BRIDGING THE GAP

An In-Vocational Training Centre for the Physically Disabled

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Opgedra aan:
My Here, Lood, Mamma & Pappa

INTRODUCTION

"Will we muster the intelligence and love, to craft a future that all living beings can share? This is the choice each of us makes every day."

L. Hunter Lovins, 2004 (Van der Ryn, 2005:59)

This dissertation concerns itself with the plight of the disabled, having been "invisible" in society for so long. We recognise the disabled in the constitution, but in society only manage scant recognition of their existence.

The disabled must be integrated into the normal, able-bodied society and become financially and economically self-sufficient. Their special needs must become the standard infrastructure of the able-bodied. Industry must accommodate them, for their impairment can be mitigated.

Not only has society turned its back on the disabled, but we are realising, to our great amazement, how we are raping our Mother Earth. Current knowledge is urging us to preserve the earth for future generations. Therefore, project planning was done against this background to qualify for Clean Development Mechanism (CDM) status in terms of the Kyoto Protocol.

Society's perception and past is not changed with a magic wand and requires a conscious decision:

"Be the change you want to see."

Mahatma Gandhi

An *In-Vocational Training Centre* is proposed to economically and socially integrate the disabled into, what is generally perceived, normal society. The Centre focuses on training people for specific skills required in the open labour market and specialises in food production and packaging for a specific target market. Locating the Centre on the inner city's edge, in close proximity to the zoo and fresh produce market, not only creates a bridge between the dense built environment and the less dense edge, but places it close to its input supply (fresh produce market) and an off-take consumer (herbivores in the zoo). With the incorporation of green houses as a productive element for urban agriculture, the building respects the natural environment it is placed in and optimises the natural and economic resources it requires to sustain itself. It attempts to reduce its ecological footprint to the minimum.

Research indicated the specific infrastructure need for the disabled and therefore the Centre is located close to transportation and city amenities. Furthermore, the planning respects the city's history, its plans for the future and society's needs. The building is designed to be a quiet building which unobtrusively, yet noticeably marks the inner city's edge without denigrating its natural surround. It thereby functions as the subtle entry (bridge) for the hitherto ignored into the city and society.

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BRIEF

1.1 THE PROJECT

The theme of the study is set in the Prinshof area of Pretoria. With analysis of the area the need to plan for disabled people was identified. This need is predicated upon the city's ecological development over time where facilities for the disabled settled there, such as the Prinshof School for the Blind, Pretoria School for Cerebral Palsied and the Northern Gauteng Association for the Disabled. The concentration of disabled facilities was further entrenched by the City's Zoning, indicating the area for education, health facilities and preservation of the city's natural resources (Apies River Precinct). Spatially the area became segregated from the rest of Pretoria and formed an 'island' of disabled, which is not integrated and therefore removed from the inner city.

It is generally accepted that although the needs for people with disabilities are catered for in the National Constitution, these are still excluded from society. Special arrangements exist for the disabled in the field of sport and recreation, but there are still serious gaps with integration of the disabled into the general economy of the country, especially the employment labour market. This is despite equity regulations legislated in compliance with the Constitution.

Statistically, only one percent of the disabled are integrated into the formal economy. (statssa:2007)

The question arises: "Why only one percent? What happens to disabled children when they leave school?"

Gutman (1968:3), in his proposals for the disabled, says that social interaction is probably one of the most important aspects that needs to be designed into a building.

It is from this premise that the dissertation investigates and designs a building for disabled people, bridging the gap to accommodate them in the formal economy and integrating them spatially into the 'life' of Pretoria. This gap is bridged (integrating the disabled into society) in the following ways:

- The disabled community, separated from the city due to its zoning and history, will be integrated into the greater city of Pretoria by consolidating into the immediate surround.
- Skills training, equipping them for formal employment. A gap is bridged between school education and skills required in the economy.
- Capitalising on the natural open space requirements for the Apies River precinct, by designing a building which optimises modern day sustainable environmental practices.
- Enhancing the nature corridor into the inner city by erasing the boundary between the passive open spaces and urban environment.


city


designated area


proposed area

selected site

1.2 PROBLEM STATEMENT

To design an in-vocational training facility that

- introduces a school-to-work transitional model for young adults with disabilities;
- creates an accessible link between able-bodied and disabled communities; and
- is environmentally and economically sustainable.

1.3 AIM OF THE PROJECT

To design a centre where disabled people can become self-sufficient.

1.3.1 Training

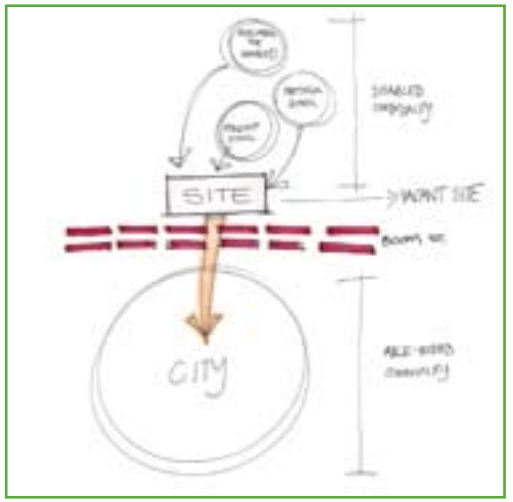
Learners may enrol for in-service vocational training.

A 'supported employment' model will be utilised whereby appropriate supported in-service training will assist learners in finding employment in the open labour market. This model is successfully used in the existing initiative, "Building Tomorrow" programme, undertaken by the Pretoria School for Cerebral Palsied. To expand the model further, the project will also integrate with the existing institutional and building structures of the Prinshof School for the Blind and the Northern Gauteng Association for the Disabled. A node will thereby be created, which will better serve the objective of integrating the disabled with the able-bodied community.

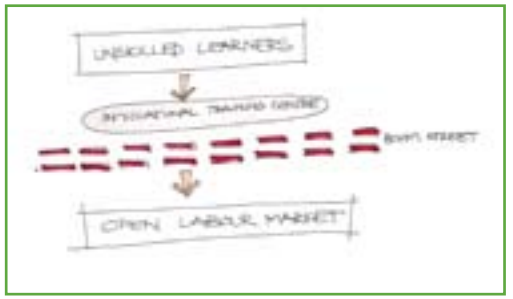
1.3.2 Link between able-bodied and disabled people

The centre focuses on training needs for the economy, especially those opportunities best suited for disabled persons. The integration into the environment of the able-bodied is facilitated by, for example:

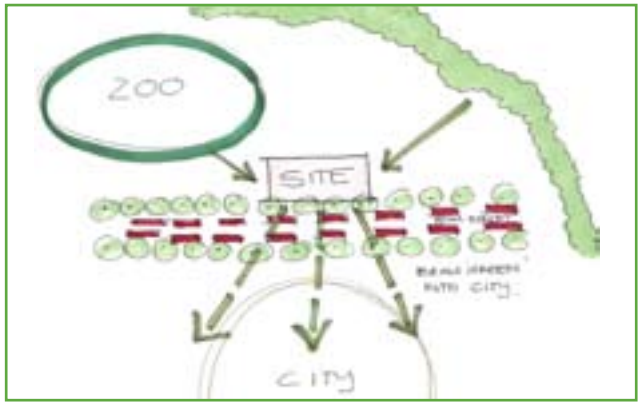
- The urban agriculture practiced at the centre, giving access and contact to outlet channels and market competitors
- Specialised training of skills and marketing these to clients to meet equity employment targets (e.g. secretarial)
- Training facility and candidates made available to companies with identified needs (e.g. photography developing industry)
- On demand training for companies with special needs using the infrastructure available at the Centre prior to accommodating the trainees into the new environment (e.g. specialised facilities and training for the blind)
- Training hall facilities in the building will be made available to the local community after hours, for example, adult training and other activities.



linking communities



transition

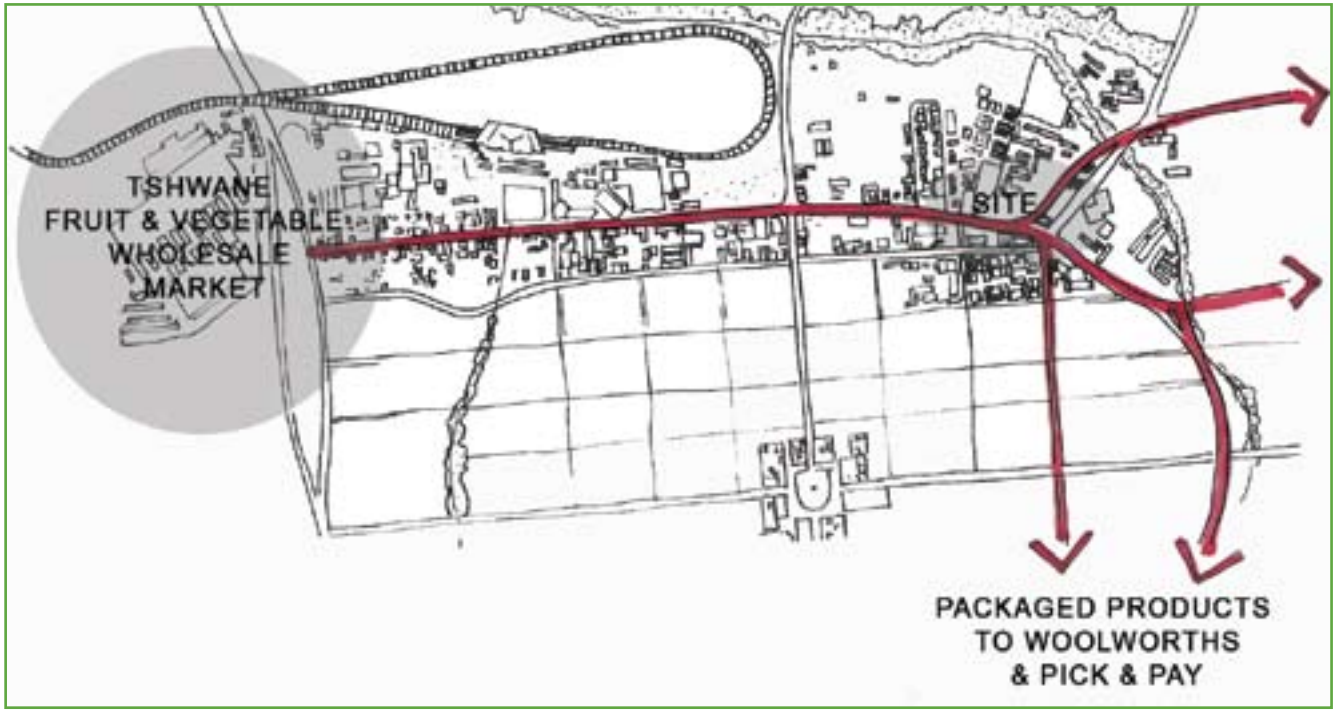


greening the city

1.3.3 Sustainability

The project aims to achieve operational self-sufficiency, i.e. financial sustainability, by:

- Rendering all services at cost recovery rates
- Linking with the Pretoria wholesale vegetable market to package vegetables for Woolworths and Pick ‘n Pay
- Executing functions best suited for the disabled, e.g. packaging for the food industry and other menial tasks not suited for mechanisation (simple assembly and packaging)
- Small-scale hydroponics urban agriculture specialising in pest and bacteria free crops (lettuce, spinach and herbs) to supply contracts with Woolworths and Pick ‘n Pay as well as including and expanding the existing Prinshof School’s productive greenhouses and vegetable supply contracts
- Small-scale subsistence farming urban agriculture, where appropriate, to support own accommodation
- Rental of the facilities for required purposes, e.g. adult basic education after hours
- Sustainable building methods reducing building operational costs as well as water and energy consumption



1.4 WHY AN IN-VOCATIONAL TRAINING CENTRE?

Disabled people find it difficult to access the formal economy on their own, as Bradley Saunders (A hand-up –not a hand out –for disabled: 2002) states:

“Because of people’s perceptions that the disabled cannot do the job properly, people feel uncomfortable with disabled people.”

Historically people with disabilities have been vulnerable to unemployment, poverty and dependence on social grants. (This is especially the experience at the Pretoria School for Cerebral Palsied). Therefore, skills training and employment is critical for learners with special education needs.

With promulgation of the Employment Equity Act, companies are obliged to employ the “physically challenged”. An incentive subsidy is paid by the Government for a year, for employing a physically challenged person. (A hand-up –not a hand out –for disabled: 2002)

It stands to reason that effecting the changes determined by the new legislation (Equity Act) will require support that still needs to be developed.

A 'transitional model', based on similar experiences in the United States of America, was devised by Leonora Nel and Colettte van der Westhuizen, both occupational therapists from the Pretoria School of Disabilities. This model entails the identification of training for skills required in the existing local employment situations. After interviewing Mrs Leonora Nel (2007), the need for a new building complex in Pretoria (the subject of this dissertation), wherein training, accommodation and work can take place, was identified as the ideal solution.

1.5 THE CLIENT

The major client in the project will be the Northern Gauteng Association for the Disabled and "Building Tomorrow" programme of the Pretoria School for Cerebral Palsied. People from the Northern Gauteng Association for the Disabled as well as children from the surrounding schools, namely the Pretoria School and the Prinshof School, will be incorporated. The Northern Gauteng Association for the Disabled currently runs a facility near Pretoria Academic Hospital that provides work for disabled people, namely *Employment Solutions*.

Other benefactors like New Hope School for the Disabled, Unica School and Alma Training Centre will also benefit from this development.

1.6 THE STAKEHOLDERS

A range of stakeholders are identified, depending on their role in the project:

1.6.1 Ownership and financial stakeholders

- National Departments of Social Welfare (social grants), Labour (SETAs and employment), Education (training curriculum) and Treasury (financial grants).

- Private sector sponsors (corporate social investment).

- International development support.

1.6.2 Operational and input stakeholders

- Skills training
- Prinshof School for the Blind
- New Hope School
- Unica School
- Alma Training Centre
- Employment Solutions
- Individual employers who are training employees and employing learners.

1.6.3 Output stakeholders

- Learners having benefited from the institution.
- Individual employers who are training employees and employing learners.
- The Tshwane Metropole.

These stakeholders would be required to take part in active debate around social responsibilities towards the disabled, the position of the new facility and the role it will play in the community.

1.7 FUNDING

Two types of funding will be required:

- Capital funding to construct the project
- Operational funding for the client to successfully sustain the business

Funding will be sourced from both Government and the private sector to render a viable and sustainable project. Partnerships therefore have to be established with both.

The sustainable building practices being applied to the building and its total planning will qualify it for Clean Development Mechanisms (CDM) funding in terms of the Kyoto Protocol. Owing to the specialised and complex nature of applying for and being evaluated for CDM funding, this aspect is not further investigated in the dissertation.

1.7.1 Government failure

Although care for the disabled is a Government obligation, insufficient funding exists. This has to be augmented from both private sector and international funders.

1.7.2 Market failure

Care for the disabled does not render an adequate return to make it viable for private sector investment. Therefore, alternative incentives must exist for the private sector to invest in these projects. Proven social investment qualifies for various types of tax rebates.

1.7.3 Capital funding

A large percentage of the capital funds will be forthcoming from the Departments of Welfare and Education. The banking sector and insurance houses favour social investment in viable projects for the disabled. Their names are often linked to elements in the project. International funders currently invest large amounts in developing projects for the disable, such as:

- Kreditanstalt für Wiederaufbau (KFW), based in Johannesburg.
- Gesellsschafft für Technische Zusammenarbeit (GTZ), based in Pretoria.

1.7.4 Operational funding

Care for the disabled and education is first and foremost a Government responsibility and hence aspects such as teachers' salaries will need to be paid by the Government. The operational cost of certain educational facilities would be the responsibility of the potential employer or beneficiary. These could, for example, be the packaging and print media and publishing sector. Their funding and implementation of learnerships for people with disabilities will assist them to meet set targets for the employment of people with disabilities.

1.8 THE CLIENT'S NEEDS

The following socio-economic needs of the physically disabled community of South Africa must be addressed:

1.8.1 Wide-scale needs

The Tshwane Metropolitan Municipality and Government have the following interests:

- The application of the Inner City Development Framework
- Compliance with applicable laws and regulations.

1.8.2 The physically disabled community's needs

- Employment creation opportunities.
- Interaction with able-bodied people.
- More training facilities.
- Training in a safe environment.
- Exposure to income-generating employment.
- Access to free or affordable accommodation, close to public transport and shopping malls whilst in training.
- An encouraging, sensory awareness and empathetic environment.

1.8.3 Local skills needs

- Northern Gauteng Association for the Disabled needs work and training facilities in surrounding areas.

1.8.4 The "Building Tomorrow" programme's needs

- New in-vocational training facilities
- Accommodation for trainees

1.8.5 The employers of the physically disabled workers' needs

- Accommodation at centres for workers undergoing training.
- Continued training.

1.8.6 The Prinshof community's needs

- Improved safety and security
- More employment

1.9 WHAT DOES IT MEAN TO DESIGN FOR PEOPLE WITH PHYSICAL DISABILITIES?

The needs of the affected parties present the opportunity to research how to create spaces in an around a centre for people with physical disabilities in order to promote their independence.

1.10 THE OUTCOME

The challenge of this dissertation is to design a centre that caters for the needs of people with physical disabilities as well as an environmentally sustainable building.





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LEVEL	FUNCTION	SPACE DESCRIPTION

ACCOMMODATION SCHEDULE

ACCOMMODATION SCHEDULE

LEVEL	FUNCTION	SPACE DESCRIPTION
A. SOUTH WING		
-1		
	Basement	• Water storage tanks
0		
	Entrance	• Reception • Waiting area
	Circulation space	• Ramp • Stairs • Broad passages also used for gathering spaces
	Training halls	• 2 clerical training rooms • 4 individual to small group training rooms • 1 photographic and printing training workshop • 3 supervisors' offices
	WCs	• 2 disabled • 5 ambulant users • Helpers' corner
	Social area / smoking patio	
1		
	Training halls	• 4 adjustable training rooms • 1 custodial training room • 1 domestic training room • 1 soap manufacturing hall • 1 supervisor's office
	WCs	• 2 disabled users • 5 ambulant users • Helpers' corner

B. EAST WING		
0		
	Administration	• Reception • Waiting area • Boardroom • Director's office • Secretary • Business Manager's office • Purchasing and contracts office • Safe • WC • Tearoom
	Cafeteria	• Inside and outside seating • WCs: – 4 disabled – 4 ambulant disabled – Helpers' room
	Kitchen	• Supervisor's office • Preparation • Cooking area • Wash-up area • Storage • Yard: – Recycle sorting area

C NORTH WING

-1		
	Basement north	• Parking garage – 9 disabled parking bays – 1 shuttle stop • Delivery zone • Security checkpoint • Kitchen staff WCs and lockers • Pump room: – Water storage tanks – Water pump – Emergency generator
0		
	Staff housing (helpers)	• Lounge • Dining room • Kitchen • Bedroom • Bathroom • Bedroom en-suite
	Internet café	• 3 telephone booths • ± 5 computers
	5 apartments for wheelchair users	• Each apartment: – 2 bedrooms – Disabled bathroom – Kitchenette – Balcony with solarium
	Recreation area	• 1 braai facility
1		
	Laundry	• Drop-off and pick-up • Storage • Hand wash area • Washing and tumble drying • Ironing • Drying area (outside) • Staff WC
	1 separate bedroom	• Single bedroom • Kitchenette • Bathroom with shower
	5 apartments for ambulant users	• Each apartment: – 2 bedrooms sleeping 2 each – Bathroom with shower – Kitchenette – Balcony with solarium
	Lounge	• Adjustable to create 3 separate smaller lounges

D. WEST WING

0		
	Sewing and ironing workshop	• 1 supervisor's office • Storage • 2 WCs
	Vegetable packaging workshop	• Supervisor's office • Men's locker rooms: – 2 disabled WCs – 1 ambulant WC • Ladies locker rooms: – 2 disabled WCs – 2 ambulant WCs
	Cool room	2
	Security checkpoint	1
	Delivery and dispatch area	• Area for recyclable organic waste to go to zoo • Area for other recyclable products, for example cardboard boxes • In and out
1		
	Therapists	• Reception • Store • Waiting area • 4 therapist's offices • 1 tearoom / lounge • Gym • Store • 2 disabled WCs
	Greenhouse	• Storage • 2 disabled WCs • Office • Tanks • Inside and outside planting area

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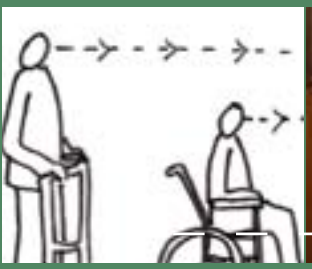
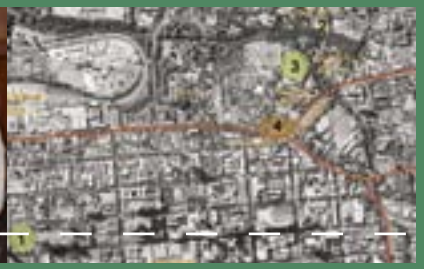




SITE SELECTION CRITERIA

3.1 THE PHYSICALLY DISABLED COMMUNITY'S NEEDS

The needs of the people in the community determined the selection of a site for the project. Accurate information regarding the number of disabled individuals, the types of disabilities, existing facilities and potential market for products and services, guided the selection.
(See Appendices 9.4)

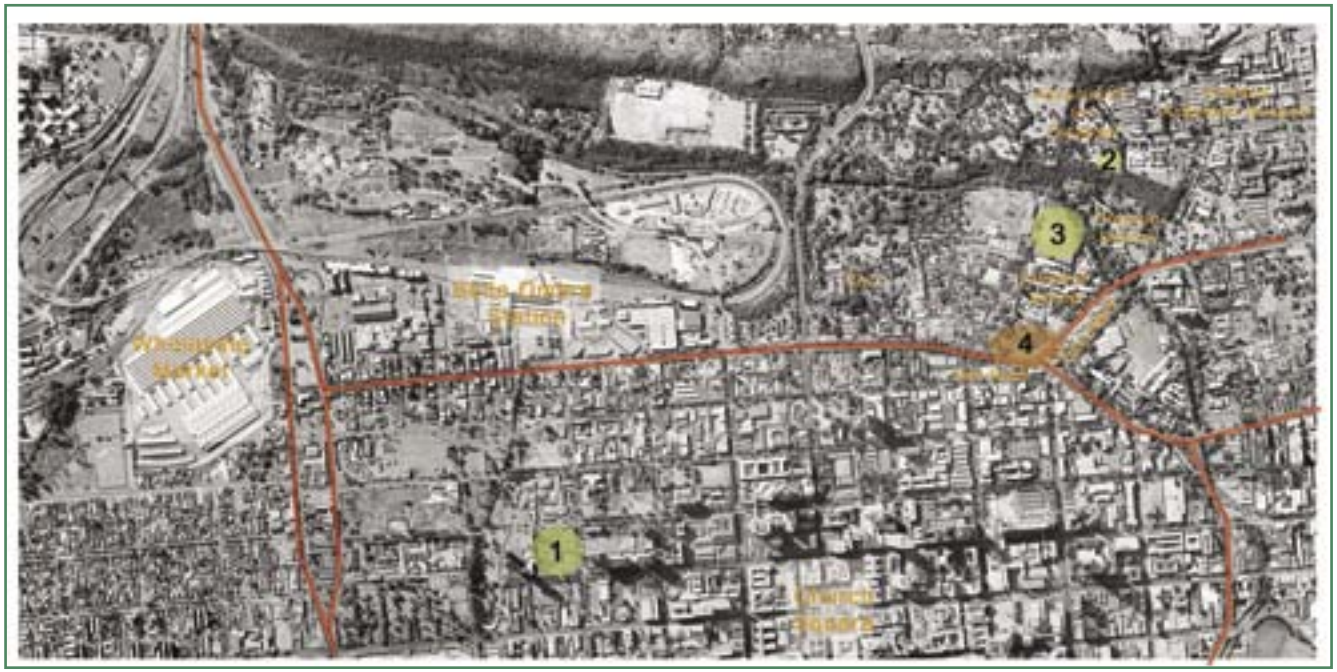
Ilze Meintjies, Chief Executive of Employment Solutions at the Northern Gauteng Association for the Disabled, stated on behalf of the physically disabled community, in March 2007, that to achieve independence the site must comply with the following requirements:

The centre must be in close proximity of public amenities, including:

- Public transport systems – bus, train, taxis, trams and Gautrain
- Shopping malls where food, clothes and appliances can be bought
- Post Office
- Worship centres
- Open spaces / Recreational facilities
- Safe areas
- Areas where association with the local community is possible
- Schools
- Social and sports amenities

Therefore the first aspect to consider when choosing a site was :

- its accessibility and
- its central location relative the amenities for the beneficiaries (see Appendices 9.1)



3.2 POSSIBLE SITES

3.2.1 Option 1:

Site in Western CBD

Advantages:

- In close proximity to the wholesale food produce market and Belle Ombre Station
- Situated on main transport routes

Disadvantages:

- Too far from other disabled facilities, e.g. Northern Gauteng Association for the Disabled

3.2.2 Option 2:

Site next to Northern Gauteng Association for the Disabled

Advantages:

- In close proximity of disabled facilities, schools and Pretoria Academic Hospital

Disadvantages:

- Not situated close enough to public transport
- The site is not large enough to accommodate the needs of such a facility

3.2.3 Option 3:

Unused sports grounds next to Prinshof School

Advantages:

- The site is large enough to accommodate the needs of the facility
- In close proximity of disabled facilities

Disadvantages:

- Slightly removed from public transport and vehicular arteries
- Difficult to access the site

3.2.4 Option 4:

Site on corner of Boom Street and Soutpansberg Road – across taxi rank

Advantages:

- In close proximity of disabled facilities, schools and Pretoria Academic Hospital
- The site is large enough to accommodate the needs of the facility
- Situated on main transport routes
- In close proximity of public transport
- Vacant site on the edge of the inner city, creating a physical link between the "abled" city to the South and the disabled community to the North

Disadvantages:

- Next to busy Boom Street

3.2.5 Conclusion

OPTION 4 will be the most appropriate for the Centre.

3.3 OVERVIEW OF THE PROBLEM IN PRETORIA TO BE ADDRESSED

Over the past 20 years, businesses and public services have moved out of the inner city towards the new eastern developments of Menlyn, Brooklyn and Woodlands. This migration caused the CBD and surrounding inner city to decay. Designers are now faced with the challenge to rejuvenate the inner city and re-establish its sustainable economic environment by attracting business and services back to it. The current rejuvenation project for the CBD is starting to re-attract the important capital injection and is slowly returning to its economic stability. It still remains a challenge to attract skilled workers back to the CBD and this project for the disabled on the fringes of the CBD is certain to contribute to the return of skilled persons.

This new building on the fringe of the CBD respects its site and aims to enhance the location, environment and community (abled and disabled). The following frameworks were used as guidelines for the design of the Centre, ensuring that it complies with the above set aims:

- Inner City Spatial Development Framework
- Nelson Mandela Corridor – with the view of upgrading the Apies River promenade to a pedestrian spine, along with activities
- Zoo precinct
- City of Pretoria guidelines for the redevelopment of the CBD

The **City of Tshwane Metropolitan Municipality's vision** is :

"To become the leading international African capital City of Excellence that empowers the community to prosper in a safe and healthy environment."

The vision clearly sets out the development goal of becoming the African City of Excellence. The vision of Tshwane (and its implications for the Inner City) therefore focuses strongly on two components, namely:

- People and the betterment of their lives;
- The image and functionality of the Inner City as an internally important city.

(Tshwane Inner City Development and Regeneration Strategy, 2005)

3.4 RATIONALISING THE CHOICE OF SITE

The location of the site is particularly favourable for the transport needs of the disabled, being opposite the taxi rank and along an important axis into the CBD. The advantageous access enhances the character of the area with the special provisions to be made for the disabled, which will render a pleasing view from Boom Street and Soutpansberg Road.

With further application of the previously mentioned City's development frameworks for the area, the community, (both able and disabled) will benefit

psychologically from the green urban design qualities of the Apies River Green Strip's close proximity.

The close proximity of nearby schools, medical facilities, public amenities and transport further benefits the site, thereby ensuring success for the proposed project. The accommodation provided on the site contributes to the much needed increase in population density for the inner city.

3.5 APPROACH AND INTERPRETATION OF THE LOCATION

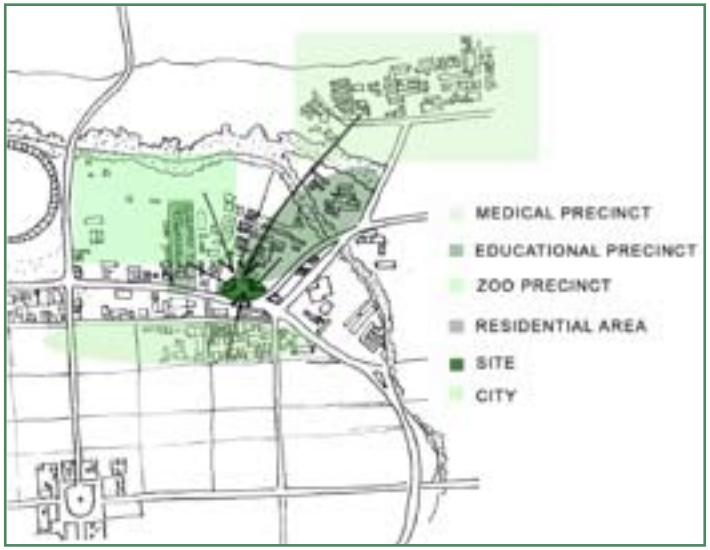
3.5.1 Approach to the site

- The site is presently a dysfunctional piece of land within a functional urban environment. The approach towards the site will be one of CONNECTION. The importance of the site will lie in the way it connects itself to the context as well as connecting different functions, communities and precincts to each other.

3.5.2 Interpreting the city

- Dewar (1997:27) stated two major shifts in thinking about the city, namely:
  - -- Scale the city on a model that uses the pedestrian and public transport as baseline
  - -- Move from a programmatic to a non programmatic approach to urban design.

The programmatic approach led to a sterile environment that became an enemy of disabled people. The disabled individual has a need for an environment that is rich in both physical and psychological opportunities and choices, if he/she is to function properly.



3.6 SITE ANALYSIS

3.6.1 Spatial Framework

- **Legibility**

The exterior and interior legibility of the future Centre is of utmost importance. The facades should convey the identity of the building so as to be clearly recognizable as a quiet, subdued building on the inner city's edge.
Legibility has a different meaning to different disabled people, for example the blind perceive and read the environment differently to the deaf and mobility impaired people. This dictates the design to be understood by all. It is important that both the able and disabled people experience and perceive the functionality of the building in the same way.

- **Accessibility**

Accessibility for the disabled is much more than mere movement, leading the design to possibly not have clearly defined floors, walls and roofs due to the necessity of ramps throughout the building. This leads to the inter-linking of the exterior and interior without any visual or physical barriers, thus being a physical, social, psychological and environmental barrier-free design.

- **Vitality**

Vitality in the Centre will be perceived on different levels of scale. Focus must be given to detail as the facility should provide enough visual stimuli to capture the viewer's imagination
Because the type of movement in the Centre is of

critical importance, it entails that the degree of visual detail for users will differ. Being a quiet building, it displays repetitive elements on the façade, rendering different perceptions of the edge to the various onlookers. The speed at which the structure is viewed whilst passing determines the level and amount of detail as well as rhythm any onlooker will experience.

- **Mass to space relation**

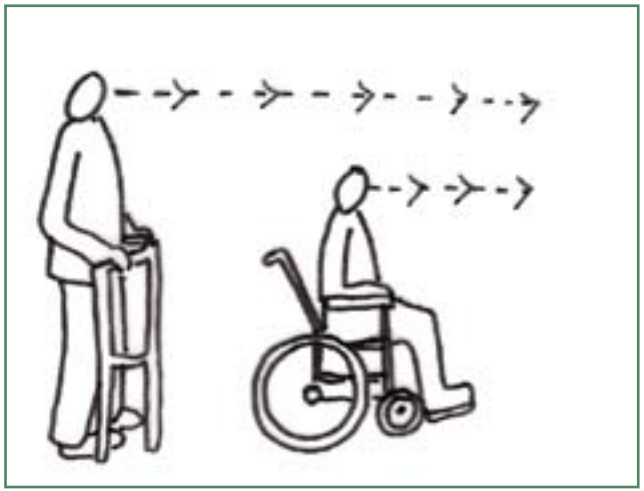
Open spaces play a dominant role in the urban environment. Buildings help in defining open spaces without the 3-dimensional mass of these having effect on the spaces. Specific functions must be assigned to open spaces, without which these will serve no purpose.
The mass to space relation must fit into the context of the urban fabric by giving better definition to the streetscape as well as creating a visual link between the taxi rank (south of Boom Street) and the Prinshof School (north of Boom Street).

- **Robustness**

Two levels of robustness exist:
Firstly, it refers to the range of activities that the Centre will accommodate. The designed spaces must be adjustable to future changes in the function of the building.
Secondly, the structure and finishes must be able to withstand the use and function the building is put to.

3.6.2 Levels of perception

The Centre must be sensitively designed to accommodate the different natural levels of perception. An enriching design can be produced with the use of the physical environment and its various vantage points. Certain details will be enjoyed by wheelchair users at a lower level and other details by pedestrians at a higher level. This level of perception is accentuated with the use of ramps at different levels, leading to enriching the overall experience of the building. Passers-by can also become involved in the perception of the building and the users thereof.



3.6.3 Movement

Movement for disabled people is an intensely personal experience. The table below explains sensations and feelings experienced by the author during an experiment (March 2007). Explanations are given on how the proposed building mitigates

Feeling/Sensation	Mitigating intervention
Overwhelming	Building not higher than 3 storeys
Inferiority	Lowering levels to human friendly scale, e.g. suspended ceilings and canopies
Invisibility	Public is visually linked with the building occupants by using large glass panes through which activities are seen
Left out	Not applicable because the building is user-specific
Focused on	Being a quiet building, it does not attract undue spectator attention
Incapability	The building is user-specific to empower the disabled

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CONTEXT

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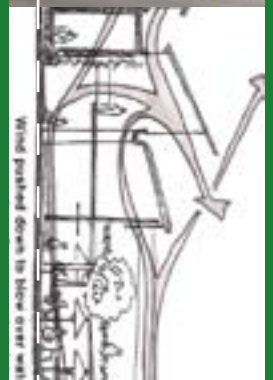


4.1 HISTORICAL CONTEXT

4.1.1 How Pretoria started

After 1848, ministers from various churches undertook missionary work across the Vaal River and after the founding of Rustenburg (1851) to the north, a need for a more centralised town between Potchefstroom and Rustenburg was identified.

In June 1852, the Volksraad of the Zuid-Afrikaansche Republiek reserved certain areas in the Apies River district for town settlement. With this goal in mind, Mr M.W. Pretorius bought certain portions of the Elandspoort and Daspoort farms along the Apies River in 1853.

In 1854, the Volksraad founded a church community ("Kerkplaats") on Elandspoort. Rev. van der Hoff proposed the name, Pretoria Philadelphia ("Pretoria Brotherhood") and on 16 November 1855 the town of Pretoria was born. In 1868, F.H. Jeppe (1834-1898) recorded that Pretoria was situated north-east of Potchefstroom – a mere eighteen hours per horse.

The town consisted of 300 erven, 80 houses and 300 residents (De Waal Collection, AV13).

4.1.2 Developments north of Boom Street

Various successful and luscious farms were situated north of Boom Street, including Rus & Urbe, Sans Souci and Belle Ombre.

A plan of Old Pretoria (± 1900) indicates that the city was bordered by *Boom Street* on the north and *Du Toit Street* on the East. Both of these "end streets" extended to the Apies River.

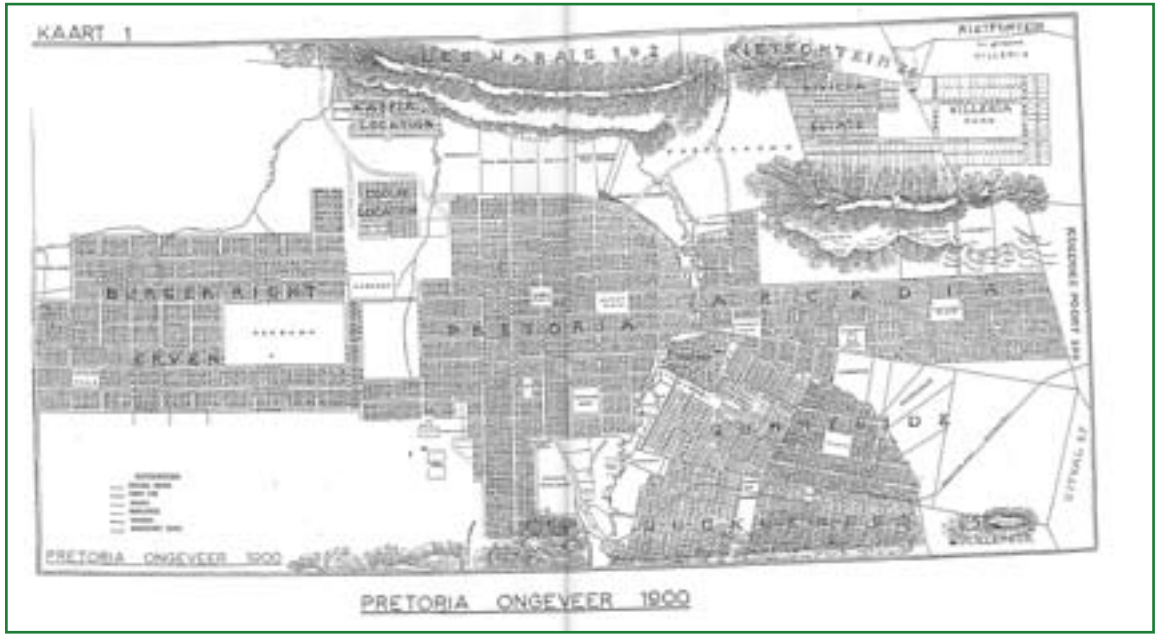
4.1.3 Development of Prinshof

The property rights that M.W. Pretorius had over Elandspoort and Daspoort were given to the government, with exception of a portion for him to cover his expenses. This incorporated the then known Adapark, except for the remaining portion of the Daspoort farm, then called Prinshof, where J.J.P. Prinsloo still lived.

Other names in the title deeds regarding the Prinshof area are:
Wessel Schutte, Cathrine Prinsloo, P.E. Roos, L.S. Roos, Piet Roos, Philippus Roos (Snr), and David A. Botha.

The conclusion can be made that the farm was subdivided and had many changes of ownership. The Prinshof 349 JR Farm registry (no 22c) has been missing for quite some time and thus the history of the Prinshof area is quite vague.

A map was found on a certain area of Prinshof. The following information was found on the map:



PRETORIA ONGEVEER 1900

"Gemeten voor den eienaar, T.H. Hove en vir goedkeuring op 23.07.1889 deur die Landmeter-generaal, J.F.B. (Johann) Rissik onderteken. Die totale oppervlak, soos toe bepaal, was 25 morg 290 vierkante voet (= 21.41 ha). " (De Waal Collection, AV13).
On the Apies River, at Hove's Drift, was a sign reading "Wagenweg naar Waterberg" (Wagon way to Waterberg), indicating that it was the link to the later Voortrekkers Road which crossed the Daspoort-Riviera Ridge that entered the Moot.

During 1899 the owner of the Prinshof area moved to Vryheid, Natal. After his death in 1906, the farm was sold to the government in 1908. On the street and erf map of Pretoria, 1911, Prinshof appears without an erf number and is registered as an experimental farm. Since 1916, the Prinshof Experimental Station paid particular interest to indigenous plants and its medicinal and poisonous properties, but has its claim to fame as being one of the first research stations devoted to a study of indigenous grasses (Stark: 1956).

During the 1960s the experimental farm was replaced by school buildings, which were used for a variety of educational purposes. In 1991 it suffered bomb explosions, but was re-constructed and is now used by the Technical University of Tshwane (TUT) (De Waal Collection, AV13).

A section of the site opposite Dr. Savage Road, also part of Prinshof, was excised to broaden and extend the one-way Boom Street. This piece of land is still not used, and was chosen as the site for the *In-Vocational Training Centre.*

North of this open field is the *Prinshof School for the Blind and Visually Impaired*; one of the five schools forming part of the Transoranje Institute for Special Education.

4.2 NATURAL FEATURES

4.2.1 Topography

Prinshof School is situated in a distinctive natural area defined by the Magaliesberg, Apies River and the Zoo precinct.

- **Natural systems generating order:**

a) Flow of Apies River
b) Mountains
c) Sun movement defining orientation

Due to later human interaction and the grid iron structure of the city, the relationship between landscape and settlement structure weakened. The natural elements, namely the Apies River and Magaliesberg's influence on the city edge can clearly be seen where the landscape and the city grid meet at Boom Street. The site is situated on this edge.

to the Centre and has both positive and negative influences on the Centre.

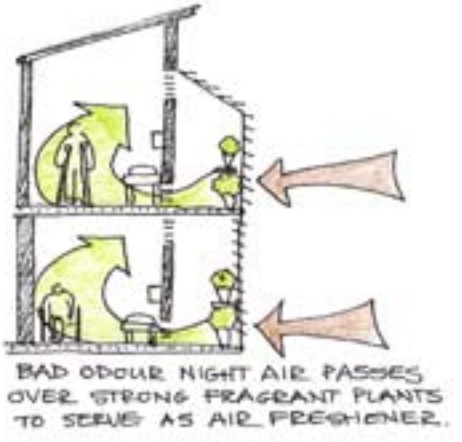
- **Positive aspects:**

– Organic waste produced at the Centre can be taken to the zoo to be used as fodder for the animals
– The sounds of animals, for example birds, have a soothing effect on the occupants of the Centre

- **Negative aspects:**

According to residents in the surrounding residential area, bad odours tend to originate from the zoo late at night. To compensate for this, fragrant plants such as Pelargoniums and Lavender are planted in the building as well as used in solariums of each individual room. At night the solarium windows are opened to the room to allow the strong floral fragrant to permeate the air and to diminish the possible bad odours from the zoo.

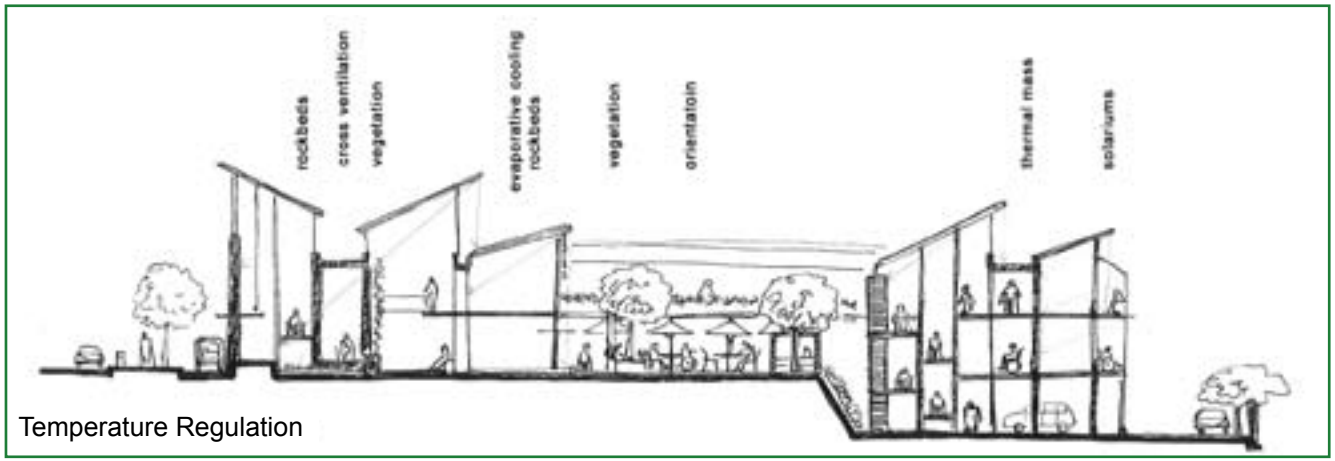
4.2.



Temperature plays an important role in designing for disabled people. According to Mrs Ilze Meintjies (2007), CE of *Employment Solutions*, people with disabilities are prone to become sick easily, thus the building must strive to remain at a constant and comfortable temperature throughout the year.

The average temperature in Prinshof during summer varies from 24°C to 36°C. Shading devices, vegetation and evaporative cooling are utilised to control internal temperatures of the Centre.

Winter month temperatures vary from 5,5°C to 12°C. Thermal mass, rock beds and solariums are used to capture the sun's energy during the day and release the energy indoors during the evenings.



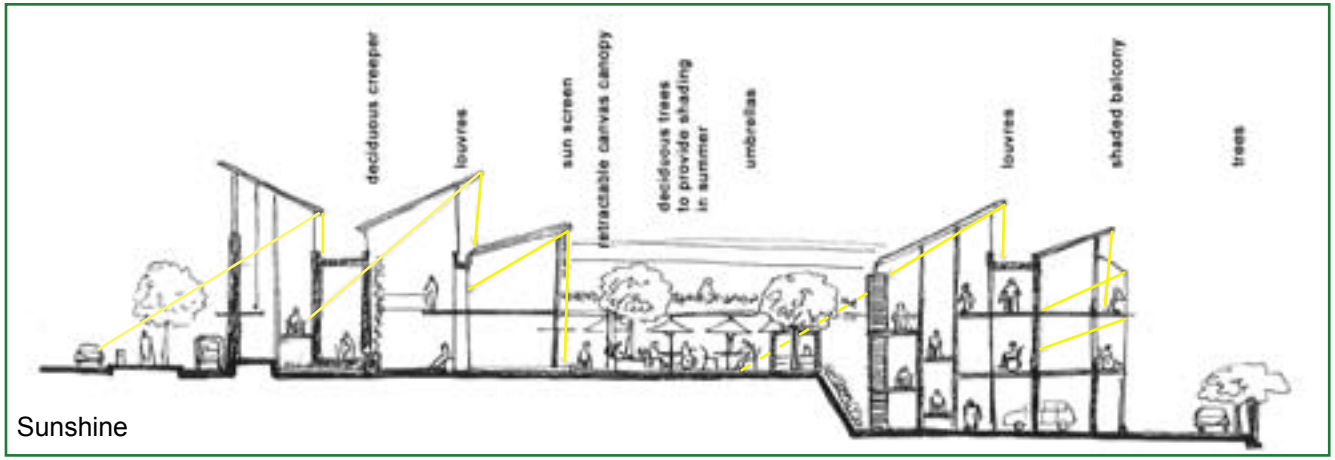
Temperature Regulation

4.2.3 Sunshine

The Centre is designed to accommodate the sun for the following reasons:

- Plants within the building need to photosynthesise.
- Heat in winter.
- Sufficient sunlight in the greenhouse.
- Light play within the building.

Natural light permitted into the building must be easily adjusted or prevented. Light reflection from floors and ceilings could be optimised, but glare must be prevented on all surfaces. The sensation of the light's heat is not only important for blind people, but also for the physically disabled.



Sunshine

4.2.4 Water

- **Rainfall**

The rainy season occurs between October and April with an average annual rainfall of 674 mm per year. Rainfall is harvested and stored in tanks to be used for irrigation, hydroponics and flushing of WCs.
Hail can be expected on an average of four days a year. The roof structure must be able to carry the weight of the hail as well as gutters must be wide enough to accommodate hail before it melts and is collected in the tanks. Due to the slant of the roof, hail will easily be disposed of towards the wide concrete box gutters where melting can take place without restricting the water flow down the gutter pipes.

