THRESHOLD ____ BETWEEN LAND AND SEA

New Waterborne Transport Node for the City of Maputo

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Submitted in partial fulfilment of the requirements for the degree of Magister of Architecture, MArch (Prof), the Faculty of Engineering, Built Environment and Information Technology at the University of Pretoria.

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For Mom and Dad,
I could not have done it without you

Thank you to Jacques, Prof Bakker and Edna

Thank you to my sisters, brothers and friends for all your help, encouragement and support.

And to my God, who makes it all possible

"For I know the plans I have for you," declares the Lord, "plans to prosper you and not to harm you, plans to give you hope and a future." *-Jeremiah 29:11 (NIV)*

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"Buildings, in their simplest form, are made of **vectors** *and* **envelopes**. *How one enters a building and moves through it constitutes the vectors. What keeps out the rain, cold, heat, noise and burglars constitutes the envelope.* **Vectors activate; envelopes define**.

Vectors typically are related to **program**. *Envelopes usually respond to* **context**, *whether social, cultural, political or geographic. Together,* **vectors, envelopes, programs** *and* **contexts** *are the basic terms of the* **architectural equation** *- a simple proposition that centuries of art and architectural history somehow have obscured.* **Materials**, *of course, are another important factor: architecture is the materialisation of ideas or concepts. But materials can also be understood as part of the sociocultural, political or geographic context."*

- Bernard Tschumi (2003:64)

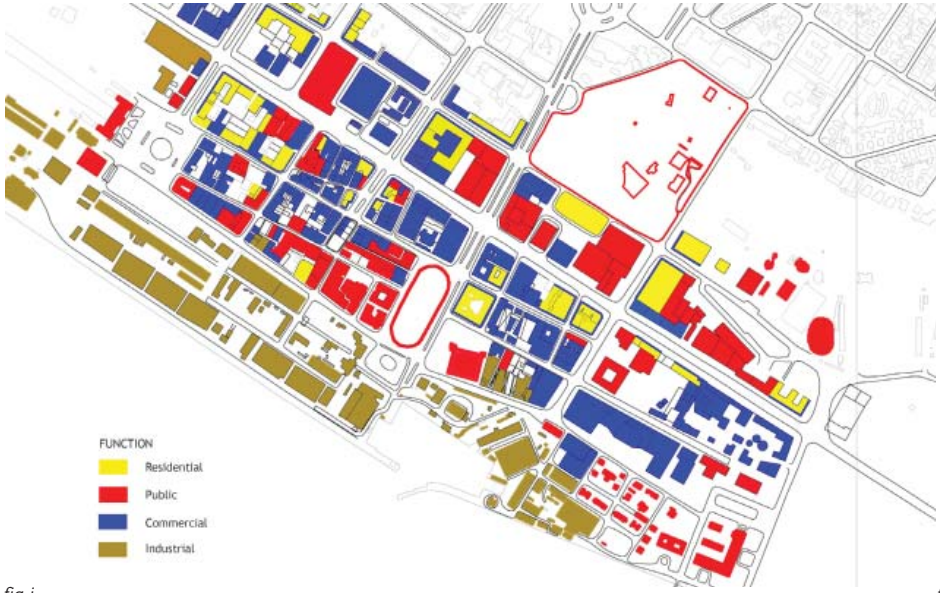


fig i

fig ii

fig iii

fig i_ Quickscan mapping showing Functions of buildings in the Baixa, categorized as Residential, Public, Commercial and Industrial, revealing opportunities for intervention.

fig ii_ Quickscan mapping showing Historical Identity of buildings in the Baixa, categorized as Contributing, Neutral, or Distracting to the overall precinct character, revealing opportunities for intervention.

fig iii_ Quickscan mapping showing Technical Condition of buildings in the Baixa, categorized as Good, Moderate, or Bad condition, revealing opportunities for intervention.

PREFACE

The Maputo Masters studio originated from an international co-operation involving the University of Pretoria, Eduardo Mondlane University in Maputo, and Technical University Delft in the Netherlands. The studio focus was on contextual design, with the revitalisation of Maputo's historic Baixa being the topic of study.

Initial Fieldwork

Initial fieldwork began during the June recess in 2010, when a group of Pretoria Honours students participated in a workshop in Maputo with students from Eduardo Mondlane University. The focus of the fieldwork was a Quickscan of Maputo's downtown Baixa district, under the guidance of Dr Jean Paul Corten of The Netherlands Cultural

Heritage Agency. The Quickscan method involves analyzing a defined area according to certain criteria, based on the analyzing team's first impression. The findings are not intended to be scientific, but are used as a tool to gain an understanding of the context.

The goal of the Quickscan was to get a foundational impression of the state of the Baixa, based on three criteria; firstly Historical Identity of each building, secondly the State of Maintenance and finally the Current Program. The resultant data became the first indicator of the Baixa's development potential.

The results of the Quickscan revealed the Baixa's core to be a legible precinct within a vibrant African metropolis that distinguishes itself from the latter by its modesty, particularly in urban fabric, architecture and infrastructure. (Corten, 2010:4)

The scan further showed that vehicular borders separate the fine grain Baixa from large-scale Maputo. The Baixa is nevertheless well connected to the expanding city through vehicular connectors from the north, and the precinct's two main squares serve to extend the historical Baixa into the surrounding city.

The Quickscan exercise concluded that the Baixa is both the historic and geographic centre of the city. It is well served by rail, road and water transport, but is in need of revitalisation. The strategic geographic position is a positive and strong driver for future development, with the historic legibility a valuable asset to revitalisation.

Further Research

In February of 2011 a second workshop and on-site research took place in Maputo. This time it included students from all three universities participating in the contextual studio. This workshop focused on creating a vision for the revitalisation of the Baixa as a primary goal from which to work further.

Experiencing the city as a pedestrian led to the formation of responses and impressions of the city.

A profound initial impression was the immense influence the sea has on Maputo as a city, while the proximity of the sea is barely perceived in the Baixa. A second impression was that the commercial port, fishing harbour, water transport and leisure did not translate into the language of the city core. These impressions exist mainly because the sea is not accessible to the public from the Baixa. The ocean, the lifeblood of Maputo, is completely disconnected from the downtown.

A strong and consistent view from all workshop groups was thus that the revitalisation of the waterfront and the reconnection of the bay with the city would have a positive effect on the revitalisation of the Baixa.

*fig iv_*
Initial impression sketch of Maputo City from Catembe across the Bay, noting the impact of the city skyline on the Bay. The influence of the Bay on the City however seems lacking.
Sketch by author

ABSTRACT

The chosen project stems from the broader context of Maputo as waterfront city. Increased industrial privatisation of the harbour strip adjacent to the city's historic Baixa district led to the relocation of public functions, away from the downtown water's edge and so disconnecting city life from the water. The potential of the city reconnecting to the water is thus latent.

The dissertation responds to this potential by reintroducing a public program to the waterfront site. The building integrates with a greater urban vision for the precinct, whereby the industrial waterfront strip is reprogrammed with a layer of mixed use functions.

A water-borne public transport node is the architectural typology to be explored. The architectural study aims to investigate the consolidation of currently fragmented water transport modes in one facility and so promote integration between different users and the public.

Exploration also includes investigation of dualities and contrasts. Interaction between formal and informal trade, water and land transport, and international trends versus local influences are explored.

The projected growth of the city further necessitates the expansion and improvement of water transport infrastructure. The proposed interchange connects all public water -borne modes of transport in Maputo, additionally establishing the link between the city and the water, and subsequently the downtown area with satellite suburbs around Maputo Bay.

The design acknowledges the historic nature of the site and context, and adds an additional layer whilst responding to the richness of the existing in an environmentally sensitive manner.

The social context of Maputo as a capital city in a developing country is another important consideration. The informal, public, transient nature of the context informs the design, juxtaposed against a first world, international business and tourism centre.

The facility will aid in the reintegration of the waterfront with the city, effectively connecting it to other modes of transport.

SAMEVATTING

Die gekose projek spruit voort uit die breë konteks van Maputo as ‘n waterkant stad. Toenemende industriële privatisering van die hawe strook aangrensend aan die stad se historiese Baixa distrik het daar toe gelei dat publiekefunksies weg van die middestad waterkant hervestig is en so doende die stads lewe van die water geskei het. Die potensiaal om die stad weer by die water aan te sluiyt is dus latent.

Die verhandeling reageer op hierdie moontlikheid deur die herinvoering van ‘n openbare program in die waterkant buurt. Die gebou integreer met ‘n groter stedelike visie vir die buurt waar die industriële waterkant herprogrameer word met ‘n laag van gemengde gebruikers funksies.

‘n Openbare watervervoer knooppunt is die argitektoniese tipologie wat ondersoek word. Die argitektoniese studie het ten doel om die huidige gefragmenteerde maniere van watervervoer te ondersoek en hulle in een fasiliteit te konsolideer en sodoende die integrasie van die verskillende watervervoer gebruikers en die publiek te bevorder.

Navorsing sluit ook die ondersoek van dualiteite en kontraste in. Interaksie tussen formele en informele handel dryf, water en land vervoer en internasionale tendense teenoor plaaslike invloede word ondersoek.

Die geprojekteerde groei van die stad noodsaak die uitbreiding en verbetering van die watervervoer infrastruktuur. Die voorgestelde reelings verbind alle openbare vorme van vervoer in Maputo, as ook verbindteniss tussen die stad en die water, en daarna die middestad gebied met satelliet voorstede rondom Maputobaai.

Die ontwerp erken die konteks en historiese aard van die terrein en voeg ‘n ekstra laag by, terwyl dit op die rykdom van die bestaande in’ n omgewingsensitiewe wyse reageer.

Die sosiale konteks van Maputo as die hoofstad van ‘n ontwikkelende land is nog ‘n belangrike oorweging. Die uiteenlopende informele, publieke end verbygaande aard van die konteks teenoor ‘n eerste wêreld internasionale sake-en toerisme-sentrum beinvloed die ontwerp.

Die fasiliteit sal die herintegrasie van die waterkant en die stad steun en die verbind van die ander vorme van vervoer daar stel.

01 _ DISSERTATION INTENTION

1.1 INTRODUCTION

Water is a natural resource that is fundamental in the development of human settlements. History shows that sites on the coast and navigable lakes and rivers, particularly natural harbours such as the Bay of Maputo, were catalysts to the growth of cities. These sites offered an obvious defence advantage, a convenient trading platform and a means of transportation (Butuner, 2006:1). Today, proximity to the sea or other water bodies creates attractive places for people to live and sources of leisure and recreation.

Major cities of the world developed along navigable water courses. Maputo is such a city. The water surrounding the city was a primary driving force in its early development. This continues to have a profound influence on the city and its people.

Today, the influence of the sea persists. Effective water transportation and accompanying infrastructure remains essential to the commercial and social functioning of Maputo. If citizens are to move easily, safely and cheaply for work and pleasure it is vital that there is a seamless interconnection of the city's different parts.

1.2 AIM OF THE CHAPTER

The aim of this chapter is to outline the intention of the dissertation and to guide the design process that follows.

1.3 THE NEED FOR WATER TRANSPORT IN THE BAY OF MAPUTO

1.3.1 Current situation

Waterborne public transport around the bay is currently managed by Transmaritima SA, a government owned company. At present Transmaritima SA serves two destinations from mainland Maputo. The service transports people, goods and vehicles, ranging from passenger cars to 10 ton trucks. The service is vital to the commuter sector, but also services commercial activities and the leisure and tourism industry.

Six vessels operate on the Bay from the existing terminal at Maputo:

- Two large vehicular and passenger ferries alternate between Catembe and Maputo, one berthed at each location overnight. This scheduled ferry service runs from 05:00 to 23:00 seven days a week, at half hourly rotations. The pair of ferries move an average of 4000 commuters daily, peaking at 5000, with average user numbers being significantly higher in summer months. The ferry is also equipped to carry up to 20 vehicles per trip, peaking at 400 vehicles daily. (fig 1.1)
- Three small vessels provide a flexible water taxi service on the same route between Catembe and Maputo. These boats, called Mapapais, run on a needs basis rather than a regular schedule, operating between 06:00 and 19:00, seven days a week. They are licensed to carry between 10 and 30 passengers.. (fig 1.2 - 1.4)
- A scheduled tri-weekly ferry service to Inhaca Island caters for both locals and tourists. (fig 1.5) There is also a parallel higher cost private service which caters chiefly for the tourist market. This private vessel currently leaves from Maputo Fishing Port (fig 1.6).

fig. 1.1

fig. 1.2

fig. 1.3


fig. 1.4

fig. 1.6

fig. 1.5

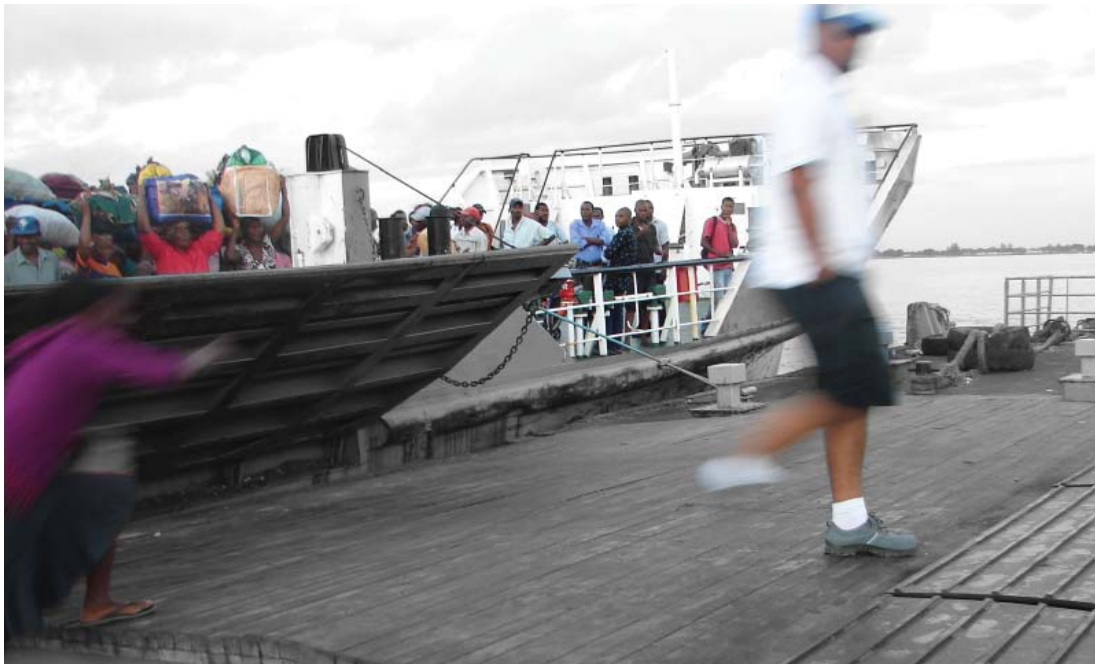
fig. 1.1_ Large vehicular and passenger ferry servicing route between Maputo and Catembe. Photo by author.

fig. 1.2 - 1.4_ Water taxi vessels servicing route between Maputo and Catembe on a flexible schedule. Photo by author.

fig. 1.5_ Passenger ferry between Maputo and Inhaca Island. Photo by author.

fig. 1.6_ Private ferry servicing route between Maputo and Inhaca Island. Photo by author.

fig. 1.7_ Passenger movement - disembarking from the ferry at Maputo



>> >

"It is a safe and affordable transport system that creates an environment for social interaction and the interaction of people of different income groups."

Wright & Hooker, 2007:86

1.3.2 Development and its influence on the need for increased Water Transport in the Bay of Maputo

Two factors indicate a potential growth of water transport in Maputo:

- the projected growth of commercial and industrial activity of the working port, and
- the projected growth of the tourism industry in Maputo and surrounds.

Growth of commercial and industrial activity

In the ten years leading up to 2007, Mozambique had an average annual growth rate of 9% per annum, making it one of Africa's strongest performers. (Newton, 2011:9) Although this growth was from a low base, it is evidence of a country on the rise. Maputo remains the powerhouse behind that growth. Projections indicate a boom in harbour activity in Maputo as well as its sister port of Matola, with trade volumes expected to double in the next four years (Jacka, 2011:41).

Monetary investments alone are indicative of the projected rapid growth of these ports. This will result in massive development in the cities supporting the ports. This growth and development requires an ever greater need for reliable and efficient water transport infrastructure to move people around the bay, as job opportunities spread to these ever increasing sites.

Growth of the tourism sector

While tourism was traditionally predominantly concentrated in the northern provinces, tourism to Maputo is on the increase. Research conducted by the Netherlands Development Organisation SNV indicates that 300 000 tourists visit Maputo every year. These figures are predicted to rise if improvements are made to services provided to tourists. Although the water transport service is not focused primarily on tourists, it is fair to say that tourists seek the authenticity associated with activities and places used by locals.

In addition to the local, regional and foreign tourists there is also a steady increase in business people visiting Maputo, as the city is the business capital of the country. Experience in other business centres shows that business visitors often include tourist activities in their itinerary, which, in this case, would involve water transport around the bay.

1.3.3 Conclusions

Through the increase in trade volumes, associated commercial activity and job creation, it can be assumed that public infrastructure such as transport will need to be expanded and upgraded to meet the needs associated with these projections. Simultaneously, attraction of the tourism sector will require a facility capable of efficiently catering to tourist needs.

1.4 URBAN INTENTION

The macro urban intention for this dissertation is two-fold. Firstly, it involves the effectiveness of transport on the bay as a whole, and secondly the effect of the transport system on the Baixa precinct.

1.4.1 Connection to the wider Bay context

The preceding analysis indicates that an increase in ferry stops and the upgrading of existing stops around the bay will be required as a result of the predicted expansion. Thus this dissertation sits within a larger framework of water-borne mass transit redevelopment, expansion and upgrade.

1.4.2 Connection to the Baixa

Industrial development and the subsequent privatisation of Maputo's waterfront led to a disconnection between the previously public nature of the water's edge and the adjacent historic core of the city.

The urban intention of this proposal is to redefine the waterfront's role in the city context, aiding the revitalisation of the Baixa. The water-borne mass transit facility will act as a catalyst by reintroducing a public layer to the currently industrialised waterfront precinct. The area will redefine a social connection for the city's people to the sea, thus re-establishing the Baixa precinct as the heart of the city.

fig. 1.8_ The badge representing Transmaritima SA, the Government -run ferry company in Maputo

1.5 CLIENT

The client is the City of Maputo, with funding from central Government. The funding will be supplemented by stakeholders in a public private partnership, as part of a larger waterfront redevelopment initiative.

> *"The City of Maputo with the support of Central Government is committed to ensure transport of quality in the main crossings throughout the country."*
>
> allafrica, 2009

1.5.1 Brief

In general terms the facility should provide infrastructure relating to the water transport industry, as well as providing a place where trade and recreation can take place, and so create a civic destination for city dwellers. The intention is for a cross-programming of facilities allowing for interaction between diverse types of people of different cultural and income groups. The facility should respond to the layers of formal and informal trade prevalent in the area, as a means of reactivating the waterfront.

The need expressed by the client is firstly for an appropriate site to be identified where the infrastructural needs for an expanding transport service can be provided. This need is based on projected growth estimates indicating the need for an improved facility for water transport.

Secondly the appropriate site should allow for the consolidation of fragmented water-borne transport into a facility that integrates more effectively with the downtown Baixa and related land transport systems.

Finally the facility must be part of a larger urban rejuvenation intervention. This will include a waterfront redevelopment which will reintroduce the city dwellers to the sea. Through such integration the water transport service shall better serve the city.

1.5.2 Program

The building is chiefly an infrastructural intervention, merging transport needs with recreational functions. The intention is to provide for fundamental formal support requirements, after which a platform for informal activities occurs.

The following functions are included:

- A ferry terminal catering to large vehicular ferries, commuter ferries and water taxis.
- Trading space for formal trade and allowing for informal appropriation of space
- Restaurants
- Storage facilities
- Waiting shelter
- Parking
- Information
- Offices and retail
- Public ablutions
- Leisure space

1.6 PROJECT AIMS AND OBJECTIVES

The aim of this dissertation is to establish a water-borne public transport facility in a proposed waterfront precinct of downtown Maputo. Pragmatically, the building will facilitate transport efficiency and connectivity. From a social perspective, the intervention provides public recreation space at the water's edge. Large numbers of people and degrees of movement introduced at this place aim to aid in the regeneration of the area.

Three objectives support this aim.

1.6.1 Maputo's water-borne transport infrastructure

The first objective is to consolidate Maputo's water-borne transport infrastructural needs into one facility that logically connects with land transport systems.

1.6.2 Linking the bay with the rest of the city

The second objective is to create a public environment that encourages social interaction. The building shall thus act as a seam connecting the bay to the rest of the city. Simultaneously the site provides a threshold or point of arrival and departure, for commuters and travellers, and a destination point for urban city dwellers.

1.6.3 Contextual design

The third objective is to design with sensitivity to the social, economic, cultural and historic context of the area. Maputo is a city rich in cultural and social dimensions, which are interconnected in areas such as the Baixa. This is an important aspect to guide the design process, as the focus of the building is to provide optimally for the user.

These aims and objectives will be realized under the banner of resource efficient design, whereby contextual, climatic and material-sensitive guidelines will inform design decisions.

1.7 DESIGN CHALLENGES

From the aim and objectives, a number of design issues need to be addressed architecturally.

The first is to define the building as the *link between land and water.* The current infrastructure does little to facilitate this transition.

The second is to design for *orientation and interaction* between the varying pedestrian users of the facility through architectural resolution. Commuters, tourists, traders and general public must all be considered.

The third design challenge is to mediate between formal infrastructure and the informality prevalent in Maputo. Herein the design will investigate its role in facilitating a revival of day/night expansion in the downtown Baixa of Maputo.

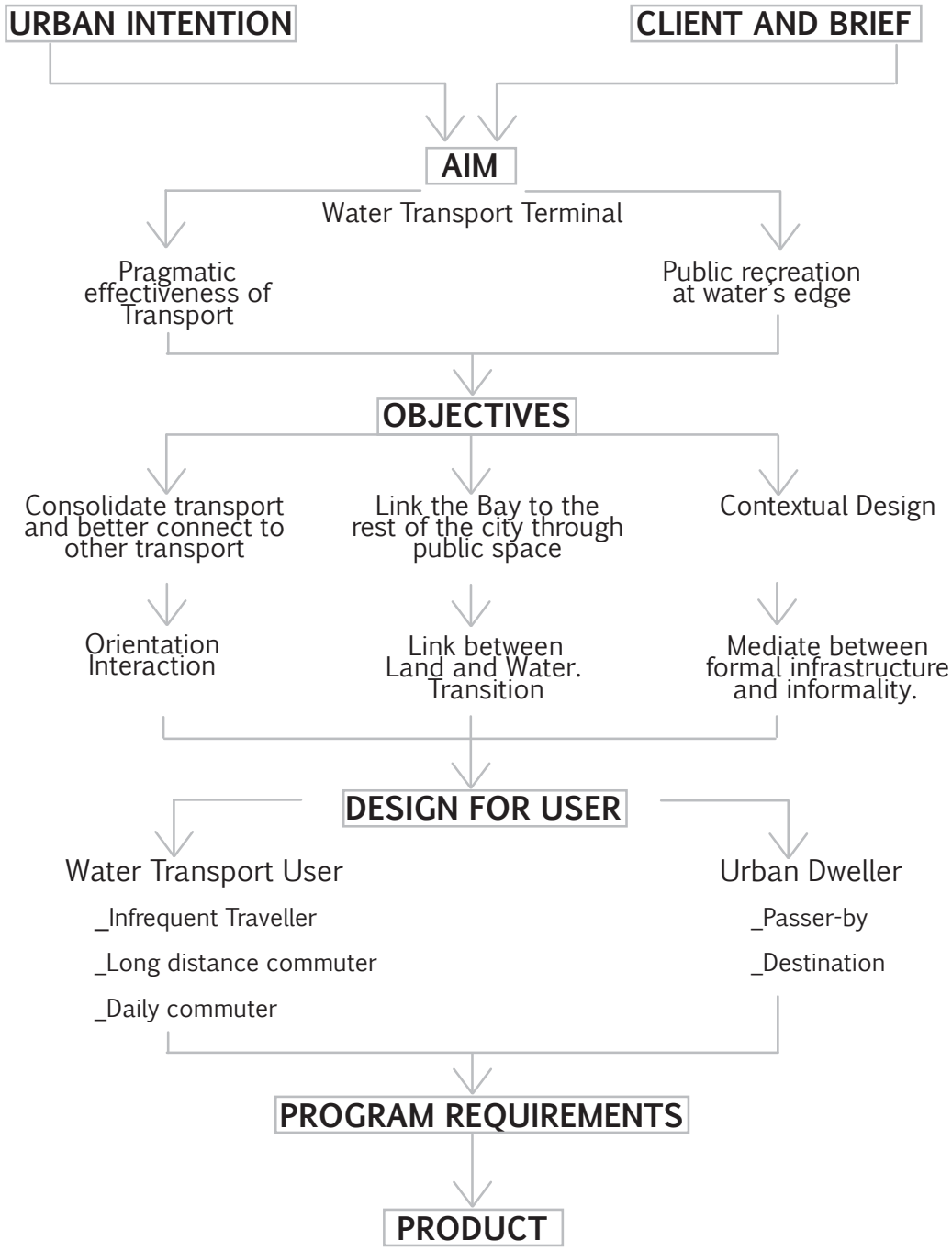


fig. 1.9 Diagrammatic depiction of intentions

1.8 DESIGN APPROACH

The design approach focuses on the user, thus providing for two broad categories of user: The first is the water transport user who arrives at and departs from the facility. The second is the urban dweller who appropriates the waterfront's larger scale intervention without the specific intention of using the transport services available.

The category 'water transport user' is further broken down into three umbrella categories of traveller:

The infrequent traveller, who is more than likely a tourist. This category will be looking for orientation, after which they may engage in recreation.

The long distance commuter may be using the facility for regional travel. These people will be looking for smooth and convenient passage through the facility, but may have more time and so may be looking for enjoyment.

The third category is the daily commuter. This category is the vast majority, using the facility on a daily basis. This category of traveller requires a smooth and convenient passage through the facility with no unnecessary delays.

The urban dweller will intentionally arrive at the building for recreational purposes, or may simply be a passer-by who gets drawn into the building out of curiosity.

1.9 RESEARCH METHODOLOGY

The research methodology involved a grounded approach focusing on gaining as thorough an understanding of context as possible. This was undertaken through:

- On site observations and assimilations
- Interviews with relevant people (Maputo Port staff; Transmaritima ferry staff)
- Literary research into similar developments, programmatic and theoretical precedents
- Literary research into the context
- Discussions with other students from three universities involved in the Maputo masters studio
- Analysis of the requirement and latent potentials of the facility and site
- Reference documents relating to the target area

Further, the research approach was to progress from the general to the specific. A clear understanding of the broader context of the site ensured a solution of optimal fit.

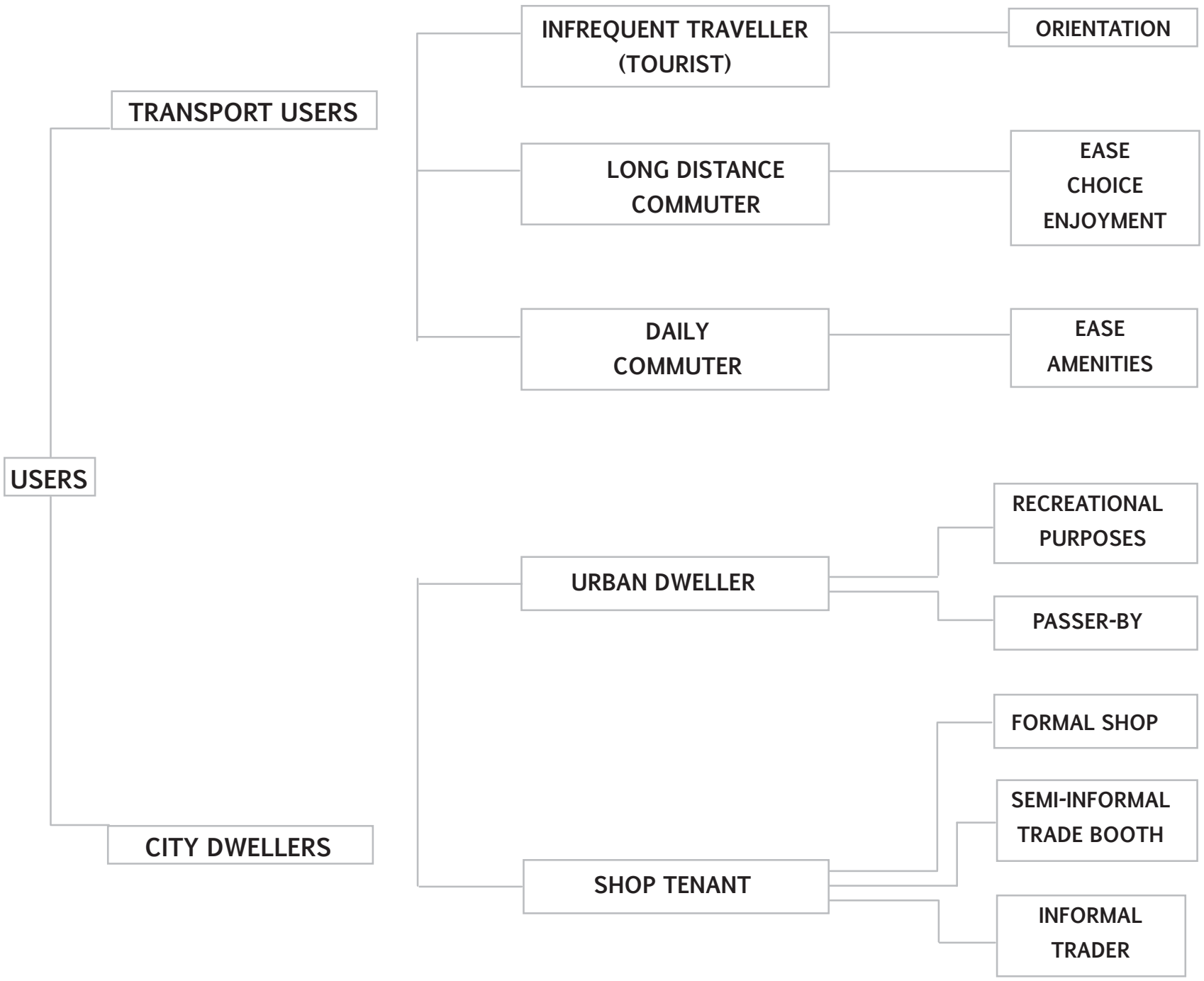


fig. 1.10
Graphic depiction of users

1.10 DELIMITATIONS AND ASSUMPTIONS

With respect to City Planning:

- It is assumed that the proposed redevelopment of a main vehicular connector within the downtown Baixa, Av. Samora Machel, into a pedestrian boulevard, as per the City Planning scheme of 2010, will be implemented.
- It is assumed that the development of the waterfront strip adjacent to the downtown Baixa district is approved, allowing for a public interface with the water, from the fishing harbour in the east, to the train station on the western boundary. The design proposal will fit into this broader vision.
- The proposed pedestrian route through the waterfront precinct in an east west direction is realized as part of the public nature to be reintroduced to the precinct, as per the proposed Urban Design Framework for this dissertation.

With respect to this dissertation:

- It is assumed that the new harbour is approved as part of the waterfront redevelopment initiative.
- It is assumed that the site, a concrete slab wharf on piles, can structurally take the weight of the building.
- Based on available information, it is assumed that the piled jetty extends 30m inland, after which groundfill occurs. The pile spacing is on a 5 x 5 metre grid.

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02_ SITE LOCATION AND CONTEXT

fig. 2.1 _ Graphic depiction of Mozambique in the context of the world map.

_africa

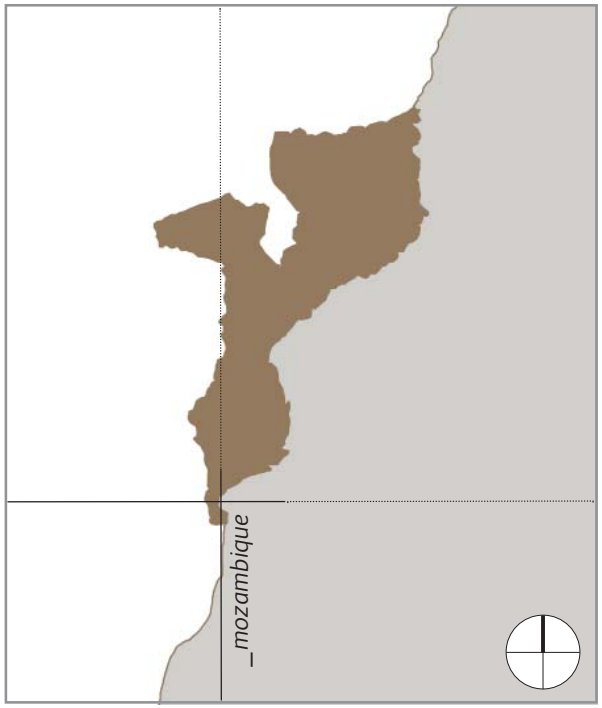

fig. 2.2 _

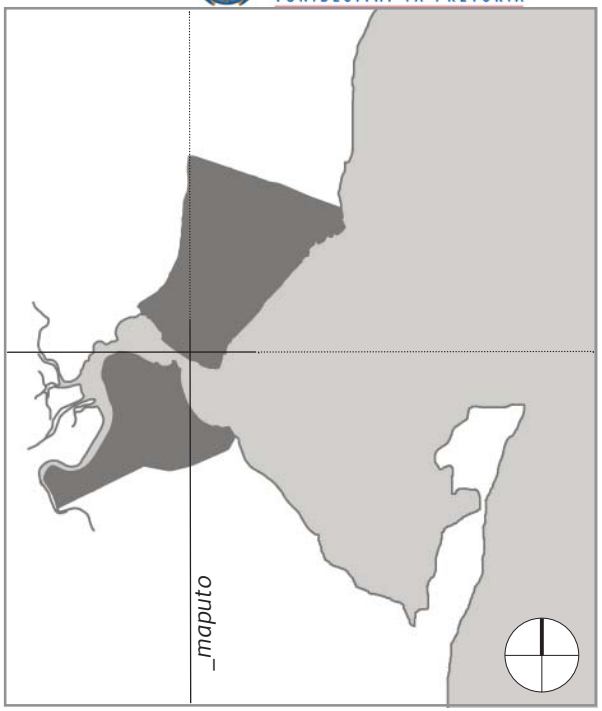

fig. 2.3_

fig. 2.4_

fig. 2.2 _ Graphic depiction of Mozambique with location of Maputo Bay indicated by crosshairs.

fig. 2.3 _ Graphic depiction of Maputo Bay with the location of the Baixa indicated by crosshairs

fig. 2.4 _ Graphic depiction of the Baixa with projects site location indicated by the crosshairs.

2.1 INTRODUCTION

Maputo, earlier an indigenous kingdom, has grown from a strategic trading base for the Dutch and then the Portuguese, into the capital of the independent state of Mozambique. Due to its location, the city serves major trade routes and forms a vital link between South Africa's northern provinces and countries in Europe and Asia.

It is a fascinating city with a rich history and cultural diversity coloured by Portuguese influences from its colonial past and its more recent emerging independent character.

2.2 AIM OF THE CHAPTER

The aim of this chapter is to establish a foundational understanding of the context in which the design proposal will take place. This understanding is necessary to produce a product of relevance and 'fit' with the context.

2.3 GEOGRAPHIC CONTEXT

Mozambique lies on the east coast of Southern Africa. The country's Indian Ocean coastline stretches for 2470km, with many bays that form natural harbours which are ideal to develop into modern trade ports (Torp, 1989:12).

At the southern end of the country is such a bay, the Bay of Maputo. The greater bay is 95km long and 30km wide. The confluences of the Matola, Tembe and Umbeluzi Rivers have formed the large and deep estuary of Espirito Santo. The estuary forms a natural harbour (Alberto & Da Silva, 1964:30).

The satellite image in figure 2.5 provides a visual orientation of Maputo City in the context of the water and surrounding regions.

The estuary of Espirito Santo opens into the western side of Maputo Bay. The greater city of Maputo, and the Baixa district, borders Maputo Bay to the east, with the Espirito Santo estuary at its western edge.

The island of Inhaca is located to the east of the bay, southeast of Maputo. On the south side of the bay the settlement of Catembe developed under the jurisdiction of Maputo. To the west Maputo borders the city of Matola with the districts of Marracuene to the north, and Boane to the southwest.

An extensive urban area centred on Maputo can be seen to wrap around Maputo Bay.

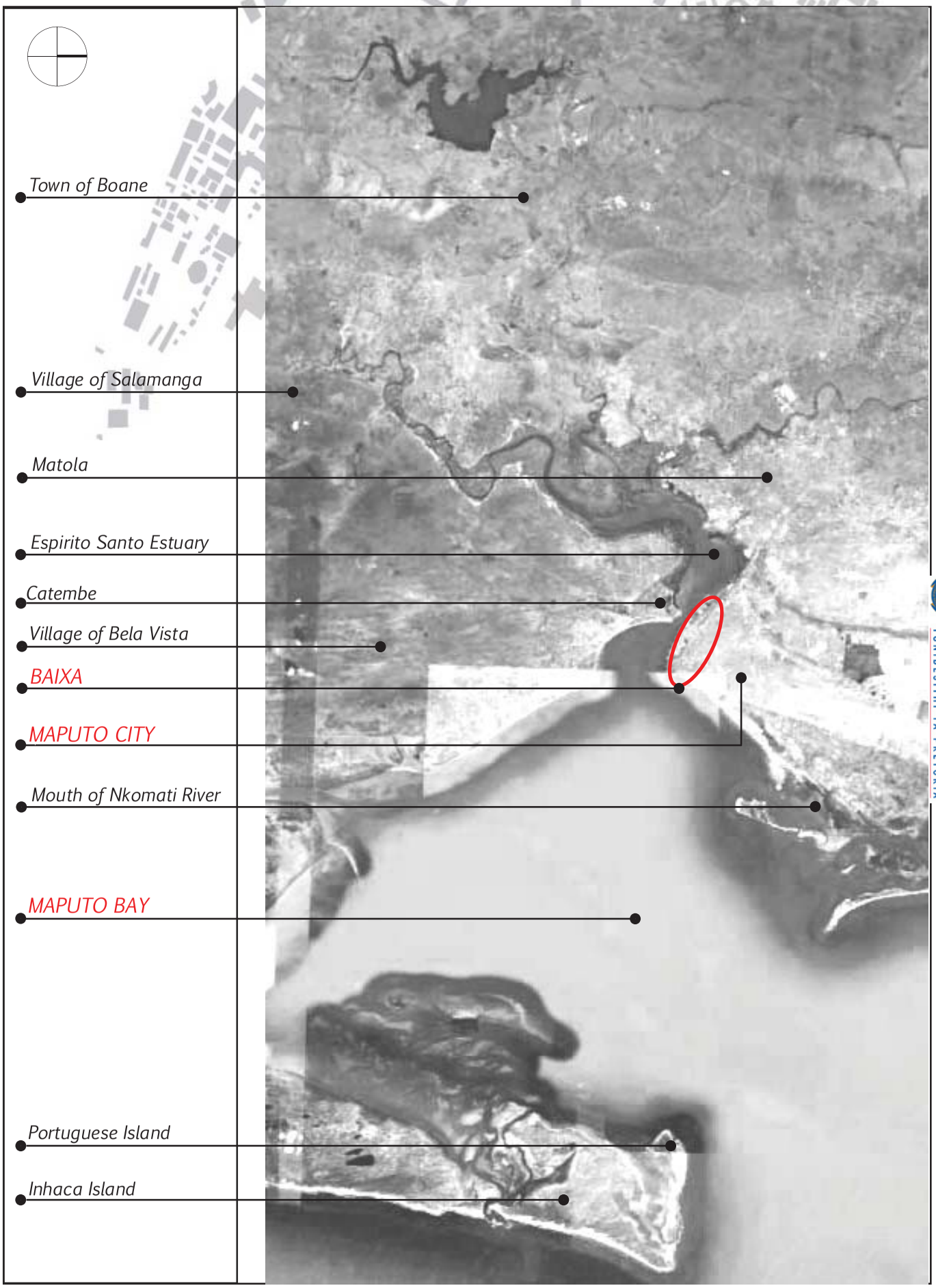

fig. 2.5
Aerial map of Maputo Bay showing the extent of Maputo Province. Note the proximity of the Catembe headland to the Baixa.

fig. 2.6 _ existing context

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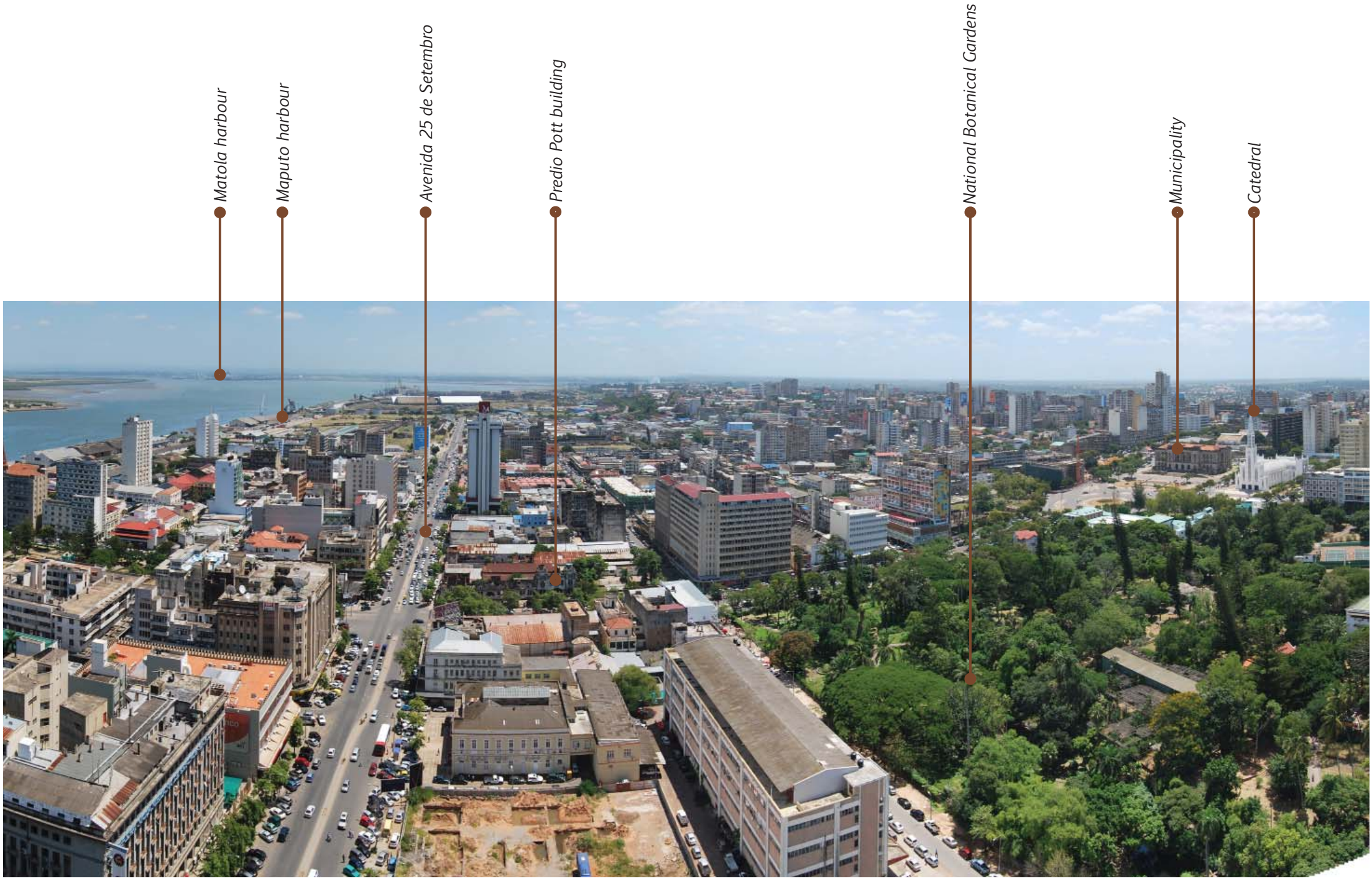


late 1400s Arab trading with Africans at Sofala (Beira) and inland

1498 Vasco Da Gama's fleet reaches Mozambique Island (Torp, 1989:12)

1506 Mozambique first settled by the Portuguese

1542 Portuguese captain Lourenço Marques makes the first successful voyage to Delagoa Bay (now Maputo)

1721 Dutch East India company founds trading station at Delagoa Bay

1730 Dutch abandon fort at Delagoa Bay

1781 Military trading port established on the bay, named after early explorer Lourenço Marques (Jenkins, 2000:3)

1850 Port of Maputo established, rising around a 1787 Portuguese fortress

1851-1867 Construction of current fort (Fortaleza de Maputo)

1869 Portuguese and ZAR (Zuid Afrikaanse Republiek) agree to build a railway between Lydenburg and Lourenço Marques

1876 Portuguese base at Delagoa Bay given the status of village

1887 Lourenço Marques recognised as a city (Alberto, da Silva, 1964:26)

1887 City is currently an island surrounded by fresh and saltwater swamps (Lage, 2009)

1890 Portuguese set official borders of Mozambique

1895 Construction of Railway from Pretoria to Lourenço Marques

1912 Basic infrastructure of Waterfront edge constructed consisting of a piled jetty and industrial wharf (Nyambir, 2002:19)

1915 Landfill project to reclaim marshland for the Baixa

1929 Port under management of state-owned Mozambican Railways Company (CFM)

2.4 HISTORIC CONTEXT

2.4.1 A Brief History of Mozambique

Africans from the west and north of the continent migrated into the coastal regions of what is today Mozambique. Trade ports were established along the coast to trade with Arabs, who had been trading with Madagascar and the Far East.

