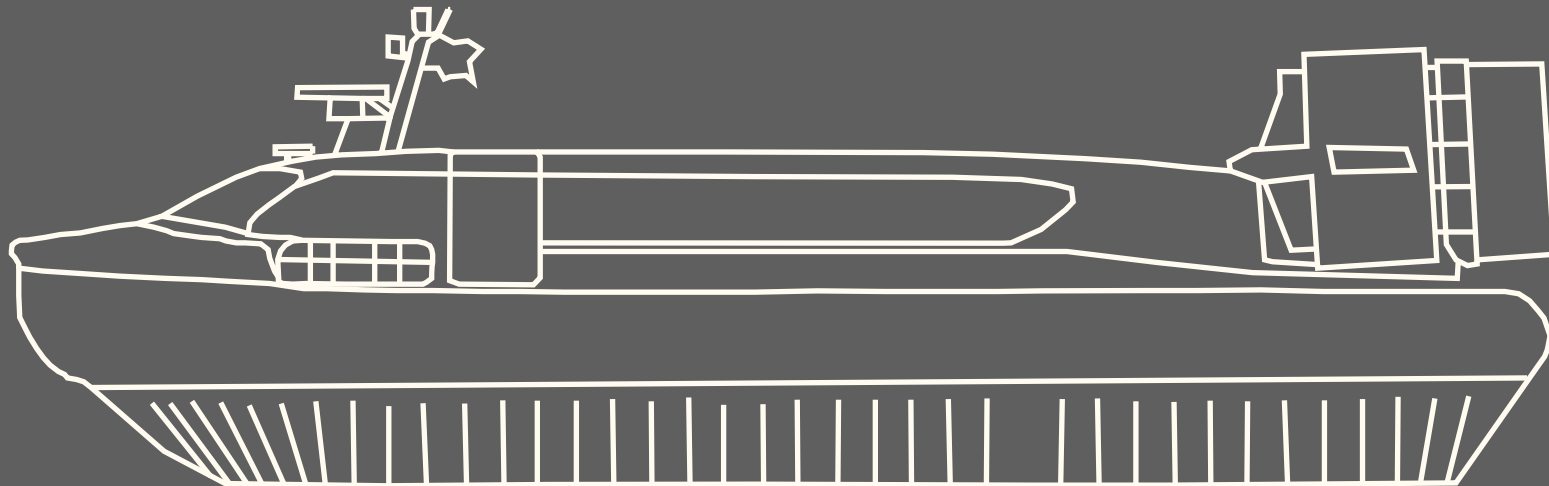


HOVERCAPE INTERPRETATIVE CENTRE
HOVERCRAFT TERMINAL



HOVERCAPE INTERPRETATIVE CENTRE HOVERCRAFT TERMINAL

SYNTHESIS BETWEEN TECHNOLOGY AND NATURE

BY
SONIA DULCE CUNHA

Submitted in the fulfilment of the requirements of Magister in Architecture (Professional), M Arch (Prof), in the faculty of Engineering, Built Environment and Information Technology, University of Pretoria. November 2003

HOVERCAPE INTERPRETATIVE CENTRE

HOVERCRAFT TERMINAL

SYNTHESIS BETWEEN TECHNOLOGY AND NATURE

The roads between Bloubergstrand and Cape Town are very congested during peak periods. The R27-freeway carries more than 80 000 vehicles per day. There is a one possible solution and that is that another form of transport be created in order to facilitate public transport. The Hovercraft ferry service is a feasible alternative to solving the traffic problems.

The Hovercraft Ferry Service would be a new ocean-bound transit system. It will serve the daily Tableview and Bloubergstrand commuters, linking Big Bay and the Mandela Gateway Terminal at the V&A Waterfront. The hovercraft ferry would successfully compete with the motorcar by providing safe, secure, comfortable, fast, reliable and predictable services. The ferry has to fill a specific gap in the holistic transport network of the area and it will assist in improving the image of public transport in South Africa as a viable attractive alternative to the motorcar. Apart from the convenience, and cost savings, Hovercape will provide a pivotal stimulus for economic and social development, as well as educating the local public on the history and importance of the area, in particular the Blaauwberg Conservation Area

The client, Hovercape, would use ferries of 25m long and 11m wide which can carry 140 people. It is proposed that the hovercrafts be used during off-peak times to carry tourists when not in use by the commuters. Robben Island is literally a stone's throw from Big Bay. at the Nelson Mandela Gateway Terminal, where the new inner city public transport route would operate from.

The roads between Bloubergstrand and Cape Town are very congested during peak periods. The R27-freeway carries more than 80 000 vehicles per day. There is a one possible solution and that is that another form of transport be created in order to facilitate public transport. The Hovercraft ferry service is a feasible alternative to solving the traffic problems. The Terminal's location is in Big Bay, between Tableview and Bloubergstrand. It would consist of the Hovercraft Terminal as well as the Interpretative Centre under within the same building. The distance between Big Bay and Cape Town is 21.5km and would be covered within 25 minutes by hovercraft, and each terminal would be served by park and ride facilities.

The client for this Interpretative Centre and Hovercraft Terminal is Hovercape Ferry Services.

This "new" service is to be implemented as soon as possible since there is a great demand and need for an additional form of public transport. Capetonians have complained time and time again of the traffic congestion problem, particularly between Bloubergstrand and the city centre. The same has occurred between Johannesburg and Pretoria, where the development of the Gautrain Service between these two major cities is considered.

Index



1. Briefing Outline	1
2. Baseline Criteria	49
3. Technical Resolution	87
4. Design Discourse	98
5. Feasibility Analysis	115
6. Design Documentation	124

HOVERCAPE INTERPRETATIVE CENTRE HOVERCRAFT TERMINAL

Part 1

Briefing Outline



Part 2

Baseline criteria



Part 3

Technical Resolution



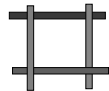
Part 4

Design Discourse



Part 5

Feasibility Analysis



Part 6

Design Documentation





List of Figures	
1. Introduction	1
1.1 Overview	1
1.2 Hovercape Interpretive Centre and Terminal	1
1.3 Study Area	1
1.4 Introduction	2
1.5 Purpose and Strategic Objectives	2
1.6 The Concept	3
1.7 More than a Transport Project	3
1.8 Public Services	3
1.9 Alternatives	3
1.10 International Evidence	4
1.11 Guidelines	4
2. Client vs User	6
3. Interested and Affected Parties	7
4. Development Plan	10
4.1 Vision	10
4.2 Land Use	10
4.3 Main Structuring Elements	11
4.3.1 Road Structure	11
4.3.1.2 Otto du Plessis Road	11
4.3.2 Public Open Space System	11
4.3.2.1 Interfaces with Public Open Space	11
4.3.3 Coastal Node	11
4.3.4 Skyline Control	11
4.3.5 Composite Building Form	11
4.3.6 Responses to Climatic Determinants	11
4.3.7 Edge Responses	11
4.3.8 Visually Intrusive Structures	11

Index

4.4 Big Bay Design Guidelines	12
4.4.1 Design Philosophy	12
4.4.2 Proportions	12
4.5 Architectural Elements	13
4.5.1 Roof Form	13
4.5.2 Windows	13
4.5.3 Verandas, Balconies, Pergolas, Balustrading and other	13
4.5.4 Aerials, Pipes, Satellite Dishes, Solar Panels	13
4.5.5 Service Yards and Refuse Areas	13
4.6 Landscaping Guidelines	13
4.6.1 Landscape Philosophy Otto du Plessis Drive	13
4.6.2 Prescribed Planting Method	13
4.6.3 Entrance Roads	13
4.6.4 Lighting	13
5. Climate	14
6. Geology	18
7. Fauna and Flora	21
7.1 Blaauwberg Conservation Area	21
7.2 Principles of the Concept Plan	21
7.3 Interface Zone	21
7.4 Primary Conservation Zone	21
7.5 Fauna	21
7.6 Flora	25
8. Visual Sensitivity	25
8.1 Elevated Landforms	25
8.2 Ridges and Spurs	25
8.3 Convex-Concave Slopes	25
8.4 Steep Slopes	25

8.5 Vegetation Cover	25
8.6 Special Features	25
9. Infrastructure	28
9.1 Existing road Structure	28
9.2 Future Road Planning	28
9.3 Bloubergsvlei Sub-Regional Plan	28
9.4 Bloubergstrand and Melkbosstrand Local Structure	28
9.5 Access Opportunities	28
9.6 Services	29
9.6.1 Water	29
9.6.2 Sewer	29
9.6.3 Electricity	29
9.6.4 Telkom	29
10 .Cultural and Historic	32
10.1 Historical Considerations	32
10.2 Ports of South Africa	36
10.2.1 Cape Town	36
11. Statistics	37
12. Accomodation Shedule	41
13.Precedent Studies	42
13.1 Yokohama International Port Terminal	42
13.2 Whitehall Ferry Station	43
13.3 Ariake Ferry Station	44
13.4 Hamburg Ferry Terminal	45
13.5 Mandela Gateway Terminal	46
14. Referred Works	47



- Fig 1.1 : Cape Town Street Map. *Study Area*. 2001/2002.11th Edition.
- Fig 1.2.1 : Blaauwberg Municipality1990. *Specific Site*.
- Fig 1.2.2 : Blaauwberg Municipality1990. *Site with Proposed Building*.
- Fig 1.3 : www.stockmarket.flyingwitch.com
- Fig. 1.4 Hovercape Documentation 2003. *Impact Criteria of the Ferry Service*
- Fig. 1.5 Hovercape Documentation 2003. *Inner City Transport*
- Fig 2.1 : Hovercape logo. www.hovercape.com
- Fig 2.2 : Hovercape Documentation 2003. *Commuter Route*
- Fig 3.1 : S.D Cunha. Jan.2003. *Landscape Photo*
- Fig 3.2 : . Altered Cape Town Street Map . *Commuter Scope*. 2001/2002.11th Edition.
- Fig 3.3 : Hovercape Documentation. *Commuter Route*.Cape Town
- Fig 3.4 : OVP Associates.May 2000/ SD Cunha 2003 . *Altered Land Ownership*. Cape Town
- Fig 4.1 : OVP Associates.May 2000/ SD Cunha 2003. *Land Use Zoning*. Cape Town
- Fig 5.1 : Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. *Mediterranean Climatic Region*. Cape Town
- Fig 5.2 : Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. *Wind Rose for Cape Town*. Cape Town
- Fig 5.3 : OVP Associates.May 2000/ SD Cunha 2003. *Average Monthly Wind Speed*.
- Fig 5.4 : OVP Associates.May 2000/ SD Cunha 2003. *Average Monthly Temperature*.
- Fig 5.5 : OVP Associates.May 2000/ SD Cunha 2003. *Average Monthly Rainfall*.
- Fig 5.6 : OVP Associates.May 2000/ SD Cunha 2003. *Average Monthly Wind Speed*.
- Fig 5.7 : OVP Associates.May 2000/ SD Cunha 2003 *Altered Dominant Winds*.
- Fig 5.8 : : Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. *Vertical Sun Angle*. Cape Town
- Fig 5.9 : : Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. *Climatic Data*. Cape Town
- Fig 5.10 : Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. *Solar Access for Building Spacing*. Cape Town
- Fig 5.11 : Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. *Roof Overhang, Window Height and Positioning*. Cape Town
- Fig 5.12: : Hovercape Documentation. *Wind Chart 1*.
- Fig 5.13: : Hovercape Documentation. *Wind Chart 1*.
- Fig 5.14: : Hovercape Documentation. *Wind Chart 1*.
- Fig 6.1 : OVP Associates.May 2000/SD Cunha. 2003. *Sequence of Deposition*.
- Fig 6.2 : OVP Associates.May 2000/SD Cunha. 2003. *Surrounding Hill Formations*.
- Fig 6.3 : OVP Associates.May 2000/SD Cunha. 2003. *Geology and Landforms*.
- Fig 6.4 : SD Cunha Site Photos. Jan 2003. *Site Landscape Photo 1*.
- Fig 6.5 : SD Cunha Site Photos. Jan 2003. *Site Photo 2*.
- Fig 6.6 : SD Cunha Site Photos. Jan 2003. *Site Photo 3*.
- Fig 7.1 : SD Cunha Site Photos. Jan 2003. *Site Photo*.
- Fig 7.2 : SD Cunha Site Photos. Jan 2003. *Crustacean Photo*.
- Fig 7.3 : SD Cunha Site Photos. Jan 2003. *Fauna and Table Mountain Photo*.
- Fig 7.4 : <http://www.capetowntourism.co.za>. 5 March 2003. *Flora*.
- Fig 7.5 : OVP Associates.May 2000/SD Cunha. 2003. *Blaauwberg Conservation Area*.
- Fig 7.6 : OVP Associates.May 2000/SD Cunha. 2003. *Regional Flora*.



- Fig 8.1 : SD Cunha Site Photos. Jan 2003. *View from Site Photo.*
- Fig 8.2 : OVP Associates. May 2000/SD Cunha. 2003. *Visually Sensitive Zones.*
- Fig 8.3 : OVP Associates. May 2000/SD Cunha. 2003. *Scenic Views.*
- Fig 9.1 : OVP Associates. May 2000/SD Cunha. 2003. *Road Hierarchy*
- Fig 9.2 : Blaauwberg Municipality. 1990. *Irrigation System.*
- Fig 9.3 : Blaauwberg Municipality. 1990. *Civil Services*
- Fig 10.1 : OVP Associates. May 2000/SD Cunha. 2003. *Archaeological Sites.*
- Fig 10.2 : OVP Associates. May 2000/SD Cunha. 2003. *Battle of Blaauwberg.*
- Fig 10.3 : Fair, D & Jones, T. 1991. *The Ports of Sub-Saharan Africa and their Hinterlands: An overview. Cape Town Harbour.* KR Litho. Pretoria/ SD Cunha 2003.
- Fig 13.1.1 : Pollock, N. 1997. *Architectural Review. Volume 201/1203. Aerial View*
- Fig 13.1.2 : Pollock, N. 1997. *Architectural Review. Volume 201/1203. Walkway*
- Fig 13.1.3 : Pollock, N. 1997. *Architectural Review. Volume 201/1203. Inside*
- Fig 13.2.1 : Wargo, M. 1994. *Domus. Volume 1994/756. Model*
- Fig 13.2.2 : Wargo, M. 1994. *Domus. Volume 1994/756. Section 1*
- Fig 13.2.3 : Wargo, M. 1994. *Domus. Volume 1994/756. Section 2*
- Fig 13.3.1 : Unknown Author. 1994. *Japan Architect. Volume 94/14. Entrance During the Evening*
- Fig 13.3.2 : Unknown Author. 1994. *Japan Architect. Volume 94/14. Sea View*
- Fig 13.3.3 : Unknown Author. 1994. *Japan Architect. Volume 94/14. East Elevation*
- Fig 13.3.4 : Unknown Author. 1994. *Japan Architect. Volume 94/14. Interior View*
- Fig 13.4.1 : Dawson, L. 1997. *Architectural Review. Volume 201/1203. Perspective*
- Fig 13.4.2 : Dawson, L. 1997. *Architectural Review. Volume 201/1203. Exterior View*
- Fig 13.4.3 : Dawson, L. 1997. *Architectural Review. Volume 201/1203. Interior View*
- Fig 13.5.1 : Reenen, G. 2000. *SA Architect. Volume 2000/8. Perspective*
- Fig 13.5.2 : Reenen, G. 2000. *SA Architect. Volume 2000/8. Side View*
- Fig 13.5.3 : Reenen, G. 2000. *SA Architect. Volume 2000/8. Entrance*

List of Tables

- Table 1.1 : OVP Associates. May 2000/SD Cunha. 2003. *Impact Criteria*
- Table 11.1 : Statistics SA. 1996. *Gender and Population Group*
- Table 11.2 : Statistics SA. 1996. *Age Groups*
- Table 11.3 : Statistics SA. 1996. *Magisterial District of Employment*
- Table 11.4 : SD Cunha. 2003. *Distances Between Intersections*
- Table 11.5 : SD Cunha. 2003. *Travelling Costs*
- Table 11.6 : SD Cunha. 2003. *Traffic Study*
- Table 12.1 : SD Cunha. 2003. *Accommodation Schedule*

1 Introduction

“An architect can only form part of a whole; he begins what others will finish, or finishes what others have begun, but he cannot work in isolation for his work is not his own personal achievement...”

Violet-le-Duc (Sporre, 1990:406)

1.1 Overview

The roads between Bloubergstrand and Cape Town are very congested during peak periods. The R27-freeway carries more than 80 000 vehicles per day. There is a one possible solution and that is that another form of transport be created in order to facilitate public transport. The Hovercraft ferry service is a feasible alternative to solving the traffic problems.

1.2 Interpretive Centre and Hovercraft Terminal

The area of Bloubergstrand/Big Bay is currently going through a major development phase. This is where the Hovercraft Terminal would be situated. The Hovercraft Ferry Service would be a new ocean-bound transit system to serve the daily Tableview and Bloubergstrand commuters linking Big Bay and the Mandela Gateway Terminal at the V&A Waterfront. Apart from the convenience, and cost savings, Hovercapse will provide a pivotal stimulus for economic and social development, as well as educating the local public on the history and importance of the area, in particular the Blaauwberg Conservation Area.

1.3 Study Area

The study area includes the entire area between Bloubergstrand and Cape Town City Centre.

Figure 1.1 also indicates other areas, nodes and activity centres outside the designated site, which should be considered for hovercraft ferry linkage in the future. This includes Camps Bay and further sectors and suburbs around the southern tip.

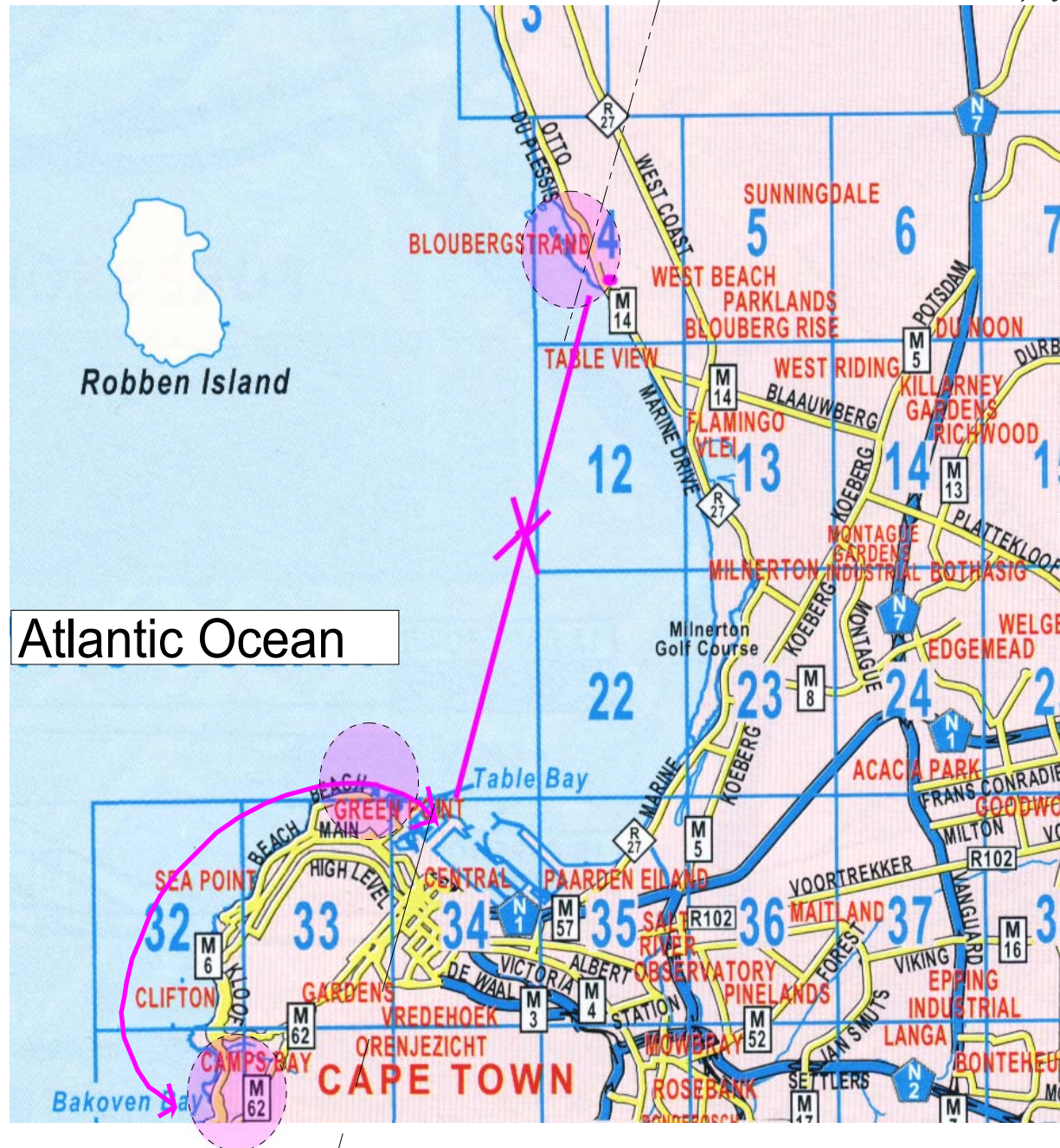


Fig. 1.1 Study Area
Cape Town Street Map.
2001/2002.11th Edition.

Briefing Document

1.4 Introduction

The Terminal's location is in Big Bay, between Tableview and Bloubergstrand, just behind the current Law Enforcement Offices. It would consist of the Hovercraft Terminal as well as the Interpretative Centre under within the same building. The distance between Big Bay and Cape Town is 21.5km and would be covered within 25 minutes by hovercraft, and each terminal would be served by park and ride facilities.

Unique features and benefits of the Hovercape Terminal would be to:

- Create job opportunities during the construction phase.
- Create and sustain additional jobs during the running, and maintenance phase.
- Reduce carbon monoxide emissions and road traffic congestion.
- Improve accessibility to an educational facility (Interpretive Centre).
- The hovercraft would promote the use of public transport

Other important considerations are the improvement of:

- The image of public transport,
- The exposure of visitors to the BCA through the Interpretative Centre

1.5 Purpose and strategic objectives

The hovercraft ferry would successfully compete with the motorcar by providing safe, secure, comfortable, fast, reliable and predictable services. The ferry has to fill a specific gap in the holistic transport network of the area and it will assist in improving the image of public transport in South Africa as a viable attractive alternative to the motorcar.

From the above, the following strategic objectives have been identified:

- The Interpretative Terminal will contribute directly and indirectly to job creation.
- It must promote the use of public transport, as well as public awareness.
- It must promote tourism.
- It must promote public service and education.



Fig 1.2 .1 Specific Site
Blauwberg Municipality 1990



Fig 1.2.2 Specific Site with Proposed Building
Blauwberg Municipality 1990, Author

1 Introduction

1.6 The Concept

In principle the ferry service consists of a return route: the one linking Big Bay and Cape Town city centre. The terminals' locations are also shown in figure 1.1. Provision should also be made for future expansions as a growth in population as well as car ownership is expected.

Since the distance between Big Bay and Cape Town would be covered in 25 minutes, the hovercraft frequencies are initially planned to be 15 minutes. There will be extensive feeder and distribution transport services at each terminal. To add value to the terminal, provision will be made for safe parking areas for commuters as well as for daily visitors for the Interpretative centre.

Reliability, safety and security, comfort and short travel times are important requirements. It must be able to attract motorcar users out of their comfortable cars into the hovercraft. It must therefore be an attractive and realistic alternative for the motorcar user and the service must be reliable.

A very large part of the market focus is on the existing motorcar users in the areas of Tableview and Bloubergstrand. This is a holistic project in which two needs of the public would be catered for, i.e. transport needs, (the need to make a living) as well as one's spiritual/social needs such as the link between man and nature.



Fig 1.3 Flying Witch
www.stockmarket.

1.7 More than a Transport Project

If this terminal is developed, the wider population will save money on transport and be in a better position to afford other aspects for a better quality of life. This project could directly assist in effectively addressing poverty alleviation. As shown in the income statistics (fig 11.4), there is a large number of people with a low income and many with an income of less than R500 per month. Thus in terms of alleviating poverty, job creation within the local community would evolve. This would in turn indirectly limit the number of people dependent on welfare services.

The project would be a labour-intensive project designed, for creating opportunities to build the partnership between the public and private sectors. The terminal would also entail educational facilities, which would in turn uplift the community.

1.8 Public Services

Existing public transport services in South Africa are not very attractive and convenient. The image of public transport, needs to be improved, otherwise people will not be willing to consider the Hovercraft Ferry as a real alternative to using their motor car. The number of South Africans owning motorcars is increasing, but ideally they should not automatically use their cars for home-work-home trips during peak hours when most of the roads are very congested. Unfortunately a practical, acceptable alternative has not yet been provided for the public.

A balanced transportation network, providing for both private and public transport, is necessary, and does have certain advantages.

In South Africa and all over the world, the equivalent of billions of rands (Gautrain Report) are lost due to traffic congestion, which leads to time lost, higher transport costs and it also negatively affects quality of life. In London the cost of congestion is R25 billion per year. On the N1 Freeway between Pretoria and Johannesburg the congestion cost is estimated at more than R300 million per year (Gautrain Documentation). Unless dedicated rights of way, such as high occupancy vehicle (HOV) lanes or bus

lanes are provided, buses and taxis are also subjected to the congestion on the roads. It is not always possible to provide HOV lanes for the full length of the bus or taxi trip.

Public transport is more environmentally friendly, compared to private cars. Cars consume three times more energy and produce three times more carbon monoxide per passenger than public transport. Hovercraft transport is even more environmentally friendly than buses, for eg. no roads needs to be constructed. Roads take up a lot of space. For example, a home-to-work journey by a single-occupancy car consumes 90 times more space than if the same journey had been made by rail, in terms of the Hovercraft journey, the difference is enormous since hovercraft travel is in a direct straight line gliding across 6 inches above the ocean surface. In the past this was not so important in South Africa with its land availability, but land is now becoming scarce in the rapidly urbanizing areas.

1.9 Alternatives

Buses do not travel entirely on their own dedicated right of way for the full route, they are also influenced by traffic congestion. Such a system would furthermore not achieve the same trip timesavings as Hovercraft travel, especially in the peak periods, and therefore not be so attractive to the motorcar user as an alternative transport mode.

Other modes of transport, such as light rail and minibus-taxis, have inherent shortcomings.

It is proposed that a shuttle service would travel along a designated route and pick up commuters and transfer them to the terminal. The shuttle service has a capacity of 36 passengers per vehicle and a provision would be made for 8 shuttle buses. In turn at the Mandela Gateway, Inner City Transport has approved a public route system by which commuters would be picked up at the V&A Waterfront and then further dispersed into the city. The inner city transport route is illustrated on Figure 1.5.

1 Introduction

1.10 International Evidence

Since the oil crisis of the 1970s, the sustainability of conventional road transport as the main mode of transport has been under continuous scrutiny. Alternatives to road transport have been promoted around the world, especially in urban areas where space is limited and where the negative impacts of road traffic such as traffic congestion, noise, air pollution and accidents have become obvious. Most countries, even the United States of America, which has a so-called "love affair with the automobile," have accepted policies and have taken steps to promote public transport.

Cities and regions with a history of extensive public transport provision have been more successful in implementing such strategies, possibly as they were in a better position to promote the use of public transport to people who are accustomed to use those services from time to time. Moreover, land-use densities have been developed around public transport corridors, and the people have accepted measures to restrict car traffic where necessary.

Rapidly developing regions often have a backlog in implementing alternatives to car traffic as the latter grows easily and extensions to the road network are usually provided on a continuous basis. This makes it extremely difficult to promote public transport successfully. However, certain opportunities (as provoked by the oil crisis) do appear from time to time, and are often realized successfully.

The demand for sustainable transport has recently been heard all over the world, and extensive research has been done on the impact of public transport as an alternative to private road transport.

The implications of establishing a new transport system should not be underestimated. The findings and experiences of other countries on the benefits of an efficient public transport system should be fully recognized, and this should assist in the decision as to a sustainable transport system for the future of South Africa.

Additional impacts of the ferry service need to be considered and include:

Personal travel time savings: People would spend less time on the roads during their every day trips if the ferry service were to be implemented. Travel by hovercraft is more productive (more personal time) than travelling by car and the hovercraft is obviously not subjected to traffic congestion. This has a substantial economic impact.

In terms of health care the following is relevant:

The modal shift to the new Hovercraft is likely to reduce traffic accidents and their associated human suffering, third party and medical costs.

The hovercraft is likely to contribute to improved air quality.

1.11 Guidelines:

The obvious benefits of the Hovercraft alternative to the economy consist of three components, namely savings in time, reduced accidents and reduced congestion.

Since many role-players will be involved and affected in this project, the Feasibility Analysis has been considered from a number of perspectives, namely:

- The users (passengers on this system once commissioned)
- Other passengers travelling in other modes of transport
- The broad community, i.e. residents of the Province of Western Cape

Environment	Noise and vibration Local air quality Global atmospheric emissions Land and water pollution Landscape Biodiversity Heritage
Safety	Accidents Personal security
Economy	Journey times Hovercraft journey time Reliability and punctuality Crowding Terminal Facility Financial costs and revenue Transitional costs of change Ticketing and information facilities Economic and regeneration impacts
Accessibility	Reduction of barriers Disabled access Pedestrian access Access for cyclists Interchange requirements Severance Option values

Fig. 1.4 Impact Criteria of the Ferry Service
Hovercape Documentation 2003

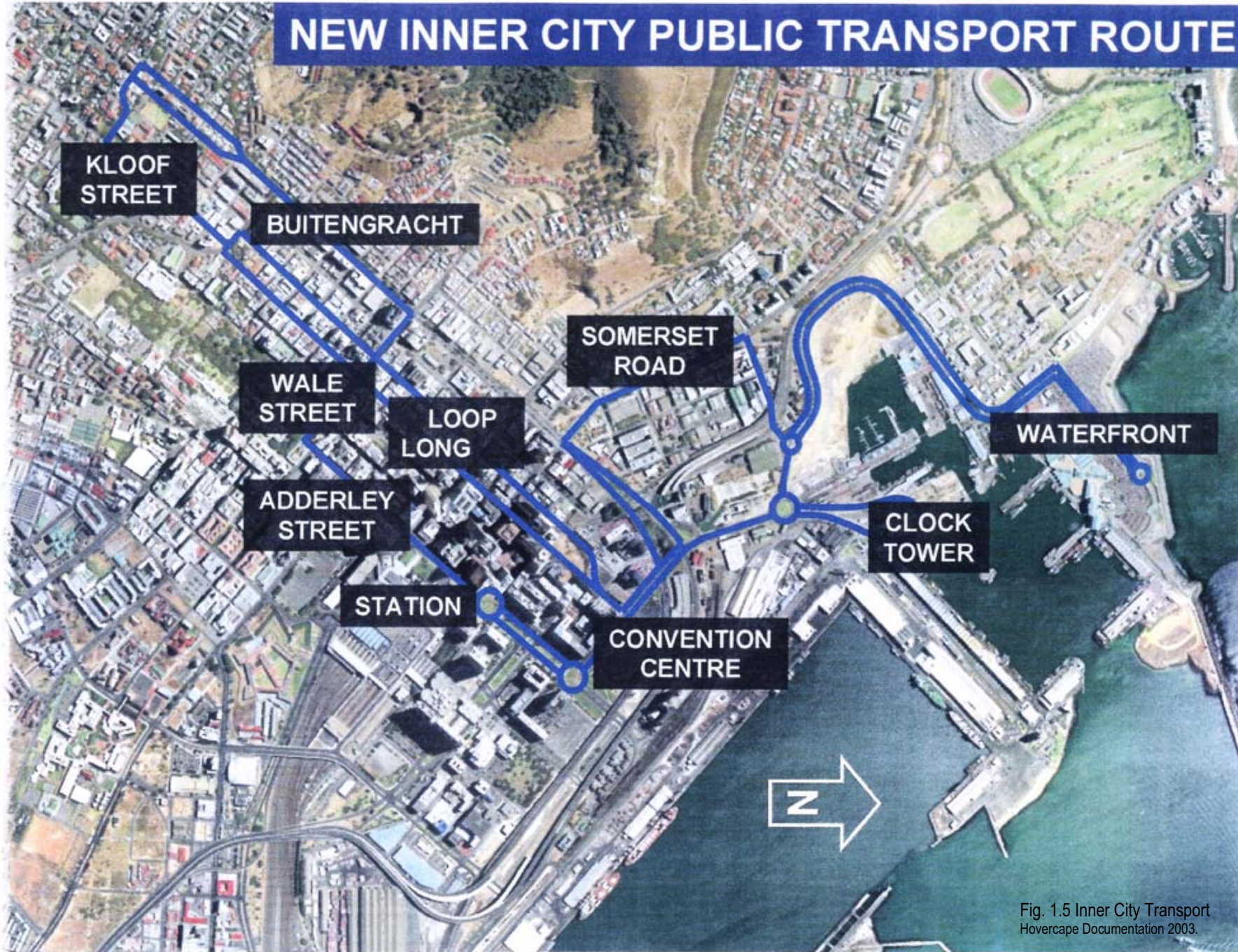


Fig. 1.5 Inner City Transport Hovercape Documentation 2003.

2. Client and User

The client for this Interpretative Centre and Hovercraft Terminal is Hovercape Ferry Services.

This "new" service is to be implemented as soon as possible since there is a great demand and need for an additional form of public transport. It is called a new service because it has yet to be used as a public transport facility in our country, and the South African public is unfamiliar with the advantages the service would offer. Capetonians have complained time and time again of the traffic congestion problem, particularly between Bloubergstrand and the city centre. The same has occurred between Johannesburg and Pretoria, where the development of the Gautrain Service between these two major cities is considered.

The same parallels may be drawn between the relief of congestion in Gauteng, to that of Cape Town, since the basic aim is the same. The advantage that Cape Town has over Gauteng is that they have the sea at their disposal and thus an additional mode of transport available to them. To a large extent, the social context and precedents studied have formed a catalyst for design understanding and thinking.

During earlier years the planning of the city of Cape Town resulted in the shielding or screening off of the city from the sea. There is the elevated freeway system constructed on the harbour perimeter, linking the south and western suburbs and the main traffic arteries from surrounding areas. This road became a visual barrier between the sea and the city centre. Capetonians are divorced from the sea by a wall of traffic.

Designing a ferry port in Big Bay demands a sensitive approach, as the edge between land and water is a major issue not only in ecological terms, since it is located adjacent to a conservation area, but also in social terms. Many factors would have to be considered, such as the scale of the building, the height, and its impact on the view. Parkades and additional facilities would also have to be provided and would also assist in the financial success of the Hovercape Terminal. The ferry tickets would only cover the basic travelling cost and the facility would be forced to become financially self sustainable in other manners in order to survive.

The design would be experienced at a pedestrian level, and viewing the sea would be up close.



Fig. 2.1 Hovercape Logo
www.hovercape.com

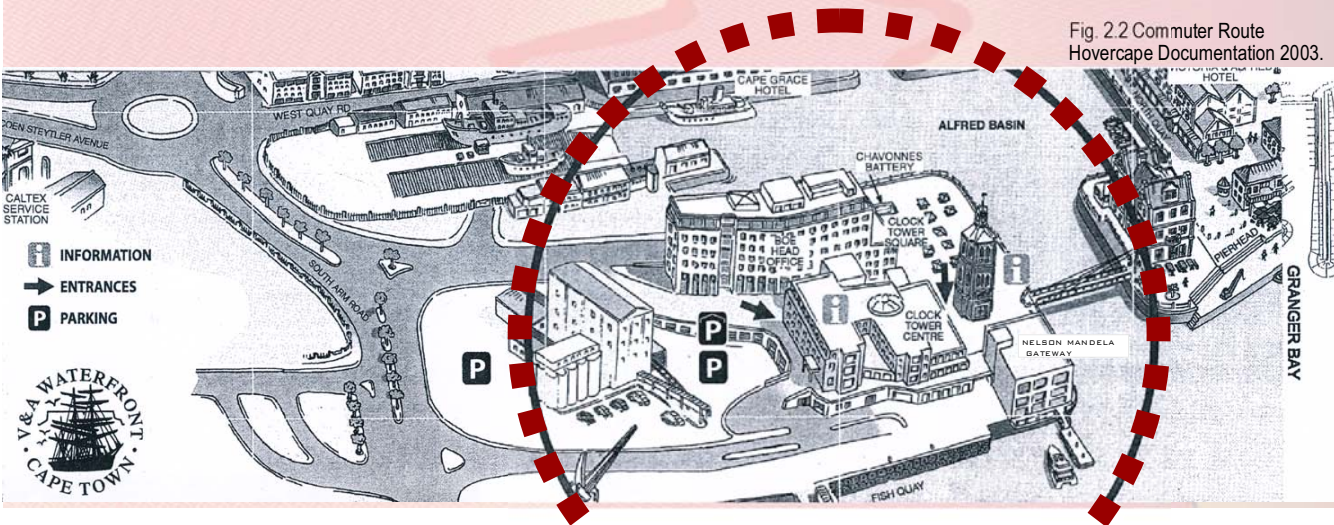
The hovercraft has a unique character where it floats 450mm above the water surface, with almost no friction, and thus lowering the impact on the ecology. It can go places boats can not, such as 150mm deep water or sea grass flats. It skims across the surface of the sea and continues right onto the beach. The rubber border around the bottom of the craft is really a skirt, not a raft and is open underneath to the water. The craft's diesel engines pump air underneath, and the pressure raises it above ground level. A tail fan pushes it in the direction the pilot wants it to go.

Thus without a doubt, the hovercraft ferry is a far better option than an ordinary ferry ship containing a hull. John Wagner, the owner of the St. Petersburg hovercraft ferry stated that the hovercraft does no more harm to the sea grass it hovers over, than a fan does to your hair. Even James Bond raced in a hovercraft chase in the James Bond movie, "Die Another Day."

The other advantage the hovercraft has is that it can cruise at about 70km/h and is not restricted to deep water, it can take a straight line path to its destination while larger boats travel slower at 10mph and have to follow channels.

The client, Hovercape, would use ferries of 25m long and 11m wide which can carry 140 people. It is proposed that the hovercrafts be used during off-peak times to carry tourists when not in use by the commuters. Robben Island is literally a stone's throw from Big Bay. Commuters would disembark at the Nelson Mandela Gateway Terminal, where the new inner city public transport route would operate from. The public transport service would pick up commuters and then drop them off along a designated route within the city centre. Respectively, a shuttle service would also be available in the Tableview and Bloubergstrand area.

Fig. 2.2 Commuter Route
Hovercape Documentation 2003.



3. Interested and Affected Parties



The design of a Ferry Terminal and Interpretative Centre would entail bringing extremities of nature such as land and water together to interact and additionally forcing social aspects of life to function within the same building.

The need to make a living in terms of financial gain and worldly possessions, and the need of sustaining one's spirituality, in terms of nature and ecology is to be sustained by the building. The affected community and public have to be informed of the benefits of the ferry service and thus would be integrated within the initial development phases.

This is where the architect and developers have to interact with the community. The problem many of the architects have is that they dream of tabula rasa type of projects where they do not have to consider existing geography and context. This is not a viable option. The aim is that the design be in harmony with nature within the context of this development. Advantage would be taken of the scenery surrounding the proposed Hovercape Terminal.

The area of Big Bay is in the process of a major development scheme and the proposed site has been designated for commercial and recreational amenities. The Interpretative Centre would serve as a great advantage to the nature reserve located adjacent to the site

The Blaauwberg Conservation Area (BCA) is in the process of being declared a National Heritage Site, and would be supported by the Interpretive Centre. As a significant community asset, the BCA would provide educational, recreational, and job creating opportunities through attracting a substantial number of local visitors and tourists to enjoy a range of opportunities and activities. The area offers exceptional natural and cultural resources where future amenities are to be developed.

In terms of infrastructure, provision would have to be made for the visitors to the BCA. School children and students would be able to have a resource for biological and conservation research and studies. The complex layers of natural, historical and cultural diversity comprise a range of educational opportunities, such as in archaeology, ecology, botany, geology, history, marine biology, geography etc.

The visual splendour of the area offers practical educational opportunities for photography, arts and crafts.

Tourism is now widely recognized as the industry with the greatest potential for economic growth and implies job creation. The Western Cape in particular is experiencing a rapid growth with tourism contributing 14% to the total gross regional product, compared with the national average of 8%. World trends indicate that adventure, cultural, heritage and eco-tourism and all nature related forms of tourism exhibit a higher than average growth rate.

The local residents commute daily to the city centre and suffer through constant traffic jams and although it is not very far away, the drive is always slow and tedious because of the high influx of motor vehicles towards the city. The catchment area of possible commuters would be from Tableview and Bloubergstrand (.fig. 3.2).

The vision is that the Big Bay area become known as a coastal node.

SITE

Fig. 3.1 Site Seen From East
S.D Cunha. Jan.2003.

Table Mountain

Robben Island

Blaauwberg Hill



3. Interested and Affected Parties



The catchment area of possible commuters was calculated with the means of various statistics obtained from Statistics SA. These are explained in more detail in section 11.

By analysing the data, it was determined that all the residents within Tableview, Bloubergstrand and up to Melkbosstrand further north, who travel and work in Cape Town city centre, would qualify as possible ferry service commuters.

The commuters of this region have to travel during rush hour traffic resulting in travelling at a low speed because of the large amount of cars on the current narrow roads. The existing roads are currently narrow and can not handle the high influx of motor cars. The option of further widening of the roads is not viable since it has constantly been widened and has resulted in a loss of scarce as well as expensive land. As mentioned before there is an increasing shortage of land as a result of urbanisation. The measure of widening roads would also only be a temporary cure.

Fig. 3.2 Commuter Scope
Altered Cape Town Street Map
2001/2002.11th Edition.

3. Interested and Affected Parties



The land between the Atlantic coastline and the West Coast Road is owned by the state and the local authority. The Big Bay site is also Government owned land, while the land falling within the proposed BCA is privately owned. Land uses permitted on the private owned land currently include:

- Forestry,
- Agriculture,
- Parks, and
- Scenic and Natural Reserves

The current private land owners which are within the proposed BCA are:

- Klein Melkbosch Plaas
- Blaauwbergsvlei Pty/Ltd
- Holliday Farm Properties
- Garden Cities
- Joyce's Dairy

It is the goal of the local authority to acquire all the private land within the BCA in order to maximise the potential of the land. A majority of the affected land owners have expressed their support for the protection of the rural environment and their willingness to negotiate.

The ultimate goal for this development as a whole is to have some sort of spiritual impact on the public that would make use of the Interpretive Centre. Hovercape Terminal is to be a synthesis of technology and nature, in the end, space, earth, and water are to be in harmony.

Fig. 3.4 Land Ownership
OVP Associates.May 2000/ SD Cunha 2003.
Cape Town

4.1 Vision

The vision for Big Bay is a mixed-use coastal facility, both in urban form and architecture. Variety and richness with an overall sense of place will be enhanced by means of individual potentials and qualities of various components of the project. Certain linking elements, such as between Blaauwberg Hill and Big Bay, by means of a visual link. The Hovercape Terminal would act as a focal point or landmark within the development area.

The planning team for the precinct plan was Rabcav (Project co-ordination and Facilitation), Planning Partners (Town Planners, Urban Design and Landscape Architecture), Hawkins Hawkins & Osborn (Transport, Civil and Electrical Engineering), De Villiers & Moore (Electrical Engineering), and David Hellig & Abrahamse (Land Surveying).

Planning Partners have been commissioned by the City of Cape Town: Blaauwberg Administration to compile a Precinct Plan for the Big Bay development. This precinct plan is used as a guide to the site development planning of the Hovercape Terminal.

The Big Bay Blaauwberg Development comprises of approximately 120ha of land on either side of the Otto du Plessis Drive and includes the existing recreational facilities at Big Bay. Road networks and bulk services are compatible with the development proposals.

General residential zoning, allowing for flats at 60 units/ha, is foreseen on either side of the east west mobility route. Each development parcel is provided with direct access off the Otto du Plessis Drive. All the road access points have to comply with the Provincial Road Access Policy and Provincial Roads Engineer (PAWC).








Planning Partners have provided view corridors to be established in such a way that the dunes beyond can be seen and thus offer visual permeability. The interaction between local residents, users and sensitive environment of the proposed facility should be promoted.

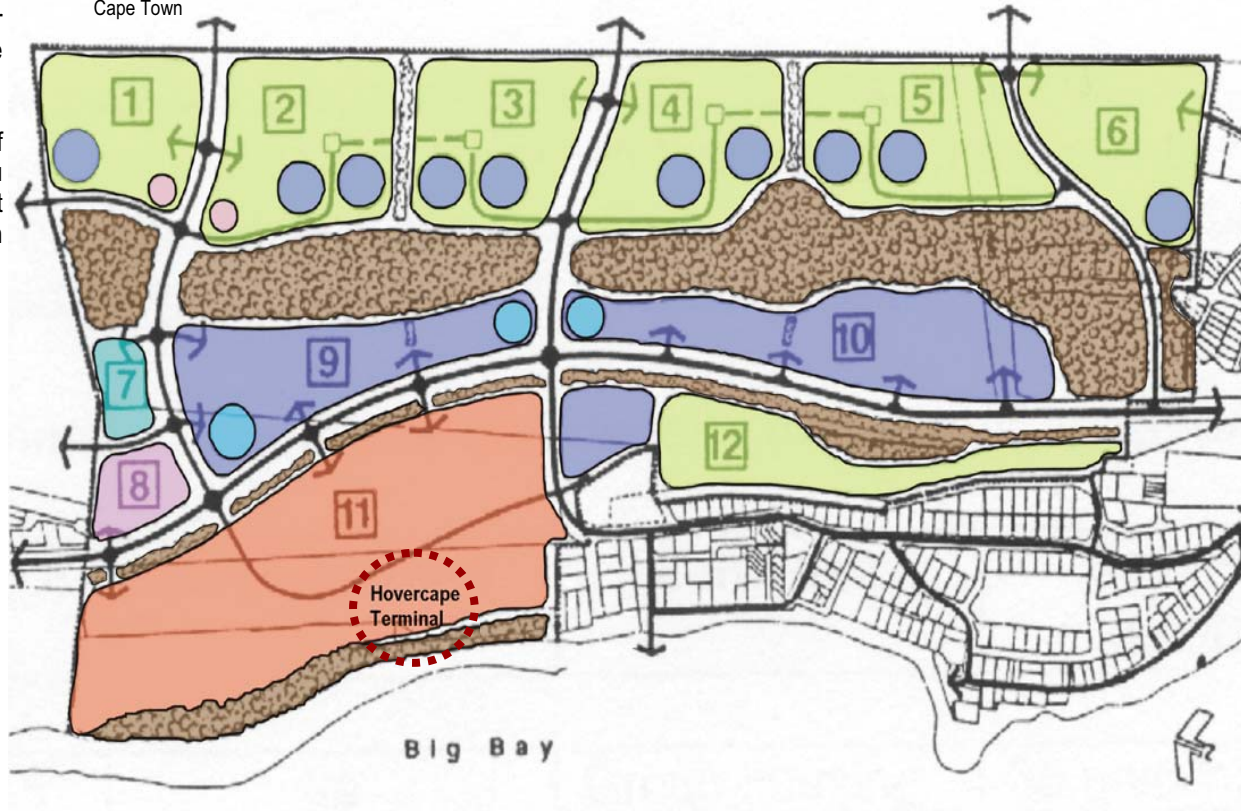
4.2 Land Use

The development Framework is illustrated in figure 4.1 on this page and provides an indication of the extent of the development as well as the land use zonings which are to be allocated.

The proposed site for the Hovercape Terminal lies within Precinct 11- Commercial, Public Facilities, Entertainment, and hotel.

Fig 4.1 Land use Zoning
OVP Associates.May 2000/ SD Cunha 2003.
Cape Town

-  Dune Management Area
-  Single Residential
-  Commercial/ Entertainment/ Public Facilities/ Hotel
-  Medium Density Residential
-  Commercial/ Service Station
-  High Density Residential
-  Precincts



4.3 Main Structuring elements.

4.3.1 Road Structure

There are four routes, which form part of the overall regional transportation structure influencing the site:

Otto du Plessis Drive, a scenic route of metropolitan significance, forming the central north-south spine of the development,

- A proposed east-west activity route(fig 5.7),
- A parallel mobility route(fig 5.7), and
- Wave Road

4.3.1.2 Otto du Plessis Drive

Otto du Plessis Drive has metropolitan significance.

The impression of moving through a green corridor should be enhanced by means of the following principles:

- Buildings and parking areas would be screened from view even if it is partial
- Buildings would be set back from the road with garden space bordering onto the road
- Visual corridors would be provided to dune ridges where possible
- Retaining walls and berms would be planted with indigenous plant species.

4.3.2 Public Open Space System

Some places are more sensitive than others and a strong emphasis has been placed on the conservation of the natural environment. The north-south dune system is a dominant character-forming element within the landscape and will contribute to the proposed development's sense of place.

4.3.2.1 Interfaces with public open space.

In order to provide a positive interface between the development area and the central dune area, the site development plan would have to address issues including boundary treatment, visual impact, landscaping, and cut and fill.

4.3.3 Coastal Node

The coastal node is proposed as a mixed-use precinct focused around a community and recreational core. A hotel and commercial/retail facilities are also proposed for the same precinct.

4.3.4 Skyline Control

The enhancement of the central dune as a major element of environmental and amenity value would also be pursued. The built form of the new building would evoke the form of a dune and at the same time that of the waves of the ocean. Thus building would be terraced along the site.

4.3.5 Composite Building Form

Visual linkages between buildings should be created. The Hovercave Terminal would be situated on a specific site and therefore will serve as a focal point and landmark building. This will improve orientation as well as richness.

4.3.6 Response to Climatic Determinants

The composite built form of the building will address the climatic constraints and ensure an acceptable degree of personal comfort. The architectural form would shelter outdoor areas from strong winds, and enable the penetration of the sun. Courtyards would be sheltered from the south-easterly winds by the built structure. In addition to the effects of the sun angles, shading devices would also have to be treated properly in order to ensure that the public outdoor spaces are not in constant shadow. this is dealt with in detail within section 5: Climate.

4.3.7 Edge Responses

The buildings should be set back from the road and landscaped. This would especially apply along Otto du Plessis Drive, the mobility and activity roads and Wave Road where scenic values should be preserved and enhanced.

4.3.8 Visually Intrusive Structures

There are certain principles to follow in order to minimize the impact structures would have on the view.

- No overhead cables within the development area would be permitted and cables would be provided underground.
- Parking areas, refuse disposal areas and delivery zones should be screened and landscaped.
- Parking areas should be behind buildings, in basement areas or if they are located in front of the building, should be adequately landscaped.

4.4 Big Bay Design Guidelines

The Big Bay design guidelines deal with environmental issues, as well as architectural and landscape architectural matters. They establish an overall vision for the area, and serve as a guiding framework for the more detail design guidelines.

4.4.1 Design Philosophy

The design philosophy aims at an architecture that fragments a building into relatively small components- the opposite of box architecture. This results in a highly articulated architectural form and if the principle is applied correctly an overall fine grained composite form will result.

One room architecture can adapt better to sloping sites and minimizes cut and fill. In essence each room would be expressed in various compositional categories of various articulation.

Outdoor spaces would be defined such as courtyards, terraces and outdoor entertainment areas.

4.5 Architectural Elements:

Simplicity in building form is the criterion, however not too much uniformity which would result in monotony.

4.5.1 Roof Form

The composite roof form is a very important design element in the creation of an overall image identity as it is the most visible feature from a distance. Again a limited number of types, colours and finishes would be used

Architectural articulation can be achieved by adopting a single roof form and rotating it in a number of directions- achieving variety. Similarly two or three roof forms can also be used.

The overall roof pitch is to be between 10 and 40 degrees. The use of flat roofs will only be accepted if the concrete slabs are finished with gravel or chip stone, either grey or brown, or alternatively, landscaped.

Roof overhangs in any direction would not be permitted to exceed the minimum required for adequate waterproofing.

4.5.2 Windows

Windows should rather have a vertical proportion than horizontal. Arches and round windows are not acceptable.

4.5.3 Verandas, balconies, pergolas, balustrading and other external elements

The above items should consist of simple lines and forms, rather than elaborate designs.

4.5.4 Aerials, pipes, satellite dishes, solar panels.

The visual impact of these accessories will be minimized by possible screens or even planting etc.

4.5.5 Service yards and refuse areas.

Service yards would be screened from view by containing them behind surrounding walls.

4.6 Landscaping guidelines

4.6.1 Landscape Philosophy

The Big Bay site is situated in a unique ecologically and visually sensitive region of the Cape. Big Bay's Landscape Design Philosophy is to retain as much of the indigenous vegetation as possible. Where disturbance is unavoidable, the veld would be rehabilitated by replanting previously rescued plant species combined with suitable commercially available indigenous plant material. Only local indigenous plants would be planted and used on site

4.6.2 Prescribed planting method

Trees are to be planted in a specific way and all shrub and groundcover areas to have 150mm layer of medium grain compost worked in. A 30mm thick coarse grain compost layer must be spread on all planted areas as a mulch layer to retain moisture.

Alien invader species are to be removed from all landscaping areas, this must be done during the sapling stage by removing the whole plant.

4.6.3 Entrance roads

Asphalt surfacing would not be allowed. Exposed aggregate pavers would be used, either of "Worcester Stone" or Table Mountain Sandstone," the concrete to have a sandstone colour.

4.6.4 Lighting

Discreet lighting is to be used at the entrance feature walls etc. without causing light pollution.

5. Climate

Cape Town is located on the 34° latitude south, which equates it more or less with Casablanca in the north. It is, nevertheless, considerably cooler in Cape Town, due to the cold Benguela current from Antarctica in the Atlantic Ocean west of the city. However, Cape Town has a Mediterranean climate. In summer it is usually pleasantly warm. The hottest days are often cooled by the Cape Doctor, the famous South-Easter, which keeps the city free of pollution.

