CHAPTER 4

DEVELOPING A CYCLING MASTERPLAN

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4.1 Introduction

This chapter explores the main stages of the development of a cycling master plan, key considerations at each stage and experiences from the pilot cities.

4.2 Purpose and process for planning

Transportation problems in cities within developing countries develop as the city quickly expands in size (Kipke, 1991). An increase of 1 million in a city's population means an additional 350 000 to 400 000 public transport trips per day (Levinson, 1998).

Due to land use policies of the apartheid era, South African cities are structurally fragmented and have many zones which lead to social and economic exclusion. This has resulted in long travel times and travel distances for many commuters situated in township areas, due to urban sprawl. Current land-use planning contributes to further urban sprawl since new housing developments are being placed on land which is still on the periphery of the municipal areas and far from urban centres, economic opportunities and transport networks.

4.3 Planning for cycling users in Ethekwini

There is a wide range of skills and speeds between various cyclists, from toddlers to fast commuters. Forcing a fast, skilled and regular cyclist onto a bicycle path that is interrupted at every intersection is to slow a skilled cyclist to such an extent that he or she will choose to ride with mixed traffic instead (Burger, 2006).

When Ethekwini Municipality developed its NMT Network process, they based it on four themes that defined the vision and goals of their NMT policy. These are:

- **Connecting:** Meeting the basic needs of the people by providing access to services; employment; directly or through other forms of transport.
- **Enhancing:** Improving the quality of life, reducing transportation costs, creating safe environments.
- **Growing:** Stimulating regeneration of the cities using tourism and other opportunities supported by NMT.
- **Sustaining:** Ensuring long term sustainability of the city through land-use development and programmes that influence behavioural changes.

The municipality concentrated on meeting the demands of existing NMT users – mainly pedestrians, as well as promoting the use of NMT by new users – skate-boarders and cyclists. This entailed looking at and identifying key nodes within the municipality and linking these with NMT facilities. The intention was to create a network that has connectivity across the municipality with dedicated facilities for the different NMT users.

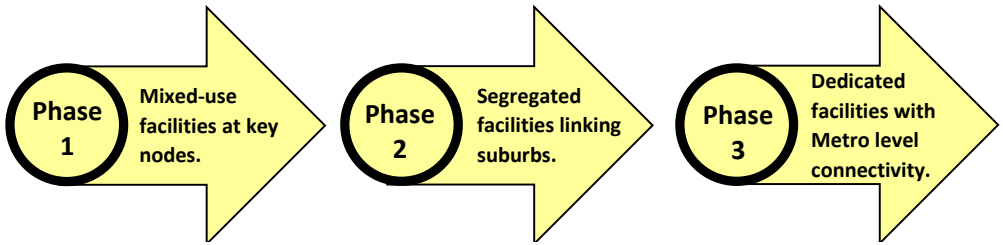

Figure 4.1 Ethekwini NMT Plan phases

4.4 Cycle networks and cycle route planning

Cycle networks require six key elements for good planning purposes, which are shown in Table 4.1

TABLE 4.1 COST CRITERIA GUIDING CYCLE NETWORKS AND CYCLE ROUTE PLANNING

Criteria		Evaluation Indicators
I)	Accessability	The infrastructure must form a continuous network and link all departure points with destinations by ensuring the following: * A consistent network which is continuous; * Complete routes which are part of a whole system; * Proper signage along the routes to raise NMT awareness and * Linkages with public transport corridors.
II)	Directness	The infrastructure must have an ability to offer cyclists direct routes by providing: * Finely meshed cycle networks; * Straight NMT paths and lanes; and * Favourable signalling to have NMT as the priority mode along the routes.
III)	Safety	The road safety of cyclists and other users should be guaranteed by: * Provision of exclusive bicycle lanes; * Applying traffic calming measures where appropriate; * Have advanced stop lines; and * Facilitate the safe crossings of NMT users along the routes.
IV)	Comfort	The infrastructure must provide a smooth surface that has; * A good, flat finish on the surface; * Few stoppages along the route; * Wide NMT lanes; and * Shelter from inclement weather along the route.
V)	Attractiveness	The infrastructure must make cycling and walking more attractive by: * Making routes pass through varied and attractive surroundings; and * Coinciding as little as possible with car corridors.
VI)	Link with public transport	Integrated Public Transport Networks are on the increase in all major cities in South Africa. Cycling is seen as a feeder mode for public transport. Cycling network planning should thus: * Be implemented in a manner that supports public transport; * Supply bicycle parking facilities at train stations: and * Link NMT infrastructure with public transport corridors through strategic roads and routes.

