



HUMANISING ACADEMIC SPACE:

Cultivating a holistic educational
site on the Frankenwald Estate

Costantino Vaindirlis

ABSTRACT

This thesis poignantly instils a holistic transdisciplinary approach to postgraduate education as an empowering and unifying community intervention on the Frankenwald estate near Alexandra township. Connecting the origins of learning and the future evolution of knowledge by supporting students through their educational experience, with a transdisciplinary experiential approach which fosters individuality, innovation and compassion. Dissolving the rigidly entrenched divisions between schools of thought through the balanced use of social and technological tools, a platform for innovation and financial freedom within closely knit community interactions.

Inspired by fractal geometry and organic structures, the scheme roots itself into its local context by creating nodes of catalytic urban renewal which ultimately dissolves all orthodox boundaries between the conventional university and the localised community in which it serves.

DECLARATION

I, Costandino Dimitri Vaindirilis (Student number-437043) am a student registered for the course ARPL7003 in the year 2015. I hereby declare the following:

I am aware that plagiarism (i.e. the use of someone else's work without permission and/or without acknowledging the original sources) is wrong. I confirm that the work submitted for assessment for the above course is my own unaided work except where I have stated explicitly otherwise. I have followed the required conventions in referencing thoughts, ideas, and visual materials of others. I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my unaided work or that I have failed to acknowledge the source of the ideas or words in my own work.



Costandino Dimitri Vaindirilis
29 January 2016

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THEORY INDEX

01 - EXPLORATION PG 8

- Exploration and Thesis Finding Process

02 - THE EXPERIENCE OF A STUDENT PG 26

- Background of my own Educational Experience
- Reconnecting the 'Reader' to the Experience of a Student
- Chapter Reflection

03 - PRINCIPLES TO REVOLUTIONISE HIGHER EDUCATION PG 34

- Connecting the Origins of Learning and the Future Evolution of Knowledge
- Interconnecting Disciplines
- Stimulating the Three Types of Learners
- Moving Learning to the Street
- Activating Head, heart, and hand
- Mind and body
- Learning through Problem Solving
- Stimulating the Architecture of Education
- Architectural Precedent and Movement Analyses
- Chapter Reflection

04 - EDUCATIONAL CONTEXT PG 80

- Origins of the University
- The Evolution of the University Typology
- The South African University System
- Issues faced by the Higher Education sector
- Creating an African Identity in Education
- The future of the University system
- Reflection on the Chapter and the Current Context of Student Protests

05-SITE, HISTORY & FUTURE GROWTH POTENTIAL PG 90

- Alexandra History Time line
- Site and Alexandra's Relationship to Wits
- Origins of the Frankenwald Estate.
- Current Context of Alexandra Township
- Current Context of the Alexandra Schooling System
- Growth of Suburbs Northwards
- Future Urban Growth Inspired by Indigenous Urban Development and Biological Organic Growth
- Chapter Reflection

DESIGN INDEX

06 – DESIGN DEVELOPMENT & LEARNING PROCESS PG 114

- Experimental Form Finding Process
- First Approach: Campus typology
- Second Approach: Singular building typology
- Third Approach: Megastructure typology
- Chapter Reflection

07 – FINAL DESIGN DEVELOPMENT PG 158

- Final Design Approach
- Final Building Design
- Technical Component
- River Thresholds
- Landscape Learning Pavilions
- Urban Growth
- Agriculture Towers and Urban Intervention
- Conclusion

08 – APPENDIX PG 242

- Reference List
- Figure List

THESIS OVERVIEW

The theoretical part of this thesis I begin by reconnecting the 'reader' to the emotional and intellectual state of being that an average student experiences in the current tertiary educational context in South Africa. After which, I will look at eight principles which could revolutionise higher education. The general guiding themes of these principles are promoting a holistic transdisciplinary educational pedagogy which inspires and instils confidence in students within an inclusive, progressive and welcoming space. These will be the guiding principles for the pedagogical philosophy and practice in my thesis intervention.

THEORY

The chosen site for my thesis is on the Frankenwald estate, just north of Alexandra township. This site is located central to a high population density of students in areas such as Alexandra, Sandton, Midrand and Tembisa. The site has close access to public transport such as Gautrain and the BRT. The site has vehicular access from both the M1 and N3 highways. The site was donated to the University of the Witwatersrand in 1905 by mining magnet Alfred Beit "in Perpetuity" and "solely and only" for educational purposes and is currently zoned as 'educational and scientific' (Faull, 2011).

SITE

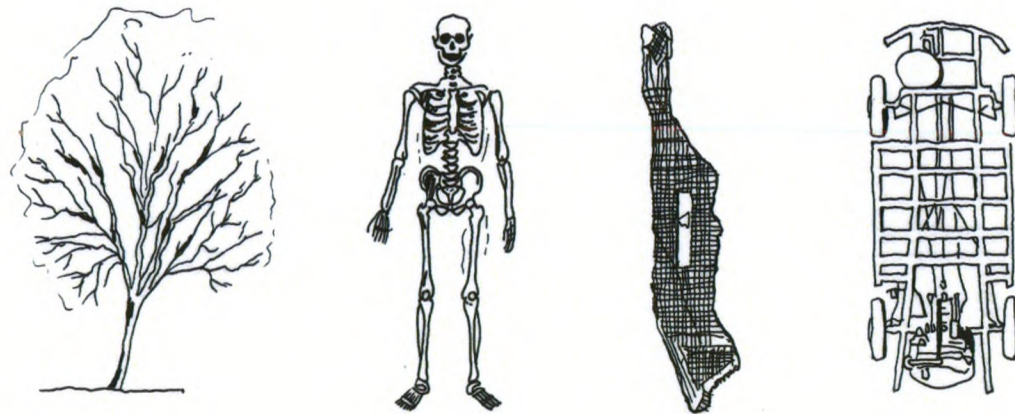


FIG 0.1: Similarities of structures: Tree, Human, New York, Car.

RIVER REJUVENATION AND URBAN INTERVENTION

The community of Alexandra is integral to activate and stimulate the processes in the building. As the first phase of my intervention, I propose the rejuvenation, phytoremediation and cleaning of the Jukskei river which runs through Alexandra then through the site. After which, an urban promenade can be built to bring life back to the river which is currently dangerous and polluted. The promenade will allow for the people of Alexandra to easily access the site along this axis. This catalytic urban promenade will be a gesture towards rejuvenation and a gift to the people of Alexandra.

PROGRAM BUILDING

My intervention on the site is a high quality tertiary educational facility which consists of two distinct but integrally interconnected components: 1) The community and foundation course centre. 2) The transdisciplinary post graduate education centre.

I believe that such an intervention on Alexandra's doorstep is a true gesture towards reconciliation and equality for the future generations which could be a step towards righting the wrongs created by the apartheid spatial planning regime and the Bantu education system.

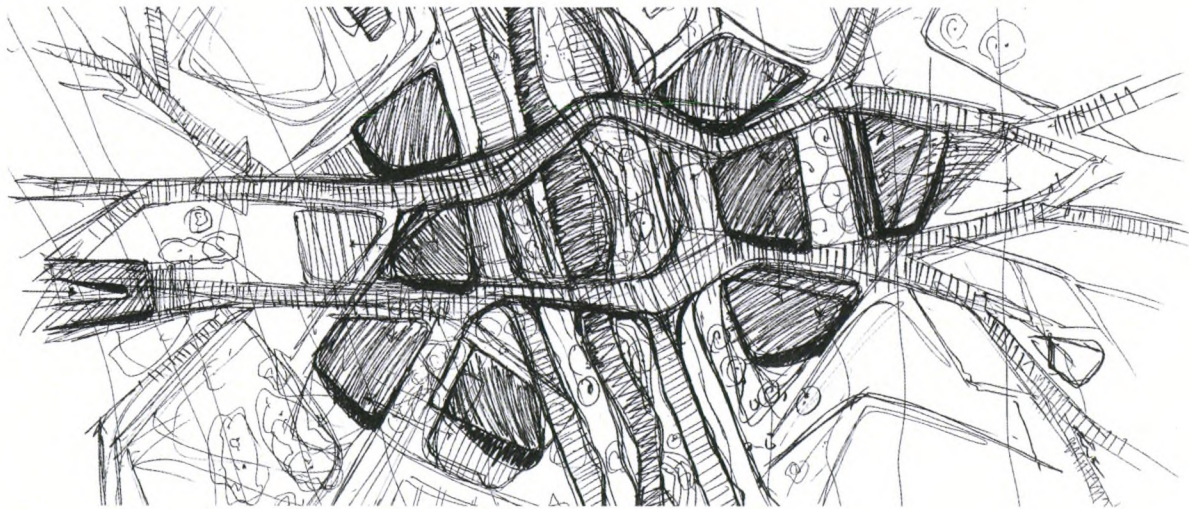


FIG 0.2: Design concept sketch



01

EXPLORATION

FIG 1

EXPLORATION & THESIS FINDING PROCESS

The entry point to my thesis was my interest in the threshold and relationship between the mind, body and the environment around us.

I further realised that the optimal way to connect these elements which have been disconnected to due to modernization was through the process of engaging with holistic education. The following process is an abstracted experience of how information travels through the body.

Please see the attached CD in the front cover of the document for the short video titled “01-*The journey of information through the body*” which I have created. The following graphics relate to the ‘scenes’ in the video.

THE SENSES ABSORBING
EXTERNAL STIMULI.

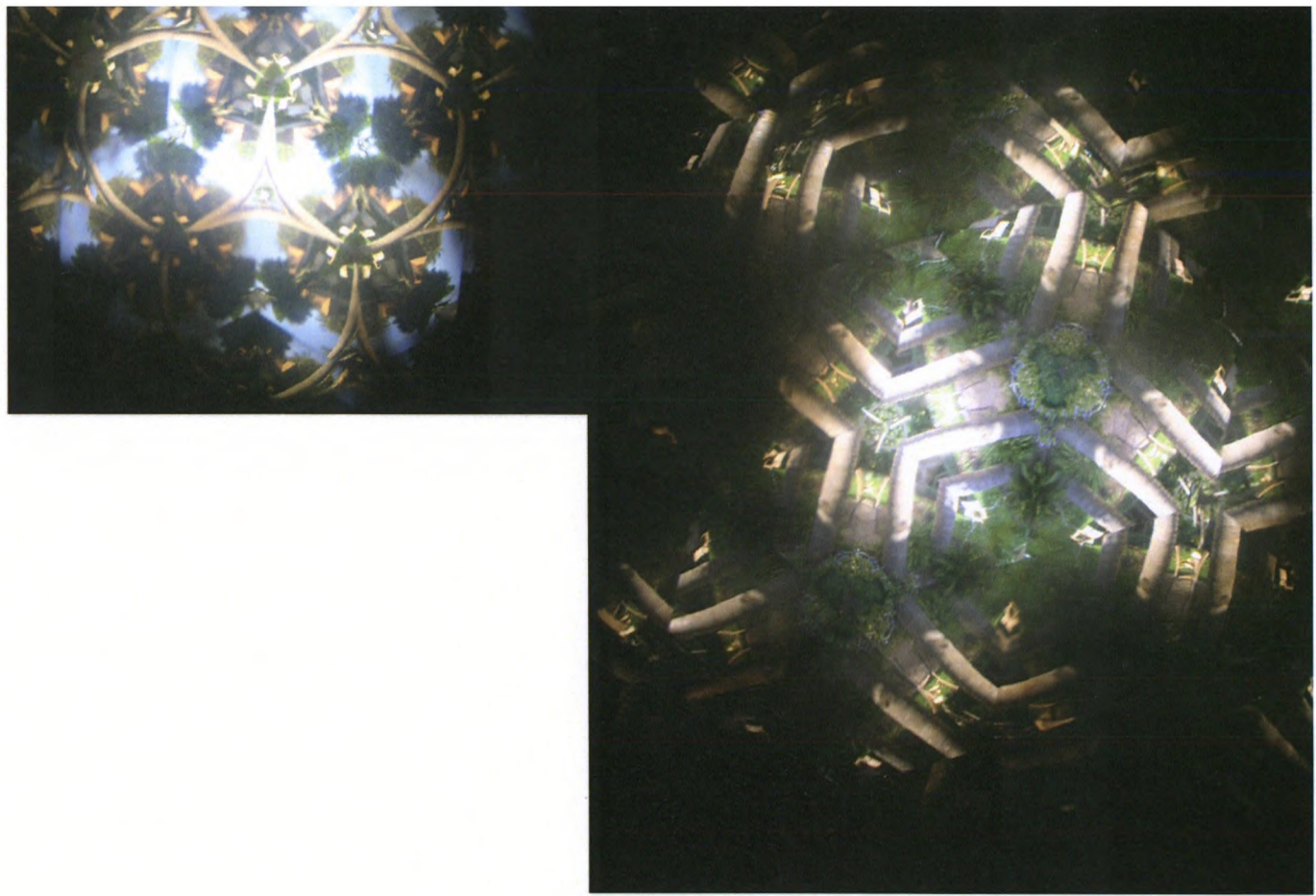
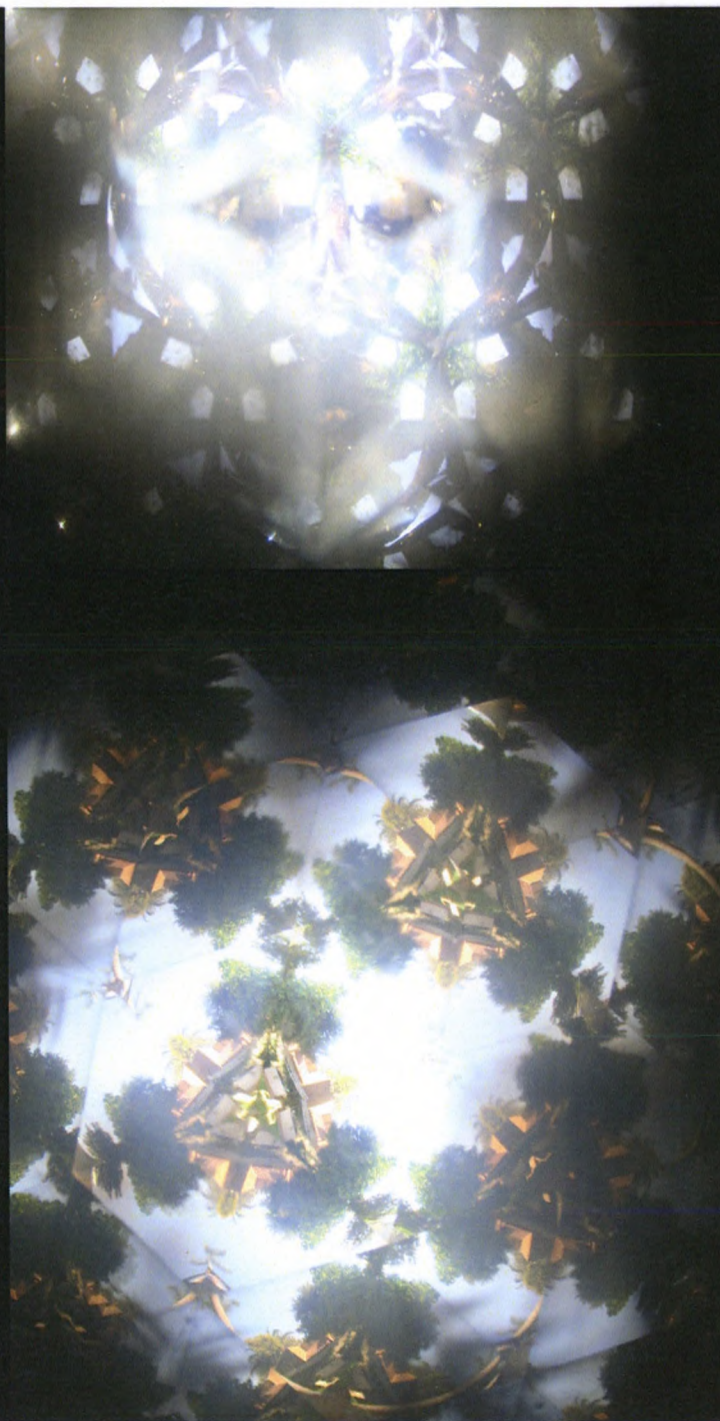
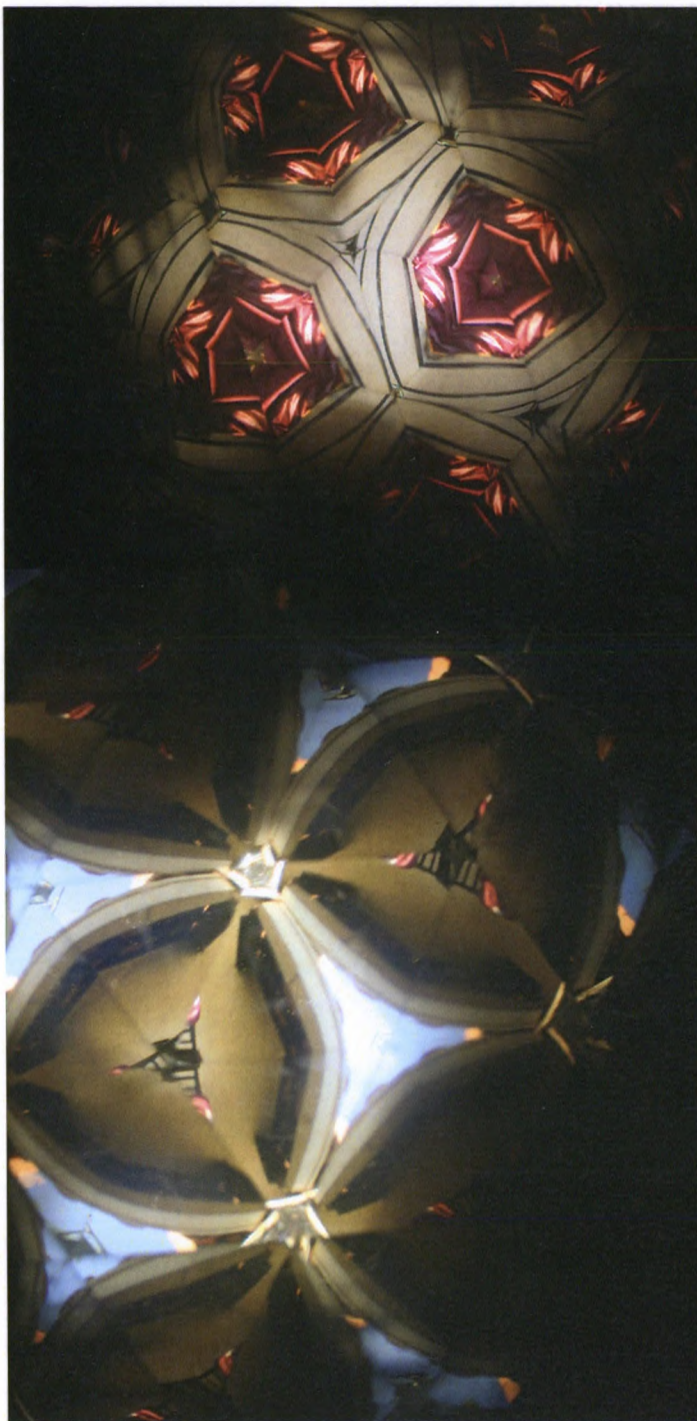


FIG 1.1: Kaleidoscope Abstraction



INFORMATION TRAVELING
THROUGH NEURAL
NETWORKS.



FIG 1.2: Movement of thought



STIMULATING EITHER THE
LEFT OR THE RIGHT SIDE OF
THE BRAIN

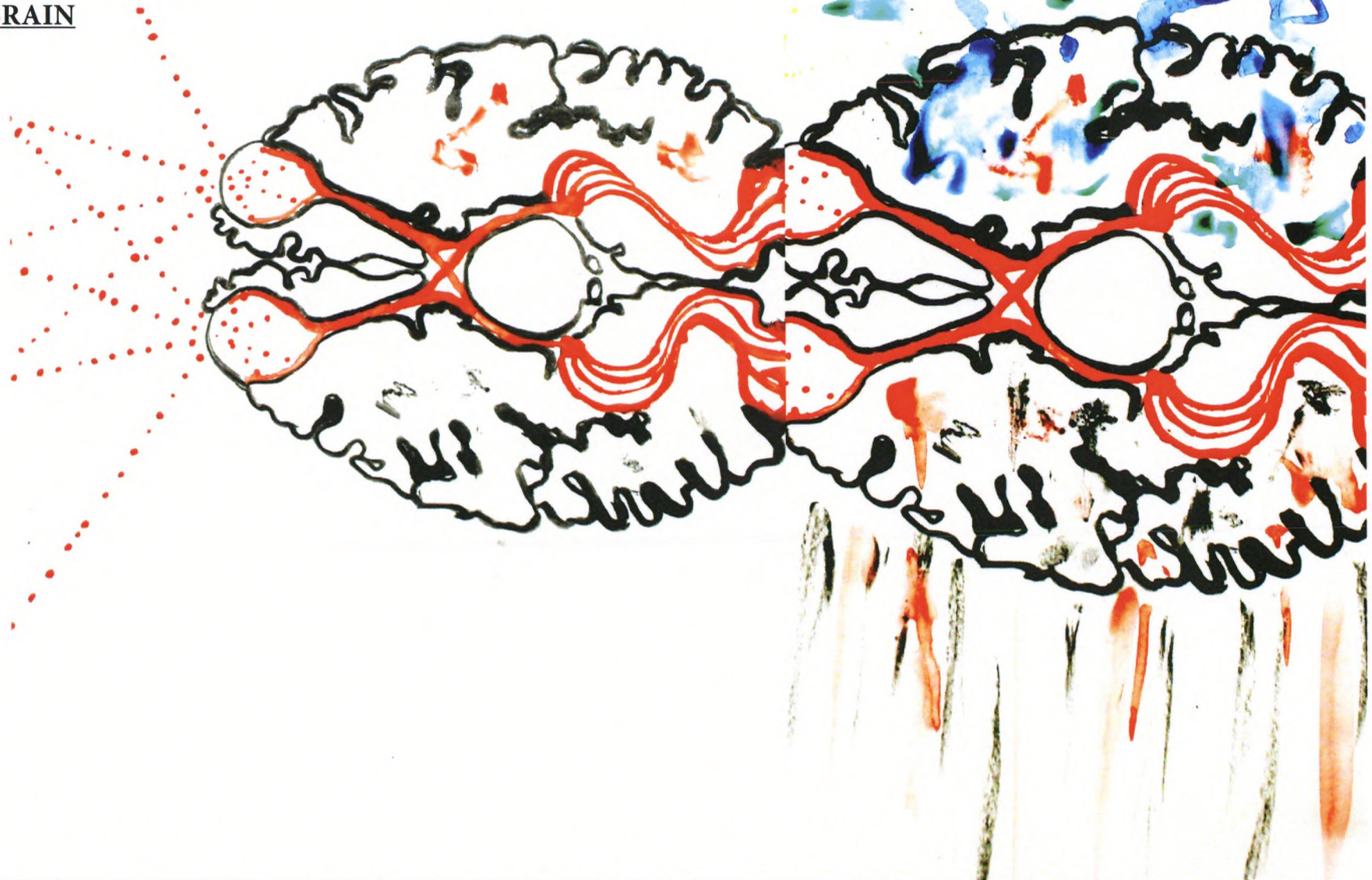


FIG 1.3: Stimulating the brain



THE CREATION AND LOSS OF
KNOWLEDGE

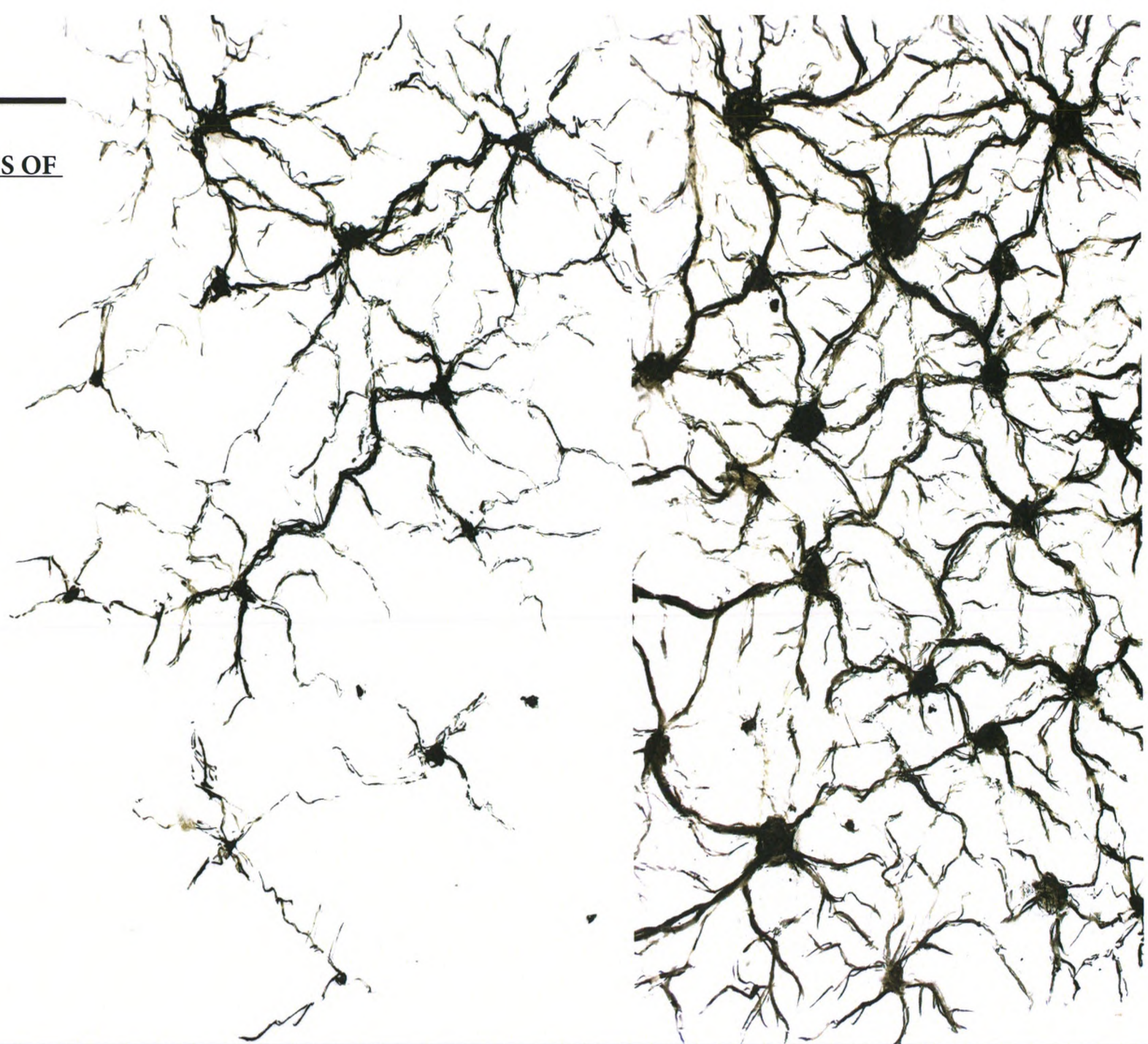


FIG 1.4: Neural networks



ACCESSING KNOWLEDGE



FIG 1.5: Accessing memories



THE MULTI LAYERED NATURE OF KNOWLEDGE

FIG 1.6: Abstract layering of knowledge



INFORMATION STIMULATING
BODILY RESPONSES

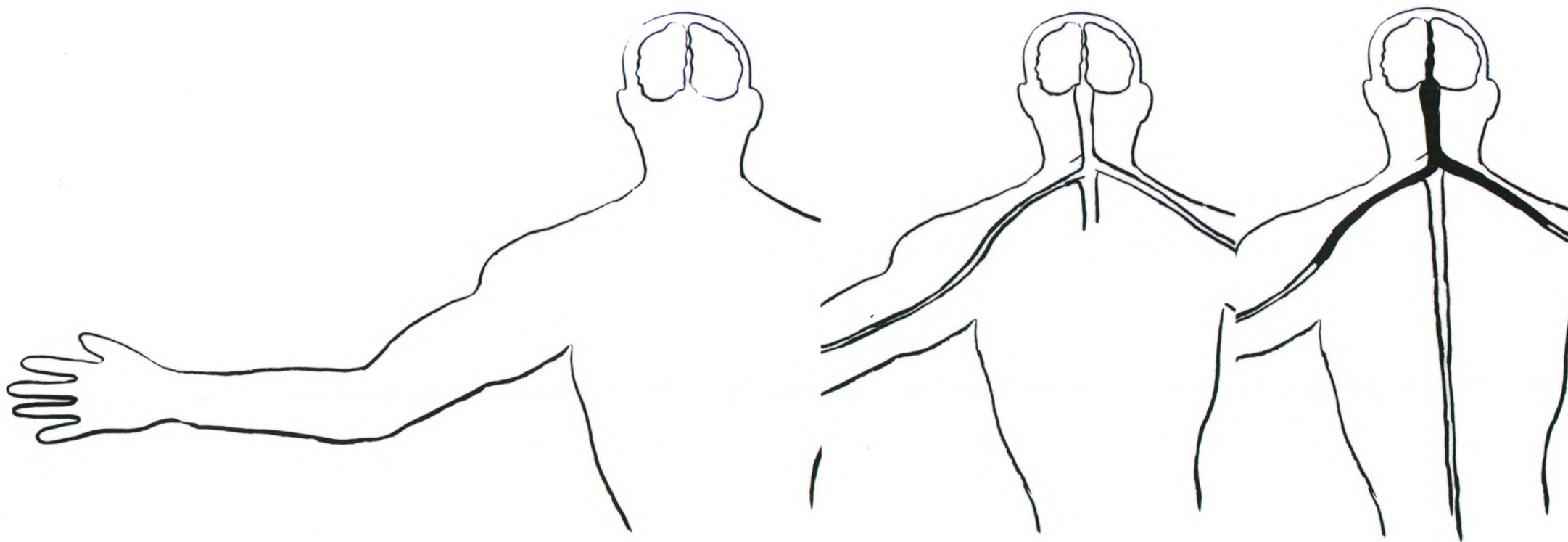
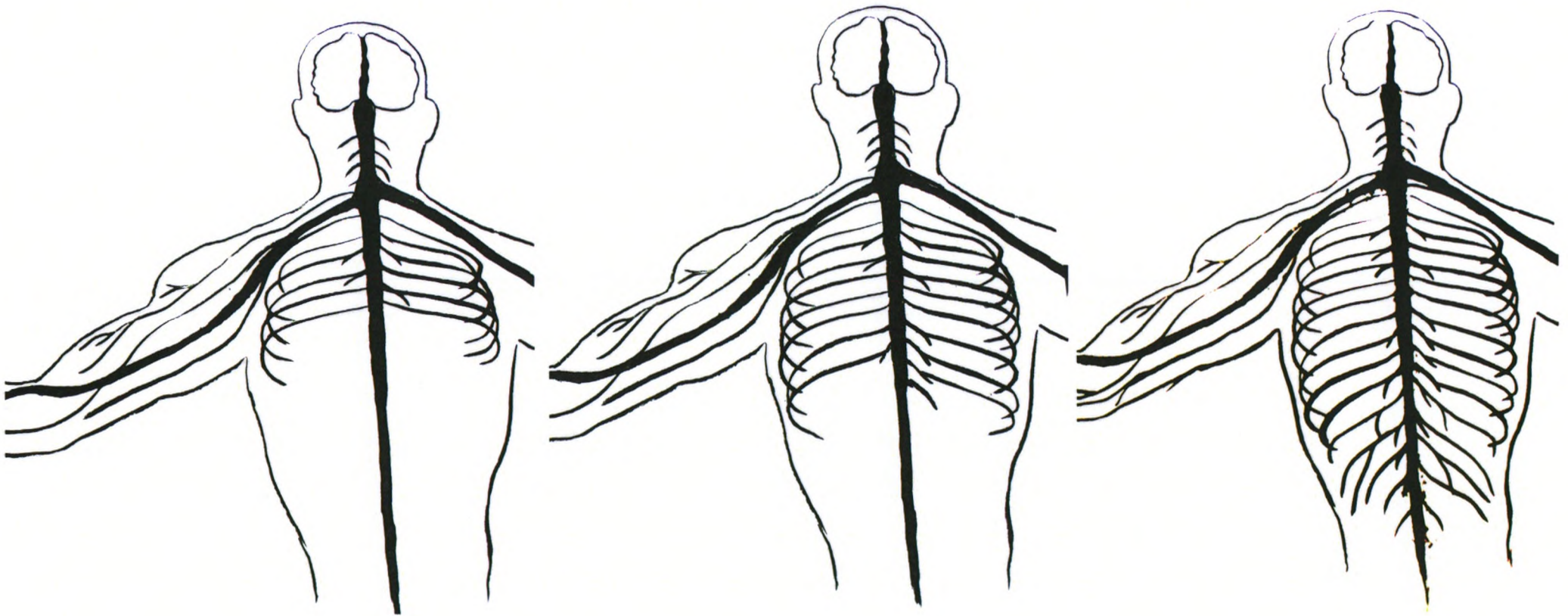


FIG 1.7: Nervous system networks.



APPLYING KNOWLEDGE

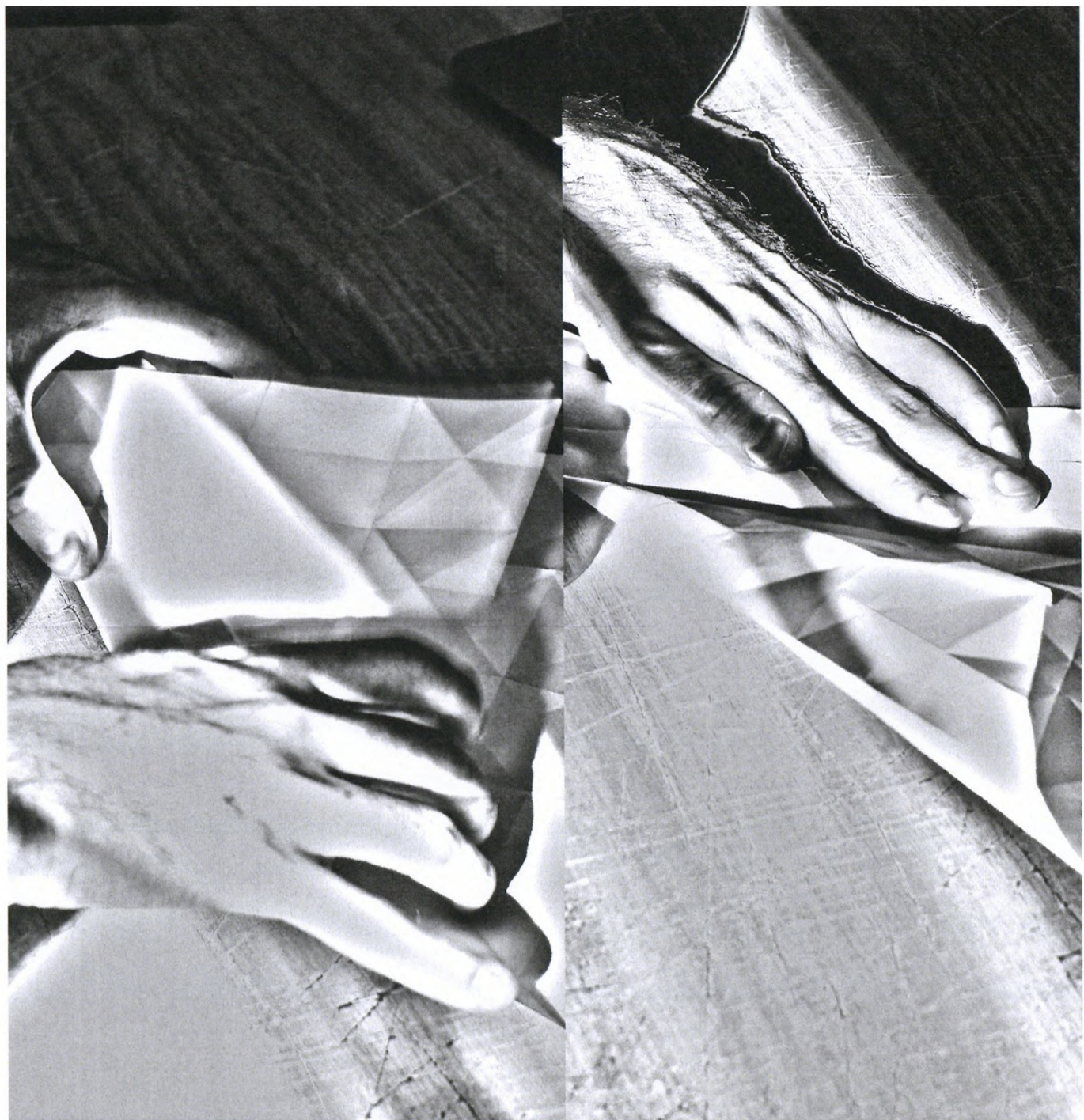
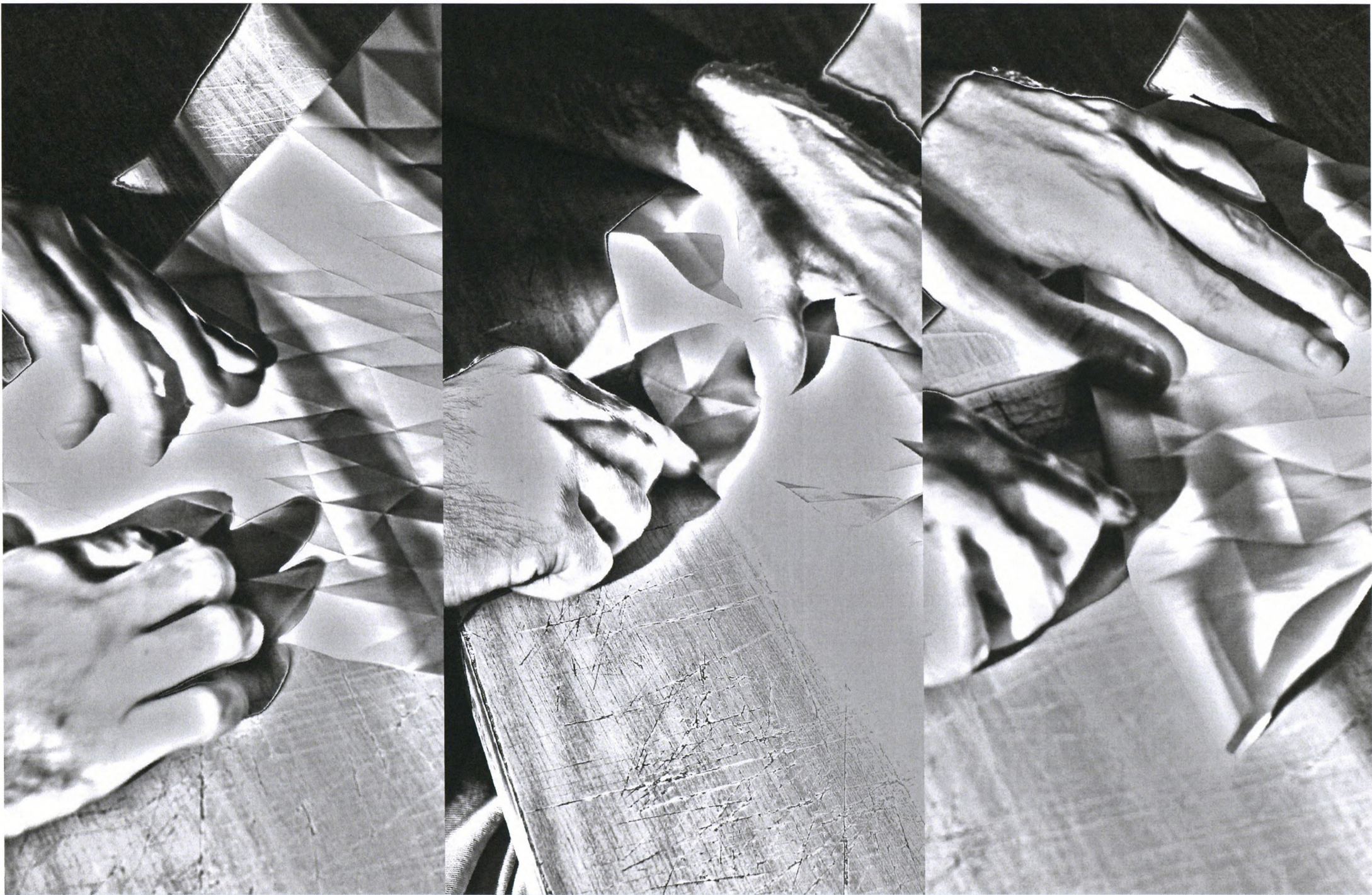


FIG 1.8: Experiential Learning



02

THE EXPERIENCE OF A STUDENT



FIG 2.0

BACKGROUND OF MY OWN EDUCATIONAL EXPERIENCE

I was lucky enough to receive an Waldorf school education, which is an internationally recognised 'alternative' education. My experience at this school was greatly influential to my outlook on the world and my relation and understanding of education.

The educational principles of the Waldorf schools movement was founded by Rudolf Steiner in 1919. The principals put great emphasis on the role of imagination and creativity in the process of learning, as well as trying to holistically integrate the intellectual, practical and creative capacities of the students.

Here I was taught that the process of education was more important than a merely insignificant mark, as the end result. All subjects were taught with a close relationship to the everyday world, with practical exercise always relating to the concepts that were taught in the class room. The goal of Waldorf education, in my opinion, is to create free thinking, open minded and analytical students, who are socially competent and hold a high moral responsibility as a member of the community.

Coming from this educational background and starting my bachelor of architectural studies at The University of the Witwatersrand (here forth referred to as Wits) I experienced this as a new form of education, which was in many senses in contrast to that of my schooling experience. Throughout my years at Wits, I have always been aware of teaching methodologies and the way that the courses are structured.

“Based on a comprehensive, integrated understanding of the human being, a detailed account of child development, and with a curriculum and teaching practice that seeks unity of intellectual, emotional and ethical development at every point, Waldorf education deserves the attention of all concerned with education and the human future”
-Douglas M. Sloan
(Hall, 2014)

RECONNECTING THE 'READER' TO THE EXPERIENCE OF A STUDENT

As an introduction to the current context of the South African tertiary educational system and to once again reconnect the 'reader' to the 'experience' of being a student. I will look at the intellectual and emotional processes that an average student experiences in the space of a tertiary educational system.

From differing cultures and backgrounds, the students in the higher education system of South Africa currently come from a diverse reality of socio-cultural and socio-economic environments. The overall experience of the student is fundamentally based on their personal background, which is a complex matter. This includes family background, culture, economic support, the type of school they attended, relative to their own personal educational experience and their selected field of study at university. These factors make it complex to study the experience of each individual student. However, for the purpose of this chapter, at some points I will look at students as a whole and in other contexts' I will look at them in relation to their unique individual backgrounds. (Kandiko & Weyers, 2013).

David Helfands' 'caricature' of the global university system goes as follows:

"Universities are fractious places, populated by customers (formally known as students) who pay increasing amounts of mostly borrowed money, in exchange for grades, from researchers with large frequent flyer accounts(formally known as professors), who report to real estate developers(formally known as university presidents)"
(Helfand, 2013).

In the current digital age, the resources that were once scarce and sacred to university institutions are imminently becoming readily accessible to anyone on open source databases and Moocs (Mass Open Online Courses). Thus information and knowledge is becoming mass marketed and commercialised due to the rapid growth and accessibility of technology and the internet.

In the light of the afore mentioned contexts I will study the nature and experience of the average student in the average South African University system. Ultimately I intend to use these insights as a basis for the design principals in the architecture of my thesis.

In looking at a student's mental processes and experiences I will divide them into two chapters; the emotional mind and the intellectual mind.

I will draw upon published work by intellectuals, interactions and interviews that I have had with students, as well as my own personal feelings and experiences.

THE EMOTIONAL MIND OF THE STUDENT

The transition between high school and university is one which comes with great of anxiety. There is a sudden change of scale from the small school campus to a large university campus. Regardless, students are thrown into this new found world and are expected to stand on their own feet. Suddenly the education system becomes impersonal and without any guidance or support the student becomes lost and alone in the academic system.

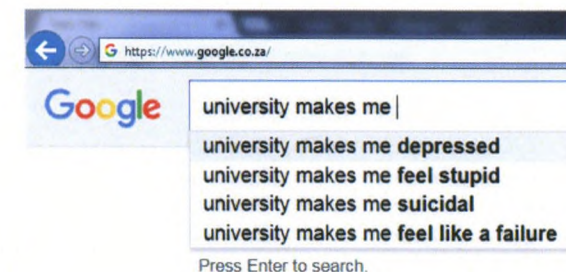


FIG 2.1: "University makes me..." google search predictions.

Dewey believes that educators need to build inter-personal relationships with students in order to understand how they, the students, perceive the world, thus being able to effectively communicate their teaching content in an effective manor (Dewey, 1963).

Social interactions are an important part of the learning process in the university. Often students are exposed to numerous new cultures and traditions that they did not experience growing up in their small town schools or exclusive private school environments. This process of engaging with new and different people is an extremely important part of developing our new generation to be more socially cohesive, especially in the light of the racial and cultural tension in our country at the moment.

Open and adaptable social learning and sharing spaces are lacking in most university campuses. I believe that, in essence this is a vital aspect of education which students are currently not receiving. For their own communal studies, students utilise unused lecture halls or tutorial rooms to create such environments for themselves, but I believe a space like this which is consciously designed for its purpose could be an essential element in a progressive university campus.

The importance of learning from one another is a vital part of university education. Yet most students dread group work because of the pain

of managing and arranging all the students to work fairly and cohesively together. I believe that the approach to these group projects needs to be rethought. The groups need to be structured around individuals with mutual interests and students should be able to formulate their own approach to the group work. The workplace where students will one day be employed, will be structured around coherent teams and not individuals at cubicles, so the importance of this group work needs to be acknowledged and appreciated.

This being said, students need to be taught how to think on their own as autonomous and independent learners. Ultimately, only a person who can guide their own learning can successfully participate and contribute to team, or group activity (Ziebarth, 2013).

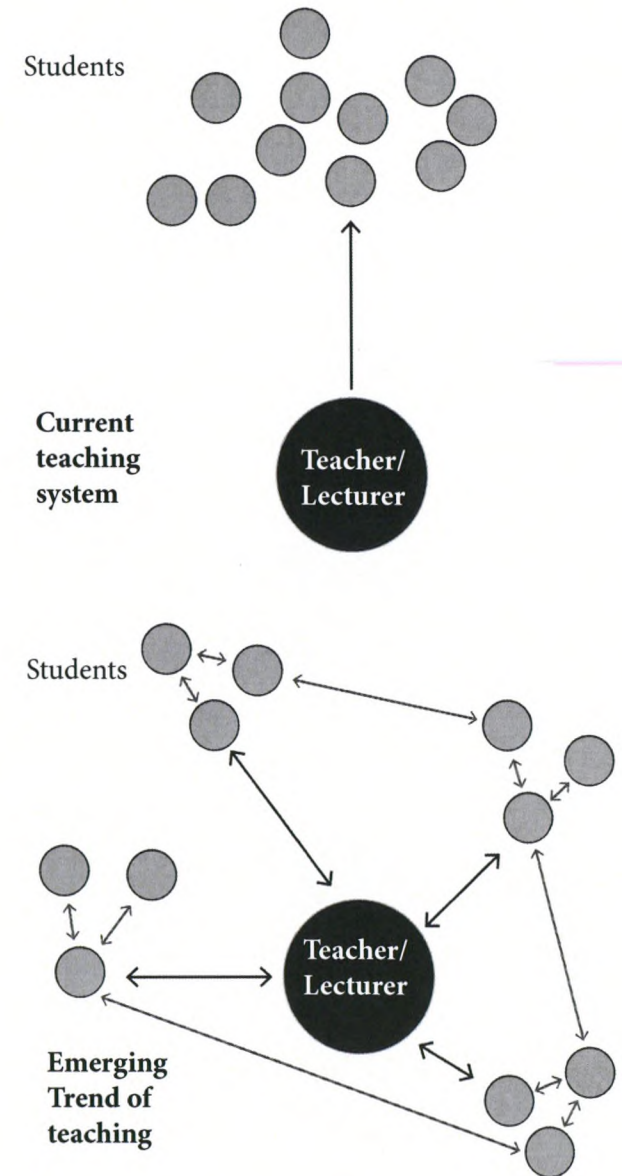


FIG 2.2: Emerging changes of teaching

THE INTELLECTUAL MIND OF THE STUDENT

University degrees are mostly highly specialised into specific fields and professions. To complete their degrees students are required to take a certain amount of courses. However although students are often able to choose subjects which they are most interested in, they still end up doing courses which they find no personal interest in. No matter how stimulating and engaging the teacher, the course content will not resonate with the student if they do not have an initial interest in the subject matter. This is a major problem throughout all levels of education. However, progressive universities are more and more allowing students to design their own degrees and curriculum's to suit their own personality and endeavour. This cultivates the students' passion and interest in their studies and allows them to take ownership of their personal education.

One of the other common denominators in progressive and alternative education systems is that of the belief in experiential learning. What must be said is that the common belief that genuine learning comes out of an experiential process is not sufficient because some experiences might hinder understanding and others might foster it. Fostering intellectual

growth is not enough, this growth must be guided in the right direction. Some experiences may produce a lack of sensitivity and arrogance in the student which could later restrict a student's openness to learning. The process and approach to the structuring of the learning experiences is very important. The educator must apply his maturity and guidance to the application of the experiential process (Dewey, 1963). Dewey suggests that:

"When we experience something we act upon it, when we do something; then we suffer or undergo the consequences. We do something to the thing and then it does something to us in return: such is the peculiar combination. The connection of these two phases of experience measures the fruitfulness of experience. Mere activity does not constitute experience"
(Ord, 2012 quotes Dewey, 1916: 104).

Dewey is proposing the difficulty and intangibility of the process of experience. He stresses the importance of two distinct aspects of experiential learning: the active experience itself and the reflection or 're-conceptualisation of experience' (Ord, 2012). Maurice Merleau-Ponty points out that "How would a painter or poet express anything other than his encounter with the world" (Pallasmaa, 1996 quotes Maurice Merleau-Ponty, 1992), this statement expresses the importance in experience because whatever we do or produce in our lives is based on the quality of our life experiences.

Examinations are generally the most stressful part of most student's academic year (McShane, 2011). Exams are commonly still based on the medieval principles of learning huge amounts of information and then regurgitating it back in the exam. There is a 'mask' that a student wears during the exam, this 'mask' is the fact that exams are anonymous, when the student writes the exam they know that the person marking their work does not know who they are personally. This system forces students to disconnect personally from the information that they are putting forward. There is no reward for your own interpretations, feelings and relationship to the topic. Even in fields such as psychology and philosophy there is still a right and wrong answer. Students are often embarrassed by what they have written because they are frequently dishonest and answer in a way which they personally do not resonate

with. This exam pressure that is put on students is intended to make them perform well but in reality and in actual fact this could be contributing to the opposite effect.

Once the exam has been graded, the student receives a mark, a percentage or symbol, which has absolutely no relevance to where an individual's weaknesses or strengths lie in the subject. In theory, the point of an exam is to see whether or not the student has understood the course content. But in reality the problem is that by running the exams at the end of the year there is no time for post exam reflection, and thus no personal weaknesses have been addressed or corrected.

Technological development has been such a great tool for many students but technology is further detracting from and denouncing the poor students who originally come from underprivileged schools. Generally they do not have the level of understanding of technology as to those that come from privileged schools where they have been using computers from a young age (Tire & Mlitwa, 2015). This is a major divide separating students academically, and ultimately has implications on the quality and final outcome of the work produced. This is an issue that universities are actively trying to address. However more work needs to be done in order alleviate the stress of IT in-transparency. This problem is further exacerbated if students do not have access to internet at home (Tire & Mlitwa, 2015).



SOCIAL LEARNING



AUTONOMOUS LEARNER

FIG 2.3: Social versus autonomous processes of learning

CHAPTER REFLECTION.

One of the most important aspects of education is to acknowledge the student as an individual. Connecting to and stimulating the student as an individual should be the driving theory in the design of educational spaces and pedagogy.

Fostering this 'connection' is an aspect of education which is totality dependent on the personal characteristics and teaching techniques of educators. In retrospect it is important for educators to understand the emotional and intellectual aspects of their students, and maintain this understanding throughout their teaching career.

I feel that the deep connection between the learner and the teacher has been disregarded in our modern education system. We need to reconnect the learner and the educator to allow for a more holistic and effective form of education.



FIG 2.4: Connection



03

PRINCIPLES TO REVOLUTIONISE HIGHER EDUCATION

FIG 3.0

In this chapter I will look at the most essential principles which could revolutionise higher education. There may be many more such principles however the ones that I am suggesting are those that I feel to be the most important in relation to my chosen site, relative to the current socio-economic and socio-political state of higher education. These will be the guiding principles for the pedagogical philosophy and practice in my thesis intervention

CONNECTING THE ORIGINS OF LEARNING AND THE FUTURE EVOLUTION OF KNOWLEDGE

- How can a building reinitiate and reinvent the ancient form of education created through travel and social interactions?
- How can architecture accommodate and support the ever growing technological developments without disconnecting students personally from one another?

I want to reconnect these two most opposing forms of education and house them in my intervention.

Before the rise of the printing press, acquiring new knowledge was often done through travel. The 'traveling intellectual' I believe was the

foundation of the development of knowledge in our modern society. These ancient travelers went from city to city, interacting with people, studying the local ways of life. With the growth of the internet travel for purely educational purposes has become purposeless. Through my intervention I want to redevelop this culture of travel and create a facility which brings intellectuals and professionals from all around the world together in order to share their personal research and create new theories and ideas with other like-minded people.



FIG 3.1: Xu Xiake, traveler of ancient china

Contrary to this however, the future development of learning is becoming increasingly autonomous due to the use of the personal computer. Students are becoming ever more disconnected from one another. While the positives of technology are great, there is a need to instill the importance of social interactions and travel to the students of the current generation. Through my architecture I intend to celebrate the social spaces and make them welcoming and interactive spaces to be in. By accommodating the physical body, with ergonomic seating and pleasant lighting, as well as supporting technology with power points and internet access, these spaces can connect and support these two opposing forms of learning.



FIG 3.2: Alexandra Township at sunset

Instead of building new housing for intended visiting intellectuals and students, my proposal is to create a room rental system in the existing houses within Alexandra. This scheme will allow for visitors to rent rooms in local houses thus experiencing the cultures and fabric of local communities. Currently a single room in Alex is rented on average for R50 to R300 per month, with my proposed system, these rooms could be rented for about R2500-R3000 per month by students and intellectuals. The surplus income can go back into developing the built environment within Alexandra. With Alexandra townships complex history in ownership, all the renewal and development investment possibilities are now taking years to implement. Instead of waiting for governments and private sector to invest, why not facilitate the development of Alexandra from the 'inside-out'?

Apart from the financial viability, the scheme could create platforms to celebrate and acknowledge Alexandra's rich community and culture, thus allowing students from other backgrounds and upbringings to be exposed to new cultures and ways of living. This scheme will allow the community of Alexandra to be engaged with this new university and there will be mutual interest in the success and the growth of the development.

INTERCONNECTING DISCIPLINES

HISTORY

As history defines, humankind's knowledge started to rapidly develop and broaden during the renaissance period. Thereafter the specialisation of subject areas started to become more and more evident. As a result our current intellectual context has been highly separated into specialised fields. To use the example of Leonardo da Vinci, who was referred to as a 'polymath' – "person whose expertise spans a significant number of different subject areas, such a person is known to draw on complex bodies of knowledge to solve specific problems" (Wikipedia, 2015). Da Vinci's fields of knowledge included invention, painting, sculpting, architecture, science, music, mathematics, engineering, literature, anatomy, geology, astronomy, botany, writing, history, and cartography.

Each of the fields of knowledge that Da Vinci once practiced has now been segmented into multiple specialised sub categories, and there are even subcategories of those sub categories. This specialization of knowledge has created great breakthroughs in science and development resulting in some of humans

most outstanding achievements, but it comes with a downside. As these specialized fields have become ever more concretised in our culture and educational systems, I believe in the past 30 years these silos of knowledge are becoming problematic because specialists are becoming ever more disconnected from the work of their peers in other related fields. As Nastasi (2012) believes that the “condition to highlight silo-specialisation has developed significant departmental boundaries that hinder a productive exchange and collaborative authoring of work”. Some fields of research and development have reached a ‘glass ceiling’ and suddenly different fields are beginning to look to each other for knowledge and collaboration.

There is an urgent need for both industry and education to start implementing a transdisciplinary approach to their work. Biomimicry is a new school of thought that is driven by a holistic transdisciplinary approach to technological development. Less than 20 years old, this field has produced groundbreaking developments and is on the cutting edge of progressive research with a spectrum of knowledge that can rival Da Vinci's.

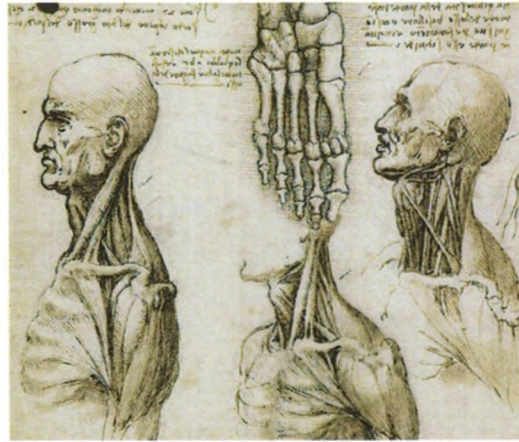


FIG 3.3: Anatomical studies



FIG 3.4: Da Vincis Invention drawings



FIG 3.5: Da Vincis Architectural drawings

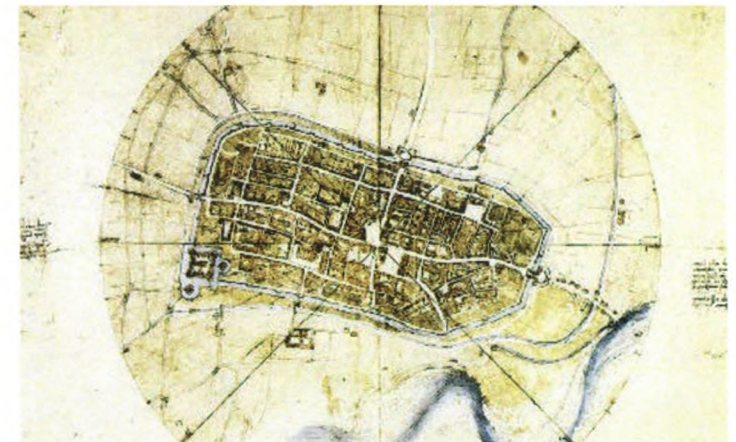


FIG 3.6: Urban design studies



FIG 3.6.1: War machines, self portraits and the Vitruvian man.

BIOMIMICRY

From the Greek word 'bios' meaning life and 'mimesis' meaning imitation, Biomimicry is a new design and engineering movement that is seeking sustainable and innovative solutions to human challenges through understanding and mimicking nature's time-tested patterns and processes. The basis of biomimicry is that nature (animals, plants and even microbes) have spent billions of years evolving and have already solved the countless engineering problems that we as a human race are still grappling with in our built environment (Benyus, 1998).

Those involved in biomimetic problem solving are almost always comprised of transdisciplinary teams working together, sharing knowledge with one another. The results of such collaboration often produce ground breaking and innovative projects which have huge potentials to better the standard of living of the human race as well as doing it in a sustainable manner.



FIG 3.7: Lotusan: Insect dirt repelling skin inspiring dirt repelling paint.



FIG 3.8: Namibian Desert Beetle: Fog-basking beetle inspired evaporators and condensers.

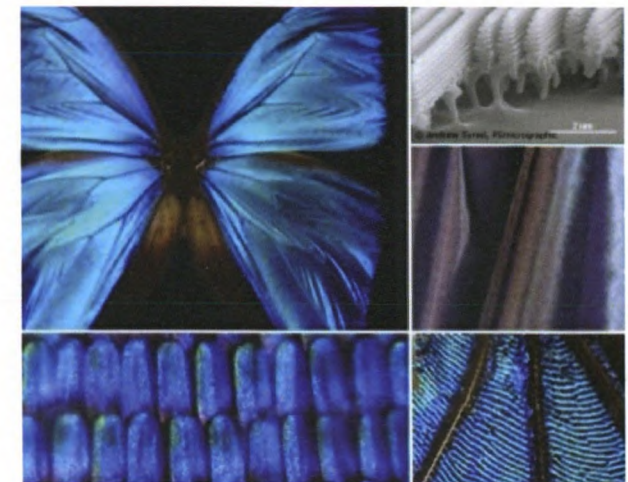


FIG 3.9: Butterfly wings: Inspiring paint without the use of pigments.

*"Nature runs on sunlight.
Nature uses only the energy it needs.
Nature fits form to function.
Nature recycles everything.
Nature rewards cooperation.
Nature banks on diversity.
Nature demands local expertise.
Nature curbs excess from within.
Nature taps the power limits"*

~Janine M. Benyus (Benyus, 1998)

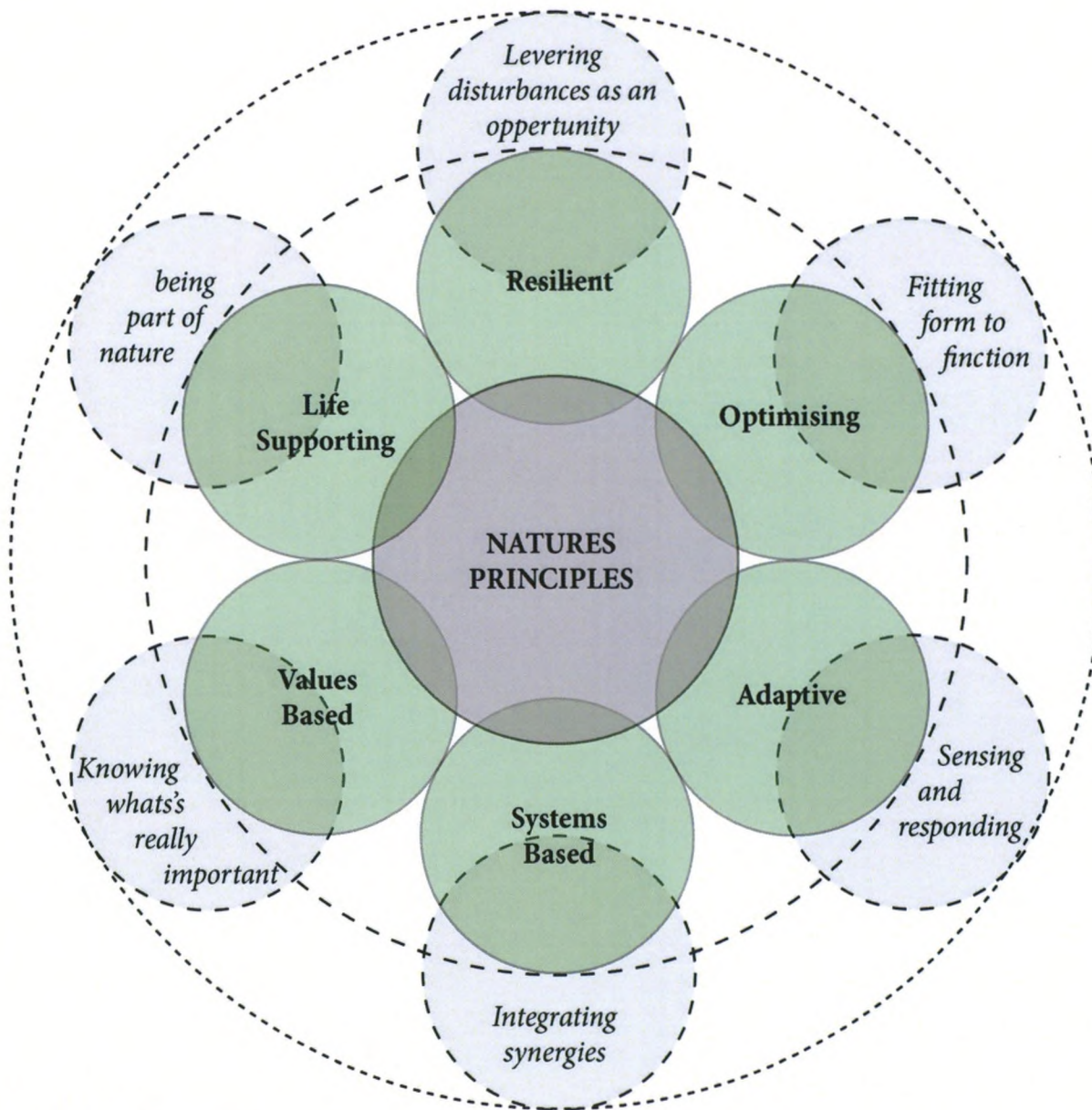


FIG 3.10: Natures principles diagram

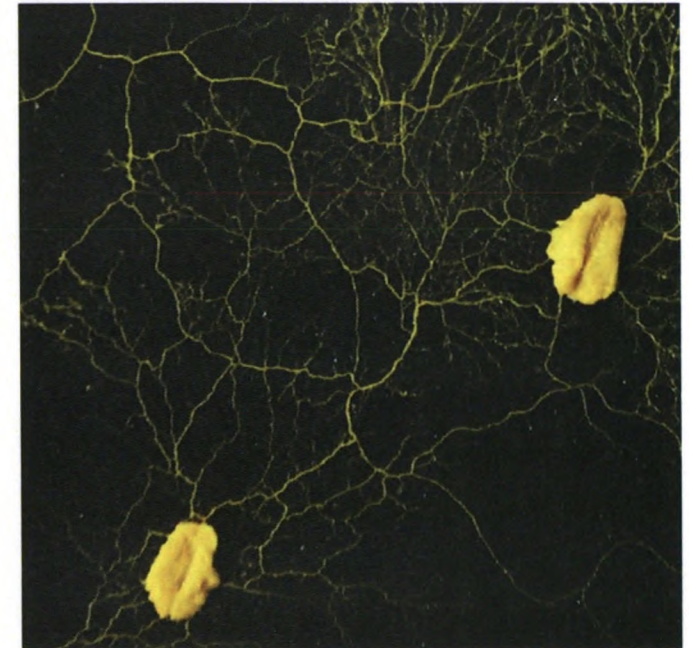


FIG 3.11: Slime mold: Could the intuitive of slime guide the design of urban transport routes.



FIG 3.12: Gecko hands: Creating clue without chemicals

STIMULATING THE THREE TYPES OF LEARNERS

Every person learns and processes information that they are exposed to in different ways. There are three main cognitive learning styles: Visual, Auditory and Kinesthetic. Most people learn best through a combination of the three learning styles (Farwell, 2015).

The Visual Learner:

Visual learners learn best by looking at graphics, watching a demonstration, or reading. For them, it's easy to look at charts and graphs, but they may have difficulty focusing while listening to an explanation.

Auditory Learner:

Auditory learners would rather listen to things being explained than read about them. Other noises may become a distraction resulting in a need for a relatively quiet place.

Kinesthetic Learner:

Kinesthetic learners process information best through a "hands-on" experience. Actually doing an activity can be the easiest way for them to learn.

Helping students identify what learning style or technique suits them best can greatly improve their cognitive ability. Holistic education should constantly be supporting all three types of learning to maintain interest in all students (Farwell, 2015).

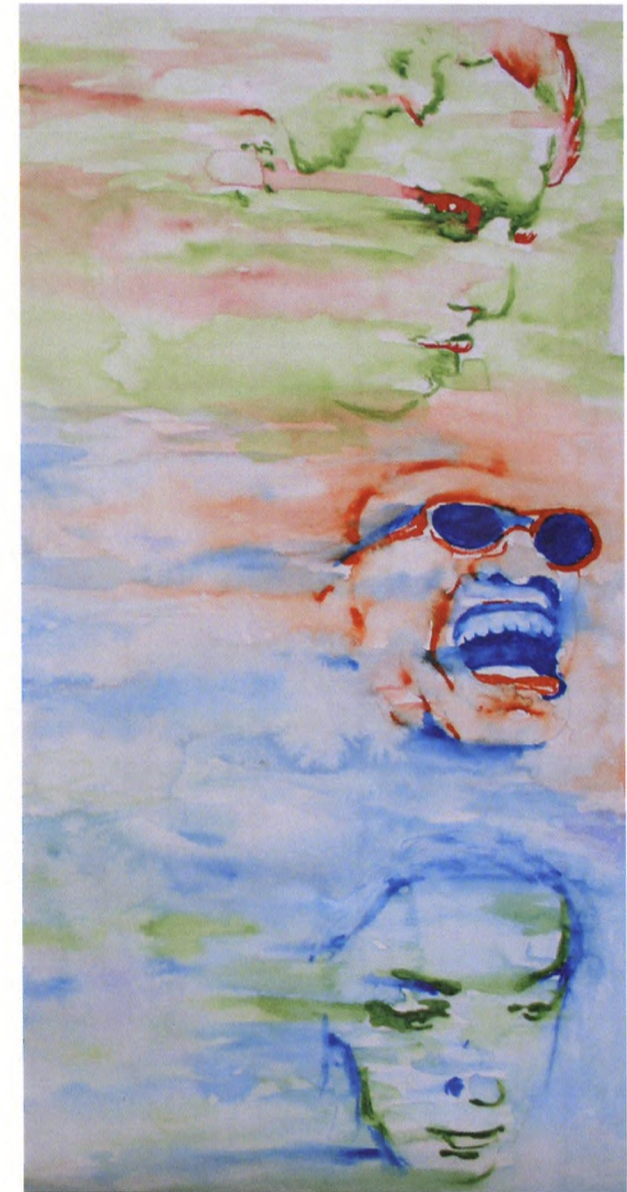


FIG 3.13: The 3 type of learners

MOVING LEARNING TO THE STREET

MOOCS - A VEHICLE FOR MASSIVE SOCIETAL CHANGE.

Massive open online courses, otherwise known as MOOCs, are totally revolutionising the state of education globally. These online courses are open to anyone from anywhere around the world, from all walks of life and from all economic sectors. Suddenly anyone can have access to thousands of online courses on literally every school of thought and discipline.

As an element of my practical research for my thesis I have taken various courses from the free MOOC platforms and I have found them greatly stimulating and inspirational. I have taken courses on general biology, nutrition, computer science, as well as various introductory courses to computer coding, psychology and human history. I tried to take these courses on as many different online platforms that I could in order to experience the different approaches and benefits of online education. The platforms that I found most rewarding to me personally were:

- www.udemy.com : it has a huge database of courses on all subjects, some courses are paid but there are hundreds of hours of free content.
- iTunes U: This is a great free app which gives students access to free content directly on the app. There are video and audio lecture options, as well as access to books and articles.
- MIT Open Courseware: Here there is access to lectures, lecture notes, projects and downloadable course materials.

PUTTING WITS ON THE GLOBAL MOOC PLAYING FIELD

Some of the elite and cutting edge universities are offering MOOC platforms. These being: Massachusetts Institute of Technology (MIT), Harvard University, Stanford University and Oxford University, just to name a few. As Wits sees itself as a powerhouse of education and research in Africa, it is a great opportunity to launch a MOOC to put its name on the global platform of innovative universities around the world. As Wits is an “engaged institution, dedicated to advancing the public good” its MOOC platform could be an opportunity to engage social upliftment across all social and cultural divides (University of the Witwatersrand, 2000). Moocs have a great potential to provide learning to people living in underprivileged contexts from around the world. Specifically looking at Alexandra and Tembisa, there is a huge need for online education because many potential students are not able to attend tertiary education.

My proposed scheme is to develop a MOOC platform which will be housed in the new building. The content for the MOOC will be created by the intellectual body of Wits as a whole. Underprivileged students from all over South Africa will have free access to this

online educational platform. The students who achieve the highest results in the courses will be offered bursaries to study full time at Wits. These bursaries will be subsidised by government, private investment as well as from the income made from other students who pay for the courses. The students that do not receive bursaries will be able to increase their education free of charge through this platform. This could allow for better job prospects or alternatively, individuals could use the credits gained from the MOOC to apply as full time students in the future. This system will allow people who are underprivileged to receive further education.

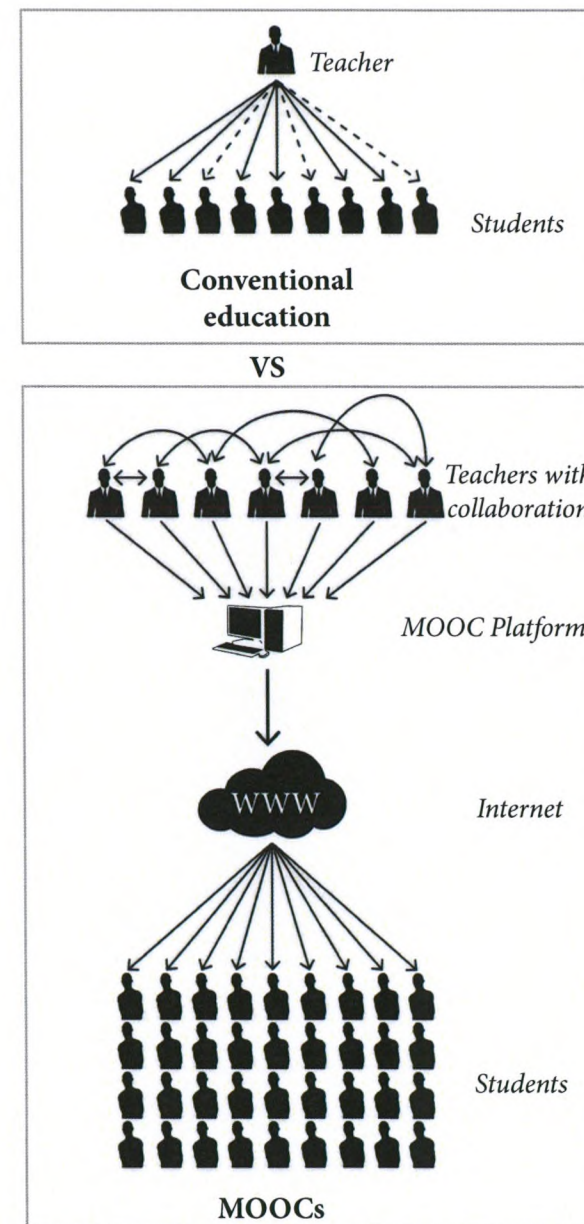


FIG 3.14: Conventional teaching VS MOOCs

ACTIVATING AND SUPPORTING SELF-ORGANIZING GROUP LEARNING OPPORTUNITIES.

While the MOOC has great benefits to support individual learning, there is also a very beneficial application for group learning. In many cases individuals do not have access to a computer or smart phone to make use of a MOOC. Here there is an opportunity to activate and support self-organizing group learning initiatives. Those interested to get involved with such opportunities can gather likeminded people at someone's house or any other venue and as a single group go through online courses on a weekly basis. The biggest problem with getting youth involved and interested with learning is that it has become mundane and boring, with this group learning through a online approach, it creates an exciting and social aspect to learning. Through online platforms like skype and google hangout, these groups can connect to one another and discuss and problem solve aspects of the course that they have just watched.

Another venue which I would like to facilitate through my urban intervention within Alexandra along the river promenade, are nodes where there are permanent fixed audio and visual facilities to allow for informal

gathering of people to engage with learning. These nodes, which will be explained in greater depth later, are designed to activate public space through online learning and sharing. This approach redistributes education from the bottom up and allows anyone from the community to connect with a subject matter which they are interested in.

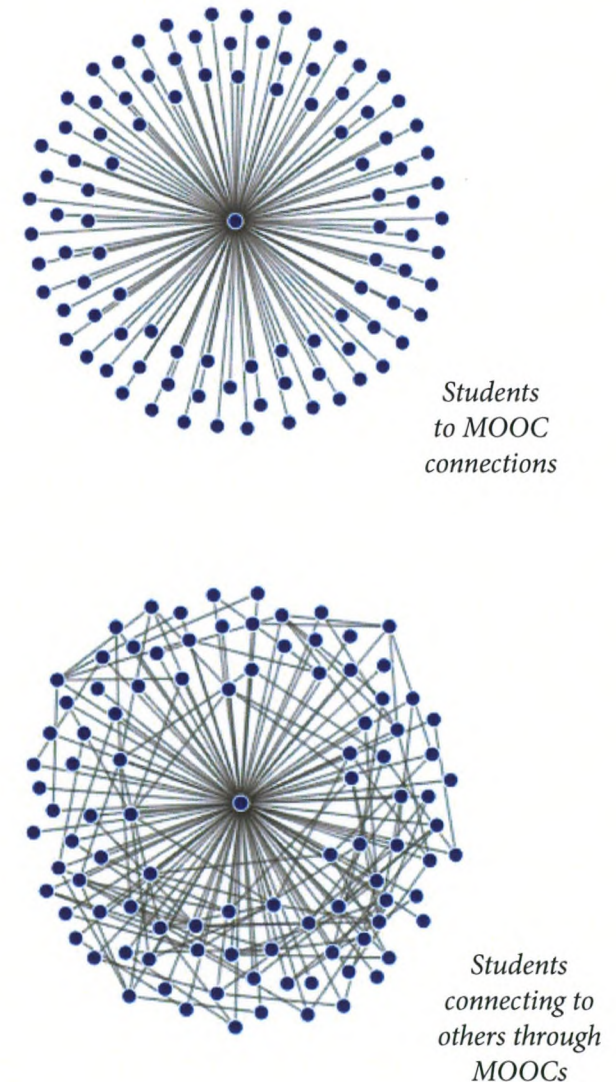


FIG 3.15: Individual MOOC VS group activated MOOCs

PRACTICING LEARNING THROUGH
IMPLEMENTATION:
CREATING LOCAL COMMUNITY
DEVELOPMENT PROJECTS.

Originality, entrepreneurship, and innovative leadership are qualities that cannot be learned while sitting in a classroom or front of a computer. These are elements that need to be fostered through interactions with the 'outside' world. Where many MOOCs fall short is that they lack the practical, social and experiential learning components of holistic education. The application of my proposed MOOC to be developed by Wits University will have a platform where students using the MOOC can connect with one another and with assistance from Wits there will be an opportunity for real life projects. These projects can use the innovation and inspiration of the students, supported by Wits and private sector donations to initiate community development projects in places that are in need.

ACTIVATING HEAD, HEART,
AND HAND:
INSTILLING PASSION AND
COMPASSION INTO THE LIFE OF
STUDENTS.

WHO AM I? AND WHERE IS MY
PASSION?

The current educational structure requires students at the age of 18 or 19 to choose what they want to study in university. I believe this is a very young age to make such a big decision which can have such huge life altering consequences. There is a need in our current educational context to create an opportunity for the student to be guided to their passions, careers and objectives in life. So many of the failures in first year university education are because the students realised that they were not interested in the course in the first place.

I believe there is a need for a bridging year where students are able to be exposed to various degrees as well as getting some experience in the work place so that they are able to understand the type of working environments that those degrees are leading them to.

YIP: YOUTH INITIATIVE PROGRAM

The YIP program which is run in Jarna, Sweden, is a one year program whose primary concern is strengthening the ability for young people to cultivate a positive social, cultural, environmental and economic change in society. YIP places a huge emphasis on combating climate change and elimination social injustice and poverty in the world. The program brings together youth from all walks of life who are seeking their passion in the world. Here they are guided and equipped with practical and theoretical knowledge which can help them initiate positive changes in their communities.

I believe that such a project is greatly needed in the context of Alexandra, and my intervention will facilitate such a program affectively by addressing local issues.



FIG 3.16: Harnessing the intellect and passion

INSTILLING SELF-CONFIDENCE, MOTIVATION AND INSPIRATION IN STUDENTS

From a young age the fear of failure was conditioned into our psyche. Each year the fear is reborn in us and teachers/lecturers taunt students with this reality on a daily basis. I believe this concept of failing has deeply damaged the creative and innovative thinking in human beings. In certain scenarios the fear of failure presents such a huge physiological threat that the motivation to avoid the experience of failure outweighs the inspiration to succeed. The only way we learn is through trial and error. Failure should not be stigmatised but be seen as a process towards learning.

Innovation and 'out of the box thinking' normally comes from students who do not have this fear. With my background in Waldorf education, marks were not the most important result of our education but rather the process of the learning itself, was of the greatest importance. Coming into university I was suddenly exposed to these students who are more obsessed with marks than they are with learning in the first place. These type of students approach a project with the attitude 'how can I do this project in a way that the specific lecturer will like and thus give me the highest mark possible'. Whereas I have

approached learning with the attitude 'how can I do this project in a way where I can learn the most and develop both my strengths and weaknesses, in the interests of my own personal long term learning goals'. I cannot say that this approach that was inbred in me from my previous education has always produced the best results in each specific project but I do believe that it allows me to have a more rounded education. I believe that universities should put a system in place to change this mind-set and allow students so seek the most out of their education and thus with this attitude higher marks would naturally follow. This will be a guiding philosophy of the pedagogy of my thesis intervention.



FIG 3.17: Balancing mind, heart, and body

EDUCATIONAL AND
ARCHITECTURAL PRECEDENT:
QUEST UNIVERSITY CANADA

Progressive universities are more and more allowing students to design their own degrees and curriculum's to suit their own personality and interests. The Quest University of Canada is, I believe, the most progressive university currently which was founded in 2002 by the former University of British Columbia president Dr. David Strangway. The Quest system philosophy is to holistically prepare students for the challenges of the 21st century. With Bachelor of Arts and Sciences degrees, students at Quest learn to develop their own intellectual capacities, develop problem solving skills, create their own educational structure which allows for interdisciplinary study and hands on experiential learning. Apart from the degree that they receive, Quest students learn vital skills which they can apply in their future such as critical thinking, communication, integration/breadth of knowledge, international perspectives, research and ethics.

