ILLUSTRATED KINETICS

A study in active architecture applied to a sports complex within Marabastad

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ILLUSTRATED SPORTS
Designing for an active tomorrow
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In a constantly growing world where technology has exceeded its expectations tenfold, the active mind of South Africa’s youth lies dormant behind screens of intelligence. The Medical Research Council recently found 45% of South Africa’s population to be overweight or even obese. Perhaps the most alarming, is the fact that 20% of children under the age of 6 are overweight. (www.health24.com) No matter what the cause – be it school funding cuts, shortage of facilities, computers or the internet – kids today are not involved in enough physical activity to achieve and maintain a healthy lifestyle.

Initiatives of Government and the Private Sector strive to provide classroom environments that are active and produce children who will maintain healthy habits of exercise and nutrition throughout their lives. SPARK (Sports, Play & Active Recreation for Kids) is an elementary school physical education research programme whose purpose is to reduce heart disease risk in youth and promote healthy lifestyles for the future. (www.foundation.sdsu.edu) Nike Go Places takes old worn-out athletic shoes and other footwear materials, grinds them up and turns them into sports and play surfaces. Locally, Super Sport’s Let’s Play initiative has recently started collecting used sports gear and equipment to be distributed to those who can’t afford their own.

Sport education not only enhances physical health, but also improves the development of motor skills, leadership qualities and even teamwork which lends for better socially equipped youngsters. (www.sparkpe.org) The inclusion of teachers and parents in these type of activities, ensures for community involvement and greater awareness. These initiatives become a school-based solution to our nation’s health care crisis.

South Africa has the privilege of hosting the 2010 Soccer World Cup which provides the perfect opportunity to create sport awareness. Soccer can become the driver for getting kids active and out of doors. Some abandoned tennis courts have already been turned into soccer pitches. The willingness is there; it is time to provide the means. This dissertation hopes a Sport Centre for Marabastad will create a healthy community.
01 Gauteng Province, Republic of South Africa,  
Geological Survey: 1970

02 Pretoria Central Business District,  
Geological Survey: 1970
Marabastad Strategic Development Study Area

The smaller grid of Marabastad as an echo of the larger scale grid typical of the Pretoria Central Business District (Hereafter referred to as CBD)

Proposed Site within the Marabastad Study Area

Pretoria Extension 14
Consisting of two erven numbered 3525 and 3526
Situated on Portion 500 (A portion of portion 6) of the farm Pretoria Town and Townlands No. 351-JR

2.1 Project Location
At one stage Marabastad was the setting for vibrant community life. The 1940 forced eviction of the entire residential population and large part of traders from the area have resulted in the annihilation of most of the community structures. Only a small portion of traders remained. The freeze imposed on Marabastad over the past four decades has left the area degraded and shunned by most of Greater Pretoria. The traders survive on people passing through Marabastad, today a major public node, to outlying regions. (Aziz Tayob Architects: 2002: 65)

The community of Marabastad is woven together with an invisible thread of diversity. There is a constant mobility existing amongst the sidewalk retail and scattered stalls across Marabastad. It is this variable nature of Marabastad that promotes architecture of multi-functionality and adaptability.

The aim of this dissertation is to provide Marabastad with a multi-sport centre with alternating levels of use and activity. Not just the top athlete, but all interested persons will benefit as exposure to many different games and sport will enhance their knowledge, skills and lifestyle. Through kinetic architecture the structure adapts to Marabastad’s shifting nature. The centre serves schools within the Pretoria CBD, sport clubs and members of the public, constantly reshaping to cater for different needs. The centre is equipped with the necessary facilities to host practise sessions for teams taking part in the 2010 Soccer World Cup with ample space for fans and sport enthusiasts. This feeds off the established transport infrastructure that defines Marabastad.

Inhabiting lost space within the urban fabric creates a site or destination for Marabastad dwellers to either partake in or watch the ongoing events, drawing the vibrant diversity of Boom Street towards the existing under utilised zone in the south, reinforcing the crumbling community structure. The building itself becomes a display case for sport, simultaneously creating awareness and intrigue. It can be described as a Centre for Illustrated Sports. The aim of this study is to create a complex where Marabastad inhabitants can actively express their vibrant nature through physical activity.
The study area, known as "Marabastad", lies in the metropolitan area of Tshwane, a metropolitan municipality established in 2001. Within Tshwane, Marabastad forms part of the Inner City of Pretoria, and specifically forms the north-western corner of the Inner City.

The Integrated Spatial Development Framework for the Pretoria Inner City (1999) describes Marabastad as a specific functional area*, which is in turn subdivided into northern and southern sub-functional areas. It describes Marabastad as "an area of great uncertainty regarding planning and future land use within the inner city." (Aziz Tayob Architects:2002:65)

*The identification is difficult to define because of the turbulent history of the area coupled with the current occupants.
The urban fabric of Marabastad reflects extreme contrasts; from the intimate scale of the original fine grained environment, over large scale tracts of wasteland to harsh structures of oversized mass. (Aziz Tayob Architects:2002:87)

The proposed site previously hosted municipal compounds and a bowling club. Both have been demolished. It hasn’t carried any built form for 40 years except for a now vacant car repair workshop on Erf 3526. Erf 3525 is currently being used for the dumping of building material. It is a underutilized zone creating a physical barrier to the west, along with the two high traffic DF Malan Drives prohibiting pedestrian flow. To the south the Heroes’ Acre Cemetery also cuts the area off of any connection with the important Church Street. The rest of the area is cordoned off by the strong railway line of the Belle Ombre station to the north and the Steenhoven Spruit that has been formalised in a concrete storm water canal to the east.

These barriers need to become permeable in order to restore Marabastad to a positive living and gathering area and re-discover it in the greater CBD context.
Existing sports grounds identified in the CBD area and the sport they accommodate:

1. Oudstudente Unie Sports Grounds - cricket, rugby, swimming, golf, hockey & tennis
2. Technical College Sports Grounds - rugby, swimming, tennis & golf
3. Caledonian Sports Grounds - soccer
4. Berea Park - golf, soccer, rugby, swimming, tennis, cricket & hockey
5. Iscor Club - tennis, hockey, rugby, golf & squash
6. Pilditch Stadium - athletics

(Mapstudio:2006)

Most of these facilities belong to specific clubs or institutions and are not open to members of the public. The Caledonian Sports Grounds functions as a soccer field for tournaments on weekends, but doesn't see much action during the week. Major athletic tournaments are held at the recently upgraded Pilditch Stadium. The show grounds situated between Pilditch Stadium and Iscor Club is to become a World Class Conference and Expo Centre, which will result in Iscor Club being turned into an elitist club of excellence.* (Aziz Tayob Architects:2002:86)

* Information obtained from discussions with representatives from the local authorities

* Circle lines indicate 500m intervals (6 minute walking distances) from the proposed site
A study on existing schools within a 10 block radius of Marabastad indicate:
1. 2 preschools: Nawab Daycare Centre, Kidicol
2. 6 public and 3 private primary schools
3. 2 public and 6 private secondary schools
4. 5 colleges: Pretoria Technicon College, New Dawn College, Tshwane North College, Meridian College, Princess Park College
5. 2 Pretoria Technicon campuses
6. Lorento Convent
7. Vista University
8. DAMSA
9. School for Cerebral Palsied
10. Pretoria Hospital School

Close by, the Eendracht Primary and Langenhoven Secondary Schools (North-West of the inner city) serve the Kruger Park and Schubart Park flats. The Protea College for Adult Education on the corner of Proes and DF Malan East is privately run and offers private courses in business and administrative fields. The Talking Beads Academy is a centre for crafts training the unemployed and has a shop where crafted products are sold.

* Circle lines indicate 300m intervals (4 minute walking distances) from the proposed site

2.3.2 Site Accessibility

2.3 Macro Scale
Early 1800's
Ndebele leader Mzilikazi attacks and drives local tribes from the highveld

1855
Pretoria is founded and named after the Voortrekker leader Andries Pretorius. The area around the Steenhoven spruit became known as Goedehoop and later Veilskoonhoop

1870
Chief Maraba sets up his kraal on the western bank of the Steenhoven spruit. Black people, employed as servants, find accommodation there. Over time a large settlement develops; now known as Marabastad

1840
White Voortrekkers move into the area previously occupied by indigenous people

1867
Area along the east bank of the Steenhoven spruit set aside for black people. The area is named Schoolplaats

1877
The First Boer War breaks out after the British have annexed the Transvaal

1880
Gold is discovered on the Witwatersrand

1881
First Boer War ends with the Pretoria Convention in 1881. The convention gives Indian and Coloured people the right to own land in the Transvaal, leading to many Indian traders to migrate from Natal

1885
Laws passed that restricted property ownership and citizenship of Indians. Bazaars were set up where they could trade

1852
Population growth among Black and White people poses a potential threat to peace. White settlers proclaim certain areas as Blacks' and pass laws limiting the free movement of black people

Marabastad Group Framework, TUKS 2007
2.4.1 Historical Timeline of Marabastad

1903
Asiatic Bazaar established as a township on a fine grid. It later develops into a lively mixed-use area.

1905
Marabastad and Schoolplaats get consolidated into one township set aside for black people.

1912
The Pretoria town council starts forced removal of residents of Marabastad to Bantu where Tshwane University of Technology is situated today.