4.5 Developing a Cycling Master Plan

A high-quality cycling network plan does not have to be motor vehicle traffic-free. When motorised traffic speeds are low, it is possible to combine bicycle and motorised traffic particularly. However, as the speed differential between the two modes increases, so does the need for separated networks.

A reasonably healthy and fit commuting cyclist will travel at 15-20 km/h. It is not recommended to mix these cyclists with pedestrians, who walk at 5 km/h. However, in recreational spaces, such as promenades, beachfronts and parks, there should be less cause for aggravation among slower cyclists, children on bicycles and pedestrians.

A Cycling Master Plan is developed by applying the following steps:

4.5.1 DETERMINE ROUTES AND MAP THEM

The present condition of networks needs to be analysed and all desire lines of cyclists need to be determined. These can be determined using field surveys. The information is then plotted into Geographical Information System (GIS) maps. These maps will then show the current user profiles, the demand and the condition of the current networks on which cyclists are travelling.

4.5.2 ANALYSE LAND USES AND MAIN TRIP ATTRACTORS

It is important to determine where people are cycling to and where cycling can be encouraged. Destinations such as schools, offices, buildings, bus stations, hospitals, and access to social amenities are important. This information can then be mapped using origin-destination patterns.

This was the case in the NMT network development of Ethekwini, where the hub of the city, the public transport facilities, the service centres were all plotted on GIS – and the NMT links to and from these nodes plotted based on walking and cycling demand and distances

Figure 4.2 Ethekwini NMT Network, ETA NMT Masterplan, 2013

4.5.3 TRAFFIC ACCIDENTS, PUBLIC TRANSPORT, BARRIERS

Create a map which records traffic accidents, barriers to NMT users (e.g. Railway lines) and motorised transport volumes.

In the case of Ethekwini Municipality, the accident statistics relating to both pedestrian and cyclist accidents were provided during the Pilot project prior to commencement of the project – during the construction of the project, and post the construction of the project (see **Table 4.2**). The purpose being to monitor and evaluate the success of the project in eliminating or reducing NMT related accidents.

TABLE 4.2 ETHEKWINI TRANSPORT AUTHORITY'S PILOT ROUTE NMT ACCIDENT STATISTICS

Location	Pedestrians Accident			Bicycle Accidents		
	2010	2011	2012 (6m)	2010	2011	2012 (6m)
Riverside Road						
Section near Bird park		2 sli				
I/S Riverside/Waterkant						1 no ink
Sub Total	**0**	**2**	**0**	**0**	**0**	**1**
KE Masinga Road						
KE Masinga/OR Tambo				1 sli		
I/S KE Masinga/Sylvester Ntuli		1 sli				
I/S KE Masinga/Florence Nzama	1 ser,1 sli	1 sli	1 sli			
Section – Unisa		1 fatal				
I/S KE Masinga/Stalwart Simelane	1 sli	1 ser/ 1 sli	1 sli			
I/S KE Masinga/Masabalala Yengwa	1 ser,1 sli	3 sli	1 sli		1 sli	
Sub Total	**7**	**8**	**3**	**1**	**1**	**0**

The City of Johannesburg also plotted their accident statistics along their NMT Pilot Route for a few years, for monitoring and evaluation purposes. These revealed hazardous locations (hazlocs) which would need to be reduced with the implementation of various NMT projects around the BRT nodes in Orlando (see **Figure 4.3**).