- **Humidity and evaporation**

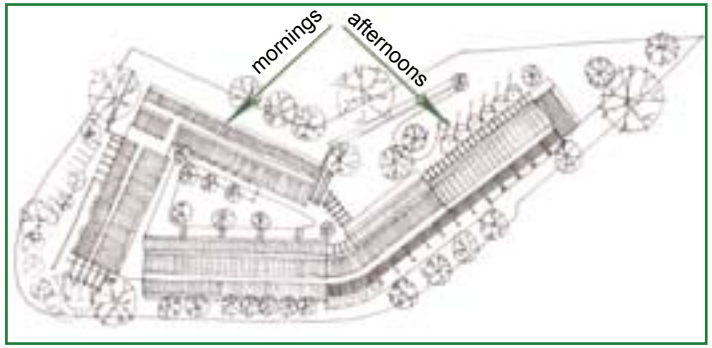
Minimum: 57% at 8h00 and 29% at 14h00 (value for September)
Maximum: 75% at 8h00 and 48% at 14h00 (March)
Water in the pools in front of the training halls and workshops evaporates during hot days, cooling the building.

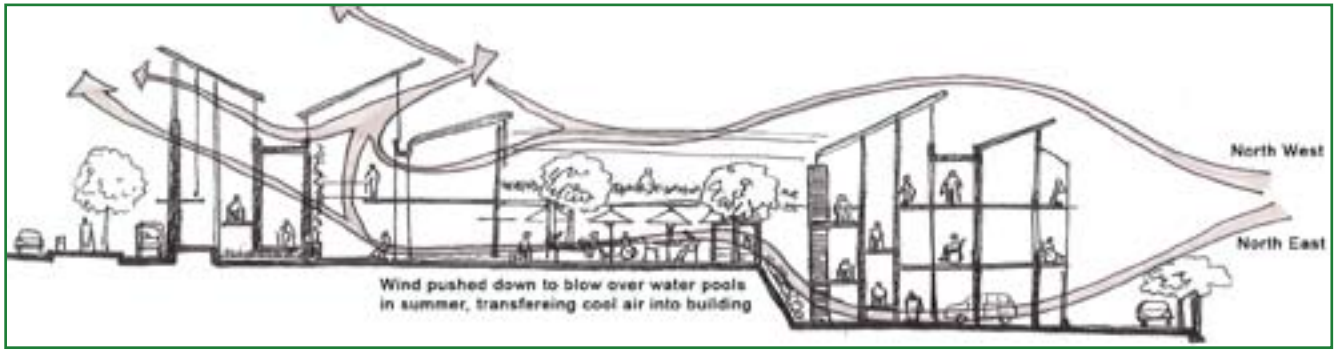
4.2.5 Wind

The general prevailing wind direction in summer is north-east in the mornings and north-west in the afternoons. In winter the prevailing winds are south-east and south-west. Wind use is maximised in the building design by orientating the courtyard in order to maximise the wind flow and encourage cross-ventilation in the building.

The northern accommodation block has a semi-basement opening towards the southern courtyard to direct wind underneath the building, thereby cooling the accommodation block as well as flowing through the courtyard, over water pools and into the training facility, creating evaporative cooling.

The north-western wind will also cool the workshops and greenhouse in the afternoons when the western sun will be at its worst.





4.2.6 Vegetation

Most of the existing trees are kept. The buildings have been designed accordingly. The trees provide character, protection and shade.

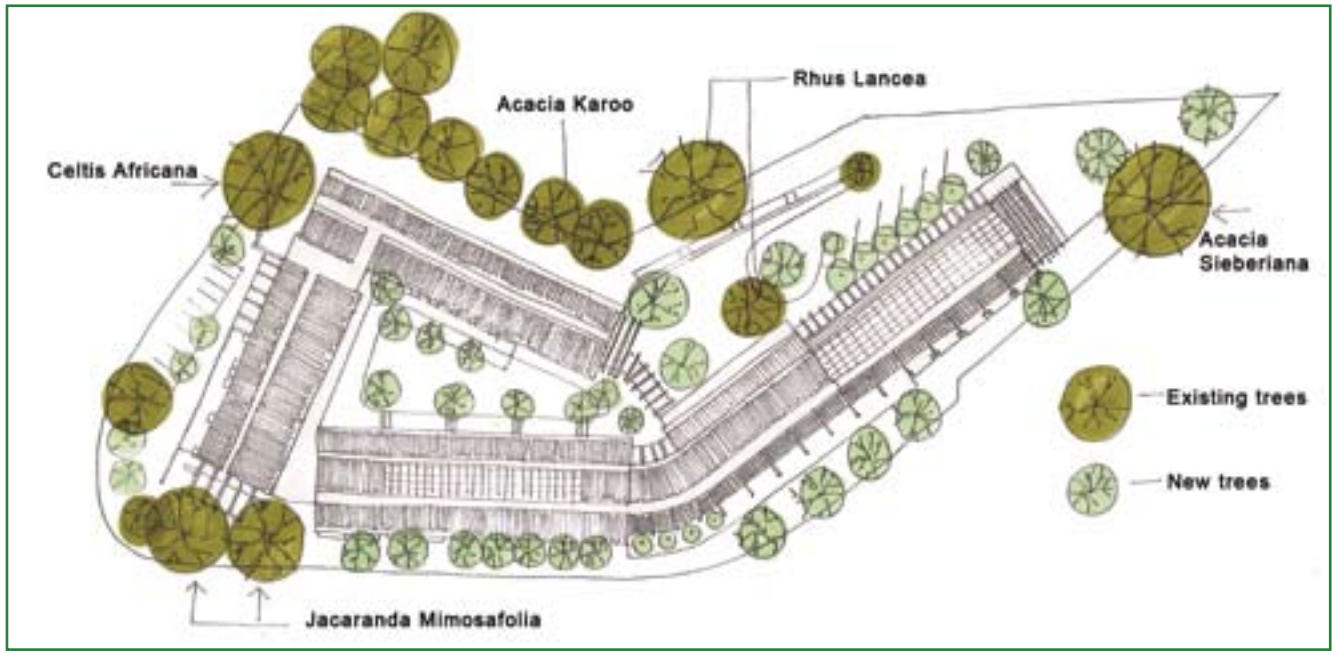
Existing trees not to be removed:

- Celtis Africana (White Stinkwood)
- Acacia Karoo (Sweet Thorn)
- Rhus Lancea (Karee)
- Acacia Sieberiana (Paperbark thorn)
- Jacaranda Mimosafolia (Jacaranda tree)

New trees (including fruit trees) to be planted:

- On the southern and eastern street fronts to create a human-friendly streetscape
- West of the site to provide shading for the parking area and decrease temperatures in the building
- On the north-western facade of the factory, creating shade for the parking area as well as decreasing the temperatures in the summer months
- In the courtyard, providing shade

Trees will enhance the sensory experience and provide food.



4.2.7 Cloud coverage

Varies from 13% in July to 54% in December.
Average = 33%

The site-specific conditions may be influenced by the proximity of the Apies River culvert as well as the Daspoort Ridge (Meyer, Pienaar, Tayob 1999; Schulze 1986).

4.3 MAN-MADE FEATURES

4.3.1 Grids

The figures below indicates that the proposed site is in the transition between two grid patterns. Boom Street forms the edge of the inner city's grid system and divides the area: to the south, the busy city with its structured grid and to the north staggered streets forming *cul-de-sacs* against the Apies River or Magaliesberg.

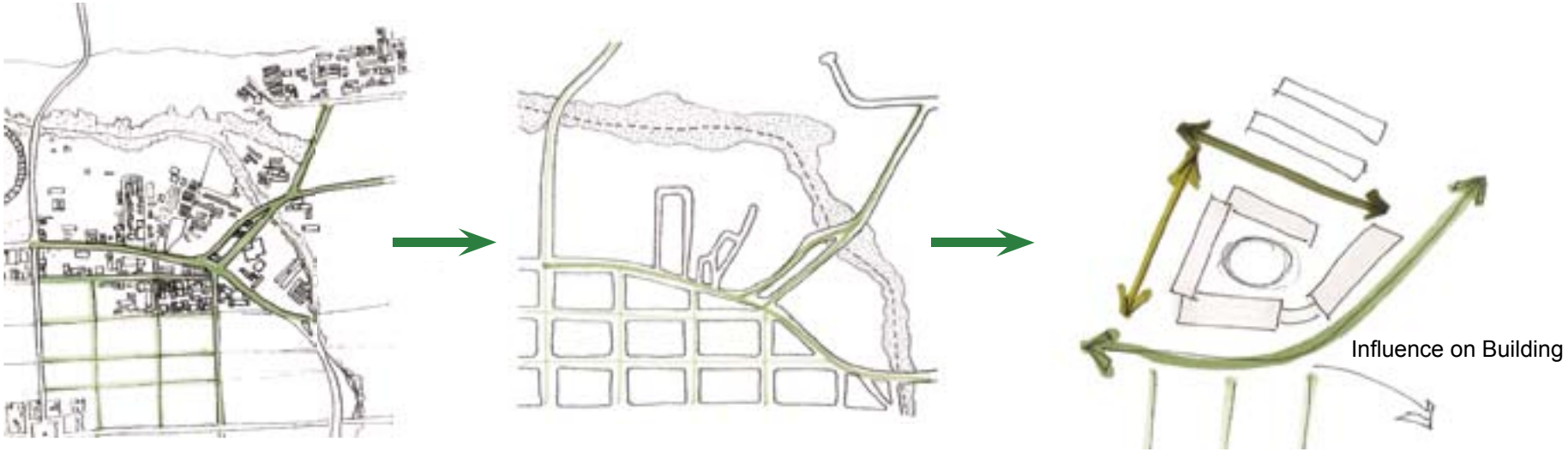
Soutpansberg Road cuts diagonally away from the structured grid crossing the Apies River where it is perceived to be the exit from the inner city.

The change in the grid shapes the form of the building, where the building forms a solid edge towards Boom Street and Soutpansberg Road. The changing rhythm of the facade will translate the vehicular speed when exiting the inner city.

4.3.2 Urban fabric

The course grain of the city, on the southern side of Boom Street, is formed by multi-storey buildings. The finer grain to the north of Boom Street is the result of residential houses. South of the site are two-to-three storey buildings; to the north a school with two-to-three storeys and to the west, residential houses of one storey.

The height and shape of the In-Vocational Training Centre respects the tendency towards the coarser grain to the north and south and the finer grain towards the west.



4.3.3 Zoning

The following figures illustrate –

- the zoning
- building use
- services of the surrounding area.

4.3.4 Neighbours

- Refuse dump

- Medium heritage houses, of which two bigger houses which have been altered substantially and to which additions have been added. They are important as they are a remaining witness of scale and age of dwelling houses in Boom Street in comparison to those in Riverdale Street.

-- Materials: Face brick, corrugated iron and plastered walls.

-- Use: Optometrist and dentist.

- Prinshof School for the Blind and Partially Sighted

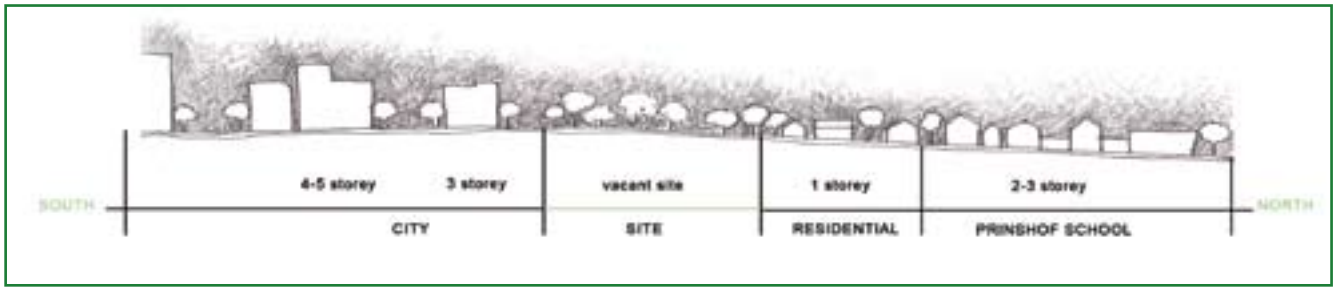
- Vacant building

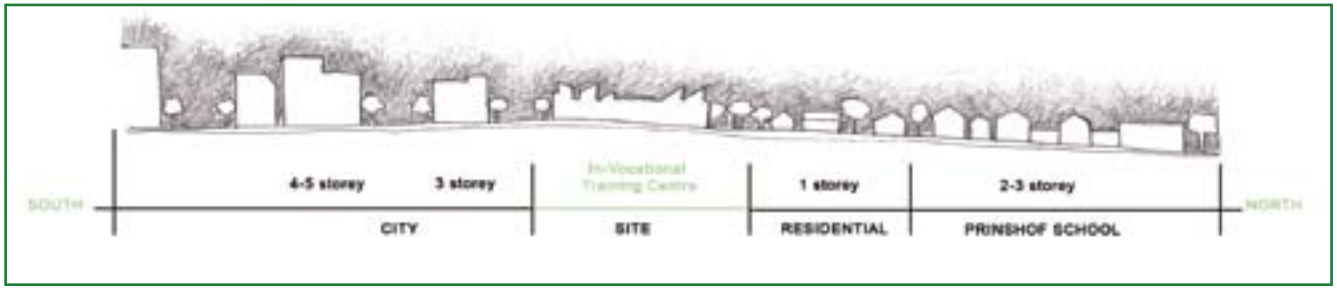
- Vacant building

- Taxi rank

4.3.5 Height of surrounding buildings

The site is situated on the edge of the inner city where a link between the busy coarse city grain and the residential and educational fine grain must be reached. The two-storey Centre with its pitched roofs addresses the city scale on the south, while the one-storey on the west compliments the one-storey residential houses.





4.3.6 Noise

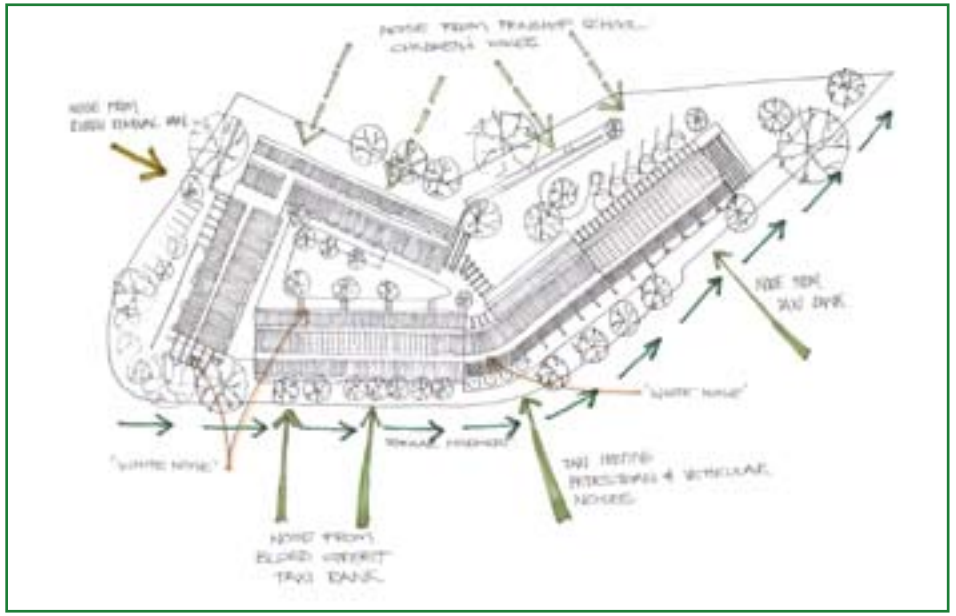
Noise can be either irritating or useful. Irritating noises can be destructive, whereas useful noises can help to orientate people in their surroundings.

- **Problem: Irritating noises**

-- Vehicular noises from Boom Street and Soutpansberg Road
-- Noises from the taxi rank, for example hooting
-- Noise made by scholars of the Prinshof School between 7h20 and 14h00.

- **Intervention: Useful noises**

These noises can either orientate or soothe users of the building. Evaporative cooling pools in the courtyard can provide “white noise” next to the passageway as orientation. The sound of the water pool linking the south wing with the east wing has a soothing and orientating effect throughout the building.



4.3.7 Dangers in the environment

- **Problem: Crime**

Crime levels in this area are extremely high. The National Crime Prevention Strategy (NCPS) was released in 1996 after the increase of crime levels in the city. The NCPS proposes prevention of crime through reducing the opportunities for crime by changing the environment in which it occurs.
Due to the fact that it is an undeveloped, open site in an urban landscape, it is prone to vagrants, drug dealers and crime.

- **Local intervention:**

By developing the site the problem regarding the vagrants will be solved.
The following three categories will influence safety and crime:

a) Visibility by others:

Urban areas should be designed so as to not have environments where people feel isolated.

b) Awareness of the environment:

Designing understandable layouts preventing entrapment spots, using adequate lighting and clear sight lines can avoid dangerous situations.

c) Finding help:

As physically disabled people are an easy target for crime, they should be able to find easy assistance from others. This can be improved by legible design.

4.3.8 Elements in the environment

- **Problem:**

Physical injuries can occur due to elements in the environment.

- **Intervention:**

Physical injury and difficulty of movement of disabled people can be prevented by:

a) Providing wide, smooth non-slip sidewalks -- thus damaged sidewalks along Boom Street should be replaced
b) Introducing warning pavements to indicate crossings
c) Introducing raised crossings to calm vehicular movement in Boom Street and Soutpansberg Road
d) Providing a Zebra-crossing where the sidewalk crosses the drop-off driveway
e) Painting dangerous obstacles in contrasting colours
f) Indicating abrupt level changes
g) Providing handrails at steps, ramps or level changes
h) Providing glare-preventing streetlights
i) Removing, replacing or repairing any obstacles, for example plant roots, irregular paving, manholes and broken bollards

4.3.1 Access

Access to the site will take place in three ways: public transport, vehicular access and pedestrian access.

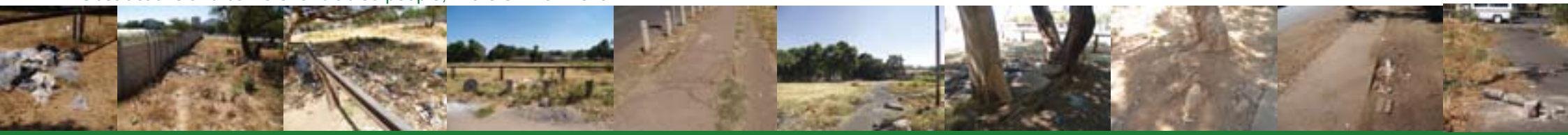
a) Public transport:

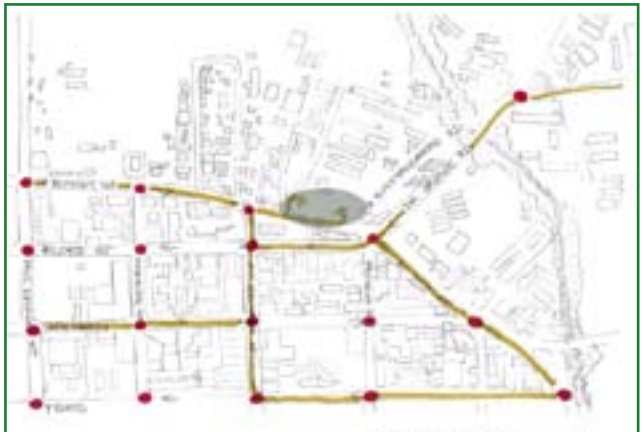
Due to the fact that a larger percentage of physically disabled people cannot drive their own vehicles, most depend on public transport. The site is situated across the taxi rank, next to a bus stop and within a reasonable distance from train stations.

Municipal bus routes stop in Boom Street.
Long-distance buses stop at Pretoria Station and thus a taxi, municipal bus or private shuttle will be required to shuttle travellers between the Centre and the station. After investigation, research showed that there is only one municipal bus equipped to transport wheelchair users and it the Centre will be on its route to the Association for the Disabled. A need exists for more municipal buses to be equipped with the necessary mechanisms to transport wheelchair users.
Conclusion: Mostly ambulant disabled travellers will use the municipal bus system.

Minibus taxis follow main vehicular arteries.
The site is ideally situated across Bloed Street Taxi Rank, which is now being developed into a metro-mall.

Obstructions and barriers for diabled people, in the environment





vehicular access to the site

vehicular movement and access

pedestrian movement and access

Private taxi services are available 24 hours a day and will be able to drop travellers off in front of the Centre. Special drop-off areas are provided in front of the building as well as in the basement of the accommodation block.

Train stations are located at a reasonable distance from the Centre. The Belle Ombre Station, to the west of the Centre, is the most prominent and will be used by many clients. Travellers can make use of a taxi service between the station and the Centre.

The Gautrain will stop at the Pretoria Station and can be reached by means of bus, taxi or shuttle services.

b) Vehicular access:

Access to the site takes place at two points:

-- A quiet entrance from Prinshof Street
-- An entrance to the workshops from Soutpansberg Road

Boom Street is a *one-way* in the direction from west to east, from which the CBD, Nelson Mandela corridor and the N4 are easily accessible. The N1 and the Voortrekkers Road artery is made accessible by Soutpansberg Road.

Problems to be addressed:

- Boom Street is a main movement artery where traffic moves at a high speed. This becomes a noise source and a danger for pedestrians to cross the street. The taxis also have erratic movements and can create congestion in the street.
- There is limited parking space for vehicles on the site.

Interventions:

- Traffic calming devices such as raised crossings with textural changes will be installed
- Due to the fact that most users of the building will not be using cars, the parking will mostly be used for either visitors or able-bodied staff members. Public parking bays are provided on Prinshof Street as it is safer for vehicular movement. Private parking will be provided in a semi-basement under the accommodation block. All bays will be for the disabled, making the bays accessible for either disabled, ambulant or able-bodied users. Additional parking will be provided on the eastern side of the site, close to the workshops. These bays can be used by staff or clients. A drop-off point is provided at Boom Street, located close to the main entrance.

c) Pedestrian access:

Pedestrians have access through the main entrance in Boom Street. Handrails play a role in leading and supporting the disabled persons into the building. The raised crossings in Boom Street not only calm the traffic, but form an easy accessible crossing that leads to the building. Textural changes occur between the sidewalk, crossings and change of levels, making the environment more legible for disabled people.

4.4 AESTHETIC CONTEXT

Site

4.5 SOCIAL CONTEXT

4.5.1 The social barrier

The general public's perception of disabled people has always been that of outsiders, degenerate or defective people, which leads to their loss of individual status and becoming almost invisible to society.

"The general culture invalidates me both by ignoring me and by its particular representations of disability. Disabled people are missing from mainstream culture. When we do appear, it is in specialized forms – from charity telethons to plays about individual struck down by tragedy – which impose the non-disabled world's definitions on us and our experience." (Morris, 1991:85)

The World Health Organization declared that the problem in facility provision is an attitudinal problem, becoming a human rights problem on a political level. The social and political context of South Africa is still in an infant stage of adjustment and re-development.

4.5.2 The site

The area is a juxtaposition between active and passive nodes with Boom Street being the dividing element.

The Bloed Street taxi rank is situated on the southern side of Boom Street, creating a *vibrant activity node*. The activity and movement pattern moves *towards the south* (Bloed Street) and into the city along with commercial activity. This creates a vibrant social environment, leading to higher noise levels towards the south.

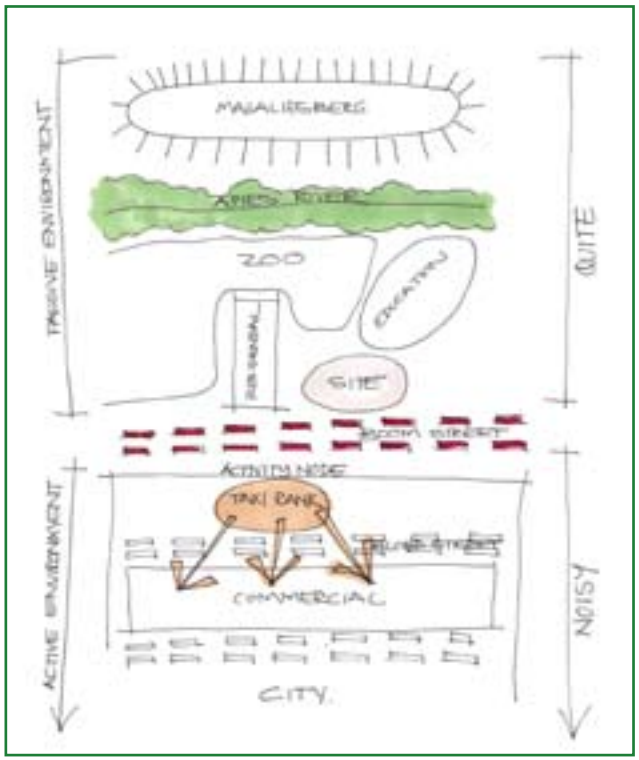
On the northern side of Boom Street is a quiet residential area together with the Prinshof School situated even more to the north. Between the busy Boom Street and the Prinshof School lies am open field, creating a barrier and lost space within the streetscape. The northern side of Boom Street is extremely quiet in comparison to the southern side and has little to no social practices and events taking place.

Boom Street is not only a physical divider but a social divider between the able-bodied community to the south (city) and the disabled community to the north (the schools and Northern Gauteng Association for the Disabled).

A *physical* as well as *psychological barrier* has been developed within this area of the inner city.
The **link** between the south (the able community) and the north (the disabled community) is thus of great importance.

4.5.3 Consciously adapting building space

Social change, in as much to place the able-bodied and the disabled on an even plain in the building context, requires a conscious decision. Opportunity, space and environment have to be equally available to each in the built environment. It should not be necessary to legislate and regulate the provision of facilities in buildings for the disabled, but rather to consciously and sensitively plan inclusively.



4.6 ECONOMIC CONTEXT

4.6.1 Previous economic environment

As discussed in the historic context, the area was previously successful farmlands. The Belle Ombre farm was described in 1912 as “a fine homestead with extensive grounds” and Sans Souci as “Beautiful Gardens” (De Waal Collection, AV13). Later the Rus in Urbe farm became the distinguished inner city zoo.
The conclusion can be made that it was a very distinguished location with economic power and stability.

4.6.2 Existing economic environment

Today, a lower economic population lives in the area. The area also comprises mostly commercial activities as well as the Bloed Street Taxi Rank – making it a very busy activity node in the lower inner city area. The taxi users form the buying power in this area. It is also an area where local traders find economic benefits in informal trading and spazas (the second economy). In the overall cityscape the area has a feeling of poor value and disregard. There is thus a potential to grow economic value and aesthetically improve the area.

4.6.3 The economics of the Centre

The Centre will be a combination of rehabilitation and educational services that will be operated as a business enterprise. The Centre’s economic contribution lies in its ability to include a section of society which has hitherto been excluded from the formal economy. According to Dr. N Meyer (2007) of the Development Bank of Southern Africa, the project will, through its inherent entry into the formal economy, deliver a positive economic contribution.

The former president of the World Bank stated that the millennium goals will not be reached without the inclusion of the disabled section of society.

As a sustainable building the project pursues the goals set in the Kyoto Protocol.

4.7 LEGAL CONTEXT

The landscape of South African labour law has acutely been impacted by the adoption of legislation to regulate all aspects of labour in South Africa. The matter of labour rights is entrenched in the Constitution of South Africa (Act 108 of 1996).

The Constitution in its own right entrenches the Labour Relations Act (Act 66 of 1995 as amended) and thereby makes the Labour Relations Act the second most important legislation in South Africa.

When dealing with the section of the labour force that may be defined as disabled we need to look at the other sets of legislation that were adopted to enable Government to fulfill the broadly defined purpose of the Labour Relations Act. These subsequent acts form the "checks-and-balances" that Government needs to enforce and measure its own performance in regard to the intentions it has set to meet in the labour market.

4.7.1 Employment Equity Act (Act 55 of 1998)

In terms of the Act, provision is made for "codes of good practices" relating to the implementation of employment equity. In this regard various such codes exist and are particularly focused on the various groups that make up the "designated groups". The Minister of Labour has issued two codes of good practice regarding disabled employees:

- Disability in the workplace – This code is a guide for employers and workers on key aspects of promoting equal opportunities and fair treatment for people with disabilities.
- Key aspects on the employment of people with disabilities – A guide for employers and workers on promoting equal opportunities and fair treatment for people with disabilities.

4.7.2 Skills Development Act (No. 97 of 1998)

o Purpose of Act

In order to further promote the aims of both the Labour Relations Act and the Employment Equity Act there cannot only be a focus on the current job market. Therefore it was decided to actively seek to promote the skills of the "designated groups" (specifically relating to disabled people) that now need to be employed. To this end the purpose of this Act is to:

"a) develop the skills of the South African workforce
– *to improve the quality of life of workers, their prospects of work and labour mobility;*
– *to improve productivity in the workplace and the competitiveness of employers;*
– *to promote self-employment; and*
– *to improve the delivery of social services;*
b) increase the levels of investment in education and training in the labour market and to improve the return on that investment;
c) encourage employers –
– *to use the workplace as an active learning environment;*
– *to provide employees with the opportunities to acquire new skills;*
– *to provide opportunities for new entrants to the labour market to gain work experience; and*
– *to employ persons who find it difficult to be employed;"* (Skills Development Act No. 97 of 1998)

4.7.1 Skills Development Levies Act (No. 9 of 1999)

- **Purpose of Act**

In order to promote skills, the Government needs finance. To acquire the necessary revenue a new tax has been established "*to provide for the imposition of a skills development levy; and for matters connected therewith*." (Skills Development Levies Act No. 9 of 1999)

- **Functioning of Act**

Other than a legal vehicle for the imposing and collecting of this tax, the Act also provides for the distribution of the collected monies. The money collected is managed by the Minister of Labour (and related government departments) and distributed to the SETAs, who in their turn are supposed to set up development programmes with the budget allocated and in line with the aims of the SETAs as set out in the Skills Development Act.

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PRECEDENTS

5

5.1 "*EMPLOYMENT SOLUTIONS*" – for people with disabilities

8 Dr Savage Road, Prinshof, Pretoria.

This precedent was chosen to gain understanding of the requirements neededto design for a work/training facility for physically disabled people.

Employment Solutions is a registered Section 21 company, committed to utilise available funds to facilitate employment options for people with disabilities.

Services rendered by *Employment Solutions*:

- Outsourcing labour intensive industrial operations
- Sales and repairs of assistive devices and wheelchairs
- Establishing contracts between employer and prospective employees with disabilities

During an interview with Mrs Ilze Meintjes, CE of *Employment Solutions*, the need for a facility to accommodate the latter service is of great importance. According to her, *Employment Solutions* is experiencing a great demand to expand. They have a waiting list of 300 disabled persons per year (Meintjes, 2007).

The existing premises will not be able to accommodate the demand. The solution to their problem was found to be that the heavy duty training (e.g. welding, mechanical and woodwork) be separated from the other training. The current premises would then be used for the heavy duty training and the new facility would then have to be built for other training, such as:

- Printing and photography
- Clerical training
- Sewing
- Domestic and custodial training
- Individual training

Certain training at *Employment Solutions* is currently taking place under a tree.

Other problems being experienced are:

- Transport – an incredible amount of money is used for transport, therefore accommodation at the new facility will be needed
- No recreational facility or lounge area
- No gym facility
- Too small offices
- No dining room or cafeteria

All of the above as well as the following aspects determined the design of the In-vocational Training Centre.

Bathrooms:

- Seating needed
- Hooks for clothing (preferably lockers)
- Signage
- Larger door dimensions
- Showers – correctly designed so as not to become storage space as seen in the photograph
- Incorrect taps
- Doors need kickplates

Drop-off:

- Raised platform

Office space too small
Provide correct lighting

Provide sufficient storage space where needed
Natural day lighting

Kitchen

- Provide space for wheelchair footings

Provide sufficient lockers
Signage
Alarm – for fire evacuation

Provide sufficient space for sewing to promote efficiency
Signage
Lighting – natural lighting
Blinds – to control lighting

Provide cafeteria or social space for employees/ trainees to enjoy lunch in a communal area instead of at their workstations.

Provide outside seating and socializing space

5.2 PRETORIA SCHOOL FOR CEREBRAL PALSIED, PHYSICALLY AND LEARNING DISABLED PUPILS

Dr Savage Road, Pretoria.

The following aspects were investigated to gain an understanding of the requirements needed to design for physically disabled people.

The mission of the Pretoria School is to guide their pupils, with the help of specialized teaching, physically, psychologically and intellectually, to become balanced socially acceptable adults.

Drop-off
Raised platform

A small barrier is needed between walkways and storm water channels to prevent injuries

Handrails and kickrails

Wheelchair users prefer round tables. Table legs must not create an obstruction.

Doors with vision panels and kickplates
Even change in floor surface
Hand and kickrails

Bath -- transfer seat

Shower spray in bathtub

Shower -- must be accessible for wheelchair users

Lever taps are easier to handle

Grab rails

Bedrooms: beds to be parallel to windows

Recreation room -- TV placed too high, creating neck discomfort for viewers in a wheelchair

Change in floor level can cause accidents

Dangerous space

- Steep ramp – collisions can take place against opposite wall
- Gully and mat = obstruction
- Rainwater is not channelled away and forms puddles

5.3 PHYLLIS ROBERTS HOUSE

Dr Savage Road, Pretoria.

The following precedent was chosen to understand the requirements needed for housing disabled people.

The Phyllis Roberts House is a good example of the extreme poverty in which so many disabled people find themselves. For that reason materials chosen for the In-Vocational Training Centre have low maintenance qualities as well as being economical and sustainable.

Un-accessible ramp

Bad signage on too narrow parking bay

Dark, sombre dining hall

Handrails to prevent injuries at windows

Vertical grab rail in shower
Non-slip surface
Insufficient shower seating and taps
Bad hygiene

Bedroom: bad space planning

Too steep level change and irregular floor surface

Ramp into swimming pool

Lower telephones for wheelchair users

5.4 JOCOD – Johannesburg Council for the Disabled

Lenasia, Johannesburg.

This precedent was chosen to gain understanding on the design of workshops.

The building consists of an administration block, three contract workshops, a linen workshop, a detergent workshop and a dining hall. The centre, run by JOCOD, an NGO that has worked in partnership with the City of Johannesburg since 1995, employs 251 disabled people.

The centre also runs an Adult Basic Education and Training (Abet) programme.

The centrepiece of the project is its hydroponics garden. The vegetable garden supplies the Fresh Produce Market in City Deep and makes a profit of R20 000 per month, according Linda Pounasamy, Director of JOCOD (2007).

Another JOCOD success story is its detergent making division, generating a turnover of R150 000 per month.

JOCOD has become a self-sustaining NGO, and employees do not have to depend on handouts.








5.5 MUSEUM OF CONTEMPORARY ART

Barcelona, Spain

Richard Meier & Partners

This precedent was chosen as inquiring into the use of the ramp.

This precedent relates to the use of ramps not only as a necessity or requirement but as an element of a building. The ramp for both pedestrians and disabled people in this building was used as part of the design elements of the building. In this regard much of the design of the building was done around a central ramp structure. The ramp structure was further used to create a sense of space and to allow the flow of natural light. It allows natural light to filter through the louvred glass wall adjoining the ramp structure. (http://www.arcspace.com/architects/meier/macba)

5.6 THE JERUSALEM CITY HALL

Jerusalem, Israel, 1998.

Diamond and Schmitt

This precedent was chosen to investigate its linking role.

The specific change to this building is the fact that one building has to crossover into different sectors of Jerusalem. This does not only relate to geographical, but also cultural differences. In this regard the building plays a linking role within the local district created for it. As part of the principle of this building an accessible yet contained urban square had to be designed with a prominent feature within Jerusalem without disrupting from it. The whole idea was the social interaction between the centre users and the public. To this end the building takes the overall scale of the precinct into account and due to a proper response to the urban needs applicable to the site, the linking and interaction role was successfully applied.

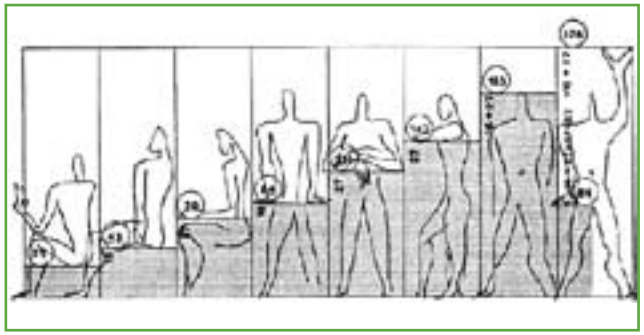
As part of the linking role within the community the importance of movement within and throughout the building is very important. The ramp and paths of movement are specifically also adapted for the disabled person whilst making the pathways and ramps very appropriate as a means of connecting the centre to the city.

Specific emphasis was placed by providing details at eye level in order to ensure that the pedestrian enjoys the environment. A cross adaptation was also made in that different perspectives for different abilities were provided, specifically relating to the fact that the perspective of the able-bodied person would differ from that of a person with a disability. These details can take the form of textures, drawings, vistas, etc.

5.7 PROPORTIONAL SYSTEM (MODULAR) USED BY LE CORBUSIER

This precedent was chosen to investigate the use of a proportional system.

Le Corbusier created a proportional system based on the fact that the average height of a man standing with his arm raised would be 2,2 metres. Taking into account that this would create a sense of space where such a person would function in relation to ceilings, doors, etc. the modular system was developed. The In-Vocational Training Centre is adapted to the proportional system of the average height of a person seated in a wheelchair. Using the same principles of relation to space, ceiling and doorframes for persons seated in wheelchairs, this modular system may also be applied to design for the disabled.



5.8 SYMBOLISTIC ART

The manner in which we experience something is known to psychology as *synesthesia*. Synesthesia sets out to allow us to enjoy an environment through senses that we would not necessarily associate with a particular function. In this regard a building could be made much more interesting due to the fact that other senses are also addressed in using the building. In this regard the experiencing of paintings, smells, sounds and even tastes expands our experience to multi-sensory experience rather than a single sense experience. Although this principle has long been established for able-bodied people, special adaptation is required when dealing with people with disabilities.

Each type of user has a different grasp of the building relating to the senses that he/she may or may not have. To this end touch will be much more relevant as a sense to blind people and to, for example, orientate themselves in changing zones. To the same end special consideration must be given to wheelchair-bound people due to the fact that their perspective differs from that of standing people -- therefore special consideration must be given to the synesthesia of different disabled people.

5.9 GREGORY BATESON BUILDING

Sacramento, California.

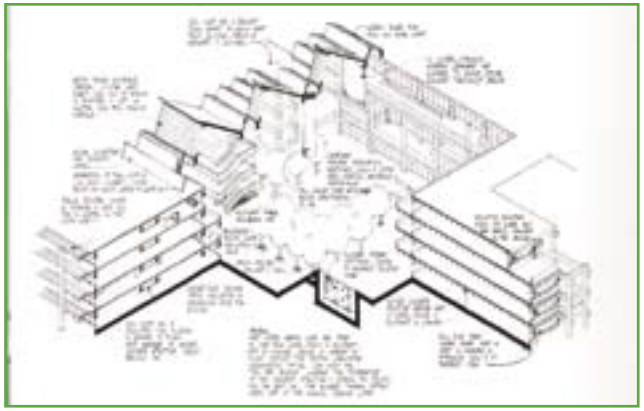
Sim van der Ryn

This precedent was chosen to gain understanding of green principles in design.

The Bateson Building was the first energy-efficient building in California. Sim van der Ryn designed with natural energy flows in the building and became sensitive to differences. He writes: “The measure became not foot-candles of quantifiable illumination, which means nothing, but the quality of light you experience, which means everything.” (Van der Ryn, 2005:66)

The wall of the building is not considered a static, two-dimensional architectural element, but a living skin that is sensitive to and adapts to differences in temperature and light. Designing a building to save energy means designing a building that is sensitive to differences, which results in a building that is better for people. People are not adapted to live at uniform and constant temperatures and light levels. People are most alive when experiencing subtle cycles of difference in their surroundings.

This building becomes “the patterns which connects” people to the change and flow of climate, season, sun, shadow, constantly tuning the occupants’ awareness to the natural cycles that support life.



5.10 "GREEN BUILDING" AT WESTLAKE BUSINESS PARK

Cape Town.

Sarah Ward and Mark Borchers – Sustainable Energy for Africa

Mike Schroeder – Development Action Group

This precedent was chosen to gain understanding of green principles used in the South African context.

This particular precedent was chosen to gain more understanding of how green principles in designing construction may be applied to a commercial building in an urban environment. A lot of time and energy was spent on the optimal thermal performance of the building and in this regard materials, construction systems, insulation, ventilation and use of natural energy such as cool night air were utilised to regulate the building's thermal performance.

A provision was made for secondary climate control mechanisms through the use of 750 mm diameter concrete pipes placed under the recycled concrete brick walls and ground floor. Two vertical chimney ducts were installed allowing the building to flush in cool night air.

Further green elements utilised include:

- Use of local sustainable materials
- Recycling of materials
- Use of recycled materials
- Harvesting and use of grey water for irrigation
- Planting of indigenous plants, fruit trees, vegetables and herbs

5.11 FREEZE FRAME VELOCITY FILMS

Rivonia – Johannesburg.

This precedent was chosen for its use of cross-ventilation and social spaces.

The simplicity and form and the honesty of the materials used in this building created a richness to the way the building is experienced. To this end the materials used and specifically the fact that the historic precedents were used in an abstract way created a very unique environment.

Regarding the climate changes and the manner in which it was responsibly considered in the design of the building is clearly reflected in the fact that much attention was given to cross-ventilation. Air is drawn from the office space surrounding an internal street where warm air is evaporated by two large mechanical fans placed on each side of it. Overhanging roofs from the first floor provide additional shading from the north of the building. Through the use of cross-ventilation and the spaces created to ensure such cross-ventilation, the connection between 'inside' and 'outside' is vastly enhanced. The use of general common social areas were established not only to create a connection between inside and outside but also to allow the opportunity for people to collaborate and socialise, specifically taking into account the creative process that is a prerequisite in the film industry.

5.12 CENTRE FOR MAXIMUM POTENTIAL BUILDING SYSTEMS

Pliny Fisk & Gail Vittori

This precedent was chosen for its use of plants in a building.

The building's appearance is the direct product of the designer's function and with this in mind, aesthetics was moved aside and left to its own devices. This resulted in a building that is very easily understandable and seems at peace with nature. The free growth and invitation to plants in the interior and exterior spaces allows a free flow from and to these areas.

The material chosen for the project was found locally and does not function in a harmful manner to the environment.

5.13 IBN-DLO – The Dutch Institute for Forestry and Nature Research

Wageningen University.
Behnisch, Behnisch & Partners

This precedent was chosen to gain understanding of green design principles.

In designing the building, specific attention was given to the culmination of interior and exterior worlds and that they be combined in one perceivable entity. This entity had to attain the equilibrium needed to define a sustainable workplace and pleasant working environment. The simple use of cross-ventilation from the three main greenhouse gardens created buffer spaces where air is either heated or cooled by using natural energy sources.

Due to the incorporation of these functional systems the building is very energy efficient. The free flow from interior and exterior buildings and the utilisation of organic growth, such as gardens and greenhouses, creates the impression that the building is not fully developed and conveys the ideal that a building does not exist in contrast to nature but as part of nature.

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6



DESIGN INVESTIGATION

6.1 DESIGN INVESTIGATION PHILOSOPHY

6.1.1 Social architecture

"We have built the tallest buildings, the longest expressway, the biggest cities; we have won the game but how did we feel inside, while we were doing it? Did we dance?"

George Leonard

Leonard sees life metaphorically as a game where we dance. (Kok, 1994: 14)

Glover reminds us that there are *"Certain people in the communities whom we have not allowed to join with us in the dance; who have not celebrated life, who have never really been allowed to play in the ultimate game, who have not experienced leisure."* (Kok, 1994: 14)

We are jerked into reality by the Finnish architect, Alvar Aalto, reminding us of social architecture and that responsible architects should design buildings that are of no harm to any user, nor should they be unsuitable for use by people. (Aalto, 1940: 15)

"*The only way to humanize architecture is to use methods which always are in combination of technical, physical and psychological phenomena, never any one of them above the other.*" (Ventre, 1997:11)

How did it happen that we cast our disabled from society and turned our backs on them? Micheline Mason and Richard Rieser outline the argument that show that the original model for dealing with disabilities was a religious one. In terms of this model, the disability was seen as a punishment for evil or the incarnation of evil and that people with disabilities had to be cast out or were subjected to the "casting out of demons". (Holmes-Siedle, 1996: 4)

To this end, through theories like the "social model" and "medical model" (See Appendices 9.3), society has developed its social conscience regarding people with disabilities. It is therefore commonly held that it is the responsibility of society at large to now incorporate people with disabilities into normal life.

Similarly, approximately 15 to 20 years ago scientists started warning us of global warming and the destruction of our planet with our continued "post-World War II" grand scale planning, high energy consumption and urban sprawl.

The Kyoto Protocol of 1997 heralded the turning point of this "Modernist" thinking.

6.1.2 The modernist view

The modernist view was driven by rational thinking based on sound engineering principles. It thereby promoted certain concepts of design and space, ignoring social differences while claiming to be inclusive. Its neutral stand claiming standardization, de-contextualism and a homogeneous public contradicted its claim to inclusiveness as it negated the needs of the disabled.

The modernist movement also did not recognize the limitation of geographic space, energy and natural resources. It concentrated on architecture being an artistic expression (viz. Notre Dame du Haut by Le Corbusier is not used as a church as intended, but a tourist attraction costing €2.00 per visitor). It was therefore a visual art and not a social expression of human needs, this being a problem as buildings are supposed to answer to human needs. This begs the question: "If the power of art lies in its visual perception, does the power of architecture lie in its ability to answer a human sensory need?"

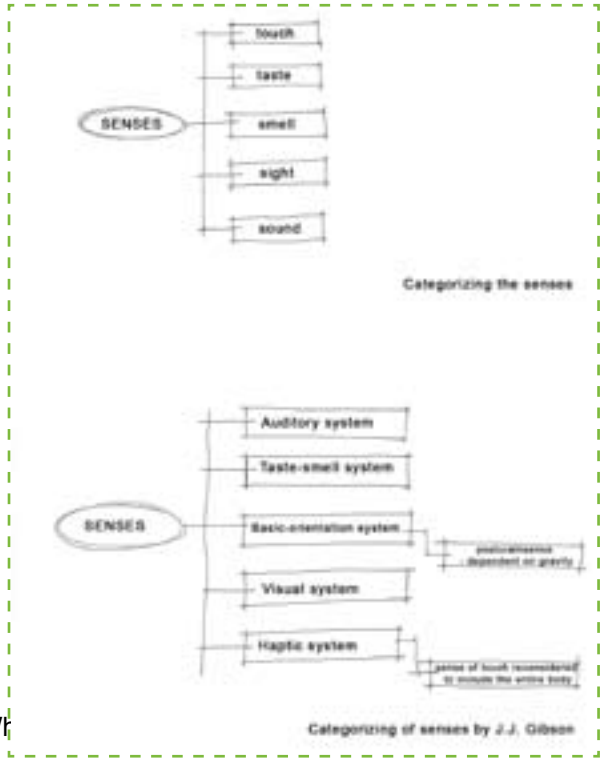
6.1.3 Sensory perception

Papanek states that: "…*architecture has to be experienced by all the senses, rather than just sight. The visual image may provide us with pictorial information, yet beauty is never skin deep*." (Papanek, 1995:76)

Benjamin Mayer lends further clarity by stating that: "*It would appear that today it is designers who are in fact blind, since for them the visual of their work appears so evident that this prevents them from seeing the essential relation which the visual has with non-visual*". (Mayer, 1997:24).

From this we become more aware to plan for our senses.

Synesthesia (the use of senses) sets out to allow us to enjoy an environment through senses that we would necessarily associate with particular information inherent to us which gives confidence. J.J. Gibson characterizes senses as an active detecting system, constantly seeking out information from the environment (Bloomer & Moore, 1997:27). He produced a new compact inventory of senses focusing on the types of environmental information the body receives, instead of the variety of sensory apparatus and responses of the body.



