

'URBAN PLANNING AND TRANSPORT PLANNING:  
THE NEED FOR AN INTEGRATED MODEL –  
THE CASE STUDY OF THE ETHEKWINI CBD, UMGENI ROAD CORRIDOR'

Submitted by:

SUZANNE LOGAN

201509126

Submitted in fulfillment of the requirements for the degree of

MASTERS IN TOWN AND REGIONAL PLANNING

at the

UNIVERSITY OF KWAZULU-NATAL

(HOWARD COLLEGE CAMPUS)

SUPERVISOR

ANNETTE VON RIESEN

MARCH 2012

## **DECLARATION**

Submitted in fulfilment/ partial fulfilment of the requirements for the degree of **Masters in Town & Regional Planning**, in the Graduate Programme in School of Architecture & Planning, University of KwaZulu-Natal, Durban, South Africa.

I declare that this dissertation is my own unaided work. All citations, references and borrowed ideas have been duly acknowledged. I confirm that an external editor ~~was~~/ was not used and that my Supervisor was informed of the identity and details of my editor. It is being submitted for the degree of **Masters in the Town & Regional Planning** in the Faculty of Humanities, Development and Social Science, University of KwaZulu-Natal, South Africa. None of the present work has been submitted previously for any degree or examination in any other University.

**STUDENT NAME – SUZANNE LOGAN**

**DATE – 14 MARCH 2012**

## **ACKNOWLEDGEMENTS**

I would like to thank, my fiancé Jarrod, my family and friends for their sustained support and encouragement over the last couple of years - without your support I could not have achieved this milestone. Secondly, I would like to thank my Supervisor Annette Von Riesen for her assistance throughout the past two years, without your help and dedication this would not have been possible. Finally, I would like to thank my colleagues at Iyer Urban Design Studio for your encouragement, support and understanding.

<b>TABLE OF CONTENTS</b>		<b>PAGE NUMBER</b>
<b>CHAPTER ONE – INTRODUCTION AND RESEARCH METHODOLOGY</b>		<b>1</b>
1.1	Introduction	2
1.2	Background and Motivation for the Study	2
1.3	Study Area	2
1.4	Research Problem	4
1.5	Hypothesis	4
1.6	Research Aim and Objectives	4
1.6.1	Primary Aim of the Study	4
1.6.2	Research Objectives	4
1.7	Research Question	5
1.8	Methodology	5
1.8.1	Literature Review	6
1.8.2	Key Informants/ Specialist Interviews	6
1.8.3	Case Study	7
1.9	Scope and Limitations	7
1.10	Chapter Outline	8
1.10.1	Chapter One (1) - Introduction and Research Methodology	8
1.10.2	Chapter Two (2) - Conceptual Framework	8
1.10.3	Chapter Three (3) - Precedent	8
1.10.4	Chapter Four (4) - Research Component	9
1.10.5	Chapter Five (5) – Integrated Performance Filter	9
1.10.6	Chapter Six (6) – The Case Study	9
1.10.7	Chapter Seven (7) – Recommendations and Conclusions	9
1.11	Chapter Synopsis – Key Findings	10
<b>CHAPTER TWO – CONCEPTUAL FRAMEWORK</b>		<b>11</b>
2.1	Introduction	12
2.2	South African Planning Context	13

2.3	South African Transport Planning Context	15
2.3.1	The White Paper on National Transport Policy (1996)	16
2.3.2	Moving South Africa 1998	17
2.3.3	National Land Transportation Act (No. 22 of 2000)	18
2.3.4	The Current Status of Transport Planning in South Africa	20
2.4	Current Development Planning Trends	21
2.4.1	Corridors and Nodes	22
2.4.2	New Urbanism	31
2.4.3	Transit-Oriented Development	37
2.4.4	Bus Rapid Transit Systems	45
2.5	Chapter Synopsis	51
<b>CHAPTER THREE – PRECEDENT</b>		<b>53</b>
3.1	Introduction	54
3.2	International Precedents	55
3.2.1	Curitiba, Brazil	55
3.2.2	Bogotá, Columbia	64
3.3	Local Precedents	72
3.3.1	Rea Vaya, Johannesburg	72
3.3.2	MyCiti, Cape Town	81
3.4	Chapter Synopsis – Key Findings	90
<b>CHAPTER FOUR – VIEWS OF PROFESSIONALS ABOUT INTEGRATION OF TRANSPORT AND URBAN PLANNING</b>		<b>92</b>
4.1	Introduction	93
4.2	Structured Interview Responses	93
4.3	Chapter Synopsis – Key Findings	100
<b>CHAPTER FIVE – INTEGRATED PERFORMANCE FILTER</b>		<b>101</b>
5.1	Introduction	102
5.2	Synopsis of Key Issues	102

5.2.1	Synopsis of Chapter Two – Component A	102
5.2.2	Synopsis of Chapter Three – Component B	103
5.2.3	Synopsis of Chapter Four – Component C	104
5.3	Identification of Key Criteria and Establishment of Evaluation/ Design Criteria	104
<b>CHAPTER SIX – CASE STUDY: ETHEKWINI CBD, UMGENI ROAD CORRIDOR</b>		<b>107</b>
6.1	Introduction	108
6.2	Case Study Context	108
6.2.1	eThekwini IDP Policy Vision	108
6.2.2	Spatial Development Framework	109
6.2.3	eThekwini Regional Context	110
6.3	Evaluation of eThekwini CBD Against Identified Design Criteria	113
6.4	The eThekwini IRPTN	113
6.5	Umgeni Road: The Integrated Model	115
6.5.1	Route Selection	116
6.5.2	Umgeni Road – Station Selection	119
6.5.3	Umgeni Road Integrated Vision	122
6.6	Conceptual Framework Relevance within the Umgeni Road Corridor	126
6.7	Chapter Synopsis – Key Findings	127
<b>CHAPTER SEVEN – RECOMMENDATIONS AND CONCLUSION</b>		<b>129</b>
7.1	Introduction	130
7.2	Recommendations	130
7.3	Conclusion	131
<b>REFERENCES</b>		<b>133</b>

LIST OF ILLUSTRATIONS		PAGE NUMBER
<b>CHAPTER ONE – INTRODUCTION AND RESEARCH METHODOLOGY</b>		<b>1</b>
Figure 1	Study Locality Plan	3
<b>CHAPTER TWO – CONCEPTUAL FRAMEWORK</b>		<b>11</b>
Figure 2	Corridor and Node Hierarchy	23
Figure 3	Activity Corridor	24
Figure 4	Spine Road	25
Figure 5	Activity Street	25
Figure 6	Composition of a Node	29
Figure 7	Precedent Illustrating Accessibility and Permeability of World Cities	32
Figure 8	Precedent Illustrating Richness of Activity	33
Figure 9	Precedent Illustrating Urban Design and Architectural Guidelines	33
Figure 10	Precedent Illustrating Urban-to-Rural Transect	35
Figure 11	Precedent Illustrating Increased Density	35
Figure 12	Precedent Illustrating Smart Transport Properties	35
Figure 13	Precedent Illustrating Sustainability Qualities	36
Figure 14	Precedent Illustrating Quality of Life	36
Figure 15	Transit-Oriented Development	38
Figure 16	Quality Spectrum of Road Based Public Transport Systems	48
<b>CHAPTER THREE – PRECEDENT</b>		<b>53</b>
Figure 17	Contextual Plan	55
Figure 18	The Curitiba ‘Trinary’ Road Concept	56
Figure 19	Curitiba’s Schematic Arrangement of Structural Axes	57
Figure 20	Plan of Curitiba Transit System	61
Figure 21	Plan illustrating Curitiba Transit Station with Urban Context	62
Figure 22	Curitiba Urban Structure along ‘Trinary’ road system	63
Figure 23	Contextual Plan	64
Figure 24	Bogotá Public Transport Route Map	69

Figure 25	Plan illustrating Bogotá Transit Station within the Urban Context	70
Figure 26	Bogotá BRT System	71
Figure 27	Contextual Plan	72
Figure 28	Gauteng Intermodal Route Map	78
Figure 29	Plan illustrating Transit Station within the Urban Context	79
Figure 30	Rea Vaya and Gautrain System Images	80
Figure 31	Contextual Plan	81
Figure 32	MyCiti Route Plan	87
Figure 33	Plan illustrating MyCiti Transit Station within the Urban Context	88
Figure 34	MyCiti System Images	89

#### **CHAPTER FOUR – VIEWS OF PROFESSIONALS ABOUT INTEGRATION OF TRANSPORT AND URBAN PLANNING**

- - -

#### **CHAPTER FIVE – INTEGRATED PERFORMANCE FILTER**

- - -

#### **CHAPTER SIX – CASE STUDY: ETHEKWINI CBD, UMGENI ROAD CORRIDOR**

Figure 35	eThekweni Municipality Existing Structuring Context	111
Figure 36	eThekweni Municipality Proposed Structural Context	111
Figure 37	Route Selection – Umgeni Road	118
Figure 38	Umgeni Road – Station Selection	121
Figure 39	Umgeni Road Integrated Vision – Existing Condition	124
Figure 40	Umgeni Road Integrated Vision – IRPTN Movement Influences	125
Figure 41	Umgeni Road Integrated Vision – Redefined Urban Grain	125
Figure 42	Umgeni Road Integrated Vision – Final Form	126

#### **CHAPTER SEVEN – RECOMMENDATIONS AND CONCLUSION**

- - -



LIST OF TABLES		PAGE NUMBER
CHAPTER ONE – INTRODUCTION AND RESEARCH METHODOLOGY		1
-	-	-
CHAPTER TWO – CONCEPTUAL FRAMEWORK		11
Table 1	Gradient of Land Intensity and Access Options	40
Table 2	Transit-Oriented Development Versus Transit Adjacent Development	43
Table 3	Intensity of Land Use and Transport Relationships	43
Table 4	Station Area Classification and Associated Land Use	45
Table 5	‘Full BRT’ Versus General BRT Classifications	50
CHAPTER THREE – PRECEDENT		53
-	-	-
CHAPTER FOUR – VIEWS OF PROFESSIONALS ABOUT INTEGRATION OF TRANSPORT AND URBAN PLANNING		92
Table 6	Key Informants Interview Responses	100
CHAPTER FIVE – INTEGRATED PERFORMANCE FILTER		101
-	-	-
CHAPTER SIX – CASE STUDY: ETHEKWINI CBD, UMGENI ROAD CORRIDOR		107
-	-	-
CHAPTER SEVEN – RECOMMENDATIONS AND CONCLUSION		129
-	-	-

## LIST OF ABBREVIATIONS

TERM	DEFINITION
<b>TOD</b>	Transit Oriented Development
<b>BRT</b>	Bus Rapid Transit
<b>ETA</b>	eThekweni Traffic Authority
<b>IDP</b>	Integrated Development Planning
<b>GEAR</b>	Growth, Employment and Redistribution Strategy
<b>RDP</b>	Reconstruction and Development Programme
<b>SADC</b>	Southern African Development Community -
<b>EIA</b>	Environmental Impact Assessment
<b>SDF</b>	Spatial Development Framework
<b>SPTN</b>	Strategic Public Transport Network
<b>ITP</b>	Integrated Transport Plan
<b>LDO</b>	Land Development Objectives
<b>IRT</b>	Integrated Rapid Transit
<b>PRASA</b>	Passenger Rail Agency of South Africa
<b>SANRAL</b>	South African National Roads Authority Limited
<b>ACSA</b>	Airports Company South Africa
<b>IRPTN</b>	Integrated Rapid Public Transport Network



## **1.1 INTRODUCTION**

The purpose of this dissertation is to identify the relationship and links shared between Urban Planning and Transport Planning. It is the author's view that Urban and Transport Planning are integrally connected and should be viewed as a holistic entity. The following study will thus try to better understand these elements and how best they should coexist together.

## **1.2 BACKGROUND AND MOTIVATION FOR THE STUDY**

Literature sources found within this dissertation support the notion that poorly planned and unsustainable cities are often a result of modernist planning approaches (Harrison et al (2003), Dewar et al (2004), Harrison et al (2008). In South Africa – structural and spatial separation has been the result of such principles found in Apartheid ideologies. It is the authors view, that one of the planning outcomes of this approach has been the separation of the academic and professional disciplines that address urban and transportation planning. Current policy and practice within South Africa still follows this vein of separation, and together with the historical legacy of distorted city land use, unsustainable and inefficient urban spaces are still found today. A major part of this inefficiency is the ongoing separation between the urban and transport planning decision-makers, the functions of the city - such as work and residence, as well as impractical commuter routes which result in excessive commuting and place high transport burdens on cities and regions. Contemporary South African planning should investigate the means to address these dysfunctional themes, particularly relating to urban and transportation planning - to achieve improved urban performance and efficiency.

## **1.3 STUDY AREA**

The study area is located between the Durban harbour district and the Umgeni River horizontally, and the Golden Mile Promenade and Botanical Gardens Road along the Berea vertically. The identified study is large; however the scale of the project requires a substantial land area to adequately test the functionality and viability of the key criteria identified within Chapter Five. The image below illustrates the proposed study area within the eThekweni CBD, along the Umgeni Road Corridor.



## **1.4 RESEARCH PROBLEM**

It is the authors view, that there is a misconception that thorough individual disciplinary planning is efficient and effective for the development of sustainable urban environments. Planning urban, transportation or infrastructural planning realms, and other built environment activities or functions cannot take place in a vacuum. The fundamental amalgamation of all components of an environment or system, need to be taken into consideration during the planning and development phase, in order to produce a sustainable well-rounded end result. South Africa, as a result of its turbulent history, has added pressure to fully integrate the development process due to the intentional separation in the past.

## **1.5 HYPOTHESIS**

The author hypothesises that, a greater integration between transport and urban planning would lead to the creation of more successful and sustainable cities and urban spaces, systems and environments. This hypothesis is to be tested through the research process for its robustness.

## **1.6 RESEARCH AIM AND OBJECTIVES**

### **1.6.2 Primary Aim of the Study**

The aim of the study is to determine, if greater integration between public transport and urban planning will create more successful and sustainable cities, and specifically whether the format of such an integrated model will achieve this outcome if applied throughout the eThekweni CBD.

### **1.6.2 Research Objectives**

The objectives of the research process are outlined below namely:-

- I. To understand the role of transport and urban planning in the restructuring of existing and creation of new nodal development within the eThekweni CBD;
- II. To identify and develop criteria or principles from local and international best practice examples, which facilitate successful transport and land use planning, urban development and management; and,
- III. To identify relevant policy documents which support the study.

## **1.7 RESEARCH QUESTIONS**

In order to test the validity of the research hypothesis, the following questions have been posed.

- I. What are the current international transport planning trends and are similar trends observable within South Africa?
- II. What are the current urban planning trends within South Africa and how do they compare to international initiatives?
- III. Identify international or local best practice models or successful case studies of integrated urban planning and transport systems that the eThekweni Municipality can learn from?
- IV. What elements make these models successful or have contributed to their failure?
- V. What lessons can be learnt from these precedent studies?
- VI. How can these lessons or models be applied in the eThekweni Municipality, more specifically to the eThekweni CBD for the proposed development of intermodal interchanges.

Throughout the research process, these questions have provided a set of reference points around which to structure the findings.

## **1.8 METHODOLOGY**

The research methodology is founded on the principle of constructive composition of information, which will use primary empirical and secondary data and qualitative interviews. The secondary data research is comprised of an extensive literature review of both urban planning and transport planning fundamentals and includes reference to books, journal articles, project work and reports. The primary research consists of site visits, and the a study of a number of local and international precedents as well as interviews with professionals involved in the urban planning and transport planning fields. The respondents for this study were identified though the use of purposive, snowball sampling. The target group includes professionals in the planning and transport fields, municipal officials as well as academics that have specialist knowledge related to the research topic. The two aspects of the methodology are outlined below:-

### **1.8.1 Literature Review**

As indicated, the literature view comprises of an extensive review of urban and transportation planning literature, to identify current themes and trends. A number of books, journal articles, reports, websites, and pamphlets have been used to support the research project.



### 1.8.2 Key Informants/ Specialist Interview:

#### eThekwini Municipal Officials –

A set of interviews has been undertaken with officials from the eThekwini Metropolitan Municipality. The aim of the interviews is to establish the City's viewpoint, from a Transport Planning and Framework Planning perspective on the possible improved integration of spatial and transport related projects – specifically Transit Oriented Development (TOD) projects.

