdoring it represents the presence of water and excellent grazing opportunities for farmers. To entomologists, it is not only a part of a micro-ecosystem but also can be used to pin specimens. To a herbalist, the bark, sap, and thorns are used to treat patients. Each has a set of lenses through which they see the same plant. The project aims to be the frame to experience multiple lenses at the same time. Ideas and people are congested, allowing for a greater understanding of the plant.

The magnifying pane shows how when the observer looks through the device at the plant; they look with a focus on a specific lens. The project's focus is on how the architecture can change how the plant is seen by introducing new information and changing the focus.



Figure 1.15 - Touchstone

1.4.2 Implicit-Explicit

Individual memory is achieved through two means of explanation, the implicit and the explicit. Implicit /ɪmˈplɪt/ - suggested but not communicated directly (Cambridge English Dictionary, 2019a) Explicit /ɪkˈsplɪt/ - clear and exact (Cambridge English Dictionary, 2019b)

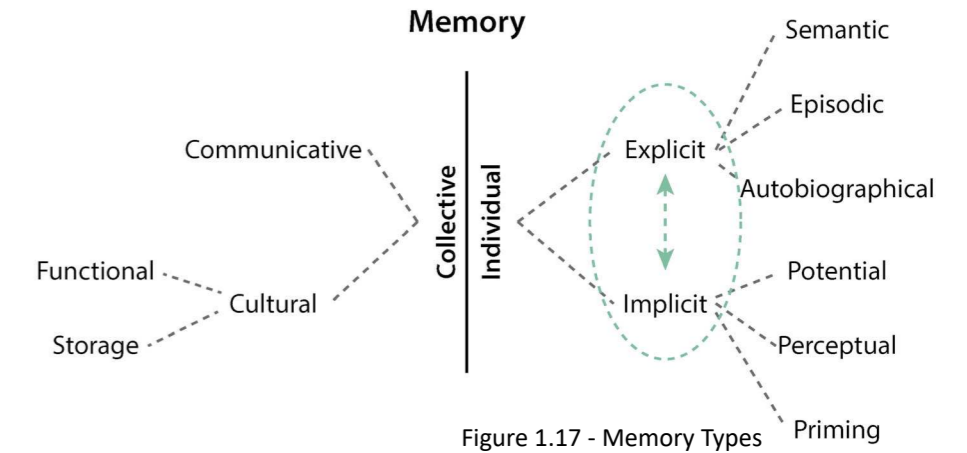
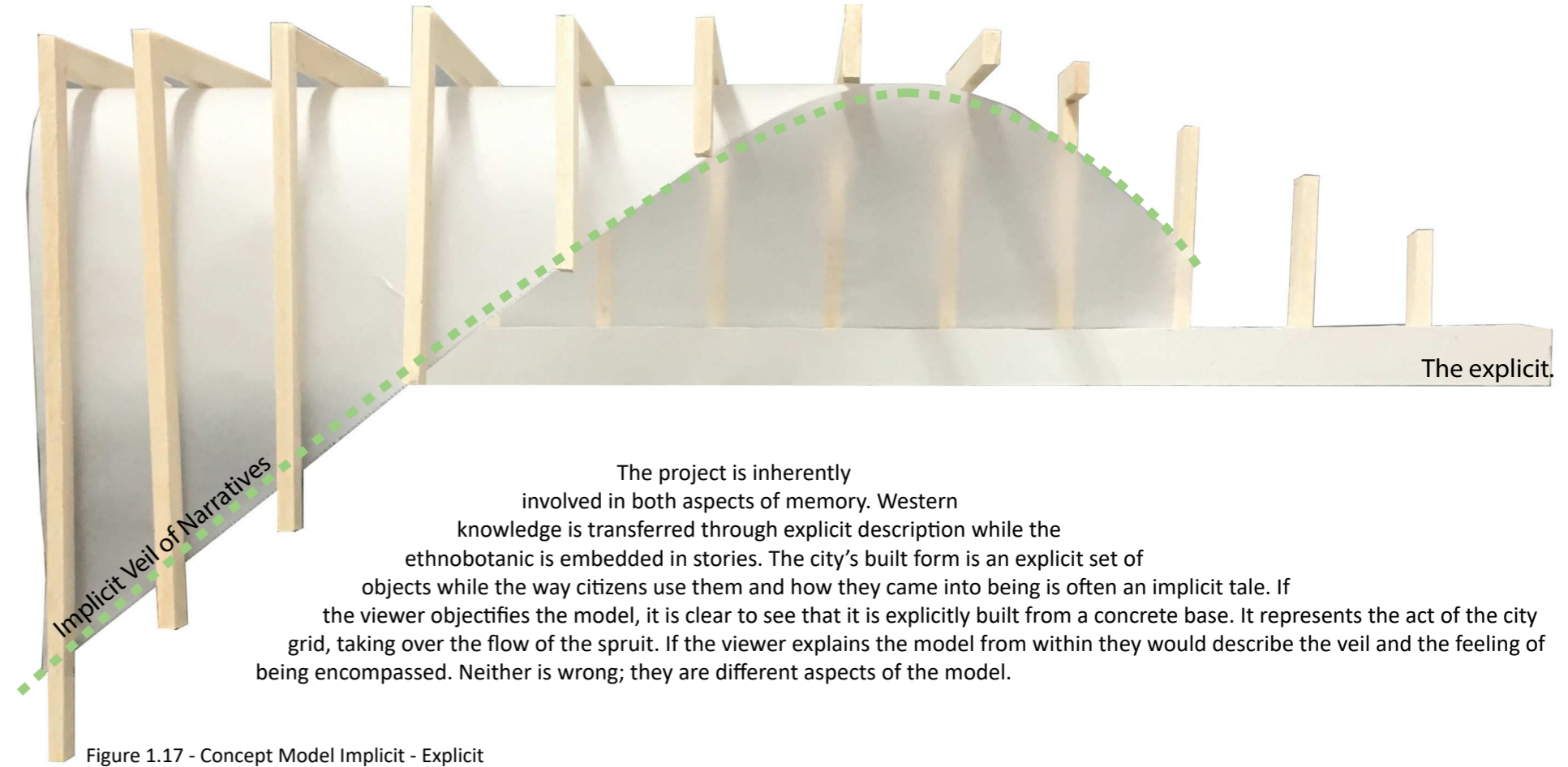


Figure 1.17 - Memory Types



The project is inherently involved in both aspects of memory. Western knowledge is transferred through explicit description while the ethnobotanic is embedded in stories. The city's built form is an explicit set of objects while the way citizens use them and how they came into being is often an implicit tale. If the viewer objectifies the model, it is clear to see that it is explicitly built from a concrete base. It represents the act of the city grid, taking over the flow of the spruit. If the viewer explains the model from within they would describe the veil and the feeling of being encompassed. Neither is wrong; they are different aspects of the model.

Figure 1.17 - Concept Model Implicit - Explicit

1.4.3 Performance

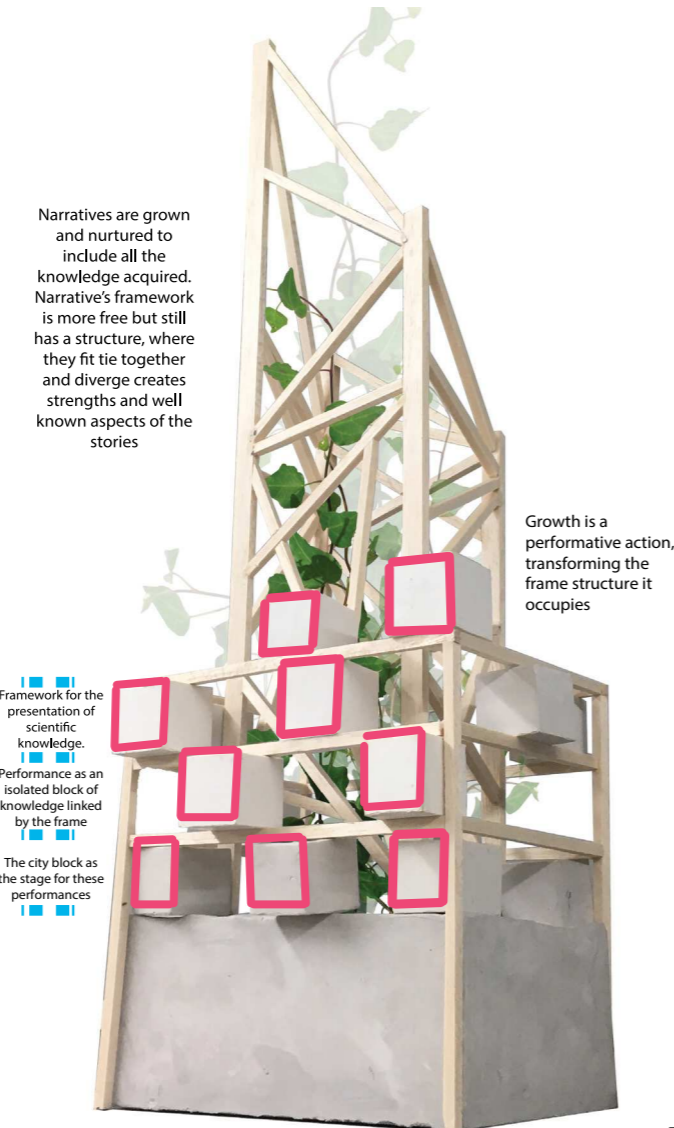
Knowledge must be performed for it to transfer from one person to another. The Sotho people share expertise through the structure of stories and an implicit understanding of the world around them. The

experience of what remedies are appropriate for what ailment the myths imply. The growth of each story is interlinked with a multitude of other stories to describe our situation within the world. Where

these stories tie together represents the well-known aspects of the stories and where they are inherently secure. Each individual's understanding grows like a plant through the structure of these stories.

Western medicine on the other hand has, since the days of Descartes, tended to focus on explicitly explaining ailments and what removes these symptoms. Its structure works like that of a uniform grid, once a subject is understood and expressly described, its research paper is a concrete fact, and it put in place.

The large block represents the concrete reality of the city and its layout. On top of which architecture



Narratives are grown and nurtured to include all the knowledge acquired. Narrative's framework is more free but still has a structure, where they fit tie together and diverge creates strengths and well known aspects of the stories

Growth is a performative action, transforming the frame structure it occupies

Framework for the presentation of scientific knowledge.
Performance as an isolated block of knowledge linked by the frame
The city block as the stage for these performances

Figure 1.18 - Concept Model: Performance

performs for the city. This performance has tended to be one of the rigid grids multiplied vertically, as depicted by the western approach. This has not allowed for life within many of the city blocks of Bloemfontein. The model (Figure 16) shows life coming from the concrete reality of the city, aided by the structures (architecture) built on the block.

The quest for specificity has driven a divide between the two means of explanation — many who have

had a western influence tend to see the implicit as nothing more than stories. Thus, seeing ethnobotany and the herbalists who engage with it as nothing more than storytellers. Further, it enforces the viewpoint that the city is not a place of storytelling and imagination. The architecture represents an interaction between the two forms of memory from the same block. It heightens their differences and possibilities for interaction by placing them in such close proximity.

1.4.4 Congestion

As the Bloemfontein and its supporting infrastructure expands, there are fewer 'unknown spaces' beyond the city. The city itself is explicit in the way it stands within the landscape. However, the networks operate on individual tales, and how they interact, where the tales come together, become nodes of intensity. The city is the 'new wild,' which man and our urbanity bring it into being.

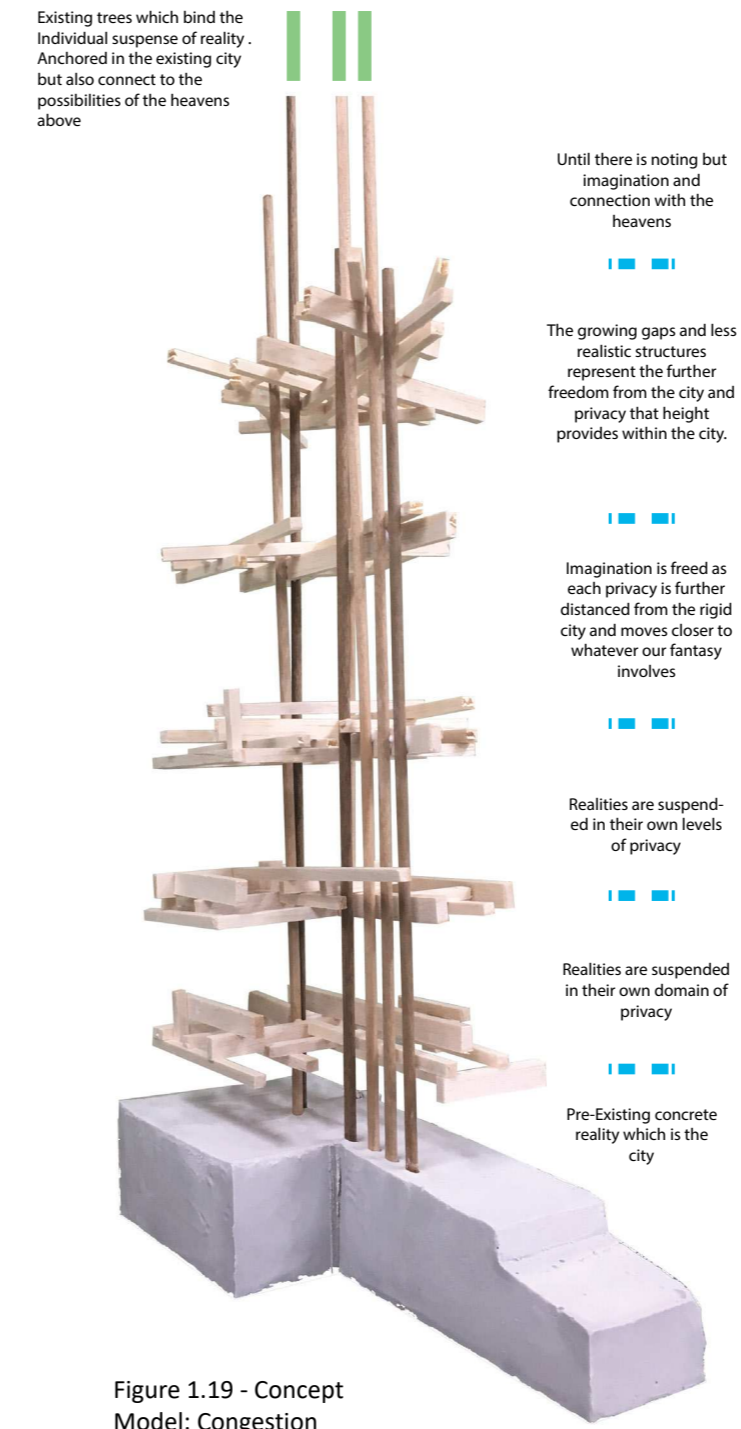
For well-functioning urbanity, three fundamental needs should be addressed (Figure 1.20). These needs are Density, Access, and Mix (Dovey, 2016:17). The city works through bringing different kinds of activity people and buildings into convenient proximity (Dovey, 2016: 25) to create nodes of intensity. This is where the 'chance like' nature of city life is strongest. They are the structural core of urbanity but not enough to create urban intensity alone.

Everyday life within the city is infused with appropriations. The city's space is territorialized by its citizens. Street vendors set up shop each morning while couples spend their leisure time occupying benches along the spruit.

Design can prevent spaces from being used in certain ways but cannot determine whether they will be used in a certain manner. In other words, design cannot create the congestion, it can only not hinder its formation.

On a smaller scale, this project works upon this principle. It places ideas and ways of thinking in very close proximity to one another. These are separate worlds, and the idea is not to dilute each other but rather enhance their difference for new ideas to form. New York in the 1970s is an example of this whose ideas will be used within the context of Bloemfontein.

Both cities' ground planes are currently pre-existing concrete realities and so must be carefully analyzed and considered. This plane is practically driven and is governed by the public. From there, each floor is an individual domain which is slowly freed from these practical realities and brought into the realm of imagination. "On each floor, the Culture of Congestion will arrange new and exhilarating human activities in unprecedented combinations" (Koolhaas, 1987: 125). This excitement of possibilities happens within each building through its mix of programming but also between buildings.



Existing trees which bind the individual suspense of reality. Anchored in the existing city but also connect to the possibilities of the heavens above

Until there is nothing but imagination and connection with the heavens

The growing gaps and less realistic structures represent the further freedom from the city and privacy that height provides within the city.

Imagination is freed as each privacy is further distanced from the rigid city and moves closer to whatever our fantasy involves

Realities are suspended in their own levels of privacy

Realities are suspended in their own domain of privacy

Pre-Existing concrete reality which is the city

Figure 1.19 - Concept Model: Congestion

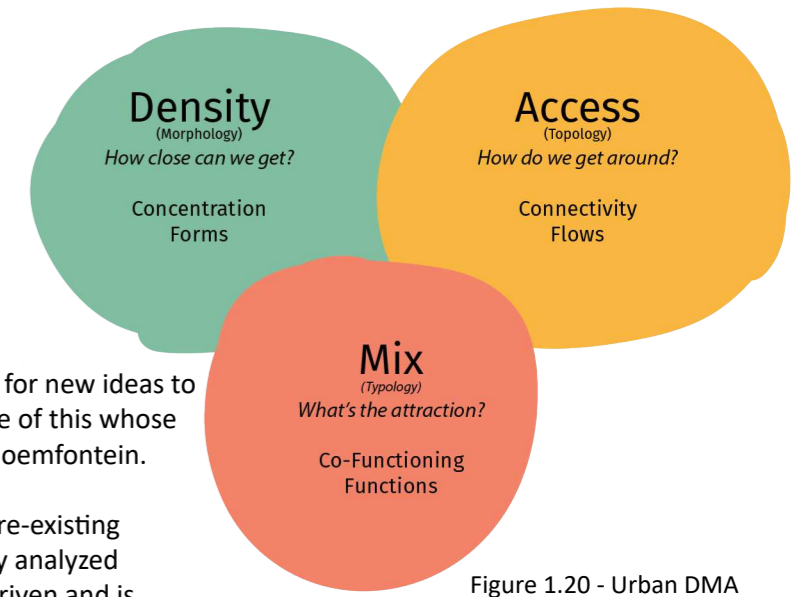


Figure 1.20 - Urban DMA

Unlike Bloemfontein, New York is a city with little to no manifesto yet lots of realization. This culture of realization and retrospective manifestos began with the city's first gesture of setting out the grid as the first idea (Figure 1.21). The overwhelming and robust nature of this first move has lived through the city as its defining essence. Bloemfontein is a city which has been built off a deep nationalist manifesto which shows power and dominance over the landscape it sits within. This is shown through its grid and architectural interventions which attempt to make sense of their surroundings by order (figure 1.22-26). These interventions have largely been built with the manifesto of a single client 'the government'. This means that the city was able to construct many buildings which follow a singular manifesto.

In contrast to this dominance, the city simultaneously takes a position of submission to the landscape. It is strategically protected by the surrounding koppies and is built around the water source. The first gesture in midtown Bloemfontein was a grid pattern as in New York but has not had as much realization over time. However, this grid pattern was informed by natural flow of the spruit (Figure 1.22). Due to the slow nature of realization in the town, there was a strip of wilderness which penetrated its heart. The winding spruit humbled it to the untamed landscape. But the two halves of this town were then stitched together by the bridges of its manifesto over the years (figure 1.23-25).

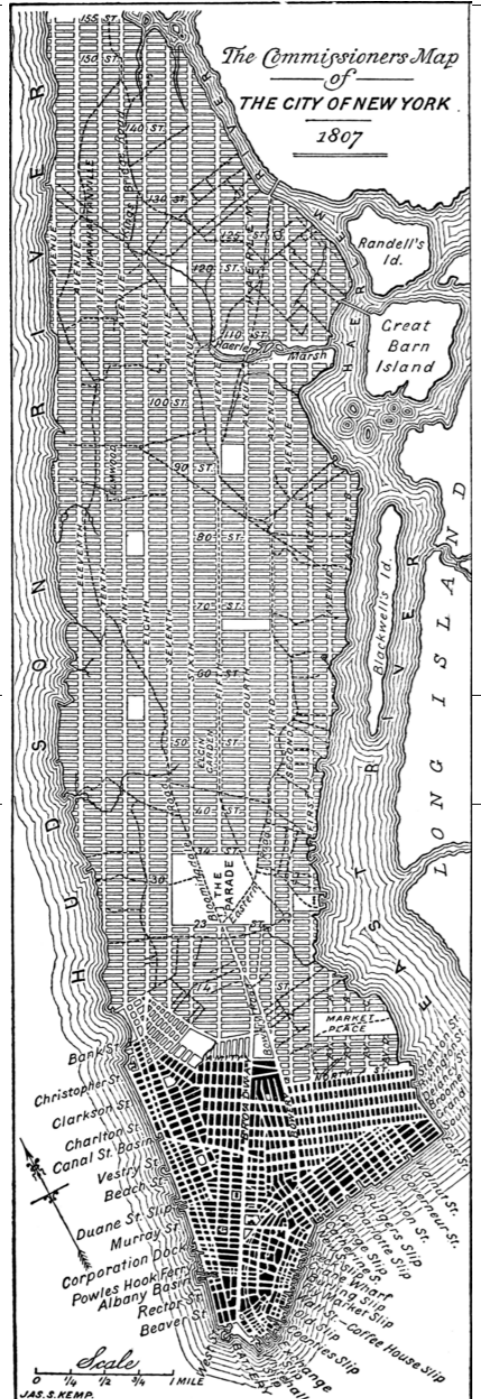


Figure 1.21 - 1807 Comissioners Grid Plan NY (Kemp, 2893: 87)

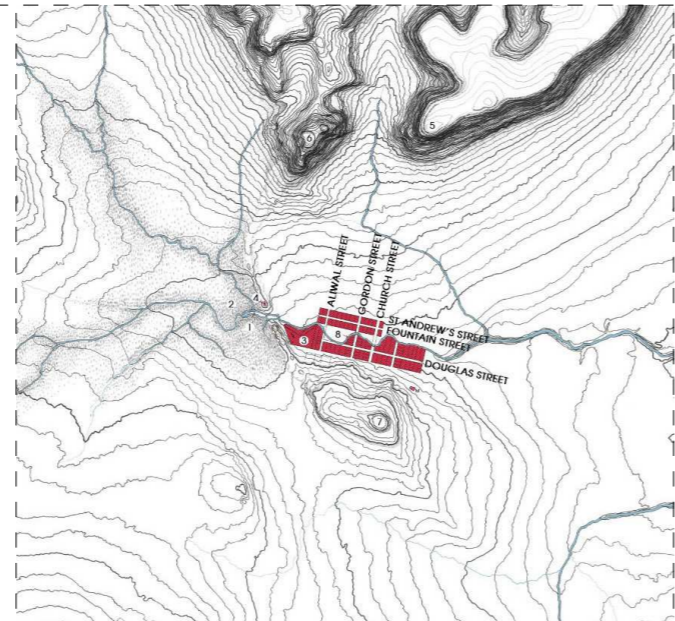


Figure 1.22 - 1848 Initial Layout (Auret, 2016: 197)

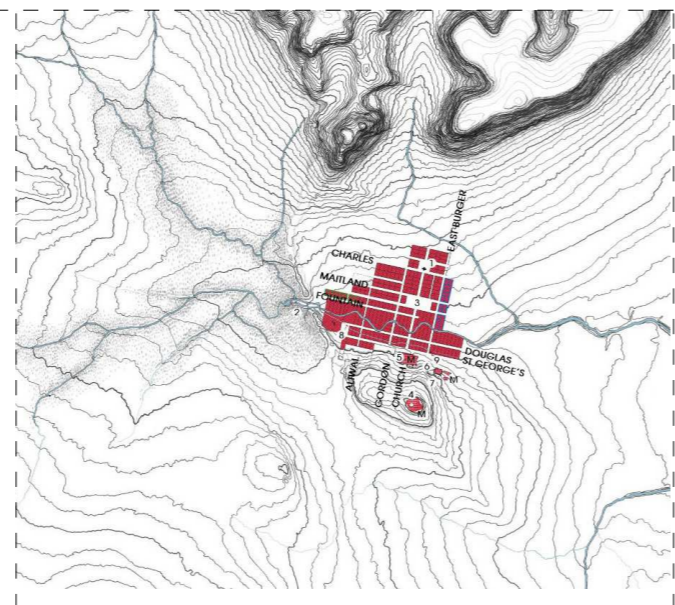


Figure 1.23 - 1867-1869 Expansion of the Grid (Auret, 2016: 199)

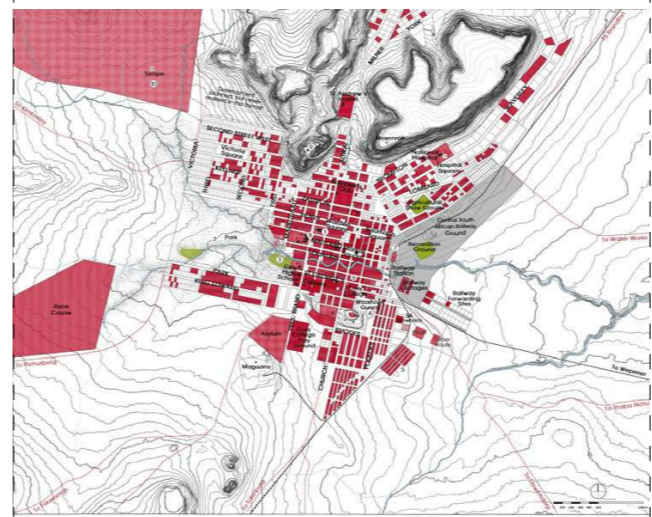


Figure 1.24 - 1904 Grid molds to the topography (Auret, 2016: 202)

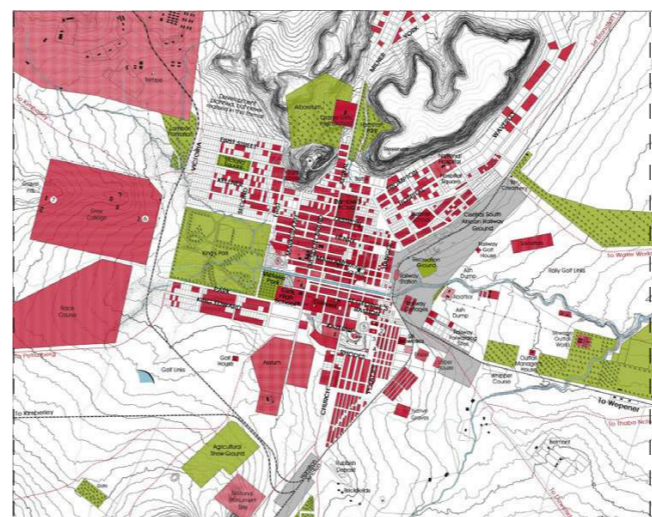


Figure 1.25 - 1912 Canalization of the spruit (Auret, 2016: 204)

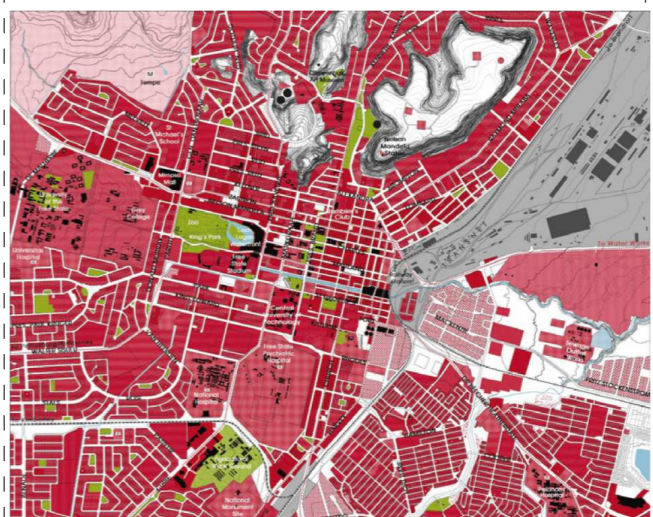


Figure 1.26 - 2015 Bloemfontein's expansion and loss of green space (Auret, 2016: 209)

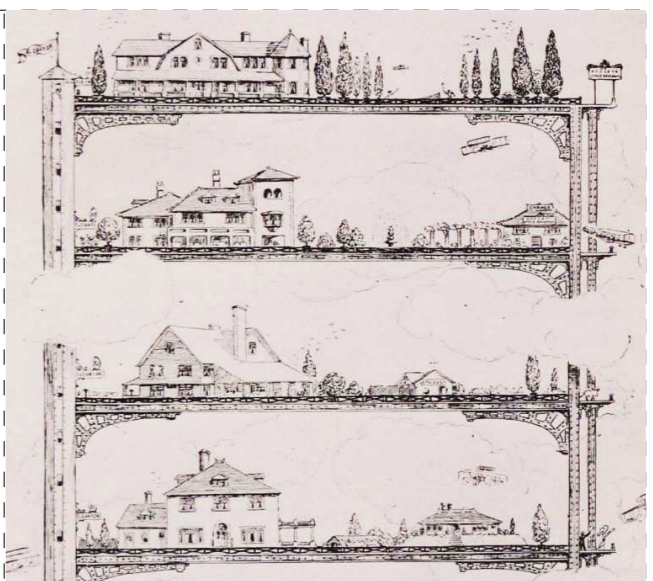


Figure 1.27 - Skyscraper as a utopian device to produce an unlimited number of virgin sites (Koolhaas, 1997: 83)

But what does the grid do?
The grid is inherently an authoritarian and rigorous exercise in planning which leaves little to the imagination. The grid as the first move limits the influence which nature has on the city's buildings. Instead of starting with an irregular site, the architects begin with a stage onto which the design may perform (Figure 2.1-2). The stage is then multiplied vertically by adding floors, each floor added draws the floor further from the realities of the city and toward a world of pure imagination (Figure 1.27). This vertical movement also allows for a closer connection to nature as it is disconnected from the concrete city below.

This lack of imagination and connection to nature in the city planning, leads to each stage containing creativity within itself. Each block becomes a paranoid critical island within the lagoon of the city and has an intense and distorted relationship with reality (Figure 2.1). Due to the scale of congestion in Bloemfontein, each block has not been taken over by single structures but rather an agglomeration of paranoid critical structures together on their islands within the lagoon of the grid (Figure 2.2). However, each block still performs as a stage, and what happens on that stage is determined by the program.

Program

The Downtown Athletics Club's program becomes the buildings ideology (Figure 1.28-31). In every dysfunction, there is the potential for new functionalities.

"In the fantastic juxtaposition of its activities, each of the club's floors is a separate installment of an unpredictable intrigue that extols the complete surrender to the definitive instability of life in the metropolis." (Koolhaas, 1997: 153).

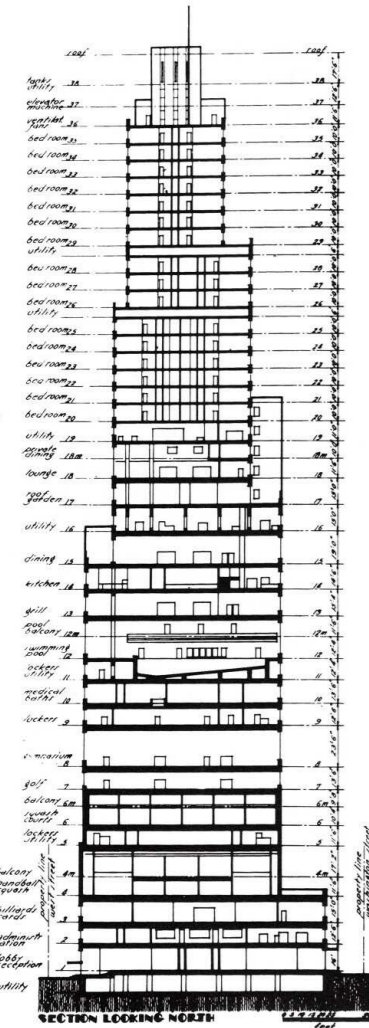


Figure 1.28 - Downtown Athletics Club (DAC) section (Koolhaas, 1997: 154)



Figure 1.29 - DAC boxing and oyster bar (Koolhaas, 1997: 154)

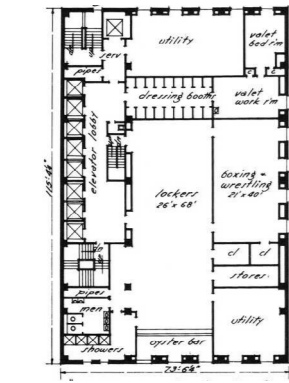


Figure 1.30 - DAC typical floor plan (Koolhaas, 1997: 154)



Figure 1.31 - DAC indoor golf (Koolhaas, 1997: 154)

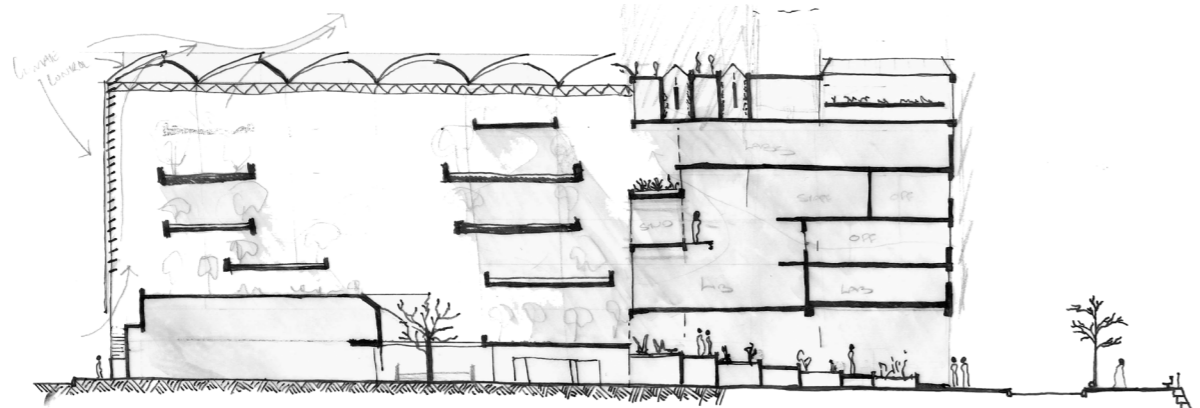


Figure 1.32 - Early design section - congestion and initial lobotomy

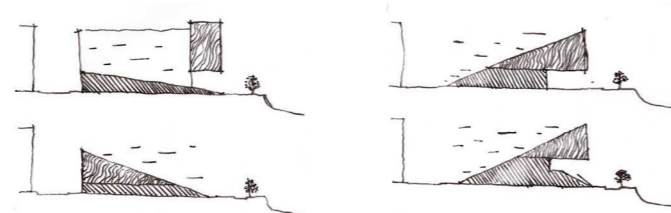


Figure 1.33 - Early functional diagrams



Figure 1.34 - Conceptual function stacking

This way of thinking determines that the program should provide the underlying assumptions about the worlds that the design is creating. The institute's program mixes leisure, research, teaching, and business as to encourage congestion within the city (Figure 1.33-34). As an element of the block, the architecture aims to create a unique and intense experience of ethnobotany for those that encounter it.

The juxtaposition of activities and smooth planning cause congestion, which itself creates demands which are reproduced naturally and artificially through the technology of the fantastic. The building becomes a city within itself, thus transforming into infrastructure for the rooms within it, just as the roads of a town are to their blocks.

The culture of congestion demands that there is the constant change and so an architect cannot design an honest façade to represent the program of the building. Koolhaas sees the façade as the means of protecting the public from the writhing changes within the structure. This great lobotomy allows for a monolithic street experience yet still provides for program flexibility and thus change within the designs — this ethnobotany project questions whether there should be a lobotomy at all. The writhing changes are a direct result of urbanity. How we, as citizens, use Bloemfontein is dynamic and so why should the city's built form remain static.

Coney Island became popular as it provided excitement and escape to the realm of the imaginary, which was not present in the streetscape of New York. Luna Park on Coney Island archives this through the aggressive mix of programming. Dreamland fabricated it through creating a city of towers which were visually stimulating and authentic to the unrelenting change demanded by the culture of congestion. This acceptance of outer change was not present within the city due to the lobotomy of buildings. This is not to say that the great lobotomy had not been built into effect within these buildings, but rather their facades relationship with the outside world were more honest to the interior program (Figure 1.37). Each structure needs to be inventive, critical and demanding of the city it finds itself within.

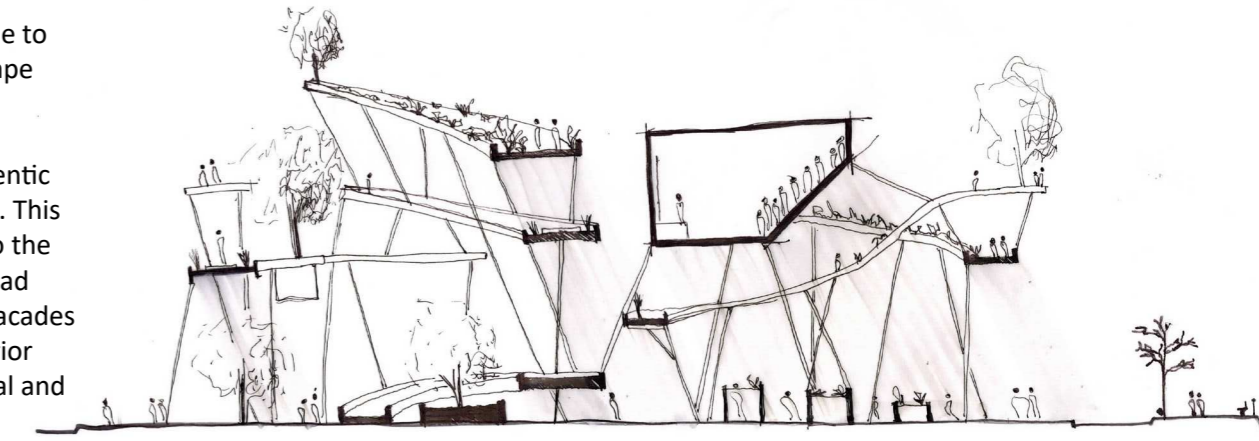


Figure 1.38 - Early design section indicating the buildings relationship to its site



Figure 1.35 - Radio City Hall - Technology of the fantastic (Stage Elevators) (Koolhaas, 1997: 215)

This approach challenges the fundamental relationships within architecture. The site is no longer the home from which a building is born but rather stage on which it performs. The program of this architecture becomes the ideology, and the architecture itself becomes the arrangement of the technical apparatus which compensates for the loss of reality (Figure 1.35-37).

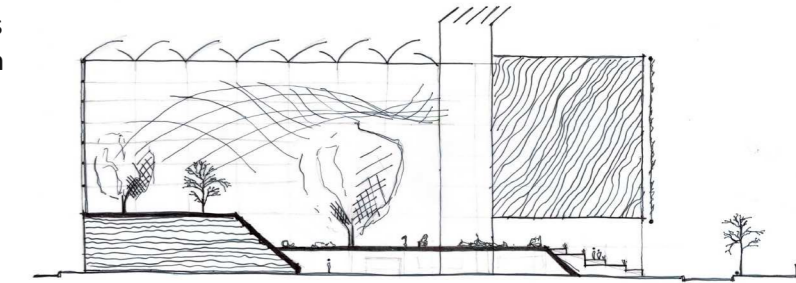


Figure 1.39 - Early design section indicating the technology of the fantastic controlling the interior climate

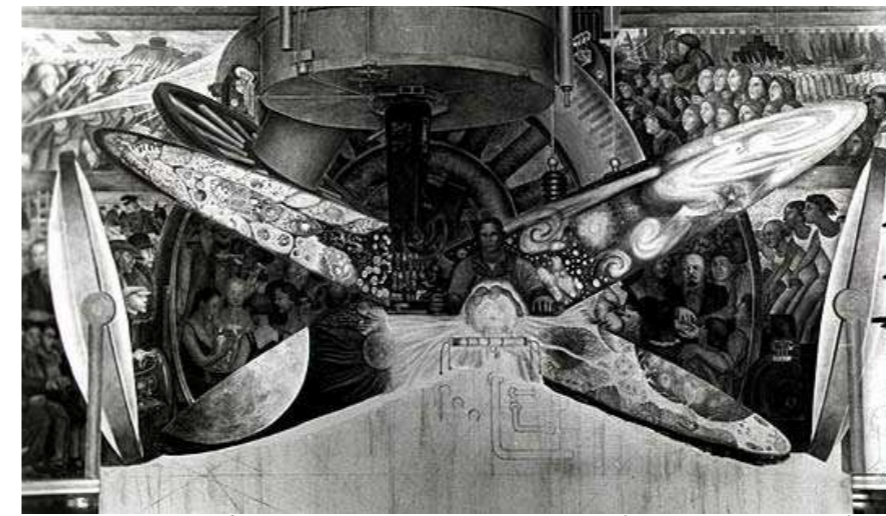


Figure 1.36 - Rockefeller center: Man at the Crossroads (Koolhaas, 1997: 221) The retention and performance of knowledge

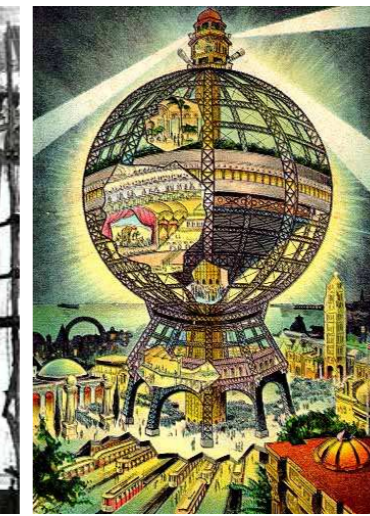


Figure 1.37 - Globe Tower version 2 (Koolhaas, 1997: 72)

The technical apparatus is referred to as the technology of the fantastic (Figure 1.38-39). It is the application of scientific knowledge for the creation of a false reality. This reality is the new wild, and man creates the world through the city. This creates a more intense reality of ethnobotany for the public to experience. Ethnobotany becomes an experience which takes over rather than an objective way of learning. The design is the infrastructure which allows each space to operate and transform the perceptions of ethnobotany. The building provides the framework from which the building can be critical of what it means to retain and perform knowledge within the context of Midtown Bloemfontein. Human-made systems aim to provide a heightened connection to the natural world than what wild nature archives (Figure 1.6).

2 Challenges

This chapter introduces some of the complexities inherent in the various aspects of this intervention. There are three main sections being topological, typological and sustainability challenges with in each these the morphological challenges are approached. Each section begins by exploring these ideas and ends by taking stock of what has been learnt in the form of precedent studies. A wide variety of reading and analysis of existing spaces help explore the ideas presented. Within this process, there are reviews of specific precedents which influenced various aspects of the design.



Figure 2.1 - City of the captive globe (Koolhaas, 1997: 295)

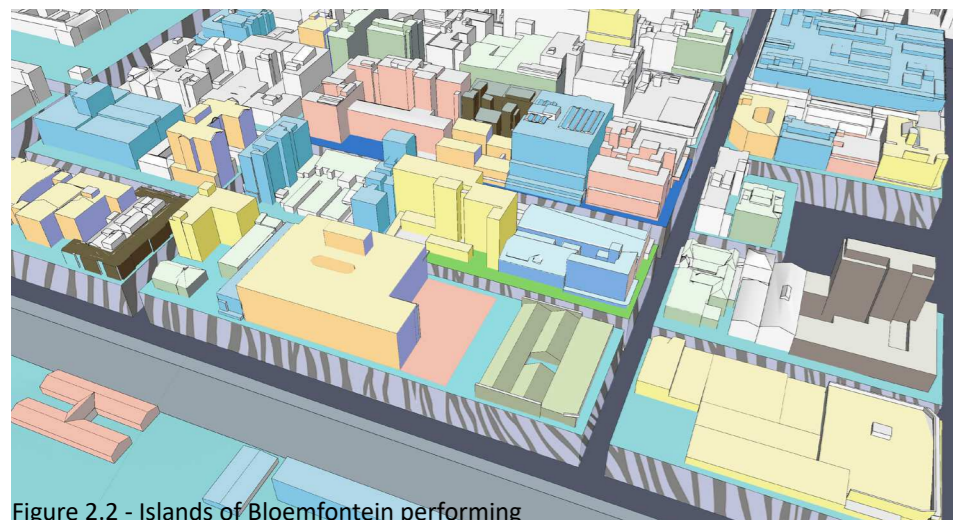


Figure 2.2 - Islands of Bloemfontein performing

2.1 Topology Related Challenges

2.1.1 Being Critical of surroundings

To the east of the site is an automotive workshop which is neither inventive nor is it critical in its design. However, through its use, it demands that the cities spaces are used for more than one strict function. The structure was remade into various applications over the previous years, forming a phantom architecture which “nowhere betrays the slightest trace of its original purpose in any way” (Koolhaas, 1978: 104). Further, its operations take over the sidewalk along the spruit, questioning why spaces are dedicated to a single purpose (Figure 2.5).

The modernist parking garage criticizes this messiness in the city through its perfect planning and strict order. However, it has been so rigid that it cannot be taken over as the town messily reinvents itself, and so the ground floor specific business areas remain empty (Figure 2.3-4).

The project is critical of what it means to perform knowledge and what it is to retain that knowledge through implicit or explicit means. It is critical of the lack of inventiveness within the block and surrounding city. It questions the perfect human-made orders proposed by the parking garage adjacent while accepting its position as a planned development.

More than this its surrounding cityscape is not sensitive to Bloemfontein’s natural landscape. The few greenspaces which exist are filled with alien water intensive plants. On the site itself, there are multiple alien tree species which do not represent the region. Rivers in the Free State can be seen from a distance as they foster life and allow larger trees to grow in the dry landscape. The concrete bed and large amounts of paving which have been added to the spruit do not allow for this life.



Figure 2.3 - Fountain Street surroundings



Figure 2.4 - Canalization of the spruit



Figure 2.5 - Cars being cleaned



To the East, the Spruit culminates with the bus rank.



The pedestrian walkway has been taken over for the cleaning of cars from the Mahindra and Moto-Inn.



The servitude is currently closed by a steel gate.

The Spruit culminates in the stadium complex and Kings park to the West.



Figure 2.6 - Selbourne Avenue

2.1.2 Connection to existing green space

The development sits along the Bloemfontein Spruit and so is connected to the 'green belt' of public space which runs through the CBD from King's Park to the west (Figure 2.10). This park has a rich botanic tradition that has permeated the city's identity in its popular name becoming 'The City of Roses.' Its permeance as a land mark in the city is shown in figures 1.22-26. This botanic tradition is different from that of an ethnobotanist's culture. King's Park's tradition is rigorously ordered and explicit (Figure 2.22-23). The gardens are manicured into hierarchy's, and axes, the plants within it are carefully grown in an unnatural climate to celebrate notions and people beyond Bloemfontein. The park imports ideas of Europe through its name, the plants, and its monuments.

Ethnobotany is entirely regional and relies on the natural landscape and the viewer's imagination for ordering. The myths order and guide the Sotho people's understanding of the world, and this shows the engagement with imagination to understand place. However, the city is man-made, the canalization of the spruit further reduces the site's natural landscape to draw from. Thus, the layout of these gardens must draw inspiration from the imagination of the users as explored in figure 2.24 and '2.2.2 Enhancing an experience or understanding'.

The Spruit is one of the main pedestrian routes through the town (Figure 2.14). During the winter months, the northern bank fills with slower-moving pedestrians who occupy the benches along the way. The spruit acts as the city's public leisure space, and so the intervention must add to this existing pattern of city life.

The southern side accommodates faster-moving pedestrians even though there is no specific pedestrian path on that side of the spruit. However, in summer, the northern bank is preferred due to its trees and buildings' shade (Figure 2.9). The project supports this system by offering its ground floor to the public as a shaded pocket park (Figure 2.10).

