

## DEVELOPMENT OF GUIDELINES FOR PUBLIC TRANSPORT FACILITIES WITHIN THE ETHEKWINI MUNICIPAL AREA

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### ABSTRACT

#### 1. INTRODUCTION

This study was undertaken as a supplement to the National Department of Transport's guidelines for the Design of Combi Taxi Facilities, which was published in 1990. Certain components of this guideline document have since become obsolete due to the changing face of public transport within South Africa. The purpose of this paper is to discuss the development of the Guideline Document for the provision of public transport facilities within the eThekweni Municipal Area (EMA).

The growth in public transport demand has resulted in the mini-bus taxi services responding almost instantaneously to this demand, while forcing other public transport services off certain routes. Requests for facilities from the taxi industry, ward councillors and others have increased, with rival taxi associations requesting separate facilities. This has been done without an understanding or appreciation for co-ordinated transport and infrastructure planning within a municipal budgetary process. These uncoordinated requests and demands have placed a strain on the financial resources of the city.

National and international research documents were researched for the study. Pedestrian count information at various taxi ranks within eThekweni was utilised to determine the current demand, as well as statistics from other public transport facilities nationally. Extensive consultation took place between officials from the eThekweni Transport Authority (ETA) and the Consulting team to develop this concise Guideline Document.

This paper further presents the output of the Guideline Document, which has become a useful asset which the ETA officials can utilise to provide high quality public transport facilities along concentrated public transport routes. This will in turn aid in improving access to good quality public transport through the provision of aesthetically pleasing, efficient and high quality public transport facilities.

#### 2. OBJECTIVES OF THE STUDY

The objectives of the study were to:

- Develop a practical approach for the process of designing public transport (PT) facilities;
- Establish an approach towards public transport facility design, which takes into account the requirements of recapitalised vehicles; and
- Focus on the needs of pedestrians as the basic functioning component at public transport stops and interchanges.

#### 3. PUBLIC TRANSPORT STATUS QUO

The eThekweni Municipal Area has four major public transport nodes with a number of other nodes of local significance. These are shown in Figure 1. The major nodes are located at:-

- Isipingo in the south;
- Durban CBD;
- Bridge City to the north; and
- Pinetown to the west.

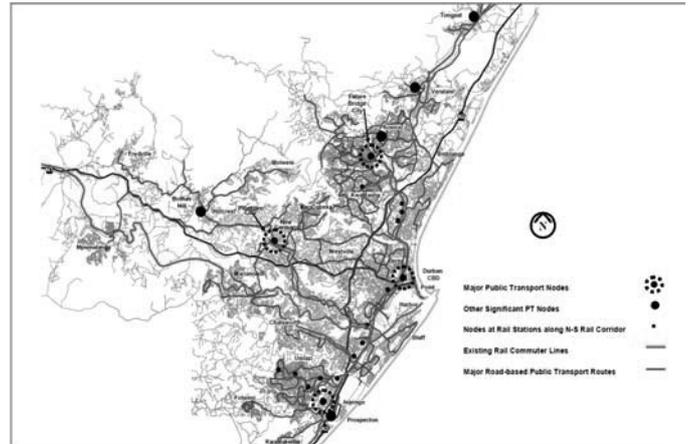
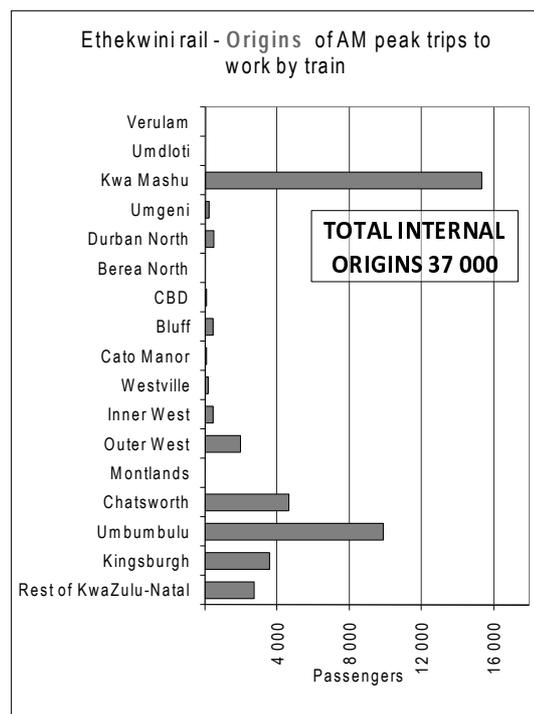


