

Finding the Maputo Central Market: Seeing the Informal Economy in Formal Architecture

Byron Snow

University of Pretoria, 2011

Student No. 10436180

Finding the
Mercardo Central de Maputo / Maputo Central Market
Seeing the Informal Economy in Formal Architecture

Author:
Byron Snow

Submitted in partial fulfilment of the requirements for the degree:

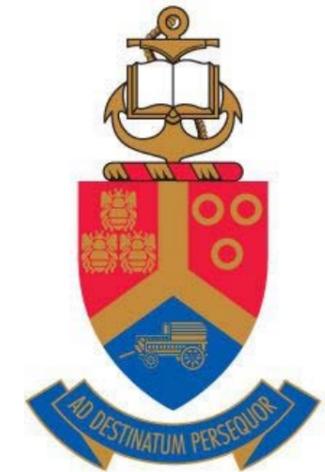
Masters in Architecture (Professional)

in the Faculty of
Engineering & The Built Environment
at the
University of Pretoria

Study leader:
Professor Karel Bakker

Course Coordinator / Studio Master:
Dr. Jacques Laubscher

University of Pretoria
2011



Detailed Dissertation Information

Full dissertation title: Finding the Maputo Central Market (*Mercardo Central de Maputo*): Seeing the Informal Economy in Formal Architecture

Submitted by: Mr. Byron Snow
Student number: 10436180

Study Leader: Prof. Karel Bakker
Course Coordinator: Dr. Jacques Laubscher

Degree: Master of Architecture (Professional)

Department: Department of Architecture
Faculty: Faculty of Engineering, Built Environment and Information Technology
University: University of Pretoria

Project Summary

Programme: Urban Market and Consolidation of Informal Trade

Site Description: The area immediately around the existing historic Maputo Central Market (*Mercardo Central de Maputo*) in the Baixa CBD area of Maputo, Mozambique.

Proposed Client: Maputo Municipality and a donor organization such as the World Bank

Users: Vendors and micro-enterprisers currently operating in and around the Maputo Central Market, and their customers.

Site Location: Consolidation of sites to the East and West of the existing Maputo Central Market.
Address: cnr. Avenida 25 de Setembro & Rua do Mesquita, Baixa, Maputo, Mozambique
GPS Coordinates: S 25° 97' 0715''
E 32° 56' 8541''

Architectural Theoretical Premise: Micro-enterprise and informal trade in Formal Architecture within a historic city centre

Architectural Approach: Facilitating informal trade and micro-enterprise within an area rich in built and un-built heritage through the expansion of suitable formal architecture, in order to formally recognise previously marginalised street vendors.

Research Field: Urbanism and Human Settlements

Abstract

The low-lying Baixa area of Maputo, is the historic and current city centre of Maputo. The district is an important transport hub, and business centre of Mozambique.

The *Mercado Central de Maputo* (Maputo Central Market), is the only infrastructure provided in support of the micro-enterprisers and traders of the city. The Central Market has reached capacity, and informal street markets have developed to the north. These have become fractured and disconnected from facilities that allow for clean, comfortable, hygienic trade, and a healthier business environment.

The architectural proposal offers a solution to the current inadequate trader infrastructure, while also recognizing the area's heritage and economic significance. The fluxing character of the market is also important in the design. While promotion of micro-enterprise and consequent economic growth will be achieved through an upgrade and expansion of market related facilities. This will allow a greater number of marginalised vendors formal recognition and legitimacy.

The intervention will act as a catalyst project in the urban regeneration, through the consolidation of the fractured market areas. Increasing the market's drawing power on potential customers will promote the Central Market as a destination within its own right.

Samevatting

Die laagliggende Baixa gebied van Maputo, is die historiese en huidige sentrale besigheids distrik van Maputo. Die distrik is 'n belangrike vervoer-, en sakeentrum van Mosambiek.

Die *Mercado Central de Maputo* (Maputo Sentrale Mark), is die enigste infrastruktuur wat mikro-ondernemings en handelaars van die stad ondersteun. Die stampvol mark het informeel versprei na die strate in die noorde. Hierdie straatmarkte is afgesny van skoon, gemaklike en higiëniese fasiliteite wat 'n gesonde besigheidsomgewing kan skep.

Die argitektoniese oplossing bied voldoende handelaar infrastruktuur, terwyl dit die erfenis, en ekonomiese geskiedenis erken. Die veranderende eienskap van die mark is belangrik in die ontwerp. Die bevordering van mikro-ondernemings en gevolglike ekonomiese groei, sal bereik kan word deur middel van 'n opgradering en uitbreiding van die mark-verwante fasiliteite. Dit sal 'n groter aantal entrepreneurs akkommodeer.

Die konsolidasie van die verwyderde straatmark in die argitektoniese oplossing sal as 'n katalisator vir stedelike hergebruik dien. Die projek sal die Sentrale Mark as 'n bestemming vir potensiële kliënte in die stad artikuleer.

Plagiarism Declaration

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this thesis is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

The dissertation is 23 552 words long (excluding captions, tables, contents & reference sections).

Signed

Byron Snow

Contents

Preamble

Glossary and Terms

Chapter 1: Orientation & General Background

Introduction: Project Context.....	1
Problem Statement	6
Hypothesis.....	6
Conceptual Framework	7
Conceptual Approach.....	8
Proposed Client	8
Research Objectives	9
Delimitation of Research or Study.....	9

Chapter 2: Theoretical Background

Context	11
Previous Industrial Architecture.....	12
Normative Position.....	15

Chapter 3: Regional Urban Character

Context Identity.....	18
Threats	29
Potential & Needs.....	31
Demonstration of Need	35
Program & Site	36

Chapter 4: Precedents & Case Studies

Precedents:	39
Case Study	44
Precedent Conclusions	51

Chapter 5: Framework

Selected Site.....	55
Existing Effects on the Site.....	56
Mapping of Existing Urban Phenomena	58
Proposed Contextual Framework.....	63
Framework Summarised	66
Proposed Informal Economy Strategy	67
Vehicular Strategy	68
Specific Site Recommendations	68

Chapter 6: Specific Site

Site Hierarchy	71
Significant Buildings	72
Topography & Flooding	78
Functioning of the Maputo Central Market	79
The Importance of the Intangible.....	86

Chapter 7: Proposed Intervention

Aim of Proposal	89
Parti Diagram.....	90
Interface with Transport.....	90
Proposal.....	92
Proposed Core Market Building Intervention	94
Interface with significant existing fabric	95
Market Functioning & Fabric.....	97
The Vending Stand.....	102
Production.....	105
Lighting.....	107
Thresholds	108
Ventilation	109
Environmental Sustainability.....	110
Topography & Flooding	111
Services	111
Fire: Escaping, Isolation, Extinguishing, Smoke	115
Surfaces, Materials, Finishes	116
Health & Cleanliness	118
Identity of Space.....	120
Overview	121

Chapter 8: Design Sketches & Conclusion

Levels.....	125
Relationship Between Levels.....	127
Plans:	128
Structural.....	131
Fire Plans	132
Technical Section & Details.....	136
Elevations	138
Sections:	140
Views:	142
Model:	144
Conclusion	148

References

Appendix 1: SBAT Rating

List of Figures

Fig. 1: Average Annual Temperature

Fig. 2: Annual Rainfall

Fig. 3: Climatic Zone

Fig. 4: Altitude

Fig. 5: Maputo: average temperature by month (author: BBC Weather)

Fig. 6: Maputo: Relative Humidity by month (author: BBC Weather)

Fig. 7: Maputo: Relative Humidity by month (author: BBC Weather)

Fig. 8: Average Years In Business in the Baixa.

Fig. 10: UV light reduction through polycarbonate sheeting (Manufacturer)

Fig. 9: Graph showing the number of full hours of full sun per day in Maputo (author, BBC Weather)

Fig. 12: Air-flow rates for ablution stacks (author)

Fig. 11: SBAT Report Graph (author)

Fig. 13: Graph showing the average monthly rainfall for Maputo (author, BBC Weather)

Fig. 14: Graph showing the average monthly water storage vs harvesting levels (author, BBC Weather)

List of Tables

Table 1: Materials Locally unique to Maputo / Mozambique

Table 2: Sea Level Rise Scenarios (Republic of Mozambique National Institute for Disaster Management (INGC), 2009)

Table 3: Sanitary Fixtures Required

Table 4: Level Character

Table 5: Structural Considerations

List of Illustrations

Illus. 1: Mobile vendors selling Cashew nuts (J Casson)

Preamble 19

Glossary and Terms 20

Illus. 2: Woman selling Bananas (Michael Tallman Photography)

Chapter 1: Orientation & General Background 1

Illus. 3: Mozambique - locality (author)

Illus. 4: Maputo Baixa - locality (author)

Illus. 5: Communist era (1970-1990) graphic, painted on a wall near the station. Photo taken 2011 (author)

Chapter 2: Theoretical Background 11

Illus. 6: The German Pavillion, Barcelona, 1929

Illus. 7: Furniture designed for the German Pavillion by Mies van der Rohe

Illus. 8: The Maputo Baixa in focus - aerial view (C Deacon)

Chapter 3: Regional Urban Character 17

Illus. 9: Statutory Declared Heritage Buildings & Precinct

Illus. 10: Building by Pancho Guedes, opposite train station (author)

Illus. 11: Church building by Craveiro Lopes (author)

Illus. 12: Baixa Functions Map

Illus. 13: Contextual Character

Illus. 14: Street Scale (top - author, bottom - J Casson)

Illus. 15: Maputo Baixa Panorama (author from images C Deacon)

Illus. 16: Contextual Materiality

Illus. 18: Transport triangles, creating pedestrian movement past the market (author)

Illus. 17: The Patina of time (C Deacon, author, C Deacon)

Illus. 19: Stripped Lead-wood poles (author)

Illus. 20: Mozambican clay bricks (author), Stripped poles and reeds (author)

Illus. 21: Mopane poles (author), Eucalyptus timber (author), Reeds (author)

Illus. 22: Baixa Flooding - Ave 25 Setembro looking west

Illus. 23: Baixa Flooding - cnr. Ave 25 Setembro & Karl Marx

Illus. 24: Baixa Flooding - cnr. Ave 25 Setembro & Karl Marx

Illus. 25: Baixa Flooding - Municipal Market

Illus. 27: Baixa Flooding: Various methods currently used by occupants to deal with flooding (author)

Illus. 26: Baixa Flooding Map

Illus. 28: Contextual Character

Illus. 29: Baixa Commerce Map

Illus. 30: Ruins & temporary infrastructure (parking & shaded parking etc)

Illus. 31: Extended Market boundary & Core Building site (author)

Illus. 32: Ground Medicinal Plants for sale, Muthi Market, Warwick Junction, Durban (author)

Chapter 4: Precedents & Case Studies 39

Illus. 34: Photo: Lusaka City Market (Gantner, 2009: 3)

Illus. 33: Lusaka City Market layout, red indicates the transport hub (Gantner, 2009: 3)

Illus. 35: Makola Market - Accra - Ghana: Transport Hub (Gantner, 2009: 11)

Illus. 36: Transport nodes around Kariakoo Market - Dar es Salaam (Gantner, 2009: 9)

Illus. 37: Makoko Land Reclamation

Illus. 38: Warwick Junction - Mielies cooking over fire (Dobson & Skinner, 2009: 76)

Illus. 39: Warwick Junction Markets Layout (Dobson & Skinner, 2009: 6)

Illus. 41: Numbering of Market Stalls. From left to right: Warwick Junction (Dobson & Skinner, 2009: 82), Stone Town - Zanzibar (K Bakker), Bamako - Mali (K Bakker), Timbouctou - Mali (K Bakker), Temporary market - Maputo Central Market (author)

Illus. 40: Warwick Junction Transport Triangle

Illus. 42: Marked street stalls - Warwick Ave. - Warwick Junction (author)

Illus. 43: Warwick Junction - Brook Street Market. Badsha Peer Festival (Dobson & Skinner, 2009)

Illus. 44: Warwick Junction - Brook Street Market. Normal operation (Dobson & Skinner, 2009)

Illus. 45: Warwick Junction - Bovine Head Market - Original Design Sketch (Dobson & Skinner, 2009: 14)

Illus. 46: Warwick Junction - Bovine Head Market - Sketch of Existing (author)

Illus. 47: Warwick Junction - Municipal street cleaning (Dobson & Skinner, 2009: 114)

Illus. 48: Warwick Junction - Muthi Market, furniture variations (author)

Illus. 49: Some stalls survive by 'intercepting customers who are drawn to stalls behind them (Dewar & Watson, 1990: 42)

Illus. 50: Dead spots caused by end walls (Dewar & Watson, 1990: 49)

Illus. 51: Ineffective customer penetration, due to stall run being too long, ie. +35m (Dewar & Watson, 1990: 50)

Illus. 52: A circulation space that is too wide (+6m) causes customers to favour one side (Dewar & Watson, 1990: 51)

Illus. 55: Ineffective customer to stall exposure because of stall run layout (Dewar & Watson, 1990: 45)

Illus. 54: More appropriate stall-run dimensions (Dewar & Watson, 1990: 50)

Illus. 56: Ineffective customer to stall exposure because of stall run layout (Dewar & Watson, 1990: 45)

Illus. 53: Loose stalls in circulation spaces wider than 4m promotes cross movement (Dewar & Watson, 1990: 53)

Illus. 57: Entrance position & grain of stall-runs working with customer flow (Dewar & Watson, 1990: 45)

Illus. 58: South facing windows, Baixa, Maputo (C Deacon)

Illus. 59: Baixa Location

Chapter 5: Framework 55

Illus. 60: Location of the Maputo Central Market

Illus. 61: 1954 Urban Framework for Maputo

Illus. 62: 1969 Urban Framework for Maputo

Illus. 63: 2008 Urban Framework for Maputo

Illus. 64: Map showing transport networks around the Maputo Bay (Baixa Framework Group)

Illus. 65: Map showing transport networks in the Centre of Maputo City (Baixa Framework Group)

Illus. 66: Map showing transport & Pedestrian movement (Baixa Framework Group)

Illus. 67: Map showing vegetated areas in Maputo (Baixa Framework Group)

Illus. 68: Map showing open spaces and vacant Buildings (Baixa Framework Group)

Illus. 69: Map showing transport nodes. (Baixa Framework Group)

Illus. 70: Map showing links and street hierarchy. (Baixa Framework Group)

Illus. 71: Formal street stalls, Ave. Guerra Popular (J Casson)

Illus. 72: Vehicles in competition with vendors (J Casson)

Illus. 73: Vehicular congestion Ave Zedequias Manganhela (J Casson)

Illus. 74: Market transaction, Market Square, Maputo Central Market (J Casson)

Chapter 6: Specific Site 71

Illus. 75: Expanded Market boundary & Core Market Site (author)

Illus. 76: Existing hierarchy of space around the existing market (author)

Illus. 78: Location of BIM Building (author)

Illus. 77: Millenium BIM Building, from Ave Karl Marx (author)

Illus. 79: Ave Filipe Samuel Magaia street edge collage (author)

Illus. 80: Ave Zedequias Manganhela shadeing (E Willeumier)

Illus. 81: Rua do Mesquita Mosque, Maputo (author)

Illus. 82: Location of Rua do Mesquita Mosque (author)

Illus. 83: Market Hall collage, Maputo Central Market (author)

Illus. 84: Historic photo, Maputo Central Market

Illus. 86: Historic photo, Ave 25 de Setembro street facade, Maputo Central Market

Illus. 87: Market stalls in the Market Square behind the historic Maputo Central Market Building (author)

Illus. 85: Ave 25 de Setembro Street facade, Maputo Central Market, Maputo

Illus. 88: Flooding, Ave 25 de Setembro, in front of Maputo Central Market

Illus. 89: Existing historic Market Building, Maputo

Illus. 90: Fish Vendor, Maputo Central Market (J Casson)

Illus. 91: Box & Rope Market Cnr. Aves. 25 de Setembro & Filipe Samuel Magaia (author)

Illus. 92: Shoe sales (author)

Illus. 93: Curio vending at market entrance (J Casson)

Illus. 97: Mobile vendor - Maputo (J Casson)

Illus. 95: Level 4 vendors - Maputo (author)

Illus. 98: Level 5 vendor - Durban (author)

Illus. 94: Level 2 vendors - Maputo (J Casson)

Illus. 96: Level 3 vendors - Durban (author)

Illus. 99: Level 6 vendor - Durban (M Teesen)

Illus. 100: Shading in the existing market square (J Casson)

Illus. 101: Vendors in shaded arcade (J Casson)

Illus. 103: Lettuce delivery (J Casson)

Illus. 102: Maputo - *Tshova* Push-Cart (J Casson)

Illus. 104: Market Push-Carts & Barrows. Left to Right: Kampala (K Bakker), Lamu (K Bakker), Bamako - Mali (K Bakker), Stone Town - Zanzibar (K Bakker), Stone Town - Zanzibar (K Bakker), Xindao (K Bakker)

Illus. 105: Shoe vendor outside the Maputo Central Market. Note car on pavement (author)

Chapter 7: Proposed Intervention 89

Illus. 106: Parti diagram

Illus. 108: Location of Chappa Mini-bus Rank (author)

Illus. 107: Consolidation of surrounding transport (author)

Illus. 109: Existing (author)

Illus. 110: Expanded Market Framework (author)

Illus. 111: Core Market Building (author)

Illus. 112: Complete (author)

Illus. 113: Expanded Market Framework Buildings (author)

Illus. 114: Core Market Buildings (author)

Illus. 116: Consolidation of the Street Markets (author)

Illus. 115: Location of BIM Building & Ave Zedequias Manganhela(author)

Illus. 117: Location of Rua do Mesquita & Historic market open space (author)

Illus. 118: Extension of the market square along its East-West Axes (author)

Illus. 120: Heritage lighting strategy precedent. Pedro Paulo de Melo Saraiva (1930), Adaptive re-use of a public market, São Paulo, Brazil (Arcoweb)

Illus. 119: Location of goods delivery area (author)

Illus. 121: Location of the Ave Zedequias Manganhela ramps (author)

Illus. 122: Sketch of a shading currently used (author)

Illus. 123: A variation of the modular market stall (author)

Illus. 124: The formation of the market stall (author)

Illus. 125: Customization of market stall (author)

Illus. 126: Modular stall panels for adaptation (author)

Illus. 127: Market Production - Dressmaker sewing a pinafore, Warwick Junction. (Dobson & Skinner, 2009)

Illus. 129: Some of the vegetable that could be grown on the production level

Illus. 128: General Hydroponics - DutchPot/EuroGrower Hydroponics system

Illus. 130: 'MODEK Opal 50' polycarbonate sheeting (Manufacturer)

Illus. 131: Balustrade sketch detail (author)

Illus. 132: The Makoko Informal Settlement, Lagos, Nigeria. The precedent for 'self-cleaning' waste removal

Illus. 133: Nakivubo Park Yard Market smoulders, Kampala, Uganda, 2009. Fire trucks where unable to get into the market, which was a continuous mass of timber framed stalls (M Mbabazi / Musinguzi, 2011)

Illus. 134: Fire Damage, historic market building, Baixa (author, photo June 2011)

Illus. 136: Calçada Portuguesa crushed-stone paving common in Maputo. The particular example is notable for the use of multiple coloured stone. (author)

Illus. 135: Goods defining space, Alcohol Market - Maputo (J Casson)

Illus. 137: Trafficable waterproofed floor, sketch detail (author)

Illus. 138: Tiling in 'Prédio Emose', Baixa. Reminiscent of *Calçada Portuguesa* crushed stone paving common in Maputo (author)

Illus. 139: Mopane Poles, informal market, Ximelene, Maputo (author)

Chapter 8: Design Sketches & Conclusion 125

Illus. 140: Street / Ground Floor enclosure plan (author)

Illus. 141: Street Level/Ground floor plan (author)

Illus. 142: Upper Level enclosure plan (author)

Illus. 143: Production Level enclosure plan (author)

Illus. 144: Polycarbonate sheeting to be in SAFLOK700 profile, fixed with Stainless steel clips (Manufacturer)

Illus. 145: Upper Level plan (author)

Illus. 146: Roof Plan (author)

Illus. 147: Roof plan (author)

Illus. 148: Street Level/Ground floor fire strategy plan showing fire escapes and 45 meter radii around them

Illus. 149: Upper Level fire strategy plan showing fire escapes and 45 meter radii around them

Illus. 150: Production fire strategy plan showing fire escapes and 45 meter radii around them

Illus. 151: Detailed Section

Illus. 152: North East Elevation

Illus. 153: South West Elevation

Illus. 154: South East Elevation

Illus. 155: Section B-B

Illus. 156: Section C-C

Illus. 157: Section E-E

Illus. 158: View from cnr. Zedequias Manganhela & Samuel Filipe Magaia

Illus. 161: Ave Samuel Filipe Magaia view
Illus. 159: Heritage view of Existing Market building facade

Illus. 160: Ave 25 Setembro view

Illus. 162: Rua do Mesquita, Showing the maintenance of the the visual link to the Mosque

Illus. 163: View of the proposed Market Square

Illus. 164: Model: Ave Zedequias Manganhela view

Illus. 166: Model: View of food court entry (east)

Illus. 165: Model: View from North

Illus. 167: Model: View of cnr. Ave Samuel Filipe Magaia & Ave 25 de Setembro

Illus. 169: Model: View from North East

Illus. 168: Model: Market Square & solar panels on ablution roof

Illus. 171: Model: View from South East

Illus. 170: Model: View from South

Illus. 172: Signage painted onto a wall, Maputo Baixa (J Casson)

References 151

Appendix 1: SBAT Rating 157

Illus. 1: Mobile vendors selling
Cashew nuts (J Casson)



Preamble

Oxford professor Nabeel Hamdi in the book *Small Change: About the Art of Practice and the Limits of Planning in Cities* states that “Not knowing can be an advantage. [Since] It leaves space to think creatively in search of alternatives”, he presses designers to challenge popularly held consensus (2004: 131 & 137). In this case, perceptions, assumptions, and consensus regarding both the tangible and intangible context of Mozambique had to be abandoned and the given context evaluated from a neutral point of view.

The following dissertation deals with an approach to architecture in this developing ‘third-world’ country, in an area with strong environmental and historical influences.

Glossary and Terms

Avenida – Portuguese: (n.) Avenue, used throughout the document with the Portuguese street names.

Baixa – A word used to refer to the downtown CBD of Maputo, literally descriptive of the flat low-lying area near the historic port reclaimed in the late 1800s and early 1900s. Inclusive of much of the oldest most historically significant built fabric of Maputo.

North Baixa – The Baixa area North of Avenida 25 de Setembro

South Baixa – The Baixa area South of Avenida 25 de Setembro

New Baixa – The Baixa area East of Avenida Samora Machel, generally inclusive of larger newer built fabric on reclaimed land.

Old Baixa – The Baixa area West of Avenida Samora Machel, generally inclusive of the oldest historic fabric and the initial trading island from which the city of Maputo sprang.

Calçada Portuguesa – Portuguese: cobbling using small angular stones no bigger than a fist. Particular to Portuguese tradition, used extensively in Maputo, often in patterns of contrasting stone colours.

Chappa – A mini-bus taxi. These operate along informal routes, stopping where needed to pick-up or drop-off passengers, who pay cash. In Mozambique these are notoriously overloaded, and are major part of the public transport system, being used by a large portion of the population.

Fortaleza Nossa Senhora Da Conceição – The name of the Portuguese *Fortaleza* or Fort in the Maputo Baixa. Reconstructed in the 1960s.

Praça – Portuguese: (n.) a park, plaza, or public square. Used throughout the document with the Portuguese names.

Rua – Portuguese: (n.) Road, used throughout the document with the Portuguese street names.

Run / vending run – An unbroken usually linear arrangement of vending areas. Usually parallel to pedestrian movement.

Trinta-três-andares – Portuguese: (n.) Thirty-three-storeys, the nick-name given to the 33 storey landmark ‘M-Cell building’, tallest in Maputo and in Mozambique

Tshova – Two wheeled push-cart pushed by a single mobile vendor or *Tshovadore*. *Tshovas* can also be hired to make deliveries and sometimes operate as mobile vendors.

Tuk-tuk – Term used throughout the document to refer to small three wheeled motorcycle with a wind-screen and canvas hood to protect the driver and one to three passengers seated on the rear bench seat. Known in Mozambique as *Tchopelas*. Generally used for short-distance transport.

Illus. 2: Woman selling Bananas (Michael Tallman Photography)



Chapter 1: Orientation & General Background

Introduction: Project Context

Study Region

The Baixa, literally the 'low lying' land in Portuguese is the Central Business District (CBD) of Maputo, Mozambique, has been selected as the study area for this dissertation, as part of an architectural approach that endeavours to draw inspiration from the existing built and un-built context.

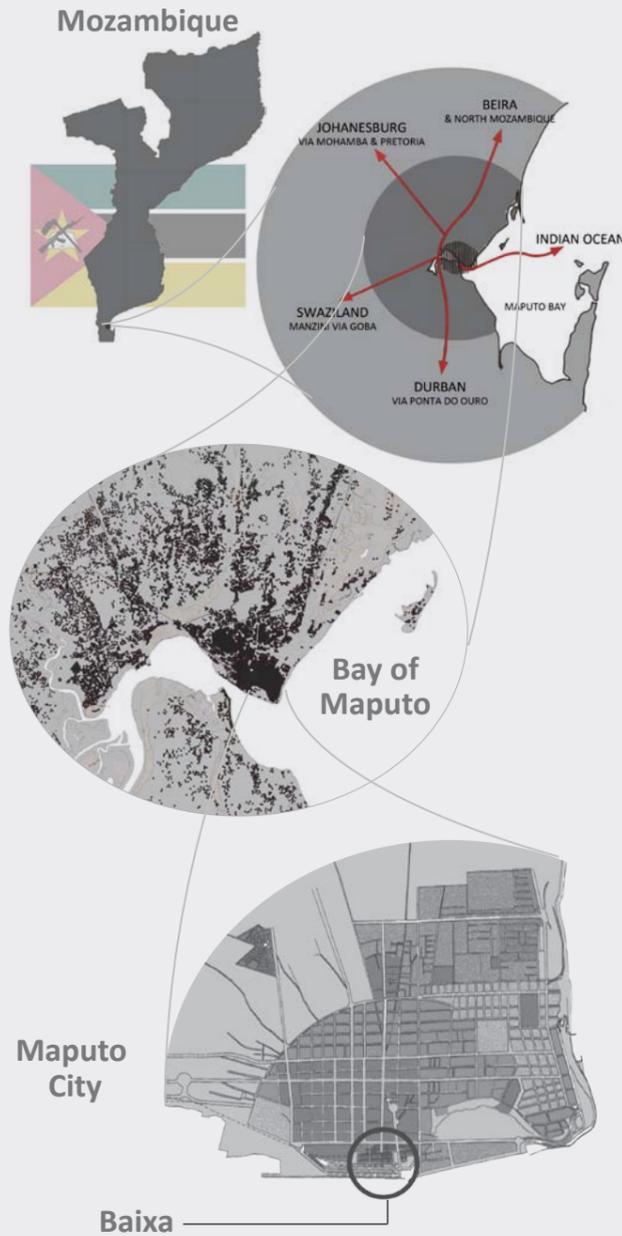
Mozambique

The country of Mozambique, located on the east coast of southern Africa is a mainly tropical biosphere. The United Nations estimates the total population of the country to be 22,8 million people, with an adult literacy rate of 44.4% (Cravinho, J.G., De Sousa, A.N., George, E. and Pelissier, R., 2011: 860 & 865)

The Mozambican currency is the *Metical* (singular, *meticais* -plural), with MZN 26.78 equal to one US Dollar (Currency Converter, 13 Oct 2011). The average annual income of Mozambique citizens is of the lowest in the world and economically the country is fairly dependant on foreign aid. In 2009 the Mozambican government spent 86 900 million Meticais of which 37.06% was grants received from external sources (*ibid*: 862).



Illus. 3: Mozambique - locality (author)



Illus. 4: Maputo Baixa - locality (author)

History

Mozambique recently gained independence from Portugal, who was the colonial power in Mozambique since the 19th century, and who made Mozambique a province of Portugal in 1951. During 1964 the nationalist movement *Frente de Libertação de Moçambique* (FRELIMO) resorted to a war of independence against colonial Portugal, and on the 25th of June 1975, after a military coup d'état in Portugal, Mozambique gained its independence. (Cravinho, et al., 2011: 842 - 844)

The independence of Mozambique was followed by an exodus of the majority of the European population, and a period of tranquility, but this was to be short lived as the ruling party's 'socialization of the countryside' campaign "...succeeded in antagonizing most of the country's peasantry..." (*ibid*: 842). The country was then plunged into a protracted civil war, in which thousands of Mozambicans were killed, or maimed. The Communist ruling party, FRELIMO, was fighting a guerrilla war against the *Resistência Nacional Moçambicana* (RENAMO), partly supported by the Apartheid South African Government. The war lasted until October 1992, when a Peace Agreement was signed, after FRELIMO abandoned its 'Marxist-Leninist' principles and embraced free-market, FRELIMO also allowed for the registration of political parties, and for elections to be held in 1994 (*ibid*: 844)

The end of the civil war left Mozambique crippled; during the fighting the country's infrastructure had been badly damaged. The architecture, although sometimes riddled with bullet- and shell- holes, was in most places exactly as it had been before the war of independence. The significant reduction in construction of buildings and infrastructure during the civil war period is visually evident, contributing to the particular sense of place.

The Region & the City

Since 1992 the government of the 799,380 square kilometer country has focused on the development of 'transport corridors', linking places of importance together, and encouraging development and investment. This includes the Maputo Corridor, crossing the Maputo province and linking Johannesburg in South Africa (Mozambique's principal trading partner), to the port at the city of Maputo (Cravinho, et al., 2011: 849 - 850)

Maputo is the capital city of Mozambique; this city is the largest in the country, with a population of just over 1 million people (*ibid*: 860). In the city itself, much of the evidence of war that was apparent at the turn of the century has been erased, leaving a modernizing, rapidly expanding, and vibrant African city.

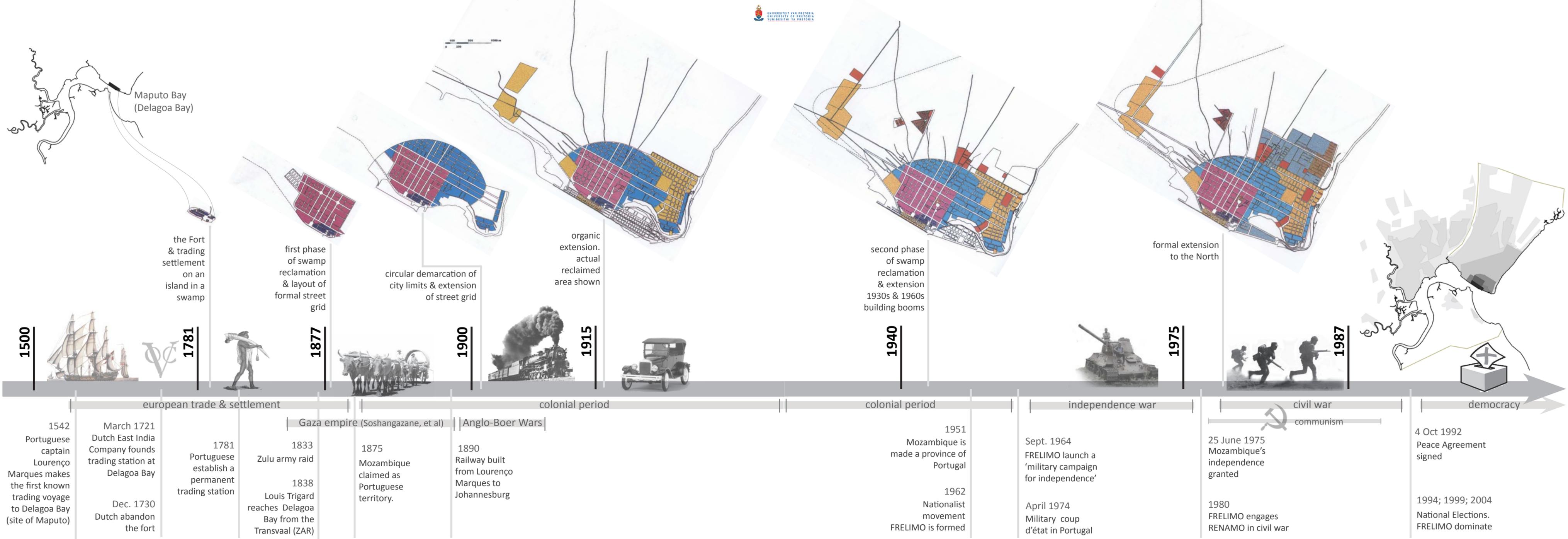
The Baixa

Downtown Maputo is known as the 'Baixa', referring to the low flat land around the harbour which is the historical centre of the city and the site of the initial Dutch, English and Portuguese island trading stations and forts. Built predominantly on reclaimed marshland, it is defined by a low crescent shaped escarpment to the North and East, and the Maputo Bay to the south (historically Delagoa Bay).

As the site of the colonial forts, and more importantly the original site of the Portuguese (*Fortaleza Nossa Senhora Da Conceição*), the Baixa is the point where the formal western city began, and developed around, as shown in the Time Line on the following pages. It is therefore the historic core of Maputo, and the part of the city with the highest density of historic buildings (Joaquim, 2011) and the embodiment of the historic involvement and interests of the Afrikaans, African, British, Dutch, and Portuguese peoples in Mozambique and the port of Maputo.

Like the rest of the city, much of the built fabric remains exactly as it was half a century ago, remnant of the colonial construction boom of the late 1960s, albeit with the beginnings of a new contemporary layer of development (Le Grange, 2009: 10-17). This has resulted in an unique built fabric, one where the contemporary sometimes contrasts strongly with the historic fabric, in terms of form, fabric, texture, and especially the scale of the building.

The Baixa is a cosmopolitan area, with residents from across Africa and the globe; this has resulted in a mix of building ideologies, with Arabic, European, and African influences evident. It is the heart of formal and informal trade of the city –and of the country– containing many levels of enterprise, banks, ministries, and various small formal and informal markets, and shops ranging in age from days old to a century old. It is this melting-pot of built-fabric, memories, peoples, cultures, religions, economies, aspirations, and dreams that has been selected as the study area of this dissertation.



Maputo as a port city, and the Baixa situated in the city centre beside the harbour, is major centre of commerce in southern Mozambique (Cravinho, et al., 2011: 849 - 850). The Maputo Baixa, as the commercial centre of Maputo, also supports a large number of micro enterprises and traders; these people act as ‘wholesalers’, who repackage large bulk shipments into manageable portions, which they then sell locally. These micro-enterprises are a crucial part of the economic activity of Maputo and Mozambique, and in the Maputo Baixa they are accommodated in the *Mercado Central de Maputo* (Maputo Central Market), managed by the Maputo Municipality.

Problem Statement

The *Mercado Central de Maputo* (Maputo Central Market) was built in 1901 and is the only built infrastructure provided in to support the micro-enterprises and traders of the city. The market streets that have developed to the north of the Central Market and have become fractured and disconnected from facilities, with the available market building, and market square behind it, filled to capacity and in desperate need of maintenance. The disconnection from facilities hinders clean, comfortable, and hygienic trade. Micro-entrepreneurs and vendors who are excluded from the market facilities, are forced to vend their goods on the streets where they are considered illegitimate, and consequently have no rights as entrepreneurs.

Hypothesis

The proposed intervention is intended to contribute to a greater collaboration in which key civic projects in the Maputo Baixa will form part of a greater urban renewal scheme within this area, significant for its built heritage and regional economic importance.

It is proposed that the city needs architectural intervention that offers a solution for the current inadequate micro-enterprise and trader infrastructure while it resonates with the economic importance of the area, and also considering its heritage significance in which economic history is very important.

Promotion and sustenance of micro-enterprise and consequent grass-roots economic growth will hopefully be achieved through an upgrade and expansion of the market related facilities at the Maputo Central Market, allowing a greater number of vendors to occupy formally recognised stands and legitimising these marginalized entrepreneurs.

Consolidation of the fractured market functions aims to solidify the Central Market as a destination within its own right, increasing its drawing power on potential customers; while acting as a catalyst project in the Urban Regeneration of the Maputo Baixa.

Conceptual Framework

Conceptual Approach

According to the architectural theorist Kenneth Frampton, Modernist architects often designed and programmed spaces in detail (1980: 164). This tendency to design in detail often means that modernist spaces can be difficult to re-program, a function essential to the smooth operation of a market building. Modernist architecture’s perceived lack of consideration of human use (Curl, 1999) and its separation from contextual issues (Davies, 1988: 6) needs to be addressed.

The concept of ‘Open Building’ as outlined by Stephen Kendal (1999: 1-16) reacts to this, proposing that a basic framework is provided which the occupants can customize and adapt to their own unique requirements. The product is therefore never finalised, but users are allowed to adapt them to suit new requirements and changing circumstances. This is a situation that is endemic to in a market system in which informality plays such a large role.

A contextually reactive approach is intended for the design, in order to identify existing uses and opportunities in placing contextually relevant architecture.

Conceptual Approach

The concept of approaching the building as a 'loose-fit' solution, that can be customised by the user to their specific requirements is therefore proposed. This allows the in-depth knowledge and hands-on experience of the user to 'tighten', hone and adapt small scale spaces to their specific and unique requirements.

Proposed Client

The Mozambican government generates 55% of what it spends; 8% of the additional expenditure is money on loan, while the remaining 37% is received in the form of grants and humanitarian aid (Cravinho, et al., 2011: 862).

It is likely that a building of a civic nature, in this location, would be developed with the Maputo Municipality as the implementing agent, in collaboration with the related national ministry and a donor organization providing a soft loan, such as the World Bank.

Current and historical infrastructure, and construction projects in Mozambique appear to illustrate that the perceived limitations of low budgets often require creative solutions to resolve seemingly straightforward problems.

Research Objectives

Research needs to focus on the regional character of Maputo Baixa and the following subsidiary aspects:

- How this regional character defines the identity of the building, since the intention is to define the context to which the building relates.
- Identifying the potential and needs within the area, a suitable program and location for an architectural intervention can be identified.
- How the existing fabric could define the appropriate scale, massing, and spatial character of the new fabric.
- If the availability of materials could define the material palette available for use in this location, as well as contributing to the material character of the intervention.

The research aims to outline the requirements of a market building, and show how some of these function related requirements could be implemented.

Delimitation of Research or Study

The national identity of Mozambique will not be investigated in depth for this dissertation; as the resulting building is not intended to be specifically Mozambican in character. The regional and urban identity will not be the focus of the study, but will rather be perceived from the availability of materials, local conditions, and historic tendencies, rather than an in-depth study of anthropology, history, regional aspirations.

It is assumed that all necessary community involvement and consultative work would have been done to fine-tune the design, should the building have been built. People in the area, who would theoretically be affected by an architectural intervention, will not be involved in, or participate in this study.

The focus of this study is the *Mercado Central de Maputo* (Maputo Central Market), briefly touching on the related public transport systems, but without going into an in-depth study of them.

Illus. 5: Communist era (1970-1990) graphic, painted on a wall near the station. Photo taken 2011 (author)



Chapter 2: Theoretical Background

This chapter deals with an approach to finding an appropriate architecture for a location in the heart of old Maputo, aiming to identify the strengths and weaknesses of these theories, and concluding with a normative position that draws from the strengths of these theories and proposes solutions to the weaknesses.

It is likely that the normative position will affect the physical- and in-tangible- character of the intervention, as well as the type of built fabric and construction methods used.

Context

For urban infrastructural projects, prefabricated elements and industrialised construction allow for faster construction times and a lower defect rate. In this contextual design inquiry for the upgrade and expansion of the Maputo Central Market, The scale of the existing street markets surrounding market, suggest an intervention large enough to require the use of, or the partial use of industrial mass production in it's construction. An appropriate, industrial architecture should therefore be investigated.

This should have a higher tolerance for construction imprecision, need less high-end or expensive construction equipment, have lower maintenance levels, a lower life-cycle cost, and be related to the a labour intensive construction industry. It should be easier to insert into the existing, working urban informal market. This could perhaps be termed a 'Loose-fit', imprecise solution that allows for the highly informal use it is likely to experience in the Maputo Baixa.

Previous Industrial Architecture

When evaluating the appropriateness of an industrial mass produced architecture, it becomes necessary to evaluate existing architectural movements which react to industrial production. There have been several of these movements, including the Constructivist, Futurist, Functionalist, Modernist, and High-Tech movements, among others (Curl, 1999: 428). The predominant of these movements (to which the others are closely related) is Modernism.

Modernism

French architect Charles-Édouard Jeanneret / Le Corbusier (1887-1965) said that the house was a 'machine for living in' (Davies, 1988). Modernists such as Le Corbusier often idealised industrialist principles of mass production and modular design. Modernist architects generally value the principles of function, a rational design approach, and honest expression of materials and structure; using modern and industrial materials, as well as mass-produced components. Buildings and their components were often modularly ordered, which allows for standardization and regularity of component dimensions. One of the better known examples of this is Le Corbusier's "Le Modulor" (1948), based on the proportions of what Le Corbusier saw to be the average human male body (Curl, 1999: 429).

The "German Pavilion" [Barcelona Pavilion] at the 1929 World Fair in Barcelona, designed by Ludwig Mies van der Rohe (1886-1969), is one of the "...most admired [modernist] paradigms of the late 1920s" (Curl, 1999). Industrial materials are expressed tectonically in a regular rational structure to support a simple flat roof, and used to create open planar spaces. Mies van der Rohe, commenting on the building, stated that the "...increased complexity of our requirements demands flexibility. For this purpose skeleton construction is the most suitable system. It makes possible rationalized building methods and allows the interior to be freely divided... by means of movable walls." (Frampton, 1980: 164). This being said, Mies van der Rohe also designed a chair specifically for this space, showing the modernist tendency to design and program spaces in extreme detail. This design of specific items for a space goes against the idea of loose-fit flexibility.