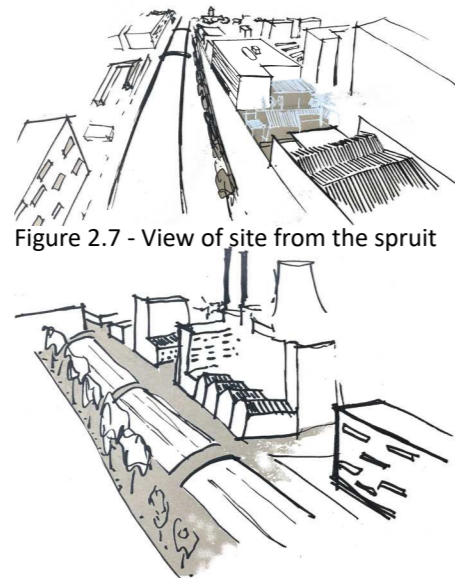


Figure 2.7 - View of site from the spruit

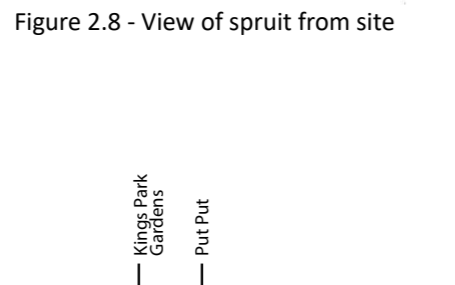


Figure 2.8 - View of spruit from site



Figure 2.9 - Pedestrians on the north bank



Figure 2.10 - Green-Space Systems

Red-Private

Orange- Access Controlled

Green-Public

2.1.3 Servitude

There is a 3.76m servitude which runs through the selected site (Figure 2.13). This servitude provides for the passage of people on foot across the site without hindrance. The original function of the servitude was to give access to internal sites which did not border on either road. It is essentially a pedestrian road, a public space. The idea of having a public space run directly through a site has been expanded on by turning the ground plane into a public gardens (Figure 2.12). Currently the has been treated as a road for vehicles, it is completely paved and offers no relation to how a human would interact with it (Figure 2.11). Currently the Green Express Café is attempting to do exactly this by placing pallet furniture in this space. The public gardens aim to provide a more permanent softening of this harsh enviroment. The parking garage to the west demonstrates where the original servitude between sites was incorporated into the design (as explored in '3.0 Technical Challenges').

This void space has a strong presence whenever I draw the site from memory or conceptually (Figure 2.13). The void area currently acts as a mediator between the two buildings on the site. It also serves as a means of negotiating the open expanse of space to the south and the looming presence of the city mass to the north. The servitude does this by splitting the block into individual buildings rather than a singular agglomeration of buildings. The final design preserves the ability to traverse the site unhindered as a reminder of the city's past lives and the phantom architectures which persist in the city.

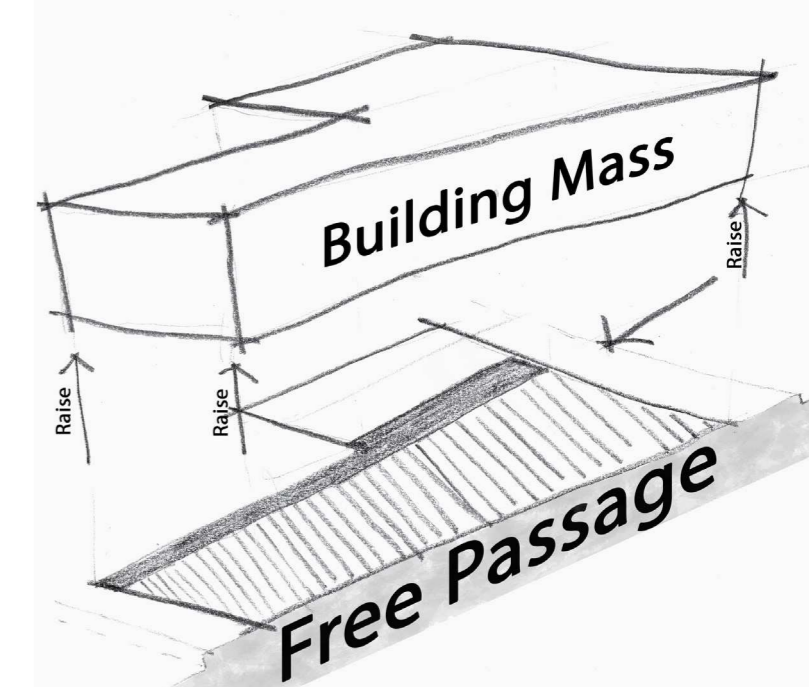


Figure 2.12 - Conceptual approach to site

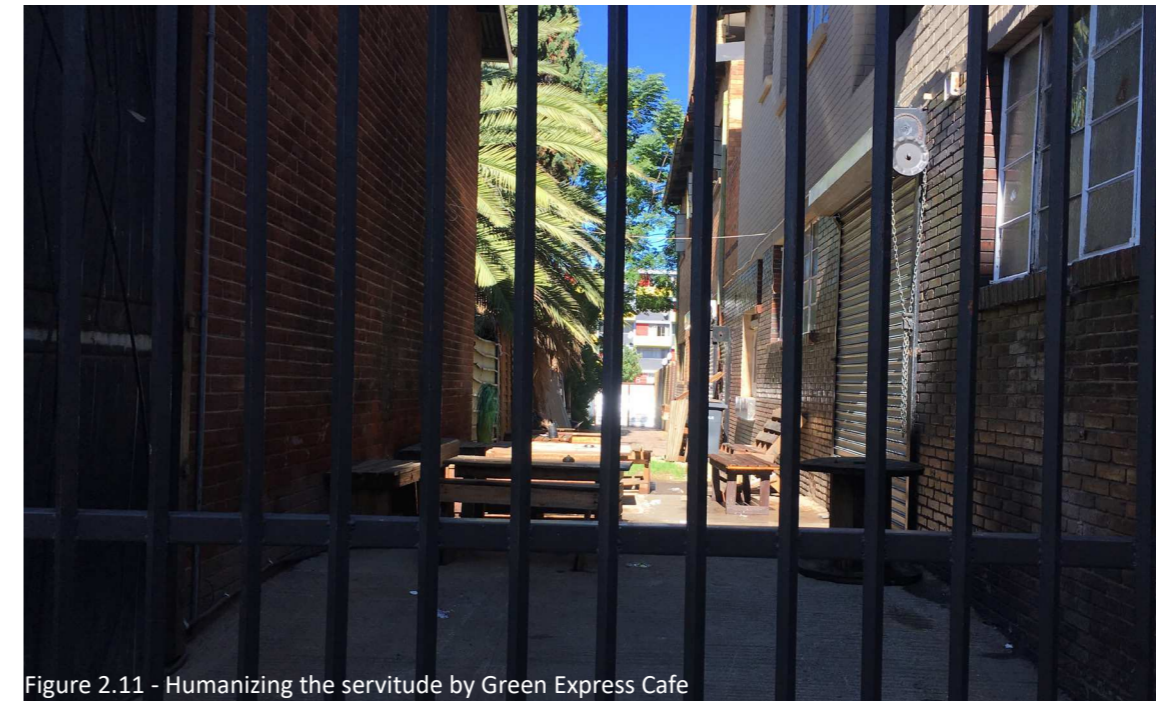


Figure 2.11 - Humanizing the servitude by Green Express Cafe



Figure 2.13 - Servitude.



Figure 2.14 - Pedestrian movement along the Spruit

Shanghai International Cruise Terminal: Shanghai Chandelier

SPARK Architects
Shanghai, China
Focus: Structural Systems – Relief Spaces

The brief required thirty percent of the land should remain free for the people of the city while half the floor plate area should be underground. This is to counteract the density of the city. The design creates a series of relief spaces within the city along its waterfront public park. This is an addition which forms a part of a masterplan of interconnected, walkable, green spaces up to the length of the Huangpu River.

Relief in the city

Along the length of this newly created park, there are various spaces which break the monotony of office buildings and mall spaces. One of these relief spaces is the ‘Shanghai Chandelier,’ it brings whimsical fun into a rigid and controlled city (Figure 2.18-19). The Faberge eggs house bars and restaurants to aid in the creation of a cultural. By lifting the pods into the air, the pedestrians can look through the arch and onto the park in front. Shanghai is notoriously packed and to glimpses through buildings into open spaces are rare. The fact that these pods hang adds dynamism to an otherwise straightforward structural system.

The design explores ambiguity in terms of where the ground is and why that matters to architecture. The design developed into a honeycomb of sunken courtyards onto the floors below where buildings disappear into. This differentiation between the below-ground floors, ground and above ground is deliberately obscure and is a commentary on the traditional Greek typical responses to meeting both the earth and sky.



Figure 2.15 - Skin

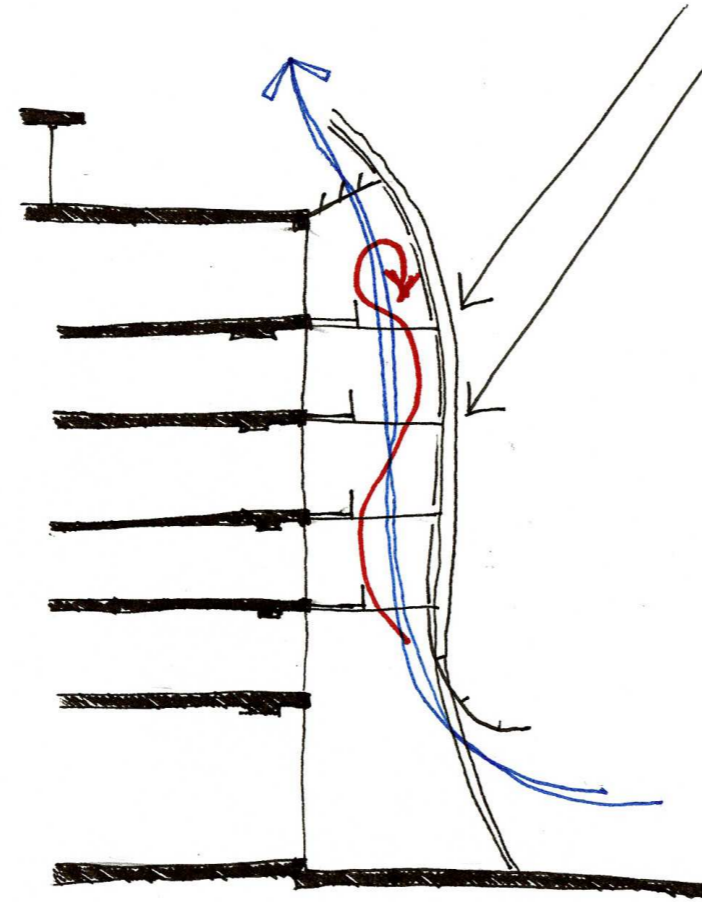


Figure 2.16 - Skin



Figure 2.17 - Scale binding facade

Figure 2.18 - Shanghai Chandelier/Faberge Eggs

Scale Binding Skin

Although each office building is already visually similar, the addition of identical skins which do not cut back at the edges provide a visual continuation when viewed from the park or opposite side of the river (Figure 2.15-17). This visual link horizontally allows the buildings to be perceived as a single slightly disjointed building without being overwhelming to those who are close. The giant order of these repetitions allows the buildings to sit comfortably in terms of both the vertical and horizontal scale when the 88,000 tone cruise ships dock alongside the park.

When the skin is illuminated at night, the flowing herringbone structure is lit up, creating a sense of freedom among the rigid grid found on the facades behind. This façade does not reach the ground and so does not provide a clear connection to the ground, the disconnect aids in the ambiguity already explored in the chandelier and surrounding sunken courtyards.

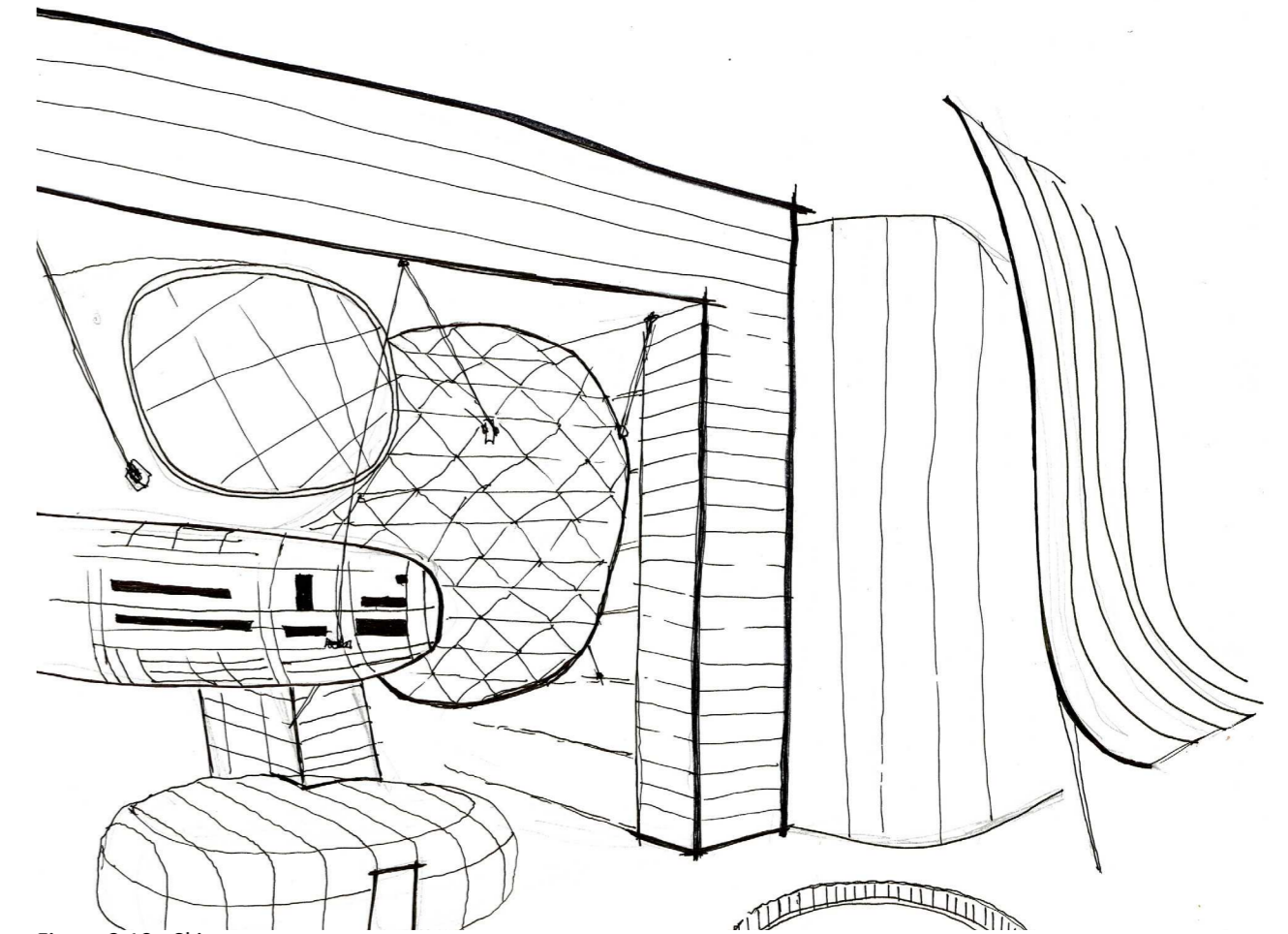


Figure 2.19 - Skin

2.2 Typology Related Challenges

2.2.1 Gardens

Gardens are places of prospect and aspect. Prospect is the region which is being overlooked, unaware of its intricacies, while aspect is the view from a specific vantage point. This is important because, in the landscape, the prospect of an area is the same for all those who encounter it. Yet their specific vantage point or lenses used to see the area will never be the same. Knowledge over time has taken the same relationship between prospect (that which is not understood) and aspect.

Man-kind's first gardens were monuments such as Stonehenge (figure 2.20). This monument is a means to make sense of one aspect of Amesbury's wild and untamable prospect. It represents orders and understanding within the place and is connected to other such places in the sea of prospect through lay lines. In King's Park, one of the first moves was to place willow trees. These willow trees were a means of ordering the prospect of King's Park. The objects in the park tell stories a

In the middle ages, the gardens ignore the untamable wild as it was too great a task to make sense of (Figure 2.21). The gardens focus on the understandable 'inside.' Knowledge at the time became internalized and for the wealthy. This culminated in the Renaissance when gardens became an exercise in perfect order and complete understanding in aspects of their design. Over time paths in the park were set out, and it was further ordered through perfect avenues of neat plants.

The gardens have continued the lineage by adding layers onto the perfect order (figure 2.22). This turns the park back toward a place of prospect, but if

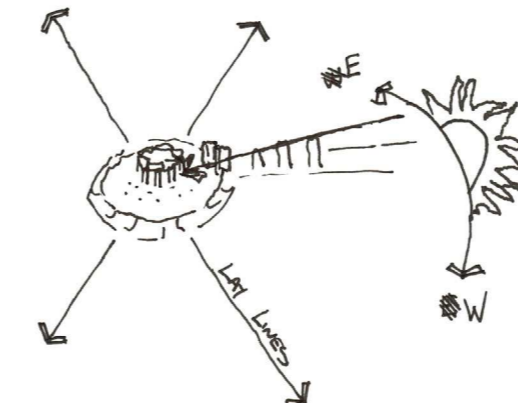


Figure 2.20 - Stonehenge (2000 B.C.)

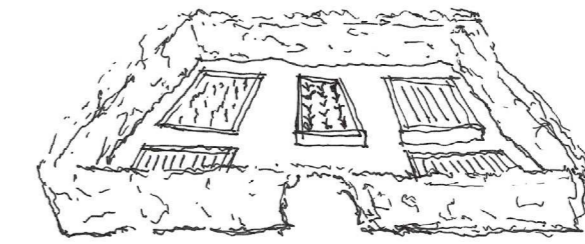


Figure 2.21 - Walled Gardens (Middle Ages)

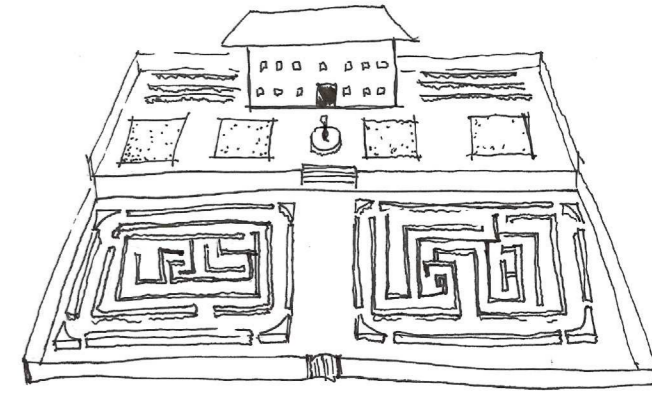
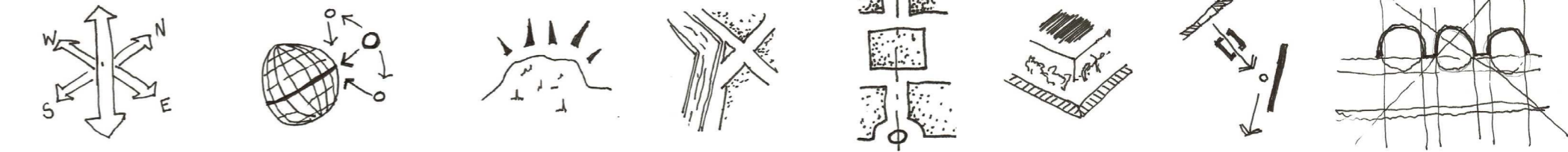


Figure 2.22 - Renaissance Gardens (16th Century)



Axis Mundi - Cardo Decumanus - Equinox - Solstice's - Topos - Genius Loci (Spiritual Topos) - Boundary - Axis - Symmetry - Space for Occupation - Transition - Harmony - Proportion

carefully looked at, it becomes a place of aspect. Knowledge is no longer something which must be rigorously accounted for; it can be held in objects, stories, and places. King's Park's master plan of measured order has been overlaid with many individual ideas about the aspect for people to experience freely (Figure 2.23). They refer to the measured order but are not solely based off it. This allows for interpretation and imagination, which is revered amongst the city's strict grid.

When members of the public encounter this project, they have a similar understanding of how it is set out. The task of the hanging gardens and exhibition is then to depict the different aspects of ethnobotany and spark imagination within them about the world which surrounds them. To picture is to tell stories of a place and engage with it. This interaction is a process of meaning, both projected onto space and constructed by it.



Figure 2.23 - Gardens of memory (2019)

2.2.2 Enhancing an experience or understanding

The ethnobotany institute must enhance the understanding of ethnobotany for the general public. The design must also enhance the public's understanding of what Bloemfontein is.

Coney Island was a place of intense experimentation. It erased the natural landscape to construct a total synthetic environment (Figure 2.24). This environment fabricated almost any sensation and is referred to as the technology of the fantastic.

“Coney Island was the site of unsustainable compromises between pairs of opposites: lowbrow and highbrow; artificial and natural. The Technology of the Fantastic versus the Urbanism of Good Intentions. The former eventually gave way to the latter and as that happened the once-vital place began a descent toward irrelevance. Something similar has occurred outside of Coney Island's dreamworld: Technology has become less imaginative and more responsible.” (Austin, 2012:1).



38 Figure 2.24 - Conceptual Perspective



Figure 2.25 - Suburban Park



Figure 2.26 - Pres. Brand Street

I believe that this responsibility of technology is what has led to the monotony and lack of relief within the city of Bloemfontein. The urbanism of good intentions is seen throughout city planning in Bloemfontein. The suburban neighborhoods are littered with desolate parks which house a generic steel swing and play set (Figure 2.25). The sidewalks throughout the mid-town comply to the responsible regulations but do nothing further. President Brand Street is the epitome of this time, it is responsible and 'highbrow' (Figure 2.26). This is due to the conservative heritage of the residents within Bloemfontein and how they have planned the city. I believe the ideals that Bloemfontein was planned on are responsibility, dignity and authority. These spaces do not serve the practical needs of modern society.

However the city is encountering a shift, the redevelopment of the spruit is more imaginative. Each bollard is individually painted and where there could have been a mundane overpass there is a unique steel bridge (figure 2.6 & 28). The trees along the spruit are dynamic when compared to the stately evergreen trees planted along president brand street. Brand street uses these alien trees as a way of importing ideals from another society.

Imagination frees the mind of the mundane responsibilities of life. It removes those nagging things which we believe to be 'knowns'. These 'knowns' limit our thinking and capacity to understand something new. This is not to say that they aren't true, but our realm of possibilities is reduced every time we hold on to one.

The design incorporates this imagination structurally by hanging the floor slabs from a girder rather than being clearly supported by a column and beam system (Figure 2.27). The design uses traditional building materials such as steel and timber, however they are used to the technical extreme. The timber is laminated to unique curves while the steel is as thin as technically possible. This gives the impression that the buildings various elements are floating. This inspires the exploration of a fantasy world where anything is possible (Figure 2.24). Technology allows for the plants to be experienced in a more intense way that what could be achieved in nature through the way in which they are displayed. The density of plants per area can be much higher than if one was searching the wild.



Figure 2.27 -Foot Bridge

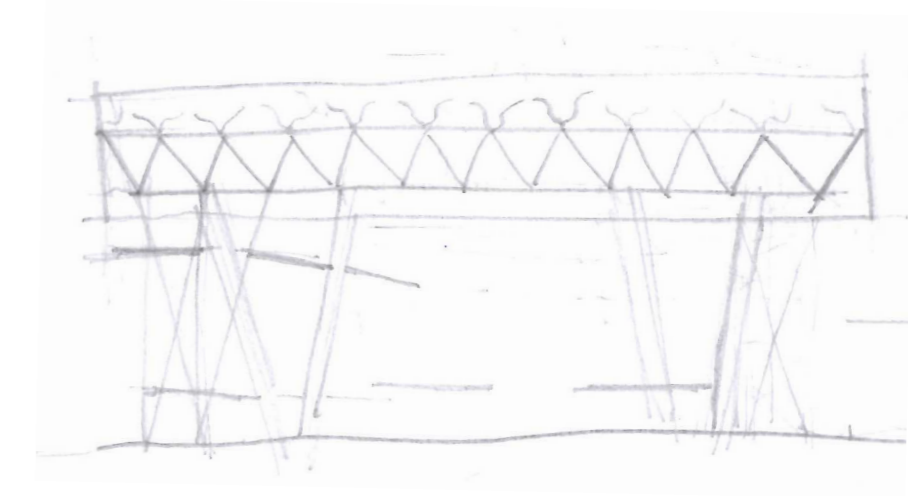


Figure 2.28 - Steel Girder Structure

The Cocoon
 AA Design & Make
 Hooke Park, UK
 Focus: Bandage Structure – Relief Spaces

The institute should heighten the experience of ethnobotany as explored in New York. The Cocoon is designed to heighten the experience of walking through the surrounding forests. It's intimate scale invited the user to rest against its wall as they clamber through the cocoons twists (Figure 2.29-30). These twists create to allow the user to imagine what is coming next and allow the smell of the wood to be more intense. The uneasy experience of moving over tree roots experiences on the forest floor is replicated through the undulating floor. The light falling through the roof provides a similar speckled light to that on the forest is what heightens the experience.

The experience which the design creates is focused on the magic and implicit aspects of African storytelling rather than the process of walking through a landscape.



Figure 2.29 - Cocoon

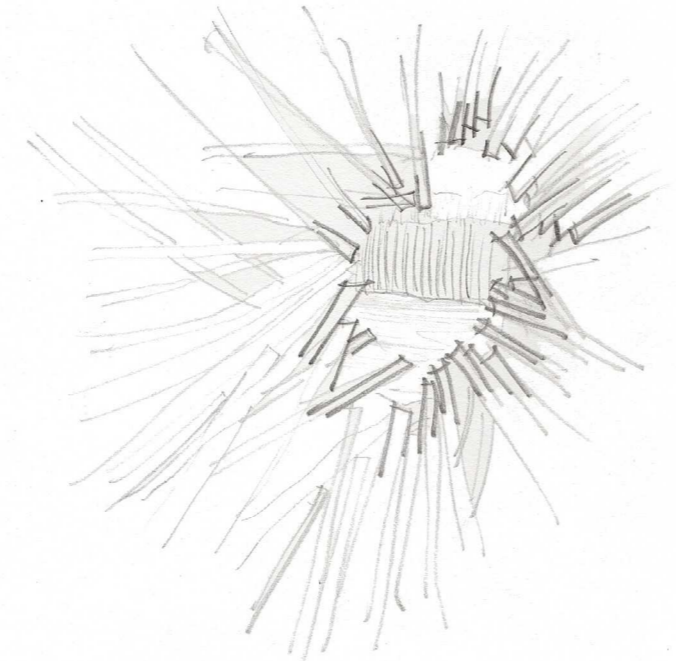
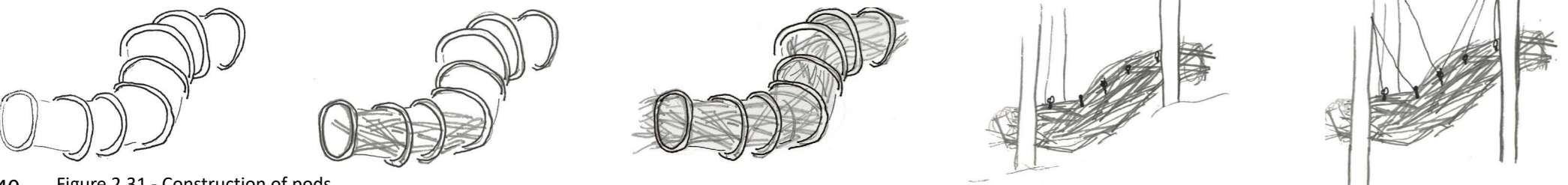


Figure 2.30 - New Perspective offered



40 Figure 2.31 - Construction of pods

2.2.3 Humanizing the research space

The research space is the contrast to the imagination and magic of the garden space. They have many practical needs and represent the responsibility of technology to modern society. However there are humans who work in the rigorous order. Their humanity and wonder must be cared for.

Department of Microbiology, UFS
 Renier Bron
 Bloemfontein

Focus: Laboratory Requirements – Gathering

Laboratory spaces are functional spaces and offer little scope for interaction. The design articulates elements of its structure as to make the building more human and understandable to those who work there (Figure 2.32). This is a reaction against the typical sterile laboratory building facades and internal spaces while remaining functional and sterile inside.

Courtyards

The multiple courtyards provide relief from the sterile lab environment and allow for gathering in an individual work environment (Figure 2.33). This is signified through the tree in both pot plants, benches, and partial shading. This leads to them being the spaces where creativity is fostered, and staff/students can informally discuss their projects with one another.

These spaces humanize the research environment, which is otherwise clear cut and clinical through their materiality. The courtyards are paved with brick pavers and are supported by the whitewashed face-brick walls which add natural light to a synthetic lit building. The trees in the courtyards add to this natural materiality and provide space to gather in the shade.

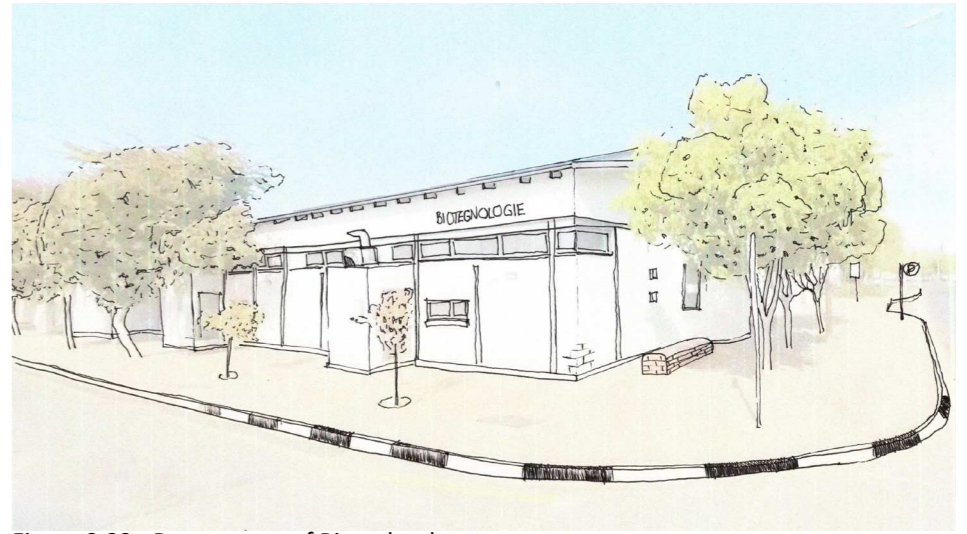


Figure 2.32 - Department of Biotechnology



Figure 2.33 - Department of Biotechnology

2.3 Sustainability:

The theme of this project is investigating how architecture can offer alternate perspectives of ethnobotany in the city. This main theme breaks down into three sub questions developed in conjunction with the three concepts. The goal of this is the meaningful making of place within the city for the occupants of the buildings and the people of the city.

Conceptual and Ethical Aims

Sustainability is a broad and all-encompassing concept and so the purpose this section is to define what the project will to address.

“Opinions largely vary on how to define the sustainability challenges that architectural design is to respond to, how to align the various stakeholders involved, which scales and elements to consider, and how to transform these questions into design strategies, spatial configurations, and materiality of buildings. These practices cannot be confined merely to technological problem-solving as they essentially mesh a range of cognitive, social, cultural, and material elements.” (Schroeder, 2018).

The second function is that it provides a framework that can be referred to within the design process as a yardstick for the success of its sustainability. The approach is based on the ‘Living Building Challenge Standard 3.1’ and centered around seven aspects of ecological and social sustainability. Its essence is in line with the conceptual basis of the touchstone (Section 1.4.1), which is to imagine the city differently. In this case, it is to redefine the city’s view of sustainability.

Focus: Imagining the city as

- Being informed by the Free State climate
- Generating its own resources
- Socially, culturally and ecologically restorative
- A place where every building contributes to the city becoming more livable

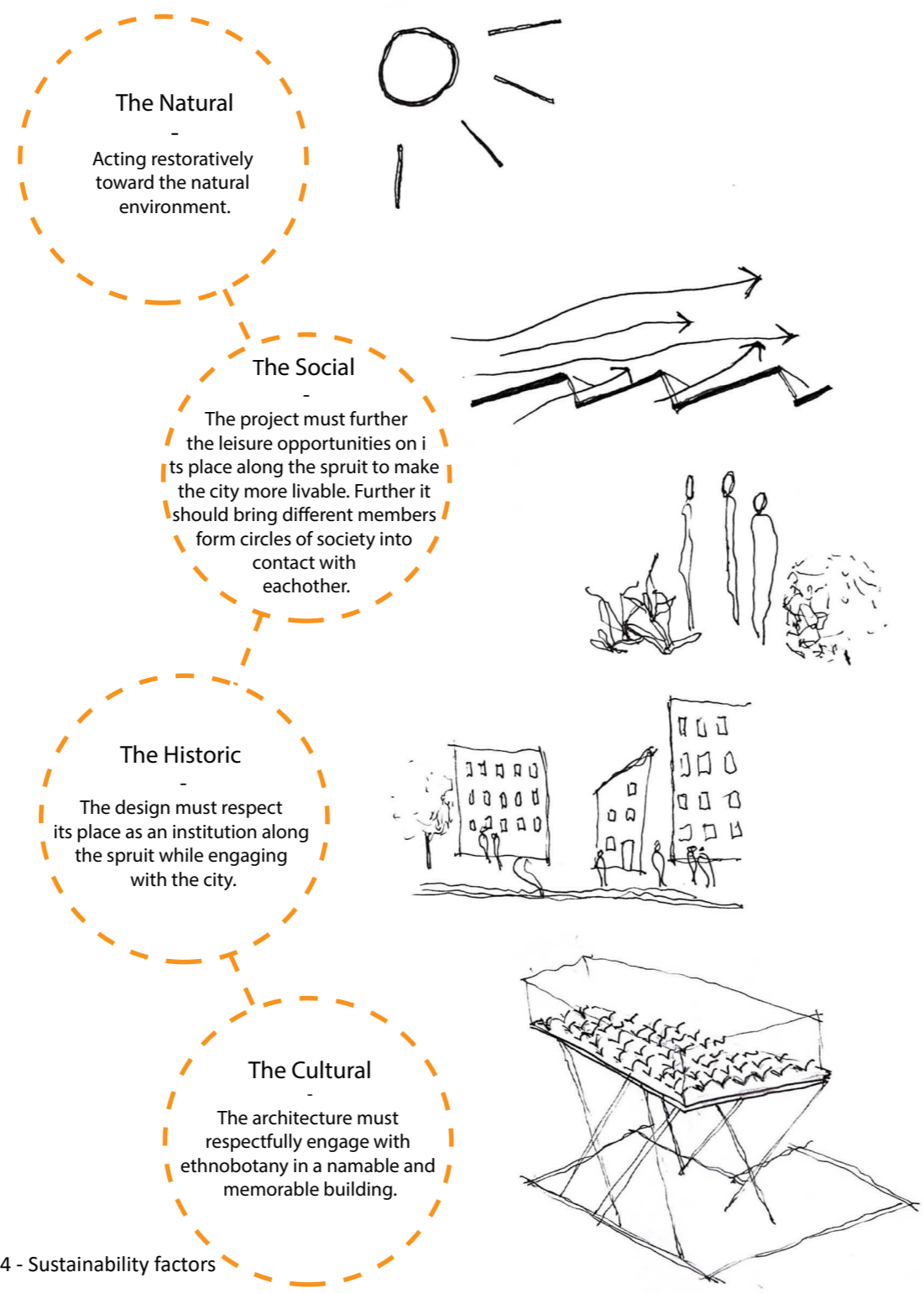


Figure 2.34 - Sustainability factors

2.3.1 Place

The intervention “realign(s) how people understand and relate to the natural environment that sustains us” (International Living Future Institute, 2016, p. 23). The design relates deeply to the place, thus restoring the nature of the place. The design encourages pedestrianization and livability within the Bloemfontein CBD through four key areas.

Adaptive Re-use

The project is built on a greyfields site. Gamble & LeBlanc define greyfield sites as those which are “economically obsolescent, outdated, failing or underused” (2004).

Urban Agriculture

For cities to become truly sustainable, they cannot rely on a global infrastructure and so must produce their own produce. Currently, the plants are grown/harvested in the rural Free State and imported into Bloemfontein. The design sufficiently provides for the needs of herbalists in Bloemfontein and its surrounds. This reduces the carbon footprint while ensuring sustainable harvesting practices. Currently, the plants researched by the University Department are grown on the UFS experimental farm on the outskirts of Bloemfontein. This development will eliminate a large amount of travel carbon for researchers while adding the benefit of more productive workdays.

Habitat Rehabilitation

“The ecological approach to urban open space planning and management [in Bloemfontein] is a sensible and achievable objective” (Dingaana & Du Preez, 2017: 1). The reference habitat is

the natural state that the site would be in without the influence of man, regarding “biodiversity, plant succession, water use, and nutrient needs” (International Living Future Institute, 2016, p. 24). The design increasingly promotes and emulates the reference habitat (Free State Grassland) of the site as it matures. The development increases the natural habitats available to the biodiversity identified as being within the reference habitat. Due to the dense nature of the city and its manicured green spaces, it loses many indigenous species. This project provides a habitable island from which the species (both plants and animals) can thrive.

Ecological Transportation

The project contributes to the creation of a walkable and pedestrianized community within the Bloemfontein CBD. It provides secure storage for human-powered vehicles such as bicycles for all staff and visitors. Existing pedestrian routes such as the street frontages of Fountain street and Selbourne Avenue along with the servitude across the site enhance and make the city more walkable through affordances such as shading and even walkable surfaces. Showers and locker rooms are provided to encourage the use of human-powered vehicles. There is an electric vehicle charging station for those still with a car.

2.3.2 Water

This aim intends to redefine how people view water wastage within the Bloemfontein CBD. Bloemfontein often has water issues such as poor quality, waste, and distribution, not to mention the waste and stormwater issues adding to the pollution of the spruit. With climate change, these problems will only grow, and so the building needs to account for this if it is to last and remain relevant over the next fifty years.

The design must provide for the sites needs through precipitation and recycling used project water as much as possible. Water discharge such as grey and stormwater should be dealt with on-site using a wetland greywater system and stored on site.

Currently the office block expels its stormwater into the spruit. Downpipes are internalized and feed into an underground drain to the spruit. The residential units have downpipes, which direct rainwater onto the sidewalk (Figure 2.35). The servitude is designed to direct some of this stormwater toward the spruit. This is shown on erf 12467 to the west, where the development had to account for the stormwater using channels and underground pipes along the length of the servitude (Figure 2.36).



Figure 2.35 - Rainwater Management Currently Red - Servitude Runoff Blue - Gutters

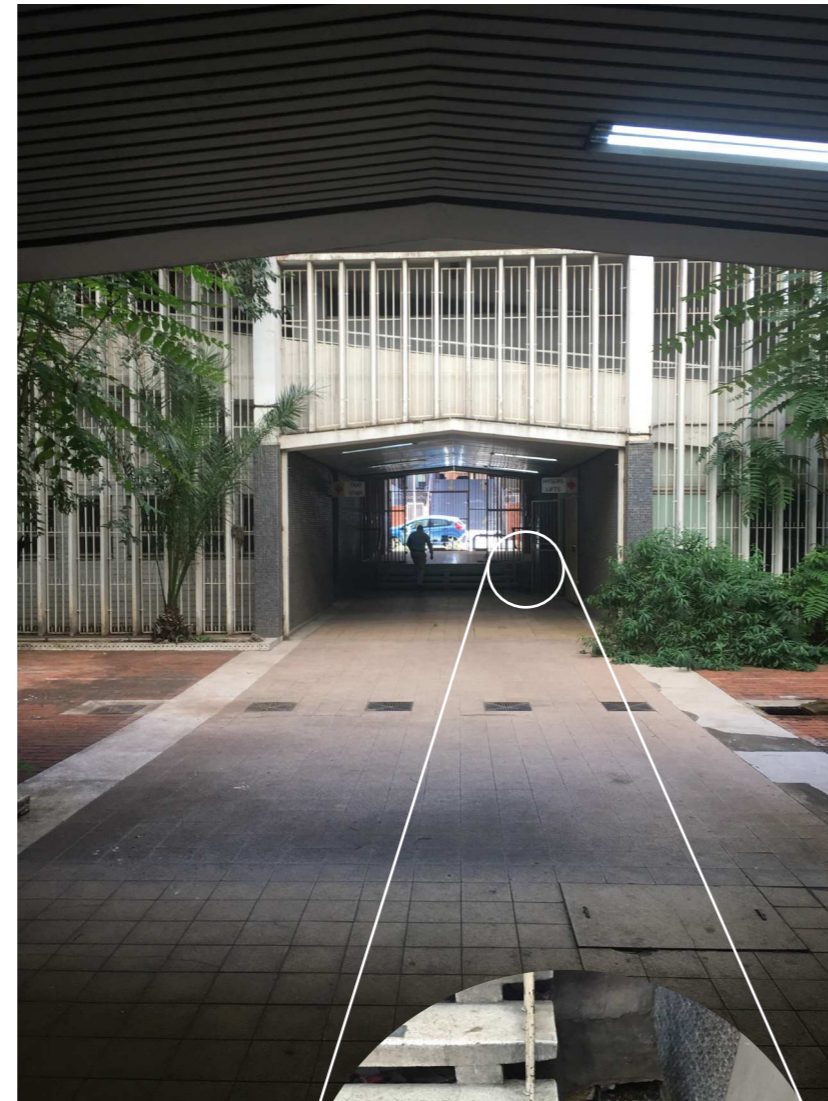


Figure 2.36 - Storm Water Management on erf 12467

Grey Water System

Due to the site size and location of the site within the Bloemfontein CBD, there is not a large amount of space separate from the public activity where a greywater system can be placed. This offers the opportunity to incorporate this system into a public space where people can interact with it. The vast amount of garden required by the program can use the treated water, thus not relying on the municipal grid (Figure 2.37).

Toilets are water efficient designs which feed into the municipal sewer system while the basins and taps greywater will be used within the gardens to offset the water requirements of the buildings. The roof design captures any rainwater on the site and will store this water in underground tanks and pumped to a tank above which will provide pressure for the lower floors.

2.3.3 Energy

The intent of this aim is to prioritize reductions and optimizations in energy use within the development thus changing the way in which Bloemfontein view energy waste. Passive means of cooling the greenhouse during the day reduces the energy load required by the building.

Greenhouse Climate Control

Cooling such a large greenhouse without over shading all the plants inside is a challenge and so the systems in place need to be adaptable to the everchanging Bloemfontein climate. However, this offers the opportunity to use the whole skin of the building as the systems for controlling the temperature inside the greenhouse. Systems such as those used on the 1992 British Pavilion (Grimshaw Architects, 2019) can be used to put sustainability at the forefront of the public's mind. The scale of the greenhouse allows for the academic component to be insulated within this greenhouse shell and so can be mutually beneficial with the academic component heating the greenhouse in winter and the greenhouse insulating the academic component in summer.

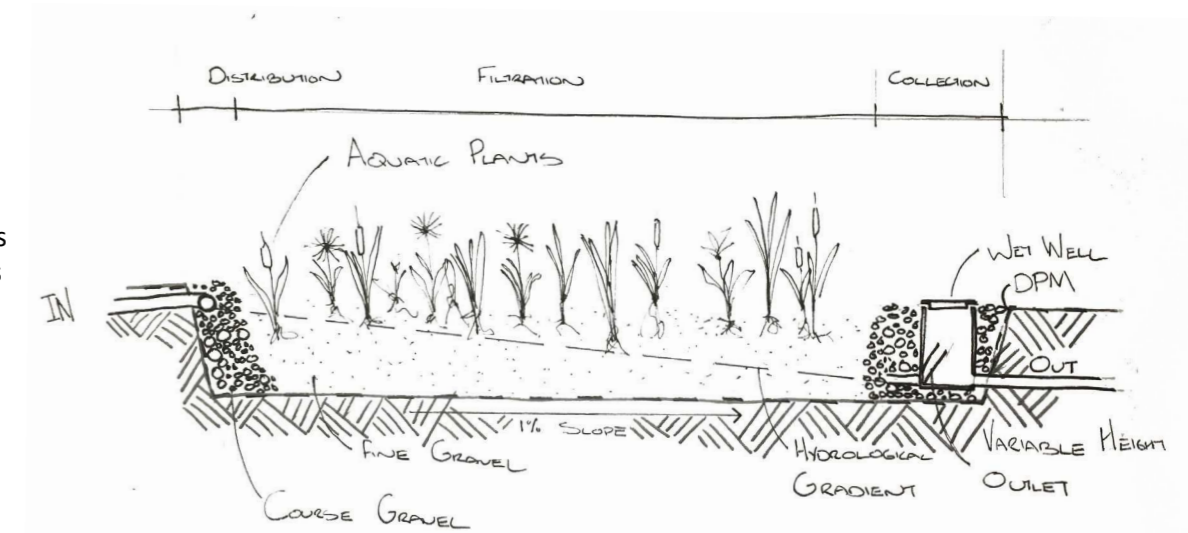


Figure 2.37 - Greywater treatment pond detail

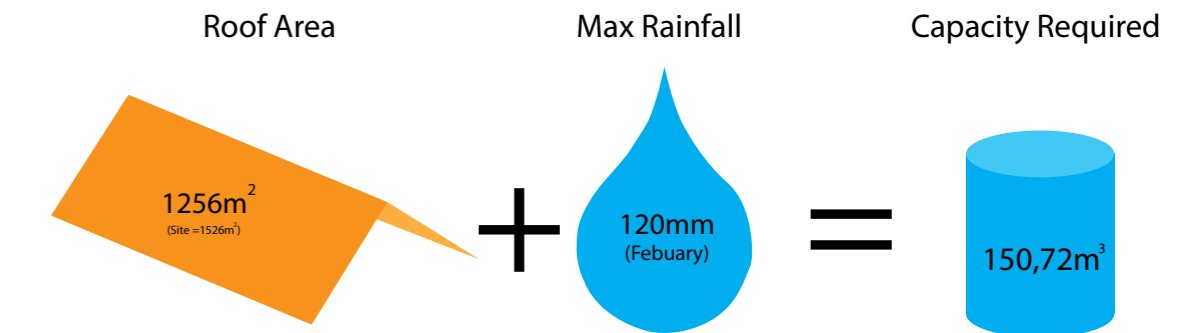


Figure 2.38 - Rainwater storage calculation

1992 British Pavilion

Location: Milan
 Grimshaw Architects
 Focus: Environmental Control Systems - Memorability

The facades take the physical form of the environmental control systems (Figure 2.39-44). Inside there is a void, in which are a series of exhibit platforms along with a pool for maritime vessels to hang over. These platforms stand independently of the environmental control skeleton which surrounds it.

Britain's naval history endows the skeleton with meaning, declaring what the pavilion represents. It has allowed the structure to become so memorable and namable that it was made into a stamp. The design uses bold architectural moves such as the wing roves to achieve social sustainability, through memorability and significance.

Interior Climate Control

To the west, the walls are made of large reservoirs which then have a skin of material fins to keep the sun from heating them directly (Figure 2.45). At night the air is cool and this then cools the water in the reservoirs sufficiently for the water to be used again in the day. They store the water which is pumped through a large panel within the design in order to cool the main hall, this greatly reduces the heat load that the small HVAC system needs to disperse.

The high volume of the interior allows for the hot air to rise where it is naturally ventilated out of the building using high level windows and prevailing East-West winds.

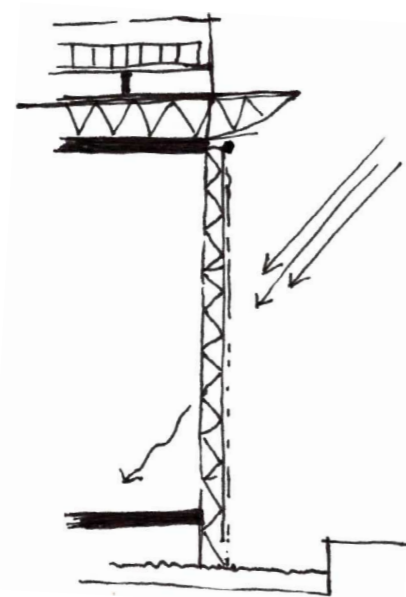


Figure 2.39 - Water Wall

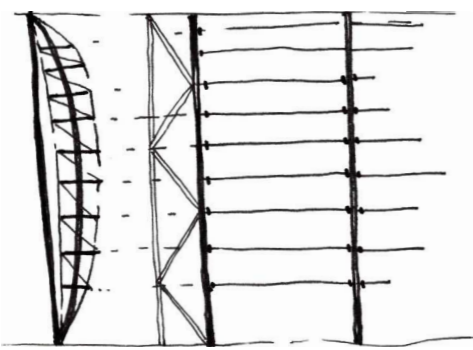


Figure 2.40 - Fin Wall

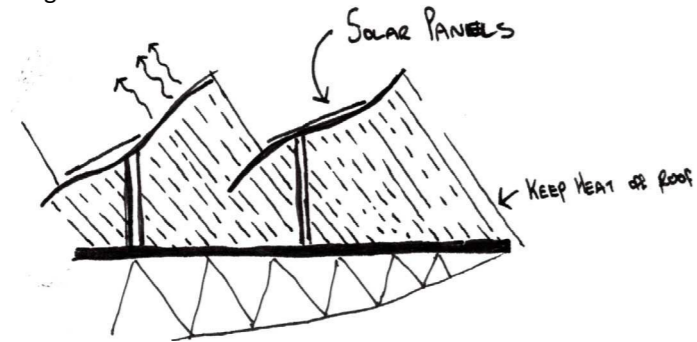


Figure 2.41 - Roof Fins

Water Wall

As the water falls down the glass facade to the east, it takes heat energy out of the sunlight and cools the space inside (Figure 2.39). Further, the falling water evaporates and cools the surrounding outdoor space to the east of the building. Solar cells on the roof supply the energy to pump the water and so when the sun is less intense, the pump moves less water and so it cools the building appropriately.