1918
All homes in the old Marabastad demolished.

1920's
Channelisation of the Steenhoven Spruit.

1923
Natives Act is passed due to the increase of black people migrating into town, forcing black people to live only in areas demarcated as black locations.

1925
Area between Steenhoven spruit and D.F. Malan drive, barber street and sewer works form the boundaries of the new Marabastad, which developed into a vibrant community.

1934
Slums Act gives authorities power to demolish areas they deem to be slums. Marabastad is declared a slum.

1940
Authorities start removing the black population of Marabastad to Atteridgeville. Only a small Coloured section remains.

1944
The birth of the New South Africa, draws into the area numerous squatters, hawkers and small scale traders.

1950

1956
Community development acts freeze all development in Marabastad. Proposed Pretoria freeway scheme will destroy Marabastad and the Steenhoven spruit. If implemented.

1958
Remaining residents of Marabastad are displaced. The Belle Ombre station is built over the Steenhoven spruit.

1962

1975

1987
Conceptual Master Plan for the Asiatic Bazaar is drawn up, but never gets implemented.

1988
The New Constitution erases all discriminating laws and policies to create a free and fair new South Africa.

2.4 Messo Scale
The reasons for site selection come to light when it is recognised that the gaps left in the city by its political history. The specific site, Pretoria extension 14 of Erf 500, is a remainder of a piece of MW Pretorius’s old farm Daspoort on which Pretoria was established on 16 November 1855. (Aziz Tayob Architects:2002:29) It has been lying dormant since the 1950’s and only the remains of an old bowling club are visible on the corner of Cowie and Proes Streets.
Based on a Freeway proposal for Pretoria in 1967, the site was to become part of a major circulation system giving access to the city via an interchange over the Asiatic Bazaar. (Bruinette,K.E.,1967) This seems to be the reason for the irregular site subdivision of Pretoria Ext 14 into Erven 2325 & 2326. All the existing structures had already been demolished when the idea was dropped. After that no action followed and the plot was forgotten along with Marabastad.

2.4.2 A Visual History of Marabastad

2.4 Messo Scale
A green corridor in addition to a historical route is proposed in an attempt to integrate the once marginalised Marabastad into Pretoria. The heritage route proposed in the Aziz Tayob Architects framework will be expanded to become a tourist attraction and activity route. The route runs from Church Square west along Church Street and turns north through Heroes’ Acre cemetery. From here it travels further north past the proposed Centre for Illustrated Sports along Jerusalem Street, past the Miriammen Temple (1927) all the way up to the produce market where it turns east towards the station, and continues past the Islamic mosque and the Old Empire Cinema recently revamped.

Then the route travels down and east along Boom Street, passing hundreds of informal trading stands that add to the identity of the area. From here the route travels south along the landscaped Steenhoven Spruit. It meanders past educational and community centres, centres for recreation, a pub or two and even a story box for the kids. A network of public squares and green areas will create opportunities for market activities. It finally spills out onto Church Street where visitors can board the new tram for the final Pretoria experience.
Remaining buildings with significant heritage value in the area would be the Miriammen Temple, a former national monument (Grade 1). (Aziz Tayob Architects:2002:161) Furthermore, the Islamic Mosque, Pillay’s Restaurant and along Church Street West, the Kruger House Museum, Reformed Church and Heroes’ Acre cemetery can be found. Also worth a visit is the Orient and Empire Cinemas.

A proposed green corridor along the Steenhoven Spruit will improve the ecological functioning of the stream and also serve as infrastructure to public activities and circulation. This green belt will extend from the remainder of Princess Park in the south (creating a link with Church Street) to the electrical substation in the north, enabling the integration of Marabastad into the greater urban fabric.
The Belle Ombre railway station serves commuters between the CBD and the settled townships on the outskirts of Pretoria. Inside Marabastad no formal taxi ranks are provided and taxi traffic operates on ad hoc arrangements. Given the existing concentration of public transport facilities in Marabastad and the volumes of commuter traffic, much pedestrian traffic is generated between the terminals for the various transport nodes, especially between Marabastad and the workplaces in the CBD. The aerial photographs indicate clear footpaths, especially along the Steenhoven Spruit, which reveals major pedestrian circulation occurring from the Belle Ombre station along the watercourse to the main streets feeding into the city.

2.4.4 Infrastructure
A public survey was done as part of the Urban Framework for Marabastad. Sixty-nine inhabitants of the area had to fill out a questionnaire to see what their interest in and experience of the area was. Considering the time that people have spent in Marabastad, the distance they travel to get there (more than 43% of people travel longer than 45 minutes) and the interest that there is to stay or own land in the area, the conclusion can be made that there is a degree of loyalty and commitment towards Marabastad by its users. (Aziz Tayob Architects:2002:139–146)

2.4.5 Social Analysis

2.4 Messo Scale
The framework, within which this dissertation is set, is a combination of the existing Marabastad area and a revision of the Integrated Urban Design Framework for Marabastad *(Aziz Tayob Architects in association with Meyer, Plenar, Tayob Partnership Architects and Urban designers:2002)*. This is done to accommodate proposed dissertations set within the Marabastad context.

The main aim is to weave together the diverse strands of social, economic, legislative and physical environments within Pretoria CBD. *(Aziz Tayob Architects:2002:3)* The cavity left by the political history needs to be filled with an environmentally sustainable development with human beings at the centre of concerns. *(Aziz Tayob Architects:2002:22)* It needs to be reinstated within the Pretoria central business district as a tourist attraction, visited for its unique vibrance and richness in historical memory.

### 2.4.6 Marabastad Framework
Due to the sufficient public transport infrastructure, accessibility is more than adequate. Taxi ranks will be provided on the traffic island between the two DF Malan drives East and West. The flow of pedestrians across these drives will need to be addressed by pedestrian crossings. The PUTCO bus depot will also have to be relocated (possibly to the Belle Ombre loop) in order to return the smaller grid to the site and to reach high-density housing of 60 units per hectare. (Aziz Tayob Architects:2002:160) An overnight taxi holding area is proposed across the Spruit to the east, utilised during the day by existing informal trade. A police station will be provided adjacent to the trading area. The Gap Proposal for Pretoria Inner City proposes a tram running along Boom and Church Street, with bus and taxi stops at the corner of Church and Cowie Street.

In order to implement pedestrian movement, the majority of north-south routes are pedestrianised, thus west-east routes carry faster moving traffic. Covered walkways and hawker stalls line these routes. Signage should make a positive contribution to the vibrant character of Marabastad by being liberal and creative.
2.5.1 ZONING AND RIGHTS

- **BUILDING LINES**
  - sides: 4.5m
  - street boundary: 3.5m

- **ZONING**
  - the site is currently zoned for municipal use with consented purposes such as institutions, parking sites, places of instruction, social halls and special buildings

- **HEIGHT**
  - Zone 5: up to 3 storeys

- **FSR**
  - Zone 5: 0.8

- **ALLOWED COVERAGE**
  - Zone 5: 50%

- **PARKING REQUIREMENTS**
  - 2 bays per 100m² of lettable area

- **DRAINAGE**
  - the existing drainage pipe runs through the centre of the site and will have to be rerouted to connect with the pipes along the perimeter

- **WATER CONNECTIONS**
  - all street lines are serviced with a connection point to the north of the site

- **SG DIAGRAM**
  - site area = 4,7436 Ha

*Zoning and rights for Pretoria Ext 14*

Large Bluegum trees mostly grow along the edge of the Steenhoven Spruit; they can be found growing in Cowie(Seventh) Street. Along Proes Street there is an established line of Tipuana trees that should be kept intact and designed for within the building layout. Apart from these, the site itself carries a total number of 13 trees. A proper planting plan will be required for the area, to address the harsh conditions.

The site itself doesn’t carry any built form and is currently used for the dumping of building material. Aerial photographs show the amount of pedestrian footpaths through and across the site, yet there is no formal gathering or use for the site.

The geology of the area is of Precambrian origin. The east-west zone consists of localised shale and siltstone, with quartzite and grit at the top. For construction purposes the soil conditions create for highly variable foundation conditions from solid rock at shallow depth to potentially expansive residual andesite soils. These aspects will have to be investigated properly by geotechnical engineers. (Aaz Tayob architects:2002:74)

2.5.2 Vegetation, Geology and Existing Use

2.5 Micro Scale
A SWOT-analysis of the area highlighted the lack of public facilities and ownership in the area. Presently, it is very littered and polluted (burning of plastic bags) whilst the spruit is at times used for bathing. The existing structure is in a state of decay. The increasing amount of squatters, illegal immigrants and hawkers is evident in the area, and these aspects support the already high crime rate.