Illus. 6: The German Pavillion, Barcelona, 1929



Illus. 7: Furniture designed for the German Pavillion by Mies van der Rohe

Criticisms of Industrial Architecture

James Stevens Curl, in his definition of Modernist Architecture, comments that it was often idealized, intended to be used in its 'purest' form, not corrupted by reality, and not intended to be used by "...untidy humanity" (Curl, 1999: 428). A certain coldness and inhumanity, perhaps a lack of consideration of the user, and user comfort, as well as the changing requirements of the user, is often cited as a criticism of industrial and modernist architecture. The 'machine' aesthetic and designs of Mies van der Rohe, including that of the 'German Pavilion' and 'Farnsworth house', often required an extreme precision that is difficult to achieve in a low-tech construction environment (Glaeser, L. (s.a.)).

Critical Regionalism

According to architectural theorist, Alexander Tzonis, Critical Regionalism was a reaction to the "...state of stagnation and disrepute..." that modernism had brought architecture into (2003: 10). A general lack of relation of buildings to their contexts became a major concern in the late 1970, at the height of 'High-Tech' architecture. Critical Regionalists seek to avoid placelessness and disconnection of buildings from their local contexts, and encourage engagement with issues of identity, and the use of contextual identity and characteristics as major design generators. The design of an architectural intervention in the context of the Maputo Baixa should therefore take the issues outlined in the previous Chapter, as well as more detailed analyses into consideration, in the hope that the contextual inappropriateness common in Modernist industrial buildings can be avoided.

The Critical Regionalist approach advocates a building that gives "...the feeling of a world being there... which does not require a translator... to be understood, but also requires no effort to be totally possessed" (Lefaivre and Tzonis, 2003: 18). It promotes perceived personal ownership and familiarity of the user with their built environment, focusing on the human tactile, intangible experience, and considers its unique property of place.

It would be appropriate to apply Critical Regionalist principles relating to the continuation of contextual characteristics, to counteract the placelessness and inhumane character of hard-line, Modernist buildings.

A Critical Regionalist approach would also allow for the significant intangible characteristics of heritage to come into play, through the availability- and contextual use- of construction materials, and for changes and flux of building use under different conditions.

It is perhaps the fluxing use of the space that is perhaps, the biggest factor against an industrial , imposed built unit.

Building for Flux

According to doctor of architecture Stephen Kendall, the main problem with a large proportion of buildings built in the last century, is "...a misguided attitude that sees the built environment as a rigid artefact made up of finished, single-use buildings ... An approach more congruent with the principles of sustainable development and good architecture is to view the built environment as an artefact that is never finished" (1999: 2). Often buildings designed following modernist functionalist principles, err in being over programmed, being designed to meet the user's specific technical requirements rather than customising general requirements to suit the user. Optimising buildings to meet specific exclusive programs, and this makes them difficult to use as conditions, requirements, and uses change.

Ype Cuperus, states that the idea of 'Open Building' "...identifies the conflict between the inertia of the building ... and a consumer demand in constant state of flux. It suggests distinguishing different levels of decision making, in order to decouple [sic.] building parts with different life cycles, controlled by different parties, proposes the construction of a base, which various different users, and progressions of users, are able to change and customize to suite their particular requirements." (2001: 1). According to John Habraken we should try to make provisions for "...unforeseen..." use of a building (1972).

Open Building encourages the user to take ownership of, and appropriate parts of a building. It advocates a system where defined spaces are allocated to various parties and individuals who then become responsible for the care and development of these spaces (Cuperous, 2001: 2). For the proposed market complex, it would therefore be appropriate to use industrial processes to create a basic structure or component that can be allocated to vendors and groups of vendors who are allowed to make modifications to suit their specific requirements.

Normative Position

Theoretical Guides

The main issues which form the basis of the normative position and serve as design guidelines for this thesis, these are:

1. Addressing regional character. This could be viewed as a means of off-setting the anonymity and placelessness of Modernist type industrialized architecture (Davies, 1988). Through a sensitive consideration of the local climate, contextual fabric (built and unbuilt), materiality, and usage patterns, the new fabric could be integrated into the Maputo Baixa.
2. Considering the fluxing use of space in that specific context, and facilitating that through providing a base which can be customized to suit the needs of various users. This user programing may prevent the prescriptiveness often associated with modernist architecture

This thesis however, places a large emphasis on findings based on precedent, discussed in Chapter Four.

Illus. 8: The Maputo Baixa in focus - aerial view (C Deacon)



Chapter 3: Regional Urban Character

“Our everyday life-world consists of concrete ‘phenomena’. It consists of people, of animals, of flowers, trees, and forests, of stone, earth, wood and water, of towns, streets and houses, doors, windows and furniture. And it consists of sun, moon and stars, of drifting clouds, of night and day and changing seasons. But it also comprises more intangible phenomena such as feelings. This is what is ‘given’, this is the context of our existence.”

(Norberg-Schulz, 1979: 6)

This chapter deals with an introduction to the ‘given’ context of the Maputo Baixa, without providing any specific analyses and immediate urban framework, since this will be dealt with in following chapters. It seeks to define the context to which an intervention relates.

An overview of the regional character defines the context to which new fabric relates. It serves to identify the potential of the area outlining the needs, and suggesting an appropriate program.

The existing scale, massing, and spatial character of the area can be used as a contextual guide for devising a new built fabric. The available palette of architectural materials also contributes to the character of the proposed intervention and the place.

Context Identity

Climate

Understanding the climate of a region is important architecturally since “...the more we know about the dynamics and subtleties of climate ... the more we understand about the nature of the appropriate architectural response” (Brown and Novitski, 1981: 299). Knowledge of the climate in Maputo is therefore essential.

As shown on the climatic maps below, Maputo has an annual mean rainfall of 600 to 800mm which falls mainly during the summer months. The area has an average temperature of approximately 23 °C, but this temperature can reach a mid-day maximum temperature in the high 30s and low 40s during summer, and with the high coastal humidity levels it can become uncomfortably warm. The maps below consequently describe Maputo as having a ‘Tropical-humid’ climate (s.a.).

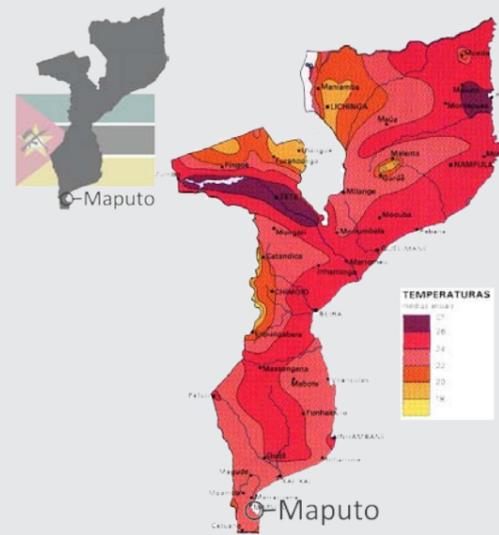


Fig. 1: Average Annual Temperature

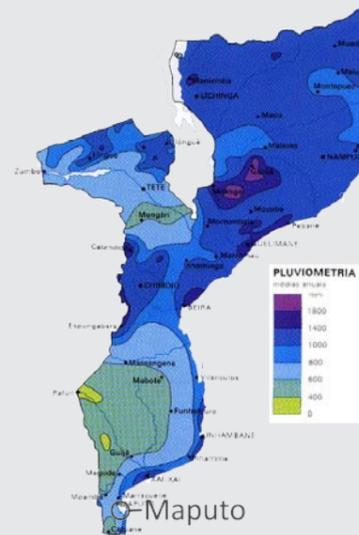


Fig. 2: Annual Rainfall



Fig. 3: Climatic Zone



Fig. 4: Altitude

The proximity of the Maputo Baixa to the sea will result in accelerated corrosion of unprotected steel, copper, and other metals; glass will also need to be cleaned very often due to the accumulation of sea-spray even on buildings several blocks from the water’s edge. The moderating effect of the ocean will create an environment in which relatively little daily temperature variation occurs; consequently architecture in the area has little reason to close itself against cold weather.

The hot humid climate of Maputo has the following desirable architectural implications (Holm and Viljoen, 1996: 30):

1. Large ventilation openings on the North and South.
2. Ventilated roof space with low thermally conductive roof.
3. No windows on East and West due to solar gain.
4. Lightweight wall construction, walls need not be insulated if they are completely shaded.
5. Shading of walls and openings (deep verandas/broad eaves)
6. Narrow free-standing buildings for efficient natural ventilation.
7. Creation of shaded open spaces.

Architectural Character

The city of Maputo is in many ways a typical African city, while certain areas of the city are highly developed with all the amenities and services of the average western city, there is also the ‘informal city’ coexisting with the formal city (Folkers, 2010: 143). In Maputo there is the modern ‘concrete city’, laid out on a structured grid of paved streets, serviced with electricity and water, and planted with trees. This part of the city is generally -but not exclusively, the old colonial city. This is, according to architect and writer Lucien le Grange, characterized by imported “...Victorian and Art-Deco Styles...” (2009: 10).

Beyond the formal city grid where the tarred roads end, the ‘other city’ begins (Folkers, 2010: 143), and is a sprawling mass of poorly serviced informal buildings – sometimes laid out to a formal pattern. This informal mass of mostly self built houses, constructed using locally available materials such as reeds, corrugated iron, and concrete blocks is perhaps typical of “... eighty percent of the buildings in Africa...” (*ibid.*: 148)

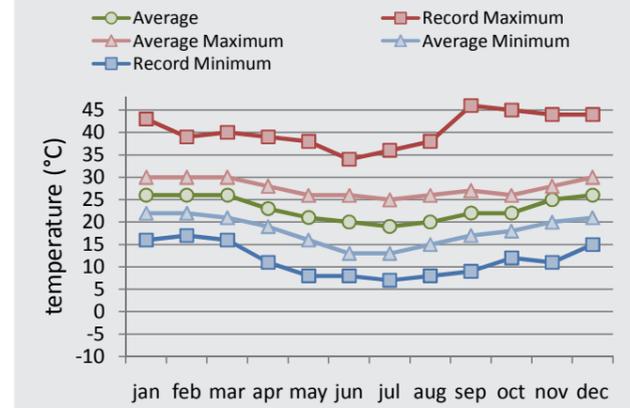


Fig. 5: Maputo: average temperature by month

(author: BBC Weather)

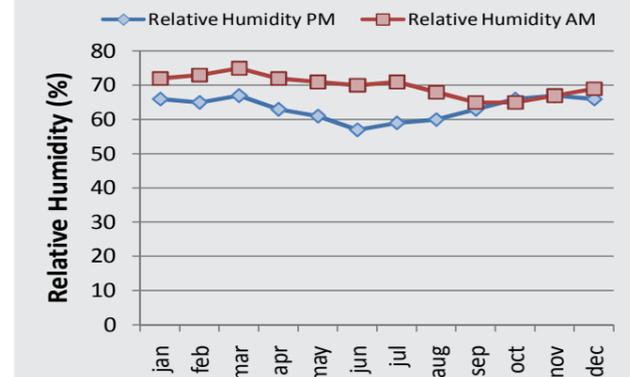


Fig. 6: Maputo: Relative Humidity by month

(author: BBC Weather)



Illus. 9: Statutory Declared Heritage Buildings & Precinct

Statutory Declared Heritage Buildings in the Baixa:

1. Mercado Central de Maputo
2. CFM - Train Station
3. Monumento da 1a Guerra Mundial (WWI Monument)
4. Casa dos Azulejos (Tile Building)
5. Standard Bank
6. Fortaleza Nossa Senhora Da Conceição
7. Imprensa Nacional (National Printing Press)
8. Biblioteca Nacional (National library)
9. Tribunal Supremo (Supreme Court)
10. Monumento e estatua de Samora Machel (Samora Machel Monument)
11. Casa de Ferro (Iron House)
12. Centro Cultural Franco Mocambicano
13. Conselho Municipal
14. Se Catedral
15. Radio de Mocambique
16. Telecomunicacoes de Mocambique

All buildings in the heritage zone and any building built before 1920 are also protected.

Built heritage

The Maputo Baixa is the historical centre of the city, with the majority of the built stock between about 1880 and 1975. Other layers built during the construction booms of the 1930s and 1960s are also evident. It was however in the 1960s when, a "...mature modernism emerged..." (Le Grange, 2009: 10), characterized by the use of modern re-enforced concrete and plastered walls. This is perhaps more pronounced in Maputo than in any other southern African city, due to the relative isolation and lack of investment in building during the recent wars in that country, and also the influence of Portuguese architects who sometimes viewed Mozambique as a testing ground for new ideas.

A new layer has also been added following renewed investment in the country after the signing of the peace accord in 1992. Currently, there is, a "...post-modern condition prevailing in Maputo," (*ibid.*: 10) and in the Baixa these buildings often contrast starkly with the historic fabric in terms of scale, and the use of contemporary cladding materials such as glass.

The buildings shown in illustration 9, along with any building within the protected zone shown in illustration 10, and any other building older than 120 years old, are protected by Mozambican law as part of the heritage of the country. This makes the Baixa a centre of built historic heritage. However, there are also significant Modernist buildings in this area that are not formally considered part of the heritage of the area. These include the Mosque in Rua do Mosquita, and Modernist buildings like the "BIM building" by architect Joao José Tinoco, (discussed in Chapter Six) as well as many buildings by renowned Mozambican Architects Pancho Guedes and Craveiro Lopes.

Current Layering

What seems to have happened in the years of civil war is the increased dominance of the 'other city'. The Baixa, in the centre of Maputo, seems to have an impromptu, informal layer of concrete blocks, corrugated iron, and reed screening that has been added as users adapt and appropriate spaces. This informal layer is a significant part of the character of the Baixa, contrasting and softening the industrial nature of many of the larger buildings.



Fig. 7: Maputo: Relative Humidity by month (author: BBC Weather)



Illus. 10: Building by Pancho Guedes, opposite train station (author)

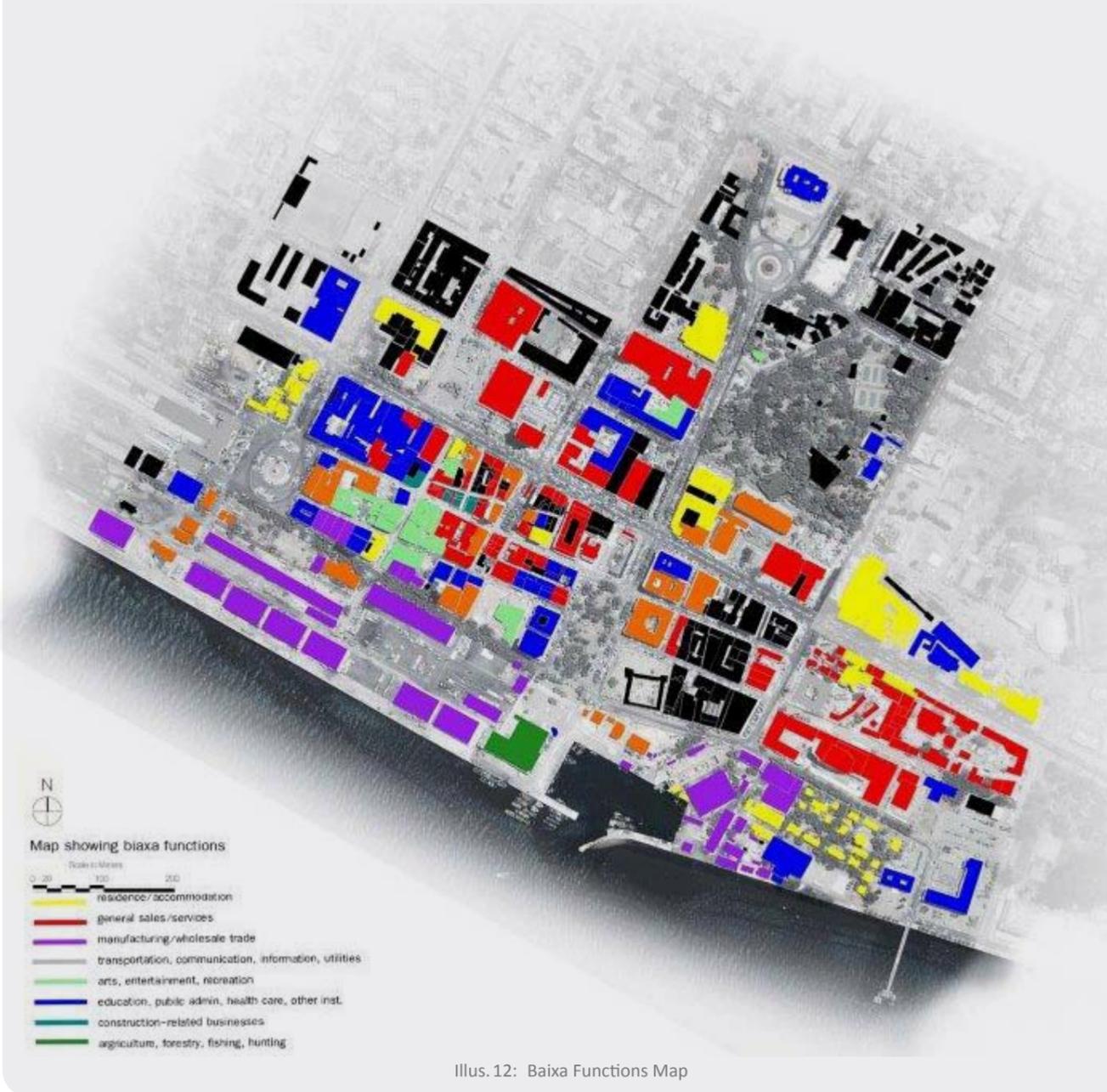


Illus. 11: Church building by Craveiro Lopes (author)

Programming

The Baixa is an important part of Maputo, despite the recent relocation of the major harbour facilities to nearby Mathola. It is still the commercial centre of Maputo, and consequently of Southern Mozambique. This new centre of industry at Mathola protects the historic fabric of the Baixa from damage by high volumes of heavy trucks and machinery associated with the functioning of an industrial harbour.

The Baixa is the seat of many of Mozambique's government departments, including the Prime Minister's Cabinet building, National library, Bank of Mozambique, Mozambican Navy, Ministry of Minerals and Resources, National School of Dance, National School of Art, and others. Despite this high density of government buildings there is also a mix of functions, indicated on the map below as residential (yellow), public (red), commercial (blue), and industrial (brown). This mixed use programming is a contributor to the vitality of the area.



Illus. 12: Baixa Functions Map

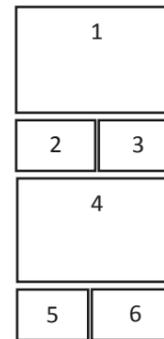
Industrial Heritage

The history of the Baixa is indivisibly linked to industry. This as well as industrial advances often triggered development throughout the history of the Baixa. Including the initial trading of mass-produced cloth and beads by the first European settlers for raw materials and ivory, the creation of a railway link to Pretoria, and the use of pre-manufactured building elements (such as cast iron verandas and columns) in buildings throughout the Baixa. The historical and current relation to the non-bulk section of the harbour also reinforces this industrial link. This historic relation to industrial developments in architecture makes it appropriate that an architectural intervention in this area acknowledges this industrial heritage.

Scale, Massing, Spatial character

Spatial Character: Importance of the Pavement and Shade

The informal character of the place means that often trade occurs in the street, on the pavements which are often arcaded on the street level. In tropical Maputo, the arcading is primarily a climatic response, shading the glazed fronts of many of the shops. The importance of shade is not only relevant to formal retail, but also to informal retail, and shaded spaces are often congested with informal vendors. Often, where there is no built shading, trade areas are defined by large umbrellas, or nestled into the shade of a tree. The importance of shade, and shelter to informal vending should therefore not be underestimated.



Guide to Illustration - Contextual Character:

- 1: Street Arcade, shopfront & cars define horizontal space (author)
- 2: Street Arcade. (J Casson)
- 3: Fixed vending area defined by umbrella shade (J Casson)
- 4: Space used by Fixed Vendors defined by wall behind and cars at the front (J Casson)
- 5: Fixed vending in Arcade space (author)
- 6: Highly mobile character of space (C Deacon)



Illus. 13: Contextual Character



Illus. 14: Street Scale (top - author, bottom - J Casson)

Spatial Character: Linearity and the Arcade

The 'transport triangle' created by the locations of the three main modes of public transport (road, rail, and water) on the outskirts of the 'old Baixa', has created a situation where there large numbers of people move between transport terminals. This movement of people has resulted in what is often a linear use of space along a street; the street edge is often arcaded, providing a shaded and sheltered route along which pedestrians move. Architectural theorists Christopher Alexander, Sara Ishikawa, and Murray Silverstein state that arcades are "...partly inside, partly outside..." spaces (A Pattern Language: Towns, Buildings, Construction, 1977: 581). They view the arcade as an introductory 'ambiguous' space between the public and private realms, and recommend that these spaces be regarded as places of transition. In the Maputo Baixa, the arcade is used as a place in its own right. Often edged on one side by formal shops, and by informal trade and/or vehicles on the other; the arcade becomes a linear shaded market space. New built fabric needs to consider this linearity, the continuity – or termination thereof, as well as the increased importance and load on these spaces due to informal trade.



Illus. 15: Maputo Baixa Panorama (author from images C Deacon)

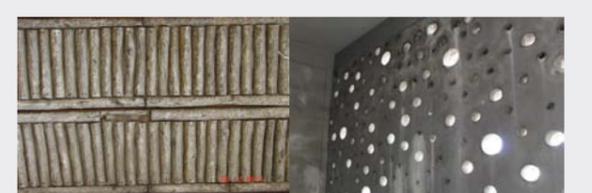
Massing

Alexander et al. (ibid.:114) recommend a four storey limit to the height of buildings. In the Baixa, the majority of the historic fabric unknowingly conforms to this recommendation, and is between one and four storeys high, limited by predominantly load-bearing technology. Buildings built recently or in the late 1960s, are sometimes eight or ten storeys high, and in the case of the 'M Cell/trinta-três-andares' building, up to 33 storeys high. These tall buildings are however, are the exception, sometimes projecting unceremoniously from a low plateau of historic buildings. It is said that this spreading of tall buildings was deliberately planned as part of Portuguese regulations before the civil war (Maputo Studio, Sept. 2011). They often form significant named landmarks, a significant part of the intangible heritage of the area, and it is therefore proposed that majority of new fabric should not exceed this limit in keeping with this pattern, and in accordance to local heritage.

Scale

The general maximum height of four storeys, in conjunction with the predominance of an arcaded building interface creates an environment where the occupants of the top floors still overlook, and have a connection to the street (ibid.:118) and relate to the pedestrian through the predominance of human-scale arcading. Buildings in this area that do not fit this general pattern, risk a tendency to coldness, and detachment from the street, and should be avoided.

1	Guide to Illustration - Contextual Materiality:	
2	3	1: Built texture contrast, Pancho Guedes. (C Deacon)
4	5	2: Cobbled pavement texture (author)
6	7	3: <i>Grelhas</i> grill block texture (author)
8	9	4: Islamic patterned steel burglar guard (author)
		5: <i>Grelhas</i> grill block texture (C Deacon)
		6: Burglar-proof coping on concrete block wall (C Deacon)
		7: Ceramic texture (C Deacon)
		8: Lath window shutter (C Deacon)
		9: Cast interpretation of the grill-block principle. Pancho Guedes (J Casson)



Illus. 16: Contextual Materiality



Illus. 17: The Patina of time (C Deacon, author, C Deacon)

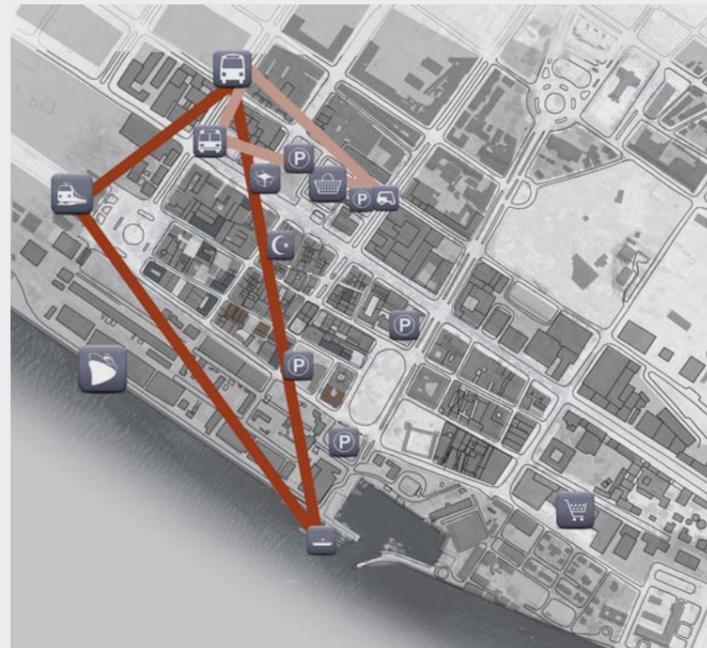
Contextual Materiality

Existing Materiality

The existing buildings in the Baixa built according to western tradition since about 1880 using solid and sometimes cutting-edge formal materials. This puts the Baixa firmly into the 'concrete city' alluded to by Folkers in *The Contemporary African City* (2010: 143). A multitude of architectural influences are apparent in the building finishes and textures, ranging from prefabricated European colonial cast-iron verandas, and ornate Islamic patterned steel burglar guards, to fine texture Portuguese pavement cobbling and the African inspired textures of the Mozambican architect Pancho Guedes.

Christian Norberg-Schulz states that in general "...all places have character [and that] to some extent the character of a place is a function of time..." (*Genus Loci: Towards a Phenomenology of Architecture*, 1979: 12). A lack of investment in built infrastructure over the nearly 30 years of war is also apparent, as is the low current maintenance budget for public infrastructure. Many buildings have not been re-painted, and in many places the organic nature of the informal 'other city' (ibid.) has crept into this area, and buildings have been allowed to develop a patina of time. The formal 'concrete-city' fabric has in many places provided a framework into which the current occupants have added a layer of less permanent materials such as timber, corrugated-iron, reeds, and welded reinforcing bar lattices, adapting the spaces to their own specific needs.

It should be accepted that buildings in this area will be allowed to develop a patina, adapted and re-appropriated by the organic 'other-city'. The choice of materials and finishes in this area should take this into account. Finishes such as paint, requiring regular re-work are therefore not appropriate; rough concrete finishes, such as those often used in the architecture of American brutalist architect Paul Rudolph (1918-97) will not be appropriate since the humid climate of the sea-side location, is conducive to the growth of mosses and structurally destructive plants such as the strangler-fig trees (*Ficus burkei*) in this finish. Local buildings are generally finished with a smooth material, such as plaster. The new built fabric should take this into consideration.



Illus. 18: Transport triangles, creating pedestrian movement past the market (author)

Material Availability

The availability of materials has a large influence on the character of the contextual built fabric. The fact that the Baixa is adjacent to a harbour means that international goods are readily available. Materials that are produced locally at a low-cost, do however still have a significant influence on the built fabric. The table below shows the most important of these materials.



Illus. 19: Stripped Lead-wood poles (author)



Illus. 20: Mozambican clay bricks (author), Stripped poles and reeds (author)



Illus. 21: Mopane poles (author), Eucalyptus timber (author), Reeds (author)

Material	Description	Produced	Sourced	Sizes (mm)	Comments
Timber – Eucalyptus (<i>Eucalyptus</i> species)	Fairly consistent hardwood including some cants & knots	Informal sawmills Xiquelene, Maputo	Salamanga, southern Mozambique	2400, 1300 lengths	Not kiln dried. Exotic species
Timber – Pine (<i>Pinus</i> species)	Fairly consistent softwood	Informal sawmills Xiquelene, Maputo	Malawi	4900, 5500 to 6000 lengths	Not kiln dried. Exotic species
Timber – Chanfuta (Regional Mahogany species: <i>Afzelia quanzensis</i> & <i>Khaya anthotheca</i>)	High quality hardwood, no defects, termite and borer resistant	Informal sawmills Xiquelene, Maputo	Inhambane province, Mozambique	2300,1550 lengths	Not kiln dried. Indigenous species. (<i>Khaya anthotheca</i> IUCN Redlist: Vulnerable) (<i>Afzelia quanzensis</i> Protected in South Africa)
Timber – Mopani Poles (<i>Colophospermum mopane</i>)	Raw Mopani poles	Informal pole merchants Xiquelene, Maputo	Mongweni, Mozambique	±4500	Indigenous species.
Timber – Eucalyptus Poles (<i>Eucalyptus</i> species)	Raw hardwood poles	Informal pole merchants Xiquelene, Maputo	Salamanga, southern Mozambique	±4500	Exotic Species
Timber – Lead-wood Poles (<i>Combretum imberbe</i>)	Stripped Lead-wood (Simbiri/iNtimbi) poles	Informal pole merchants Xiquelene, Maputo	Inhambane province, Mozambique	±4500	A protected species in South Africa. Very hard timber.
Reeds	River reeds	Xiquelene, Maputo		±4500	Seen as a sub-economic material
Clay “ceramic” Bricks	Large extruded clay bricks	Maputo surrounds	Maputo Province	Length: 300 Height: 200 Width: 70/100/150/200	Strength: 1,5mPa & 2,5mPa. (4mPa special order)
Concrete Block / Bloco	interlocking concrete block	Around Maputo	Concrete: Mozambique	Length: 400 Height: 200 Width: 70/100/150/200	Used widely throughout Maputo
Grill Block / Grelhas	Concrete grill block	Around Maputo	Concrete: Mozambique	Various	Used widely throughout Maputo

Table 1: Materials Locally unique to Maputo / Mozambique

Threats

The Baixa being situated just above sea-level on reclaimed marshland is vulnerable to flooding. This currently occurs due to rainfall flooding, but is according to the Mozambican Institute for Disaster Management sea-rise flooding during cyclonic events is an increasing risk. (Study on the Impact of Climate Change on Disaster Risk in Mozambique: Synthesis Report, 2009: 12)

Rainfall Flooding

Rainfall flooding in the Baixa is exacerbated by its situation within a crescent shaped escarpment. This escarpment acts as a large catchment area, gathering rainfall on the hard urban surfaces, and concentrating it into the low-lying Baixa, this excess run-off does not drain fast enough into the ocean to prevent flooding, due to the low flat nature of the Baixa.

The drainage of this area is poor due to its proximity to sea-level, and the cupping within the reclaimed area. Refuse blocking of the few drains and inadequate regularity of storm water inlets also exacerbate the situation.

Sea-level Rise Flooding

The country of Mozambique is prone to cyclones, which batter the coastline occasionally, and cause flooding due to storm surges into low-lying areas. This coupled with the predicted increase in cyclonic activity means that sea flooding of the Baixa will occur more regularly than it has in the past (Republic of Mozambique National Institute for Disaster Management (INGC), 2009: 10 - 12)

Scenario	2030	2060	2100
Low Sea Level Rise Scenario –‘best case’	100mm	200mm	300mm
High Sea Level Rise Scenario –‘worst case’	100mm	1 000mm	5 000mm

Table 2: Sea Level Rise Scenarios (Republic of Mozambique National Institute for Disaster Management (INGC), 2009)



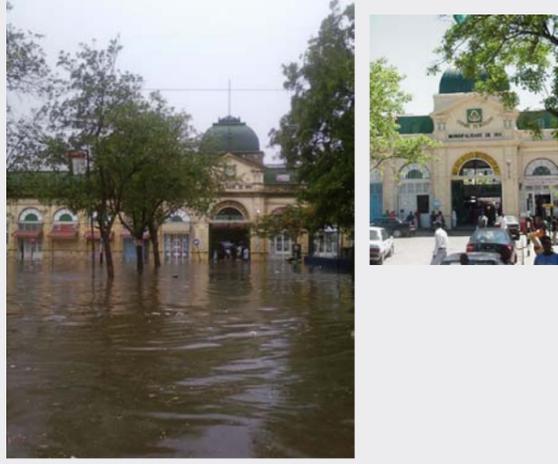
Illus. 22: Baixa Flooding - Ave 25 Setembro looking west



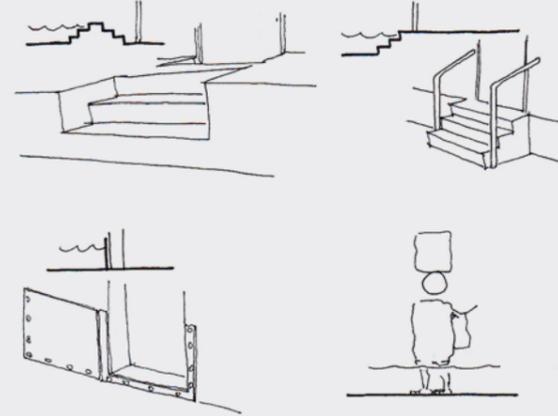
Illus. 23: Baixa Flooding - cnr. Ave 25 Setembro & Karl Marx



Illus. 24: Baixa Flooding - cnr. Ave 25 Setembro & Karl Marx



Illus. 25: Baixa Flooding - Municipal Market



Illus. 27: Baixa Flooding: Various methods currently used by occupants to deal with flooding (author)

Flooding map



Illus. 26: Baixa Flooding Map

Existing Response to Flooding

Existing buildings in the Baixa, while not having any basements, respond to this periodic flooding in one of four ways:

- 1) A step barrier, stairs at the entrance of the building, going up to approximately a meter in height, then immediately down again to a low internal floor level.
- 2) A steel gate, made from a plate of steel approximately a meter high, which swings across a doorway, and bolts tightly onto a neoprene foam seal.
- 3) A plinth, raised over a meter above street level, used by mainly by banks with electronic equipment on the ground floor.
- 4) Resignation and acceptance to the fact that it does flood, but that the flooding is short lived, with economic impact.

Considering the predicted increased incidence of flooding, it is essential that new developments have a strategy to cope with this.

Potential & Needs

Transport Importance

Maputo is an important city in terms of transport. Positioned as the end point on the Maputo – Johannesburg transport corridor, it is important to terrestrially based transport, as well as being a point of interchange between aerial, oceanic, and terrestrial transport. The city forms a gateway to the country, with many travellers and tourists stopping in Maputo before moving north.

The Baixa is the heart of the transport system in Maputo; it therefore has national and international transport importance. Busses, trains, and *chappas* (mini-bus taxis), operate from here on international, national, and local levels; while ferries serve to bridge the barrier created by the Maputo Bay, and link coastal- and island- destinations to the city centre. Small three wheeled *tuk-tuks* move passengers short distances. The major train, ferry, *chappa*, and bus terminals are located within five minutes walking distance (400 meters) of one-another, triangularly arranged around the Baixa. The resultant pedestrian traffic

between these points contributes positively to the character of the area. This creates potential for enterprise, a fact that has not been missed by entrepreneurial Mozambicans and a cosmopolitan array of businessmen and shopkeepers.

Enterprise

The transport related traffic and port function of the Baixa lends itself to retail. Medium 'formal' and micro 'informal' retail coexist side-by-side, with formal retailers often using informal vendors as a manner of reaching customers before their competition. A more detailed analysis of retail is discussed in Chapter Six.

1. Medium retail: Businesses with formal shops and premises, franchises are largely absent. A field study conducted by students of the University of Pretoria found that some businesses had been open for a day, while others had been open for over a century (almost the age of the city), results from the study are shown in the following graph.
2. Micro-enterprise: Often individual entrepreneurs without formally recognised premises, either mobile or fixed. Often regarded as informal, they are often recognised by their peers, with some vendors found by the author to have claimed occupation of a specific area of pavement in excess of ten years. These 'informal' vendors form part of an elaborate social network of vendors and suppliers, often working in collaborative syndicates and buying-groups.

Guide to Illustration - Contextual Character:

- 1: Fixed Vendor sells fish (J Casson)
- 2: Pavement forms the Formal/Fixed vendoe interface. (author)
- 3: Fixed vending & congestion (author)
- 4: Typical shaded fixed vending stand (author)
- 5: Vending occurs in the shade (author)
- 6: A *Tshovador* rests next to his *Tshova* cart (J Casson)
- 7: A *Tshova* cart is unloaded at the Xiquelene market (author)
- 8: Mobile foot vendor sells nail-polish (J Casson)
- 9: Mobile foot vendors sell cashew nuts (J Casson)



Illus. 28: Contextual Character



Illus. 29: Baixa Commerce Map

The *Mercado Central de Maputo* (Maputo Central Market), a building and market square regulated by the Maputo municipality has been provided in order to provide for the micro-entrepreneurs. This is however, full to capacity, entrepreneurs who cannot fit into this confined area do not have any other choice but to sell on the streets without any infrastructural or hygiene facilities. Entrepreneurs who sell outside of the demarcated official areas are often harassed by city officials, a situation that is far from ideal.

It is possible to buy a wide variety of merchandise, from port related industrial machinery or farming equipment to clothing and fresh bread. This formal and informal commercial nature is a major contributor to the character of the

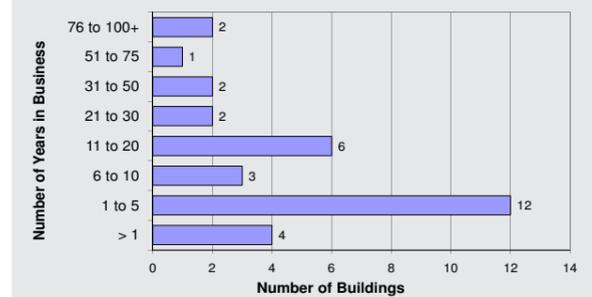


Fig. 8: Average Years In Business in the Baixa.

place, and new developments in this area should consider this contextual property with regards to programming.

Fluxing Use

A large portion of the users of the Baixa are informal traders, and that the significant portion of the public transport such as the *chappas* and busses operate informally, this means that the area is in constant flux, with no particular time schedule, but rather on-demand. Even the largest formal vehicular ferry operates formally on the informal 'on-demand' principle that it leaves 'when it is full'.

Traders and services, particularly micro-entrepreneurs, being involved in fairly marginal business, shift on-demand to meet changing hourly, daily, or monthly demand, and optimise business opportunities. This flux of use should be borne in mind at all stages of design.

Terminals

In the Baixa, busses and *chappas* operate from informal ranks on Ave. Guerra Popular with little formal infrastructure provided for the busses and *chappas*. This is partly due to the fact that both of these functions have developed and operate informally 'on-demand'.

Open Sites

According to Norburg-Schulz, time is "...the order of phenomenal succession and change" (Genus Loci: Towards a Phenomenology of Architecture, 1979: 56). In the Maputo Baixa this time related succession of change is particularly evident in the advent of abandoned sites, sites where the formal building has degraded to ruin, through fire or neglect. These spaces are not necessarily unused, and while some are still in decay, others serve as parking lots or formal basketball courts. These spaces leave a patchwork of spaces where the original function and building has decayed, allowing for new formal or 'on-demand' programming.

Demonstration of Need

The contextual and regional issues in the selected area all form part of the tangible and intangible 'given' fabric outlined below.

Contextual Identity

A harmony with current architectural tendencies, historic layering and heritage, needs to be sought in order to address the Critical Regionalist Ideals outlined in the normative position. This could be achieved through:

1. A detailed analysis of the discussed issues in specific relation to the site.
2. The evaluation of the contextual appropriateness of proposed materials.
3. The use of a building scale, massing, and spatial characteristics that respond to the existing circumstances.
4. An approach to the Heritage of the area.
5. Addressing the regional climate, in this way identifying with local buildings that do the same. Issues of sustainability relating to climate then become an inherent part of the design



Potential

The transport related commercialism and fluxing use are a significant characteristic of the Baixa, and a relatively overlooked aspect of civic life in this area. This, in conjunction with the independent enterprising nature of many of the users is a major point of opportunity. The programming and function of an architectural intervention hoping to tap into this contextual potential should be that of transport and trade.

Program & Site

It is therefore proposed that the program of the 'building' on which this dissertation focuses should be to facilitate individual enterprise. And that it is located at or near the existing Central Municipal Market (*Mercado Central*), since markets act as "...magnets of commercial activity in rapidly growing metropolises, the market buildings themselves become the de-facto center of larger market districts..." (Gantner, 2009: 2). Thus an intervention that aims to revitalise the current market area, allowing it to and expand beyond the walls which constrict it. Vendors operating outside of the formally recognized market should be facilitated in this market expansion, and legitimized as part of the formally recognized economy, and legal system.

It is proposed that the sites immediately to the east and west of the existing Central Market, and the actual site of the existing market be used to create spaces to accommodate this program.



Illus. 31: Extended Market boundary & Core Building site
(author)



Illus. 34: Photo: Lusaka City Market (Gantner, 2009: 3)

The following precedents are all markets, or market areas, and are intended to glean an understanding of the operation and organisation of the typical African Market.

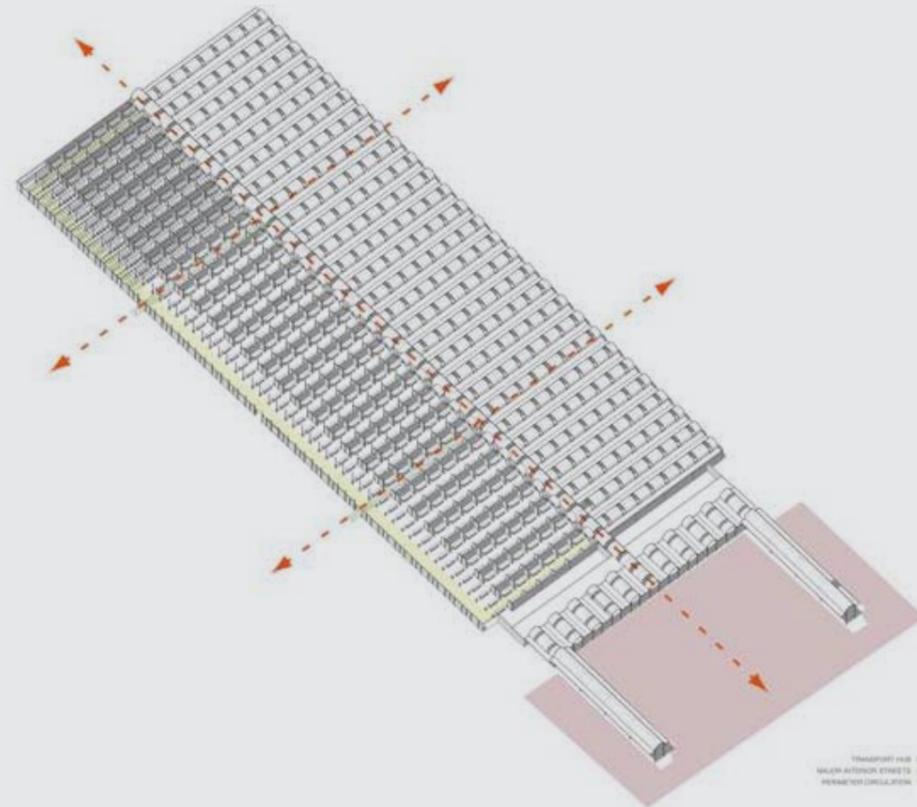
Spatial Use in an African Market: City Market, Lusaka, Zambia

Simply referred to as the “City Market”, the main market in the centre of Lusaka, Zambia (unknown architect) is a large architecturally utilitarian building, covering a full two city blocks. Built in an effort to formalize the previously peripheral market activities around the site, the building consists of a grid of uniform market stalls under a repeating domed profiled-sheeting roof.