Figure 4.3 City of Johannesburg Network Development Plan

4.5.4 SELECT ROUTES AND LABEL THEM

In the development of City Johannesburg's Network Development Plan, certain routes would be classed and evaluated according to comfort, attractiveness, security, safety, proximity to public transport and accessibility.

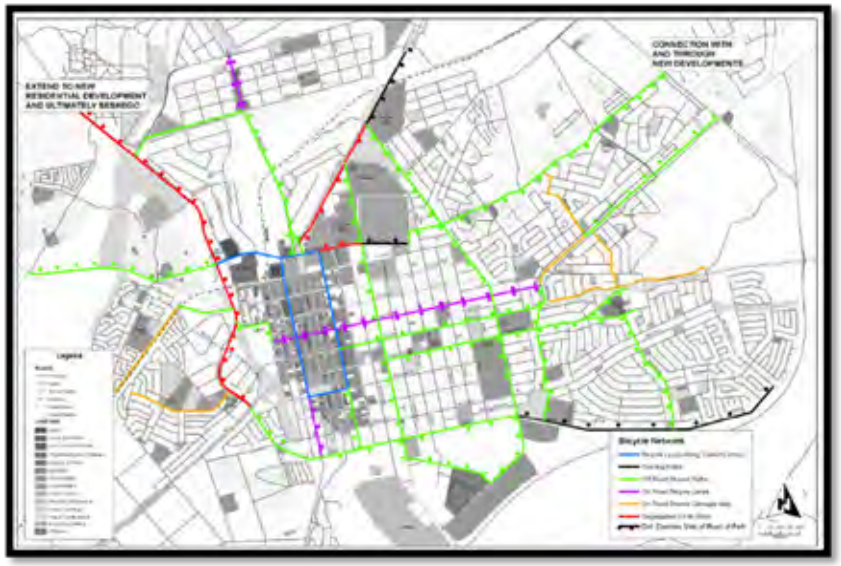

Figure 4.4 City of Polokwane Cycling Network Development Plan

The City of Polokwane developed a cycle network to ensure a legible network with good continuity that connects residential areas with key destination points. Each route was classed based on whether it was off-street and whether it would be shared with pedestrians or not.

4.5.5 LOCATE PROBLEM SPOTS/HAZLOC SITES

The accident statistics and condition analysis is used to locate problem spots which would require further diagnosis. An analysis would be undertaken to determine the most effective and efficient interventions, each of which would be prioritised in terms of urgency.

4.5.6 PREPARE A LIST OF ATTRACTIVE INTERVENTION OPTIONS

The list of options and priorities would be developed and presented to stake holders. After which, sketch designs would be prepared and costed for each intervention based on actual site data.

On the basis of the cost estimates per intervention, the available budget, the design proposals for each intervention and the expected benefits of each intervention, discuss and decide on priorities: the provisional first package for implementation would be determined.

4.5.7 FINAL ROUND OF DISCUSSION AND DECISION MAKING

Clear agreements would need to be included on:

- Work plan for implementation, with clearly defined tasks and persons in charge;
- Delegated authority of those who are to implement the work; and
- Budget and actual availability of funds for type of contract and supervision.

4.6 Integration with public transport

In cities with high bicycle mode share (such as Amsterdam, Copenhagen, Berlin and Bogota), as well as cities with lower mode-share (such as Portland, New York City and cities in the UK), most trains (light rail, metro and suburban rail) permit bicycle travel off-peak. Folding bicycles are permitted at all times.

In New York City, bicycles are permitted on the subways at all times, and rail carriages include instructions regarding bicycle-tie-down procedures.

Presently in South Africa, bicycles are only permitted on-board public transport vehicles if they are foldable and in a bag. With the Integrated Rapid Public Transport Network aiming to integrate public transport and other modes of transport, being able to ride to the station or bus terminal, put a bicycle on the public transport mode and complete the trip on one's bicycle, would make a significant impact on commuter cost and mode integration.

