

## 8.0 DESIGN DEVELOPMENT

## 8.1 CONCEPT

The existing buildings at intersection fig. 64 do not define it as a space as a result some of them being set far back from the corners. In this design proposal new buildings fig.65 will be placed along the street edges connecting with some existing building.

The new buildings will define a space at the intersection which will bind the disparate building scales which are at adjacent to each other. It is proposed that the main pedestrian entrance will be on along the Hinterland Drive near the main entrance to the campus forming a cruciform tower as landmark.

## 8.2 LEGIBILITY OF THE SITE

- To increase the legibility of the site, paths, nodes and landmarks must clearly be identifiable.
- The intersection of Hinterland Drive and Hans Strijdom Drive must be a node.
- In order to do this, the proposed buildings in the framework will define space at the intersection
- The entrances of the buildings should be at the corner that it is visible.



Fig.64: The existing intersection lacking spatial definition (author).



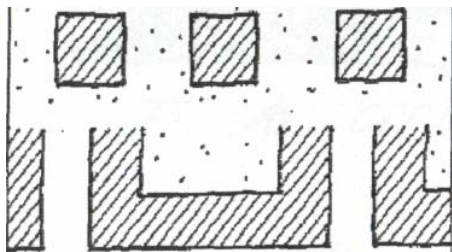
Fig.65: Proposed INTERSECTION – Forming spatial definition of urban space (author).

There are two objectives to be achieved in designing path enclosure at the intersection:

- to give each path a strong character, easily distinguished by users
- to bring out the relative functional importance of each path.

### CONCEPTUAL ENCLOSURE THEORY

#### LESS ENCLOSURE



#### MORE ENCLOSURE

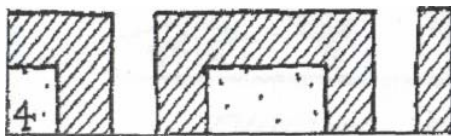
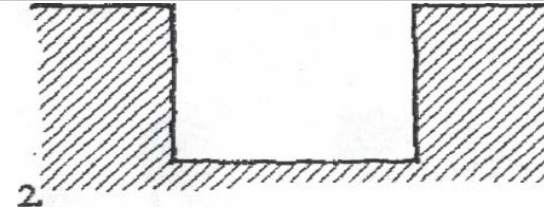
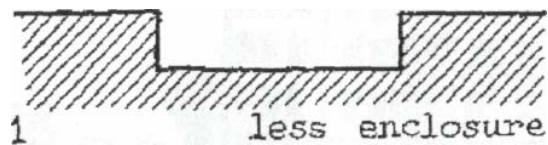


Fig.66: Enclosures in plan (Bentley, 1985:45)



#### MORE ENCLOSURE

Fig.67: Enclosure in section (Bentley, 1985:45)

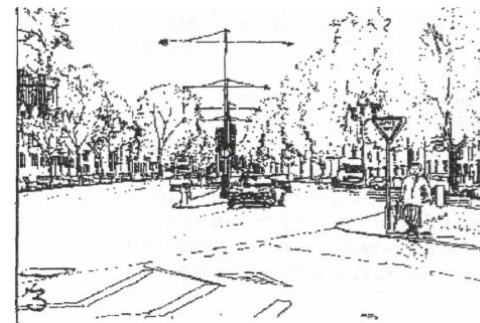


Fig.68: St. Giles, Oxford, England (Bentley, 1985:45)

A path's legibility is crucially affected by its enclosure in plan and section. Height/width ratios of less than 1:3 seem weakly enclosed (1, 2), so avoid them where possible- Where this is difficult, enclosure can be increased by planting (3).

Paths are channels of movement. Examples are Hinterland Drive and Hans Strijdom Drive. To reinforce the paths, Bentley (1985: 52) suggests that the path enclosure must be increased. This must be done in plan and section.

## CONCEPTUAL ENCLOSURE THEORY APPLICATION

A typical Mamelodi street shows that there has not been made a proper provision for pedestrian sidewalks. The existing Mamelodi street section has no space definition. The buildings are far from the street edge, with brick fence around it.

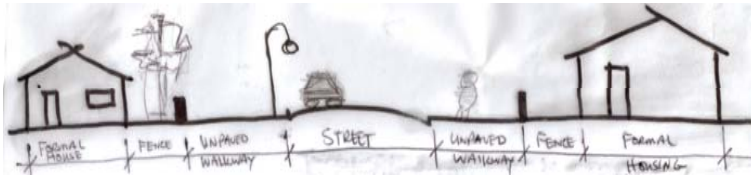


Fig.69: Existing Mamelodi Street section (author).

In the proposed street section at the intersection and all main streets in Mamelodi, the height of buildings is adjusted to form a defined path. There are paved sidewalks with street lights modified from the existing street lights and activities like informal trading stalls for pedestrians.

Active streets make vibrant paths where people will feel that they are part of the community.

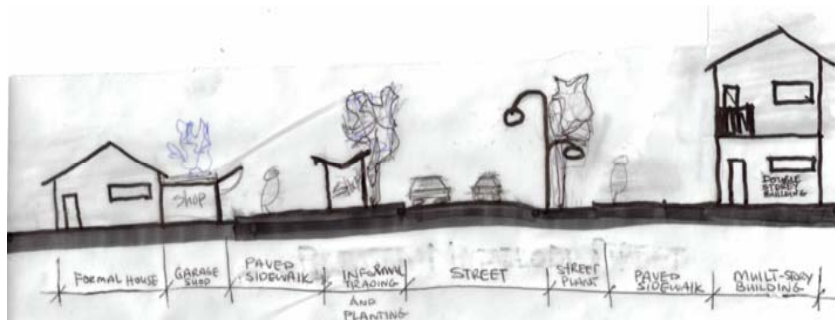


Fig.70: Proposed Mamelodi Street section (author).

In contrast to nodes, which can be entered, landmarks are point of reference which most people experience from outside. The corner of Hans Strijdom Drive and Hinterland Drive is an ideal place for a landmark, because a lot of people pass it. It is also situated near bus stop and proposed taxi rank, making it a good meeting place.

Well defined paths around the site, distinctive nodes created as well as a landmark at the corner of Hans Strijdom Drive and Hinterland Drive will increase the legibility of the site.

### 8.3 FRAMEWORK



Fig.80: The proposed site within the existing fabric (author).

The existing site situation

- No paving on side walks
- Informal trading stalls along the roads
- No vegetation/trees
- No landmark on the intersection
- Ugly edge on the Hans Stijdom Drive on University of Pretoria side fence.

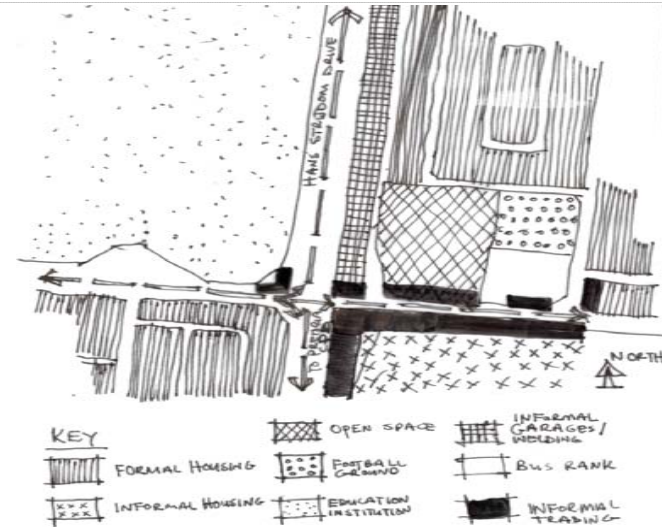


Fig.81: Existing zoning framework at the intersection (author).