The significance of the city market is however, not in the built architecture, but rather in the use of space that becomes clear when imposed over the neutral grid of stalls. With no formal allocation of stalls present, the vendors have been left to arrange themselves within this building as they please, paying the authorities a rental for the stalls that they occupy. This has resulted in the grouping of vendors with identical merchandise into distinctly identifiable areas according to social conventions (Gantner, 2009: 2). This allows vendors some social support and assistance, as well as the ability of self-regulation within these groups. In Lusaka this functional grouping occurs locally on an informal level and on a city scale at a formal level (ibid.).

These groupings may perhaps be referred to as sectors, and benefit the vendors in that they are able to:

- Self-regulate and form representative groups
- Work in mutually beneficial syndicates, co-operative, or buying-groups, and buy larger volumes
- Draw on a larger knowledge and experience base
- Create a known location and larger stock range; and consequently a larger customer draw



Illus. 33: Lusaka City Market layout, red indicates the transport hub (Gantner, 2009: 3)

According to architect Garret Gantner “this form of self-organization would not be possible in a building with more delineated programmatic areas...” (ibid.).

Vertical Spatial Use: Makola Market, Accra

The social grouping of vendors into sectors found in Lusaka also occurs in the “Makola Market”, immediately adjacent to the commercial centre of Accra, Ghana. (unknown architect) The commercial centre of Accra, Ussher Town, is denser in terms of human use than the centre of Lusaka. Small scale vendors in the streets arrange themselves so that the “... market participants begin to create spatial definitions that alter the normal form (and normal function) of the street, developing spaces that respond to their needs as vendors...” in a highly spatially sensitive and significant way (ibid.: 6). This layer then creates a threshold to the more established enterprises in the buildings and vertically to the second and sometimes fourth floors of buildings. This pattern reaches its peak immediately around the Makola Market building. The upper floors in these areas are often used for storage and wholesaling (ibid.: 6).

Significantly the local authorities do not persecute street vendors; this has allowed the Ussher Town area to become a large commercial centre infused with individual enterprise.

When the historic Makola Market building, built in the 1920s, burnt down in 1993, the authorities replaced it with a ‘modern’ market building with four storeys of retail. Formal shops were provided, with doors, walls, and air-conditioning. In the local context shops with closed doors due to air-conditioning lost business, since customers believed them to be closed. Walls limited the display area to the smaller windows, and the walled isolation of neighbouring shops negated the benefits of the existing market social system, weakening the benefits of sectorial grouping. Many traders opted to move out of the new building to trade in the streets, and in the open area planned for parking and public transport (ibid.: 11).

It is therefore apparent that the social sectorial grouping in the market is very important to its proper functioning, and that the tangible architecture should take this intangible architecture into consideration. Verticality within the market, particularly where density is high can be appropriate, and isolation of areas due to level change can be overcome through social understandings and changes in function and level of formality.



Illus. 35: Makola Market - Accra - Ghana: Transport Hub (Gantner, 2009: 11)

Market Relation to Transport: Metro Mall, Johannesburg

“Metro Mall”, nodal interchange for busses and taxis in Newtown, Johannesburg (2003 - 2005), was developed by Urban Solutions in consultation with the Mini-bus taxi associations and vendors who already used the site. Split into two blocks, Block-B for Lenasia bound transport, and Block-C for Soweto bound transport; the development includes holding bays, and terminal points for various types of mini-bus taxi and bus. Significantly the entry-points for each type of transport is on the street level, and so this is maintained as a pedestrian zone.

The significance of this building is the formal built recognition of the integral link between a transport node and retail, and pedestrian movement zones are flanked by vending areas.

Formal markets edging significant transport nodes include all precedents mentioned in this chapter. It is therefore clear that public access to and from a transport node is a key factor determining the positioning of a market. Goods are also often transported to the market by public transport, which is therefore essential to the market’s operation.

The Market as an Urban Generator: Kariakoo Market, Dar es Salaam

The presence of a market often results in increases in economic activity, social exchange, and organisation of the city. This is the case at in the Kariakoo area of Dar es Salaam (*ibid.*: 6). The initial market dating back to First World War, caused a “... substantial influx...” of traders into the area since the 1920s, with the neighbourhood being spontaneously planned around the market (*ibid.*). In the 1970s a new Kariakoo market building (1972-1974) -on the site of the

existing building- was designed by Tanzanian architect Beda Amuli, this iconic structure has since become the “... definitive commercial centre of the city and has reinvigorated the former African quarter with socioeconomic life” (*ibid.*).

Market formalisation: Various Precedents

Formalisation of an what is seen as an ‘informal’ market is often seen as a method of regional upliftment. A market may not necessarily be supported by formal infrastructure, but the vast changes this ‘formalisation’ would entail become extremely disruptive of the formal social networks associated with micro-entrepreneurship. Social unrest and civil strife has resulted at many of the markets where this has been attempted, including at the proposed formalisation of the Marché Rood Woko in Ouagadougou, Burkina Faso in 1993 (Gantner, 2009: 10), and at the proposed construction of a shopping mall on the site of the Warwick Junction Early Morning Market, Durban, in 2009 (Skinner, 2009: 107).

Motivation for landowners to formalise markets into formal shops rather than regulate them goes against the fact that in Warwick junction, the rental charged by the eThekweni (Durban) Municipality per square meter of regulated street vending area is higher that the equivalent rental on the floor area of a formal shop (Interview, 11 July 2011).

Dealing with Waste: Makoko, Lagos, Nigeria

Ideally located close to the Lagos city centre, Nigeria, the informal area of Makoko, extends out into the Lagos Lagoon. Buildings are usually built on stilts, and inter-connected by a network of boat ways and bridges. There is however, some solid land in this area, reclaimed by the residents to build houses on. Rubbish is layered with sawdust to create small platforms, before a final layer of sand is added; this has created a high demand for rubbish in the area. The resulting economic value placed on rubbish means that despite being a net importer of rubbish the area is very clean (Welcome to Lagos, Ep.2.1: 01:00 to 08:05).



Illus. 36: Transport nodes around Kariakoo Market - Dar es Salaam (Gantner, 2009: 9)



Illus. 37: Makoko Land Reclamation

Case Study

An African Market: Warwick Junction Market Precinct, Durban

Architect: Various co-ordinated by Asiye eTafuleni NGO

Date: 1997 to present

What

According to Caroline Skinner, the Warwick Avenue Junction was until recently “...widely recognised as a model of sensitive integration of street traders into urban plans...” (Challenging city imaginaries: Street traders’ struggles in Warwick Junction, 2009: 101). Also known as the Warwick Triangle, Warwick Junction is a mixed residential and commercial area, well served by health, religious, and educational facilities. Historically the scene of frequent and sometimes violent clashes between vendors and police, the area has since 1997, been the focus of the municipal Warwick Junction Urban Renewal Project. The focus of this being improving servicing, maintenance of health standards, regulation and self-regulation market vendors, and upliftment of the area by working with, and encouraging initiatives from existing vendors’ social organisations such as Informal Traders Management Board (ITMB), Traders Against Crime, Traditional Healers Umbrella Body and the Self Employed Women’s Union (SEWU). The regulatory “...strategy is to build a cooperative attitude between officials and traders to improve conditions on the street ...” (ibid.: 8 & 10).

The Warwick Junction Precinct is a conglomeration of various markets, or different groupings of market sectors, with each major sector being large enough to attract customers. The Warwick Junction area has been a centre of trade since the 1880s when the Early Morning Market came into being as a place to sell vegetables. The area has supports a wide variety of traders, currently including clothing, fruit, fish, meat, spice, vegetable, lime/ochre, cooked mielie (corn), iMphempo (incense herb), and bovine-head vendors. iziNynga (herbalists) sell muthi (traditional medicine), izangoma (spiritualists) can be consulted, and gold-tooth fitters. Each of these ‘sectors’ occupies a different zone or market within the Warwick Junction precinct. The market precinct includes the English Market, Early morning Market, Bovine head Market, Berea Station Market, Brook Street Market, Music Bridge Market, Lime Market, *Muthi* (traditional medicine) Market, and associated street markets among others.

Intervention Summary

Over ten years working with the traders organizations the renewal project included (Skinner, 2009):

- Relocation of the Brooke Street Squatters
- Protection of market areas from vehicular invasion through the use of bollards and the provision of alternate parking facilities for mini-bus taxis which where competing with vendors for pavement space
- Provision of water and sanitation facilities
- Muthi (traditional medicine) market, for approx. 1000 current vendors.
- Project Centre renovated
- Early morning Market refurbishment
- Five off-street Mini-bus taxi Ranks completed
- Herb Traders market (iMphempo) (1998) (designed by Design Workshop) (ibid.)
- Improving mielie cooking facilities
- Improved Bead selling facilities
- Infrastructure for Brooks Street vendors (designed by Architects Collaborative)
- Provision of facilities for bovine head cooking
- ‘Informal Economy Policy’ reviewed and amended
- An increased more accessible police presence.

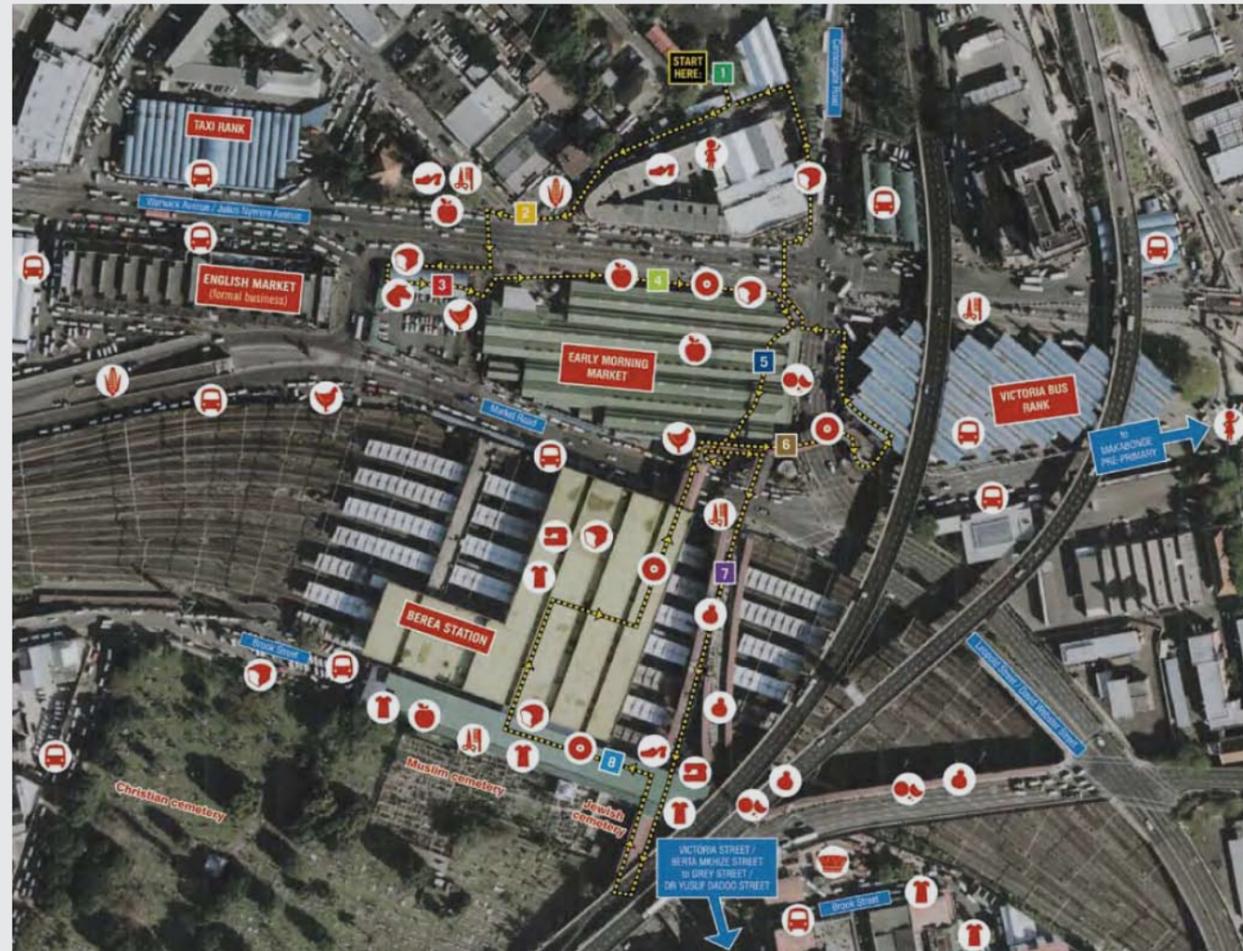
It is significant that the above interventions were conducted in consultation with the affected vendors.

Where

Located in what is known as the Warwick Triangle, the junction terminates the N3 highway, and serves as an entry point and primary transport node for some 460 000 commuters travelling by bus, mini-bus, or train into the Durban CBD. It is therefore a prime position for informal trade and supports the highest densities of vending in the eThekweni [Greater Durban] Metropolitan area (Unknown, s.a.: 3). Located in the city centre, the area facilitates 5 000 to 8 000 vendors (Skinner and Valodia, 2003: 436), with many of these sleeping overnight on the pavement next to their stock.



Illus. 38: Warwick Junction
- Mielies cooking over fire
(Dobson & Skinner, 2009:
76)



Illus. 39: Warwick Junction Markets Layout (Dobson & Skinner, 2009: 6)

- | | | | |
|----------|---------------------------------|--|----------------------|
| 1 | The Project Centre | | food |
| 2 | Fresh Produce | | barbering |
| 3 | The Bovine Head Market | | sewing |
| 4 | Mixed trading strip | | clothing |
| 5 | The Early Morning Market | | fresh produce |
| 6 | The Music Bridge | | clay |
| 7 | The Traditional Medicine Market | | cows' heads |
| 8 | The Brook Street Market | | mealies |
| | | | music |
| | | | chickens |
| | | | shoe repairs |
| | | | traditional medicine |
| | | | beads |
| | | | taxis and buses |

Relation to Public Transport

The Warwick Junction Markets occupy the area between and around the Warwick Avenue Mini-bus Taxi Rank, Victoria Bus Rank, and Berea Train Station. These form a movement triangle across the market area, resulting in volumes of pedestrian traffic across the market spaces.

Social Organisation

Social organization and internal co-operation among vendors in the Warwick triangle has shown itself to be strong among the different groups of vendors, with many sharing vending areas and taking turns to return to the rural areas where they re-stock raw materials and visit their families. Formalized social groups such as the SEWU often provide members with basic public education (ibid.: 13 & 18). SEWU even organised a group of women volunteers who clean the street for up to three hours a week because "...it is good for business and that they are proud of their city and concerned about its image" (Skinner, 2009: 105). Formal, governmental, and corporate bodies have been able to interact with the traders through consultation with these associations.



Illus. 40: Warwick Junction Transport Triangle



Illus. 41: Numbering of Market Stalls. From left to right: Warwick Junction (Dobson & Skinner, 2009: 82), Stone Town - Zanzibar (K Bakker), Bamako - Mali (K Bakker), Timbuctou - Mali (K Bakker), Temporary market - Maputo Central Market (author)

The Importance of an Address

One of the most significant aspects of the renewal is the formal recognition of the street as a legitimate market area through the demarcation of pavement spaces to individual vendors (Working in Warwick.: 10). This allows the vendors a measure of security, allowing entrepreneurs to buy larger volumes of stock, and create business plans in a more stable environment, while allowing regulation of health and safety standards through engagement of authorities with known communities, as is the case at Warwick Junction. Police are then able to provide market security, rather than fighting against the market participants. The demarcated spaces allow a movement corridor on the pavement where pedestrians are safe from passing



Illus. 42: Marked street stalls - Warwick Ave. - Warwick Junction (author)



Illus. 43: Warwick Junction - Brook Street Market. Badsha Peer Festival (Dobson & Skinner, 2009)



Illus. 44: Warwick Junction - Brook Street Market. Normal operation (Dobson & Skinner, 2009)

vehicular traffic, and should these corridors become unsafely congested the police would be able to legitimately clear them, a considered pavement layout is therefore important. Vendors pay rent on these spaces as they would with any market stall, they are therefore legally recognised and legitimised by formal structures.

Multiple Use: Brooke Street Market

The position of the Brooke Street Market adjacent to the cemetery containing the shrine of Muslim saint Badsha Peer is significant. For the last 60 years, vendors have moved out of this market for one day of the year, allowing 10 000 devotees of the Mazaar Society, followers of the Saint, to gather in the space. This is an understanding that has benefited both parties, with the shading roof over this market having been contributed to by the Mazaar Society, and the traders paying a lower rent on stands in this space (Dobson & Skinner, 2009: 89)

Goods Movement

Movement of goods around the area is particularly important to the smooth operation of various market functions. This occurs mostly by 'barrow' in Warwick junction, and barrow operators have been found to move in excess of 300kg in one load. Barrow operators are hired by vendors to deliver goods and to move stock to and from night time storage in and around the markets. This sector is organised, managed, and manned predominantly by a social grouping of young Pondo men.

Facilities for Trade

Traders in this area had the following requirements (Skinner, 2009: 15)

- Night time personal shelter from weather and secure goods storage
- Day time personal- and goods- shelter from rain and heat.
- Water and sanitation facilities
- Lighting allowing night time trade and security
- Access to electricity
- Security policing

Mielie Cooking Facilities Intervention

The municipality identified the mielie selling as a health hazard due to open fires and husks blocking drains, and the open fires also damaged the pavements. After extensive consultation with the mielie cookers they constructed a dedicated cooking facility in a safe location, still using the more heat effective open flame (Skinner, 2009: 084), which prompted a 350% increase in mielie vendors, and currently an estimated 26-28 tonnes of mielies are cooked there, with an estimated weekly street value of R1 million (Participatory Process: Intuitive Process(es) Towards Responsive Urban Architecture, s.a.). A similar consultative design process was followed regarding the herb traders, Brooke Street, and muthi markets, and with the cooking and selling of bovine heads. Improved hygienic facilities prompted an increase in trade, and a diversification of dishes offered (Skinner, 2009: 16)

Inhabitation: Layout Adaptation in the Bovine Head Market

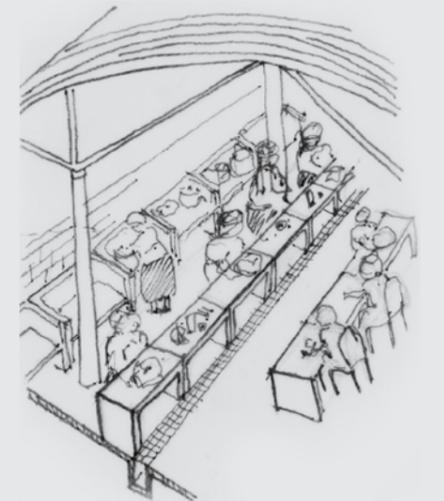
The Bovine Head Market serves as the 'food-court' of the market. A variety of food is available, but this area specializes in the Zulu delicacy of tender beef head meat. This sector has very specific requirements, and becomes a health risk if it operates in poor conditions. A specific design was proposed to meet these requirements, heavy concrete furniture was used, and the layouts of these have since been moved to meet the changing requirements of the customer. In an interview with the elected Bovine head Market representative, the author established that this was in order to best meet the customers requirements, since seating areas where customers could sit and enjoy their food were insufficient (interview 11 July 2011).

Inhabitation: The Muti Market Furniture Debacle

The Muti Market specialises in traditional medicine, and customers can consult with a traditional healer or purchase medicinal herbs in this linear market. At one stage an attempt was made to upgrade this market, moving it from the pavement to a specialist area. The provision of appropriate specialist furniture was envisaged; with the designers engaging with the vendors, and even building a series 1:1 full scale models to present to them. All of the proposed furniture was rejected, and only the shading, protective roof was built. A large proportion of the current furniture provided and built by the vendors is however, according to architect Richard Dobson, very similar to the designed suggestions, "...but in fine detail its completely different..." (Personal Correspondence, 11 July 2011). Individual market stalls differ as salesmen draw on individual experience, preference, and requirements to define their specific spatial requirements.



Illus. 45: Warwick Junction - Bovine Head Market - Original Design Sketch (Dobson & Skinner, 2009: 14)



Illus. 46: Warwick Junction - Bovine Head Market - Sketch of Existing (author)



Illus. 47: Warwick Junction - Municipal street cleaning (Dobson & Skinner, 2009: 114)



Illus. 48: Warwick Junction - Muthi Market, furniture variations (author)

Inhabitation: Furniture for Flux

Traditionally, heavy indestructible furniture is provided in public facilities such as markets. This however creates an environment that is difficult to clean, easy for criminals to hide in, and relatively inflexible to change. In consultation with the existing table carpenter of the Warwick Junction area, a more collapsible trestle table was designed in conjunction with the fixed street vendors in the area, and this design is currently in use by them. This allows vendors mobility, while leaving easily cleanable spaces which are cleaned occasionally by the municipality, and regularly by volunteer vendors. Open uncluttered pavements also allow a safer night time environment.

The Sanitation Sector

Provision of sanitation facilities was problematic, with high incidences of toilet blockages, and the running of these facilities by a market group was proposed as a solution (*ibid.*: 18). This means that sanitation facilities are used at a small fee, which supports an attendant responsible for the cleanliness, basic maintenance, and safety of the facilities, as well as the provision of proper toilet paper.

Physical Levels

At some points the markets within Warwick Junction are multi-levelled, and the level change often defines a change in formality, with the general rule being that higher levels attract businesses with a higher level of formality that are able to exert a higher draw on customers. Ground planes are generally open, with formality increasing with height. A level change may also be used to define a sectorial change as is the case with the stepped transition between the Brook Street Market and the Lime Market.

In relation to the Maputo Central Market

Although the Mercado Central de Maputo is smaller in scale than the Warwick Junction area, and probably closer in size and specific goods offered to the Early Morning Market. The Maputo central market is also located within a transport triangle, and operates in a very similar manner, with the greater market in the surrounding streets serving associated sectors. Topographically, climatically, and historically, Maputo and Durban are very similar, and relatively close geographically. Most significantly the organization and driving forces are have been found to be very similar.

Precedent Conclusions

Summary

The significance of the market as an urban element is not exclusively the built architectural fabric as an object, although this is not unimportant, the intangible “...social configuration and cultural influence [of the market] on the surrounding urban fabric” is significant (Gantner, 2009: 2). This is demonstrated at Warwick Junction by the emergence of vendors associations (and the formal recognition of these associations) markets are primarily controlled by their participants, and although they might be inherently chaotic it allows for a “...rapid, improvised change that is characteristic of modern societies...” without excluding lower-income participants from its gains (*ibid.*: 14). A market “... anchors the local culture and creates an irreproducible locality” (*ibid.*: 18), and in the case of the Maputo, the economic built and intangible culture is anchored and represented by the historic market.

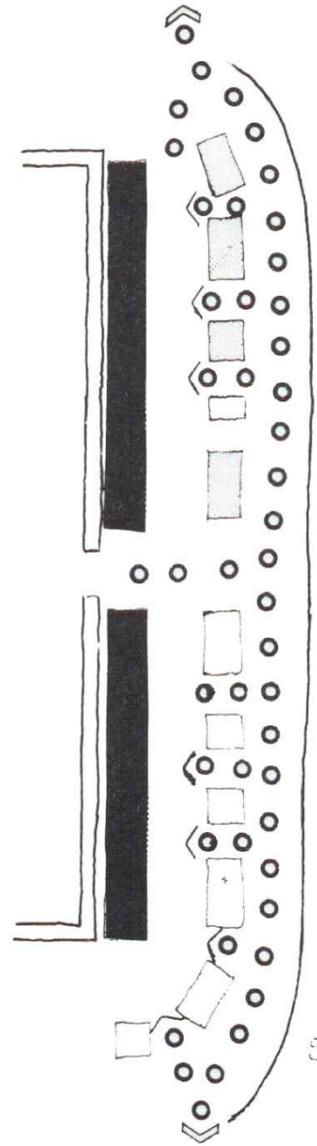
Regulated market stalls or pavement areas, not only within the formal market confines, but also in the streets surrounding the market (as is the case in Warwick Junction) is very important to the health and character of the urban environment surrounding the market. In most countries, including Mozambique, selling wares in the streets is illegal. This is however enforced to greater and lesser extents in various countries and cities, with the most lively market districts occurring where local police do not, cannot, or will not enforce anti-hawking laws, examples of these areas are the Kariakoo and Makola Market districts. Regulation of pavement and market spaces allows vendors to be formally and legally recognised through the payment of a small rental.

Spatial Character

Spaces within the market system seem to facilitate shifting functions. It therefore becomes important that space creation allows for, and facilitates this shifting flux of use at different levels and intensities.

Sectors

Vendors in all the analysed markets group together into market sectors, with the largest sector often acting in the same way as an anchor tenant would in a shopping centre. These groupings are often off the street, forcing prospective customers to move through a series of smaller sectors and individual stores before arriving at the anchor (Dewar & Watson, 1990: 42).



Illus. 49: Some stalls survive by 'intercepting' customers who are drawn to stalls behind them (Dewar & Watson, 1990: 42)

Market Levels

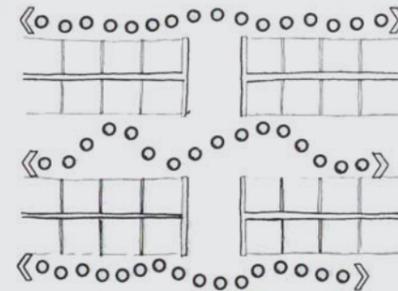
There are also different market levels within the sectors with vendors operating at different levels of formality, from the mobile pavement trader to the enclosed market shop. Vendors at lower levels may not want to change levels for business reasons (Personal Correspondence, 11 July 2011).

Equality in the Market

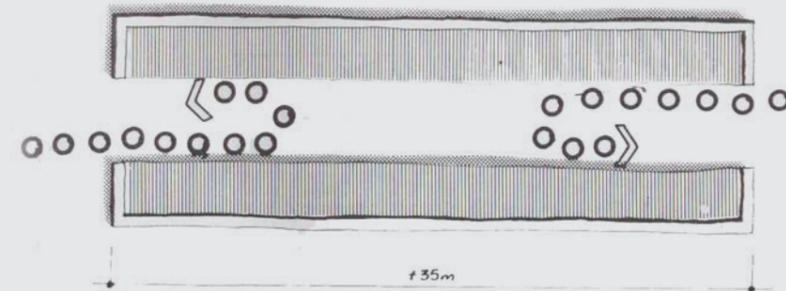
The self organization of market social structures means that these organizations are fairly democratic. Vendors stalls seem to be fairly uniformly sized and distributed where stalls of the same sector and level are grouped, with the main size change being across market levels. Smaller less formal stalls seem to be closer to faster moving pedestrian traffic.

Theoretical Guidelines

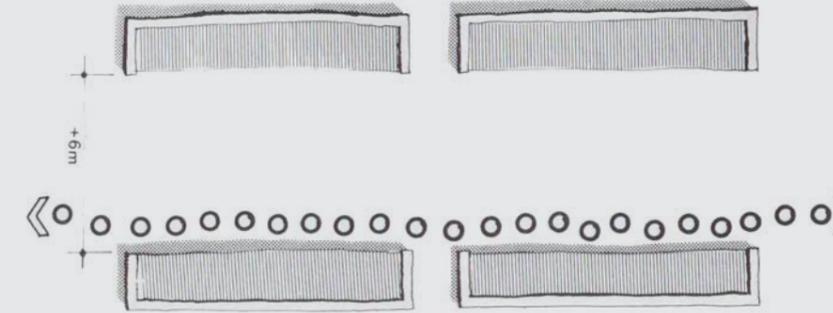
The following illustrations describe the general situations found in the studied markets, and confirmed by the research on African and International markets by Prof. David Dewar and Vanessa Watson (1990: 42-53)



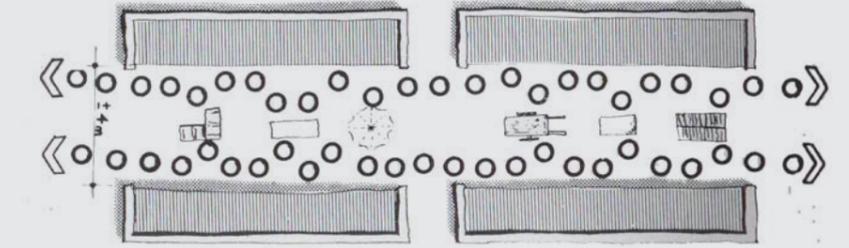
Illus. 50: Dead spots caused by end walls (Dewar & Watson, 1990: 49)



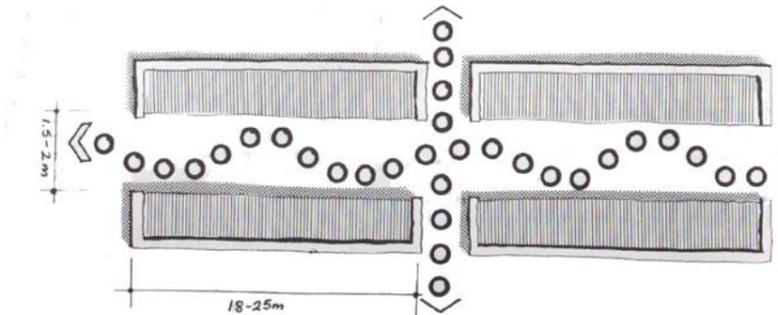
Illus. 51: Ineffective customer penetration, due to stall run being too long, ie. +35m (Dewar & Watson, 1990: 50)



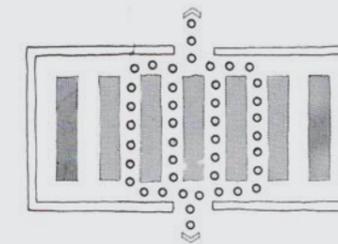
Illus. 52: A circulation space that is too wide (+6m) causes customers to favour one side (Dewar & Watson, 1990: 51)



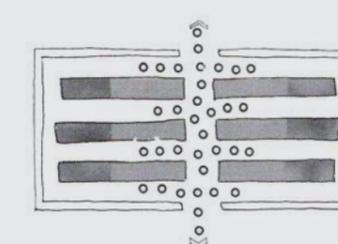
Illus. 53: Loose stalls in circulation spaces wider than 4m promotes cross movement (Dewar & Watson, 1990: 53)



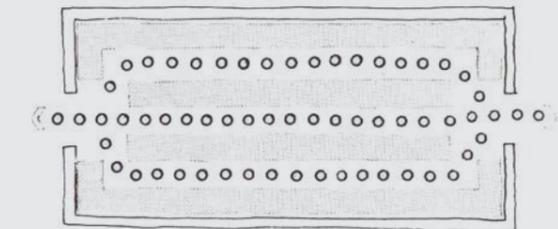
Illus. 54: More appropriate stall-run dimensions (Dewar & Watson, 1990: 50)



Illus. 55: Ineffective customer to stall exposure because of stall run layout (Dewar & Watson, 1990: 45)



Illus. 56: Ineffective customer to stall exposure because of stall run layout (Dewar & Watson, 1990: 45)



Illus. 57: Entrance position & grain of stall-runs working with customer flow (Dewar & Watson, 1990: 45)

Chapter 5: Framework

“In general we say that man ‘builds’ his world. The first mode of building consists in concretizing [sic.] the natural forces.”

(Norberg-Schulz, 1979: 51)

This chapter deals with a strategy on dealing with the ‘given’ context of the Maputo Baixa, discussed in Chapter Three. It is intended to propose guidelines to design by identifying appropriate responses to the context at an urban level.



Illus. 59: Baixa Location

Selected Site

The selected site is the site of the existing central municipal market and municipal parking lots to the east and west of the *Mercado Central de Maputo*. The spirit of enterprise present in the area is a major factor that has driven physical development since the first traders settled in the immediate area. It is hoped that support of individual enterprise on this site will promote individual economic activity and social development in the area, while continuing the spirit of enterprise that forms such an important part of the heritage and character of the area.

The location of the *Mercado Central de Maputo* is shown in the adjacent image.



Illus. 58: South facing windows, Baixa, Maputo (C Deacon)

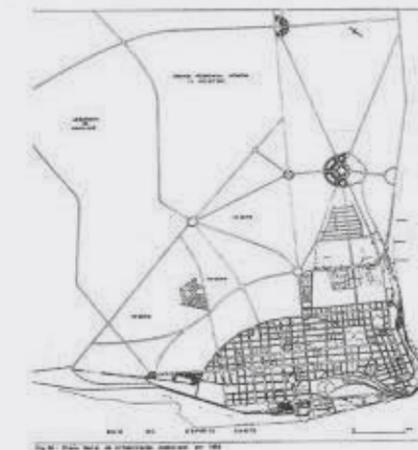


Illus. 60: Location of the Maputo Central Market

Existing Effects on the Site

Frameworks

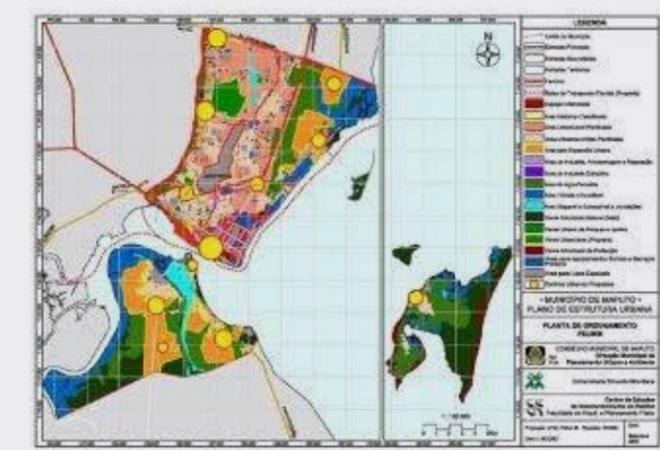
There are three existing Municipal frameworks for the City of Maputo; the 2008 revision based on previous versions will be used as the large scale basis into which a smaller scale framework for the Maputo Baixa will fit.



Illus. 61: 1954 Urban Framework for Maputo



Illus. 62: 1969 Urban Framework for Maputo



Illus. 63: 2008 Urban Framework for Maputo

1954 Framework

This framework developed by the colonial Portuguese, focuses on the formal 'cement city', with many policies focusing on consolidating the regime's image.

Aimed predominantly at the location and phasing of residential and industrial areas, the framework laid down a grid of major roadways through the city.

It proposes high densities at the centre of city, with well connected outlying nodes .

1969 Framework

This is the most comprehensive Urban framework, it is thorough and detailed. It provides guidelines for the development of an extended city, without being overly rigid.

2008 Framework

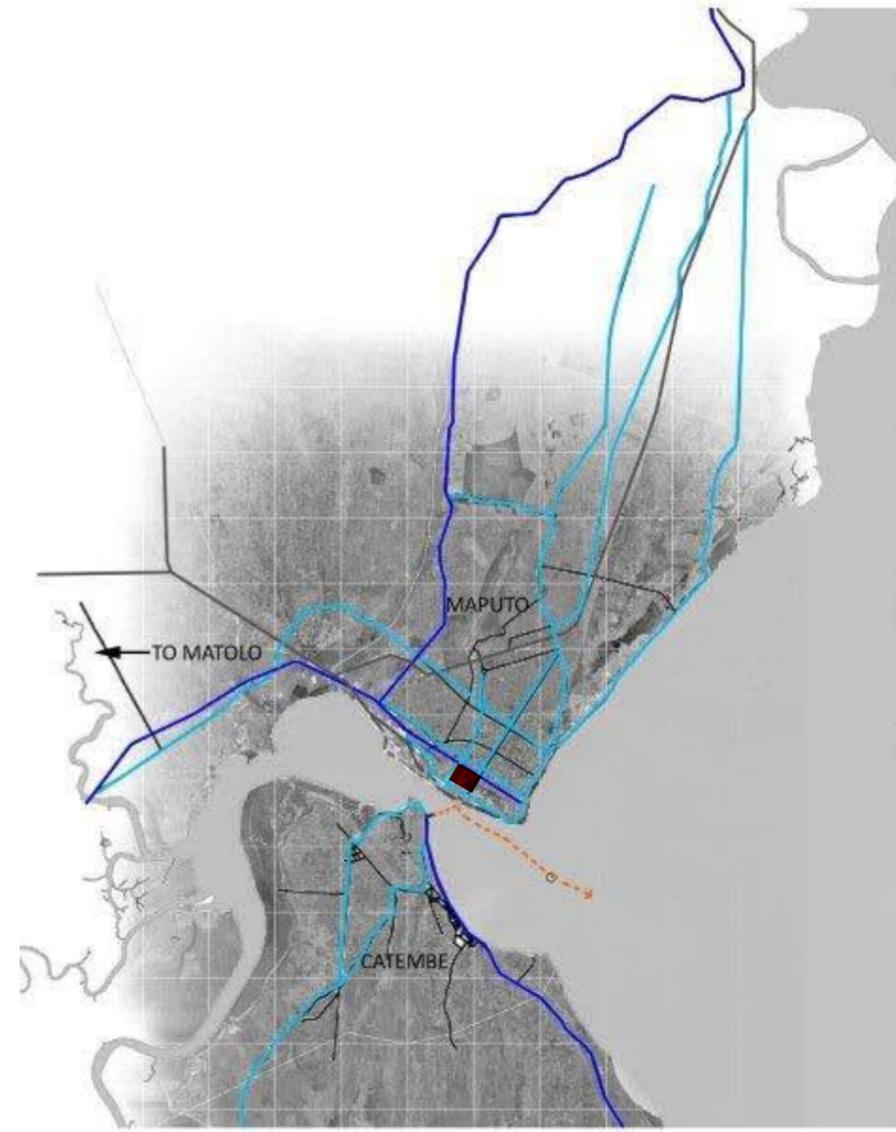
The PEUMM (*Plano Estrutura Urbana de Municipio de Maputo*) is guided by the fundamental laws of the country. It aims to ensure that the basic urban rights of the citizen are met, including:

- Access the city
- Safe transit and urban mobility
- Infrastructure and service provision.
- Access education, health, sport, information, leisure, cultural, and safety facilities
- Participation
- Access to urban land, decent housing, and sanitation

This is the Urban Framework that is in use currently.

Mapping of Existing Urban Phenomena

The following pages outline urban phenomena not outlined in Chapter Three that have an influence on the site (images from group framework).



Illus. 64: Map showing transport networks around the Maputo Bay (Baixa Framework Group)



Illus. 65: Map showing transport networks in the Centre of Maputo City (Baixa Framework Group)

■ Major Road Network
■ Secondary Road Network
■ Tertiary Road Network
■ Rail Network
--- Water Ferries

Transport Networks

The images show the proposed site in relation to the transport network. Significantly:

- The Major provincial road network (Ave. 24 July) connected to the site by Secondary and tertiary roads
- The termination of many of these major roads (particularly North-South roads) in the Baixa.

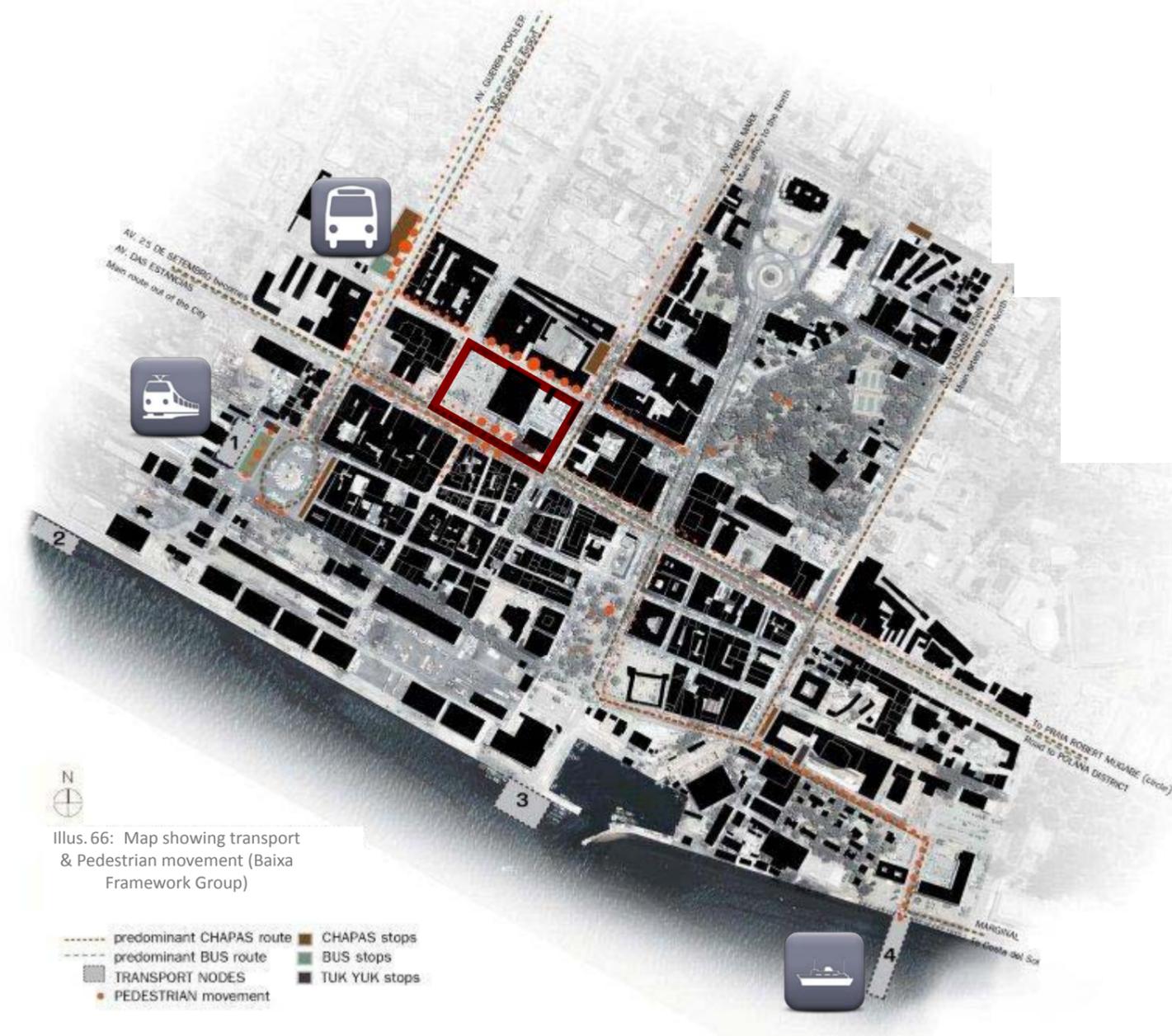
Transport and Pedestrian Movement

Density of passing pedestrian trade is essential to informal vending.