However, a strong base of informal trade feeds off the high pedestrian flow within the area. The site has a central locality; situated 10 minutes from Church Square and the Belle Ombre station, and the N4 connects to the site in the West. The huge produce market and settled transport infrastructure creates opportunity for development. The site requires a building to compliment its locality and size: a structure of integrity that becomes a destination or landmark.

2.5.3 Social Behaviour
Climate: Marabastad is characterised by generally high temperatures and relatively low humidity, frequently combined with high afternoon temperatures in the summer. Summer rains average 741mm per year. Precipitation occurs mostly due to thunderstorms with rates around 90-100mm per hour. Hailstorms are fairly common as well. Cloud cover is about 33% per year (13% in July and 54% in December).

Wind: Prevailing winds are calm and blow from the north-east. During winter cold snaps bring winds from the south with approximately 89 days of frost per year. In the summer thunderstorms are accompanied by turbulent wind patterns. (Aziz Tayob Architects:2002:45)

Therefore efficient climatic design is necessary in order to prevent pollution. It will also require building mass that can accommodate for varying temperature movements as well as materials resistant to hail storms. There is a need for a structure that provides shade and shelter against heat and precipitation. One example is the use of covered verandas over pavements.
“If a building could mediate our needs and the environment outside, its demand on physical resources could be slashed.

If it could transform to facilitate multi-uses, its function would be optimized.

If a building could adapt to our desires, it would shape our experience.”

Guy Nordenson M.A.Fox:2002
Marabastad is the kind of place where a Spruit is used for bathing in broad daylight, it’s a place where old drums are turned into burners in order to sustain a maize-cooking business. Marabastad is home to sidewalks turned into shops and old tyres used as seating, barriers, a swing and even a climbing structure for kids. In Marabastad you will find that two steel ramps have the makings of an entire vehicle repair shop. A tree becomes a shelter against the scorching sun, a restaurant for bus drivers over lunch, a stand to sell goods at, a gathering spot for street games in the afternoon and even a washing line on weekends.

The inhabitants of Marabastad utilize existing structures to cater for their needs; the Belle Ombre Tennis Club is used as a basketball court on weekends, the vacant lot between Struben and Proes Street is used as a dumping site and the area demarcated as an overnight taxi holding area is used as a precinct for informal trading during the day.

It is this variable nature of the inhabitants of Marabastad that this dissertation attempts to address. Providing Marabastad with a structure that will create a platform for adaptability on a more formal scale: controlling chaos, whilst embracing transformation.
South Africa has recently been diagnosed with shocking obesity statistics amongst our children. (www.health24.com) No matter what the cause - be it school funding cuts, shortage of facilities, computers or the internet - many kids today are not involved in enough physical activity to achieve and maintain a healthy lifestyle. Especially in Pretoria CBD where schools aren't adequately equipped with sports facilities and not many sites are dedicated to the development of sports. Sport Education does in fact not carry much weight on the Pretoria City Planning Scheme's priority list. (Aziz Tayob Architects:2002) South African society is following down a path of difficult return.

3.1 Problem Statement
SUB-PROBLEM 1:

How can one promote the importance of physical health amongst our youth within the Pretoria CBD?

The young minds of today are mostly intrigued by computers and technology. Unfortunately, sedentary activity is worsened by the lack of awareness of physical health within Pretoria CBD. The only sporting experience available are obstructed views to fenced sporting grounds. Often activities are held behind enclosures, making them unavailable to the passerby. In addition, existing initiatives that are dedicated to the enhancement of physical health through sporting activities lack facilities to operate from.

OBSTACLES:

1. It is not feasible to erect a fully equipped sports facility purely for non-profit initiatives. Although the centre might focus on the development of the youth to obtain certain levels of fitness, motor skills, and attitudes, it is simply not economically feasible.
2. When creating a centre open to the public, security control becomes a major problem, especially with the high crime rate and vandalism in Marabastad.

OPPORTUNITIES:

1. Chance to develop a sports facility whose activities are visible and accessible to the passerby in order to promote awareness of a healthy lifestyle.
2. Use of technology and adaptable architecture to spark interest in sports activities within the Marabastad community.
SUB-PROBLEM 2:

How would the issue of security be addressed, especially within Marabastad?

Marabastad is regarded as a crime hot spot, even with two police stations within 1.5km vicinity. A police service point has been established in the south-eastern corner of the Maraba Centre, where the SAPS as well as the Marabastad Policing Forum maintain a presence. A definite need for visible policing in the area exists. For proper security and protection of the end users of the centre, fencing will be necessary. However, the requirement regarding visibility of activities is of equal importance. At night time crime prevails due to the lack of efficient lighting (CSIR Building and Construction Technology:2001), a problem this dissertation attempts to address.

OBSTACLES:

1. Opening up a structure to the public, complicates control and therefore security.
2. Marabastad, a "rotting cavity"* and undesirable location in public opinion, discourages dwellers from outside of town to visit the area.

OPPORTUNITIES:

1. The typographical slope can help to address security problems. Especially at the sports field, terraces create seating for the public to watch games without gaining access to the fields.
2. The structure will need facilities that are able to host the public at certain times of day, but can also be closed off for protection and private use. Kinetic design principles could facilitate in this ideal.
3. Lighting can promote safety and security with this type of facility. Especially at night time, better visibility will reshape society's dark perceptions of Marabastad into thoughts of light and orientation.

* "Rotting cavity" as defined by Aziz Tayob Architects. (Aziz Tayob Architects:2002:92)
SUB-PROBLEM 3:

Why would a sport centre be successful in Marabastad?

The rigid grid, size and lack of vacant lots within the remainder of Pretoria Inner City, makes a sport centre highly improbable. Over the past four decades all development within Marabastad was frozen. (Aziz Tayob Architects:2002:73) Presently a number of open spaces are available for development within this area. The proposed site between Struben- and Proes Streets hasn’t supported any built form except for a motor repair shop since the seventies. (Aziz Tayob Architects:2002:52) The site is ideally situated to carry a landmark building, celebrating the western edge of the Pretoria CBD. Marabastad has become a major transport node and that makes it further suitable for such a development. In addition, Marabastad offers a unique nature of vibrance and adaptability that could embrace such a structure within its daily events. The sports grounds would serve schools, clubs and individuals from within the CBD as well as from neighbouring settlements.

OBSTACLES:

1. Marabastad has been declared a slum and is shunned by the rest of the inner city. (Aziz Tayob Architects:2002)
2. Major traffic routes pass through the area carrying high speed traffic.

OPPORTUNITIES:

1. This dissertation attempts to integrate Marabastad with the CBD as functioning body, linking it with schools and sporting facilities across the city.
2. The proposed historical route (Aziz Tayob Architects:2002:162) will accommodate the pedestrian scale of Marabastad while simultaneously creating lanes, thoroughfares and crossings to lower traffic speed.
3. An attempt is made to reinstate the finer urban grain of Marabastad.
3.3.1 Limitations and Delimitations

1. The proposed design is a Centre for Illustrated Sports; that will educate through sports, not a contemporary school.

2. The centre is equipped with a stadium of limited capacity to allow less formalised spectating. Still it has the ability to host practise sessions for teams partaking in the 2010 Soccer World Cup and major events to follow.

3. It is a centre for the community to practise sport and therefore certain elements will be open to the public. However it is a sports club and, depending on the levels of activity, monthly membership fees will be charged.

4. The centre becomes the stage for existing initiatives to develop community involvement through sponsorship.

3.3.2 Assumptions

1. A framework is set in motion for the upliftment of the entire Marabastad area (Aziz Tayob Architects:2002) and this dissertation feeds off the suggested infrastructure.

2. Teams participating in the 2010 Soccer World Cup and major events to follow, will use the sports fields as training facility.

3. Although funds will be generated for the development, excessive costs should be avoided during material selection and construction.

4. Frameworks written and composed for the upliftment of Marabastad show that once strategies are set in place, crime rates should drastically decline which will make for a better living environment. (Aziz Tayob Architects:2002:95)

5. A relationship or arrangement will exist between the Centre for Illustrated Sports and the Tshwane Events Centre. Possible problems regarding capacity could be addressed by proper management between the two centres. Athletes from Pilliditch Athletic Centre can for instance visit the Marabastad facility to improve their techniques and do fitness training and vice versa.

