Remodeling the Urban Space
public transportation oriented development in Cape Town South Africa

student: Wei Wang 1343319
mentor: Stephen Read
Alexander Vollebregt
Willem Hermans
Peter de Bois
remodeling the urban space
public transportation oriented development in Cape Town South Africa

by
Wei Wang

Submitted to the Department of Urbanism, Urban Transformations laboratory, Spacelab studio at Delft University of Technology, for fulfillment of the degree of Master of Science in Architecture, Urbanism and Building Sciences (track Urbanism). June 2008

Mentor team:

Stephen Read
(Urban Renewal and Management)

Alexander Vollebregt
(Urban Renewal and Management)

Willem Hermans
(Urban Design)

Peter de Bois
(Urban Compositions)

External committee: Martijn Stellingwerff
Acknowledgements

This thesis is the final result of the my graduation year study of Cape Town in the SpaceLab studio at the Department of Urbanism at Delft University of Technology in the academic 2007/2008. All the achievements I reached which presents in this book are supported by the good cooperation of individual effort and the collective works within Cape Town team.

First of all, I would like to thank to my four mentors: Dr. Stephen Read, Ir. Alexander Vollebregt, Ir. Willem Hermans, Ir. Peter de Bois, for their knowledgeable inputs and critical reflections from different specialistic fields, thank to our External committee Martijn Stellingwerff for the well collaboration and remarks in our presentations.

I also want to show my special appreciation to Anthony Fuchs, Gerhard Bruyns who organize the workshop in Cape Town the exhibition at BK and their help on the process of our graduation schedules.

Last but not least I want to thank to my labmates with whom I spent a brilliant study year, all the discussions presentations the trips which made me learn a lot out of the class. Thanks to Bonnie our driver and Henni who travelled together with us in Cape Town, and kind support from Cape Peninsula University of Technology for the arrangement of the vehicle and study facilities.

To my parents, thank you!

Wei Wang
Contents

Abstract-----------------------------------------------------------------V

Part I City
1. Introduction------------------------3
2. Motivation------------------------8
3. City Profile------------------------9
   -urban frame-----------------------9
   -history--------------------------15
   -demography----------------------21
   -highlighted places---------------31
   -problem field-------------------39
   -conclusion----------------------43

Part II public transportation
1. theoratical background---------46
2. network stop and centre in the
   notion of public transportation--47
3. Features of public transit forms
   using in Cape Town----------------48

Part III existing city model
1. 2D imbalance----------------------55
2. 3D imbalance----------------------58
3. mobility imbalance----------------61

Part IV project

<table>
<thead>
<tr>
<th>Part V reflection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to existing busiest train station</td>
<td>99</td>
</tr>
<tr>
<td>Hypothesis Phlipi Stock Road station</td>
<td>100</td>
</tr>
<tr>
<td>Greneration of new public spaces</td>
<td>102</td>
</tr>
<tr>
<td>Phillipi to be a centre</td>
<td>111</td>
</tr>
<tr>
<td>station development along the north-south corridor</td>
<td>123</td>
</tr>
</tbody>
</table>
Abstract

This graduation project is not to give an answer but to place a number of arguments that a social segregation could be disorganized through a spacial intervention, a reformed public transportation system is able to make remarkable changes for the city in the social and economical context. Due to the existing city network of Cape Town is intentionally schemed for a fragmented urban environment, I attempt to intervene at the infrastructure level-improve the physical condition, project an efficient public transportation system, in order to open up an equal and public urban atmosphere for any ethnicities of the citizens and to discover a practical meaning of public transportation in a population soar-up city.

First of all, apparently an in-depth investigation of the city especially at the structural layer is necessary to perceive the spacial logic of urbanization, i.e. the historical causes, the way of the future transformation, the interaction of the city network and the functional zones. The conclusion is that the network condition engages the allocation of the centralities and shapes the urban body, associated with the traffic condition, the movement pattern and transportation forms represent their power in the process of urban growth and influences the extension of urban frabic.

Secondly the theoretical study and case study on public transportation. It is not a new topic that applying public transportation in a city to address the urban problems. Some hypotheses are put on the table to sign up Cape Town as a new and particular case. Curitiba Brazil, Bogota Colombia, Lagos Nigeria, Stockholm Sweden considering as successful cases which make public traffic as the main principle to orientate the urban development, what kind of insights and inspirations could be gained from their experiences?

Focusing on the structure layer, the existing city model is clear. Collateing on the city map, the problematic areas pop out and wait for a physical solution. However, the shortage of the traf-
fic condition is only part of the causes but still plays a significant role, my job is to dig out the crucial factors in the problem field which a public transport is able to react.