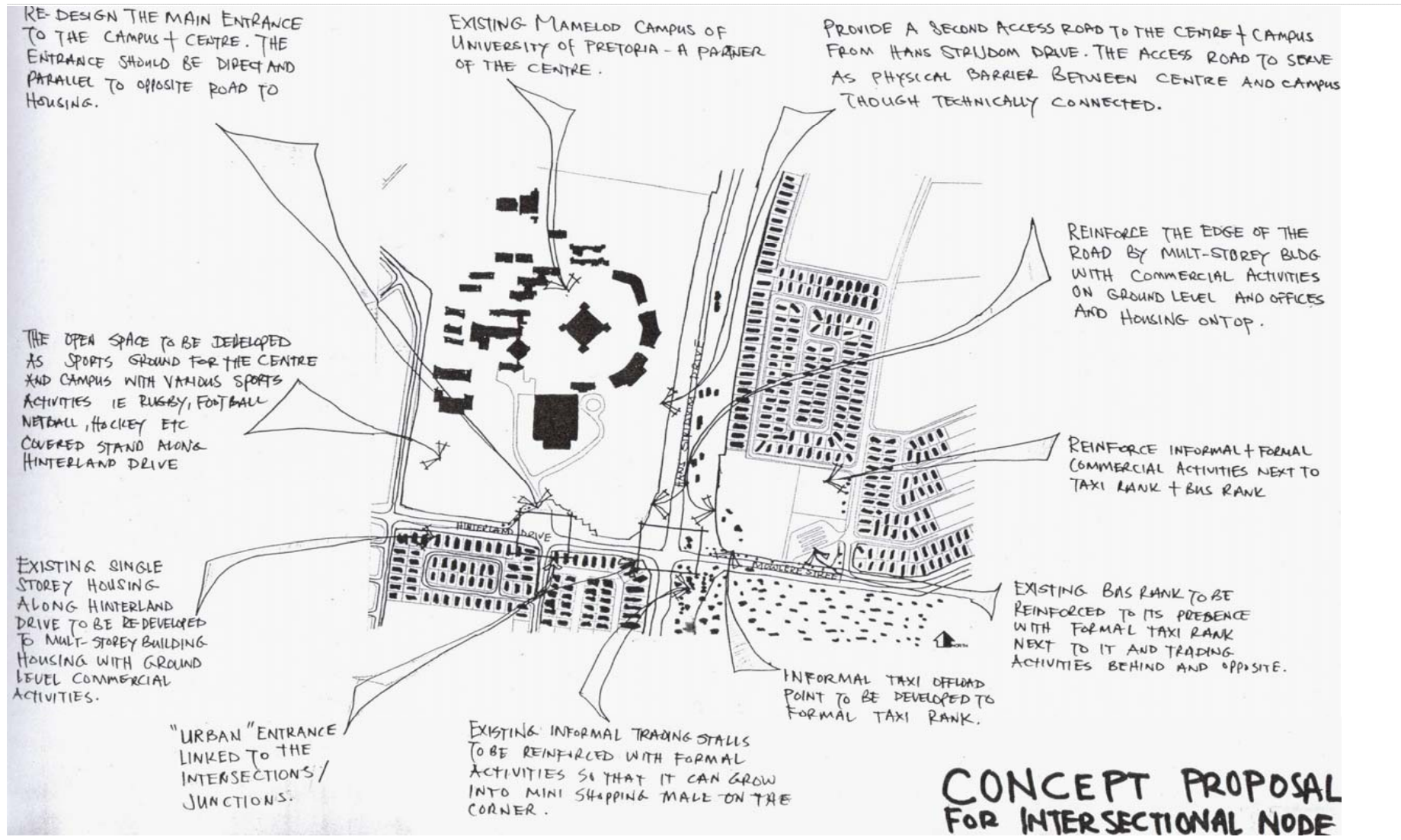
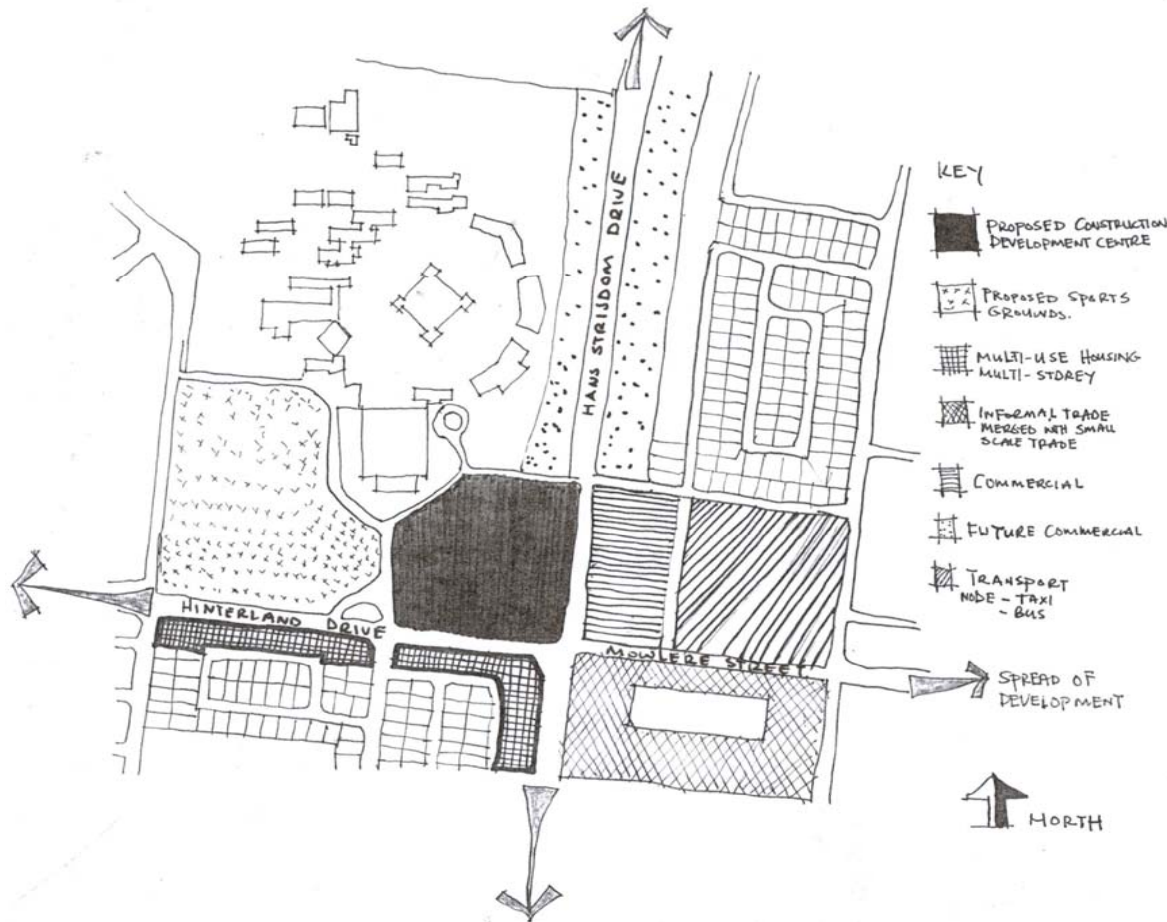


Fig.82: Proposed conceptual framework at the intersection (author). Scale 1:4,000.