Figure 1: Existing Public Transport Nodes and Services

According to the National Household Travel Survey in 2003, for eThekweni, the 870 000 households generate 0.9 trips to work per household per day. Of these, 0.5 are made by public transport. The highest proportion of public transport trips is made in the lower income settlements such as Inanda Rural, Chatsworth, Umbumbulu (Umlazi), Outer West, Verulam and KwaMashu – where the employment rates are lower than elsewhere within eThekweni.

The demand for road-based public transport services for trips to work is 430 000 trips per day. The combined total of trips by public transport amounts to around 1.4 million daily trips by road-based public transport (this includes return trips and educational trips).

Figure 2 shows the origins of work trips by rail and road-based public transport within eThekweni. Train service demand is predominantly from KwaMashu in the north and Umlazi in the south. The greatest demand for road-based services and rail services is in Umlazi, Inanda Rural, Inner West, Verulam, Chatsworth and KwaMashu. Throughout, road-based services have a greater share of the public transport market than rail.



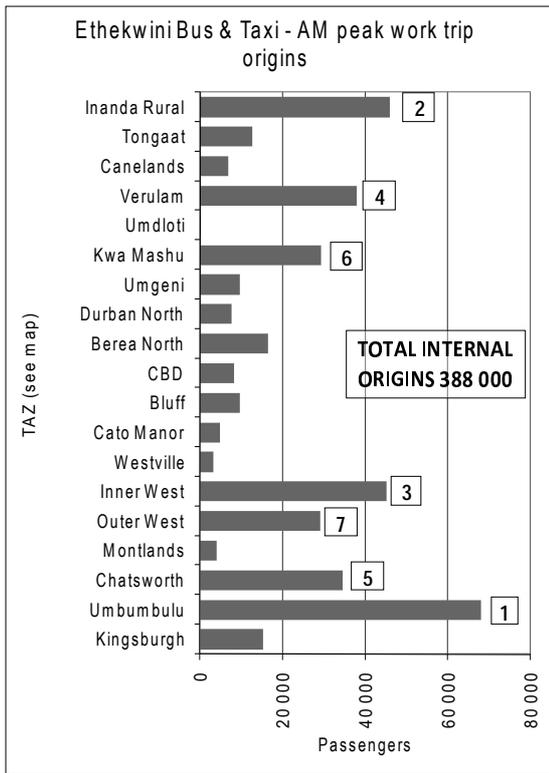


Figure 2: Public transport origins and destinations of formal employment 1

#### 4. LEGAL AND INSTITUTIONAL FRAMEWORK

##### 4.1 White Paper on National Transport Policy

The mini-bus taxi plays a vital role as an urban transport mode within South Africa. The availability of high quality public transport facilities on public transport routes to aid the growing requirements of users is essential.

*"The adequacy or inadequacy of transport infrastructure can have a significant enhancing or inhibiting effect on social and economic development."*

The above statement is an extract from the White Paper on National Transport Policy (1996) that highlights the importance of transport infrastructure in social and economic growth. All public transport facilities within the eThekweni Municipality should be developed with this vision in mind. This can be achieved by obtaining a balance between the needs of the user or customers of public transport and that of the legitimate public transport operators. The location and development of facilities would thus require careful consideration.