The Portuguese navigator Vasco Da Gama first reached Mozambique in 1498, and the Portuguese began to settle and trade on the coast early in the Sixteenth century. The colonial interest in the region stemmed from its strategic location along Indian Ocean trade routes. (Torp, 1989:12) In 1781 a military trading post was established on the bay, which was named after an early Portuguese navigator, Lourenço Marques (Jenkins, 2000:3).

By 1850, the Port of Lourenço Marques was properly established around the original 1787 Portuguese fortress. From 1851 to 1867 a new fort was constructed on the site of the original fort (Vincente, 2010). In 1876 the base was given the status of a village, and was recognised as a town in 1887 (Alberto, Da Silva, 1964:26).

Mozambique was administered as an 'overseas province' of Portugal from 1951. The country developed strong links with South Africa through import and export via the 1893 NZASM railroad linking the then Transvaal with the port of Lourenço Marques (now Maputo).

1951 *Mozambique is declared an overseas province of Portugal*

1962 *Nationalist movement Frente de Libertacao de Mocambique (FRELIMO) is formed, led by Eduardo Mondlane*

1962-1975 *13 year liberation struggle*

1969 *Eduardo Mondlane assassinated. Samora Machel elected leader of FRELIMO*

1975 *June 25th sees Mozambique become an independant state with Samora Machel as president*

1977 *Introduction of refrigeration building to Maputo Fishing Port (Nyambir, 2000:19)*

1980 *FRELIMO engages the Resistencia Nacional Mocambicana (RENAMO) in a civil war*

1981 *Productivity and profit margin dangerously low in the Port (o'Laughlin, 2002:15)*

1986 *President Samora Machel and 33 others killed in a plane crash. Machel succeeded by Joaquim Chissano*

1987 *Mozambique begins moving towards a free market economy*

1990 *FRELIMO embraces social democracy resulting in a name change to the Republic of Mozambique*

1991 *FRELIMO-RENAMO ceasefire. RENAMO recognised politically*

1994 *Mozambique Ports and Railways Authority (CFM) commences a privatisation program of the Port of Maputo through joint venture*

2002 *Cargo volume through Port of Maputo at 1.2 million tons*

2005 *Guebuza inaugurated as president*

2005 *Port cargo increases to 6.2 million tons*

2010 *Dredging of the quay at TCM increased the channel draught (depth) from 9,4m to 11m*

fig. 2.7_ Timeline of Mozambican history depicting subject related events in context of events of national importance.

2.4.2 A synopsis of Recent History

With the establishment of the Front for the Liberation of Mozambique (FRELIMO) under the leadership of Eduardo Mondlane in 1962, Mozambique became part of the movement for independence from colonial rule that swept across Africa. The struggle for independence ended in 1975 when the country became an independent state.

Following independence from Portugal, Mozambique underwent a long and violent civil war between the anti-communist Mozambique National Resistance (RENAMO) and Marxist FRELIMO. The war continued for more than ten years until peace in 1991. Since then Mozambique has been building a multi-party democracy and has held five general elections.

The struggle for independence and the subsequent civil war left the country economically devastated. Privately-owned industries were nationalised and infrastructure decayed as investment in productive assets stopped. Mozambique became one of the world's poorest countries. Political and economic reforms began during the late 1980s and since then the social and economic recovery of the country has continued.

A new constitution provided for free elections and a free market economy. Nationalised enterprises have again been privatised, and the combination of economic reforms and foreign aid have put the country on the path to recovery.

Mozambique's social and economic recovery during the first decade of the 21st century has been substantial, albeit from a low base. Maputo is at the centre of the economic recovery.

2.4.3 Historic Context of Maputo

The old Baixa, or 'downtown' of Maputo, dates back to the second half of the 19th century, and is the city's historic core. The original city was established around the fort and harbour area. Until 1887 the area was essentially an island surrounded by fresh and salt water swamps. From 1887 to 1915 a landfill project was undertaken to reclaim the marshland that became the Baixa. This resulted in the stitching of the Baixa to the expanding city (Lage, 2009).

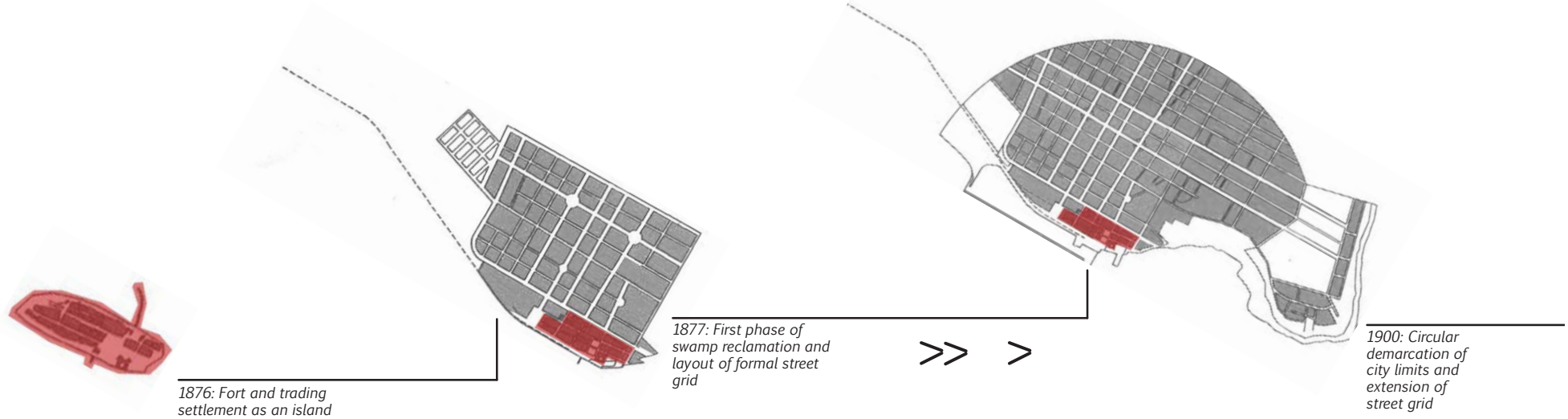
In 1912 the basic infrastructure for the working harbour adjacent to the Baixa, including the fishing port, was constructed. This happened on a site that was previously underwater, but reclaimed through the refill project. The structure consists of a piled jetty and wharf (Nyambir, 2002:19).

During the 1960s and 1970s, water-borne transport occurred from this working harbour. Due to the increasing industrialisation and expansion of the port, the water transport facility was moved out of this area and relocated further east up the coast. The intended civic and public in quality of the space thus became increasingly marginalized and today the waterfront no longer provides for water-city integration.

By re-introducing the original public transportation program to this site, an opportunity arises to again celebrate this richly historic site as a social interaction point in the city.

The development of Maputo from the first settlement in the 1870's, around the original fort, to the city layout evident today, is illustrated by figure 2.8. The original heart of the city is shaded in the progressive depiction of the developing city. The original circular street depicting the city's outer limits is evident.

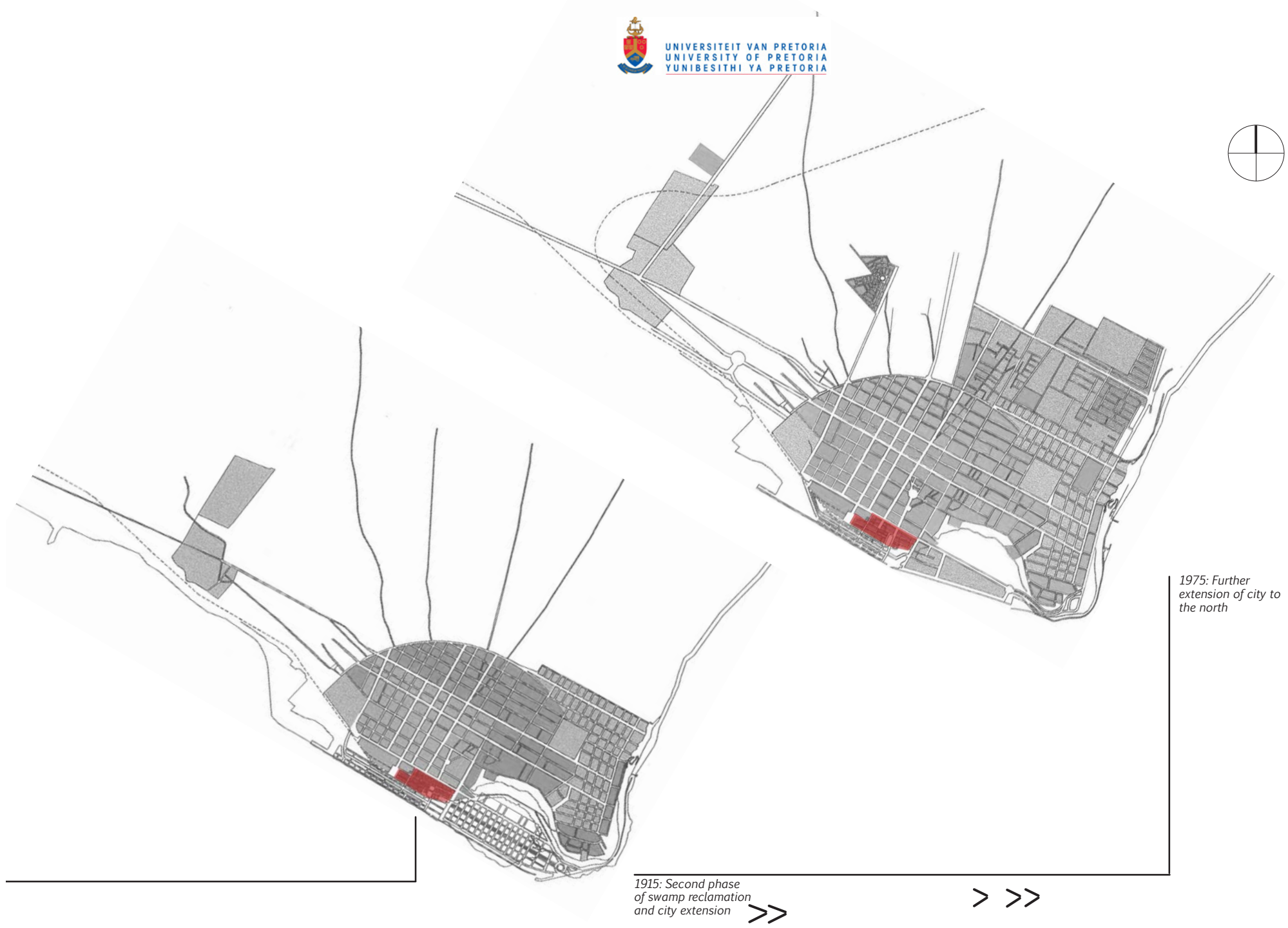
The series of figures below show how the residential expansion of Maputo occurred eastwards while westward expansion was more industrial and driven by the trade port.



1876: Fort and trading settlement as an island

1877: First phase of swamp reclamation and layout of formal street grid

1900: Circular demarcation of city limits and extension of street grid



1915: Second phase of swamp reclamation and city extension

1975: Further extension of city to the north

fig. 2.8_ Development of Maputo showing swamp reclamation and city expansion beyond circular demarcated limits. Original island indicated in red

"The African Metropolis will never be a generic global city - and not only because of lack of prosperity and perspective, but also because the African city consists of more than imported western technology and institutions. The African city is both a symbol and a mirror of a culture that adamantly differs from western cultural norms."

Folkers (2010:143)

2.5 SOCIAL CONTEXT

Although Mozambique is one of the poorest countries in the world (UN Habitat, 2008:6), it is a developing country with expanding industrial and tourism sectors and a growing economy.

Maputo is the largest city in the country, with the 2007 census determining the population to be around 1.8 million people.

The Baixa and immediate surrounds form part of the formal city known as the 'cement city'. Informality increasingly becomes more apparent as one moves north from the city centre and around the bay and estuary towards Catembe.

The greater Maputo area is the economic backbone of the region and the country. As is the case in and around Africa's capitals and economic centres, Maputo's population is growing steadily as more people move into the city from surrounding provinces. As mentioned earlier, growth rates recorded pre-1950 indicated the annual natural rate at approximately 3%. After 1950 this value increased to over 9%. These values are indicative of a high urban migration rate (Jenkins, 2000:15).

In a social context such rapid growth combined with a turbulent history can lead to contrasts. Against the backdrop of a formal capital city, a strong culture of informality exists. Many people travel from the suburban areas and informal outskirts of the city via public transport to make their living in the 'cement city', in both the formal and informal sector.

Informal trade is a very real condition in the city and needs to be designed for. Much of this trade happens at interchanges where large numbers of pedestrians congregate or where they move, particularly where public transport culminations occur.

fig. 2.9_

fig. 2.10_

fig. 2.11_

fig. 2.9_
Image of a mobile informal trader selling fruit from a Tchova

fig. 2.10_
Image of an informal trader selling bread and refreshments near a taxi stop.

fig. 2.11_
Image of a mobile informal trader selling a nail-painting service in the Baixa

fig. 2.12_

fig. 2.13_

fig. 2.14_

fig. 2.12_
Image of an informal traders vending stall near to the train station, selling snacks and other essential items.

fig. 2.13_
Image of an informal trading stall in the Baixa.

fig. 2.14_
A mobile trader carries his wares, selling them on foot throughout the Baixa.

fig. 2.15_ Map showing the extent of the historically protected precinct of the Baixa. Individually protected buildings are indicated.

2.6 PRECINCT CONTEXT

2.6.1 Site Location

The term 'Baixa' means 'low' in Portuguese and defines the flat, reclaimed area of Maputo.

The 'old' Baixa, indicated of figure 2.16, refers to the historic downtown of the city, the precinct located between the railway station in the west and the fort on the eastern edge.

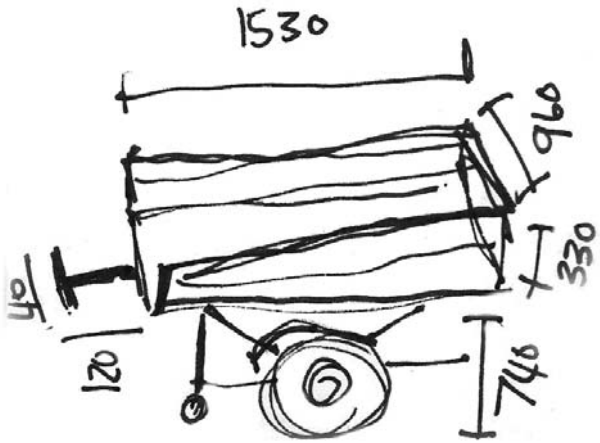
The 'new' Baixa, indicated on figure 2.16, describes the flat area to the eastern side of the city, stretching from beyond the fort eastwards to the yacht club at the culmination of the Marginal. This area features much new development.

The 'old' Baixa (hereafter referred to as the Baixa) is the study precinct for this dissertation. It falls within a historic zone of Maputo protected by legislation in which buildings built before 1920 are protected by law. (Vincente, 2010)

In addition to these individually protected buildings, the legibility of the Baixa as a whole results in a coherent precinct. Development in the area should be sensitive to this.

fig. 2.16_ Aerial map of precinct in context. Notable buildings of historical significance highlighted. Existing and proposed new ferry docks highlighted.

fig. 2.17_ Image and dimensions of a Tchova, the push cart used in Mozambique for informal trade.



2.6.2 Baixa Character

The Baixa's character is layered with influences. The Portuguese colonial influence is clearly evident in the urban layout of the area. Public open squares and plazas, narrow colonnaded streets complimented by generous boulevards and classic colonial buildings all reveal the Portuguese heritage of the city.

The influence of the modernist tradition in Maputo is evident in many buildings in the Baixa. Climatic conditions are addressed in the facade through shading techniques and the use of brise soleil.

The informal retail quality of its streets adds another character-defining layer to the downtown, revealing the African dimension of the city. Informality thrives in the area, with pavement stalls often being linked to the formal shop behind. The informal retail is closely associated with high pedestrian density, concentrated at places of interest, recreation and public transport nodes. The informal trade is often mobile, being operated from "Tchovas", which are custom-made carts on wheels to accommodate anything from fresh produce to public phones. Most vending is linked to necessities, such as food, clothing and mobile phone airtime.

In contrast, the southern waterfront part of the Baixa is industrial in character. The area is under-utilised and has become redundant space. This precinct is discussed in further detail in the pages to follow. Of relevance here is that the area is a legible district with a defining character.

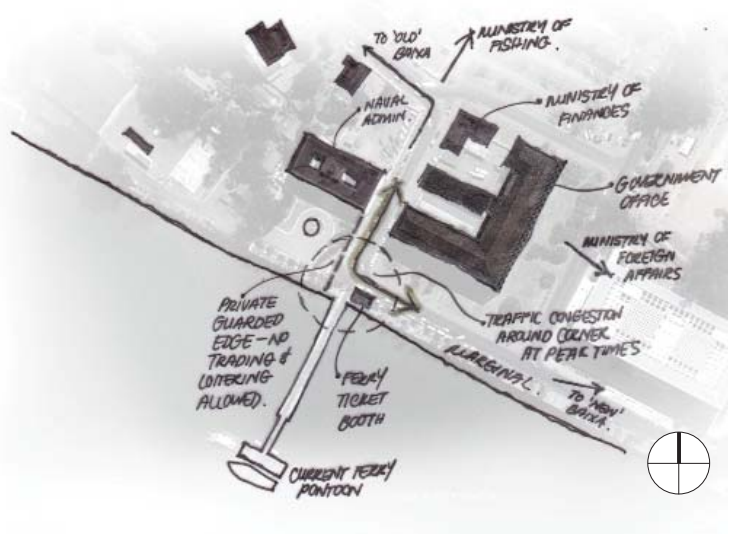


fig. 2.18_ Figure ground sketch of area around the current ferry terminal at Maputo, emphasizing physical constraints of site, traffic congestion problems and location within an administrative precinct.

2.6.3 Transport within the Baixa precinct

Being the oldest part of the city, the Baixa is the arrival point into the city for all modes of transport.

The three main vehicular modes of transport ,namely municipal buses, Chapas (mini-bus taxis), and tuk-tuks (motorised people carriers), have terminuses in the Baixa. In addition, many commuters arrive in the Baixa from surrounding suburbs by train or ferry.

As mentioned, Maputo's current ferry terminal provides the link between the city of Maputo and Catembe across the bay to the south. The current facility provides the fundamentals but does little to facilitate connection, a sense of arrival, or a means of orientation. Additionally, it provides no amenities to the commuter. The infrastructure supporting this service is thus failing to harness the immense potential lying dormant at such a dynamic transit point.

The current location is further unsuitable from a social, people-focused perspective. The terminal is removed from the pedestrian-rich old Baixa, and is located on the edge of the so-called 'new' Baixa, a more car-focused, heavier-grain part of the city. Analysis referenced in a later chapter shows that most users of the facility are destined for the old Baixa, either as a destination or to continue their journey from there, making use of other available public transport modes. Users of the facility are thus inconvenienced as the water-borne public transport fails to drop them at an optimal site for access to the parts of the city they require.

In addition, physical constraints at the current site do not allow for expansion of support facilities. It is locked between two formal government administrative buildings with strict security. This allows no breathing space around the site, with resulting bottle-necking and traffic jams at peak times.

fig. 2.19_ Photograph showing the current ferry terminal and the lack of physical space for expansion due to administrative buildings bordering the site.

fig. 2.20_ Archive image showing public edge to the old harbour.

fig. 2.21_ Archive image showing vessel departing from the public edge to the old harbour.

fig. 2.22_ Image showing signage from original passenger terminal at the waterfront. Photo emphasizes the heritage value of the precinct. Photo by author

fig. 2.20_

fig. 2.21_

fig. 2.22_

2.7 SITE CONTEXT

fig. 2.23_ Opposite Figure depicts buildings in immediate context

The proposed site (fig. 2.23) for the water-borne public transport node is at the end of Avenida Samora Machel. This boulevard is the axis connecting the city to the sea, and forms part of the vision of the greater urban framework for the industrial waterfront of the Baixa.

Archive images reveal that the area was the original location of water transport but has since been relocated. This was due to the increased industrialisation and privatisation of the harbour during the mid twentieth century.

Dramatic changes in commercial ports and shipping have led to specialised terminals and container facilities. These developments could not be accommodated at the original port and were thus built into new specialised berths further into the bay towards Matola. This relocation of the trade and shipping activity has resulted in the decay of the original harbour area adjacent to the Baixa.

> "Public space at transit points offers great capacity for multi-dimensional placemaking: recreation, transportation and potential commercial spheres all merge in a cacophony of urban energy."
> _Isichei, U. 2002

By consolidating water-borne transport to one site, proximity between the different public transport nodes is greatly improved and the arrival experience enhanced for the visitor. Additionally, relocation to the original site commemorates the historical heritage of the place.

The site thus serves the user better, and integrates into the city better. These improvements will help arrest and reverse the decay of the old port area.

The current ferry site features a pier and terminates in a substantial floating pontoon. This facility is easily adapted for reuse as a destination facility for a smaller amount of people. The site is optimal for a restaurant or bar, as the proximity to the marginal is suitable for weekend activites.

Alternatively, there is a tradition in Maputo of weddings and other ceremonies taking place on piers and breakwaters. These festivities and celebrations on weekends and public holidays are regular further up the coast. Such activities could begin to occur at the old pier.

2.7.1 Site Plan showing Immediate Context

PROPOSED SITE

1_ *Current fish processing facility*
Single storey concrete warehouse.

2_ *Underutilized industrial harbour precinct*

3_ *Industrial warehouses*
Single storey portal frame structure with brick infill.

4_ *Clock tower*

5_ *Maputo fishing port administration buildings*

6_ *Dry dock*

7_ *Fortaleza de Maputo*
Site of original Portuguese fort - protected by heritage legislation.

8_ *Naval precinct*

9_ *Current ferry terminal*

10_ *Administration building*
9 stories high

11_ *Office building*
12 stories high

12_ *National Theatre*

13_ *Museu de Moeda*
Museum of Money - protected by heritage legislation.

14_ *Police station*

15_ *Maputo shopping centre*

16_ *Original train tracks of harbour train loading ships with cargo.*

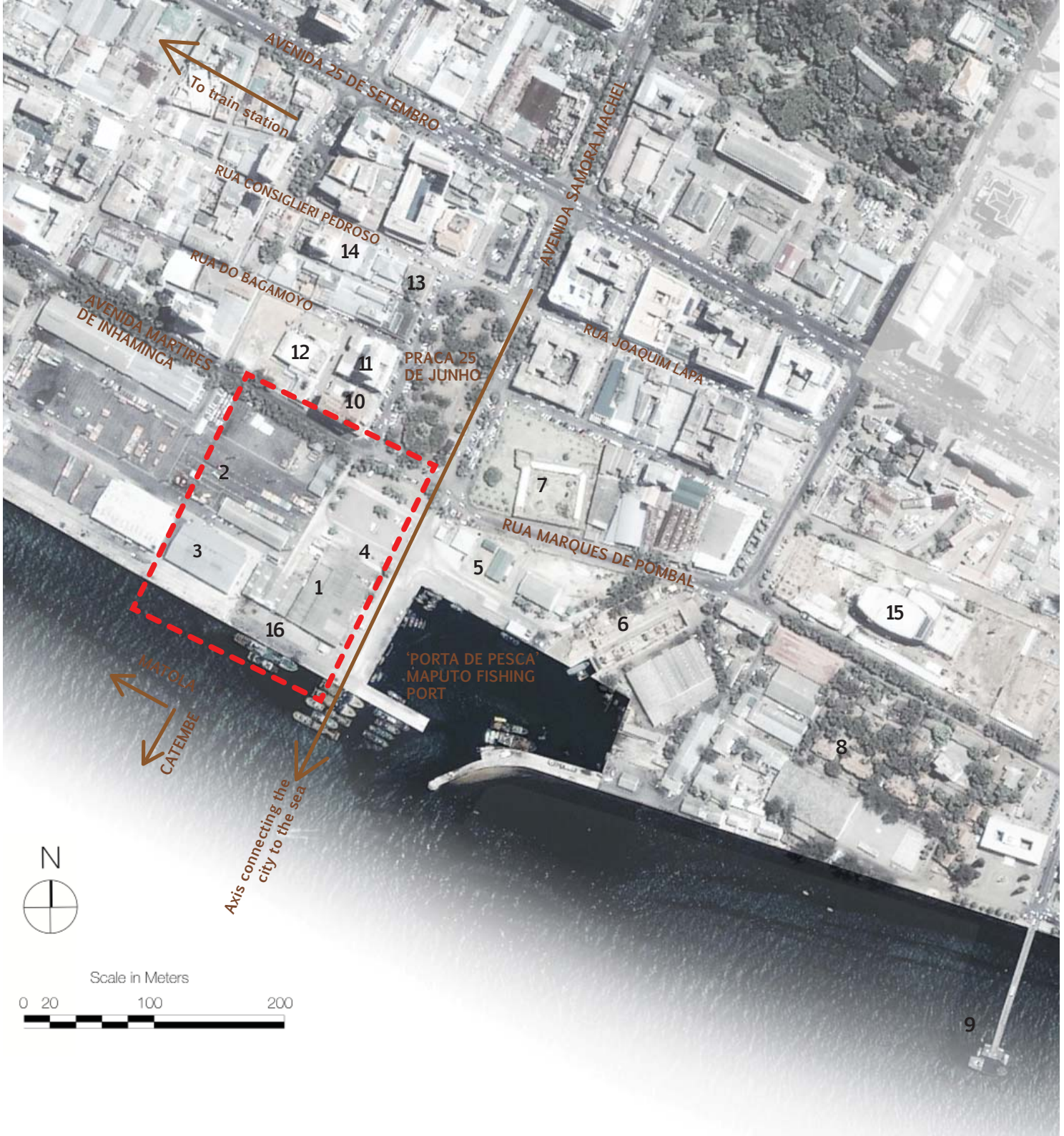


fig. 2.24_ Aerial map key to show location of each site view.

*fig. 2.24_i Aerial map key showing location of site view fig. 2.25,_ fig. 2.26_ and fig. 2.27_*

*fig. 2.24_ii Aerial map key showing location of site view fig. 2.28_ and fig. 2.29_*

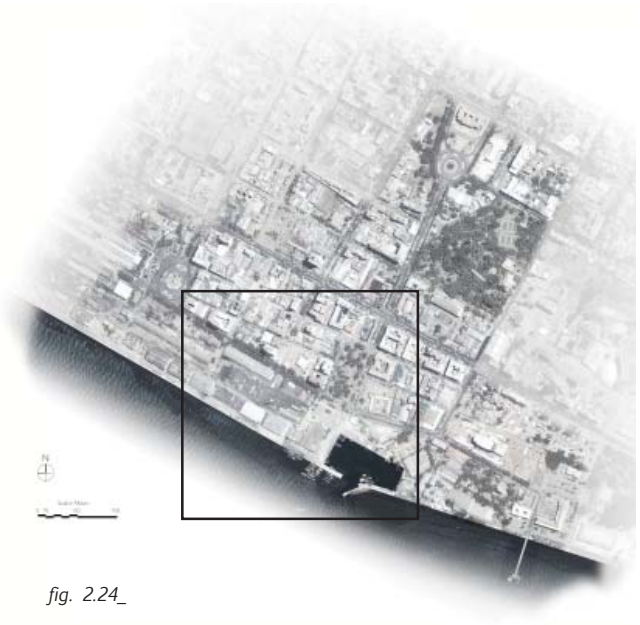


*fig. 2.24_*

fig. 2.24_i

fig. 2.24_ii

fig. 2.25_ View of site entrance off Avenida Martires de Inhaminga.

fig. 2.26_ View of site from the Fishing harbour looking eastwards showing original railway tracks.

fig. 2.27_ Aerial view over proposed new harbour site.

*fig. 2.25_*

*fig. 2.26_*

*fig. 2.27_*

fig. 2.28_

fig. 2.28_
View of southern side of Praca 25 de Junho from site entrance.

fig. 2.29_

fig. 2.29_
View of site for proposed public event square adjacent to ferry terminal site. Building to be demolished as per Urban Masterplan.

2.8 ENVIRONMENTAL CONTEXT

Two important environmental factors need to be considered for this dissertation, namely City Climate and Tidal Range.

2.8.1 City Climate

Located on the east coast of Africa, Maputo is affected by the warm Mozambican Current flowing through the channel between Mozambique and Madagascar. The result is a tropical climate, with a warm and prevalent humid daytime condition. Winds are predominantly easterly, south easterly and southerly. This provides some relief from the heat and humidity. (Jenkins, 2000:8) Occasionally the Indian Ocean tropical monsoons move down the coastline as far as Maputo.

Maputo's rainy season is from October to March, with an average annual rainfall of 770mm.

Temperatures and humidity drop somewhat in the drier winter months from April to September. Monthly relative humidity ranges from 59% in June, to 67% in November.

The climate influences the design in that occupant comfort will be an important consideration in this particularly humid environment. Orientation of the building should maximise possibilities for airflow and cross ventilation, making use of the prevailing wind direction. Additionally, effective shading methods shall be incorporated to ensure maximum occupant comfort and protection from the heat.

2.8.2 Tidal Range

Maputo has a particularly large tidal range as a result of its location within the large enclosed bay. The tidal range from spring high to spring low is in excess of 3.7 metres. To put this in comparative perspective, the tidal range in Cape Town is 2 metres, while the tidal range in Venice is only 800mm.

As a result of this, harbour edge conditions catering for the public require careful design consideration. Effectively, access from land to ferry can vary by a story in height throughout the day. Investigations into the use of ramps, stairs and lifts for universal access to the water transport vessels for both vehicles and people are dealt with in more detail in the design development chapter of this dissertation.

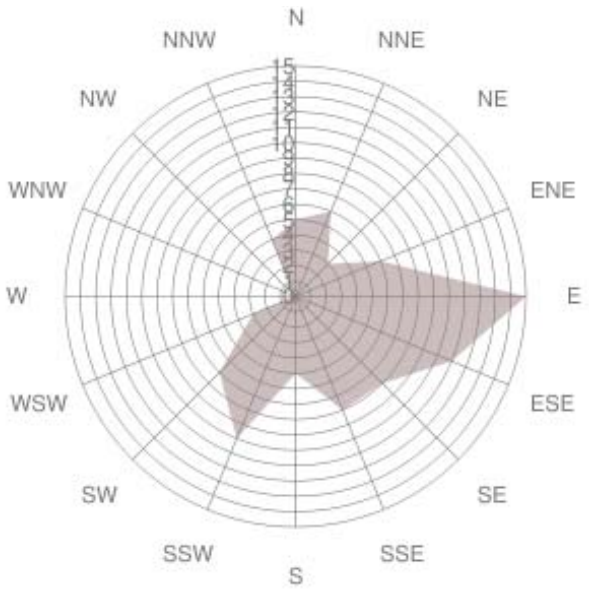


fig. 2.30_ Average annual wind rose for Maputo

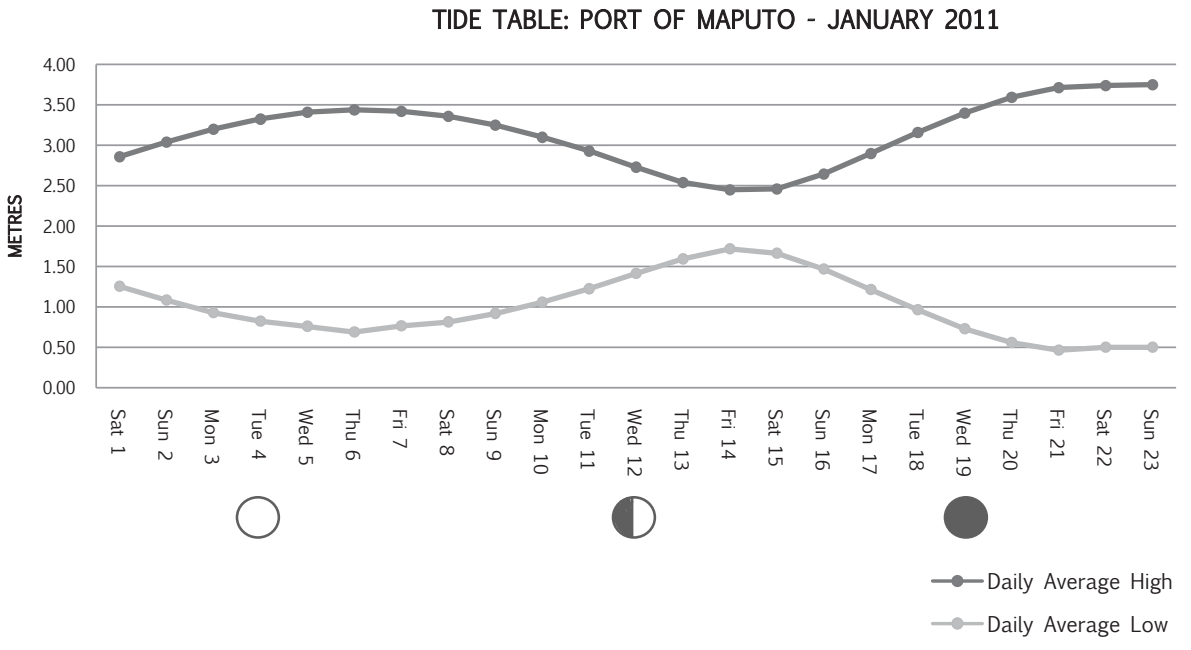


fig. 2.31_ Tidal Graph showing average daily tidal range for a typical month in Maputo Bay

fig. 2.32_ Collage of Architectural responses to Climate in the Baixa

> " 'Contextualism' is an approach that respects the setting in terms of its history, topography, memory, route and so on."
>
> _Porter (2004:31)

2.9 ARCHITECTURAL RESPONSE

Architecturally, contextual design is an important driving force behind this dissertation. Contextualism in all spheres is considered, with certain aspects particularly relevant to this project.

Geographically, the orientation and relationship of the building to the site will require consideration. Proximity to the water will affect material choices, and tidal range will determine access options.

Historical context is an important reference in order to integrate the building sensitively into an incredibly dynamic and layered context. The industrial character of the precinct itself guides an appropriate architectural response, and drawing on the heritage clues to the area, both tangible and intangible, aids in producing a product of relevance.

Due to the public nature of its program the social context of the city is of specific relevance to this design, . The layers of formal and informal trade prevalent in the Baixa are a character-defining trait of this city. With this in mind it is important for this design to understand the way in which this proposed transport node could facilitate and serve this sector,.

Environmentally, the humid tropical climate of Maputo will require a contextual architectural response focussing on occupant comfort. Much of the city's architecture exhibits features effectively adapted to the Mozambican environmental context. The use of *brise soleil* and other shading techniques is widely evident, providing increased thermal comfort to building occupants.

Due to the public nature of the building and the context of Maputo as a city in a developing country, passive techniques are pursued rather than high tech solutions.

North-south orientation of the building will be strived for, with narrow plan widths allowing for naturally ventilated spaces using the prevailing winds where possible. The use of shading and screens will be maximised to provide relief from the harsh tropical heat. These factors are dealt with in specific detail during design development.

Contextualising the design proposal is important. It should acknowledge the industrial tradition of the chosen site, whilst equally importantly responding to climatic requirements and social nuances.

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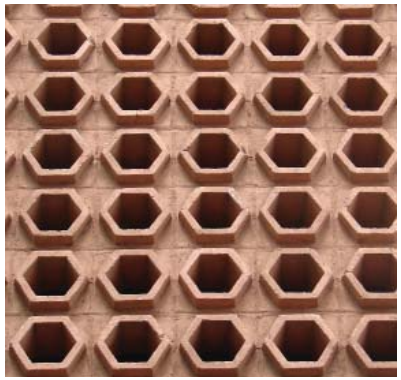
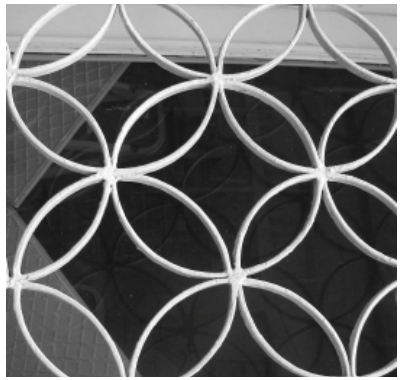



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03 _ URBAN DESIGN

3.1 INTRODUCTION

This dissertation proposes a significant intervention to improve transport and revive public space in the old Baixa of Maputo. Before engaging with such an intervention it is important to understand the large scale legislation, in order to position a smaller scale precinct proposal therein.

3.2 AIM OF THE CHAPTER

The goal of this urban investigation is to better understand the current conditions within the precinct of study, so that the proposed solution adds value to the existing larger system.

3.3 PAST AND PRESENT PLANNING FRAMEWORKS

The steady development of the city and surrounds necessitated planning to facilitate orderly expansion. A number of planning frameworks have been developed over the years. Development of the city from the original island settlement is illustrated in fig. 2.8 in the previous chapter.

The first framework was established in 1887, and expanded development around the initial settlement.

The next framework issued in 1954 reflected the Portuguese state policy of the time. The plan, depicted in figure 3.1, aimed at locating and phasing industrial and residential areas, whilst restructuring major roads. Population densities were addressed with the intention of establishing the highest population densities in the centre with decreasing towards the periphery of the city. In this process the borders of the city were defined.

The most comprehensive urban plan to date was issued in 1969. This plan, shown in figure 3.2, detailed the guidelines of land use for the entire city, whilst providing guidelines for expanding suburban forms.

In 2008, the PEUMM (*Plano de Estrutura Urbana Municipio de Maputo*, the Urban Structure Plan of the Municipality of Maputo), shown in figure 3.3, set out detailed principles of urban development. The principles include guidelines of the basic rights of the citizens to the city. Among these rights were: The right to the city; the right to urbanised land; the right to decent housing; the right to sanitation; the right to safe transit and urban mobility; the right to infrastructure, services and equipment for urban education, health, information and culture, sport, leisure and safety; and the right to participation.

Following on the PEUMM, a proposed master plan was issued by the municipality in 2010. It focused on traffic solutions specifically in the Baixa area. The plan details major road networks and rail improvements. A new BRT route is proposed, and redevelopment of Avenida Samora Machel into a pedestrian boulevard is formalised. Development of under-utilised land along the marginal to the eastern side of the city are also addressed.

It is important to note the proposed future construction of a tolled bridge across the bay thereby directly linking Maputo to Catembe, as shown in figure 3.4. Such a project will greatly facilitate heavy long-haul traffic through Maputo province and stimulate commerce throughout the district. The regional nature of the project as opposed to a municipal focus means it will not lessen the requirement for localised public transport around the bay by ferry.

