

REDEFINING BOUNDARIES

A NEW BORDER COMPLEX BETWEEN SOUTH AFRICA AND MOZAMBIQUE

2005

Submitted in fulfillment of part of the requirements for the degree of
magister professional in architecture in the Faculty of Engineering,
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South Africa.

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REDEFINING BOUNDARIES

For Mom and Dad with all my love,
and EQF, thank you.

REDEFINING BOUNDARIES

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II PREAMBLE

This dissertation aims to challenge the existing built thresholds that are in place between South Africa and its neighbouring countries.

In the words of Heidegger, “ *A boundary is not that at which something stops, but as the Greeks recognised, the boundary is that from which something begins its presencing.*”¹

Boundaries and edges need to be created. They need to be made strong. They need to dominate and control. But borders must not be barriers.

This study sets out to investigate the design of a border complex as a transition zone between two countries. It intends to encourage international connectivity, and encourage fair trade and travel, by addressing the functional requirements expectant of a border post, and ensuring the necessary control. Emphasis is also placed on movement through a site where many challenging physical constraints call for innovative design solutions, and where a harsh climate needs to be addressed.

control
TRANSITION
welcome.....

BOUNDARY ‘ *that which bounds, divides, or separates*’ or ‘ *something that indicates a border or limit*’

'The Briefing Document gives an overview as deduced from information gathered in South Africa.'

BRIEFING DOCUMENT

1

1.1

INTRODUCTION

Mozambique and South Africa have taken great leaps in strengthening their relations in the last 10 years. The development of the Maputo Corridor has enhanced trade and activity between the two countries substantially, and economic growth and global competitiveness is now within reach.

The Maputo Corridor runs through one of the most highly industrialised and productive regions of Southern Africa. It follows the N4 national toll road from Johannesburg and Pretoria, and runs on an east– west axis to the capital of Mozambique, Maputo. Large concentrations of manufacturing, processing, mining and smelting industries occur in this belt. The corridor passes through vast industrial and primary production areas containing steel mills, petro-chemical plants, quarries, mines, smelters and plantations of forests, sugar cane, tropical fruit and citrus.¹

The aim and intention of the corridor is to work with organised business, and South African and Mozambique authorities, to allow optimum efficiencies along the corridor and provide exporters and importers with cost-effective access to their nearest deep water port in Maputo, and neighboring Matola. Many South African businesses, especially those in Gauteng, Limpopo and Mpumalanga, see this as a more viable route of business compared to using the harbours at Richards Bay and Durban. Cost savings are achieved due to shorter distances, and the entire rail link to Maputo is now run by one company, Spoornet, which excludes the need for carriage changes at the border.²

Today there is still the distinction made between first world and third world countries, those still developing and those already developed. This distinction can be made between South Africa and Mozambique. Economic, social and cultural differences are evident, but where this was a barrier in recent times, today these differences can be the basis of opportunity.

With this discourse, the border between these two unparallel domains is challenged. A seam between two countries, different in stature, needs to be created to provide a connectedness, so that international relations are strengthened, and economic and social growth inspired. The choice of border type, and how to arrange it on this specific site demands an understanding of the prevailing socio– cultural system, and the behavioral and spatial components currently in place.

1.2

PROBLEM STATEMENT

The existing Lebombo Border is a point of weakness in the flow of trade and travel between Mozambique and South Africa. With the ever increasing movement of goods and people between the two countries, problems at the border are now a cause of concern. Traffic congestion and bottlenecks often result in queues up to 3km long, and trucks often take as long as 8 hours to transit the border.

Lack of office and storage space for the Government departments also result in inefficient operation. Official procedures need to be simplified and speeded up if trade is to flow, and productiveness to increase. Ultimately the problem of traffic congestion needs to be alleviated so that there is a normalisation of trade and commercial links between the two countries.

This scheme aims to promote fair trade between the two countries. Currently the foreign relations between South Africa and Mozambique stand in good stead, and trade agreements have in recent months been signed, resulting in prosperous export and import contracts. Mozambique currently has two major investment projects in terms of trade in South Africa. Mozal currently exports large quantities of aluminum to South Africa, and Mozambique provides natural gas underground from Maputo to Secunda. The border post plays a vital role in the facilitation of trade and commerce by ensuring smooth flow of traffic by both people traveling, and goods ferrying between the two countries. The R40 billion multi–industry Maputo Development Corridor is set to revolutionise the economies of both countries and the intervention of a new border complex will aid in giving access to the Maputo coastline to both tourists and industries from the landlocked provinces in South Africa.

There exists an entire precinct at the border. Border activities, housing for Customs and Immigration officials, and the adjacent town of Ressano Garcia needs to be investigated as a whole. In a landscape where river gorge and mountain provide the site, physical constraints need to become the basis of new design initiatives. Scenery and landscape are two ideas which carry strong emotional associations. Frustration caused by the poor operation of the border needs to be alleviated. Movement needs to evoke the emotions that make the travel a good experience.

1.3 STAKEHOLDERS AND ROLE PLAYERS

The Governments of South Africa and Mozambique operate the border.

The Departments of Home Affairs (DHA), South African Revenue Services (SARS), and the South African Police Services (SAPS), are the three key role players in border control on the South African side. The Department of Home Affairs controls all Immigration aspects, SARS controls all Customs and Excise duties, and the SAPS is responsible for all patrolling and security at the border.

Additional role players who are also active in border control, include:

SANDF	South African National Defence Force
NIA	National Intelligence Agency
DTI	Department of Trade and Industry
DOH	Department of Health
DOA	Department of Agriculture
DFA	Department of Foreign Affairs
DEAT	Department of Environmental Affairs and Tourism
DCS	Department of Correctional Services
DOT	Department of Transport
DPW	Department of Public works

It is however only the DHA, SARS, SAPS, the NIA, DOH, and DOA who require office space and who are physically present at the border.



1_001

1.4 CLIENT PROFILE AND FUNDING

The Government of South Africa and the Government of Mozambique have identified that the Lebombo Border Post, a southern border between the two countries, is inefficient in operation and that a design intervention is needed. Negotiations and the drafting of legal frameworks have already commenced with regard to the proposal of a new 'one-stop' border. The option of the total redesign of the entire precinct has been agreed to, and the required land in both countries has already been procured. The Departments from both countries will operate from one building. The initiative will be driven through Cabinet, and the various regulatory processes and procedures will be undergone that are required for the scheme to commence. The facility is commissioned as a joint venture between the two Governments.

Due to time constraints, and cash flow and economic differences between the two countries, a public/ private enterprise is to be established between the two governments and Old Mutual Property. Old Mutual is to provide all capital funding and develop the facility. Upon completion of the project, based upon rentable area, both Governments will pay monthly rentals for agreed periods of time, until it is owned as a dual asset by the Governments of South Africa and Mozambique. Time frames and payment strategies are to be in place prior to the commencement of the project.

1.5 FUNCTIONAL REQUIREMENTS

The border complex would primarily have to provide the necessary accommodation space for the Customs and Immigration procedures of the two countries to operate effectively. This would include work space that allows for the control of travelers through the building, and the processing of all legal paperwork and passport control.

All Governmental Departments would need the necessary accommodation to be able to carry out their relevant procedures. Office and storage space are the primary requirements and vary according to the needs of each department.

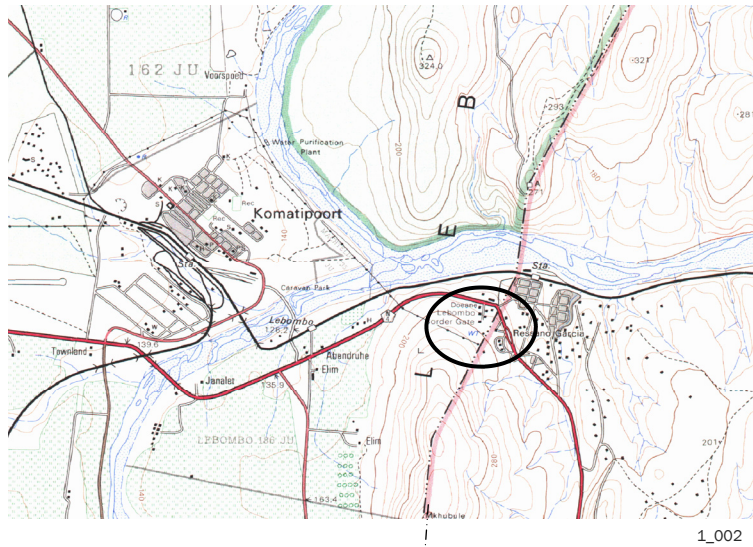
Other requirements include a suitable road design to facilitate traffic flow, sufficient parking, and a transportation terminal on the South African side for taxis, cars and buses. The transportation terminal does not form part of this study.

1.6

SITE SELECTION

The site is situated where the existing Lebombo border post is positioned. It lies along the N4 national toll road, 5km east of the town, Komatipoort. Site is predetermined due to the nature of the project. The new building will fall in the procured site, within range of the border fence. As a 'one-stop' border post, the necessity to alight from your vehicle more than once is alleviated, and the exact placement of the building is to be determined by the physical constraints of the landscape.

A framework would need to be set in place between the two countries regarding the maintenance and use of the site. Although it is a one stop facility, the operation is still handled as it is currently, whereby the South African process falls under South African regulations and the Mozambiquan process falls under Mozambiquan regulations.



SOUTH AFRICA



MOZAMBIQUE

1.7

PRECEDENTS

The study of the operation of existing border posts, those between South Africa and her neighbouring countries, and global examples, will form the main precedent research objectives. Problems at existing ports of entry need to be identified and researched, and flaws that currently undermine control made visible prior to the commencement of the new design.

African border posts that would be included in the investigation include

Beit Bridge	(South Africa and Zimbabwe) and,
Ngwenya	(South Africa and Swaziland)

African examples are to be used for operational and socio-cultural context studies.

Global borders to be investigated include:

Rainbow bridge	(United States and Canada),
Point Roberts	(United States and Canada) and,
Calexico	(United States and Mexico)

Americans have never agreed on the purpose of their borders; are they internationalist bridges or isolationist walls? NAFTA (North American Free Trade agreement), and the realities of illegal immigration make this an unanswerable debate.

There are different Border Post types. Depending on Political and Economic conditions of neighbouring countries, different needs arise as to what a border post is intended to be, and what building type is needed.

Border posts can be open or closed. Some countries have no built structure, others accommodate complex functions. Some have the sole purpose of controlling movement, and to provide a passage of travel, others control the movement of goods and regulate trade. Some are intense military zones, others have no need to provide a defensive front. Some borders go over mountains, others cross rivers and require bridges. Some are friendly borders, others are unwelcoming. Some are now no longer in existence and were pure barriers in the past. Museums at these sites now give insight as to how the function of borders have evolved over time.

What type of border is needed between South Africa and Mozambique? It was once a point of defence that no tourist wished to cross. Today the context has changed and it needs to act as a gateway that allows free movement of vehicles, people and goods.

The search is for an absolute unchangeable truth. The further we move away from the figurative, the closer we come to the truth. A literal and pragmatic approach to architecture ensures that no ambiguity exists and all obscurity is alleviated. A pragmatic approach to architecture is one bearing on human interests and practicality. It functions and is sensible. My approach to architecture is pragmatic. Adolf Loos stated that 'form follows function'. Form must however also provide a 'sense of place', the *genius loci*, as Norberg Schultz explains.³

Function and form create an image, and good architecture is one where the image is remembered. Functionality ensures the relation between building and user, as does form. The movement and flow through a space needs to be a subconscious phenomenon that occurs and decision-making needs to be reduced to the minimum. As in the case of a border post, the user has no decision to make. It is not a building whereby the visitor needs to make a decision as to whether or not to enter and engage with the building. It is one that once approached needs to be entered. It cannot be bypassed. The user is what drives its operation and there needs to exist a relation between building and user.

Any enclosure is defined by a boundary. The boundaries of a built space are known as floor, wall and ceiling. The boundaries of a landscape are structurally similar according to Norberg Schultz, and consist of ground, horizon and sky. This simple structural similarity is of basic importance for the relationship between natural and man-made places. The enclosing properties of a boundary wall are determined by its openings and the character determined by placement of windows doors and thresholds. The character is determined by the material and formal constitution of the place. It is therefore important to ask the following questions, what is the ground on which we walk, how is the sky above our heads, how are the boundaries that define a place. How a boundary is, depends upon its formal articulation, which is again related to the way in which it is built.

In general the boundary, and in particular the wall, makes the spatial structure visible as a continuous extension, direction or rhythm.⁴ At a border post there has to be a break in rhythm due to functional requirements. It is therefore my intention in this discourse to create a transition zone for trade and travel, whereby movement and rhythm across the border is achieved even although there exists a physical boundary. How the building rests on the ground and how it rises towards the sky needs to be considered.

Countries, regions, landscapes, settlements and buildings form a series, with a gradually diminishing scale. A border post is a detail in a larger operation. The contexts of two countries need to merge into one built complex. Symbolisation, visualisation and gathering are processes merging in this building and the meaning in this one place becomes a function of context.

New technology increases the ability to move and communicate, simultaneously eroding the connection to place, and perhaps alters identity and problematises those notions of time and distance with which people traditionally measure and map their world.⁵ Approach to a building is of extreme importance, with this scheme even more so. Road architecture, is one where acceleration and recession of size of a built structure or natural feature, is a function of distance. Upon approach to the border, signage, form, shape and thresholds determine movement through the site, and need to be treated suitably to allow transition to happen as smoothly as possible.

As people are becoming more used to movement, breaks in continuity affect our emotional states when we are in a physical space. Within a span of time, which is being incessantly restructured by advanced technology and industrial redeployment., space is no longer designated simply by a line, but it has become synonymous with the programming of a 'time schedule'.⁵ The process is therefore also of vital importance. Functionality, movement, identification and orientation all affect this time schedule.

To gain an existential foothold, man has to be able to orientate himself and know where he is. He also has to identify himself with the environment and know how he is in a certain place. Lynch's concepts of 'node', 'path', and 'district' denote the basic spatial structures which are the object of human orientation.⁶ This all lends itself to image, and a good environmental image gives a sense of emotional security. Identification is the basis for human sense of belonging and together with orientation, time and functioning can be affected.

All these ideas need to merge together in this scheme, and a precinct created where humans can live and work harmoniously. The architecture must be a part of us and a part of the experience so that the image is embedded in our memories.

'Contextual analysis provides the necessary departure point for the design. A comprehensive understanding of historic and prevailing conditions allows for a response relevant to site, operation and control.'

CONTEXT STUDY

2

2.1 THE MAPUTO CORRIDOR

A Development Corridor is a merger between transport corridors and spatial development initiatives. A transport corridor provides the infrastructure for movement of goods and people, and connects areas of economic activity with sea ports for export.¹

Development Corridors are found throughout Africa. They are about a long term access to Education Infrastructure, Health Infrastructure, Entertainment Infrastructure, Service Infrastructure, Transport Infrastructure and Electricity & Water infrastructure etc.

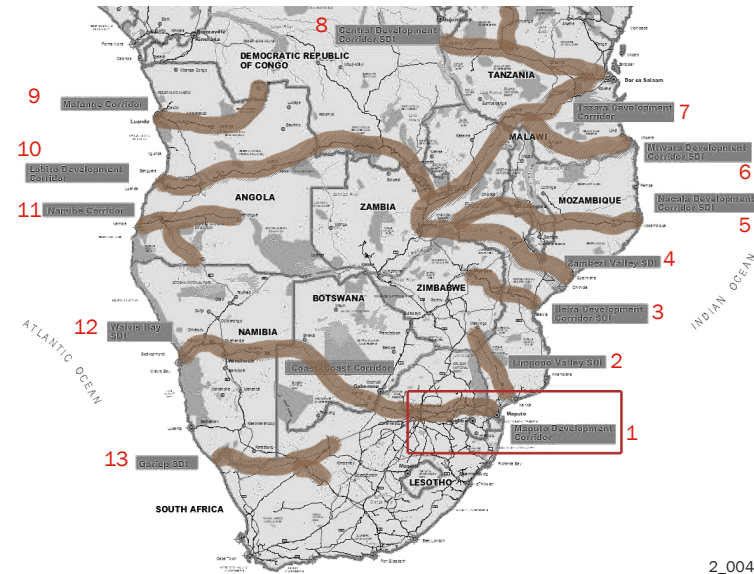
South Africa is one of the leaders of export on the African Continent, and for our gain, the Maputo Corridor is one of the more important networks. Many NGO's have stakes in the corridor, and facilitate the operations between Government, funders, operators, exporters, and local enterprises. All gain economically from the development. The Maputo Corridor does not limit opportunity to its extents, but it provides the opportunity for smaller sub corridors to develop in surrounding provinces, in both South Africa and in Mozambique

The 4 key principles of the corridor include:

- _the rehabilitation of Infrastructure networks, including road, rail, land ports, sea ports, and telecommunications,
- _to maximize investment in the potential of the corridor,
- _to maximize social development and employment opportunities,
- _to ensure sustainability by developing policies, and strategic frameworks.

The 3 key objectives of the corridor at this stage are:

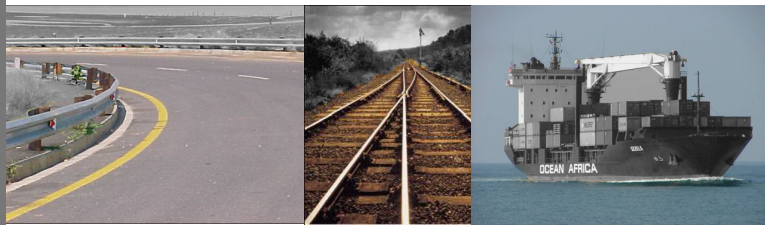
- _to encourage cargo owners to commit to work together to overcome the remaining constraints.
- _to address the Border post inefficiencies, increase operational hours, and improve infrastructure, and
- _to address transport services, including rail and shipping terminals, and road networks.²



2_004

Development Corridors in Africa

- | | |
|-----------------------------------|--------------------------------|
| 1 Maputo Development Corridor | 8 Central Development Corridor |
| 2 Limpopo Valley SDI | 9 Malange Corridor |
| 3 Beira Development Corridor SDI | 10 Lobito Development Corridor |
| 4 Zambezi Valley SDI | 11 Namibe Corridor |
| 5 Nacala Development Corridor SDI | 12 Walvis Bqay SDI |
| 6 Mtwara Development Corridor SDI | 13 Gariiep SDI |
| 7 Tazara Development Corridor | |

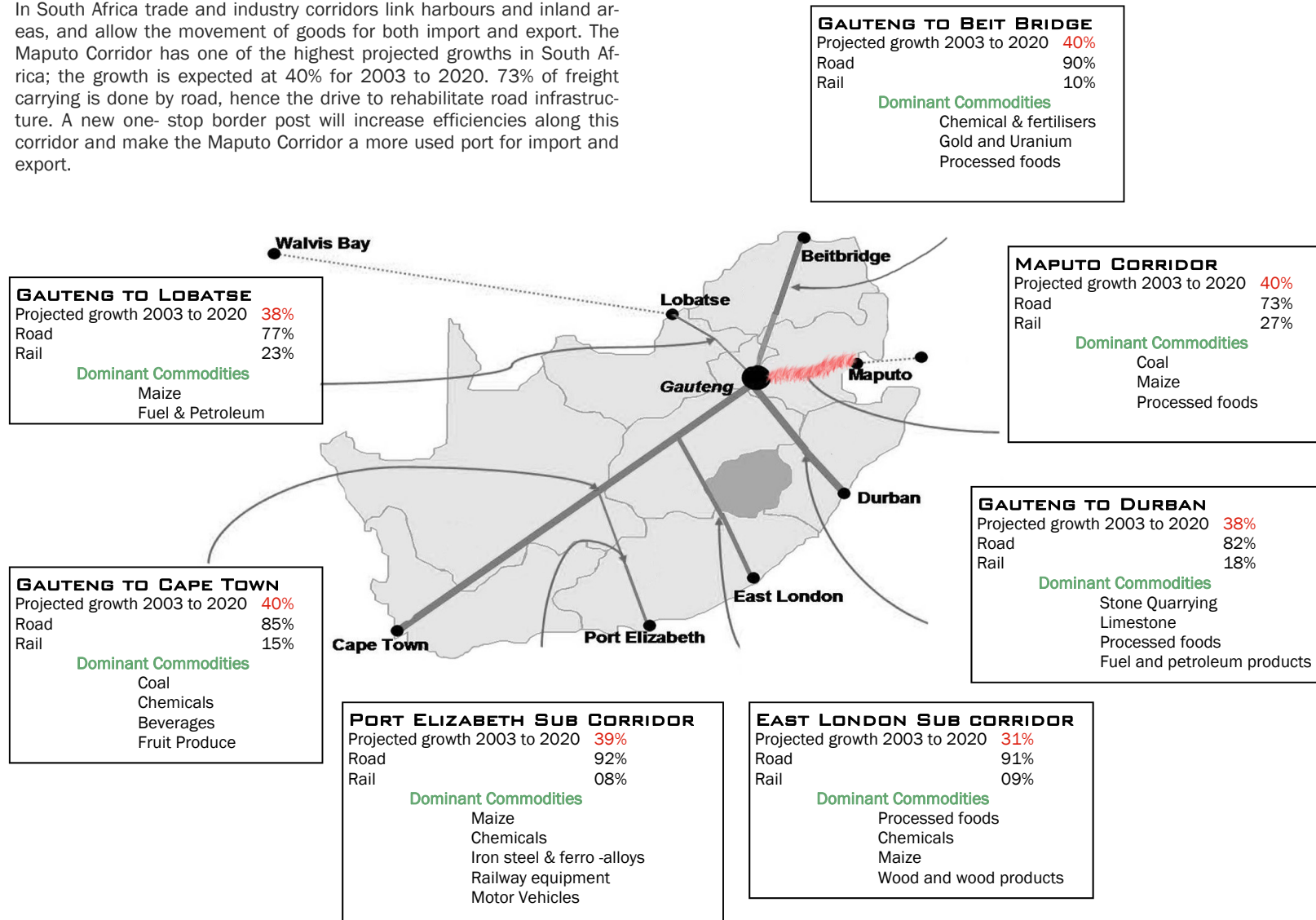


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In South Africa trade and industry corridors link harbours and inland areas, and allow the movement of goods for both import and export. The Maputo Corridor has one of the highest projected growths in South Africa; the growth is expected at 40% for 2003 to 2020. 73% of freight carrying is done by road, hence the drive to rehabilitate road infrastructure. A new one-stop border post will increase efficiencies along this corridor and make the Maputo Corridor a more used port for import and export.



2.2

LOCALITY

South Africa has an extensive land borderline, there are 52 land border posts, shared with 6 other countries- Mozambique, Zimbabwe, Botswana, Namibia, Lesotho and Swaziland.³

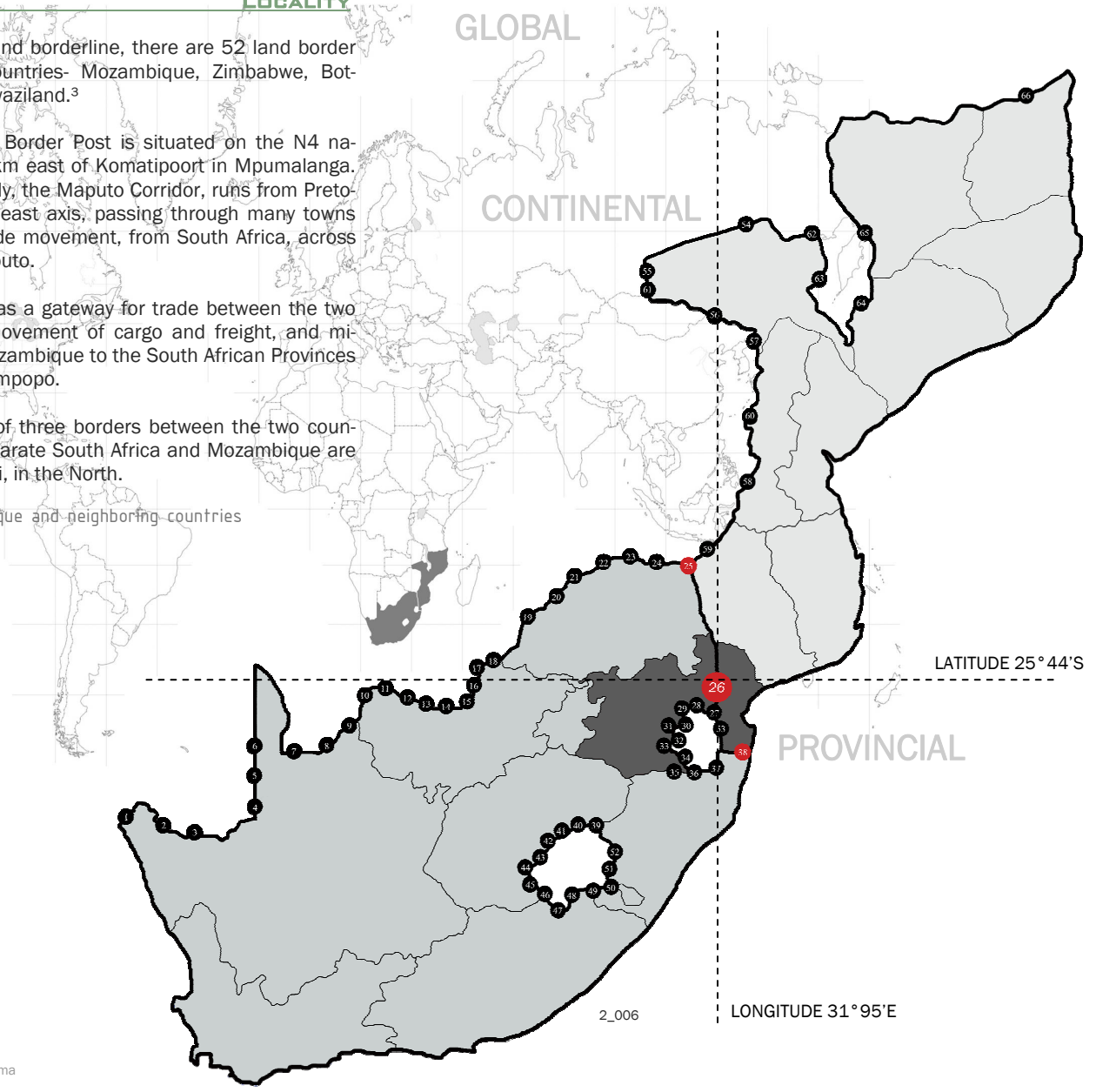
The Lebombo/ Ressano Garcia Border Post is situated on the N4 national toll road approximately 3km east of Komatipoort in Mpumalanga. The N4, or in context of this study, the Maputo Corridor, runs from Pretoria in Gauteng along a west to east axis, passing through many towns and cities that contribute to trade movement, from South Africa, across the border to the harbour at Maputo.