Finally, salves go to the correct sores. The interventions will come up with the problems, I propose a new public transportation system, clarify the urban structure by train/light rail system; create new centres for the Cape Flats inhabitants, shife the power from the west to the east of the city, eventually switch the city model from a mono centrality to a polycentrality.
Part I

city
Cape Town urban fabric
1. Introduction
Cape Town, the third most populous city and the oldest city of South Africa, is located at the southernmost corner of African Continent. Often regarded as one of the world’s most beautiful cities because of its geography, Cape Town is one of the most popular South African destinations for tourism.
The city has several well-known natural features that attract tourists, which concentrates at the cape town peninsula, most notably Table Mountain, which forms a large part of the Table Mountain National Park and is the back end of the City Bowl. Cape Point is recognised as the dramatic headland at the end of the Cape Peninsula. Many tourists also drive along Chapman’s Peak Drive, a narrow road that links Noordhoek with Hout Bay, for the views of the Atlantic.

Cape Town is the economic centre of the Western Cape and serves as the regional manufacturing centre. It also has the primary harbour and airport in the Western Cape. The city has recently enjoyed a booming real estate and construction market, with many people buying summer homes in the city as well as relocating there permanently. The central business district is under an extensive urban renewal programme, with numerous new buildings and renovations taking place under the guidance of the Cape Town Partnership. Cape Town has four major commercial nodes, with Cape Town Central Business District containing the majority of job opportunities and office space. Century City, the Bellville/TygerValley strip and Claremont commercial nodes are well established and contain many offices and corporate
headquarters as well. Most companies headquartered in the city are insurance companies, retail groups, publishers, design houses, fashion designers, shipping companies, petro-chemical companies, architects and advertising agencies. The Western Cape also generates a quarter of the South African agricultural sector’s total gross income and more than half of South Africa’s exports. Much of the produce is handled through the Port of Cape Town or Cape Town International Airport. Most major shipbuilding companies have offices and manufacturing locations in Cape Town.

Strat with port business, it debuted as a Dutch revictualing station for the ships sailing to Eastern Africa, India, and the Far East in 17th century. The harbor which was situated at table bay (the north west inlet of Cape Town metro) impulsed the urbanization straightly along the west-east freight ways connecting north industries and the north-south freeways going along coast lines of cape peninsula to the major white residential areas. In 1910, instead of Boer Republics the British colonialist established the Union of South Africa after they won the Second Boer War (1899-1901). Britain Cape Town became the legislative capital of the Union, and later of the Republic of South Africa.

Figure 6: City of Cape Town Migration Trend per Racial Group, 2001-2025

Source: Centre for Actuarial Research, 2005 (Population projections for the Western Cape 2001 – 2025)
In the 1948 elections, the National Party won on a platform of apartheid (racial segregation), the apartheid reinforced this discipline by banishing the non-white ethnicities to the townships in the Cape Flats. During the apartheid era large housing projects were built here, mostly as part of the Nationalist government’s larger effort to force the so-called Coloured community out of the central and western areas of Cape Town, which the political theorists of the day had designated as whites-only areas. This meant that only whites could reside there permanently, as a result the different worlds are defined: the white the colored and the black. The white predominates the fascinating city territory delightful living and working areas near to the city centre, in the contrast the non-white suffers poverty unemployment disease and gangsterism in the Cape Flats. Housing actually is a big problem for them, due to the increase of immigration and population growth is getting remarkable, plenty of informal settlements emerged in Cape Flats. Nowadays the racial fragmented city faces to globalization economic formalization and other opportunities and challenges.

                      2006:  3,239,768                   2006:  45,5%
                      2010:  3,368,892                   2010:  45,9%

Number of wards :   110

<table>
<thead>
<tr>
<th>Population growth rates (average annual)</th>
<th>City of Cape Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2006</td>
<td>0,02%</td>
</tr>
<tr>
<td>2006-2010</td>
<td>0,01%</td>
</tr>
</tbody>
</table>

Centre for Actual Research, 2005 (Population projections for the Western Cape 2001 – 2025)

<table>
<thead>
<tr>
<th>Socio-economic indicators</th>
<th>Cape Town</th>
<th>W. Cape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate 2004</td>
<td>23,40%</td>
<td>18,6%</td>
</tr>
<tr>
<td>Number of unemployed 2004</td>
<td>275,730</td>
<td>387,000</td>
</tr>
<tr>
<td>Proportion of households with no income (2001)</td>
<td>13,31%</td>
<td>12,06%</td>
</tr>
<tr>
<td>Number of households with no income (2001)</td>
<td>102,062</td>
<td>145,768</td>
</tr>
</tbody>
</table>

Source: Statistics South Africa; Census 2001, LFS 2004
2. motivation of research and analysis

The motivation is to find ways to affect real urban landscapes by strategic means through an understanding of processes of actual urban growth and development, and we are very much concerned with the process of urbanization as the realization of an ‘ordinary’ urban reality on the ground. (SpacerLab 2008) Cape Town whose urban growth and development was significantly impacted by apartheid is still containing ordinary urban components. Based on the research of ordinary factors, we attempt to indicate that ordinary condition is mainly determining and directing the urbanization progress.