The current president of Quest David Helfand believes that universities have lost sight of their true purpose. This being to educate in the sense of the word of its true latin roots, 'educatus educare', which means 'to open up and lead forth'.

He further elaborates on it by saying education is here "To open up minds to new perspectives and lead them forth to a life time of learning" (Helfand, 2013).

Universities that want to be seen as innovative, interdisciplinary institutions must construct their physical, structural and cultural identity as such.

(Harris & Holley, 2008)



FIG 3.18: Western facade



FIG 3.19: Meeting room



FIG 3.20: Internal atrium



FIG 3.21: Library study



FIG 3.22: Garden Courtyard



FIG 3.24: Entrance



FIG 3.23: Seminar room



FIG 3.25: Balcony Terrace

'20% TIME' INITIATIVES

Allot of students have a problems with getting distracted while trying to study or do an assignment, but I have found that allot of the time the object/subject of the distraction has some relevance to their field of study. For example an architecture student watching a documentary about street art in the Brazilian favelas. Although this may not directly 'add' to his/her education, such information is vital in building a holistic general knowledge around their field of study. Why can not this 'distraction' be used as a source of innovation. For example, Google has a policy of "20% time" where Google asks their employees to spend 20% of their time at work on a 'pet' project or interest that is not

generally covered by their job description. The project which has been running since 2004 is seen as a crucial process which has allowed the company to innovate and has resulted in many of Googles most significant developments, such as: Gmail, Google Transit, Google News, google glass and many others (Mims, 2013). Instead of 'punishing' students for investigating (being distracted by) topics of their interest why can not this be supported with systems like '20% time' in education. I personally spend allot of time during a project investigating topics that in some sense relate to the project that I am currently working on, but this is not necessarily pragmatised in the final result. I think that a 20% time type of policy could add a valuable aspect to all tertiary education systems and create a more holistically rounded and balanced student.



FIG 3.26: Google offices in Dublin, Ireland.

CONNECTING THE 'SKILLS, KNOWLEDGE, AND EXPERIENCE' IN EDUCATION TO WORK IN INDUSTRY.

Teaching students skills that are valuable in the workplace such as the balance found between independence, teamwork, creativity, social skills, time planning and leadership are qualities that cannot be learned in conventional education. The Waldorf belief that education should "prepare young people for life" is very applicable in this sense. Our current educational system is not preparing students enough for the working world. Private industry is beginning to look at individual applicants in a holistic manor with the priority not being on the academic marks achieved, but on the overall maturity, creativity and talent of the applicant.

Through my research and experience the following qualities are not taught in academia which are vital characteristics that allow for success in life:

- **Knowing how to learn:** every individual's brain is wired slightly differently. Some learn better form seeing the material, some need to hear it and other may need to write it. Being able to learn how to learn best is one of the most powerful principles that we should be teaching people

- **Innovation and creativity:** Often the most academically bright students do not know how to think out the box and problems-solve unexpected challenges. Instilling the confidence to be creative is a vital aspect of a holistic learning.
- **Applying theory to real life scenarios:** Being able to fluently memorise information is somewhat pointless in the everyday life. Learning how to apply theoretical 'best practices' to the unique situations in professional projects is vital to success
- **Relevant professional experience:** Experience is one of the most important aspects that employers look for when recruiting. The current educational system is highly disconnected with the working world. Practical experience should be an essential aspect and compliment academic education. Far too often there is a disconnect from what is taught in the classroom to what occurs in practice.
- **Social skills and networking:** We all know the phrase "Who you know is more important than what you know" but it is hard to get to know people. Teaching the importance of communication and sociability is vital, far too often we are not able to efficiently communicate and connect with one another.
- **Giving and receiving feedback and criticism:** learning how to receive praise and criticism is extremely important. The ability to absorb and

reflect upon criticism is vital as the majority of the working world is based on teamwork.

- **Presentation skills.** Often we have to present verbally in front of people at university (in some degrees) but we are never taught the principles of how to present correctly. The ability to convey ideas clearly and speak confidently is of great importance and it is a skill that can only be learnt through practice. (Johns, 2013)

The above mentioned characteristics and principles will be practically incorporated into the pedagogy of my intervention.

Ernst & Young, one of the UK's biggest graduate recruiters, has removed high academic marks as an entry requirement because they believe that there no evidence that high achievement in the academic arena correlates with success in later life. The Ernst & Young managing partner for talent says that the academic achievement of an applicant will still be considered but the priority will be based on an holistic approach using an interview system and an online assessment to judge the potential of applicants (Sherriff, 2015).

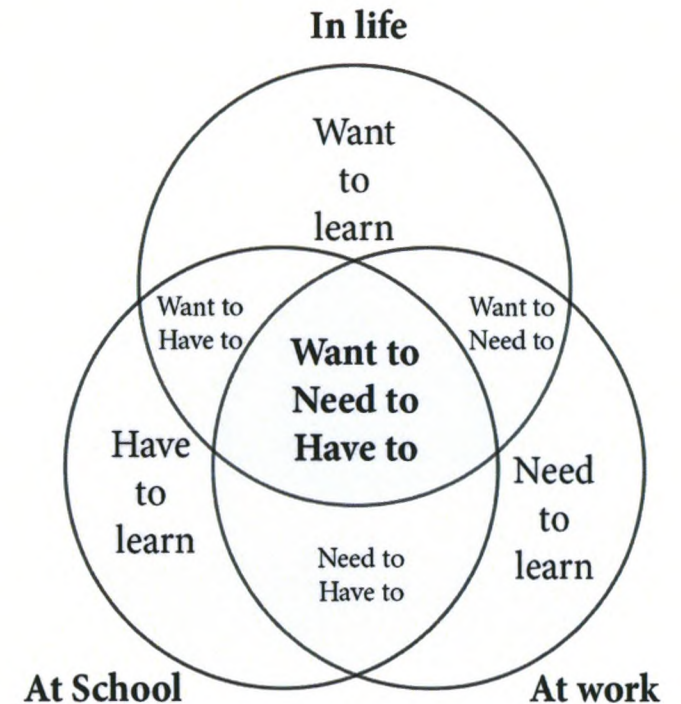


FIG 3.27: The different contexts for learning.

MIND AND BODY: STIMULATING THE HEART AND CLEARING THE MIND

MEDITATION

In the past 10 years Governments, NGOs and private industries have identified the need to improve education in our country. Huge amounts of money and resources have been invested into improving this sector. These investments have highly developed the quality of education in our country but I believe where they fall short is that they are only creating infrastructure for learning and the emotional mind of the students has not been considered. Students from all socio-economic contexts are highly stressed and are ridden with anxiety due to the pressure that is put on them. This is especially evident in children living in townships such as Alexandra, where they live in homes with high levels of stress, anxiety trauma and even violence and abuse. These influences severely cripple the cognitive and learning abilities of these students.

I believe that the state of mind of these students needs to be urgently addressed. Meditation is a tool that can greatly improve stress

management, focus and creativity as well as reduce anxiety. Meditation has been portrayed by the mainstream media as a luxury, but it is not a luxury, it is a vital essential that only requires the investment of a small amount of time every day. The simple act of teaching students to meditate for 20 minutes a day can make a great improvement in their lives both emotionally and intellectually (Puddicombe, 2013).

- **Stress:** Stress is primarily a biological function, or defence mechanism as a reaction to perceived danger. In our modern day lives we experience long term stress where as our Palaeolithic ancestors experienced short bursts of stress from an attack of an animal or other human elements. Biologically, the part of our brain called the hypothalamus responds to perceive dangers with a 'fight or flight' response, which releases adrenalin, which in turn increasing heart rate and speeds up breath, preparing us to either fight or run away from the perceived danger. This stress can have severe impacts on our prefrontal cortex, which allows thought processing and decision making. These 'dangers' were once perceived as a dangerous animal but now they are perceived as elements of our daily lives. The adrenalin and increased heart rate sends a signal to your prefrontal cortex to shut down temporarily and allow the midbrain to take over, where instinct takes over from rational thought (Cooper, 2013). Studies have shown that practice of meditation

activates the "rest and digest" part of our nervous system which aids with stress management. It reduces our blood pressure, allows our heart rate to drop and slows respiration, which is referred to as the "relaxation response" (Puddicombe, 2013). The benefits of this response increase your ability to manage stress, balance hormone levels and most notably increase brain coherence. Cortisol is an anxiety and nervous hormone. Studies have shown that 10 minutes of meditation can reduce cortisol levels in the body by 40% whereas a good night of sleep only reduces it by 10% (The David Lynch Foundation, 2015).

- **Focus:** Focus is an extremely important aspect of learning. The ability of a student to control his focus has been shown as a far better predictor of academic achievement than that of the IQ of the student. Stress and pressure reduce our "working memory capacity" which is our ability to retain and manipulate thoughts. American researchers have done tests where meditation is taught to marines before deployment to the Iraq war to see if it could help with working memory capacity and focus. The study showed that just 10 minutes of daily meditation over an 8 week period increased their working memory capacity and allowed marines to think more clearly under pressure. This result can be directly related to students who need to think more clearly in pressured moments, whether they are in exam or under daily domestic pressure (Puddicombe, 2013).

- **Anxiety:** Anxiety can be one of the most crippling emotions in our psyche. Research has shown that through our evolution as a species our brains have been conditioned to a “negative bias”, meaning that we are likely to detect and focus on negative information before positive ones. This is a survival technique where our brains have been trained to constantly monitor our environment for imminent threats. The university of Massachusetts Medical School conducted a study where they took a group students with clinical levels of anxiety and taught them meditation. The outcome was that 90% of participants experienced a significant reduction in anxiety and depression (Puddicombe, 2013).
- **Creativity:** University of Groningen and North Dakota State University conducted a study to test the effect of mediation on people involved in creative tasks. Studying 86 student volunteers

the practice of meditation increased their creative problem solving abilities in an astoundingly positive way. In the current context of our economy and modern technological development where information is easily accessible, students and workers who are able to creatively interpret and apply information are highly valuable. Creative thinking has the power to create opportunities and open doors, especially for young students coming from a previously disadvantaged township such as Alexandra (Puddicombe, 2013).

I believe that the teaching and practice of meditation can have a profound and long lasting influence of the quality of lives of all people and especially students from Alexandra Township.



FIG 3.28: EarthChild Project khayelitsha, Capetown. Image courtesy of EarthChild Project

As part of my research I have begun my own learning of meditation through an app called “Headspace”. With over 1 million users, this app is causing a cultural shift in how we think and talk about meditation. With a secular approach to its guided mediation programs it has created a platform that makes meditation very accessible to the everyday person. Initially, however I resisted the idea of it, thinking that this is too ‘new age’ and ‘airy-fairy’ for me and my life style. However having used this app for the past 2 months, I have found a dramatic reduction in my personal anxiety levels and experience much better sleep.

EARTHCHILD PROJECT

The EarthChild Project works within the existing school structures, by placing coordinators in schools to introduce and maintain their programs. The project is funded by various individuals, private businesses, teachers, parents and volunteers. Their programs supplements and supports the existing academic curriculum by helping the children to develop practical skills for healthy and holistic living, such as stress management techniques, meditation and yoga, to help them at school and in their lives. They are present in 7 schools in Khayelitsha and Lavender Hill, facilitating over 2,000 children (Kretzmar, 2015).

AFRICAN TRANCE RITUALS AND LIMINAL EXPERIENCES

There are many parallels that can be drawn between the concepts and experiences in eastern practices of meditation and those of trance dance rituals of southern African indigenous “bushmen”. Essentially these parallels make total sense, because we are all human beings. The Hindus had their theories on meditation and the bushman have their own theories on trance rituals but essentially these two cultures from opposite side of the world are seeking the same thing, a connection to one’s body as well as to an entity/energy outside of their body.

Due to commercialisation and globalisation, the majority of society has been disconnected from these ancient practices. These practices do not necessarily have to be related to any religion or faith but they simply are processes which further connect us to ourselves and the earth. I believe that through teaching of such practices to all religious and cultural groups, there is an opportunity to discover a space of mutual sharing and understanding between us all.

Through my intervention on the site, I want to create a sacred space where such trance ritual and traditions can be practiced. The site has a

sense on rurality while still being connected to the city of Johannesburg. This site can foster the reconnection to this lost culture in South Africa and celebrate it as a heritage of the people of South Africa.

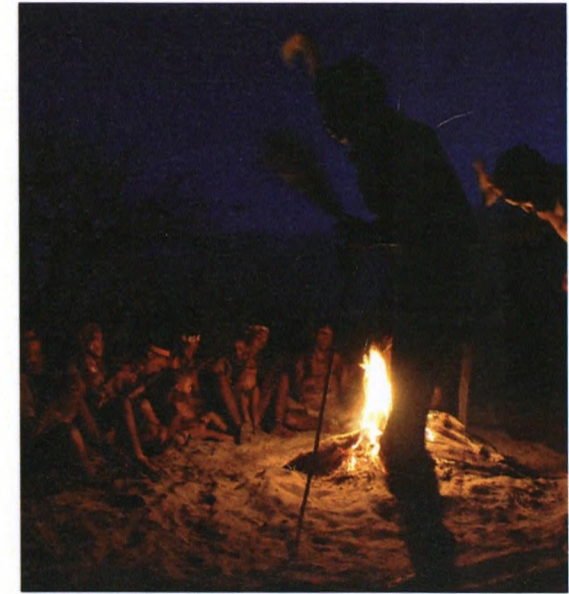


FIG 3.29: The San in trance-like states entered through hypnotic drumming, dancing, chanting and meditation



FIG 3.30: The Indian Kecak dance, with its origins in a trance like ritual.

THE BODY

Since the time of the ancient Greeks, vision has always been seen as the most important sense and in the resulting western culture; knowledge has become analogous with vision and the element of light a metaphor for truth. During the renaissance the senses were categorised into a hierarchy where vision was the highest and touch being the lowest. Our technological culture has further categorised the senses where now vision and hearing are glorified as senses that we use to engage in a social manner and the other senses have been relegated to mere bodily functions (Pallasmaa, 1996).

The ocularcentric aspect in our society is strongly seen in the field of architecture. In some cases, this is shown in the inhumanity of contemporary architecture which often neglects the other senses. Similarly, education is burdened by this pathology of the western ocularcentrism. As education has become a purely intellectual process it has lost its humanism and relationship to the body. In fact education has even become disconnected from the psyche of the actual student and consequently there is no attention or regard for individuality. Similarly, modernist architecture has 'housed' the visual sense but has left our body 'homeless' (Pallasmaa, 1996). The architecture of

educational spaces often totally disregard the psychological and sensory needs of the student occupying the space.

One of the most important senses that educational spaces often neglect is hearing. More than we realise, acoustics affects us physiologically, psychologically, cognitively and behaviourally. A study has shown that a student sitting in the fourth row of a conventional classroom has the speech intelligibility of only 50% which means students have to work very hard to keep up with the lesson/lecture. Learning spaces with better acoustics create better behaviour of students and allow for increased learning. We should spend more time designing for our ears than our eyes and think about experience in architecture as much as we do for appearance (Treasure, 2012). I have found in my own experience how noise can highly affect my quality of thinking and concentration.

Furthermore the other senses and ergonomics such as touch, feel, comfort and temperature need to be holistically addressed by ensuring that furniture and room temperature is comfortable and adaptable for its function.

There are currently interesting links that I see developing in the philosophy of knowledge where fields like biomimicry are revealing the immense wisdom of nature, which in turn are revealing the wisdom of the body and thus the human as a whole. I see the old philosophy of

the ocularcentric based theory of knowledge being bridged by this new school of thought that is reconnecting us to our most ancient natural processes. This knowledge is embedded in nature and in our bodies.

THE IMPORTANCE OF NUTRITION

It has been acknowledged that proper nutrition plays a huge role in a person's cognitive abilities. The department of basic education has implemented its national school nutrition program which is doing great work promoting and teaching the importance of nutrition and locally grown food production. Although it has implemented great policies, it does not have far reaching effects and in many cases it is the first thing that is dropped during budget cuts.

Studies have shown that that with better nutrition students are able to better learn, have fewer absences and student behaviour dramatically improves which causes less disruption in the classrooms (Just, 2014).

Several studies have shown that that an iron deficiency in a person can decrease dopamine transmissions which in turn negatively impacts cognition (Just, 2014). The best sources of dietary iron is "Non heme iron" which is a type of iron found in plants foods such as beans and greens.

Deficiencies in other minerals such as thiamine, vitamin E, vitamin B, iodine, and zinc also play a huge role in cognitive abilities and mental concentration. Additionally, a sufficient dietary

intake of amino acids and carbohydrates has the ability to improve perception, intuition and critical thinking (Just, 2014). All these above minerals can adequately be found in easily, cheaply and locally grown vegetables.

There is a problem with depression in youth generally and it is a major issue for youth in Alexandra particularly. Mood disorders, like depression, and substance abuse often initiate one another. Many youth in Alexandra often experience depression because of the stress and

conditions that they are living in. Inadequate nutrition can often exacerbate depression and research shows that those with depression are twice as likely to use drugs as an escape. Various clinical studies have shown that by utilising a diet consisting of predominantly fruits and vegetables one can dramatically reduce levels of depression, anger and anxiety (Greger, 2015).

Therefore in conclusion, I believe that teaching all students how to grow their own vegetables and proper nutrition is a vital aspect of education.

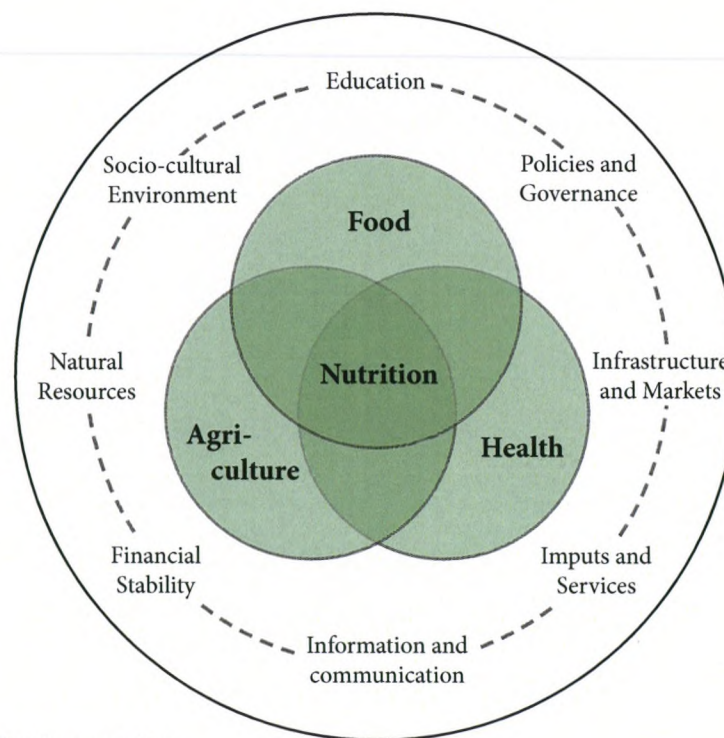


FIG 3.32: Factors affecting true nutrition

RURAL LIFE EXPERIENCE

Due to the 'westernisation' of African culture, many South Africans who are living in urban areas, parents are sending their children to rural areas to experience and engage in rural life. I believe that this is a very important tradition to hold as children are rapidly becoming disconnected to nature.

Due to the large size of the Frankenwald estate there is an opportunity to create a space to teach and reconnect students to nature. Through teaching practical rural skills like agriculture this site can also become a hub within the city of Johannesburg where children and youth can engage in the landscape. This will re-establish the site as a space for nature learning and study as it was used by Wits in the past.

LEARNING THROUGH PROBLEM SOLVING:

The medieval approach to learning where the teacher professes and the students listens is an extremely outdated means of teaching. Although some forms of learning require this approach, I believe that it should be

supplemented with activities of experiential learning. Experiential learning is a process of learning through the practice of doing and physically engaging in the subject matter. Experiential learning which is more specifically defined as "learning through reflection on doing" (Patrick, 2011:63). David A. Kolb was one of the main thinkers in developing the concept of experiential learning in the 1970s, drawing heavily on the work of John Dewey, Jean Piaget and Kurt Lewin.

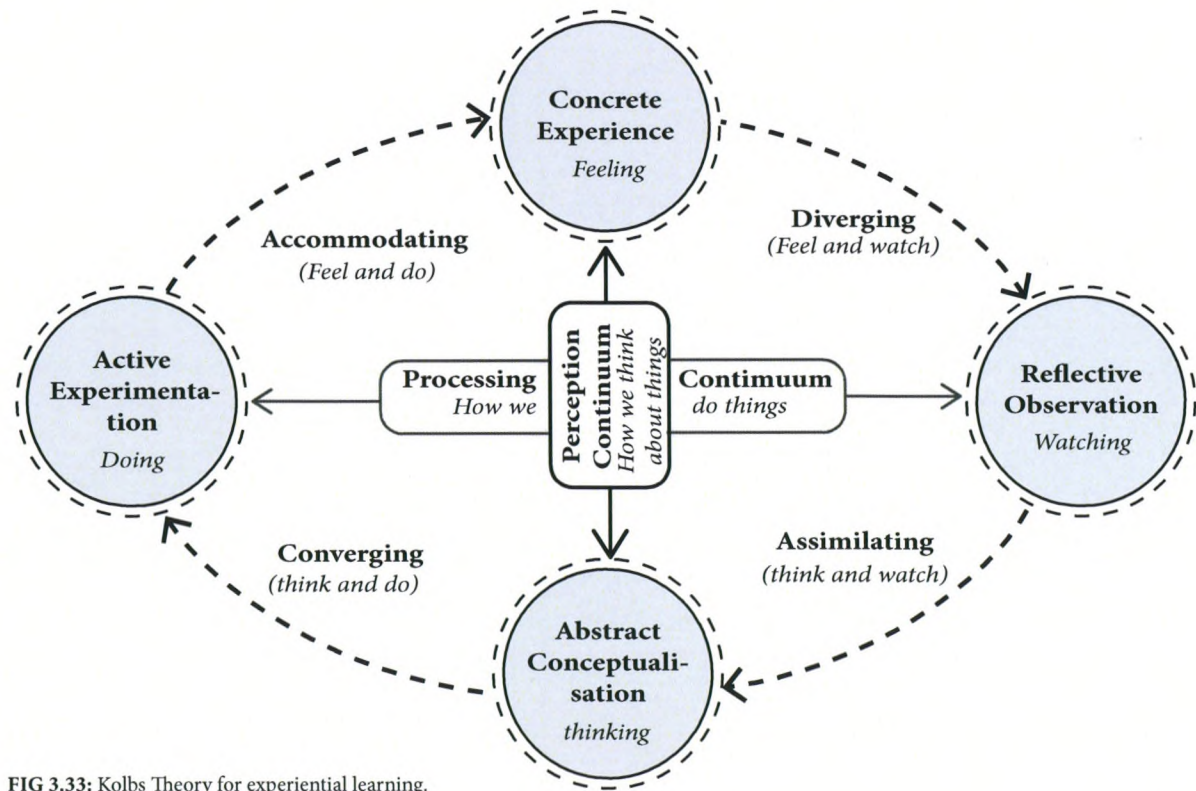


FIG 3.33: Kolbs Theory for experiential learning.

Kolb believes that for a learner to gain holistic experiential knowledge, he/she must have the four following abilities:

- The learner must be willing to be actively involved in the experience;
- The learner must be able to reflect on the experience;
- The learner must possess and use analytical skills to conceptualise the experience; and
- The learner must possess decision making and problem solving skills in order to use the new ideas gained from the experience.

(Caffarella, et al., 2007)

The overall emphasis of the pedagogical principals applied in the thesis is to apply a holistic process combined with experiential learning. The core areas where these practices will take place will be in the three different Lab spaces. The fabrication Lab, the transdisciplinary lab and the landscape Lab will operate individually but there will be a strong connection between them in order to facilitate an interpolation of ideas.

*“Men are wise in proportion, not to their experience, but to their capacity for experience.” ~ George B. Shaw
(Shaw, 2004)*

THE FABRICATION LABORATORY

The skill and knowledge of creation has been lost in our educational system. The ability make something with our hand is an extremely stimulating process for our brains and without exception anyone and everyone is able to engage in this type of learning. A Fabrication Laboratory(Fab Lab) is a perfect place to engage with processes of making. A Fab Lab is a space which allows the local community members to participate in supportive environment in order to develop and fabricate products which will address their local community and personal needs. The Fab Lab would contain various digital fabrication machinery, such as, laser, plasma and water jet cutters. 3D printers, circuit board and electronic equipment, as well



FIG 3.34: Students collaborating with a robotic arm at the Institute for Advanced Architecture in Catalonia (IAAC), Spain.

as various other computer controlled subtractive milling machinery. There will also be access to conventional manual machinery such as table saws, drills, belt sanders, etc.

My intention to incorporate such a facility is deeply influenced by the sites adjacency to Alexandra Township and the nearby Kramerville creative commercial district. The concept of the Fab Lab is to engage a bottom up approach to problem solving and innovation. The people from the Alexandra community can come into the lab and with support they can design and develop much needed products to better their standard of living. The idea for such products can only be thought of by the people who need them. An example of such innovative products could be, a safer paraffin stove to prevent against shack fires, an early warning smoke detector, a dust bin which does not allow rats to get inside and many more.



FIG 3.35: Conventional manual machinery workshop.

There is also the opportunity to incorporate commercial sponsorship for the innovation and development of new products which could be the start of many small businesses.

There are currently 6 Fab Labs in the country but this would be the only one in Gauteng. The information and products developed in the Fab Labs are shared with the other labs allowing a distribution of knowledge. The Fab Lab will stimulate the creative element amongst the youth, especially those affected by the digital divide experienced in underprivileged communities. Giving power back to the people, I believe this facility can offer career building opportunities and greatly improve the quality of life and instil confidence amongst the local population.

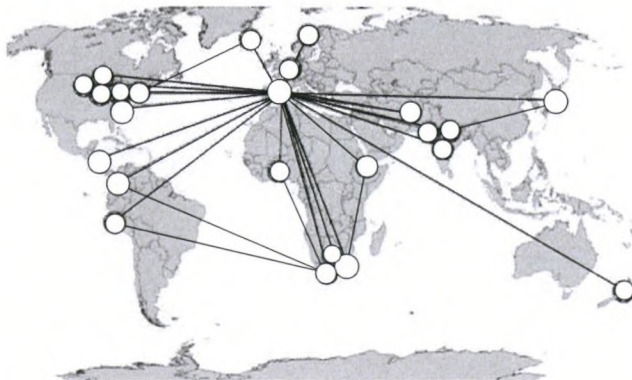


FIG 3.36: World wide Fab Lab Network.

THE TRANSDISCIPLINARY LABORATORY

Currently the problem faced in some of the leading universities which embrace and apply this progressive transdisciplinary approach, is that the faculties are separate and disconnected. This is deeply hindering the cross pollination of ideas as well as the inter relation and inter communication between students and their facilities. With my intervention there is an opportunity to dilute those barriers between faculties. Thus, creating a cohesive space for transdisciplinary problem solving and innovation. The optimum space for this is a transdisciplinary laboratory. This is one space where all the labs from the differing faculties will share a single open and transparent area.



FIG 3.37: Chemical engineering laboratory.

This facilitates seamless research, concept and idea sharing between the different schools of thought.

With the Fab Lab having a bottom-up approach to problem solving and the transdisciplinary Lab having a top-down approach to problem solving comes an incredible opportunity for knowledge sharing between the these two opposing approaches.

“Physical space that symbolically models engagement and innovation is an important aspect of successful interdisciplinary initiatives”

(Harris & Holley, 2008)



FIG 3.38: Prototyping space.

THE LANDSCAPE LABORATORY

The human race once evolved by adapting to nature, but now we are adapting our environment to suit our needs and cities are our new habitat. We have all become disconnected from the natural environment and this is ever more prevalent in the new generations who think their food comes from the 'shop'. I personally have witnessed this in children from many different backgrounds. Even more dramatically the tertiary educational systems have become totally disconnected from the natural world and thus only few students from certain degrees take field trips to nature.

"It's important to have knowledge of the heart ... How do you get that? Well, you learn through the soles of your feet, the palms of your hands, the seat of your pants. All that knowledge has to pass through your heart on the way to the head."

(Forest and Nature School in Canada, 2014 quotes Our Kids, 2014).

Philosophically we need all students to reconnect and understand the systems of nature because in essence we are all part of the same environment. Consequently our daily lifestyles have severe impacts on our environment.

"We must draw our standards from the natural world. We must honour with the humility of the wise the bounds of that the natural world and the mystery which lies beyond them, admitting that there is something in the order of being which evidently exceeds all our competence" (Benyus, 1998, p. 1).

This implies that wisdom of natural systems far exceed our current technological developments. From the medical industry to the engineering industry, the growing momentum of biomimicry is reinforcing the importance of looking to nature for inspiration. Engaging the landscape as a space to learn and experiment is a vital aspect of my thesis.



FIG 3.39: Panorama of Frankenwald estate.

STIMULATING THE ARCHITECTURE OF EDUCATION

DEPRIORITISING THE LECTURE HALL

The Lecture was the first step towards mass education during the medieval times. This practice originated in the first university in Bologna, Italy in 1088. Where the lecturer would read from a book and the students would then take notes. As this pre-dates the printing press, the lecturer held the only book and the process of the lecture was for transfer the knowledge to the students, who in turn would take their own notes and make their own books. After the invention of the printing press in the 1600s, theoretically the lecture should have become extinct but it still is the primary means of education today.

The current reality is that in most cases the lecture is an extremely unstimulating learning environment. Students can generally read faster than the lecturer can talk. While saving time, reading also ensures the accurateness of the information portrayed. Studies done on the notes that students take in lectures have shown

to be woefully inadequate, with major errors, omissions and misunderstandings taken by the student. The lecture culture sends the message: *"no need to read the professor will feed; we cannot read the professor must feed"* (Bain, 1993), in this light the lecture should be deprioritised.

This being said the lecture format still holds great importance for the gathering and the sharing of certain forms of information as well as essentially creating a sense of community in the institution. The lecture should supplement other forms of education, not be the primary method of teaching.



FIG 3.41: Singapore University of Technology and Design ,UNStudio + DP Architects

There is also the opportunity to incorporate commercial sponsorship for the innovation and development of new products which could be the start of many small businesses.

There are currently 6 Fab Labs in the country but this would be the only one in Gauteng. The information and products developed in the Fab Labs are shared with the other labs allowing a distribution of knowledge. The Fab Lab will stimulate the creative element amongst the youth, especially those affected by the digital divide experienced in underprivileged communities. Giving power back to the people, I believe this facility can offer career building opportunities and greatly improve the quality of life and instil confidence amongst the local population.

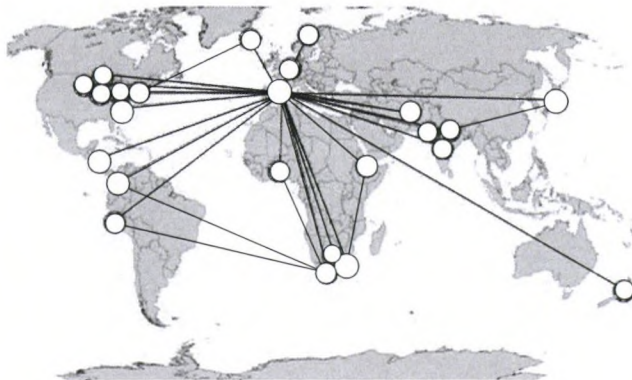


FIG 3.36: World wide Fab Lab Network.

THE TRANSDISCIPLINARY LABORATORY

Currently the problem faced in some of the leading universities which embrace and apply this progressive transdisciplinary approach, is that the faculties are separate and disconnected. This is deeply hindering the cross pollination of ideas as well as the inter relation and inter communication between students and their facilities. With my intervention there is an opportunity to dilute those barriers between faculties. Thus, creating a cohesive space for transdisciplinary problem solving and innovation. The optimum space for this is a transdisciplinary laboratory. This is one space where all the labs from the differing faculties will share a single open and transparent area.



FIG 3.37: Chemical engineering laboratory.

This facilitates seamless research, concept and idea sharing between the different schools of thought.

With the Fab Lab having a bottom-up approach to problem solving and the transdisciplinary Lab having a top-down approach to problem solving comes an incredible opportunity for knowledge sharing between the these two opposing approaches.

“Physical space that symbolically models engagement and innovation is an important aspect of successful interdisciplinary initiatives”

(Harris & Holley, 2008)



FIG 3.38: Prototyping space.

BALANCING INDIVIDUAL LEARNING WITH GROUP LEARNING

To stimulate all types of learning, it is very important to balance both individual learning space and group learning space. Design for learning spaces often only considers the lecture halls or tutorial rooms and there is no consideration for informal learning and gathering spaces which I believe are vital aspects to the learning experience. Often group learning is the most stimulating and effective form of learning and it should take priority in educational architecture.

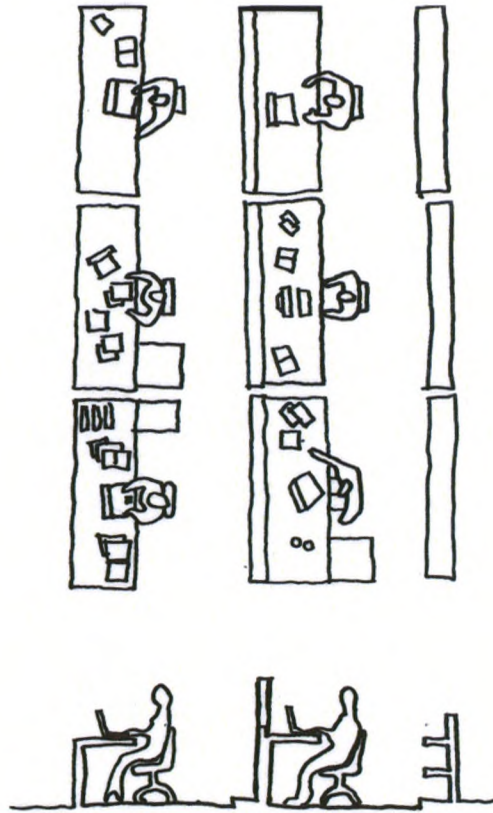


FIG 3.42: Library type work spaces: for greater concentration people face each others back's or have screens between them.

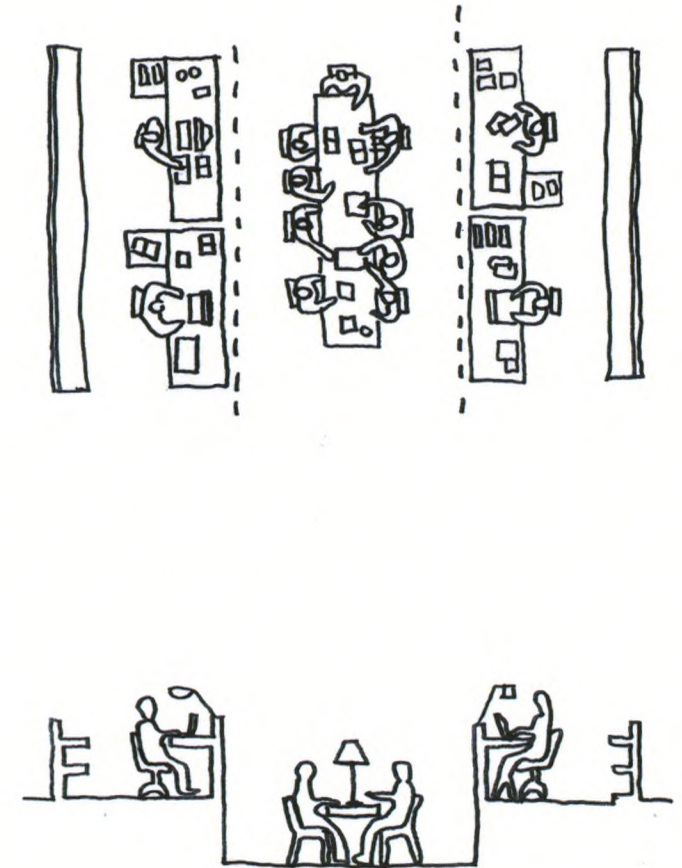


FIG 3.43: Other type of library spaces with change of levels to allow for privacy and concentration.



FIG 3.44: Window work desks, which allot for isolation while still being stimulated by exterior views

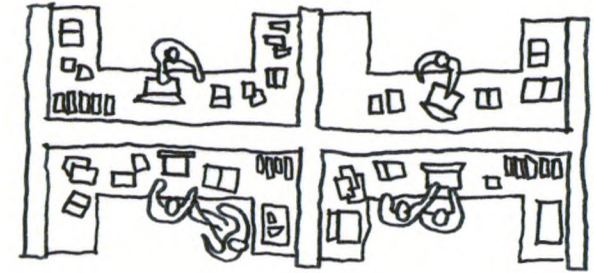


FIG 3.46: Group working desks

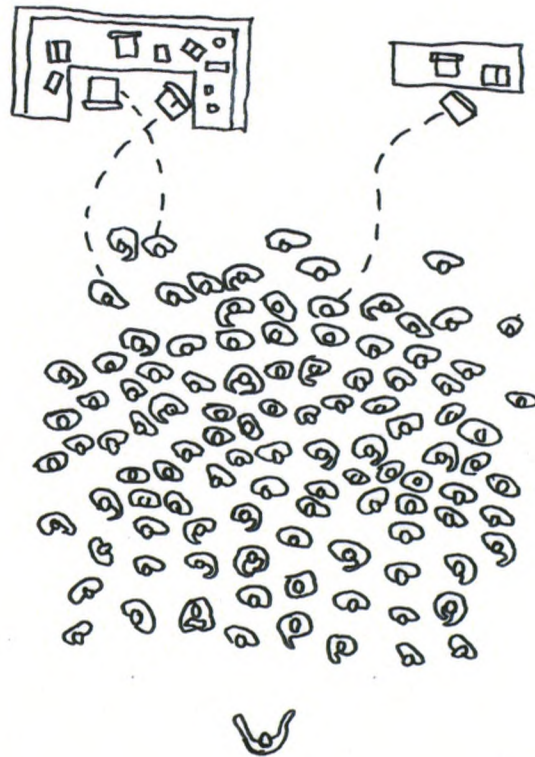


FIG 3.45: Social area and gathering spaces.



FIG 3.47: Small meeting and seminar desks.



FIG 3.48: Board room tables prioritizing the persons at the ends

CREATING TRANSPARENCY, ACCESSIBILITY & LEGIBILITY

In the past and even currently, tertiary education has a sense of exclusivity as many cannot afford to attend conventional universities. In order to counteract this perception I believe that new university building should be more transparent, accessible and legible in order to make these spaces more welcoming and hospitable for students, especially those who come from rural areas.



FIG 3.49: The Great hall, University of the Witwatersrand

Transparency: Architecture should allow a visual connection between the outside world to the interior activities of the university. I don't believe universities should be an 'island', behind closed walls in their community, like they currently are. The lines between university and community should be blurred and the university should incorporate itself with in the local community's urban fabric and culture. Yet, of course there should still be a space which is sacred for the students only. This concept of transparency also applies to my specific approach and belief in a transdisciplinary method to education. There should also be a transparency within the building between the different faculties, allowing greater social interaction and academic sharing. Furthermore the ideas of transparency need to be applied between the academic staff and the students. There should be a closer more personal relationship between students and staff.



FIG 3.50: Adidas Laces research and development building by Kadawittfeld Architects.

Legibility: As an educational building has a constant cycle of new students every year, the legibility of such a building/campus is very important. The space should allow for a new student to very easily orientate one's self and navigate around the building.

I intend to imbed the Alexandra 'corner culture' in the form and experience of the building, which will be further explained in later chapters.

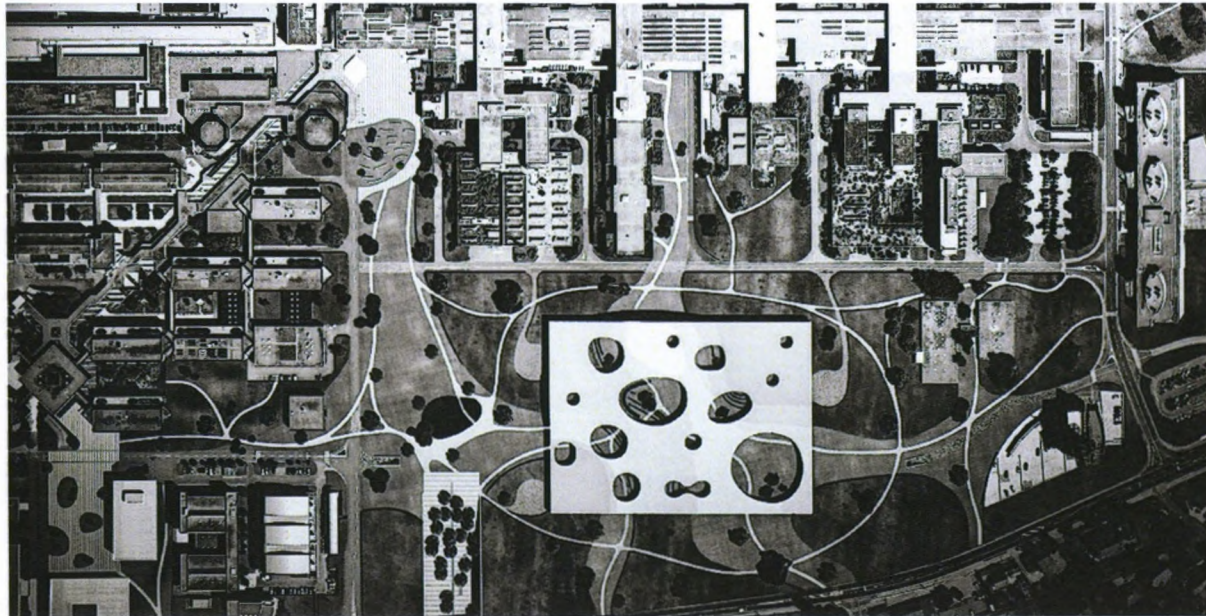


FIG 3.51: Rolex Learning Center, SANAA Architects.



FIG 3.51 A: Womens Opportunity Center, Sharon Davis Design.



FIG 3.51 B: Womens Opportunity Center, Sharon Davis Design.



FIG 3.51 C: Womens Opportunity Center, Sharon Davis Design.

Accessibility: The architecture should be more welcoming, intriguing and enticing, to allow a potential student to feel welcomed rather than to feel intimidated by the building. The typical iconic universities grand building, such as the wits great hall almost always has an overpowering feeling as it looks 'down' on you with its Iconic Order pediment and Doric columns. This type of language has no context in our current political, cultural and geographical context and is further disconnecting people from the building that should be in fact welcoming them. A building can be iconic while still be welcoming, it can still portray an academic language while still relating to the everyday man.



FIG 3.52: Singapore University of Technology and Design ,UNStudio + DP Architects

STIMULATING 'RESPIRATORY' ARCHITECTURE

In essence, Architecture is based on the dynamic and mutually dependent programs that contain motion and those that are motionless (spaces of movement and gathering). Both of which have their own association with the bodily senses, the mind, emotion and soul. I believe that the program of motion (spaces where the body moves) activates and brings life to the otherwise lifeless arrangement of architectural mass. I am interested in the way in which we experience Architecture through the means of movement. I see a building as a respiratory organ, inhaling and exhaling the life forces of the human being and the capillaries of this process are the space of movement, referred to as circulation. I believe that in various precedents in history the circulation spaces are celebrated because of their great social, cultural and spiritual relevance. I believe that more attention should be paid to the way we experience a space while moving through it, and less towards the still image, which is the common way that we depict a building or a space.

As our bodies have rhythms of breaths, heart beats, states of sleep and wake, so too do buildings have similar rhythms and cycles.

"Le Corbusier meditated upon the cycles of nature- breath, the moon, the seasons, even menstruation, all of which provided evidence of the way in which human bodies are anchored to the world, giving scale to our endeavours"
(Samuel, 2010, pg. 90).

Furthermore I am interested in the invisible factor of movement that is hidden by the scale of time. In perceiving a building, when the scale of time is distorted (when time is sped up through time lapse photography) you become aware of its respiratory qualities. Empty phases in buildings at night, then in the day, the gathering of people, bringing life, sounds and energy to the identical space. This energy is then funneled into the lecture hall where the buildings atmosphere becomes lively and then suddenly goes quiet once again when the lecture starts, but ultimately a different type of quiet to that at night.

In summary, just as the human body which breathes in pure fresh air and breathes out processed carbon dioxide, the architecture of the building 'breathes' in uneducated and unprocessed students, then ultimately exhaling more enriched students on a daily basis.



FIG 3.53: Carpenter Center for the Visual Arts by Le Corbusier.

BEING HONEST

What does it mean for a building to be honest? This question is highly debated amongst intellectuals and professionals. I believe, in essence, a building's 'honesty' is developed through the Architects design methodology and process. This design process, as I see it, has been deeply influenced by our history as a species. The distinction between art and science is one of the underlining influences of the debate about honest architecture. Before the rise of modern science the word Art was used to describe all artefacts created by man. The term Art was used to refer to the ability to create a tangible object, whether it is religious or utilitarian. As the field of science developed the distinction between art and science grew larger but the field of architecture was somehow left in-between. The creation of artefacts has always been based on tradition and as a skill has been passed down from generation to generation. Thus precedents, styles and typologies are deeply ingrained and conditioned in the minds of creators, whether they are artists, architects or engineers. This prior conditioning can be seen to be a problem because it influences the image the creator has in his mind's eye about the solution to the problem, before he attempts to solve the problem (Colquhoun, 2001).

Design is in essence a problem solving activity. In the modernist movement there is an implied belief in 'biotechnical determinism', this is a form of theory that believes the design process needs to undertake scientific analysis and problem solving in order to derive a form. The quintessence of this functional doctrine of the modern movement was that the meaning and the aesthetic were important but it could no longer be achieved by the deliberate searching for final forms. Scientific analysis and understanding of the requirements of program and accessibility should be the driving form finding process of architecture. Thus then, whatever may come out of this process, may still allow a wide range of flexibility in creating the final resolution and aesthetic.

Most notably a designer who uses this mathematical procedure is Yona Friedman (Colquhoun, 2001). He believes that this mathematical process needs to take place, but this process can result in various arrangements of the architectural form and that the designer, at the end of the day, needs to make the decision as to which is the best approach. Another architect to use this approach is Yannis Xenakis. He designed the Philips Pavilion while working in the office of Le Corbusier. Xenakis says that "Calculation provided the characteristic form of the structure but that after this, logic no longer operated, and the compositional arrangement had to be decided on the basis of intuition". (Colquhoun, 2001, pg. 45-51)



FIG 3.53a: Yannis Xenakis, Philips Pavilion, Brussels, 1958.

Colquhoun (2001) believes that although this is a valid process, the architect while doing his/her scientific analysis and resolution cannot fully foresee the complexity of every variable activity required of the program and this is where precedents and topologies need to be observed and learned from.

In essence, some argue that Architecture can never be honest because the built result was subjected to the creative interference of the architect but can creativity not be honest? I believe creativity can be honest and a building's design whether it is based on scientific analysis, precedents or intuition, the outcome can still be something that is extremely sensitive and responsive to the site, the climate and the user.

INNOVATING SPACE

The current growth of innovative and stimulating space is coming out of the commercial sector. Companies are realising the importance of social space as an investment in effective team building and innovation

These precedents along side show these companies attempts to create spaces that are more humane, socially interactive and connected to nature.

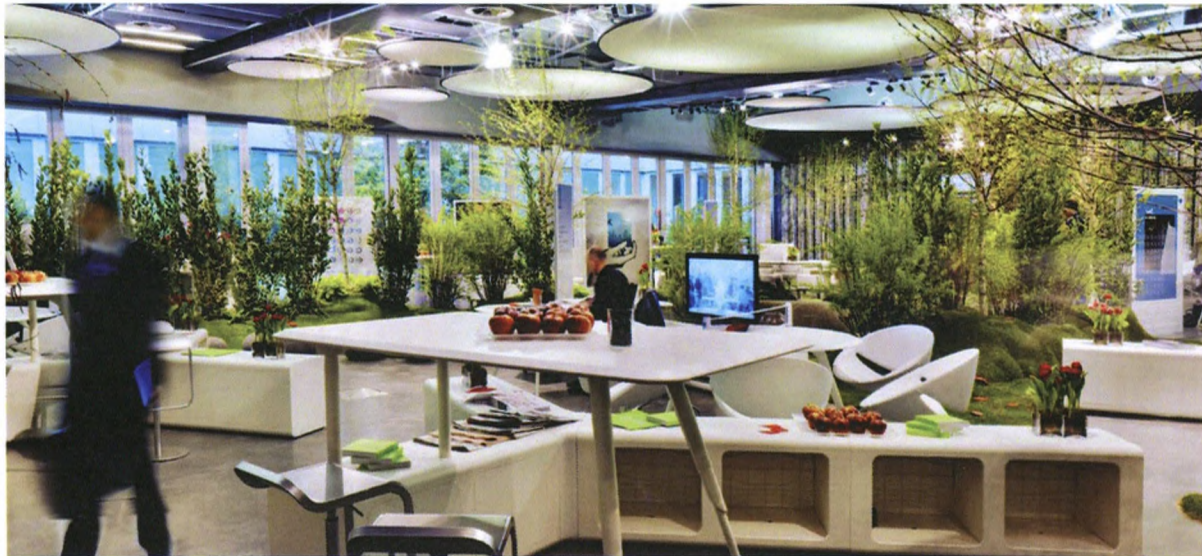


FIG 3.53b: ThinkGarden Offices, Milan Italy.



FIG 3.69c: Seglas Cano Offices, by Iwan Baan



FIG 3.53d: Dtac Headquarters, Bangkok.



FIG 3.53e: Google offices Zurich.



ARCHITECTURAL PRECEDENT & MOVEMENT ANALYSES

THE CENTENARY BUILDING,
PRETORIA
BY EARTHWORLD ARCHITECTS

I believe that in the design process of the Centenary building, the architects took into consideration practical and analytical procedures to design the form of the building which has allowed it to be so successful in its functionality to hold six 300-seater lecture halls while still achieving a multi-dimensional result. In the articulation of the detailing of the building the architects have been incredibly sculptural in their use of curves and materiality which I believe is very successful.

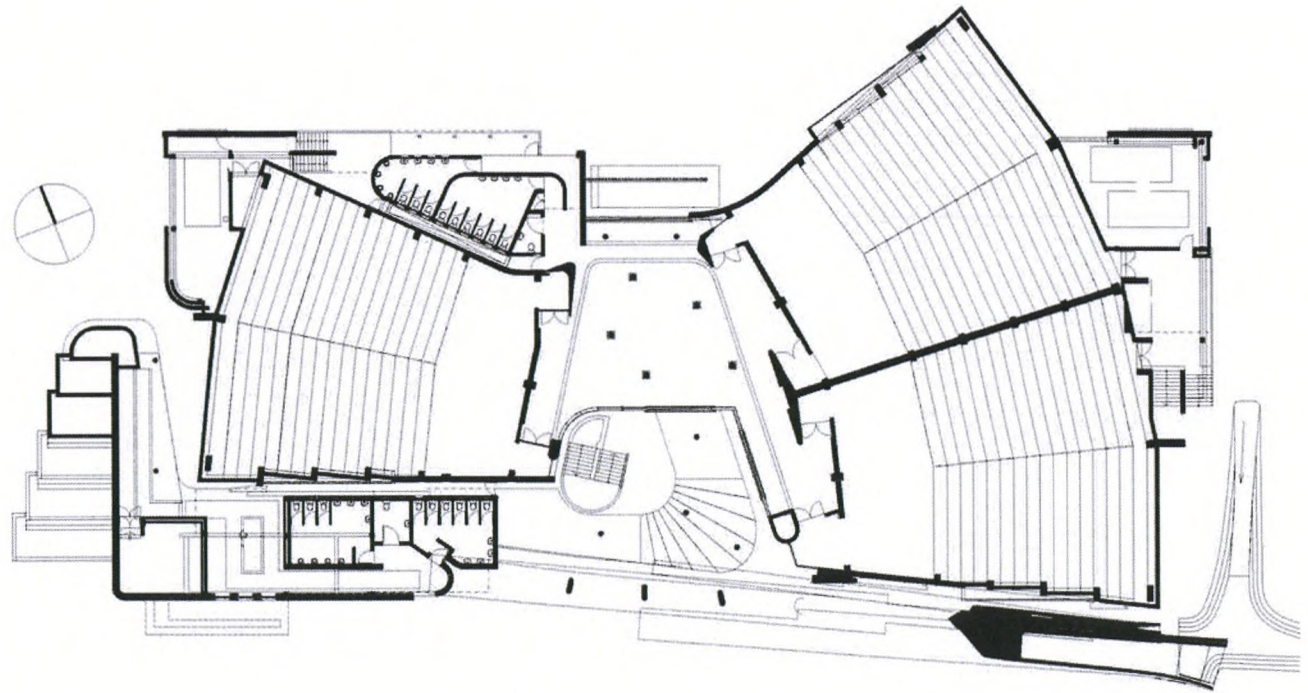


FIG 3.54 (ABOVE): Image courtesy of Earthworld Architects

FIG 3.55 (LEFT): University of Pretoria, Centenary building, Pretoria.

I believe that in the design process of the Centenary building, the architects took into consideration practical and analytical procedures to design the form of the building which has allowed it to be so successful in its functionality to hold six 300-seater lecture halls while still achieving a multi-dimensional result. In the articulation of the detailing of the building the architects have been incredibly sculptural in their use of curves and materiality which I believe is very successful.

The Centenary building has a deep relationship to its site. On a micro scale it perfectly masses itself onsite accommodating existing axes and strengthening new ones. The building has very specific campus sensitivity and is very particular to the university itself. It draws inspiration from various other celebrated modernist buildings by Sandrock and Jootse on campus. At a macro scale the building's materiality and aspects of design have taken inspiration from the Sunnyside and greater Pretoria context. I believe the building's seamless transparency and sense of welcoming is very much relating to the historical context, that it is the first lecture hall building built at the University of Pretoria post-apartheid, Pretoria being the city stronghold of the apartheid government. (Joubert, 2009, pg54)



FIG 3.56: University of Pretoria, Centenary building, Pretoria, Photo collage 1



FIG 3.57: University of Pretoria, Centenary building, Pretoria, Photo collage 2

MOVEMENT ANALYSIS

This analysis will look at various urban conditions around the Campus of the University of the Witwatersrand and the University of Pretoria. Through time lapse photography I attempt to reveal the cycles and rhythms of students, as well as, analyse how they move and gather. Please watch the short video titled '02-Movement Analysis' in the attached CD which shows time lapses of the analyses I have created.

As per the simple key below, red lines represent lines of most used movement routes which I have seen through my analysis and viewing the footage multiple times. The blue shapes are informal social gathering spaces which are areas that are 'sculpted' by the movement routes. Through the process of doing this photography, I have learnt allot about this 'respiratory' nature of universities, and urban conditions in general. Simply being an observer for a few full days, I have learnt allot which could not be achieved through conventional mapping. This observation of cycles, rhythms, the ways in which students move and associate with one another, will be invaluable design drivers for this.

KEY

Movement Routes



Social Gathering Spaces



FIG 3.58: Wits University, Amic deck stairs.



FIG 3.59: Wits University, Science Stadium stairs.



FIG 3.60: Wits University, Umthombo building pathway.



FIG 3.61: Wits University, Science Stadium.

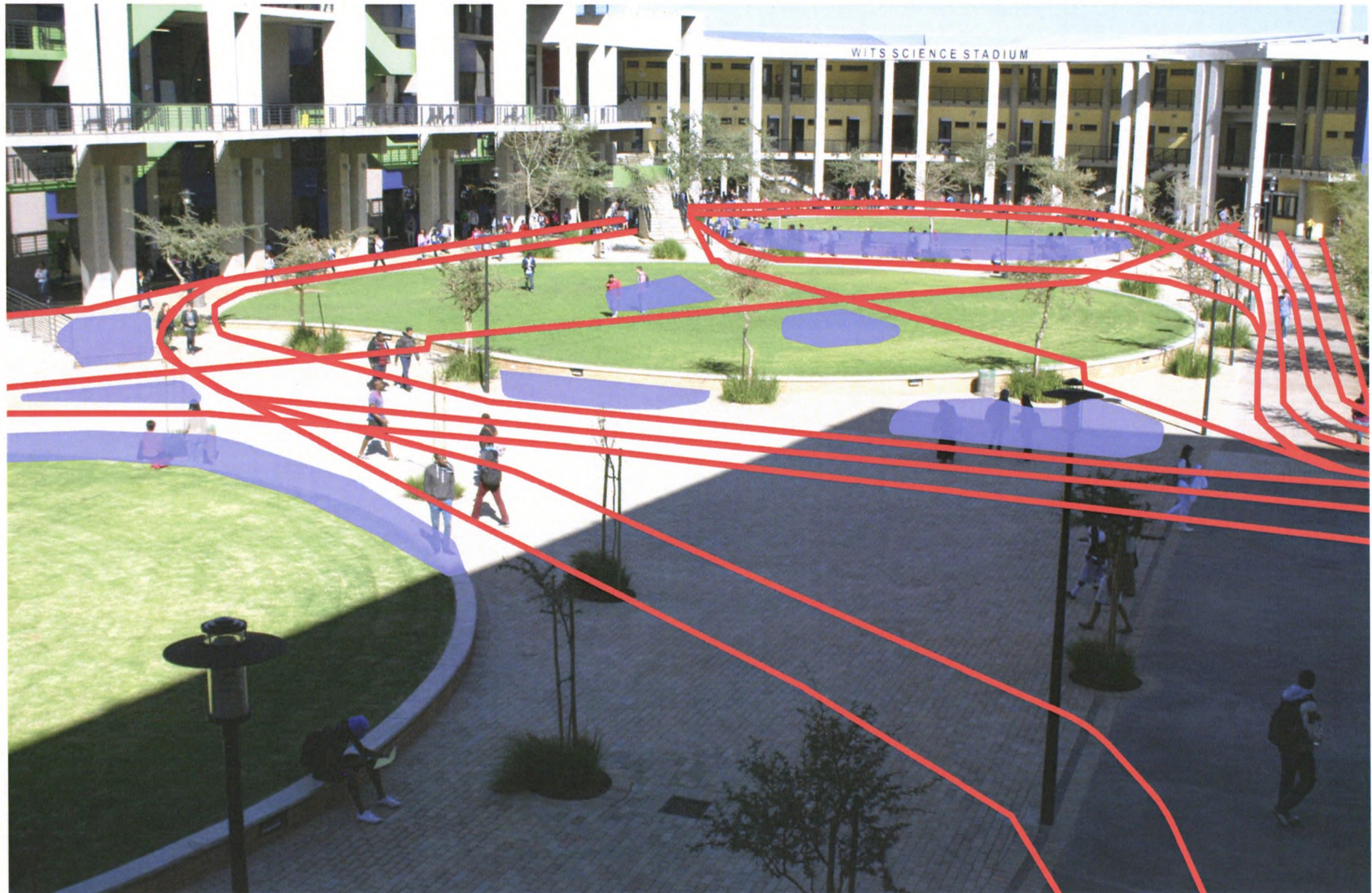


FIG 3.62: Wits University, Science Stadium.

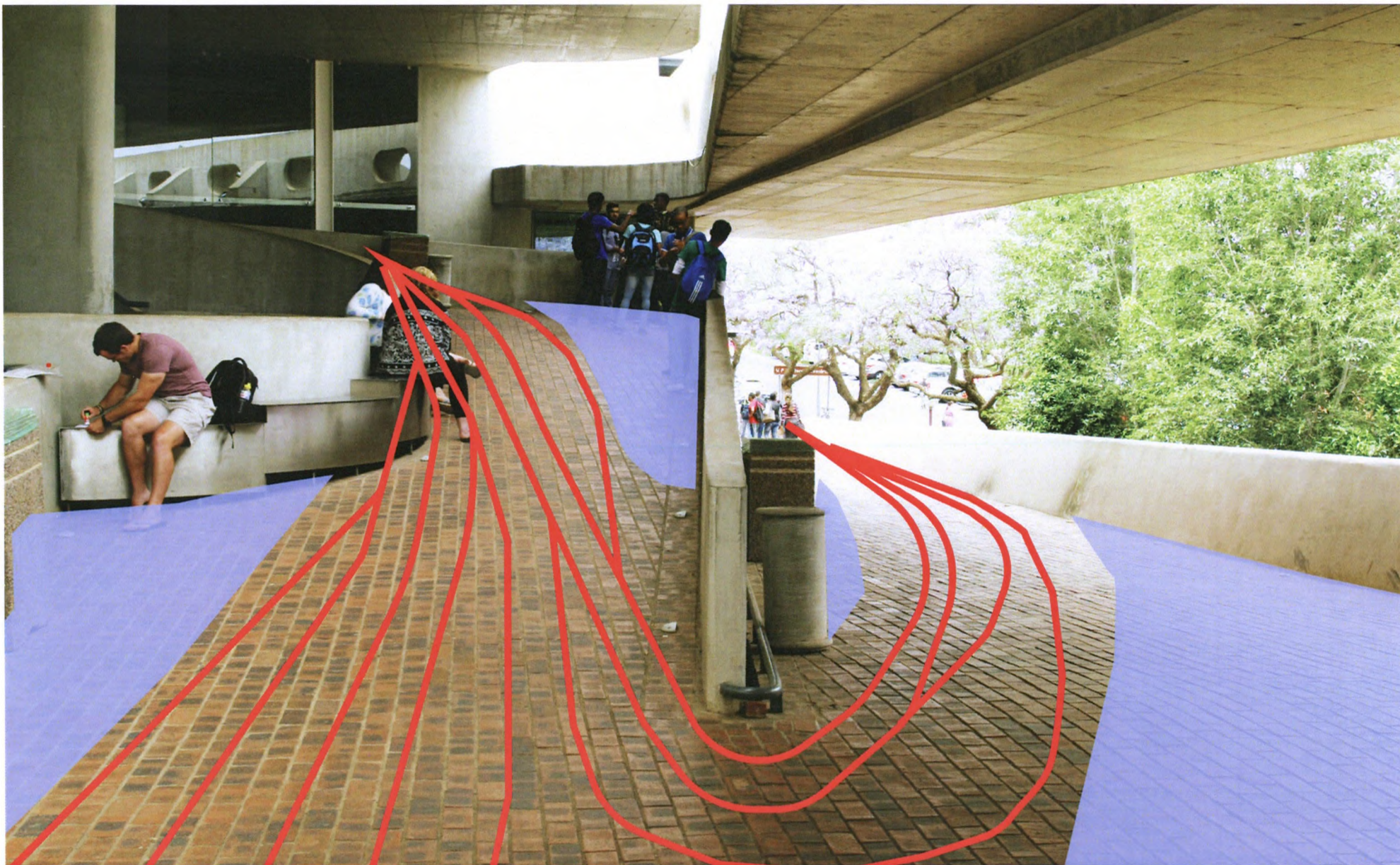


FIG 3.63: University of Pretoria, Centenary building, Pretoria.



FIG 3.64: University of Pretoria, Centenary building, Pretoria.



FIG 3.65: University of Pretoria, Centenary building, Pretoria.



FIG 3.66: University of Pretoria, Centenary building, Pretoria.

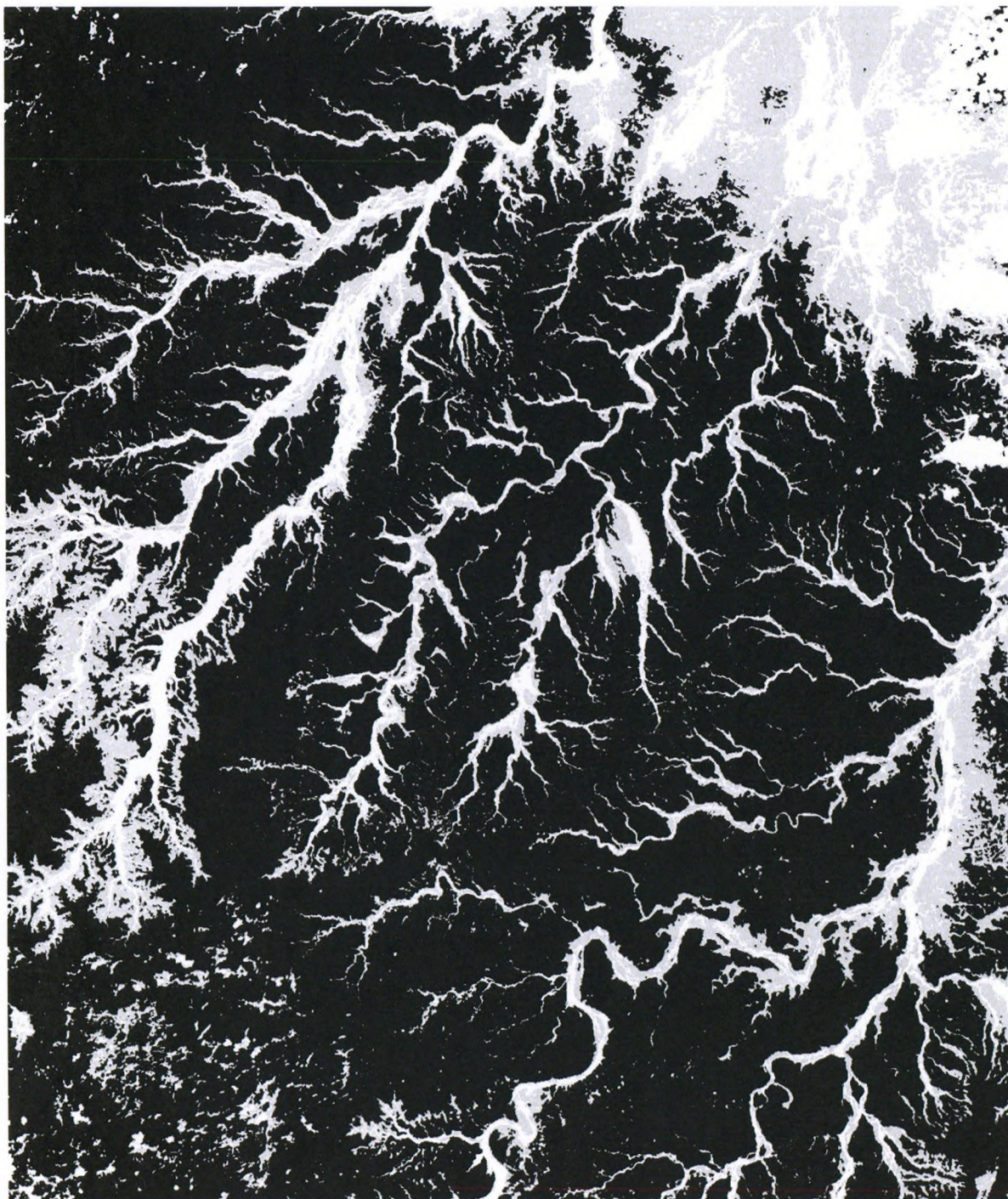
CHAPTER REFLECTION.

Education is a key human growth component of our development as the human race. Our ability to learn and apply knowledge is what has separated us from other non human animals. This being said I believe that we need to become humble and look to nature for its wisdom. We need to use technology with greater competency but still foster a deep connection to nature and the interaction of people in our communities.

The architecture that supports learning in the future needs to become ever more adaptable to reach to the ever changing landscape of human education.



FIG 3.67: The tree as an ancient place of gathering and learning.



04

EDUCATIONAL CONTEXT

FIG 4.0

ORIGINS OF THE UNIVERSITY

Social spaces have always been underestimated for their incredible potential for developing and sparking of new ideas. The example which Steven Johnson uses in his book and TED Talk 'Where Good Ideas Come From' is that of the English coffee house and how it was critical to the development of one of the most important intellectual movements referred to as the Age of Enlightenment from the 1620s to the 1780s. The interesting impact which these coffee houses had on history were for two reasons, first of all it was what they were drinking and second was the social space created.

Travelers learned about coffee through travels to Asian empires of the time. They noted the benefits of added energy and alertness that this

hot black liquid gave to the local people. The consumption of coffee and tea very quickly transfused itself into popular European culture. Before the popularity of the coffee house, what people drank, all day, was alcohol and effectively the entire population was drunk all day. Once people started to switch from alcohol which is a depressant to coffee and tea which are stimulants, suddenly people had clearer and more focused minds.

The second aspect which had influence was that of the actual nature of the space of the coffee house. Its open and adaptable layout allows for easy social interaction, it was a place where all people from different walks of life and schools of thought could get together independently (Johnson, 2010).

The Queens Lane Coffee house which is still in existence today, is one of the most renowned coffee houses in England. Founded in 1665, it was one of the first coffee houses established in Oxford to be referred to as a 'penny university'.

They were known as 'penny universities' because they offered an alternative form of education to the structured academic education of the time. Anyone could access the coffee houses with a penny admission charge, and this included access to coffee, newspapers and conversation. The unique part of these spaces was that it attracted an eclectic group of people from all economic classes. During a time where society was highly exclusionary, these spaces promoted inclusion. Even students and academics from the universities would use the coffee houses as spaces for stimulating discussion and debate with like minded patrons (Ukers, 1935).



FIG 4.1: Queens Lane Coffee house.

THE EVOLUTION OF THE UNIVERSITY TYPOLOGY

THE SINGLE BUILDING TYPOLOGY

Other than the 'penny universities', the origins of the conventional university evolved from cathedral schools who continued the preservation of knowledge which monasteries had previously been responsible for. These newly forming universities had to develop to meet the need for professional training of people in the need urbanising society. To house their needs, these institutions retrofitted existing buildings which were no bigger than a city block. These universities would soon be 'diluted' into the urban fabric of cities.



FIG 4.2: Merton colleges. Oxford.

In time, however, as student numbers grew, this method became unfeasible and the need for permanent structures were built to house these institutions. This marked the establishment of the university as an institution (Botha, 2009).

Merton College at Oxford is a good example the first of the dedicated university building typologies (FIG 3.5 A). This distinct typology of the square unit with an internal courtyard portrayed the exclusivity of educational at the time. Once again, as student numbers grew, additional units were built, eventually forming clusters (FIG 3.5 B). Stellenbosch University in South Africa has a similar 'single building' typology (FIG 3.5 C) (Botha, 2009).

THE CAMPUS TYPOLOGY



FIG 4.3: University of Virginia, Charlottesville.

Thomas Jefferson, the third president United States and American founding father, coined the term "academic village". He used this term to describe the University of Virginia which he designed in 1817 (Zechmeister, 2011). Thomas Jefferson describes his goal for higher education:

"We wish to establish in the upper and healthier country, and more centrally for the state a University on a plan so broad and liberal and modern, as to be worth patronizing with the public support, and be a temptation to the youth of other states to come, and drink of the cup of knowledge & fraternize with us...In fact, a University should not be a house but a village"
(Ziebarth, 2013).

The Latin term campus which means 'field' describes the very unique built character of American universities at the time. The word campus was first used to describe the college grounds, then later was used to describe the entire university and its compounds (Botha, 2009). The campus typology began to become more popular because it was not only more convenient than its predecessors but it was healthier, safer, and a lot less noisy and thus making it a more conducive space for learning (Zechmeister, 2011). This topology was thereafter adopted by various designers around the world and has become seen as the ideal university (FIG 3.5 D).

THE MEGASTRUCTURE TYPOLOGY

The challenge that the campus typology began to develop was that the size of the grounds grew to a point where the distance between buildings became too great. This in turn prohibited communication between faculties. University institutions began to radically rethink their design. Ultimately the invention of the 'megastructure' was developed to increase density and house the increasing complexity of its organisation. Various universities around the world incorporated this typology in attempts to become progressive institutions. This is clearly notably in the University of Essex in 1962 (FIG 3.5 G) and the Rand Afrikaans University (currently known as the University of Johannesburg) in 1972 (FIG 3.5 I) (Botha, 2009).



FIG 4.4: Rand Afrikaans University, Johannesburg.

SINGLE BUILDING

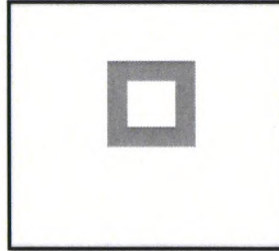


FIG 3.5 A: Merton colleges, Oxford (1264)

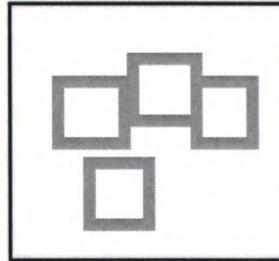


FIG 3.5 B: Oxford colleges

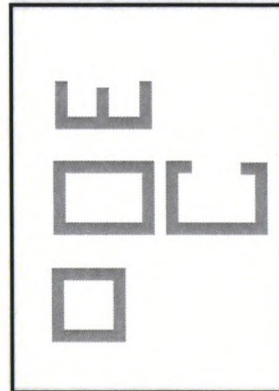


FIG 3.5 C: Stellenbosch University (1874)

CAMPUS

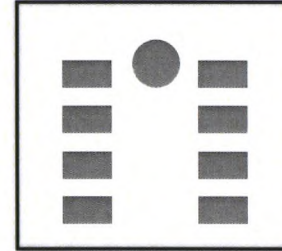


FIG 3.5 D: University of Virginia, Charlottesville (1817). Designed by Thomas Jefferson

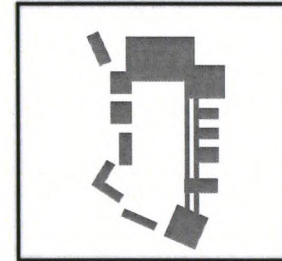


FIG 3.5 E: The Hebrew University, Jerusalem. Designed by Kaufmann, Klarwien & Rau

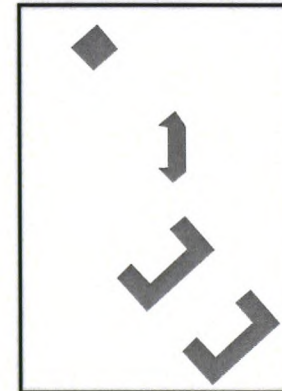


FIG 3.5 F: University of Pretoria (1908)

MEGASTRUCTURE

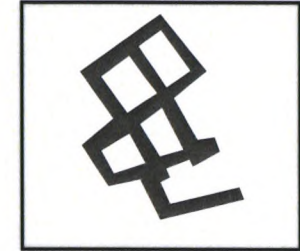


FIG 3.5 G: University of Essex, Colchester (1963). Designed by Kenneth Capon

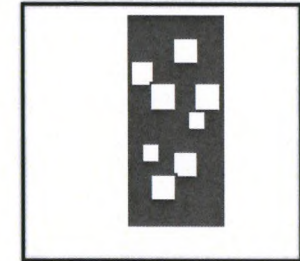


FIG 3.5 H: The Free University of Berlin (1964). Designed by Candilis, Josic, Woods & Schiedhelm

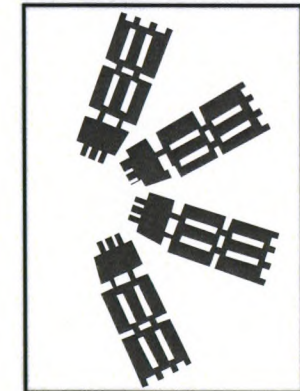


FIG 3.5 I: Rand Afrikaans University, designed by Meyer van Wijk (1908)

FIG 4.5: Figure ground study of the typological evolution of Universities.

THE SOUTH AFRICAN UNIVERSITY SYSTEM

South African universities sit uncomfortably between the deeply 'westernised' colonial system of which they were modelled on and the movement of 'transformation' and 'Africanisation' since 1994. The movement towards transformation is in progress but it is only addressing the quota of non-white academic staff and students and no attention has been given to 'Africanisation' of the institutional pedagogical philosophies. Unfortunately the institutions still base their policy and practice on universities from the United Kingdom, Canada and Australia. With the major student protests which happened at the beginning of 2015, the universities in South Africa have to do a major rethink about its policies of inclusiveness, cultural representation in academic staff, language of instruction and many more aspects.

The government has identified the shortage of seats in the higher educational system over the past 10 years. In response, the Department of Higher Education and Training has intensified its efforts to expand the higher education system country wide by investing funding through Government's Medium Term Expenditure Framework (MTEF). This funding has gone into the development of new universities in

Mpumalanga and the Western Cape as well as building and infrastructure projects on existing universities. Wits has reached its maximum development on the main campus as well as the education and medical campuses.



FIG 4.6: Students queue outside the University of Johannesburg to secure some of the last remaining university places on January 10, 2012.



FIG 4.7: The 2014 Strikes at Tshwane University of Technology over lack of funds in the National Student Financial Aid Scheme.

ISSUES FACED BY THE HIGHER
EDUCATION SECTOR.

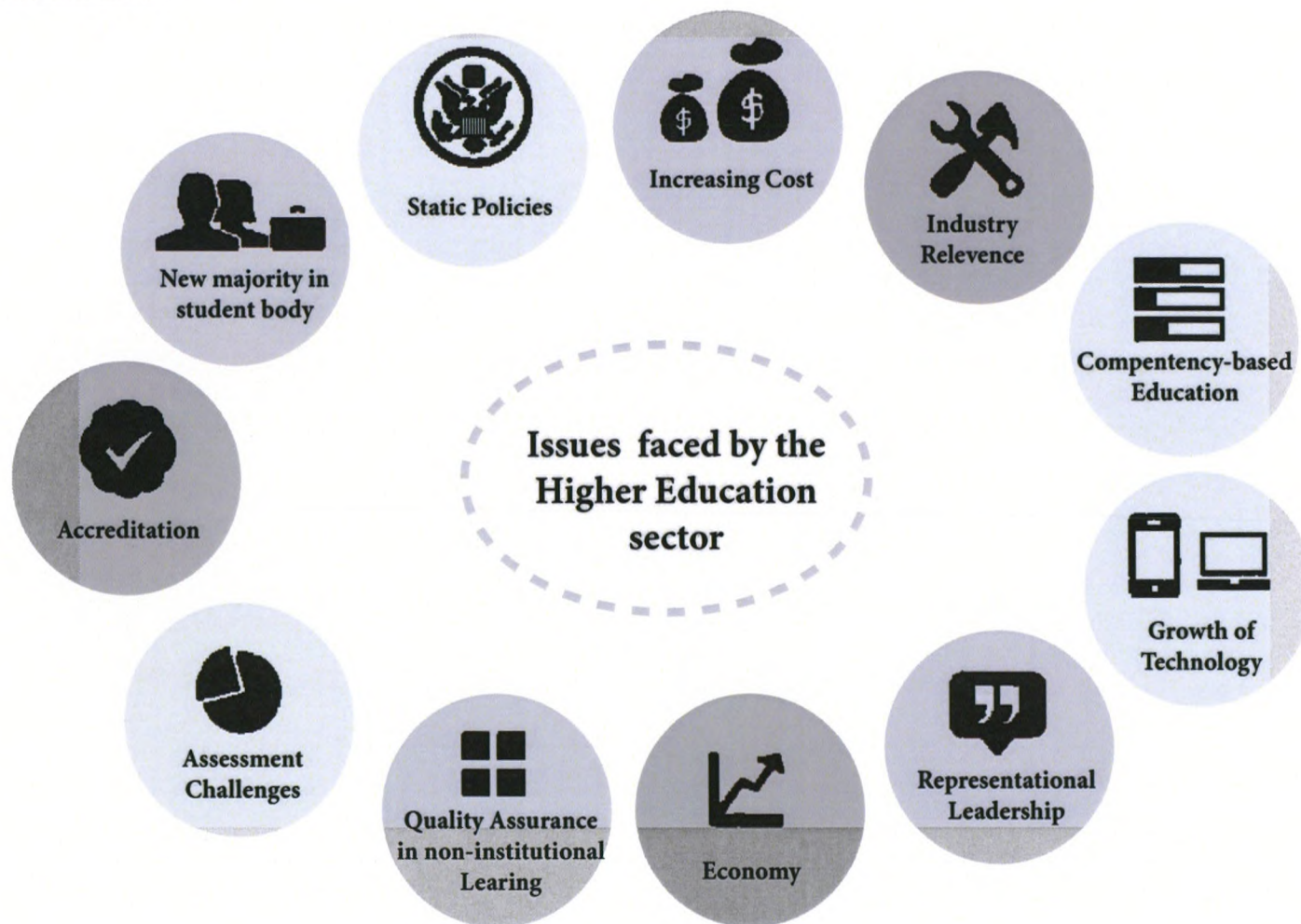


FIG 4.8: Issues faced by the Higher Education sector.

CREATING AN AFRICAN IDENTITY IN EDUCATION

The 'Rhodes Must Fall Movement' is a collective movement of students and staff at the University of Cape Town protesting against the reality of institutional racism and lack of transformation at the university. The focus of the movement is against the perceived "white supremacy" and "privilege" at UCT and to create real transformation for students and staff, as well as to "decolonise" education in South Africa (Unknown, 2015). Similar protests occurred at the University of Stellenbosch where the organisation 'Open Stellenbosch' protested against the teaching in Afrikaans at the university, as well as the 'Black Students Movement' of Rhodes University (named after Cecil Rhodes) protesting against the name of the university.

In the light of these protests at universities, the country is looking to academia to see how ready it is to reflect upon itself and implement change. What the university systems needs to do is to incorporate a feedback system where it can clearly and transparently acknowledge and address the concern and opinions of all groups of students. Incorporation of young multicultural academics into the academic organisational structure, who have fresh eyes on the system, will allow for a balanced

platform for all the student concerns to be addressed. The current hierarchical and bureaucratically-bound structures need to be replaced with humble, self-reflective and agile structures, with members representing all economic and cultural groups (Machanick, 2015).



FIG 4.9: Marxist students table at University of the Witwatersrand.