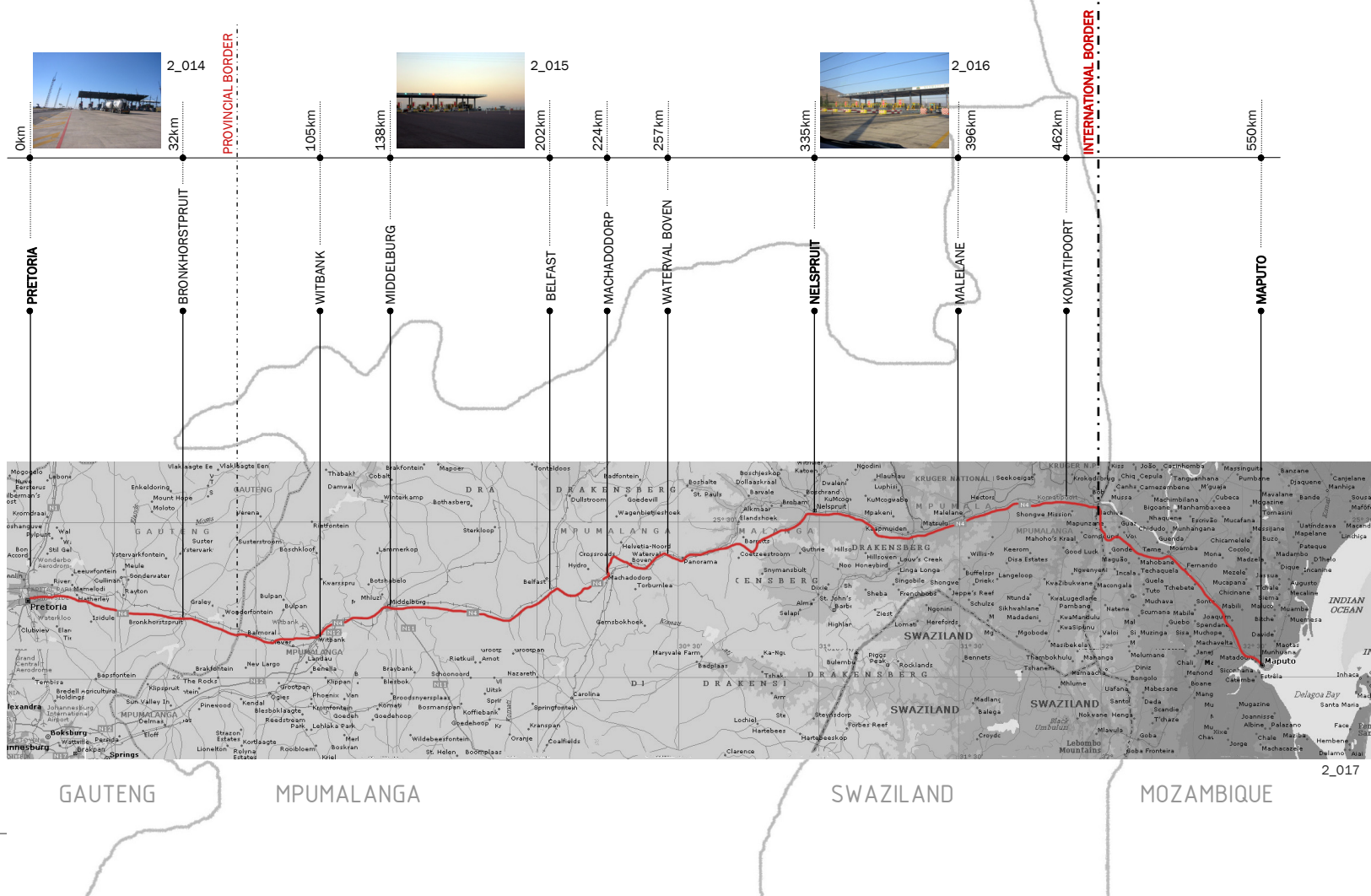
The border is positioned to act as a gateway for trade between the two countries, specifically for the movement of cargo and freight, and migrant labour movement from Mozambique to the South African Provinces of Mpumalanga, Gauteng and Limpopo.

This Border post is the largest of three borders between the two countries. The other borders that separate South Africa and Mozambique are Kozi Bay, in the south, and Pafuri, in the North.

Land Ports South Africa, Mozambique and neighboring countries

- | | |
|-----------------------|----------------------|
| 1 Alexander Bay | 34 Bothashoop |
| 2 Vioolsdrift | 35 Mahamba |
| 3 Onseepkans | 36 Onverwach |
| 4 Nakop | 37 Golela |
| 5 Noenieput | 38 Kosi Bay |
| 6 Rietfontein | 39 Montansa Pass |
| 7 Gembok | 40 Caledonspoort |
| 8 Middeldruts | 41 Ficksburg Bridge |
| 9 McCarthys Rest | 42 Peka Bridge |
| 10 Makopong | 43 Maseru Bridge |
| 11 Bray | 44 Van Rooyens Gate |
| 12 Boshhoek | 45 Sephaphos Gate |
| 13 Makgobistad | 46 Makhalleng Bridge |
| 14 Ramatiabama | 47 Tele Bridge |
| 15 Skilpadshek | 48 Ongeluksnek |
| 16 Swartkopfonteinhek | 49 Quachas nek |
| 17 Kopfonteinhek | 50 Ramatseliso Gate |
| 18 Derdepoort | 51 Boesmansneck |
| 19 Stockpoort | 52 Sani Pass |
| 20 Groblers Bridge | 53 Namaacha |
| 21 Zanzibar | 54 Cassacatiza |
| 22 Platjan | 55 Zumbo |
| 23 Pontdrift | 56 Mecumbura |
| 24 Beit Bridge | 57 Nyama panda |
| 25 Pafuri | 58 Espungabera |
| 26 Lebombo | 59 Chicualacuala |
| 27 Mananga | 60 Machipanda |
| 28 Jeppes Reef | 61 Kanyemba |
| 29 Josef dal | 62 Ulongwe |
| 30 Oshoek | 63 Zobue |
| 31 Lunatsi | 64 Milange |
| 32 Nerston | 65 Mandimba |
| 33 Emhalatini | 66 Mocimboa Do Rouma |

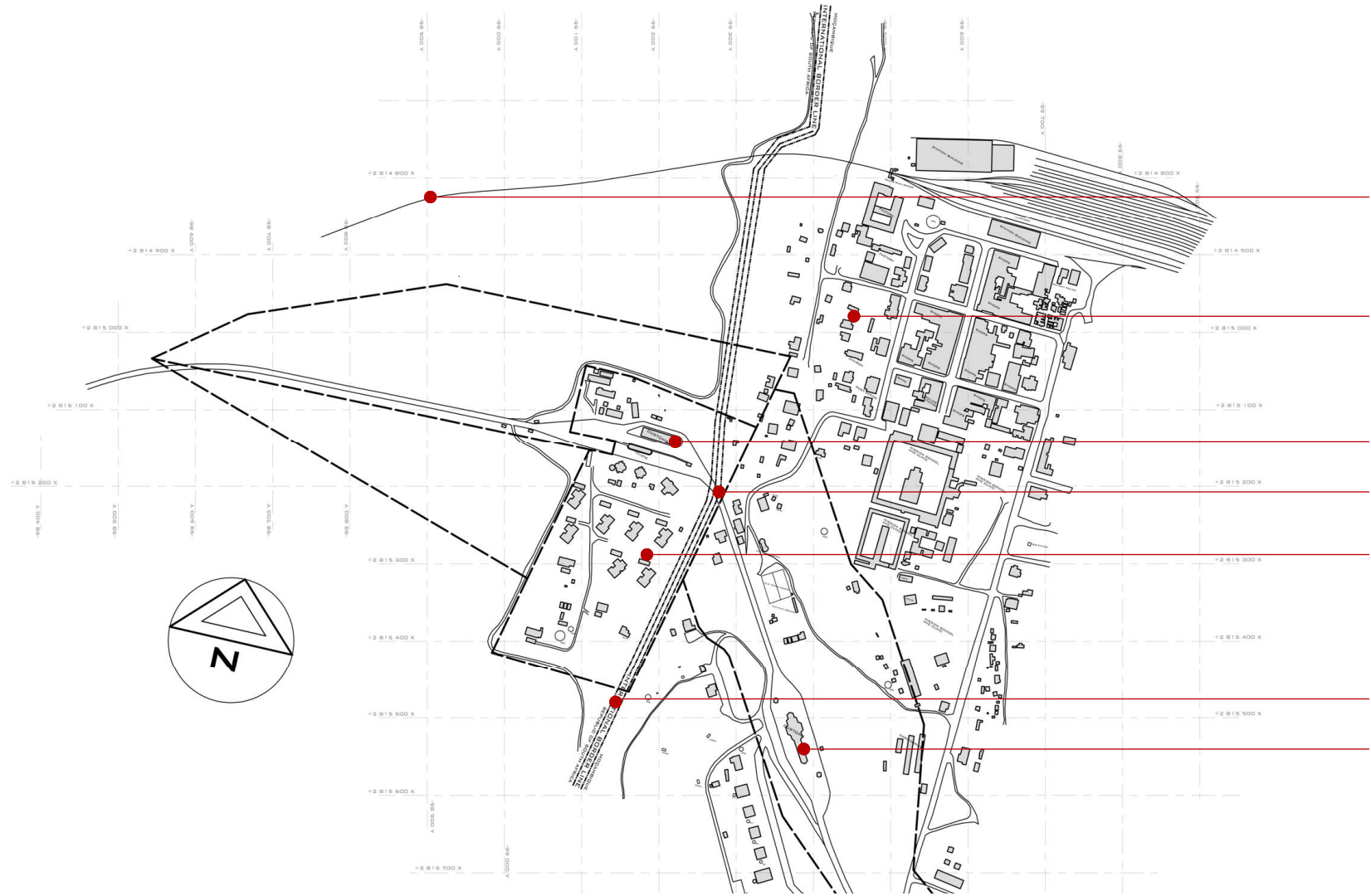


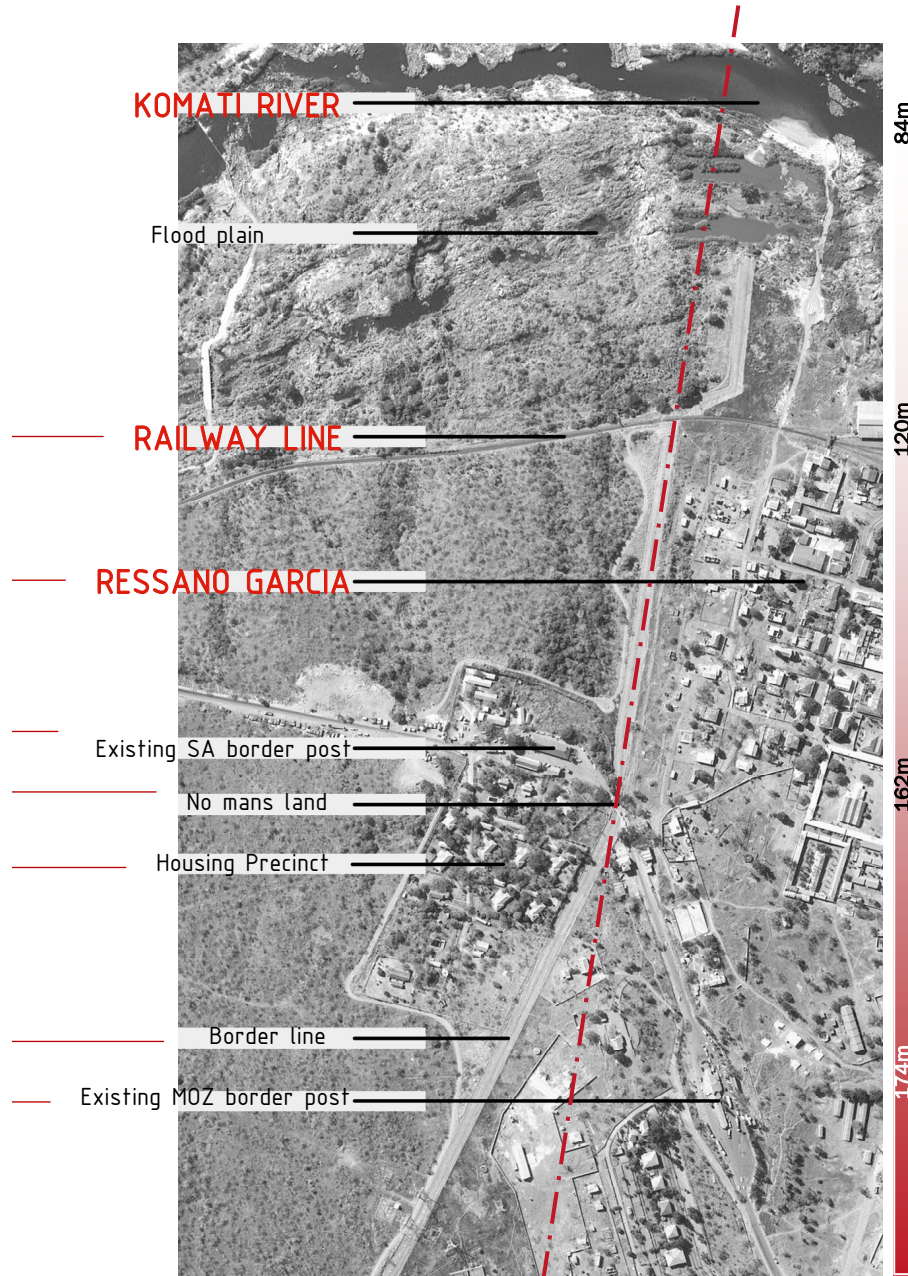


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2.3

PHYSICAL CONTEXT





N4 NATIONAL ROAD

The N4 section of the Maputo Corridor extends from the Gauteng border, 27km west of Witbank in Mpumalanga, to Maputo. The length of this section is 504km.

The concessionaire of the N4 is Trans African Concessions (TRAC). The Investment value for the total concession period is estimated at R3.0 billion. The initial construction carried a value of R1.5 billion.⁴

TRAC has identified certain economic aims of the N4, all of which have an indirect affect on the border post:

- _ fostering trade between Maputo and Mozambique
- _ creation of a new export and import thoroughfare between the two countries and with the rest of the world via the Maputo harbour
- _ development of trade and tourism
- _ creation of scope for further development of major exporting industries
- _ reduction in the cost of transport
- _ fostering the development of downstream economic activity, empowerment and development of communities.

RAILWAY LINE

Spoornet has successfully concluded negotiations with Mozambique Railways for the concession to operate the Ressano-Garcia line from Komatipoort to Maputo. The deal will facilitate the realisation of a 'seamless' rail system between Johannesburg and Maputo, freight trains will no longer have to stop at the border gate. This initiative will hopefully increase the competitiveness of rail against road.

At present, freight trains have to be unhitched from locomotives at Komatipoort and pulled through to Maputo by Mozambique railways. This is time consuming process which has led to the increase of trucking operations. If the rail network could take a load of road freight, pressure on the border would be reduced substantially.

Currently 10 trains operate per day by direction, with the possibility of 14 in the future, 40 wagons per train are currently utilised and this could also increase to 50 wagon trains. An investment of R 56mill has been allocated over the next two years for the rehabilitation of the rail infrastructure and maintenance.⁵

North West



2_020

North



2_021

North East



2_022



2_027

North East



2_023

North East



2_024

East



2_025

East



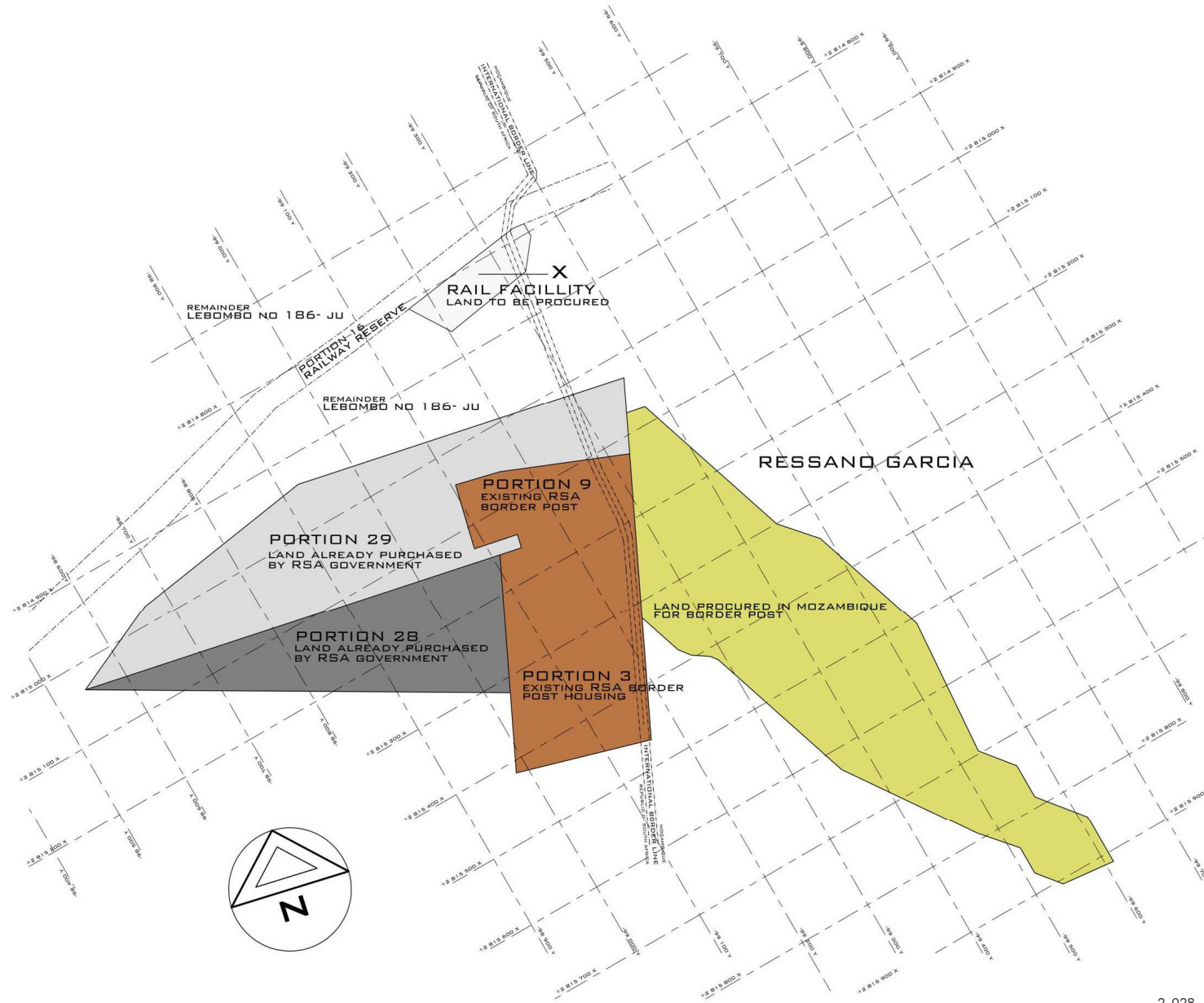
2_026

The existing South African Border post is situated on the land marked Portion 9. This ground accommodates the Government Departments and the residential precinct. The Mozambiquan Border post is accommodated directly across the border from this, on land that is owned by the Mozambican Government.

To date, the South African Government has additionally procured the land marked Portion 28 and Portion 29. The Mozambican Government have procured the strip of land indicated in green along the R510 National Road.

The agreement between the two governments allows the design of a 'one-stop' border post to be accommodated anywhere within this combined site. The total area of the site is 34,5 Hectares. (345 163m²)⁶

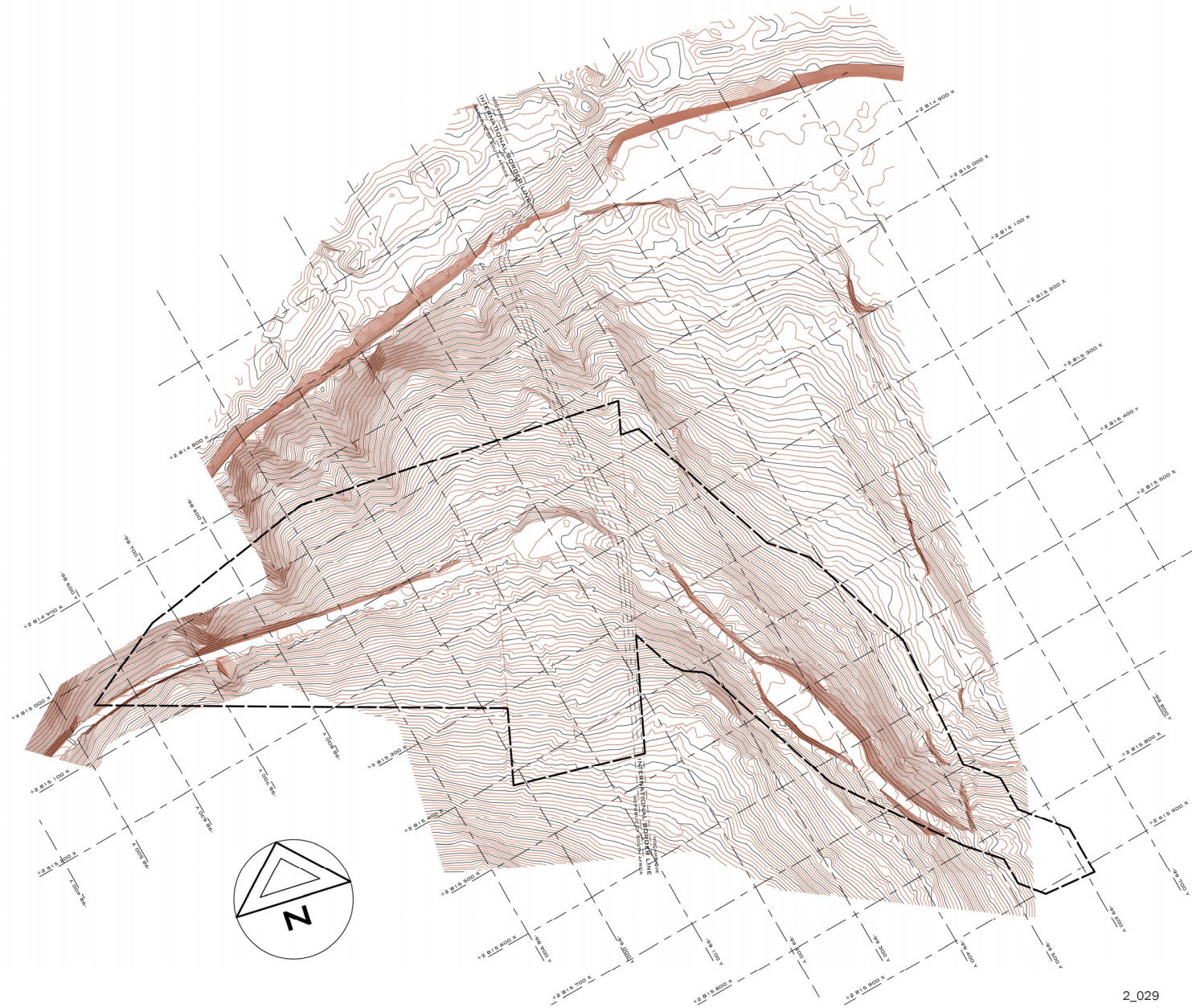
The rail station is currently situated on the periphery of Ressano Garcia. This facility will within time be moved to the land adjacent to the railway reserve, marked x.



The Border Post is situated approximately 170m above sea level in the Lebombo Mountain Range. This north-south trending range, consisting of erosion resistant Stormberg lavas, forms the border between South Africa to the west and Mozambique to the east. The rocky shallow-soiled mountainous terrain is dissected at intervals by rivers providing natural gateways.⁷

The Crocodile River in the north and the Komati River in the south, converge in the gorge adjacent to the site. Both of these rivers arise in the Upper Escarpment and drain eastward to their confluence at Komati-poort. From the confluence, the Rio Incomati drains north-eastward through Mozambique to the Indian Ocean.

The topography therefore provides certain physical constraints due to the gradient of the site, but conversely to this, allows for a 180 degree view window across the river gorge. The design proposal is one that portrays a merge between building and landscape. The lie of land allows for a building with entrances and exits on different levels. Excavation, and cut and fill, will allow for a building that works with the contours of the land, and enhances the understanding of the site.



2.3.4

CLIMATE

Average Daily Maximum Temperature (C) Data for station [0520691 2] - KOMATIDRAAI Measured at 08:00

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1993			30.2	31.3	28.4	25.8	25.7	26.2	30.5	29.1	29.4=	33.4
1994	30.9	31.1	32.2	29.1	27.4	26.5	25	26.2	28.2	30.9	38.3	37.5
1995	38.8	34	32.3	31	27.8	26.9	27.7	28.6	31.8	33	30.8	31.5
1996	32.5	32.5	30.9	29	27.6	27	25	26.4	30.6	31.5		32.3
1997	31.8	31.6	30.2	28	25.6	27.8=	25	28.1	28.4	28	30.1	30
1998	28	21	32.0=	30.6	28.5	27.2	26.4	28.4	30	28.1	29.6	
1999			29.4=	29	27.6	26.9	26.5	28.5	28			
2000	29.7			27.9	26.4	26.2	25.4	26.8=	28.5		30.2=	33
2001	32	31.4	31.1	29.5	27.9	27.3	26	28.4	29.3	30	29.5	29.7=
2002	32.8	31.4			28.9	25.5	26.6	27.7	29.1	30.5	29.8	31.2
2003	33.6	33.5	31.8	30.2	27.3	23.8	25.1	27.6	29	29.6=	31.7	34.6
2004	32.6	31.9	29.6	28.3	26.8	25.2	24.5	28.2	28.3	30.3	33.1	33.6
2005	33.2	33.5	31.3	29.3								

2_030

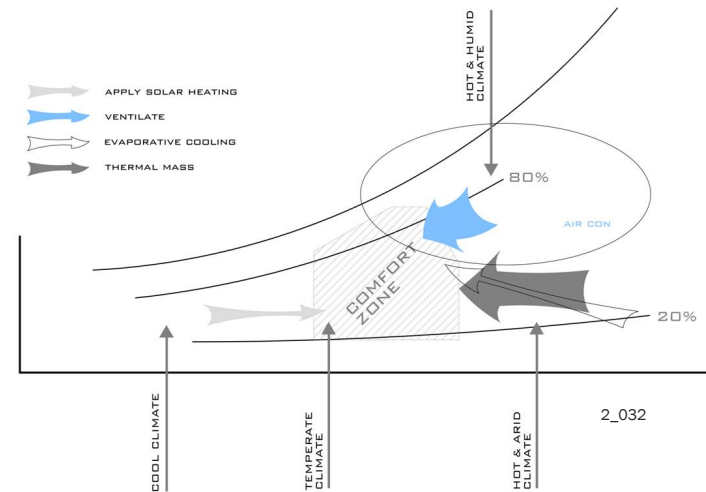
Average Daily Minimum Temperature (C) Data for station [0520691 2] - KOMATIDRAAI Measured at 08:00

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1993			19.8	18.4	14.7	9.2	10.9	11.1	14.7	17.8	17.7	20.2
1994	19.9	19.6	19.4	16.6	11.9	8.2	6.3	9.6	12.9	18.7	24.2	24.6
1995	26.5	22.1	20.5	17.8	14.4	10.5	10.9	13.3	16	19.6	20.2	20.3
1996	22.1	22.1	19.6	16.9	14.8	9.9	9.9	12.1	16.4	18		20.7
1997	21.4	21.1	20.1	15.2	12	7.4=	10.4	12.7	16.6	16.2	18.2	19.5
1998	18.4	11	20.0=	17.6	12.2	9.5	10.8	12.7	15.8	17.4	19.8	
1999			19.8=	17.6	14	9.2	10.5	12.3	14.9			
2000	21			17.3	12.7	12.4	10.1	12.0=	15.8		19.8=	21.1
2001	20.9	21.7	21.2	19.2	14	10.7	10.7	14.3	15.4	18.8	20.7	21.3=
2002	21.5	20.8			12.8	10.3	9.2	15	15.2	17.3	17.3	21
2003	21.5	22.3	20.4	18.2	14.3	12.2	9.6	11.2	13.5=	17.8=	19.9	21.1
2004	21.8	21.8	20.6	18.2	13.4	9.4	9.2	13.6	14.2	17.5	20.4	21.6
2005	22.7	22	20	18.4								

2_031

The Border is situated in a subtropical climate zone and has a summer rainfall. Summer in the area is generally very hot and humid. The temperatures range from as high as 40° C during the day, to 10° C in the evening. The region experiences very mild winters. Temperatures in winter vary between 20° C during the day and 10° C at night. While humid conditions prevail during the summer months, the winter months of June, July, and August are usually dry.⁸

Winds blow mainly from the east, they are generally light, with occasional gales before and during thunderstorms.