The falling water provides a sense of suspension inside the pavilion, which allows the inside to become 'another world'. This is the world of Great Britain inside. The reflection pool in front of this facade gives the pavilion a monumentality and classical permanence.

Solar Fins

To reduce solar heat gain in the hot climate of Seville, the architects opted to place a series of fins on the roof to reduce how much sun hits the physical roof itself. The gap between the fins and the roof allows for the breeze to flow through and cool the surfaces (Figure 2.41). On these fins, there are a series of solar cells which provide the energy required to run the pavilion's pumps, lights, and small HVAC system.

Rigging as Inspiration

Both the North and South facades incorporate canvass sheets to protect the building from the harsh sun (Figure 2.40). These canvass sheets and steel structure interperate Great Britain's maritime culture and craftsmanship into an efficient environmental control system within the building. This building demonstrates how a high-tech architectural building can be sustainable in its daily operation through simple systems.



Figure 2.42-44 - 1992 British Pavilion climate control systems (Grimshaw Architects, 2019)

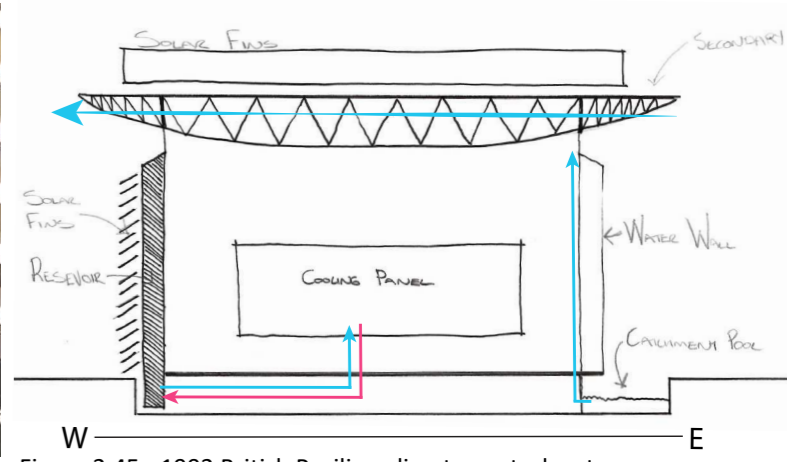


Figure 2.45 - 1992 British Pavilion climate control systems

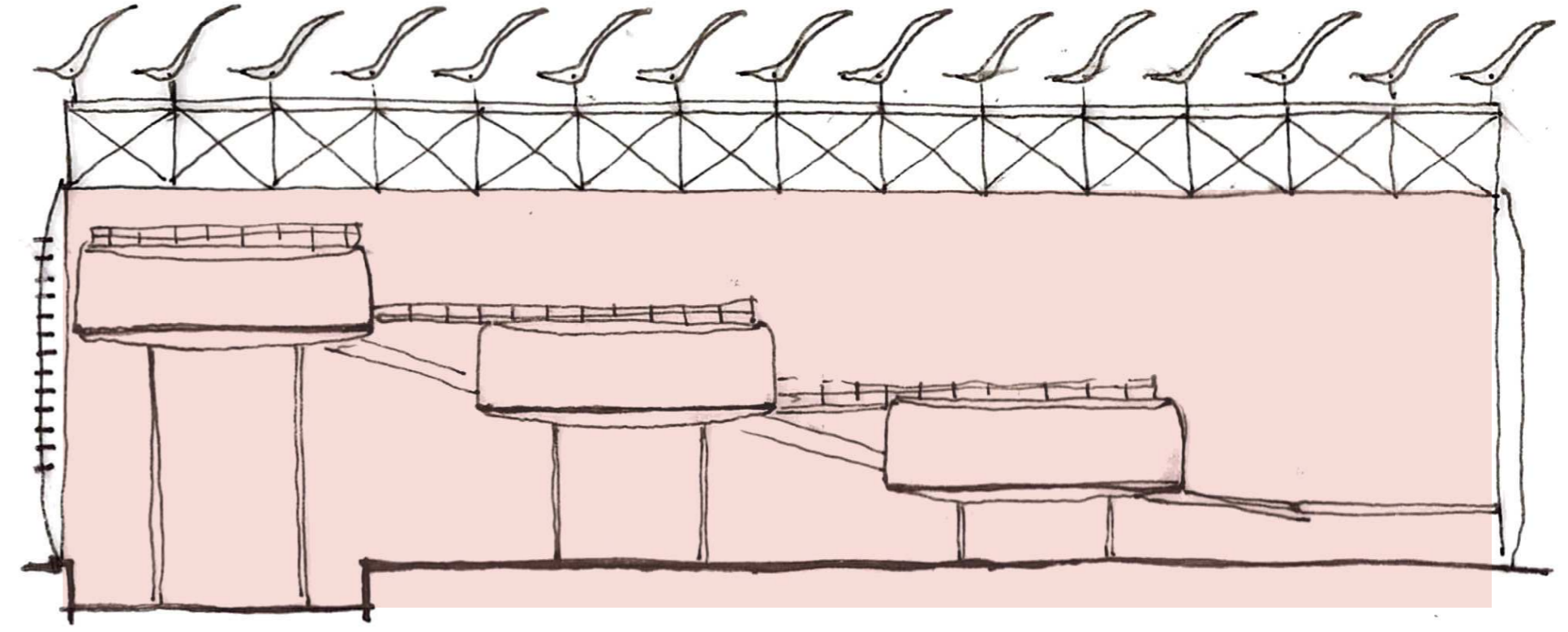


Figure 2.46 - 1992 British Pavilion N-S Section

2.3.4 Health

The intent of this is to redefine what those who use the Bloemfontein CBD see as a healthy and acceptable space. It aims to promote a productive, nourishing and healthy built environment over time.

Access to Environment

Each regularly occupied space has openable windows that provide access to fresh air and light (Figure 2.47). The design promotes a connection between nature and the occupants of the building through its planning and program. The design accounts for the changes in climatic conditions throughout the year without the reliance on mechanical systems.

Air Quality

Exhaust systems should be provided for kitchens, bathrooms, laboratory and janitorial areas in order to maintain a high quality of air within the building.

2.3.5 Equity

The aim is “to make the world work for 100% of humanity in the shortest possible time through spontaneous cooperation without ecological offense or the disadvantage of anyone” Buckminster Fuller. The development should enhance the infrastructure provided to the holistic community within the Bloemfontein CBD.

Human Centered Design

The design promotes and prioritizes human spaces rather than spaces for automobiles, thus promoting a culture of interaction along the new servitude space. The laboratories both have a break room which connects to the city outside and offers the chance to interact much like the courtyards within the Department of Microbiology (Page 43).

Barrier Free Access to Nature and Place

Universal access is into consideration for barrier-free architecture and so the development is wheelchair friendly (2.47-48). The maximum ramp slope is 1:12 within the project allowing for it to be accessible for all the users. The public spaces is enhanced through street furniture, public art, gardens, and benches. This enhances the pedestrian leisure space of the spruit which runs through the CBD.

The built-up nature of the spruit and CBD means that a habitat extension is a viable approach to restoring the natural balance. This is a dense addition of nature which solves various climatic and social issues within the city. Eco boulevard by Ecosistema Urbano is an example of how this can be implemented through specific systems and approaches to the city (Ecosistema Urbano, 2007).

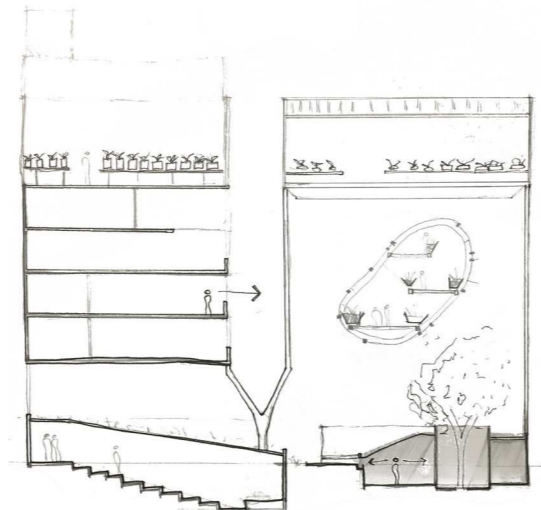


Figure 2.47 - Access to nature within a high rise

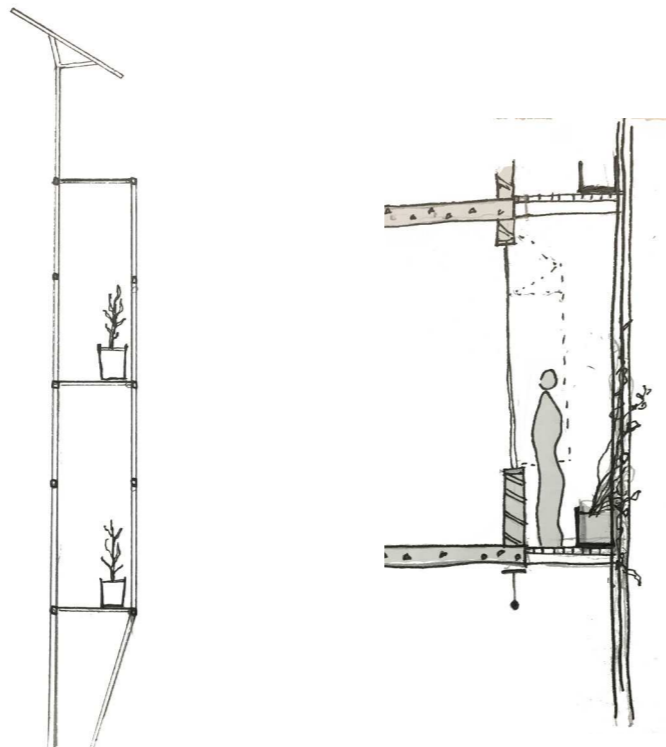


Figure 2.48 - Eco Boulevard inspiring design skin section

Eco Boulevard

Location: Milan
Ecosistema Urbano
Focus: Nature in the city

The eco boulevard project is not intended as a final solution but rather as a temporary prosthetic for the city’s rejuvenation (Figure 2.51). In this case the space is not used and this aims to make the space more attractive for recreation to the micro climate of the space being cooler than its surrounding. This idea could also be used to enhance existing dense public spaces to become more livable for their inhabitants. It allows the plants to form dense habitats raising multiple levels. Once the rest of the park has been propagated these towers are to be taken down and the spaces left behind will remain as clearings in the garden. The structure demarcates a social space under itself and raises its-self clear of that space so it may be used as its inhabitants please (Figure 2.49).

2.3.6 Beauty

The aim is to redefine the sense of built environment care within the CBD and along the spruit. Human delight should be promoted through culture, spirit, and place. This must take the public form of gardens, art and small conveniences made toward the people of the city.

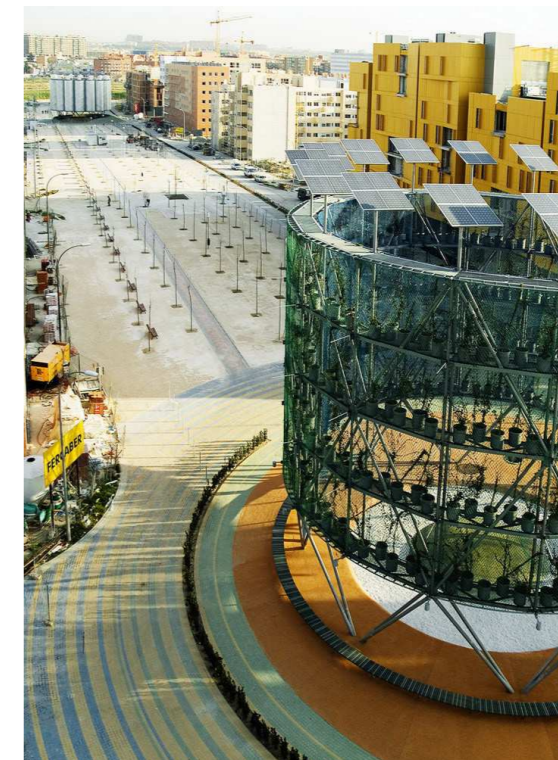


Figure 2.49 - Eco Boulevard (Ecosistema Urbano, 2008)

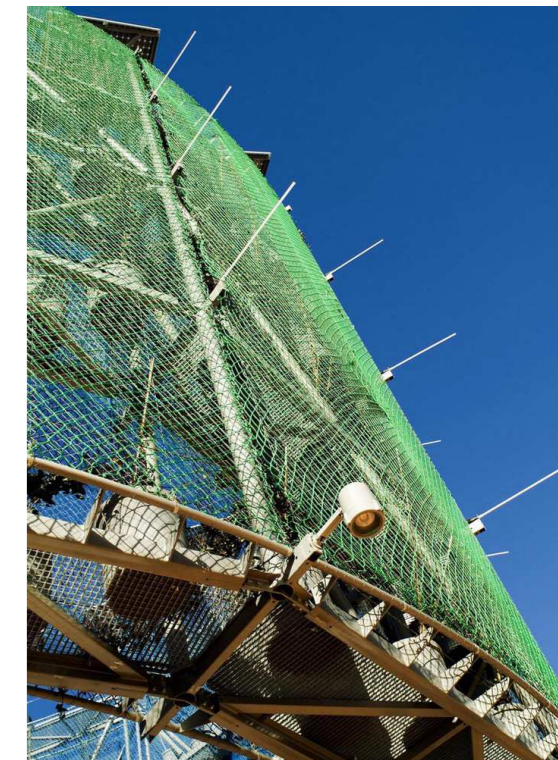


Figure 2.50 - Green wall (Ecosistema Urbano, 2008)

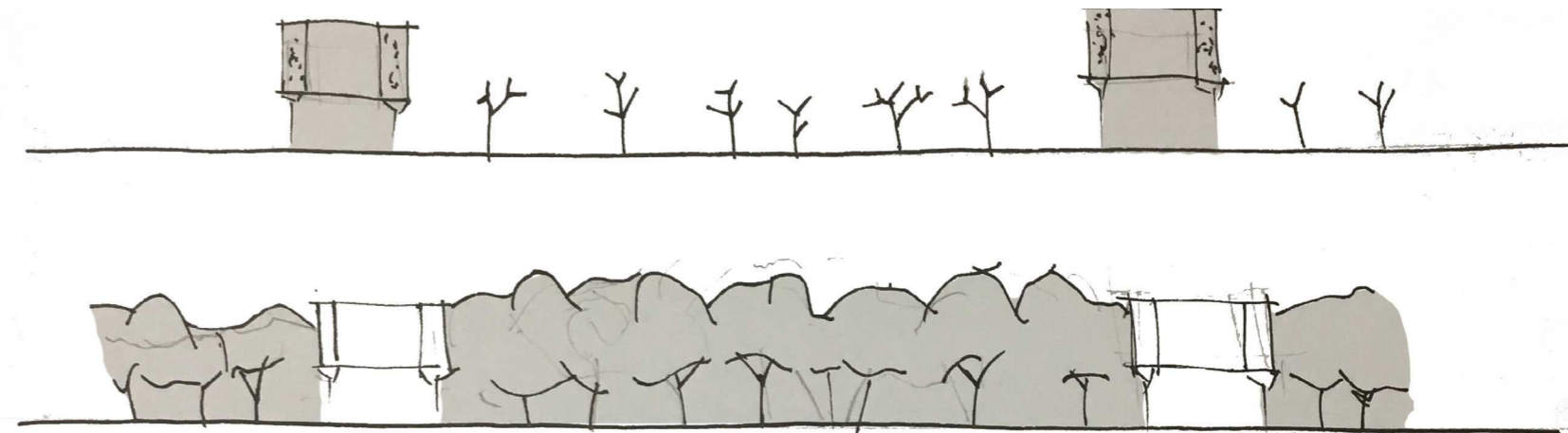


Figure 2.51 - Eco Boulevard transforming the urban landscape

2.3.7 Materials

The aim is to promote a local material economy which is “non-toxic, ecologically restorative, transparent and socially equitable” (International Living Future Institute, 2016, p. 43).

Red List Materials

The project should not contain materials which are on the ‘Living Building Challenge Materials Red List’ (as found in Annexure A), these are not ecologically sustainable materials and so are avoided.

Steel is used for the greenhouse spaces, representing the cold analytical nature of the explicit research. While wood will be used in places relating to the implicit due to its warm nature which encourages engagement.

The columns and trusses which span the length of the site are made of steel. Its thin members add to the imaginative nature of the place created within the gardens. The floors of the larger greenhouse to the east will be made of steel planking to let light through into the hanging gardens below. The perforations add to the suspense of reality inside the building as researchers seem to float as they work the gardens.

Below these trusses hang a series of calabashes to be constructed out of timber which will house garden space and walkways. These calabashes will be held in place by steel cables to give the sense of a suspended reality the participant is engaging with. The calabashes house implicit knowledge and so area made of wood.



Figure 2.52 - Development render of design

Polycarbonate Sheeting

Readymade sizes of multiwall polycarbonate sheeting limit and guide the design process when using the material. The sheeting is used as a roofing and walling material for the greenhouses. It allows for good light transmission while providing high R values. It is also very light with ‘Cleardek’ claiming that its product ‘Seplux’ weighs half that of a similar strength glass (Cleardek, 2019: 2). Two types of the sheeting are used in the project.

Cleardek ‘Seplux’ interlocking panel (Figure 2.55)

This system is used as a walling system which fits between the truss structure of the greenhouses. The benefit of it is that the system has no standing seams or lighting obstruction. The system also does not require lateral support, and so is completely supported by its aluminum frame. These panels are 40mm thick and come in a width of 435mm.

Multiwall Polycarb Panels (Figure 2.53)

These do not come as a finished system but are rather a building material in a thickness of 25mm. This 25mm three wall system allows for a light transmission of 72 percent. Compared with the 10mm system which offers 82 percent light transmission. Thus, the roof angles remain relatively perpendicular to the sun's rays in order to minimize the angle of incidence (Figure 2.56). Sheets are clamped together using aluminum profiles (Figure 53).

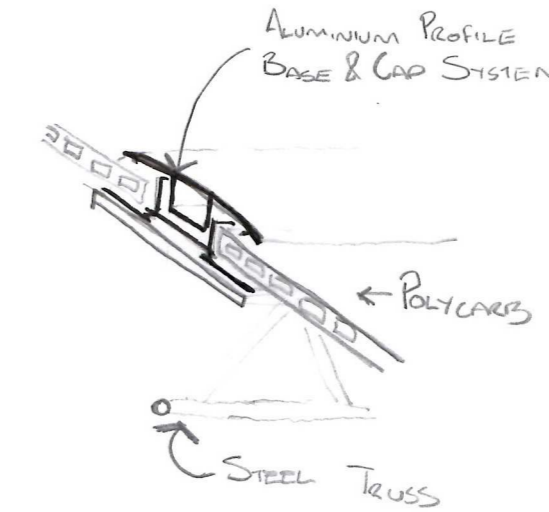


Figure 2.53 - Polycarb fixing system

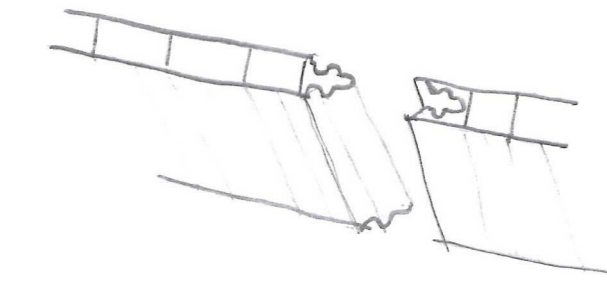


Figure 2.55 - Cleardek ‘Seplux’ connection

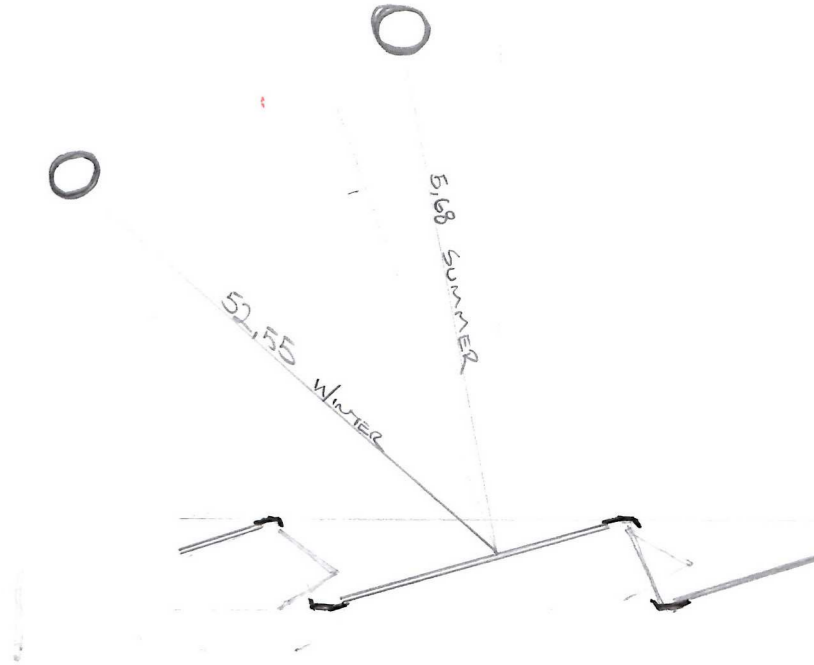


Figure 2.54 - Sun angle calculations

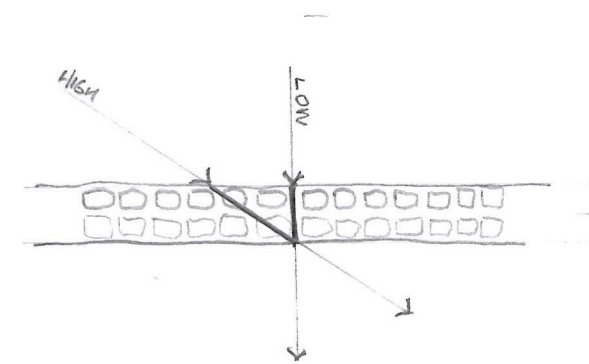


Figure 2.56 - Angle of incidence

UFS Dept. Agriculture Greenhouses

Location: Bloemfontein
Focus: Construction Principles

The university uses two styles of greenhouse on the Bloemfontein campus. One is a glass, steel and aluminum greenhouse type and the other is a newer aluminum and polycarbonate greenhouse. The first set shown in figure 2.57 are based on a glass construction, the spans of glass are not very large. These greenhouses have a light shade-cloth structure 500mm above the glass to protect the glass from hail. The polycarbonate greenhouses do not require this as the sheets are strong enough to resist this alone.

A steel structure is fastened to the slab on ground foundation between which is the secondary structure which houses the glass panel system. Each greenhouse is separated into three climate adjustable compartments. The air conditioners for which are located externally against the southern wall (Figure 2.61). This wall is constructed of brick to retain heat at night and is what the ducting system and services fasten to. Currently the greenhouses are used for three purposes. Plant Pathology; Soil, Crop and climate Studies and plant breeding studies.

The greenhouses in this project will take the polycarbonate route as it is lighter and more durable.

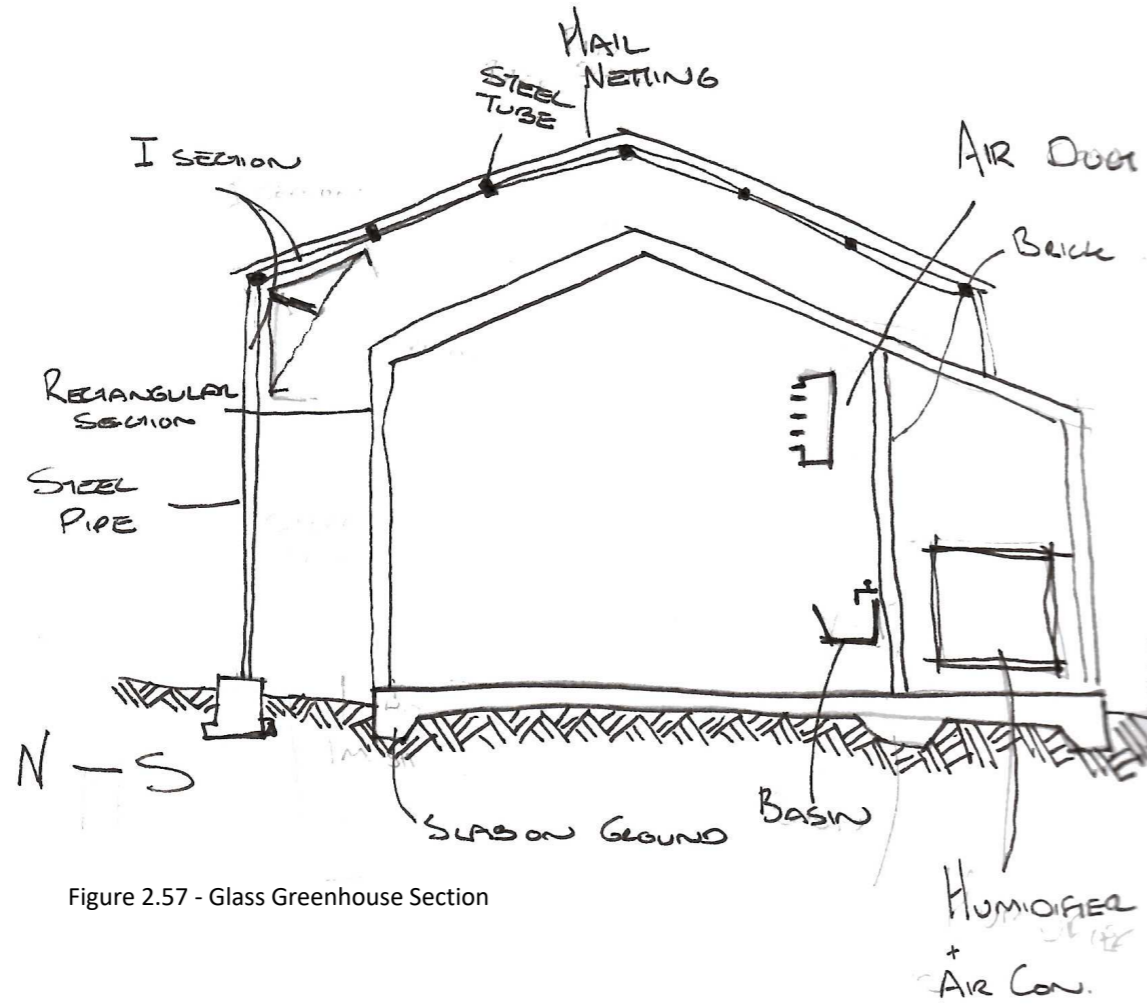


Figure 2.57 - Glass Greenhouse Section

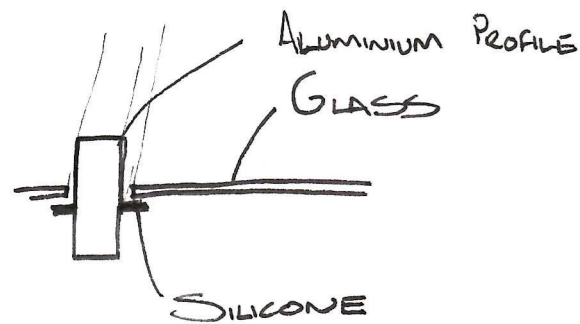


Figure 2.58 - Glass Fixing

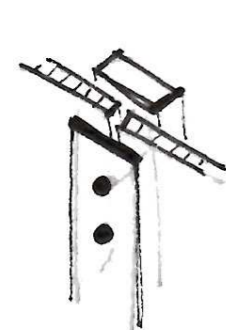


Figure 2.59 - Polycarb Fixing

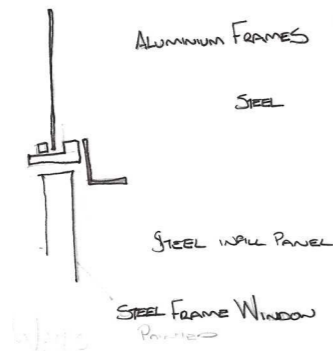


Figure 2.60 - Glass Greenhouse Window

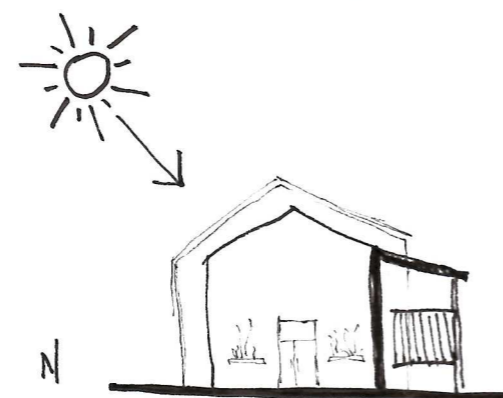


Figure 2.61 - Greenhouse and Climate Systems

Glue Laminated Timber (Glulam)

This structural engineered wood product is made by bonding layers of timber together with structural adhesives (Figure 2.66). The benefits of using glulam are that they are significantly more energy efficient than steel profiles and can be constructed to complex curves (Figure 2.62). The rings which make up the hanging gardens offsite the design can be manufactured offsite and transported to site thus making the process very space and time efficient. The strength of these timber profiles can be altered by making them thicker or thinner where necessary. For the project the thinner profiles act as bracing while the thicker profiles gather the load of the structure and transfer it to the girder above. The wood gives a warm natural feel to the spaces in which it is used, thus encouraging interaction. The Bavarian Forest Treetop Walkway uses these to great effect in '3.5 Structural Investigations' on page 62 and works in a similar structural system.

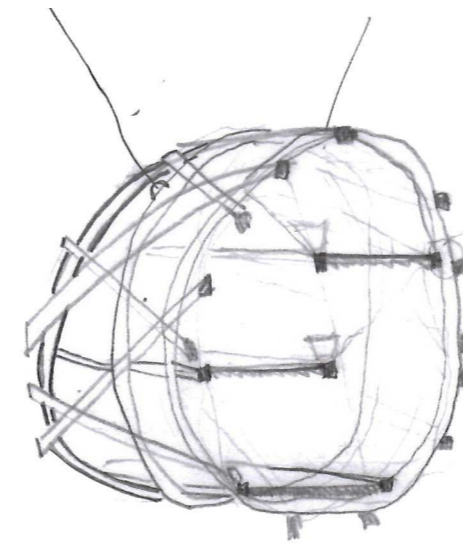


Figure 2.62 - Glulam pod development

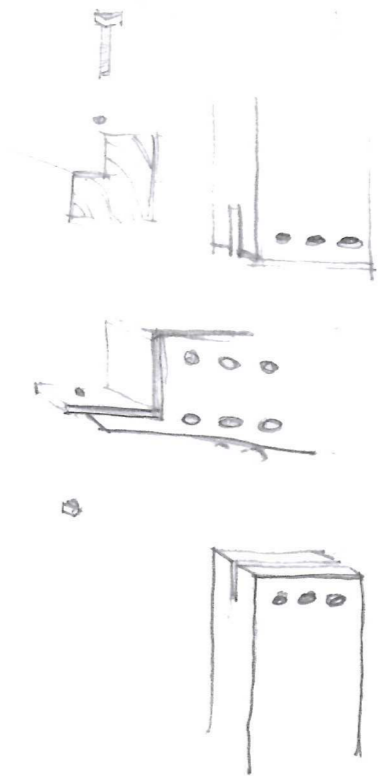


Figure 2.63 - Glulam connection detail

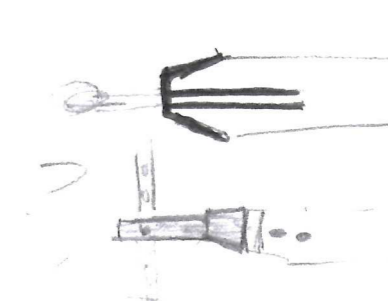


Figure 2.64 - Glulam-Steel Connection

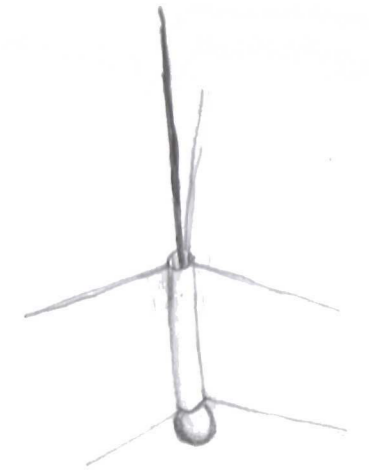


Figure 2.65 - Connection detail

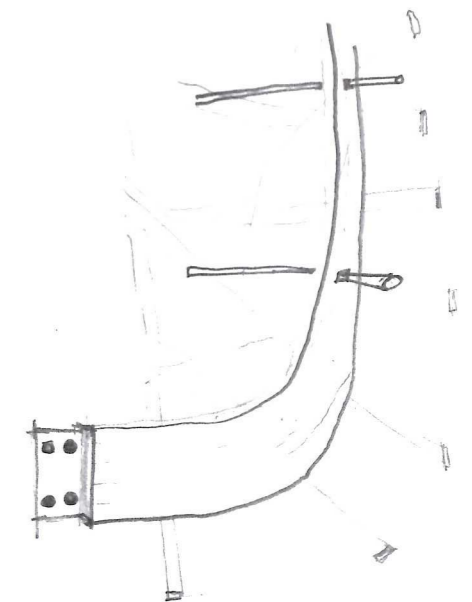


Figure 2.66 - Glulam profile development

Steel (Planks too)

Steel profiles are used throughout the project due to their high strength and slender form. It has a high tensile strength and so steel rods are used to hang the floorplates and pods from the girders above. By hanging these elements rather than supporting them the steel rods can be far slendrer allowing for the suspension of the pods to be less noticeable. Hidden steel plates are also used to connect the rods to each pod structure (Figure 2.63; 65).

The floor of the green house uses a steel planking system much like scaffolding planks (Figure 2.72). These are lightweight and offer the opportunity for a part of the greenhouse floor to be a mesh thus connecting the public and greenhouse to an extent.

The beams throughout this project are specially fabricated girder modules (Figure 2.69). These are fabricated in Bloemfontein but off site and thus adding to the efficiency and speed of the construction process. This also allows the structure to be light and more material efficient.

The gutters and capping of the greenhouse structure are typical greenhouse gutter beams (figure 2.67; 68; 70). These are gutters which also act as beams for the battens to be attached to. In this project they have been reinforced to span further that would be typical due to their structural requirements.

Composite Slab

The floorplates of each story need to be as light and thin as possible to be more efficient with material use. This means that permanent steel formwork has been used to reduce the slabs depth and thus the volume of concrete required buy the project (Figure 2.71). On top of this slab is a false floor which allows services to be conveniently stored. It also gives the opportunity for the laboratories to easily change after the technology within becomes redundant. Once the main girders are erected on site the floor slabs can be quickly assembled and the concrete cast while the following floors are assembled. This process is quick as the formwork need not be disassembled once the slab is set.

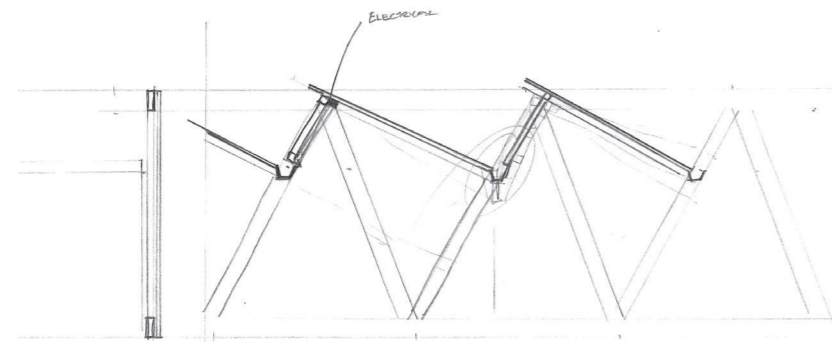


Figure 2.67 - Greenhouse Gutter Beam

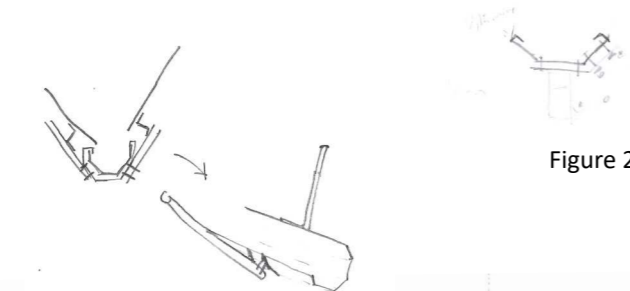


Figure 2.68 - Gutter Beam Fixing

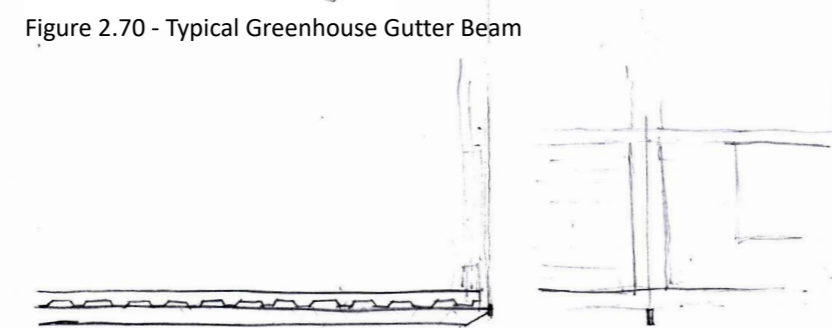


Figure 2.70 - Typical Greenhouse Gutter Beam

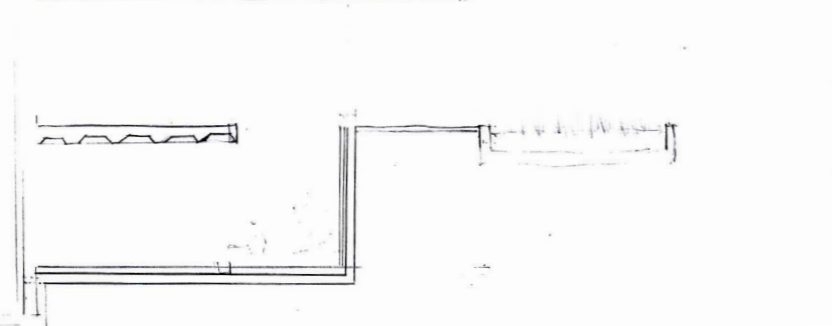


Figure 2.71 - Composite Slab

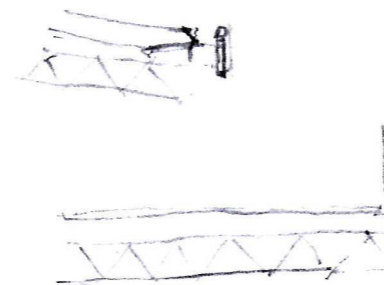


Figure 2.69 - Girder



Figure 2.72 - Grip Strut Decking (McNicols, 2019)

3.0 Technical Challenges

These investigations uncover various aspects of the project and provide design cues. They do so by revealing the requirements, conditions, and problems associated with the different elements which will be integrated into a single design solution.

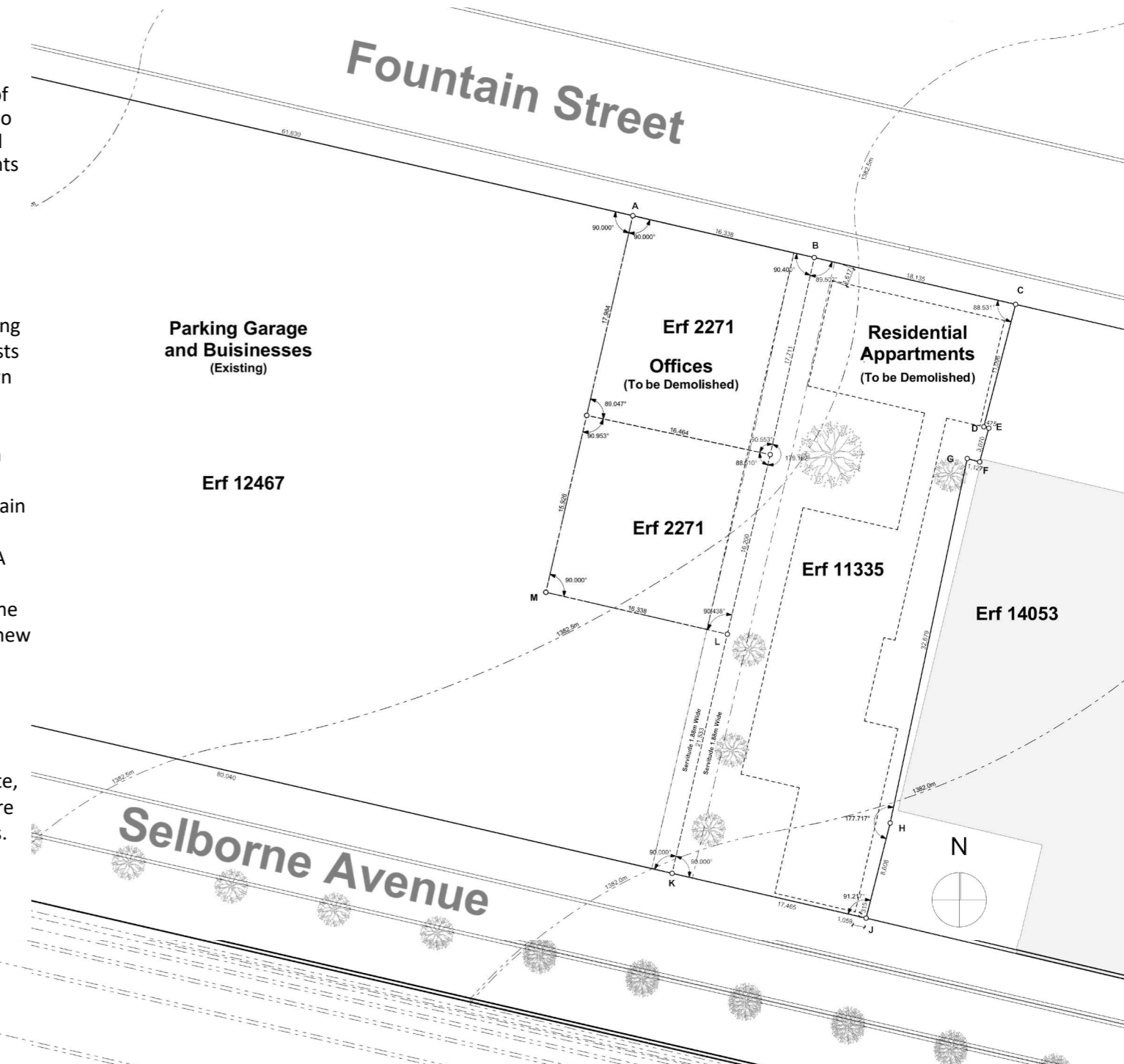
3.1 Municipal Non-Negotiables

This selected site consists of three erven and two structures (Figure 3.1). The western building covers two erven (Erf 2271 and 2272). It consists of a co-working office space/coffee shop known as Green Express Café. This establishment occupies the front half of ground its floor. The building's upper level is abandoned, filled with rubble and poorly kept. The third erf (11335) stretches between Fountain Street and Selbourne Avenue. It consists of two stories of basic student accommodation. A rambling set of additions such as carports and extra rooms characterizes the development. The project consolidates the three erven into this new plot. The existing buildings will be demolished entirely. The consolidated portion of land will contain the built structures on for the project.

There are no building lines on the proposed site, as shown in figure 3.1. The site's boundaries are an agglomeration of past erven and servitudes. For SG diagrams, see Annexure A. For the consolidated site plan, see Drawing A101.



Figure 3.1 - Site Plan



3.1.1 Encroachments

The municipality allows for infringements beyond the boundaries of the site.

8.1 A cantilevered overhanging roof may be erected over the street boundary or building line, at a height of at least 2,75m above the finished ground level, measured from the finished ground level to the lowest point of the overhanging roof.

8.2 Foundations that are at least 0,75m under the ground level may exceed a street boundary or building line with a maximum of 0,5m.

8.3 Sunshades and overhead lamps may exceed a street boundary or building line: provided that there is a head clearance of at least 2,1m, measured from the finished ground level to the lowest point of such sunshades or overhead lamps.

8.4 Eaves projections may exceed the street boundary or building line (Mangaung Metropolitan Municipality, 2016).

3.1.2 Side Walk Paving

The municipal paving regulations need to be understood because the sites require a servitude across them (Figure 6). The municipality allows property owners to place and replace paving on the sidewalks adjacent their buildings as long as the paving fulfills specific requirements (Mangaung Metropolitan Municipality, 2016).

“5.2 Paving or slabs must be laid to the grade, line and cross-fall pointed out by the Council and must conform to the following further requirements:

- (a) For ordinary paving or slabs, the minimum cross-fall must be 1:100 and the maximum cross-fall 1:25.
- (b) Non-skid paving or slabs of a type to be approved by the Council must be used for cross-falls between 1:25 and 1:15: provided that the maximum cross-fall must not exceed 1:15.
- (c) Longitudinal grades must not be steeper than 1:25 for ordinary paving. Slabs and non-skid paving or slabs may be used for longitudinal grades between 1:25 and 1:15: provided that the maximum longitudinal grade must not exceed 1:15.

5.3 When carriage openings are formed in curbs and cross footways or pavements, such openings must be paved or slabbed

6.1 The owner or occupier of an erf adjoining a street may, at his or her own cost, grade and plant with grass any land lying between the erf and that part of the street intended, laid out or made up for the use of vehicular traffic.

6.2 The owner or occupier of an erf aforesaid may plant flowers or small shrubs in a strip of land not exceeding 1 meter in width immediately adjoining the said erf” (Mangaung Metropolitan Municipality, 2016).

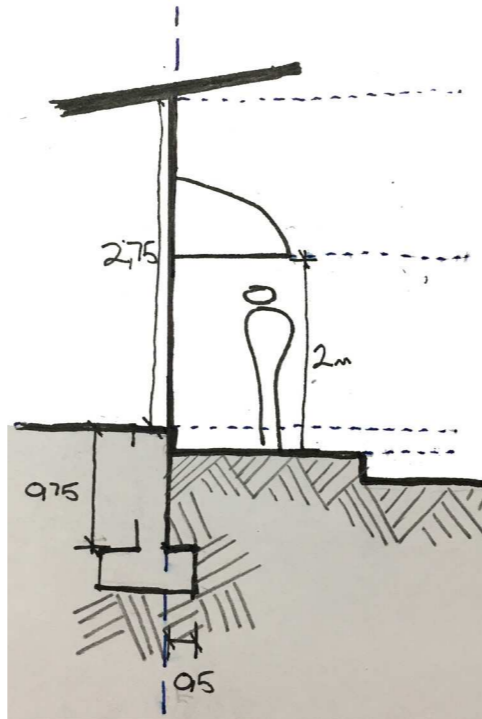


Figure 3.2 - Sunshade regulations

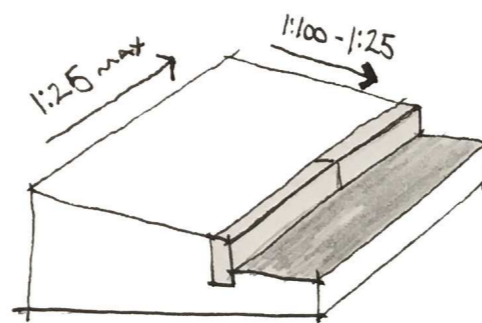


Figure 3.3 - Paving slopes regulations

3.2 Servitudes

25-27 Fountain Street has a 3.76 m servitude passageway which requires that the erf can one can cross without obstacle. The adjacent 6 Fountain street had a similar servitude requirement when built which is accommodated in the form of a passageway through the center of the parking garage. Both servitudes have gates on currently and have been locked to keep people out.

3.2.1 Development Rights

This investigation spans three plots which are currently separate, erf 2271 and 2272 are legally bound. The site is zoned as an urban development zone as well as diverse development (Mangaung Metropolitan Municipality, 2014). This zoning classification aligns with the intended project (Figure 3.4).