It seldom rains in summer, and then only briefly. The winters are cool and wet, but the temperature hardly ever falls below 10° C. The average daily maximum is 28°C in summer and 17°C in winter. The average daily minimum is 15°C in summer and 6°C in winter. Extreme maxima may yield 43°C and 30°C in summer and winter respectively, while extreme minima may yield 4° C and -6°C respectively, depending on the altitude. A maximum diurnal variation occurs in March.

The water temperatures in the Atlantic are low, due to the above-mentioned Benguela current, but east of the city the influence of the Indian Ocean is noticeable, and the beaches and seaside places on that side of the Cape Peninsula are more populated. The beaches in the west do have the advantage of protection from the South-Easter by the Table Mountain.

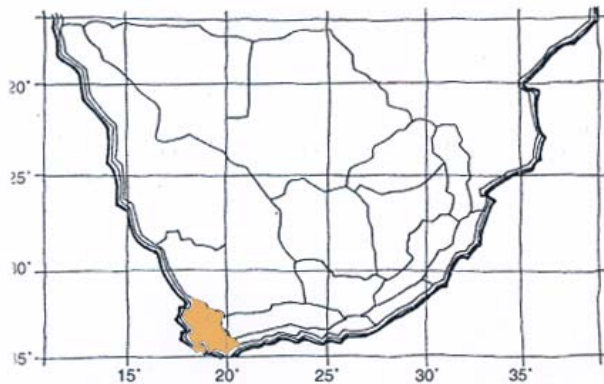


Fig 5.1 Mediterranean Climatic Region
Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. Cape Town

The regional climate is a result of the seasonal migration of the pressure belts northwards in winter, accompanied by cyclonic rainfall and southwards in summer when the pressure belts pass by the country to the south. The area experiences summer months of humidity, minimal rainfall and south-easterly winds, as well as having a winter rainfall regime. Winter months are characterized by moderate to strong north-easterly north-westerly winds, fog, inland frost and higher humidity than summer months.

The climate of the area can be understood in terms of regional influences at the larger scale, and topographical influences at the local scale. The microclimate of the Blaauwberg Hill is of particular interest, in that it has implications for planning and design. As the Blouberg is a relatively small topographic feature, it may have a small, but not insignificant effect on the rainfall pattern. Being on the drier West Coast, the rainfall is only about 400mm, considerably less than Cape Town's.

Winter humidity is partly above the comfort zone but will be alleviated by heating. Summer humidity is slightly above the comfort zone but small enough to be insignificant.

The prevailing wind direction is determined by the seasonal cyclonic movements, the wind coming mainly from the south-east in summer and the north-west in winter. Local wind patterns are however affected by the Blouberg topographic features. The effect of the False Bay jet, the acceleration of wind across the Cape Flats, is experienced within the area.

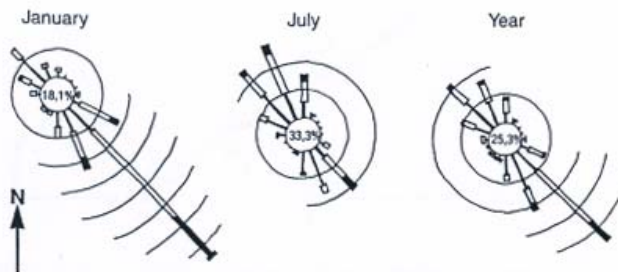


Fig 5.2 Wind Rose for Cape Town
Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy. Cape Town

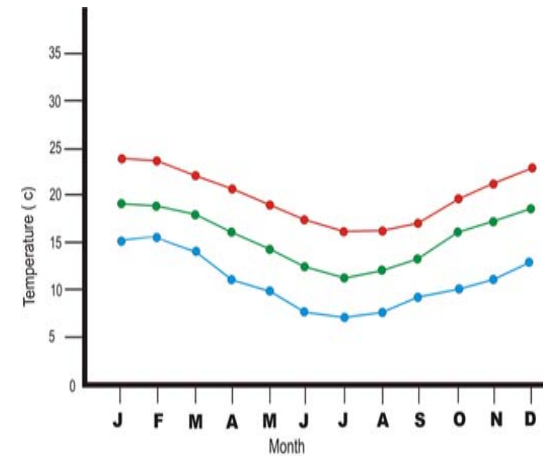


Fig 5.4 Average Monthly Temperature (1980-1984)
OVP Associates.May 2000/ SD Cunha 2003.

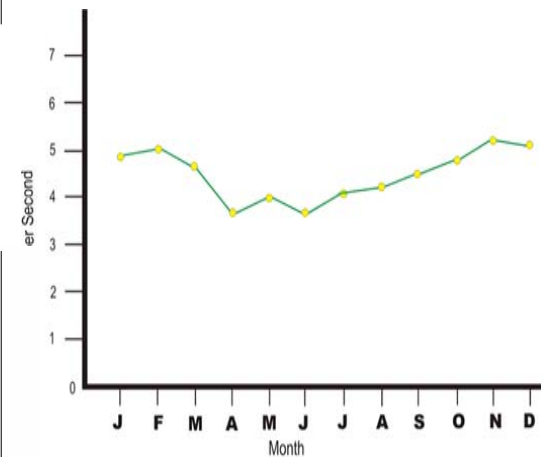


Fig 5.3 Average Monthly Wind Speed (1980-1984)
OVP Associates.May 2000/ SD Cunha 2003.

5. Climate

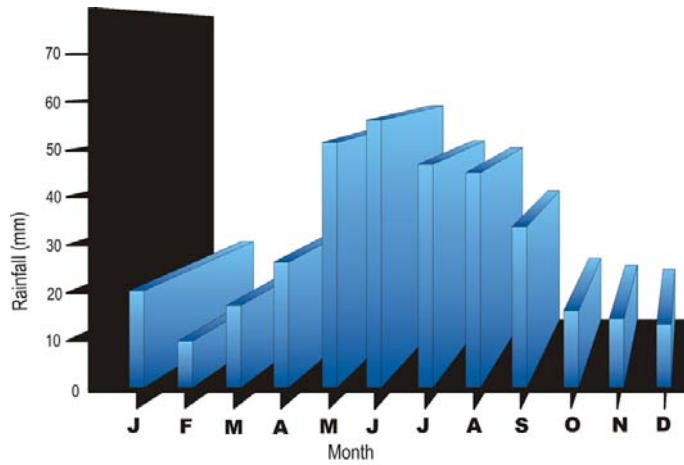


Fig 5.5 Average monthly Rainfall
OVP Associates.May 2000/ SD Cunha 2003.

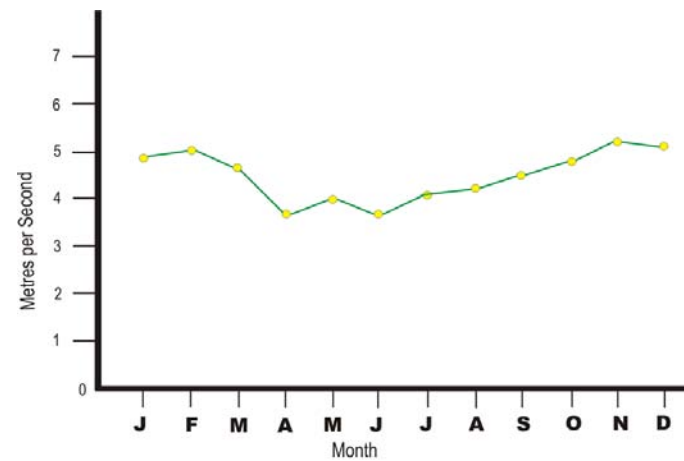


Fig 5.6 Average monthly Wind Speed
OVP Associates.May 2000/ SD Cunha 2003.

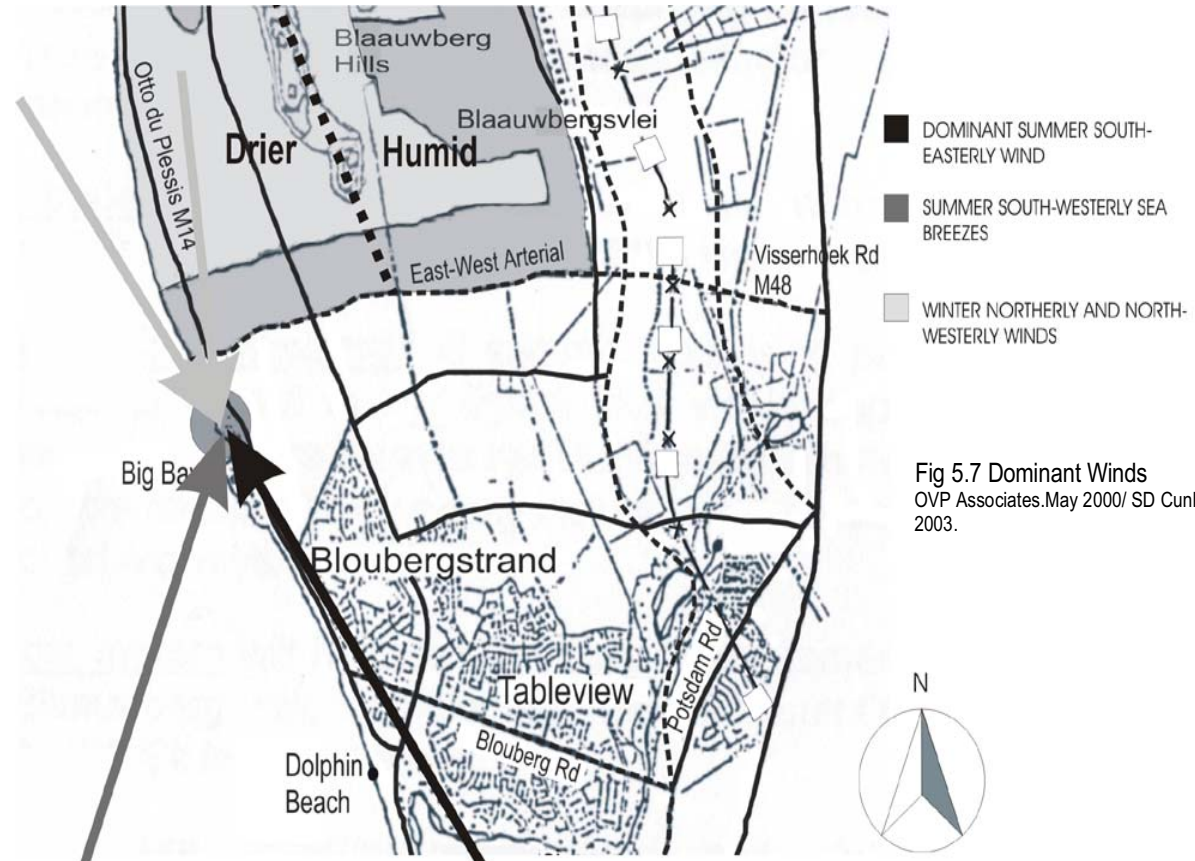


Fig 5.7 Dominant Winds
OVP Associates.May 2000/ SD Cunha 2003.

The sea has a moderating effect on temperatures, the site being cooler than inland locations. The area also lies within the sea breeze zone helping to cool the land. Fog occurs along the Atlantic Coast, mainly during the changeover of seasons, and may extend up to 5km inland. At the site scale, temperature is affected by the shadow effects of the Blouberg, and by sea breezes.

The various slope orientations are indicated on the diagram (fig 5.57).

NE-facing slopes have a warmer, more humid climate;
NW-facing slopes tend to be warm and dry;
SW-facing slopes tend to be cool and dry; and
SE-facing slopes tend to be the coolest and wettest.

Noticeable contrasts in micro-climate occur over relatively short distances in response to the terrain . The variation in climate has an effect on soil formation, vegetation patterns and human comfort, and these in turn have implications for planning.

Urban layout is traditionally compact and useful in providing protection for external spaces from unwanted winds. Orientation should preferably be with the longest sides facing north-south resulting in an oblong plan form. Buildings should be designed to shield summer outdoor living areas from the south-easterly wind.

5. Climate

Although building and street orientation must take the south-easterly winds into account, cognizance must also be taken of south-westerly sea-breezes during the midday period in architectural design. In winter, northerly or north-westerly sea-breezes are experienced. Wind strength and duration are less in winter, although wind chill may be considerable. Thermal mass is also advantageous in summer and can be concentrated in walls and floors. The concrete walls and floors absorb the heat of the sun during the day and then release the heat during nightfall. Cavity walls enhance the effect of thermal mass and are required against moisture penetration.

Openings would be arranged to facilitate ventilation, cross ventilation would be promoted and roof lights are also arranged with openings in order to facilitate the release of hot air during summer. Ventilation enhancement is demonstrated with the technical section of this document. Ventilation is effective to alleviate summer overheating, but relying on natural breezes is probably sufficient.

The effect the wind conditions have does not only affect the design of the building but also whether the Hovercraft Service would be usable or running on certain days.

An average of 45 knts wind speed would disable the service, for safety reasons. It has been calculated from wind chart 1, that the service would be disabled for a maximum of approximately seven days of the year.

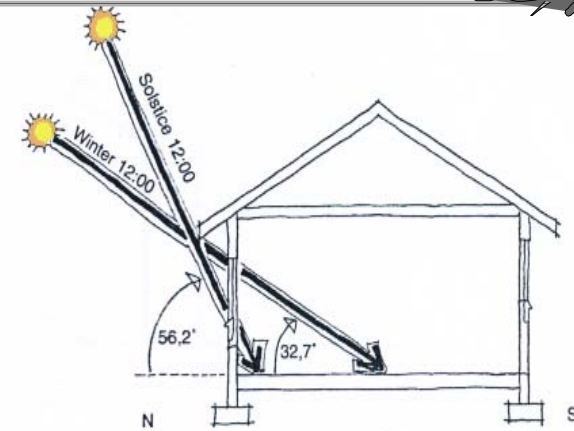


Fig 5.11 Roof Overhang, Window height and Positioning for Cape Town

Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy.

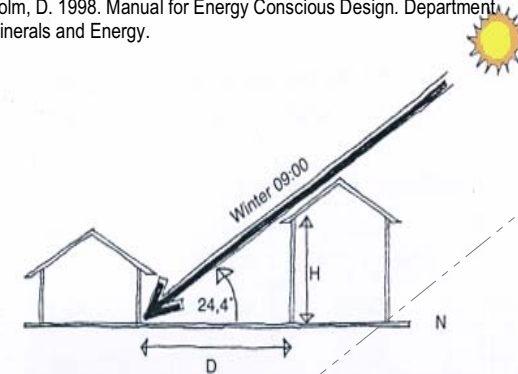


Fig 5.10 Solar Access for Building Spacing in Cape Town D= 2,2H

Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy.

Vertical sun angle at 12:00 solar time

	Latitude (South)	Solstice 21 March/23 Sept	Winter (22 June)
Cape Town	33,80	56,20	32,70

Fig 5.8 Vertical Sun Angle

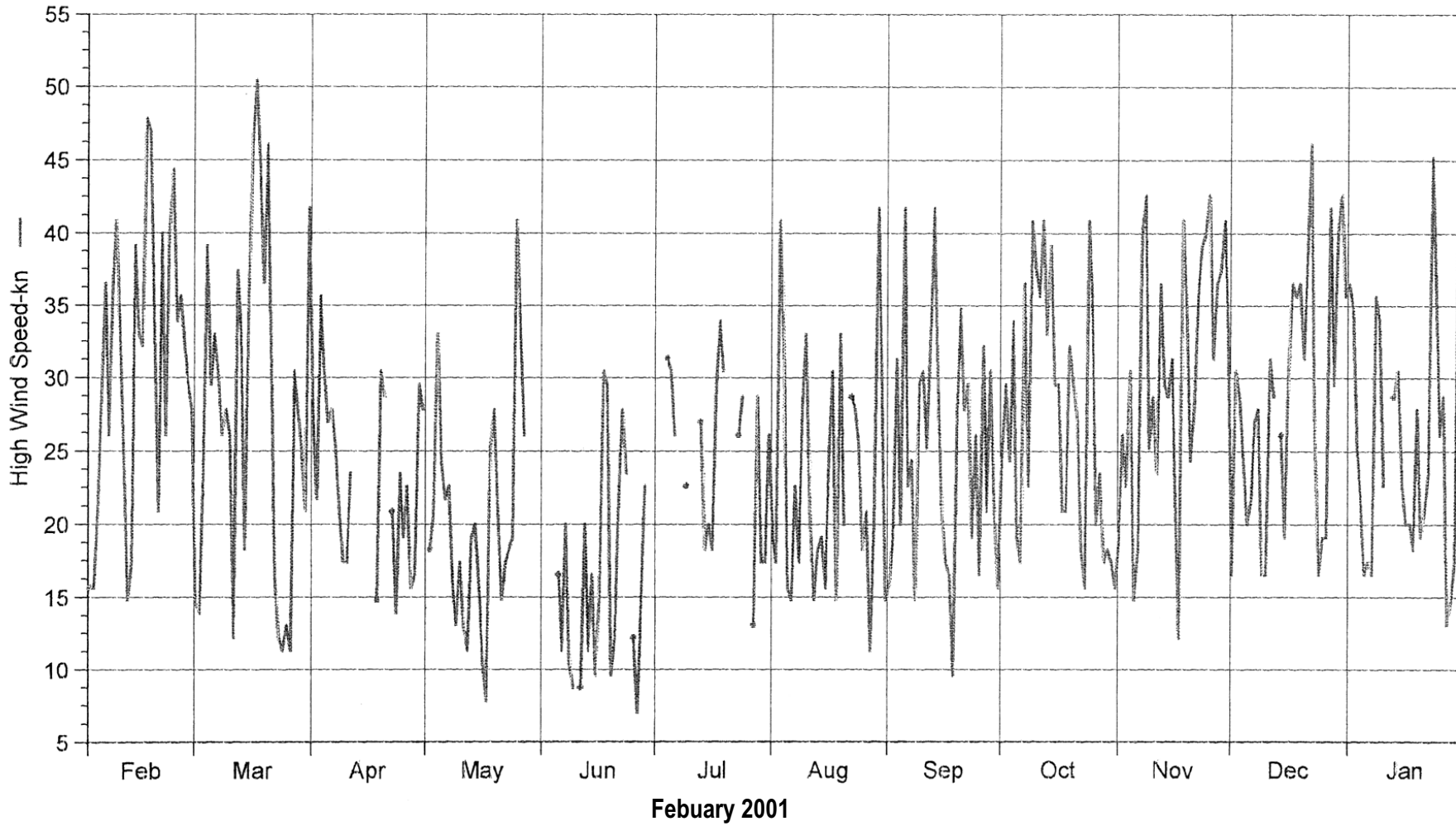
Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC	Ave
Max Average Monthly Temperature (c)	26	26	25	23	20	18	18	18	19	21	24	25	21.97
Min Average Monthly Temperature (c)	15	15	14	12	9	8	7	8	9	11	13	15	11.38
Average Monthly Amplitude (k)	10	11	11	11	11	10	11	10	11	11	10	10	10.59
Average Relative Humidity (%)	58	65	69	72	75	74	76	72	73	66	62	62	68.46
Average Relative Rainfall (mm)	15	16	20	41	67	93	82	77	40	33	16	16	43.08

Fig 5.9 Climatic Data for Cape Town

Holm, D. 1998. Manual for Energy Conscious Design. Department Minerals and Energy.

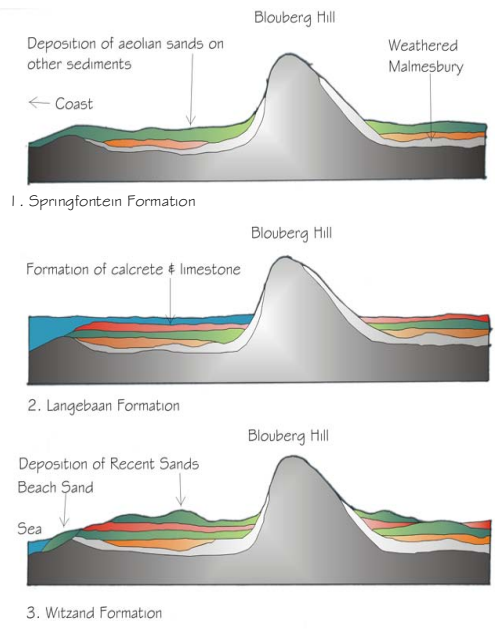
Sunset



■ Hi Wind Speed

Fig. 5.12 Wind Chart indicating the maximum wind speeds
Hovercape Documentation

6. Geology



Sequence of Deposition over Time
(vertically exaggerated)

Fig. 6.1 Sequence of Deposition
OVP Associates.May 2000/SD Cunha. 2003.

The Blouberg Hill is the only major koppie on the West Coast, within a 100 km radius of Cape Town. It has a varied geological, soil and vegetation composition. Soils of the area bear a direct relationship with their parent material. Blaauwberg Hill consists of a series of hills, including Grootberg, Kleinberg, as well as a third outcrop which lies to the east of the other two.

Largely surrounded by relatively flat coastal plains and low growing vegetation, the hills define the landscape in the region and form the most prominent landform on the southern West Coast providing, from Grootberg at an elevation of 231 metres above sea level, exceptional panoramic vistas of Table Bay, Table Mountain, Signal Hill, Tygerberg Hills and Robben Island. Another factor of the design is the physical characteristics between land and sea, and this would have to be addressed in order to form a synthesised building at the point where they meet. The intention is to have the building integrate into the landscape and form part of it. The landscaping would exceed to a height higher than some regions of the roof of the building. This occurs over the section of the Interpretive Centre.

The Blouberg Hill consists of rocks belonging to the Tygerberg Formation of the Malmesbury Group of rocks. These are the oldest rocks in the area and consist of greywacke, phyllite and sandstone. The Blouberg Hill forms part of a family of Malmesbury Rock landforms in the Table Bay area, the others being Signal Hill, Robben Island, and the Tygerberg Hills. These rocks also crop out along the coastline, notably at Bloubergstrand and Melkbosstrand.

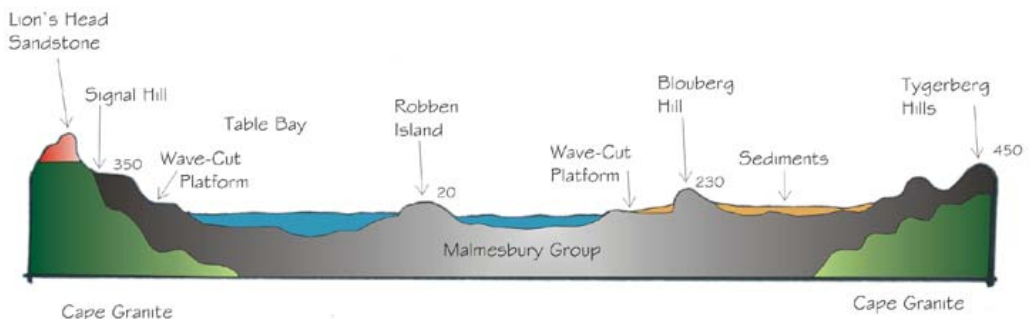
The structure and the grain of the landscape has historically been dictated by the folding and faulting of the Malmesbury beds, which had been laid down in earlier times. The folding is a consequence of the Pan African tectonic event, and the intrusion of the Cape Granites. The folds, which extend roughly in a NW - SE direction, have ridges which project above the surrounding landscape (e.g. the Blouberg), and rock bedvalleys which lie below the sea level, or beneath thick layers of sand deposited by the sea and wind.

Changes in sea level have further played a role in shaping the landscape. During certain geological periods the coastline would have been many kilometres further out to sea, and Robben Island would have been linked to the Blouberg by dry land. In other periods the present coastal plain would have been covered by the sea which resulted in the deposition of calcareous marine deposits, which in time have formed into calccrete or limestone.

It is this sequence of deposition of marine and aeolian materials, during various periods of sea level rise and fall, that provide the key to understanding the landscape of the study area. (See fig 6.1).

At first aeolian sands were blown in from the sea covering most of the area. These are quartzitic type sands together with calcareous marine fragments. Over time, (mainly through leaching from the rain) these materials were decalcified and formed acid sands, which support the present coastal fynbos vegetation (Springfontyn Formation).

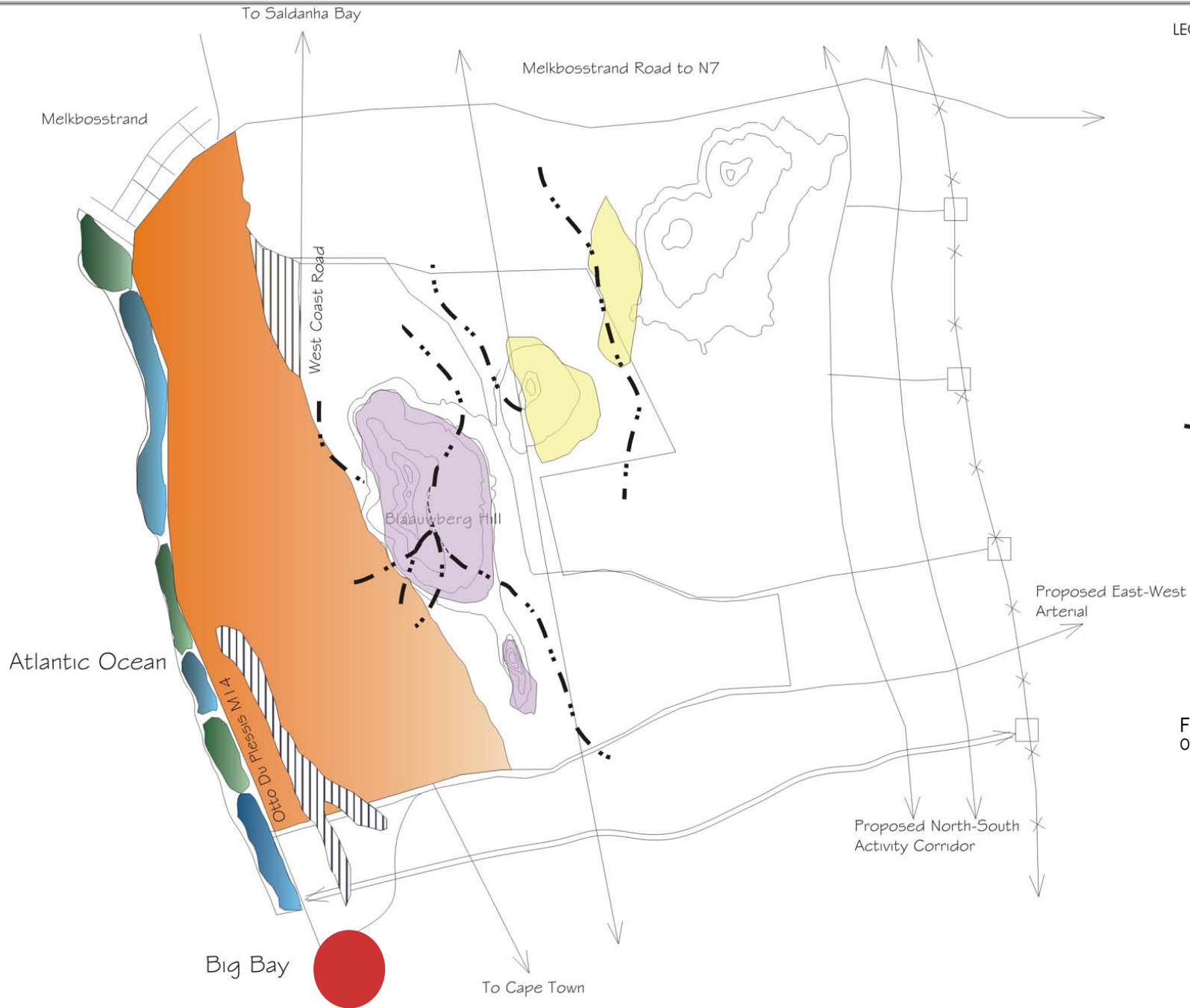
Next came a deposition of more calcareous type material, which formed a hard calccrete layer on the upper surface. This has weathered to clayey type soils in places. In low-lying spots, the calccrete forms an aquiclude, i.e. it causes water to pond at the surface, resulting in the numerous small vleis found in the area, such as the Bloubergvlei. This is known as the Langebaan Limestone Formation.



Surrounding Hill Formations
(vertically exaggerated)

Fig. 6.2 Surrounding Hill Formations
OVP Associates.May 2000/SD Cunha. 2003.

6. Geology



LEGEND:

- LITTORAL COASTAL DUNES
- UNCONSOLIDATED AEOLIAN SAND AND LONGITUDINAL DUNES
- EXPOSED LIMESTONE
- SHALLOW MALMESBURY ROCK
- MALMESBURY ROCK OUTCROP FEATURE
- DRAINAGE SWALES
- Site

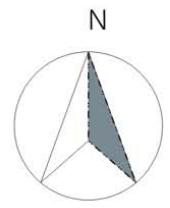


Fig.6.3 Geology and Landforms
OVP Associates.May 2000/SD Cunha. 2003.

6. Geology

In more recent times, further deposition of aeolian sands has resulted in a series of dunes, some older the others. The younger dunes are less compacted, more unstable and therefore prone to wind erosion. These longitudinal dunes known as the Witzand Formation dictate the grain of the land at the local scale, and tend to support a wind-pruned, dwarf community of strandveld type vegetation.

Some mixing has taken place, as well as natural erosion of the hill-slopes, leading to a much more complex mosaic of soil types across the study area.

The lower slopes consist of weathered Malmesbury rock and less steep gradients, resulting in fewer constraints for building.

In terms of site specific soil conditions, a light grey sand which varies from fine to coarse sand characterises the site as well as a fair amount of shell fragments. Extensive sand has accumulated into parabolic dunes, some of which rise as much as 82m above sea level. Dune landscapes with shell bearing sand occurs up to a depth of 50m thick. Fine sand occurs on the windward side while coarse gritty sand occurs in hollow sections in between the dunes.

There is also a certain degree of dune destabilisation, blow-outs, erosion and alien vegetation encroachment which have occurred. As a result of these soil conditions pile foundations would be used to support the building.

The hardened calcrete layers, which occur in the Langebaan Formation, often have shallow water table or small vleis, and are unsuitable for developments and would require, soakaways. The unconsolidated sands of the Witzand Formation are vulnerable to wind erosion if the covering vegetation is removed, and require compaction, particularly on the leeward side of dunes. The littoral dunes along the coastline are subject to the dynamic action of sea wind, and sand.

Where excavations are necessary, the blocky graywacke and sandstone rock would be a suitable building stone. Weathered Malmesbury materials can be used as a sub-base for roads. The calcrete and ferricrete layers that occur in the area could be used on a small scale for road building, while the quartzitic sands of the Springfontyn Formation are suitable for building



Fig. 6.5 Site Photo 2 as seen from the west
SD Cunha Site Photos. Jan 2003.



Fig. 6.6 Site Photo 3as seen from the west
SD Cunha Site Photos. Jan 2003.

Fig. 6.4 Site Landscape Photo 1 as seen from the north
SD Cunha Site Photos. Jan 2003.



Broad-leaved shrubs and small trees such as taaibos and ghwarrie and a fair number of succulents, dominate the vegetation.

Several plant species in the BCA have medicinal properties; whilst a number are edible, have value for basketwork or related uses as well as others which command spectacular spring wild flower exhibitions, an asset for eco-tourism.

West Coast *Renosterveld* is found on the koppie itself, a vegetation type restricted to the more fertile soils of the Western Cape. Although severely affected by agriculture, there are nevertheless remnant stands of this vegetation type remaining here, particularly on the upper slopes and crown of the hill.

Although similarities between the Renosterveld and Dune Thicket exist, particularly in the form of thicket clumps and species, and succulents, the former is far more grassy and contains a higher proportion of bulbs. Along the crown of the koppie one also finds a patch of low, succulent shrubs, which is related to the vegetation of the Little Karoo. However, it is considered too small to be granted status as a vegetation type in this area.

The third vegetation type is also dependent upon sand, this time the acidic sand on the eastern side of the Blaauwberg. This is termed *Sand Plain Fynbos* and is typified by the presence of characteristic fynbos families such as the proteas, reeds and boegoes, The vegetation comprises short to medium height shrubs, interspersed with reeds. Succulents and broad-leaved shrubs are no longer prominent. Fynbos is largely confined to small remnants on Joyces Dairy Farm , having been greatly reduced through agriculture and extensive acacia infestation. Uncontrolled fires are also an important impact.

At present, alien vegetation infestation, agriculture and insufficient management, e.g. uncontrolled fires have impacted on the conditions of the vegetation, but much of this can be restored to their natural state.

Environmental education; ecology, (an integral part of the biology syllabus), cannot be taught effectively from a text book, natural systems such as those in the BCA can play a critical role in the education process.



Briefing Document

Fig. 7.3 Fauna and Table Mountain
SD Cunha Site Photos. Jan 2003.

Fig. 7.4 Flora
<http://www.capetowntourism.co.za>



Blaauwberg Hill is located along the west coast and within 25km from the center of Cape Town. The hill, its immediate surrounds and the land between it and the Atlantic Ocean are regarded as representing a conservation entity of global environmental, historical and educational significance. The Blaauwberg Conservation Area forms the northern boundary of the expanding Cape Metropolitan Area

7.1 Blaauwberg Conservation Area

As a significant community asset, the BCA will provide educational, recreational, and job-creating opportunities through attracting substantial numbers of local visitors and tourists to enjoy a range of opportunities and activities offered by the areas exceptional natural and cultural resources and developing amenities.

7.2 Principles of the Concepts plan

There are two distinct but integral conservation zones proposed:

- The Primary Conservation Zone surrounded by a transition zone known as
- The Conservation Interface Zone.

7.3 Interface Zone

The character of the area is to be enhanced by incorporating viable natural vegetation areas and guiding eco friendly urban development. This will also be underpinned by the principles of sustainable conservation, sustainable development and bio-diversity. Development in the interface zone would provide opportunities for activities such as recreation, commercial and tourist amenities. Alternative lifestyles and support systems such as solar energy would also be explored.

7.4 Primary Conservation Zone

Four distinct zones constitute the Primary Conservation Zone. The south, east, and north zones are land bound and the Atlantic coast forms the western edge.

This area extends from the coast towards the eastern boundary of the BCA and includes the Blaauwberg Hill as well as transitional areas of botanical importance and sites of archaeological, historical and cultural importance.

7.5 Fauna

The West Coast Strandveld, of which the BCA is part of, is known for its exceptional concentrations of certain faunal groups and is recognized as one of the hotspots of species richness and endemism of vertebrate and insect groups.

Specialist studies on flora assume that in the process of protecting diverse natural vegetation, one will, by definition, protect a diverse fauna through conserving their habitat. Providing a diverse habitat would promote the interest among the educational and the general public if only by providing a greater choice in scenery.

7.6 Flora

According to Conservation International, the Western Cape is one of 24 bio-diversity hotspots in the world with high number of endemic species.

The BCA has been identified as one of 37 core sites within the Conservation of the Cape Flats Flora Study (Botanical Society 1999). It has also been identified as a priority area for conservation of bio-diversity, with the highest number of species (459) relative to size of the area, as well as 13 Cape Flats endemic species, emphasizing its regional conservation significance, for it is here that the west coast flora begins. The areas uniquely possess all three West Coast Lowland vegetation types, namely Strandveld, West Coast Renosterveld and Sand Plain Fynbos, corresponding to a specific geological substrate.

Strandveld or Dune Thicket occupies the coastal calcareous sands, in general between the koppie and the high water mark. Two major plant communities are recognized: tall thicket on the higher dunes with deep sand and dwarf thicket on the shallow sand over limestone, largely near the coast.



Fig. 7.1 Site Photo
SD Cunha Site Photos. Jan 2003.



Fig. 7.2 Crustacean Image
SD Cunha Site Photos. Jan 2003.



Fig. 7.6 Regional Flora
OVP Associates.May 2000/SD Cunha. 2003.

8. Visual Sensitivity

The longitudinal dunes within the coastal plain, create small topographical features in the generally exposed landscape.

The natural / rural character of the area has scenic value, particularly in the context of the urban development sprawling northwards along the coast.

These scenic resources can be seen as having a value to local residents, tourists and society as a whole; it is therefore important to assess the relative visual sensitivity of these features.

Visual exposure is a function of sensitivity, and is determined by aspects such as ridges and spurs visible against the skyline, higher elevations and steep slopes, (which are more visible from a distance, and convex slopes (which are more exposed than concave slopes). The low vegetation does little to visually absorb or screen urban development.

Visual sensitivity is further affected by the presence of scenic drives, including the West Coast Road, Otto du Plessis Drive and the Melkbosstrand Road leading east from Melkbosstrand. Vistas of Table Mountain, Robben Island and picturesque farmsteads, or rural scenes, are characteristic features of the area that need to be taken into account.

Historical features, such as old farmsteads and battlefield sites, as well as natural features such as rock outcrops and valleys, all add to scenic value.

Factors that determine the visual sensitivity of the various landscape are:

8.1 Elevated Landforms:

The higher elevations tend to be more prominent and visible from both a large area and longer distance, and are therefore visually vulnerable;

8.2 Ridges and spurs:

These landforms constitute the skyline and may be visually vulnerable, particularly in silhouette conditions;

8.3 Convex-concave slopes:

Convex, or outward-facing slopes tend to be more visible than concave or inward-facing slopes;

8.4 Steep slopes:

Steeper slopes tend to be more visible than flatter slopes particularly, when siting structures or roads, which require cut and fill;

8.5 Vegetation cover:

Low, sparse vegetation provides less screening effect and is therefore more visually exposed than dense vegetation with a closed canopy;

8.6 Special features:

Special landscape features such as cliffs, outcrops, historic, religious and viewing sites represent valuable scenic resources.



Fig. 8.1 View from Site
SD Cunha Site Photos. Jan 2003

8. Visual Sensitivity

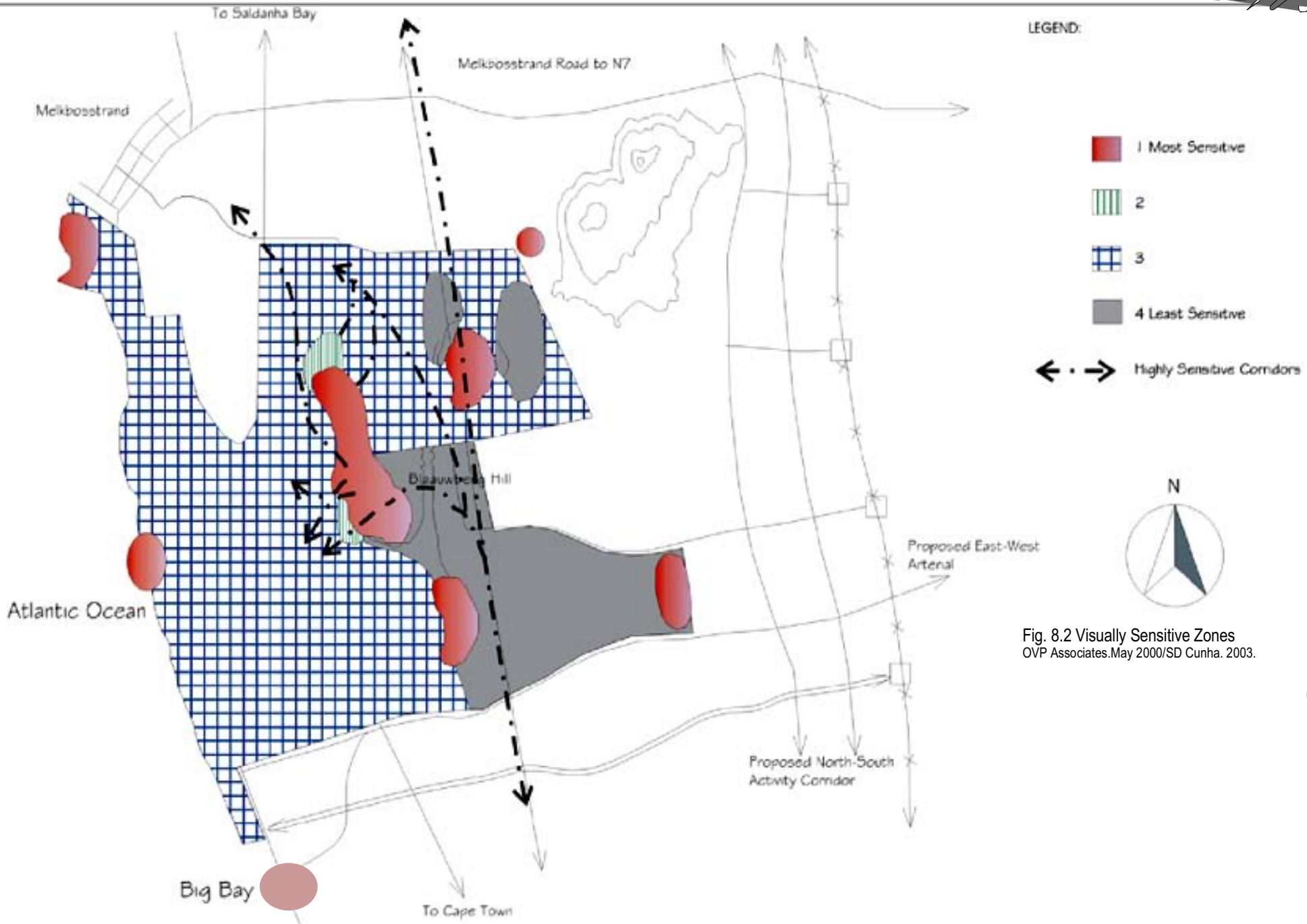


Fig. 8.2 Visually Sensitive Zones
OVP Associates.May 2000/SD Cunha. 2003.

8. Visual Sensitivity

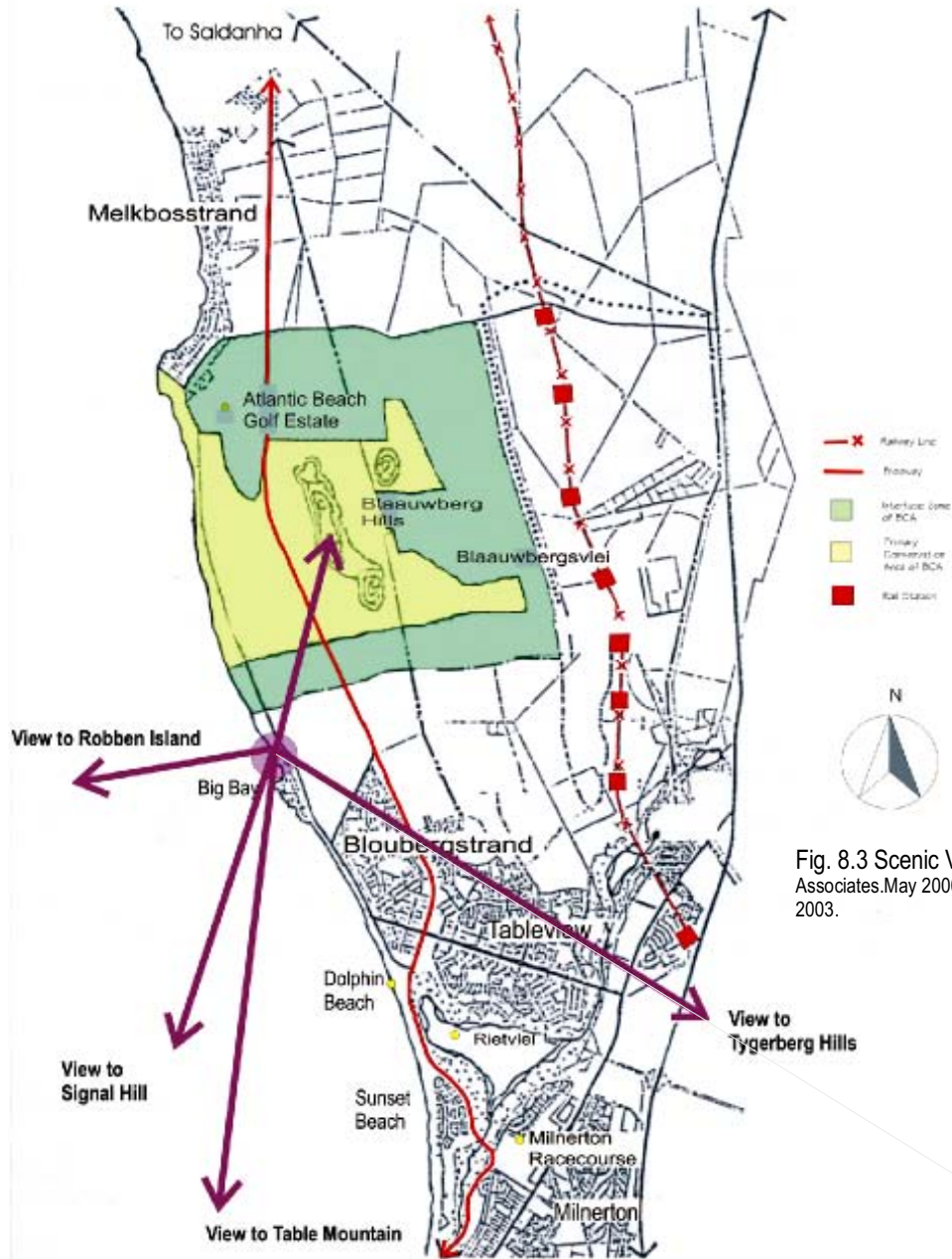


Fig. 8.3 Scenic Views OVP Associates. May 2000/SD Cunha. 2003.

9.1 Existing Road Structure

One of the major considerations for the proposed Hovercape Terminal is access by means of two important roads which are situated in a north-south direction. The first is the Otto du Plessis Drive (R27), a regional road which connects Cape Town with the towns along the West Coast. In terms of road hierarchy concepts, the road can be termed as an expressway for the section after the proposed Blaauwberg conservation area. A road such as this has the capacity for high speed/ high volume traffic movement serving inter-towns needs. Intersection spacings would be some 1600m apart and are at-grade with the prospect of an interchange when turning demand is high.

The current annual average daily two way traffic is approximately 7300 vehicles in this region of which 10% are heavy vehicles. The posted speed limit is 120km/h and the measured average speed is 110km/h. To the south of the Blaauwberg Conservation Area i.e along the Hovercape Terminal, Otto du Plessis Drive can be classified a primary distributor for the section south of the BCA. This type of road has the capacity for medium to high operating speeds with medium to high daily traffic movements.

The second road is the Marine Road (M14) , a coastal main road which links to Melkbosstrand and Blaauwberg and back to the R27. This road can be classified as a district distributor providing for traffic movement at moderate travel speeds and moderate volumes over medium and relatively short distances.

North of the proposed BCA lies the M19, a main road which links the Marine Drive (M14) at the R27 with the National Road (N7) in a west-east direction. This is a primary distributor similar in function to the R27 south. Intersections and direct property access to this type road is generally in the order of 600m to 800m apart with 500m the absolute minimum where operating speeds on the road are less than 90km/h.

The fourway intersection of Otto du Plessis Drive (R27) and Marine Drive (M14) is currently signalized and has been provided with highly visible warning signs and street lighting. This was brought about by the high accident rate at the intersection.

9.2 Future Road Planning

a) Metropolitan Road Planning

The most significant new route is an east-west primary arterial (distributor) which is intended to link the Vissershok Road (M48) at the N7 to Otto du Plessis Drive (R27) and Marine Drive (M14). The importance of this route is that it would form the southern boundary of the proposed reserve. The arterial will ultimately become signalized at its intersection with the R27.

To the east , three north-south distributors are proposed, spaced equally between Otto du Plessis Drive (R27) and the N7. Initial proposals are that the western most road, a district distributor, should form the eastern boundary of the proposed reserve. It is envisaged that a transverse (east-west) distributor will be needed to connect these three proposed roads approximately midway between the M19 and the proposed west-east arterial.

Another major proposal is the routing of the National Road (N7) in a northeasterly direction towards Atlantis and connecting to the R27. The interchange with the N7 would also connect the proposed extension of the R300 Freeway. The Atlantis alignment is intended to serve as an alternative to the West Coast Road and not to replace it. The R27 will remain a high order road for some time to come.

9.3 Bloubergsvlei Sub-Regional Plan

Regional scale transport proposals within the Bloubergsvlei Area and in which the proposed Nature Reserve falls include:

1. A metro scale activity corridor to the north along Koeberg Road;
2. A proposed N7 (Atlantis) Freeway alignment along the existing N7 as mentioned above;
3. Station sites along the Atlantis railway line, in line with proposals that this line forms the primary public transportation facility for the Bloubergsvlei Area;

9.4 Bloubergstrand and Melkbosstrand Local Structure

Some of the preliminary policy and strategy recommendations relating to roads and access were:

1. Reinforcing the function of the Otto du Plessis Drive (R27) as a high order road with, adequate road width and shoulder and suitable signage;
2. Proposed west-east local distributor some 500m to 800m, from the west-east arterial, which would link Marine Drive with the N7. It would function as an activity spine and accommodate public transport;
3. Proposed Birkenhead Road / local distributor) connecting Melkbosstrand with Otto du Plessis Drive (R27).
4. Proposed west-east arterial previously mentioned.

9.5 Access Opportunities

(a) Development Environment

This site is on the edge of an urbanized area where there is very little roadside development but may include small holdings. There may be established farm stall-type businesses, roadside services. The development environment will thus influence the nature of accesses within this area.

(b) Proposed Access Points

Main access to the Hovercape Terminal would be off the Otto du Plessis Drive (R27)(see pg 29) provided the conditions for sight distances are met. The access would require a dedicated right turn lane and a left turn lane.

In the future when the proposed west-east arterial is built, it may be necessary to have an alternate entrance on that route. The proposed north-south road will also allow separate access points, possibly for future developments.

9.6 SERVICES

1) Water

Two municipal water mains, (150mm dia and a 300mm dia) occur along Otto du Plessis Drive between Table View and Melkbosstrand. A connection will be permitted to either pipe. An existing 700mm dia water main, from the east, supplies the two existing reservoirs on Blouberg (Klein Melkbosch) centrally situated in the proposed nature reserve. Storm water infrastructure should be accommodated in road reserves and open spaces. A 3m reserve needs to be provided in development parcels to accommodate the flow of storm water.

2) Sewer

An existing municipal sewer serving the Blouberg/Table View area, commences its run approximately 2km to the south of the proposed nature reserve. An existing 400mm dia sewer serving the Melkbosstrand area, which has spare capacity, is situated in the northern area of the proposed reserve. To make use of the facility, a pump station may be required.

The design of sewerage infrastructure should place an emphasis on a gravity fed system that will be linked with bulk services. Again 3m reserves should be established.

3) Electricity

An existing overland municipal service, is located west of the R27. There are two north-south power line servitudes (eastern edge of the Blaauwberg to Table View and another east of the railway line). These provide open space corridor linkages to other regional open spaces e.g. Koeberg Nature Reserve, Rietvlei,

Electricity will be supplied to the development parcel, to connect with a bulk supply to be installed in the realigned Otto du Plessis Drive road reserve. No overhead cables are permitted and will thus be located within internal road reserves.

4) Telkom Services.

Full telephone services are currently available in the developed area and Telkom would be responsible for accommodating the users as the demand arises with the developments.

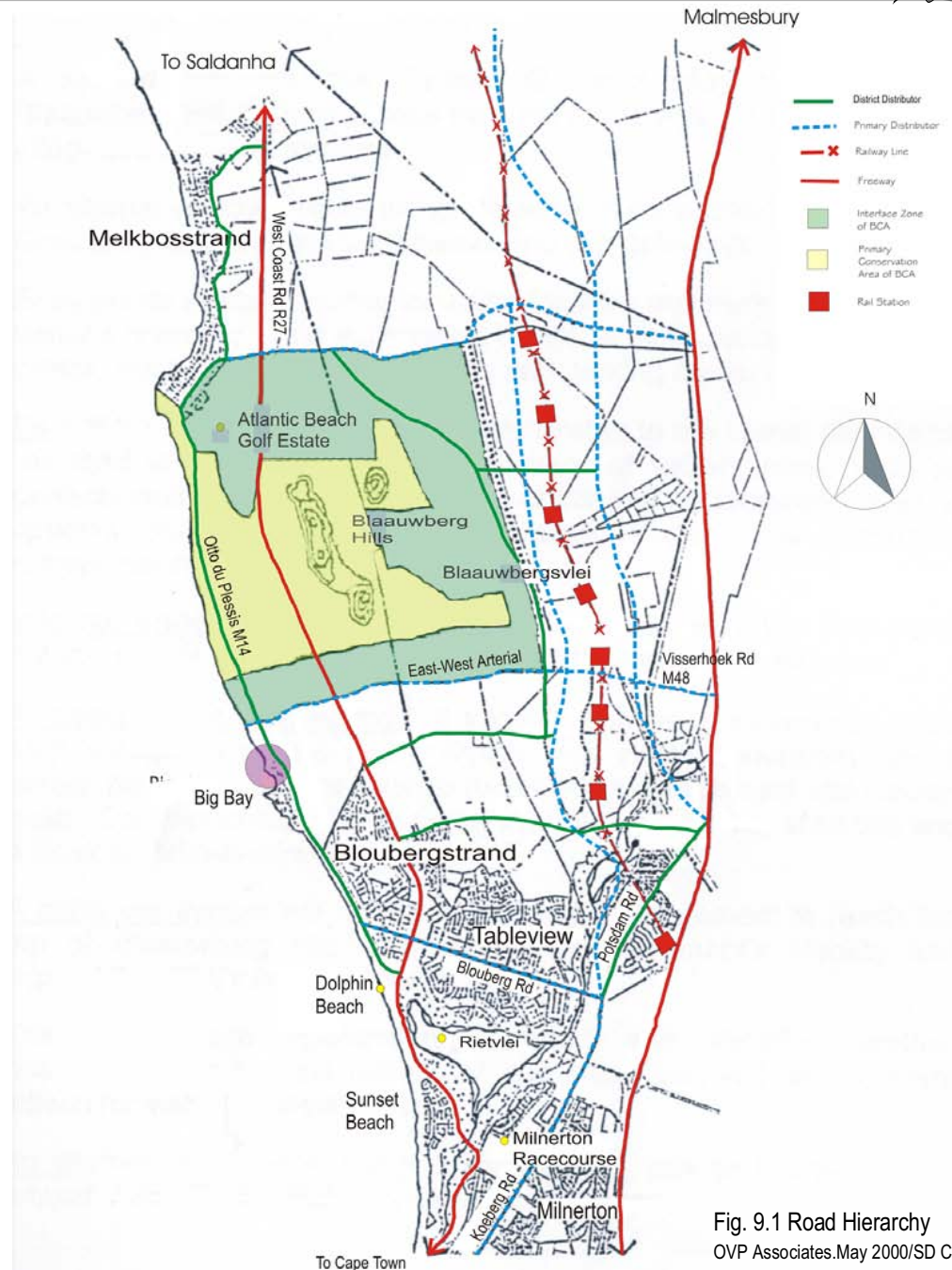


Fig. 9.1 Road Hierarchy
OVP Associates.May 2000/SD Cunha. 2003.