September

DECEMBER

32,68°C/ 21,14°C

JUNE

26,3°C/ 9,9°C

March

2.3.5

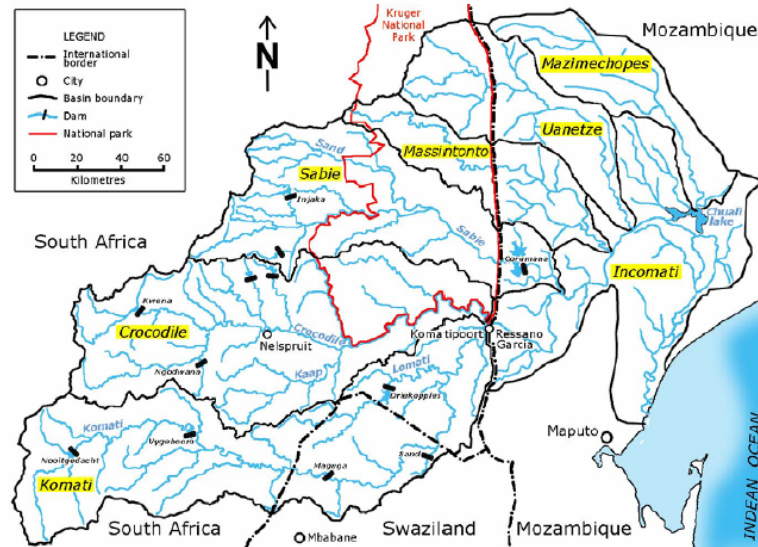
HYDROLOGY

The average annual rainfall of the site is 538mm. It is lower than surrounding areas because of the fact that it lies in a rain shadow in the lee of the Lebombo Mountains. Moist air masses from the Indian Ocean move in over the Region, and high summer temperatures usually cause atmospheric instability. This results in the rainfall being in the form of thunderstorms. Mean annual rainfall of the entire region ranges from 500 to 750 mm.⁹

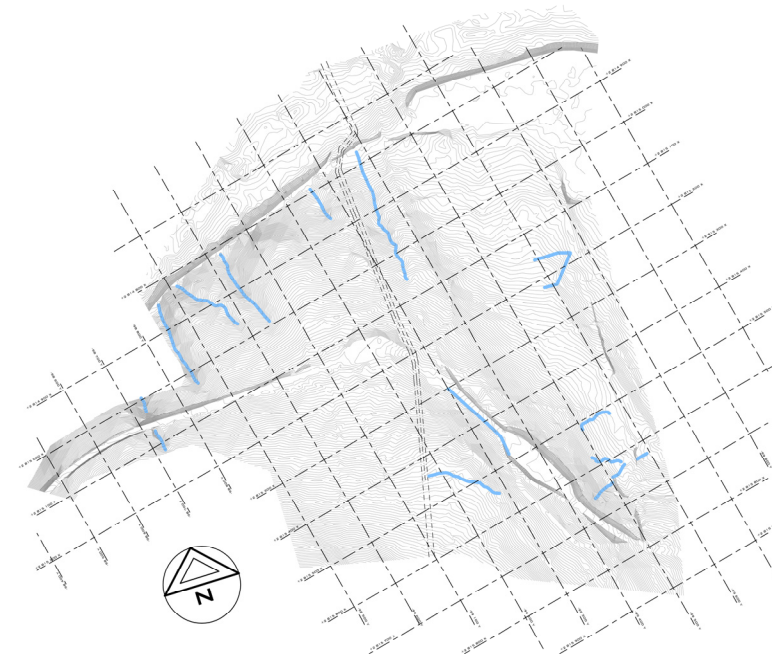
The border is situated in the Incomati River catchment basin. This basin is shared between South Africa, Swaziland, and Mozambique, and discharges in Maputo Bay in the Indian Ocean.¹⁰ Run-off on the site needs to be taken into account in the planning phase of the new built structure. Nature effectively operates in spite of what man proposes, and although water can be controlled, the path and direction of flow should be planned appropriately. Water run-off on the site flows down the slope to the Komati river. Rainwater harvesting should be considered, or alternatively provision made for the flow of surface water.

0557806B3 KOMATIPOORT Lat:25.4330 Lon:31.9500 Height:140 m 1995-2004													
MON	AVE	ST DEV	N DAY RAIN	NUM MON	1 5	5.1 10	10.1 20	20.1 50	50.1 100	100 900	MAX R DAY	MAX RAIN DATE	
JAN	70.6	59.6	5.4	9	1.9	1.4	1.1	0.8	0.1	0	70	1998/01/06	
FEB	110.6	140.5	5.7	9	1.7	1.2	1.2	0.8	0.4	0.1	150	2000/02/06	
MAR	62.2	67.2	3.9	9	1	1	0.7	1.1	0.1	0	53	2001/03/18	
APR	34	22.7	3.1	9	1	0.7	0.8	0.4	0	0	45	2001/04/12	
MAY	10.6	14.5	1.6	8	0.9	0.4	0.4	0	0	0	32	2003/05/05	
JUN	0.5	1.3	0.3	9	0.1	0	0	0	0	0	4	2000/06/06	
JUL	8	6.8	1.1	9	0.3	0.2	0.3	0	0	0	16.5	2001/07/30	
AUG	5.4	9.4	1.1	9	0.4	0.6	0	0	0	0	14	1996/08/20	
SEP	21.4	21.9	2.3	10	0.8	0.3	0.8	0.2	0	0	30	2000/09/20	
OCT	40	36.3	3.5	10	1.3	0.5	0.8	0.7	0	0	44.5	1995/10/27	
NOV	85.9	94.8	5	10	1.7	0.7	1.1	1.2	0.3	0	89	2001/11/15	
DEC	88.6	77.5	4.3	9	1	0.8	0.8	1.4	0.2	0	80	1998/12/02	
YR	537.8		37.4		12.1	7.8	8	6.7	1.2	0.1			

2_034



2_033



2_035

2.3.6

FAUNA & FLORA

The Incomati River provides habitats for a rich variety of species. The basin provides refuge to at least forty threatened bird species, eleven threatened terrestrial mammal species, twelve threatened fish species, and eight threatened reptile and amphibian species, which are all dependent on water and/or riverine vegetation. In addition to these, about 104 threatened plant species are found in the basin.

Cycads (*Encephalartos* spp.) are vulnerable to disturbance, and of the twenty-eight *Encephalartos* species listed as either endangered, rare, or vulnerable, six species occur in the Incomati river basin, of which five species are endemic.

There is an abundance of bird life in the area, well over 500 bird species have been recorded in the Incomati river basin, of which seventy-three species are listed as threatened in South Africa. Among the endangered bird species occurring in the basin are the Wattled Crane, the Black-rumped Buttonquail, the Blue Swallow, the Egyptian Vulture, and the Yellowbilled Oxpecker.

Endangered terrestrial mammals occurring in the region include the *Hippotragus equines* (roan antelope) and the *Lycaon pictus* (wild dog). Numerous rare reptiles, amphibians, and butterflies also occur.

The Kruger National Park, part of the recently proclaimed Great Limpopo Transfrontier Park, borders onto the Inkomati river directly north of the site.

The site falls in the Lowveld region of vegetation. This vegetation type stretches over the lower margin of the Lower Escarpment Region, the Plains and the Lebombo Mountains. It is a mixed veld, dry, with a smaller proportion of macrophyllous trees than in the Lowveld Sour Bushveld region, and a bigger proportion of microphyllous trees (small-leafed, defended physically by thorns, such as *Acacia* and *Dichrostachys*). Where conditions permit, areas of this veld type have been transformed by intensively farmed sugar cane and orchards. A lot of bush clearing is currently being undertaken near Komatipoort. Almost 25% of this veld type is protected in government controlled reserves, which makes it one of the best protected veld types in South Africa. It is the vegetation of southern Kruger National Park, the majority of the protected area is included within the KNP.¹¹

2.3.7

GEOLOGY

The geology of the area is characterized by sedimentary, volcanic, granitic, and dolomitic rocks, and quaternary and recent deposits. The Lebombo Mountains comprise Karoo sediments with *Ecca* sandstones, shale's and coal, topped by Stormberg lavas. The soils are shallow to skeletal with mesotrophic to eutrophic properties.

The Bushveld Igneous Complex forms an extremely important feature of the region, and contributes a very large proportion of the region's mineral wealth. The geological features of this area consist mostly of basic mafic and ultramafic intrusive rocks, accompanied by extensive areas of acidic and intermediate intrusive rocks. At the southern periphery of this area, large dolomite and limestone formations occur, accompanied by extensive mineralisation along their contact zones. Large areas of the central portion of the Limpopo basin consist of various deposits of consolidated and unconsolidated sedimentary rocks, with important belts of intrusive Greenstone rocks that are heavily mineralised. The north-south trending rhyolites and lavas of the Lebombo Mountains mark the eastern border between South Africa and Mozambique. Elsewhere, harder, silicified sandstones and cherts, as well as syenitic and granitic outcrops, form erosional remnants that protrude above the generally undulating terrain.¹²



2_036

2.4 POLITICAL HISTORICAL CONTEXT

' In 1725 Jan van de Capelle, head of the Dutch fort Lydzaamheid in Delagoa Bay, acting on instructions from the authorities in the Cape, sent an expedition to explore an inland route to Monomatapa. This military expedition of 31 men was commanded by the secunde Frans de Kuiper, on July 5th his sergeant Johannes Monna and 6 men inspected the road through this poort to the Komati River. They were the first Europeans to enter the present day Eastern Transvaal' ¹³

2.4.1 PRIOR TO 1948: THE COLONIAL EXPERIENCE

Delagoa bay deeply influenced early developments in southeastern Africa as people settled round its shores and along its rivers. Inhabitants engaged in activities such as fishing, hunting whales, trading ivory, and maintaining an economy of cattle keeping and agriculture. Through trade operations, especially the trade of copper, the influence of the bay stretched across the Lebombo mountains to the interior.¹⁴

In 1721, a Dutch expedition built a fort in what was to become the city of Lourenço Marques, now the city of Maputo. The Portuguese established their first permanent trading station in 1781. Towards the end of the eighteenth century the bay was a hive of activity, with the British having established a post at the southern shores of the Bay. The city of Lourenço Marques was, however, only founded in 1790. In the nineteenth century, it became the major trading port for the Swazi and Zulus, for the Tsonga chieftainships to the north and, after the Great Trek, for the Transvaal Boers who first settled in the former Transvaal (now Mpumalanga) in the late 1830s.

Both Britain and the Transvaal Boers claimed Delagoa Bay (in 1861 and 1868, respectively). Portugal protested, and in 1869 the Boers and the Portuguese signed a treaty that recognized Portugal's possession of the Bay.

The discovery of important minerals in the Transvaal area during the second half of the nineteenth century reinforced the emerging regional economy. A link was established from the eastern frontier of Transvaal, and along the ridge of the Lebombo Mountains, linking the highveld and the port.

The enormous mine developments required an intensive support network in terms of transport, communication, agriculture, trade, and labor. Lourenço Marques with its harbor was strategically positioned.

The construction of a railway connecting the city to Johannesburg, and passing through Ressano Garcia where the Komati and Crocodile rivers join to form the Incomati, was completed in 1895.¹⁵

Labor movement intensified after 1850, when migrant workers from southern Mozambique traveled via Johannesburg to Durban to work in the sugar industry. The discovery of diamonds in Kimberley in 1869 and gold in the Rand area (Gauteng) and near Barberton in 1886 further intensified this traffic of human labor. From the middle of the nineteenth century the economy of southern Mozambique was thus dominated by its link with South Africa. This link was formalised by the signing of three treaties between Portugal and South Africa, including one on free trade (1875), one on traffic with the Transvaal (1895), and legislation concerning the recruitment of mine workers from Mozambique in 1896. In 1901, just after the South African War, the British High Commissioner renegotiated an agreement with the Portuguese to allow recruitment of mineworkers in exchange for direct payment in gold and preference for Delagoa Bay as a port. During 1903–7 southern Mozambique supplied some 50,000 laborers annually, or 60 percent of the total black labor force on the mines. By 1909, Lourenço Marques dominated 65 percent of all trade with the Transvaal.

2.4.2 THE PERIOD 1948–74: ECONOMIC DEVELOPMENT

By 1952, some 250,000 Mozambican workers were staying in South Africa, of whom only 100,000 were there legally. The swift decolonisation of the continent in the 1960s drove Portugal and South Africa closer together. This is most clearly demonstrated by the construction of the massive Cahora Bassa dam on the Zambezi. This project was a joint venture in which the Anglo American Corporation, as well as Portuguese capital, had a strong interest. Dam construction started towards the end of the 1960s, and coincided with increased guerrilla activities by Frelimo, the liberation movement that came into power at Mozambique's independence in 1975. During this period agricultural development in the Incomati basin increased significantly. This led to the opening up of the area for commercial farming, and the forced removal of black farmers from areas designated for white farmers.

A paper mill was constructed in 1966 in the upper parts of the Crocodile river (Ngodwana). In 1960 Swaziland started to establish sugar plantations along the Umbeluzi river, adjacent to the Komati, with support from the Commonwealth.¹⁶

2.4.3 THE PERIOD 1975-94: TURMOIL AND PEACE

Mozambique attained independence in 1975, and at the same time the African National Congress (ANC) within South Africa increased its domination dramatically. South Africa started to destabilize Mozambique by supporting Renamo, the resistance movement that competed for power with Frelimo. South Africa also unilaterally decreased the number of Mozambican mineworkers allowed into South Africa, from 127,000 in 1975 to 38,000 in 1978.

During the 1980s, South Africa increased its destabilising activities in neighboring countries, and its support to Renamo in Mozambique. The result was that by 1983 the countryside in southern Mozambique had become unsafe. At the end of 1983, South Africa signed a secret non-aggression pact with Swaziland. In the midst of the insurgent activities, negotiations started between Mozambique and South Africa, which culminated in the signing of the Komati Agreement in March 1984.

South Africa experienced severe economic problems after the gold price declined sharply in 1983; production from its manufacturing industry stagnated, and unemployment increased. This fuelled political turmoil. South Africa's interest in entering into a new agreement may therefore be seen as a desperate effort to position itself as the key to regional peace, and in so doing regain some confidence of foreign investors. Mozambique was faced by an even more dramatic collapse of its economy. It wanted to increase the volume of goods ferried through Maputo, to regularise the export of electricity from Cahora Bassa, and to increase the number of mineworkers allowed into South Africa.

The Komati agreement did not however have the intended effect. Rather than decreasing, Renamo's destabilising activities increased and developed into a fully-fledged civil war. The death of Samora Machel in an unexplained plane crash in December 1986 shocked the world. It was only after Nelson Mandela was released from prison in February 1990 that the political atmosphere improved. In the same year the Mozambican government introduced a new constitution that provided for multi-party democracy, and started negotiations with Renamo. This resulted in the Peace Accord signed in October 1992. A UN peacekeeping force arrived in the country, and after some delays multi-party elections were held in November 1994.

They were followed by successive good harvests and a steady growth in the economy. Foreign investors are now showing serious interest in a number of large projects, particularly in the energy and minerals sector but also involving transport and tourism.

2.5

ECONOMIC CONTEXT

Economic linkages between South Africa and Mozambique have been shaped by four major dynamic factors; the regional strength of the South African economy, the weaknesses and public policy options of the Mozambiquan economy; the international weakness of the South African economy; and the dominant role of the minerals- energy complex around which most of the political, social, and economic dynamics of capital accumulation in South Africa is structured.

Maputo became an important commercial center towards the end of the nineteenth century. Economic development in the upper parts of the Incomati basin started to become significant around the same time, when the first towns such as Barberton and Nelspruit were established in South Africa. Today Mozambique is one of Africa's success stories, considering that at the end of the civil war in 1992 they were ranked one of the poorest countries in the world. They do however still rely heavily on foreign assistance. Their economy was reformed by the elimination of subsidies and restrictions on imports and reduction on import tariffs. Mozambique has the natural resources to sustain the development of the agriculture, forestry, fishing, energy and tourism industries. Placed in an ideal trading location, increased exports in these areas will increase the amount of foreign exchange brought into the country. Mozambique has an agriculturally based economy. Contributing to 23.3 % of the countries GDP. Industrial development has been slow as a result of the civil war that destroyed most of their infrastructure.

In South Africa mineral deposits form the basis of the countries wealth, agriculture too plays an important role in economical prosperity. Existing mining activities in the region are limited to coal mining in the upper reaches of the Komati river catchment, and along the Lebombo Mountain range south of Komatipoort. Two crops dominate the area: rain-fed commercial tree plantations (some 340,000 ha), and irrigated sugarcane cultivation (42,800 ha) . It is estimated that in the South African part of the Incomati basin some 83,000 ha is irrigated, of which nearly 30,000 ha (36 percent) is given over to sugarcane. This is crushed and converted to sugar in two sugar mills, both owned by TSB (Transvaal Suiker Beperk). Sugar production at the two mills contributes about 17 percent of total sugar production in South Africa.

Both countries belong to the SADC (Southern African Development Community). This trade protocol will create a free trade zone over time among the more than 200 million consumers in the SADC region. The 10 year implementation process of the SADC trade protocol began in 2002 with the immediate elimination of duties on a large list of 'zero' rated goods.⁴⁷

2.5.1 THE ECONOMIC IMPACT OF THE CORRIDOR ON
TRADE & INDUSTRY

The Maputo Development Corridor comprises of three major primary infrastructures namely: the Maputo Transport Corridor (N4), Maputo-Ressano Garcia Rail Line and Maputo-Goba Rail Line. The development projects implemented in the perimeter of the corridor are estimated at USD 10 billion.¹⁸

Ressano Garcia Rail Line

Is an 88km rail link between the Maputo Port and Mpumalanga areas in South Africa. It has a capacity to move 5 million tons per year in one direction.

Goba Rail Line

With the capacity to carry 4,8 million tons/year in both directions, it links Maputo with the Kingdom of Swaziland

Maputo-Witbank Transport Corridor

The corridor is operated under a concession contract, with 5 toll gates along the 420 km of highway, between Maputo and Wit bank. This project has absorbed \$ 320 worth of investment. The first ever toll road to operate in Mozambique demonstrates the role that private sector can play in the development of public infrastructures.

MOZAL Aluminium Smelter

With a total capacity of 500.000 tons of aluminium, it started production in 2001, and was invested in it so far \$2,329 billion.

SASOL Gas Pipeline

A 866 km pipeline from the Temane gas field in Mozambique, cost \$1.3 billion.

In South Africa the corridor provides closest access to sea; improved profitability and efficiency in transports; enhanced viability of mining projects; increased movement of goods and people; increased viability of the Maputo Port, and the increased tourism attraction of Mpumalanga

The prospects for Mozambique include improved road quality & safety, shorter distances to sources of supply (SA); increase of Mozambique's GDP by 7% (2003); increase of Mozambique's exports; the increase in job opportunities, and Maputo is seen as a major tourism destination by South Africans, and global tourists.



2.6 SOCIO- CULTURAL CONTEXT

2.6.1 PEOPLE, CRIME AND POVERTY



Half of Mozambique's 18 million people live below the world banks poverty threshold of \$1 a day, this contributes largely to the problems the country faces.¹⁹ Migrant workers from Mozambique are therefore a common phenomena in South Africa, and commute on a monthly, weekly and daily basis. The State is entitled to regulate the entry, length of stay, and economic activities of these workers. The 1999 White Paper on International Migration proposes that migrants must offer 'desirable' skills and qualifications to be legally allowed to work in South Africa.²⁰ Throughout legislation the term 'illegal alien' is used to describe foreigners who are in the country unlawfully, basically those without legal documentation. The perception that there are many 'illegal aliens' from Mozambique currently in South Africa is generated through a number of different social mechanisms, including media articles, political speeches and popular beliefs, and is also reflected in border arrest figures and repatriation numbers.



Motivation for the tightening of border controls is led by the fact that there has been considerable growth in cross border crime, and the globalisation of the activities of organised crime syndicates. Criminal gangs in Mozambique and South Africa smuggle girls across the border using bush paths near Ressano Garcia. Many girls are kidnapped or lured by cash and then sold in South Africa, or shipped to Europe.²¹ Although Ressano Garcia is well policed, poor civil service pay in Mozambique means it is easy to bribe officials. Trafficking in humans, human organs and drugs are great concerns. It is also recognised that firearms smuggled across the borders are playing a role in violent crimes in both the countries. The current problems in South Africa with the illegal movement of goods, and people, demonstrate that without proper border control, crime will continue to increase. As the SADC moves towards a free trade area this presents the region with a number of challenges.

2_037

A 1997 estimate of Ressano Garcia's population puts it at 8,782.²² An estimated 150 formal settlements comprise staff houses for customs officials and railway staff. A larger proportion of people live in informal settlements consisting primarily of mud huts and shacks. Formal settlement dwellings are mainly two- to three-room brick houses, and residents organise themselves in the extended family system. These units share common facilities, including a bathroom and water. The only recreational facilities in the area are bars and soccer fields.

Ressano Garcia is very poor. It has attracted limited business investment and remains impoverished. The only well-built structure in the town is the Bank International de Mozambique. The rest of the town still bears scars of the devastating civil war. The majority of its people are either unemployed or engaged in informal trade. An estimated 500 people are economically active in Ressano Garcia, approximately 3,000 cross the border regularly to find jobs in South African mines. The major sources of local employment are provided by freight, retail, construction, customs, and the police, which together provide employment for about 500 people. Informal sector activities, primarily vending, provides employment for approximately 400 people. Most locals travel daily to and from South Africa to buy goods for resale in Ressano Garcia and the rest of Mozambique. A lot of the women also engage in illegal foreign currency dealings at the border gate.

The largest sources of formal income in Komatipoort are wholesale, freight clearance, police, customs, immigration, the municipality, the postal service and banks. Supermarkets, lodges, and bottle stores also play a significant role. The freight clearing agents in this area are mostly mobile caravans at the border gate, which are then also sources of commercial sex work by night. Most women in Komatipoort engage in street vending or work in shops and as maids. Compared to other border towns, Komatipoort is not a very busy border. It is, however, adjacent to a very poor part of Mozambique, which makes its commercial sector busy. South Africa is still relied upon heavily by the upper class citizens of Mozambique for their supplies. Most Mozambiquans who reside in Maputo, still make monthly or even weekly trips to Nelspruit to do their shopping. Sometimes even travelling as far as Johannesburg to make their purchases.

2.6.2

HIV AND AIDS

Approximately 70% of the worlds people living with HIV/ Aids are in Sub-Saharan Africa, with the southern region most seriously affected.²⁴ Prevalence is especially high in cross border areas with high mobility among truck drivers, migrant workers and commercial sex workers. After the war- induced isolation ended, and the subsequent increase in movement and trade to and from Mozambique, the epidemic has surged drastically. Researchers estimate that Ressenao Garcia has approximately 30 permanent sex workers, ranging in age from 19 to 30.²⁵ They seek clients primarily at bars and bottle stores, and rely on truckers who cross the border and stay overnight.

Target groups for educational programmes now include sex workers, truck drivers, miners, uniformed officials and informal traders. Limited AIDS educational activities take place in Ressenao Garcia, although the local health center does have a few posters about HIV/AIDS and STI's on its walls advising clients to use condoms. A new visitors centre for both Mozambique and South Africa, at the border, will provide educational material on Aids and HIV, and other social issues.

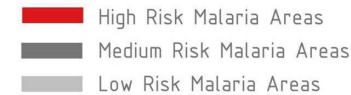
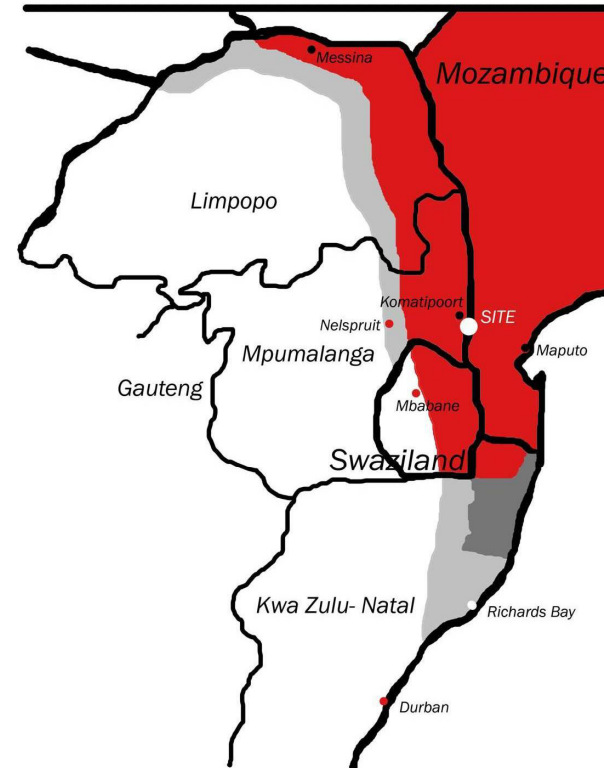
2.6.3

MALARIA

According to the World Health Organisation, WHO, malaria kills a million people a year, of which 90% are in Africa.²⁶ Malaria is a life-threatening disease that is a major health risk for travelers to malaria endemic areas. The Anopheles mosquito, which is responsible for transmitting malaria, is no respecter of borders. So the battle against malaria needs to be waged across borders. Appropriate advice and use of drugs, and most importantly, non-drug measures, can prevent most travelers from contracting the disease.