The 'North Baixa' around the market is well served by *chappa* minibus taxis and Tuk-tuks. Pedestrian densities seem to be highest immediately around and between transport nodes.

The Baixa serves as the public transport centre of Maputo. Often commuters need to travel to the Baixa in order to change routes to get to their destinations. This makes the area ideal as a market centre, where commuters are able to make quick convenient daily purchases of goods in small quantities. The appropriateness of the large fresh produce sector in the Maputo Central Market also becomes clear.

Architecturally these high volumes of pedestrian movement should be harnessed or allowed for.



Greenscapes of Maputo

The greenery that is found in the Maputo City Centre can be roughly categorised into three groups:

- Natural Vegetation (light green)
 - Located predominantly on the steep escarpment which runs along the coastline, then penetrates the city
 - Important to the prevention of erosion, and as a green belt in the city
 - The natural ingress of water into the soil helps prevent flooding in the Baixa
- Park or Garden (dark green)
 - Many well designed, well used, and safe parks are found throughout the city
- Reclaiming wild vegetation
 - Many vacant sites, have a layer of green growth made possible by the tropical climate and consequent fast growth of plants.



Greenery is important to the urban character of Maputo. The tropical climate also means that the shade offered by trees in parks and on the streets, is well used

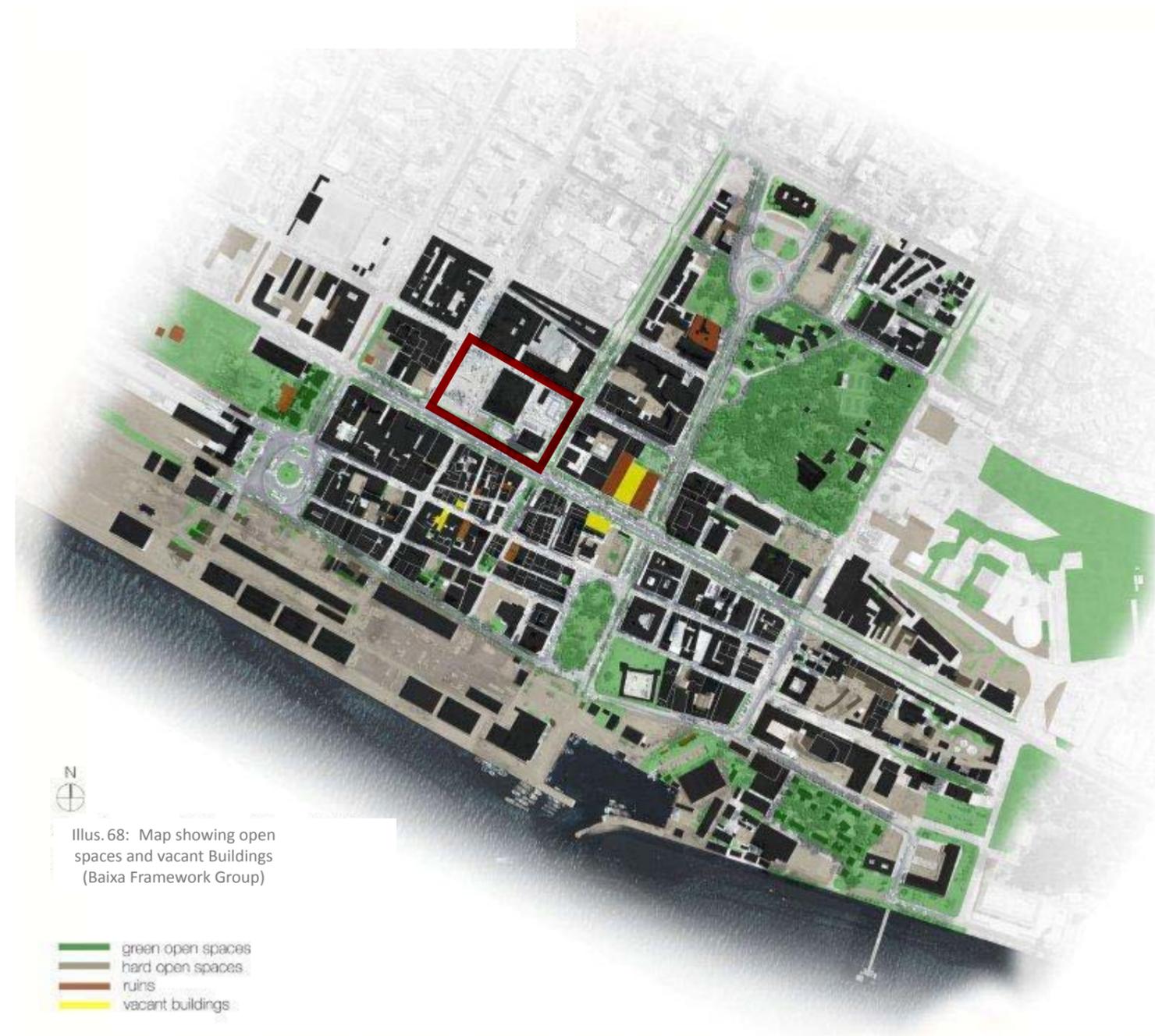
Open Spaces, Ruins, and Vacant Buildings

There is a large proportion of green space within the Baixa. Links between these should perhaps be strengthened into a consistent network of green space.

Vacant sites form an inconsistency in the urban fabric. These are often used as informal housing or areas for waste disposal. They provide an opportunity for reprogramming that would strengthen the existing urban character.

The high demand for parking is highlighted by the use of a large proportion of these open spaces as parking lots.

A large section of open land on the waters edge is open. This is part of the old Port, now predominantly relocated to Mathola. This forms a barrier that isolates the historically water related Baixa from the waters edge. It provides an opportunity for sensitive waterside development that would act as an extension of the Baixa, reconnecting it to the waters edge.



Illus. 68: Map showing open spaces and vacant Buildings (Baixa Framework Group)

green open spaces
hard open spaces
ruins
vacant buildings

Proposed Contextual Framework

The following pages outline essential elements of the proposed framework.

Harnessing the Generative Force

Historically the generative force of the Baixa has been the business related to the industrial port at the Baixa. This port has however, been moved to Mathola where modern industrial bulk handling facilities are available. This has not prevented the continued vibrance of the area as the Central Business District of Maputo, and an important point where bulk consignments are broken up for retail.

The Baixa is the centre of the city, many people move to and from the Baixa as they commute to and from work, with many transport routes terminating at or close to the Baixa. Many commuters change transport modes in the Baixa, between the available trains, *chappas*, tuk-tuks, ferries, taxis, etc. This is a major generative force in the Baixa, and the points where these various transport routes terminate as well as the character of the links between these nodes becomes important.

It is therefore proposed that a two-fold catalytic regenerative strategy for the Baixa is pursued. Firstly dealing with the nodes; evaluating, optimising, and revitalising them within the Baixa, including the transport-, recreational-, and retail- nodes. Secondly evaluating the links between these and optimising them to enable spontaneous growth within the Baixa due to accessibility. The Baixa is Ideally placed for this since it is traversed by links between the transport nodes in a 'transport triangle', other nodes also create various links between each other.

It is proposed that, as an important economic node, the Maputo Central Market be included in this catalytic urban renewal strategy an important economic node.

The following images visually summarise the proposed regenerative framework.

Transport Nodes

Kevin Lynch states that Nodes are created through intense use, occurring where there is a concentration of activity. There are three major points proposed within the Baixa where various means of transport have created such nodes.

1. Chappas (Mini-bus Taxis)

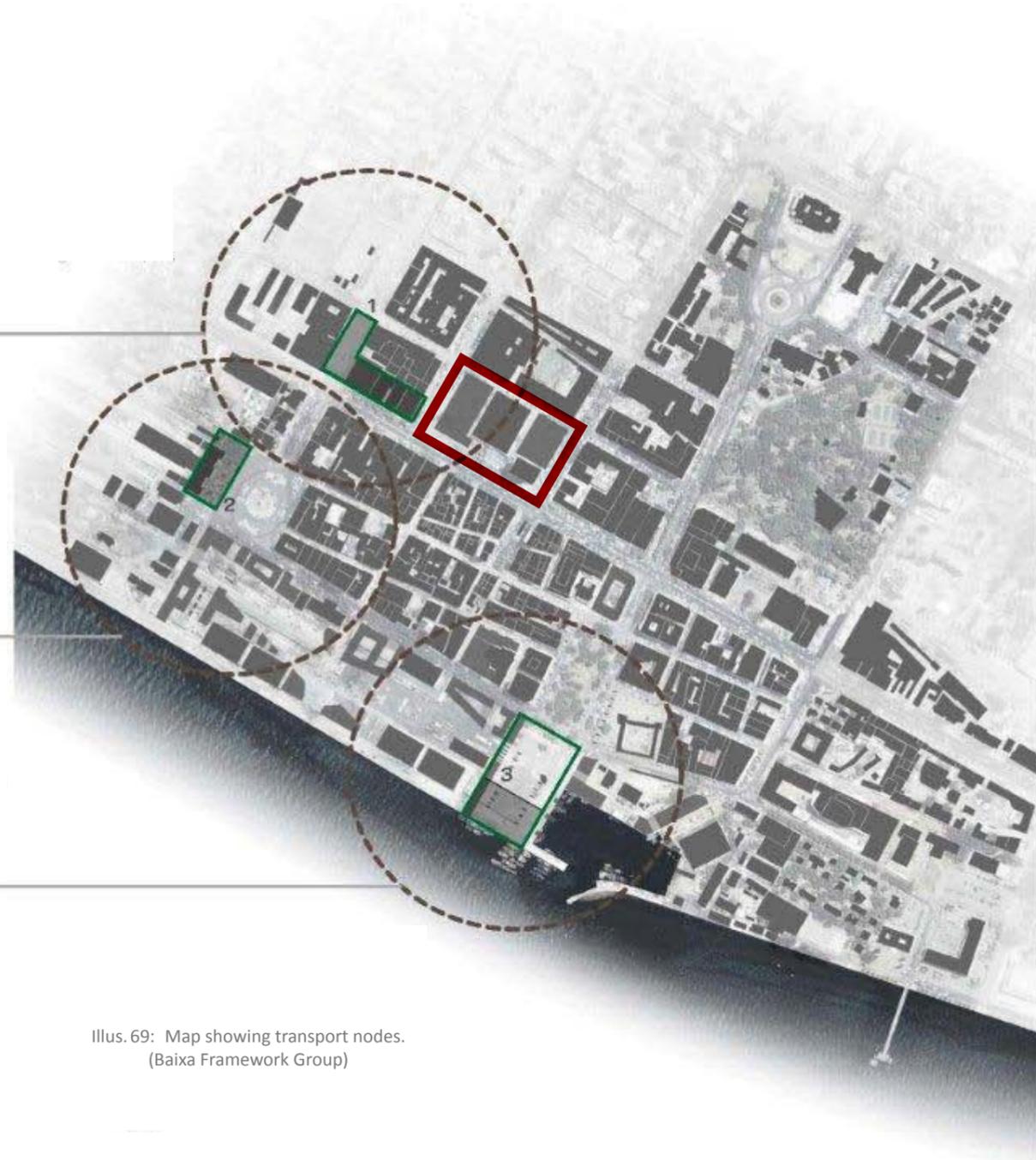
These largely informal shared taxis, are a significant part of the public transport system. The Baixa is the terminus, and interchange point for many of the *chappa* routes.

2. Train

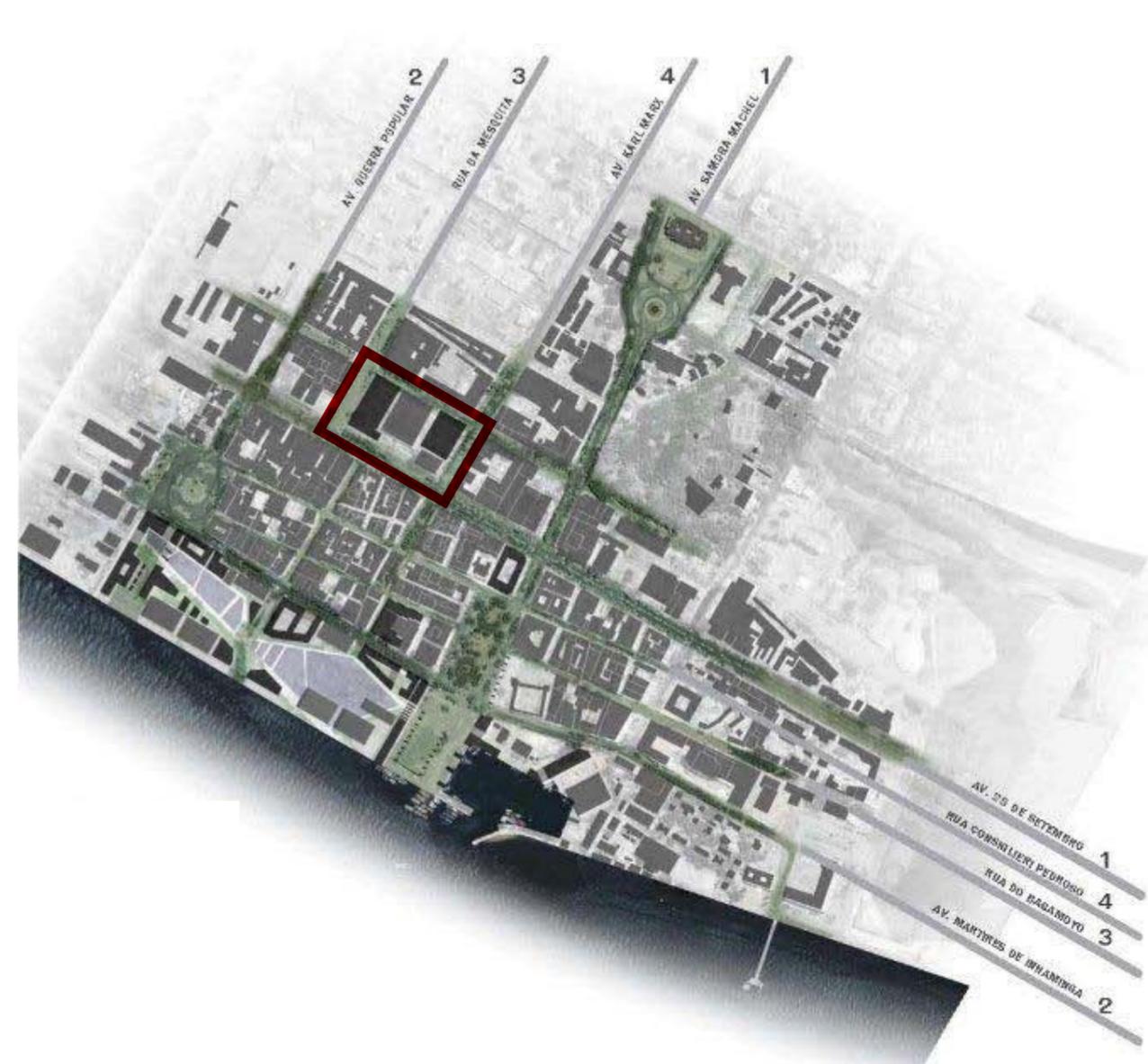
Operating on a fairly informal basis the train is a major means of entry into the Baixa, and current Maputo Municipality plans include an extension and upgrade to this system

3. Ferry

This forms a very important link to Catembe (the south side of the Maputo Bay) and nearby islands and villages. Proposed as a redevelopment of the historic location this node integrates both land and water transport.



Illus. 69: Map showing transport nodes.
(Baixa Framework Group)



Illus. 70: Map showing links and street hierarchy.
(Baixa Framework Group)

Links

The links between the predominant transport nodes, as well as other nodes and places of importance should also be considered.

Christian Norberg-Schulz states that "... places are designated by nouns..." but that the spaces or links between them as "...a system of relations..." are denoted by prepositions such as 'along', and 'between' (Genus Loci: Towards a New Phenomenology in Architecture: p16).

The links 'between' nodes are therefore worthy of formal consideration as designed spaces. The viewing of the Baixa as a system of inter-related spaces allows for design which enhances the operational ease, functionality, beauty, and experience of the Baixa.

The consideration of these links as a development opportunity allows for strategic low key intervention that could trigger localised urban regeneration.

The adjacent map ranks the major links in order of hierarchy, this allows for the effective prioritization of spatial design.

Framework Summarised

Linkage

The use of linkages aims to establish connections between elements, nodes, and places. At a framework level it is proposed that it is not only individual nodes that should be considered, but also the spatial relationship or linkage between them, as well as the termination of these linkages. By overlaying the hierarchy of these links with the existing fabric, it is possible to establish the most important places. The location of the Maputo Central market on important linkages, therefore shows its urban importance.

Place

The individual's relationship with the context should be considered, particularly through the consideration of open spaces as significant public places. This is particularly relevant in tropical Maputo, where the climate allows for significant formal and informal use of open space. The Maputo Central Market is one such open space.

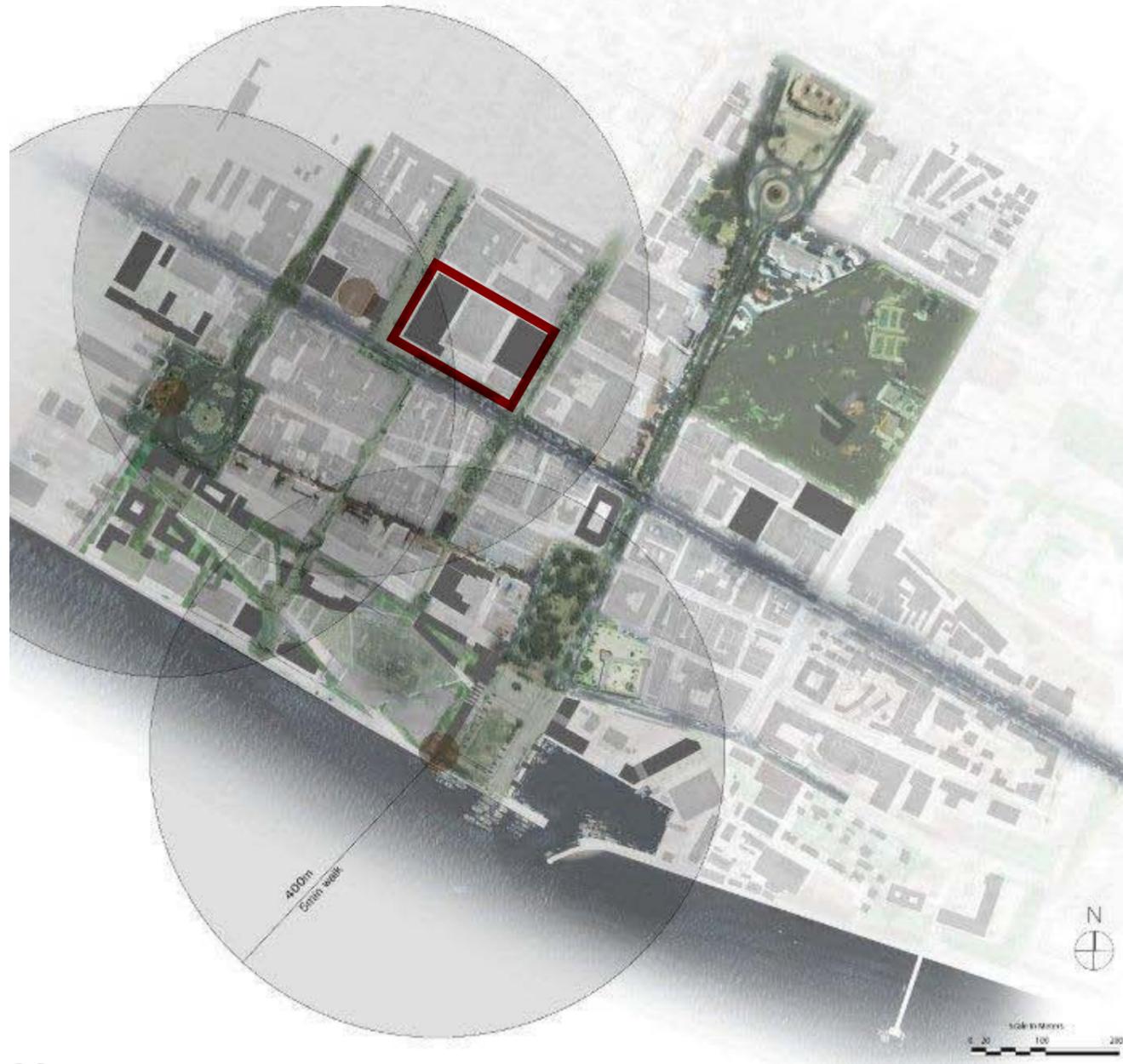
Proposed Informal Economy Strategy

The importance of an official strategy regarding the 'informal economy' is shown by the success of the Warwick Junction revitalisation projects, since different unrelated institutions and role-players were able to co-operate according to a predefined strategy on which they all agreed and which considered the interests, goals, and responsibility of all parties involved.

It should be mentioned that people within the formal market, although they agreed that vendors outside the formal market should be regulated, did not support their removal, sighting that this would deprive these people of a livelihood. Many established shops were found to co-operate with entrepreneurs in the informal economy as a way to reach customers.

The strategy should promote micro-enterprise as a positive contributor to the heritage and vitality of the Baixa, as well as a significant attractive force to the Baixa. This is proposed through:

- The provision of demarcated vending sites on street pavements, for which vendors pay a minimal rent. This allows:
 - Formal and legal recognition of traders
 - Inclusion of traders into the existing formal market administration structure
 - Formal discourse between authorities on health, security, pavement congestion, and other issues.
 - Increased business stability for vendors and formal retail (incremental growth of more permanent fixed structures as stability increases).
 - Increased revenues generated to cover increase market administration costs
 - as a part of the formal market vendors on official sites are the responsibility of the existing Market Police responsible for that specific market, they can then be held accountable by vendors associations.
 - The width of pavements and the infrastructure with which they are provided changes.
- Encouragement and recognition of traders associations
 - As a channel of multidirectional communication (provision of meeting spaces)
 - As a means of self regulation, and crime prevention
- The maintenance of the existing police force (provision of facilities)



Illus. 71: Formal street stalls, Ave. Guerra Popular (J Casson)

Vehicular Strategy



Illus. 72: Vehicles in competition with vendors (J Casson)

There has been a 66% increase in the number of cars using Maputo's roads since 2005. This coupled with the historic absence of laws requiring on-site parking, and a tradition of not providing on-site parking even in multilevel buildings means that the pavements and open spaces of Maputo are often clogged with cars. This has the following implications:

- Pavements are often blocked by parked cars, forcing pedestrians to walk dangerously in the street
- Street vendors have to compete with cars for pavement space, in order to make a living

Multi-storey parkades are proposed at strategic points near entrances to the Baixa, and near transport nodes. These could be provided by the municipality as a way to deal with the parking congestion, and can be used as revenue generating assets. As a further measure, new buildings should be required to include a certain amount of on-site parking.

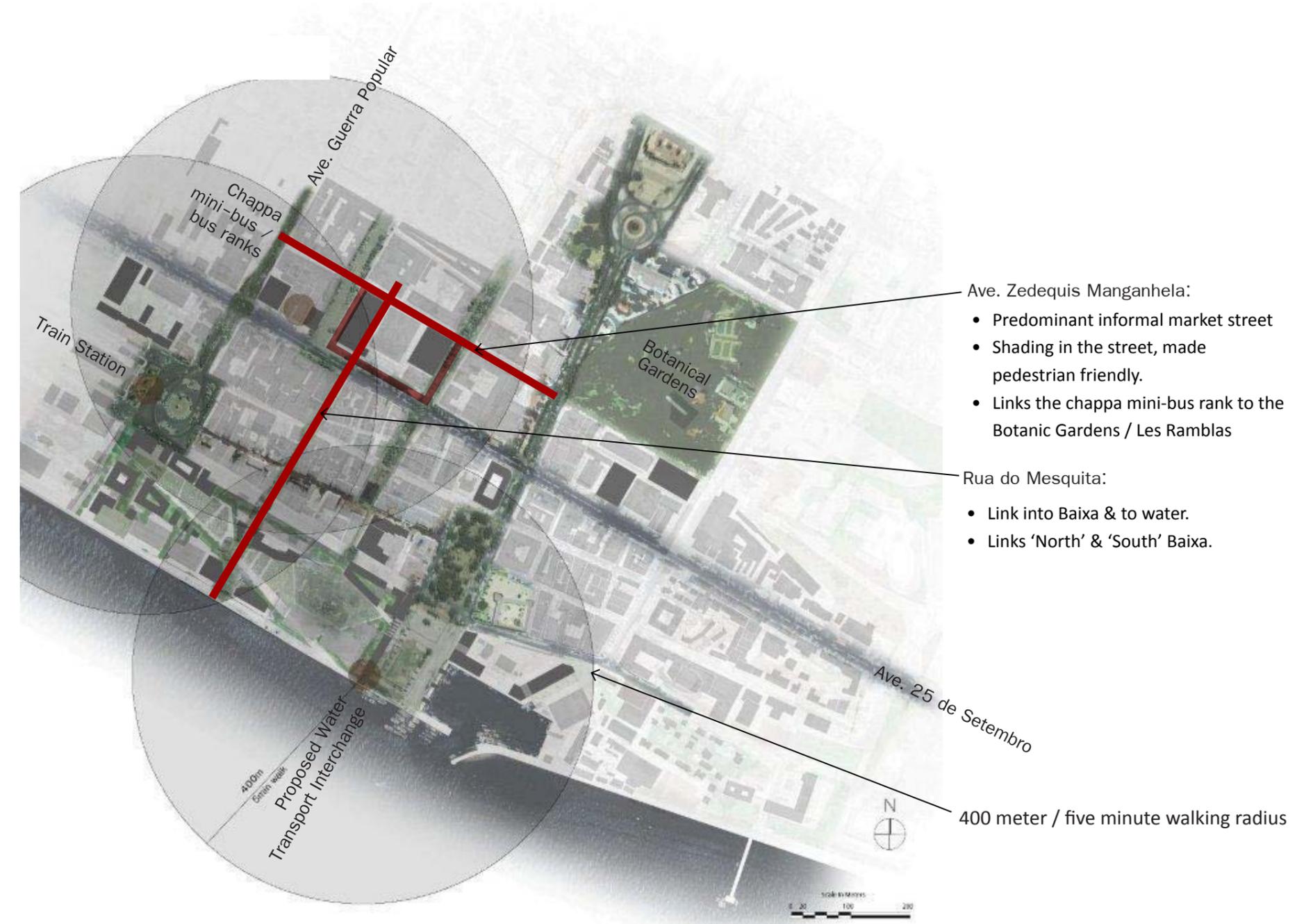
In this way, the pedestrian nature and heritage of the Baixa, particularly the 'Old Baixa' would be allowed to continue. It is further proposed that vehicular traffic and parking be limited on some of the smaller streets in these areas such as Rua do Bagomoyo and Avenida Zedequias Manganhela, in favour of pedestrian spaces.



Illus. 73: Vehicular congestion Ave Zedequias Manganhela (J Casson)

Specific Site Recommendations

The following image highlights the important proposals relating directly to the Maputo Central Market.



- Ave. Zedequias Manganhela:
- Predominant informal market street
 - Shading in the street, made pedestrian friendly.
 - Links the chappa mini-bus rank to the Botanic Gardens / Les Ramblas

- Rua do Mesquita:
- Link into Baixa & to water.
 - Links 'North' & 'South' Baixa.

400 meter / five minute walking radius

Illus. 74: Market transaction, Market Square, Maputo Central Market (J Casson)



Chapter 6: Specific Site

“Compared with art, music and literature, which can be staged in different locations, architecture is rooted to the place of its setting.”

Tim Porter (2004: 134)

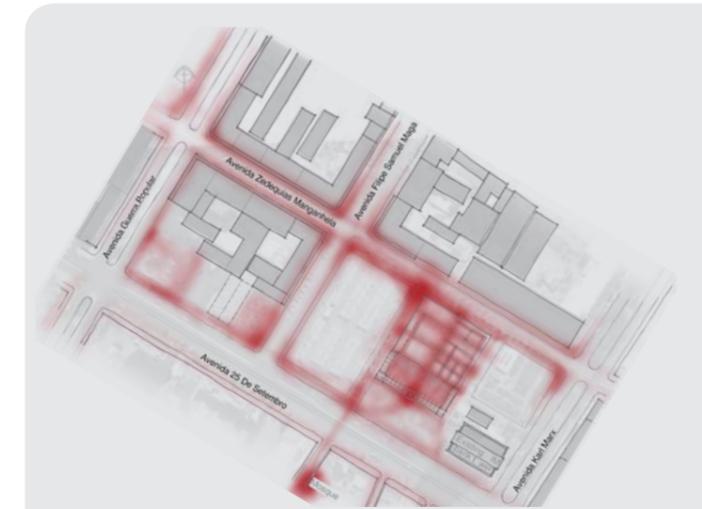
This chapter aims to show the specific built and non-built influences on the site, and to propose strategies to these at a theoretical level.

Site Hierarchy

Architectural academic Tom Porter, states that “Architecturally speaking, hierarchy is an ordering device that clearly arranges form, space, function, etc., according to a ranked degree of importance or capacity” (Porter, 2004: 76). Every city, street, building, or other situation where form, space, or function, are found consequently has some type of inherent hierarchy between various elements in these three categories. This is also true for ‘empty’ sites, or in the case of uniform parking lots, like those on the sites around the Maputo Central Market. External influences give different areas on this sites different levels of importance, depending on their own importance.



Illus. 75: Expanded Market boundary & Core Market Site (author)



Illus. 76: Existing hierarchy of space around the existing market (author)

To establish of new spaces on this site, the existing hierarchy needs to be understood before a new layer of spaces can be added. The most important influences on this site are those listed for attention in the urban framework; namely:

- The Ave. Zedequias Manganhela market street on the north.
- The termination of Rua do Mesquita on this market street.
- The location of the transport nodes, particularly the Ave Guerra Popular chappa mini-bus rank and the tuk-tuk rank, as these have the strongest inter-relation with the existing market.
- The location and direction of travel to the existing market building, and market square.



Illus. 78: Location of BIM Building (author)



Illus. 77: Millenium BIM Building, from Ave Karl Marx (author)

By reviewing the above influences, the existing spatial hierarchy over the proposed site was established. It is proposed that new built fabric and spaces takes note of this hierarchy by linking into it and developing onto it.

Significant Buildings

Architectural academic Tim Porter states that “Place is a geographical point that has its roots in history and in the future...” (2004: 111). This is certainly the case in Maputo, and has been increasingly recognised by the authorities, with the recent passing of laws protecting the built history of the country, particularly the heritage found in the Maputo Baixa, leading to a list of formally protected buildings within a generally protected heritage area centred around the Baixa. Apart from the buildings on this list, there are other buildings, and built characteristics around the site that can be considered significant for various reasons.

BIM Building

This seventeen storey building by Portuguese architect Joao Josè Tinoco, situated adjacent to the existing Central Market Building is significant as a land mark in the immediate vicinity due to its height, and also because of the appropriateness of the bank function in relation to the market function.



Illus. 79: Ave Filipe Samuel Magaia street edge collage (author)

Avenida Filipe Samuel Magaia Street-Edge

The street-edge on the opposite side of *Avenida Filipe Samuel Magaia (to the West of the market)* is made up of three predominant sections; a cleared site (box-and-rope market), a light double-storey arcaded building, and a heavy single storey arcaded building; each of these being significant.

The Box market is a significant sector of the market, relating directly to the long-distance bus rank. While the double-level arcading on the double level building is significant in that it is achieved through the use of prefabricated cast-iron columns and trellis-work commonly used in the late 1800s. The single storey building used cast-iron brackets to form corrugated iron arcade-type shading and is important in that it reflects the typology of the majority of the buildings of its time, allowing a particularly wide pavement with a shaded transitional space onto which the buildings activities spill.

It is proposed that built fabric addressing these buildings be sensitive to the low scale of these buildings, and recommended that as part of this intervention the two buildings be restored.

Avenida Zedequias Manganhela Arcading

This street, to the north of the market is important in terms of market function. It is the predominant market street leading between the Central Market and the *chappa* (mini-bus taxi) rank in *Ave. Guerra Popular*. It is proposed that this street be made friendly to pedestrians between *Ave. Guerra Popular* and



Illus. 80: Ave Zedequias Manganhela shadeing (E Willeumier)



Illus. 81: Rua do Mesquita Mosque, Maputo (author)



Illus. 82: Location of Rua do Mesquita Mosque (author)

the Botanical Gardens at an Urban Framework level. This is in an effort to create a direct link between these two points reinforcing pedestrian movement past the market. It is further proposed that vending activities be allowed and regulated in this area, linking the street markets to the north to the central market, and extending the market to meet the public transport as part of a greater 'informal economy strategy'. It is further proposed that due to the importance of shade to the vending in these areas that all new buildings on this section of the street should be required to have an arcaded street edge to allow for this.

Rua do Mesquita Mosque

This religious building is significant in the role that it plays in the flow of time in the Baixa, devotees are called to prayer at regular set times from the minaret of this building. This has a significant impact on the daily experience of the Baixa,

and of the Central Market, with a large proportion of market activities being halted for Friday prayers. Functions such as the pubs and clubs of *Rua do Bagomoyo* come to an abrupt end and are silent shortly before the morning call to prayers is sounded from the mosque.

Although this building falls within the zone of heritage protected buildings, it is recommended that the function of this building receive special protection, and that sight-lines to the minaret are protected along the length of *Rua do Mesquita* to the north and south of the mosque. This protection of sight-line has an effect on the proposed market site, since *Rua do Mesquita* crosses the site to meet with *Ave. Zedequias Manganhela*.

Original Mercado Central de Maputo Building

The Existing Market Building

The original Central Market building was built on reclaimed land in 1901, shortly after the completion of the Lourenço Marques (Maputo) to Johannesburg railway and first phase of swamp reclamation. Until the 1960s when the BIM building was built, this was the only building on the city block that it sits on, and it is likely that this block functioned as an extended market square. Currently, only the walled area immediately



Illus. 84: Historic photo, Maputo Central Market



Illus. 83: Market Hall collage, Maputo Central Market (author)



Illus. 86: Historic photo, Ave 25 de Setembro street facade, Maputo Central Market

behind the building forms part of the formal market.

The Existing Market: Heritage

The *Mercado Central* building has formed an important part of the enterprising culture present in the Maputo Baixa. It is perhaps the oldest continuously operating commercial institution in the historic Baixa area, with the nearest competitor being the Minerva Bookstore in Rua Consiglieri Pedrosso having been founded in 1910. No other institutions older than 100 years were found in the area during 2010 field research (Author, et al, 2010). The built fabric and function of the *Mercado Central* building are therefore significant in that they show the longevity and tenacity of the local enterprising spirit.

It is therefore proposed that in accordance with the recommendations of the *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (Burra Charter), that the market function of the existing *Mercado Central* building be protected, and that the fabric of should be restored (International Council on Monuments and Sites (ICOMOS), 1999). The restoration should be to water-tight state, with all fire and water damage repaired to match the original specifications. During the restoration, additions, alterations, and customization that facilitate enterprise should not be removed; this includes the localised raising of internal floor levels as a strategy to protect goods from water damage during flooding. A management plan should also be drawn up in order to ensure the continued functioning of this space as a market, and to ensure continued maintenance consistent with the restoration.



Illus. 87: Market stalls in the Market Square behind the historic Maputo Central Market Building (author)



Illus. 85: Ave 25 de Setembro Street facade, Maputo Central Market, Maputo

This building is currently specially protected in Municipal and Mozambican legislation, requiring permission on a ministerial level before alterations or demolitions can take place. This is appropriate considering the significance of the building as a symbol of the initial generative forces and character of the City of Maputo, and a tribute to the entrepreneurial spirit that has driven the growth of the city. It is proposed that this building be restored.

The Existing Market: Tourism

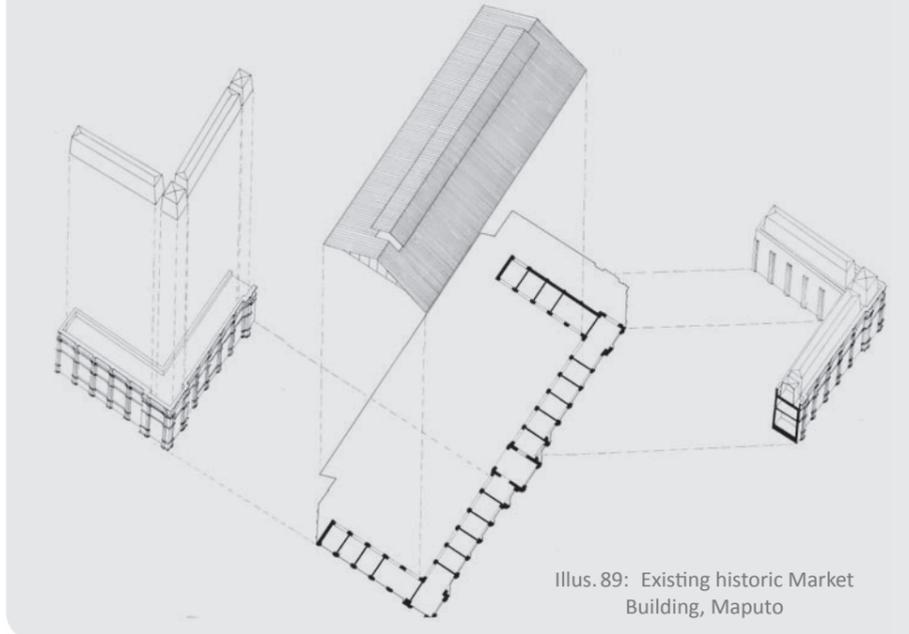
This building is also an important tourist destination, but this should not be a primary reason for its protection, since “In most cases the aesthetic meaning is the only meaning it needs...” in order to fulfil the tourists requirements (Bauman, 1993: 241). The facades and functional romanticism of the building are therefore important to tourism in Maputo.

It is therefore proposed that enough open space should be left in front of this building (Ave. 25 Setembro side) to allow for the viewing of the full front facade, and that changes may be made to the building provided that they optimise its operation and do not puncture the front facade.

Of much greater significance to an architectural intervention involving this building is the soft intangible fabric of the functioning and social organisation of the market.

The Existing Market: The Customer

The average customer at the market arrives at the market via all of the available transport methods in the Baixa (Train, Bus, Car, Chappa Mini-bus, Tuk-tuk, by foot, etc.). These are should be integrated where possible into the market. The shopping experience should also occur in a clean, shaded, comfortable environment, where the customer is at their leisure to browse through goods. Corridors should therefore be wide enough to accommodate the traffic, yet narrow enough to showcase goods. Spaces should be shaded, with resting and sitting areas, and surfaces should be smooth and regular.



Illus. 89: Existing historic Market Building, Maputo



Illus. 88: Flooding, Ave 25 de Setembro, in front of Maputo Central Market



Illus. 90: Fish Vendor, Maputo Central Market (J Casson)

The Existing Market Square

The walled and locking market square behind the market building is significant in the way that it has developed. Table stalls in this area are generally rented from the municipality on a four month lease, but some of the larger enclosed stalls are owned on a 99 year lease, the highest level of land ownership in Mozambique. This area has developed ad-hoc, as the market expanded, and the grain of the layout reflects movement patterns of people to and from important parts of the market. The fabric of the stalls in this square are mostly self-built, apart from a few areas of market tables, which have oversailing roofs provided. Each of these market stalls responds to the owners unique requirements and preferences.

Topography & Flooding

The physical topography of the site is fairly unusual. The site is located on what was a mangrove swamp surrounding the original trading island in what was then Delagoa Bay (Maputo Bay). The section of this that the market and its immediate surrounds are located on, was reclaimed before 1900 with fill probably brought in by rail during the construction of the railway.

This means that the site is almost perfectly flat. In a site survey by the author it was found that there is a 200mm fall over the 120 meters between Ave 25 de Setembro (on the south) and Ave Zedequias Manganhela (on the north), with a similar fall over the 200 meter width of the site.

This flatness does however, cause some problems, with basins formed at most intersections along Ave 25 de Setembro, this street is the epicentre of the flooding problem in the Baixa. A system of open surface drainage channels that allow for the fast drainage of this flood water has been proposed, and it is assumed that this will be effective in draining this area.

Investigation has showed that established stalls within the market are often raised 600 - 800mm above the surrounding level, as a flood defence. It may therefore be appropriate to raise certain levels of the market to promote drainage, and possibly as a flood defence.

Functioning of the Maputo Central Market

Functional Health

The functional health of the Maputo Central Municipal Market is good. It is an autonomous unit which runs fairly smoothly, and is regulated by a dedicated police force. This fabric, both built and un-built should therefore not be adversely affected by the new additions to this market, but rather, emulate it.

Market Sectors

The intangible structure of the market is very important to the healthy functioning of the market as demonstrated in the previous precedent studies. The Maputo Central Market underlying intangible structure, is a system where vendors form into groups to protect common interests. These may be small groups of two or three businesspeople working in syndicate, co-operatives, buying-groups, or larger groupings on sectorial lines. These groupings can be mutually beneficial through the ability of to buy larger volumes, draw on a larger knowledge and experience base, and create a known supply location and larger stock range; and consequently a larger customer draw.