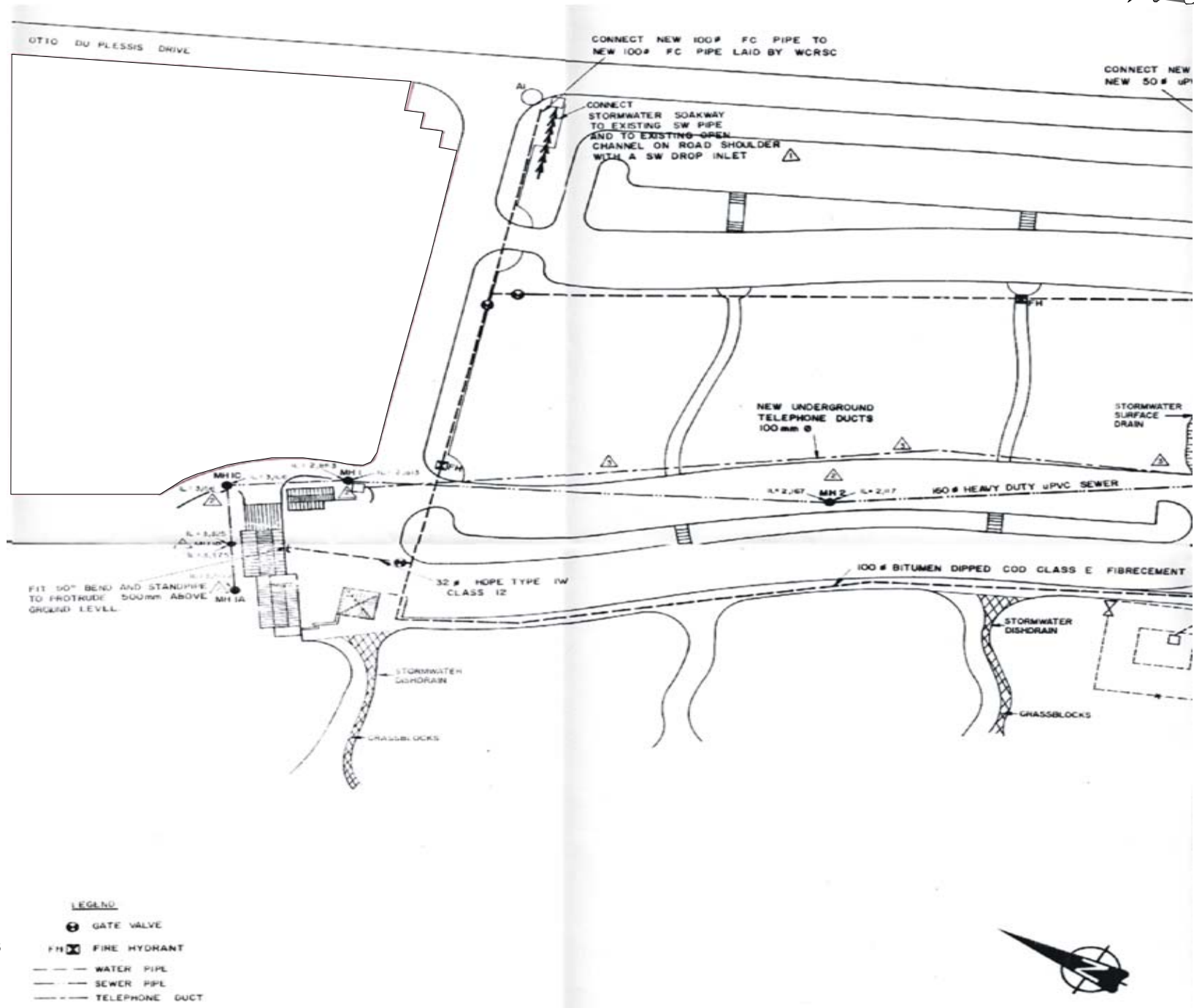


Fig. 9.3 Current Civil Services
Blauwberg Municipality, 1990

Briefing Document

10. Cultural and Historic

10.1 Historical Considerations

The archaeological, historical and cultural heritage of the proposed Blaauwberg Nature Reserve is both rich and varied. Located between Bloubergstrand and Melkbosstrand on the Cape west coast, the proposed nature reserve represents a snapshot of South Africa's regional history. The proposed Blaauwberg Nature Reserve is considered to be exceptionally sensitive. The Blaauwberg Hill should be considered a cultural resource. Buildings on top of the Grootberg date back to the 2nd World War (1945-49). The ruins are considered to be historically sensitive.

The establishment of an interpretive centre at Big Bay (Bloubergstrand), would coincide with the heritage management of this important area. This center would also be of an educational nature focusing on, among others, the cultural history of the region.

Shell middens and archaeological remains along the coastline, as well as to the east of Blouberg Hill, are testament to the indigenous Khoi communities who once occupied this landscape. The driftsand dunes between the coast and Blouberg Hill contain, early, as well as more recent shell middens, and calcified dunes here may also hold very old cultural material, as well as ancient animal lairs with preserved bones.

Small caves located in the vegetated kloofs on Blouberg Hill served as look out points for the Khoi, to alert them to ships coming into Table Bay.

Blue Mountain, otherwise known as Blouberg Hill, is the most prominent landmark in the proposed Blaauwberg Nature Reserve. The Battle of Blouberg took place on 6th January 1806. In this battle, a British expeditionary force, heralding the start of the second British occupation of the Cape, defeated the Dutch East India Company forces of General Janssens. The battle was fought mainly around the vlei, on what is today the farm Bloubergsvlei. Some fighting also took place on the eastern slopes of the Kleinberg.

The Battle of Blaauwberg marked the start of the second British occupation of the Cape, and the end of final Dutch rule. And beneath the cold Atlantic Ocean, in Table Bay, the remains of shipwrecks, some dating to the mid 17th century, represent an important period of the early maritime history of South Africa and Europe. Casualties of the war were buried in soft sand on the dunes. The location of these gravesites is, however, mostly unknown.

The original farmhouse building around the vlei has been demolished. It was originally used as a field hospital for wounded soldiers during the battle. Some annular and stoneware, as well as a LSA silcrete flake, are located around the vlei. Musket balls have also been found on the site.

During the Dutch East India Company (VOC) period, a number of forts and trading outposts were established in the Table Bay area, at Blouberg, Riet Valley, Vissershok and Jan Biesjes Kraal (Milnerton). The Riet Valley outpost was also used as a camp for the Khoi regiment during the first British occupation of the Cape (1795-1803), and as a base for General Janssens during the Battle of Blouberg (1806). Historical wells and freshwater springs were also dug at Rietvlei, Bloubergsvlei and Blouberg.

An artillery observation post, diesel station, and accommodation and mess buildings dating from the 2nd World War have been constructed on top of the Blouberg Hill. In addition, a radar station was constructed lower down the slopes of the Blouberg Hill, which was operational by mid-1942 (Clift 1997:7).

The old municipal water reservoir on top of the large sand dune directly opposite the Caltex garage in Melkbosstrand, has been built on top of the foundations of a British fort dating to the time of the Battle of Blouberg. The remains of the fort are not visible today, but the foundations, are probably buried beneath the floor of the reservoir and the surface of the dune.

The early Dutch settlers at the Cape would have encountered indigenous Khoisan communities on these shores and living among the dunes, and made contact with them. There are historical accounts of Bushmen and Strandlopers utilizing the coastal resources along the beaches at this time. Presumably, some of the remaining shell middens in the area would reflect this contact period.

10. Cultural and Historic

Up to 15-ship wreck sites are located in Table Bay, and north of the mouth of the old Salt River. These include that of the *Nieuw Haerlem* (1647) and the *Oosterland* (1697). Excavations of the *Oosterland* were undertaken in 1989. The aim of the excavation was to collect information focusing on the history of the VOC which was instrumental in the shaping settlement at the Cape of Good Hope in 1652 (Werz 1990, 1993). The wreck lies about 500 m south of the mouth of Milnerton Lagoon.

Described as frozen moments in time, shipwrecks have the potential to inform us about life at sea, vessel construction methods, the material culture of the period, and trade and trade networks. Wrecks constitute a valuable historical-archaeological resource that must be preserved and protected.

This archaeological and historical heritage is a sensitive, fragile and non-renewable cultural resource.

The proposed Blaauwberg Nature Reserve presents the city of Cape Town with a unique opportunity to integrate the city's cultural heritage into the overall development and management of the proposed reserve.

The archaeological significance of Bloubergstrand and Melkbosstrand has been well established, with more than 90 sites having been recorded and mapped. There are numerous shell middens and sites with shell and pottery along an almost continuous stretch among the frontal dunes, all the way from Paarden Eiland to Melkbosstrand. Many of these sites have since been lost as a result of land reclamation, and residential and recreational development.

A well preserved shell midden at the junction of Otto Du Plessis Drive and 11th Avenue in Melkbosstrand, was recently destroyed by the developers of Milkwood Place, a residential housing development within the proposed new Melkbosstrand CBD. The Milkwood Place midden was also used for educational purposes by the South African Museum.

Excavations of a large, well preserved midden containing pottery, shell pendants, stone tools, bone, ostrich eggshell beads, rare ostrich eggshell water containers, perlemoen bowls, and shell scoops, have been found. Preliminary analysis of the bone samples indicate the presence of sheep and cattle, suggesting that the site is dated within the last 2000 years BP.

Several dozen archaeological sites are also known, from Milnerton, Rietvlei, and Koeberg (Rudner 1968; Kaplan 1983, 1994, 1995a, 1995b), to the internationally significant Middle Pleistocene (older than 120 000 years) site Duinefontein, in the Koeberg Nature Reserve (Deacon 1976; Klein 1976). New excavations by local and international archaeologists have recently been completed at the site.

A relatively large number of Khoisan and non-indigenous burial sites have also been recovered between Milnerton and Melkbosstrand. Four burial sites were uncovered when excavating foundations for a private house, and a service trench alongside Otto Du Plessis Drive.

A fragment of a fossil human femur bone was also found in Otto du Plessis Drive, just west of the Milkwood Place development. Two San skeletons were also removed from a large sand dune on the farm Groot Oliphantskop (close to the old Mamre road) about 50 years ago by Mr. D. Drury, a taxidermist at the South African Museum. The skeletons, along with a number of bored stones and ostrich eggshell beads, were later housed in a private collection at Mr. Drury's home in Bloubergstrand (Kaplan 1996).

One Later Stone Age (LSA) site is located on the farm Blaauwberg (Joyces Dairy). The site, comprising a wind-deflated blowout, occurs in a long wide strip about 500 metres south-east of the farm homestead, on the edge of some vegetated land alongside a boundary fence, and adjacent to some wheat fields. The site contains large numbers of stone tools, including, modified and unmodified flakes, chunks, cores, scrapers, hammerstones, grindstones, ostrich eggshell and pottery. The majority of artefacts are in silcrete, with some in quartz also occurring. The site, however, lies outside of the preliminary boundaries of the proposed nature reserve.

10. Cultural and Historic



Fig. 10.1 Archaeological Sites
OVP Associates. May 2000/SD Cunha. 2003

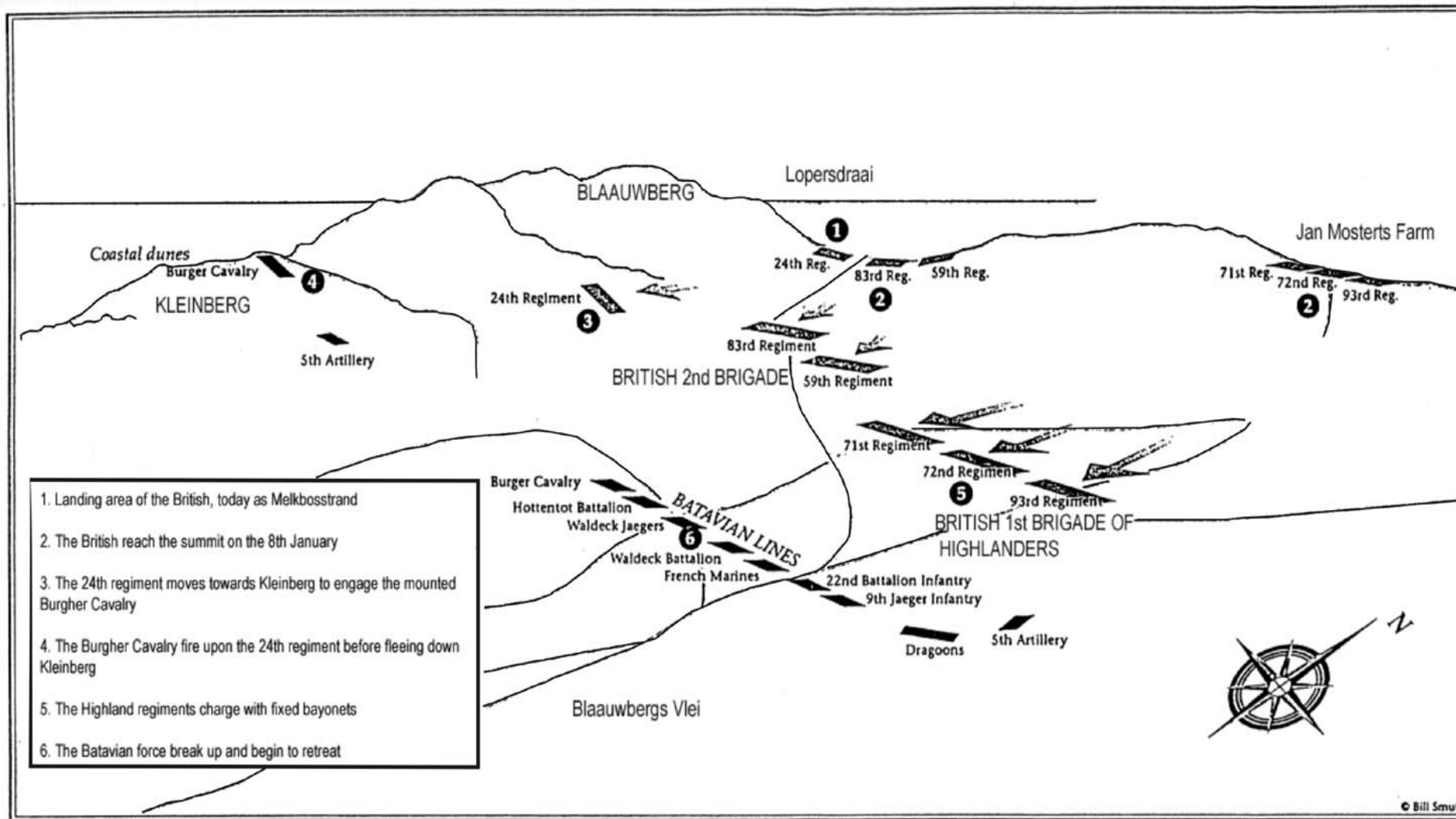


Fig. 10.2 Battle of Blouberg
OVP Associates.May 2000/SD Cunha. 2003

10.2 Ports of South Africa

The role in the overall transport infrastructure of Southern Africa played by three traditional general-cargo (or liner) ports of the then Cape Province- Cape Town, Port Elizabeth and East London- is very different from that of Durban. In the past the four ports acted jointly as main gates of trade for the whole region and in particular for the PWV area. Since the advent of containerization in the mid-1970s, Durban has increasingly pre-empted this trade, while at the same time the catchment of the three Cape ports has shrunk to their immediate regional hinterlands.

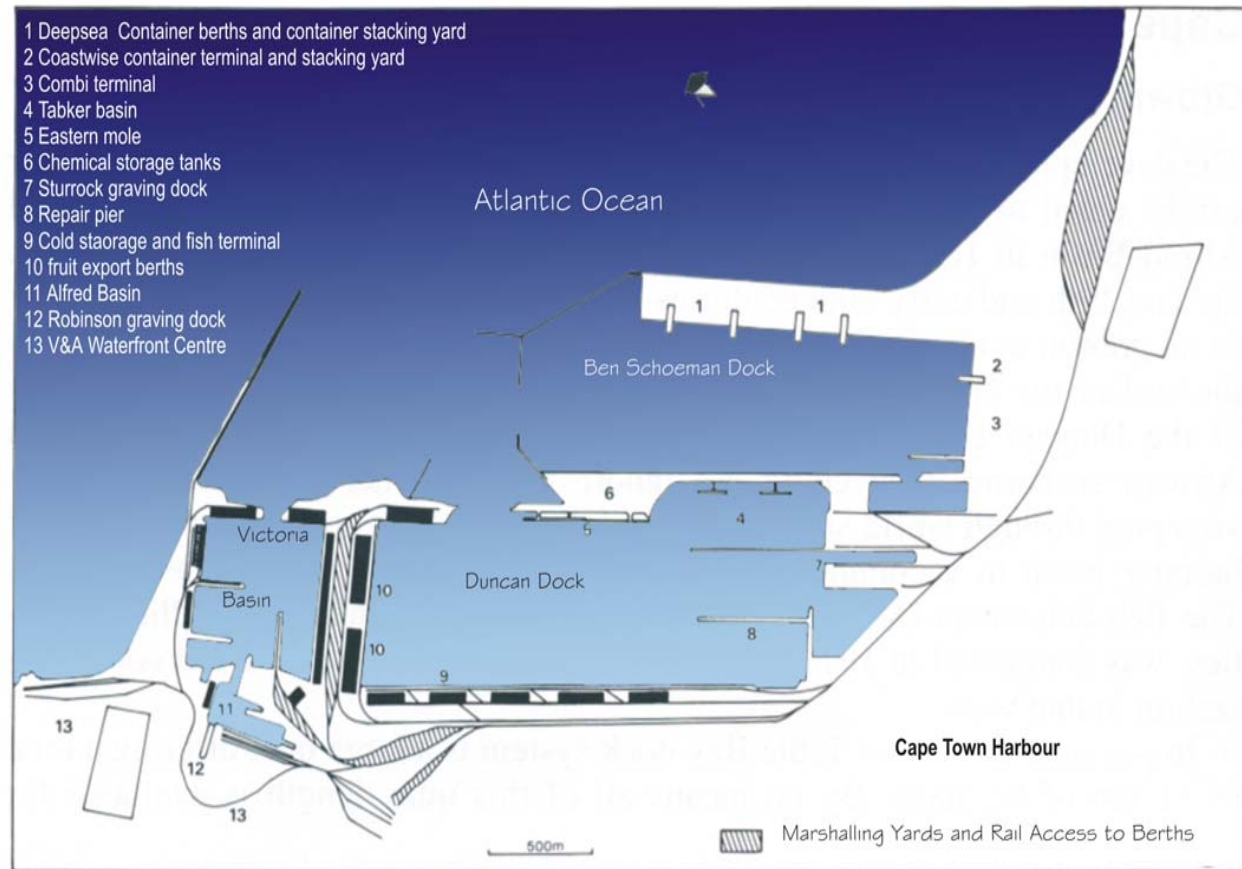
Thus while Durban has captured a larger share of the increasing cargo cake, the tonnages handled by the three Cape ports have fallen by about 30% from some 14 million tons per year in the 70s to 10 million in the 80s.

10.2.1 Cape Town

The development of protected port facilities at Cape Town's Table Bay Harbour can be dated to mid- Victorian times with the commissioning of the enclosed Alfred Basin in 1870. Construction of the larger Victoria Basin started in the late 19th and beginning 20th centuries. The port was to move closer to its present configuration during the 1930s when quays were constructed to the east to the original Victorian dock system, culminating in the completion of the Duncan Dock in 1945. The relatively deep water (up to 15m at berths) and an absence of length restrictions are maintained at the V & A Docks. Finally when it became clear that southern African sea borne trade could not ignore the container revolution that was sweeping through the world shipping from the late 1960s, construction of an outer harbour basin to accommodate a dedicated container terminal was initiated. The Ben Schoeman Dock, together with its landside container handling facilities, was completed in 1977 in time for the official adoption of full containerization in that year. In the same manner additional facilities would have to be created in order to accommodate the high traffic congestion problem within the city from the surrounding suburban areas.

In physical terms, the Table Bay dock system is a large one, offering a total of 11km berthage. The hovercraft ferry terminal would be shared with the Robben Island Ferry Terminal. Official approval of the use of the Mandela gateway terminal has been given. These waterfront areas have been subjected to recent property development via the Victoria and Alfred Company, renovated into major tourist attraction with various facilities such as the shops, restaurants, a hotel and maritime museum.

Fig 10.3 Cape Town Harbour
Altered. The Ports of Sub Saharan Africa and their Hinterlands: An overview. .



Statistics South Africa South Africa Census 96			
Table 1			
Gender and Population group by Geographical areas for Person weighted			
	Blouberg Strand	Table View	Total
Male			
African/Black	242	28	270
Coloured	183	15	198
Indian/Asian	5	12	17
White	526	2243	2769
Unspecified	7	44	51
Total	963	2342	3305
Female			
African/Black	201	43	244
Coloured	262	48	310
Indian/Asian	8	10	18
White	529	2347	2876
Unspecified	6	52	58
Total	1007	2500	3507
Total			
African/Black	443	72	515
Coloured	445	64	509
Indian/Asian	13	22	35
White	1056	4589	5645
Unspecified	13	96	109
Total	1970	4842	6812

Figures greater than 0 and less than 5 are randomised to preserve confidentiality

Created on 2003/02/24

Space-Time Research Web page: www.str.com.au

Space-Time Research Online support: support@str.com.au

SuperCROSS. Copyright © 1993-2003 Space Time Research Pty Ltd. All rights reserved.

Table 11.1 Gender and Population Group
Statistics SA. 1996.

The residents of Tableview and Bloubergstrand fall within the catchment area of possible commuters who would use the Hovercraft Ferry Services in order to commute between home and work. The relevant total commuters is approximately 6810. This total includes all age groups and would thus not be able to represent the economically active group. It is assumed the economically active group would be between the ages of 20 and 65 (the usual retirement age). Hence a more appropriate total number of possible commuters could be 4450.

Statistics South Africa South Africa Census 96			
Table 1			
Age by Geographical areas for Person weighted			
	Blouberg Strand	Table View	Total
0 - 4	160	344	504
5 - 9	121	334	455
10 - 14	130	274	404
15 - 19	113	267	380
20 - 24	184	278	462
25 - 29	183	458	641
30 - 34	186	505	691
35 - 39	160	514	674
40 - 44	163	395	558
45 - 49	124	329	453
50 - 54	112	282	394
55 - 59	81	231	312
60 - 64	72	196	268
65 - 69	70	155	225
70 - 74	47	100	147
75 - 79	27	61	88
80 - 84	11	23	34
85 - 89	6	5	11
90 - 94	0	1	1
95 - 99	1	2	3
100 +	0	0	0
Unspecified	20	83	103

Figures greater than 0 and less than 5 are randomised to preserve confidentiality

Created on 2003/02/24

Space-Time Research Web page: www.str.com.au

Space-Time Research Online support: support@str.com.au

SuperCROSS. Copyright © 1993-2003 Space Time Research Pty Ltd. All rights reserved.

Table 11.2 Age Groups
Statistics SA. 1996.

Another consideration is that all these possible commuters are not destined for Cape Town city centre. The following statistic could be achieved from two major sources being from:

Magisterial District of Employment
Traffic Study at Relevant Intersections.

Statistics South Africa South Africa Census 96 Table 1 Magisterial district of employment by Geographical areas for Person weighted, 15-65, Employed			
	Blouberg Strand	Table View	Total
Bellville	123	187	310
Goodwood	37	182	219
Cape	506	1707	2213
Simonstown	14	1	15
Wynberg	32	126	158
Mitchells Plain	4	9	13
Kuilsrivier	7	16	23
Paarl	3	1	4
Stellenbosch	1	7	8
Somerset-West	0	0	0
Strand	0	3	3
Wellington	0	0	0
Bredasdorp	0	3	3
Caledon	0	1	1
Hermanus	0	0	0
Heidelberg	0	0	0
Swellendam	0	0	0
George	0	0	0
Knysna	0	0	0
Mossel bay	1	0	1
Riversdal	0	0	0
Calitzdorp	0	0	0
Ladismith	0	0	0
Oudtshoorn	0	0	0
Uniondale	0	0	0
Ceres	3	0	3
Montagu	0	0	0
Robertson	0	0	0
Tulbagh	0	0	0
Worcester	2	0	2
Hopefield	0	3	3
Malmesbury	25	70	95
Piketberg	0	0	0
Vredenburg	0	1	1
Moorreesburg	0	0	0
Clanwilliam	0	0	0
Vanrhynsdorp	0	0	0
Vredendal	0	0	0
Beaufort-West	0	0	0
Laingsburg	0	0	0
Murraysburg	0	0	0
Prince Albert	0	0	0

Figures greater than 0 and less than 5 are randomised to preserve confidentiality

Created on 2003/02/24

Space-Time Research Web page: www.str.com.au

Space-Time Research Online support: support@str.com.au

SuperCROSS. Copyright © 1993-2003 Space Time Research Pty Ltd. All rights reserved.

Statistics South Africa South Africa Census 96 Table 1 Individual Income (Monthly) by Geographical areas for Person weighted, 15-65, Employed			
	Blouberg Strand	Table View	Total
None	54	60	114
R1 - R200	52	34	86
R201 - R500	49	72	121
R501 - R1000	139	100	239
R1001 - R1500	90	115	205
R1501 - R2500	63	234	297
R2501 - R3500	46	297	343
R3501 - R4500	48	293	341
R4501 - R6000	58	400	458
R6001 - R8000	42	287	329
R8001 - R11000	58	239	297
R11001 - R16000	49	143	192
R16001 - R30000	41	64	105
R30001 or more	23	13	36
Unspecified	4	147	151

Figures greater than 0 and less than 5 are randomised to preserve confidentiality

Created on 2003/02/24

Space-Time Research Web page: www.str.com.au

Space-Time Research Online support: support@str.com.au

SuperCROSS. Copyright © 1993-2003 Space Time Research Pty Ltd. All rights reserved.

Table 11.4 Individual Income
Statistics SA. 1996

The relevant statistics is of those possible commuters whom are employed at :

- Bellville,
- Goodwood,
- Cape,
- Kuilsrivier,
- Paarl

This would amount to a total of 2951 possible commuters.

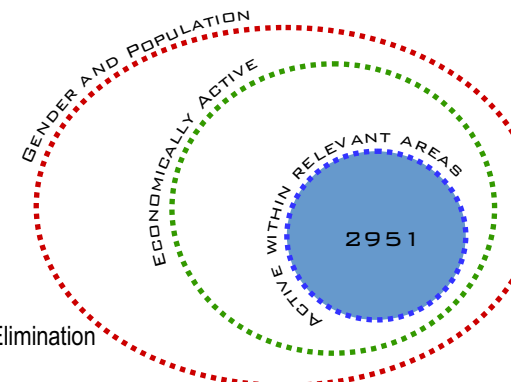


Fig 11.1 Elimination Process.
Author. 2003

	V & A Terminal	Milner Rd	Boundary Rd	Loxton Rd	Race Course Rd	West Coast Rd	Blaauwberg Rd	Sandown Rd
Hovercraft Terminal	21.44 km	14.58 km	12.6 km	11.56 km	9.52 km	4.96 km	4 km	2.74 km
V & A Terminal		6.86 km	8.84 km	3.02 km	11.92 km	16.203 km	17.44 km	20.18 km
Milner Rd	6.86 km		1.98 km	3.02 km	5.06 km	9.62 km	10.58 km	13.32 km
Boundary Rd	8.84 km	1.98 km		1.04 km	3.08 km	7.64 km	8.6 km	9.86 km
Loxton Rd	9.88 km	3.02 km	1.04 km		2.04 km	6.6 km	7.56 km	8.82 km
Race Course Rd	11.92 km	5.06 km	3.08 km	2.04 km		4.56 km	5.52 km	6.78 km
West Coast Rd	16.48 km	9.62 km	7.64 km	6.6 km	4.56 km		0.96 km	2.22 km
Blaauwberg Rd	17.44 km	10.58 km	8.6 km	7.56 km	5.52 km	0.96 km		1.26 km
Sandown Rd	20.18 km	13.32 km	9.86 km	8.82 km	6.78 km	2.22 km	1.26 km	
Melkbostrand Rd	29.42 km	22.56 km	20.58 km	19.54 km	17.5 km	12.94 km	11.98 km	10.72 km

Table 11.4 Distances between Intersections
SD Cunha. 2003.

The distance to travel from Race Course Rd to the Mandela Gateway Terminal would be a marginal difference to travel to the Hovercraft Terminal, and thus could be regarded as a half way mark between the two respective terminals. In terms of these statistics West coast Road, Blaauwberg Road, Sandown Road and Melkbosstrand Road are closer in terms of distance to the Hovercraft Terminal than to the Mandela Gateway Terminal.

	Travelling Return Costs								
	V & A Terminal	Milner Rd	Boundary Rd	Loxton Rd	Race Course Rd	West Coast Rd	Blaauwberg Rd	Sandown Rd	Melkbosstrand Rd
Hovercraft Terminal	R 117.92	R 80.19	R 69.30	R 63.58	R 52.36	R 27.28	R 22.00	R 15.07	R 43.89
V & A Terminal		R 37.73	R 48.62	R 54.34	R 65.56	R 90.64	R 95.92	R 110.99	R 161.81
Milner Rd	R 37.73		R 10.89	R 16.61	R 27.83	R 52.91	R 58.19	R 73.26	R 124.08
Boundary Rd	R 48.62	R 10.89		R 5.72	R 16.94	R 42.02	R 47.30	R 54.23	R 113.19
Loxton Rd	R 54.34	R 16.61	R 5.72		R 11.22	R 36.30	R 41.58	R 48.51	R 107.57
Race Course Rd	R 65.56	R 27.83	R 16.94	R 11.22		R 25.08	R 30.36	R 37.29	R 96.25
West Coast Rd	R 90.64	R 52.91	R 42.02	R 36.30	R 25.08		R 5.28	R 12.21	R 71.17
Blaauwberg Rd	R 95.92	R 58.19	R 47.30	R 41.58	R 30.36	R 5.28		R 6.93	R 65.89
Sandown Rd	R 110.99	R 73.26	R 54.23	R 48.51	R 37.29	R 12.21	R 6.93		R 58.96
Melkbostrand Rd	R 161.81	R 124.08	R 113.19	R 107.57	R 96.25	R 71.17	R 65.89	R 58.96	
Feasibility Radius						4.25m	6.17m	17.44m	
Monthly Savings						R 700,80	R 1 017,92	R 2 877,60	R 2 337,60
Annual Savings						R 7 708,80	R 11 193,60	R 31 653,60	R 25 713,60

Table 11.5 Travelling Costs by Private Vehicle
SD Cunha. 2003.

From these statistics it is able to determine which would be the cheaper means of travelling on a daily basis. Here it is clear that huge savings could be achieved yearly if the option of travelling by hovercraft is chosen over private transport. Currently a return ferry ticket is estimated to cost approximately R40 daily. The feasibility radius is also indicated at each major intersection.

INTERSECTION	AM north	AM south	MIDDAY north	MIDDAY south	PM north	PM south	SATURADAY NORTH	SATURADAY SOUTH
University of Pretoria. Cunha.SD.2003								
Melkbosstrand Road	485	290	169	137	304	396	291	282
Sandown Road	407	613	510	308	435	546	416	620
Porterfield Road	581	937	507	711	992	597	642	680
Blaauwberg Road	556	528	540	572	1374	682	666	843
Marine Road	384	3229	798	968	2139	869	920	1181
Ocean Way Road	666	3250	1118	1028	2763	1043	1210	1250
Racecourse Road	725	2691	1224	1164	3025	1137	1344	1144
Broad Road	668	2009	1234	1144	2632	1129	1217	1117
Loxton Road	801	2152	1475	1233	2943	1203	1302	1209
Boundary Road	888	2366	1480	937	2796	920	1312	1054
Milner Road	712	2326	1347	1005	2924	949	950	713
TOTAL	6873	20391	10402	9207	22327	8874	10270	17210
Average until Racecourse Rd	543	1648	695	698	1576	752	628	857

Table 11.6 Traffic Study: Amount of cars passing through the intersection
SD Cunha. 2003.

The Traffic study gives an indication of the amount of exact commuters which travel daily. All intersections together have an average of 1612 cars travelling through daily during peak hours, i.e AM south, and PM north. During the weekend the amount of commuters is approximately halved. It is assumed that an average of 10% of the vehicles travelling through are heavy duty vehicles, or trucks.. These will thus not make use of the ferry service available daily. Thus a total of 1450 possible commuters is achieved. Another assumption is that a maximum of 50% of these possible commuters would make use of the Hovercraft ferry service, i.e being 725 ferry service commuters. Since the establishment of the Ferry Terminal is based on the traffic congestion problem on the roads, it is fair to say that this would be a correct and fair estimation of the possible commuters.

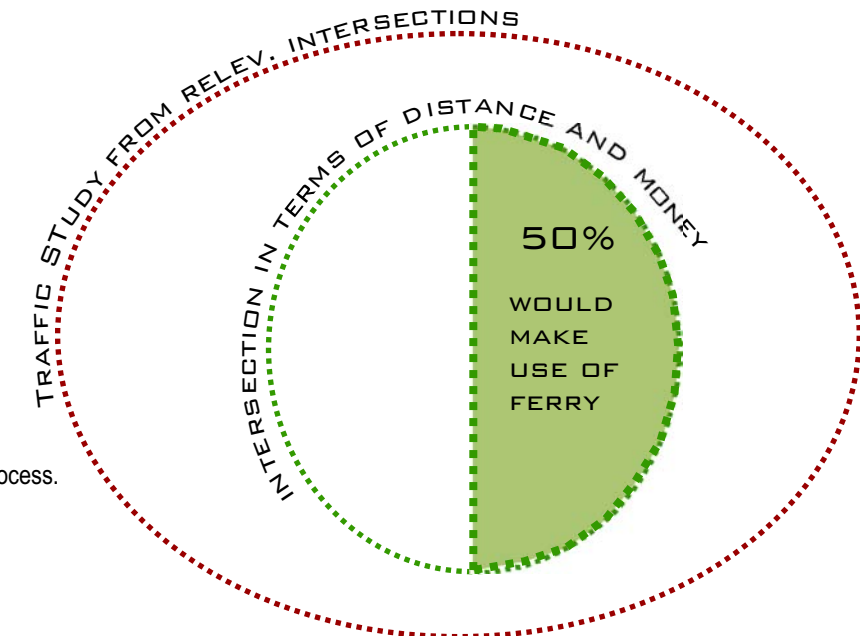


Fig 11.2 Traffic Elimination Process.
Author. 2003

HOVERCAPE INTERPRETATIVE CENTRE HOVERCRAFT TERMINAL

Part 1

BRIEFING OUTLINE



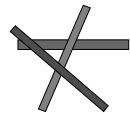
Part 2

BASELINE CRITERIA



Part 3

TECHNICAL RESOLUTION



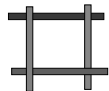
Part 4

DESIGN DISCOURSE



Part 5

FEASIBILITY ANALYSIS



Part 6

DESIGN DOCUMENTATION



Index

1.1.Occupant Comfort	49
1.1.1 Lighting	49
1.1.2 Thermal Control	49
1.1.2.1 Ventilation	49
1.1.2.2 Climate and Site Analysis	49
1.1.2.3 Thermal Design Strategies	51
1.1.2.4 Envelope Thermal Resistance	51
1.1.2.5 Heating Design Strategies	51
1.1.2.6 Cooling Design Strategies	51
1.1.2.7 HVAC System	52
1.1.3 Acoustics	52
1.1.3.1 Acoustic Schematic Design Strategies	52
1.1.4 Views	53
1.1.5 Access to Green Outside	54
1.2 Inclusive Environments	55
1.2.1 Public Transport	
1.2.2 Routes	
1.2.3 Toilet and Kitchen Facilities	
1.3 Access to Facilities	57
1.3.1 Childcare	57
1.3.2 Banking	57
1.3.3 Retail	57
1.3.4 Residential	57
1.4 Participation and Control	58
1.4.1 Participation and Control	58
1.4.2 Social Spaces	58
1.5 Education, Health and Safety	59
1.5.1 Education	59
1.5.2 Security	59
1.5.3 Safety	59
1.5.4 Health	60

2.1 Local Economy	61
2.1.1 Local Contractors	61
2.1.2 Local Building Material Supply	61
2.1.3 Outsource Oppurtunities	61
2.1.4 Repairs and Maintenance	61
2.2 Efficiency of Use	62
2.2.1 Useable Space	62
2.2.2 Occupancy	62
2.2.3 Use of Technology	62
2.3 Adaptability and Flexibilty	63
2.3..1 Vertical Dimension	63
2.3.2 Internal Partitions	63
2.3.3 Services	63
2.4 Ongoing Costs	64
2.4.1 Maintanance	
2.4.2 Cleaning	
2.4.3 Security	
2.4.4 Insurance/Water/Energy/Sewerage	
3.1 Water	65
3.1.1 Rain water	65
3.1.2 Water Use	65
3.1.3 Grey Water	65
3.1.4 Run Off	65
3.1.5 Planting	65
3.2 Energy	66
3.2.1 Location	66
3.2.2 Ventilation	66
3.2.3 Heating and Cooling Systems	66

3.2.3.1 Phase Change Cooling	66
3.2.3.2 Hollow Core Slab	67
3.2.4 Appliances	68
3.2.5 Energy Sources	69
3.2.5.1 Wave and Tidal Energy Production	69
3.3 Recycling and Re-use	70
3.3.1 Organic and Inorganic Waste	70
3.4 Site	71
3.4.1 Brownfield Site	71
3.4.2 Vegetation	71
3.4.3 Landscape Input	71
3.5 Materials and Components	72
3.5.1 Upper Floors	72
3.5.2 External Walls	73
3.5.3 Roofs	74
3.5.4 Floor Finishes and Coverings	75
3.5.5 Substructural Floor System/ Floor Surfacing	78
3.5.6 Windows and Curtain Walling	79
3.5.7 Internal Walls and Partitioning	80
3.5.8 Suspended Ceiling	80
3.5.9 Doors	82
3.5.10 Internal Paint Finishes	83
3.5.11 Insulation	84
3.5.12 Landscaping and Hard Surfaces	85
3.5.13 Smart Materials	86

List of Figures

List of Figures

- Fig 1.1: Site Scale: Berms Serving as Wind Breaks
- Fig 1.2: Possible Shading Devices
- Fig 1.3.1: Seasonal Sun Angles
- Fig 1.3: External Shading; Inside Out
- Fig 1.4+1.5 Acoustic Wall Section
- Fig 1.6: Views
- Fig 1.7: Site Views
- Fig 1.8: Green Outside Spaces
- Fig 1.9: Parking Facilities
- Fig 1.10: Toilet and Kitchen Facilities
- Fig 1.11: Access to Facilities
- Fig 1.12: Education, Health and Safety
- Fig 3.1 Water System
- Fig 3.1.2 Water System
- Fig 3.2: Day-Night Cooling Cutting Edge of Sustainability; Cutting Edge of Sustainability
- Fig 3.3: Hollow Core System Cutting Edge of Sustainability; Cutting Edge of Sustainability
- Fig 3.3.2 Building Climatic Strategy Systems
- Fig 3.4: Fluorescent Lights, Living Spaces
- Fig 3.5: Single Lever Faucet; Living Spaces
- Fig 3.6: Tidal Point Absorber; Cutting Edge of Sustainability
- Fig 3.7: Danish Tidal Point Absorber; Cutting Edge of Sustainability
- Fig 3.8: Tidal Point Absorber Placement; Aerial Photo.2000
- Fig 3.9: Bricks; Living Spaces
- Fig 3.10: Sod Roof Example; Living Spaces
- Fig 3.11: Piping within Floor Slab; Living Spaces
- Fig 3.12: Use of Glass; Living Spaces
- Fig 3.13: Doors; Living Spaces
- Fig 3.14: Paints; Living Spaces
- Fig 3.15: Insulation; Living Spaces
- Fig 3.16: Landscaping Living Spaces

List of Tables

List of Tables

- Table 3.1: Altered Upper Floors ; The Green Guide to Specification
- Table 3.2: Altered Cavity Walls; The Green Guide to Specification
- Table 3.3:Cladding The Green Guide to Specification
- Table 3.4:Pitched Roofs; The Green Guide to Specification
- Table 3.4 Soft Floor Finishes; The Green Guide to Specification
- Table 3.4 Hard Floor Finishes; The Green Guide to Specification
- Table 3.5 Substructural Floor Systems; The Green Guide to Specification
- Table 3.6: Windows; The Green Guide to Specification
- Table 3.7: Non-Load Bearing Partitioning; The Green Guide to Specification
- Table 3.8: Load Bearing Partitioning; The Green Guide to Specification
- Table 3.9: Demountable Partitioning; The Green Guide to Specification
- Table 3.10: Suspended Ceiling; The Green Guide to Specification
- Table 3.11: Doors; The Green Guide to Specification
- Table 3.12: Internal Paint Finishes; The Green Guide to Specification
- Table 3.13: All Insulations; The Green Guide to Specification
- Table 3.14: ZODP Insulation; The Green Guide to Specification
- Table 3.15: Hard Landscaping; The Green Guide to Specification

The quality of the building itself as well as that of the surrounding environment will have an effect on the commuters as well as the visitors of the centre. A comfortable space is a prerequisite since it is expected that a person or commuter would be spending a significant amount of time within the building each day. The additional advantage of the site is that it is located next to the ocean and the sea smell and sounds of the crashing waves has a therapeutic and almost calming effect on people. Various aspects determine the degree of human comfort and the most relevant for my project will be discussed in detail.

1.1.1 lighting

All the working environments of the building would be well day lit, since the facility would mostly be used during the day. A minimum of 10% of the floor area of each space shall be provided with natural lighting. If the building is excessively dark and one has to depend on artificial lighting, the atmosphere and mood of the commuters and working staff would become almost depressive, - as it would be to live or work in a basement. The Interpretive Centre, shall have spaces where the people can control the amount of daylight entering within the space or room, which they are using.

Ideally artificial lighting should only be used for evening purposes. By providing sufficient daylighting within the building, another common problem is averted, that is, the expulsion of heat from electric lighting additional to that of heat from occupants. Electric lighting is energy intensive and thus sustainable measures within the building have to be made in order not to waste unnecessary energy. The further energy must travel, the more energy is lost, and as electric light is created it also brings about twice as much heat per unit of light to the space as daylighting. Thus energy would be produced or harvested on-site in various forms such as, wave and tidal power. The key here is energy conservation and thus daylighting is more appropriate.

South facing windows give less intense, more even light during the course of the day and minimize solar gain. Maximum usage of the sunlight would be used to illuminate the departure lounge naturally. The north facing windows maximize solar gain and yield a broad range of illumination levels over the course of the day.

Space use will determine the lighting levels (footcandles). Public spaces such as the Departure lounge and the Hoverpad would be illuminated by uniform (ambient) lighting (500lux), while the offices (500lux) as well as the seminar and conference rooms (750lux) would have localized, (task) lighting or a combination of both. The restaurant would require approximately 200 lux and the bathroom a lux level of 100 lux. Appropriate ambient lighting is 450 lux.

Specific control schemes, which could be used for the conference and seminar facilities:

ON-Off switching and daylighting: a photocell senses exactly how much daylight is available and informs the controller which then compensates by switching on electric lights when necessary.

The types of glass used for the façade will also influence the amount of daylighting.

Occupancy sensor switching: A body heat or motion detector switches off the light shortly after it senses the room is unoccupied. This would be installed in rooms in the Interpretive Centre.

There are four major daylight components which would have to be considered when developing a daylight design-sunlight, light from the sky, externally reflected light and internally reflected light. The details of the fenestration and room surface finishes must interact appropriately with these four components. Internally reflected light and externally reflected light would have to operate together in certain open spaces such as the Departure lounge. Glare should be avoided in such spaces. Exterior shading devices should effectively reject the sun, yet admit daylight. The sky component is the primary source of daylight. Apertures would be placed in more than one plane of the arrival hall and thus would provide more balanced light. They occur on the northern and western facades additional to the roof lighting apertures.

The internally reflected component plays the major role in illuminating a space. Room surfaces receive the daylight from the apertures and act as secondary sources of illumination. Light-colored surfaces (those with a high, internally reflected component) redistribute the light more evenly throughout the space and maximize the illumination potential. Dark-colored surfaces (those with a low, internally reflected component) absorb the light and reflect little, so that the apertures, in effect, only provide pools of light. Light coloured surfaces would be used in public spaces such as the arrival/departure lounge.(refer to technical documentation)

It is likely that solar power will provide a major share of the renewable energy needed in the future, since solar radiation is by far the largest potential renewable resource. The solar thermal resource serves two energy domains: namely heat and electricity. The problem with solar power is that high capital investment is necessary. To the contrary tidal power is significantly cheaper to install and thus solar power would not be necessary.

A glazing system that eliminates the need for framing with the junction between panes sealed with 10—12 mm of silicon would be used. The importance of this system is that it can achieve a U-value of 0.8 W/m² K that should make it highly attractive for commercial application when coupled with its aesthetic appeal. (Refer to Technical documentation)

Electrochromic glass would also be used in the Departure Lounge. This works by passing a low electrical voltage across a microscopically thin coating to the glass activating a tungsten -bearing electrochromic layer, which can darken in stages. Electricity is only used to change the state of the coating, not to sustain its level of transmittance. About 3 V are needed to effect the change, and this could be provided by the building energy management system or be individually controlled by occupants, allowing for fine-tuning to immediate needs. This system offers several advantages. Foremost is the fact that it can save energy. It avoids overheating and solar glare. Trials conducted in Germany indicated that glass of this kind could save up to 50% of the energy required for air -conditioning. Even when the glass is fully darkened external views are not impaired.

An additional feature is 'hydrophilic' glass in terms of maintenance. This is a self-cleaning glass. Layers are deposited on the glass during the float manufacturing process to produce the photocatalytic characteristics of the glass. After exposure to ultraviolet light in daylight the coating reacts chemically in two ways. First it breaks down organic deposits — tree sap, bird droppings, etc. — by introducing extra molecules of oxygen into the deposit. This has the effect of accelerating the rate of decay. Second, the coating causes the glass to become hydrophilic. This means that droplets of rain coalesce to form sheets of water, which slide down the glass removing dirt particles in the process. The really smart aspect of the product is that the coating stores enough ultraviolet energy during the day to sustain the process overnight.

The avoidance of cleaning costs, especially for such a building, could offer considerable annual savings, especially where the "glass box" of the Departure Lounge is concerned.

1.1.2 Thermal Control

1.1.2.1 Ventilation

Natural ventilation has to be achieved as far as possible throughout the whole building. Mechanical ventilation should not be fully relied on other than possibly in the bathrooms as well as in the kitchens; even here it would be unnecessary.

Natural ventilation may be achieved by the use of the exposed thermal mass of a building to be cooled by the outside air during the night. Exposed concrete floors are the most effective cooling medium. The cooling stored in the fabric, is released as radiant cooling or an air stream directed over surfaces during the day. Vents or windows/openings are opened at night to admit the cool air into the building. During the day, warm air is vented to the atmosphere. The fact that it is radiant cooling may allow the air temperature to be slightly higher than the norm while still maintaining comfort conditions. The system is optimized if there is cross-ventilation and internal solar gains are kept to a minimum.

The goal is to reach an effective comfortable temperature of 21°C -24°C through a balanced use of supporting systems. Offices and conference facilities would have a ventilation rate of 8 L/sm², while the public spaces would have 5 L/sm².

1.1.2.2 Climate and Site Analysis

People tend to be comfortable within a fairly narrow range of temperature and relative humidity called the comfort zone. This zone can be extended by providing wind and shade when temperatures are lower, and by adding moisture when the humidity is low. It is possible, by analyzing the site's seasonal sun and wind patterns, to place the building and outdoor spaces to take advantage of the site's climatic conditions.

1.1.2.3 Thermal Design Strategies

Site-scale strategies:

Windbreaks would be used to protect the building without shading it during the winter; neighbouring buildings could achieve this.

Trees would be used for shading during the overheated months for outdoor spaces and parking areas.

Ventilation air would be pre-cooled by allowing the wind to pass over damp vegetation and ocean, through shaded areas

Building-scale strategies:

Higher internal gains zones are on the cooler side of the building; e.g. The hover pad

At least 5% of the floor area would be provided with openable windows.

Cross ventilation would be promoted.

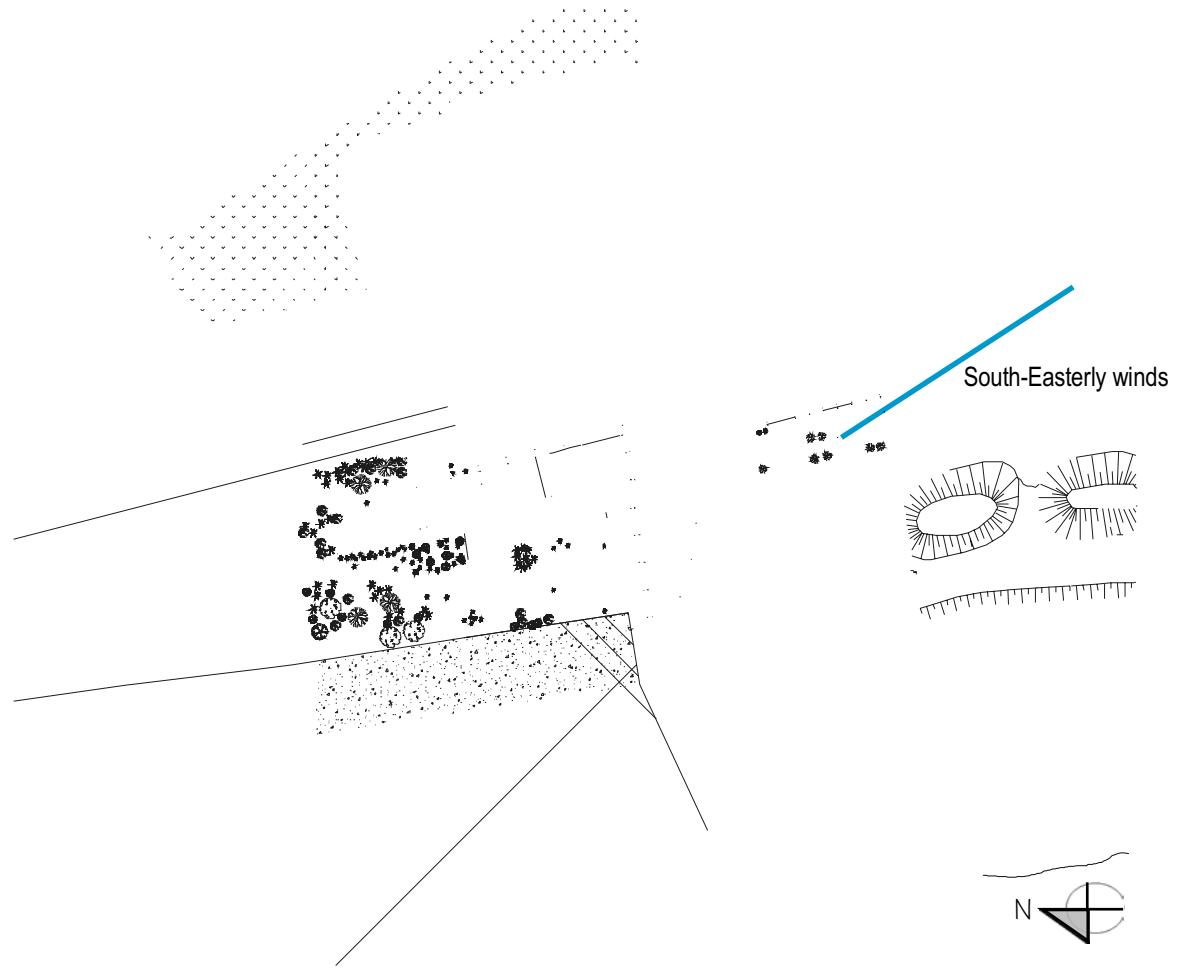
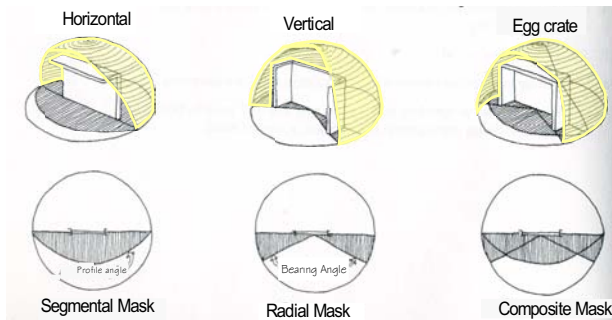


Fig 1.1: Site Scale: Berms serving as wind breaks



Component scale shading strategies:

- S: vertical
- SE: Vertical
- E: Egg-crate
- NE: Horizontal or egg-crate
- N: Horizontal or egg-crate
- NW: Horizontal or egg-crate
- W: Egg-crate
- SW: Vertical

Fig 1.2: Possible Shading Devices

1.1.3 Acoustics

There are 3 major sources of sound on site, the traffic (cars, shuttle buses, hovercraft), the sea, and the building itself. It is further sub-divided into a point source or linear source of sound. The level of intensity drops 6 decibels with each doubling of the distance from a point source and 3 decibels with each doubling of distance from the line source. The hovercraft would be a line source of sound and would play a major role in the sound insulation of the interpretative center and arrival hall. The plant room and services spaces would have to be acoustically absorbent in order to limit the dissemination of sound to the rest of the building.