The following officials were approached:

- I. Soobs Moonsammy, head of Development Planning, Environment and Management within the eThekwini Municipality; and,
- II. Manoj Rampersad, senior representative from the eThekwini Traffic Authority (ETA).

In addition, the following private sector individuals were approached and agreed to be interviewed for the dissertation:

#### I. Transport Planner – Jarendra Reddy

Jarendra Reddy's core competencies are in integrated urban transportation planning throughout South Africa. Therefore the aim of the interview was to provide an understanding as to the vision, objectives, planning rationale and challenges anticipated behind transportation related infrastructure in relation to the surrounding existing and proposed land use within the eThekwini context;

#### II. Urban Designer/ Planner – Tony Markewicz

Tony Markewicz is a well known Town and Regional Planner within the KwaZulu-Natal Region, who has a wealth of experience. He presented a paper entitled '*Translating eThekwini's Compact City Vision into Reality Through Integrated Transportation and Land Use Planning*', at the South African Transport Conference this year. It is this background, and his work on the eThekwini Northern Corridor Development, that sees his input into this study as important.<sup>1</sup>

---

<sup>1</sup> The identified private sector Urban Planner has been modified from the original project proposal as a result of new information. Tony Markewicz replaces Nathan Iyer, the paper presented at the South African Transport Conference in July 2011 by Markewicz described above, makes his contribution to this study more applicable.



### 1.8.3 Precedents

Precedent examples, both international and local have been used as a method for understanding and providing the context for the need to integrate urban and transport planning. Successful and world renowned South American precedent of Curitiba in Brazil and Bogota in Columbia, to a lesser extent, as well as local precedents – the BRT system of Johannesburg namely Rea Vaya and the Cape Town MyCiti (IRT) project, have been identified as being relevant and contemporary examples of projects which have best practice or can provide lessons that need to be considered as part of this research. Local examples are used to guide the planning of the eThekweni case study, within a South African context.

## 1.9 SCOPE AND LIMITATIONS

It is acknowledged that the research topic, Urban Planning and Transport Planning – The need for an integrated model is a very broad in nature and can be interpreted to cover a wide range of related transportation and planning issues. The study does not intend on looking at all aspects of Urban Planning or Transport Planning, but to focus on aspects that relate specifically to public transport planning and the related spatial and urban planning elements which support it.

Similarly there are limitations to the evaluation of the extensive projects that have been identified as having relevance for the research. The application and development of Transit-Oriented Developments, and the BRT systems within South Africa, and particularly in the eThekweni Municipality, have continued to develop and change throughout the research process. For this reason, the dissertation will only identify key planning criteria from the case studies and projects that should be taken into account when identifying the possible system structure and supporting elements for a replicable model of integrated planning and transportation planning.

It must be noted that whilst the intention of this study is to provide criteria for the establishment of routes and station locations, primarily to understand the link between transportation networks and either associated land use characteristics, the route selection in terms of this study will be conceptual as the development of a full traffic model to determine the commuter demand falls outside the scope of this project. Therefore, the route selection will be determined through the use of the remaining criteria established. It should also be noted that the selection of routes and station locations are specific to this study and based on the information available during the research process.

The limitations described above will however, not affect the outcome of the study, as the study will look to identify possible criteria for the eThekweni Municipality context rather than merely assess the existing condition.

## **1.10 CHAPTER OUTLINE**

The following dissertation has five chapters, and is structured in the following manner.

### **1.10.1 Chapter One - Introduction and Research Methodology**

The opening chapter has introduced the study, establish the background of the topic and outline the purpose of the forthcoming chapters. This chapter will also outline the hypothesis, research questions and research methodology proposed for the study.

### **1.10.2 Chapter Two - Conceptual Framework**

Chapter two provides the theoretical grounding for the dissertation and the case study to follow. As a result, it is essential to understand the fundamental components of the study – Urban Planning and Transport Planning. This chapter will therefore outline the key theoretical underpinnings to the current evolution of Urban and Transport Planning in light of the current global and local trends; the political and structural changes within the South African context over the last decade; and the rise of new key structuring elements within urban confines - such as the drive towards more sustainable cities comprised of defined Corridors and Nodes, New Urbanism principles, Transit-Oriented Development and Bus Rapid Transit Systems (BRT).

### **1.10.3 Chapter Three – Precedents and Case Studies**

International and local precedents will be studied, outline the need and an understanding of the desire for and success of integrated urban and transport planning. The study of these precedents will identify the lessons from practice and will evaluate the approach used, the processes that have been adopted, and identification of the common trends and guidelines which have been developed through different projects and which can be used to establish a set of normative principles to inform projects in South Africa and eThekweni.

#### 1.10.4 Chapter Four - Views of Professionals about Integration of Transport and Urban Planning

This chapter provides examples of the research questionnaires and structured interviews which were conducted with the identified key stakeholders, officials and planning and transportation practitioners. Although the questions seem very open-ended, the questions were structured in a manner as to allow the interviewee freedom to express their opinion without any influences. The key questions put forward to the interviewees were;

1. What criteria were used to develop the routes and station locations identified?
2. What are the criteria used to integrate transit stations into existing environments?
3. Who makes-up the project team identified for the facilitation and implementation of this project?
4. How well was the project received by the community and existing transport associations?
5. What lessons have been learnt through the project to date, and how will they be overcome in future stages?

#### 1.10.5 Chapter Five - Integrated Performance Filter

Chapter five's ultimate aim is to develop a set of criteria which will be used to evaluate the eThekweni CBD case study. The criteria will be developed as a result of a detailed synthesis of the key issues identified from chapter two to four.

#### 1.10.6 Chapter Six - The Case Study

The criteria established in chapter five will be used to evaluate the performance of the identified study area, namely the eThekweni CBD, to house a successful integrated urban and transportation system, and to ultimately provide a sustainable urban environment for its inhabitants.

#### 1.10.7 Chapter Seven – Recommendations and Conclusion

The final chapter of this dissertation will synthesise the main findings from the research conducted and provide recommendations for the integration of two fundamental functions for any built environment – Urban Planning and Transportation Planning. These recommendations will be generalised in terms of the two themes, although at the same time will endeavour to guide the implementation of an integrated system within the eThekweni CBD context.

### **1.11 CHAPTER SYNOPSIS – KEY FINDINGS**

The primary motivation for this study is to identify the need for greater alignment between the primary building blocks of an urban system, and the fundamental need for complete integration of the urban planning and transport planning processes. The misalignment of either of these components will result in an unsustainable and inefficient system and city which will always struggle to compete successfully with similar counterparts.

The theoretical underpinning, precedent studies and structured interviews of this study will ultimately identify an integrated performance filter through which an appropriate evaluation of the eThekweni CBD case study can take place. This integrated performance filter, together with the outcomes from the case study evaluation will identify and put forward appropriate recommendations and concluding remarks for this study.



## 2.1 INTRODUCTION

*‘Historically two of the threads of the spatial planning suite – namely land use and transportation planning have been perceived as two complementary but separate disciplines. Similarly economic planning has also lacked integration with the spatial and social issues that influence and impact upon it. Generally land use planning has been perceived as a fuzzy discipline being aligned with the social sciences and architecture where urban design issues were addressed. In contrast, transportation planners were considered as part of the engineering component of the built environment sector. It is therefore not surprising that the policy and legislation related to the two sectors run in parallel but often took very little direction from or consideration of each others needs or requirements. Although there was recognition during the 1980’s that there was a need for better integration between transportation and land use/ spatial planning the two remained largely separated until the late 1990’s when the notion of an integrated development planning system and the IDPs were introduced in terms of the Municipal Systems Act (Act No. 32 of 2000). The introduction of integrated development planning as an approach was also indicative of a realisation that issues of sustainability were coming to the fore in terms of new planning debates in the post Apartheid South Africa’ (PPDC, 2007; 60).*

The above extract from the Provincial Planning and Development Commission Report (2007) outlines the purpose of this study; ‘Urban Planning and Transport Planning – The need for an Integrated Model – The Case Study of the eThekweni CBD, Umgeni Road Corridor’. Almost two decades have passed since the end of the Apartheid era and full integration between government sectors is still lacking. It is therefore the objective of this research to highlight the need for greater integration, within the South African context, in light of the new global trends in the built environment.

The following section provides the theoretical foundation for the study. This chapter is broken down into three main sections – the South Africa planning context, the South African transportation planning context, and the current global development planning trends which fall under the sustainable cities umbrella; including aspects such as Corridors and Nodes, New Urbanism, Transit-Oriented Development and Bus Rapid Transport. The chapter will then conclude with a synopsis of the key findings from the three sections.

## 2.2 THE SOUTH AFRICAN PLANNING CONTEXT

Setting the framework for the South African planning context is crucial to understanding the landscape and challenges which the country is currently facing. The South Africa we witness today is modelled on technocratic spatial organisation resulting in planning landscapes of inequality, division and segregation. These defining principles of Apartheid were legally enforced by the National Party Government between 1948 and 1994. Racial segregation in South Africa began in the colonial era; however, Apartheid as an official policy was introduced following the general election of 1948. The Afrikaner-dominated National Party, through white supremacy and minority rule, promoted and implemented the segregation and division of the population, resulting in forced removals, the deprivation of citizenship for black people, and the creation of Self-Governed Homelands and independent states. Government legislation divided the South African population into four distinct groups according to their racial groups – ‘native’, ‘white’, ‘coloured’, and ‘Asian’ (Baldwin-Ragaven et al, 1999), and through spatial engineering created a very scattered, unrelated settlement pattern.

As a result of these actions, *‘our cities have been historically divided along racial lines, with the poorer communities situated away from job and economic opportunities and are excluded from the social fabric of our cities. Our rural areas are characterised by dispersed settlement patterns, without access to basic infrastructure, including water, electricity and sanitation’* (DLA, 2007: 1). These settlement patterns and the dependence on migrant labour were, amongst other themes imperative to the success of creating exclusive urban environments for whites only. There existed a phenomenon of urban relocation, whereby men seeking greater job opportunities in the urban areas were grouped into residential and housing pockets, and were subjected to strict forms of movement control.

The Apartheid era, in order to enforce the ruling party’s ‘ideals’, was governed by a set of principals. A few of the Apartheid laws that defined spatial planning are identified as follows; Group Areas Act (act No. 36 of 1966) – *‘regulated ownership and occupation of land for whites, coloured and Indians. Land was made available for members of a particular group for whom that area had been proclaimed* (Van Wyk; 1999: 104); the Reservation of Separate Amenities Act (Act No. of 1953), which regulated and reserved amenities on municipal grounds such as beaches, buses, hospitals, schools and universities for the white population. People of colour, particularly black people were provided with services greatly inferior to those which were provided for the white’s; Slums Act - This Act provided that inner city/

urban areas occupied by black, Indian and coloured communities of low income/ poor stature to be removed and relocated to designated areas of land outside of the white urban areas (Harrison et al, 2008).

During the early Apartheid city regime, the Group Areas Act and Land Tenure Advisory Board *'brought town planning schemes into direct relationship with segregationist measures. The Group Areas Act provided for large scale forced removals, for example Cato Manor in Durban – whereby mixed racial communities from inner city slums to other designated areas, which effectively became 'townships'.* These townships were planned such that they had buffer zones around them, comprised of natural features, industrial areas or vacant land. The layouts of the townships were highly controlled, with one entry and exit point dictating limited access.

This era was followed by 'Grand Apartheid, which was characterized by the development of 'Homelands' which were fragmented areas located on some of the least productive land in South Africa and isolated from growth centres' (DLA, 2007: 1). These spatial planning initiatives by the Apartheid government had a number of consequences on the urban form: *'distorted settlement patterns, with poorest communities having to travel the longest distances; difficulty in the provision of efficient and viable public transport because of dispersed settlement patterns and low densities; high infrastructure provision costs; inefficient use of large tracts of land including agricultural land'* (DLA, 2007; 2). These are just some of the spatial inefficiencies inherited from the Apartheid era.

'The formation in 1994 of the South African Government of National Unity ushered in a frenetic era of policy formulation in the form of Green and White papers and legislation drafting in relation to urban areas: the legislative framework relating to urban development changed significantly between that time and now. Inter alia, the *Development Facilitation Act (No. 67 of 1995)*, the *Housing Act (No. 107 of 1997)*, the *National Water Act (No. 36 of 1998)*, the *National Environmental Management Act (No. 107 of 1998)*, the *Local Government Municipal Structures Act (No. 117 of 1998)*, the *Municipal Demarcation Act No. 27 of 1998)*, the *National Land Transport Interim Arrangements Act (No. 45 of 1998)*, the *National Heritage Resources Act (No. 25 of 1999)*, the *National Land Transport Transition Act (No. 22 of 2000)* were all been introduced within this period' (Dewar, et al 2004:1).



Although there is criticism with regards to the lack of integration between the new pieces of legislation, as well as the cumbersome and multi-dimensional development approval processes which have emerged as a result of the new policy introduction, the intentions behind the policies and the intended changes were good, progressive and long-overdue (Dewar et al, 2004). Dewar et al (2004; 2) state that *'the direction of required change is in all cases the same: the overriding intention is to transform fragmented, distorted Apartheid settlements so that they positively accommodate the activities of the vast majority of their inhabitants'*.

### **2.3 THE SOUTH AFRICAN TRANSPORT PLANNING CONTEXT**

*'The system of public transport provision in South African cities has been a product, as well as instruments of Apartheid'* (Behrens et al, in Harrison et al, 2003; 160) South African landscapes were meaningfully created through spaces of great distance, inequality and division - as discussed in the South African Planning Context section above. Access to non-urban areas was regulated and restricted, and in most cases, admission was limited to a single entry and exit point. As a result, the public transport services in South Africa were primarily developed to link these peripheral townships with the more central economic centres. The working class were usually located a substantial distance from employment opportunities. As a direct consequence of this policy, transport subsidies from the South Africa government became imperative. The states rationale for subsidising public transport were twofold; firstly to ensure the mobility of the labour force in the national economy, and secondly, subsidies were put in place to compensate township residents for the government's resettlement policy (Behrens et al (2003), Clark (2000) and Naudé et al (1994) in Harrison et al, 2003).

Urban Apartheid policies were introduced in the early 1950s with the promulgation of two specific Acts, the Black Services Levy Act (No. 64 of 1952) and the Black Transportation Service Act (No. 53 of 1957). These Acts made the provision for employers to pay a levy for Black employees for the subsidisation of specific transport services. In 1972, a similar Act was promulgated for other race groups namely the Coloured and Indian/ Asian workers known as Transportation Services for Coloured Persons and Indians Act.

The increasing transport costs in the years following resulted in the employers resisting to paying the full costs of workers journeys to and from their places of work. From 1975 onwards, the central

government began to pay an increasingly higher proportion to the subsidies of bus and rail services. The emergence of the unsubsidised informal mini-bus taxi industry in the mid-1980s resulted in a steady decline in bus and rail commuters to the extent that by mid-1980's mini-bus taxi's carried just more than half the national urban Black commuter market (Cameron, 2000 in Behrens et al in Harrison et al, 2003). Despite the rapid decline in bus and rail passengers using the services provided, there has been a rapid increase in the subsidy costs. The proportion of public transportation passengers benefiting from the government transport subsidies have therefore decreased. In turn, this has resulted in both the train and bus operators consequently either withdrawing uneconomic services, or the reduction to the frequency of the service on particular routes. These changes were made in an effort to reduce the overall transportation costs.

The existing public transport system appears to be meeting the basic travel needs of a large portion of the urban population. This system however, is neither equitable nor financially sustainable. Due to the change in commuter patterns and the progressive move away from the Apartheid era it became apparent that there was an urgent need for new transport policies; as a result the framework for urban passenger transport policy underwent significant change in the beginning of the new millennium. The key documents guiding this process have been identified as the White Paper on National Transport Policy, published by the National Department of Transport in September 1996; Moving South Africa Action Agenda: A 20-year Strategic Framework for Transportation in South Africa, produced by a Department of Transport project team in May 1999; and National Land Transportation Transition Act (Act No. 22 of 2000) approved by parliament in August and signed into effect by the President in December of 2000. These policies and statutes will now be considered in more detail.