Schedule Of Rights				
Property Description				
Erf/Portion - 11335		Site Area - 970.88m ²		
Township - City of Bloemfontein		Title Deed No		
Zoning Information				
Town Planning Scheme		Amendment Scheme No.		
Use Zone		Residential 002		
Annexe No.				
Development Control Measures				
Permissible		Control		Actual
N/A		Building Height		2 Stories
N/A	90%	Coverage		51.05%
N/A		Floor Area Ratio		1.14
0mm	869.54	Floor Area		495.63
		Building Lines		0mm

Schedule Of Rights				
Property Description				
Erf/Portion - 2271		Site Area - 292.70m ²		
Township - City of Bloemfontein		Title Deed No		
Zoning Information				
Town Planning Scheme		Amendment Scheme No.		
Use Zone		Business 002		
Annexe No.				
Development Control Measures				
Permissible		Control		Actual
N/A		Building Height		2 Stories
N/A	88.92%	Coverage		88.22%
N/A		Floor Area Ratio		2
0mm	260.27	Floor Area		259.18
		Building Lines		0mm

Schedule Of Rights				
Property Description				
Erf/Portion - 2272		Site Area - 263.42		
Township		Title Deed No		
Zoning Information				
Town Planning Scheme		Amendment Scheme No.		
Use Zone		Business 002		
Annexe No.				
Development Control Measures				
Permissible		Control		Actual
N/A		Building Height		2 Stories
N/A	88.86%	Coverage		88.12%
N/A		Floor Area Ratio		2
0mm	234.04	Floor Area		232.82
		Building Lines		0mm

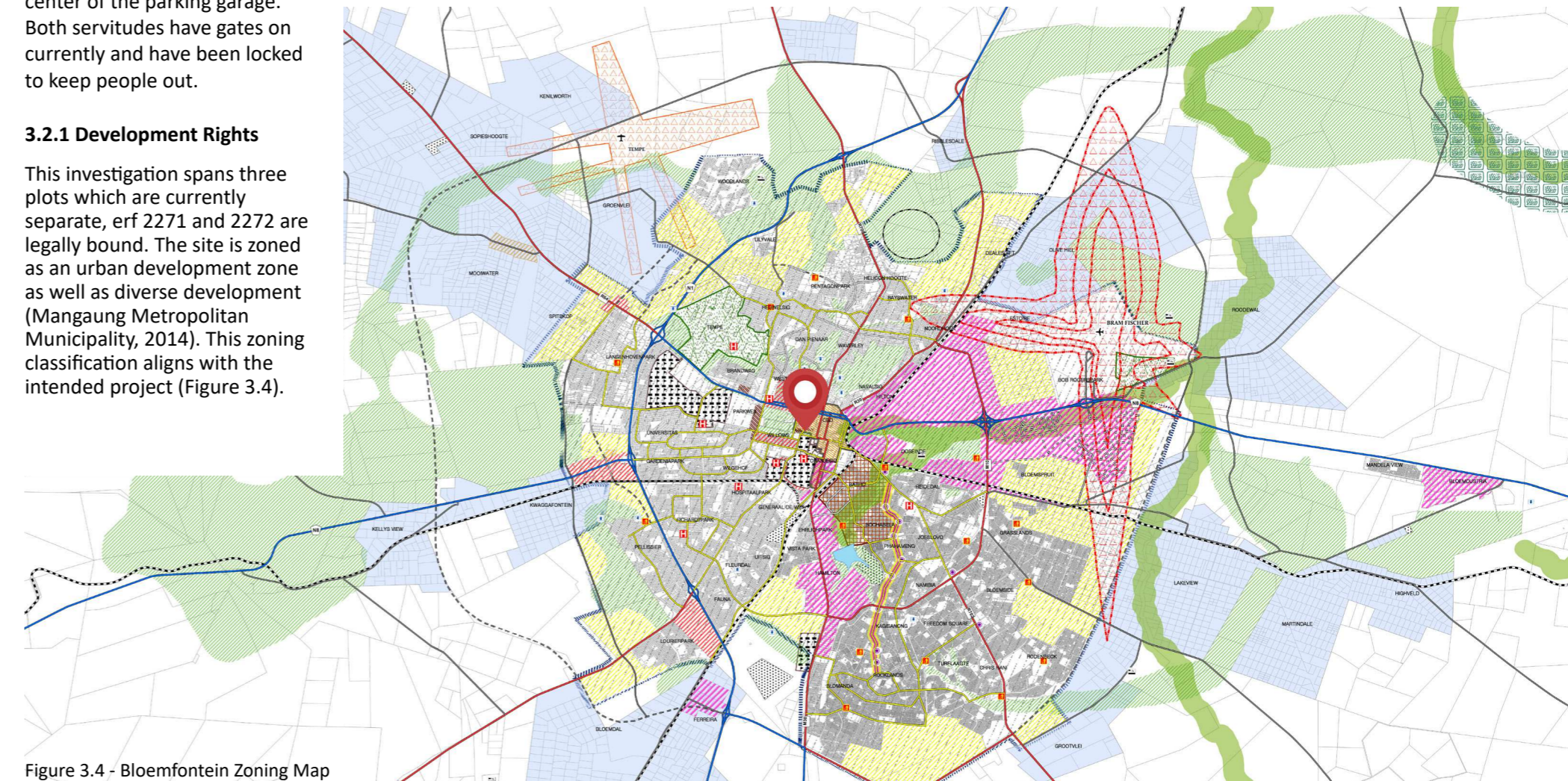


Figure 3.4 - Bloemfontein Zoning Map

3.3 Topography

There is a 1250mm fall across the site at a slope of 1:51 (Figure 3.7). The site is bordered by Fountain Street and Selbourne Avenue and the spruit. The sidewalk along Fountain Street is 2.5m wide while the one on Selbourne Avenue is 3.5m, both are made of concrete brick pavers.

There are very few soft surfaces across the site; the only green spaces are those beneath trees. This continues out onto the spruit. The trees are concentrated along the pedestrian routes along the length of the spruit, as shown in figure 2.6.

There were no useful soil samples available on this 'brownfields' site. There is a high water table due to the site's proximity to the spruit. The South West corner of the site lies on the historical path of the spruit as shown in the maps of (Figures 1.22-26).

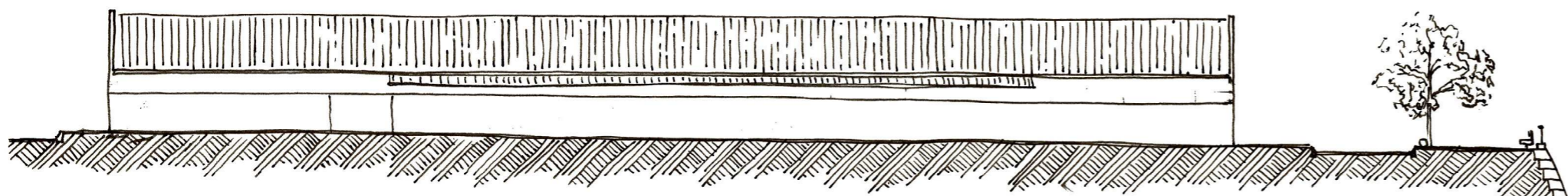


Figure 3.7 - N-S Section

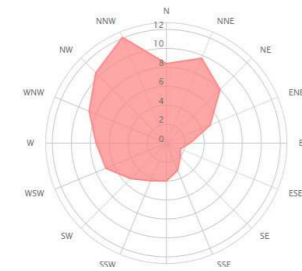


Figure 3.5 - Wind Information Bloemfontein (Windfinder, 2019)

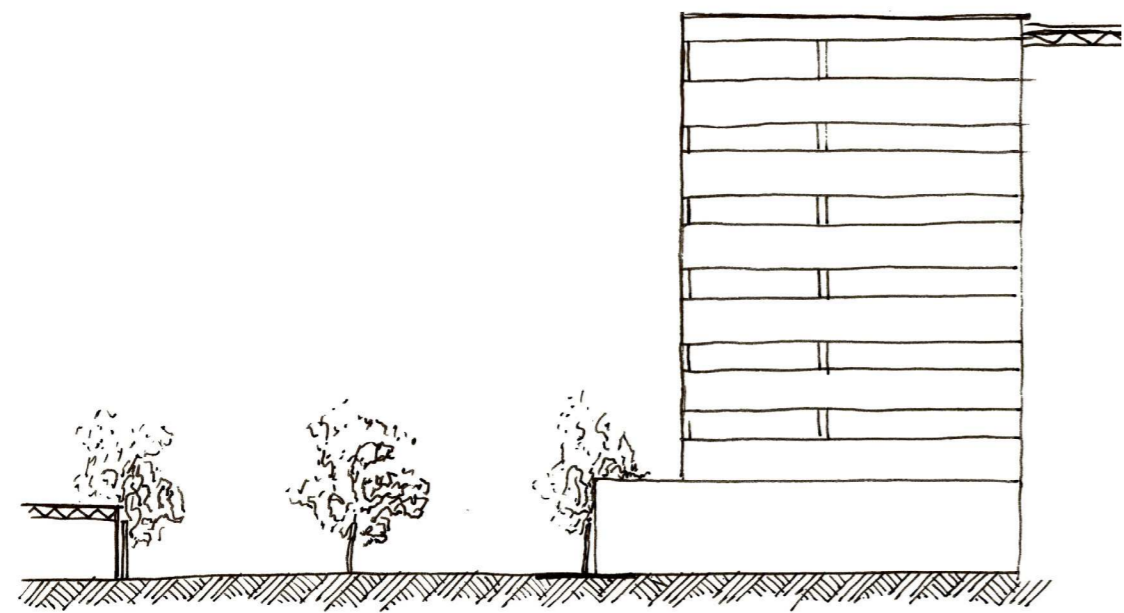
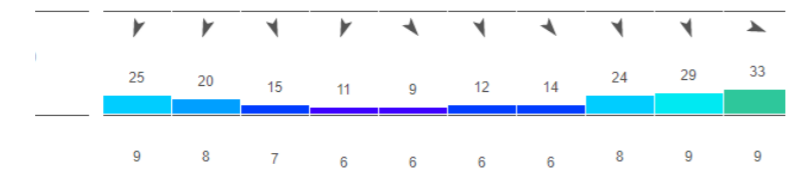


Figure 3.6 - E-W Section

3.4 Climate

The research done by the UFS Department of Phytomedicine and Phytopharmacology focuses on Free state specific plant species. This means that rain and sunlight are not determining factors in the plant species climate requirements. What is of concern is the precipitation and adjacent water storage calculations. In order to achieve the sustainability goals identified, the design needs to store the 180m³ of rainwater which falls in February. The architecture should also provide adequate shading as the sun hours of Bloemfontein are high year round (Figure 3.9).

Figure 3.5 shows the temperature in Bloemfontein as fluctuating between 36.1 and -1.9. Figure 3.8 shows the dry nature of Bloemfontein. The weak and predictable nature of the winds on the site is indicated in figure 3.5. This wind can be used to cool the greenhouses in summer when it is stronger.

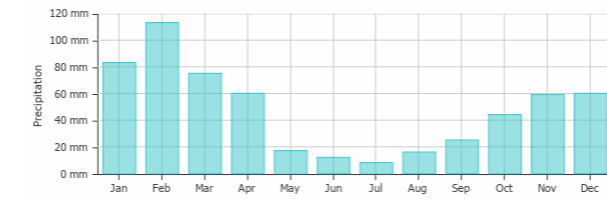


Figure 3.8 - Rainfall Bloemfontein (Windfinder, 2019)

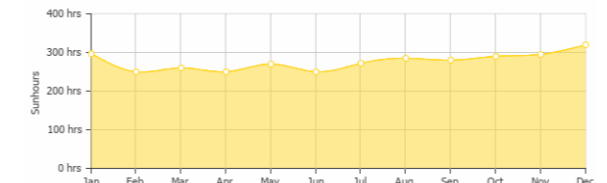


Figure 3.9 - Sun hours Bloemfontein (Windfinder, 2019)

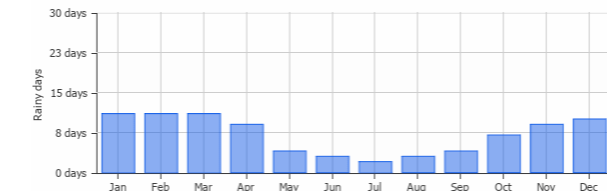


Figure 3.10 - Rainy days Bloemfontein (Windfinder, 2019)

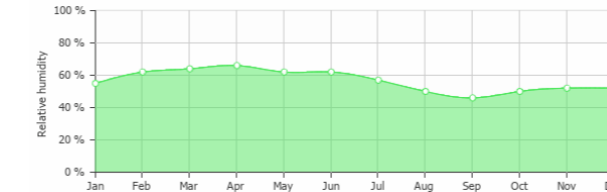


Figure 3.11 - Relative Humidity Bloemfontein (Windfinder, 2019)

3.5 Structural Investigations

3.5.1 Exoskeleton Structures

The exoskeleton carries the primary lateral load of the building on the exterior of the floor plate. It is often characterized by the framing structure where all loads are transferred to. In the case of some buildings such as the Barcelona Media-tic Building by Cloud 9 (Figure 3.12-14). Each floor plate hangs off the primary structure thus the ground floor can be completely free of structural elements (Figure 3.14). Other solutions take the load of each floor plate out into the exoskeleton level by level.

Advantages:

- The interiors become column free
- It makes the building instantly identifiable
- Fireproofing becomes easier
- Weight of structure (More sustainable)
- Can become a dual façade system easily

Disadvantages

- Scale is required to develop enough shear and bending resistance
- The façade is dominated by the structural system thus not aligning with Koolhaas's ideals of the city described earlier.
- Often requires precise custom-made segments to be assembled on site (Not Local and thus less sustainable)

This system allows for each floorplate to be unique yet free of bulky columns and beams. Making each floor a virgin site ready to adapt to the possibilities explored on it. It also allows for a free façade where the building's face can be changed every time the function of a floor is changed.



Figure 3.12 - Media-TIC main truss (Lee, 2010)

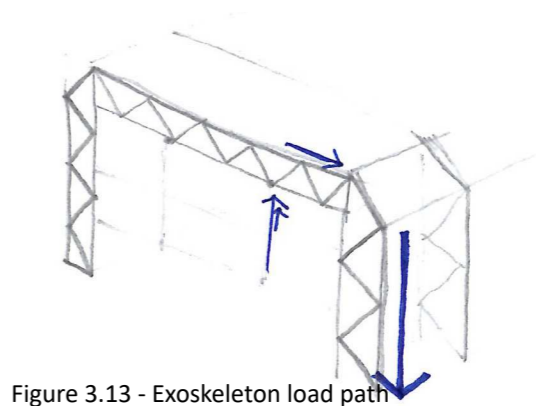


Figure 3.13 - Exoskeleton load path

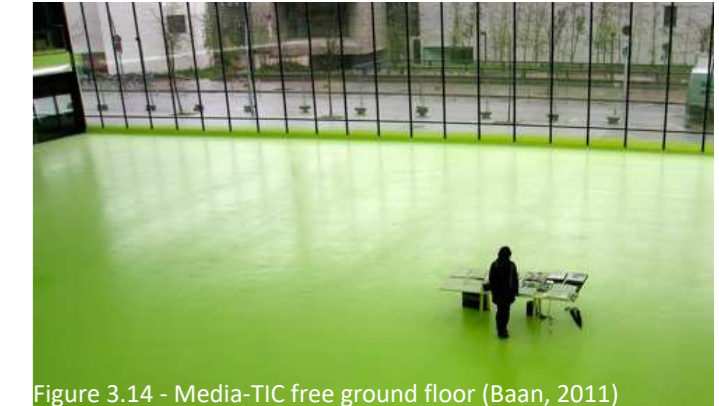


Figure 3.14 - Media-TIC free ground floor (Baan, 2011)

Application: Departmental Flooring System

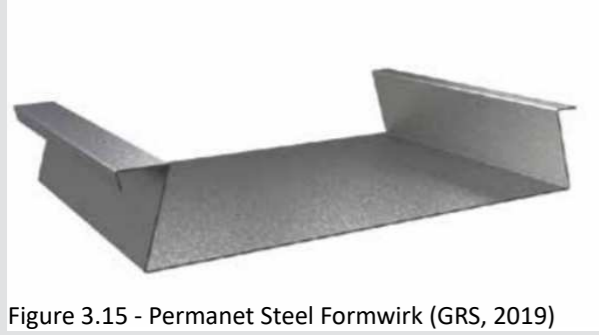


Figure 3.15 - Permant Steel Formwork (GRS, 2019)

Bond-Lok Permanent Steel Formwork

The formwork is used within the research component and provides the base for the raised access flooring system. This is a single span floor slab system which can be quickly assembled within the exoskeleton to provide stiffness during construction. These lengths of formwork are fixed to the top of the girders onto which the concrete is then cast. The girders then pierce the skin of the building and are fixed to the steel rods which hang from the truss above. Figure 3.17 investigates how best to make the various connections between the façade, girder and raised access flooring system.

Advantages:

- Floor slabs can be thinner than traditional pure concrete slabs
- The slabs can be quickly assembled on-site
- Eliminated the need for the construction and destruction of temporary formwork
- No additional reinforcing other than a light mesh for shrinkage control is required

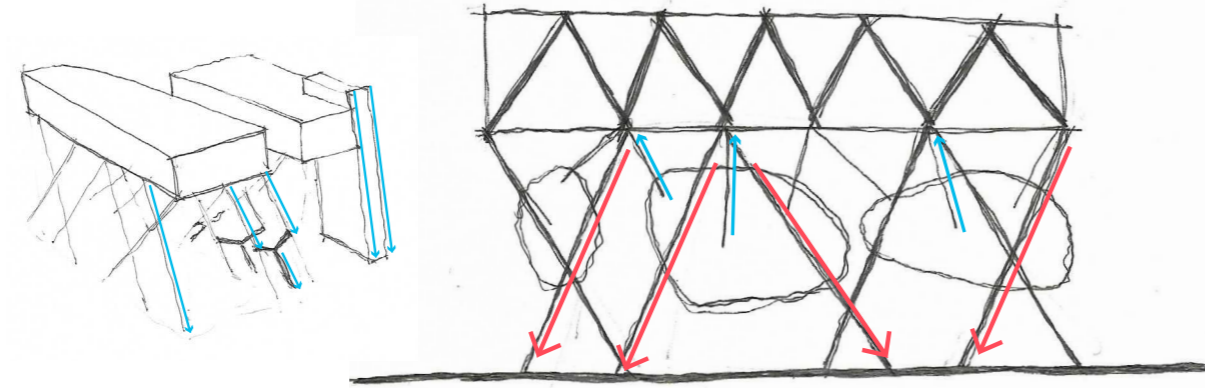


Figure 3.16 - Exoskeleton load path applied

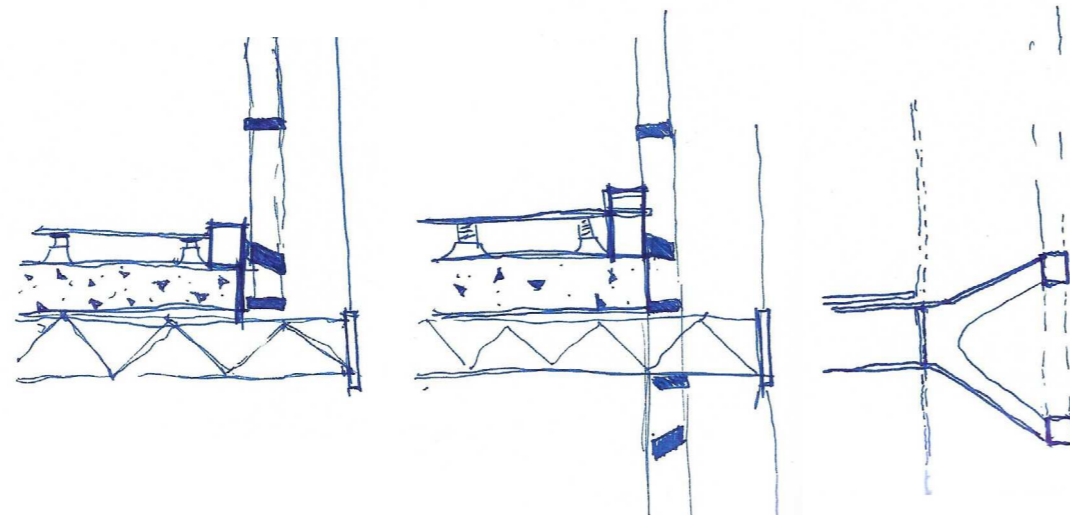


Figure 3.17 - Development of flooring connection

Application: Propagation Greenhouse Flooring System within Exoskeleton



Figure 3.18 - Grip Strut (Eaton, 2019)

Grip Strut Safety Grating

These are used in the same manner as scaffolding planks. The propagation greenhouse uses two plank surfaces, namely the Grip Strut surface and the Dimple Only pattern. The Grip Strut surface is used along the walkway area in order to facilitate a visual connection and allow light into the gardens below. The Dimple Only pattern is used under the growing trays in order to prevent debris and water from falling below.

Advantages:

- Approximately half the weight of a traditional Bar Grated solution for equivalent live load strength
- Planks are interchangeable and so the same system can be used for punctured and solid flooring
- Quick installation times
- Can be welded along their length to achieve a more uniform deflection

Available Lengths:
600mm – 3 000mm for a 60mm profile depth

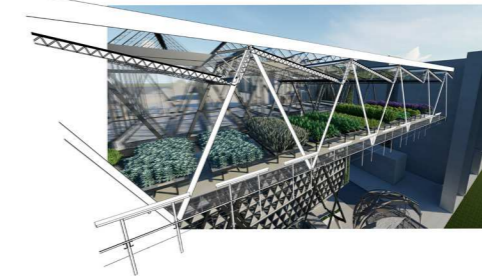
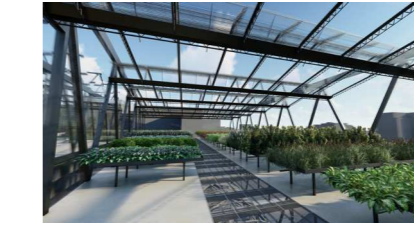


Figure 3.19 - Roller bed structure

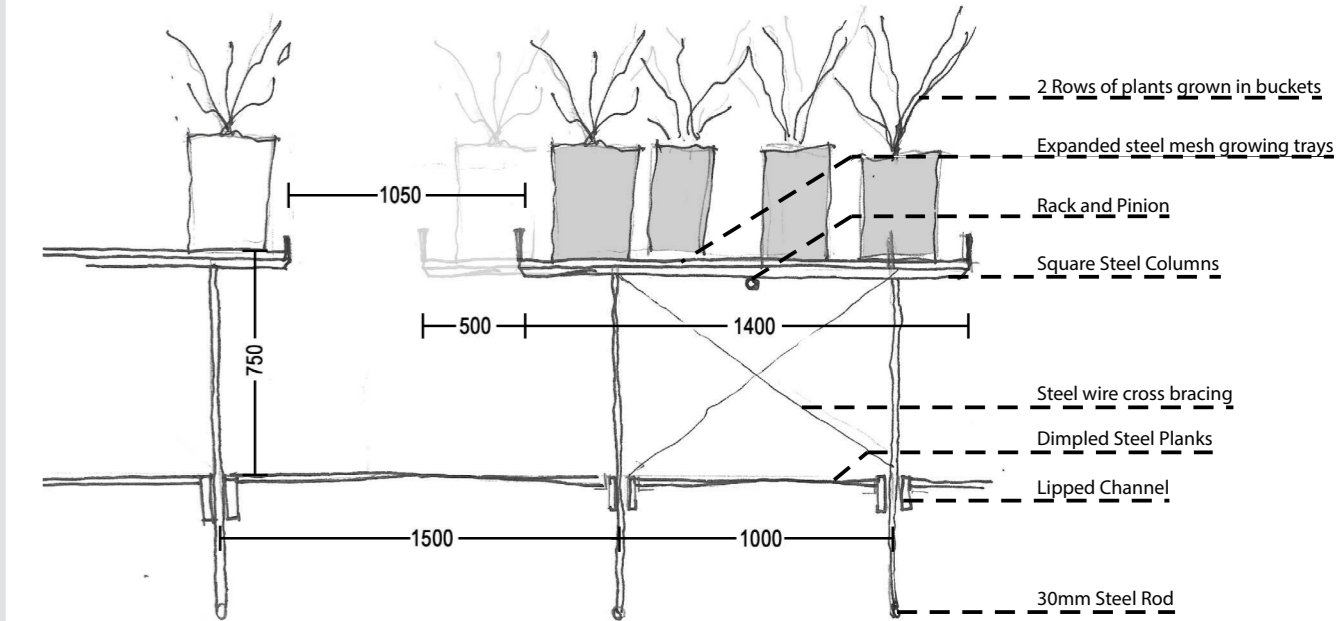
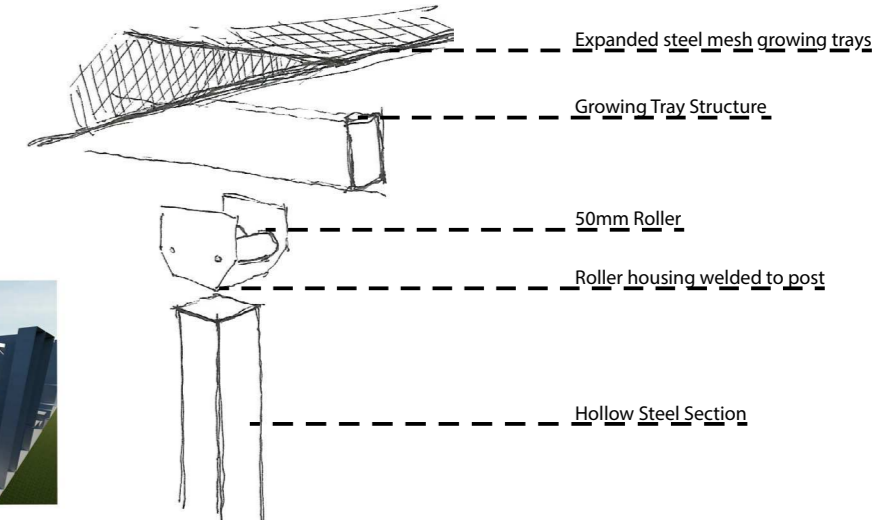


Figure 3.20 - Bed / Plank Spacing

Treetop path, Bavarian Forest National Park

Location: Neuschonau, Germany
Focus: Walkway System – Program

The wooden walkway is integrated into the treetops of the forest. Along the path there are various ‘points of information’ which explain the mountain forest in front of the viewer as well as ‘adventure’ points (Figure 3.21). Here the viewer has the option to take a more adventurous route as to heighten the experience of being high in the forest. In practice these are sections where the slats have been replaced with a tight rope, individual slats, tree stumps or a net. The concept of this walkway is to perceive the forest from a different viewpoint and engage with it where normally impossible.

The structure consists of laminated timber sections, timber sections and steel profiles (Figure 3.21-24). The steel is used as a secondary structure and bracing. The timber relates to the forest and so it's used as the primary elements of the structure.

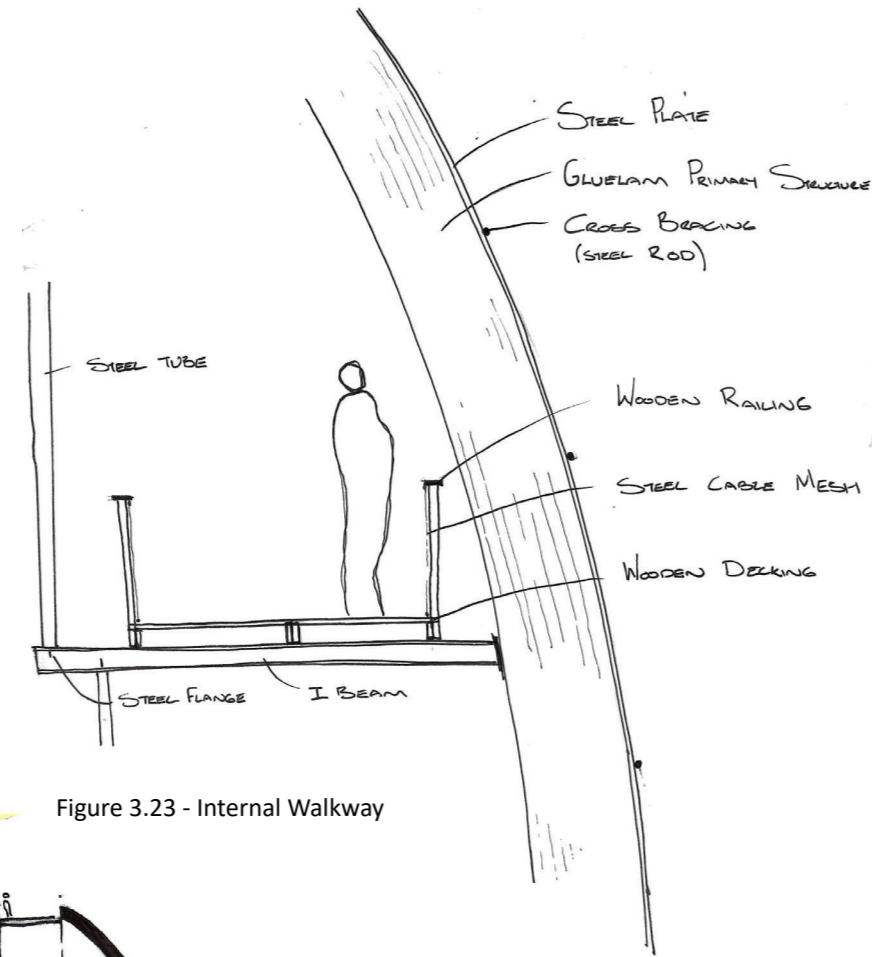
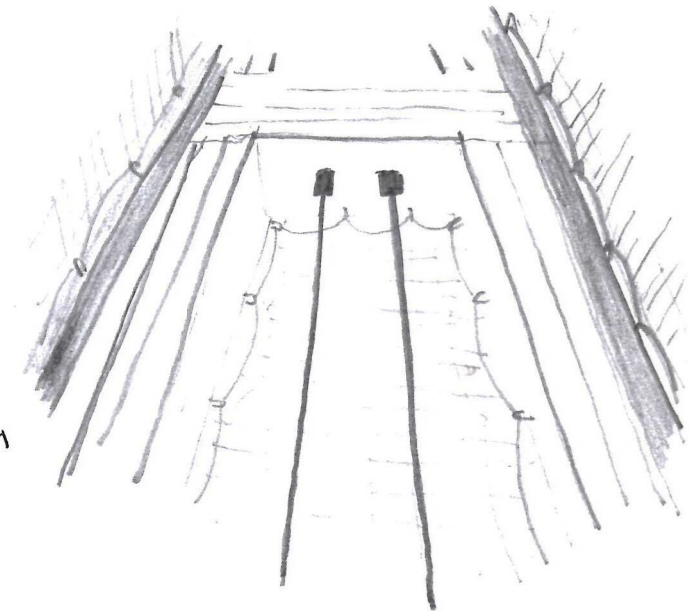


Figure 3.23 - Internal Walkway



62 Figure 3.21 - 'Adventure Point'

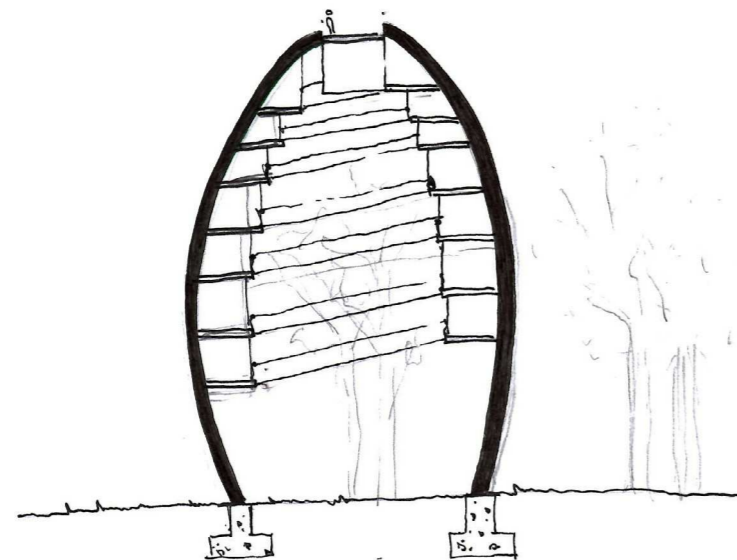


Figure 3.22 - Section, Bavarian Forest National Park

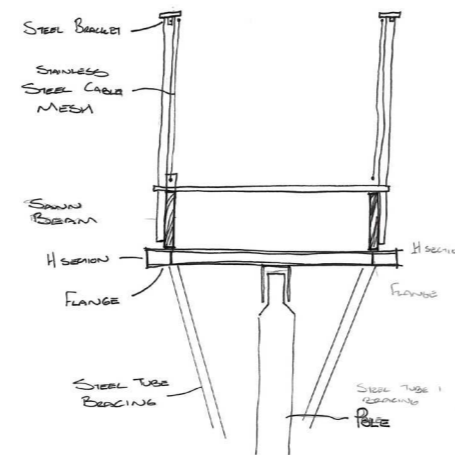


Figure 3.24 - Walkway Structure

Application: Hanging Gardens

1. Bracing Connections

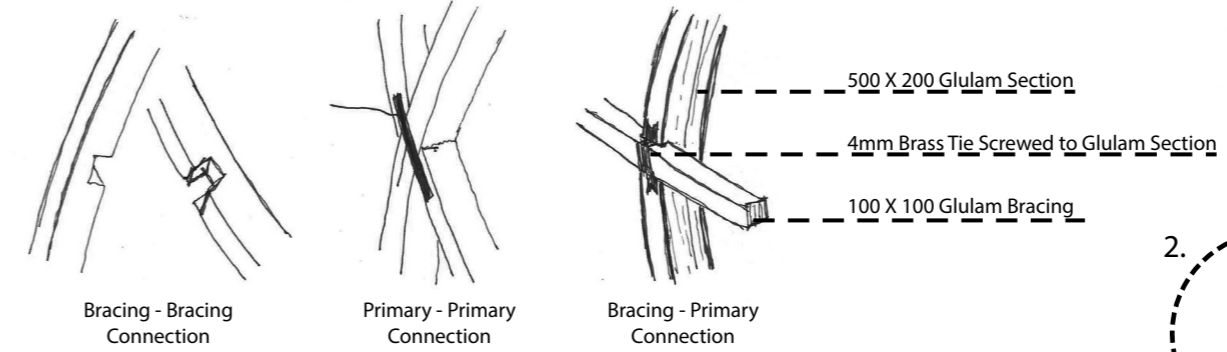


Figure 3.25 - Pod connections

2. Steel Connection

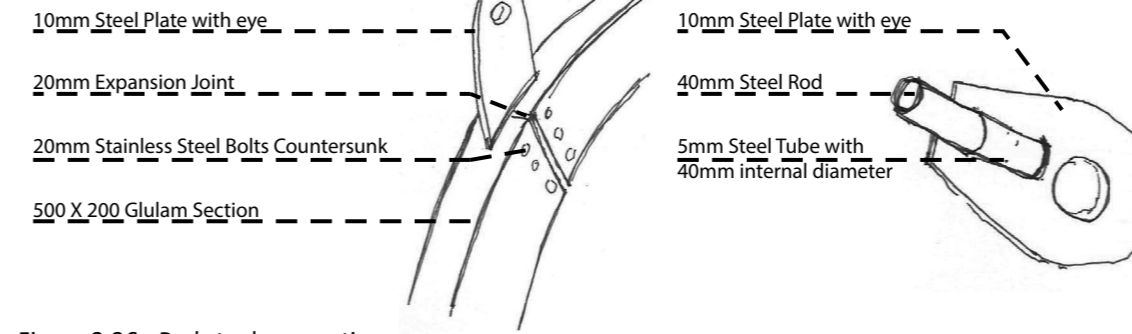


Figure 3.26 - Pod steel connections

3. Walkway and Planter

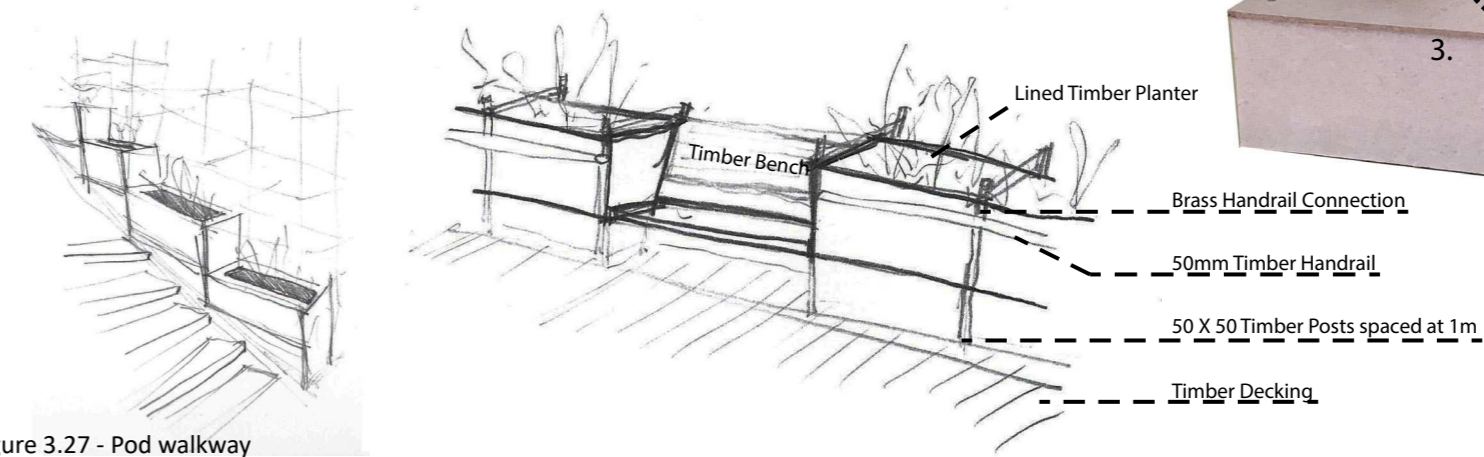


Figure 3.27 - Pod walkway

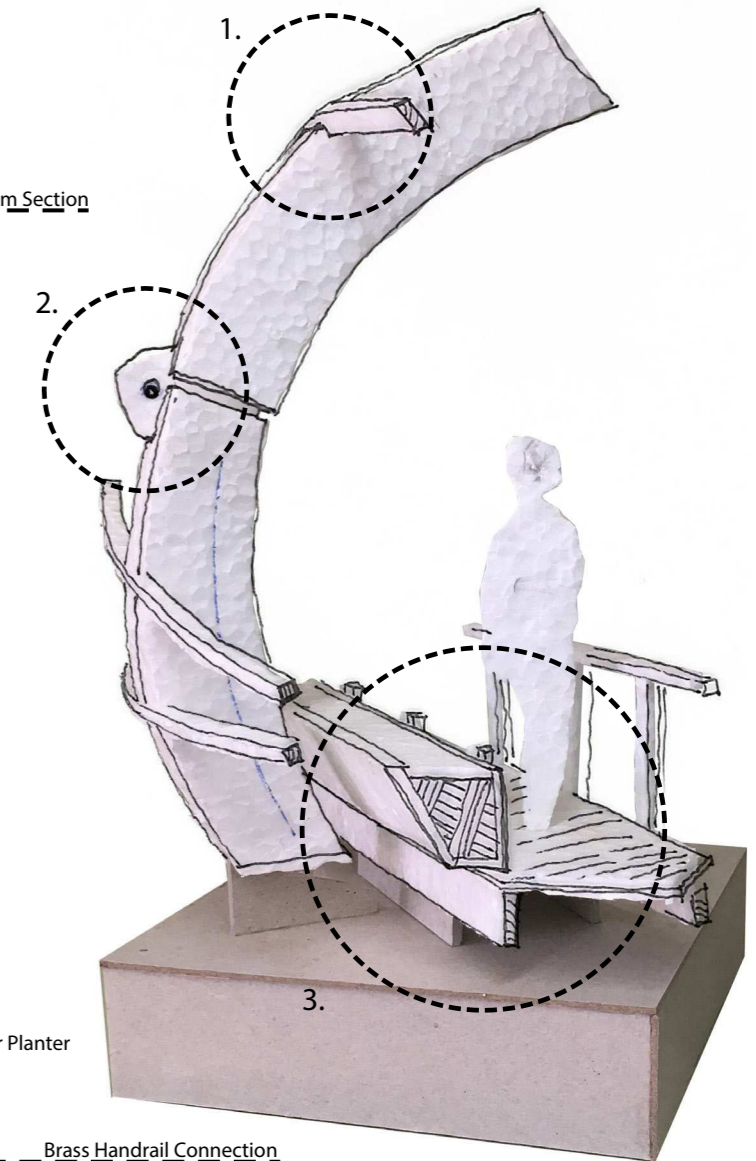


Figure 3.28 - Pod structure cut away model

3.5.2 Masonry Shells

These are self-supporting arch based forms which act in compression to create very stable forms. Their load path must be within the depth of the arch structure in order to the structure to remain standing (Figure 3.31). They can be made of thin tiles and are incredibly strong (Figure 3.29-32). Essentially, they are based upon the same principles which gothic architecture and vaults are based upon. A simple thrust line can determine whether an arch will stand by analyzing whether that line falls within the depth of the arch's structure. Each masonry unit needs to be acting in compression for the structure to be stable. Examples of these structures include Peter Rich's Mapungubwe Interpretation Centre and the Armadillo Vault by Block Research Group (figure 3.32). The armadillo vault shows the strength of these structures as it has no mortar between the single cut limestone pieces.

Advantages

- Local construction possible with training
- They can be cost-effective
- Are lightweight when compared to similar masonry or concrete structures
- Strength
- Thermal Insulation
- Can be public space for walking on

Disadvantages

- Does not support multistory buildings
- Point loads are difficult to deal with
- Does not support the free façade ideals
- Takes over the morphology of the building



Figure 3.29 - Mapungubwe Exterior (Fagan H, 2010)



Figure 3.30 - Mapungubwe arch interior (Fagan H, 2010)

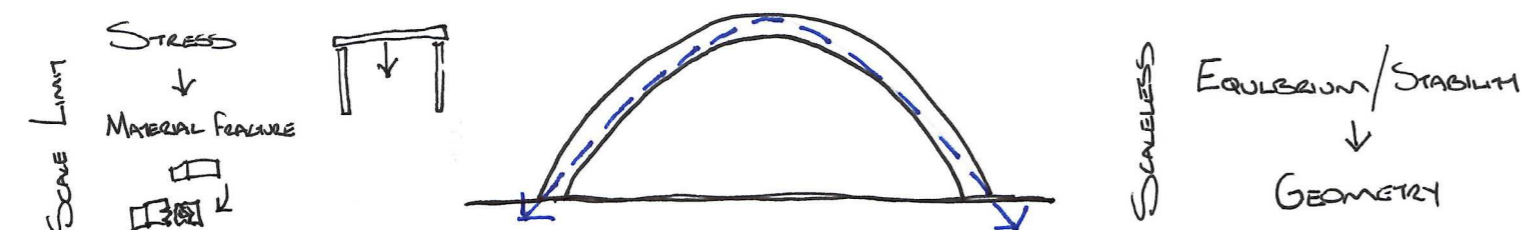


Figure 3.31 - Masonry arch design principles



Figure 3.32 - Venice Biennale Armadillo Vault (Van Mele, 2016)

This system while it is efficient cannot adapt to the writhing change within the city. They are structures of permanence, either being completely rebuilt or remaining the same for centuries. They also require large columns and the floor slab depths are thick when used in multi-story buildings and so will not be used.

3.5.3 Portal Frames

Two-dimensional rigid frames which get their three-dimensional strength through repetition (Figure 3.33-34). The column and beam are at times combined into a single structural element through a rigid connection. This is the standard way in which to build a greenhouse structure (Figure 3.38). They are easily scalable lengthwise and provide a large clear span under which plants can be grown.

Advantages:

- Their construction is easy and time effective (Locally sustainable a requirement of the sustainability report)
- The elements can be prefabricated and assembled on sites will little space and environmental impact
- Provides a large uninterrupted floor space
- Cost-effective
- They are lightweight and so require less material
- Provides a structural rhythm along its length

Disadvantages

- Poor fire resistance properties
- Requires multiple frames in order to become more rigid
- Their span is limited
- Does not support large multistory buildings

While this is the standard way to build greenhouses, these greenhouses are built on ground level. Further this system requires large columns as the height of the buildings increase. This would be a wasteful use of steel and so not sustainable and so will not be used.

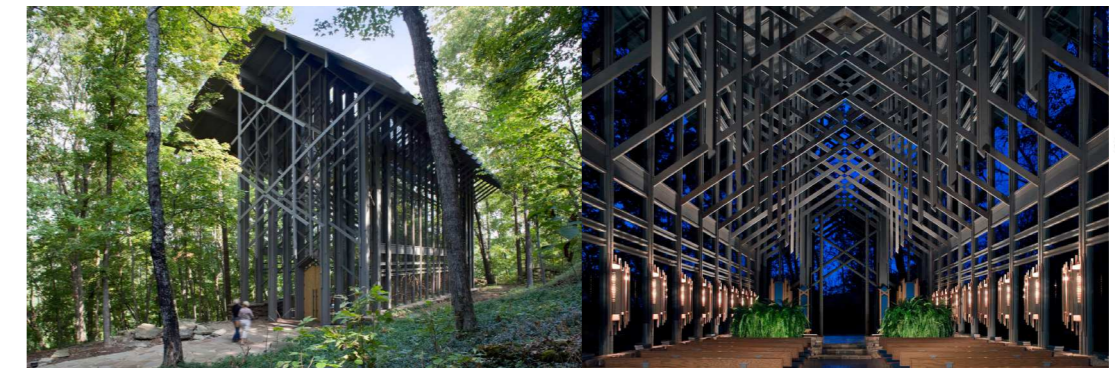


Figure 3.33-34 - Thorncrown chapel timber portal frame structure (Galloway, 2018)

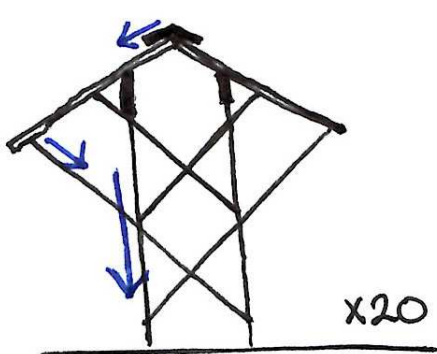


Figure 3.35 - Portal frame load path

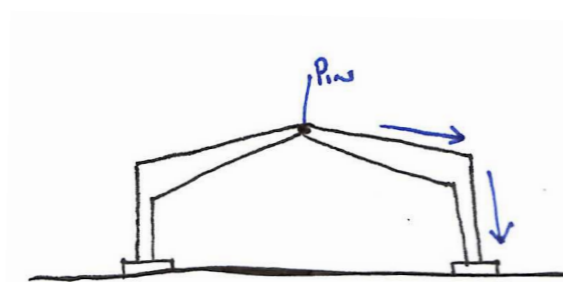


Figure 3.36 - Pinned portal frame load path

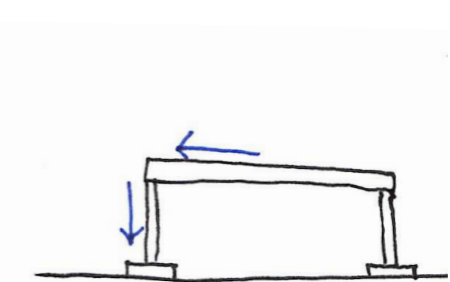


Figure 3.37 - Column and beam portal frame

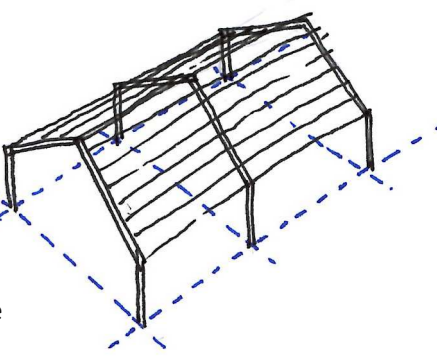


Figure 3.38 - Portal frame axonometric

3.5.4 Conclusions

All three structural systems cannot be used together in the project as their morphologies and strengths don't align with the conceptual goals of the project. The focus for the project is on exoskeleton structures as these structures allow for the floor plates to hang freely without interrupting other floors. This relates to one of the theoretical ideas posed in section one, where each floor has the possibility to be a virgin site,

filled with imagination and possibilities. This truss structure forms the walls of the greenhouses which are the heaviest aspects of the project and so the load can be transferred directly into the trusses. Below which laboratories and gardens will be attached. Exoskeletons also allow for the building to be easily adapted for future uses by replacing the floorplates with new ones. This once again relates to the culture of congestion further explored in the theoretical aspect of the document (Part 1).