1.1.3.1 Acoustic Schematic Design Strategies

Site scale strategies:

- Natural and manipulated landforms would serve as additional sound barriers and absorbers.
- Sound could be absorbed with dense vegetation
- Unwanted sounds would be masked with pleasant, naturally occurring sounds (ocean etc.)

Building scale strategies:

- Noisiest and quietest spaces are separated i.e. the Terminal and Interpretative Centre.

Component scale strategies:

- Thermally massive walls would be used as acoustic barriers
- Ventilation-acoustic conflicts have to be avoided
- Sound has to be absorbed and prevent reflective echoes with absorptive materials in spaces such as the seminar and conference rooms.
- Sound would be absorbed with acoustic materials in the ceiling plane and walls.
- Vertical, hanging acoustic panels would be used in the ceiling when it must be thermally massive or when it must be exposed for aesthetic or daylighting purposes.

Acoustic walls will extend from floor to ceiling to prevent sound leaking over the wall

Rooms may be classified acoustically as being “dead” “neutral” or “live”.

“Live” rooms have predominantly hard surfaces such as wood, masonry, plaster, glass, concrete, and metal. Public spaces such as the arrival and departure halls would be classified as “live” spaces. These hard surfaces are acoustically reflective so that sounds created in the room stay “alive” for a long time by bouncing off the surfaces. Reflected sounds also tend to blend with new sound in a “live” room. Rooms that are live seem exciting.

“Dead” rooms have predominantly soft surfaces such upholstery, drapes, acoustic tiles, carpets, gypsum and people. Timber panels could also be installed in order to increase sound absorption. The soft surfaces are acoustically absorptive so that sounds created in the room are not reflected. Sounds in “dead” rooms are distinct and clear. Rooms that are “dead” seem excessively quiet and relaxing. “Dead” spaces would entail offices, seminar and lecture halls.

“Neutral” rooms seem neither “live” nor “dead”. Refer to the Technical Documentation on sound Attenuation Calculations.

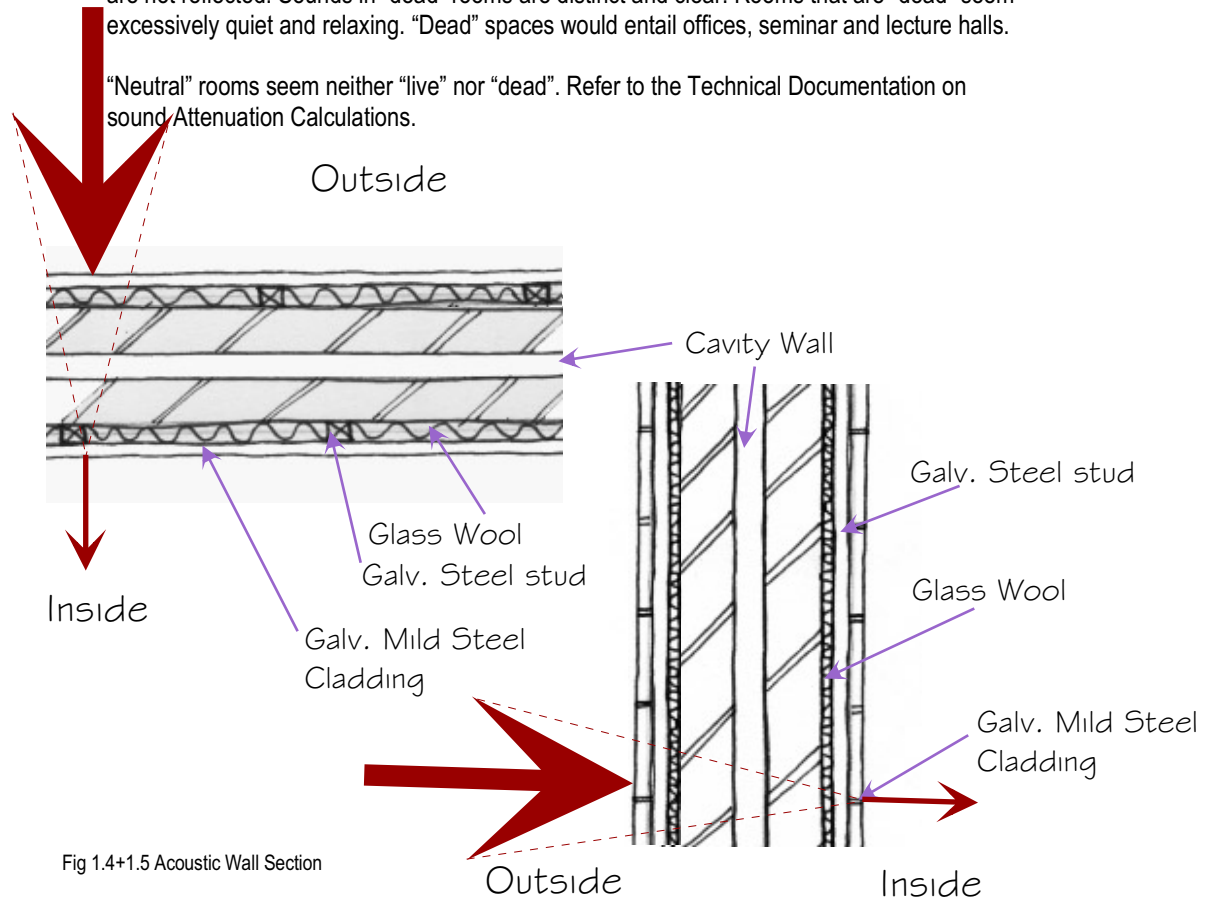


Fig 1.4+1.5 Acoustic Wall Section

1.1 Occupant Comfort

1.1.5 Access to Green Outside

The commuters as well as the visitors of the building will be in constant access with naturally vegetated areas. It is imperative that the Interpretive center has a link with the surrounding environment since the center is geared in an environmental and historical/social manner.



Fig 1.8: Green Outside Spaces

Social criteria

The building itself is designed to accommodate a range of needs. It will accommodate various people as well as various functions and services. The spaces surrounding the building would support sustainability since they would contain additional services and functions from the terminal building.

1.2.1 Public Transport

The terminal building is important in terms of public transport. A parkade able to accommodate about 400 vehicles would be adjacent to the terminal building on the eastern side of the site. The parkade would be camouflaged in such a way that it would seem to be a natural dune as well as being vegetated. During weekends when the commuter facility is not extensively used; the parkade would serve as parking for beach goers or even serve as additional parking to the other facilities in the surrounding areas, such as the hotel or shopping centre.

The other form of public transport, which would be accommodated on site, is the shuttle bus services, large bus facilities as well as “short term kiss and ride”. There are 8 designated spaces for the shuttle buses (parallel along the building), 3 large bus spaces (parallel along the building), 36 staff parking, and 62 -drop off/ pick up spaces (also parallel along the building). Wheelchair parking is also provided.



Fig 1.9: Parking Facilities

1.2.2 Routes

All movement would radiate from a central point, that is, entrance Hall, either in the southerly direction to the Hovercraft Ferry and then in a northerly direction towards the Interpretive center. Level changes are kept to a minimum between the spaces. In order to maintain the integrity of the building, it has three main sections and between these; a level change would be defined. These level changes would be wheelchair navigable by means of ramps of a 1:12 fall.

1.2.3 Toilet and Kitchen Facilities

Sufficient toilet facilities are to be provided for commuters as well as interpretative center visitors. Two separate toilet facilities are provided on either side of the Entrance Hall. A Coffee Kiosk would serve the ferry commuters and a Restaurant would be provided in the Interpretive Block.



-  Toilet Facilities
-  Kitchen Facilities

Fig 1.10: Toilet and Kitchen Facilities



1.3 Access to Facilities

Living and working patterns require access to a range of facilities and services. The established community's needs within the Big Bay area would be provided for, with easy accessibility. This may minimise the environmental impact, which a family living in this area, would have.

1.3.1 Childcare

It is proposed that childcare facilities are to be provided relatively close to the terminal building. The designated site is the northern vacant site 11A. Childcare facilities are needed for the numerous commuters who have 9 -5 employment in the city. These people would use the Hovercraft Ferry and drop off and pick up their children after work. The presence of this facility will further encourage the use of the terminal services and contribute to its success.

1.3.2 Banking

An ATM facility would be provided within the building but more extensive banking facilities would be established within the surrounding Big Bay development area.

1.3.3 Retail

Retail facilities would form part of the Big Bay Development. Again these facilities would be used by the daily commuters on a day -to-day basis.

1.3.4 Residential

Residential blocks have been assigned to blocks across the Otto du Plessis Drive. The Terminal building is located between Table View and Bloubergstrand, which has a large residing population.

Fig 1.11: Access to Facilities

- Childcare Facilities
- Retail Facilities
- Banking Facilities



Social criteria

The terminal building depends on the public for their support and thus excluding them from the design process would be destructive to the development. The input of the community may generate care and concern by the residents for the development. This in turn would promote productivity. The community would further have access to teaching facilities of the interpretative center.

1.4.1 Environmental Control

The users of the building should feel comfortable, that is, it should be habitable. The environment of the building would be controlled manually, while mechanical control would be kept at a minimum. Windows would be openable and there would be constant direct contact with the outside environment and natural spaces.

1.4.2 Social Spaces

The Departure Lounge and Entrance Hall is where social interaction would be at a peak level. Facilities provided are a coffee kiosk with seating as well easy access to toilet facilities. The restaurant facility is provided in the Interpretive block. Vending machines and newspaper stands would be located in the lounge area.

1.5 Education, Health and Safety

The building needs to cater for the well being, development and safety of the people that use it. A safe environment would have to be provided to reduce any incidences, and first aid help should also be available. Access to information and learning would create a competitive work force. This would ensure that people remain healthy as well as economically active.

1.5.1 Education

Seminar and conference facilities are to be provided at the disposal of the community. Courses would be offered in order to educate the public and visitors on the surrounding area, mainly BCA, in terms of history and the natural and biological environment. On the western courtyard, alongside the Interpretive Centre Controlled vegetation would serve to educate the public in terms of indigenous vegetation. This would allow the students and visitors to be able to be in direct contact with all the species present in this area.

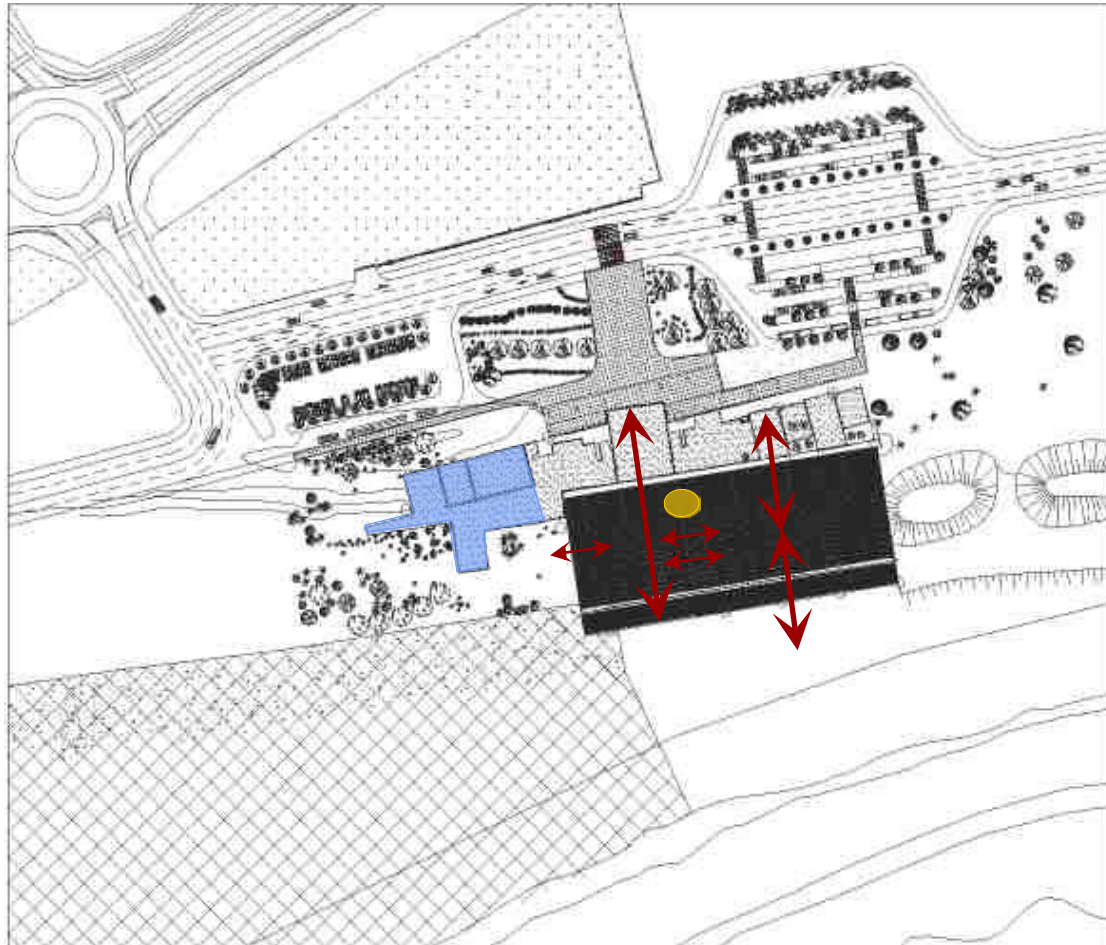
Reading material such as newspapers would be available for commuters in the departure lounge, keeping them informed and educated on local and international affairs.

1.5.2 Security

Measures are to be taken in order to ensure the safety of commuters as well as visitors. Routes in and around the building are to be safe and well lit. Clear visual links are established between the various spaces. The various parking areas are located close to the main building.

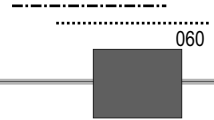
1.5.3 Safety

The secured safety of the public is of utmost importance. The safety of the commuters as well as the safety of the public and beach goers has to be dealt with in such a way that a view of the traveling hovercraft is maintained. Two dune piers would border the route of the hovercraft onto the beach and directly into the building. This would ensure the safety of the public on the beach and offer them a view of the ocean.



- Educational Facilities
- Security Points
- Visual Links

Fig 1.12: Education, Health and Safety



1.5.4 Health

Good health can be defined as a state of complete physical, mental and social well-being. This working environment will have a major influence on an individual's well-being. The concept of comfort is synonymous with well-being and studies of "sick buildings" have drawn a connection between poor comfort conditions and symptoms of ill-health in the occupants and users.

Attributes of a healthy life include a clean, safe environment; time for rest and recreation; as well as a having a fulfilling job. The effects on health of allowing sunlight and daylight to enter a building, and air to ventilate spaces, is apparent and almost common sense.

A healthy environment would be maintained within the building. Thermal control would be at an optimum using a minimum of mechanical heating in order to maintain the optimal temperature in spaces. Natural ventilation would be promoted. Windows would be openable and the summer screening would also be controllable. Floor finishes may not contain or emit any harmful contaminants. The health of the planet and the health of those who live in it and in the case of the construction industry, those who manufacture building products, construct buildings, or occupy them - are intrinsically linked.

The energy conservation requirements for controlled sunshine, good daylight; natural ventilation, individual control and materials of low embodied energy are all those factors that foster good health and well being.

2.1 Local Economy

The phenomenon of the global economy is now so entrenched and so much part of our way of life and existence that it precludes viable self-sustaining communities in any socially and economically interconnected context. Designers, specifiers, manufacturers and contractors in the building industry should set up and follow principles for sustainability. The management and construction of the building can have a major impact on the economy of the area. This project will stimulate the economy in this area and will be sustained by the various buildings that make use and develop the local skills and resources.

2.1.1 local Contractors

Contractors from the nearby areas within Cape Town, and the local community would be employed.

2.1.2 Local Building Material Supply

Sand, cement, bricks and stone would be locally supplied and to a certain extent manufactured locally. Again the materials have to be manufactured in a sustainable manner and not emit poisonous gases. It is now generally realized that many of the resources once thought of as infinite will within decades become exhausted or uneconomical to extract. Thus high-embodied energy material would be avoided. Materials such as stone, wood, steel and bricks would be the main building materials.

2.1.3 Outsource Opportunities

Provision would be made for creating opportunities for small emerging local businesses. Catering, cleaning and security services may be outsourced as well as making office space available for businesses or even individuals to use in order to generate a monthly income. Single offices would be at the disposal of visiting lecturers at a part-time or hot desking period, for the means of preparing lectures or others.

2.1.4 Repairs and Maintenance

All repairs and maintenance of the building and services will be assigned to local contractors. The building materials and service units would be selected in terms of low maintenance. For example "self cleaning" glass would be used in order to minimize maintenance in that respect. Materials would be mechanically or chemically treated in order to survive the Mediterranean ocean climate, in order to prolong its life and in order to decrease maintenance.

Buildings cost money and make use of resources whether they are used or not. Efficient use of the building spaces and the building as a whole would support sustainability, and thus additional needs for more buildings would be eliminated. Thus the hot desking system for the office spaces are efficient.

2.2.1 Useable Space

Non-usable spaces such as plant rooms and WC's should not compose of more than 20% of the total area of the building. Non-usable space is at 11,5% of the total area.

2.2.2 Occupancy

The aim is that all working and living spaces are occupied for a minimum of 30 hours per week. This means an average of 4.2 hours per day. This target is truly minimal and the ferry service would be in operation for at least 14 hours per day for commuters alone. Additional to this service is that of the interpretative facilities and restaurant. The office spaces are also expected to be occupied for approximately 8 hours per day during the week.

2.2.3 Use of Technology

The conference facilities provided would support sustainability, since additional buildings do not have to be built for conference means. Conference rooms would also be fitted with projector facilities. Technologically advanced wall mounted information boards would be used for the ferry services as well as for general information.

2.3 Adaptability and Flexibility

Most buildings have a long life span and thus it is important that the uses within the building be adaptable.

2.3.1 Vertical Dimension

The structural dimension minimum for sustainability is 3m. Most spaces require a high floor to ceiling height, such as the Hover Pad (min 9m), Departure Lounge and Entrance Hall. The conference facilities and seminar rooms have to accommodate a height optimal for acoustic purposes.

2.3.2 Internal Partitions

Internal partitions are to be erected in office spaces. This would allow for variations within the office spaces.

2.3.3 Services

Service spaces are easily accessible in case of maintenance and repair.

2.4 Ongoing Costs

2.4.1 Maintenance

As stated earlier materials would be specified in order to achieve low maintenance costs. Among the low maintenance elements to be selected is glass and steel.

2.4.2 Cleaning

Measures would be taken to limit the requirements for cleaning of certain materials and elements. Hard wearing solid floors would be used since it is a public building and is expected to be readily used. The windows would be easily accessible for cleaning and as mentioned before the need to clean the windows would be minimal since "self cleaning" would be used.

2.4.3 Security

One of the measures of limiting security would be to have clear sight lines and views. The outside or perimeter spaces of the building is to be well-lit and thus ensuring the safety of the visitors as well as that of the commuters.

2.4.4 Insurance/Water/Energy/Sewerage

A policy would have to be implemented in order to reduce the consumption of energy and also to monitor the energy usage within the building. The pigmentation of the glass can be monitored and adjusted manually and the water and heating systems would also have to be monitored.

3.1 Water

Water is required for many purposes and since the site is located next to a water body one would think that there is no problem with water supply. The issue here is that water should be conserved and recycled, no matter how much water one thinks one has at their disposal- basically living and working sustainably is the only option. Rainwater should be captured, stored and in turn used for certain functions, for example, sanitation. Reducing the water consumption supports sustainability by reducing the environmental impact required to deliver water and its disposal after its use.

3.1.1 Rainwater

Rainwater would be harvested and then stored in underground water tanks to be further distributed to the building.

The minimum monthly rainfall: 15mm
The maximum monthly rainfall: 93mm

Approximate Roof Catchment Area: 4780.6m²
This would mean that a minimum volume of 71.7m³ (71 700 liter) of water could be stored, while a maximum of 444.6m³ (444 600ltr) could be stored. Harvested water would solely be used for sanitary purposes. In turn the grey water would be used for landscaping. The landscaping would be sufficient since only organic detergents would be used.

An approximation of ferry commuters was 700 and approximately 20 staff members. When the conference facilities are fully booked an approximate number of 130 people are expected.

The approximate water consumption would be 23ltr per person per day, Thus a maximum of 19 550 litres of water per day would be needed. Municipal water costs between R1.00 and R2.30 per m³.

The harvested water can supply a maximum of 70% of required water needed for the building, thus a cost saving of approximately R1 022.58 could be made per month on water alone.

Typical water consumption for intensive landscaping range between 0.6 and 1.3m³/m² per annum.

Rainwater would require a collection filter after which the water would then move to the storage tanks. Water would then move to the distributor where the water would be directed to the flush cisterns.

The storage tanks are located underground and made of concrete. Overflow will lead to the drainage system and would be protected against backflow. An additional pump would also be needed in order to maintain the sufficient pressure.

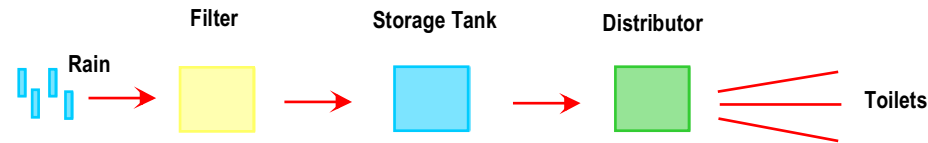


Fig 3.1 Water System

3.1.5 Planting

Planting that occurs on site as well as the vegetated artificial dunes are all low water requiring, indigenous plant species. This would also enhance the integrity of the building within its environment. The dunes surrounding the building would also be vegetated.

3.1.2 Water Use

Water efficient devices such as low flush toilets would be used as well as other water efficient appliances.

3.1.3 Grey Water

Grey water would contain organic detergents which are not harmful to the environment and be filtered and used for landscaping purposes. The addition of gypsum or compost to the landscape would additionally neutralize the chemicals within the water (sodium etc).

3.1.4 Runoff

Having pervious or absorbent surfaces reduces runoff. The building is within a natural setting and almost seems as though it is totally enveloped by vegetated dunes.

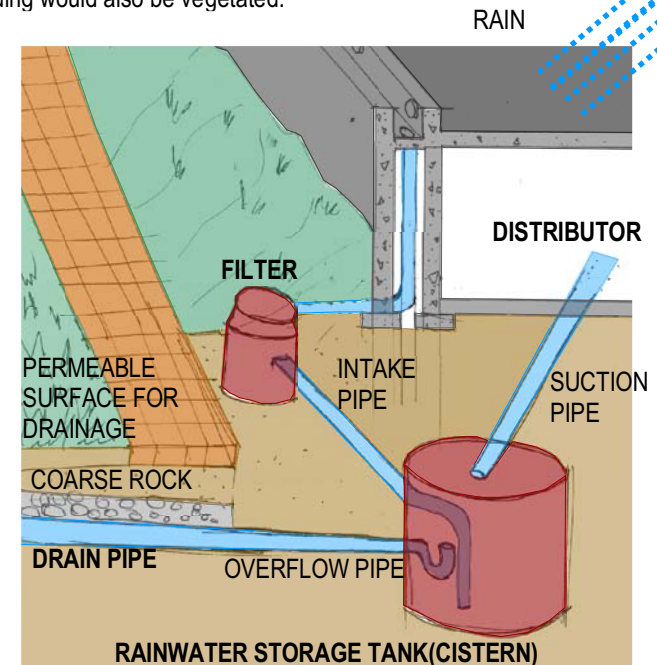


Fig 3.1.2 Water System
Author

Buildings consume a lot of energy and provision would have to be made in order to generate additional energy. Making use of recycled or renewable energy such as wind or sunlight will contribute highly to sustainability.

3.2.1 Location

The building could be described as a node of public transport and thus contributes to sustainability. Public buses and taxi areas are also provided. A shuttle bus service is made available to the commuters and thus less energy is spent on fuel for private cars.

3.2.2 Ventilation

Natural ventilation would be promoted as far as possible. At least 50% of the windows would be openable and thus promote cross ventilation. The restaurant at the interpretative center is partly outdoors.

3.2.3 Heating and Cooling Systems

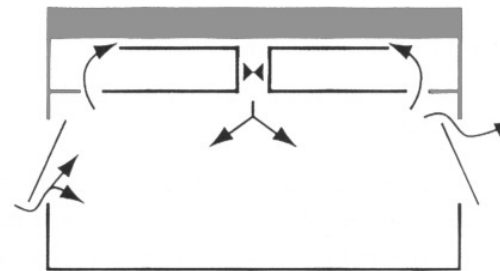
3.2.3.1 Phase Change Cooling

A phase change System is used in the ceiling voids as well as in the floor slabs while thermal mass is used within the walls in order to control the climate within the building.

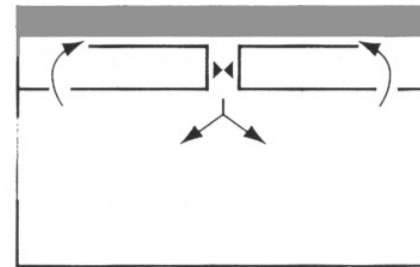
A phase change material (PCM) is one, which changes its state from solid to liquid when subjected to heating and vice versa when cooled. Water is the obvious example. When it changes from a solid (ice) to a liquid it absorbs large amounts of heat before it shows any increase in temperature. A PCM, which changes its state at temperatures around the range for thermal comfort, is ideal for moderating temperature in buildings. It is a highly energy efficient system, using only a fraction of the energy consumed by conventional air-conditioning. It is a system particularly suited to temperate climates where a few degrees of cooling can achieve a comfortable air temperature.

The system draws daytime warm external air over an array of fluid-filled heat pipes. The pipes conduct heat to storage modules containing a solid PCM. The PCMs located in the ceiling void absorb the heat as they slowly melt during the day, providing cool ventilation air.

During the night the opposite occurs. Cool air draws over the PCMs causing the material to solidify. The heat generated in the process is dumped outside the building. The whole operation works on the principle that latent heat is stored in the PCMs. Their temperature hardly changes throughout the cycle since it is their latent heat capacity, which brings about the change in air temperature.



Night – use ambient air to cool slab



Day – cooled slab reduces air temperature

Fig 3.2: Day-Night Cooling
Cutting Edge of Sustainability

3.2.3.2 Hollow Core Slab

Precast concrete floors with integral connected ducts can effectively move either cool or warm air throughout the building. The air is in contact with the thermal capacity of the concrete before entering the occupied space. The soffit of the slab should be exposed to effect maximum heat exchange with the occupied area.

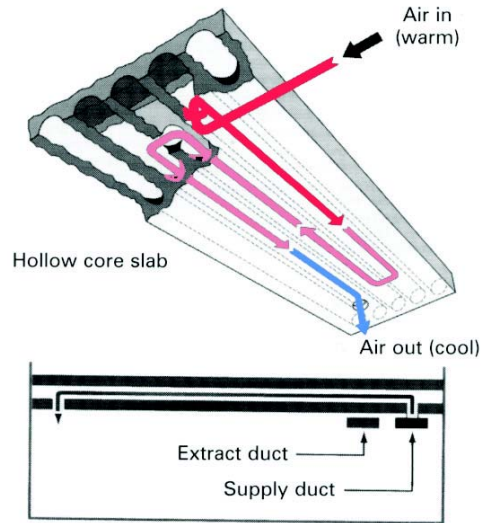


Fig 3.3: Hollow Core System
Cutting Edge of Sustainability

The hollow core principle would be used in winter where piping within the hollow floor would occur. This is known as Hydronic floor heating where hot water would flow through copper pipes or high density polypropylene providing radiant heat. The hot water flowing through the pipes would be heated by means of a boiler.

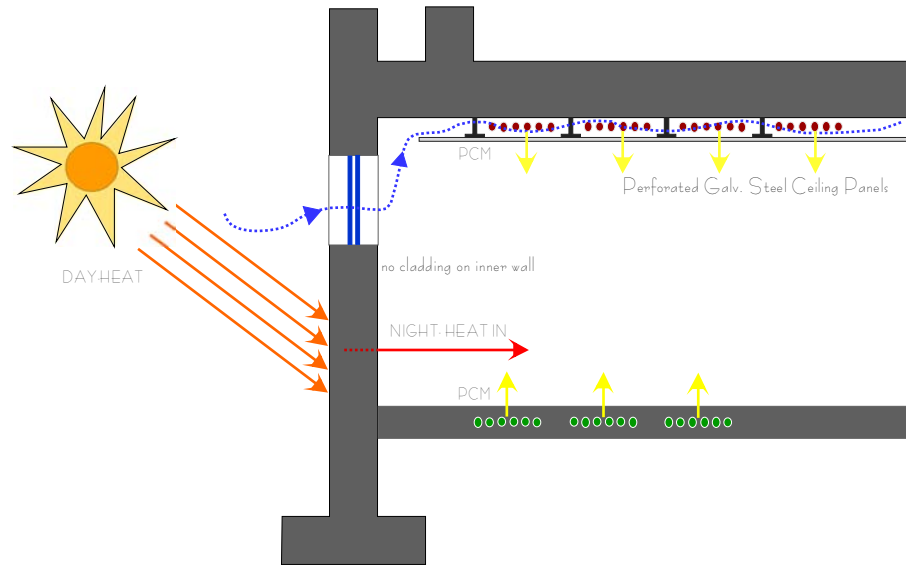


Fig 3.3.2 : Building Climatic Strategy Systems
The Author

3.2.4 Appliances

Appliances and fittings which make it easier to save water use flow restrictors, where less water flows from the faucet, and an additional aerator which would make the flow feel plentiful. Single lever faucets also save water since the optimum temperature can be adjusted. A typical showerhead uses 26.5 litres of water per minute while the water saving model uses 5.6 litres per minute. Water efficient toilets, which use about 3 -6litres of water per flush, would also be used.

Energy efficient fittings and lighting appliances such as compact fluorescent lamps produce six times the amount of light with eight times the lifespan of conventional incandescent lamps.



Fig 3.4: Fluorescent Lights
Living Spaces



Fig 3.5: Single Lever Faucet
Living Spaces

3.2.5 Energy Sources

3.2.5.1 Wave and Tidal Energy Production

Maritime nations have a huge advantage in the energy resource in the form of waves. The average wavelength is around 120m and, in high seas, a wave carries about 100kW/m of potential energy. These are systems, which are focused on a nodal form of absorbing energy of the waves to generate electricity. The Offshore Wave Energy Converter (OWEC) consists of a floating buoy (A) attached to the seabed by "elastic" moorings enabling it to exploit the motion of the waves. The buoy height is 5m and the diameter 5 -10m and requires a water depth of 40 -50m. Attached to the buoy is a vertical tube or acceleration tube (B) of a length of around three times the diameter of the buoy up to 25m. Within the acceleration tube there is a free moving piston (C), which has a restricted stroke to prevent overloading of the system. The principle is that the buoy moves vertically against the damping mass of the water in the acceleration tube under the buoy. The relative movement between the buoy and the water mass in the tube is transferred by the piston (D) into the energy conversion system consisting of a hydraulic pumping cylinder, which, via a hydraulic motor drives the generator (E). This system converts 30 - 35% of the energy of the waves into electricity. Clusters of these buoys would make a plant and generate over 200kW, sufficient to support a small suburb. Various buoys would align the path of the hovercraft along the ocean.

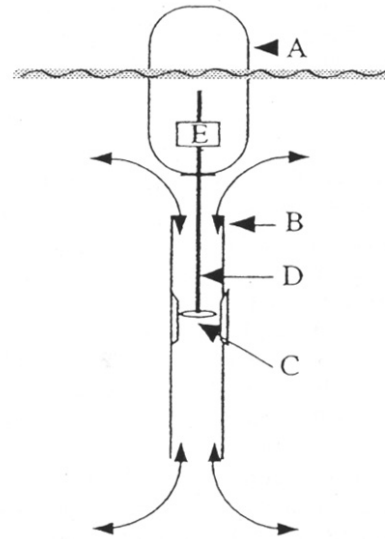


Fig 3.6: Tidal Point Absorber Cutting Edge of Sustainability

The relative movement between the buoy and the water mass in the tube is transferred by the piston (D) into the energy conversion system consisting of a hydraulic pumping cylinder, which, via a hydraulic motor drives the generator (E). This system converts 30 - 35% of the energy of the waves into electricity. Clusters of these buoys would make a plant and generate over 200kW, sufficient to support a small suburb. Various buoys would align the path of the hovercraft along the ocean.

Another type of Danish energy point absorber employs a float connected by a polyester rope to a suction cup anchor. The rope is connected to a hydraulic actuator within the float that pumps fluid into a high-pressure hydraulic accumulator. A hydraulic fluid provides the return stroke from a low-pressure accumulator. As the waves create motion within the float, a pressure difference between the high and low pressure accumulators build up. The pressure difference drives the hydraulic motor and generator. A system with a 5m diameter would have a rated output of 20-30kW

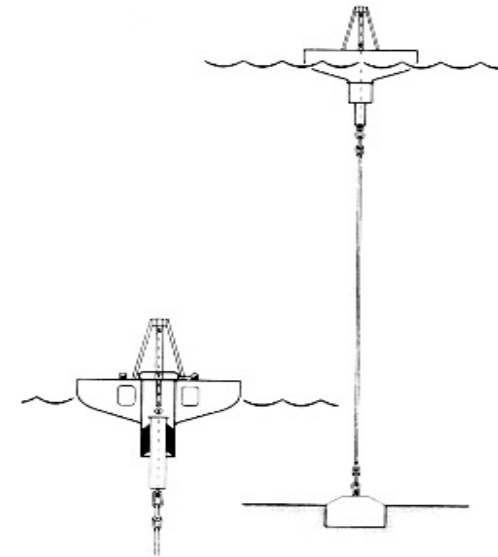


Fig 3.7: Danish Tidal Point Absorber Cutting Edge of Sustainability

The Tidal Absorber buoys would be placed along the path of the hovercraft for a distance extending to Table View. The energy would be transferred from the buoy to a switch room within the Terminal building by means of an electric wire which is encased within a concrete pipe beneath the ocean floor.



Fig 3.8: Danish Tidal Point Absorber Placement Aerial Photo 08.11.2000

3.3.1 Organic and Inorganic Waste

Sorting of the different types of waste as well as temporary storage would occur on site and there after picked up and then recycled off - site.

The building has a fairly large footprint but currently the site is being bulldozed and no/ very little vegetation exists on the site. What is to be done is to replace as much vegetation as possible back onto site. Natural vegetation and dunes will mostly envelop the building. On the eastern side of the building it would appear as though the building is underground and that it partially protrudes its roofs. This would indeed contribute to sustainability by helping create and maintain an environment that supports life.

3.4.1 Brownfield Site

As mentioned earlier the building is situated on a site, which has been disturbed to such an extent, that very little vegetation exists as a result of the bulldozers leveling the site. It is sustainably correct to designate the Terminal building on this site since it is already disturbed.

Fig 3.8: Portion of Site



3.4.2 Vegetation

The site has minimal vegetation, which has survived, and thus extensive effort is made to replant. Planting would occur in parking areas and sod roofs. Planting would also occur at the parkade building in order to camouflage its existence from the eastern side, contributing to the integrity of the natural eastern façade. Another form of planting is the use of the dune slopes on the southern side of the building as well as the dunes on the beach, which emphasize the hovercraft travel path.

3.4.3 Landscape Input

The landscaping would not require extensive insecticides or pesticides and heavy artificial fertilizers because indigenous vegetation would be planted and so they would thrive in the environment in which they grow.

The construction of buildings usually requires large quantities of materials and components. These materials may contain a high embodied energy (energy to produce, transport etc.). Their development may also require processes that are harmful to the environment and consume non-renewable resources. Reference is made to The Green Guide to Specification where various materials are ranked between A and C, according to environmental impact. A equals least environmental impact/ or good environmental performance, with B and C ratings increasing in their environmental impact.

Environmental issues related to building material production are:

- Climate change: Global warming or greenhouse gases
- Fossil Fuel Depletion: coal, oil or gas consumption
- Ozone Depletion: Gases that destroy the ozone layer
- Human Toxicity: Pollutants that are toxic to humans
- Waste Disposal: Material sent to landfill or incineration
- Water extraction: Mains, surface and ground water consumption
- Acid Deposition: gases that cause acid rain
- Ecotoxicity: Pollutants that are toxic to the ecosystem
- Summer Smog: Air pollutants that cause respiratory problems
- Mineral Extraction: Metal Ores, minerals and aggregates

3.5.1 Upper Floors

Functional Unit: 1m² of upper floor construction, to satisfy building regulations, capable of supporting a live load of 2.5kN/m² and dead load of 1.85kN/m² and including any additional beams to span between supports. These figures include repair, refurbishment or replacement over a 60-year period.

Concrete floors are the only viable option when it comes to commercial applications. Precast units can reduce the mass of a floor structure greatly while still maintaining a high floor load. Thus hollow or lightweight systems give the best environmental option. High mass concrete floors are the poorest performers in terms of the environment. The use of pulverized fuel ash (PFA or fly ash) and ground granulated blast furnace slag (GGBS) within concrete is widespread and have small environmental impacts and their use in concrete and as a aggregate has significant benefit in decreasing its embodied environmental impacts. New blended cements contain up to 30% of PVA a by-product of coal-fired electricity generation. This use of PVA has the further advantage of avoiding landfill costs while also reducing the need to quarry natural aggregates such as gravel.

Recycled crushed concrete has been used for some time for low-grade applications like road construction. It is now being heralded as being suitable for less-demanding structural elements.

Upper Floors	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Hollow Precast Reinforced Slab and Screed	A	A	A	A	A	A	A	A	A	A	A	565	60	A	C	C	A
Solid Prestressed Composite Floor	C	C	C	A	C	C	C	A	C	A	C	1080	60	C	A	C	A

Table 3.1: Altered Upper Floors
The Green Guide to Specification

3.5.2 External Walls

Perhaps more than any other decision the decision of the external wall specification is subject to a wide range of considerations in a practical, economic, and visual sense.

Natural stone with a blockwork inner leaf as well as cast concrete walls provide a heavyweight construction of good environmental performance. This is primarily because stone is a minimally processed material. Additionally brickwork has a comparably low A rated environmental impact

Stainless steel cladding profiles extremely well, combining the benefits of lightweight cladding together with good recycling attributes and gives a relatively low embodied energy and pollutant emission.



Fig 3.9: Bricks Living Spaces

Cavity Wall																		
Element	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Brickwork outer leaf, insulation, blockwork inner leaf, plaster/ concrete walls	A	A	A	A	A	C	A	A	A	A	A	A	660	60	C	A	B	A
Natural stone outer leaf, insulation, blockwork inner leaf, plaster	A	A	A	A	A	C	A	A	C	B	A	B	6912	60	C	A	A	B

Table 3.2: Altered Cavity Walls The Green Guide to Specification

Cladding																		
Element	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Aluminium profiled double skin cladding, galvanised steel fixing rail, insulation	A	B	A	A	A	A	A	A	A	A	B	A	288	60	B	A	A	A
Aluminium framed opaque insulated glazed curtain walling system	C	C	B	A	C	A	A	B	B	C	A	A	7800	60	C	A	C	B

Table 3.3:Cladding The Green Guide to Specification

3.5.3 Roofs

As a general rule, specifications with low mass and minimal industrial processing achieve good environmental profiles. Pitched timber framed roofs with clay, natural slate, or concrete tiles produce the smallest environmental impacts because of the light weight nature of the overall construction. However this option would not be viable under these circumstances and thus light weight steel systems would provide the next best solution. This roofing material would be cold rolled. The metal contains a highly recycled material content. Aluminium or steel roof sheeting would contain a polyurethane or PVC coated finish in order to protect it from corrosion. Aluminium roof sheeting has good anti-corrosion properties, good durability and good tensile strength.

Sod Roofs would also be used at certain parts of the building, which has previously been indicated already.

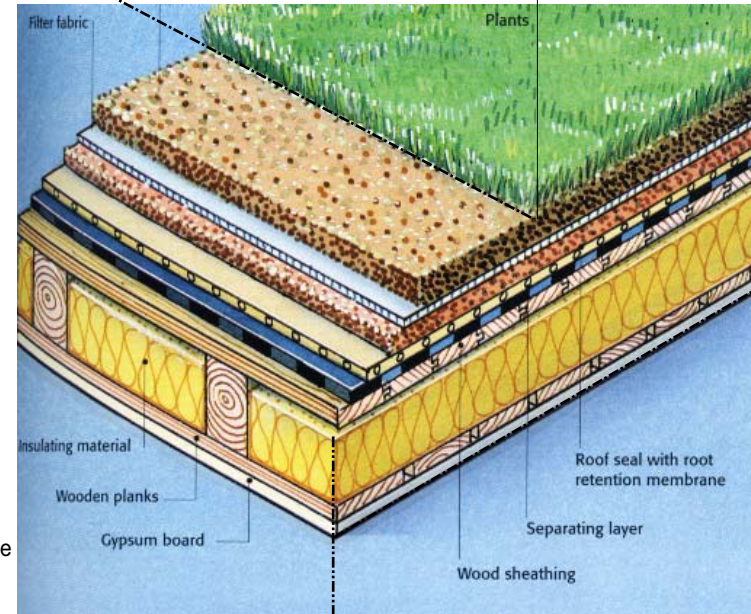


Fig 3.10: Sod Roof Example Living Spaces

Pitched Roofs	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Double skin profile roof, coated outer and inner aluminum skin, insulation on steel roof structure	A	A	A	A	A	A	A	A	A	A	B	A	720	60	A	B	B	A
Polymer/resin bonded slates, battens, sarking felt on timber roof structure with insulation between rafters	C	C	C	A	C	A	A	C	C	C	B	A	972	60	C	C	C	C

Table 3.4: Pitched Roofs
The Green Guide to Specification

3.5.4 Floor Finishes and Coverings

Floor finishes have been indicated as a major source of VOC emissions, which can have an effect on the indoor air quality. One has to first establish whether rooms require hard or soft floor finishes, depending on whether the material needs to be cleaned or whether a particular visual, acoustic or comfort-related qualities is a priority.

Hard floor finishes include timber, sheet and tile materials.

Of the hard floor finishes, those derived from natural materials requiring minimum processing appear to perform very well, even where the floor may be uneven and needs to be sheathed with hardboard before applying the surface material.

Compared to other floor finishes, timber performs as one of the best options in all its forms, strip or block.

A number of hard tile floor finishing materials perform well over the life cycle because of their durability.

The entrance, restaurant, exhibition area and hover pad are to be hard surfaces.

Table 3.4 Hard Floor Finishes
The Green Guide to Specification

Hard Floor Finishes																		
Element	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication*	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Ceramic floor tiles	A	A	A	A	A	A	A	A	A	A	A	C	264	60	C	C	C	A
Hardwood (25mm)	A	A	A	A	A	A	C	A	A	A	A	A	576	60	C	A	B	A

Table 3.4 Soft Floor Finishes
The Green Guide to Specification

Soft Floor Finishes																		
Element	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication*	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Wool carpet, recycled rubber crumb underlay	A	A	A	A	A	B	A	A	A	A	A	A	312	60	A	B	C	C
80/20 wool/nylon carpet, recycled rubber crumb underlay	A	A	B	A	A	B	A	A	A	A	A	A	372	60	A	B	C	C

Soft floor finishes include carpets and mattings.

Wool carpets tend to produce the best results. This is due to them being basically natural materials requiring the minimum of industrial processing. The poorest performers are carpets with sponge/foam underlays/backings. Carpets can perform well, provided they are used with natural fibre or recycled rubber underlays. A wool carpet on natural fibre or recycled rubber crumb underlay is the best carpeting option overall.

The seminar rooms, designated as soft spaces.

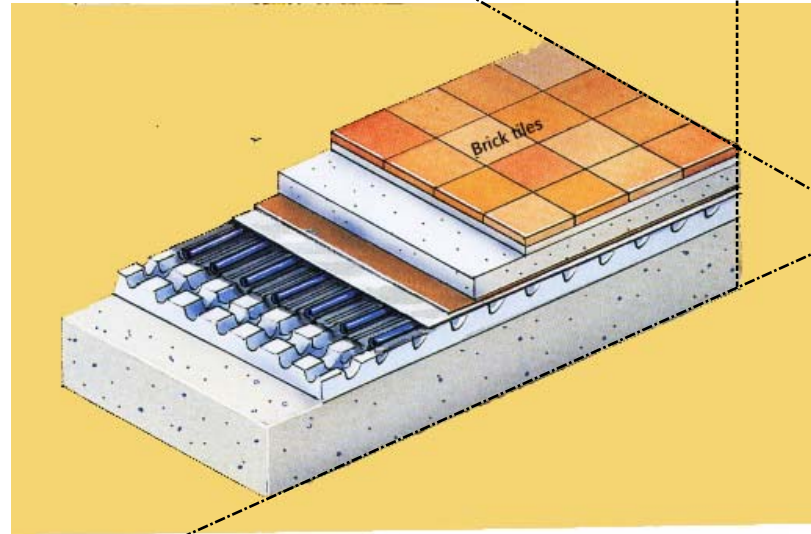


Fig 3.11: Piping within Floor Slab
Living Spaces

Topmost layer:
Tiles in a thick mortar setting.

Intermediate Layer

Subflooring, sheet metal cladding, heating/cooling pipes, insulation panels

Supporting Layer:

Reinforced Concrete

3.5.5 Substructural Floor Systems/Floor Surfacing

These systems are useful as raised “computer floors” commonly used to provide access for power and IT connections. The ratings have shown that the best performing are to be timber systems with the chipboard/ galvanized steel decking performing intermedia tely. The cheapest and well performing raised flooring is plywood on timber battens with an A rating and costing approximately R396 per m². Two other options are stated below where the plywood option is the more favourable.

Table 3.5 Substructural Floor Systems
The Green Guide to Specification

Substructural Floor Systems/ Floor Surfacing	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toixity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication`	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																		
Shallow raised flooring system- hardwood on galvanised steel profile decking	A	A	A	B	C	A	C	A	B	C	B	B	312	60	C	A	A	C
Shallow raised flooring systems- chipboard on glavanised steel profile decking	B	B	B	A	A	B	C	B	A	A	B	B	372	60	A	B	B	B

3.5.6 Windows and Curtain Walling

Timber windows are found to have the lowest embodied energy impact option due to timber being a natural product requiring relatively low energy levels in manufacture. The steel and aluminium windows perform intermediately in achieving B ratings and may be needed in large spaces such as the Departure lounge. The environmental profile of glass shows a clear advantage over the use of polycarbonates, which require high levels of energy in manufacture and record poor emission levels.

Triple Planar glass is a glazing system that eliminates the need for framing with the junction between panes sealed with 10 –12 mm of silicon. The importance of this system is that it can achieve a U-value of 0.8 W/m² K that should make it highly attractive for commercial application when coupled with its aesthetic appeal.

Electrochromic glass marketed as Econtrol works by passing a low electrical voltage across a microscopically thin coating to the glass activating a tungsten-bearing electrochromic layer which can darken in stages. Electricity is only used to change the state of the coating, not to sustain its level of transmittance. About 3 V are needed to effect the change, and this could be provided by the building energy management system or be individually controlled by occupants, allowing for fine-tuning to immediate needs.

This system offers several advantages. Foremost is the fact that it can save energy. It avoids overheating and solar glare.

Trials conducted in Germany indicated that it can save up to 50% of the energy required for air-conditioning. Even when the glass is fully darkened external views are not impaired.

'Hydrophilic' glass is a self-cleaning glass, which goes under the name of Pilkington Activ. Layers are deposited on the glass during the float manufacturing process to produce the photocatalytic characteristics of the glass. After exposure to ultraviolet light in daylight the coating reacts chemically in two ways. First it breaks down organic deposits — tree sap, bird droppings, etc. — by introducing extra molecules of oxygen into the deposit. This has the effect of accelerating the rate of decay. Second, the coating causes the glass to become hydrophilic. This means that droplets of rain coalesce to form sheets of water, which slide down the glass removing dirt particles in the process. The really smart aspect of the product is that the coating stores enough ultraviolet energy during the day to sustain the process overnight. The avoidance of cleaning costs, could offer considerable annual savings, especially where atria are concerned.



Fig 3.12: Use of Glass Living Spaces

Table 3.6: Windows
The Green Guide to Specification

Windows	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Painted preserved softwood timber framed window/ curtain walling	A	A	A	A	A	A	A	A	A	B	C	A	2220	60	C	A	B	C
Aluminium framed window/curtain walling	B	C	B	A	C	A	A	C	A	A	A	A	2820	60	A	A	A	A

3.5 Materials and Components

3.5.7 Internal Walls and Partitioning

Internal walls and partitioning may be transparent, translucent or opaque, may achieve particular fire resistance or may provide particular acoustic qualities.

Three basic partitioning is distinguishable mainly:

Loadbearing partitioning

Timber stud partitions used in a loadbearing capacity would probably be the best environmental option due to low mass and use of low impact materials.

Non-loading partitioning

The lowest impact specification here would be both the timber and steel stud partitions. The glass blockwork performs the worst due to the thickness and high mass of the material and the very high energy levels required in the manufacturing processes.

Demountable partitioning

Demountable partitions can be seen to have advantages and disadvantages. Over the life of a building, demountable partitioning may be more flexible in use and may need a lower rate of renewal because it can be reused in a new location. It may also be perceived as temporary and hence be replaced at a greater frequency.

Non-Loadbearing Partitioning		Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication`	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																			
Steel stud, plasterboard, glass wool insulation, paint		A	A	A	A	A	A	A	A	A	A	B	A	480	60	C	C	C	C
"Frameless" glazed partitioning system, silicon jointed, aluminium base channel		A	A	A	A	B	A	A	A	B	A	A	A	2940	60	C	A	C	C

Table 3.7: Non-Load Bearing Partitioning
The Green Guide to Specification

Loadbearing Partitions		Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication`	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																			
Aerated blockwork partition, plasterboard on dabs, paint		A	A	A	A	A	A	A	A	A	A	A	A	492	60	B	B	B	B
Reinforced concrete		C	A	A	A	B	C	B	A	A	A	A	A	960	60	A	A	A	B

Table 3.8: Load Bearing Partitioning
The Green Guide to Specification

Demountable Partitions		Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication`	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																			
Aluminium framed, plasterboard panels with cardboard honeycomb core, paint		B	B	B	A	B	A	A	B	A	A	A	A	516	60	C	C	C	A
Vinyl finish chipboard panels with flaxboard core, aluminium framing		C	C	C	C	A	A	A	C	A	A	A	A	2940	60	A	A	C	A

Table 3.9: Demountable Partitioning
The Green Guide to Specification

3.5.8 Suspended Ceilings

The best performing specifications overall are the plasterboard and gypsum-based systems and the simple plastered soffit, with the worst ratings attributed to the wood/wool systems, one of the heaviest. Suspended systems offer advantages over the traditional plastered soffit, being economic and easy to install method of concealment of building services or of lowering ceilings for visual reasons. Suspended ceilings also offer the advantages of adaptability and can be easily removed.

Table 3.10: Suspended Ceiling
The Green Guide to Specification

Suspended Ceilings	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																		
Suspended ceiling, concealed grid, gypsum based tile	A	A	A	A	A	A	A	A	A	A	A	B	672	60	C	C	C	B
Direct finish: plasterboard on timber battens	A	A	A	A	A	A	A	A	A	A	A	A	252	60	C	C	C	C

3.5.9 Doors

A good performing door includes the fully glazed timber framed doors, due primarily to timber being a low impact product and the relatively low impact of glazing. Other A rating are doors using a softwood core - irrespective of the facing material. The core is therefore a primary determinant of embodied energy impact, the mass of the core being some of 3 or 4 times that of the door facing. Chipboard provides the worst performing alternative.



Fig 3.13: Doors Living Spaces

Table 3.11: Doors
The Green Guide to Specification

Doors	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																		
Plywood faced, softwood core	A	A	A	A	A	A	A	A	A	A	A	A	2264	60	C	A	A	A
Softwood frame, fully glazed with wired glass	A	A	A	A	B	B	A	A	B	A	A	C	4800	60	C	A	B	C

3.5.10 Internal Paint Finishes

Many manufacturers now produce paints that are free of chemicals such as ammonia, formaldehyde and phenols, which, at high levels of exposure, can be irritants and can be causing breathing difficulties. Unused paint, brush cleaning solvents and adhesives should be disposed of in a careful manner during the construction phase. Practices such as cans of unused paint being thrown into site waste containers for landfill or combustion or being poured into public drainage systems, cause pollution or toxic emissions and can be specifically prohibited. As a general principle, paints that utilize water or vegetable oil as a base and are produced using simple processes achieve the best environmental profiles. Top-scoring or preferred paints include linseed oil emulsion paint.



Fig 3.14: Paints Living Spaces

Table 3.12: Internal Paint Finishes
The Green Guide to Specification

Internal Paint Finishes	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Element																		
Matt linseed oil emulsion	A	A	A			A	A	A		A	A	A		5				
Matt solvent-borne paint microvoid resin	C	C	C			A	A	C		B	C	A		5				

3.5.11 Insulation

Insulation is generally very low density material and only small masses are needed to provide high levels of insulation. The use of insulation in the building fabric will significantly reduce the environmental impact from the operation of the building over its lifetime. The functional unit of insulation with a sufficient thickness to provide a thermal resistance value of 1.48 m²K/W, is equivalent to approximately 50mm of insulation with a conductivity of 0.034W/mK. Mainly two types of insulation can be distinguished:

- Insulation including HCFCs
- Zero ozone depletion potential insulation (ZODP)

The best performers overall are the low density variants of rock wool and glass wool while low density expanded polystyrene and ZODP polyurethane (PU) foam can be used where intrinsic strength is required, and both perform well. Cellular glass and ZODP extruded polystyrene provide the poorest performance against most of the chosen environment criteria.

There is an increasing demand for eco-insulation materials that are obtained from natural sources. The most popular up to the present is cellulose fibre derived from recycled newspaper. The material is treated with boron to give fire resistance and protection against vermin infestation. It is suitable for wet-spray or dry blown application. One of the most popular proprietary brands is 'Warmcell'. It has a thermal conductivity of 0.036 W/m K which puts it in the same category as most of the main insulants on the market.