FIG 4.10: Removal of the Rhodes statue at the University of Capetown.

THE FUTURE OF THE UNIVERSITY SYSTEM

Apart from my afore stated principles to revolutionise tertiary education, there are a few additional elements that I believe need to be incorporated as universities develop in the future. Although they might seem idealistic, universities need to incorporate such measures to assure their survival, especially in the light of the current protests by students and academic staff in 2015.

- **Universities need to embrace technology as a vital aspect of education.** Universities should be on the cutting edge of technological developments. In a time where technology is becoming so cheap, each student should receive his/her own laptop upon entry to university.
- **Universities must engage with schools.** There should be a close connection between the university and the school, there should not be such a disconnect between these 2 forms of education.
- **Think out the box.** With an agile administration and implementation system, universities should be able to adjust curriculum and policies to the changing economic, technological and cultural climate in the world.
- **Break down the boundaries between universities:** Universities are constantly competing with one another head hunting lecturers and academics from other institutions. I believe this competition needs to stop and universities should be able to share their mutual resources and staff to foster a higher level of education for their students.
- **Emotional support.** Mentorship programs should be incorporated so that every student has access to someone to speak to about both academic and emotional problems.
- **“Be free”:** Tertiary education should be a right for all people. Government and the private sector should implement strategies to ensure that all universities are free, or at the very least, substantially subsidised, especially for those coming from previously disadvantaged upbringings.

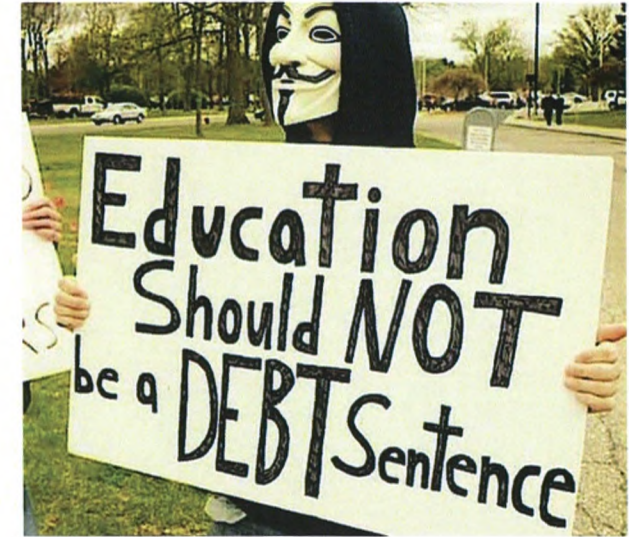


FIG 4.11a: 'Anonymous' mask wearing protester in the United States of America.



FIG 4.11b: Fee increase protests, Pretoria, October 23rd 2015.

REFLECTION ON THE CHAPTER AND THE CURRENT CONTEXT OF STUDENT PROTESTS

Over the past few years, South Africa has seen many post colonial and post apartheid concerns come to rise as the young educated population begins to publicly question the existing socio-political and socio-economic structure. The current protests at the University of the Witwatersrand have shown that students are no longer willing to accept that political freedom in itself is enough. As Students we are striving to better our own lives and the lives of our families and we want to live in a way that reaffirms our freedom with dignity. We are determined to live in a country where we all have equal opportunities and the most basic opportunity is education (Nyamhunga, 2015).

Students are beginning to speak their mind about what they believe in. This unrest in the university system is not solely caused by financial reasons, it also has stemmed from the lack of transformation and relevance of the actual curricula, as shown in the 'Rhodes Must Fall' movement and the current 'Fees Must Fall' protests which has spread to various universities in South Africa (Machanick, 2015). The success of the 'Rhodes Must Fall' movement to remove the statue of Cecil John

Rhodes at UCT has empowered young people in South Africa to call for further 'decolonisation' and equality goals. These movements have brought to light the levels of inequality in South Africa's tertiary education system (Subramany , 2015).

The Fees Must Fall protests are being called the biggest uprising in South Africa since the fall of apartheid. This is the first such unrest of youth since the Soweto Uprising of 1976. Unlike the Soweto uprising, this new movement has a new resource, that being technology. The youth are utilising modern communication and social media to strengthen their message. Twitter has been a vital resource to raise awareness and coordinated strikes and gatherings. South African youth are raising the issue about access to education, asking the question: "How can we get ourselves out of poverty if we cannot afford the required tool (education) to combat poverty with" (Nyamhunga, 2015).

I believe that the educational system needs to become adaptable and listen to the needs and concerns of students. The education system and especial the tertiary system needs to deeply rethink its current structures, it needs to reconnect to its essence, ultimately becoming a welcoming space for the intellectual and emotional development of all students unconditionally. Its systems and policies need to be more humanly integrated as they are currently lifeless and disconnected to the needs

of the student. The use of government funds needs to be radically restructured to accommodate the need for tertiary education. Budgets must be re-prioritised by putting education at the forefront of national needs.

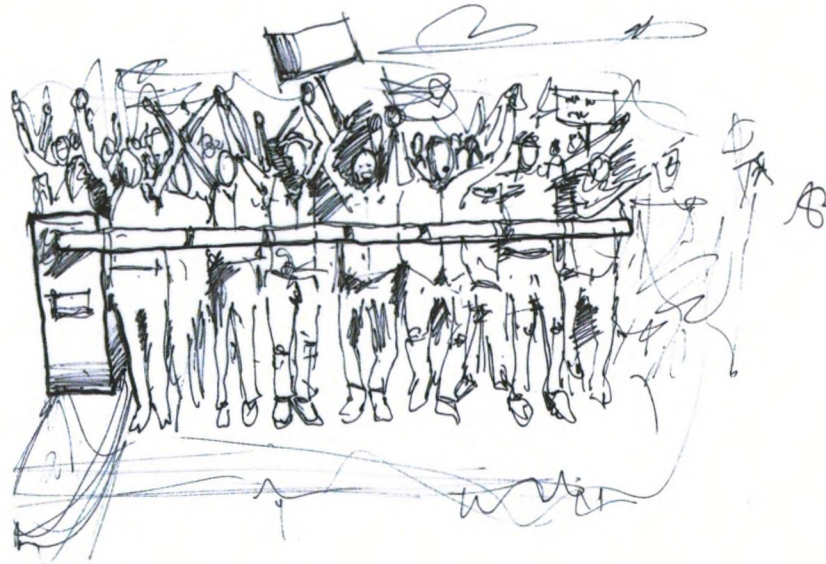


FIG 4.12: Sketch of student protests at the University of the Witwatersrand, October 2015.



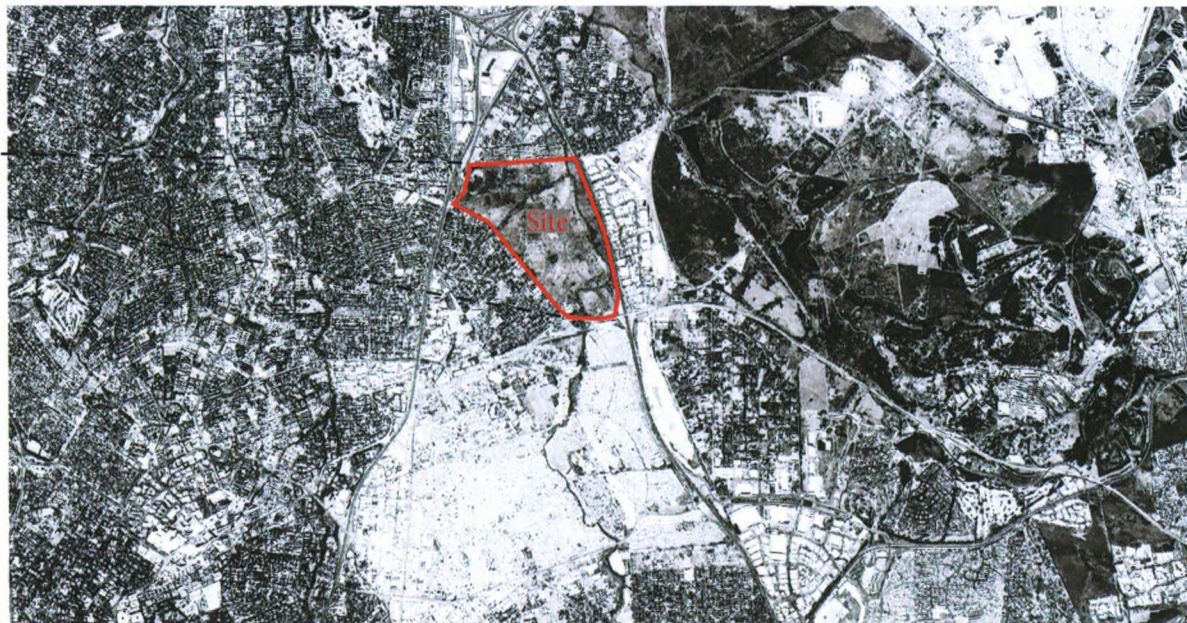
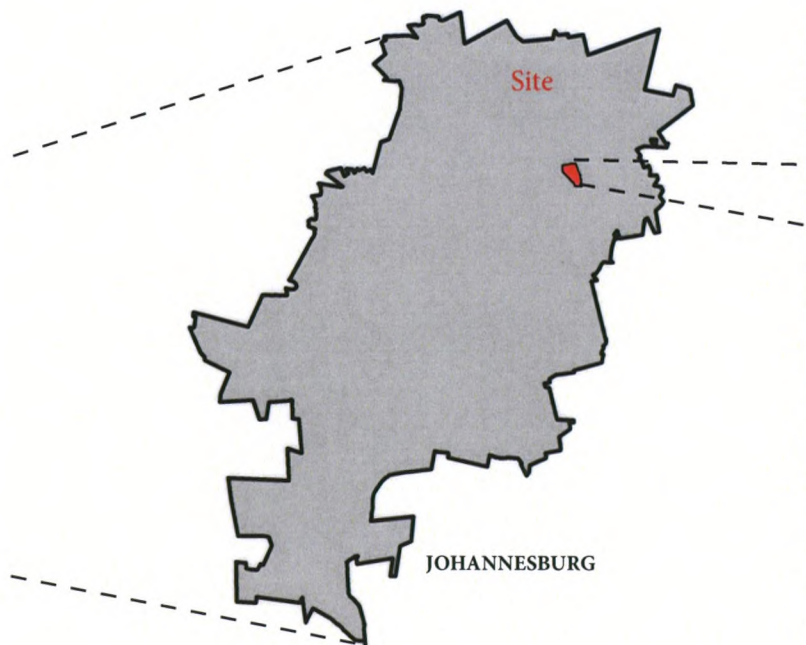
05

SITE, HISTORY & FUTURE GROWTH POTENTIAL



FIG 5.0

FIG 5.1: Site Location diagram



ALEXANDRA HISTORY TIME LINE

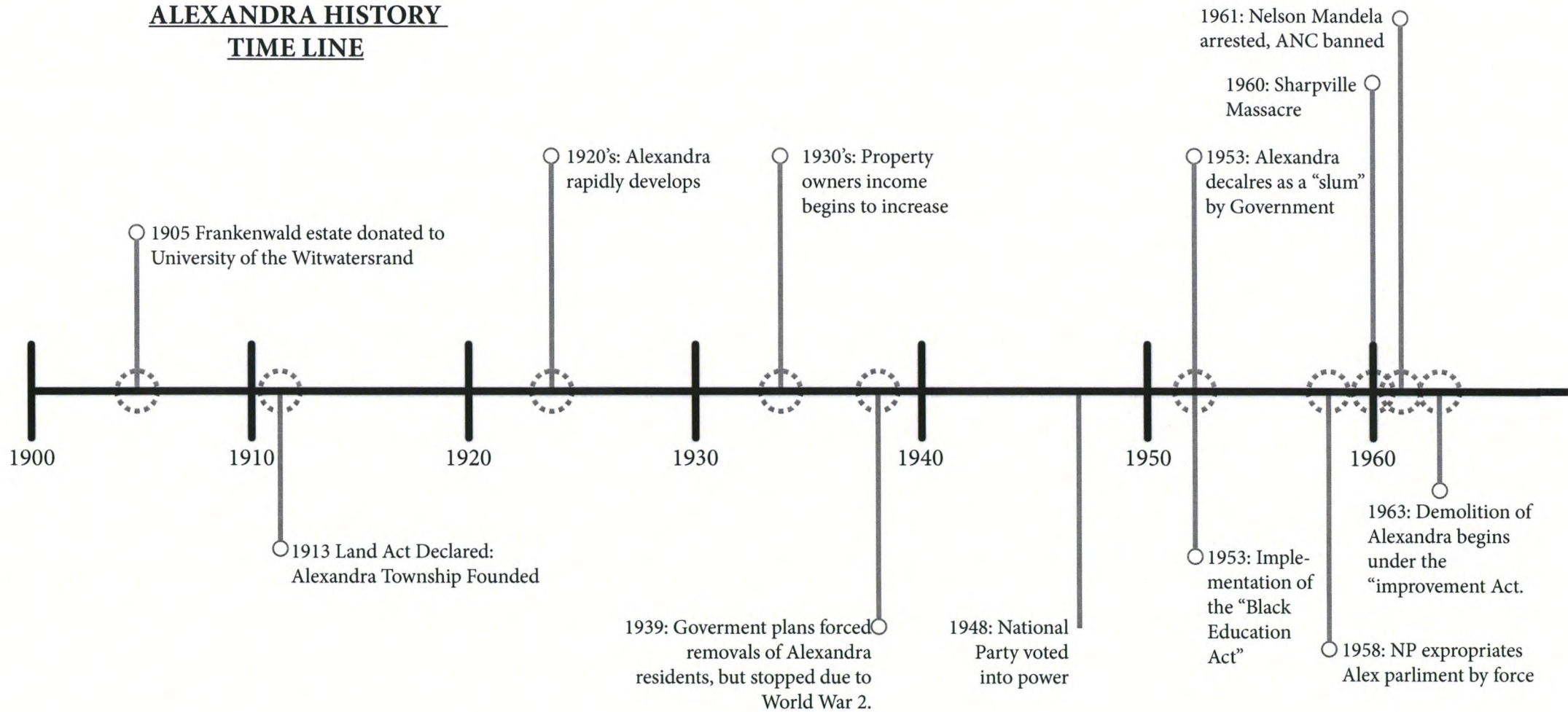
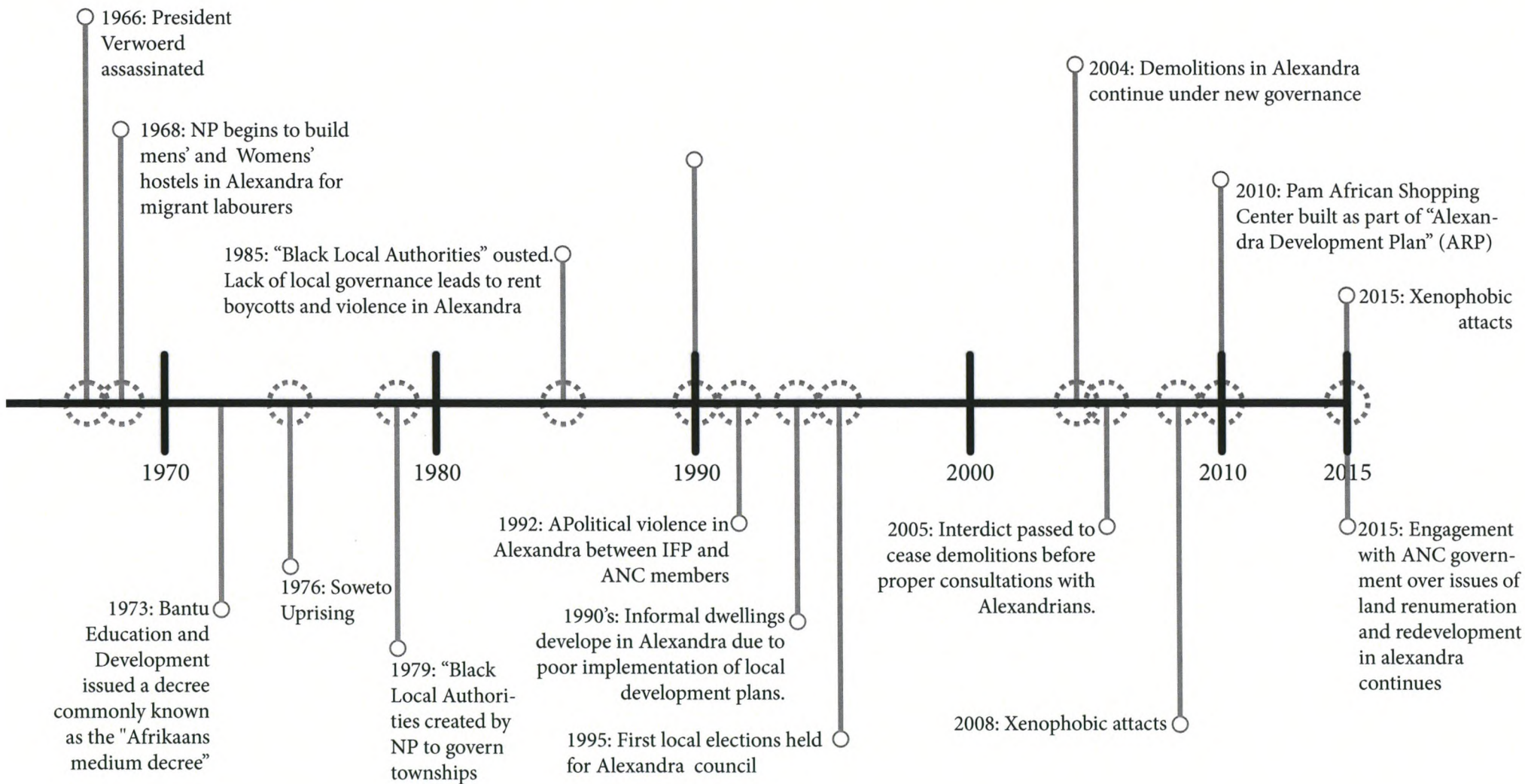


FIG 5.2: Time line of the history of Alexandra Township and factors influencing it.



SITE AND ALEXANDRA'S RELATIONSHIP TO WITS

Historically there is a deep connection between Wits and Alexandra, as well as Frankenhof estate. Alexandra has always been a site for research as well as philanthropic work for various faculties at Wits. Wits medical and build environment students have been doing work in Alex dating back to pre-1940.

Although the connection between Wits and Alexandra has always existed, there has always been an accessibility problem for potential students from Alexandra. This being geographic and economic accessibility. With Louis Botha Avenue being the main arterial between Alexandra and Wits, Alexandrians have always had to navigate an ever-changing contexts of public transport or lack thereof.

As a direct consequence of the apartheid regime, the community in Alexandra is still underprivileged and marginalised today. I believe the proposal to develop a high quality tertiary educational facility on Alexandra's doorstep is a true gesture towards reconciliation and equality for the future generations.

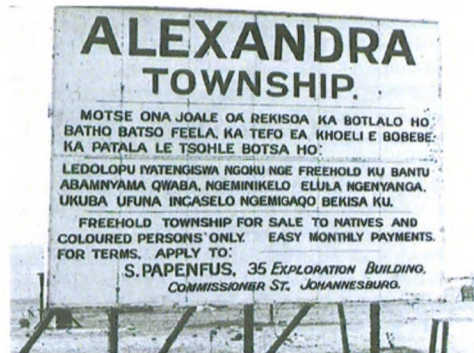


FIG 5.3a: Land for sale sign.



FIG 5.3b: Street trader kiosk



FIG 5.3c: Jukskei river, 1956

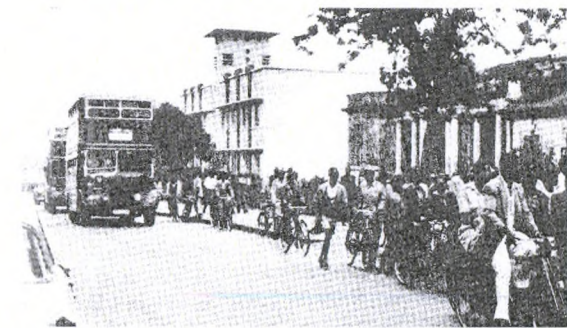


FIG 5.3d: Bus boycott (1944).



FIG 5.3e: 1st street, Alexandra



FIG 5.4: Alexandrian residents commuting by truck.



FIG 5.5a: Bus boycotters riding to work in the early morning on Louis Botha Avenue (1944).



FIG 5.5b: Wits Medical students inspecting the hygienic standards of Alexandra (1940).



FIG 5.6: Aerial photograph (1952)



FIG 5.7C: Site aerial photograph

CURRENT CONTEXT OF ALEXANDRA TOWNSHIP

Alexandra, described by Nelson Mandela as “exhilarating and precarious”, is a sprawling township some 12km north-east of the city centre. Over 500 000 people live in this township (2001 Census), which is approximately two square kilometres. It’s surrounded by but disconnected from upmarket suburbs like Sandton, Kelvin and Wendywood. Linda Twala, grandson of one of the original settlers of Alexandra, was born there and wouldn’t live anywhere else. He calls it “a wonderful place”. Many others feel the same about the township (Davie, 2003).

Apart from the positivity aspects of the township, it requires urgent investment and infrastructure developments and upgrades.



FIG 5.8a: Alex FM advert.



FIG 5.8d: 1st street colonnade.



FIG 5.8b: Msimang centre, second avenue.



FIG 5.8e : Alexandra Heritage Centre, Peter Rich Architects.



FIG 5.8c: Roosevelt street looking south.



FIG 5.8f: Gautrain flyover bridge.



FIG 5.8h: 1st street colonnade and new development.



FIG 5.8g: Pan Africa shopping center.



FIG 5.8i: Traditional medicine.

CURRENT CONTEXT OF THE ALEXANDRA SCHOOLING SYSTEM

There are a large number of schools in Alexandra Township. Ranging from nursery schools to high schools and small colleges. Education holds great importance in the Alexandrian culture and many notable intellectuals, academic and politicians have grown up there. Yet there is a high drop out rate amongst youth, some say that drugs are the main cause of this problem as well as from the stress of child and single mother headed households (Langa, 2006). Many of the schools have recently received infrastructure and other governmental upgrades but schools are still struggling to function efficiently. Furthermore teachers have gone on strike for wage increases and this has created great instability in schools.

Although the quality of education is on the rise, technology is a major aspect of education in schools that needs to be addressed. Students in Alexandra are in a dire need to access computers. This is a major problem because when these students enter university, they are severely disadvantaged in their ability to use and efficiently operate computers (Langa, 2006).

KEY:



LOCATION KEY:

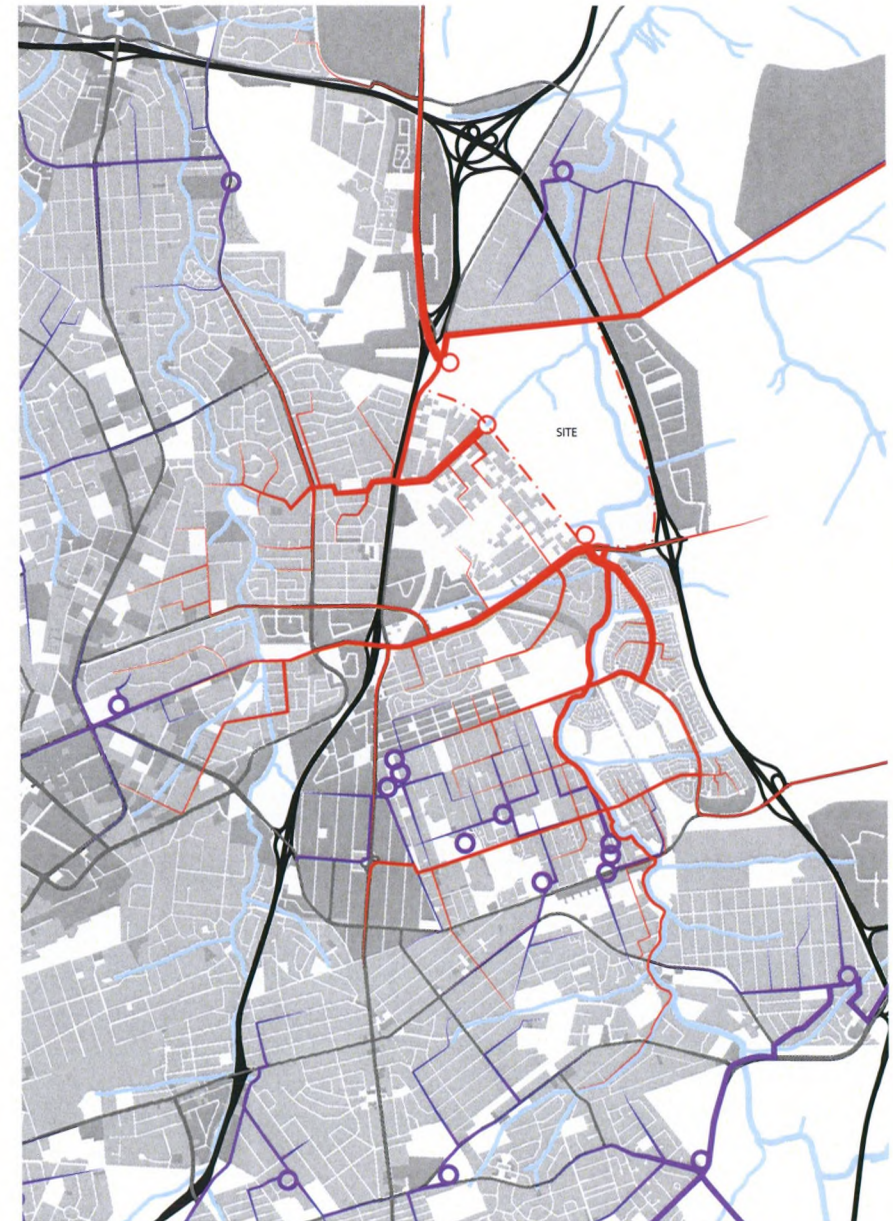


FIG 5.9: Pedestrian watersheds

GROWTH OF SUBURBS NORTHWARDS

The growth towards the northern suburbs in Johannesburg has seen rapid development since the 1980s. Within the past 10 years this growth had become rapid with huge townhouse developments in Lonehill and Fourways, putting huge pressure on the sewage and electricity infrastructure. There are many emerging new developments, such as Waterfall estate and Steyn City which are developing residential, office, retail and industrial components. Similar but on a much larger scale the site is located just 3km from the potential R 83 billion Shanghai Zendai development, which will include a financial district, ten hotels, ten shopping plazas and theme park (Reinacher, 2013). Furthermore there are the purely residential middle to upper income developments like Kylami estate, Fourways gardens, and Dainfern. Juxtaposed to these are the rapid growth of townships such as Alexandra, Tembisa and Diepsloot in the area.

With all the phenomenal growth and development occurring in these areas, there exists a formidable need for tertiary education at a nearby location such as this. Thus the Frankenwald site is perfectly located with its substantial area of development potential. It holds a huge opportunity for the future growth of a new Wits campus.

KEY:

Formal Houses (per m²)

- 56 - 523
- 523 - 990
- 990 - 1457
- 1458 - 1924
- 1925 - 2391

Townhouse units (per m²)

- 56 - 431
- 432 - 809
- 809 - 1187
- 1188 - 1565
- 1566 - 1942

Estate/security units (per m²)

- 50 - 201
- 202 - 352
- 353 - 503
- 504 - 654
- 655 - 805

Urban land cover

- Urban

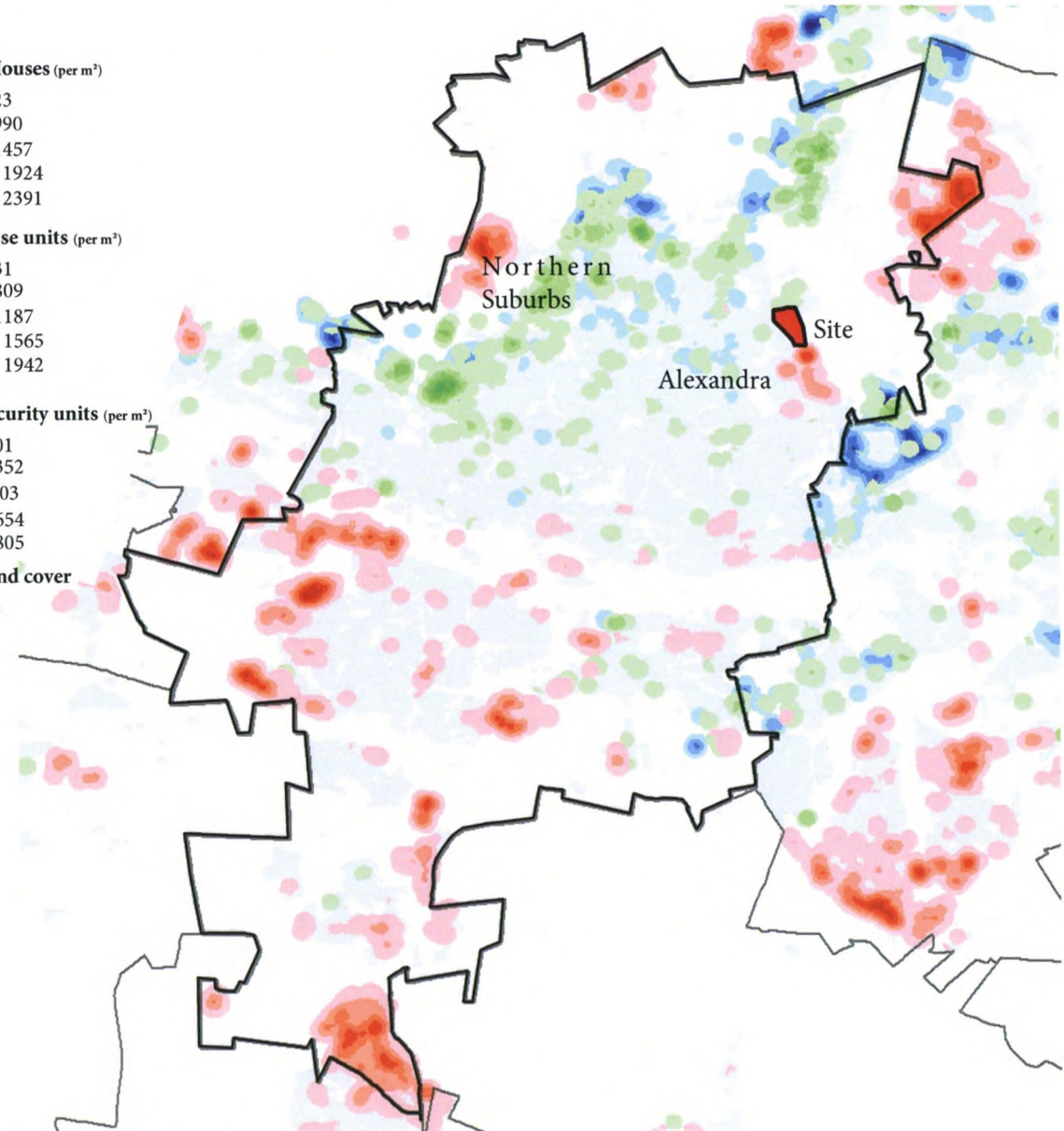


FIG 5.10: New residential developments.

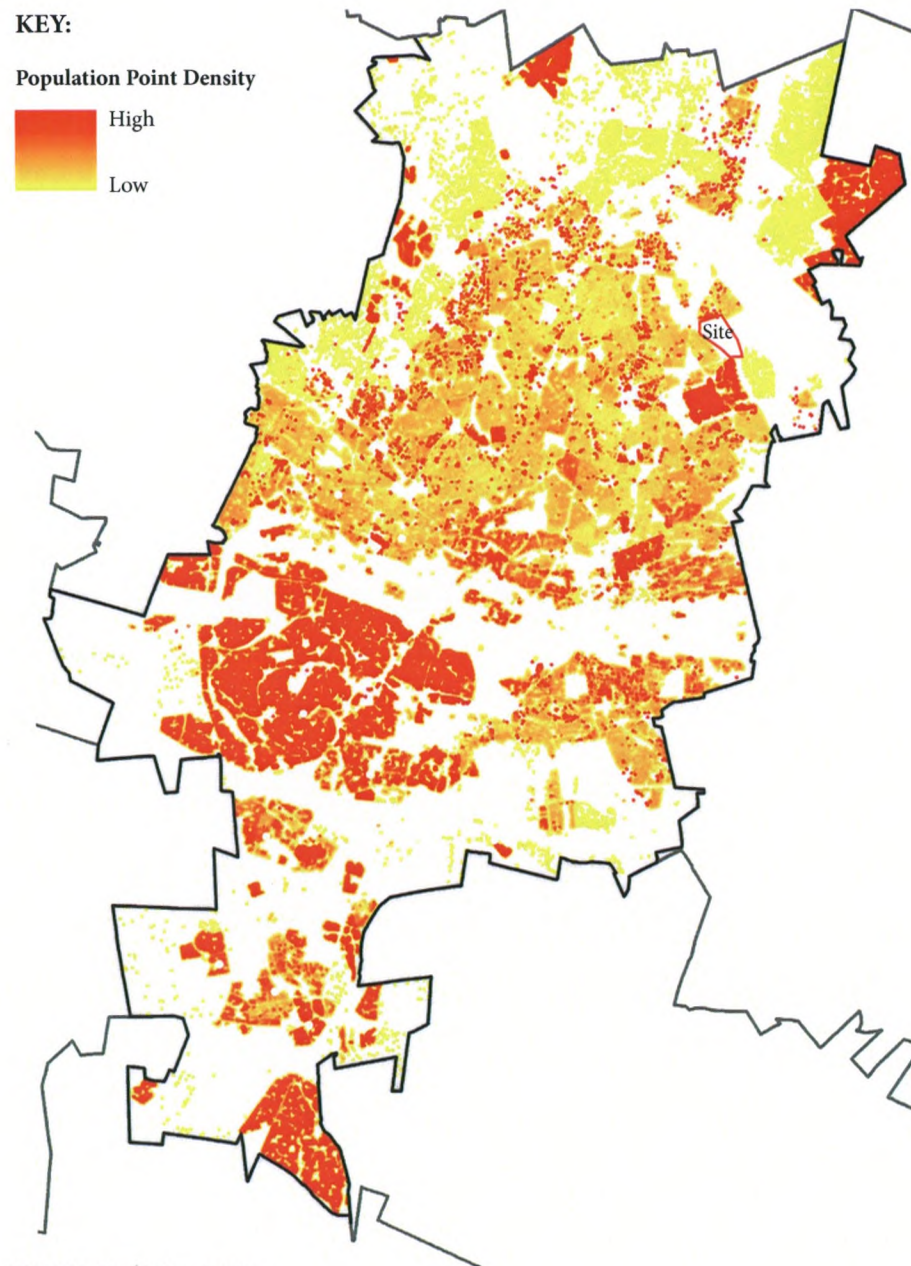


FIG 5.11: Population density.

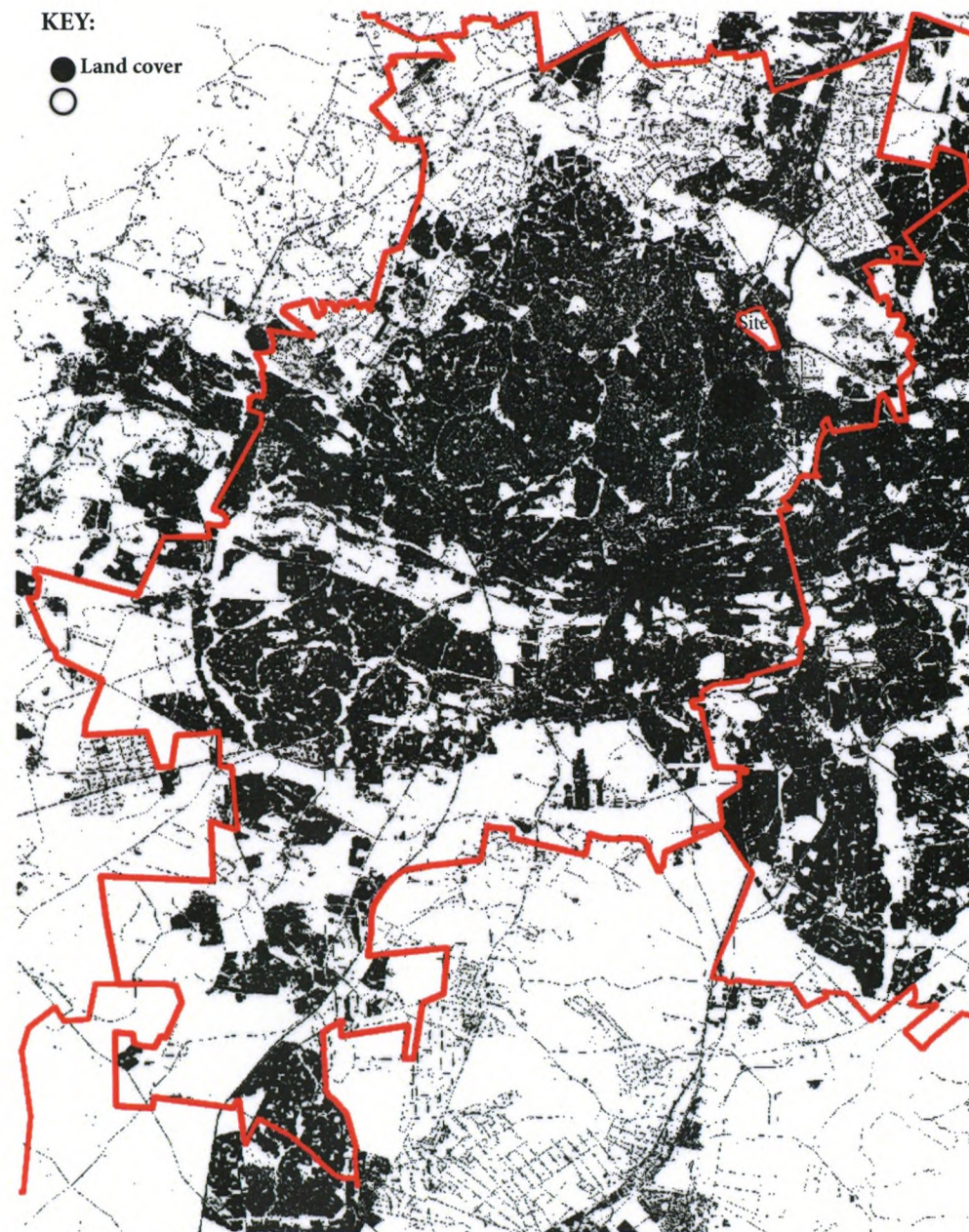


FIG 5.12: Urban land cover.

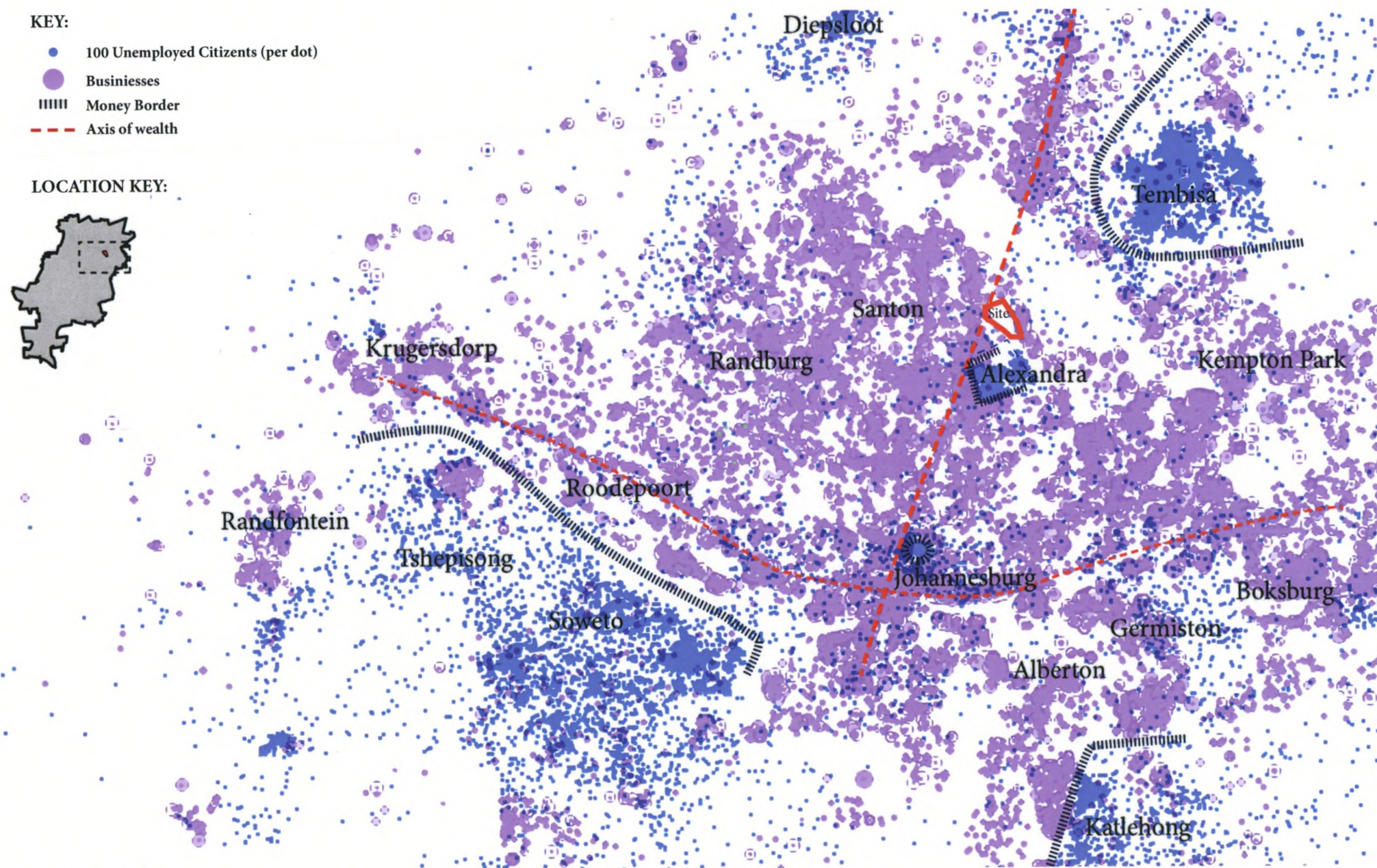


FIG 5.13: Money Borders

FUTURE URBAN GROWTH INSPIRED BY INDIGENOUS URBAN DEVELOPMENT AND BIOLOGICAL ORGANIC GROWTH

AFRICAN FRACTALS AND ORGANIC STRUCTURES

Fractal geometry is an exciting emerging field of transdisciplinary research with a fusion between mathematics and information technology. Fractals are not just attractive computer generated graphics but anything that appears random or irregular in nature can be formed by fractals. Fractals are the building blocks our lives and appear at all scales of matter, manifesting in tiny places like the membrane of a cell and as magnificent and huge as the entire solar system (Kluge, 2000).

In 1975, the Polish born French/American mathematician coined the term 'fractal' as a way to describe shapes that are detailed and identical at all levels of scale.

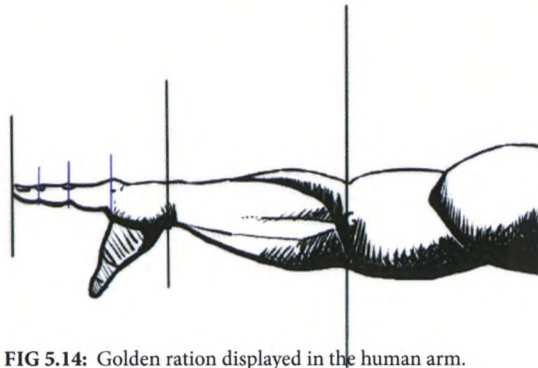


FIG 5.14: Golden ration displayed in the human arm.

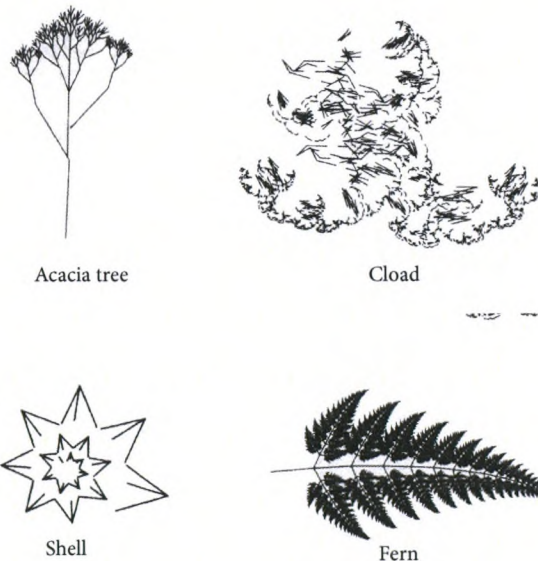


FIG 5.15: Recursive fractal construction of natural objects.

"Clouds are not spheres, mountains are not cones, coastlines are not circles, and bark is not smooth, nor does lightning travel in a straight line..."

*~Benoit Mandelbrot
(Weiss, et al., 2015)*

The most striking characteristic of fractals is their self-similarity, the whole resembles smaller parts at different scales. Like the way how a small twig of a branch resembles the whole branch, which looks similar to the entire tree or how a river network resembles the smaller streams and the tributaries that feed that stream (Weiss, et al., 2015). In the same respect on a molecular level of every human cell is replicated identically to the solar system above us.

The computer generated fractals graphics have become an important tool for modelling biology, geology, computer science, telecommunications, medicine, surface physics and other natural sciences. While fractal geometry is reaching towards the future of high tech science, its roots are firmly embedded in patterns of African design and fundamental to concepts to African knowledge systems. Similarly fractal geometries have been seen in the history of various cultures around the world (Egash, 1999).

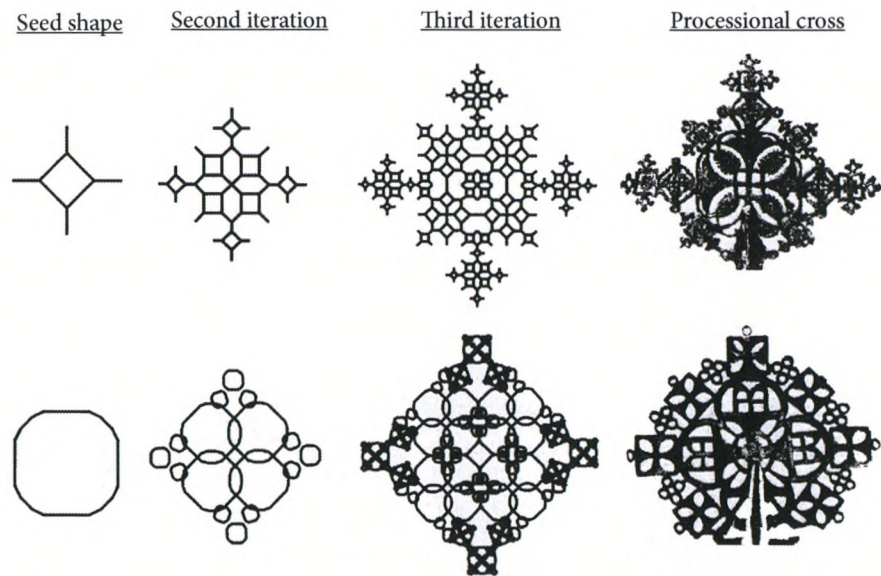


FIG 5.16: Fractal simulations for Ethiopian processional crosses through three iterations.

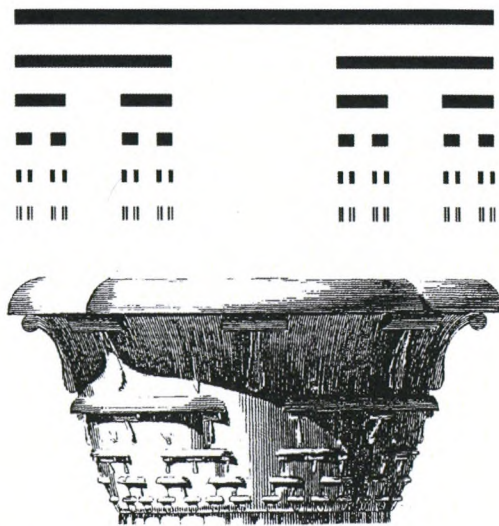


FIG 5.17: Lotus capital of Egyptian order columns displays its origins in fractals.

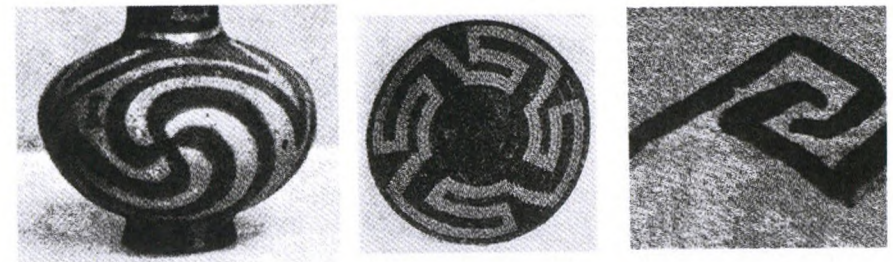
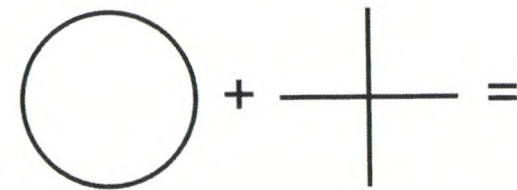


FIG 5.18: combination of circular and quadrilateral forms in Native American designs as a fourfold or bifold rotation.

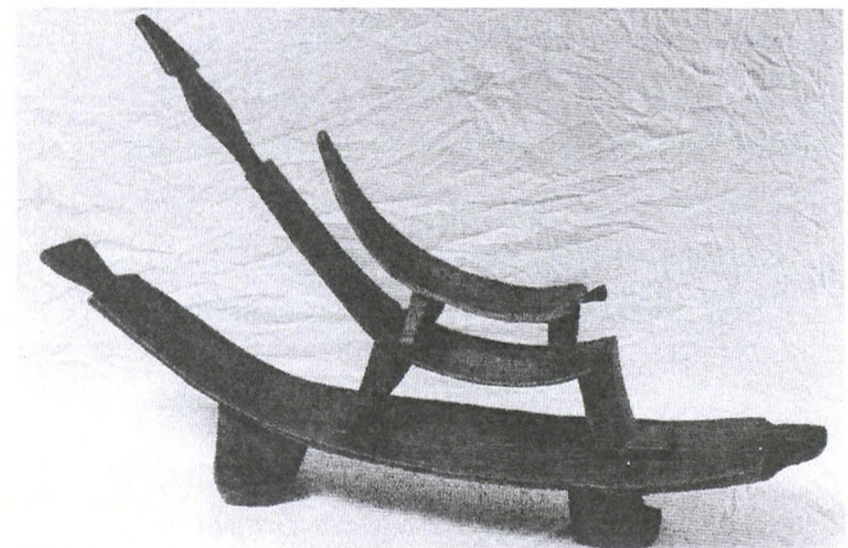


FIG 5.19: African stools in scaling series.

Architecture often portrays a 'fingerprint' of the cultural it's built for, thus architecture forms itself around cultural concepts. For example in Christian architecture, the floor plan often resembles a triangle, symbolising the holy trinity, or form of the cross. But even the most mundane forms of architecture involve geometric decisions. At first glance, traditional/vernacular African architecture can seem so varied that one cannot seem to find anything in common. Yet across the continent one can see the presence of fractal geometries in various different countries and cultures. The trace of fractals cannot be seen in all African cultures but regardlessly there is a remarkable amount that do in fact.

There are three distinct types of fractals that are evident in African architecture and urban formations, those being, rectangular fractals, circular fractals and branching fractals.

RECTANGULAR FRACTALS



FIG 20: Seed shape for the fractal simulation of the palace in figure bellow. Grey line swill be replaced by scaled down replica of the entire seed.

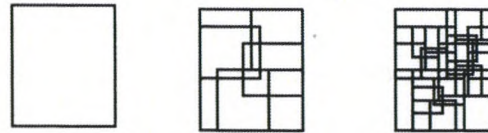


FIG 5.20.1: First three iterations of the fractal simulation.

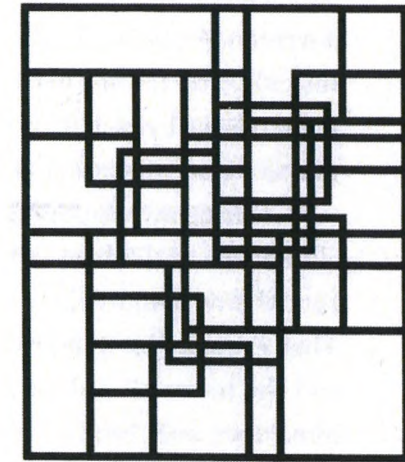


FIG 5.21: Enlargement of the 3rd iteration.



FIG 5.23: Aerial view of the city of Logone Birni in Cameroon. The largest building complex, in the center is the palace of the chief.



CIRCULAR FRACTALS

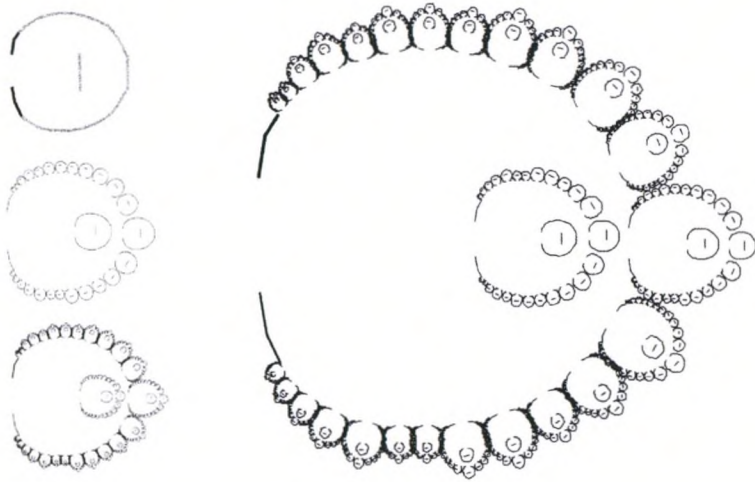


FIG 5.24: Digital fractal generation of Ba-ila.

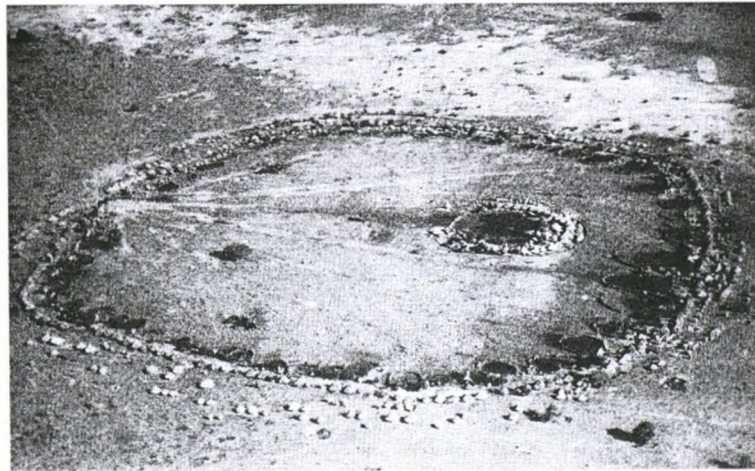


FIG 5.25: Aerial photograph of Ba-ila settlement pre 1944.

BRANCHING FRACTALS

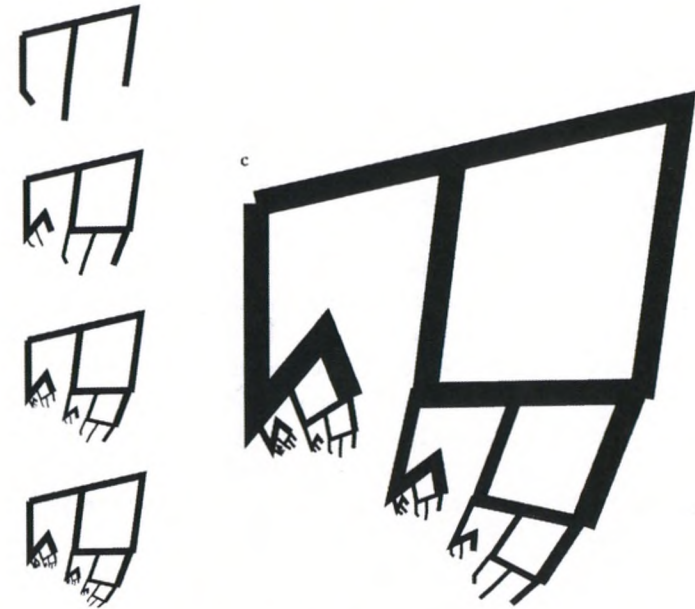


FIG 2.26: Digital fractal generation of Cairo street pattern.



FIG 5.27: Map of the streets of Cairo , 1898.

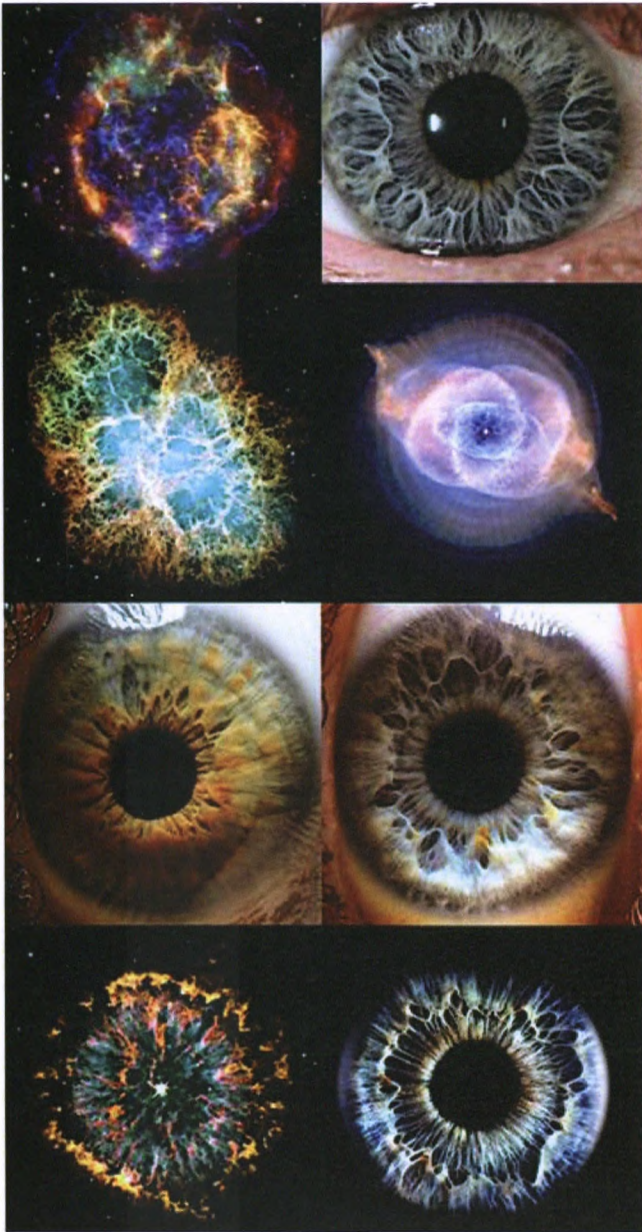


FIG 5.28: Eyes and Nebulas

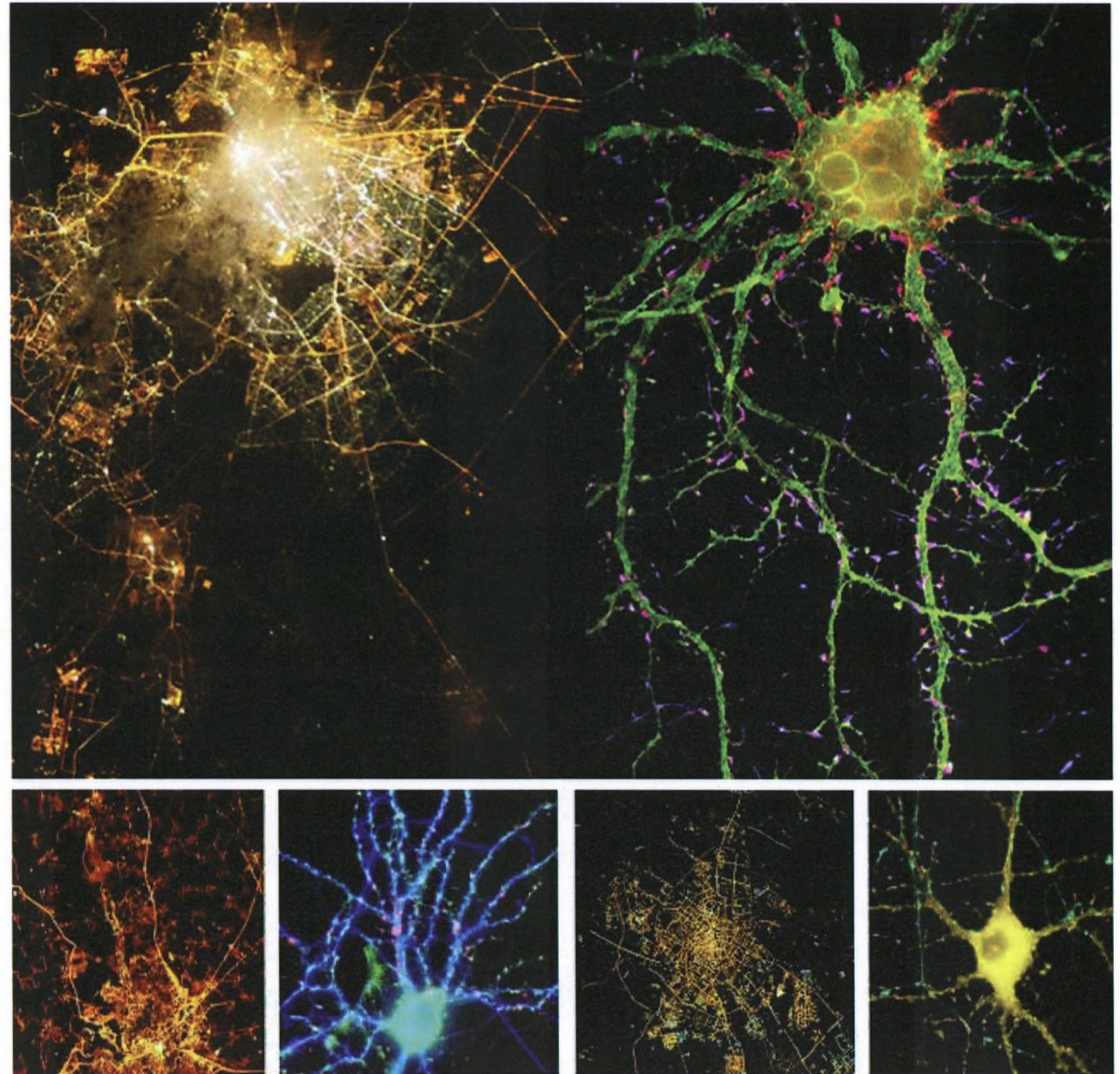


FIG 5.29: City formations related to forms of brain neurons.



FIG 5.30: Robber fly eye.



FIG 5.32: Nautical Seashell

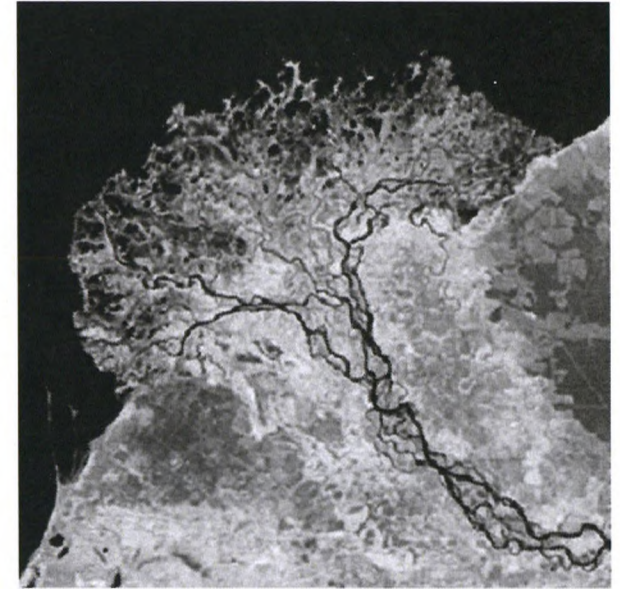


FIG 5.34: Nile river delta



FIG 5.31: Veiled Lady Mushroom

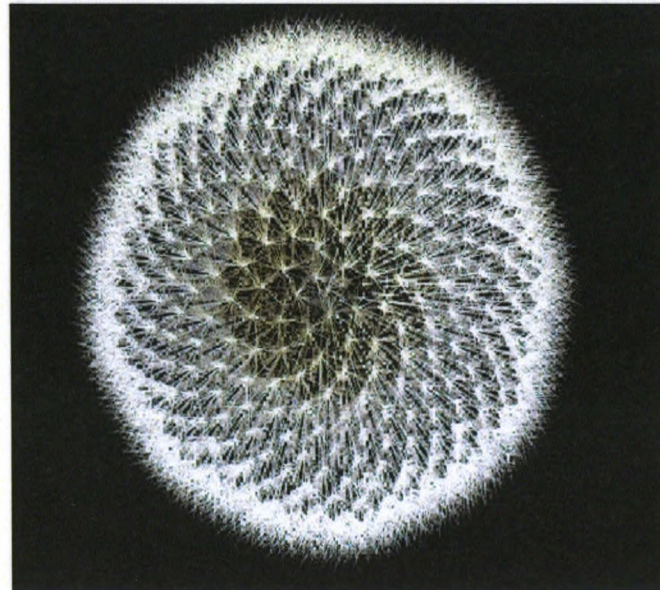


FIG 5.33: Top view of dandelion seeds.



FIG 5.35: Winter tree

FUTURE GROWTH.

The metaphor for my project is that the building is a symbol of a seed, and in time it will grow to become an educational campus. This seed, holds within itself the nutrients and intelligence it needs to sustain its life, but for the seed to grow it needs an external stimulus. This stimulus is the people that bring life to the building.

The first form of 'stimuli' will come from the people within Alexandra. As the first phase of my project, I propose the rejuvenation, phytoremediation and cleaning of the Jukskei river which runs through Alexandra then through the site. After which, an urban promenade can be built to bring life back to the river which is currently dangerous and polluted. The promenade will allow for the people of Alexandra to easily access the site along this axis. This urban promenade will be a gesture and gift for the people of Alexandra. Once this project is completed then the building can be constructed. In this way the architecture will receive its stimulus from along the river promenade.

The other form of 'stimuli' will be from students and intellectuals coming from surrounding areas in Johannesburg and even other cities and

countries. The new BRT system is connecting the Johannesburg CBD with the Sandton CBD. This public transport network, which passes near the site will create an easy connection between Wits main campus and Frankenwald campus. This will allow for the two campuses to integrate into one another. Furthermore, the connection to the Gautrain and the two major highways will provide access from surrounding areas.

Just like branches of a tree grow outwards from the trunk, I intend for the future growth of the campus to 'grow' from my intervention and in the long run it will become the entry point to the future campus.

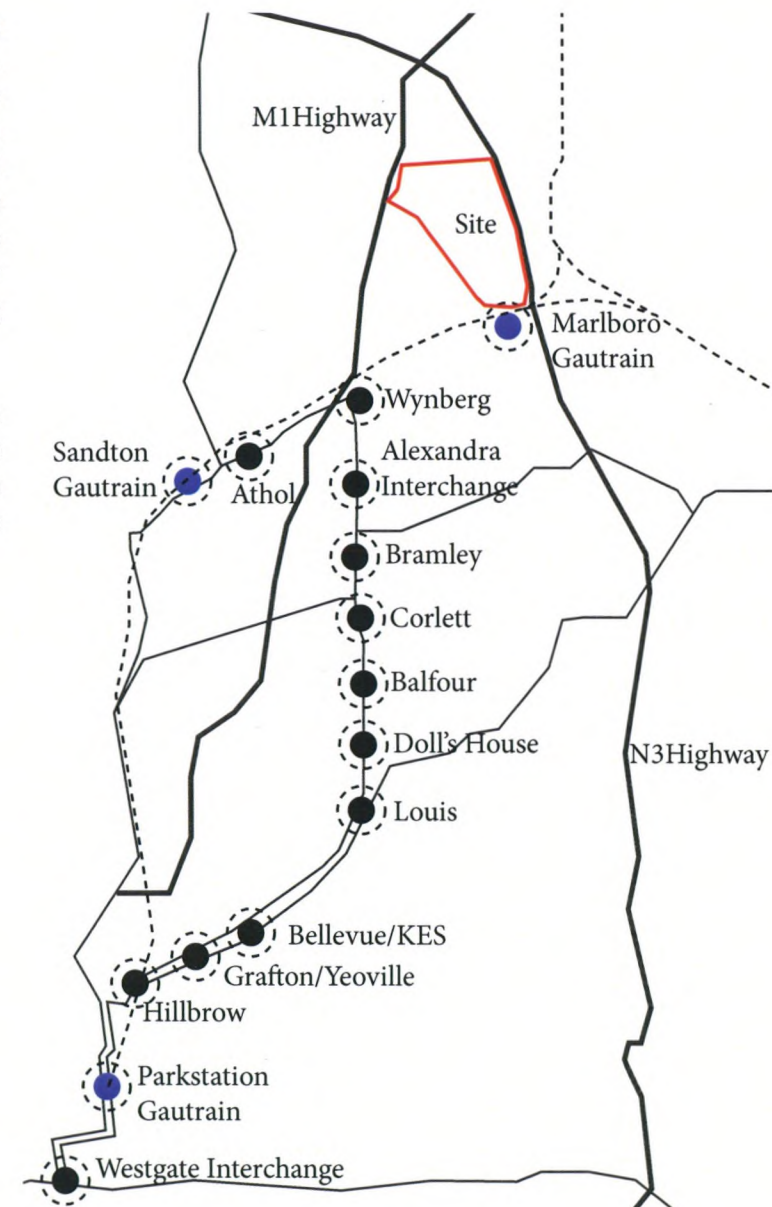


FIG 5.36: Proposed Louis Botha 'Corridors of freedom' link



FIG 5.37: Diagram of urban regeneration nodes.

INTEGRATION INTO ALEX

I believe that, apart from the growth of the campus on site, it should grow and integrate itself into the fabric of Alexandria. The nodes of growth within Alexandria should be nodes of catalytic urban renewal. Stitching east bank and west bank, while connecting Alexandria to the campus itself.

CHAPTER REFLECTION

I believe the proposal to develop a high quality tertiary educational facility on Alexandra's doorstep is a true gesture towards reconciliation and equality for all the future generations. This could be a giant step towards righting the travesties of the apartheid spatial planning regime and additionally negating the effects of the debasing and debilitating Bantu education system.

At all scales there are these archetypal connections between humans and the environments in which we inhabit. We are naturally encoded with these mathematical and instinctual elements however in the modern day reality, in which we live, we have been systematically disconnected from these vital elements. I believe that through our interface with the natural world we can reconnect with these ancient bodies of knowledge.

By acknowledging and teaching our commonality as human beings and by accepting that we are in essence all one, this could foster a more inclusive and understanding community in times of great tension and unrest. Furthermore this will allow humans beings to understand that we are holistically part of nature, our actions affect nature and most importantly we are one with nature.

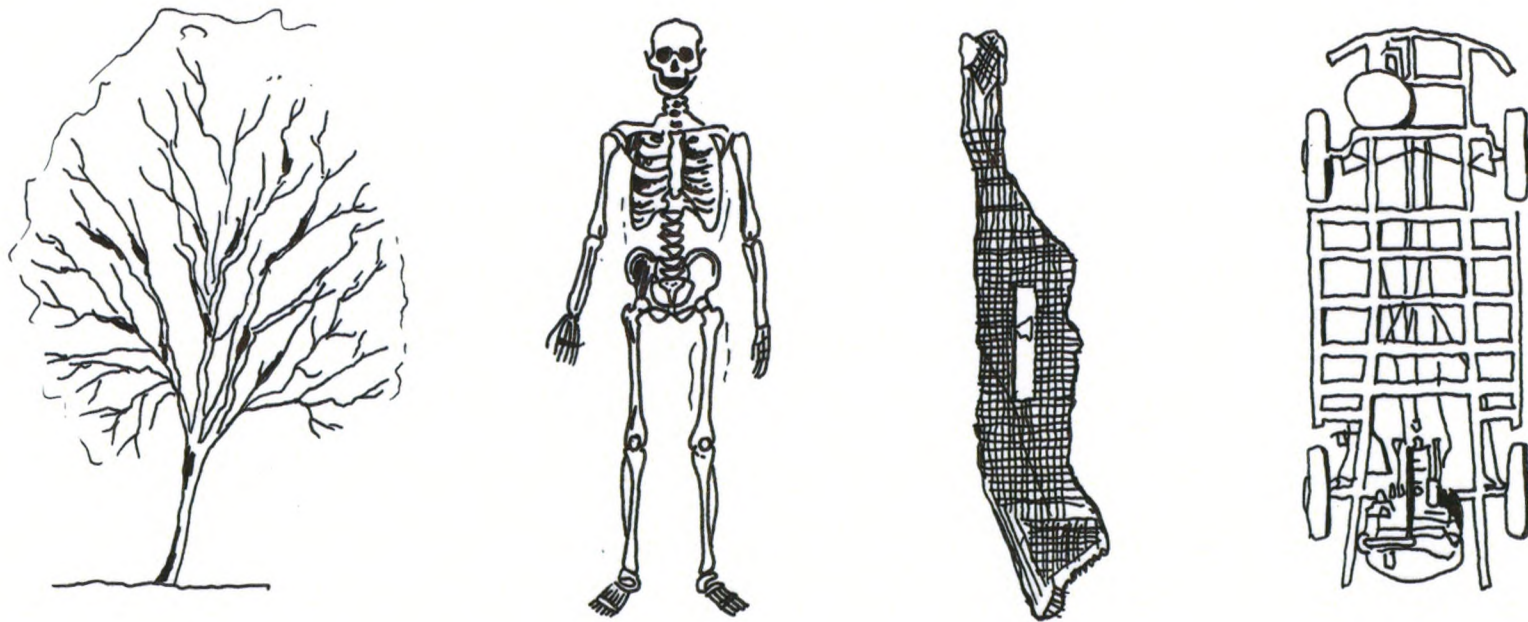
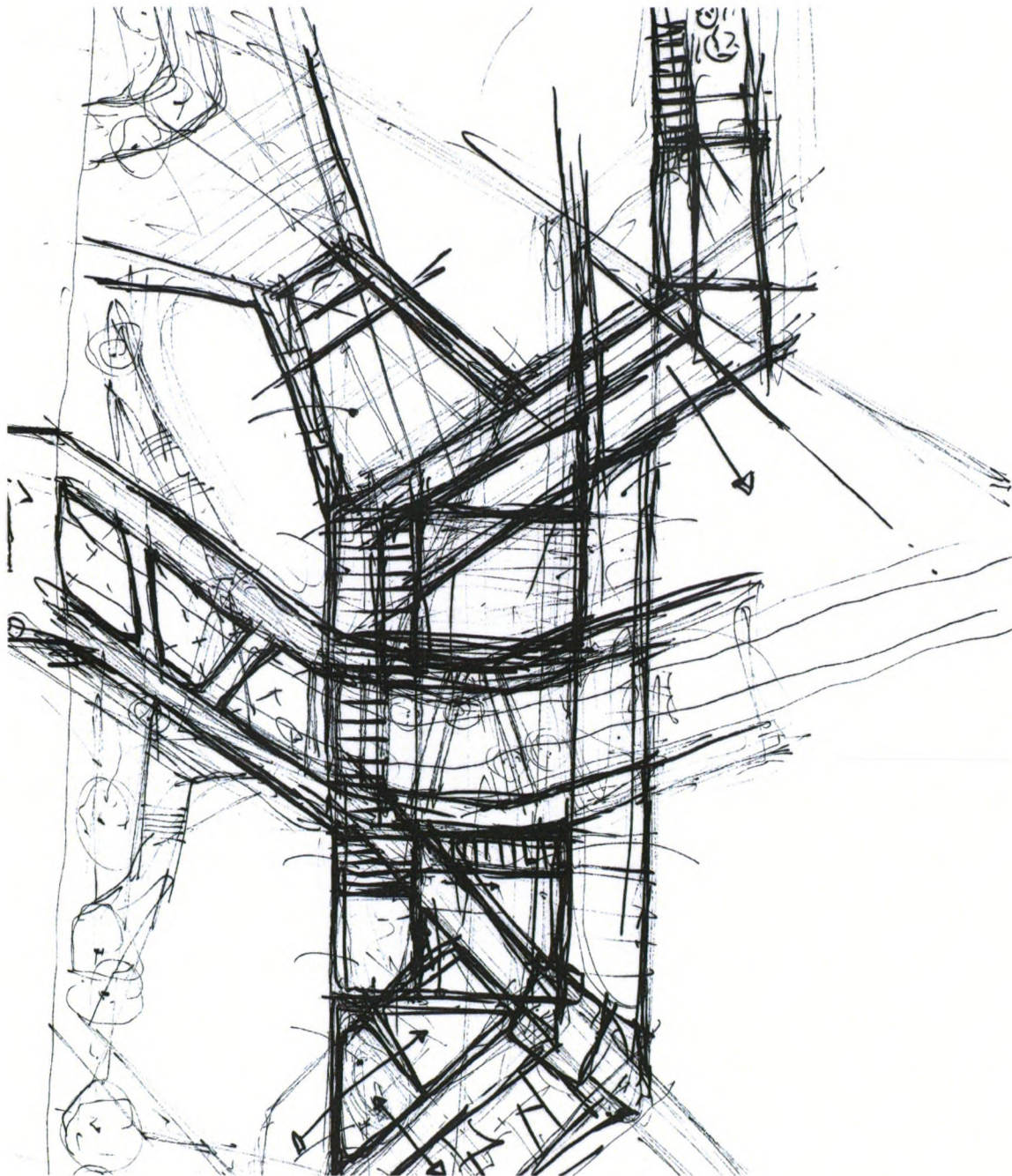


FIG 5.38: Similarities of structures: Tree, Human, New York, Car.



06

DESIGN DEVELOPMENT & LEARNING PROCESS

FIG 6.0

NON LINEAR LEARNING PROCESS

Throughout the year I have engaged with various design approaches for the thesis. By engaging with these design approaches I have learnt a lot about my own way of learning and this has allowed me a greater analytical mind when looking at the design of educational spaces at the urban scale and on the architectural scale.

In this vein I learn and explore through drawing and model making. I find that the drawing is not a way to depict a design but in reality it is a way of grappling with a problem that you are trying to resolve. In this chapter I will briefly lead you through the design stages which I engaged with through the year.

I first engaged with a process of finding forms and processes through abstract model making. Some of the ideas that I came across in this creative process became elements which I incorporated in my design approaches.

There after I will explain the 3 approaches to my design intervention that I experimented with are displayed in this chapter. These design processes have greatly informed and shaped the overall concept of my thesis and the thinking behind my final design outcome. As I have previously said, I believe that the process of learning is as important as the final product. In this chapter I take the reader through my design process.

THE EYE

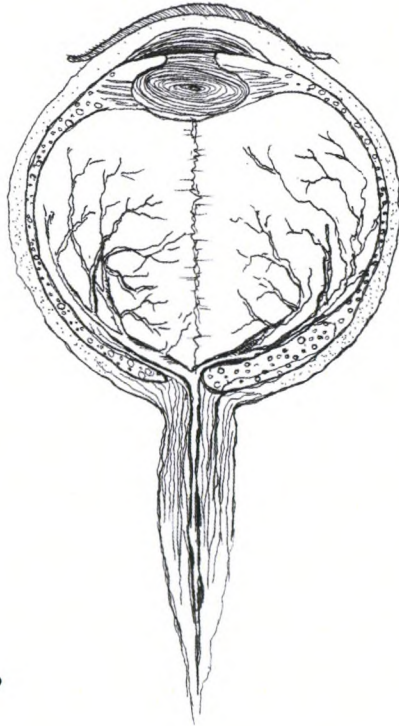


FIG 6b

The lens focuses light through the vitreous humor, a clear gel-like substance that fills the back of the eye and supports the retina. The retina receives the image that the cornea focuses through the eye's internal lens and transforms this image into electrical impulses that are carried by the optic nerve to the brain (Warren, 2015).

THE SPINAL VERTEBRA

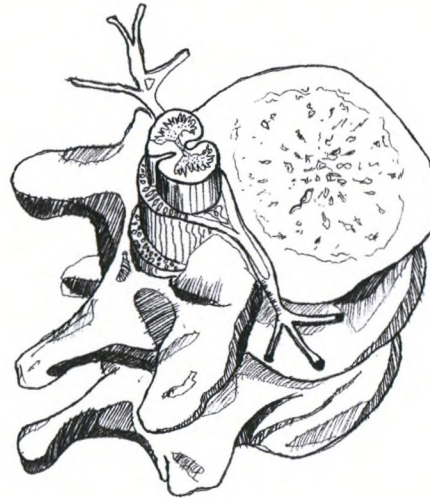


FIG 6c

The spine is our body's central support structure. It keeps us upright and connects the different parts of our skeleton to each other, such as the head, chest, pelvis, shoulders, arms and legs. Although the spine is made up of a chain of bones, it is flexible due to elastic ligaments and spinal disks (PubMed Health, 2015).