Cities that plan to integrate cycling with public transport should:

- Regard transport interchanges as key destinations and origins;
- Radiate infrastructure from and toward public transport nodes; and
- Provide cycling networks with safe lock-up facilities at public transport inter changes and transfers.

Figure 4.5 One-way streets with bus and cycle lanes running parallel in Münster, Germany.

4.7 Planning bicycle parking sites

Good bicycle parking not only serves the cyclist or potential cyclist, but also contributes to and complements public space, prevents theft and vandalism, and encourages a positive modal split.

Bicycle parking should not be too far from the relevant destination, and the bicycle network. It should be identifiable through clear signage. It's best to install parking in such a way that is accessible to building entrances and streets, but away from pedestrian pathways and vehicles and stairways.

Parking racks should also not obstruct pedestrian movement and other users, nor obstruct the views of vehicles at intersections. Security, lighting and weather protection is essential (Jaxa, 2009).

BICYCLE PARKING AND LOCKERS AS PART OF CAMPUS MOBILITY STRATEGY

The University of Stellenbosch experienced growth in student numbers causing increased traffic and transportation problems on its campuses both in Stellenbosch and in Tygerberg.

In an effort to find a solution to these problems, the University conducted a mobility study, which incorporated pedestrianisation projects, cycle projects, parking projects, shuttle services on campus, public transport services to the campuses; as well as various elements of urban design, such as public transport terminals, bus shelters, cycle racks and lockers, and park-and ride facilities.

This study took place from January 2010 to October 2010, resulting in a 10-year transportation implementation plan for the University based on the concept of pilot services to be extended on an annual basis.

4.8 Developing a bike share system

Bicycle sharing systems, also known as public bike, free bike or city bike schemes or systems, are important sustainable transport interventions, usually aimed at people who do not own bicycles. They are designed to complement public transport. Unlike with most bike rentals, users can pick up a bicycle at one location and drop it off at another location. The systems offer fast and easy access, with no large deposits or documentation. Pricing systems encourage short commuter trips. Often such systems are government subsidised, or funded through advertising revenue.
Bike rental, or bike hire systems, on the other hand, are usually privately owned and for profit, and rent bicycles for a few hours or per day. They're aimed most often at the tourist or leisure market.

Presently, Ethekwini and Johannesburg have commissioned feasibility studies for bike sharing systems in their cities. The recommendations of these studies will determine the best location for a bike share system in the cities, as well as the feasibility/ funding and long term sustainability of such a system.

Figure 4.6 Bike share systems in United Kingdom, Spain and China
Source: Schroeder (2012)

CITIES CONSIDERING BIKE-SHARING SHOULD UNDERSTAND THE FOLLOWING:

- *Why should your city or province invest in and promote such a system?*
- *Who will use and benefit from the system?*
- *What would an ideal system look like?*
- *Where is an ideal coverage area?*
- *What time frame is possible for implementation?*
- *What is the purpose of your system?*

4.9 Key lessons learnt from the pilot cities and other municipalities

- It is imperative to develop a ***whole cycling network master plan*** instead of piecemeal initiatives. This was evident in the three pilot cities, which each had comprehensive cycling master plans for the areas in which they planned to implement the pilot projects. However, a ***cycle network for an entire urban area*** needs to be identified and mapped.

- Identifying and developing a cycling network should ***involve cycling stakeholders.*** Part of their involvement is to ensure that there are suitable options for both experienced and recreational and/or emerging users as well as the development of "cycling tolerance" so that shared-use paths are able to accommodate a variety of users.

- The cycle network ***map should be made available on-line*** (with opportunities for public feedback). This helps to promote the network, and also enables stakeholders to identify gaps and problem locations, and make suggestions for improving the network.

- Ethekwini is looking at ways to subsidise staff members to change the ***travel allowance procedures*** for staff members using cycling as a mode of transport.

4.10 Concluding comments

Bicycle network planning is the basis upon which a good cycling culture can be developed within a city promoting low-cost mobility. Many cities within South Africa lack the know-how on proper bicycling network planning, and this will hamper their efforts in promoting the bicycle as an alternative mode of choice.