The Border Post site falls in a high risk malaria area. Malaria occurs in limited areas in South Africa, mainly in the low altitude (below 1000m) areas of Limpopo, Mpumalanga and North Eastern KwaZulu- Natal (See map of malaria risk areas in South Africa.) The disease is distinctly seasonal, with the highest risk being during the wet summer months of October through to May.

It is intended that the visitors centre provide the necessary information to tourists so as to be able to take the necessary precautions against contracting the disease.



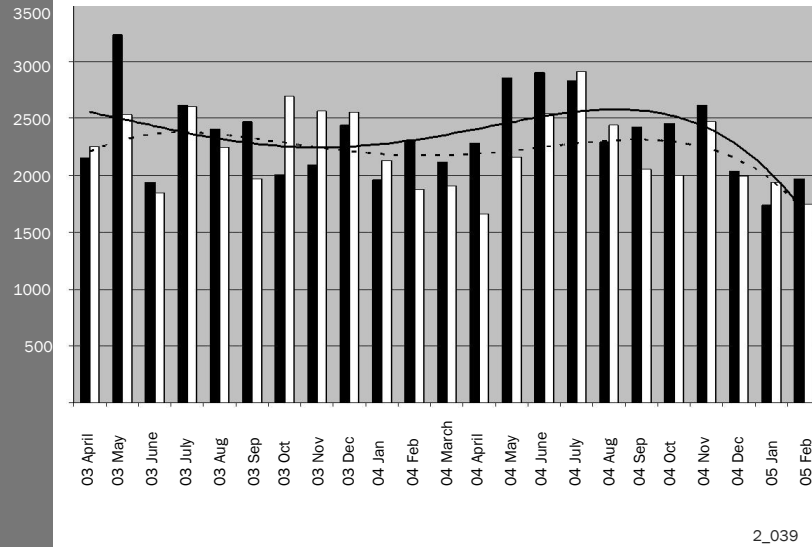
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2.7

BORDER STATISTICS

2.7.1

TRUCK STATISTICS

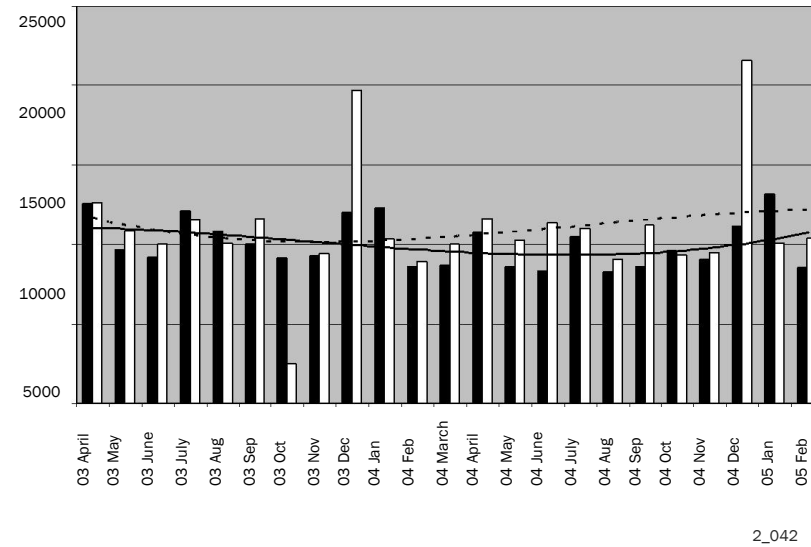


2_039

departures
 entries
 graphical polyline
 graphical polyline

2.7.2

CAR STATISTICS



2_042

departures
 entries
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2_040



2_041



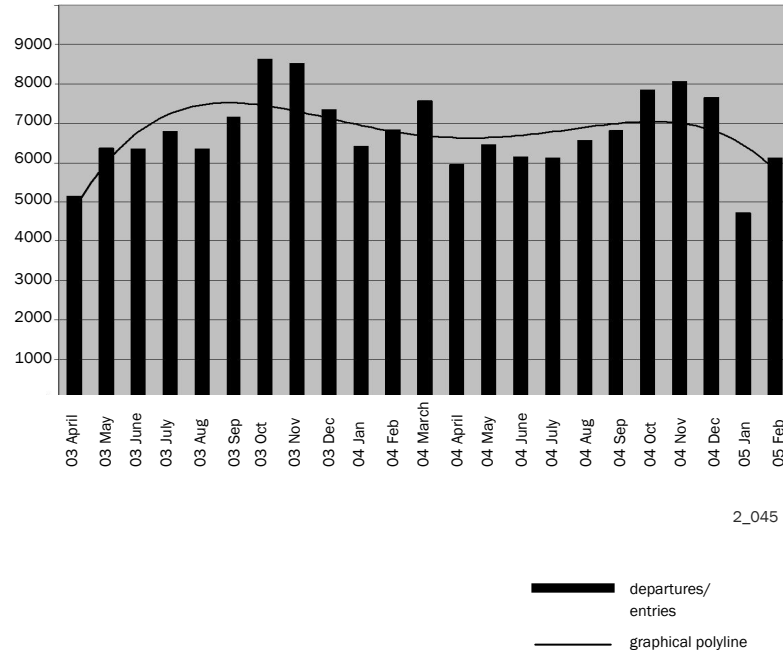
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2_044

2.7.3

PEDESTRIAN STATISTICS



2_045

ANALYSIS - DECEMBER

ENTRIES (SA)

± 19 000 · CARS

± 7 400 · PEDESTRIANS

± 2 500 · TRUCKS

DEPARTURES (SA)

± 14 000 · CARS

± 7 400 · PEDESTRIANS

± 2 400 · TRUCKS

= ± 620 CARS / DAY

= ± 240 PEDESTRIANS / DAY

= ± 80 TRUCKS / DAY



2_046



2_047

2.8 FUNCTIONS OF THE DEPARTMENTS

2.8.1 SOUTH AFRICAN REVENUE SERVICES

The South African Revenue Services (SARS) comprises the former departments of Inland Revenue and Customs and Excise. Customs and Excise is responsible for the control of duties and taxes at ports of entries. The Department enforces Customs as well as related trade laws, and ensures the social welfare of the citizens of the Republic, by controlling the import and export of prohibited and restricted goods.²⁸ They need to ensure the timeous clearance of goods, and facilitate the speedy movement of travelers through South African borders.

All procedures are governed by the Customs & Excise Act No 91 of 1964. Goods arriving in the country may only enter through approved ports of entry. In order for Customs to safeguard any revenue due to the State, and to ensure compliance with national legislation, the importer needs to declare to Customs what he/ she has brought into the country and the mode of transport utilised. National legislation allows an importer 7 days in which to clear goods from the time it has landed in the Republic. Goods not declared or cleared within this time period may be removed and detained in a State Warehouse.²⁹

Importation

An importer is required to complete the bill of entry declaration, and ensure that it is accurately completed. The clearance process includes accepting and checking goods against the documents produced, examination of the goods if necessary, and the assessment and collection of duty and VAT. Customs can detain goods for the Department of Health, Agriculture and other Government Departments. The relevant Government departments ensures compliance with other applicable laws, rules and regulations.

Exportation

Important economic decisions are based on trade statistics and it is therefore imperative that SARS accurately record export procedures. Examination facilities need to be provided at ports of entries. Some goods can sometimes be totally prohibited by other authorities and in other instances special permits or licences may be required. Customs offices scrutinise documents in order to ensure compliance with the various laws, regulations and rules.



2_048

Only 19 of the land ports that South Africa shares with her neighbouring countries are designated for the movement of commercial goods. The land borders are all rated according to the level of service provided at the border post. The rating ranges from A to C. At an A status border post, all three of the main Government Departments involved in the control of the movement of people and goods across the border post are present. These include Customs and Excise (South African Revenue Service), Immigration (Department of Home Affairs) and the South African Police Service (SAPS). At the B border posts, only two of the departments are present, and at the C status border posts, only one department is present.²⁷ The South African border police are present at all land border posts in South Africa.

The Ressano Garcia border post is classified as a Category A border post.

2.8.2

DEPARTMENT OF HOME AFFAIRS

The Department of Home Affairs designates ports of entry and handles the administrative control of the entry and departure of persons in terms of the Aliens Control Act.. Every sovereign state has the right to determine who will be admitted to the country, whether temporarily or permanently, and to set any conditions for such admission. The administrative protection and exercising of this right is known as Immigration Control and is supported by legislation.³⁰

The department is responsible for aliens control and admissions, they also verify and validate all travel documents, such as passports, visas, permits etc.

Home Affairs also has the function of controlling refugee/asylum concerns. Generally, work in both of these areas entails granting legal status to foreigners, processing and renewing permits, and repatriating or deporting 'prohibited persons'. At this point, it is important to differentiate between the terms repatriation and deportation. Repatriation involves returning undocumented foreigners to their home countries. That is, people who are in South Africa illegally, either because they entered the country without documents or because they have overstayed the legal time that was granted to them. Deportation involves returning foreigners convicted of a crime to their home countries.

The DHA decides the status of particular foreigners in the country. Corruption and fraud are common problems as it is often that those who are not legitimately entitled to documentation, are often able to buy legal status from corrupt officials. This may result in the purchase of forged passports and ID books or, more commonly, the purchase of bona fide South African documents that are illegally granted to the buyer.

The work of the department is not restricted to status determination and issuing documents. Officials are also mandated to trace and apprehend undocumented foreigners. In this regard, the department works closely with the police and the defence force to find and detain suspects. Once suspects have been apprehended by the DHA, the police and the department is responsible for processing and repatriating undocumented migrants. By law, the processing period between apprehension and repatriation (i.e. the detention period) cannot exceed 30 days without judicial approval.³¹

2.8.3

SOUTH AFRICAN POLICE SERVICES

The main function of the Border Police is to prevent and detect cross border crime and to stop the illegal movement of people and goods into or out of South Africa. The Border Police also perform functions on an agency basis for the Department of Home Affairs and SARS, as derived from section 205 of the Constitution (Act 108 of 1996) and the Police Act (1995). They also assume the responsibility of enforcement of the law applicable to cross border crime.³² The Division of Protection and Security Services is responsible for the security at ports of entry.

The prevention and investigation of cross border crime is important to ensure public order, and to protect and secure inhabitants of the Republic and their property. Control needs to be assumed over matters including:

- _the import and export of firearms and explosive goods.
- _animal markings
- _illegal importation of foodstuffs, cosmetics and other restricted items.
- _Illegal exportation of precious metals or diamonds
- _counterfeit moneys
- _illegal exporting of stolen property/ vehicles
- _detection of wanted persons exiting South Africa.

Major problem areas experienced by the SAPS in their operation, include the limited resources often available to the police, including both man power and physical possessions, the lack of search and storage facilities, and limited training opportunities are also problematic. There is also a shortage of patrol vehicles. The main intention is ultimately to decrease the vast number of illegal crossings occurring on a daily basis and to prevent, combat, and investigate all criminal activities, and uphold law and order.

The SAPS works together with the National Intelligence Agency, and the Department of Correctional Services to enforce maximum control at border posts, and ultimately provide the necessary safety and protection of those crossing the border legally.

2.8.4

OTHER DEPARTMENTS

DOA DEPARTMENT OF AGRICULTURE

The Department of Agriculture is also involved in the administrative control at ports of entry. The Department of Veterinary Services have the responsibility of ensuring that all animals/plants and animal/plant products entering and leaving the country have an Import/ Export Permit. All plant and plant products and animals and animal products could potentially introduce diseases into the country, and associated economic losses are easily prevented by effective border control. They also provide national veterinary risk management services and set legislation, policy and standards regarding all functions of Veterinary Services.³⁴

DOH DEPARTMENT OF HEALTH

The Department of Health is responsible for the control of foodstuffs entering and leaving the country, disease control, and hygiene requirements, i.e. they control all food, pharmaceutical and disease related matters. They need to ensure that proper measures are implemented to enhance free trade within the SADC, but at the same time to also fulfill its obligation to protect the health of consumers.³⁵

DOT DEPARTMENT OF TRANSPORT

The Cross Border Road Transport Agency (CBRTA), a division of the Department of Transport, is responsible for the regulation and control to the cross- border road transport market, and facilitates the establishment of cooperative relationships between public and private sector institutions who have an interest in cross border road transport. The Department contributes to the creation of a borderless Southern African Development Community and facilitates and regulates cross-border flows of traffic in a manner that optimises mobility and accessibility, thus contributing to the seamless integration of the Southern African Development Community.³⁶

They also ensure the maintenance and servicing of roads. The N4 national Road, from Pretoria to Maputo is operated by TRAC (Trans African Concessions). They are the concessionaire of the R3bn project, and build, finance, operate, maintain and expand the 503km N4 toll road between Witbank, South Africa and Maputo, Mozambique.³⁶

NIA NATIONAL INTELLIGENCE AGENCY

The National Intelligence Agency is responsible for ensuring a secure environment for all South Africans. The NIA has therefore been established as a function of government to serve the purpose of national security. NIA is subservient to the interests of the State and the well-being of all its inhabitants.³⁷

They therefore work jointly with the SAPS at Border Stations and assess the total (economic, social, political and environmental) domestic security situation, in order to identify and report to the executive departments any signs or warning signals of threats or potential threats to the constitutional order and the safety of the people.

'The Baseline Criteria for this study is based on the South African side of operations, as per research completed, and interviews held with the relevant Government Departments. Mozambique's requirements will be assumed to be the same as South Africa's.'

BASELINE CRITERIA

3

3.1 THE FUNCTION OF A BORDER POST








The proposed new one- stop border complex needs to accommodate the relevant Departments who operate from the border, and allow for effective operation by allowing the relevant regulatory procedures to happen accordingly. A single simplified cargo clearing procedure and document management across the two countries needs to be ensured to make the corridor viable.

Certain frameworks and legal strategies would need to be in place prior to the operation of a one- stop border, in order to alleviate any arguable differences which could arise between the two countries if not properly addressed prior to commencement. The building will allow for the separate operation by both countries. It must be mentioned however, that certain areas will prove to operate more effectively if both countries work together to maximise efficiency. Searches on vehicles and trucks can be done by representatives from both countries while parked in one bay to alleviate the need of stopping twice to undergo inspections.

The processes are split into categories as are in operation currently. The new design aims to allow for the three categories of users to remain separate in operation, both to maximize efficiency and to allow maximum jurisdiction and control over the users.

The three categories of user include:



 REPÚBLICA DE MOÇAMBIQUE República of Mozambique		CARTÃO DE EMBARQUE / DESEMBARQUE Embar / Disembarkation Card				
1. APELIDO Surname						
2. NOME Given Names						
3. PASSAPORTE N° Passport Nr.		4. VALIDADE Validity dd mm aa/yy	5. NACIONALIDADE Nationality	6. SEXO Sex M F		
7. DATA DE NASCIMENTO Date of Birth dd mm aa/yy		8. PAÍS DE RESIDÊNCIA HABITUAL Country of Permanent Address		9. DURAÇÃO DA VISITA Duration of Visit/Trip.		
10. DESTINO Destination			11. ENDEREÇO DE HOSPEDAGEM Address of Stay			
2. MOTIVO DA VIAGEM Purpose of Visit/Trip NEGÓCIOS <input type="checkbox"/> OFICIAL <input type="checkbox"/> TURISMO <input type="checkbox"/> TRÂNSITO <input type="checkbox"/> Business Official Tourism Transit VISITA A FAMILIARES/AMIGOS <input type="checkbox"/> TRABALHO <input type="checkbox"/> MINEIRO <input type="checkbox"/> Visiting Relatives/Friends Work Miners Outros <input type="checkbox"/> Indique: _____						
13. MEIO DE TRANSPORTE Mode of travel	 MATRÍCULA Registration	 VOO NR. Flight Nr.				
USO OFICIAL / For Official Use VISTO NR. Visa Nr.						
LOCAL DE EMISSÃO Issued at						
NOME DO INSPECTOR Name of the Inspector						
OBSERVAÇÕES Remarks						
Carimbo Stamp						

3_004

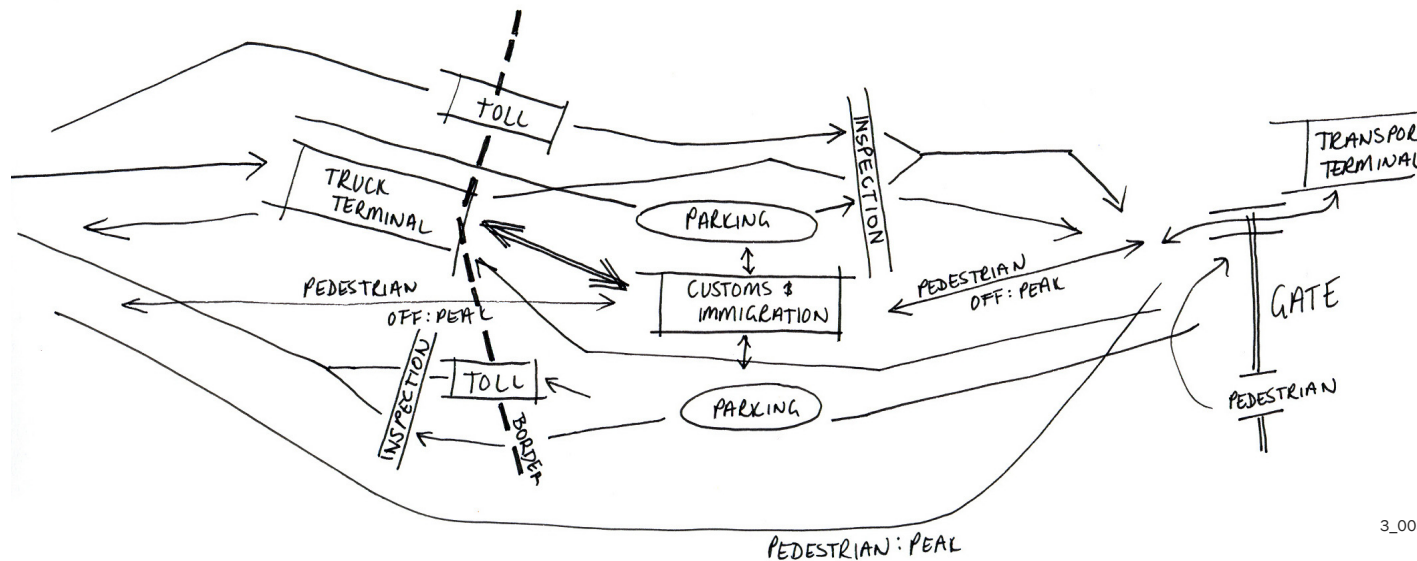
The Bottom line for the new Border Complex is to ensure that the intervention results in meeting the customer needs, which to date have grown faster than the current infrastructure and institutional improvements can cope with. The existing facility is too small for the traffic it receives. The new joint border post needs to address the following issues to ensure its operational efficiency:

- __A legal/ regulatory framework needs to be implemented to govern the operation,
- __The main consideration is the establishment of, and access to the common control area, i.e. the Customs and Immigration section.
- __Opening and closing times need to be aligned to customer needs and to coordinate with peak and off- peak times. Time delays need to be minimal.
- __Adequate customer facilities need to be provided. The services need to be reliable and speedy.
- __There needs to be a management structure in place so as to ensure coordination between all the operating parties.
- __Many problems would be alleviated if both countries were

moving at the same pace. This is however not the case. The separation needs to therefore be addressed in such a way that separate decision making can be made.

- __The capacity problem needs to be addressed. People; systems; and equipment needs to be adequate,
- __There needs to be a harmonised document system
- __There needs to be adequate customs search and warehouse capacity.
- __There needs to be an IT system in place to ensure departmental integration, together with an integration between inspection facilities, documentation areas etc.

There are currently no fully operational one-stop border posts in the SADC region, this new border would be a flagship upon which further border posts could be modeled. There are however different protocols between different sovereignties, e.g. trade, legislative, communicative & loading, which would cause different issues to be addressed at different borders. A corridor approach needs to be undertaken whereby specific recommendations of the respective borders be followed regarding the infrastructure & technology available.



3.2 OPERATIONAL PROCESSES

The following processes are those currently in place. With the implementation of a one-stop border, the two frontiers would disappear. The processes stay the same, the only difference is that there is now no need to return to your vehicle and drive to the next frontier, all processes for both countries are done in one building.

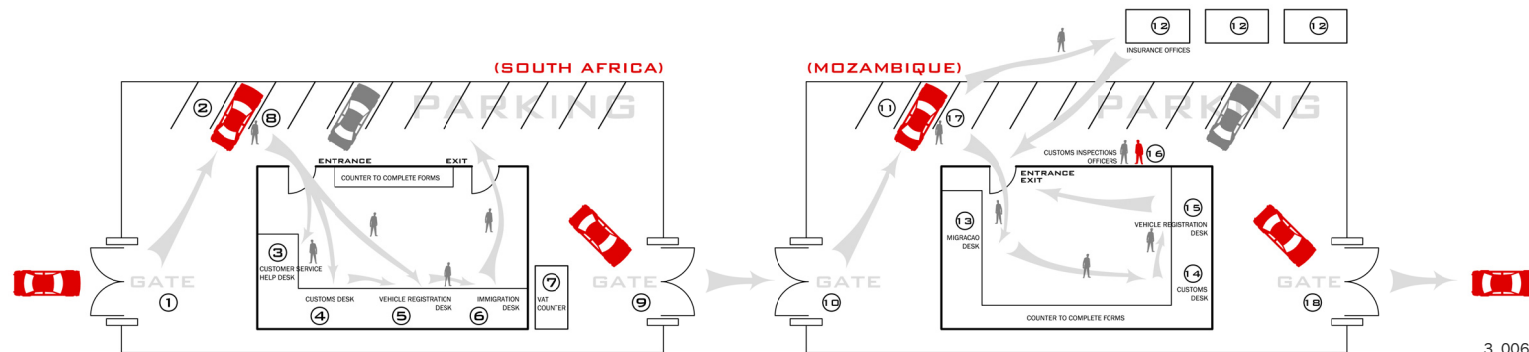
3.2.1 PASSENGER VEHICLES

South Africa to Mozambique: South African Frontier

1. Collect your gate pass (car registration & number of people in vehicle are recorded)
2. Park in designated area, all passengers disembark & proceed to frontier office.
3. If you have any questions proceed to the Customer Services help desk
4. If you have export goods to declare, go to the Customs desk where the original invoices must be stamped.
5. The driver of the vehicle reports to the Vehicle Registration desk and presents the original car registration document, collects a DA341 document, completes it, and has the gate pass & DA341 stamped.
6. All passengers proceed to the SA Immigration desk with their passports and the gate pass where the passports will be stamped.
7. If you are not a SA citizen and wish to reclaim VAT, present the goods and original invoices at the VAT counter for a VAT refund.
8. Embark your vehicle, proceed to the gate and hand over the gate pass.
9. Drive to the Mozambican Frontier area.

South Africa to Mozambique: Mozambique Frontier

10. Enter the gate and collect your gate pass (car registration & number of people in vehicle are recorded)
11. Park in designated area, all passengers disembark and proceed to the frontier office)
12. If you did not obtain vehicle insurance beforehand, purchase this insurance at one of the insurance offices for R150,00.
13. Report to the Migracao desk with your passport, R12,00 cash and completed disembarkation card.
14. If you have import goods to declare, go to the Customs desk for the necessary declaration & present the original invoices.
15. The driver of the vehicle reports to the Vehicle registration desk and presents the original car registration document, pays R10,00 and presents the DA341 and gate pass and has them stamped.
16. Request an inspection officer to inspect the vehicle and stamp your gate pass.
17. Embark your vehicle, proceed to the gate and hand over the gate pass.
18. Exit the border facility and proceed along the N4.



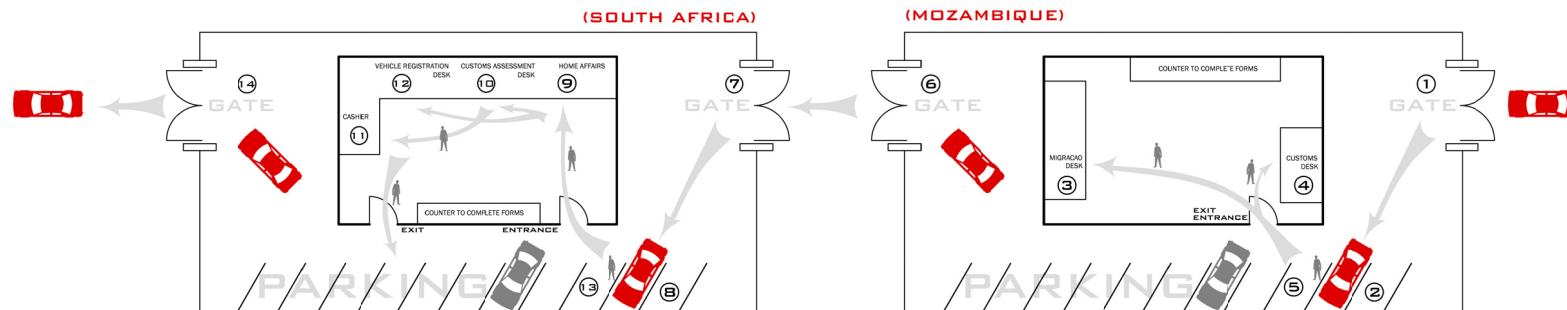
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Mozambique to South Africa: Mozambique Frontier

1. Drive through the gate.
2. Park in designated area, all passengers disembark & proceed to frontier office.
3. Proceed to the Migracao desk, hand in the completed Disembarkation card, and have your passport stamped.
4. Should you have anything to declare proceed to the Customs desk.
5. Return to your vehicle.
6. Drive through to the South African frontier

Mozambique to South Africa: South African Frontier

7. Enter the gate and collect your gate pass (car registration & number of people in vehicle are recorded)
8. Park in designated area, all passengers disembark and proceed to the frontier office
9. All individuals to go to Home Affairs with their passports and the gate pass to have their passports stamped.
10. Should you have anything to declare, go to the Customs Assessment office. An official will determine if and how much duty and VAT you should pay in SA Rand.
11. Payment is then made at the cashier.
12. Driver of the vehicle is to then proceed to the Vehicle Registration desk with the car vehicle registration form and gate pass to have them stamped.
13. Embark vehicle and proceed to the gate.
14. At the gate walk through disinfectant bath, present your stamped receipt received for any duties or VAT paid, and proceed through gate.