Personally I am very interested in people influx in the realm of metropolis, in Cape Town the movement pattern and transportation mode apparently varies by skin color. Actually the people flow represents the urban concurrents, i.e. the centralities (the concentration of functional facilities) the residential and the movement tracks, which formulated the urban structure in spatial economic and social levels.

Cape Town is a particular case as the city formed by colonial authority and the apartheid intents to discard black and colored out of the urban network. What could urbanists do in such a political strategized city? How could I make a new urban frame (what kind of frame it is?) which can reform the spatial mode in order to equalize the development opportunity? What and how can a spatial intervention benefit poor community furthest?
3 City Profile

3.1 urban Frame
Motorway

N1 N2 M4, all start at city centre, radially drive 3 different developing directions in the urban territory. N1 which links Cape Town with Bloemfontein, Johannesburg, Pretoria and Zimbabwe in the national and international level transmits the economic energy to Voortrekker Road—the middle level road paralleling with. With good connection both to the national and local network, Voortrekker leads a linear centrality—passing through the north industrial districts, and was advanced by a passenger train line running neck by neck with which go to the Somerset West and then to Eastern Cape. Bellville as a brief stop on the national rail line holds plenty of economic opportunities in the middle of Voortrekker Road and gradually convinced a status of vivid commercial centre.

N2 is the main coastal highway of South Africa. It runs from Ermelo in Mpumalanga, down towards the south coast through Kwa-Zulu Natal and the Eastern Cape, before terminating in Cape Town in the Western Cape. It incepts at the city centre going southeast down to the False Bay, which intersects the stretch of Voortrekker road (R109) at Somerset West. M7 M10 and R300 crossing N1 and N2 and N7 off from N1 mainly integrate the city to the national framework from south to the north. The sub-roads Klipfontein Road and Lansdowne Road play the similar role in the cape flats with that of Voortrekker road in northern part. While they are the only linkages between Rondebosch Wynbergy and cape flats, and are the most intensive routes for the non-white commuters. M3 M4 M5 going down though Rondebosch Wynbergy continuously to the Cape of Good Hope, additionally they are parallel with Metrorail running long the east coast line which basically serves the white residents and tourists, somehow Rondebosch CBD attracts plenty of non-white shoppers and workers, the weak linkages have never offer them a fair communication.
National roads:
N1 N2 N7

Regional road:
R300 R310 R27

Metropolitan road:
M3 M4 M5
M10 M17

Secondary roads:
Voortrekker Road
Klipfontein Road
Lansdowne Road

3.1 urban Frame
Railway
-Commuter Rail Services
The most valuable asset of the Cape Town metropolitan transport area is its railway system. The system dates from 1862 when the first line was laid between Cape Town and Eesterivier coming with the extension of the Nyanga line to Mitchells Plain and Khayelitsha.
The commuter rail network in the City of Cape Town has 260 km of rail track, 14 rail service routes and 97 stations, which running by 3 directions:

Centre-NE Railway Line
The railway line running from the Centre of Cape Town to the North-East direction, goes from Cape Town to Worcester and further up, and is utilized by Metrorail Western Cape. This line connects different suburbs like Belville to the city centre and neighborhood cities like Paarl. The national rail line go to the north run once a day from Cape Town to Johannesburg.

Centre-SE Railway Line
The railway line running from the Centre of Cape Town to the South-East direction, goes from Cape Town to Strand and is utilized by Metrorail Western Cape. This route connects Strand and Somerset-West to Cape Town, and has a division line running to Khayelitsha.

Centre-South Railway Line
The rail line running from the city centre of Cape Town to Simon’s Town in the South direction, connects the different suburbs and villages in that area. This line is also utilized by Metrorail Western Cape. The line runs along the beach, when going to the direction of Simon’s Town and leaving the city of Cape Town.
The passenger rail network in the City of Cape Town area has 260 km of rail track, 14 rail service routes and 97 stations.

**National train:**
- Cape Town-Johannesburg
- Cape Town-Durban

**Metro train**
- Cape Town-Mitchells Plain
- Cape Town-Khayelitsha
- Cape Town-Strand

**Tourism line:**
- Cape Town-Simon’s Town

Source: [http://www.seat61.com/SouthAfrica.htm](http://www.seat61.com/SouthAfrica.htm)
3.2 urban History

1652: Jan van Riebeeck and his men erected shelters and laid out vegetable gardens and orchards.

1666: Simon van der Stel arrived to govern in the Cape. The beautiful town of Stellenbosch is named after him. Simon van der Stel was the founding father of the Cape wine industry. He was a dynamic commander promoted colonial-style expansion, as per his instructions from the Company.

