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The re-use of the UP Mamelodi campus and the stitching together of landscapes as a vehicle for empowerment





THANK
YOU

Ida Breed, for your patience, encouragement, dedication and advice.

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The re-use of the UP Mamelodi campus and the stitching together of landscapes as a vehicle for empowerment

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Mamelodi is a multi-cultural township located 20kms east of the Tshwane city centre. It is a vibrant and complex place, alive with opportunity, diversity, talent and creativity. It is also however, afflicted by many problems, especially those of a social and economic nature, like unemployment, poverty, poor living conditions, and so on. Mamelodi therefore, is a place where the implementation of appropriate design could make a real difference in the lives of its inhabitants.

The University of Pretoria Mamelodi campus, due to its prime location and inherent qualities, has the opportunity to contribute significantly to the upliftment and transformation of the people around it, and to become a place of value and pride. It is however, missing this opportunity for a number of reasons: the isolation and segregation of the campus, its anonymity and lack of local identity, as well as the inaccessibility of the campus to local residents. One possible solution would be the full integration of the campus into the surrounding community, thereby enabling the empowerment of people on both a physical and psychological level.

Both of these types of empowerment can be achieved through modifications to the University boundaries and the reworking of the open buffer zone into an area of common ground – a transition zone where the University and the community can come together and be of value to one another. There are two levels of value – quantitative, which can be achieved through the implementation of a cultivated landscape, and qualitative, which is made possible through the creation of a maieutic landscape.

In order to achieve a continuous, integrated urban fabric, this study primarily investigates the creation of a large-scale framework design that considers the site in its entirety. The organising element in this regard was the existing storm water system which was also regarded as a missed opportunity. The study then progresses to a more detailed level in an area which was deemed to possess challenging and diverse options.

The space chosen is located at the entrance to the UP Mamelodi campus library, in the transition zone between University and community, where it functions as a public square. Both the principles of integration and maieusis were applied here in a bid to create an empowering landscape that is immersed in its context, that is accessible, and that is therefore used and appreciated by many.





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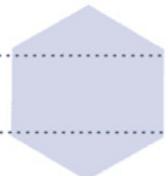
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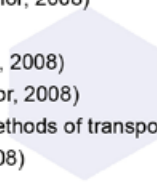
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chapter 1



Part 1: Setting the scene

Townships in South Africa are not unlike *ghettos*¹ found all over the world. They are also however, complex, vibrant places housing different people from different cultural backgrounds, different income groups, different language preferences, and different value and belief systems. They are places filled with challenges, opportunity, ingenuity and creative thought.

Although townships are multifaceted, dynamic places to live, bursting with culture and life, they are also unfortunately fraught with a myriad of problems. These include a lack of infrastructure, overcrowding, unemployment, HIV-Aids, poverty, urban sprawl, and a general lack of amenities, to name but a few.



Figure 2:
Informal settlement across from the UP Campus (Author, 2008)
Small shelters constructed from available materials



Figure 3:
The informal edge of Hans Strydom Road (Author, 2008)
Hot, dusty, eroded and strewn with litter



Figure 1:
"With a dustbin bag, twigs and string..." (Adrian de Kock, 2008:7)
Children take to the streets with their home-made kites in Tswelopele Ext. 8



Figure 4:
There are numerous informal vendors in and around Mamelodi (Author, 2008)
Such vendors sell anything from fruit, vegetables and sweets to low-cost phone calls and hair cuts

Mamelodi is a township situated on the eastern edge of the Tshwane district. It was created during the Apartheid era as a means of separating the African population from the rest of the city (le Roux, Louw & Nel, 1980:ii). Due to the precise placement of this township, buffered by the Magaliesberg mountain range in the north, it still remains partially segregated and on the outskirts of the city. This division from thriving commercial areas has resulted in the fact that people living there have to travel substantial distances in search of work, ensuring that they spend much time away from home; a situation which is both inconvenient and has contributed to many social issues.

1. Ghetto:

A part of a city, especially a slum area, occupied by a minority group / a segregated group or area (Thompson, 1996:570).



Figure 5:
Diversity in Mamelodi (Author, 2008)
Zozo panel construction, taxi-wash, residences - living & working in the same place

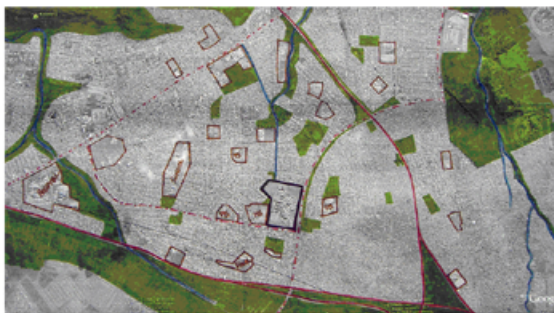


Figure 6:
Green open spaces around the UP Mamelodi Campus
(Google map manipulated by author, 2008)

Mamelodi also has a severe shortage of d open space and the houses in this area al with extensive back gardens in which to play, relax and de-stress.

There are plenty of open spaces within the city fabric but these are simply leftover spaces which have become voids and do not contribute anything positive to the functioning of the township. Instead, they are desolate and neglected spaces with no elements of human scale, rendering them inhospitable; spaces that breed crime and are used as nothing more than dumping grounds. These areas contribute more to the problems of Mamelodi than to the solutions.



Figure 7:
Vast, inhospitable, littered and neglected open spaces
with no elements of human scale (Author, 2008)



Figure 8:
Open spaces that contain no designed elements or creative thought
are uncared for by community members (Author, 2008)

Part 2: The real world problem

As shown in the above paragraphs, Mamelodi has a great many needs and shortcomings which have to be addressed, and the University of Pretoria Mamelodi campus, because of its prime location and inherent qualities, has the opportunity to make a real difference. The campus has the ability to significantly aid and empower the people of Mamelodi and to become a place of value, distinction and pride. At present, however, the campus is not being used optimally. It functions as an obstruction in the urban fabric; an insular element with insufficient students which has become almost meaningless to the people around it.

According to Keast (1967:13), “an important criterion for evaluating campus plans would be to ask whether the campus encourages the maximum number of impromptu encounters with other students, with other faculty members, with visitors, with works of art, with books and with activities of which one is not usually a regular part“. A lack of ‘encounters’ at the UP Mamelodi Campus can be attributed to two main factors:

2.1) The isolation of the campus

The campus is completely cut off from its surrounding landscape by a double security fence as well as a large buffer zone of open land which runs all the way around the campus heart. This separateness enforces the idea that the university is an elitist institution for use only by a privileged few. It is an insular island which serves as both a physical and metaphysical division between different economic classes.



Figure 9:
Open, anonymous buffer zone surrounding the University
(Mr SID aerial photo, digitally manipulated by author, 2008)

The campus has inverted itself in a typical laager formation, turning its back on the surrounding community and shutting them out, resulting in the fact that the University has become insignificant to the people. This is evidenced by the dumping ground which has been established just outside the double fence enclosing the University; a prime example of the outcomes of the institution's physical separation from its immediate surroundings (see Figure 11).

Gerrit Jordaan (2008), urban planner for the University of Pretoria is quoted as saying, "A city around a University and a University within a city are two completely different things". Integrating the University into it's surrounding community will increase the potential for people to benefit not only from the services provided, but also from a day to day interaction with the facilities on offer.

2.2) The anonymity of the campus

The campus suffers from a complete lack of local identity. It says nothing about its context, about the people that use it or about its history. It could be this placelessness and lack of character which contribute to the shortage of students. There is no pull factor – why go to the Mamelodi campus when you can use main campus, with all its events, artworks, facilities and cultural activities, for the same amount of money?



Figure 10:
View from inside the University of the boundary fence
across the buffer zone (Author, 2008)



Figure 11:
Dumping ground right outside the University's
secondary gate (Author, 2008)



Figure 12:
The campus with its lack of character and local identity (Author, 2008)

Another factor which contributes to this is the physical campus layout. The UP Mamelodi campus was previously a Vista University campus, and was incorporated into the University of Pretoria on the 2 January 2004, as per the national government's restructuring of higher education program (University of Pretoria, 2008). The treatment of the previous Vista University Campus's nationwide is a prime example of the de-contextualised design process decried by Oktay (2002: 266), who says that the use of universal design standards denies a place its sense of identity and genius loci. Relph (in Walmsley & Lewis, 1984:161) agrees with Oktay and states that uniform planning is destroying localism and creating homogenous landscapes. "Planners are creating a placeless geography and fostering a sense of placelessness [where] man has no sense of awareness of the deep and symbolic significance of places and no appreciation of the role of places in his own identity". The university can therefore be accused of not contributing to either the identity or the wellbeing of the people who need it most.



Figure 15 & 16: Landmark buildings on both the Port Elizabeth NMMU Vista campus and the UP Mamelodi campus are identical (Nelson Mandela Metropolitan University. www.nmmu.co.za, [S.a.]) (Author, 2008)

"A deep human need exists for associations with significant places. If we choose to ignore that need, and allow the forces of placelessness to continue unchallenged, then the future can only hold an environment in which places simply do not matter. If, on the other hand, we choose to respond to that need and transcend placelessness, then the potential exists for the development of an environment in which places are for man, reflecting and enhancing the variety of human experience" (Relph, 1976:147).

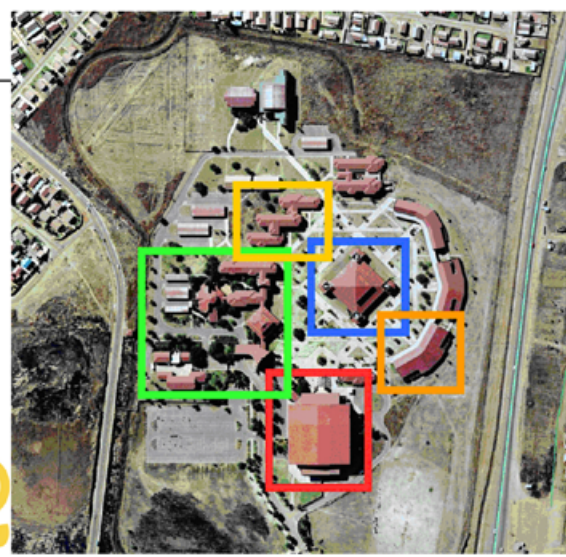


Figure 13: General layout of the UP Mamelodi campus (Google map digitally manipulated by author, 2008)



Figure 14: General layout of the University of Johannesburg Vista campus (Google map digitally manipulated by author, 2008) The similarities in both building form and layout of the UP and UJ Vista campuses are blatantly obvious.

In other words, the University can thrive when it is used, loved and 'owned' by the people living there, and this can happen when the campus gains an identity that the people can relate to and feel comfortable in. Friedberg (1970:151) hits the nail on the head when he says that pride and identification cannot be built with second-hand materials. If anything, a deteriorated community with deteriorated morale needs a facility that is better than elsewhere; something that is unique; a place of distinction.

4

cut & paste

2.3) The inaccessibility of the campus

This brings us to the third major problem on the UP Mamelodi Campus: the fact that a university as we currently know it is a closed, prescriptive and elitist institution. It is therefore inaccessible and meaningless to many of the surrounding residents as they are unable to attend University, whether it is for financial reasons, insufficient educational qualifications, or simply a lack of information. In the 43rd pattern: University as a Marketplace, Alexander, Ishikawa & Silverstein (1977:232) condemn “concentrated, cloistered universities with closed admission policies and rigid procedures which dictate who may teach a course”, as these kill any opportunities for learning. Rather universities should become marketplaces which are open and public and woven throughout the city, allowing any and all with the will to learn, this opportunity.

The campus as it stands is the incorrect institution for its context, and the University has, to an extent, realized this. It is in the process of implementing community service and outreach programs (University of Pretoria, 2008) which will contribute to the solution, but will not completely solve the problem and create a continuous urban fabric. These Community Engagement policies are however definitely a step in the right direction and provide something upon which to build a fully engaged community facility that will benefit the people as a whole, create opportunities and improve lives.

Part 3: Research goal and problem statement

Research goal:

The creation of a landscape that empowers people, both physically and psychologically, that adds meaning and value, and that fosters a sense of community. A landscape that challenges accepted methods of education, and attempts to integrate life and learning. An innovative landscape that is grounded in its context and speaks of the identity of its people.

Problem statement:

The current layout and design of the UP Mamelodi campus does not reflect its physical and social context, thereby limiting its interaction with and understanding of the needs of the people living and working around it.



Figure 17:
An example of community engagement already in practice at the UP Mamelodi campus (Author, 2008)

Figure 18:
Community engagement ensures that the students benefit from the practical experience, while at the same time providing the community with free legal advice (Author, 2008)



Part 4: Sub-problems / research questions

How can the landscape be used as a means of education?

Education = knowledge. What is knowledge, and how does one accumulate it?

Can the landscape become a 'teacher'?

How can a landscape challenge current ideas and contribute to the rectification thereof?

How can one create a landscape that empowers people?

What is the meaning of empowerment?

How can the landscape become a tool for the empowerment of people?

Are there different types of empowerment?

How can a landscape foster community spirit and a sense of unity?

What is a 'community'?

How does a landscape contribute to the building of a community?

Can the landscape be used as a means of encouraging community participation?

How can identity in the landscape be achieved?

What is 'identity' and what does it mean to different people?

How does the identity of place relate to or influence the identity of an individual person?

What is the relationship between identity and place-making?

Part 5: Hypothesis

A landscape has the ability to empower people both physically and psychologically. This can be achieved through context specific design that responds to the social, economic and political needs of the area and its people.

Part 6: Assumptions and delimiters

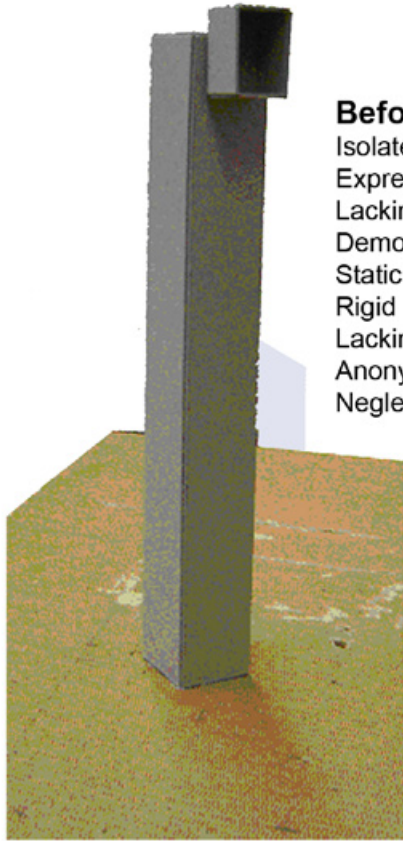
Assumptions:

The author assumes that the future plans of the University of Pretoria regarding community engagement will go ahead as planned (as per the UP website). NGO's will move onto the campus and it will function as a practical training ground for students. Furthermore, the author assumes that the University is willing to contribute to the upgrade and rejuvenation of the UP Mamelodi Campus in any way possible. The author also assumes that the proposed building line specifications and zoning of areas on and around the campus will be approved by council.

Delimitations:

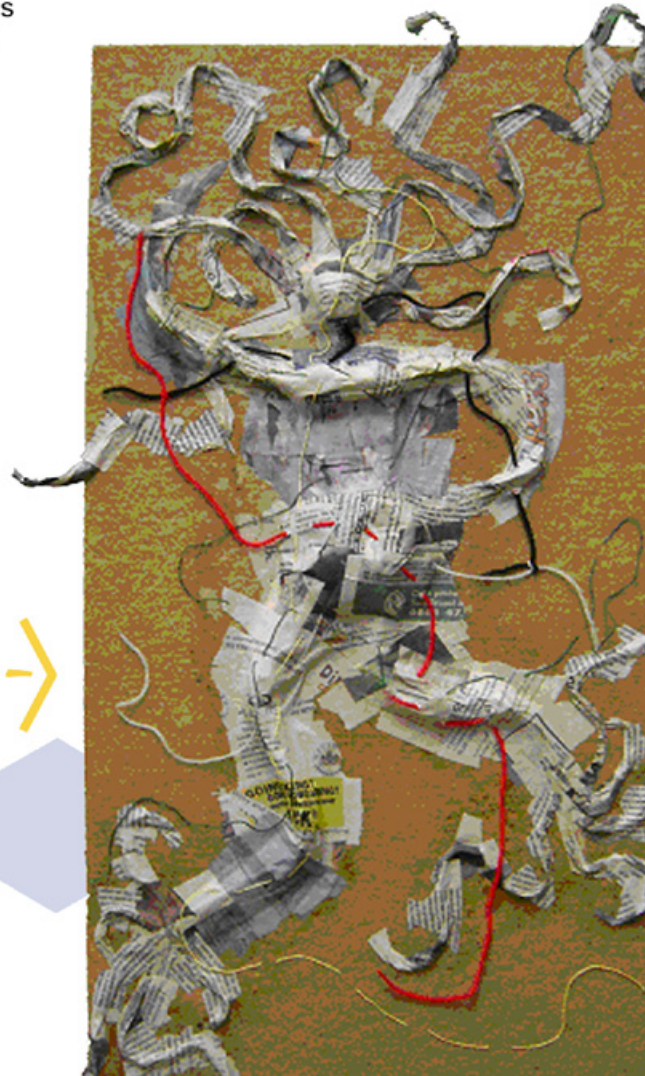
The author is basing all decisions on the current physical, social and economic context of Mamelodi. The Tshwane IDP will be incorporated, as far as possible, and the design will try to predict future expansion, but it primarily attempts to solve problems existing in the area in 2008.

The author will be focusing primarily on the identity of place as opposed to the identity of individuals, but will discuss the effect of place identity on one's individual identity.



Before intervention:

Isolated
Expressionless
Lacking identity
Demoralised
Static and sterile
Rigid
Lacking life
Anonymous
Neglected



After intervention:

Ephemeral and alive
Flowing outwards
Full of expression
Integrated into; connected with...
Complex and colourful
Fertile with ideas
Brimming with creativity
Possessing an identity
A metaphor for life

chapter 2



Part 1: Introduction

Throughout the following document, the 'community' will be mentioned many times. It is therefore important to define what is meant by 'community' and its role in everyday life. (See Appendix 1) According to Ferrinho (1980:5), a community can essentially be described as a group of people with one or more element in common. These elements bring about the formation of a bond between these people, and the more common elements there are, the stronger the bond will be. The human race is essentially one large community, broken up into many smaller communities. Each community has specific qualities that differentiate it from other communities, and individuals are part of many different communities throughout their lives as their needs change.

According to Maslow (in Walmsley, 1988:59), there are six main needs in life. (See Appendix 2) He believes however, that higher order needs cannot be fully realized until lower order needs have been met. This is true to a certain extent, but these needs are not mutually exclusive; the world does not work precisely according to a hierarchical triangle. Every human being has basic concrete needs like food, water, clothing and shelter, and basic abstract needs such as self-reliance, happiness and human dignity. Whilst people are striving to fulfil their concrete needs, their abstract needs are sometimes neglected. Such needs are, however, integral to development and growth.

Hamdi (2004:15) says that "human wellbeing is as important to economic growth as growth is to wellbeing". Abstract needs must therefore also be satisfied in order to achieve the equilibrium necessary for ideal development. A hungry stomach or the need for a safe place to sleep will usually come before the need to express oneself through painting, but this does not render the need for art invaluable. In fact, many people use creative avenues of expression as a means of dealing with their lack of lower order needs. Any intervention therefore, that satisfies both types of needs is ideal, and such a solution will doubtless be better than one which meets concrete needs only.

Figure 19:
An illustration of the various
needs of all human beings
(Author, 2008)



How then can the University contribute to the provision of needs in general? The introduction of an educational 'curriculum' which is accessible to all people and empowers them so that they are able to fulfil their own needs could be a first step. According to Ilich (in Alexander et al, 1977:101), institutions should be channels to which anyone wishing to learn has access without credentials or pedigree; public spaces in which peers and elders outside that person's immediate environment now become available. What is needed is an area of exposure; a place of encounters; a platform for community development.

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Another ideal opportunity presents itself in the zone of barren land surrounding the university heart. A possible solution would be to shrink the actual campus and encourage densification of the university within these boundaries. The outer space could then become a transition zone between the residential areas and the campus; an in-between space which functions as the stitch that knits together the university and the community. It is in this open space that the university and the public become of value to one another; where they can come together to learn and grow, thereby creating a fully integrated community.

Part 2: The importance of designed public open space

2.1) The building of communities

Carr et al (in Oktay, 2002:263) believes that public open space provides an integral place for people to carry out the functional and ritual activities that bind a community together. In densely populated areas, like Mamelodi, public outdoor spaces are sometimes the only places where people can come together and share the same 'room' regardless of background, age, ethnicity or economic status. Such spaces reinforce communal bonds and promote social equality and democracy; they are a necessary part of everyday life. These spaces "...promote a sense of place, become a source of community pride, and offer opportunities for people to play an active part in caring for the local environment" (Tshwane Open Space Framework, 2005:96).



Figure 20:
Relaxing under the shade of a tree in Church Square
(Author, 2007)



Figure 21:
Enjoying the sunshine and people watching in Strijdom Square
(Author, 2007)

work
play
sleep
relax
gather
wait
eat
meet



Figure 22:
Impromptu puppet show in Church Square
(Author, 2007)

2.2) The protection of the environment

The promotion of environmental awareness is an integral element of landscapes today. We are currently experiencing a *global crisis*² which will have disastrous consequences for all humanity if it continues unchecked. It is our responsibility to educate people about the sustainable use of our natural surroundings. Gallagher (1993:214) explains that all people need restorative experiences with plants, water and trees – things that will always be – universal elements. The landscape plays an integral role in fostering a global appreciation of the importance of these universals to our well-being, and this is a vital step in securing their future. In order to make an impact, people need to understand the power of nature, and for this to occur, they need to experience it, interact with it and question it. They need to become a part of it, not only for the sake of environmental conservation, but also because “nature is a human need” (Gallagher, 1993:202).

2.3) The restorative value

“In the stress of urban living, overcrowding, traffic, overload of stimulation, lack of peace and quiet, all take their toll. In walking from one place to another one must discriminate, screen out extraneous stimuli, and pay attention only to those signals that are relevant to the journey. The mental faculty that performs this screening becomes fatigued. Vegetation serves as a shock absorber for the human sensory system assaulted by the smells, sounds and sights of the city. It does not present a challenge to the senses, does not have to be screened out, but provides an opportunity for rest from the constant mental alertness” (Kaplan in Francis & Hester, 1990:246).

According to Gallagher (1993:202), “nature excites our senses, restores our nerves, invites us to play, enhances our social bonds, and supplies meaning and metaphor to our lives.” It is thus evident that human beings need public parks and natural settings in order to function optimally within their current frenetic lives. A public space encourages communal bonding, supports the fact that everyone is part of the bigger picture, and reinforces the idea of Ubuntu, i.e. you are human through other humans.

2. Global crisis:

This crisis includes interdependent problems such as global warming, climate change, ozone depletion, vanishing biodiversity and many more. Coupled with the earth’s growing scarcity of resources and its decreasing ability to support its ever-increasing population, the future looks bleak. Our communities and the larger human enterprise rest upon the often-invisible foundation of natural systems, and if we do not rethink the manner in which we use these natural systems, we will alter them forever (Dumanoski, 2001).



Figure 23:
Contact with nature enables us to understand and appreciate its power and grace (Author, 2008)



Figure 24:
Spending time in nature gives us the opportunity to reflect and relax (Author, 2007)

2.4) The creation of a catalyst

Through the creation of beautiful and functional green spaces, we may also inspire others to do the same, thereby creating an enhanced living environment for all and encouraging community interaction and participation. South Africa can learn from the approach of the Guarapiranga Urban Rehabilitation Program in Sao Paulo, which aims to assimilate slums into the city by providing well-maintained, high quality and innovative community spaces that, in turn, promote private investment in homes, businesses and leisure activities. These spaces encourage social and civil integration, and environmental decline is gradually replaced by the perception of progress (Hindes & Osman, 2005:60).

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These designed public open spaces therefore function as catalysts which encourage development and growth. Aesthetically pleasing and dignified environments are not the exclusive domain of the affluent. They are equally as important in disadvantaged communities where they can make a big difference to the quality of life of the people in these areas, as well as to their feelings of identity and self worth.

Part 3: The importance of identity

Identity is about belonging; about what you have in common with some people and what differentiates you from others. At its most basic it gives you a sense of personal location; the stable core to your individuality (Weeks, 1990:88). According to Thompson (1996:674), identity is “the quality or condition of being a specified person or thing”. It is informed by the relationships that occur between different people as well as between people and place.

Krupat (in Dixon & Durrheim, 2004:457) supports this by stating that “an individual’s sense of self arises in part through his/her transactions with the material environment” thereby suggesting that such environments “do not simply serve as settings for individuals’ activities, actions or behaviours but are instead actively ‘incorporated’ as part of the self”. Korpela (in Dixon & Durrheim, 2004:458) agrees and says that only once these physical settings have been actively and imaginatively incorporated can individuals create environments where self-coherence, self-worth and self-expression can be pursued.

Places with a specific identity are therefore integral to the formation of personal identity. Places allow people the freedom and confidence to be themselves, they encourage interaction with other people and in so doing inform personal identities even more. As Walmsley (1988:68) says, “places become reservoirs of significant life experiences and thereby lie at the centre of a person’s identity and sense of psychological well-being”.



Figure 25:
Public park - Guarapiranga - promotes community integration, pride and a sense of ownership (Hindes & Osman, 2005:61)



Figure 26:
Camden Town, London - The shops, people, clothing, decor - everything speaks the same language and has the same identity (Author, 2008)

“Identity can and should be the basis for long-term, successful place-making; a process that nurtures local distinctiveness and pride in place” (Cumberlidge & Musgrave, 2007:144). This is backed up by Pugh (2000:334) who is of the opinion that both spontaneous and formal improvement can be enhanced by encouraging the expressiveness of life, art, design, and other such humanly commitments. People attribute meaning to a place when they can see themselves and their daily lives in the design; when they can identify with specific elements. This is further enhanced if they were personally involved in the creation of these spaces.



Part 4: Community involvement and participation

According to Swanepoel & de Beer (1996:24-29), there are eight principles of community development:

- Principle of participation (involve EVERYONE - poor, rich, educated, not. Everyone has something to contribute);
- Principle of abstract human needs (provide for both concrete needs AND abstract needs);
- Principle of learning (there is no teacher, everyone learns from everyone else);
- Principle of empowerment;
- Principle of ownership;
- Principle of release (do not aim to bring relief, but rather to free people from their trap. Once free they can gradually improve the situation themselves);
- Principle of 'adaptiveness' (flexible experimentation and a willingness to learn on the part of everyone involved);
- Principle of simplicity (big sophisticated complex projects limit the scope for learning and participation).



Figure 27:
Participation of the community in the design and construction of Thokoza Park, Soweto provides an aesthetic that people can identify with (Author, 2008)

Figure 28:
Community painted murals in Ivory Park, Ekhuruleni foster a sense of pride and ownership (Author, 2008)



In the author's opinion, the principle of participation is one of the most important principles. If it is followed, many of the other principles will occur naturally. For example, if the community is allowed to participate, they will automatically learn new skills and teach one another things, thus empowering themselves and others, and creating a sense of ownership at the same time.

This process of participation reawakens a spirit of community and encourages bonds between different people, between people and their environment, and between people and themselves. It serves to liberate feelings of self-worth, self-fulfilment and pride, in both the place, and in the people themselves and their achievements. These methods attempt to build a community that holds the capacity to initiate its own changes, and to continue developing and transforming itself.

This redefinition of design and planning as part of the process of enablement is the only way of proceeding with the changes that are necessary on the UP Mamelodi campus. Hamdi (2004:xvi) says that we can only begin to make progress and to grow when we are secure enough in ourselves, individually or collectively, to be interdependent; when 'I' becomes 'we' and when 'we' is inclusive of 'them'. It is for exactly this reason that the concept of community needs to be encouraged and built-up; communities together have more resources, more voices, and more hope than one man alone.

Community involvement and participation also acts as a means of education. An education that encourages new experiences, stimulates conversation and thought, and fosters an appropriate, integrated method of learning.

Ferrinho (1980:83) states that "the school does not only exist to perform an academic task, divorced from the surrounding world of living reality, but exists also to meet the felt needs of the people. When a school and community interact in this way, the community activates the school, and the school activates the community." This is precisely the approach needed to reactivate the UP Mamelodi campus - a facility that is context appropriate and provides for the everyday educational needs of its surrounding community. After all, much of a person's education occurs outside and separate from the formal courses in which he/she is registered, and only a university which stimulates curiosity, and prompts casual encounters and conversation will produce a true education in the broadest sense (Keast, 1967:13).

Alexander et al (1977:232), some thirty years ago, discussed the need for a university which would treat the learning process as a normal part of adult life for all people in society. This vision, however, was not realised, especially not in places like Mamelodi where it is needed most. As Gallagher (1993:128) says, "we find that what started out as 'a way' has somehow turned into 'the way'. It seems that once the environmental particulars of a modus operandi work their way into the nervous system, they help close our minds to better options and incline us towards knee-jerk reactions".

A society that emphasizes teaching, breeds children, students and adults who are passive and unable to think or act for themselves. Creative, active individuals can only grow up in a society which emphasizes learning instead of teaching (Alexander, et al, 1977:100). This statement is backed up by Hamdi (2004:xxv), who criticizes the fact that "knowledge is valued more than experience or understanding. He explains that rationality and factual evidence are more rewarded than creativity because they are easier to measure", and that these things are a "barrier to learning".

Creative, self-motivated learning as opposed to prescriptive teaching is therefore the key. Walmsley (1988:12) says that “human beings are naturally inquisitive animals. They seek out and assimilate information above and beyond what is necessary for day-to-day living. This inquisitiveness enables individuals to elaborate on their model of reality as well as to test its reliability”. This is the type of learning we should be encouraging; one which helps people to help themselves. We need to bring back the idea of open education - schools without walls, where knowledge is “discovered” by the learner through group interaction, the blending of different subjects and skills, and questioning, rather than teacher-centred instruction where knowledge is “presented” to a learner via lectures, textbooks and testing (Cuban, 2004).

Appleyard (in Walmsley, 1988:21) notes that there are three distinct sorts of environmental knowledge, namely operational knowledge which allows you to go about your daily life, remembering what route to take, where to find things, etc. Responsive knowledge which comes about as a result of individuals responding to a striking feature in the physical environment (extends beyond the visual to include sounds and smells). And inferential knowledge, which does not come from direct experience, but rather from the ability to extrapolate beyond what is actually known and to make probabilistic inferences about things that have not yet been experienced. The landscape should therefore aim to accept the operational, stimulate the responsive and encourage the use of the inferential.

Coombs and Ahmed (in Ferrinho, 1980:82) discuss three modes of education – informal, formal and non-formal. Informal education is spontaneous and relies upon television, personal contacts, etc. Formal education is highly institutionalised and programmed, i.e. conventional schools. And non-formal education is organized, but the content varies with the needs and demands of the learners. A true community school should be able to successfully integrate these three types of education, and this is what the UP Mamelodi campus must aim towards.



Figure 29: Sensory stimulation using fresh and dried herbs - interactive educational experience. Sussex, England (Author, 2008)



Figure 30: Interesting facts and tips for medicinal use increases the educational value. Sussex, England (Author, 2008)



It has thus been ascertained that the UP Mamelodi campus functions as an island in the midst of its community; a community which is in real need of **education and guidance** and could benefit substantially from the input of such an institution. The importance of **designed public open space**, the value of **local identity and pride**, and the essential need to **involve the community** in the development process from the beginning have also been discussed. If applied, these four points have the ability to empower members of the community, be it in a physical or psychological capacity.

The Mamelodi University campus has the power to become a facilitator of this empowerment; a vehicle for change; an institution that uplifts its community and becomes an integral part of its everyday functioning. This could be achieved by rethinking the functioning of the open buffer zone surrounding the University heart. Instead of being 'dead space', this area could be transformed into a landscape of value, both to the University and to the surrounding community. It could function as the common ground; a transition zone where the University and the community can come together and be of value to one another.

There are two different types of value, qualitative and quantitative, and this transition zone has the ability to accommodate both, thereby ensuring a richer, more experiential landscape; a landscape of meaning.

If implemented, this landscape of value will connect and integrate the University with its surroundings, as well as enabling the University to progress from being an island to becoming a catalyst for growth and development at the heart of the community. By using existing resources, such as stormwater channels and the rich and diverse culture and abilities of the surrounding people, such changes can be easily achieved.