## PROPOSED INTERSECTION DEVELOPMENT FRAMEWORK

- The Construction Development Centre will generate the opportunity for the Sustainable future development at the intersection and along the roads.



Opportunity offered/ skills mastered at the centre

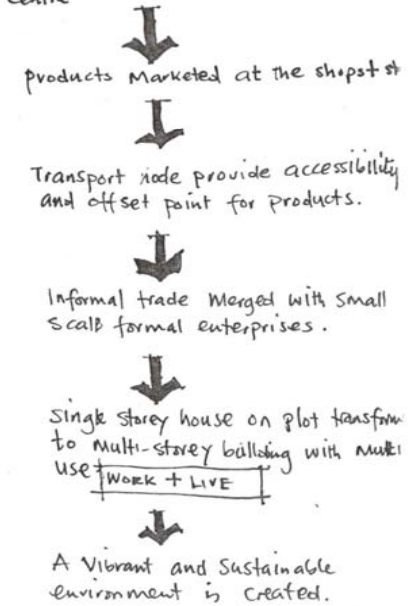


Fig.83: The proposed development framework at intersection (author).

The proposed intersection development framework will be done in two phases:

#### PHASE ONE

- Creating a pedestrian friendly intersection by paving the side walks along the Hans Strijdom and Hinterland Drives.
- Creating a landmark on the corner of Hans Strijdom and Hinterland Drives.
- Reinforced the edge of Hans Strijdom and Hinterland Drives with multi-storey buildings.
- The proposed Community Construction Centre

#### PHASE TWO

This phase will include:

- Formalising the informal commercial activities along the Hans Strijdom and Hinterland Drives where there is heavy pedestrian and vehicular moments from Tshwane CBD with formal trading stalls.
- Formalising the informal taxi stopping points along the the Mowlere street with a TAXI RANK next to existing Bus rank
- Upgrade and legalise the existing informal welding and garage stalls to formal light industry factory shells along the Hans Strijdom Drive.

### 8.4 SITE ANALYSIS, PLANNNG AND DESIGN

The following diagrams analyse the site and illustrate the principles on which the design and planning of the site is based.

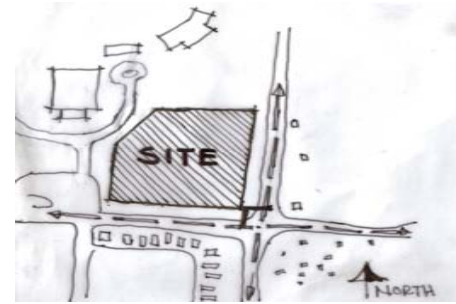


Fig.84

#### THE PROPOSED SITE

The site is on the corner of Hans Strijdom Drive and Hinterland Drive. These are two main roads from Tshwane CBD to the site. Hinterland Drive has more pedestrian and vehicular movement. Hans Strijdom Drive is more vehicular and the most direct route to CBD.



Fig.85



## BUILDINGS STANDING ON THEIR OWN

Large open areas are not contained or defined. The buildings at intersection do not relate to each other spatially

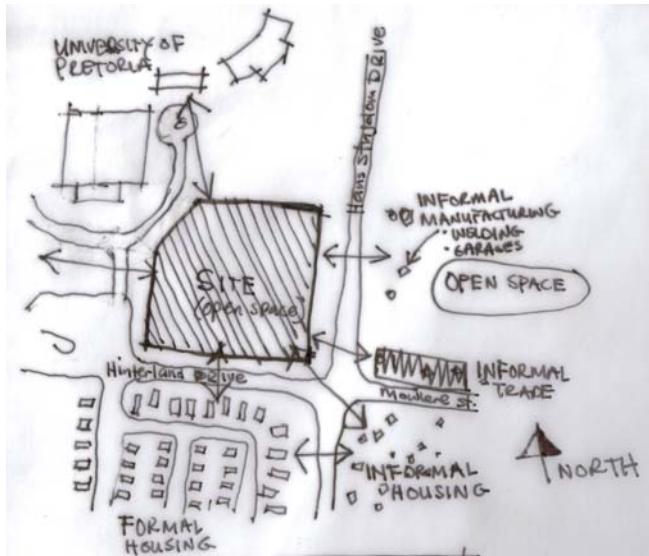


Fig.86

### SPACES AROUND THE SITE

Various spaces surround the site and create an opportunity to relate existing activities with the centre. The informal settlement will

provide the best field research and experimental area for the Centre.

The informal trade will compliment the Centre's sources of funding by selling products from THE CENTRE to the community. Informal small enterprises along the Hans Strijdom road will transform to formal enterprises with activities of the Centre.

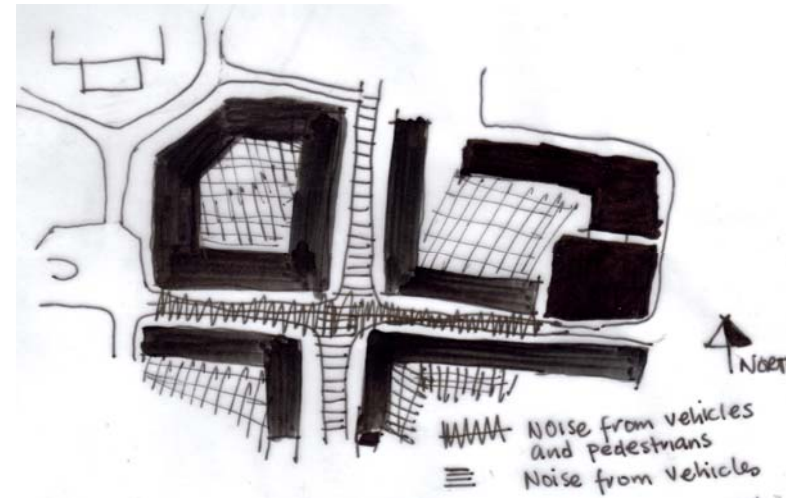


Fig.87

### RESPONSIVE BUILDINGS ENCLOSURE

Open areas are not contained or defined as in fig.6.14. The buildings are not related to each other spatially. The proposed Buildings are placed on the site so that the street edges are defined and contained internal spaces are created inside. The

proposed layout of the Centre is structured around the CENTRELISED PUBLIC SPACES.

The intersection corners and all corners are defined as entrances, landmarks and directional pointer.

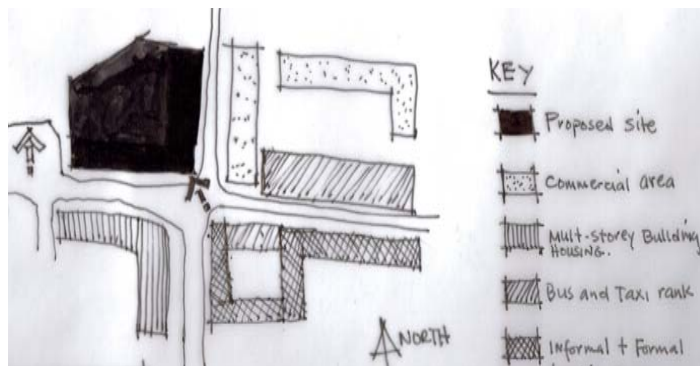


Fig.88

#### ACCESSIBILITY & FUNCTIONS OF THE SITE

Buildings placed close to street edges so that street edges are defined and street spaces are contained.