THE COCHLEA

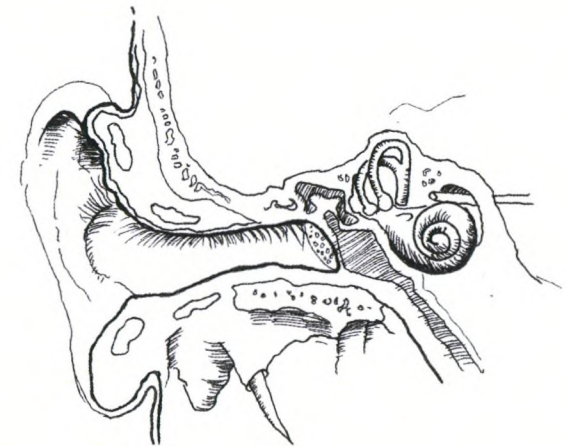


FIG 6d

It is in the cochlea that the vibrations transmitted from the eardrum through the tiny bones are converted into electrical impulses sent along the auditory nerve to the brain. The inner ear, which is surrounded by bone, also contains semicircular canals, which function for purposes of equilibrium and hearing (Hass , 2003).

THE BRAIN STEM

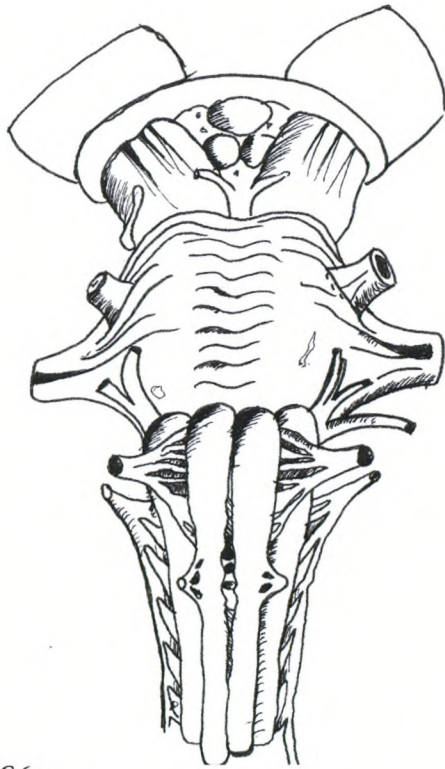
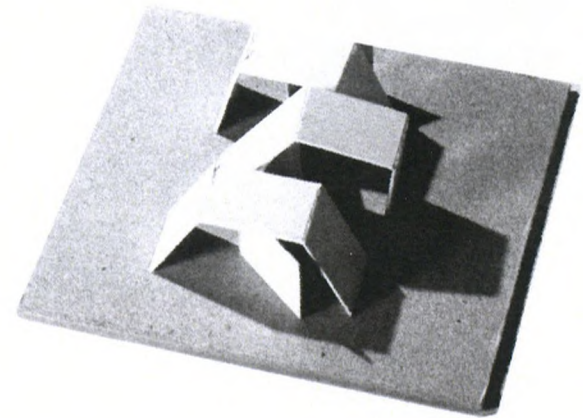
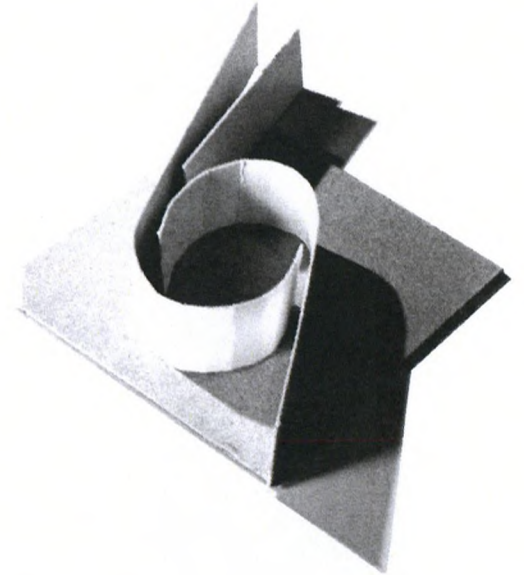
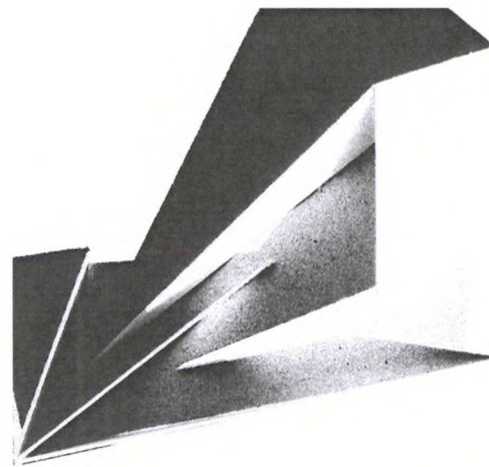
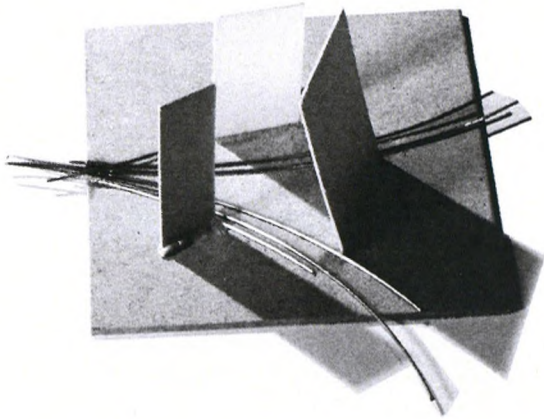


FIG 6a

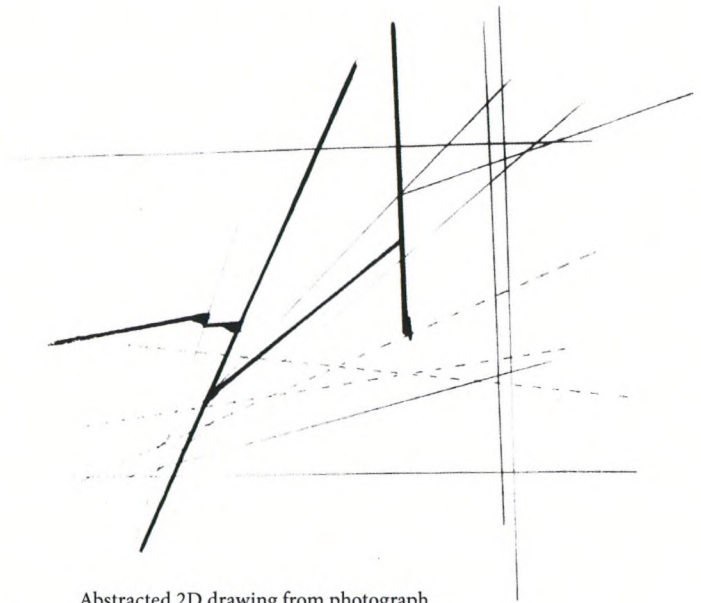


Organ clay model

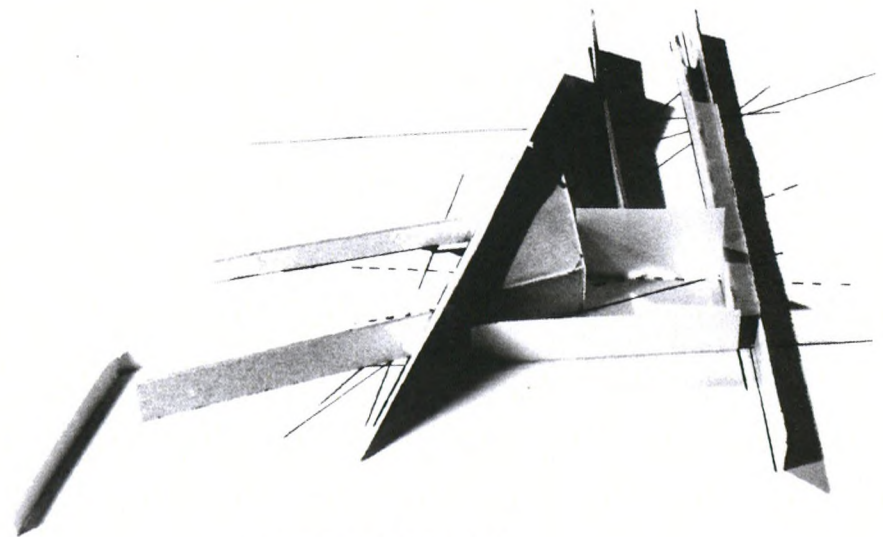
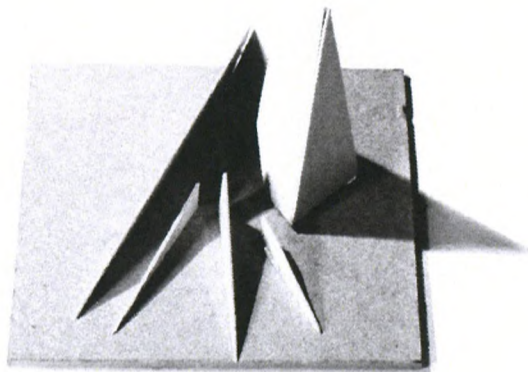




Photograph to be abstracted



Abstracted 2D drawing from photograph



Form extracted 2D drawing

THE EYE

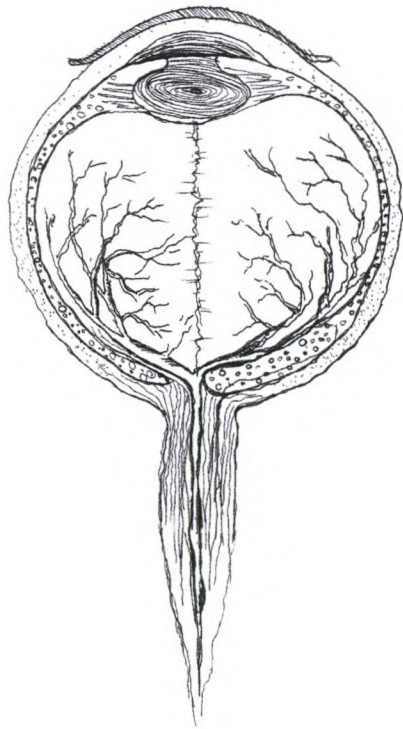
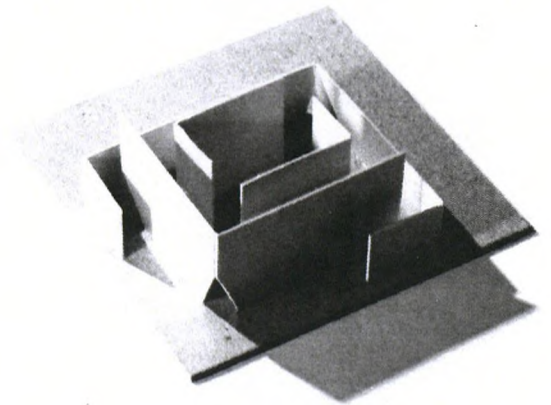
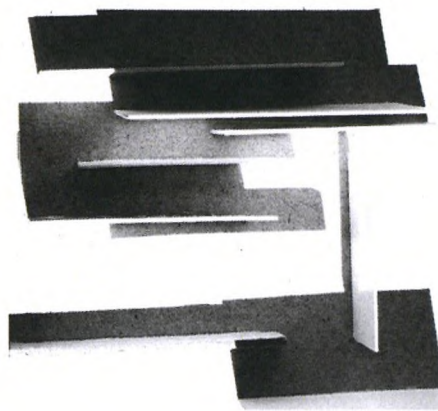
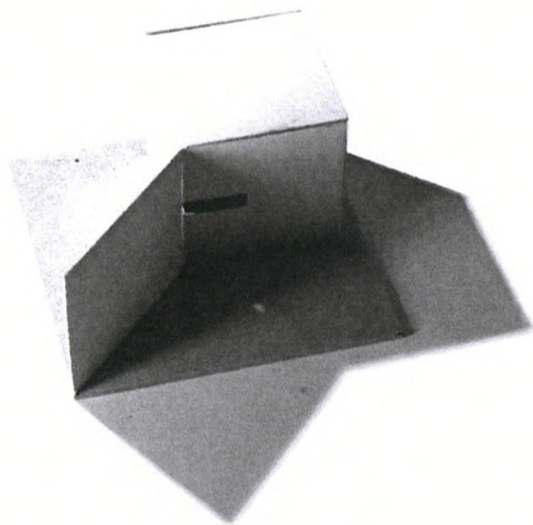


FIG 6b

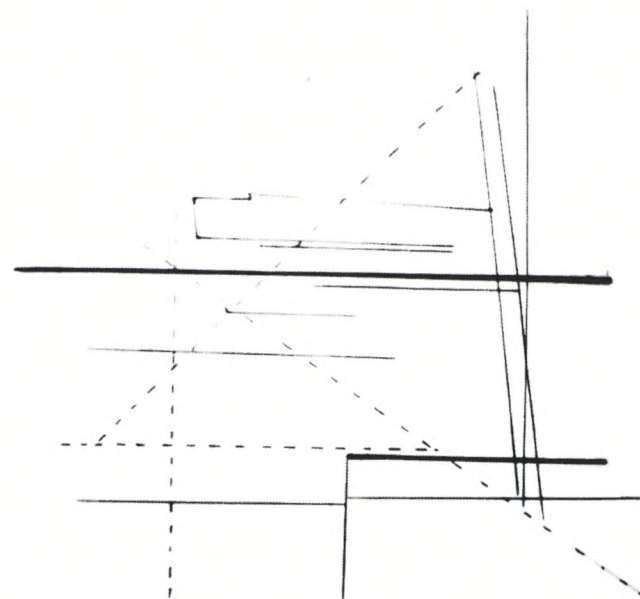


Organ clay model

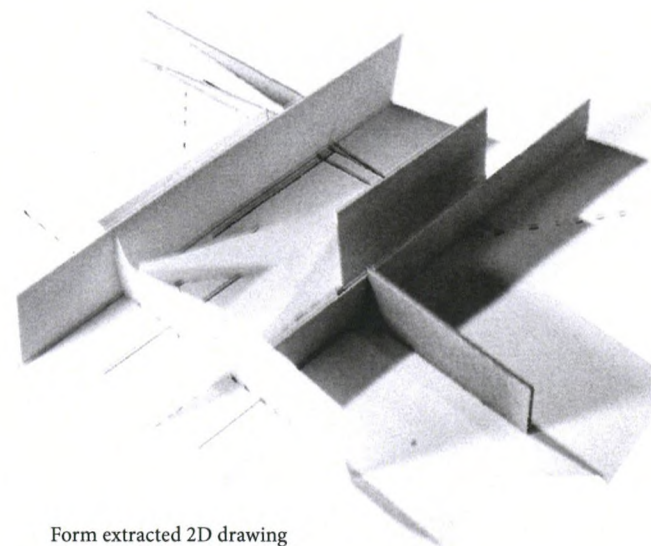
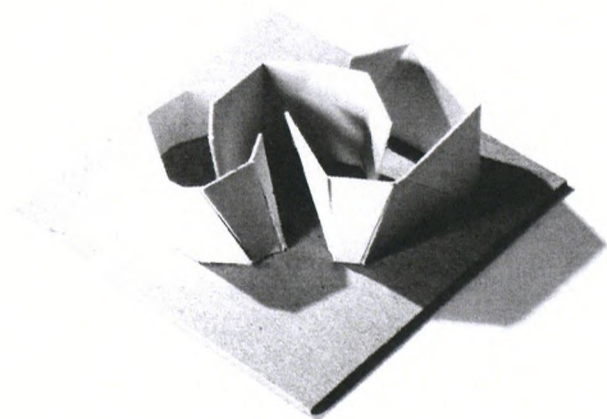




Photograph to be abstracted



Abstracted 2D drawing from photograph



Form extracted 2D drawing

THE SPINAL VERTEBRA

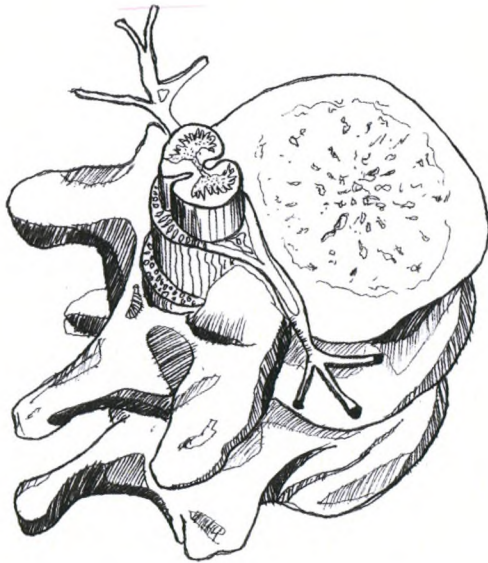
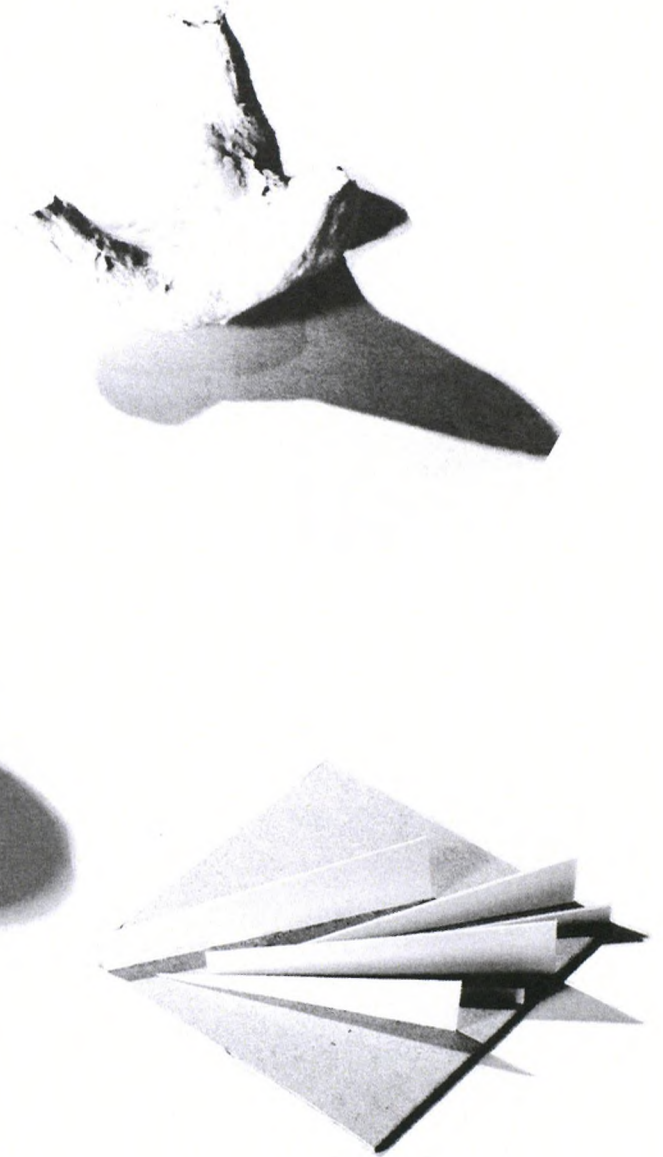
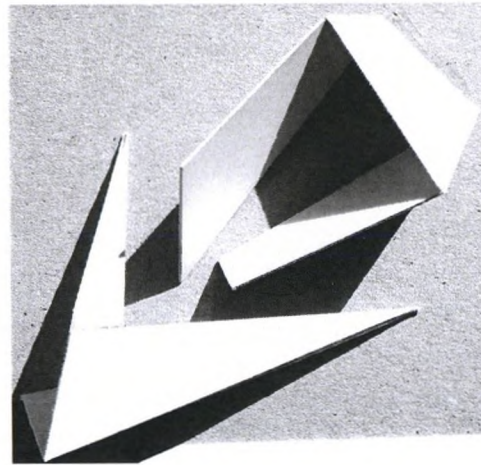
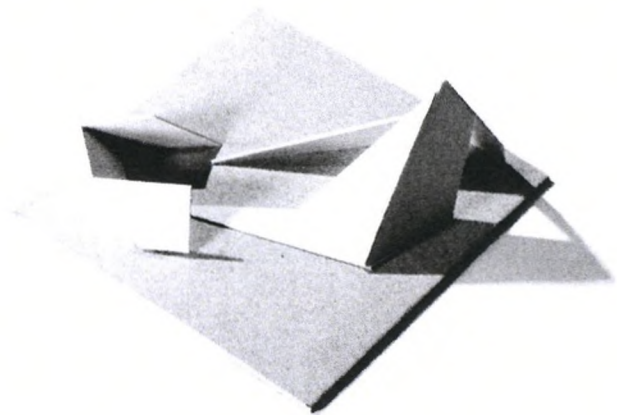


FIG 6c

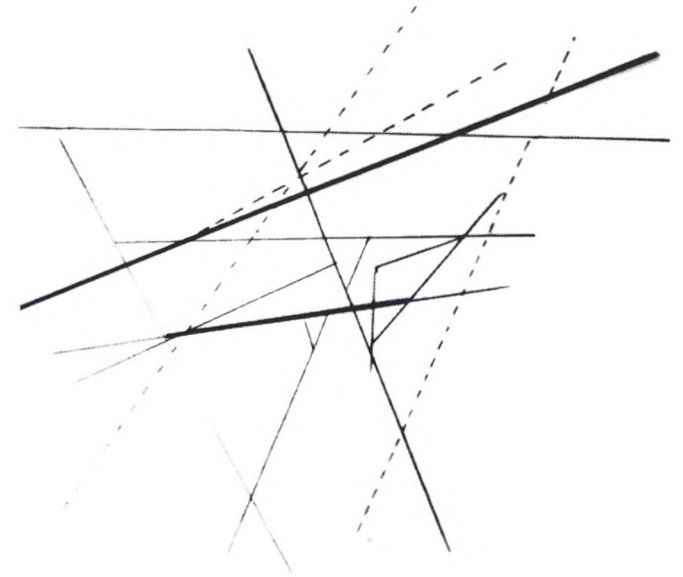


Organ clay model

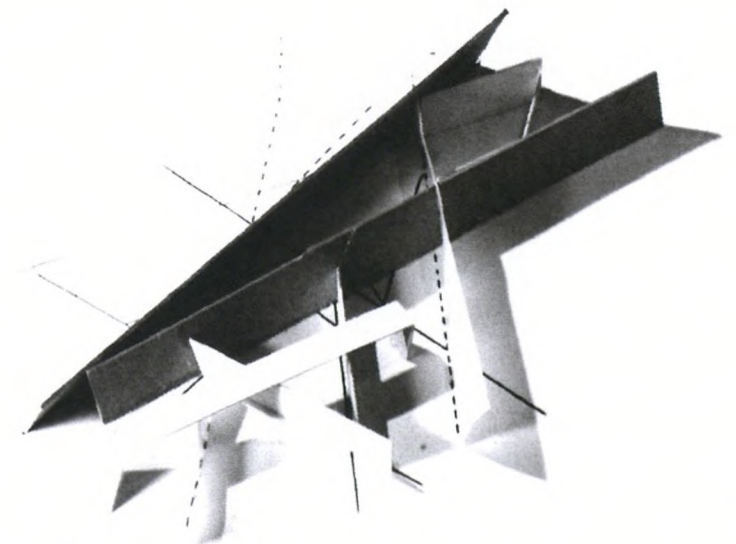
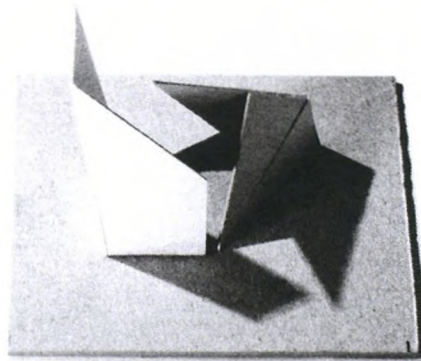
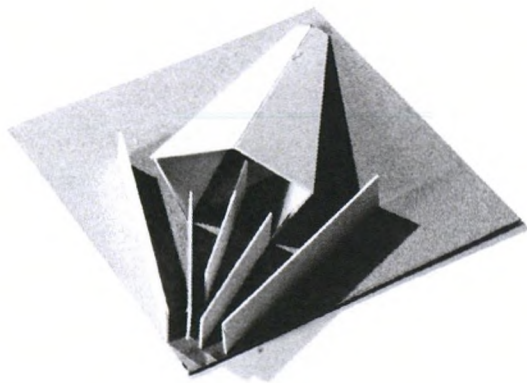




Photograph to be abstracted



Abstracted 2D drawing from photograph



Form extracted 2D drawing

THE COCHLEA

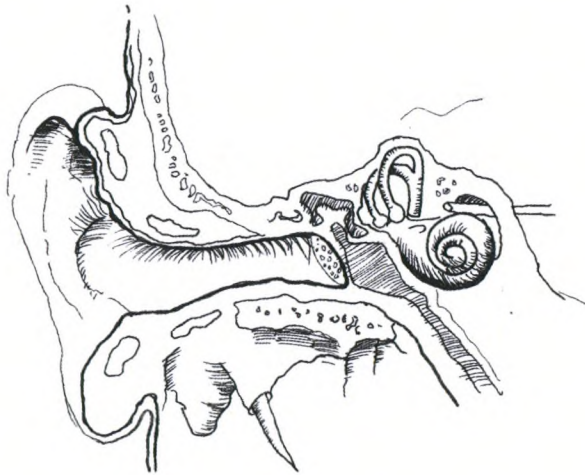
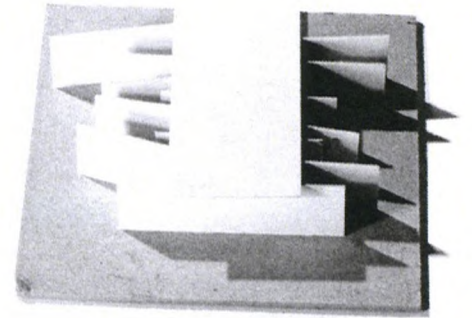
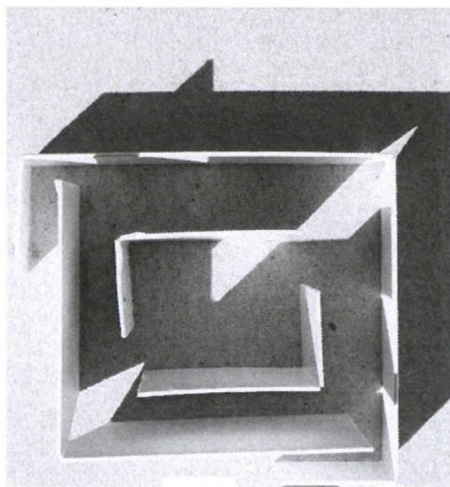
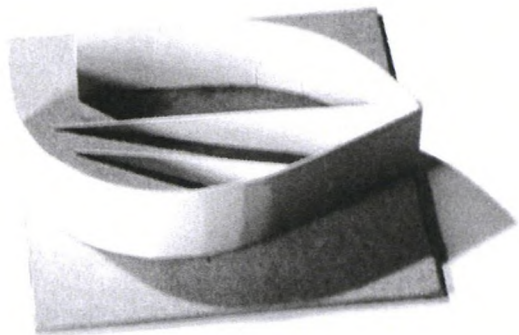


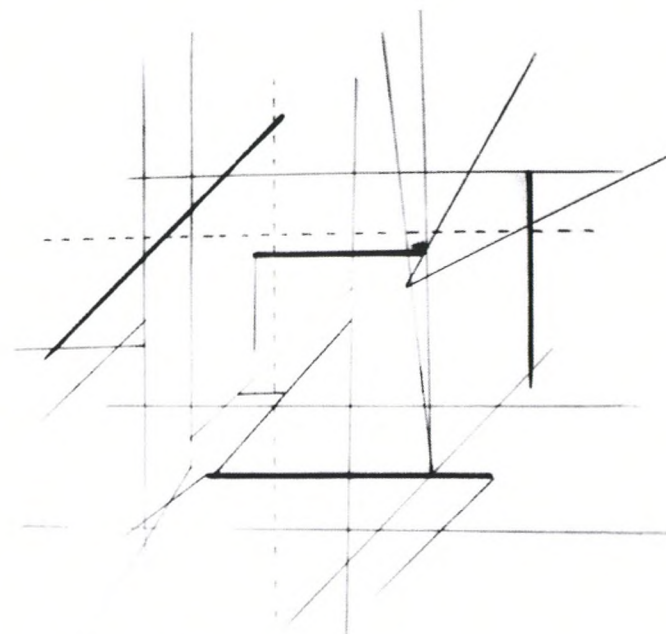
FIG 6d

Organ clay model

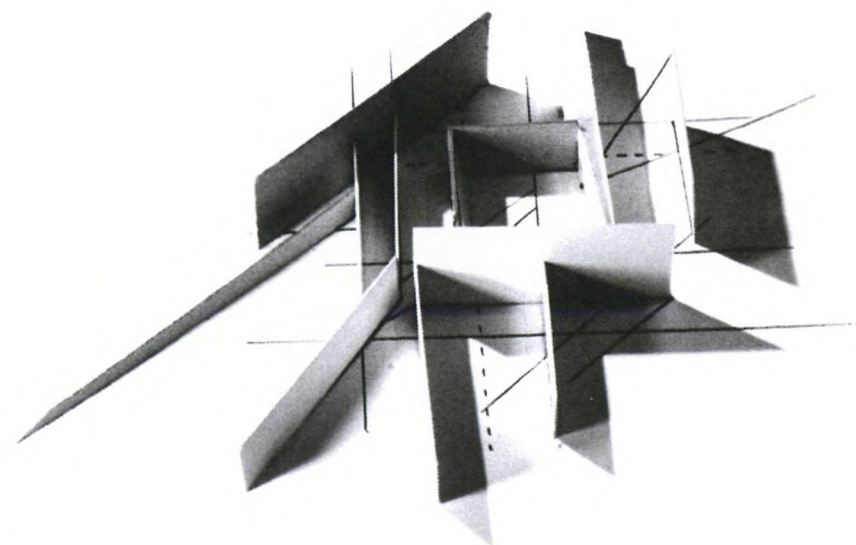
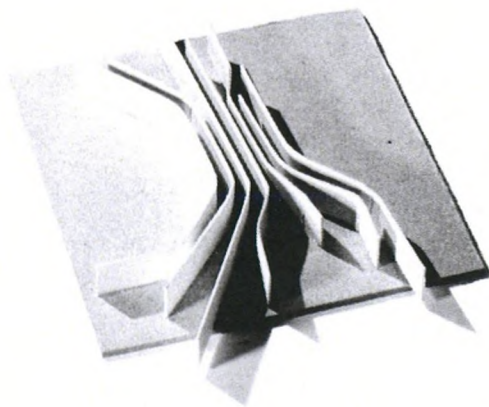
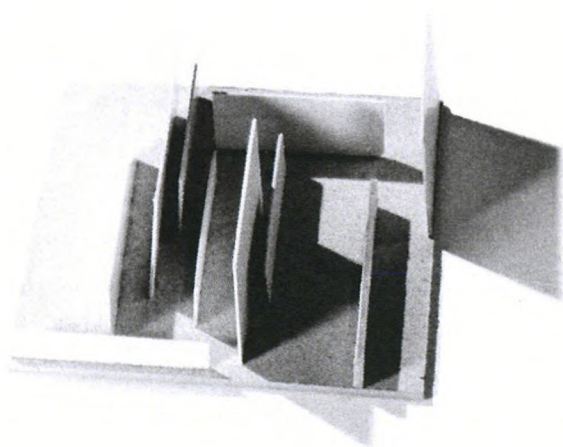




Photograph to be abstracted



Abstracted 2D drawing from photograph



Form extracted 2D drawing

READING THE SITE



FIG 6.1: Site Entry points

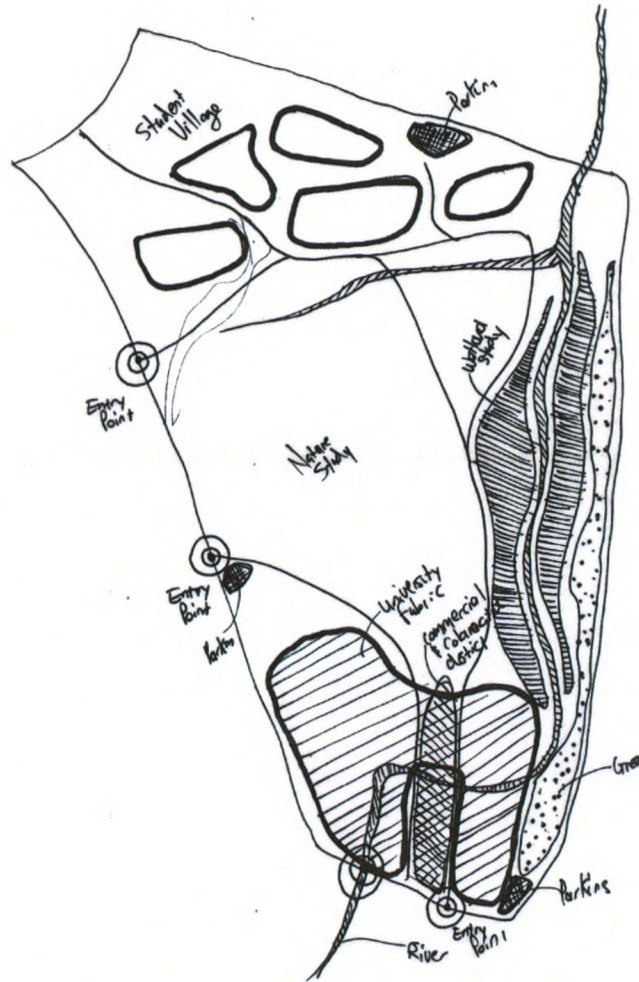


FIG 6.2: Site Zoning

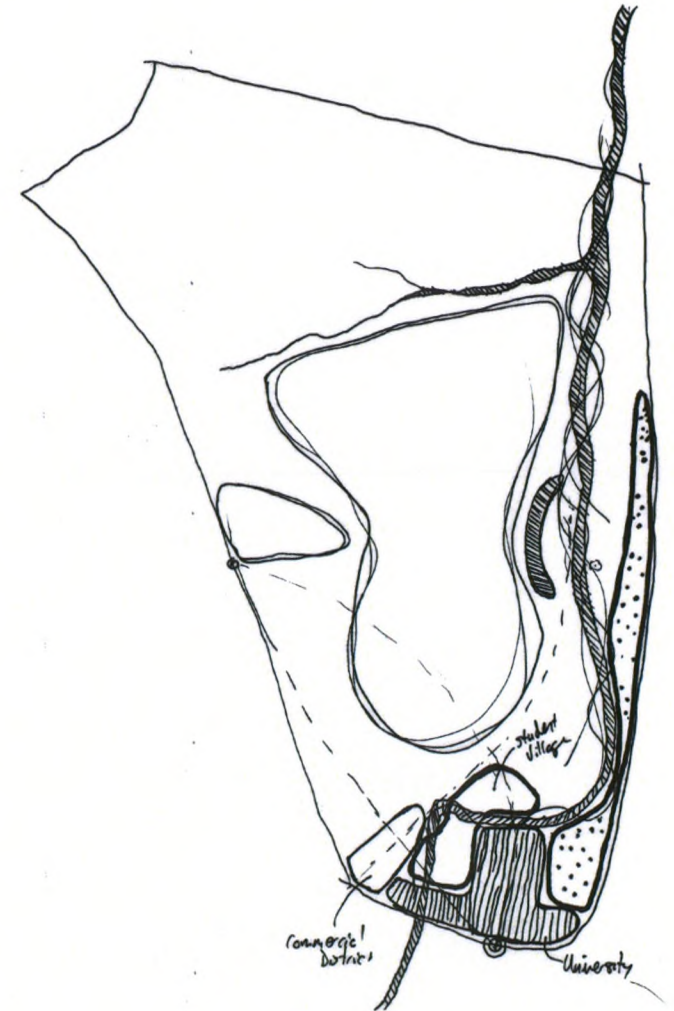


FIG 6.3: Site Zoning

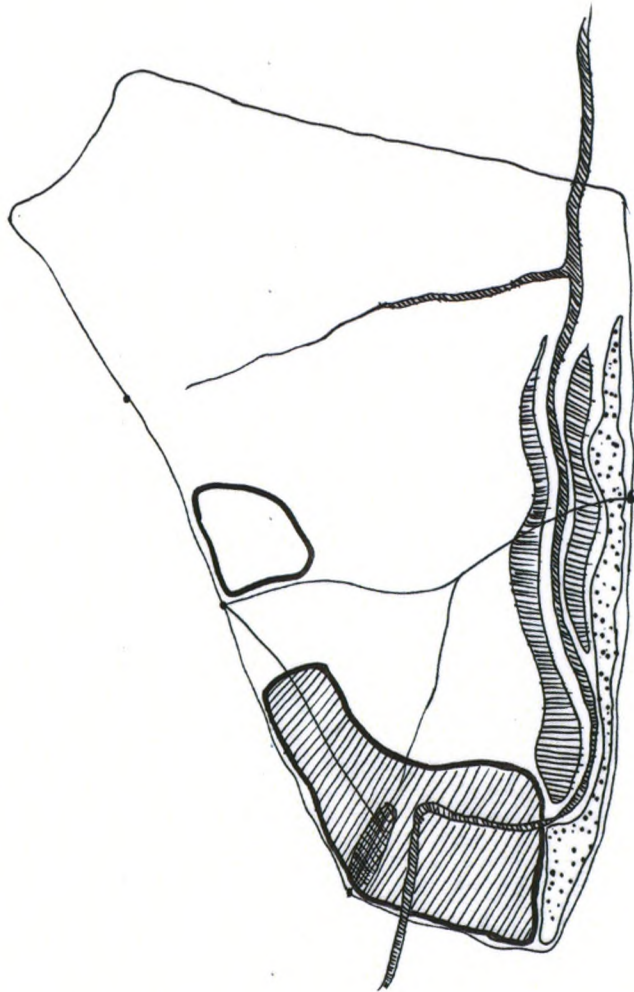


FIG 6.4: Site Zoning

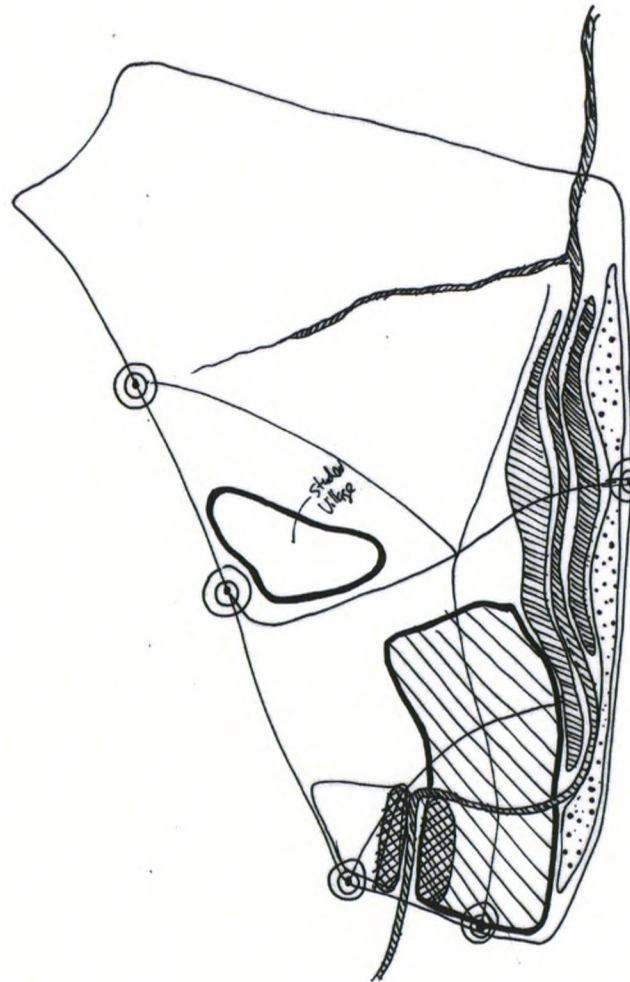


FIG 6.5: Site Zoning

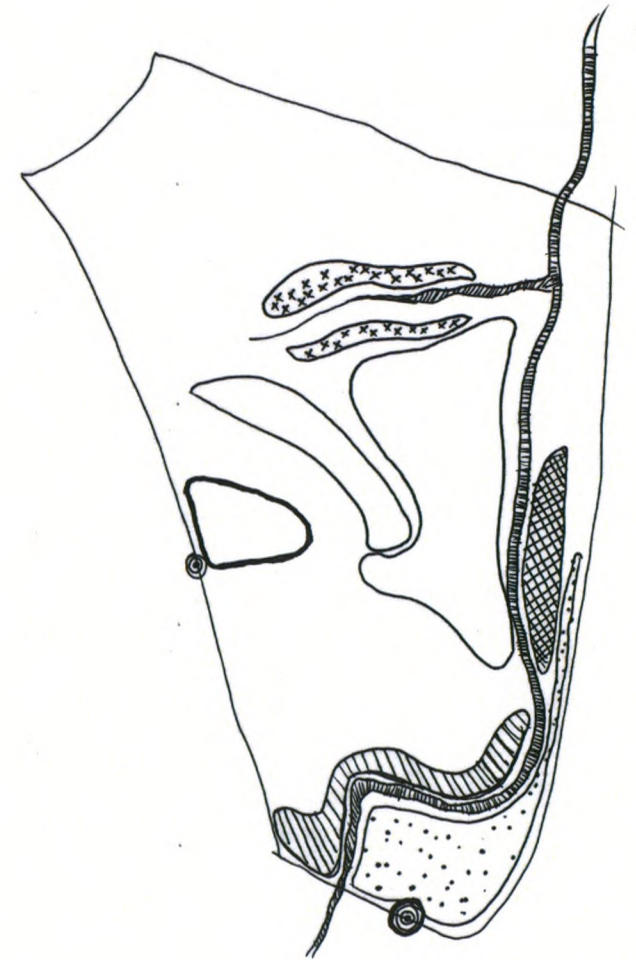


FIG 6.6: Site Zoning

FIRST APPROACH

CAMPUS TPOLOGY

My first approach to the thesis intervention was to design a new campus on the site. My plan was to design the campus at an urban scale then to design one building within the scheme. The following pages of drawings are my explorations of urban possibilities of the site.

Throughout this process the type of building that I planned to design was a space which hosted collaboration, innovation and social sharing. I wanted for this building to be the hub and gathering point of the campus.

Through reflecting on this design approach, I realised that this was by far too much of a conventional and typical approach to a university design, and was the opposite to the actual intent of my thesis. Though the process of zoning the site for such a campus I gained helpful and informative insights into the topography, orientation, context and views on the site.

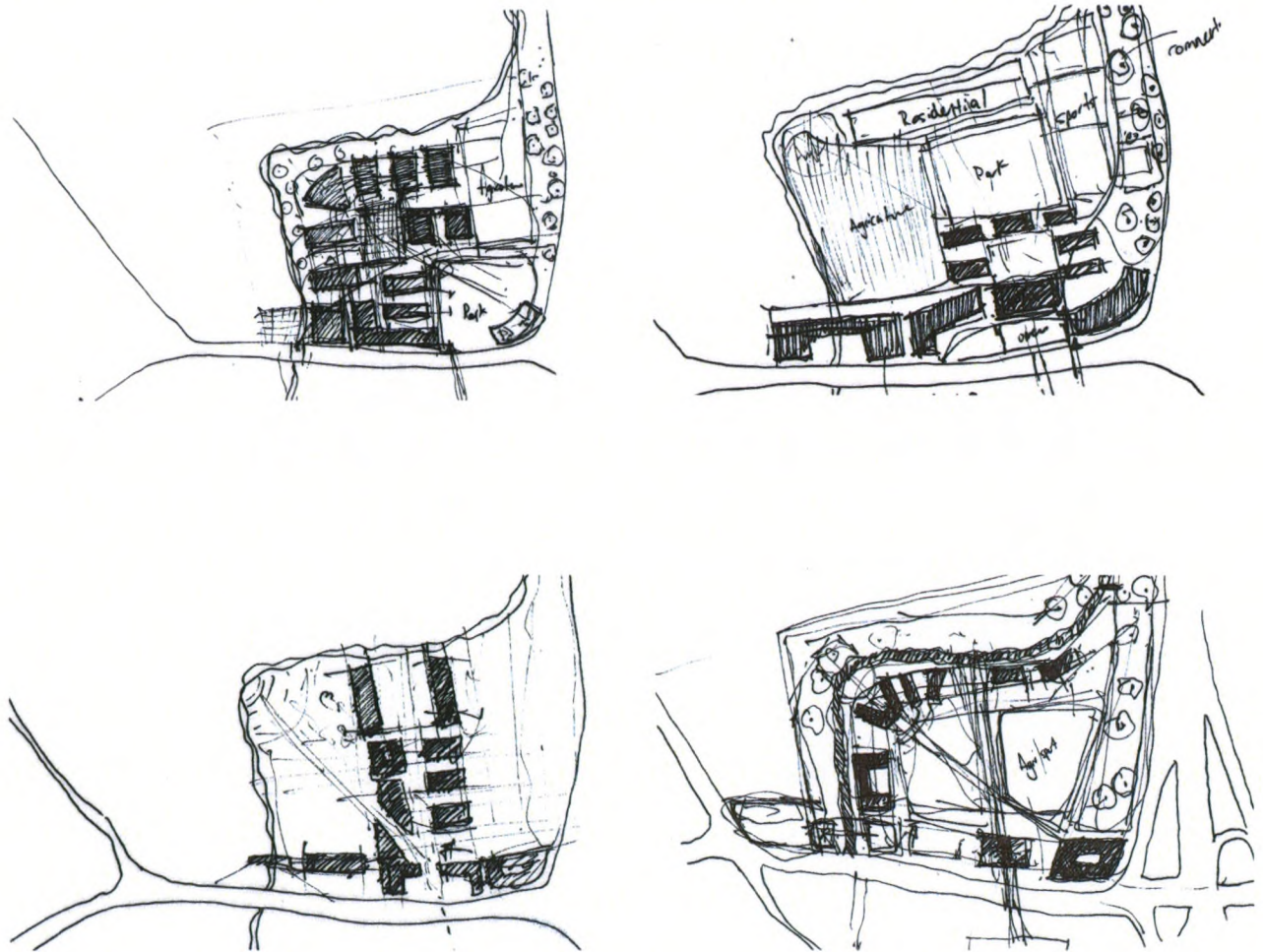


FIG 6.7: Site attempts

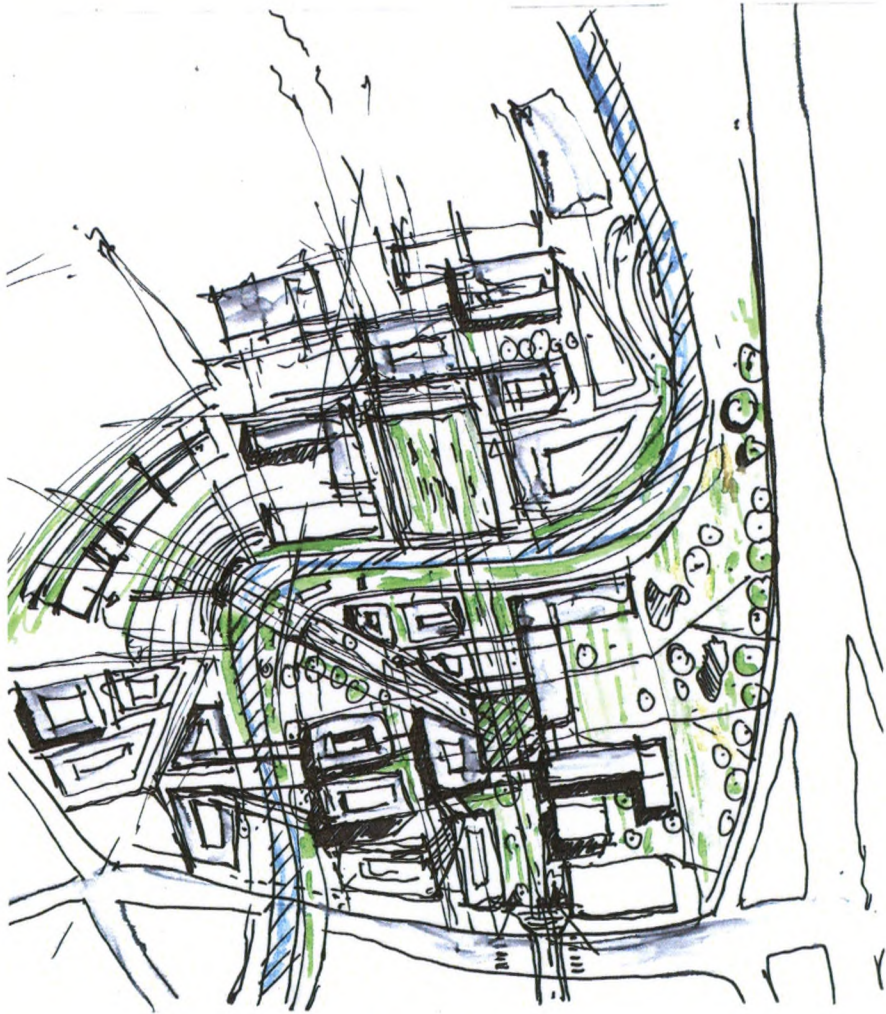


FIG 6.8: Site Massing Exploration 1

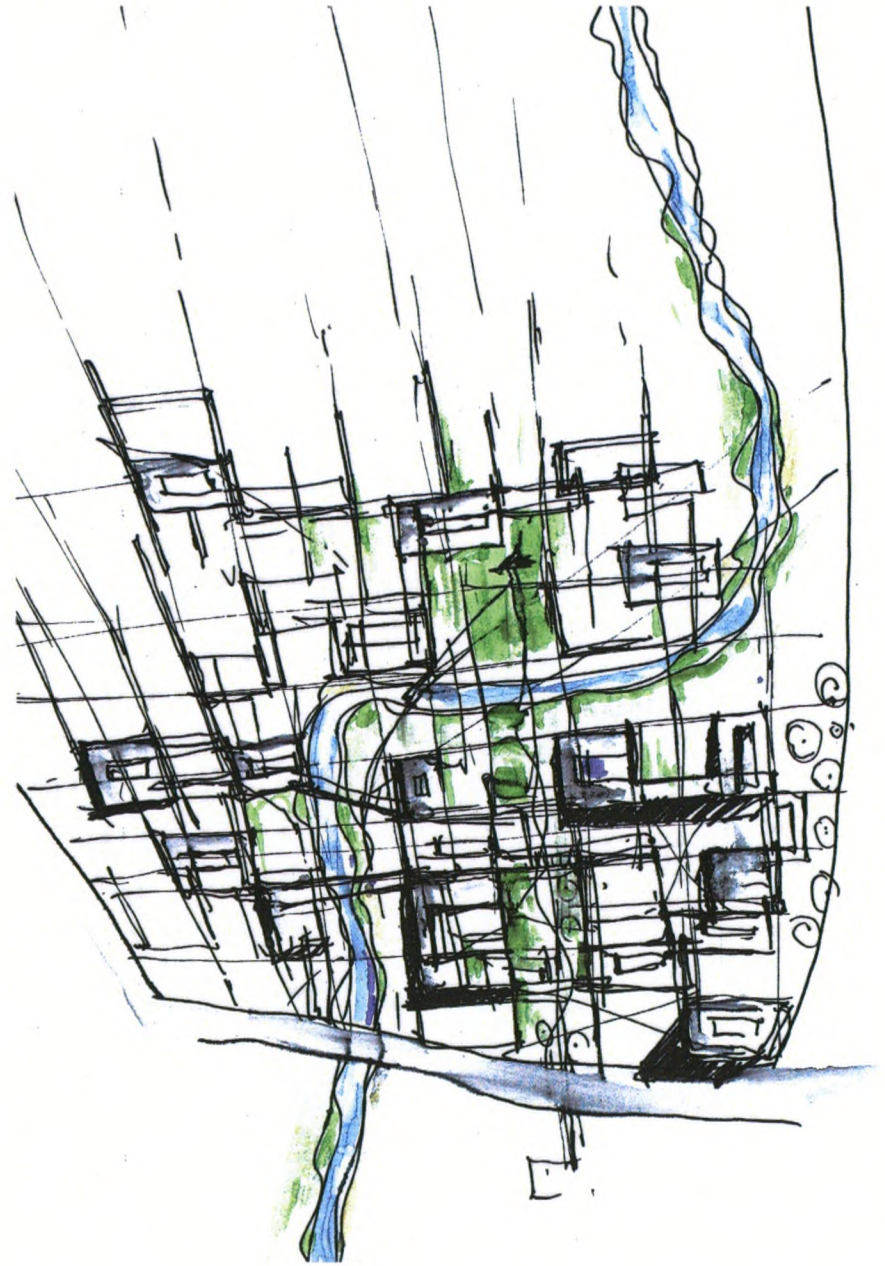


FIG 6.9: Site Massing Exploration 2



FIG 6.10: Site Massing Exploration 3

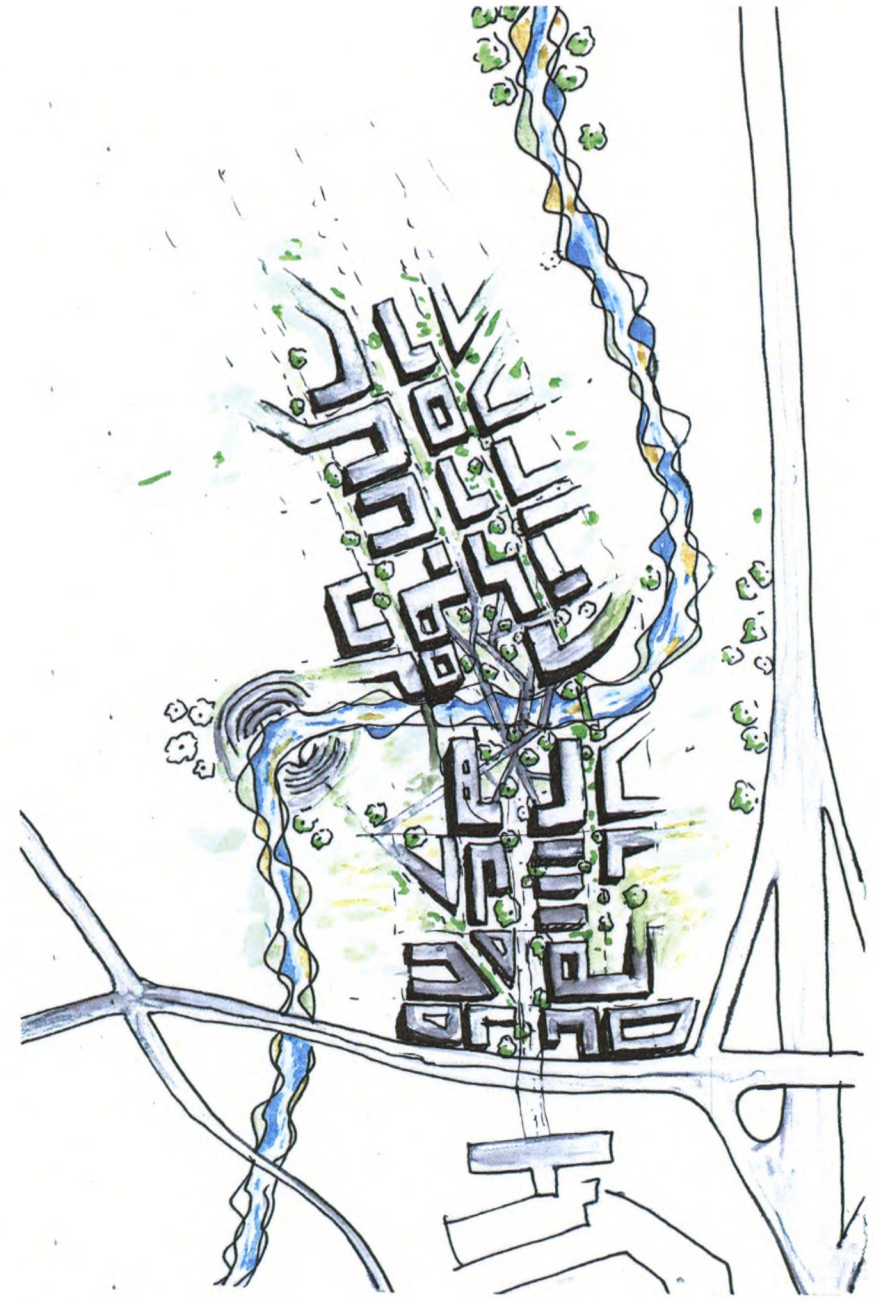


FIG 6.11: Site Massing Exploration 4

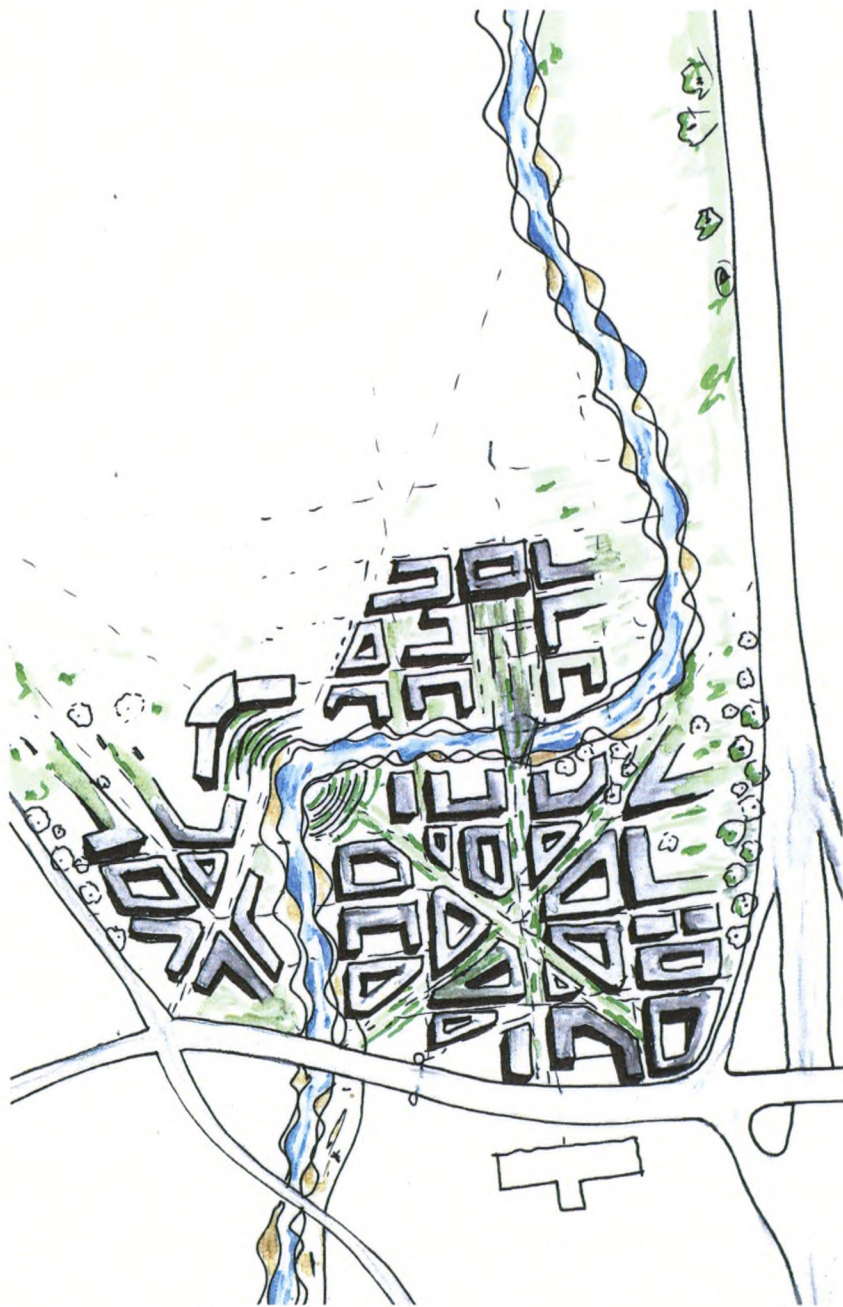


FIG 6.12: Site Massing Exploration 5

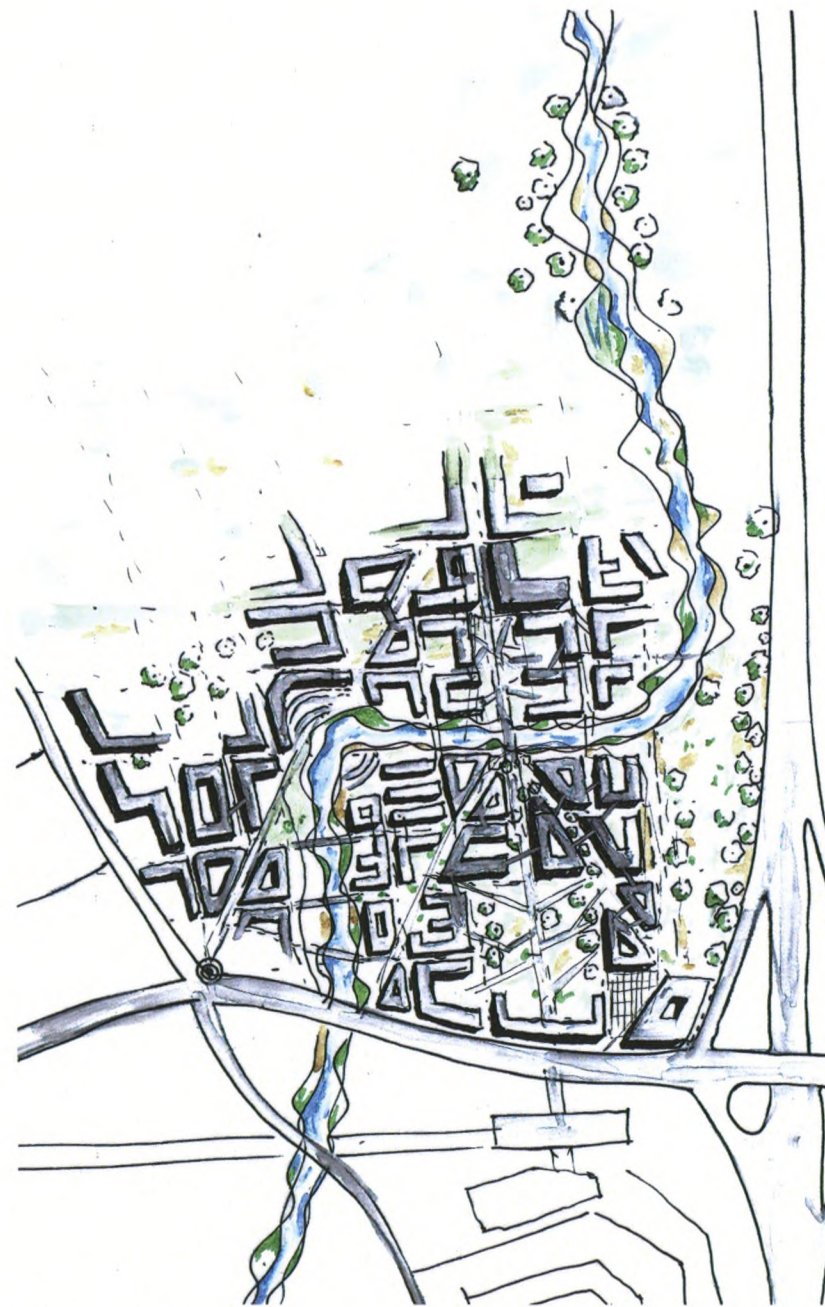


FIG 6.13: Site Massing Exploration 6

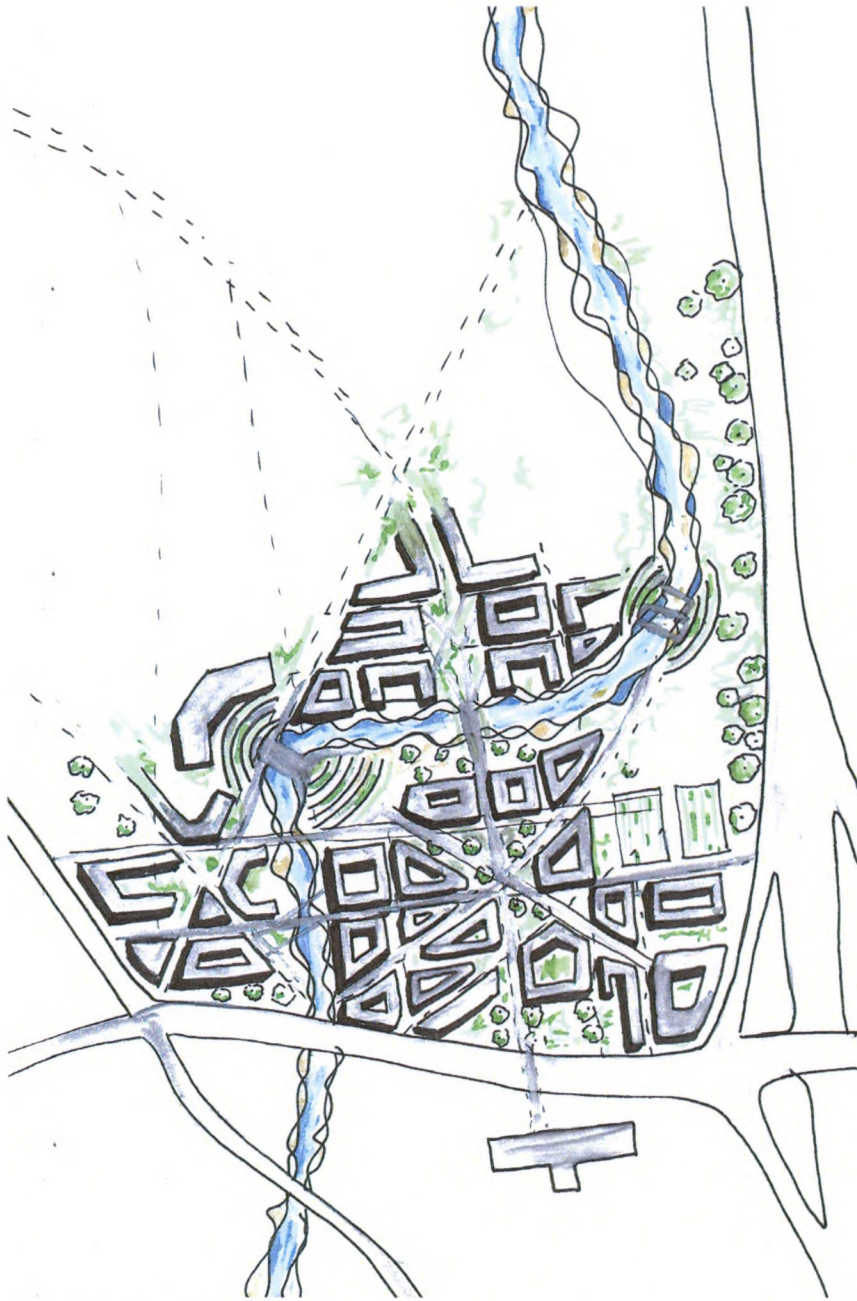


FIG 6.14: Site Massing Exploration 7

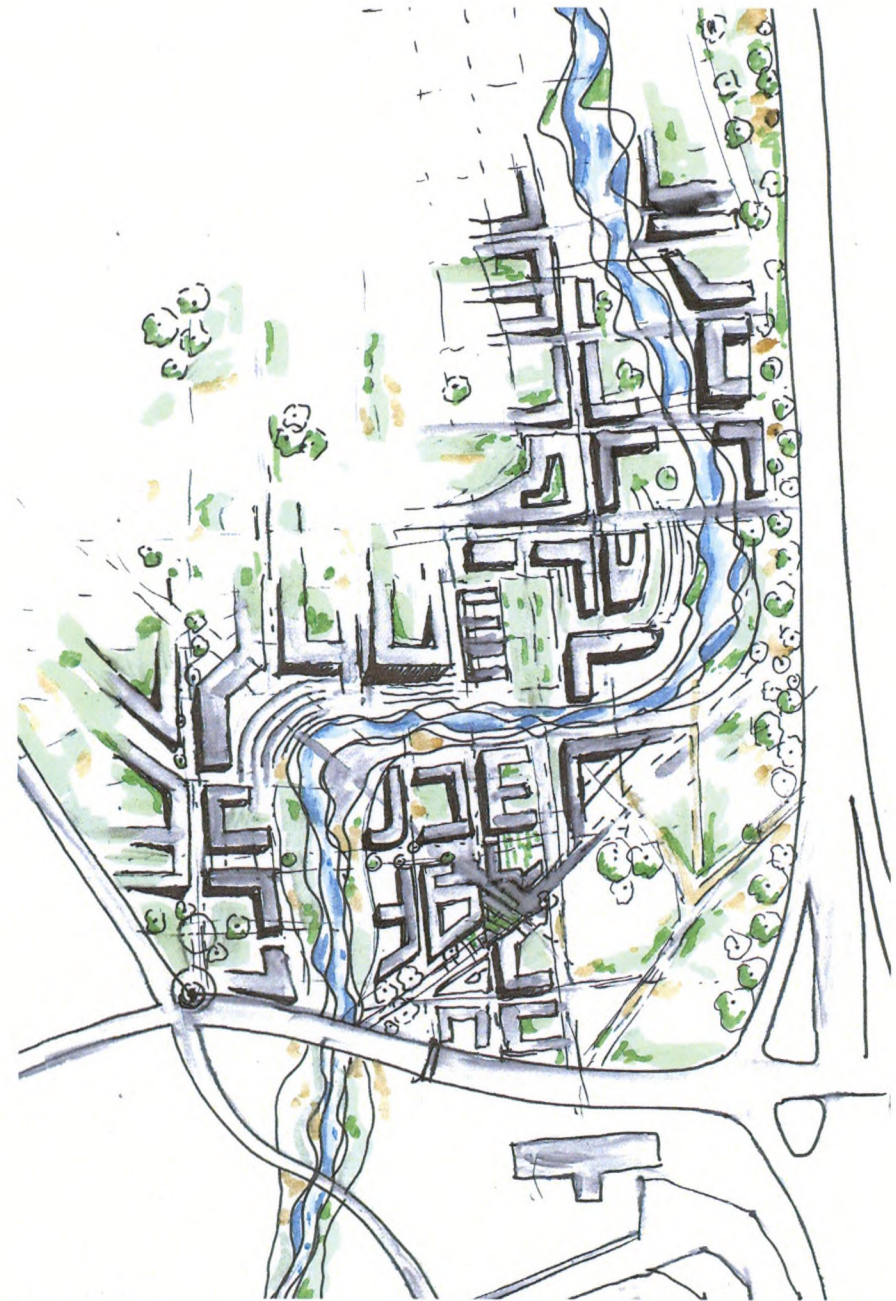


FIG 6.15: Site Massing Exploration 8



FIG 6.16: Site Massing Exploration 9



FIG 6.17: Site Massing Exploration 10

SECOND APPROACH

SINGULAR BUILDING TYPOLOGY

Having realised that my previous approach was not correct for the site I decided that I needed to create an intervention on the site that was more sensitive to the landscape and one that could break out from the constraints of the conventional university typology.

In this design approach, I intended to create a smaller scale intervention which had more influence of the needs of the local Alexandra community. This was still a urban scale intervention and I once again intended to design one building in the scheme. Although this was an urban scheme the buildings were more spread out and had a more sensitive relationship to the landscape. The following pages contain my drawing as an attempt at this design.

At this stage the overall program of the intervention was similar to my final program but this program was accommodated in the various 'scattered' buildings. However the challenge that I came across was that once again a very large built intervention had to occur for the optimal functioning of the campus as I had intended.