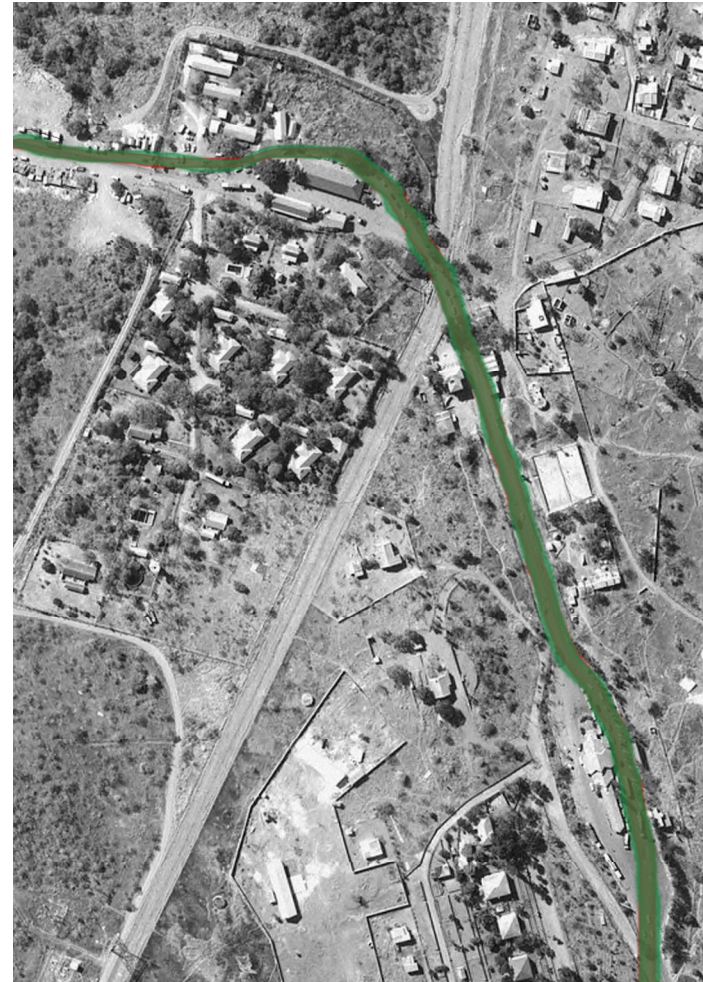


3.2.2

FREIGHT TRUCKS

South Africa to Mozambique/ Mozambique to South Africa

1. Trucks to proceed along N4 National Road and enter truck clearing yard 2km east of Komatipoort
2. Sign in with the a clearing agent and hand in all relevant documentation. This includes:
 - Commercial Invoice from exporter
 - Packing list from exporter
 - F178
 - Road freight manifest
 - Road consignment note from carrier
3. Agent prepares:
 - DA550 (SA export bill of entry)
 - Notification Document
 - CA Instructions
 - Transit Memo
 - Gate pass and DA341
4. Documentation filed, together with a copy of drivers passport and forwards to customs.
5. Customs to provide verification
6. Driver receives notification and signs out
7. Proceeds to border and collects gate pass and DA341
8. Parks in designated truck docking bays.
9. Driver to have gate pass and DA341 form stamped at the Vehicle registration desk.
10. Driver presents the notification document to customs and the stamped documentation he filed with the clearing agent is released.
11. Driver proceeds to the Immigration desk and has his passport stamped.
12. The Driver proceeds to the Mozambique side of operations and proceed to the vehicle registration desk with the gate pass, DA341 and fee.
13. He then proceeds to the Customs desk where personal goods are declared, the transit memorandum is processed and verification obtained.
14. He then proceeds to the Immigration desk to have his passport stamped
15. Upon return to his truck it is searched by officials from both countries in order to match documentation, and the truck is sealed.
16. Final stamps are issued by both countries and the truck exits the holding area and proceeds to the exit gate where the gate pass is handed in.



3_008

3.2.1

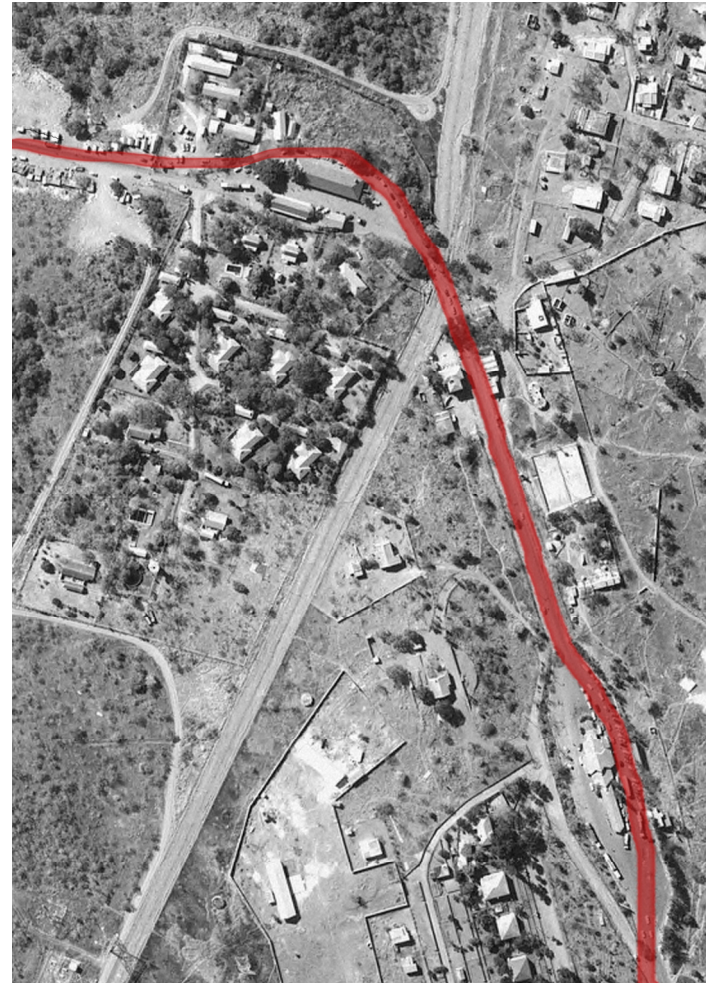
PEDESTRIANS

South Africa to Mozambique

1. Collect your gate pass
2. Follow the demarcated walkway to the Customs & Immigration Building
3. Enter the building. If you have export goods to declare, go to the Customs desk where the original invoices must be stamped.
4. Move to the Immigration desk and hand over passports and the gate pass in order for the passports to be stamped.
5. If you are not a SA citizen and wish to reclaim VAT, present the goods and original invoices at the VAT counter for a VAT refund.
6. If anything is unclear approach the Customer Service Help desk
7. Exit the South African section and move through to the Mozambican side of operations.
8. If you have import goods to declare, go to the Customs desk for the necessary declaration & present the original invoices.
9. Report to the Migracao desk with your passport to have it stamped
10. Exit the building and continue along the walkway to the gate
11. Present gate pass and present stamped passport to inspection officer.

Mozambique to South Africa

1. Collect your gate pass
2. Follow the demarcated walkway to the Customs & Immigration Building
3. Proceed to the Migracao desk and have your passport stamped.
4. Should you have anything to declare proceed to the Customs desk.
5. Exit the Mozambique section and move through to the South African side of operations.
6. All individuals to go to Home Affairs with their passports and the gate pass to have their passports stamped.
7. Should you have anything to declare, go to the Customs Assessment office. An official will determine if and how much duty and VAT you should pay in SA Rand.
8. Exit the building and continue along the walkway to the gate
9. Present gate pass and present stamped passport to inspection officer.



3_009

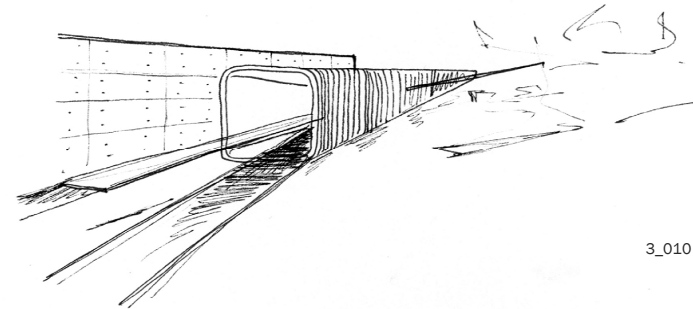
3.3

DESIGN GUIDELINES

The guidelines as set out below are compiled based on *SBAT: The Sustainable Building Assessment Tool*.¹

A relationship needs to be developed between sustainability and buildings. As we build and construct, so the earth's resources are consumed. Slowly they are diminishing. It is now upon us to take control and give attention to sustainable building design. We need to reduce the damage we cause to the globe by creating sustainable environmental, economic and social systems.

LANDSCAPE
views
gradient.....



3_010

3.3.1

ENVIRONMENTAL

SITE

Topography

The slope of the site allows for a multi level building and the opportunity to have entrances and exits on varying levels. This also allows for the separation of public and private areas, and also the separation of functions to optimise control. The level differences can be used as borders to control the movement of people. It is intended for the movement of people crossing the border to be split on the varying contours, so that channeling can lead to maximum efficiency. The road to Mozambique would therefore be on a lower contour than the road to South Africa.

Roads and Parking

Roads need to be designed to cater for the maximum weight of freight vehicles. The road network needs to be integral to the contour of the land, to mould in and form part of the landscape. The existing road infrastructure will be retained only as far as the two new turning circles, from there, a new road network is proposed, incorporating additional lanes.

Erosion control measures for storm water run off, on and around the roads, needs to be addressed. Road cuttings need to be vegetated immediately after construction to also limit the effects of erosion.

The movement of passenger vehicles, freight trucks and pedestrians is to be separated completely. The movement of pedestrians is to be isolated on the lowest contour and pedestrians are to be processed in a separate building. This is to reaffirm the idea of ensuring maximum control and security. The separation of passenger vehicles and cargo carrying trucks will also optimise efficiency, and processing delays can be minimised as much as possible. Two trucking terminals will be located separately from one another. One will serve those moving from South Africa to Mozambique, and the other will serve those moving from Mozambique to South Africa

A major consideration is always to minimise the walking distance of the passengers from parking bays to their destination, unless other factors such as cost dictate differently. Parking should be designed to ensure that movement is as smooth as possible and congestion be avoided. The option of a parking system whereby reversing is eliminated would provide a smoother movement of traffic.

Neighboring Buildings

Six of the residential dwellings south of the building would need to be demolished to allow for the size of the new complex. The existing buildings currently being used by the SAPS would also be demolished. The functions these houses currently fulfill will be relocated to the new administration building.

Vegetation

The size of the new built structure does not allow for the retention of existing vegetation. Vegetation falling outside this footprint will however be retained. Planting of new indigenous trees needs to be undertaken as soon as the site has been established. Vegetation also provides the desirable shading and fulfils the vital function of limiting the action of soil erosion. Planting also contributes to the visual integrity of the precinct. In a landscape where the border is in an open landscape, the planting plays an important role in the visual impact it has on a traveler.

Soil disturbances should be kept to a minimum and the planting of exotic vegetation should be discouraged. Erosion control needs to be practiced in areas where topsoil is disturbed and cannot be prevented.

Views

One of the key conceptual generators of this site is the 180° view window. Traveling towards Mozambique the road straddles the northern ridge allowing for a view over the Komati river gorge to the left. This view is integral to the design and enhances the experience when the user is engaged with the site.



Protection from the weather

Important factors are the angle at which the rain is likely to fall and the necessity for protection from strong winds in the dry as well as the rainy seasons. Provision of shade from the sun is also important and sun angles relevant to the site should be taken into account.

WATER

Rain Water and Run off

The behavior of water on the site becomes integral to the design. The lie of the land results in surface water flowing down slope to the Komati river. The flow therefore dissects the site and channeling needs to be addressed so as to minimise environmental impact. Rainfall will be dealt with by either of two ways. Where possible rain water will be harvested for reuse, or alternately carefully channeled back into the landscape.

Grey Water

The grey water generated from the site will be used on the landscape or discharged into the Komati River.

Water efficient devices

Guttering and down piping needs to be designed to ensure maximum collection of water. Water storage tanks are to be provided so that collected rainwater can be stored until reuse. The position of the tanks needs to be addressed in relation to building functions and thermal values, so as to ensure the water stays at a cool temperature.

Storm Water Drainage

Drainage across the site will be channeled, and otherwise be absorbed by the soil or used by vegetation and other ground coverings.

ENERGY

Ventilation Systems

The extreme climate necessitates the operation of effective cooling systems. An open design will ensure sufficient movement of air through the building. Building depth should be kept to the minimum to allow optimal cross ventilation. Sufficient overhangs, shading devices, light external colours, openings and vegetation contribute to ensuring a cool environment and maximum user comfort. Outdoor spaces are to be well shaded. A comfortable outdoor environment is needed so that visitors can wait without the added discomforts caused by heat.

Renewable Energy

Solar water heaters can be utilised to provide the building with the limited hot water it requires. Kitchen and ablution facilities are the only sections that have a hot water requirement, and the site is situated in a location where there is sufficient sunlight for solar panels to be effective.

Wind Turbines could also be utilised to provide suction of interior warm air, out of the building. They could be located above the northern exposed windows to provide the necessary pressure differences to allow maximum, effective ventilation to take place.

WASTE

Organic/ Inorganic waste

All organic waste should be reused after recycling on the environment.

Inorganic waste, both during construction, and upon completion, when the building is under operation, should be sorted so that it can be recycled if possible. Documentation will be abundant during the buildings life cycle. Paper recycling will be very effective if an initiative can be developed between the departments and either Sappi or Mondi, both of which are very active in the area.

MATERIALS AND COMPONENTS

Recycling and reuse of materials and components

The fencing currently in place would be reused to enclose the entire border complex on the northern side. Currently the fencing does not stretch the entire length. New fencing would need to be acquired to ensure security for the entire precinct. Bricks from the demolished residential dwellings could also be reused in the construction of the new building.

Material and component sources

Materials can be sourced from Nelspruit and from Maputo. Emphasis should be placed on sourcing materials from Mozambique in order to try and inject investment into local business. Certain materials will need to be sourced from elsewhere in South Africa. Distances need to be taken into account as most materials will need to be transported on trucks, the rail line could also be utilised to transport materials from the Gauteng region to the site.

3.3.2

ECONOMIC

LOCAL ECONOMY

Local Resources

The cost of a new border complex can provide job opportunities for the local community and inject cash flow into small businesses in the area. Contractors, materials, components, fittings and furniture can all be locally sourced. The employment opportunities generated by the new complex can also reduce the level of unemployment in Komatipoort and Resano Garcia, and cleaners, gardeners, administration staff and other maintenance workers can be sourced from the neighboring towns.

Repairs and maintenance

The repairs and maintenance of the building should be limited by specifying materials with long life cycles. The border will however still need a maintenance contract. This can be awarded to a business in the surrounding areas. It would have to be drafted into the legal framework as to whether one contractor would service the entire building, or whether each country will have their own contract with a relevant company. This applies to all maintenance contracts including, landscape maintenance, cleaning services, catering services, care taking etc. The roads are maintained by TRAC. Their contract includes maintenance and repair of the N4 from Pretoria to Maputo.

There is always the possibility of vandalism in a public building. The existing border post does not however show drastic degrees of it. It should however be considered when materials are chosen, especially street furniture and outdoor features. The constant presence of South African and Mozambiquan police officers does minimise the actions of vandals, and patrolling would be integral in the new design. This will hopefully remain a deterrent to any possible vandals. Materials should also be specified for their anti corrosion properties so as to ensure long life cycle. This can prove to be a high initial expense, but maintenance and repair costs could therefore be reduced in the future.

EFFICIENCY OF USE

The operation of the building needs to be as efficient as possible. This is one of the core reasons for the intervention. The building is to be fully occupied to ensure that a large enough staff composite can handle all processes. The new complex will house all functions on the site to ensure an overall effective operation. The business hours of the border will remain unchanged, it should be noted that during December the Border operates 24 hrs a day.

Usable space

The building should be oriented so as to ensure the maximum optimisation of the site. Although the site is large, the larger the complex is, the harder it becomes to maintain maximum control and jurisdiction over the area. Outdoor spaces should however be generous, the movement through the site should still be an enjoyable one and cramped spaces should be avoided.

Shared use

The building function results in shared use being integral to the operation of the different departments. One building complex allows for a more efficient and cost effective operation. Internally the countries are separated into two wings to provide a distinction between the two. The Departments of South Africa share the same common areas, including ablutions and kitchen facilities, as do the Departments of Mozambique. Each country functions differently and control needs to be given to a specified area.

Management of space

The design should provide for definite areas for each department as set out in the accommodation schedule. An overall management strategy should be in place to ensure a coherence between all the departments.

ADAPTABILITY & FLEXIBILITY

Offices should be large enough so that internal space planning can be adapted to suit the different requirements of the different departments. The nature of this specific building is such that function will never change. It is only the possibility of expansion that would alter the internal organisation in the future. The main guideline is to ensure that the option of external expansion is in place should trade and industry increase dramatically. Space should be identified, that should additional parking and inspection bays, etc. be needed in the future, this would be possible.

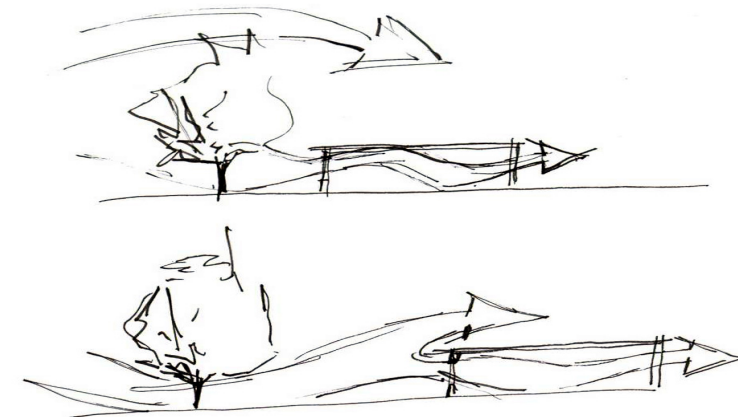
OCCUPANT COMFORT

The border post has two occupants. Those who work at the border, and those who transit the border. People crossing the border enter the building to follow the necessary regulatory processes, on the way to their destination. Employees of the Government Departments reside either in Komatipoort or Ressano Garcia.

Both groups of occupants need to be ensured maximum comfort. The employees need a work environment in which they can operate productively, and travelers need a place of rest or ease in an often unbearable climate.

Ventilation

Ventilation needs to be provided naturally. Passive strategies need to be employed to minimise the need for mechanical ventilation. In the extreme climate of the site however, mechanical ventilation would need to be utilised during the peak summer months when temperatures often reach 40°C. The option will however be in place that natural ventilation can be used during the majority of the year, and mechanical ventilation is only used in the extreme conditions of summer. The existing winds need to be utilised to cool the interior of the building.



Lighting

Lighting is an important aspect of security. The design must take lighting into account, and must ensure that no dark corners are available to conceal criminals. The location and design of light fittings should consider potential vandalism but at the same time ensure easy, economic maintenance.

Noise

The site lies in the open landscape directly south of the Kruger National Park and is generally quiet. The only noticeable noise is generated from traffic, and the trains which frequent the border at hourly intervals. Trucks generate the most noise. The trucking terminals should therefore be located away from the Customs and Immigration building so that tourists and passenger vehicles are separated from the noise that is generated.

Views

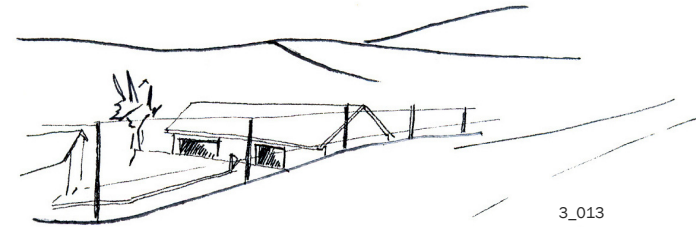
Views are an important generator of the design. The site is one of complexity. Views from the site include the Komati river gorge and the confluence of the Incomati and Crocodile rivers. The railway line runs parallel to the river and forms a picturesque view. The Kruger National Park borders onto the river north of the site. The town of Ressano Garcia forms the view towards the North East of the site, and although it is an image of poverty and struggle, it is not an unwelcoming view.

The building should therefore be oriented to allow optimisation of these views. It is important for the building to open up to these views, so that the attractiveness and beauty welcomes visitors to either of the countries. The area also needs to be conserved so that these views remain windows of beauty in the future.

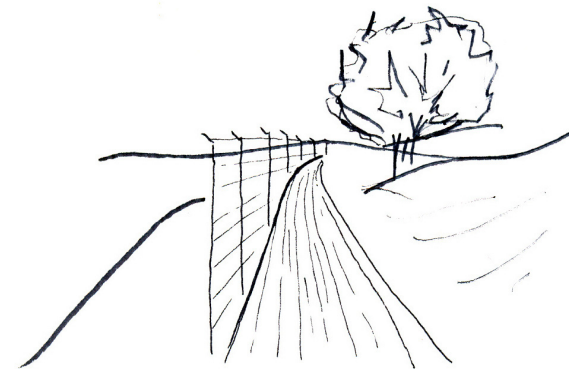
INCLUSIVE ENVIRONMENTS

Access

A Border post is frequented by people of different age, gender, race, economic and social status. The design needs to cater for the entire world population. Both able-bodied and physically challenged users need to be catered for. All visitors need to be welcomed when they engage with the site and the built complex. The building needs to be legible and route movement through it needs to be easily distinguishable. Not only does the building need to be legible, but the entire movement across the site from the N4 needs to be properly addressed.



3_013



3_014



3_015

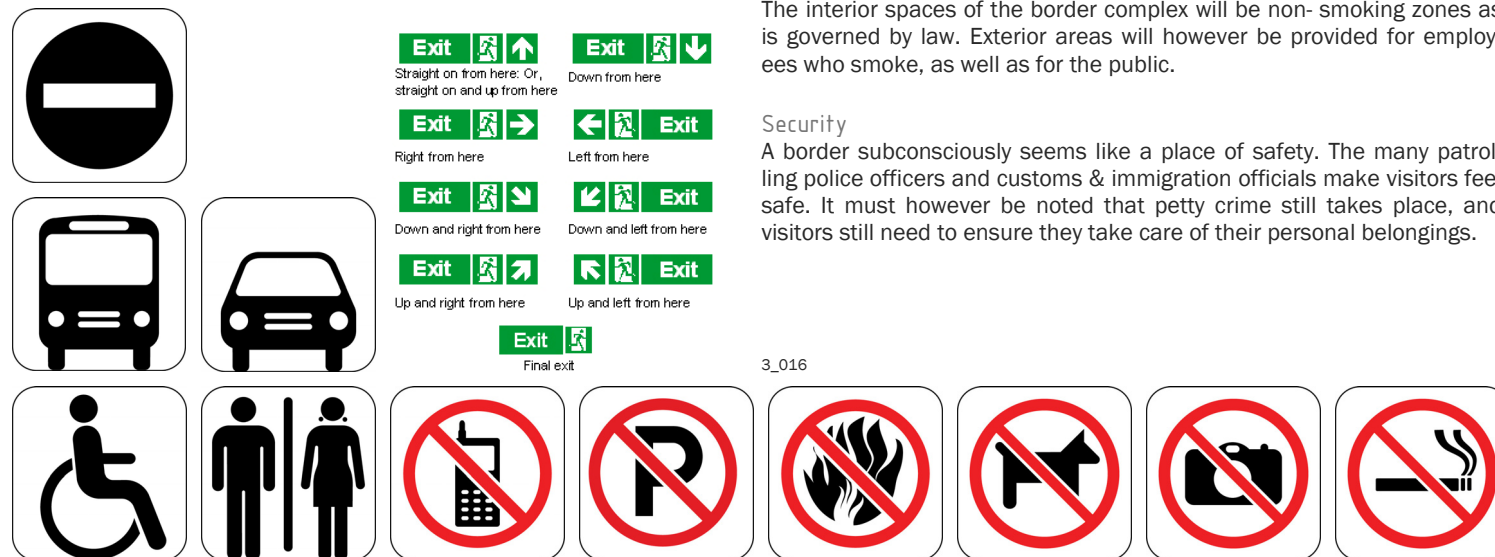
Legibility does not only refer to signage, but also as to how building forms draw a visitor through the building. Angles of wall enclosures, size of openings, heights of ceilings, view windows, and surface materials all aid in developing a building language. The building needs to welcome the user. A Border post is the first encounter with a new country and needs to play a welcoming role. The border should be the departing point for something new ,or the beginning of the next adventure.

Signage and information

Signage is threefold. Directional signage, safety signage and information or educational signage all play a role in the legibility of the building. Building regulations govern the amount and position of safety and fire signage, and needs to be complied with correctly.

Directional signage can be incorporated into the building design so as to clearly indicate the processes that a visitor needs to undergo. Crossing a border can often be a daunting process, and all elements of uncertainty need to be alleviated.

Educational and information signage can be utilised at the visitors centre to provide information regarding social cross- border issues, i.e. HIV & Aids, Malaria, Cholera, Crime, Personal safety etc. Signage and images can also provide insight into the attractions of the two countries and promote and market the attractions.



PARTICIPATION & CONTROL

Environmental control

The building needs to be user controlled. Office environments need to be able to be individually controlled so as to ensure maximum user comfort. The air conditioning provided, as mentioned before, is only intended for extreme conditions. Offices need to be individually air conditioned so that it is not necessary to have an entire centrally controlled system running. Windows need to be openable so that employees have the option of allowing drafts to blow through.

EDUCATION, HEALTH AND SAFETY

Education

The border post can act as an educational tool for both countries. Today society places emphasis on education, not only the literal meaning of being taught at school, but social educational is now highlighted by campaigns in the media. Billboards are used for product advertising or alternatively for punting social issues, prevention of HIV, dangers of drunk driving, promoting drug free countries etc. The Border is a point where these social issues become prevalent. The visitors centre can therefore be a tool to educate poorer, uneducated people who cross the border. Pictures often portray a message better than text, as often those it is intended for are illiterate.

Smoking

The interior spaces of the border complex will be non- smoking zones as is governed by law. Exterior areas will however be provided for employees who smoke, as well as for the public.

Security

A border subconsciously seems like a place of safety. The many patrolling police officers and customs & immigration officials make visitors feel safe. It must however be noted that petty crime still takes place, and visitors still need to ensure they take care of their personal belongings.

3.4 ACCOMMODATION SCHEDULE

The accommodation schedule below is that for South Africa.² For the purpose of this study the requirements for Mozambique, and her operations, will be assumed to be the same as that for South Africa.

