

Intersecting the Maputo Fishery Harbour

Architecture as threshold between fixed and fluid

Paul Gregory Devenish

2012

Intersecting the Maputo Fishery Harbour:

Architecture as threshold between fixed and fluid

Paul Gregory Devenish

Submitted in partial fulfilment of the requirements for the degree Magister in Architecture (Professional) in the Faculty of Engineering, the Built Environment and Information Technology.

University of Pretoria
Department of Architecture
June 2012

Project Address:
Porto de Pesca de Maputo (Maputo Fisheries Port)
Marques de Pombal Road, Maputo
GPS Location: 25°58'31.55"S; 32°34'11.66"E

Main Function: Fish processing and Sale

Study Mentor: Marga Viljoen
Studio Mentor: Dr. Jacques Laubscher



In loving memory of my grandmother who taught me how to live and love:

Mercia Jesse Brown
2 June 1917 - 6 August 2011

TABLE OF CONTENTS**TABLE OF CONTENTS**

P. ii

LIST OF FIGURES

vi

CHAPTER 1: INTRODUCTION

P.	03	PROJECT SUMMARY
	04	OUTLINE OF STUDY
	04	REAL WORLD PROBLEM
	05	SUB PROBLEMS
	05	DESIGN AIMS
	05	HYPOTHESIS

CHAPTER 2: THEORY

P.	09	PLASTICITY IN ACTION
	11	POLYVALENCY
	13	UNDERSTANDING 'ACTION'
	18	THEORY APPLIED TO SITE
	20	THE ROLE OF AMBIGUITY: IMAGINATION, DREAMS, HOPE
	23	ARCHITECTURE: TEMPORAL FORCE

CHAPTER 3: CONTEXT AND MAPPING

P.	26	CITY PROFILE
	28	PERIPHERY
	30	DEFINING THE BAIXA
	31	MAPPING
	32	CURRENT CITY FRAMEWORK
	33	MAPS

CHAPTER 4: URBAN CONDITION

P.	44	SITE: PORT CONDITION AND AXIAL CONDITION
	46	PORT CONDITION
	48	PORT AREA AND SURROUNDS
	52	AXIAL CONDITION: AVENIDA SAMORA MACHEL
	56	CASE STUDY: URBAN FORM

CHAPTER 5: BRIEF AND PROGRAM

P.	64	CRITERIA FOR SITE SELECTION
	65	LIST OF PROBLEMATIC ASPECTS
	67	TENURE AND POTENTIAL FUNDING
	67	INTERESTED AND AFFECTED PARTIES
	69	PROGRAM
	71	INHABITING THE BOUNDARY WALL
	72	CASE STUDY: PROGRAMMATIC FORM
	76	CASE STUDY: INDUSTRIAL FORM

TABLE OF CONTENTS (CONTINUED)**CHAPTER 6: DESIGN DEVELOPMENT**

P.	084	THE HARBOUR PRECINCT
	087	PORT AS THRESHOLD
	090	INFRASTRUCTURE IN RESPONSE TO THE TEMPORAL
	090	THE AXIS
	094	DESIGN SYNTHESIS AND DEVELOPMENT
	100	PLANS
	102	FORMAL PRINCIPLES ILLUSTRATED

CHAPTER 7: TECHNICAL DEVELOPMENT

P.	106	PRINCIPLES
	108	FISH HANDLING AND DISTRIBUTION PROCESSES
	112	URBAN TERRACE
	114	UPPER LEVEL ACCOMMODATION
	115	PRIMARY STRUCTURE
	118	SECONDARY STRUCTURE
	122	WATER TREATMENT

CHAPTER 8: DRAWINGS

P.	126	PERSPECTIVES
	131	SITE PLAN
	132	PLANS
	134	SECTIONS
	138	DETAIL SECTION
	140	DETAILS
	142	MODEL

CHAPTER 9: CONCLUSION

P.	149	CONCLUSION
----	-----	------------

APPENDIX A: URBAN HISTORY

P.	154	TIMELINE
	158	BACKGROUND TO HISTORICAL DEVELOPMENT OF MAPUTO
	159	TRADING POST ON THE ISLAND: EARLY 19TH CENTURY
	161	THE BEGINNINGS OF A TOWN: LATE 19TH CENTURY
	163	EARLY 20TH CENTURY DEVELOPMENTS
	165	THE OFTEN OVERLOOKED "REED CITY" DEVELOPMENT
	165	ADDRESSING THE WIDER METROPOLITAN ZONE