The eThekweni Transport Authority's Integrated Transport Plan (Update 2010-2015) and the KwaZulu-Natal Department of Transport's mission are aligned to the White Paper, and all strive for public transport that is safe, reliable, effective, efficient, accessible, affordable, integrated and needs driven.

##### 4.2 Current Challenges

Currently the city provides taxi and other modal facilities to meet the customer and public transport operator needs. There are existing facilities throughout the city including residential, commercial and industrial zones. Some of the facilities are formal and there are some that are informal. Due to the high demand for public transport, the mini-bus taxi services have grown in leaps and bounds by responding almost instantaneously to the demand and also by forcing other public transport services off certain routes. The demand for taxi facilities has increased through

requests received from the taxi industry, Ward Councillors and others. This is done without an understanding or appreciation for coordinated transport and infrastructure planning, and the prioritisation within a municipal budgetary process. These uncoordinated requests and demands place a strain on the resources of the city and negate any planning integrity to development. A clear policy is thus required for the city, which highlights the process of planning, to determine the need for facilities and which would guide and direct the ETA while highlighting the process to the public.

##### 4.3 Customer Needs

- To improve the quality of public transport and reduce travel times within the city;
- To have ranking bays that accommodate all sizes of taxi vehicles;
- Safety as a priority concern including safe pedestrian access, safe queuing, boarding and alighting infrastructure at public transport facilities;
- To address compliance to design standards that promote universal accessibility;
- Sufficient holding areas;
- Adequate geometric designs for the manoeuvrability of vehicles and pedestrians within and through the facilities; and
- Design standards for alleviating any potential for congestion within the public transport facilities.

##### 4.4 Policy Framework

The policy framework has taken the current challenges of existing public transport facilities into consideration and investigates ways for these facilities to be improved. The key issues that have been identified and that needs to be addressed at decision making level, are; the customer's needs, planning, and how public transport relates to land use.

Another important element is to have high quality public transport facilities that are both aesthetically pleasing and have a uniform look and feel across the various locations. This will ensure that the nodes become a part of the existing environment and will be easily identified by the public.

It is important to make an effort to align existing and new public transport facilities with these policy guidelines. Ultimately, the objective is to have public transport facilities within eThekweni that addresses the growing needs of the users of public transport in eThekweni effectively.

#### 5. DEFINITIONS OF PUBLIC TRANSPORT FACILITIES

##### 5.1 Public Transport Interchanges and their influence on Urban Structure

Public transport hubs or interchanges are places where passengers are exchanged between vehicles or between different transport modes. Interchanges are thus vibrant urban nodes with important elements of place making. It causes flows of people and traffic and typically comprises activities that could both be an attraction or a repellent. As a general principle, the public transport facilities should always be located in places of high accessibility and make provision for informal trading at the same time. The interchanges must also improve the general environmental quality and sense of place, and ultimately lead to a sense of well-being and dignity for those who make use of them.

##### 5.2 Public Transport Interchanges and their influence on Urban Structure

Four dimensions of hierarchy have been defined for public transport interchanges. These are:

- **Hierarchy of mode** - Movement involves a variety of modes including pedestrian, bicycle, mini/midi-bus taxi, bus and train. These can occur in

different combinations.

- **Hierarchy of size** - the more modes that are involved in an interchange, the greater the capacity and the greater the propensity to attract other activities. These are mainly based on the location and land use surrounding the site.
- **Hierarchy of function** - Public facilities serve different purposes and therefore the location of a public facility will depend on the specific function that it performs. One needs to evaluate what purpose and function the facility will serve and then decide on the best location thereof.
- **Hierarchy of location** - High order public facilities should be located in dominant positions in terms of space and movement systems e.g. along activity streets where there are high enough thresholds to support them. This will also ensure that people gain direct and easy access to these facilities.