Pedestrian are encouraged to enter the building en route to their destination.

The main pedestrian entrance to the Centre is on the existing main entrance to the campus on Hinterland Drive.

Vehicular access will be on the existing main entrance to the campus on the Hinterland Drive.

A taxi node is created next to existing bus rank to formalise the taxi stop points along the streets.

Commercial activities reinforced along the Hans Strijdom Drive and Mowlere streets and pedestrian side walks introduced at the intersection.

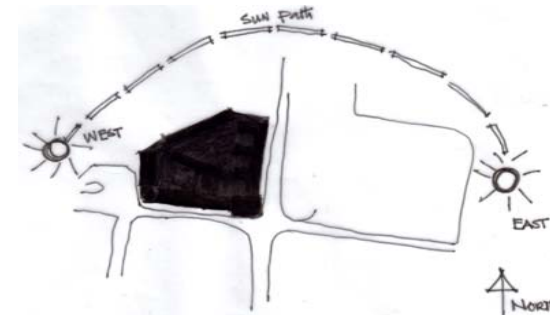


Fig.89

#### ORIENTATION OF BUILDINGS

Buildings are orientated to the NORTH where possible or along the street edges to define the street edges and responds to it as urban spaces.

Where housing units could be not being oriented to the north, they could look out onto the internal courtyard.

Buildings must be able to shade off summer sun and allow in winter sun.

Where the building is facing the strong west winds and east sun appropriate measures should be taken i.e planting trees to block the winds and shade uncomfortable sun.

## 8.5 DEVELOPMENT OF THE DESIGN

The following diagrams illustrate the concepts and development of design.

Site analysis in terms of site planning

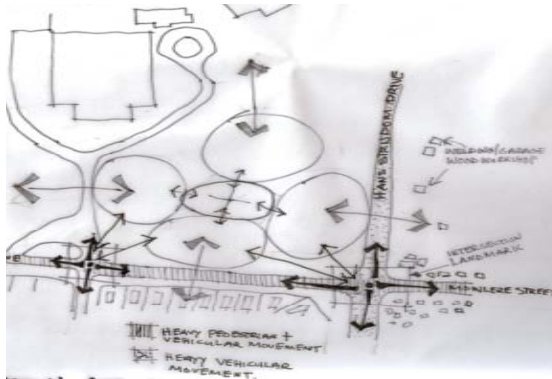


Fig.90

### CONCEPTUAL SITE RESPONSE AND USE

- Bubble diagrams to show relationships of functions, space and movement
- Movement of people and cars as main movement system.
- Daily activities at the intersection to determine the functions of the spaces and of the Centre.
- Addressing the street edge as urban fabric.
- Intersection as landmarks and entrance points to the Centre.

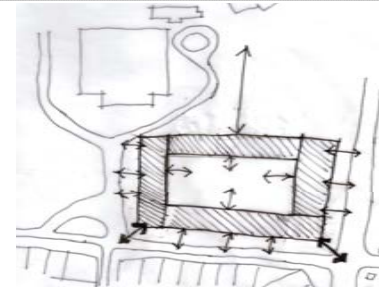


Fig.91

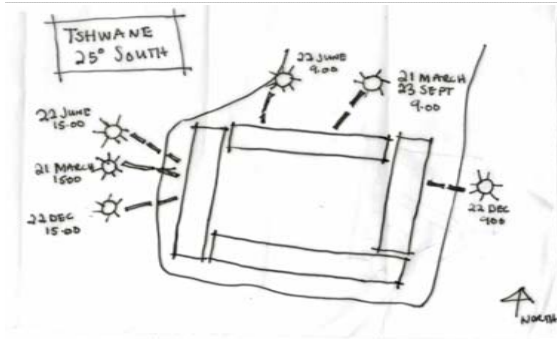
### FIRST CONCEPTUAL SITE RESPONSE TO PLAN FORM AND MOVEMENT

- Locating blocks according to movement system and in relation to the existing pattern of enclosure of the whole campus and its grid system
- Intersectional nodes to be entrance nodes to the Centre.
- Areas along Hinterland Drive and Hans Strijdom Drive to be public areas with commercial activities.

### CONCEPTUAL RESPONSE TO CLIMATE

The basic concept is to shade the internal courtyard from which cool air can be drawn into the building in summer. The trees must be deciduous (e.g. Celtis Africana), so that sunlight can enter the courtyard in winter. Hot air inside building will be expelled from the openings placed close to the ceiling of each level.

The northern part of the courtyard is landscaped, planted with grass. During summer when the solar angle is higher and it is warmer, people may relax on the lawn. During winter less sunlight will reach the courtyard. The southern part receiving should have a hard concrete surface with high thermal capacity, meaning a more comfortable environment.



The western building will create a warmer courtyard, screens off the cold WESTERN wind in winter.

Fig.92: Movement of sun in relation to the building of the Centre

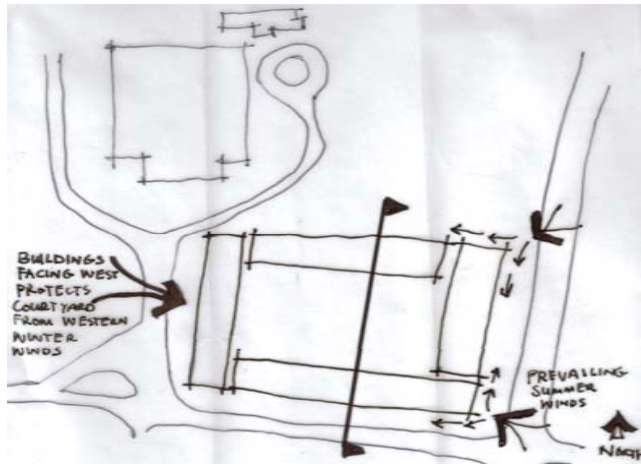


Fig.93; Wind movement to first conceptual block plan (author).

The cooling effect of a wind that meets an opening in the façade at an angle is much greater than of a perpendicular wind. In the summer months, the wind is north-easterly to south-easterly, thus meeting the shops and classrooms at an angle with the result that good cross-ventilation takes place.

## CONCEPTUAL CLIMATIC CONTROL DESIGN SKETCHES

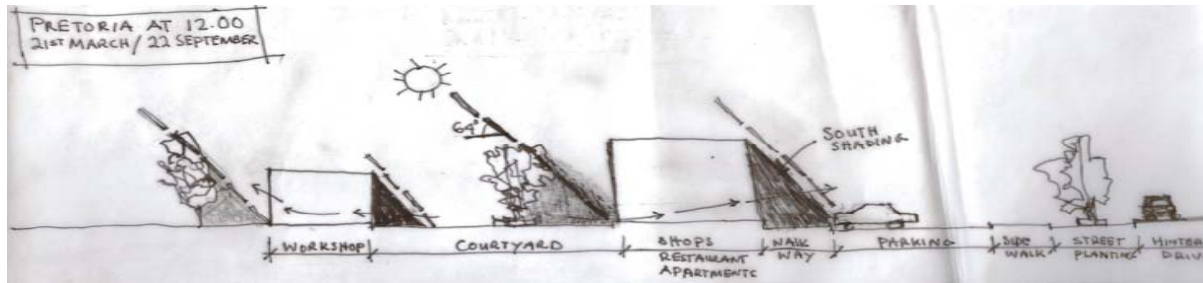


Fig.94: Conceptual North – South section through the Centre, showing the cooling effect of shaded courtyard and shading on south side which will allow full length glazing to shops and offices windows. the northern side need large overhang to protect sunlight in summer.