3.4.1 OFFICE SPACE

SOUTH AFRICAN REVENUE SERVICES



Staff Component 141 (shift staff)
 Current accommodation
 3x offices in the main building
 2x 3 bedroom house
 1x Wendy house
 2x Rondawel

Required accommodation
 office space (30 people) (240m²)

DEPARTMENT OF AGRICULTURE



Staff Component 10 (including gate guards)
 Current Accommodation
 Office space for 5 people

Required accommodation
 office and storage space (40m²)

SOUTH AFRICAN POLICE SERVICES



Staff Component 35 (including patrolling officers)
 Current Accommodation
 7x offices
 2x guardhouses

Required accommodation
 office space (15 people) (160m²)

DEPARTMENT OF HEALTH



Staff Component 1
 Current Accommodation
 1x wendy house

Required accommodation
 office and storage space (40m²)

DEPARTMENT OF HOME AFFAIRS



Staff Component 58 (shift staff)
 Current Accommodation
 1x 3 bedroom house

Required accommodation
 office space (10 people) (80m²)

NATIONAL INTELLIGENCE AGENCY



Staff Component 1
 Current Accommodation
 1x rondawel

Required accommodation
 office and storage space (32m²)

3.4.2 GENERAL OPERATIONAL REQUIREMENTS

CONTROL FACILITY	(100m ²)	PEDESTRIAN ADMINISTRATION BUILDING	(400m ²)
Gate house and boom		Offices	
Guardhouses (60m ²)		Store rooms	
Vehicular & pedestrian paving		Public Area	
CUSTOMS & IMMIGRATION ADMINISTRATION BUILDING	(400m ²)	COMMERCIAL VEHICLE INSPECTION FACILITY	
Customer Services help desk		Administration office (8 people)	(150m ²)
Vehicle registration desk		Documentation storage	(50m ²)
SARS counter		Covered inspection platform	(75m ²)
DHA counter		Inspection trench	(75m ²)
Finger print area		Overhead inspection walkway >1m wide	
Public area		Weigh bridge	
		Scanner	
General office	(35m ²)	LIGHT VEHICLE INSPECTION FACILITY	
Strong room	(9m ²)	Toll Booths	4 booths
Store room	(9m ²)	Covered search bays	4 bays
Archive	(20m ²)	Vehicle inspection trench	(85m ²)
Search & interview room/ scanner/ scale	(50m ²)	STATE WAREHOUSE	(250m ²)
Boardroom	(40m ²)	Detention area for confiscated goods	
Staff canteen/ kitchen facilities	(140m ²)	OUTBUILDINGS	
Staff admin area	(20m ²)	Holding cells	(20m ²)
IT rooms	(15m ²)	Flammable liquid store	(10m ²)
Paraplegic access		Generator room	(10m ²)
		Storeroom for DOA	(12m ²)
ABLUTIONS		Incinerator	
Staff toilets		PARKING REQUIREMENTS	
Males		Heavy vehicles	10 bays
WC	3	Passenger cars	20 bays
HWB	4	Buses	5 bays
Urinals	5	Car holding	6 bays
Females		Truck holding	6 bays
WC	7	Official vehicles	20 bays
HWB	4	VISITORS CENTRE	(150m ²)
Toilet for disabled	1		
Public toilets			
Males			
WC	3		
HWB	6		
Urinals	7		
Females			
WC	11		
HWB	8		
Toilet for disabled	1		

3.4.3

RESIDENTIAL ACCOMMODATION

Current accommodation

- 13x 3 bedroom family units
- 19x 3 single bedroom units
- 8x 3 bedroom flats
- 4x 2 bedroom flats

Required accommodation

- 51x 2 bedroom units
- 25x 3 bedroom flats
- 94 single accommodation units

The residential accommodation requirements will not be addressed in this study.



3.4.4

SERVICES

INFRASTRUCTURE

- Access widening
- Parking
- Storm water/ soil drainage
- Lighting

ELECTRICAL SUPPLY

The electrical supply needs to be upgraded and a generator needs to be supplied. Power is currently supplied from a 200kVA transformer which is fed from a 22kV Eskom power line. The existing feeder line into the land port is loaded to approx 80% of capacity. In order to carry an additional 1,1MVA, the line would need to be upgraded by installing a voltage regulator.

WATER SUPPLY

At present water is pumped from the Komati river approximately 500m northwest of the land port. The water is then pumped to a treatment plant located near the existing housing to the south of the land port; this plant needs to be upgraded. Alternatively a pipeline from Komatipoort needs to be installed. Rain water from the water tanks will also be used for water supply to the building.

SEWERAGE SYSTEM

Sewerage from all the buildings currently drains to a 15m³ septic tank with a French drainage system located north of the land port.

- Buildings to be demolished
- ★ Existing vegetation to be retained

3_017

3.5

LEGAL CLAUSES

The following are clauses which would be drafted into the legal frameworks to be in place between South Africa and Mozambique. They will aid in controlling the common areas of the border complex that the two countries share.³ Areas outside of the common area are governed by the Laws of the respective country.³

(1) The Contracting Parties agree that authorised officials, who perform their border control functions extraterritorially may wear weapons if, under the laws in terms of which they are authorised, they may do so as part of their official uniform, but may use those weapons only in self-defence inside the common control area.

(2) The Contracting Parties undertake to ensure the following in respect of a common control area -

(a) points of entry shall be properly signposted to inform users on at least the following matters:

A warning that it is an offence to evade any border post control or change the sequence of such control.

The exit and entry checks to be conducted;

The sequence in which first the entry checks and then the exit checks will be conducted;

The documentation to be submitted;

Service fees payable;

The directions to the facilities at which such checks will be conducted; and

Directions to parking facilities;

(b) entry to the perimeter area shall be fenced and the fences and gates shall be maintained and serviced regularly;

(c) points of entry and exit shall be secured by way of a gate or boom and manned by an adequate number of security personnel;

(d) administrative procedures shall be adopted to regulate access and departure from the area including the issue of vehicle tokens at the point of entry that have to be returned at the exit; and

(e) the area shall be well-lit at appropriate times.

(3) The Contracting Parties shall ensure that their respective designated authorities and the Cross Border Corridor Committee receive immediate notification of any criminal act perpetrated by any authorized official.

(4) The Contracting Parties confirm their commitment to trade facilitation as enunciated in the Memorandum of Understanding and agree to develop a harmonised procedures manual setting out procedures in respect of all functions performed in the common control area.

The common control area shall comprise -

(a) the service buildings;

(b) stretches of carriageway and the shoulders along those stretches including any ramps adjacent to the service buildings;

(c) storage areas;

(d) the road between the turning circles;

(e) the corridor used for pedestrian traffic on both sides of the pedestrian control building;

(3) The Contracting Parties agree to demarcate the common control area to create dedicated exclusive control areas for each Contracting Party.

(4) The co-ordinates of the total common control area including the co-ordinates for the respective exclusive control areas contemplated in subsection (3), as well as a map thereof, shall be contained.

'Precedents provide insight as to the functional requirements of a border post, building on a sloping site, and a study of approach- ROAD ARCHITECTURE'

PRECEDENT STUDIES

4

approach Multi level
Toll system
International connectivity **One-stop**

4.1

CALEXICO



4_001

location Calexico; USA and Mexico
function Border Crossing
architect Dworsky Associates



4_002



4_003



4_004



4_005

Calexico is located 120 miles east of San Diego. High security checks are necessary due to the large socio-economic differences between the USA and Mexico; drug, pornography and other smuggling; and the September 11 attacks. Security checking should however be balanced as to not strangle local and regional economies and local cross-border movements.

Border posts themselves form an integral part of local economies and trans-border infrastructure, there is a continuous improvement of cooperation in border control procedures between the United States and Mexico. Corruption is reduced by contracting out 'secondary inspections'. The border also has dedicated commuter lanes with electronic inspection technology. A website operates, which is updated every 30 minutes, indicating the number of open lanes at each of the 2 border crossings, and the expected waiting time at each provides information to prospective users of the facilities.

Long delays occur at visas/ passport and commercial vehicle check points during daily peak periods. This is due to limited crossing hours, and the lack of infrastructure and staff.

Two modest concrete block office buildings are tied together with a glazed lobby filled with light from a Teflon coated, glass fibre canopy. The north/ south oriented lobby offers views to both the countries.

4.2

RAINBOW BRIDGE

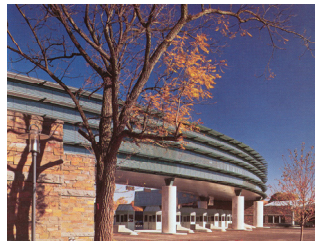
American borders can be studied to aid in the design of a new South African border for a number of reasons. Although traffic between America and her neighboring countries is vastly greater than between South Africa and Mozambique, the principles remain the same.

Crossing the line between the United States and Canada, at Rainbow Bridge, is a mere formality. Entrants summarise their itinerary to a U.S. Customs officer, who waves them on, this simple procedure is nevertheless, very significant.

The border station, whose midpoint is the international border, is curved in plan and supported on stone clad columns providing toll and inspection facilities below. Six toll lanes cater for vehicles leaving USA, and 19 inspection lanes allow for optimal efficiency in searching those entering the United States.

The roofs of the outbuildings and parking shelters stand in contrast to the main Customs and Immigration Building. Orientation of the building and roof structure ensues that emphasis is placed on arrival into the USA and not departure there from.

The enormity of the decision to place a border post next to the worlds tallest waterfalls, Niagara Falls, makes this a site of great public interest. The relation between surrounds and building becomes an important consideration to the architect. Natural features need to take preference, and in light of this the magnitude of scale of this building is questionable. It is this idea versus that of delivering a 'boundary', or place symbolic of authority, pride and control which come up against each other.



4_006



4_007



4_008



4_009

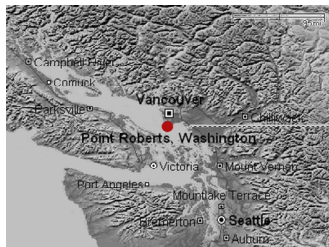


4_010

location Niagara Falls; USA and Canada
function Border Crossing
architect Hardy Holzman Pfeiffer Associates

4.3

POINT ROBERTS



4_011

location Point Roberts; USA and Canada
function Border Crossing
architect Miller & Hull



4_012

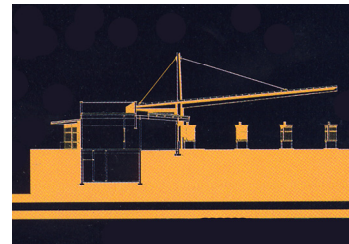
Point Roberts provides the border between the United States and Canada, at the furthest western crossing on the North American Continent.

Concrete, steel and glass is used for booths and outbuilding to match the construction of the main building. The rain-coast construction provides a dialogue between natural and built tectonics. The design takes into account the natural surrounds, and optimises natural light through the orientation of the roof structure, which extends into nature.



4_013

The architecture of roofs and overhangs become the main elements of the architecture and define the main functions, toll and inspection facilities. Scale proves to be of a smaller scale than that of Rainbow Bridge and is more apt to review in relation to the scale of border post as required at Ressano Garcia.



4_014

The public interior areas are distinguished by the geometries of steel structure and tubular air ducts. The contrast of material choice differentiates functions and denotes a spirit of openness. The building opens up to views of the wooded grounds and the interior and exterior orientations of the building respond to the ecology of the backdrop.

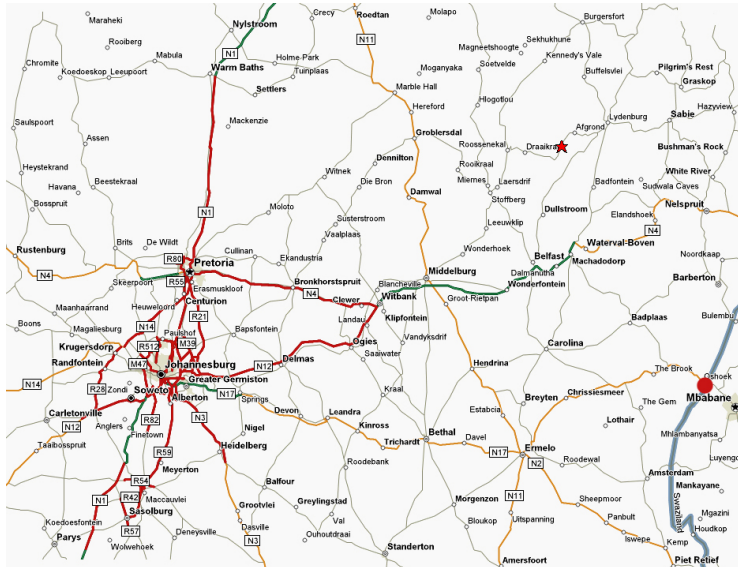


4_015

The linearity of the design on plan becomes an important reference point. It provides the linkage between nature and road. Two situations arise when contemplating a border. Either a linear form, parallel to the road and movement can be explored, or alternatively a building form following the physical border line, whereby movement needs to dissect the building, and the building literally becomes a border.

4.5

NGWENYA



4_017

location Ngwenya, South Africa & Swaziland
 function Border Crossing



4_018



4_019



4_020



4_021

Ngwenya border post, between South Africa and Swaziland, is 90 km from the town of Ermelo.

The user departments include South African Revenue Services, Department of Home Affairs, South African Police Services, and the Department of Agriculture. No booms are in place and canopies are needed over all search bays and platforms.

Major problems are the lack of office space, parking bays and inspection facilities. There is limited passport control office space and only six work stations for a staff composite of 15 people per shift. Electrical supply is by Eskom, power failures are frequent and generator power is a requirement. Water is supplied by two boreholes and there is an onsite sewerage treatment plant.

The identified operational needs which would enhance operational efficiency include:

- _ canopies over search bays
- _ freight inspection platforms
- _ canopy over the platform
- _ truck docking bays
- _ inspection walkway
- _ inspection trench
- _ weigh bridge
- _ parking bays

Garages are currently used for accommodation for the Customs and Immigration officials, new residential accommodation is one of the key requirements. This needs to be studied on a socio-cultural level as to determine a suitable location for a new housing precinct for the staff and their families.

The border is an island type design, as are all South African borders.

4.6

CONSTITUTION HILL

Constitution Hill is the site of the Old Fort Prison complex and now the new Constitutional Court. The precinct comprises of the Old Fort, Number 4 and the Women’s Jail which have all been preserved for their heritage value. The Awaiting Trial block and a few buildings that were situated on the western side of Number 4 have been demolished to meet the space requirements for the new Court building.



4_022

The Constitutional Court building itself includes an entrance foyer, and court chamber, the justices’ chambers, a library on the northern wing and an exhibition area that runs parallel to the Great African Steps.



4_023

The court responds well in context with the surrounding buildings and sub-station, creating well shaded internal courtyards. The building relates well with visitors, the slope and lie of the land allows the user to interact with the building on varying levels, and entrances to different sections can be achieved on different levels, also providing the necessary divisions between public and private areas.

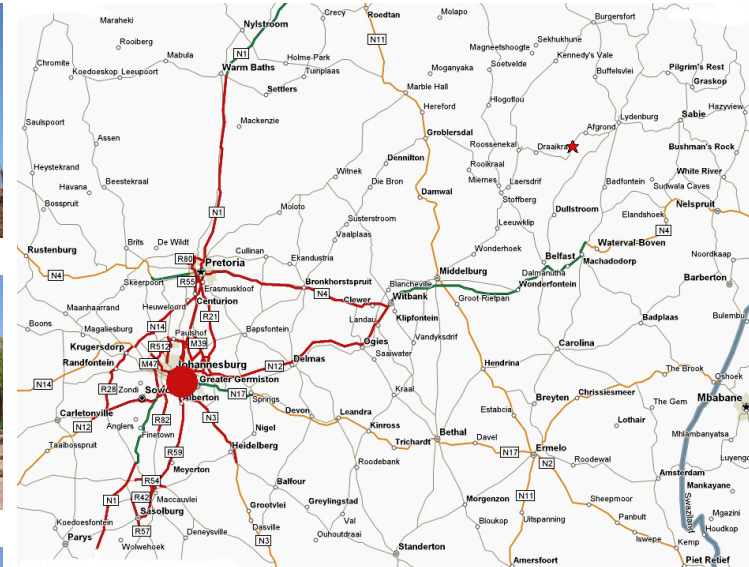


4_024

The principle materials are timber, concrete, steel, glass and black slate, all local materials except for the timber which is thought to be imported from Asia. Bricks recovered from the awaiting trial block have been used in the construction of the new walls and the great African steps which divide the old stone wall of number four and the courts glass frontage.



4_025

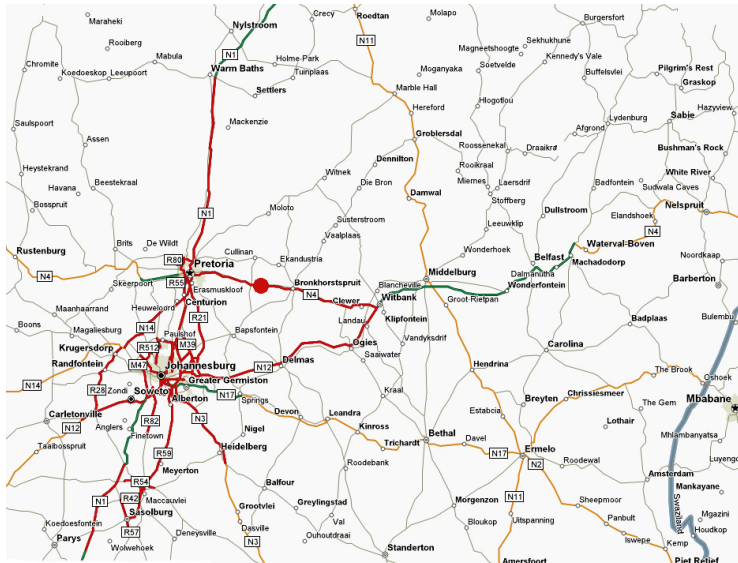


4_026

location Constitution Hill, Johannesburg, South Africa
function Constitutional court precinct
architect Urban Solutions & OMM Workshop

4.7

DIAMOND HILL



4_027

<p>location</p> <p>function</p> <p>architect</p>	<p>Diamond Hill</p> <p>N4 Toll Gate</p> <p>Tolplan</p>
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4_028



4_029



4_030



4_031

The Diamond hill toll gate is situated on the N4 National Highway between Pretoria and Bronkhorstspuit. Construction was completed in 2003. It became the 5th toll gate on the Maputo Corridor between Pretoria and Maputo.

Other Toll gates are situated in Middleburg, Machadodorp, Malelane and in Mozambique.

The design is by Tolplan, who are responsible for most toll facilities in South Africa. It is a small scale building and comprises of three cube structures, linked with common passages and roof overhangs.

The building stands isolated on raised ground, to the south of the road. Tall steel structures frame the precinct and provide lighting after the sun sets. The entrance to the administration building is approximately 300m to the west of the toll gates.

The administration building is constructed from brick, steel and glass. The absence of natural vegetation to provide shading is noticeable, overhangs are not large enough to work efficiently, and the double volume glass frontage forming the northern façade results in sunlight streaming in from mid morning.

Water storage tanks become an integrated part of the design, not only on the Diamond Hill site but all along the N4 in the District municipality area.

Detailing of the water tank support structures is an integral part of the design and proves a successful notion in developing an overall design language along the highway.

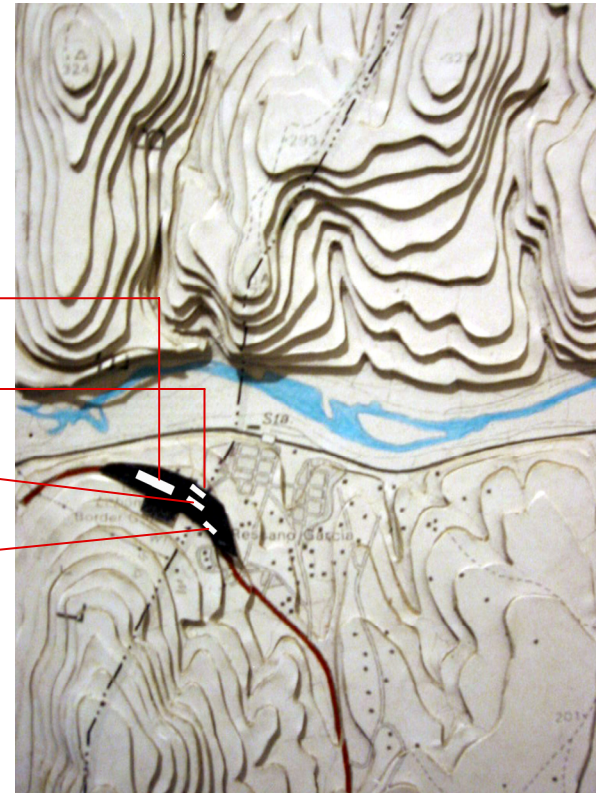
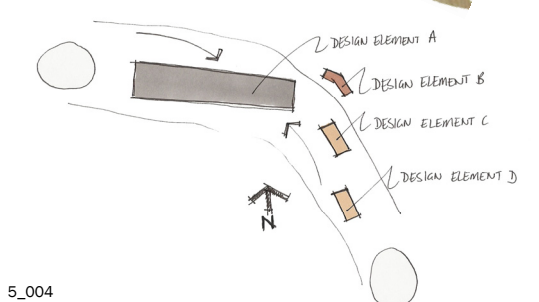
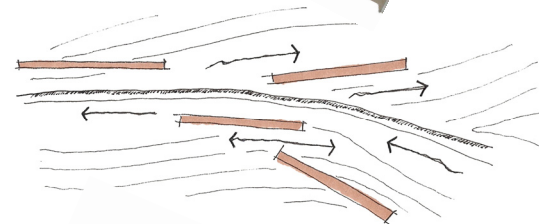
**DESIGN DISCOURSE &
TECHNICAL DEVELOPMENT**

5

A NEW BORDER COMPLEX BETWEEN SOUTH AFRICA AND MOZAMBIQUE

5.1

SITE DESIGN



DESIGN ELEMENT A
Main Customs and Immigration Administration Building

DESIGN ELEMENT B
Satellite Administration building for pedestrians

DESIGN ELEMENT C
Truck Terminal for traffic to Mozambique

DESIGN ELEMENT D
Truck Terminal for traffic to South Africa

5.2 APPROACH & CONCEPTUAL EXPLORATION

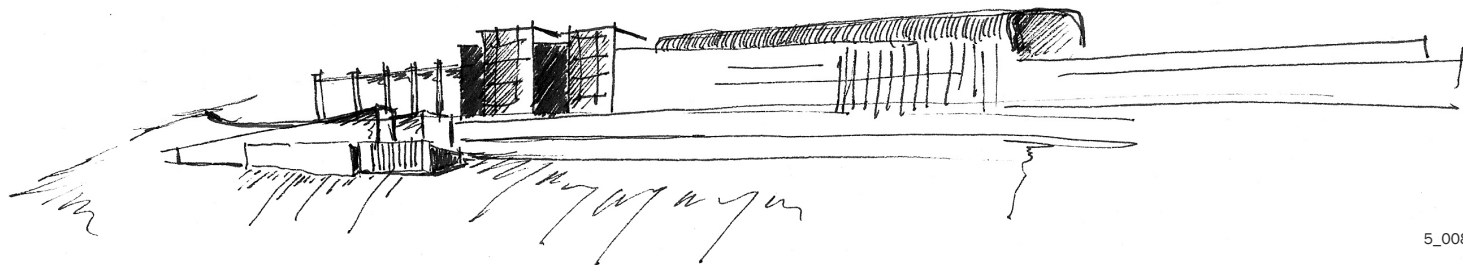
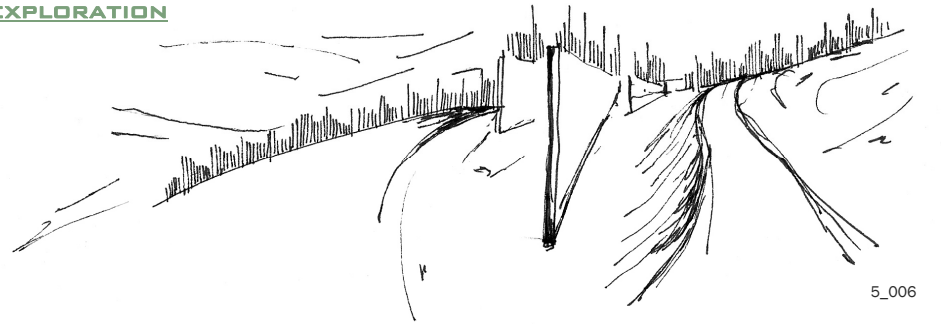
Architecture is an art form that is bound up with utilitarian, technical, and economical considerations, and with the 'sense of place' and physical conditions of a site. Architecture must therefore be balancing. It is the coordination of aesthetics, functions and technological considerations.

Road architecture is a distinctive expression, as aesthetics are often dictated by the surroundings themselves. A simple design, or a minimalist approach intensifies the concepts, making it clear to the observer. Since the road interacts to a high degree with the surroundings, it is important for the building to be easily grasped, clear and understandable.

The Design Guidelines set out in Chapter 3 give an overview of the major design considerations of this scheme.

The design is generated from 3 major conceptual ideas:

Movement & Transition
Function & Control
Landscape & Surrounds



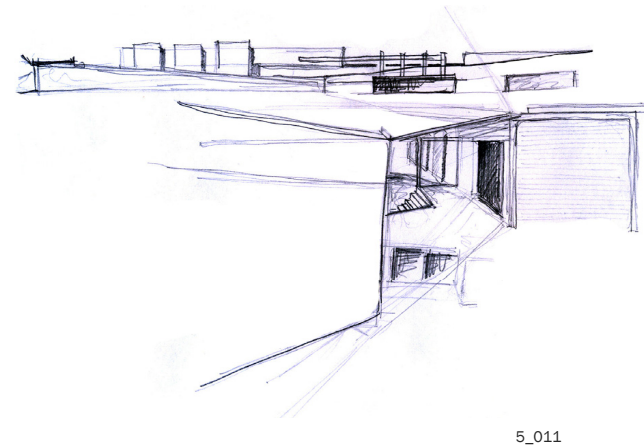
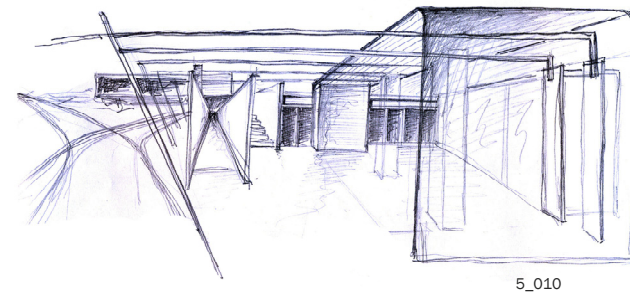
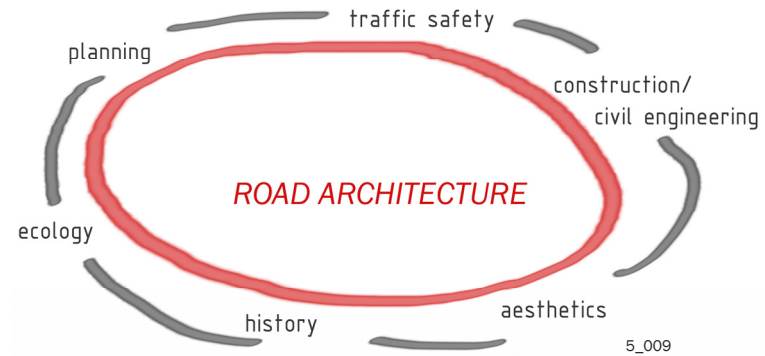
Design thinking evolved from the idea of separating movement across the site into two bands. The operation of a 'one-stop' border forces the separation of traffic in two directions, from South Africa to Mozambique, and from Mozambique to South Africa. This results in an island type design whereby the building needs to be accessed from all sides. The building therefore needs to welcome visitors from both sides of approach.