1862: The first trams in the Cape Colony started running on this line on the Cape Town to Eersterivier section in February.

1864: Wynberg Railway Company's endeavor was to build a line from Cape Town to Wynberg, which was opened in December.
1652: Jan van Riebeeck and his men erected three houses in a small bay they named Table Bay. They called the new settlement Cape Town.

1657: Farms were granted by the Company to a few servants in an attempt to increase productivity.

1666: Work commenced on a fortress, known as the Castle, which replaced the previous wooden fort.

1679: Simon van der Stel arrived to govern in the Cape. The beautiful town of Stellenbosch is named after him. Simon van der Stel was the founding father of the Cape wine industry. He was a dynamic commander promoted colonial-style expansion, as per his instructions from the Company.

1800: Voortrekker Road opened in December. This road was leading to the Maitland area where called Voortrekker Road. This road is leading to places where called Voortrekker Road.

1862: The first railway opened in Simmon's Town. It's route was from Simmon's Town to Wynberg, which was to build a line from Cape Town to Wynberg, which was started. It's route was joined up with Kloof Nek from Sea Point. Toll was collected until about 1900.

1887: Victoria Road to Hout Bay was completed. A toll-house was erected where Victoria Road joined up with N10 road from Sea Point. Toll was collected until about 1900.

1890: Construction of the first of the Table Bay docks, Alfred Dock, was started.

1899: Green Point Common was established as a military camp.

1900: The emancipation of the slaves estimated to be on the region of 39,000. This led to the establishment of Bo-Kaap, a "upper city", by a Muslim community after being freed from slavery. The year also saw the start of a Legislative Council.

1903: Cape Town was declared the legislative capital of the newly-formed Union of South Africa.

1904: The official opening of the Central Electric Station in Dock Road.

1933: Cape Town City Council authorised the use of trolley buses, or trackless trams as they were called.

1935: The reclamation of 480 acres of land on the foreshore was started. This included the expansion of the harbour and the expansion of the central city by some 270 acres.

1966: District Six was declared a "White Group Area". This meant that all buildings except religious ones could be demolished ("slum clearance"). About 130,000 people (mostly Coloureds and Africans) were forced to move to residential areas on the Cape Flats.


1975: Development of Mitchell's Plain started – 40,000 home-ownership dwellings for 20,000 people.

1994: First democratic local government elections were held. Greater Cape Town was then split into six municipalities, with a total of 144 wards within an umbrella Metropolitan Council. The NP was 5 of 6 municipalities.

After the elections hundreds of thousands moved to urban areas in search of work, putting up shacks made of tin, wood and cardboard - for example in Khayelitsha.
built-up areas in 2000
The urban sprawl is directed by the construction of road system. port->wine farm->manufacture->residential
3.3 demographic feature

All the top figs are considering Cape Flats, it is the densest area, the highest criminal area, and the majority there is black.
Ethnicity and Apartheid segregation caused by Apartheid. Black people predominates Cape Flats. In the 1948 elections, the National Party won on a platform of apartheid (racial segregation). This led to the Group Areas Act, which classified all areas according to race. Formerly multi-racial suburbs of Cape Town were either purged of unlawful residents or demolished.

-wikipedia

Source: www.capetown.gov.za/
spatial diversity
living in different worlds
spatial diversity
working in different worlds
spatial diversity
shopping in different worlds
3.4 highlighted places ‘centralities’
- concentration of economical activities
global scale centre

-City Centre
metropolitan scale centres

-Bellville
city scale centres

- Claremont & Wynberg
middle scale centres

-Athlone
local centres

-Mitchells Plain
local centres

-Guguletu Nyanga Philippi
local centres
-Khayelitsha
3.5 problem field
-segregation (residential)
The urban landscape of Cape Town city is characterized by historical reason. Ambitiously the
colonialism planners defined the land use and placed the barriers in order to create a white
prioritized society. Remarkably the different treatments towards the races represents frag-
mented urban agglomerations on the city map. The white ecology and black&colored ecol-
ogy split up in different parts of the city. The white dominates the geographic amenity which
is rich with living condition, and the non-white neighbourhoods are segregated in the Cape
Flats. However, the apartheid reinforced this discipline by banishing the non-white ethnicities
to the townships, as a result the segregation is situated in spatial social and economic levels.

- urban inequality and development imbalance
In evidence, the development diversity appears in the city. The North part along N1 and the
west part along M4 which predominated by white ecology are rich with living and economic
conditions, and in comparison Nothing happened along N2 which crosses Cape Flats. Differ-
ent worlds are defined: City centre and peninsula area which feed touristic interests accom-
modate plenty of shopping malls hotels restaurants hospital and other basic urban facilities.
Bellville Claremont and Wynberg are known as municipal scale CBDs, and the Cape Flats
composed by local CBDs squatters and vacant lands is always referring poverty criminal and
HIV epidemic.