Categorizing the senses

Categorizing of senses by J.J. Gibson

Wh

stimulus in order to gain a better understanding of the source of stimulation. This mobilized orientation involves a total body balance. Total body balance is enabled by our constant knowledge of ground-level due to gravitational pull, making us constantly aware of our postural sense of up and down. Gibson calls this our basic-orientation system.

"A man standing on the earth normally has several sorts of cues available to him, all indicating the direction of the gravitational vertical. These cues can be subdivided into three main classes: visual – from the alignment of planets, buildings and other objects; vestibular – from the sensory canals of the inner ear; kinesthetic – from the pressure and joint receptors in various parts of the body" (Jones, 1994:14).

6.1.4 Orientation

Our senses are used to orientate us within our surroundings.
"We touch, listen and measure the world with our entire bodily existence and the experiential world becomes organized and articulated around the center of the body" (Pallasma, 1996:45).

Kevin Lynch states that *"A good environment image gives its possessor an important sense of ambitional security."* (Lynch, 1983:7)

A sense of security can be experienced when one can easily orientate oneself in the environment, by easily accessing and memorising the environmental image.

People with physical disabilities have a constant fear of the environment. This is created by the inaccessibility of the environment. Environments are often designed in such a way that the disabled use and experience it in a totally different way than able-bodied people. The use of back doors and separate facilities, for example, can create an orientational confusion. The function of a place or space must be accentuated and designed in such a way that the users, being able-bodied or disabled, can orientate themselves in the same manner.

Each individual functions within the community, in a time-space environment, with relative favourable circumstances. Existing constraints can be overcome by executing a choice, which leads to a specific activity pattern, as Thrift explains:
"How time is used is intimately bound up with human physical mental needs, the constraints of the built-environment and accepted societal time tables. Thus each human being traces an ***activity pattern in time and space*** *which uses time and space as resources."* (Thrift, 1977:413)

Wheelchair users and other physically disabled persons cannot always overcome constraints through the execution of a choice. They are trapped within an unfriendly built-environment that does not always provide them with a choice, wanting to escape the constraints that time and space play on their reaction pattern.

Ching wrote: *"Since we move in time through a sequence of space, we experience a space in relation to where we've been, and where we anticipate going."* (Ching, 1942:246). Fundamentally, the physical manifestation of architecture accommodates ***human activity***. However, the arrangement and organisation of the elements of form and space will determine how architecture might promote endeavours, elicit responses, and communicate meaning (Ching, 1942:10).

To communicate meaning in the built-environment, one should be able to orientate and identify with a place. A user must develop a meaningful hold on a specific place, which will enable him/her to truly dwell (Bloomer & Moore, 1997:27).

According to Vischer, a place that consists of different elements has a specific identity which triggers different emotions, giving the user a sense of place and empathy (Bloomer & Moore, 1997:27).

Christiaan Norberg-Schultz believes that *'Place is part of existence'*, meaning that it is difficult to imagine any experience without an association with a specific place. He also states that by *'inhabiting'* a landscape, it becomes recognised and understood. People that inhabit the landscape in turn act as the '*guardians'* of that space and through interaction reveal the *essence of the place* (Quantrill & Webb, 1991:47).

6.1.5 Essence of places

Since the emergence or our species, humans have been making places and spaces. We have been designing them for 30 000 years, making us better at producing cheaper material things at a faster pace.

Advancements in science and technology have provided the knowledge and tools allowing us to shape our world in an utterly frantic way. According to Van Der Ryn (2005:7), *"…we have lost our ability to create places of beauty, comfort and durability that fit both the natural world and our own human nature."*

Architecture speaks about the culture from which it springs and manifests values, ideas, hopes and dreams. According to Van der Ryn (2005:7), architecture is:

"the human habitat, the environment of our own creation, the skin that separates us from the natural world.
It is also a sense of walls – mental and physical – that compartmentalize our perception of the world.
It does not have to be."

Sometime during the last century, architecture lost its soul. Modern culture with its wealth, power and technology created structures once deemed impossible, while the cold post-modern structures inspire a detached sense of awe and wonder. Very few appear to have qualities that truly move us. Beauty and spirit were once an integral part of cultures. When last have we been moved to tears by a building or did not want to leave a place because of the impact it had on us? We travel around the world to experience architecture, but we spend our lives in architecture that makes us feel empty.

Pallasmaa wrote in "The eye of the skin" that '*the authenticity of architectural experience is grouted in the tectonic language of building and comprehensibility of act of construction to the senses'* (Pallasmaa, 1996:43). Spatial qualities are contained in sensations.

Our buildings, our suburbs and our cities are lifeless and cold; disconnected from people. They are uninspiring.

"To inspire is to breathe life into"
(Van der Ryn, 2005:7).

We need to make the buildings of our everyday lives fit our deepest human needs. We can design environments that inspire and nourish our souls.

Buildings and cities must be reconnected to the cycles and flows of the natural world that are the basis for all life on earth. We are still designing and building as though resources are unlimited, without regard to the waste and pollution caused by construction and function of the building as well as designing selfishly, only for able-bodied persons.

Humans are rapidly changing the planet and creating a "handicapped" environment.
Today no place and no ecology on earth are untouched by the consequences of human activities.

Architecture together with urban design can become integrated into the web of life, its cycles and flows. Louis Sullivan, a great 19th Century architect stated that *"form follows function"*, while it is interesting to note that Sim van der Ryn stated that *"form follows flow"*.

Both these views were carefully taken into consideration while designing the ***In-vocational Training Centre***, where a symbiosis of the two must be reached. The Centre must fulfil the practical and functional needs of the disabled as well as fulfil its environmental duties. The building, at its best, can be a physical and environmental enabling product, or at its worst, a handicapping product.

Buildings are not static objects, but organisms. Cities are not mechanical assemblies, but ecosystems (Van der Ryn, 2005:8).

Buildings can become more integrated with nature through ecological design. In the same sense humans can become more integrated with the built-environment by means of inclusive design. In both cases *attitudinal* challenges must be overcome. Nature can live without humans, but humans cannot live without nature. Architecture can make this truth transparent and allow us to experience it at a deep transforming level.

Not enough attention is given to the cost of operating and maintaining poorly designed buildings. This cost, over the lifespan of a building, is four times greater than its initial cost (Van der Ryn, 2005:8). We do not give enough thought to how to design buildings that can adapt and change. We must begin to think about these consequences.

How often have 'expense' and 'fire hazard' been used to sanction the denial of equality to disabled people? There will naturally be expense involved in implementing change.

Buildings need to be made "whole" through commonsense design intelligence that incorporates life-enhancing technologies. Our dominant world view of a mechanical clockwork universe of the machine must be shifted to the intricate interconnected web-like order that underlies the living world at all scales.

What does this shift mean for design and architecture? How can design truly reflect the intricacy, complexity, beauty, consideration and dynamic qualities of the living world?

As Mahatma Gandhi said:
"We must be the change we want to see."
This is the essence of actively living with hope.

6.2 ORIENTATION AND IDENTIFICATION

6.2.1 Orientation

The following are components of orientation:

- Landmarks
- Clues
- Compass direction
- Measurements
- In- and outdoor numbering systems

6.2.2 Landmarks

Landmarks can be any familiar object, sound, odour, temperature or tactile clue that is easily recognised and known within a permanent location.

The following are landmarks in the site context:

a) The Union Buildings to the east
b) The Taxi Rank
c) The Pretoria Zoo
d) The Engen garage on the corner of Boom and Bloed Streets

- **Implementation:**

The building is designed around a central courtyard, becoming the landmark of the building.

6.2.3 Clues

Clues are sensory stimuli determining a person's position or direction.

- **Implementation:**

The handrails, fragrant plants and textural differences in floor surfaces of the building direct a person through it.

6.2.4 Compass direction

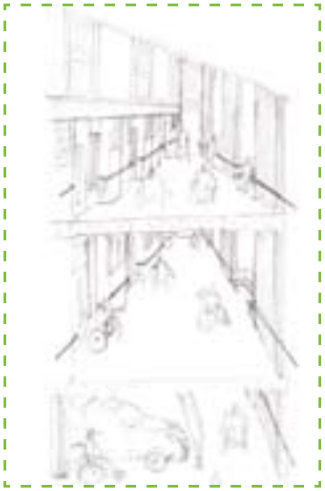
- **Implementation:**

The shape of the building, with its straight internal passages, makes it easy for people to direct themselves within the building. It is easy to direct a new visitor to for example the recreation area from the entrance (e.g. keep straight down the passage past the cafeteria, turn 90˚ right after the stairs, pass the ramp and apartments, turn 90˚ into the recreation area.)

6.2.5 Measurements

- **Implementation:**

Doors are placed at constant intervals in the training facility and accommodation block. This helps to orientate people, especially people with visual disabilities.



6.2.6 Identification

According to Christiaan Norberg-Schultz, identification means to experience a 'total' environment as meaningful. He states that by 'inhabiting' a landscape, it becomes recognised and understood. People that inhabit the landscape in turn act as the 'guardians' of the space and through interaction reveal the essence of the place (Quantrill and Webb, 1991:47).

- **Implementation:**

By designing the building according to inclusive design principles, the 'total' environment will be able to be experienced as meaningful. The building is designed to create interaction between the users of the building. This is created by "spatial pockets" along corridors, where socializing can take place.

6.3 FORM

6.3.1 The form of the Centre

The form of the Centre is determined by:

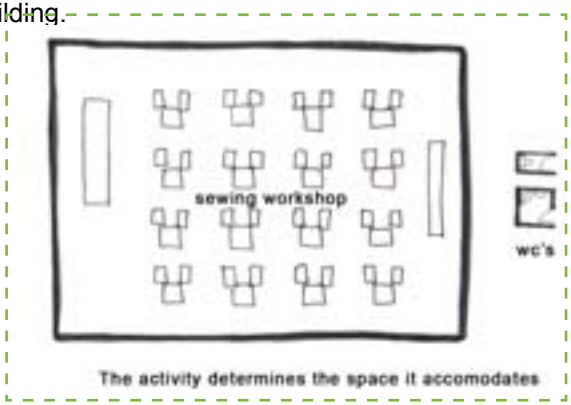
a) Influence of the context
b) Spatial requirements of each space within the Centre
c) Organisation of different spaces

a) Influence of the context

- Grids
- Vegetation
- Surrounding buildings' orientation and shape
- Streetscape
- Climate (sun angles and wind)
- Function

b) Spatial requirements of each space within the Centre

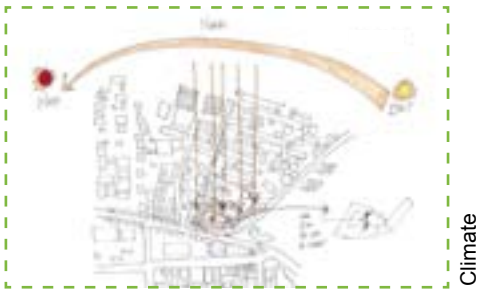
Each space has its own function, and conversely the function or activity that each space accommodates will influence its spatial requirements. All the individual spaces together influence the form of the building.




Grids


Vegetation


Surrounding buildings


Climate


Functions

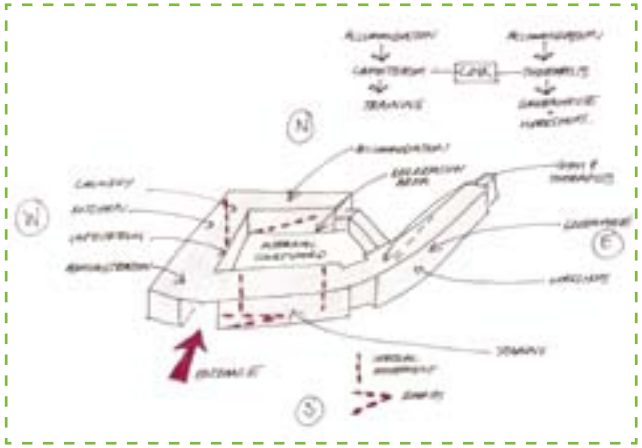
c) Organisation of different spaces

- **Privacy hierarchy:**

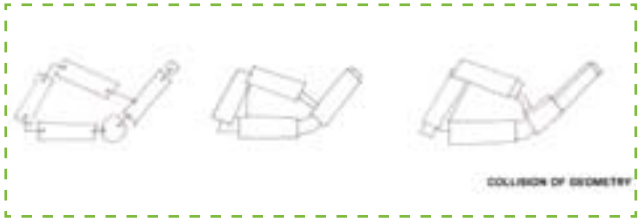
Spaces are arranged according to their privacy levels.

- **Function:**

Spaces are organised in relation to their function. Spaces related to accommodation (e.g. laundry, recreation room, lounge and apartments) are organised together. Training facilities are grouped close to the administration area, whereas the workshops and greenhouse are placed to the eastern side of the building. The building is linked by means of a cafeteria, used by both occupants of the accommodation block as well as trainees from the training facility.



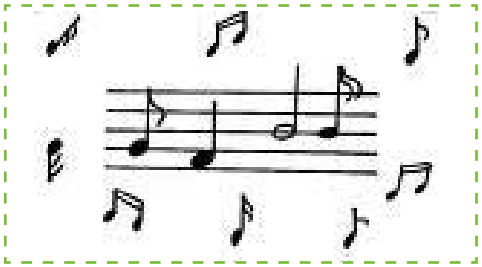
6.4 FORMAL COLLISION OF GEOMETRY



6.5. DATUM

Datum line: "the horizontal base-line from which heights and depths are measured."
(Chambers, 1972)

The lines of a music staff serve as a datum for reading notes and the related pitches of their tones.



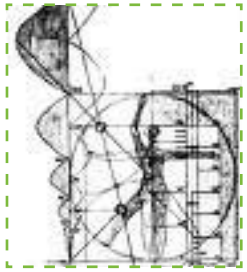
Vasily Kandinsky stated that the straight line in the artwork is the element that gives the artwork order.

Boom Street and Soutpansberg Road serve as the datum line for the shape of the Centre.

6.6 ORDERING PRINCIPLES

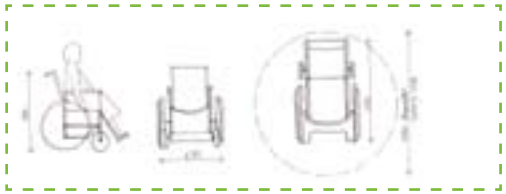
- **Anthropomorphic proportions:**

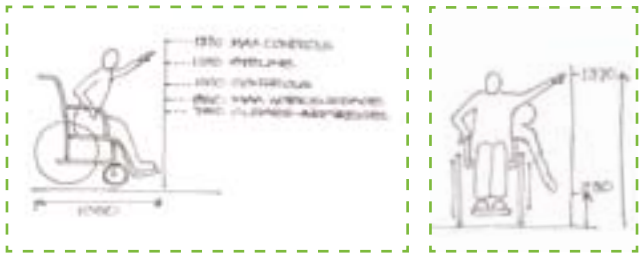
Le Corbusier created a proportional system based on the fact that the average height of a man standing with his arm raised would be 2.2 metres.



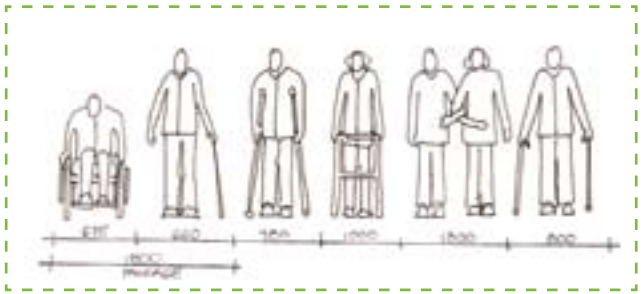
The *In-Vocational Training Centre* is adapted to the proportional system of the average height of a person seated in a wheelchair.

Dimensions and proportions of the human body are used as guidelines. All the volumes of space required for activity, movement and rest are based on the dimensions of the human body and the turning circle diameter of a wheelchair.



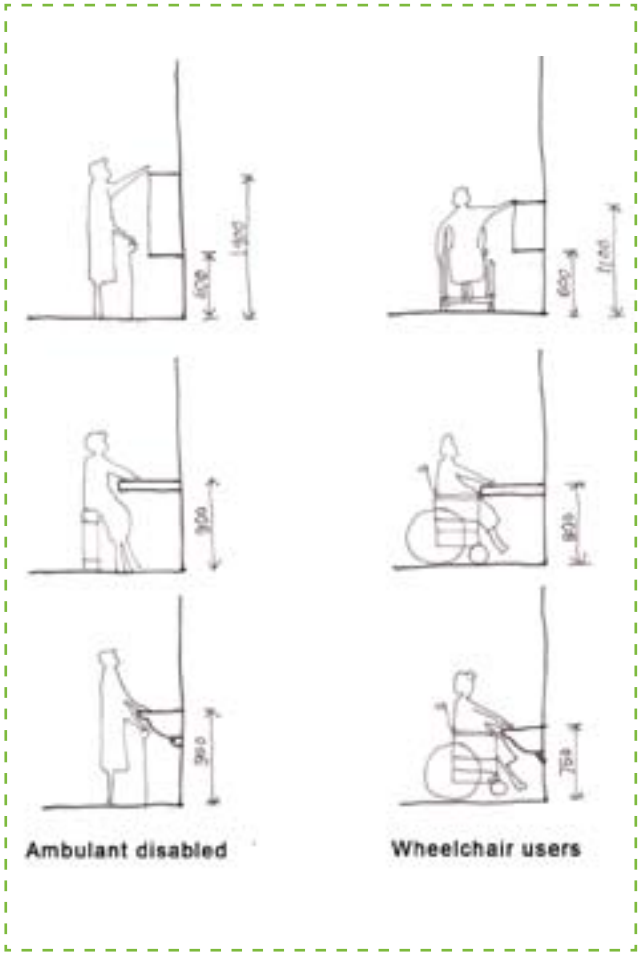


PASSAGES: determined by width and sizes needed for physical disabled people to pass each other (wheelchair users).



HANDRAILS: form and sizes are determined by the size of the average human hand and the height and distance a person can easily reach. The grip of the handrail must also be considered, because many physically disabled people can not grip their hands.

HEIGHT: different heights are needed for ambulant disabled and wheelchair users.



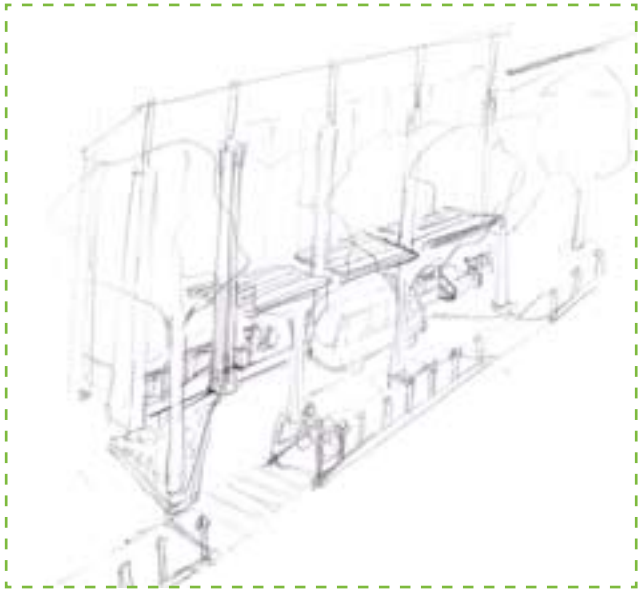
6.7 CIRCULATION

6.7.1 The approach

The building's approach varies, depending on the direction and distance of the onlooker from the building. The building is also experienced at different levels or heights, as wheelchair users experience different sensations of place and space. The building will be experienced from the sidewalk next to the Centre, from across the road (the taxi rank), from the Prinshof School and as far as Du Toit Street. Each view will create a different emotion.

The building will also be experienced as a quiet building, hugging the street edge. The street façade comprises vertical columns placed at different intervals, creating a rhythmic effect. Passers-by will experience the rhythm at different intervals when "exiting" the inner city.

The drop-off area is defined by bollards, different paving, a lowered canopy roof and a raised platform. Zebra-crossings will be needed where the drop-off zone crosses the sidewalk. Benches are provided for waiting. Handrails lead the visitor down a ramp and into the foyer of the building, from where he/she can orientate him/herself.



6.7.2 The entrance

The entrance is level with the sidewalk, making it easily accessible for wheelchair users. A recessed entrance is designed, creating a sheltered atmosphere. Because of this, a portion of the exterior space reads as part of the Centre.

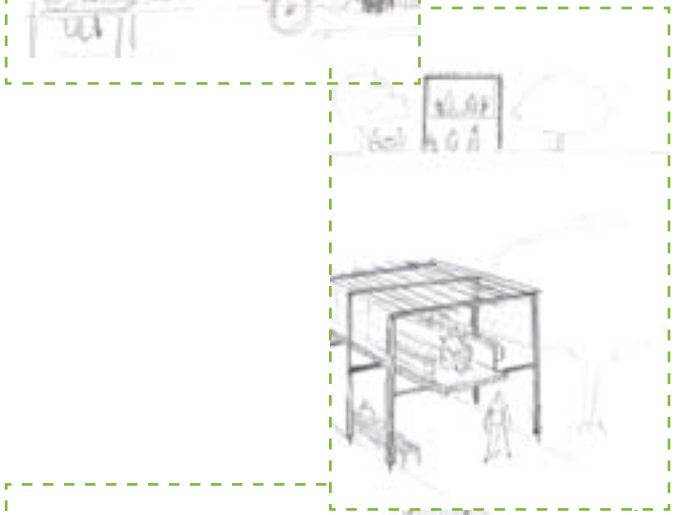
On approaching the building a person passes a water pool, creating a calm, relaxed atmosphere in a busy urban environment. The pool has a sensory effect -- not only does it help orientate a person by its sound, but also has a visual effect by reflecting the building.

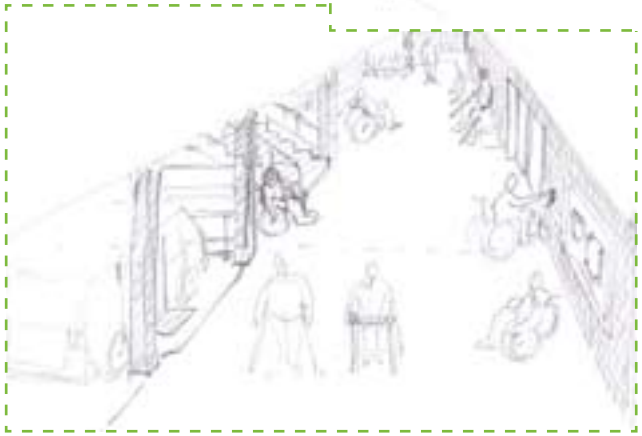
6.7.3 The path

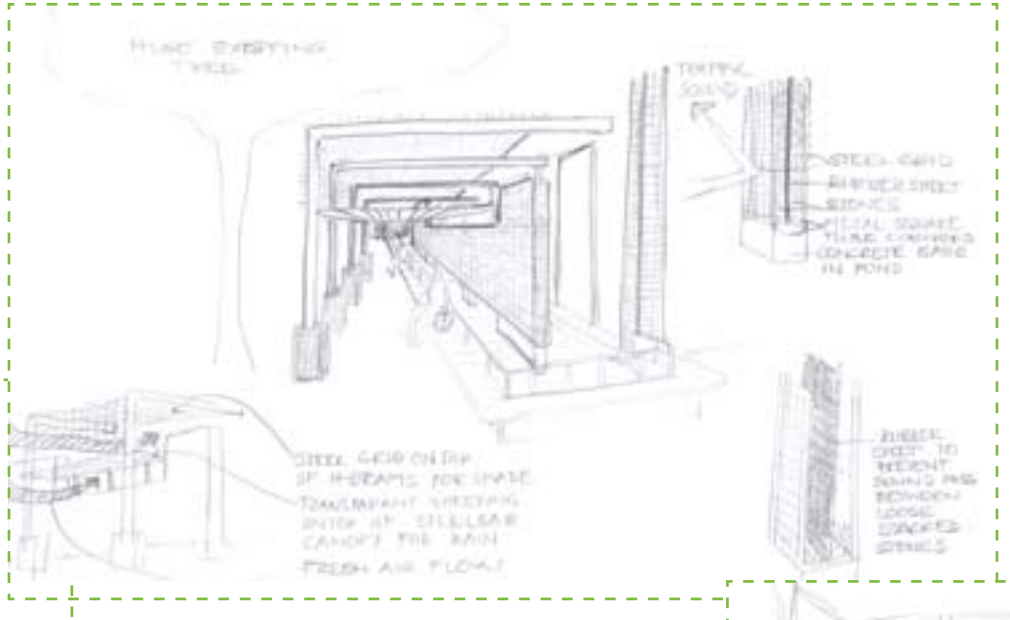
After entering the building, a choice of two directional pathways can be taken. One leads to the cafeteria and accommodation and the other leads to the training halls, workshops and greenhouse.

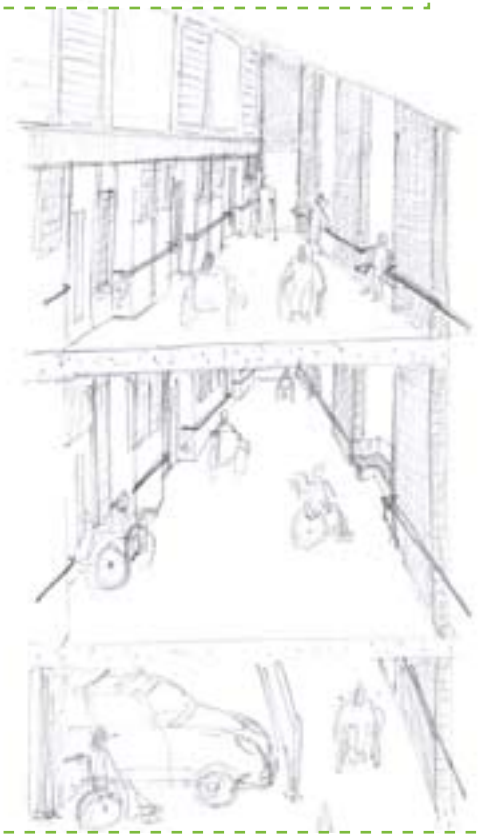
By means of a handrail and differently textured, non-slip floor surfaces, a person is lead through the building.

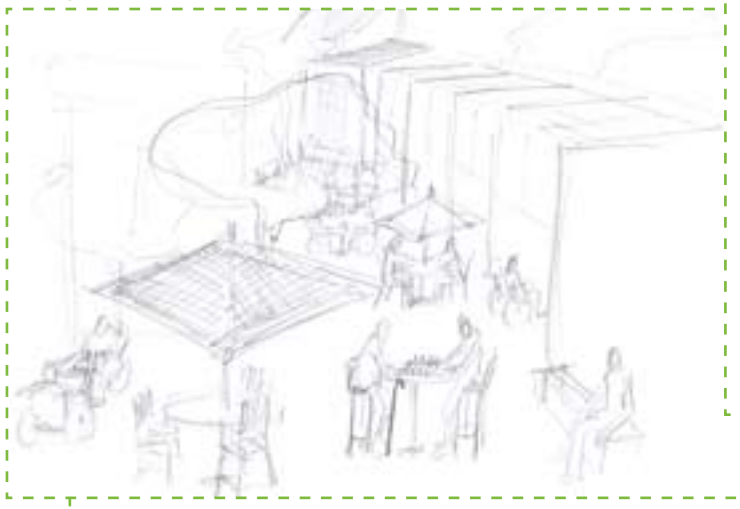
The path has to be easily accessed, as well as being large enough for wheelchair users to manoeuvre in. Wheelchair users prefer straight pathways without any obstacles or barriers. This had a great influence on the design. To accommodate the straight passages (but not have them deadly boring) an atrium was designed where different vantage points can be experienced from passages and balconies. To break the monotony of the long passages, walls are stepped forward and backward, creating individual spaces. Plants are used to soften the harshness of straight passages. This lends perspective and judgement of distance.











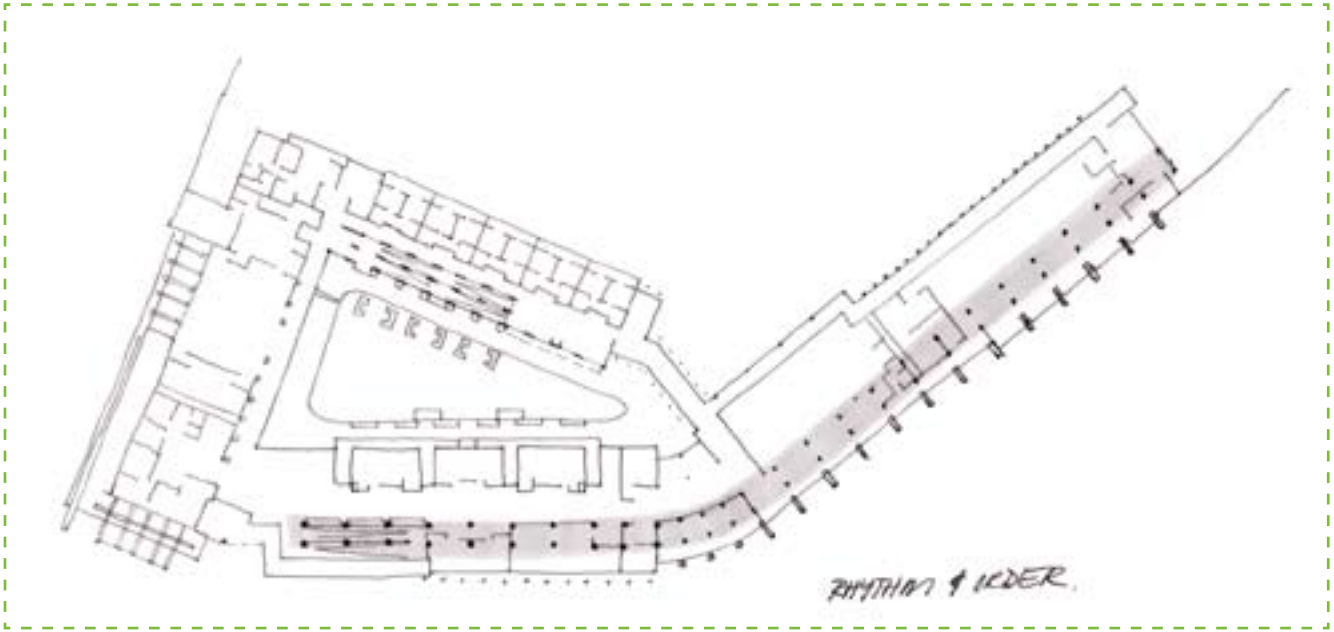
6.8 RHYTHM, ORDER AND TEXTURE

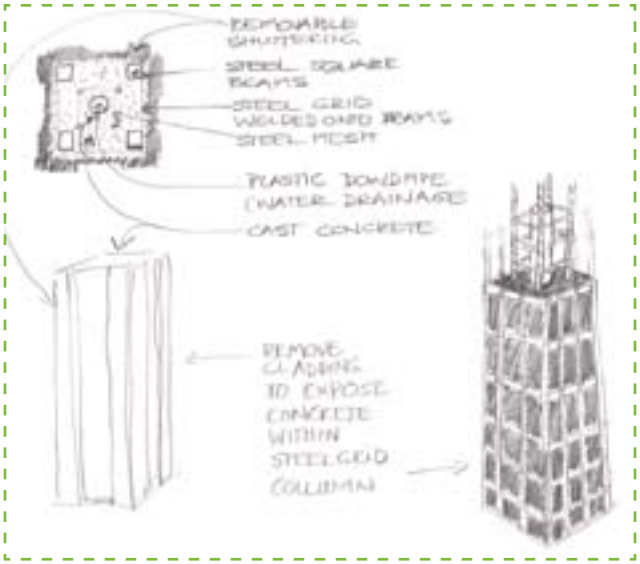
Visual richness is given to the design by different floor and wall finishes. The design started with a spine, in which the services are housed, running through the plan of the building. This developed into a three-dimensional, vertical, structural element with the following functions:

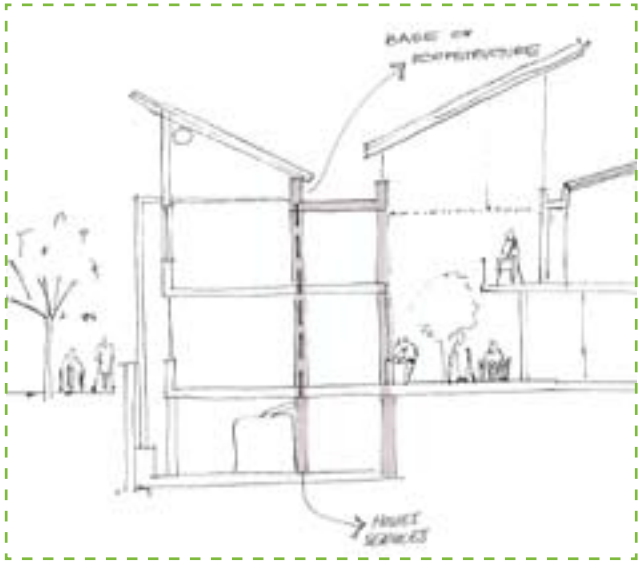
- The base of the roof structure
- Services are housed within the columns
- Vertical circulation (the ramp) is incorporated
- Creates order in the design
- Creates rhythm in the building `

"Space constantly encompasses our being. Through the volume of space, we move, see forms and objects, hear sounds, feel breezes, smell the fragrances of a flower garden in bloom. It is a material substance like wood or stone. Yet it is inherently formless. Its visual form, quality of light, dimensions and scale depend totally on its boundaries as defined by elements of form. As space begins to be captured, enclosed, moulded and organised by the elements of form, architecture comes into being." (Ching, 1989:108)

Architectural form, texture, material, light and shade modulation form part of the quality articulating space.







6.9 DESIGNING FOR PHYSICALLY DISABLED PEOPLE

6.9.1 Sidewalk

Dropped kerb:
An existing dropped kerb is provided next to Prinshof Street. Dropped kerbs can present a significant hazard to a wheelchair user. The waiting user is close to the edge of the pavement and is required to “hold” onto the gradient whilst waiting. For this reason the type of dropped kerb which uses a fall on either side of the crossing is preferred.

Textile surface:
Usually assists disabled people by indicating change of surface and level.

Raised kerb:
Located in front of entrance enabling wheelchair users to easily cross Boom Street.

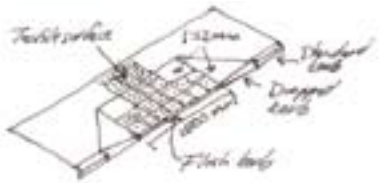
Seating/street furniture:
Located so that wheelchair users do not find it difficult to manoeuvre around obstructions and blind people can walk around safely without colliding with unexpected obstacles.

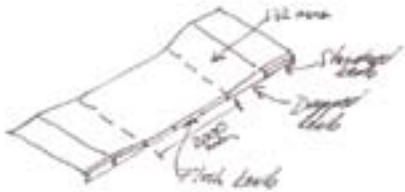
Bollards:
- Protect pedestrians from the vehicular traffic and prevent vehicles (especially all the taxis in the area) from parking on the pavement.
- Should be at waist rather than knee level (1 000 mm high) to prevent them from being a tripping hazard for visually disabled people.
- Should be of contrasting colour to the surrounding area with no horizontal projections on the bollards.

Lighting:
The route from the Centre to parking bays and transport routes should be clearly lit to improve the ability to navigate and the safety of users of the area.

Paving:
- Should be even, firm and well drained.
- Should have a non-slip surface in wet and dry conditions.
- Should avoid sudden or irregular changes in gradient and gaps more than 100 mm wide in the surface of the path.
- Angles at intersections should be splayed or rounded to make turning the corner easier for wheelchair users.

Channel gratings and manhole covers:
- Should have non-slip surfaces.
- Should be flush with pavement.
- Openings in gratings should be no larger than 13 mm in one direction.
- Gratings with elongated openings should be positioned with the long dimension perpendicular to the predominant direction of traffic.





6.9.2 Parking

Kerbside parking (on Prinshof Street):

- In-line parking bays should allow access to the rear of the vehicle where a wheelchair is stored.
- Spaces should be clearly marked at both high and ground level.
- Provide a ramp and dropped kerb access.
- Transfer zones should have yellow cross-hatch road markings.
- Dimensions:
  - Wheelchair users: 6 600 mm long x 3 600 mm wide
  - Ambulant users: 6 600 mm long x 3 000 mm wide
  - Transfer zone: 1 200 mm wide
- It is dangerous for wheelchair users to pass behind cars, therefore a transfer passageway must be provided at the front of the parking bay.

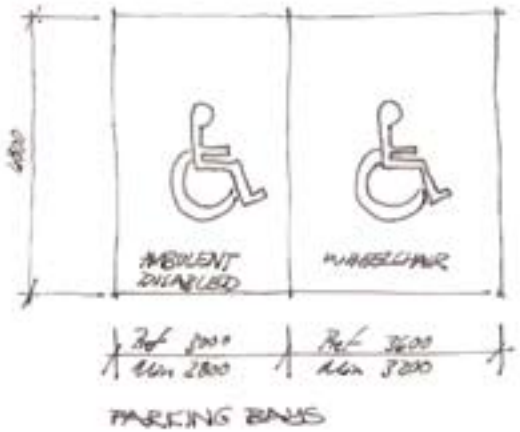
Residential parking:

- Should be as close as possible to accommodation.
- Ramp and lift is provided for vertical movement to apartments.

6.9.3 Public transport

Bus stop:

- Ambulant disabled tend to have great dependence on public transport.
- Bus stop is located next to the Centre.
- Sheltered seating is provided at different heights:
  - 450 mm for able-bodied persons
  - 900 mm for ambulant disabled (suitable for people with stiff hips)



6.9.4 Drop-off

- Raised platform for easy access of wheelchairs into taxis.
- Non-slip surface.
- Maintenance-free seating at different heights to accommodate ambulant disabled.
- A handrail leads people from drop-off area towards the entrance.
- Overall lighting provided as a safety measure.
- The glass façade separating the drop-off area from the ramp and interior space creates a visual link between the interior and exterior, contributing to safety.

6.9.5 Entrance

The route that a disabled person takes in getting into a building is extremely important. The treatment of the site of a building and the relative locations of the entrances, service entrances and points of arrival contribute to the ease of use of a building by disabled people.

Outside seating is provided in such a way as not to create an obstacle.

Automatic sliding doors assist disabled people and remove barriers to others. Sliding doors are preferred for high traffic entrances. Glazed areas should have tinted warning strips at 1 600 mm height to prevent accidental collisions.

Acoustics: The sound coming from the water pool at the entrance helps orientate the occupant and visitor.

Security/ Reception desk is strategically placed and easily identifiable by the general surroundings. Counter-tops should be either 800 mm high or have at least a 1 m long section at 800 mm high with a 500 mm deep x 750 mm high leg space below to allow wheelchair users to approach the counter either from the side or head on. Leg space should be provided at the front for the visitor and at the rear for the receptionist.

Information and labelling: Information boards indicate site plans and maps of the building to help orientate and divert visitors. All information should be printed in large print and lower case, in *sans serif* typeface, for example *Training.*

Light: Contrast in light levels between the outdoors, entrance and passages should be avoided. Large glass windows on the north and south prevent the entrance hall from becoming dark.

- Entrance hall: 200 lux
- Reception desk: 500 lux

Ventilation: Natural ventilation.

Electric: Plugs are located at the security/reception desk as well as in the waiting area.

Materials:

- Colour contrast helps with orientation and movement of occupants
- Reception desk must have rounded edges and corners
- Non-slip floor texture

Size: Large enough to accommodate heavy circulation through the hall. Occupants will pass through the hall, moving between the cafeteria, administration and training facilities. It has the possibility of becoming a gathering space.

6.9.6 Stairs

Ambulant disabled people prefer stairs to ramps.

Dimensions: Should ensure that they are of a shallow pitch

- Treads = minimum 320 mm
- Risers = maximum 145 mm (130 mm preferred)

Nosings:

- Should be splayed or rounded to at least 6 mm radius
- No overhang on the nosing to avoid tripping
- Contrasting colour
- Non-slip nosing

Handrails:

- 900 mm above tread level and 1 000 mm above landings
- On balustrades the bottom rails should prevent a 100 mm spherical object from passing between the treads and guarding

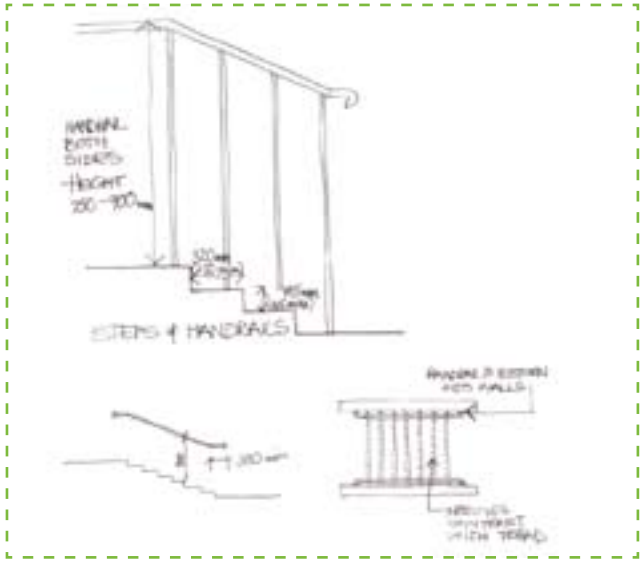
Light:

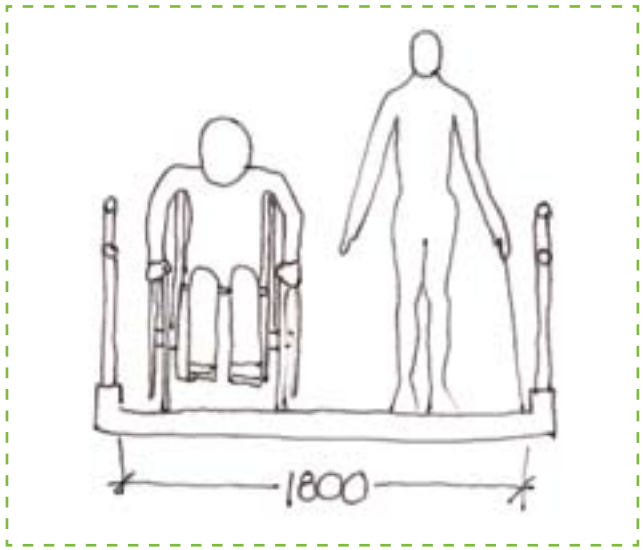
- Minimum: 75-100 lux
- For people with visual disability: 200 lux

Tactile warning strip: Before the beginning of a flight of stairs

Areas of refuge: Refuge area on stairwell indicates a clear fire escape route

Signage: Located consistently within the stairwell





6.9.7 Ramps

Gradient:

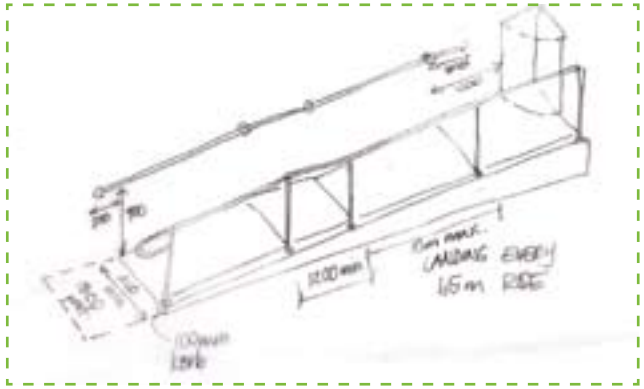
- 1:12 gradient with 9 m (or 1,5 m rise) resting intervals, used at main ramps
- 1:10 gradient used at drop-off ramp
- 1:8 gradient used at parking

Width: A ramp which is 1 800 mm wide allows two users to pass each other on the ramp.

Surface: Non-slip surface to be used.

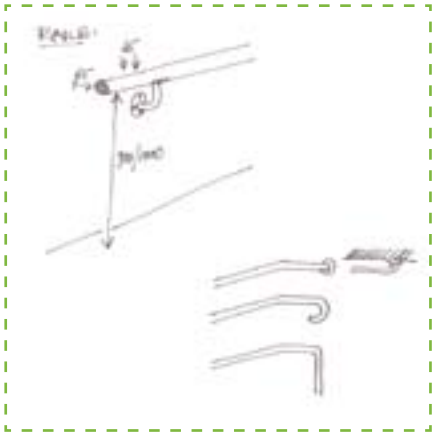
Cross-slopes: The exterior ramp in front of the greenhouse must be constructed to avoid pooling of water. Provide a cross-slope (1:50) across the width of the landings or provide drainage holes.

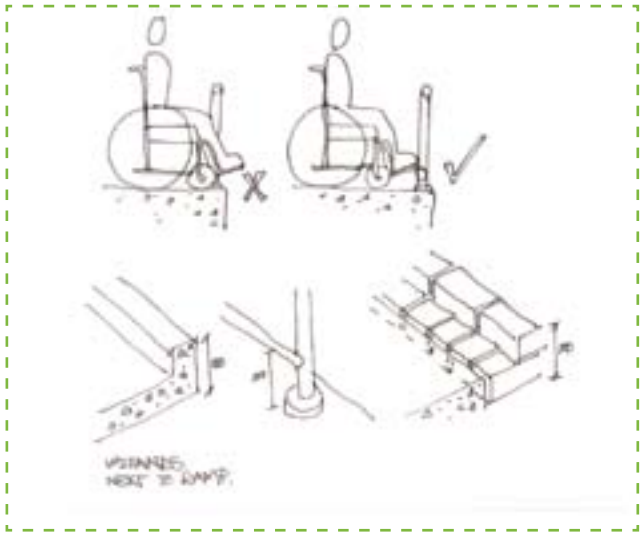
Light: Good illumination achieved by a combination of low-level directional light sources and high-level general or diffuse sources.



6.9.8 Handrails

- Should be easily gripped and supported
- Circular section handrails (40-50 mm outer diam)
- Powder-coated steel tube
- Contrasting colour/hue
- Minimum clearance of 45 mm between wall and handrail
- Continue around corners and across landings





6.9.9 Lifts

Control buttons:

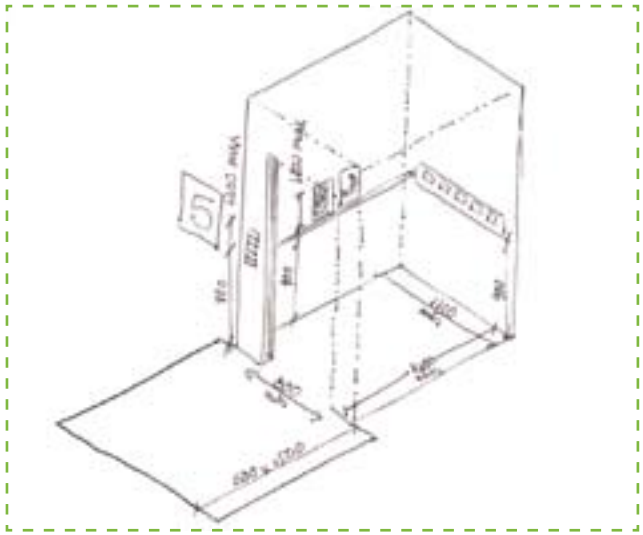
- Call buttons inside and outside the lift must be accessible and visible to wheelchair users
- Must contrast with the background and be engraved for blind persons

Doors: Opening time of 15 seconds is required or the installation of door sensors.

Light:

- 50-75 lux
- Diffused light source

Ventilation: According to suppliers specification.
Acoustics: Audible indication of level change and door closure should be used.



