INTRODUCTION
From the theory investigation and site analysis, objectives are formulated. These are used to set principles to guide the conceptual design phase. The objectives become the criteria for evaluating the success of the project.

Define the site
The site cannot be analysed in isolation from its surroundings, as these influence activities on the site. In order to propose a design for the site, it is important to define how the surroundings influence the site. It is also important to establish what effect the new proposal will have on the site.

Integration
The site was analysed in terms of field-dependence/independence. This investigation showed that different social and cultural groups use space differently. This resulted in the principle aim of this dissertation to design for the different social and cultural user groups.

Consistency
Areas of consistency provide a point of reference and give identity to the design.

Transformability
Adaptable elements interact with the constants. The transformative areas are event-driven and depend on their use.

Interaction
Create areas that will facilitate various means of interaction, such as between the users and the city, the users and the building and different user groups with each other.

Schedule
In order to determine which spaces in the design will be constant, transformative or interactive, a schedule is drawn up and each space should be analysed in terms of requirements and use.
Design Investigation
Concept Exploration

Prof Schalk le Roux (Piekke en Geboue van Pretoria Volume II 1990:130) refers to Pretorius Square as ill-defined. He suggests that better spatial definition will elevate the square from the through-route it currently is to a vibrant gathering place.

Currently the layout of Pretorius Square is based on the Roman Forum model. This model, with its strong axis, is a symbol of dominance (F. Motsepe 2006), hierarchy and exclusion and does not allow for interaction between users. It can therefore be compared to the field dependent diagram.

Bernard Tschumi strives for architecture to be a ‘combination of space, events and movement without any hierarchy.’ (Tschumi 1997) This can be done by applying principles of field-independence as it is a model for inclusion and equality of users. Finian Motsepe (presentation 2006) on designing for Ubuntu, names 4 principles: order, hospitality, dignity, sharing. The field-independent diagram allows for these four principles and the break down of hierarchy.

fig.5.1 Concept Design: Pretorius Square
Two methods of setting up a programme can be implemented. The first is based on schedule and the second is based on events, as suggested by Bernard Tschumi.

‘PROGRAMME: A determined set of expected occurrences, a list of required utilities, often based on social behaviour, habit or custom. (Tschumi 2000:13)

EVENTS: An intermediate set of unexpected outcomes.’ (Tschumi 2000:13)

When reading the schedule based programme, words such as ‘auditorium’ evoke predetermined concepts, while the description ‘area for discussion’ is far more open-ended and allows for exploration. Each identified area in the event-based programme will be further investigated. From here models will be built identifying their ideal characteristics. These can then be used to in the design process by adapting them to the context.
Design Investigation

Exploration of Areas in the Programme

fig. 5.3 - 5.7
Design Investigation

**AREA FOR REFLECTING**

**EVENTS:** Write, study, compose, develop, test, examine, confirm, produce.

**WRITTEN WORD**

**CHARACTER:** Intimate, safe, private, solid.

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**AREA FOR RESEARCH**

**EVENTS:** Collection of books, recordings, images, film and people with knowledge.

**VARIABLE MEDIA**

**CHARACTER:** Spine through building, used by all, connects different languages, connects users to other events in the building.

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**AREA FOR EXHIBITION**

**EVENTS:** To engage the public. Show work being done. Link inside and outside spaces.

**VARIABLE MEDIA**

**CHARACTER:** Inviting, transforming, link users to events.
Design Investigation

Concept Sketches

**fig. 5.8**

**THE SHELL**

**fig. 5.9**

**THE TRANSFORMATIVE**

**fig. 5.10**

**THE CONSTANT**

**CONCEPT**
Programme specific pods within a transformative building.

**CONSTANT**
Programme driven

**TRANSFORMATIVE**
Event driven
These are the first concept sketches experimenting with the theoretical objectives.

In the first exercise (fig 5.8 - 5.10), the building is proposed as a shell, divided into constants and transformatives. The constants are illustrated as pods, floating inside the building, the rest of the building, a grid system, houses the transformative elements and can adapt to the needs of the users.