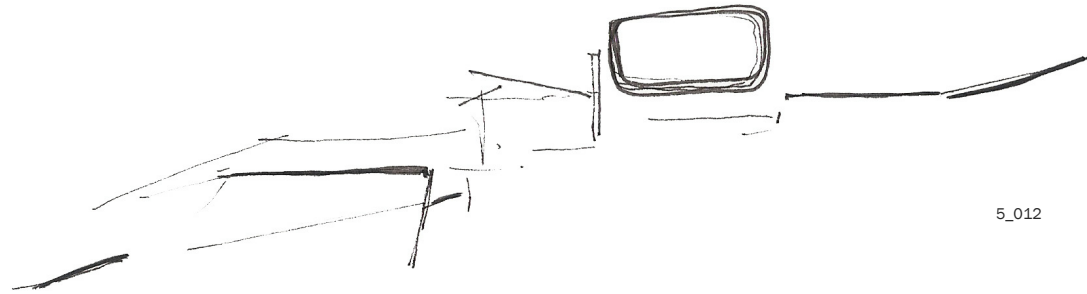
The two sides of approach to the building allow for contrasts in the architectural style. This can emphasise the diversity of the two countries. On approach from South Africa the experience will be different than if you were to approach the building from Mozambique. The architectural language is carried out throughout the entire complex. This is achieved by using the same detailing and materials. Building form and proportion are used to differentiate between the two sides. Bold contrasting elements are used to intrigue, and angular offsets of walls also draw a visitor into the building. The richness of the two countries is portrayed in the design, and the diversity of the cultural context is highlighted.

The relation of building to road is an important interface. The way in which the building extends into the landscape also needs to display the relationships between the two countries, and how they merge together on one site. Moulding the building along the contours, and using linear elements around the ridge ensure that the building does not dominate over the landscape, but rather acts as a gateway, enhancing the natural surrounds by drawing attention on approach, and again welcoming any visitor.

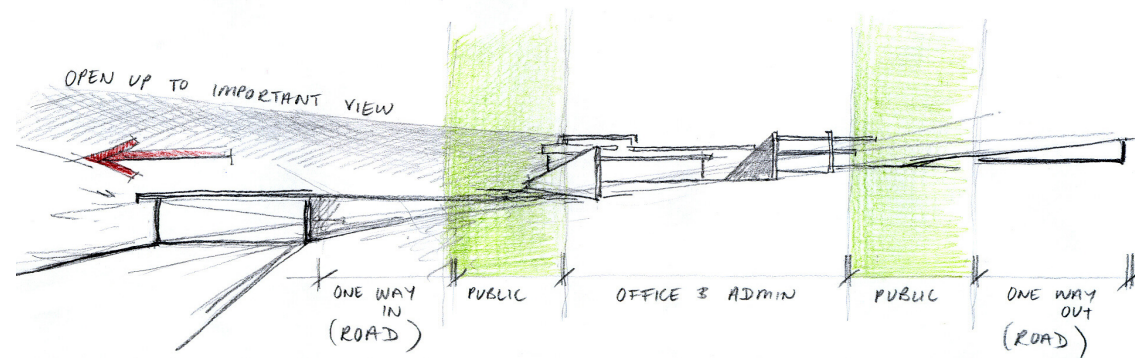
Linear elements, that run parallel to the direction of travel, draw and entice people through the site and allow for no obstructions in the flow of movement. Building length, parallel to movement, also allows for a maximum view window over the surroundings. By keeping the east and west facades to a minimum dimension, both solar control and the effect of having to cut through the building is controlled.

The building needs to be legible. Everyone needs to engage with the building, and movement through the building needs to be clear. The orientation of walls, openings in the roof, openings in the walls and floor levels, all need to all contribute to making the building easy to access and understandable.

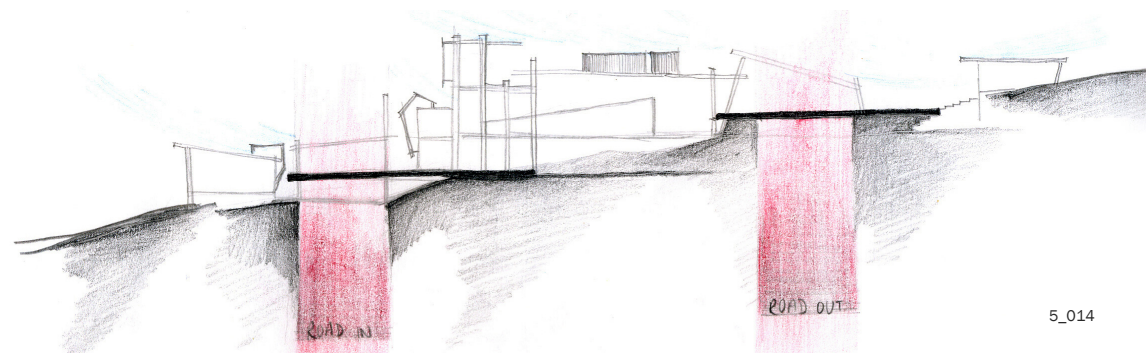




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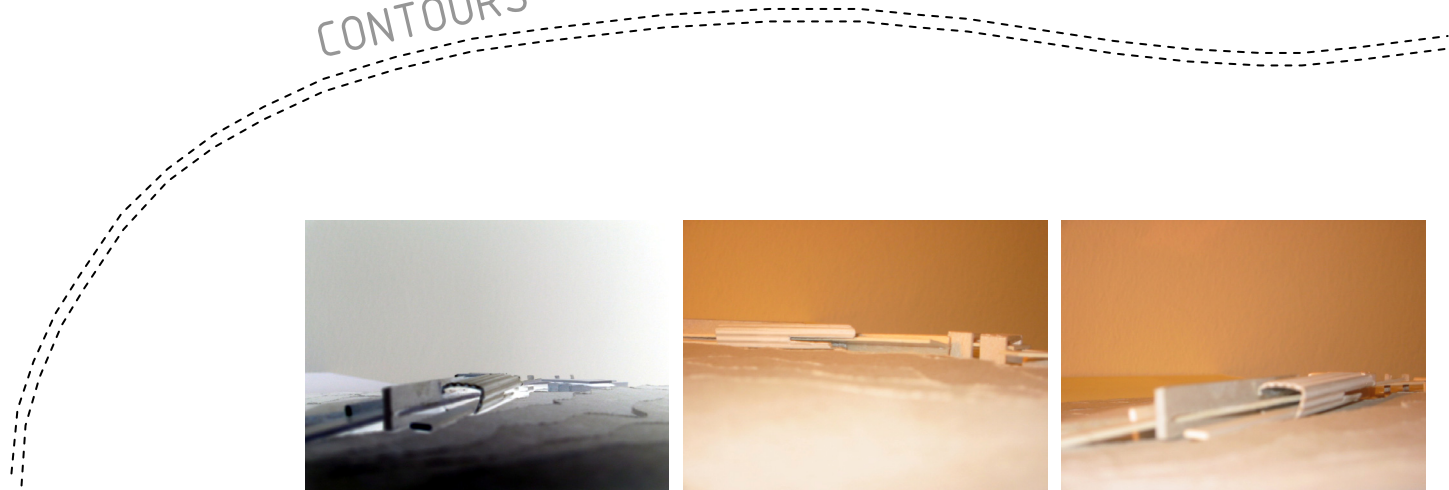


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5_014

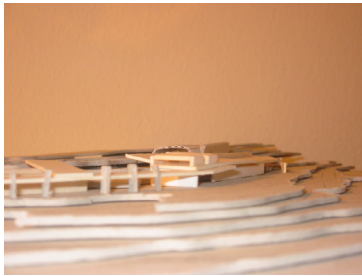
CONTOURS



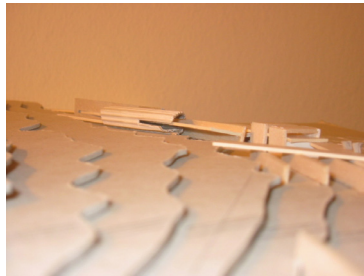
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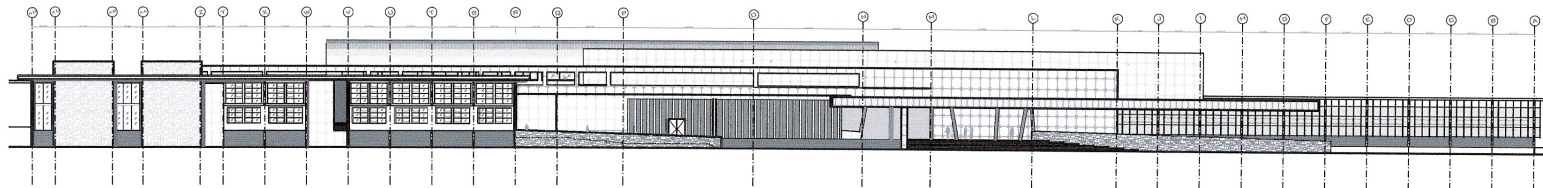
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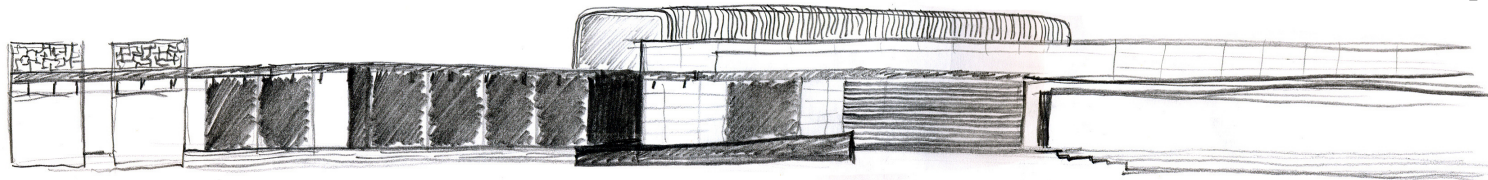
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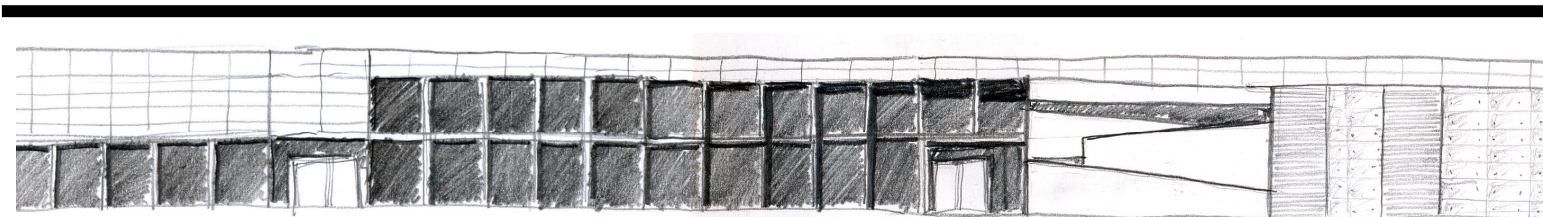


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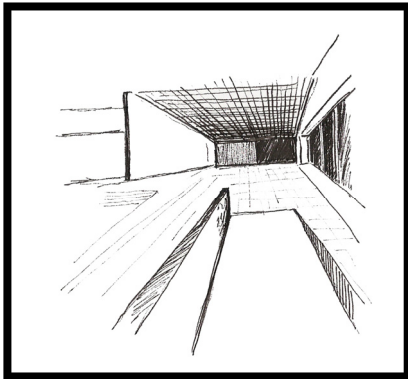


LINEARITY

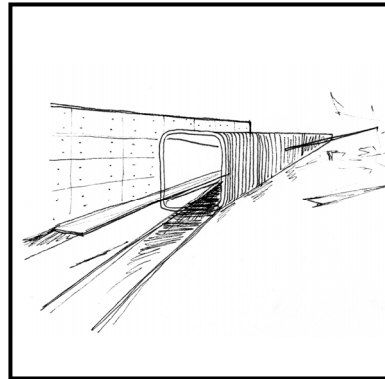
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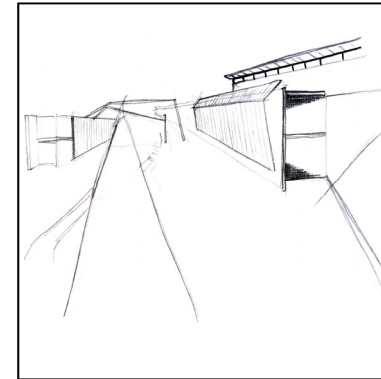
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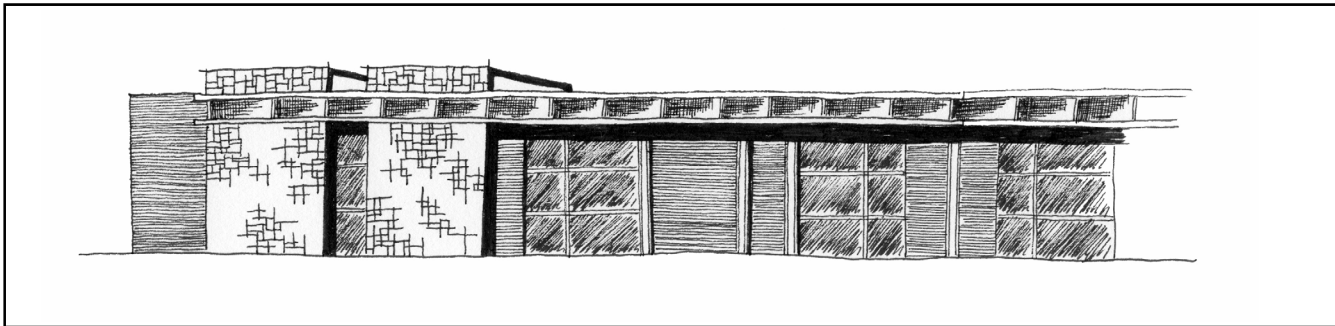
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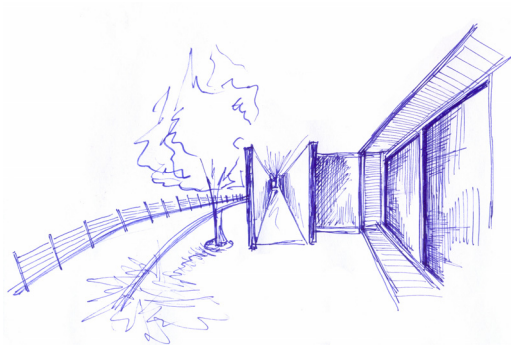
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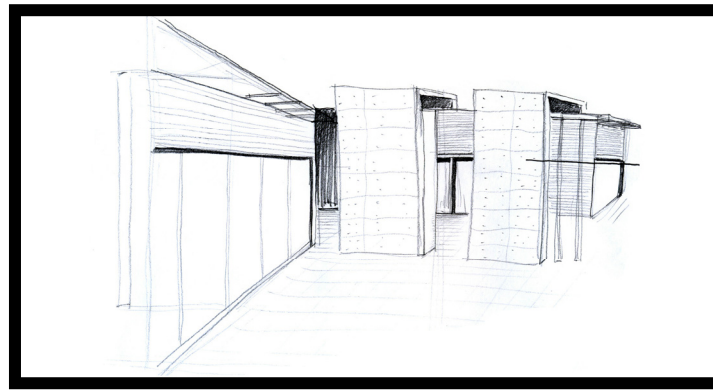


5_026



5_027

PROPORTION



5_028

Scale

Is both perceivable and relative. The building needs to be understood in terms of the scale of the human body. Sizes can however be altered from familiar dimensions to enhance symbolism and enhance contrast to act as welcoming elements.

Structure

Refers to the way in which the landscape and building complex is built. Patterns of rhythm can be created with regard to geometry, sizes, distances, building forms, and road widths etc. There needs to be a relationship between structure and the natural surrounds.

Space

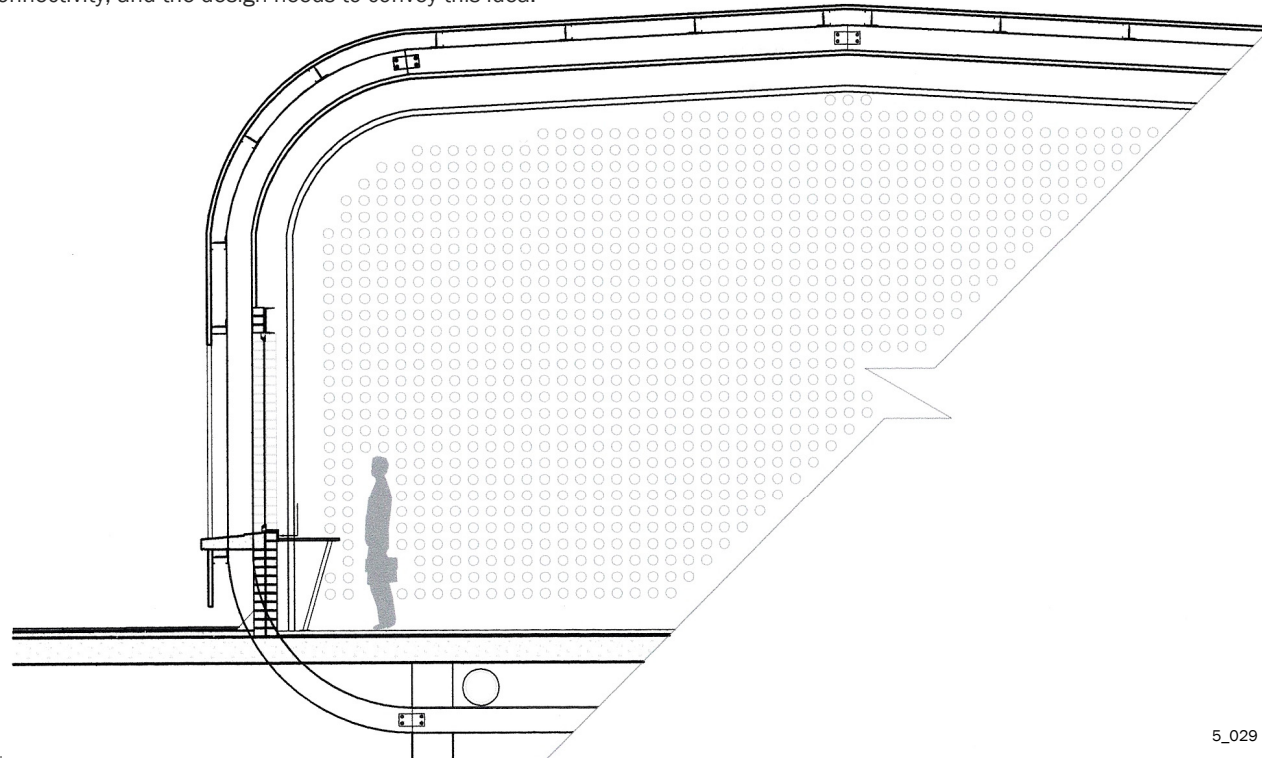
The sky is the ceiling, the earth is the floor and landscape/ building elements are the walls. Often small changes in the alignment or design can provide greater spatial variation, for example a view, and consequently give a richer visual experience.

Identity

Describes the character of a space, and enhances the relations between building or landscape and user. Familiarity or understanding make the experience a comfortable one.

Unity

Needs to exist between landscape and building/ road and building edge and roof and sky. Two countries, unified in one built complex promote international connectivity, and the design needs to convey this idea.



5.3

ORIENTATION

North/ south facades



5_030

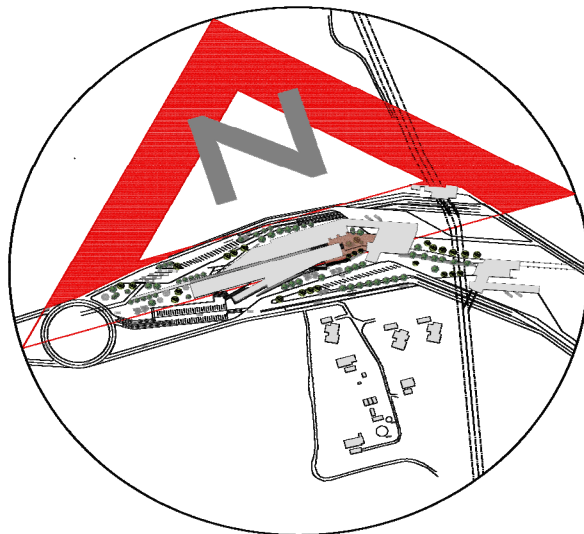
The building is orientated to optimise the northern and southern exposure. The linearity of its form allows the long facades to open up to the views, and allow for an open design. Large roof overhangs on the northern and southern facades provide shading for the offices.

West/ east facades



5_031

The eastern and western facades of the building are designed to be short elevations, reducing the climatic strains which would be experienced in this harsh climate if they provided too much exposure. The eastern and western elevations of the building are designed to incorporate minimal openings, and all exposed glazing on these facades are provided with sun screening mechanisms to shade from the harsh sun.



5_032

5.4

SUN/ WIND/ RAIN



5_033

5.4.1

SOLAR ANGLES

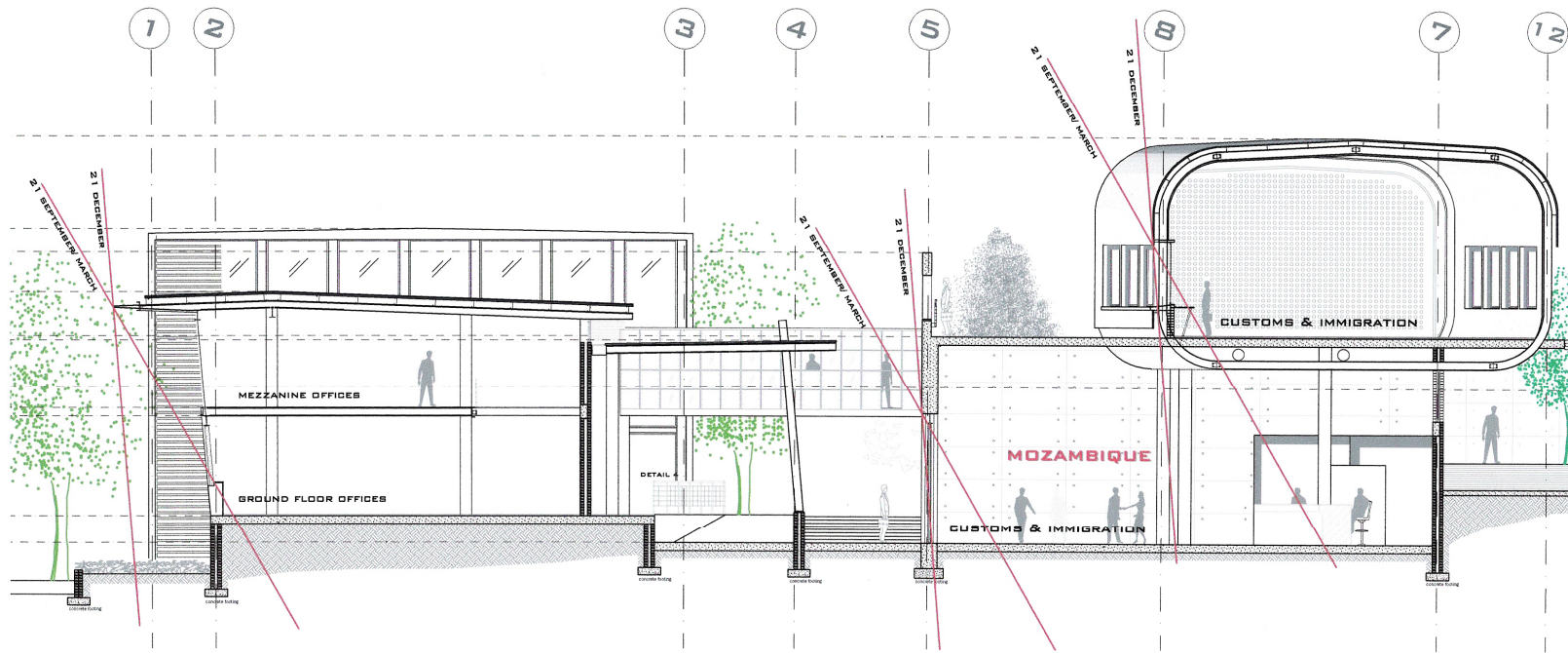
Komatipoort coordinates 25° 50'S
31° 55' E

Sun angles are investigated to ensure overhangs and shading devices provide the necessary shading to all facades.

Shading is obviously most crucial during the summer months, The sun angles taken into account are therefore those between the equinoxes, and devices are designed for the period between 21 September and 21 March.