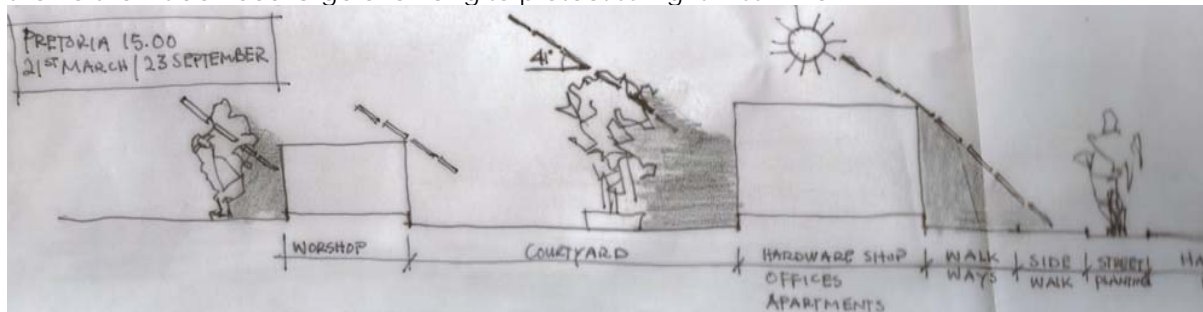


Fig.95: Conceptual West – East SECTION through the Centre. All walkways are shaded. The need for screen on the building from sun, wind and rain.

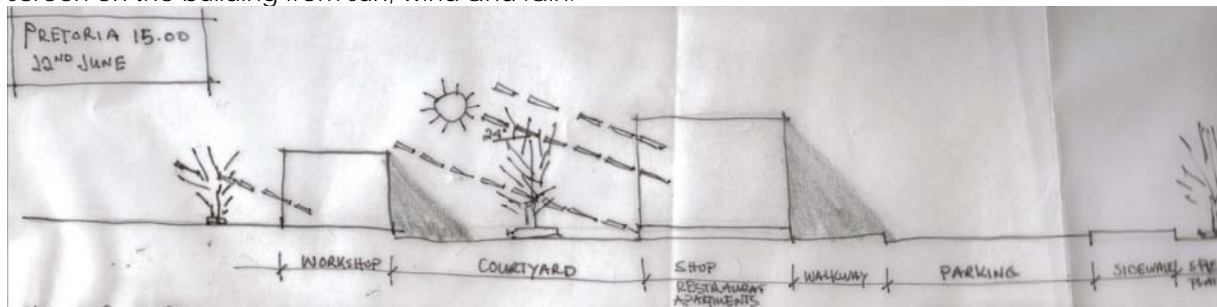
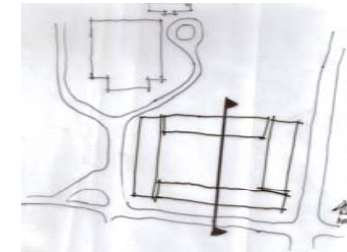
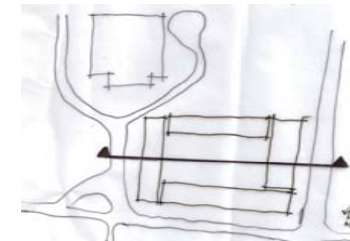


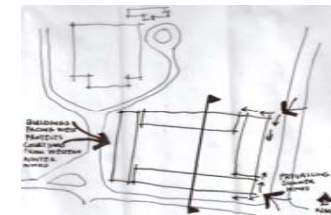
Fig.96: Conceptual North –South section. In winter, trees will loose their leaves and let the warm sun through because the sun angles are low to pass through the large overhang. The southern facades are not exposed to sun where large window openings will bring light into buildings.



Site



Site



Site



## CONCEPTUAL OUTDOOR PLACE THEORY

The most important outdoor spaces in the design of the Construction Development Centre are the internal courtyard and the urban space along the streets. In order for these spaces to have enough space definition, it should comply with the basic space requirements that Bentley (1985:54) suggests:

- Compact plan forms, with strong enclosure in plan and section
- Entrances positioned to emphasis the node as an element distinct from its surroundings.
- Entrances designed for minimum interruption of the node's enclosing surfaces.

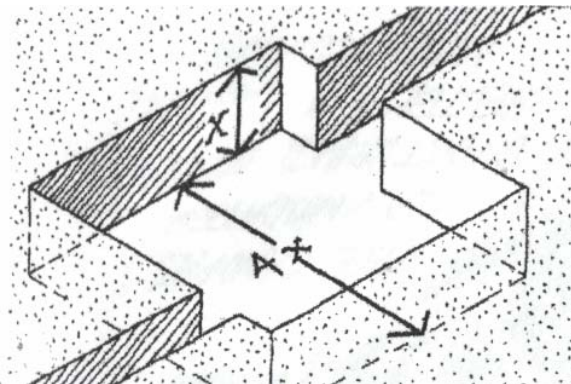


Fig.97: The height to width ratios can be opened up to 1:4 before an enclosure seems too weak.

Outdoor space will be partly covered and the main courtyard will be exposed to direct sunlight and planted with deciduous trees

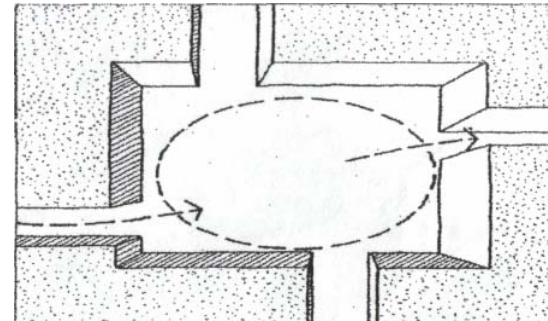


Fig98: The node seems more distinct if it is not possible to see straight through from one entrance to another

Bentley (1985) goes on to say that designers tend to think in terms of specialised spaces for different activities, separated off from one another.

*"But activities in public spaces are public activities.... It is the activities themselves which act as the most important supports for other activities: people come here to experience other people. So if public space is chopped up into separate activities, most of its robustness is removed"* (Bentley 1985:56).



Fig.99: Robust outdoor space, Treviso, Italy (Bentley 1985).

## DESIGN CONCEPTUAL DEVELOPMENT

Following the existing patterns of movement and circulation along the main roads influenced the movement systems at the Centre. Buildings are placed along the routes as well as activities within these spaces are to engage with the passer-by, stimulating interest and awareness towards the Centre and its programmes.

## INTERACTIVE ROUTE

Establishing an interactive route along the roads will allow the Centre to actively engage with people passing through the site and the community as whole. Discussions between workers and people on the route are encouraged and provide a good platform from which to exhibit and showcase the various activities and products developed at the Centre. Various spaces and buildings will encourage interest on the operations of the Centre. Building edges along these routes are permeable to allow outside interaction with activities happening deep inside the Centre.