### **2.3.1 The White Paper on National Transport Policy (1996)**

The National Transport Policy was one of the many initial policy documents introduced after 1994 to begin the regeneration process of South Africa. It provided a policy which generated a new vision for the transport sector '*... to provide safe, reliable, effective, efficient, and fully integrated transport operations and infrastructure which will best meet the needs of freight and transport customers at improving levels of service and cost, in a fashion which supports government strategies for economical and social development whilst being environmentally and economically sustainable*'. The White Paper was notable in that it clearly proposed a set of key policy actions where the integration of land use and

transportation planning and the concept of nodes and corridors were outlined. *‘Urban restructuring and efficient land use transport interaction’* were to be the tools employed to redress the inherited problems of urban transport and spatial planning (PPDC, 2007: 61).

For the vision of the White Paper to be achieved the following actions were put forward;

- I. Bringing focus to the transport system through the concentration of private and public investment on high volume routes and in major nodes. The primary network established which will form the backbone to the transport system will be underpinned and supported by complementary feeder routes;
- II. Develop inter-modal transport facility in strategic and supporting nodal positions; and,
- III. Create an environment that is conducive to empowerment of commuters which will enable transport service providers to improve on efficiency, productivity and competitiveness.

(Marrian, 2001)

### **2.3.2 Moving South Africa 1998**

South Africa’s transport landscape is that of a network with vast scope and long distances where demand is scattered and characterised by uneven flows and dramatic peaks (Moving South Africa: Action Agenda; 1999). The legacy of the Apartheid era can be seen quite clearly in the inefficiencies of the transport system. In many instances, the current allocation of infrastructure and resources reflects a set of economic and social choices that have been superseded. The ‘facts on the ground’ indicate that the existing infrastructure, subsidies, range of services, and use are a direct outcome of decisions made by the Apartheid government (Moving South Africa: Action Agenda; 1999).

Consequently, the ‘Moving South Africa’ policy was published in 1998 identifying one of the most important urban strategic challenges facing public transport. Sub-optimal spatial planning is seen as the biggest driver of public transport cost and the most difficult to turn around (Marrian, 2001). The policy document highlights a number of areas of concern such as ‘long distance line-haul travel, very limited in-fill development on major routes and highly peaked travel demand impacting negatively on public transport vehicle utilisation rates and reverse-ridership’ (Marrian, 2001). In conjunction with the concerns and challenges the paper emphasised a number of key actions to overcome these strategic

challenges and put forward solutions such as corridor densification and the optimal deployment of modes to meet commuter requirements.

To achieve and give effect to the objectives set out in the 'Moving South Africa' Strategy the National Department of Transport implemented the 'Moving South Africa Action Agenda' in 1999. Within this document the National Department of Transport outlined a plan to meet the existing travel needs of the nation in a sustainable manner and articulated the view that transport is *'...an enabling industry, one which exists not only to meet goals inherent to transport, but also to meet other pressing national and social objectives'* (Marrian, 2001). The objectives listed within the 'Action Agenda' included – economic growth, creating a high and rising standard of living for all citizens as set out in Growth, Employment and Redistribution Strategy (GEAR) and the Reconstruction and Development Programme (RDP); increased trade, especially with neighbouring Southern African Development Community SADC countries; improved access to employment opportunities; and increased social integration (NDoT, 1999: 18 in Marrian, 2001).

The policy therefore outlines two elements to achieve such a vision (NDoT, 1999:21);

- I. A 'Strategic Network' that forms the backbone and life blood of the system, containing densely developed rides and inter-connected linear corridors concentration travel demand; and,
- II. A 'Supporting Network' which forms a dual function of feeding into and distributing the 'Strategic Network' commuters and connects to areas outside the core network.

In order to achieve such a vision the Department proposed the focusing of development, investment, resources and high-density land use along these identified strategic and supportive networks and nodes, therefore allowing for the necessary threshold to support the public transport initiatives. This however, is not a short-term goal but a long-term vision spanning ten to twenty years through the assistance of targeted Town Planning controls and interventions (Marrian, 2001).

### **2.3.3 National Land Transportation Transition Act (Act No. 22 of 2000)**

The National Land Transportation Transition Act was the outcome of a series of policy drafting processes since 1996. The primary objectives of the National Land Transportation Act are to provide the measures

necessary to transform and restructure South Africa's land transportation systems, the main emphasis of which is placed on public transport objectives.

The main principles and actions outlined by the policy are summarised in the National Land Transportation Transition Overview document (2001; 7) as being:-

- Providing affordable public transport that is responsive to commuters needs. Transport services must be designed to integrate with different modes, be cost efficient, achieve quality services that make use of the existing resources optimally, has limited environment implications and above all be safe;
- Providing state subsidies which must be geared to assist the marginalised users as well as those with poor access to social and economic activity;
- Supplying an effective land transport system that must be achieved through integrated planning, provision and regulation of services and infrastructure, and effective law enforcement;
- Promoting law enforcement as a vital tool towards managing and regulating land transport, and the efforts of all involved must be co-ordinated to prevent duplication;
- Ensuring that public transport is given a higher priority than private transport, and that all spheres of government promote public transport;
- Promoting investments in land transport must that support economic, financial, technical and environmental sustainability;
- Integrating land transport functions with land use and economic planning and development through measures such as corridor development, densification and infilling, and transport planning must guide land use and development planning;
- Providing for the needs of special categories of passengers (such as learners, tourists, and people with disabilities) within by the system provided for mainstream transport;
- Promoting the participation of all interested parties in transport planning;
- Providing a computerised land transport information systems for all spheres of government which must be compatible and allow mutual access; and,
- Ensuring that costs can be recovered from the direct users of services wherever practical.

The policy outlines general principles for transport planning, and its relationship with land development which need to be taken into account through the development of transport plans. These principles

emphasise the need for land transport planning to be integrated with the land development process. The land transportation objectives of transport plans have been identified as:-

- Enhancing the effective functioning of cities, towns and rural areas through planning transport services and infrastructure in the context of their integrated development plans and land development objectives;
- Providing for direct economic activity, mixed land uses and high density residential development into high utilisation public transport corridors that connect development nodes, and discourage urban sprawl where public transport services are inadequate;
- Giving priority to infilling and densification along public transport corridors;
- Giving higher priority to public transport than private and discourage private vehicle use through travel demand management measures;
- Enhancing accessibility to public transport for persons with disabilities; and
- Minimise harm to the environment.

The Act provides the framework and establishment of Transport Authorities whom will be responsible for the planning, integration, implementation and law enforcement within Transportation. The planning function and objectives will involve 'the preparation of Integrated Transport Plan (ITPs) with a 20 year horizon. The ITP, however is one of five local land transport plans that link both individually and corporately to both the key municipal plans' i.e. the Integrated Development Plan (IDP) and the Provincial Land Transport Framework (Marrian, 2001: 4).

#### **2.3.4 The Current Status of Transport Planning in South Africa**

Despite the continued efforts to incorporate a range of new policies subsequent to the formation of the new government in 1994, inadequate changes have been implemented with regards to the integration of urban planning and transportation. Urban development continues to follow a low-density sprawl pattern, *'often in the form of fragmented pockets or cells of development. This tendency makes the provision of efficient and viable public transport very difficult, if not impossible'* (Dewar et al, 2004).

Transport as well as urban planning in the last couple of years has been seen as reactive instead of progressive and forward-thinking – simply dealing with the existing demands instead of addressing

increased accessibility and convenience. Dewar and Todeschini (2004) outline the reasons for this as being:-

- I. In the case of South Africa change is difficult and complex. The new policies and guidelines put in place to restructure and formulate the new South Africa landscape are completely opposite to the ones which were entrenched for decades;
- II. Young, dynamic, open-minded individuals are seldom in official decision-making positions to carry forward the new policies and guidelines. The decision-makers are primarily senior officials that are comfortable with what they 'know', and who lack the energy and enthusiasm to carry forward the new vision;
- III. It is also difficult to ensure that all officials subscribe to the new approach; and,
- IV. Ultimately, 'transportation decisions have been taken in vertical 'silos'...' *Transportation has been seen as an end in itself: a discipline with its own internal 'rules' and methodologies... There is no clear understanding of the implications of the transformed urban paradigm for transportation practice'* (Dewar et al, 2004).

## **2.4 CURRENT DEVELOPMENT PLANNING TRENDS**

Transportation and the built environment are inextricably intertwined. They provide the foundation for the development and impact on the design of all cities and urban centres. Actions performed within a centre of activity, such as a town or city, are carried out with a distinct rationale and for economic, personal or social objectives. To this end, transportation can be viewed as a key input in achieving these objectives. Transportation and the transport network can be referred to as the 'life blood' of any activity centre, influencing an environment's physical form and liveability. Poor transportation and land use integration reduces the liveability of an environment leading to urban decay.

The following section outlines the main characteristics influencing current global trends within the built environment, which are pertinent to this dissertation. The section will begin at a macro level investigating the nodes and corridor concept, which at the most basic level, in most cases, give structure and meaning to the urban form in which they are found. The second part identifies principles of new urbanism to be applied to nodes as the building blocks for creating people centred sustainable environments. The third component encapsulates elements and draws from the new urbanism approach and focuses on transit-oriented development, fully integrating the fundamentals of transport

and spatial planning. The last section of this chapter will bring together the components from the preceding sub-sections and relate them to the current world-wide trend for the introduction of Bus Rapid Transit (BRT) within the urban context.

#### **2.4.1 CORRIDORS AND NODES**

Corridors are not a new concept, and usually refer to the urban context. They represent a highly active expansive mixed-use, multi-functional urban structure that is origin and destination driven. Corridors house interlinked transport routes of different lengths and structures that accommodate multiple transport facilities that shape and control the product of that corridor.

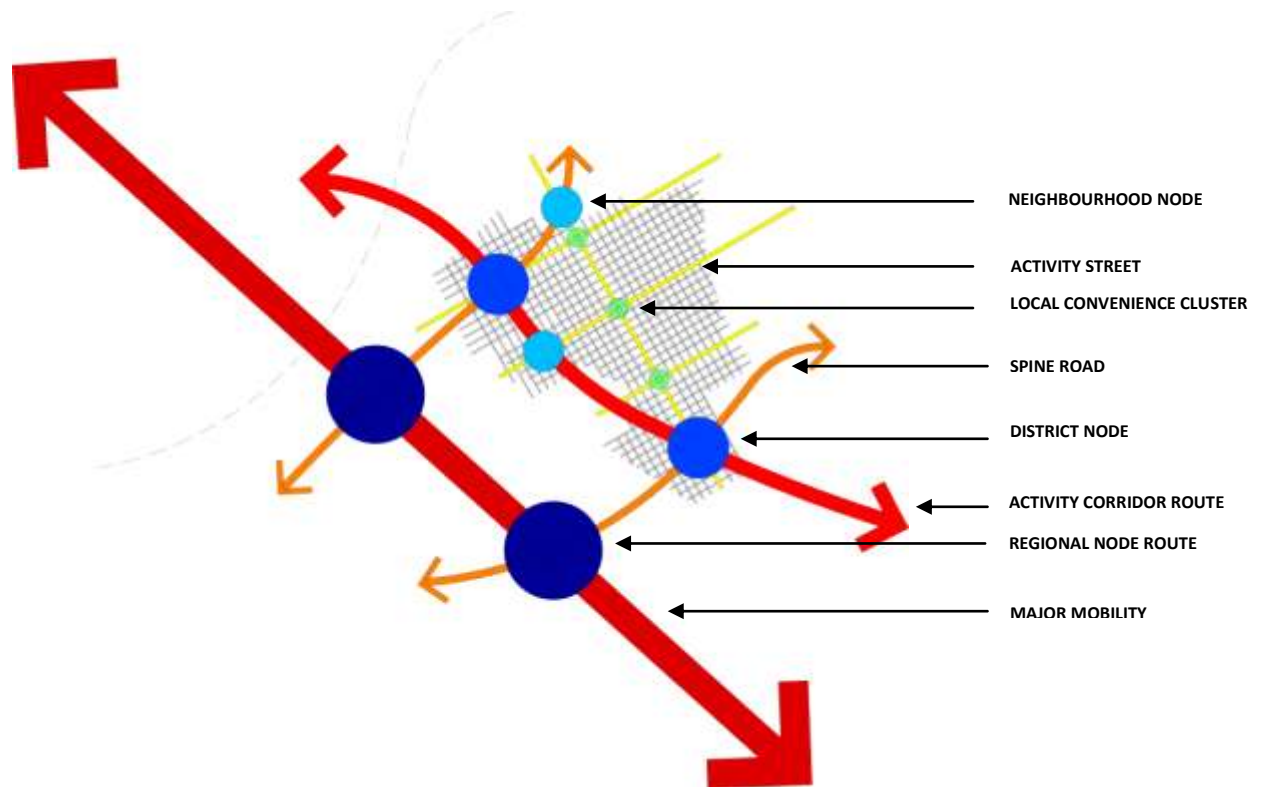
Typically Land Use Planners and Transportation Planners have different definitions of a corridor system; however the above mentioned elements are generic fundamental components that support a corridor system.

Corridors may be geographically defined by natural features such as ridges, ranges, rivers or the sea, and are either organic or planned. They can be identified as multi-stranded movement systems that are determined on public transport networks. The transport networks can take a combination of forms from rivers, main roads which consist of at least one but in most instances facilitate more than two movement systems, or train networks where stations are roughly 1600 meters apart, which is equivalent to a 10 minute walk. Corridors can exceed lengths of thirty kilometres and vary from two to five kilometres in width (GAPP, 2007). In the urban context, these movement systems normally consists of a number of incoherent, however linked, high streets that are focused along a common and central system. Corridors will expand in width as a number of crosswise streets form interconnections with various longitudinal movement systems, consequently creating a more structured and intense environment (GAPP, 2007). The concentration of high streets, stations and cross streets fuel the rise of nodal developments along the spine. Corridors are complex systems which encapsulate a variety of mixed land uses. The ribbon like system, due to its flexibility has an intricate range of socio-economic profiles as a result of the interrelationship of 'local', 'district' and 'regional' identities.



#### 2.4.1.1 Corridor Hierarchy

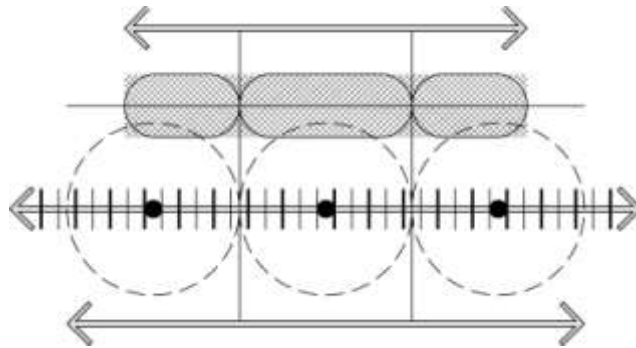
The advantage of having a hierarchically differentiated (defined in terms of continuity) system of routes making up the corridor is that a more complex pattern of land values occurs, allowing all activities, large and small, formal and informal, to find a place within the system.



**Figure 2: Corridor and Node Hierarchy** (Logan, 2011)

From the outset a distinction needs to be made that corridors, spines and activity streets are not one in the same. Each are related to the other in a nomenclature but have a similar however diverse set of characteristics. Therefore the following definitions from the 'Land Use Corridor and Nodes Study' done by the CSIR in association with the eThekweni council in 2000 has been used to define each concept:-

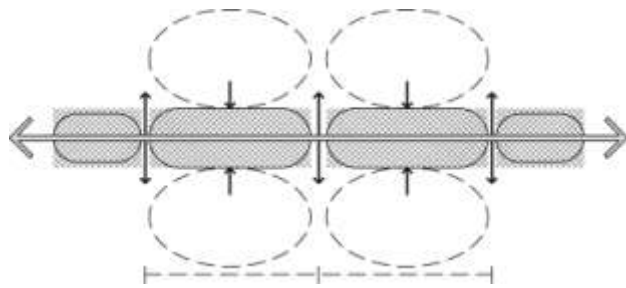
- I. **Activity Corridors** – *'An activity corridor is a linear zone, traversing urban or inter-urban areas, and surrounding a significant road or public transport infrastructure which forms its spine'* (Green et al; 2000, xv) (See conceptual diagram on page 24).