### 5.3 Defining Public Transport Facilities

The following on- and off-street public transport facility types are defined. The facilities are defined in terms of levels to illustrate the magnitude of the facility. They range from major facilities at Level 1 to smaller facilities at Level 4:

#### 5.3.1 Public Transport Stop – Kerbside and Median Stop (Level 4b)

Kerbside stops are the most common, simplest and convenient form of public transport stops. Due to its simple design, kerbside stops are easy and inexpensive to install, easy to relocate, and provide easy access for bus/mini-bus drivers causing minimal delays to these vehicles.

Median stops are located in the centre of a roadway for exclusive use by public transport vehicles. These utilise exclusive public transport lanes located on the median. This is most notable in IRPTN designs around South Africa.

#### 5.3.2 Public Transport Embayment (Level 4a)

Public transport bays are designed to allow public transport vehicles to pick up and discharge passengers in an area outside of the traffic lane. The greater the distance that is placed between waiting passengers and the traffic lane, the greater the increase in safety. Public transport bays are encouraged on roadways with high operating speeds, along existing and future transportation corridors that require minimal supporting facilities. No ranking is to take place at public transport bays.

#### 5.3.3 Minor public transport rank (Level 3)

These facilities are located within a road reserve at which mini/midi-bus taxis and buses are allowed to wait and/or stop for passengers boarding or alighting. These facilities are normally the origin point for most passengers and are functional primarily in the peak periods.

#### 5.3.4 Major public transport rank/Terminal facility and/or Holding facility (Level 2)

A location at a common end of one or more routes, where mini or midi-bus taxis and buses can wait for passengers, who can transfer, alight or board efficiently. Terminal facilities should be centrally located so as to be conveniently accessible on foot to residential, commercial and industrial users.

#### 5.3.5 Multi-modal facility (level 1)

Multi-modal facilities are located at or within major destinations and cater for a wide variety of public transport modes such as buses, taxis, rail and pedestrians. These are always located off-street. The land requirement for multi-modal facilities is determined by the number of routes served, the frequency of the service, the volume of waiting passengers and layout factors which affect the design of the facility.

## 6. WARRANTS FOR PUBLIC TRANSPORT FACILITY PROVISION

Public transport facility project requests often arise due to a conceived opportunity (e.g. new developments) or a perceived problem (e.g. significant delays caused by public transport vehicles stopping in unmarked places along a busy corridor).

A combination of quantitative and qualitative measures were utilised to assess the need for public transport facilities in an effort to guide the planning efforts of the ETA. However that being said, it was imperative that the application thereof be sensitive to the context of the area and the general policy position that the guideline document undertook.

The quantitative warrants for public transport facilities have further been separated into primary warrants and secondary warrants. The primary warrants are applicable where the passenger demand per day is greater than 500, or the peak hour demand is more than 100 passengers per hour. The secondary warrants are applicable in cases where the passenger demand is less than 500 passengers per day or 100 passengers per hour.

### 6.1 Primary Warrants Based on Passenger Demand

Determining the need (demand) for public transport facilities requires an integrated approach from all role players. Passenger numbers are seen as a critical element in allocating possible public transport facilities along a certain route. The exact demand for a public transport facility must be determined and depending on the extent thereof, it must be utilised to warrant facilities.

### 6.2 Secondary Warrants Based on Low Passenger Demand

Where the passenger demand per day is less than 500, the use of a qualitative measures analysis tool was proposed, that makes it possible to justify and prioritise facilities. The tool consists of the following elements:

- **Environmental Criteria**

Environmental criteria can be divided into physical and social. This addresses the extent of the impact of the implementation of the project on its natural environment as well as the degree of favourability of all sectors of society towards the project;

- **Improvement of Equity**

The degree to which the project will improve equity in the area by improving access to good quality public transport for the poorer sectors of the population, will determine whether the facility is warranted or not;

- **Traffic Delays and Conflicts**

Where there is evidence of delays caused by the illegal stopping activities of public transport vehicles and the adverse effects on the functioning of other modes of transport in the corridor, public transport facilities could be warranted if the introduction of these could alleviate congestion and ease delays; and

- **Pedestrian Safety Issues**

Where there are many known cases of safety issues related to non-motorised public transport users due to a lack of proper public transport facilities, this should warrant provision of public transport facilities.