Shanghai International Cruise Terminal: Shanghai Chandelier

SPARK Architects
Shanghai, China
Focus: Structural Systems – Climate Control

The design uses multiple structural systems. The focus will be on the exoskeleton and pod structure of the jewels of Shanghai. A series of restaurants that hang within an exoskeleton and form the focus of the design.

Climate Control

Singapore is within a tropical rainforest climate and so it does not have distinct seasons, temperatures range between 22°C and 33°C (Windfinder, 2019b). Cooling is, therefore, the primary goal of these systems.

The development uses a river water cooling system to reduce the demand made on the HVAC systems within the massive development (Figure 3.40). Cold water is taken from the Huangpu River where the heat from the building is passed onto it through heat exchangers where it is passed under the basement and expelled.

The double skin façade allows for the UV heat to be trapped before it enters the building while still offering the free flow of air (Figure 2.16; 34). Large sliding doors which open onto balconies and the smaller windows allow for the building to vent its hot air into this dual façade where it rises out of the façade.

The social spaces on the laboratory floors will work in this way, however the laboratories need a more precise system in order to function correctly. The large hanging gardens create a temperate microclimate which buffers the building against the harsh temperatures of Bloemfontein. Thus reducing the heating and cooling load of the academic component.



Figure 3.39 - Shanghai Chandelier restaurant pods (Archello, 2019)

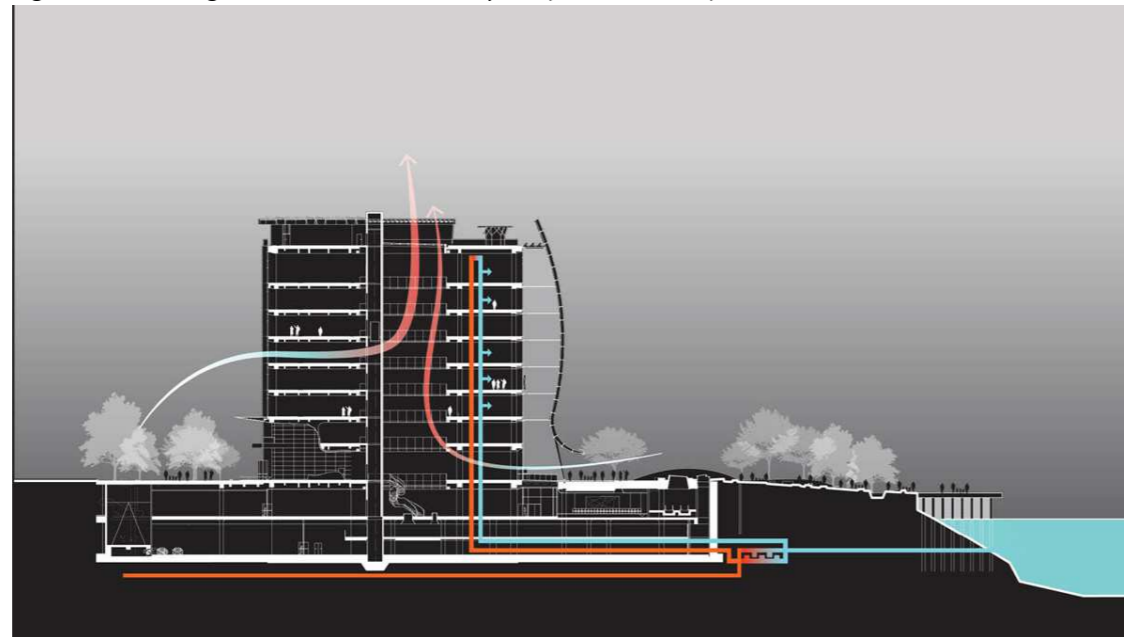


Figure 3.40 - River water cooling system (Yatzer, 2019)

Structure

The exoskeleton which frames the pods was the only feasible solution as two subway lines run directly underneath this portion of the site and so they cannot take the load of a traditional column and beam multi-story building. The jambs of the exoskeleton house the circulation and services required by the restaurants and bars which hang in-between. It also provides a means to reach the rooftop restaurant and bar.

Exoskeleton structures require that the floors below hang from the truss which spans above the floors, each floor can be totally unique as the load path can run directly up into the truss (Figure 3.41). This allows Spark architects to be able to suspend whole worlds in this space without one affecting the other. The cables supporting the pods run in tension and so there is a risk of the structure swinging in winds. This is counteracted by tying the pods down into the lambs of the exoskeleton and using triangular supports between each floor to keep the pods themselves rigid. The smooth skins of these pods are then supported by a secondary structure which is fastened to the primary pod structure.

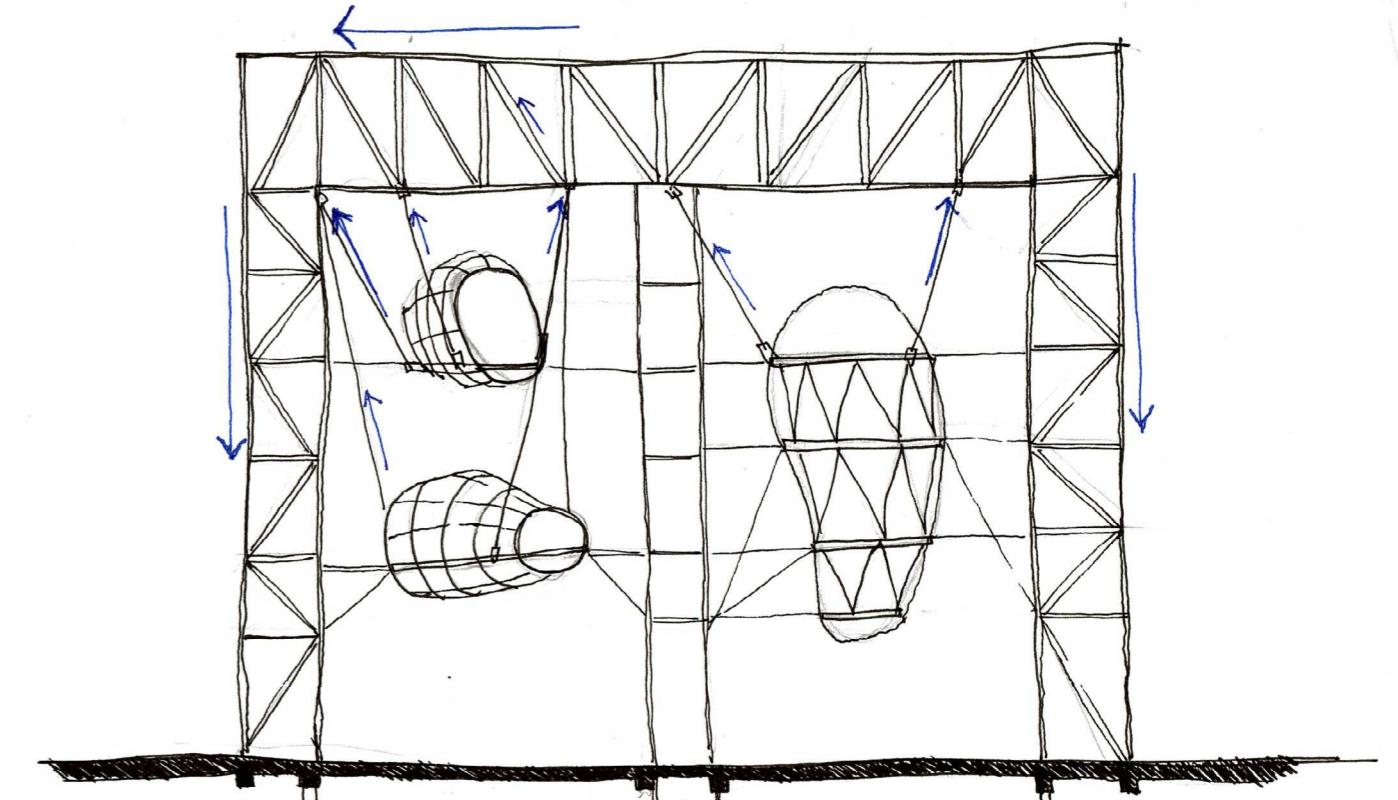


Figure 3.41 - Load paths of exoskeleton

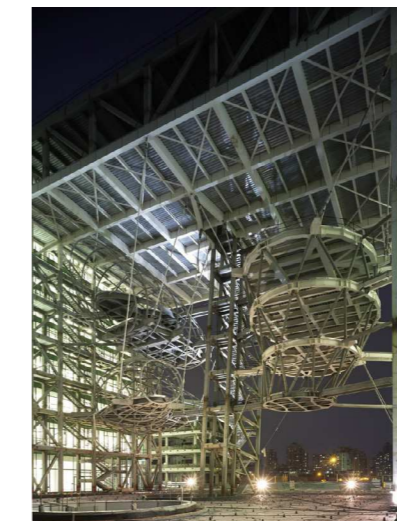


Figure 3.42 - Steel structure

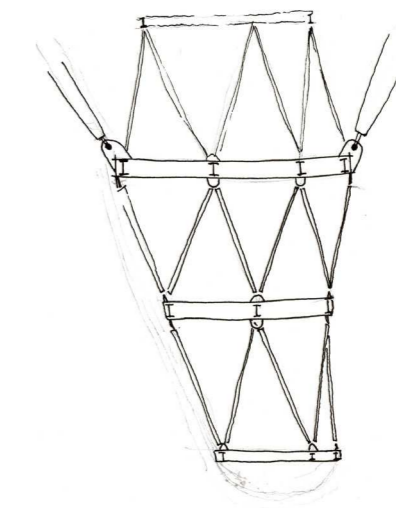


Figure 3.43 - Pod Structure

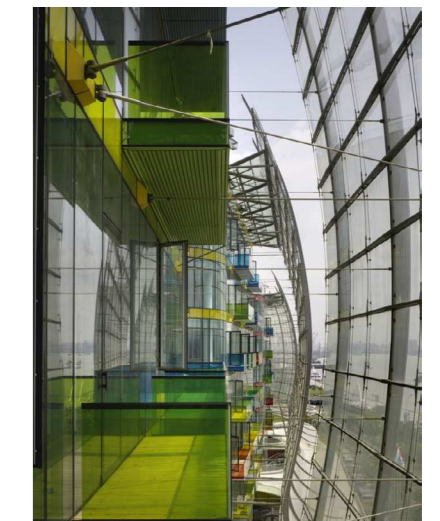


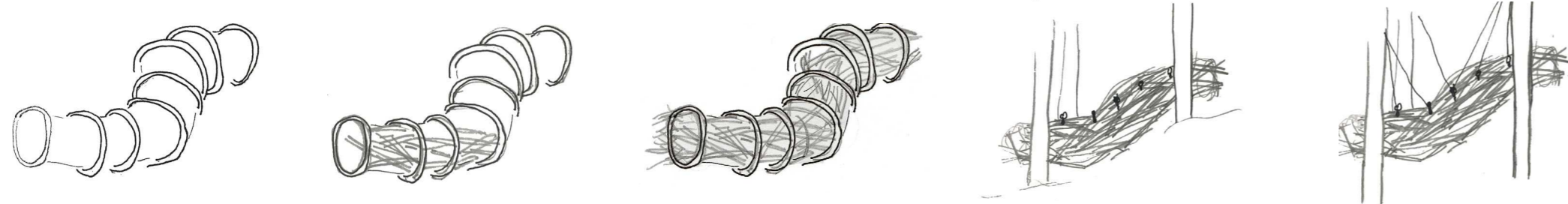
Figure 3.44 - Facade skin

The Cocoon
 AA Design & Make
 Hooke Park, UK
 Focus: Bandage Structure – Relief Spaces

The Cocoon is designed to represent the experience of walking through the surrounding forests, it provides the observer with a new perspective of the forest at the end. It invites the user to participate and imagine what's next in the structure thanks to its intimate scale and undulating floor. This precedent directly relates to the calabashes proposed in the design.

Structure
 The designers initially modeled the space between the three trees and designed the cocoons rings to fit (Figure 3.45-49). These structural rings are CNC milled out of plywood sheets and are where the cables which support the structure connect to the cocoon. The rings were then set up as they would be in between the trees and a cedar tree was milled into thin strips for the skin. These strips were then steamed so that they could be bent and layer by screwed to the structural rings until the structure was stiff enough to be hoisted into the trees. Steaming means that the structure is naturally prevented from rot issues and so the natural wood adds to the forest experience.

This structure is designed to support 2-3 people at a time and so it can afford to be held together by the thin strips of cedar. Its scale is also such that 5 anchor points can support the whole structure whereas the calabashes in the design are multiple stories in height and support a large amount of ground and people within them. Thus the calabashes need to be more structurally proficient than the inefficient bandaging onto rings demonstrated here. The handmade nature and informality of the cocoon is, however, a desirable aspect of this project.



68 Figure 3.49 - Construction Process



Figure 3.45 - Structural Rings (Frearson, 2019)



Figure 3.46 - Final Bandaging (Frearson, 2019)



Figure 3.47 - Initial Bandaging (Frearson, 2019)



Figure 3.48 - Hanging (Frearson, 2019)

3.6 Health and Safety

3.6.1 Refuse

A compost heap in the rooftop greenhouses reduces the volume of biological waste which needs to be removed from the site. Laboratory refuse is collected in bins at each workstation module where it is sorted into recyclables, general waste and chemical waste. The recyclables and general refuse is then dropped down the refuse duct and collected on ground floor. Chemical waste is stored in the chemical room where it is removed by contractors. The refuse is removed from its skip from the Fountain Street sidewalk once a week, like the systems used by the surrounding buildings (Figure 3.50).

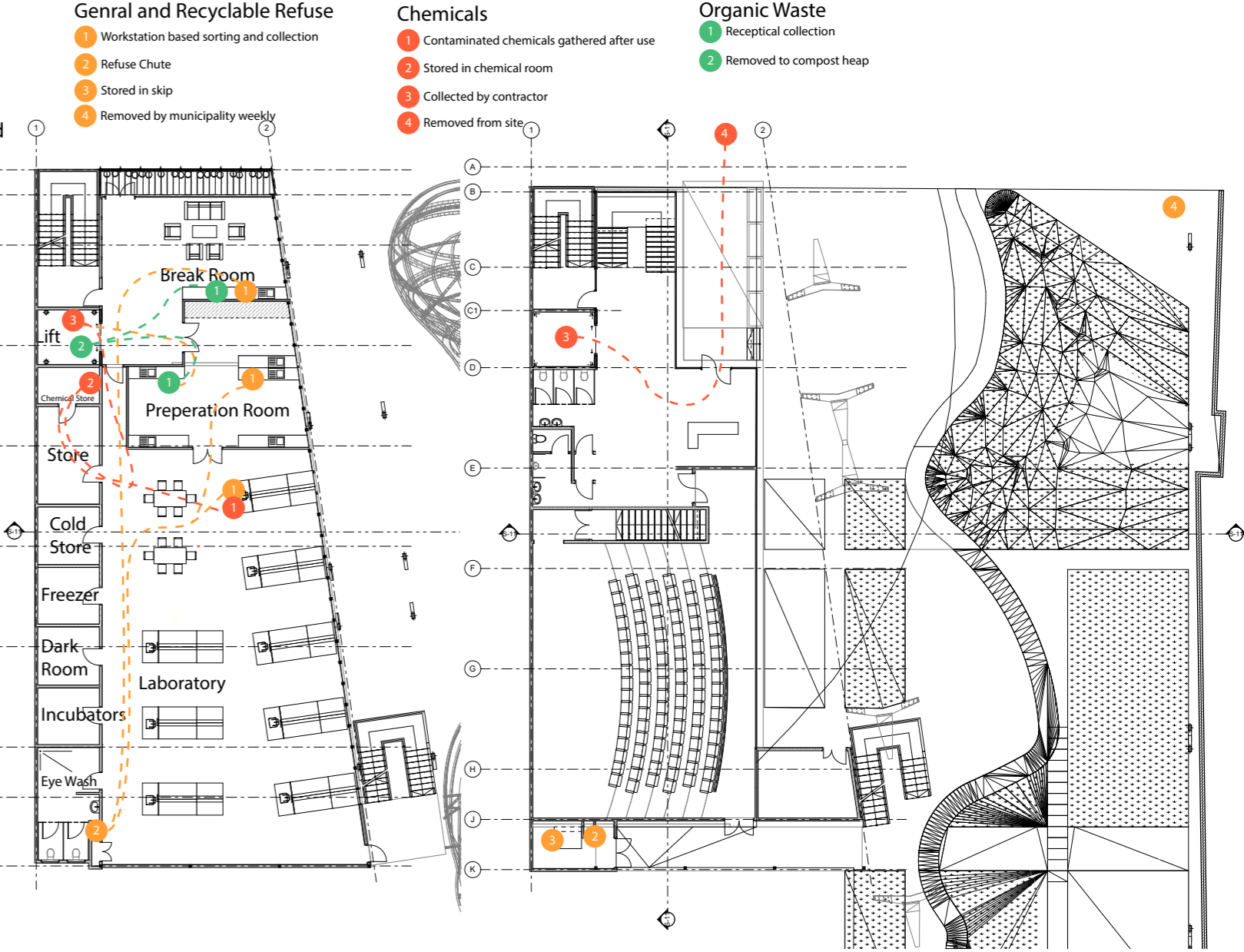


Figure 3.50 - Refuse Removal Laboratory levels and Ground Floor

Center for Sustainable Landscapes

Design Alliance Architects

Pittsburgh, USA

Focus: Laboratory Requirements - Ventilation

Laboratory Units

The Laboratory units in this project are mainly used for taxonomy in an educational sense and so they are large and open with little equipment. Each Lab unit has a small writing desk space attached or an area for collaboration. These spaces are nearer the circulation for less disturbance and contamination of the experiments (Figure 3.51). They do however follow the health aspect of what the Phytopharmacology Labs need to achieve. This is done by making the lab floor slab 12m wide with windows on both sides (Figure 3.52-53). The windows also ensure that fresh air is circulated through and expelled using slanted ceiling panels which rid the space of the warmer used air and reflect the natural light into the center of the floorplate. The shorter northern ceiling panel is due to less light entering through this elevation and so the more powerful southern light needs to be distributed deeper into the space. A light shelf to the south helps draw in this more powerful light without allowing natural light to directly disturb the lab tables. The remaining light is provided by upward facing LED's which evenly spread their light over the space below.

Atrium

The circulation spaces and the atrium space uses a stack effect to ventilate the building naturally (Figure 3.52). The building can be completely naturally ventilated since the laboratory units aren't used for chemical or biological experiments. This means that the air pressure isn't strictly controlled, and the contaminated air does not need to be expelled safely.



Figure 3.51 - Laboratory Layouts Ground

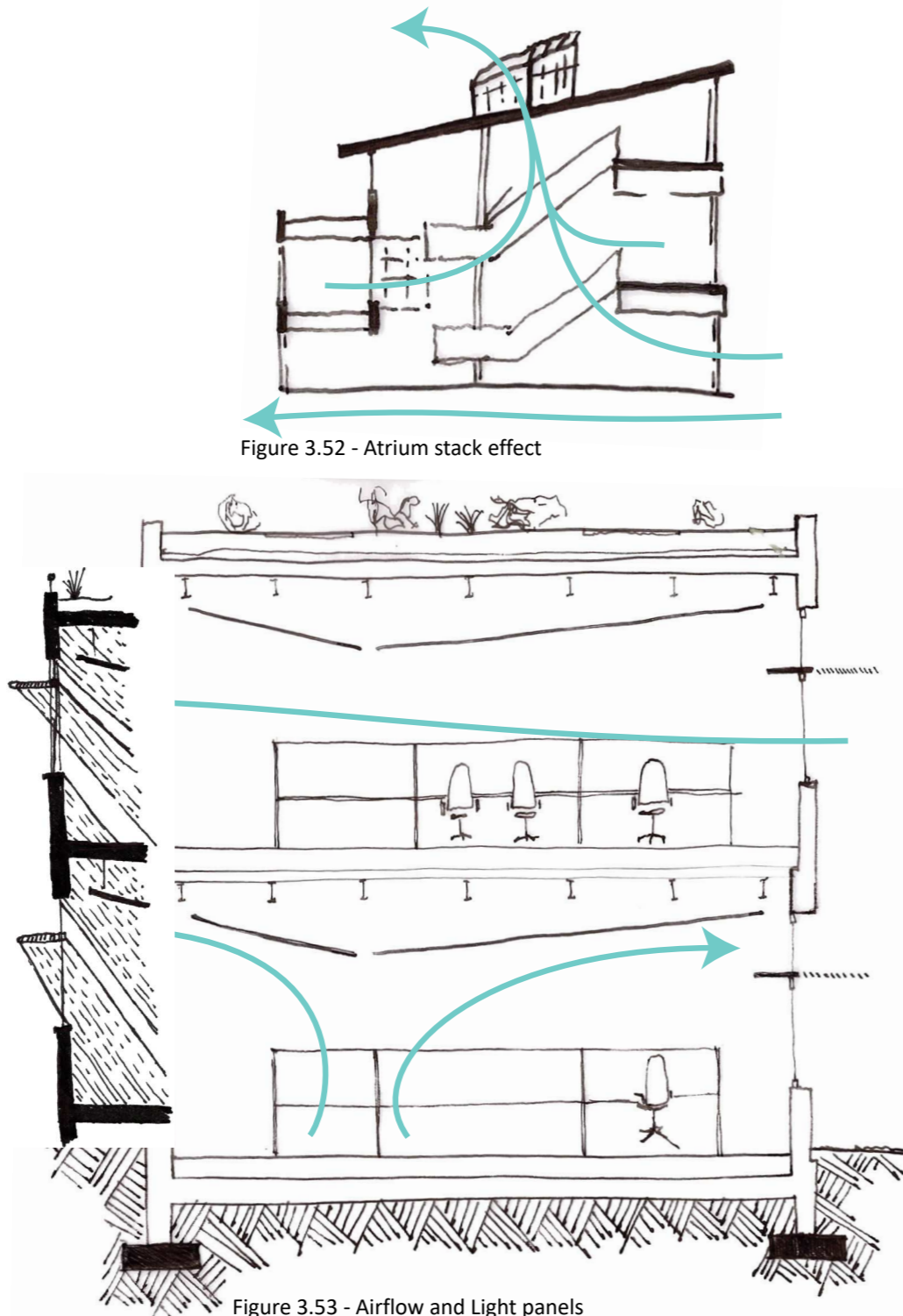


Figure 3.52 - Atrium stack effect

Figure 3.53 - Airflow and Light panels

3.6.2 Ventilation

Application: Efficient mechanical ventilation systems

The labs require a mechanical ventilation system to keep the air inside them safe and contaminant free. This system needs to be able to do six air changes per hour in each laboratory. This means that the system needs to change 4500m³ of air per hour or 2648 CFM. This dictates that the ducts need to have a cross-sectional area of 0,27m². The labs must be ventilated as efficiently as possible yet still meet the regulations discussed.

The design uses an extraction vent and a filtered inlet vent as the labs should remain in positive pressure as not to let in contaminants. Thus the inlet vents have a greater area as more air needs to be blown through them. The design places the inlets on the floor and at the lowest point in the ceiling (Figure 3.54; 56). The lab tables may not have gusts of air flowing over them and so air is brought into the lab above the movement space and is blown against the service rooms to further diffuse any strong air currents. It remains efficient and safe by not mixing the hot contaminated air with the new cool air through the ceiling design and placement of piping. Figure 3.55 investigates ways to efficiently keep the building cool using the raised access flooring and natural ventilation for areas such as the break rooms.

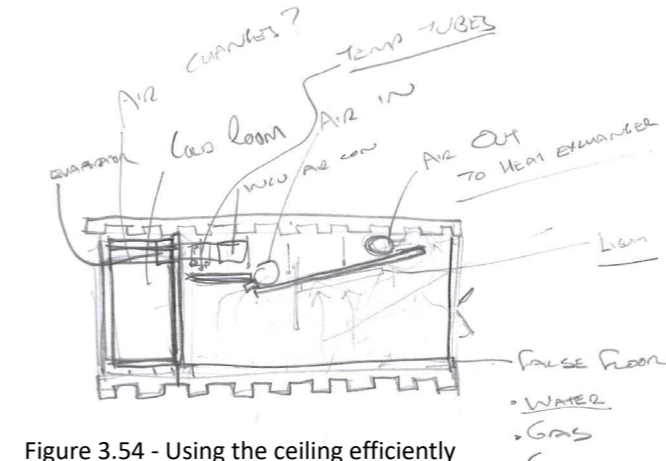


Figure 3.54 - Using the ceiling efficiently

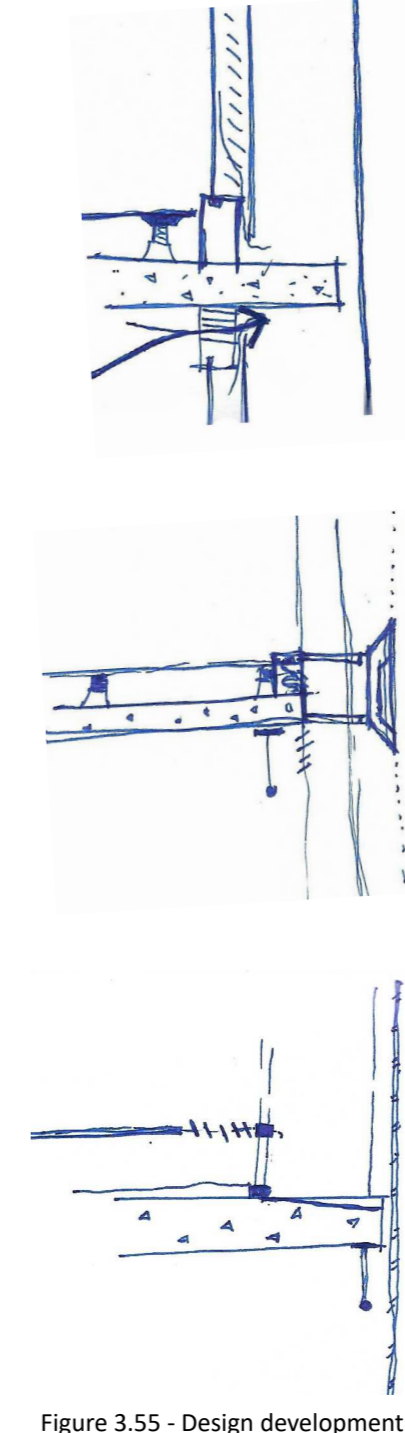


Figure 3.55 - Design development

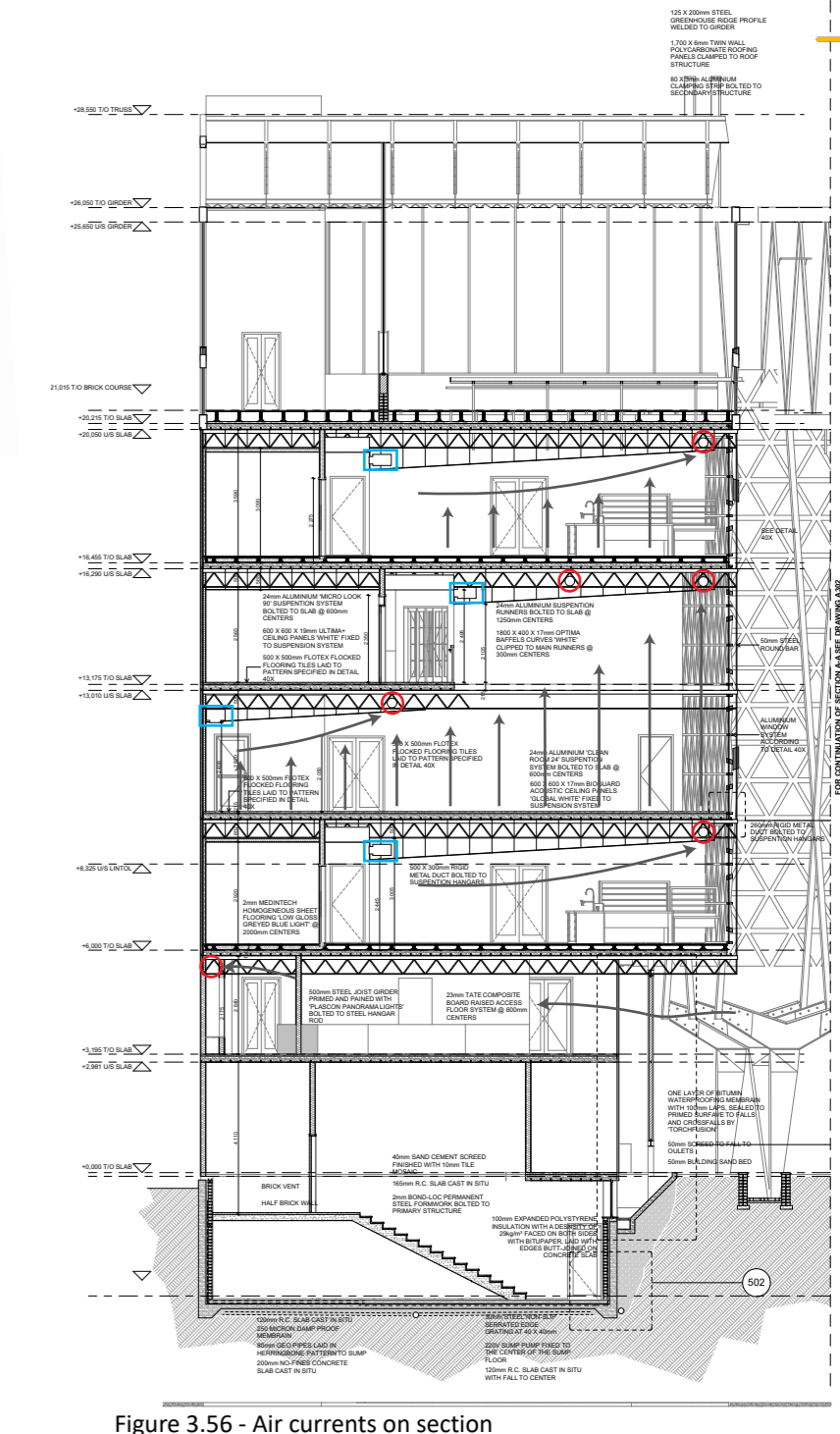
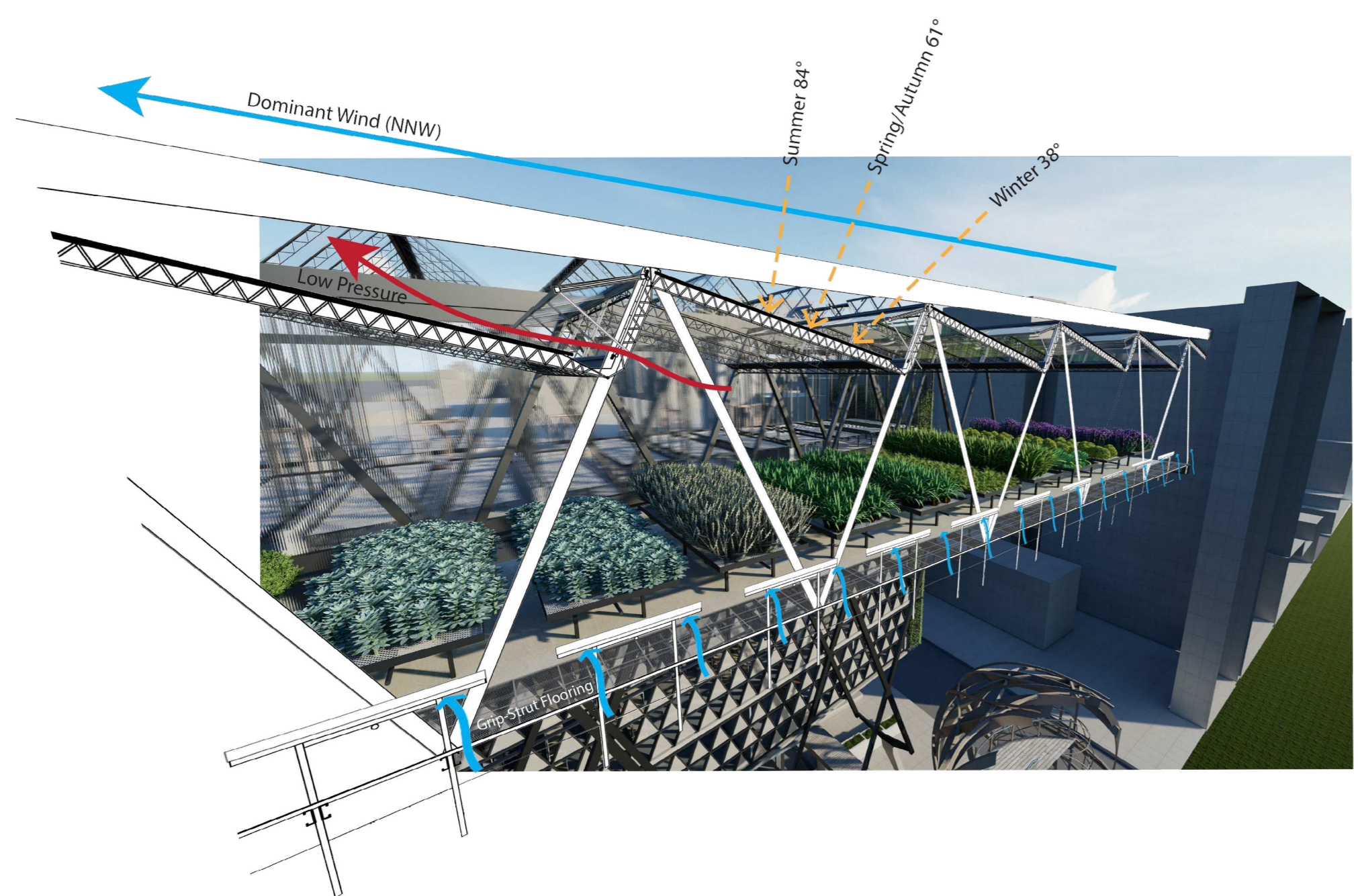


Figure 3.56 - Air currents on section

Natural ventilation system of the propagation greenhouse



UFS Dept. of Biotechnology and Microbiology
 Renier Bron
 Bloemfontein
 Focus: Laboratory Requirements

The design articulates elements of its structure as to make the building more human and understandable to those who work there. This is a reaction against the typical sterile laboratory building facades and internal spaces while remaining functional and sterile inside.

3.6.3 Laboratory Operation

Laboratories are located along the perimeter of the building with circulation, offices, and supporting services tying the labs to the courtyards (Figure 2.33). These courtyards become a relief space within the rigorously controlled environment within the labs. This, however, becomes a problem as the office spaces are where a lot of writing happens and so the staff can easily get irritated and distracted by others outside. With this interference, however, comes communication and connection as other staff members join those already outside. If this effect could be incorporated into the circulation rather than the office spaces it could be a very effective tool for collaboration.

The laboratories are for students at the university and so apply to the postgraduate laboratory proposed by the design. Their desk areas and the equipment required is crucial to the planning of these spaces (Figure 3.58-60).

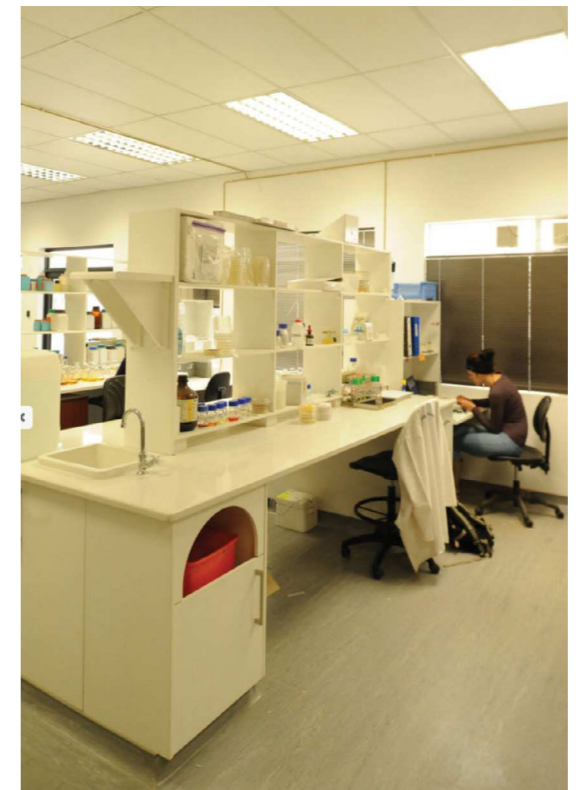


Figure 3.58 - Laboratory Station (Renier Brönn, 2019)

Labs	No.	m ²	%
Labs	75	7 525	67%
Supporting rooms		404	51%
Grow Room	15	1 15	2%
Small Incubator	6	7 42	5%
Large Incubator	35	1 35	4%
Microscope Room	13	2 26	3%
Lab Cubicles	10	5 50	6%
Culture Collection	23	1 23	3%
Crystallography	25	1 25	3%
Cold Room	9	2 18	2%
Freezer Room	20	1 20	3%
Radioactive Room	20	1 20	3%
Dark Room	10	2 20	3%
Storage	100	1 100	13%
Deliveries	10	1 10	1%
Admin		383	49%
General Offices	15	10 150	19%
Reception	15	1 15	2%
Waiting Room	25	1 25	3%
Seminar Room	60	1 60	8%
Staff Room/Kitchen	95	1 95	12%
Ablutions	38	1 38	5%
Total Area		787	100%
Other			
Circulation	390	1 390	
Courtyards	150	2 300	

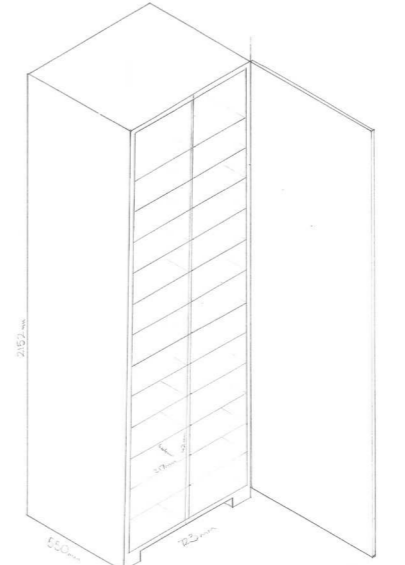


Figure 3.59 - Specimen Cabinet

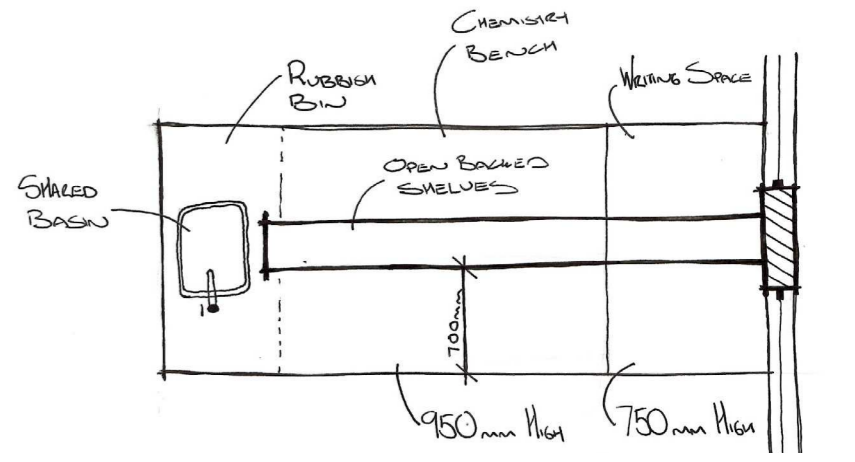


Figure 3.60 - Workspace Layout

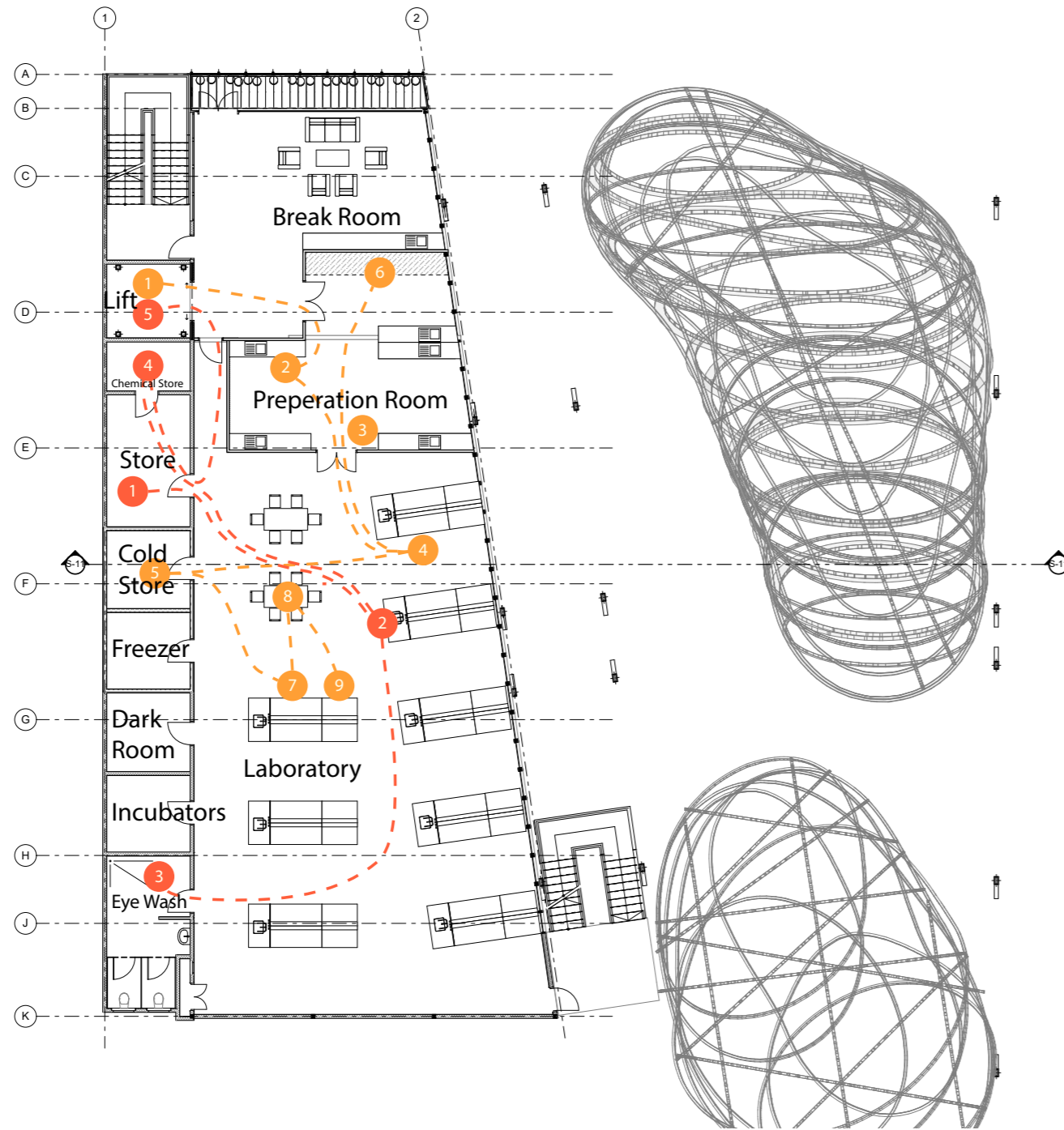
Application: Laboratory layout

Experiment Process

- 1 Specimens brought down in cart
- 2 Specimens cleaned and dissected
- 3 Book lab module + Rules
- 4 Lab Station - Conduct Experiments
- 5 Store Cart
- 6 Specimens placed in test environment
- 7 Record Results
- 8 Discuss results with peer/supervisor
- 9 Write up results

Chemicals

- 1 Chemicals booked out + Safety Checklist
- 2 Chemicals Used
- 3 Eye wash station
- 4 Store contaminated substances
- 5 Contractor removes chemicals



3.6.44 Lighting

Natural lighting is used as much as possible in the design. The large eastern façade of the departmental block consists of floor to ceiling windows and composite panels. This façade is shaded by the greenhouse and pod structures throughout the morning. Thus, the light which enters the labs is largely indirect lighting. This light is evenly distributed through the space using a high slanted ceiling (Figure 3.63). This idea is taken from the Center for sustainable landscapes investigated on page 70. The laboratories require less natural lighting than the library spaces and so the panels in the window system are designed to let in less light.