-freeway is not for non-white society
N1 N2 M4, all start at city centre, radially drive the urbanization through 3 directions in the
city territory. M17 M7 and M10 intersect N2 which go down from the north to the Cape Flats
do not contribute to connect the black and colored ethnic zones to the citywide motorway
network but widen the barriers between the dynamic centralities and the underdevelop-
ment areas. Few junctions on N2 connect either to the poor neighborhoods in Cape Flats or
to N1, thus poor communities are not involve in the urban grid, it is hard for them to access
service job and any functional facilities.

-different hierarchies of movement and urban agglomerations
White moves in a global and national scale so that they using the urban spaces on the global and regional level as well, on the other hand the mobility of non-white is far more lower than them, they move in the citywide and local level, namely take the middle scale and local scale spaces.

-inefficient public transport
Public transportation system due to white people are not involved in purely concerns part of the city inhabitants-black and colored. The uncompleted rail network terminates in Khayelitsha and Mitchells Plain, the tracks are lack of maintenance; and the unstable bus routes and poor operation impact negatively on the services. Furthermore low routing coverage and high crime reduce the public belief. Since the authorities failed to carry the passengers to the destinations by will, the dynamic informal sectors emerged to feed the increasing demands. However, the malignant competitions between the informal sectors (i.e. non-licence taxi) cause bus minibus and taxi wars which raise the social insecurity of the whole area.

-informal settlement(passenger pressure in cape flats)
The inhabitant of Khayeliytsha (the biggest black residential area) is more than one million! Since the early 1970s, Cape Town has been experiencing a significant influx of black Africans, Nowadays, an estimated 48,000 people move into the city every year (Weaver 2004), and this influx has contributed to the large number of informal settlements in the city, which current estimates put at 164 settlements. The enormous housing requirement leads to cluster of slums in Cape Flats which threatens the urban perspective and eco-circumstance.

Cape Town is a heaven and is a hell
Cape Town is fragmented
Cape Town is poor-rich polarized
Cape town is racismized

Cape Flats is isolated
Cape Flats is poverty
Cape Flats is unemployed
Cape Flats is criminal

developing imbalance is existing!
unemployment is rising!
low income immigration is rising!
city insecurity is rising!
CONCLUSION
What is Cape Town? structured by three main axes
1 industry business----------------------------------------------N1 Voortrekker
2 nature resort tourism residential-------------------------------M3 M4 M5
3 Cape Flats airport----------------------------------------------N2
desired by the Cape Flats

HEALTH

SOCIAL MIXTURE

FREE&SECURITY

EDUCATION

SOCIAL CARE

FREE&SECURITY

ECONOMIC VITALITY

NEW PUBLIC SPACE

MORE FORMAL HOUSING

NICE LIVING ENVIRONMENT

MORE JOBS

MOBILITY

GOOD TRAFFIC

GOOD INFRASTRUCTURE

I am here to do something!
Part II
public transportation
1. PUBLIC TRANSPORTATION (theoretical background)

- Public transport is for everybody especially for the poor
- Public transport controls mass influx and allocation of the development
- Public transport structures movement pattern and infra-hierarchies
- Public transport is well known as an efficient and environment friendly traffic form
2. network stop and centre in the notion of public transportation

- Public transportation
- Travel stop
- Mobility public spaces
- Speed flexibility cost interchange destination
- Change of traffic condition

- Access mono-functional
- Stop functional diversity
- Centre hierarchical
3. Features of public transit forms using in Cape Town

Trains are fixed line systems which are best suited to carrying large numbers of people rapidly. Their pattern of stopping is, for reasons of efficiency, relatively infrequent.

Buses are road-based, operate best over intermediate distances, carry more passengers than the kombi-taxis but far less than the train, travel slower and stop more frequently. Although capable of changing direction, they operate best over lengthy, relatively uninterrupted, runs. Furthermore, the cost of operation is the same regardless of load. Accordingly, they operate best at peak movement times or under conditions where high capacities are assured.

Taxis are flexible, stop at will, operate best over short haul trips, have a high trip frequency, lower running cost than buses and have a lower carrying capacity - this enables them to operate efficiently in non-peak periods.

-city grid
In the city of Cape Town likewise, the traffic lines radiating out from the city center is waiting for a grid formulation (Fig 14). All the urban fragments especially the areas have been isolated by the freeway system will get a chance to be connected through a either surface or underground public transportation system. In doing this, different ethnicities are able to spend their journeys on same vehicles. After reconstruct the north-south traffic corridors, those transport arteries, both north to south and west to east, are further to be molded as public transport backbone which tackle the major bus routes. In succession the fierce loading stress on the rail will be released.