The next group of concept sketches (fig.5.11 - 5.13) starts investigating the concept in terms of site and requirements. A design was made to pull the pods out of the building, thus having the constants housed separately from the transformative part of the building. This was done for various reasons. Firstly, it allows the building to be read easily by passers by. The shape and material qualities of each part will portray its use. Secondly, the pods can be elevated off the ground, allowing the ground floor below to be developed into a museum park in order to promote the museum park boulevard and to take the ISDF proposals into consideration. Lastly, by splitting them, a passage could be created between the two where circulation can happen. Such an area will allow for interaction between the two parts of the building and their users.

*PROGRAMME: a determined set of occurrences, a list of required utilities, often based on social behaviour, habit or custom.*

*EVENTS: An intermediate set of unexpected outcomes.* (Tschumi 2000:13)
**Design Investigation**

**Concept Exploration**

**CONCEPT**

Interaction between constant and transformative

**INTERACTION**

In response to the context, the design should allow for a balance between elements of consistency and elements of an adaptive, transformative nature.

The concept proposal shows the cross-programmable (transformative) activities in the main building, which will house the library and offices.

The programme specific (constant) activities are housed in pods. This allows for freedom in designing the pods. Each can be designed to the size, shape and quality required for its use. They will house an auditorium, lecture halls, studio’s and workshops.

Between the two parts of the building is a service spine and the circulation hub. These house the services that both sides of the building depend on. Placed in the middle, the two parts share facilities, allowing for an area for interaction between the users of the two parts.
Design Investigation

Concept Exploration

fig.5.15 Concept Sketch: Section
Design Investigation

Concept Exploration

CONCEPT 1: Alternating levels connected with an internal ramp system.
CONCEPT 2: External ramp system connecting the programmed and unprogrammed buildings.

The ramp is a building on its own, housing movement and linkages. Activity nodes on the ramp act as thresholds into the building and create areas where activities can overflow and interaction can take place.

TSCHUMI'S HUB:
The hub acts as the main circulatory system of the building, connecting the various activities whilst acting as an interactive node that links all users and events. (Tschumi 2000: 289)
Circulation at ground level
Circulation on ground level was designed to integrate passers by and users.
Tourists: The ground level functions as an open museum-garden where exhibitions and performances can take place. The restaurant or kiosk in the old NZASM building will attract tourists from Pretorius Square to the site.
Commuters: The ground level walkways provide infrastructure for the commuters who move to and from Bosman Street Station to the CBD during peak ours. Small trade can be put up during this time and taken away once the commuters leave.
Users: At any stage, the tourists and commuters will have opportunities to enter the building via ramps and stairs. Users can either enter through the north or will be able to park on the south or in the basement.
Staff: Staff parking is provided at the back near the staff entrance.
Deliveries: Deliveries will be via the basement.

Vertical Circulation
The circulation system is the most important part of the design as this is not only a space for movement but is where interaction between users will take place. The circulation hub is the centre of the building: connecting the constants and the transformative. However, it is clearly visible from outside. This will allow users and passers-by to understand the building and to be invited in. The hub is the semi-public zone of the building.
It allows more flexibility in the main building as this is almost free of circulation.

GATEWAY
As a capital city, the gateways to Pretoria will be governmental and institutional buildings. It is important to design a facility that is an example of current South African architecture.

TEXT
Text will be used on the facade to illustrate its use as an institute for African language studies. African artists will be commissioned to do murals inspired by literature. The south facing glass facade will be covered in letterwork of poems written in African languages. The concrete walls on the west and east facades can have text cast into the concrete depicting the name of the institute. Walls can also be left open for graffiti to be done on them.
Design Investigation

Design Considerations

TRANSFORMABILITY

The main building is designed to be flexible and adaptable to a variety of uses. Flexibility is achieved in two categories.