3.3 Project Scope
The land is owned by Tshwane Metropolitan Council. A Public Private Partnership will have to be formed between the Tshwane Metropolitan Council, the Department of Sport and a private developer. The developer should be appointed via an open tender process. From this partnership will emerge the managing body of the facility. The private developer will be in charge of setting up a management model and funding proposal. During the construction phase he/she will act as project manager of the works. Additional funding could be generated by donations from major sporting bodies, e.g.: Nike & Super Sport, etc.

The Centre becomes a gathering place to view the 2010 Soccer World Cup on big screens. It accommodates teams partaking in the event with practise grounds as well as ample seating for their fans. The opening ceremony of the 2010 World Cup also creates an opportunity to involve the whole community.

Client: Public Private Partnership
Developer: Private sector Developer, eg. Retail Africa, Planet Fitness, etc.
Tennants: Physical Activity Chain eg. Virgin Active, Health & Fitness, etc.
End User: Any sportsman and sportswoman in training

3.4 Client Profile
According to Spanish architects, Abalos and Herreros, recycling is when a material is of such nature that one can breathe new life into it. (Domus: 2005: 53) Therefore the materials they use can be submitted to transformative processes.

The Retiro Park Gymnasium is one of many of this firm’s so-called ‘eco-monumental’ designs. Natural elements and materials are used to break down the contemporary construction of the city. To them nature is an aesthetic definition that might integrate the values of contemporary society within architecture, and that distances itself from contemporary aesthetic principles. (Domus: 2005: 51)

Abalos and Herreros have used the structure in such a way to sustain nature. The grille enveloping the whole pavilion acts not only as protection, but also as a support for the creepers that will eventually cover it. This demonstrates what is termed ‘re-discrition’, the re-using of something in a different context that automatically transforms things into apprehensible aesthetic entities. (Domus: 2005: 53)

It is this connectivity of re-description that has driven the appearance of nature in their work.
Materials Used:
1. Grille mesh as support to creepers
2. Translucent screens
3. Steel framing
4. Two different grain woven steel screens as walls for the tennis court

Application:
1. Mesh screen’s dual function as structural element and backdrop for creepers simultaneously emphasises memory and aspiration
2. Reminder of nature as active participant in design
3. Adaptability of structure to vary in translucence from daytime to night time, captures architectural transformation

4.1.1 Retiro Park Gymnasium

Project: Retiro Park Gymnasium, 2002
Location: Parque del Retiro, Spain
Architect: Abalos & Herreros

4.1 Abalos & Herreros
Abalos & Herreros’ beginnings in industrial architecture gave them a unique approach to the design of public buildings. They build university buildings with the same materials as a recycling plant. They have mastered what one might call the *industrial vernacular.* (McGuirk, J. : 2006)

The main goal was to strengthen civic pride by creating a meeting facility as an extension of the public square. The inclusion of natural and man-made materials creates a provocative juxtaposition, through which the designers hoped to create a representation of the old and the new.

White corrugated polycarbonate is used to cover the exterior, while woven plant material sheath the interior of the wall cladding, referencing the old and organic. The grass matting are biodegradable and the steel and polycarbonate are recyclable.

The translucent polycarbonate sheeting illuminates the interior. A series of pivoting panels provide a high degree of spatial continuity.
Materials Used:
1. Translucent polycarbonate sheeting
2. Woven plant material
3. Steel tube section framing
4. Simple I-beam support structure

Application:
1. Pivoting doors as entrance or wall
2. Translucent sheeting used for natural lighting by day and artificial lighting by night
3. Adaptability of structure to be a private meeting hall, or to become an open structure linking up with the external public square.

4.1.2 Colmenarejo Municipal Hall

Project: Colmenarejo Municipal Hall, 1999

Location: Colmenarejo, Madrid, Spain

Architect: Abalos & Herreros

4.1 Abalos & Herreros
The late Finnish architect, Alvar Aalto (c. 1898 - 1976), was a humanist philosopher whose hand could more easily be seen in the natural materials he used and the details of his designs, than in the overall look of his buildings. He was more concerned with people than with power, more with pleasing than impressing. (Riding, A.: New York Times: 2007)

The Saynatsalo Town Hall is an example of governmental architecture in which indigenous building traditions and materials are combined with modern design and building technology. Set within a small town centre, it is surrounded with pine trees typical of Finland. Alvar Aalto’s generous use of wood, both for exterior panelling and for interior floors, ceilings, stairs and window blinds, speaks to the surrounding landscape.

Alvar Aalto’s detailed analysis and resolution of lighting quality is visible throughout his designs. He employs white surfaces as secondary illumination sources. Much attention is given to maximised southern exposure through the use of vertical glazing as well as the use of louvres to control sunlight at different times of day.

Alvar Aalto defended his organic geometry through the use of supple, natural materials and respect for human feeling. (Riding, A.: New York Times: 2007) This is visible in his embracing courtyards and stepped grass terraces with human activity as central focus.
Materials Used:

1. Brick exterior
2. Timber exterior panelling, interior ceilings, stairs and floors.
3. Timber truss systems
4. Vertical glazing

Application:

1. Pedestrian friendly courtyards
2. Stepped grass terraces as part of building shape and utilised by the occupants
3. Use of louvres, glazing and white surfaces to control and direct natural lighting
4. Attention to detail enhancing the experience of the end-user

4.2.1 Saynatsalo Town Hall

**Project:** Saynatsalo Town Hall, 1949 competition, 1952 built

**Location:** Saynatsalo, Finland

**Architect:** Alvar Aalto
Herzog & De Meuron’s sports complex is located at the border between Switzerland and France. It features a large indoor gym and an open-air oval track. Since service ducts are hidden behind glass facades, the interior is exposed concrete. The entrance area is dominated by a clear-span roof that runs the full length of the building and is its most monumental feature.

The interior and exterior are linked by light: daylight creates bright channels throughout and vistas stretch up to 70 metres. The gym floor was sunk into the ground, allowing for an external shape that is almost flat. The facade glazing is tinted dark with screen prints to give the building an almost sacred air. (www.spluttini.com)

The building design has successfully simplified the intricacies of large structure design as its appearance defies gravity, structure and functional form. This building simply consists of a floor, a wall and a roof.
Materials Used:
1. Exposed concrete interior
2. Glass facades: tinted dark with screen prints
3. Flat concrete roof supported by diagonal concrete columns
   hidden within interior
4. Textured concrete exterior

Application:
1. Hidden service ducts
2. Lighting channels to connect interior with exterior
3. Attention to detailing and connection of edges
4. Varying finished floor levels to influence building shape and spectator views

4.3.1 Pfaffenholz Sports Complex

Location: Saint Louis, France.
Architect: Herzog & De Meuron
The *Soweto Careers Centre* is challenged by its context, topographical site limitations and existing buildings on site. (Oseroo, C.: 1994: 22-29) Jo Noero kept these structures intact and designed a community centre with innovative vault-shaped roofing structures and brightly painted structural elements that create intrigue and provides for a vibrant and active centre.

The clever roof design is directly influenced by the different functions within the building. The curved IBR-sheeting vault structures are located over the higher floor spaces inside the building where there is in fact a second level in use. Jo Noero has also used mono-pitch roof structures to emphasize intimacy within the building, this is echoed by the flat roofs framing the walkways at the entrances of buildings. Again scale plays an important role as one notices how the sloping roofs subtly embrace the tree that covers the courtyard.
Materials Used:
1. Exposed steel columns and truss systems
2. IBR-profile metal sheeting as cladding and roofing system
3. Plastered brick walls - brightly painted
4. Decorated truss interiors
5. Plasterboard ceilings and insulation

Application:
1. Exposed structure to frame buildings
2. Curved sheeting profile to celebrate higher movement levels within a building
3. Concrete and grass combined to form a designed exterior surface that becomes the spatial link between buildings
4. The ways in which a building, surrounding a courtyard, influences it and the spatial links between interior and exterior.

4.4.2 Soweto Careers Centre

Project: Soweto Careers Centre, 1990

Location: Diepkloof, Soweto, Gauteng, South Africa

Architect: Jo Noero
The site for the school is within a densely populated informal settlement. It has to be adapted to accommodate a communal sport field and the new Further Education and Training Centre (FET) which calls for more entrepreneurial training. The classrooms on the street edge are designed to be used for entrepreneurial teaching with hatches that open to the street to allow for public interaction. This single storey line of classrooms mimics the scale of the informal settlement around it, but also declares its institutional character.

(www.noerowolff.com:2007)

In areas like Khayelitsha, schools are often the first public buildings and sometimes the only permanent, durable and expensive buildings. Therefore the street facade of the school has a strong specific image for identification.