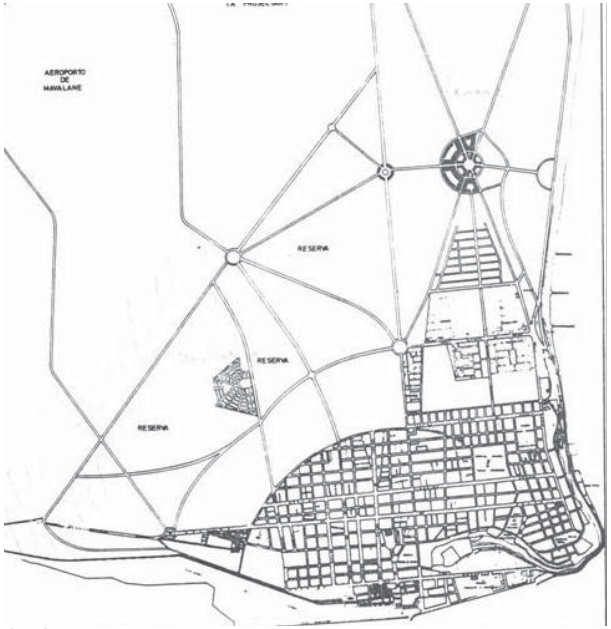


fig. 3.1_

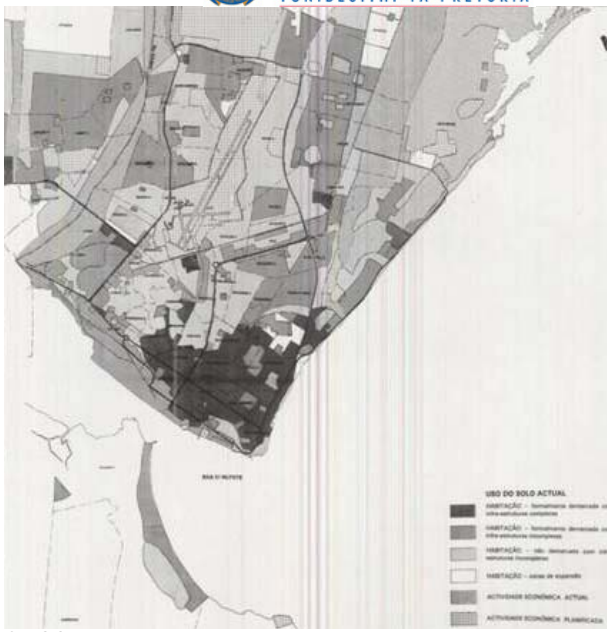


fig. 3.2_

fig. 3.3_

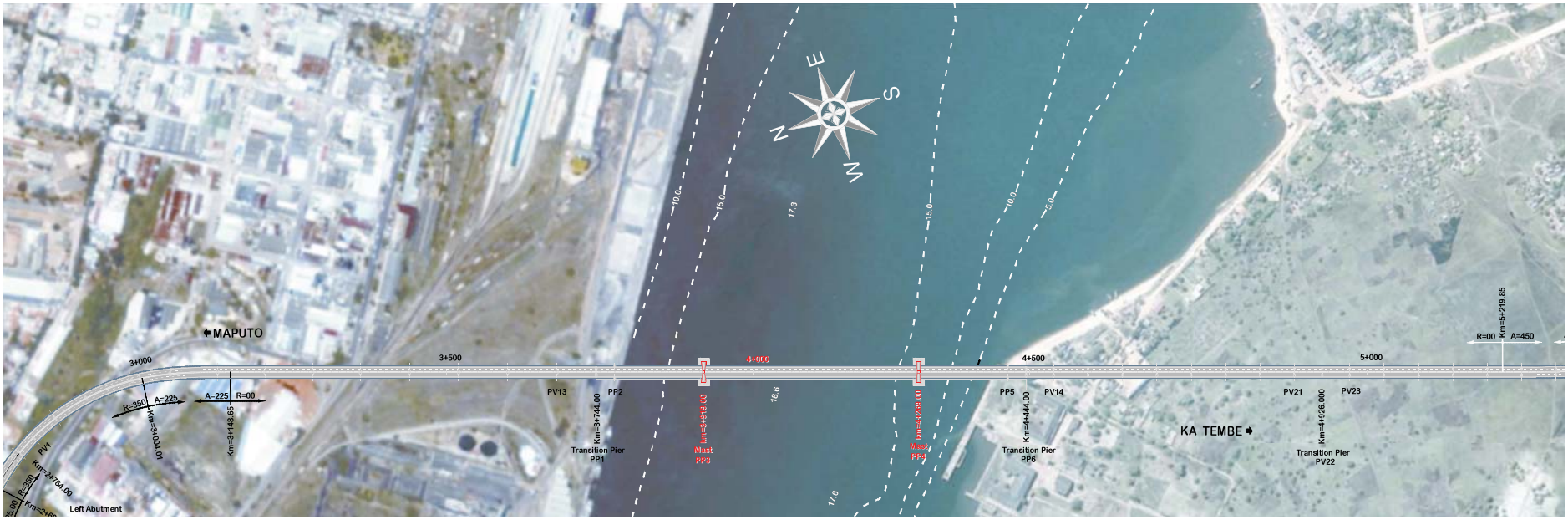


fig. 3.4_

fig. 3.1_ Image depicting 1954 framework

fig. 3.2_ Image depicting 1969 framework

fig. 3.3_ Image depicting the 2008 PEUMM framework for the city

fig. 3.4_ Image depicting the location of the proposed tolled bridge linking Maputo and Catembe. The bridge occurs west of the Baixa and current ferry crossing.

"Urbanism is about human life... Architecture is an experiential art in which all the circumstances of knowledge and technique are brought together to create the possibility of memorable and unexpected encounters occurring on street corners and sidewalks."

_ Robert Stern

3.4 PROPOSED BAIXA URBAN MASTER PLAN CONSIDERATIONS

The vision for the precinct framework is to revitalise the Baixa as the historic heart of Maputo. The Baixa reads as an identifiable area with a coherent character. The variety of functions and the synthesis of formal and informal make for a rich dynamic.

There are however spaces within the precinct that are under-utilised and in varying states of decay, causing disconnection through the area. The most notable disconnection is the barrier between the old Baixa and the sea in the form of the industrial harbour which forms a barrier to the waterfront. Due to developments in international shipping the need for specialist terminals led to the port operations expanding westwards into the bay. The original harbour land thus lies largely underutilised.

In addition the Baixa suffers from a lack of night-time activity, giving it a single faceted daytime nature, with current night-time activities being for the most part illegal. There is a need to address this by proposing ways of injecting a 24 hour cycle to the precinct.

Reconnecting the old Baixa with the waterfront is a clear driver for re-awakening this historic heart of Maputo. The port developments have provided an opportunity to not only revitalise the waterfront area but also to reconnect the Baixa to the sea.

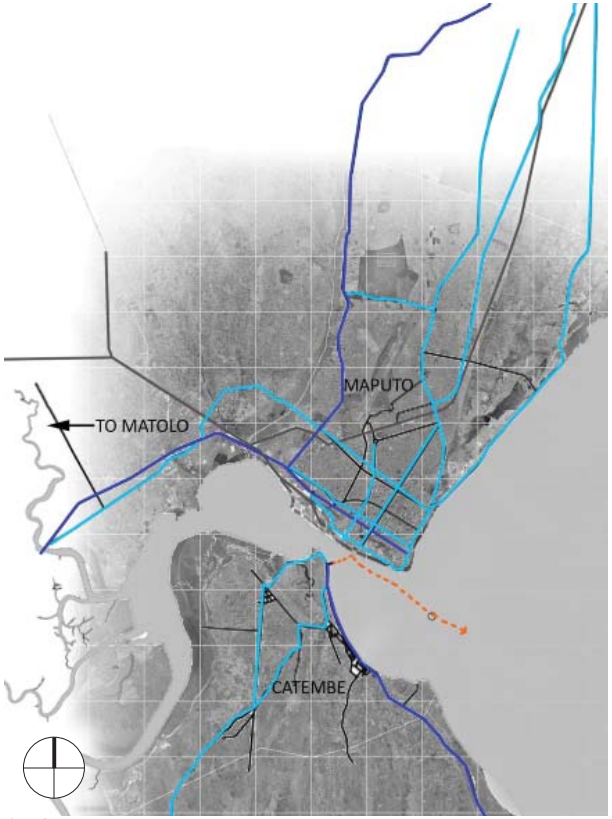


*fig. 3.5_*

fig. 3.5_ Map showing Macro transport routes around the bay of Maputo

fig. 3.6_ Map showing transport feeding into the Baixa

fig. 3.7_ Map indicating location of the three public transport termini in the Baixa, and their proximity to each other.

opp pg: fig. 3.8_ Mapping of Transport routes and Pedestrian movement through the Baixa. The mapping shows that pedestrian movement is in a predominantly westerly direction from the current ferry.

3.5 OBJECTIVES OF THE PROPOSED URBAN MASTER PLAN

The solution is not to demolish existing infrastructure, but rather to use a strategy of infill where possible, enhancing the existing potential of the area. The overarching theme of the precinct urban plan is therefore one of connection. By focusing on connection networks to and within the Baixa, the district will be reactivated

3.5.1 Connection of open space networks

The primary connective goal of the urban precinct plan is to establish an interface between the old Baixa core and the sea, a reaction to the industrialisation of the waterfront which compromised its public nature. The intention is to redevelop this section of the waterfront stretching from the station to the fishing port by:

- Introducing a public interface that will improve the city's link with the water's edge.
- An infill strategy that will be adopted to retain as many of the industrial character buildings as possible, retaining a memory of the heritage of the area.

The opening up of this land will create a waterfront precinct that connects to important civic spaces: Praca de Trabalahdores on the western boundary and Praca 25 de Junho in the east.

3.5.2 Define transport interchanges as connective nodes

Nodes occur where there is a concentration of activity, often brought about by some physical use. In the Baixa, transport nodes provide such concentration. As characteristic of an African city, they are vibrant areas with concentrated numbers of people, and subsequent informal trade. Analysis of transport routes reveals that the city is served by vehicular means of transport that deliver commuters into the Baixa via north-south links.

Three main transport nodes identifiable within the precinct are firstly the train and bus station, secondly the chapas stop, and finally the ferry terminal as shown in figure 3.7

The ferry terminal was moved from the central pedestrianised Baixa to the eastern side of the city. When pedestrian movement analysis is overlaid onto transport mapping (fig. 3.8), it is evident that the majority of people leaving the current ferry migrate

westwards towards the old Baixa and surrounds, with few commuters filtering eastwards. Rather than being a part of the bustling vibrancy of the Baixa the movement of people to and from the ferry is currently only a route to a destination for necessity's sake, .

The relationship between the three transport nodes is also significant in revitalising the downtown precinct. It describes how pedestrians move through the Baixa core between the three facilities. The proximity of the nodes to each other simplifies their interconnected use. Proximity further creates linkages between them, with walking distance between the different facilities reduced to a manageable distance for pedestrians. The framework proposes a relocation of the ferry terminal building to better serve the user's needs.

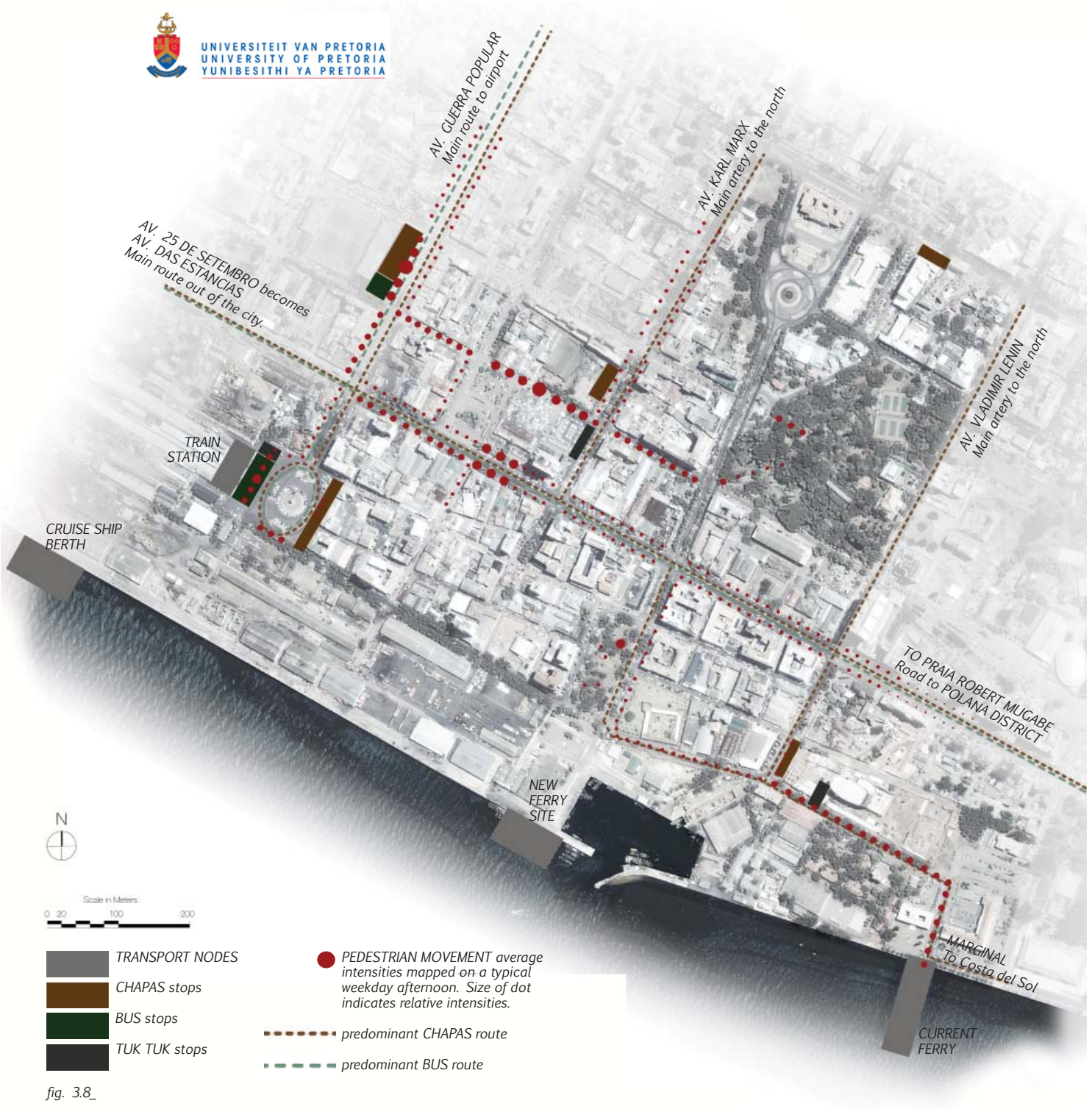


*fig. 3.8_*

opp pg: fig. 3.9_ Graphic indicating intentions within the Urban Masterplan for the proposed character of Avenida Samora Machel.

"The 'movement space' constituted by streets forms the essential connective tissue of urban public space from the micro scale of circulation within buildings to the macro scale of whole cities. So streetspace forms the basic core of all public space - forming a continuous network or continuum by which everything is linked to everything else... The challenge is to address the street as an urban place as well as a movement channel, and how to make this conception of the street work - not just as an isolated architectural set piece, but as a contribution to wider urban structure."

_ Marshall, 2005:19

3.5.3 Use Streets as Connectors

Baixa streets are characterized by their high degrees of pedestrian activity and informality on the one hand, and the enormous presence of the car on the other. Thus streets in the Baixa are movement routes, whilst additionally providing public urban place.

Identified within this master plan is firstly the importance of extending the north-south links to connect the greater city with the Baixa and into the waterfront redevelopment proposal. In particular, Avenida Samora Machel is recognized as being a place-making street. Avenida Samora Machel can be seen as the 'via Triomphalis' of Maputo City, the ceremonial gateway into the city of old. Within the urban master plan, the street is upgraded to a pedestrian boulevard, connecting the Municipal buildings on the north-eastern edge of the precinct with a significant civic square, Praca 25 de Juhno, in the heart of the Baixa. The intentions and proposed character of Avenida Samora Machel is referred to in Figure 3.9.

The avenue borders on the national Botanical Gardens, and will thus inject new life and interest into the gardens. Additionally, the redesigned boulevard will culminate at the waters' edge in an urban public space created through the waterfront redevelopment initiative. The hard public space will complement the soft landscaping of Praca 25 de Juhno, reconnecting the city to the sea, and celebrating the gateway from the sea to the city for the people of Maputo.

Secondly, within the urban masterplan, Bagamoyo Street within the old Baixa precinct has been identified as the primary direct pedestrian connector between the two significant civic plazas, Praca de Trabalahdores on the western boundary of the Baixa core, and Praca 25 de Juhno. Establishing successful connector streetscapes as public space is closely related to the first aim of connecting open space networks.

Thirdly, Avenida 25 de Setembro is seen as an important vehicular east-west connector through and to the Baixa. This role is to be retained, thus pedestrian connection across that street at appropriate points will need to be addressed.

Within the Baixa, all streets are addressed as "the connective tissue of urban public space" within the city. (Marshall, 2005:19) Given the cultural and social nature of Maputo, it's streets are essential elements to the social and economic functioning of the city.

AVENIDA SAMORA MACHEL

fig. 3.9_

CURRENT CHARACTER OF STREET:

Avenida Samora Machel links the historic core of the Baixa with the newer parts of the 'cement city' further inland. It is not the busiest of the downtown vehicular streets, but was designed as the 'Via Triomphales' of Maputo.

PROPOSED CHARACTER OF THE STREET:

Avenida Samora Machel been identified by Maputo City Planners to be adapted as the main pedestrian promenade street in Maputo, the remodelling to be based upon la Ramblas in Barcelona. The intented quality is experiential in nature, linking to city landmarks such as the Botanical Gardens and the Cathedral. It is intended as the central destination spine for both tourists and residents, culminating in a public space at the waters edge. It will act as an orientation spine within the city, pedestrianorientated with slow moving traffic.

Precedent _ La Ramblas in Central Barcelona

Popular with both locals and tourists
1.2km long tree-lined pedestrian mallrunning from the city centre to the harbour
Most cosmopolitan street in Bacelona, with the greatest diversity of people, passers-by, shoppers, tourists, street musicians, vagrants, prostitutes.
Works as a city-wide event. People are willing to drive a long distance to it.

Charactersitics of a successful promenade:

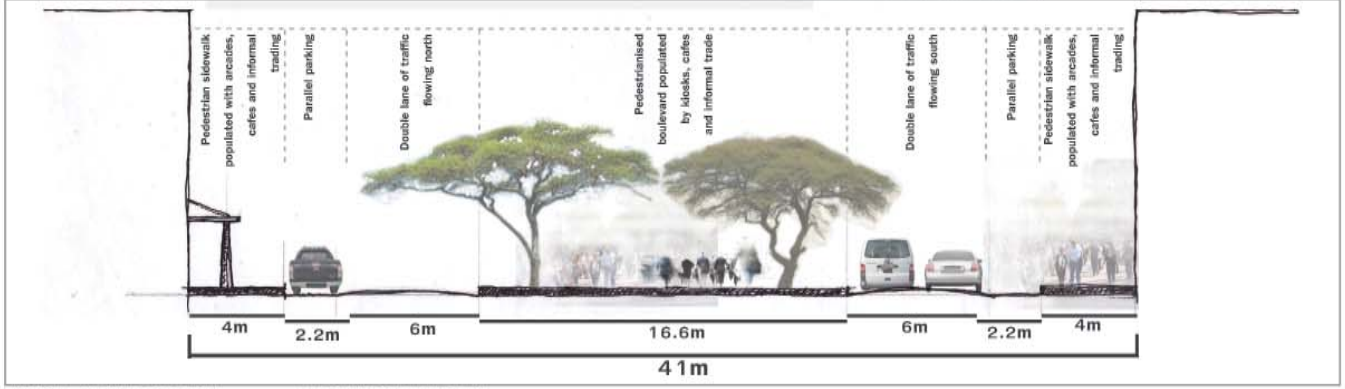
As proposed by Christopher Alexander, the vision for the boulevard is as follows:

_ High density pedestrians using it
_ Associative functions: eating places and small shops
_ Destination / strong goal
_ Variety of functions that act as destinations
_ Provisions for people to stay: widening of pedestrian paths, planting of trees, walls to lean against, stairs and benches and niches for sitting, opening of streetfronts to provide pedestrian cafes, displays encouraging lingering (1977:169)

'Encourage... a promenade at the heart of every community, linking the main activity nodes, and placed centrally. ...Put main points of attraction at the two ends, to keep a constant movement up and down. (Alexander et al, 1977:173)

Aerial view _ Avenida Samora Machel

Precedent _ La Ramblas in Central Barcelona



TYPICAL STREET SECTION _ AV. SAMORA MACHEL

3.6 PROPOSED BAIXA URBAN MASTER PLAN

The proposed Baixa Urban Master Plan, referenced in the preceding sections, is consolidated in figure 3.10. The graphic depicts intentions for the precinct and provides a foundation from which to work towards a detailed design.

1_ *Defined "old Baixa" precinct*

2_ *Redevelopment of industrialized waterfront strip into public waterfront precinct*

3_ *Upgrade of Avenida Samora Machel into a pedestrian promenade linking the city to the sea in a north-south direction*

4_ *Development of a new public plaza culminating Avenida Samora Machel at the ocean*
Relocate and consolidate Fishing Port facilities to the Harbour's northern edge

5_ *Activate previously dead urban edge along Avenida Martires de Inhaminga through public programming of buildings*

6_ *Locate new water-borne public transport node at new public event plaza to catalyse precinct through the injection of large flows of pedestrians.*

6a_ *Three public transport nodes within the Baixa are located within comfortable walking distance from one another, maximising pedestrian movement between them through the Baixa.*

7_ *Introduce a parkade to the periphery of the Baixa to ease traffic congestion and encourage pedestrian focused movement in the precinct.*

8_ *Establish north-south connections from the city to the sea, either physically or visually*

9_ *Retain Avenida 25 de Setembro as primary east-west connector through and into the Baixa. North-south connections across this street at required points will need to be considered.*

10_ *Revitalization and upgrade of the Botanical gardens through the Avenida Samora Machel redevelopment, as part of a larger open space network initiative*

11_ *Rua da Bagamoyo to be the primary direct connector through the old Baixa linking two significant public plazas, Praca de Trabaldores in the west and Praca 25 de Juhno to the east. As part of a larger open space network connection initiative.*

12_ *Site for consolidated Fishing Facilities*

13_ *Establish a continuous public pedestrian route between the new waterfront precinct development and the Marginal on the eastern border of the city*

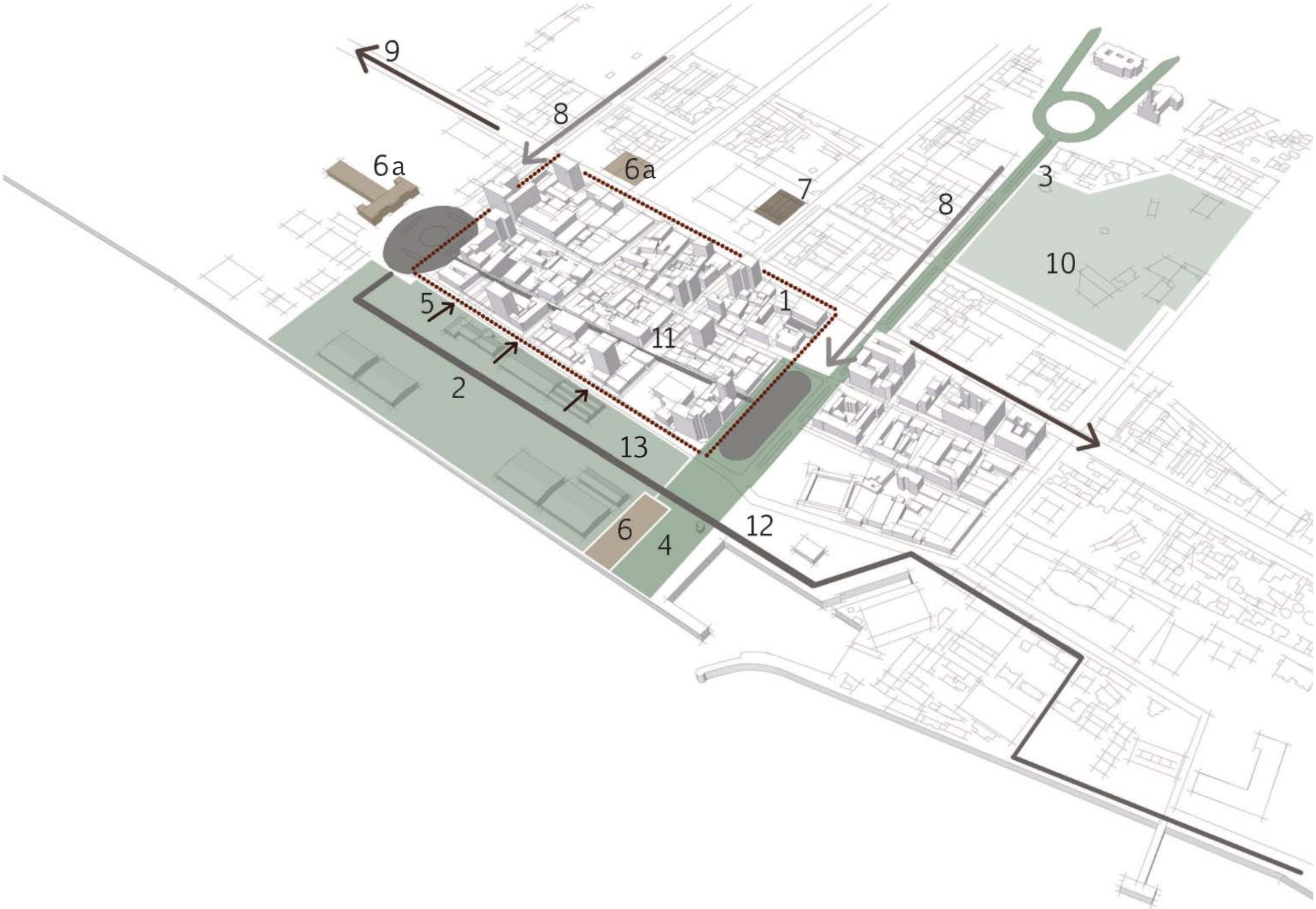


fig. 3.10_ A graphic depiction of the intentions of the proposed Baixa urban master plan.

"When natural bodies of water occur near human settlements treat them with great respect. Always preserve a belt of common land immediately beside the water."

_ Alexander (1977:137)

3.7 OBJECTIVES OF THE PROPOSED WATERFRONT PRECINCT SPATIAL DEVELOPMENT FRAMEWORK

The focus area for a more detailed urban design development for this dissertation is the waterfront precinct zoned for revitalisation.

The aim of the waterfront redevelopment framework is to react to the previous industrialisation of the waterfront by reactivating it in a public sense. The under-utilized space offers latent potential for stitching the waterfront back into the city.

By introducing a public quality to an area from which city dwellers can enjoy the waterfront, and through appropriate programming revitalization of the precinct as a 24 hour area is possible.

The industrial character of all buildings in the precinct will be retained as far as possible. Introduction of new buildings of a public nature will be in a scale sensitive to the context.

The concept of connection is again a strong theme in this endeavour as connectivity to the rest of the city is vital to the precinct's success, and its positive effect on the adjacent old Baixa.
The primary focus should address the needs of everyday city inhabitants. By introducing a public transport node into the area, an attempt is made to prevent gentrification from occurring. The development thus shifts from a typically tourist focus, to a primarily local focus.

In addition, the introduction of residential components to the site will further aid the 24 hour cycle of the district.

3.8 URBAN SCALE PRECEDENT STUDY

The aim of investigating waterfront precedents is to gain an understanding of what constitutes a successful waterfront redevelopment and how these principles can be applied to Maputo's context.

The visibility of urban waterfront sites means that the waterfront becomes the stage upon which the most important pieces are set; the waterfront becomes an expression of culture.

Marshall's view that "pieces of city that enrich life, offer decency and hope as well as functionality, and can give some notion of the urban ways of living..." (2004:4) is relevant to Maputo as a city in a developing country.

fig. 3.11_

fig. 3.12_

fig. 3.13_

fig. 3.11_ Darling Harbour satellite image

fig. 3.12_ Darling Harbour aerial view

fig. 3.13_ Darling Harbour esplanade

3.8.1 Darling Harbour, Sydney

The redevelopment of Darling Harbour was conceived in the 1980's, following the pioneering success of the waterfront redevelopment of Baltimore's Inner Harbour, in the United States.

Like Maputo's waterfront, sizes and operations of ships changed the needs of Sydney's port. The land was freed up to use for public purposes, and in 1984 the decision was made to redevelop the area. (Galloway, M) Public and private funding combined with state ownership of most of the land, facilitated the development of a cultural, educational and recreational hub that includes convention centres, museums, an aquarium, hotels, shopping centres, bars, and restaurants. The Darling Harbour Development has been called the "Festival Market" model (Marshall, 2004:29).

The Darling Harbour development is generally considered a success story in waterfront redevelopment. From a pedestrian traffic perspective it is very successful as visitor numbers have skyrocketed since the development took place. Establishing facilities close to the city centre and providing much needed urban space in proximity to the water, adds to the appeal of the project (Marshall, 2004:30).

Criticism of the project is its weak integration into the urban context, as it fails to connect with the fabric of the surrounding city. This failure, in part, due to its design intention as a self-contained "campus development". Existing roads do not extend into the new development, and the edge condition creates a barrier to the rest of the city (Marshall, 2004:31).

A further shortcoming is that the zoning excluded a residential component, which limits possible 24 hour activities. As a result, the retail components rely solely on outsiders, with no continuous day and night residential support.

_ Lessons learnt

- Waterfront developments are successful as "places for people". The magic of the waters' edge attracts a broad spectrum of visitors.
- Integration of the new development into the existing city fabric is important to ensure a harmonious extension of the original city.
- Provision of 24 hour facilities is essential, with adequate residential components to support the area. Facilities for both locals and tourists ensure a dynamic place.

3.8.2 Victoria and Alfred Waterfront, Cape Town.

The Victoria and Alfred Waterfront in Cape Town is on the site of the city's historic Table Bay. In 1859 construction of the first harbour on the site began. The Alfred Basin was completed in 1870, and a second basin, the Victoria Basin, was completed 35 years later.

In 1937 a new deep water harbour was approved for construction to the south of the original two basins. Additionally a massive land reclamation project was undertaken resulting in the new Cape Town Foreshore. Roads, traffic circles and elevated freeways introduced to this area resulted in the city being cut off from the sea, denying citizens direct access to its historic coastal heritage. The Victoria and Alfred Basins were the centre of the fishing industry in Cape Town at the time, but security legislation resulted in the area becoming derelict and underutilised by the 1970s.

In the 1980s investigations began to re-establish connections between the city and the sea, adding a public layer to the working harbour. This was the birth of the V&A Waterfront concept realised today.

The primary planning goal was to re-establish physical links between the city and the waterfront, creating a desirable destination for locals and visitors.

A second important aspect of this project was the decision from planning stage to retain the working elements of the harbour, providing an authentic backdrop to new developments. Thus the maximum amount of original built fabric was retained and reused, adding an authentic element to the project.

Diversity of uses was a third key development goal in the project. The mix of tenants was complementary but still ensured competition.

A fourth goal was to create a place that appealed to Capetonians first, with the belief that tourists seek out places favoured by locals. Statistics show that the visitors' profile of the waterfront is comprised of 65% local Capetonians, 21% foreign tourists and 14% domestic tourists, revealing the waterfront to be first and foremost for its citizens. The site of the development is centrally located, and easily accessible from all parts of Cape Town.

fig. 3.14_

fig. 3.15_

fig. 3.16_

fig. 3.14_ Victoria and Alfred Waterfront satellite image

fig. 3.15_ Victoria and Alfred Waterfront aerial view

fig. 3.16_ Victoria and Alfred Waterfront view over Quay Four

A number of design principles of successful waterfronts were identified through the V&A project:

- Build on a waterfront's unique qualities. A harbour site is different from an inland water body. The precinct design must be based on and acknowledge these differences.
- Respect the water as a body of space. Design the development so that it emphasises the shape and character of the water space
- Focus on water-dependant and water-related uses. Create a balance of retail, residential, hotel, office and recreational uses, to bring residents and visitors to the waterfront for extended periods (24 hours a day, seven days a week).
- Create a wide variety of waterfront spaces by integrating promenades, plazas and landscaped courts for a range of activities such as walking, jogging, shopping, dining etc.
- Design waterfront spaces for public events and celebrations attracting locals and visitors to the waterfront on a year-round basis. In the planning of these spaces, provision should also be made for a space(s) that can accommodate big gatherings of people for celebratory events.
- Clearly define public access. Emphasise the line of the waterfront's edge with promenades and plazas that provide continuous public access along the water.
- Restricted access edges should be identified and integrated into the overall design.

_ Lessons learnt

- Development of a waterfront site must respond to its unique location and local circumstances.
- Ensure sufficient anchor projects attract a critical mass of people benefitting from the site as a whole.
- Retain authenticity of original harbour as much as possible, to prevent a 'theme park' result.
- An environmentally and culturally sensitive project will ground the product retaining the ambiance of a real place
- A wide range of mixed-use activities and tenants will ensure a successful development day and year round.

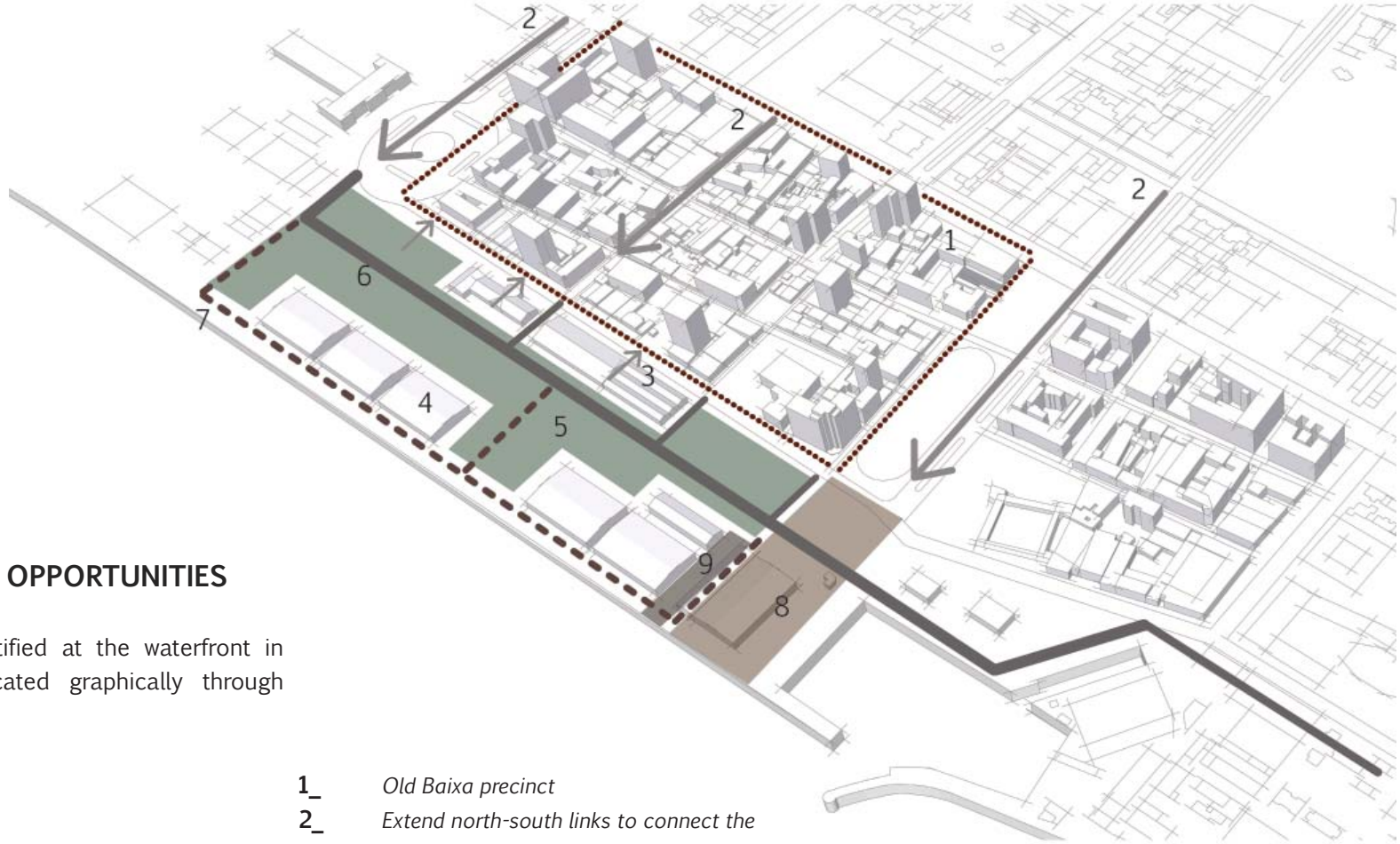


fig. 3.17_ A graphic depiction of the opportunities identified at the Maputo waterfront.

3.9 WATERFRONT OPPORTUNITIES

The opportunities identified at the waterfront in Maputo are communicated graphically through figure 3.17.

1_ *Old Baixa precinct*

2_ *Extend north-south links to connect the city to the waterfront, either visually or physically*

3_ *Activate street edge between waterfront precinct and old Baixa on Avenida Martires de Inhaminga*

4_ *Adaptive reuse of existing buildings where appropriate*

5_ *Densification of the area by infill of an appropriate urban scale and public/mixed use program*

6_ *Introduction of pedestrian route through new development precinct, linking up to the marginal esplanade to the east of the city*

7_ *Introduction of an esplanade next to the water, linking up to proposed main pedestrian route*

8_ *Introduction of new urban public event square complementing the sift landscaping of Praca 25 de Juhno. The public square will open up the culmination of Avenida Samora Machel to the sea.*

9_ *Introduction of water-borne public transport facility to the precinct as per larger Baixa vision.*

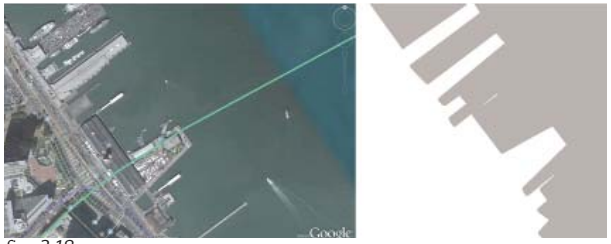


fig. 3.18_

fig. 3.19_

fig. 3.20_

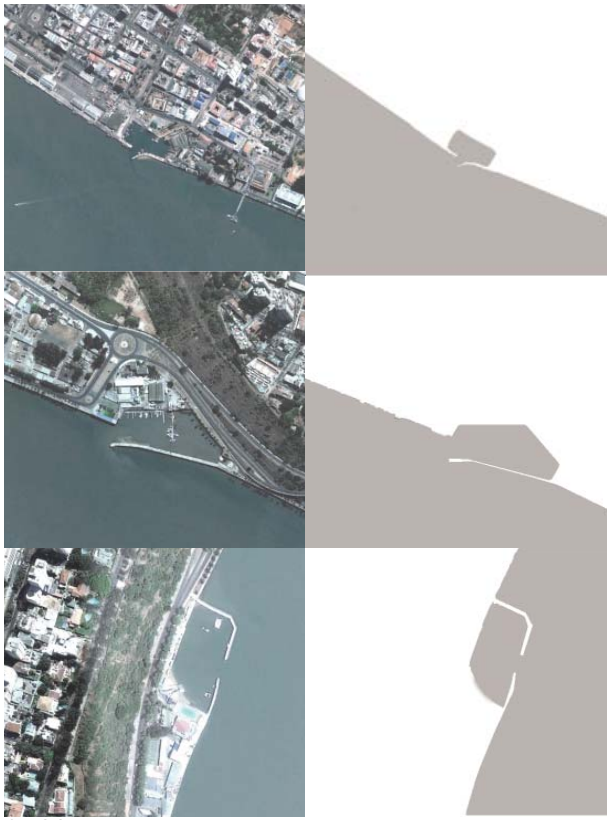


fig. 3.21_

fig. 3.18_ Harbour figure ground study of San Francisco, an example of piers built out into the water.

fig. 3.19_ Harbour figure ground study of the Inner Harbour in Baltimore, an example of piers built out into the harbour.

fig. 3.20_ Harbour figure ground study of Lisbon, an example of the built in harbour approach.

fig. 3.21_ Figure ground study of existing harbours in Maputo, showing the tendency towards a built-in harbour approach.

3.10 HARBOUR STUDY

With the introduction of a water-borne transport facility to this precinct, there arises an increased need for waterside access for boats.

The design of harbour basins is a specialised field, and so was only dealt with at an urban framework level. Studying the figure ground diagram of various harbour conditions around the world revealed the tendency in Maputo to adopt the built in harbour approach rather than building piers out into the sea. This land-to-water relationship is advantageous in that it offers an uninterrupted shoreline, a large land/water interface optimising valuable waterfront property, and offers considerable enclosure (Adler, 1999:23-7).

As the reclaimed harbour front precinct is a piled jetty over the water for an estimated 30 metres inland, this method was more cost effective than building out offshore.

“As well as offering protection from waves, breakwaters also prevent harbours from filling up with silt” (Neufert, 2000:514). An external breakwater working together with the existing breakwater of the fishing harbour will limit the amount of dredging required, and further protect the harbour from wave and current interference.

3.11 PROPOSED WATERFRONT PRECINCT SPATIAL DEVELOPMENT FRAMEWORK

The objectives of the proposed Waterfront precinct Spatial Development Framework are consolidated in figure 3.22. The graphic depicts intentions for the precinct and indicates the way the new Waterborne Public Transport node will integrate into the waterfront development.

1_ *Old Baixa precinct*

2_ *Physical connection of Avenida Samora Machel with the water*

3_ *Visual connection of Avenida Guerra Popular with the water*

4_ *Proposed new public and mixed use residential buildings*

5_ *Multipurpose public event space*
Functions of the original Fish Processing building to be relocated from this site to the northern edge of the Fishing Harbour.