If a facility is warranted in terms of said four qualitative measures, then the ETA would have to find sufficient road reserve width or land to accommodate these facilities.

### 6.3 Prioritisation process after the warrant process

After the qualitative and quantitative measures set out have been applied to potential projects, a prioritisation process can begin. A balance needs to be maintained between maintenance and development needs, having due regard for the best possible solution within an environment of limited funding and massive backlogs.

The priority focus would be on facilities with the greatest demand of passengers; followed by informal facilities with no amenities; followed

by public transport stops and bays, then on facilities that process less than 500 passengers per day or less than 100 passengers per peak hour, but are warranted due to qualitative factors as contained in the guideline document.

**7 DESIGN GUIDELINES FOR ON AND OFF-STREET FACILITIES**

**7.1 Aim of public transport facility designs**

All public transport facilities should provide for seamless and efficient movement of passengers. This includes special needs passengers, elderly people and young children. Very high concentrations of pedestrians are often found in the vicinity of public transport facilities such as railway stations, bus termini and mini-bus ranks. Such concentrations typically occur in the early morning and late afternoon peak periods. Many accidents also occur at these locations due to factors such as pedestrians running across the road to catch a bus or train.

**7.2 On-street facilities**

Public Transport stop locations must be selected to meet the needs of passengers and maximise passenger convenience. The spacing, location, design and operation of public transport stops must significantly influence transportation system performance and the satisfaction of the customer. The preferred public transport stop locations must also satisfy the conceptual transport of walkable communities and result in increased passenger convenience and comfort. The on-street facilities should furthermore be placed in such a manner that they minimise traffic conflicts and do not create hazardous conditions at intersections or driveways.

**7.3 Off-street facilities**

A well designed interchange should provide clear routes between services or modes, which minimise the time and effort involving in making a transfer. Wherever possible, transfer should be equally convenient in both directions. Obstruction of pedestrian routes can cause delays and lead to congestion. The design of new interchanges should therefore seek to ensure that, as far as possible, pedestrian routes are kept clear of structural elements such as pillars. Public transport facilities will not be used if they are located far from destinations. There are many examples of termini and ranks in South Africa that are either not used or that are under-utilised. Such facilities serve no purpose and are detrimental to the image of public transport in the country.

**7.4 Pedestrian and cyclist facilities**

Planning for pedestrians within the interchange itself should incorporate the principle of maintaining a separation between passengers and vehicles, as well as separating arriving and departing passengers to minimise interference. The public access routes within the interchange should be clearly defined and all pedestrian movements should be focused and have clearly defined crossing points, constructed to minimise pedestrian and vehicle conflict.

Facilities for cyclists should be accommodated at modal interchanges as for some passengers, cycling is seen as a feeder for public transport. Interchanges should:

- Supply parking facilities at train stations; and
- Link Non-Motorised-Transport (NMT) infrastructure with public transport corridors through strategic nodes and routes.

**8. OPERATING PROCEDURES**

Determining the need (demand) for public transport facilities requires an integrated approach from all role players. Passenger numbers are seen as a critical element in allocating possible public transport facilities along a certain route. The following process as shown in Fig.3 has been outlined to determine the demand to support such facilities, when

a request has been received by the ETA through ward councilors; an IDP stakeholder process; private developers; taxi organisations; and community representatives.