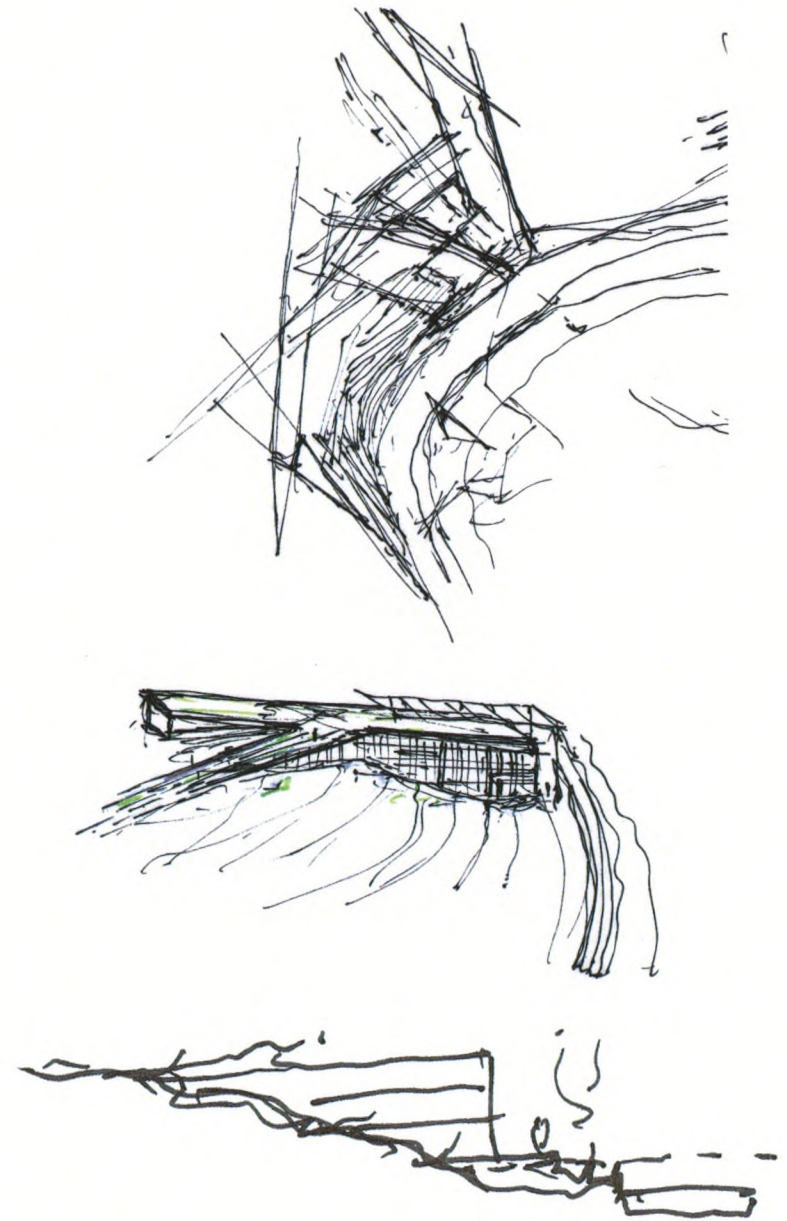


FIG 6.18: Exploration Sketches

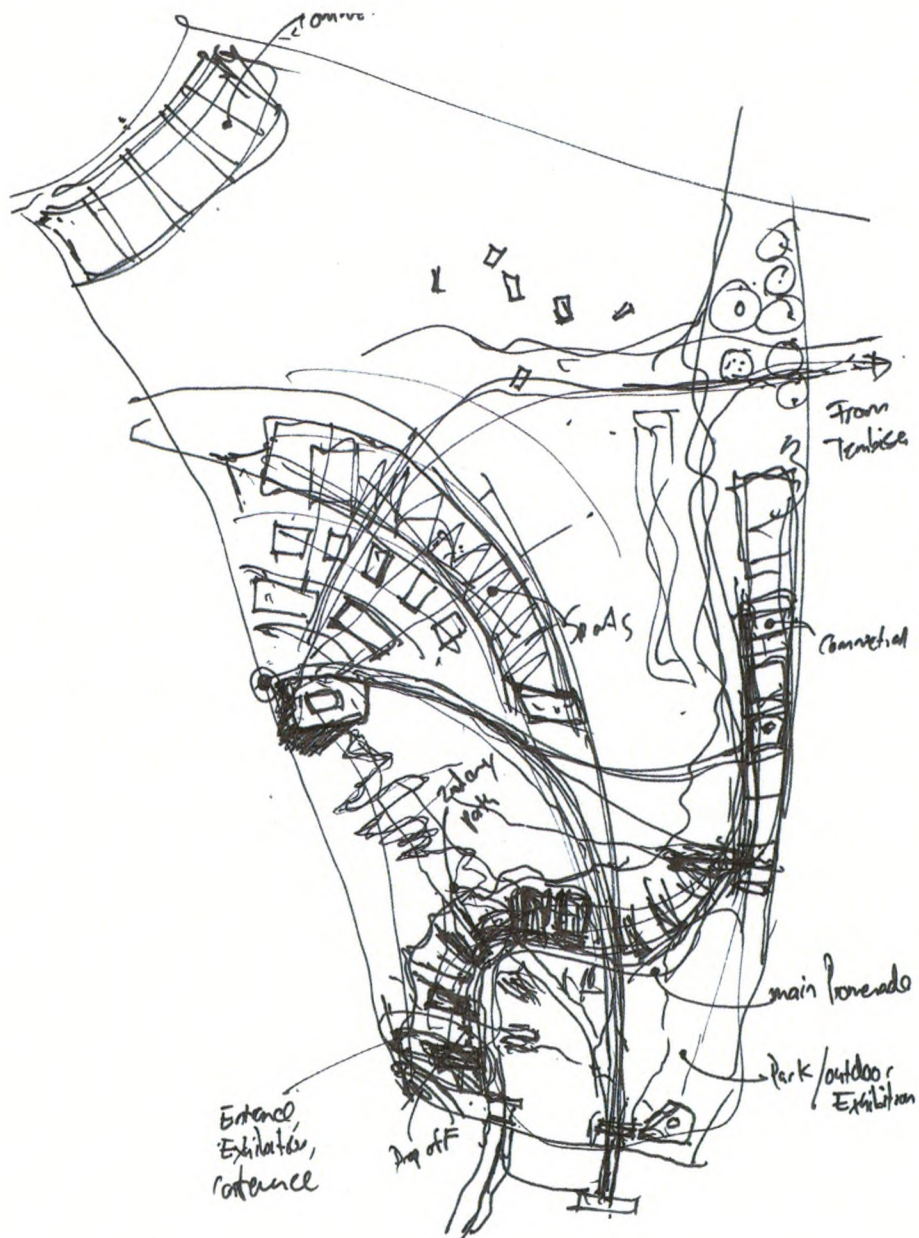


FIG 6.19: Site Massing Exploration 1

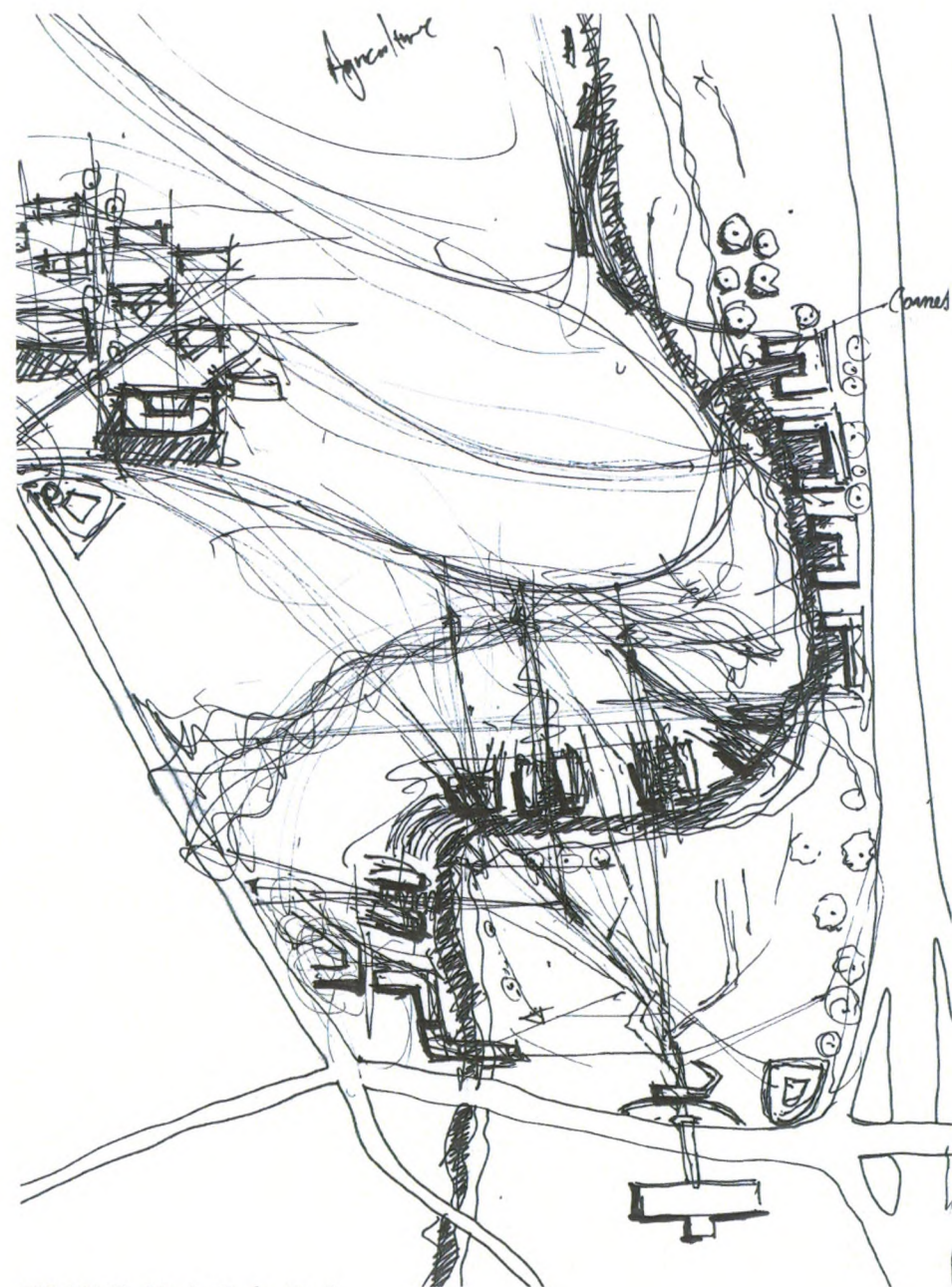


FIG 6.20: Site Massing Exploration 2

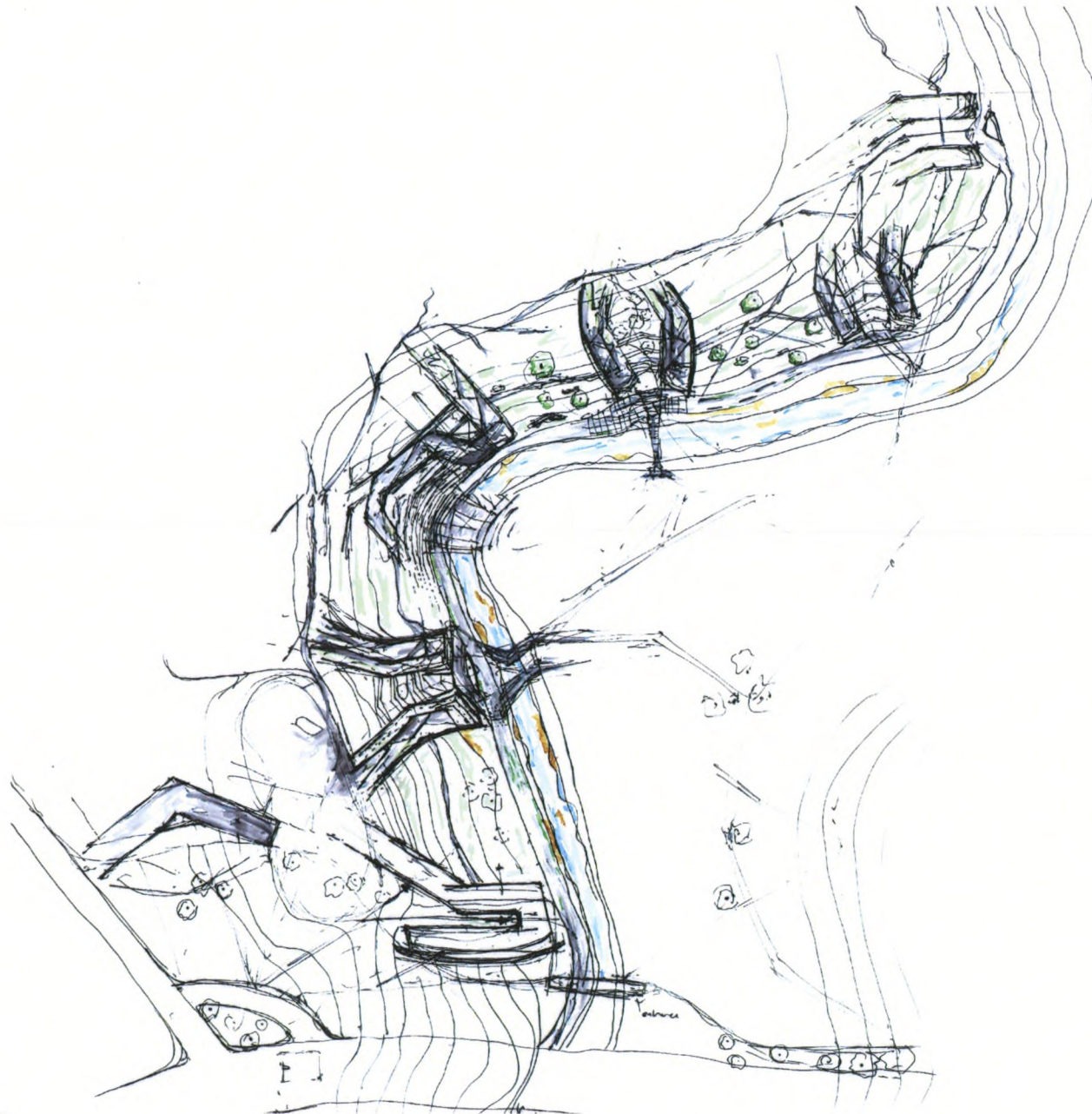


FIG 6.21: Site Massing Exploration 3

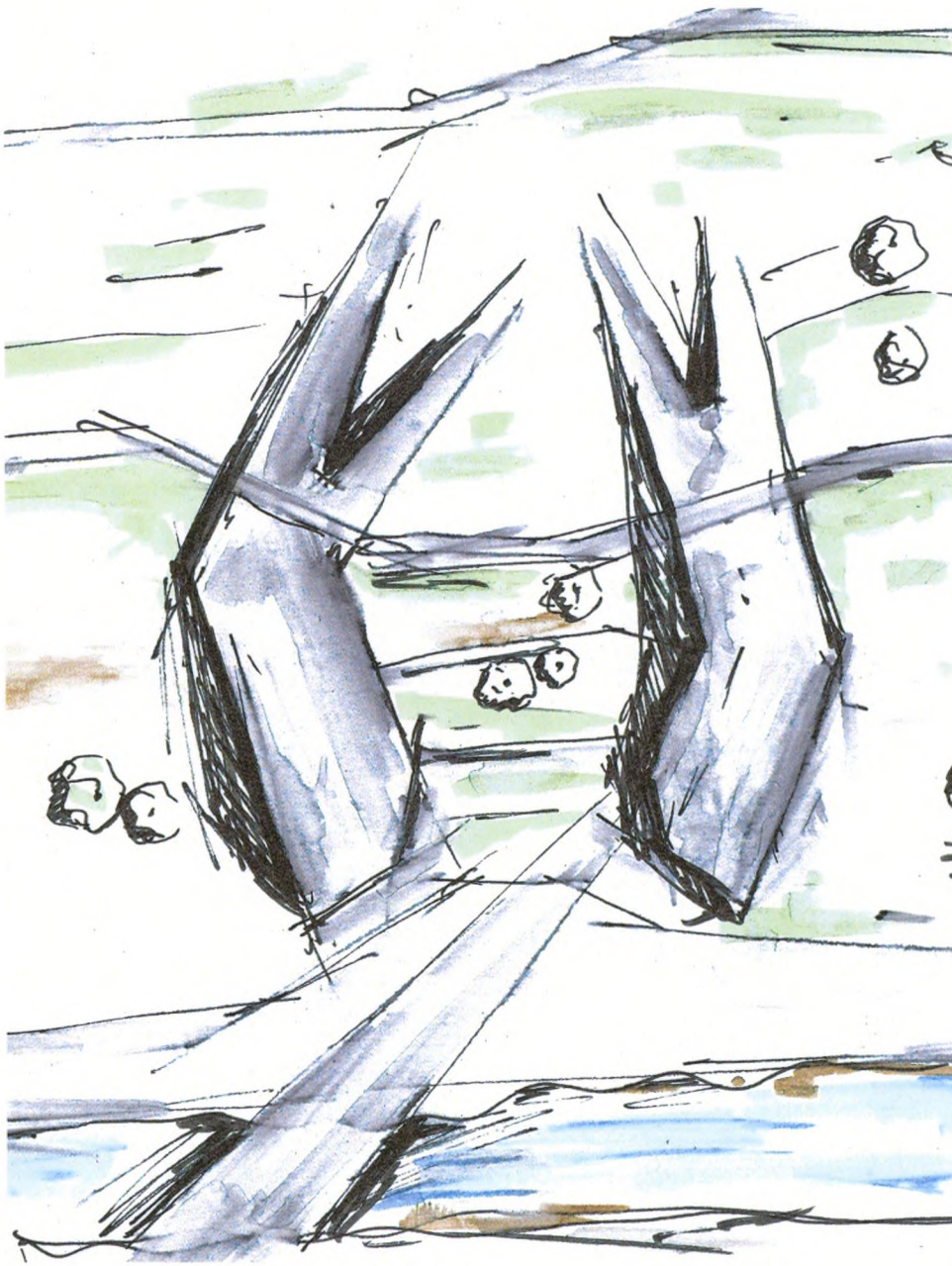


FIG 6.22: Generic factually building cluster concept plan

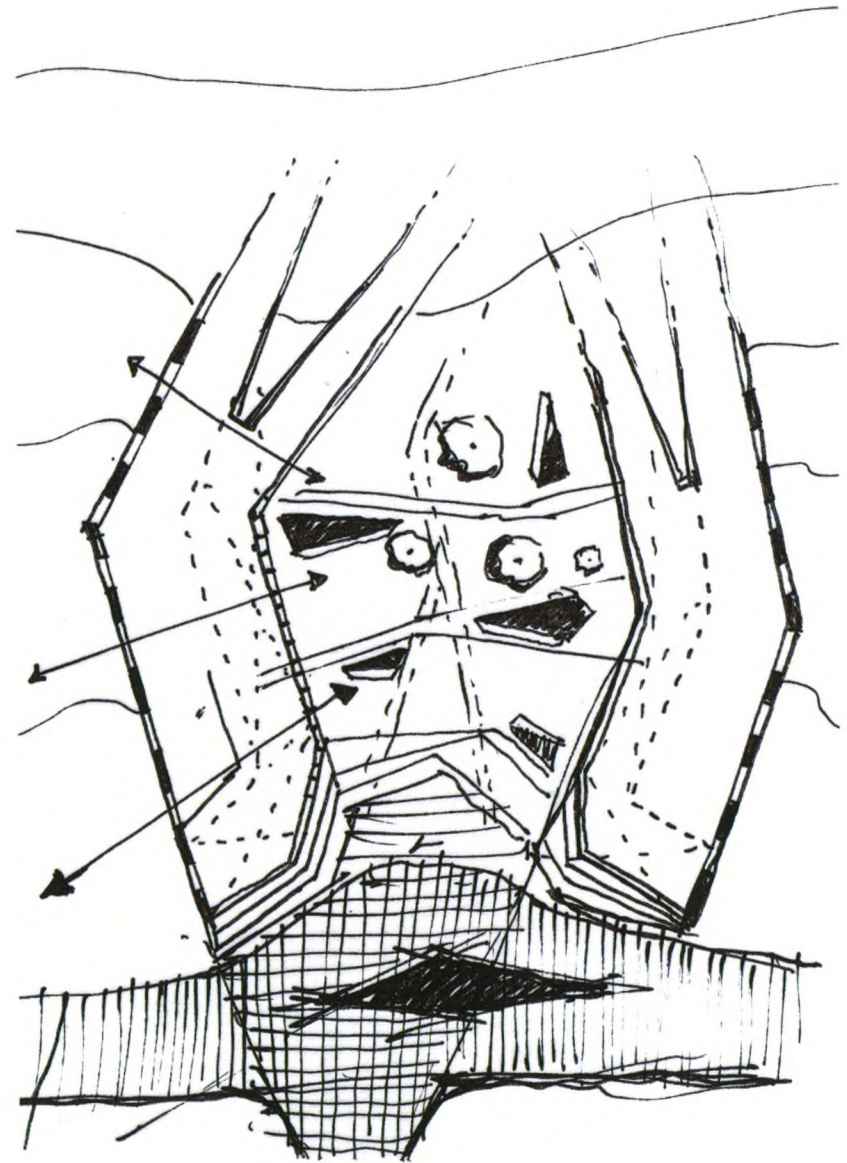


FIG 6.23: Generic factually building cluster plan

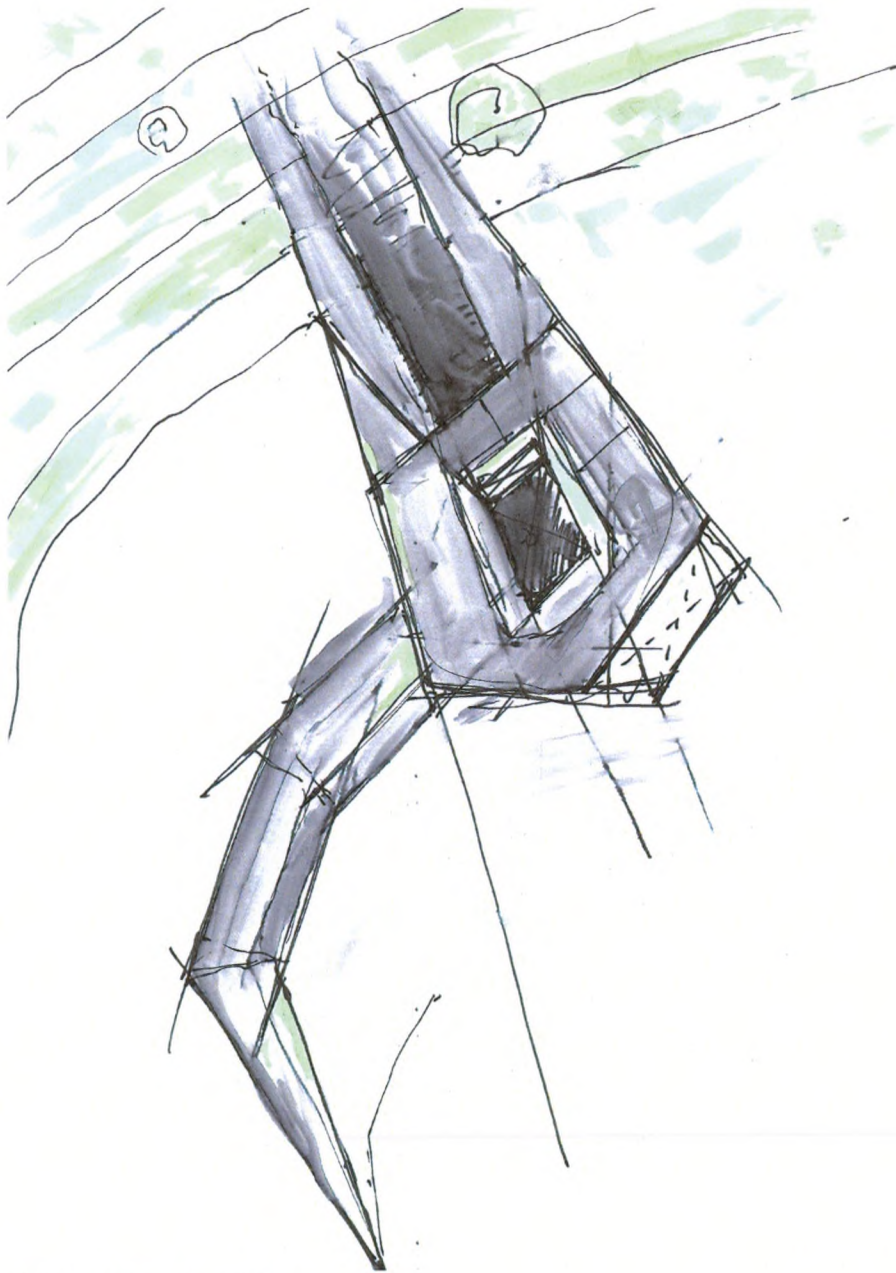


FIG 6.24: Collaboration building concept plan

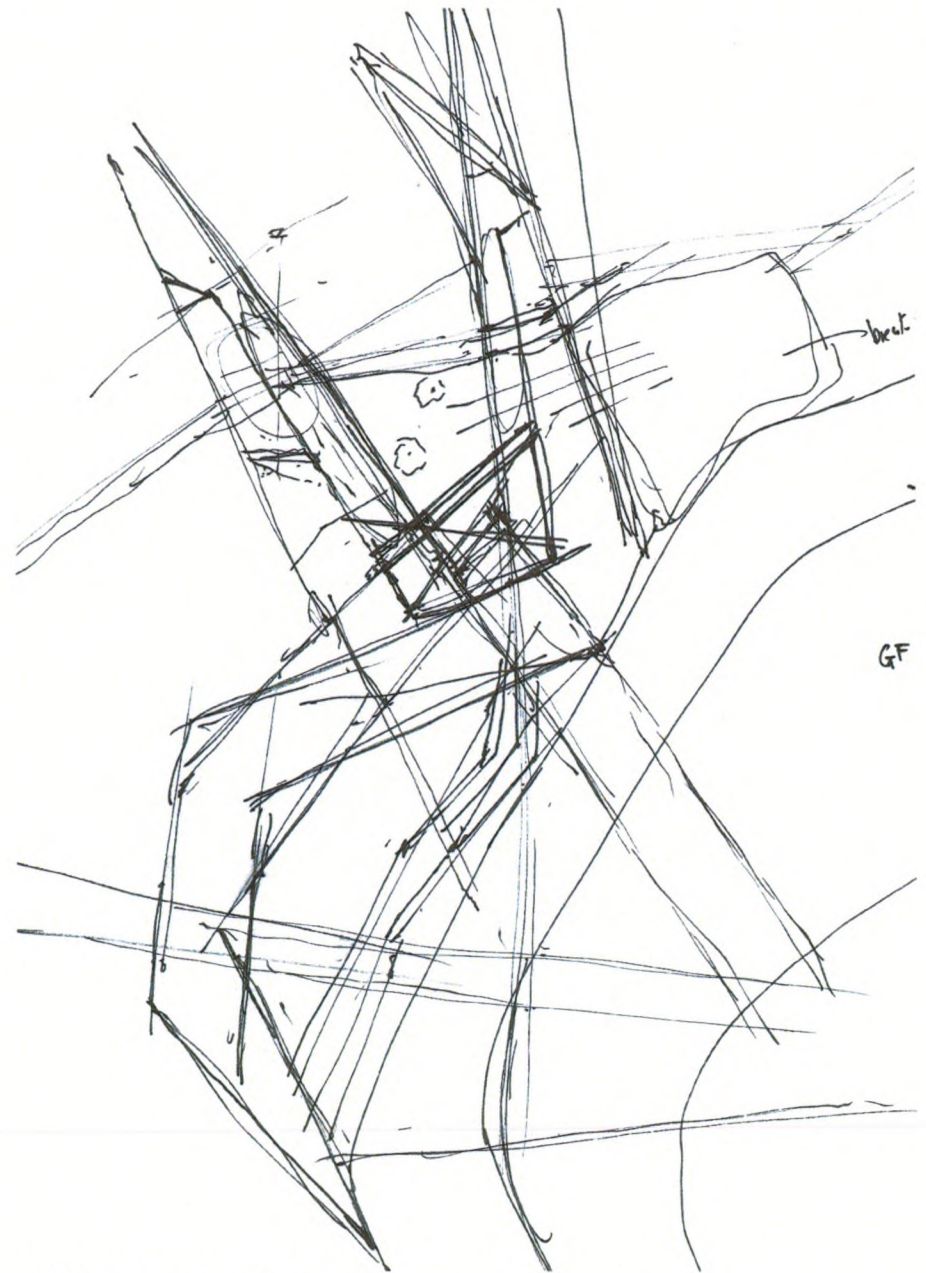


FIG 6.25: Collaboration building plan sketch

FIG 6.26: Collaboration building plan sketch

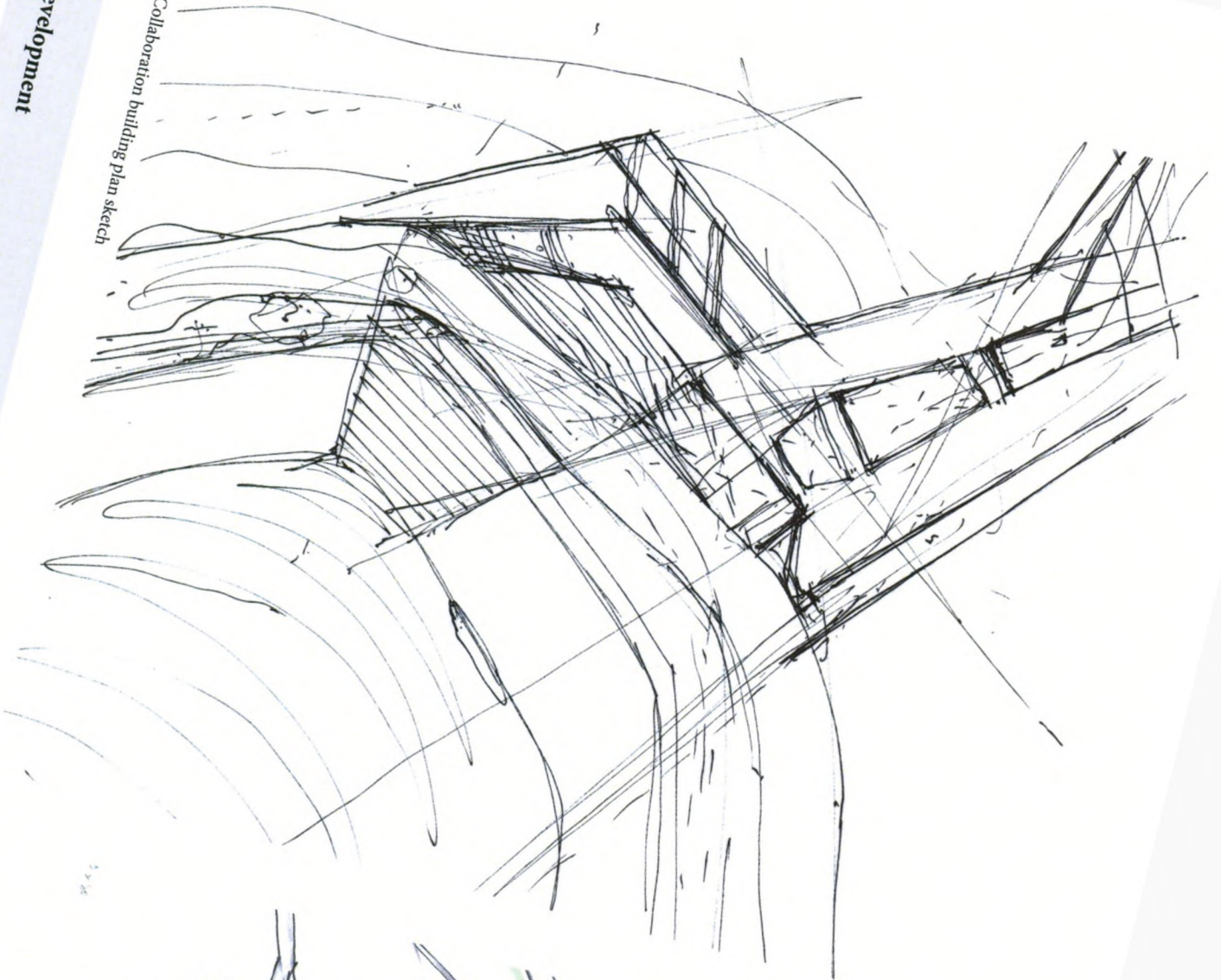
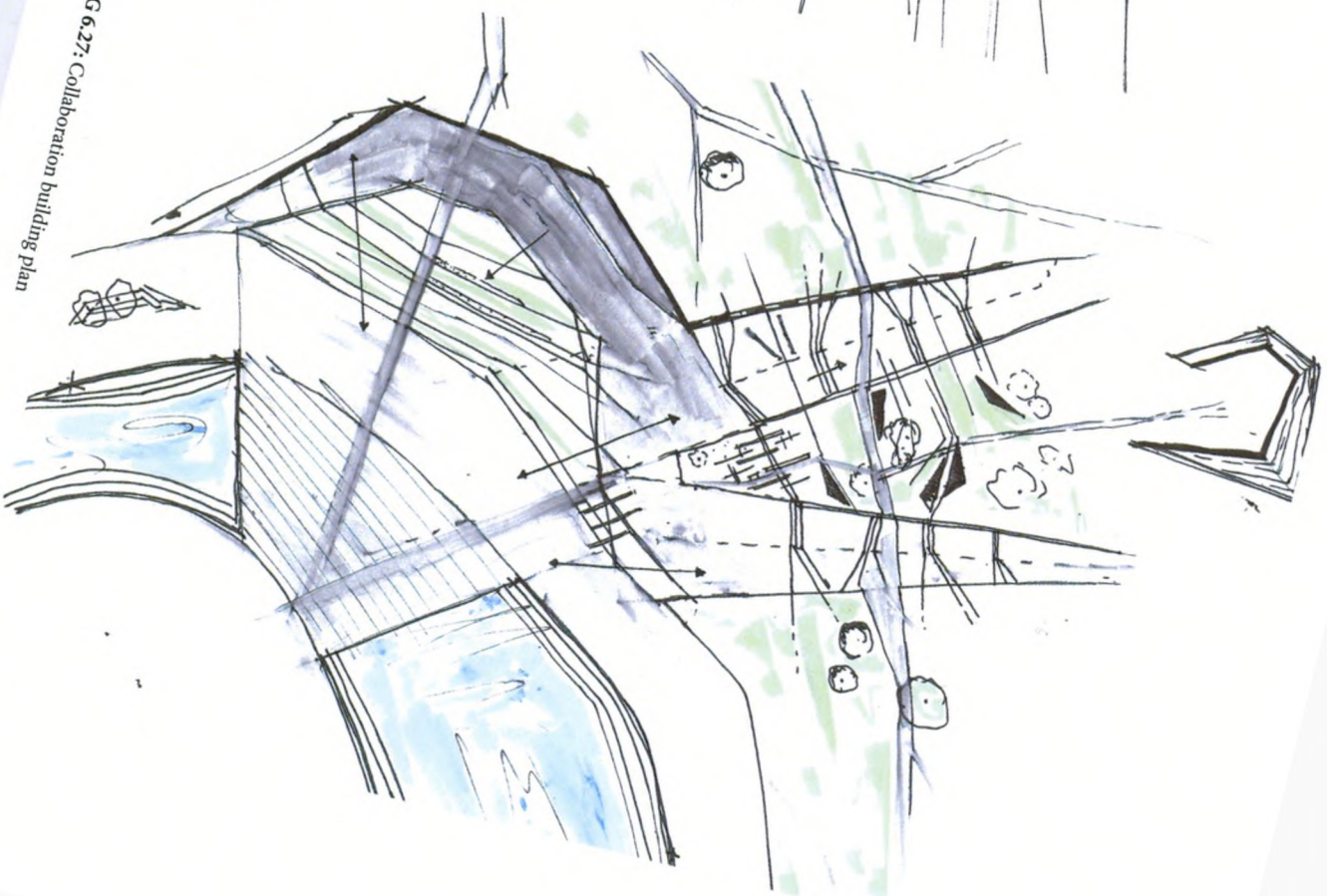


FIG 6.27: Collaboration building plan



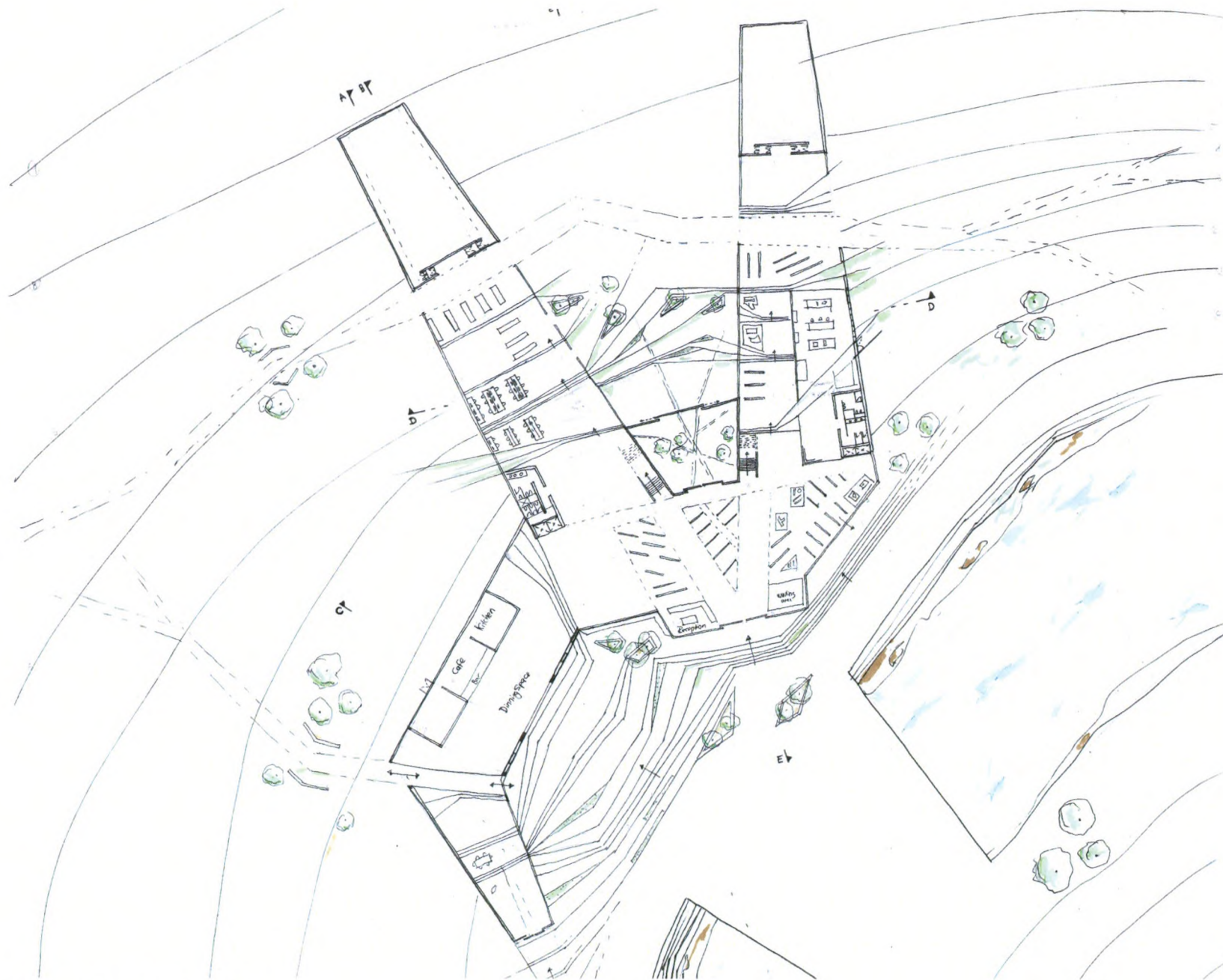


FIG 6.28: Collaboration building. Ground floor plan

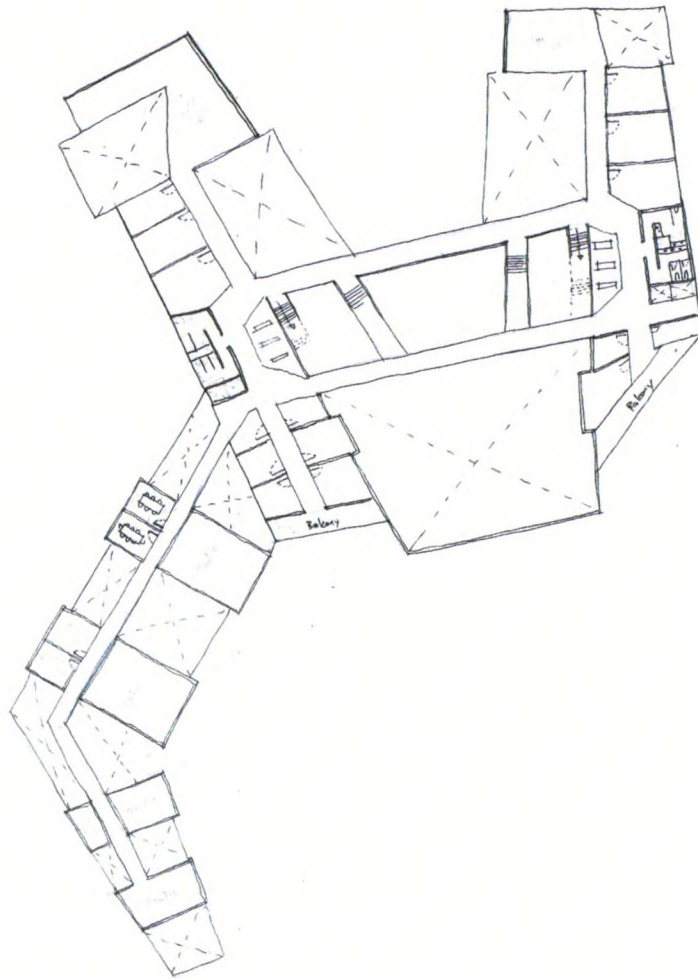


FIG 6.29: Collaboration building. First floor plan

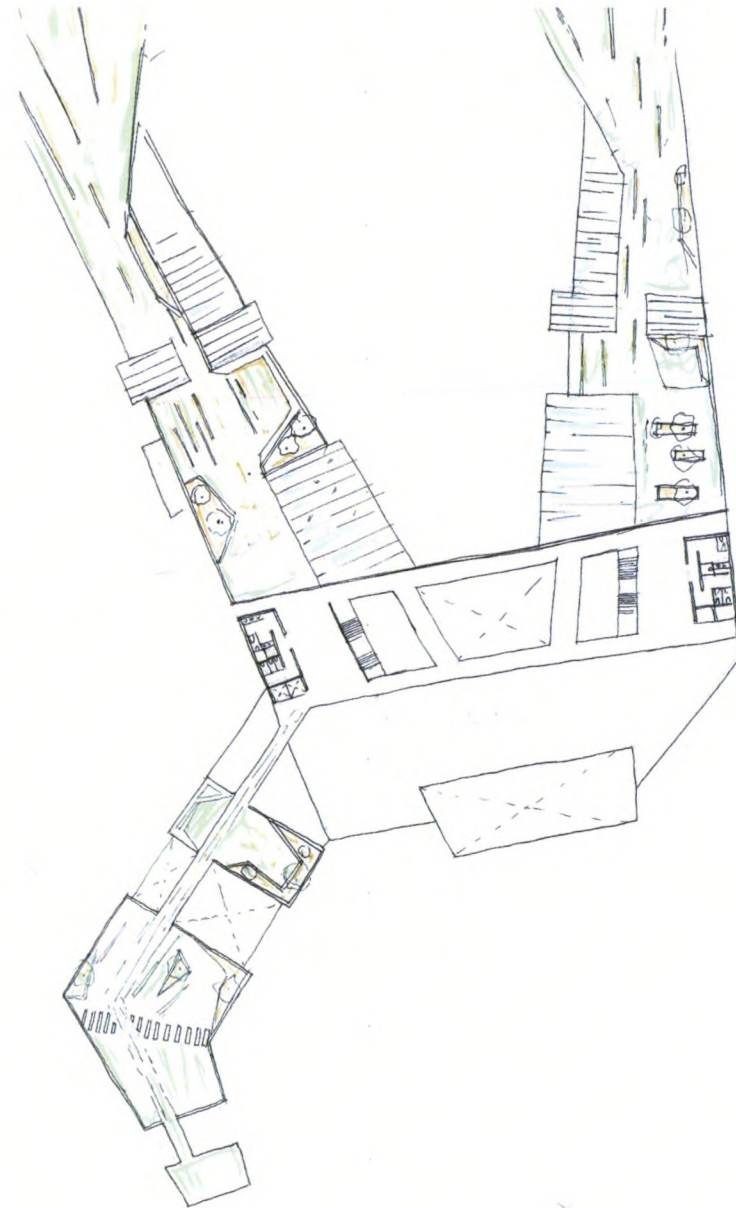


FIG 6.30: Collaboration building. Second floor plan

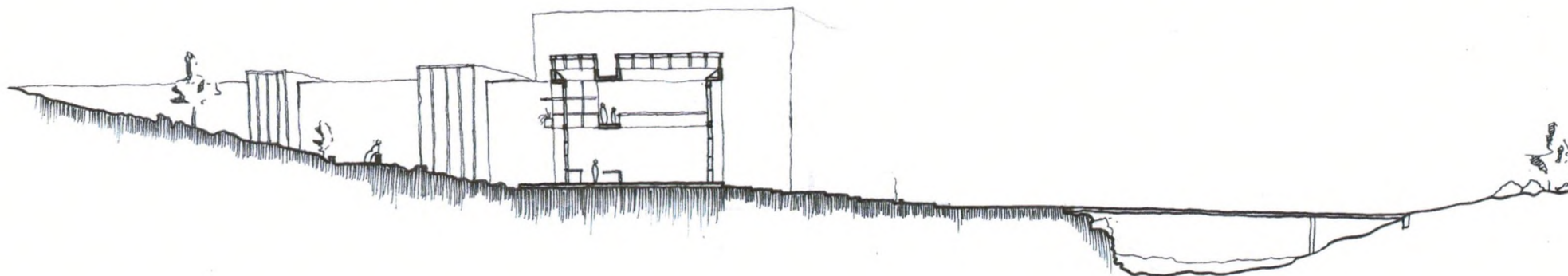


FIG 6.31: Collaboration building. Section AA

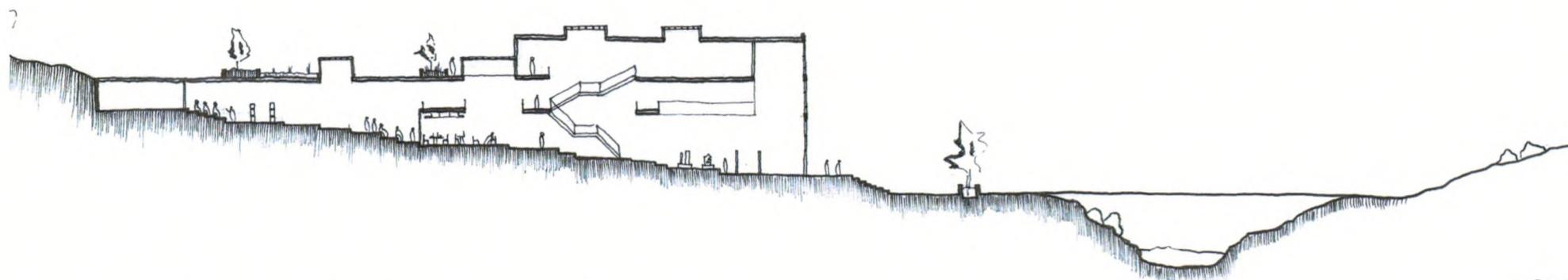


FIG 6.32: Collaboration building. Section BB

Section
1:200

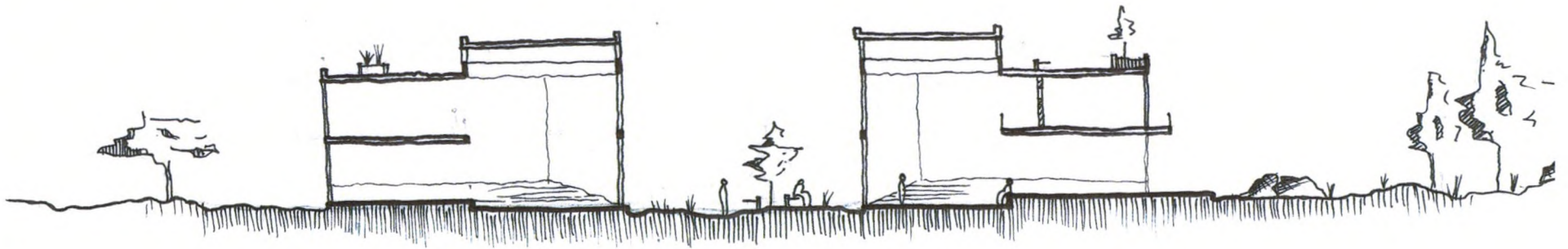


FIG 6.33: Collaboration building. Section CC

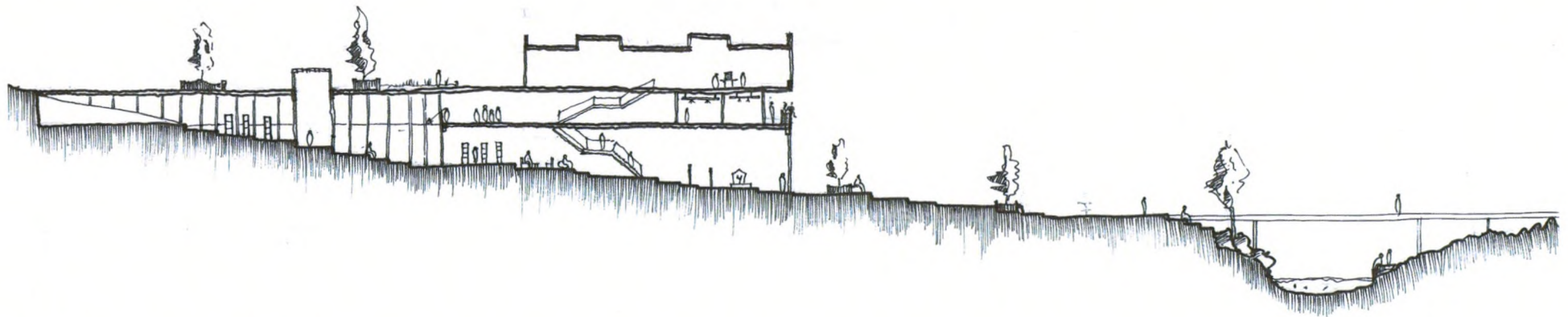


FIG 6.34: Collaboration building. Section DD



FIG 6.35: Urban Plan



FIG 6.36: Urban Plan of the whole site.



FIG 6.37: Urban Plan of possible future development.

THIRD APPROACH

MEGASTRUCTURE TPOLOGY

At this point, the idea which I had was to create one building which contained all of the program which I had previously scattered in the various buildings in the scheme.

This approach meant that with the intervention of just one building it would allow the program to 'survive' without the outside support of a large urban scheme. In essence this building was a seed of a new campus and contained all the vital elements that it required.

The symbolic gesture of this building was to connect east and west bank of Alexandra township across the river. Historically these two sides have been in tension and disconnect from one another by the river.

The following drawings are my exploration with this design approach.



FIG 6.38: Concept Sketches

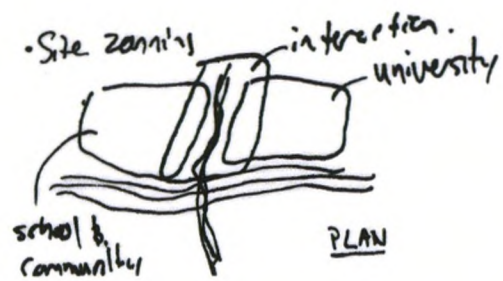


FIG 6.39: Adjacency diagrams.

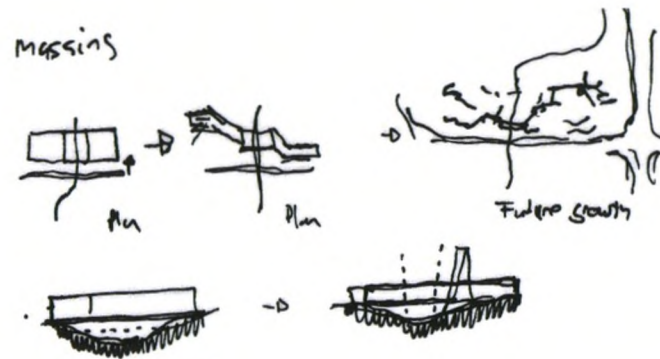


FIG 6.41: Massing

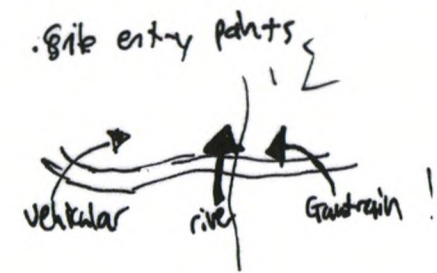


FIG 6.43: Entry Points

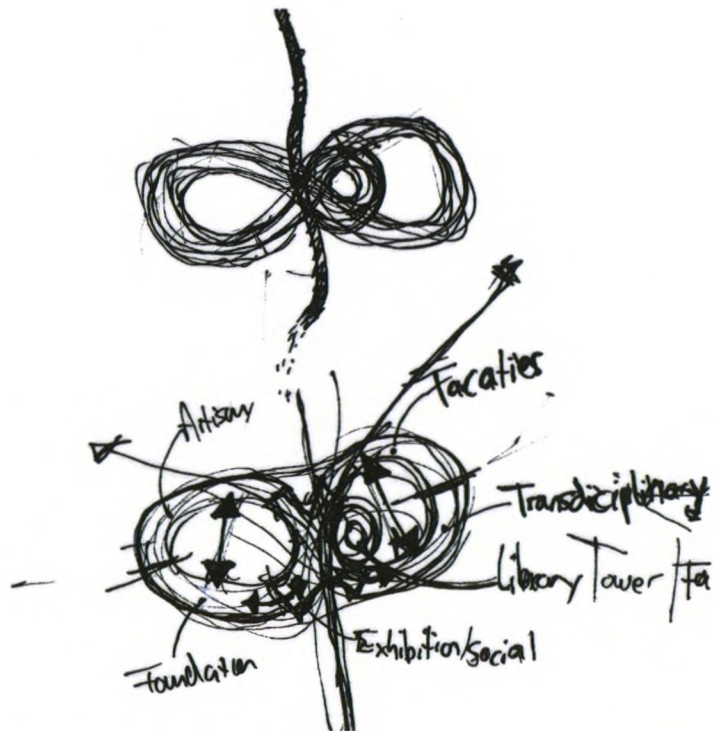


FIG 6.40: Program adjacency diagrams.

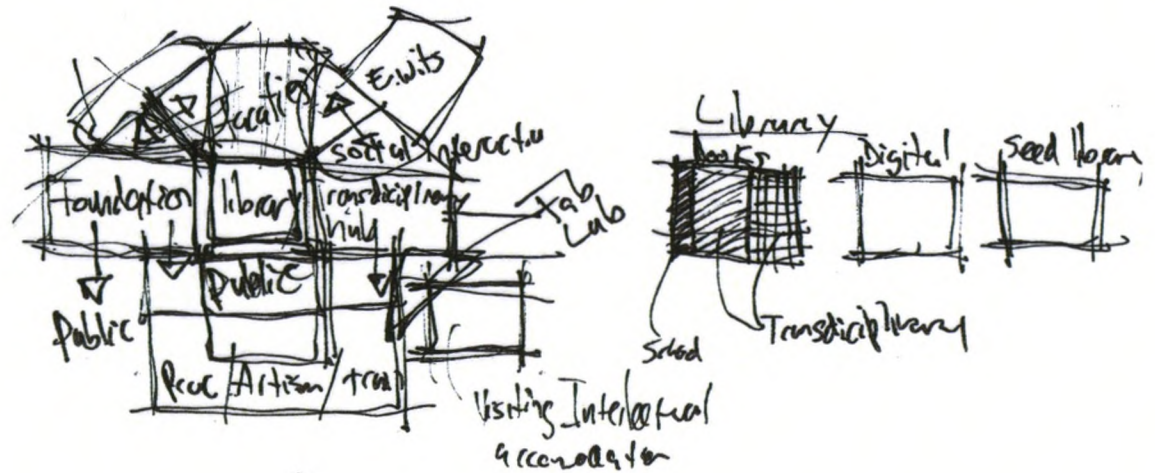


FIG 6.42: Program adjacency diagrams.

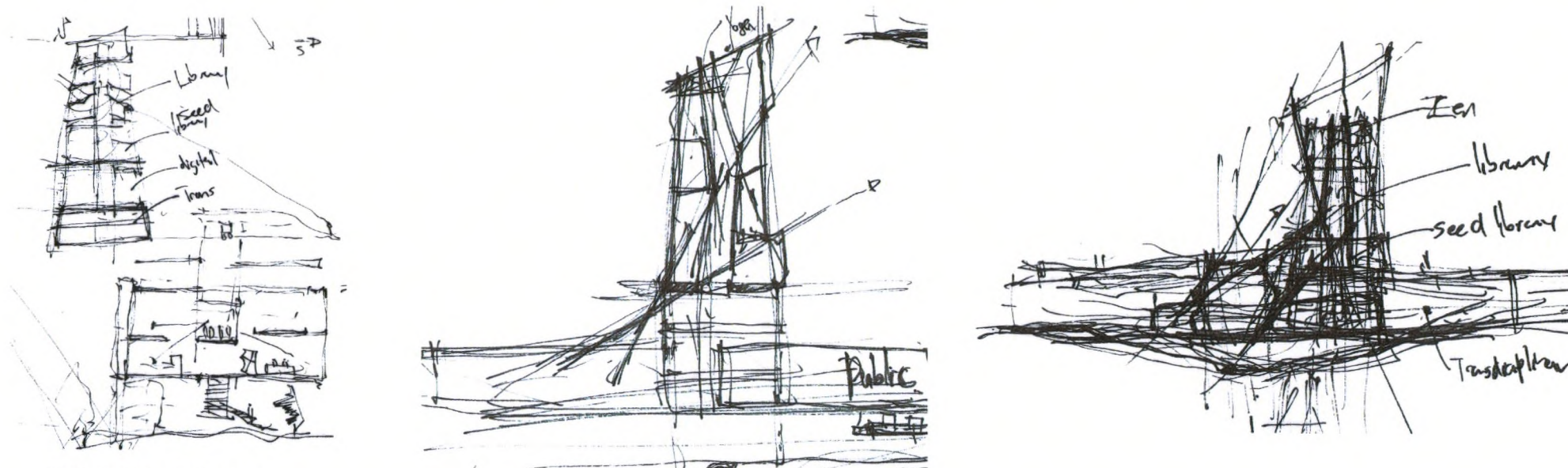


FIG 6.44: Section Explorations

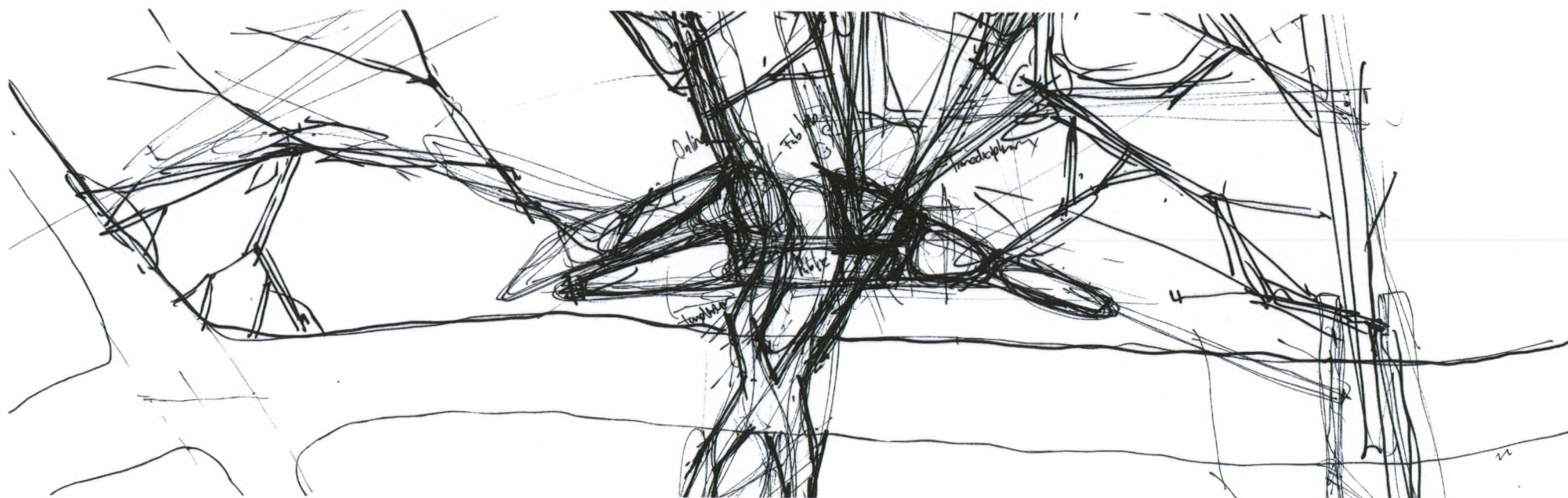


FIG 6.45: Plan Concept Sketch

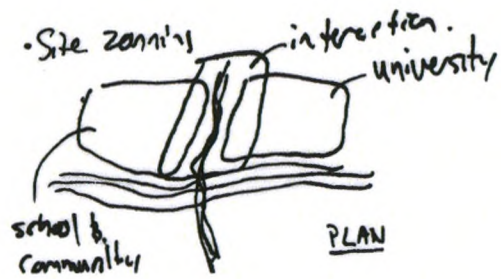


FIG 6.39: Adjacency diagrams.

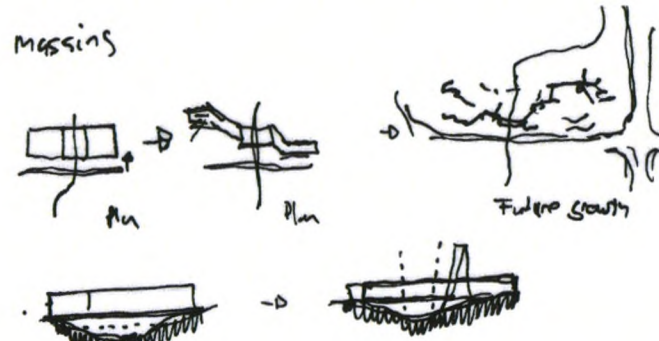


FIG 6.41: Massing

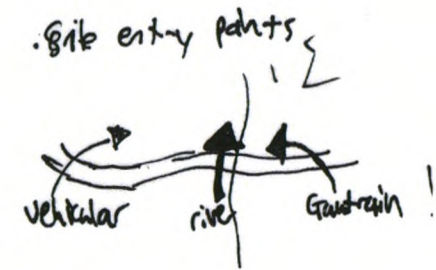


FIG 6.43: Entry Points

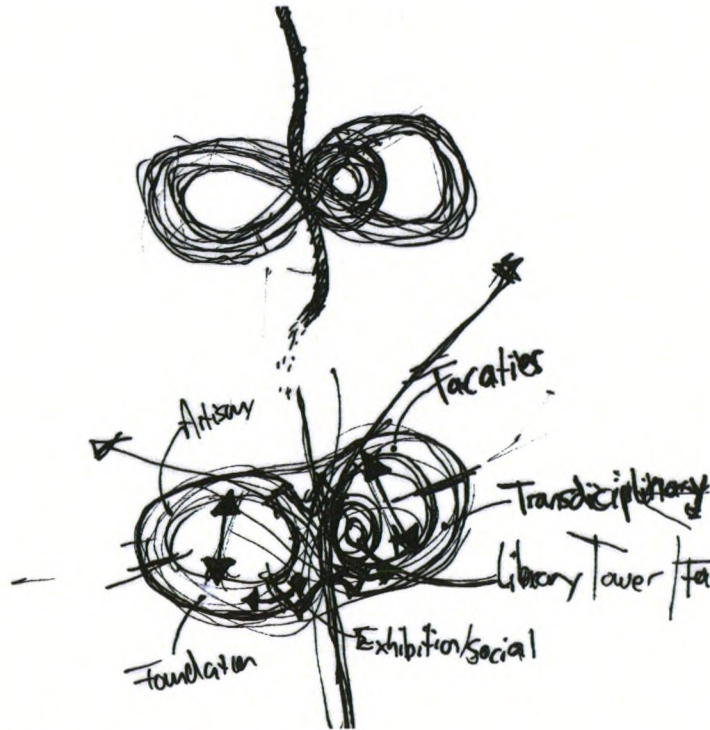


FIG 6.40: Program adjacency diagrams.

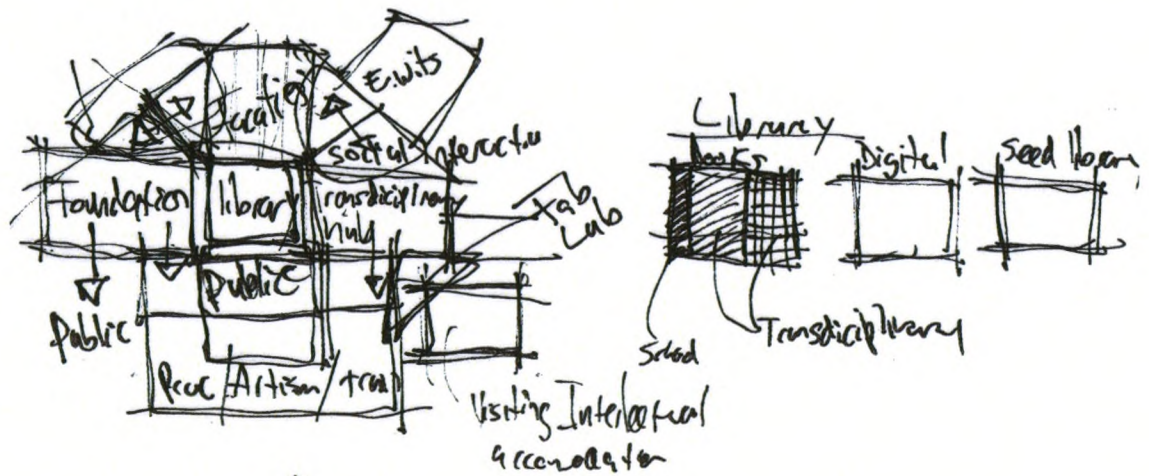


FIG 6.42: Program adjacency diagrams.

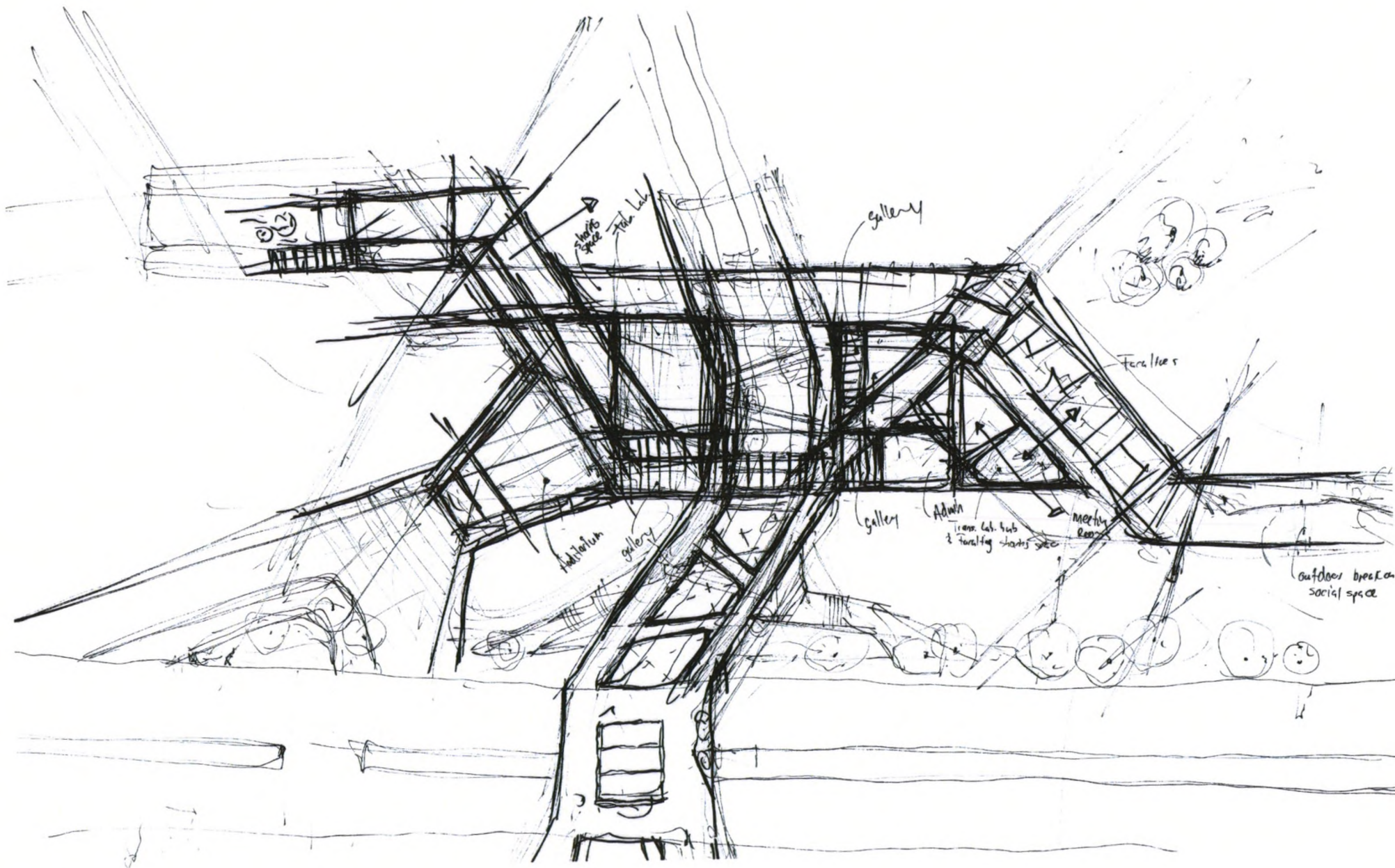


FIG 6.46: Plan Sketch

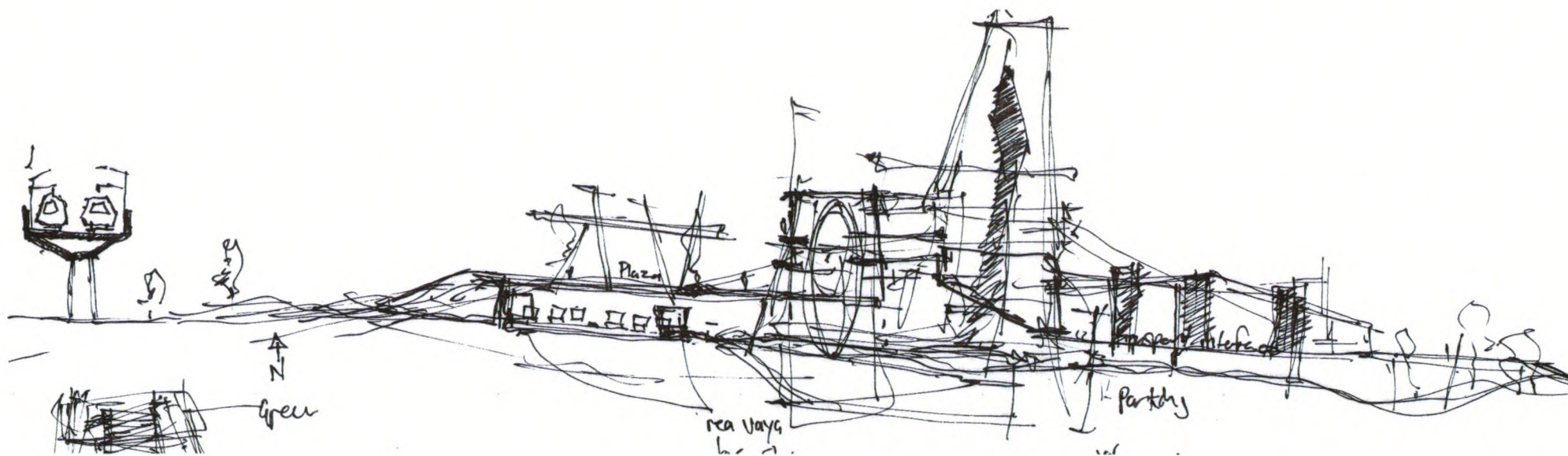


FIG 6.47: Section Sketch

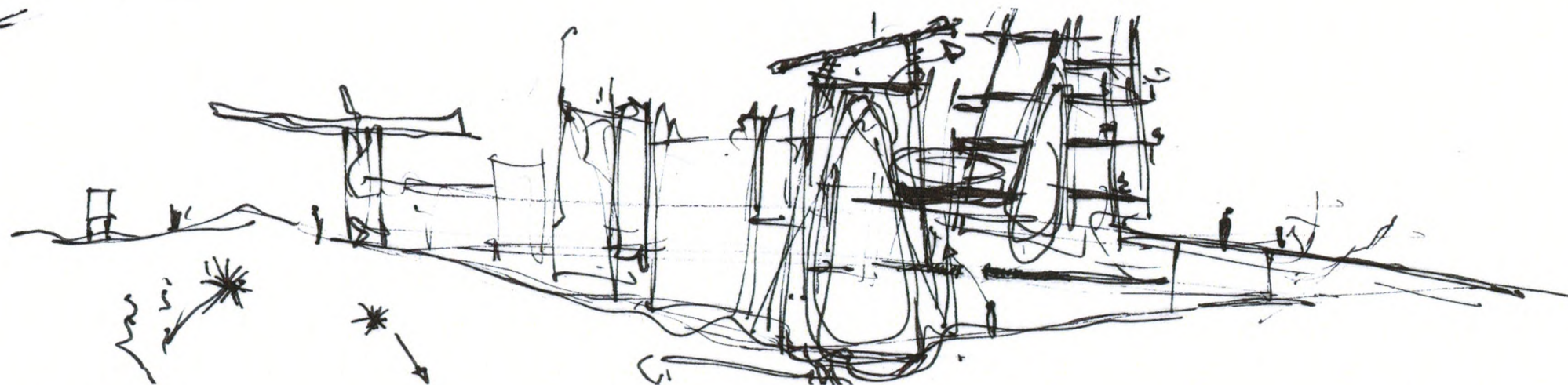


FIG 6.48: Section Sketch

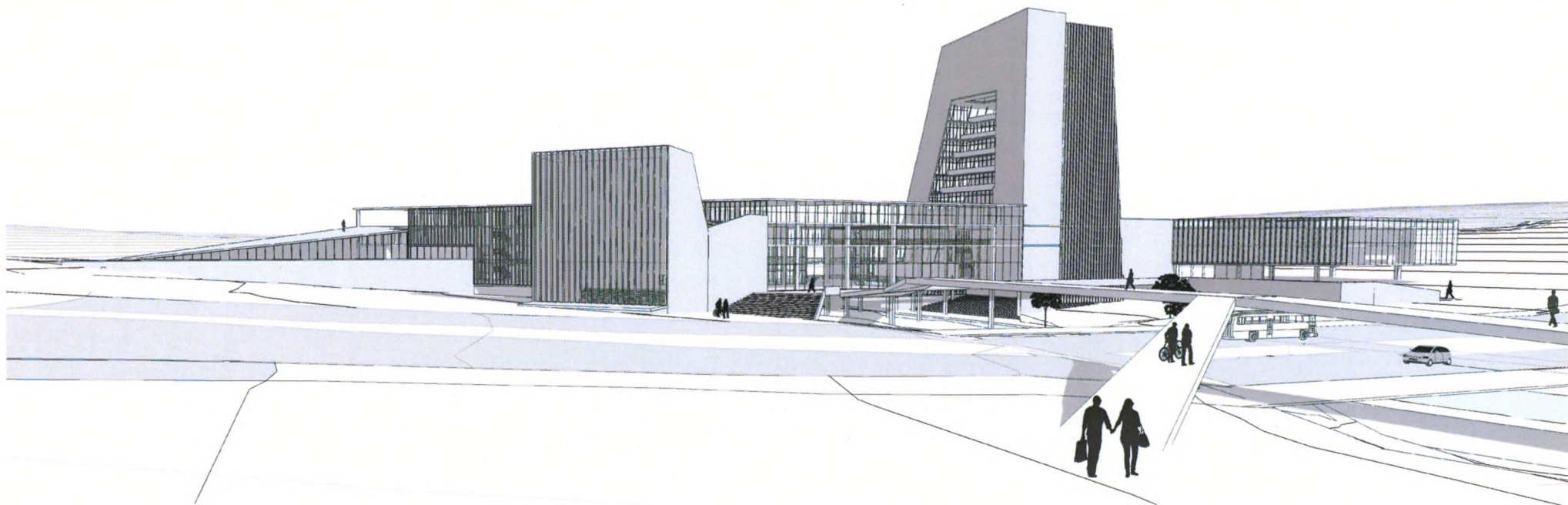


FIG 6.49: Perspective from South West

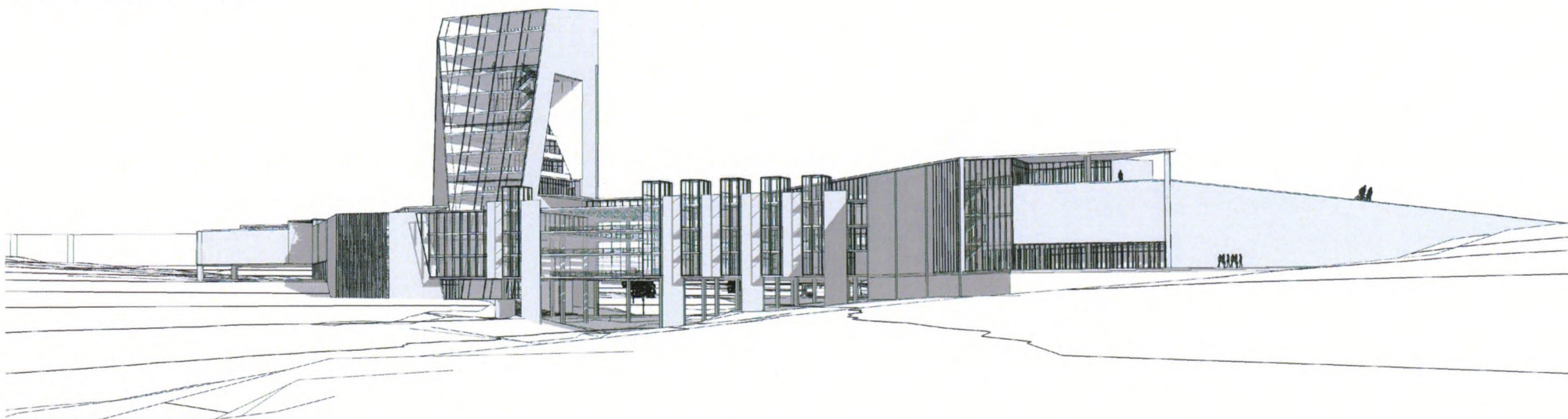


FIG 6.50: Perspective from South West

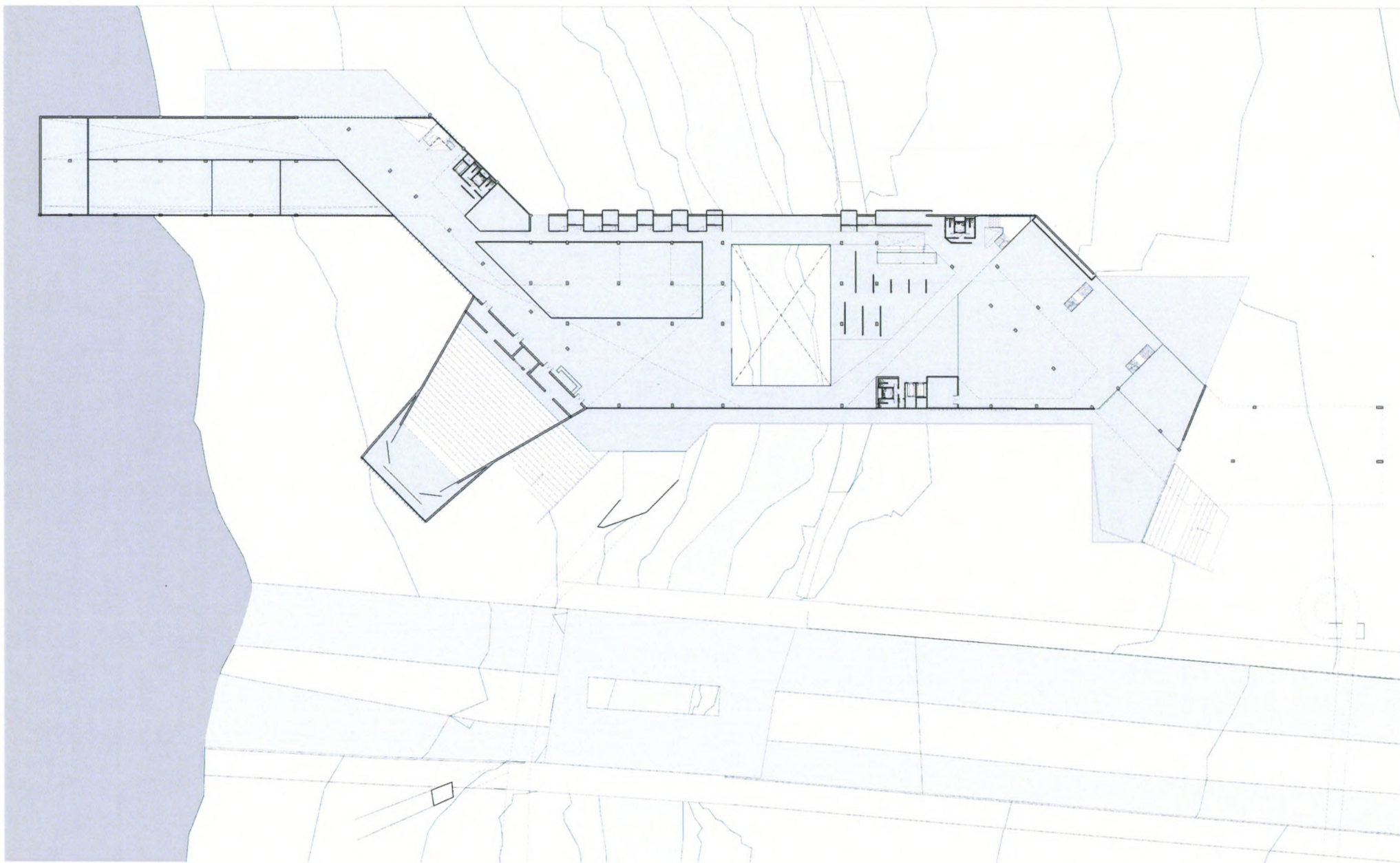


FIG 6.51: Ground Floor Plan

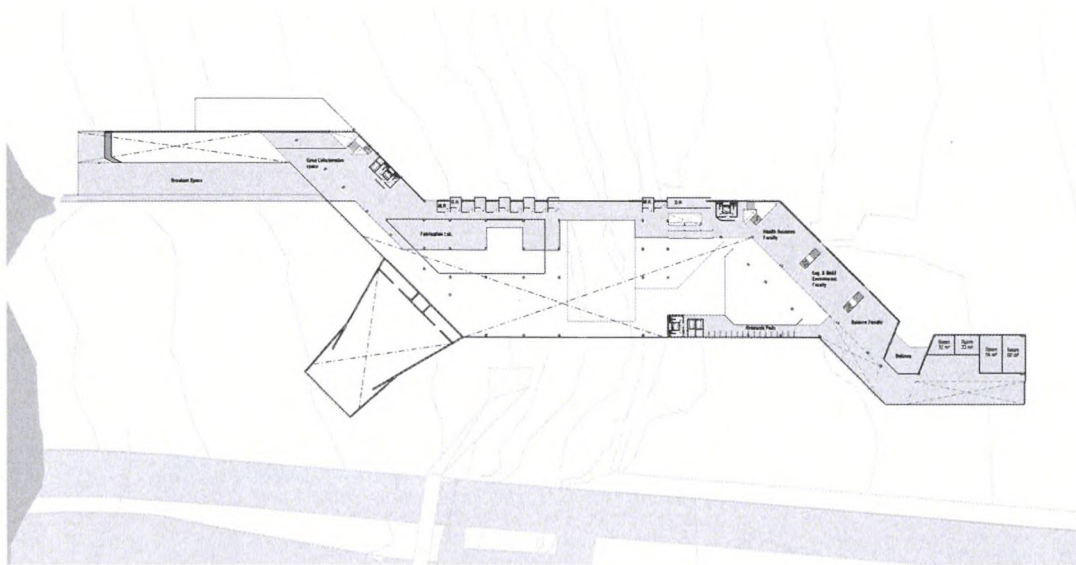


FIG 6.52: First Floor Plan

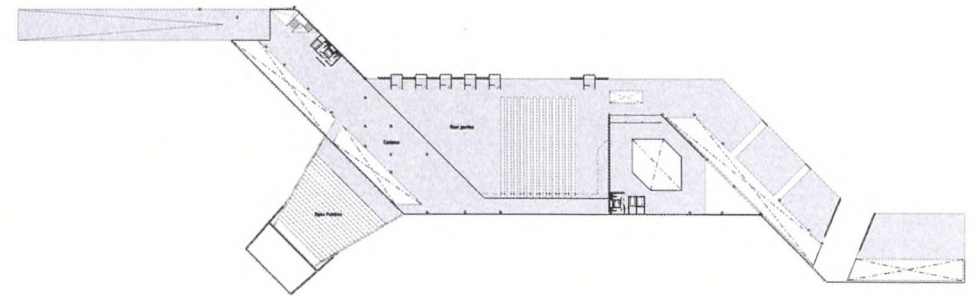


FIG 6.54: Third Floor Plan

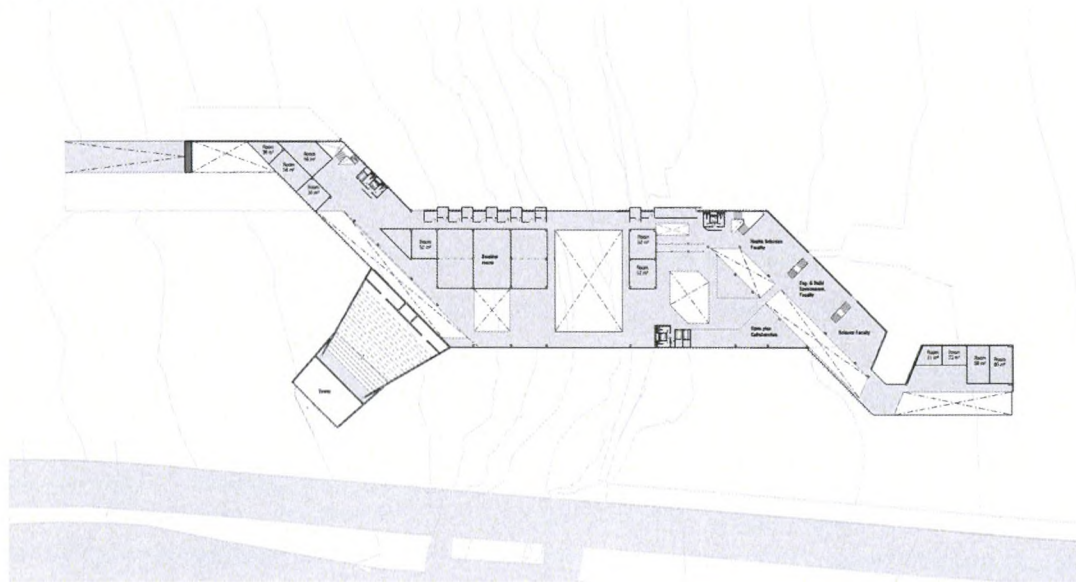


FIG 6.53: Second Floor Plan

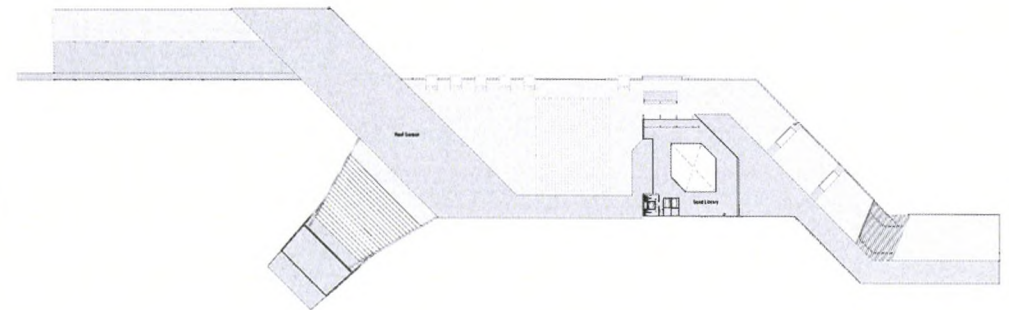


FIG 6.55: Fourth Floor Plan

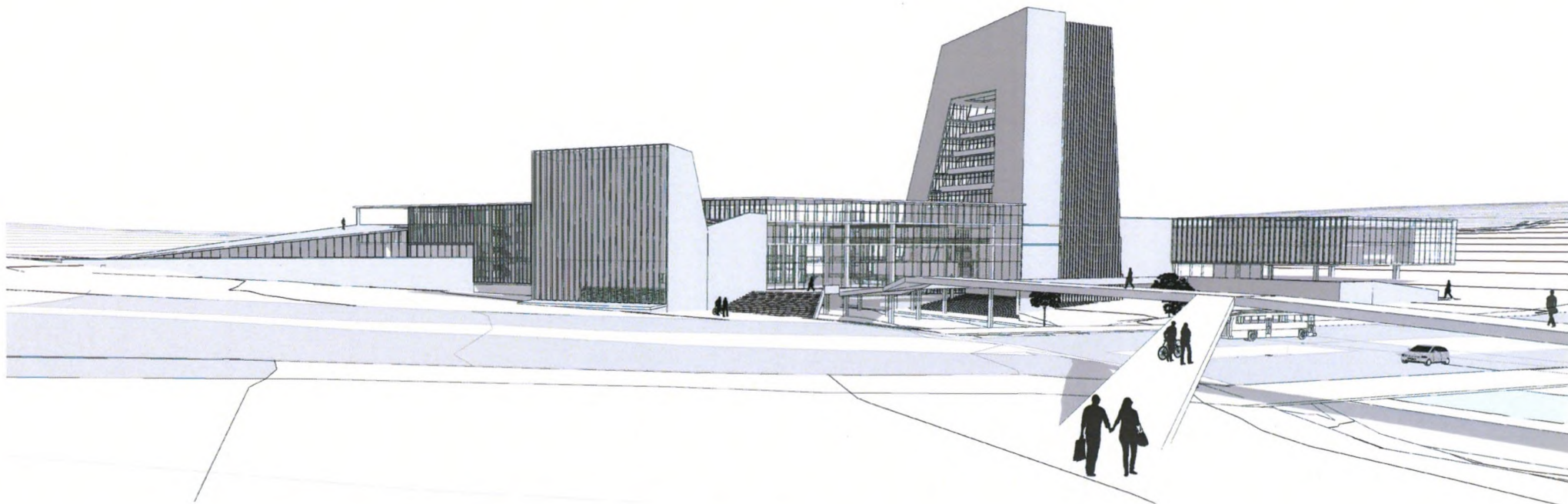


FIG 6.49: Perspective from South West

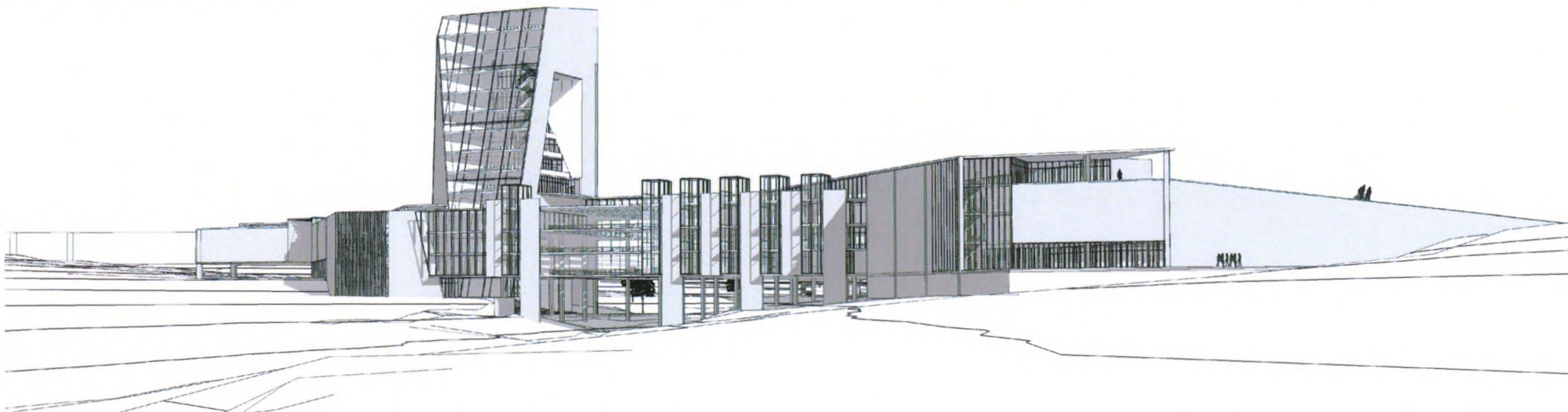


FIG 6.50: Perspective from South West

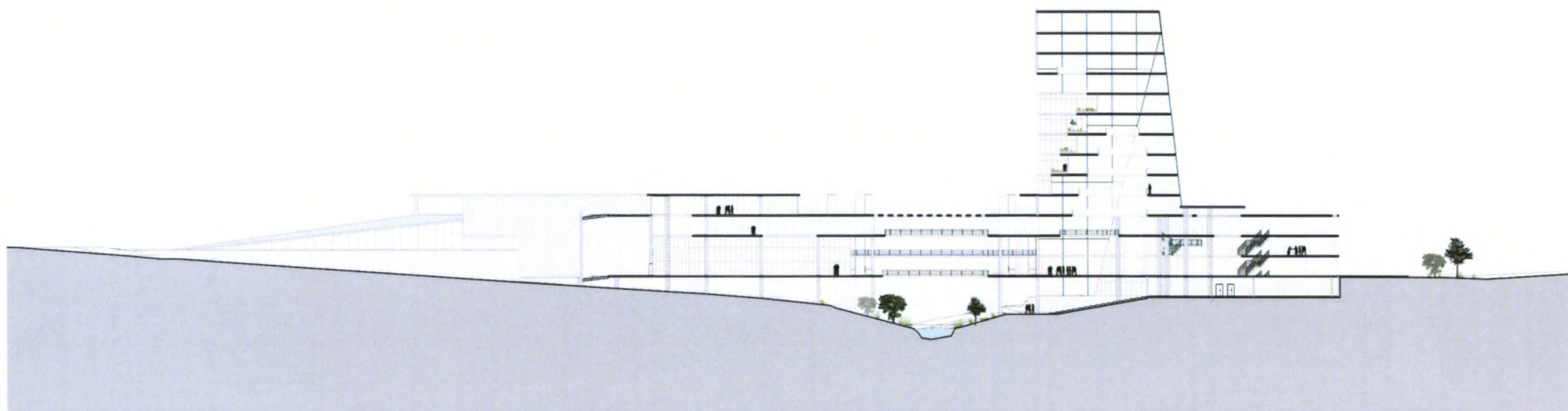


FIG 6.56: Section AA

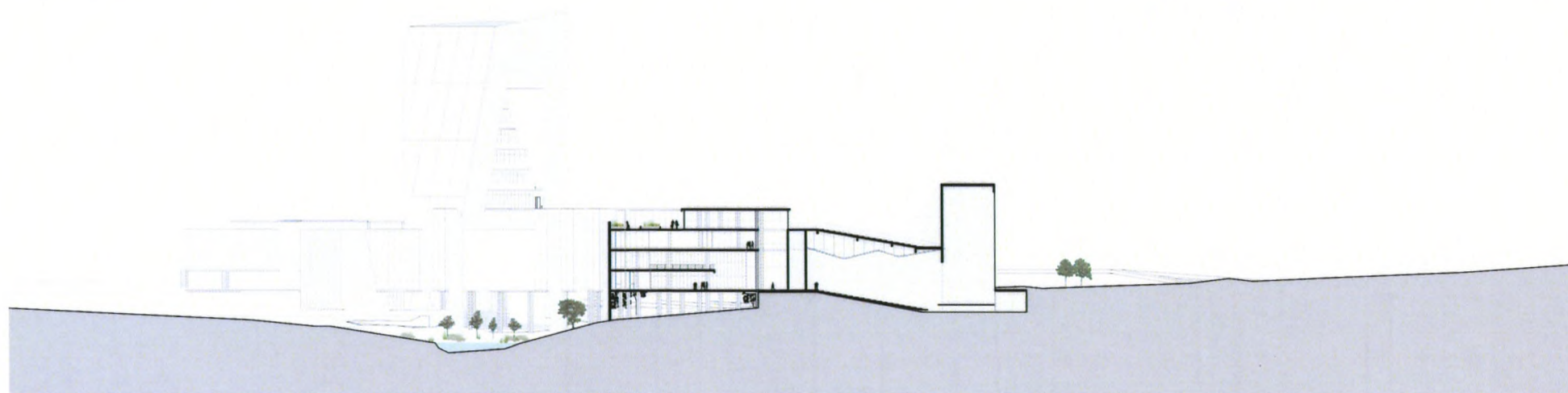


FIG 6.57: Section BB

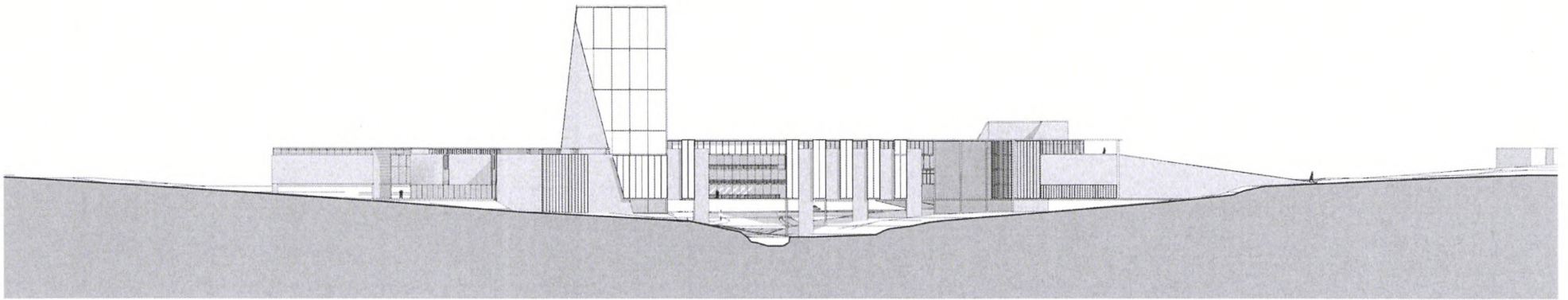


FIG 6.58: North Elevation

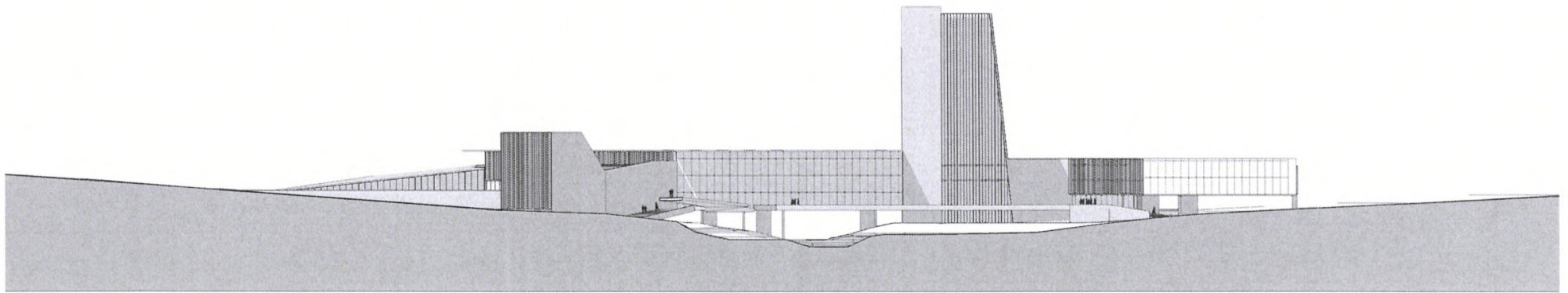


FIG 6.59: South Elevation

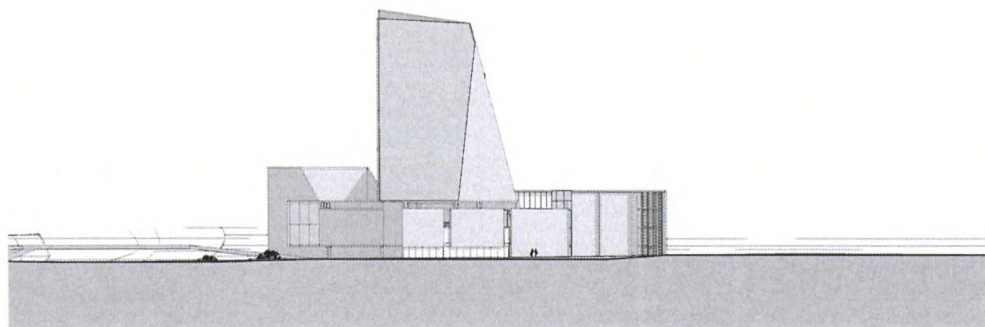


FIG 6.60: West Elevation

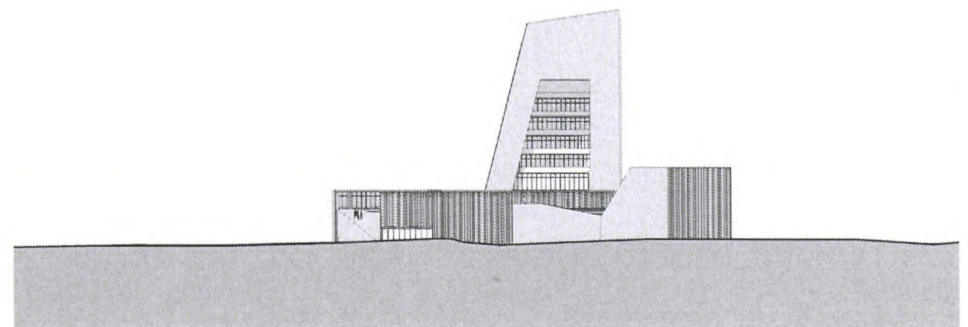


FIG 6.61: East Elevation

Chapter Reflection

This third design approach was done before the majority of the writing of my thesis. After being engaged with writing and researching, I re looked at this design I realized that it did not adequately align itself with my theory and ideas that I had further developed. The buildings scale was too large and unwelcoming. It did not connect and relate to the landscape and it did not celebrate and pronounce the river as I had intended it to do.