6_ *Site for proposed new Waterborne Public Transport facility*

7_ *Proposed active edge. Activate through public infill buildings and adaptive reuse of existing previously introverted buildings to respond to public edge*

8_ *Public pedestrian route through site*

9_ *Proposed esplanade linking to pedestrian route*

10_ *New harbour increasing waterfront edge and providing docking space for transport vessels. Harbour complements existing fishing harbour and frames urban event space*

11_ *Proposed new fishing facility*

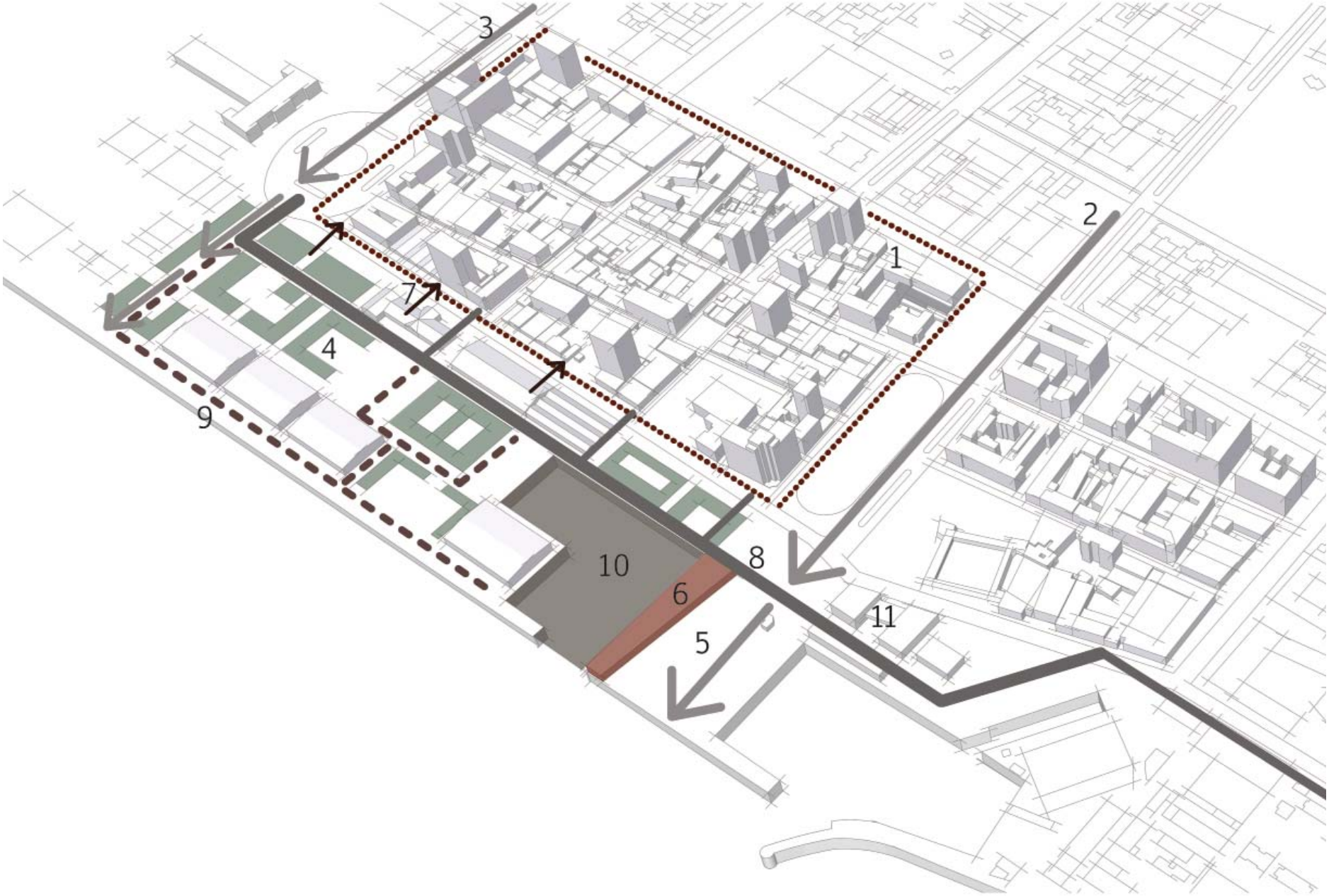


fig. 3.22_ A graphic depiction of the intentions of the proposed Waterfront spatial development framework

04 _ THEORETICAL APPROACH

4.1 INTRODUCTION

Maputo is the capital city of a developing country. The theoretical investigation is thus carried out with an awareness that the African urban context is one of contrast. African space is strongly defined by urban processes. The challenge for the proposed intervention in a city such as Maputo is to cater for both the local phenomenon and the global norm, the marrying of the formal with the massive influence of the informal and the changeable with the fixed. It is important to focus on not what the intervention is, but what it does.

4.2 AIM OF THE CHAPTER

The aim of the chapter is to establish relevant theories as design informants to guide the design process.

"Places... can be imagined as articulated moments in networks of social relations and understandings, but where a larger proportion of those relations, experiences and understandings are constructed on a far larger scale than what we happen to define for that moment as the place itself. This in turn allows for a sense of place which is extroverted, which includes a consciousness of its links with the wider world, which integrates in a positive way the global and the local."

_ *Massey (1994:7)*

4.3 ORDER

"Human societies are spatial phenomena: they occupy regions of the earth's surface, and within and between these regions material resources move, people encounter each other and information is transmitted... But a society does more than simply exist in space. It also takes on a definite spatial form and it does so in two senses. First, it arranges people in space in that it locates them in relation to each other, with a greater or lesser degree of aggregation and separation, engendering patterns of movement and encounter that may be dense or sparse within or between different groupings. Second, it arranges space itself by means of buildings, boundaries, paths, markers, zones and so on, so that the physical milieu of that society also takes on a definite pattern. In both senses a society acquires a definite and recognisable spatial order." (Hillier & Hanson, 1984:28)

This statement holds significance at both an urban design level, and the level of the particular design intervention. Within the context of this design proposal, spatial order is an important factor to consider, being a public transport facilitator. The program administers the movement and orientation of large numbers of people.

4.4 PLACE

Wolf Prix, founder of Coop Himmelb(l)au writes that "the gradual privatisation of urban public space... is having profound effects on contemporary architecture as a whole. Faced with a lack of public funds, cities and local authorities are increasingly unable to play an active role in urban planning and instead acquiesce to private investors who help themselves to the biggest and best pieces of the city" (2003:18).

In a similar vein, urban geographer Doreen Massey writes in her book, *For Space*: "There is widespread concern about the 'decline of public space' in

the... city: the commercial privatisation of space, the advent of new enclosures such as, iconically, the shopping mall, and so forth" (2005:152).

The risk here is that the potential quality public places in cities are lost to the citizens. In Maputo, this loss of public space was seen at the waterfront, where history reveals that industrial requirements triumphed over human needs regarding access to the water. Architect and educator Robert Stern supports what he calls an architecture of healing, whereby 'left-over' space is used within cities. The Baixa exhibits such spaces.

Massey however goes on to comment that all spaces are socially regulated in some way, if not by explicit rules, then by the population fundamentally working it out for itself. Perhaps the regulation of public space is not the definitive problem in urban areas, but rather the intensity at which this regulation is formalised and monitored. Any public space that is provided in urban areas will have some underlying order based upon the users of that place. This is particularly evident in developing countries where informal elements seem incongruent, but are nevertheless arranged to an underlying ordering system.

Massey preceded her opinions in *For Space*, with the book *Space, Place and Gender*, wherein she gives her opinion of place: "Places...can be imagined as articulated moments in networks of social relations and understandings, but where a larger proportion of those relations, experiences and understandings are constructed on a far larger scale than what we happen to define for that moment as the place itself. This in turn allows for a sense of place which is extroverted, which includes a consciousness of its links with the wider world, which integrates in a positive way the global and the local" (1994:7).

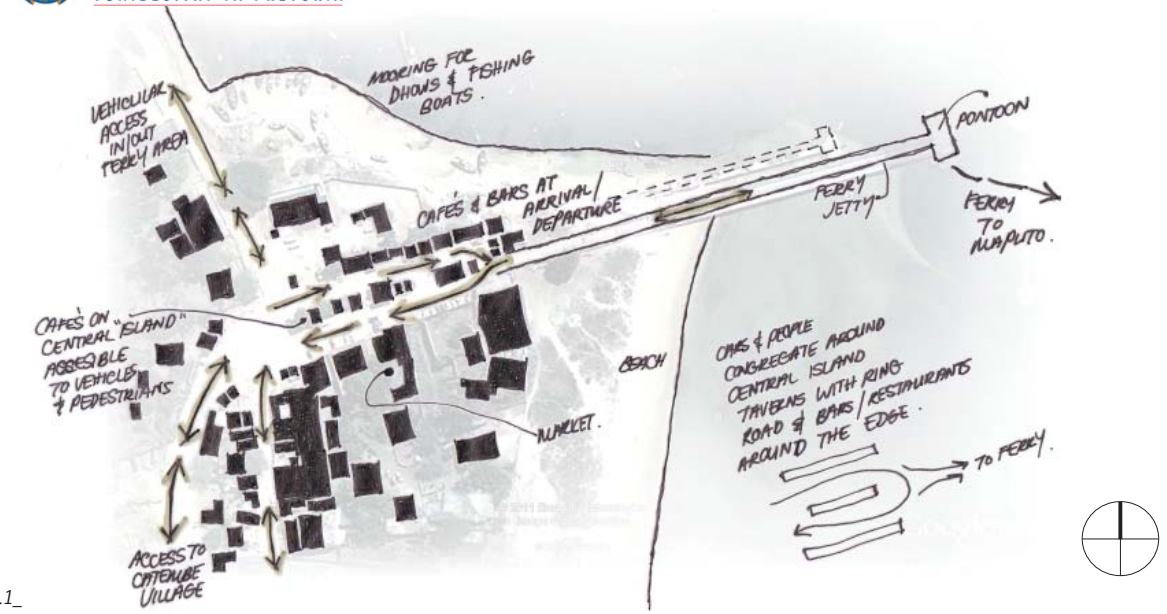


fig. 4.1_ Figure ground sketch of area around the ferry stop at Catembe. Sketch illustrates public space populated by bars and restaurants, accessible to both vehicles and pedestrians.

*fig. 4.1_*

Thus place is not static or fixed, and particularly in an African context, is often characterised by informal appropriation. Jane Jacobs, an urban writer, stated that "the site of people attracts still other people." (1961:33) If public social interaction can be seen as the main attraction of any city, then a transport node is an important place for integrating a critical mass of people with a quality public space within the city, allowing for social interactions to unfold.

Thus it is an important theoretical objective within the dissertation to consider placemaking in the design development. A sense of place is a quality lacking in the current facility. Place in this instance is not seen as monotonous, but rather as a complex multifaceted social construct.

4.4.1 Precedent informing the theoretical approach _ Catembe

An interesting local precedent that formed the intrigue behind my investigation into successful public place is the development around the ferry stop in Catembe across the bay from the Baixa, and it's contrast with the situation in Maputo. The ferry stop at Catembe is a pier stretching out from the headland, essential to reach the deeper water for boat access away from the beach.

At Catembe, passengers disembarking the ferry are greeted by a public space in interaction with the transport node. The headland extends out to welcome the traveler, and as one crosses from water to land cafes and taverns start to occur. The gathering space for boarding and disembarking the ferry culminates in an intimate cluster of shops, restaurants, bars and trading space, both formal and informal, catering to the pedestrian and the vehicle traffic in successful combination. Vehicles share the road space with overflow customers from the local taverns. The area is lively throughout the day and well into the evening, with many locals simply enjoying the atmosphere and amenities with no specific intention of using the associated transport. The public space around the ferry becomes the place to be.

The same is not true of the ferry stop in Maputo. Although on a different urban scale to Catembe, it lacks 'place'. Perhaps the greatest reason for that is the lack of physical space around the site, meaning expansion possibilities are stifled. Undoubtedly, latent potential exists at this transit point.

fig. 4.2_ Image depicting public space around ferry transport node at Catembe. The vehicular access roads to the ferry are shared by pedestrians.

"If one can establish a track through space which becomes the actual path of movement of large numbers of people, or participators, and can design the are adjacent to it to produce a continuous flow of harmonic experience as one moves over the track in space, successful designs in cities will be created"

_ *Bacon (1968:34)*

4.5 ORIENTATION

The built environment is about creating spaces for people founded on a fundamental need. In his writings regarding *Genus Loci,* Norberg-Schulz (1980:5) states that rather than seeing architecture as having different types, rather different solutions to different situations are required, in order to provide for a need. Contextual design means learning from the surroundings to inform what the building needs to be.

The identity and sense of place of a particular environment aids the recollection of a particular urban landscape (Lynch, 1981:131). Architecture can be used as a means of orientation within a greater context. The proposed intervention is on a significant landmark site within Maputo, bordering on the culmination of an important arterial road with the water. It's program involves the movement of large numbers of people in the most efficient manner. Thus the built result could be a tool in orientating oneself within the newly prescribed urban landscape.

On a smaller scale, within the building, orientation and transition is important as you make the change from water to land. The process of entering the transitional spaces affects the way you feel about the city unfolding before you. "If the transition is too abrupt there is no feeling of arrival" (Alexander et al, 1977:549). Arrival and orientation within the space is very important. Thus threshold is another important theoretical departure point for the design.

4.6 THEORIES AS DESIGN INFORMANTS

Spatial order is an important informant in the design as the movement of large numbers of people quickly and effectively through a transport facility requires ordered planning. Thus movement routes, paths, places of congregation and requirements for different users were considered during design development.

The idea of placemaking was another important theoretical informant to the design. Of importance was the right of citizens to non-commercialised quality public places in the city. A transport node provides the opportunity for a critical mass of people integrating with a public place. Ample unprogrammed public space is provided in and around the building. The urban square is adaptable for different events and celebrations.

4.7 CONCLUSION

Within the building a spatial order was employed based on the investigations into movement and user requirements. This allows for a new underlying order to develop through the informal appropriation of space throughout the building, resulting in a dynamic, layered and changeable place.

Placemaking guided the design to ensure that decisions were made while considering the place as part of a larger system within the city. Again, the theme of connection arises.

The building sits on a landmark site, thus orientation further informed the design. The building's main entrance occurred on a prominent corner, thus the design needed to respond to that. Equally important was orientating the traveller or commuter by giving attention to the threshold between land and water.

American architect Steven Holl writes extensively on the perception of architecture through experience and movement. He is of the opinion that "Architecture holds the power to inspire and transform our everyday existence. To see, to feel these physicalities is to become the subject of the senses" (Holl, 2006:40).

French philosopher Gilles Deleuze maintained that nomads orientate themselves in space by means of physical metaphors and journey rather than formalised settlement patterns. His theory is valuable within the informal context of the Baixa.

Architectural space becomes the materialisation of human activities, influenced by physical, natural and socio-economic events. The spatiality is not permanent but rather defined through instants and events. Architectural space becomes an action space.

The formal elements of the building become the backdrop from which the informal dynamic of the city can be expressed and accommodated.

The architecture strived for in this dissertation is not one to be comprehended as an object, but rather is intended to be unfolded and interpreted as one navigates the spaces. The focus becomes less about what it is (an object), and more about what it does (for the user).

05 _ DESIGN DEVELOPMENT

5.1 INTRODUCTION

The design development phase is seen as the refinement of the design concept for realization into a building. All investigations, analysis and guidelines preceding this are incorporated to inform the design process and guide the result. During design development it becomes important to give closer attention to all aspects of the design.

5.2 AIM AND OVERVIEW OF THE CHAPTER

5.2.1 Aim

The aim of this chapter is to illustrate key findings and objectives, to show how design decisions were made in an attempt to refine the design to a product.

5.2.2 Overview of the chapter

The chapter commences with a discussion of the exploration iterations that were progressively refined into the baseline conceptual intent. The refined concept is then correlated with appropriate precedents that lead into four architectural design imperatives.

The design imperatives are discussed in some detail followed by considerations and decisions relating to structure, building climate and material choice. The designer is of the belief that design development and technical investigation are interchangeable, and therefore they are consolidated into one chapter.

"A concept, whether a rationally explicit statement or a subjective demonstration, establishes an order, a field of enquiry, a limited principle."
_ Steven Holl

5.3 CONCEPTUAL DESIGN INTENTIONS

The design intention for the dissertation was to create a valid public space that provides infrastructure to Maputo's water transport system.

The conceptual premise was one of threshold, movement and connection.

The design concept firstly focusses on defining a threshold between land and sea. Next a rethinking of transport architecture from pragmatic infrastructure perspective on the one hand, to its possibilities as meeting point and social space on the other. The theme of movement was explored, with the spatial order being one of articulated moments along a path as destination points along a route.

Particularly in an African context, a flexible, multi-functional product is most appropriate. By designing the building to cater for a variety of functions, it engages the community on numerous levels without demanding participation. Public space in an African urban condition should allow for informal exploration and gradual discovery of unprogrammed space.

The design exploration further involved investigating the mediation of two broad categories of user, namely the city dweller drawn to the waterfront for recreation, and the transport user. These two broad categories have the potential for a multi-faceted place.

Fundamentally, the importance was placed not on what the intervention IS (form) but what it DOES (for the user).

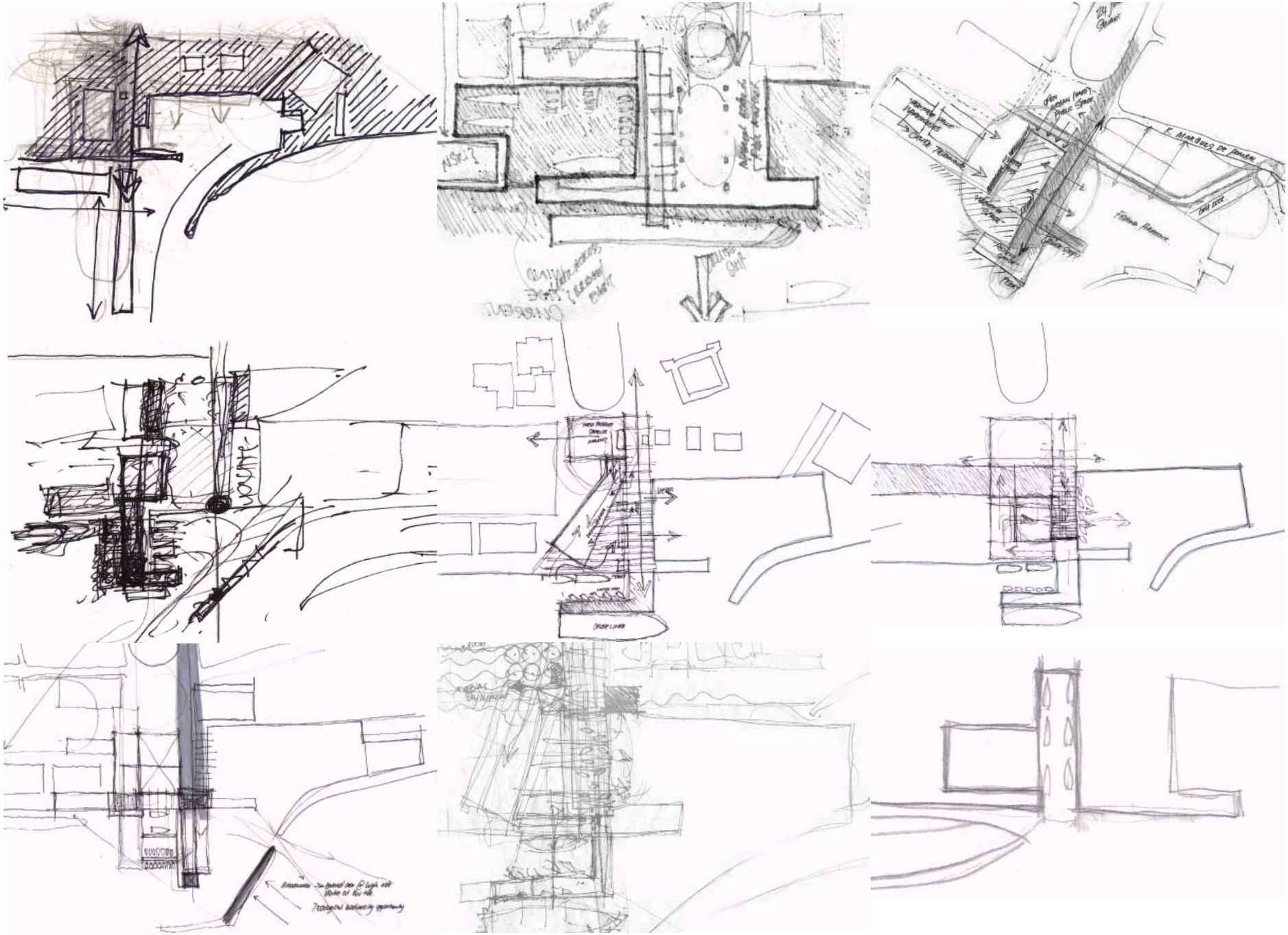


fig. 5.1_ Selection of conceptual exploration sketches testing site options against the conceptual intentions of the design By author

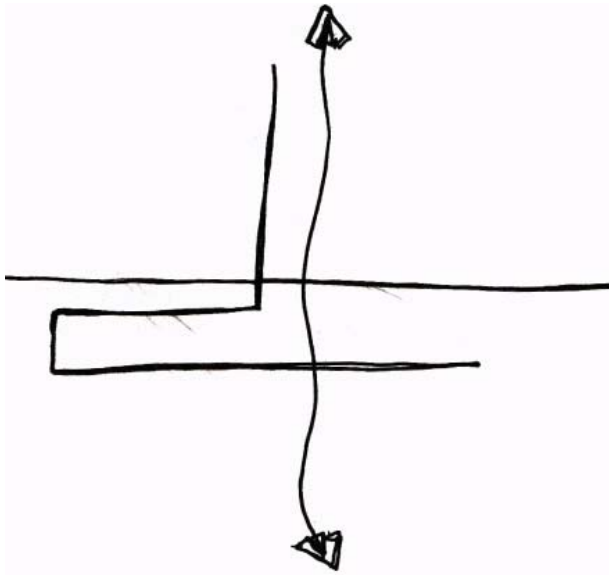


fig. 5.2_ Initial parti diagram By author

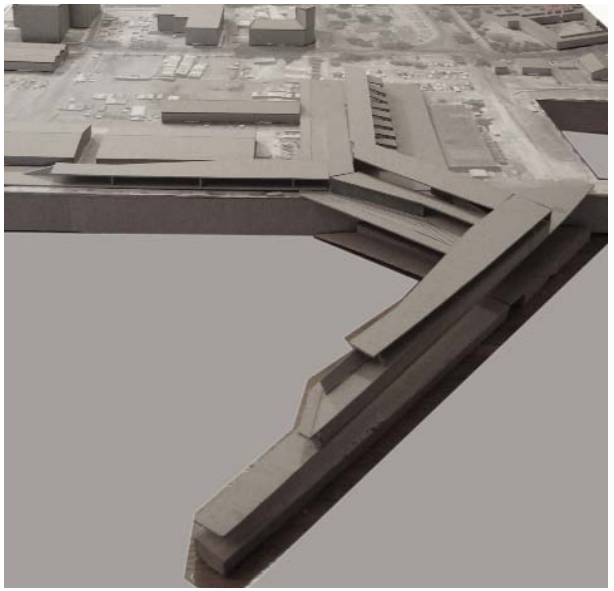


fig. 5.3_ View of first iteration model from the southern side

5.4 SPATIAL EXPLORATION OF CONCEPT

The spatial exploration of the concept was done using rough conceptual models. This allowed for three dimensional exploration of the intentions. These models proved useful to gain an understanding of scale and spatial qualities.

5.4.1 First Iteration Model

The intention with the first model was to explore the notions embedded in the initial parti diagram in three dimensional spatial media. The marrying of different users including the possibility of combining ferry commuter and cruise ship travellers in one facility.

The model investigated the connection between land and sea. The approach was to extend the land into the sea. In addiiton the model investigated the marrying of different user groups into one facility and explored different levels and planes for these different users. The iteration also explored the architectural translation of contrast, light and shadow, solid and void, land and sea.

Through this model it became clear that extending into the sea was inappropriate to the site and context. In addition the scale of the structural intervention required was firstly inappropriate to the design intention and secondly would be a particularly costly exercise.

_ Design Conclusions

- Building out into the water is unsuitable in the current context. It requires an intensive structural intervention to support a cruise ship exposed to wind and currents, and it compromises the shipping approach into Maputo and Matola ports.
- The connection of the building to the urban square requires more detailed consideration.
- The pragmatics of how the users of the facility move through and to the building should be considered.
- Building out into the water is not an appropriate solution. However, the need for increased waterside access for boats still needs to be addressed.

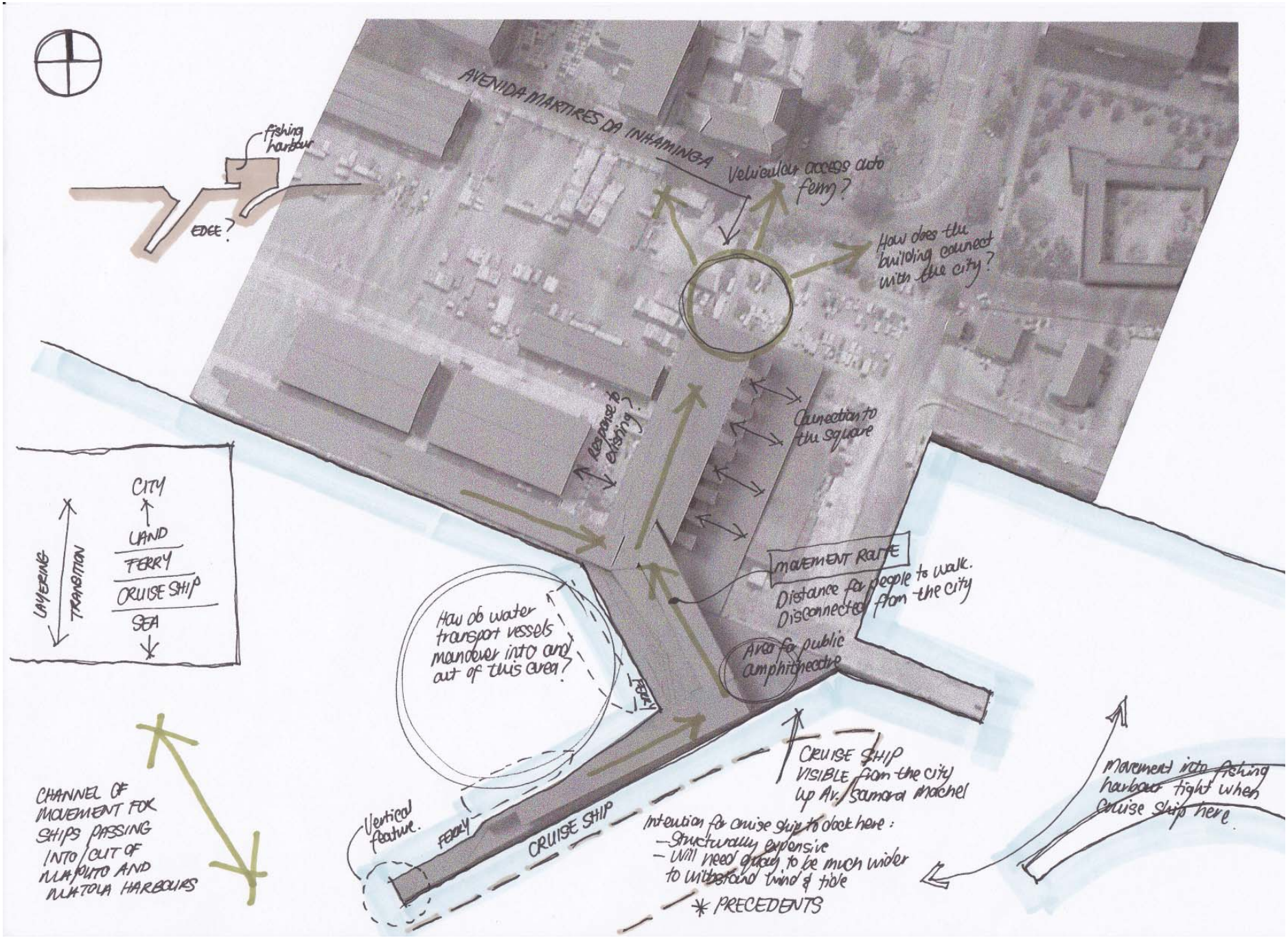


fig. 5.4_ Conceptual investigation of first iteration model showing findings, lessons and pitfalls.

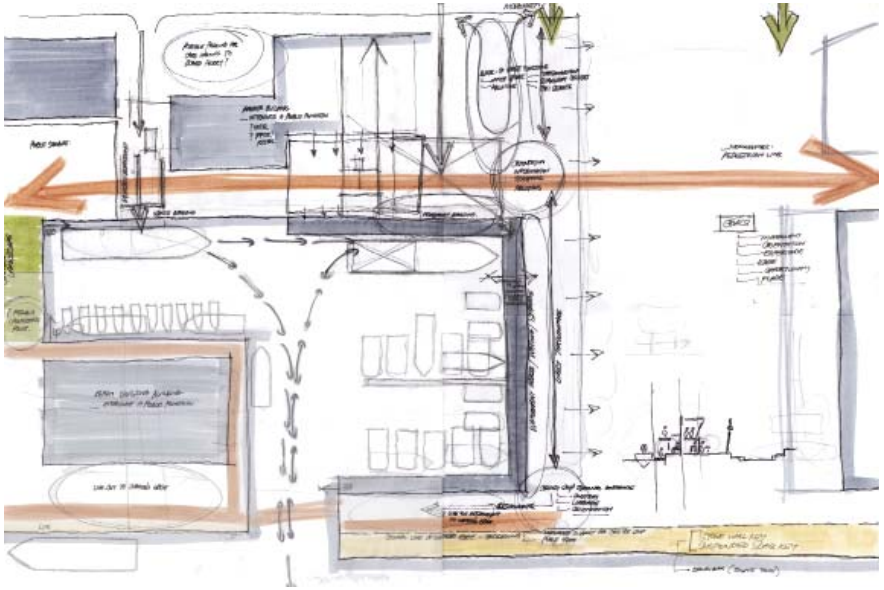


fig. 5.5_ Spatial exploration of site potential during second iteration

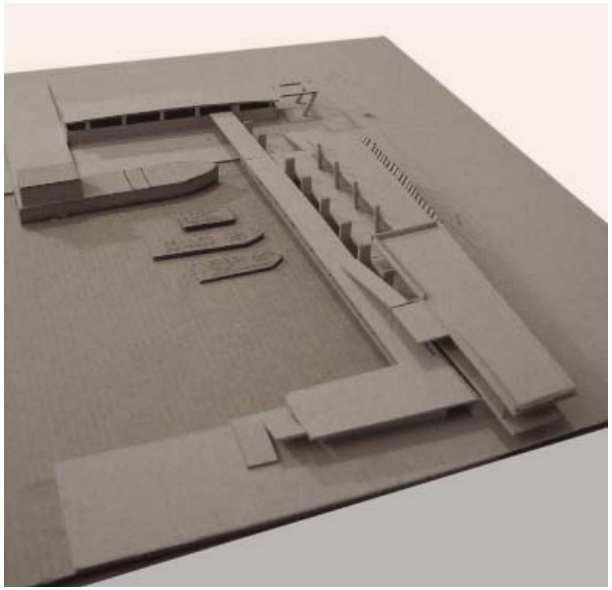


fig. 5.6_ Second iteration model

5.4.2 Second Iteration Model

The second iteration responded to the lessons learnt from the first iteration. The first major change stemmed from building out being an inappropriate solution. The second iteration thus increased waterside edge by cutting into the existing edge to form a new harbour and settling the proposed building alongside it. This approach allowed for sufficient waterside access for boats and proved economically more viable and contextually more appropriate. A harbour study comparing world-wide precedents with the norms in Maputo discussed in Chapter 3 was part of this iteration.

Spatially, the exploration in this second iteration again dealt with movement. It again tested the possibilities of movement routes on different levels including roof access, with movement between the planes occurring via ramps. The iteration also included the design intention of commuter users and cruise ship users being accommodated in the same building.

The spatial investigation in this iteration revealed that a terminal building is more successful as a linear building and that a corner building is unsuitable. It became clear that a linear building parallel to a body of water would best serve the programmatic function of the facility.

The model result was very rigid and formal but was a useful step in the iterative process.

It clearly revealed the need to better resolve the practicalities of how the large ferry and smaller water taxis manoeuvre themselves alongside the building.

_ Design Conclusions

- A linear building typology that avoids right angles is most suitable.
- Practicalities of how the boats move in and out of the harbour are important design informants.
- Each user type must be investigated and designed for. This includes an understanding of how vehicles and pedestrians move through the building and board the vessels.
- It is important to acknowledge the experiential impact of water, and investigate how to design for building users interacting with it.

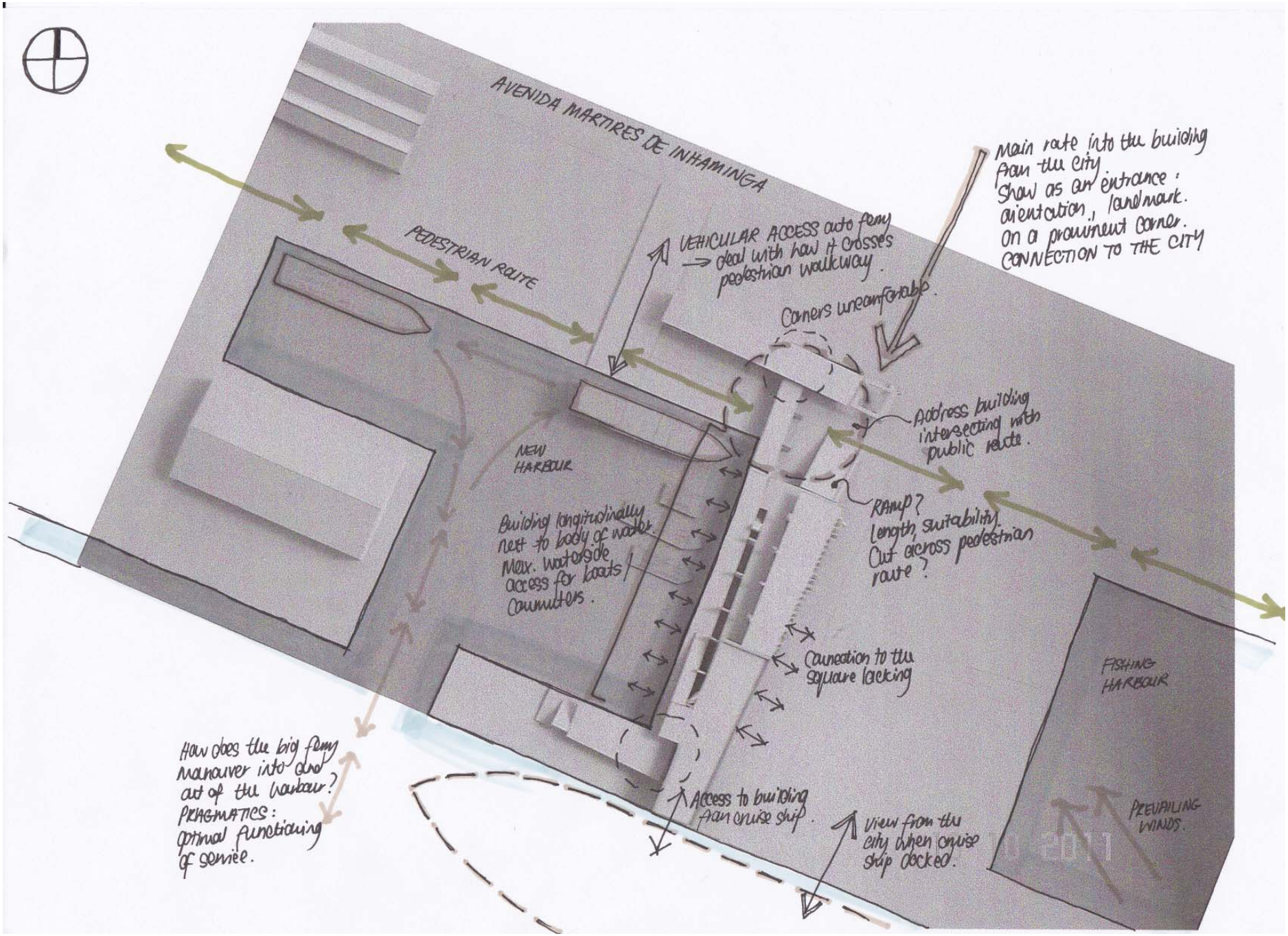


fig. 5.7_ Conceptual investigation of ideas and shortcomings shown on the second iteration model

fig. 5.8_ Third iteration model, southeastern facade

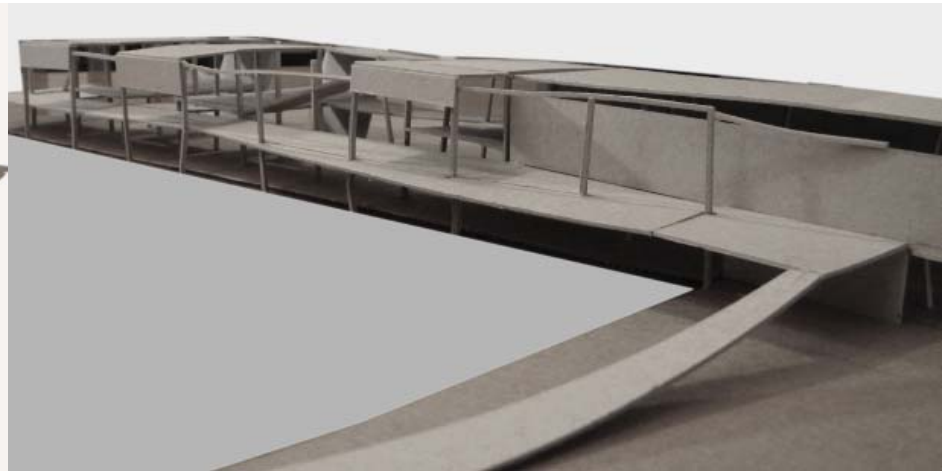


fig. 5.9_ Third iteration model, northern facade onto harbour edge

5.4.3 Third Iteration Model

The third iteration used a 1:200 scale, increasing from the previous two iterations at 1:500 scale. This investigation expanded on the second iteration allowing for spatial issues made evident in the previous model to be better explored. This concept model was adjusted to create a linear building.

The increased scale of the model greatly increased clarity of design issues. During this iteration five main design issues emerged. The first issue related to the exploration of a movement route one floor up, parallel to the ground plane. The model revealed this not be an appropriate design decision. The reason being that removing the public from the ground plane contradicts the intention of catalyzing the public place through large numbers of people.

Inhabiting the roof was the second issue that was shown to be unnecessary for similar reasons. By introducing public access to the roof the success of the substantial ground plane public space as proposed in the urban plan would again be compromised.

The third issue that was revealed in this iteration was the notion of access to different levels via ramps. This proved unsuccessful as the ramps cut public spaces off from each other and inhibited public movement routes.

The fourth issue revealed in this investigation led to a reconsideration of the ferries' relationship to the building as this is critical to the optimal functioning of the transport system. Understanding of how the water vessels move, and in what way pedestrians and vehicles interact with the vessels would be critical to the design resolution.

The fifth issue that became clear was that within the functioning of the building as part of the larger waterfront precinct, the cruise ship would be optimally catered for west of the ferry terminal site, independent of the ferry transport building.

The third iteration again made it clear that the form needed to be better articulated through the movement needs of the user.

_ Design Conclusion

- Main public movement is most appropriate on the ground plane
- Ample public space at ground level makes inhabited roof unnecessary
- Ramps as mode of entry are unsuitable as they fragment the spaces.
- The cruise ship travellers should be accommodated elsewhere as the functional needs and typological expression of a cruise and ferry terminal are different and not suitable for combining on this site and in this context.