Refurbishment

Care was taken to allow for low cost refurbishment of the building, if the users or function of the building were to change at a later stage. Every second floor of the main building is of timber and every other floor of reinforced concrete. These timber floors can be removed when double volumes are required, so the layout can be changed. A grid of steel I-section beams provide structural support on a 5mx8m grid. Raised floors allow for services, such as air-conditioning and cabling, to be taken through the floor. Raised floors will be installed on a grid system and will allow for flexibility of layout.

Every day use

Flexibility for everyday use includes the raised floor system which allows services to reach all parts of the building independent of the layout. Movable parts of the timber floors allow for more flexibility. These floor panels are situated under the existing timber floor and can be slid out using a pulley system to increase the floor area as required.

Calculations:

Aim: To determine load that each wheel will carry in order to choose the correct system from the manufacturer.

Density of timber:
- Pine = 480 – 720 kg/m³ (use maximum)
- Density of plasterboard = 1280 kg/m³

Determine the amount of timber used:
- 3m x 0.125m x 0.038m = 0.01425m³
- 2.5m x 0.125m x 0.038m = 0.0890625m³
- 3m x 2.5m x 0.016m = 0.12m³
- 3m x 2.5m x 0.008m = 0.048m³

TOTAL = 0.2833125m³

Determine the amount of plasterboard used:
- 3m x 2.5m x 0.0064 = 0.048m³

Weight of timber:
0.2833125m³ x 720kg/m³ = 203,985kg

Weight of plasterboard:
0.048m³ x 1280kg/m³ = 61.4kg

TOTAL: 265.4 kg on each wheel

Thus choose the following system:
Henderson 301H straight sliding gear to carry up to 400kg consisting of galvanised steel top track type 301H, side fix
aluminium brackets and end clips type 1A/301, adjustable hangers type 57A/S, brass roller guide type 106N/100, galvanised steel bottom guide channel 100, two bow handle type 463.

Interchangeable partition walls are provided on a grid system for ease of use. The grid consists of tracks built into the ceiling and floors. The panels can be clipped into these, or removed as required. When panels are not in use they can be rolled into storage rooms in the service core. Panels include: Closed panel, panel with opening, panel with glass window, panel with door, balustrade.
Design Investigation

Design Considerations

ORIENTATION & CLIMATE

Orientation
The orientation is determined by the city framework, and the functions housed. The main building, which contains the library, is set back on site to create a public open space on ground level. The main façade faces north, favourable for the location of the public open space and the foyer of the main pod. The library building faces south, which is preferred as sunlight damages books. The building is tilted slightly towards the north-west to accommodate the movement of commuters through the site and encourage them to move past and into the building.

Sunlight
With a maximum of 80% sun in summer and 67% in winter (AAL310, 2002: 19), sunlight is an abundant resource. Careful planning of glazing overhangs and orientation will ensure that glare is minimised but that a comfortable amount of heat is permitted into the building. The design process also focuses on harvesting sunlight for energy.

Existing Buildings
The existing department of home affairs has north-facing windows. Care was taken not to block direct sunlight onto the façade. This influenced the decision on shape and height of the proposed design.

Louvre System
Sunscreens block direct sunlight during summer whilst diffusing light and preventing glare. For this reason louvres are fitted over the glass roof of the circulation hub.

Natural Light
Direct sunlight is hazardous to books but indirect natural lighting is preferred to artificial light for reading. Therefore light is allowed into the building through glass walls on the south façade.
The library building is set behind a semi-solid service wall and faces south. This is ideal because direct sunlight damages books, while natural indirect light is favoured above artificial light for reading. For this reason the offices and study rooms are located on the southern façade. Direct morning sun from the east should be blocked out of the building. For this reason the plant room is situated on the eastern façade. Direct sunlight from the west should also be avoided.
Rainfall

Summer rainfall area, thus November to March.
50-80 rainy days per year
380mm to 700mm per year
Hail 4 times per year
High evaporation levels during summer.
Average humidity: 59%

Water is harvested from the roof through downpipes into
water tanks situated underground. The tank will be fitted with
an overflow valve when it full. Stormwater channels and the
basement water drainage is also stored in an underground tank.
Stored water will be used for irrigation/cleaning of outside and
basement surfaces. Grey water can also be used for flushing
WC’s.