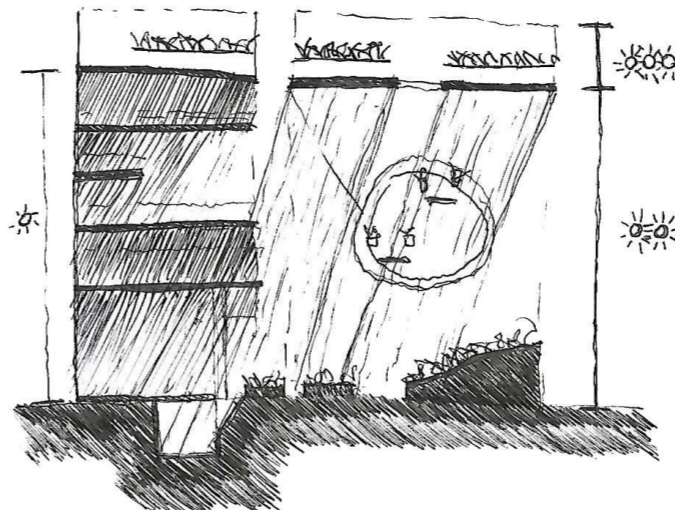


Figure 3.62 - Sectional lighting concept

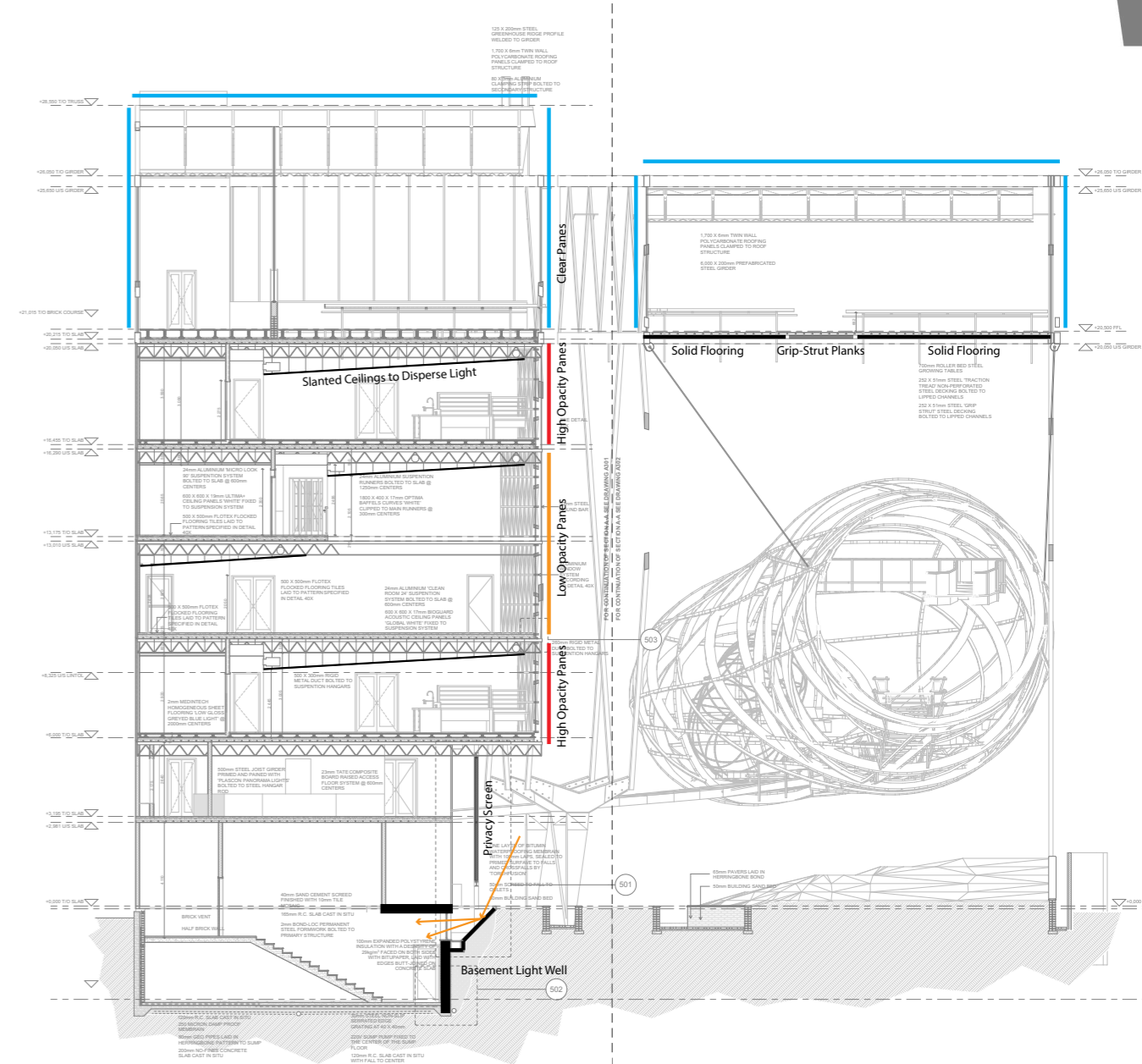


Figure 3.63 - Lighting material diagram

Application: Basement lightwell

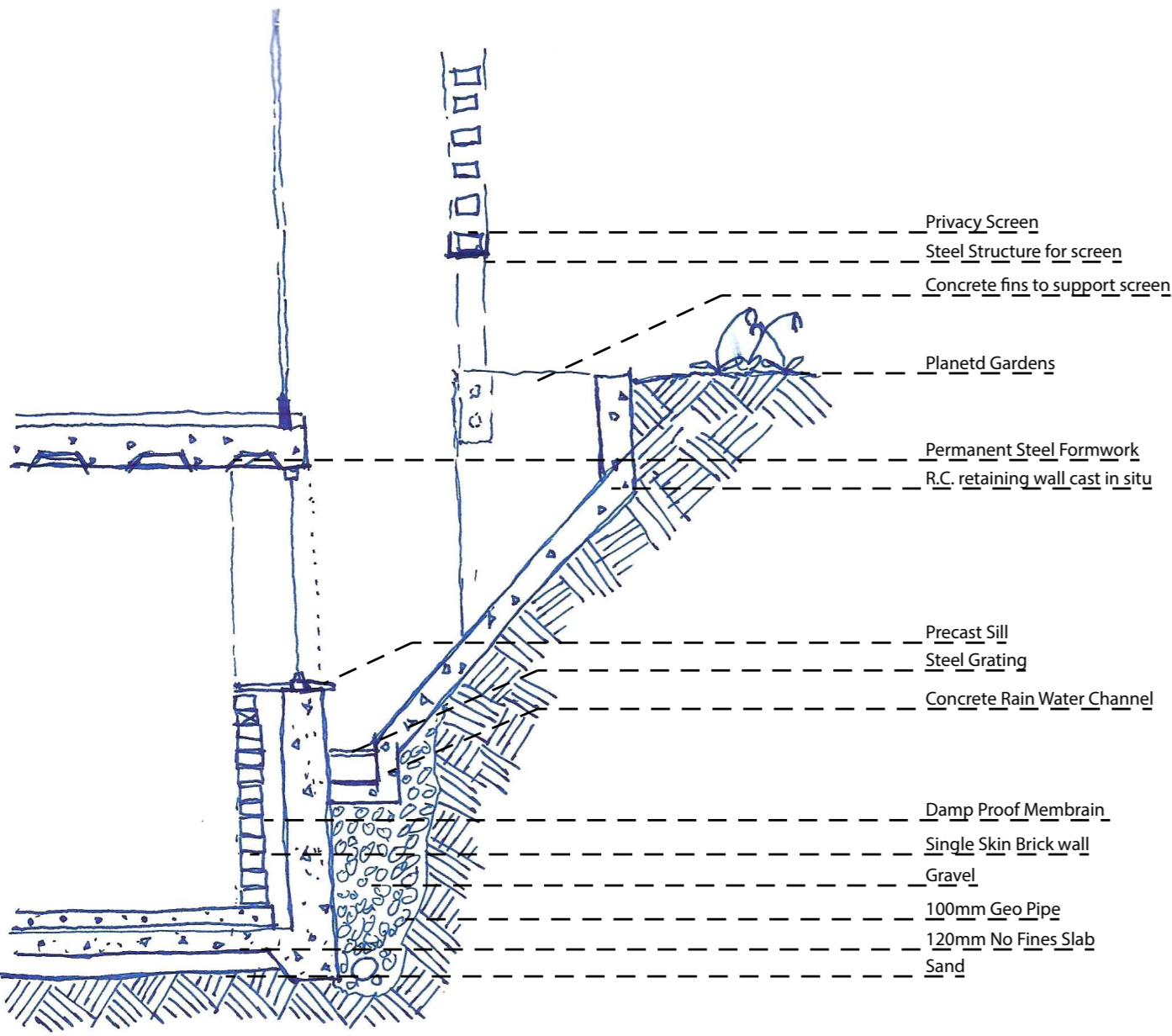


Figure 3.64 - Basement light well diagram



Figure 3.65 - Basement light well concept

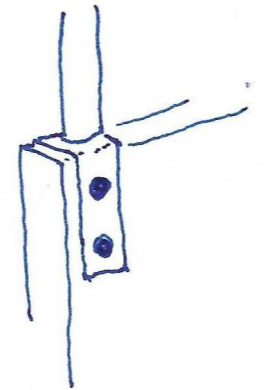


Figure 3.66 - Privacy screen connection

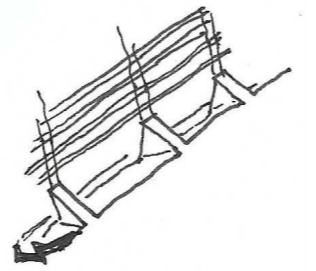


Figure 3.67 - Basement light well fins

3.6.5 Fire

SANS 10400 Part T states that the design requires two paths for escape and thus the building requires two sets of stairs to evacuate the building. The path to which cannot be longer than 45m at any given point.

d) Any building of a height of more than three stories shall be provided with not less than two escape routes and 1) an emergency route shall form part of each such escape route, and 2) such emergency route shall include a stairway that forms part of the escape route and also that part of the escape route from the lower end of the stairway to any escape door. (SABS, 2011)

It further states that the design needs a hose reel per Floor where the hose will reach all areas of the floor.

4.34 Hose Reels

4.34.1 Hose reels for the purposes of fire fighting shall be installed in any building of two or more stories in height or in any single-story building of more than 250 m² in floor area, at a rate of one hose reel for every 500 m² or part thereof of floor area in any storey, provided that such hose reels shall not be required in any building classified as H4 or in any dwelling unit in an occupancy classified as H3 where each unit is provided with independent access to ground level.

4.34.2 Any hose reel installed in such building shall comply with the requirements in SANS 543, shall be installed in accordance with SANS 10105-1 and SANS 10400-W and shall be maintained in accordance with the requirements in SANS 1475-2.

4.34.3 Any hose reel so installed shall be positioned to ensure that the end of the hose will reach any point in the area to be protected.

4.34.4 Any hose reel installed in any building shall bear, in a prominent position on the reel disc facing the user, a certification mark from an accredited certification body.

4.34.5 Where no water supply is available, two 9 kg or equivalent fire extinguishers that comply with the requirements of 4.37 shall be provided in place of each required hose reel.

Fire Safety

- 1 Fire Escape
- 2 Fire Hose Reel + Escape Plan
- 3 Fire Hydrant + 30m Hose Reel
- 4 120min Fire Rated Walls
- 5 Vented Stairwell

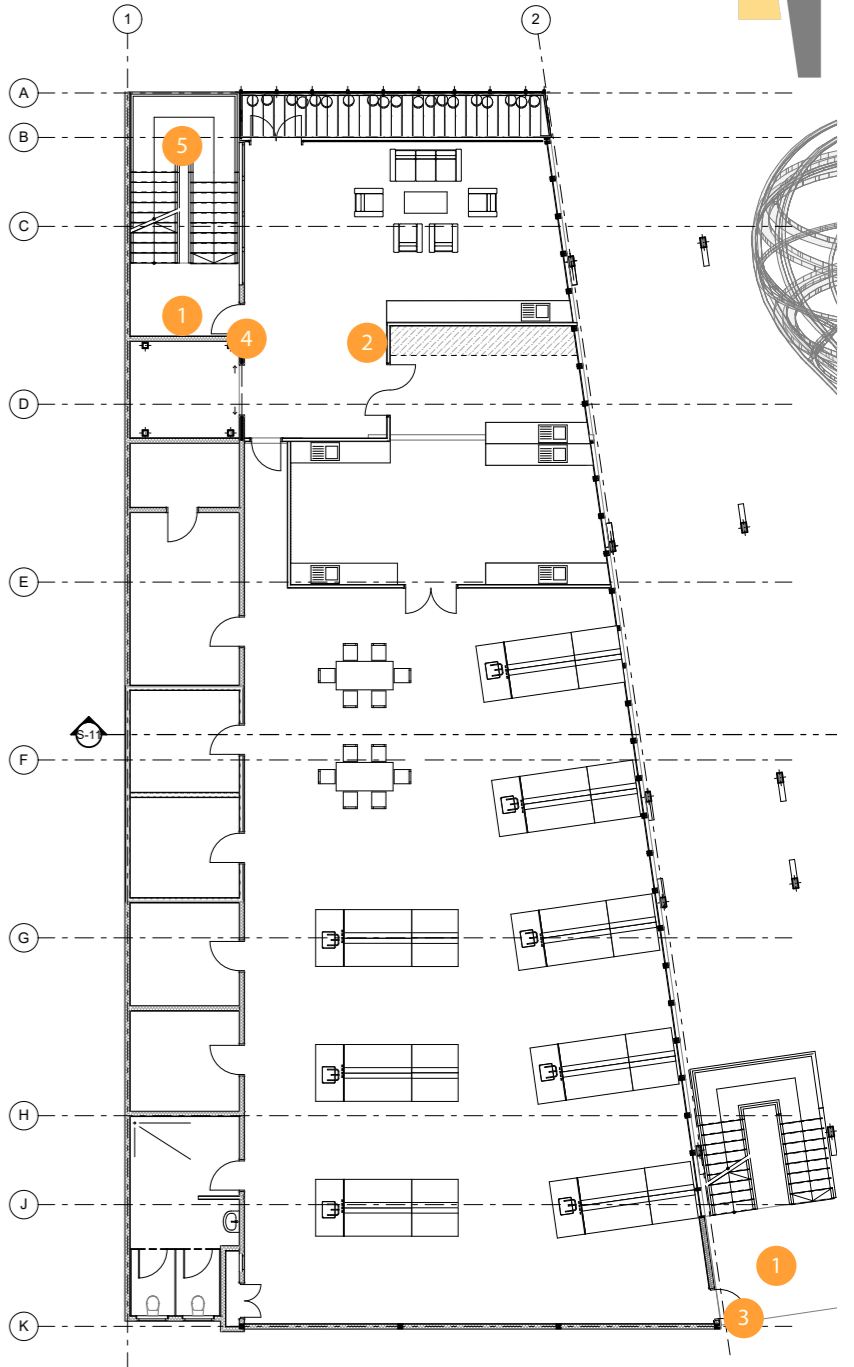


Figure 3.68 - Fire safety diagram

Further, the site requires two fire hydrants as the design is over 12m in height and has 8 floors which means that that it requires 8 hydrants.

4.35.1 Hydrants in positions subject to direction by the local authority shall be provided in

- a) any building that exceeds 12 m in height, and
- b) any building (excluding buildings classified as H4) of any height with a total floor area that exceeds 1 000 m².

4.35.2 Any hydrant required in terms of 4.35.1 shall be provided at a rate of not fewer than one per 1 000 m² or part thereof of total floor area and not fewer than one per story located in the firemen's lift lobby in such building or occupancy, or emergency stairway where no firemen's lift is provided, as the case might be, and shall be distributed in such a manner that the fire hose referred to in.

4.35.3 can reach to every part of the relevant area.

4.35.3 Any hydrant shall, where required by the local authority, be provided with an appropriate fire hose of 24 m or 30 m in length, together with couplings and a 16 mm internal diameter nozzle, all of which shall comply with the requirements of SANS 1128-2. Such hose and nozzle shall, when positioned in the open air or in any factory building, be suitably housed in a cupboard, provided that this requirement shall not apply to an occupancy classified as J4. (SABS, 2011)

3.6.6 Vegetation

Mangaung Metropolitan Municipality has a specific by law which deals with vegetation on site, this, however, should not be a problem due to the kinds of plants which are used for medicine within the Free State generally not being creepers or vine plants which would take over the structures.

7. (2) No person may allow grass, weeds, reeds, shrubs, trees or any like vegetation to become

overgrown on premises to such an extent that it may pose a fire hazard or a probable fire

hazard on such premises or to any adjacent premises or any other person's property (Mangaung Metropolitan Municipality, 2013)

3.6.7 Service Shafts

The Labs require a services shaft and so the fire rules regarding shafts are were kept in mind when designing the shafts.

4.40 Protection in service shafts

4.40.1 The walls of an internal service shaft shall have a fire resistance of not less than the requirements for structural stability given in table 6, subject to a maximum requirement of 120 min.

4.40.2 Where a vertical service shaft provided in a building is not separated from the floors it serves by a separating element, and such shaft does not contain any combustible material, it shall be fire-stopped at the level of every second story above the bottom of such shaft. Such fire stop shall have a fire resistance of not less than the requirements for structural stability given in table 6, subject to a maximum requirement of 120 min.

4.40.3 Where such a shaft is so provided and it contains any combustible material, it shall be fire stopped at the level of every story above the bottom of such shaft.

4.40.4 Where a vertical service shaft is used for ventilation or contains non-combustible plumbing or drainage services or is a non-combustible rubbish chute, no fire stop shall be required within such shaft, and the doors to such shafts shall be self-closing fire doors in accordance with the requirements of 4.10.

4.40.5 Where a service penetrates a separating element, such separating element shall be firestopped with a suitable system of the same rating of the element it passes through. Such system shall have a test report prepared in accordance with the requirements of SANS 10177-2 and shall be installed in accordance with the provisions relating thereto.

(SABS, 2011)

3.6.8 Sprinkler Systems

The feasibility of incorporating a fire sprinkler system into the greenhouse spaces so that it could double as the watering system for the plants was investigated. However due to the watering precise control required to be efficient wen watering the plants, the system would be too wasteful. Thus the design uses hydrants and hose reels.

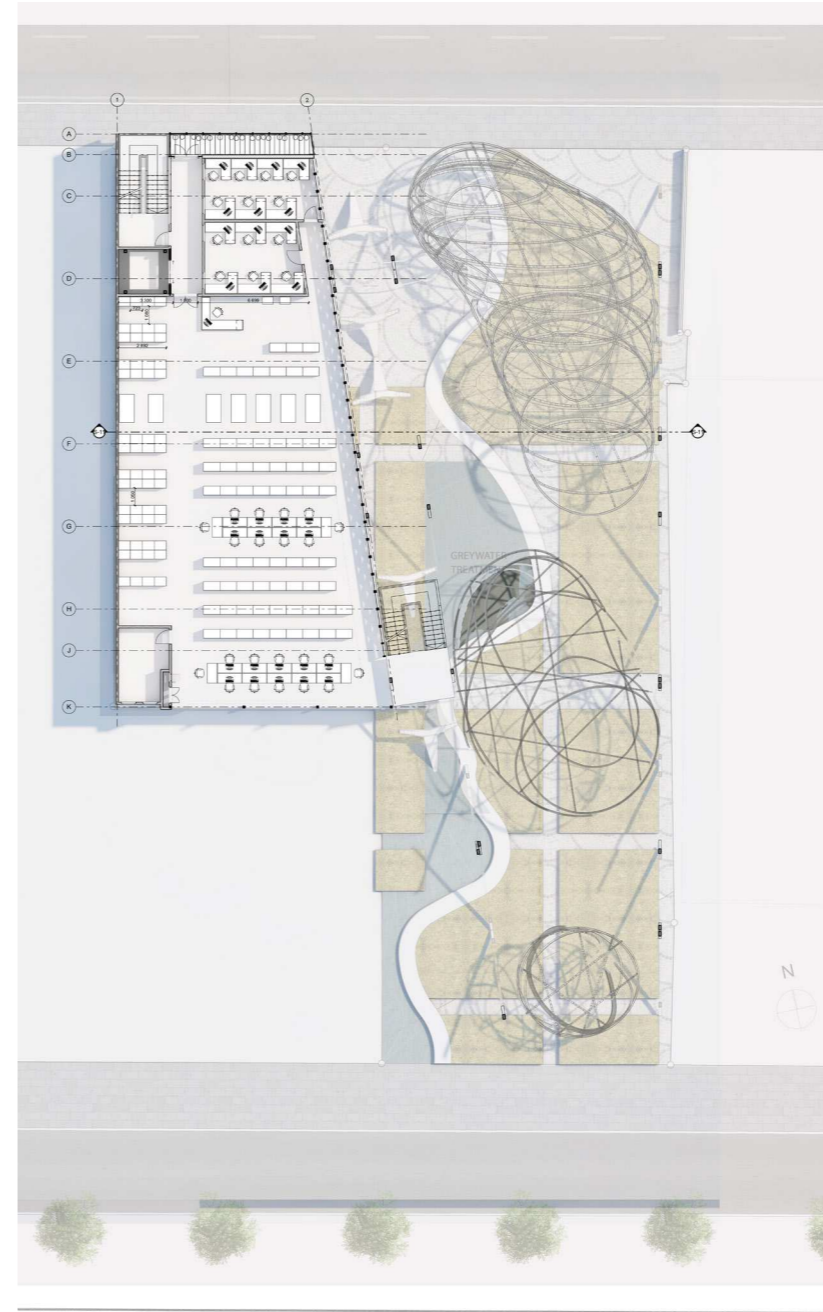


Figure 3.69 - Development based on these laws

3.6.9 Library Operation

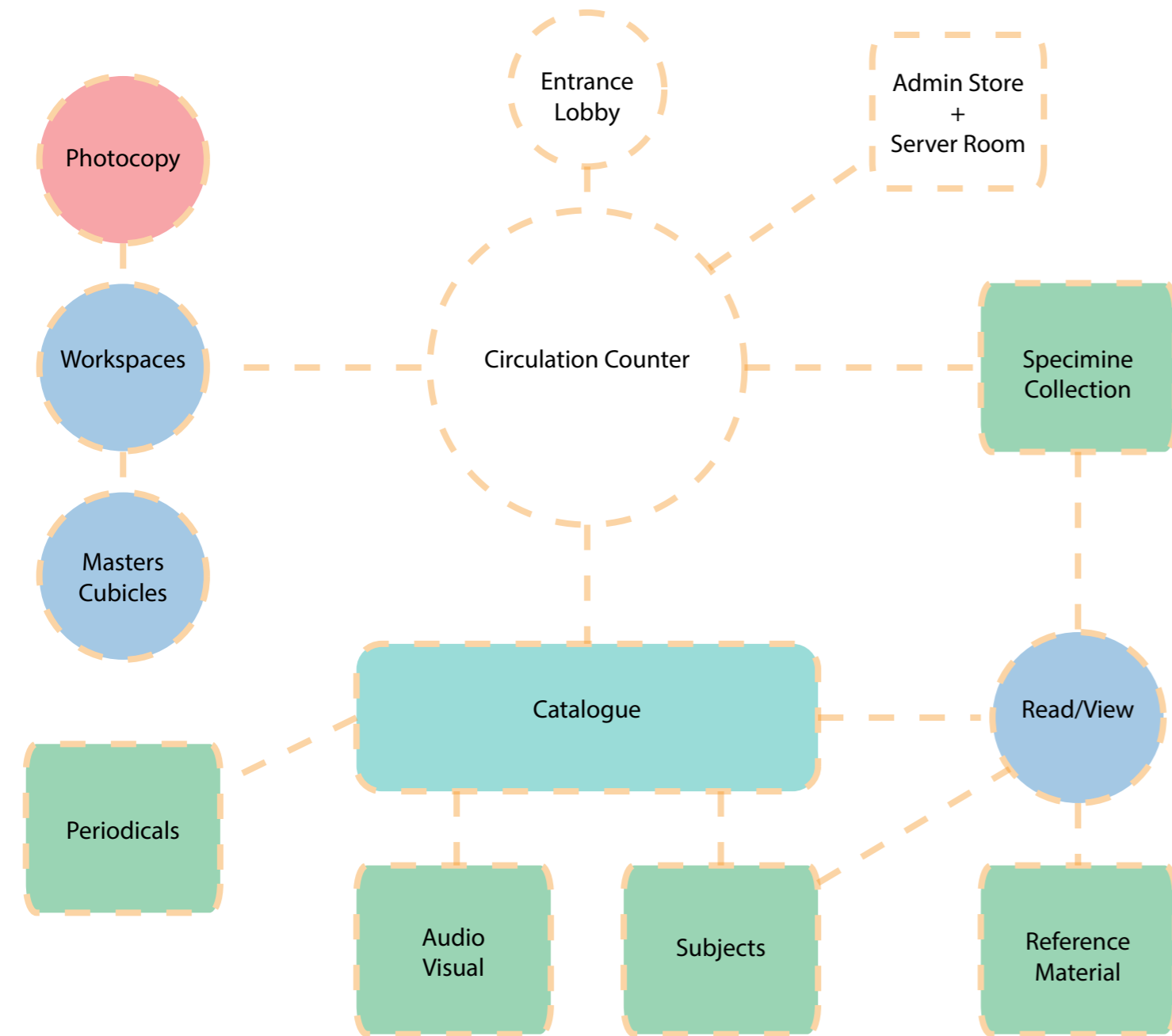


Figure 3.69 - Library operation diagram

3.6.10 Accommodation List

Growing Space	Single unit Area	Units	1132 m ²
Propagation	772	1	772 m ²
Climate Controlled	53	5	265 m ²
Public Gardens	150	1	150 m ²
Hanging Gardens	500	1	500 m ²
Headhouse	80	1	80 m ²
Garden Store	15	1	15 m ²

Academic	Single unit Area	Units	1130 m ²
Laboratory	248	2	496 m ²
Preparation Room	53	2	106 m ²
Microscope Room	9	2	18 m ²
Incubator Room	9	2	18 m ²
Freezer Room	9	2	18 m ²
Cold Room	9	2	18 m ²
Dark Room	9	2	18 m ²
Store	15	2	30 m ²
Chemical Store	6	2	12 m ²

Library	338	1	338 m ²
Masters Workspace	58	1	58 m ²
Store	12	1	12 m ²
Recording Room	38	1	38 m ²

Administration	Single unit Area	Units	404 m ²
Foyer/Reception	110	1	110 m ²
Offices	135	1	135 m ²
Individual Offices	11	8	88 m ²
Academic Record Store	19	1	19 m ²
Multi-functional	52	1	52 m ²

Public	Single unit Area	Units	636 m ²
Exhibition	259	1	259 m ²
Workshop/Training	111	1	111 m ²
Auditorium	137	1	137 m ²
Storage	18	1	18 m ²

Social	Single unit Area	Units	170 m ²
Balcony	10	5	50 m ²
Break Room	60	2	120 m ²

Services	Single unit Area	Units	142 m ²
Ablution	17	1	17 m ²
	8	1	8 m ²
	16	1	16 m ²
	13	3	39 m ²
Refuse	9	1	9 m ²
Pump Room	20	1	20 m ²

Circulation	Single unit Area	Units	450 m ²
Horizontal	167	1	167 m ²
Vertical	21	7	147 m ²
	26	6	156 m ²
Hanging Gardens	255	1	255 m ²

Total Area			4552 m²
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4.0 Design Synthesis

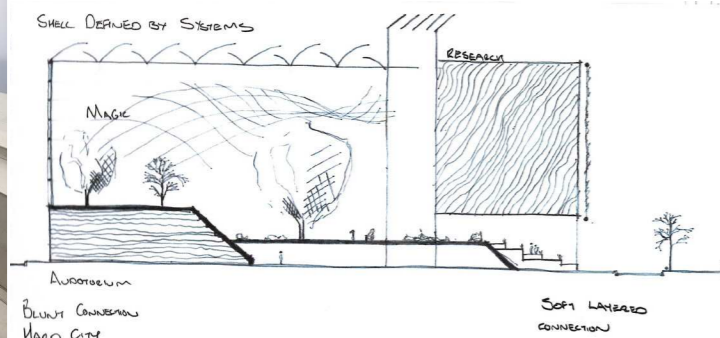
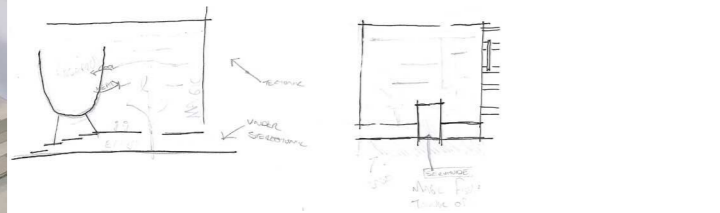
4.1 Design Development

1



Take Out

- The morphology of the building needs to be more interesting. Koolhaas talks about a monolithic street experience and inside is where the magic happens, this magic needs to be planned.
- The ground plane needs to become a public space living onto the spruit.
- There must be more involvement for the person experiencing the gardens, walkways through the gardens treetops would ignite imagination.

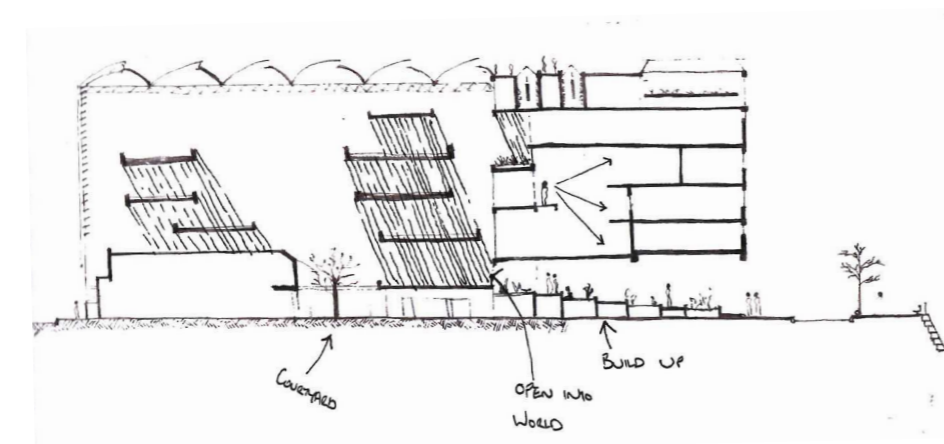


2



Take Out

- Is it a shed or a duck? Currently it's a shed with some feathers glued on. The building should be namable and memorable, and this is neither. It is not envisioning ethnobotany from new lenses. I must imagine the most crazy and beautiful way of creating the space and work back from there adding functional elements.
- Botanical gardens all have paths from which you view the plants. This can be used as the basis of my imagination.

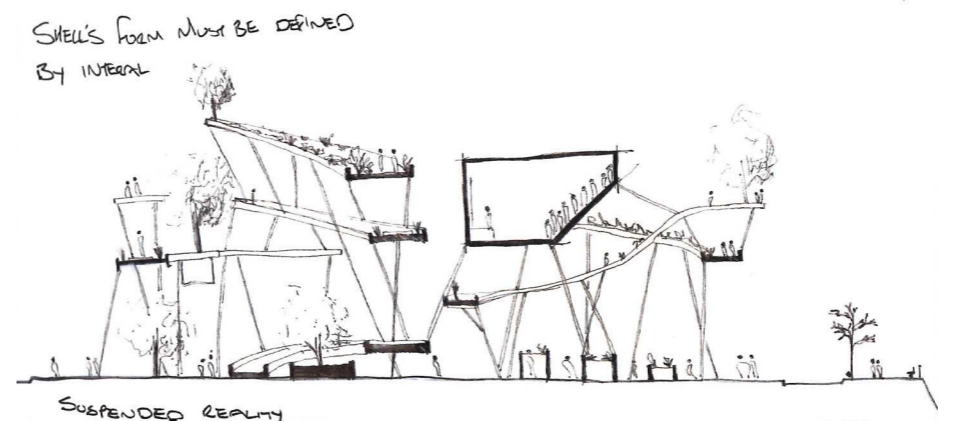
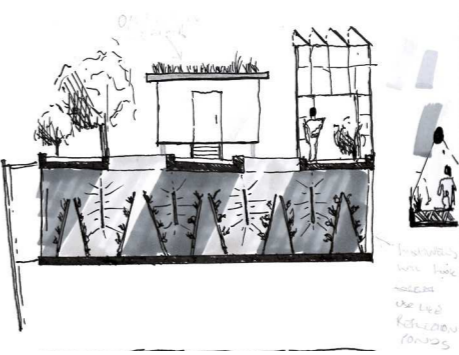


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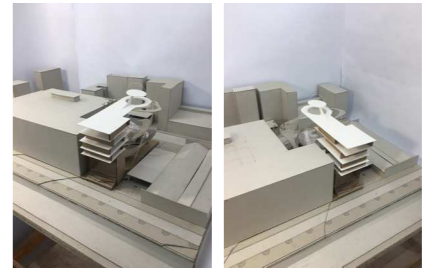


Take Out

- The endless freedom of a walkway cannot drive this design. It is frivolous and does not help dictate the layout of functions meaningfully. There needs to be a middle ground between this and the previous authoritarian box.

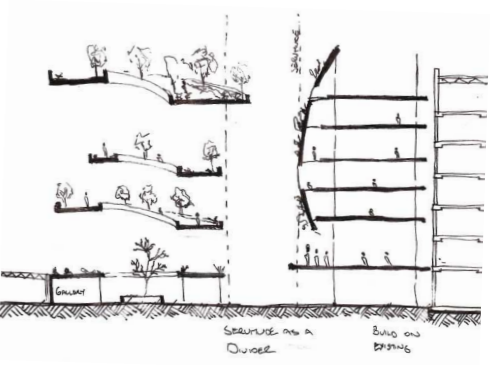


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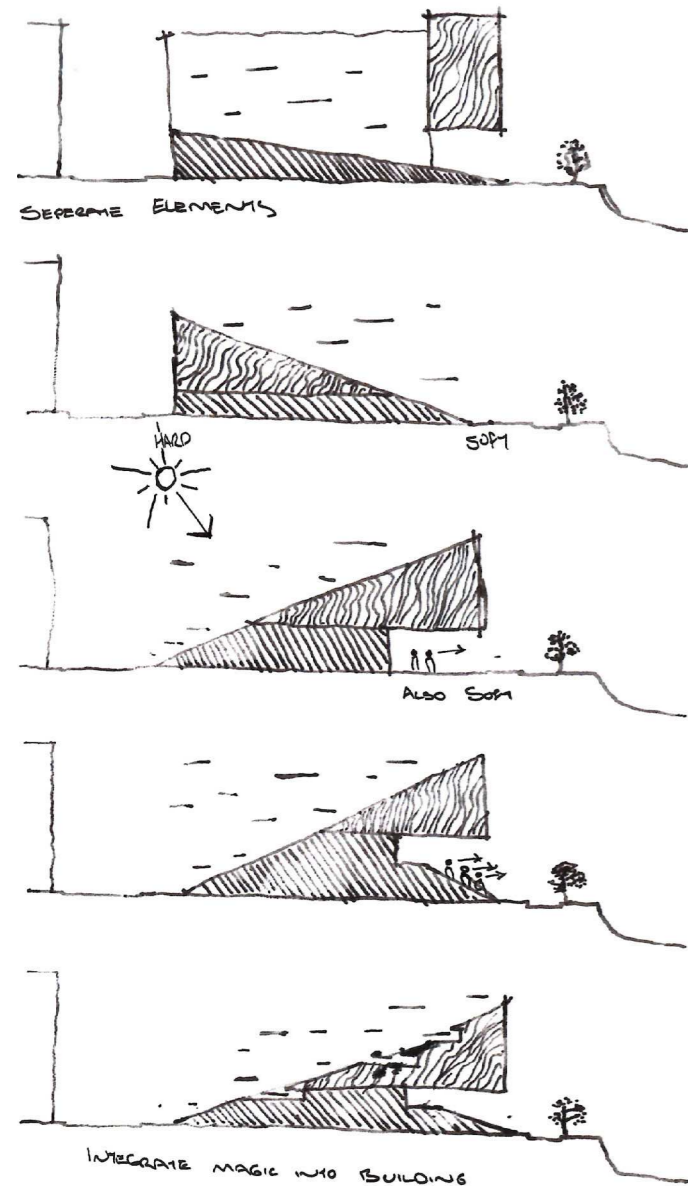


Take Out

- Using such a strong form and merely placing it alongside the world of imagination and intrigue does not help engage either
- Suspending a ball or element which should be on the ground adds excitement, it is a new way of seeing the traditional botanical gardens.



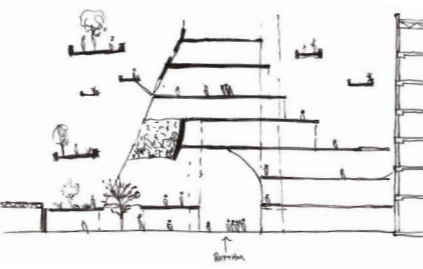
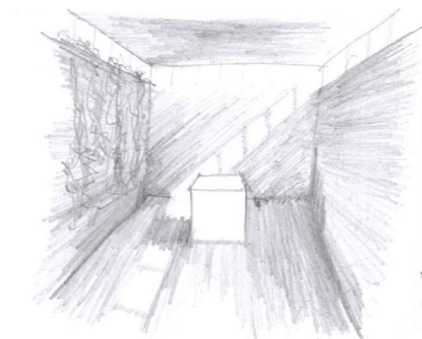
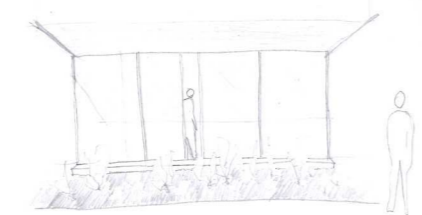
5



Take Outs

- Firstly the strong geometric forms helped make an impression on the spruit. This presence is essential because most herbalists will walk from central park up the spruit to reach the institution.
- I then investigated the possibility of placing all the functions under a ramp, which allows for the most growing area on the site.
- For things to grow I needed to maximize the solar gain.
- However, this orientation does not add to the life on the spruit and disconnects the gardens from it completely.
- Adding a slope allows for people to rest in front of the building on its steps and gives it a presence along the spruit.
- The walkways of the garden need to be integrated into the fabric of the built landscape. Just as the boomslang in Kirstenbosch integrates into the natural.

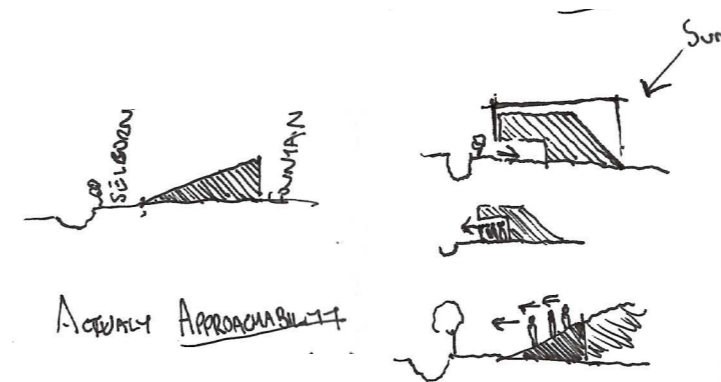
6



Take Out

- Maximizing solar gain is more important for the greenhouse and research component where conditions consistent with the rest of the Bloemfontein is important.
- There must be a series of experiences within the progression through the project. This starts on the ground plane for the public.

7



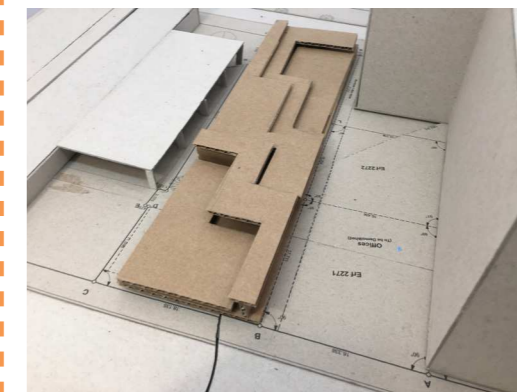
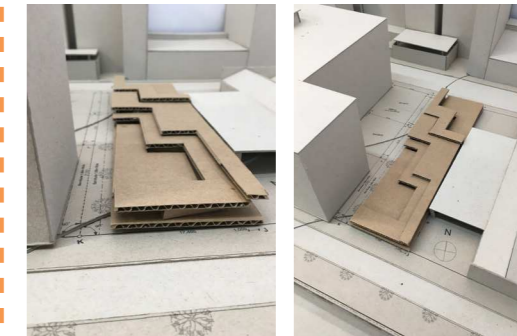
Take Out

- This is an institution's plinth. This will not change the perception of ethnobotany itself but rather lump it into the university system.

8

Take Out

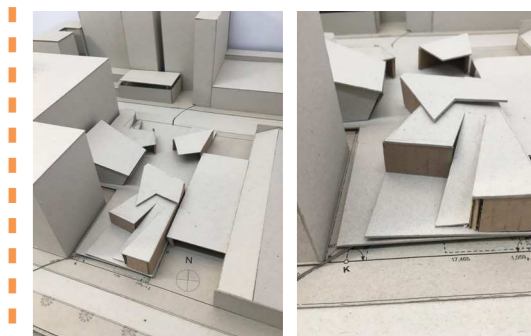
- It becomes difficult to place meaningful rooms under this type of public component.
- I must remove the existing structures to meaningfully increase the density on the site, thus allowing for congestion.



9

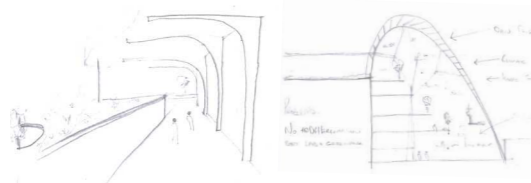
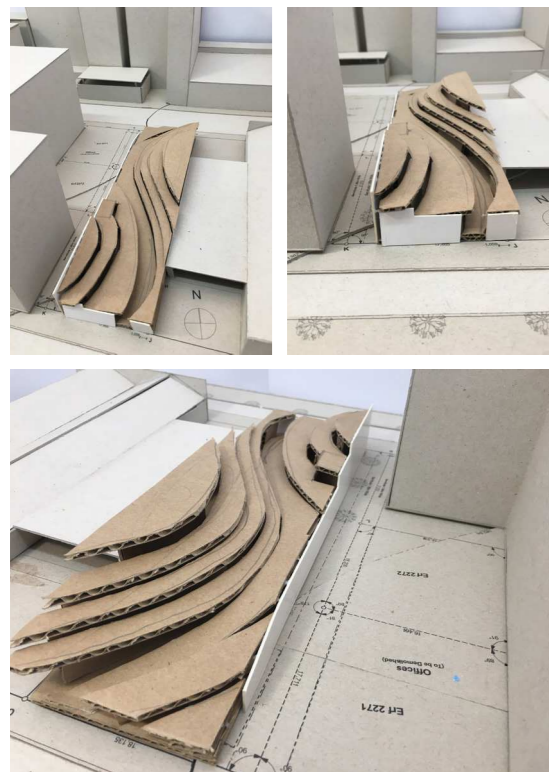
Take Out

- There was something beautiful about being able to interact with the buildings by being able to walk on their roof.
- The ground plane needs to be more about the gardens than fitting functions into it.
- The original servitude and draw across the site are lost by placing the buildings like this.



Take Out

- This is a bit meaningless. It draws you across but does not relate to anything else.
- The servitude is used too directly as a street which is not that interesting and it is not being reinvented. The path over the roof is closer to a reinvention.

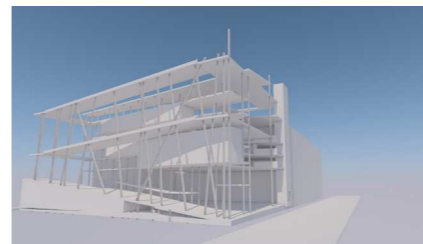
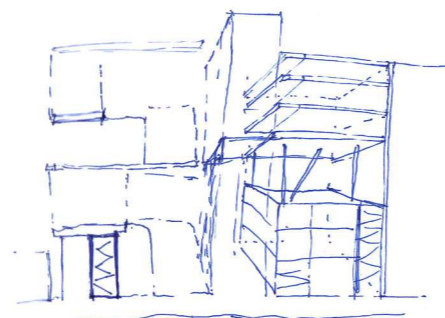
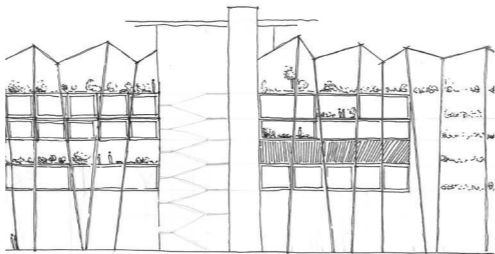


Take Out

- Using such a strong form and using that to draw people across the site is a good idea.
- I enjoy the interaction between the grid of offices and the walkway of gardens.
- The gardens shade the offices and labs well.
- Imagining the design as the 'Downtown Athletics Club' is a productive way to free my imagination yet remain functional.
- This diagonal element needs to relate to something meaningful.

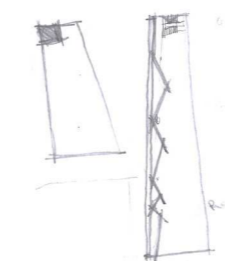
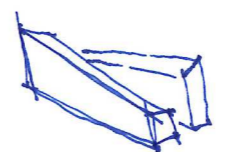
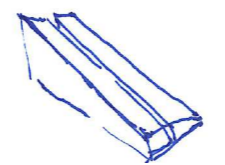
Take Out

- By refereeing to the natural landscapes of the Free State I am not embedding the project as a thing of the man-made wilderness (The City).
- Slanting the columns reduces the rigor and monotony of the design.



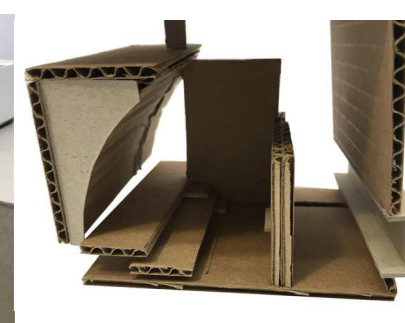
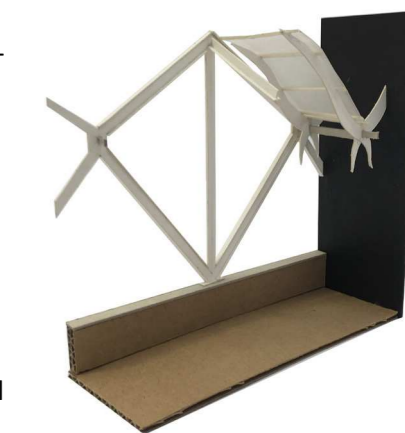
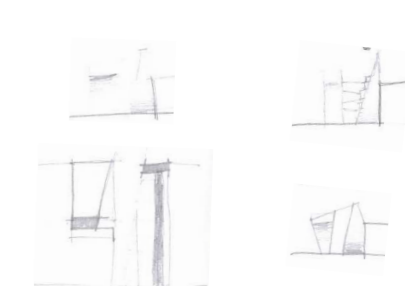
Take Out

- Using the strong void space is a better drawing element across the site.



Take Out

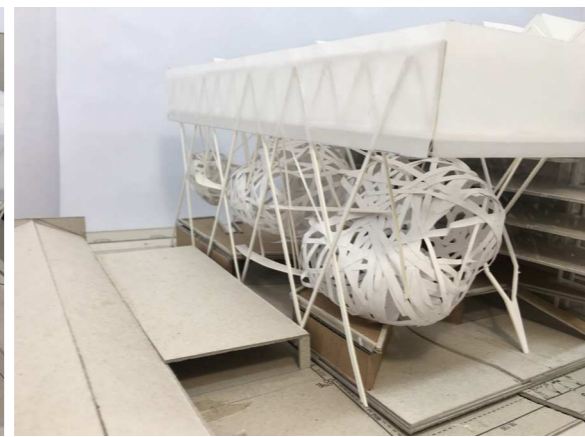
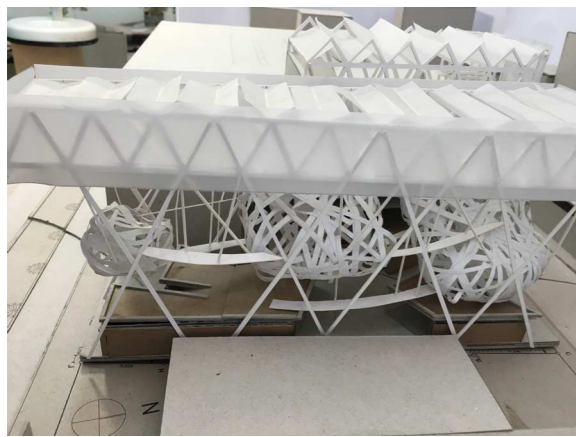
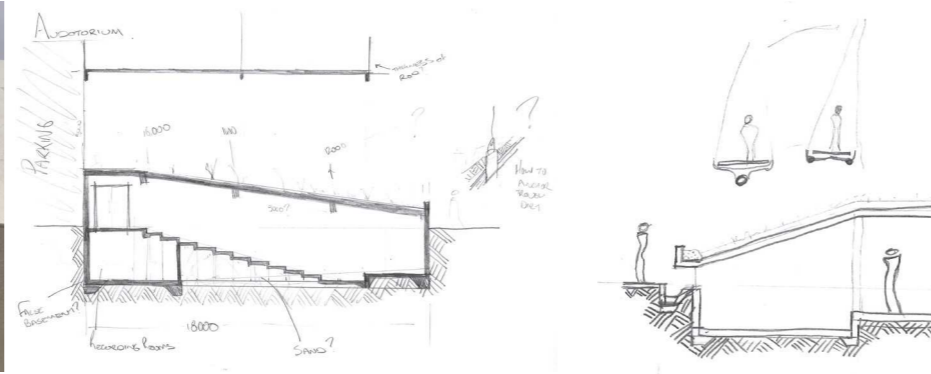
- Offices should not be separated from the research component. I must rather look back to the program stacking I investigated in 12. Making one site the gardens and the other the research component has many benefits.
- The ramp is impractical if it attempts to get all the way to the roof. The roof should just be Greenhouses. A visual connection with the labs (where the research is actually done is better).





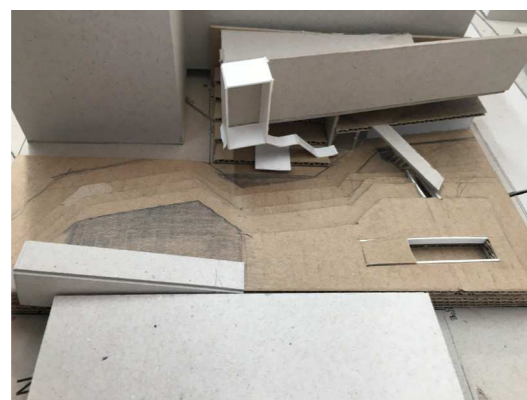
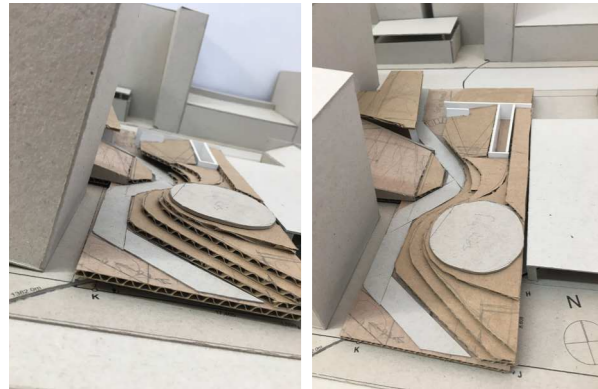
Take Out

- The truss structure can suspend everything below! This structure allows for the strong form and the intriguing experience below.
- Combining the experience of the ball which I lost in step 4 and the experience of the garden path is a meaningful step in the correct direction.
- The Ground floor must be very open and clearly public space in order to add to Bloemfontein's green.



Take Out

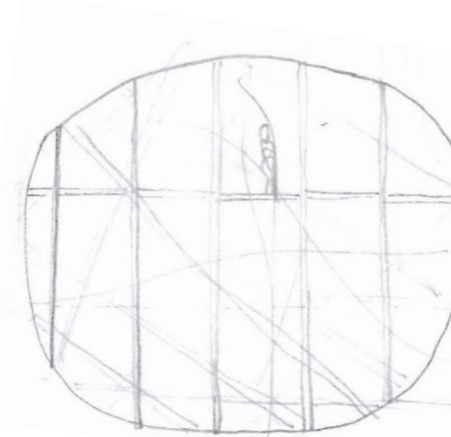
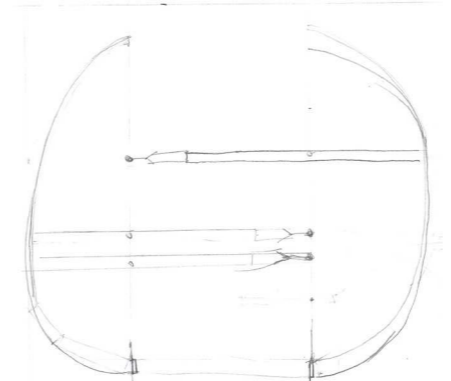
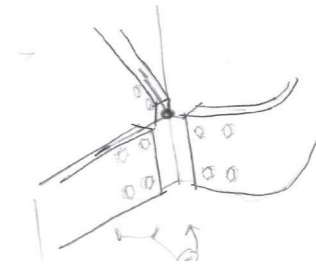
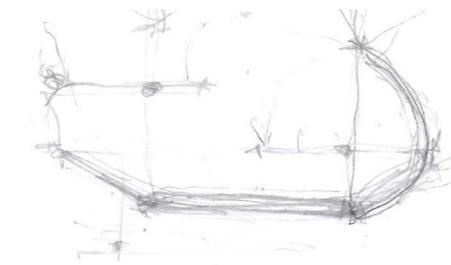
- I enjoy the meandering path which follows the general direction of the strong void space.
- Storing water in the gardens is a good visual way to change people's view of wasting water.