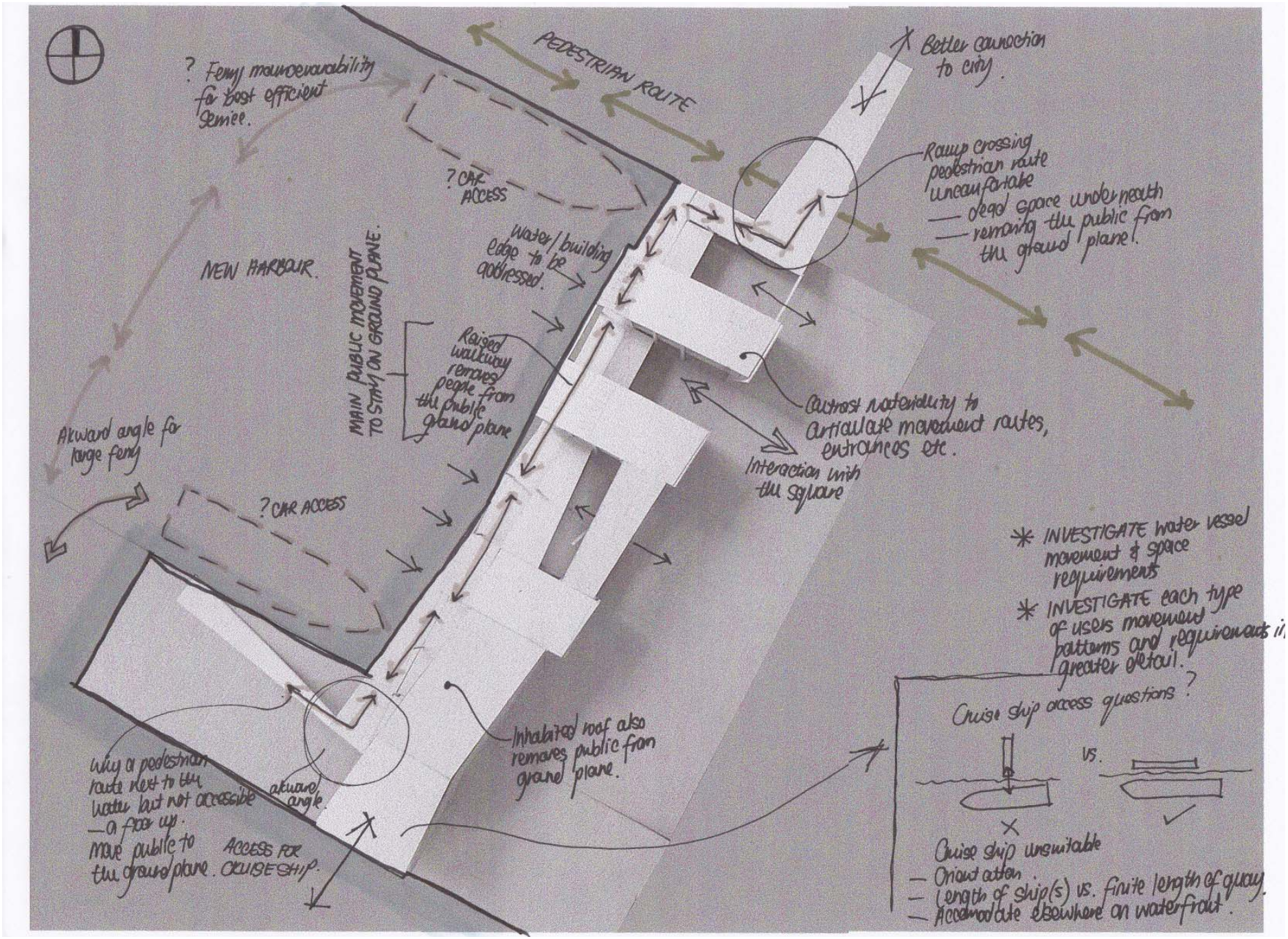


fig. 5.10_ Conceptual investigation of ideas and shortcomings shown on the third iteration model

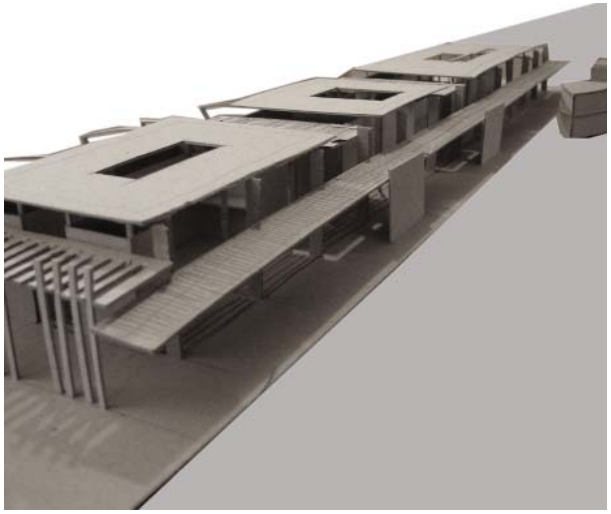


fig. 5.11_ Fourth iteration model, northern facade onto harbour edge

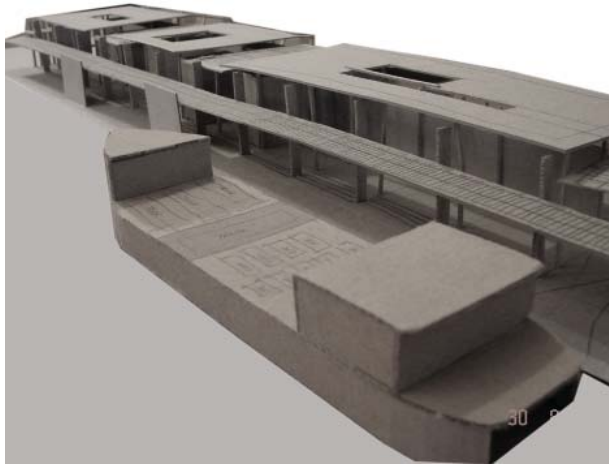


fig. 5.12_ Fourth iteration model, northern facade onto harbour edge, from southern perspective

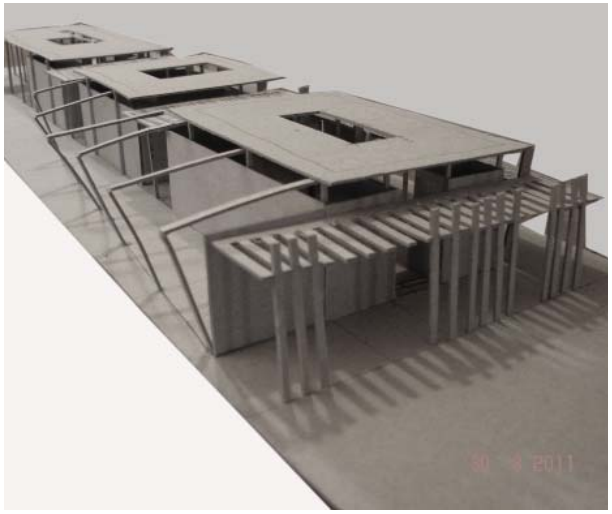


fig. 5.13_ Fourth iteration model, southeastern facade

5.4.4 Fourth Iteration Model

The fourth iterative spatial model consolidated the lessons from the previous three iterations.

Firstly this investigation focused on the spatial implications of bringing the consolidated public surface back down to the ground plane and secondly how the building would connect with the context on all sides, namely the harbour to the northwest, open sea to the southwest, the public urban space to the southeast, and the connection to the harbour precinct and city on the northeastern edge.

Requirements in terms of movement, orientation, climate and functional aspects were also redefined as well as the effect of any level changes on those with disabilities.

The final spatial iteration was then tested against the requirements of the user, ensuring that the design was user- and movement-driven rather than form driven.

Finally the model made the need for attention to edge conditions clear: this design is about threshold.

_ Design conclusions

- User movement is the important driver behind space planning in the design
- Definition of entrances and other means of orientation within the building are important. An ordering system is required through the site, as the design execution of the building is linear.
- The treatment of edge conditions requires attention which must focus on threshold.

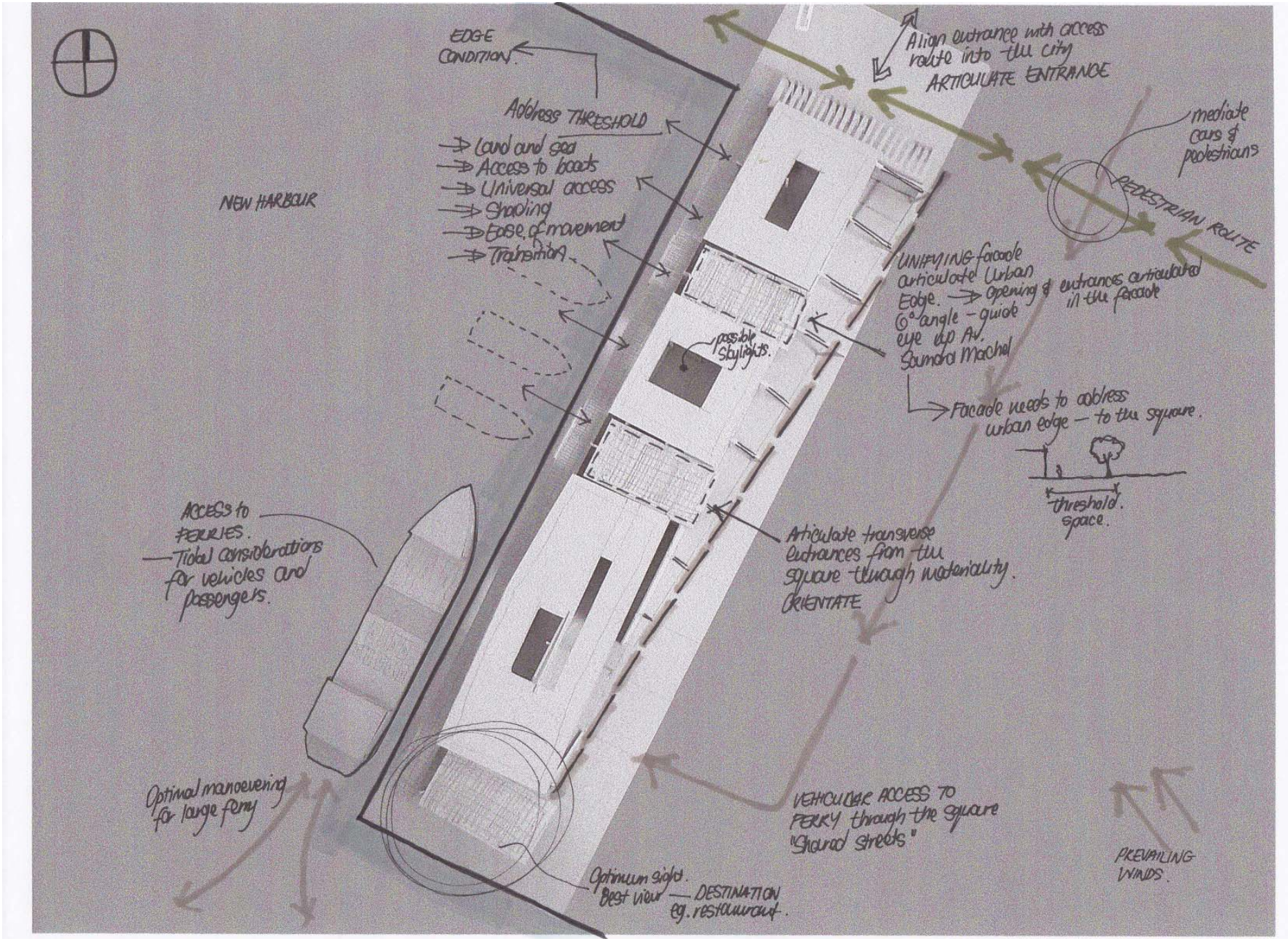


fig. 5.14_ Conceptual investigation of ideas and shortcomings shown on the fourth iteration model

fig. 5.15_ Conceptual exploration of waterfront precinct spatial development opportunities

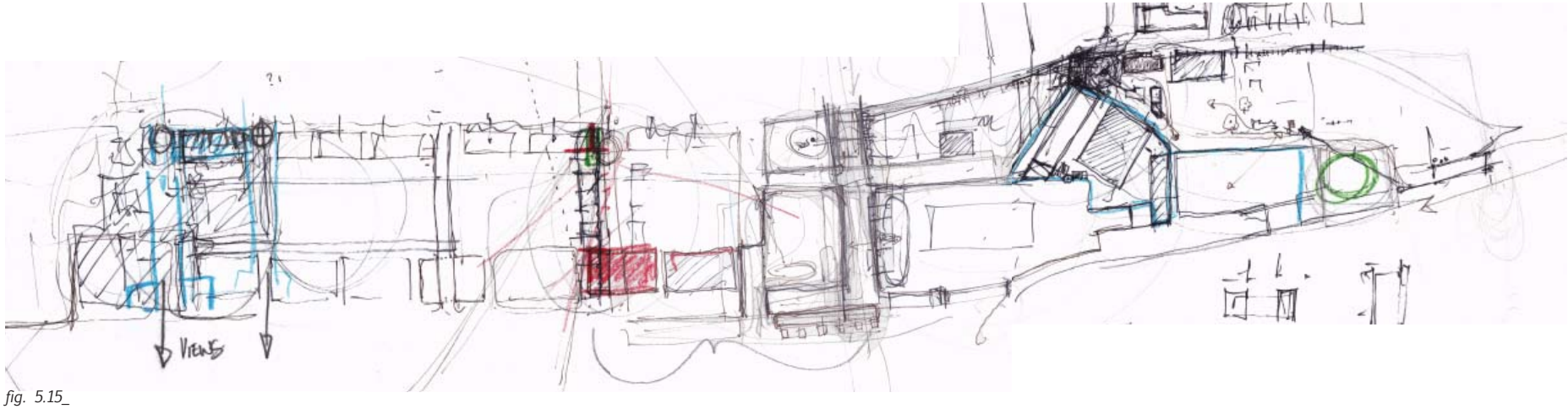


*fig. 5.15_*

5.4.5 Iterative exploration of concept translated to waterfront precinct scale

The conceptual conclusions reached through the iteration process are explored in figure 5.15, with the conclusions illustrated in figure 5.164. The figure depicts the water transport facility and harbour integrated into the context. The harbour is shown as zoned into clear areas of use. Additionally it shows exploration of the development of the waterfront, as discussed in greater detail in Chapter 3, referencing the new cruise ship berth.

*fig. 5.16_*

fig. 5.16_ Iterative exploration of waterfront precinct spatial development

fig. 5.17_ Conceptual diagram of waterfront precinct intentions By author

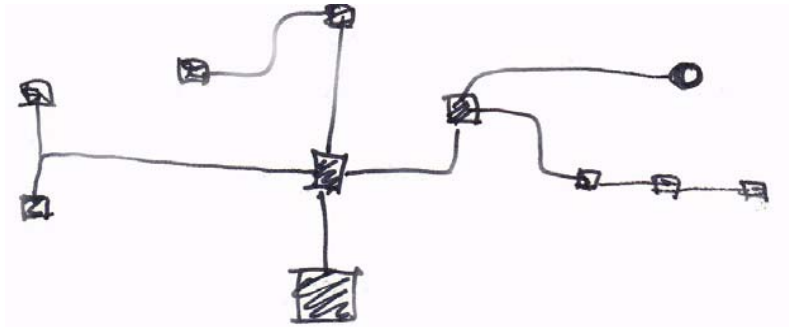


*fig. 5.17_*

Existing Buildings retained
Adaptive reuse to keep character of the precinct

New buildings
Anchor buildings to bring in capital - help fund the project
?private investors

Ferry terminal building

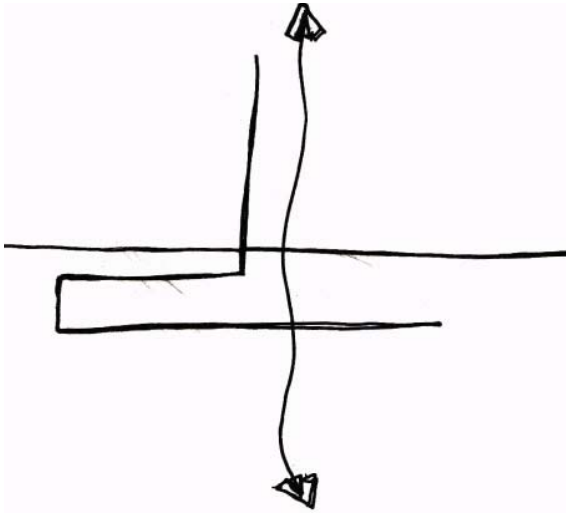
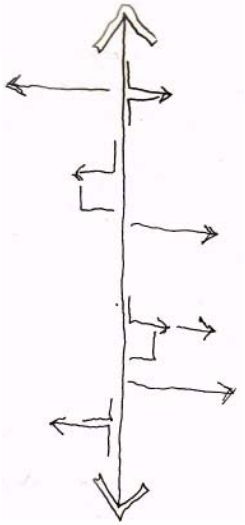
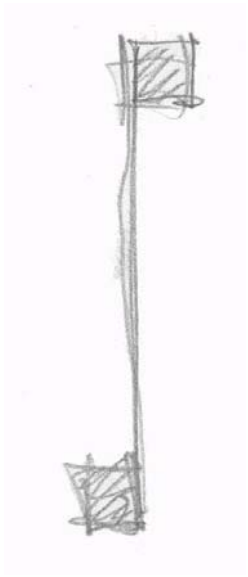





fig. 5.18_ Series of concept sketches showing development of the parti diagram during the iterations

5.4.6 Conclusion of the iterative exploration of the concept

Each iteration aided in refining the complex balance needed in this design. The balance firstly required that the building not be designed as an object in space, but be integrated into the context on all sides, namely the square, the sea, the harbour and the Baixa.

From a more pragmatic perspective the balance recognized the transport planning as important, but equally important is the building's relationship to the Baixa and its role as catalyst and anchor of the waterfront redevelopment.

The key objectives of the design are then identifiable as:

1. Provide for the optimal functioning of an expanding water transport system
2. Provide universal access to water transport, which was not so at the current terminal
3. Design for the user by identifying the different user requirements
4. Design the building and its relationship to the surrounds as a catalyst for placemaking at the new Waterfront precinct. Edge conditions are particularly important.
5. Design an architecturally integrated building acknowledging the diverse contextual dimensions of the place, to produce an architecture of fit.
6. A loose-fit building with infrastructural service cores and plenty flexible movement space allows for flexibility.

5.5 CONCEPT REFINEMENT

The iterative process refined the concept and defined what the building needs to be and needs to provide. The initial concepts of threshold, movement and connection were recognized as fundamental to a balance in the design.

In addition the balance between the building's role as terminal and its role in catalysing waterfront regeneration must be retained and developed.

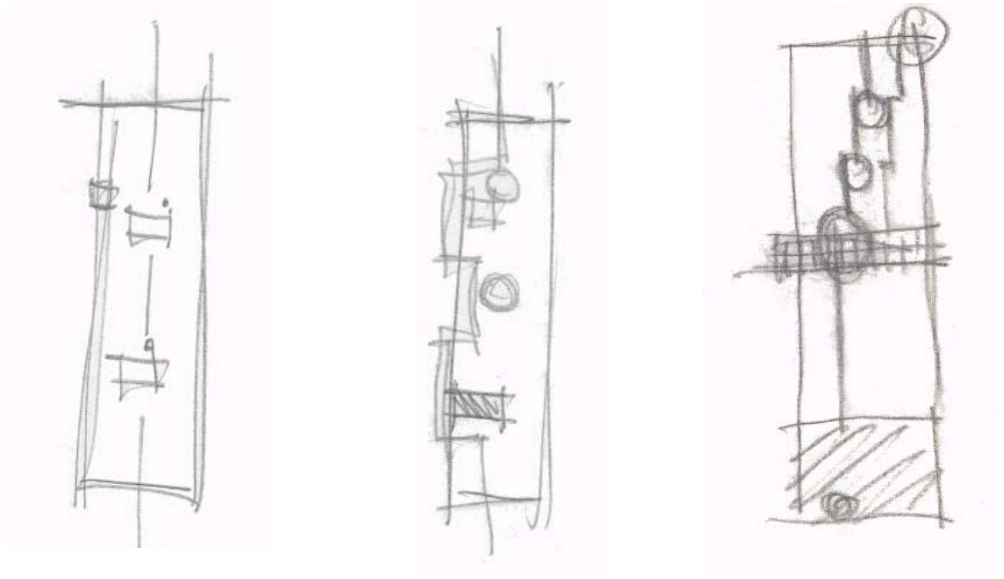


fig. 5.19_ Sketch showing conceptual refinement

The conceptual conclusion was thus for a loose-fit building which allows for flexibility and changeability. A frame with infill was found to be an appropriate approach. Service cores anchor the building with movement space, allowing for change and informal adjustment according to needs, as well as providing maximum possibility for interaction and accidental encounters between users. Thus allowance is made for placemaking.

Fundamentally, the importance was placed not on what the intervention IS (form) but what it DOES (for the user).

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Within the broad framework the concept is tested as to how the space will provide for each user. The transport user remains the driver of the facility but is complemented by a recreational and a destination user. This mix of users will bring the local and the global; the formal and the informal into contact with each other, as discussed in greater detail in the theory chapter.

5.5.1. Transport User

The category 'transport user' can be broken down into three broad categories, as discussed in preceding chapters. The movement patterns of transport users of the facility are mapped in general terms in figure 5.20, showing the predominant use of the water side of the building.

The first category of transport user is an infrequent traveller or tourist who requires orientation and has some time for recreation.

The second category is the long distance commuter, using the facility as part of a regional travel itinerary. These individuals require ease and amenities, but may also engage in recreational activities.

The third category is the daily commuter and forms the bulk of people using the facility. This group requires ease, and the use of amenities provided.

Fundamentally, all travellers require ease of movement through the building and between the building and the ferries. A clear, unobstructed choice of movement routes through the building to and from entrances to water transport vessels is necessary.

5.5.2 Recreational User

The recreational users are less predictable as they may have time to meander through the building by choice. They may be using the building with no intention of using of the transport facilities associated with it. Thus figure 5.21 depicts possible flexible movement routes for this category of user towards destinations such as restaurants and cafés within the building. The recreational user may also be drawn into the building through connections with the city and the waterfront pedestrian routes.

5.5.3 Destination User

In an attempt to create lively public space at a transit point where transport, recreation and commercial activities all merge, the destination user was a very important driver behind the design. Thus this user relies on what the building provides as a means of livelihood. This user ranges from a formal retailer to the informal trader appropriating in-between space.

Figure 5.22 depicts indicative movement routes of this user category, with markers indicating point of sale.

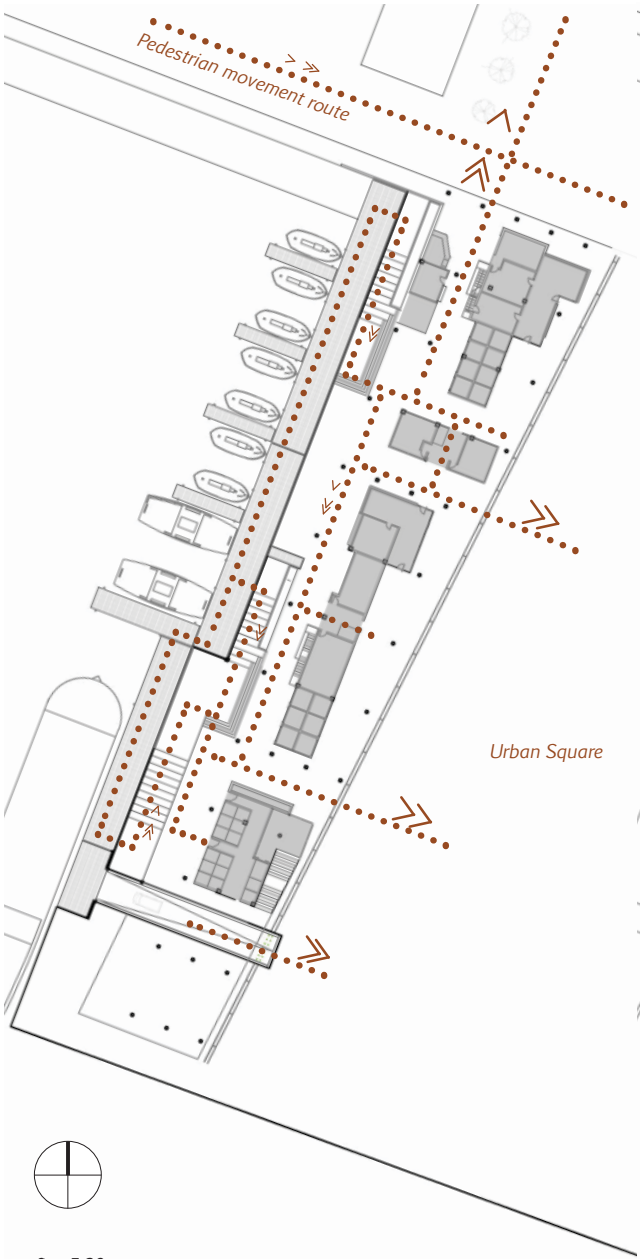
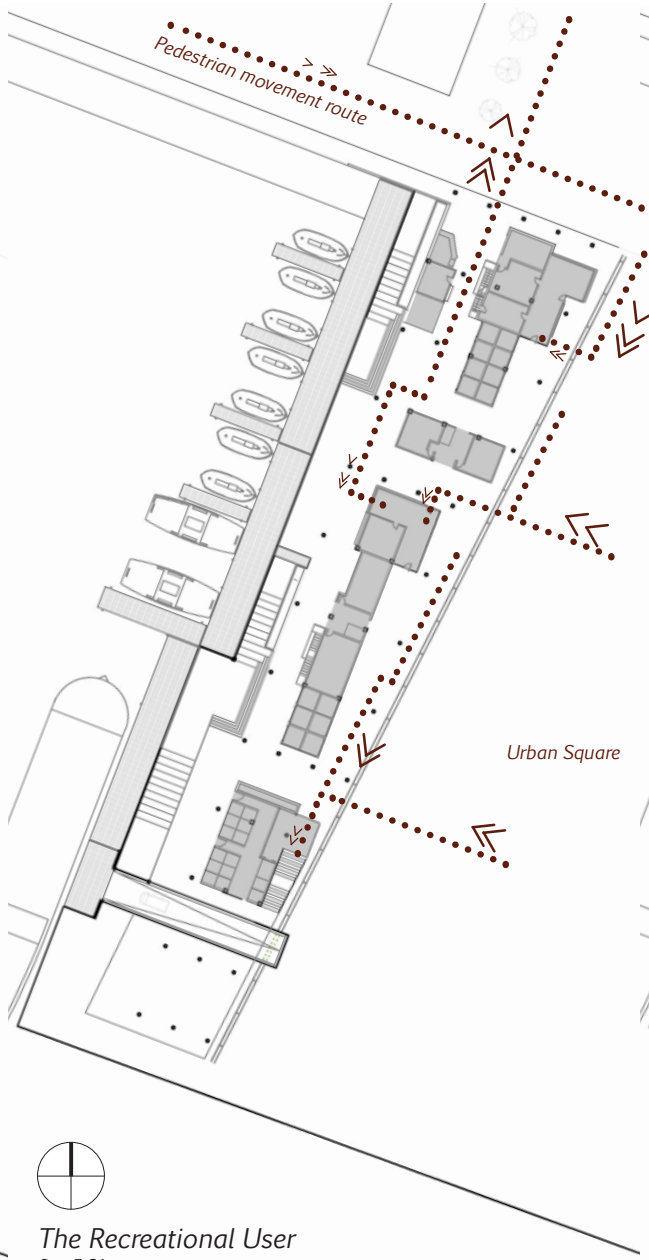
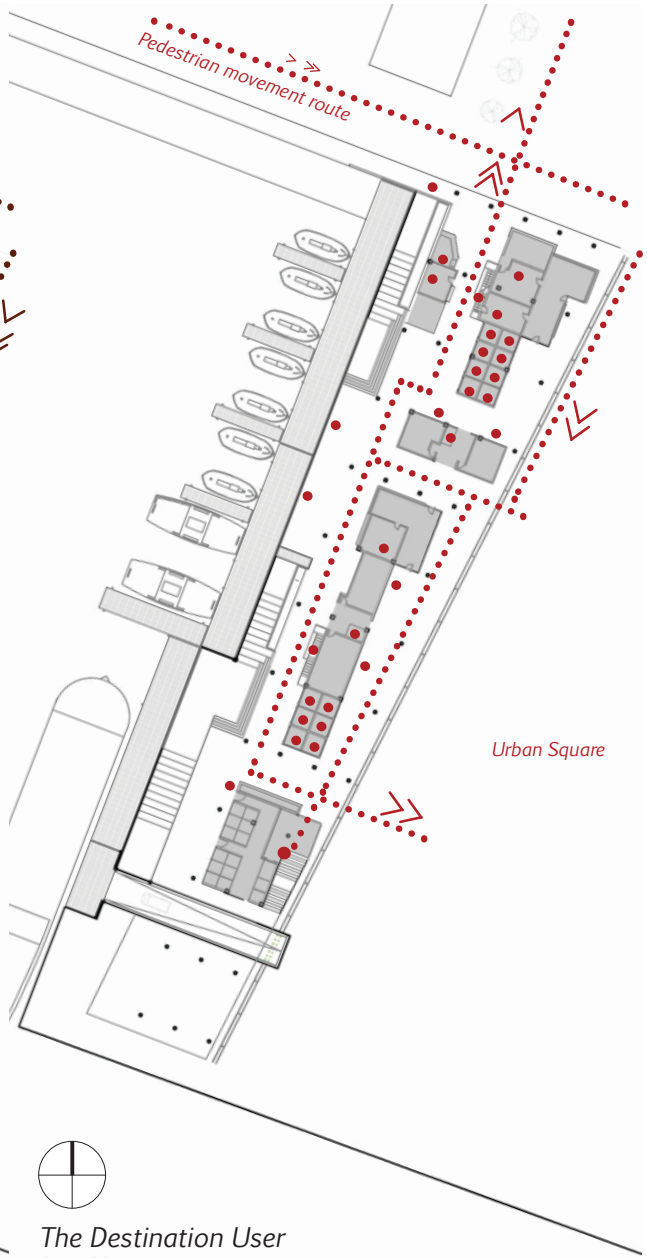


fig. 5.20_



The Recreational User
fig. 5.21_



The Destination User
fig. 5.22_

fig. 5.20_ The Transport User. Map depicting the projected predominant movement patterns of this category of user within the building. Linear movement predominantly occurs on the northwestern travel edge.

fig. 5.21_ The Recreational User. Map depicting the projected predominant movement patterns of this category of user within the building. Unpredictable movement patterns lead towards destinations such as restaurants.

fig. 5.22_ The Destination User. Map depicting the projected predominant movement patterns of this category of user within the building. Movement predominantly occurs directly to place of work. Markers indicate point of sale.

5.6 PRECEDENTS

5.6.1 Baragwanath Transport Interchange

Soweto, South Africa
Urban Solutions Architects

This precedent is relevant as it focuses on the movement of large numbers of people as the design generator and ordering system. It was chosen to better understand the increased formalization that occurs around transport interchanges of a traditionally informal nature.

The Baragwanath project provides for one of the busiest transport nodes in South Africa. The facility is located opposite the Chris Hani Baragwanath Hospital, one of the largest of its kind in South Africa

The planning principle for the building is centered on a covered arcade which acts as an orientating spine along the length of the intervention. It stretches for over 1300 metres, and is on average only 50 metres wide. The arcade acts as the binding element onto which all functions and amenities are attached.

The facility's length is differentiated spatially through functions clustered along its length. Entrances and orientation are emphasized by focal towers colourfully mosaiced by local artists. (Urban Solutions, 2006:045) Variations in height articulate public spaces and break the continuous snake of commuters. Designated places provide the infrastructure for markets, ablutions and seating. A variety of trading stall sizes and configurations cater for different traders' needs.

The robustness required for a public facility such as this is found in the choice of material. The sensitivity and lightness of the geometry however prevent the result being a heavy concrete building. In the opinion of Professor Alan Lipman, "the standard of workmanship is exceptionally polished: joints are neat and surfaces smooth where required... The level of craftsmanship and detail create a happy conjunction." He goes on to state that the building reflects permanency, and respects the ritual of daily commuting by mass transport (Joubert, 2009:141).

The building acknowledges the important and permanent role of a public transport interchange as a gathering place for a large number of citizens.

fig. 5.23_

fig. 5.24_

fig. 5.25_

Lessons learnt:

- Orientation and identification of entrances are crucial to transport interchange facilities
- A building can become a work of artistic expression, whilst still providing infrastructural necessities.
- Incorporating local artwork enhances the sense of identity and ownership of a building by locals.
- The area is accessible by vehicles, but they drive slowly and do not hinder pedestrians.
- Robustness of a public building does not have to come at the expense of craftsmanship. Quality detailing and dignified spaces can be achieved regardless.
- Movement routes and location of amenities require planning for the successful activation of the building length.

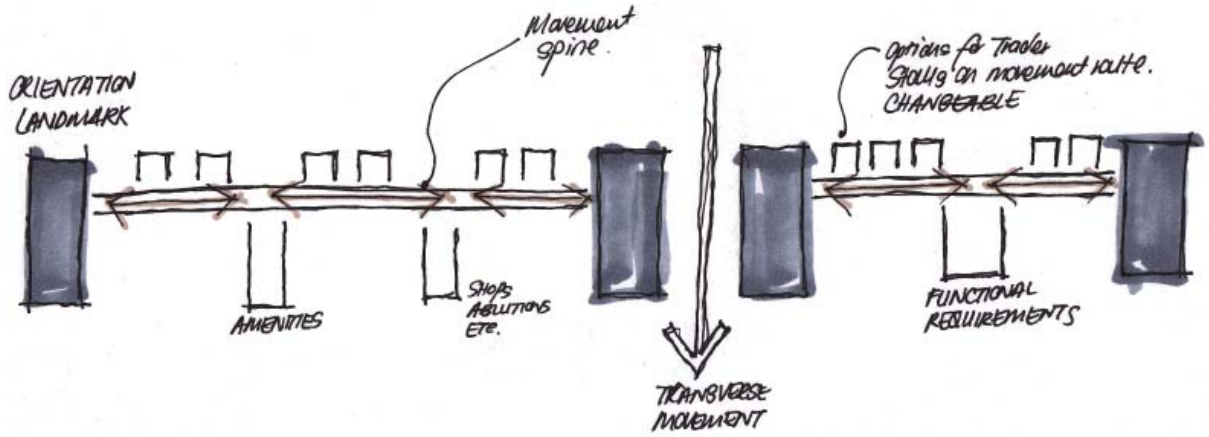


fig. 5.26_

fig. 5.23_ Entrance to the Baragwanath Transport Interchange. The entrance is defined as a landmark to aid in the orientation of users.

fig. 5.24_ The movement arcade allows for trade to take place along its length.

fig. 5.25_ Variations in trader stall size and composition caters for different retail needs.

fig. 5.26_ Conceptual sketch exploring the spatial logic of the plan. By author

5.6.2 Yokohama International Port Terminal

Yokohama, Japan
Foreign Office Architects

The value of this precedent lies in the designers' approach to the interface between the terminal building and public place. The aim of the precedent study is to better understand the merging of these two components.

Although not on the same scale or specific program as this dissertation topic, this precedent also has a common focus on movement and connection of the building to the city.

The Yokohama terminal is located on the waterfront, in close proximity to an urban park.

The brief was for an international port terminal, acting dually as a cruise terminal for visitors and as a public space offering amenities to the citizens of Yokohama. The resultant design is a landscaped public space that wraps around the cruise terminal facility. The symbolic presence as a gateway becomes less important as the functional structure becomes the foundation for a public space. The dynamics of movement were a departure point in the design process (Moore, 2002:67).

The aim was to investigate a new possibility for mediation, whereby the two components laid out in the brief become integrated, challenging the borders of segregation usually implemented in such a scheme (Unknown, 1995:19). "The citizens and the passengers are weaved through the

fig. 5.27_ Aerial view of yokohama international port terminal

enforcement of connections between their respective circulation systems. The relative position of the terminal facilities and the equipment for urban leisure is reversed to increase the interaction between the two systems" (Unknown 1995:19).

The main building houses the departure and arrival facilities, including ancillary facilities required; one level below houses parking facilities; the roof level is designed as an urban park for pleasure, allowing for views back over the city. The park is a combination of soft landscaping and sculptural timber decking. The main terminal space allows for flexibility through the cruise-ship related infrastructure being removable. Thus the space becomes multi-functional.

The project is essentially a cruise terminal. It provides a connection to the water and a sense of arrival whilst fluidly providing a threshold for visitors and locals.

Lessons learnt:

- Successful integration of and provision for different user groups occurs as the building challenges the borders between programmed building and public space. This lesson can be reinterpreted within the African context of Maputo.
- The precedent is a successful example of movement and fluidity translated into architectural form
- Flexible use of space successfully reduces the risk of space not being used when a ship is not berthed at the facility. This can be interpreted at Maputo in providing a facility that exists due to the presence of water transport, but simultaneously caters for stand-alone programmatic functions.

5.7 ARCHITECTURAL DESIGN IMPERATIVES

The design challenges requiring investigation at an architectural level are connection, orientation and interaction, mediation and contextualism. These four fundamental design imperatives are individually considered in sections 5.8 to 5.11 following.

5.8 CONNECTION

The theme of connection was addressed in the design development by investigating the edge conditions of the building. The contrasting edge conditions on the southeast and northwest of the building as well as the public space to the east are particularly important.

The northwestern side of the building is referred to as the 'travel edge' as it is the threshold between the building and the water.

The southeastern side of the building is referred to as the 'public edge', as it is the interface of the building with the public square. Located to the east of the building, the character of the public square to the east of the building, and how the building communicates with the square is investigated.

5.8.1 Travel Edge

The design considerations for the travel edge involve the movement of large numbers of people. The design aims to celebrate the water's edge, providing opportunities for engagement and appreciation between the user and the water.

The tidal range in Maputo is in excess of 3.7 metres. In a design sense this significantly influences the access to boats for both vehicles and pedestrians, as one of the horizontal planes are constantly moving. Precedents of moving buildings were investigated but found to occur in areas with minimal tidal ranges. The tidal range in Maputo amounts to change of over a story in height.

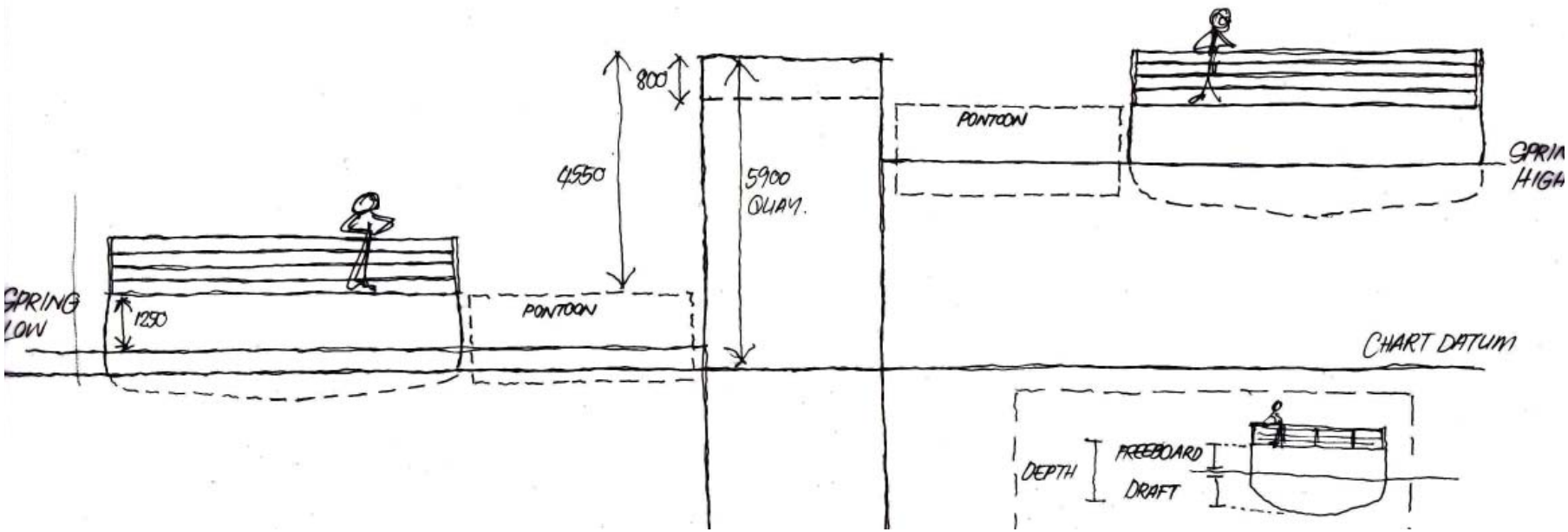


fig. 5.28_ Sketch depicting the tidal range of Maputo, and the dimensional change between land and sea.

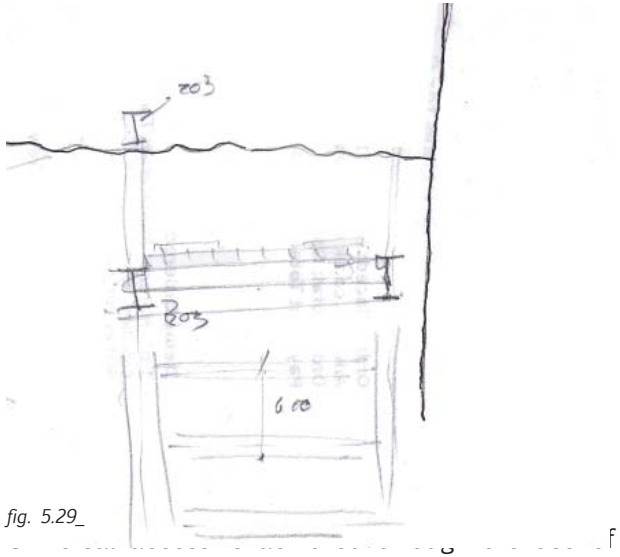


*fig. 5.29_*

_Pedestrian Access

The design must provide public access to the ferries at all tidal variations.

The use of a ramp for pedestrian access to the pontoon was investigated and ruled out. The length of the ramp required to cater for the 1:12 universal access ramp slope at spring low tide was in excess of 40 metres. In addition, the structural support required for such a ramp would need to be movable and mounted on rollers to allow for tidal variations. The ramp would form a barrier rather than a connector between the building and the sea. This compromised the design intent of connection to the water.

Stationary steps proved to be the optimum design solution, providing threshold, connection and possibilities for sitting and engaging with the water.

The steps were designed with a generous tread, acting as individual landings. Pontoons floating alongside the steps rise and fall with the changing tide, thus access to the pontoon and subsequently the water transport vessels is possible at any tidal stage from the step nearest to the level of the water.

In this way water was used in the design to emphasize the passage of time through changing tides throughout the day. As the tide rises, so the pontoons float upwards, and the steps disappear to form pools of water adjacent to the building.

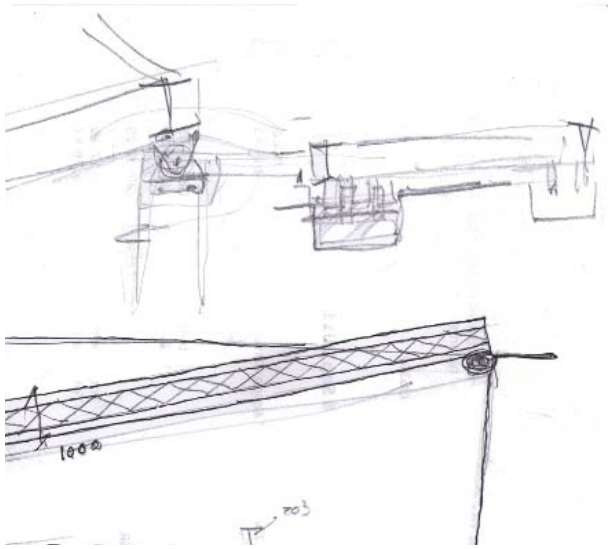
_Universal Access

The design decision to use steps to ensure the pontoons and water transport vessels are accessible to pedestrians required universal access to be addressed. The requirement is for access between the fixed building level and the changing levels of the floating pontoons.

an outdoor wheelchair platform lift. The wheelchair platform mechanism is based on lifts available commercially, which are suitable for outdoor application and do not require invasive building works. (Handson LIfts, 2011). The lift will be fitted with a sensor to ensure that it comes to a halt at the correct required level according to the changing tide.