Coming more into prominence is sheep's wool. One of the first buildings to use wool as an insulant uses 200 mm of wool in its cavities. It has to be treated with water-based boron. Natural building products include cellulose fibre, cork and sheep's wool. All these natural materials are hygroscopic, that is, they absorb moisture without any damage to their functional integrity. Water vapour can move through them that makes them ideal for 'breathing' walls, which offer short-term protection against condensation. The big benefit is in offsetting the need for vapour barriers, which are notorious for being at the mercy of operatives on site.



Fig 3.15: Insulation Living Spaces

Table 3.13: All Insulations
The Green Guide to Specification

All Insulations (including those using HCFCs)																		
Element	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Cavity blown glass wool insulation, assumed density 25kg/m	A	A	A	A	A	A	A	A	A	A	A	A	60	60	C	C	C	C
Any foamed insulation (HCFC blown)	C	C	B	C	C	A	A	B	C	C	A	A	120	60	C	C	C	C

Table 3.14: ZODP Insulation
The Green Guide to Specification

Zero Ozone Depletion Potential (ZODP) Insulations																		
Element	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Expanded polystyrene (EPS) density 15kg/m	A	A	A	A	A	A	A	A	A	A	A	A	60	60	C	C	C	C
Recycled cellulose insulation	A	A	A	A	A	A	A	A	A	A	A	A	72	60	A	C	C	C

3.5.12 Landscaping Hard Surfaces

The ratio for parking spaces is approximately 1 space per 25m² of gross floor area commonly used for office developments. These mean the area of hard surfacing can be around 80% of the floor area. These large areas of hard surfacing can obviously have significant impacts on the environment. The best performers are concrete paving specifications and paving slabs. Asphalt performs the worst due to more intensive industrial processing and the need to replace the material more often. A significant part of the embodied energy can be attributed to the hardcore base used beneath the material. The impact can be reduced if recycled aggregates are used. Thus the use of recycled aggregate, for both hardcore and within the concrete will improve the environmental profile of the material, while maintaining quality control of the strength and stability of the material.



Fig 3.16: Landscaping Living Spaces

Landscaping: Hard Surfacing	Summary Rating	Climate Change	Fossil Fuel Depletion	Ozone Depletion	Human Toxicity to Air and Water	Waste Disposal	Water Extraction	Acid Deposition	Ecotoxicity	Eutrophication	Summer Smog	Minerals Extraction	Cost R/m	Typical Replacement Interval	Recycled Input	Recyclability	Recycle Currently	Energy Saved by Recycling
Concrete paving slabs	A	A	A	A	A	A	A	A	A	A	A	A	240	60	C	A	A	A
Asphalt	C	C	C	A	C	C	A	C	C	C	C	A	600	60	C	B	B	A

Table 3.15: Hard Landscaping
The Green Guide to Specification

3.5.13 Smart Materials

According to Philip Ball, associate editor for physical sciences with the Journal *Nature*:

Smart materials represent the epitome of the new paradigm of materials science whereby structural materials are being superseded by functional ones. Smart materials carry out their tasks as a result of their intrinsic properties. In many situations they will replace mechanical operations. We will see smart devices in which the materials themselves do the job of levers, gears and even electronic circuitry. There is even the prospect of a house built of bricks that change their thermal insulating properties depending on the outside temperature so as to maximize energy efficiency.

Materials such as thermochromic glass (darkens in response to heat) come into the general category of *passive* smart materials.

HOVERCAPE INTERPRETATIVE CENTRE HOVERCRAFT TERMINAL

Part 1

Briefing Outline



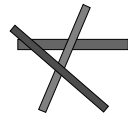
Part 2

Baseline criteria



Part 3

Technical Resolution



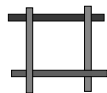
Part 4

Design Discourse



Part 5

Feasibility Analysis



Part 6

Design Documentation



Index

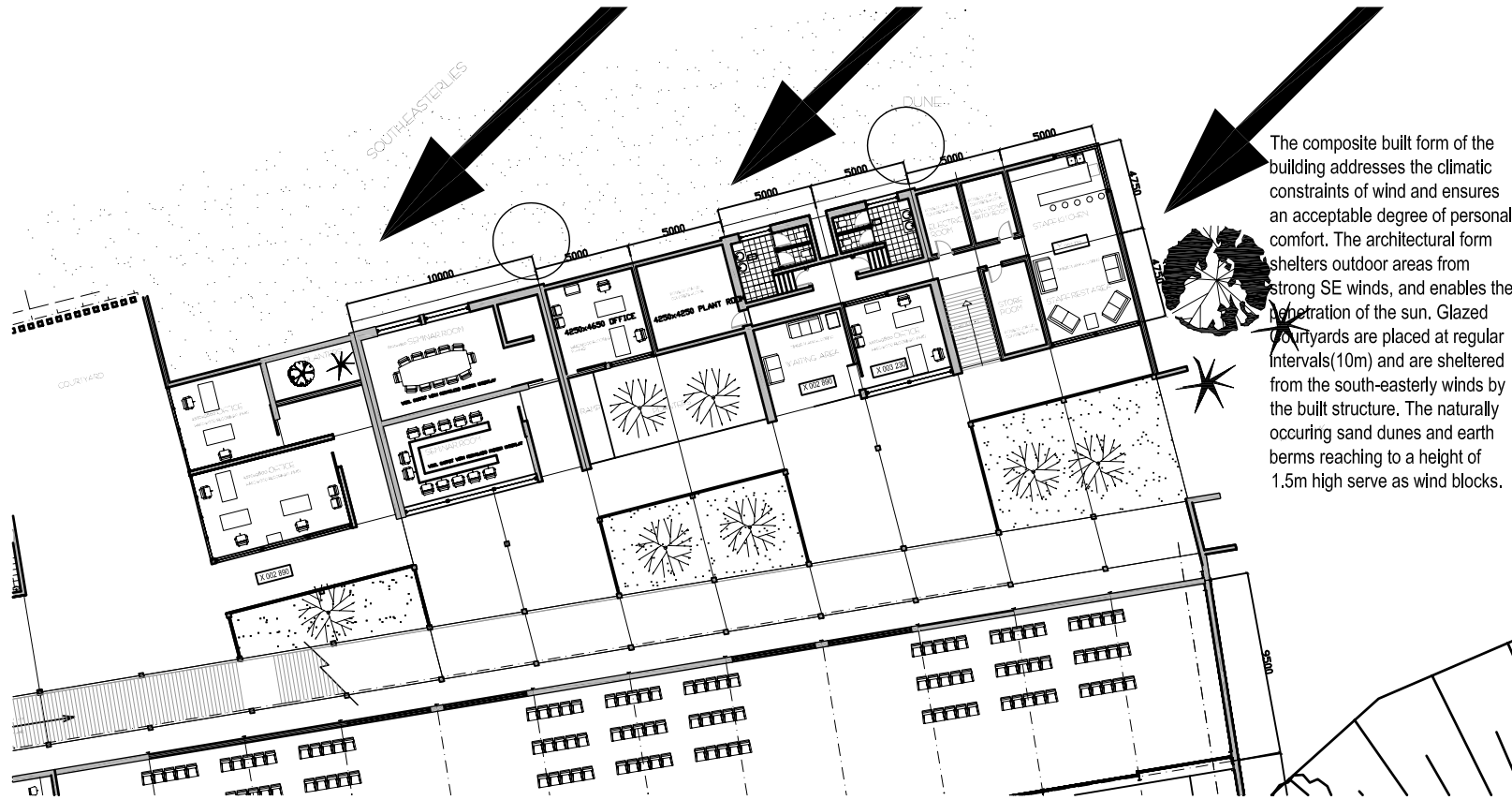
1.1 Climatic Design Strategy	87
1.2 Detail 1: Roof Glazing System	88
1.3 Detail 2: Roof Ventilation	89
1.4 Detail 3: Foundation/Support Juncture	90
1.5 Detail 4: Glazing System	91
1.6 Detail 5: Acoustic Wall System	93
1.7 Detail 6: Hollow Core Floor System	94
1.8 Detail 7: Sod Roof System	95
1.9 Detail 8: Parking Shading System	96

List of Figures

- Fig 1: Detail Plan Indicating Wind Protection. *Sonia Cunha 2003*
- Fig 2 Roof Detail. *Sonia Cunha 2003*
- Fig 3: Roof Lattice Detail. *Sonia Cunha 2003*
- Fig 4: Roof Ridge Section. *Sonia Cunha 2003*
- Fig 5: Foundation. *Sonia Cunha 2003*
- Fig 6: Section A-A of Wall. *Sonia Cunha 2003*
- Fig 7: Section B-B of Wall. *Sonia Cunha 2003*
- Fig 8: 3-Dimensional Representation of Wall. *Sonia Cunha 2003*
- Fig 9: Detail Plan of Wall. *Sonia Cunha 2003*
- Fig 10: Detail Section of Wall. *Sonia Cunha 2003*
- Fig 11: Detail Section of Hollow Core Floor. *Sonia Cunha 2003*
- Fig 12: Detail Section of Sod Roof. *Sonia Cunha 2003*
- Fig 13 Section/Perspective of Sod Roof. *Sonia Cunha 2003*
- Fig 14: Vertical Section of Parking. *Sonia Cunha 2003*
- Fig 15: Horizontal Section of Parking. *Sonia Cunha 2003*
- Fig 16: Hand Sketch Indicating Earth Berms. *Sonia Cunha 2003*

List of Images

- Images 1-3: Admin Block Perspectives. *Sonia Cunha 2003*
- Images 4.6: Roof Perspectives. *Sonia Cunha 2003*
- Images 7-9: Departure Lounge Wall Perspectives. *Sonia Cunha 2003*
- Image 10: Departure Lounge Wall Perspective. *Sonia Cunha 2003*
- Images 11-13: Acoustic Wall Perspectives. *Sonia Cunha 2003*
- Images 14-16: Floor System Perspectives. *Sonia Cunha 2003*
- Images 17-19: Sod Roof Perspectives. *Sonia Cunha 2003*



The composite built form of the building addresses the climatic constraints of wind and ensures an acceptable degree of personal comfort. The architectural form shelters outdoor areas from strong SE winds, and enables the penetration of the sun. Glazed courtyards are placed at regular intervals(10m) and are sheltered from the south-easterly winds by the built structure. The naturally occurring sand dunes and earth berms reaching to a height of 1.5m high serve as wind blocks.

Fig 1: DETAIL PLAN INDICATING WIND PROTECTION SCALE AS PER A1 FOLIO

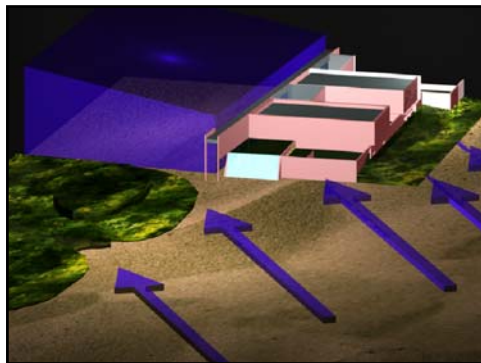


IMAGE 1



IMAGE 2

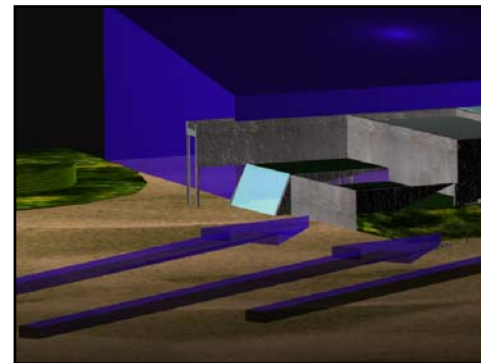
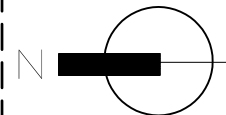


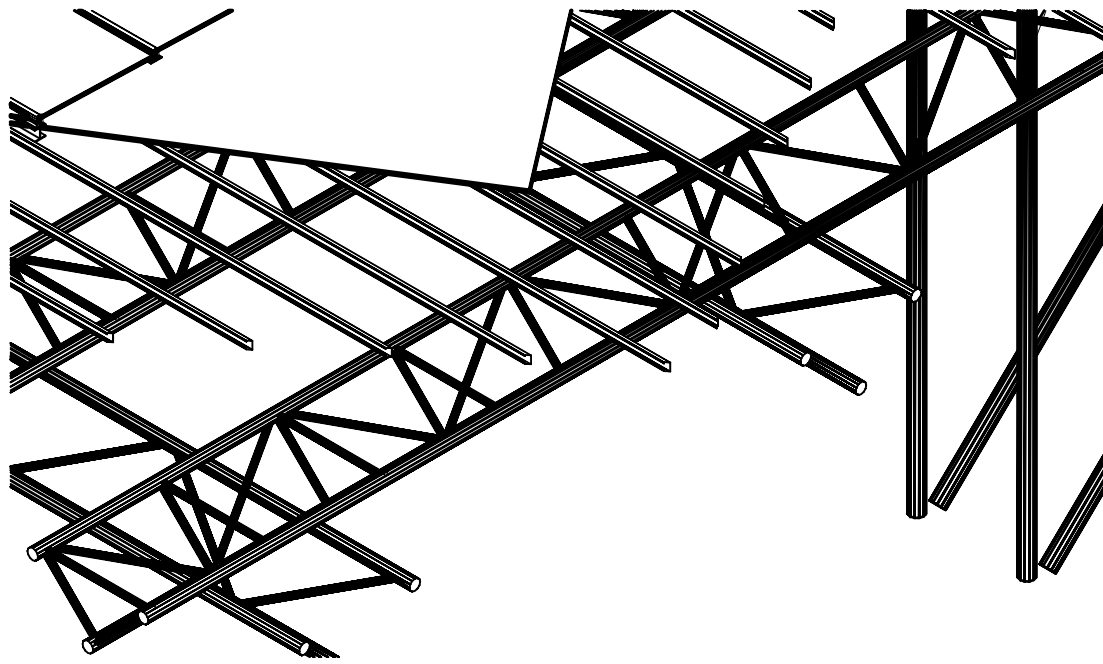
IMAGE 3

Images showing the solid south easterly building block, protecting the rest of the development from the wind.

HOVERCRAFT

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE





are opened at night to admit the cool air into the building. During the day, warm air is vented to the atmosphere. The fact that it is radiant cooling may allow the air temperature to be slightly higher than the norm while still maintaining comfort conditions. The system is optimized if there is cross-ventilation and internal solar gains are kept to a minimum.

Fig 2: Roof Detail
Sonia Cunha 2003

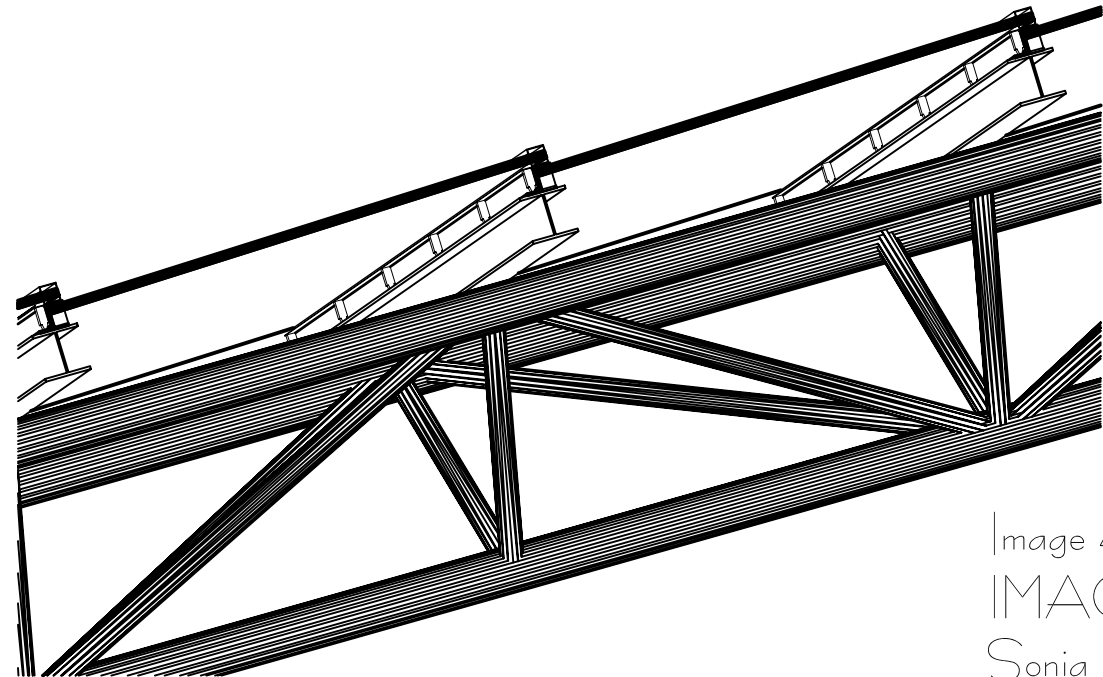
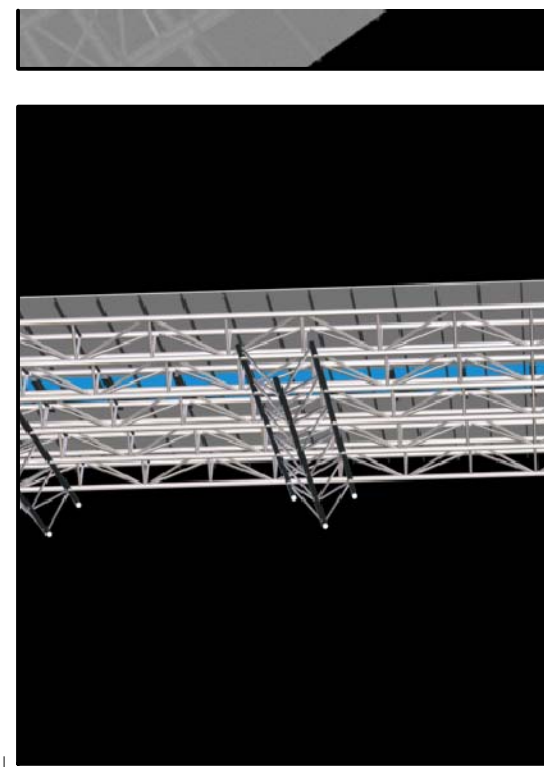


Fig 3: Roof Lattice Detail
Sonia Cunha 2003

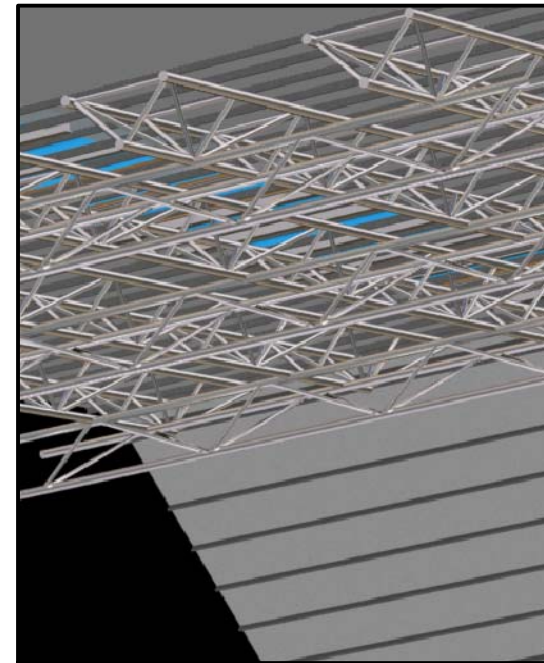


Image 4-6: 3-DIMENSIONAL
IMAGES OF ROOF
Sonia Cunha 2003

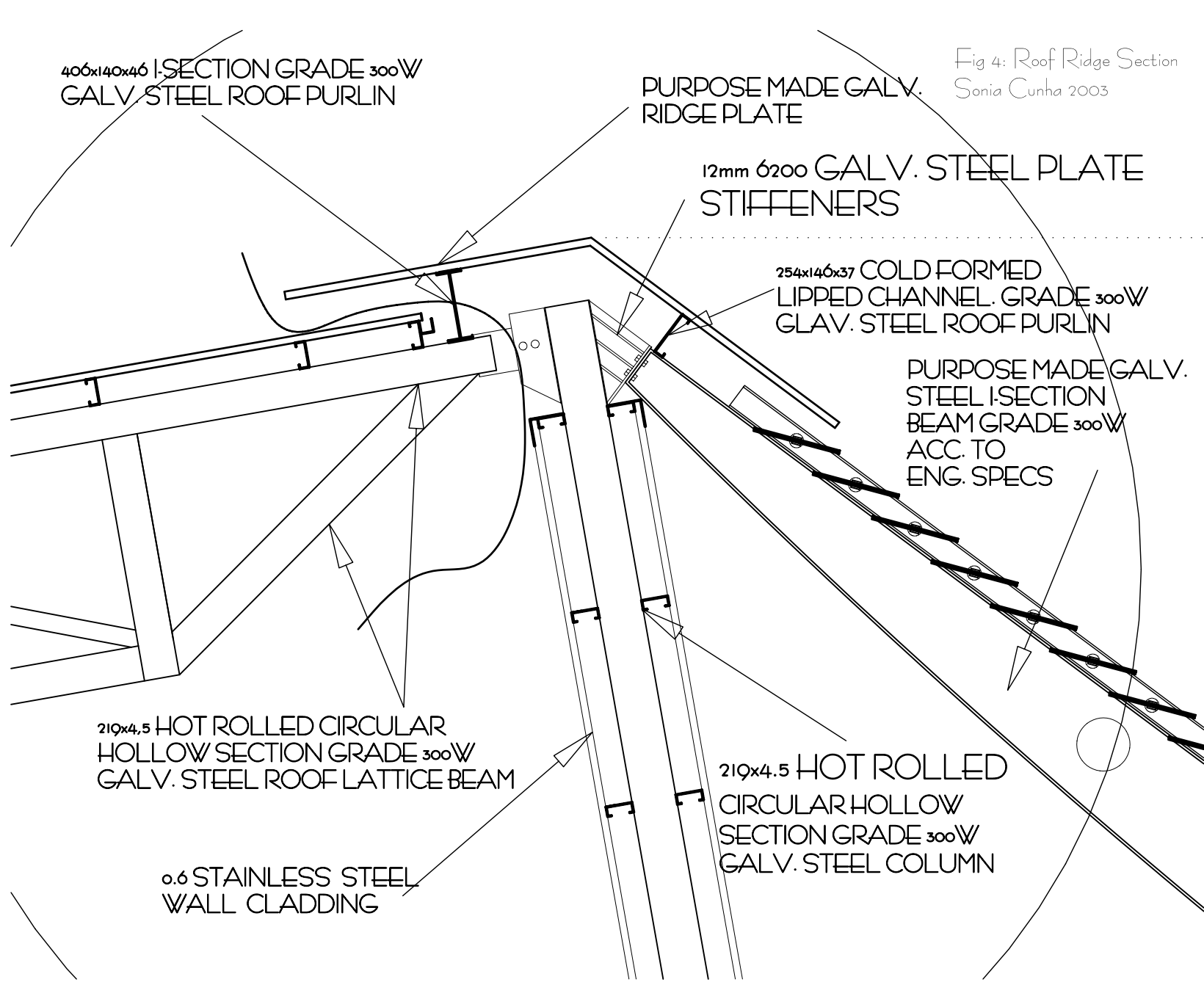
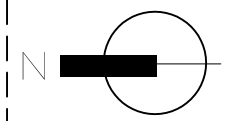


Fig 4: Roof Ridge Section
Sonia Cunha 2003

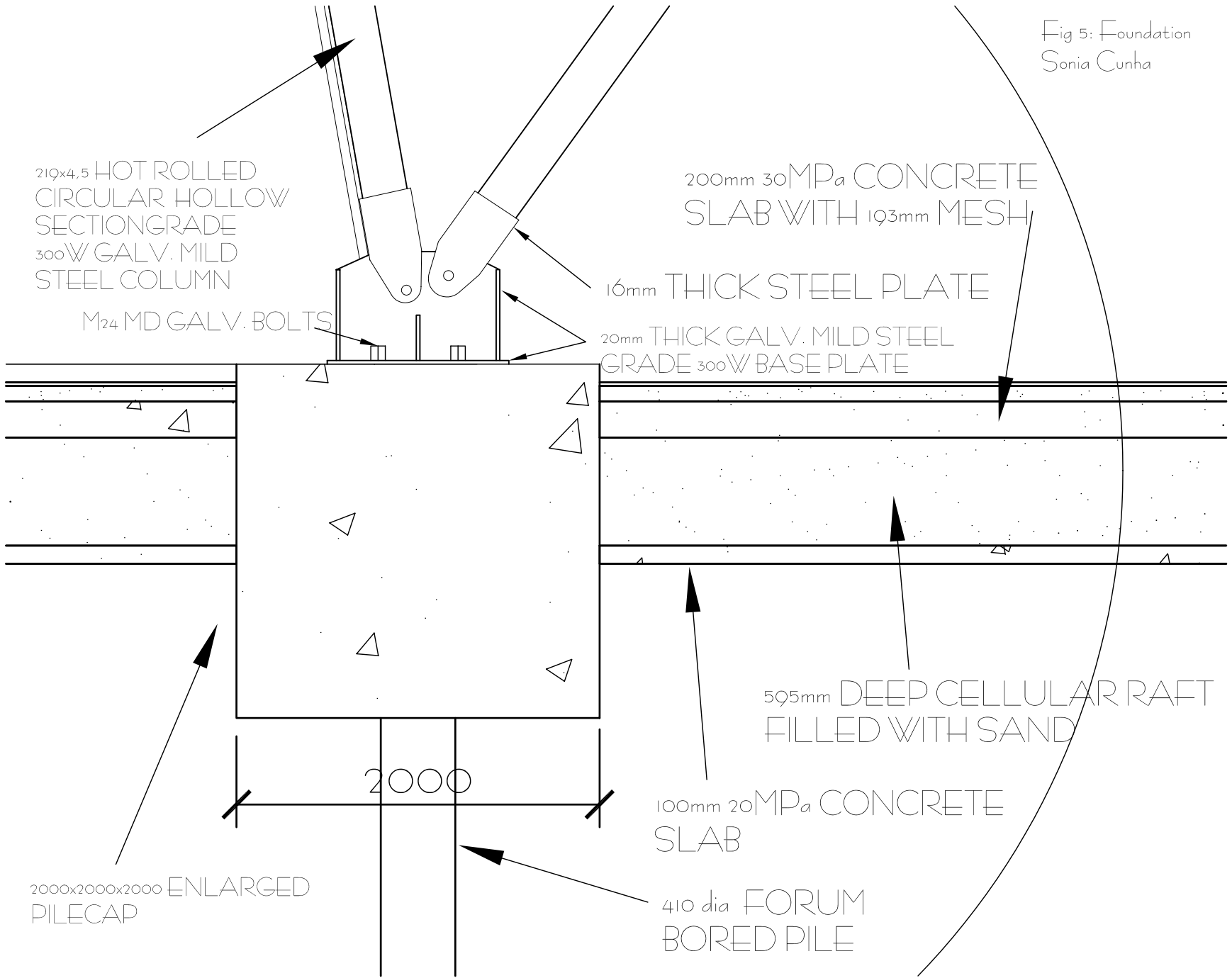
HOVERCRAFT

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE



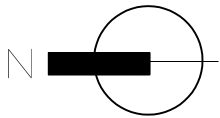
DETAIL 2

Fig 5: Foundation
Sonia Cunha



HOVERCRAFT

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE



DETAIL 3

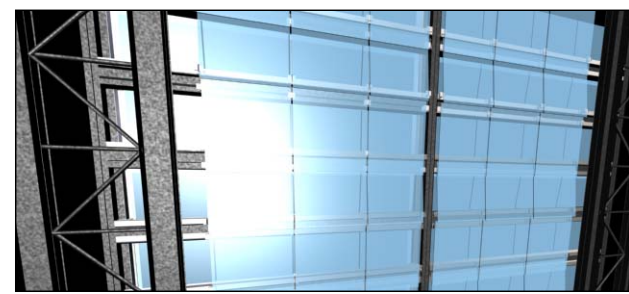
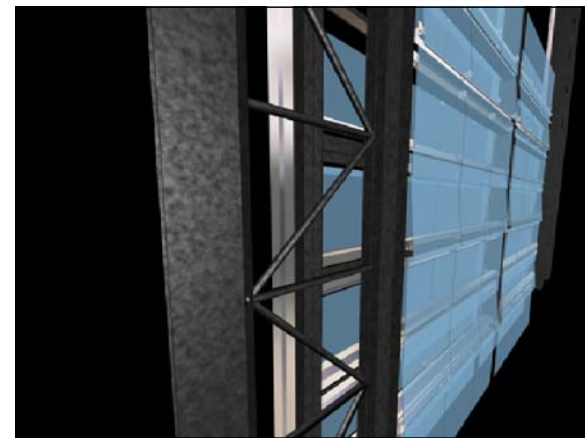
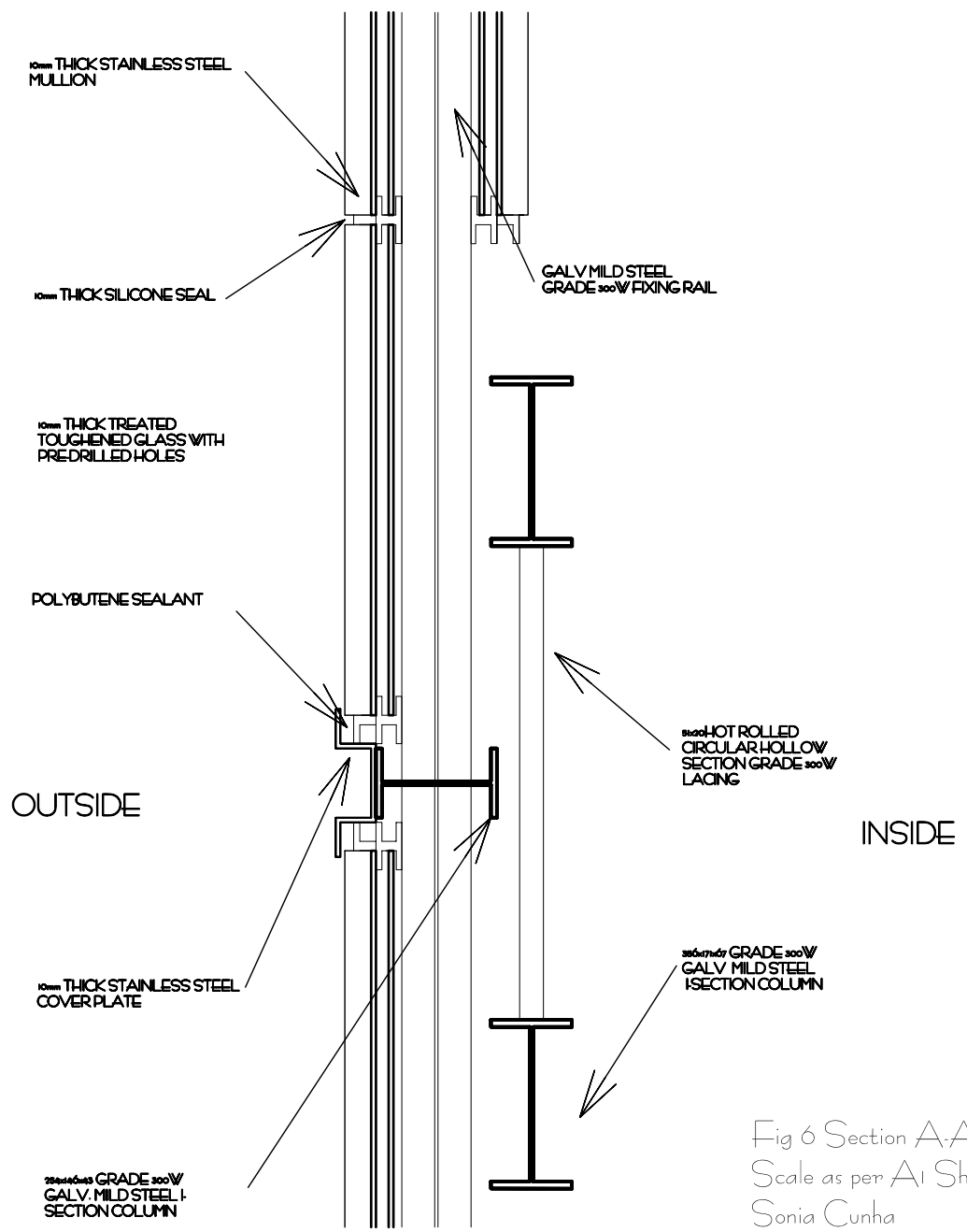
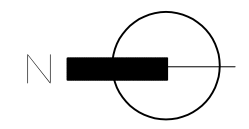


Fig 6 Section A-A of Wall
 Scale as per A1 Sheet
 Sonia Cunha

Images 7-9: 3-DIMENSIONAL IMAGES OF FACADE

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE



DETAIL 4

Page 91

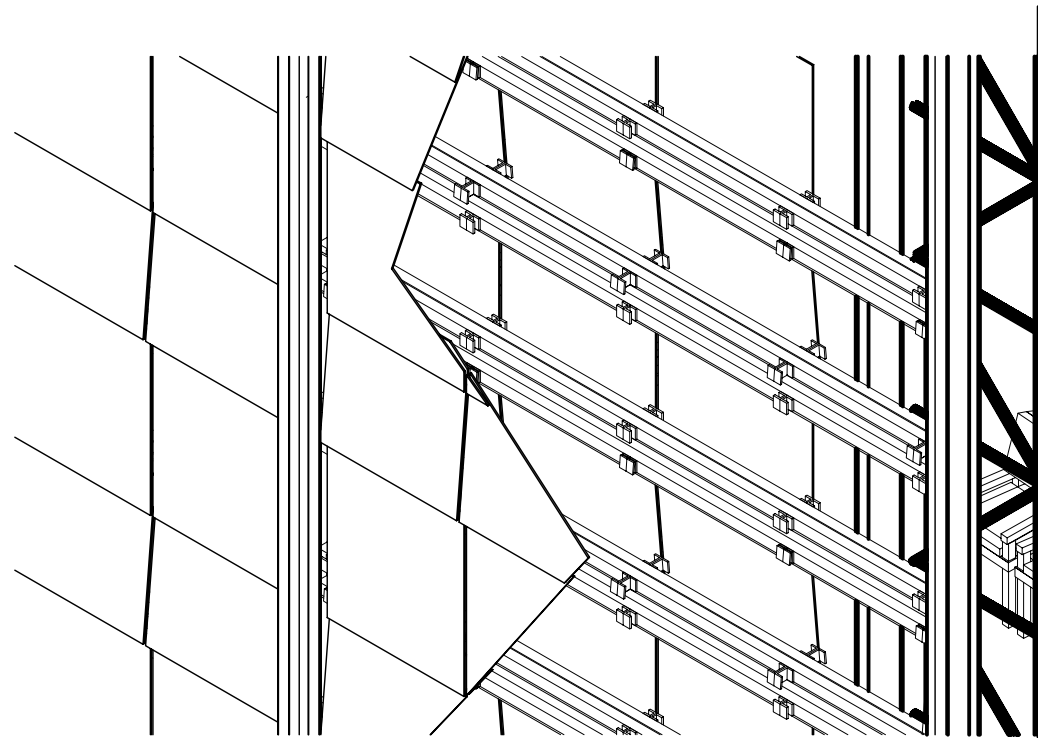
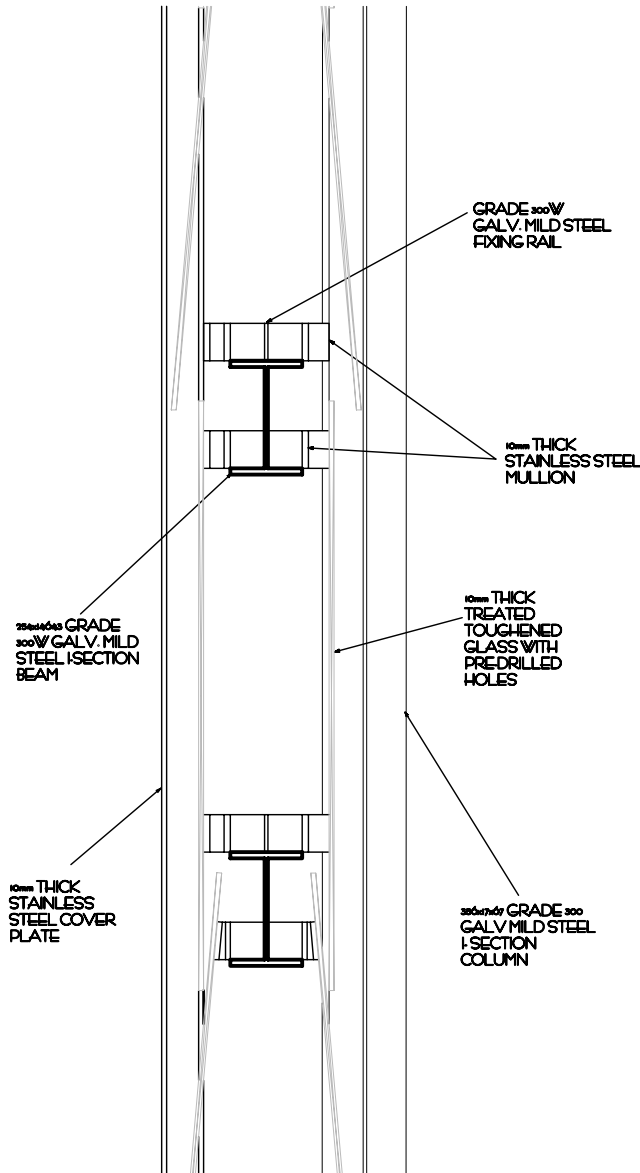


Fig 8: 3-DIMENSIONAL PRESENTATION

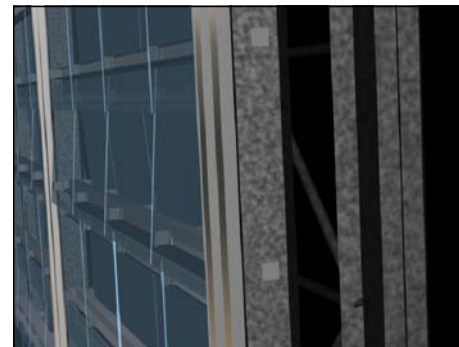
A glazing system that eliminates the need for framing with the junction between panes sealed with 10–12 mm of silicon would be used. The importance of this system is that it can achieve a U-value of 0,8 W/m² K that makes it attractive when coupled with aesthetic appeal. Electrochromic glass would also be used. This works by passing a low electrical voltage across a microscopically thin coating to the glass activating a tungsten-bearing electrochromic layer, which can darken in stages. Electricity is only used to change the state of the coating, not to sustain its level of transmittance. About 3 V are needed to effect the change, and this could be provided by the building energy management system or be individually controlled by occupants, allowing for fine-tuning to immediate needs. This system offers several advantages. Foremost is the fact that it can save energy. It avoids overheating and solar glare. Trials conducted in Germany indicated that glass of this kind could save up to 50% of the energy required for air-conditioning. Even when the glass is fully darkened external views are not impaired.

An additional option is 'hydrophilic' glass in terms of maintenance. This is a self-cleaning glass. Layers are deposited on the glass during the float manufacturing process to produce the photocatalytic characteristics of the glass. After exposure to ultraviolet light in daylight the coating reacts chemically in two ways. First it breaks down organic deposits – tree sap, bird droppings, etc. – by introducing extra molecules of oxygen into the deposit. This has the effect of accelerating the rate of decay. Second, the coating causes the glass to become hydrophilic. This means that droplets of rain coalesce to form sheets of water, which slide down the glass removing dirt particles in the process. The really smart aspect of the product is that the coating stores enough ultraviolet energy during the day to sustain the process overnight.

Fig 7: DETAIL SECTION INDICATING FRAME ELIMINATION AND VENTILATION

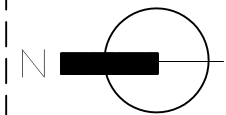
Scale as per A1 Sheet

Image 10:



HOVERCARP

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE



DETAIL 4

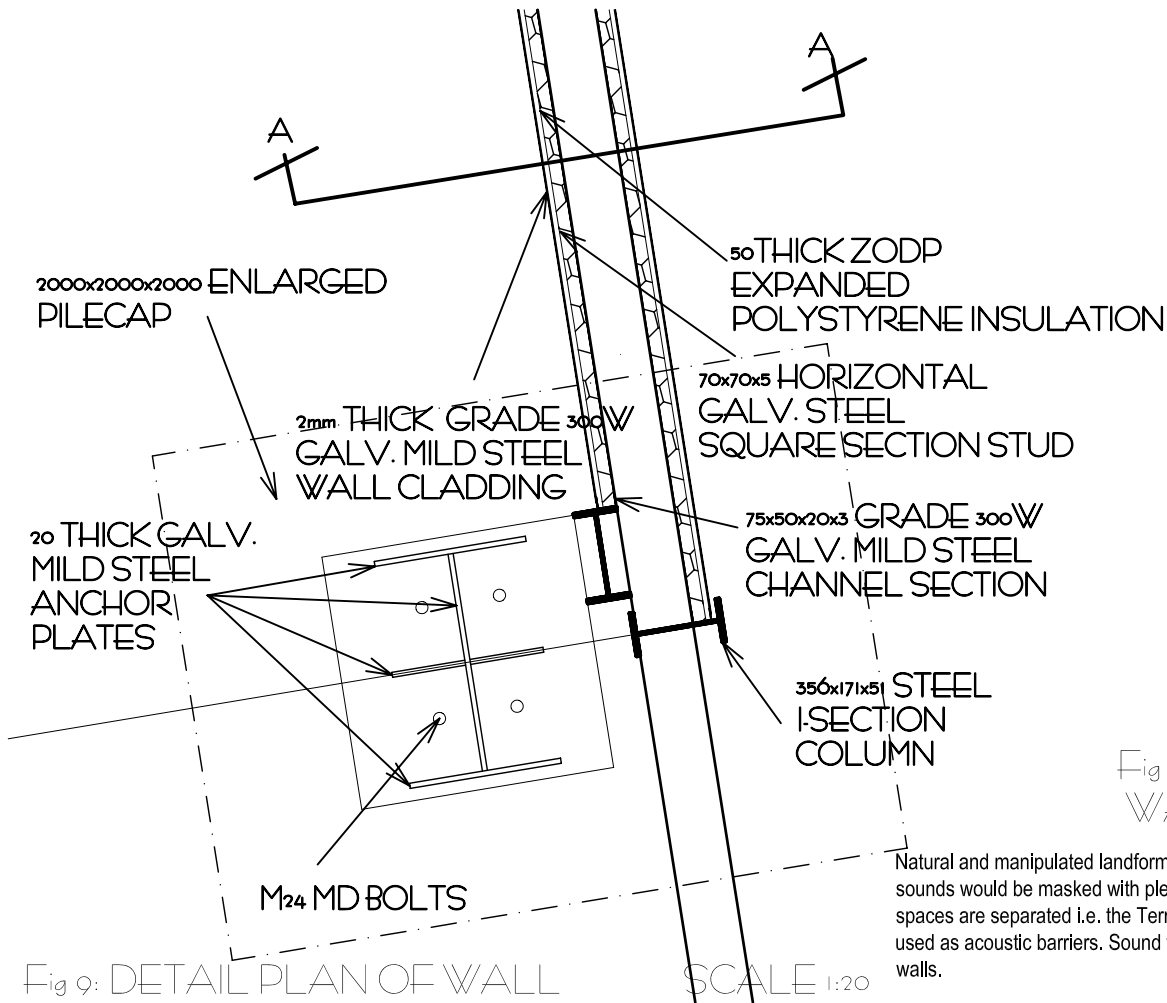


Fig 9: DETAIL PLAN OF WALL SCALE 1:20

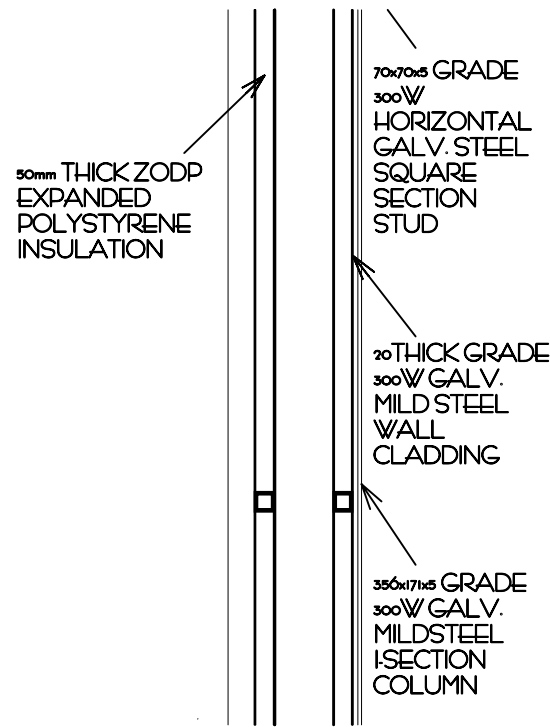


Fig 10: DETAIL SECTION A-A OF WALL

Natural and manipulated landforms would serve as additional sound barriers and absorbers. Unwanted sounds would be masked with pleasant, naturally occurring sounds (ocean etc.) Noisiest and quietest spaces are separated i.e. the Terminal and Interpretative Centre. Thermally massive walls would be used as acoustic barriers. Sound would be absorbed with acoustic materials in the ceiling plane and walls.

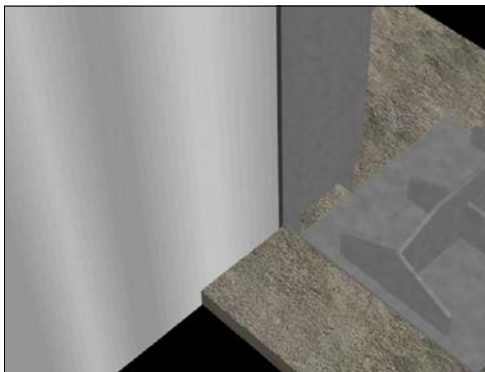
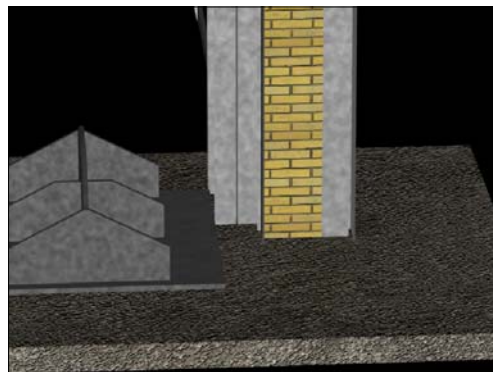
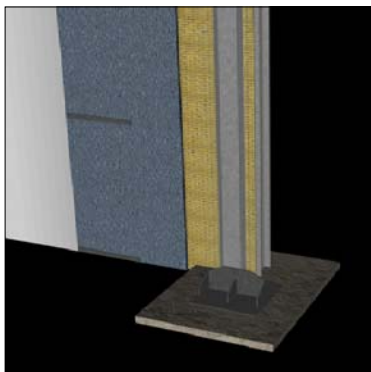
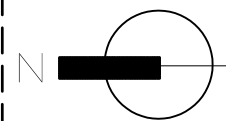


Image 11-13



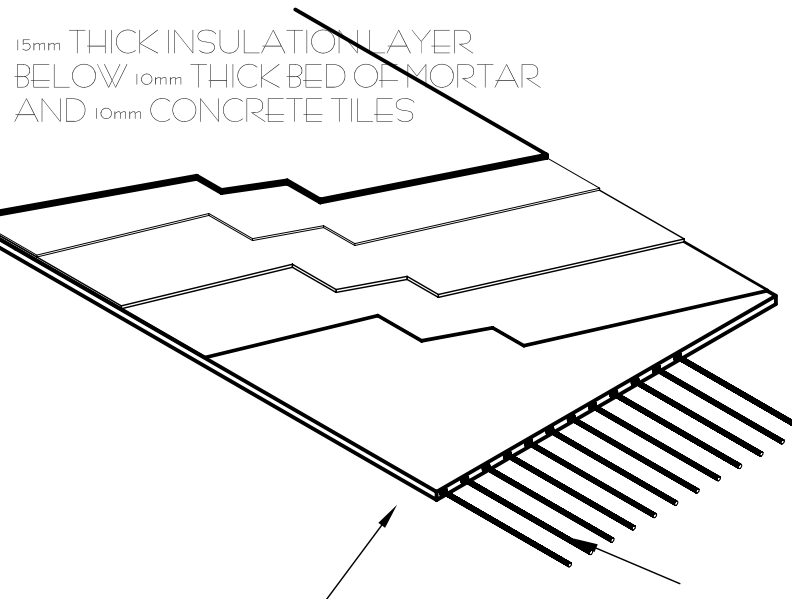
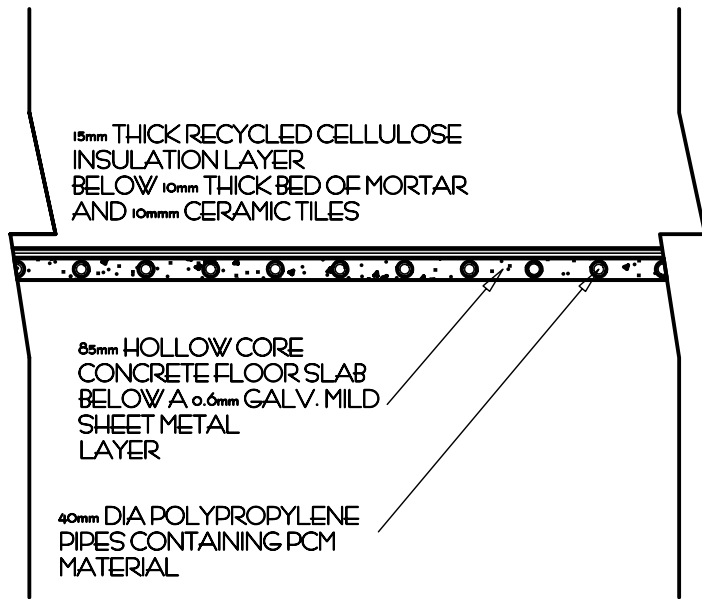
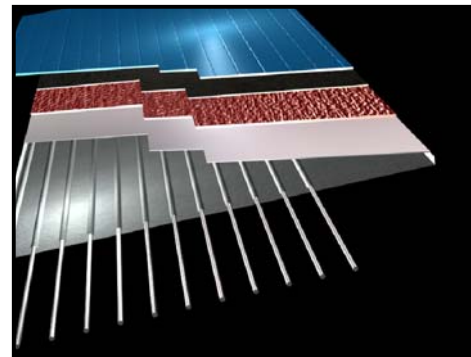
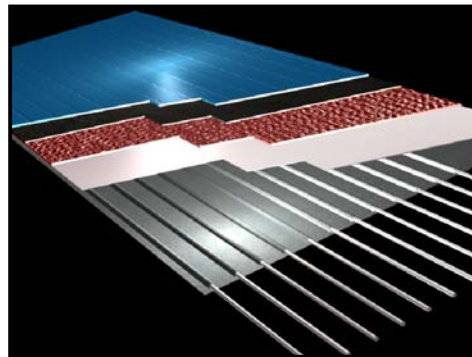
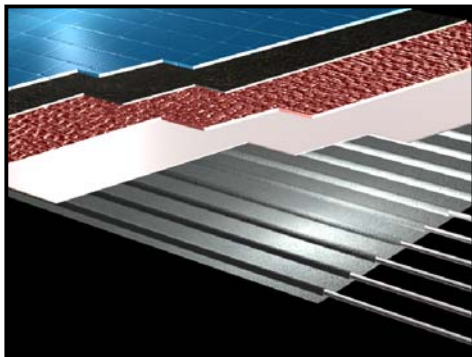


Fig 11: DETAIL SECTIO OF HOLLOW CORE FLOOR
SCALE: A_s Per A₃ Sheet

Precast concrete floors with integral connected ducts can effectively move either cool or warm air throughout the building. Additionally the air is in contact with the thermal capacity of the concrete before entering the occupied space. The soffit of the slab is exposed to effect maximum heat exchange with the occupied area.

The hollow core principle would be used in winter where piping within the hollow floor would occur. This is known as Hydronic floor heating where hot water would flow through copper pipes or high density polypropylene providing radiant heat. The hot water flowing through the pipes would be heated by means of a boiler.