## LAYOUT AND DESIGN OF BUILDINGS

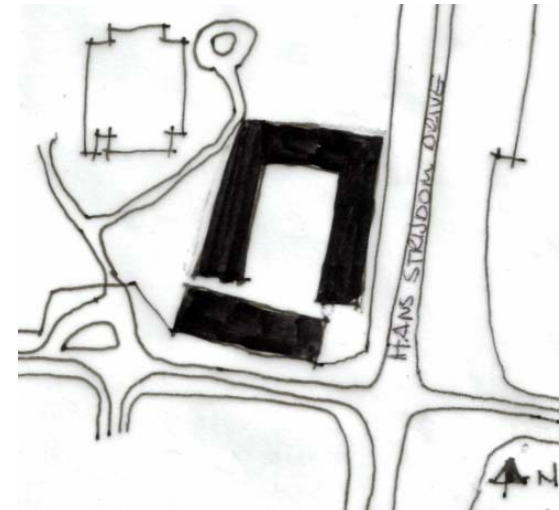


Fig.100

## DIAGRAM 1

The first concept for the positioning of buildings on the site was a U-shaped and linear building forming an internal courtyard. There will be entrance on the corner of Hans Strijdom Drive and on the main entrance for pedestrians. Vehicles will be using the existing Main Entrance to the Campus.

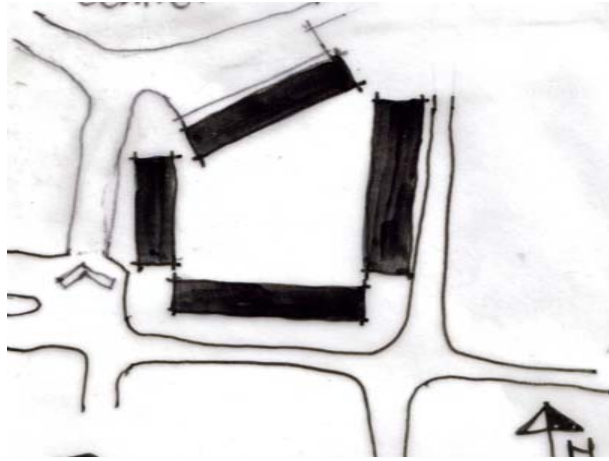


Fig.101

### DIAGRAM 2

The U-shaped building is fragmented to add more pedestrian entrance on Hans Strijdom Drive and from the proposed parking near the existing multi-purpose Hall which has access road from the main entrance and the Centre will use this road for vehicle access to the centre and parking between the road and the west facing building of the centre.

The main entrance is redesign and west block is parallel to the road. The northern block is twisted along the access road.

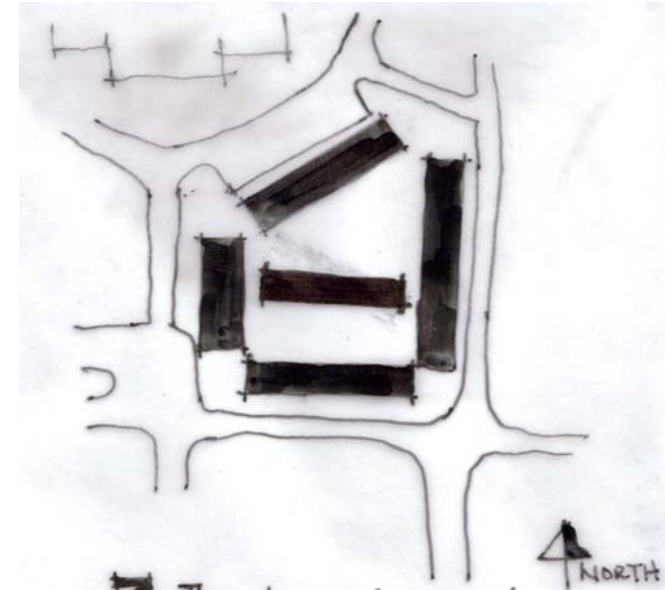


Fig.102

### DIAGRAM 3

The huge courtyard is broken up by adding another block in the middle. This will make the Centre have more and different courtyards for different functions and sizes.

Fig.100- 103, Conceptual planning sketches (May, 2006).



Fig.103

#### DIAGRAM 4

The pedestrian entrance at the main entrance to the campus expressed as a cylindrical circulation tower and becomes another landmark. Another block is added at the corner of intersection, also to serve as landmark and exhibition hall.

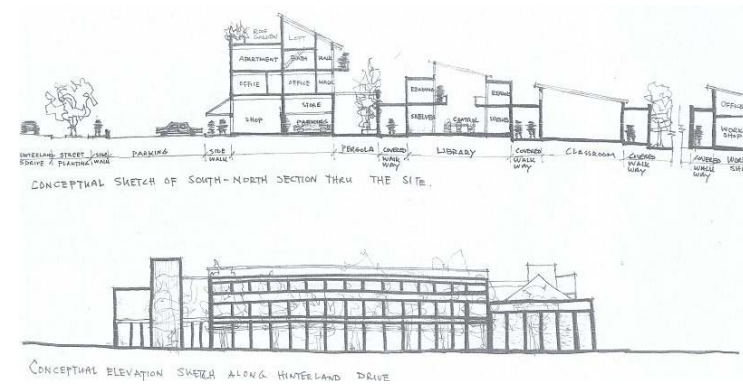


Fig.104: Conceptual Section and elevation phase resolution of design (May, 2006) (author).

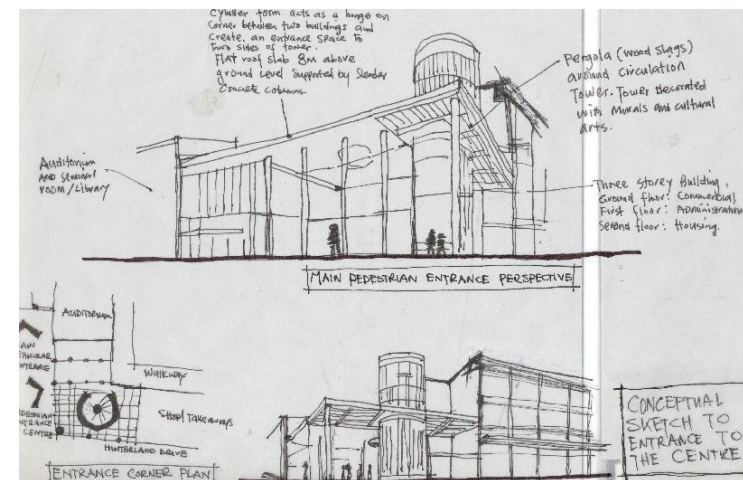


Fig.105: The conceptual pedestrian entrance at the main entrance to the campus expressed as a cylindrical circulation tower and becomes another landmark (author).



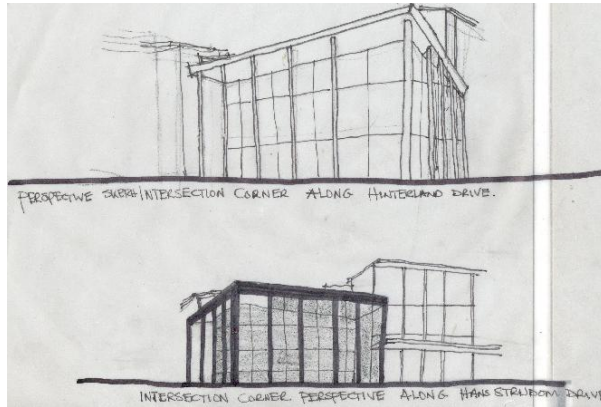


Fig.106: The conceptual corner of Hinterland and Hans Strijdom is exhibition hall with colonnade around as another landmark on the intersection (author).