There is a central circulation space - a reminder of the organic urban spaces created in informal settlements. It is lined with trees and benches and the perimeter is lined with canopies to facilitate circulation on the scale of both an individual and a crowd. (www.noerowolff.com:2007)

The L-shaped classroom blocks protect the open spaces from strong directional winds and sand. The roof lights are shaped to cause suction on the leeward side of the roof and to improve natural ventilation in summer.
Materials Used:
1. Concrete pavings, sports surfaces and building structure lines extended to gutters and concrete paving
2. Concrete building blocks, bagged washed and painted
3. Structural steel columns
4. IBR profile sheeting
5. Saw-toothed roof truss systems to span larger halls
6. Plastered walls painted red or olive green to provide identity
7. Trees and concrete benches to pedestrianize courtyards

Application:
1. The use of large simple signage for orientation
2. The development of street facades to accommodate public interaction
3. The use of canopies to protect against climate as well as direct within the building
4. Orientation of buildings to protect courtyards against climate and even crime

4.4.4 Usasazo Secondary School

Project: Usasazo Secondary School, 2004 built
Location: Khayelitsha, Cape Town, South Africa
Architect: Jo Noero
“If architects designed a building like a body, it would have a system of bones and muscles and tendons and a brain that knows how to respond. If a building could change its posture, tighten its muscles and brace itself against the wind, its structural mass could literally be cut in half.”

- Guy Nordenson Fox, M. A. : 2002

[Images of architectural designs]
**Kinetic Architecture: A Definition**

In general, *kinetic architecture* is defined as buildings and/or building components with variable mobility, location and geometry.

A kinetic structural solution may include folding, sliding, expanding, and transforming in both size and shape.

This can be achieved by means of pneumatic, chemical, magnetic, natural or mechanical solutions. (Fox, M. A.: 2002)

**Kinetic Architecture** creates spaces that can physically reconfigure to meet changing needs. This approach places a large emphasis on the dynamics of architectural space. Three key elements come to light: structural engineering, embedded computation and adaptable architecture. Contemporary innovations include the works of such as Chuck Hoberman and Santiago Calatrava, amongst others. These demonstrate the possibility of kinetic implementation on an architectural scale. (Fox, M. A.: 2002)

New materials such as ceramics, polymers and gels, fabrics, metal compounds and composites allow unprecedented structural experimentation. (Fox, M. A.: 2002) In addition, technology provides a vision into microscopic natural mechanisms and advanced manufacturing of high quality kinetic parts.

The integration of embedded computation and kinetic function is fast becoming a practical and feasible reality. Intelligent kinetic systems can act as a moderator responding to change between human needs and environmental conditions. Moreover, flexibility of space responds to the requirements of any human activity. Specific applications may include intelligent shading and acoustical devices, automobile parking solutions, police box stations, teleconference stations, devices for ticketing and advertising, as well as school and pavilion access controls.

Pragmatic considerations are of importance within any building. When introducing kinetics to architecture, these include costs of manufacture and operations. The result could be a unique architecture that addresses the dynamic, flexible and constantly changing activities of today and tomorrow.

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**5.1.1 Rationale**

5.1 Kinetic Architecture
Device / technology: Suitcase House

Developer / architect: Gary Chang

Description:
This is a space that provides ultimate flexibility; achieved through the use of partitions, lighting and mobile furniture.

An industrial shelving system is used and hidden behind curtains. Uplighting is used to articulate movable structural members. Established notions about the nature of intimacy, privacy, spontaneity and flexibility is questioned within this project.

Possible Application:
This becomes a more feasible kinetic solution, allowing multi-functionality that accommodates a wide spectrum of sports at different times of the day.
Device / technology: Dune Underground Exhibition

Developer / architect: Daan Roosegaarde

Description: Using fibres, steel, microphones, sensors, software and other media, Roosegaarde creates variable square meters of display. Optic fibres respond to the presence of humans by changing appearance and following the movement and sounds of pedestrians.

Possible Application: The notion of lights responding to presence can be simplified and applied to streetlights running along the heritage route.

The concept can even be incorporated into the stadium lights that respond to the noise of the crowd.
Device / technology: Podium Light Wall

Developer / architect: Kinecity, Massachusetts (USA)

Description: As people walk on the kinetic pavement, a strip of blue light (7 floors tall) follows them on the wall of the building. It accentuates the individual as well as patterns created and already existing on the streets.

Possible Application: On sidewalks along the facade to promote safety as well as interaction between interior and exterior activities.
Device / technology: Digital Mile

Developer / architect: Zaragoza (MIT, USA)

Description: Incorporating digital media into everyday aspects of the public realm. Creating places that respond to users, accommodate multiple activities and provide information.

The Digital Mile is equipped with free wireless technology along the route. A water wall makes use of digitally controlled streams of water and an intelligent street light system, changes colour and intensity in response to the time of day. Making use of solar charging, informative street furniture provides pedestrians with up to date information on bus routes, traffic and the weather.

Possible Application: The concept of an intellectual route could be integrated with the proposed Heritage Route for Marabastad. Existing infrastructure and locality makes this an ideal area for such a proposal. Technologically advanced walkways could echo the identity of Marabastad.
“These new programs present practical architectural situations for unique and wholly unexplored applications that address today’s dynamic, flexible and constantly changing activities.”

- Casswell, W. Fox, M. A. : 2002
Learning from advanced technologies, the aim of this dissertation is to design a structure that makes use of local construction methods to construct a building with interactive attributes. Conventional building methods are re-evaluated at the hand of kinaesthetics. Unfortunately, limited skills and technology proves the implementation of kinetic and interactive architecture within the South African context relatively expensive. The challenge is thus to convince possible investors, to fund an interactive structure, as a means of improving the physical health of a community.

Obesity and related illnesses carry a health care expense of between 5 to 8% of the health budget, with considerable indirect costs. (www.sasom.co.za). A more adaptable structure will result in a longer its lifespan and ability to satisfy more than one need, and effectively lure more than one beneficiary.

The introduction of a performance environment within an urban context, creates the opportunity for 'lost' space to become meaningful. A dialogue can develop between inhabitant and visitor, between spectator and athlete, etc. A dynamic interchange that was once characteristic of Marabastad at the hand of a new idol, the sport star.

5.2.1 Opportunities and constraints

5.2 Application within the dissertation
"In temporary architecture I explore the journey. Through the journey you arrive at the idea of variations and you learn that these are as important as the final results...

The end result is no more than a more defined vibration that grows out of all changes that have been between the initial project and the final construction."

- Enric Miralles Miralles, E. : 2000
During the initial site development, the author was unsure about the inclusion of Erf 2326. However, the motor repair shop's 30 year lease has expired and they are planning a move to Visage Street (Pretoria inner city). The unnatural site division is attributed to the 1967 Freeway Proposal. (Bruinette, K.E.: 1967) According to municipal officials, Munitoria plans to demolish the building in order to make room for future development. (Joubert, A.: 2007)

The factors mentioned above, provided an opportunity to reinstate the rectangular grid, typical of Pretoria CBD.

It was important to promote interaction between interior function and exterior pedestrian, onlooker or spectator. This was achieved by giving attention to active facades, screening and a translucent building structure.
The Heritage Route runs through the centre of the site. This creates opportunities to locate a point of arrival, especially from Proes and Struben Streets (that are one-way feeders to the site). A taxi drop-off zone and bus stop are functional requirements along the route.

Jerusalem Street, that runs through the site, connects to Marabastad’s business centre and Belle Ombre Station. This street will largely be pedestrianised, whilst still allowing limited access for public/transport vehicles.

On an adjacent site bordering Cowie Street to the east, a Green Square is proposed. This ‘lung’ is extended to connect with the centre Heritage Route. Passengers will disembark from their busses at this junction, enter the site, and negotiate their way past the cafeteria towards the different functions. Other access points to the centre, stadium and sports fields exists, but controlled access and safety were aspects of major concern.
6.1.2 Concept Development

6.1 Horizontal Gymnastics
Light quality within a building can be controlled by proper louvre design. The western aspect of the site is relatively exposed and needs proper design consideration. In an attempt to avoid solid western walls, sliding louvres and translucent sheeting are proposed, this will allow sunlight in, whilst avoiding glare and heat storage. The louvres can be adjusted throughout the day for different seasons to achieve climatic control.

During winter time, the double facade of louvres and curtain wall panels provide warmer interiors. Alternatively, during summer time, the opening profiles within the glass facade create the opportunity to let the hot air out while the louvres can be closed for protection against the sun.

Visual links between interior and exterior are investigated, as well as between the different functions within a building. The hierarchy of involvement is addressed by controlling the circulation flow from public to private spaces.

Transparency was an important aspect, making the activities within the structure visible from the street. Thereby including and intriguing the passing community.
The pool complex was designed to allow for views in from street level. This again creates the opportunity for interaction between exterior and interior. Another design opportunity is found in the reflective light through open walkways and the curved roof structure.

The curved roof with louvres on the vertical support, accommodate possible build up of humid air within the structure.