Images 14-16

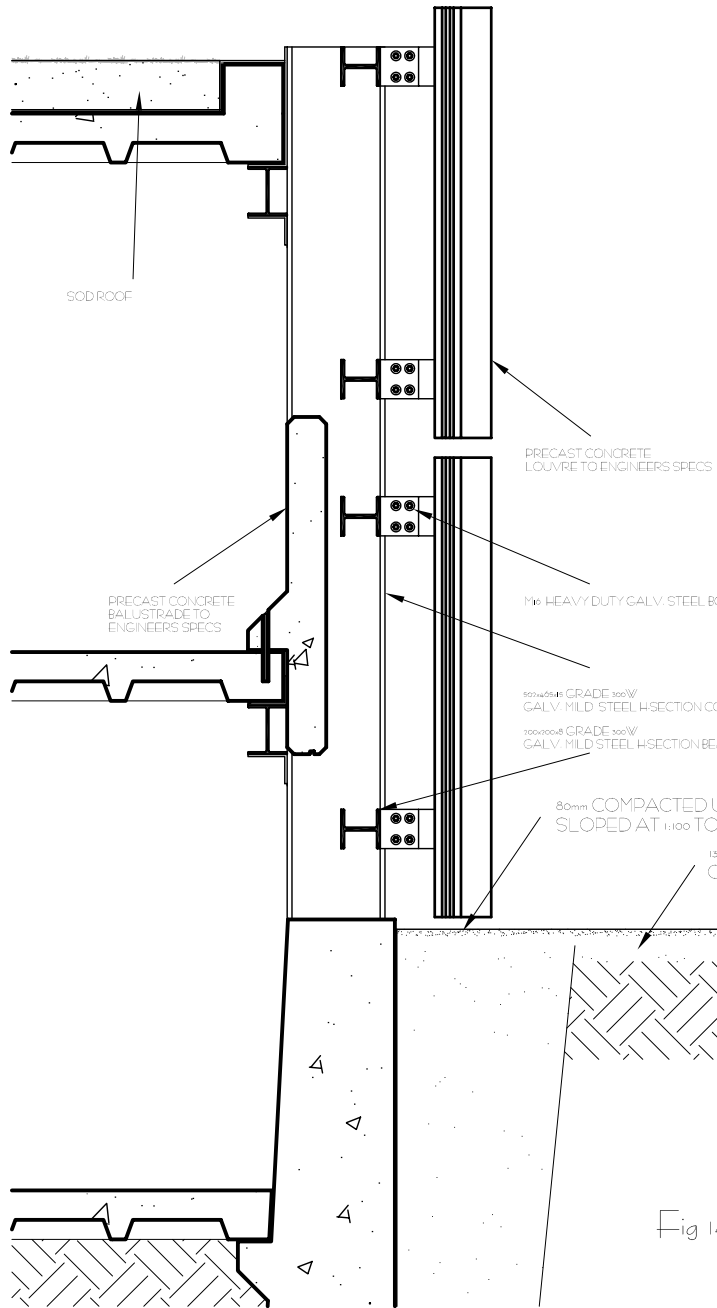


Fig 14: VERTICAL SECTION OF PARKING

Fig 15: HORIZONTAL SECTION

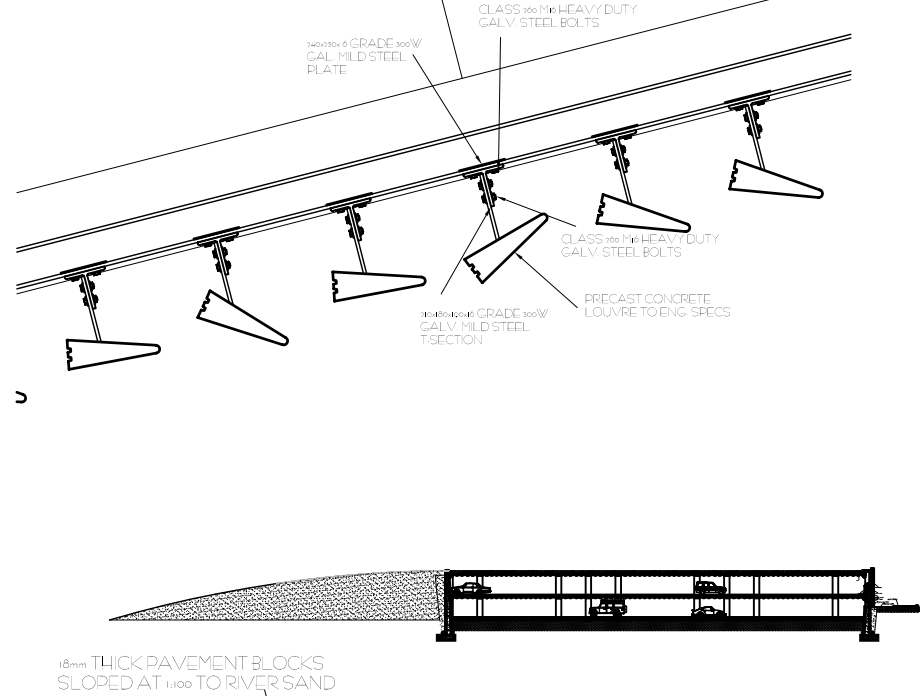
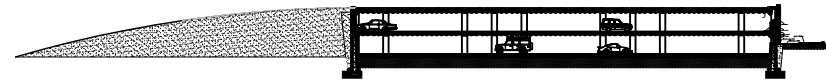


Fig 16: VERTICAL SECTION SHOWING EARTH BERM



HOVERCAPE INTERPRETATIVE CENTRE HOVERCRAFT TERMINAL

Part 1
Briefing Outline



Part 2
Baseline criteria



Part 3
Technical Resolution



Part 4
Design Discourse



Part 5
Feasibility Analysis



Part 6
Design Documentation



Access to Access.....

This is the manner in which I approached this project, designing a Hovercraft Ferry Facility, additional to community service facilities. Cape Town has many serious problems. Because the physical form of the city is spread out, people have to travel long distances. This means that public money, which could be better spent on improving peoples lives, must be spent on transport subsidies and infrastructure such as roads. These long journeys are a waste of energy and they create air pollution and traffic congestion. It also means people have to spend a lot of time and money on traveling. The Hovercraft Terminal would transport daily commuters from the Bloubergstrand/Tableview area to the Mandela Ferry Terminal in Cape Town.

Life is very inconvenient and expensive for many people in the city who cannot afford a car. Many communities are far from the facilities and the services they need, and they must travel far to get to them. The long travel times is inconvenient as well as stressful for the commuters. It is true that the natural setting of Cape Town is beautiful but it is now being spoilt by air pollution, productive agricultural land being used and destroyed in order to supply more road networks and infrastructure. These forms of large movement infrastructure potentially form barriers between communities, because it cannot be crossed. There is not an option of extending roads any further because the only available land is scarce and at the same time, valuable agricultural land. The aim of this facility is essentially to create a new set of places and to establish new opportunities where there are currently few. This facility would additionally bring the local commute closer to nature, as well as provide education. Everyone has the right to have convenient access to a similar range of urban opportunities, social facilities and natural amenity. People require access to access, a situation where they can change from one mode of transport to another quickly and easily, where the system will allow them to change direction easily. Only now will people really experience the opportunities of all parts this city has to offer.

Fig 1:

Elevated Highway. APier and Maritime Museum for Cape Town Pg 14



the sea. There is the elevated freeway road system constructed on the harbour perimeter, linking the south and western suburbs and the main traffic arteries from surrounding areas. This road became a visual barrier between the sea and the city center. Capetonians are divorced from the sea by a wall of traffic.

1.1 Theoretical Design Approach

The term “theory” derives from the Greek word for “vision” - theoria. There is a need for a new theory to be elaborated, which will do away with “old architecture” and establish a new framework worthy of our new democracy. It was aimed to transform the city and life, freeing the forces of reason to build an ideal world. Rather than elaborating ground theories, the emphasis is given on foregrounding given situations, small -scale predicaments and specific attitudes, and the need of a Hovercraft Ferry Service as being a realistic issue, and dealt with in terms of present and future needs. That provision has to be made for future issues by attempting to predict realistically, and the reality is that we have no choice but to advance with our transport technology.

Architecture is itself architecture of the future, a perpetual project whose plans are constantly being redrawn. I spent the entire year designing in circles resolving one design issue and at the same time creating another. The design has been a lengthy process but ultimately an ideal solution must be reached. It is a slow moving art, closely dependant on the economic, political and social factors and on the changing fashions. Thus we, as architects tend to have legitimized and attempt to decipher signs, symptoms and trends in contemporary architecture. What I believe to be a successful strategy to starting a design is to be called reverse logic: instead of starting by saying, this is what I want to do; I defined very carefully what I did not want to do ; mainly disturb any social, ecological, or economic balances into instability.

1.2 Context

history of social and technical invention and not of styles and forms. The spirit lies in our history, its secrets, its territory, and its geography. The design of the Interpretative Centre required a great deal of research of the Blaauwberg Conservation Area. Its many attributes such as its diverse fauna and flora, Battle of Blaauwberg, and many others mentioned in the Briefing Document. It is on this basis that architecture is created and in the same manner the Hovercape Terminal became an integrated building providing diverse opportunities for the community.

Architects have invariably represented the domination of man over nature, of the city over the eco-system, of the built over the unbuilt. This building relates to the history of the area, the social needs as well as a technical advancement of the transport industry servicing the public. By ignoring geography and pursuing the tabula rasa as an obsession, modern architecture has ended up confusing context and world, nature and public gardens. In fact context and geography has determined the architecture of the Terminal building where the landscape flows over and into the Interpretative Centre.

The Terminal is situated on a relatively empty site in Big Bay, currently used for parking, containing strong links with Blaauwberg Hill and the Blaauwberg Conservation Area, Table Mountain and Robben Island. In a micro scale sense the most important link is that of the ocean. Design principles and techniques were determined by the vistas with these links in mind, creating visual corridors.

large scale and due to the diverse landscapes with shell bearing sand which occurs up to a depth of 50m. The interpretation of Place and Context is the very essence of an architectural act. Ever since the enlightenment, the loss of nature has haunted the city dwellers conscience. Stylistic effects have been intelligently reworked and have been sensitive to the existing territorial conditions: to climate, wind, wear and tear, the seasons, the built and the unbuilt, time and raw materials, reducing everything to their bare essentials. Whether a landscape is urban, suburban, natural or cultivated, it has its own topographical, emotional and climatic codes. It is through these places and contexts that I worked from. More detail is provided within the Baseline Criterion.

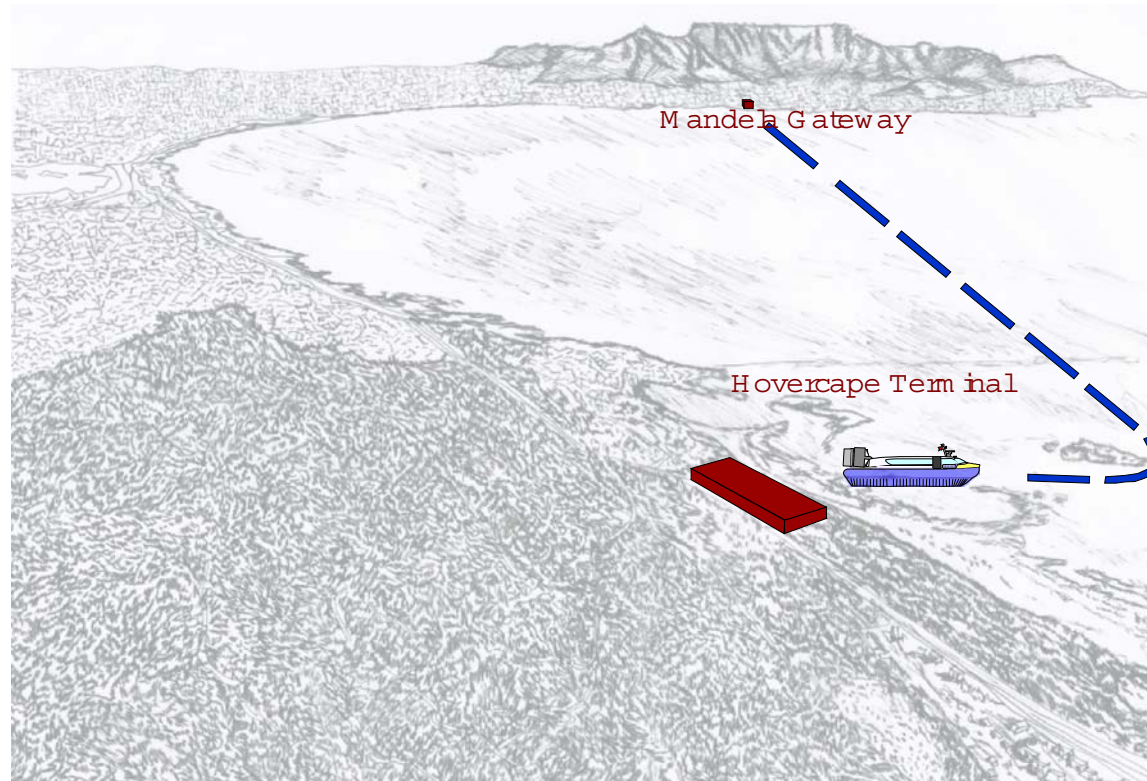


Fig 2. Specific Site and Hovercraft Route
Hand Sketch, Sonia Cunha 2003



1.3 Design - Ecology

The design is based on an overall ecological organization, which takes into consideration the existing social fabric. Architecture has always been as much about the event that takes place in a space as about the space itself. A green city is a man-created architecture that is in harmony with nature and the earth to provide a friendly space for human beings.

“ All artifacts produced by man have their origin in nature” Itsuko Hasegawa; unknown source.

Architects succeed in establishing original values , which could prolong for years to come. In this case the value of sustainability and ecology has been present for many years yet the implementation of it seems to be slow. The issue of congestion would prolong as long as the population keeps growing and keeps demanding. As a result continuous pressure is placed on our natural resources.

The aim is to strive to create fresh environmental alternatives and technically innovative ways of living through building. A tradition of expanding possibilities through realizing dreams has occurred, because architecture is but a mere dream until realized into a building after years of research and revision.

Energy awareness is a new ecological awareness brought back down to earth. A new sensitivity to natural phenomena and the ways in which they can be harnessed by technology has emerged, filtering the heat of the sun and taming the wind, creating a relationship which is at once economical and sensual, beautiful and useful. The admin Block and Interpretative block serve as an anchor for the Terminal Facility and at the same time serving as a wind block from the south -easterly winds. Skylights allows sufficient light into the building while the wall of the departure lounge also provides a visual link to the ocean. Faced with a world which is both complex and unpredictable, architectural thinking has become more modest. If one does not transform with the rest of nature then we too would stay behind and lose grips with the true meaning and essence of design-architecture.

materials and functions. The materials used for the “anchor block” is off shutter concrete. The materials and surfaces were left unfinished in their natural state. The concrete surfaces of the shade panels and within the building were plastered to a smoother finish but not painted. This has left the building with an earthy colour. The use of the natural elements creates a warm and welcoming feeling for the occupants and visitors. Architecture usually differentiates nature but in this design the aim is to integrate with nature, through the raw materials and working with the site’s slope and not against it.

The building is reduced to it’s natural elements, which reflects its “simplicity” and honesty. The facile cosmetics of corporate architecture are not needed; instead concern is based on architectural and human quality of buildings. As the architect must be more than the mouthpiece for the prevailing opinions, but the soul must be part in the creative struggle. The intelligence, desire and ambition of people everywhere should not be underestimated in the task of creatively mastering the challenge of creating productive spaces for people and thus changing their perspectives on how various spaces can encourage creativity today of which could also determine one’s future.

1.4 Technological Advancements

The concept, architecture, is going through a massive change, barely discernable amidst the haze and dust clouds raised by urbanism. Population explosion, industrial revolution and its direct consequences, global market and global communication and networks: These are examples explaining why so many buildings have been built in the 20th century. Since the dawn of the industrial revolution, technology and science have played an increasingly important role in building. Technology has the potential to produce new, and original forms. The metropolis strives to reach a mythical point where the world is completely fabricated by man; so that it absolutely coincides with its desires. Cape Town has generated its own metropolitan urbanism and thus a metropolitan deserves its own specialized architecture. One has to combine presence with non-existence. There has been an unprecedented and exhilarating explosion of new ideas and technologies, many of which have a profound potential to improve and indeed emancipate our lives. Technology has transformed our society and our needs and thus requires a continuously developing architecture to support the transforming architect. Technology has indeed transformed architecture irreversibly e.g. Crystal Palace. Le Corbusier, the “apostle” of “machine for living in” and author of “ode to the right angle” had produced a complicated generous, sensual building full of curves and folds, and thus even “the great Le Corb” was forced to transform or evolve.

advancements in America and Europe, such as the Subway and Underground Systems. Finally it is time for Africa to advance in such technologies as these.

This technological adventurousness has provoked the criticism that modern buildings are incapable of harmonizing with their older surroundings. New developments in technology make society more receptive, since various experiments become more accepted as possible realities. But the fact is that all significant architectural movements have been innovative and indeed revolutionary in their time, with the result that some of the most beautiful architectural compositions in the world emerge precisely from the juxtaposition of great buildings of very different styles clearly and courageously relating through time. I believe in the rich potential of science and technology. Aesthetically one can do what one wants with technology, for it is a tool and not an end, but we ignore it at our peril. New technological developments offer architects an extraordinary opportunity to evolve new forms and materials and functions.

are denied the opportunity to lead decent lives. Approximately 20% of the families living in this area earn a minimal monthly allowance of only a R1000. Over the past fifty years, our development has accelerated to the point where if it continues uncontrolled it will destroy humankind. In terms of transport facilities, the South African roads have become extensively congested and it seems cruel to use our natural landscape to reproduce additional and expand tarred surfaces, which would in turn serve the harmful vehicle fumes into our atmosphere. Only by the inauguration of a more conscientious approach, through education, research and above all reflection can we avoid this cataclysm. And avoid it we can, for the problems that face us are manageable; there is energy, and there are ways, for the world is immensely rich in intellectual resources. The hovercraft floats 16 inches off the ocean surface, thus having a minimal affect on the oceans microbiology. In this instance additional capital is not needed to manufacture a transport to be constructed.



mind the gap

Fig 3. Mind The Gap
SD Cunha 2003

direct bearing on our appreciation of successes and failures of modern Architecture; and now architecture has an effect in a broader sphere. If we continue to consider only our individual needs, to be selfish, to specialize rather than to try to understand the universal implication of what we do, or if retreat into a nostalgic dream of a past that never existed, rather than making best of the most brilliant modern minds and is, then our future is bleak, to say the least. The hovercraft is a realistic mode of transport, commuting people between where they live (Blouberg Municipal) and where they work in the city center.

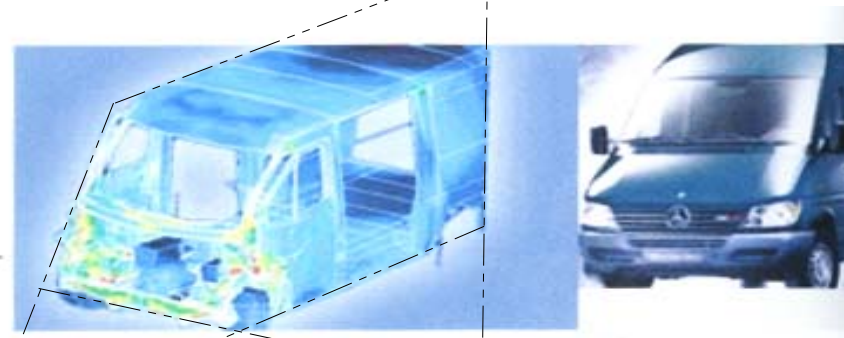
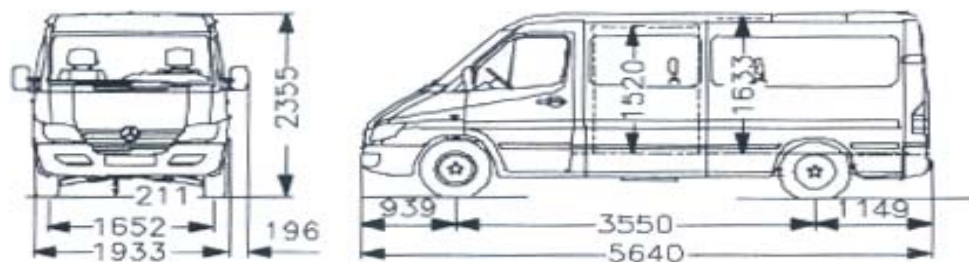
1.5 Public Dependancies

Architects cannot work in a vacuum; unlike other artists, they are totally dependent on a site, a brief and finance. Additionally architects are dependant on the provocations of the wider public - clients, individuals, or institutional. Good architecture, in this age as in any other, is born of an enlightened client, generous financing and most importantly; a public-minded brief. 'Form follows profit' is the aesthetic principle of our times.

Thus, design skill is measured today by the architect's ability to build the largest possible enclosure for the smallest investment in the quickest time. The factors that now determine the design of a building are maximum economic efficiency in terms of rentable space to gross space, wall to floor ratios and minimum storey height. Supposedly arcades, gardens and balconies, even recessed windows, impinge on rentable space and are deemed incompatible with the profit principle, and because developers and their shareholders want a quick return on their investment The result is invariably a single - activity building in the form of a thin skinned box — a shopping centre, an office building or a block of flats —with no unprofitable public spaces, no expressive or innovative structural features and certainly no room to celebrate the art of Architecture.

Thus an adaption or compromise should be followed as truth: Function does not follow form and form does not follow function but which definitely interact. There is no architecture without event, without action, without activities, without functions, architecture is to be seen as the combination of spaces, events, movements, without any hierarchy or precedence among these concepts. The in-between itself becomes a concept, condensing the different fields of investigation, ecology, image, travel, and sociology. The building could be said to be the "inbetween". The compromise between land and ocean. The sea-side block is known as the terminal block. It displays a play of structure which is light and transparent, while the "anchor" block is solid and almost impenetrable. The building is "contrasting" on either side (east and west) but at the same time displaying the intersection between the land and ocean. Intersection or the inbetween is also experienced within the building between shade and light.

Fig 4. Shuttle Bus Mathews



define space. All these issues have an effect on the quality of life of the people making use of these spaces. The problem is not style but quality, not aesthetics but ethics." *Rogers, pg 56.*

With this in mind, an architectural movement towards trying to create a building, which provides for a number of overlapping people and functions, has to occur. Present society offers a richer, more complex and in many ways more conflicting spectrum of choices than before. As a result demands are made on architecture. This owes chiefly to the increasing complexity of social relationships and interactions. Architecture must now participate in social transformations, becoming more dynamic, fluid and even more kinetic than it has ever been before.

architecture has put off its princely autonomy, and at last has agreed to learn from those areas of experience to which it has tried to dictate. A building of multiple uses is created serving the community in various ways, such as technology, transport, administration, education and research.

Vision and large-scale co-ordination are essential to successful planning of a public building such as the terminal. Public authorities must be willing, at the very least, to insert demanding environmental standards into the planning laws, making balconies, parks, courtyards and cultural amenities for our society as obligatory as fire escapes. Buildings, the city and its citizens will be one inseparable organism sheltered by a perfectly fitting, ever-changing framework. Man, shelter, food, work and leisure will be connected and mutually dependent so that an ecological symbiosis will be achieved. The best buildings of the future, for example, will interact dynamically with the climate in order better to meet the users' needs and make optimum use of energy. Architecture will no longer be a question of mass and volume but of lightweight structures whose superimposed transparent layers will create form so that constructions will become dematerialized.

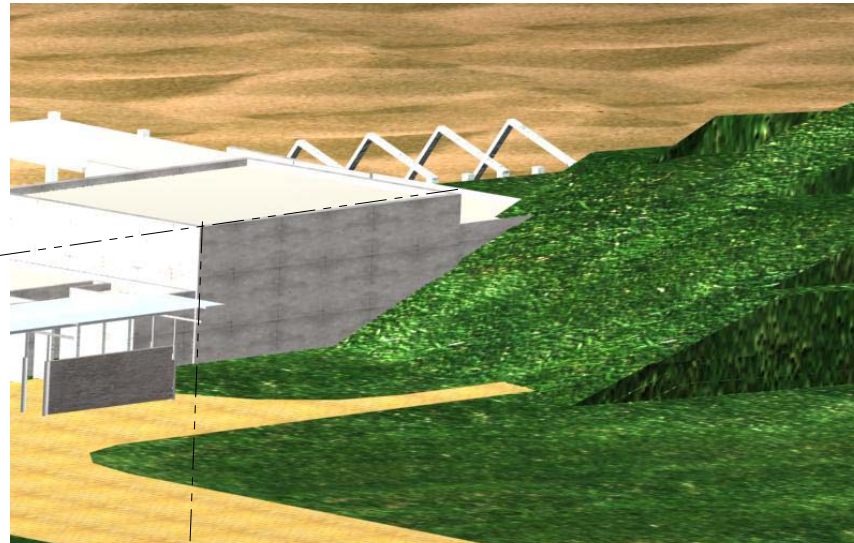


1.6 Nature and the Machine

The American city, a city that regulates (suppresses or regulates) enjoyment through the presence of object buildings, plays a key role in the unraveling of the absence of nature in urban discourse, indicating the repetition of a symptom that goes back to the original urban scene: the violation of nature by the machine; a confrontation in which, in the struggle between the machine and the forces of nature, woman is suppressed. The American city - that place where urban development directly coincides with the westward displacement of the frontier, where a rational order was applied to virgin land - presents the most pertinent example of the relationship between nature and the city in 20th century urbanism as ideology and its articulation of the real. The development of the American city can be explained through the opposition between nature and culture, wilderness and the city.

concentration, neglecting networks, leaving bottlenecks, aborting highway widening, stimulating car ownership, proclaiming the undying appeal of the city (when will anyone start to sing the appeal of the new?) suffering the cumulative brutality of a daily invasion of post-urban hordes. The smelly train systems are always too full, buses crisscross, the country without rhyme or reason, roads in all directions clog, suffocation with a conveyor belt of trucks proving that no one is where he should be, all goods are delivered to the wrong place. How much longer must still continue with this cycle?

As stated earlier, advancements are necessary. The building is kept as low, and extends almost 200m blending in with the landscape and preventing view obstructions. The building is designed in such a manner so as to disappear into the landscape, while it would almost appear that commuters are being swallowed under the ground.



perspective

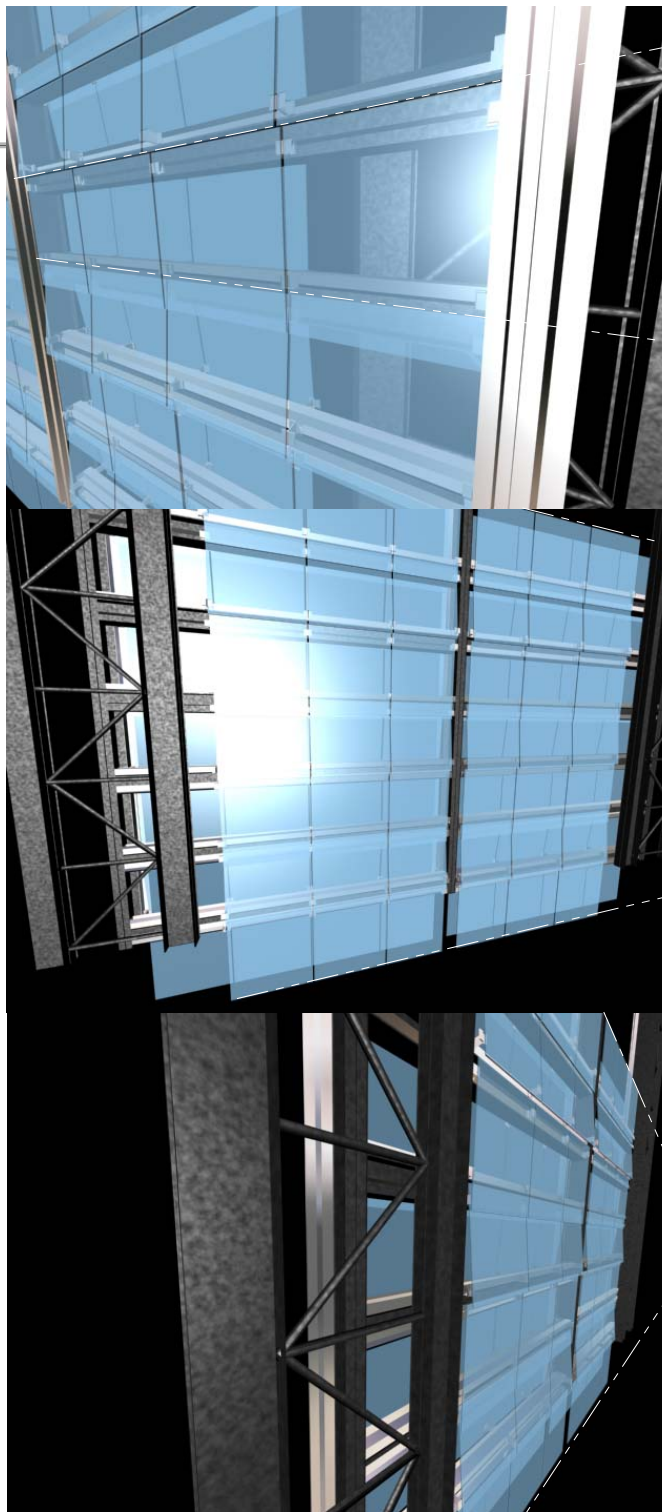
architectural discourse from Vitruvius through the Renaissance, when beauty, the most important property of buildings, was supposed to result from the representation of nature. The moral and aesthetic quality with which nature is imbued is considered far superior to economic forces and the potential for development these forces represent. Buildings are described to replace the land. That is architecture's original sin. Give us back the land and architecture. By making us a wave of the ground we inhabit, we can regain a sense of reality of place in a culture that is more and more dependant on the abstraction of engendered by the virtual mass production of real and virtual spaces, instant communication and digital manipulation.

The machine, both product of and vehicle for the scientific revolution, made industrialization possible in a manner apparently consistent with the democratic project; at the same time, it both became and symbolized a threat to the pastoral ideal.

must say that to be relevant to its time to be "contemporary" a work of architecture must fulfill certain conditions and must be part of the bustle and turmoil the ebb and flow of everyday life must be related harmoniously to the rhythm of the universe, it must be consonant with man's current stage of knowledge of change. For all great architecture is contemporary of its time, relevant to its situation in space, time and human society- but also eternal with being eternal - that is in harmony with the cosmos and the evolutionary life - no architecture can be called contemporary." Hassan Fathy, unknown source

1.7 Intergrated Design

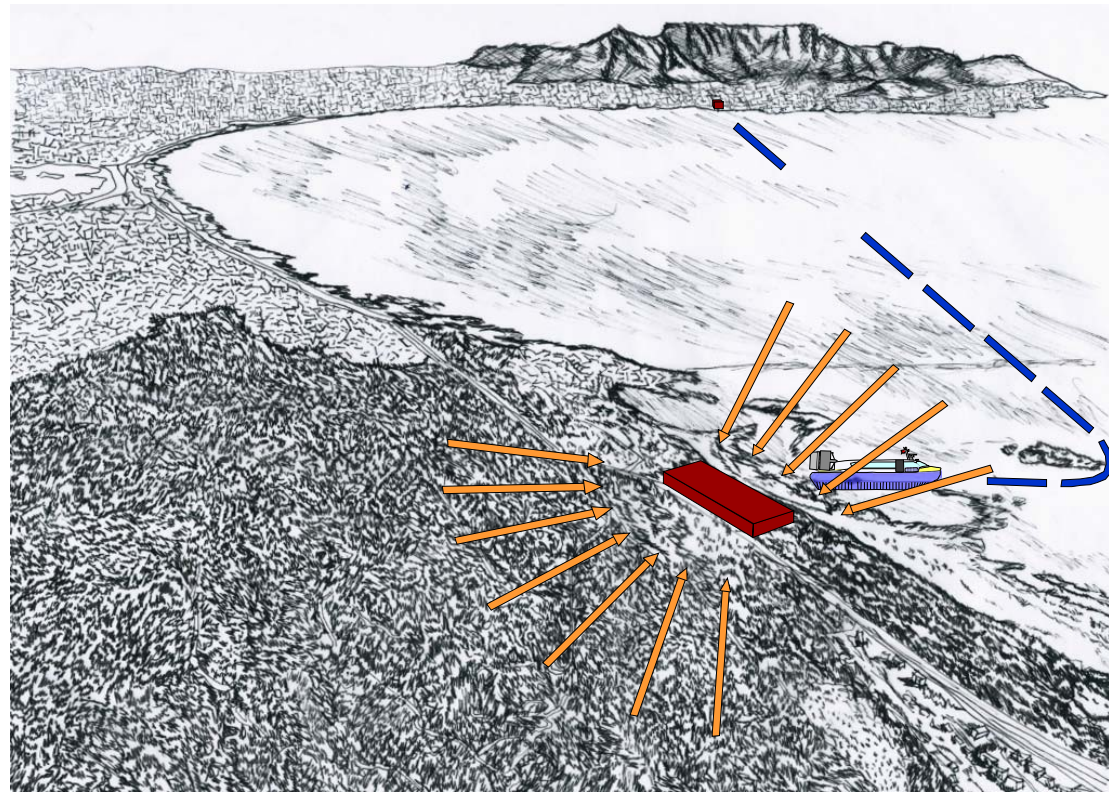
Land and architecture are gently integrated one with the other. The interior space and departure space is designed for maximum transparency. The commuters are thus in constant contact with nature. The special character of this building is to be derived between the balance achieved from contrasting elements, nature and technology. The architectural formula of putting the green over the grey or the "soft over the hard" would prevent alienation of the citizens, thus creating an architecture which is woven in to nature, generating density, exploit proximity, provoke tension, maximize friction, organize in -betweens, promote filtering, sponsor identity, and stimulate blurring. The attempt to create a cohesive ensemble of building is demonstrated by the transparencies of the Terminal Section and where the landscape and the "anchor" block seem to function as one.



translucent wall of the
Departure Lounge.
SD Cunha 2003

community, by providing educational facilities. A building of this nature needs to be accessible to the whole community, and used by the members of the community at large. The building is integrated with its users and encourages interaction in the form of education, research, technology, transport.

The building is a dynamic landmark building, able to be viewed from every angle. People willingly recognize the importance of their own environment, express concern about the state of public facilities that affect their daily lives, and want to participate and regain control over them. It is not sufficient for architects to implement our own personal beliefs. Our architecture has to be receptive to the diversity of individuals. The original Tower of Babel was a symbol of ambition, chaos, and ultimately failure, this machine would be a “working Babel” that effortlessly swallows, entertains and processes the traveling masses. Thus the terminal would not simply have a utilitarian character but become an attraction.



SD Cunha 2003

1.8 Intergrated Sustainability

To become a landmark this project has had to adopt a form that resists easy classification, the mechanical, the industrial, the utilitarian, the abstract, the poetic, the surreal, it combines optimal artistry with a optimal sustainable efficiency.

An effective interior temperature is achieved by means of a balanced use of systems. Natural ventilation is achieved by means of exposed thermal mass of the building being cooled by outside air, while exposed hollow concrete floors are the most effective cooling medium. Within the hollow cores are polypropylene pipes, which contain PCM material, which contains either heating or cooling material. Electrochromic glass is used in the “breathing” wall as well as in the roof lights. The advantage this type of glass offers is that it saves energy, and avoids solar glare and overheating. Even when the glass is fully darkened external views are still not impaired.

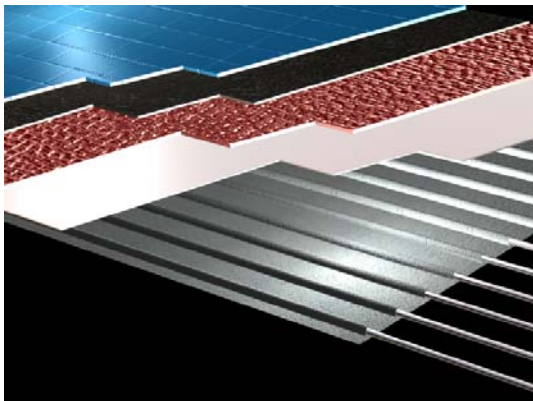


Image illustrating the Hollow Core Floor System
SD Cunha 2003

parameters outlined in an official programme. These types of programmes tend to be abstract and does not usually address the real needs of the individuals users, in this case the commuters of the hovercraft ferry, and thus resulting in not being responsive to reality. In essence this public building would be returned to the users, involving them in the decision –making and making them recognize the importance of their involvement within not only the design process but also the building process. Some architects believe that architectural integrity bears no relationship to practicality and that architecture can be independent of any human involvement. This attitude could only diminish the quality of architecture.

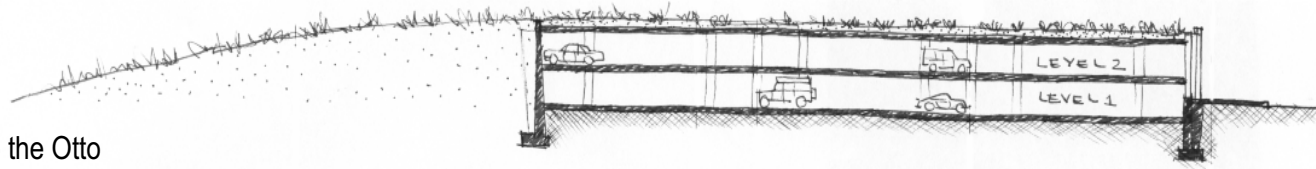
Architecture, rather than being an autonomous discipline, is permeated by and has mirrored social realities. The place is defined by very diverse characteristics: residential further north and south, a primary road on the east and the ocean on the west. The orientation of the building onto the ocean contributes to the powerful value of the building in its urban context.

1.10 Built Structures

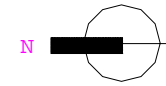
- 1.10.1 Parking Facility
- 1.10.2 Hovercape Terminal
- 1.10.3 Anchor Block

1.10.1 Parking

The parking structure is located adjacent to the Otto du Plessis Road and acts as a barrier between the cars on the main road from the rest of the complex. It is able to house 450 vehicles. Again the parking structure is a contrasting element with the “absence” of a façade on the northern and eastern sides and by means of totally vegetated earth berms and partially transparent western façade by means of a concrete louvre system and the total transparency of the southern façade. Parking facilities are also provided at the city center. Additional to this a shuttle bus service is available picking up and dropping off commuters close to their homes



Section Through the Parking Block
Illustrating the Earth Berm, and Roof Garden
SD Cunha 2003



Illustrating the Detail of the Concrete Louvres
On the Western Facade
SD Cunha 2003

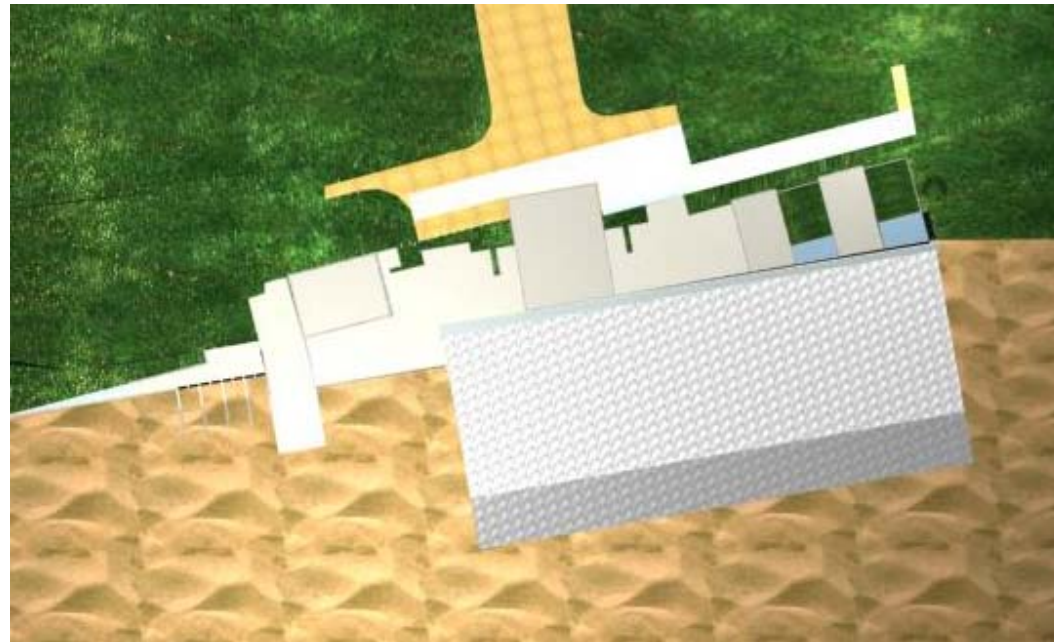
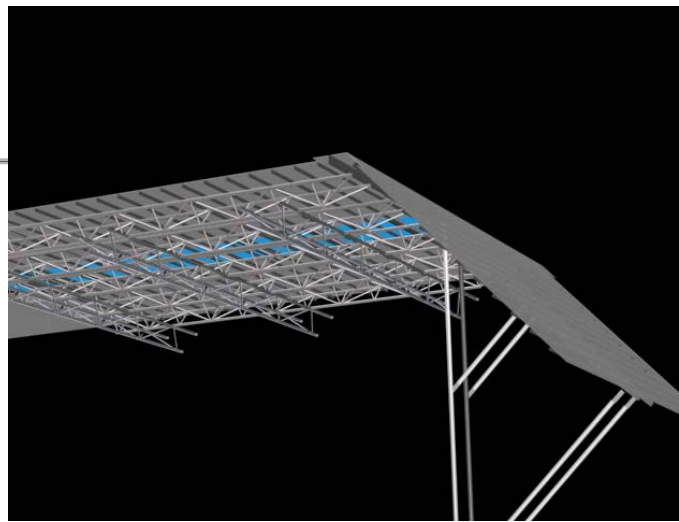
Illustrating the semi-basement level parking plan
SD Cunha 2003

HOVERCAPE TERMINAL

1.9. Hovercape Terminal Facility

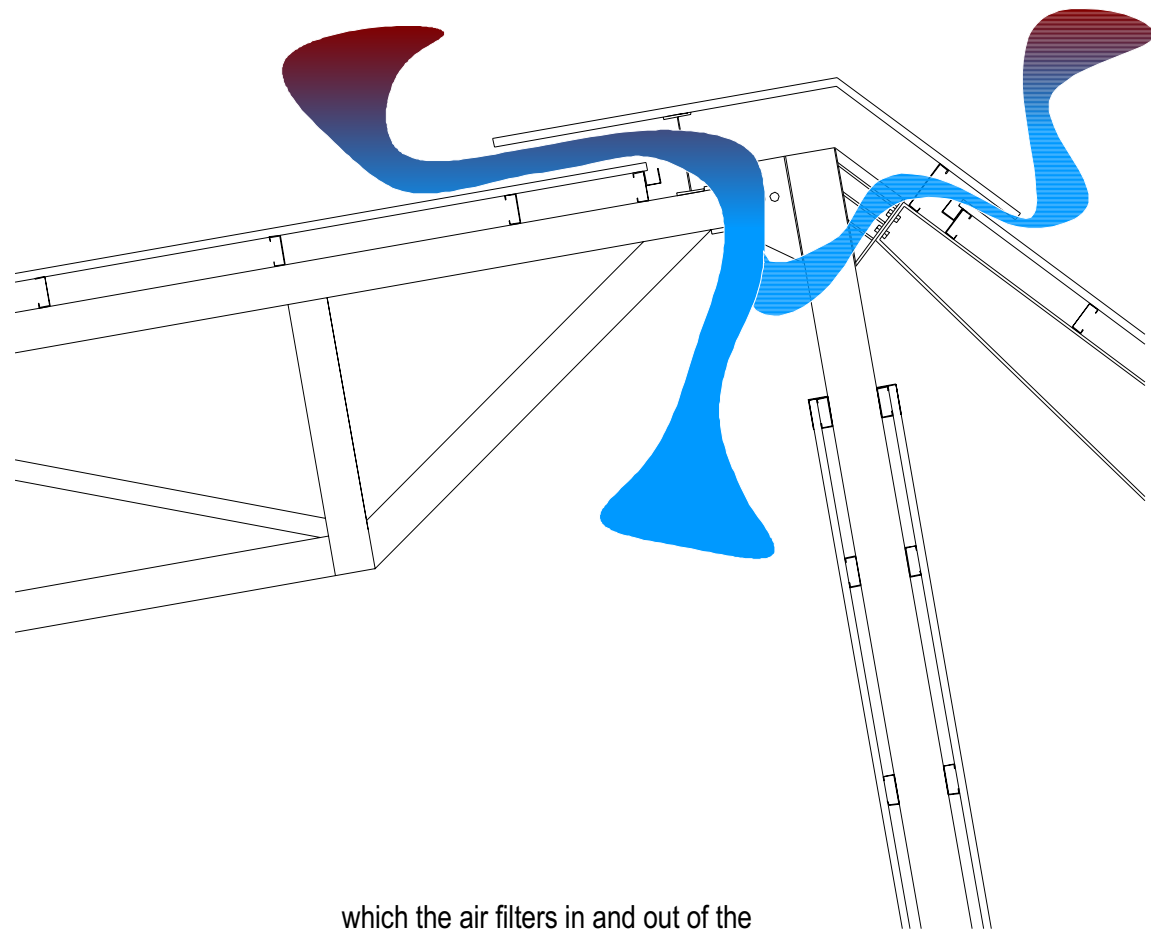
The building is an image of something which is at once singular and multiple. The building as a whole in singularity and exterior and interior spaces of multiplicity. It allows the inside to be outside (Departure Lounge and Deck), it allows the façade to be two-dimensional, and it demands to be looked at. What surfaces need to be (or could be) solid or continuous or transparent? The terminal would form a 2-faced entity: to the city/ocean (transparent) and to the conservation area (solid). The building reflects three essential features- the climatic conditions of the west cape coast, its geographic location and its link to the BCA, as well as the needs of the building to perform its function as a Terminal Building or transport facility.

Because there is no aesthetic direction, which is followed, there were various possibilities of consequently completing such a complex building. One is just to gather enough information to explore and generate a space from these different codes or data brought together; but sometimes the information is not available –or not relevant - and this leads to the other solution into which the building has been resolved into: a “contemporary design” very pure and smooth and simple. The project is not the result of aesthetic whim, but reflects the needs of a society and a place. It is a tribute to the beautiful ocean.



lights of the Terminal Building, aerial top view.
SD Cunha 2003

emphasizing that it projects a connection towards the ocean view. Arriving, waiting, buying, and eating are all activities that go on in the Hovercape Terminal building and follow a certain order that are expressed and are tangible by means of the assignment of them to specific spaces. The building gives off a great air, with great attention to detail. The diverse uses that this building would hardly have permitted a single austere and uniformed façade. The clarity of the scheme has created clear and luminous spaces that frame the view of the different perspectives, that of the ocean, and that of the Blaauwberg conservation area. The project's play of volumes creates various scenarios in which the sea is ever present and is framed by architectural elements like the large glass façade of the departure lounge. The significant contrast between the two main façades; that is, eastern and western; clearly determines the front and back sides. The first is open and the second is closed. The integration of nature with the building is achieved through the appropriation of the characteristics found within nature, vegetation, natural ventilation, and daylight. The reference to nautical construction is achieved through the reproduction of spaces and the relationship between the interior and exterior instead of formal gestures. In this manner the design of the building creates the sensation of being in front of the ocean, yet it avoids any literal references to a nautical theme. The structure is composed of two buildings. The light and shiny structure of the Terminal, which contrasts, with the rough finished concrete of the remaining part of the building.



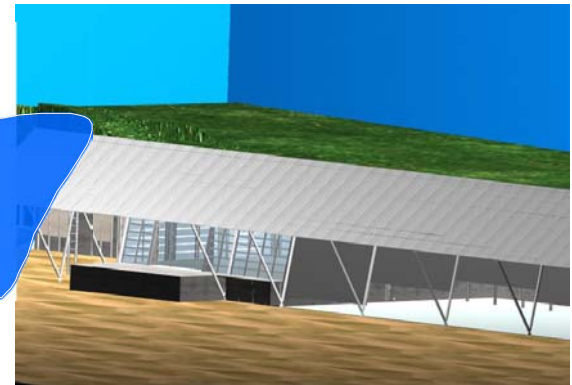
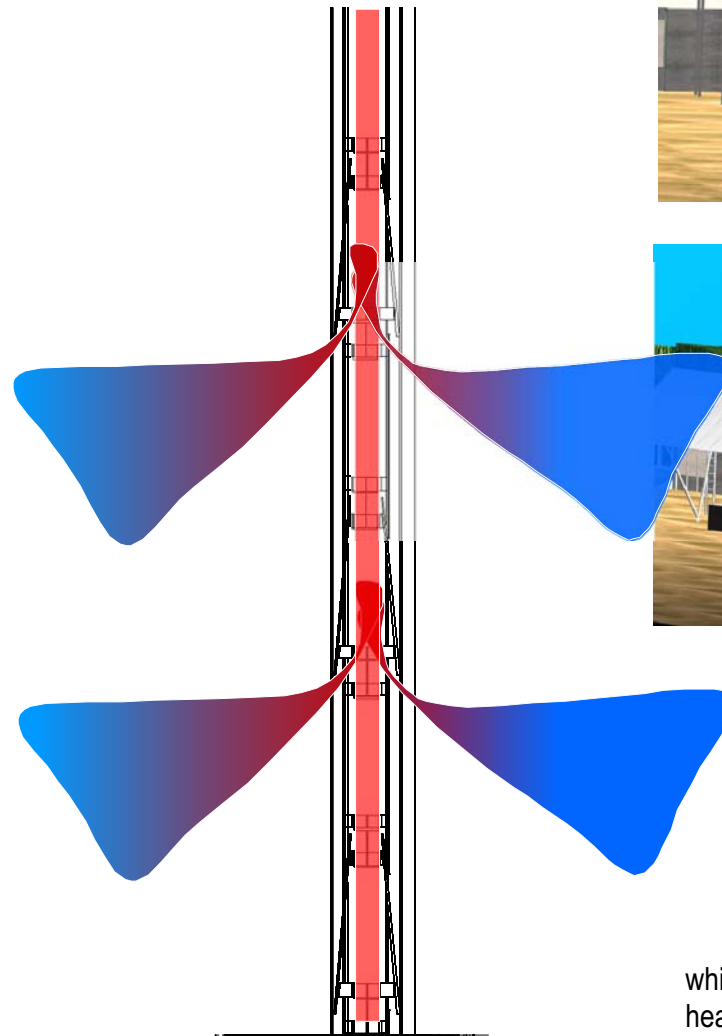
which the air filters in and out of the building through the Terminal Roof .
SD Cunha 2003

1.10.2 Seaside Block

The metal roof surface stretches out in a lengthwise manner to cover a distance of 110 meters, and huge skylights provide natural light in the interior of the Terminal. The metal roof sheeting of the terminal contrasts with the exposed concrete. The creation of the massive roof structure allows an abundance of outdoor light to filter in and spaces are allowed an extensive view of the inside at all moments of the day. The roof of the Terminal is composed of steel sheeting while the southern façade of the Departure Deck is also clad in chromed steel sheeting offering a vibrant grey colour, which reflects diffused light. It is important that one observes light as essentially mobile. It has been filtered, captured, and almost hauled into the building, even within the niceties of hard, rational architecture. The administration and Interpretative block have flat concrete roof with roof lights coinciding with the placement of internal courtyards.

According to Louis Khan, 'structure is the giver of light.' The western façade of the Terminal is transparent and is designed to be an enormous sign that can be seen over a great distance over the ocean. At night the terminal is illuminated from the interior - turning the building into an enormous lamp by the sea. The objective was to create pure and transparent spaces that establish a connection between man and his surroundings. The Departure Lounge consists of a breathing wall which allows light as well as air movement.

the city center, the Terminal architecture contrasts and compliments that of the city center.



SD Cunha 2003

which the "breathing wall" serves as a heat chimney and also illustrates the movement of air.

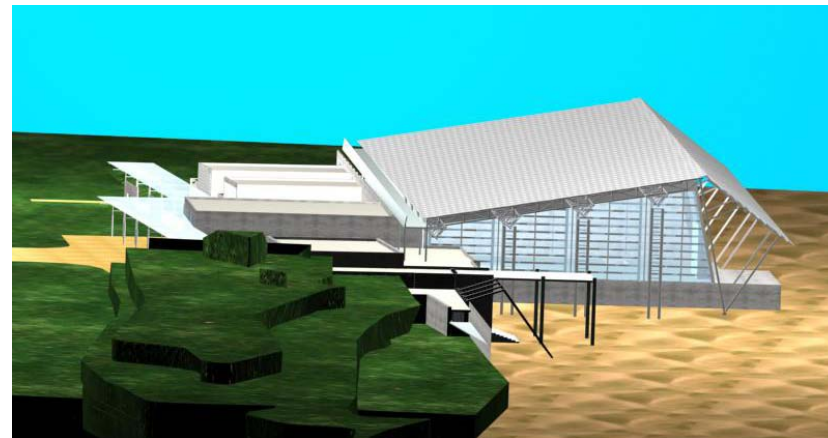
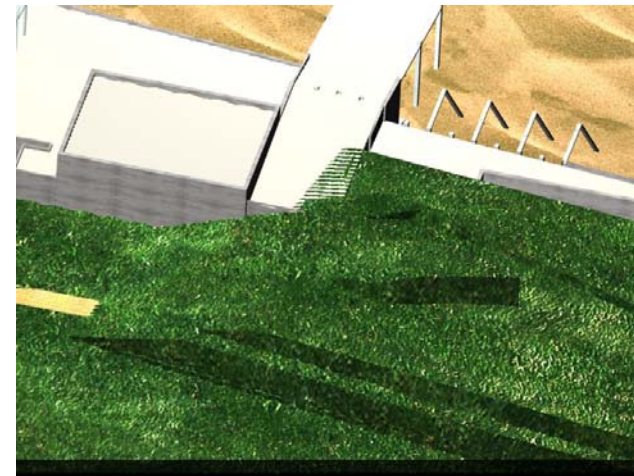
SD Cunha 2003

1.10.3 Anchor Block

The eastern side of the building is contrasting in itself, being a solid concrete block on the exterior while having transparent interiors. This solid concrete block forms an urban network on a small scale. The eastern block contains the administration facilities as well as the Interpretative Centre containing lecture and conference facilities. These spaces come together by a series of heavy walls that create openings, which in turn provide a sense of fluidity and continuity. The window frames in this block are mounted on the internal part of the wall, thus casting very pronounced shadows. The administration first floor is exposed concrete and part of the floor projects outwards from the rest of the building, casting shadows on the lower façade. The lines of this Eastern block display extreme simplicity. As mentioned before the interior spaces seem to have a floating roof on columns making the spaces transparent and open from the inside.