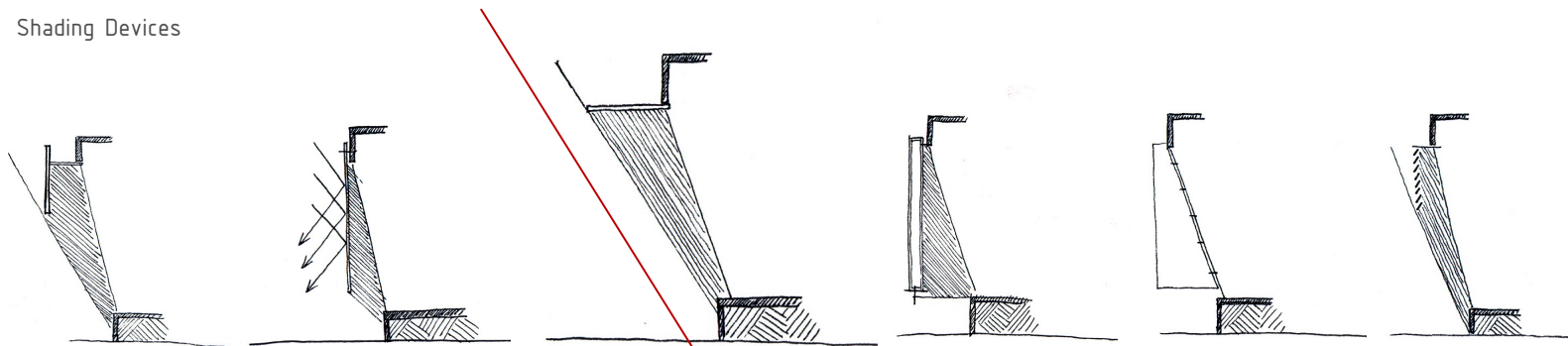
Solar Times	06:00	08:00	10:00	12:00	14:00	16:00	18:00
Azimuth 21/09 21/03	90E	75E	49E	0	49W	75W	90W
Altitude 21/09 21/03	0°	25°	49°	60°	49°	25°	0°
Azimuth 21/12	111E	98E	83E	0	83W	98E	111E
Altitude 21/12	12°	36°	62°	83°	62°	36°	12°

5_034



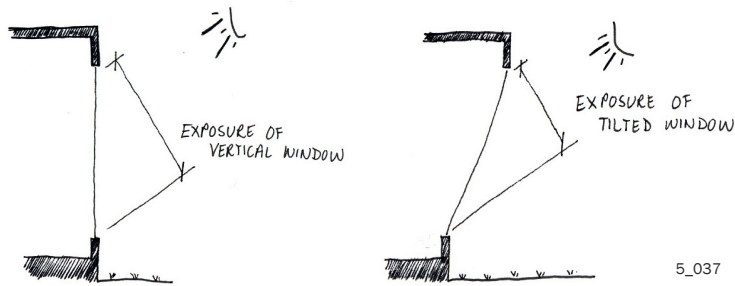
5_35

Shading Devices

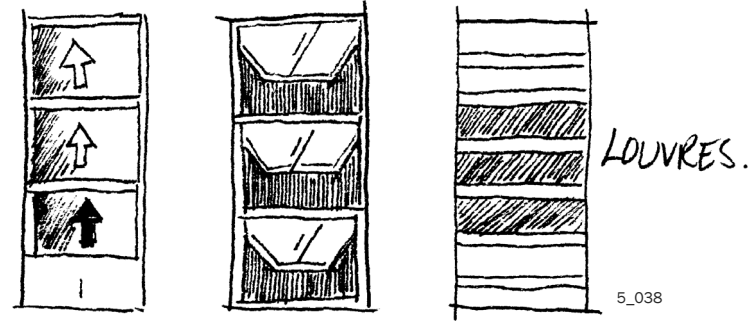


5_036

5.4.2 VENTILATION & WINDOW DESIGN



5_037

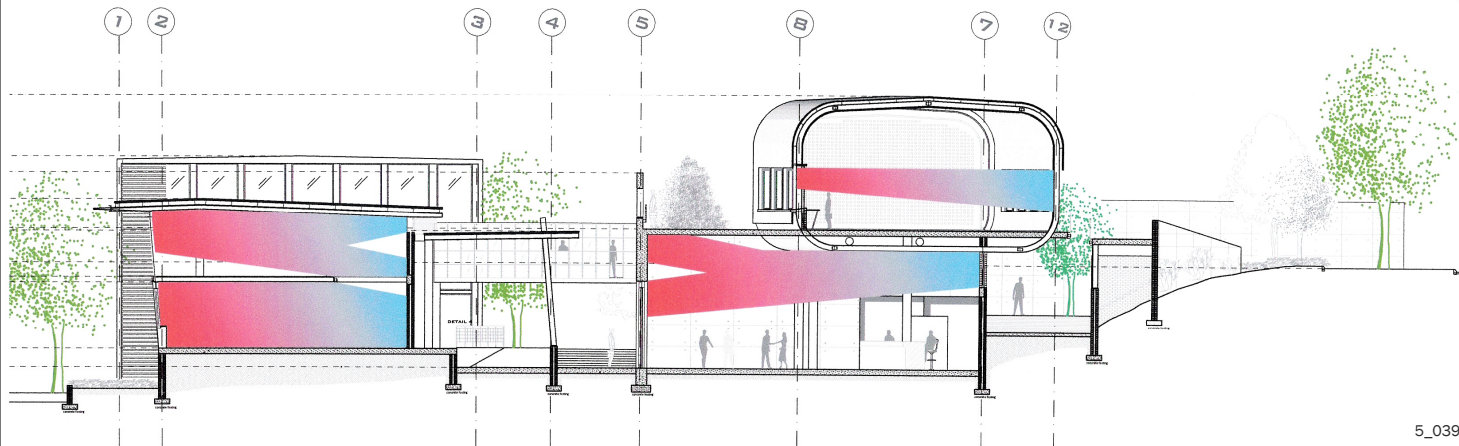


5_038

The hot humid climate of the Lowveld calls for an open, naturally ventilated building, to provide as much relief as possible for the extreme heat discomfort experienced during the summer months. The building is oriented in order to allow movement of air to flow through the building. Valley winds are drawn through, and air movement is encouraged by offsetting walls at angles to create wind tunnels. Window and door openings are large, and by angling exposed walls the angle of incidence is kept to an angle smaller than 30°. This reduces solar exposure dramatically.

Various window opening types were investigated. Horizontal pivot windows will aid with enhancing ventilation and are easy to control by the user.

Cross ventilation is encouraged by keeping the depths of the building to a maximum of 15m, where possible the depth has been kept to 12m. Certain public areas, i.e. the main Customs & Immigration administration areas, cannot keep to this depth due to functional requirements and require a larger area. In these areas however, mechanical ventilation can be employed during peak summer months to provide optimum user comfort. The building needs to be user controlled, natural cross ventilation needs to dominate, however the option does need to be in place whereby mechanical cooling systems can provide relief in summer. Ceiling voids are large enough to facilitate the air conditioning ducts, they are either to be hidden in ceilings, in office areas, or exposed or recessed in floor voids in the public areas. Diffuser placement will be determined by internal space planning.

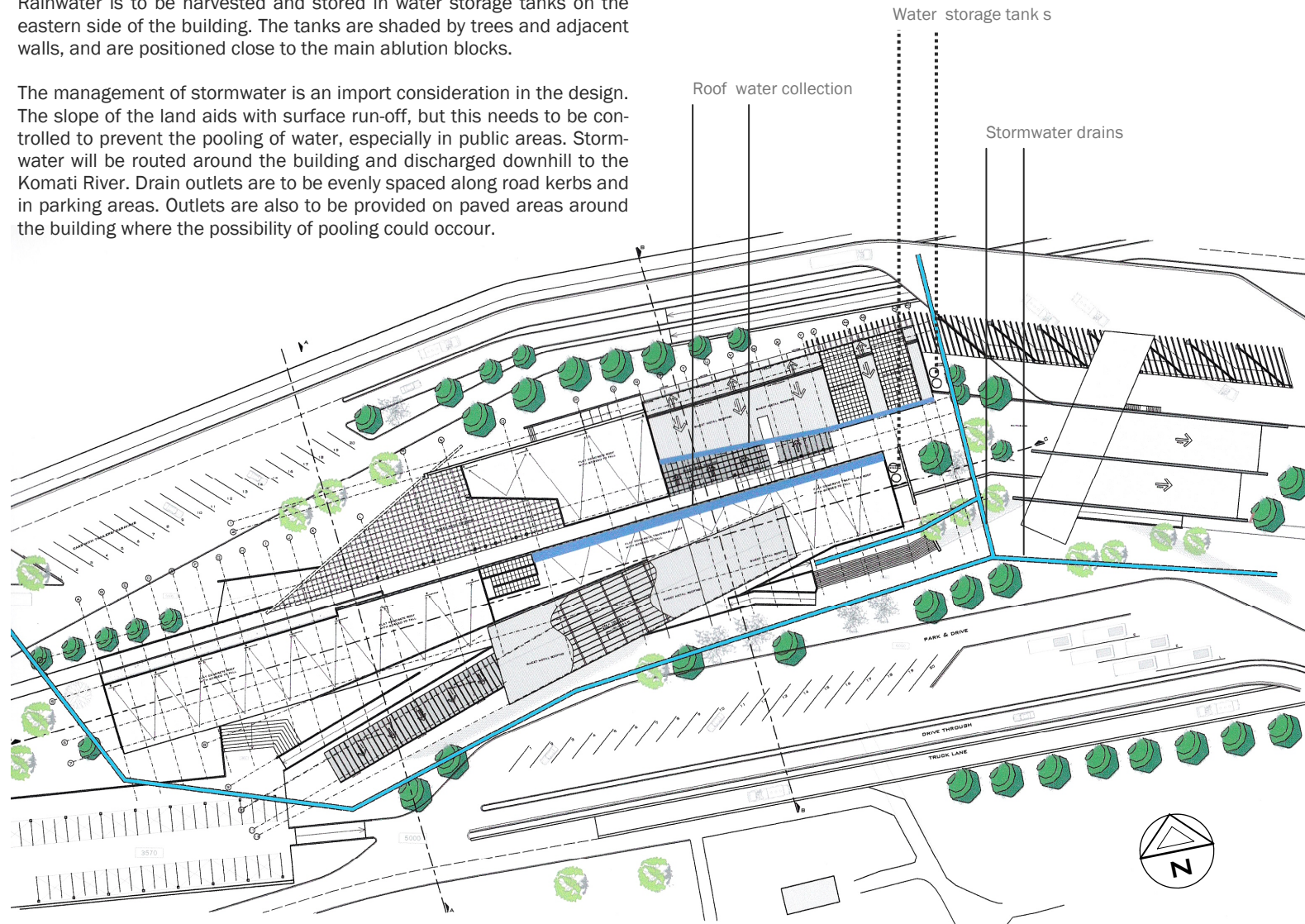


5_039

5.4.3 RAIN AND STORMWATER CONTROL

Rainwater is to be harvested and stored in water storage tanks on the eastern side of the building. The tanks are shaded by trees and adjacent walls, and are positioned close to the main ablution blocks.

The management of stormwater is an important consideration in the design. The slope of the land aids with surface run-off, but this needs to be controlled to prevent the pooling of water, especially in public areas. Stormwater will be routed around the building and discharged downhill to the Komati River. Drain outlets are to be evenly spaced along road kerbs and in parking areas. Outlets are also to be provided on paved areas around the building where the possibility of pooling could occur.



5.5

EXTERNAL WORKS

5.5.1 PARKING & ROAD CONSTRUCTION

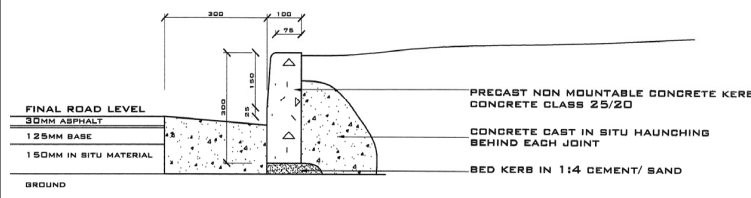
The nature of the built complex has direct reference to the flow of traffic and to the provision of parking. Parking becomes an integrated aspect of the design product and becomes the point of reference for the driver and passengers.

Various parking configurations were explored, efficiency and movement are addressed as key principles. There must be no doubt to driver as to which lane he must be in, where he must park etc. Signage too becomes an integrated feature of the design, for pedestrian, passenger vehicle and cargo vehicle. Roads should be designed in a clear and simple way to facilitate orientation for all users. It should be easy for motorists to navigate their way across the site, confusion as to where to go should be eliminated, and lanes and parking need to be clearly marked and sign posted. The roads should also be designed to ensure that motorists comply with the legal speed limit.

Road architecture needs to sometimes be predictable to eliminate any element of danger, or element of insecurity. Structures, planting and terrain need to relate to the scale of the road so as not to surprise the motorist or interfere with his/ her vision or overview.

Safety also depends on providing enough room for traffic. The movement of vehicles and trucks, and pedestrians crossing roads need to be carefully coordinated to ensure overall safety. A major consideration is to minimise the walking distance of the passengers and to make movement through the complex as legible as possible.

The road construction is to be specified by an engineer. The large loads on the road surface necessitate an asphalt surface to take the wear from heavy trucks.



5_041

5.5.2 WALKWAYS AND PAVING

Pattern and flooring material choice can help clarify the street space and make it a comprehensive environment that the visitor can identify with.

Paving can also emphasise separations, or a difference in level. A calm, smooth surface provides a good background. Often too many types of flooring details, and changes from one type to another, attract attention and can make the street space or outdoor landscape areas seem confusing or chaotic. The same paving finish is therefore to be used for the majority of the built complex. The only differences will be where the differentiation is needed between public and private spaces.

Paving choice should also allow for disabled access and should not be a safety concern. Porous walkways would be ideal on the lie of the land to allow the penetration of rain water into the ground. Because the building is a public entity however, solid paving bricks will be a more suitable walking surface.

5.5.3 LIGHTING

Lighting has an important architectural function. Dimensions of lighting features need to be harmonised with the surrounding scale. Safety and security at the border needs to be enhanced using suitable lighting. Mast lights need to be incorporated to ensure enough illumination during the night. Outdoor lighting needs to be sturdy in design, and solid materials should be used to ensure the best quality and guarantee. Good materials also stand up to weather and wear and prove more economical over the long term.



5_042



5_043

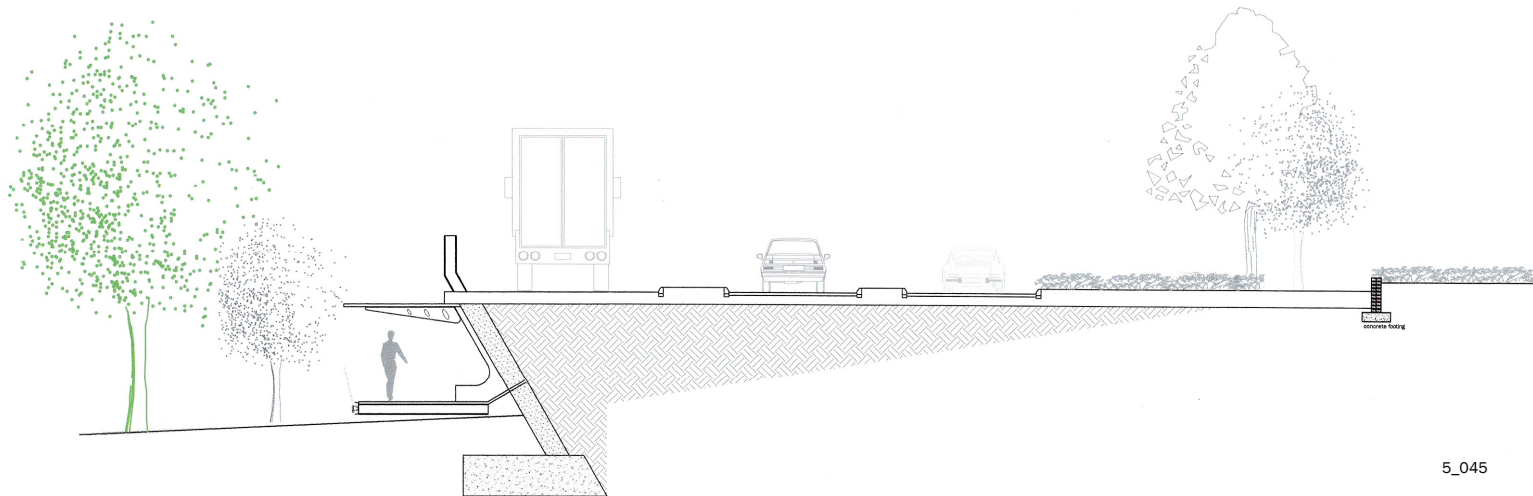
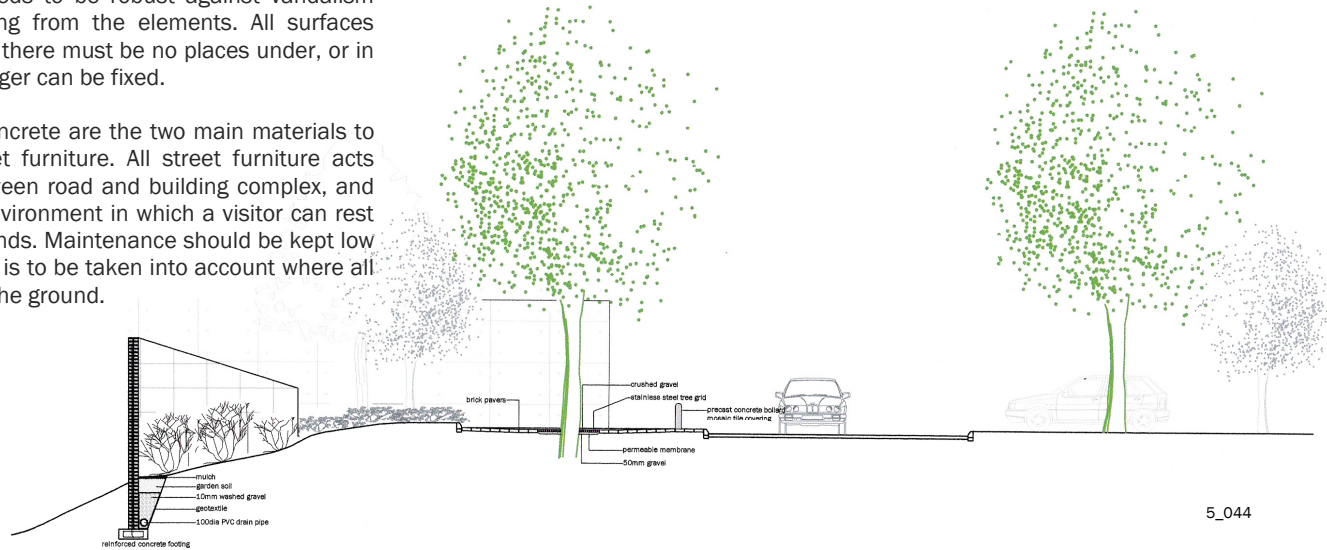
5.5.4

STREET FURNITURE

Bollards Seating Dustbins Drinking fountains Tree grids

All street furniture needs to be robust against vandalism and against weathering from the elements. All surfaces need to be visible and there must be no places under, or in which elements of danger can be fixed.

Stainless steel and concrete are the two main materials to be used for the street furniture. All street furniture acts both as a barrier between road and building complex, and to create a relaxing environment in which a visitor can rest and take in the surrounds. Maintenance should be kept low and drainage detailing is to be taken into account where all elements are fixed to the ground.



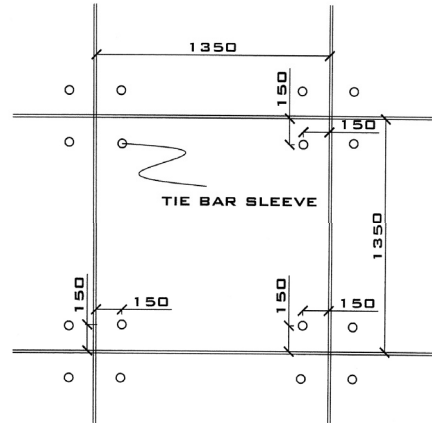
5.6

MATERIALS

Concrete

Concrete work needs to be done with care. The quality of the off shutter work needs to be done by trained specialists so as to ensure good detail. All edges need to be chamfered, both to ensure a neat edge and because they are easier to cast. The runoff of rainwater needs to be carefully dealt with in order to ensure that surfaces are not stained. Each horizontal surface needs to be drained individually, and although darker colours and heavier textures can hide stains, light coloured concrete is to be used due to its thermal performance. Shuttering needs to be designed accordingly so as to provide the detail as indicated below. Steel or glass fibre reinforced polyester shuttering is proposed to ensure the smoothest finish possible. The placement of the sleeve holes to be used for the tie bars, is an important detail.

The safes need to be constructed of reinforced concrete. The shell must be of 30MOA concrete, and no openings must be provided.



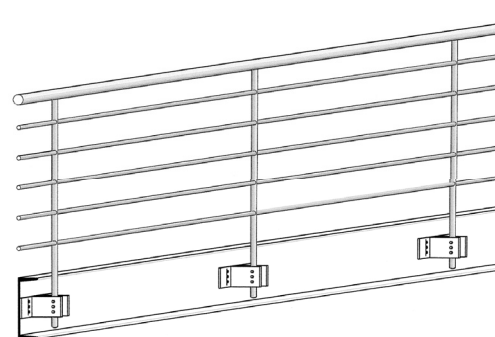
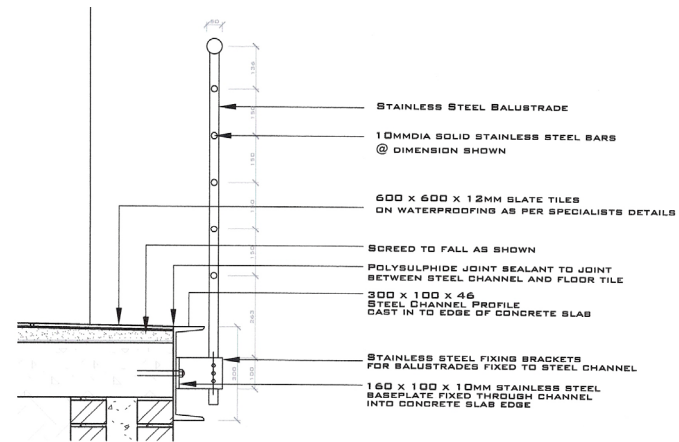
5_046

Masonry

All masonry work is to be internally plastered and painted, but the external skin is to be face brick. A light colour is to be used for thermal performance, to ensure that heat absorption is minimised

Steel

Mild steel I- profiles, and channel profiles are used structurally throughout the building. Steel members also form edging detailing, and I- beams are used to frame all window and door openings. All stair and balustrade details are uniform throughout the complex, both externally and internally. Stainless steel is used for its robust qualities and its resistance to weathering.



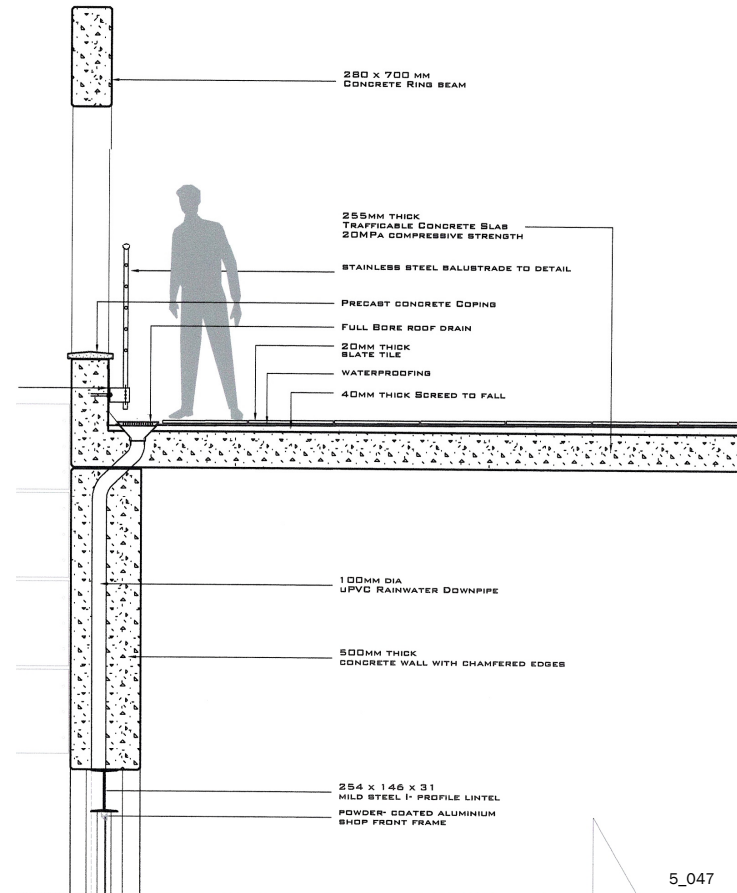
Roofing

Roofs become important elements of the design. Choice of material type, height differences and overhangs merge to enclose the buildings functions. The building is kept to one storey. Mezzanine levels are allowed for in certain areas, this allows for the interplay of different levels to draw in different amounts of sunlight.

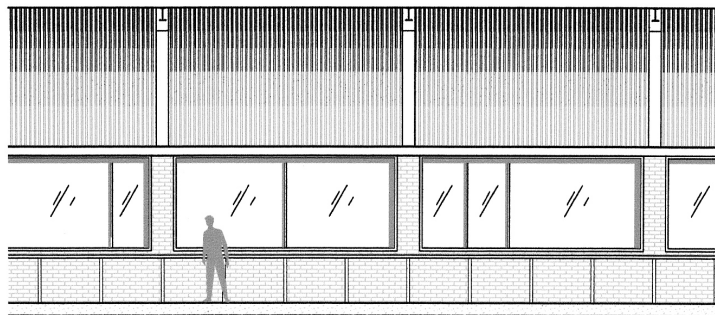
Roofs other than flat concrete slabs, are a monopitch type with a 0.6mm thick sheet metal covering, laid on purlins using hook bolts. Sheet metal is also used as a cladding material. An ideal situation, in this specific climate, would be to have a pure white building, to allow maximum reflection of solar energy. Roof sheeting not exposed to the visitors will be painted white, all other surfaces will be reflective or light coloured. All sheeting is to be well insulated. Insulation needs to be provided for the entire built structure. A foil type will ensure that heat is kept out of the building and allow for maximum user comfort.

Trafficable roofs need to be of 20– 30 MPa concrete, and cast and cured correctly. The screed needs to be a minimum of 40mm thick, and have a minimum gradient of 1: 50. Full-bores need to be placed accordingly, to allow for the efficient drainage of rainwater and it needs to be ensured that water is discharged to a suitable area.

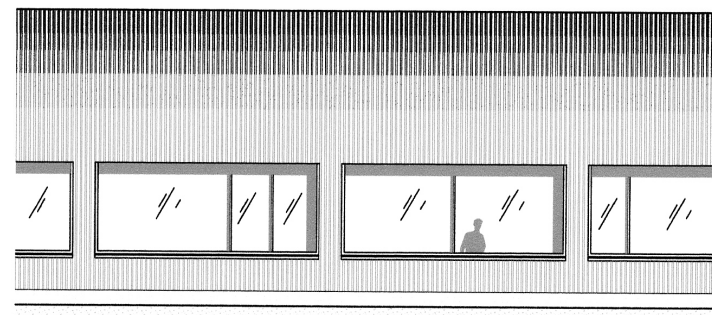
Waterproofing needs to be detailed with care on the flat concrete roofs. It needs to be laid by a specialist, and taken up at least 200mm against the parapet walls. Protection of the waterproofing is achieved by laying tiles on top, inspection and maintenance the roof could however be problematic.



5_047



Internal Section of tubular structure



External Elevation of tubular structure

5_048

5.7 CONSTRUCTION DRAWINGS

site plan

lower floor plan

upper floor plan

roof plan

north elevation

south elevation

west elevation

section aa

section bb

section cc

details

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6

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GLOSSARY

“border post” means a port of entry or exit designated at or near the common border of at least two Member States and at which a common control area is established;

“border post users” means those persons who make use of the facilities and services at a border post for the purposes of transiting such border post;

“border post facility” means infrastructure and equipment located within the common control and includes office space and accommodation for authorized persons and border post end users, cargo inspection bays, security areas, weighing stations, parking areas, warehouses, duty free and other shops, rest rooms, restaurants, cafes, canteens, communication centres and banking facilities;

“common control area” means the restricted area, established by agreement between Member States, in which only the public functionaries of each participating jurisdiction or their duly appointed agents may execute border-post related functions;

“one-stop processing” means processing which entails the simultaneous or consecutive compliance and completion of both relevant Member States’ border crossing formalities, requirements and procedures at one location;

“restricted areas” means those areas within the common control area to which only certain functionaries and / or only one relevant Member State have access;