The 50m pool can become flexible via the application of two laterally moving bulkheads. These pool dividers allow for different activities at different times of day.
The Centre for Illustrated Sports will accommodate the following:

**Marabastad Stadium:** 4930m²
1. Two full-size grass pitches (ideal for hockey, soccer and rugby).
2. A 600m running track that connects to the greater 1500m track that weaves through the facility.
3. A mini-stadium with seating for 5000 spectators, equipped with press box for major events.
4. Grass terraces with seating for a further 2500, with built-in demonstration corridors.
5. Changing and shower facilities for 4 teams (2 male, 2 female).
6. Retail component (subject to tenants) on Proes Street.
7. Sport medical centre with treatment and consulting rooms providing physiotherapy, sports injury massage, and access to specialist doctors, lifestyle and wellness advisors.

**Pool Complex:** 8975m²
1. 12 lane 50m swimming pool with depth varying between 1500mm and 2000mm to accommodate underwater hockey, waterpolo, synchronised swimming and water-aerobics.
2. Learner pool with depth of 1200mm to accommodate guided water jogging, swim school, water-aerobics and under water breathing classes.
3. Downstairs changing village equipped with saunas.
4. 6 Squash courts on ground floor level.
5. Fitness centre with 9 treadmills, 26 stationary cycles as well as two demonstration and aerobic halls (respectively 250m² and 90m²).
Indoor Sports Hall: 1570m²
1. 1520m² artificial grass flooring suitable for hockey, soccer and event hosting.
2. Seating around perimeter for 600 people.

Multi-Sports Hall: 1576m²
1. Long Hall with Desso grass flooring suitable for cricket net practise as well as indoor golf.
2. Multi-purpose halls with sprung-wood floors suitable for volleyball, table tennis, badminton and indoor netball.
3. Two Regupol tracks with sand boxes to allow combined triple and long jump.
4. Dojo centre for martial arts training and competitions equipped for karate, judo, wrestling and boxing.
5. Fitness suite equipped with 7 lifting platforms, free & fixed weights as well as stretching and warm-up zone.

Open Court: 634m²
1. An open court with regupol floor finish to accommodate netball, tennis and basketball. Netting envelope to keep balls in field.
2. 13m high concrete climbing walls fitted with cleats and foot- and handgrips for adventure sport.

Centre for Monkeys: 1513m²
1. Pre-primary and Primary halls for monkeyastic activity.
2. Quiet room or meditation studio for audio-visual hand-eye coordination development, yoga and pilates.
3. Trampoline shaft with two ground fitted mats.
4. External exercise courtyard fitted with purpose made muscle training playground equipment and concrete master climbing walls.

Admin and Food Court: 1497m²
1. Admin offices for centre staff as well as sports club managers or trainers.
2. Full kitchen to cater for take-away and cafeteria, in and outdoor on groundfloor as well as for the roof cafe on first floor.

5.3 Site layout and accommodation
Personal safety is a major concern when developing takes place in Marabastad. Where possible, slope is utilised as a physical barrier, this is evident at the terraces for the full-size sports fields. The proposed structures is also placed to define safe enclosure. In addition, Clearvu Fencing is used to protect the rest of the campus. This is a security barrier which disappears into its surroundings. It is manufactured from high density, high tensile mesh with apertures too narrow for finger and footholds.

Night-time security is enhanced by the use of proper street lighting and visibly active security. The application of a kinetic walkway (a concrete paving with embedded sensors to activate lighting on the facades), will also assist in creating a safer environment for pedestrians. The lights will be visible through translucent sheeting, resulting in an awareness of external movement from within the structure. The activities hosted within this complex, creates for extended hours of use.

The centre is equipped with a 1500m running track that can be split up into three separate tracks of 600m, 500m and 400m. The running track is made of Regu-Turf, ideally suited for fitness training. An adventure route, deviates from this track, catering for track-and-field athletes. For longer distance runners, the track links up with the Heritage Route running through the greater Marabastad area, measuring at a distance of 1800m.

Landscapes are designed to promote pedestrian interaction. On the ground floor below the elevated administration component, one of numerous interior courtyards is defined. All concrete paving will be engraved with lines defining games like hop-scotch, hand-ball and even chess. Hollow blocks provide seating for enjoying take-away meals, waiting for the bus, or simply for interaction or reflection.
07 Tudor Road Trail Crossing (USA)
International Iron and Steel Institute: 1997: 27

08 Visibility, anti-climb and anti-cut features of the ClearVu 2 Security Fencing System
www.cochranesteel.com

09 Translucent Sheeting at Cambridge University
www.cambridge/visuals.com

10 Kinetic Street lighting activated by movement
www.kineticaarchitecture.com

11 Regupol Type 7619 AG
Synthetic outdoor surfacing for athletic running tracks
Finrex: 1995

12 Interactive Courtyards - New York
www.interactivearchitecture.com

7.2 Centre Safety & General Dynamics
The parking area is designed to accommodate a proper bus turning circle, especially for the high flow coming from the North along DF Malan Drive East and down Struben Street. A taxi-drop off zone will cater for the vast amount of taxi commuters in Pretoria CBD. Bus shelters are constructed from standard steel profiles to assist with mass production. The aim is to erect similar bus stops throughout Marabastad and even Pretoria Inner City. The shelters should respond to individual locations using a variety of materials dressing/cladding the steel frames. The use of intelligent screens on these structures will create for functional information centres.

Big sliding gates across Jerusalem Street will control vehicular access, whilst allowing a pedestrianised throughway when closed. This will allow buses to access the complex with relative ease when dropping off sports teams. This drop-off is situated in close proximity to the change rooms and ablution facilities provided for the teams. These dressing rooms can be open to public when necessary. Participating teams filter through these cloakrooms to gain access to the full-size sports fields on the opposite side. On first floor level over the change room, seating can be rented out to fans or teams partaking in games. Transparency and visual connection allow for passive surveillance in this area.
15 Movement through Change Rooms
Sketch plan by author: 2007

16 Tram Stations with similar structure and alternative infill materials, Hannover, Germany
Bell, B., et al.: 2006

17 Kinetic touch screens

7.3 Busstop & Change Rooms
The Medical Centre is designed as a sports injury clinic with the potential of a full sports medicine and science centre. Treatment and consulting rooms are defined using movable partition within a large hall. The centre will provide services such as physiotherapy and sport massage, amongst others. The structure is adaptable to serve the needs of the different inhabitants. It will be equipped with enough electronics cabling to support a human performance centre for physiological testing and monitoring. A Medical Health Clinic is situated on the island between the two DF Malan Drives and to the south of Proes Street. This provides access to specialist doctors and lifestyle and wellness advisors; the Medical Centre on campus becomes the meeting place between athlete and professional.

Large pivoting panels are used to create an adaptable structure that could be private if need be, but also has the capacity to either open up to the public on street level, or towards the sports fields. The interior divider walls are shifting screens that run on tracks fitted to the structure floor and ceiling, enabling different interior configurations to accommodate various activities. These walls are framed by 50mm openings that allow light through in order to emphasize structural adaptability. For ease of operation, all services are fitted in the floor. This transitional space is rather similar to the treatment facilities at the finishing line of the Comrades, albeit housed within the static determinants of a permanent structure.
21 Movement through the Medical Centre
Sketch plan by author 2007

22 Sport Therapy Centre, Team Bath Sport Centre, University of Bath, Germany
www.teambath.com 2007

23 Shifting walls and use of lighting behind translucent sheeting at Cambridge University
www.cambridge/visuals.com

24 Shifting walls framed by light, Responsive Space, MIT, Massachusetts, USA
www.interactivearchitecture.com 2007

7.4 Medical Centre
The **Food Court** consists of a Cafeteria, Garden Cafe and Take-Away on ground floor, and a Roof Cafe on the first floor. The kitchen is equipped to cater for a capacity of 150 sit-down customers per meal. Deliveries therefore amount to an average of 25,5kg/strokes per day. *(Adler, D. :1999: 18-8)* Ample storage is provided in a 10m² cold store with deep freeze and cold room. Dry storage shelving amount to 0.45x25 running metres for canned and dried items to be delivered three times per week. The **Hot Kitchen** is equipped with 1 oven, two 2kW microwave ovens, one 0.5m² grillier, two 0.6m² griddles and a 90kg/hr fryer.

The **Cold Kitchen** consists of four work stations; for the preparation of fish, meat, vegetable and salad as well as dessert. The area is fitted wash basins connected to a floor drain and grease trap. The **Scullery** has a sterilising dishwasher, with the capacity to do 3000 pieces/hr, as well as two wash basins and ample worktop space. Refuse collection occurs once a week from the delivery yard where 5 waste containers are covered with shade cloth to protect against harsh conditions. A 380V 3Phase dumb waiter connects the kitchen with the Roof Cafe.