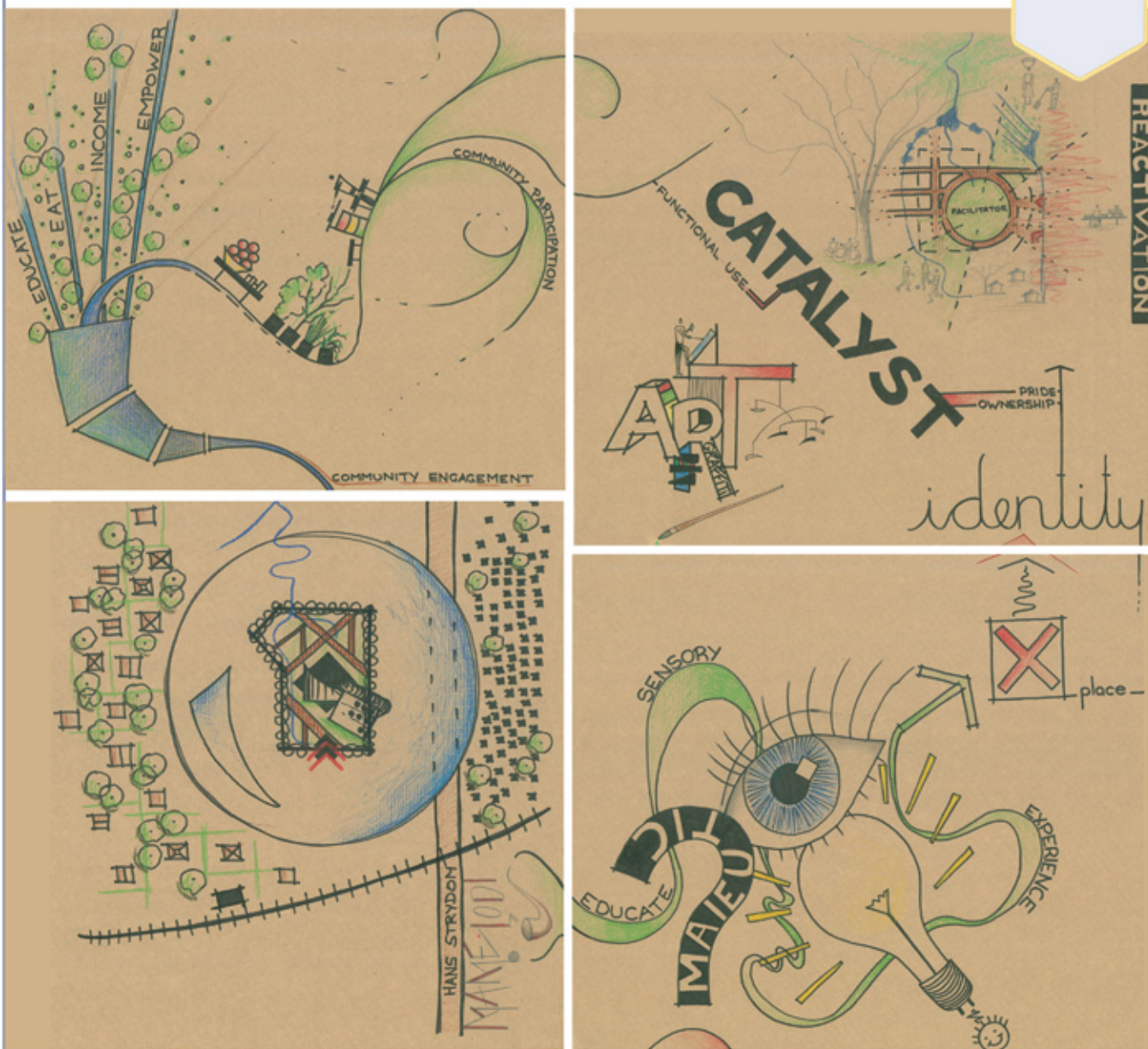


Figure 31: Conceptual ideas on the improvement and integration of the UP Mamelodi campus (Author, 2008)

The university as a facilitator; a vehicle for empowerment, both physical and psychological.
 The university as a means for building relationships and creating connections.
 The university as the heart of the community; an integrated whole...

Part 1: Two levels of value

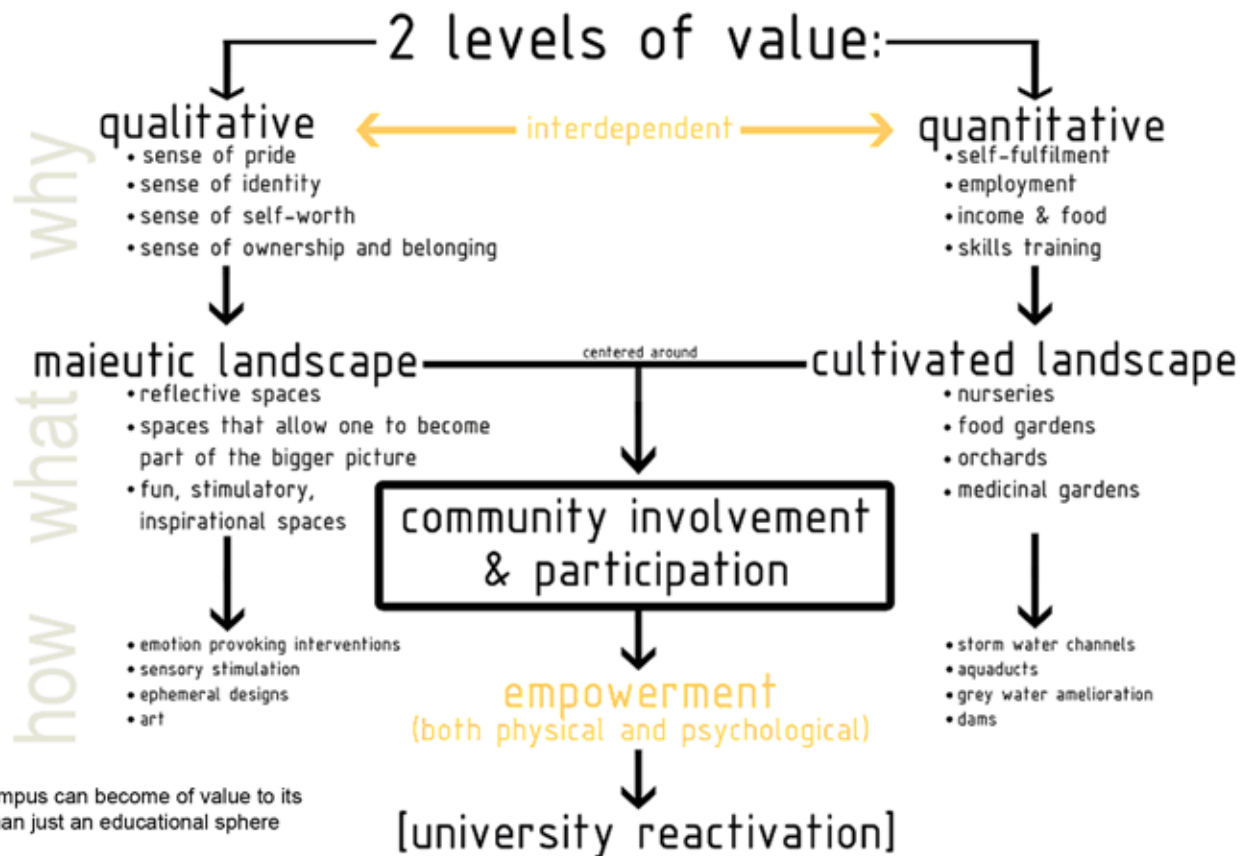


Figure 32:
The UP Mamelodi campus can become of value to its community in more than just an educational sphere
(Author, 2008)

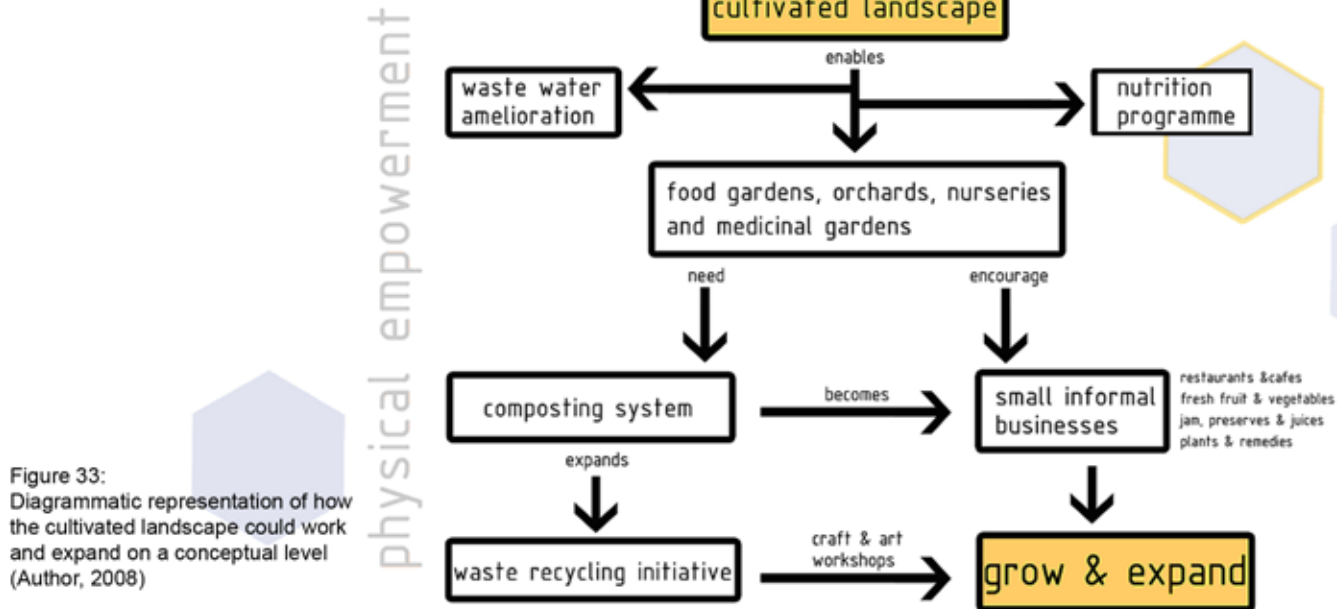
The transition zone between the residential areas and the formal campus should be transformed into a landscape of life. A landscape that becomes a solution, a provider, an educator, a catalyst for change, a platform for opportunity... This can be achieved through the design, detailing and spatial orientation of the interventions; by adding value to the area on both a quantitative and qualitative level. These two elements, quantitative and qualitative, are interdependent; one will not function optimally without the other, as shown in Figure 32 above. Quantitative value can be achieved through the design and implementation of a **cultivated landscape**, while qualitative value is obtained by creating a place of identity - a **maieutic landscape** (refer to Figure 32).

The maieutic encourages pride and ownership, ensuring that the landscape will be maintained and cared for, while the cultivated landscape ensures appreciation on a functional and practical level. Gallagher (1993:218) believes that "over time, individuals ... will come to prefer - even enjoy - the elements of natural environments that have increased their ability to function, and that pleasure motivates further awareness of those stimuli." Therefore, the design as a whole boosts the well-being of the community, thereby motivating further awareness and appreciation of the landscape.

3. Maieutic:

Serving to bring a person's latent ideas into clear consciousness (Thompson, 1996:821). Refer to page 20 for a more detailed explanation.

Part 2: The Cultivated Landscape



The cultivated landscape is educational in that it teaches people basic skills on how to plant, grow, harvest and utilise their produce. This incorporates the community in a working nutrition program while at the same time offering them with a sustainable form of income. Existing storm water channels will be manipulated in order to feed the food gardens, nurseries and medicinal gardens providing the produce. These gardens can also act as catalysts leading to bigger and better things, for instance, the development of small businesses like cafes, composting centres and markets as shown in the diagram above.

These interventions also present an opportunity for the community to participate in the creation of something meaningful. As Hamdi (2004:21) says, we should "liberate the latent potential of the everyday" by making the ordinary special and the special more accessible (Hamdi, 2004:xix). Gardens are one of the best ways of doing this as they "represent fast, highly visible changes that serve as neighbourhood rallying points. Reports on the effects of gardening projects, particularly in low income neighbourhoods, give evidence of increased neighbourliness leading to an enriched sense of community" (Lewis in Francis & Hester, 1990:247). This functional landscape also provides time for contemplation, relaxation and reflection, and can be psychologically beneficial in itself. "Through peace and tranquillity, enhancement of self-esteem, demonstration of long and enduring patterns in life, [and] connectedness to larger concepts, gardens and gardening are healing" (Lewis in Francis & Hester, 1990:250).

Figure 34:
The empowerment of many
(Anglo Platinum Kotula Trust, 2008:16)



20

psychological empowerment

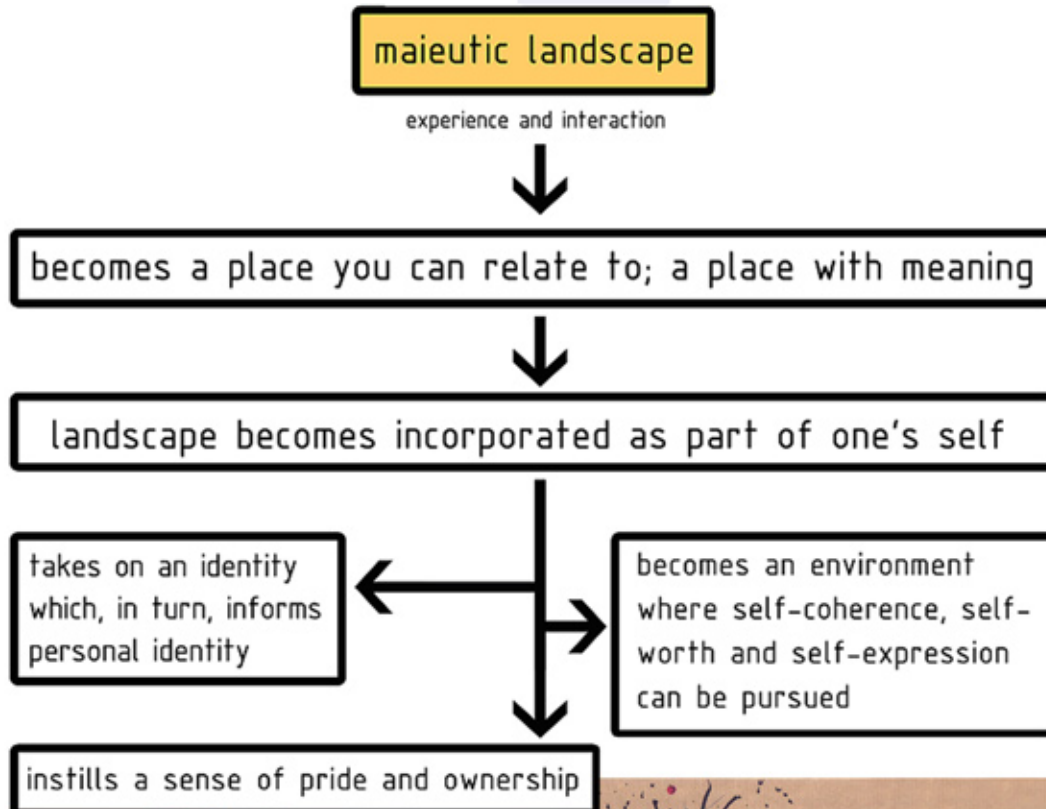


Figure 35: Conceptual idea of how a maieutic landscape can influence a person's experience of a place (Author, 2008)



Figure 36: Diagrammatic representation of the meaning of 'maieutic' (Author, 2008)

Maieutic is defined as that which “serves to bring a person’s latent ideas into clear consciousness” (Thom, 1996:821). Mamelodi, because of its social infrastructure and the hardships that people endure on a daily basis, is in need of elements which stimulate ideas of self-worth, self-confidence, self-fulfillment and well-being. In other words, the main aim of maieutic involvement in Mamelodi is psychological empowerment. The design will therefore attempt to create three different types of spaces which the author believes will achieve this aim. These are spaces for reflection and restoration; spaces where one feels as though they are connected to a larger system; and spaces where one can simply play, have fun, be inspired and forget all one’s worries for a while.

3.1) Reflective spaces

Reflective spaces serve as small sanctuaries off the beaten path where people can go to collect their thoughts, relax, take in their surroundings, make plans and just be at peace. Friedberg (1996:95) is of the opinion that although light, wind, sun, sky, shadow, reflection, temperature, seasons and time are omnipresent, they are also common and familiar, and therefore go unnoticed. This is true, and it is only when one of these elements causes discomfort or unprecedented happiness that we actually notice it. The landscape can be designed in such a way that these elements are once again seen and appreciated, enabling them to bring pleasure to the viewer and in so doing, to restore, renew and inspire. It is these elements that create places in which reflection and peace are possible, and unfortunately, there are few such spaces of escape in Mamelodi even though they are necessary for the optimal functioning of everyday life.

3.2) Being connected to a larger system

These spaces where one goes to commune with oneself are equally as important as spaces where one feels part of the bigger picture. Communal gathering spaces are integral to the building of community spirit, and to the functioning of society as a whole. There are however two different types of ‘bonding’ spaces; those in which people can come together, and those where man and nature become one. These spaces allow a person to feel as though they are part of a larger natural system; spaces where man can commune with nature on a deeper, more spiritual level.

3.3) Inspiration and fun

The natural environment is also usually where one will find inspirational spaces that stimulate feelings of freedom and fun; spaces where one can play, fantasize and leave all other worries behind. This is known as the ‘play theory’, which Appleton (1975:170) defines as an aesthetic experience allowing a release and escape from the pressure of reality. It revolves around the assumption that “freedom can be found when personal activity is liberated from control by objective factors”.

“Play is an overlooked part of contemporary city life and one of the most neglected aspects of the public realm. Opportunities for spontaneous action, surprise and pleasure for all age groups ... make dense urban environments liveable and humane. Encouraging and prompting play makes public spaces safer and more cared for by encouraging lingering and interaction with the space rather than merely using the public realm as a corridor” (Cumberlidge and Musgrave, 2007:207).

Figure 37:
Man and nature become one
(Digitally manipulated by author, 2008)



3.4) The experience of space

The above mentioned spaces all overlap in their functions, i.e. play spaces can accommodate a gathering of people; reflective spaces are often used as areas in which to commune with nature, etc. These spaces are not programmed and allow people the freedom to use them as they see fit. The main requirement is simply that anyone who uses these spaces, experiences them. According to Dewey (1934:246), experience is concerned with the interaction of an organism with its environment; an environment that is human as well as physical and that includes the materials of traditions and institutions as well as local surroundings. The organism also brings with it native and acquired forces that play a part in the interaction, thereby ensuring that everyone's experience of a place is different.

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In order for us to make sense of these experiences, however, we need to be provided with 'in-between' areas where reflection can take place and information can be assimilated. Cullen (1971:10) believes that what brings an experience alive is the drama of juxtaposition brought about by contrast and change: the locations at which here becomes there. He believes these transitional experiences to be crucial to our ability to sustain psychological engagement with our surroundings. Without them, he says that our surroundings will just slip past us featureless and inert.

In other words, there need to be patches of focused stimulation connected by linear threads that bind them together within the greater whole. How one experiences these patches is the key to the creation of successful places, and ultimately to psychological empowerment. According to Lynch (1972:1), a desirable experience is one which "celebrates and enlarges the present while making connections with past and future". This is what a maieutic landscape is about – the creation of spaces which are used, experienced, appreciated and remembered.

Maieutic landscapes are very similar to works of environmental art, where the artist extrapolates the existing urban environment thereby sensitizing the viewer to it and demanding their involvement in it (Friedberg, 1970:99). This heightened experience can be achieved by making use of four specific techniques. These comprise the stimulation of the five senses, the emphasis and use of ephemeral, moving matter, the use of art and creative expression within the landscape, and the evocation of emotion. Combined, these interventions have the ability to stimulate sensory perception, encourage contemplation and maximise experience thereby changing the way we look at the world, and the way in which we see ourselves.

3.5) Ephemeral qualities

Halprin (in Howett, 1987:116) asserts that what is significant is not so much the understanding of what exists at any given moment in time, but that the existence is ephemeral and in constant motion. Transient experiences ensure that the viewer has more chance of noticing the element than if it was a static object he was seeing for the tenth time. As each viewer experiences and understands things differently, it matters not exactly what the experience means, but that it means something.



Figure 38 & 39:
The ephemeral nature of plants - vegetation that changes its patterns, textures, colours, size, smell, etc. (Acacia xanthophloea. Author, 2007) (The Ephemeral Garden, Paris, France. Hohenadel, 2008)

3.6) The use of art

Another technique that will stimulate different understandings and meanings is the use of art and creative expression in place-making. One of the advantages of art is that it does not require one to overcome language barriers or cultural differences before it can be 'understood'; it has the ability to stimulate thoughts and ideas in anyone. Dewey (1934:270) says that "art is the most universal and freest form of communication", that it "weds man and nature" and that it "renders men aware of their union with one another in origin and destiny". According to Dissanayake (1992:34), "art can be considered as a behaviour (a 'need', fulfilment of which feels good) like play, something humans do because it helps them to survive". She says that "this behavioural tendency is inherited, and thus both indelible and universal. That is to say, it is not the exclusive possession of just a select few; rather, like swimming or lovemaking, art is a behaviour potentially available to everyone because all humans have the predisposition to do it".

Art is therefore good for people. According to Thompson (1996:69), art is defined as "the various branches of creative activity concerned with the production of imaginative designs, sounds or ideas". In other words, art is any and all forms of creative expression. Music is a form of art with the power to move us transcendently; by means of music a supra-individual state is created in which composer and listener can exist, together, joined in a common consciousness (Dissanayake, 1992:119). If a natural element, i.e. wind or water is the composer of a melody, then it follows that man, as the listener, and nature can become one. Seamon (in Walmsley, 1988:63) says that "individuals do not experience the world as an object, but rather are fused with the world through a web of feelings". Art, in any form, therefore has the ability to evoke emotion which triggers specific feelings depending on the nature of the art and the mental state of the viewer. The depth of emotion determines the poignancy of the experience. "Emotion is understood as the tension or excitement level produced by the interaction of brain processes of perception, expectation, memory, etc." (Dissanayake, 1992:176).



Figure 40:
Public art in Dublin city centre, Ireland (Author, 2006)

Figure 41:
Singing Ringing Tree (Richardson, 2007:98)
A musical sculpture that sings with the movement of the wind



3.7) Sensory stimulation

Emotions are however, not only triggered by art, but can also be activated by sensory stimulation. According to Gallagher (1993:127) our relationship with the larger world is built from countless sensory interactions between us and our settings. How we experience the physical environment therefore depends upon the stimulation of the five senses, for instance, what you see, in addition to what you hear, smell, how it feels, and the memories and emotions evoked by these clues. The more senses the design stimulates, the greater the experience of the place will be.

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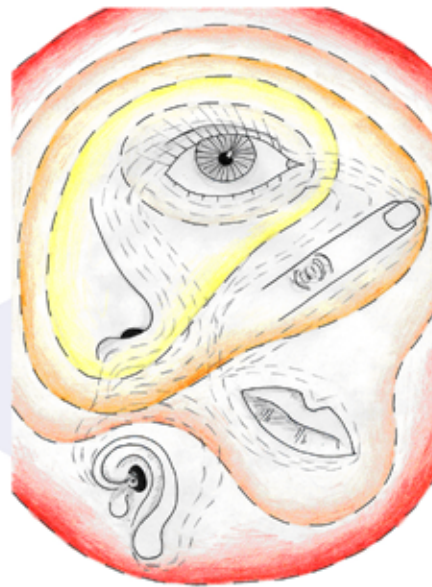


Figure 43:
The more senses one stimulates, the more intense the experience becomes (Author, 2008)

3.8) Spatial arrangements

The sensory aspects of a landscape are connected to the spatial aspects; they have a direct influence upon one another. According to Gustafson (in Amidon, 2005:26), spatial arrangements are concerned with how you move, what your eyes rest on, what the depth of feel is, what you walk through, what you sit on... Spatial arrangements determine movement and flow through the landscape having a substantial effect on what Thayer (in Swaffield, 1994:104) terms the 'Three dimensions of meaning'. Simply put, the distance from which an intervention is viewed and the sequence in which one views it will have a profound effect on the experience generated by the intervention. In particular, it will affect our sensory perceptions, as our sense of smell, attention to detail, auditory capabilities and the scale of the intervention will change as our nearness to it changes.

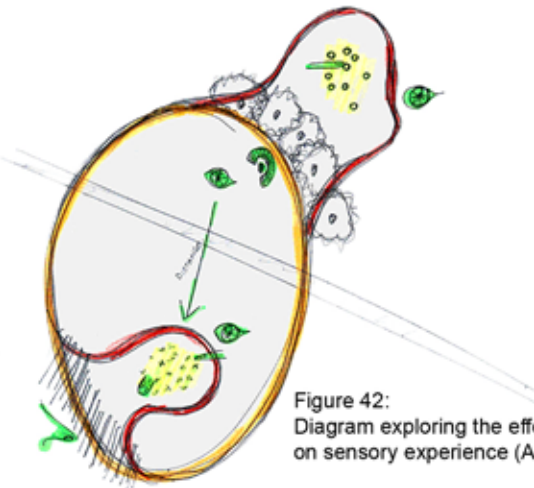


Figure 42:
Diagram exploring the effect of distance on sensory experience (Author, 2008)

The proximity, position and speed of the viewer will therefore have a definite effect on the experience. For example, "a tree may be said to have shape, but when we observe a mountain covered by trees from a distance, what strikes us is not the shape of the trees, but the texture" (Appleton, 1975:106).

Another way of accentuating the environmental experience is to emphasize the hazard element – to provide excitement and the possibility of a challenge by allowing the viewer to experience familiar environments in unfamiliar ways. This can be made possible by providing different kinds of locomotion, or by viewing the landscape from unusual angles. Also, "by altering the speed at which we pass through the landscape, we may greatly alter the time-sequences which are an integral part of our perceptive experience" (Appleton, 1975:178).



Figure 44 and 45:
Distance defines shape, texture and detail (Author, 2007)

3.9) Time

Time is therefore one of the most important elements affecting one's experience of a place, not only because of the speed at which we are moving, or the ephemeral nature of the environment, but also because the viewer's understanding increases, his/her mood changes, he/she has different emotional reactions at different times, and so on (Walmsley & Lewis, 1984:76). The purpose of the viewer also has an effect on his/her experience in that it determines how much time a person can give to looking, listening and experiencing.

3.10) Cognitive elements

Finally, one can make use of elements which are pleasing to the cognitive faculties, i.e. repetition, pattern, continuity, variation, contrast, balance and proportion (Dissanayake, 1992:54). Walker (in Francis & Hester, 1990:120-128) discusses three main ideas in this regard - gesture; hardening and flattening of the surface; and seriality. These three ideas can be linked to our earlier discussions on spatial arrangements and their impact on one's experience of a place.

The first, "gesture" can be described as "a linear statement in the landscape that becomes an organising element for perceiving the whole". He uses Robert Smithson's "*The Spiral Jetty*" as an example of this, as it persuades the viewer to look at the landscape in a new way simply because of the geometry of the design and the way it is placed. Walker also discusses the merit of Christo's "*Running Fence*" as an example of gesture because of the way in which the shimmering fence interacts with the landscape influencing its ability to "make you perceive the landscape differently" (Francis & Hester, 1990:121). Other methods of creating gesture include framing of views, emphasizing perspective, creating grand vistas along sight lines, among others.



Figure 46:
Gesture - a linear statement in the landscape
(Running Fence, 1972-6 -- Christo, Ruby, 2006)



Figure 47:
Movement and speed affect our perception of the world
around us (Author, 2008)

Figure 48:
Gesture enables us to look at the landscape
in a new way (Spiral Jetty, www.at.or.at, 2003)



The second idea has to do with the hardening and flattening of surface. A simple example of this is the placing of a carpet on an undefined floor, thereby creating a defined space (Francis & Hester, 1990:124). Changes in level, even small ones will also have this effect. Intricate paving patterns are visually stronger than their surrounds and are therefore useful in the creation of 'physically undefined' space. These methods of almost abstract space creation serve to emphasize, and draw the eye; they create focal points that will be noticed by the viewer.

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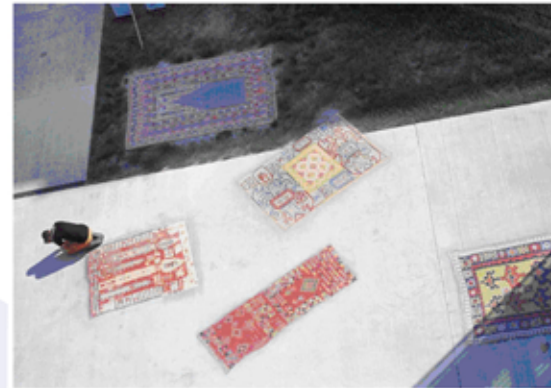


Figure 49:
Mosaic carpets - a good example of hardening and flattening of the surface (Carpets, Austria. Andraschek, 2005)

Seriality is a form of repetition which "when used with insistence begins to visually dominate the non-repetitive elements of its environment" (Francis & Hester, 1990:127). Such interventions draw your eye into the space; they demand attention and engage the mind. Even just a simple 'why?' can be enough to start a conversation or create an idea, both of which have the ability to change your way of thinking.

Combining spatial, sensory and emotional aspects can produce a rich and thought provoking experience. The landscape should therefore emphasize the importance of material elements and spatial configurations that can draw together the physical and mental worlds, stimulating the mind to wander, to contemplate and wonder, and to find satisfaction in the experience of nature (Thwaites, Helleur & Simkins, 2005:530).

The above tools, qualities and spaces encourage people to see things differently, to question, to be critical, thereby stimulating thoughts and ideas, conversations and community, a landscape of learning.

Sardello (1986:35) maintains that if learning were free to work in the world it would produce a ferment of conversation, writing, performance, speculation, investigation and the making of images in art, music, poetry and drama. Culture would flourish, bringing about a synthesis of imagination, identity and social cohesion. The University campus is thus an ideal space for such an intervention as it combines the educational, recreational and functional, thereby drawing the campus out into the communal zone and unifying the area; thus providing a place filled with ideas and the means with which to inspire ideas.



Figure 50:
Seriality is an important element in the design of The Citadel, California (Cooper & Taylor, 2000:31)



Figure 51:
An explosion of culture (Digitally manipulated by author, 2008)

Part 4: Conclusion

Bunschoten, Hoshino & Binet (2001:23) explain that the landscape can be likened to a strange dynamic skin, echoing the crust of the earth, but with different mechanics, different rhythms and undulations. Love, life, weather and seasons ripple this skin. Nature and man work together in the creation and manipulation of this skin; we are all a part of it just as it is a part of us. The landscape is what ties us together, what links us to the earth. It is where we are truly at one with nature and with our fellow man.

We need to promote the social interaction and bonding of people, and a well-designed public space that is accessible to all is the ideal way of achieving this. Any settlement is a body, with mass, skin, motion and emotion. Just as a body is a complex network of systems within a system, a settlement functions in the same manner. When you transplant a heart, it needs to be sourced, matched and prepared in order to function optimally (Bunschoten *et al*, 2001:45). The same can be said for a settlement – any intervention within its fabric needs to be carefully planned, based on the human, and uniquely and creatively implemented. It needs to be connected to the body, its main source of life, for only then will it live, thrive, and positively influence the thoughts and emotions of its users.



Figure 52:
A network of systems functioning as a single city
(Mural in Brighton, U.K. Author, 2007)



Figure 53:
A balanced ecosystem - natural and man-made
in harmony (Mural in Brighton, U.K. Author, 2007)

Figure 54:
Mamelodi within its greater
context (Author, 2008)

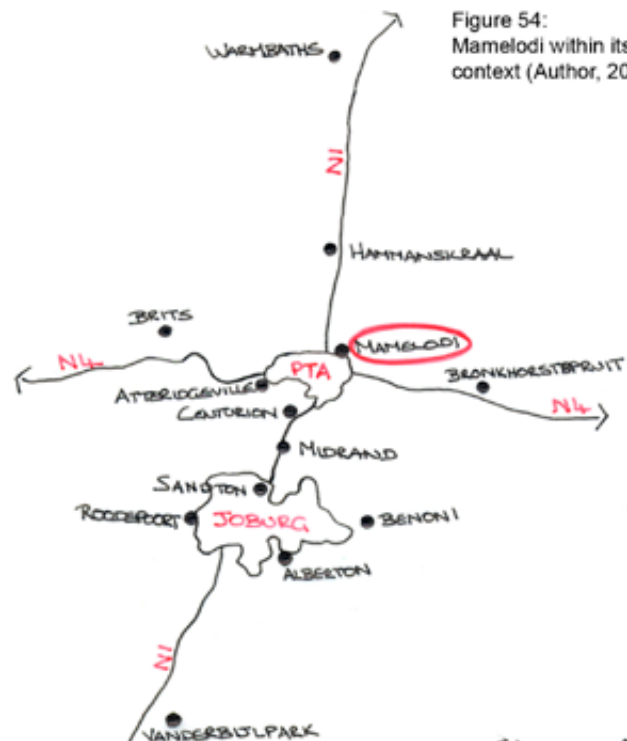
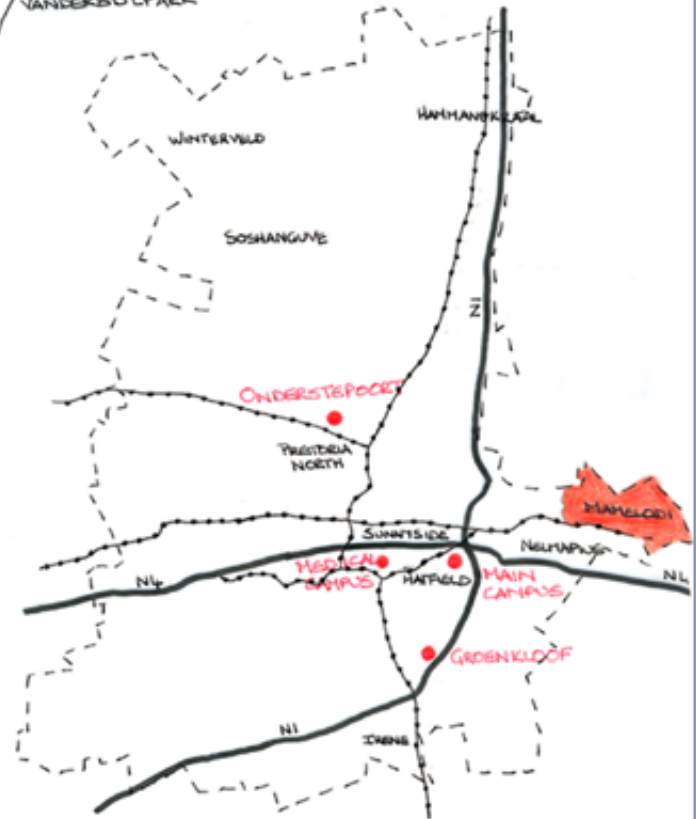


Figure 55:
Location of Mamelodi within
Tshwane (Author, 2008)



Part 1: The Context



Figure 56:
The greater Mamelodi area (Author, 2008)

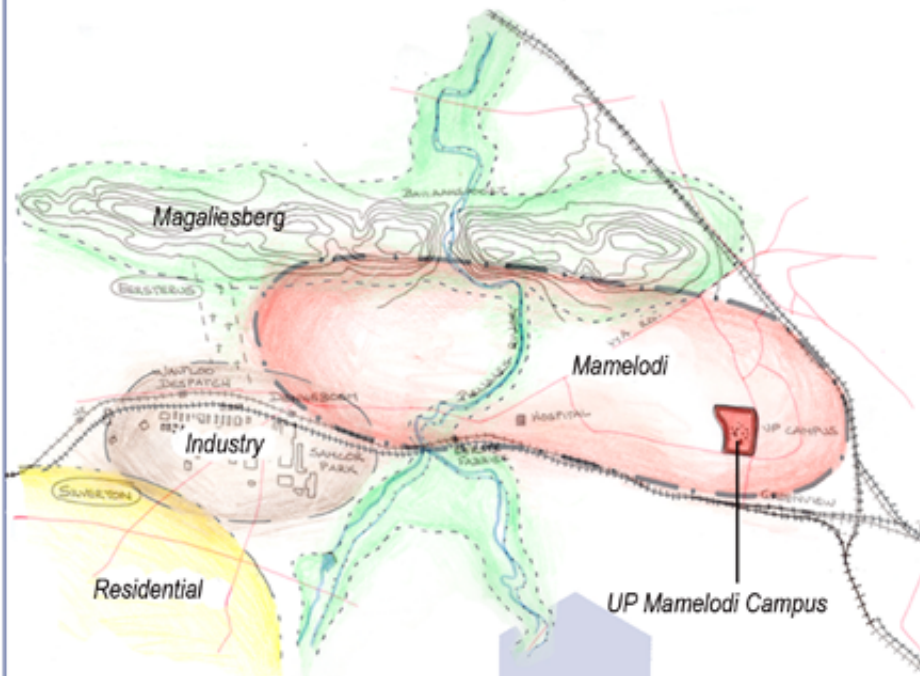


Figure 57:
Zoning - Mamelodi and its surrounds (Author, 2008)

As discussed previously, Mamelodi is an urban landscape situated 20 kilometers east of the Tshwane City Centre. It is a dynamic, vibrant, multi-cultural community set at the foot of the majestic Magaliesberg Mountains. This physical barrier forms the northern and eastern borders of Mamelodi, while the Pretoria-Witbank highway creates the southern border.