**Figure 3: Activity Corridor** (IRC - South Coast Road Economic Framework, 2005).

As illustrated by the above diagram, activity corridors are urban intensive bands which support intense transport infrastructure that provides high levels of accessibility to neighbouring areas. Through the activity corridors, intensive transport linkages and powerful land-use components arise. These powerful linkages reinforce and increase land prices along the network, as areas of greater accessibility demand greater land values. The CSIR report (2000) identifies that activity corridors can follow either a more traditional approach by consisting of higher residential density, or a more intensive employment generating approach. Despite the residential, commercial or mixed use characteristics created along the corridor, the degree of the growth and development of a corridor largely depends on the available land on either side of the movement system. For corridors to function efficiently and effectively they need to incorporate one or more spines or activity streets and a number of nodes. Major corridors accommodate central linear transport routes, such as railway networks and freeways, large shopping concentrations, industrial parks, social, cultural and sporting facilities, and generally a large amount of residential accommodation. The combination of these and other aspects result in activity corridors having a higher market threshold than spine roads and activity streets (Green et al, 2000).

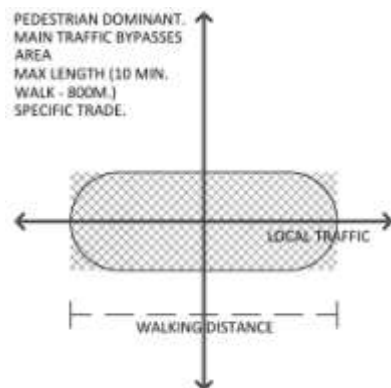
- II. **Spine Road** – *‘This refers to the central road or high street of the activity corridor on which all activity is focused and which carries the major road-based public transport services’* (Green et al, 2000, xv).



**Figure 4: Spine Road** (IRC - South Coast Road Economic Framework, 2005).

The orientation of spine roads provides the ultimate locations for business and community facilities, as well as high density housing. An assortment of high density land uses such as retail, cultural and residential components are give access to, supported and encouraged by the principles and underlying functions of spine roads. The same principles of linearity and accessibility that apply to the activity corridor apply more specifically to the spine roads. Spine roads may be composed of a ne of three basic types of road infrastructure namely:- dedicated activity streets; two-way super-streets; and a one-way couplet super-street systems' (Green et al, 2000).

- III. **Activity Street** – *'Activity streets incorporate both the land use along the spine road, as well as the spine road of a 'mini corridor' with local significance'* (Green et al, 2000, xv).



**Figure 5: Activity Street** (IRC - South Coast Road Economic Framework, 2005).

The same principles of linearity, accessibility and market threshold that are relevant to corridors apply, but there are much lower levels of opportunity; for example, there may be no heavy rail transit,

freeways or metropolitan scale land-uses in close proximity' (Green et al, 2000). Activity streets have a tendency to develop spontaneously within urban areas, and can develop as a result of concentrated local trips within a local neighbourhood. Although activity routes are significant they do not connect primary metropolitan nodes, they create the local focus and '*linear heart*' of an area (Green et al, 2000).

#### **2.4.1.2 Common Elements of Corridors**

Through the study of corridors it has emerged that these movement systems have dominant characteristics. The main components of a corridor can be identified as land uses, modes of transport, physical form and scale, associated linkages, as well as socio economic status of corridor residents. Corridors thrive on a variety of mixed multi-functional land uses. The more diverse the land uses are, the better equipped the corridor is to fulfilling its associated function. The main types of land uses found along a corridor have been acknowledged as retail, offices or services, motor related and mixed land use features. A second element of corridors is the different modes of transport that move along the network systems which are predominantly private vehicles and an assortment of public transport. In order for a corridor to function efficiently and expediently, its shape and form needs to resemble a ribbon and or beads on a string. This ideology creates a good visual image of the movement systems or corridors, however it is important to note that nodal placements along the corridor are not regular and form at high order intersections. The size and scale of corridors vary according to the position - for example, activity corridors are city scale large inter-urban corridors; spine roads are district level medium scale spines; and activity streets are local small scale high streets. In order for corridors to thrive it is important that they make meaningful connections and linkages between different points such as townships and the CBD, industrial areas, retail nodes and or suburbia. Without these connections, the ability of the corridor to function efficiently will be reduced. The last notably dominant feature of a corridor is the socio economic status of corridor residents. Residential buildings which line the corridor tend to be a combination of up-market high rise, up-market low to medium density, emerging low middle class and high density low income.

Apart from these key characteristics, corridors contain generic elements which define them and set them apart from other typical streets. These include;

- A major metropolitan gateway;
- A secondary gateway;

- A pinch point;
- Activity strips;
- Dual access boulevards;
- Interchanges;
- Station squares;
- Structured public transport stops;
- Sports or recreational forecourts;
- Public or civic forecourts; and,
- Structured non-motorised movement paths.

Corridors may contain some, but not necessarily all of the elements and in different combinations.

As illustrated, corridors are intricate and fluid systems that require a combination of components to make a complete structure. These components fit together like a puzzle, however each system may contain a different combination of elements, and only once all pieces are put together will the system function efficiently. Like many concepts in spatial planning, corridors have relevance's with other built environment disciplines. The challenge is to integrate the various uses of the concept into a classification that is clear and unambiguous and in a manner that enhances integrated development planning in its application.

Nodal development associated with and around activity corridors, spine roads and activity streets are not exclusive to liner developments. Activities will logically cluster around areas of greater intensity and high accessibility and convenience. The orientation of these systems symbolic relationships between large and small units is well established. This point of reference facilitates corridors inability to be fundamentally effected by change, providing effective methods of breaking down fragmentation and increasing integration.

#### **2.4.1.3 Corridor Initiatives**

Corridor initiative may evolve as a result of a number of projects such as public transport, non-motorised transport, land rationalisation, housing infill, provision of public facilities, public space programmes and small business promotion projections. These initiatives are more about the recognition of beginnings and incentives and less about the end state. They are about creating an environment

which promotes and encourages long term, spontaneous, consolidation, intensification and growth. Corridors are not comprehensive; they are the result of long term processes and should not be seen as a once-off project. These networks are *'instead made up of a series of strategies, selective actions and interventions of diverse types, initiated in the hope and belief that these will lead to spontaneous and positive responses in surrounding areas overtime'* (PPDC, 2007; 39). They are, to a great extent, dependent upon public-private partnership and public expenditure, as necessary in order to give direction to private sector investment. Public investment is necessary to create the preconditions for private sector response and to create and reinforce investor's confidence. These initiatives cannot be undertaken in isolation, and are reliant on strong partnerships and leadership roles that need to be addressed in order for the corridor to yield success.

The purpose of a corridor is to stimulate growth, and to provide reinforcement and consolidation of identified linear areas of urban development or emerging concentrations linked to road networks. Therefore successful corridors are a result of intensive activity location and the permeability of the pedestrian environment. In order to accommodate these elements along a corridor, interrelated and inevitable requirements need to occur. Firstly, where necessary, roads must be narrow enough for pedestrians to cross efficiently. If the road does not allow for this, the road needs to be narrowed or pinched. This can be achieved by the reduction and merging of traffic lanes and the extension of pavement areas into the road area. Mechanisms of this type have been used in the Bellair Corridor located in Cato Manor Durban.

#### **2.4.1.4 Nodes**

Nodes occur at different scales along a corridor or movement network and can be alluded to as 'beads on a string'. The intensity of a node is determined by the friction or energy created by the intercepting movement networks. In an article entitled *'A Tale of Two Cities: A Matrix of Node'*, written by Holden (2011) in the South Africa Property Review), a node constitutes at least the following;

- I. **Land Use:** - Activities are clustered to achieve economic efficiency and a combination of compatible land uses;
- II. **Urban Form;** - The node is contained within a clear boundary and a recognizable core. It has a pedestrian focus, but does not necessarily exclude vehicular traffic. Development provides a

fine-grain, pedestrian friendly interface. Public space such as parks and squares are linked to the pedestrian network;

- III. **Movement and Transport:** -The node has a strong pedestrian focus and pedestrian connectivity. Accessibility via private transport is convenient but does not dominate movement within the node. Public transport is integral to the design and functioning of the node;
- IV. **Public Amenities:** - Public amenities and community and social facilities are linked to pedestrian routes and integrated with commercial activities;
- V. **Management:** - The node is managed as a cohesive entity and not merely as a series of separate properties, landowners and activities. Public areas are beautified and maintained as image building and unifying elements of the node.

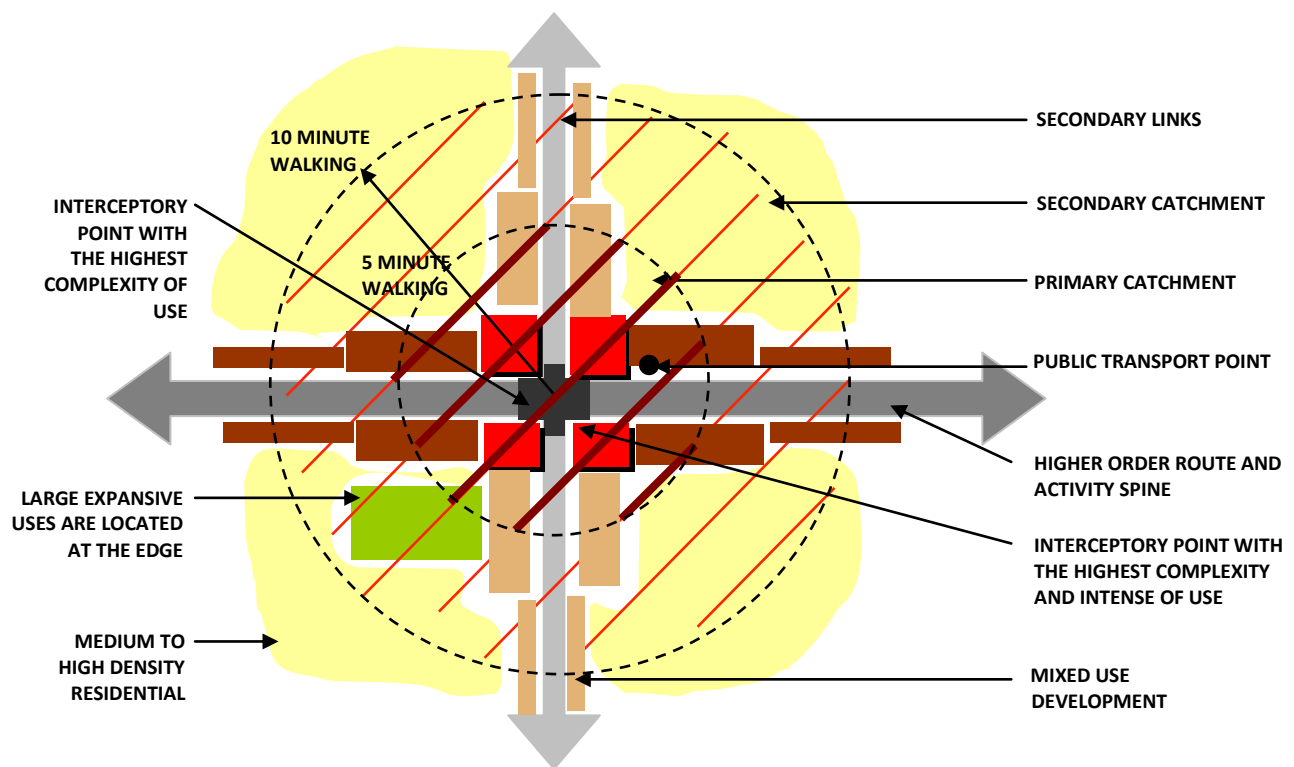


Figure 6: Composition of a Node (Iyer, 2008)

#### **2.4.1.5 Corridors and Nodes in the South Africa Context**

*'One of the primary motivating factors for the use of corridors in South Africa was that of restructuring the Apartheid City. Since the advent of democracy in 1994, there have been increasing calls to restructure South African cities radically' (PPDC, 2007; 87).*

The reconstruction of the South African landscape is more prevalent in the urban context. The Provincial Planning and Development Commission produced a Report on *'Development Corridors: Towards appropriate planning within KwaZulu-Natal'* (2007), which identifies five interrelated interjections, required for the successful reconstruction process within the South African urban context.

- I. Intensity** – Intensity is not an option. Intensity is required as a prerequisite for the creation of intense, vibrant local markets which are able to compete at a global level. The development of such markets require the input and integration of a number of urban elements, such as; influential environments in order to create opportunities for large and small business to flourish, facilitating a symbiotic relationship. High densities as a precondition for the promotion of public transport and non-motorised modes of movement; greater efficiencies in terms of utility and social infrastructure to be achieved under high density conditions.
- II. Non-motorised and Public Transport** - Non-motorised and public transport movement modes become the dominant modes of movement. Efficient transportation requires relatively continuous movement channels, which are reinforced by high thresholds of support. Therefore housing is utilised to reinforce and intensify corridors that carry public transport, as well as to reinforce transportation interchange.
- III. Greater Mix** – The third challenge in the reconstruction of the South Africa urban landscape refers to the ability to influence and alter the current mono-functional character of the South Africa cities and to adopt a more urban model of development by achieving a greater urban mix.
- IV. Integration** – Higher levels of integration refers to race, class culture and ages. *'Spatially, an important dimension of this is breaking down the coarse grained, fragmented fabric of South African cities, which has resulted from the applications of the central precepts of the two ideologies of modernism (particularly the neighbourhood unit concept) and Apartheid or separate development (the Group Areas Act, Act 66 of 1966, as amended), so that different activities and groups lean upon, and support, each other. Urban corridors have an important role to play in this integration'* (PPDC, 2007, 88).



- V. Promoting Greater Equity and Convenience** - Providing people the freedom to move more freely between points as well as modes of transport. Therefore encourages a more decentralised pattern of development, particularly with regards to economic activities.

#### **2.4.2 NEW URBANISM**

*‘Cities and towns have been engines of growth and incubators for civilization and have facilitated the evolution of knowledge, culture and tradition as well as industry and commerce. Urban settlements properly planned and managed, hold the promise for urban development and protection of the worlds natural resources through their ability to support large numbers of people while limiting their impact of the natural environment’* (Second United Nations Conference on Human Settlement (Habitat II).

New modernism development focuses on entrenching a number of principles such as walk-ability, connectivity, diversity, a mixture of land-uses, mixed housing opportunities, increased densities, sustainable transport, as well as an improved quality of life, assembled in a coherent, integrated manner in order to form a complete community in any particular environment. These principles are primarily influenced by urban design guidelines and standards which are fundamental and assist the development of a sustainable compact city.

New Urbanism is comprised of ideals such as mixed uses, more walk-able neighbourhoods, and locally relevant architecture. In neighbourhoods with diverse populations, shared understanding of these ideals cannot be assumed. The ideal should seek to accommodate social differences without exclusion (Day, 2003).

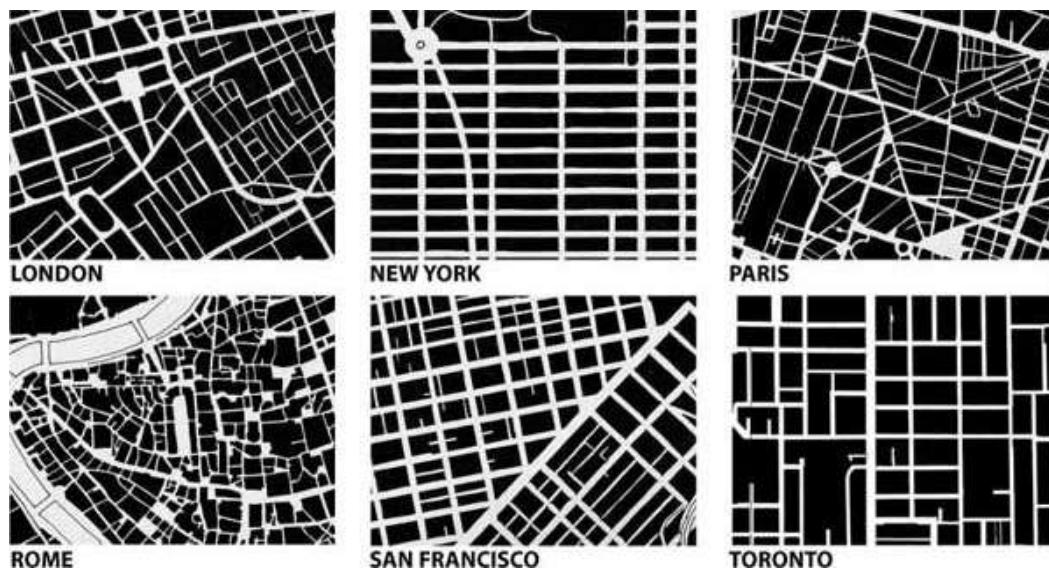
##### **2.4.2.1 New Urbanism Principles**

The following principles have been identified as the building blocks for creating people centred sustainable environments. These principles can be applied to new developments or the regeneration of existing towns or cities. New Urbanism principles can be applied at many different scales such as a single building or a cluster of buildings, a city block or a neighbourhood, village, town or city.