As demonstrated by the Makola Market in Accra, Ghana, and by the Warwick Junction Markets in Durban, the successful facilitation of these sectors into new interventions is important.



Illus. 91: Box & Rope Market Cnr. Aves. 25 de Setembro & Filipe Samuel Magaia (author)



Illus. 92: Shoe sales (author)



Illus. 93: Curio vending at market entrance (J Casson)

Existing sectors within the Maputo Market currently operating inside the formal Market space and on the street pavements include:

- Alcohol
 - Bulk alcohol; Loose alcohol
- Beauty Products
 - Hair pieces & Hair products; Cologne & Perfume; Nail varnishes, make-up, etc.
- Boxes & Ropes
- Cage birds
- Car washing
- Clothing
 - Bags; Shoes & Cobblers; Clothing (cloth/*capulanas*, & clothing from piles, tables, or hangers); Seamstress & tailors
- Curios & Souvenirs
- Entertainment (foozball, board games, gambling)
- Food
 - Prepared on site; Prepackaged or precooked food, cold drinks & chilled beer
- Fresh Produce
 - Fish; Crustaceans & Shell-fish; Vegetables, Herbs, & Tubers; Fruit; Red Meat
- Household
 - General household goods & Home supplies; Household Appliances
- Mobile vendors
 - Snacks & Cigarettes; Miscellaneous; Nail-polish
- Music & DVDs
- Storage
- *Tshovas* (push-cart operators)
 - Fresh Fruit & Vegetables; Goods movement services
- Water
 - Iced drinking water

The alignment of vendors in each sector into certain areas is voluntary, and sometimes several pockets of vendors from a single sector are found in different areas, while some vendors choose to work alone. Each of the above sectors has unique requirements, with each sectors' sub-sectors having its own more specialised requirements, and each specific vendor having their own spatial requirements and preferences.

Anchor Sector

Each of these vending groupings, or sectors, exerts a certain draw on customers, in a similar manner that shops in a formal shopping centre exert a draw. In the Maputo Central Market, the primary sector is the Fresh Produce Sector, which specialises in fresh fruit, vegetables, herbs, nuts, and seafood. This sector is housed at the core of the existing market building and market square, and acts as an anchor sector, being the major attraction to potential customers, drawing them across smaller sectors and market stalls.

Vending Levels

There are also within these sectors different layers of vending, with some sectors predominantly at a certain level, and vendors choose to align themselves into various layers. In Maputo these can be roughly divided into the following groups:

1. Mobile Vendors

- selling small quantities of goods by foot or *tshova* over a large area
- sometimes co-operating with, or employed by formal shop owners

2. Street Vendors,

- selling goods displayed on a mat on the pavement,
- often in shaded arcades,
- sometimes semi-mobile
- daily set-up

3. Street Vendors with furniture,

- selling goods often displayed on tables, or other less mobile furniture
- often with an umbrella for shade when none is provided
- daily set-up

4. Table Market vendors

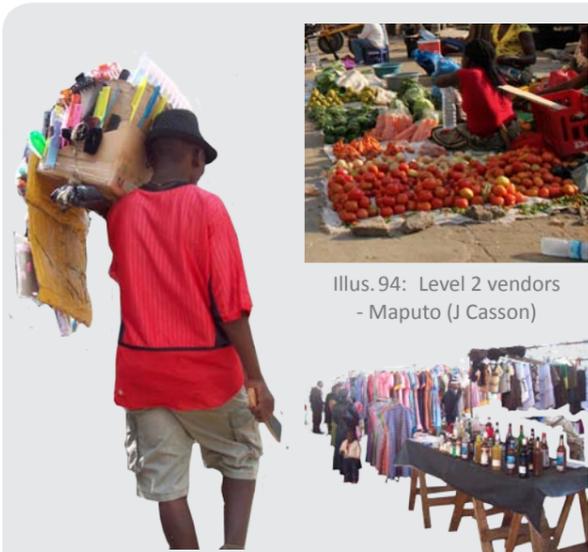
- selling from provided fixed furniture for which they pay rent
- shade is provided
- remote water and toilet facilities are provided
- goods are left on the open tables overnight within a secured market space

5. Stall Market vendors

- sales stands which are rented or owned on 99 year lease
- remote water and toilet facilities are provided
- stalls lock at night

6. Small shops

- small shops with doors which customers pass through
- rented or owned on 99 year lease
- remote water and toilet facilities are provided
- electricity



Illus. 97: Mobile vendor - Maputo (J Casson)



Illus. 94: Level 2 vendors - Maputo (J Casson)



Illus. 96: Level 3 vendors - Durban (author)



Illus. 95: Level 4 vendors - Maputo (author)



Illus. 98: Level 5 vendor - Durban (author)



Illus. 99: Level 6 vendor - Durban (M Teesen)

Many of the vendors operating at the various levels do so permanently, with some vendors having been found to have occupied the same spot for over a decade.

It is proposed that the architectural intervention should facilitate all of the above levels of trade.

Vending Against a Wall

In many cases vendors in the Baixa and around the market, where observed to position themselves with their backs against something, a wall building, hedge, fence, or open lot. This is probably because this is the side of least, or no traffic, and allows a maximum goods exposure.

Operating Hours

Unlike many other markets the Maputo Central Market only reaches full trade capacity at about 09h00 during week days, with core market activities ending just after sundown after customer levels drop. The rationale for this is that many of the street vendors begin the day selling in more lucrative locations where the morning traffic is greater, or buying stock. They arrive at their regular spots in and around the market at about 09h00 when customers begin to visit the Central Market. Many of the goods sold at the Central Market and surrounds are only bought by customers on the return trip to their houses in the afternoon or evening.

A large proportion of stalls close for Friday Prayers at the Mosque. The market also has reduced operating hours on Saturdays and is closed on Sundays, but many of the vendors, particularly those selling curios, cloth, or alcohol relocate to different sales locations over this time.

It is proposed that all facilities allow for trade after dark, within the market and in the surrounding streets, while night time storage facilities for street traders is also provided.



Illus. 100: Shading in the existing market square (J Casson)



Illus. 101: Vendors in shaded arcade (J Casson)

Shading

Shading is very important to market functions in Maputo due to the tropical climate. Vendors almost always sell from a shaded area, to the extent that shade almost becomes a spatial defining element. These shading elements are often street arcades, but also include trees, umbrellas and light roofing structures.



Illus. 103: Lettuce delivery (J Casson)

Delivery of Goods

Fresh produce such as fruit and vegetables is delivered to the market in bulk, by small open trucks which arrive at any time of the day. Vendors know when the truck will arrive and leave their stalls to buy produce. Other produce such as mangoes are transported by small scale farmers by *chappa* or other public transport to the market where they are sold. Fish, crustaceans, and shellfish are bought directly from artisan fishermen at the fish harbour, then transported to the market. Clothing and other products are often bought in bulk from importers locally, then sold in smaller quantities.

Vendors often organise themselves into co-operatives which buy larger bulk quantities which they divide among several vendors to sell.

The Tshovas (Push-Carts)

Often the bulk purchases, existing stock, or daily vending equipment, needs to be moved from their point of purchase or storage to their point of sale. This is often done by the *tshova* (push-cart), the operators of these move large amounts of goods throughout the market and often over large distances on behalf of their customers. These *tshovas* form an important sector of the market and are essential to the operation of the market.

It is proposed that all market areas be designed to be accessible to *tshovas* (push-carts) and that an area be dedicated for the receiving of bulk goods from which distribution takes place.



Illus. 102: Maputo - Tshova Push-Cart (J Casson)



Illus. 104: Market Push-Carts & Barrows. Left to Right: Kampala (K Bakker), Lamu (K Bakker), Bamako - Mali (K Bakker), Stone Town - Zanzibar (K Bakker), Stone Town - Zanzibar (K Bakker), Xindao (K Bakker)

Production

Many of the micro-enterprises in the market are based on the principle of 'one-step-further' production. Goods sold in bulk are often broken up 'one-step-further' to allow customers to buy single products; cloth can be bought by the meter instead of in 100 meter rolls, etc. This means that many business people in the market are often also occupied with production, refinement, preparation or packaging of goods. Seamstresses sew dresses, women cook chicken, and cashew-nut sales people spice their produce.

Enforcement & Security

The Central Market also includes an enforcement sector of dedicated Municipal security personnel, who are solely responsible for market functions. Street vending is technically illegal in Mozambique, but this is only enforced in the immediate surrounds of the walled Central Market space, in order to protect the business of rent paying vendors within the market area.

It is proposed that the official market is extended into the street, past the boundaries of dedicated market spaces in a similar manner to that used at Warwick Junction. That is that vending spots be demarcated in the streets and vendors who choose to sell in the streets can formally rent these spots. In this way these vendors are legitimised as part of the market. They would then contribute to, and be entitled to access facilities such as water and toilets. Street vendors can then enjoy the security of tenure enjoyed by vendors within the market, and conduct their business in an environment of greater security.

The Importance of the Intangible

At first glimpse the market seems to be a chaotic mass of individual vendors, but analysis shows a clear, but highly complex social structure and pattern of use, nurtured and built up over time. This intangible fabric is perhaps more important to the functioning of the market than the build fabric, and care must be taken not to damage this intangible market system. The complexity of this system is also staggering, and considering the stall requirements for various vending levels for different sectors, sub-sectors, and the varying individual experience and vending expertise, becomes a highly intricate task. Spaces in these circumstances become spaces of facilitation rather than of prescriptive spaces.



Chapter 7: Proposed Intervention

“The existential purpose of a building [architecture] is therefore to make a site become a place, that is, to uncover the meanings potentially present in the given environment.”

(Norberg-Schulz, 1979: 18)

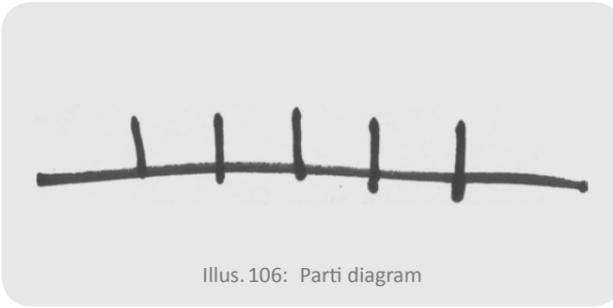
This chapter aims to show a movement from theory, and regional- and site- influences, to an architectural concept, dealing with various architectural elements, issue-by-issue, then moving towards a buildable element.

The proposed intervention exists at two scales, an expanded market intervention framework, that will allow for the smooth functioning and integration of the market within its context, and a focus on one core building within an expanded market project framework, being the core market building.

Aim of Proposal

The Maputo Central Market is the only built infrastructure provided for the support of micro-enterprises and traders of the city. Consequently market streets that have developed to the north of the Central Market as a result of a lack of space. These have become fractured and disconnected from these facilities, while the available market building, and the market square behind it, filled to capacity and in desperate need of maintenance.

Illus. 105: Shoe vendor outside the Maputo Central Market. Note car on pavement (author)



Illus. 106: Parti diagram

The proposed architectural intervention seeks to consolidate these street markets, enabling cleaner, more comfortable, and hygienic trade. It aims to address the exclusion of micro-entrepreneurs and vendors who through circumstance are forced to vend their goods on the streets, as well as promoting the continued patronage of the market by customers as a choice destination.

Parti Diagram

The adjacent parti diagram denotes a loose-fit framework, which is mostly horizontal, with repeating spaces into which various elements can fit, allowing for a fluxing usage within a simple set base.

Interface with Transport

An Expanded Market Intervention

A good interface with public transport is essential to the healthy operation of a market, and this is certainly the case with the market streets around the Maputo Central Market, as well as the market itself. The *chappa* mini-bus taxi rank to the immediate north of the intersection of Avenues Zedequias Manganhela & Guerra Popular, in conjunction with the long/medium distance busses on the corner of Avenues Guerra Popular & 25 de Setembro and Tuk-tuk rank at the intersection of Avenues Zedequias Manganhela & Karl Marx form a micro transport triangle within the larger transport triangle of the Ave Guerra Popular road transit, Train Station, and Ferry. These triangles cause a the large flow of pedestrian traffic essential to sales.

It is proposed that the relation to this transport system be considered in the expansion of the market, since the transport sector is an essential driver of customer traffic through the market.

Specific Transport to Market Interface

Long/Medium Distance Bus Rank

It is proposed that the relation between the Box & Rope Market and the Long/Medium Distance Bus Rank be strengthened. This could be done through the removal of the covered parking and spare parts warehouse that separate these interlinked functions. An improved spare parts warehouse can be provided on the open site immediately north of the Bus rank, this would serve both the bus rank and the *chappa* mini-bus taxi rank better due to its location.

Chappa Mini-Bus Rank

The *chappa* mini-bus taxi rank to the immediate north of the corner of Aves. Guerra Popular & Zedequias Manganhela, serving primarily as a terminus for the P. Combatentes and Ximelene to Baixa routes is essential to effective customer flow across the market. It is proposed that this be maintained in its current location, as a pick-up and drop-off point.

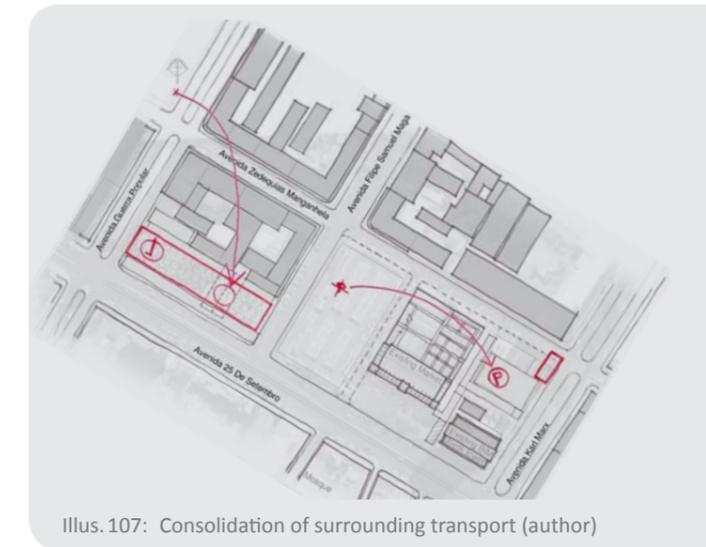
Additional Facilities

It is proposed that the Ave. 25 de Setembro street edge between Ave. Guerra popular & Ave. Filipe Samuel Magaia becomes an expanded transport node, with the Box & Rope Market on the street edge, an expanded holding zone for Long/Medium Distance busses and the P. Combatentes & Ximelene *chappas*; enclosed at the northern edge by an informal mechanics area relating to the spare parts warehouse.

The site (to the east & west) of the existing market is currently being used as shaded parking. Since the shortage of parking is problematic in Maputo, it is proposed that a four level parkade be constructed to take up the parking that will be removed from this site.



Illus. 108: Location of Chappa Mini-bus Rank (author)

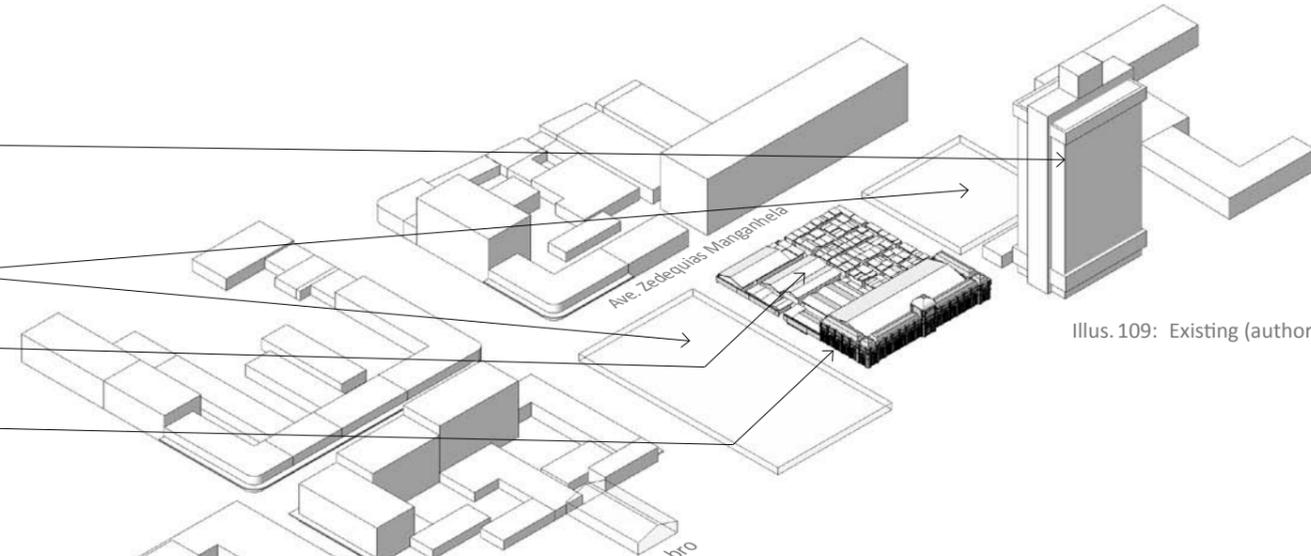


Illus. 107: Consolidation of surrounding transport (author)

Proposal

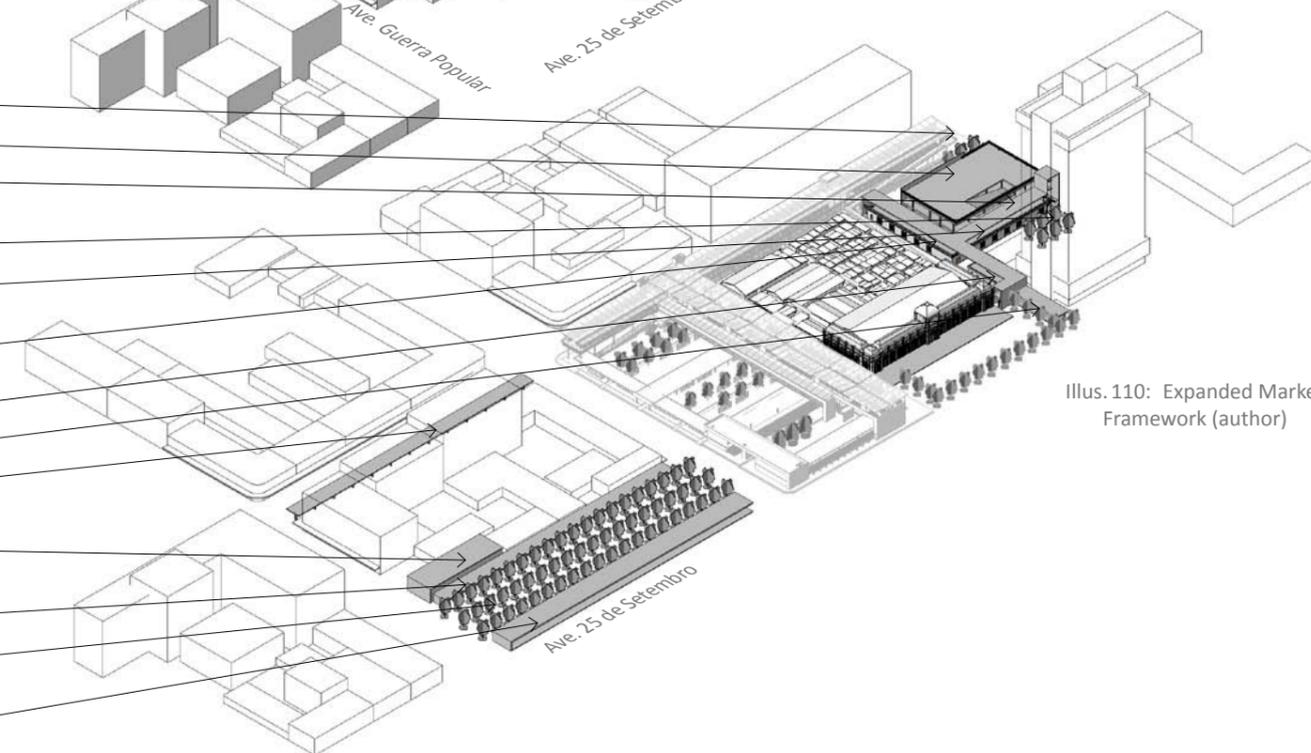
Existing:

- BIM Bank building (Banco Internacional de Maputo)
- Existing shaded parking
- Existing Market square
- Existing Mercado Central de Maputo building

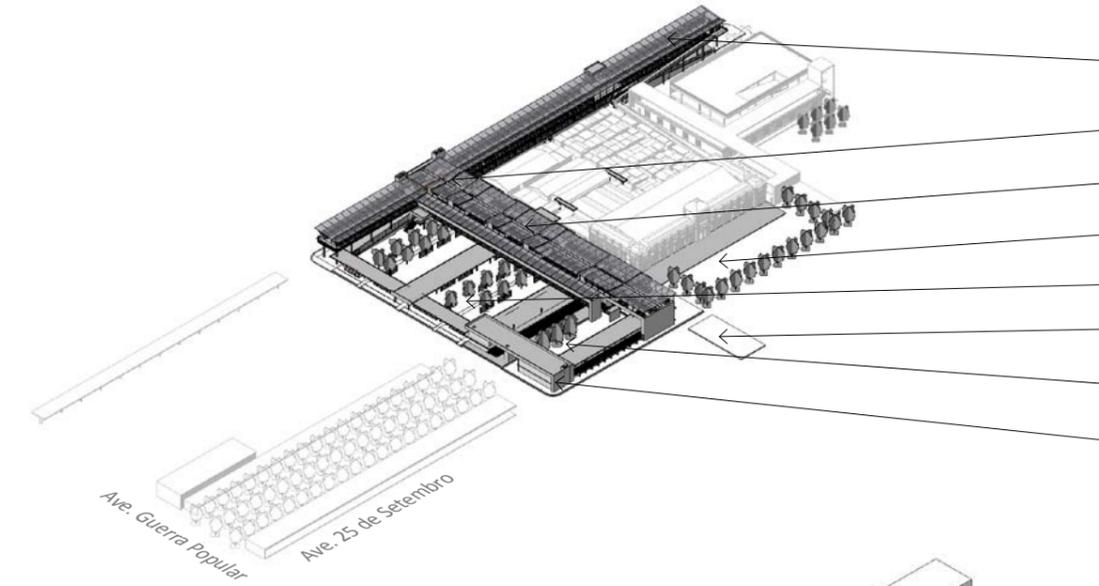


Expanded Market framework:

- Tuk-tuk Rank
- 4 level Parkade
- Tshova (push-cart) operators facilities
- Goods Delivery
- Administration Offices & general meeting spaces
- Showers & Ablutions above storage for street vendors
- Cold Storage
- Curio Market
- Shading of street vendors in Avenida Zedequias Manganhela
- New spare parts warehouse (Old warehouse demolished)
- Mechanics & vehicle repair
- Shaded Chappa Mini-Bus & Bus Holding Zone
- Box & Rope Market



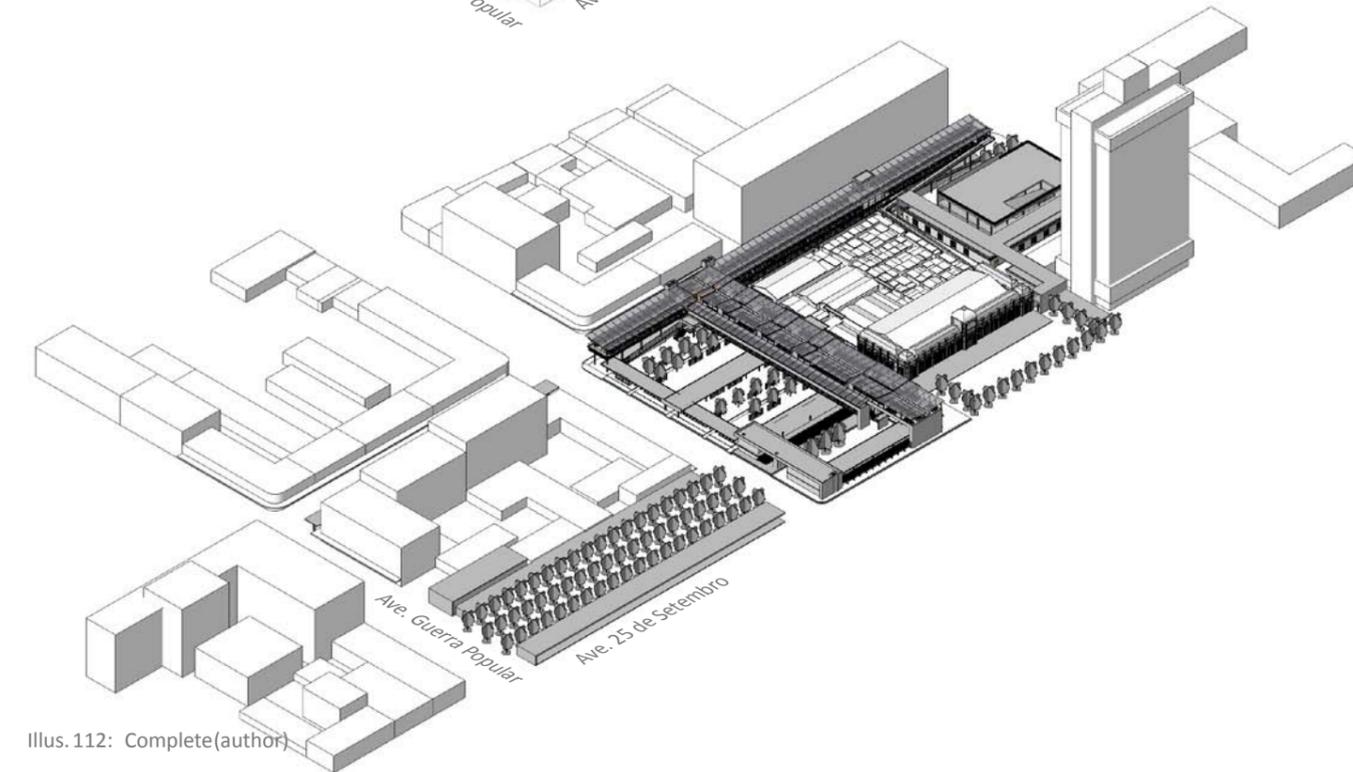
Illus. 111: Core Market Building (author)



Core Market building:

- Ramped raised street market
- Managed ablutions
- Core expanded market building
- Tourists' square
- Extended Market Square
- Pedestrian crossing
- Food Court & Entertainment
- Managed ablutions

Illus. 112: Complete (author)



Complete

The adjacent image shows the completed proposal in context, both the Expanded Market Framework, and the Core Market Building.

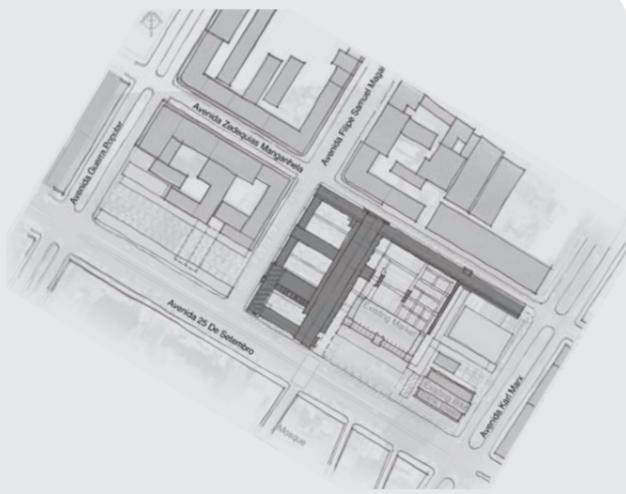
Proposed Core Market Building Intervention

It is proposed that for the healthy functioning of an expanded market, in particular the Maputo Central Market, the following facilities will be required (together these form a substantially large complex, with this dissertation focus on the actual built market facilities).

- Expanded Market framework:
 - Goods Delivery
 - *Tshova* Operators Facilities
 - Administration Offices & general meeting spaces
 - Storage facilities for street vendors
 - Cold storage (refrigeration & freezing of seafood and vegetables)
 - Managed ablution facilities with the specific inclusion of shower facilities
 - An optimised Box & Rope Market, and proposed Mechanics edge with transport holding zone
 - Shading of street vendors in Avenida Zedequias Manganhela
 - Waste Depot (Separation, Recycling, & Buy-Back)
 - Tuk-tuk Rank
 - Modular vending space definition frame
- Core Market building:
 - Expanded facilities for vendors and micro-enterprises
 - Managed public ablutions
 - Tourists' square
 - Eating and entertainment area with related food preparation
 - Production facilities



Illus. 113: Expanded Market Framework Buildings (author)



Illus. 114: Core Market Buildings (author)

Interface with significant existing fabric

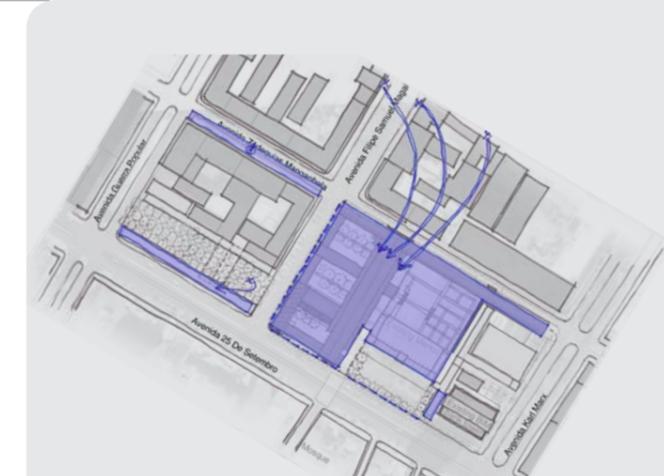
Buildings

The proposed building will allow the 17 storey BIM Building to tower over it as a land mark, and in the urban pattern of scattered skyscrapers prevalent in Maputo. The proposed new building will not exceed four storeys in height so that the link between street and upper levels, essential to the correct functioning of a market, is not broken. This responds to the four storey limit on the historic Old Baixa, proposed at an urban level.

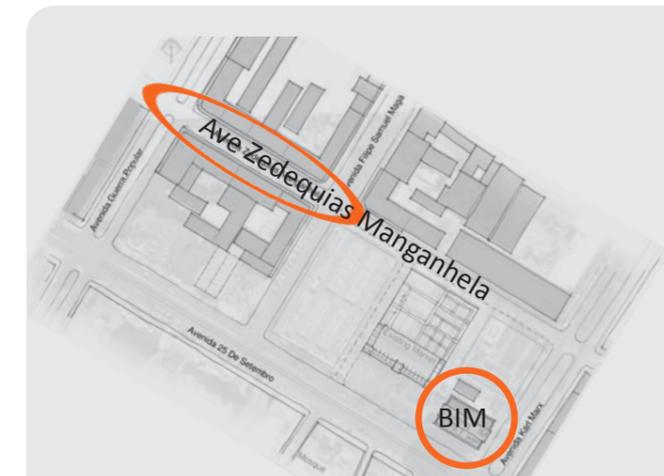
On the Ave. Filipe Samuel Magaia street edge (north west) the building will have a single or double storey mass, allowing the historically significant buildings across the road an equal dominance of the street. The central area of the proposed built edge in this area is also set back to reinforce the notion of this street as an enclosed active space.

The limitation of vehicular access to the existing one way street Avenida Zedequias Manganhela (north east edge) has already been proposed at an urban level. A finer block-by-block approach is proposed in the immediate vicinity of the market in order to foster the market character of this street. This proposal is as follows:

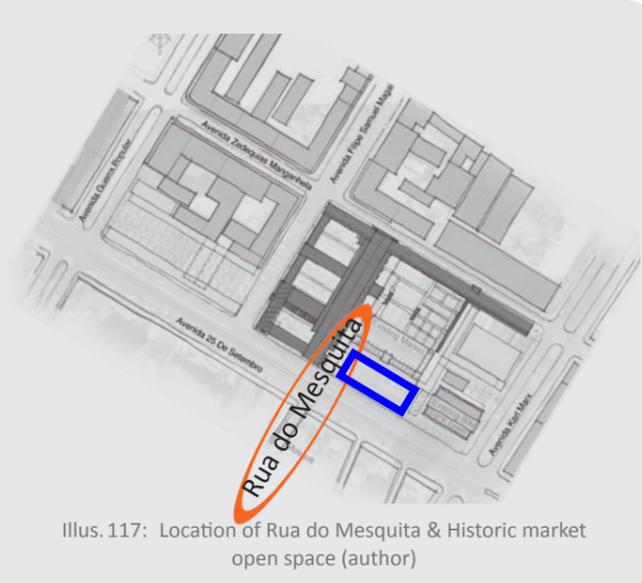
- From Ave. Guerra Popular to Ave. Filipe Samuel Magaia
 - Maintenance of an arcaded (and therefore shaded) built edge
 - Widening of pavements
 - One vehicular thoroughfare with one lane parallel parking
 - A linear shaded structure supporting defined market stands as part of the market
- From Ave. Filipe Samuel Magaia to Ave Karl Marx
 - One vehicular thoroughfare with one lane parallel parking
 - Encroachment of the built market into the street as a continuation of the market into built structure



Illus. 116: Consolidation of the Street Markets (author)



Illus. 115: Location of BIM Building & Ave Zedequias Manganhela(author)



Illus. 117: Location of Rua do Mesquita & Historic market open space (author)

The Rua do Mesquita, an extension of which runs directly past the historic market building is significant to the market. It links the market to the Mosque visually & physically, as well as linking to Rua do Bagomoyo, the predominant night-life street in the area. At a framework level this is also proposed as a link to the water's edge. The built massing deliberately reinforces this, leaving sight lines open to the Mosque and its minaret.

The creation of an open space in front of the historic market building (Ave. 25 Setembro side) allowing it to be viewed as a whole, has been proposed in the previous chapter, as well as that changes to the building do not puncture the front facade. It is also proposed that the existing market square be left as a functioning part of the proposed building.

Existing Market

Market Square

It is proposed that expansion of the proposed market be allowed to develop in the manner that has shown itself to be so successful in the open market square behind the existing market building, that is changes done at an incremental ad-hoc basis. It is further proposed that this area be left as the functioning market space that it is, and that the new grain of the proposed market link into the existing grain of the market square. This will allow this square to grow into the existing market, as well as using it as a source of dimensional guidelines for vending runs from existing successful precedent and practice. These vending runs are unbroken usually linear arrangements of vending areas, and their correct orientation and length is essential to the healthy functioning of the market.

It is therefore proposed that the main East-West axes of the existing market square be extended onto the proposed market square. This follows the growth pattern of the existing market square, where the grain of the axes of newer additions seems to follow movement routes into the established market. It is proposed that the western market wall have access portals punctured into it allowing for access from the new market square into the old market square, and that these openings be six to eight meters wider than the required opening to allow a visual connection into the old market square, and prevent dead-spots behind these walls.



Illus. 118: Extension of the market square along its East-West Axes (author)

Market Building

The historic and culturally significant built fabric and function of the *Mercado Central* building will be protected restored, to continue to show the longevity and tenacity of the local enterprising spirit. The built fabric will be restored to its original condition, without removing non-detractive additions such as the raised floor level, which is a response to flooding. The function of the Market building will also be protected. Low level external up-lighting will be installed at the base of the facades, in a similar method to that employed during the adaptive re-use at the Pedro Paulo de Melo Saraiva market building (1930), São Paulo, Brazil. This will light them up at night, increasing the building's hierarchy, and reflecting a gentle ambient light into the surrounding spaces. The lighting angle will highlight the texture of the façades.

Market Functioning & Fabric

Capacity and Verticality

It is proposed that the primary method of consolidation of these street markets, providing facilities, and recognising the street vendors would be through an increase in capacity of the Maputo Central Market onto the surrounding parking lots. This capacity can then be further increased through the introduction of upper levels, a phenomenon that has not hindered market functionality in the Makola Market district in Accra, or in Warwick Junction, Durban

Goods Delivery

A dedicated area for goods delivery off Ave. Karl Marx has been allowed for. Small trucks can stop here to sell bulk goods to vendors, who then make use of the associated *tshova (push-cart)* operators to move their goods into the market. Consequently the links into the market are deliberately weak, since this serves as a type of back-of-house function.



Illus. 120: Heritage lighting strategy precedent. Pedro Paulo de Melo Saraiva (1930), Adaptive re-use of a public market, São Paulo, Brazil (Arcoweb)



Illus. 119: Location of goods delivery area (author)

Inter-level Circulation & Push-Cart Accessibility

The importance of the *Tshova* (push-cart) to the healthy functioning of the market cannot be underestimated. Each level of the market is accessible to *Tshovas* through a series of ramps at various points in the market. Broad stairs at several points also allow for pedestrian movement between levels.

Physical levels & Connection

Two interconnected ramps leading off Ave. Zedequias Manganhela, positioned parallel to-, and projecting into- the street, maintaining a visual and physical connection along the market street and into the market. At several other points there are broad stairs that allow for pedestrian movement between levels. A visual connection between the street level, and the ‘Upper Market’ level is maintained through the use of visually permeable balustrading, and enclosure on the upper market level; this gives the potential customer a view of the type of goods on offer on this level, and contributes to the visual vibrancy of the market.

Physical Levels, Market Levels, & Sectors

General

Precedent has shown that there is an increase in permanence of enterprise on higher physical levels of a market. Reduced foot traffic on these higher levels means that these stalls are generally more established, and of a higher market level than those at street level; consequently and have a larger draw on customers. It is therefore proposed that vendors of market levels five (stall vendors) and six (small shop vendors) be accommodated on the upper physical level.

‘Upper Market’

The clothing market, currently operating in dirty overcrowded conditions half a block-to the north, is one such sector that exerts a significant draw on customers. The presence of artisans such as seamstresses, dressmakers, and tailors who are involved in production within the sector means that there is a demand for higher market level facilities, particularly since many of these artisans currently work without basic facilities such as electricity, lighting, and storage. It is predicted that this clothing sector will occupy a large proportion of the ‘Upper Market’ floor.

‘Ramped Market’

The section of raised market directly between the ramps on Ave. Zedequias Manganhela, is likely to be occupied by the electronics sector currently operating in that street selling household appliances, computer accessories and similar electronics. These businesses are restricted because of the limited storage of stock in street stalls, and the possibility of lockable stalls would allow for a greater selection of stock to be kept, and minimise damage through eliminating daily transport of goods.

Ground Level

The ground level is intended as a general market, with lower vending levels two to five (mat, street table, market table, & market stall) accommodated. This area will lock and be guarded at night to allow overnight security of goods.

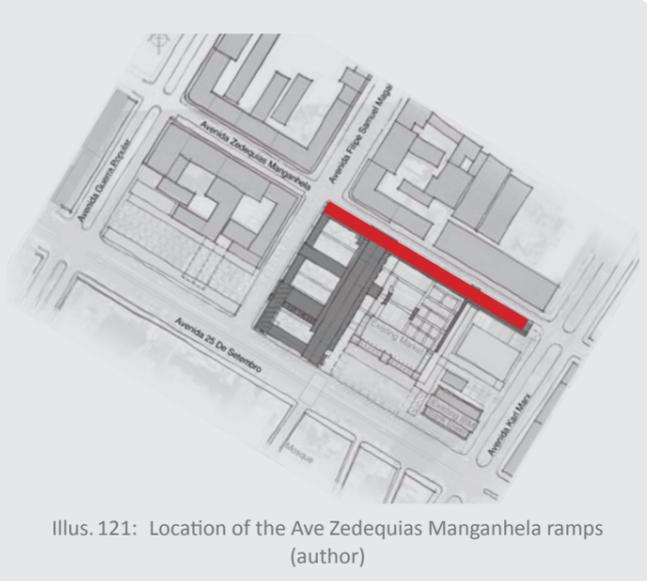
Entertainment Area (Food & Waiting)

Currently there is a strong relation between the food sector and the transport sector, as commuters and drivers buy packaged or prepared food from vendors around the Ranks, as well as involving themselves in entertainment activities such as board games, pool, and foosball. This has led to the formation of the ‘Chicken braaing’ sector in Ave. Zedequias Manganhela, west of Ave Guerra Popular. It is assumed that facilities for an improved entertainment and food preparation area be provided directly relating to the expanded public transport holding zone on Ave 25 de Setembro. This will also fulfil the role of market ‘food court’.

A stage within this area is proposed as a venue for public performances, small concerts, public meetings, etcetera.

Tourist Facilities

As discussed in the previous chapter, the importance of the market to the tourism industry is mainly in the facade of the historic building as well as a romanticised idea of its functioning. Eating freshly prepared fish at a market is also an activity popular on tourist itineraries, with a distant fish market catering exclusively to the tourists needs. It is proposed that this function, at a tourist orientated level be introduced as part of the tourist interface of the market. This should take the form of small fish restaurants/cafes located in the front face of the historic market building, relating both to the seafood sector of the market and the tourist square.



Illus. 121: Location of the Ave Zedequias Manganhela ramps (author)

It is proposed at a built framework level that an area be provided on the eastern edge of this square for the sale of curios, and for premium user-paying toilet facilities operating on the system discussed below.

The required numbers of sanitary fixtures required was calculated according to South African National Standards (SANS 10400 - 1990 Parts A20 & PP13). The Core Market Building was classified as a B2 type occupancy, and for the area of the building, the following sanitary fixtures required fitted are shown in the table below:

	Male			Female	
	WC	Urinal	W. H. Basin	WC	W. H. Basin
Building Type B2	13	17	16	29	15

Table 3: Sanitary Fixtures Required

Market Expansion

It is expected that the proposed intervention should cause the contraction of the existing physical area covered by the existing pavement-based markets immediately surrounding the existing market to as these market functions are consolidated and densified around the existing municipal market. Future growth will then occur through further densification withing or spread of stalls onto the concrete roofs.

Initially this is expected to happen through a building up of the market stands, and an increase in the built permanence and substantiality of the vending stalls in the same manner as in the existing market square. On the upper levels this is expected to occur as an extension of more formal roofed stalls onto un-occupied flat concrete roofs. The surfaces of these roofs will be finished with a waterproofed screed, protected by a trafficable floated concrete layer.

Upper Level Expansion

At the upper levels it is expected that the formality and size of the shops will increase. This should be encouraged until these areas reach maximum capacity. The concrete 'roofs' of ground floor spaces have been deliberately placed at the same level as the upper floors, their finished surface and the interface with the upper floor-slab will allow for the addition of lightweight structure/s to be added as an extension to the more formal market stalls.