-diverse bus types integrate the characterized urban agglomerates, Hierarchy of infrastructure layers relating to transportation modes.
The pertinent solutions that different bus types approaching different road section based on the context do suite the recent situation of Cape Town. Currently The chaotic freeway
transport combining unefficient railway transport consist of bus minibus taxi etc. However few roads which link the cape flats to Bellville Claremont and City centre is out of loading capacity, apparently are full of congestions and be aware of increasing insecurity. Additionally feeder lines were blocked by the dwelling zones respectively populated different races. The inner district non-licence bus minibus and taxi are forbidden to board to external areas which are compulsorily implemented as a secrete rule. In this case, the new administration which aim to formalize and integrate the network must on one hand focus on the missing links of the road frame in thinking about the joints and interchanges, on the other hand notice the various circumstances, i.e. roads races, in which the different transportation forms can
be installed. For example, minibus with the character of the flexibility both on stop frequency and route taking and pertinency for the small passenger conglomeration, it actually matches the need of the neighborhoods such as Khayelitsha and Guguletu. The Metrobus system is considerably in favor of handle the similar situations in the municipalitan scale whose fascination have already been demonstrated in Curitiba and Nagoya Japan, Vancouver Canada as well.
Metrobus system which is well employed in Nagoya Japan, Vancouver Canada simply works on road system, while the exclusive bus lanes are not necessary in every part of the road. That means a remarkable cut on the reconstruction budget. Moreover a integrative schedule combining bus minibus taxi system is able to build up a synergy that close the barriers between the separated destinations i.e. the ended up train line in Mitchells Plain and Khayelitsha.
- integration of bus operating sectors

The public sectors and private sectors work together in the case of Curitiba, in Cape Town the crisis of the transportation discipline is integrate the formal semi-formal and informal sectors. It will give rather a liberty in a short term development in a small range, while the duty free taxis could still on use but the zone defences must be removed for a fluent journey. Increasing job opportunities in informal market could drive a capital accumulation, otherwise the private sectors is encouraged by the progress of formalization gradually and is getting ready and happy to set themselves in the formal system in the future.
Part III

existing city model
Existing Model
1. 2D IMBALANCE

According the result of mapping, the large scale and middle scale activities concentrates at the northern and western axes of the city. It is represented on the map that the big shopping malls supermakets and informal retails are mostly along Voortrekker Road and M5 which illustrates where the economy vibrant areas are.
1. 2D IMBALANCE

The two powerful axes consist of infra-power and economic power. Apparently the majority of economic facilities go along Voortrekker Road and M4 M5 which both are featured by the railway paralleling, basically a healthy urban grid (with both good local and global integration) indicates the spatial quality and economic vitality. Contrastly nothing happens along N2.
two powerful axes-global integration

-bad local integration in Cape Flats, lack of transitivity form the large scale grid to the local grid
2. 3D IMBALANCE
hierarchies of
-RACES
-ECONOMICAL FACILITIES
-SPATIAL QUALITY
-MOTORWAY
LAYERS OF MOTORWAY

FACILITIES

shopping mall
supermarket
formal market
formal retail
informal market
informal retail
car services
furniture shops

attorney
bank
industry
hospital
hotel
post office
park
university
3. MOBILITY IMBALANCE
white and tourist-users of ‘private web’
3. MOBILITY IMBALANCE
black and coloured -users of ‘public web’
3. MOBILITY IMBALANCE
private web VS public web, congestion inefficiency and insecurity

problems for the rich class
the city is not free everywhere for the high income class, Cape Flats in one way stops the continuity of south coast line development, the bad traffic condition in Cape Flats is a threaten for the metropolis.

problems for the poor class
illogical traffic concentrations exists on Kipfontein Road, the attraction and the production destinations are isolated at the edge of the network, the functional mixture is lacking and logic traffic interchanges are lacking.
Part IV
project
1 Goals
SHIFT THE MODEL
imbalance->equity
- equalize the development opportunities
- reform the urban structure by public transport strategy
- enhance the transitivity between the layers of networks
- raise transportation related centres
- promote the black&colored mobility
- bring free and safe to both the poor and rich
- break the social and economical barriers
1.1 polycentrality
-bring more job opportunities to the poor and near to their living areas, so that equalize the development in the metropolitan scale
1.2 shift the power from the west and north to the east—Cape Flats
1.3 free the poor
transform time to space

Time usage per employee in daytime

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity A</td>
<td>32%</td>
</tr>
<tr>
<td>Ethnicity B</td>
<td>50%</td>
</tr>
<tr>
<td>Ethnicity C</td>
<td>18%</td>
</tr>
</tbody>
</table>

- **Working**: 8 hours
- **Shopping**: 2 hours
- **Commuting**: 1 hour
- **Rest**: 1 hour