- I. Accessibility and permeability** – Designing and developing spaces which allow maximum accessibility and permeability to all its users is fundamental to the goals of New Urbanism. Creating environments for people that offer a variety of choice and flexibility enables the space to be more

robust and versatile. Permeability should be enhanced for all users including vehicular and pedestrian movement. The development of a hierarchy of interconnected street grids helps disperse vehicular traffic, ease walking, and creates distinctive spaces assisting with the navigation of the area. These elements are distinct within the images below illustrating well known cities street grids.

Precinct zones should be carefully designed to facilitate an 800 meter or a 10 - 15 minute walk between places of desire. Designs should aim to create wide pedestrian friendly streets which are framed by buildings lined with colonnade edges. 'Wide roads would be narrowed to divert through-traffic and to increase 'pedestrian-friendliness' (Day, 2003). The streets should be traffic calmed to discourage fast moving cars, and in special cases streets should be free of cars allowing for fully pedestrian priority areas. Urban landscaping and beautification therefore becomes an important feature in these zones.



**Figure 7: Precedent illustrating Accessibility and Permeability of World Cities**

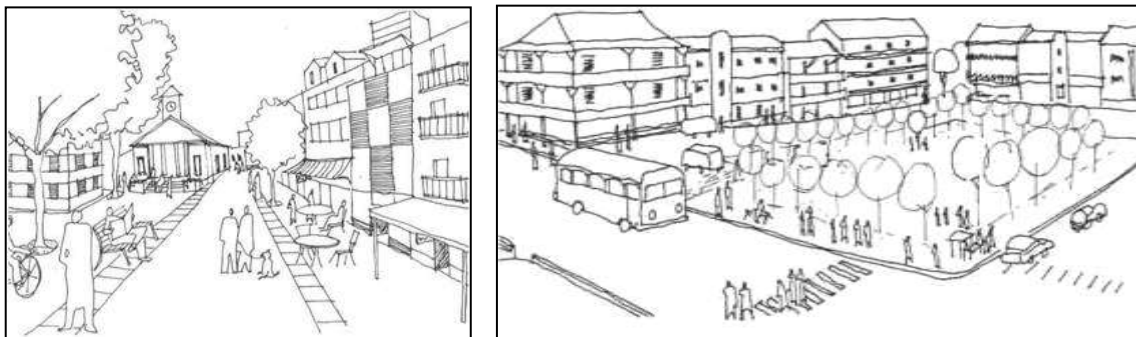
([www.pinterest.com/pin/126663808239529301/](http://www.pinterest.com/pin/126663808239529301/))

- II. Richness of Activities** – Richness of activities ensure that a dynamic mix of integrated activities exist to promote access to a wider range of opportunities and experiences, which will guarantee that there is a diverse range of people of different ages, classes, cultures and race. A range in types, prices and sizes of housing opportunities within a precinct will also increase the dynamic nature of an area. A diverse environment increases levels of choice available to its users.



**Figure 8: Precedent illustrating Richness of Activity.** (Iyer Urban Design Studio Precedent Images)

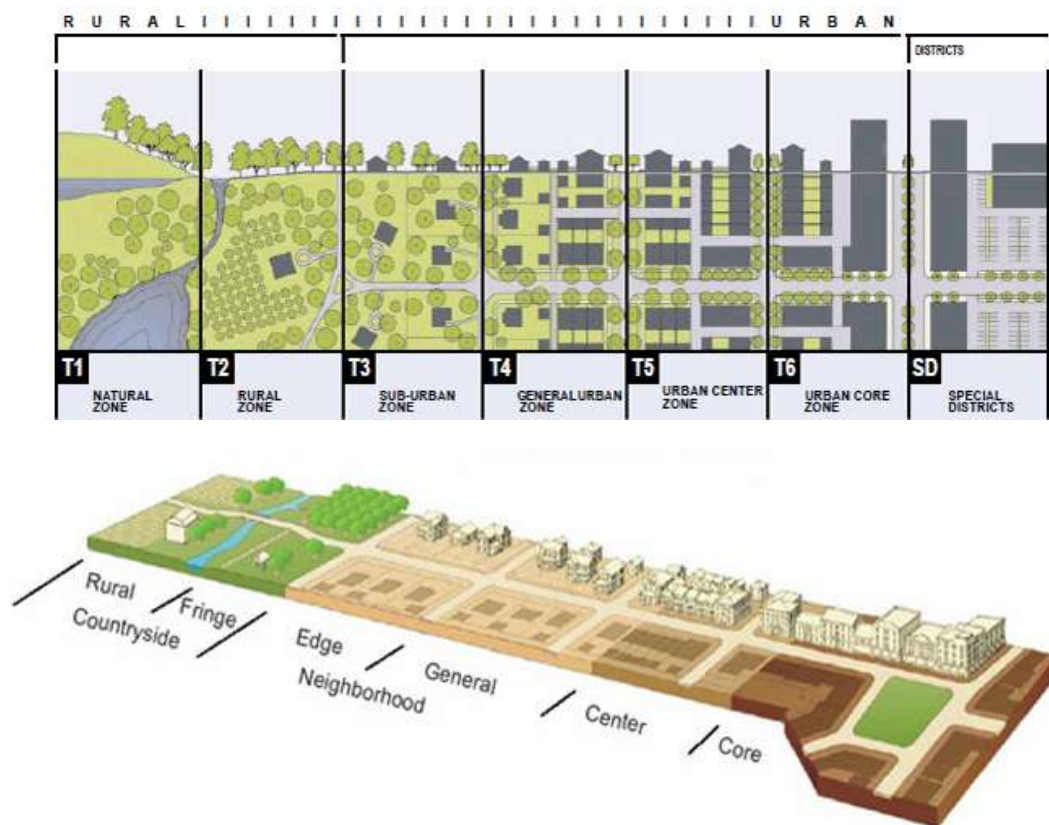
**III. Urban Design and Architectural Guidelines** – Developing a ‘sense of place’ within an area is fundamental for the precinct to develop its own image and identity. The development of an areas identity is significant for its success amongst a range of similar nodes. ‘Neighbourhood design should reinforce the unique identity of each place by adopting a consistent and distinctive architectural style that draws on local history, culture, geography and climate’ (Congress for the New Urbanism 2000, in Day, 2003). Qualities that should be harnessed are places which are of human scale, aesthetically inquisitive, emphasis placed on civic functions and uses, as well as human comfort and safety.



**Figure 9: Precedent illustrating Urban Design and Architectural Guidelines.** (Iyer Urban Design Studio Precedent Images)

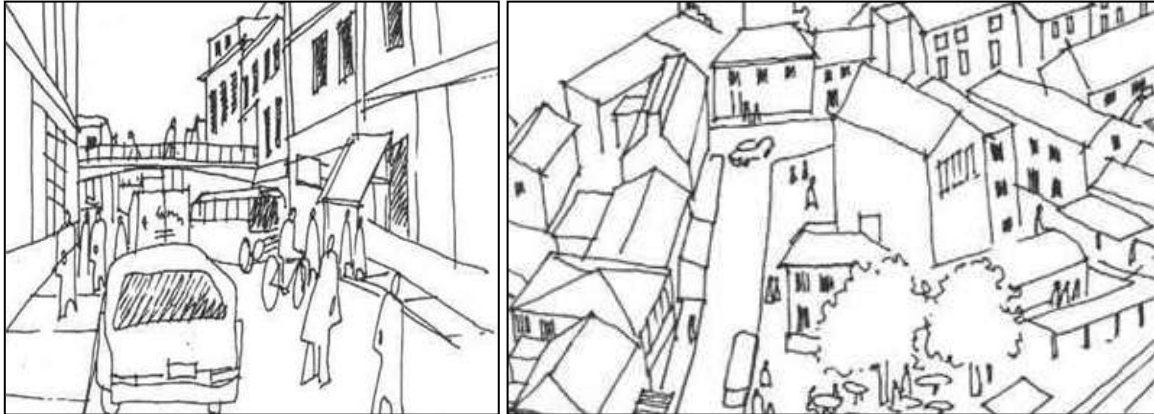
**IV. Traditional Neighbourhood Structure** – A traditional neighbourhood structure has a discernable centre and edge, with public space well defined. The public realm and public space is an important

quality of the environment, which must be defined. The traditional neighbourhood structure has a range of densities and activities which are located within an 800 meter radius or a comfortable 10 to 15 minute walk. Its structure is also characterised by transect planning. Transect planning refers to, *'Highest densities at town centre; progressively less dense towards the edge. The transect approach is an analytical system that conceptualizes mutually reinforcing elements, creating a series of specific natural habitats and/or urban lifestyle settings. The Transect integrates environmental methodology for habitat assessment with zoning methodology for community design. The professional boundary between the natural and man-made disappears, enabling environmentalists to assess the design of the human habitat and the urbanists to support the viability of nature. This urban-to-rural transect hierarchy has appropriate building and street types for each area along the continuum'* ([www.newurbanism.org](http://www.newurbanism.org)).



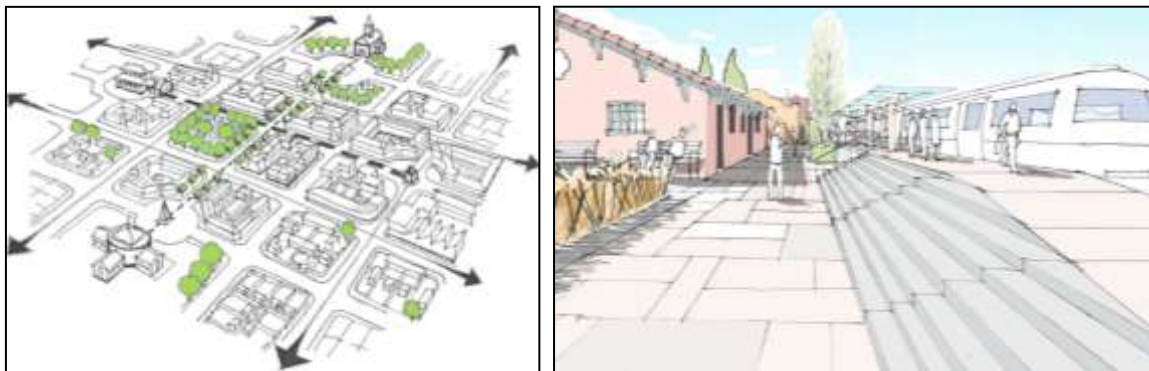
**Figure 10:** Precedent illustrating Urban-to-rural transect (Takemoto, 2001)

- V. Increased Densities** – Increased densities allow for a large threshold to support the environment in which they live. The provision of activities and building densities permits a live, work, play environment that enables a more efficient use of resources and services.



**Figure 11: Precedent illustrating Increased Densities.** (Iyer Urban Design Studio Precedent Images)

- VI. Smart Transportation** – Providing smart transportation involves the development of a network of high-quality transport networks (trains and busses) that connect neighbourhoods, towns and cities together. These networks are supported by the complementary design of pedestrian friendly streets that encourage greater use of non-motorised transport as daily transport.



**Figure 12: Precedent illustrating Smart Transport Properties.** (Iyer Urban Design Studio Precedent Images)

- VII. Sustainability** – Introducing and enforcing sustainable elements require that there are minimal environmental impacts during development and operations of networks and facilities. Existing urban environments must be made aware of energy efficient, eco-friendly methods of production,

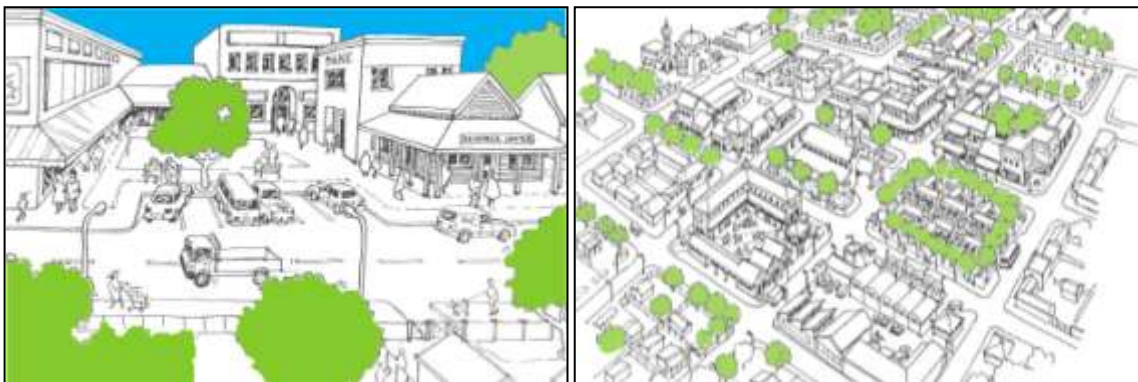


with more local products utilised reducing the global footprint of the area. The introduction of specific green building techniques are welcomed such as planted rooves, rain water harvesting, solar panels and the use of local products. Increasing sustainability in a area however, is more than building green it includes the the encouragement of traditional neighbourhood cluster, where non-motorised public transport as the primary source of movement, comodities bought and sold are locally produced and recycling goods is supported to identify a few.



**Figure 13:** Precedent illustrating Sustainability Qualities ( [www.sustainablelandscapearch.co.uk](http://www.sustainablelandscapearch.co.uk))

**VIII. Quality of Life** – The implementation and facilitation of the New Urbanism principles described yield a high quality environment that creates places which enrich, uplift and inspire the human spirit. Members of the community primarily see their neighbourhood as having a ‘specific heritage, common self identification, a common culture and set of norms... *common ordering of individual needs and wants into a single, shred vision of the future in which all can be shared*’ (Day, 2003 and Barber 1984 in Day, 2003).



**Figure 14:** Precedent illustrating Quality of Life (Iyer Urban Design Studio Precedent Images)

#### **2.4.2.2 The Benefits of New Urbanism**

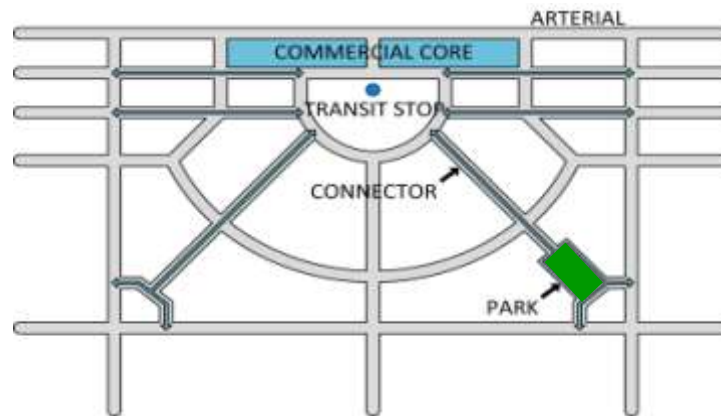
The application of the New Urbanism principles to new or existing properties within neighbourhoods, towns and cities will generate a number of benefits. These created benefits work to the advantage of a range of users who interact with the environment, such as residents, businesses and ultimately the local council. The development of high-quality spaces will ultimately provide a better place to live, work and play, encouraging an environment which is active twenty-four hours of the day. Quality environments are transferred into healthier lifestyles, which are encouraged through the design of pedestrian focused streets, increased freedom of movement and independence to children and elderly, access and availability to recreational areas and aesthetically pleasing environments. The pedestrian designed environment supports a more pedestrian friendly community, therefore providing greater opportunities to get to know other people within the neighbourhood and town, resulting in meaningful relationships and a better sense of community. The increased interest in non-motorised modes of transport will reduce traffic congestion and global emissions therefore contributing positively to the sustainable city programme. A reduction in the use of cars and a mix of residential and commercial uses leads to a decrease in the need for parking facilities and the preservation of public open space. The greater activity generated as a result of the active streetscapes reduces crime and potential dangerous areas due to increased visual surveillance and general activity. Interest will be generated within the neighbourhoods and provides security for property owners, as property prices and values should stabilise, if not increase. Enhanced civic involvement within the area and a more active community will require less governance and control by state institutions.