6.9.10 Signage and labelling

Information on signs:

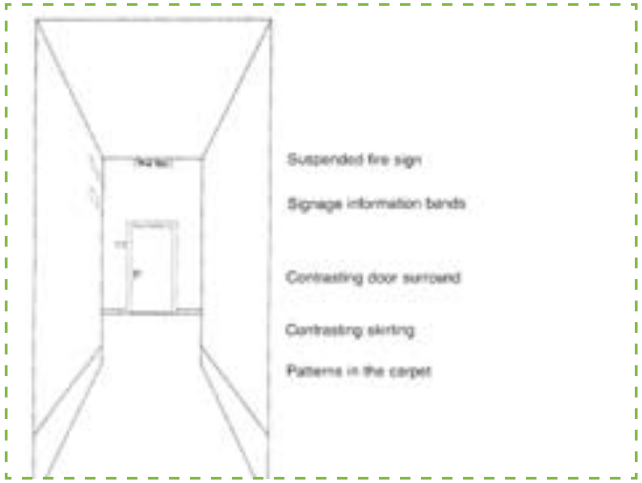
- Typeface should be legible -- lower case is easier to read
- Lettering should contrast signboards

Location:

- Signs should be part of the planning of the building or environment and not added later.
- Consistent sign location/placement bands should be established throughout the building.
- Tactile signs at accessible heights for standing people as well as wheelchair users = 1,15 m and at a forward distance of 0,5 m.
- Door signs: In the centre of the door or 25 mm away from the door at 1 600 mm height.
- Lift and stair floor signs: 100 mm high lettering indicating floor number.

Light levels:

- 100 and 300 lux depending on surrounding light level.
- Minimise glare with mat finishes.



6.9.11 Administration offices

These are located near the visitors' entrance.

Ventilation: Passive ventilation and evaporative cooling.

Light:
- 300 lux
- The western sun is screened.

Acoustics:
- Carpets dampen noise
- Double glazing towards street
- Sound of water can be heard if windows are opened towards the pools
- Stone and mesh wall reflects vehicular noise from the street
- All the spaces are designed to accommodate wheelchair users and a 1,5 m turning circle

Director:
- Convenient to staff and visitors
- Conference room for staff and board meetings is indicated near the director's office
- A waiting area and secretary accompany the director's office

Business manager:
- As the responsibility of the director and business manager is closely related the offices should be near each other
- It must also be close to accounting and clerical staff

Receptionist: Located at a point of control.

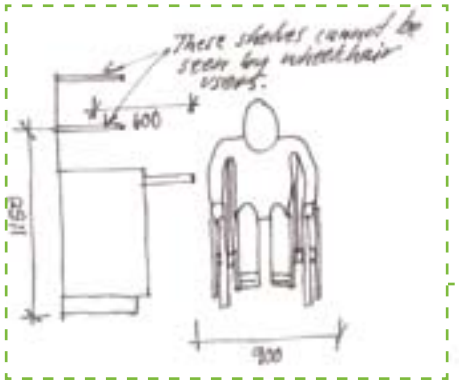
6.9.12 Cafeteria

Light: 100-300 lux

Ventilation: Passive ventilation

Acoustics:
- Sound of water, from outside pool, can have a calming effect
- Sounds from serving area help to orientate people

Other:
- Tables and chairs must be placed for easy passageway for wheelchair users (± 1,5 m passageway between tables)
- Round tables should have a central leg so as to create no obstruction for wheelchair users
- Hooks for walking sticks or canes must be provided
- Serving counter should be at reachable height for wheelchair users (800 mm)
- Sliding tray is:
  – 300 mm wide and the highest reach-over shelf no more than 1 150 mm
  – continuous to till with leg room available no less than 250 mm UFFL
- Where possible, food shall be displayed on a tray, so that this can be dragged forward to reach items at the back
- A clear corridor of 900 mm must be provided in front of the counter



6.9.13 Laundry

Light: 500 lux

Ventilation: Passive ventilation.

Acoustics: Noise made by the washing machines and dryers.

Movement in laundry: Spaces are designed with a 1,5 m wheelchair turning circle in mind.

6.9.14 Training halls

Light: 300 lux

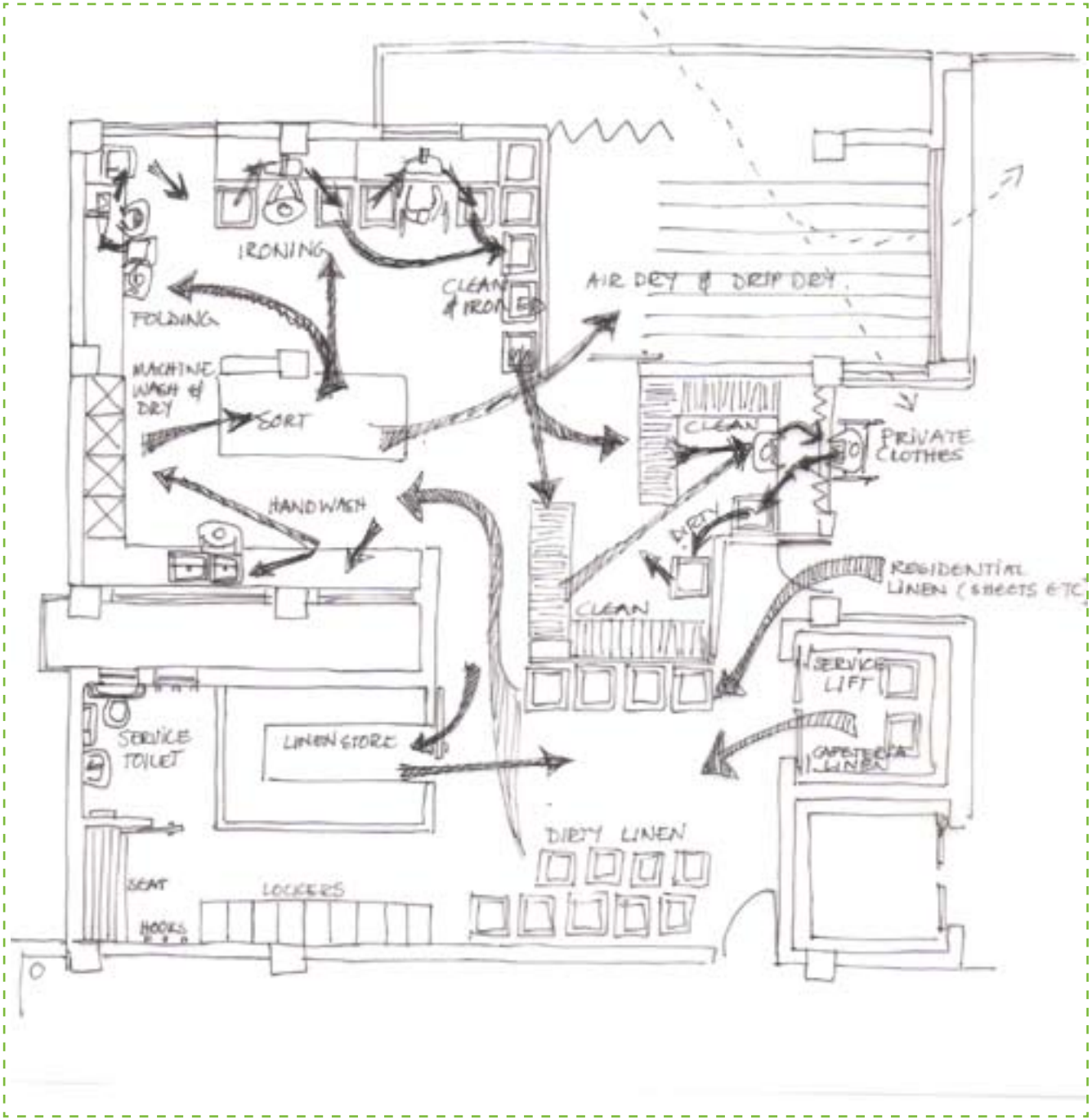
Ventilation: Passive cooling and evaporative cooling.

Electrical: Plugs and counters for the use of electrical equipment such as projectors, laptops and machinery.

Water: Each training room must be fitted with a sink (according to Mrs L Nel, job-coach of "*Building Tomorrow*").

Sizes:

- Small group/individual training rooms.
- Larger training halls where in-service training will take place.



6.9.15 Sewing workshop

Light: 300-500 lux

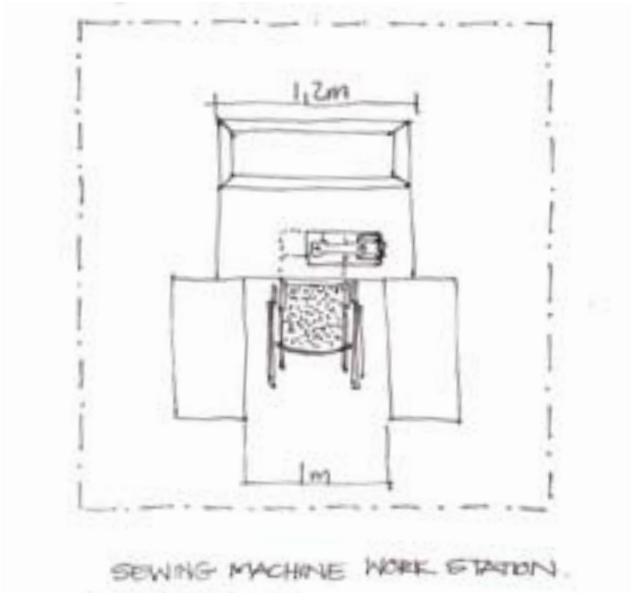
- Natural lighting.
- Task lighting – located at each workstation.
- General lighting – luminaires to provide uniform illumimance.

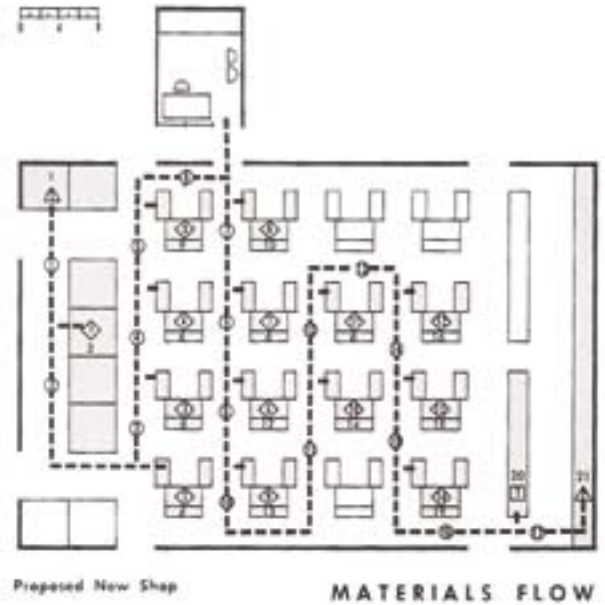
Acoustics:

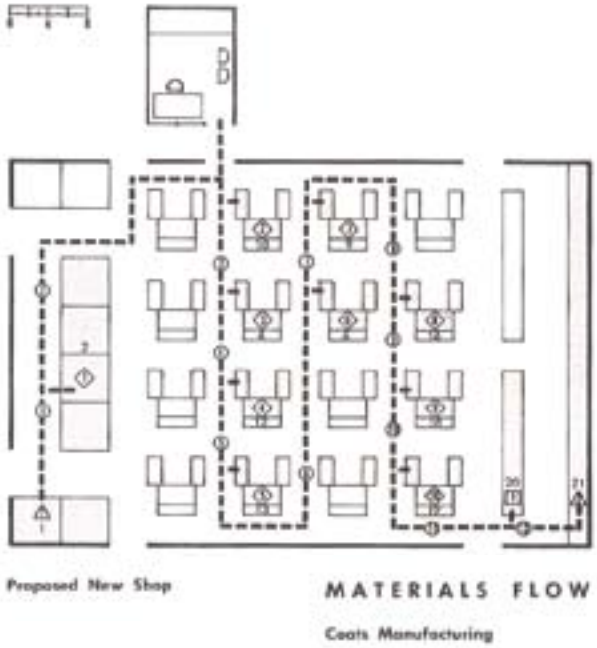
- Carpets dampen noise.
- Double glazing.
- Cavity walls.

Efficiency in material flow is a major concern. Efficiency is achieved by:

- layout and
- use of appropriately selected equipment arranged with aisles with sufficient width for ease of operation.







6.9.16 Kitchens (both in apartments and main building)

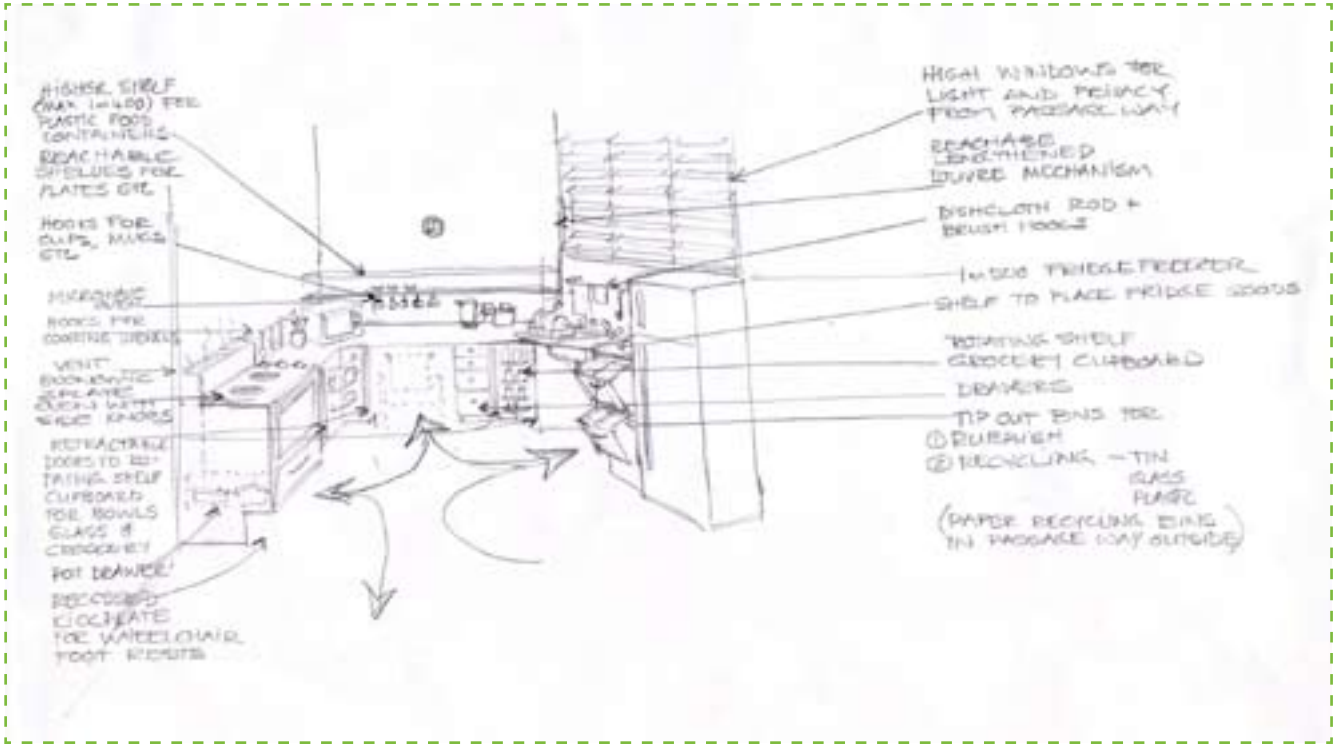
Light:

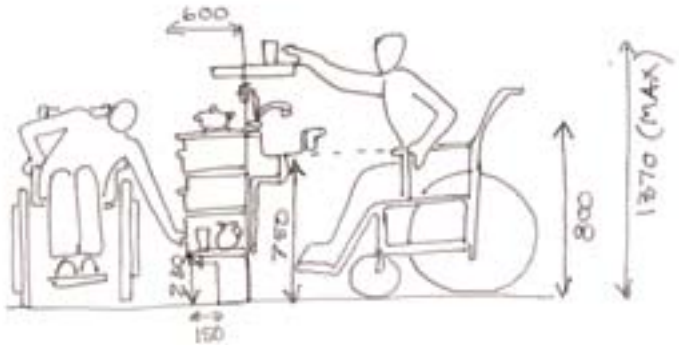
- Task lighting must be provided.
- Natural day lighting takes place.
- Levels of illumination can be adjustable by using louvres. This suits different eye conditions and heights of people either standing or in a wheelchair.
- 150-300 lux.

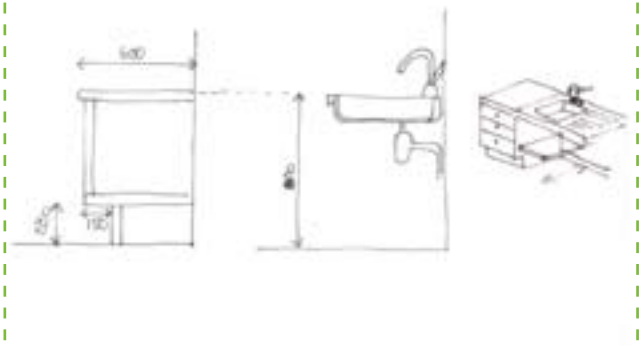
Ventilation: Passive ventilation.
Electric: Ample plugs should be provided.

Other:

- Non-slip floor surface.
- Use a continuous sequence of units – worktop, sink and cooking.







6.9.17 Bedrooms

Light:

- 100-150 lux
- Bed lamps are fixed to walls above beds to prevent residents from bumping over them.

Ventilation: Passive cross ventilation.

Electric: Provide sufficient plugs for radios, TVs, chargers and any additional electrical appliances.

Acoustics: Carpets dampen noises.

Dimensions:

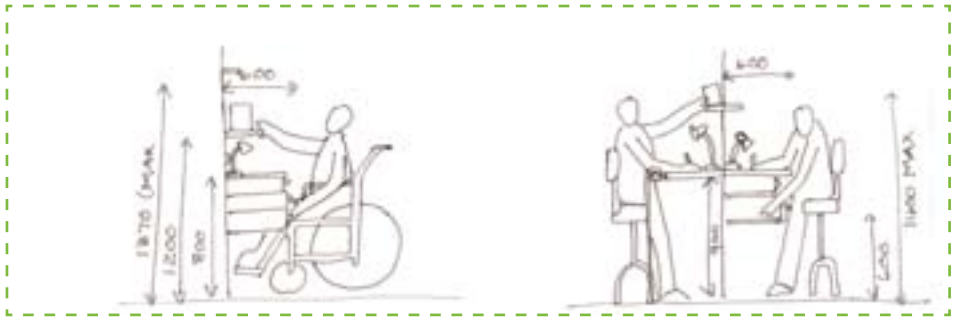
- Bedside space for:
  - Lateral transfer from wheelchair: 1 000 mm preferred (800 mm minimum).
  - Frontal transfer from wheelchair: 1 200 mm minimum.
- Level of mattress for:
  - wheelchair users: 480 mm approx.
  - nursing supervision: 650 mm approx.
- Clear space for footplates of wheelchair beneath the bed: 200 mm minimum.
- Wall-fixed mirrors:
  - Standing position:

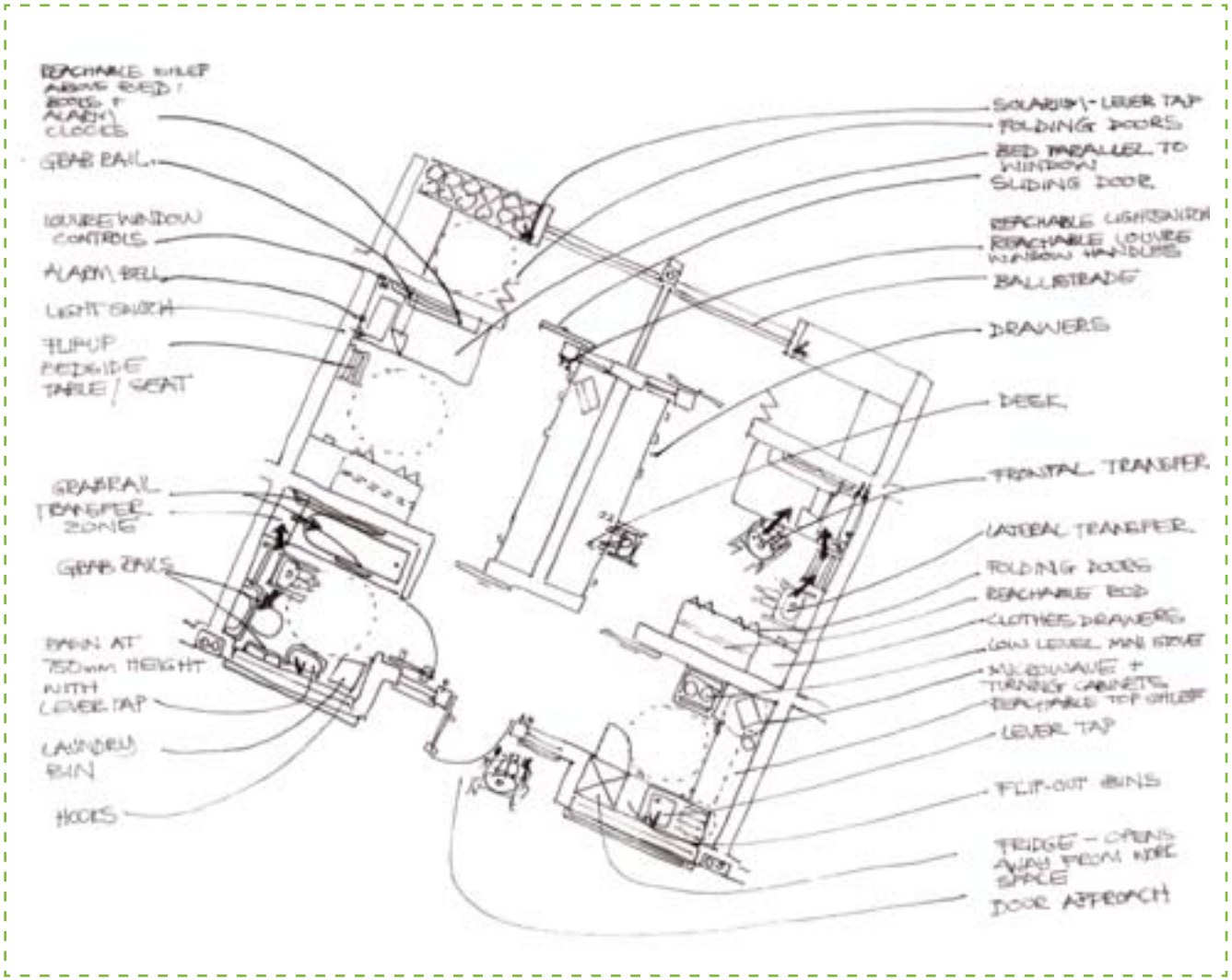
    Upper level of mirror: 1 800 mm minimum from floor.

    Base of mirror: 1 300 (no higher).
  - Wheelchair:

    Base of mirror: 900 (750 mm preferred).

    Attention should be given to positioning the angle of pivoted mirrors.





Other:

- Narrow shelving and drop-down work surfaces.
- Bedside tables to be folded down when not in use.
- The position of the bed is most important. To avoid glare it should be parallel to windows rather than facing them.
- Preferred window sill height = 600 mm high.
- Wheelchair users make either parallel, frontal or lateral transfers from chair to bed and sufficient floor space must be provided.
- The height of the mattress must be level with the seat of the wheelchair.
- Higher levels are more advantageous for some ambulant disabled (650 mm).
- Bed must be stabilised and not move during transfer.
- Adequate foot space for wheelchair footplates should be provided beneath the bed.
- Adjustable beds, allowing different heights, cater for varying types of disabilities.
- Reaching potential of the disabled resident will dictate the level of storage facilities.

6.9.18 Bathrooms

Light: 100-200 lux.

Ventilation: Natural cross ventilation.

Acoustics: No particular adaptations.

Water: Grey water (from washbasins, showers and baths) is drained to tanks, undergoes a reverse osmosis process and is pumped through the building to be used to flush toilets.

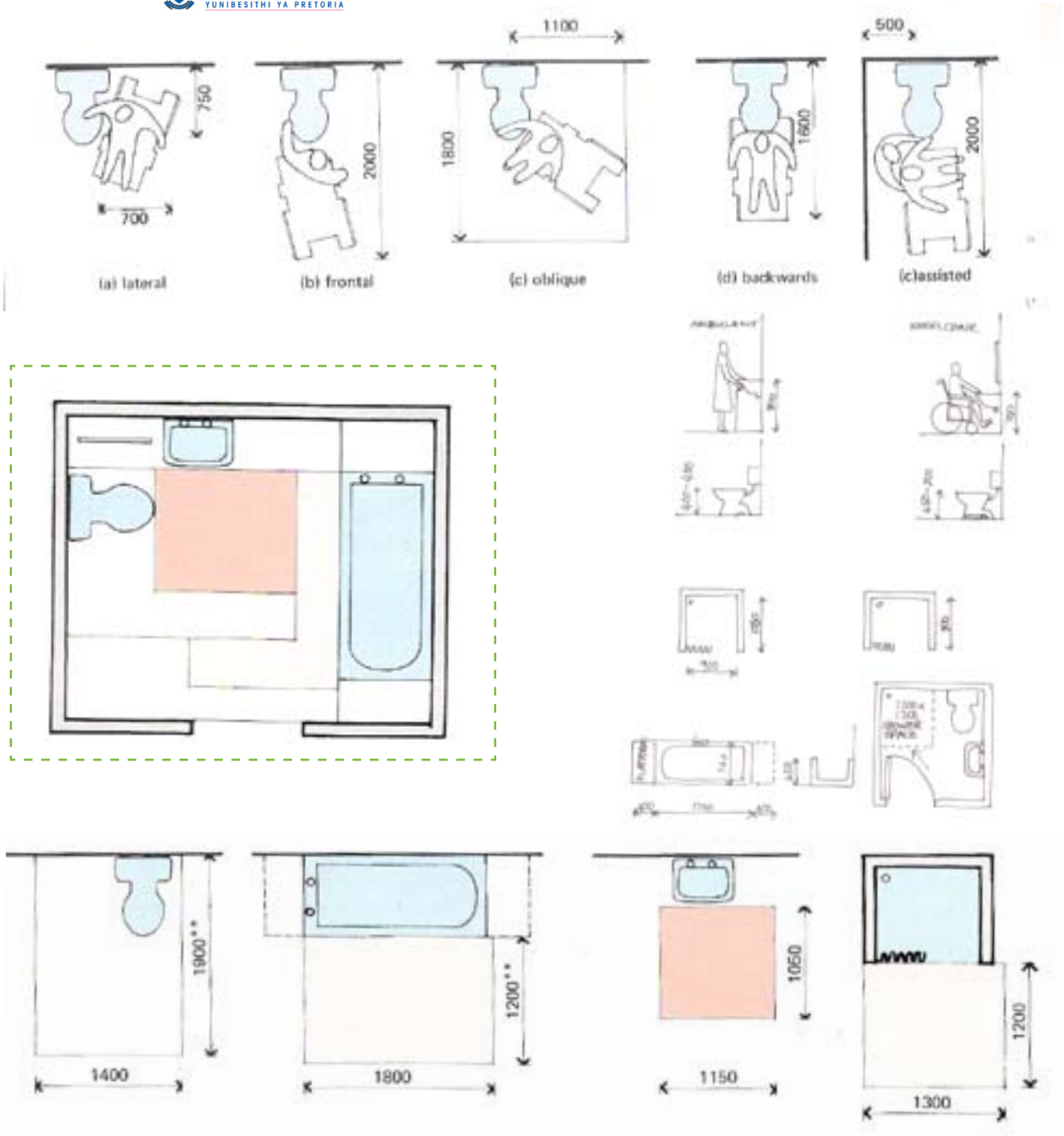
Electric:

- No electrical plugs are provided in the bathrooms.
- Shower plugs are provided at reachable height.

Privacy: Translucent louvred windows are located above eyelevel. A mesh screen is placed in front of the windows in the passageway.

Other:

- Non-slip floor is essential.
- Lift-off hinges on bathroom doors.
- Non-slip mat inside the bath and shower.
- A vanity unit means that all toiletries can be performed in the one place, enhancing economy of movement and effort.
- Hand spray shower fixed to wall next to bath.
- Bath taps to be placed in the wall, central to the bath.
- Vertical, horizontal or diagonal grab rails on adjacent walls.
- Trapeze lift above bath.



6.9.19 Passages

Size: Width of passages and ramps were determined by the standard dimensions in the illustrations shown.

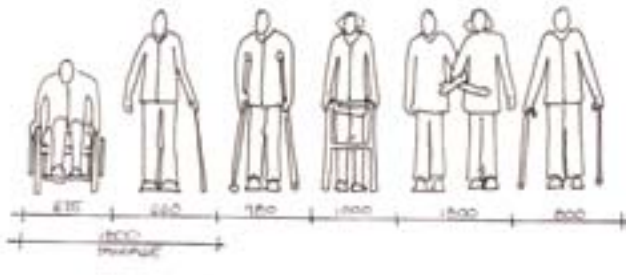
Ventilation: Passive ventilation.

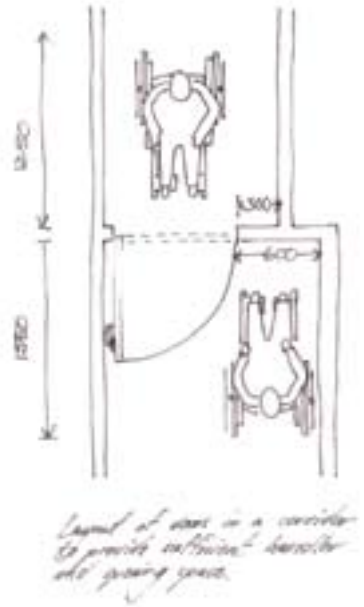
Light: Natural light enters the atrium through the translucent roof, lighting the passageways. A good level of ambient light and light fittings should be chosen to ensure that even light without a glare is distributed throughout passageways.

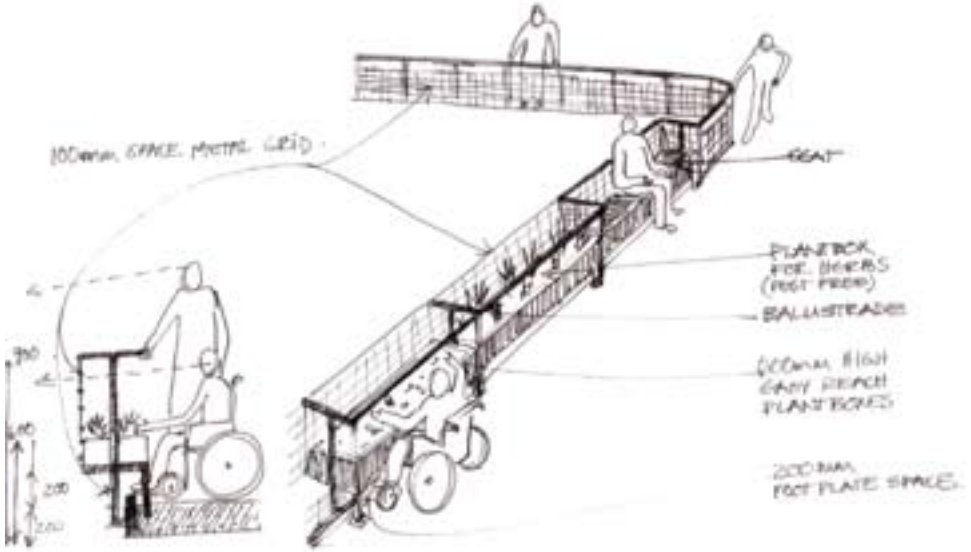
Other:

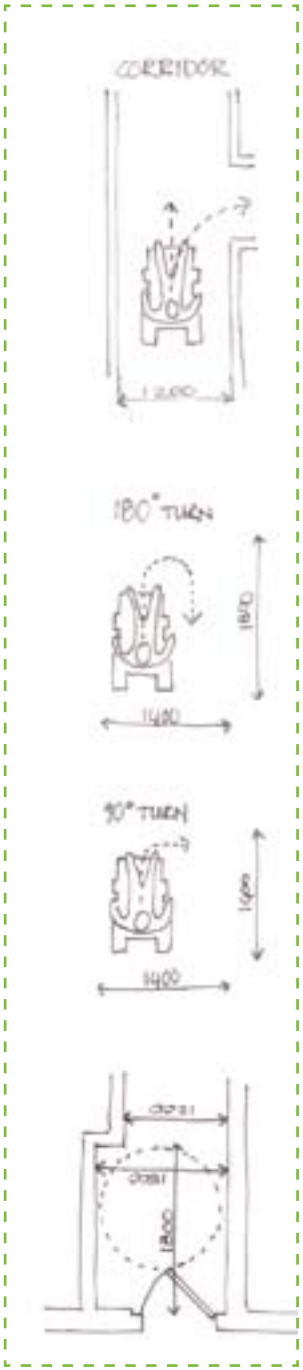
- Non-slip surfaces.
- Handrails must be provided along passageways.
- Signage along passages conveys information and indicates emergency exits.
- Fire hoses should be recessed in walls of passages so as to not create an obstruction.

Vegetation: Planters with a variety of plants, herbs and creepers are located along some passageways. This brings greenery into the building, having a calming and therapeutic effect on the occupants.









6.9.20 Doors

Opening width: It is the clear opening width that is the important factor in the accessibility of a door for people using wheelchairs.

Vision panels: Double-vision and single full-length vision panels allow people approaching a door to see wheelchair users at a lower level.

Door furniture:

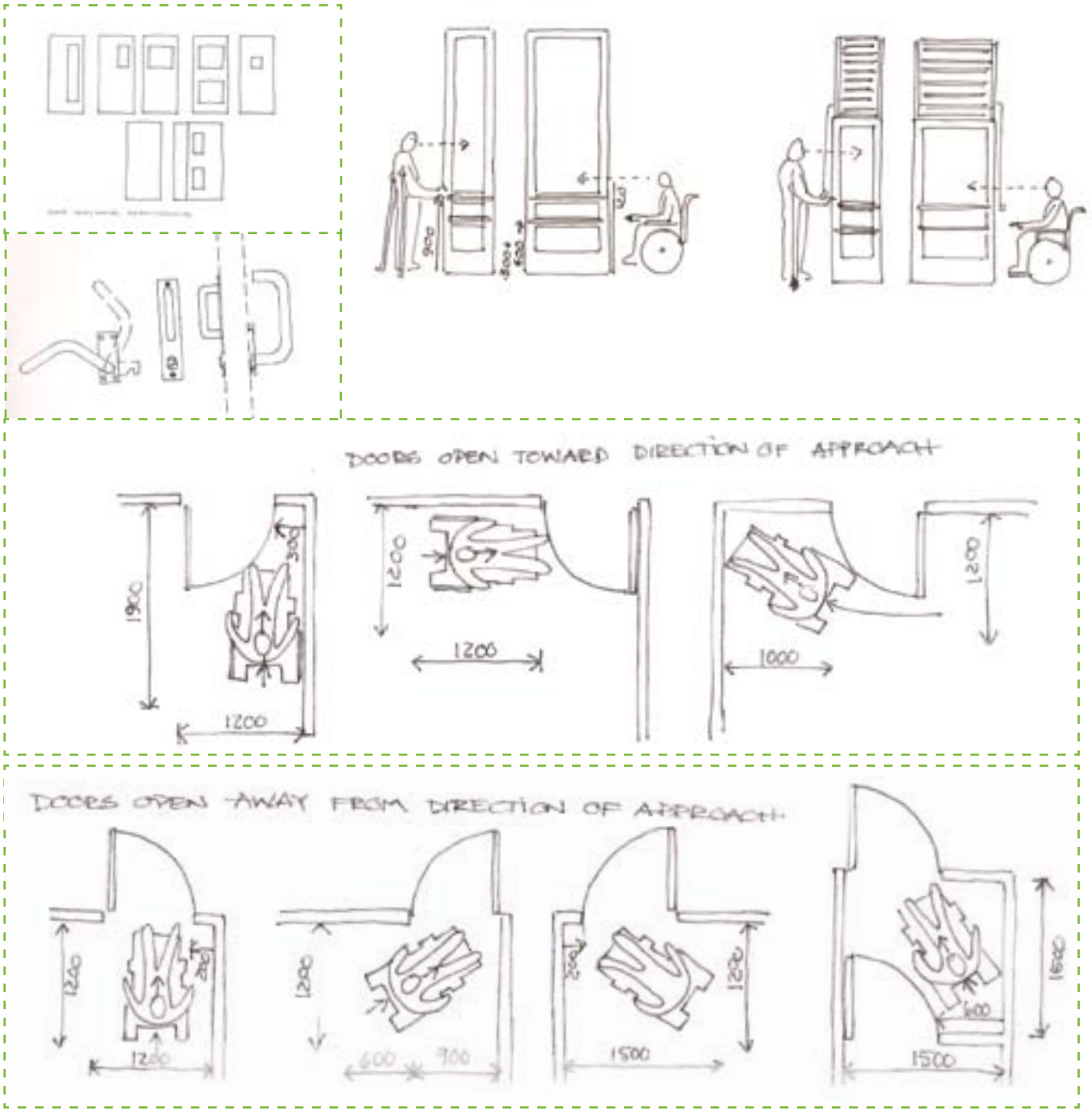
- Incorporate a pull handle, lever latch or a locking mechanism.
- Should provide a good visual contrast with the door and background.
- Should be located at a comfortable height for both ambulant and wheelchair users.
- Lever handles are easier to grip than round knobs.

Kickplates:

- The majority of wheelchair users open doors using the footrests of their wheelchairs.
- Kickplates protect the door as well as make the opening of the door easier by providing a surface that the footrest can easily slide along.
- Fitted across the full width of the door.
- Made of aluminium, 200 mm high above the floor.

Automatic openers can assist disabled people and remove barriers to others.

Sliding doors: Wheelchair users prefer sliding doors and are used within the Centre.



6.9.21 Windows

- Important factors are positioning, ventilation, safety, illumination and control.
- Visual range provided is especially important for those confined to a chair.
- Disabled need to control ventilation and windows should open and close with ease and safety, making louvre windows preferable.
- Thought given to the positioning of windows will make for effective daylight illumination,
- Controls must be able to be used with one hand (safer for those with balance problems).
- Space to sit by a window is an asset. This can be found along the passages between training halls.

Dimensions:

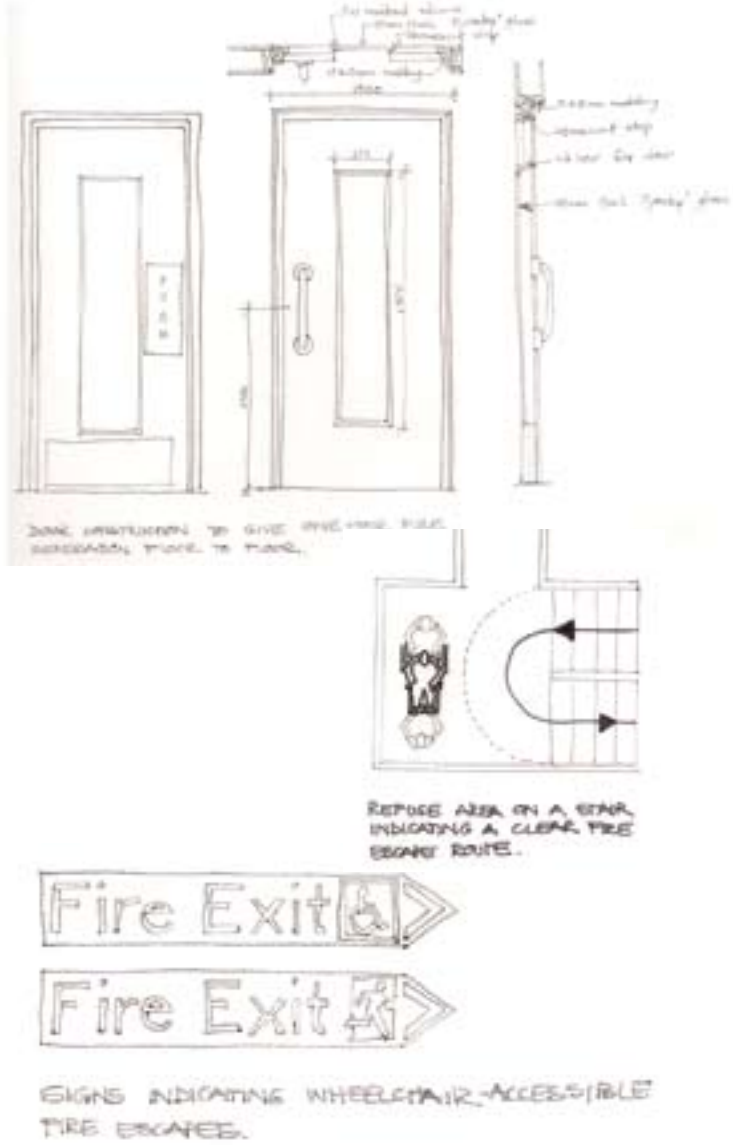
– Height of controls for windows should not exceed:
Ambulant disabled: 1 550 mm
Wheelchair users: 1 100 mm preferred (1 350 maximum)
– Recommended level of sill to allow satisfactory visual range from the sitting position: 600 mm

Louvre windows with reachable control

6.9.22 Fire regulations

SABS 0400 TT16	Escape routes	Less than 45 m to nearest escape door
SABS 0400 TT17	Rooms with + 25 occupants	+ 800 mm escape door
SABS 0400 TT17	Room with + 50 occupants	2 escape doors
SABS 0400 TT18	Feeder routes to escape route	Non-combustible material
SABS 0400 TT21	Minimum of escape routes	1 100 mm
SABS 0400 TT34-35	Hydrant and hose reels are provided at correct intervals	

- Alarm will sound in the case of fire.
- Break-glass alarm points should be a max height of 1 200 mm UFFL (located in the basement garage).
- Stairways provide areas of refuge.

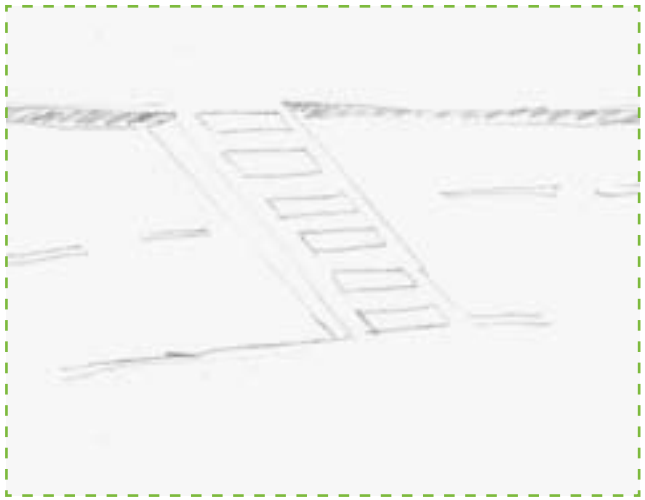


6.9.23 Telephones

To be placed at 1 200 mm height.

6.9.24 Traffic calming devices

The aim of slowing the traffic in Boom Street is to make drivers more alert of their surroundings. Proposed new raised crossings with different surfaces will achieve this.



6.9.25 Gardens

Gardening is a hobby which many disabled enjoy and find therapeutic.

There should be independent access to the gardens with sheltered areas for sitting in privacy and comfort with room to move around safely.

The following basic requirements enhance accessibility:

- Suitable level surfaces, free from obstacles.
- Gentle slopes or steps where difference in ground level is unavoidable.
- Paved or concreted paths of adequate width. Gravel or loose surfaces are avoided.
- Handrails alongside paths, is desired. These will be helpful to the ambulant as well as vision disabled.
- Raised garden beds for wheelchair users and for those who are unable to bend or kneel.

Dimensions:

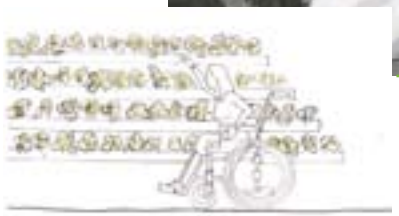
- Raised beds:
  - Convenient height when standing: 750 mm.
  - Convenient height for wheelchair users: 600 mm.
  - Where there is a path along only one side of the bed, the range of bed width allowing comfortable reach is 600-800 mm.
  - Where paths exist on both sides of the bed, suitable width of the bed is 1 200 mm.
  - Construction of a raised bed should allow toe recess for both the wheelchair and standing gardener. Knee recess will give added advantage to the wheelchair user.
  - Width of paths: 1 200 mm preferred (1 000 mm minimum).

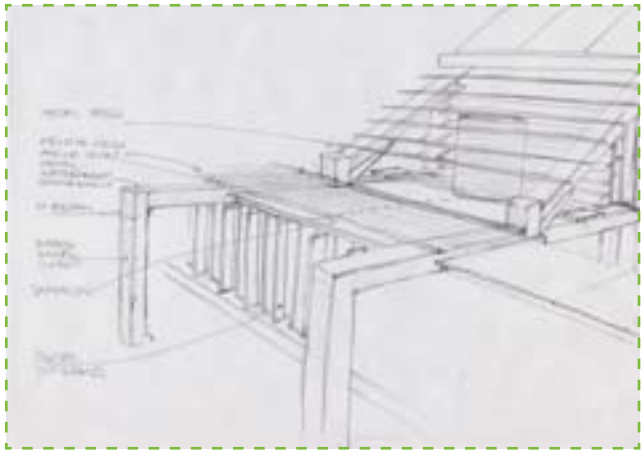
6.9.26 Greenhouse

The greenhouse has been designed to allow enough light to enter through the roof and wall panels.

Lettuces and spinach will be produced by means of hydroponics.

The structures used for planting plants are of such a nature that disabled people can easily reach and harvest production.





6.10 AESTETIC PRECEDENTS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TECHNICAL INVESTIGATION

UNIVERSITEIT VAN PRETORIA
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7.1 MOVEMENT, ACCESS AND SECURITY

There are three ways of accessing the building.

Pedestrians enter at the main entrance on Boom Street and are led to the reception / security desk from where surveillance takes place over the main access point and movement routes.

Vehicular access is on the northern side of the site leading into a semi-basement, from where a lift, ramp and stairs provide access to the Centre.