*Space*
2 Concept
shift the model by controlling the movement pattern
use public transportation to reform the movement pattern and remodel the segregated urban space
HOW
-fix the missing linkages
-layer the **public traffic web**
-clarify the hierarchies of the mass transit movement, enhance the connection between different levels of public transportation networks, integrate the different scales of networks, create access for white colored and black to the profitable destinations.
The existing network condition
the rich social class is freely moving on the mobile network by private cars, the poor only could stay at
the local layer of the network, whose movement relies on public transit. The current bad public transit condition limited their movement, and it is far away from their living areas—the townships to the city centre, whilst it is very difficult to reach the upper networks.
Project a public transit network to clarify the mass movement hierarchies and integrate the urban grid
- railway frame for **the large scale movement**
- metro train
- The rail line is able to bring the poor from middle scale and the local to the large scale movement.
-connect bus (BRT)

combine the **middle scale** and large scale movement

- The rapid bus lines and feeder lines can deliver people to the train station and carry them from the station to the final destinations, the train&bus station plays a role as a traffic hub.

The car users are frequently using the middle scale grid as well, the optimised traffic web provides new condition that different social groups are able to meet.
‘hybrid system’
- Access bus and minibus combine the **local scale** middle scale and large scale networks to a three-dimensional web.

-The combination of train network and freeway network provides a new condition that the people can freely move and switch between the different levels networks, so that the public activities will take place at the interchanges, new economic chances and public space is going to emerge, different social groups could all take advantages at the station and the vicinities.
station development
station development
- enhance the special meaning of middle scale grid in the public network
- train lines have their stations at the middle scale grid
- the main bus routes are running at middle scale grid
- the stations (bus/train) generate new traffic and economic centres at the middle scale grid
Equalize the development opportunity
Mix the social economical groups

3 scheme

fix the network
Bellville-Phillippi
Atlantise-City Centre
Khayelitsha-Kuils River
new roads across airport
Khayelitsha-Kuils River
Wynberg-Phillippi
new roads from M5-Klipfontein
new roads across agriculture

clarify the traffic hierarchies
integrate the network
Rail network
motorway network
reinforce the North-South motorway/railway connection
enhance the middle scale grid
large scale grid
middle scale grid
local scale grid

change the movement pattern
Public Transportation system
involve white to public transit
improve non-white mobility

polycentrality
new developing corridors
provide more job opportunity
provide more investment opportunity
4 interventions
New public transportation system
1 phasing

- Khayelitsha-Kuilsriver-Bellville
- Phillipi-Wynberg
- loop MRT
- Cape Town-Atlantise
- Phillipi-Bellville rail
- relocate airport
- relocate Nyanga Bus Terminal
2.1 Phase 1 (2010-2020)
Khayelitsha-Kuilsriver-
Bellville
commuting and business route

Aim
Create a direct access to
Bellville (the secondary centrality in Cape Town) for the
Cape Flats (especially Khayelitsha) commuters, Bellville
provides majority of jobs and business chances to the
people, and approximately one quarter of city population
lives in Khayelitsha, and more than half of the employees are using train there.
The new train line is to solve the urgent traffic problem - the massive commuting
demands between these two destinations.

FACTS: 1.2 million people live in Khayelitsha and 3 million is anticipated by the year 2030 which is more than 1/3 of the city population. Currently 45.8% of the employees are taking train to the work.

Khayelitsha
Bellville

- system length: 10.8 km
- speed: 50 kph
- frequency: 10 minutes
- number of stops: 6
- format: metro train, intercity train
the urban nodes connected
2.2 Phase 2 (2015-2025)
Philippi to Wynberg

Commuting and tourism route

Aim
give direct access from Philippi to Wynberg in order to facilitate the trip from Khayelitsha Mitchells Plain to Wynberg (city scale centre), integrate diverse urban nodes: white coloured and black residential districts, park, urban agriculture and industry zones. The new connection from tourism sector to residential sector. The new line will raise the investment fascination of that area, whilst bring more job opportunities to Cape Flats inhabitants.

**Parametre**
- system length: 8.5km
- speed: 40kph
- frequency: 10 minutes
- number of stops: 5
- format: metro train

[Map of Philippi to Wynberg route]
2.3 Phase 3 (2025-2035)
MRT loop integration & equalization route

Aim
Equalize the developing opportunities, involve Cape Flats to the Metropolitan strategy.