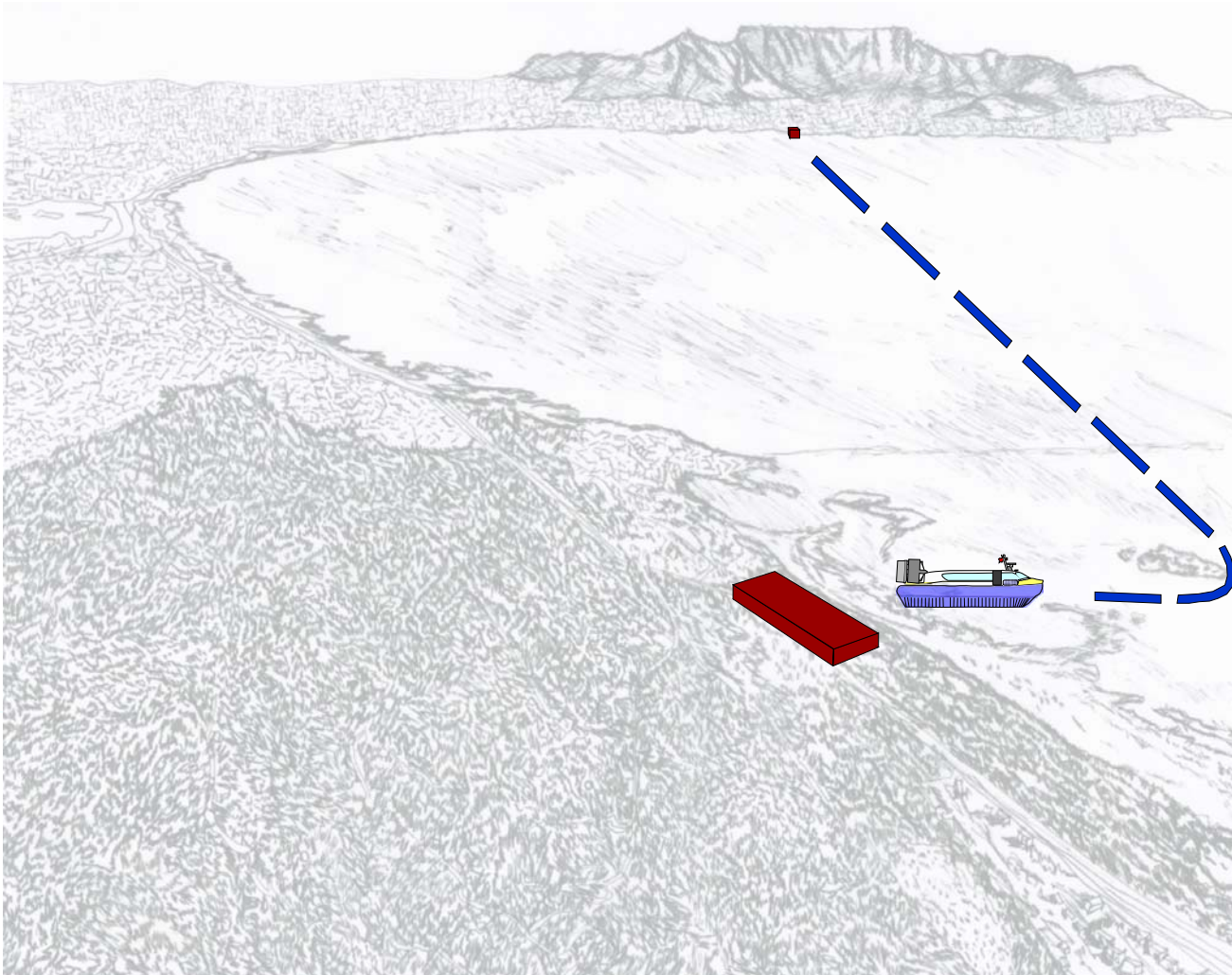
The Interpretative Centre is a quieter space where a closed and more intimate atmosphere exists leading to the courtyard along the western façade of the Interpretative Centre representing a synthesis of the cycles of nature, living beings and of time of the BCA. This type of facility needed to be exposed in the sense that it is easily accessible by public transport and located in a public area of the community. This has ensured that it can easily serve the people from the broader area.

groups such, scholars, students, business people etc. There is not enough money to meet the needs of individual user groups. This makes the Terminal building economical since it allows it to pay for itself (it is used over most of the day and charges are paid by many different groups.).



the ever -quickening speed of our social, technical, political and economic change ; an architecture depicting our transformation yet permanence where finally urban regeneration and economic vitality can take place, reflecting the changing and overlapping of functions, and needs; building as a form of controlled randomness which can res pond to complex situations and relationships. Architecture has always equated greatness with the breaking of rules.

makes use of the service. It is to be a unique experience of the synthesis of technology and nature. In the end space, earth and water are to be in harmony.



This design was started with no aesthetic agenda, and it followed that the design had the possibilities of going into any direction. Here the development is approached as an opportunity to just express the dream of these objects, the fantasy attached to hovercraft travel. The design contains material sensuality and contextual sensitivity, breaking down the definite barriers between architecture and landscape, between water and land so that the man made and natural will gradually merge and fuse. At eye level with the sea, it is easy to be one with nature, to be an intimate and necessary part of that sensuous sultry landscape.

HOVERCAPE INTERPRETATIVE CENTRE HOVERCRAFT TERMINAL

Part 1

Briefing Outline



Part 2

Baseline criteria



Part 3

Technical Resolution



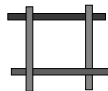
Part 4

Design Discourse



Part 5

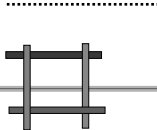
Feasibility Analysis



Part 6

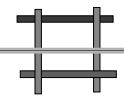
Design Documentation





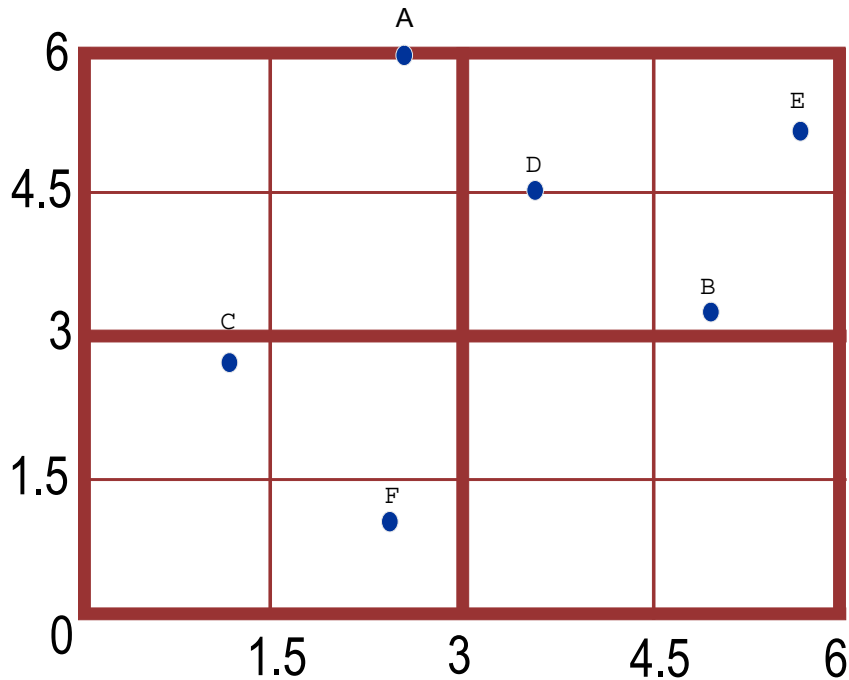
1.1 Stakeholders	115
1.2 Risk Management	116
1.3 Accomodation Schedule	118
1.4 Budget and Fees	119
1.5 Project Pregram	120

1.1. Stakeholders



Stakeholder Group	Power			Level of Concern		
	Influence of Others	Direct Control of Resources	Y-Axis Score	Technical	Social	X-Axis Score
	0.35	0.65		0.2	0.8	
A Hovercape	6	6	6	6	2	2.8
B Blouberg Community	2	4	3.3	4	5	4.8
C Blouberg Municipality	4	2	2.7	2	1	1.2
D Inner City Transport	3	3	3	3	4	3.8
E Ferry Commuters	5	5	5	5	6	5.8
F Scholars/Students	1	1	1	1	3	2.6

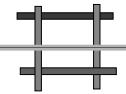
Table 1.1. Stakeholder groups; SD Cunha 2003



Thus the ferry commuters, Inner Transport Dept. and the Blouberg Community would be the major stakeholders possessing the most influence, as well as have an impact on the project.

Table 1.2. Stakeholder groups B; SD Cunha 2003

1.2 Risk Management



PROBABILITY/ IMPACT RISK RATING				
Risk Description	Probability (A)	Impact (B)	Numeric Ranking (C)	Category Ranking
1 The Facility not being used. Thus no income.	1	8	8	Low (Minor +Rare)
2 Noise Pollution Reg.	3	8	24	Low (Minor+Unlikely)
3 Strong Winds	2	8	16	Low (Rare+minor)
4 Vandalism	6	3	18	Low (Minor+Likely)
5 Environmentally Sensitive Area	5	8	40	Medium (Minor+Likely)

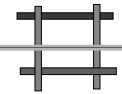
Table 1.3 Probability/ Impact Risk ; SD Cunha 2003

Probability is measured between 1-10, with 1 being least probability. Impact is also measured between 1-10, with 10 having the highest impact.

The greatest risk, which this project has to deal with, would be its location. The facility is located on a site on the beach of Bloubergstrand. The site is a Brownfield site, so in fact a precaution has been to select a site, which has already been partly or fully developed. The area has been proposed for large-scale development. Currently known as Big Bay Development. The land of entire Big Bay area has been prepared for development, including flattening slopes, dividing erven and designating each to specific functions and levels of development. The natural slope has been maintained as far as possible. With this in mind approximately 520m² of the Interpretative Centre is buried beneath the ground. The western façade is open and transparent to the ocean view.

Additionally the building has been located adjacent to a future reserve area, known as the Blaauwberg Conservation Area. The Interpretive Centre within the Terminal Facility is the Base Centre for this Conservation Area. The building is composed of 2 sections, namely the seaside block and a landside block. The seaside block has a main structure of glass and steel rendering the building transparent. The land-side block is also partly submersed 1.5m below the earth berms on site. This block is a single to double storey height. The intention was for the building to blend in with the landscape with the use of natural materials, such as the in-situ cast concrete walls and structure. Thus keeping the impact on the environment to a minimum.

1.2 Risk Management



Precautions have to be taken to contract a private or independent security company for the Terminal Facility. A main security office is located within the building with security cameras monitoring movement and activity. The building as well as the exterior is to be well lit during the evenings.

Strong Winds

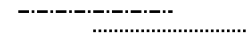
With reference to the documented wind charts, the hovercraft cannot operate within wind conditions exceeding 45 knots. This is predicted to occur a maximum of 7 days throughout the whole year. With this result measures would be taken to transport commuters by means of shuttle vehicles and buses. An external advisory weather monitoring team would be employed. This would enable that an additional early warning weather facility be provided at the terminal displaying the weather forecasts. This would enable commuters to plan their transport alternatives in advance.

Noise Pollution

The noise the hovercraft would dissipate would be minimal since the sound is baffled. The Big Bay area would be fully developed with shopping centers etc. and thus the sounds of the ocean and hovercraft would blend in with the hustle bustle of activities in the area. The coastline towards the Cape Town city center is mainly composed of industrial buildings and factories and thus would also not be disturbed by the minor sounds coming from the hovercraft ferries. Certain sections of the building have been constructed with sound insulating materials within walls and ceilings etc. The facility has also been divided into quieter and noisier sections. Namely, the southern part of the building (terminal and administration) would experience louder sounds than those in the northern section-Interpretative Centre.

No Income Generation

The probability of the Terminal Centre not being used to its full potential is minimal. The building offers a service the community needs, that is traffic congestion relief in the form of a, safe and reliable alternative; the hovercraft ferry. The other social services being offered is an educational facility provided with seminar room and conference facilities. A large spectrum of individuals; business persons, scholars, students, tourists, adult learners, etc would use these. There is a need facility such as this and thus will be used to its full potential.



1. Concept Development	124
2. Detail Drawings	136
3. 3- Dimensional Renderings	145

The placing of the building on the site was first looked at. The building had to be orientated in such a manner that the terminal faces the ocean side in order to make hovercraft travel accessible.

A berm was placed on the south eastern side to serve as a wind break.

Fig.1 Concept Sketch 1

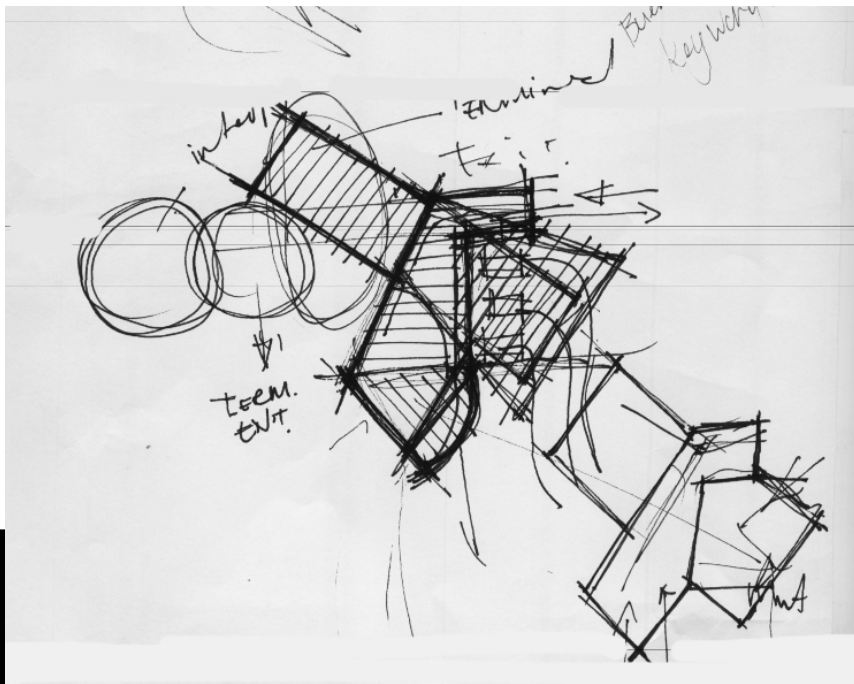
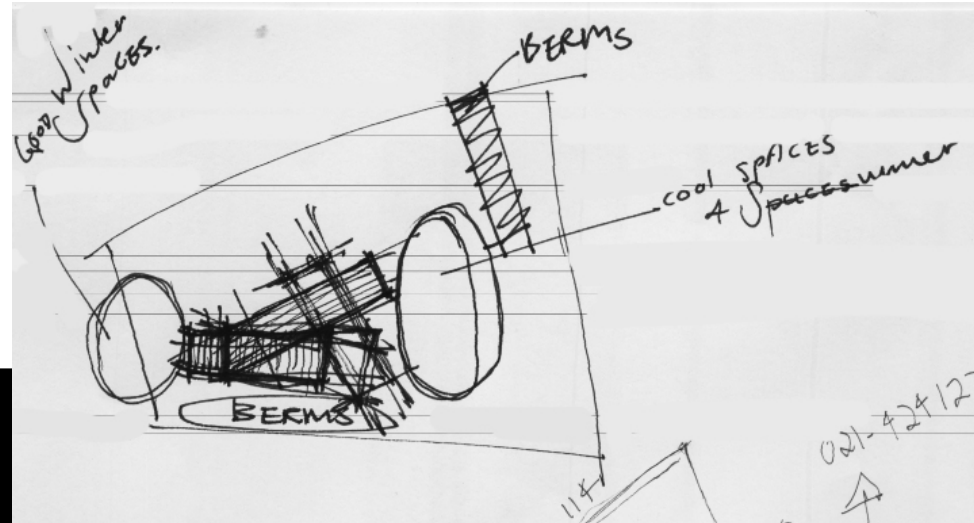


Fig.2 Concept Sketch 2



Numerous Axis would also be achieved in a visual manner, that to Blaauwberg Hill
Robben Island
Table Mountain

It was later established that the most important link is that of the terminal with the ocean

The aim was that the architecture of the structure should be experienced through the movement of spaces and time-This all involves: Approach/ Entry
Sequence of Spaces
Access

This would be achieved by- structure enclosure

- Environmental Comfort
- Health, Safety and Welfare
- Durability

Accommodation of a program according to – user requirements, needs

- social/cultural factors
- historical precedents

The Terminal building is not a building but a system comprised of:

- Spatial System
- Enclosure System
- Structural System
- Circulation System

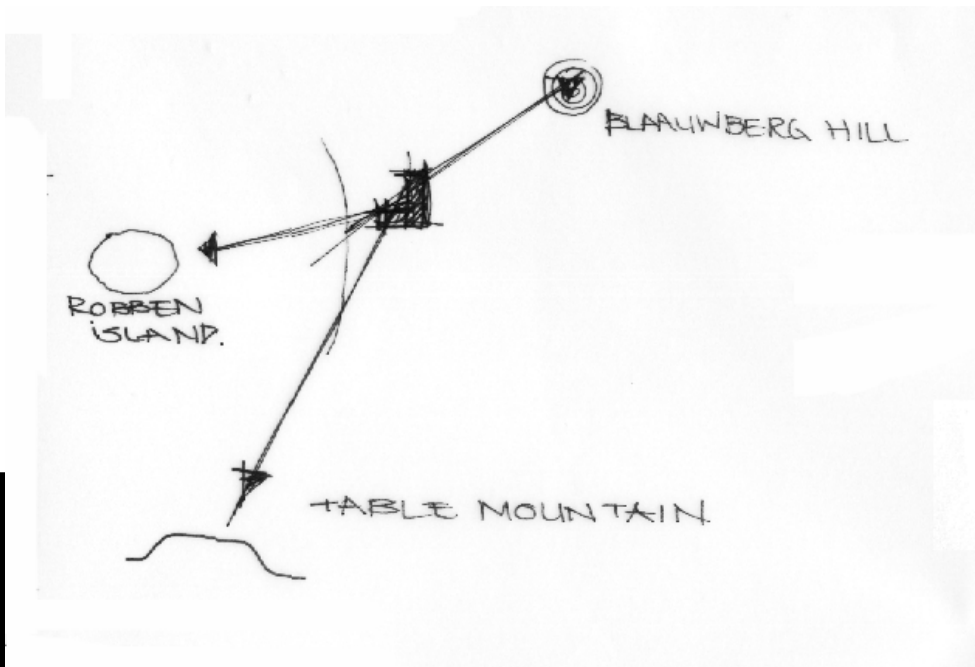


Fig.3Concept Sketch 3

Fig.6 Space Linkages 1

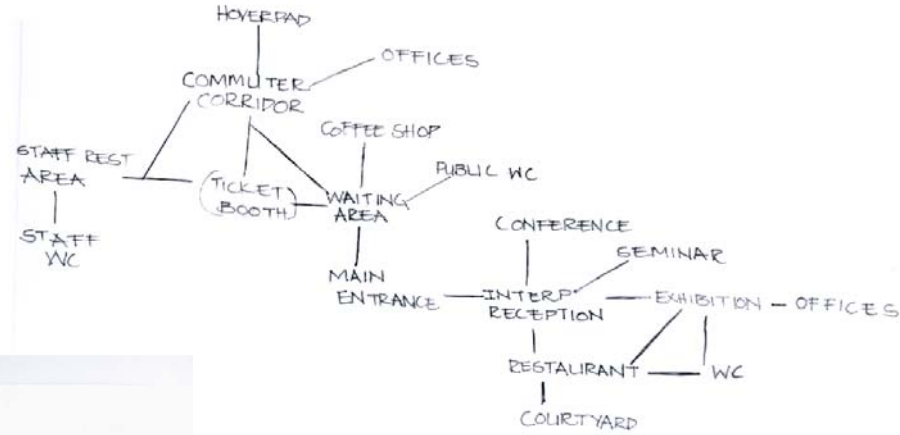


Fig.5 Concept Spaces 1

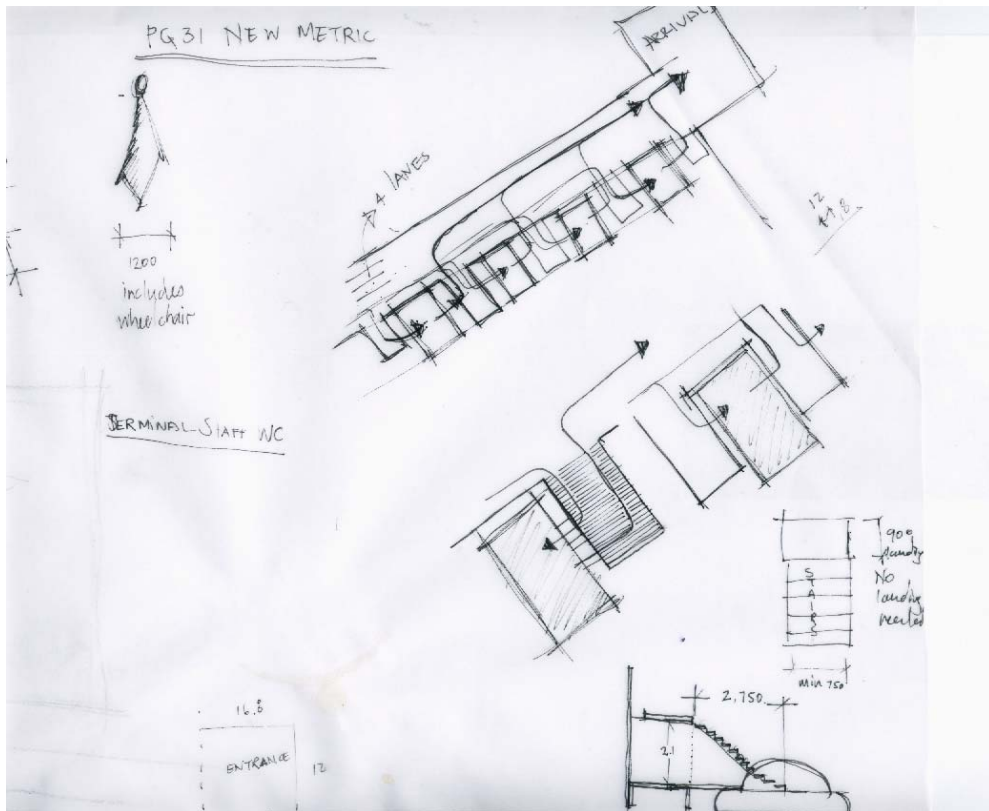
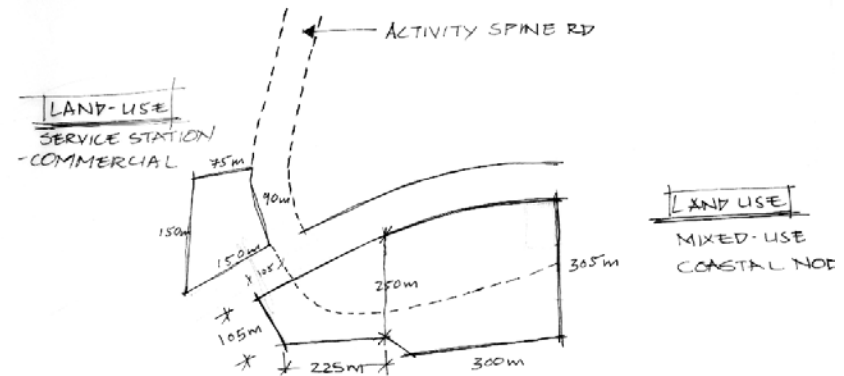


Fig.7 Site Context



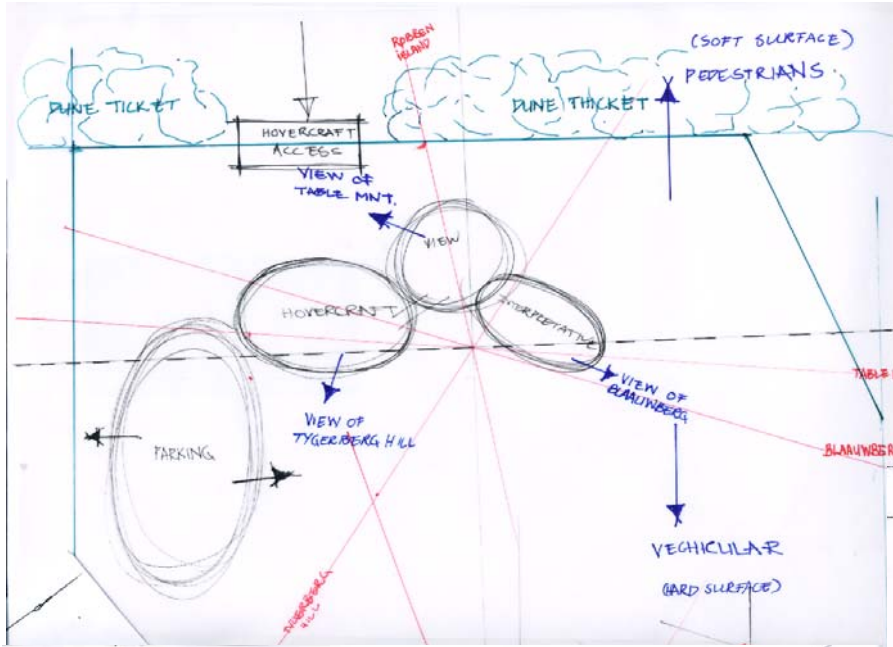
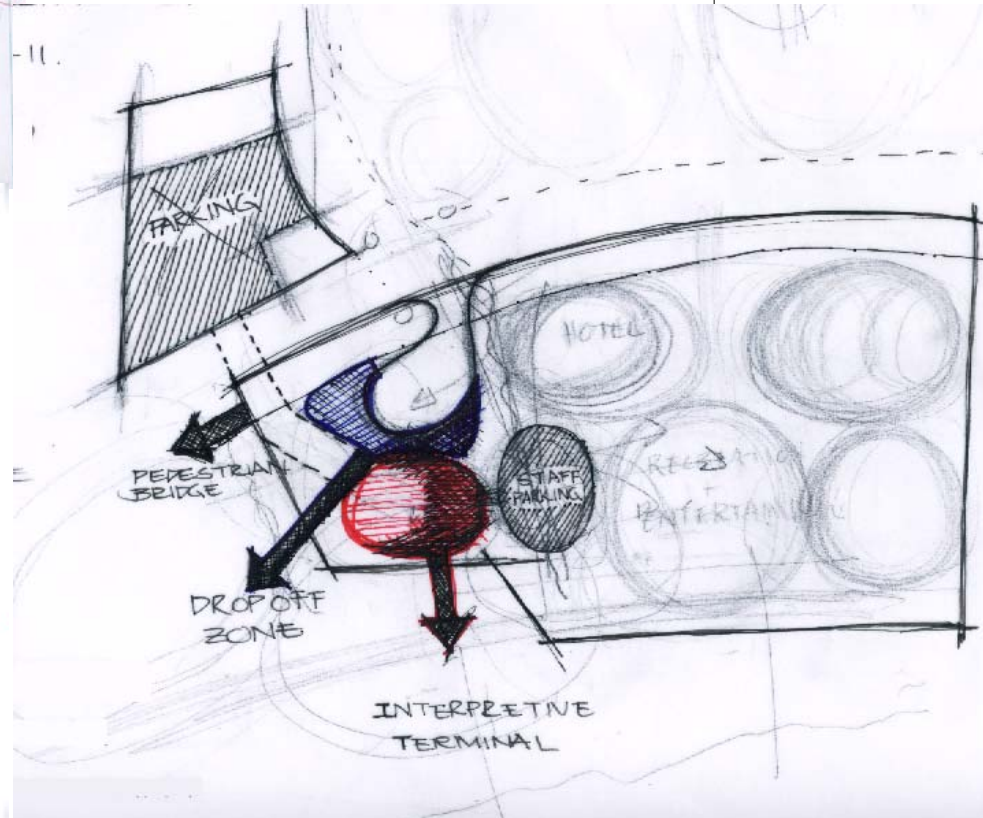
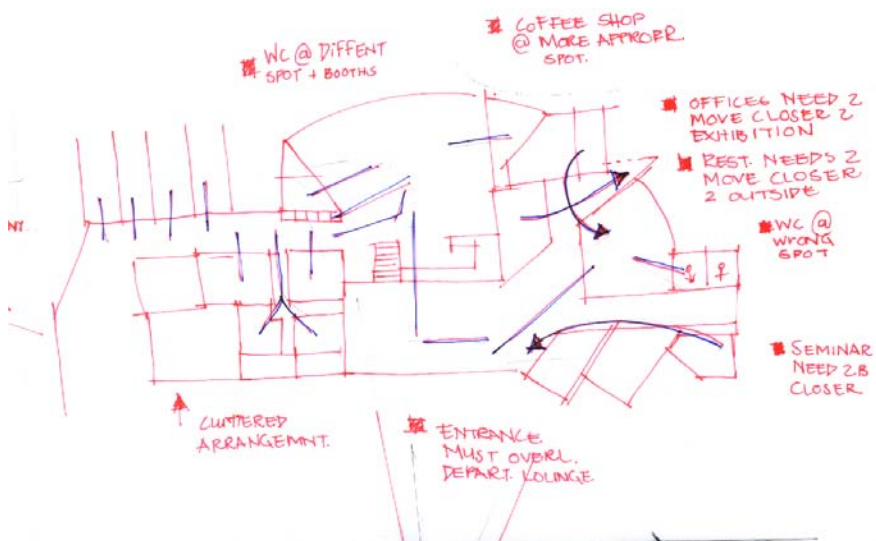


Fig.8 Site Context 2

A series of rectangles can be generated to form a uniform organization- each rectangle is proportional to the other as well as the overall structure. An order of rhythm and repetition of functions within the building would occur along a datum line was to be achieved, possible along one of the axis

Fig.9 Site Context 3

Fig 10. Concept Alterations



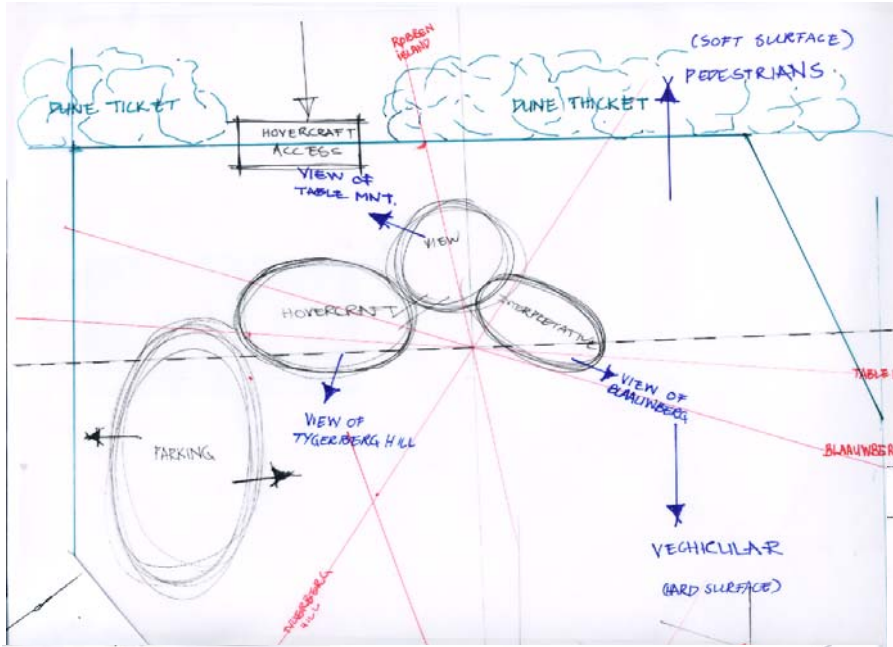


Fig.8 Site Context 2

A series of rectangles can be generated to form a uniform organization- each rectangle is proportional to the other as well as the overall structure. An order of rhythm and repetition of functions within the building would occur along a datum line was to be achieved, possible along one of the axis

Fig 10. Concept Alterations

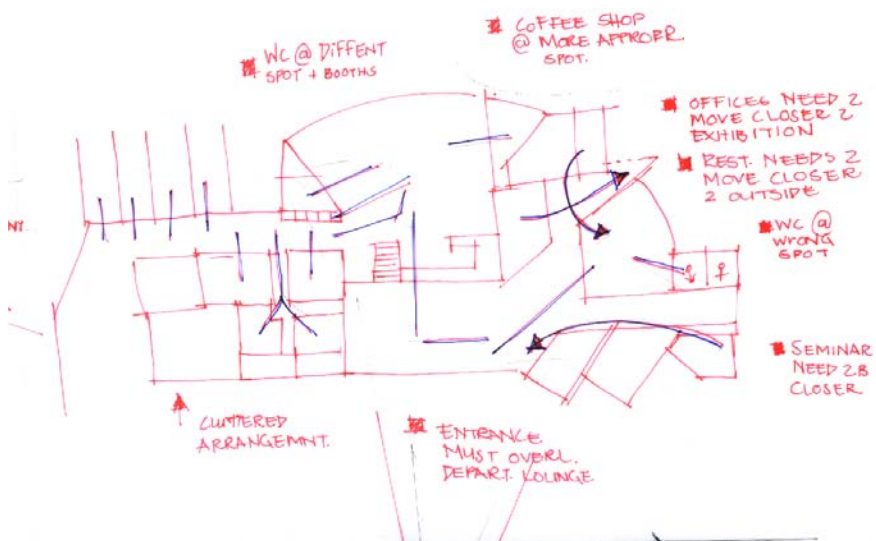
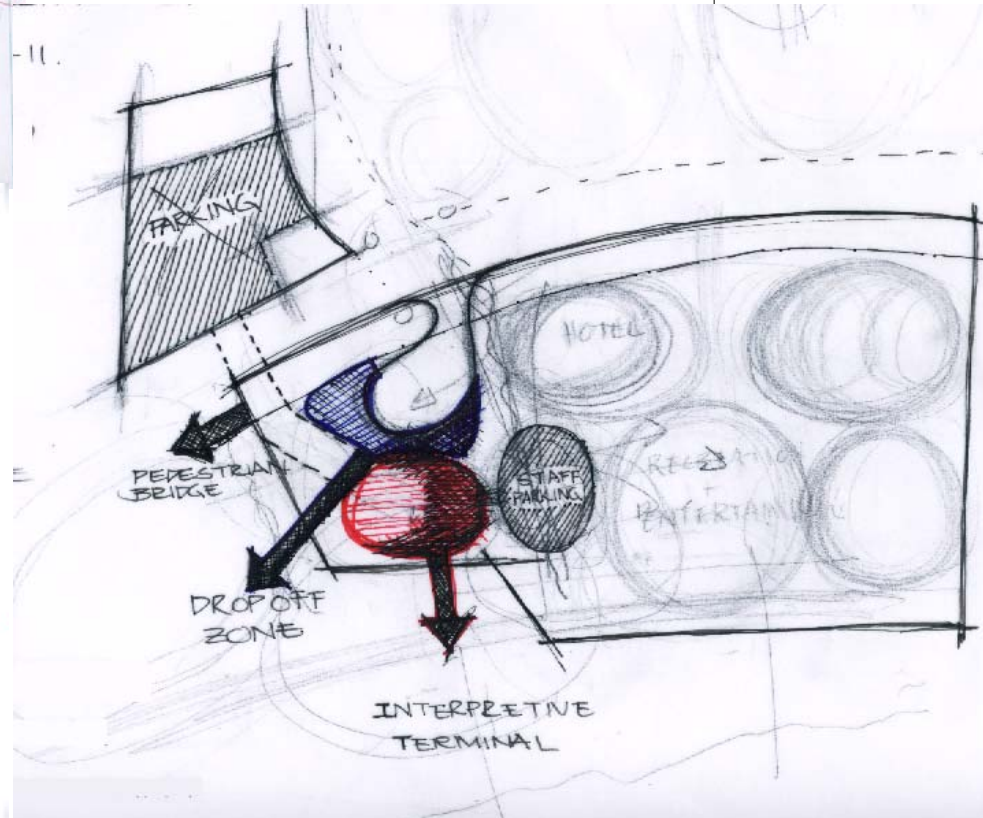


Fig.9 Site Context 3



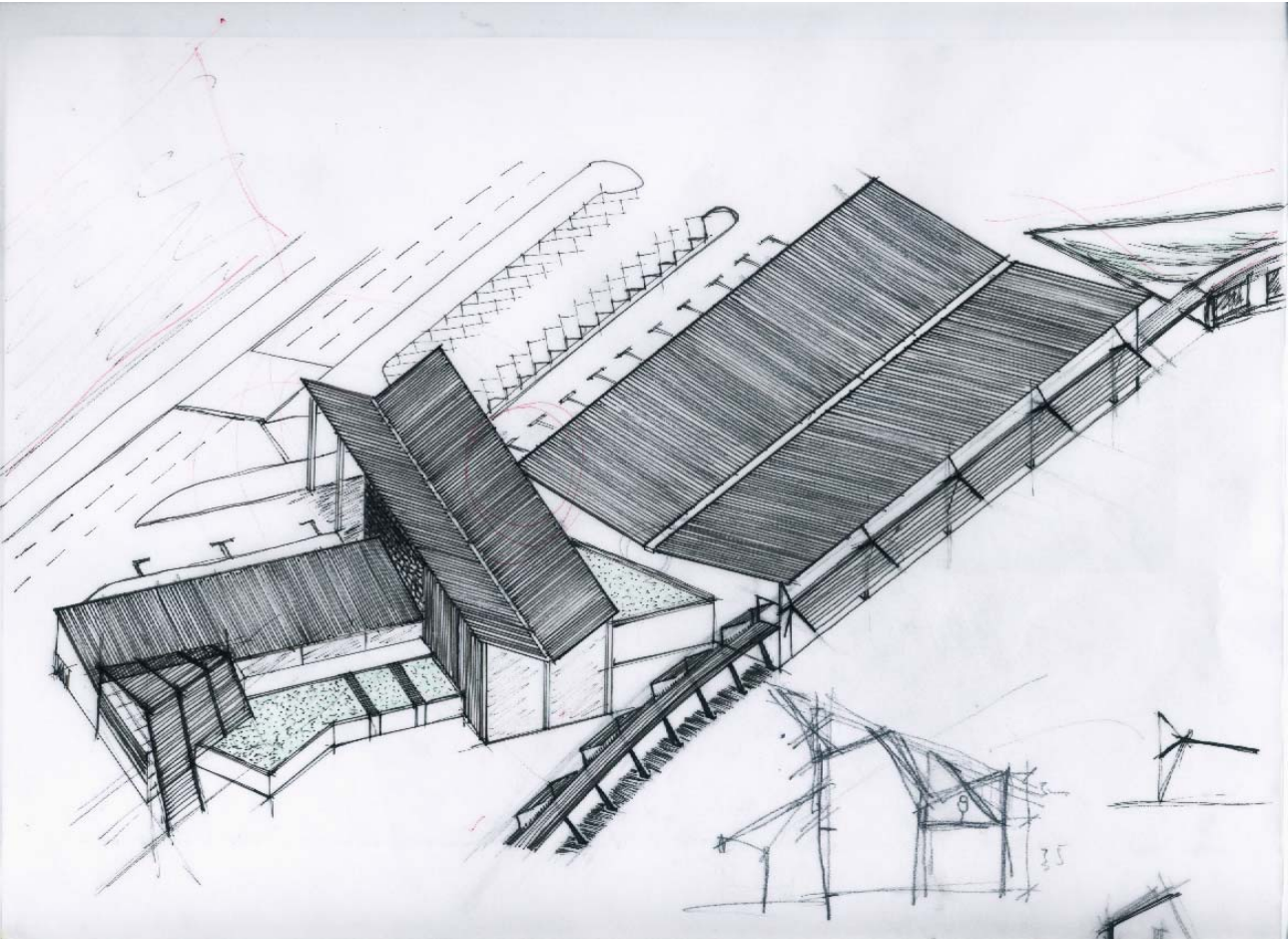


Fig.16 Concept Perspective

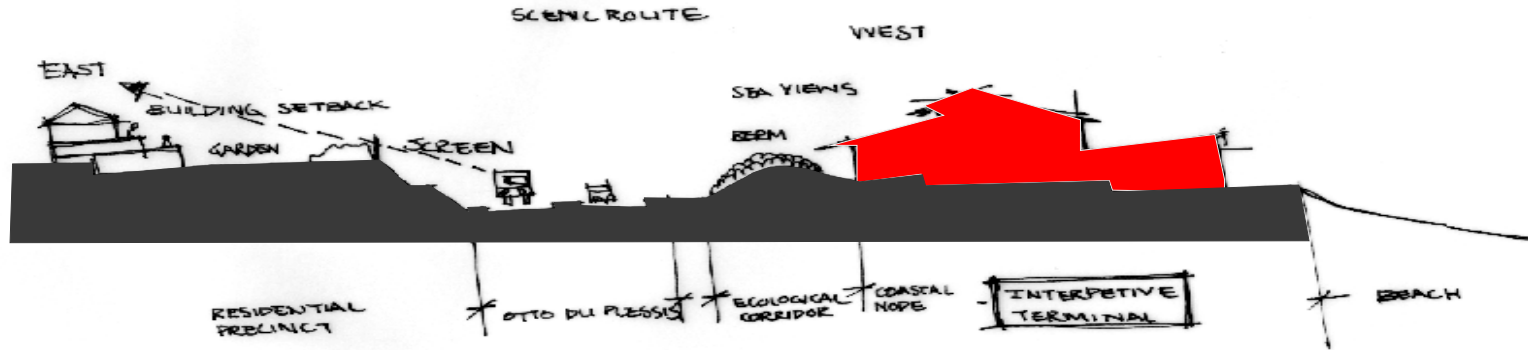


Fig.17 Section Through Otto du Plessis Road

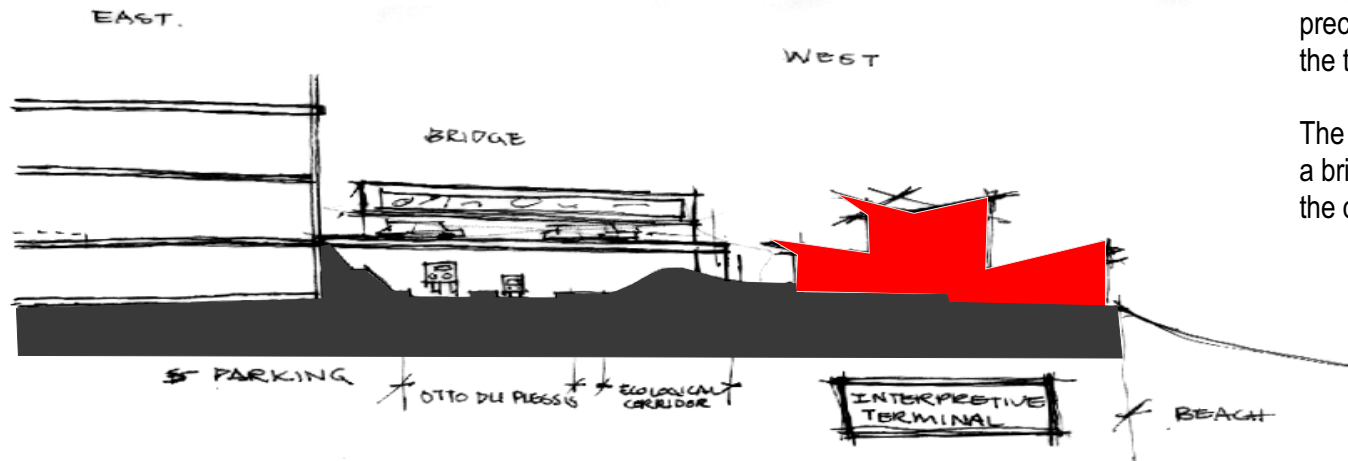


Fig.18 Section Through Otto du Plessis Road with Additions

Parking was original to be located along precinct 8, but ultimately is placed adjacent to the terminal building within the same site.

The sketch also indicates the original idea of a bridge which ultimately got excluded from the design.

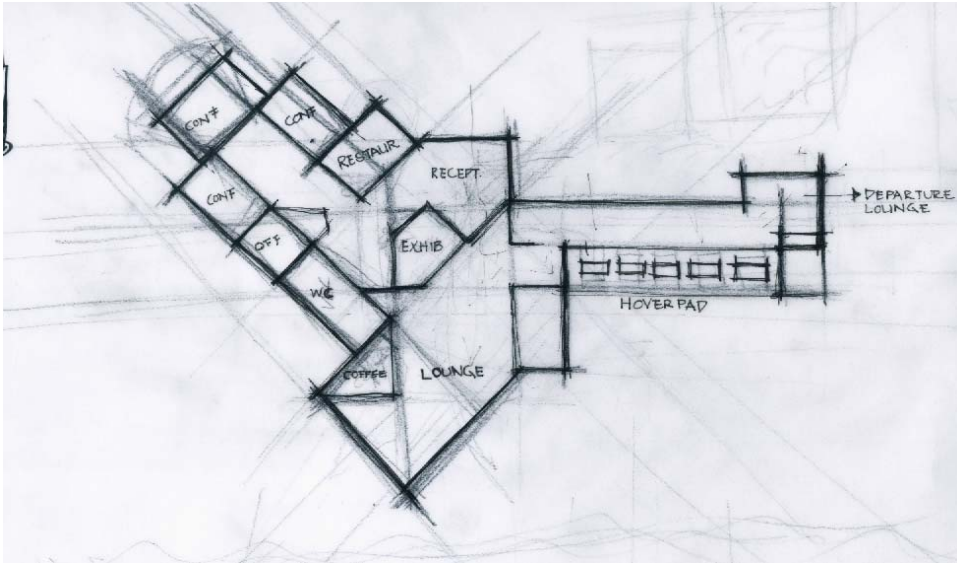


Fig.19 Concept Sketch 8

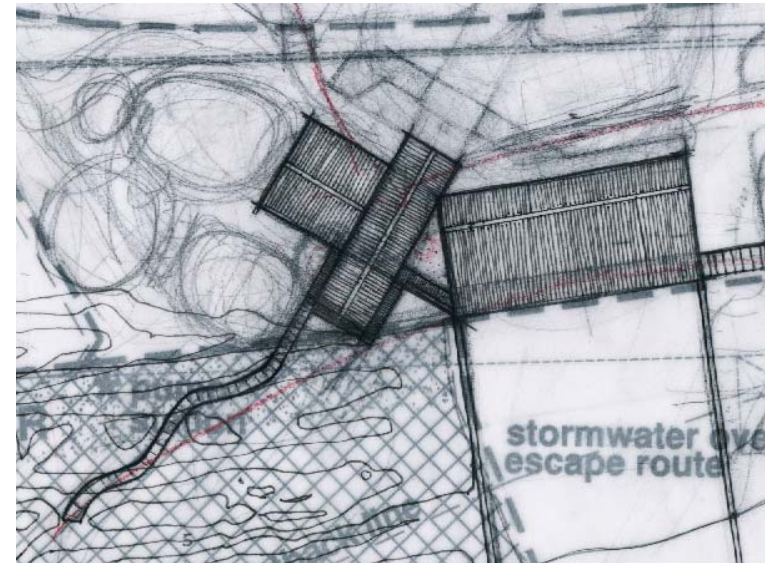


Fig.20 Concept Sketch 9

The hovercraft deck was placed along the sea-side of the building while the Departure Lounge was placed with a view towards the ocean. The Interpretative spaces were placed along a axis orientated towards the Blaauwberg Hill.

Development stage 1

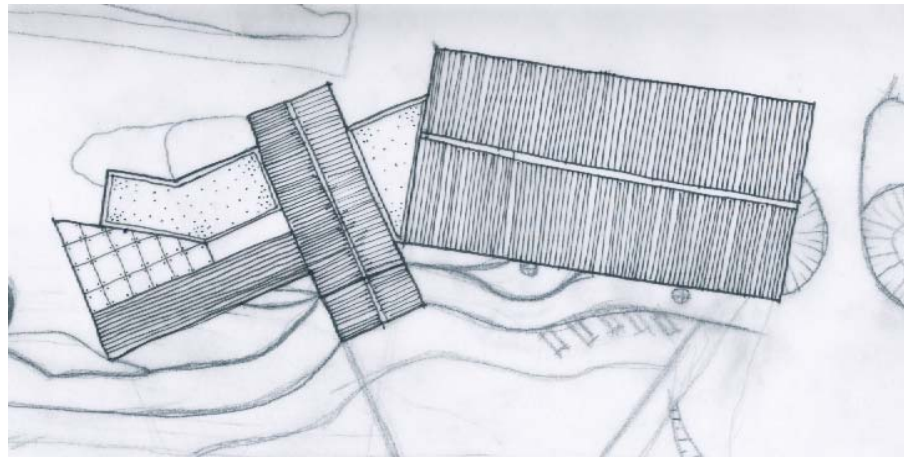
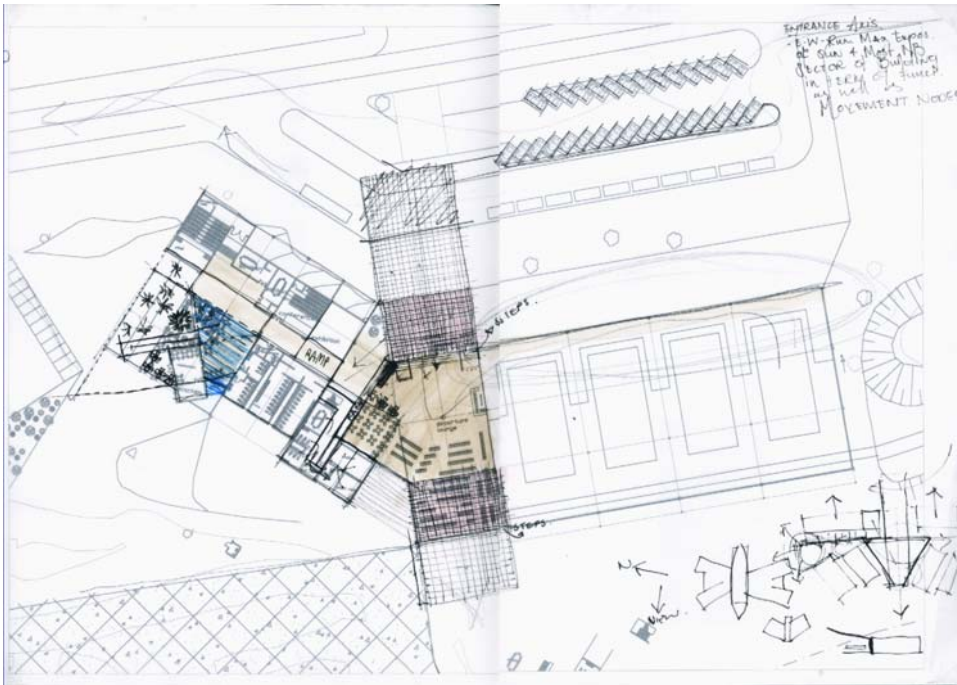


Fig.21 Concept Sketch 10

Fig.22 Concept Sketch 11

A principle axis is maintained from the entrance through to the ocean, another axis, the interpretative center, is towards Blaauwberg Hill, while the Ferry deck maintains an axis towards Table Mountain. The Interpretative Centre has a courtyard which flows into the landscape.