#### **2.4.3 TRANSIT-ORIENTED DEVELOPMENT**

It has been established that the contemporary formulation of the concept of Transit Oriented Development (TOD) originated in the United States during the late 1970s and early 1980s'. The prominence of this concept only gained momentum during the 1990s when it gained a strong association with the emerging 'smart growth' and 'new urbanist' movements (Wilkinson, Unpublished).

TOD is characterised by a set of distinct features. They are nodal or precinct developments defined by walkable, mixed use urban form of which a transit station is the epicentre. The densities are highly concentrated around the transit stations and progressively decrease outwardly for approximately 400 meters to 800 meters, which is representative of a comfortable pedestrian scale. A TOD is a unique form

of urban development which is synonymous with the New Urbanism and Smart Growth principles that are gaining momentum throughout the world as a tool to achieve greater sustainable development. 'A primary goal TOD is to integrate land use and transportation to create successful and sustainable urban environments that overcome automobile dependence' (Renne in Thwaites et al, 2007; 106).



**Figure 15: Transit-Oriented Development** (Calthorpe (1994) in The City of Calgary Land Use Planning and Policy: Transit Oriented Development, Best Practice Handbook)

#### 2.4.3.1 TOD Principles

No two areas or station precinct are the same, however they are guided by particular attributes which are critical to the success of any TOD. The City of Calgary in 2004 developed a TOD Best Practice Handbook, which was intended as an information resource guide for Council, developers, builders, planners, urban designers, communities and the general public. The aim of the handbook has been to explain the purposes, characteristics, benefits and challenges of TOD. The key components, as identified through the Calgary (2004) Handbook, which are commonly found to be critical to the success of TOD are identified as;

- I. **Get the Land Uses Right** - A fundamental component of creating the correct mix of land use within a TOD zone is to distinguish between supportive land use and non-transit supportive uses. Non-transit supportive uses generate very little or no ridership. They inevitably consume large tracts of land and predominantly create unsafe environments for pedestrians. Non-transit supportive uses are primarily dependent upon a vehicle for transporting goods and require significant land for low intensity development and parking. Classic examples of non-transit supportive uses are large wholesale stores, warehouse storage, car dealerships, auto service centres and regional sports fields. Transit supportive uses are identified as high pedestrian generators which promote greater



transit ridership. Uses that are recognised as significant transit supportive include; medium to high density residential, offices, high schools and tertiary facilities. Complementary uses to the primary supportive use are noted as appropriate retail, restaurants, personal service and civic functions. The complementary or secondary types of uses will support functions and generate activity in both peak and off-peak hours.

Encouraging a robust mix of uses such as residential, office and supporting services in a station precinct, generates a live, work, play environment and promotes a sustainable development. The development of such an environment encourages activities during off-peak times, contributing to active and visual security of the area. Locating the majority of the transit-supportive uses within walking distance, approximately 400 meters to 800 meters radius of the station, allows for greater pedestrian movement, therefore making the most convenient and attractive travel mode for the site.

- II. Promote Density** - Creating appropriate development densities and thresholds around each transit station is critical. The development of densities patterns needs be in context with each particular station. It is ideal to locate the highest densities closest to the transit station, to enforce the desired outcome. *‘Intensity of development can taper off away from the station, to create an appropriate transition and interface with the surrounding community’* (Calgary, 2004).

Whilst significant densities at the station precincts are critical, a master plan should be developed to allow flexibility to increase densities over time, and adapt to the changing needs of the community. *‘Vacant lots, surface parking lots and existing low intensity use present opportunities for future infill development’* (Calgary, 2004).

The following table has been adapted from the original in Griffin’s ‘Building Type Basic for Transit facilities’, and indicates the typical gradient of land intensity from the centre of the node or station facility.

Gradient of Land Intensity and Access Options			
Station Planning Area Zone	Distance	Relative Level of Development Intensity	Transit Station Access Options
Core	400 m radius	Higher density, mixed land use including office, retail and service businesses, residential, and compatible community facilities.	Short walk, bicycle or bus
Neighbourhood or Ring	400 m -800 m radius	Medium density, mixed land use including office, retail, and service businesses, residential, and compatible community facilities	Long walk, bicycle or bus
Support Area	800 m – 2 500 m radius	Development intensity is likely to vary, relative to the development that surrounds the overall station area. Mixed, medium-density land use may continue in support of the neighbourhood/ ring area, and lower-density development, including retail and service businesses serving larger markets, may occur.	Bicycle, bus, or park- and-ride

**Table 1:** Gradient of Land Intensity and Access Options (Griffin, 2004; 53, 55 and 57)

- III. Create Convenient Pedestrian Connections** - The key to convenient pedestrian movement is to make sure it is short, continuous and direct. Major, contributing activities of the precinct needs to be located within 400 to 800 meters of a station. The sidewalks and paths anchoring the precinct need to be universally accessible and identifiably distinguishable. All pedestrian routes should be designed around public streets, unless there are good opportunities to knit new parts of the town or city together which are safe and currently existing. Vehicular and pedestrian routes should be designed to minimise points of conflict, allowing for a better quality environment.

- IV. Ensure Good Urban Design** - *‘Urban design is the art of making places for people. It includes the way places work and matters, such as community safety, as well as how they look. It concerns the connections between people and places, movement and urban form, nature and the built fabric, and the processes for ensuring successful villages, towns and cities’* (By Design, Commission for Architecture and the Built Environment, 2000).

Getting the basics right requires an approach which promotes particular ‘urban truths’. These are the timeless qualities which create opportunity, facilitate choice, promote safety, encourage investment and which has at its basis the development of places that work for all people.

- V. Create Compact Development Patterns** - Planned structured development that aims to compact street networks, cluster buildings and provide for future growth opportunities is fundamental to successful TOD. Greater permeability and accessibility increases the efficiency of the transit circulation and offers the users greater choice. The development of a city grid system which is between 100 to 150 meters in length helps provide a comfortable walking distance, and allows greater flexibility within the system. Buildings of similar activities that are grouped or clustered together provide a “one-stop” opportunity to conveniently access a variety of destinations on foot’ (Calgary, 2004). The buildings should also be thoughtfully assembled to accommodate future intensification.

- VI. Manage Parking** - A primary aim of TOD is to lessen the dependency on vehicles; therefore providing accommodation for vehicles must be carefully managed and planned. However, it must not be forgotten that vehicles, to a degree, are still critical to the success of a vibrant TOD district. For that reason provision for parking must be taken into account. Creating adequate parking for these facilities will require a staged and iterative process – accommodating enough, but not too much parking; strategically located parking areas at the rear or sides of the buildings; and smaller parking lots which do not overwhelm a station precinct with large hard space. Provision also needs to be made for bicycles, as *‘bicycles can extend the local commuting range beyond the typical 800 meters’* (Calgary, 2004). Therefore ample, convenient and safe storage lots for bicycles need to be placed at each transit station, in close proximity to the transit station entrance.

- VII. Make Each Station a 'Place'** - As the focal point in each transit precinct, the transit facilities become a destination in its own right, as well as a gateway to the rest of the town or city. Due to the dominance the facilities hold, the buildings themselves should become landmarks – notable places and an aid in local way-finding and legibility.

From the inception of such facilities, characteristics such as sightlines and views to and from the stations need to be harnessed and developed to help orientate pedestrians to their surroundings. Legibility in an environment is critical for pedestrians to navigate through a system. 'Sightlines can be terminated by important features such as the station, a community building, monument or public art' (Calgary, 2004). Buildings and spaces which promote public-ness around the station facility are encouraged to create visual interest and safer pedestrian environments. *'Buildings oriented towards the street edge can enclose important vistas and shape the public realm'* (Calgary, 2004). The integration of open spaces in close proximity to the station facility emphasises the station as a public space. They provide physical and visual relief to the surrounding built up environment.

#### **2.4.3.2 Transit Oriented Development versus Transit Adjacent Development**

The table below demonstrates the differences and advantages between Transit-Oriented Development and Transit Adjacent Development. Without careful, well thought-out planning, transit precinct development may result in Transit Adjacent Development instead of the Transit-Oriented Development. The implications of which will result in unsuccessful and unsustainable development patterns which do not meet the criteria identified above, i.e. providing the correct land use, promoting efficient density patterns and pedestrian connectivity, developing good urban design characteristics and acknowledging that the transit station is a place in its own right.

Transit Oriented Development	Transit Adjacent Development
<ul style="list-style-type: none"> <li>▪ Grid street pattern</li> <li>▪ Higher densities</li> <li>▪ Limited surface parking and efficient parking management</li> <li>▪ Pedestrian- and bicycle-oriented design</li> <li>▪ Mixed housing types, including multi-family</li> <li>▪ Horizontal (side-by-side) and vertical (within the same building) mixed use</li> <li>▪ Office and retail, particularly on main streets.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Suburban street pattern</li> <li>▪ Lower densities</li> <li>▪ Dominance of surface parking</li> <li>▪ Limited pedestrian and cycling access</li> <li>▪ Mainly single-family homes</li> <li>▪ Segregated land uses</li> <li>▪ Gas stations, car dealerships, drive-through stores and other automobile-focused land uses.</li> </ul>

**Table 2: Transit-Oriented Development versus Transit Adjacent Development** (Renne, 2009 in VPTI, 2011)

### 2.4.3.3 Transit Area and Land Use Relationship

*‘The desire to coordinate the planning of land use and transit investment is a growing trend across the world. Many cities and regions are promoting better use and intensification of land around major transit facilities as a means to achieve a number of their broader planning goals’* (Griffin, 2004). Densities and increased development intensity is a prerequisite for a successful, self sustaining transit node. The following table indicates the residential and commercial land use densities necessary to support a transit facility. ‘Although the activity levels describe the station area in terms of land use intensity, other characteristics such as the location, mixture of existing and future land uses, types of access, and development potential further differentiate each station area’ (Griffin, 2004:56).

INTENSITY OF LAND USE AND TRANSPORT RELATIONSHIP		
Residential Use	Commercial Use	Transportation Compatibility
15+ unit/ 0.4 ha	50 + employees/ 0.4 ha	Supports rail or other high-capacity service
7 – 14 units/ 0.4 ha	40 + employees/ 0.4 ha	Supports local bus service
1 – 6 units/ 0.4 ha	2 + employees/ 0.4 ha	Support cars, carpools, and vanpools

**Table 3: Intensity of land use and transport relationship** (Griffin, 2004)

The following table highlights six station types against the land use which is typically associated. These tables have been extracted from 'Building Types Basic for Transit Facilities' (Griffin, 2004; 59).

Station Area Classification And Associated Land Uses			
Classification	Station Area Features		
	Distinctive Characteristics	Examples of Desired Land Uses	Transit Service
Urban Mixed Use	Mixed and multiple land use, employment and retail centre, cultural/ civic activity, government centre, high density (Residential and non-residential), predominantly structured parking and some surface parking, grid streets, 3+ story buildings	High-density commercial, office and residential, mixed-use building, cultural and civic facilities, hotels and conference centres, restaurants and services, government offices.	Regional Rail; Intracity Bus; <ul style="list-style-type: none"> <li>▪ Express Bus;</li> <li>▪ Feeder Bus;</li> <li>▪ Local Bus;</li> <li>▪ Shuttle; and,</li> <li>▪ Taxis.</li> </ul>
Specialty Urban	Thematic land use (university, hospital, etc.) mixed and multiple land use, employment centre, mid to high density (residential and non residential), structured or surface parking, grid or modified grid streets.	Institutional and office uses, hospital, clinics, research and development facilities, mid-to-high-density housing, educational facilities, retail restaurants and services, university-related cultural facilities.	<ul style="list-style-type: none"> <li>▪ Regional Rail;</li> <li>▪ Intracity Bus;</li> <li>▪ Express Bus;</li> <li>▪ Feeder Bus;</li> <li>▪ Local Bus;</li> <li>▪ Shuttle;</li> <li>▪ Taxis; and,</li> <li>▪ Park-and-ride.</li> </ul>
Town Centre	Mixed and multiple land use, employment centre, 'main street' commercial, mid-density (residential and non residential), structured or surface parking, grid or modified grid streets.	Retail (facing the street), mid-density, housing and office, mixed use building, town square, restaurants and services, some government office, entertainment.	<ul style="list-style-type: none"> <li>▪ Regional Rail;</li> <li>▪ Local Bus.</li> </ul>
Suburban Employment	Employment centre, mid-and high-density (residential and non residential), structured or surface parking, interconnected streets.	Mid-and-high-density office and housing, research and development facilities, light industry, restaurants and services, accessory retail	<ul style="list-style-type: none"> <li>▪ Regional Rail;</li> <li>▪ Local Bus;</li> <li>▪ Shuttle; and,</li> <li>▪ Park-and-ride.</li> </ul>

Station Area Classification And Associated Land Uses			
Classification	Station Area Features		
	Distinctive Characteristics	Examples of Desired Land Uses	Transit Service
<b>Suburban Residential</b>	Mix of attached and detached housing, neighbourhood business, mid-density (residential and non-residential), surface parking, interconnected streets.	Mid-density office and housing, neighbourhood retail, services and restaurants	<ul style="list-style-type: none"> <li>▪ Regional Rail;</li> <li>▪ Local Bus; and,</li> <li>▪ Park-and-ride.</li> </ul>
<b>Suburban Mixed-Use</b>	Mixed and multiple land use, employment and retail centre, mid-and high density (residential and non-residential), structured or surface parking, interconnected streets.	Mixed-use buildings, retail and office, mid-and high density housing, civic spaces, entertainment.	<ul style="list-style-type: none"> <li>▪ Regional Rail;</li> <li>▪ Local Bus;</li> <li>▪ Shuttle; and,</li> <li>▪ Park-and-ride.</li> </ul>

**Table 4:** Station Area Classification and Associated Land Use (Griffin, 2004)

#### 2.4.4 BUS RAPID TRANSPORT SYSTEMS

Wright (2003) recognises that the *'origins of Bus Rapid Transit can be traced back to Latin American planners and officials seeking a cost-effective solution to the dilemma of urban transport. The rapid growth of Latin America urban centres beginning in the 1970s placed a heavy strain upon urban transport service providers. Facing high population growth from a citizenry dependent upon public transport and having limited financial resources to develop car-based infrastructure, Latin American municipal planners were challenged to create a new transport paradigm. One ingenious response was Bus Rapid Transit, a surface metro system that utilizes exclusive right-of-way bus lanes. The developers of the Latin American BRT systems astutely observed that the ultimate objective was to swiftly, efficiently, and cost-effectively move people, rather than cars'* (Wright, 2003).

Cities throughout the world are initiating the BRT concept in an effort to provide cost-effective transport solutions for their inhabitants. The introduction of which is resulting in the testing and modifying of the system due to unique circumstances therefore *'the state of the art in BRT continues to evolve'* (Wright, 2003). The BRT model is generally understood as a *'high-quality, customer-orientated transit that delivers fast, comfortable and cost-effective urban mobility'* (Wright, 2003). As a result of the evolution

and modification of the system, it is known by other names in various places across the world, 'including High-Capacity Bus Systems, High-Quality Bus Systems, Metro-Bus, Express Bus Systems, and Busway Systems. Ultimately, BRT systems incorporate most of the high-quality aspects of underground metro systems without the high costs. BRT systems are thus also known as 'surface metro' systems (Wright, 2003).

A BRT system can be identified or described as the umbilical cord of a city; with its primary focus to give life. The system becomes a fundamental structuring or restructuring element in the South African context within the overall spatial layout of an urban environment. The new movement systems start to redefine roads as multi-functional, robust activity movement lattices rather than sterile systems with a single purpose.

#### **2.4.4.1 Features of BRT**

Like corridors, BRT systems have distinct identifiable features. Despite the current growing world-wide trend for the introduction of BRT system within world cities, *'few systems have achieved status as a complete BRT system. The recognition of the key characteristics can be invaluable to system designers and developers'* (Wright et al, 2007). According to the BRT Guide developed by Wright and Hook in 2007, the following is a list of features found on some of the most successful BRT systems implemented to date.