To ensure maximum safety for the user, design considerations will include safety railings and a non-slip surface.

The lift is centrally located midway along the length of the travel edge to ensure minimum distances to any of the water transport vessels.



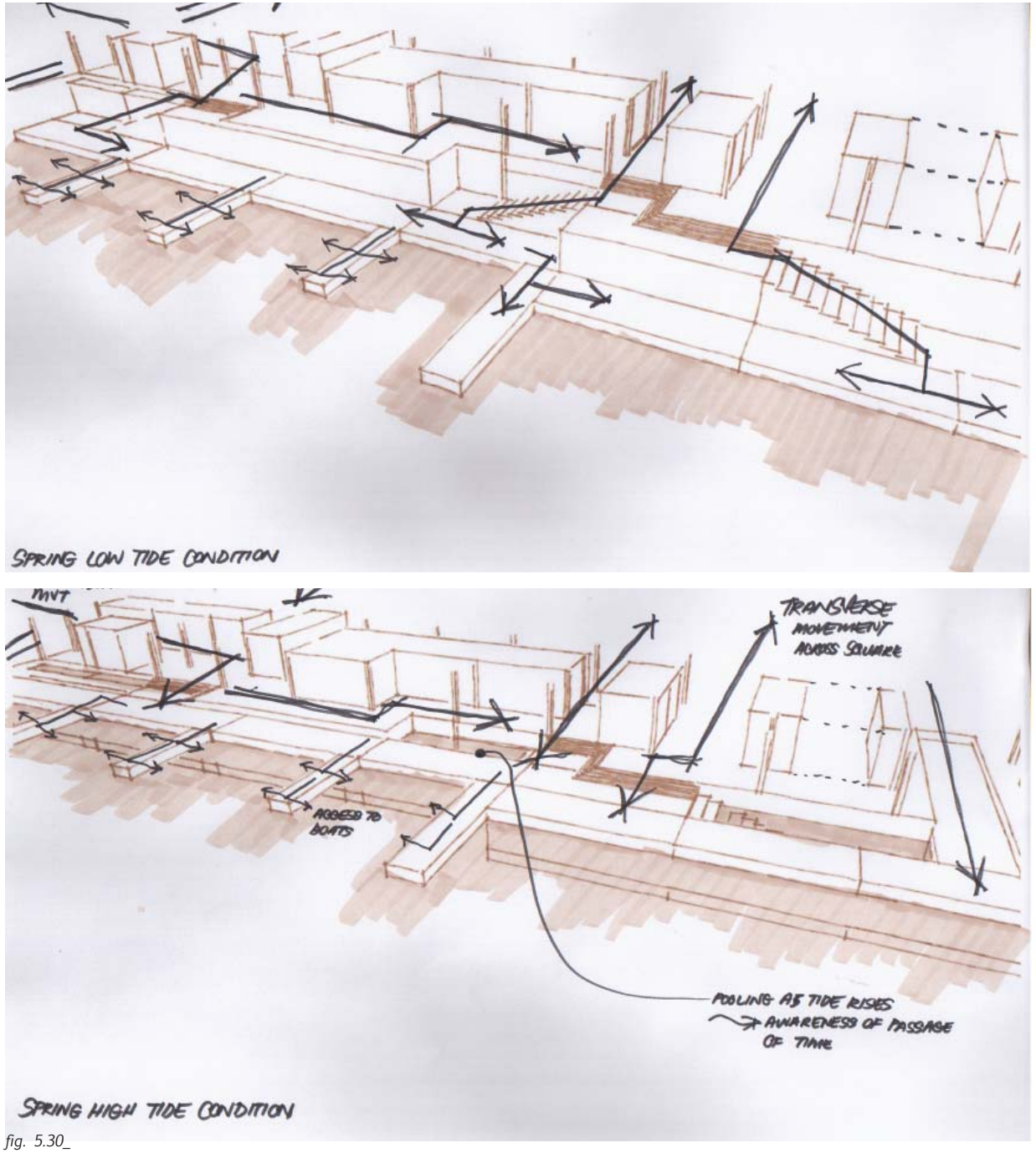


fig. 5.30_

fig. 5.29_ Technical investigation into vehicular ramp detailing

fig. 5.30_ Design exploration into the effects of high and low tide on the building's public interface between land and water

_Vehicular Access

Vehicular access to the large ferry must be able to accommodate cars and light trucks. The current facility provides vehicular and pedestrian access to the ferry from the same point, causing congestion and bottlenecking at peak times, with vehicles posing a danger to pedestrians.

The design proposal here is to provide separate and controlled vehicular access to the ferry via a dedicated ramp. The structure of the vehicular access ramp is based on that of the current ramp, which proves to be a successful solution for cars getting onto and off the ferry. The detail design of the ramp will be subject to a Marine Engineer's investigation.

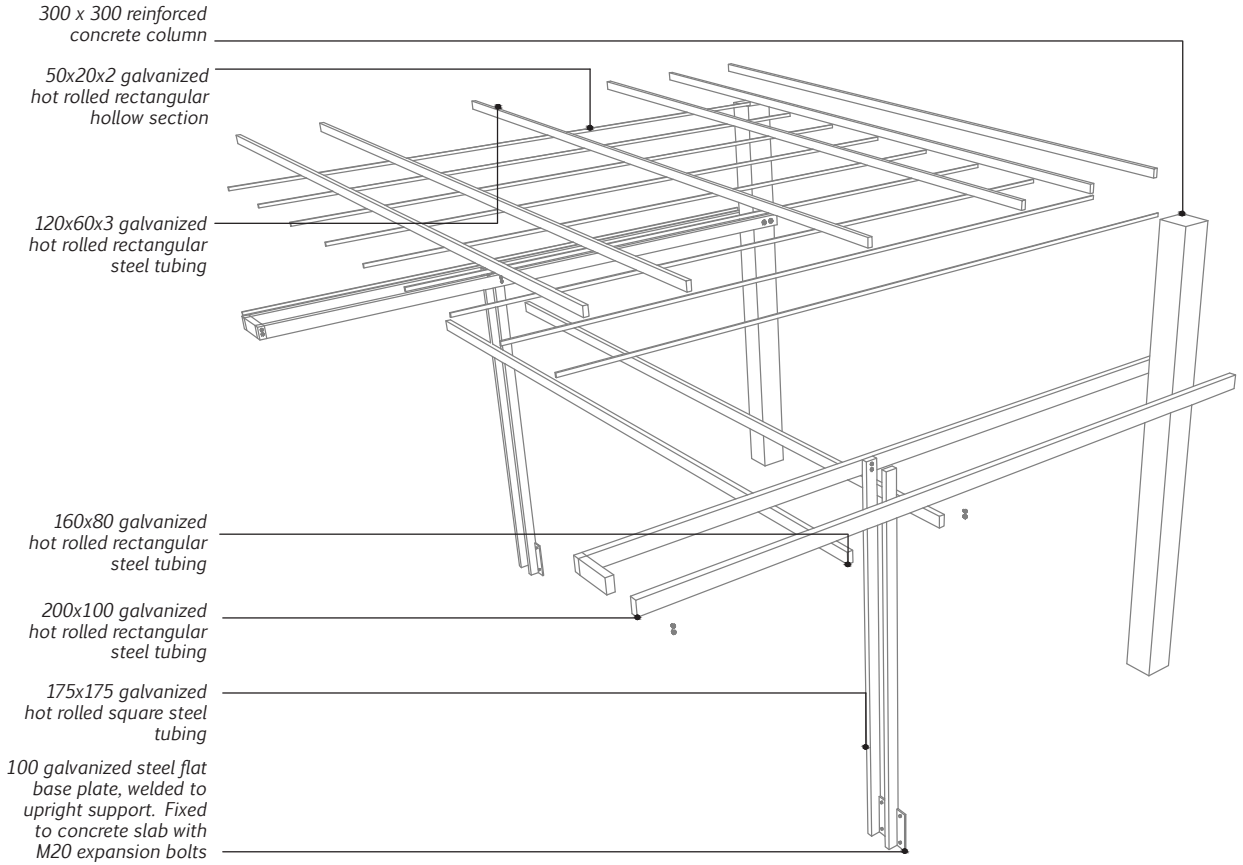
fig. 5.31_ Senecio Tamoides (Canary creeper)

fig. 5.32_ Detail of pergola on Travel Edge

_Commuter thermal Comfort

Shading of the northwestern travel edge gives passengers relief from the heat and humidity. As the site is a typically hard urban precinct, greenery is introduced by planting a pergola to provide shade.

The plant suggested for the pergola is *Senecio tamoides,* commonly known as the Canary creeper. It is an evergreen perennial, capable of climbing several meters. The plant occurs naturally in the Maputo region and thrives in the warmer climate. It grows in full sun, and as it is a hardy plant it is particularly well suited to this harsh marine environment. The scented canary yellow flowers bloom in clusters during late summer and early autumn.



5.8.2 Public Edge

The public edge refers to the southeastern edge of the building, the edge facing onto the public square. As this facade faces onto a flexible event space, the requirement is for a defined urban edge whilst not compromising the movement and access needs of a permeable public building. Deliberate transverse movement into the building from the square as well as filtering in and out through meandering is intended. A facade screen provides a uniform impression towards the city with movement requirements and access through the screen clearly designed.

A second layer of consideration between the building and the public space is the treatment of the car. As vehicular access to the square is required in order for cars to board the ferry, the effect of the car on a largely public space needed addressing. Vehicular access to the periphery of a public square has proved successful at places such as Praca do Commercio and Praca do Rossio, the two main squares in Lisbon.

As the vehicular access here is not a public thoroughfare, but rather a destination specific vehicular track, the proposal is a shared streets approach. This approach caters for a street thoroughfare, by demarcating the space through bollards, seating and planting.

The road is thus not defined in the traditional sense through level changes and painted lines, but is more subtly referenced through paving layout on a continuous surface. This ensures that when cars are not present, pedestrians once again take ownership of the space.

It was important here to ensure connection between different parts of the precinct, thus vehicular access should not become a barrier. Reference was again made to the successful way in which cars and pedestrians co-inhabit the street at Catembe, and at the Baragwanath Transport Interchange.

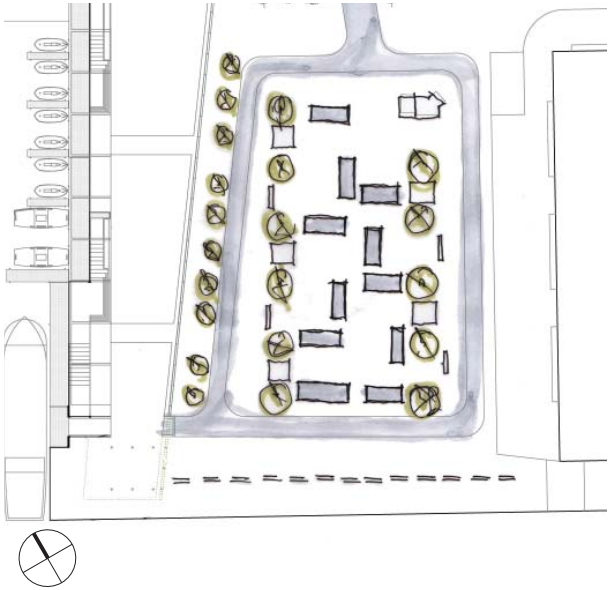


fig. 5.33_ Sketch depicting possible use of flexible public space as an urban market, with traders stalls arranged throughout the square.

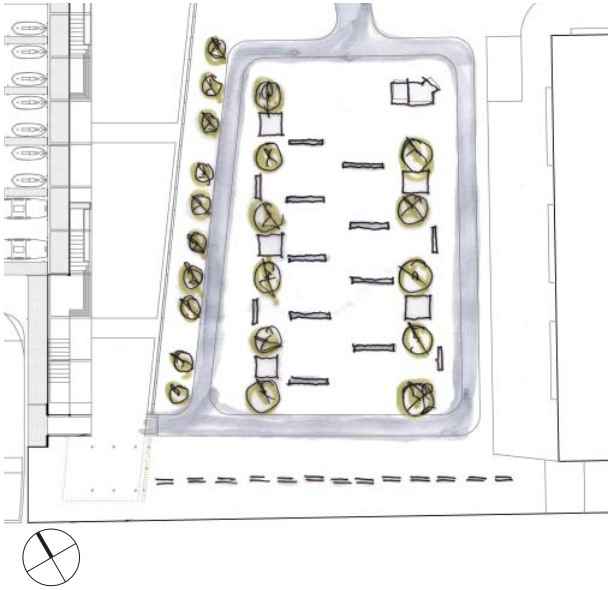


fig. 5.34_ Sketch depicting possible use of flexible public space for outdoor exhibitions, with exhibitions arranged throughout the square

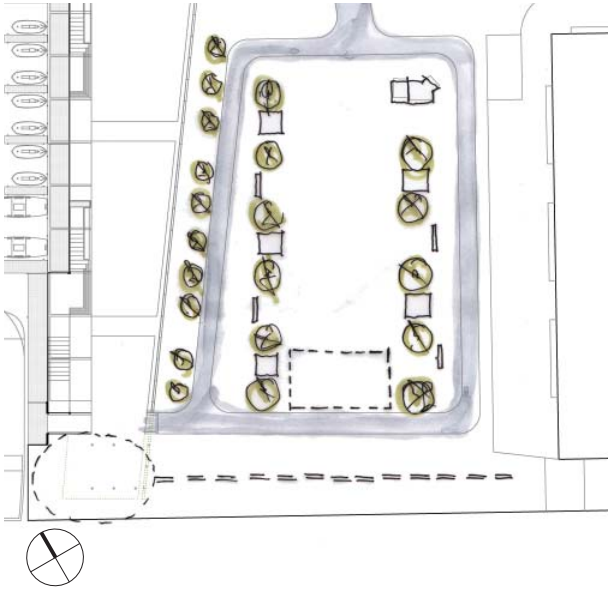


fig. 5.35_ Sketch depicting possible use of flexible public space for public concerts, with a suggested stage location.

5.8.3 Relationship of the Building to the Square

The square design development proposes a largely unprogrammed space. In an African context, large public spaces often function very successfully with minimal programming. A good example in Maputo is the street and public space along the beachfront at the city's outer limits. Very little by way of formal infrastructure exists. However, on weekends the space is packed with people.

The square is framed by the proposed Water Transport building on its western edge, with the newly proposed Fishing facility framing its eastern border. The pair of buildings define the public space between. On the southern side the square is open to views across the bay, revealing passing ships and small boat activity, thus successfully bringing the city back into contact with the water. Avenida Samora Machel, culminating in Praca 25 de Junho borders the square on the north.

The large open space of the square could cater to a variety of uses and public events such as concerts, significant public holiday celebrations, markets, exhibitions, performances and other large group gatherings.

The edge treatment of the square is significant in order to catalyze the use of the space, encouraging the public to take ownership. Seating, planting and refreshment stands will anchor the public square as a destination.

Vehicular movement around the periphery of the square will be related directly to the waterborne transport facility, and service vehicles, with general public vehicles prohibited.

The southern edge of the square is landscaped to provide the public access right up to the interface with the sea. Seating is provided to allow for relaxed enjoyment of the space. The historic railway lines still present on the site are retained and celebrated as a reminder of the heritage of the area.

Although a predominantly hard urban space, the square will be softened with sectional planting and trees to provide shade from the heat and humidity.

5.8.4 Urban Square Design Development Opportunities

1_ *Location of new Fish Facility forming the eastern boundary to the new Urban Square*
2_ *Hotel anchor building*
3_ *Direction of traffic flow in and around the site*
4_ *Vehicular access to site for boarding the ferry*
5_ *Vehicular access control and possible parking*
6_ *Crossing of vehicular access and pedestrian route to be dealt with through bollards guiding access for cars, and paving layout indicating pedestrians have right of way*
7_ *Entrance access to Water Transport Building connecting to street axis into the city*
8_ *Original Portuguese clock tower to be protected. Building to be reused as the square's anchor cafe and information centre.*
9_ *Open space allows for direct vistas to the sea. The unprogrammed space can be used for a variety of events, namely concerts, festivals, holiday celebrations, markets and exhibitions.*
10_ *Kiosks and cafes encourage public recreational use of the space*
11_ *Allowance for public outdoor exhibitions.*
12_ *Vehicular boarding of the ferry*
13_ *Historic railway tracks retained on the site.*
14_ *Public access to the water's edge*
15_ *Planting provides shade.*
16_ *Public walkway with views over the Fishing Harbour*
17_ *Praca 25 de Junho*
18_ *Culmination of Avenida Samora Machel*

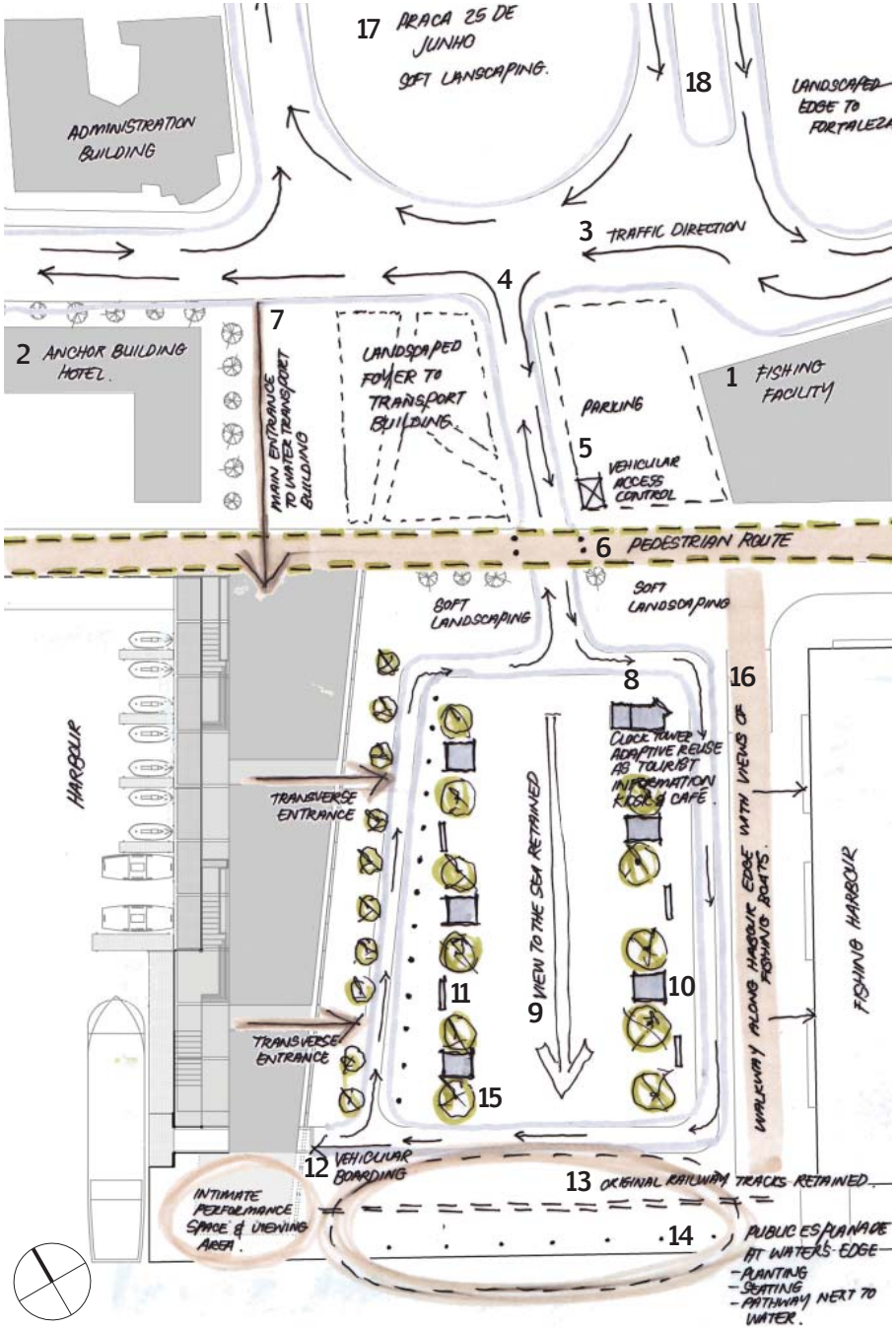


*fig. 5.36_*

fig. 5.36_ Detail development of Urban Square

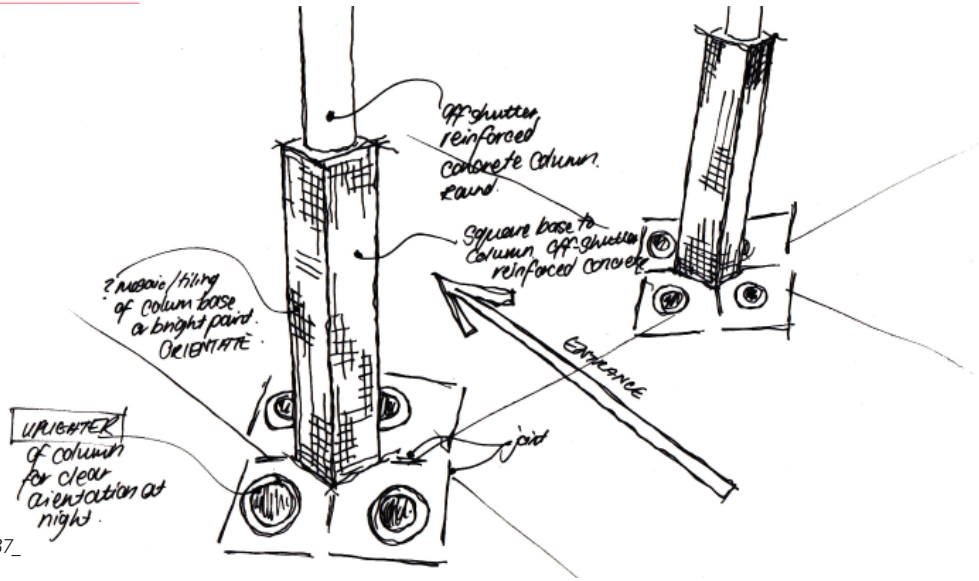


fig. 5.37_ Conceptual exploration of column condition at entrances

*fig. 5.37_*

5.9 ORIENTATION

Of design importance is that the building orientates its users, and provides opportunities for interaction. The building should be clearly navigable.

Movement routes define built fabric in relation to open space. Interaction between users begins to occur through the architectural blend of open spaces, both prescribed and unprescribed.

5.9.1 Orientation for users: ordering system

The building is ordered from very public at the northermnost end, gradually scaling down to less public and more destination-specific functions as one moves through the building. The linear plan ensures that users can easily orientate themselves in relation to the water and the ferries, which are visible from most parts of the building.

Orientation for users within the building is aided by the treatment of columns. Column conditions are used to define the main entrance and transverse entrances to the facility. Entrance columns become square columns when they meet the ground, mosaiced, to make them clearly recognizable.

5.9.2 Movement through the Building

Movement through the building is designed to allow for interaction between different users, and to maximise opportunities for traders to come into contact with potential customers.

Nodes such as restaurants are located at opposite ends to necessary amenities such as ablution facilities. This results in a connective movement spine between destination points where trade can take place.

Office space for Transmaritima ferry company and destination amenities are provided for on the first floor. Such amenities include services which transport users of the facility would find useful.

5.9.3 Ticketing

Formal issuing of tickets is positioned at the information kiosk and ticket counter at the main entrance to the building at its northern end. Vehicular and pedestrian tickets can be purchased from here. Allowance is made throughout the building for the informal sale of tickets via dedicated traders through a centralized system. The system will be administered in a similar fashion to mobile telephone airtime, ensuring that the number of tickets sold per ferry trip is regulated.

A line of security is implemented at the steps descending to the pontoons with regard to pedestrian

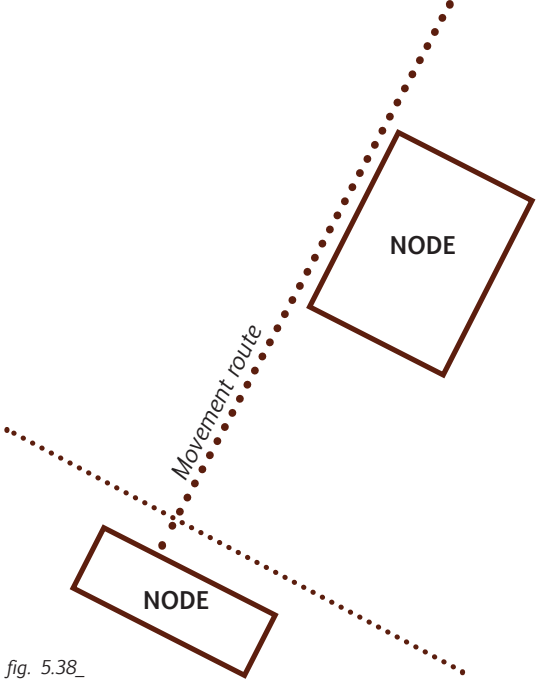


fig. 5.38_

boarding of the ferries. People not in possession of a ticket will not be permitted access to the pontoons, which are reserved for ferry commuters only. This ensures maximum safety for commuters as queuing and congestion will be limited on the pontoons.

Tickets for the vehicular ferry can be purchased beforehand at the main ticket counter of the building. Regulation of vehicles in possession of tickets will occur at the vehicular entrance to the square.

Vehicular orientation and flow is important regarding the loading and disembarking of vehicles from the ferry. Thus a ring road is designed around the square to ensure that queueing vehicles do not interfere with disembarking vehicles at peak times.

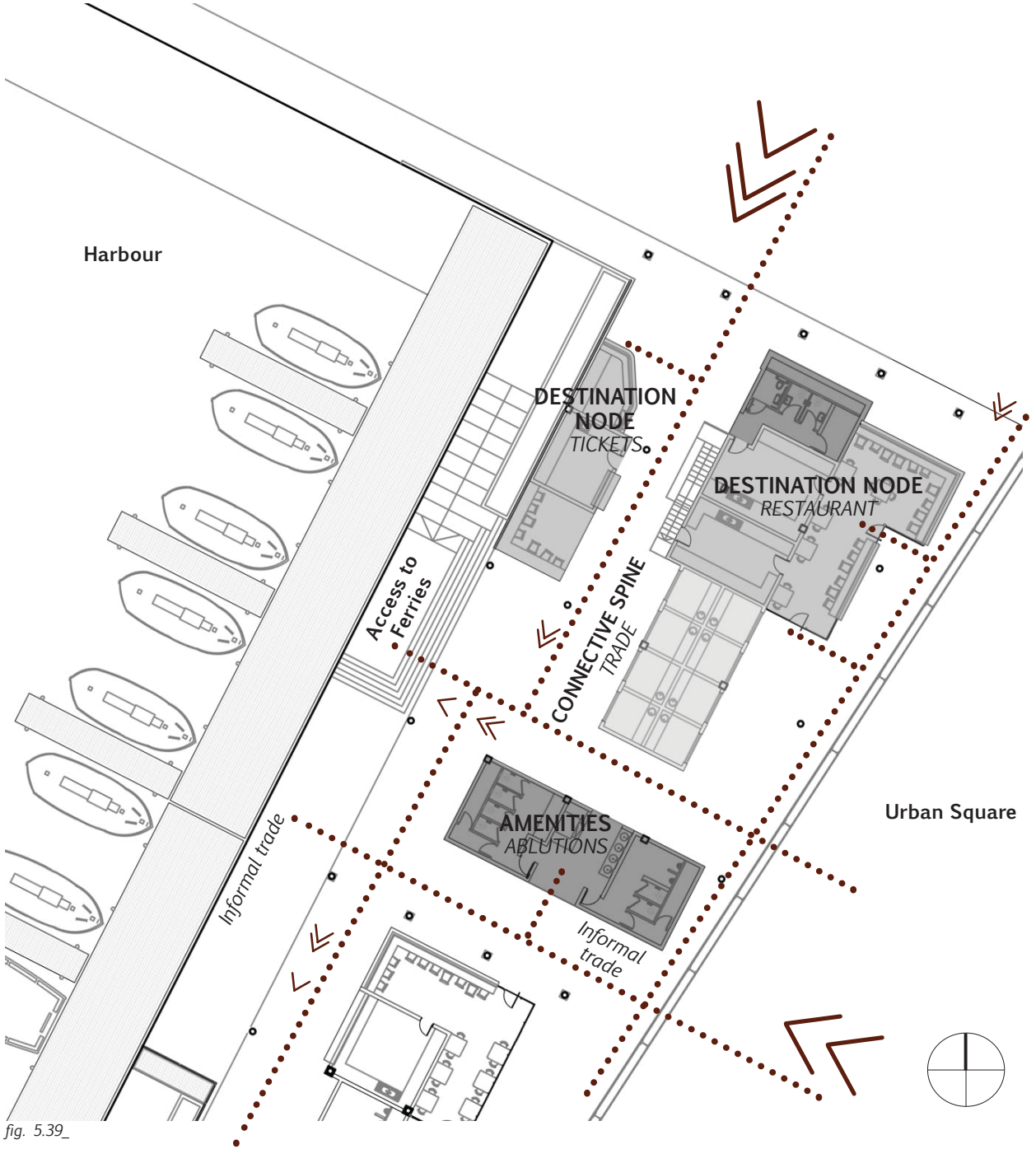


fig. 5.39_

fig. 5.38_ Graphic depicting conceptual movement through the building, echoing the parti diagram

fig. 5.39_ Plan detail showing how movement through the building informed program placements

fig. 5.40_ Conceptual sketch showing thresholds and blurring of boundaries under one unifying roof

"...an architecture that has the ability to evolve and is capable of reproducing itself through use and everyday life; its obsession shifts from appearance and form to implementation and social strategies that create conditions and surfaces for human activity."

_ Lootsma (1999:264)

5.10 MEDIATE

Mediation between different users and different means of trade is an important design investigation This aspect of the design development involved interrogation of the program to ensure adequate spaces were provided for all user groups.

The design allows for necessary infrastructural needs, as well as formal retail and ancillary functions. Unprogrammed space is deliberately provided for the informal sector to appropriate. Thus the building was not designed with finite boundaries, but rather inside, outside, formal and informal is all housed under a consolidating roof.

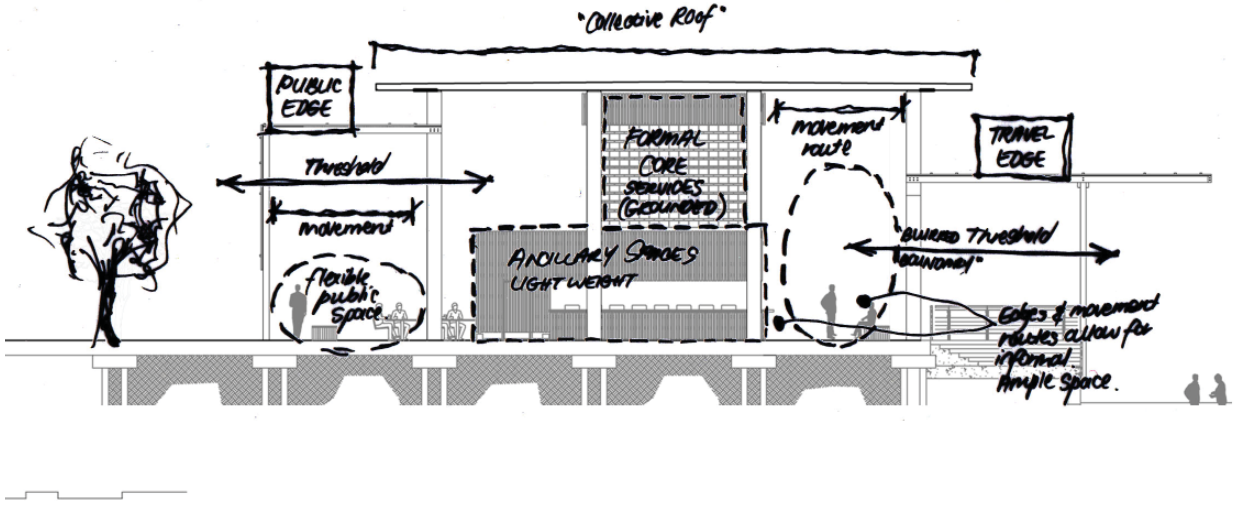


*fig. 5.40_*

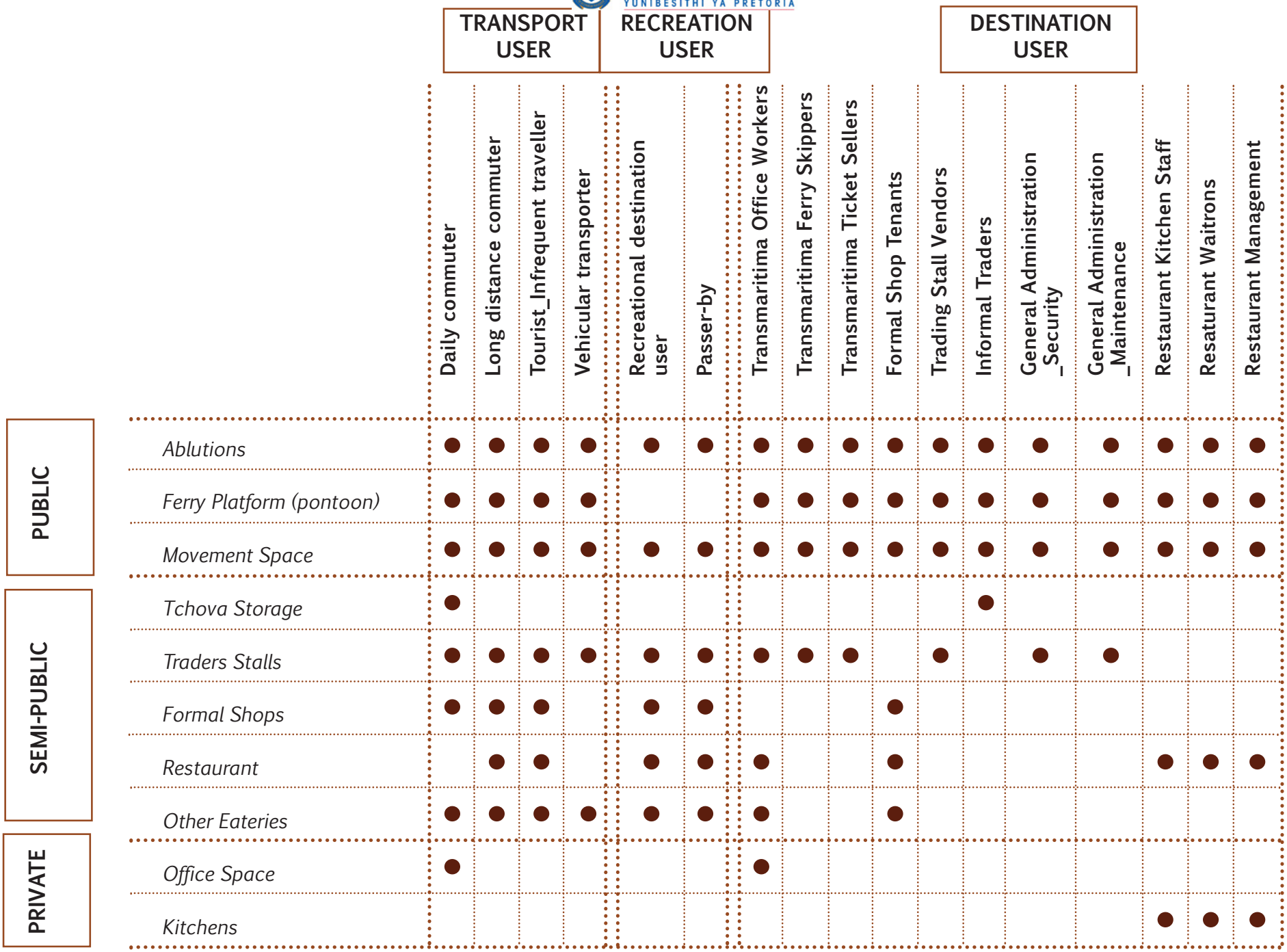


fig. 5.41_ Matrix depicting users and program, revealing potential for interaction of different user groups

fig. 5.42_ Image of Calcada Portuguesa (Portuguese pavement)

fig. 5.43_ Image of brickwork warehouses in the waterfront precinct

5.11 CONTEXTUALISM

To ensure an architecture of fit, contextualism is an important consideration. In particular the design takes note of the historical, social, and environmental contexts. Design decisions were tested against their contextual fit.

5.11.1 Historic

The waterfront context in which the building sits is industrial in character. Buildings in the vicinity are single storey portal framed warehouses with brick infill and corrugated roofs. These warehouses have cultural significance, thus the use of similar bricks in the new Water Transport facility references the context.

The majority of the area features an exposed concrete slab, however the historic wharf edge retains the original railway tracks and brick paving from its industrial past. In addition, *Calcada Portuguesa* (Portuguese pavements) is evident in the Baixa precinct. The paving is a decorative style of contrasting black and white paving stones laid in various patterns. The paving method is prevalent in Portugal, and is evident in Maputo as a reminder of its colonial heritage. Thus the use of this method is appropriate to the site.

5.11.2 Social

From a social perspective, the optimal functioning of the transport service was a design driver, ensuring that the service was efficient and beneficial to all users, namely commuters, recreational and destination users. This optimal functioning is in the context of a blend of formal and informal characteristics of an African city like Maputo.

Informal trade is very apparent in Maputo, particularly concentrated around high pedestrian areas and transport nodes. It can be assumed that the informal sector will also develop around this node. This is acknowledged, encouraged and provided for. Examples are the provision for preparation facilities with public water points provided, additionally secure overnight storage space for tchovas and other trade goods are provided.

Office space and destination amenities such as provision of services are allocated to the first floor. Restaurants and taverns are provided for recreational purposes, providing for a diverse mix of users.

The ground plane is thus designed to be accessible and public, with formal amenities dividing space, with provision for informal appropriation.

"In its widest sense, the term 'context' refers to all the issues and circumstances that surround a design of which the nature of the setting is the most tangible. As the derivation of the word means 'weave together', the spirit of its meaning denotes an interdependence - 'weaving' or 'knitting' designs into existing site conditions and the striving for a sense of fit."

_ Porter (2004:31)

5.11.3 Environmental considerations

The context and program of the building are not conducive to high-tech sustainability solutions. The sustainable focus of the building is primarily from a social and urban perspective

Resource efficient design was the driver behind the sustainable features of the building, with passive technology being the preferred option. The simplicity of the building lent itself to passive energy conscious solutions. The existing harbour wall and required proximity of the building to the water resulted in it having a general north to south orientation, rotated slightly northwest to southeast.

Climatic Responses

Maputo's tropical climate is pivotal in design decisions. Shade and air flow are essential to provide relief from the heat and humidity. Orientation of the building generally responded to the north south axis, maximizing northern sun exposure whilst limiting harsh western sun penetration through large overhangs and the implementation of a pergola.

The openness of the building lends itself to enjoying the cool balmy evenings along the waterfront, activating the area into the evening.

The building's orientation further benefits from prevailing winds occurring from the east. The breezes off the sea can cool the building as no obstructions or other buildings occur between the water and the transport facility. The narrow oblong plan ensures maximum possible cross ventilation.

Shading devices employed use the principles of vertical shading to the east and west, with horizontal shading to the north. A shading technique widely employed in Maputo is brise soleil, which reduces heat and solar glare on the sunside facade of a building. The technique involves a shading screen that prevents high-angle summer sun penetrating the building, but can be designed to allow low-angle winter sun to provide some passive solar heating. The technique is employed on the southeastern facade of the building, facing onto the public square.