Design Investigation

Calculations:

Roof catchment area: 90mx12m = 1080m²
Average rainfall per rainstorm: 40mm
40 x 1080m² = 43,200 litres per rainstorm
43,200 litres per rainstorm that can be used to irrigate the
park.
Tank size:
5,000mm long x 3,456mm wide x 2500mm high will hold
exactly 43,200 litres.
Temperature
Summer: Average temperatures of 16°C to 30°C with occasional highs of 42°C. Maximum monthly average of 28.6°C in January.
Winter: Average temperatures of 7°C to 23°C with lows of up to 0°C at night. Minimum monthly average of 4.5°C in July.
Thermal mass is provided by the concrete walls and roof absorbing direct and indirect solar radiation during the day and releasing it into the building later. The amount of time it takes to release the heat depends on the thickness of the wall/roof. The 300mm thickness is ideal for allowing the heat to be absorbed during the day and be released at night. The lower temperatures absorbed during the night will be released during the day. This will provide a comfortable work environment and will alleviate the use of a mechanical heating and cooling system.

Wind
Summer winds blow from east/southeast to northwest.
Winter winds form South-west and north-east.
The building is orientated for maximum cross ventilation. The summer breeze is encouraged to pass through the museum park area while the winter wind is blocked by the buildings to the north-east of the site.
85 concrete slab with fall of 1:70min toward stormwater channel

vented brick

300 reinforced concrete retaining wall with tie holes left open as weep holes at 1/m²

75 cavity

110 brick wall

25 cement mortar screed to 1:70 fall

100 concrete surface bed with 3mm sawn joints to 1/4 slab depth in panels of 4x4m max.

water used for washing cars and basement to fall of 1:70 towards sump

20 MPa concrete foundation according to engineer's specification

450x450 cast iron grid over concrete frame with 1500 uPVC pipe under slab at fall of 1:200min towards tank

850 uPVC pipes at 500 centres

0.45 polyolefin damp proof membrane

85 dry packed bricks for seepwater to run to sump

85 reinforced concrete base with weep holes

Detail 1B Scale 1:50

Detail 1C Scale 1:50

Institute for African Language Studies

Basement Details 1B & C

Drawing

Sheet 1

Scale 1:50

满满的

J Novelle

R J van Rensburg
0.45 copper sheets of 600 wide with standing seams on felt over 22 thick tongue and groove softwood planks

300x50 laminated SA pine beams bolted to steel frames on site

High density polyurthane foam insulation packed between timber beams

50x50x3 mm angle welded to steel frame and bolted to timber beams with two M8 hexagon bolts

300x50 0 nails at 400 centres
Steel angles fixed to flanges with two M8 hexagon bolts

Four 100 x 10 steel flanges welded to 2190 x 6 x 31.5kg/m hollow steel column

175x175x10 steel angle welded to 178x178x10 I-beam and bolted to flange

2190 x 6 x 31.5kg/m hollow steel column with four 100x5 steel flanges welded to it

1000mm high handrail of 60x20 timber fastened to steel flange

Stainless steel cables 100mm apart spanned between flanges

25 sandstone tile floor finish

100 precast, pre-stressed hollow core concrete slab in sizes of 1800x600

178x178x10 steel I-beam spanning 5000mm between steel angles

175x175x10 steel angle welded to I-beam at 5000 centres and bolted to 100x6 steel flange with two M8 hexagon bolts

Plan: Connection of ramp to columns

Scale 1:10

Connection of ramp to columns

Scale 1:50