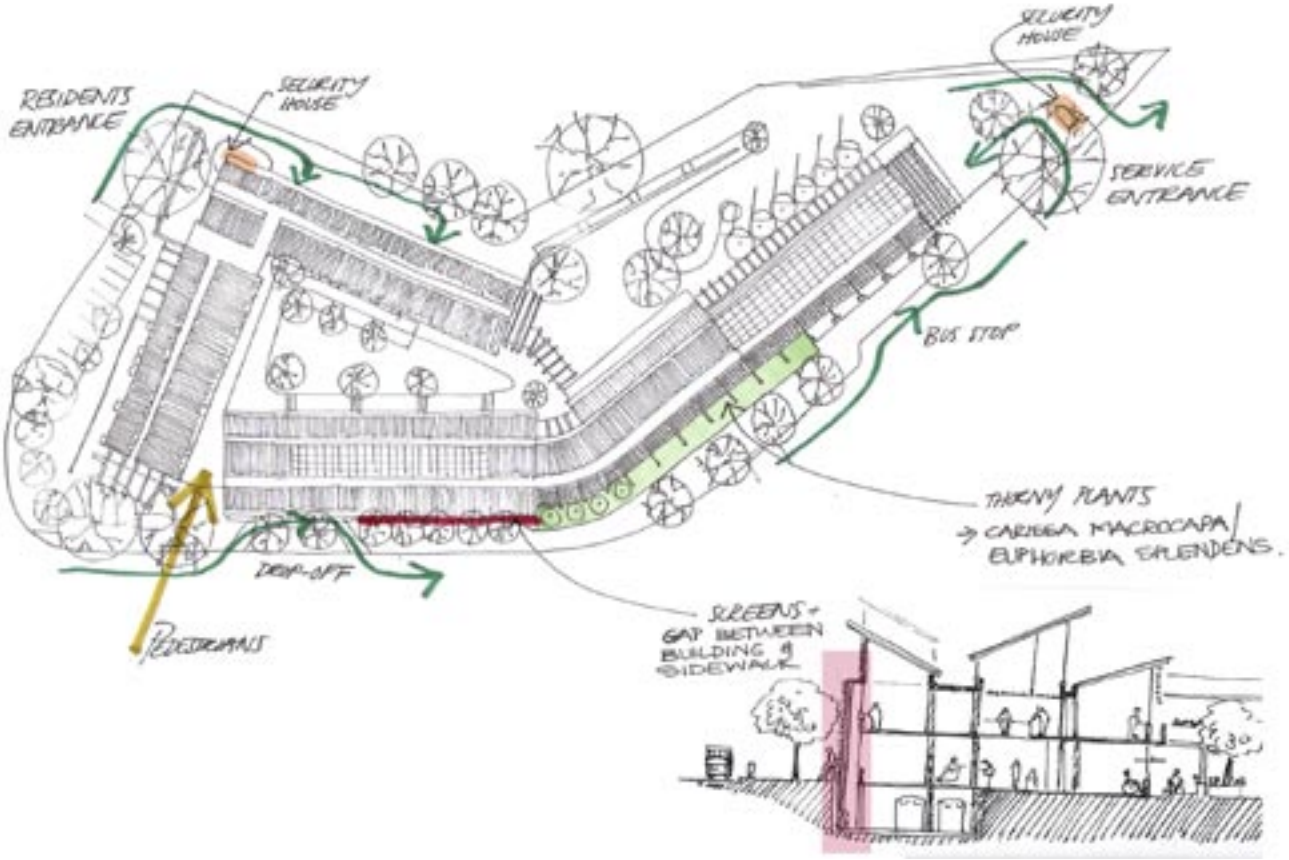
A separate service **drop-off area** is provided. Delivery personnel will be able to use either the service lift or stairs. A security guard at the northern gatehouse will be responsible for the controlling of the deliveries and will have full eyesight over the delivery area.

A **guardhouse** on the eastern side will be responsible for controlling the incoming and exiting of service vehicles to and from the workshops. Existing walls between the site and Prinshof School will remain. New walls will be built on the western and eastern border.

The use of mesh and/or grating for screens form an aesthetical element of the building but also fulfils the role of **security** (as burglar bars would). Transparency of the building is achieved by the use of glass and contributes to security by means of creating passive surveillance.

The water pools not only play a role in evaporative cooling and having a calming effect on occupants but create a barrier between pedestrians and the building. Vegetation (in some cases) is also used for this purpose. Thorny plants such as *Carissa Macrocarpa* and *Euphorbia Splendens* are planted on the southern side of the building between the sidewalk and building. These plants contribute by “greening” the streetscape as well as contributing to safety and security.

Artificial security, for example CCTV surveillance and security doors can be strategically placed in spaces that are most likely to provide a safety threat.

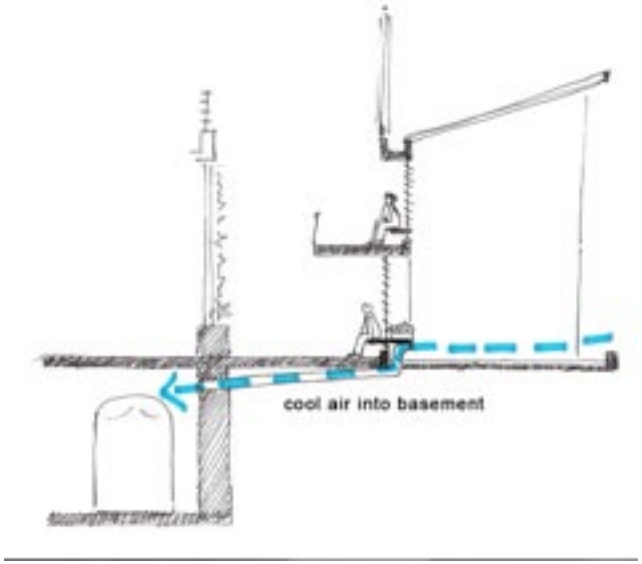


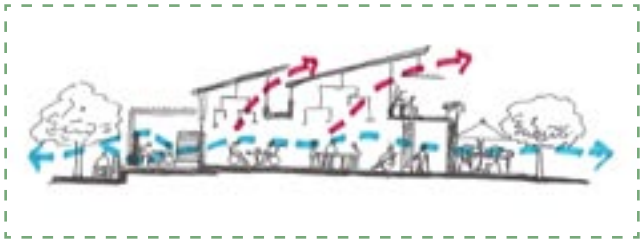
7.2 VENTILATION

Natural ventilation occurs throughout the building and is less maintenance intensive over the lifecycle of the building. As previously discussed, the building is placed and designed as to maximize natural ventilation by means of utilising the existing wind patterns and directions.

The following regarding ventilation was considered whilst designing:

- Training halls are relatively narrow as to have natural ventilation occur easily.
- The atrium between the training halls cause a natural stack effect, resulting in a comfortable interior environment.
- Louvre windows are used, allowing occupants to control the amount of ventilation occurring in the building.





7.3 WATER COLLECTION

Water collection has an ecological as well as a financial impact on the Centre. The rainwater is harvested from all the roofs and channelled to water tanks.

- **Stored water** from the greenhouse roof (east wing) is used in the greenhouse or overflows into the evaporative cooling pond after which it can also be used to irrigate the gardens.

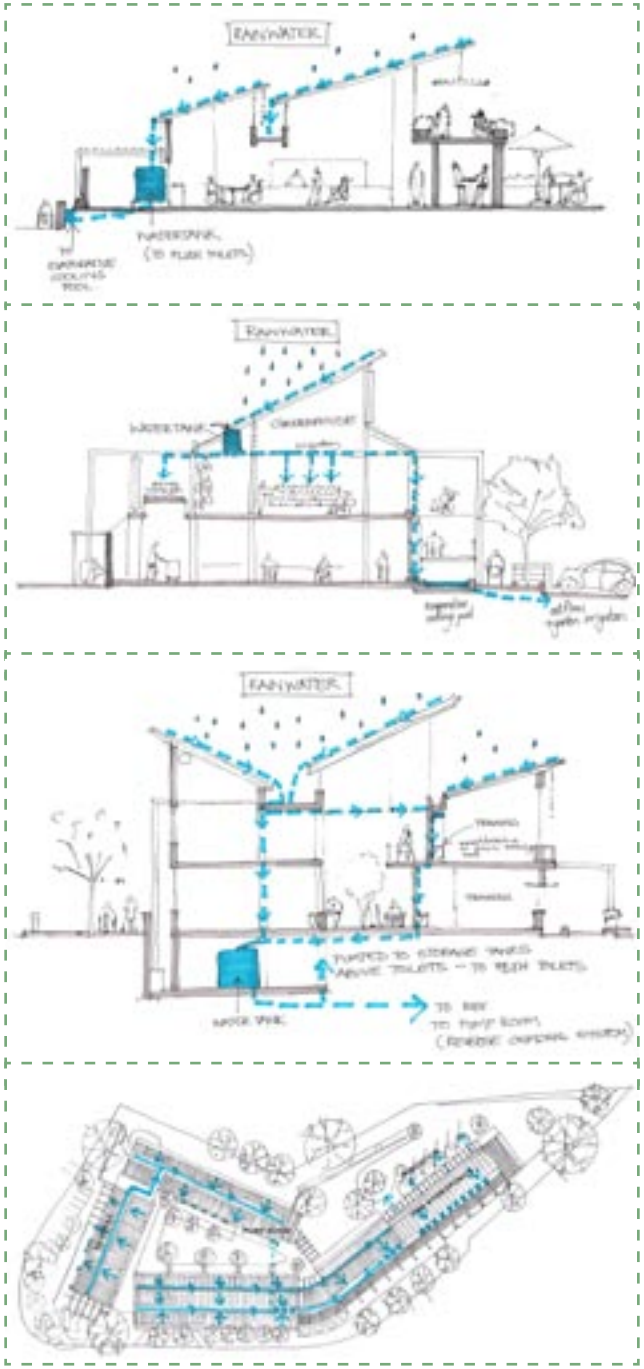
- **Rainwater** from the training facility (south wing) and accommodation block (north wing) are stored together with grey water from the building in tanks in a basement. From there it undergoes a reverse osmosis process (see Appendices 9.7) and is pumped back through the building to be used for flushing toilets, after which it is disposed of in the sewer system.

Pretoria's municipal underground sewerage pipes do not have steep slopes. Grey water is necessary to wash the sewerage pipes clean, therefore all water from baths, basins and sinks are recycled once directly towards toilet flushing.

- **Harvested rainwater** from the cafeteria roof (west wing) will be used for the evaporative cooling pools. The down pipes are located in or attached to columns, integrating them with the respective facades.

Month	Aggregate rainfall in mm/ month for Pretoria	Total amount of water harvested (kℓ)
January	101,3	349
February	108,8	375
March	63,8	218
April	37,5	129
May	48,4	167
June	3,8	131
July	2,3	79
August	2,3	79
September	11,3	389
October	82,5	285
November	168,8	582
December	112,5	388
TOTAL	**745,27 mm**	**3171kℓ**

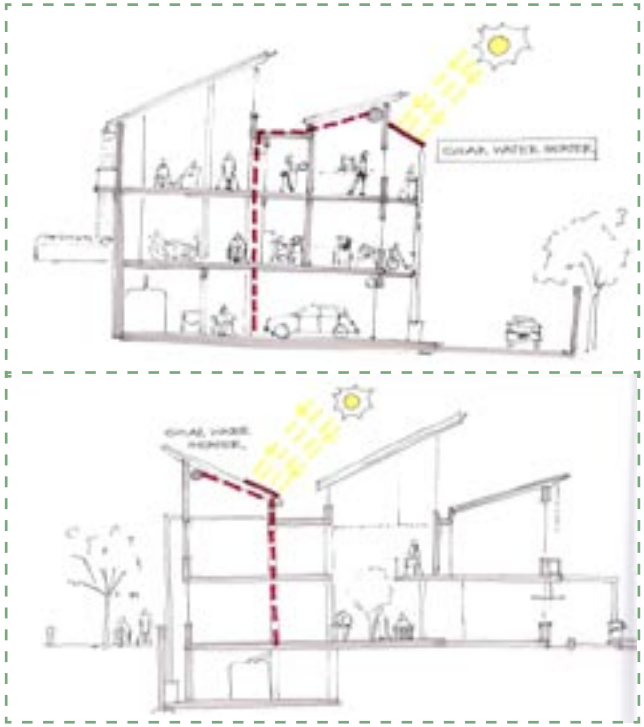
Harvested rainwater volume = 3 171 m^3
Current cost per 1 m^3 = R5
Possible annual savings = R15 855



7.4 SOLAR WATER HEATERS

The solar water heaters on the roofs of the accommodation block, training facility and kitchen roof will provide warm water for use in WCs, kitchens and sinks in training halls. This system will serve a complementary function, working in conjunction with a conventional water heating system that will be used on cloudy days.

Solar heaters are orientated to receive maximum exposure to northern light. Storage tanks should be located higher than the solar heater. Water from these heaters will be distributed to the rest of the Centre by means of additional pipes and are added to the lighting structure piping.



7.5 FIRE

The escape routes are in accordance with section T of the National Building Regulations. An escape route may not exceed 15 m in one direction. Once in an escape route, two escape options exist. The total length of the escape route plus the emergency route to a safe point outside the building does not exceed 45 m.

In case of fire, all building users must evacuate in the direction of the alarms, leading everyone away from the danger. A sprinkler system will be installed throughout the building. The same sprinklers used for irrigating plants in the atrium and greenhouse can also be used in the case of fire. All rooms will be fitted with smoke detectors. Smokers will be forced to use balconies as this will be a smoke-free building.

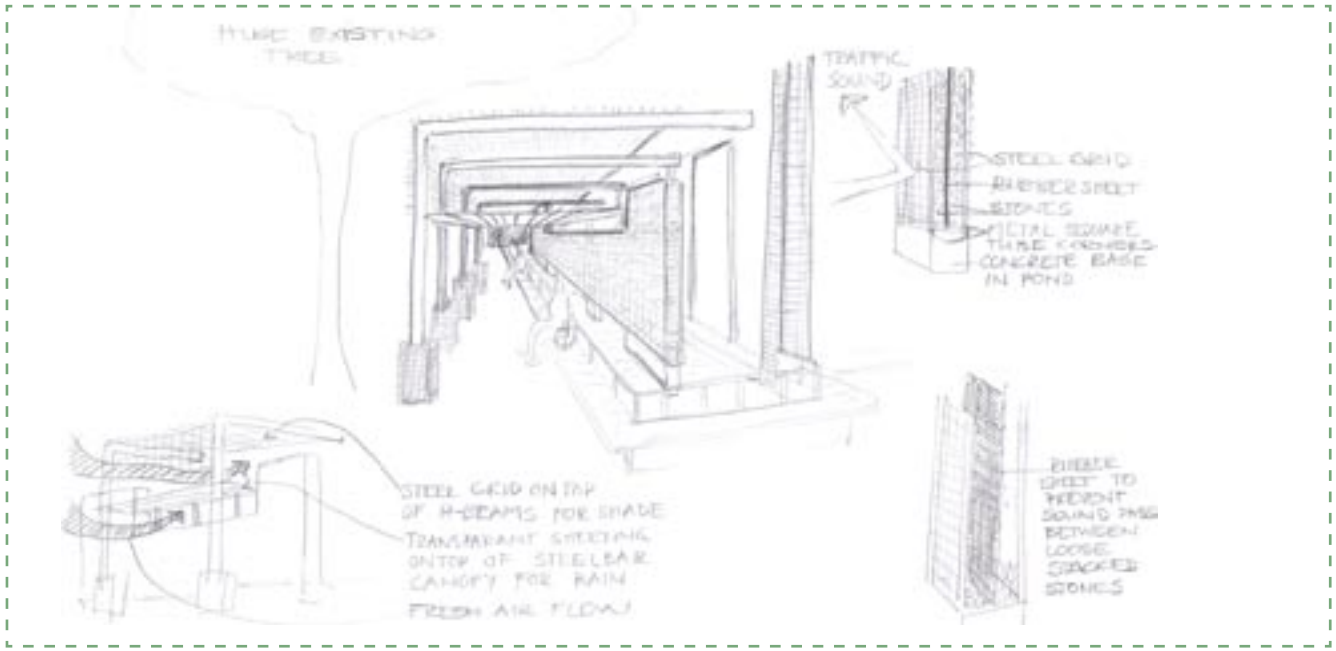
7.6 ACOUSTICS

7.6.1 Sound level recommendation

	DB
Training facility	
• Lecture rooms	30-35
• Workshops	35-40
Administration	
• Private offices	35-40
• Boardroom	30-35
Atrium	40-45
Reception	45-55
Cafeteria	40-50
Kitchen	45-50
Apartments:	
• Living quarters	25-30
• Lounge	30-40

The main source of noise originates from the traffic in Boom Street and the Bloed Street taxi rank across the road. 330 mm cavity walls filled with polystyrene panels and double glazing are used on the street façade. The ceilings for these areas consist of acoustic panels. Grate screens on the southern façade will act as a noise reflector. The stone and steel mesh wall on the outside of the administration offices also serves as a noise barrier.

The objective is to achieve best possible acoustic qualities by the least expensive means. Wheelchair users moving past a wall can easily damage the materials on it, thus insulating materials need to be robust.



7.7 RECYCLING

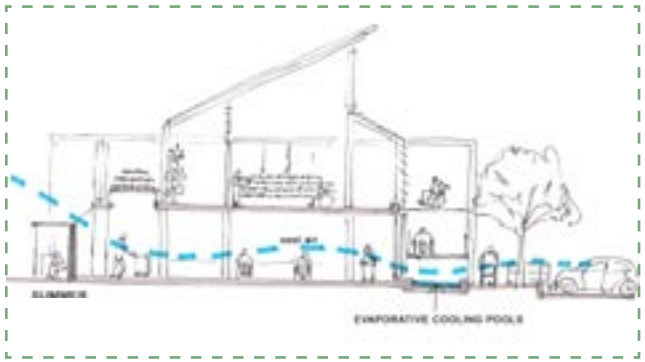
7.7.1 Waste

Organic waste from the kitchen and vegetable packaging workshop (for example peels and leaves) will be sent to the zoo daily as fodder. Organic waste that cannot be used as fodder together with seasonable plant material produced by deciduous plants will be added to the neighbouring Prinshof School's existing compost plant.

Each of the apartments will be fitted with sufficient recycling bins. Recycling bins for glass, tin, plastic and paper will be located on the western border of the property, in close proximity to the municipal recycling depot.

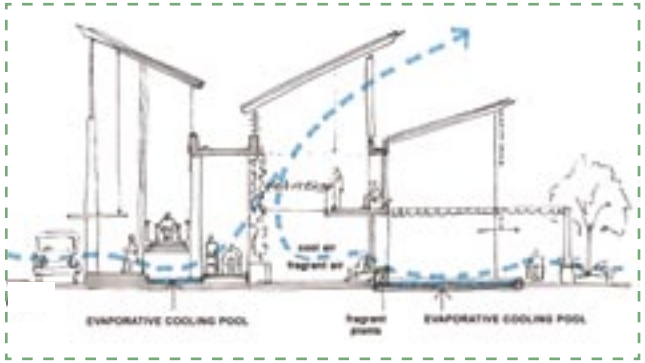
7.8 EVAPORATIVE COOLING POOLS AND ROCK BEDS

In summer, wind is channelled over the water pools in front of the building, creating evaporative cooling within the building. During winter the water is drained, leaving rock beds that absorb solar heat and transmit it into the building.

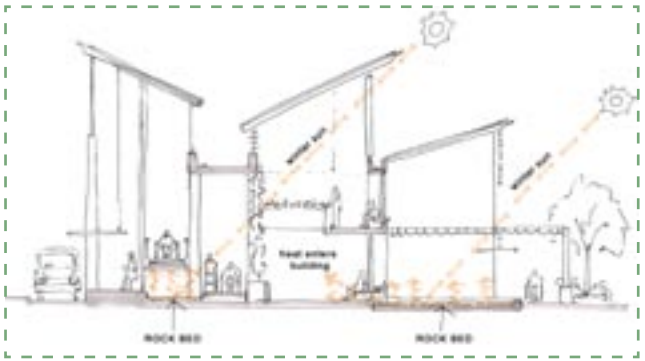


Summer

Winter



Summer



Winter

7.9 MATERIALS

Materials give richness to space and act as informative tactile and visual devices. The materials used to construct the Centre must also be found in the surrounding buildings. The building, as an educational centre, must be able to visually link with the Prinshof School's character as well as the city's aesthetics. The challenge is to design a building that can link these two different characters while still have a character of its own. Most of the surrounding roofs in the residential area and the Prinshof School are corrugated pitch roofs. On the other hand, the city character across the road is more cube-like with horizontal and vertical concrete shapes dominating.

7.9.1 Concrete

Concrete is used to construct the floor slabs and columns of the building, as it provides sufficient versatility to enable puncturing. It also acts as an effective energy storing device.

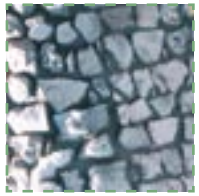
7.9.2 Steel

Steel is easy to construct and adds extra versatility.

7.9.3 Brick

Utility bricks form a part of the area's character and must be respected.

7.9.4 Stone



The western wall wrapping around the building, leading to the entrance, is made of a steel mesh frame filled with stone (like gabion walls) through which soft light and air flows freely. Evaporative cooling pools are drained in winter leaving a rock bed. These rock beds are a theme carried throughout the Centre.

7.9.5 Timber

Timber is used as screens.

7.9.6 Corrugated iron sheets

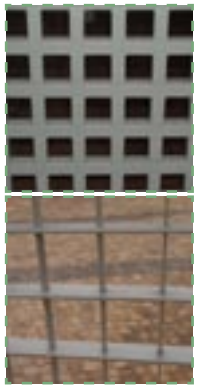
Corrugated iron is the preferred roofing material for reasons of:

- Workability
- Low cost
- Fast to construct
- Relates environmentally to the surrounding buildings.

7.9.7 Translucent plastic sheeting

Dampalon is a glazing system with light-diffusing and insulating qualities. It provides a combination of superior quality transmission, thermal performance and shading factors.

7.9.8 Grating/Mesh



Grating/mesh is used for roofing, screening, security bars, seating as well as over stormwater channels.

7.9.9 Clay tiles

Clay tiles act as an effective energy storing device.

7.9.10 Fibre cement boards

Fibre cement boards are used to close off service ducts.

7.9.11 Glass

Glass gives the building a transparency, visually linking the able-bodied world with the disabled world. Tinted glass will reduce glare and heat gain in the building.

7.9.12 Plaster finishes

Different textural finishes can be achieved by dragging different objects over stucco plaster. By adding coarse river sand to plaster a coarser finish can be achieved, where stucco plaster floated with a wooden trowel can yield a finer texture.

7.9.13 Carpets

Carpets of synthetic fibres are more viable than natural fibres. Polypropylene fibre carpets will not shrink, are hostile to microbes and stains can easily be removed. The under felt must be chosen to increase resilience, improve durability and reduce sound transmission (Matthews, 2003:111).

7.9.14 Non-Slip Flooring

7.9.15 Canvas

7.9.16 Paving

7.9.17 Water

7.10 FAÇADES – THERMAL AND LIGHT REGULATION

7.10.1 Training facility – South wing

South façade

Training halls:
The training halls are insulated by double glazing and a cavity wall, having more of an acoustic than a thermal impact. During summer a small amount of sunlight will enter the south facing training halls, leaving them comfortably cool. During winter the south facing training halls will receive light and heat from the atrium. The roof pitch is designed in such a way that sunrays will enter south facing training halls.

Atrium:
During summer the louvre windows are opened to create a natural stack effect. The south-eastern wind enters through the southern louvers, accelerating and pushing the hot air out through the northern louvre windows. This creates a negative pressure on the south and a positive pressure on the north.

During winter the northern louvres are shut. Due to the translucent roof, this leads to a greenhouse effect heating the building from within.

North façade

This façade forms the one edge of the courtyard. The following elements have an effect on the façade's thermal and light regulations:

Vegetation:
Deciduous trees are planted in front of the building, filtering the northern sun and providing shade in summer. Vegetation within the atrium has a calming as well as cooling effect on occupants.

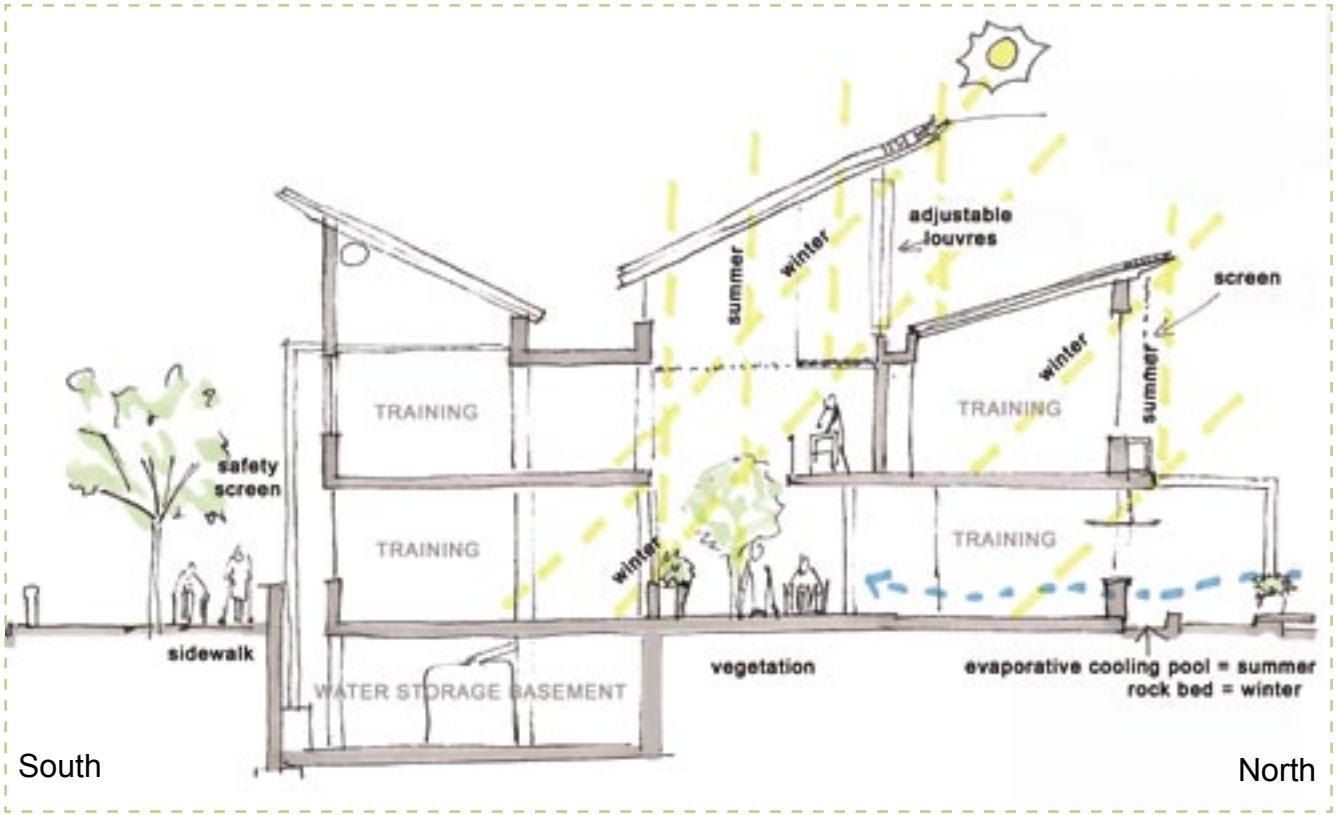
Rock beds:
During winter months solar energy is captured by the rock beds. The heat energy is transferred into the building, creating a temperate internal environment.

Sunscreens:
Horizontal slatted screens provide shading.

Louvres:
Adjustable glass louvres and glass panels allow light to enter the building. Hot air rising freely in the atrium exits freely. The louvres can either be automatic or used manually by using a long hooked stick (akin to opening school windows). The long window strip gives the illusion of a floating roof.

Overhangs:
Attached to the roof beams are steel grids preventing excessive light from entering the building.

Due to the incorporation of these functional systems the building is very energy efficient. The free flow from interior and exterior buildings and the utilisation of organic growth (gardens and greenhouses) creates an image that the building is not fully developed and conveys the ideal that a building is not existing in contrast to nature, but as part of nature.



7.10.2 Cafeteria and offices – East wing

West façade

The roof is slanted upwards towards the east, protecting the building against the fierce western sun.

A vertical timber screen acts as a shading device in front of offices and WCs.

The western wall not only acts as a noise barrier, but also protects the offices and cafeteria from the western sun.

The water pool not only has a soothing effect on the cafeteria users, but has a cooling effect into the building.

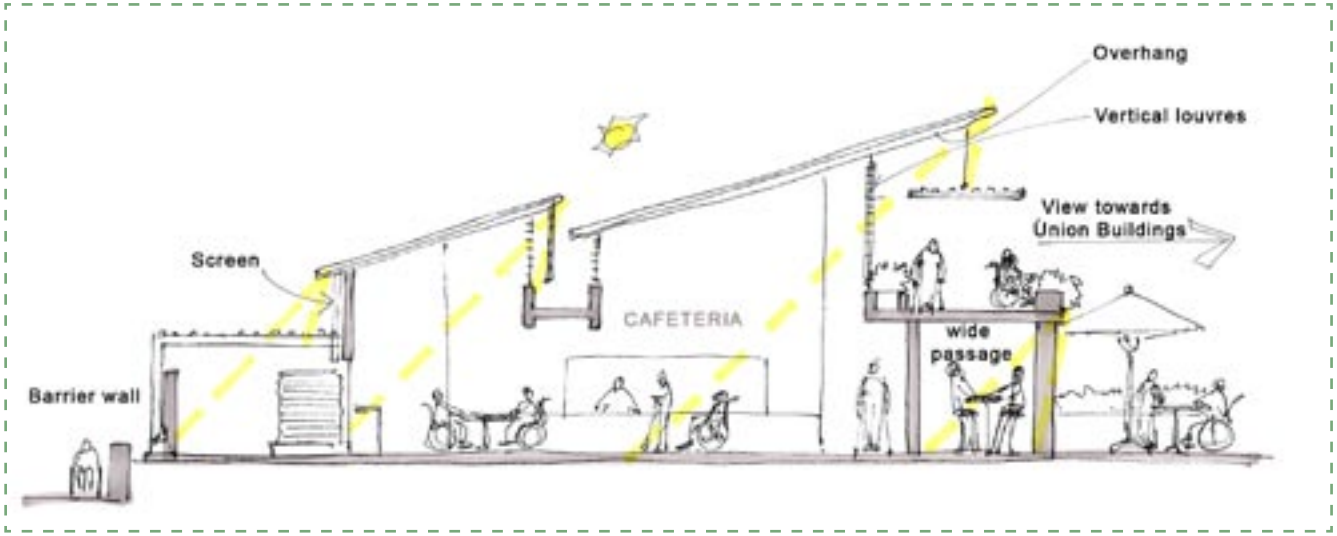
East façade

Overhangs, vertical louvres and deep passageways all contribute to the light and thermal regulation of the Centre.

Waiting areas are designed along the passageways.

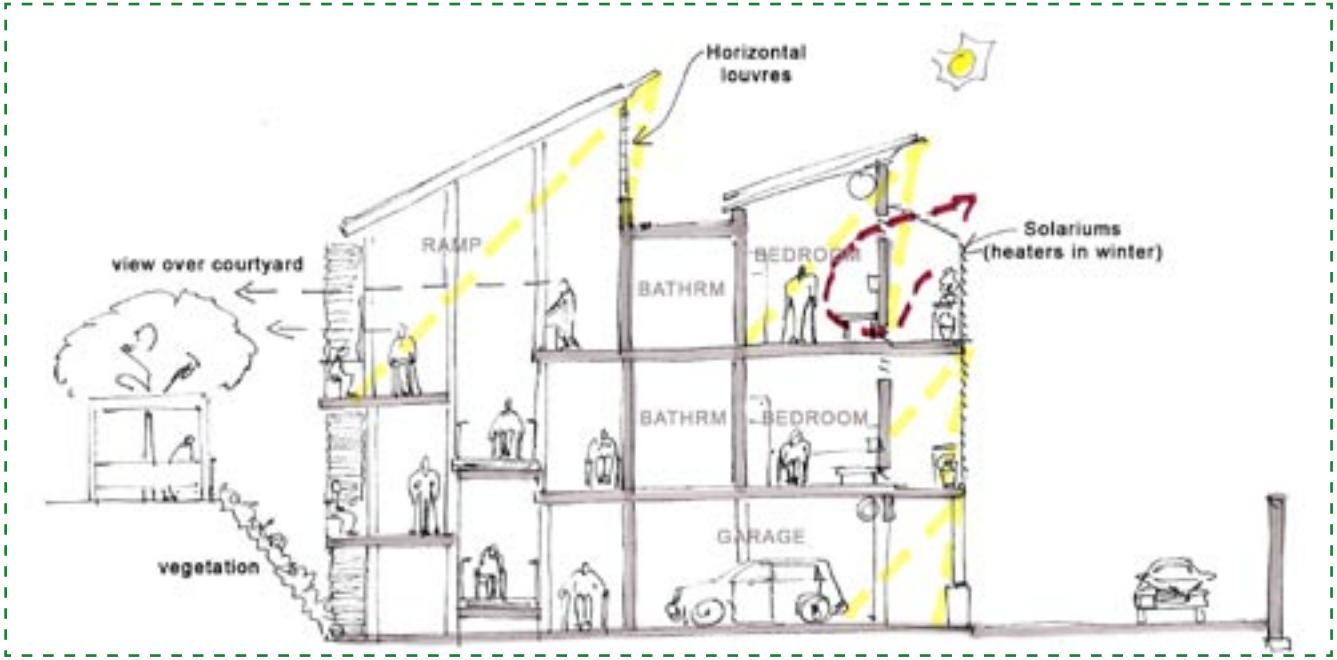
A view of the Union Buildings can be enjoyed from the passageway towards the eastern side.

To the north a view of the Magaliesberg can be enjoyed as well as to the south a view of the cityscape.



Cafeteria

Accommodation



7.10.3 Accommodation block – North wing

South façade

Bathrooms and kitchenettes of all the apartments are located on the southern side.

The open ramp is located on the south of the building, making it an active focus point when viewed from the courtyard.

The building is separated by two separate pitched roofs. This maximises sunlight and air entering the building.

In winter the southern ramp hall receives northern light through the northern opening between the steel and concrete roof.

North façade

In summer overhangs and screens prevent too much light from entering the rooms. During winter sunlight falls on the balcony's clay tiles. Tiles absorb heat, which is released into rooms at night. The solariums also work as natural heaters. At night windows can be opened to let heated air flow into the rooms.

As an added bonus, the plants in the solarium not only have a calming effect and provide a pleasant fragrance, but also absorb CO_2 and release O_2.

7.10.4 Workshops – East wing

South-east façade

The greenhouse makes use of vertical louvre windows on the south-eastern façade.

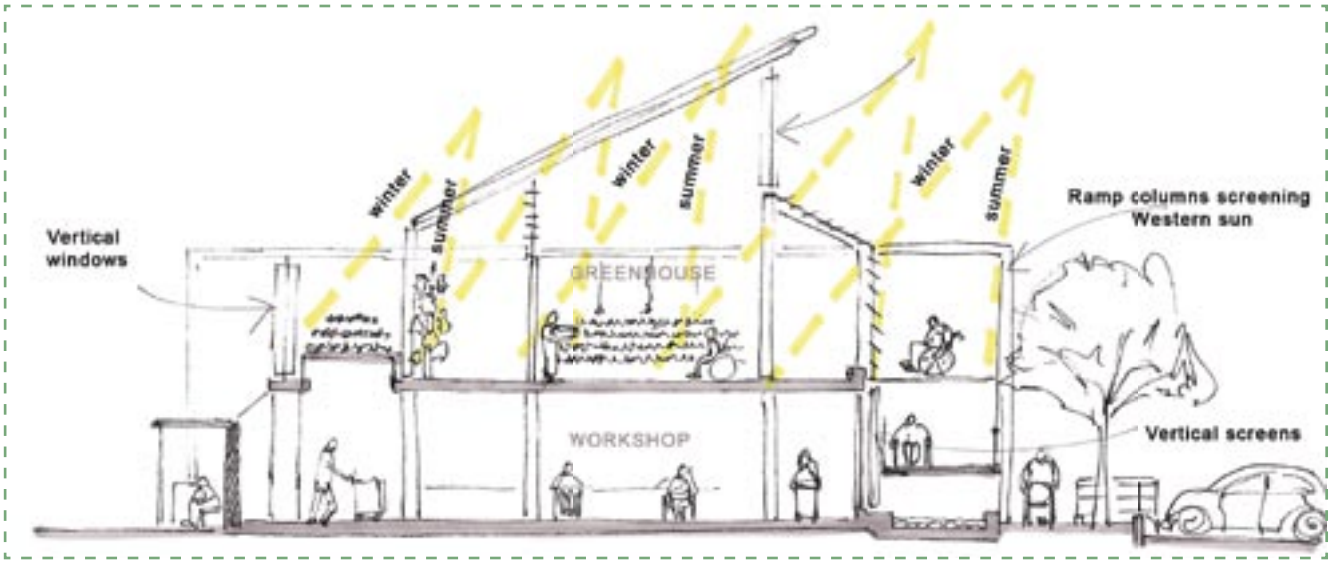
Roll-down canvasses are used in the sewing workshop. Occupants can regulate sunlight in the mornings.

North-west façade

In the vegetable packaging workshop (factory) vertical timber beams are installed at an angle to only allow northern sun to penetrate.

The greenhouse is designed to allow as much sunlight as possible to enter.

Workshop



7.11 LANDSCAPING

Plants have a very therapeutic effect on people. Disabled people's senses are extremely sensitive and thus find plants especially pleasing. Fragrant plants are often used to orientate the visually disabled.

The plants used in and around the Centre have the following benefits:

- Provides a calm, soothing, pleasant atmosphere
- "Greens" the city
- Provides a financial income. The herbs grown in and around the Centre can be harvested and sold. Herbs have a high monetary value, whereby the Centre can benefit financially.

All the plants are planted in specific areas to fulfill a specific function.
The functions can be categorised as follows:

- Fragrant plants: serves to better the air quality and smell of the city
- Thorny plants: serves as security barrier
- Herbaceous plants: Makes the air fragrant and can either be used by the occupants of the building or packaged and sold. Currently, the pupils at Pretoria School package and sell herbs as a funding method. Not only is it very successful but also has a healing and therapeutic effect on the pupils.(Nel, 2007)

Geraniums
– fragrant
-Pelargonium
odaratissimum
= geranium scent
- Pelargonium
tomentosum
= peppermint scent
- Pelargonium crispum =lemon scent

Lavendula
dentate
– fragrant
-hardy

Tropaeolum majus (Nasturtium)
– fragrant & edible
- good for window boxes

Artemisia dracunculus
(Tarragon)
– herbaceous

Salvia officialis
(Sage)
– herbaceous

Organum heracleoticum
(Majoram)
– herbaceous
-hardy

Jasminum officiale
fragrant
semi-climber
or semi-shade

Mentha spicata (Mint)
– herbaceous
hardy,
semi-shade or sun

Rosmarinus officinal
i (Rosemary)
– herbaceous
-semi-hardy,
evergreen, fragrant

Lemon tree
(Eureka)
– Edible

Foeniculum vulgare (fennel)
herbaceous
-medicinal plant

Origanum vulgare
– herbaceous
-hardy

Allium
schoenoprasum (Chives)
– herbaceous

Ocimum basilicum (Basil) – herbaceous
-in-doors as well as out-doors

Carissa Macrocarpa – thorny – used as security hedge
-attractive foliage and white flower

Euphorbia Splendens – thorny - used as security hedge
-low hedge with flowers in winter

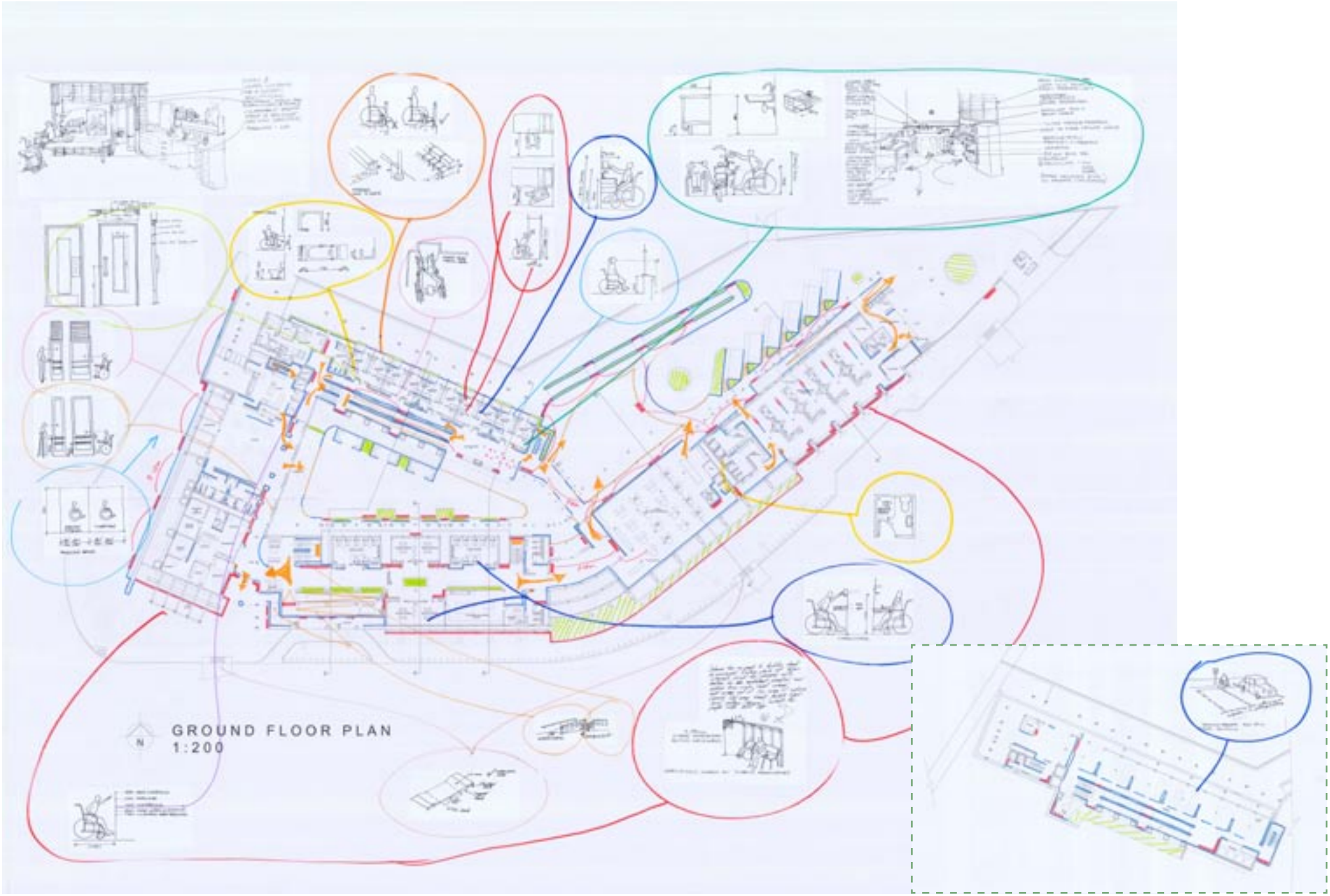
GROUND FLOOR PLAN

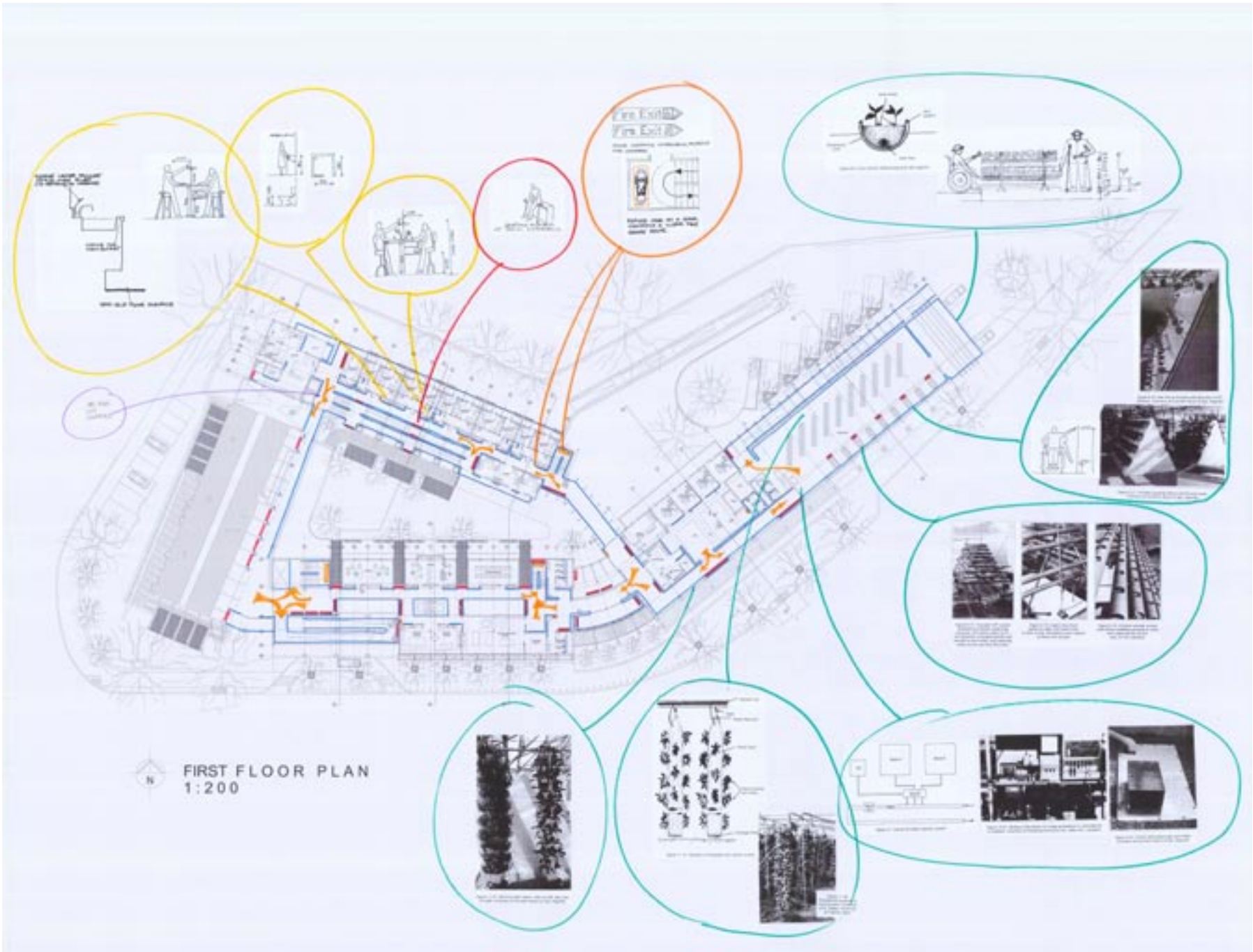
Petroselinum Crispum (Parsley)
– herbaceous
- good in-doors

Passiflora edulis (Granadilla) – edible plant
-non-fussy vine; needs supports at 1.5-1.75m intervals

Thymus citriodorus (Lemon Thyme)
– herbaceous

Thymus vulgaris (Thyme) –
herbaceous


GROUND FLOOR PLAN
1:200


FIRST FLOOR PLAN
1:200

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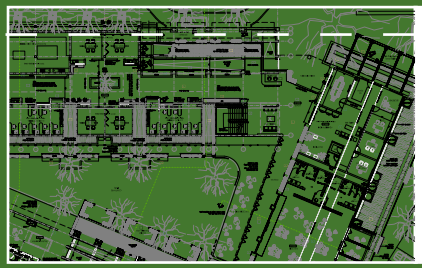
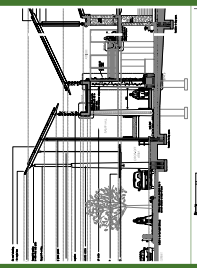
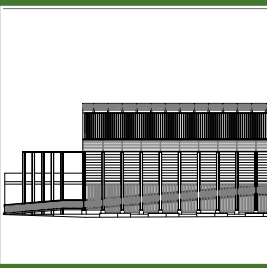
8