Development stage 2



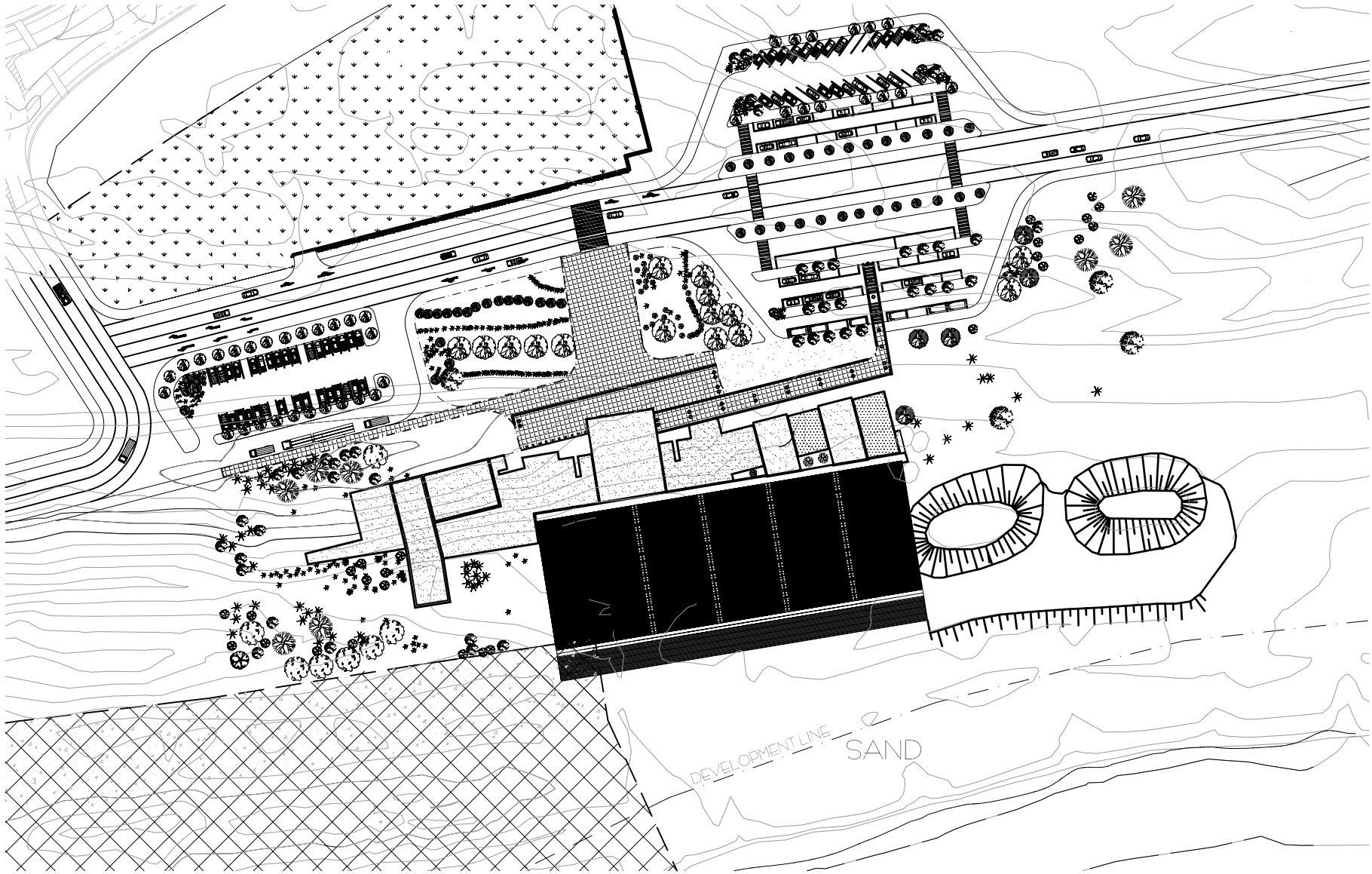
Fig.24 Concept Sketch 13



Fig.25 Concept Sketch 14

The strict symmetry of the building slowly dissipated within stages towards arriving at the final design development

Development stage 4



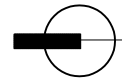
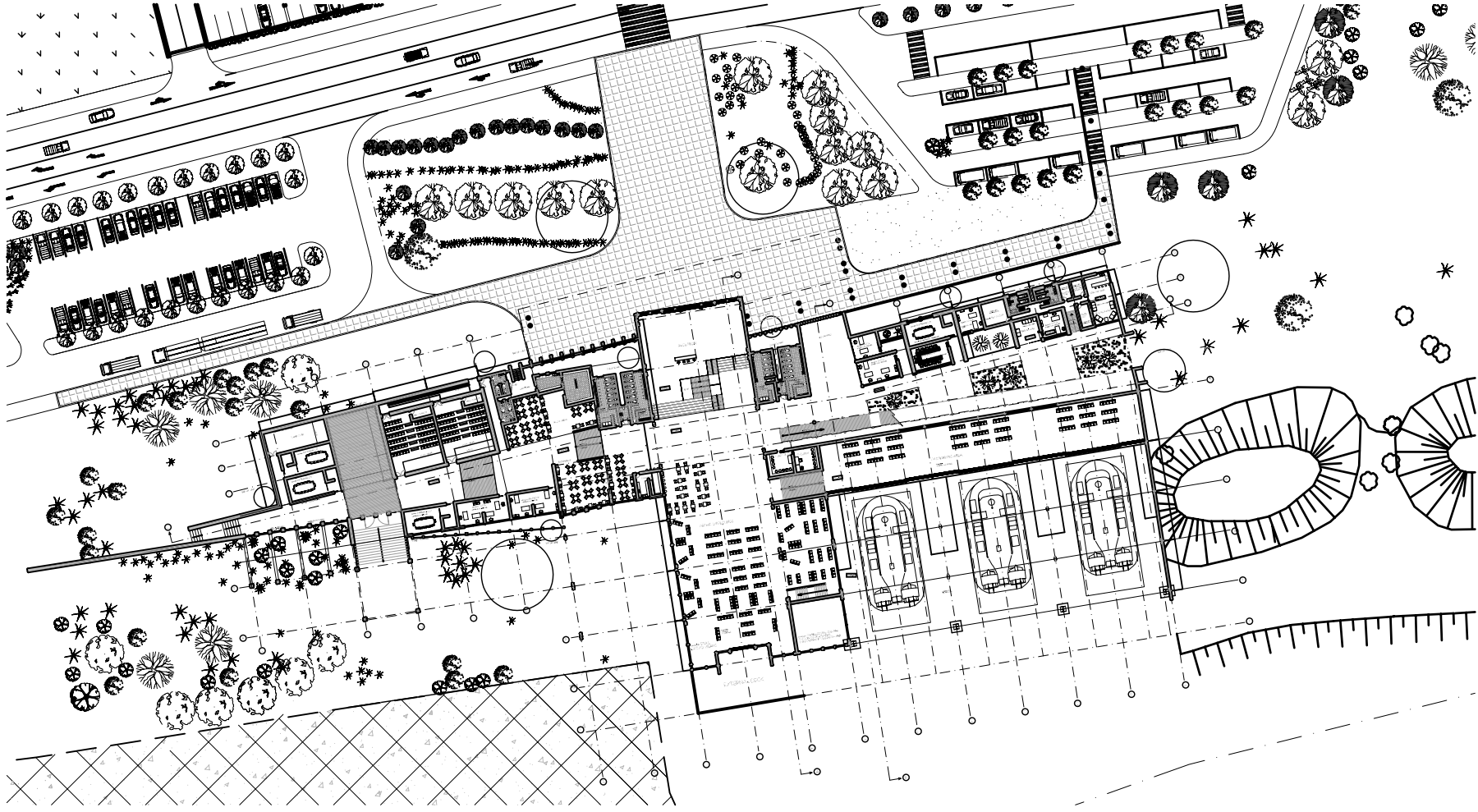
SONIA DULCE CUNHA
SITE PLAN

MARCH (PROF) II
SCALE 1:1000

9801419

H O V E R C R A F E R R Y

HOVERCRAFT FERRY TERMINAL INTERPRETIVE CENTRE



HOVERCAPE

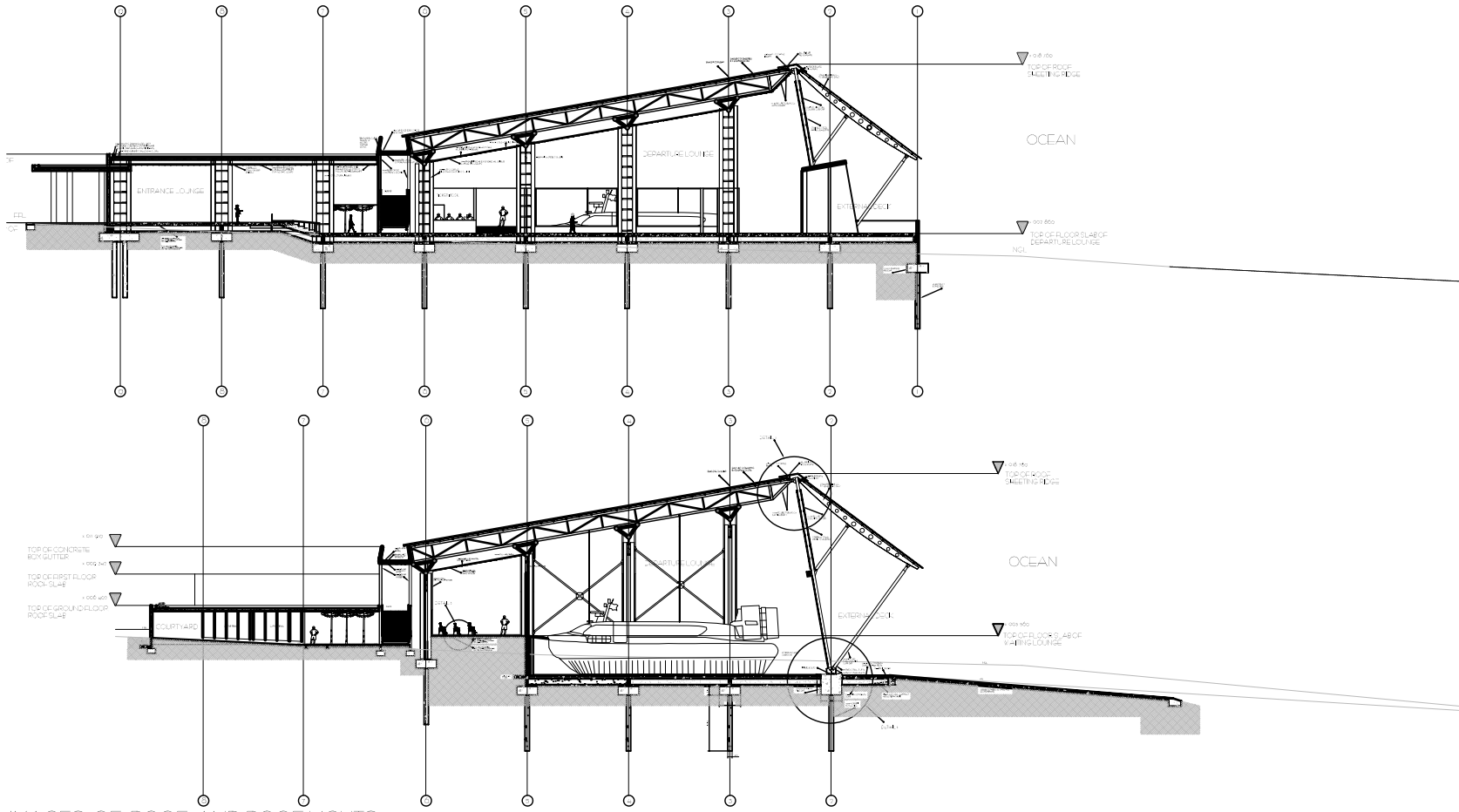
HOVERCRAFT TERMINAL INTERPRETIVE CENTRE

SONA DULCE CUNHA
GROUND FLOOR PLAN

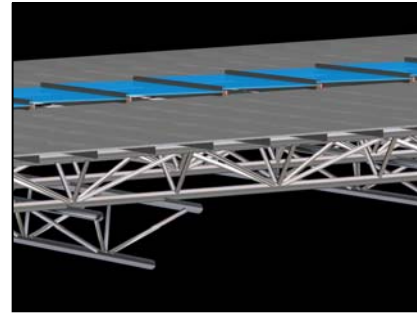
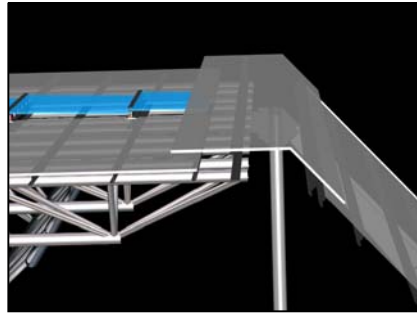
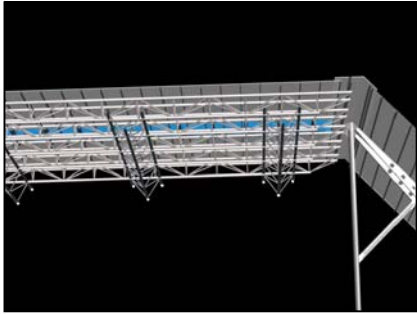
MARCH (PROF) III
SCALE 1:750

08.04.10

SYNTHESIS BETWEEN TECHNOLOGY AND NATURE SYNTHESIS BETWEEN TECHNOLOGY AND NATURE SYNTHESIS BETWEEN TECHNOLOGY AND NATURE

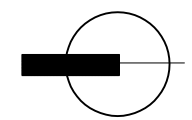


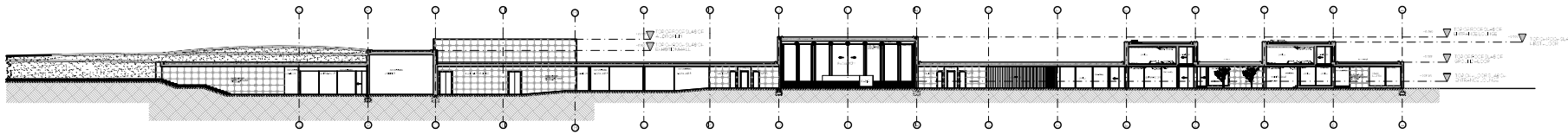
IMAGES OF ROOF AND ROOF LIGHTS



HOVERCRAFT

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE

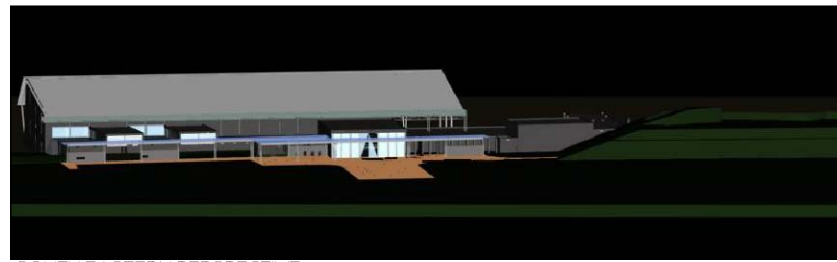




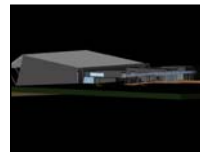
WESTERN ELEVATION



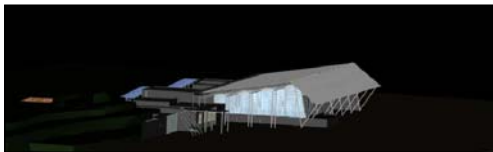
EASTERN ELEVATION



SOUTH EASTERN PERSPECTIVE



NORTH WESTERN PERSPECTIVE

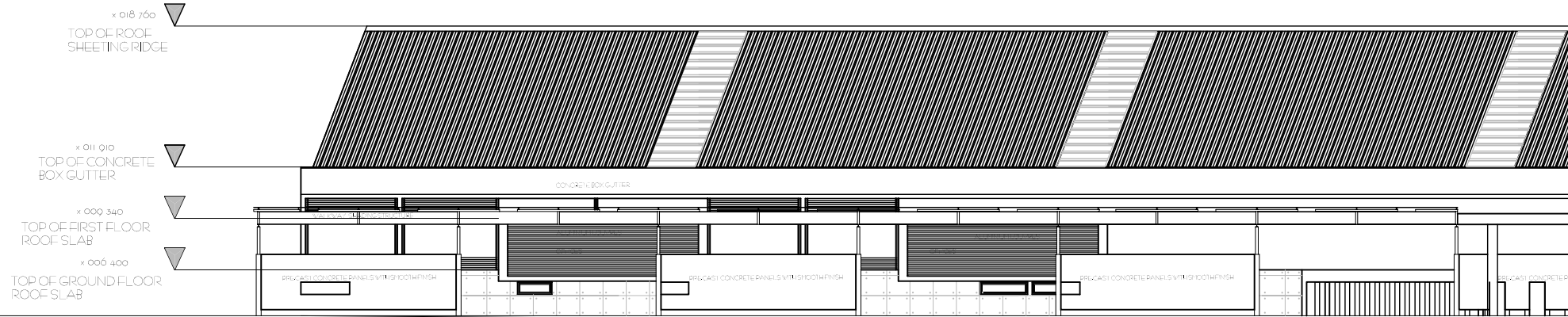


SONIA DULCE CUNHA
SECTION C.C

MARCH (PROF) II
SCALE 1:500

0801419

H O V E R C R A F E O
HOVERCRAFT FERRY TERMINAL INTERPRETIVE CENTRE



NORTHERN PERSPECTIVE EASTERN PERSPECTIVE

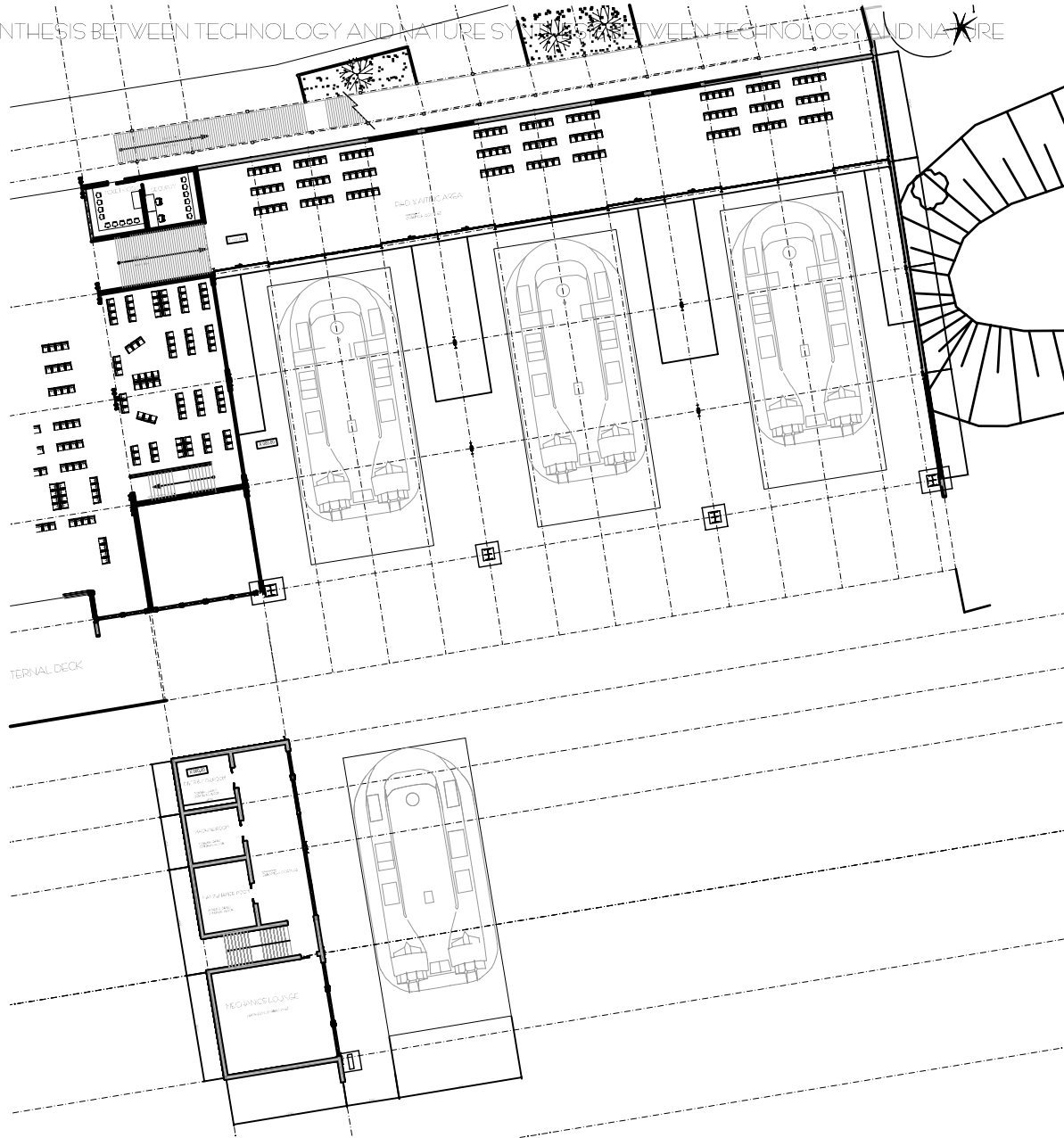


SONIA DULCE CUNHA
EASTERN ELEVATION

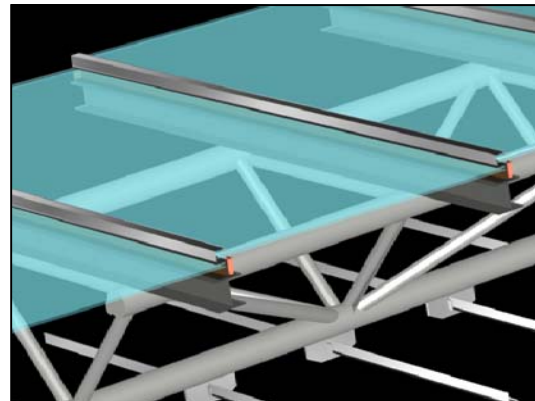
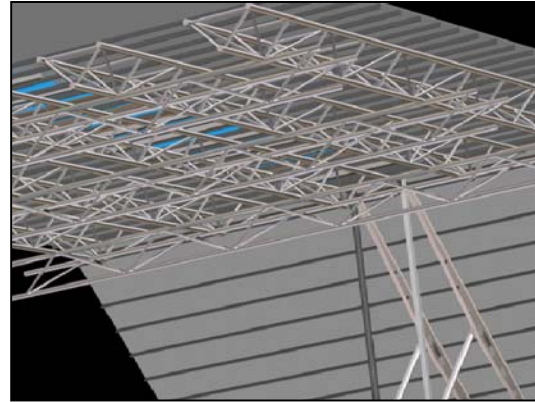
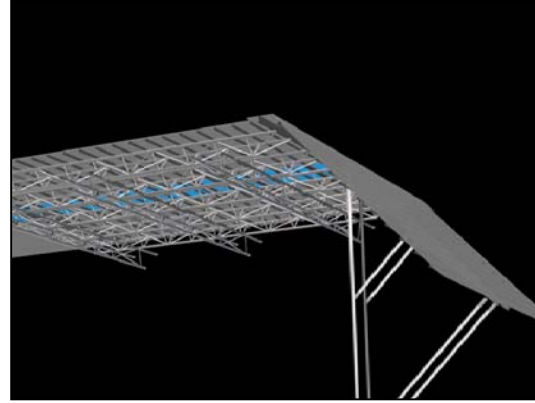


MARCH (PROF) II
SCALE 1:400

SYNTHESIS BETWEEN TECHNOLOGY AND NATURE SYNTHESIS BETWEEN TECHNOLOGY AND NATURE



IMAGES OF ROOF AND ROOF LIGHT



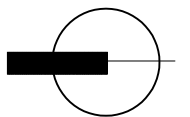
SONIA DULCE CUNHA
DETAIL DOCKING PAD

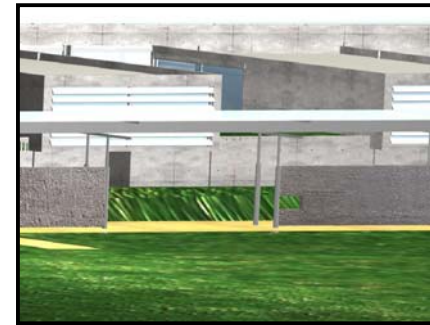
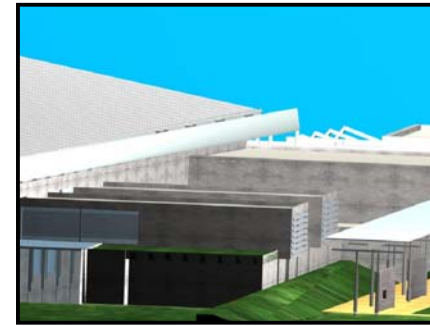
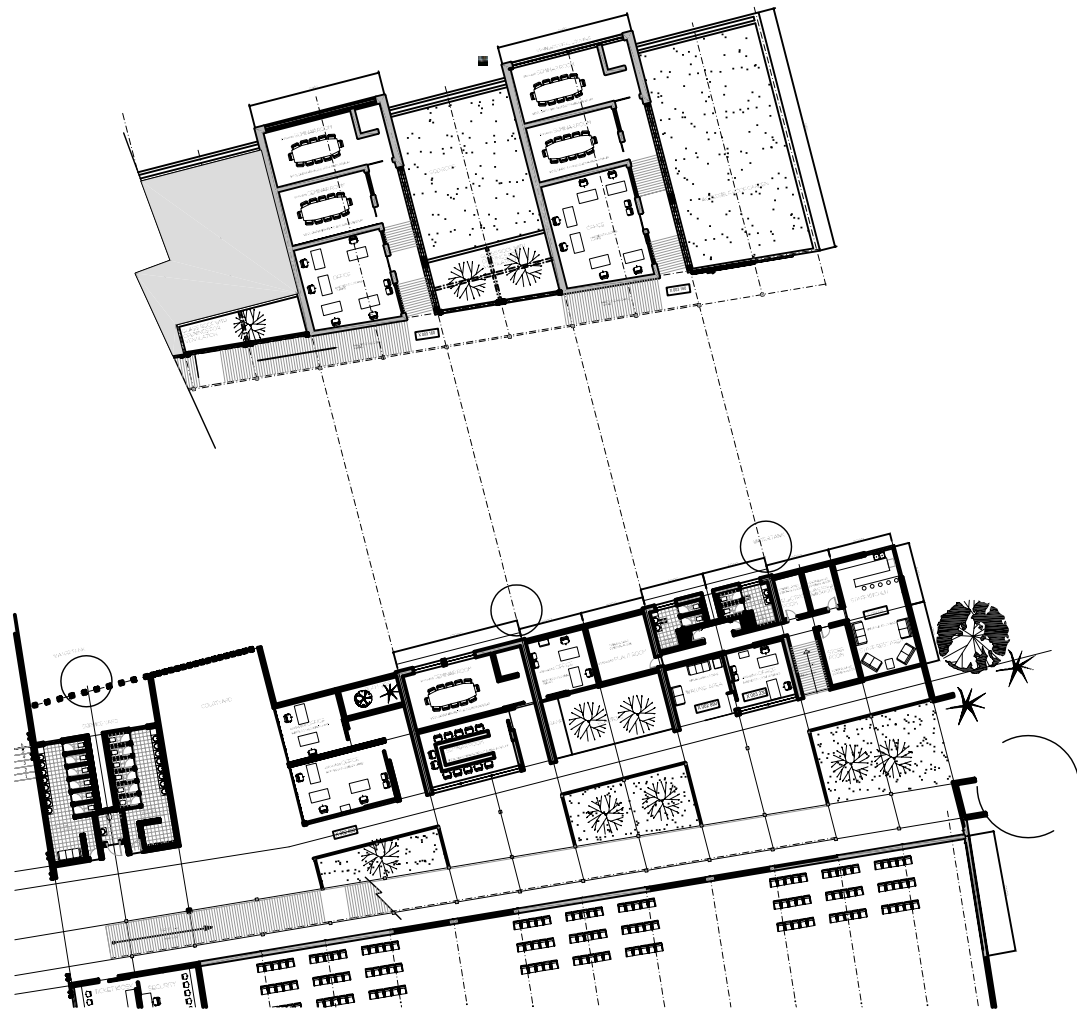
MARCH (PROF) II
SCALE: 1:200

9801419

HOVERCRAFT

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE

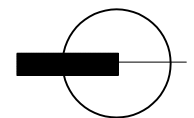




IMAGES OF ADMIN BLOCK

HOVERCRAFT

HOVERCRAFT TERMINAL INTERPRETIVE CENTRE



SYNTHESIS BETWEEN TECHNOLOGY AND NATURE SYNTHESIS BETWEEN TECHNOLOGY AND NATURE SYNTHESIS BETWEEN TECHNOLOGY AND NATURE SYNTHESIS BETWEEN T

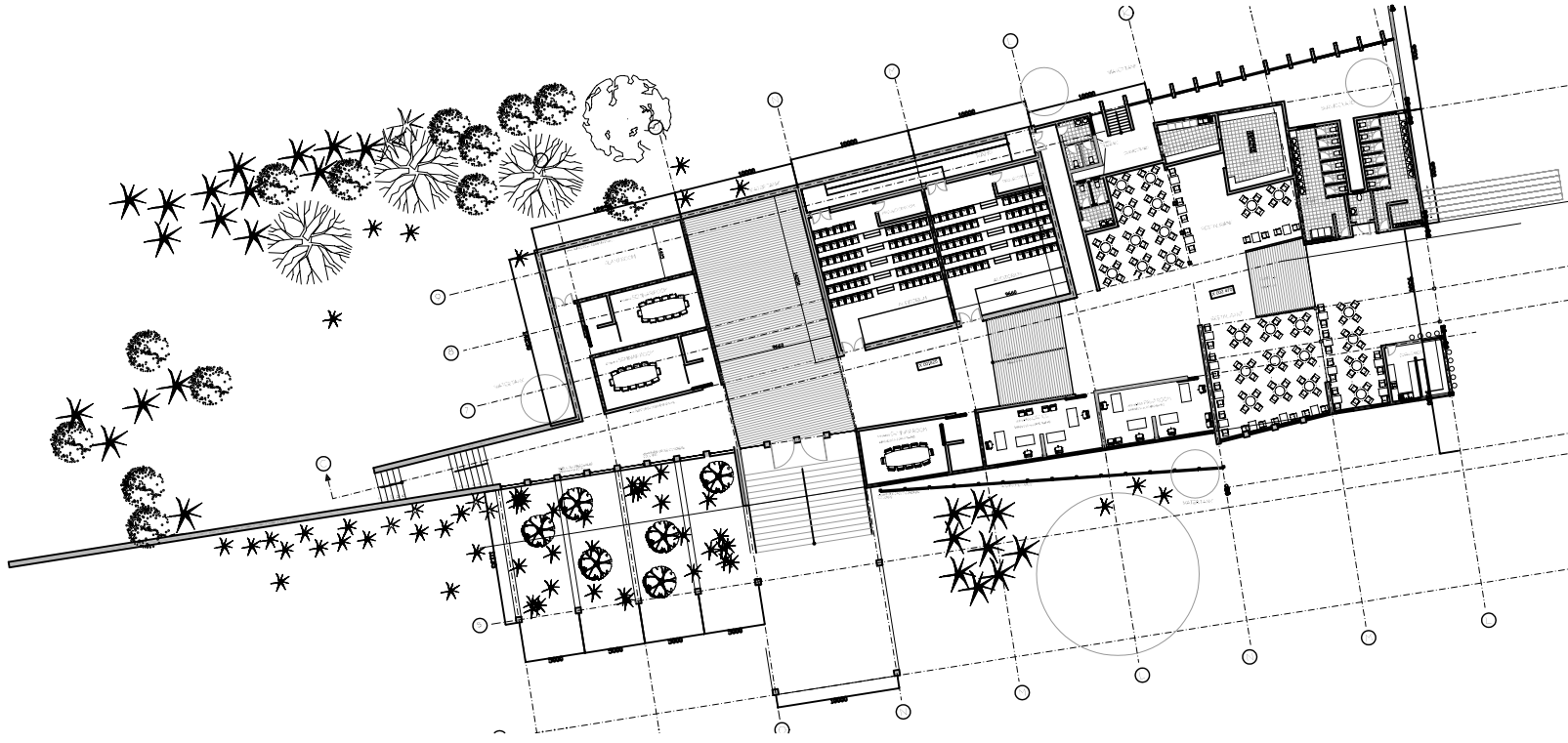
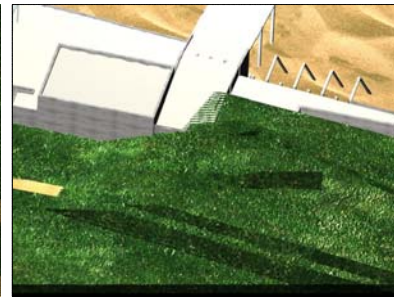
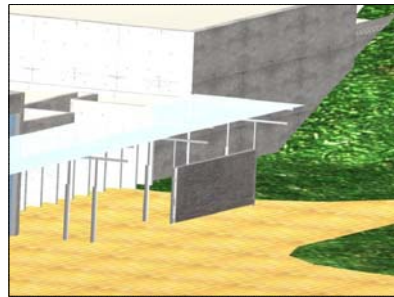
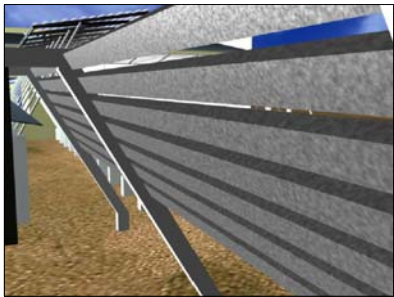
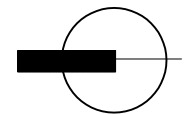


IMAGE OF PARTIAL INTERPRETATIVE BLOCK



HOVERCRAFT

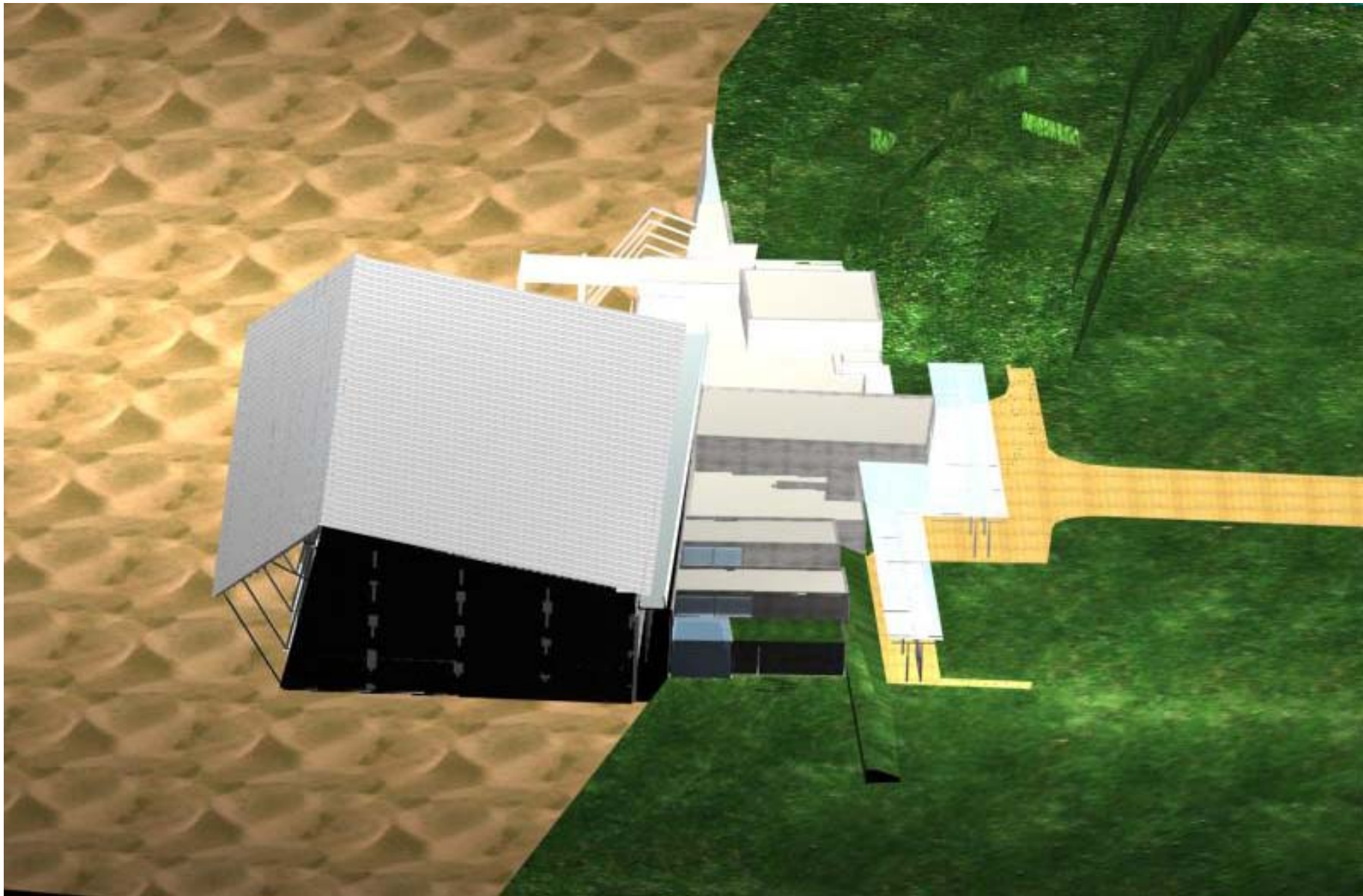
HOVERCRAFT TERMINAL INTERPRETIVE CENTRE



SONIA DULCE CUNHA
DETAIL INTERPRETATIVE BLOCK

MARCH(PROF)II
SCALE: 1:200

0801419



AERIAL VIEW

Fig 26: Aerial View

Design Documentation

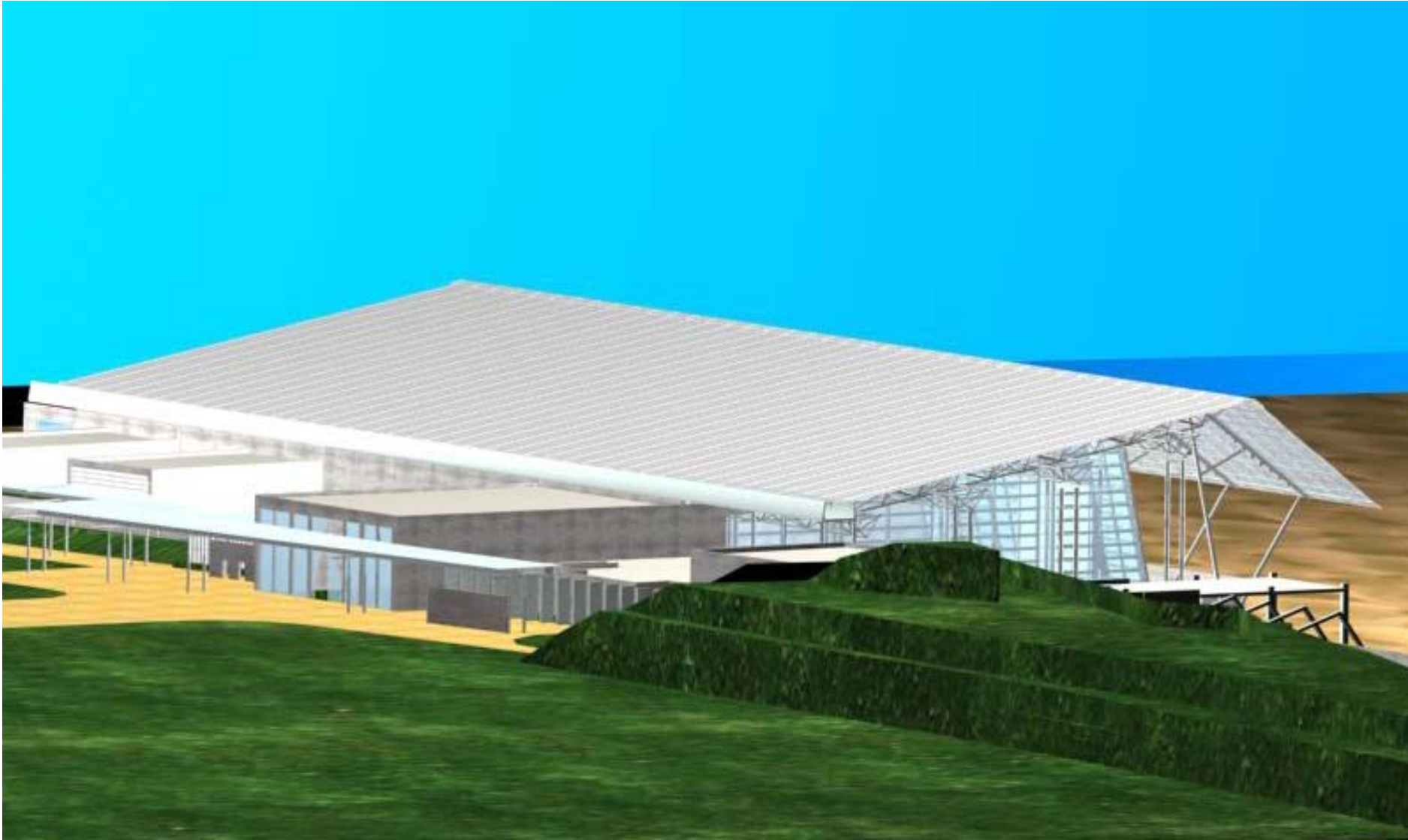
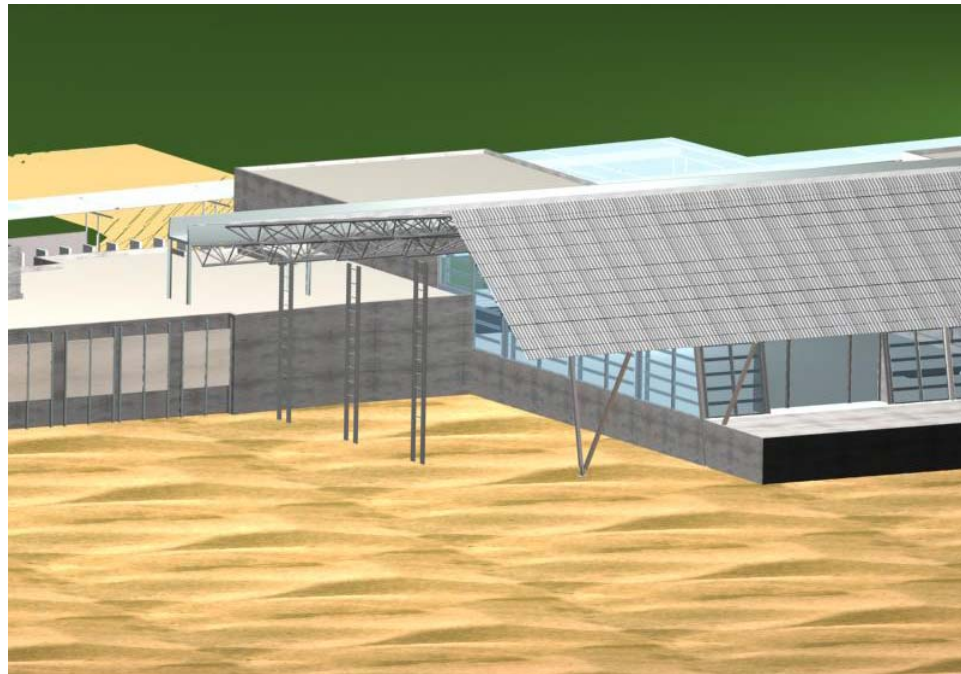
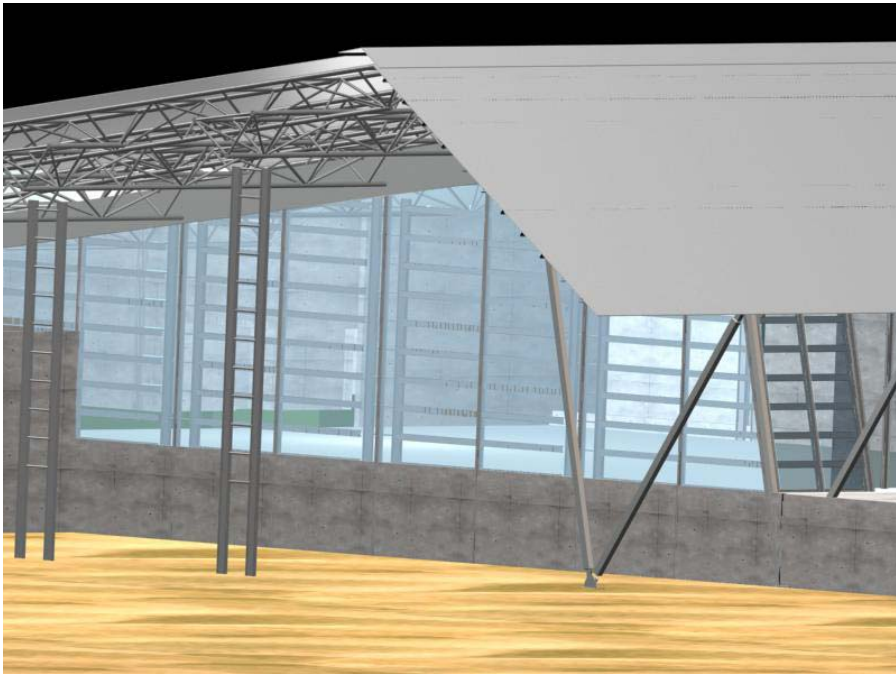


Fig.27: Perspective View

PERSPECTIVE VIEW

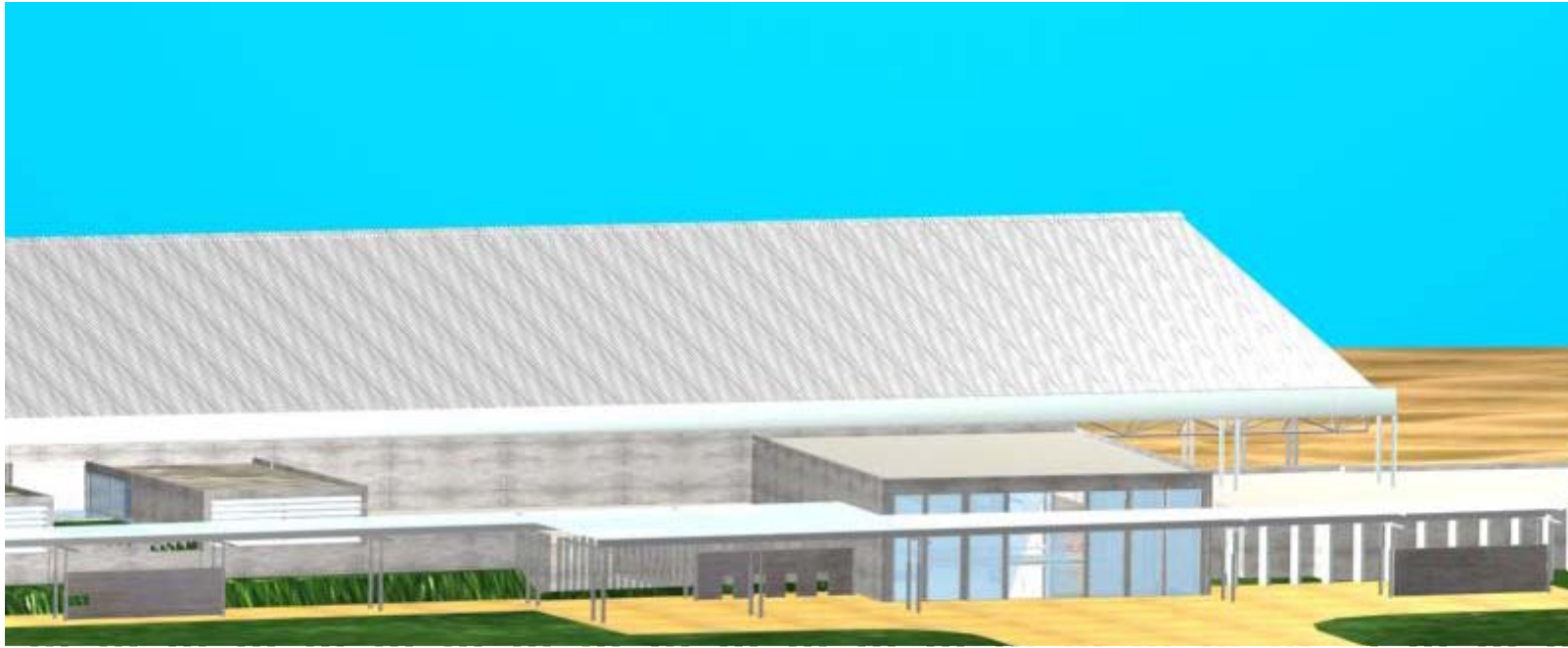
Design Documentation



WESTERN FACADE

Fig.28-30: Western Facade Perspectives

Design Documentation



EASTERN ELEVATION

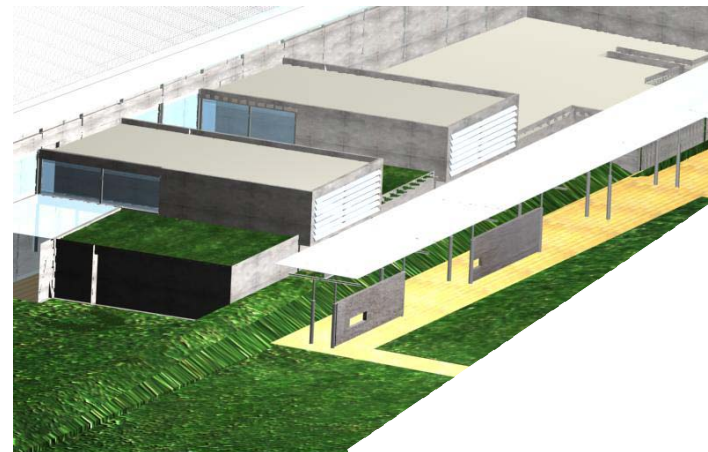
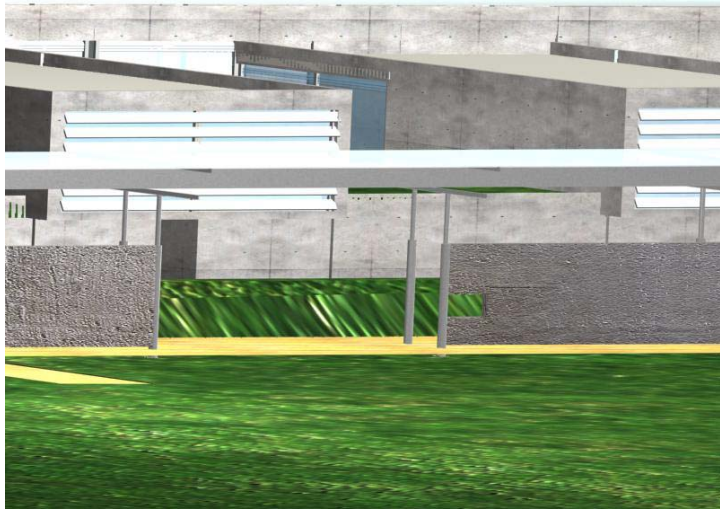


Fig.31,32: Eastern Facade Perspectives



ADMIN BLOCK

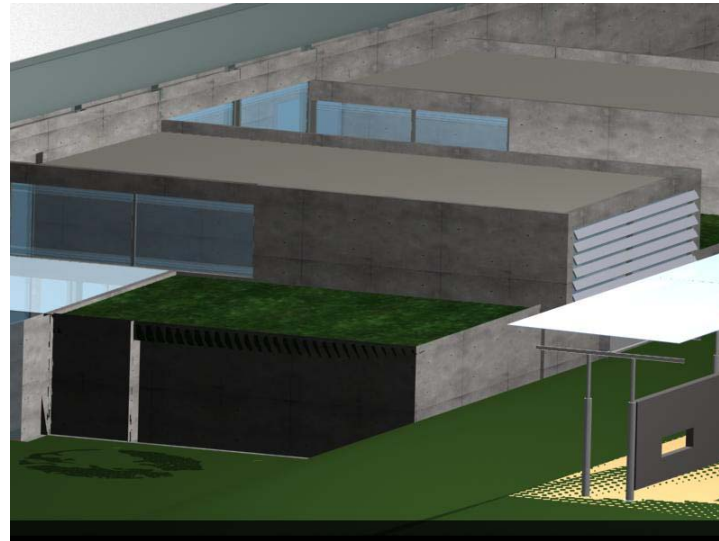
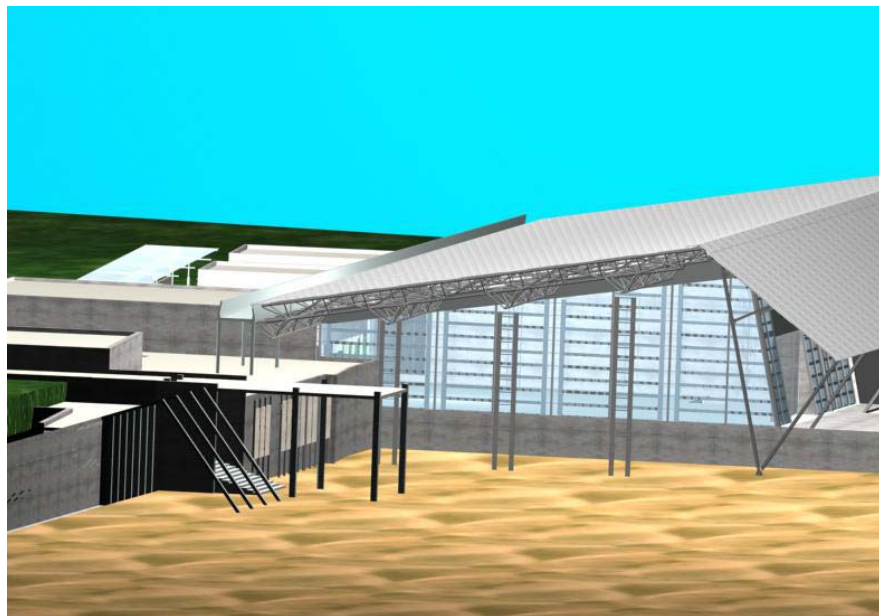


Fig 33,34: Admin Block Perspectives

INTERPRETIVE BLOCK

Fig 35,36: Interpretive Block Perspectives





DEPARTURE LOUNGE

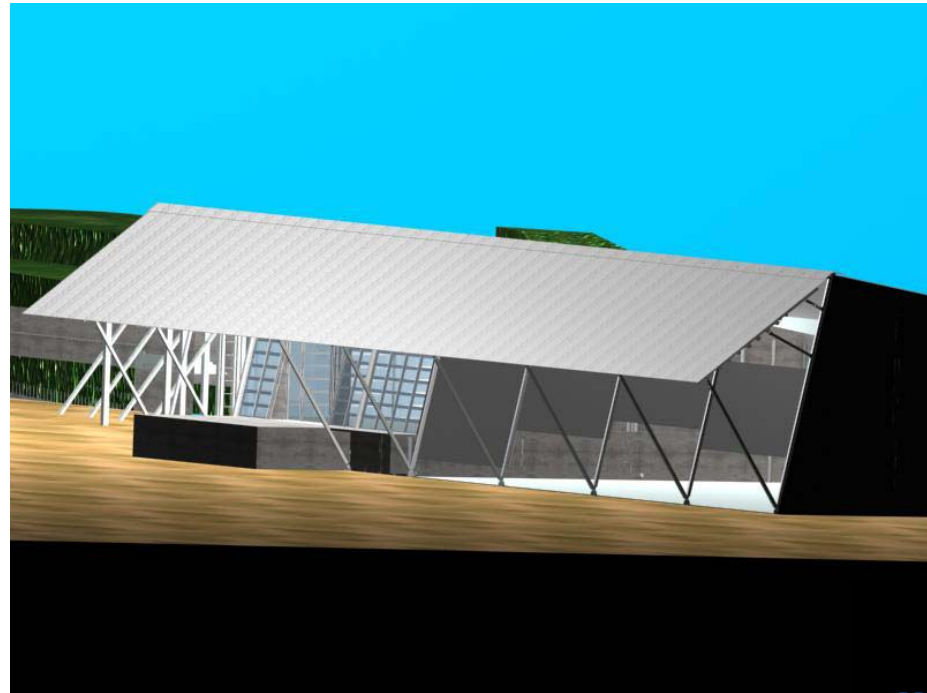


Fig 37,38 Departure Lounge Perspectives



Fig 39: Site View

PLACEMENT OF THE TERMINAL BUILDING WITHIN THE LANDSCAPE

MY SINCERE GRATITUDE TO..... **University of Pretoria. Cunha.SD.2003**

all honour to GOD

PA..... *My hero."I want to be just like you...."*

MA.....*My Heroine " You give me strength."*

Johhny+ Luis....

Dr & Mrs Basson....lifetime idols.

Final Year Class of 2003....*Gerrie, Drikus,Josh*

Department...*Roger Fisher, Piet Vosloo, Henri Comrie, Lana & Yvonne*

Alex Swanepoel-*HOVERCAPE Fast Ferry Services*

DRE|vdwesthuizen

NEEL Svanrooyen

TREV|lovell

NIX|uys

NAOMI|kruger

*WERNER|leithgob

BARRIE-
HOOD|roccon