A tributary of the Apies River, called the Moretele, divides Mamelodi into two distinct halves, and a significant portion of Mamelodi's green open spaces can be found along its banks.

Tsamaya road - the main road cutting diagonally across Mamelodi, along which much of the township's business and light industry can be found, lies along the old trade route to Sekhukhuneland. The railway line running along the southern edge of Mamelodi is a reminder of President Paul Kruger's struggle to gain independence from Britain through access to the Maputo harbour 110 years ago (van der Waal, 2000:1).

Mamelodi has a rich history of cultural diversity, complex social and economic relations, as well as its spirited political dynamics, mainly brought about by historical policies.



The History...

Mamelodi was originally a large farm called Vlakfontein, and its name was officially changed in 1962 to Mamelodi which means "Mother of Melodies". It is widely believed that this name originated from President Paul Kruger who was known to the Bantu by his name 'father of whistling' or 'man who can imitate bird'. Mamelodi lives up to this name, as it saw the formation of an original and unique jazz style called Molombo Jazz (Mamelodi Tourism Brochure, [S.a.]).

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The Pretoria City Council bought Vlakfontein farm in 1945 to provide accommodation for the cities labourers. In 1950, the apartheid policy and Group Areas Act saw people being forcibly removed from their houses and relocated to Mamelodi, where in 1953 the first official housing units were built, and it was formally proclaimed a 'township'. Development began west of the Moretele River but was halted in 1968 in line with the apartheid regime, due to the fact that there were too many people moving into the area. Development only began again in the late 1980's and spread over the river into the east (van der Waal, 2000).

The Vista University Campus, as it was previously known, was built in 1980 and served as an intellectual centre during the move towards a democratic government (van der Waal, 2000). It was officially incorporated into the University of Pretoria on 2 January 2004 (University of Pretoria, 2008).



Figure 58:
Some of the first housing units built in Mamelodi, c. 1956 (van der Waal Collection, Africana Section, UP library)



Figure 59:
Historic Mamelodi - photograph of residents, c. 1960 (van der Waal Collection, Africana Section, UP library)

Figure 60:
Historic Mamelodi - photograph of residents, c. 1960 (van der Waal Collection, Africana Section, UP library)

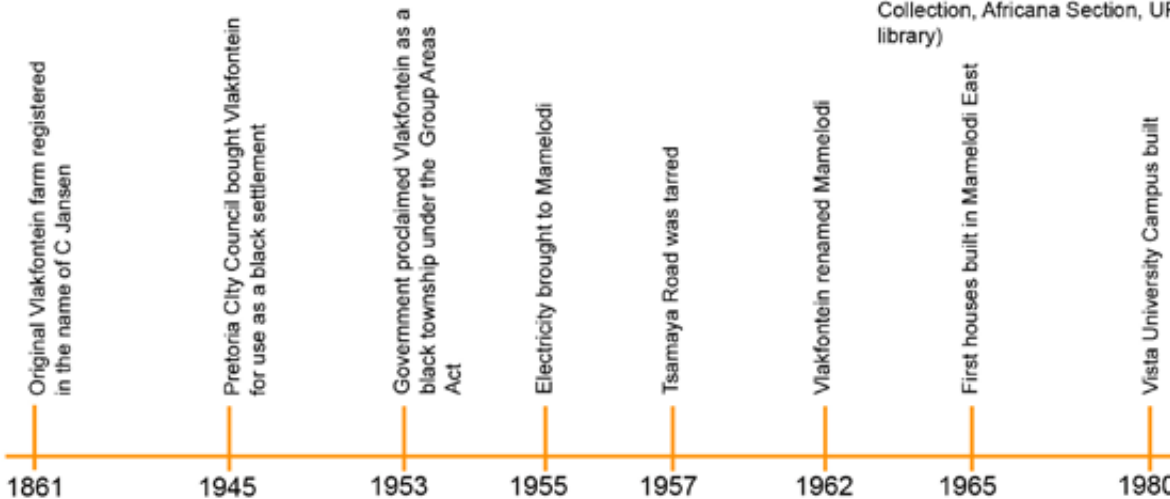


Figure 61:
Timeline of significant events (van der Waal, 2000)

Employment:

unemployed



31



Figure 62a:
Informal trade along street edge (Author, 2007)

shebeens
taxi's
informal: vegetable vendors

informal:

travel everyday

by foot



rail

Methods of Transport:



taxi



Figure 62b:
Sam - Lives and works as a carpenter
in Mamelodi (Author, 2007)

Figure 63:
Formal housing - Mamelodi (Author, 2008)



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Formal residential

Semi-formal residential

Figure 64:
University forms the buffer zone
between different economic
classes (Author, 2008)

Informal residential

Figure 65:
Informal housing - Mamelodi (Author, 2008)



Figure 66:
Semi-formal housing - Mamelodi (Author, 2008)



- Business and retail
- Community facility
(places of public worship,
sport, instruction & recreation)
- Residential / Community
facility
- Undetermined
- Public open space



Figure 67:

Aerial photo of UP Mamelodi campus and surrounds (University of Pretoria, 2008)

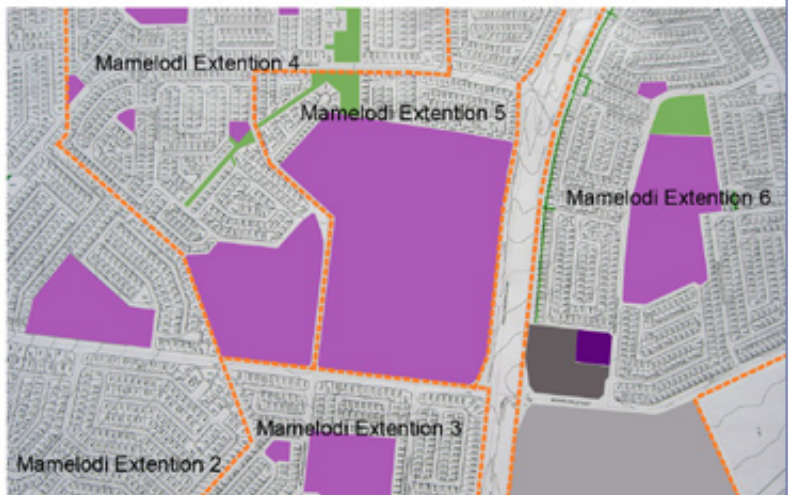


Figure 68:

Municipal zoning of areas adjacent to the UP Mamelodi campus
(Council map, digitally manipulated by author, 2008)

Biome: Rocky Highveld Grassland

This is a transitional type of biome lying between the typical grasslands of the high inland plateau, and the bushveld of the lower inland plateau. It is found mainly between 1500 – 1600m in altitude, also known as Bankenveld, which is a fire maintained grassland (Low & Rebello, 1996:39).

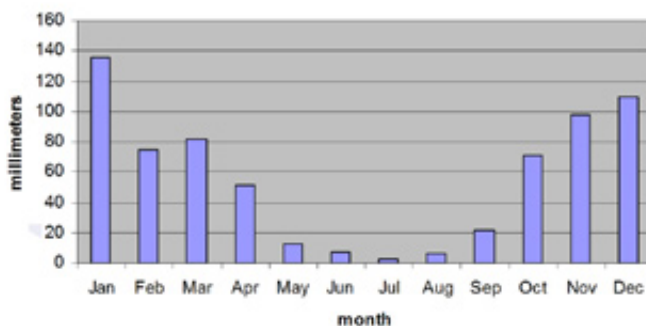
Soil type:

Mamelodi is situated mainly on the sedimentary shale deposit on the Magaliesberg Group, Pretoria Series of the Transvaal System. The soil comprises mainly of weathered shale which tends to become clayey under wet conditions (Le Roux, Louw & Nel, 1980:5).

Summers are long, hot and dry, and even though there are frequent thunderstorms, water is still considered a precious resource. Winters are short and mild with little to no rain, and frost is therefore rarely a problem. The clayey soil found in this area ensures that not too much water will be 'lost' to infiltration, and the vegetation commonly occurring here has a low - moderate water consumption.



Precipitation



Average Temperatures

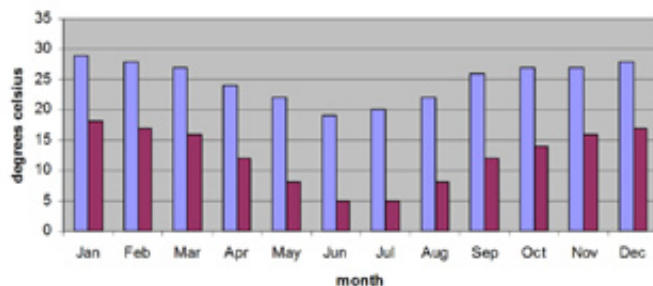


Figure 69, 70, 71 & 72: *Cussonia* sp.; *Rhus* Karee alongside a large poplar growing inside the stormwater channel; *Acacia xanthophloea* and *Acacia sieberiana* - all photographed on the UP Mamelodi campus (Author, 2008). Other vegetation found on site: *Combretum* sp, *Dombeya rotundifolia*, *Celtis africana* and various other *Acacia* species

Figure 73 & 74: Precipitation & Average Temperatures in Mamelodi (Author, 2008)

Maximum Average Temperature
Minimum Average Temperature



Part 3: The Site

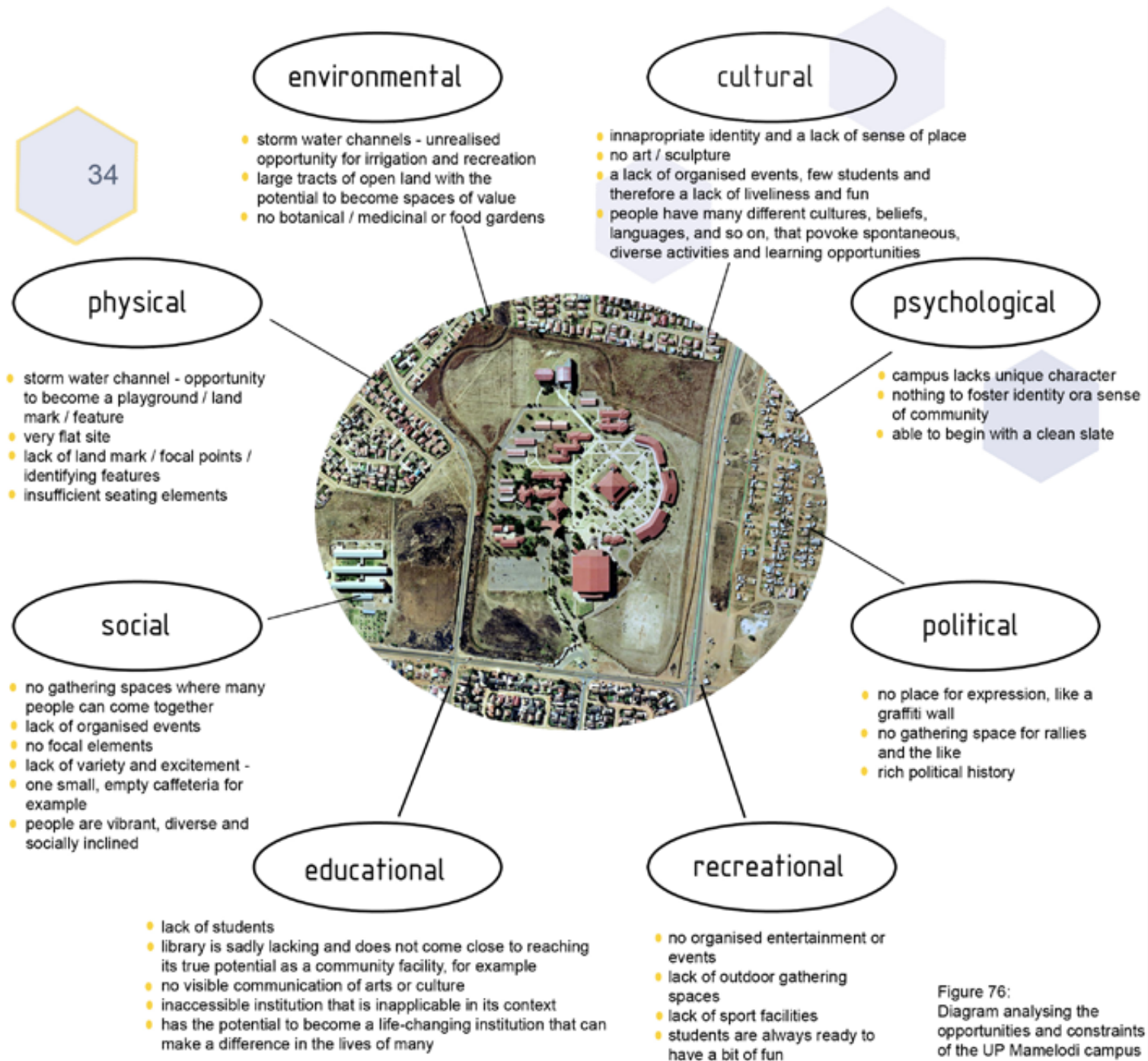


Figure 76:
Diagram analysing the opportunities and constraints of the UP Mamelodi campus (Author, 2008)

existing



Northern edge of University - People living directly adjacent to boundary fence throw rubbish over onto University property



Figure 77: Informal vendors located at the entrance to the University and along Hans Strydom Road (Author, 2008)

Eastern edge of University - Open land on both sides of Hans Strydom Road - very busy road, some retail happening along the edge - retain and enhance this. University turns its back on the road and closes itself off - solution? Concrete-lined storm water channel running the length of the campus

Western edge of University - High school across the road - create a link? Large open un-surveyed stretch of land, with a natural storm water channel running along its edge



Figure 80: Aerial photo of UP Mamelodi campus (University of Pretoria, 2008)



Figure 78: Gladys - lives opposite the University entrance and rents rooms out to students (Author, 2008)

Figure 79: On weekdays, throngs of school children move along the University's southern edge (Author, 2008)

Southern edge of University - Entrance to the campus, busy mornings. Major pedestrian route for children on their way to & from school. Formal residential edge - many people, passive surveillance, etc.



Existing fences,
entrances and
circulation

36



Figure 81:
Intimidating double wire + palisade fence
surrounding the campus (Author, 2008)



Figure 82:
The palisade fence and open
buffer zone are not a welcoming
site (Author, 2008)

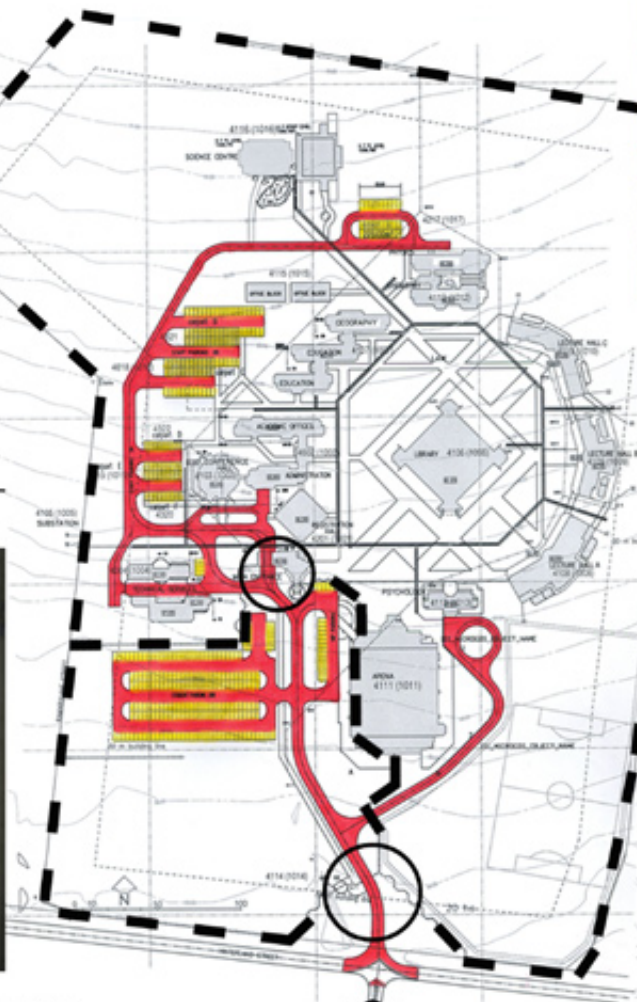


Figure 83b:
View of the University from Hans Strydom Road
(Author, 2008)
All but the roofs are obscured by the palisade fence

- Entrance to University
- - - Palisade fence
- Vehicular circulation
- Parking
- Pedestrian circulation



Figure 83a:
The entrance to the campus is walled off and secured
by a guarded boom gate. There are no seating /
waiting areas and trees are non-existent (Author, 2008)

Existing hydrology

Figure 84:
Hydrology in context (Author, 2008)

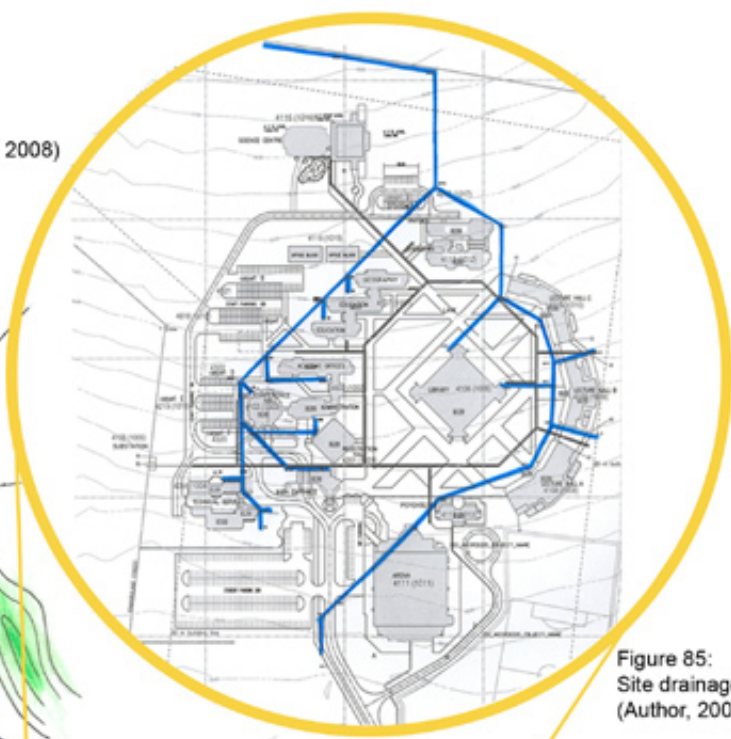
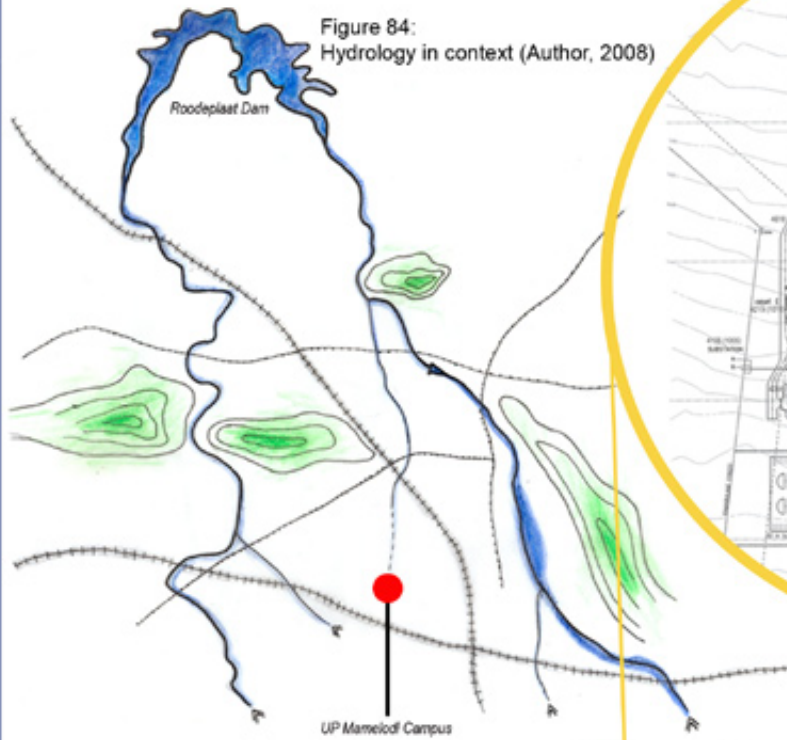


Figure 85:
Site drainage
(Author, 2008)

Figure 86:
Storm water runs in a vegetation-lined permeable channel on the eastern side (Author, 2008)



Figure 87:
Channelled water on site (Author, 2008)



Figure 88:
Storm water runs in a concrete-lined channel on the western side of the campus (Author, 2008)



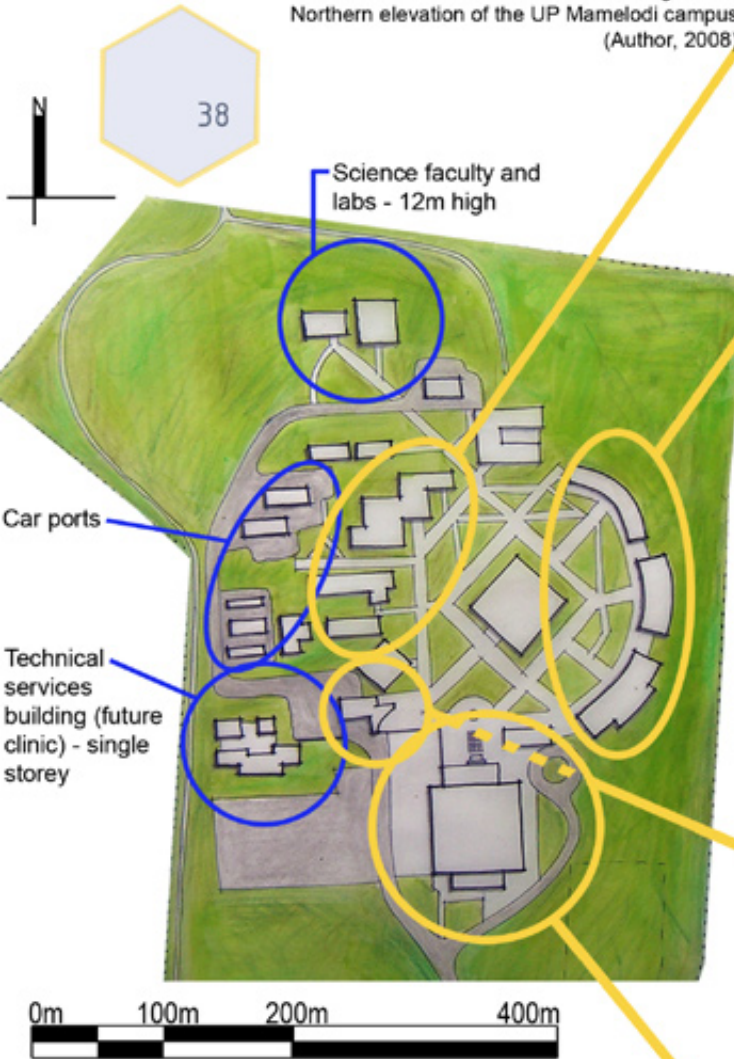
Figure 89:
Northern elevation of the UP Mamelodi campus
(Author, 2008)



Various faculty buildings, not being used optimally (offices are empty, courses have been discontinued, and so on - 6 - 9m high



Lecture halls, presently in use - single storey



Landmark entrance building - 15m at its highest point



Arena - used by University for sport and large gatherings, as well as the cafeteria. Used by the community for special functions like weddings, etc - 12m high

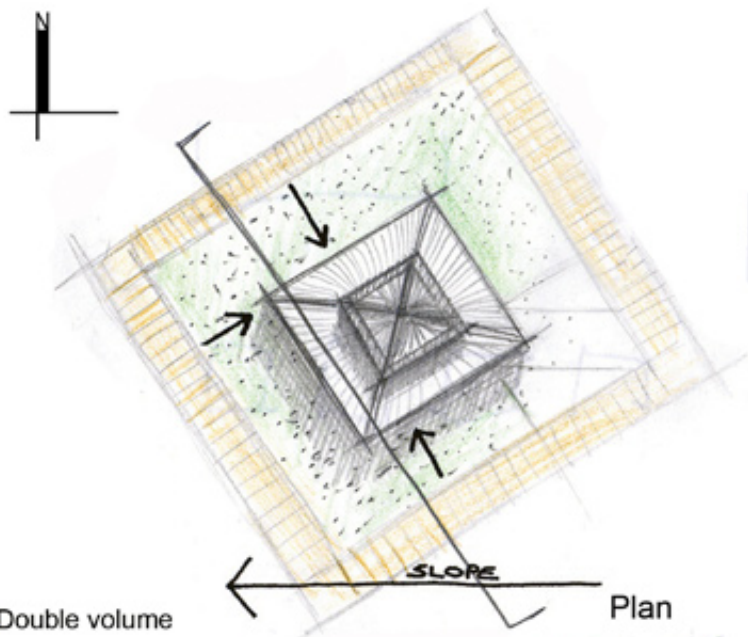


Figure 90:
Southern elevation of the UP Mamelodi campus (Author, 2008)



Figure 99:
Diagrammatic drawing of the campus (Author, 2008)

Existing library within restrictive laager formation - square visually impermeable structure dominating the existing rigid, geometric arrangement. Inaccessible to the public.



Double volume

Study area

Secure book area



Figure 100:
Interior view of the library building (Author, 2008)

Figure 102:
Vertically exaggerated, diagrammatic plan & section of library building (Author, 2008)

Section



Figure 101:
The library building is almost completely visually impermeable (Author, 2008)



Figure 103:
Situated in the centre of a ring of buildings, the library is visually dominant (Author, 2008)

Having analysed the site and having identified both the challenges that need to be addressed, and the opportunities that will inform the future design proposal, as well as the theoretical premise on which to base this proposal, we can now move on to the design specifics.

The design brief, as well as the successes and failures of pertinent precedents, serve to create a reliable point of departure from which to proceed.

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Part 4: Brief

Mission:

- Maximise opportunities for **all people**
- Teach, empower and stimulate creative thought
- Build community spirit
- Provide spaces in which feelings of pride and local identity are fostered
- Encourage mutually beneficial relationships between people and their natural environment
- Promote sustainable development

The **U.P. Mamelodi Campus** offers the ideal place in which to explore and address these goals...

“ If you are thinking a year ahead, sow seed.
If you are thinking ten years ahead, plant trees.
If you are thinking one hundred years ahead,
educate the people ”

Chinese Proverb (Thompson & Sorvig, 2000:287).





Figure 104 & 105: Community-owned food gardens (Author, 2008)

Ivory Park Food Gardens, Johannesburg

The Ivory Park urban eco-village is run by a host of co-operatives, with members growing and selling vegetables, fixing and selling bicycles, recycling waste, running eco-tours and sewing clothes. A construction **co-operative made up of local community members** is in the process of building the village's first homes. Project founder, Annie Sugrue defines the eco-village as **a place "where people work, play, grow their own food and generate their own energy"**. She also explains however, that the village does not function as an "island", but strives to **work in partnership with the broader Ivory Park community** (Russouw, 2004). This is a prime example of what the University should become - a facilitator that encourages and oversees the running of small businesses by local community members; a facility that provides education at a grass roots level.

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 Figure 106:
 Cabbage plantation with
 irrigation (Author, 2008)



 Figure 107:
 Informal market just outside
 food garden for the sale of
 produce (Author, 2008)


- Bold, sculptural, robust place making elements
- Vast, open and relatively unused
- No evidence of community involvement
- Sand soccer field with footpath straight through it
- Water used as element running throughout park – areas of neglect & lack of maintenance
- 3-4 children's play spaces – pre-made standard elements
- Standard element tying park together – concrete sculptures and benches

Dorothy Nyembe Park VS



Figure 108:
Bold, sculptural focal elements (Author, 2008)



Figure 109:
Soccer field used as a walk-through (Author, 2008)



Figure 110:
Water course - littered and eroded (Author, 2008)



Figure 111:
Amphitheatre (Author, 2008)



Figure 112:
Neglect and degradation (Author, 2008)



Figure 113:
Standardised play elements (Author, 2008)

- Sculptural qualities not as immediately striking
- Smaller spaces, more enclosed and better utilised
- Community art and involvement evident – creating pride and local identity
- Grass soccer field in use
- Water used as element running through park – better maintained
- Children’s play areas not as standard and unimaginative
- Standard element tying park together – balustrades, bridges and fences



Figure 114:
Family picnic under a large shady tree
(Author, 2008)



Figure 115:
Soccer on a Sunday afternoon
(Author, 2008)



Figure 116:
Gum-pole play structure
(ILASA Merit Awards, 2005)



Figure 117:
Bridges can become sculptural elements
(Author, 2008)



Figure 118:
Community-designed mosaic
(Author, 2008)



Figure 119:
Community participation
(ILASA Merit Awards, 2005)

Thokoza Park

Figure 120:
Skills transfer enables people to
find gainful employment (ILASA
Merit Awards, 2005)



We can now begin to explore the possibilities involved with the creation of a spatial network of growth, opportunity and empowerment. It is necessary to investigate the site in its totality, so a large-scale framework proposal must be considered before we proceed with the masterplan design. Designing at this larger scale first will provide a set of principles with which to work, as well as providing clues to the ways in which the University campus links to its surroundings and how it could possibly act as a catalyst to facilitate change.

The first step even before the framework, however, is to identify the overall vision and aims for the project so that they may inform the way forward.