TECHNICAL DRAWINGS

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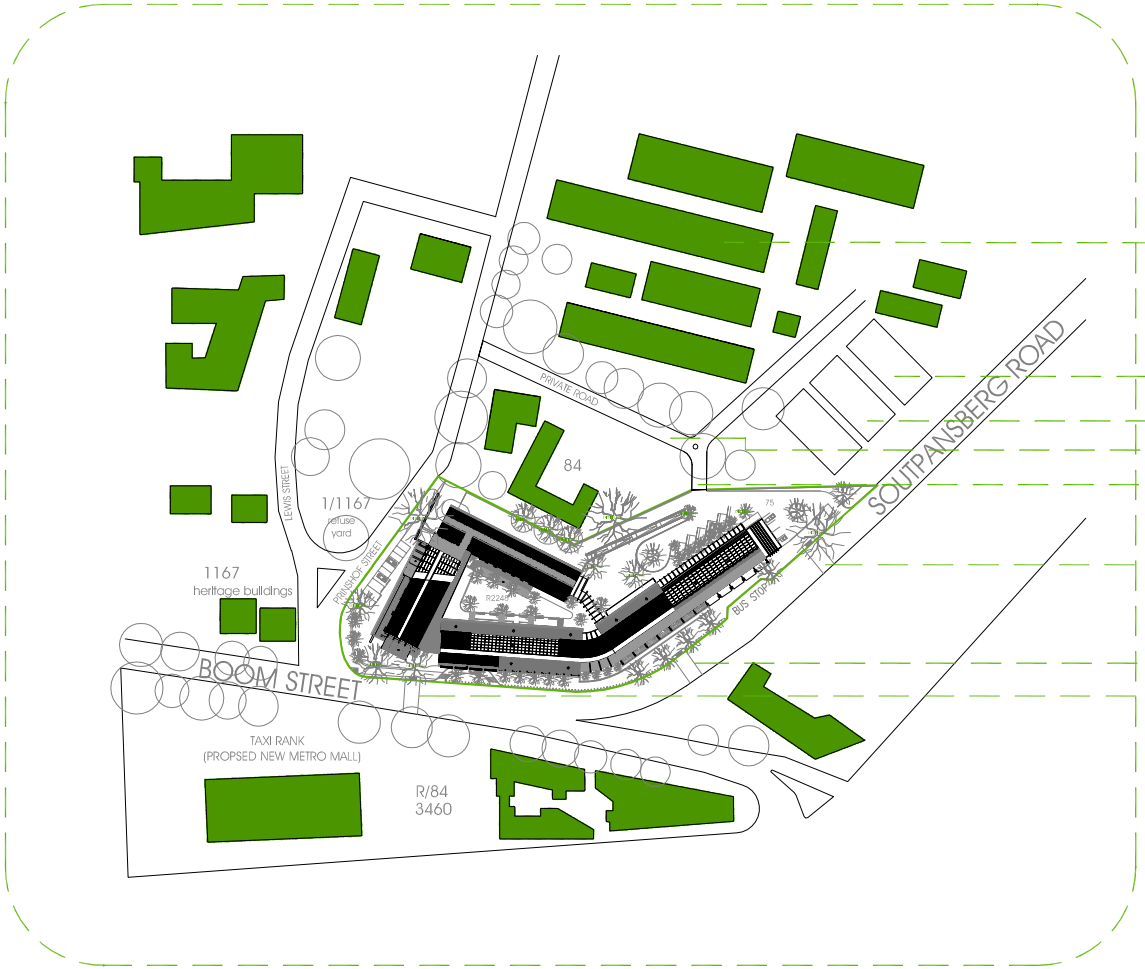
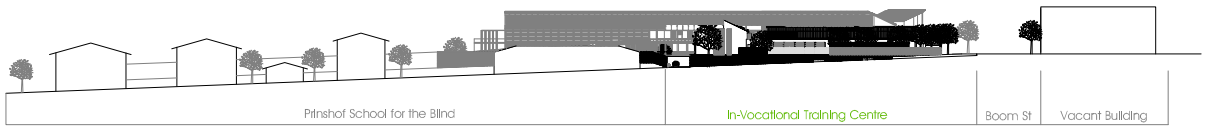
SITE





NORTH-SOUTH SECTION THROUGH SITE

N

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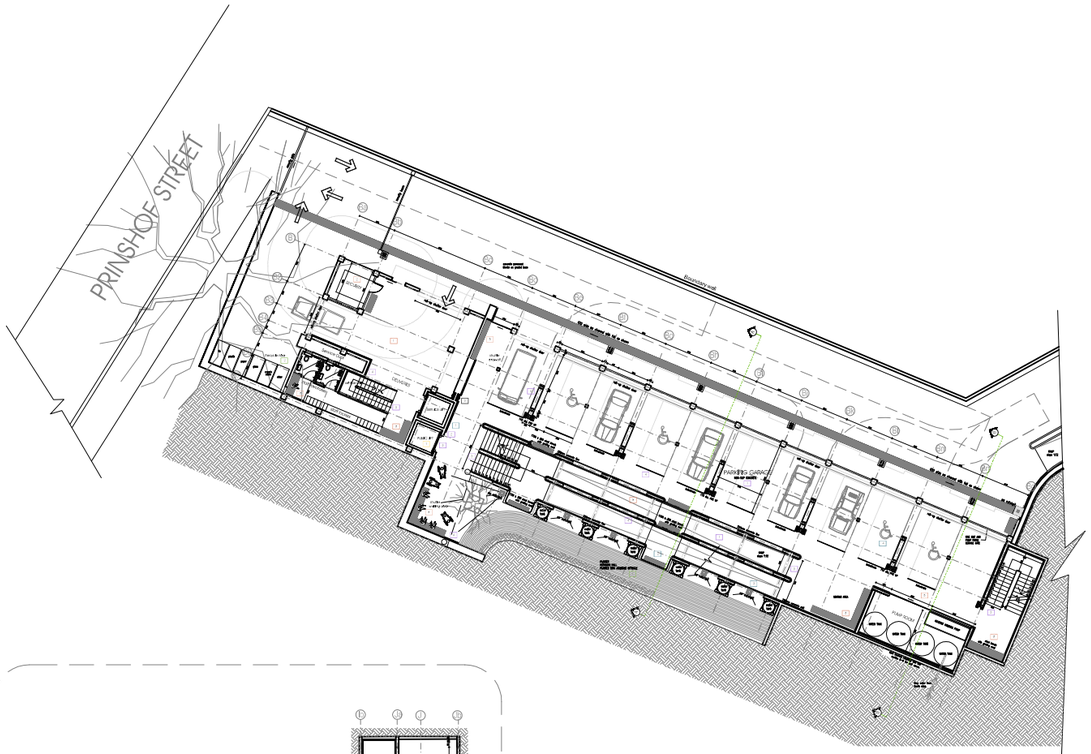
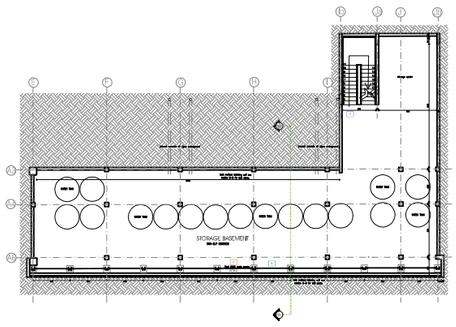
BASEMENT
-1
1:500



SEMI-BASEMENT UNDER ACCOMMODATION BLOCK
- GARAGE PARKING



BASEMENT UNDER TRAINING HALLS
- USED FOR STORAGE (water and other)

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	SENSORY NOTES:
	SIGHT
1	LARGE SIGNAGE indicating location of lift & control buttons are highlighted; information boards
2	VIEWS resting areas provide views over the courtyard
3	NATURAL LIGHTING openings between concrete fins provide for natural lighting and ventilation
4	VEHICULAR SIGNAGE provide sufficient signage for disabled parking bays
5	SCREEN see-through grate screen creates barrier between basement and public at street level
	SOUND
1	AUDIBLE LIFT bell sounding at each level
	SMELL
1	VEGETATION smell helps to determine people
2	WASTE RECYCLING care taken so that waste does not begin to smell by using closeable recycle bins
	TOUCH
1	FLOOR SURFACES non-slip surfaces
2	CONTROL BUTTONS supplemented with braille lettering and at lower level for wheelchair users
3	WARNING SURFACES textured strip to indicate the entrance of the lift, the beginning of stairs or ramp
4	BALUSTRADES steel balusnade at 900mm & 700mm for users, leading users throughout the building
	SAFETY
1	SEPERATE DELIVERY BAY turning area provided for delivery vehicles prevents vehicles from reversing out
2	SECURITY BOOTH controlling access to the building
3	FIRE EXTINGUISHERS at correct distances and reachable heights, recessed into walls as to not be an obstruction
4	STEEL SCREEN security screen between the street level & basement
5	BROAD PASSAGES space provided for ambulant disabled and wheelchair users
6	RESTING AREAS seats at 450mm & 900mm heights must be provided every 10m or where necessary

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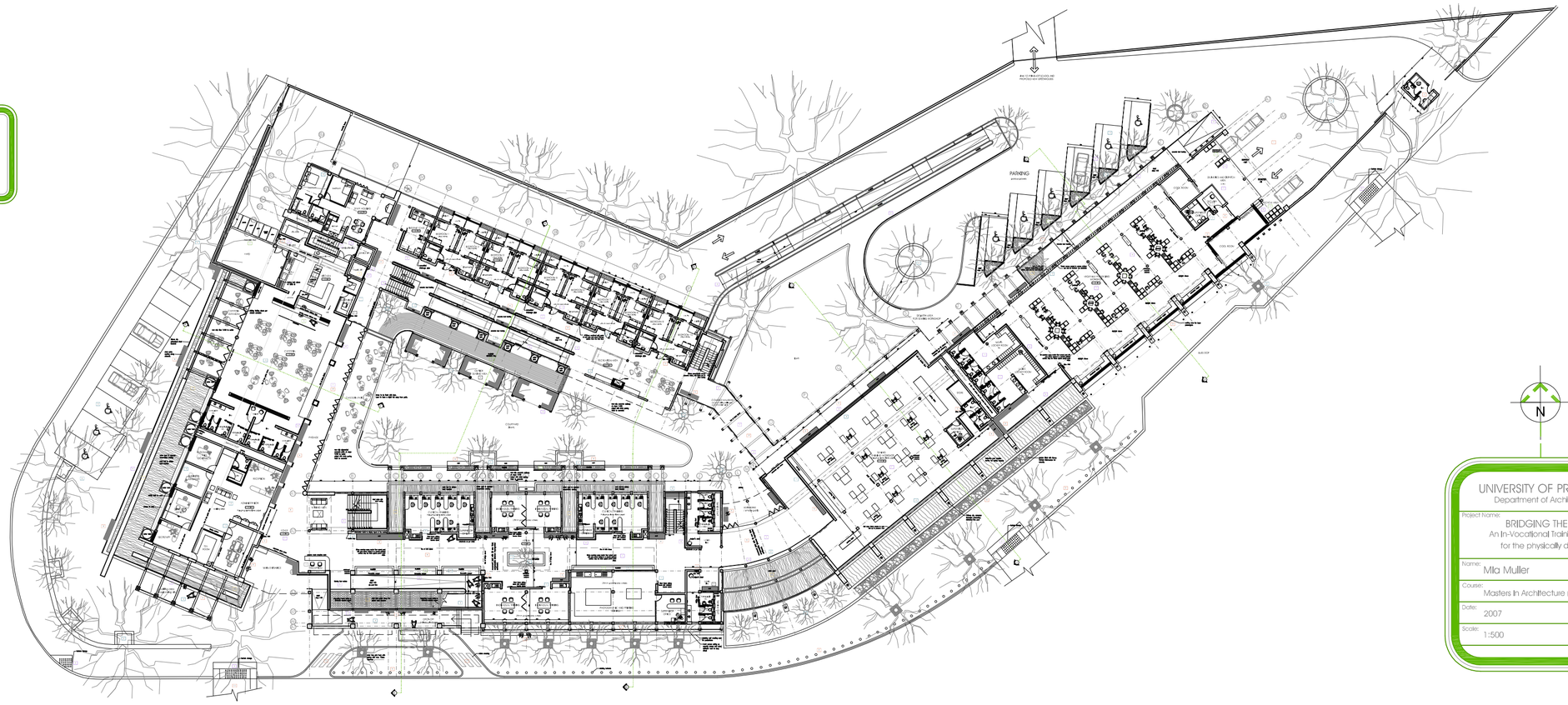
GROUND
0
1:500



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SENSORY NOTES:

SIGHT

SOUND

SMELL

TOUCH

SAFETY

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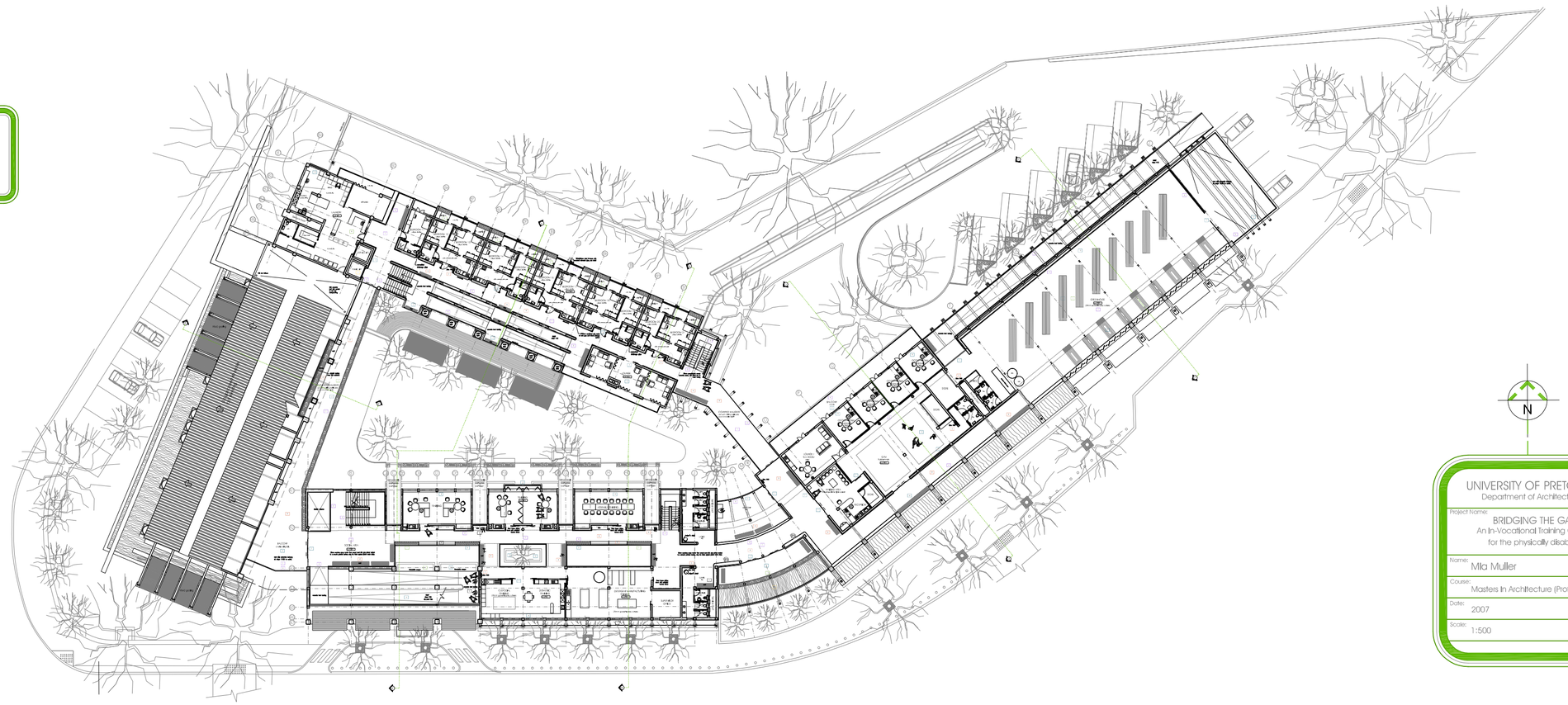
FIRST
1
1:500



GENERAL NOTES:

CLEARING OF THE SITE
digging up and removal of all unwanted vegetable matter and unwanted materials on site.

EXCAVATION
excavated by the contractor to the levels shown on the drawings. Bottom of trenches and holes should be level and stepped where necessary. All top soil is to be kept to one side and spread back on completion.

FILLING
of approved clean earth well watered and rammed in layers not exceeding 150mm in depth and thoroughly consolidated to a density of 90 % Modified AASHTO. Sloping banks made up of ground shall be of such an angle as to maintain the stability of the banks and the ground above.

TERMITE CONTROL
Soil has to be poisened against the inside foundation walls and under floors with chlorade soil insecticide to comply with SABS 1164.

CONCRETE FOUNDATIONS
to be cast on solid excavated trenches; all external and perimeter wall foundations to be laid on a 50mm bed of course sand, well consolidated.

SURFACE BED
6:4:1 concrete surface beds, 100mm thick, are to be laid generally between walls

REINFORCED CONCRETE
reinforced concrete beams and slabs to be according to engineer's instructions .

SENSORY NOTES:

- SIGHT
  - LARGE SIGNAGE: information boards and building maps
  - LIGHTS: ceiling mirrors in toilet areas provide views over the courtyard in passing.
  - WINDOWS / SKYLIGHTS: natural lighting and ventilation provided by glass louvres or transparent roofing above.
  - SHELVES AND BENCHES: provides sufficient signage for disabled and visiting blind.
  - DOORS: doors in public areas are adjustable by wheelchair users at lowered heights as 900mm height.
  - DOORS: doors in public areas are placed / doors have colored handles for disabled people to handle.
  - LANDSCAPE: provides shade outdoor and human interfaces in buildings.
  - LIGHTS: provides shade outdoor and human interfaces in buildings.
  - LIGHTS: 1 BEAM 1 BEAM 1 DAY. Entire the building users with the public.
- SOUND
  - HEARING LOOP: Loop surrounding of each level.
  - SPEECH NOISES: noise people with the aspect of water spills as a relationship between.
- SMELL
  - FRAGRANCES: smell helpful to disabled people.
  - SCENTED: fragrant plants in sculptures like this rooms.
  - LAUNDRY: smells of laundry detergents helps with distraction.
- TOUCH
  - TOUCH SURFACES: Accessible surfaces.
  - CONTROL BUTTONS: supplemented with braille following and at knee level for wheelchair users.
  - HANDRAIL SURFACES: textured strip to indicate the entrances of the lift, the beginning and end of a ramp, or any level change.
  - HANDRAILS: Handrails provided at 900mm & 700mm for users, providing users the support of the building.
- SAFETY
  - TIPS STRETCHER STEPS: on corners of the rooms, and moveable heights.
  - EDGES: Rounded edges so as not be an obstruction.
  - STEEL RAILINGS: Security access.
  - BROAD AISLES: spaces provided for centralized disabled and wheelchair users.
  - RESTING AREAS: seats or benches at 900mm heights must be provided every 10m, or where necessary.

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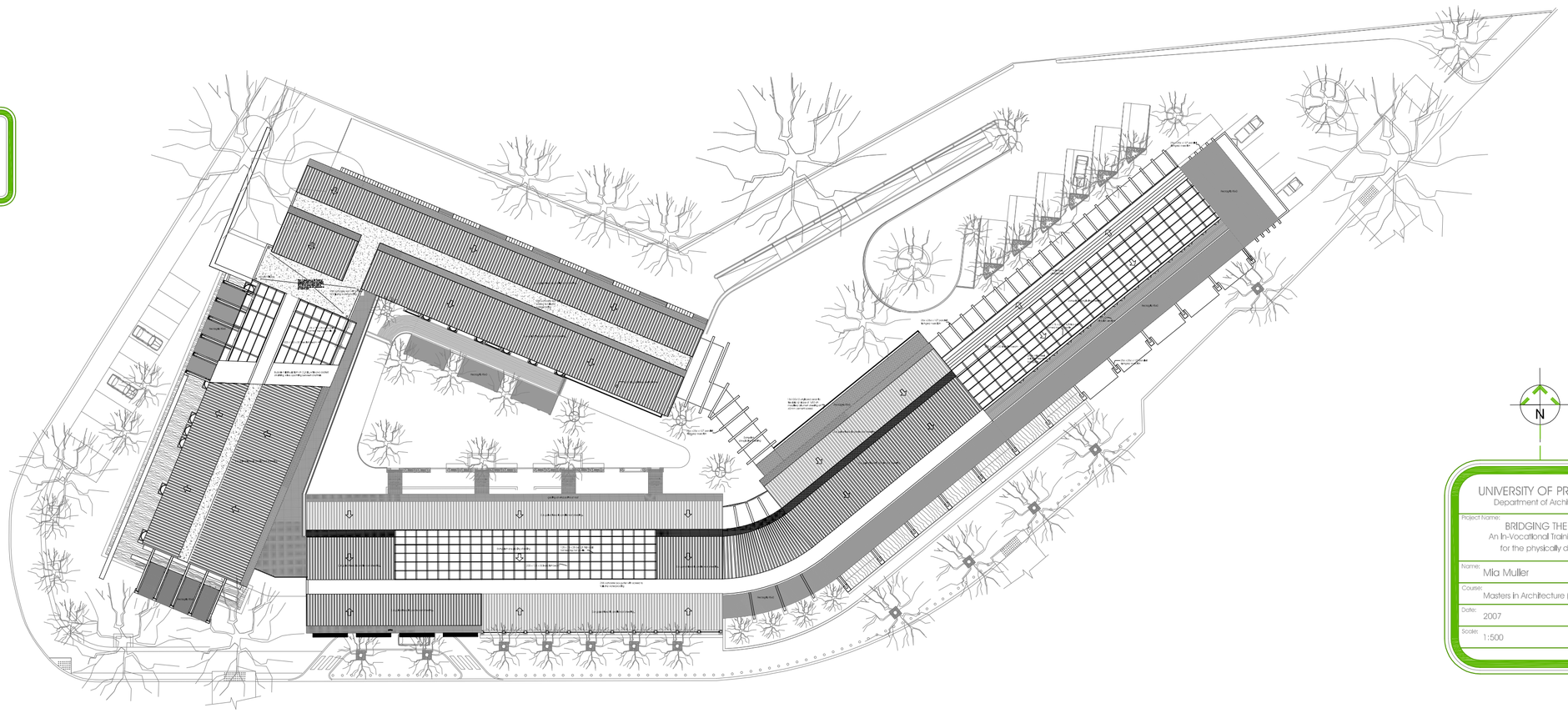
ROOF
2
1:500



GENERAL NOTES:

WATER SUPPLY
Provide water supply with copper pipes that must comply with SABS 460 and class 003. Fittings to comply with SABS 1067.

DRAINAGE
110 PVC sewer and drain pipes to comply with SABS 791. Class SDR 51 normal duty pipes with specified sizes. Coupling must be push fit sockets with rubber seal rings.

CLEANING EYES
provided cleaning eyes at ebd of each sewer branch, 1200 radium from municipal connection.

INSPECTION EYES
to be provided at every direction change, every 6000 intervals, at the highest point of branchand connection.

DAMP PROOF COURSE
Polyolefin damp proof course
0,250mm black embossed dpc to comply with SABS 952, type B.
Lay dpc in adjoining lengths and with corner laps over full width of wall, level with top of floor and not less than 50mm above finished floor lines.

Polyloefin damp proof membrane
0,375 smooth green dpm to comply with SABS 952, type C.
Lay dpm in adjoining lengths and with full corner laps over width of wall length with top of floor not less than 150mm above finish floor line.

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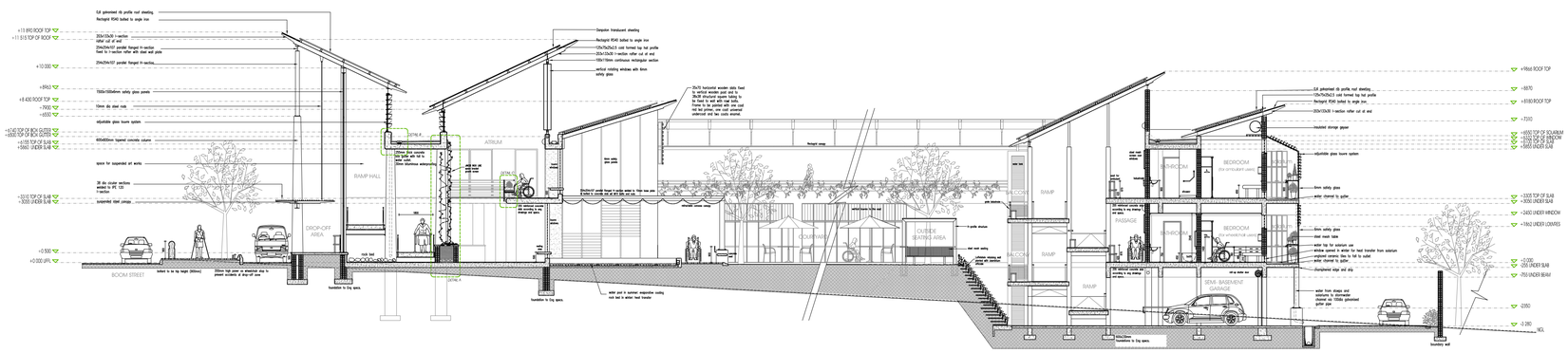
SECTION
A-A
1:150



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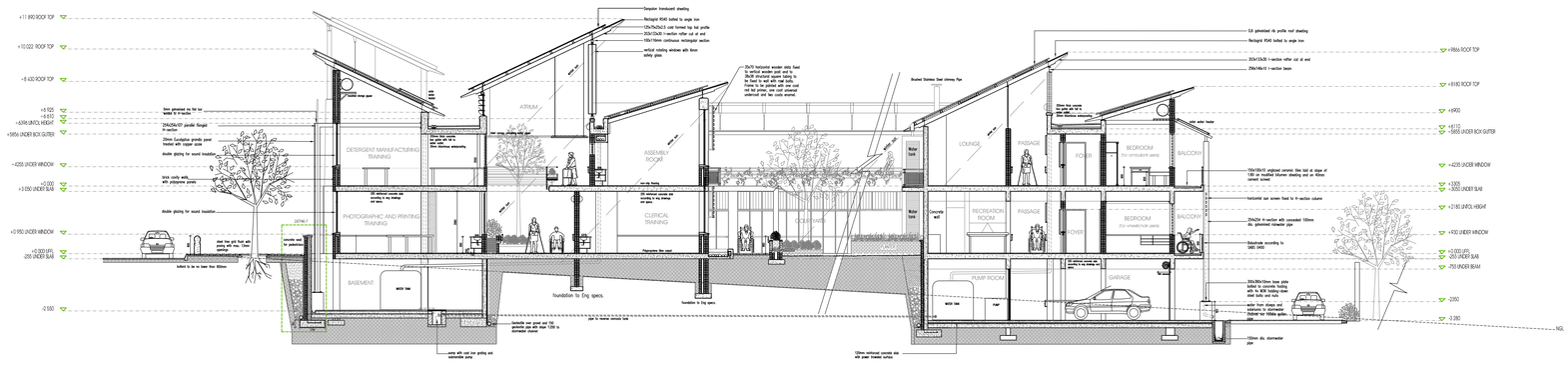
Scale: 1:150

SECTION
B-B
1:150



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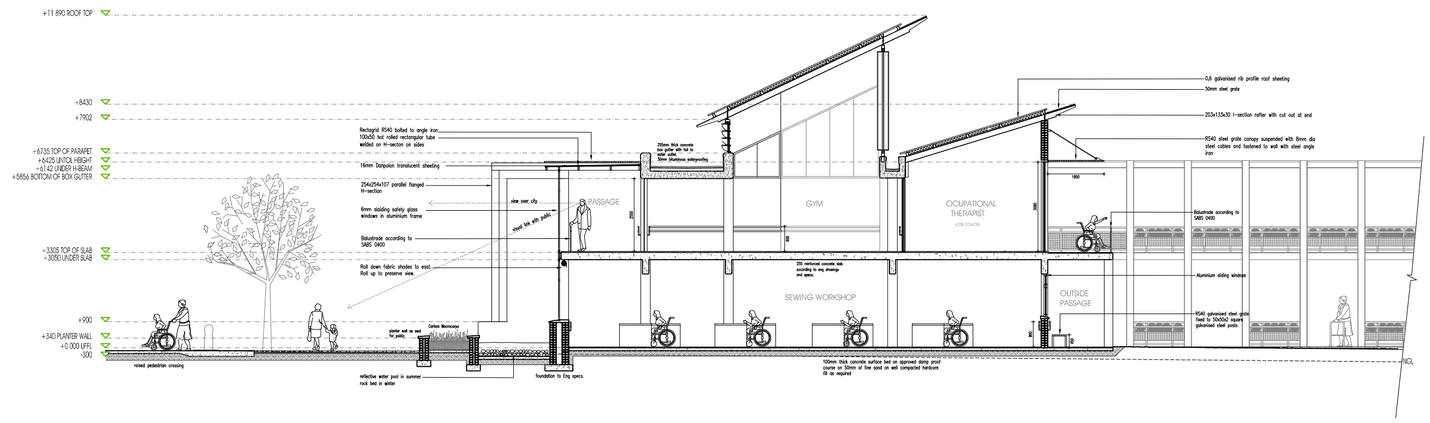
SECTION
C-C
1:150



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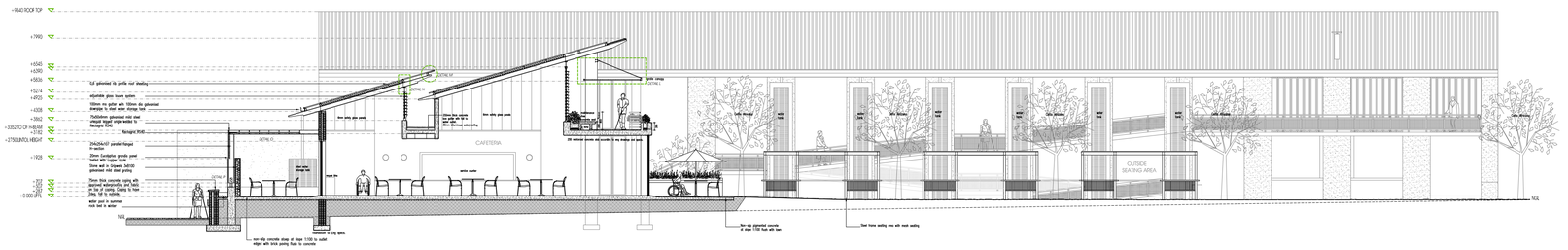
SECTION
E-E
1:150



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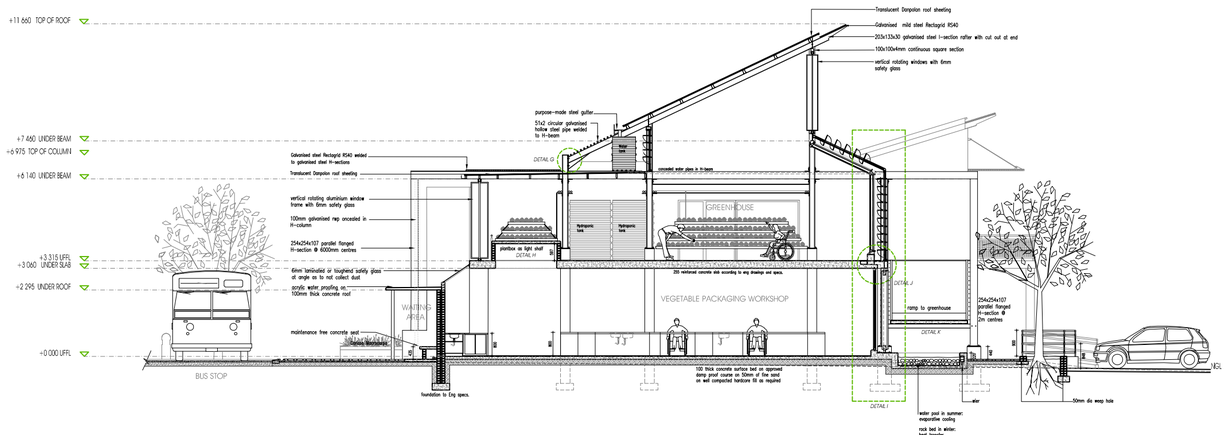
SECTION
D-D
1:150



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Scale:
1:150

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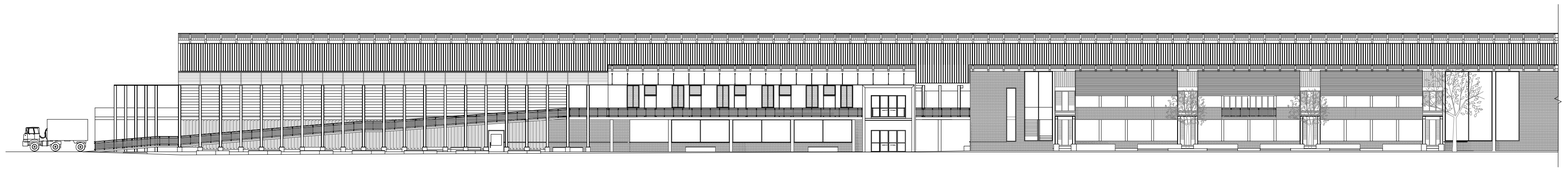
ELEVATIONS
1:300

SOUTH FROM BOOM STREET



NORTH FROM THE COURTYARD

N

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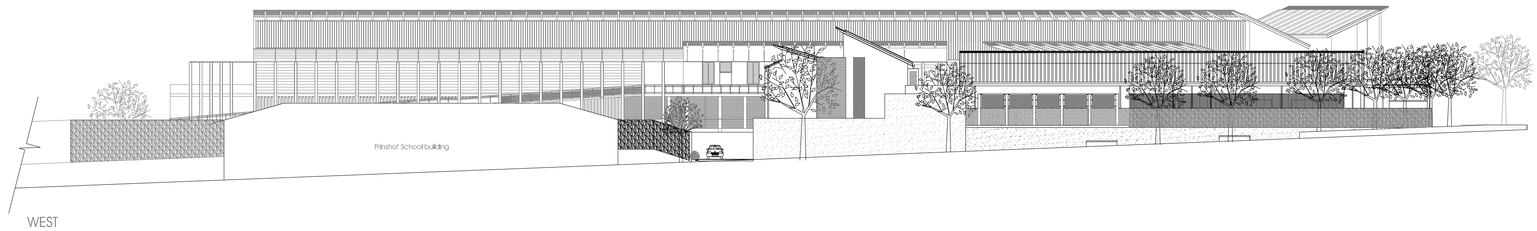
Scale: 1:300

ELEVATIONS
1:300



WEST

NORTH FACADE OF ACCOMMODATION BLOCK

N

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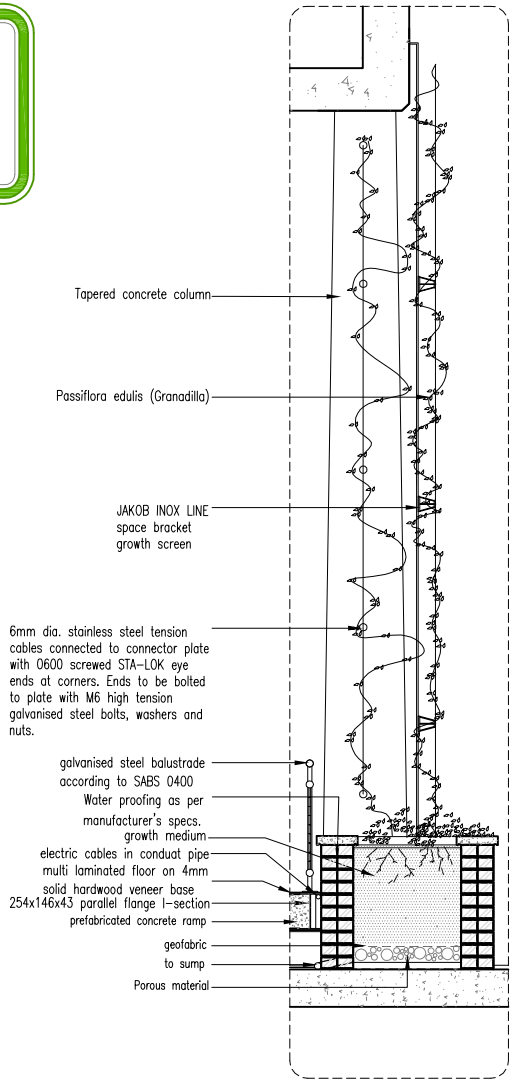
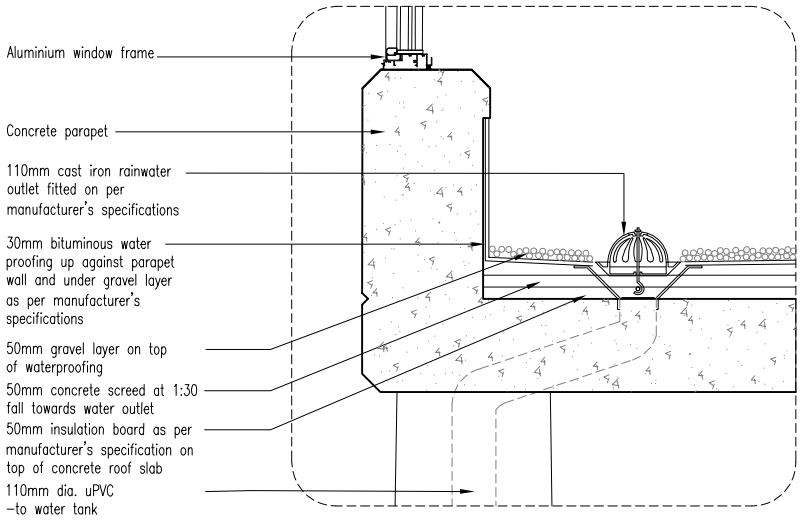
Scale: 1:300

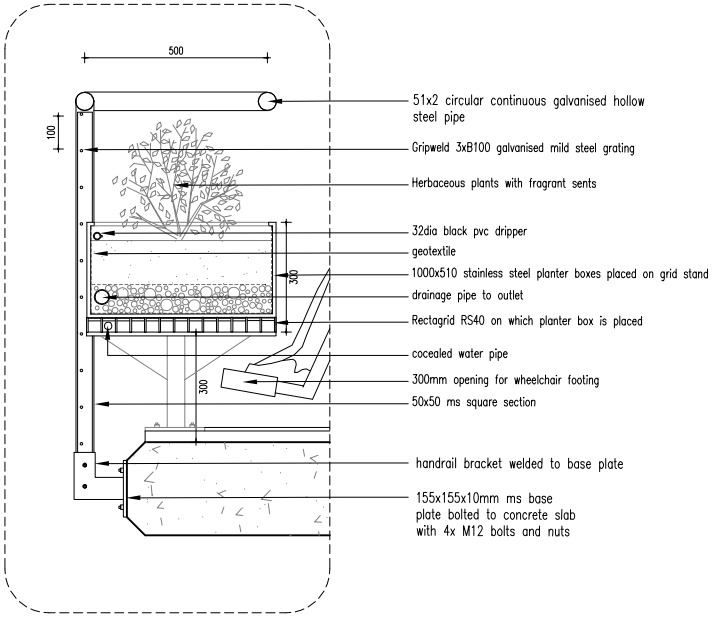
DETAILS



DETAIL A
PLANTER WITH GROWTH SCREEN NEXT TO RAMP
1:50



DETAIL B
RAINWATER DOWN PIPE IN CONCRETE BOX GUTTER
1:20



DETAIL C
PLANTER BALUSTRADE
1:5

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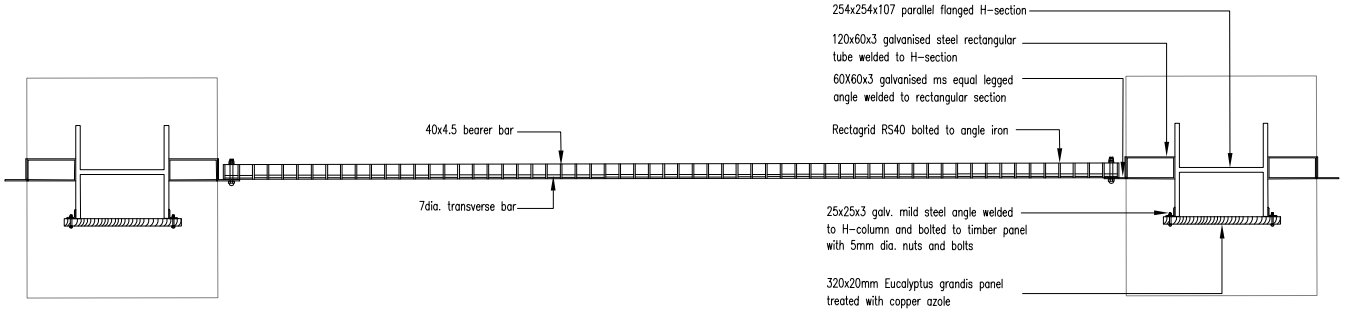
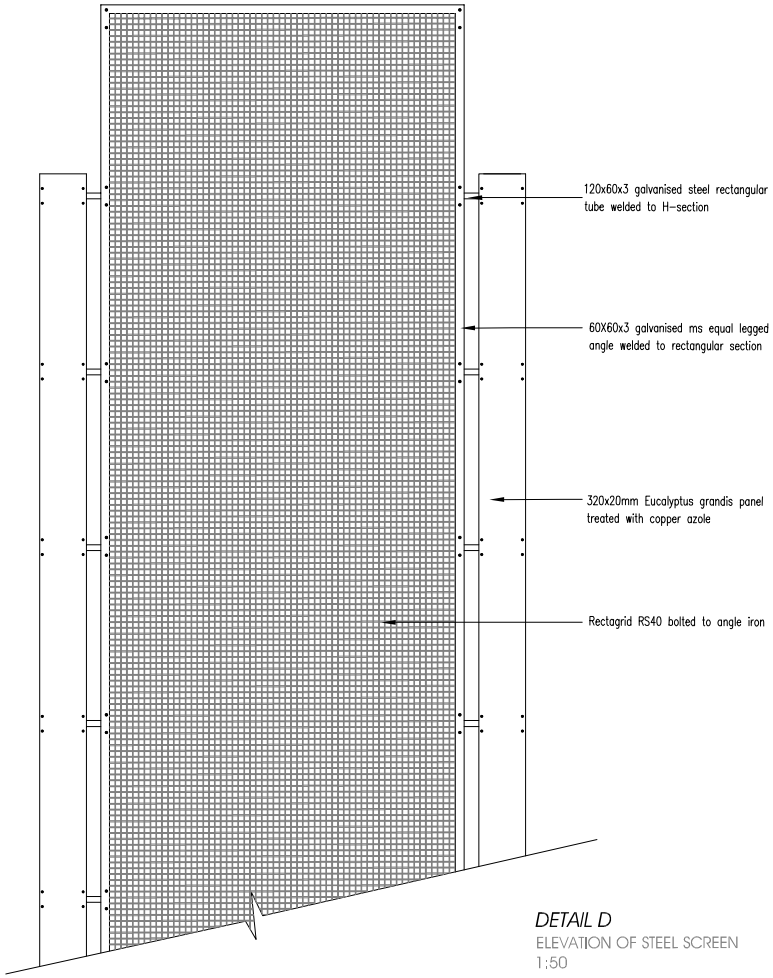
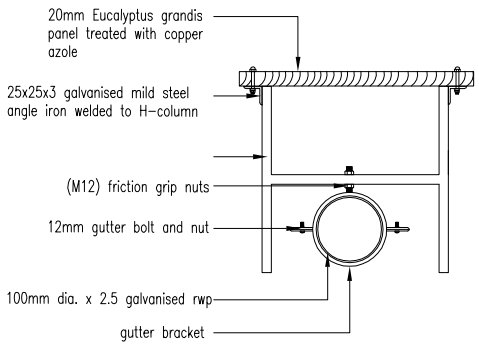
DETAILS



DETAIL D
PLAN OF STEEL SCREEN
1:20



DETAIL D
ELEVATION OF STEEL SCREEN
1:50



DETAIL E
RAINWATER DOWN PIPE IN
H-SECTION STEEL COLUMN
1:10

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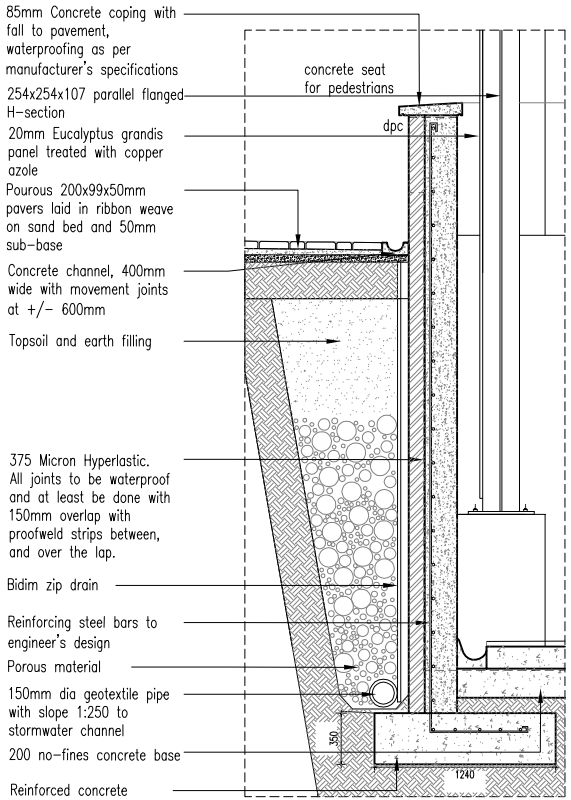
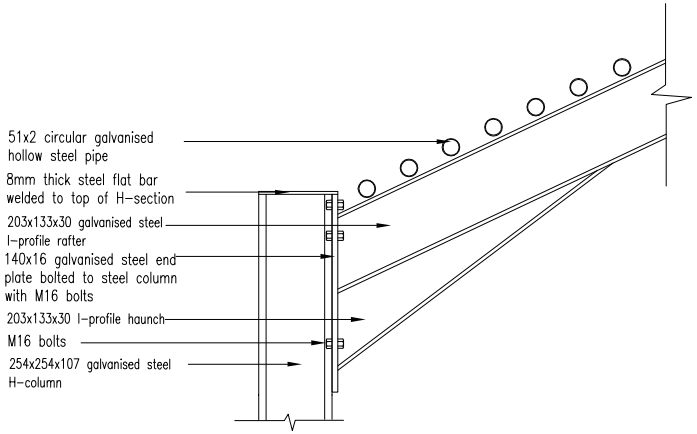
DETAILS