Realising this at a very late stage I decide to attempt a new design.

Here upon I realised in retrospect that my previous 3 design approaches were engaging with the 3 university typologies that I had researched. The 'Single Building', the 'Campus' and the 'Megastructure' as displayed on the next page.

SINGLE BUILDING

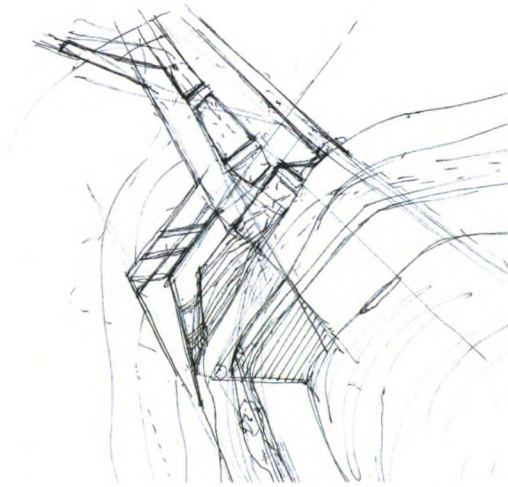


FIG 6.62: Plan Sketch

CAMPUS



FIG 6.63: Urban Sketch

MEGASTRUCTURE

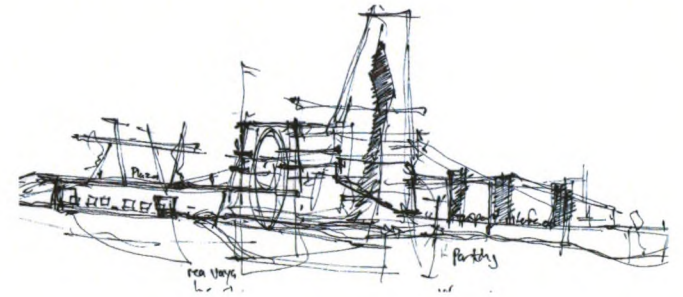


FIG 6.63: Section Sketch



07

FINAL DESIGN DEVELOPMENT

FIG 7

FINAL DESIGN APPROACH

UNIVERSITY TYPOLOGY HYBRID

Having learnt from the process of designing the three different typologies I realised that my intervention must ultimately incorporate the elements which holistically work best from all three.

Ideally my design should have the legibility and accessibility of the 'singular building', the safety and connection to nature of the 'campus' as well as the connectivity and complexity of the 'megastructure'.

My final design attempts to bridge the gap between these three typologies while deeply connecting and entrenching itself in its immediate landscape and surrounding urban community.

PROGRAM

The overall program of my thesis has two distinct but closely related elements.

1) The Foundation Course and Youth Initiative Project.

This component is deeply related to and informed by the local community of Alexandra township. It is intended to support school students from the community by allowing them to more easily access tertiary education and to perform better once they do so. Further more, it provides facilities which allow the community to improve their standard of living and life style.

2) The Transdisciplinary Post Graduate Facility.

This is an satellite facility of the university of the Witwatersrand. The centre offers transdisciplinary degrees at honours masters and PHD levels. It is also a space which welcomes intellectuals from around the world to come visit and engage in the local cultural community and use the space and facilities in the building.

The Landscape Lab is an additional 'program' which both the community and university components can utilise. This consists of pavilions in the landscape which accommodate nature study and field research, as well as space for students to 'escape' and 'retreat' to on the site. Here students can either gather as groups or simply go to quietly and privately to read. The actual built component of this laboratory consists of landscape pavilions and benches under trees.

The core space of this intervention overall is the river amphitheatre gathering space. This acts as the social gathering, intellectual sharing and exhibition space. Each building breaks out onto this area which reinstates it as vibrant interactive space.

The holistic foundation of this project means that teaching of the mind is equally important as teaching the body and 'spirit'. Knitted into the previously mentioned programs, there are spaces to practice meditation, traditional rituals and yoga, as well as, permacultural agriculture farming.

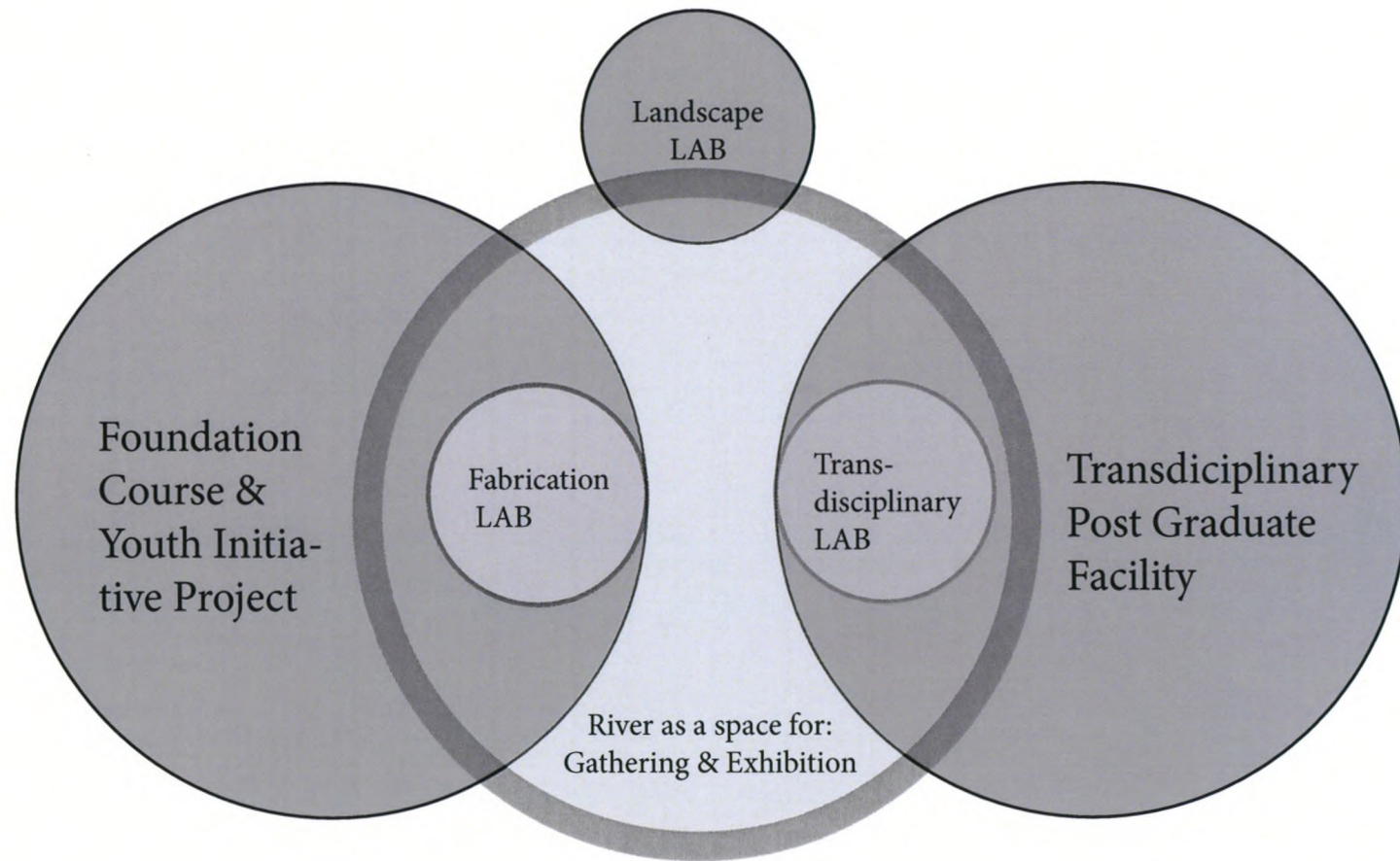


FIG 7.1: Program Diagram

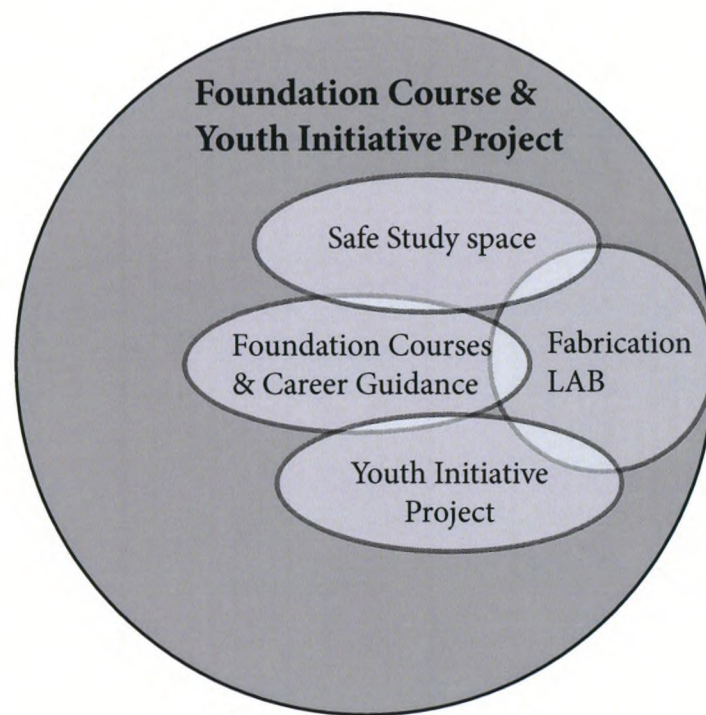


FIG 7.2: Detailed program diagram: Local community focused program

SAFE STUDY SPACE

Many children who live in Alexandra stay in homes in which the conditions are not conducive to learning or homework to be done. In most cases they either do not have decent desk and lighting conditions or the atmosphere at home is too chaotic and disruptive. Responding to this issue, my intervention has a safe study space where children from the local community can utilise as and when they need it.

This space contains open and adaptable seating arrangements to allow for group discussions as well as quiet individual learning areas. The space also has laptops which children can use while they are there. The close connection of this facility to the university allows for a mentoring and tutoring opportunities.

FOUNDATION COURSES AND CAREER GUIDANCE

The failure rate statistics which I received from the Wits Academic Information & Systems Unit (AISU) show a huge problem with the failure rate of first year students. Specifically looking at the three faculties of my intervention, there is a 60-80% failure rate in 1st year. From my analysis of these statistics I found that 60-80% of students in 1st year drop out because of the disinterest or the misunderstanding of the reality of the degree they have chosen. Furthermore, 20-40% of students fail because they were not prepared enough for 1st year, and inevitably return to repeat the year.

In addressing these factors, my intervention contains a foundation course facility with a flipped learning approach which will aim to better prepare students for 1st year. 'Flipped learning' is an approach where students will study the information required on their own through a MOOC (the MOOC which will be created in the building) thereafter the students gather with a teacher and they discuss and apply the information from the MOOC accordingly.

Career guidance is also offered to students from the local community. The transdisciplinary nature of the building creates a stimulating space where students can be exposed to various types of work being studied in the building.

YOUTH INITIATIVE PROJECT

The YIP is a program whose primary concern is strengthening the ability for young people to cultivate a positive social, cultural, environmental and economic change in society. YIP places a huge emphasis on combating climate change and the elimination of social injustice and poverty in the world. The program brings together youth from all walks of life who are seeking their passion in the world. Here they are guided and equipped with practical and theoretical knowledge which can help them initiate positive changes in their communities.

FABRICATION LAB

The Fabrication Laboratory (Fab Lab) is a perfect place to engage with processes of making. A Fab Lab is a space which allows the local community members to participate in a supportive environment in order to develop and fabricate products which will address their local community and personal needs. The Fab Lab would contain various digital fabrication machinery, such as, laser, plasma and water jet cutters, 3D printers, circuit board and electronic equipment. There will also be access to conventional manual machinery such as table saws, drills, belt sanders, etc.

LANDSCAPE LAB

The landscape lab encompass various activities which occur on the site as well as the habitable roofs of the building. Such activities are:

- Landscape pavilions which create shaded spaces in the landscape which allow students to appropriate as they need.
- Studying of indigenous fauna and flora, as was done historically by with students in the past.
- Practicing and teaching of various cultural and traditional rituals.
- Quiet space for mediation practice.
- Teaching of biodynamic and permaculture farming methods.

The site holds great potential for many other such activities in its future development.

TRANSDISCIPLINARY LAB

This is one space where all the labs from the differing faculties will share a single open and transparent area. This facilitates seamless research, concept and idea sharing between the different schools of thought. This lab is the hub and connection point between the faculties and is an important place to practice experiential learning.

This lab will not contain all the equipment that each faculty would normally use if it had a dedicated building, as this would be an overly expensive and practically complex space. This lab contains the essential and most commonly used equipment to support transdisciplinary research.

The open and adaptability of this space is important as technology is constantly developing. Machinery and research methods are constantly developing and the space needs to reflect this nature.

FACULTIES

Addressing the need for a transdisciplinary approach to learning and research, creates a space where the borders between the faculties are diluted to foster a more holistic and rounded education.

The faculties that I have chosen for this intervention are: Science, Health Sciences and Engineering and the Build Environment. I have chosen these faculties because they are involved in a type of engineering and research that is becoming more prominent in our modern technological development.

The centre offers transdisciplinary degrees at honours masters and PHD level. Here students are supported to design their on curriculum in guidance from faculty members and students have access to space

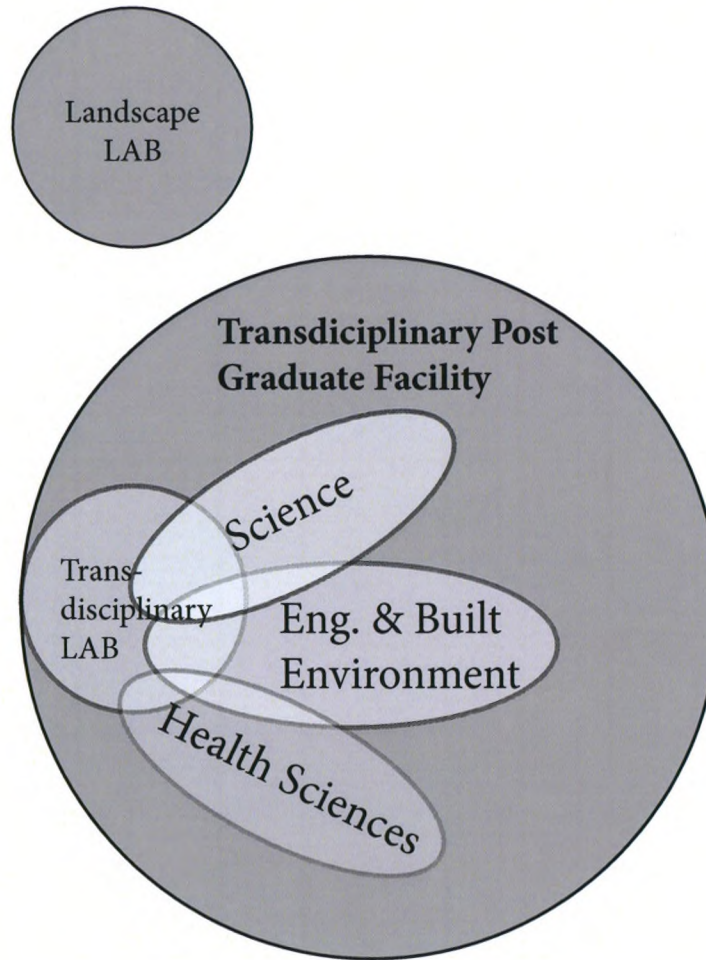


FIG 7.3: Detailed program diagram: University focused program

SPATIAL ARRANGEMENT

The spatial adjacencies of the programs are a vital aspect of the intervention. The connectivity and flow between the different programs are important to the functioning of the building. This diagram along side shows the important connections between the different programs.

Instead of allocating separate space for each of the three faculties, I decided to dilute them into one another by creating three programmatic masses where the faculties can appropriate them as they need. The 'quiet space' is a place where students can go to do individual learning. This is an adaptable space where students can appropriate it as they need. The 'intermediate space' is a space for semi quiet group learning and contains hot desks for academics. The 'loud space' is a space where for gathering of large groups of students and to accommodate and engage loud and passionate group interactions.

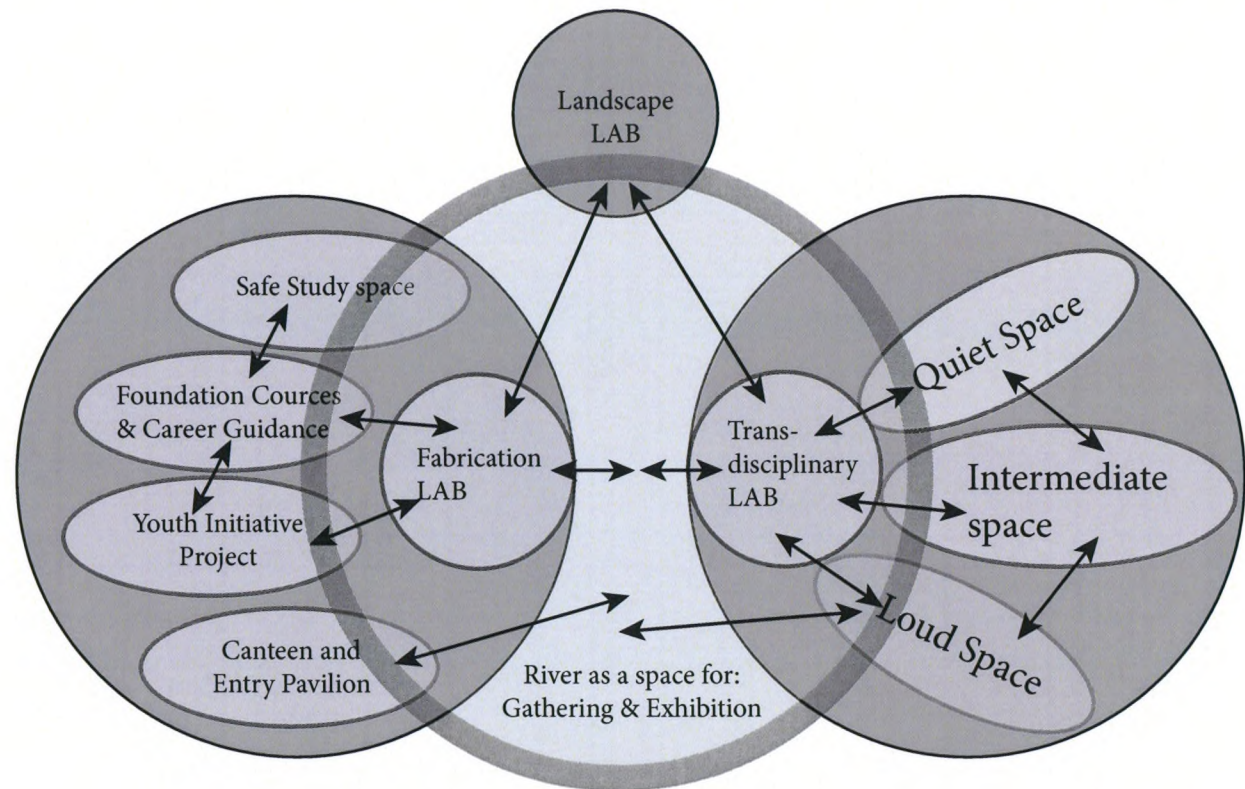


FIG 7.4: Spatial arrangement and adjacencies diagram

BRAIN METAPHOR

The programmatic massing of my intervention is a metaphor of the brain. For the purposes of this diagram the left and right sides of the brain are switched. I have done this to correctly relate the diagram to the site. Therefore the right side of the brain is represented by the red hemisphere and left side of the brain is represented by the blue hemisphere in the diagram.

The red part of the brain in the diagram represents the community aspect of my intervention. This hemisphere of the brain as well as this part of my intervention, engages with processes such as creativity, emotion, intuition, holistic thought and art. Balancing that component of the project is the blue part the diagram and brain, which represents the university aspect of my intervention. This hemisphere engages in logic, analysis, linear thinking, mathematics and facts.

The river acts as a place where these two opposing elements can meet and learn from one another. The river has always been seen as a place of gathering throughout human history and I intend to reconnect to this historical culture in the intervention.

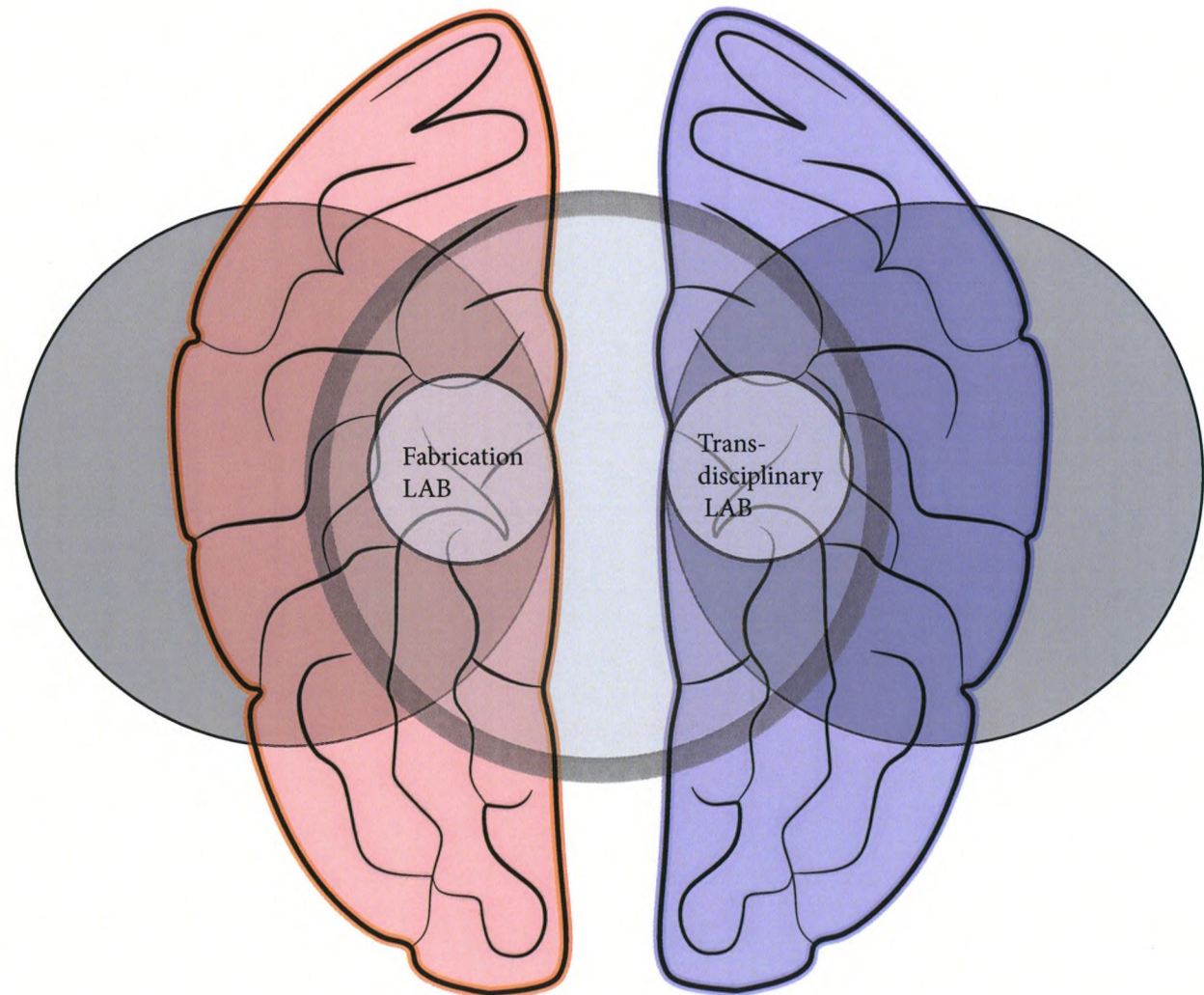


FIG 7.5: Metaphor for the brain

OVERALL SCHEME

The overall scheme is deeply influenced by its local context. It does not function in isolation but responds to and supports existing infrastructure and the socio-economic and socio-political influences in its context.

The intervention becomes a platform where various NGOs can meet and collaborate. This couples on effectively with the connection to the youth initiative project where students can learn from existing initiatives which are currently being implemented by these NGOs.

Further more the system supports and collaborates with the existing schools systems. The flipped learning approach of the foundation course will act as a precedent for possible future implementation of this approach into the school systems in South Africa.

The intervention plugs into the existing tertiary education system in Johannesburg. Students who are studying single discipline degrees at any university would be able to come to this building and engage in short courses to broaden their scope of knowledge. The building acts as an intermediate platform where intellectuals from various universities can gather to collaborate and share their knowledge. Instead

of building new housing for intended visiting intellectuals and students, my proposal is to create a room rental scheme in the existing houses within Alexandra. This scheme will allow for visitors to rent rooms in local houses thus experiencing the cultures and fabric of local communities. The surplus income can go back into developing the built environment within Alexandra.

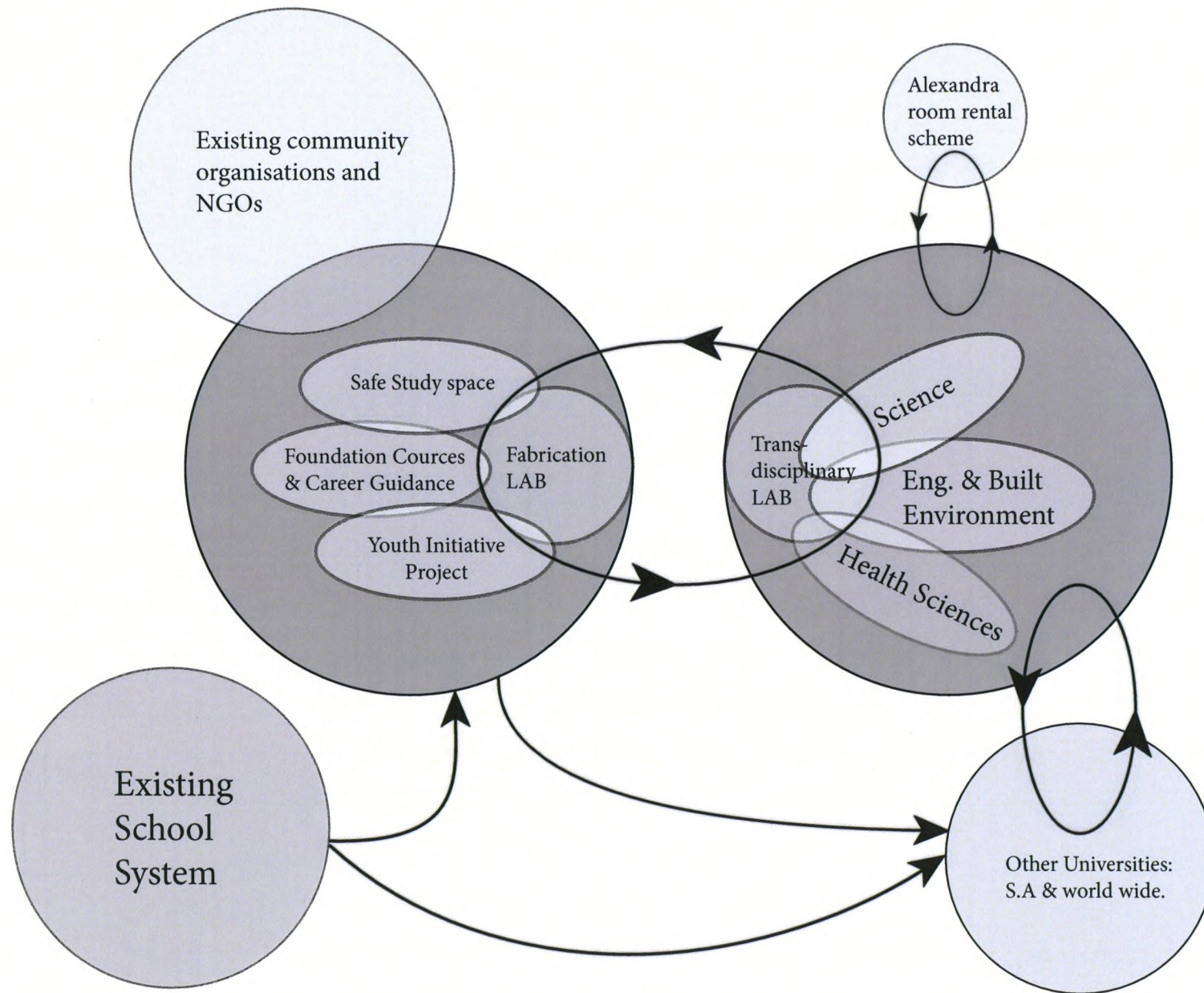


FIG 7.6: Schemes contextual relationships

EXACT SITE POSITIONING

The exact siting of the intervention was chosen to allow for the building to be far enough from Malborow drive to minimise traffic noise while still being close enough for easy pedestrian access. The position along the river was chose at a point where there are little no trees which would be required to be cut down.

The existing dilapidated plastic factory as seen in FIG: 7.9 would be removed.



FIG 7.7: Site: View river looking towards Malborow drive and Gautrain flyover.



FIG 7.8: View from pedestrian bridge



FIG 7.10: Jukskei river edge on site



FIG 7.9: Positioning of exact site.



FIG 7.11: Site: View from exact site looking towards Malborow drive.



FIG 7.12: Site: View from existing factory looking eastwards.

EXPLORATION SKETCHES

My design intention is to accommodate each program mentioned previously in its own free standing building, all of which are clustered together. This allows for each program to act individually but still maintaining the connectivity between them all. Seeing that each of these buildings are relatively small, my design development will look at them all. This is especially the fact because I see this design as a cluster of small individual buildings which function as a single building with the landscape weaving between the different programs.

Moving away from the angular forms of my previous designs, this design attempt to create forms which are more welcoming and comfortable. The masses are shaped by the mutual relationship between the programmatic requirements and pedestrian movement routes on site. Inspired by my student movement analysis in chapter three (pg 70) and organic fractal forms, this design attempts to initiate a meeting point between African indigenous typologies and contemporary architecture. The spaces themselves are intentionally simple to allow for legibility and adaptability.

Please watch the short video titled '*02-Design Development*' in the attached CD which shows a graphical representation of my design development.

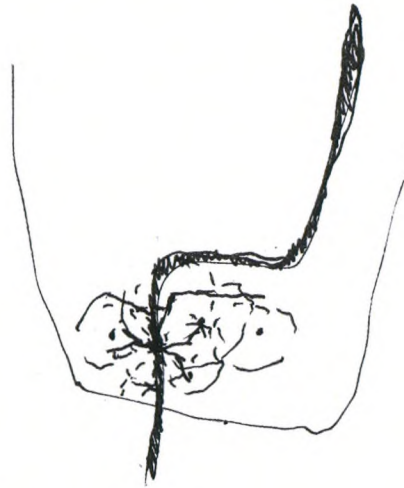


FIG 7.13: Concept

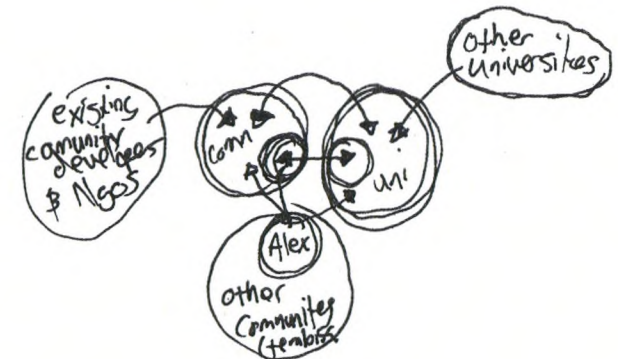


FIG 7.15: Massing concept

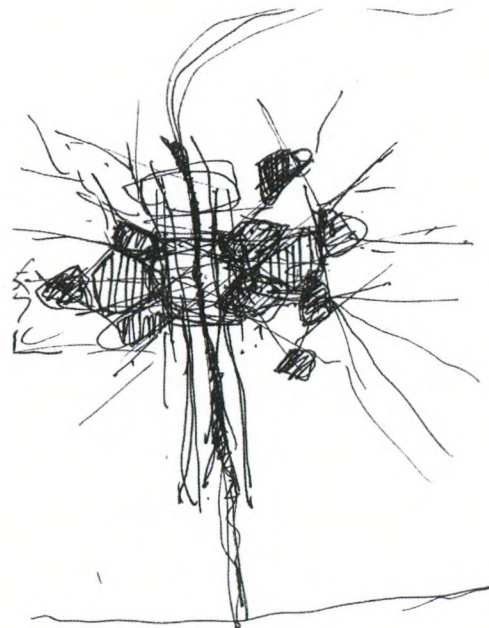


FIG 7.14: Massing concept



FIG 7.16: Growth concept

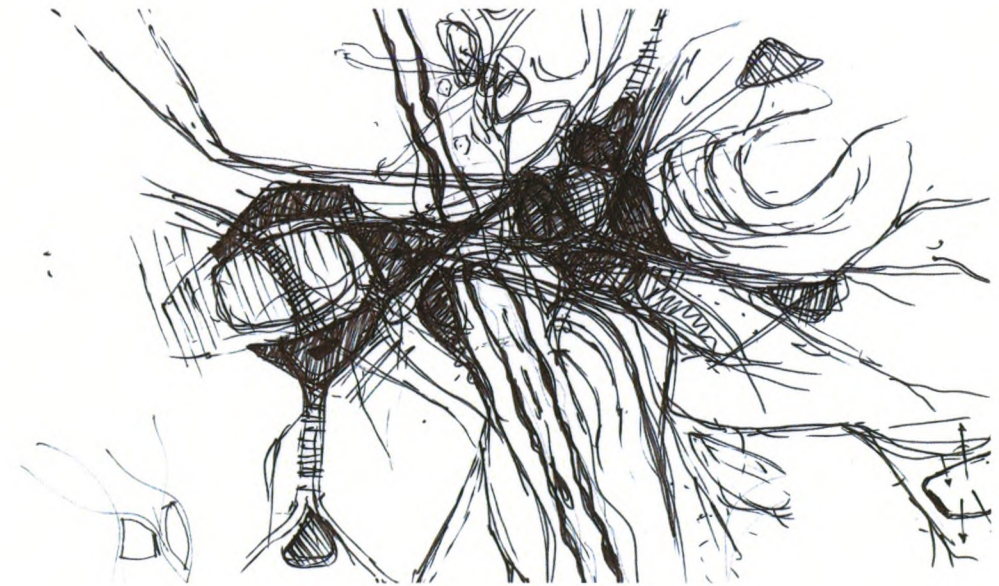
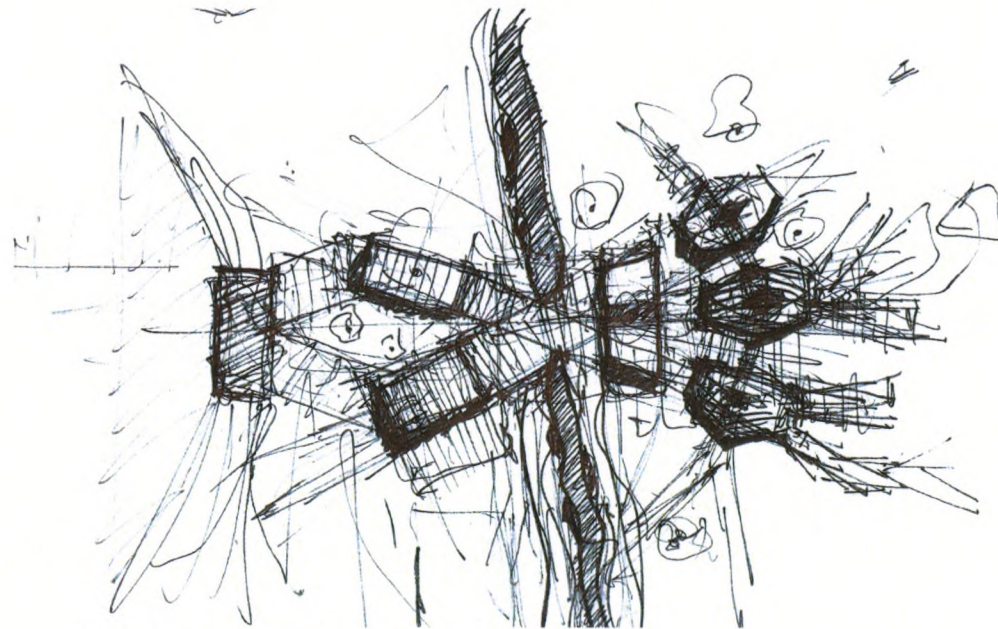
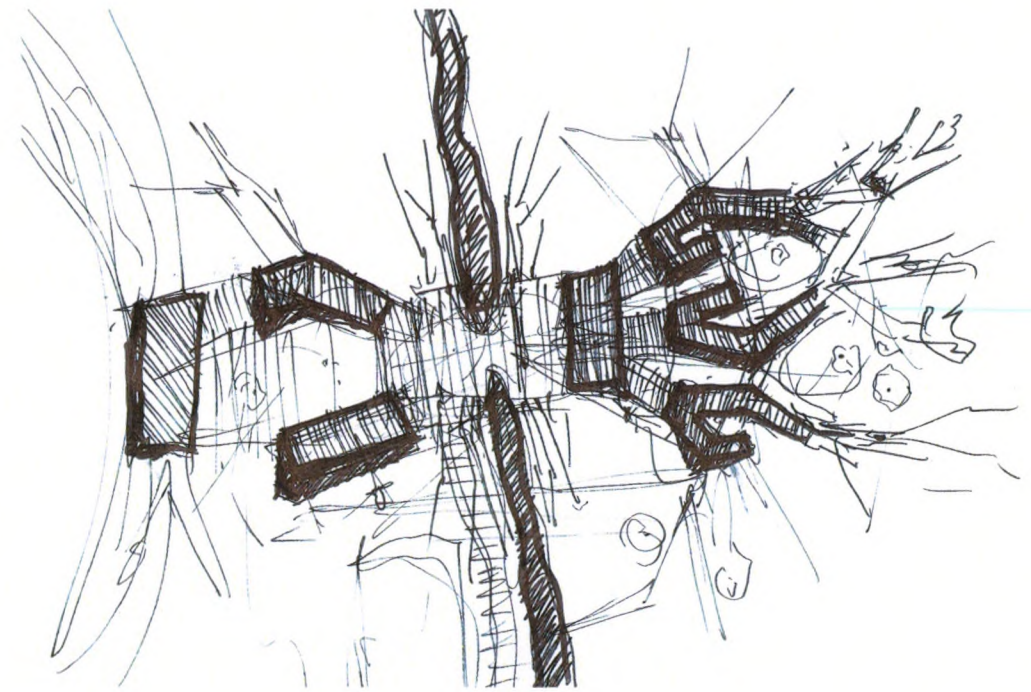
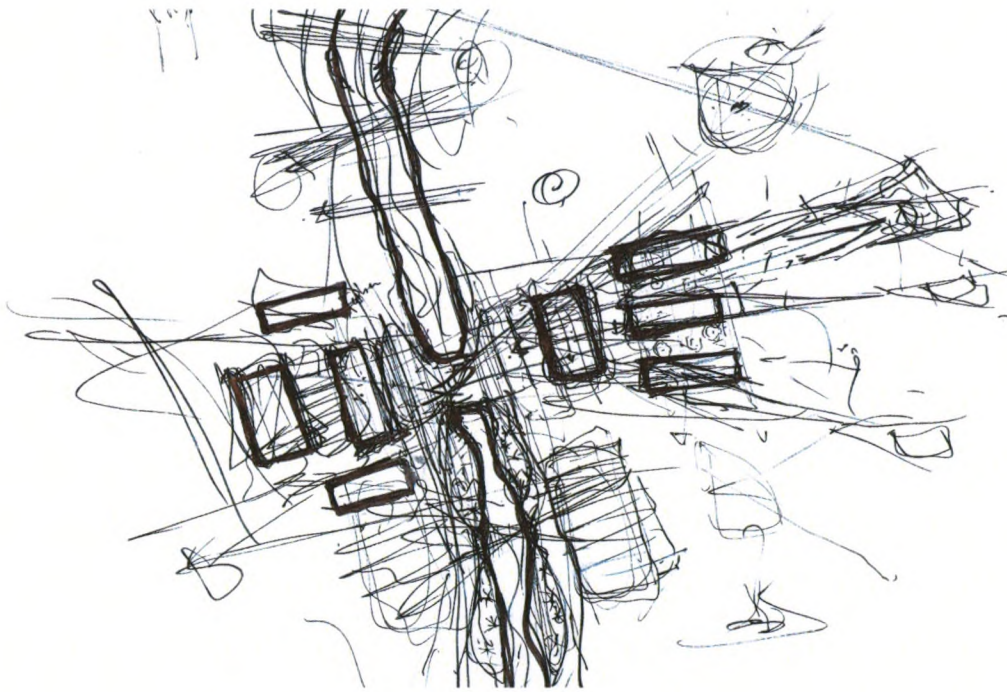


FIG 7.17: Four design process sketches



FIG 7.18: Perspective along promenade

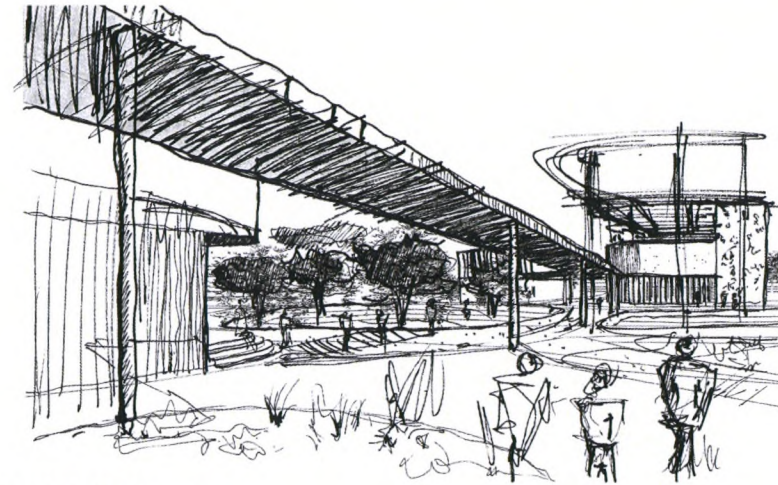


FIG 7.21: Sketch perspective

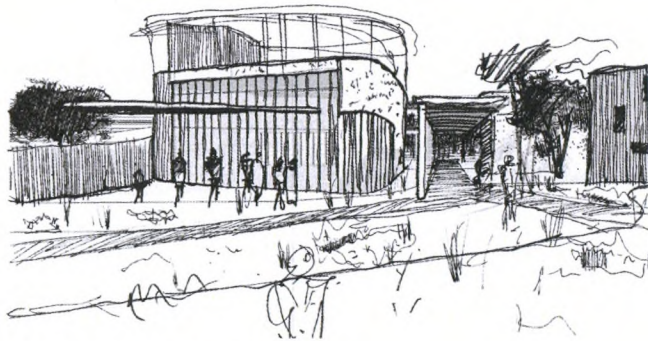


FIG 7.19: Perspective of gathering building

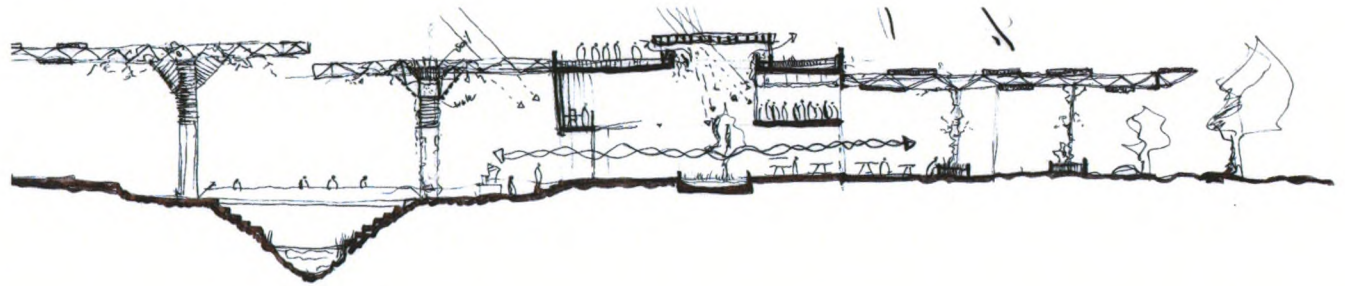


FIG 7.22: Sketch section



FIG 7.20: Long section sketch

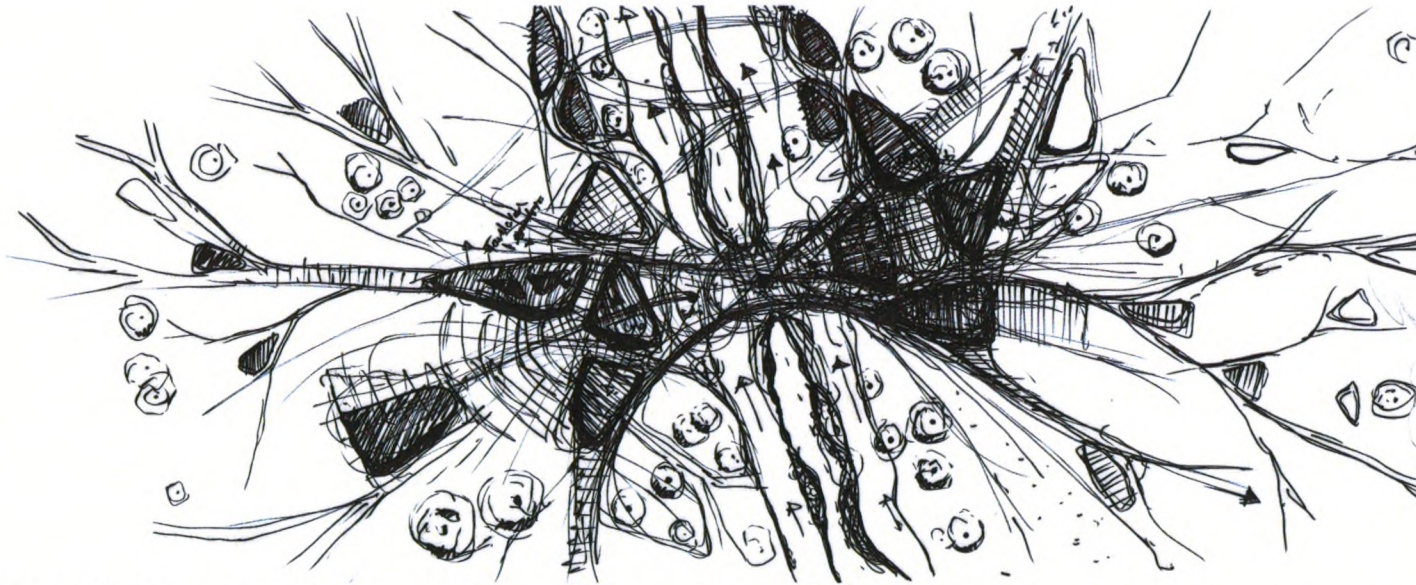


FIG 7.23: Initial design development plan

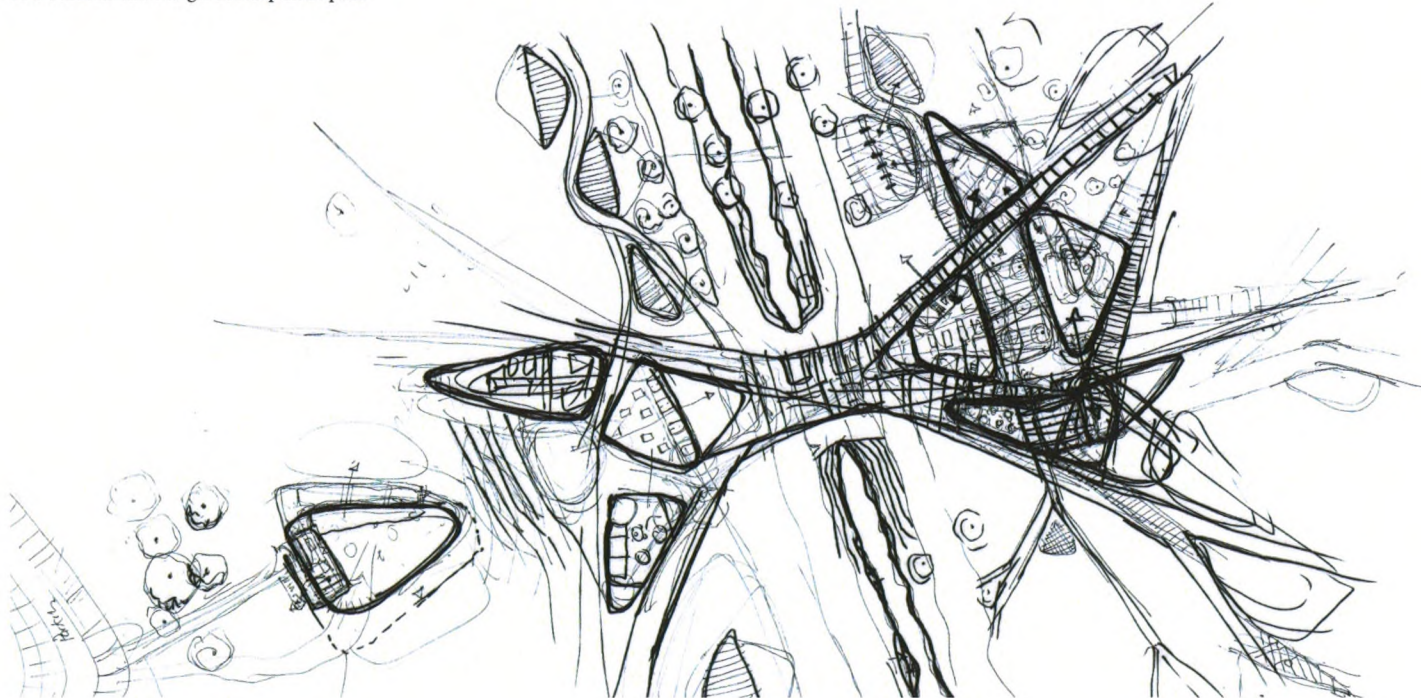


FIG 7.24: Initial design development plan

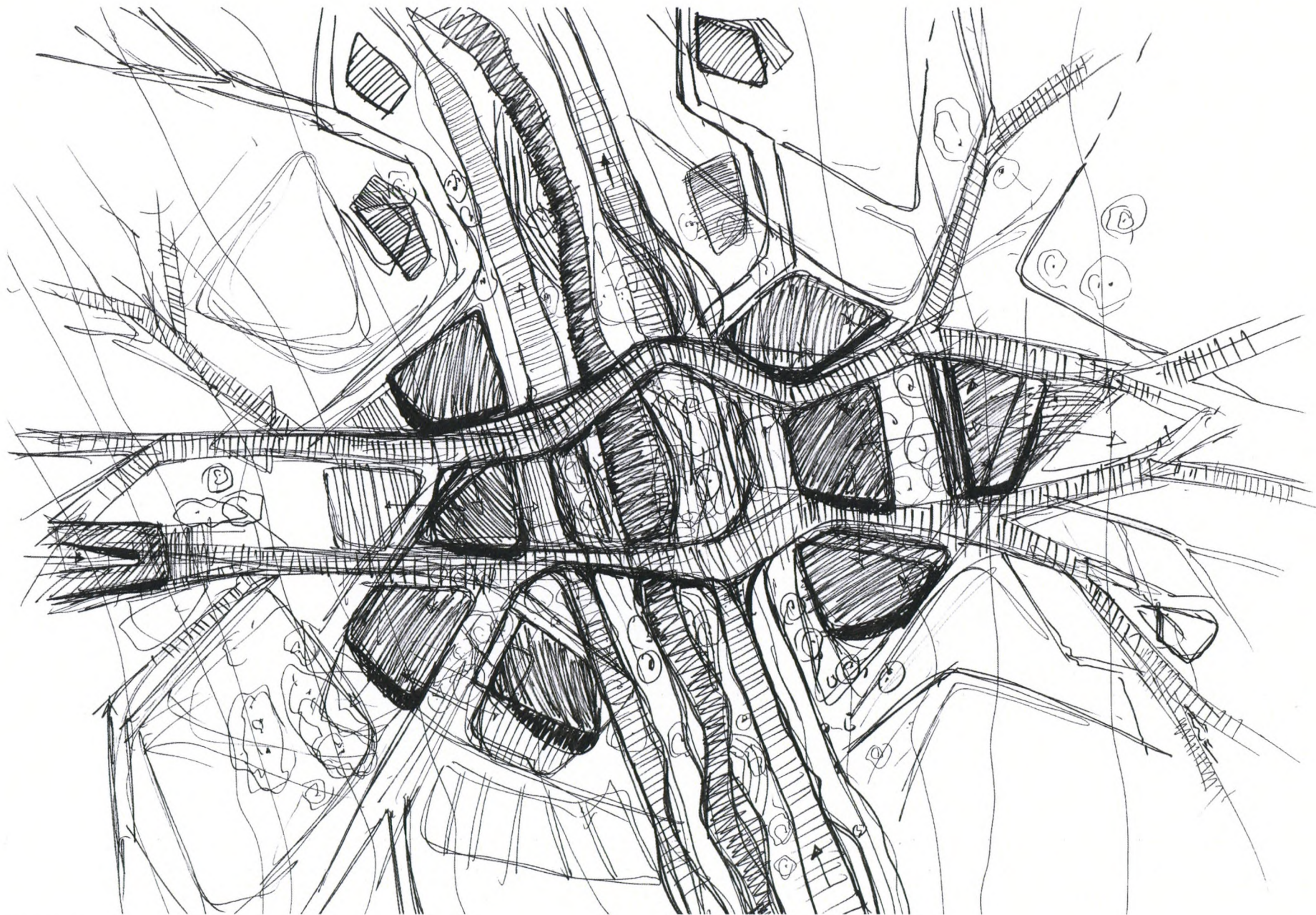


FIG 7.25: Design development roof plan

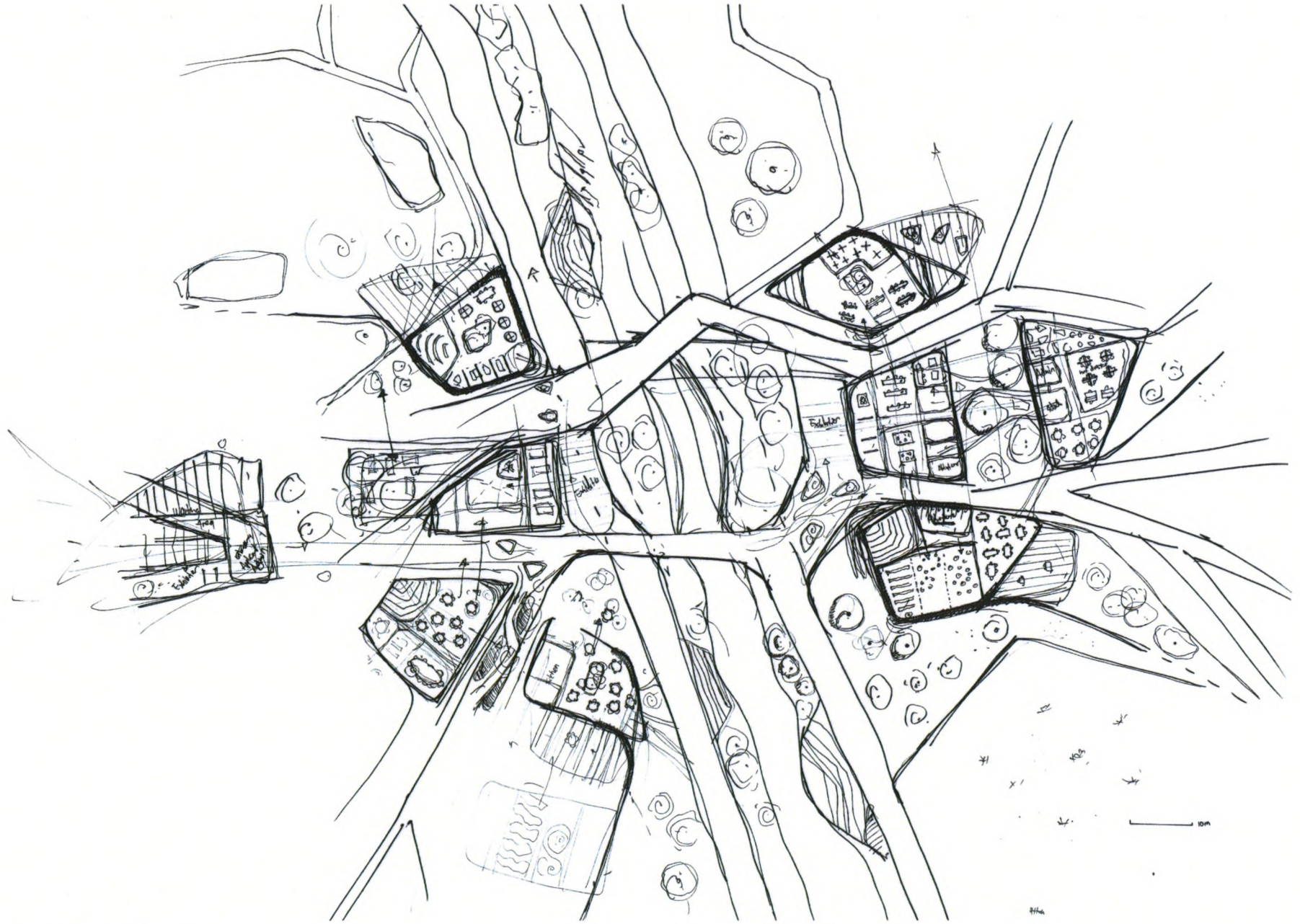


FIG 7.26: Design development floor plan

FINAL BUILDING DESIGN

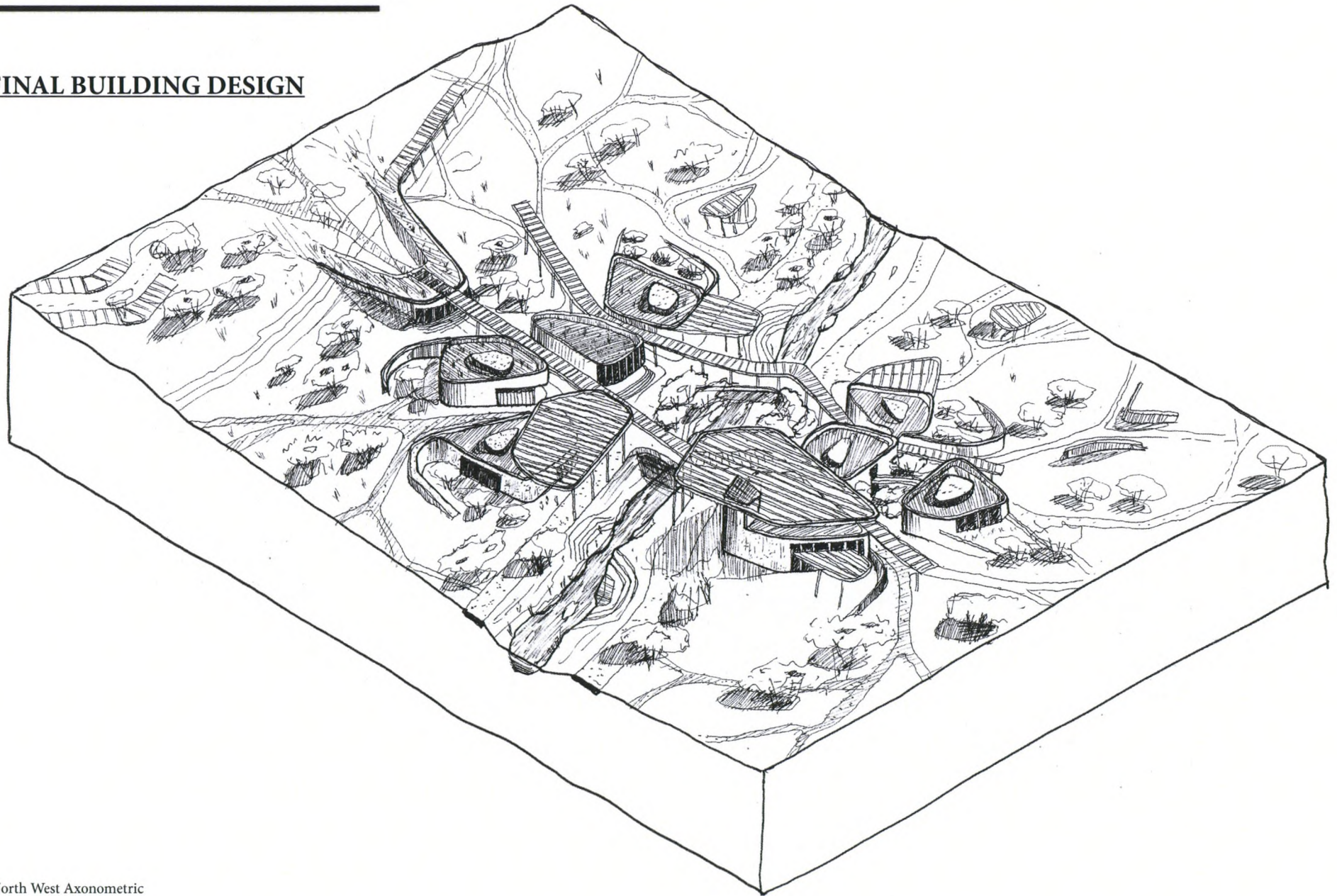


FIG 7.27: North West Axonometric
Scale: 1:2000

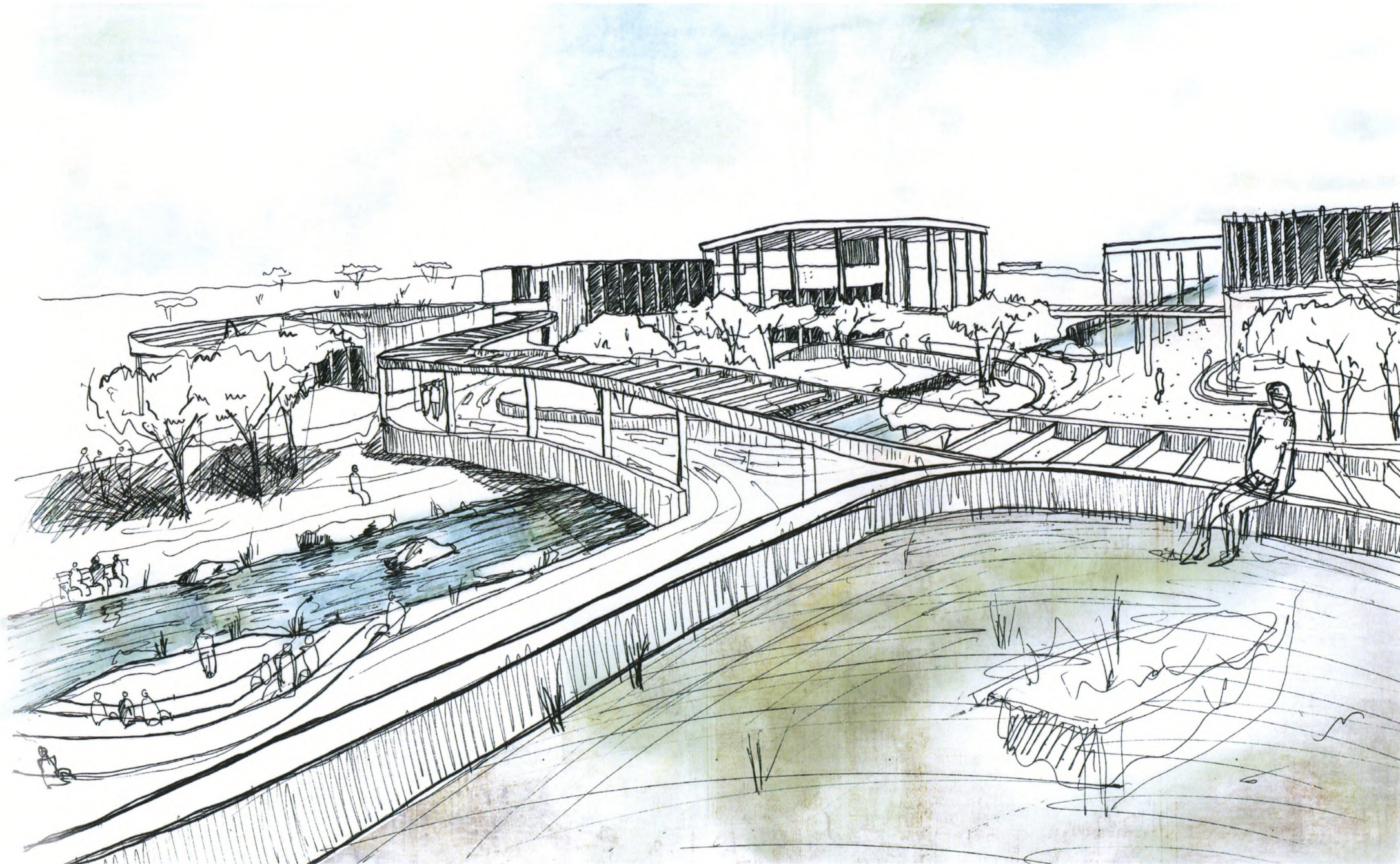


FIG 7.28: External perspective: View from community study space roof top

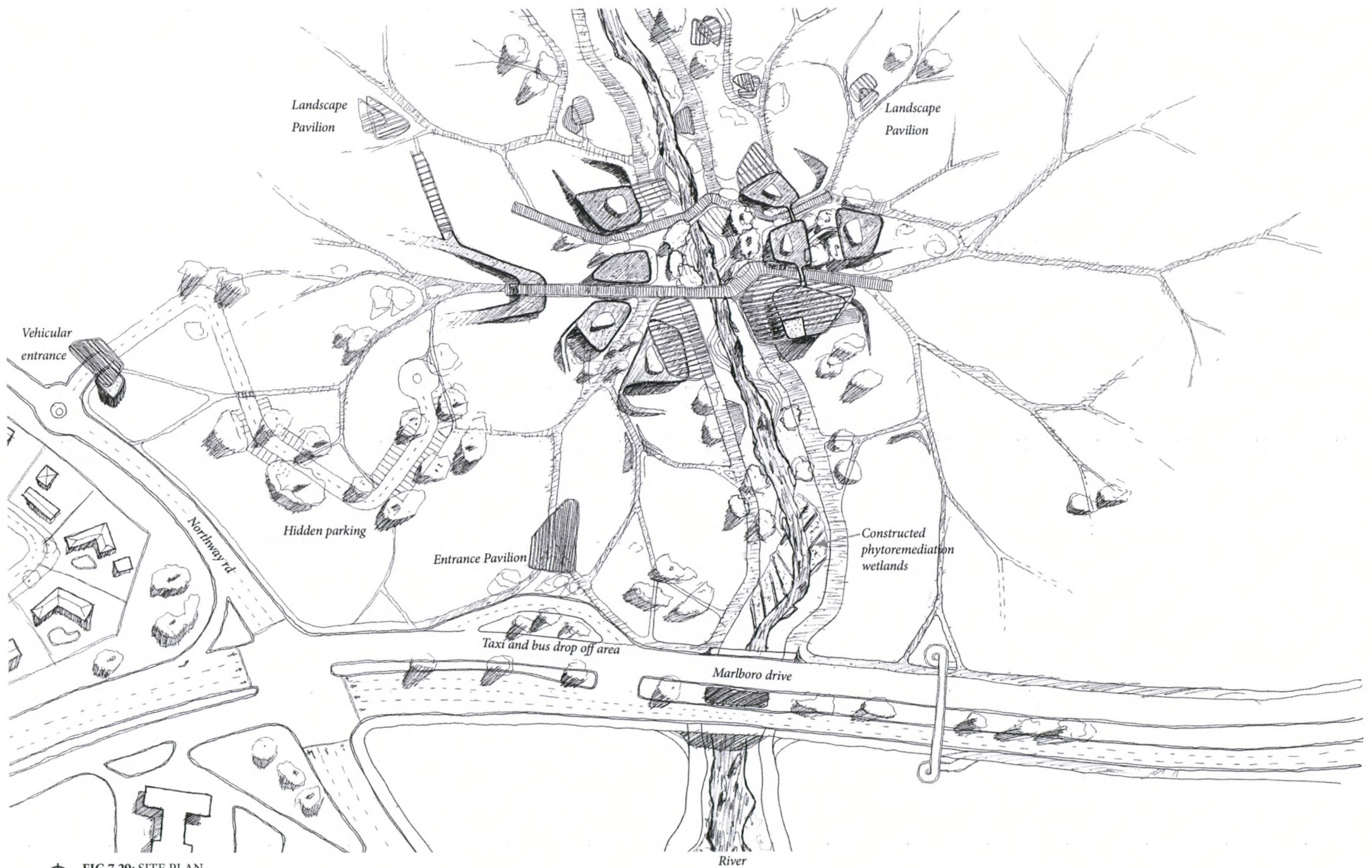


FIG 7.29: SITE PLAN
Scale: 1:2000

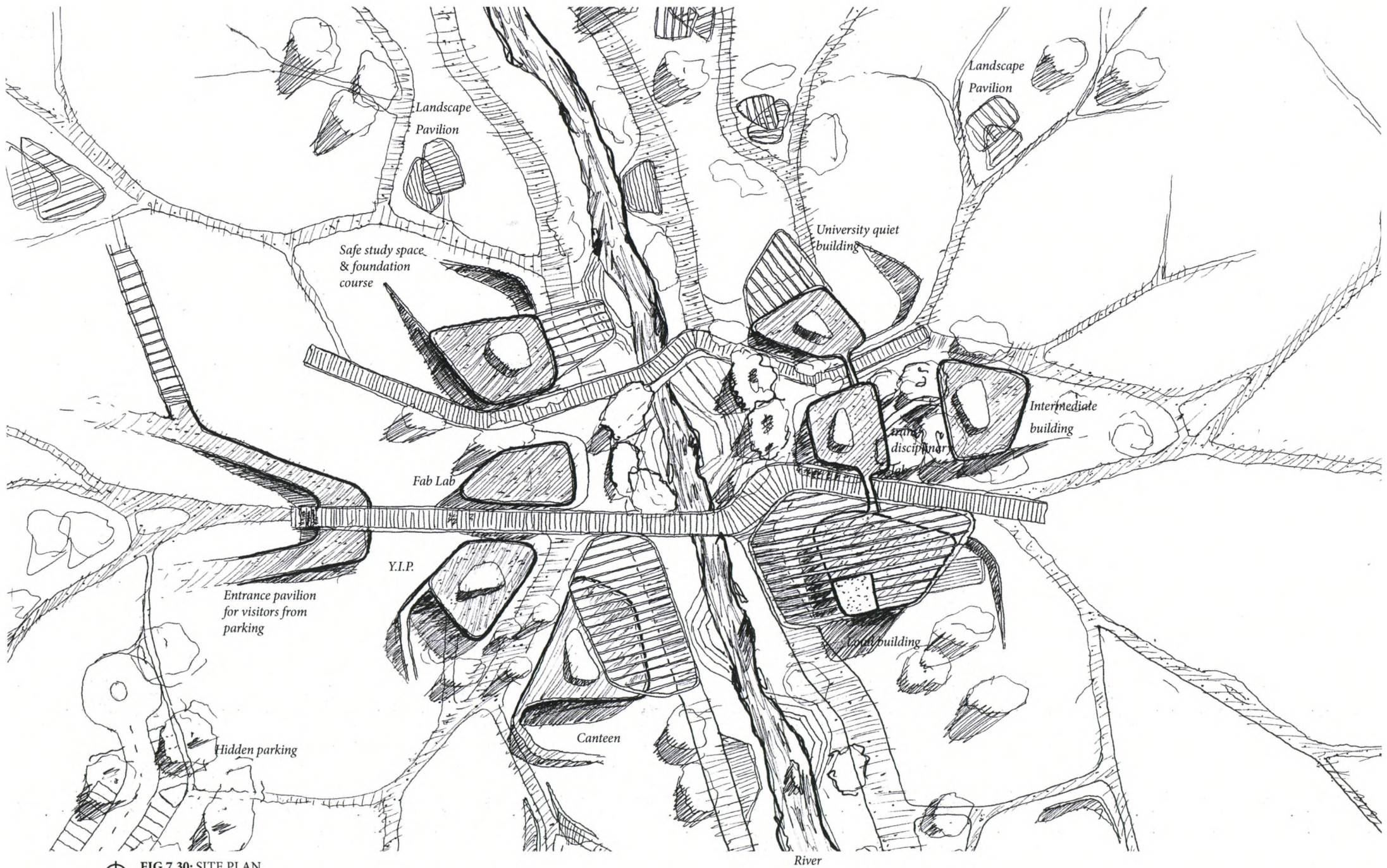


FIG 7.30: SITE PLAN
Scale: 1:1000



FIG 7.31: GROUND FLOOR PLAN
Scale: 1:500



FIG 7.32: FIRST FLOOR PLAN
Scale: 1:500

Final Design Development



FIG 7.33: SITE PLAN
Scale: 1:500

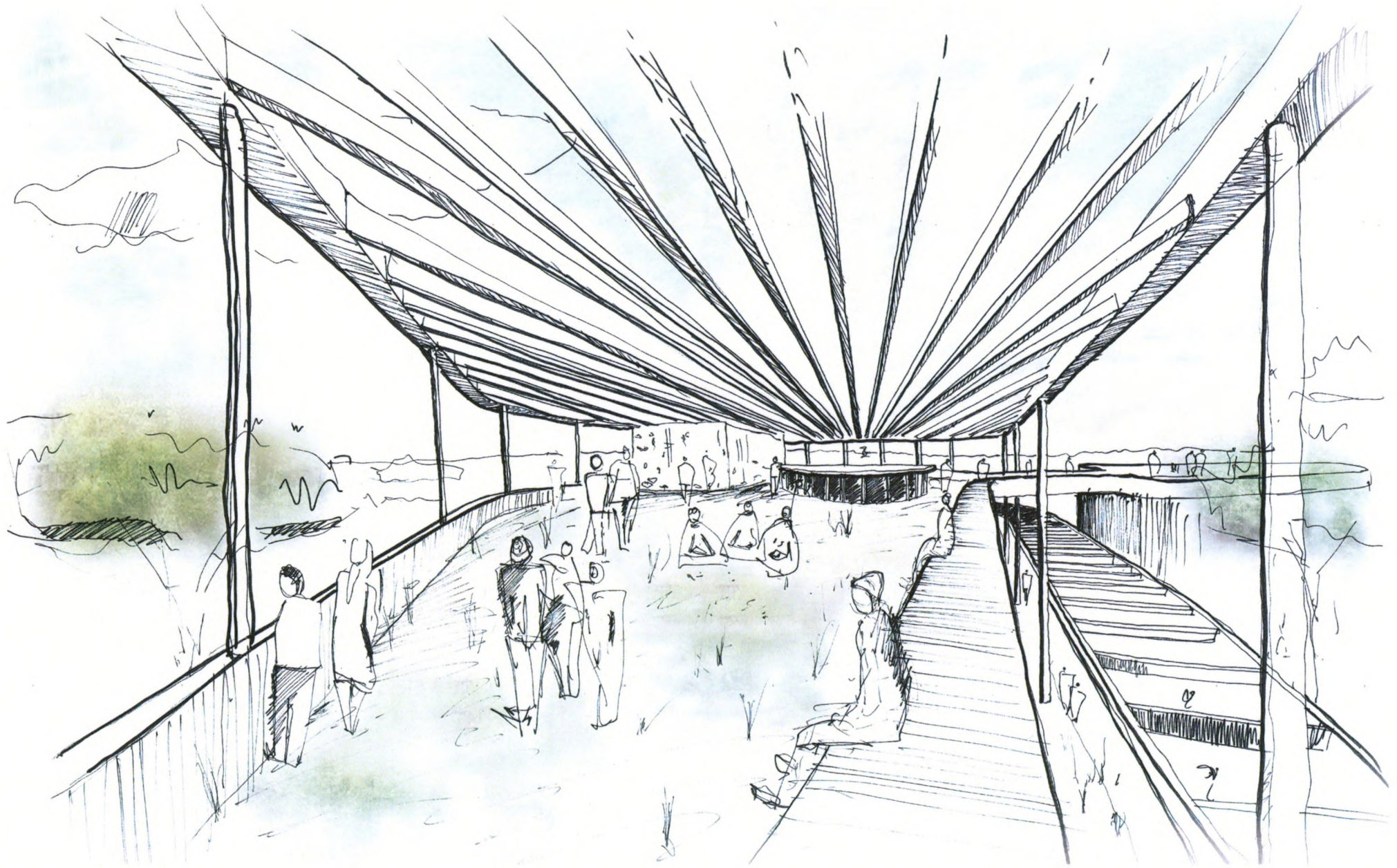


FIG 7.34: Roof top garden

MATERIALITY



FIG 7.35: Indigenous Acacia trees of the site.