Part 1: Conceptual Framework



Figure 121 & 122:
Conceptual exploration
of possible interventions
on the UP Mamelodi
campus (Author, 2008)

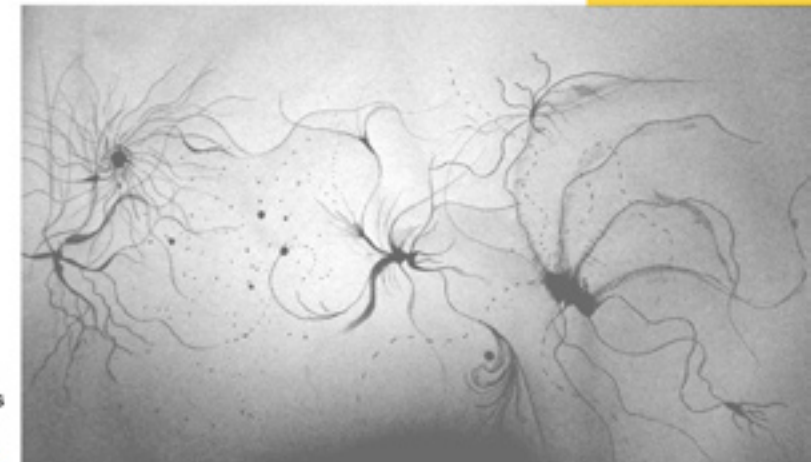
Vision:

- The University as a catalyst; a facilitator of change
- The University engaging with the community
- Interventions that educate and empower people as far as possible
- A permeable society focussing on community interaction
- Place-making, linkages and connections
- Redefinition of the education system in Mamelodi

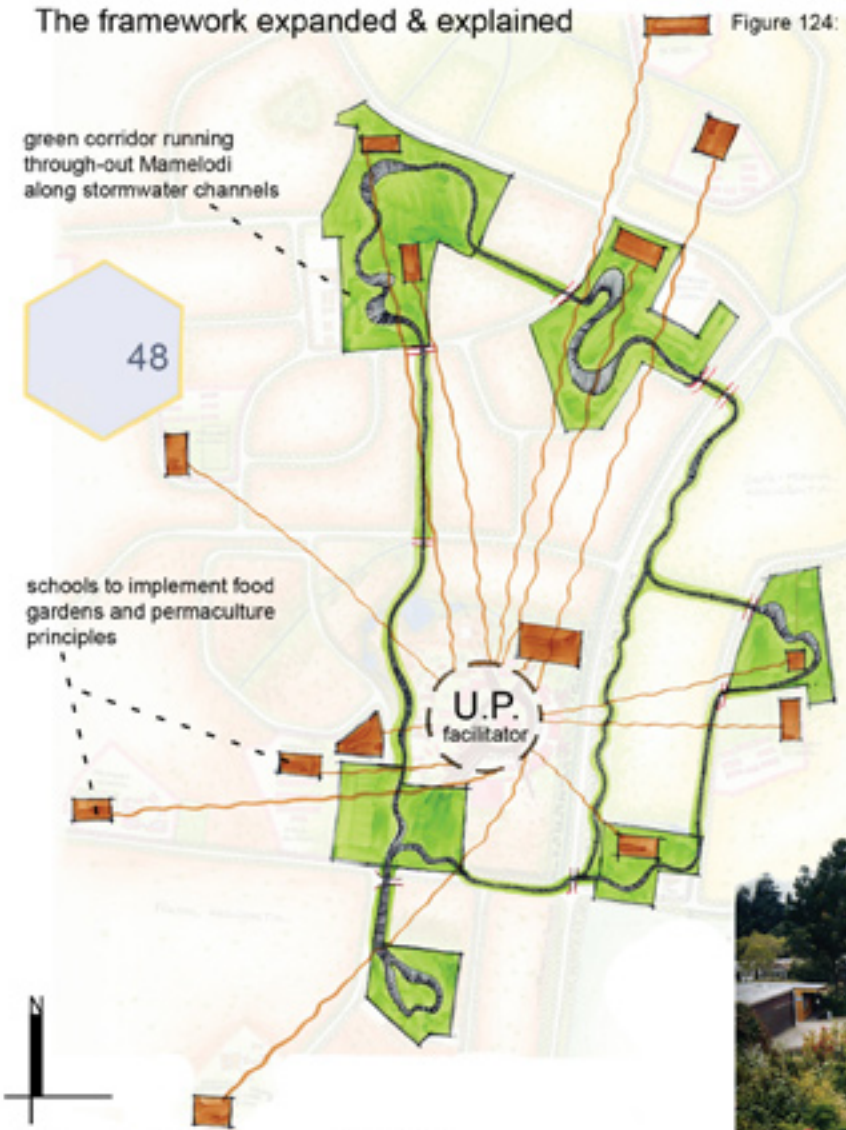
Aims:

- Economic empowerment
- Social cohesion
- Environmental and ecological repair
- Shifts in perception
- Identity and pride

Figure 123:
The infectious impact of a catalyst (Author, 2008)



The framework expanded & explained



University becomes a facilitator:

- Surrounding schools to implement a nutrition program with training and resources to be provided by the university.
- University grounds become a living laboratory where people can learn, teach and develop their skills.

Food gardens

Educate, empower, inspire, integrate

Figure 124: The spread of knowledge (Author, 2008)
Diagram showing how the University can link with and benefit surrounding schools

"The Edible Schoolyard addresses several key contemporary social policy agendas in an innovative way. Issues around community cohesion and multiculturalism, public health, education reform and environmental responsibility are all addressed through a visionary yet pragmatic gardening and cooking programme. Through creating a slower, more experiential and less overtly 'skills-oriented' approach to education, it has demonstrated that environmental and social responsibility can be taught to children and have a tangible impact on the community as a whole."
(Cumberlidge & Musgrave, 2007:78)



Figure 125: Edible Schoolyard, USA, 1994 - present
(Cumberlidge & Musgrave, 2007:78)

community cohesion

empowerment

experiential education

Figure 126:
Green, growth, growing (Author, 2008)

This greening initiative spreads out into Mamelodi bringing about pride and psychological empowerment

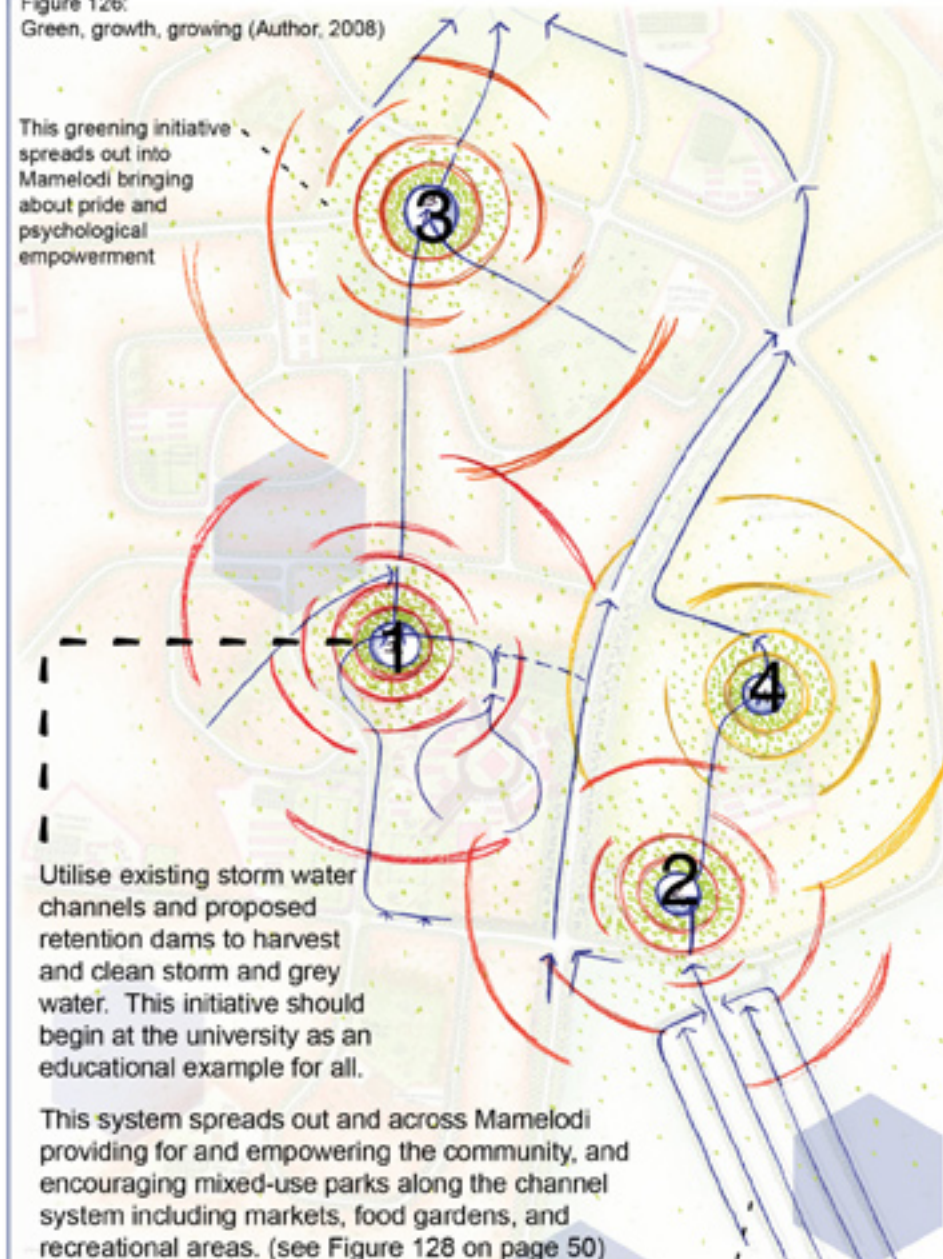
Utilise existing storm water channels and proposed retention dams to harvest and clean storm and grey water. This initiative should begin at the university as an educational example for all.

This system spreads out and across Mamelodi providing for and empowering the community, and encouraging mixed-use parks along the channel system including markets, food gardens, and recreational areas. (see Figure 128 on page 50)

Implementation of tree-lined swales in the informal sector, to channel storm water into dams for food garden irrigation and supplementation of storm water system.

Storm water system

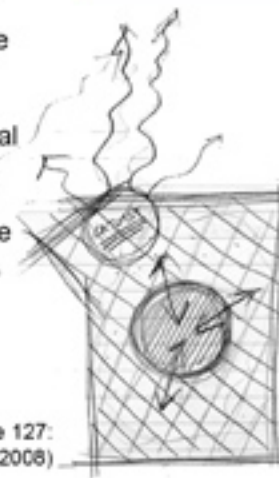
Enabling education, empowerment, connectivity and identity



The channel system existing in Mamelodi has the potential to be enlarged, upgraded, designed and used as a community food park and nursery (especially if grey water starts being pumped in). This channel system forms a green corridor running throughout the township, creating an ecological green lung which could have a larger impact and added benefits with a bit of work.

An NGO on the University campus will be responsible for this greening initiative, i.e. the University becomes a facilitator. This initiative will start at the university and grow up the storm water channel system. The first step therefore is to create a nursery as well as the food gardens on the campus. This nursery will serve as the vehicle for future expansion, providing plants for growth up the channel. More nurseries can be set up as it grows; always start small. The University will provide training for all those interested; students can come and help, and in so doing, learn too (experiential learning). Some of the plants can be sold, as well as the food. In this way, the project contributes to skills, education, employment, food, income and a green Mamelodi.

Figure 127:
University as a catalyst (Author, 2008)



Part 2: Masterplan Design Concepts and Process

"Cities were invented to facilitate the exchange of information, friendship, material goods, culture, knowledge, insight, skills, and also the exchange of emotional, psychological and spiritual support." We must maximise these exchanges, whilst minimising the travel necessary to accomplish them.

Engwicht (in Hayward & McGlynn: 1993:85)

50



Figure 128: Live, work, play, grow, eat, learn, love (Author, 2008)



Figure 129: Masterplan attempt # 1 - storm water channels, food gardens, keep all existing buildings, SW - NE axis (Author, 2008)



Figure 130: Masterplan attempt # 2 - storm water channels with main retention dam at lowest point of site (Author, 2008)



Figure 131: Masterplan attempt # 3 - move face of University to Hans Strydom Road and create portals inviting people into the campus (Author, 2008)



Figure 132: Masterplan attempt # 4 - allow for the future expansion of the university, use buildings as boundaries, multi-functional fences, soccer field, aquaduct (Author, 2008)



Figure 133: Masterplan attempt # 5 - living laboratory, experimental housing, open-air classrooms, shading structures, medicinal gardens (Author, 2008)



Figure 134 Final masterplan - modifications to library + public square, storm water channels + food gardens, aquaduct, shading structures + open air classrooms, SW - NE axis, community engagement faculty, multi-functional fences, living laboratory = grey water amelioration, medicinal gardens, experimental housing (Author, 2008)

Final and completed masterplan - combination of previous five attempts

See page 56 for a more detailed, larger version

51

Figure 135:
Conceptual ideas
Some initial thoughts
and ideas that guided
the design progression
of the masterplan

52

conceptually speaking



connect



shading structures



unify

Serpentine streams & paths



A tree is not just a tree...

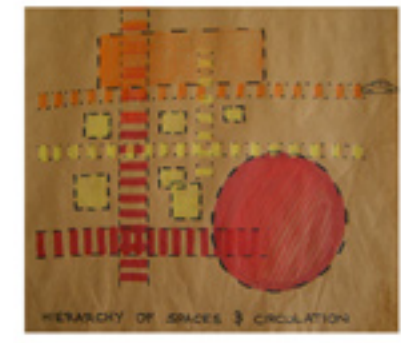


Look twice,
think deeper,
discover...

Multi-functional fences
& medicinal gardens

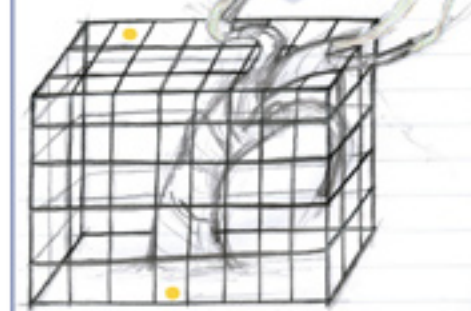


the Island



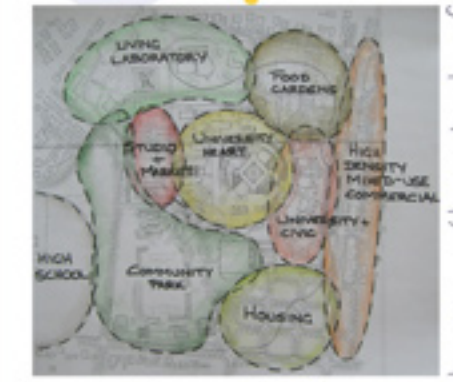
53

dance to the music of the wind



break free!

busy, vibey hub of activity



channel = opportunity



learn
.....
teach
.....
grow

Four phases of implementation

(Author, 2008)

54

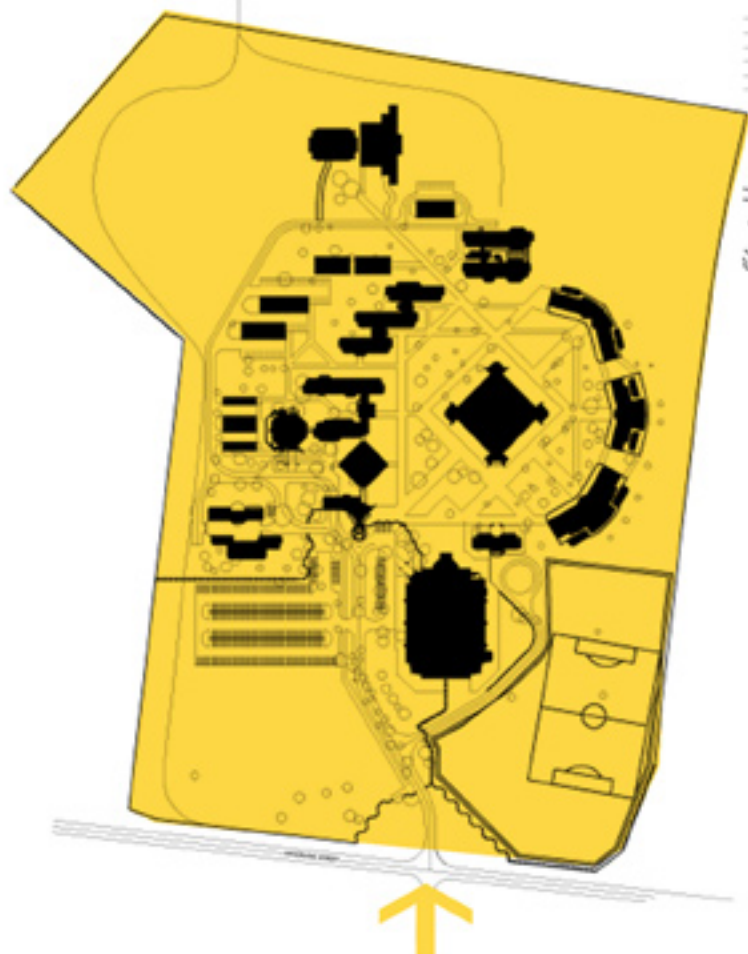


Figure 136: Existing
Unrealised potential and wasted space

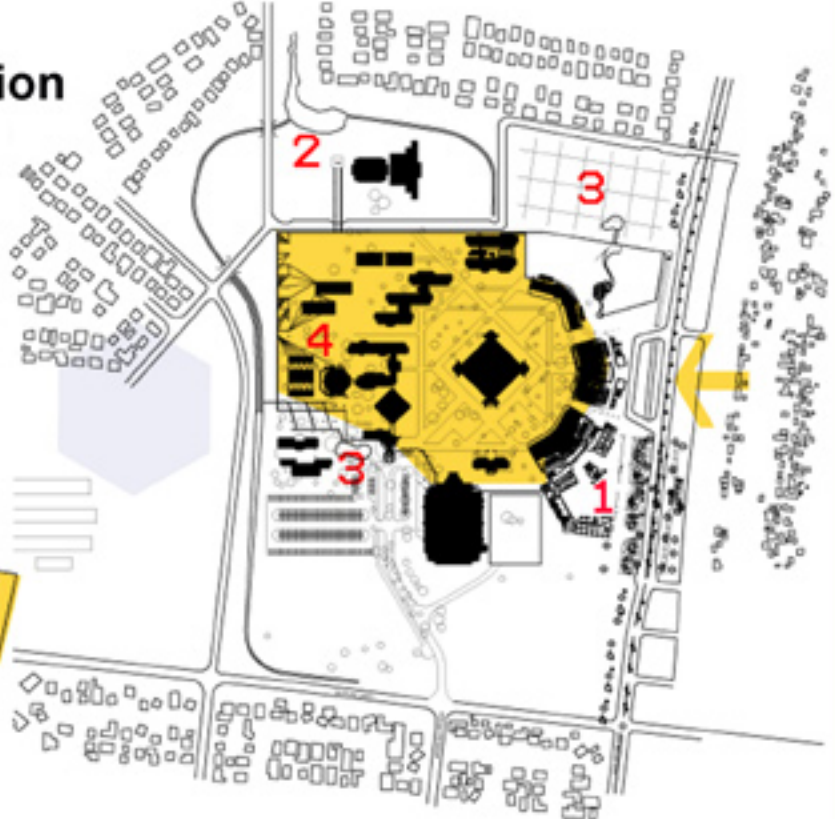


Figure 137: Phase 1
 Shrink secure University area, move fences and relocate the face of the University to Hans Strydom Road
 1 Community engagement development on Hans Strydom Road
 2 Main dam and aquaduct + relevant channels
 3 Medicinal gardens and community food gardens
 4 Carport open-air classrooms

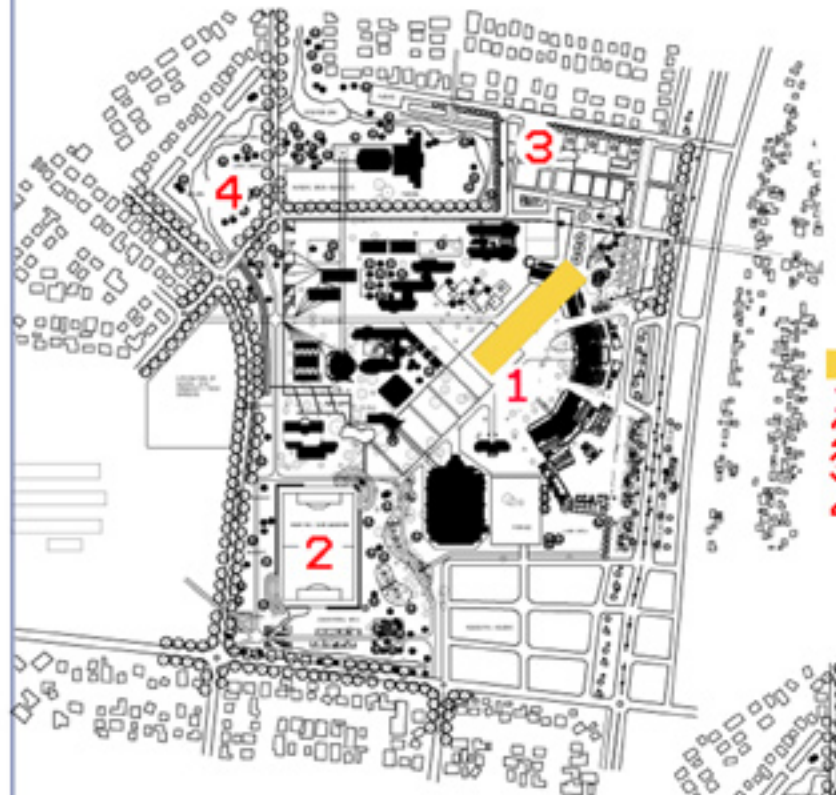
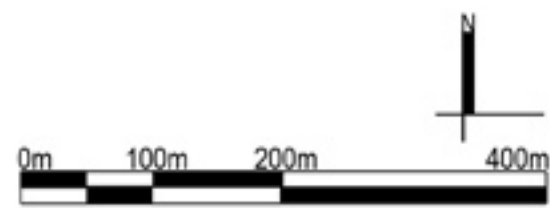


Figure 138: Phase 2:
 Extension of library & its square
 1 Interior section around library
 2 Soccer field, theme gardens & soundscape
 3 Housing development in north-east corner
 4 Living lab + wetlands
 Experimental housing

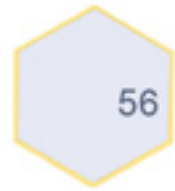
- Design Principles:**
- Building height no more than 12m (4 storeys)
 - Coverage: 70%
 - Complete relaxation of the building line
 - Zoning – mixed-use policy
 - Utilise grey water and storm water as far as possible on site for irrigation, rejuvenation of ground water, recreation and education
 - Length of block 20-40m to allow permeability, with roads every 100m
 - Pedestrian walkways, cyclist paths and street trees (indigenous) + street furniture along roads
 - Pedestrian crossings and an island in the middle of Hans Strydom
 - Encourage informal trading and stalls
 - Promote passive surveillance
 - Encourage community engagement and involvement
 - Create public spaces to be used by the community -
 - University lives out into the community
 - Densification of people and commercial activities
 - Waste recycling (collect, separate and use on or as near to site as possible)
 - Make use of sustainable and renewable energy sources



Figure 139: Phase 3:
 Extension and enlargement of the campus according to the group urban framework based on the design principles laid out

55

Final Masterplan



- 1 residential
- 2 hans strydom road
- 3 university entrance & community engagement
- 4 food gardens & housing development
- 5 living laboratory & experimental housing
- 6 open air classrooms & meeting areas
- 7 medicinal gardens
- 8 health clinic
- 9 soccer field / water amelioration
- 10 soundscape
- 11 themed educational gardens
- 12 arena & function garden
- 13 parking
- 14 relaxation area
- 15 cafeteria
- 16 meet / play / study
- 17 academic & community library



Figure 140: Completed Masterplan (Author, 2008) - more detailed information to follow



Figure 141: Vehicular circulation (Author, 2008)



Figure 143: Taxi's are one of the main methods of transport in Mamelodi (Author, 2008)

Circulation on campus is pedestrian only, with provision made for a multi-storey car park at the edge of the campus where it is easily accessible during soccer matches, functions in the arena, etc.



Figure 142: Pedestrian circulation (Author, 2008)

- University Entrance Point
- Primary Circulation Route
- Secondary Circulation Route



Figure 144: Walk, walk, walk (Author, 2008)

58

Water runs into a main channel, and is subsequently allowed to fill smaller channels running perpendicular to the main one. This is achieved through the opening of a mini sluice gate. These smaller channels are completely permeable and allow the water to infiltrate, thereby "irrigating" the food gardens planted on either side of them.

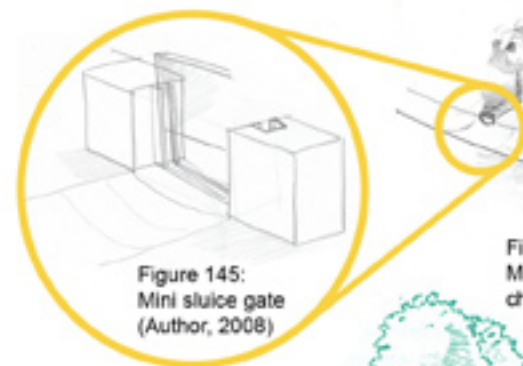


Figure 145: Mini sluice gate (Author, 2008)



Figure 146: Main feeding channels with smaller irrigation channels (Author, 2008)

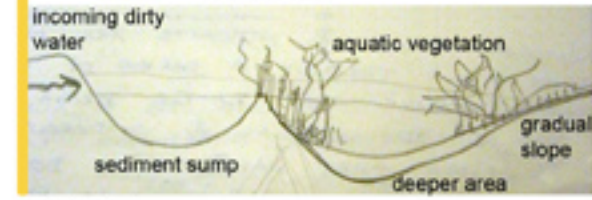


Figure 147: Multi-celled amelioration dam (Author, 2008)

The separation of a pond into multiple cells will enhance pollutant removal and lessen maintenance tasks



Figure 148: Water seeps into soil from irrigation channel (Nel, [S.a.]:30)

community empowerment = food gardens



Figure 149: Food gardens provide people with food, something to be proud of and a place to interact with others (Author, 2008)



Figure 151: Aquaduct supplies water to food garden areas as well as becoming a landmark element (Author, 2008)



Figure 152: Hardscaped channel where people can go to play, admire and meet - channel becomes the focal element, e.g. Exchange Square - Manchester (Author, 2008)



Challenge:
Storm water is channeled off the site without utilising its potential as an aesthetic and recreational opportunity. It is also a useful resource that is not being tapped.



Opportunity:
Use existing storm water channels both as a means of physical empowerment (food gardens, etc), and psychological empowerment - improve aesthetics, create identity of place and encourage pride and ownership.

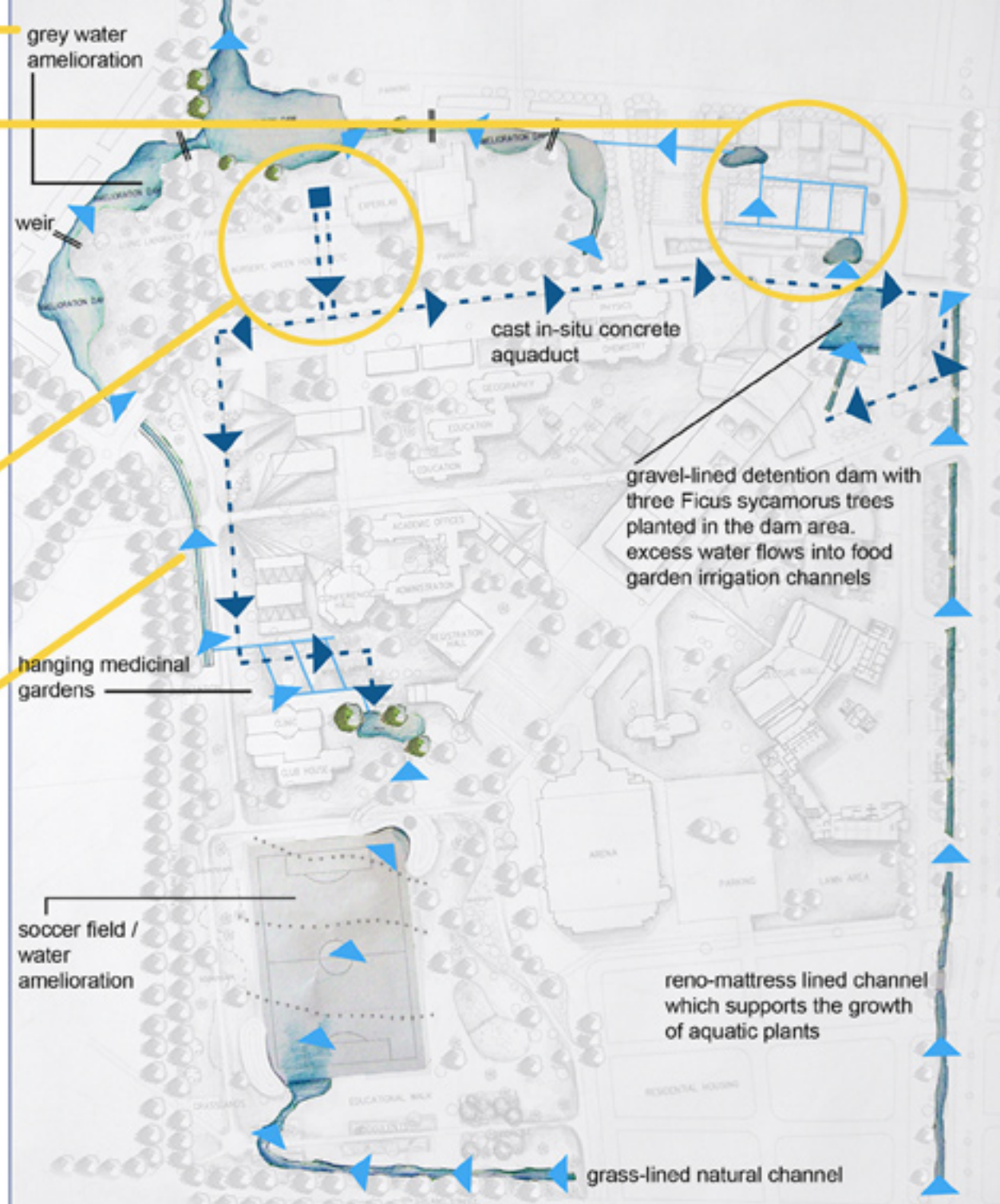
grey water amelioration

weir

hanging medicinal gardens

soccer field / water amelioration

Figure 153: Diagrammatic representation of water circulation on site (Author, 2008)



gravel-lined detention dam with three Ficus sycamorus trees planted in the dam area. excess water flows into food garden irrigation channels

reno-matress lined channel which supports the growth of aquatic plants

grass-lined natural channel

59



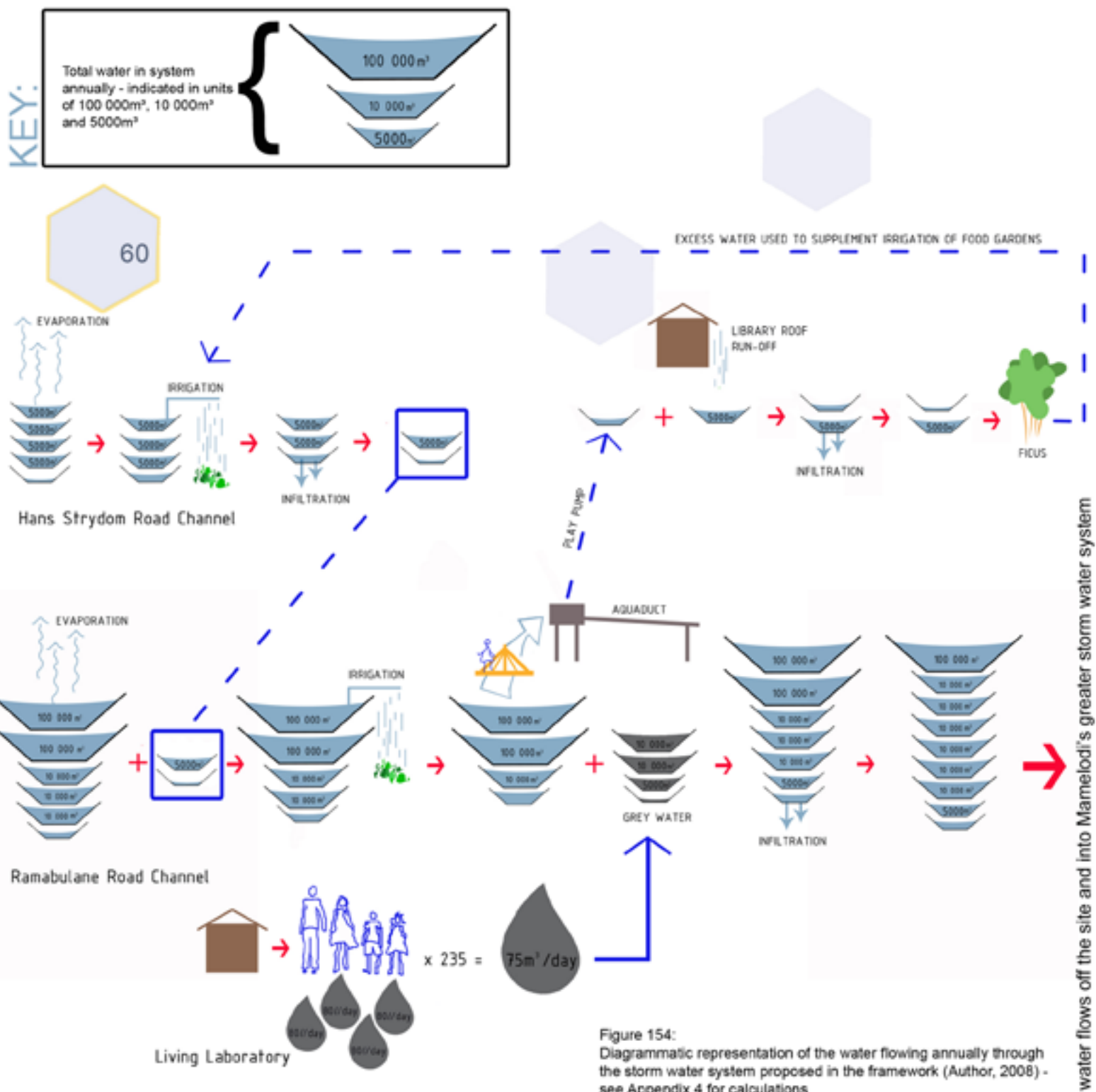


Figure 154: Diagrammatic representation of the water flowing annually through the storm water system proposed in the framework (Author, 2008) - see Appendix 4 for calculations