APPENDIX B: THEORY: HISTORIC REVIEW

P.	171	THE RATIONAL
	173	THE COUNTER RATIONAL
	175	ARCHITECTURAL PRACTICE
	175	TIME AND 'CHANGEFULNESS' IN ARCHITECTURE
	176	FLEXIBILITY
	177	REACTIONS

ACKNOWLEDGEMENTS

P.	179
----	-----

REFERENCES

P.	180
----	-----

Author	Figure 1.1	Photograph of boat
Pleatfarmer(Alias), 2009	Figure 2.1:	Photograph of a Verner Pantan Mirror.
Kroko, 2008	Figure 2.2.1:	Montessori School in Delf, Herman Hertzberger, 1970: floor closed
	Figure 2.2.2 :	Montessori School in Delf, Herman Hertzberger, 1970: modules removed
	Figure 2.2.3 :	Montessori School in Delf, Herman Hertzberger, 1970:children seated
	Figure 2.2. 4:	Montessori School in Delf, Herman Hertzberger, 1970: design diagram
	Figure 2.2. 5:	Montessori School in Delf, Herman Hertzberger, 1970: children playing
Koolhaas et al., 2001: 225-26	Figure 2.3.1:	Urban Africa, photographic series: informal market 1
	Figure 2.3.2:	Urban Africa, photographic series: informal market 2
Merrill, 2010	Figure 2.4.1:	Streets, Bushes, Print series by Leigh Merril, archival pigment print
	Figure 2.4.2:	Streets, Jean Street, Print series by Leigh Merril, archival pigment print
	Figure 2.4.3:	Streets ,Fulton Street, Print series by Leigh Merril, archival pigment print
Tschumi, 1976	Figure 2.5.1:	Advertisements for Architecture, Bernard Tschumi, 1976-1977, Advertisement 1
	Figure 2.5.2:	Advertisements for Architecture, Bernard Tschumi, 1976-1977, Advertisement 2
Cassimo, 2011	Figure 2.6:	View across Maputo Fisheries Harbour looking west
Donovan, 2008	Figure 2.7:	Diller Scofidio Renfro's Blur Building, 2002
Author	Figure 2.8:	Architecture as temporal force sketch
	Figure 3.1:	Africa
	Figure 3.2:	Mozambique
	Figure 3.3:	Maputo Province
	Figure 3.4:	Metropolitan of Maputo
	Figure 3.5:	Maputo: Cement city
	Figure 3.6.1:	3-D model of the Baixa
	Figure 3.6.2:	Map showing the position of the Baixa 3-D model in relation to the 'cement city'
	Figure 3.7.1:	Original landform
	Figure 3.7.2:	Baixa: low lying area
	Figure 3.7.3:	Protected historic area
	Figure 3.7.4:	Urban mapping study area
	Figure 3.8:	Textures of the 'reed city'
	Figure 3.9 :	Textures of the 'cement city'
Author et. al. (Team Baixa)	Figure 3.10:	Transport network, Public transport and improvement projects: Metropolitan scale
	Figure 3.11.1:	Maputo Citywide Transport Networks
	Figure 3.11.2:	Public transport and city improvement Projects: Citywide Scale
	Figure 3.12.1:	Citywide green open spaces
	Figure 3.12.2:	Baixa study area open space network
	Figure 3.13:	Public Transport
	Figure 3.14:	Figure-ground study and pedestrian density
	Figure 3.15:	Heritage buildings (protected)
	Figure 3.16:	Predominant Functions
	Figure 3.17:	Formal and informal retail
Author	Figure 4.1:	Site in context of Harbour condition and Axis condition