FIG 7.36: Off shutter concrete bridges



FIG 7.37: Timber decking at waters edge.



FIG 7.38: Alternating patchwork of concrete steps and grass.

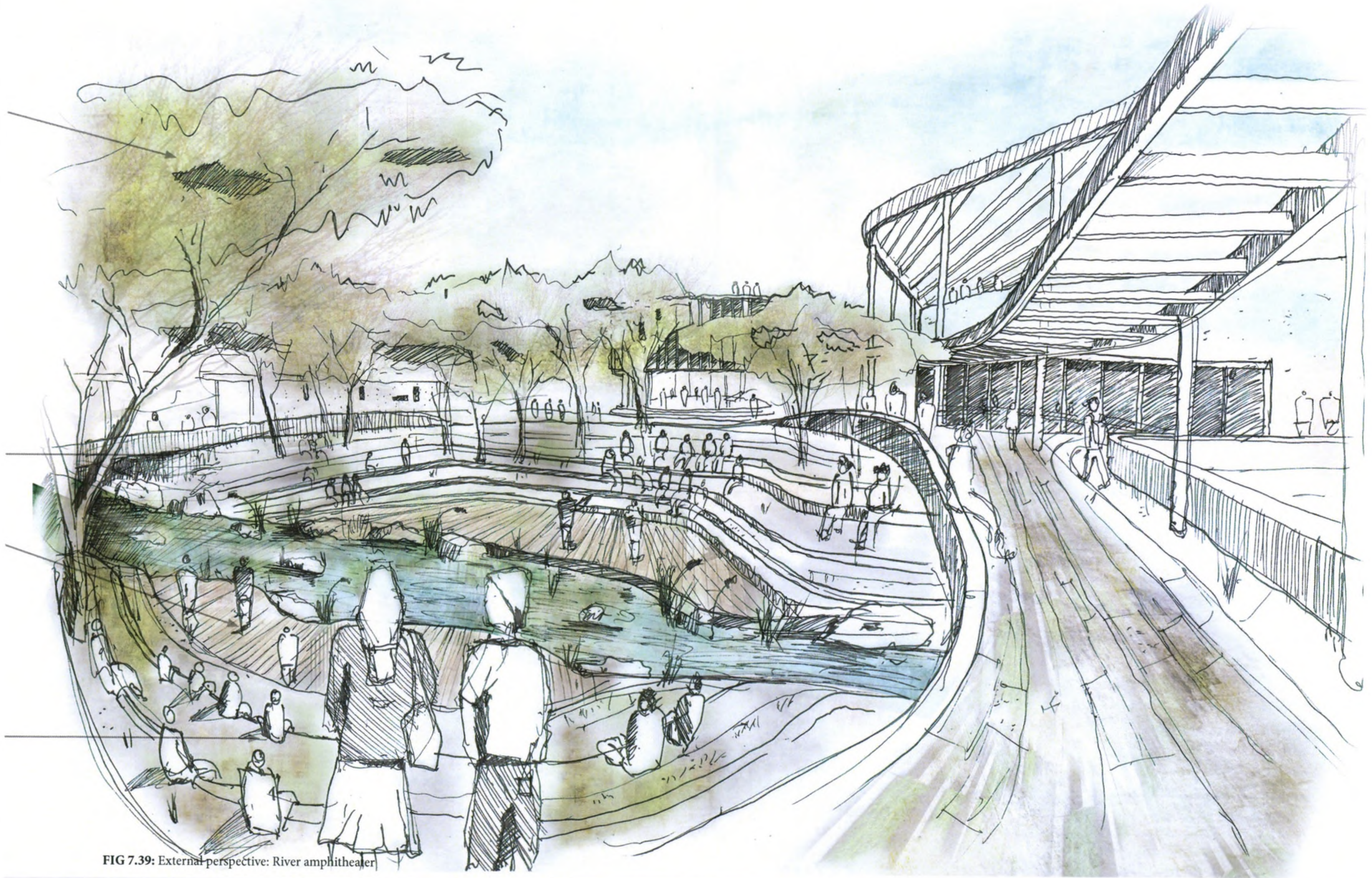


FIG 7.39: External perspective: River amphitheater

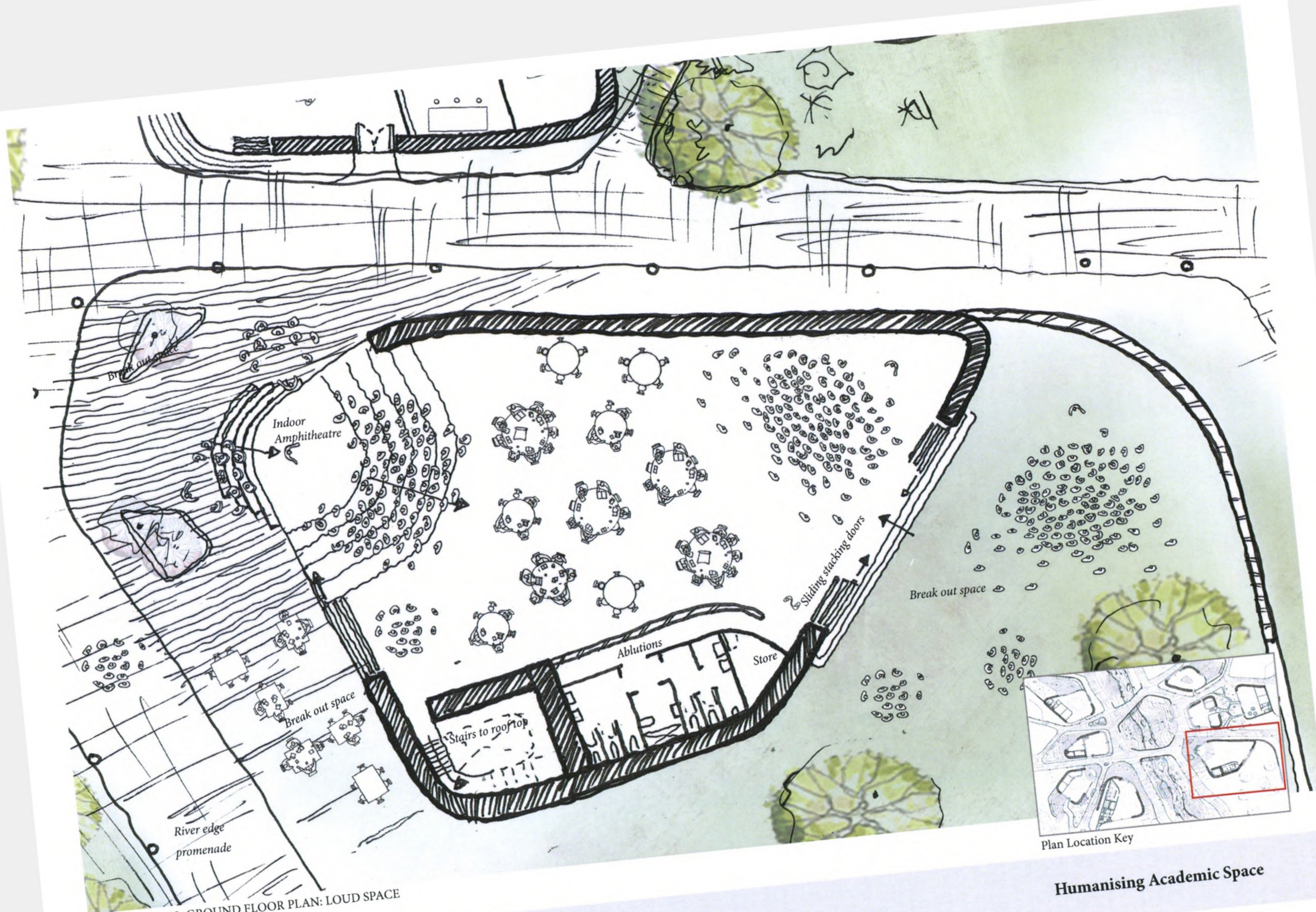



FIG 7.40: GROUND FLOOR PLAN: LOUD SPACE
 Scale: 1:200

Humanising Academic Space



FIG 7.41: GROUND FLOOR PLAN: TRANSDICIPLINARY LAB & ADMIN/INTERMEDIATE SPACE

Scale: 1:200



Plan Location Key

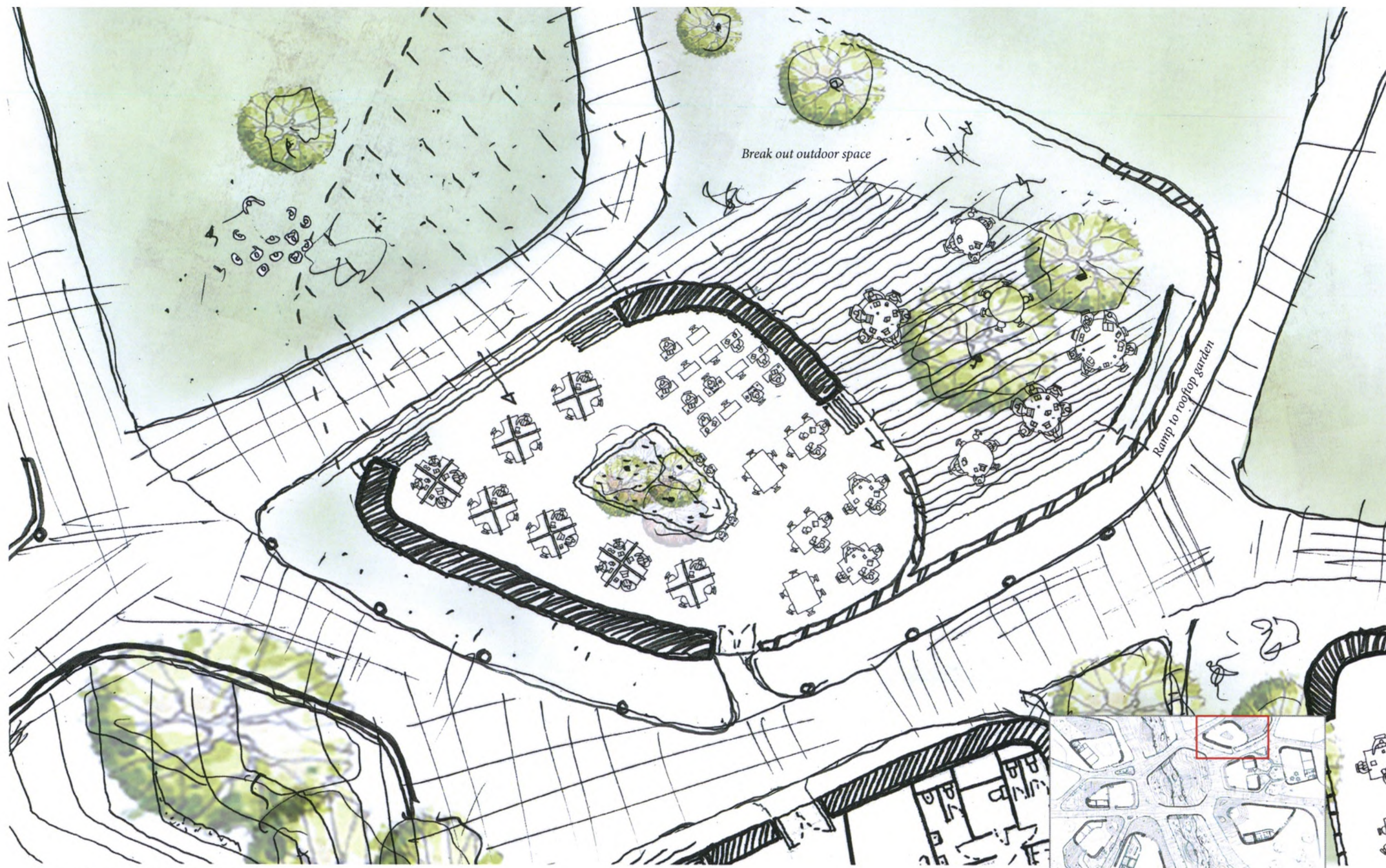


FIG 7.42: GROUND FLOOR PLAN: QUIET INDIVIDUAL STUDY SPACE
Scale: 1:200

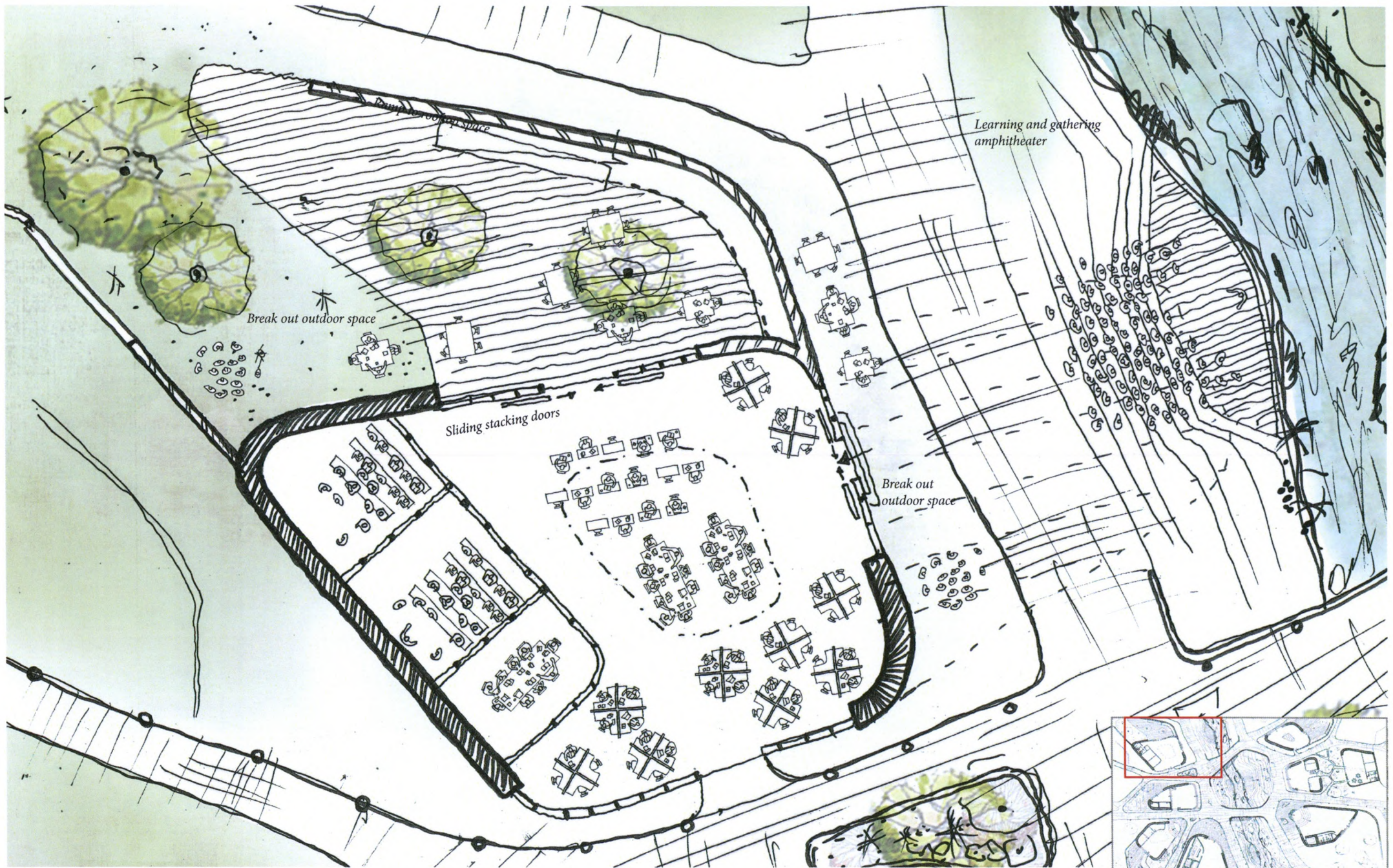


FIG 7.43: GROUND FLOOR PLAN: COMMUNITY SAFE STUDY SPACE
Scale: 1:200



Plan Location Key

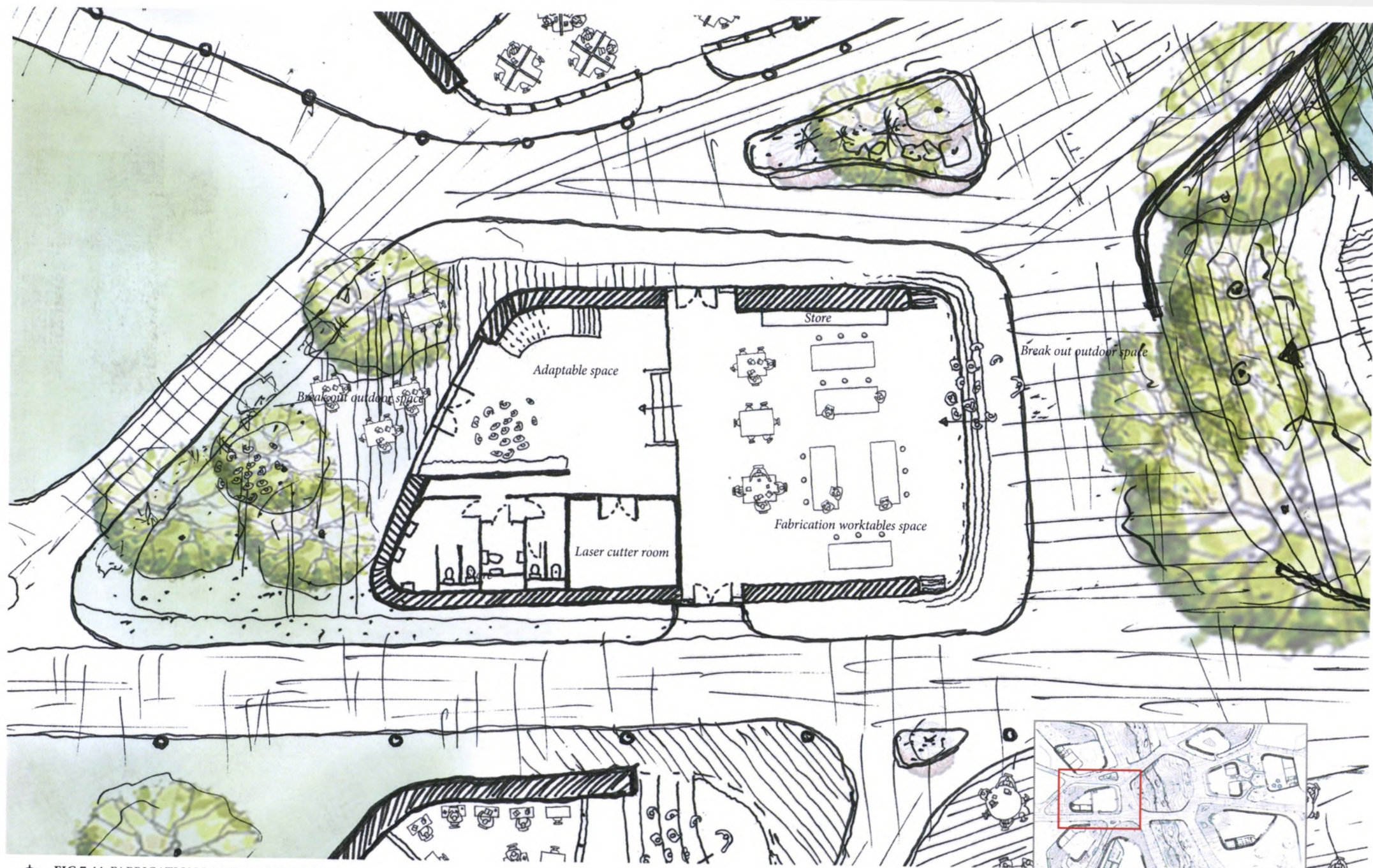


FIG 7.44: FABRICATION LAB GROUND PLAN
Scale: 1:200



FIG 7.45: CANTEEN AND Y.L.P.
Scale: 1:200

MATERIALITY



FIG 7.46: Stone on site



FIG 7.47: Laminated timber pergolas

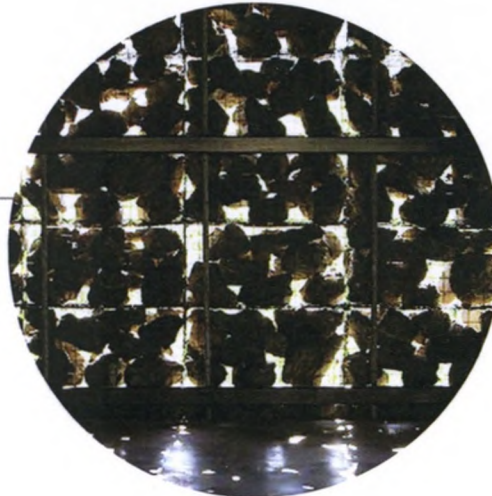


FIG 7.48: Stone gabion walls, using stone from site.



FIG 7.49: Timber facade screens

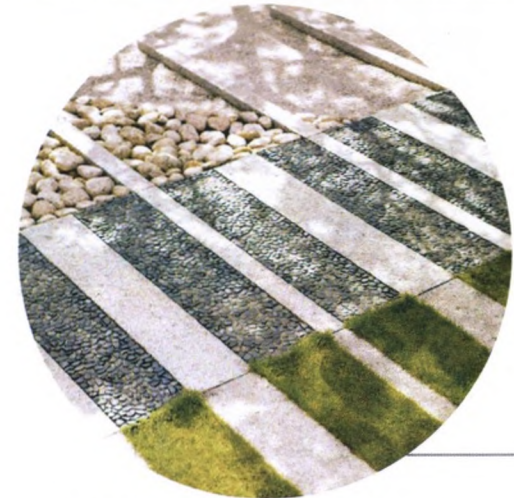


FIG 7.50: Various textured pathway finishes

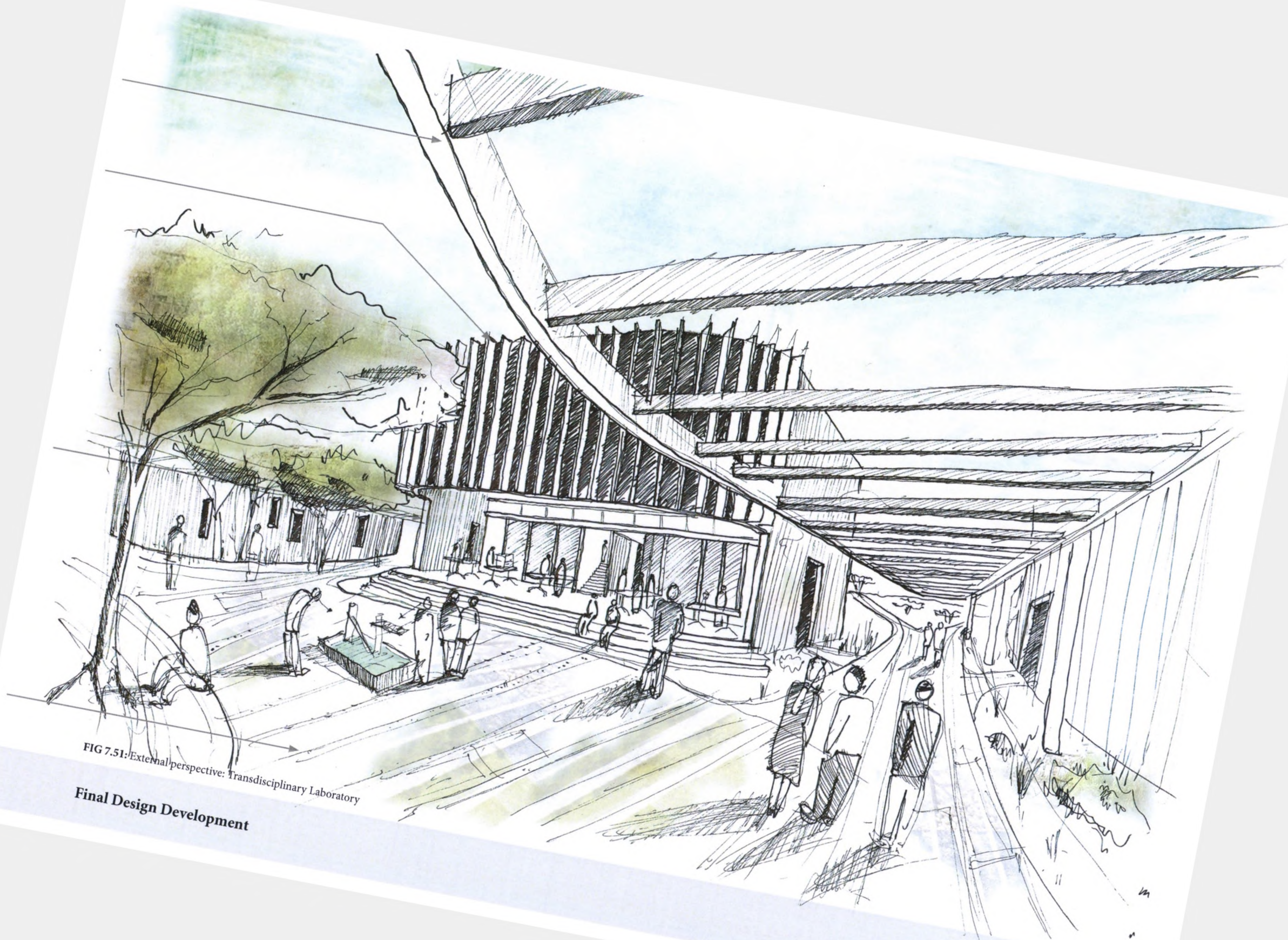


FIG 7.51: External perspective: Transdisciplinary Laboratory

Final Design Development

The gradual slope of the landscape is used to create seamless transitions between buildings. The buildings are nestled amongst the indigenous acacia trees creating comfortable shaded courtyards.

The ground floor of the buildings are relatively open and permeable allowing fluid movement of students in and around the buildings.

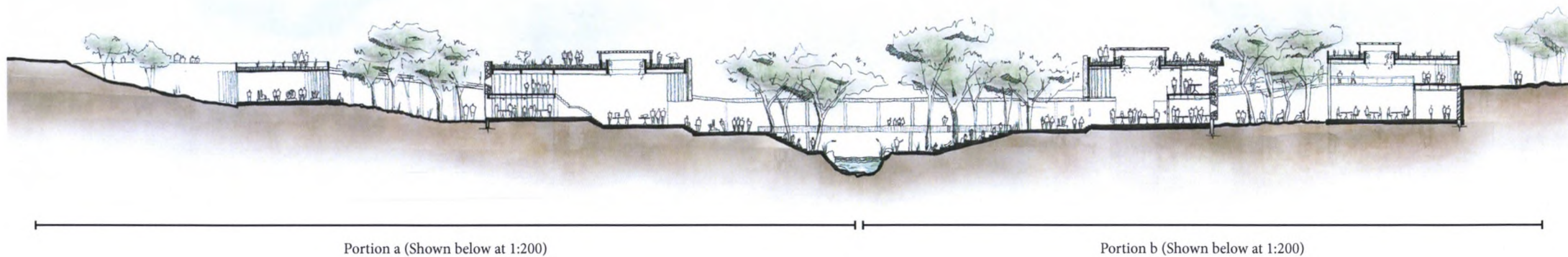


FIG 7.52: LONGITUDINAL SECTION

0 10m

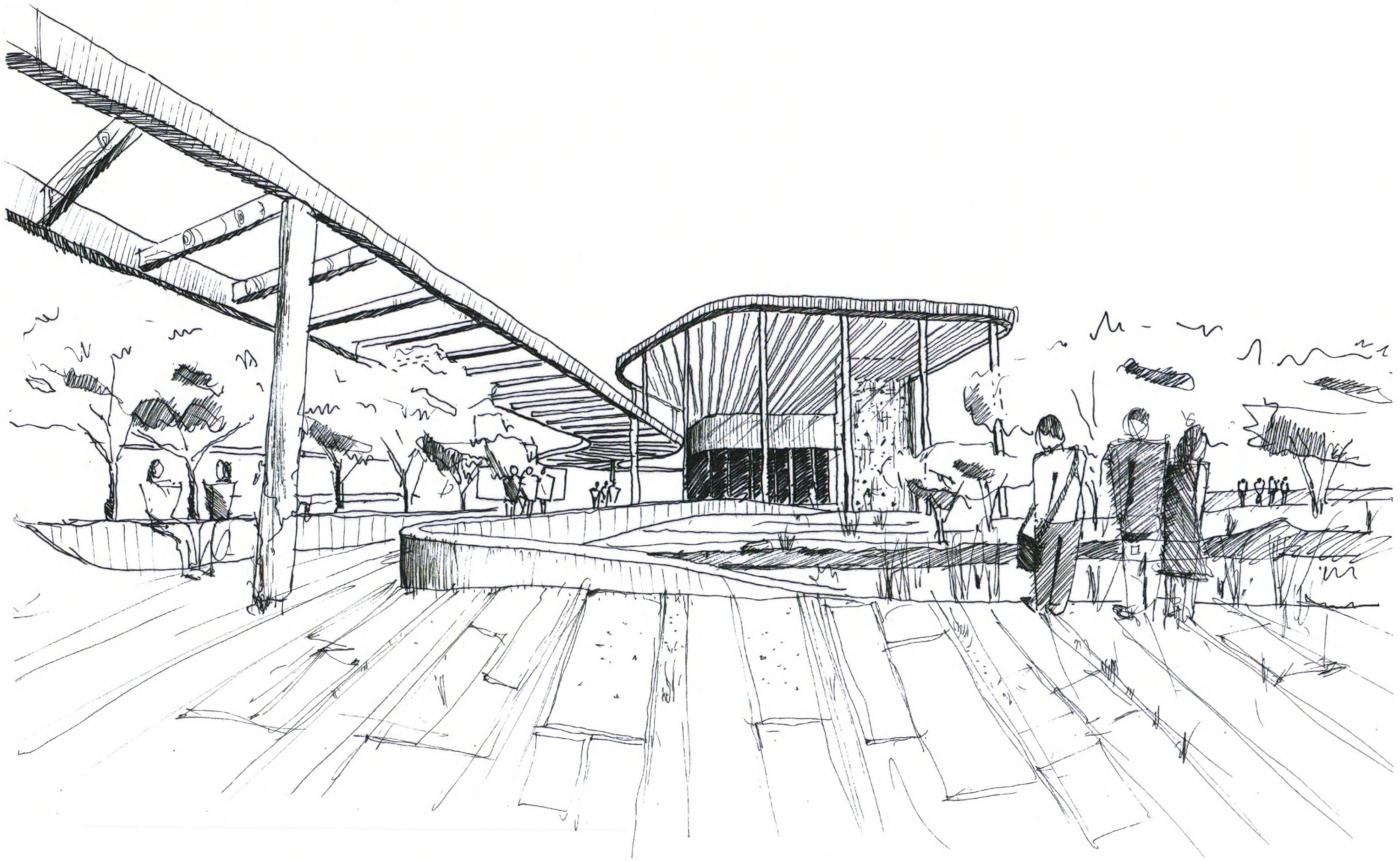


FIG 7.53: External perspective: View from the canteen toward the east

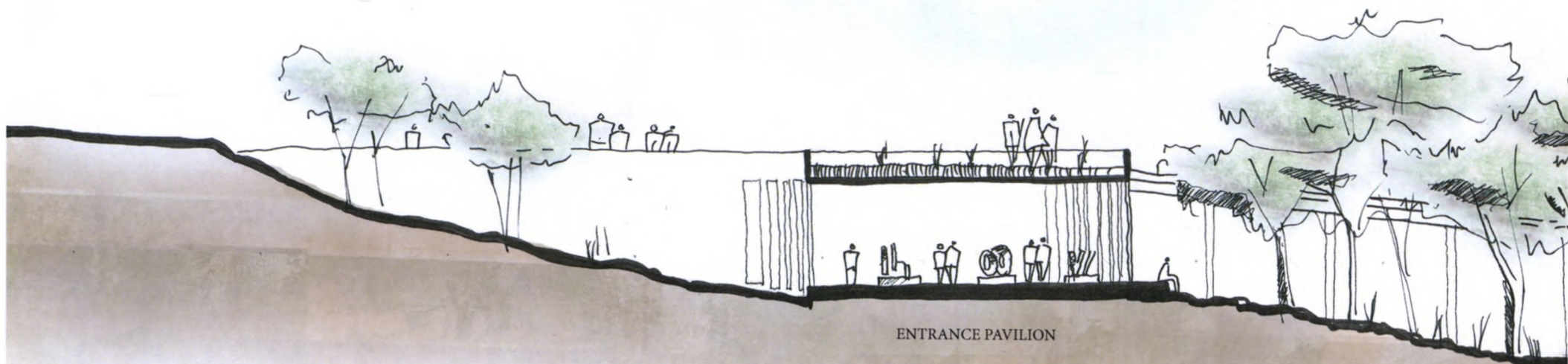
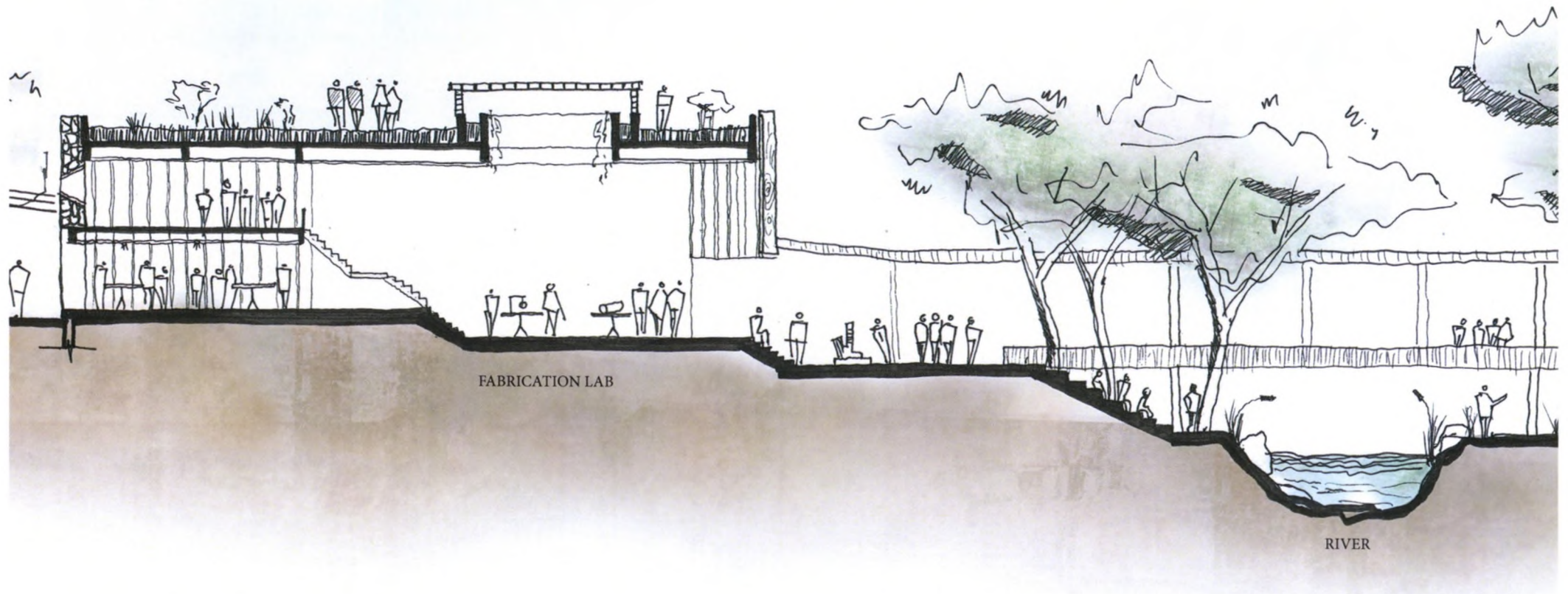



FIG 7.54: LONGITUDINAL SECTION (Portion a)
 Scale: 1:200



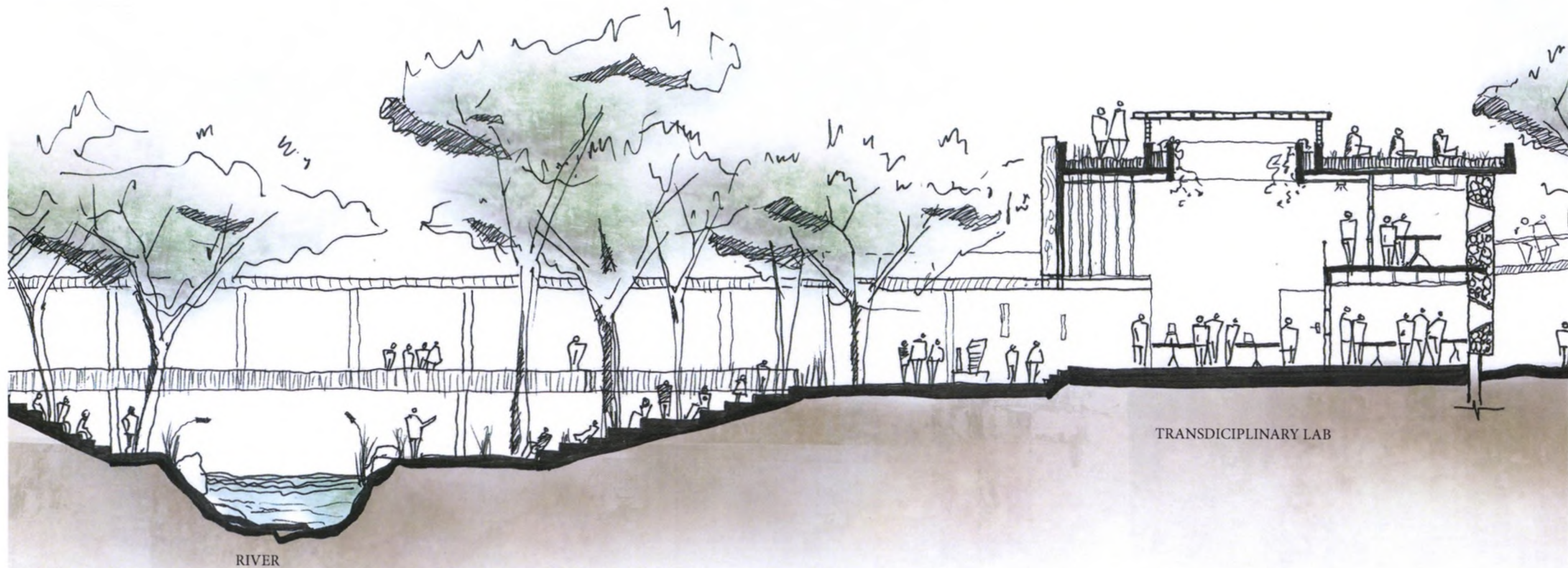
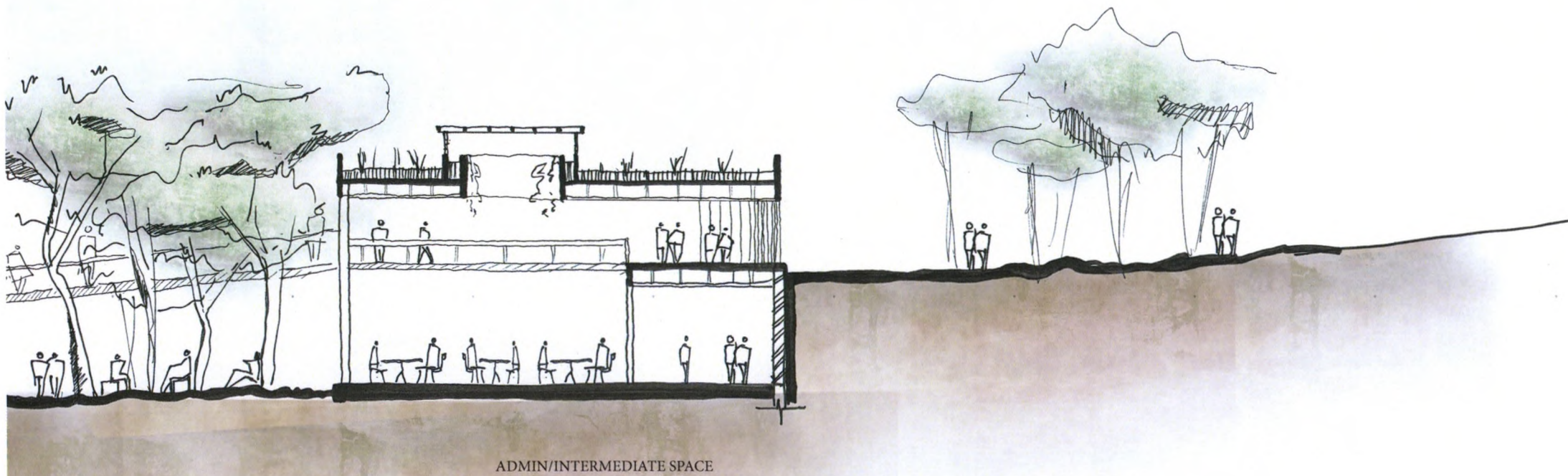


FIG 7.55: LONGITUDINAL SECTION (Portion b)
Scale: 1:200



ADMIN/INTERMEDIATE SPACE

MATERIALITY



FIG 7.57: Ivy hanging from sky light



FIG 7.58: Timber acoustic treated ceilings



FIG 7.59: Rammed earth wall

FIG 7.56: Steelcase furniture solutions for education: The Node school chair is mobile and flexible. It's designed for quick, easy transitions from one teaching mode to the next, unlike traditional school desks and chairs.

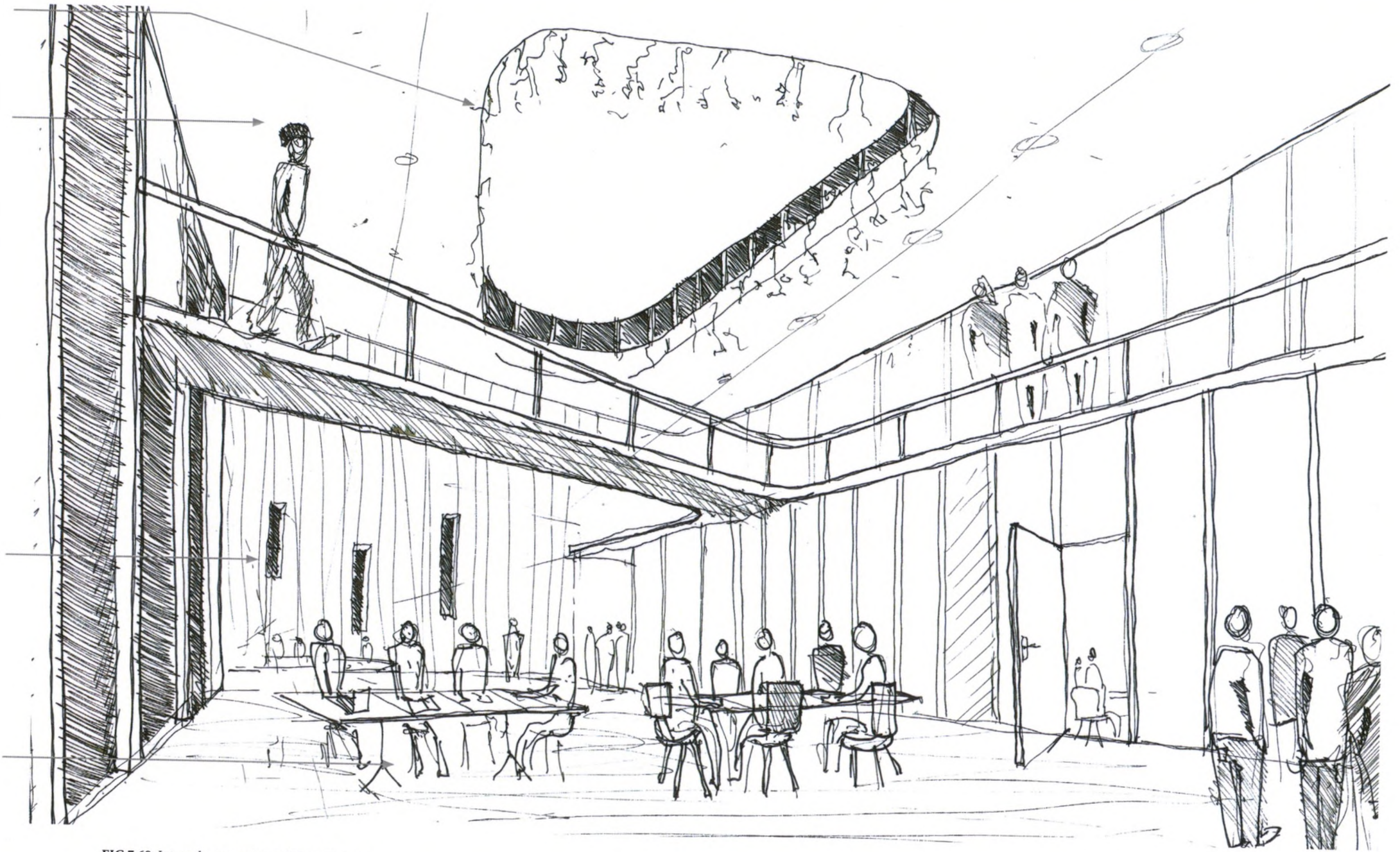
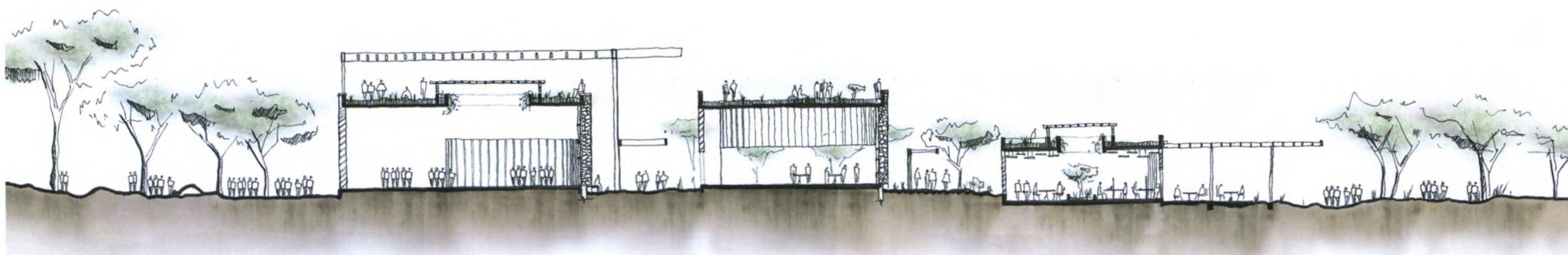


FIG 7.60: Internal perspective: collaborative space.



Portion shown below at 1:200)


FIG 7.61: SHORT SECTION
 0 10m

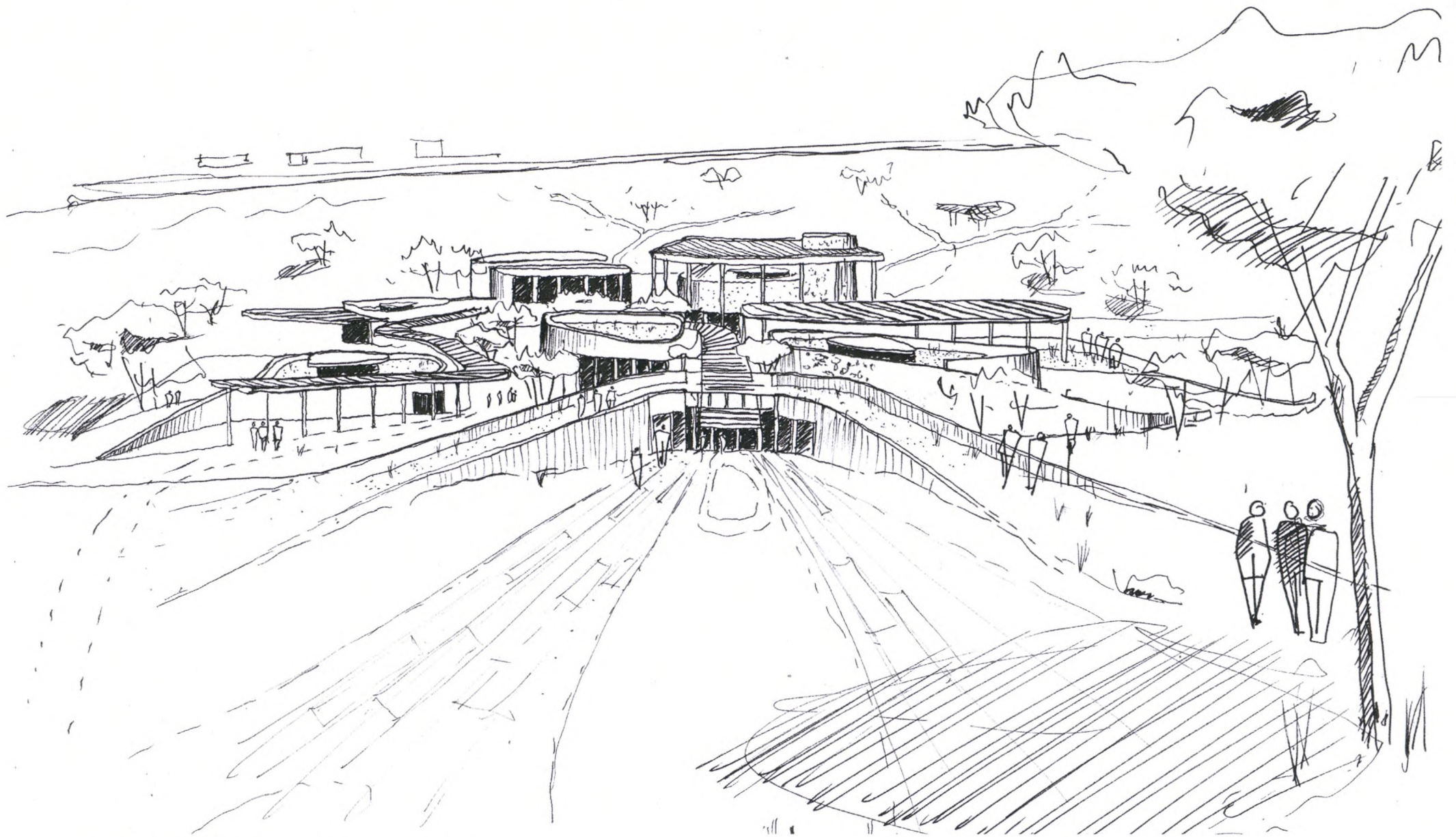
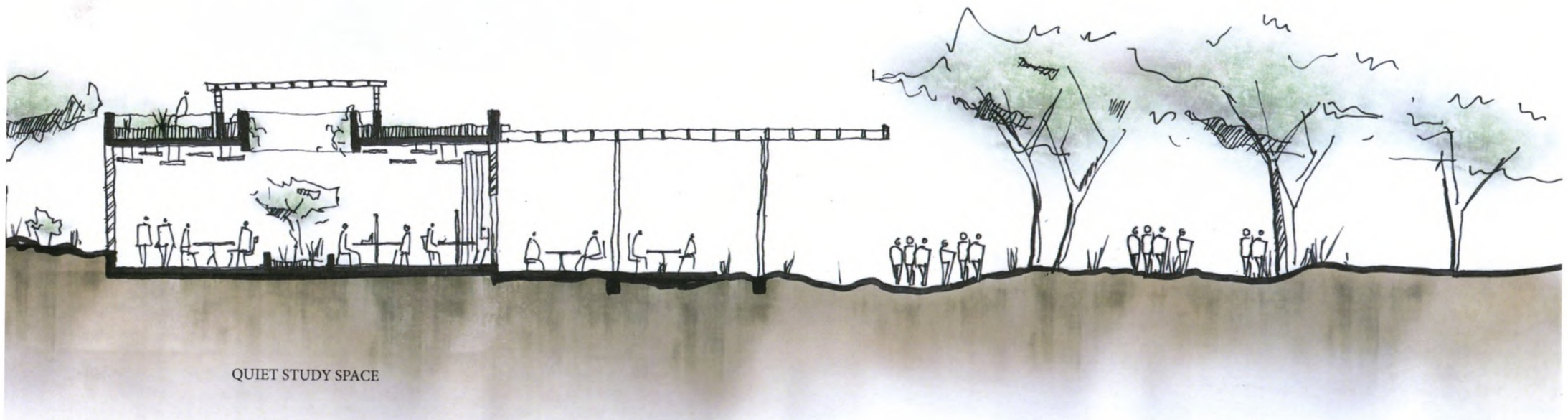


FIG 7.62: External perspective: View of entrance pavilion from parking



QUIET STUDY SPACE

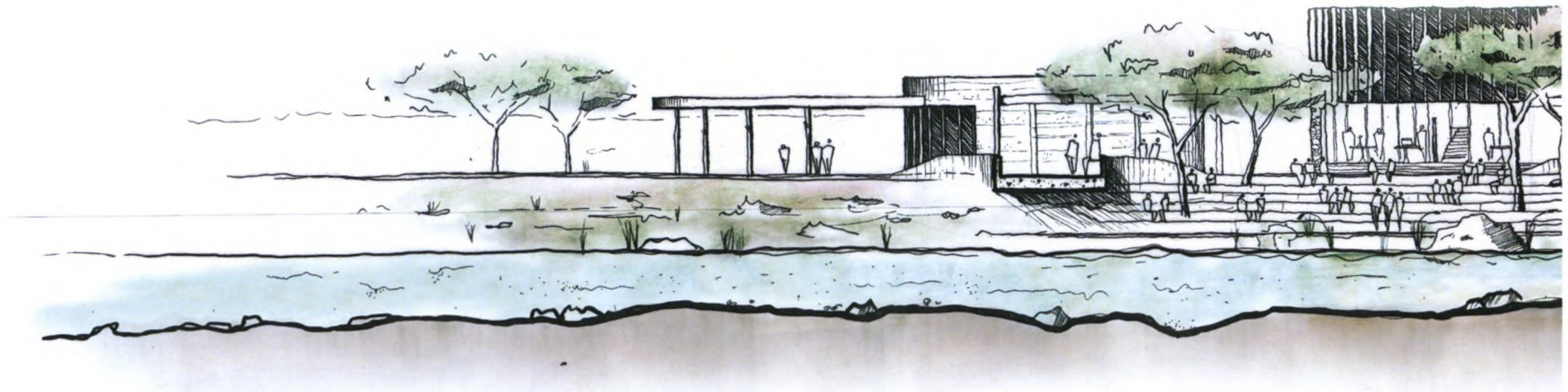
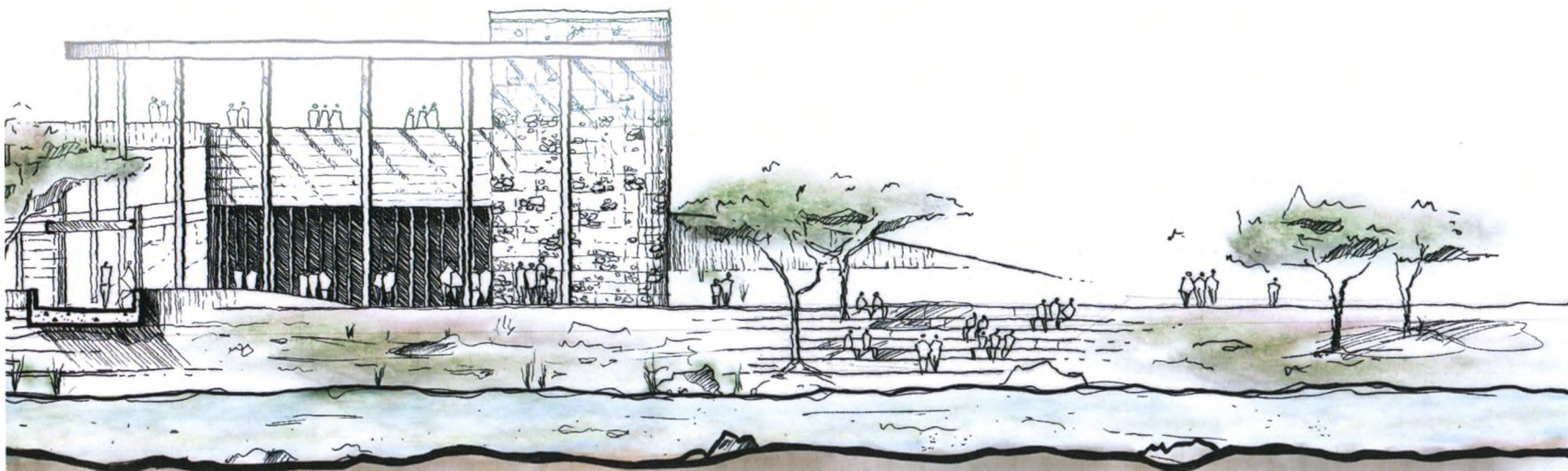


FIG 7.63.1: SECTIONAL RIVER ELEVATION WEST



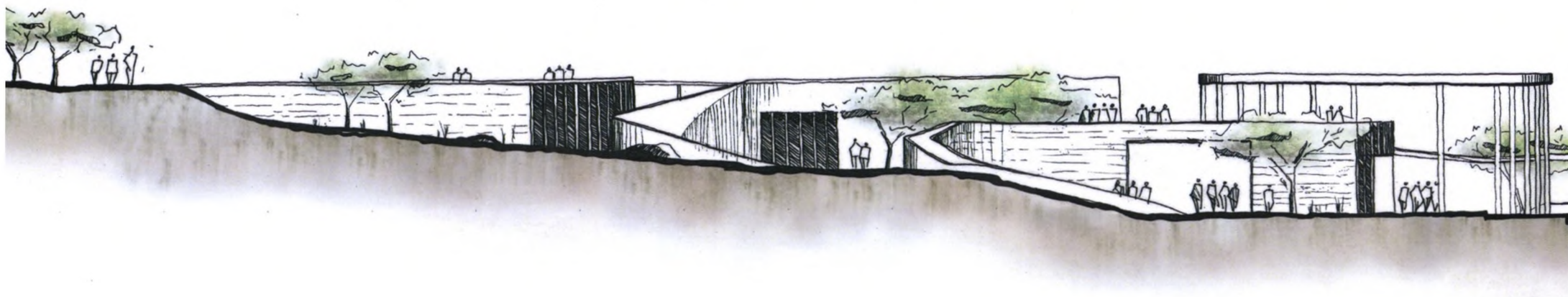
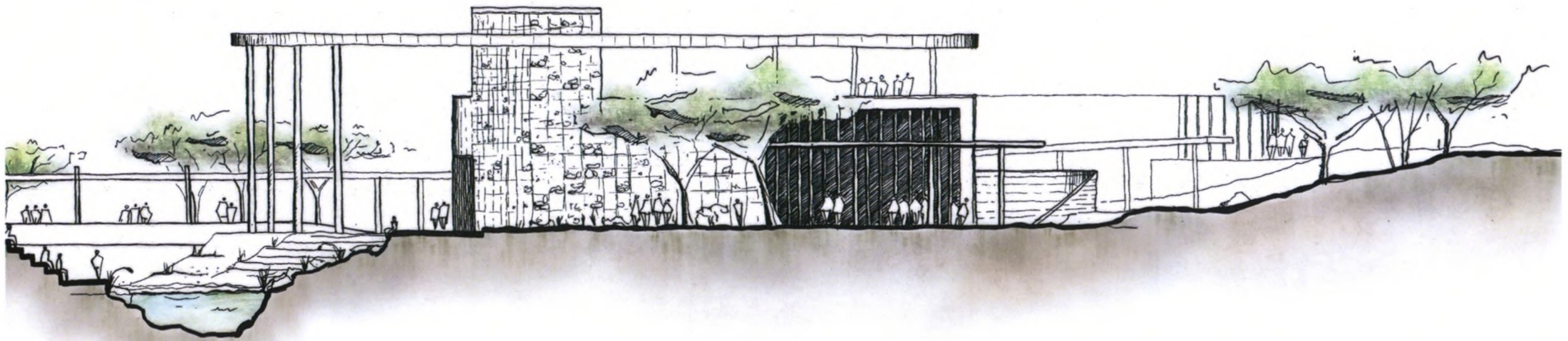


FIG 7.63.2: SOUTH ELEVATION



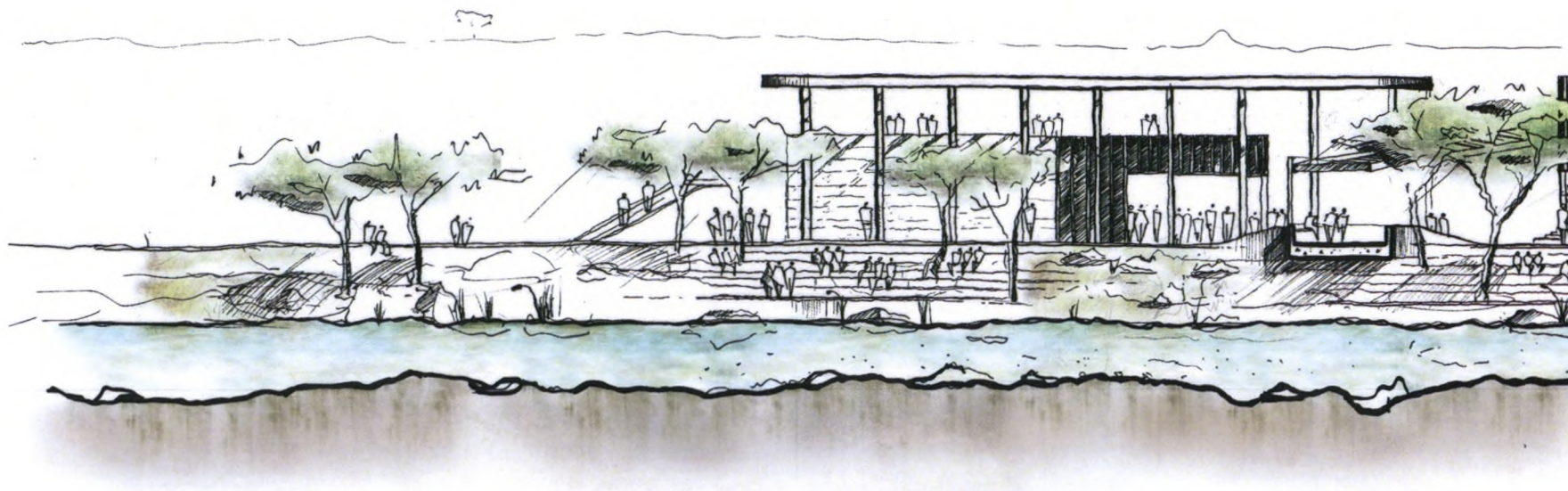
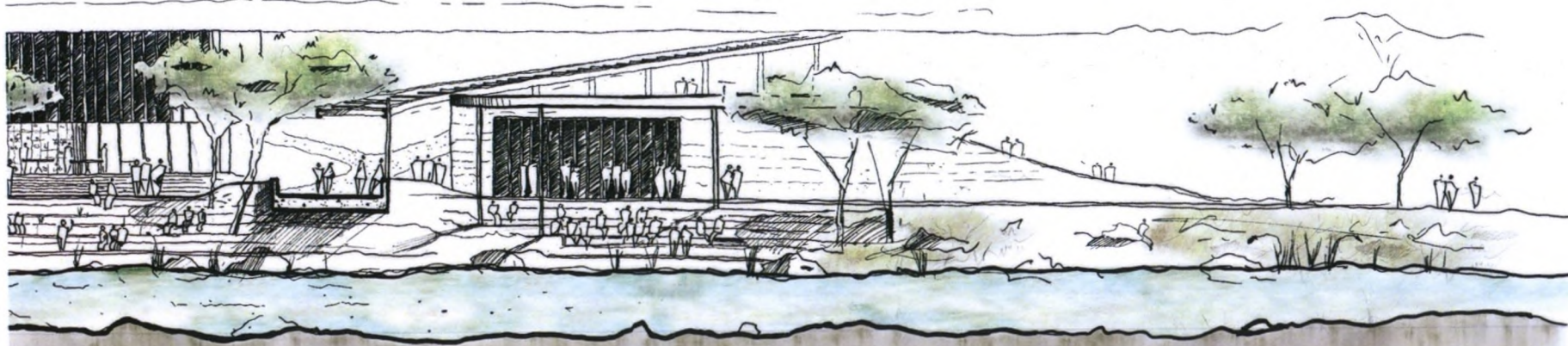


FIG 7.63.1: SECTIONAL RIVER ELEVATION EAST



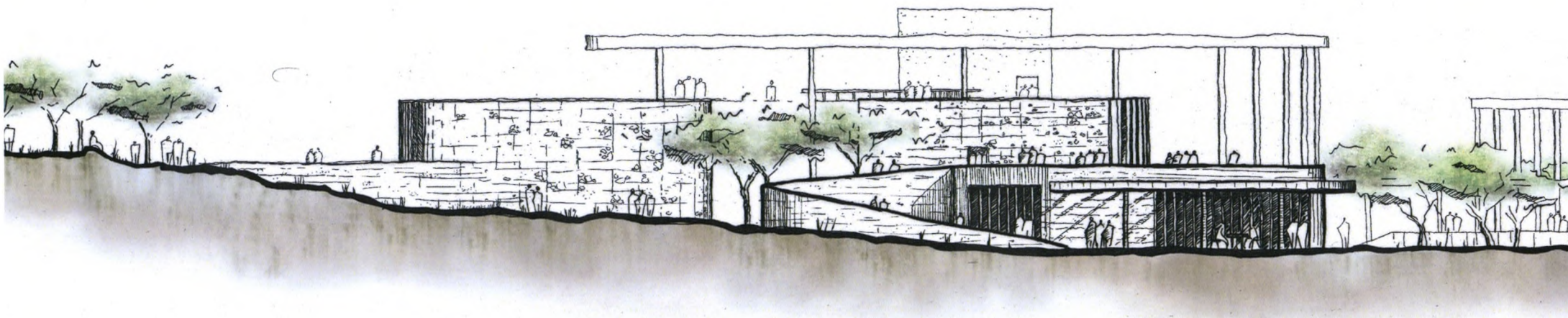
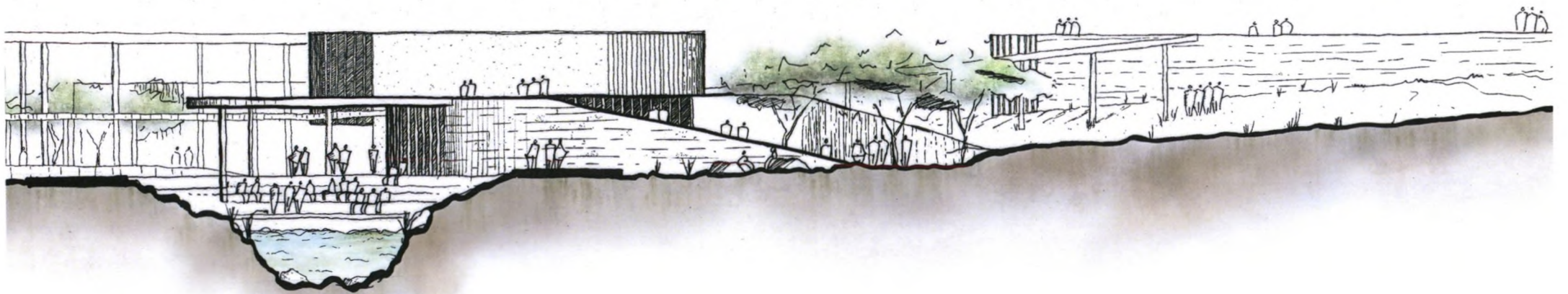
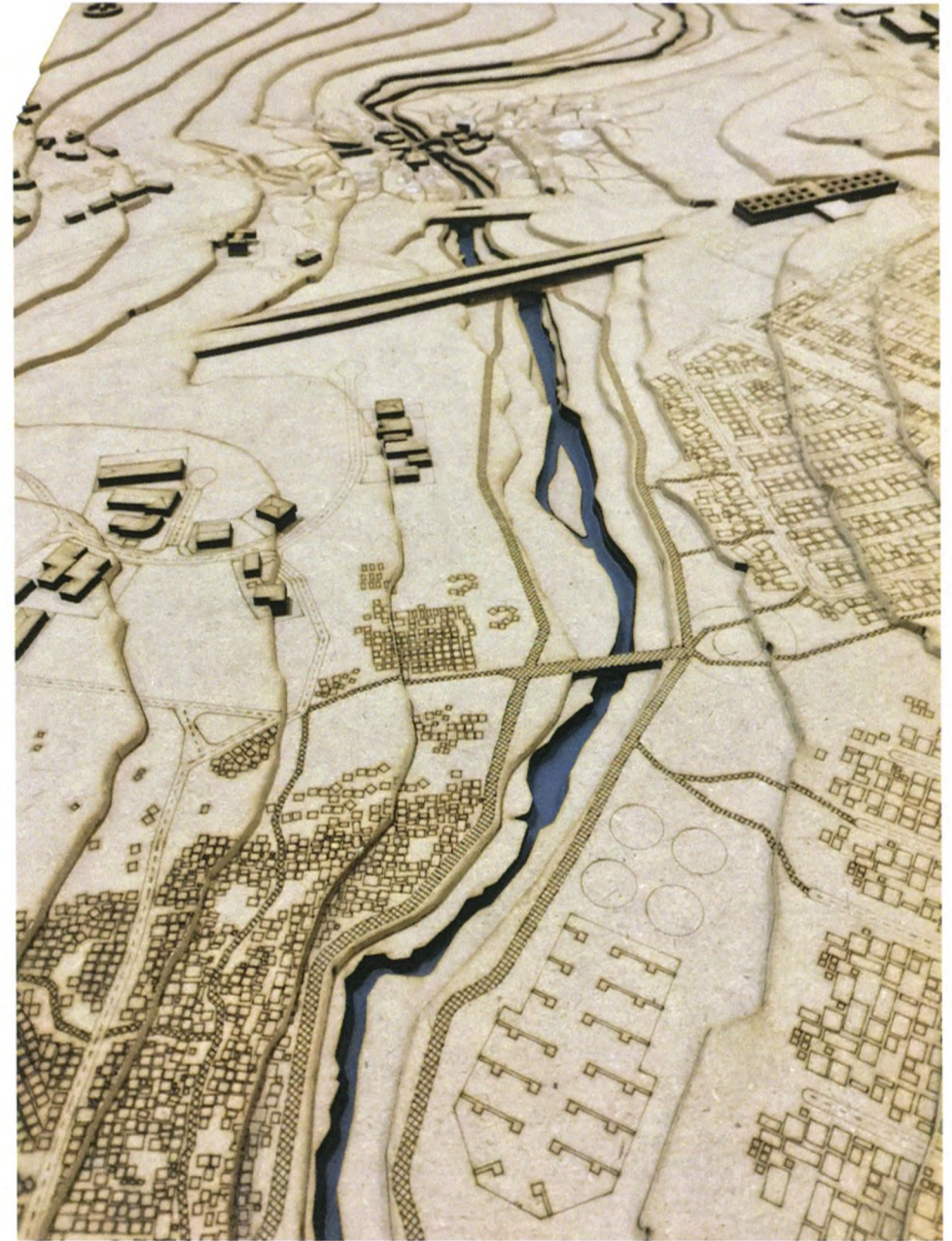


FIG 7.63.4: NORTH ELEVATION



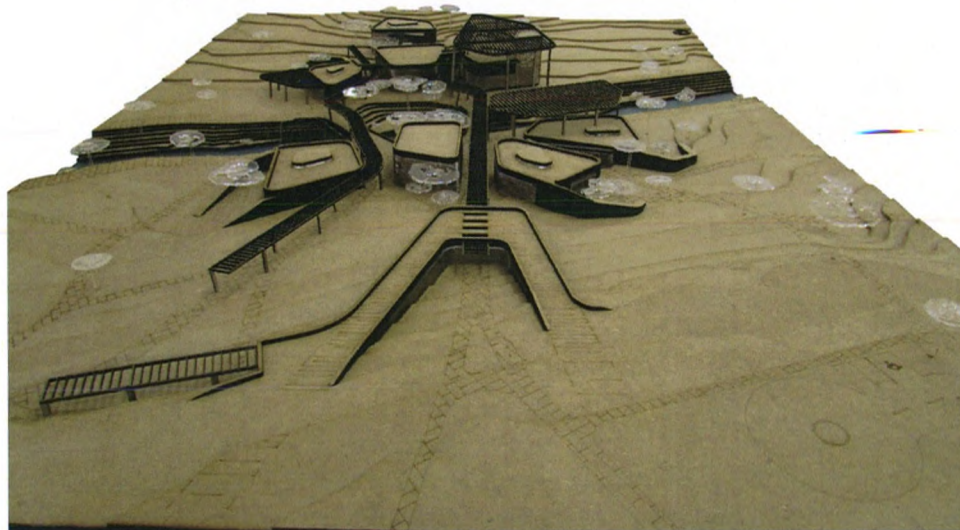
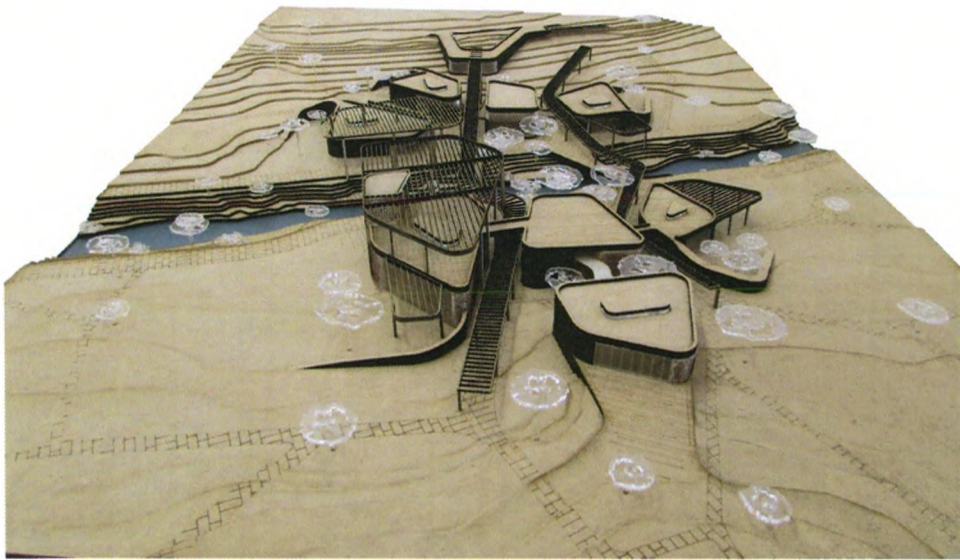
SITE MODEL





BUILDING MODEL





TECHNICAL COMPONENT

I intend to use a gabion wall as a heavy element of the design. The rocks used in the gabion wall should be large with about a 300mm diameter, this will create a loosely packed effect which will allow light to penetrate through the wall. The precedent study for this technical component is the porous gabion wall of the Dominus Winery in the Napa Valley, USA by Herzog & de Meuron. The beautiful dappled light creates a very comforting and natural feeling space (Fairs, 2007).