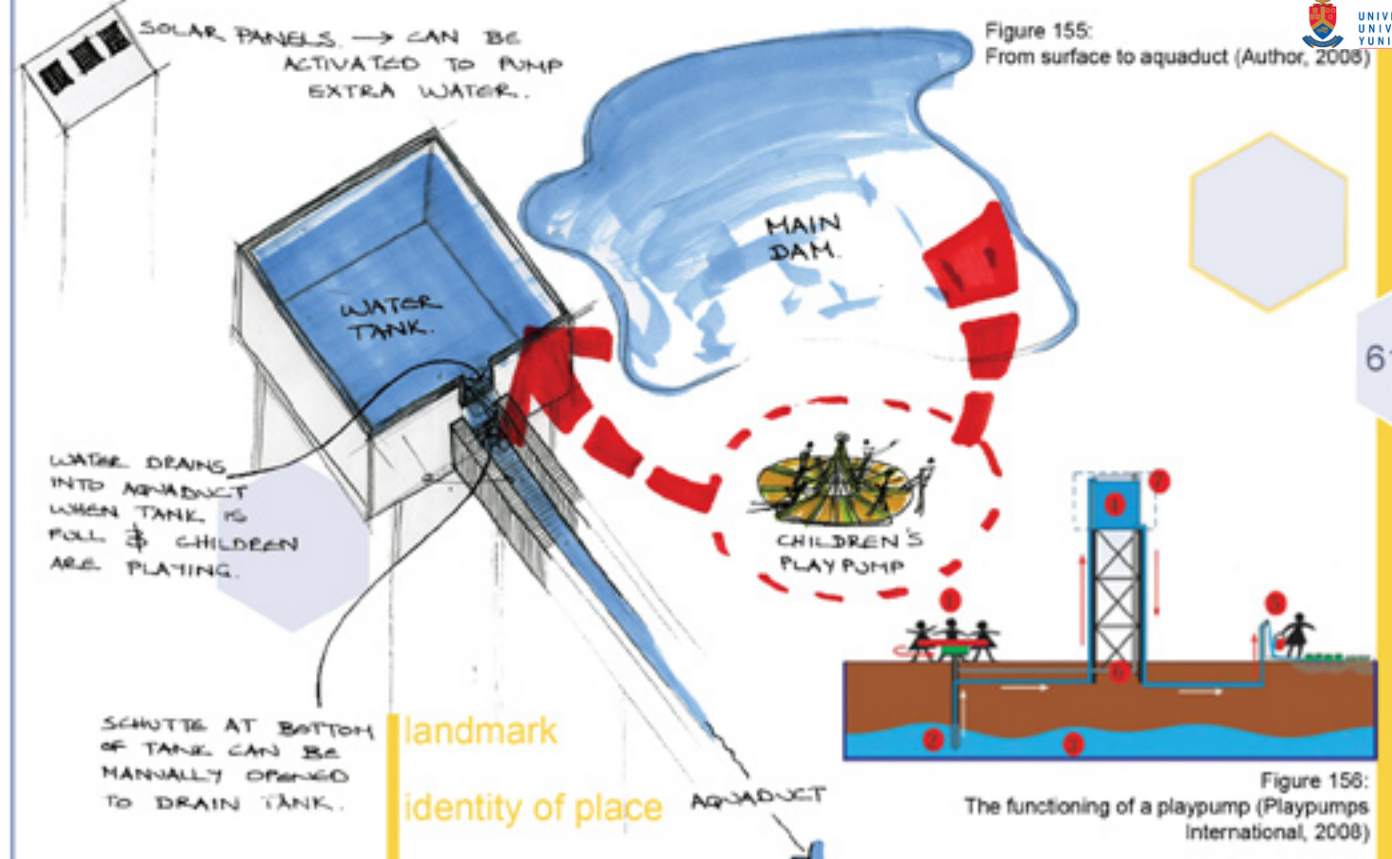


Figure 155: From surface to aquaduct (Author, 2008)

landmark
identity of place
community spirit
unifying element
multi-functional

Figure 156: The functioning of a playpump (Playpumps International, 2008)

Figure 157 & 158: Both water collection tank and aquaduct can be used as focal elements that provide a place with a specific character and identity. They have the potential to become landmarks within Mamelodi, and a source of community pride (Author, 2008) (Musgrave & Cumberlandge, 2007:14)

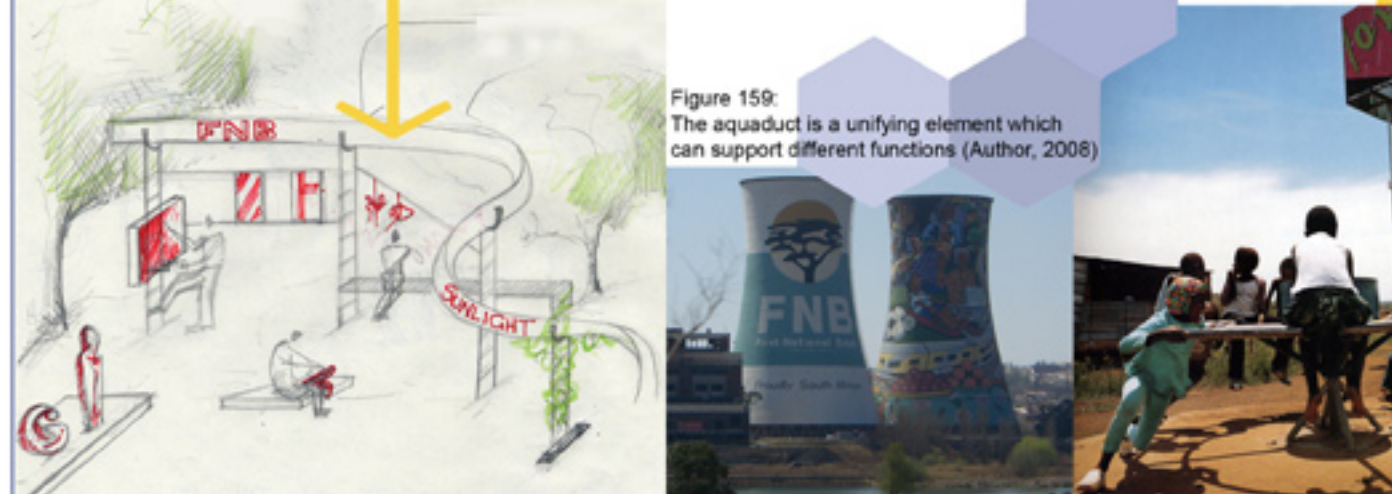




Figure 164: Examples of plants in the succulent rockery (Author, 2006)

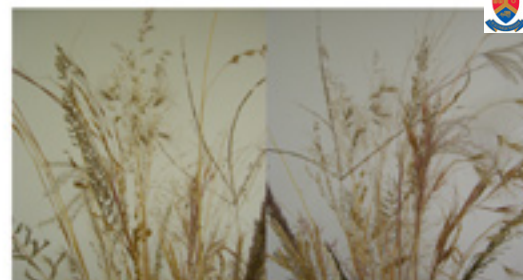


Figure 165: The grassland (Author, 2007)



Figure 166: Typical aquatic plants (Author, 2007)



Figure 167: A forest of different tree species (Author, 2007)



Figure 168: Conceptual ideas for the soccer field (Author, 2008)



Figure 169: Soccer is a very popular sport (Author, 2008)

education trail F
Comprises 4 'urban rooms', each representing a different type of vegetation - a forest, a succulent rockery, a wetland and a grassland. These rooms provide areas in which to sit and relax, as well as educational, experiential 'classrooms'

soccer field D
Soccer for Hope is an NGO that uses soccer as a means of education and communication with the youth about drug and alcohol abuse and HIV-AIDS

function garden E
Aesthetically pleasing flower garden where members of the community can picnic, take wedding photos, go to relax, and so forth



Figure 170: Meeting and relaxing in the succulent rockery 'room' (Author, 2008)



Figure 171: Photo's in the garden (Author, 2008)



Figure 160: Medicinal gardens are supported and irrigated by aquaduct structure (Digitally modified by author, 2008)



medicinal gardens A

Utilise the aquaduct structure to create vertical gardens and tranquil spaces of medicinal value, both physically and psychologically.

health clinic B

The University has set aside this building as a future health clinic in line with community engagement principles

soundscape C

A soundscape is a sound or combination of sounds that arise from an immersive environment. It consists of natural sounds, like animal vocalizations and the sounds of weather; and environmental sounds created by humans through musical composition, sound design, or as a byproduct of ordinary human activities, including conversation, work, and play (Wikipedia, [S.a.]).

The soundscape will consist of, among other things, Aeolian harps with a twist... Called "Plastorgans", these recycled, innovative musical instruments double as community art works, stimulating feelings of pride and ownership. Old bottles with slits cut into them are decorated by local community members, and due to their low-cost can be changed and redecorated as often as possible, rendering them the perfect ephemeral sculpture garden.

62



Figure 161: Vertical landscapes create tranquil private spaces (Margolis & Robinson, 2007:30)

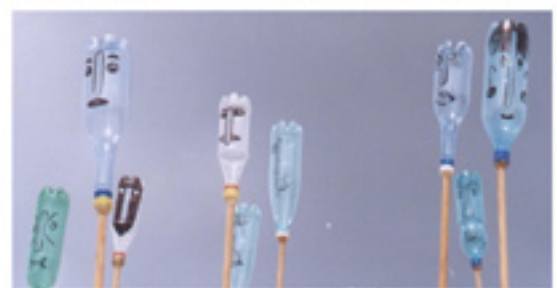
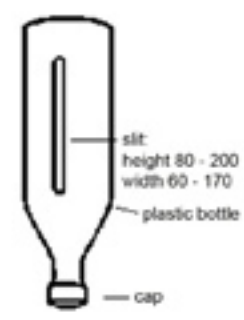


Figure 162 & 163: Plastorgan (Ferment, [S.a.])

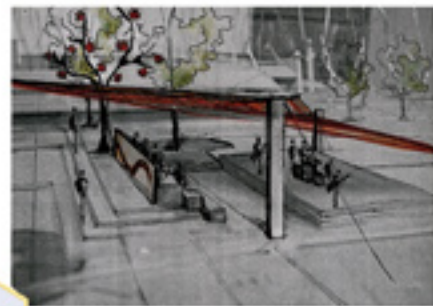


Figure 172: Small stage area for informal concerts, etc. (Author, 2008)

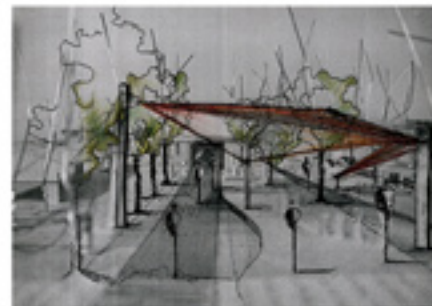


Figure 173: View of pathway leading into the University under the shading structures (Author, 2008)



Figure 174: Woven fences with niches opening to both sides to invite user participation (Author, 2008)

64

shading structures and woven fences G

Involve the community in the creation of shading structures over and around the existing carports. This creates both a sculptural place that community members can identify with and take pride in, as well as a space which is robust and multifunctional and can be used to host workshops, or as outdoor classrooms, market spaces, etc.

Community members will also be involved in the weaving of fence murals thereby ensuring that the transition zone between the University and the surrounding residential areas is welcoming and becomes a part of the local community.



Figure 175: Woven fence - The Eden Project, Cornwall, U.K. (Author, 2006)



Figure 176: Simple structures - interesting patterns (Author, 2007)

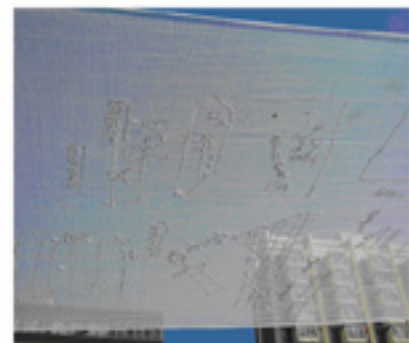


Figure 177: Shading structures that create shadow art on the ground - Cascoland, Johannesburg (Author, 2007)

living laboratory H

The University leases out a portion of its land for 50 years to a housing company like SHIFT. In conjunction with the University, the land becomes a living research laboratory for experimental housing. The Chemical Engineering, water utilisation unit, as part of the community engagement initiative, does short practical courses on cleaning grey water, etc. Students and community members are therefore encouraged to get involved and obtain both information and skills, as well as a sense of self-fulfilment and accomplishment.

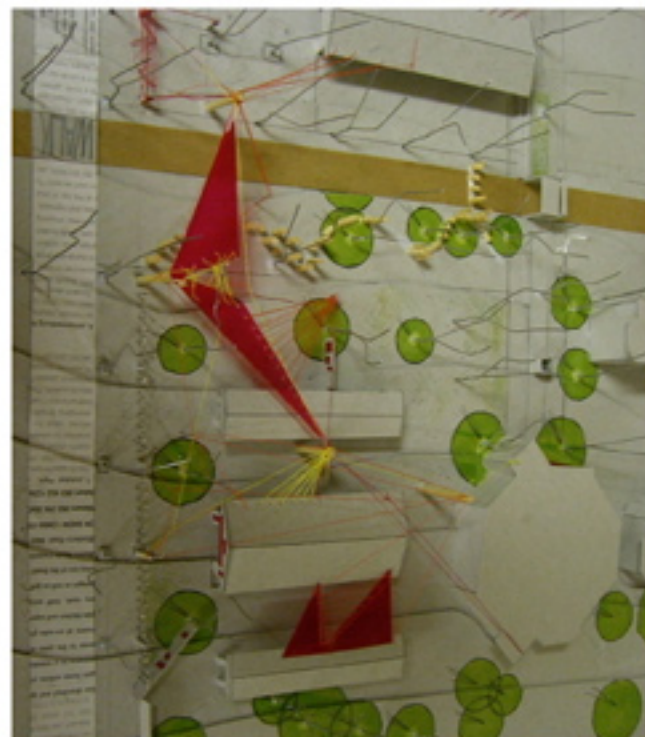


Figure 178: Conceptual model exploring use and connection of car ports and the surrounding spaces (Author, 2008)

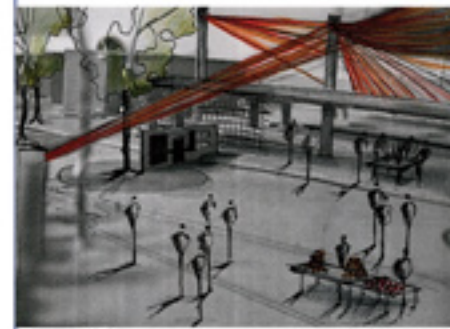


Figure 179: Car ports as market spaces with storage areas (Author, 2008)



Figure 180: Fence as furniture - Park JB Lebas, France (Gaventa, 2006:121)

Figure 181: Adaptable and comfortable (Give and Take. Centuori & Rock, 2003)

Figure 182: Fences that double as seating elements to both sides (Author, 2008)



multifunctional fences J

Fences are conceived as a necessary security element in South Africa – this however, does not mean that they must be mono-functional and boring. Multi-functional fences ensure that the security element remains, but that boundaries are not as formal or rigid, and that fences can be used from both sides, thereby encouraging interaction between people within and without. They give a “come closer” invitation rather than a “go away” message.



Figure 183: Fences that double as seating / market space (Author, 2008)

car port outdoor classrooms |

Create an opportunity for the final urban framework to occur – implement open air classrooms and workshops in a temporal setting in order to bring people onto the campus. This enables it to become functional in a way that is meaningful and of value to the community. The existing carports provide an ideal setting for such an intervention. Teach art and music classes, small business and book keeping skills, craft workshops, community building workshops, nutrition and planting information sessions, aids awareness workshops, basic literacy skills, etc. These spaces can also function as meeting and gathering spaces.

65

cafeteria area **K**

Consisting of a variety of vendors and stalls. Located adjacent to the study and meeting areas, and just off a main circulation path.

Amphitheatre-type space **L**

Stepped grassy seating space with an informal stage area and projection screen. Links the interior section of the University with the community park and soccer field.

under and around the library **M**

Hardscaped area for easy maintenance and circulation. Raised, open-air study space under library building. Mediation between built forms and natural forms - trees protude through holes in the concrete slab 'softening' the raised concrete walkway and creating a feature.

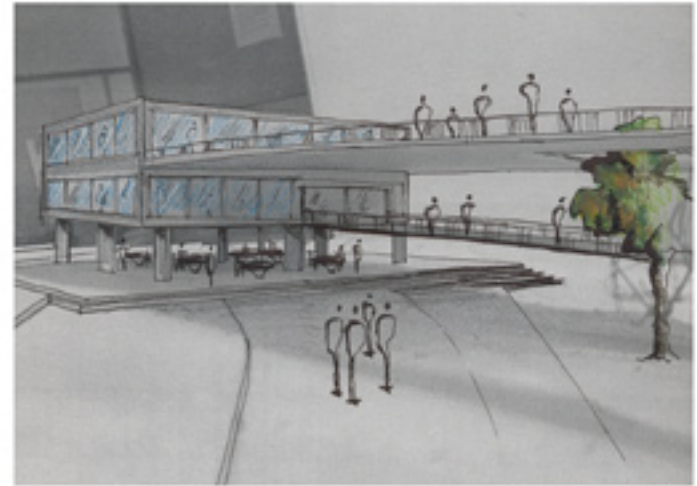
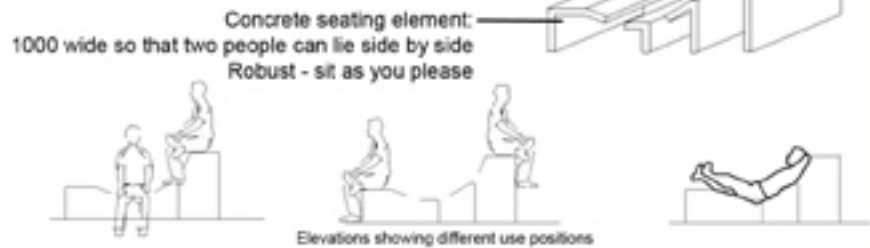


Figure 185: Underneath the library (Author, 2008)

chill space **N**

Open grassy area with plenty of large shade trees and concrete seating elements. Adjacent to the lecture halls, it is located in the perfect position to relax after class, meet with friends, eat a quick lunch, and so on.

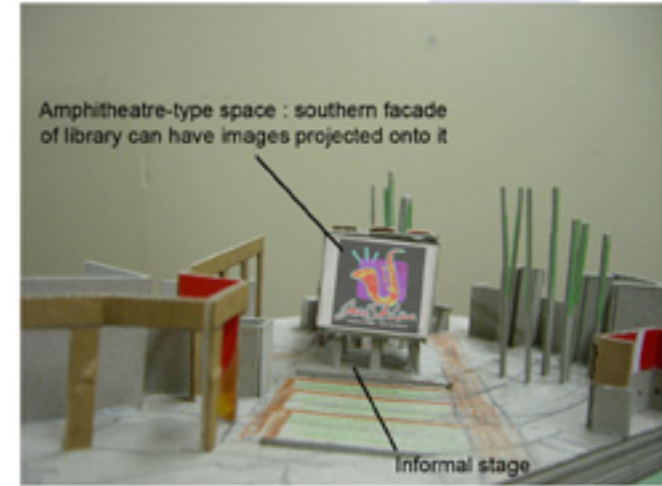


Concrete seating element: 1000 wide so that two people can lie side by side Robust - sit as you please

Figure 187: Conceptual seating elements (Author, 2008)



Figure 184: Model showing the interior section of the University from above (Author, 2008)



Amphitheatre-type space : southern facade of library can have images projected onto it

Informal stage

Figure 186: Model showing amphitheatre-type space and projection area (Author, 2008)

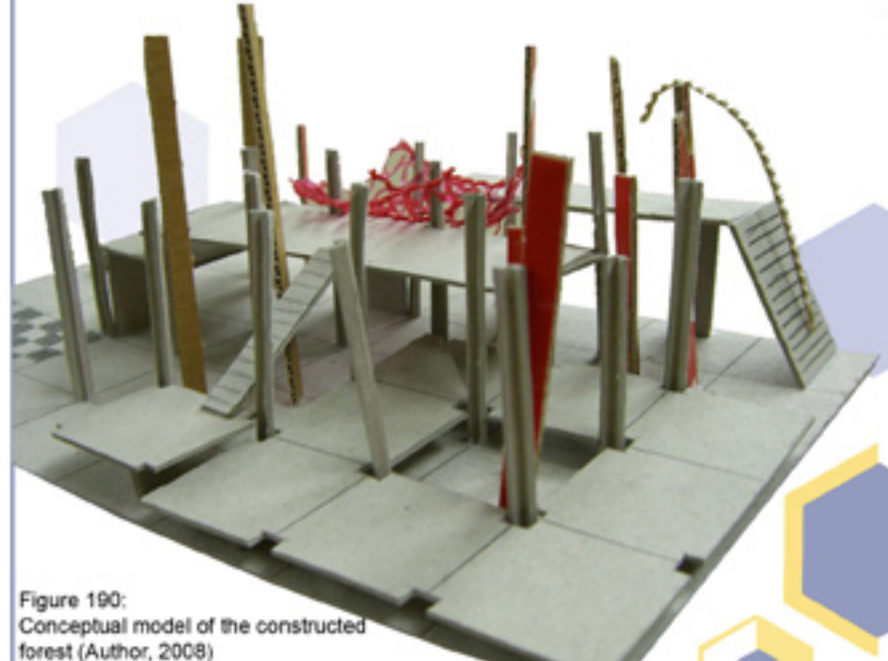


Figure 190: Conceptual model of the constructed forest (Author, 2008)



Figure 188: Model showing prominence of vertical elements (Author, 2008)



Figure 189: Model from the top showing raised platforms and hammock-type structures (Author, 2008)

the constructed forest **O**

- Different levels
- Vertical elements - trees & supports
- Hammocks
- Shading structures
- Play spaces - slides, ropes, ladders, swings, etc.
- Meeting, working, relaxing, seating

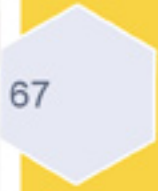




Figure 191: Model showing the existing layout and library building (Author, 2008)



Figure 192: Attempt at emphasising the circular element (Author, 2008)



Figure 193: Attempt at integrating the different grid systems (Author, 2008)

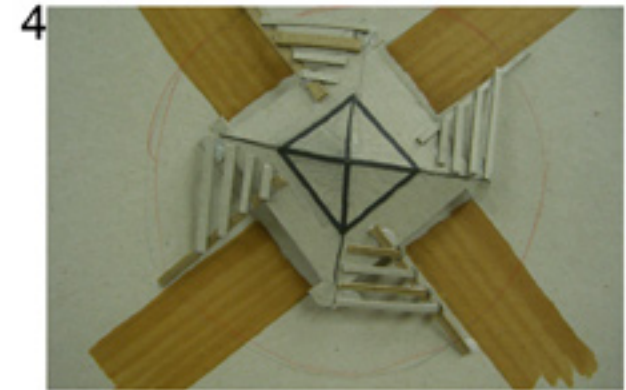
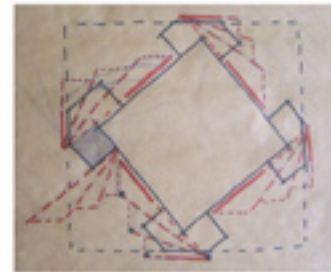


Figure 196: Alternate between the two main grid systems in order to reconcile them (Author, 2008)



Figures 195, 196, 197: Diagrammatic attempts (Author, 2008)

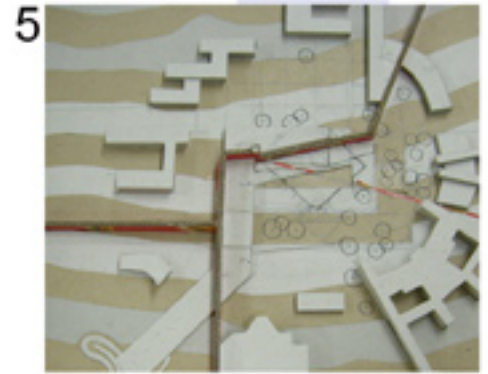


Figure 194: Connecting the 2 corners of the site and making the library accessible from the outside (Author, 2008)

Challenge:

Existing library:

- rigid and restrictive
- visually impermeable
- inaccessible to the public.



Figure 199: Connection and modification of two existing buildings (Author, 2008)



Figure 200: Transition zone between public and semi-public, created by overhang (Author, 2008)

Solution:

The proposed community library tries to mediate between the demolition of the existing library and keeping it as it is now. The new library is created by linking the existing building with one of the existing lecture halls. The structural supports of the existing library will be kept while the ground floor walls will be broken out to increase permeability (1), thereby creating an open-air study hall. The books will be shifted one floor up and a second floor will be built on top (2). The first floor will connect to the old lecture hall (3), which will be remodelled into the community library (4). These interventions succeed in breaking the rigid geometry, linking the community and the university, and creating a visually permeable, open and inviting library which is accessible from the outside.

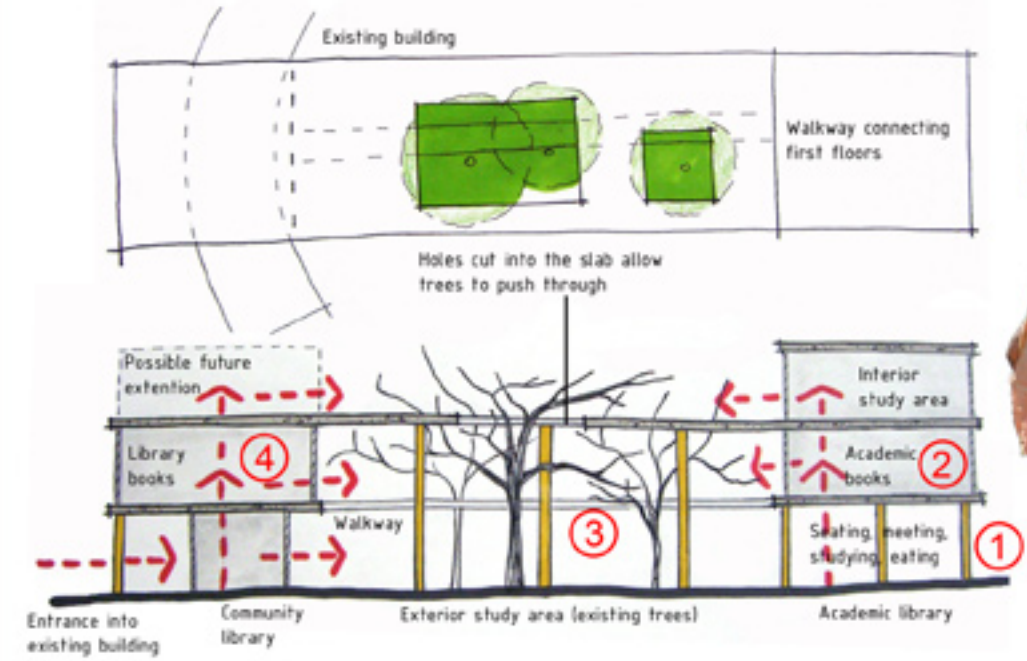


Figure 201: Diagrammatic plan and section of proposed library building (Author, 2008)





As stated previously, there are three different types of spaces that will encourage empowerment. These spaces become places where people can escape from everyday life; where they are encouraged to dream. These are:

Reflective spaces where one can be calm, collect one's thoughts and be at one with oneself. In places like Mamelodi, many people live very over-crowded, hectic, hard lives that leave little or no space for peace and reflection. Time is a precious commodity, so these reflective spaces need to be easily accessible and well known.

Spaces where people feel connected to others in similar situations, where they feel like they are part of a larger community, as well as part of the larger natural system. This is important in a place like Mamelodi where people face hardships on a daily basis, and need to feel that they are not alone.

Fun, stimulatory, inspirational spaces where one can relax, play, be free and leave all worries behind. A place where the imagination comes alive...

Some of the 'tools' that can be used to create these spaces are:

- Elements with an ephemeral nature
- Art (especially that which involves the community)
- Sensory stimulation
- Specific spatial arrangements
- Gesture, hardening and flattening of surface and seriality

The following design will attempt to empower the residents of Mamelodi by creating the spaces mentioned above on a more detailed level.

Part 1: Introduction



Figure 202: Circulation in and around the University (Author, 2008).



Figure 203: Square will be used by young and old alike (Author, 2008).

Why detail this section - opportunities, advantages, needs and constraints?

All circulation patterns in and around the University start or terminate in this square. It therefore becomes an important node within the University precinct.

It is public, and therefore cannot be closed at night and become dead space.

The public library acts as the intermediary link between the University and the public. It will be used by young and old alike - it is the perfect interface.

The space is located in the middle of three significant zones, namely, institutional, busy retail and everyday life (food gardens, residences, apprenticeships, and so forth.) It needs to interact with all of these facets and therefore provides an exciting challenge.

The square can become an exhibition space for the types of skills being taught in the apprenticeship workshops adjacent to it.

Figure 204: Ordinary everyday life (Author, 2008).



Part 2: Plan development and process

72

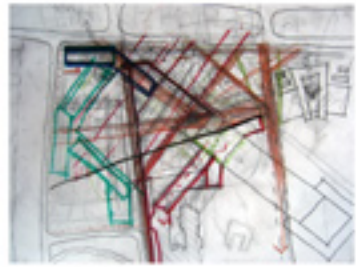


Figure 205 : Attempt to reconcile grid systems present on site (Author, 2008)



Figure 206 : Incorporation of food gardens and apprenticeship workshops (Author, 2008)



Figure 207 : Incorporation of water, aquaduct and raised spaces (Author, 2008)



Figure 208 : Model showing progression of green, water and raised areas (Author, 2008)

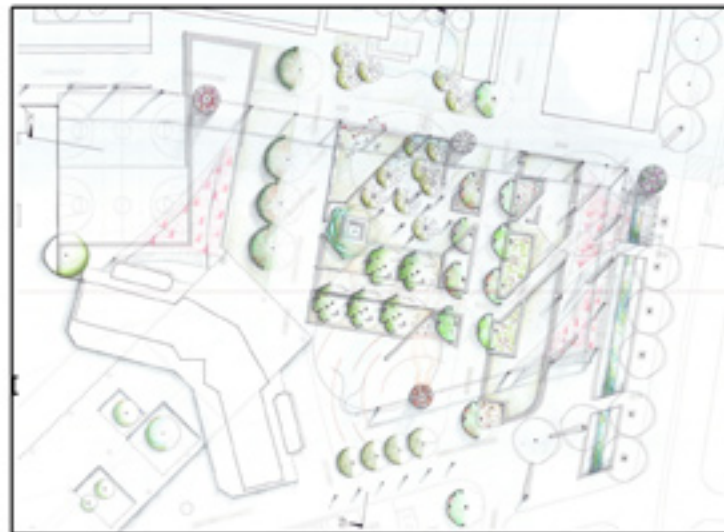

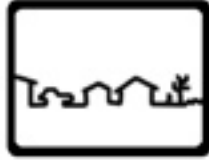




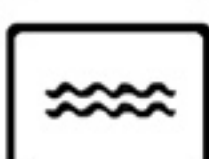



Figure 209 : Almost there - central section around figs still too rigid and static (Author, 2008)

- Informal market Area 
- Density - people - passive surveillance 
- Environmental education & appreciation 
- Play spaces 
- Sensory planting 
- Reduce, Reuse & Recycle 
- Sustainable water use 
- Specified circulation routes 

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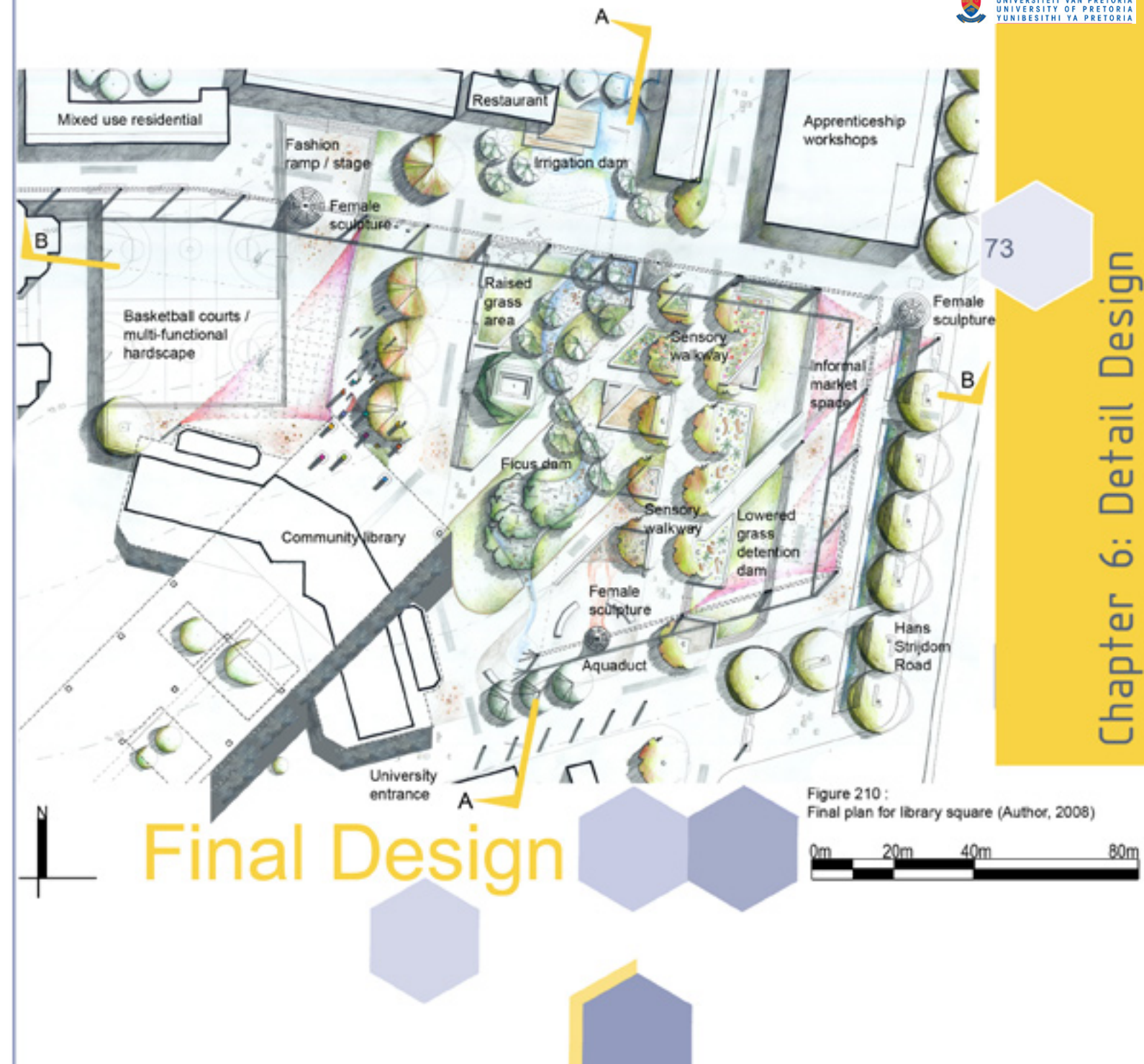


Figure 210 : Final plan for library square (Author, 2008)

Part 3: Design Principles

There are eight design principles that, in the author's opinion, must be adhered to in order to successfully create the previously mentioned spaces, and thereby, empower the people of Mamelodi. These principles are:

1 The creation of **multi-functional, simple, robust** elements and spaces.



Figure 211: Basketball today (Author, 2008)

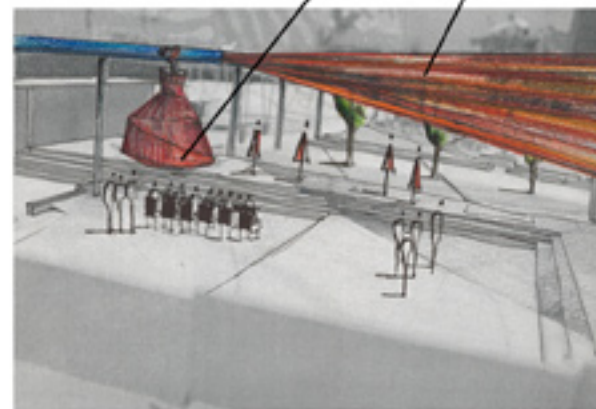


Figure 212: Gathering space tomorrow (Author, 2008)

The above hardscape space, for example, is able to be used as a sports 'field' (netball / basketball) with seating provided on steps all the way around the courts, as well as providing a perfect surface on which to unpack chairs for a concert to be held on the multi-functional ramp / stage adjacent to the courts.