Thus the passive design responses integrated into the design can be summarised as:

- shading
- air flow utilising prevailing winds
- optimum orientation along north south axis
- openness
- cross ventilation
- brise soleil
-

5.12 DESIGN REFINEMENT
THREE DIMENSIONAL EXPLORATION

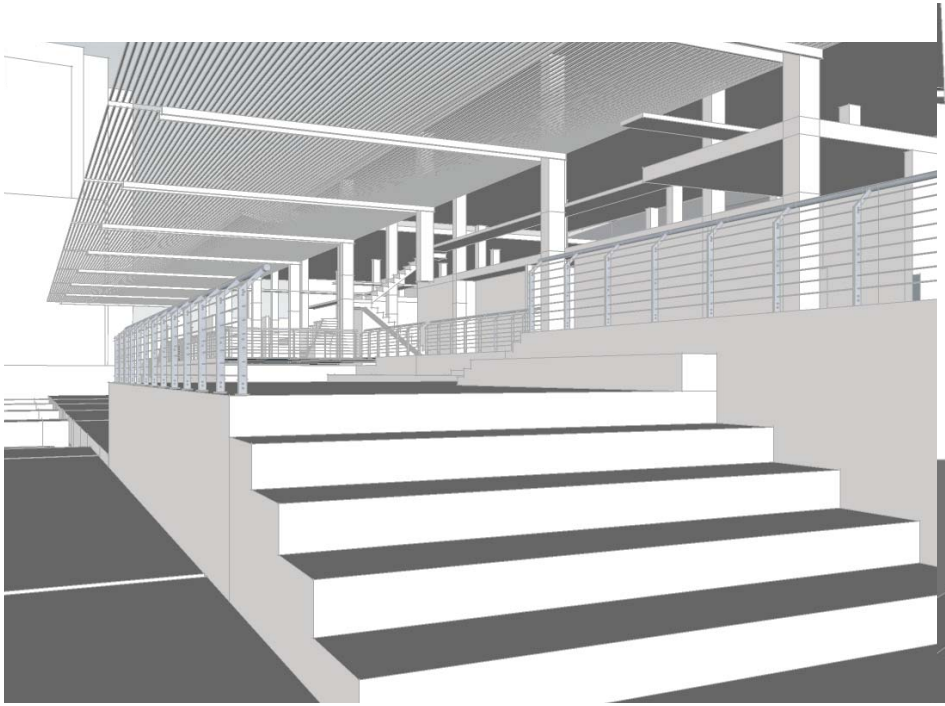


fig. 5.44_

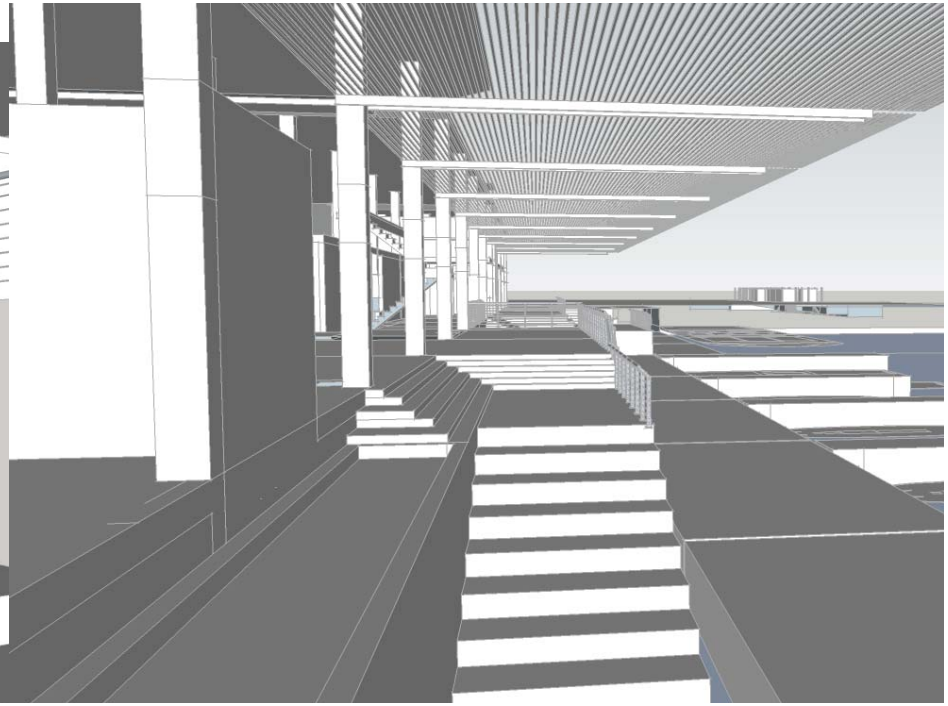


fig. 5.45_

fig. 5.44_ Three dimensional image depicting steps accessing the pontoon

fig. 5.45_ Three dimensional image depicting Travel Edge

fig. 5.46_

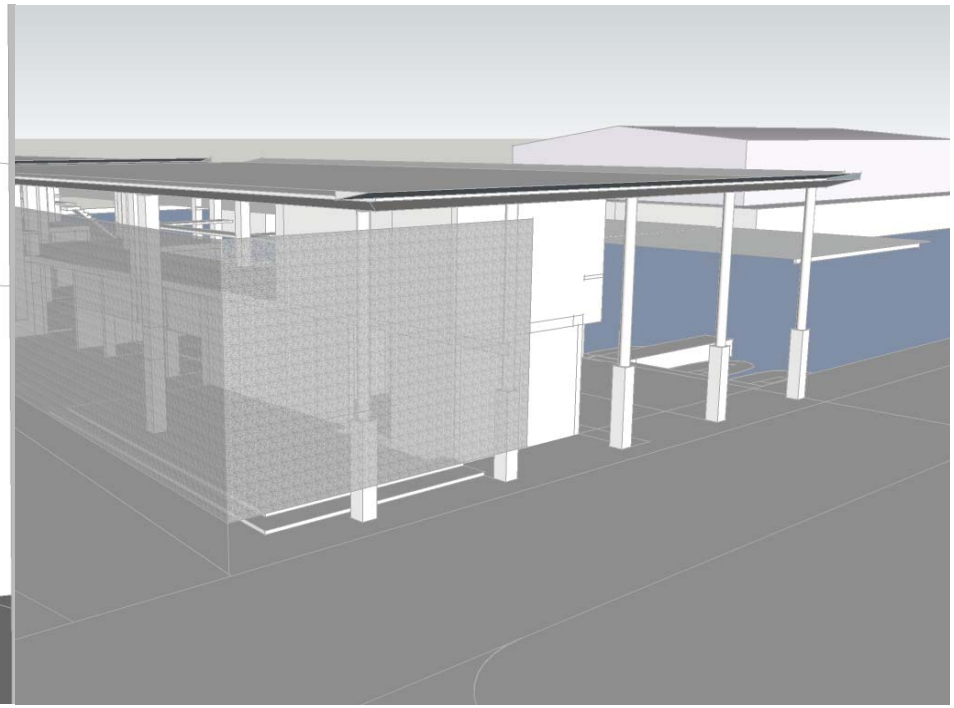


fig. 5.47_

fig. 5.46_ Three dimensional image depicting movement route from main entrance of public pedestrian throughfare

fig. 5.47_ Graphic representation of Urban Edge from the northeastern perspective

fig. 5.48_
Image depicting structural composition of the building

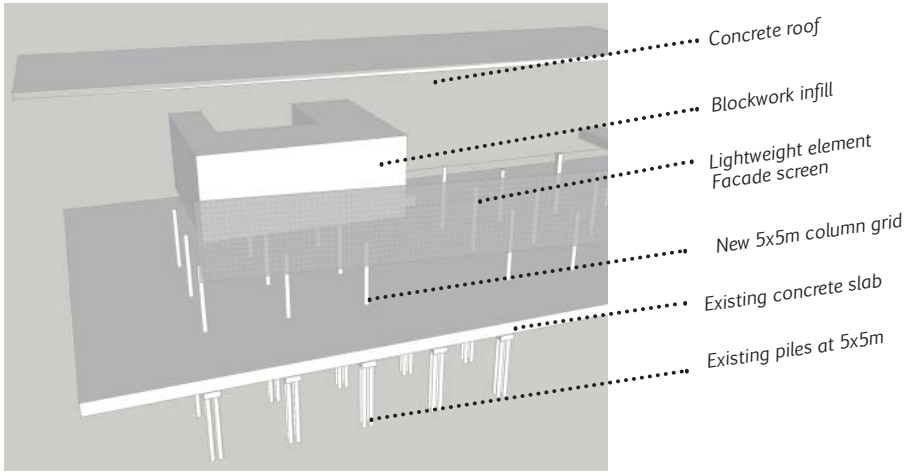


fig. 5.48_

5.13 STRUCTURE AND CONSTRUCTION

The choice of site for the waterborne transport terminal is located on an existing wharf consisting of a slab supported by concrete piles at 5 metre by 5 metre spacing. The column grid of the new intervention thus responds to the existing structural conditions, by adopting the 5 x 5 grid spacing.

Sea water extends approximately 25 metres underneath the wharf. Thus in order to accommodate the proposed new harbour the existing harbour wall is adjusted to ensure maximum stability for the new waterborne transport structure, as indicated in figure 5.49 and 5.50.

The structure is a frame and infill building. Concrete columns and slab form the frame with block infill containing infrastructural service cores which define formal boundaries, facilitating movement space around them.

The buildings facades respond to contrasting edge conditions to southeastern and northeastern orientation. Edge conditions are informed by programmatic needs and respond to climatic requirements. Structural steel, timber and concrete louvered and glazed facades and screens clip onto the rational frame, creating threshold spaces, blurring the boundary between inside and outside.

The construction of the building is intended to be labour intensive, enabling job creation to local workers. The incorporation of contextual blockwork within the building ensures employment for artisans. The locally manufactured masonry units consist of large blocks, dimensions 425 x 340 x 250, and small blocks, dimensions 425 x 85 x 250. The masonry units are manufactured to be precinct context sensitive, and are intended as part of a job creation project. Units strength and durability should comply with minimum applicable standards.

In addition, allowance for mosaic detailing and other artworks throughout the building encourages participation from local artists and craftsmen, instilling a sense of ownership of the building within the local population.

fig. 5.49_ Image indicating existing harbour wall location in red

fig. 5.50_ Image indicating proposed new harbour adjusted to ensure stability to the site.

5.14 BUILDING CLIMATE

The program and context of the building resulted in the designer adopting passive technology rather than high tech solutions to occupant comfort.

Narrow plan form allows for maximum cross ventilation with the building orientated towards prevailing southeasterly winds. Large overhangs and shading considerations, explored in detail design as indicated in the following chapter, offer relief from the heat and humidity.

fig. 5.51_ Graph indicating average monthly rainfall days in Maputo

fig. 5.52_ Graph indicating average monthly precipitation in metres, in Maputo

fig. 5.53_ Image key indicating classification of roof sections into A, B and C.

5.15 RAINWATER HARVESTING

Rainwater harvested from the roof is used to supplement the municipal supply required for ablution facilities throughout the building. Storage tanks occur above the first floor slab, as indicated in the long section found in the following chapter.

Rainwater calculations were tested against an indicative monthly demand to reveal the size and quantity of rainwater tanks required for each section of roof according to collection potential of each roof area. Roof section A requires 17 x 900 litre storage tanks, section B requires 16 x 900 litre tanks, and section C requires 12 x 900 litre tanks.

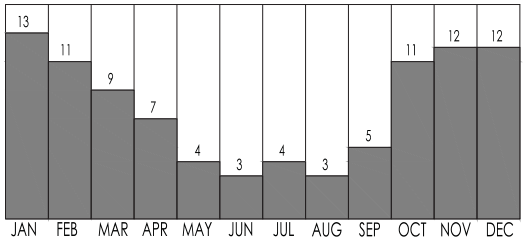


fig. 5.51_

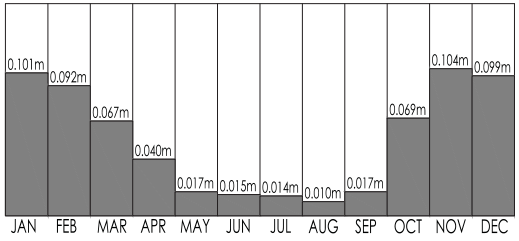


fig. 5.52_

AVERAGE MONTHLY ROOF COLLECTION POTENTIAL

ROOF AREA x MONTHLY PRECIPITATION x RUNOFF FACTOR (0,9)

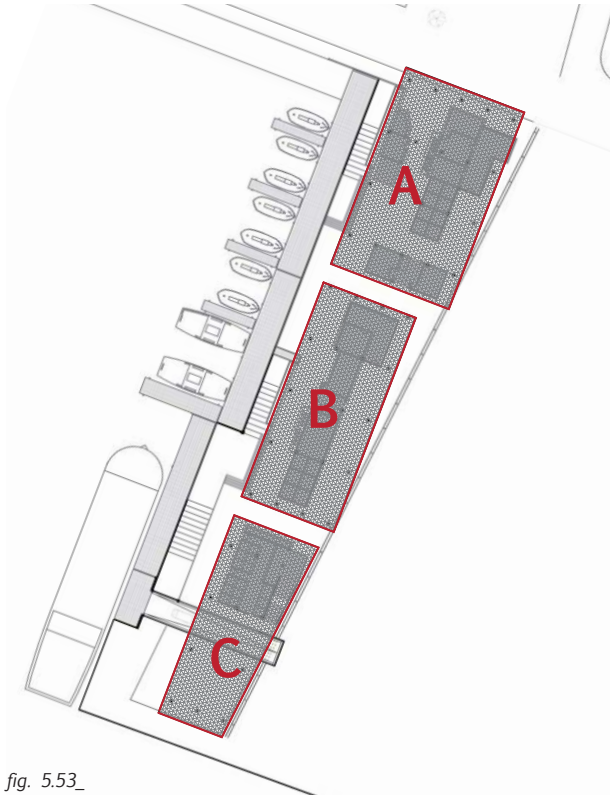


fig. 5.53_

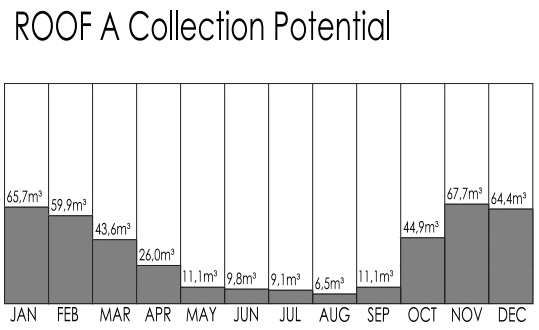


fig. 5.54_

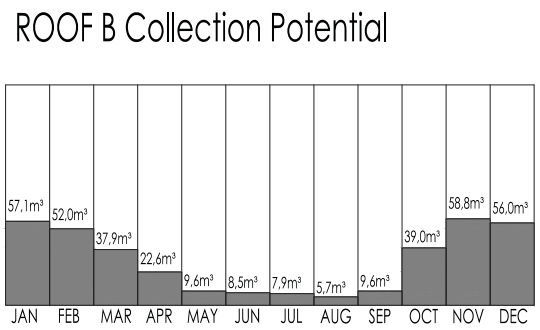


fig. 5.55_

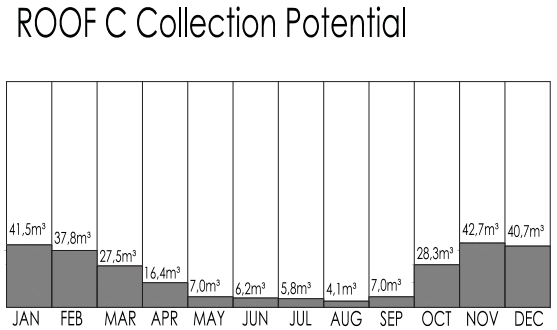


fig. 5.56_

fig. 5.54_ Graph indicating average monthly collection potential of roof A

fig. 5.55_ Graph indicating average monthly collection potential of roof B

fig. 5.56_ Graph indicating average monthly collection potential of roof C

ILLUSTRATIVE TYPICAL MONTHLY DEMAND: ROOF A JANUARY

16 TOILETS	6 LITRES PER FLUSH	6 FLUSHES HOUR AVERAGE
2 URINALS	2 LITRES PER USE	6 USES PER HOUR AVERAGE
6 WASHAND BASINS	2 LITRES PER USE	12 USES PER HOUR AVERAGE
8 TRADERS SINKS	2 LITRES PER USE	12 USES PERHOUR AVERAGE
3 KITCHEN SINKS	2 LITRES PER USE	12 USES PER HOUR AVERAGE

DAILY ASSUMPTIONS:

TOILET FLUSHES	72
NUMBER OF TOILIETS	10
LITRES PER FLUSH	6

THEREFORE: 4320 LITRES REQUIRED PER DAY =4,3 CUBIC MERES PER DAY

=126 CUBIC METERS MONTHLY

SUPPLY: 65,7 CUBIC METERS

DEMAND OUTWEIGHS SUPPLY IN THE MONTH OF JANUARY WITH MAXIMUM RAINFALL

PROVISION IS MADE IN THE BUILDING FOR STORAGE OF WEEKLY QUANTITIES OF RAINFALL TO SUPPLEMENT MUNICIPAL SUPPLY

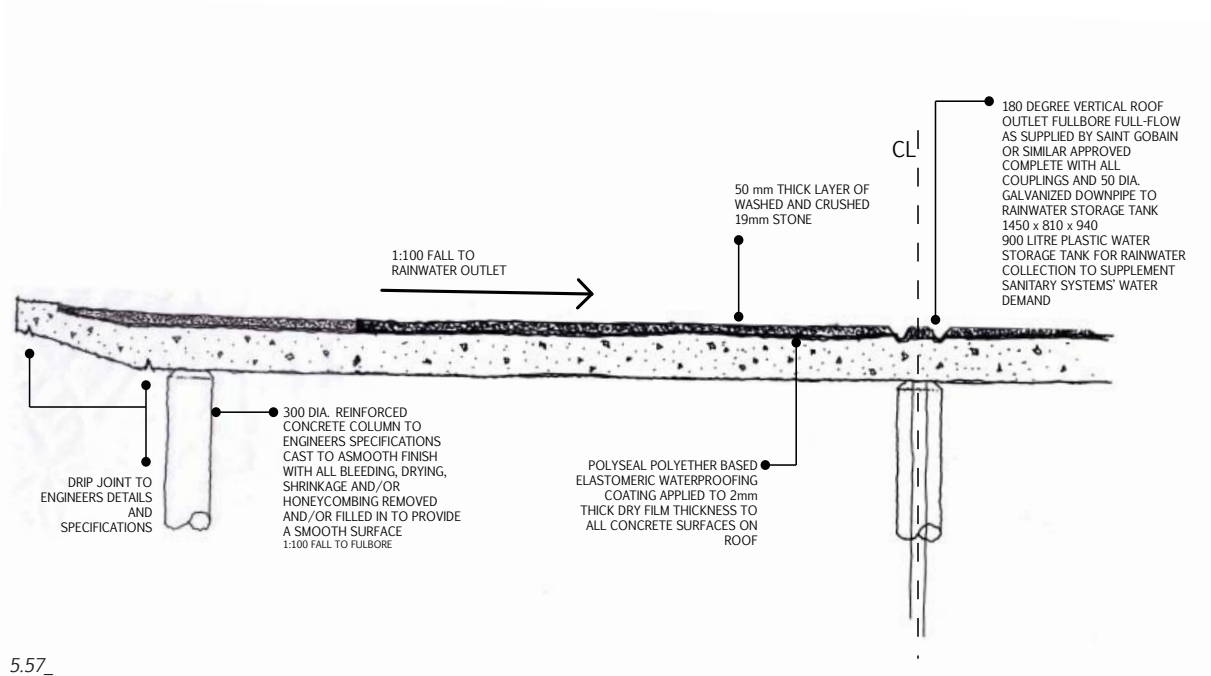


fig. 5.57_

fig. 5.57_ Roof section detail sketch showing rainwater outlet to water storage tanks

5.16 MATERIAL CHOICE

Material choices was informed by various site and context factors. The first main consideration is the marine environment of the site which necessitates anti-corrosive measures. The second consideration is that it is a public transport building and the materials needed to be robust and long lasting.

Additionally, material choices were made taking clues from the existing context. Materials that were evident in the area hinted at the success of such materials.

5.16.1 Concrete

Concrete was chosen as a construction material due to its robustness in high trafficked areas, and also for its hardiness in harsh marine environments. Contextually, the use of fair faced concrete is extensive in Maputo City, often to sculptural effect.

5.16.2 Brick/Blockwork

The blockwork used in the building is chosen to coincide with the blockwork and bond method prevalent in the waterfront area and responds specifically to the warehouses at the water's edge.

5.16.3 Timber

The use of timber is due to its strong performance and durability in marine environments. Timber is a significant export of Mozambique, and is readily available.

5.16.4 Stainless steel

Stainless steel is the choice material for balustrades and other detail work. Although expensive, it is highly corrosive resistant and thus good in harsh marine environments.

Stainless steel detailing will be prepared off-site as far as possible and fitted on site via bolting, to limit on site welding.

5.16.5 Galvanized steel

Galvanized steel will be used for structural steelwork. Zinc coating can be successfully overcoated with paint to provide a Duplex system. Duplex systems are used in aggressive environments such as this one, where the zinc alone cannot adequately protect the steel.

5.16.6 Cor-Ten steel

Cor-ten steel is used in the shading facade on the eastern side of the building. It is suitable due to its improved atmospheric corrosion resistance.

5.16.7 Natural materials

Being a tropical country, coconut palms are prevalent around Maputo. The intention with the eastern facade screen is to allow for portions of natural

material within a patterned 'weave' facade, in reference to the African craft of weaving. The material of choice is the coconut husk, which as an organic material has already proven itself hardy as a rope product and in netting applications.

The coconut weave accent panels will be accompanied by metal weave patterns of varying densities to create a textured shading facade.

5.16.8 Planting

It is intended to introduce greenery to a previously harsh harbour environment. As mentioned earlier, on the northwestern facade shaded pergolas will be planted with *Senecio Tamoides* (Canary creeper). The plant is indigenous to East Africa and is suitable for full sun

Along the southeastern facade, trees will be planted along the shared street interface with the square, of the Acacia species. This is in reference to Maputo being informally called the Acacia city, in reference to the prevalence of the species.

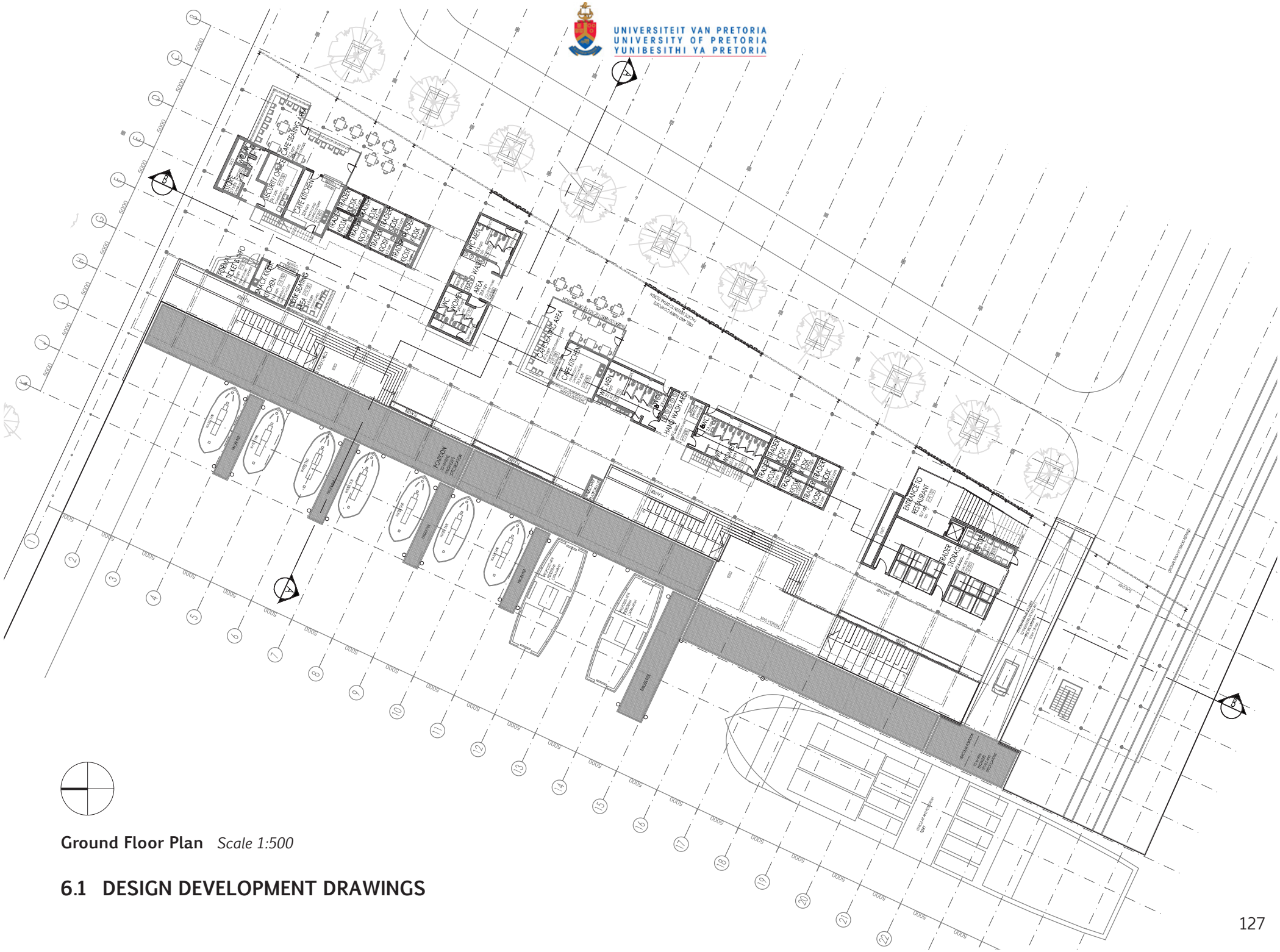
5.16.9 Other

The detail design specifications for the floating pontoons adjacent to the building will be as in accordance with naval architect practices. However, it is necessary that the material required will be slip-resistant and fire-resistant, preferably of timber surface where applicable.

5.17 CONSOLIDATION

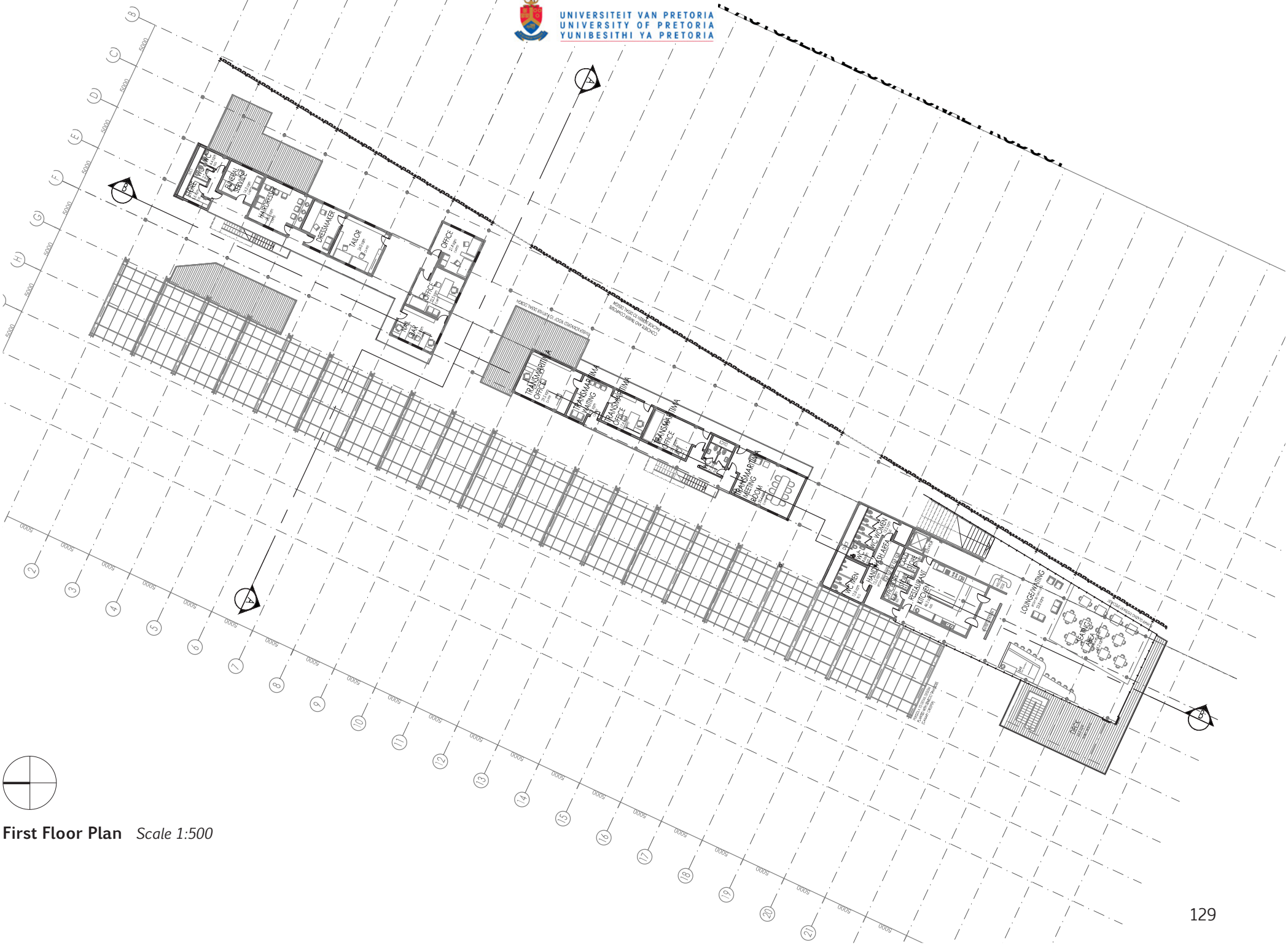
The design development for the facility required a constant balance between the nature of Maputo as a fast paced business centre, and the informal nature of the capital city of a developing country. The blending of a transport imperative with the revitalization of the precinct was the fundamental challenge in the design development.