**Take Out**

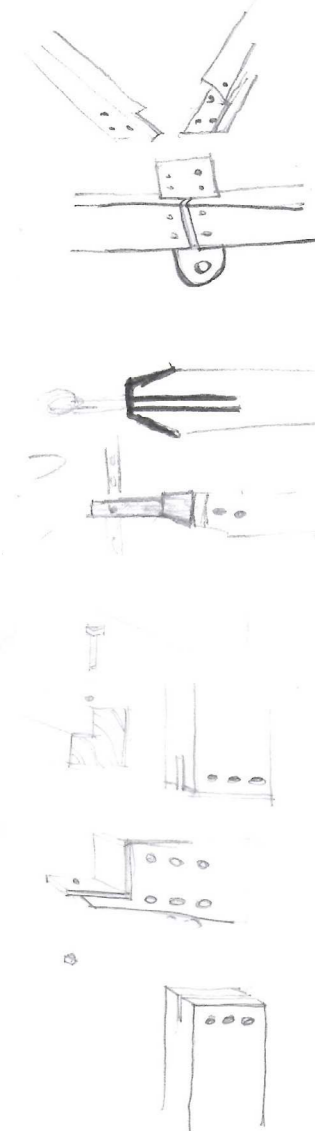
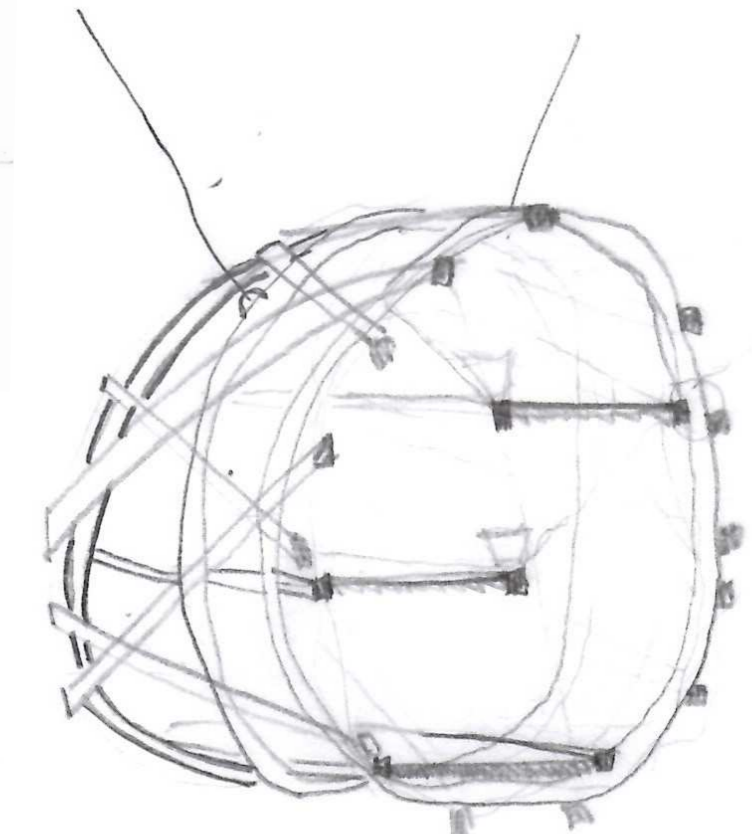
- This gives the experience of walking through a rolling valley. This is not a Free State experience.
- The ground is still meaningless. It is an experience without any context.

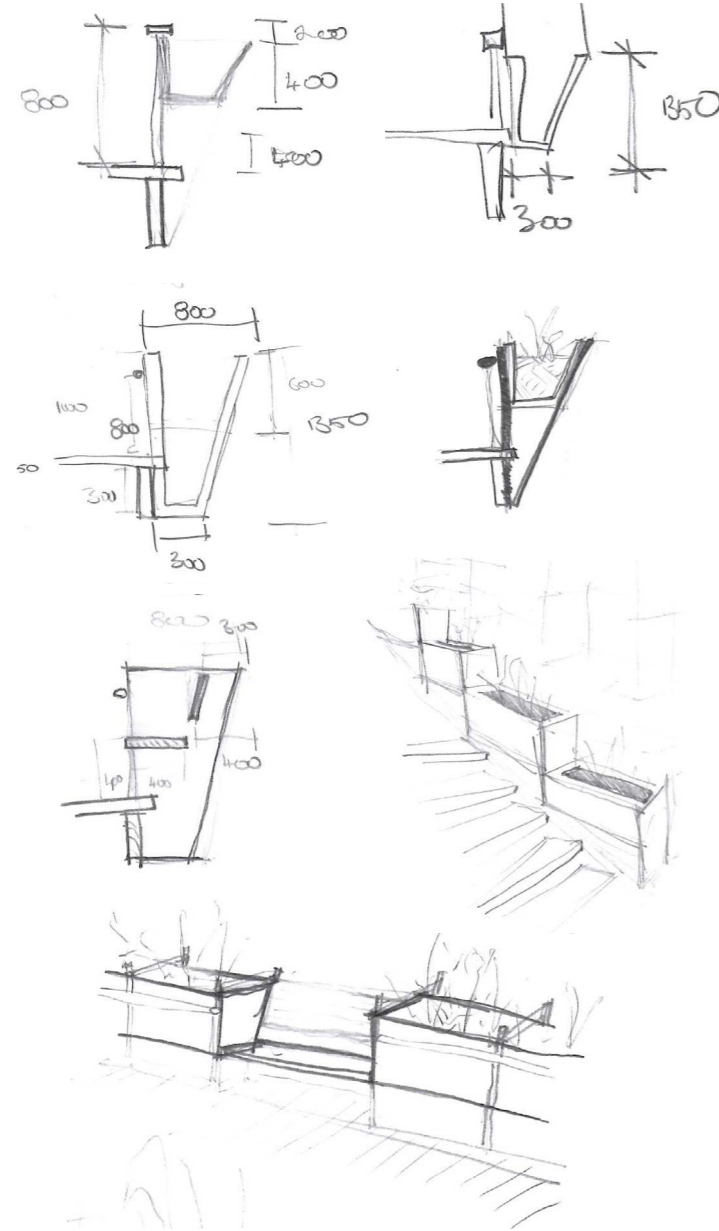


The pods are conceptually based on calabashes and baskets which store valuable supplies for the herbalist much like this institution stores knowledge and plant species for future generations of herbalist. When the user walks through it he is exploring the plants which are in the herbalist's repertoire.

**Take Out**

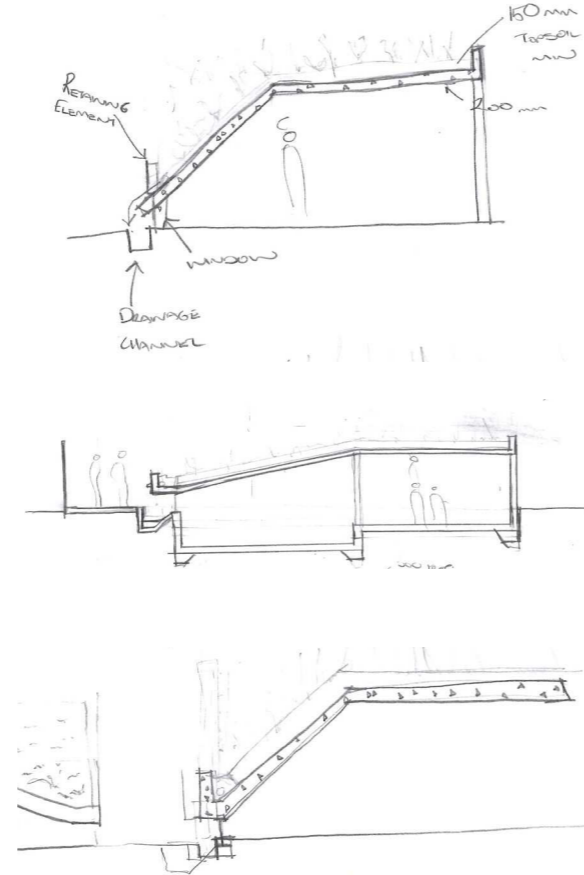
- Suspending a ball or element which should be on the ground adds excitement, it is a new way of seeing the traditional botanical gardens.
- The pods cannot be made of bowstring trusses and they need to be more loosely assembled.
- The pods need to be able to be a complete structural system which is then hung in place.





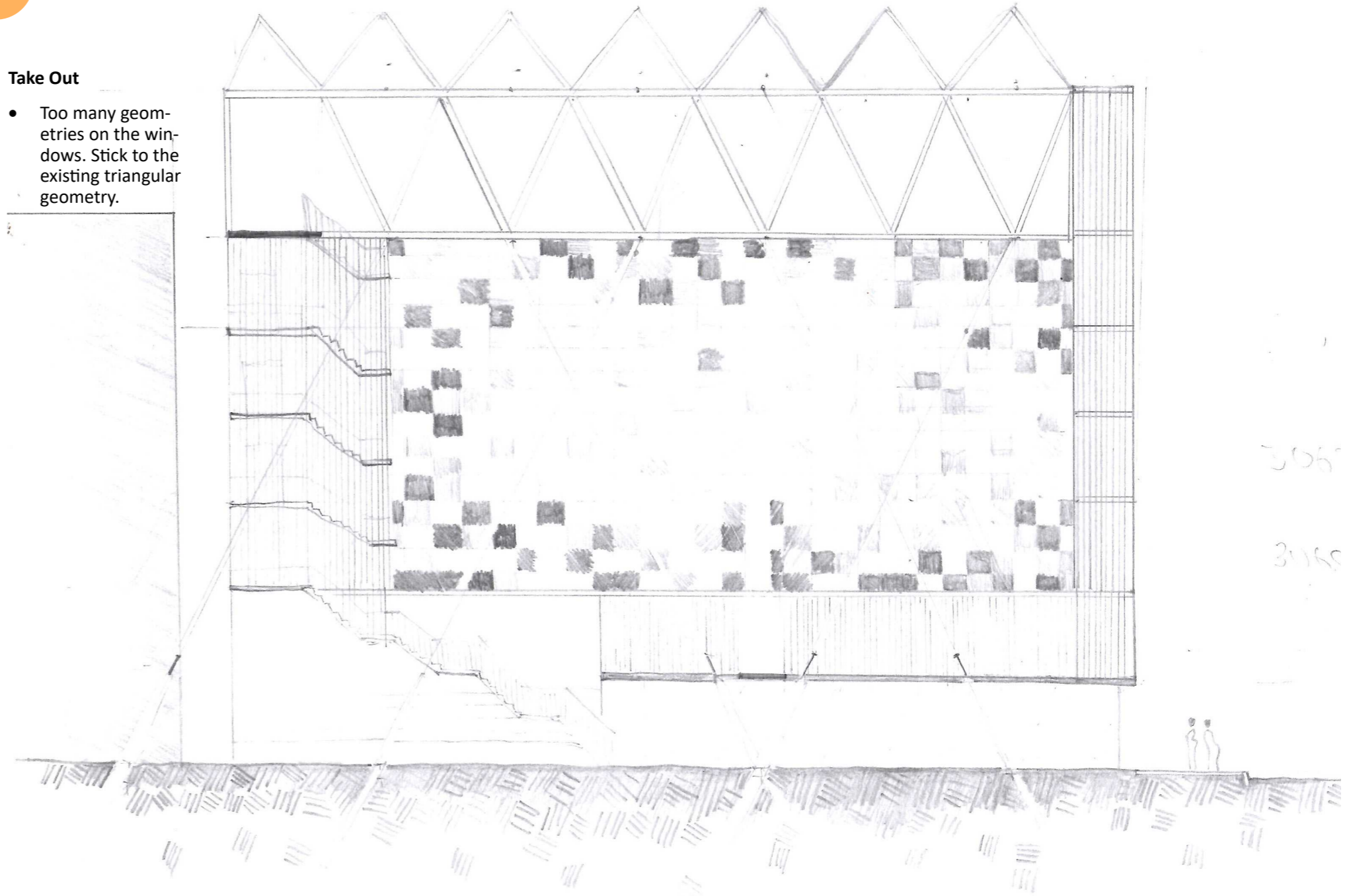
Take Out

- Having buildings with the public gardens on the roof is impractical as they must be sunk into the ground creating multiple issues.

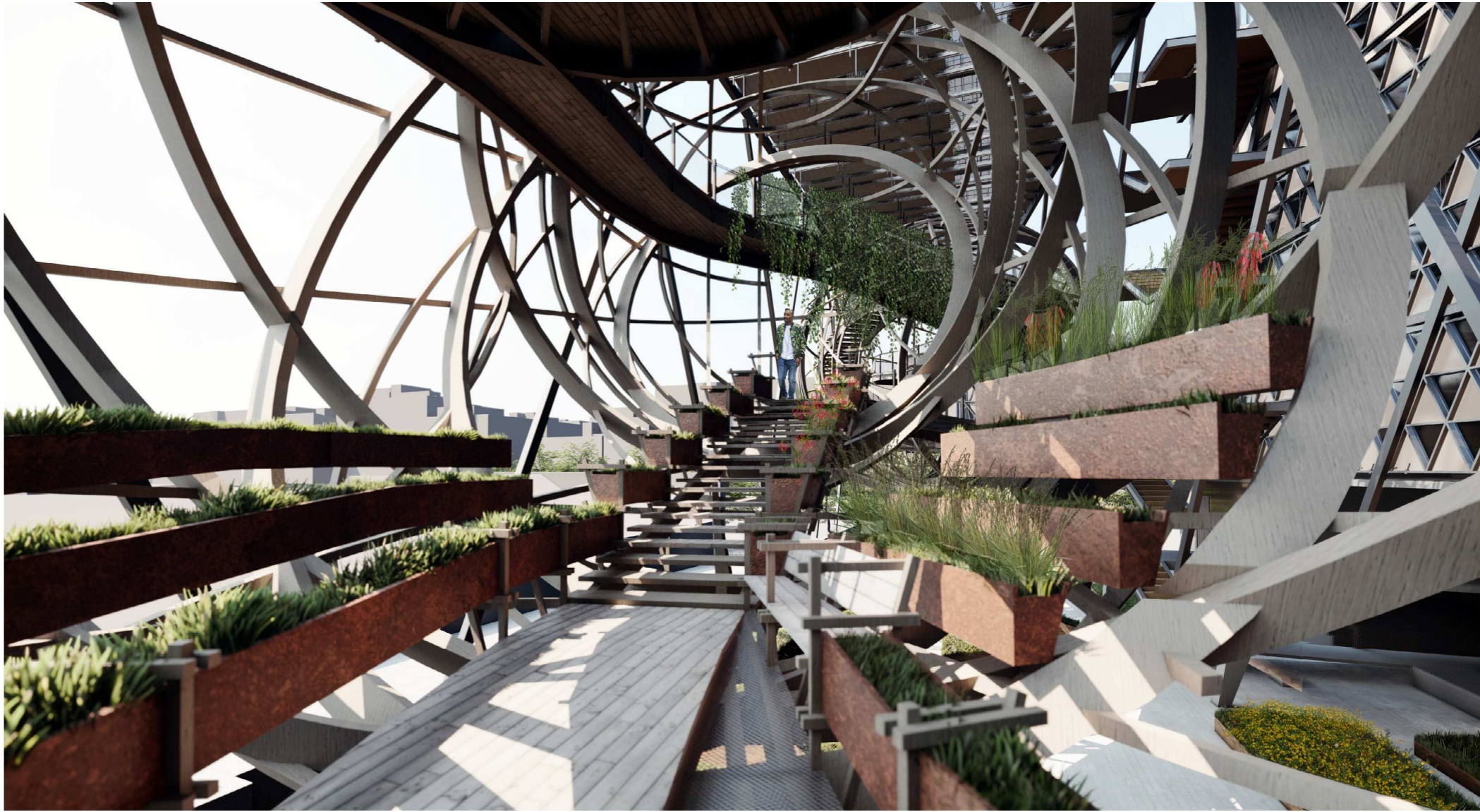
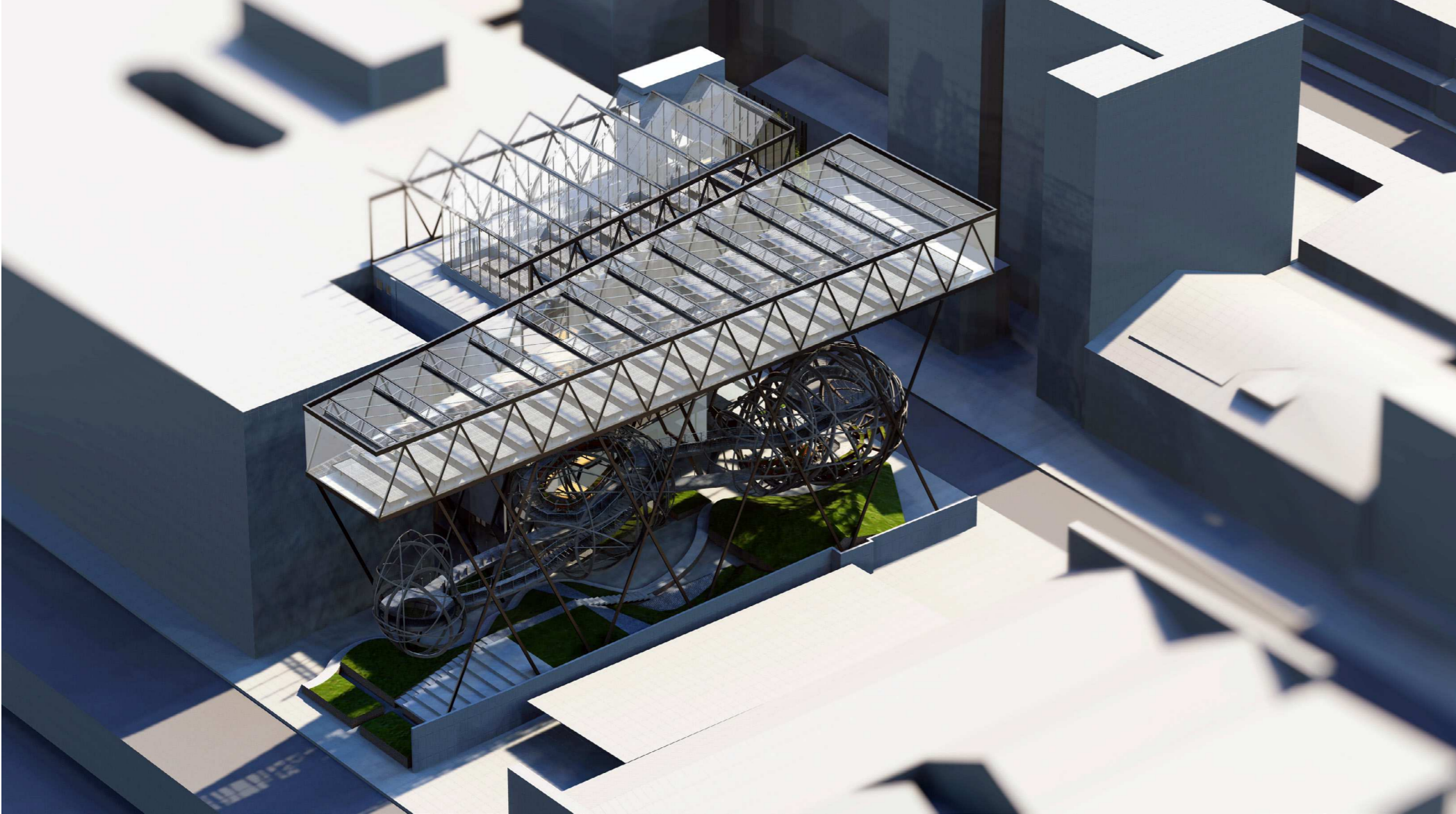


Take Out

- Too many geometries on the windows. Stick to the existing triangular geometry.



4.2 Design Conclusion





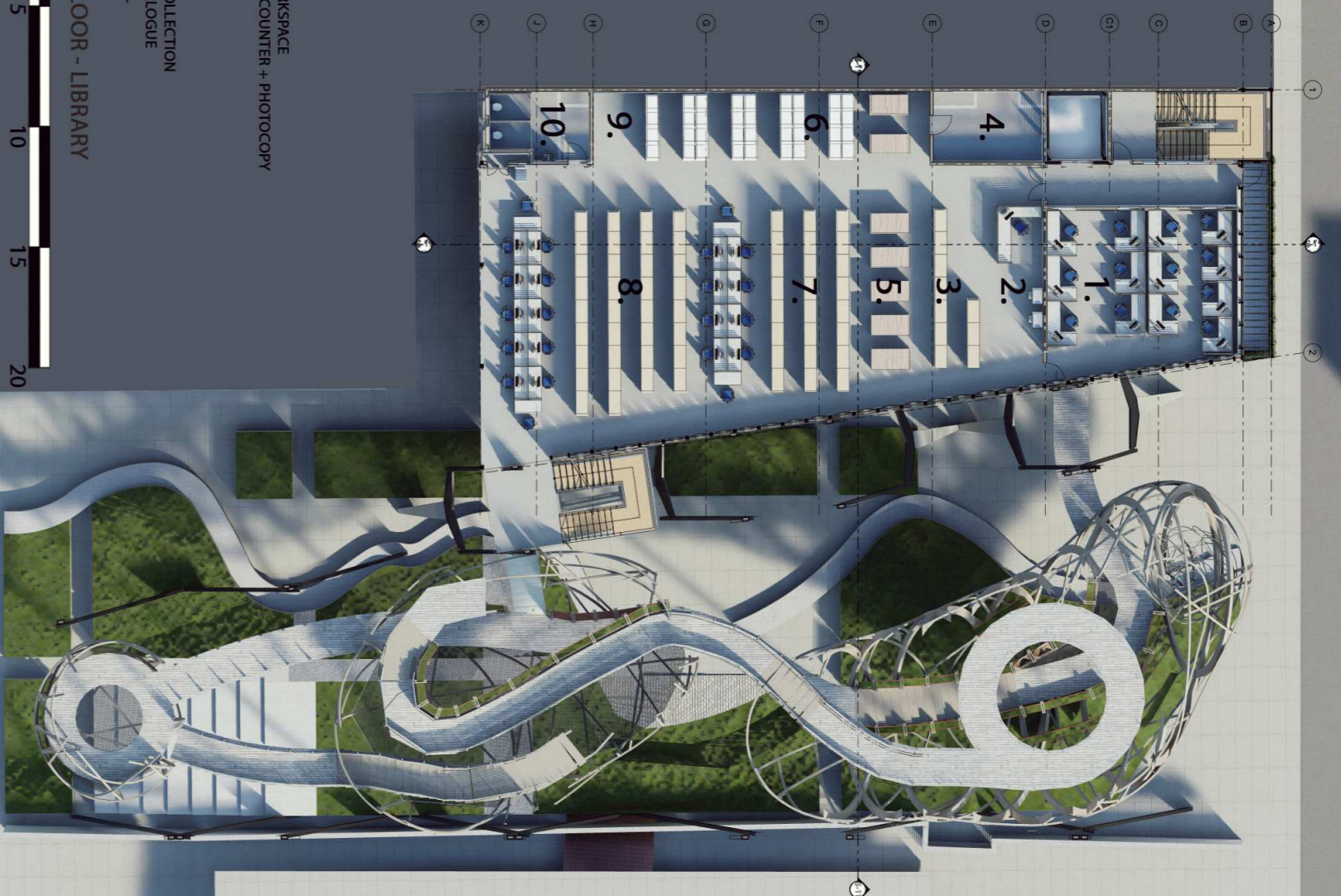
- INDEX**
- 1. ACADEMIC RECORDS STORE
 - 2. TRAINING ROOM
 - 3. STORE ROOM
 - 4. STUMP ROOM
 - 5. VISITORS LOCKERS
- BASEMENT - TRAINING AND STORAGE**



- INDEX**
- 1. RECEPTION
 - 2. MALE ABLUTION
 - 3. FEMALE ABLUTION
 - 4. AUDITORIUM
 - 5. GARDEN STORE
 - 6. REFUSE ROOM
- SECOND FLOOR EXHIBITION**

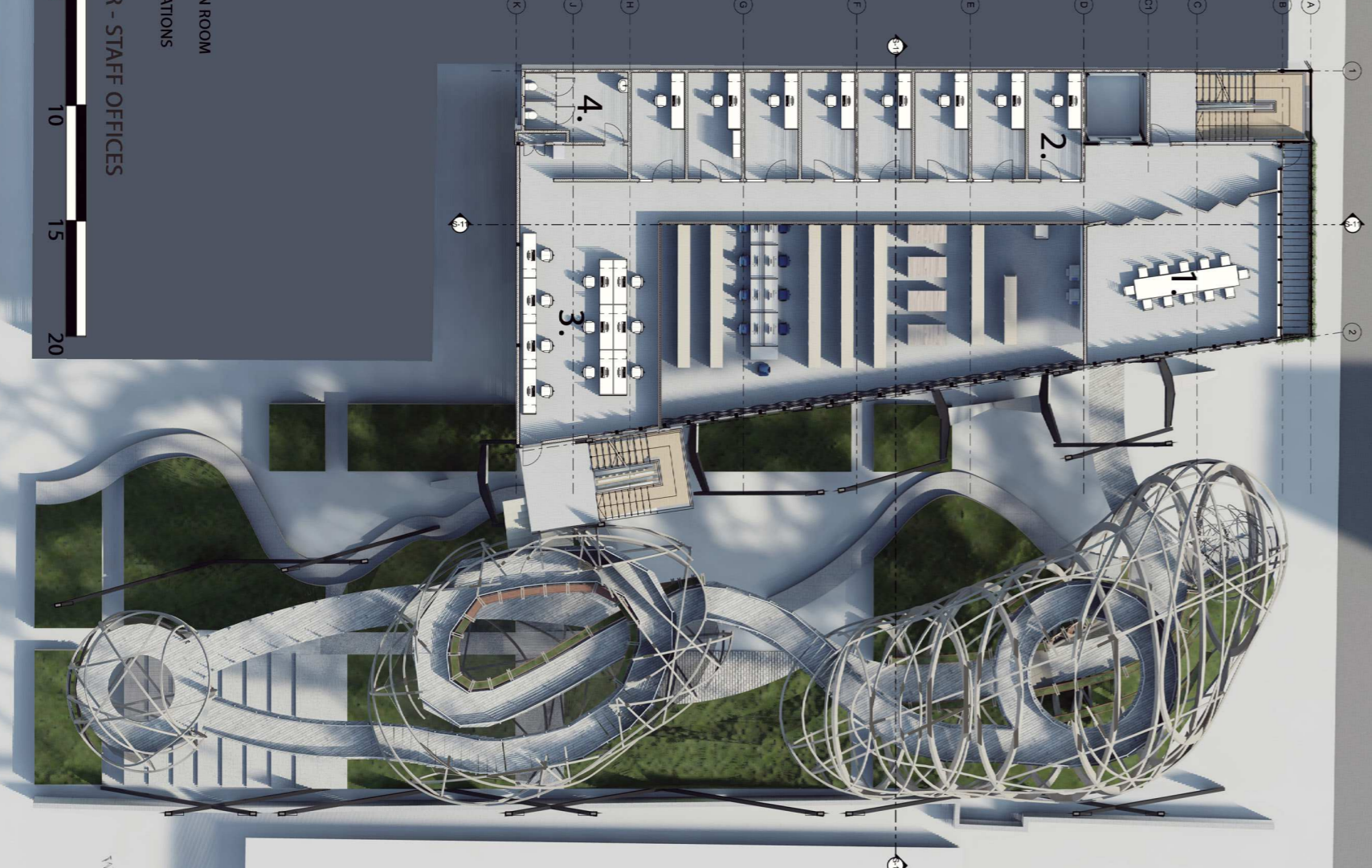






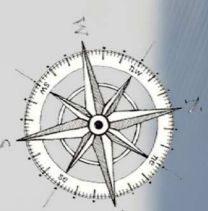
- INDEX**
- 1. MASTERS WORKSPACE
 - 2. CIRCULATION COUNTER + PHOTOCOPY
 - 3. PERIODICALS
 - 4. STORE
 - 5. READ/VIEW
 - 6. SPECIMENS
 - 7. REFERENCE COLLECTION
 - 8. SUBJECT CATALOGUE
 - 9. AUDIO/VISUAL
 - 10. TOILET

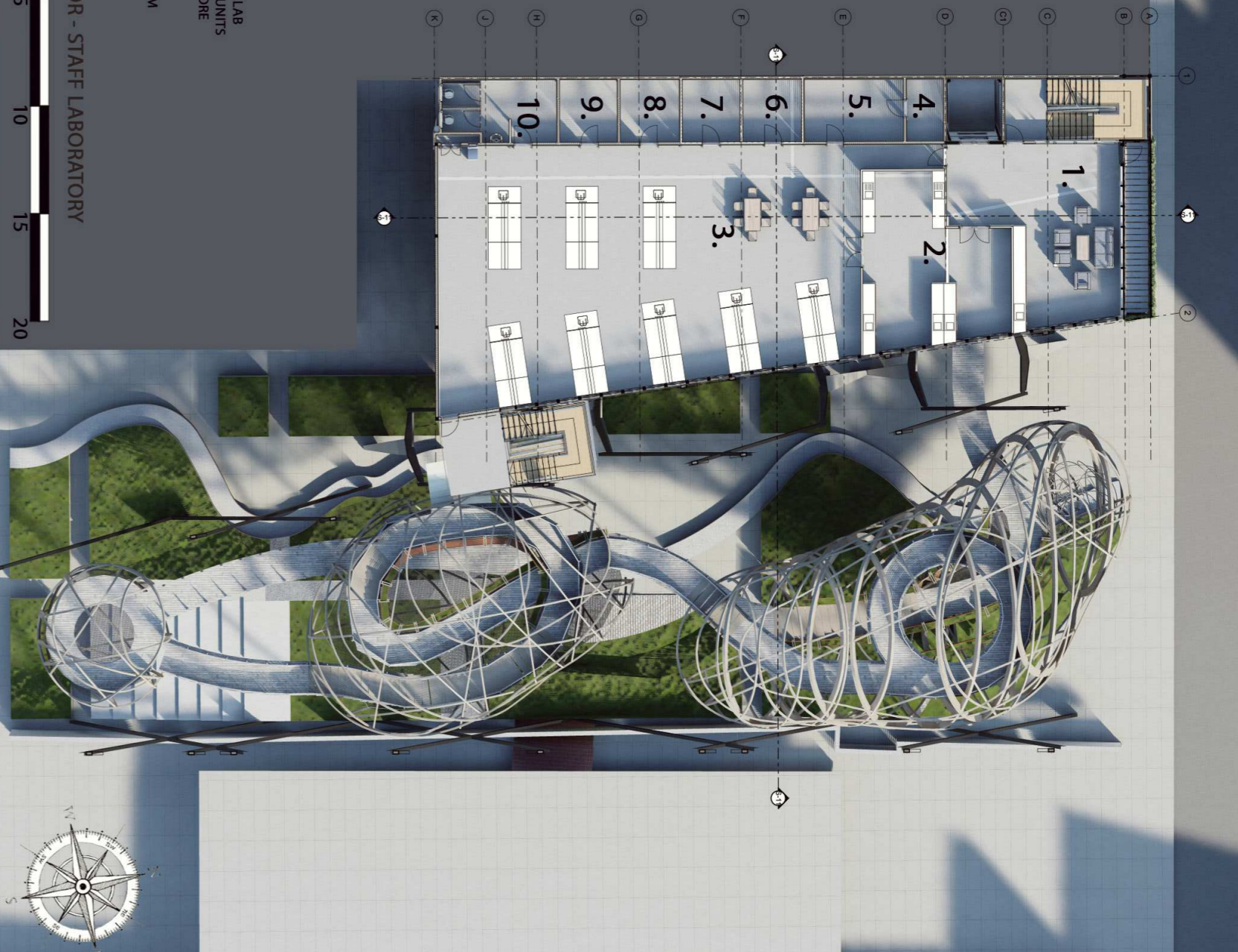
FOURTH FLOOR - LIBRARY



- INDEX**
- 1. MULTIFUNCTION ROOM
 - 2. STAFF OFFICE
 - 3. STAFF WORK STATIONS
 - 4. TOILET

FIFTH FLOOR - STAFF OFFICES





- INDEX**
- 1. BREAK ROOM
 - 2. PREPARATION LAB
 - 3. LABORATORY UNITS
 - 4. CHEMICAL STORE
 - 5. STORE
 - 6. COLD ROOM
 - 7. FREEZER ROOM
 - 8. DARK ROOM
 - 9. INCUBATORS
 - 10. TOILET

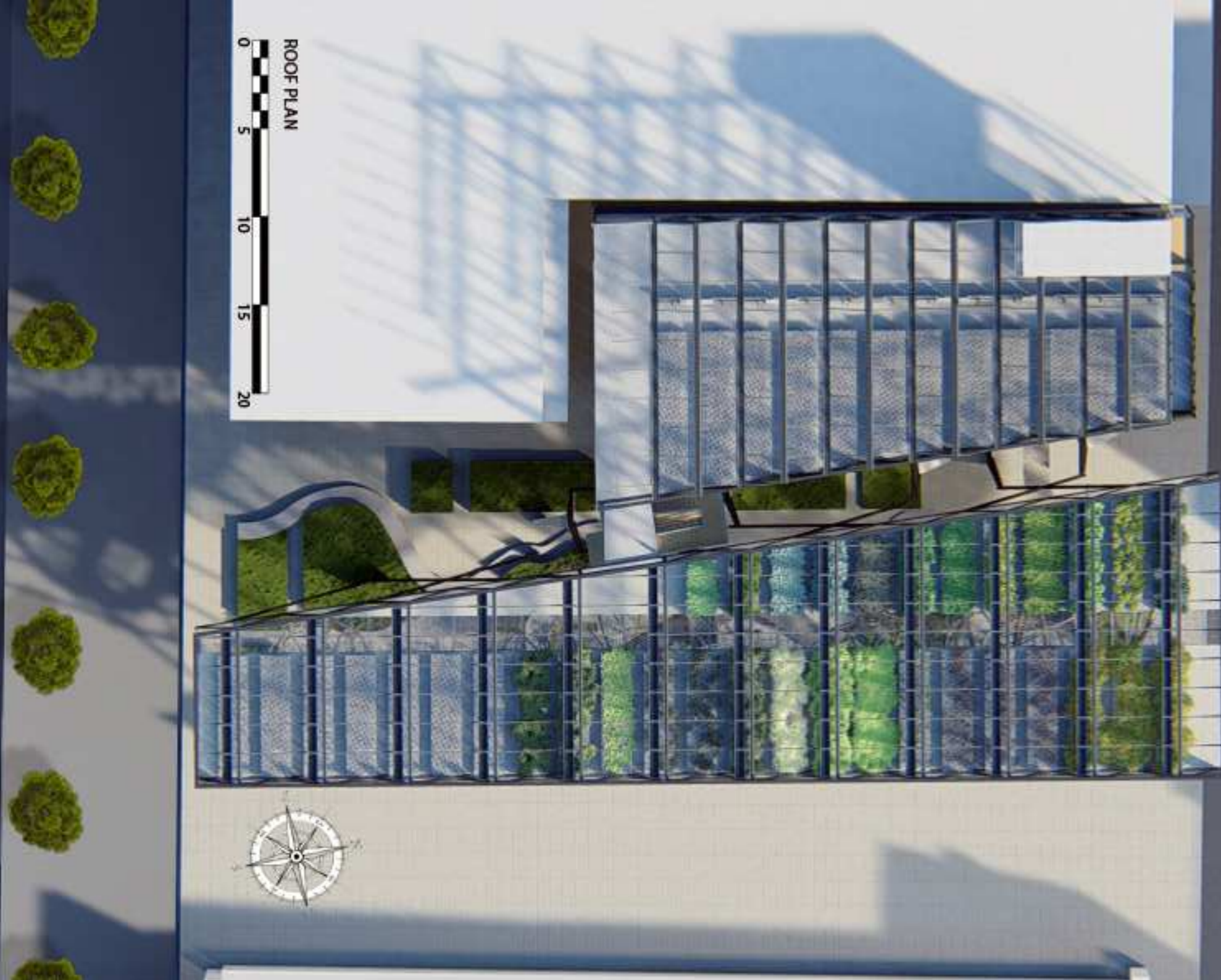
SIXTH FLOOR - STAFF LABORATORY



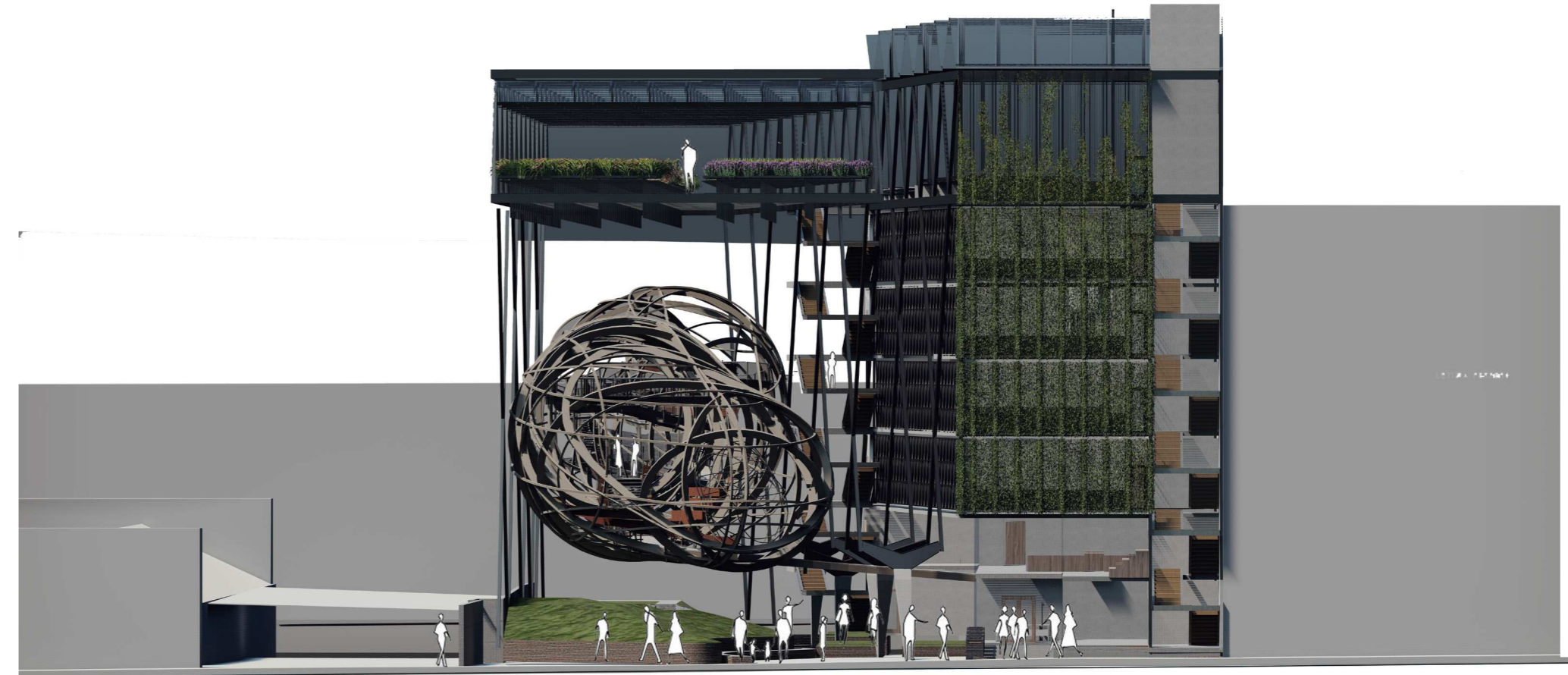
- INDEX**
- 1. CLIMATE CONTROLLED (PLANT PATHOLOGY)
 - 2. CLIMATE CONTROLLED (SOILS)
 - 3. CLIMATE CONTROLLED (CROP)
 - 4. CLIMATE CONTROLLED (CLIMATE)
 - 5. CLIMATE CONTROLLED (GENETICS)
 - 6. HEAD HOUSE
 - 7. GREENHOUSE (PROPAGATION)
 - 8. GANTRY WINGCH
 - 9. CHEMICAL STORE
 - 10. TOILET