Community involvement and participation. This will be achieved with the large female sculptures, concrete walkway narratives, the mural on the basketball wall, locally made shading structures, mosaic work, and so on.

Greenery and natural elements increase towards the food gardens, and decrease towards the busier, more dense areas, i.e. Hans Strydom Road. The movement of water over the site also achieves this. It begins in a very rigid, hard container and subsequently moves into a pebble-lined, organic, planted swale...



Figure 213: Vegetation and softer elements increase towards the residential and food garden areas (Author, 2008)

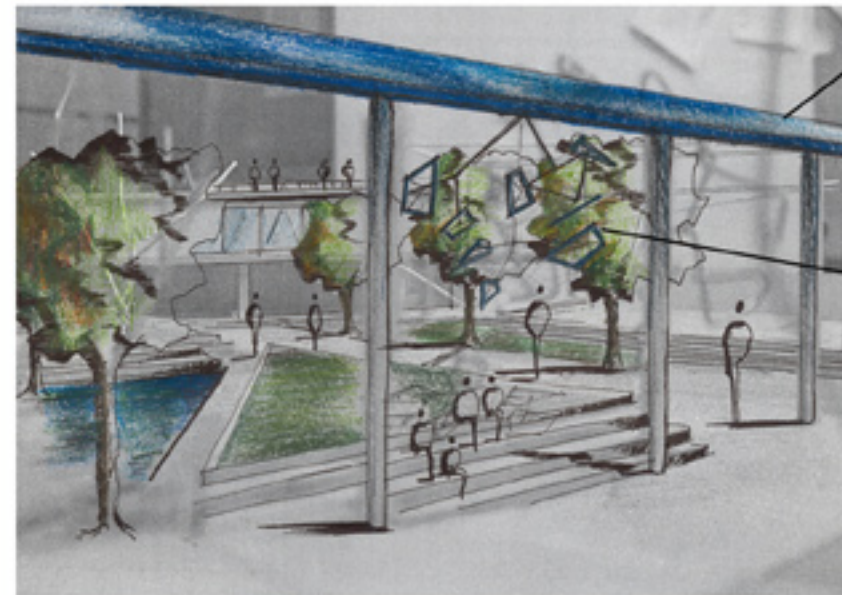


Figure 214: Wind mobiles throw changing patterns on the ground and frame changing vistas (Author, 2008)



Figure 216: Plaza de Dali, Spain (Mangado, 1996)

Multifunctional spaces - Parterre-type elements: Manipulation of the landscape to create level changes in an attempt to reconcile the different grids and geometries on the site, as well as to break the monotony of a flat site. This brings elements closer to eye level thereby allowing people a different experience of that element and inviting them in to touch it, sit under it, and so on.

The use of **vertical elements to define main circulation routes**. This is accomplished through the positioning of aquaduct supports and tall trees.

Make use of **ephemeral elements**, like vegetation, wind mobiles, musical sculptures, rust patterns on paving, and so on.

2

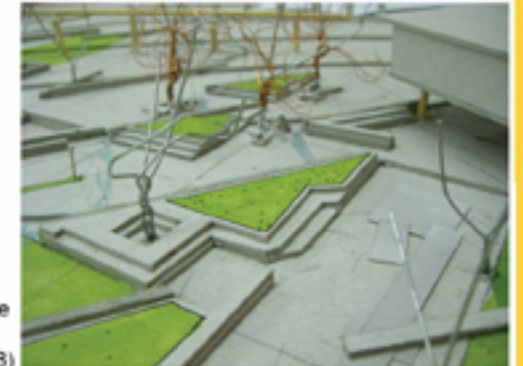


Figure 215: Changes in levels - space creation (Author, 2008)



74

1

75

76

The **stimulation of the senses** through the use of tactile and textured materials, aromatic vegetation, shadow play, musical sculpture, and so on.



Figure 217: Sensory stimulation - Vodacom advert (Wallpaper Magazine, 2006)

Stick to the **colour scheme**



Figure 220: Colour scheme (Author, 2008)

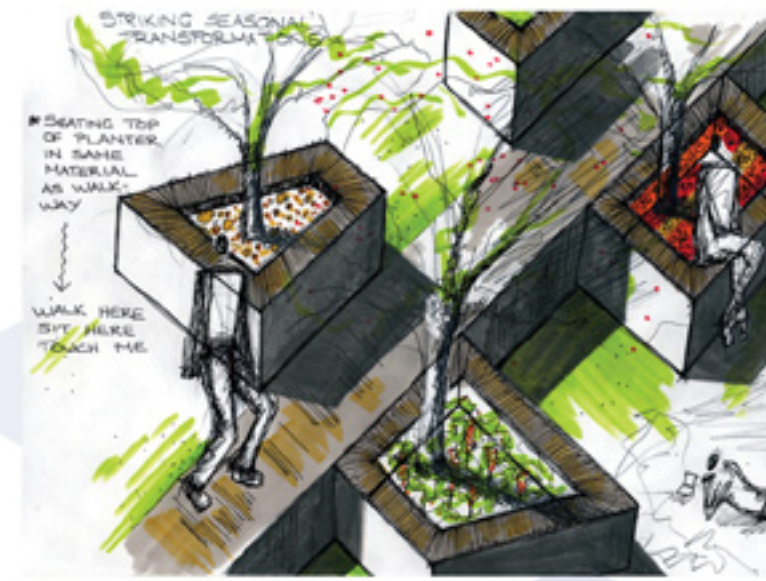


Figure 218: Sensory walkway at different levels (Author, 2008)



Figure 219: Examples of tactile, visual and aromatic elements found in planters along sensory walkway (Author, 2008)

3



Figure 221: Platforms for play (Opie, 1994:16)



Figure 222: Build forts, create secret spaces, stimulate the imagination (Coppard, 2003)



Figure 223: Looking out from the library (Author, 2008)

4

Create **play areas**, especially for children; places where the **imagination** can run wild...

"Playgrounds that deny the child; that offer no chance of involvement, participation or manipulation; that are devoid of choice, complexity and interaction will be empty of children" (Friedberg, 1970:29)

What we need are places of imaginative play and learning. We need to broaden the definition of a playground. They should be places where children can make up their own games and create new patterns of play.








"Children thrive in play situations where they can be architects and builders and are given materials (rocks, logs, pipes, sand, water) to do so. Children fed a steady diet of static equipment for muscle exercise don't get to exercise their imaginations and creative powers" (Sticks, Stones, Water and Leaves by Dannenmaier, 2006:61).

Columns create a colourful focal point, as well as providing the structure upon which to build forts and construct magical lands.



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Key to trees used

	<i>Ficus sycomorus</i> subsp. <i>sycomorus</i> (Sycamore fig)	Large focal tree with plank roots upon which to sit and play
	<i>Celtis africana</i> (White stinkwood) / <i>Combretum apiculatum</i> subsp. <i>apiculatum</i> (Red bush-willow)	Street trees with non-aggressive root systems. Do not produce large messy fruits.
	<i>Bolusanthus speciosus</i> (Tree wisteria) / <i>Dombeya rotundifolia</i> (Wild pear) / <i>Erythrina</i> <i>lysistemon</i> (Common coral tree) / <i>Schotia</i> <i>brachypetala</i> (Weeping boer-bean)	Plant along the sensory walkway - flowers and pronounced seasonal change
	<i>Acacia sieberiana</i> var. <i>woodii</i> (Paper-barked thorn)	Focal tree - flat top and peeling, papery bark
	<i>Harpephyllum caffrum</i> (Wild plum)	Shade tree + reddish, spiral-type leaves
	<i>Combretum erythrophyllum</i> (River bush-willow) / <i>Acacia xanthophloea</i> (Fever tree) / <i>Syzigium cordatum</i> (Water-berry)	Trees to be planted in and around water points - like wet feet. Appropriate colours
	<i>Heteropyxis natalensis</i> (Lavender tree)	Attractive bark and red & purple autumn colours
	<i>Catha edulis</i> (Bushman's tea)	Slender, upright canopy, non-aggressive root system



Schotia brachypetala
(Weeping boer-bean)



Combretum
erythrophyllum
(River bush-willow)



Erythrina lysistemon
(Common Coral tree)



White stinkwood
(*Celtis africana*)



Ficus sycomorus subsp
(Sycamore fig)



Syzigium cordatum
(Water Berry)



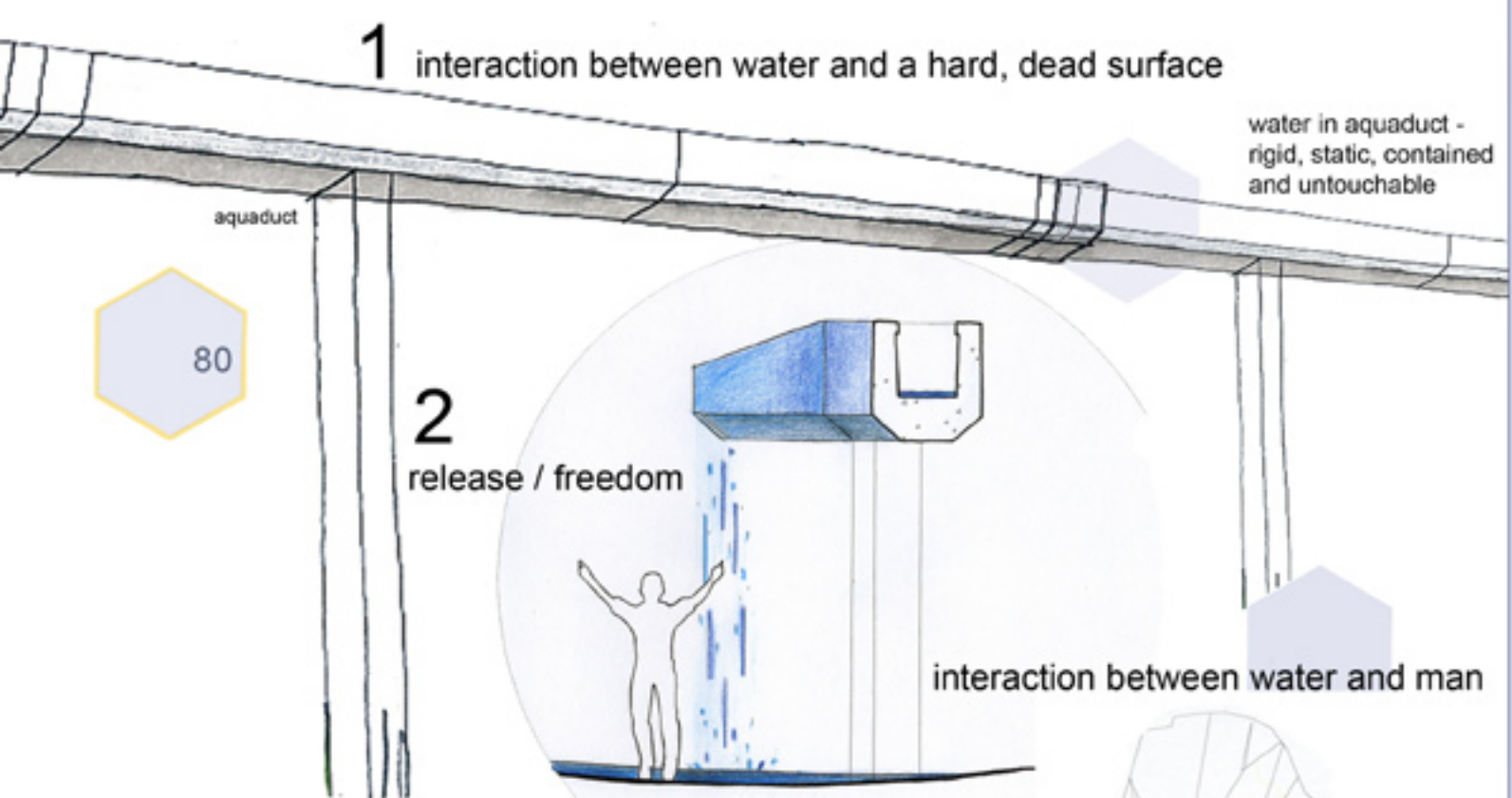
Acacia xanthophloea
(Fever Tree)



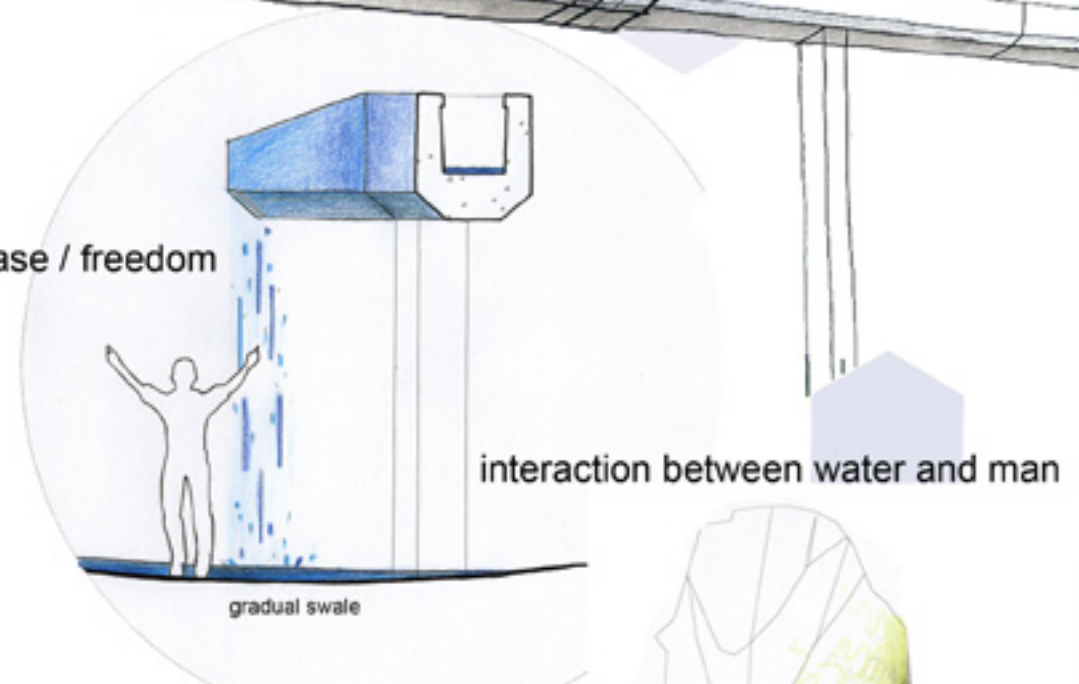
Bolusanthus
speciosus
(Tree Wisteria)



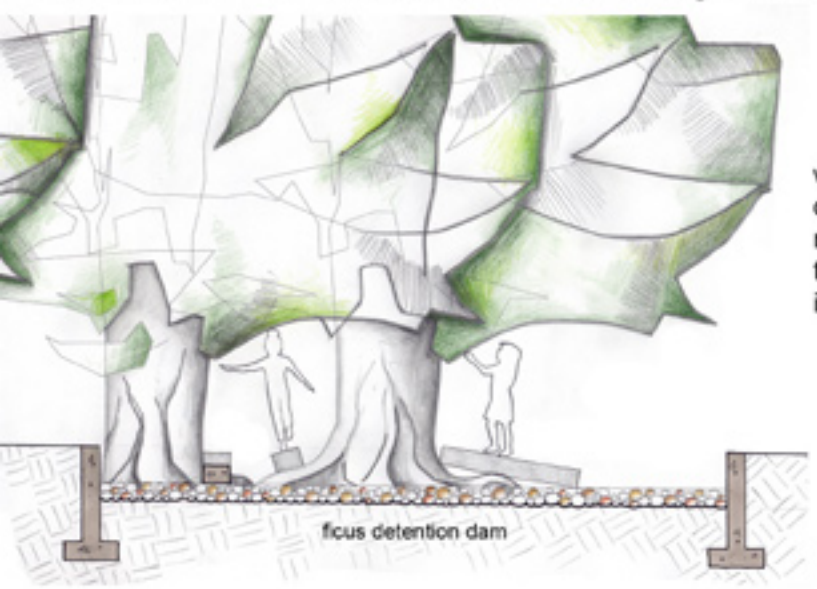
1 interaction between water and a hard, dead surface



2 release / freedom



3 interaction between water and natural vegetation



water in surface dams - organic, natural, growth, texture and able to be interacted with

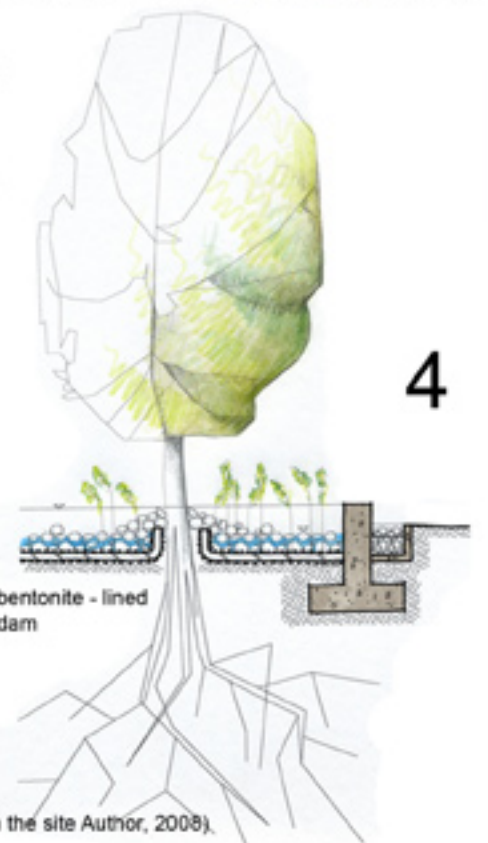
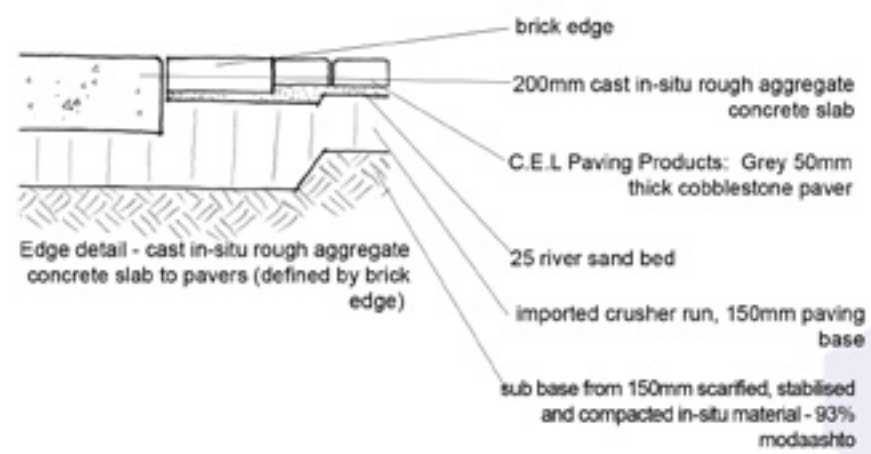
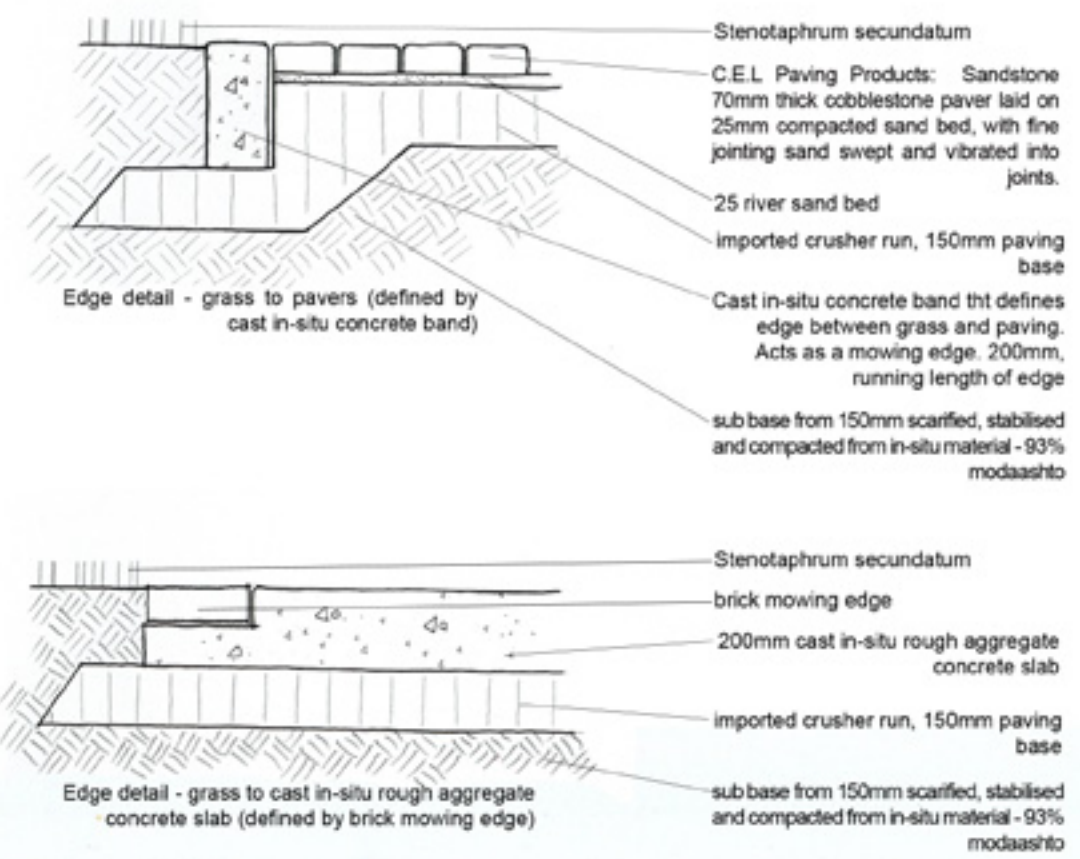
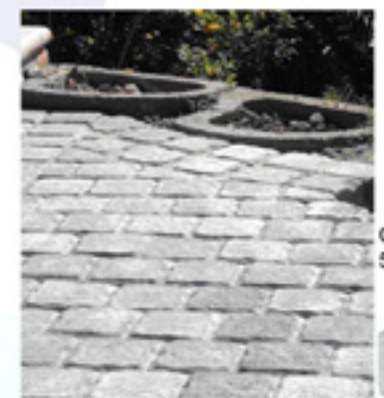


Figure 225 : The journey of water through the site Author, 2008).



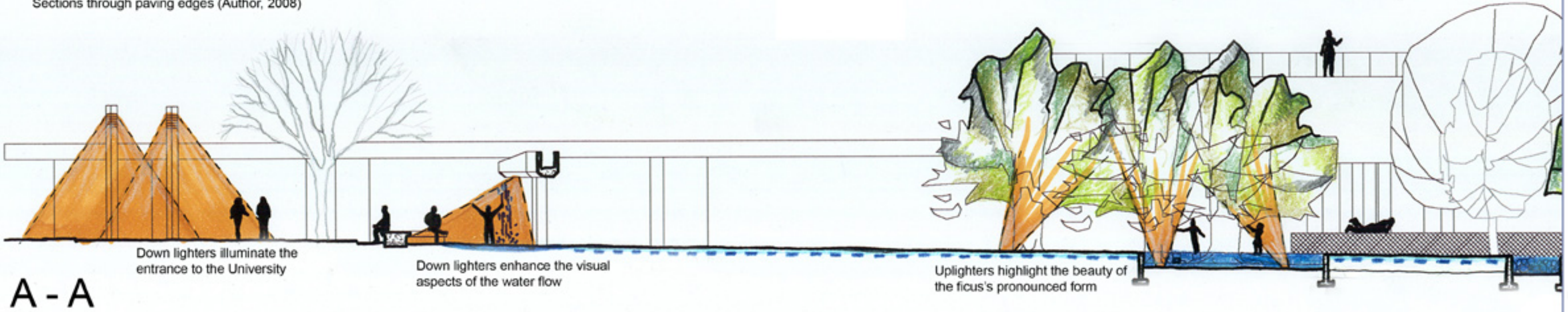
C.E.L. Paving Products: Sandstone 70mm thick cobblestone paver laid on 25mm compacted sand bed, with fine jointing sand swept and vibrated into joints.



C.E.L. Paving Products: Grey 50mm thick cobblestone paver



Figure 226: Sections through paving edges (Author, 2008)



150 x 150 x 10 equal leg mild steel angle spanning approximately 6000

Galvanised mild steel lock bolt with washer to prevent the bolt from slipping into oversized hole which allows for expansion

100 cast in-situ exposed aggregate concrete slab

150 crusher run paving base

Sub-base from 150 scarified, stabilised and compacted in-situ material

50,80 diameter galvanised mild steel round hollow section, 3 thick forming handrail

31,80 diameter galvanised mild steel round hollow section forming balustrade

30 thick cast in-situ concrete screed containing mesh to prevent cracking

120 thick precast echo slab with hole drilled into it to provide space for bolt

120 x 10 galvanised mild steel bearing plate with graphite grease between it and the angle to allow for expansion

Galvanised mild steel threaded j-bolt cast into concrete

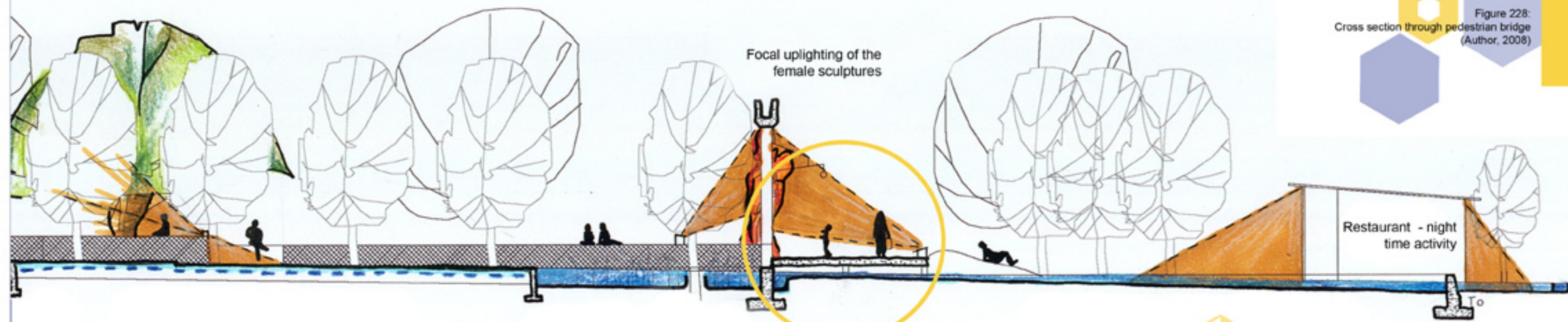
Cast in-situ concrete foundation wall

Galvanised mild steel cross brace

150 x 150 x 10 equal leg mild steel angle

Figure 227:
Longitudinal section through pedestrian bridge (Author, 2008)

Figure 228:
Cross section through pedestrian bridge (Author, 2008)



Trees which like wet feet.
This is because the bentonite liner forms a surface upon which condensation will occur keeping the area around the roots continuously moist and warm

Indigenous wetland plants, e.g. Typha capensis and Cyperus textilis

200 layer of gravel which breaks any capillary action and protects against erosion as well as providing an aesthetic visual barrier

Maximum water level 94.70

Non-woven, needle-punched geotextile

100 thick Sodium Bentonite liner

Non-woven, needle-punched geotextile

Sub-grade prepared and compacted to engineers specifications

Cast in-situ concrete channel with waterproofing

99.91

Wind mobile hangs from a stainless steel eyelet cast into the underside of the channel - consists of wooden frames which portray a constantly changing view of the sky / horizon, depending on where a person views the mobile from.

400 x 400 cast in-situ fairface concrete column supporting the aquaduct at 10m centres and varying heights

Pedestrian bridge over water channel

Gravel-filled energy breaker with geotextile

Cast in-situ concrete channel running the length of the weir, 100 thick, 400 deep

Cast in-situ concrete weir with 400 thick footing

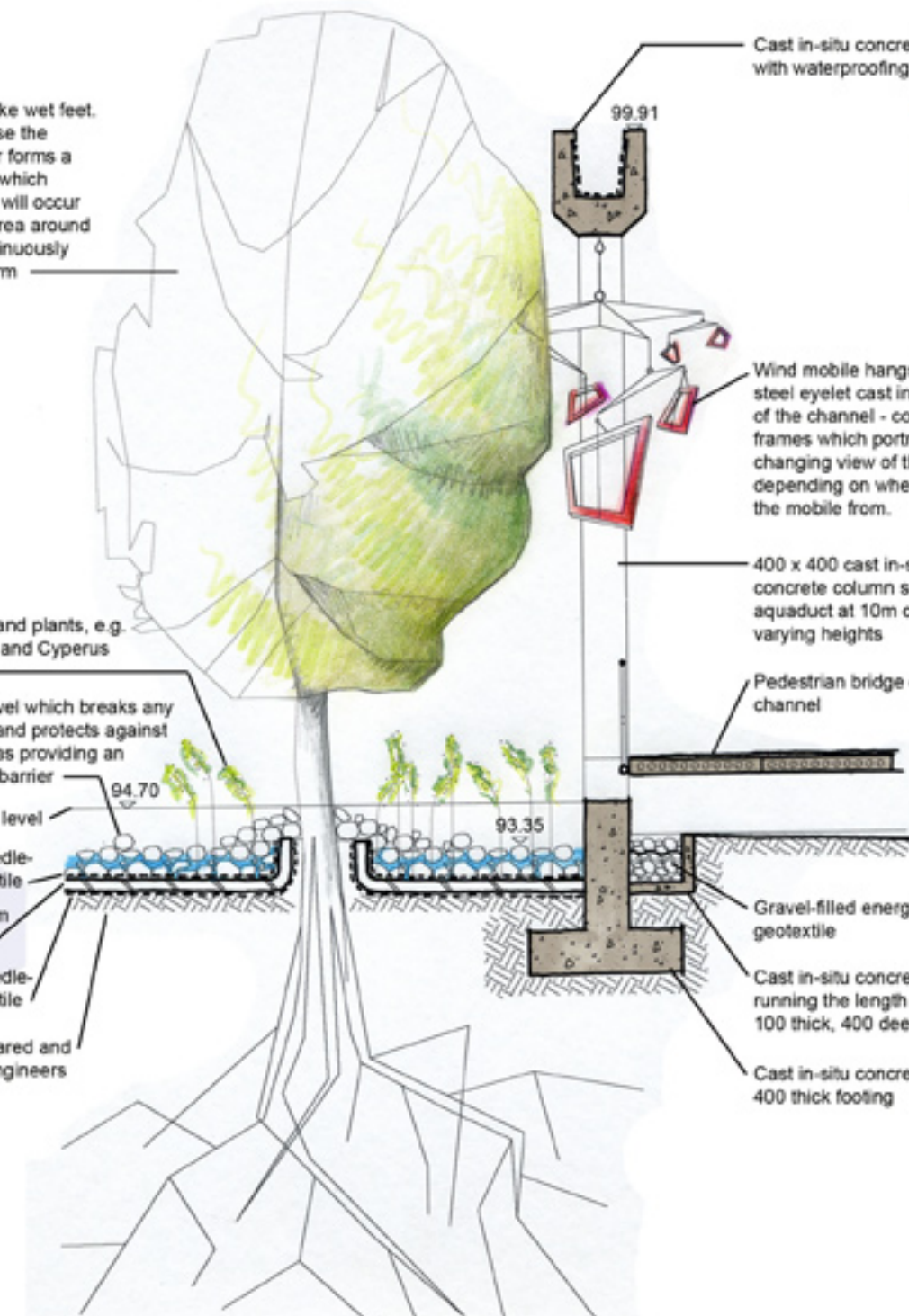


Figure 229: Blown up detail of section through bentonite - lined dam (Author, 2008)

community participation

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- learn new skills and teach one another things, thus empowering oneself and others, and creating a sense of ownership at the same time.
- reawakens a spirit of community and encourages bonds between different people, between people and their environment, and between people and themselves.
- liberates feelings of self-worth, self-fulfilment and pride, in both the place, and in the people themselves and their achievements.