- I. **Physical Infrastructure** - The physical infrastructure is defined by segregated bus way or bus-only road networks. A BRT network is predominantly located in the median of the roadway, which is part of an integrated network or routes and corridors. The corridors are enhanced by numerous stations that are likened to beads on a string, which are conveniently located to provide comfortable, secure, weather-protected environment. Stations are created with specific design criteria in mind such as level access between platforms and the vehicle floor, pedestrian ease and convenience, minimising vehicle and pedestrian conflicts to list a few. Both the stations and terminal are also designed to facilitate easy physical integration between truck routes, feeder services and other mass transit systems. The public nature of the system warrants the improvements to nearby public space which contribute to the node that is created by the station precinct. Physical infrastructure designs also need to acknowledge the ease of access between the



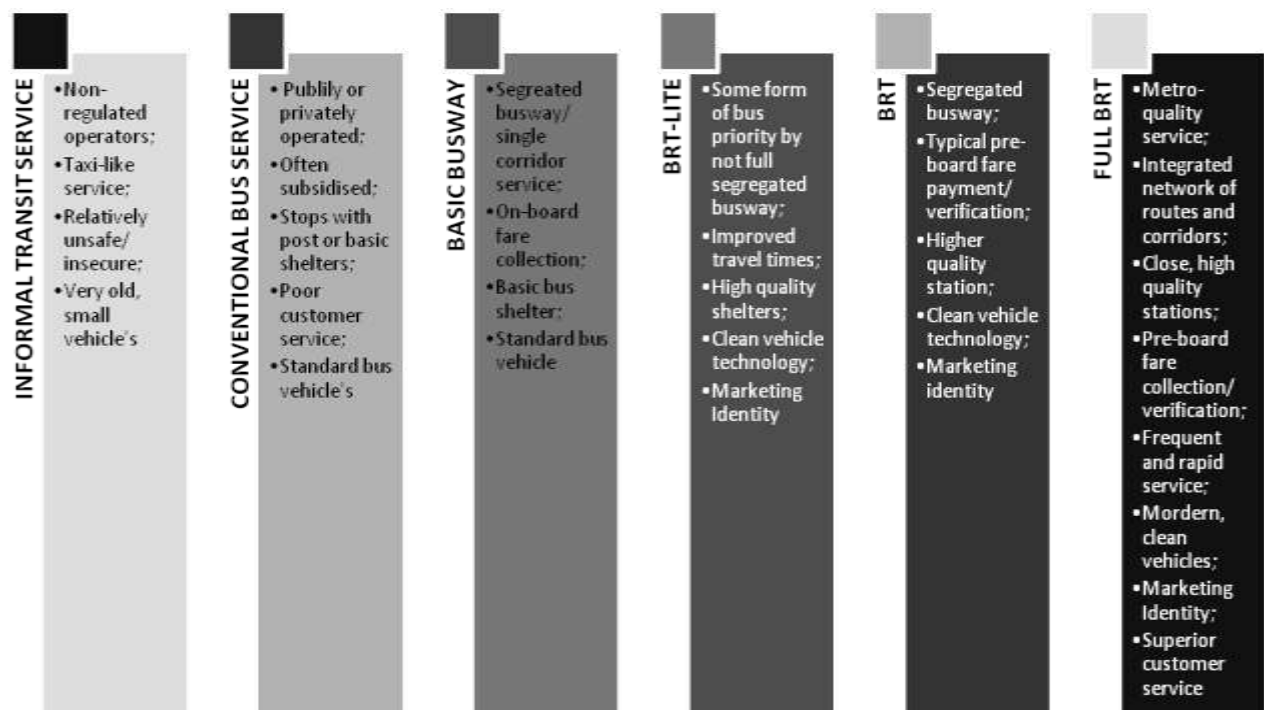
system and other urban mobility option such as walking, bicycles, taxis, and private vehicles. Special provisions for ease of access by physically disadvantaged groups such as children, the elderly as well as the physically disabled is also an important design element.

- II. **Operations** - Frequent and rapid service between major origin and destination points along the system is part of the operational requirements of the network. Its efficiency and success lies in the ability of the operations team to provide ample capacity for passenger demand along the corridor, as well as rapid boarding and alighting. The effectiveness of the system also relies on the pre-board fare collection, verification and fare-integration between routes, corridors and feeder services at the station precincts.
- III. **Business Institutional Structure** - The BRT system can be defined as a 'closed-system', entry to which is restricted to prescribe operators that have been identified under a reformed business and administrative structure. Contracts are awarded to operators through a competitive, wholly-transparent bid process. The effective and efficient management of the business operations should result in the elimination or minimization of public-sector subsidies towards the system operations. Independently operated and managed fare collection system as well as quality controlled oversight from an independent agency are important to the success of the overall operations.
- IV. **Technology** - High-tech, world class technology is required for the successful running of the highly technical system, for both the busses on the routes as well as the fare and management operations. Busses are required to conform to standards which provide for low-emissions and low-noise technology, contributing to the sustainable development objectives of the overall system. The systems management is controlled through a centralised control centre utilising applications of an Intelligent Transport System (ITS), which assists in automatic vehicle location and provides signal priority at intersections. This high-tech technological system also provides support for the automotive fare collection and fare verification technologies required to facilitate the effective management and operations of the overall system.

**V. Marketing and Consumer Service** - A key tool for success is distinctive marketing and identity for the system as a whole. Excellence in customer service and provision of key customer amenities is critical to the on-going success, as well as clear route maps, signage, and real-time information displays which are visibly placed within stations and vehicles used on the system.

#### 2.4.4.2 BRT Classifications

The BRT Planning Guide (2007) has identified a list of characteristic and a tiered approach to defining and assessing the BRT concept. The following table illustrates the general ‘quality spectrum’ of road based public transport systems, and the basic classifications of the graded transport system.



**Figure 16: Quality Spectrum of Road Based Public Transport System (Wright et al, 2007)**

*‘A successful BRT system does not simply move a person from point A to point B. A successful BRT system invokes a feeling of confidence to its users, creates a sense of community pride, and help to transform the very nature of a city’s urban form’* (Wright et al, 2007; 13). The following table identifies the difference between the qualities of a ‘full BRT’ system and that of a general ‘BRT’. A strict classification of the ‘full BRT’ as identified below recognises only two truly ‘full BRT’ systems in the world, as of March

2007. The two systems that have been acknowledged are Columbia's Bogotá and Brazil's Curitiba systems – both of which will be looked at in greater detail in chapter three of this study.

The lack of significant 'full BRT' systems is due to the fact that it is a part of relatively new global trend in transportation and the concept is still evolving in practice. The BRT Planning Guide also notes 'that 'full BRT' has only occurred in the two cities with the highest levels of political commitment towards quality public transport' (Wright et al, 2007; 14). The 'full BRT' system is defined as a system with the following minimum characteristics, and a general BRT as;

'FULL BRT'	GENERAL BRT
<ul style="list-style-type: none"> <li>▪ Segregated bus ways or bus-only roadways over the majority of the length of the system's trunk/ city centre corridor;</li> <li>▪ Location of the bus way in the median of the roadway rather than in the curb lane;</li> <li>▪ Existence of an integrated 'network' of routes and corridors;</li> <li>▪ Enhanced stations that are convenient, comfortable, secure, and weather-protected;</li> <li>▪ Stations provide level access between the platform and vehicle floor;</li> <li>▪ Special stations and terminals to facilitate physical integration between truck routes, feeder services, and other mass transit systems (if applicable);</li> <li>▪ Pre-board fare collection and fare verification;</li> <li>▪ Fare – and physical – integration between routes, corridors, and feeder services;</li> <li>▪ Entry to system restricted to prescribed operators under a reformed business and administrative structure ('closed system');</li> <li>▪ Distinctive marketing identity for system.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Segregated bus ways or bus-only roadways over the majority of the length of the system's trunk/ city centre corridor;</li> </ul> <p>And requiring at least <u>two</u> of the following features;</p> <ul style="list-style-type: none"> <li>▪ Existence of an integrated 'network' of routes and corridors;</li> <li>▪ Enhanced stations that are convenient, comfortable, secure, and weather-protected;</li> <li>▪ Stations provide level access between the platform and vehicle floor;</li> <li>▪ Location of the busways in the median of the roadway rather than in the curb lane;</li> <li>▪ Pre-board fare collection and fare verification;</li> <li>▪ Special stations and terminals to facilitate physical integration between truck routes, feeder services, and other mass transit systems (if applicable);</li> <li>▪ Fare – and physical – integration between routes, corridors, and feeder services;</li> <li>▪ Entry to system restricted to prescribed operators under a reformed business and administrative structure ('closed system');</li> <li>▪ Distinctive marketing identity for system;</li> <li>▪ Low-emission vehicle technology (Euro III or</li> </ul>

'FULL BRT'	GENERAL BRT
	<p>higher);</p> <ul style="list-style-type: none"> <li>▪ System Management through centralized control centre, utilising ITS application such as automatic vehicle location;</li> <li>▪ Special physical provision to ease access for physically-disadvantaged groups, such as children, the elderly, and the physically disabled'</li> <li>▪ Clear route maps, signage, and/ or real-time information displays that are visibly placed within stations and/ or vehicles.</li> </ul>

**Table 5: Full BRT' Versus General BRT Classification** (Wright et al, 2007)

#### **2.4.4.3 Reasons for Implementation**

The continued growth, development, compaction and congestion of world cities have led transportation and spatial planning professionals to exam public transportation solutions to improve urban mobility and contain urban sprawl. *'These concerns have led to the re-examination of existing transit technologies and the development of new, creative ways to improve transit service and performance. BRT is seen as a cost-effective means of achieving these objectives'* (TCRP, 2003: 24). BRT as an option comes to the fore as it presents a wide variety of benefits, such as the systems incremental growth through staged building; use and expansion of existing infrastructure therefore minimising community impacts; the planning involved requires shorter planning and construction time frames in comparison to other similar infrastructural projects; the system can be implemented quickly and incrementally, without precluding future rail investment if warranted; the cost is markedly lower than rail and provides greater flexibility; *'BRT can easily provide a broad array of direct express, limited-stop, and local all-stop services on a single facility. Rail systems, with their large basic service units, must often force multiple transfers to serve the same markets'* (TCRP, 2003: 24); the BRT system is well suited for facilitating the extension of routes which are out of reach of existing rail transit lines; the system can be integrated into urban and suburban environments providing an appropriate feeder services to and from areas where densities are currently too low; and an integral part of the city's structure, and a catalyst for redevelopment (TCRP, 2003).

#### **2.4.4.4 Objectives and Implementation for South Africa**

The existing public transport system within South Africa is a contentious, erratic and undesirable system aimed at providing a service to the lower incomes groups. Currently, the public transport system is made up of primarily rail and bus services which are subsidized by the government and the mini-bus taxi service which is unsubsidized. Each of these modes of transport work separately as they do not integrate or provide a supporting role, but rather compete against one another.

The primary aim for the introduction of BRT into South Africa is to upgrade the quality and performance level of the existing public transport system. The objectives, which have been set by the Department of Transport include:-

- I. Identified trunk routes that will make use of large busses travelling in dedicated median lanes on current roads, with smaller buses operating on BRT routes without dedicated lanes, feeding commuter into the trunk routes;
- II. The system plans to level the playing fields between the existing taxi and bus operators, while drastically improving efficiencies and costs; and
- III. Bus operators will be provided with concessions to operate the system;

## **2.5 CHAPTER SYNOPSIS – KEY FINDINGS**

The Apartheid legacy still remains entrenched in the South African structure, *‘despite the nation’s best intentions to dismantle the impacts of Apartheid and to integrate settlements along both racial and social lines; it continues to be a massive challenge’* (South African Cities Network). The myriad of new policies instrumented by government within the last two decades are aimed at achieving a desirable, integrated and sustainable country. Their implementation and final desired outcome of which will take time, however in parts the connecting and restructuring process is underway.

Corridors, nodes, new urbanism principles, transit-oriented development and bus-rapid transit are current planning mechanisms which are being utilised to restructure and regenerate urban centres across the world. The literature review above highlights a number of similarities between the concepts identified, such as increased densities, greater accessibility and permeability for both vehicular and non-vehicular transport as well as smart transport solutions, a greater mix of uses and activities with a node, the encouragement of good urban design and architectural principles to promote environments

designed for people, the development of traditional neighbourhood structures which endorse intensities within the core, dissipating toward a lower intensity residential component on the fringes. These planning trends articulate a universal thrust for greater sustainability within an urban context, and suggests an opportunity to apply these within our planning realms to help address the dysfunctions of the Apartheid legacy.

Therefore, it is the authors aim to extract these qualities; traditional neighbourhood structure, good urbanism, smart transportation and environments designed for people and illustrate their relevance within the eThekweni context – Chapter Six.



### 3.1 INTRODUCTION

The twentieth and the beginning of the twenty-first century has seen transportation modes and uses changing rapidly – moving from individual car ownership, busses, to high speed rail and BRT systems. The singularly orientated method of private vehicular use, apparent in our current cities, is fast becoming prehistoric, uneconomical and not environmentally friendly. Throughout the world one can see the migration away from the private car to more efficient, sustainable models of transport like the high speed rail or the Buss Rapid Transport systems.

This global acceptance is evident through the rapid growth of public transport corridors and public transport systems which have in some cases been established out of the need to decongest city centres and provide safe, fast and quality transport. Other evidence of change is found in statutory thinking, with the implementation of public transport levies and taxes within compact cities to discourage the use of privately owned vehicles. The researcher's primary aim in this analysis is to identify and understand these changes and trends, with insight of their possible effect and likely impact on the redevelopment of city centres and the development of new nodal clusters.

This chapter evaluates four BRT systems that are currently operating locally and internationally. The international models, Curitiba in Brazil and Bogotá in Columbia, are major icons and world renowned examples of successful BRT systems which are well documented. The local models identified are both in their infancy, but are however operating, and provide better context to the local South Africa environment and market. These chosen precedent studies have also been selected as the researcher has visited all of them in recent years and has 'on the ground' experience of them.

Each of the individual case studies is presented in terms of a structure analysis in the following manner:-

- a. Background – The background will illustrate the context within which the development is situated, identifying elements such as the population size, the land coverage, densities and topographic conditions.
- b. Basic structure of the Transport System – This provides a brief description of the existing operating system.
- c. Evaluation of the Development – An assessment of the system is undertaken to evaluate the strengths and weaknesses.



- d. Precinct Integration – A brief assessment of the integration between the transit station and the surrounding land use.
- e. Key Performance Criteria – The key performance criteria are elements which contribute to the success of a transport system and the adjacent land uses in which it is supported.
- f. System Images and Precinct Examples.

## 3.2 INTERNATIONAL PRECEDENTS

### 3.2.1 Curitiba, Brazil

#### a. Background

Curitiba is the capital city of the state of Paraná, one of the three states that comprise the Southern part of Brazil. The Metropolitan Region of Curitiba is comprised of 26 cities, has 3,307,945 inhabitants in a 432 square kilometre area, and with an estimated annual growth rate of 2.02% (Investor Guide Book, 2010).

Curitiba is situated approximately 400 kilometres from the city of São Paulo, which is considered the largest economic centre in Brazil. The Investor Guide Book (2010) describes Curitiba as a city that is ahead of future demands through its urban planning, with the community member central to its policy making. Since 1970, the city has been a role model for urban management, public transport and successful urban environments – adding quality of life to the population of Curitiba.