In order to comply with SABS/SANS 0200, openings are scattered at non-overlapping intervals to contain sound within the **waller corridor**. The floors are covered with **Microplex** perforated tiles and **Gypsum fibre** panels are used for sound absorbing ceilings. According to SABS/SANS 0400, the air requirements within kitchens and cafeterias are 17.5 l/s and 7.5 l/s(smoking) & 5 l/s(non-smoking) respectively. Thus, a centrifugal fan (from **Xpelair**) will be installed in the kitchen, with an air duct & filter above grills and stoves. The **waller corridor** is lined with 8mm toughened glass, with printed decals for obstructed views to the kitchen. It not only acts as acoustics barriers, but also insulates and therefore confines the heat generated by the kitchen. The corridor is fitted with a **Danpalon** roof to let natural light in, and with a louvered vent to allow accumulated hot air to escape.

The Take-Away component’s location allows for passive surveillance onto the parking lot, bus stops and bicycle rack. The extended operating hours of this facility creates for safer surrounding environments.
7.5 Food Court

27 Food Court Ground Floor - Not to scale
Sketch plan by author: 2007

29 Framed entrances, Indigenous System
Jo Noero
www.noerowolff.co.za : 2007

30 16mm translucent Danpalon Multicell roofing panels
Revolutionary Danpalon Systems : 2007

28 Food Court First Floor - Not to scale
Sketch plan by author: 2007

31 Booth seating, Cafeteria - Canteen 01
The Administration building is lifted from ground floor to allow the green corridor from Steenhoven Spruit to extend through the site. The elevated position also makes it visible from various locations. Access is provided via a passenger lift and an open-air staircase. The building comprises of a steel structure on a 5m column grid with toughened Solar E glazing infill panels. Sliding louvre doors are used to permit direct sunlight from entering the offices. These sliding panels allow the user to alternate the spread of the facade according to his or her needs. The steel columns are clad with translucent sheeting to allow natural lighting in, even when the entire facade is closed. Fluorescent tube lighting are fixed to the sides of the cladded steel structures for artificial lighting. This will illuminate the courtyard below at night time.

Adjustable Luxalon louvre systems are installed to allow accumulated hot air out during hot summers. The glazing panels are fitted with opening profiles for cross ventilation. The sloping roof provides ample space for the installation of an aircon duct along the middle of the open plan offices.

The walkway floor that runs through the structure is made of 20mm frosted toughened glass from SmartGlass. The 1,5x3m glass panels are fitted on lipped channel purlins bolted to the building structure. The permeability of the floor allows the dwellers below obstructed views of the building users as well as a constant awareness of movement. All glazing consist of a transparent honeycomb insulation plus light diffusing veils sandwiched between two lites or architectural glass. An energy-efficient metal spacer and structural silicone surround the structure and a breather tube assures air pressure equilibrium.

Application of Solera L from SmartGlass:
Visible light transmittance = 3% - 67%
Shading Coefficient = 0.04 - 0.75
Light diffusing power = Moderate to excellent
Size limit = 1524x64x3658mm
Fitted with operable windows
(www.smartglass.co.za:2007)
35 Movement through Administration Building
Sketch plan by Author: 2007

36 Movement awareness through glass flooring
SB Magazine: 1/2005

37 Corrugated polycarbonate, filtered light and sound, House in Imazato, Japan, Katsuyasu Kishigami
Bell, V. N., et al.: 2006

38 Sliding shutters from Luxalon
Luxalon Sun Control Systems: 2005

7.6 Administration Building
On arrival at the Pool Complex, the user is diverted towards a long corridor that leads you to a changing village, equipped with lockers, showers and even a sauna. Frosted Danpalon ceilings fitted at the back wall of the showers, allows natural light in from within the Pool Complex. A vent shaft is provided above the showers to allow hot air out. PVC pipes set at intervals in the wall of the complex, are connected to this shaft to draw out excessive humid air within the complex. The corridor leads to a staircase at the end, which takes users to the first floor.

Back at the entrance an alternative route will take the user to 6 squash courts fitted with 12mm Contra-vision Glass walls and louvres at a height of 5m for ventilation. The back wall of the squash courts create a barrier for the western afternoon sun and helps keep the complex cool. Access from the squash courts, are glass panels in the gunite concrete pool construction to allow for views into the pool. These are also found along the corridor and the pool facade on Proes Street. After investigation it became clear that a pool this size would generate too much water pressure for full-size windows; small (600x600mm) square windows or longer and thinner (1200x600mm) would be more suitable. The 32mm laminated toughened glass is fixed with 125x50mm steel hollow section frames and 3mm high density foam. The pool is retained by a 100mm gunite concrete leaf, with 280mm brick cavity wall supported by 600x230mm brick buttresses at 3000mm centres.

The pool uses saltwater that is heated by absorber heating panels set on the roof. The water is cleaned by 8 sandfilters (1000mm dia x 2400mm fibreglass reinforced tanks) and 4 chlorifiers (600x1200x800 fibreglass reinforced PVC tanks). The filter pump and motor is manufactured by PoolEquip.
7.7 Pool Complex
The pool complex has been designed to allow views into the pool from street level. This creates the opportunity for interaction between exterior and interior, as well as between the different activities within the structure. As the user follows the long corridor, the ceiling opens up towards the first floor and the reflection of the sun on the water is visible on the roof structure. On the first floor, a demonstration area and fitness suite, equipped with 26 stationary cycles and 10 treadmills for cardiovascular fitness training, looks out onto the green corridor and multi-sports hall. The pool domain is enveloped with over 55% glass facades, filling it with natural light. A 7m east facing glass facade connects with the Learner Pool, where precast concrete hollow section seating creates a gradual descent to the pool below. All equipment used in the pool are stored in lockable containers.

The roof structure reacts to the different activities within the complex. Monopitch roofs cover the areas to the east and west of the pool (learner pool and squash courts), as they follow functions on ground level. The highest circulation routes are framed by curved roof structure at a higher level, while the pool itself is covered with a saw-toothed roof truss systems constructed from 45x45x5 steel angle cleats. The curved roof structures consist of 203x65x25 steel T-section formed rafters, fixed to lipped channel purlins and cladded with 0.8mm flat metal sheet cladding to imitate a body of mass suspended weightlessly above walkways. These structures are supported by a truss compiled of two 254x146x43mm universal beams and 45x45mm steel angles to span 32m. The western vertical support of the structure is constructed of 55x75mm steel angles with cross bracing and baseplates. 500x75mm timber seating is fixed to this support structure and treated with primer for protection against damp and salt. Possible collection of warm moist air at the highest point of the vaulted structure, are addressed by fitted adjustable louvres on the vertical support. Condensation will run down the curve of the roof and into the gutter through weep holes provided.
51 Interior truss supports, 
Polymer Engineering Centre, 
Victoria, Australia 
Bell, V. B., et al. : 2006

52 Curved translucent sheeting 
Polymer Engineering Centre, 
Victoria, Australia 
Bell, V. B., et al. : 2006

53 Multifunctional pool, 
Founders Complex, 
University of Bath, Germany 
www.teambath.com : 2007

7.7.2 First Floor

7.7 Pool Complex
The corridor along the pool leads to the outside where curved seating walls covered under trees provide courtyard seating for gathering. The pathway connects to the a 1500m² Indoor Sports Hall. The floor is covered with Desso Sportsflooding, (consisting of 7.6mm polyolefin fibre woven interlocking fabric on a 10mm Regupol shock absorbing underpad with a 170mm concrete subbase) ideal for 5-a-side soccer, netball, 6-a-side cricket, hockey training and for instance Super Sport's LetsPlay initiative. The northern and southern walls of the hall are punctured by glazed openings which frame precast concrete spectator seating. For outside pedestrians to be able to see the activities inside the hall, the level difference between the height of the spectator seating and the external finished floor level must be no greater than 1000mm. The sports surface is therefore dropped to below ground level. This also accommodates the aspect of water reticulation as these type of floors require vast amounts of water. The equipment store, open to the inside, has a door connecting it to the outside for external fitness exercises.

**Natural light** enters the hall through continuous clerestories along the roof structure. Glazing continues along the sides of the structure. Alternate thickness translucent sheeting panels with low energy fluorescent lighting are fixed to the structure. Aluminium framed glazing is fixed to the sheeting at right angles, forming interior niches for scoreboard keeping, the fixing of curtains and the fixing of climbing apparatus. The external facade will however remain flush in order to avoid it from being used as a urinal. Due to the translucent nature of the cladding and the lighting fixtures set within the walls, these structures will light up their surroundings at night time.

**Mechanical ventilation** is fixed to the inside of the roof trusses down the centre of the structure. Adjustable louvres are installed along the base of the walls in order to allow fresh air intake. Hot air will rise and accumulate at the highest points of the roof trusses where vents allow escape.
7.8 Indoor Sports Hall
The Centre for Monkeynastics caters specifically for primary and pre-primary school kids. The centre is aimed at developing the motor skills of the children through a spectrum of games and activities. The activity courtyard is equipped with climbing apparatus, a sand box and training slopes. The building structure encloses the courtyard on three sides, not only protecting it from wind and sun, but also creating a safe environment for outdoor activities. Exterior walls are built with brightly coloured glazed bricks, each colour representing a different type of sport hosted at the Centre for Illustrated Sports.