Principles of community participation strive to build a community that holds the capacity to initiate its own changes, and to continue developing and transforming itself.

Figure 230:
Chalk on board - local children - community artwork
(Author, 2008)



Figure 231:
Members of the community and students at the
University (Author, 2008)



Community participation and interaction with the landscape through elements that can be altered and built by the community, thus creating not only a space but also a place.

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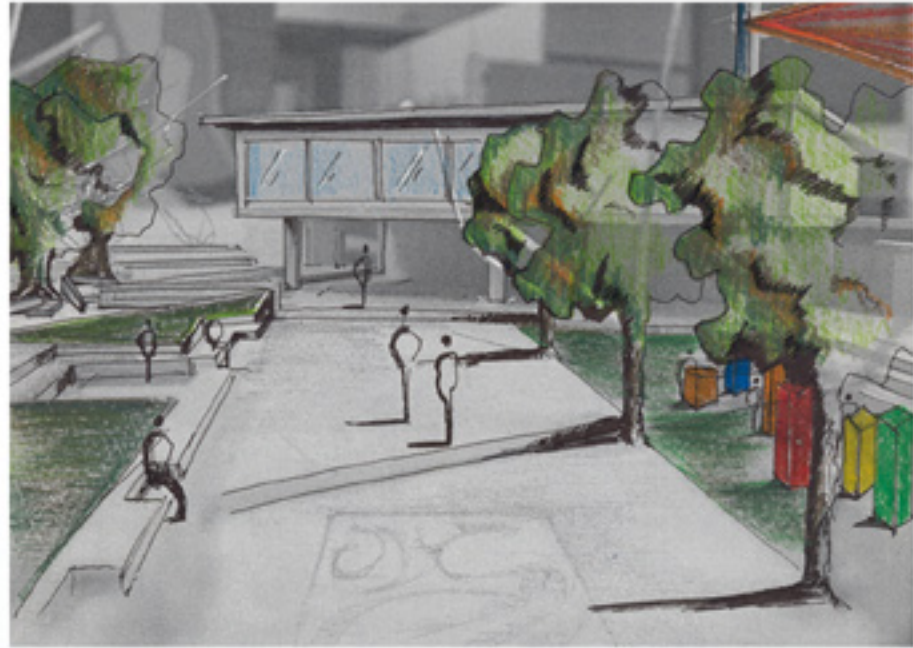
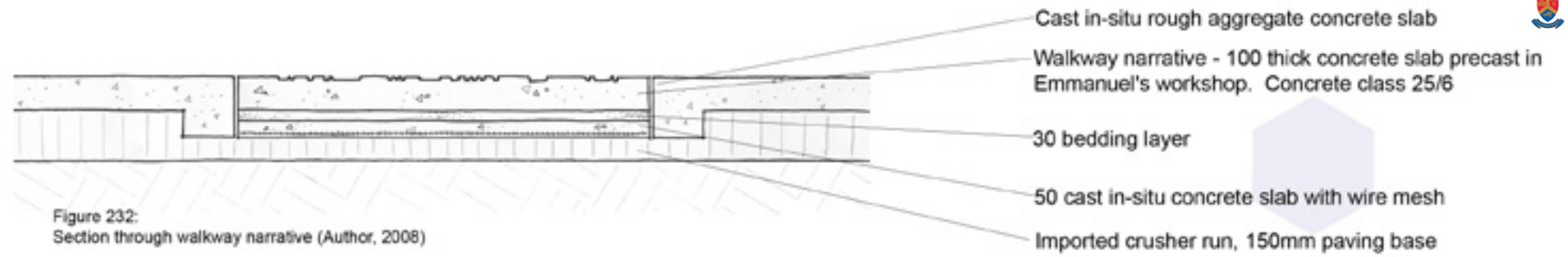


Figure 233:
Narrative strip in concrete leads one towards the library (Author, 2008)



Figure 234:
Wind mobile - ephemeral shadows (Author, 2008)

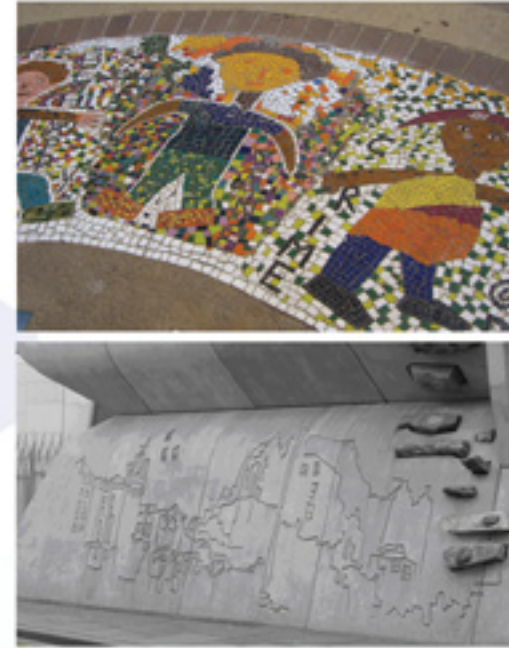
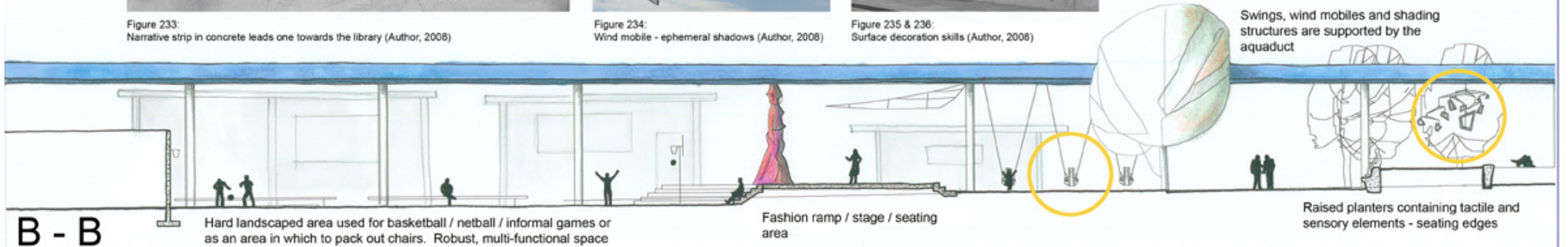
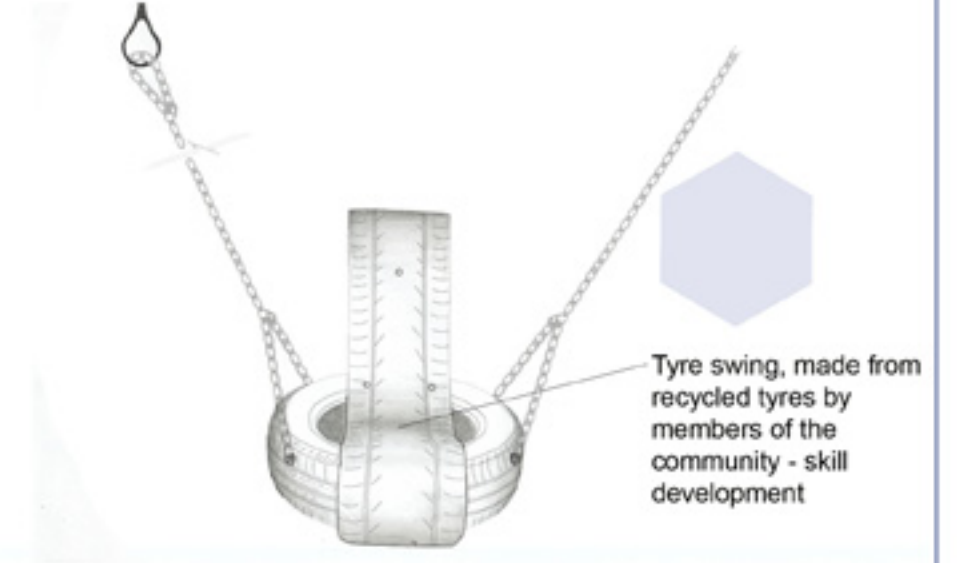


Figure 235 & 236:
Surface decoration skills (Author, 2008)



Generating music through play...

As the wind moves through the strings it causes them to vibrate producing an enchanting, ethereal, almost haunting sound. All strings are tuned to the same pitch but have different tensions, lengths, densities and diameters. The wind will therefore play one harmonic on one string and a different harmonic on another, depending on the intensity of the wind. This produces an unpredictable, volatile composition of sound that changes with every gust of wind

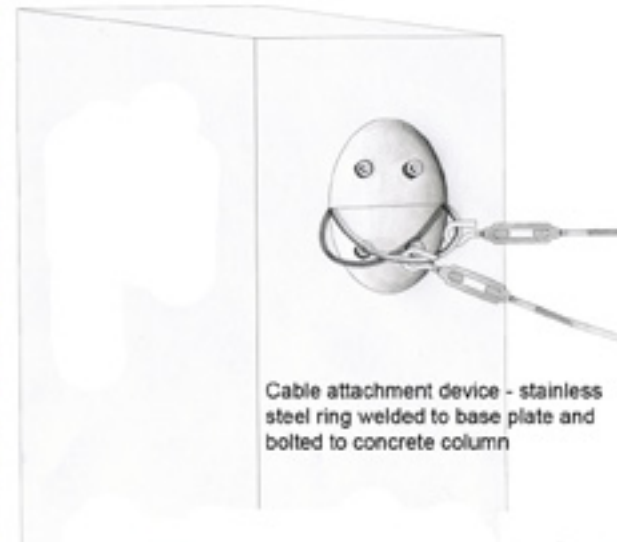


Figure 237: Aeolian harp (Nieheimer Kunstpfad, 2000)

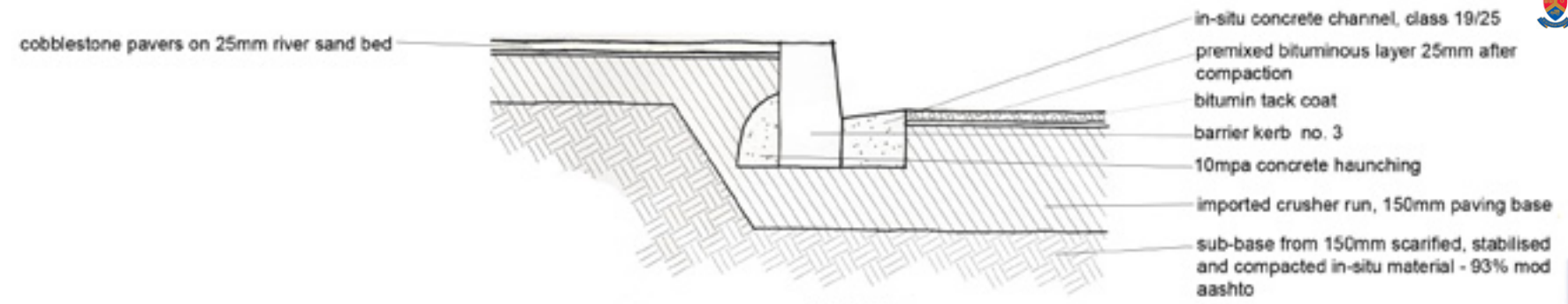


Figure 238: Section through road edge (Author, 2008)

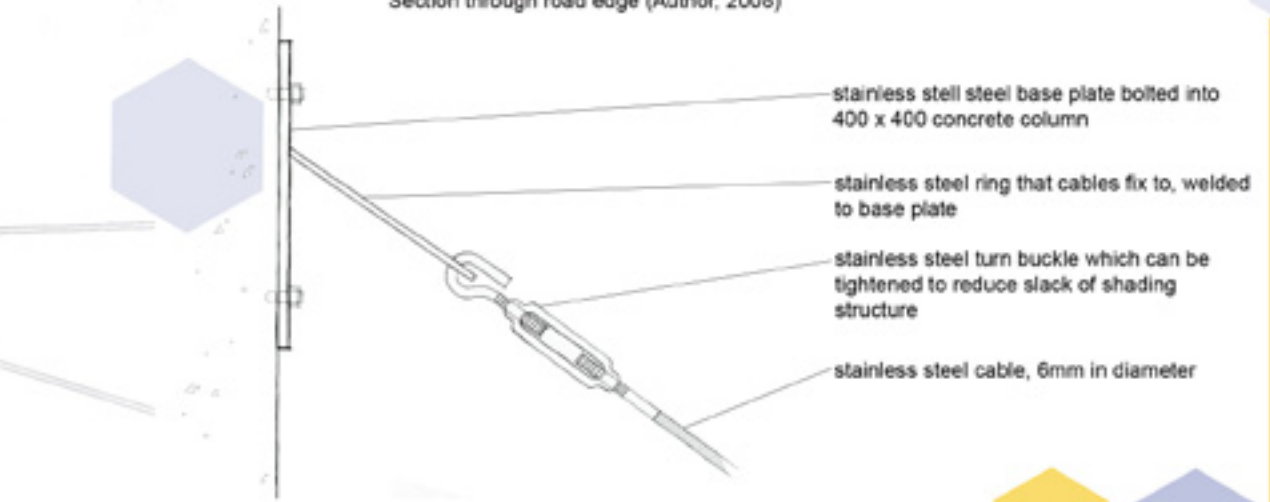
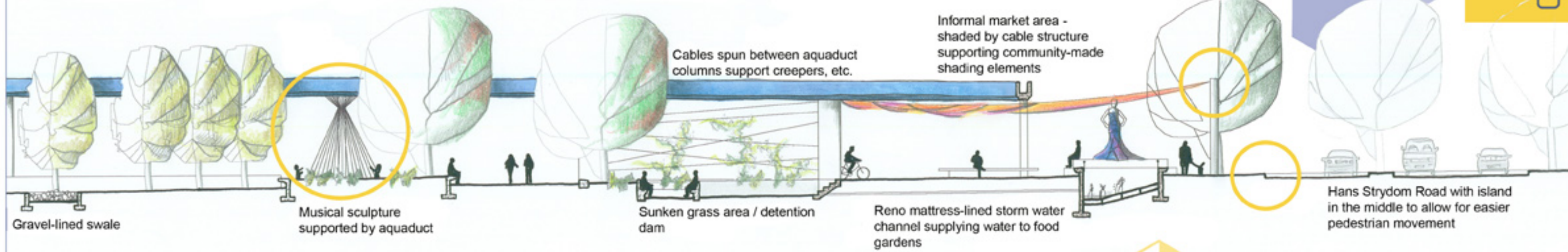


Figure 239: Connection of cable to column (Author, 2008)



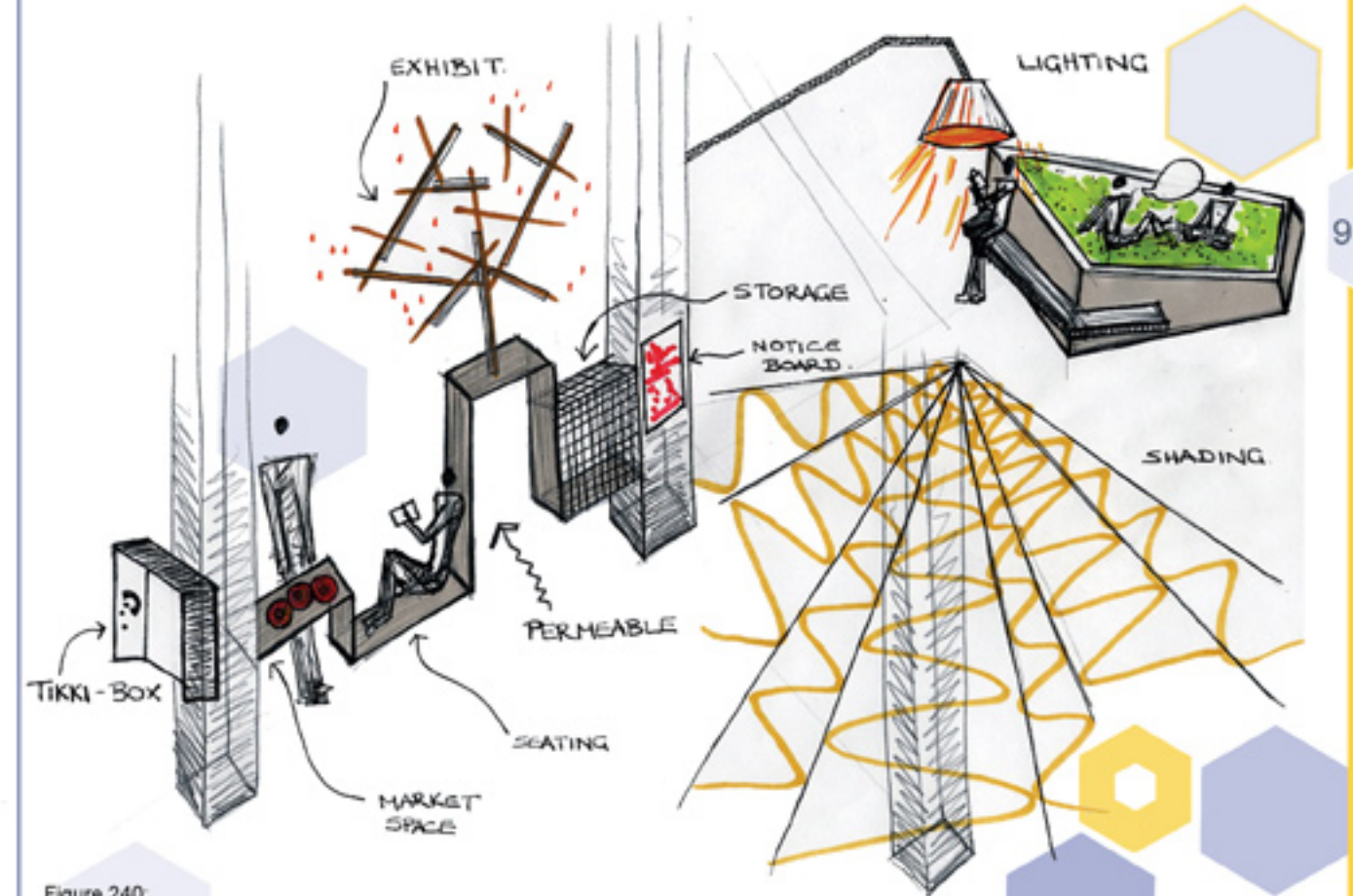


Figure 240:
Conceptual ideas - market spaces, relaxation places and exhibition areas (Author, 2008)

Shading structures comprise squares of woven material (recycled plastic bags, reused PVC vinyl, woven rope, a patchwork quilt of old clothes, and so on). Made by community members they provide local identity and encourage pride and ownership. A changeable community artwork that builds local spirit and teaches new skills.

Figure 241:
Shading structure (Unknown, [S.a.])



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Community-made shading structure creates a shady, robust space where an informal market could take place

Cables spun between columns supporting aqueduct. Fixed to stainless steel eyelets cast into the concrete columns. These cables support the vegetative creepers growing in the 500 high raised planter between the 2 columns

Two 450 high seating platforms made of cast in-situ concrete upon which stand a steel-frame female figure clad in a dress woven from recycled and reused materials. Made by community members as an exhibition of community art and skill creation

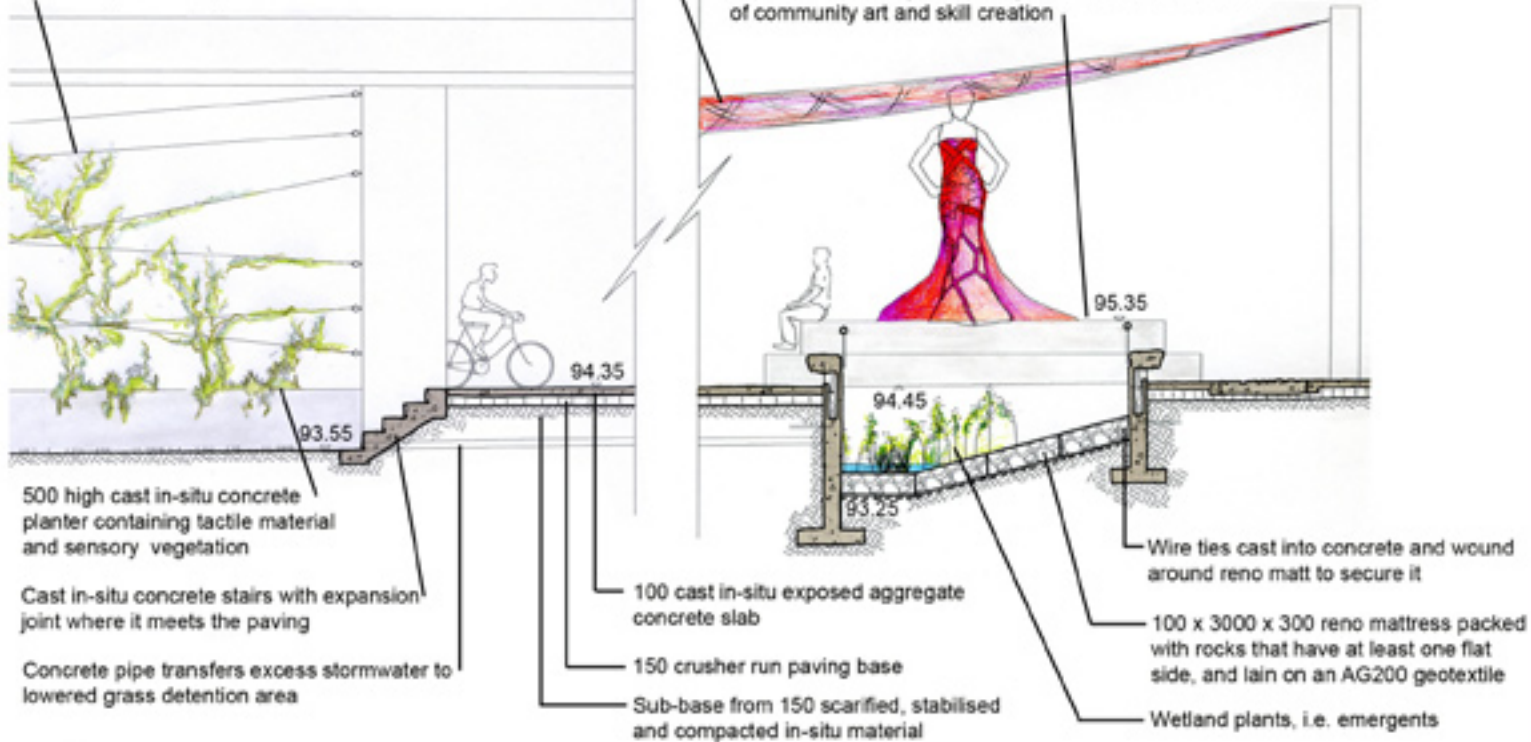


Figure 242:
Blown-up section through stormwater channel (Author, 2008)

Stimulate senses, interactive elements & community participation such as changing female outfits and mobile shadow play elements... Both encouraging a relationship with the space through community involvement.

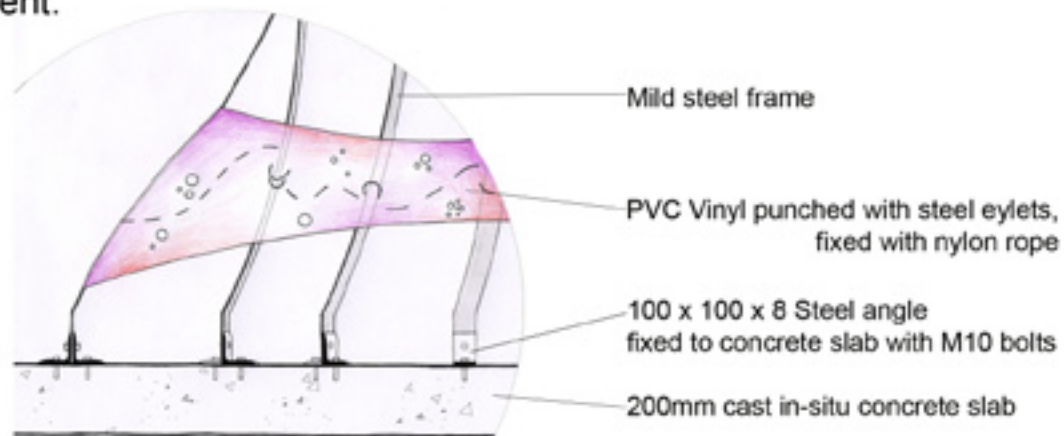
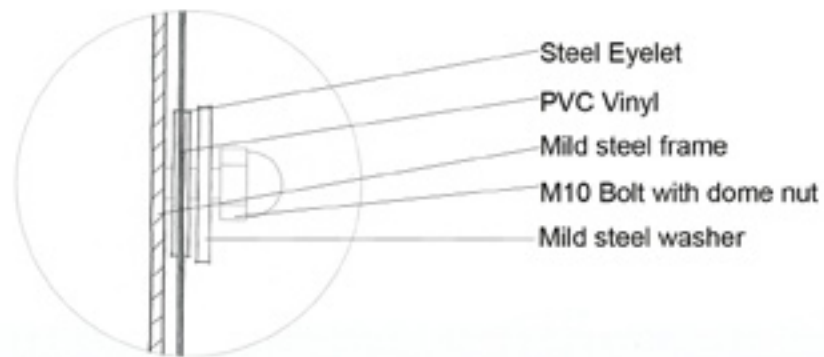


Figure 243 & 244: Sectional exploration into constructing and fixing the sculptures (Author, 2008)



PVC Vinyl (reused billboard material) is stitched onto the mild steel frame using nylon rope - forms part of the decorative element on the dress. The Vinyl has holes cut into it which are then protected by steel eyelets. This allows wind movement through the sculpture, as well as forming part of the aesthetics. The Vinyl dress is also bolted onto the steel frame at intervals.

Figure 235: Plastic bag dress (mygreenchicago.com, 2007)

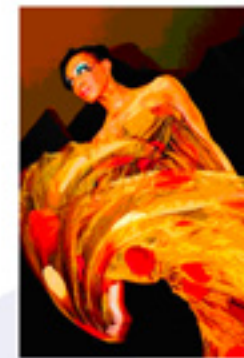


Figure 239 & 240: Nstee, Haute Magazine, FashionAfrica.com [S.a]



Figure 236: Exploration into construction and clothing of female sculpture (Author, 2008)



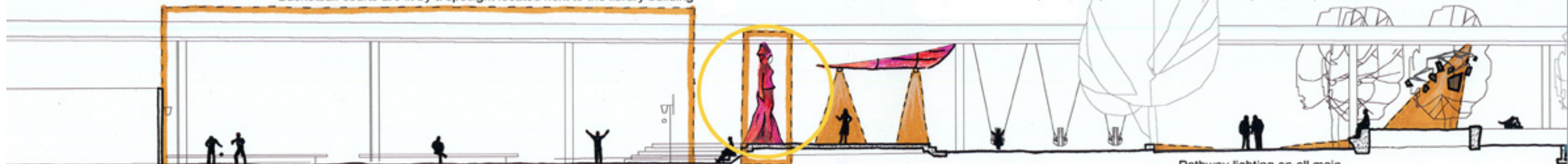
Figure 237: Metal figures - Cullinan (Author, 2007)



Figure 238: Steel frame figure - CSIR - Gianfanelli (Author, 2007)

Wind mobile provides changing shadows at night due to down lighter on underside of aquaduct

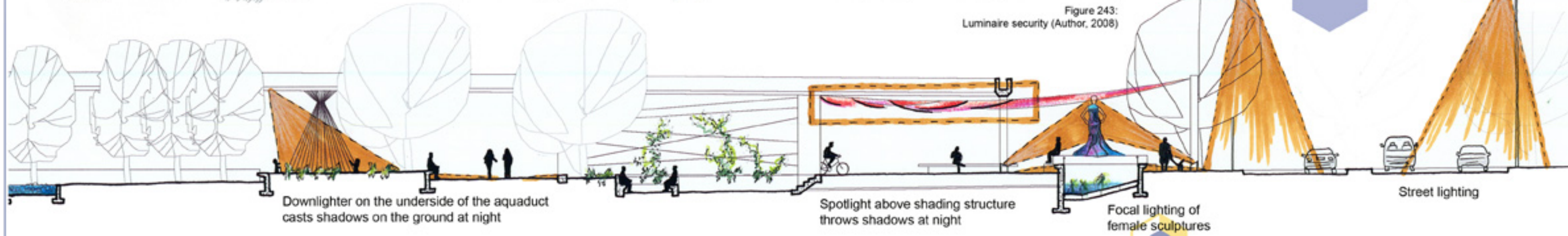
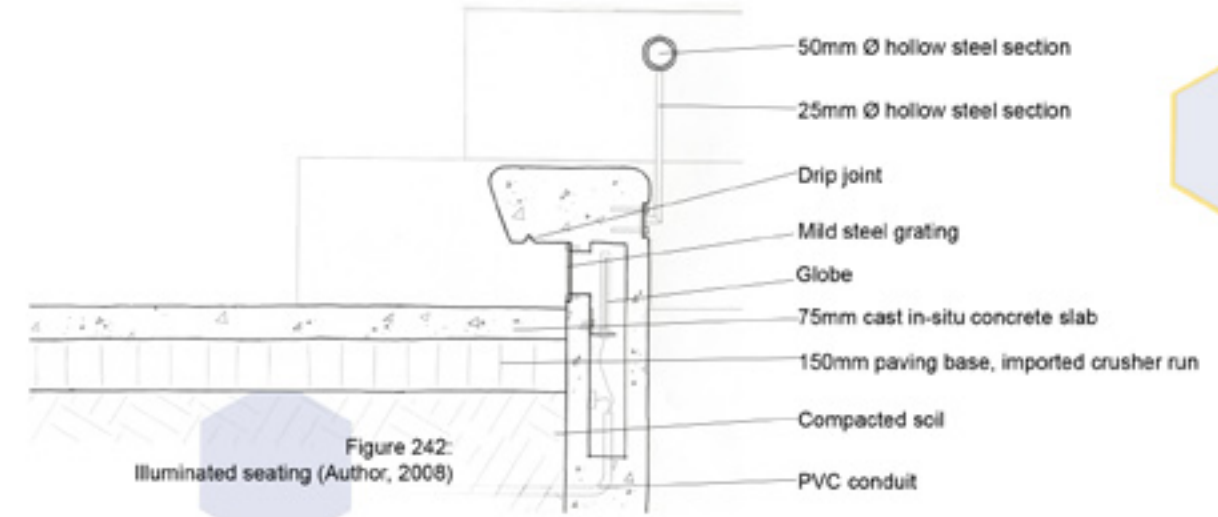
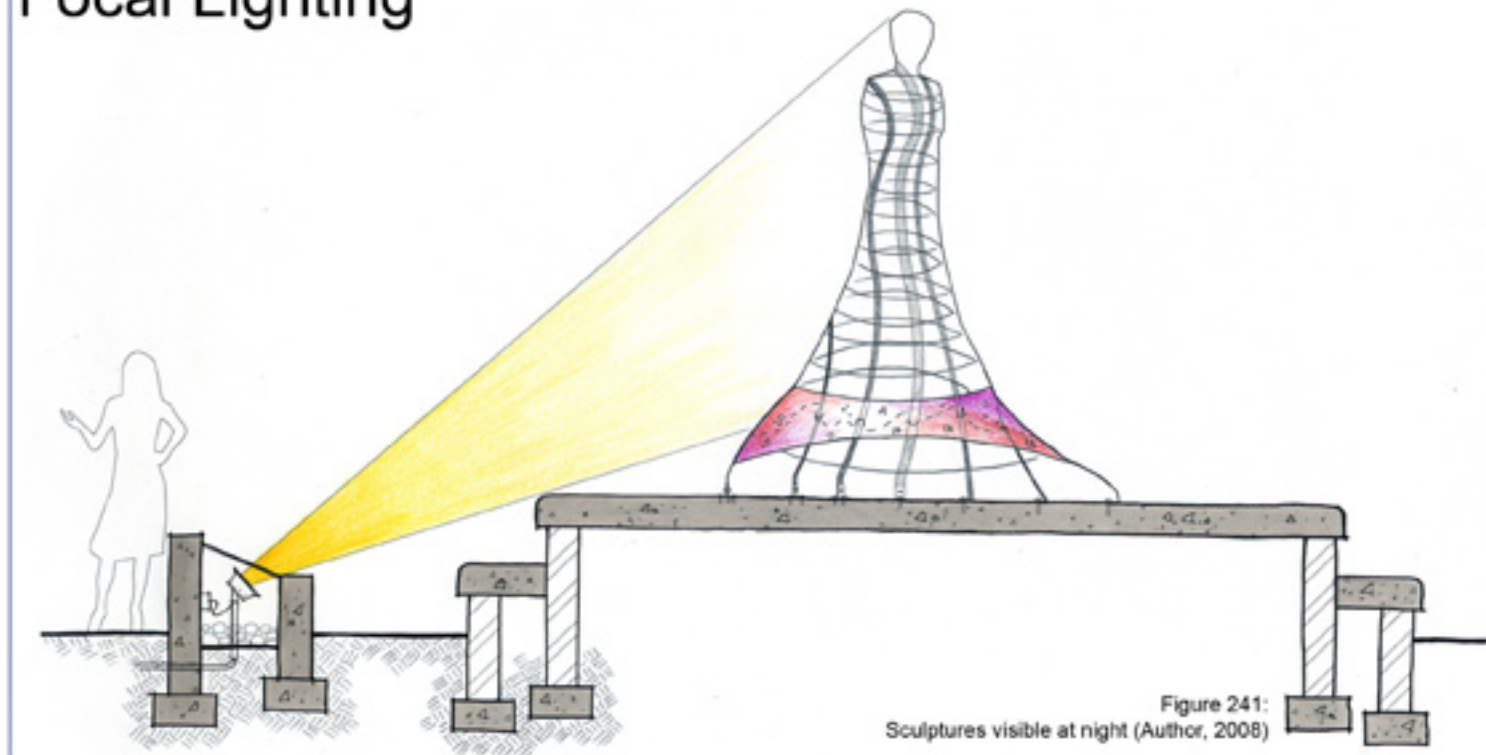
Basketball courts are lit by a spotlight located next to the library building