Author	Figure 4.2:	Site in context of Harbour condition and Axis condition
Adapted by Author: Google Earth, GPS: 25°58'31.55"S; 32°34'11.66"E	Figure 4.3:	Port Functions: Barriers dividing the Old Baixa from the ocean
Author	Figure 4.4:	Panoramic view of dry dock adjacent to Maputo Fisheries Harbour
	Figure 4.5:	Panoramic view of Maputo Fisheries Harbour from dry dock site
	Figure 4.5 :	Panoramic view of Maputo Fisheries Harbour
	Figure 4.6:	Panoramic view of street in front Maputo Fisheries Harbour
	Figure 4.11:	City Cathedral
	Figure 4.12:	City Hall
	Figure 4.13:	Praça de 25 Junho
	Figure 4.14:	Fortaleza de Maputo
	Figure 4.15:	Avenida Samora Machel
Forjaz, 2004	Figure 4.16.1:	Independence Square Plan
	Figure 4.16.2:	Independence Square Perspective
	Figure 4.17.1:	Fisheries Museum Plan
	Figure 4.17.2:	Fisheries Museum Perspective 1
	Figure 4.17.3:	Fisheries Museum Perspective 2
Lobato, 1968	Figure 4.7.1:	Aerial view along Avenida Samora Machel looking north
	Figure 4.7.2:	Aerial view showing termination of Avenida Samora Machel
	Figure 4.7.3:	View along Avenida Samora Machel looking south
Author	Figure 4.8:	Avenida Samora Machel
	Figure 4.9:	Axis distinct from rest of city form
Adapted from (Ching, 2007, p.341)	Figure 4.10:	Axis terminating elements and its application in Avenida Samora Machel
Adapted by Author: Google Earth, GPS: 41°24'43.12"N; 2°13'26.47"E	Figure 4.18.1:	Aerial photograph of Barcelona showing Diagonal Axis
Amadalvarez(Alias), 2004	Figure 4.18.2:	Aerial perspective photograph of Plaza Forum 2004.
Bardou, 2011	Figure 4.19.1:	View from Plaza looking back along Diagonal Avenue
	Figure 4.19.2:	View from Plaza looking ocean through framed vista.
	Figure 4.19.1:	View from Plaza, architectural form articulating the movement of space beyond itself.
Adapted by Author: Google Earth, GPS: 41°24'43.12"N; 2°13'26.47"E	Figure 4.20:	Aerial photo of the Forum 2004 precinct showing position of left views.
Gregory, 2004: 60	Figure 4.21.1:	Exterior view of Forum 2004 Congress centre by Herzog & de Meuron
	Figure 4.21.2:	Interior view of Forum 2004 Congress centre by Herzog & de Meuron
	Figure 4.21.3:	Exterior view along Diagonal Avenue
Adapted by Author: Google Earth, GPS: 41°24'43.12"N; 2°13'26.47"E	Figure 4.22 :	Aerial photo of the Forum 2004 precinct
Author	Figure 5.1:	Informal street eatery outside the Maputo Fisheries Port
	Figure 5.2:	Image showing trawler landed in the Maputo Fisheries Harbour.
	Figure 5.3:	Image showing dhows landed in the Maputo Fisheries Harbour
	Figure 5.4:	Recent extension of fish sale area at the Maputo Municipal Market
Unknown, 2010	Figure 5.5:	Fish sale area at the Maputo Municipal Market
Author	Figure 5.6:	Informal street eatery outside the Maputo Fisheries Port
	Figure 5.7:	Informal afternoon street fish market outside the Maputo Fisheries Port
	Figure 5.8:	Informal afternoon street fish market outside the Maputo Fisheries Port

Adapted by Author: Google Earth, GPS: 40°24'46.43"N; 0°25'53.48"E	Figure 5.9:	Figure-ground plan of Benicarló showing position of fish market in red
Adapted by Author: Google Earth, GPS: 40°24'46.43"N; 0°25'53.48"E	Figure 5.12:	Exterior view of fish market from street.
	Figure 5.13:	Exterior view of deliveries and unloading side of building.
Miguel, 2007: 40	Figure 5.10:	Exterior view of collections side of building.
	Figure 5.11:	View showing the internal and external skin of fish market building.
Modified by author, from Miguel (2007: 38-42)	Figure 5.14:	Structure diagram: columnar perimeter to reveal planar void in centre
	Figure 5.15:	Circulation to use diagram
	Figure 5.16:	Repetitive to Unique diagram
	Figure 5.17:	Additive to Subtractive diagram:
	Figure 5.18:	Unit to whole diagram
Miguel, 2007: 37-43	Figure 5.19:	View across harbour
	Figure 5.20:	View up ramp to entrance
	Figure 5.21:	Internal view showing administration offices on upper level
	Figure 5.22:	External screen detailing
Adapted by Author: Google Earth, GPS: 25°54'5.04"S; 28°9'34.49"E	Figure 5.23:	Figure-ground plan of Highveld Business Park
Bakker, 2011	Figure 5.24.1:	East elevation
	Figure 5.24.2:	West elevation
	Figure 5.24.3:	First floor plan
	Figure 5.24.4:	Ground floor plan
Author	Figure 5.25:	View looking Southeast showing public entrance of the building
	Figure 5.26:	Image showing window between factory and laboratory
	Figure 5.27:	Steel sheeting adjacent to concrete wall with shadow gap
	Figure 5.28:	Delivery and collection area for factory
	Figure 5.29:	Steel sheeting forming shadow line above concrete
	Figure 5.30.1:	Circulation
	Figure 5.30.2:	Additive to subtractive
	Figure 5.30.3:	Unit to whole
Bakker, 2011	Figure 5.31.1:	Detail of window between factory and offices
	Figure 5.31.2:	Detail of southern wall
	Figure 5.31.3:	North - South Section through building
Author	Figure 5.32.1:	Repetitive to unique diagram
	Figure 5.32.2:	Geometry diagram
	Figure 5.32.3:	Symmetry and balance
	Figure 5.33:	View of main entrance of TriBeCA Coffee Factory
	Figure 6.1:	Harbour precinct development plan and phasing
	Figure 6.2.1:	Design development sketch
	Figure 6.2.2:	Design development sketch
	Figure 6.2.3:	Design development sketch
	Figure 6.3.1:	Section through harbour edges showings transfer process
	Figure 6.3.2:	Section through harbour edges showings transfer process
	Figure 6.4:	Design development sketch