Parameter
- System length: 56km
- Speed: 70kph
- Frequency: 15 minutes
- Number of stops: 23
- Format: MRT
the urban nodes connected
2.4 phase 4 (2030-2040)
relocate the airport
create Mitchells Plain -Phillipi-Bellville corridor
commercial & traffic route

Aim
Mitchells Plain which plays a role as a local centre actually is mostly formalized area in Cape Flats. The economic power from Bellville will go through Mitchells Plain and continuously reach the coastline development in the future.
A new traffic hub is proposed at Philippi (Stock Road station), as the new network condition will be created and Nyanga Bus Terminal is proposed to move to the site which is close to the new light rail station.
2.5 Phase 5 (2035-?)
Cape Town City-New airport-Atlantise tourism & commuting route

Aim
enhance the train connection from the new airport to the city centre and to the Cape Flats as well. Make the cargo line to a passenger use which could especially benefit the Atlantise commuters get to their jobs. New airport and north coast line development is also considered as a future development.

**parametre**
- system length: 36.8km
- speed: 60kph
- frequency: 15 minutes
- number of stops: 8
- format: rural train
3 updated train map

shift some of the terminals from the existing city centre to the eastern peripheries, the main traffic structures Khayelitsha into the urban frame.
Part V
reflection
The Effets -focus Philippi
test one node-Philippi

1 changes to existing busiest train station  Phlippi Stock Road station
-new condition on the large scale movement

BEFORE

Philippi station, a current busiest train station, located at the middle section of the separated train line—the singular railroad from Cape Flats to the Cape Town City, it is circled by the heavy bus routes and is at the central area of heavy bus-line grid. The broken public traffic network doesn't make the commuters take advantages from this importance, and there's no clarification of the hierarchies of the bus service.

AFTER

MRT loop turns Philippi from a local boarding centre to one of the important traffic node in the metropolitan scale, a train intersection is taken place, alternative routes and different traffic formats are provided for the metropolitan city and local movement to the same destinations as well to the different destinations.
The public and private web are bad integrated in Cape Flats, although it is close to N2 from which it is still hard to access the local grid. However the bus traffic is very intensive, who is circuitously running through the local grid and middle scale grid.

2 Hypothesis Phlippi Stock Road station
-network condition
The ‘private path’ enters to the middle grid as the new access going through the field of airport is projected, whilst public network is able to be enhanced through two directions-W-E and N-S, both the current local grid users and private traffic users can participate in the middle scale grid-share the public spaces.
3 Generation of new public spaces

A public space or a public place is a place where anyone has a right to be without being excluded because of economic or social conditions, although this may not always be the case in practice. -Wikipedia

infra space  business&ministry  market&green
3 Hypothesis Phlippi Stock Road station
-traffic condition
3 Hypothesis Phlippi Stock Road station
-traffic condition

AFTER

legends
- existing railroad
- train station
- proposed light rail
- new motorway
- MRT line
- new train station
- new light rail station
- bus station
- new bus station
- infra public space
- bus terminus
- new bus terminus
3 Hypothesis Phlipi Stock Road station
-infra public space

NEW PUBLIC SPACE

- existing railroad
- train station
- proposed light rail
- new motorway
- MRT line
- new train station
- new light rail station
- bus station
- new bus station
- infra public space
- bus terminus
- new bus terminus
3 Hypothesis Phlippi Stock Road station
- movement pattern

BEFORE

legends
- railroad
- major bus routes
- major car routes
- proposed light rail
- speed bus line
- new car routes
- commercial public space
3 Hypothesis Phlippi Stock Road station
-movement pattern

AFTER
3 Hypothesis Phlippi Stock Road station
-commercial & informal public space

NEW PUBLIC SPACE

Legends:
- railroad
- major bus routes
- major car routes
- proposed light rail
- speed bus line
- new car routes
- commercial public space
3 Hypothesis Phlippi Stock Road station

-legograming
3 Hypothesis Phlippi Stock Road station
- public spaces
4 Phillipi to be a centre
-train cross
Successful station patterns in Cape town and Amsterdam Holland

Wynberg
developments take place along M4 in front of the train station, plenty of residence is behind the station.

Bellville
station is close to the highway, infra-space predominates the station vicinity, which consists of parking lots, bus minibus ranks.

Amsterdam Sloterdijk
rail intersection combining two levels of train line and metro line, development between highway and rail lines take place at both sides of train station.
Take 1000 m radius from the station to scheme the future development, and to see the possible impacts to this area.
The proposed light rail from Bellville to Mitchells Plain and the existing rail track from Khayelitsha to Cape Town centre will intersect at Philippi Stock Road station, the public traffic condition is dramatically changed in this area.
According to the pre-research about the success station centres, the zoning plan of new Philippi is worked out. The proportion of infra-space commercial space industry and ministry building are approached to reform Philippi to a centre of transportation hub, it is an interchange node on the middle scale grid, where people can switch any forms of transport freely. Car service and large parking lots around the station enhance the relation of public web and private web.
Phillipi perspective 2040
5 station development along the north-south corridor
- subcenters in Cape Flats
-new economic corridors
two powerful axes in Cape Flats
W-E
N-S
-shift the model
-shift the power from the west to the east