The Meditation Room is a steel structure suspended between two brick structures, externally clad with minikwab corrugated stainless steel sheeting and insulated with 40x600 tongue-and-groove Isoboard. Windows are limited to 200x1200mm openings in the eastern facing wall to avoid from interrupting meditation. Cross ventilation is promoted by door openings in the western facade and adjustable louvres below windows in the eastern facade. The entire room is naturally lit through the application of 16mm translucent Danpalon Multicell roofing panels with superior light transmission to insulation ratio.

Retractable and adjustable louvres are fitted external to double glazed windows on the northern facade of the exercise halls. Adjustable vents at the top and bottom of windows allow air to pass in and out. Floor slabs stop short of the facade to assist with ventilation of interior spaces. All vents and louvres are operable by a building management system, catering for varying needs.
64 Centre for Monkeynastics Ground Floor Plan
Sketch Plan by author - not to scale : 2007

65 Centre for Monkeynastics First Floor Plan
Sketch Plan by author - not to scale : 2007

66 Mniwave corrugated stainless steel sheeting, Profil Arbed Head Office, Luxembourg, Boih and Minkus Architects
International Iron and Steel Institute : 1997

67 Brightly coloured glazed bricks, Rainbow Alliance, Holland, De Twee Sneeken Architects, 2004

7.9 Centre for Monkeynastics
Purpose-made concrete and steel climbing walls connect the Centre for Monkeynastics with the Open Court on Struben Street. These climbing walls, equipped with finger and foot holds as well as cleat rings, act as a security barrier to the Centre. The open court is lined by 254x146x31 steel I-profile columns that supports court lighting as well as the stainless netting mesh enveloping the open structure to limit balls to the court. The court is covered with coated alkali resistant fibre glass mesh cloth, to protect it from excessive heat build-up. The mesh cloth emits light but protects players’ eyes against glare.

The court is equipped with retractable basketball/netball baskets (with adjustable height) and removable tennis nets to accommodate multiple use. The court surface is finished with Regupol Sports Surfacing suited for basketball, netball and tennis. Concrete retaining blocks form terraced seating for spectators adjacent to the court. Behind the seating blocks, the Cleargl scrreen along the running track provides secondary security.

The Open Court functions directly from within the Centre for Illustrated Sports, but can also be opened to the public at certain times of the day or week. A large shifting screen (by Hilalldam) runs on a track on either sides of the climbing wall, bordering the court. When the screen is on the street’s of the climbing walls, access is provided to users from within the Centre, while prohibiting access from the street. Alternatively, the screen wall can be shifted across to the opposite side of the climbing walls to allow the members of public entry onto the court, simultaneously providing security to the Centre.
72 Open Court Layout
Sketch Plan by author - not to scale: 2007

73 Climbing walls at Sports Training Village, University of Bath
www.teambath.com: 2007

74 Close-up of Ball Bungee Connection

75 Stainless netting mesh for roofing systems

76 Coated alkali resistant fibre glass mesh cloth

7.10 Open Court
It is envisioned that the centre for multi-sport accommodate various kinds of sports, within one building envelope, at different times of day. The aim is achieved by the use of sliding hanger doors form Hillaldam, bleacher seating and planned floor finishes. Translucent synthetic steel divider curtains will also be introduced to allow for flexible interior spaces.

In addition, the roof structure will slide open to accommodate volleyball games, out/indoor cricket and even golf practice. Coated alkali resistant fibre glass mesh cloth covers the open courts at a height of 7 metres to keep balls in field. The cloth is supported by aluminium poles horizontally fixed to the steel structure.

The adaptable envelope can become an atrium, but can also be closed to prohibit inclement weather from interrupting sports activities. Precast concrete hollow blocks form terraced spectator seating that borders the structure.

The steel structure is clad with profiled metal sheeting, mostly KlipLock 700 and Miniwave, and insulated either with glasswool insulation backing the chalk boards on certain walls, or with 40x600x600mm tongue-and-groove Isoboard.

Permanent walls form the backdrop for mesh covered storage cages, electronic scoreboards and lighting fixtures. The extended wall, on the eastern facade has ribbon-like window openings at alternating heights, allowing views of athletes training on the adjacent hurdles track. At the end of the 6 lane 50m hurdles track is a sand box to accommodate long jump and triple jump. Track-and-field athletes cross these hurdles and sand boxes as part of their adventure course.
80 The room can be cleared to accommodate a singular match, or it can be used for training sessions hosting a multitude of matches simultaneously. High performance judo centre, Sports Training Village, University of Bath

www.teambath.com : 2007

79 Access and Views through the Multi-Sports Centre
Sketch Plan by author - not to scale : 2007

81 6 lane 132m Indoor Sprint track, triple jump pit at the end, Sports Training Village, University of Bath

www.teambath.com : 2007

7.11 Multi-Sport Centre
The use of bleacher seating on tracks around an axis, permits the end-users to change the building structure to accommodate their specific needs at different times of day. If there is no seating requirements, these bleachers can fold away to become room separators.

Sun angles are used to transform the interior lighting quality at different times of day. Danpalon roof lights, tinted red, yellow and blue are fixed at specific angles to the sun, in order to create different lighting conditions. Changing interior colors can assist with schedule orientation as well as creating a specific light quality.

A modular approach is followed. The structural grid defines a court area that can be utilized for singular or multiple sports. This subdivision of courts within the greater structural rhythm of the building, is a subtle reminder of Marabastad’s finer grid layout as opposed to the bigger divisions of neighbouring Pretoria’s Inner City blocks.
7.11 Multi-Sport Centre
Kliplock 700 in dove grey Chromadek sheeting fixed to purlins with concealed fixing clips. Closed with Industrial 7 eaves and ridge filler from Polyclosures.

40x600 tongue and groove isogard rigid extruded polystyrene closed cell insulation board with polyethylene treated kraft slip sheet fixed concurrent with roof covering over steel purlins.

Apex fagia flashing from Graft-lock fixed to 2,5x25x300 stainless steel bracket with fastner and fixed to rafter or roof sheeting with s/s. self-tapping screw.

150x65x20x2 steel lipped channel purlin bolted to 125x75x8 steel angle cleat with 4xM16 bolts and welded to 203x133x25 steel h-profile rafter.

Steel closer fixed to 125x75x8 steel angle welded to beam.

203x133x30 universal beam h-profile bolted to concrete column with 200 steel holding down bolts on steel bearing plate.

Anodised aluminium frame.

8mm laminated glazing panel.

450x600 reinforced concrete column on 600x1200x450 concrete column footing.

**Roof Edge Detail**

Scale 1:20
Ventilation Detail

Scale 1:20
Admin & Cafeteria Details

Scale 1:20
Danpalon multicell 16mm translucent panel, snap on and interlocking dry-glazed profiles fixed to concealed stainless steel retention clips. Superior light transmission/insulation ratio.

End wall construction:
- Metal counter flashing
- Flashing and closure angle
- 55mm stainless steel frame
- Pivot base
- 150x90x24 PFC support purlin
- 203x133x25 tapered end rafter

No ceiling, insulation or waterproofing required.

600mm fluorescent tube lights set on purling for uplighting.

16mm laminated glass with printed decal polycrystal interlayer between two layers of float glass set in anodised aluminium frame fixed to 50x40 spacer and purlin.
01 Developmental Growth
The aim of this dissertation was to provide Marabastad with a Centre for Illustrated Sports that could accommodate alternating levels of use and activity. Issues surrounding security was addressed by the application of fencing, climbing walls, passive surveillance and landscaped terraces.

In order to promote a positive living environment, the structure allows for cross ventilation, temperature control and the use of natural lighting. Furthermore, a permeable structure is achieved by the use of translucent sheeting, glass flooring, pool windows and large glazing panels. The differential use of facilities is promoted by the implementation of bleacher seating, shifting screen walls and curtain panels.

The centre allows the youth within Pretoria CBD access to sports training facilities and equipment in order to promote physical activity. A suspended meditation room, enhances body-awareness. A running track, surrounding the centre, connects with the bigger heritage route, linking the Present with the Past. Intelligent screens at busstop structures throughout the city will advertise activities hosted within the complex.

The centre becomes a performance environment capable of adjusting to a specific user’s needs, which in turn should result in a longer lifespan. The introduction of kinetic architecture, enables the structure to interact with its potential users. This built work now awaits functional intervention by different sports.

9.1 Concluding the Dissertation
9.1 List of Figures
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All plans, sections and details done by author. 2007.

CHAPTER 9:

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