My detail for this type of wall, shown on the following pages, will incorporate a sliding stacking glazing system. This allows for the space to be sealed if needed in winter. In summer this type of wall will thermally protect from the outside heat while still allowing a slow cross ventilation to cool the spaces. Incorporated into the detail is a bench which allows for students to use the wall as informal seating space.



FIG 7.64: Exterior wall view



FIG 7.65: Exterior wall view



FIG 7.66: Interior wall view

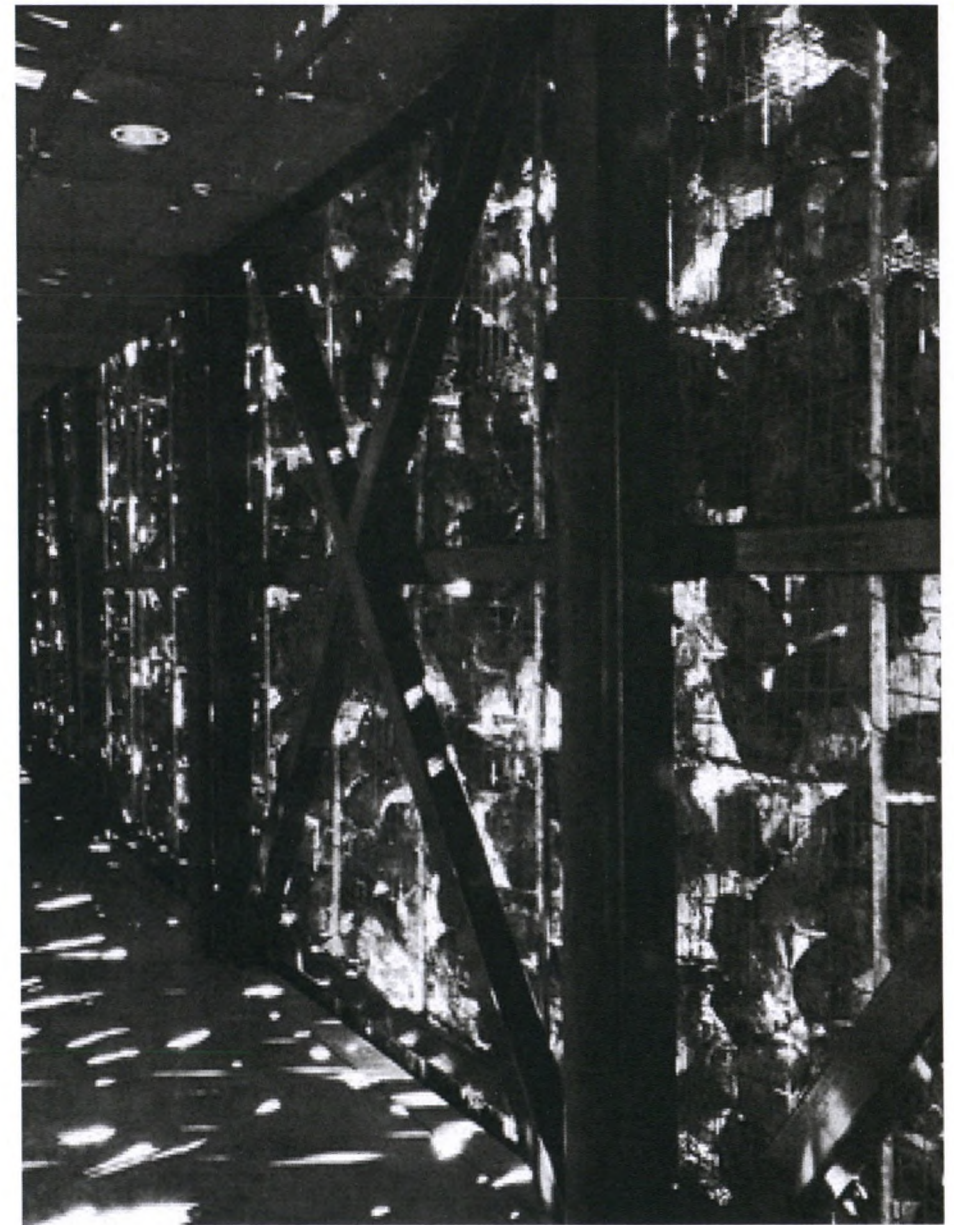
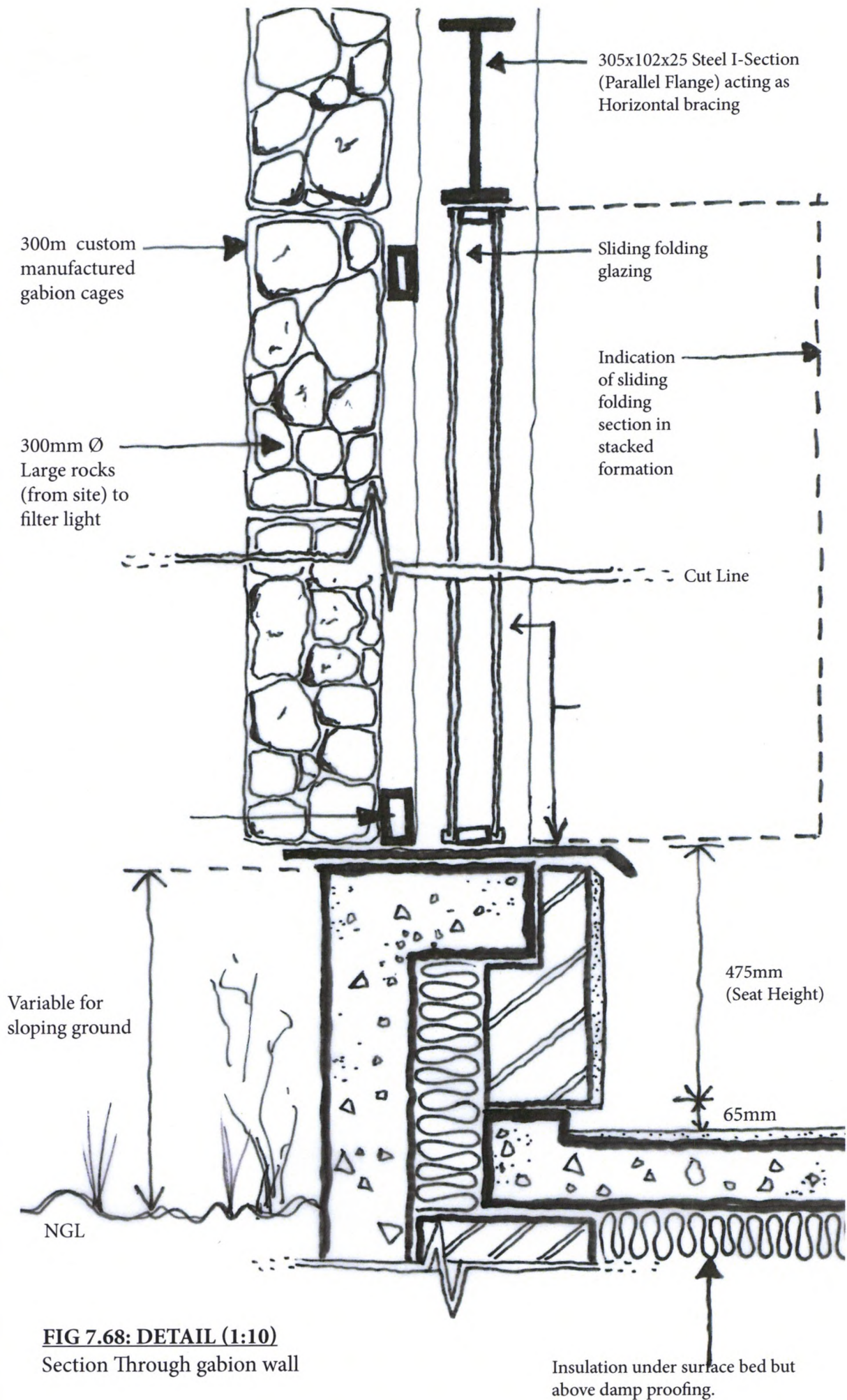


FIG 7.67: Interior wall view



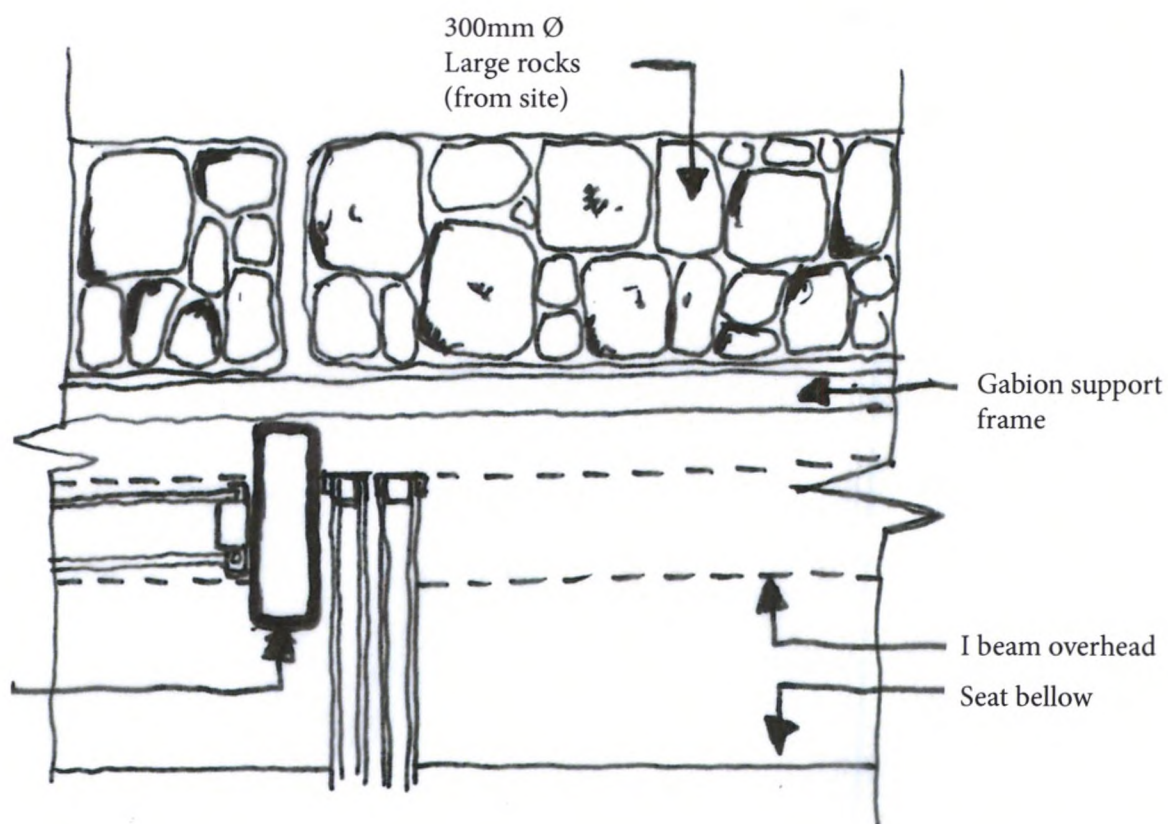


FIG 7.69: PLAN DETAIL AT -450 mm (1:10)

Section Through gabion wall level

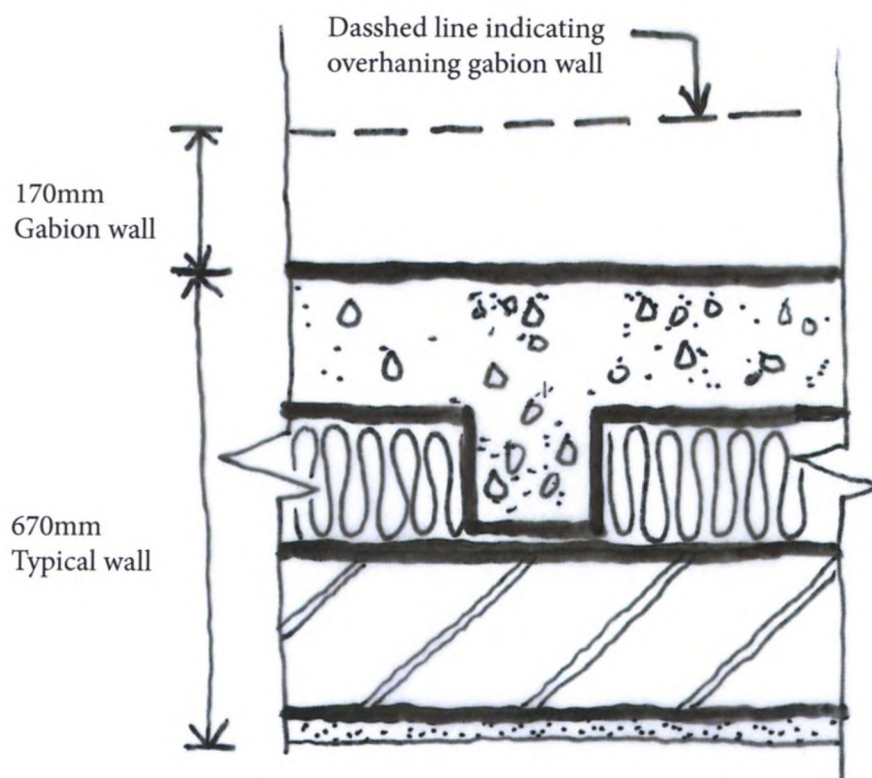


FIG 7.70: PLAN DETAIL AT -450 mm (1:10)

Section Through base wall

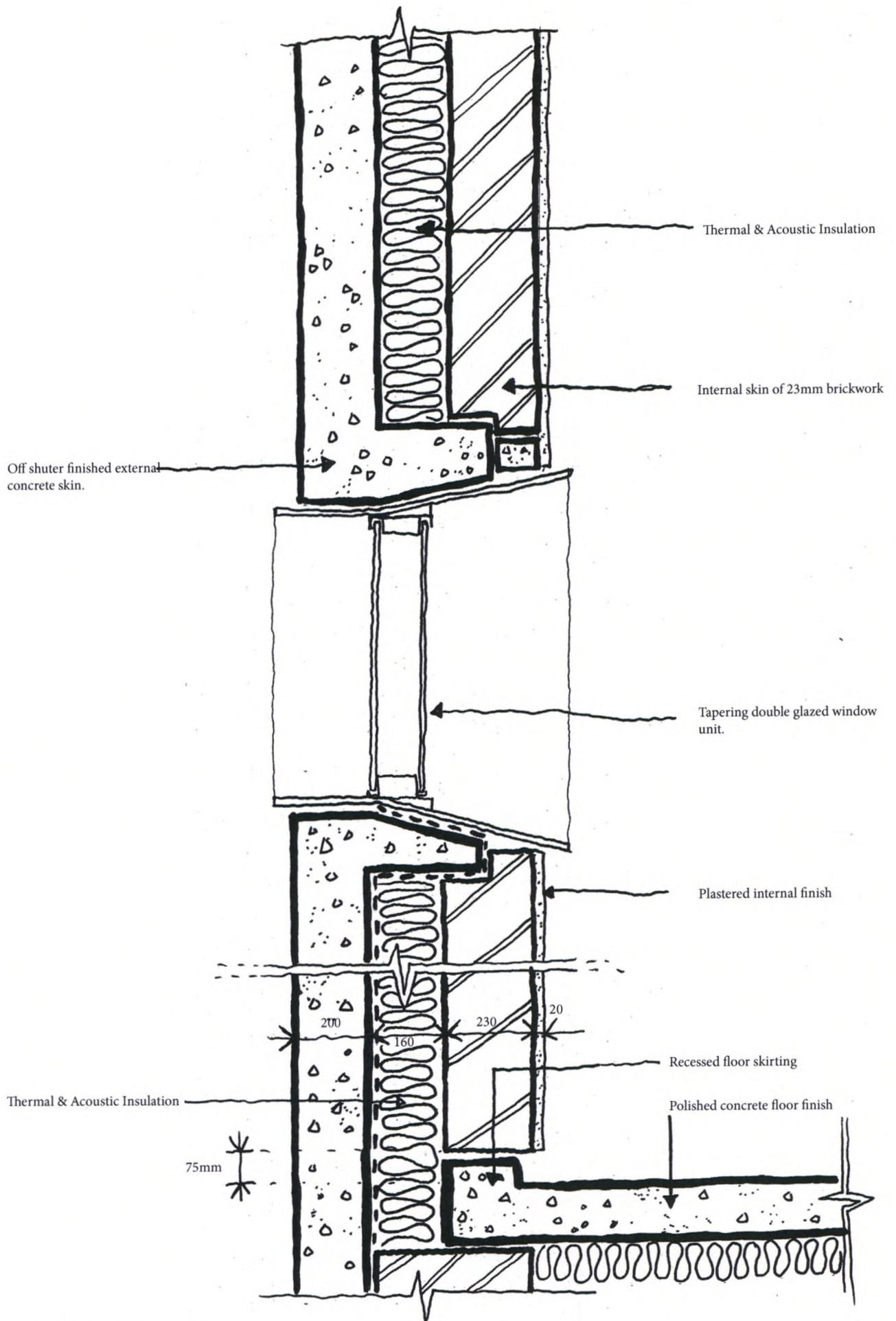


FIG 7.71: DETAIL (1:10)
Section Through concrete wall

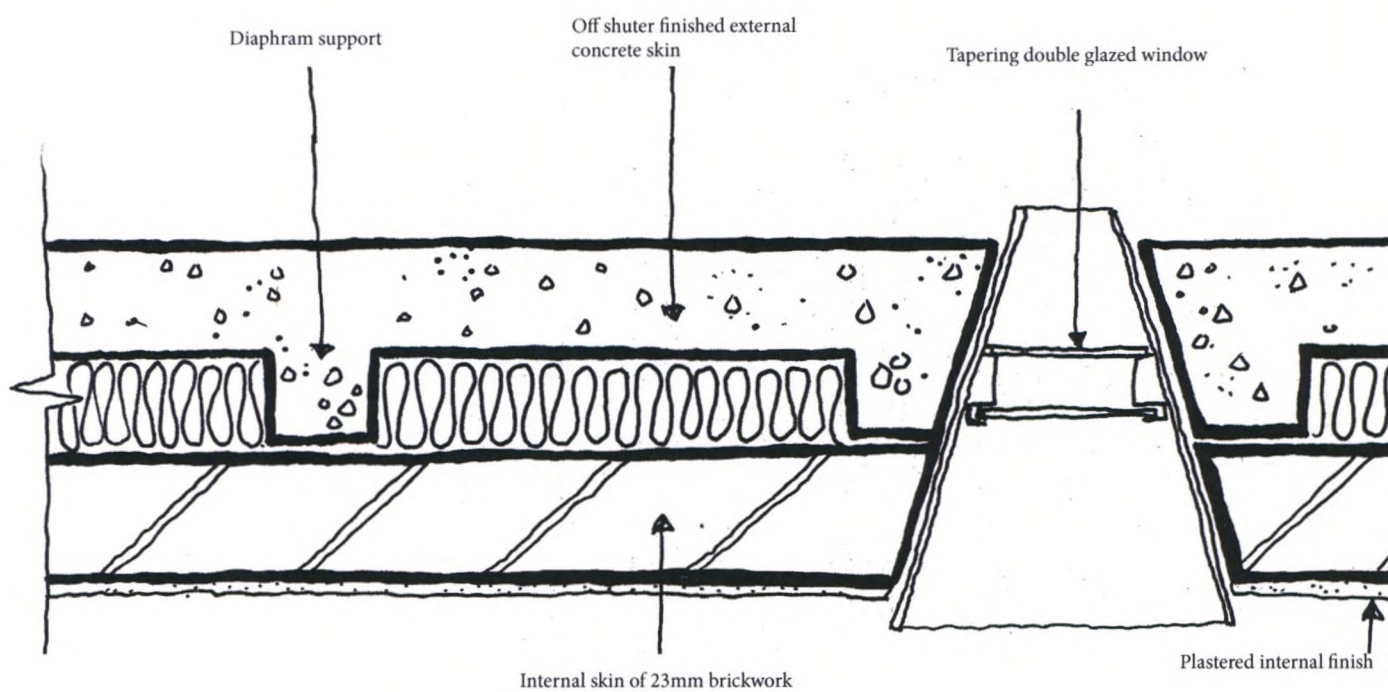


FIG 7.72: PLAN DETAIL AT 700 mm (1:10)

Section Through wall

RIVER THRESHOLDS

As the flooding of the Jukskei river has been a major problem in the past, the intention of the design of the different river thresholds is to specifically protect against flooding. The level change created by the thresholds protects against the highest possible water level, that being the level of the 100 year flood line. As seen in the sketch along side, I have designed various thresholds which functionally protect against flooding while also accommodating various functions to activate the river as a social and interactive space.

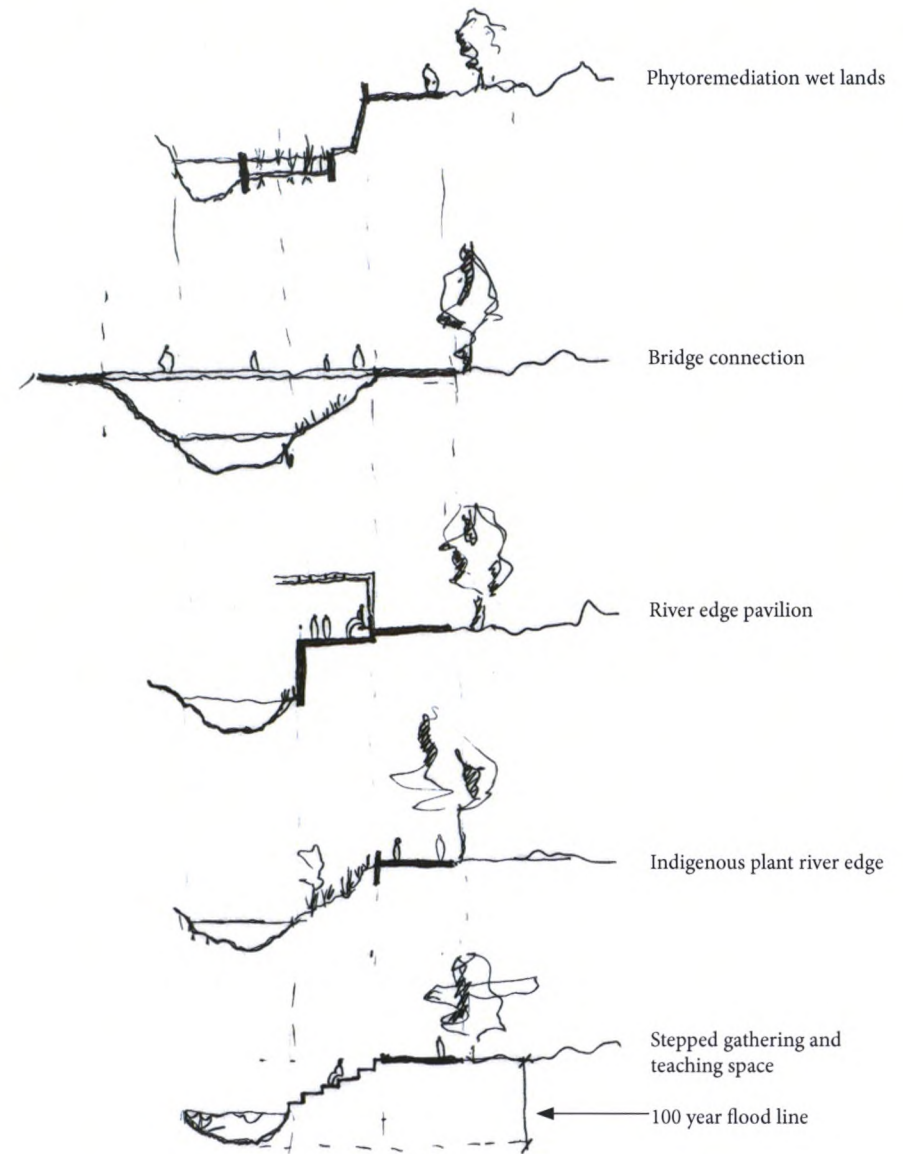


FIG 7.71: River edge typologies

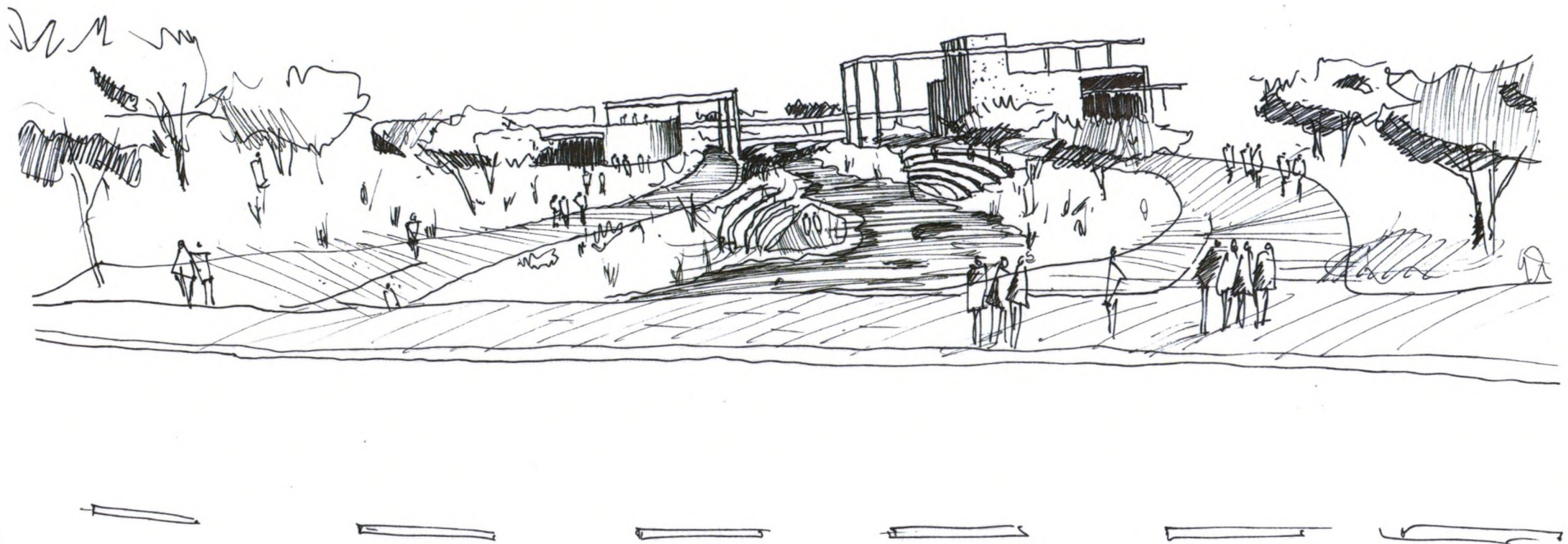


FIG 7.72: External perspective. View from Marlboro road.

LANDSCAPE LEARNING PAVILIONS

As previously stated, the landscape pavilions are a component of the landscape lab. The landscape pavilions create shaded spaces in the landscape which allow students to appropriate them as they need. The pavilions also supply power outlets generated from solar power, a water point and wifi.

Inspired by the overlapping and shaded nature of trees, these pavilions create a shaded space in the landscape to use for individual learning or group learning. Reconnecting learning to its origins of story telling under a tree, these pavilions reconnect learning back to the landscape. The pavilions can also be adapted to accommodate a mobile laboratory which could be set up there if required. Students could then collect study samples from the site and examine them in the pavilion.



FIG 3.72: The tree as an ancient place of gathering and learning.

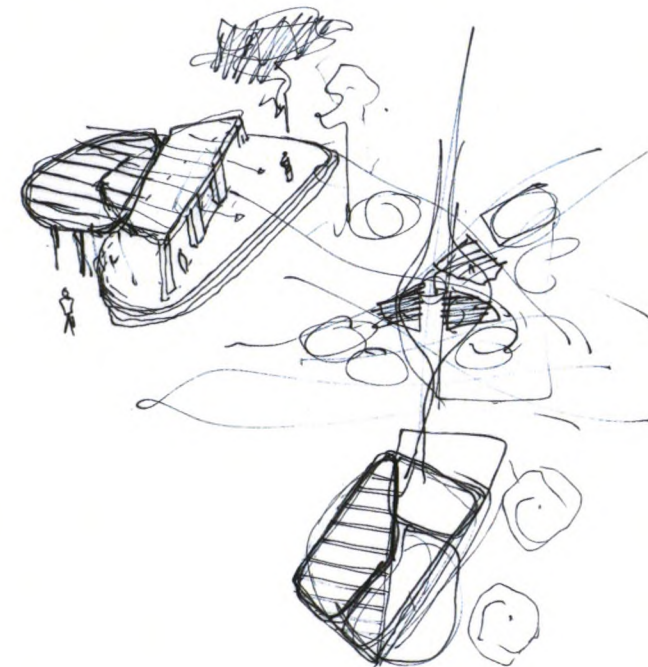


FIG 7.73: Pavilion concept sketch

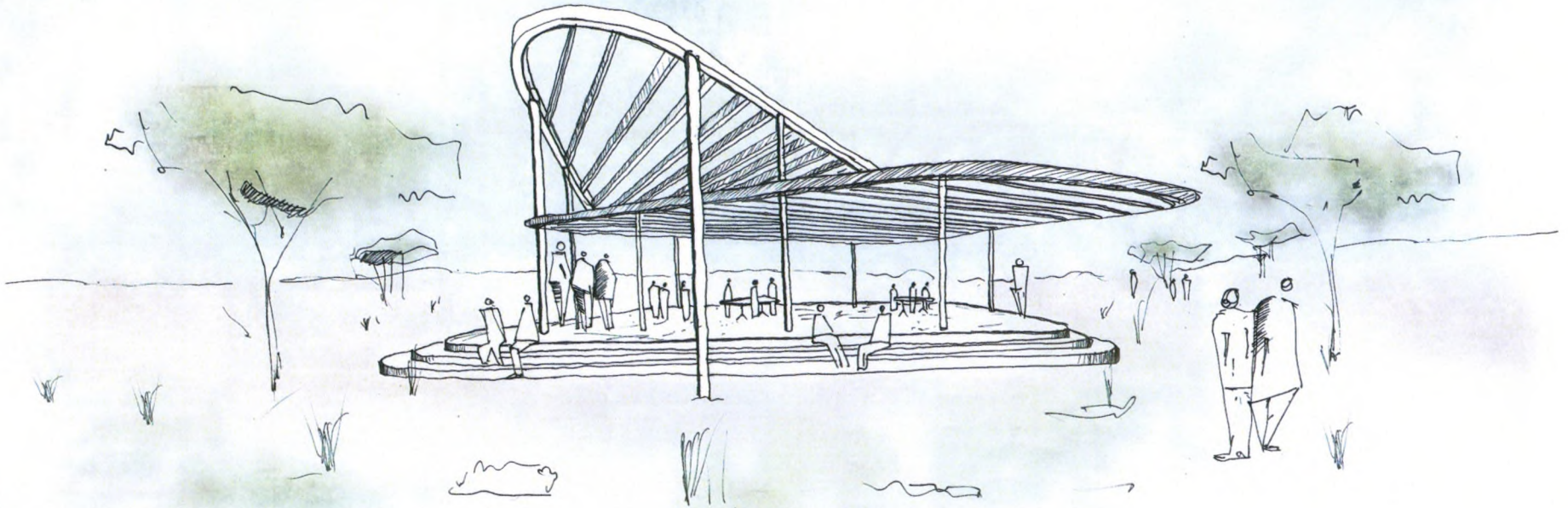


FIG 7.74: Landscape pavilion perspective sketch



FIG 7.75: Site Panorama

URBAN GROWTH

My larger urban intervention contains two aspects:

1) Improving Alexandra's connectivity by accommodating the pedestrian movement. East and west bank of Alexandra have been historically disconnected due to the Jukskei river, I propose the construction of new pedestrian bridges and the pedestrianisation of existing bridges, as per FIG:7.77. I also propose a new river promenade to be built along the river. This will be the main artery that students will use to get to the site. This promenade will also re-establish the river as a park, as it has currently been neglected and in many cases is seen as a dangerous location.

2) The Nodes of future urban growth. The core component of the nodes are the agriculture towers which will be explained on the following page. Just as the intervention will 'grow' on the Frankenwald site, these nodes will become points of future growth to begin the redevelopment of Alexandra.

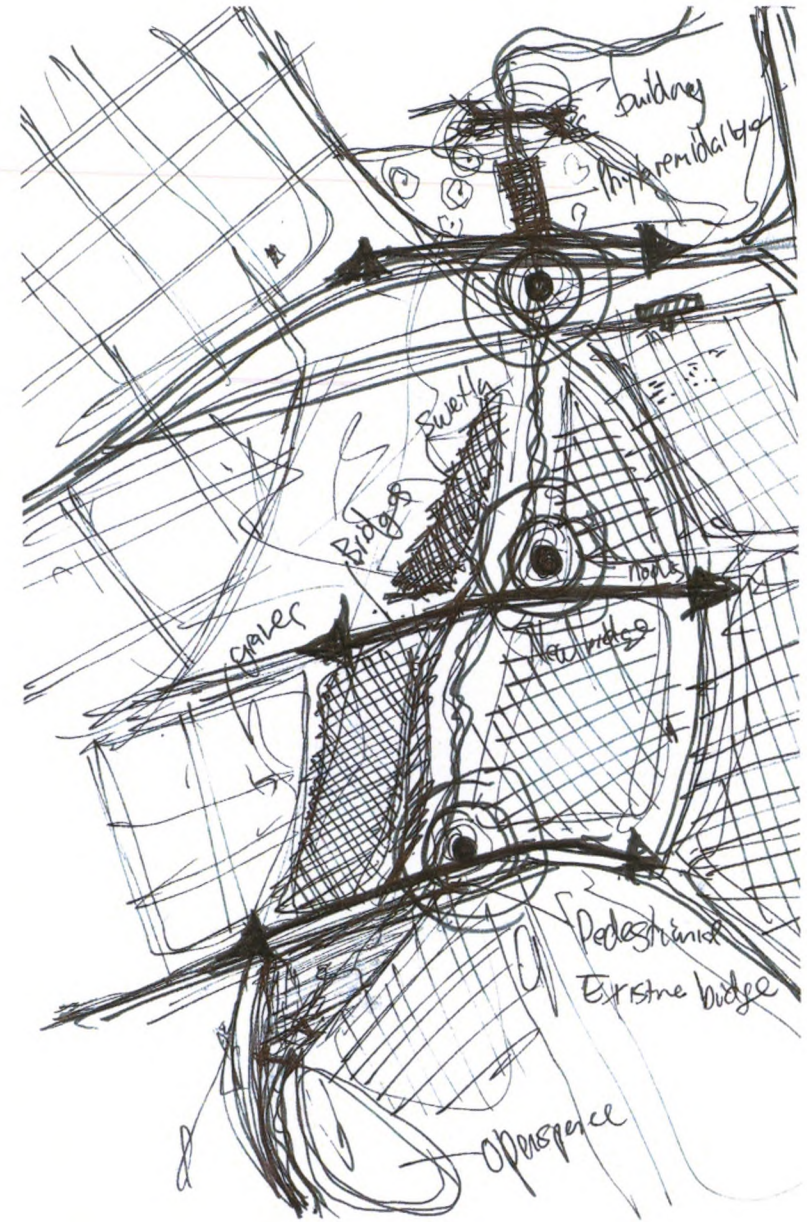


FIG 7.76: Urban nodes concept sketch

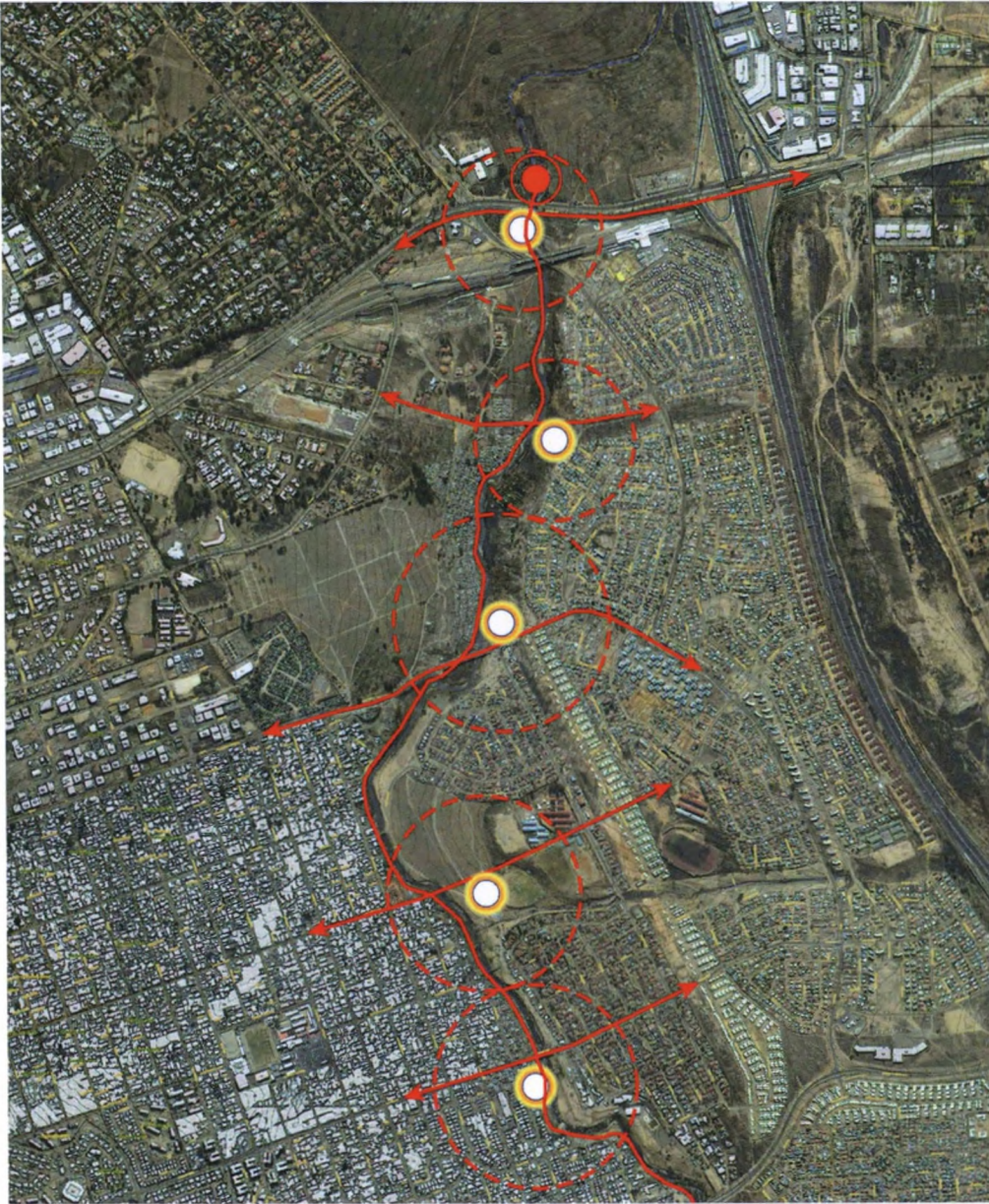


FIG 7.77: Urban node intervention points and pedestrian bridges.

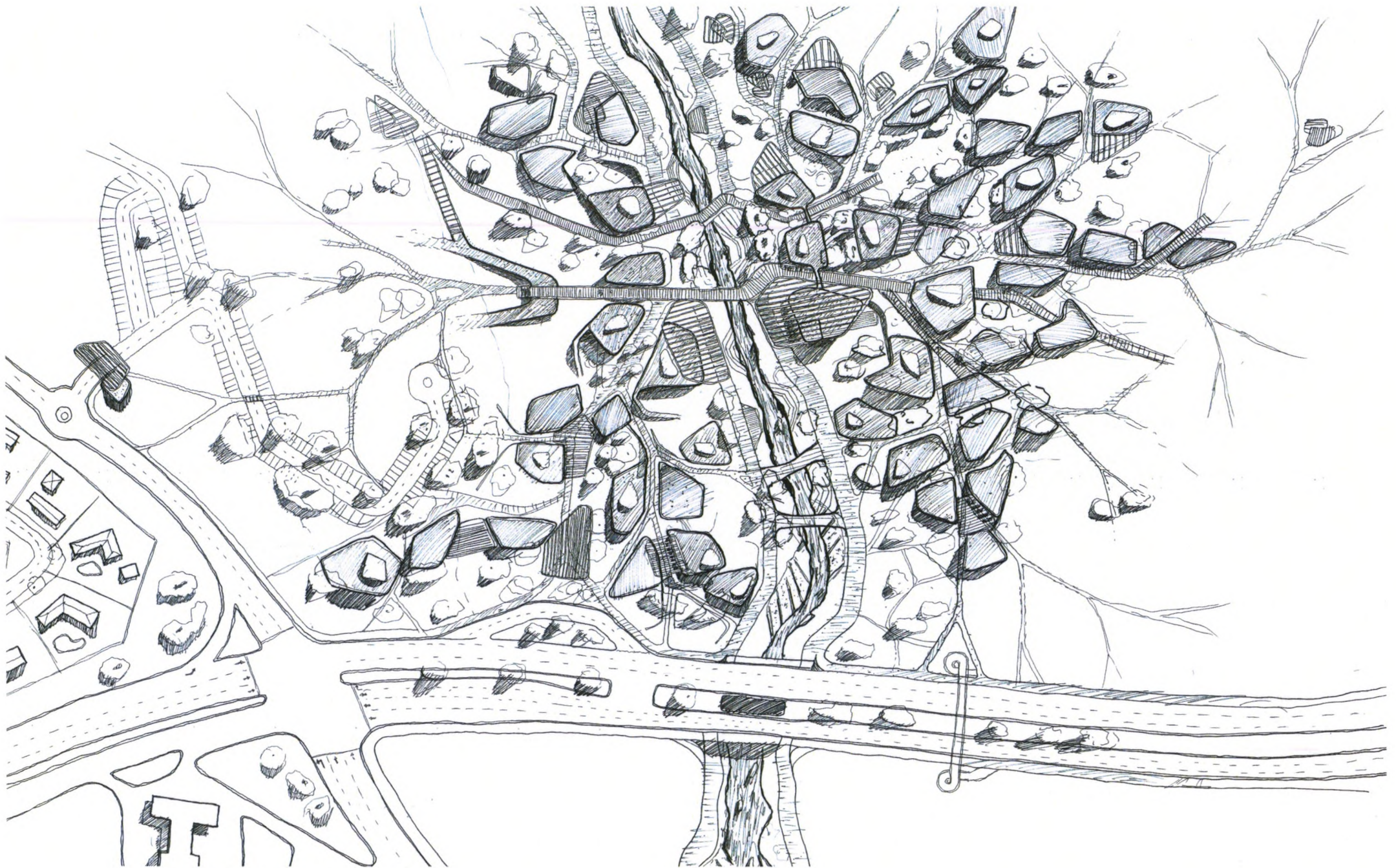


FIG 7.80: FUTURE VISION SITE PLAN
Scale: 1:2000



FIG 7.81: Future growth vision sketch.

AGRICULTURE TOWERS & URBAN INTERVENTION

The agriculture towers are core component of the nodes for future urban growth. These free standing are vertical towers where vegetables can be grown. The tower is on stilts and its base has a podium which creates an open social space. The tower will contain a projector and speakers, at certain times of day the MOOC created on the Frankenwald campus will be played at these locations. This allows for social learning and for those who don't have access to a phone or a computer to be exposed to the MOOC. Various households in Alexandra do not have access to electricity and the internet. These towers will also supply charging points for people phones as well as free Wifi (Vermeulen, 2011).

The towers are part funded by Wits University and the private sector. People from the community who are interested to have ownership of a portion of the tower to grow their own vegetables, will apply to be part of the scheme. The fabrication lab will be the venue where people will gather and be taught to build such elements. With professional guidance these people will build the towers themselves. This will teach them practical skills as well as foster a sense of ownership of the space. The people will then have access to a certain portion of the tower and they will be able to grow their own food with guidance from student volunteers.

An important part of these intervention nodes is the application of Phytoremediation to clean the river. Phytoremediation is a process where specific plants are used to mitigate the environmental pollutants. The plants are able to contain, degrade, or eliminate metals, pesticides, solvents, explosives, crude oil and its derivatives as well as various other contaminants from the media that contain them (Landmeyer, 2011). In applying phytoremediation to clean the water of the Jukskei river, part of the river will be diverted into wetland grow beds. These beds will filter and clean the water.

To prevent further pollution of the river there will be an investment in upgrading the rubbish removal infrastructure for the area as well as supplying recycling points where the local community can bring their rubbish.

The agriculture tower is lifted off the ground in order to prevent the rats from getting into the vegetables. There is a huge problem with rats in Alexandra. There are people who are trying to grow their own vegetables but they are not able to because of the rats that eat the whatever they grow. In addition there will be Owl coops incorporated into the towers. Owls are currently being used in Alexandra to reduce the rat population. The rat problem is exacerbated by the excess litter that is dumped in certain areas. (Clafin, 2014)

By incorporating the owl coops and increasing rubbish removal I believe that ultimately the rat problem will be reduced.

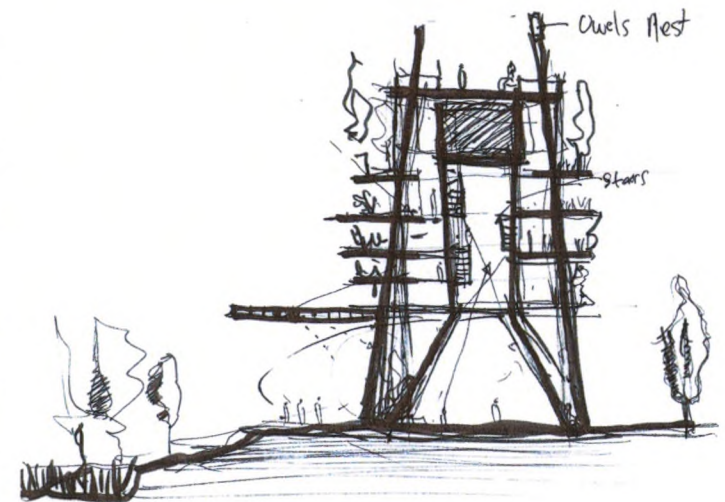
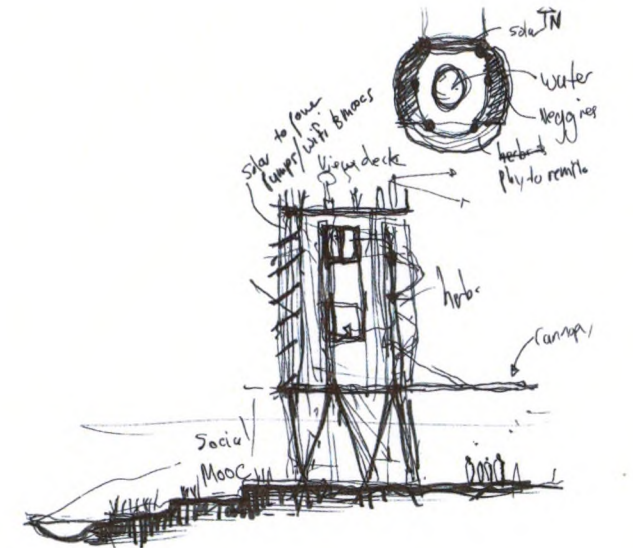


FIG 7.82: Agriculture tower sketch section.

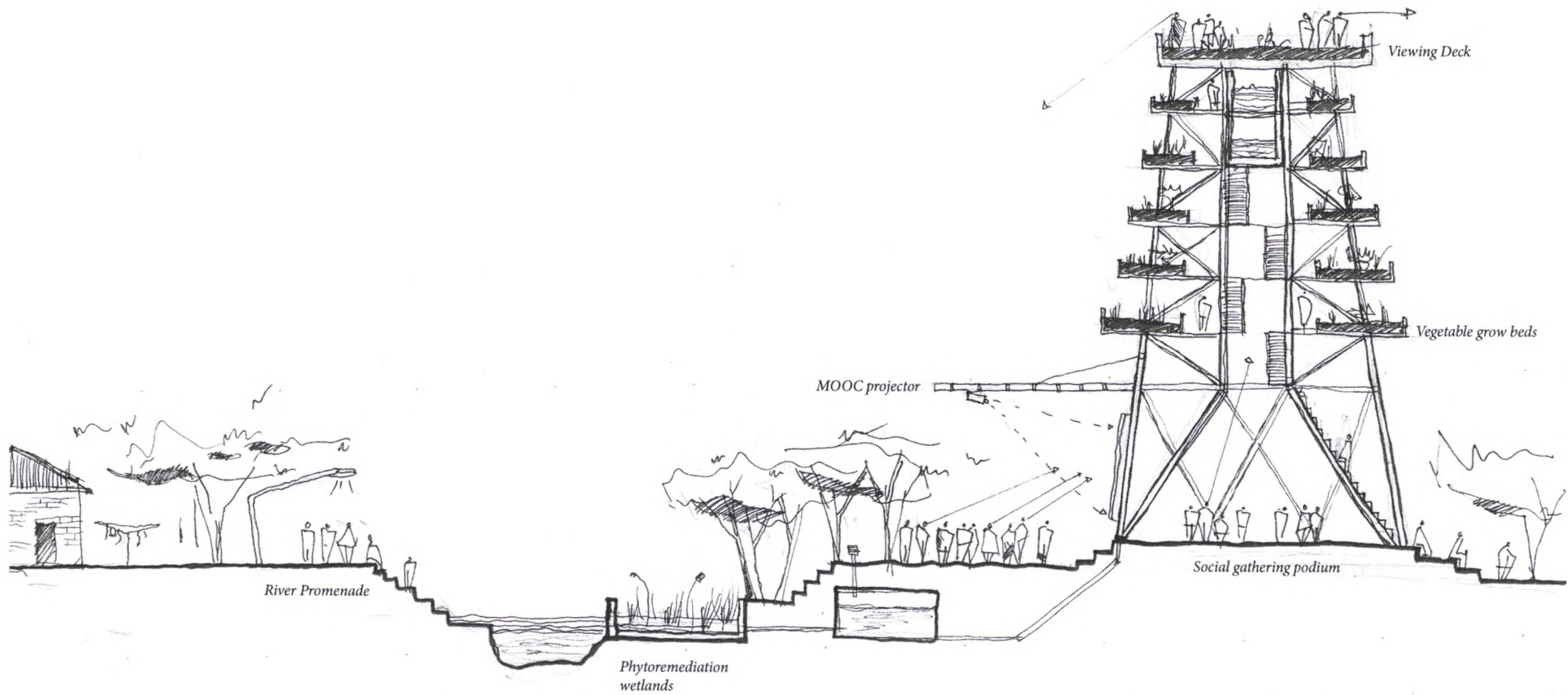


FIG 7.83: Agriculture tower sketch section.



FIG 7.84: Agriculture tower possible site

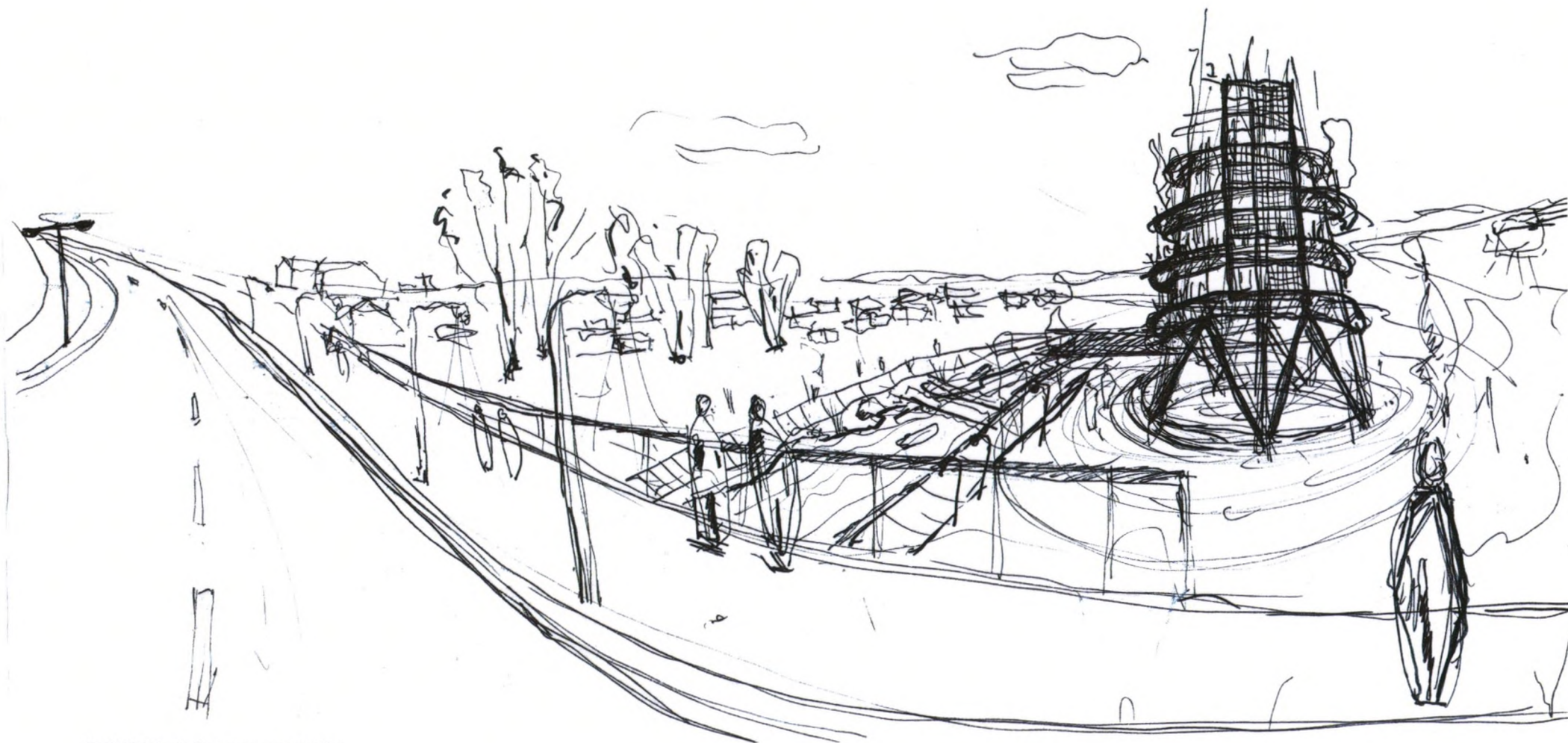


FIG 7.85: Agriculture tower perspective



FIG 7.86: Agriculture tower possible site

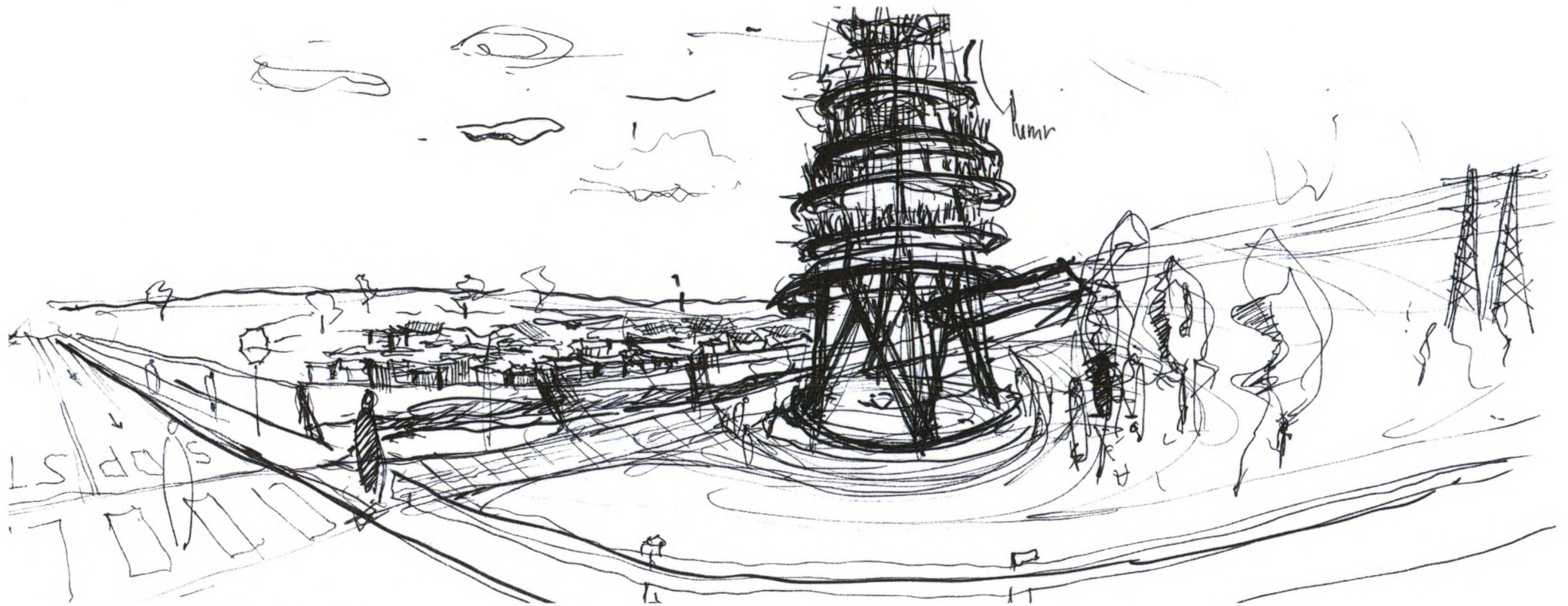


FIG 7.87: Agriculture tower perspective

CONCLUSION

I have learnt great amounts through engaging with the various design approaches in my thesis. The final design is a holistic fusion of the most influential aspects of those designs which I felt worked best. I believe that this final design creates spaces where social interaction is fostered while still acknowledging the individual. I believe that my intervention addresses the origins of learning and the future evolution of knowledge. It connects to our most ancient human nature while innovating with cutting edge technology.

The overall message I have learned through my thesis process is that our society and the educational system needs to become sensitive and understanding of one another. We need to break down hierarchical and egotistical structures and support our own development through supporting one other. Education needs to become agile and constantly update teaching techniques and content to the ever-changing climate of the global world. Education is our most essential human right and we need to ensure that all people receive fair and equal access to this vital resource.

08

APPENDIX

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FIGURE LIST

Chapter 0

FIG 0.1: Similarities of structures: Tree, Human, New York, Car: Hand Drawn, Vaindirlis, C (2015)

FIG 0.2: Design concept sketch: Hand Drawn, Vaindirlis, C (2015)

Chapter 1

FIG 1.1: Kaleidoscope Abstraction: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.2: Movement of thought: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.3: Stimulating the brain: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.4: Neural networks: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.5: Accessing memories: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.6: Abstract layering of knowledge: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.7: Nervous system networks: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 1.8: Experiential Learning: Photograph collage, Johannesburg, Vaindirlis, C (2015)

Chapter 2

FIG 2.0: Computer Generated after Omethon, (2015), City Map 2 [ONLINE]. Available at: <http://lindelokse.deviantart.com/art/City-Map-2-69479660> [Accessed 09 September 15].

FIG 2.1: "University makes me..." google search predictions: Computer Generated After www.google.com

FIG 2.2: Emerging changes of teaching: Computer Generated drawing, after <http://arch1101-2015jy.blogspot.co.za/>

FIG 2.3: Social VS autonomous types of learning: Computer Generated drawing, Vaindirlis, C (2015)

FIG 2.4: Connection: Hand Drawn, Vaindirlis, C (2015)

Chapter 3

FIG 3.0: Hand Drawn, Vaindirlis, C (2015)

FIG 3.1: Xu Xiake, traveler of ancient china: Unknown, (2012), Xu Xiake [ONLINE]. Available at: <http://www.absolutechinatours.com/UploadFiles/ImageBase/China-Travel-Culture.jpg> [Accessed 18 July 15].

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FIG 3.6.1: War machines, self portraits and the Vitruvian man. Leonardo di ser Piero da Vinci, (2015), Unknown [ONLINE]. Available at: <http://www.leonardoda-vinci.org/Drawings-Of-Water-Lifting-Devices.html> [Accessed 09 September 15].

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FIG 3.8: Namibian Desert Beetle: Fog-basking beetle inspired evaporators and condensers: Pius Leuba dit Galland, (2015), Namibian Desert Beetle [ONLINE]. Available at: <http://www.slideshare.net/GreenDrinksChina/biomimicry-the-future-of-sustainable-innovation-pius-leba> [Accessed 23 September 15]

FIG 3.9: Butterfly wings: Inspiring paint without the use of pigments: Pius Leuba dit Galland, (2015), Structural colors [ONLINE]. Available at: <http://www.slideshare.net/GreenDrinksChina/biomimicry-the-future-of-sustainable-innovation-pius-leba> [Accessed 23 September 15]

FIG 3.10: Natures principals diagram: Computer drawn, after <http://dreamfire.vc/why-dreamfire-ventures>

FIG 3.11: Slime mold: Could the intuitive of slime guide the design of urban transport routes: Heather Barnett, (2015), Searching for food [ONLINE]. Available at: <http://slpzone.blogspot.co.za/> [Accessed 23 September 15].

FIG 3.12: Gecko hands: Creating clue without chemicals: Pius Leuba dit Galland, (2015), gecko tape [ONLINE]. Available at: <http://www.slideshare.net/GreenDrinksChina/biomimicry-the-future-of-sustainable-innovation-pius-leba> [Accessed 23 September 15].

FIG 3.13: The 3 type of learners: Hand Drawing , Vaindirilis, C (2015)

FIG 3.14: Conventional teaching VS MOOCs: Computer Generated, Vaindirilis, C (2015)

FIG 3.15: Individial MOOC VS group activated MOOCs: Computer Generated after <http://insights.wired.com/profiles/blogs/moocs-2-0-scaling-one-on-one-learning#axzz3oHY1hadb>

FIG 3.16: Harnessing the intellect and passion: Computer edited after: <https://warosu.org/lit/thread/6762101>

FIG 3.17: Balancing mind, heart, and body: Computer Generated after: <http://www.wildpotential.org/>

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FIG 3.19: Meeting room: A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.20: Internal atrium: A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.21: Library study: A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.22: Garden Courtyard: A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.23: Seminar room: A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.24: Entrance : A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.25: Balcony Terrance: A. Larigakis, (2015), Unknown [ONLINE]. Available at: http://larigakis.ca/mies_portfolio/quest-university-canada-squamish-bc/ [Accessed 14 September 15].

FIG 3.26: Google offices in Dublin, Ireland: Josh Dunlop, (2015), Unknown [ONLINE]. Available at: <http://www.incomediary.com/top-20-most-awesome-company-offices> [Accessed 13 May 15]

FIG 3.27: The different contexts for learning: Computer Generated after: https://en.wikibooks.org/wiki/Peeragogy_Handbook_V1.0/Overview

FIG 3.28: EarthChild Project khayelitsha, Capetown. Image courtesy of EarthChild Project, Available at: <http://earthchildproject.org/>

FIG 3.29: The San in trance-like states entered through hypnotic drumming, dancing, chanting and meditation: Catherine Whitworth, (2013), Trance Dance at the BaSarwa Bushmans Camp, Botswana [ONLINE]. Available at: <http://catherinewhitworth.com/trance-dance-at-the-basarwa-bushmens-camp-botswana/> [Accessed 12 July 15].

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FIG 3.32: Factors affecting true nutrition: Computer Generated, Vaindirilis, C (2015)

FIG 3.33: Kolbs Theory for experiential learning: Computer Generated after <http://www.businessballs.com/kolblearningstyles.htm>

FIG 3.34: Students collaborating with a robotic arm at the Institute for Advanced Architecture in Catalonia (IAAC), Spain: Marsden, E., 2014. Makeshift: An Experimental Stage for Spatial Exchange. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?value=Marsden%2C+Elliot&type=author> [Accessed 04 September 2015].

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FIG 3.36: World wide Fab Lab Network: Computer Generated, Vaindirilis, C (2015)

FIG 3.37: Chemical engineering laboratory: Joseph Ostafi, (2015), Better, smaller and more sophisticated tools streamline research at KAUST's labs in Thuwal, Saudi Arabia. [ONLINE]. Available at: <http://www.hok.com/thought-leadership/the-scientific-workplace-of-the-future/> [Accessed 29 August 15].

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FIG 3.39: Panorama of Frankenwald estate: Photograph collage, Johannesburg, Vaindirilis, C (2015)

FIG 3.41: Singapore University of Technology and Design ,UNStudio + DP Architects: Hufton+Crow, (2015), Unknown [ONLINE]. Available at: <https://www.competitiononline.com/en/projects/51374> [Accessed 10 September 15].

FIG 3.42: Library type work spaces: for greater concentration people face each other's backs or have screens between them: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.43: Other type of library spaces with change of levels to allow for privacy and concentration. hand drawn after: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.44: Window work desks, which allot for isolation while still being stimulated by exterior views: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.45: Social area and gathering spaces: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.46: Group working desks: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.47: Small meeting and seminar desks: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.48: Board room tables prioritizing the persons at the ends: De Villiers, S., 2015. Wiredspace. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah> [Accessed 16 September 2015].

FIG 3.49: The Great hall, University of the Witwatersrand: Makeshift: An Experimental Stage for Spatial Exchange. [Online] Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?value=Marsden%2C+Elliot&type=author> [Accessed 04 September 2015].

FIG 3.50: Adidas Laces research and development building by Kadawittfeld Architects: kadawittfeldarchitektur, (2015), Unknown [ONLINE]. Available at: <http://www.architektur-wasser.de/referenzen/adidas-laces.html> [Accessed 01 October 15].

FIG 3.51: Rolex Learning Center, SANAA Architects: SANAA, (2015), Unknown [online]. available at: <http://rolexlearningcenter.epfl.ch/page-34751-en.html> [accessed 12 august 15].

FIG 3.51 A,B,C: Womens Opportunity Center, Sharon Davis Design: Elizabeth felicella, (2013), unknown [online]. available at: <http://www.archdaily.com/433846/women-s-opportunity-center-sharon-davis-design> [accessed 16 september 15]

FIG 3.52: Singapore University of Technology and Design ,UNStudio + DP Architects: Hufton+Crow, (2015), Unknown [ONLINE]. Available at: <https://www.competitionline.com/en/projects/51374> [Accessed 10 September 15].

FIG 3.53: Carpenter Center for the Visual Arts by Le Corbusier: Unknown, (2015), Carpenter Center for Visual Arts, Cambridge [ONLINE]. Available at: <http://www.fondationlecorbusier.fr/corbuweb/morpheus.aspx?sysId=13&IrisObjectId=4676&sysLanguage=en-en&itemPos=9&itemCount=78&sysParentId=64&sysParentName=> [Accessed 19 March 15].

FIG 3.53a: Yannis Xenakis, Philips Pavilion, Brussels, 1958: SAMUEL, F.(2010) Le Corbusier and the Architectural Promenade. Basel:Birkhauser

FIG 3.53b: ThinkGarden Offices, Milan Italy: Josh Dunlop, (2015), Unknown [ONLINE]. Available at: <http://www.incomediary.com/top-20-most-awesome-company-offices> [Accessed 13 May 15]

FIG 3.53c: Seglas Cano Offices, by Iwan Baan: Josh Dunlop, (2015), Unknown [ONLINE]. Available at: <http://www.incomediary.com/top-20-most-awesome-company-offices> [Accessed 13 May 15]

FIG 3.53d: Dtac Headquarters, Bangkok: Josh Dunlop, (2015), Unknown [ONLINE]. Available at: <http://www.incomediary.com/top-20-most-awesome-company-offices> [Accessed 13 May 15]

FIG 3.53e: Google offices Zurich: Josh Dunlop, (2015), Unknown [ONLINE]. Available at: <http://www.incomediary.com/top-20-most-awesome-company-offices> [Accessed 13 May 15]

FIG 3.54 (ABOVE): Image courtesy of Earthworld Architects

FIG 3.55 (LEFT): Centenary building: Photograph collage, Pretoria, Vaindirlis, C (2015)

FIG 3.56: Centenary building photo collage 1: Photograph collage, Pretoria, Vaindirlis, C (2015)

FIG 3.57: Centenary building photo collage 2: Photograph collage, Pretoria, Vaindirlis, C (2015)

FIG 3.58: Wits University, Amic deck stairs: Photograph, Johannesburg, Vaindirlis, C (2015)

FIG 3.59: Wits University, Science Stadium stairs Photograph, Johannesburg, Vaindirlis, C (2015)

FIG 3.60: Wits University, Umthombo building pathway: Photograph, Johannesburg, Vaindirlis, C (2015)

FIG 3.61: Wits University, Science Stadium: Photograph, Johannesburg, Vaindirlis, C (2015)

FIG 3.62: Wits University, Science Stadium: Computer generated, Vaindirlis, C (2015) on Photograph, Johannesburg, Vaindirlis, C (2015)

FIG 3.63: University of Pretoria, Centenary building, Pretoria: Computer generated, Vaindirlis, C (2015) on Photograph, Pretoria, Vaindirlis, C (2015)

FIG 3.64: University of Pretoria, Centenary building, Pretoria: Computer generated, Vaindirlis, C (2015) on Photograph, Pretoria, Vaindirlis, C (2015)

FIG 3.65: University of Pretoria, Centenary building, Pretoria: Photograph, Pretoria, Vaindirlis, C (2015)

FIG 3.66: University of Pretoria, Centenary building, Pretoria: Photograph, Pretoria, Vaindirlis, C (2015)

FIG 3.67: The tree as an ancient place of gathering and learning: Hand drawn, Vaindirlis, C (2015)

Chapter 4

FIG 4: Computer Generated after Paul Bourke, (2013), Features in the Diaorama Magazine, issue 4, May 2013. [ONLINE]. Available at: <http://paulbourke.net/fractals/googleearth/> [Accessed 12 August 15].

FIG 4.1: Queens Lane Coffee house: Unknown, (2015), A 17th century Coffee House – pungent hubs of news, conversation and gossip [ONLINE]. Available at: <https://theperfumemistress.wordpress.com/2012/03/28/wake-up-and-smell-the-coffee/> [Accessed 26 March 15].

FIG 4.2: Merton colleges. Oxford: Unknown, (2015), Unknown [ONLINE]. Available at: <http://www.oxfordshireinfo.co.uk/oxford/oxford-university/merton-college/> [Accessed 20 August 15].

FIG 4.3: University of Virginia, Charlottesville: Unknown, (2015), University of Virginia [ONLINE]. Available at: <https://brohammas.wordpress.com/2012/09/30/uva-where-college-lives/> [Accessed 24 September 15].

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FIG 4.5: Figure ground study of the typological evolution of Universities: Botha, E. J., 2009. Existing Fabric as generator for a 'new identity: Re-connecting lost space. 1st ed. Pretoria: University of Pretoria.

FIG 4.6: Students queue outside the University of Johannesburg to secure some of the last remaining university places on January 10, 2012: Victoria Eastwood, (2015), Students queue outside the University of Johannesburg to secure some of the last remaining university places on January 10, 2012. [ONLINE]. Available at: <http://edition.cnn.com/2012/01/10/world/africa/south-africa-stampede/> [Accessed 13 August 15].

FIG 4.7: Strikes at Tshwane University of Technology over lack of funds in the National Student Financial Aid Scheme: Theana Breugem, (2014), Tshwane University of Technology students protest on January 29, 2014 [ONLINE]. Available at: <https://www.enca.com/tut-classes-resume-wednesday> [Accessed 01 August 15].

FIG 4.8: Issues faced by the Higher Education sector: Computer Generated after <https://www.linkedin.com/pulse/20140407211253-23485324-designing-the-future-of-higher-education>

FIG 4.9: Marxist students table at University of the Witwatersrand: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 4.10: Removal of the Rhodes statue at the University of Cape Town: Kimon de Greef, (2015), Unknown [ONLINE]. Available at: <http://magazine.good.is/articles/university-of-cape-town-removes-cecil-rhodes-statue> [Accessed 09 August 15].

FIG 4.11a: 'Anonymous' mask wearing protester: Unknown, (2015), Unknown [ONLINE]. Available at: <https://twitter.com/bnast18> [Accessed 18 September 15].

FIG 4.11b: Fee increase protests, Pretoria, October 23rd 2015: Kim Ludebrook, (2015), October 23: Some of the protesting students and youths from political parties gather by a security fence at the Union Buildings. [ONLINE]. Available at: <http://www.bdlive.co.za/national/education/2015/10/29/gallery-student-protests> [Accessed 30 October 15].

FIG 4.12: Sketch of student protests at the University of the Witwatersrand, October 2015.

Chapter 5

FIG 5.0: Untitled: Hand Drawn: Vaindirilis, C (2015)

FIG 5.1: Site Location diagram: Computer Generated, Vaindirilis, C (2015)

FIG 5.2: Time line of the history of Alexandra Township and factors influencing it: Computer Generated, Vaindirilis, C (2015)

Fig 5.3a: Land for sale sign: Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

Fig 5.3b: Street trader kiosk: Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

FIG 5.3c: Jukskei river, 1956: Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

FIG 5.3d: Bus boycott (1944): Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

FIG 5.4: Alexandrian residents commuting by truck: Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

FIG 5.5a: Bus boycotter's riding to work in the early morning on Louis Botha Avenue (1944): Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

FIG 5.5b: Wits Medical students inspecting the hygienic standards of Alexandra (1940): Philip Bonner and Noor Nieftagodien, "Alexandra: A History," Johannesburg: Wits University Press, 2008.

FIG 5.6: Aerial photograph (1952): Philip Bonner and Noor Nieftagodien, Alexandra: A History, Johannesburg: Wits University Press, 2008.

FIG 5.7a: Sign on-site: Photograph collage, Johannesburg, Vaindirilis, C (2015)

FIG 5.7b: Site panorama: Photograph collage, Johannesburg, Vaindirilis, C (2015)

FIG 5.7c: Site aerial photograph: Computer Generated Drawing after Google Earth image.

FIG 5.8a: Alex FM advert: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8b: Msimang centre, second avenue: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8c: Roosevelt street looking south: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8d: 1st street colonnade: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8e : Alexandra Heritage Centre, Peter Rich Architects: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8f: Gautrain flyover bridge: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8g: Pan Africa shopping center: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8h: 1st street colonnade and new development: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.8i: Traditional medicine: Photograph, Johannesburg, Vaindirilis, C (2015)

FIG 5.9: Pedestrian watersheds: Computer Generated after QGIS spatial data database.

FIG 5.10: New residential developments: Computer Generated Drawing, after GCRO (2014) Accessed at <http://gcro1.wits.ac.za/gcrogis1/> on 04 September 2015

FIG 5.11: Population density: Computer Generated Drawing, after GCRO (2014) Accessed at <http://gcro1.wits.ac.za/gcrogis1/> on 04 September 2015

FIG 5.12: Urban land cover: Computer Generated Drawing, after GCRO (2014) Accessed at <http://gcro1.wits.ac.za/gcrogis1/> on 04 September 2015

FIG 5.13: Money Boards: Computer Generated Drawing, after De Villiers, S., 2015. Wiredspace. [Online]
Available at: <http://wiredspace.wits.ac.za/handle/10539/45/browse?type=author&value=De+Villiers%2C+Sarah>
[Accessed 16 September 2015].

FIG 5.14: Golden ratio displayed in the human arm: Computer Generated Drawing, after <http://bashoh.com/2014/07/golden-ratio-in-nature/>

FIG 5.15: Recursive fractal construction of natural objects: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 16.

FIG 5.16: Fractal simulations for Ethiopian processional crosses through three iterations: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 136

FIG 5.17: Lotus capital of Egyptian order columns displays its origins in fractals: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 207

FIG 5.18: combination of circular and quadrilateral forms in Native American designs as a fourfold or bifold rotation. Pg 46

FIG 5.19: African stools in scaling series: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 56

FIG 5.20: Seed shape for the fractal simulation of the palace in figure bellow. Grey line will be replaced by scaled down replica of the entire seed: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 22

FIG 5.20.1: First three iterations of the fractal simulation: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg22

FIG 5.21: Enlargement of the 3rd iteration: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 22

FIG 5.23: Aerial view of the city of Logone Birni in Cameroon. The largest building complex, in the center is the palace of the chief: Eglash, R., 1999. *African Fractals: modern computing and indigenous design*. 3rd ed. New Brunswick: Rutgers University Press. Pg 22

FIG 5.24: Digital fractal generation of Ba-ila. Eglash, R., 1999. African Fractals: modern computing and indigenous design. 3rd ed. New Brunswick: Rutgers University Press. Pg 27

FIG 5.25: Aerial photograph of Ba-ila settlement pre 1944: Eglash, R., 1999. African Fractals: modern computing and indigenous design. 3rd ed. New Brunswick: Rutgers University Press. Ph 27

FIG 2.26: Digital fractal generation of Cairo street pattern: Eglash, R., 1999. African Fractals: modern computing and indigenous design. 3rd ed. New Brunswick: Rutgers University Press. Pg 37

FIG 5.27: Map of the streets of Cairo , 1898: Eglash, R., 1999. African Fractals: modern computing and indigenous design. 3rd ed. New Brunswick: Rutgers University Press. Pg 37

FIG 5.28: Eyes and Nebulas: Unknown, (2015), Unknown [ONLINE]. Available at: <https://sathyasaimemories.wordpress.com/tag/spirituality/> [Accessed 03 October 15].

FIG 5.29: City formations related to forms of brain neurons: Unknown, (2015), Unknown [ONLINE]. Available at: <http://cozyhunter.com/> [Accessed 11 September 15].

FIG 5.30: Robber fly eye: Unknown, (2015), Unknown [ONLINE]. Available at: <http://ink361.com/app/users/ig-373324003/resonanceproject/photos> [Accessed 06 September 15].

FIG 5.31: Veiled Lady Mushroom: Unknown, (2015), Unknown [ONLINE]. Available at: <http://ink361.com/app/users/ig-373324003/resonanceproject/photos> [Accessed 06 September 15].

FIG 5.32: Nautical Seashell: Unknown, (2015), Unknown [ONLINE]. Available at: <http://ink361.com/app/users/ig-373324003/resonanceproject/photos> [Accessed 06 September 15].

FIG 5.33: Top view of dandelion seeds: Unknown, (2015), Unknown [ONLINE]. Available at: <http://ink361.com/app/users/ig-373324003/resonanceproject/photos> [Accessed 06 September 15].

FIG 5.34: Nile river delta: Unknown, (2015), Unknown [ONLINE]. Available at: <http://ink361.com/app/users/ig-373324003/resonanceproject/photos> [Accessed 06 September 15].

FIG 5.35: Winter tree: Unknown, (2015), Unknown [ONLINE]. Available at: <http://ink361.com/app/users/ig-373324003/resonanceproject/photos> [Accessed 06 September 15].

FIG 5.36: Proposed Louis Botha 'Corridors of freedom' link: Computer Generated from from <http://www.reavaya.org.za/consumer-information/the-routes>

FIG 5.37: Diagram of urban regeneration nodes: Computer Generated, Vaindirlis, C (2015) after Google Earth image.

FIG 5.38: Similarities of structures: Tree, Human, New York, Car: Hand Drawn, Vaindirlis, C (2015)

Chapter 06

FIG 6.0 Hand Drawn, Vaindirlis, C (2015)

Fig 6a: The Brain stem: Hand Drawn, Vaindirlis, C (2015) after: unknown, (2015), FIGURE 14-1 [ONLINE]. Available at: <http://what-when-how.com/neuroscience/the-cranial-nerves-organization-of-the-central-nervous-system-part-1/> [Accessed 01 May 15].

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Fig 6d: The Cochlea: Hand Drawn, Vaindirlis, C (2015) after: Unknown, (2013), Ear Diagram [ONLINE]. Available at: http://diagrampic.com/?attachment_id=240 [Accessed 01 May 15].

FIG: 6.1 to FIG 6.63: All Hand Drawn, Vaindirlis, C (2015)

FIG 7.68: Interior wall view: Marcus Fairs, (2007), Untitled [ONLINE]. Available at: <http://www.dezeen.com/2007/09/09/dominus-winery-by-herzog-de-meuron/> [Accessed 19 August 15].

FIG: 7.68 to FIG: 7.70: All Hand Drawn, Vaindirlis, C (2015), Loosely based on Boogertman & Partners Architects detail.

FIG: 7.71 to FIG: 7.74: All Hand Drawn, Vaindirlis, C (2015)

FIG 7.75: Site Panorama: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 7.76: Urban nodes concept sketch: Hand Drawn, Vaindirlis, C (2015)

FIG 7.77: Urban node intervention points and pedestrian bridges: Computer Generated, Vaindirlis, C (2015) after Google Earth image.

FIG: 7.80 to FIG: 7.83: All Hand Drawn, Vaindirlis, C (2015)

FIG 7.84: Agriculture tower possible site: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 7.85: Agriculture tower perspective: Hand Drawn, Vaindirlis, C (2015)

FIG 7.86: Agriculture tower possible site: Photograph collage, Johannesburg, Vaindirlis, C (2015)

FIG 7.87: Agriculture tower perspective: Hand Drawn, Vaindirlis, C (2015)

FIG 7.88: Aerial Photograph of Canadian mountain range: Paul Bourke, (2013), Canada [ONLINE]. Available at: <http://paulbourke.net/fractals/googleearth/> [Accessed 12 August 15]



THANK YOU