DETAIL F
RETAINING WALL
1:50



DETAIL G
STEEL ROOF CONNECTION IN GREENHOUSE
1:20

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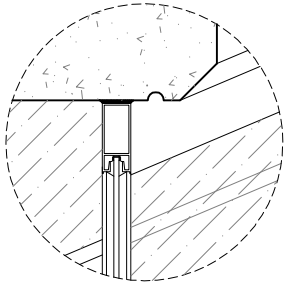
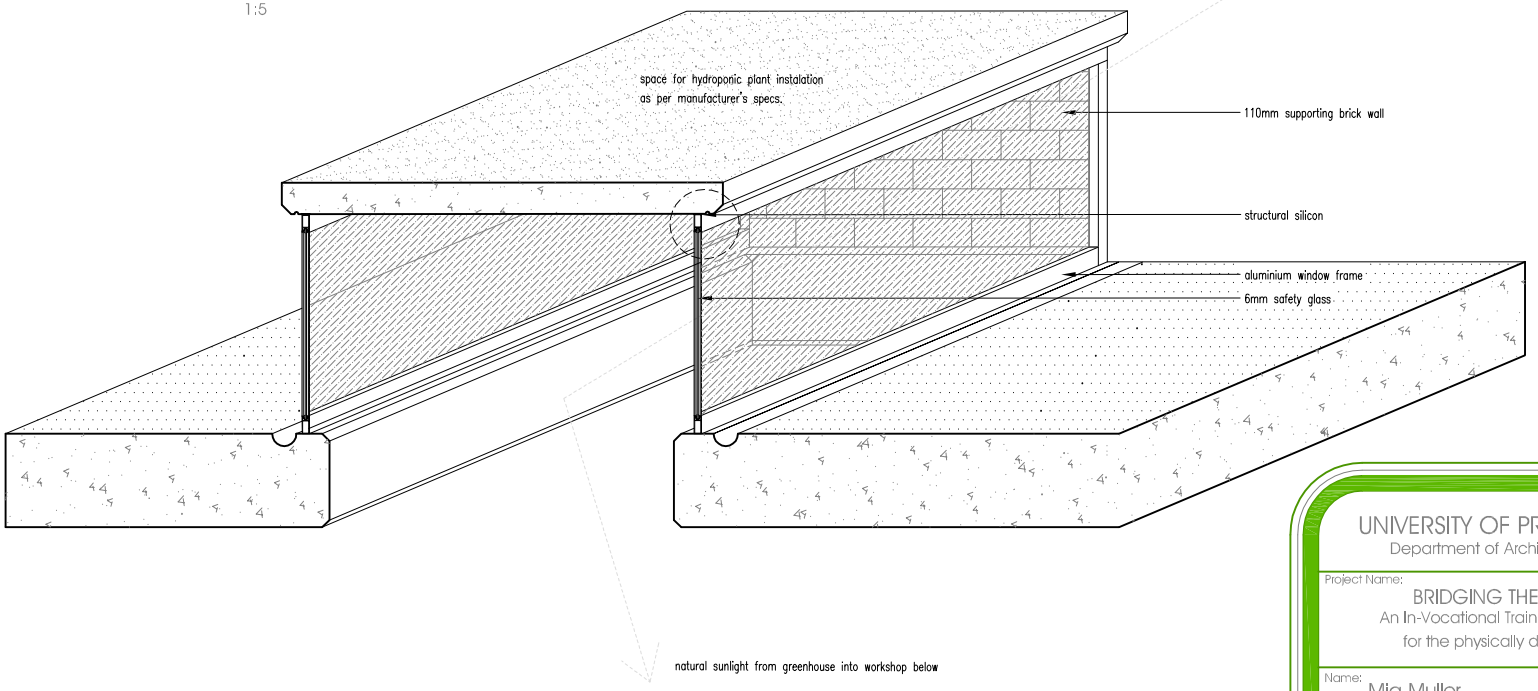
DETAILS



WINDOW FIXING
1:5



DETAIL H
PLANT BOX AS LIGHT SHAFT
1:20

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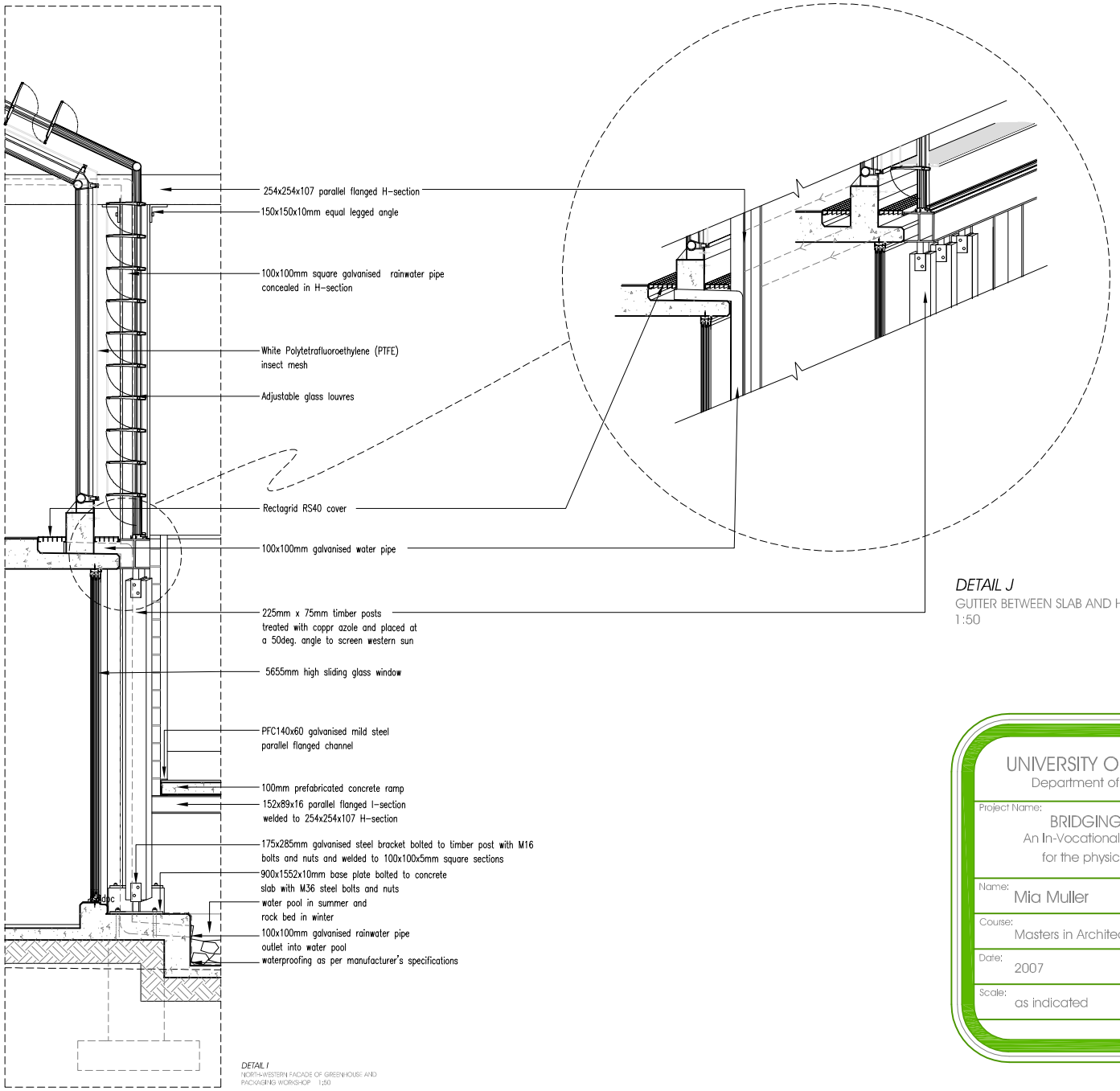
DETAILS



DETAIL I
NORTH-WESTERN FACADE OF GREENHOUSE AND PACKAGING WORKSHOP 1:50

DETAIL J
GUTTER BETWEEN SLAB AND H-BEAM
1:50

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DETAILS

Galvanised steel balustrade with RS40 grate welded between steel sections

254x254x107 parallel flanged H-column

100x100mm galvanised rainwater pipe concealed in H-section

PFC140x60 galvanised mild steel parallel flanged channel

100mm prefabricated concrete ramp non-slip textured screed surface

152x89x16 parallel flanged I-section welded to 254x254x107 H-section

fluorescent tube light

pool wall forming seat

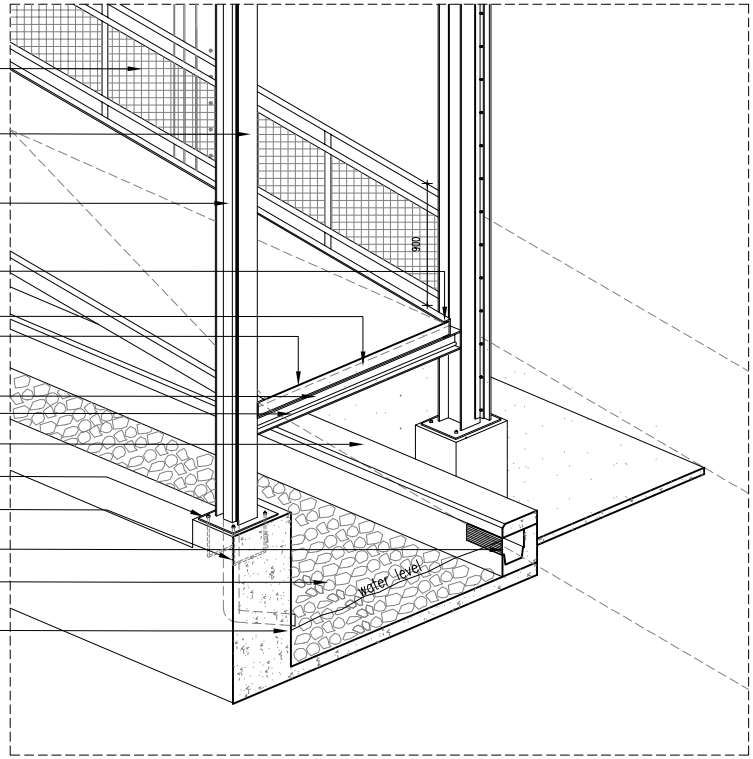
300x380x10 galvanised steel base plate on non-shrink grout

stainless steel bolt cage according to engineer's specs.

side wall skimmer with removable strainer

water pool in summer and rock bed in winter

100x100mm square galvanised rainwater pipe outlet into water pool



DETAIL K

RAMP OUTSIDE OF THE GREENHOUSE, WITH EVAPORATIVE COOLING POOL / ROCK BED BENEATH

not to scale

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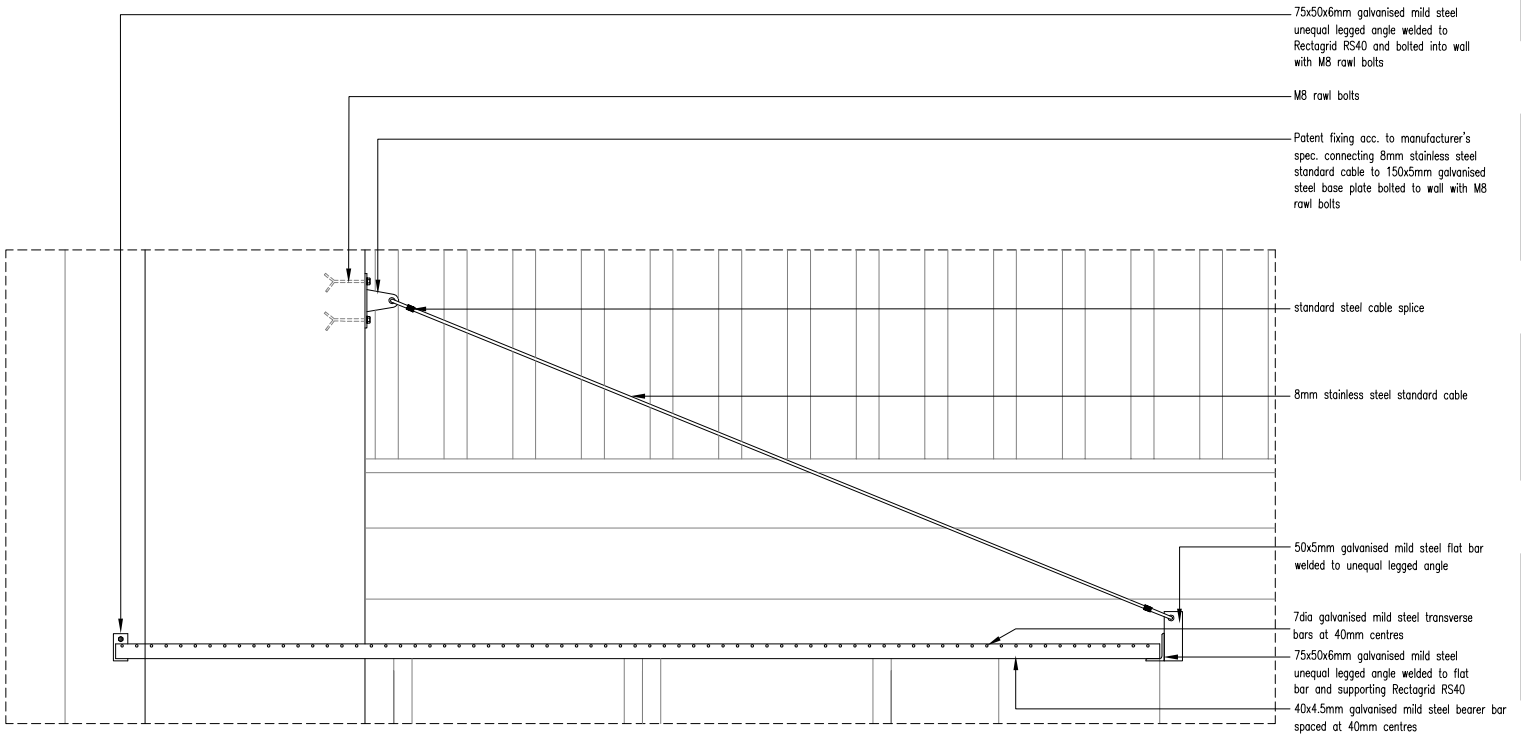
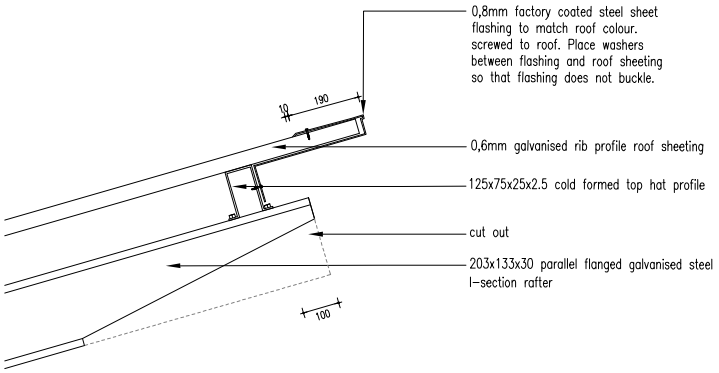
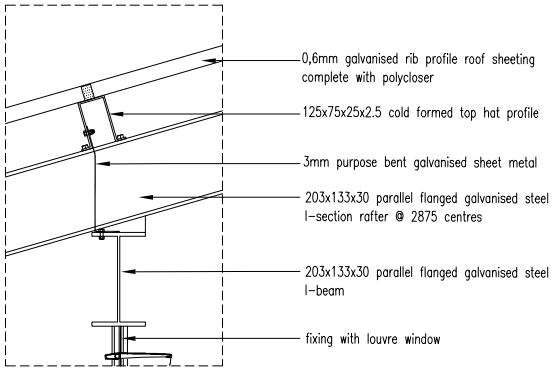
DETAILS



DETAIL L
GRATE CANOPY
1:20



DETAIL M
CAFETERIA ROOF
1:20



DETAIL N
CAFETERIA ROOF
1:20

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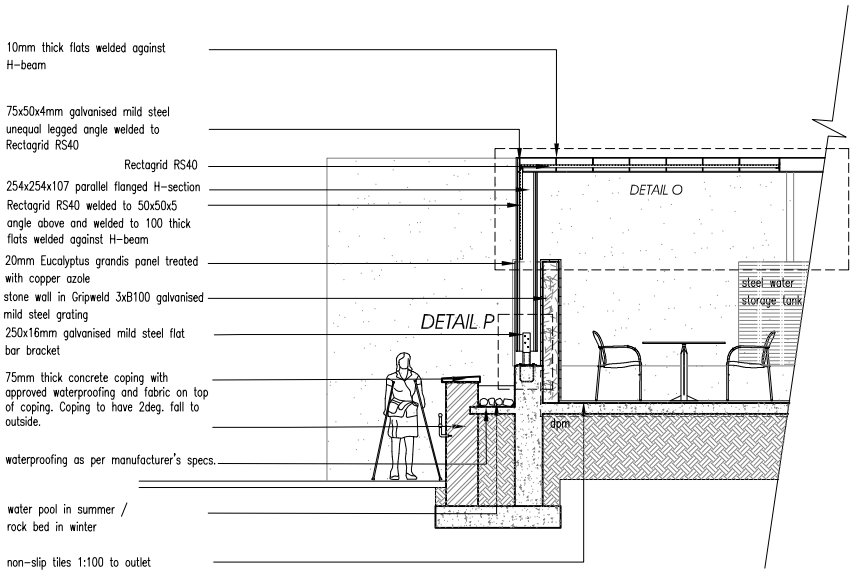
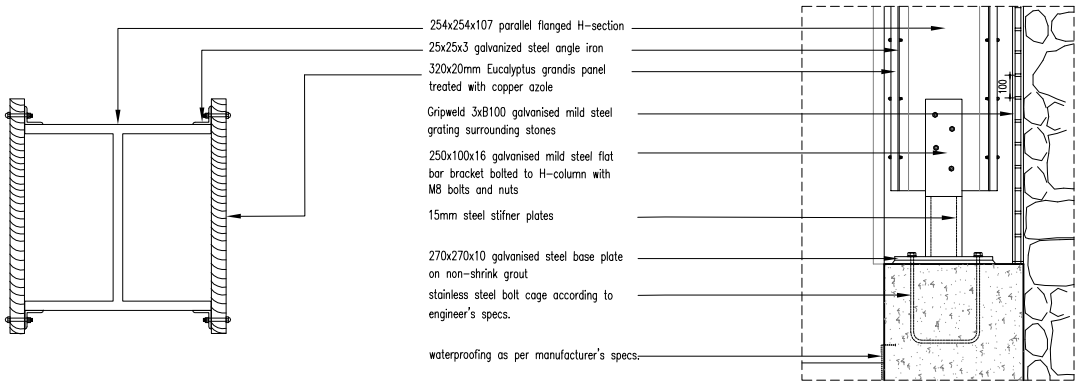
DETAILS



CAFETERIA VERANDAH
WITH GRATE SCREEN
1:100



DETAIL P
H-column fixing
1:20

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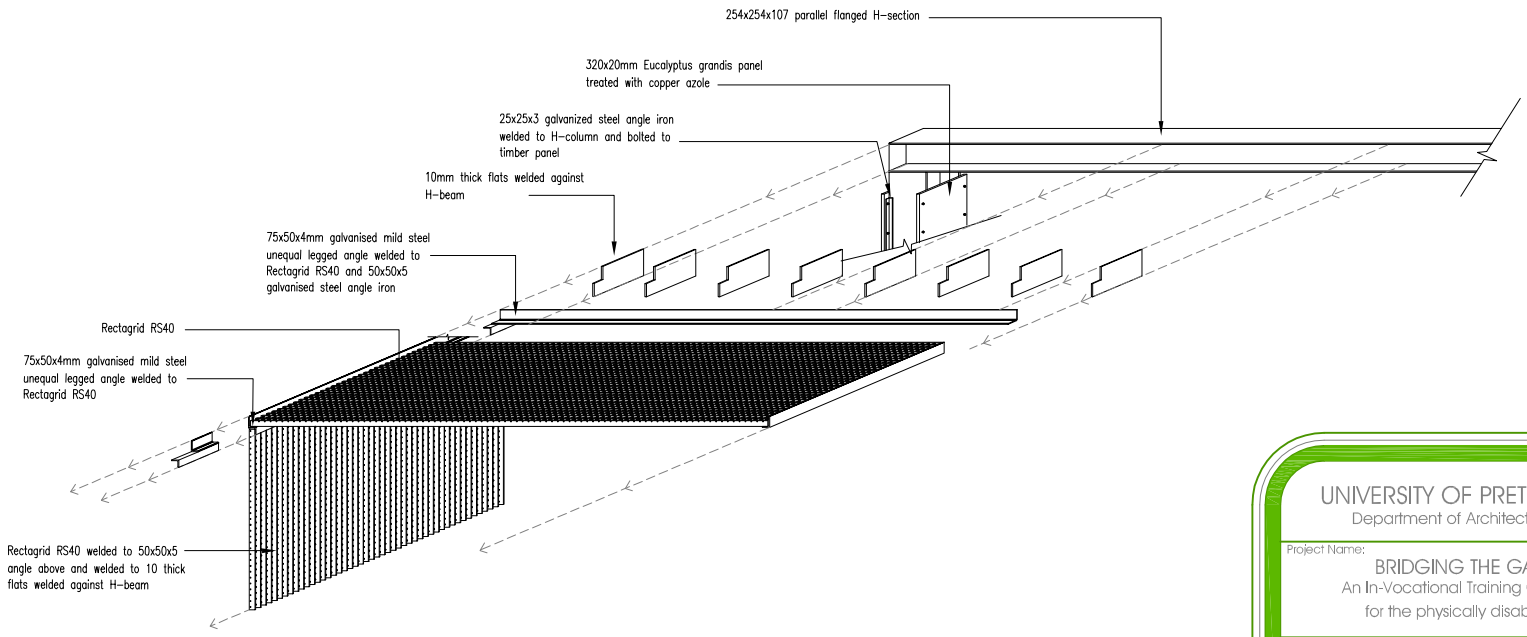
DETAILS



DETAIL O
Grate screen
1:50

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CONCLUSION

CONCLUSION

The project has succeeded in achieving to bridge the gap between able-bodied and disabled members of society in Pretoria by:

- **Integrating the disabled into able-bodied society.** The building gives the disabled an identity. They participate and contribute in the formal economy by taking the opportunity of producing greenhouse food and linking with the fresh produce market. Income is also derived from the specialised training and by performing other menial tasks, particularly packaging.

- **Implementing the objectives of the national constitution by applying effort and capital in the capacitation, inclusion and upliftment of the disabled.** The disabled can become economically independent and financially self-sustaining in an environment of reduced state grants and subsidies.

- **Optimising the building's ecological footprint on the earth, thereby symbolising the increasing contribution of the disabled to society.** The green nature of the building qualifies it for Clean Development Mechanism (CDM) funding, which warrants further investigation.

- **Complying with future planning parameters for Pretoria** by softening the Inner City edge and returning life and economic power to the CBD.

It is proposed that the concept of the *In-Vocational Training Centre for the Disabled* be replicated elsewhere in South Africa. Links can be forged with existing infrastructure for the disabled (in this case, Pretoria School and Prinshof School, etc.) while capitalising on the already existing comparative advantages for economic sustainability.

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LIST OF FIGURES

Solar water heaters – author
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Recycling – author
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Materials-
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Steel – Detail hosed. Visual books. 2007.
Brick - Architexture. Visual books. 2003.
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Carpets - Architexture. Visual books. 2003.
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Canvas – Detail housed. Visual books. 2007.
Paving – Detail housed. Visual books. 2007.
Water - Detail housed. Visual books. 2007.
Facades – author

APPENDICES

SBAT – Microsoft Office Excel 2003. Percentage A. Performed by the author.
Tshwane Inner City Framework diagrams – Tshwane Inner City Development & Regeneration Strategy, 2005. PDF.
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- Sunday Times – 4 February 2007.
- Fourways Review – Week ending. 9 March 2007.
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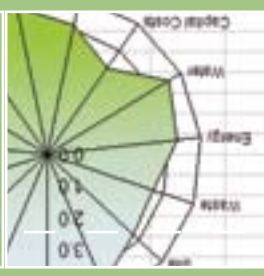
APPENDICES



9.1 BASELINE DOCUMENT

9.1.1 Social issues

A.

Criteria	Target Set
	Occupant comfort:
Ventilation	• The building wi□s life cycle. • Louvre windows (easily used by disabled) will allow occupants to control the amount of natural ventilation.
Thermal comfort	• Temperatures in the building must be carefully monitored to keep the occupants comfortable and the food healthy. • Occupants will be able to regulate drafts through the adjustable louver windows. • Thermal mass of the building will increase temperatures in winter. • Deciduous plants will limit sunlight in summer and heat the rooms in winter. • Evaporative cooling systems to be incorporated.
Views	• The view of the Union Buildings to the east will be accentuated. • The view over the □ • Views over□ "softening" the building.
Noise	• A distinc□ • This site is centered between 2 major contrasting noise sources and equilibrium must be reached in this building. • South and East of Site = Taxi Rank = loud = constant hooting, sirens, buzzing and voices • Block and dampen noise on southern side of Centre through façade design and acoustic design of training rooms and kitchen. • North of Site = Prinshof School for the Blind = quiet Although the classrooms are very noisy, the part of the school bordering the site is very quite and used for private agriculture to sustain the children in the hostels. • There is no need to dampen the sound as much, thus the accommodation can be placed on northern side. The benefits would be that units will enjoy subtle sounds of children voices at specific hours as well as benefit northern sunlight in the rooms. • *Acoustic elements:* Walls: Thick and solid walls absorb sound. Windows: 4mm and 6mm glass Floors: Soft, fibrous materials in designated areas will absorb sound wave energy. Ceilings: Increase the mass by installing heavy materials in ceilings. Planters with plants: Sound is diffused through the plants.

Indoor/Outdoor	• Balconies on □ solariums. • Northern balconies on the training facilities block ensure views over the courtyard.

B.

Criteria	**Target Set**
	<u>Inclusive Design / Barrier-free design:</u> **(See Design Investigation)**
Circulation	• Easy movement and navigation is of critical importance in this building. Access must be allowed to all parts of the building with level changes addressed by ramps/stairs and lifts.
Furniture	• Height of wo□ concern for wheelchair users. • The material must suit the function and the light of the room. • 50% of furniture to be manufactured on site by local labour. • Other furniture can be bought from the cane workshop for the blind..
Lighting	• General principles for internal lightening include: light-coloured walls, floor and ceiling; vertical windows rather than roof lights; and light fittings which hav□ comparison to the reflected light in a space.
Floor finishes	• Provide navigational information. • *Carpets:* Type of carpet has a great impact on wheelchair users. The harder the carpet the better to move. Low-pile looped or compressed-fibre carpets are recommended. Carpets and carpet tiles should be securely attached. Bold patterns can be used to guide people. • *Linoleum:* Generally good, though noisy. Adhere firmly to the floor surface. Polished linoleum can be a serious threat. Use non-slip flooring polish. • *Non-slip flooring:* 1) grit applied to an epoxy carrier 2) abrasive vinyl sheets 3) rubberized tiles.
Toilets & Kitchens	• Must be easily accessible to all. • Have non-slip flooring. • Warm water taps must be on the same side of the basin throughout the building and the cold water taps must be closest to the WC. • Cupboards must be correct height and reachable for wheelchair users. Lights must be fitted under top kitchen cupboards, so as to shine on work surfaces without shining in persons' eyes.
Entrance	• From the parking or drop-off area up to the entrance of the building must be legible and easily accessible (with a handrail) for both able-bodied and disabled people and without any distinction. The entrance must be well defined.

External areas, parking & paths	• Accessible car parking with correct dimensions. • Pathways that are well illuminated, firm, well drained with a non-slip surface. Intersections should be rounded or splayed for wheelchairs and clearly marked. • □ • Channels, gratings and manholes must have a non-slip cover flush with the pavement. • Pedestrian crossings must be well lit with well-defined and maintained road markings. Dropped kerbs must be provided at intersections.
Transport	• Road and pedestrian connections are essential to the building. The Centre is located 50m or less from main public transport, namely Bloed Street Taxi Rank and the proposed tram line.
Doors	• Doors must be correct width, and placing with appropriate handles, kickplates and vision panels.
Fire and emergency escape routes	• See page 81.
Ramps, stairs & lifts	• All changes in level catered for with appropriate ramps of 1:12 fall, or lifts. • The right design and usage is of great importance, see page 60.
Edges	• All edges i.e. between walls and floors and stair nosings clearly distinguished through the use of contrasting colour (for visually impaired)

C.

Criteria	**Target Set**
	Access to facilities:
Schools	• The Prinshof School fo□ from the site. Inner city schools are within 3km reach.
Tertiary education	• Damsa is located less than 100m from site.
Public transport	• The Bloed Street Taxi Rank is across the road from the Centre. The Centre is on the local bus route and near the proposed tram line station.
Banking	• ABSA in Pretorius Street and First National Bank in Vermeulen Street, both easily accessible by public transport (within 3km).
Retail	• □. Attention must be given to the sidewalks and crossings to accommodate disabled people to get to the retail stores.
Communication	• Postnet is situated in Schoeman Street. • Payphones would be placed in the accommodation block, in the internet café. • An Internet café is situated within walking distance in Bloed Street and one will be provided in the Centre.
Hospitals	• Pretoria Academic Hospital is within walking distance (± 400m) and is also on the local public transport route.

Recreation	• The Zoo is within 200m from the Centre.
Sports grounds	• The Oudst□ Centre. • Sports grounds are situated on the corner of Nelson Mandela Drive and Schoeman Street and can be reached with public transport.
Theatres	• The Pretoria State Theatre is 5 blocks away (within walking or public transport distance).
Work / Residential	• Work for disabl□ public transport. • Residential housing is also in the surrounding area.

D.

Criteria	**Target Set**
	<u>Participation & Control:</u>
Environmental Control	• Building must be user and environmental friendly. • Occupants have a certain amount of control over their environmental conditions, e.g. opening windows / blinds. • The building forms part of the industrial ecology and green architecture approach.
User training	• Every occupant should know how the building functions and know the emergency exit procedures and locations.
Amenities	• Easy access to work, training and accommodation as well as ablution facilities.
Local community	• Local community involvement within the building is an important aspect for community upliftment. • Occupants in the building must interlink with the local community of the area; thus linking able-bodied with disabled people.
Social spaces	• Informal / formal socializing will take place in the cafeteria, lounges and recreation area of the building. • Seating along regular routes will be provided for social interaction. • The greenhouse will not only produce healthy food, but will also provide for social interaction between occupants.

E.

Criteria	**Target Set**
	<u>Health, Safety and Education:</u>
Recreation & exercise	• See: ‘access to facilities’.
Smoking	• This will be a smoke-free building with allocated areas for smoking.
Air quality	• Passive ventilation systems will ensure good air flow through the building with good interior air quality.

Safety & security	• Spac□ surveillance. • Textures and types of pavement will warn occupants of danger. • Smoke detectors in all rooms. • Fire extinguishers are located in areas as per regulations. • Emergency doors will close in case of fire to prevent fire from spreading. • Security checkpoint at food delivery and distribution area. • Electrical appliances and sockets are on correct, safe level. • Ramps are of correct gradient so as to not produce speed wobbles for wheelchair users.
Education	• The buil□ skills.
Health	• Information readily available on health, education, and career development issues. This could be in the form of a well-serviced notice board located at the lift.

9.1.2 Economic issues

A.

Criteria	Target Set
	<u>Local Economy:</u>
Local contractors	• 80% of the construction will be completed by local contractors within Tshwane (in a 40 km radius of the Centre) with the aim of reducing embodied energy in regard to transport to and from the site.
Local material supply	• 80% of material will be sources from surrounding area and 20% of material will be produced within a 200km radius of the Centre.
Local components	• 80% of components to be produced within Gauteng.
Repairs & maintenance	• All repairs and maintenance to be done by either the local community or within the region of Tshwane, which will create continuous labour business around the site.
SMME support	• SMMEs can be used during and after construction.

B.

Criteria	Target Set
	<u>Ongoing Costs:</u>

Maintenance	• Aim to keep maintenance costs low by specifying low maintenance materials.
Cleaning	• Can be done by local workers (able-bodied).
Security	• Building to □ with able-bodied security guards day and night (to be able to *run* after criminals -if needed)
Care taking	• The necessary medical and therapeutic provisions have to be made. A care giver will be staying on the ground level of the accommodation block to help extreme physically disabled occupants (e.g. with bathing).
Shared costs	• Spaces must be designed to be multi-functional, so as to share costs between different users, e.g. training centre can be used for vocational training for disabled during the day and for adult education at night.
Cost monitoring	• A□ management.
Gardening	• □A link between □

C.

Criteria	**Target Set**
	<u>Capital Costs:</u>
Existing flora	• Most of the trees will be conserved.
Efficiency	• No complicated shapes and construction.
Consultant fees	• Incentives provide for reduced capital costs and continuing costs.

D.

Criteria	**Target Set**
	<u>Efficiency and use:</u>
Space use	• By reducing the service space, more usable space is created.
Occupancy schedule	• The workshops will be occupied at a minimum of 35 hours per week (5days x 7hrs/day). • The accommodation will be occupied 90%-100% of the time. • The trai□
Management of space	• Spaces must be designed so as to not waste any space. • A correct management system must be put in place to ensure successful productivity of the building.
Use of technology	• The occupants will be provided with access to technology, e.g. internet. A central IT room will be provided.

E.

Criteria	Target Set
	Adaptability & Flexibility:
Vertical dimensions	• The heights of neighbouring buildings must be kept in mind: 1. Prinshof School = 1-3 storeys 2. Residential area on western side = 1 storey 3. Commercial buildings across Boom Street on southern side = 1-3 storeys
Internal partitioning	• Adjustable internal partitioning for easy changing of spaces. • Modular systems to be considered.
Structure	• Structure placed to allow for open spaces. • Three separate structural systems will be used. The three systems involve the way of living (by disabled), the process of energy production (work & training) and the act of organic food growth (greenhouse). The three systems (brick, concrete and steel) will have a metaphoric influence on the material used.
Circulation & service spaces	• Easy access to be provided to all areas and services in the building. • The main generator for the design is the movement through the building. Vertical and horizontal movement will mostly be dealt with by the use of ramps.

9.1.3 Environmental issues

A.

Criteria	Target Set
	Energy:
Transport	• Publi□
Ventilation	• Passive ventilation systems will reduce the energy consumption in the building.
Environmental control	• Less mecha□ building's life cycle.
Appliances and fittings	• Energy efficient fittings to be used, e.g. fluorescent lighting.
Energy sources & renewable energy	• Renewable energy sources to be used, e.g. solar water heaters and solar cookers to be considered.

B.

Criteria	Target Set
	Water:
Rainwater	• All rainwater to be harvested and used for irrigation of hydroponics or flushing of WCs.
Grey water	• Grey water to be used for flushing toilets.
Runoff	• Use of pervious surfaces maximizes the replenishing of groundwater and will reduce stormwater runoff. Hard landscaping will be minimized, e.g. car parking.
Water usage	• Water efficiency devices to be used, e.g. WCs. Water will be used quite extensively in the Centre due to the plants and evaporative cooling pools, but it can be managed by efficient devices and environmental awareness of occupants.
Plants	• Formal gardens to have indigenous plants that require less water. Vegetable and herb gardens to be strictly monitored as to amounts and times of irrigation.

C.

Criteria	Target Set
	Waste:
Organic waste	• Recycled on site and used in permaculture process. Used as compost for vegetable and herb gardens.
Inorganic waste	• Inorganic waste to be sorted, stored correctly and disposed of. A municipal wastage dump is located across the street from the Centre and was kept in mind whilst designing.
Toxic waste	• Ensure safe disposal or recycling of products.
Sewage	• Connect to main sewerage system.
Construction waste	• Waste to be kept to the minimum through good management and design. Some construction waste products can be recycled within the composting process and be used for the urban agriculture.

9.1.4 Site

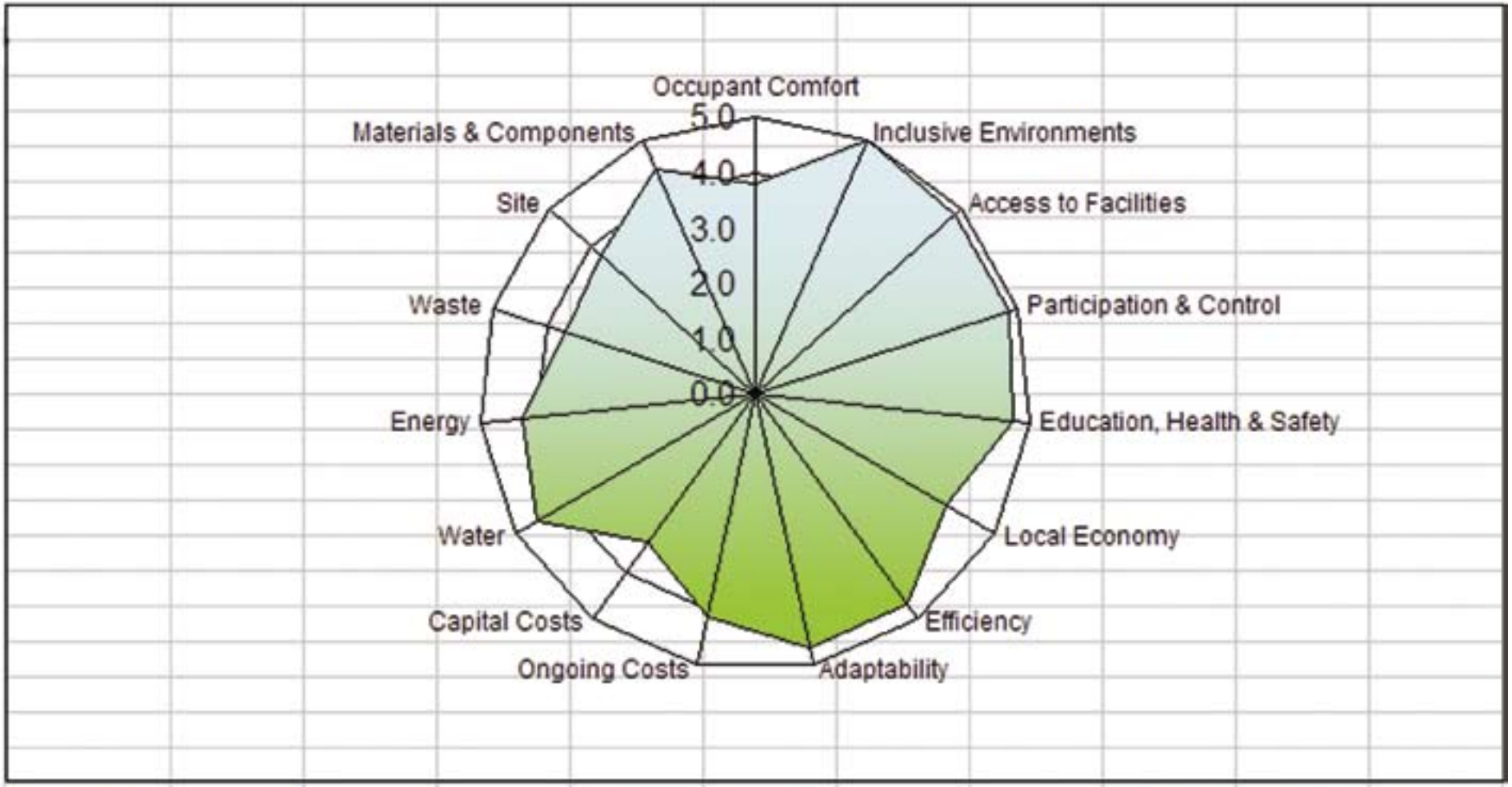
A.

Criteria	Target Set
	Site:
Neighbouring buildings	• The new Centre must not have a negative effect on the surrounding cityscape and environment, thus the following must be kept in mind while designing: 1. Scale 2. Materials 3. Functions 4. Adaptability
Ecosystem	• The whole building forms its own ecosystem within the city, which specifically relates to the one function of hydroponic food production. The balance that has to be kept in the natural environment must also be kept in the built environment. • This Ce□ with a successful economic outcome.
Landscape inputs	• Permaculture principles to be applied with no artificial inputs. • Industrial ecology will be exercised
Construction processes	• Minimise negative impact on the site as much as possible during construction.

9.1.5 Materials and components

A.

Criteria	Target Set
	Materials & Components:
Material / component sources	• 70% to be sourced from renewable resources.
Embodied energy	• 80% of building to be made with low embodied energy, including locally produced and sourced timber, concrete & steel.
Manufacturing process	• No environmental damage to be done during manufacturing.
Recycling & reuse of materials & components	• Possible recycling and reuse of materials and components from surrounding construction sites.
Modular coordination	• Aim to d□



Social	4.6	Economic	4.2	Environmental	4.1
		Overall	4.3		

9.2 TSHWANE INNER DEVELOPMENT AND REGENERATION STRATEGY – 2005

9.2.1 Tshwane vision

The City of Tshwane Metropolitan Municipality's vision is "To become the leading international African capital City of Excellence that empowers the community to prosper in a safe and healthy environment." (Tshwane Inner Development and Regeneration Stratergy – 2005: 5)

The vision clearly sets out the development goal of becoming the African City of Excellence. The vision of Tshwane (and its implications for the Inner City) therefore focuses strongly on two components, namely:

- People and the betterment of their lives;
- The image and functionality of the Inner City as an internally important city.

9.2.2 Development approach

The Inner City Development and Regeneration Strategy is based on a "catalytic intervention" approach to influence the development of the Inner City through specific strategic interventions.

The proposal is to focus public budget expenditure on specific projects and catalytic developments. This will create strong stimuli for private sector investment to respond positively. An integrated, multi-disciplinary approach must be followed in addressing the complex issues of the Inner City, whereby integrating physical, economic and social spheres and imply certain institutional arrangements.

The following are certain strategic interventions that are proposed in the Inner City, which will begin to create enabling environments for the regeneration of the Inner City.

9.2.3 Spatial and physical interventions

These interventions are based on eight building blocks:

<u>Block 1:</u> Announcing the destination

The Inner City must be announced by defining gateways into the city. On the south, the city is defined by a sense of significant green open spaces in the natural setting. According to the framework, a landmark comprising strong vertical lines is to be provided in the area of the old tram bridge in Nelson Mandela Drive.

The entrance from the north via Paul Kruger Street is already defined by a strong natural setting. The entrance could, however, be enhanced by creating a landmark at its point of entrance over the mountain, balancing it with the monumental Freedom Park at the southern end of Paul Kruger Street on Salvokop.

After analysis of the city another gateway was also identified. On the north-eastern side of the city, where Dr Savage Road, Boom Street and Du Toit Street connect, a new gateway is perceived.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The IVTC is situated on the edge of the city where Boom Street enters Soutpansberg Road. The corner is perceived as an exit out of the Inner City. Therefore the IVTC will be a quiet building so as not to detract attention from the "entrance" of the city. The building hugs the street edge, whereby its horizontality is enforced. The street façade comprises of vertical columns placed at different intervals, creating a rhythm. Passers-by will experience the rhythm at different intervals when "exiting" the city.

Block 2: **Cultural circle**

This concept is based on the identification of all existing cultural landmarks and facilities and the enhancement thereof.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The site is perfectly situated on the proposed fixed mono-rail connection and pedestrian routes, linking the Zoological Gardens and the Mandela Corridor, with a view over the Union Buildings to the east and the Inner City to the south.

Block 3: **Defining the Capital Precinct**

The Inner City is framed by a road grid, creating a system of welcoming boulevards. Within the system of welcoming boulevards emerges a monumental grid, centered around the *Axis of Expression* (Church Street and Paul Kruger Street) linking Church Square, the Union Buildings and Freedom Park.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The IVTC is situated on a framing grid/welcoming boulevard. Presently Boom Street's character stops directly next to the proposed site, where the boulevard of trees (London Planes) stop abruptly. Therefore the wide sidewalk next to the IVTC will be used not only to accommodate movement of people but also create an attractive environment. Trees and seating will be provided along the IVTC, enhancing the welcoming boulevard's character.

Block 4: **Nelson Mandela Corridor and Apies River Promenade**

Nelson Mandela Corridor

This corridor is a future focal area for arts, culture, government, business, entertainment and commercial development, with prime exposure on Nelson Mandela Drive. Within this framework emphasis has been placed on the pedestrian, cyclist and those dependent on public transport.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The framework is a good example of how to apply traffic calming methods and how to balance movement networks. It will be used to create crossings in Boom Street for the disabled.

Apies River Promenade

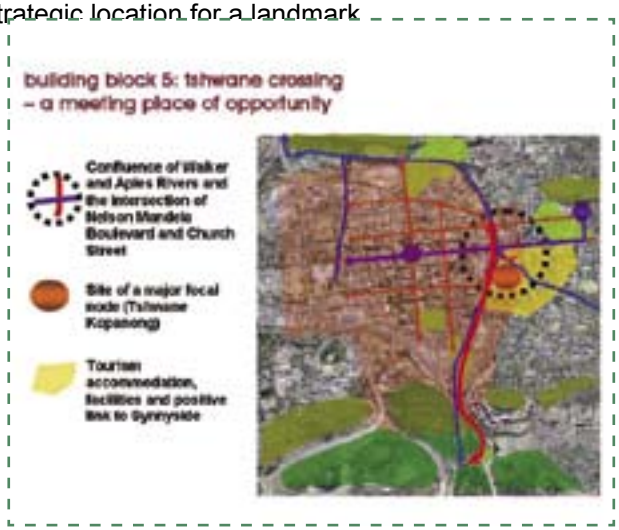
The Apies River must be transformed to its original green state. The land to the north of the proposed Tshwane crossing along the Apies River is proposed to become recreational entertainment space.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The site is a link between the Zoological Gardens and the Apies River via Boom Street and Soutpansberg Road. The streetscape will be designed to create a green link between the two. Trees and seats for pedestrians will be provided along the road.

Block 5: Tshwane Crossing – A Meeting Place for Opportunity

This crossing will be a meeting place, where the Apies River, the Walker Spruit, Nelson Mandela Drive and Church Street meet. It has been identified as a strategic location for a landmark.



Block 6: Zone of Urban Regeneration

The northern, western and north-western (Marabastad) parts of the Inner City are highly neglected areas. Urban regeneration is desperately needed.

The area in front of the Zoological Gardens is very neglected. It is proposed that this area can provide small business opportunities for creative industries that will contribute to the creation of more tourism around the zoo.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The IVTC can link with the proposed "Creative Industries"/SMMEs. The in-vocational training that will take place will form part of the creative industries (SMMEs).

Block 7: Movement and Accessibility

The movement and accessibility aim for Pretoria comprises three main sub-strategies:

-- Moving between Johannesburg, Oliver Tambo International Airport and Tshwane Inner City.

-- Moving people between the Inner City and other destinations in Tshwane.

-- Ease of movement within the Inner City.

- **Effect on/of In-Vocational Training Centre (IVTC):**

The IVTC will be located on or close to main transport routes.

(Tshwane Inner City Development and Regeneration Strategy, 2005)

9.3 WHO IS DISABLED AND WHAT DOES DISABILITY MEAN?

9.3.1 Introduction

There are various definitions that can be looked at and they are classified as follows:

a) Definitions in terms of the World Health Organisation (WHO):

- *Impairment*: Any loss or abnormality of psychological, physiological or anatomical structure or function.
- *Disability*: Any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being.
- *Handicap*: A disadvantage for an individual, resulting from an impairment or disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex and social and cultural factors) for that individual.

b) Definitions in terms of the British Council of Organisations of Disabled People (BCODP):

- *Impairment*: Lacking part or all of a limb, or having a defective limb, organ or mechanism of the body.
- *Disability*: The disadvantage or restriction of activity caused by contemporary social organization which takes no or little account of people who have physical impairments and thus excludes them from the mainstream of social activities.

9.3.2 Recent developments

a) World report on disability and rehabilitation

During the World Health Assembly resolution of May 2005 it was found that "there is no agreement on definition and little international comparable information on the incidents, distribution and trends of disability or impairments". It was also found that there was no global document that compiles an analysis the way countries have developed policies and responses to address the needs of people with disabilities.

Taking into account that the number of people with disabilities is growing as a result of factors such as population growth, ageing and medical advances that preserve and prolong life, it has become more and more important to address this matter. In terms of the world report it was decided that a world report will be developed between the end of 2006 and mid-2009 to ensure that global recognition and action is taken regarding the matter of addressing the needs of people with disabilities.

Key developments in disability legislation:

- *Adoption of action plans or policies on disabilities at international level such as UN Standard Rules on the Equalisation of Opportunities for Persons with Disabilities.*
- *Emergence and evolution of Community-based Rehabilitation (CBR).*
- *Creation of organisations by people with disabilities and their families.*
- *Paradigm shift from "medical model" to "social model" of disability.*
- *Approval of new International Classification of Functioning Disability and Health (ICF) by the World Health Assembly.*
- *Adoption of the United Nations Comprehensive and Integral International Convention on Promotion and Protection of the Rights and Dignity of Persons with Disabilities.*

b) The World Health Organisation Disability Assessment Schedule II (WHODAS II)

WHODAS II sets out a new measure of function and disability regarding the classification and function of disabilities. The domains of functioning assessed by WHODAS II include:

- Understanding and communicating
- Getting around
- Self care
- Household and work activities
- Participation in society

WHODAS II distinguishes itself from other measures of health status, disability and functioning in that it is

- compatible with an international classification system,
- cross-culturally developed, and
- treats all the disorders at parity when determining level of functioning.