Ground Level Expansion

The ground level is intended to be the most flexible and fluxing level, accommodating the lower vending levels which are more fluxing and adaptive by nature. This picks up on the circumstance of the existing market square; this was a trading area defined by built structure into which the market has been allowed to expand in an ad-hoc manner.

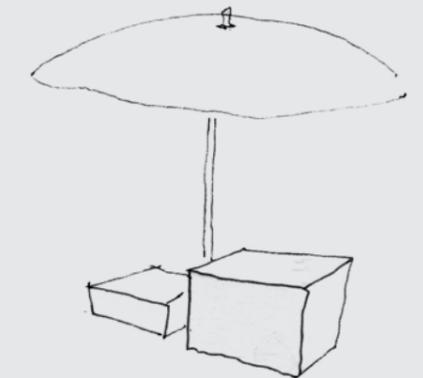
It is therefore intended that the ground floor form an architecturally defined market square into which the functioning physical and metaphysical fabric of the existing market square expands. It is predicted that this will occur in the covered and shaded areas first, gradually formalising structurally and spreading into the open areas. To encourage this the grain of the existing market has been drawn into these spaces through the continuation of axes into the new areas shown by paving and changes of level. There are three of these east-west axes, with the central axis being higher in hierarchy and consequently roofed, with enough shading for vendors and pedestrians.

It is proposed that at the crossings of these three walkways with the mass of the Upper Level market, that atria cut into these levels facilitate the visual connection between levels so essential to the healthy functioning of the market.

Shading

As previously mentioned shading is very important to market functions in Maputo due to the tropical climate. Areas important to trade in the proposed building are therefore all roofed, with those areas that are not roofed being shaded by trees.

The market building forms a more formal solid shading structure, enclosing a lighter shaded market square, defined by a shaded edge. This echoes the existing market building condition.



Illus. 122: Sketch of a shading currently used (author)

Inhabitation

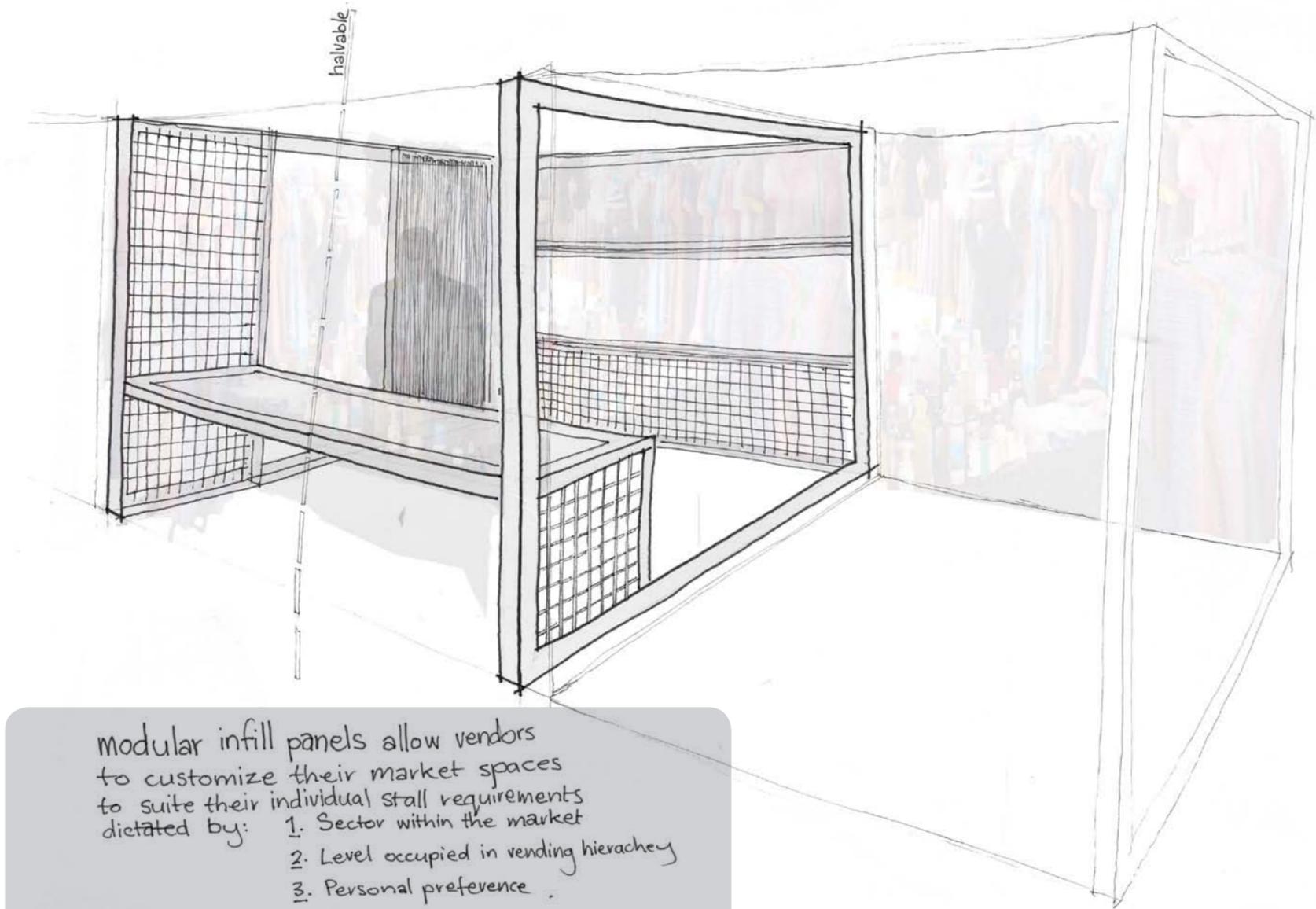
Precedent has shown that no highly designed set of furniture, or spatial application can satisfactorily meet the needs of all the affected vendors. This is even the case at the same vending level in the same sector; as was the case at the Warwick Junction Muthi Market, where vendors with seemingly identical furniture needs rejected the provision of a set furniture piece. A minimal level of prescription in this matter is therefore proposed; allowing rather for a bottom-up spatial appropriation and customisation.

The Vending Stand

A basic three dimensional spatially defining frame is proposed. This frame draws heavily on the principles of 'Open Building', and is intended to allow for the fluxing requirements of the market vendors, allowing them to control and become responsible for their own spaces. A customised frame can be used to facilitate the display of a diverse range of goods, through various added enclosure panels and hanging or shelving systems.

It is proposed that these frames be constructed of timber:

- Rusting due to the caustic coastal environment does not occur (any changes using welding would destroy any protective coatings).
- Timber is a low-tech material that is already extensively used in informal adaptations to formal structures in the area.
- Timber can be nailed, bolted, screwed, dowelled, or jointed with ease. Items and hooks can be easily fixed to timber by nailing, stapling, or tying; and other materials such as corrugated iron are easily fixed to it.
- Timber is readily available and relatively inexpensive.
- The timber will be treated with a fire-retardant.
- Extensive consultation with vendors in the Warwick Junction Muthi Market showed that vendors preferred the more familiar adaptable timber to other materials (Dobson & Quazi, 2011).

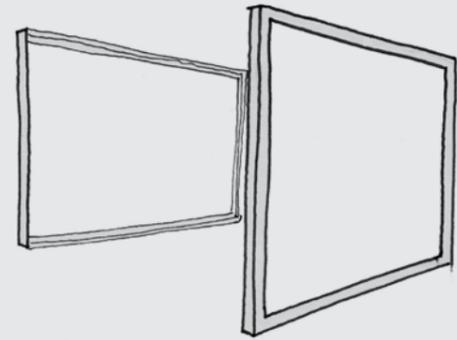


modular infill panels allow vendors to customize their market spaces to suite their individual stall requirements dictated by:

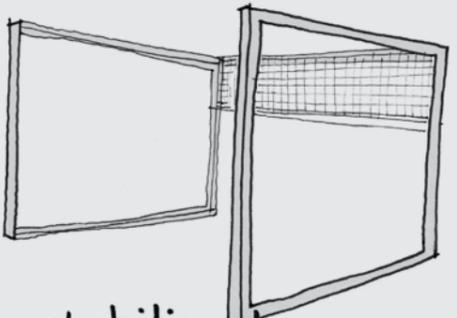
1. Sector within the market
2. Level occupied in vending hierarchy
3. Personal preference

modular market stall

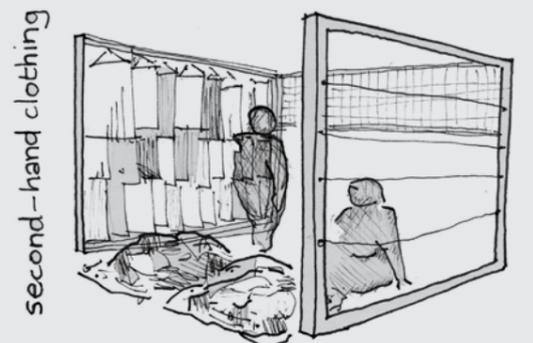
Illus. 123: A variation of the modular market stall (author)



- base



- stabilised

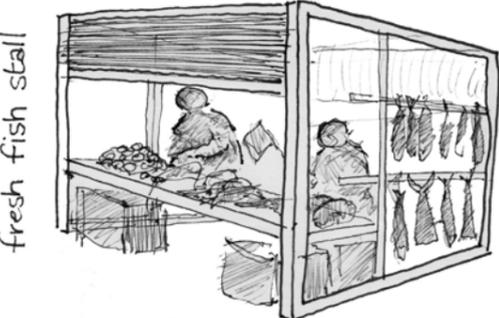


- customised

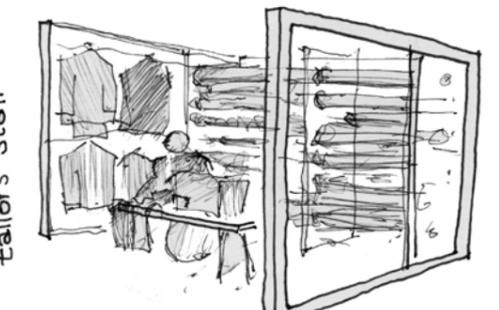
Illus. 124: The formation of the market stall (author)



alcohol stall

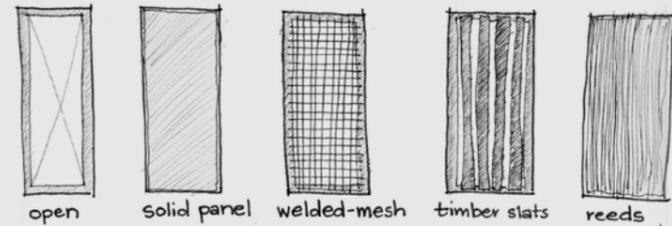


fresh fish stall

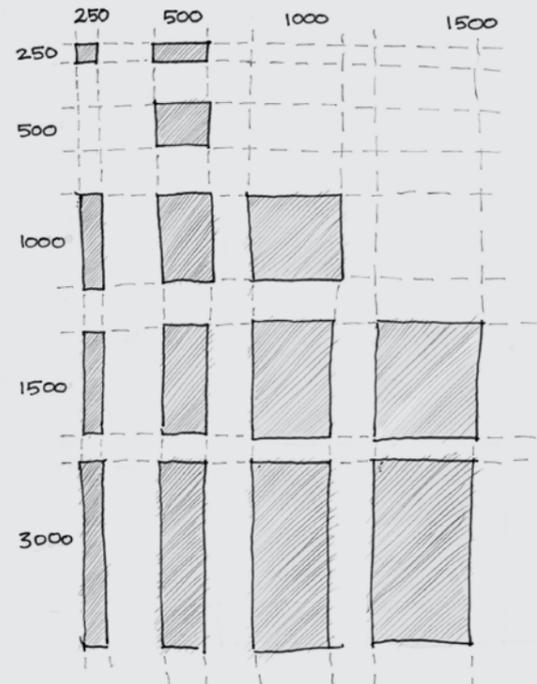


tailor's stall

Illus. 125: Customization of market stall (author)



modular stall panels



Illus. 126: Modular stall panels for adaptation (author)

These frames should be modular in dimension, which will allow a carpenter within the market to produce a range of standard fittings such as shelving, and enclosure panels en-masse. These can be offered for sale to vendors who then fit-out their own spaces.

This forms a major part of the strategy for the recognition of the street vendors, with a customisable vending stand used throughout the market, and used to extend the formal market into the streets. It is proposed that these frames are numbered, fixed in position, that vendors pay a minimum rent to occupy it; and in this way they are recognised by formal bodies.

Production

General

Production, and 'one-step-further' processing is an important part of the functioning of the market. Currently, seamstresses, dressmakers, and tailors work in the clothing market on the pavements of Ave Samuel Filipe Magaia. This processing and production occurs over the different sectors, at different levels, but these can be separated into the following groups with the proposed response.

- Production of goods
 - Requiring a little space & some storage, as well as electricity and lighting, the production of goods particularly within the clothing sector (seamstresses, dressmakers, and tailors) can be accommodated in lock-up stalls in the Upper Market
- Refinement of raw produce
 - This typically requires very little space, but generate large amounts of waste (eg. de-shelling cashew-nuts). An effective waste removal system such as the proposed system using *Tshova* push-carts will allow this to happen anywhere within the market.
- Cooking of food
 - Requiring basic hygiene and storage facilities, this will be provided in a dedicated area opening onto the entertainment area.



Illus. 127: Market Production - Dressmaker sewing a pinafore, Warwick Junction. (Dobson & Skinner, 2009)



Illus. 129: Some of the vegetable that could be grown on the production level

Dangerous, highly industrialised production, with a high risk of fire will not be allowed in the main market building, as they pose fire and safety dangers, as well as having different electricity requirements.

Vegetable Production

Most sectors in the market has the potential to include a measure of production or processing in their functioning, for example, the cashew nuts can be de-shelled and spiced on site. The fresh produce sector however, is reliant on external production and supply. This is the predominant ‘anchor’ sector of the existing market. It is therefore proposed that a production sector relating to fresh produce could be a significant extension to the market. The concrete roofs of the Upper Market, and Ramped Market be used for this purpose, and an assortment of vegetables could be grown.

In order to reduce the structural loading on the structure of the building a soil-less agricultural system such as hydroponics is proposed. The use of raised growing tables that allow the agricultural systems to be independent of the market structure. These could be ‘suspended-hydroponics’ an intensive agricultural system that grows plants with their bare roots suspended in tanks which are periodically filled with nutrient enriched water. Poor soil conditions in Maputo and surrounds often makes growing crops difficult, and large amounts of fresh-produce is imported by road from South Africa. This would reduce the markets reliance on this source of produce.

The ‘General Hydroponics’ ‘2m² EuroGrower’ (USA model name) / ‘2m² DutchPot’ (European model name) “...user-friendly, reliable, and inexpensive...” (Manufacturer, 2011) removable hydroponic system has been selected for use in the Mozambican context. It will be used with a return drip water system (to reduce use, and increase nutrient efficiency), and use locally sourced coconut fibres as a growing medium. The system is deliberately nonintegrated into the building structure allows for future adaptability or removal of the hydroponics. This system is among those commercially used in South Africa.



Illus. 128: General Hydroponics - DutchPot/EuroGrower Hydroponics system

Statistics:

- 551 units
- 1102m² growing area
- 17632 plant capacity
- 150ℓ x 551 units = 82650ℓ of nutrient enriched water cycling.

It is proposed that the each of the 551 units be individually owned and maintained by fresh-produce vendors, with the initial purchase being subsidised, and training provided in production and maintenance. This will allow vendors direct control of production.

The hydroponic production levels will be accessible to *tshova* push-cart via a ramps, which link to the goods delivery area. Visibility of this level is unimportant in comparison with the market levels below, and the hydroponics level is only visible at atrium and access points.

An enclosing and protecting green-house roof on the production level acts to protect the plants from the elements and excessive Ultra Violet light exposure common in the southern African context. This will be through the use of ‘Opel 50’ coloured translucent polycarbonate roofing. This will allow sufficient natural light for the growth of sun-loving plants such as Beans, Broccoli, Cantaloupes, Cauliflower, Cucumbers, Eggplant, Lettuce, various Melons, Peanuts, Peppers, Pumpkin, Squash, Strawberries, Tomatoes, as well as various herbs. This will allow for the production of produce already available in the market, increase the variety available, and reduce the travelling distance of the produce.

Lighting

As far as possible natural lighting will be employed, with a floor plate that never exceeds 16 meters in depth. In the Upper Level market diffuse light will be allowed to filter into the circulation spaces from the greenhouse above. Lighting fixtures will be provided to allow nighttime security and trade. Where possible these will be low voltage LED fittings, powered by batteries charged by Photovoltaic cells, located on the roof of the ablution facilities in the eating and entertainment area. This will include a 900mm upstand which will hide the PV cells from view.

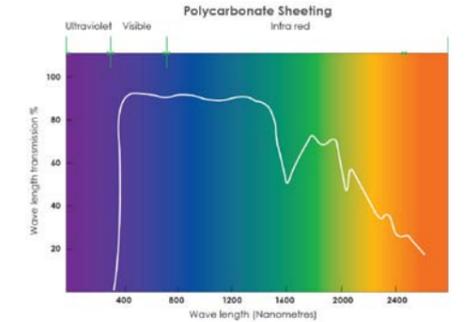


Fig.10: UV light reduction through polycarbonate sheeting (Manufacturer)



Illus. 130: ‘MODEK Opel 50’ polycarbonate sheeting (Manufacturer)

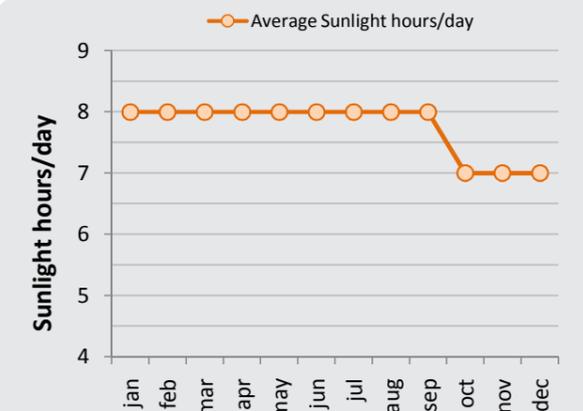


Fig.9: Graph showing the number of full hours of full sun per day in Maputo (author, BBC Weather)

Thresholds

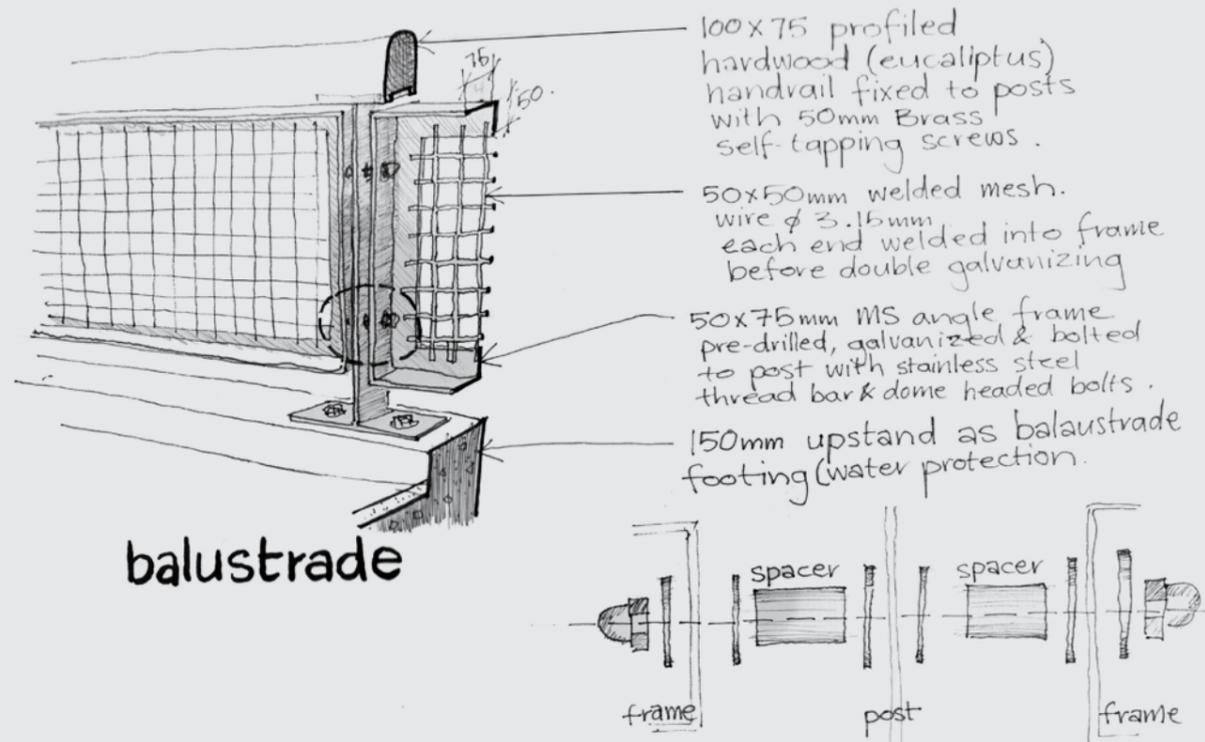
Vendor Integration

The recognition of vendors on sites outside of the market confines, as well as the permeability of the built edge of the market is intended to create an easy transition between the formal street vendors and the formal market spaces. Thresholds are consequently non-exclusive, but consisting mainly of a slight constriction in space with a small level change, as well as the physical presence of large gates which are used to close off the market at night.

Visual Transparency

As demonstrated at Warwick Junction and in the Karriakoo Market upgrade, visual and audio transparency is very important to the healthy functioning of a market, since it allows for the social and business interactions between stalls. Goods on display are intended to be the primary obscuring element within the market, maximising product exposure to customers.

The proposal therefore uses relatively few solid walls, and balustrades are deliberately transparent to promote an inter-level visual connection. Where a physical barrier is used this is achieved using a welded mesh or timber screen, with roller shutter or sectional-lifting doors used in conjunction with large overhangs for weather protection. This also allows for improved ventilation.

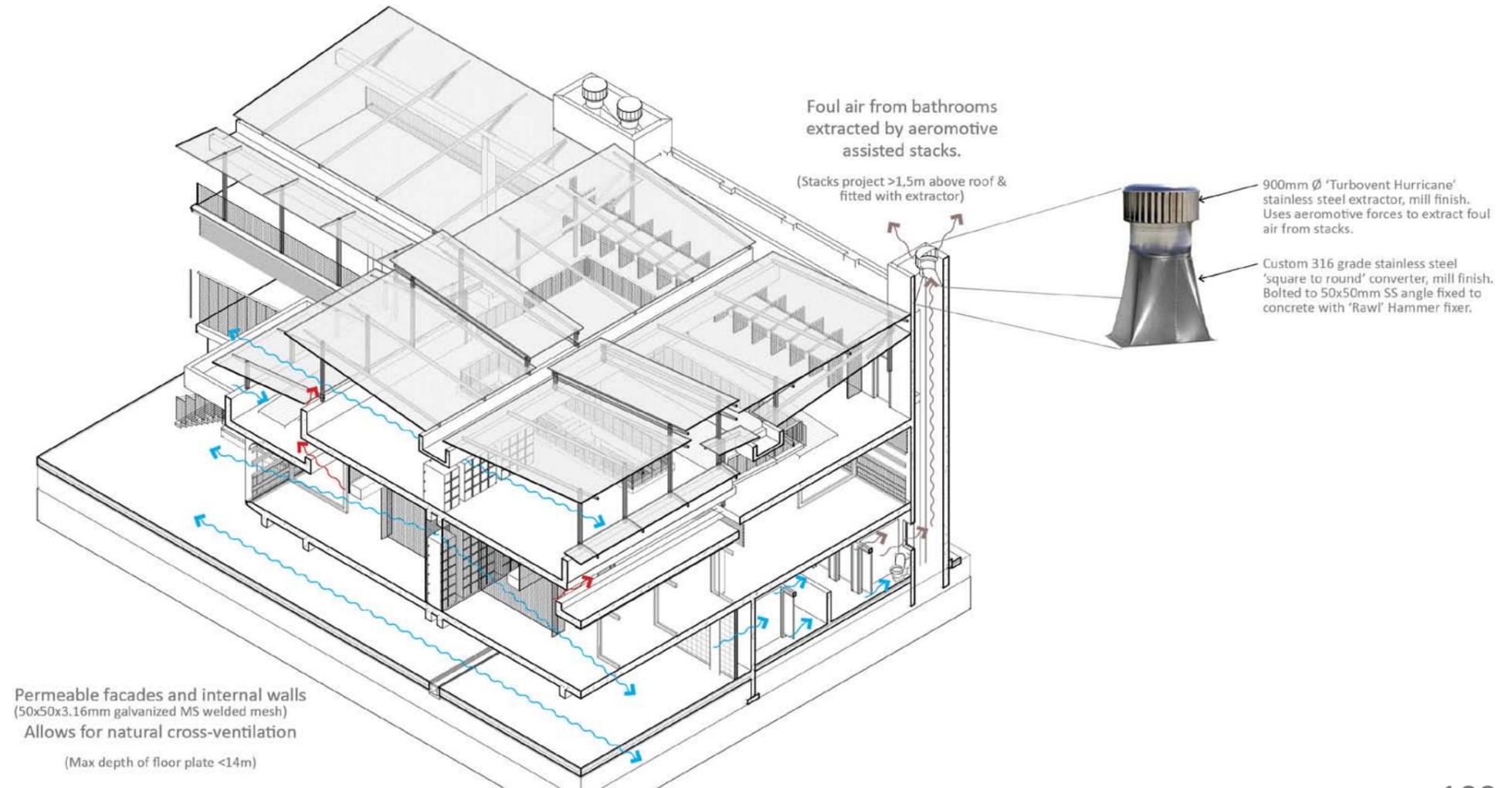


Illus. 131: Balustrade sketch detail (author)

Ventilation

General

Ventilation of this building is essential in the humid coastal tropical climate of Maputo. The relatively narrow floor plates are deliberately unenclosed to allow for natural cross ventilation of these spaces. Ceiling heights are high, and double volume in places to increase the effectivity of this ventilation.



$$Q = C_d \cdot A \cdot \sqrt{2 \cdot g \cdot H_d \cdot \left(\frac{T_i - T_o}{T_i}\right)}$$

Q = Volume Rate of Flow (m³/hr)
 Cd = Discharge Coefficient (Efficiency) 80% = 0.8
 A = Area of Smallest Opening (2.577m²; 6444m²)
 G = Gravitational Acceleration = 9.8m/s
 Hd = Height of Stack = 15.1m
 Ti = Internal Stack Temperature (°C)
 To = Outdoor Temperature (°C)

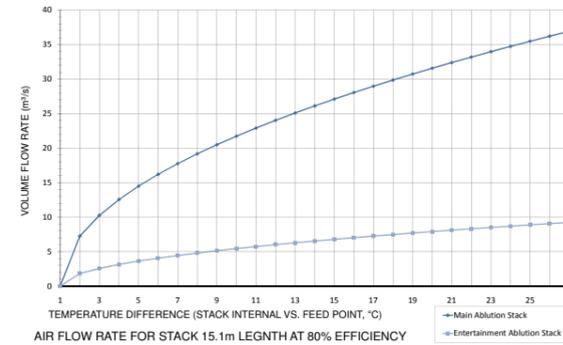


Fig. 12: Air-flow rates for abluion stacks (author)

Ablutions

Ablution facilities are passively ventilated by the extraction of air through dedicated ventilation stacks. These draw fresh air into the toilet facilities, from the surrounding market spaces; this air is then drawn over the WCs then out through the stacks to a higher level. This draw is created by the extraction of air from these stacks by large ‘whirley-birds’ driven by the natural aeromotive force of the sea-breeze.

A flow of air is achieved by using the restricting shape of the stack, promoting the occurrence of thermomotive forces. A temperature difference due to the concrete wall of the stack causes air movement through differing densities, since hot air rises and is replaced, therefore in a restricted sectional area this causes a flow of air over the height of the restricted area.

The air-flow can be calculated using the adjacent formula. the results are shown in the graph.

Environmental Sustainability

The environmental sustainability of the building is addressed through the:

- Natural ventilation of market spaces.
- Aeromotive ventilation of abluion facilities.
- Avoidance of high embodied energy materials such as Aluminium.
- Use of locally sourced materials (lowered transportation).
- Avoidance of the use of locally available protected timbers (Mahogany species *Khaya anthotheca* - IUCN Redlisted as well as Mahogany species *Azelia quanzensis* and Leadwood *Combretum imberbe* - both protected in South Africa).
- Rain-water and Raw-water harvesting on site through storage, or hand and solar pumping.
- Use of low-voltage LED solar lighting (Maputo receives a high proportion of full sunlight per day).
- Elimination of the use of paint, and VOC producing materials.
- The use of photovoltaic powered solar pumping to move ground and stored rain water to raised tanks where it is gravity fed to the point of use.

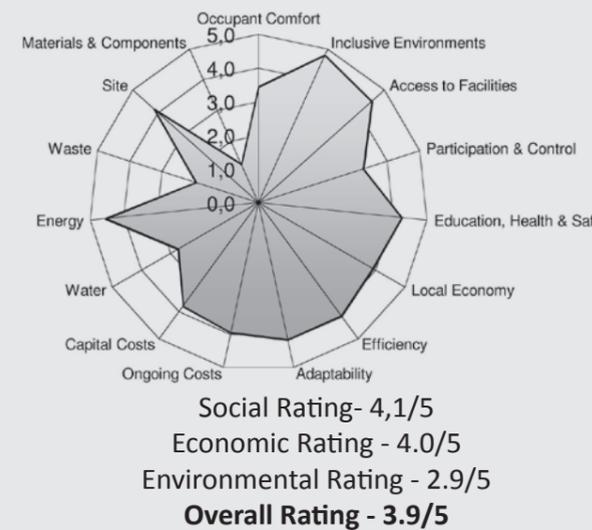


Fig. 11: SBAT Report Graph (author)

Although it is hoped that through the above methods the building would become inherently environmentally sustainable, the use of rating tools helped in determining the success of the above sustainability measures. It was decided that many rating tools, such as the Green Star Assessment Tool where not designed or suited to the evaluation of this type of building, being a Market Building. It was then decided to use the SBAT (Sustainable Building Assessment Tool) developed by the South African CSIR (Council for Scientific and Industrial Research), because this tool also considers social aspects as part of sustainability. This rating method rates the building high 3.9 out of a possible 5, which is high.

Topography & Flooding

It has been mentioned that the site is very close to being perfectly flat, and that flooding is a problem at times, with many stalls having been raised 600mm above the surrounding level as a reaction to this. It has been assumed that measures at an urban level, to deal with this flooding will be effective. It is a however, proposed that to ensure proper drainage of the site that areas of the site (particularly sales areas) be raised in a series of 150mm high steps to a level of 600mm above the surrounding pavement level.

Services

Many services are intended to be provided by an autonomous service sector within the market, facilitated by the market authorities as a way of reducing administrative load, and ensuring effective service delivery.

Water

The existing water sector of the market is primarily engaged with the sale of cold drinking water to vendors, and it is proposed that this sector be expanded to control the provision, and payment for, all water provided in the market.

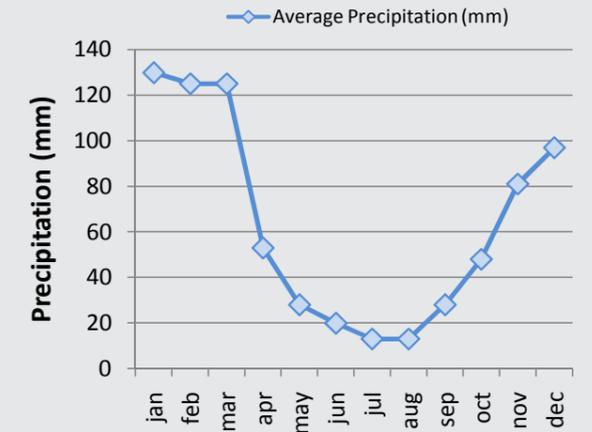


Fig. 13: Graph showing the average monthly rainfall for Maputo (author, BBC Weather)

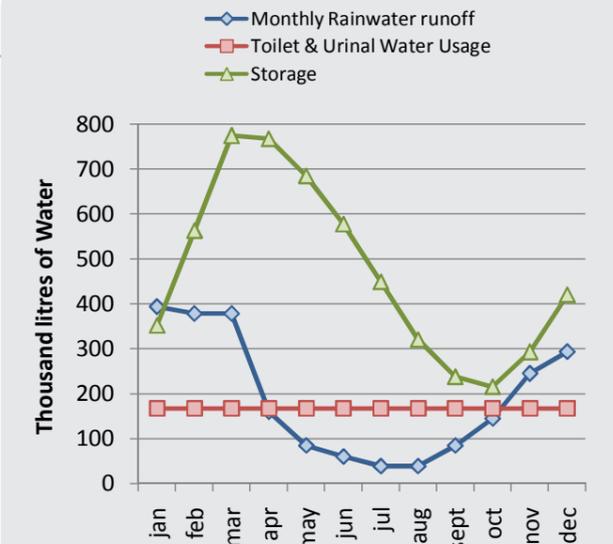
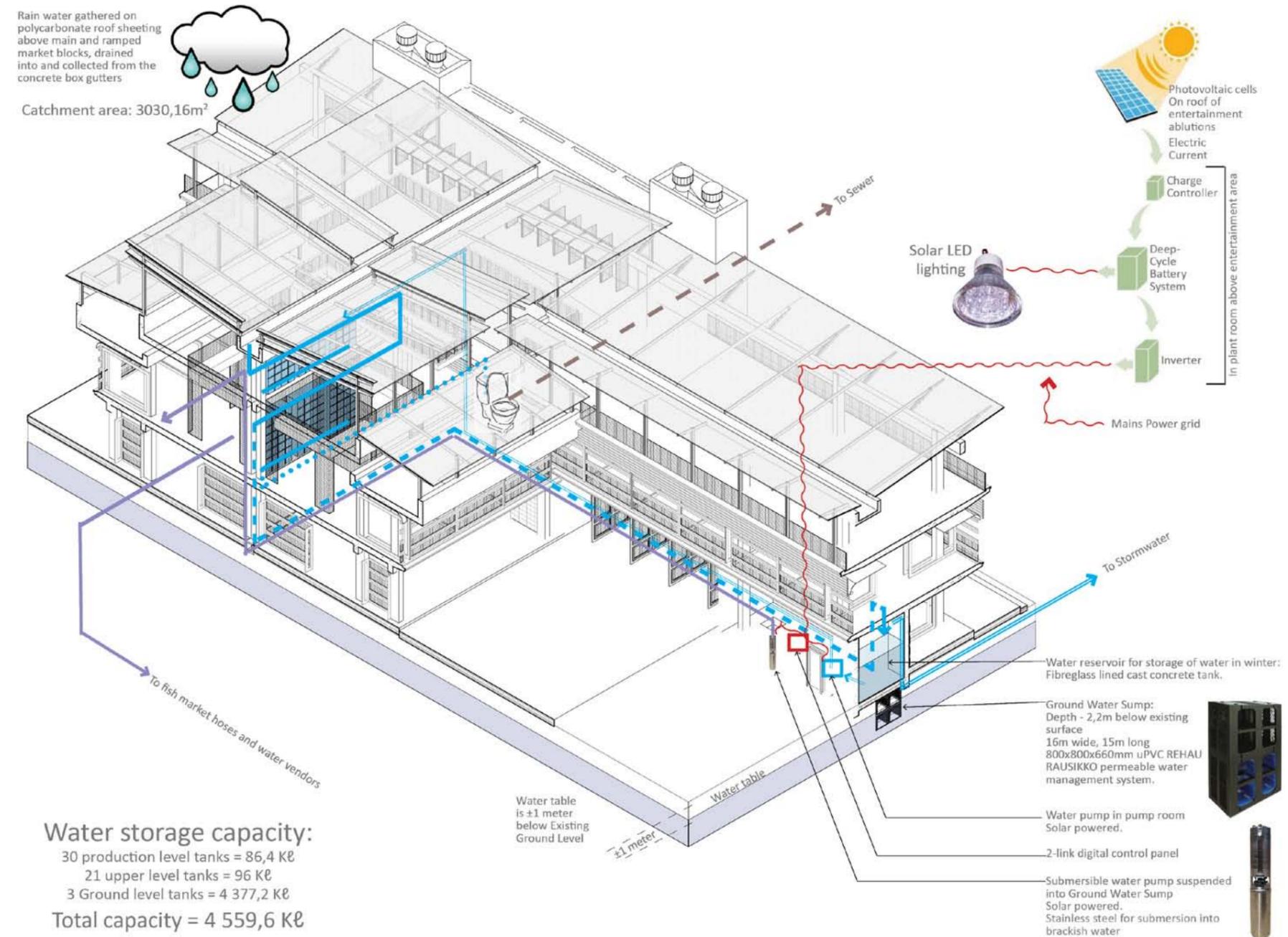


Fig. 14: Graph showing the average monthly water storage vs harvesting levels (author, BBC Weather)



Water storage capacity:
 30 production level tanks = 86,4 Kℓ
 21 upper level tanks = 96 Kℓ
 3 Ground level tanks = 4 377,2 Kℓ
Total capacity = 4 559,6 Kℓ

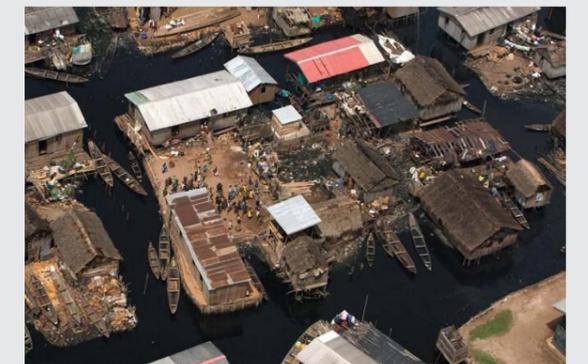
Water will be sourced from the following three sources:

- Stored rain-water
 - Gathered from the roofs, not from the potentially very dirty market areas
 - Non-potable fresh water
 - Used for flushing toilets and urinals
- Water pumped from the water table
 - Approximately one meter below the surface
 - Non-potable salty water
 - Hand pumped for sale
 - Used to flush toilets and urinals
 - Used for washing down spaces
- Potable Municipal water
 - Used in the food sectors
 - Sold as potable water
 - Fire fighting water

Market stalls with stand-pipes for each of these water types, will be provided, allowing the growth of the water sector. Each of these stand pipes will be metered and lockable, with a water vendor paying market authorities for water used. Where possible hand pumping will be used, this will reduce maintenance requirements, dependance on electricity or fuel, and bring down the final price of the water.

Waste Removal & 'Self-cleaning'

A waste depot is proposed at a built-framework level. Waste of various types will be bought and kept temporarily in skips in this area. A municipal removal truck can then collect these skips. Placing an economic value on waste, will encourage the formation of an informal waste removal service within the Market and immediate surrounds, and it is likely that *tshova* push-cart operators will collect rubbish for delivery from the depot on a return trip to the goods delivery or storage areas proposed. The accessibility of the whole market area to *tshova* push-cart then becomes important, and makes the market effectively 'self-cleaning'.



Illus. 132: The Makoko Informal Settlement, Lagos, Nigeria. The precedent for 'self-cleaning' waste removal

Electricity

All stalls will be provided with electricity supplied to each shaded market stand within the formal market, with electric wiring routed through shading structures. A 'Pay-as-you-go' metering system operating on a similar system to cellphone airtime sales, and sold by the same mobile vendors is proposed. The HT/LT Substation is proposed under the eastern Ave Zedequias Manganhela ramp, a position accessible to heavy delivery vehicles.

Security

The current market police force will be increased to regulate the expanded market, with the formal market designed to allow night time locking. Facilities for these market police will be provided at a built framework level.

Sanitation Sector

The provided ablution facilities will be operated as a sector within the market, a pay-toilet system allows the maintenance of attendants in each facility. These attendants would ensure the facilities cleanliness, safety, basic maintenance, and the availability of toilet paper and other sanitary products.

Refrigeration

It is proposed that refrigeration and freezing cold rooms be provided as part of the Expanded Market Framework. This can be operated as a sector of the market, with this sector also providing ice to customers. Vendors will then be able to store produce and keep perishables fresh for longer periods of time, and buy in larger amounts. This should have a direct physical link to the fish and vegetable sectors.

Fire: Escaping, Isolation, Extinguishing, Smoke

The consideration of the effect of fire in the market is demonstrated by the recent fires which gutted the Nakivubo Park Yard Market (2009) and Owino Market (2011), both in Kampala, Uganda. Markets are very vulnerable to fire because of the extensive use of moveable, combustible materials, narrow covered passages and frequent inaccessibility to fire fighting vehicles. Large open fires are often used to cook food.

Escape

All stairways are designed to operate as fire escape stairs, and are within 90 meters (45m escape distance) of one another. An enclosed fire escape with the appropriate smoke extraction, serves the production level exclusively.

Isolating, Extinguishing, Smoke

The pedestrian walkways running east west, associated atria, and Rua do Mesquita are intended to act as some measure of fire isolation. The atria, being three storeys in height, require to be protected with fire sprinklers, but it is proposed that the whole covered area of the market be protected with these sprinklers. These should be split into sections so that only the sprinklers in a burning area are activated to minimise stock damage. The open nature of the building allows smoke to escape easily.

Accessibility & Water Provision

Rua do Mesquita will allow a fire engine access into the heart of the market. Fire booster points will be provided at points which are less accessible.



Illus. 134: Fire Damage, historic market building, Baixa (author, photo June 2011)



Illus. 133: Nakivubo Park Yard Market smoulders, Kampala, Uganda, 2009. Fire trucks were unable to get into the market, which was a continuous mass of timber framed stalls (M Mbabazi / Musinguzi, 2011)

Surfaces, Materials, Finishes

General Material Strategy

Durability

All materials need to be durable and have a long, maintenance free life-span. No paint is to be used throughout the building and no aluminium fittings or finishes will be used in the building because of their high scrap value.

The proximity of the building to the sea means that steel will rust quickly, and will have to be very well protected against oxidation, or preferably avoided in preference of timber, brass, or high grade (316 grade) stainless-steel.