Figure 6.5.1:	Design development sketch
Figure 6.5.2:	Design development sketch
Figure 6.6:	Design development series
Figures 6.7:	A study of the harbour edge condition of permeability
Figure 6.7.1:	Development series, sketch 1
Figure 6.7.2:	Development series, sketch 2
Figure 6.7.3:	Development series, sketch
Figure 6.8.1:	The grid
Figure 6.8.2:	Grid permeability
Figure 6.8.3:	Axial grid distortion
Figure 6.9:	Units, grids and grid systems
Figure 6.10.1:	Design development: contextual geometries explored on plan
Figure 6.10.2:	Design development: contextual geometries explored on plan
Figure 6.11.1:	Design development: contextual geometries explored in 3 dimension
Figure 6.11.2:	Design development: contextual geometries explored in 3 dimension
Figure 6.11.3:	Design development: contextual geometries explored in 3 dimension
Figure 6.11.4:	Design development: contextual geometries explored in 3 dimension
Figure 6.12:	Design development: contextual geometries explored on plan
Figure 6.13.1:	Design development: contextual geometries explored in 3 dimension
Figure 6.13.2 :	Design development: contextual geometries explored in 3 dimension
Figure 6.13.2:	Design development: contextual geometries explored in 3 dimension
Figure 6.14:	Design development: form in context plan
Figure 6.15.1:	Design development: form in context model
Figure 6.15.2:	Design development: form in context; rectilinear structure framed by a series of diagonal aprons.
Figure 6.16.1:	Design development: contextual geometries explored on plan
Figure 6.16.2:	Design development: contextual geometries explored on plan
Figure 6.17.1:	Design development: sectional explorations
Figure 6.17.2:	Design development: sectional explorations
Figure 6.17.3:	Design development: sectional explorations
Figure 6.18:	Concept sketch: the rectilinear form acts as datum to the diagonal screen
Figure 6.19.1:	Design development: the evolution of the plan
Figure 6.19.2:	Design development: the evolution of the plan
Figure 6.19.3:	Design development: the evolution of the plan
Figure 6.19.4:	Design development: the evolution of the plan
Figure 6.20:	Design development: sectional explorations in which the volume is reduced as the building comes into closer proximity to the water
Figure 6.21:	Ground floor plan
Figure 6.22:	First floor plan
Figure 6.23.1:	Inside / outside: lockable zones
Figure 6.23.2:	Main building as datum line to screen