06 _ DRAWINGS

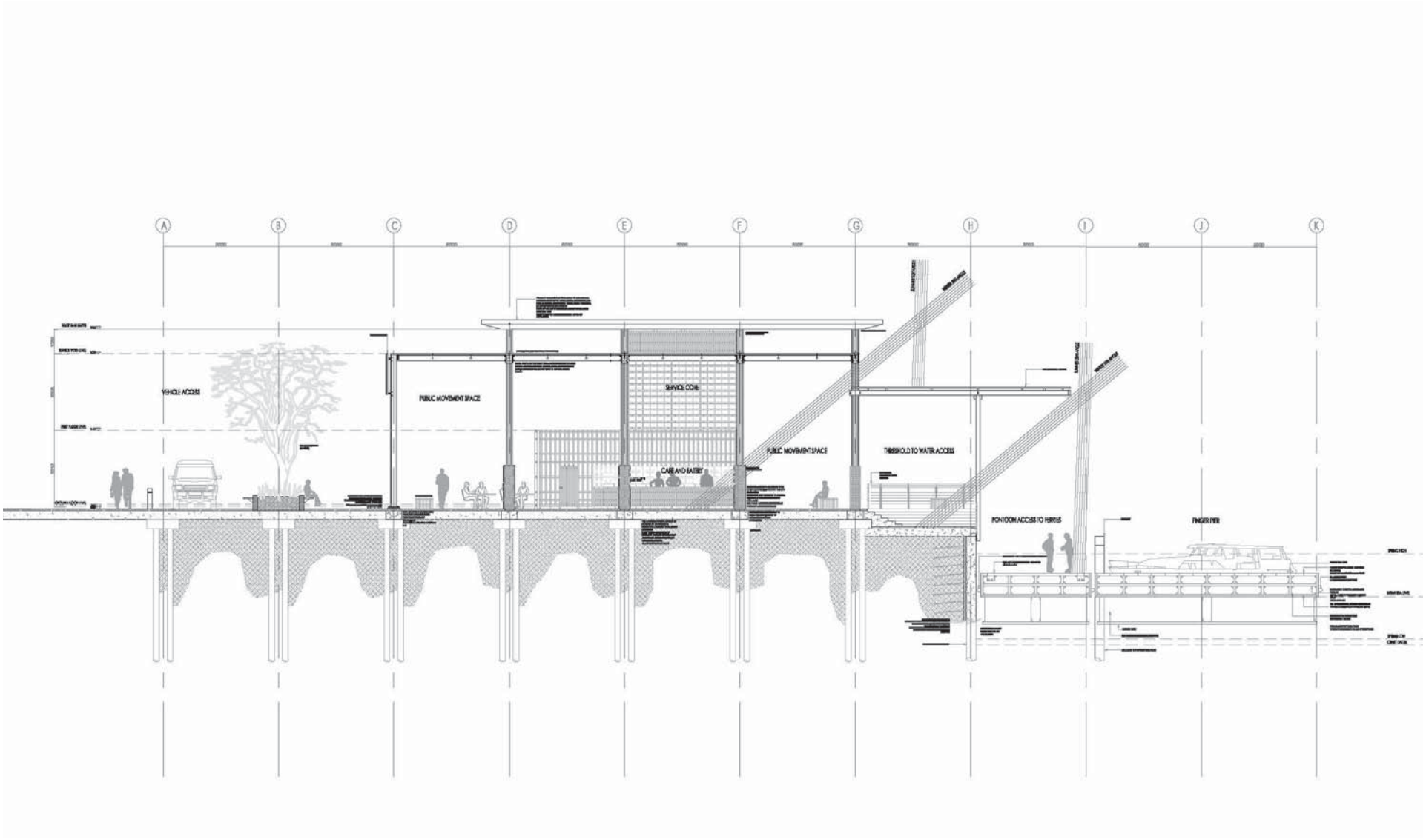


Ground Floor Plan *Scale 1:500*

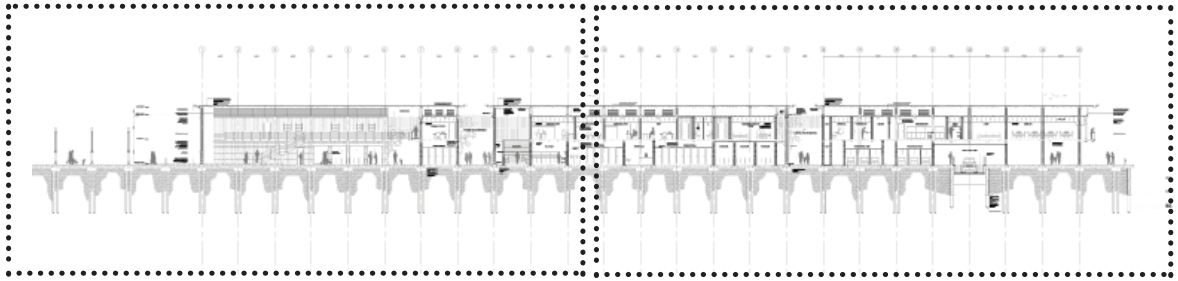
6.1 DESIGN DEVELOPMENT DRAWINGS



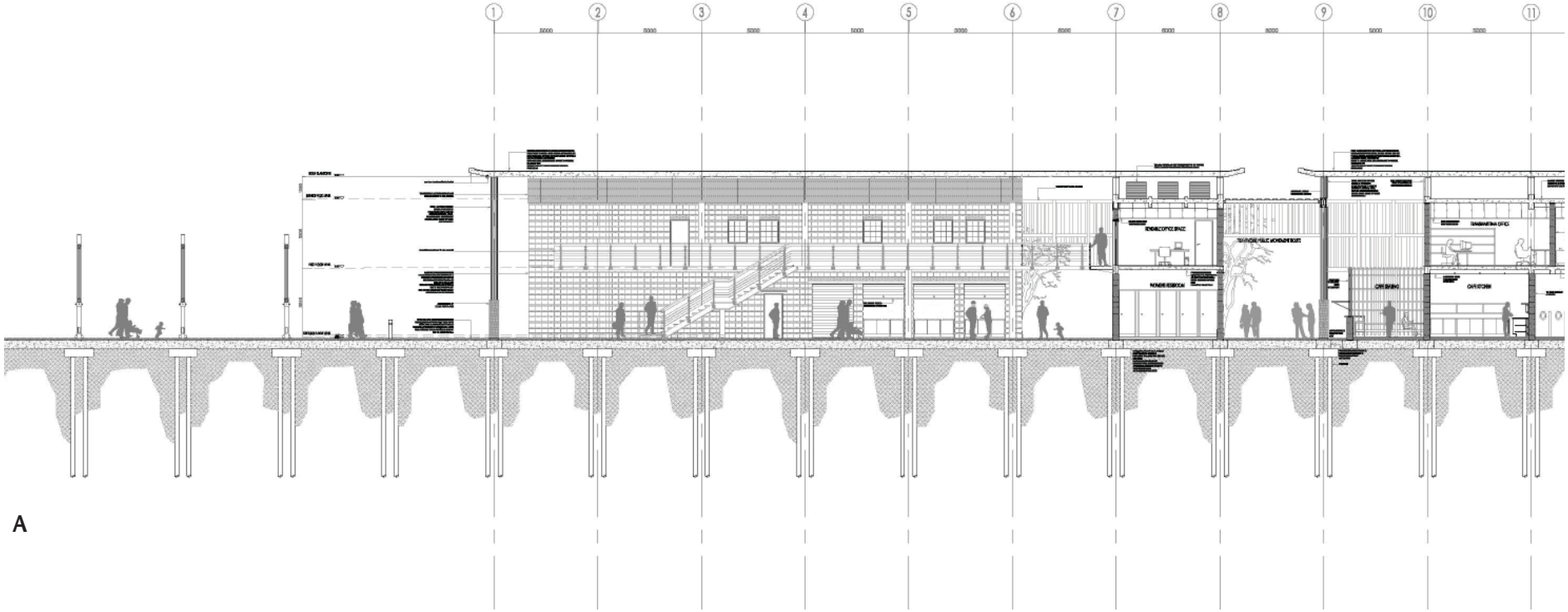
First Floor Plan *Scale 1:500*



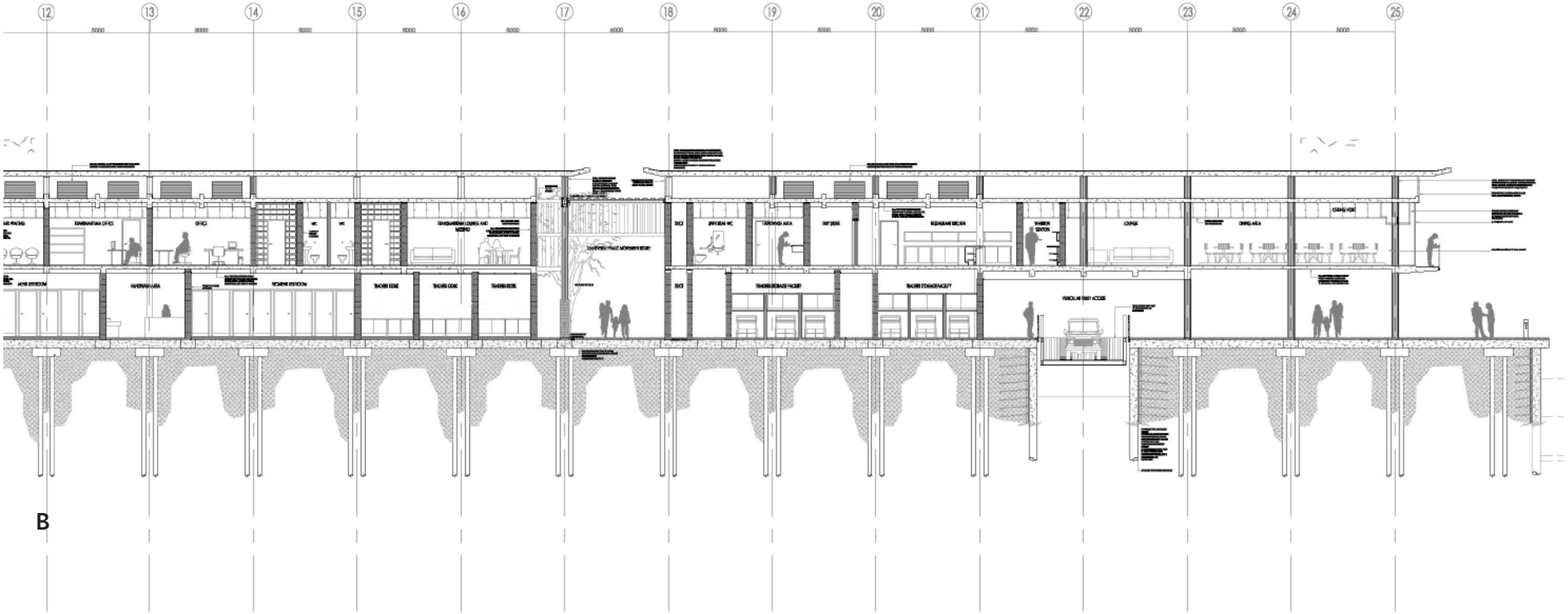
Section A-A *Not to scale*



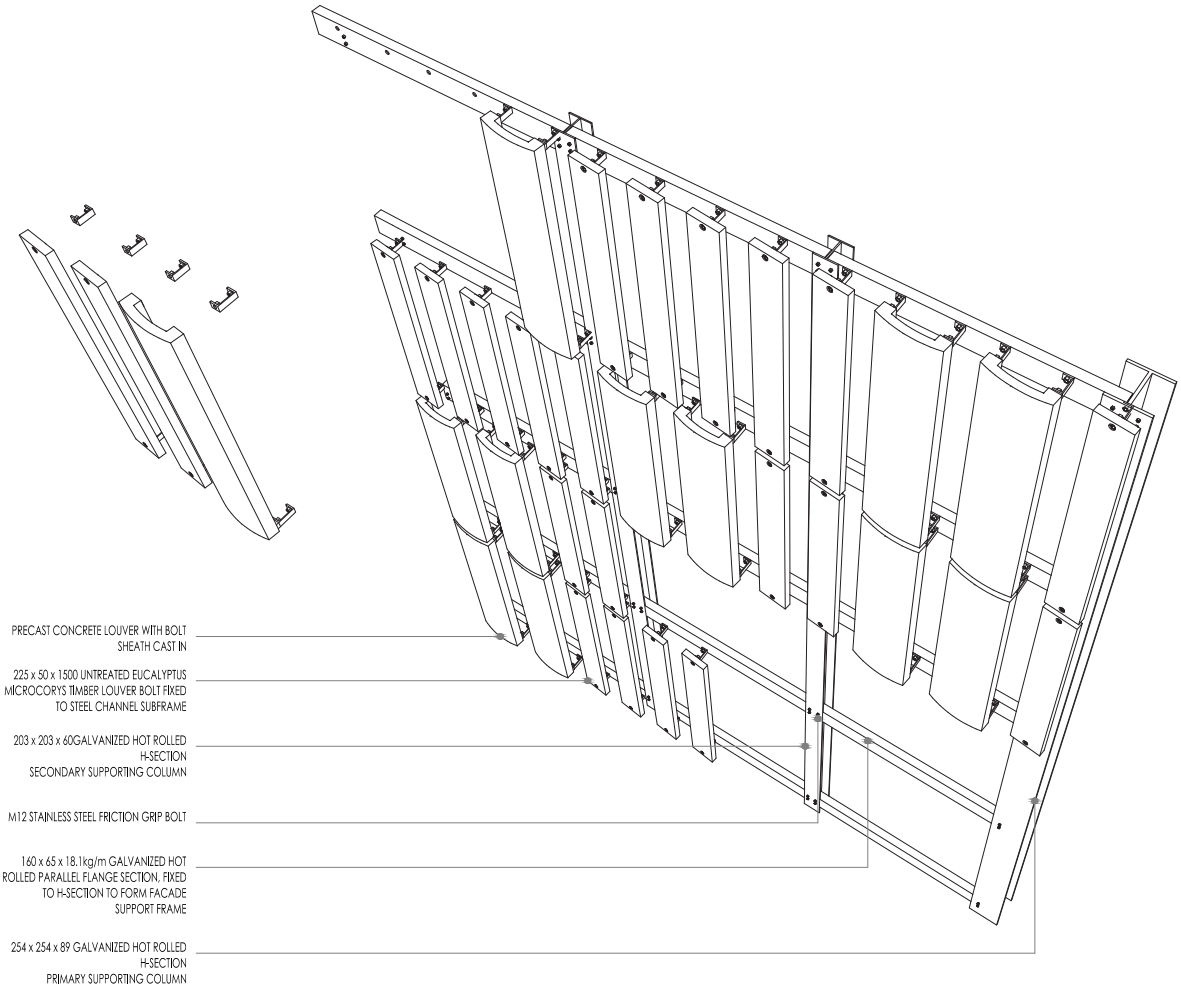
Section Key



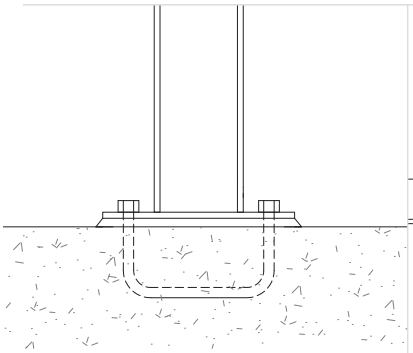
Section B-B *Not to scale*



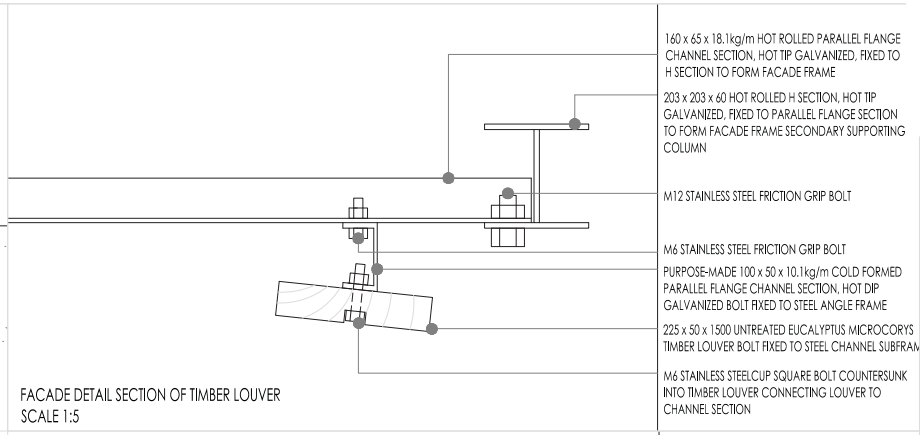
B



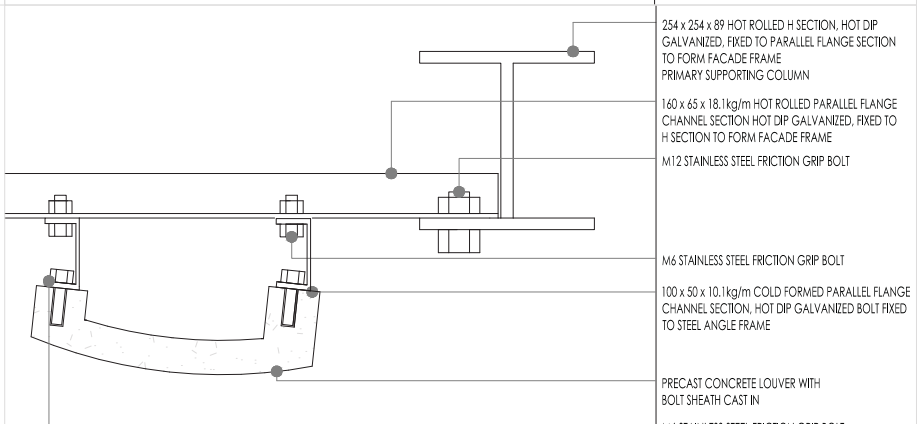
FACADE AXONOMETRIC



COLUMN FIXING DETAIL
SCALE 1:10



FACADE DETAIL SECTION OF TIMBER LOUVER
SCALE 1:5

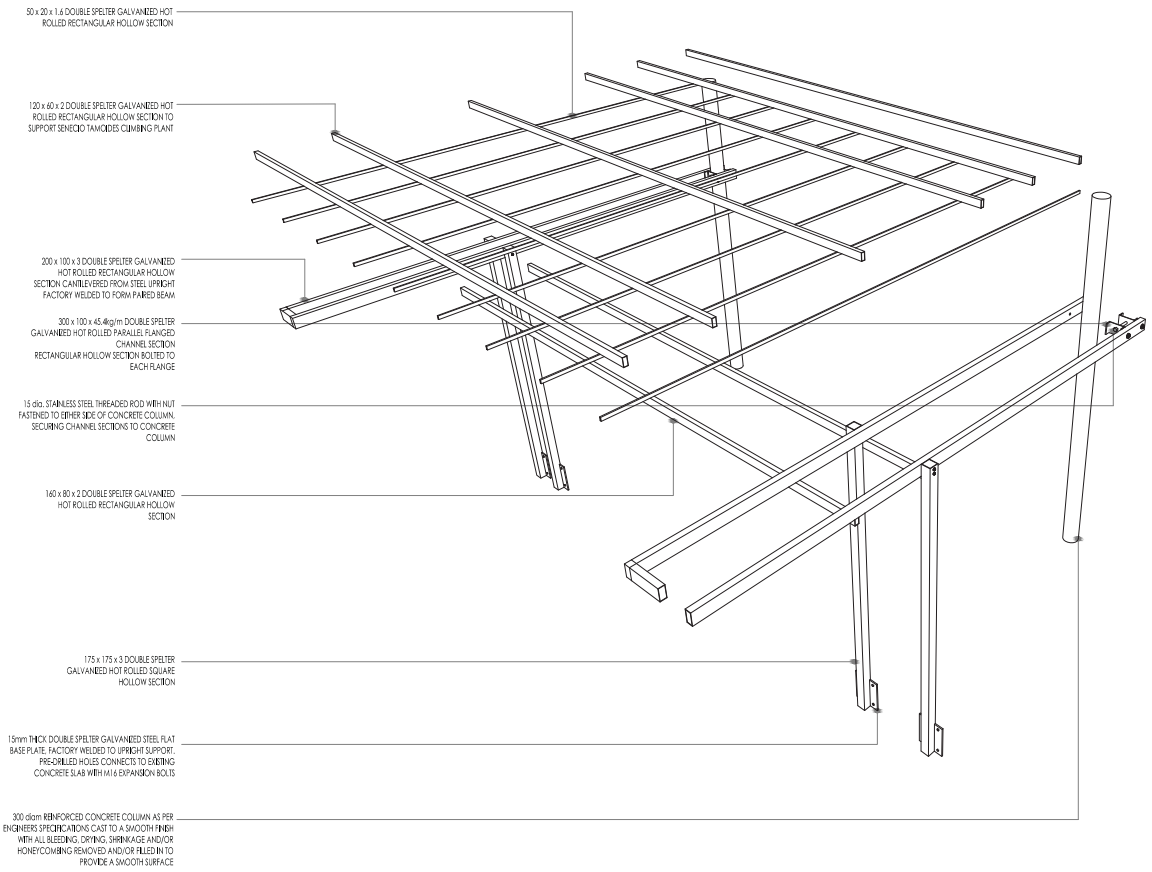


FACADE DETAIL SECTION OF CONCRETE LOUVER
SCALE 1:5

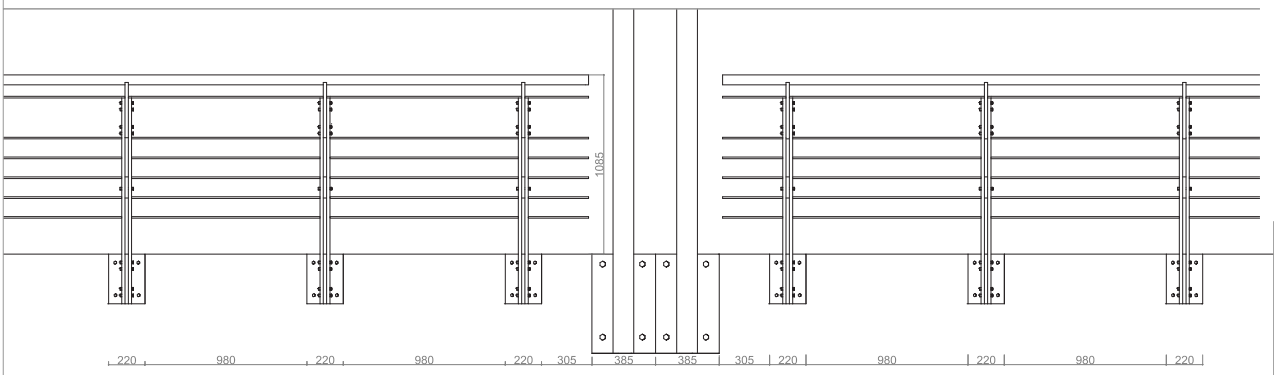
NOTE:

ALL MEMBERS TO BE PRE-DRILLED AND GALVANIZED BEFORE ARRIVAL ON SITE
NO WELDING ON SITE
NO DRILLING ON SITE
ALL FIXINGS TO BE STAINLESS STEEL UNLESS OTHERWISE SPECIFIED

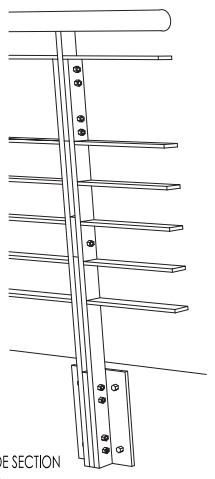
FACADE DETAIL



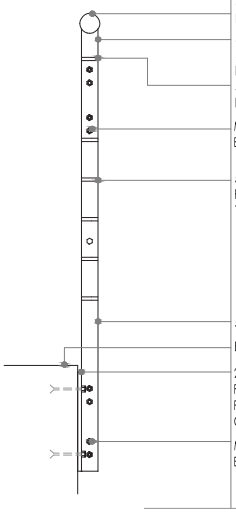
PERGOLA EXPLODED AXONOMETRIC



BALUSTRADE ELEVATION
SCALE 1:20



BALUSTRADE SECTION
SCALE 1:10



60mm diam. x 1.2 300 SERIES STAINLESS STEEL ROUND TUBE HANDRAIL FACTORY WELDED TO 50 x 20 STAINLESS STEEL FLAT

50 x 20 300 SERIES STAINLESS STEEL FLAT FACTORY WELDED TO STAINLESS STEEL ROUND TUBE HANDRAIL. PRE-DRILLED, BOLTED TO BALUSTRADE COMPOSITE PANEL AND STAINLESS STEEL UPRIGHTS

50 x 10 300 SERIES STAINLESS STEEL FLAT FACTORY WELDED TO 50 x 20 STAINLESS STEEL UPRIGHT

M6 STAINLESS STEEL FRICTION GRIP BOLTS BOLTING BALUSTRADE COMPOSITE PANEL TO UPRIGHT

50 x 10 300 SERIES STAINLESS STEEL FLAT FACTORY WELDED TO 50 x 20 STAINLESS STEEL UPRIGHT TO FORM BALUSTRADE COMPOSITE PANEL

50 x 20 300 SERIES STAINLESS STEEL FLAT UPRIGHTS

EXISTING SLAB EDGE

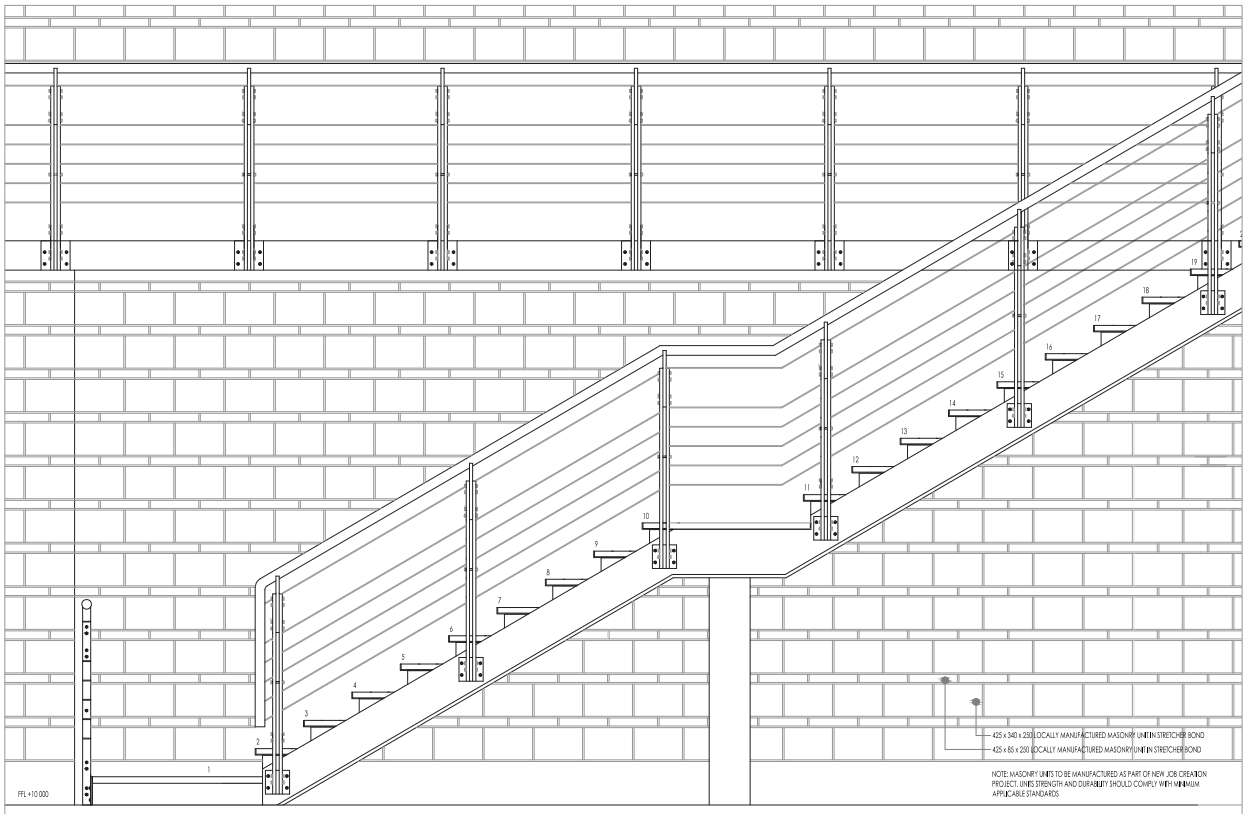
220 x 300 x 10 300 SERIES STAINLESS STEEL FLAT BASE PLATE, FACTORY WELDED TO UPRIGHT PRE-DRILLED HOLES FOR M6 STAINLESS STEEL EXPANSION BOLTS CONNECTING BALUSTRADE TO EXISTING SLAB

M6 STAINLESS STEEL FRICTION GRIP BOLTS BOLTING BASE PLATE TO UPRIGHT

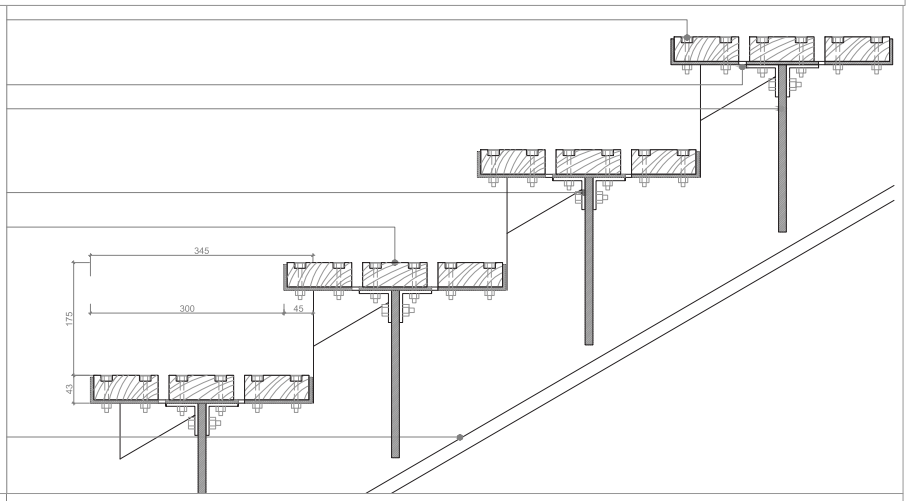
NOTE:

ALL MEMBERS TO BE PRE-DRILLED AND GALVANIZED BEFORE ARRIVAL ON SITE
ALL MEMBERS TO BE DOUBLE SPELTER GALVANIZED UNLESS OTHERWISE SPECIFIED
NO WELDING ON SITE
NO DRILLING ON SITE
ALL FIXINGS TO BE STAINLESS STEEL UNLESS OTHERWISE SPECIFIED

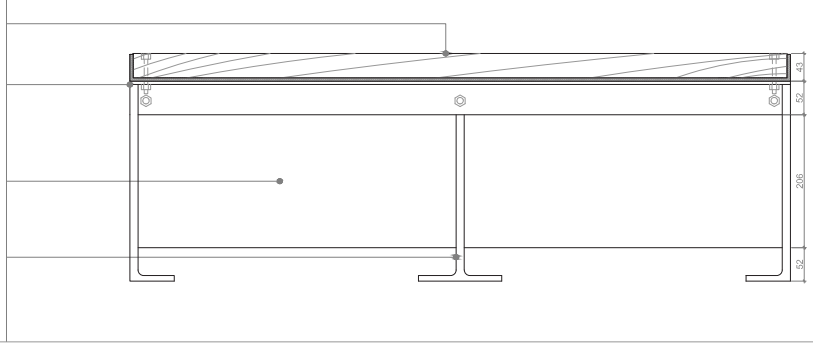
BALUSTRADE AND PERGOLA DETAIL



STAIRCASE ELEVATION
SCALE 1:20

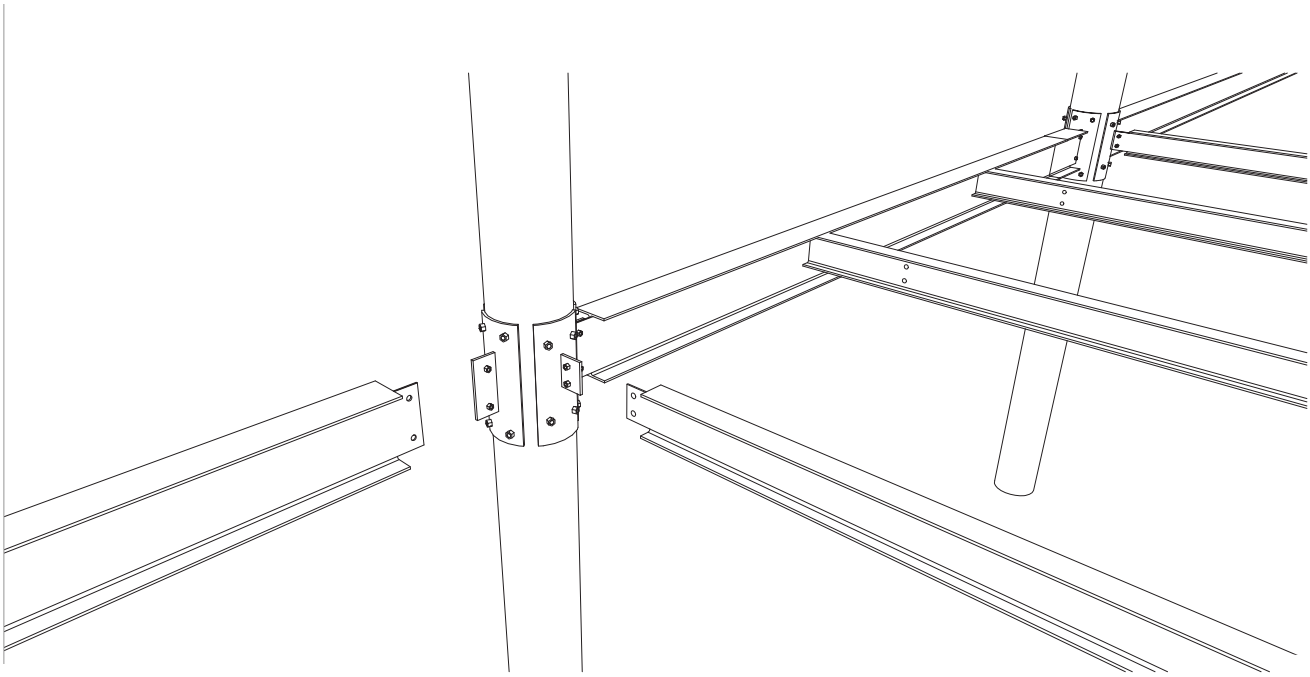


STAIR TREAD DETAIL CROSS SECTION
SCALE 1:5

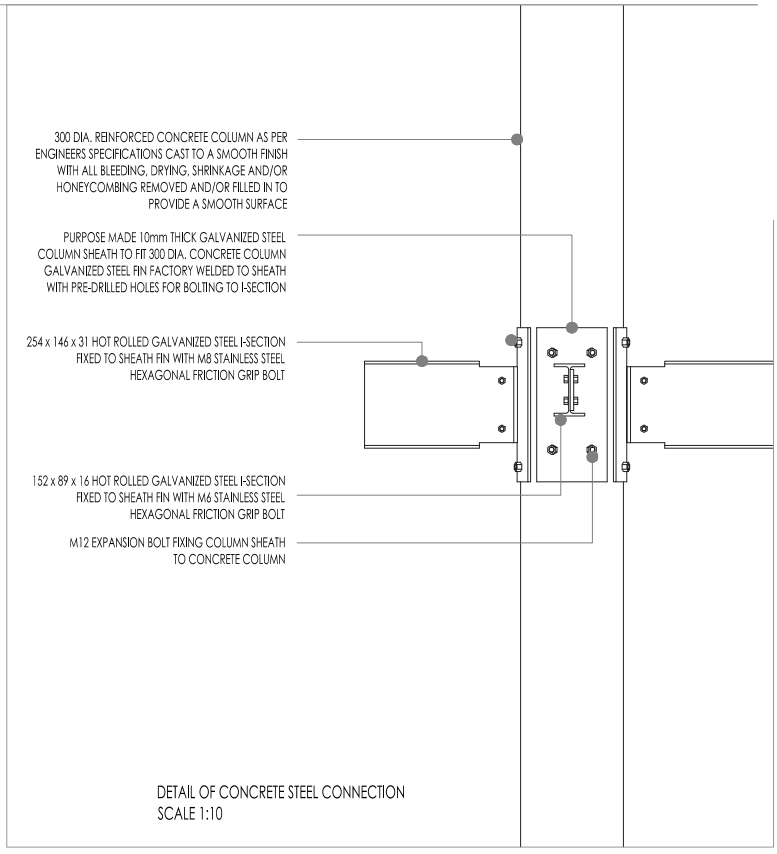


STAIR TREAD DETAIL LONG SECTION
SCALE 1:5

STAIRCASE DETAIL



CONCRETE STEEL CONNECTION AXONOMETRIC



DETAIL OF CONCRETE STEEL CONNECTION
SCALE 1:10

NOTE:

ALL MEMBERS TO BE PRE-DRILLED AND GALVANIZED BEFORE ARRIVAL ON SITE
NO WELDING ON SITE
NO DRILLING ON SITE
ALL FIXINGS TO BE STAINLESS STEEL UNLESS OTHERWISE SPECIFIED

CONCRETE COLUMN TO STEEL CONNECTION

fig. 6.1_ Graphlc impression of Travel Edge

6.2

fig. 6.2_ Graphic impression of circulation space within the building

fig. 6.3_ Graphic impression of vehicular access to pontoons for ferry boarding

fig. 6.4_ Graphlc impression of Urban Edge showing entrance

fig. 6.5_ Graphlc impression of movement spine to waterside access

fig. 6.6_ Impression view of travel edge of waterborne transport terminal

fig. 6.7_ Impression of main entrance to Waterborne Transport Terminal

fig. 6.8_ Impression view of travel edge of waterborne transport terminal showing pedestrian and vehicular access to pontoons

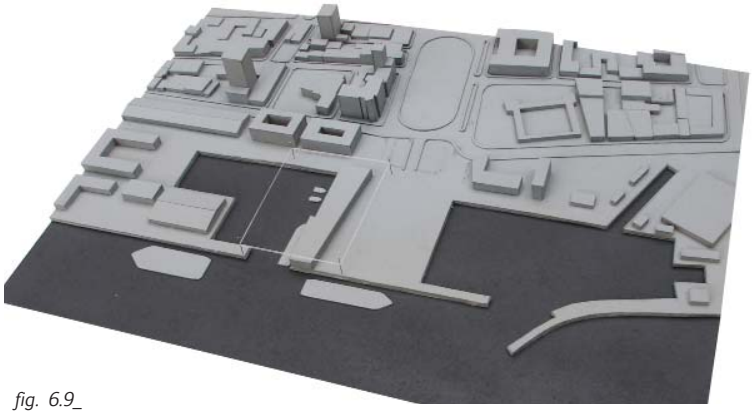


*fig. 6.9_*

fig. 6.9_ Context model showing proposed new harbour in relation to the existing

*fig. 6.10_*

fig. 6.10_ Macro context model showing Maputo Baixa and surrounds

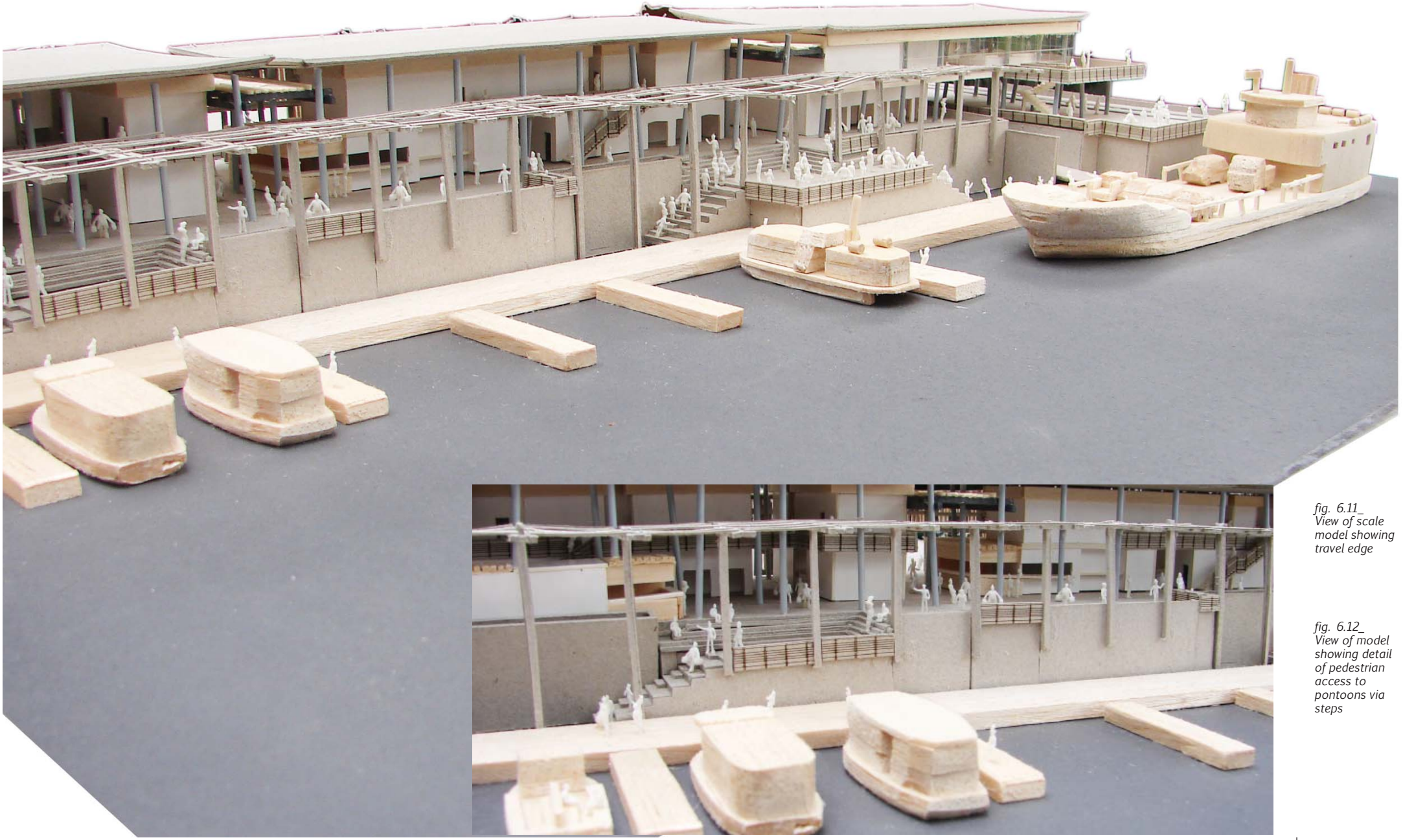


fig. 6.11_ View of scale model showing travel edge

fig. 6.12_ View of model showing detail of pedestrian access to pontoons via steps

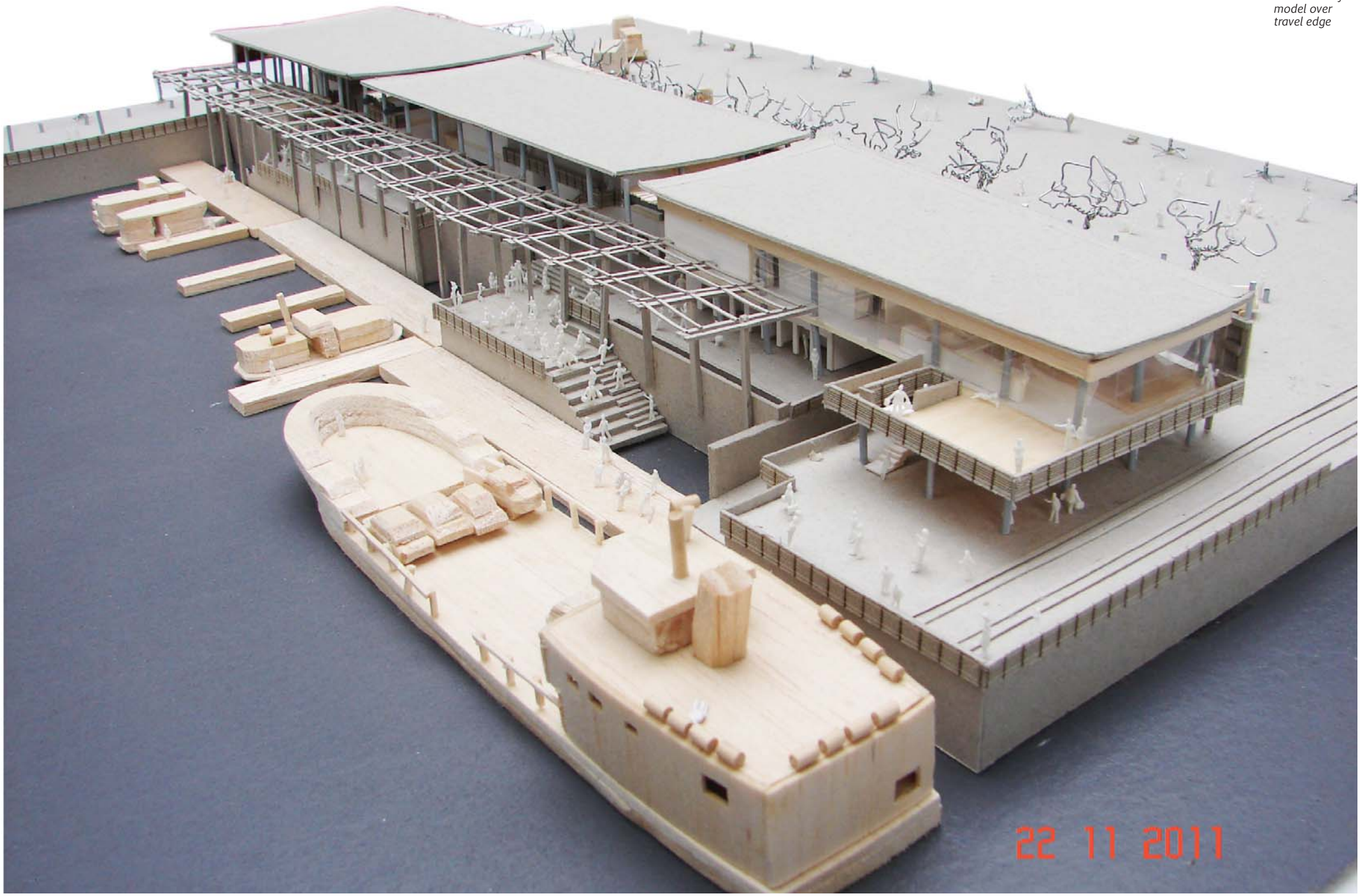


fig. 6.13_ Aerial view of model over travel edge

fig. 6.14_ View of main entrance to the building

fig. 6.15_ Aerial view of model over urban edge

GLOSSARY

Local terminology and Portuguese translations

Baixa	low
Espirito Santo	estuary
Avenida	avenue
Rua	street
Tchova	push cart used in the informal context for the movement of goods and items for sale
Chapa	minibus taxi
Mapapai	water taxi
Fortaleza	fort
Catedral	Cathedral

Nautical terms

beam	the width of a ship
catamaran	a stoutly constructed wooden or steel raft placed between ships or between a ship and the jetty to avoid damage to either.
depth	the vertical distance from the lowest point of the hull to the measured deck of a ship.
draft	the vertical distance measured from the lowest point of a ships hull to the waterline or the water surface. note: a ships draft will change depending on water density (eg salinity and temperature) and ships load.
chart datum	the depth of water at the lowest astronomical tide
freeboard	the height of the ship's side that is above the waterline note: the freeboard will change with the loading of the vessel
jetty	a platform built out from the shore on piles so that there is sufficient depth alongside for ships to berth
mole or breakwater	a long pier or heavy masonry build on the seaward side of a harbour for protection. it may be designed for berthing ships on the shoreward side.
pier	a narrow jetty built of masonry or on piles usually extended at right angles to the shore line. note: a pier may be used as a breakwater or as berths for ships.
pontoon	a floating structure used for buoyant support. note: in tidal waters a flat-topped pontoon is used as landing place for boats and ferries alongside piers and jetties. pontoons are usually connected to the shore or jetty by a hinged bridge.
tidal range	the measured vertical distance between low tide and high tide.

SCHEDULE OF FIGURES

REFERENCES

Books

ADLER, D. 1999. Metric Handbook. Oxford. The Architectural Press

ALBERTO, C & DA SILVA, V. 1964. The City of Lourenco Marques Guide. Lourenco Marques. Tipografia Academica

ALEXANDER, C. Et al. 1977. A Pattern Language: Towns, Buildings, Construction. New York. Oxford University Press

BACON, E. N. 1968. Design of Cities. New York. Viking Press.

BINNS, T. 1994. Tropical Africa. New York. Routledge.

DEFENCE COUNCIL. 1967. Admiralty Manuals of Seamanship Volumes I and III. London. Her Majesty's Stationary Office.

DEFENCE COUNCIL. 1967. Admiralty Manual of Navigation Volume I. London. Her Majesty's Stationary Office.

HILLIER, B & HANSON, J. 1984. The social logic of space. Great Britain. Cambridge University Press.

HOLL, S. 2006. Questions of Perception: Phenomenology of Architecture. Japan. A+U Publishing.

JACOBS, J. 1961. The Death and Life of Great American Cities. New York. Random House.

KOSTOF, S. 1991. The City Shaped Urban Patterns and Meanings through History. Canada. Bulfinch Press

LOOTSMA, B. 1999. Synthetic Regionalisation: the Dutch Landscape Towards a Second Modernity. Recovering Landscapes: Essays in Contemporary Landscape Architecture. Edited by Corner, J. New York. Princeton Architectural Press.

LYNCH, K. 1981. Theory of Good City Form. Cambridge. MIT Press

MARSHALL, R. 2001. Waterfronts in Post Industrial Cities. London. Spon Press

MARSHALL, S. 2005. Streets and Patterns. New York. Spon Press

MASSEY, D. 1994. Space, Place and Gender: A Global Sense of Place. Minneapolis. University of Minnesota Press.

MASSEY, D. 2005. For Space. London. SAGE Publications

MORAIS, J. 2001. Maputo: Patrimonia da Estrutura e Forma Urban Topologia da Lugar. Lisbon. Livros Horizonte.

NEUFERT, E. 2000. Architects' Data. Oxford. Blackwell Science.

NORBERG-SCHULZ,C. 1980. Genusloci:towardsaphenomenology of architecture. New York. Rizzoli Publishers.

PORTER, T. 2004. Archispeak: An Illustrated Guide to Architectural Terms. New York. Spon Press.

PRIX, W. 2003. b5 2 c6: Public Space. In: Tschumi, B & Cheng I (ed) The State of Architecture at the Beginning of the 21st Century. new York. Monacelli Press.

TORP, J. E. 1989. Mozambique. London. Pinter Publishers Ltd.

TSCHUMI, B & CHENG, I. 2003. The State of Architecture at the beginning of the 21st Century. New York. Monacelli Press.

VICENTE, J. 2010. Inventoria do Patrimonia Edificado da Cidade de Maputo: Catalogo de Edificos e Conjunctos Urbanos Propostos para Classificacao. Maputo.Edicoes FAPF.

WEGELIN, H. 2007 Model Building Specifications and Standards 5.0: Guide for Architects. Pretoria. Published by author .

Articles

BUTUNER, B. 2006. Waterfront Revitalization as a Challenging Urban Issue. 42nd IsoCaRP Congress. Istanbul.

FISHER, R & CLARKE, N. 2011. RED in Architecture - an Ecotropic Approach. Architecture SA. September/October pp. 19-22.

GALLOWAY, M. [unknown]. East Darling Harbour, Millers Point, History and Development. Sydney Harbour Foreshore Authority.

ISICHEI, U. 2002. From and for Lagos. ARCHIS. Vol.1, pp.7-15.

JACKA, C. (ed.) 2011. Maputo Port poised for more growth. Maritime Southern Africa. May/June, pp. 41-42.

JENKINS, P. 2000. City Profile: Maputo. Cities, Vol. 17, pp. 207-218.

MOORE, R. 2002. Point of Departure. Domus. September Vol. 851, pp.64-75.

NEWTON, J. (ed.) 2011 Africa's Gem: Port Maputo. Export and Import South Africa. March, pp.8-12.

O'LAUGHLIN, B. 2002. Contingent Identity and Socialist Democracy in the Port of Maputo. Working Papers Series No. 372.

URBAN SOLUTIONS, 2006. Baragwanath Transport Interchange and Market. Digest of South African Architecture. 2006/2007, pp.44-47.

UNKNOWN, 1995. Yokohama International Port Terminal. Ni-wa-minato: a differential mediation. Architect and Builder. May, pp.18-20.

Reports

CORTEN, J. 2010. Quickscan Maputo: A description of results. July 2010. Unpublished.

VAN ZYL, P. 2005. The Story of the Victoria and Alfred Waterfront Development. Unpublished. Victoria and Alfred Waterfront (Pty) Ltd..

Presentations

LAGE, L. 2009. African Perspectives. Translated by Edna Peres Sept 2010

Interviews

Unknown. Interview with employee of Transmaritima ferry company. Maputo. 02 March 2011.

Mc Phearson, G. Interview with Maputo Port Employee. Port Directors Building, Maputo. 30 June 2011.

Academic Dissertations

NYAMBIR, T. 2002. Future Management and Rehabilitation of Maputo Fishing Port in Mozambique. Thesis. The United Nations University Fisheries Training Program.

City Frameworks

2004. Hobart Urban Design Framework. Developed by the Tasmanian Government, Hobart Ports Authority and the Hobart City Council

Websites

New ferry links Maputo to Catembe, August 2009. All-africa, viewed May 2011. <http://allafrica.com/stories/200908200902.html>

Viljoen, C. 2005. Senecio tamoides (canary creeper). Kirstenbosch National Botanical Gardens. accessed October 2011. <http://plantzafrica.com/plantqrs/senectam.htm>

BIBLIOGRAPHY

Books

BAHAMON, A. 2005. Sketch, Plan, Build: World Class Architects show how it's done. New York. Harper Collins Publishers.

CORBETT, N. 2004. Transforming Cities: Revival in the Square. London. RIBA Enterprises.

FISCHER, J & KUNZ, M. 2007. Cafe and Restaurant Design. Los Angeles. teNeues Publishing Group.

FOLKERS, A. 2010. Modern Architecture in Africa.

GUEST, R. 2004. The Shackled Continent: Africa's Past, Present and Future. London. Macmillan.

MEREDITH, M. 2006. The State of Africa: A history of fifty years of Independence. Cape Town. Jonathan Ball Publishers.

TRANBERG HANSEN, K & VAA, M. 2004. Reconsidering Informality: Perspectives from Urban Africa. Spain. Grafilur Artes Graficas.

TSCHUMI, B. 1994. Event-cities: Praxis. Cambridge. MIT Press.

TSCHUMI, B. 2000. Event Cities 2. Cambridge. MI Press.

Articles

BRAND, D. 2007. Bluespace: a typological matrix for port cities. Urban Design International. Vol 12, pp. 69-85.

DAVEY, P. 1999. Public realm: Architects should not abandon commitments to place, figure, human scale and the public realm in the construction of cities. The Architectural Review, Vol. 206, No.1299, pp.32.

FOURCHARD, L. 2011. Lagos, Koolhaas and Partisan Politics in Nigeria. International Journal of Urban and Regional Research. Vol. 35, No.1, pp.40-56.

HOYLE, B. 2002. Urban Waterfront Revitalisation in Developing Countries: The Example of Zanzibar's Stone Town. The Geographical Journal, Vol 168, No. 2, pp.141-162.

PALLASMAA, J. 2000. Hapticity and Time: Notes on Fragile architecture. The Architectural Review. Vol. 207, No. 1239, pp.78-84.

SOUTHWORTH, B. 2002. Urban Design in Action: the City of Cape Town's Dignified Places Program - implementation of new public spaces towards integration and urban regeneration in South Africa. Urban Design International. Vol 8. pp. 119-133.

UN HABITAT, 2008. United Nations Human Settlement Program: Mozambique Urban Sector Profile. Nairobi. UNON Publishing Services Section.

VISSER, G & KOTZE, W. 2008. The State and New-Build Gentrification in Central Cape Town, South Africa. Urban Studies Journal. Vol 45. No. 12 pp. 2565-2593.

Websites

www.pps.org accessed March-September 2011

www.publicspace.org accessed March-August 2011

www.accuracyandaesthetics.com accessed August 2011

www.darlinghabour.com accessed May 2011

www.mobilegeographics.com accessed August-September 2011

www.windfinder.com accessed September 2011