## CONCLUSION

In the search for the form for the Construction Centre, the intention was to create a building form dictated by the site, function, needs of the people and buildings that will address the regionalist view.

The major influences on the finalising the plan form was the intersectional landmark, identified by the designer as well as the public space and the street edge. The final building form is not identical to each other, yet they have the same function, finish and aesthetic quality. The form the buildings are kept as simple as possible, in order for them to address the concept of being economical.

The building form was designed to appear a horizontal as possible as to encourage human scale and address the street edge. The buildings

also needed to reflect an industrial -type building form of simplicity and prefabrication, as some of the buildings in the end had to reflect their function as being workshops and has to be removed if the function does not exist.

*“Form -making is the core act of Architecture. The crucial moment of concentration on form should have the same freedom and independence from programme, function, economic and the other pragmatic concerns that architecture has to address anyway as sculpture or other arts: and architectural form making should be an imaginative inhabited investigation in three dimensions”* (Mouton, 2001 cited in Haig Beck & Jackie Cooper,2000:409).



Fig.107: Model of concept phase resolution of design (May, 2006) (author).



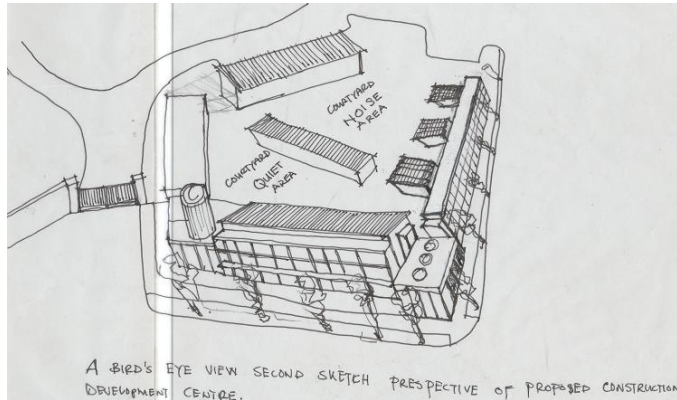


Fig. 108: Conceptual bird's view (May, 2006) (author).

## 8.6 BRIEF AND ACCOMMODATION

### BRIEF

The client brief was the centre to provide practical training skills to unemployed in arts and other crafts related works. It will provide free technical skills to people who want to improve their informal housing, but due to their background, need financial support and opportunity in order to acquire these skills. The centre will also provide a research and development facilities in low cost housing and alternative materials in the construction industry.

### PROGRAMME

1. ADMINISTRATION	2. EDUCATION	3. SKILL TRAINING	4. COMMERCIAL
Reception	Classrooms (technical, business)	Workshops (wood, metal, arts, crafts, painting )	Book/stationery shop
Administration (registry, offices, accounts)	Seminar room	Research labs	Take a ways/restaurant
Offices for lecturers and researchers.	Computer room	Experiment/scrap yard	Hardware shop
Apartment for staff and students	Library	Material testing lab	Communication centre (e-mail, telephone, cell phone and fax)
	Exhibition space		Offices and apartments for rent

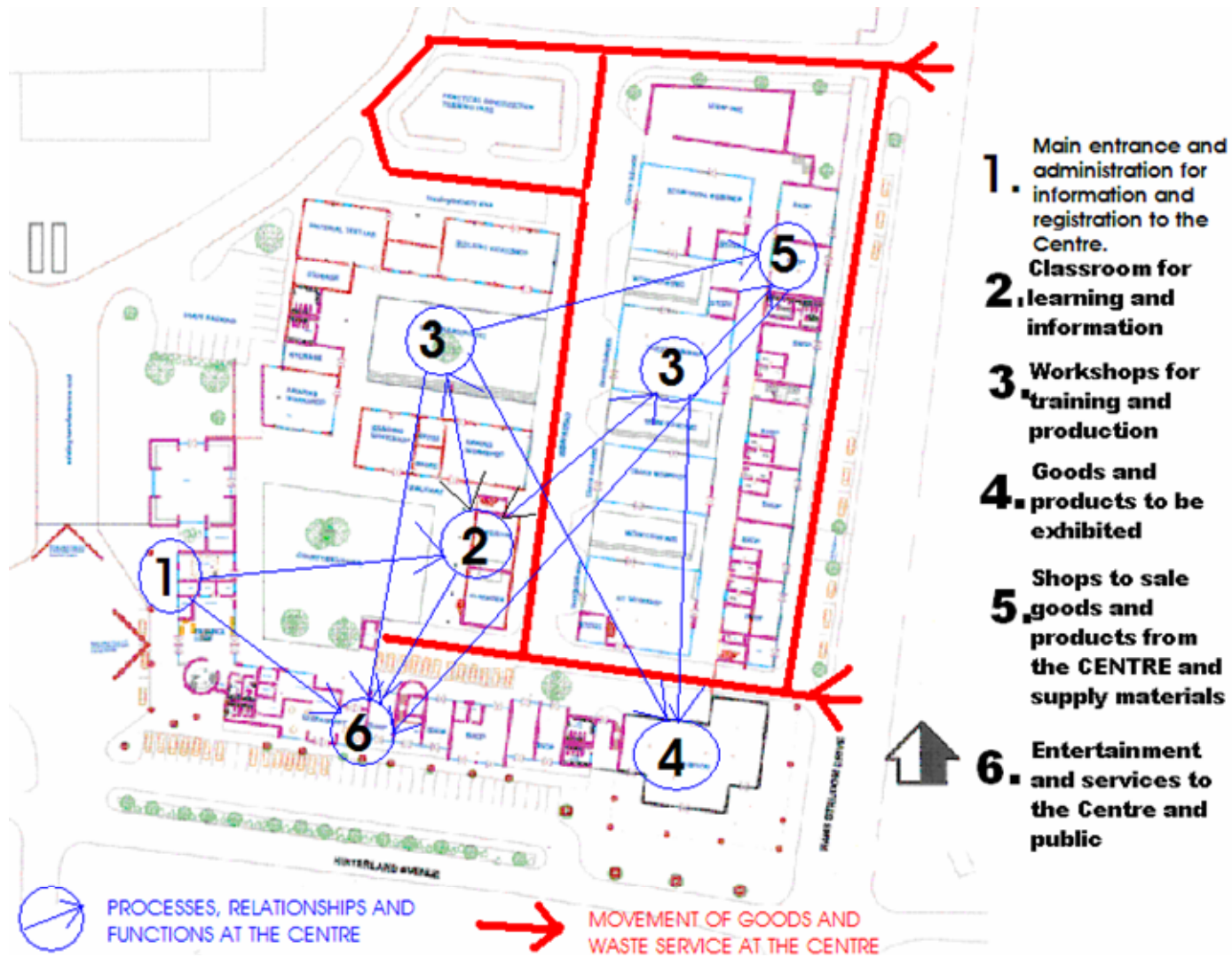


Fig.109. Space relationship, goods and waste movement (October, 2006).