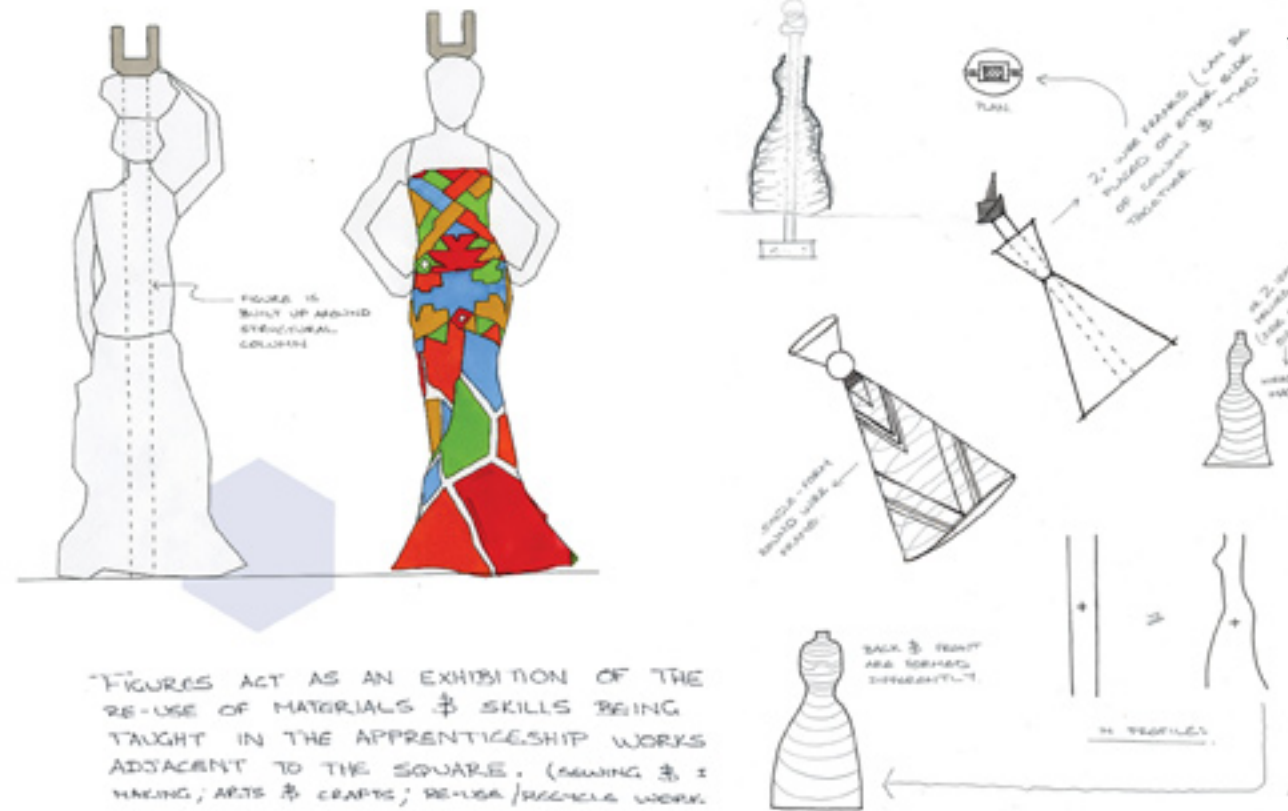


Lights can be attached to cable system to provide focal light for stage performances

Pathway lighting on all main circulation routes

Focal Lighting





FIGURES ACT AS AN EXHIBITION OF THE RE-USE OF MATERIALS & SKILLS BEING TAUGHT IN THE APPRENTICESHIP WORKS ADJACENT TO THE SQUARE. (SEWING & MAKING; ARTS & CRAFTS; RE-USE/RECYCLE WORK)

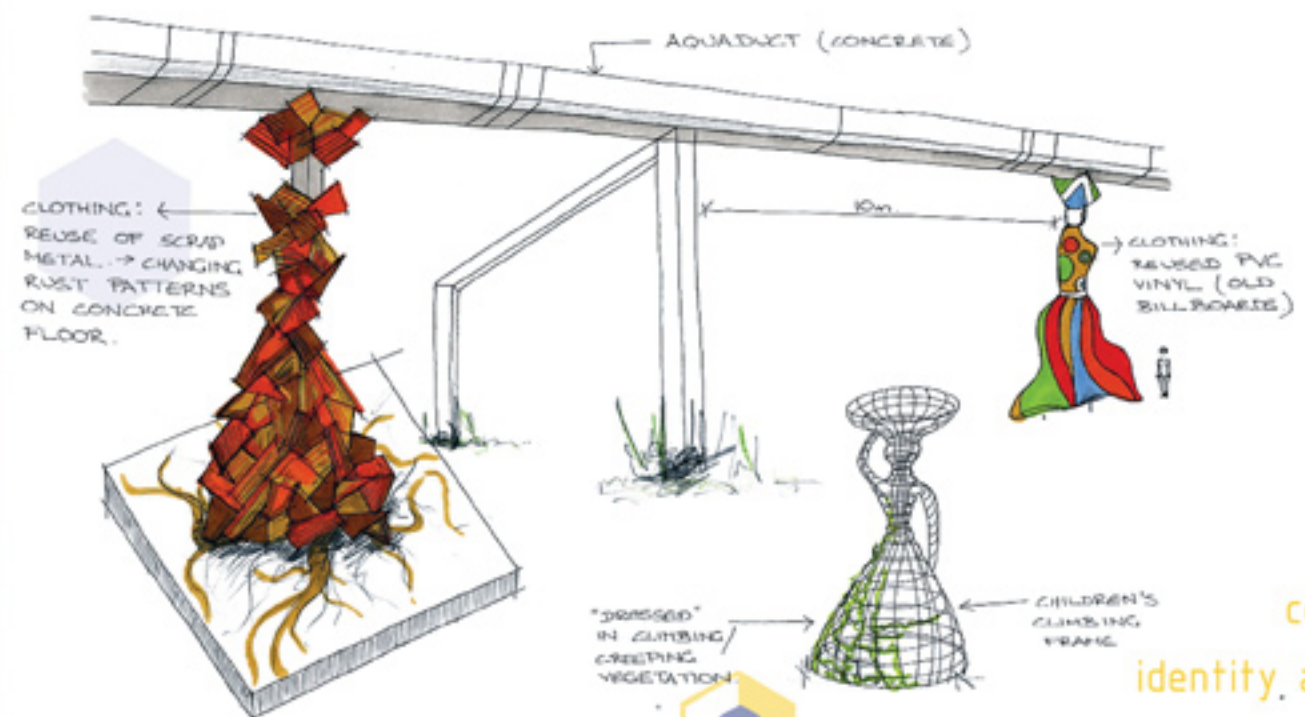


Figure 244: Conceptual exploration of female sculptures - materials, construction, etc. (Author, 2008)

exhibition
community art
identity, and character

female sculptures
aqueduct
fig trees

landmark creation
identity creation
space as place

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The spaces created by the three *Ficus sycamorus* trees, specifically chosen for their plank root systems, can be used for relaxation and reflection as well as a playground. Concrete blocks are placed in the detention dam, and are displaced by the tree roots as they grow and move. This is symbolic of the delicate balance between nature and man-made elements. The constantly shifting patterns are not rigid and ordered, but change as nature wills them to.



Figure 245:
Children can play, climb and hide in their 'garden of imagination'
(Author, 2008)



Figure 246:
A place of relaxation and reflection where one can commune
with nature (Author, 2008)

100

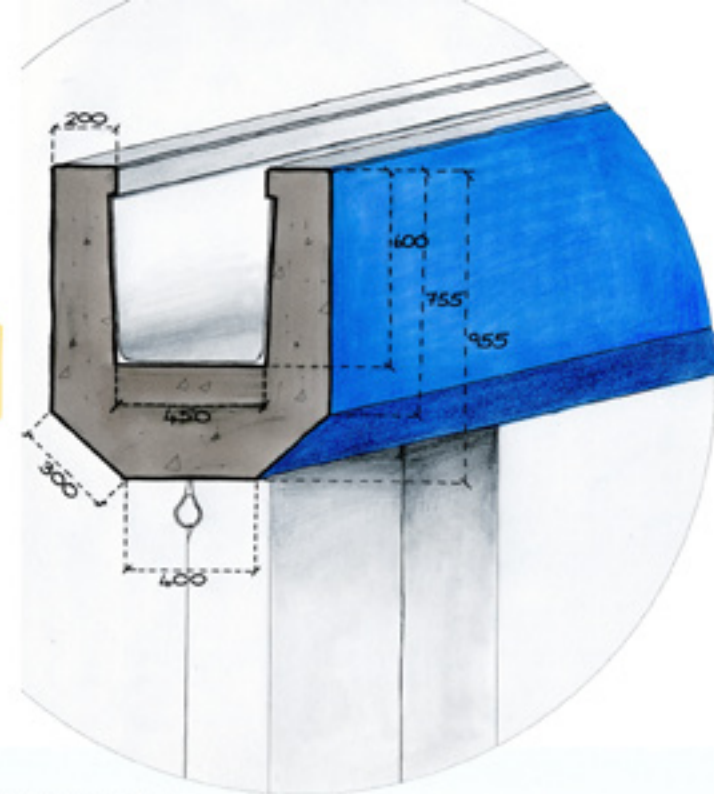


Figure 247:
Aquaduct particulars (Author, 2008)

35 MPa concrete with waterproofing admixture, finished in middle sky blue exterior paint. Interior painted with 3 coats of ABE Super Lakold

sit and reflect
commune with nature
play, climb, hide

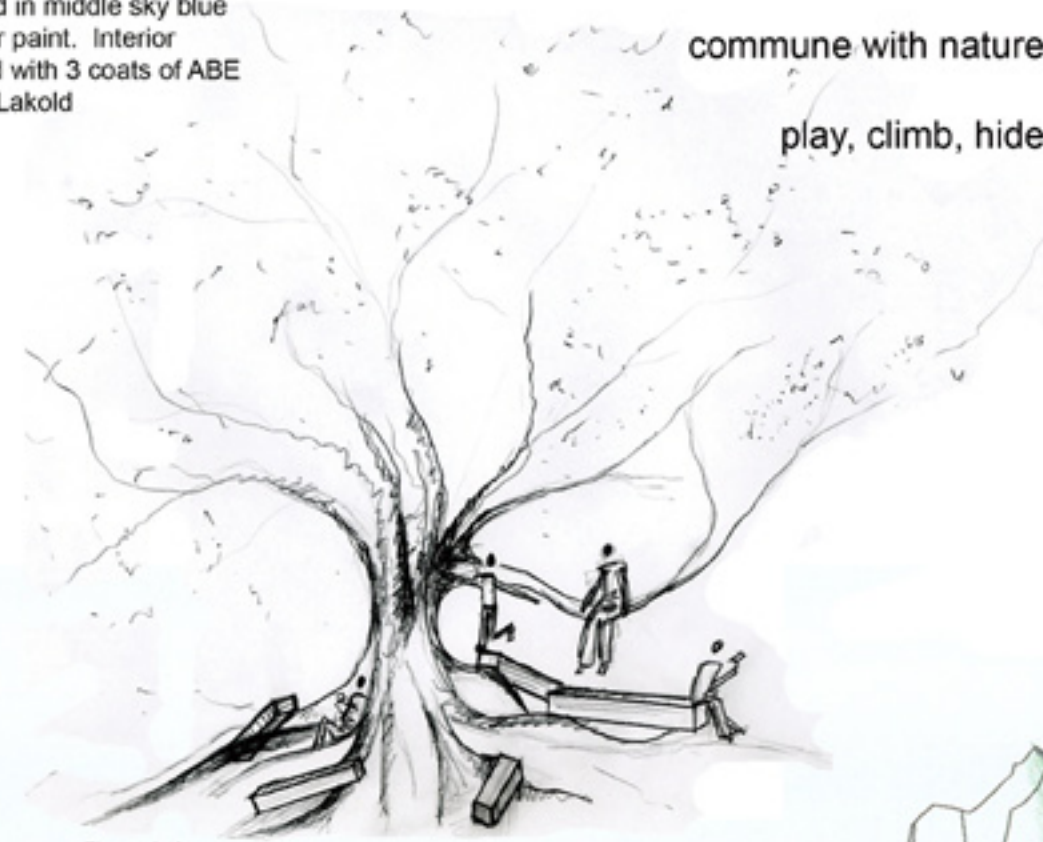
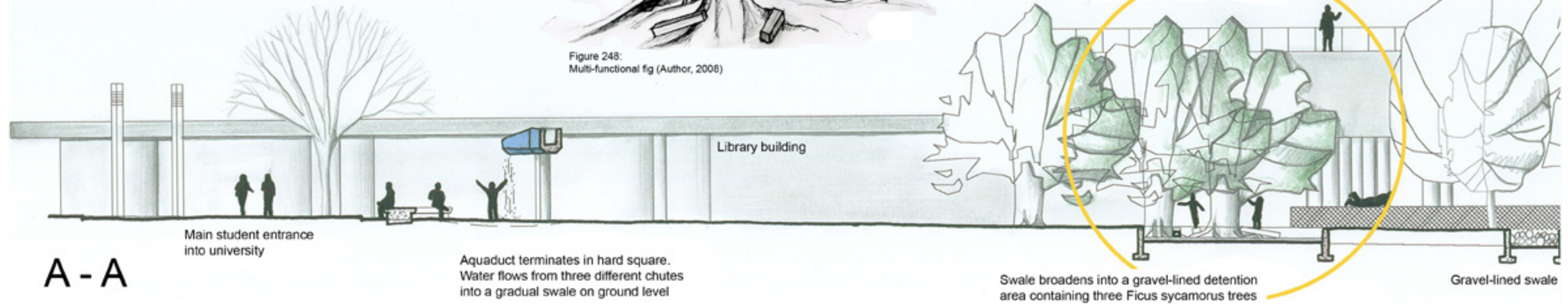


Figure 248:
Multi-functional fig (Author, 2008)



Figure 249:
Conceptual model of space around ficus trees (Author, 2008)



A - A

Main student entrance into university

Aquaduct terminates in hard square. Water flows from three different chutes into a gradual swale on ground level

Library building

Swale broadens into a gravel-lined detention area containing three Ficus sycamorus trees

Gravel-lined swale

View over square from uncovered second floor of library - extends all the way into the university

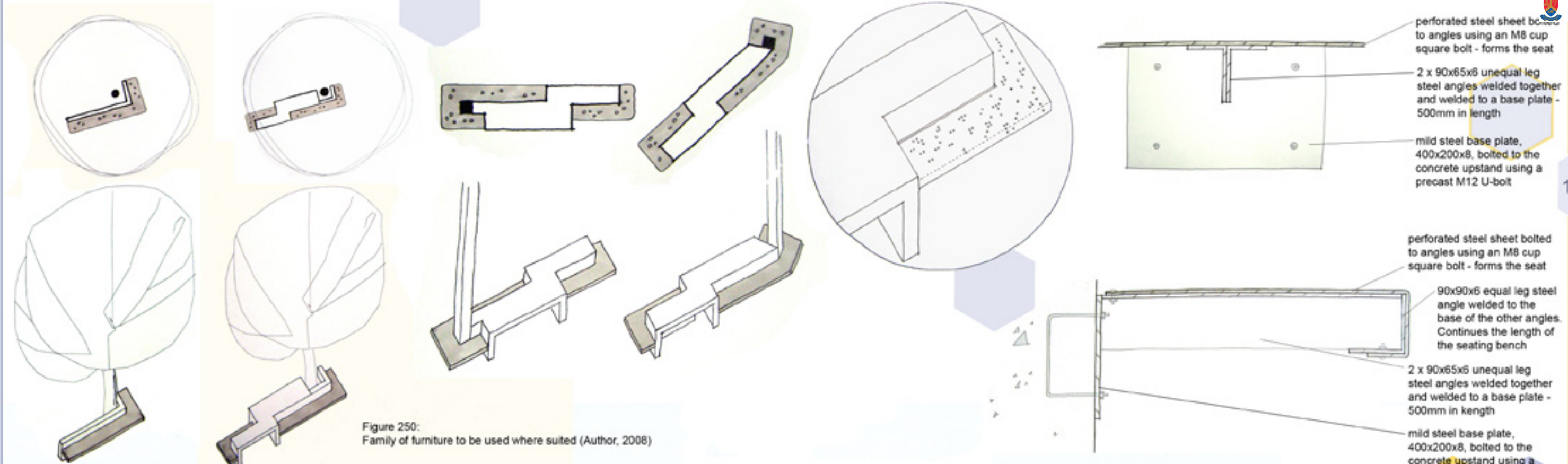
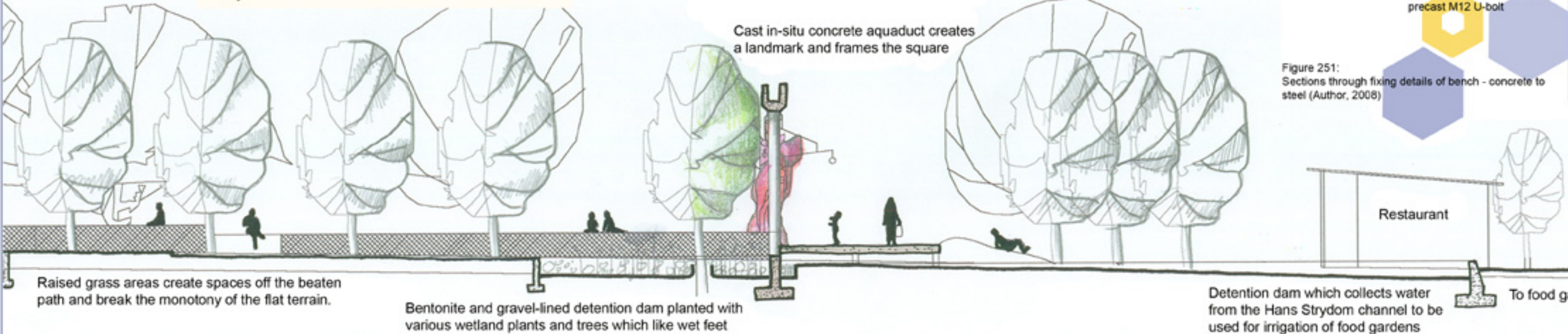


Figure 250: Family of furniture to be used where suited (Author, 2008)

Figure 251: Sections through fixing details of bench - concrete to steel (Author, 2008)



Part 4: Conclusion

'Learn 2 live; live 2 learn' is an empowering landscape at the heart of Pretoria University's educational division in Mamelodi. This landscape attempts to integrate the surrounding community with the campus through the shifting and rethinking of fences, and the creation of a community park as the interface between the two. This open green space provides areas in which members of the community can gather, play and reflect. It is also equipped to handle the hosting of workshops and short courses.

'Learn 2 live; live 2 learn' embeds itself well within the vibrant atmosphere of the township through the incorporation of robust, multi-functional spaces that are accessible to all. It also makes use of sensory and ephemeral elements to create places of interest; places people will identify with, remember and come back to. Landmark elements, like the aquaduct and the female sculptures are employed not only as focal elements, but also as community art works and exhibitions of skill. These 'announcements' in the landscape speak of the culture and identity of the surrounding people and become a testament to their pride, hope, diversity and sense of self - true maieutic symbols.

The strong sense of place created, and the resultant empowerment will, in time, bring about the rejuvenation of the campus in such a way that it can be of benefit to all. No longer an island, the University will function as a stitch - bringing together people, connecting minds and interlinking thoughts. The University thus becomes an example of a new type of education - one that starts in the landscape.





chapter 7

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chapter 8

COMMUNITY
IS

THE SPECIFIC SYSTEM OF ACTION WHICH ARISES

(Theory of systems)

WHEN A HUMAN POPULATION.

(Demography)

SETTLED IN A GIVEN TERRITORY, ESTABLISHES

(Geography)

STRUCTURAL ARRANGEMENTS FOR ADAPTIVENESS TO IT IN ORDER TO LIVE AND SURVIVE
AS A GROUP,

(Economics)

DEVELOPING INTERACTIVE RELATIONSHIPS AMONGST ITS COMPONENTS, WHICH NOT ONLY
DEFINE AN ORDER KEPT OFF EQUILIBRIUM BY SOME KIND OF STRESS BUT ALSO

(Sociology)

ORIGINATE SHARED WAYS OF THINKING, FEELING AND ACTING WHICH ARE

(Cultural anthropology)

INTERNALIZED BY ALL THE POPULATION AND WITH WHICH EACH INDIVIDUAL IDENTIFIES
HIMSELF IN A PARTICULAR DEGREE ACCORDING TO HIS PERSONAL LIVING EXPERIENCE AND
INHERITED CHARACTERISTICS.

(Psychology)

Appendix 2: Hierarchy of needs

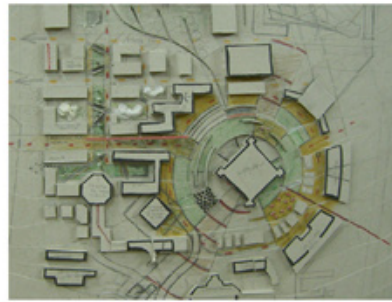

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Need Category	Description	Attributes of the urban environment associated with the satisfaction of needs (examples)
1. Physiological	Provision of food, shelter and health care.	Retailing/wholesaling systems distributing food, clothing and health supplies. Health care clinics and hospitals. Essential services (water, sewerage, power). Dwellings.
2. Safety – security	Protection from physical harm and intruders. Privacy and absence of overcrowding. Protection of property.	Fire and police protection services. Road safety. Absence of noxious environmental elements (pollutants). Residential areas that ensure privacy.
3. Affection – belonging	Harmonious relationships with other members of the community. Identification with and acceptance of groups within the community.	Facilities for community organisations (meeting places). Physical layout of neighbourhood such that cooperative and harmonious inter-family relationships are fostered. Physical identity of the neighbourhood.
4. Esteem	Status and recognition by others in the community.	Opportunities for home ownership. Prestige of neighbourhood.
5. Self actualization	Role relationship <i>vis a vis</i> others. Realization of one's potential. Creativity / self expression.	Built environment that facilitates creativity and self expression. Employment opportunities and community organisations that enable the use and development of skills.
6. Cognitive / Aesthetic	Provision of educational experience, intellectual stimulation and experiences. Aesthetically appealing events and phenomena.	Educational and cultural facilities. Recreational facilities. Aesthetically appealing built and natural environment.

Appendix 3: Models not used in the main text



Existing condition of site



Emphasise the circle



Question the question mark



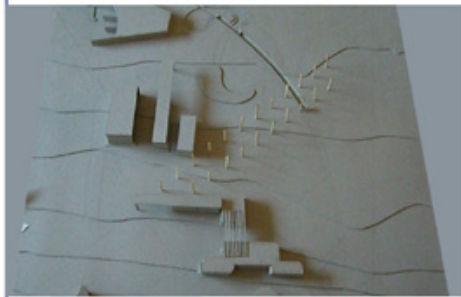
Lift the landscape, drop the library



Urban rooms and major circulation routes



Go vertical - intervene on building facades



Major axis linking entire site



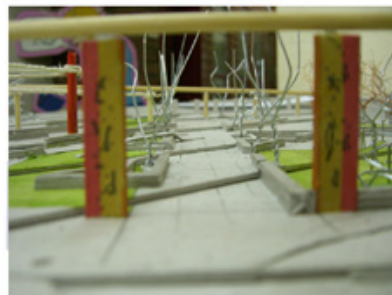
Entrances and major circulation routes



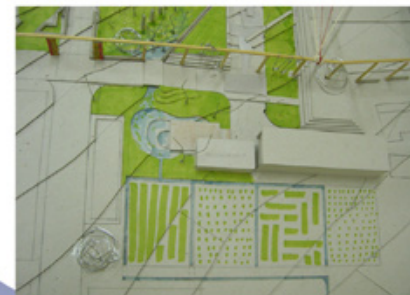
Aquaduct pulling through the centre



Linking the library



Enter under the aquaduct



Irrigation of food gardens

Appendix 4: Storm water calculations

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Hans Strydom Channel:													
Month:	Max Precip:	Min Precip:	Ave (mm):	Ave (m):	Water collection area (sqm):	Vol of water (cube m):	Area of channel (sqm):	Evap (mm/week):	Evap (m/mnth):	Evap Vol (cube m/mnth)	Vol of water - evap (cube m):	Area to irrigate (sqm):	Irrigation (mm/week):
Jan	492	17	254.5	0.2545	20000	5090	1680	35	0.14	235.2	4854.8	1386	80
Feb	199	8	103.5	0.1035	20000	2070	1680	35	0.14	235.2	1834.8	1386	80
Mar	186	17	101.5	0.1015	20000	2030	1680	35	0.14	235.2	1794.8	1386	80
Apr	166	3	84.5	0.0845	20000	1690	1680	35	0.14	235.2	1454.8	1386	80
May	63	0	31.5	0.0315	20000	630	1680	35	0.14	235.2	394.8	1386	80
Jun	84	0	42	0.042	20000	840	1680	35	0.14	235.2	604.8	1386	80
Jul	26	0	13	0.013	20000	260	1680	35	0.14	235.2	24.8	1386	80
Aug	29	0	14.5	0.0145	20000	290	1680	35	0.14	235.2	54.8	1386	80
Sep	83	0	41.5	0.0415	20000	830	1680	35	0.14	235.2	594.8	1386	80
Oct	175	12	93.5	0.0935	20000	1870	1680	35	0.14	235.2	1634.8	1386	80
Nov	253	31	142	0.142	20000	2840	1680	35	0.14	235.2	2604.8	1386	80
Dec	219	46	132.5	0.1325	20000	2650	1680	35	0.14	235.2	2414.8	1386	80
Total	1975	134	1054.5	1.0545	20000	21090	1680	35	0.14	2822.4	18267.6	1386	80

Ramabulane													
Month:	Max Precip:	Min Precip:	Ave (mm):	Ave (m):	Water collection area (sqm):	Vol of water (cube m):	Area of dams (sqm):	Evap (mm/week):	Evap (m/mnth):	Evap Vol (cube m/mnth):	Vol of water - evap (cube m):	Vol of water + E's excess (cube m):	Area to irrigate (sqm):
Jan	492	17	254.5	0.2545	220000	55990	9773	35	0.14	1368.22	54621.78	57506.06	2500
Feb	199	8	103.5	0.1035	220000	22770	9773	35	0.14	1368.22	21401.78	22172.06	2500
Mar	186	17	101.5	0.1015	220000	22330	9773	35	0.14	1368.22	20961.78	21704.06	2500
Apr	166	3	84.5	0.0845	220000	16590	9773	35	0.14	1368.22	17221.78	17726.06	2500
May	63	0	31.5	0.0315	220000	6930	9773	35	0.14	1368.22	5561.78	5561.78	2500
Jun	84	0	42	0.042	220000	9240	9773	35	0.14	1368.22	7871.78	7871.78	2500
Jul	26	0	13	0.013	220000	2860	9773	35	0.14	1368.22	1491.78	1491.78	2500
Aug	29	0	14.5	0.0145	220000	3190	9773	35	0.14	1368.22	1821.78	1821.78	2500
Sep	83	0	41.5	0.0415	220000	9130	9773	35	0.14	1368.22	7761.78	7761.78	2500
Oct	175	12	93.5	0.0935	220000	20570	9773	35	0.14	1368.22	19201.78	19832.06	2500
Nov	253	31	142	0.142	220000	31240	9773	35	0.14	1368.22	28971.78	31181.06	2500
Dec	219	46	132.5	0.1325	220000	29150	9773	35	0.14	1368.22	27781.78	28958.06	2500
Total	1975	134	1054.5	1.0545	220000	231990	9773	35	0.14	16418.64	215571.36	223588.32	2500

Grey water Calculations:													
Area of Housing (sqm)	Area of E's housing (sqm)	3 stories (sqm)	Family of 4 (sqm)	No. of families	No. of people	80l grey water/person/day	Vol grey water/day (cube m):	vol grey water/mnth (cube m):	Evap (m/mnth):	Area amelioration dam (sqm)	Evap vol (cube m/mnth):	Vol grey water/mnth - evap (cube m):	Vol grey water/year (cube m):
1440	3265	14115	60	235.3	941.0	75280.0	75.3	2258.4	0.14	752.8	105.392	2153.0	25836.096

Library Square:

Playpump pumps 1400l / hr (cube m/mnth):	Evap (m/mnth):	Area of channel + dam (sqm)	Vol of evaporation (cube m/mnth)	Vol of water - evap (cube m/mnth)	Area of library roof (sqm):	Month:	Max Precip:	Min Precip:	Ave (mm):	Ave (m):	Vol of water from roof (cube m / mnth)	Total vol of water (cube m / mnth)
168	0.14	190	26.6	141.4	4061	Jan	492	17	254.5	0.2545	1033.5245	1174.9245
168	0.14	190	26.6	141.4	4061	Feb	199	8	103.5	0.1035	420.3135	561.7135
168	0.14	190	26.6	141.4	4061	Mar	186	17	101.5	0.1015	412.1915	553.5915
168	0.14	190	26.6	141.4	4061	Apr	166	3	84.5	0.0845	343.1545	484.5545
168	0.14	190	26.6	141.4	4061	May	63	0	31.5	0.0315	127.9215	269.3215
168	0.14	190	26.6	141.4	4061	Jun	84	0	42	0.042	170.562	311.962
168	0.14	190	26.6	141.4	4061	Jul	26	0	13	0.013	52.793	194.193
168	0.14	190	26.6	141.4	4061	Aug	29	0	14.5	0.0145	58.8845	200.2845
168	0.14	190	26.6	141.4	4061	Sep	83	0	41.5	0.0415	168.5315	309.9315
168	0.14	190	26.6	141.4	4061	Oct	175	12	93.5	0.0935	379.7035	521.1035
168	0.14	190	26.6	141.4	4061	Nov	253	31	142	0.142	576.662	718.062
168	0.14	190	26.6	141.4	4061	Dec	219	46	132.5	0.1325	538.0825	679.4825
2016	0.14	190	319.2	1696.8	4061	Total	1975	134	1054.5	1.0545	4282.3245	5979.1245

Irrigation (m/month):	Irrigation_vol (cube m/mnth):	Vol of water - irrigation (cube m):	C:	Vol of water - C (cube m):
0.32	443.52	4411.28	1527	2884.28
0.32	443.52	1391.28	621	770.28
0.32	443.52	1351.28	609	742.28
0.32	443.52	1011.28	507	504.28
0.32	443.52	48.72	189	-237.72
0.32	443.52	161.28	252	90.72
0.32	443.52	-418.72	78	-496.72
0.32	443.52	-388.72	87	-475.72
0.32	443.52	151.28	249	97.72
0.32	443.52	1191.28	561	630.28
0.32	443.52	2161.28	852	1309.28
0.32	443.52	1971.28	795	1176.28
0.32	5322.24	12945.36	6327	6618.36

Channel:

Irrigation (mm/week):	Irrigation (m/month):	Irrigation vol (cube m / mnth):	Vol of water - irrigation (cube m):	Playpump pumps 1400l / hr (cube m/mnth):	Vol of water - playpump (cube m):	Vol of water + grey water (cube m):	C:	Vol of water - C (cube m):	Main dam vol (cube m):	Vol of water R (cube m/mnth)
80	0.32	800	56706.06	168	56538.06	58691.07	16797	41894.07	2000	39894.068
80	0.32	800	21372.06	168	21204.06	23357.07	6831	16526.07	2000	14526.068
80	0.32	800	20904.06	168	20736.06	22889.07	6699	16190.07	2000	14190.068
80	0.32	800	16926.06	168	16758.06	18911.07	5577	13334.07	2000	11334.068
80	0.32	800	4761.78	168	4593.78	6746.79	2079	4667.79	2000	2667.788
80	0.32	800	7071.78	168	6903.78	9056.79	2772	6284.79	2000	4284.788
80	0.32	800	691.78	168	523.78	2676.79	858	1818.79	2000	-181.212
80	0.32	800	1021.78	168	853.78	3006.79	957	2049.79	2000	49.788
80	0.32	800	6961.78	168	6793.78	8946.79	2739	6207.79	2000	4207.788
80	0.32	800	19032.06	168	18864.06	21017.07	6171	14846.07	2000	12846.068
80	0.32	800	30381.06	168	30213.06	32366.07	9372	22994.07	2000	20994.068
80	0.32	800	28158.06	168	27990.06	30143.07	8745	21398.07	2000	19398.068
80	0.32	9600	213988.32	2016	211972.32	237808.416	69597	168211.416	2000	144211.416