Author	Figure 6.23.3:	Circulation to use
	Figure 6.23.4:	Rhythm: Repetitive to Unique
	Figure 7.1:	Floor being sprayed
	Figure 7.2:	Fish handling
	Figure 7.3:	Water filtration
	Figure 7.4:	Early design sketch exploring tectonic concept
	Figure 7.5:	Tectonic language
Adapted by author from Fisheries, FAO, 1988	Figure 7.6.1:	Drawing of typical fish boxes used to transport and temporarily store fish harvest
	Figure 7.6.2:	Drawing of a typical fish washing concrete table
	Figure 7.6.3:	Drawing of a typical fish weighing scale
	Figure 7.6.4:	Drawing of a typical fish filleting concrete table with drainage gutters and catchment
Author	Figure 7.7:	Diagram of fish handling and distribution process illustrated on ground plan
Adapted by author from Fisheries, FAO, 1988	Figure 7.8.1:	Drawing of a typical insulated fish and ice concrete storage tank
	Figure 7.8.2:	Drawing of a typical poly ethylene air tight fish offal storage container
	Figure 7.8.3:	Drawing of a typical fish auction and sale steel reinforced concrete table
Author	Figure 7.9:	Short section through restaurant and ablutions
	Figure 7.10:	Long section showing terracing of primary structure
	Figure 7.11:	First floor plan
	Figure 7.12.1:	Primary Structure perspective
	Figure 7.12.2:	Primary Structure exploded view
Allen, 2008	Figure 7.12.3:	Concrete finish , rough sawn timber sheeting used for formwork
Author	Figure 7.13:	Structure Diagram
	Figure 7.14:	Secondary Structure perspective
Youngman, 2008	Figure 7.15:	Aluminium roof sheeting
Reynaers Aluminium, 2011	Figure 7.16.1:	Diagram showing axonometric view of aluminium window system
	Figure 7.16.2:	Diagram showing axonometric view of aluminium window system
Author	Figure 7.17:	Typical section through building facade
SunPlan AG, 2009	Figure 7.18.1:	Diagram showing axonometric view of aluminium louvres
	Figure 7.18.2:	Diagram showing exploded axonometric view of aluminium louvres
	Figure 7.18.3:	Photo showing the application of alluminium louvred facade
GKD-USA, 2000	Figure 7.19.1:	GKD metal fabric, Escalé 5 x 1
	Figure 7.19.2:	GKD metal fabric, Escalé 7 x 1
	Figure 7.19.3:	GKD metal fabric, Helix 6
Author	Figure 7.20:	Ground floor plan showing position of water treatment and use processes
Bauer et. al. 2010: 63	Figure 7.21:	Diagram of simple grey water filtration system
Author	Figure 8.1 - 8.6:	Perspectives
	Figure 8.7:	Site Plan
	Figure 8.8 - 8.9:	Floor Plans
	Figure 8.10 -8.11:	Sections
	Figure 8.12:	Detailed Section
	Figure 8.13 - 8.15:	Details

Author	Figure 8.16 - 8.21	Model
Koolhaas et al., 2001	Figure 9.1:	Abstract Painting: Abstraktes BILD, Gerhard Richter, 1990
Croucher, 2012	Figure 9.2:	Architectural Pinhole photograph 1
	Figure 9.3:	Architectural Pinhole photograph 2
Morais, 2001	Figure 10.1:	Fort & trading settlement on an island swamp - 1876
	Figure 10.2:	First phase of swamp reclamation & layout of formal street grid -1887
	Figure 10.3:	Circular demarcation of city limits & extension of street grid -1900
	Figure 10.4:	Second phase of swamp reclamation & extension - 1915
	Figure 10.5:	Organic extension of erfs in second phase swamp reclamation - 1940
	Figure 10.6:	Extension of the city to the north - 1955
Jenkins, 2009: 15	Figure 10.7:	1969 Map
	Figure 10.8:	1979 Map
	Figure 10.9:	1989 Map
Jenkins, 2009: 4	Figure 10.10:	View of early settlement across the marshland from the mainland
Morais, 2001	Figure 10.11:	1876 Plan of the early settlement of Lourenço Marques showing island separated from the mainland by marshland.
Redrawn by author from Morais, 2001	Figure 10.12.1:	1876 Plan of the early settlement of Lourenço Marques showing island separated from the mainland by marshland.
	Figure 10.12.2:	Diagrammatic grid layered over the 1887 Plan for the expansion onto the mainland
	Figure 10.12.3:	Diagram showing the Establishment of the City Hall axis
	Figure 10.13:	Figure-Ground map of Lourenço Marques – 1903
	Figure 10.14:	Figure-Ground map of Lourenço Marques - 1940
Morais, 2001	Figure 10.15:	Municipal Map: Zoning and network plan -1953
	Figure 10.16:	Municipal Map: Actual network and land occupation -1953
Jenkins, 2000: 11	Figure 10.17:	View towards the city centre from the 'Reed City'
Eisen's Primitive Hut superimposed by author with Bentham's Panopticon	Figure 11.1:	Charles Eisen's engraving of the Vitruvian primitive hut overlaid on Jeremy Bentham design of the Panopticon
Rougeau, 2008	Figure 11.2:	Fountain, 1917, Marcel Duchamp, 1964 Replica
Wood, 2011	Figure 11.3:	Photograph of artist Marcel Duchamp sitting and smoking in front of his artwork
Arango, 2010	Figure 11.4:	Interior photograph of Maison de Verre, designed by Pierre Chareau, 1931
Pilloton, 2007	Figure 11.5:	Nakagin Capsule Tower, designed by Kisho Kurokawa, 1972
Shulma, 1997	Figure 11.6:	Eames House, Charles and Ray Eames, 1952