## ACCOMMODATION

### GROUND FLOOR

Restaurant (kitchen included)	450mm <sup>2</sup>
13 shops	4,000m <sup>2</sup>
Metal workshop	250mm <sup>2</sup>
Painting workshop	200m <sup>2</sup>
Arts workshop	150m <sup>2</sup>
Wood and Crafts workshop	250m <sup>2</sup>
Information centre	200m <sup>2</sup>
Sewing /braiding workshop	144m <sup>2</sup>

### FIRST FLOOR

Offices	2000m <sup>2</sup>
Administration	300m <sup>2</sup>
4 classrooms	1200m <sup>2</sup>
Library	550m <sup>2</sup>
Research labs	150m <sup>2</sup>

### THIRD FLOOR

Family apartment	900m <sup>2</sup>
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Add services and circulation	3000m <sup>2</sup>
<b>GRAND TOTAL</b>	<b>13,760m<sup>2</sup></b>

### 8.7 ALLOCATION OF FUNCTIONS

Following the development framework shown in 8.3, commercial functions are placed on the ground floor along the streets edge. There is huge traffic of pedestrians and vehicles along these streets through the intersection and this will also ensure that these edges are active. The more the people, the safer the streets will be.

The administration of the Construction Centre is accommodated on the first floor. The offices are facing the main streets on south side and facing the courtyard on the northern side. The offices are designed to use natural ventilation and the windows are large for optimum use of natural light.

Classrooms will divide the big courtyards into two courtyards. Research laboratories and seminar rooms will be on the western building close to the proposed car parking and the main existing multipurpose hall. The buildings will be shaded from western sun by sun shading devices- ie large overhang. The workshops will be joined to offices and shops along the Hans Strijdom Drive forming small courtyards between them.

The housing will be on the second floors of the building along the streets, Hinterland Drive and Hans Strijdom Drive. Apartments are either north facing or look down into the internal courtyard. The apartments increase the height of these buildings, helping to define the streets as paths.



Fig.110: Ground floor accommodation –MAY, 2006 (author).

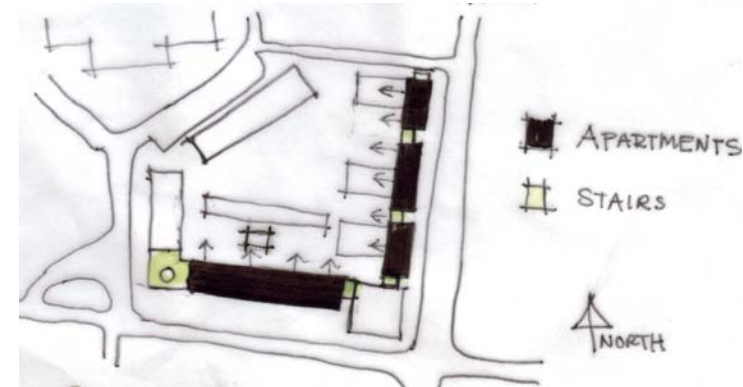


Fig.112: Second floor accommodation –May, 2006 (author).

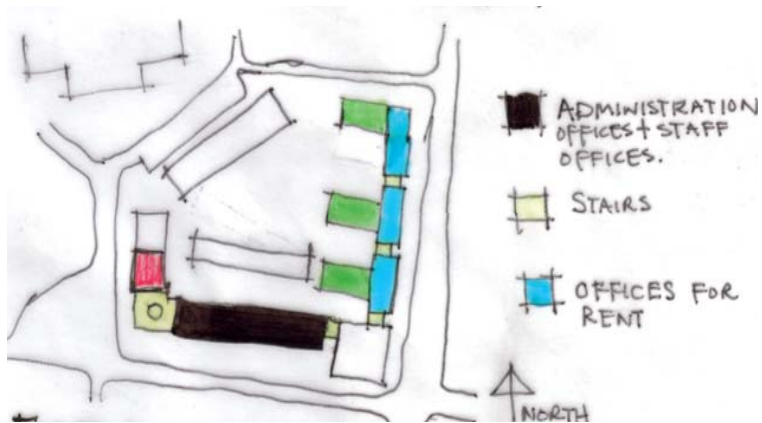


Fig.111: First floor accommodation-May, 2006 (author).



Fig.113: Model of concept phase resolution of design (September, 2006) (author).

## 8.8 FUNCTIONAL DESIGN ANALYSIS OF MAIN ACTIVITY AREAS. WORKSHOPS

The workshops are designed in a semi – industrial to suit the use and function of the building. The workshop areas can be described as light production and assembly because the production is small and production runs variable or irregular. This is because the primary purpose of these workshops is to train people and producing will be secondary purpose. A wide variety of equipment and machines from small to sophisticated machines will be available.

The deepest part of the workshop will be the working area which will be 12metres maximum deep. This depth allow for sufficient natural light and ventilation. Provision should be made in design for the support and routing of services and easy access for maintenance and alteration. Environmental services, air ducts for supply and extraction, steam or water pipes and lighting cables can require routing to particular work areas. The selection of the workshop structure was influenced by the services loading and routing demands. The daylight requirements are based on the production process and working conditions of people. Work people need outside awareness.

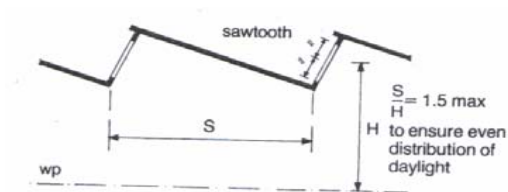


Fig. 114: Sawtooth roof exploration (Tutt, P and Adler, D.1998:20).

There is evidence of increased productivity and improved labour relation if people are able to identify external conditions.

### METAL WORKSHOP

Size: 250m<sup>2</sup> including storage and office. Programme: Working hall: 160m<sup>2</sup> working benches surrounded by machines. General store: 72m<sup>2</sup> ground and first floor accessible to working area. Tool box storage and sink with direct access to the working area. Courtyards facing the working area in the workshops.

Flow scheme: off-load area along the service road. Store portable trolley/racks. Cutting area: abrasive cutting (2x1.2) hand guillotine (1x1.5). Work/process stations: forge (2x1), welding plant (2.8x2.5), brazing (Co<sub>2</sub>+ asetilen 2x3), drill (1x2), hand grinder (1x2) work bench (2.5x2).

Finishing area: painting (2x2), acid (1x1.5)

Store: indoor ground or upper flow.

### WOOD WORKSHOP

Size: 250m<sup>2</sup>. Capacity 15 -20 people.

Flow scheme:

Offloading area: along the service road. Store: open area with racks accessible to service road. Cutting area: radial saw (1.5x3), power saw



(2x1). Working area: carpenter's bench (3x4.5) lathe (2x3) dust collector (1.5x2).

Finishing: painting and brushing (3x2)

### **ART WORKSHOP**

Size: 150m<sup>2</sup>. Capacity: 20-30 people

Equipment: 15 double tables, painting board, sink, paper cupboard and general store.

### **PAINTING WORKSHOP**

Size: 150m<sup>2</sup>. Capacity: 10-20

Equipment: Drawing table 3.5 per person, regular table 2.0 per person, store, sink and paper cupboard.

### **SEWING WORKSHOP**

Size: 144m<sup>2</sup>. Capacity: 10-15 people.

Equipment: working table + machine (2.2 per person)

Store.