Local Material Use

It is preferable that materials are produced or sourced locally, either from around Maputo, within Mozambique, or neighbouring countries (in that order).

This shows itself in the specific choice to use:

- Mozambican made cement, in in-situ concrete work and precast units.
- Exotic Eucalyptus timber from Salamanga, southern Mozambique
- Mopani poles from Mongweni, Mozambique

Extensive use of precast concrete grill-blocks (grelhas) popular in Maputo, the thinning of low level concrete edges, and the addition and allowance of a layer of tectonically light and less permanent materials over the a heavier concrete layer, is an effort to respond to the identified regional character. This is also the case with the use of *Calçada Portuguesa* type patterned crushed-stone paving as used locally.



Illus. 136: *Calçada Portuguesa* crushed-stone paving common in Maputo. The particular example is notable for the use of multiple coloured stone. (author)



Illus. 135: Goods defining space, Alcohol Market - Maputo (J Casson)

Use of industrial Materials

The use of more industrial materials such as concrete, and the industrial fixing of materials forming part of the core structure of the building is proposed. This Modernist use of materials often creates cool, clinical ambients, as well as a remoteness in relation to the user as discussed in Chapter Two. The use of timber and other local materials in a fairly raw state is used to offset this, drawing on elements of Critical Regionalism. The imprecision of the raw materials also reflects the small variations in the market spaces which contributes to the vibrancy of the market.

Material Strategy for Specific Elements

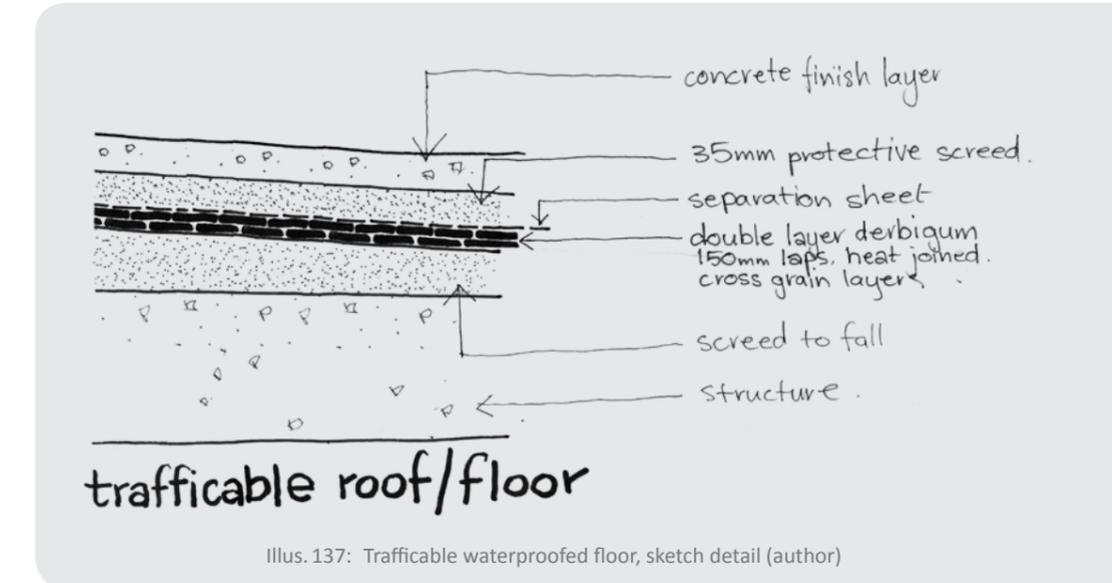
Floors

Surfaces need to be highly durable, but still human in scale. On ground level, the extensive use of *Calçada Portuguesa* crushed-stone paving, commonly used in Maputo and particularly in the Baixa is proposed. This will allow for a durable textured surface, in which the touch of a human hand is clearly evident. A multicoloured patterned surface is proposed.

The finish of all concrete surface-beds as well as the floor / roof surface of all the suspended slabs could be a stained, polished, and waterproofed screed, with the screed on appropriate suspended slabs falling to Full-bore drains. This will allow all concrete roofs to be trafficable, to allow for future ad-hoc expansion.

Walls

The finishes of solid vertical elements will where possible, be either smooth finished off-shutter concrete, stained bag-wash finished blockwork, or precast concrete grill blocks commonly used in Maputo to allow ventilation. Where a transparent vertical element is required, this will either be a galvanised, primed, and painted mild-steel welded mesh within a timber frame, or local timber screens. Timber screens will be constructed from vertical Mopani poles, blade-stripped of their bark and fixed in such a way that their bases are suspended off the ground to prevent water related rot. This timber will be deliberately allowed to age.



Illus. 137: Trafficable waterproofed floor, sketch detail (author)

In market areas spatial enclosure through the use of transparent vertical elements is proposed. This will allow for permeability in terms of sight and sound, ensuring that goods are visible to customers, since they become the primary obscuring element within these spaces. It also allows the social and business interactions between stalls essential to the organisation of the market sectors to continue, despite the presence of a physical barrier.

Balustrades

These will be predominantly welded mesh panels with a timber hand rail, with the timber giving a warmth to the more industrial materials, and the welded mesh allowing transparency between levels.

Ceilings

Soffit ceilings of unpainted smooth steel shuttered concrete that has had the joints polished smooth is proposed for its durability and maintenance free character.

Bathrooms

All bathrooms will have a stained and polished screed floor with a coved skirting, as well as durable vandal proof fittings. Walls will be plastered smooth, with the plaster having been stained to prevent the necessity of paint.

Health & Cleanliness

The presence of sectors that deal with food makes the hygiene of these areas very important. In particular the seafood and cooking areas will be provided with specialised facilities. These will also be the only areas that are formally dedicated to a certain sector or function, allowing other areas a greater degree of flexibility.



Illus. 138: Tiling in 'Prédio Emose', Baixa. Reminiscent of *Calçada Portuguesa* crushed stone paving common in Maputo (author)

Seafood

The fresh seafood sold in the market is not chilled or frozen, it is only kept wet and shaded to prevent it from drying out. A potential for odour and dangerous bacterial levels arises from the following issues:

- Water running off fish stagnating.
 - Proper drainage and hoses allowing the area to be properly cleaned
- Waste from cleaning fish and fish that is 'off' is not disposed properly
 - Provision of 'Food Waste Disposers' that liquidise and dispose this waste into the sewage system
- Ingress of contaminated water into surfaces
 - All surfaces (tables, floor, etc) to be impervious. It is proposed that this be a smooth concrete or screeded finish sealed with a cementitious 'Sika Seal' sealant and with coved skirtings

Water run-off from the seafood cannot be allowed to flow directly into the storm water system, as it may contain or develop dangerous levels of bacteria. The run-off from the seafood area must therefore drain into the sewage system, and the areas surrounding the seafood sales area be raised by 150mm to prevent the flow of contaminated water to the surrounding areas.

The proposed refrigeration and freezing facilities, will allow vendors to better control the freshness of the fish, as well as increasing the availability of ice for chilling fish.

Cooking

Cooking areas are also a potential hygiene risk. It is proposed that the floors of these areas be epoxy sealed screed, falling to a grease trap in each area, and that basic washing facilities be provided in sealed impervious concrete.

Identity of Space

Regional Identity

The Regional identity has been taken from the following guidelines, as outlined in Chapter 3:

- Climate
 - An open, ventilating , climatic response has been chosen.
- Existing architectural tendencies
 - Use of thin Portuguese type modernist concrete edges prevalent in Maputo.
 - Extensive use of concrete.
 - A lightweight, less permanent, layer on a concrete frame.
 - Use of *Calçada Portuguesa* crushed-stone type paving prevalent in the Baixa.
- Heritage:
 - Built heritage considered.
 - Industrial heritage acknowledged through the use of industrially produced vending areas.
 - Intangible economically and entrepreneurially driven heritage is considered and reinforced through support of enterprise and commerce in the market function of the building.
- Scale
 - Pavement dominance, linearity of space, and context massing considered.
- Material use
 - Local characterising materials used.

Spatial Syntax and Identity

Markets are generally spaces that are rich in spatial character. The building will thus be split into several zones, with each of these zones having a characteristic finishing approach. The following measures have been taken:

- Finishes will be constant in materiality, but vary in application pattern, colour, and the size of the smallest material unit.
- Tree species will be varied by grouping, allowing a change in light conditions and shading patterns in the spaces that they define.

Overview

The above considerations form a complex web which sets out the infrastructural base for a unique physical and intangible place. The building becomes a significant item of built civic infrastructure that promotes and legitimises micro-enterprise and trade through the expansion of the market, as well as the recognition of the street as a formal market place. This should occur within a contextually sensitive environment, low in maintenance needs, and facilitating the healthy functioning of the market system in an environmentally responsible manner.



Illus. 139: Mopane Poles, informal market, Ximelene, Maputo (author)

Chapter 8: Design Sketches & Conclusion

“Like the customized Levis you can order on the internet, customized architecture is naked until the client moves in to give it meaning.”

Richard Woditsch (Archispeak: 10)

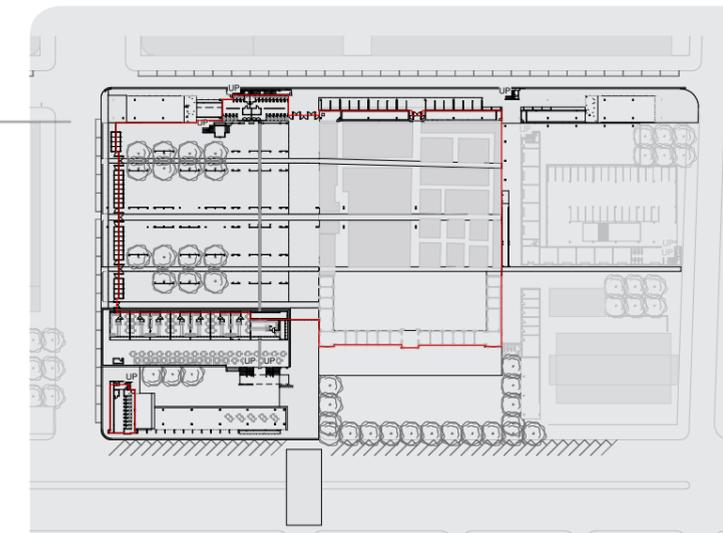
This chapter aims to communicate graphically the essential elements of the design in terms of sketch plans, sections, elevations, and details. In contrast to the previous chapter, this section deals with the design and technical aspects of the design from a physical perspective rather than a theoretical perspective. It deals specifically with the completed proposal.

Levels

Street / Ground Floor

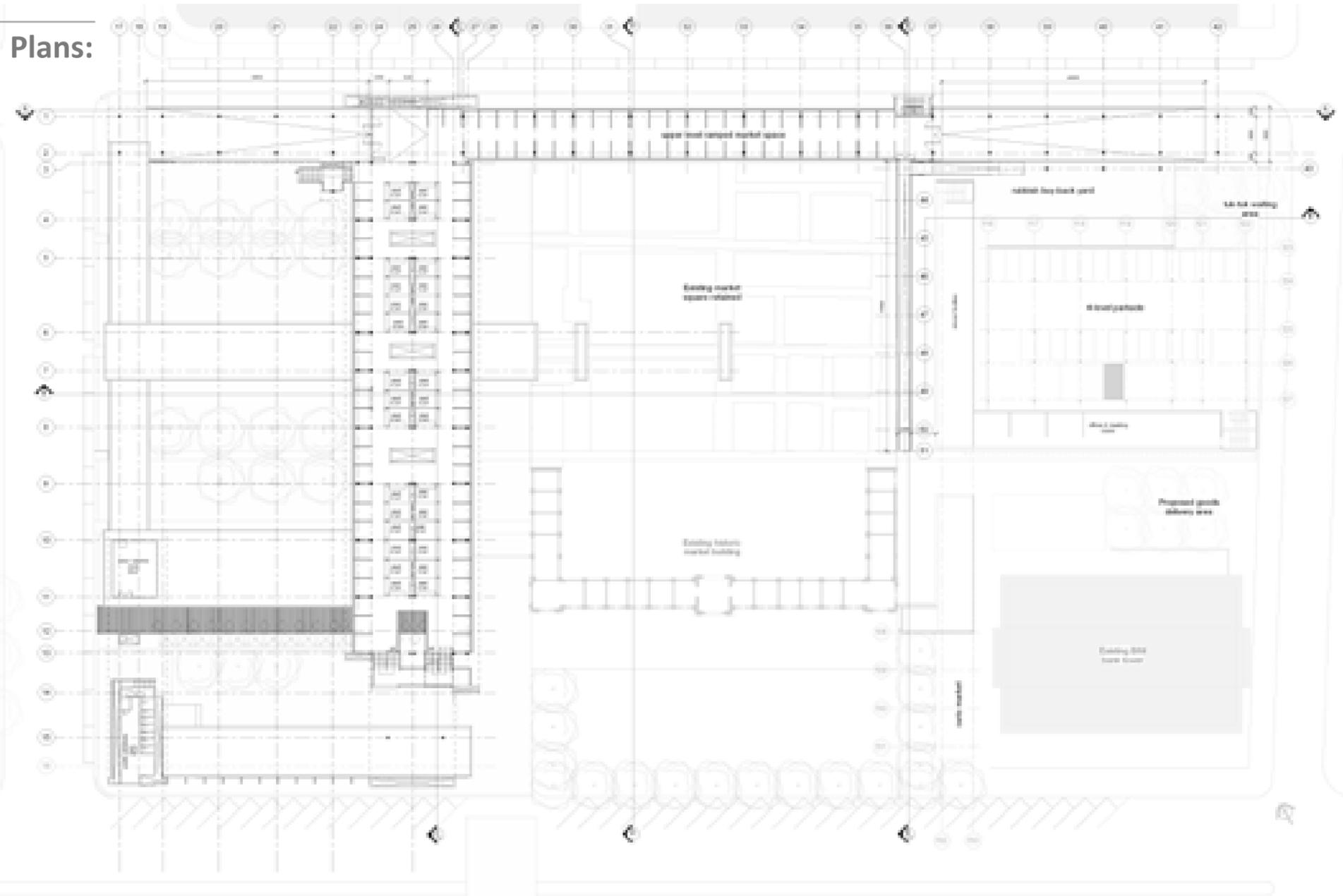
The ground floor is deliberately open, allowing easy access and integration with the street. The new market square links into the existing square, picking up the grain of the existing successful stall fabric.

The Market can be secured through the use of pivoting or sliding gates, as shown in the adjacent plan.

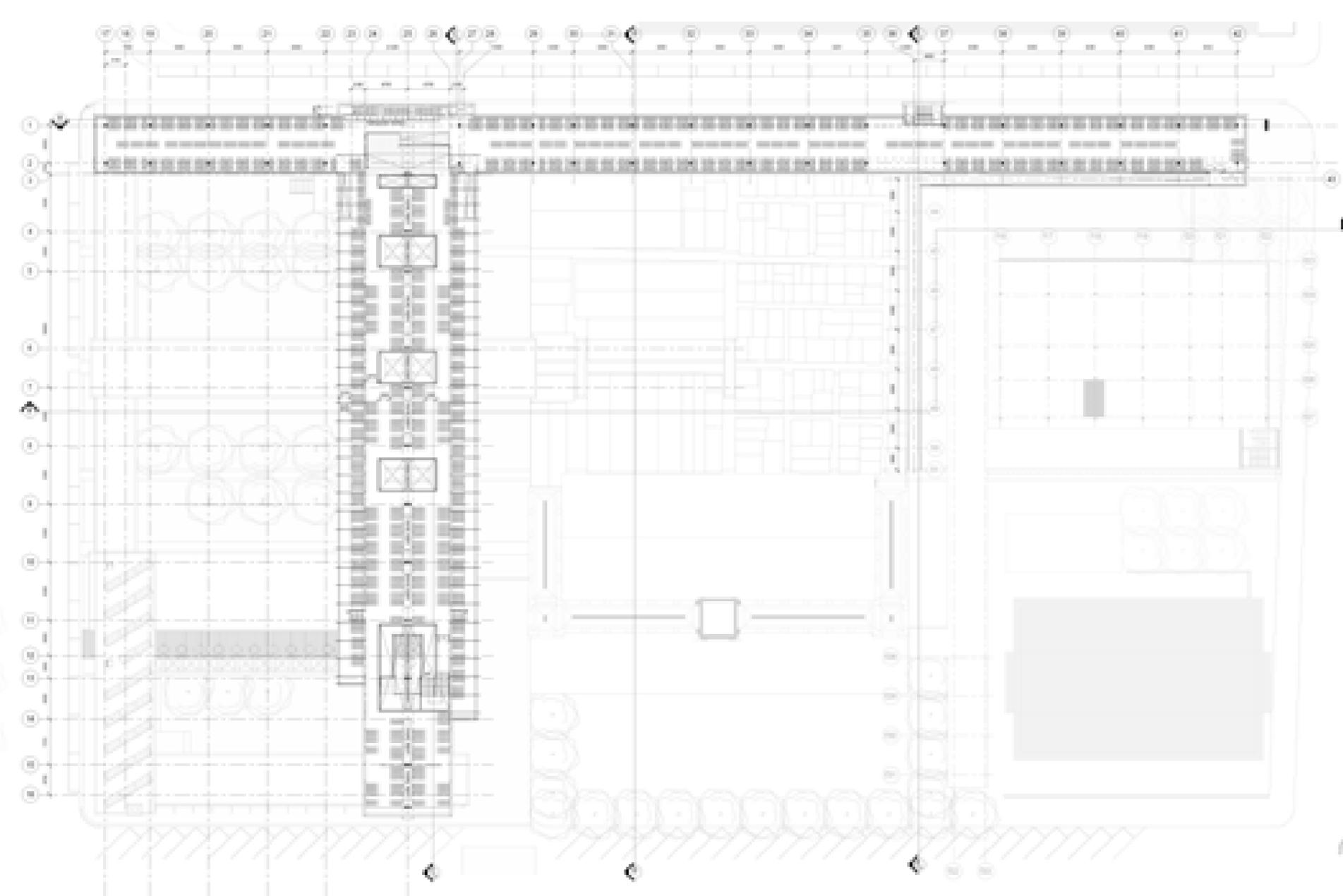


Illus. 140: Street / Ground Floor enclosure plan (author)

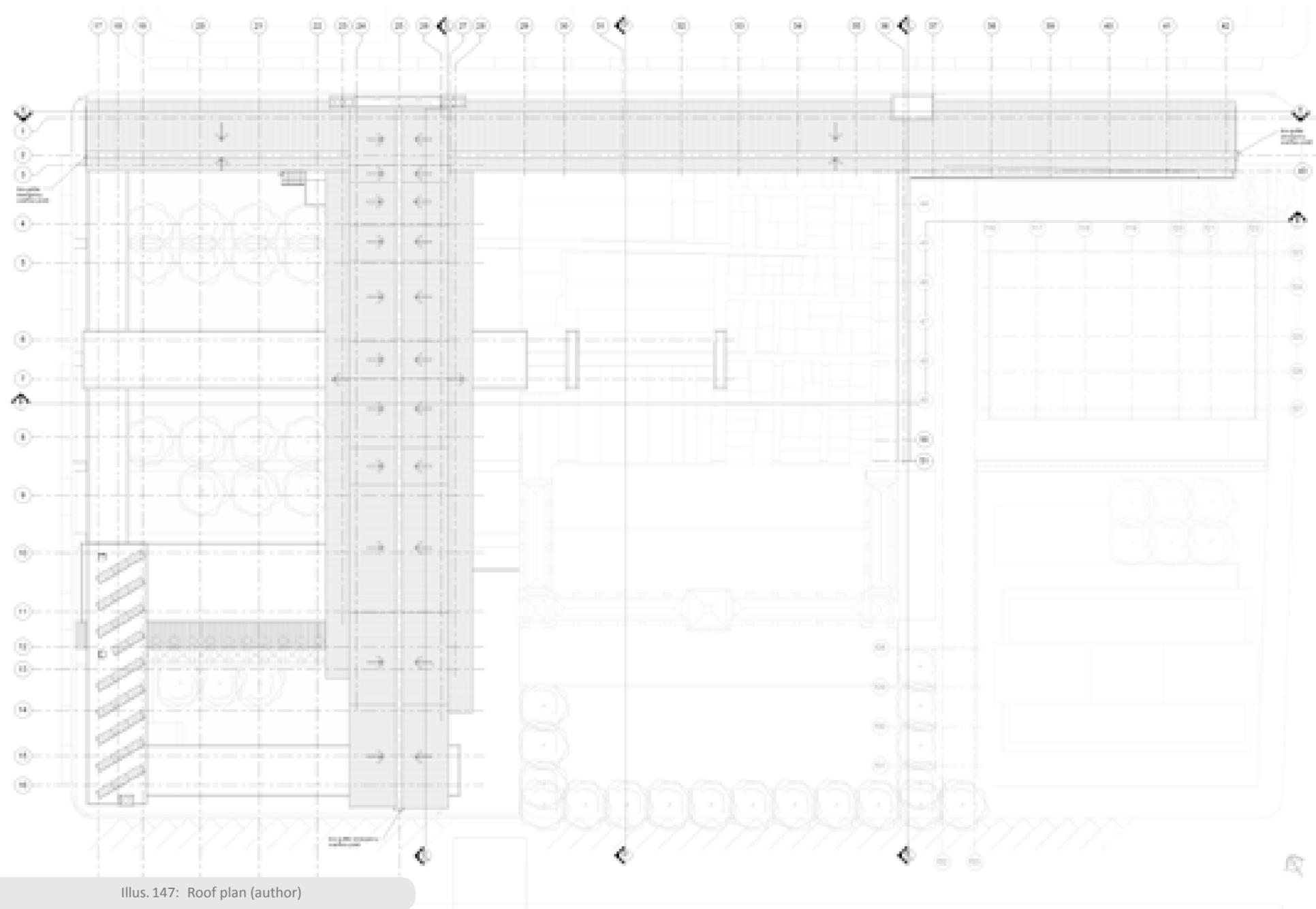
Plans:



Illus. 145: Upper Level plan (author)



Illus. 146: Roof Plan (author)



Illus. 147: Roof plan (author)

Character of Different Levels

Precedent has shown that all levels are not equal, and each level is treated differently in terms of visual and physical accessibility. This is as shown in the following table:

Level	Character	Response
Ground Floor	Open, accessible, lower market levels operating at a lower level of formality, subject to the highest rates of flux.	Open spaces that allow for a high level of vendor flux. Shortest rental periods.
Upper Level	Linear spaces, higher market levels, more established vendors with a higher customer draw. These will often include a measure of production (eg. tailors, seamstresses, dressmakers, cobblers, etc). A good link with the Ground Floor is required.	More lockable permanent stalls. Longer rental periods. Strong physical and visual link to lower levels. Transparent balustrade.
Production Level	Open, semi-public, secure space, accessed for short periods of time during the day. Low level of flux. A weak link with the lower levels orientates the user. Perhaps quite a dirty and messy level.	Visual connection to all levels at stairs. Low level of connection to ground floor. Measures to prevent water flow to lower levels.

Table 4: Level Character

Visual Penetration

Visual penetration between all levels has been allowed at the crossing of the ground floor axes, and the upper levels. This orientates the user and breaks up the length of the upper level spaces. These atria, being spatially higher than three floors will be fitted with dedicated fire sprinklers.

Structural

The following table deals with an overview of the general structural considerations undertaken in the design:

Foundation Conditions

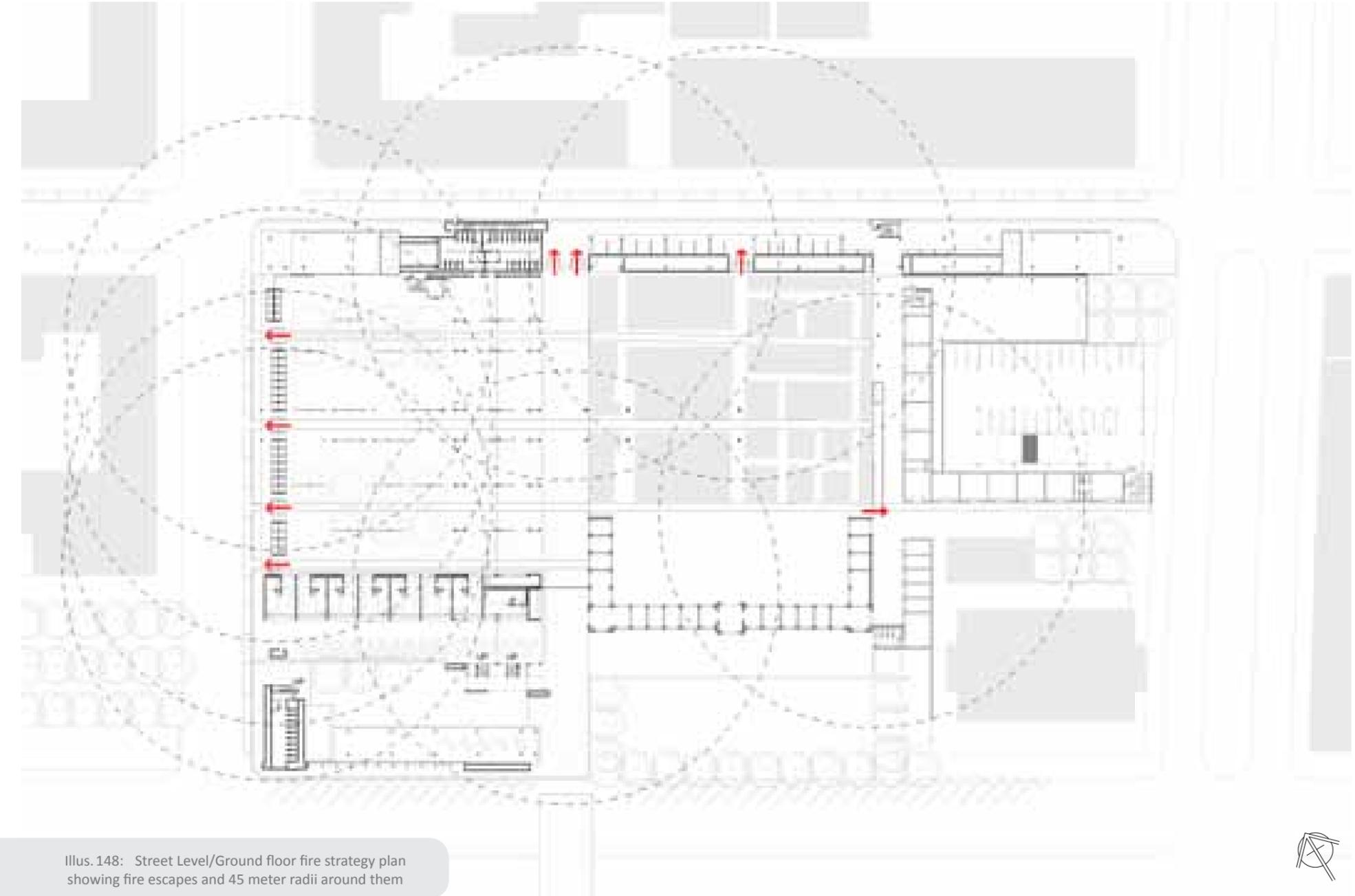
The site is located on reclaimed land, which was previously costal swamp land. It is assumed that the layer of reclamation fill is not suitable as a bearing layer for a building of this size. It is also assumed that the costal swamp layer is unsuitable as a bearing layer. Friction piles are proposed as a founding support to the building structure.

	<i>Material</i>	<i>Maximum Span / Height Required</i>	<i>Minimum Dimension</i>	<i>Other</i>
Spanning	Concrete	<12 meters	750mm	
	Concrete Suspended Slab	<6.2 meters	340mm	340mm shuttered in-situ concrete
	Timber	3 to 6 meters	300mm	Achieved through the use of a 150mm deep timber beam with a triangulated tension cable on the underside.
Cantilevering	Timber	<3 meters	150mm	
	Concrete	500mm -1500mm	100mm end	Edge tapers from 340mm to 100mm over length of cantilever. All cantilevered of slab >3 meters.
	Concrete	1850mm	-	No taper. 340mm thickness with 1000 upstand at end. Cantilevered off 2600mm slab with rigid joints to concrete columns at ends.
	Timber	<1 meter	-	Ends taper from 150mm to 75mm
	Timber	2300mm	-	Supported by timber haunch to reduce cantilever to <1 meter
Columns	Concrete	11 meters	two 300x300mm	Top and bottom fixed
	Concrete	<3.5 meters	300x450mm	Top and bottom fixed
	Timber	<3 meters	100mm	Two 100x38mm sandwich column with 50mm spacer
Market Stall (Horizontal element)	Timber	3 meters	150mm	
Market Stall (Vertical element)	Timber	2.4 meters	100mm	150mm depth to match horizontal

Table 5: Structural Considerations

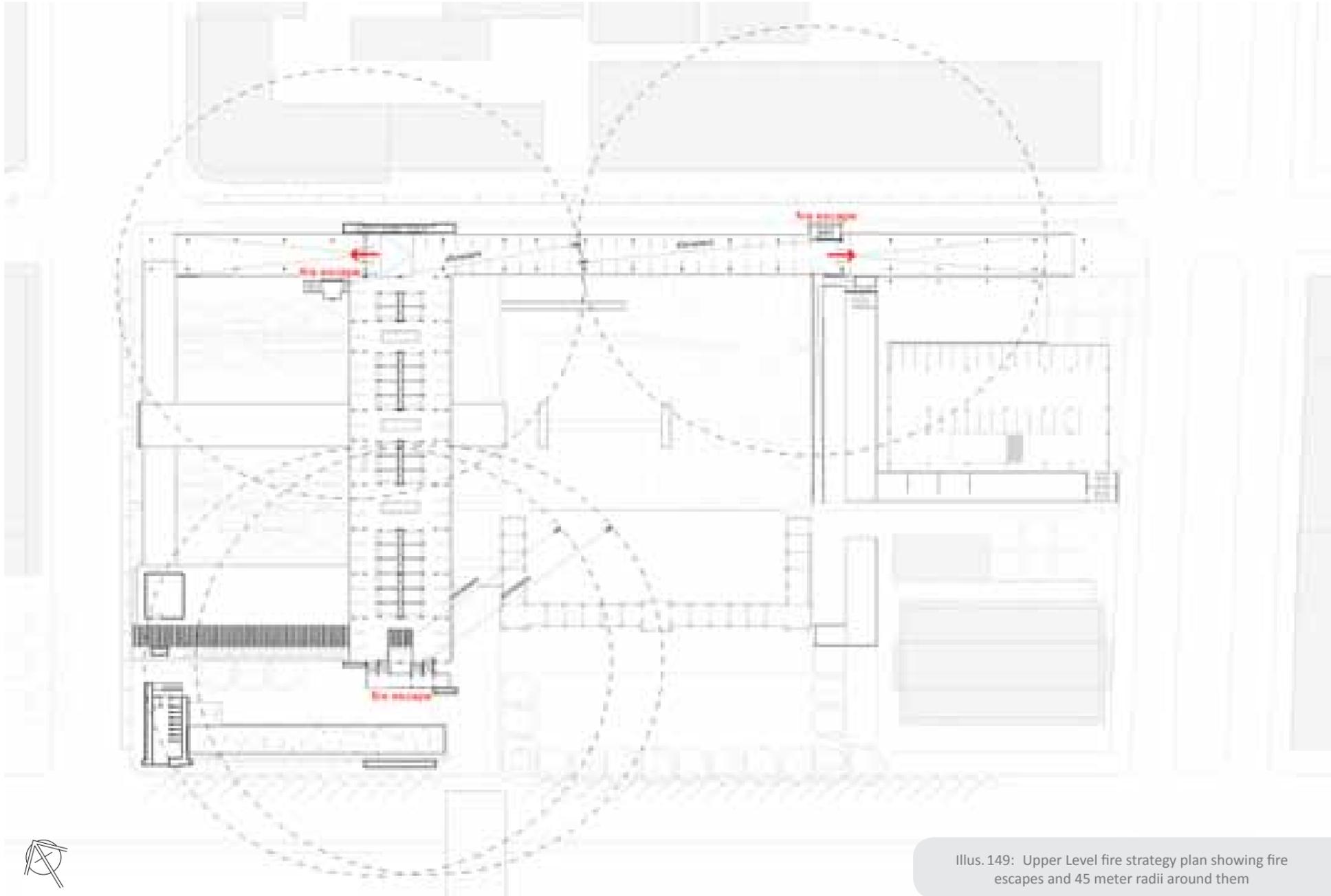
Fire Plans

The following plans show the positioning of fire escapes.

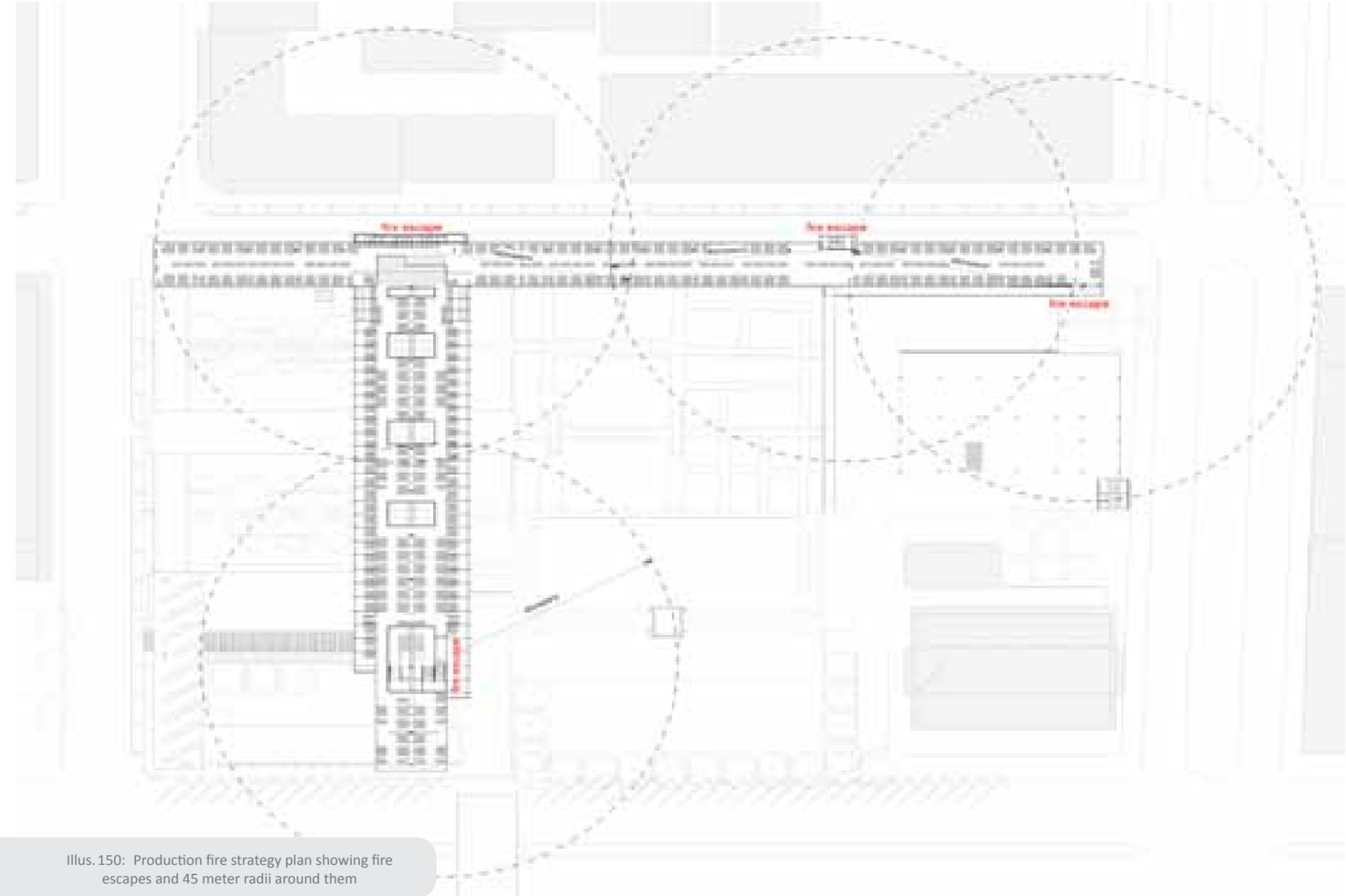


Illus. 148: Street Level/Ground floor fire strategy plan showing fire escapes and 45 meter radii around them





Illus. 149: Upper Level fire strategy plan showing fire escapes and 45 meter radii around them

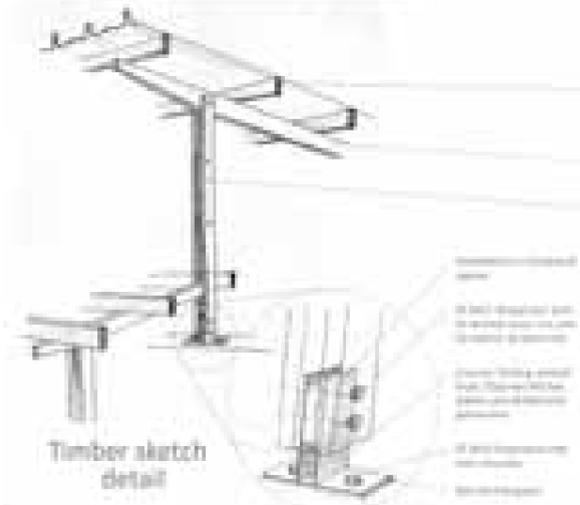


Illus. 150: Production fire strategy plan showing fire escapes and 45 meter radii around them

Technical Section & Details

- Crucial detail elements:**
- Material of the job of metal, materials used.
 - Where used, use of a galvanised and not cut or welded on site.

- Environmental**
- Use of Best Materials
 - Evidence of UK compliance systems
 - Minimising heat island effect urban areas



Item	Ref.	Spec.	Notes
1	1	...	...
2	2	...	...
3	3	...	...
4	4	...	...
5	5	...	...
6	6	...	...
7	7	...	...
8	8	...	...
9	9	...	...
10	10	...	...
11	11	...	...
12	12	...	...
13	13	...	...
14	14	...	...
15	15	...	...
16	16	...	...
17	17	...	...
18	18	...	...
19	19	...	...
20	20	...	...
21	21	...	...
22	22	...	...
23	23	...	...
24	24	...	...
25	25	...	...
26	26	...	...
27	27	...	...
28	28	...	...
29	29	...	...
30	30	...	...
31	31	...	...
32	32	...	...
33	33	...	...
34	34	...	...
35	35	...	...
36	36	...	...
37	37	...	...
38	38	...	...
39	39	...	...
40	40	...	...
41	41	...	...
42	42	...	...
43	43	...	...
44	44	...	...
45	45	...	...
46	46	...	...
47	47	...	...
48	48	...	...
49	49	...	...
50	50	...	...
51	51	...	...
52	52	...	...
53	53	...	...
54	54	...	...
55	55	...	...
56	56	...	...
57	57	...	...
58	58	...	...
59	59	...	...
60	60	...	...
61	61	...	...
62	62	...	...
63	63	...	...
64	64	...	...
65	65	...	...
66	66	...	...
67	67	...	...
68	68	...	...
69	69	...	...
70	70	...	...
71	71	...	...
72	72	...	...
73	73	...	...
74	74	...	...
75	75	...	...
76	76	...	...
77	77	...	...
78	78	...	...
79	79	...	...
80	80	...	...
81	81	...	...
82	82	...	...
83	83	...	...
84	84	...	...
85	85	...	...
86	86	...	...
87	87	...	...
88	88	...	...
89	89	...	...
90	90	...	...
91	91	...	...
92	92	...	...
93	93	...	...
94	94	...	...
95	95	...	...
96	96	...	...
97	97	...	...
98	98	...	...
99	99	...	...
100	100	...	...

Table showing Structural Constitutions

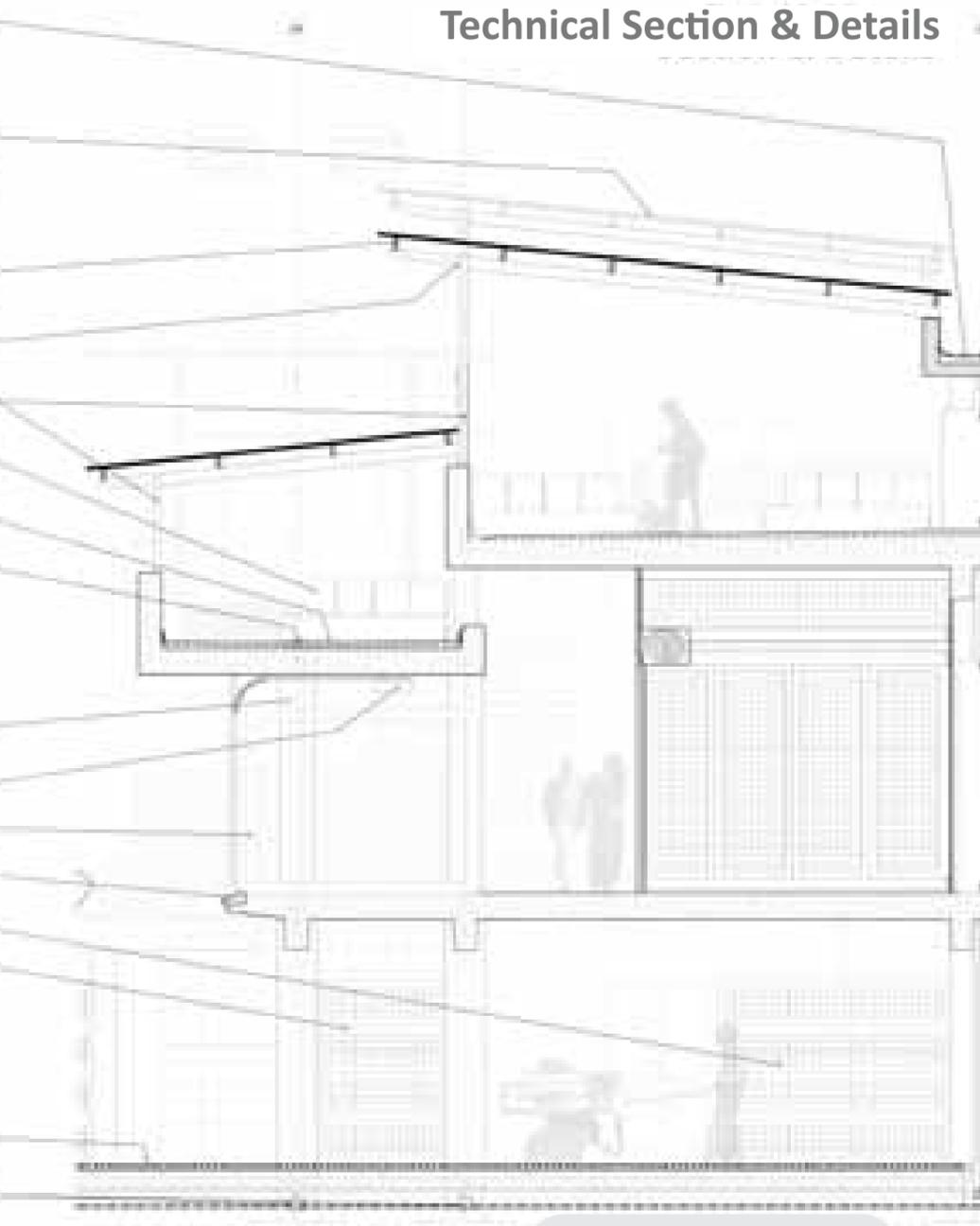
... ..