SEVENTH FLOOR - GREENHOUSES

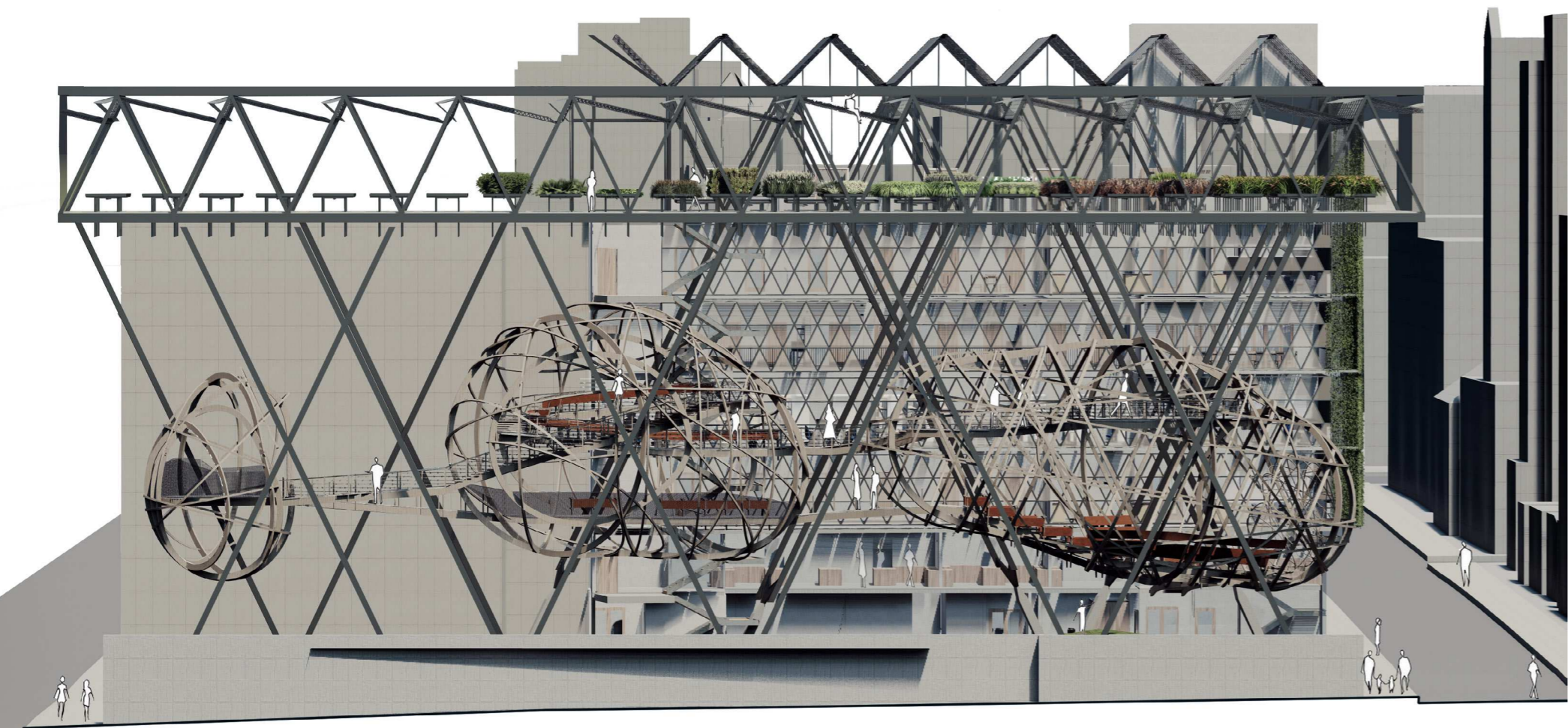




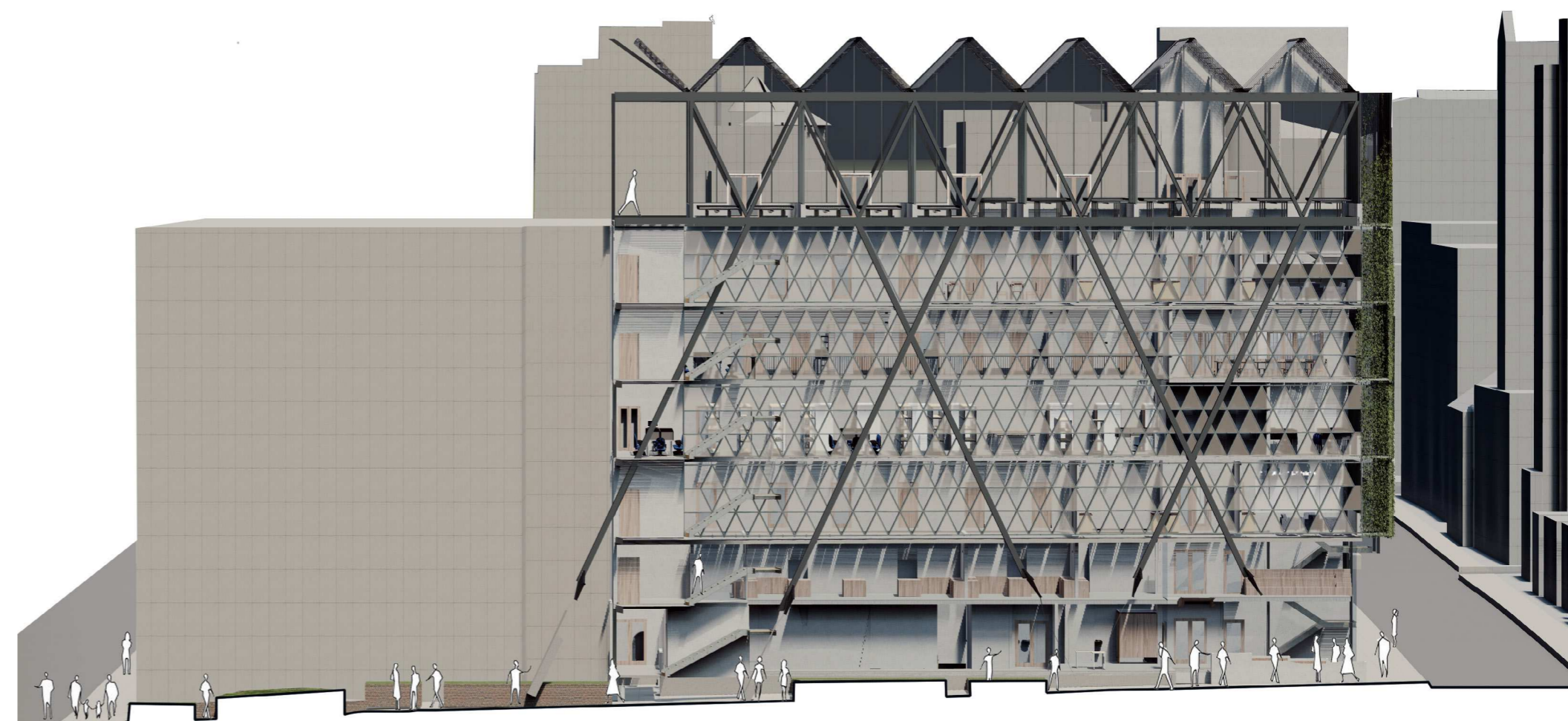
ROOF PLAN
0 5 10 15 20



NORTH ELEVATION
0 5 10 15 20



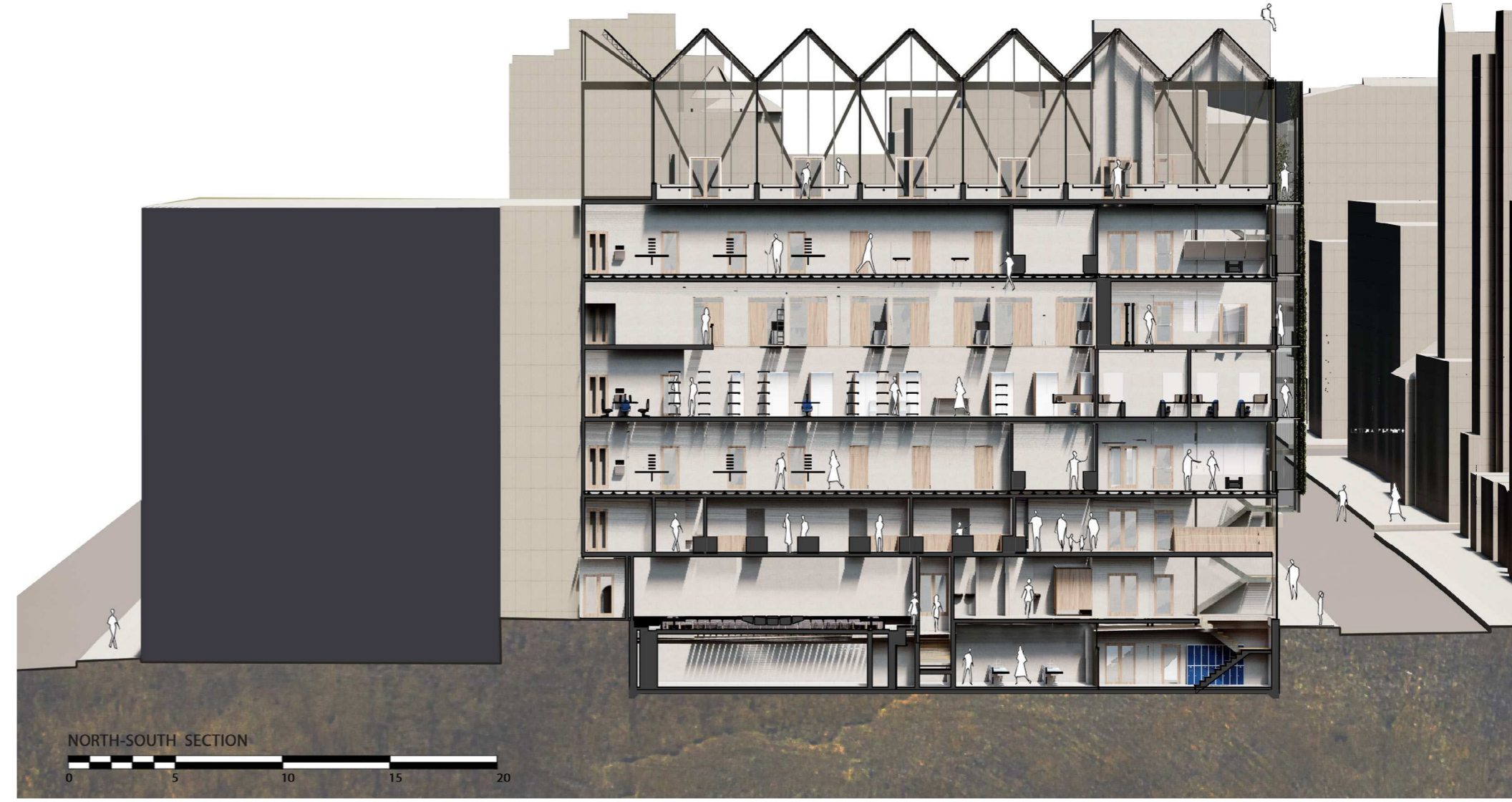

EAST ELEVATION
0 5 10 15 20



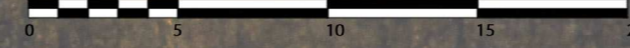
INTERIOR ELEVATION
0 5 10 15 20

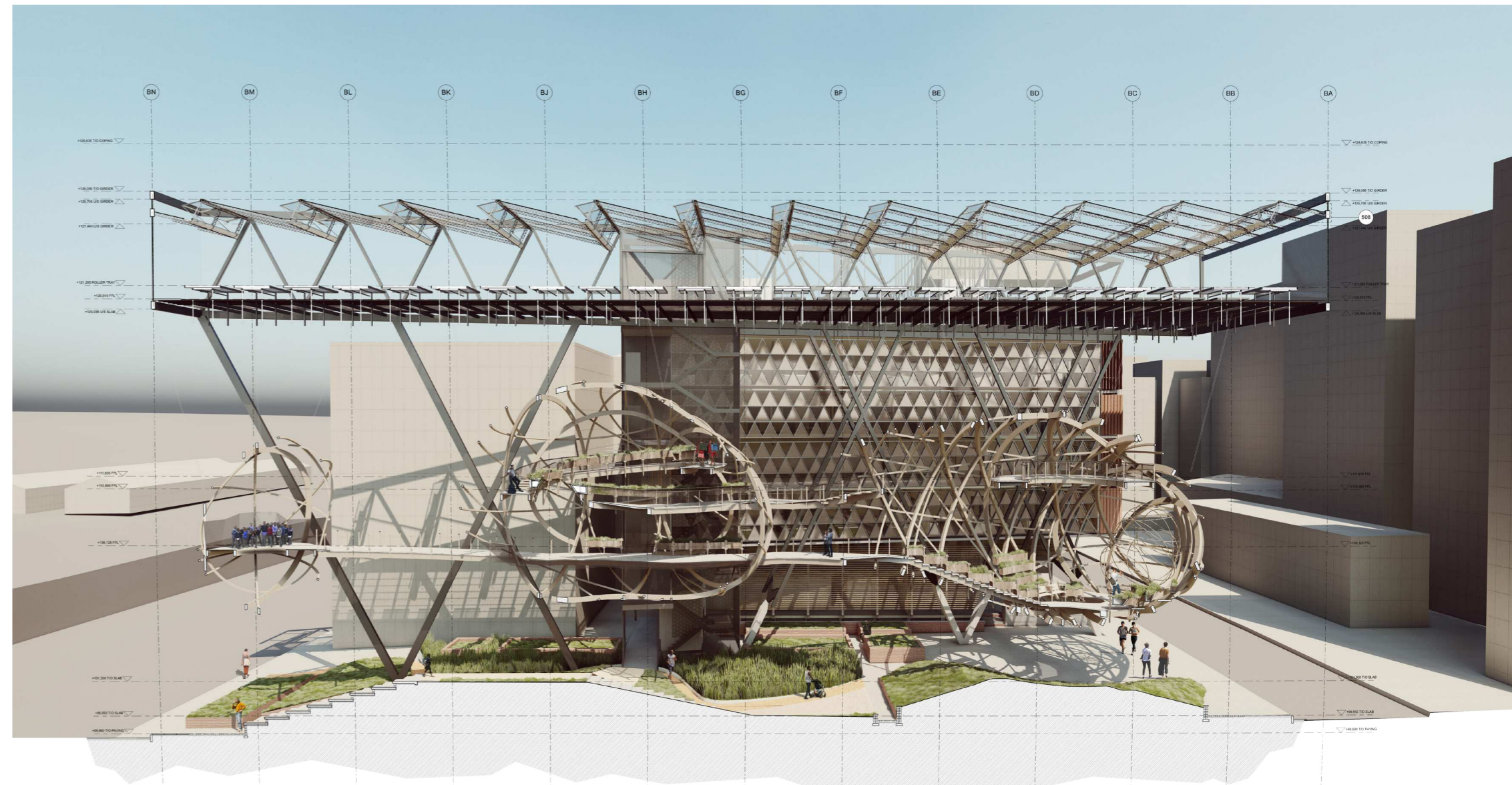
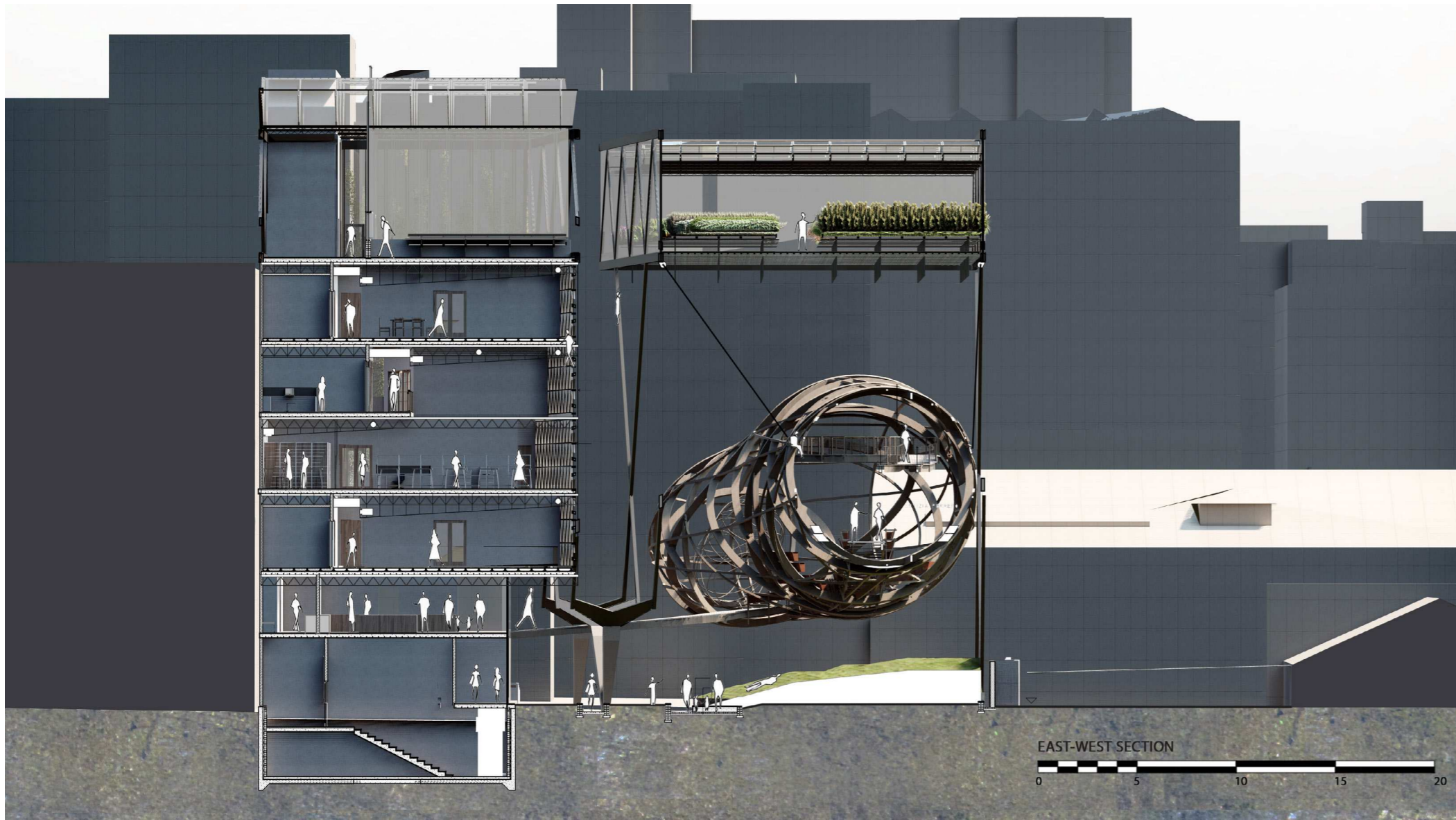


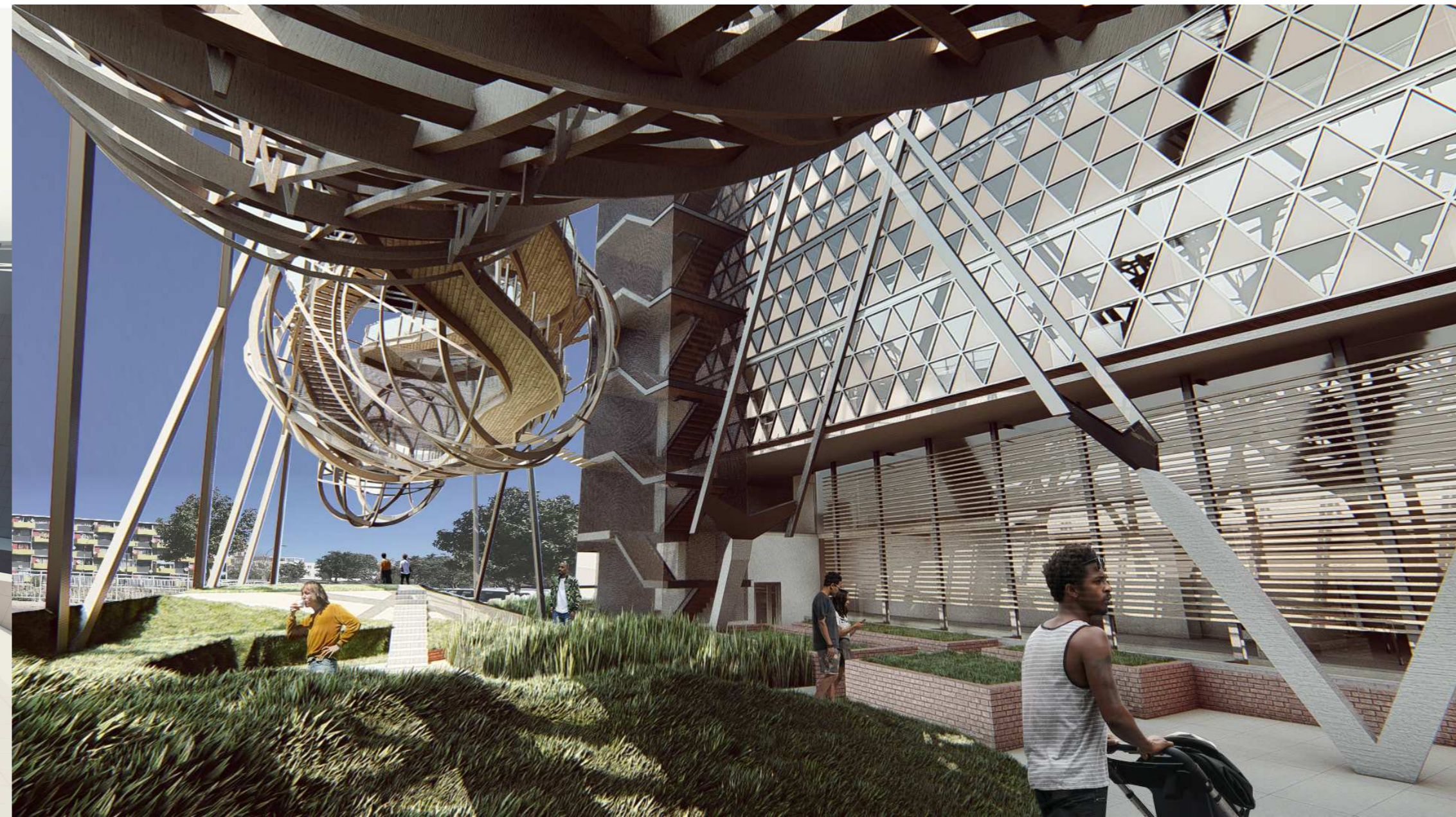
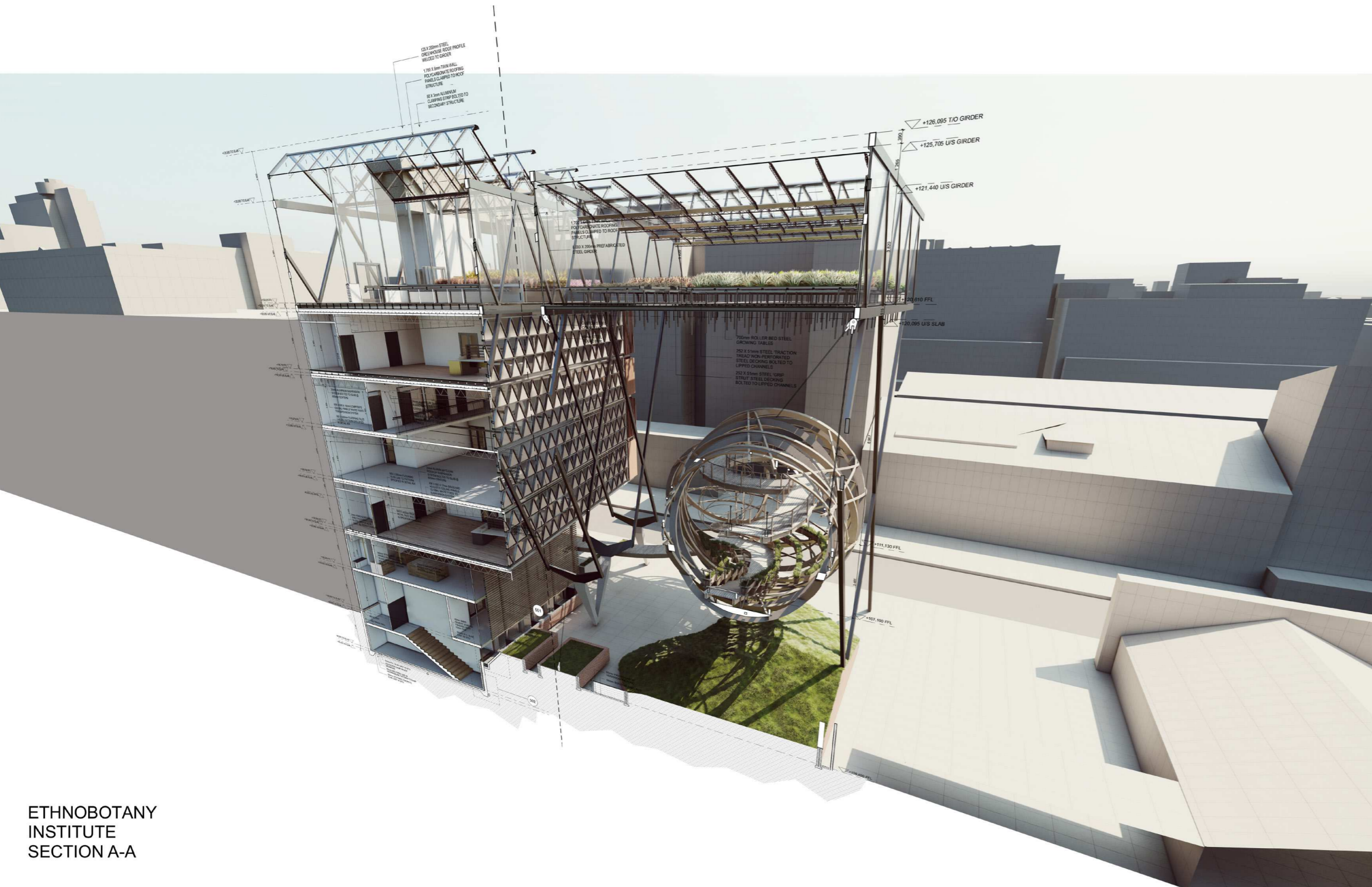
SOUTH ELEVATION



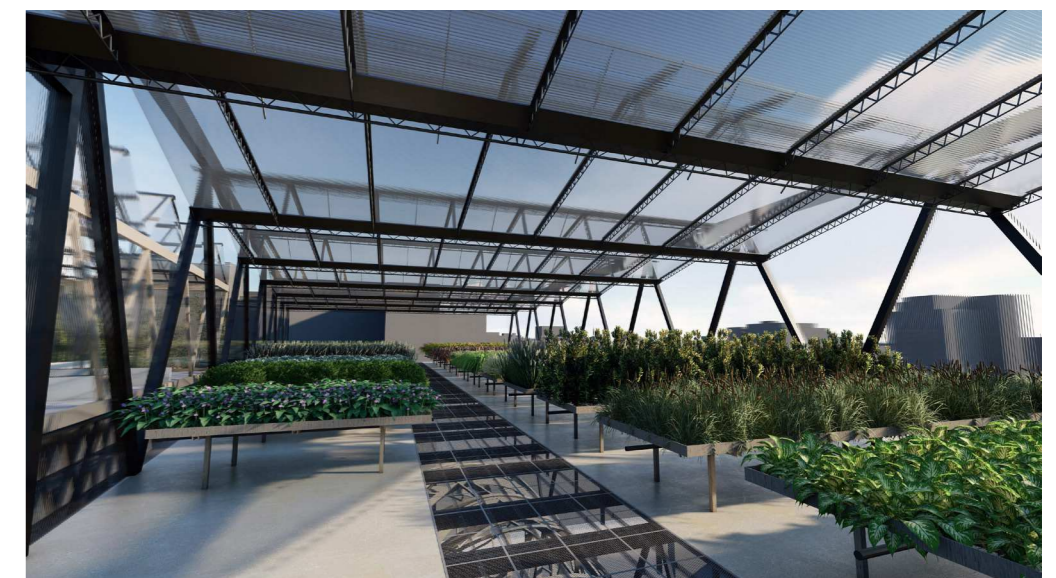
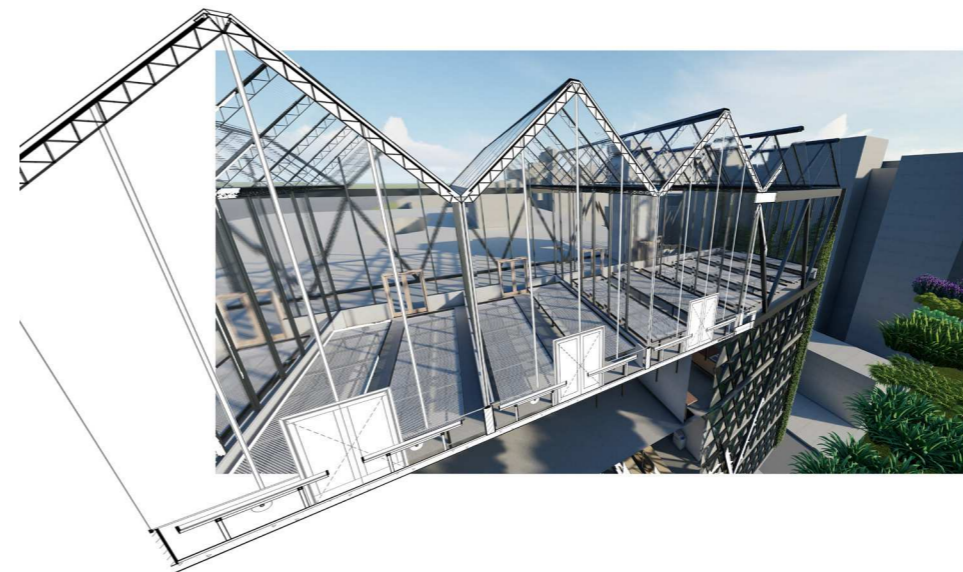
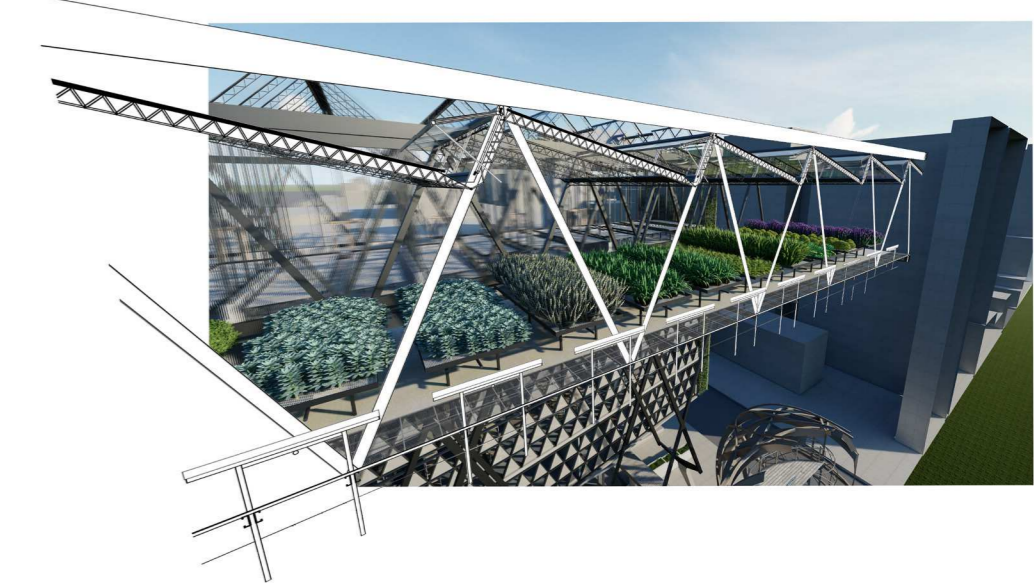
NORTH-SOUTH SECTION

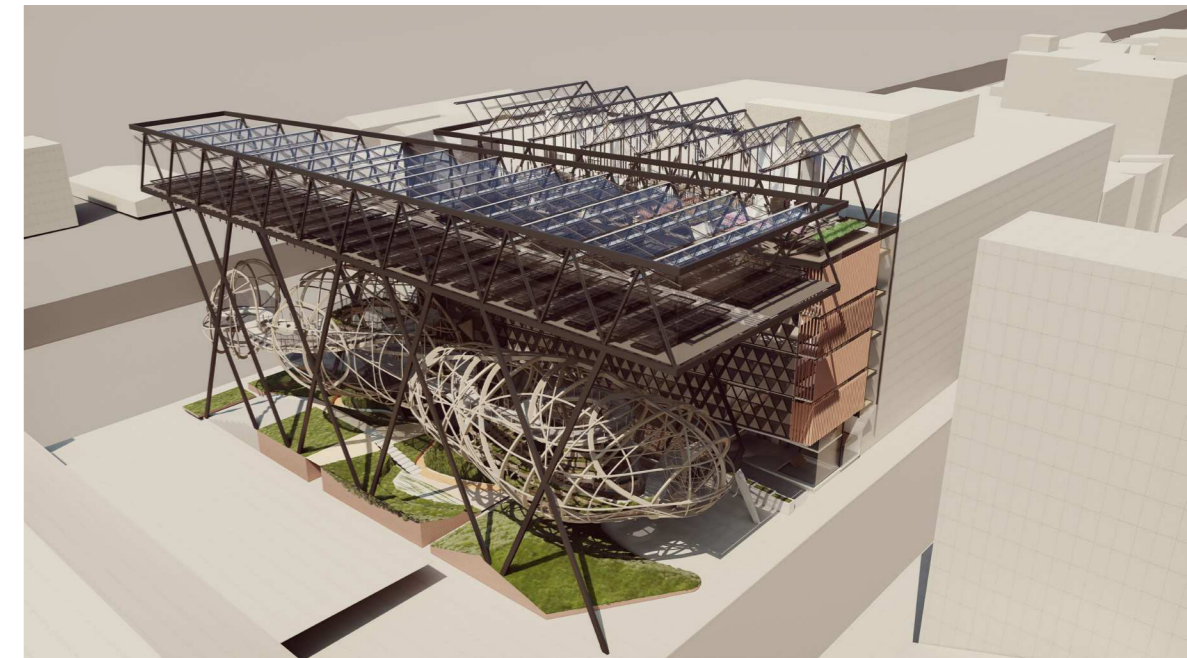
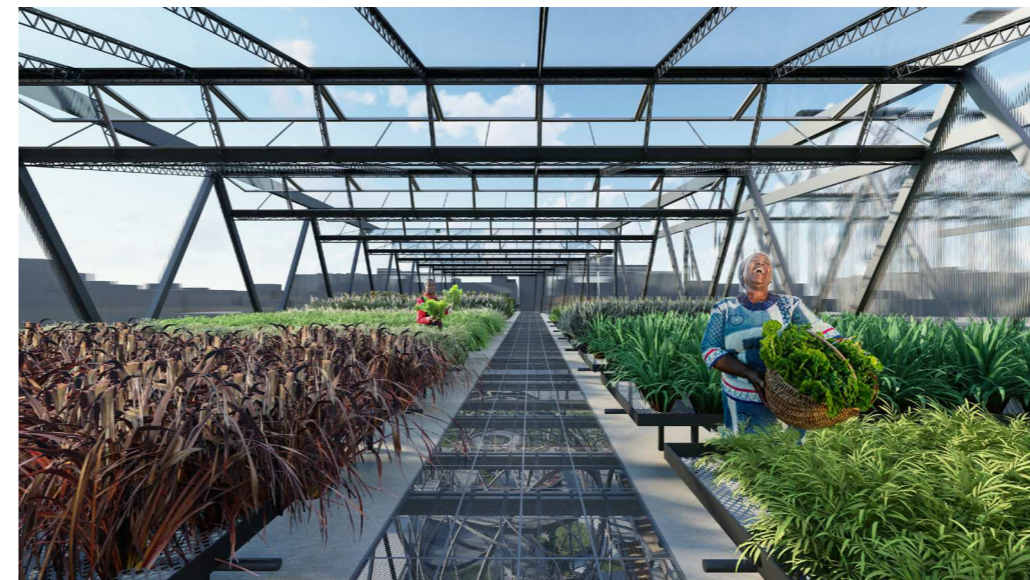
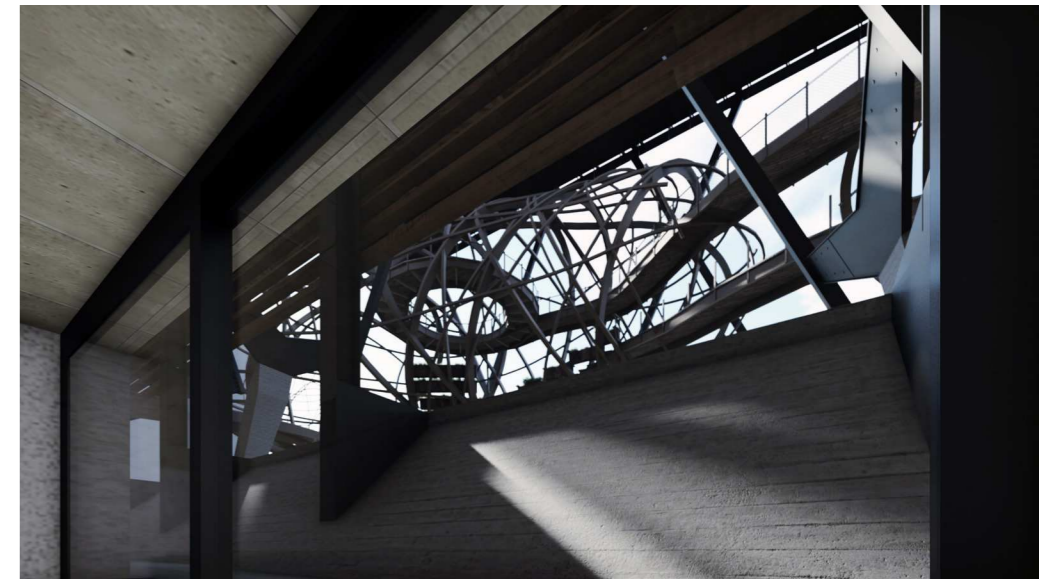
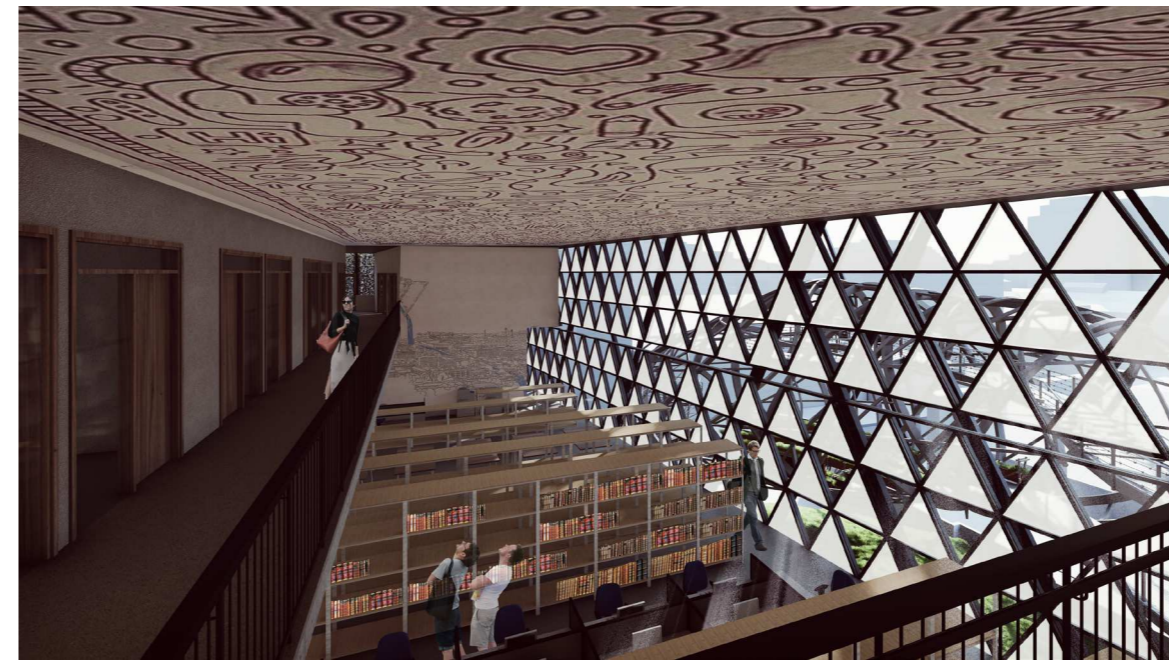


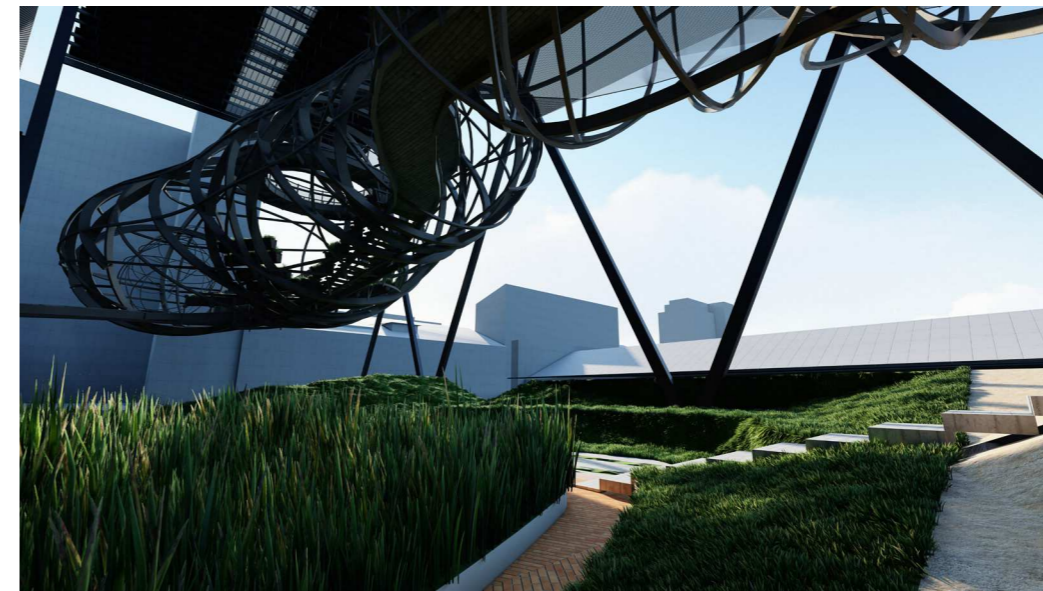
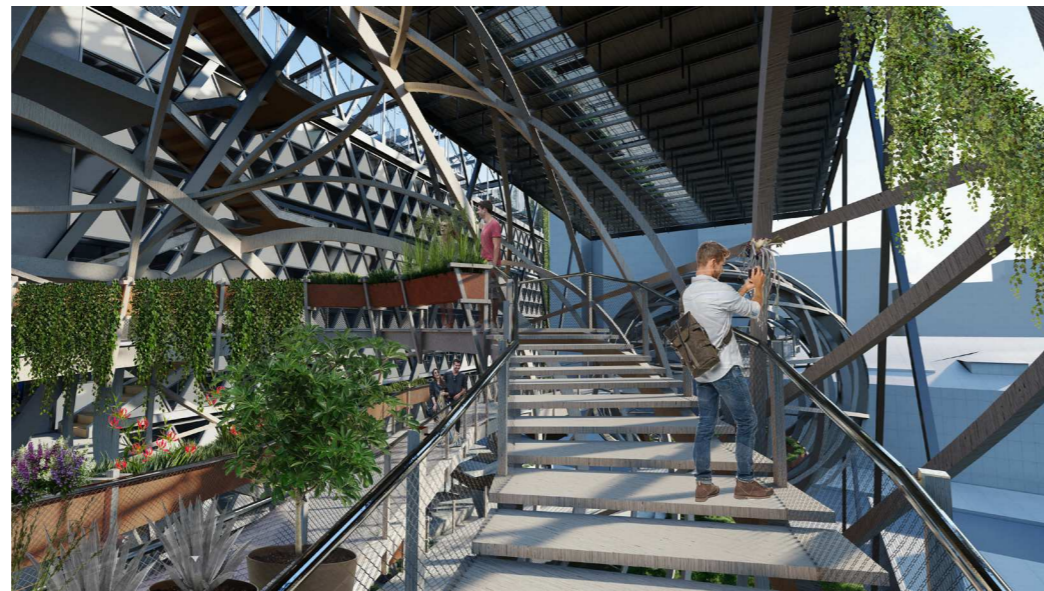
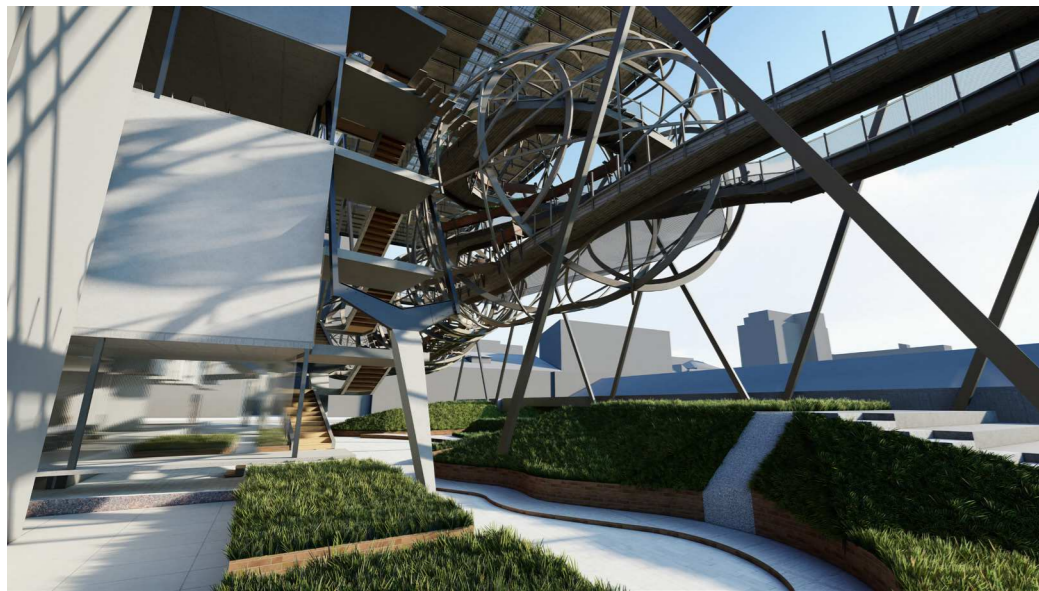
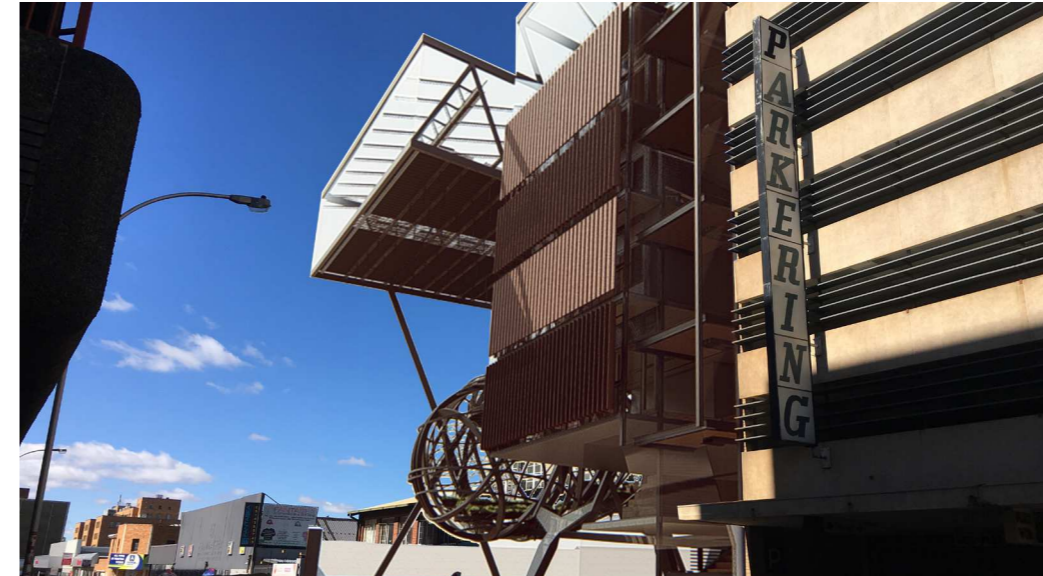
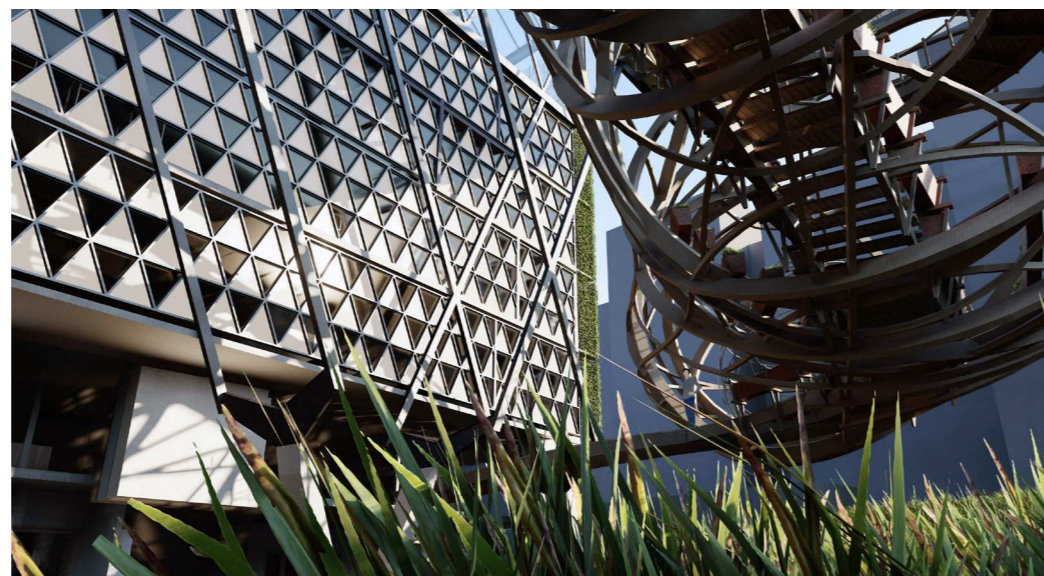
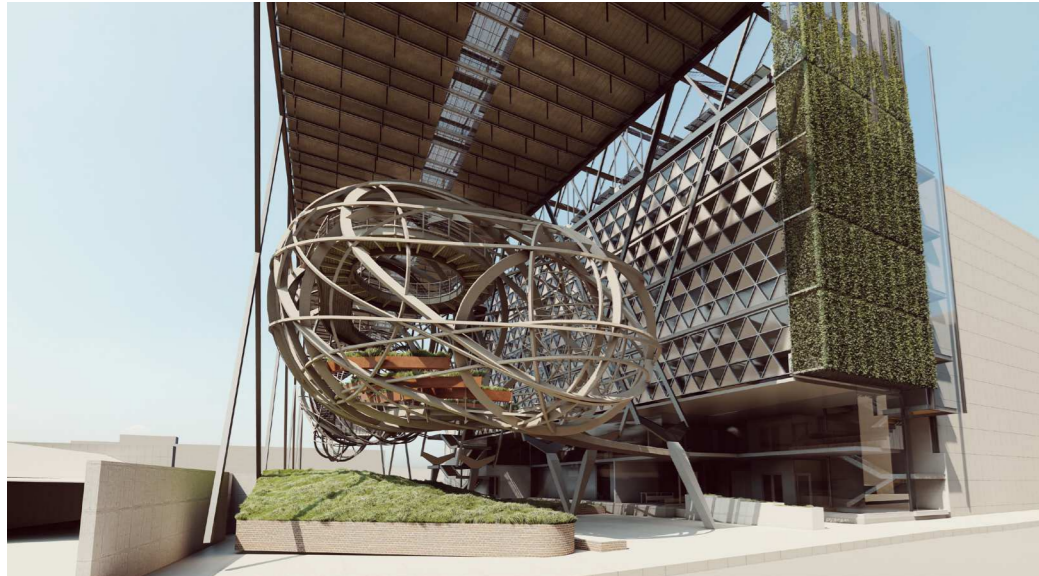




ETHNOBOTANY
INSTITUTE
SECTION A-A







5.0 Reflection

I began the year intrigued by a book of short stories. Many showing how South Africa is turning against what has served it so well over many years. Using plants to treat ourselves is something every one of our cultures did. With this came an intimate knowledge of the land. Through my five years here it feels to me that Bloemfontein has a culture of longing. Firstly to be 'one with the land/our heritage' while simultaneously wanting to be like the big South African cities. At the end being satisfied with neither. Investigating this in-between has inspired me with the magic and potential which lies within the mid-town. So often projects are timid, that is not what the building needed to be. To change a perception the thing needs to be perceived, and I have loved the freedom this has brought me.

This project has had many iterations partially explored and then traded for a new idea and inspiration after a Friday night spent looking out over the site. I think each one has been better than the last. However many of these iterations could have been a viable solution, and so maybe I should have stuck to an earlier idea and pushed through with it. With this said at each step I tried to choose the most logical and simple solution to the problem.

When compiling the development of the design I realized that many of my ideas were present in much earlier iterations; however I failed to understand the importance of them in the moment and so moved 'onward and upward' missing what I was looking for. I have probably still missed many.

With this said I genuinely believe that this project would be a worthwhile addition to midtown. I think it achieves various goals that I set and discovered throughout the process.

Exploring what the city could be

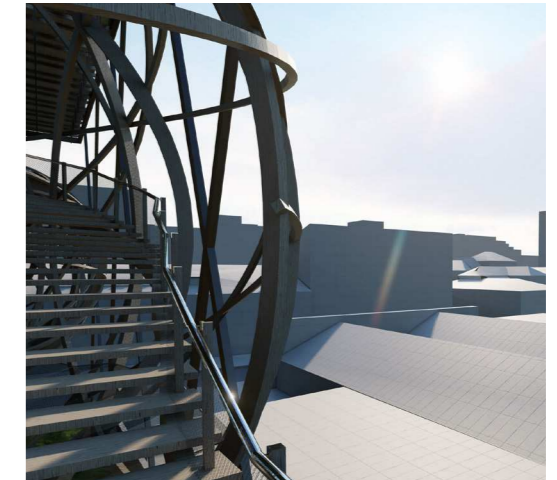
The project really adds to the daydreamy vibe of the spruit on a Saturday afternoon. It would provide a needed fully public green space where there isn't one near. Further than that it performs along an critical but underappreciated corridor within the city's built landscape. I believe that this small project restores the built landscape to a level of contempt far beyond its site boundaries.

Change in perception

The building certainly challenges the current idea of what a building within the mid-town looks like and how it interacts with the rest of society. Further, its walkways provide an exciting way in which to see the plants with Bloemfontein as the context. I think that the building represents and houses these viewpoints as separate entities yet still a part of the same morphology.

Functioning Ethnobotany Research Space

Finally, the building functionally suits the use patterns and requirements of a university postgraduate research group. I believe the line between being a functional department while maximizing the public enjoyment of the site has been carefully walked. The design can fit far more in terms of the program onto the site than its peers. These functions have strict needs and each of them has been met through careful congestion of the vertical space on the site.



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The process was captivating and I am learning a lot.
I am blessed to have had this opportunity.

Thanks for reading
Matt.

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Herbalist's resources come from ritualized places of gathering known only to themselves. This journey takes them beyond the realms of what is 'known' by the tribe and into areas only they know. They see these places through a different lens to the rest of society, and has an in-depth knowledge of plants and what each can do. The knowledge of these plants is implicitly rooted in the stories and myth of the specific area. In contemporary society, knowledge is explicit and must be available to all to be embraced. This dictates that the herbalist's lenses must be shared to transform how society sees ethnobotany.

As cities such as Bloemfontein grow, and farms occupy increasing amounts of this landscape, the medicine man has fewer and fewer places to gather his specimens. The realm of the 'unknown' wild is, therefore, further and further diminished. The congestion of the city is the 'new wild' and is brought into being by man.