The purpose of such a World Health Organisation Assessment Schedule would be that a single definition and action base could be defined and implemented in different countries and to this extent, this classification system does not only cross over the cultural differences found in the world but also the language barriers and in this regard the WHODAS II classification system has been translated in more than sixteen languages, which represent most of the spoken languages in developed countries.

c) World Health Organisation

The United Nations General Assembly adopted the *International Convention on the Rights of Persons with Disabilities* on 13 December 2006. In terms of this convention member countries are required to ensure that people with disabilities are granted equity under the law and freedom from discrimination.

The ratification process, which took place in March 2007, makes this convention legally binding on membership countries. A committee was therefore established that will be able to review claims by all on behalf of alleged victims of violations of the convention as well as to undertake enquiries in cases where it has reliable evidence of gross and systematic violations of the rights of people with disabilities.

It is therefore the aim and ambit of this legislation to ensure that people with disabilities are treated fairly and equitably on an equal footing in all United Nations membership countries.

d) Legal rights

The legal rights of people with disabilities have been expanded over a long period of time and in the implementing of their rights, disabled people have worked to establish several important principles:

- Disabilities are to be evaluated on an individual merit and not stereotyped on assumptions about disabilities.

- Society must make certain changes to enable disabled people to participate more easily in business and social activities. Examples in this regard would be wheelchair access to public transport, building entrances, etc.

- Disabled people should, to the extent appropriate for each individual, be integrated with people who are not disabled.

- Medical models versus social models, taking into account that the World Report on Disability and Rehabilitation specifically aims to shift the mindset from the “medical model to the social model” of disability.

  - Medical model of disability:

The medical model of disability is a model by which illnesses or disability are the result of a physical condition, specific to the individual may reduce individual’s quality of life and causes clear disadvantages to the individual.

The purpose of the medical model is therefore to understand and learn to control or alter the cause of such a disability. It is therefore argued that a compassionate or just society invests resources in health care and related services in an attempt to cure disability medically, expand functionality and improve functionality, thus allowing disabled persons a more “normal” life.

Often a medical model of disability is used to justify large investments in these procedures, technologies and research when adaptation of the disabled person’s environment could ultimately be cheaper and more attainable. It is therefore set out by the medical model that through science and the application thereof; it would be possible to reduce not only the disability as a percentage of society, but also the impact thereof.

In terms of the medical model vast investments in these developments are argued for.

- Social model of disability:

The social model of disability proposes that barriers and prejudice of inclusion by society are the ultimate factors defining who is disabled and who is not. During the 1970s the UK organisation, Union for the Physically Impaired against Segregation (UPIS), claimed that disability was *"the disadvantage or restriction of activity caused by a contemporary social organisation which takes little or no account of people who has physical impairments and thus excludes them from participation in the mainstream of social activities*." This has consequently been the definition applied to the social model of disability.

Society is therefore asked to review itself in terms of its social responsibility towards disability rather than its mere medical impact. The social model of disability often focuses on societal challenges and in this regard accentuates four specific focuses, namely

- *Attitudes*. A more positive attitude towards certain mental traits or behaviour or not underestimating the potential quality of life of those with potential or actual impairments.

- *Social support*. The support rendered by society to people with disabilities with regard to overcoming barriers by providing resources, aid or positive discrimination to overcome them.

- *Information and the access thereto in formats that are accessible to the disabled*. Braille, for example, or specific levels of informatio.

- *Physical structures*. The access to and from buildings, public transport and normal day-to-day activities.

The social model of disability distinguishes between the terms "impairment" and "disability". Impairment is used to refer to the actual attributes (or loss of attributes) of a person whether it be in terms of limbs, organs or mechanisms (including psychological). Disability is used to refer to the restrictions caused by society when it does not give equivalent attention and accommodation to the needs of individuals with impairments.

The social model also relates to economics. It proposes that people can be disabled by a lack of resources to meet their needs. It addresses issues such as under-estimating the potential of people to contribute to society and add economic value to society, if given equal rights and equal sustainable facilities and opportunities as others.

e) Conclusion

The main difference between the medical model and the social model can be summarised as follows:

In terms of the **medical model**, disabled people are defined as people with certain conditions or certain limitations on their abilities to carry out "normal day-to-day activities".

In terms of the **social model**, employers and service providers are prompted to make "reasonable adjustments" to their policies and practices or physical aspects of their premises to allow the participation of people with disabilities in the normal social and economic activities on an equal footing with able-bodied people.

9.4 STATISTICS

9.4.1 International statistics

In terms of the World Report it is estimated that 10% of the world's population – approximately 650 million people of which 200 million are children – experience some form of disability.

9.4.2 South African statistics

According to the statistics acquired from Statistics SA, the following divisions are made from a population figure of 40 million:

Sight disabled:	1 091 022
Hearing disabled:	383 408
Physically disabled:	55 774
Mentally handicapped:	192 554
TOTAL	**1 722 758**

In other words, 4,3% of the South African population are disabled. According to the CASE report conducted on behalf of the Department of Health there are between 2,3 million and 2,5 million people with disabilities in South Africa.

According to the Central Statistical Service (SA Yearbook, 1998) at least 400 000 in 1995 were deaf or hard of hearing.

Of the deaf population:

– 68% live in informal settlements
– **70% are unemployed**
– 40% attend school
– 66% are illiterate

9.4.3 Statistics South Africa

Census 2001 reveals the following statistics:

a) Number of disabled persons by gender and population group

Population group	Number			Percentage		
	Male	Female	Total	Male	Female	Total
African	879 680	974 696	1 854 376	5,2	5,3	5,2
Coloured	88 583	80 095	168 678	4,6	3,9	4,2
Indian/Asian	21 550	19 685	41 235	4,0	3,5	3,7
White	92 230	99 463	191 693	4,4	4,5	4,5
Total	**1 082 043**	**1 173 939**	**2 255 982**	**5,1**	**5,0**	**5,0**

b) Number of disabled persons by province and sex

Province	Number			Percentage		
	Male	Female	Total	Male	Female	Total
Western Cape	96 549	90 301	186 850	4,4	3,9	4,1
Eastern Cape	173 229	199 037	372 266	5,8	5,8	5,8
Northern Cape	23 620	23 353	46 973	5,9	5,5	5,7
Free State	87 758	97 619	185 377	6,8	6,9	6,8
KwaZulu-Natal	219 685	250 903	470 588	5,0	5,0	5,0
North West	105 169	106 054	211 223	5,8	5,7	5,8
Gauteng	**164 588**	**167 023**	**331 611**	**3,7**	**3,8**	**3,8**
Mpumalanga	87 319	94 874	182 193	5,8	5,8	5,8
Limpopo	124 128	144 774	268 902	5,2	5,0	5,1
Total	**1 082 043**	**1 173 939**	**2 255 982**	**5,1**	**5,0**	**5,0**

c) Number of disabled persons by sex and age group

Age group (years)	Number			Percentage		
	Male	Female	Total	Male	Female	Total
0-9	101 838	88 822	190 660	2,2	1,9	2,1
10-19	156 980	148 755	305 735	3,2	2,9	3,0
20-29	149 422	134 806	284 228	3,7	3,2	3,5
30-39	165 153	145 787	310 940	5,4	4,3	4,9
40-49	165 871	168 727	334 598	7,5	6,7	7,1
50-59	142 602	155 928	298 530	10,8	10,3	10,5
60-69	102 815	138 168	240 983	13,7	12,5	13,0
70-79	62 396	111 578	173 974	16,9	17,7	17,4
80+	34 966	81 368	116 334	25,6	27,9	27,2
Total	**1 082 043**	**1 173 939**	**2 255 982**	**5,05**	**5,0**	**5,0**

9.5 WHEELCHAIR EXPERIENCE

A day in the life of Jozef Victor – a man in a wheelchair.

"To start off with, just getting into a secure parking for disabled without making a fool of yourself trying to get the attention of the security to open the parking area.

Now to get out of the vehicle without help, is the trickiest part. I need to fold down the backrest of the seat I am sitting in to make space for the wheelchair to pass between myself and the steering wheel.

Once the wheelchair is outside the vehicle, I must lean out of the vehicle without losing my balance by hanging on to the steering wheel of the vehicle to assemble the wheelchair by fitting its wheels, and laying the cushion I have to sit on without puncturing it, because it is an air cushion.

Transferring myself from the vehicle into the wheelchair is really challenging.

Once in the wheelchair the experience truly begins. Even locking the vehicle manually with a key without losing balance, is not easy.

Pushing myself up the ramp into the shopping centre takes a great amount of upper body strength. Luckily for me, the shopping trolley was inside the centre; otherwise I wouldn't have got to the top of the ramp.

Pushing the trolley and the wheelchair was a big struggle, not to mention steering the trolley into the right direction. Luckily there were trolleys, because baskets are out of the question. A basket on the lap makes it almost impossible to push the wheelchair.

Just getting around in a shopping centre without the trolley is a big challenge, never mind steering the trolley and myself through mazes and a whole city of people trying to shop.

No sympathy or empathy from anyone, just another person in a wheelchair.

Trying to take items from the shelves and putting them into the trolley is not the easiest thing to do. Not even trying to read the prices on the shelves – written to small. To reach for something in the back of a lower level shelf is very difficult, never mind the higher shelves.

Trying to pay at a normal pay point is a matter of impossibility. The wheelchair can not fit through a normal aisle at a pay point. The writing pad to write on and the pay point desk is too high to see properly. Trying to unload the trolley onto the pay point desk -- what a task!

After payment has been made, steering the trolley back to the vehicle, down the ramp and trying to stop the trolley and wheelchair from not bumping into another vehicle or landing in front of a moving car, is a very challenging affair.

Now the whole reverse exercise of getting back into the vehicle."

(Victor, 2007)

9.6 CRIME PREVENTION STRATEGIES ACCORDING TO THE INNER CITY DEVELOPMENT FRAMEWORK

CRIME PREVENTION	INNER CITY DEVELOPMENT FRAMEWORK'S STRATEGY
Awareness of the environment	**1. Improved and adequate lighting** • Proper placement • Proper protection and maintenance **2. Good sight lines** • Visible entrances • Users to see and be seen through boundaries • Appropriate landscaping **3. Design out entrapment spots** • Avoid entrapment spots adjacent to main movement routes • Provide adequate security measures if entrapment spots are unavoidable **4. Provision of a variety of choices through an environment** • Provision of alternative routes through the environment
Visibility by others	**5. Create an environment where people can be seen** • Informal surveillance "eyes on the street" • Avoid blank facades at street level • Ensure that routes to and from parking lots are overlooked • Provision of activity at street level to ensure informal surveillance **6. Ensure 24-hour use of environments** • Ensure that the scale of the development is consistent with the surroundings and that people will not lose touch with the street **7. Intensify specific usage** • Place activity generators in active areas • Multi-functional use of areas **8. Increase sense of ownership** • Ensure that the new development in the neighbourhood is similar in character to that of the neighbourhood to ensure that residents can identify with the development • Ensure that open spaces are overlooked by residents • Enable and ensure proper maintenance
Finding help	**9. Enhance and improve signage** • Strategic location of signage • Maintenance • Understandable and appropriate to all social groups **10. Enhance legibility** • Ensure that the design of a place makes the function of the space clear

(Heyns, 2004: 164)

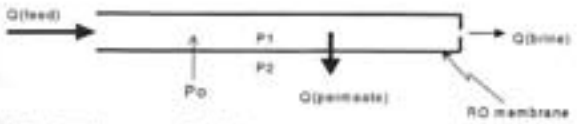
9.7 REVERSE OSMOSIS

In the reverse osmosis process, an external hydraulic pressure is applied to a concentrated solution; forcing pure water through a membrane against osmotic pressure of the system. The external pressure must be higher than the osmotic pressure.

There are four types of Reverse Osmosis module designs used commercially namely, tubular, plate and frame, spiral wound, and hollow fibre modules.

The table below compares the four module designs. When comparing their energy requirements, one will immediately conclude that spiral reverse osmosis is the required module to link with a solar-powered water supply.

A Schematic Description of the Reverse Osmosis Process



Po = Osmotic pressure of feed water
P1 = Inlet pressure (after high pressure pump)
P2 = Pressure in permeate stream

P1-P2-Po = Effective pressure driving force

Recovery = 100 x Q(permeate)/Q(feed)

Comparison of Reverse Osmosis Types

CRITERIA	ORDER OF COMPARISON
System Costs	Tubular, Plate & Frame >> Hollow Fibre, Spiral
Flexibility in Design	Spiral >> Hollow Fibre > Plate & Frame > Tubular
Cleaning Behaviour	Plate & Frame > Tubular > Spiral > Hollow Fibre
Space Requirements	Tubular > Plate & Frame > Spiral > Hollow Fibre
Susceptibility to Fouling	Hollow Fibre >> Spiral > Plate & Frame > Tubular
Energy Requirement	Tubular > Plate & Frame > Hollow Fibre > Spiral

9.8 NEWSPAPER ARTICLES

Cecil Masha and Yolanda Herbst are currently doing in-service training, courtesy of the *Building tomorrow* programme of the Pretoria School for pupils with disabilities. They spoke to Colita van der Westhuizen about the programme.

In-service training bridges gap

Stephen Selaluke

Three years ago Pretoria School for Pupils with Disabilities launched a programme called *Building tomorrow*, which is a bridge between school and the workplace.

"The aim of the programme is to prepare pupils socially, physically and emotionally for the outside world," says occupational therapist, Leonora Nel.

"The pupils get the opportunity to do in-service training that enhances their chances of obtaining permanent employment," says Leonora.

The school has a total of 330 pupils of which 24 are involved in this programme.

Yolanda Herbst is an 18-year-old former pupil of the school. She is now doing in-service training at Jakaranda hospital, in the administrative section.

"I am enjoying working at the hospital and the people are friendly and helpful. They do not judge people with disabilities," says Yolanda.

Yolanda encourages people with disabilities not to give up hope and to believe in themselves.

Cecil Masha, aged 19, also attended the same school.

He is now doing in-service training at Dynamism, working in graphic design.

The *Building tomorrow* programme prepares people with disabilities, for the working environment when they finish school.

"Everything becomes possible if you are confident in life, irrespective of you circumstances," he says.

Programme that helps challenged pupils

CORNELIA DU PLOOY

The Building Tomorrow programme is a unique initiative aimed at physically and mentally challenged pupils. The programme allows for a transition period between the school environment and the workplace.

By providing in-service training to pupils in different occupational fields that interest them, they are able to try and find a job with a better understanding of what is expected of them once they enter the market.

For the past three years the Building Tomorrow programme has been presented with great success at Pretoria School.

Leonora Nel, occupational therapist, said: "We realised early on how valuable the programme is. It used to be that once the pupils had finished school they settled in an home and do nothing. Their development ceased. Students with special needs wanted to prepare for independent living. The Building Tomorrow programme

With the programme, Pretoria School has involved professionals within the community to help the pupils try their hand at different jobs, ranging from administrative work to graphic design to nature conservation. The Pretoria School hosted a "thank you day" for those involved in the Building Tomorrow programme. These included professionals who had set aside their time to provide in-service training to the pupils.

Yolandi Herbst, a former pupil at the school and programme participant, said: "I work at Jacaranda Hospital doing administrative work in the pharmacy. I enjoy it and once my in-service training is complete I think I want to continue with admin work. It really prepares me."

Ina Prinsloo, pharmacy assistant, said: "Yolandi is an excellent worker and very diligent. I am confident that she will do well in this line of work as she is so meticulous."

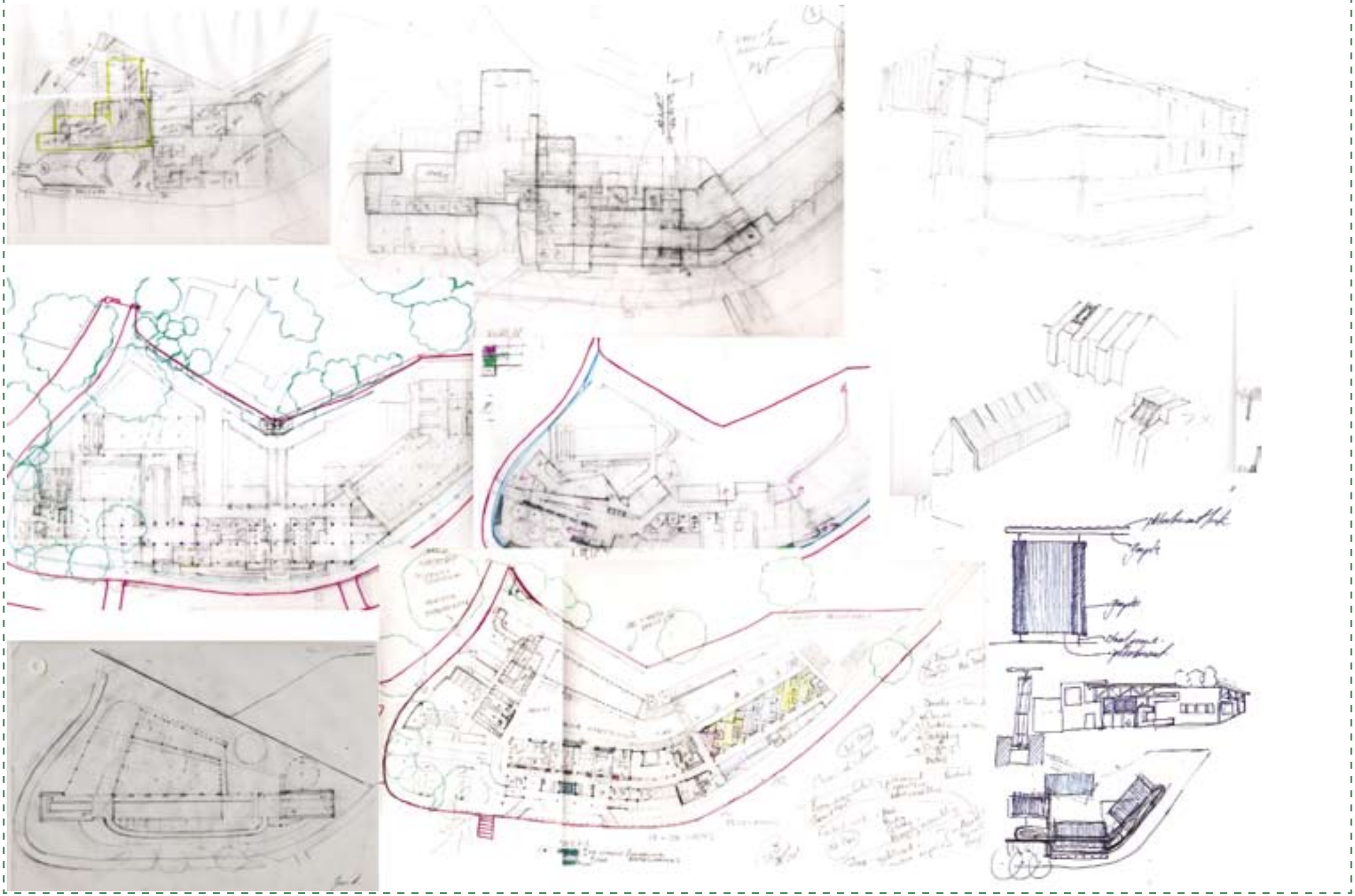
Cecil Masha is being trained as a graphic design assistant. "The time I have spent there has encouraged me to pursue distance learning and to qualify as a graphic designer."

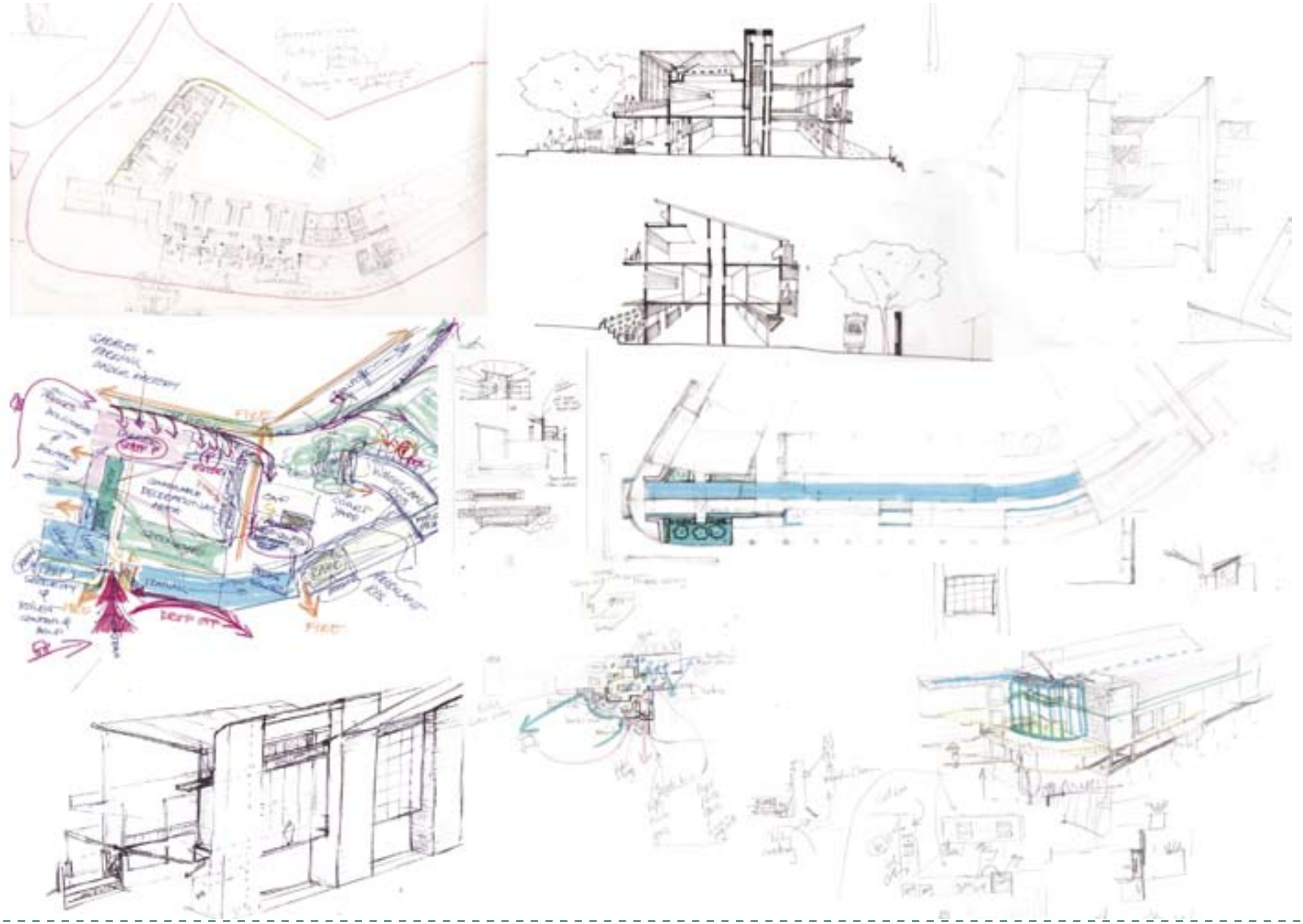
She said: "The most rewarding part of the programme is knowing that you have contributed to make someone being whole."

DINING FOR A CAUSE: Richard Roux and Tony Raposo, the Living Link Centre held a successful fundraising dinner at Rodizio Brazilian Restaurant in Fourways last Friday. The centre cares for adults with intellectual difficulties and provides life skills training for its members. "We assist them in living independently from their families and help place them in jobs," explained Julia Wilkinson, director of Living Link.

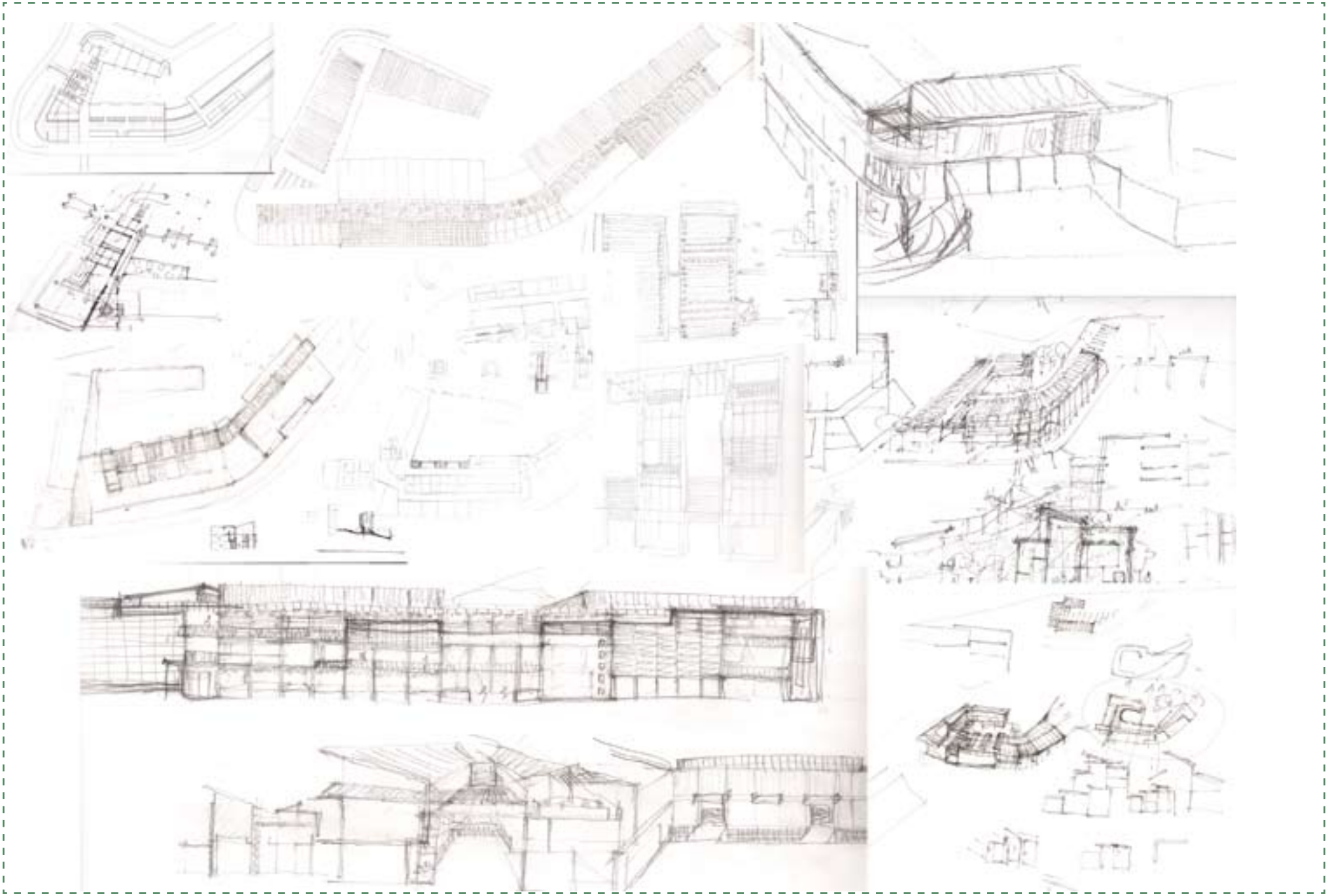
Photo: Lisa Thomas

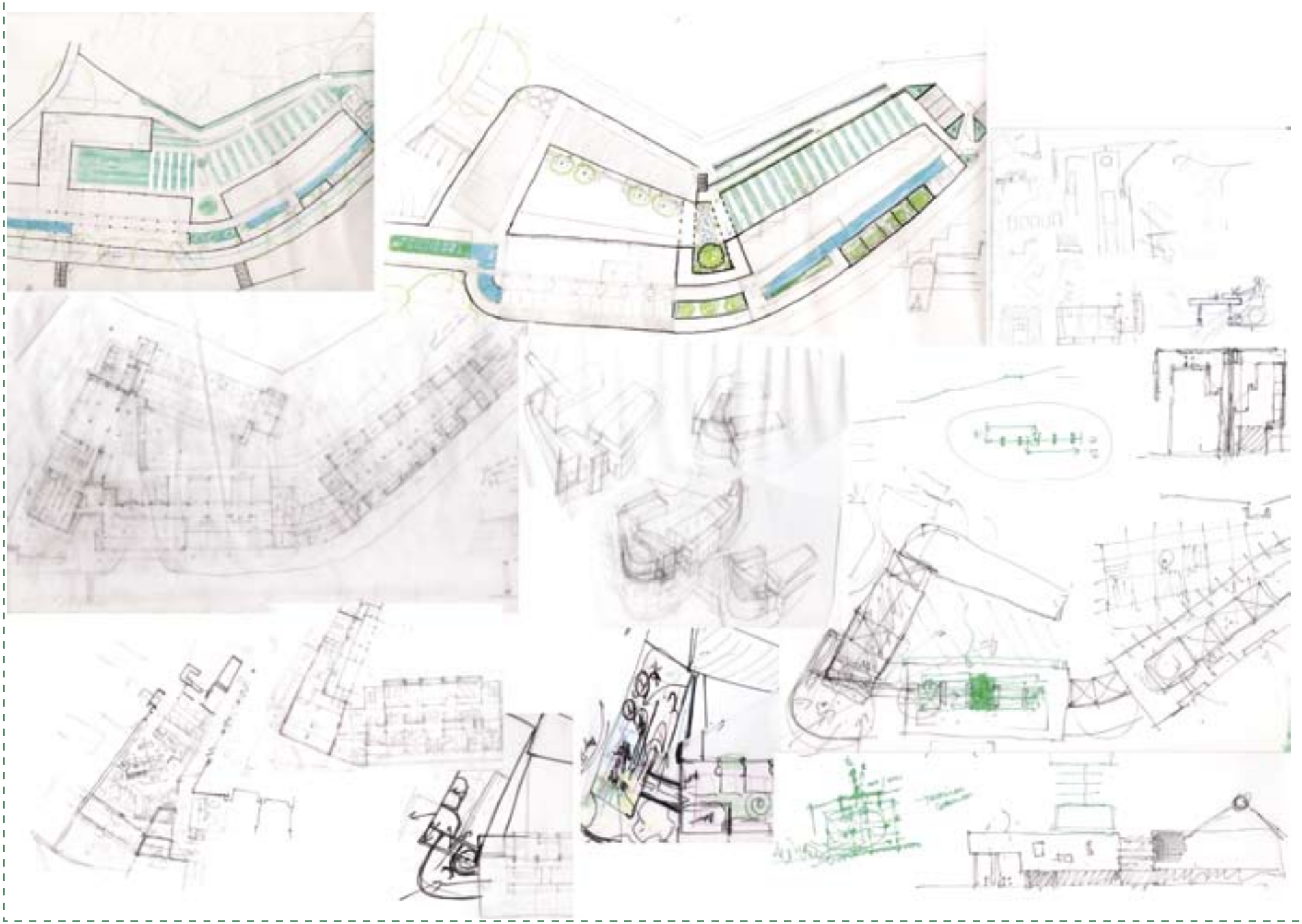
9.9 DESIGN DEVELOPMENT





APPENDICES





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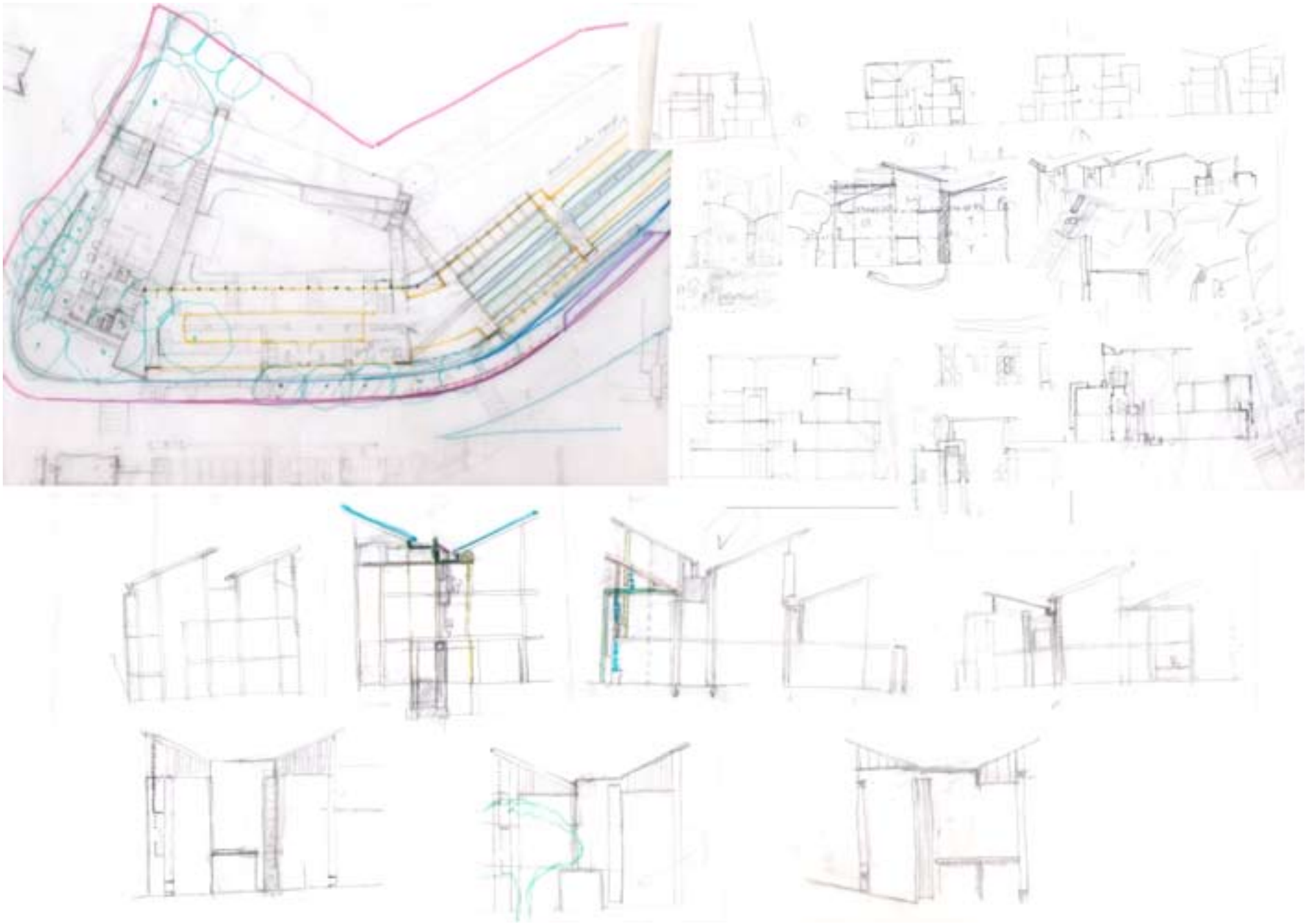
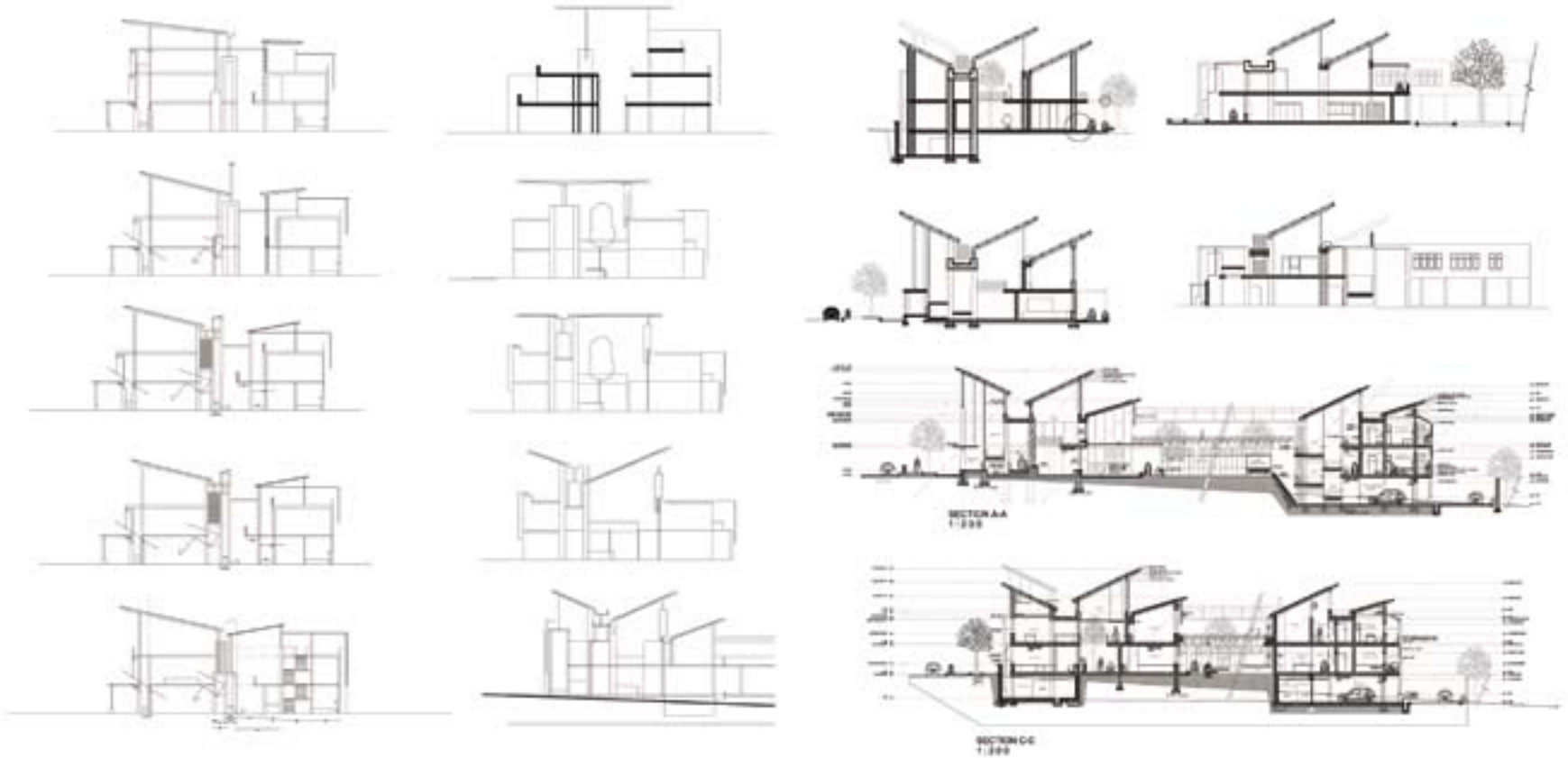
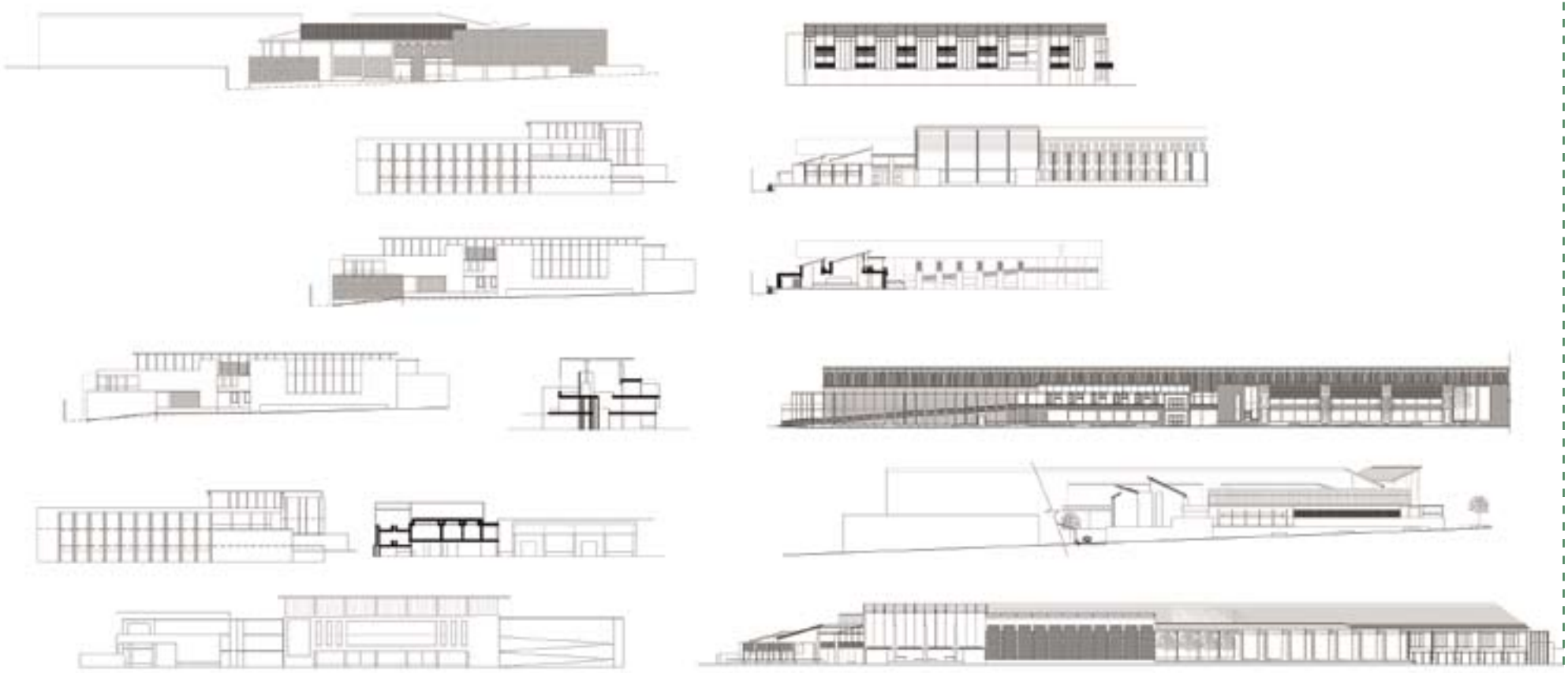
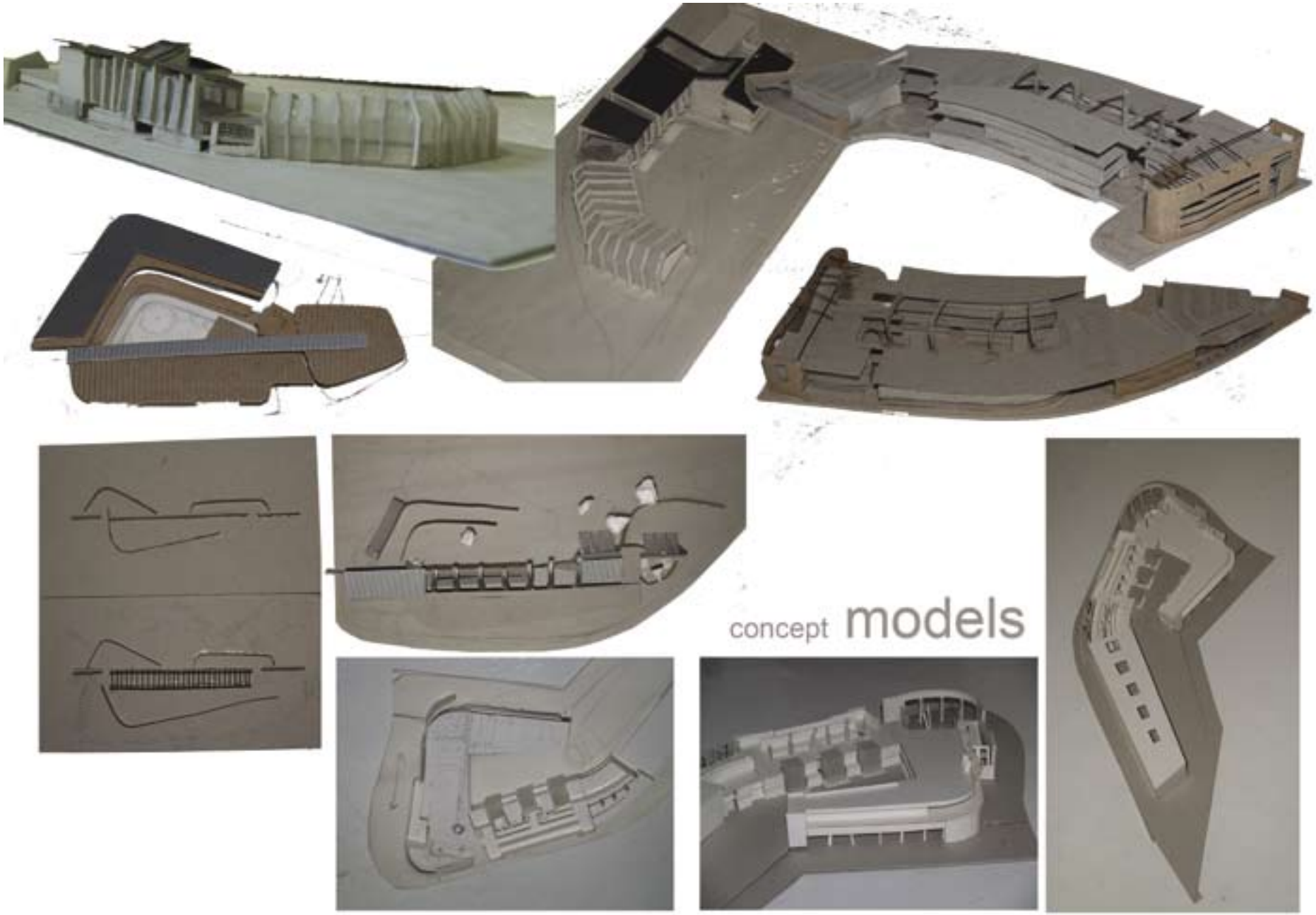
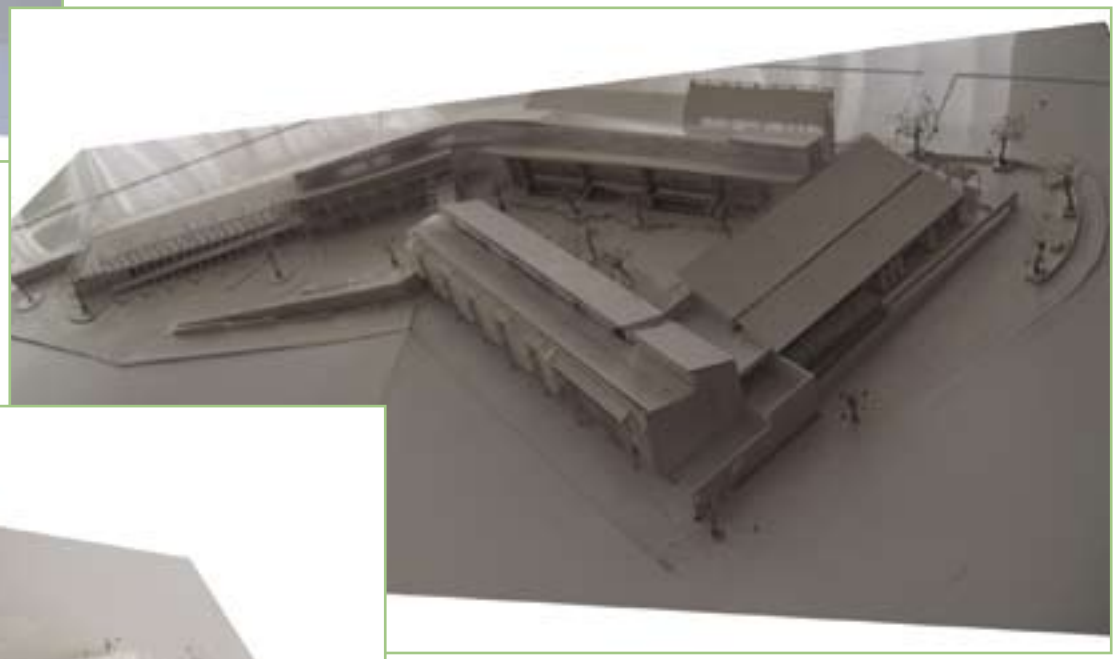







concept models



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