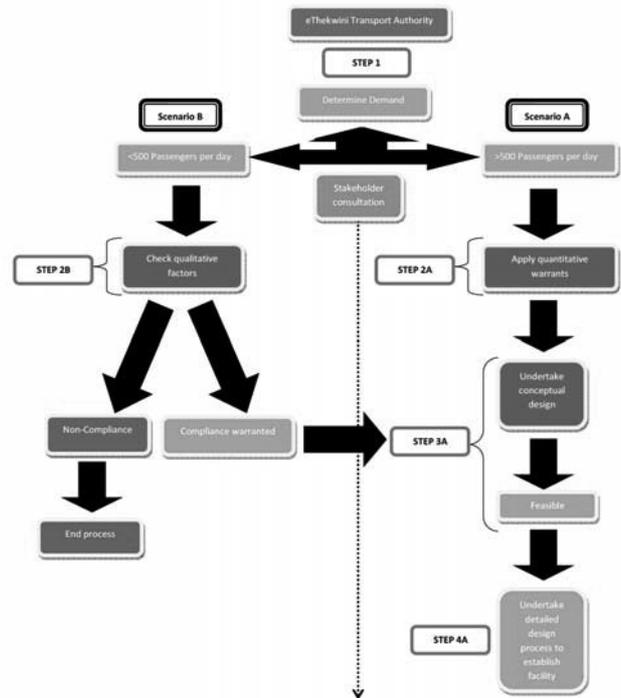


Figure 3: Public transport process

**9. PRIVATE DEVELOPER REQUIREMENTS FOR NEW FACILITIES**

A compromise should be reached to encourage the developer to provide public transport facilities through public-private partnerships. Although the upgrading and improvement of the basic infrastructure is the responsibility of the local authority, the developer can, as a result of the impact study, be instructed to implement specific mitigation measures.

If a development is large enough to warrant public transport facilities, the developer should be required to design and construct the facilities. The developer should acknowledge that a public transport facility is in the interest of its commercial function, when social externalities like safety and comfort of its labour and/or customer base are accommodated.

An appropriate facility conceptual design should be undertaken and submitted to the ETA for approval, which should be in line with the Facility Design Elements of the Guideline Report.

**10. CONCLUSION**

The Guideline Document is intended for use as a central resource which informs and influences public transport infrastructure planning decisions at local and site-specific level.

The Guideline Document will also be used as a design tool when developing new public transport facilities or upgrading/relocating existing ones. The level of provision aspired to for public transport facilities as outlined in the Guideline Document, particularly as a minimum requirement, should also help to inform, develop and justify future capital investment.

Through explanations and diagrams, the Guideline document provides the tools needed to plan public transport facilities and associated amenities within the eThekwin region.

It was not intended that the guidelines be prescriptive as it is recognised that in reality each site will present its own site-specific constraints, and some flexibility and professional judgment will need to be exercised. Nevertheless, there is a strong aspiration to deliver a change in public



transport facilities provision and it is envisaged that the ideal scenarios outlined in the Guideline Document will be delivered on the ground, as much as possible.

#### 11. RECOMMENDATION

It is recommended that a committee be formed which comprises officials from all Municipalities within South Africa to discuss, research and document further work on this particular subject. This document may then be used as a comprehensive guideline for our country.

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Robin Chetty qualified and began his career in Civil Engineering in 1993 in the Roads Department of the Pietermaritzburg Municipality. In 1997 he moved to the Roads and Stormwater Department of the Inner West City Council (Pinetown). In 2000 he was seconded as an Acting Project Manager to the Housing Department. In 2002, Robin was appointed as an Engineer in the Traffic Engineering Department of the Ethekwini Municipality. In 2008 he was promoted to Senior Manager: Public Transport Planning where he is at present. He has completed a Post-Graduate Diploma in Transportation from UKZN (Howard College) as well as a master's degree in Business Administration (MBA) from UKZN (Westville Campus). He is currently registered as a Professional Engineer and one of his major projects is project managing the Integrated Rapid Public Transport Network (IRPTN) programme for the eThekweni Transport Authority. He is married with two sons and is also a part-time bible teacher.

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