... ..

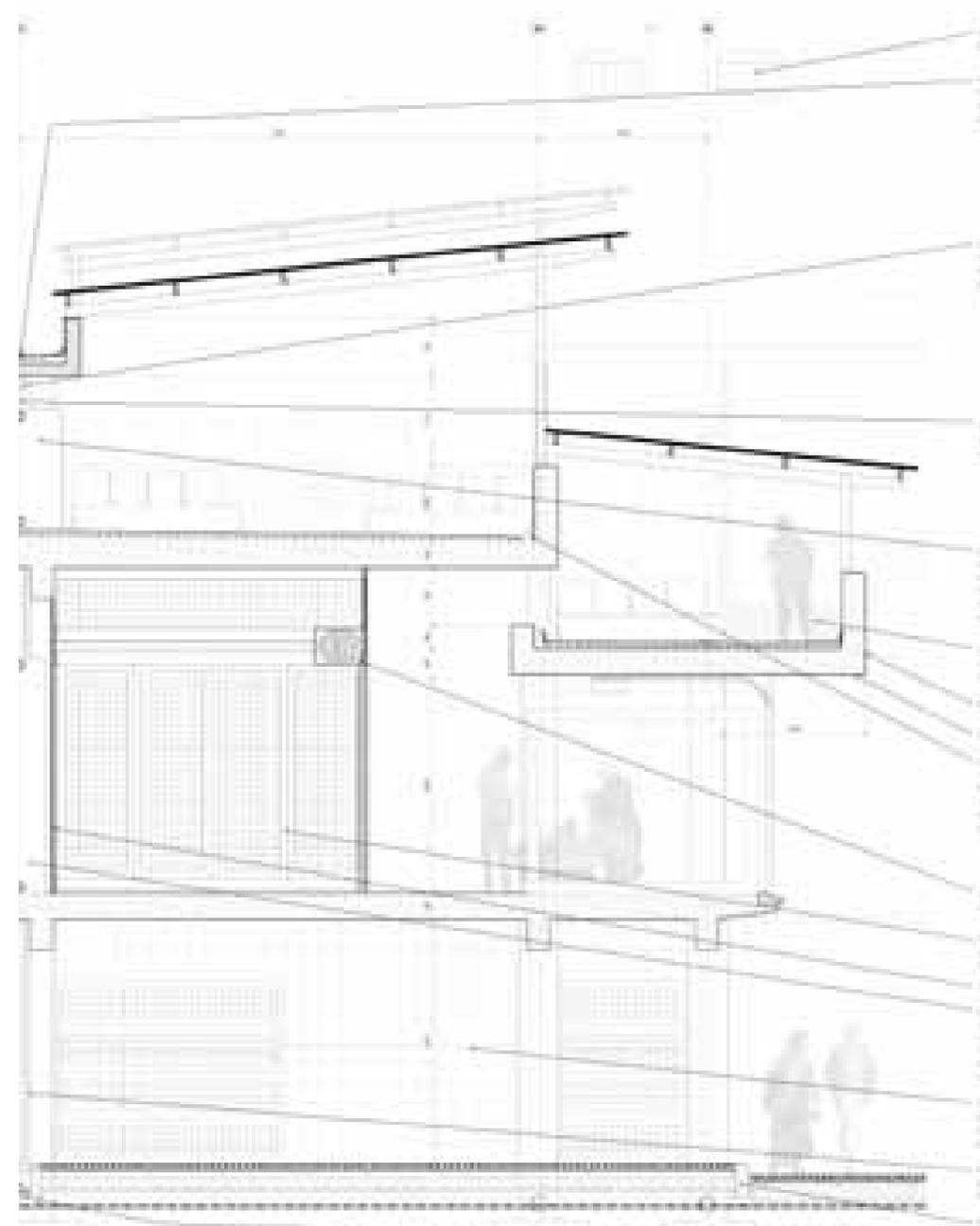


... ..

... ..



Illus. 151: Detailed Section



... ..

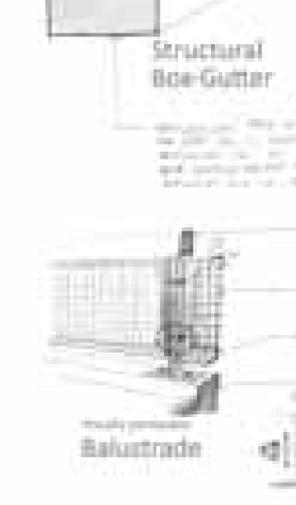
... ..



... ..

... ..

... ..



... ..

... ..

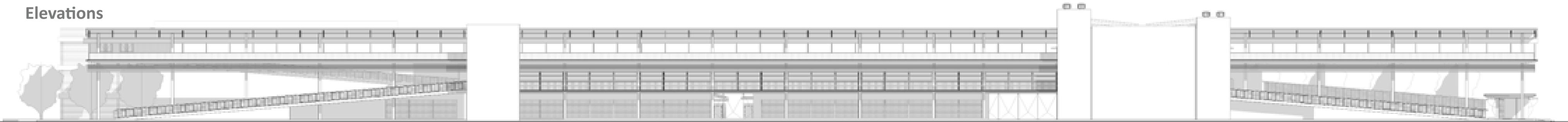
... ..



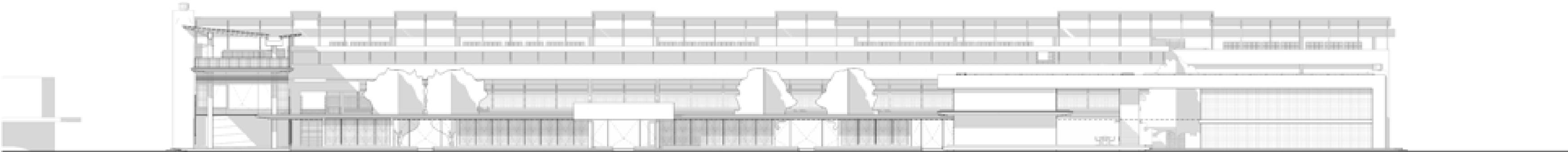
... ..

... ..

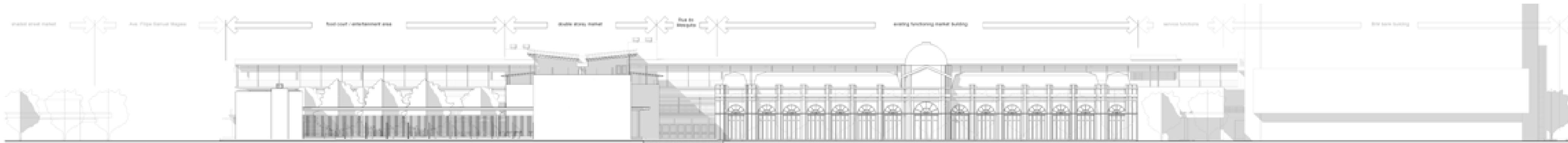
Elevations



Illus. 152: North East Elevation

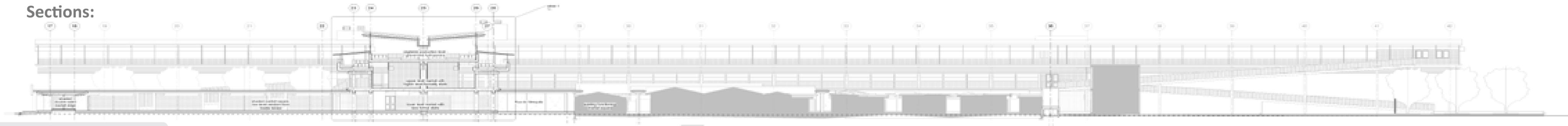


Illus. 153: South West Elevation

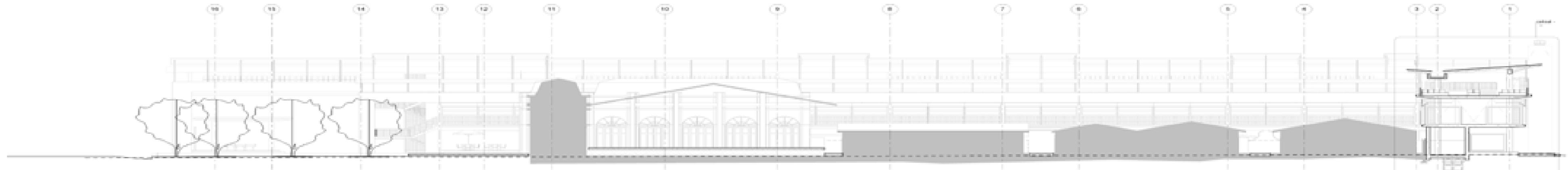


Illus. 154: South East Elevation

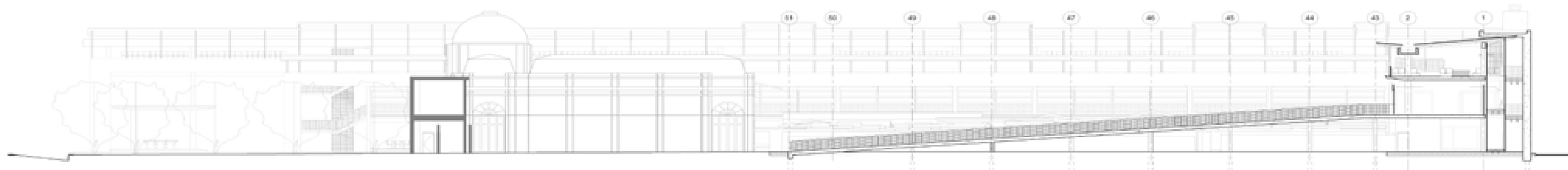
Sections:



Illus. 155: Section B-B



Illus. 156: Section C-C



Illus. 157: Section E-E

Views:



Illus. 158: View from cnr. Zedequias Manganhela & Samuel Filipe Magaia



Illus. 159: Heritage view of Existing Market building facade

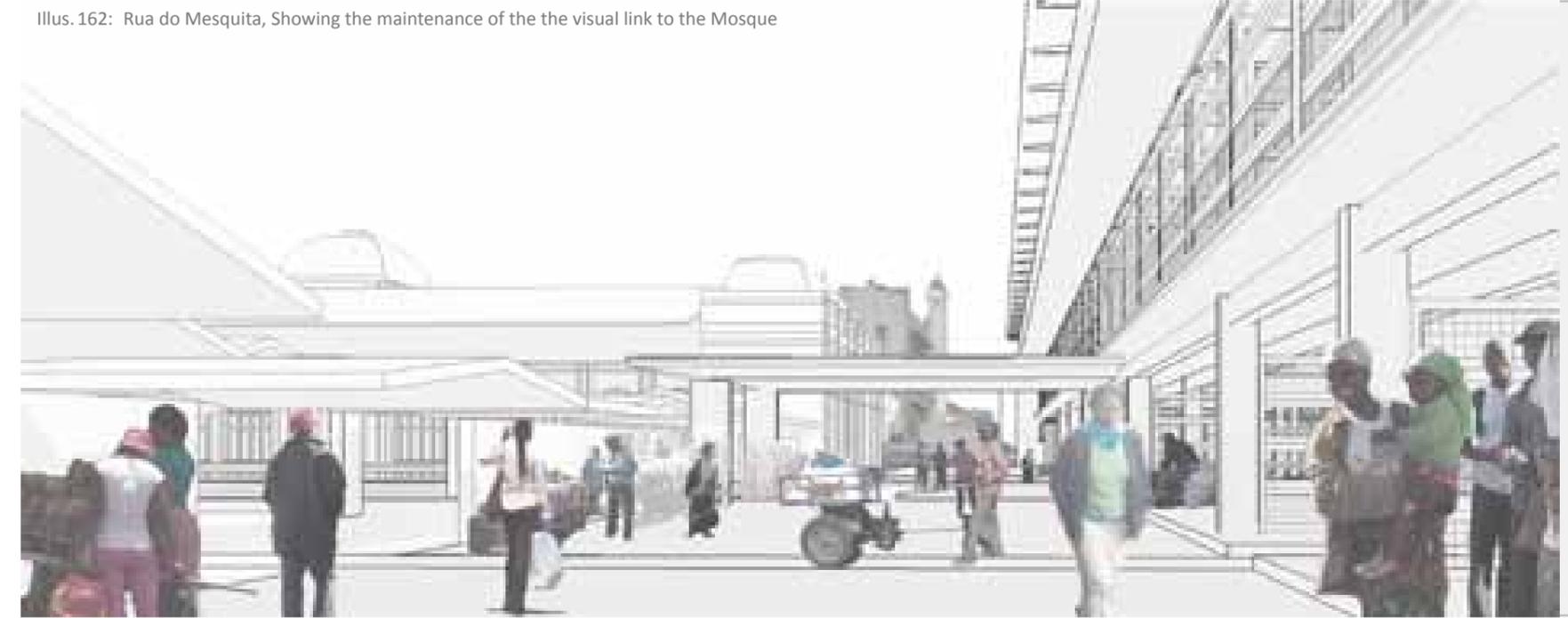


Illus. 160: Ave 25 Setembro view



Illus. 161: Ave Samuel Filipe Magaia view

Illus. 162: Rua do Mesquita, Showing the maintenance of the the visual link to the Mosque



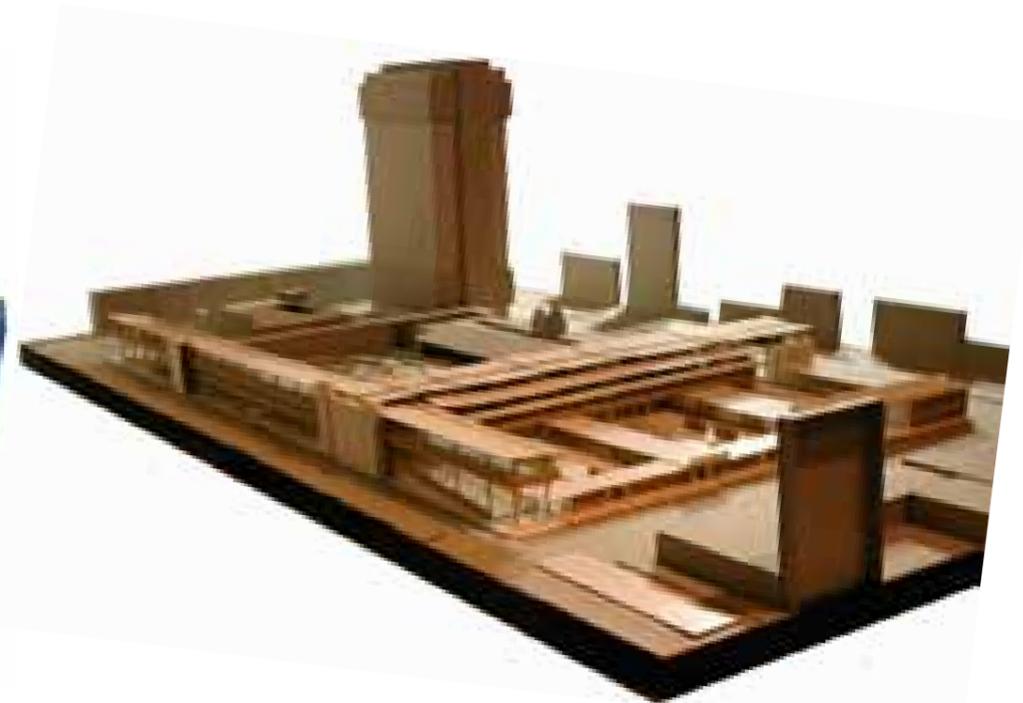
Illus. 163: View of the proposed Market Square



Model:



Illus. 164: Model: Ave Zedequas Manganhela view



Illus. 165: Model: View from North



Illus. 166: Model: View of food court entry (east)



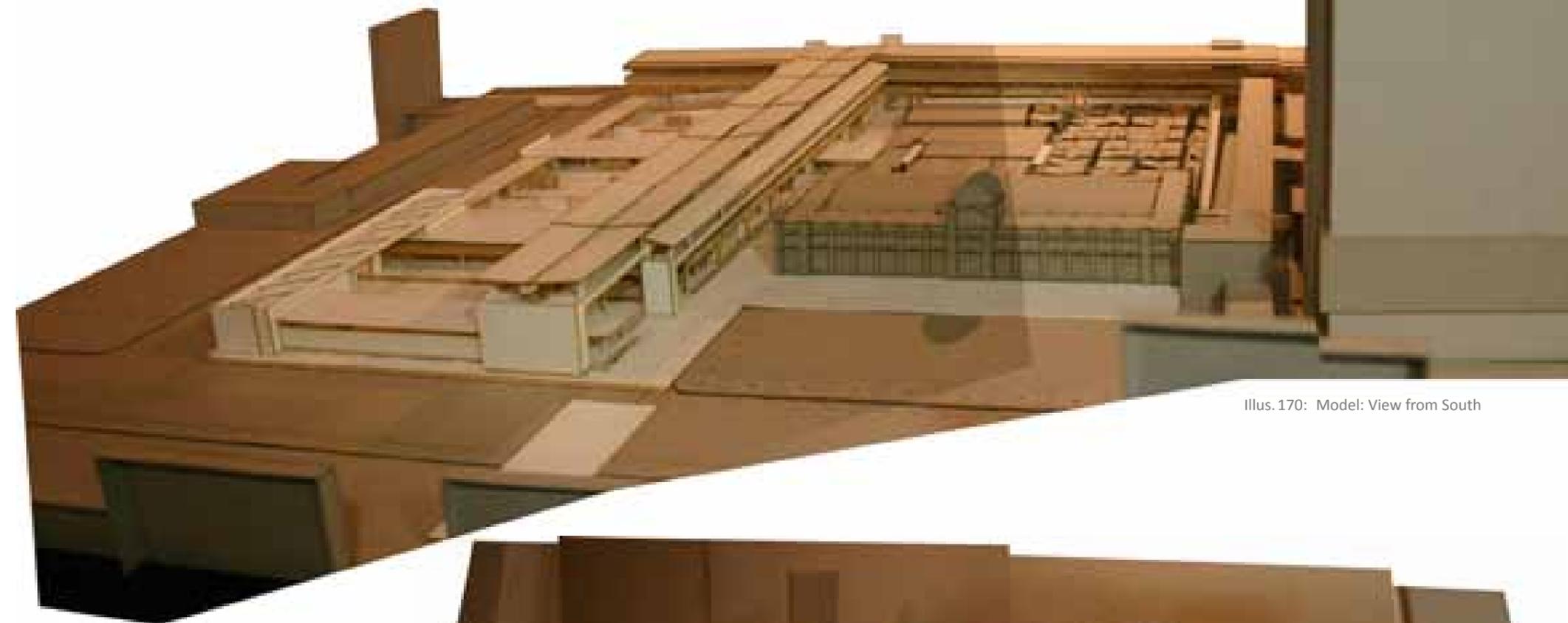
Illus. 167: Model: View of cnr. Ave Samuel Filipe Magaia & Ave 25 de Setembro



Illus. 169: Model: View from North East



Illus. 168: Model: Market Square & solar panels on abluition roof



Illus. 170: Model: View from South



Illus. 171: Model: View from South East

Conclusion

Maputo is a significant economic centre of south eastern Africa, and particularly southern Mozambique. The Baixa area of Maputo is an important business centre of Maputo, both historically and currently. It serves as a key area in the economic health of this region. The market intervention is intended to become a destination within its own right, particularly through its increase in physical size, improvement in spatial appropriateness, recognition and inclusion of the vendor, improved shopping comfort, and consequent increase in drawing power on potential customers. In this way the intervention seeks to act as a catalyst project in the urban regeneration of the Baixa, offering a solution to the current inadequate micro-enterprise and trader infrastructure, promoting grass-roots based economic growth.

In Maputo, and in the Baixa, a significant portion of the public services such as transport and retail operate informally, providing for customers needs on-demand. This creates an environment in which service providers and retailers adapt very quickly to small changes within the economic system or customer demand. This in turn creates a flux of spatial usage, and the loose-fit user-customisable vending stall aims to provide an adaptable market-level appropriate response to this fluxing use.

The enterprising culture present in Maputo and the Baixa, is physically and culturally embodied by the *Mercado Central* building, which constitutes a tangible representation of the longevity and tenacity of the local enterprising spirit. The restoration of this building, as well as the protection and advancement of its function is intended to further entrench this contextual characteristic into the area.

The market proposal is intended as a contextually sensitive response, low in maintenance needs, and facilitating the healthy functioning of the existing informal market system in an environmentally responsible manner. This infrastructure should facilitate clean, hygienic, appropriate, and comfortable trade.

Illus. 172: Signage painted onto a wall, Maputo Baixa (J Casson)



References

Film:

Unknown (s.a.) Welcome to Lagos, Episode 2.1. BBC. accessed via Youtube, 09 July 2011 [Film]

Van der Haak, B. (s.a.) Lagos. Africam Media Online (AMO) [Film]

Interview:

Dobson, R., & Quazi, T. of Asiye eTafuleni. Interview with the author on 11 July 2011, Durban.

Joaquim, V. Buildings and Urban Spaces Proposed for Classification in Maputo (Presentation). 3th March, 2011, Maputo

Representative of the Warwick junction Bovine Head Market vendors, Zulu language interview with the author on 11 July 2011, Durban

Written:

Alexander, C., Silverstein, M. and Ishikawa, S. (1977) 'A Pattern Language: Towns, Buildings, Construction', New York: Oxford University Press.

Banham, R. (1960) 'Theory & Design in the First Machine Age', London: The Architectural Press.

Bauman, Z. (1993) 'Postmodern Ethics', Malden, Oxford, & Victoria: Blackwell Publishing.

Cravinho, J.G., De Sousa, A.N., George, E. and Pelissier, R. (2011) 'Mozambique', in Europa Europa Regional Surveys of the World: Africa South of the Sahara, 40th edition, London and New York: Routledge.

- Cuperus, Y., (2001) 'An Introduction to Open Building', accessed via Google Scholar, 12 May 2011, 23h28
- Curl, J.S. (1999) 'Oxford Dictionary of Architecture', Oxford: Oxford University Press.
- Currency Converter, [online] <http://www.exchangerate.com/currency-converter.html> [13 Oct 2011, 23h48]
- Dewar, d., and Watson, V. (1990) 'Urban Markets: Developing Informal Retailing', London and New York: Routledge.
- Dobson, R. and Skinner, C. (2009a) 'Designing for and with Street Trade: The Case of Warwick Junction', Digest of South African Architecture, vol. 14, pp. 082 - 085.
- Dobson, R. and Skinner, C. (2009b) 'Working in Warwick', Durban: School of Development Studies, University of Kwazulu Natal.
- Folkers, A. (2010) 'Modern Architecture in Africa', Sun Architecture.
- Forjaz, J. (2004) 'n Between Adobe and Stainless Steel', [Online], Available: <http://www.joseforjazarquitectos.com/textos/between.html> [13 Mar 2011].
- Frampton, K. (1980) 'A Critical History of Modern Architecture', London: Thames & Hudson Ltd.
- Gantner, G. (2009) 'The Urban Market: Social Configurations in the African City', in African Perspectives: The African Inner City: [Re]sourced.
- Glaeser, L. (s.a.) 'Global Architecture: Ludwig Mies van der Rohe: Farnsworth House, Plano, Illinois'. 1945-50, Tokyo: A.D.A Edita.
- Habraken, N.J., (1972) 'Supports an Alternative to Mass Housing', London
- Hamdi, N. (2004) 'Small Change: The art of Practice and the Limits of City Planning', London: Earthscan.

- Holm, D. and Viljoen, R. (1996) 'Primer for Energy Conscious Design', Pretora: Department of Minerals and Energy.
- International Council on Monuments and Sites (ICOMOS) (1999) 'The Burra Charter: The Australia ICOMOS charter for the conservation of places of cultural significance', accessd via ICOMOS website [13 Mar 2011, 22h18]
- Kendall, S. (1999) 'Open Building: An Approach to Sustainable Architecture', Journal of Urban Technology, vol. 6, no. 3, pp. 1-16.
- Le Grange, L. (2009) 'The Work of Jose Forjas Arquitectos: Maputo, Mozambique', Architecture South Africa, July / August, pp. 10-17.
- Lefavre, L. and Tzonis, A. (2003) Critical Regionalism: Architecture and Identity in a Globalized World, Munich: Prestel.
- Mapas De Mocambique, [Online], Available: http://www.xirico.com/c_htm/tri/mapas.php [10 Apr 2011].
- Musinguzi, B. (2009) Kampala market fire raises burning questions. *The East African: Business* [online], Posted 27 Feb 2009 at 20:06
- Norberg-Schulz, C. (1979) Genus Loci: Towards a Phenomonology of Architecture, London: Academy Editions.
- Porter, T. (2005) Archispeak: An Illustrated Guide to Architectural Terms, London & New York: Spon Press: Taylor & Francis Group.
- Republic of Mozambique National Institute for Disaster Management (INGC) (2009) Study on the Impact of Climate Change on Disaster Risk in Mozambique: Synthesis Report, Maputo: INGC.
- Skinner, C. (2009) 'Challenging city imaginaries: Street traders' struggles in Warwick Junction', Agenda, vol. 23, May, pp. 81, 101-109.

Skinner, C. and Valodia, I. (2003) 'Local Government Support for Women in the Informal Economy in Durban, South Africa', *International Journal of Politics, Culture and Society*, vol. 16, no. 3, Spring, pp. 431 - 444.

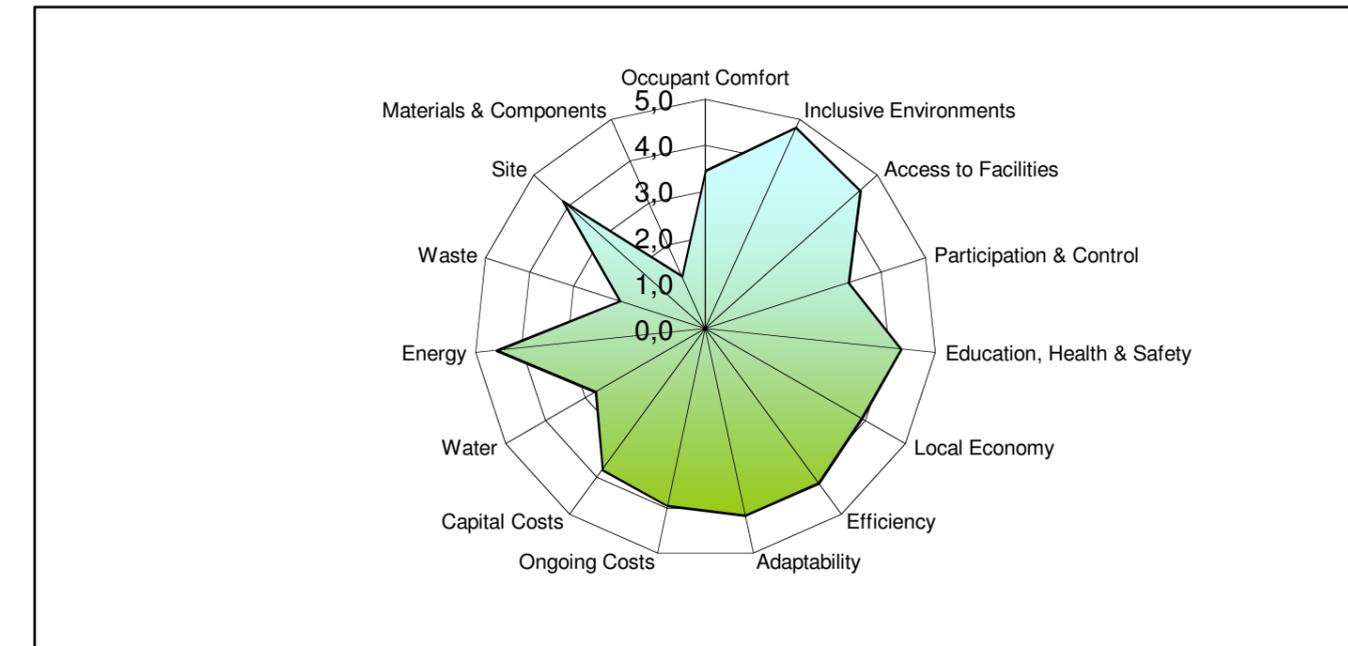
Unknown (s.a) CBD Durban with special emphasis on Warwick Junction. accessed via Google Scholar, 12 May 2011, 23h28

Unknown (s.a.) Participatory Process: Intuitive Proces(es) Towards Responsive Urban Architecture, *Architecture South Africa*, pp. 20 -24.

Appendix 1: SBAT Rating

SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

PROJECT		ASSESSMENT	
Project title:	Finding the Maputo Central Market: Seeing the Informal Economy in Formal Architecture		
Location:	Maputo, Mozambique	Undertaken by:	Byron Snow
Building type (specify):	Commercial	Company / organisation:	University of Pretoria
Internal area (m2):		Telephone:	Fax:
Number of users:	17000	Email:	
Building life cycle stage (specify):	Design	Date:	Oct-11



Social	4.1	Economic	4.0	Environmental	2.9
Overall		3.7			

Building Performance - Social

Criteria	Indicative performance measure	Measured	Points	Quantified modelled or measured performance data
SO 1 Occupant Comfort	Explanatory notes		3.5	http://greenbuilding.ca/
SO 1.1 Daylighting	% of occupied spaces that are within distance 2H from window, where H is the height of the window or where there is good daylight from skylights	100	1.0	all spaces
SO 1.2 Ventilation	% of occupied spaces have equivalent of opening window area equivalent to 10% of floor area or adequate mechanical system, with upolluted air source	95	1.0	all except bathrooms
SO 1.3 Noise	% of occupied spaces where external/internal/reverberation noise does not impinge on normal conversation (50dbA)	5	0.1	only bathrooms surrounded by sufficient mass
SO 1.5 Thermal comfort	Tempreture of occupied space does not exceed 28 or go below 19oC for less than 5 days per year (100%)	50	0.5	on warmest most humid days temperature could get high but spaces are shaded, and naturally ventilated
SO 1.5 Views	% of occupied space that is 6m from an external window (not a skylight) with a view	95	1.0	
SO 2 Inclusive Environment	Explanatory notes		4.8	
SO 2.1 Public Transport	% of building (s) within 400m of disabled accessible (20%) and affordable (80%) public transport	100	1.0	chappa/mini-bus rank 1 block away, currently used by disabled
SO 2.2 Information	Comprehensive signage provided (50%), Signage high contrast, clear print signage in appropriate locations and language(s) / use of understandable symbols / manned reception at all entrances (50%)	100	1.0	all vendors act as receptionists
SO 2.3 Space	% of occupied spaces that are accessible to ambulant disabled / wheelchair users	100	1.0	all spaces
SO 2.4 Toilets	% of occupied space with fully accessible toilets within 50m along easily accessible route	80	0.8	all
SO 2.5 Fittings & Furniture	% of commonly used furniture and fittings (reception desk, kitchenette, auditorium) fully accessible	100	1.0	all
SO 3 Access to Facilities	Explanatory notes		4.5	
SO 3.1 Children	All users can walk (100%) / use public transport (50%) to get to their childrens' schools and creches	50	0.5	single route to destinations because of Baixa being transport hub
SO 3.2 Banking	All users can walk (100%) / use public transport (50%) to get to banking facilities	100	1.0	adjacent to bank
SO 3.3 Retail	All users can walk (100%) / use public transport (50%) to get to food retail	100	1.0	food sold on site
SO 3.4 Communication	All users can walk (100%) / use public transport (50%) to get to communication facilities (post/telephone/internet)	100	1.0	all available in Baixa
SO 3.5 Exercise	All users can walk (100%) / use public transport (50%) to get to recreation/exercise facilities	100	1.0	Praca do 25 Setembro Trim Park accessible
SO 4 Participation & Contro	Explanatory notes		3.3	
SO 4.1 Environmental control	% of occupied space able to control their thermal environment (adjacent to openable windows/thermal controls)	25	0.3	each stall is under the controll of the owner
SO 4.2 Lighting control	% of occupied space able to control their light (adjacent to controllable blinds etc/local lighting control)	0	0.0	lighting is automated on a solar system
SO 4.3 Social spaces	Social informal meeting spaces (parks / staff canteens / cafes) provided locally (within 400m) (100%)	100	1.0	entertainment & eating spaces provided
SO 4.4 Sharing facilities	5% or more of facilities shared with other users / organisations on a weekly basis (100%)	100	1.0	all significant facilities shared
SO 4.5 User group	Users actively involved in the design process (50%) / Active and representative management user group (50%)	100	1.0	open building' design, and vendor organization management
SO 5 Education, Health & S:	Explanatory notes		4.3	
SO 5.1 Education	Two percent or more space/facilities available for education (seminar rooms / reading / libraries) per occupied space (75%). Construction training provided on site (25%)	25	0.3	construction training for vending stands
SO 5.2 Safety	All well used routes in and around building well lit (25%), all routes in and around buildings visually supervised (25%), secure perimeter and access control (50%), No crime (100%)	100	1.0	routes well lit, visually supervised by vendors, night thime perimeter control, dedicated poliecing
SO 5.3 Awareness	% of users who can access information on health & safety issues (ie HIV/AIDS), training and employment opportunities easily (posters/personnel/intranet site)	100	1.0	part of market management
SO 5.4 Materials	All materials/components used have no negative effects on indoor air quality (100%)	100	1.0	no paint or VOC producing materials used.
SO 5.5 Accidents	Process in place for recording all occupational accidents and diseases and addressing these	100	1.0	management of building

Building Performance - Economic

Criteria	Indicative performance measure	Measured	Points	Quantified modelled or measured performance data
EC 1 Local economy	Explanatory notes		3.9	
EC 1.1 Local contractors	% value of the building constructed by local (within 50km) small (employees<20) contractors	40	0.4	market stalls constructed by vendors
EC 1.2 Local materials	% of materials (sand, bricks, blocks, roofing material) sourced from within 50km	65	0.7	materials deliberately sourced locally
EC 1.3 Local components	% of components (windows, doors etc) made locally (in the country)	90	0.9	deliberate use of local materials
EC 1.4 Local furniture/fittings	% of furniture and fittings made locally (in the country)	100	1.0	all furniture & vending stalls made locally
EC 1.5 Maintenance	% of maintenance and repairs by value that can, and are undertaken, by local contractors (within 50km)	95	1.0	low maintainence building, with electric system being the
EC 2 Efficiency	Explanatory notes		4.2	
EC 2.1 Capacity	% capacity of building used on a daily basis (actual number of users / number of users at full capacity*100)	75	0.8	
EC 2.2 Occupancy	% of time building is occupied and used (actual average number of hours used / all potential hours building could be used (24) *100)	41	0.4	occupied 10 hours of the day
EC 2.3 Space per occupant	Space provision per user not more than 10% above national average for building type (100%)	100	1.0	
EC 2.4 Communication	Site/building has access to internet and telephone (100%), telephone only (50%)	100	1.0	Mcell' vendors make this possible
EC 2.5 Material & Components	Building design coordinated with material / component sizes in order to minimise wastage. Walls (50%), Roof and floors (50%)	100	1.0	building on 300mm modular
EC 3 Adaptability	Explanatory notes		4.3	
EC 3.1 Vertical heights	% of spaces that have a floor to ceiling height of 3000mm or more	80	0.8	all except bathrooms, some vending spaces, and some production
EC 3.2 External space	Design facilitates flexible external space use (100%)	100	1.0	adaptable market square and entertainment space
EC 3.3 Internal partition	Non loadbearing internal partitions that can be easily adapted (loose partitioning (100%), studwall (50%), masonary (25%)	50	0.5	market stands
EC 3.4 Modular planning	Building with modular stucture, envelope (fenestration) & services allowing easy internal adaptaptation (100%)	100	1.0	
EC 3.5 Furniture	Modular, limited variety furniture - can be easily configured for different uses (100%)	100	1.0	
EC 4 Ongoing costs	Explanatory notes		4.0	
EC 4.1 Induction	All new users receive induction training on building systems (50%), Detailed building user manual (50%)	0	0.0	
EC 4.2 Consumption & waste	% of users exposed on a monthly basis to building performance figures (water (25%), electricity (25%), waste (25%), accidents (25%)	100	1.0	management to include monthly reports to vendors
EC 4.2 Metering	Easily monitored localised metering system for water (50%) and energy (50%)	100	1.0	individual electricity metering, water vending
EC 4.3 Maintenance & Cleaning	% of building that can be cleaned and maintained easily and safely using simple equipment and local non-hazardous materials	100	1.0	movable furniture in market square allows this, as well as tshova acces to all of the building
SO 4.5 Procurement	% of value of all materials/equipment used in the building on a daily basis supplied by local (within the country) manufacturers	95	1.0	market stands constructed of local timber
EC 5 Capital Costs	Explanatory notes		3.8	
EC 5.1 Local need	Five percent capital cost allocated to address urgent local issues (employment, training etc) during construction process (100%)	100	1.0	preference to local labour and tradesmen
EC 5.2 Procurement	Tender / construction packaged to ensure involvement of small local contractors/manufacturers (100%)	80	0.8	shell built by large corporation, stalls locally
EC 5.3 Building costs	Capital cost not more than fifteen % above national average building costs for the building type (100%)	0	0.0	the national average is VERY low
EC 5.4 Technology	3% or more of capital costs allocated to new sustainable/indigenous technology (100%)	100	1.0	sustainable bathroom ventilation, photovoltaic energy
EC 5.5 Existing Buildings	Existing buildings reused (100%)	100	1.0	Existing market & market square plugged into

Building Performance - Environmental

Criteria	Indicative performance measure	Measured	Points	Quantified modelled or measured performance data
EN 1	Water	<u>Explanatory notes</u>		2.8
EN 1.1	Rainwater	% of water consumed sourced from rainwater harvested on site	75	0.8 approximately, see chapter 7
EN 1.2	Water use	% of equipment (taps, washing machines, urinals showerheads) that are water efficient	100	1.0 all
EN 1.3	Runoff	% of carparking, paths, roads and roofs that have absorbant/semi absorbant/permeable surfaces (grassed/thatched/looselaid paving/ absorbant materials)	0	0.0 water table is approx 1meter below the surface, there is no place for absorbed water to go, hence the existing flooding problem
EN 1.4	Greywater	% of water from washing/relatively clean processes recycled and reused	0	0.0
EN 1.5	Planting	% of planting (other than food gardens) on site with low / appropriate water requirements	100	1.0 indigenous trees
EN 2	Energy	<u>Explanatory notes</u>		4.6
EN 2.1	Location	% of users who walk / cycle / use public transport to commute to the building	95	1.0 majority of users
EN 2.2	Ventilation	% of building ventilation requirements met through natural / passive ventilation	100	1.0
EN 2.3	Heating & Cooling	% of occupied space which relies solely on passive environmental control (no or minimal energy consumption)	100	1.0
EN 2.4	Appliances & fittings	% of appliances / lighting fixtures that are classed as highly energy efficient (ie energy star rating)	85	0.9 all low voltage LED solar lighting, kitchens use regular appliances
EN 2.5	Renewable energy	% of building energy requirements met from renewable sources	75	0.8 lighting, and water pumping
EN 3	Waste	<u>Explanatory notes</u>		2.0
EN 3.1	Toxic waste	% of toxic waste (batteries, ink cartridges, flourescent lamps) recycled	95	1.0 waste seperation at buy-back area
EN 3.2	Organic waste	% of organic waste recycled	0	0.0
EN 3.3	Inorganic waste	% of inorganic waste recycled.	0	0.0
EN 3.4	Sewerage	% of sewerage recycled on site	0	0.0
EN 3.5	Construction waste	% of damaged building materials / waste developed in construction recycled on site	100	1.0 all construction waste sold for re-use
EN 4	Site	<u>Explanatory notes</u>		4.2
EN 4.1	Brownfield site	% of proposed site already disturbed / brownfield (previously developed)	100	1.0 site is parking lot/ street
EN 4.2	Neighbouring buildings	No neighbouring buildings negatively affected (access to sunlight, daylight, ventilation) (100%)	100	1.0
EN 4.3	Vegetation	% of area of area covered in vegetation (include green roofs, internal planting) relative to whole site	26	0.3 vegetable production level & green squares on south west
EN 4.4	Food gardens	Food gardens on site (100%)	100	1.0 vegetable production level
EN 4.5	Landscape inputs	% of landscape that does not require mechanical equipment (ie lawn cutting) and or artificial inputs such as weed killers and pesticides	90	0.9 majority of landscape is paved
EN 5	Materials & Componer	<u>Explanatory notes</u>		1.3
EN 5.1	Embodied energy	Materials with high embodied energy (aluminium,plastics) make up less than 1% of weight of building (100%)	100	1.0
EN 5.2	Material sources	% of materials and components by volume from grown sources (animal/plant)	25	0.3 extensive use of timber
EN 5.3	Ozone depletion	No materials and components used requiring ozone depleting processes (100%)	0	0.0 refrigeration and cold rooms
EN 5.4	Recycled / reuse	% of materials and components (by weight) reused / from recycled sources	0	0.0
EN 5.5	Construction process	Volume / area of site disturbed during construction less than 2X volume/area of new building (100%)	0	0.0