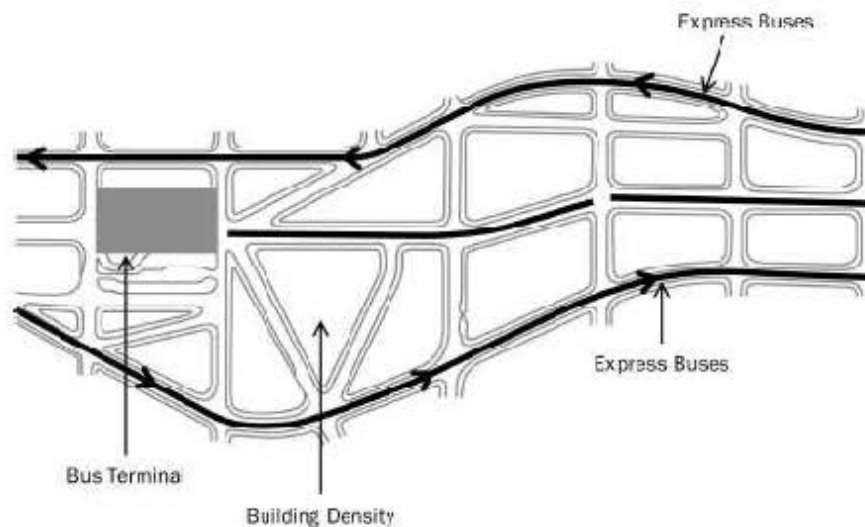


**Figure 17: Contextual Plan**

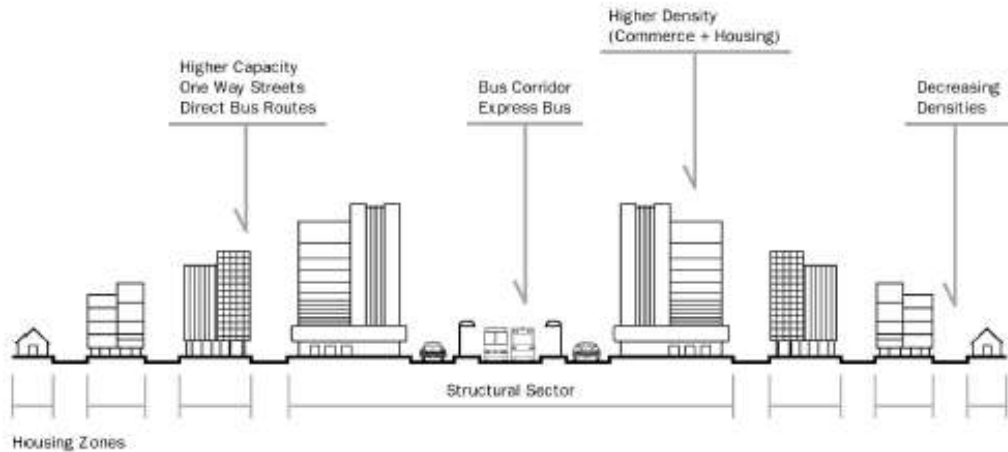
## b. Basic Structure of the Transport System

The public transport system development in Curitiba in the 1970's is one of the most widely published and reported transport systems in the world. The Curitiba bus system and master planning have become world renowned examples of successful integrated urban and transport planning, for which the model is being transposed (Logan, 2011; original dissertation). The BRT system was developed as an integral part of an overall master plan where the city ensured that land use planning and transportation strongly related and reinforced one another. This popularity can be associated with the cost-effective and efficient solutions the system has achieved. *'The system is further considered to be sustainable in terms of a city with significant social challenges and relatively limited financial resources'* (Pienaar et al, 2005).

The master plan was defined by the controlled and strategic radial expansion of the city along five axes or corridors. The five primary axes in the system are defined as a 'trinary' road system. This concept of the 'trinary' system of a central bus way anchored by high density development is illustrated below. It is supported by a number of local streets and a one-way arterial route. The system is characterised by intense, high density development in the centre along the main spine which dissipates outwards, as described in the 'Urban-to-Rural Transects' and traditional neighbourhood structure in Chapter two.



**Figure 18:** The Curitiba 'Trinary' Road Concept (TCRP, 2002)



**Figure 19:** Curitiba's Schematic Arrangement of Structural Axes (IPPUC, Rabinovitch, Hoehn, 1993 Creating a Linear City with a Surface Metro, R. Cerero, UC Berkeley, 1995 in TCRP 90, 2002)

Development patterns of this nature therefore generate concentrated, high demand for transport services along the narrow corridors. Demands along these corridors are therefore achieved through the implementation of a dedicated public transport service. The contrary is that concentrated high development patterns along such corridors would not exist without the support of efficient, cost-effective public transport service – the two components, land use and transportation are symbiotic.

*'Travel demand for the bus way system is further generated as the bus ways enter and cross the central business district (CBD) while traffic access is limited by traffic management methods (bus-only access, pedestrianisation, parking controls, etc.), and secondly the bus feeder services are integrated into the bus way at through interchange terminals and stops' (TCRP, 2002).*

The overall bus system within Curitiba stretches for approximately 60 kilometres, transporting on average two million people per day (TCRP, 2002). According to the TCRP (2002) report 'the system carries up to 11 100 passengers one way on the busiest bus ways in the peak direction during the peak hour, with an average bus speed of 20 kilometres per hour and 30 kilometres per hour on the express or direct routes. The express or direct routes travel between the origin

and distinction without stopping. The development costs have been estimated at 1 500 000 U.S. dollars per kilometre, equivalent to 12 million Rand per kilometre' (TCRP, 2002; 1).

Rabinovitch et al (1993) identified the following as key guidelines to the integrated approach to the development of transport and land use within Curitiba-

- I. Promotion of a linear urban city growth by integrating public transport, road network development, and land use along key, 'structural axes';
- II. Traffic decongestion of the city centre and preservation of the historic central city core;
- III. Management and control of land use citywide;
- IV. Provision of economic support incentives to urban development to realize land use aims and to assist employment generation; and,
- V. Improvement of infrastructure.

### **c. Evaluation of the Development**

A number of prerequisites have been identified in order for a transit system to be successful. The TCRP (2002) report recognises the requirements include a system which is well used, consists of a dedicated right-of way service that is financially viable, which eases traffic congestion and provides *'good and preferential access to areas of high demand (such as city centres), and planning around land use that provides a potentially high passenger demand'* (TCRP, 2002).

According to Pienaar et al (2005) the success of the Curitiba public transport system which was developed over a period of approximately 30 years, is attributed to-

- I. The strong political leadership and will of Jamie Lerner – the three time mayor;
- II. Guidance from a specialised land use and transportation planning unit, Ubranização Curitiba SA (URBS), an organisation with a total staff compliment of 1 730 personnel;
- III. Control and sustain urban growth by means of a land use master plan and the development of high density activity corridor;
- IV. Provision of high capacity, dedicated right-of-way bus service for these corridors, combined with circular routes linking radial routes; and,

- V. An effective institutional system where the operational planning and public transport law enforcement are the specific responsibility of the municipal unit established for the purpose.

#### **d. Precinct Integration**

A station and its precinct must have a symbiotic relationship – both require one another to be successful. The purpose of the following sub-section is to briefly access the general integration, or the lack thereof, between the existing environment and the public transport system within the Curitiba context. Only one area or station within the overall system will be assessed in order to identify whether the theoretical objectives identified at the project outset have been achieved.

The Curitiba city grid system provides a good base within which the BRT system can function, providing increased accessibility and permeability. Linked to the station and grid system, a number of pedestrian priority zones have been established, where main streets within the city centre have been closed to motorised modes of transport. The establishment of these links promoted the city users to first priority over vehicles. These systems are connected and supported by a robust vertical and horizontal mix of uses including; retail, commercial, office, residential of varying levels and public open space.

Although it is not particularly evident from the image below, the Curitiba system is hinged on the traditional neighbourhood structure – higher intensity mixed use development concentrated in the centre diminishing to lower intensity residential suburbs, this system works very efficiently within the Curitiba context where it has been functioning for over 30 decades as a spatial structuring element. The introduction of the BRT system has contributed to the urban reconstruction of the city centre into what can be witnessed today. The Curitiba system has become an icon in terms of true integrated management between two basic building blocks of any city – Urban Planning and Transport Planning. *‘The integration of different elements of urban development avoided problems associated with piecemeal development such as pollution, traffic congestion and unsustainable fuel consumption rates. For example, integrated transportation and land-use was a key factor contributing to the city’s development, controlling growth, cutting pollution and enhancing the life of residents’* (Hayakawa, 2002).

(Please see Figure 20 below – inner/ lighter circle denotes a 400 meter radii and the second, larger circular surrounding this illustrated an 800 meter radii)

#### **e. Key Performance Criteria**

It is evident from the above that political will and drive is the overarching key performance criteria of a successful transit system. Without committed and strong leadership a development of this magnitude and complexity will find it extremely difficult to gain support and develop fully. An integrated land use and transport master plan is another anchoring element which requires firm institutional support and commitment. Other elements, which are in no way less important include sufficient demand and intensity along corridors to support the desired activity and a dedicated right-of way transit service. The traditional neighbourhood structure to the integrated development approach has proved to be very successful in this case. It has a scope which is growing and allowing the city to develop a more sustainable approach to the overall city functioning.

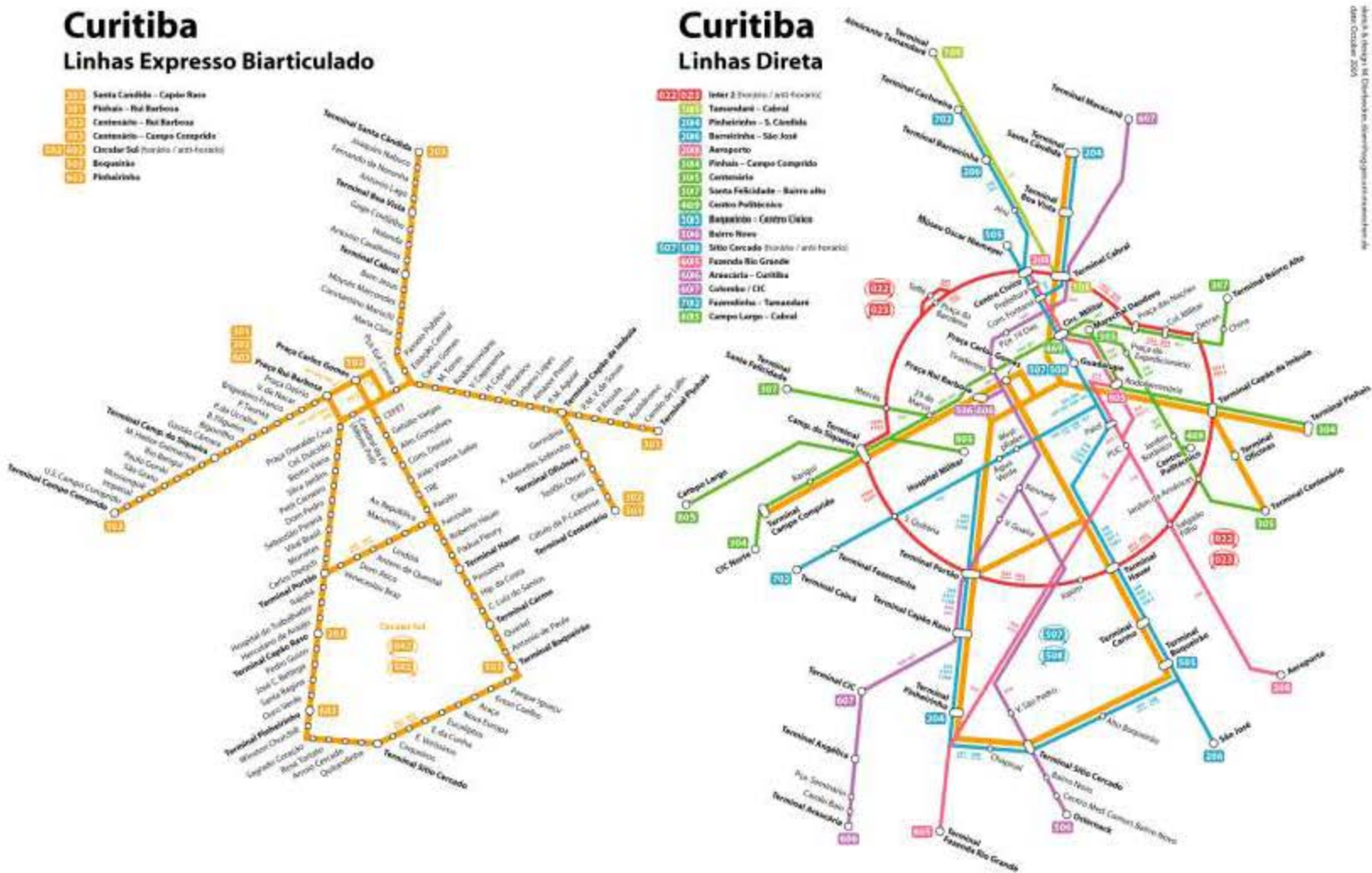


Figure 20: Plan of Curitiba Transit System (<http://www.curitiba.info/map-of-curitiba.html>)



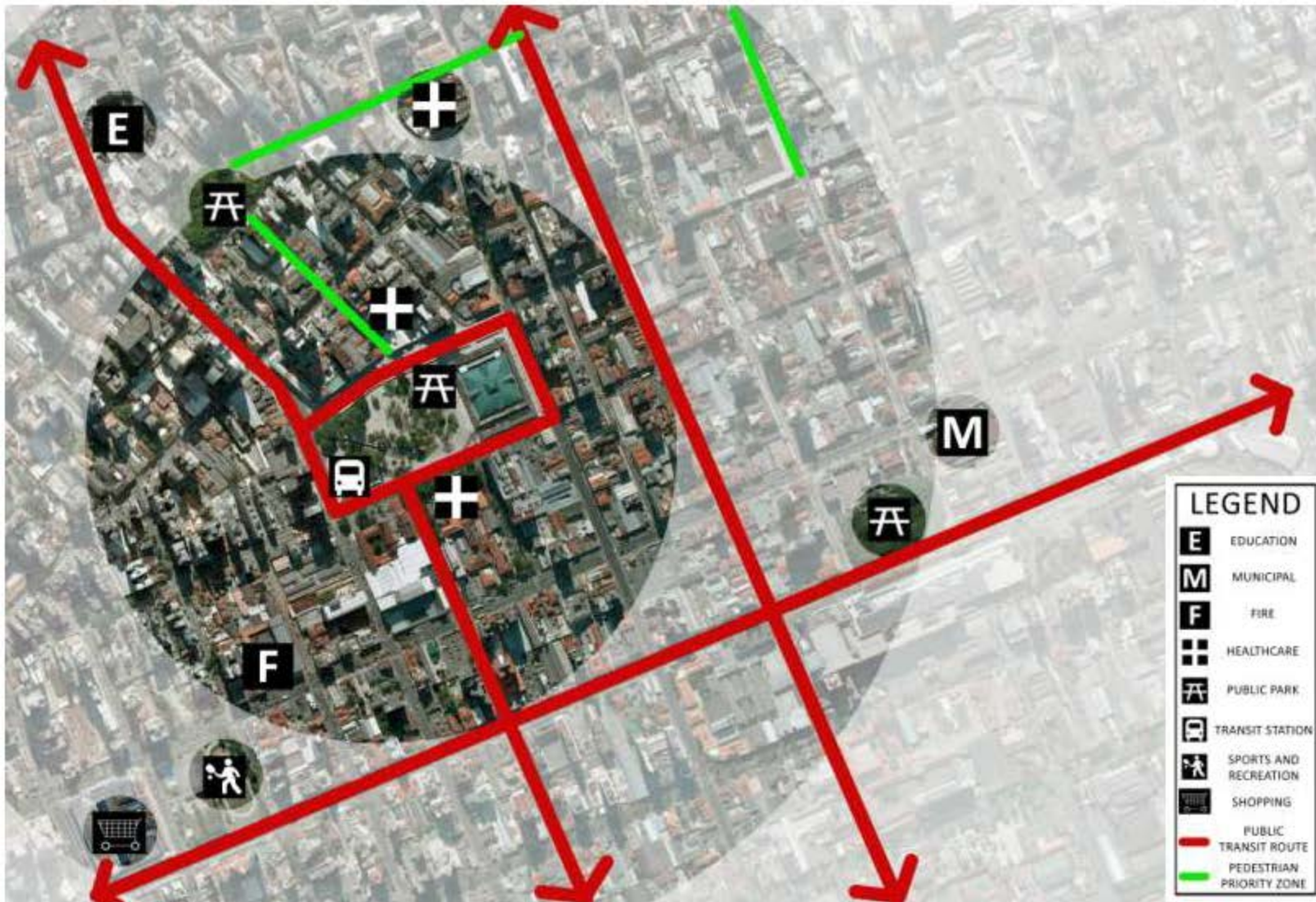


Figure 21: Plan illustrating Curitiba Transit Station within the Urban Context (Logan, 2011)



f. System Images and Precinct Example



Figure 22: Curitiba Urban Structure along 'Trinary' road system

### 3.2.2 Bogotá, Columbia

#### a. Background

Bogotá is the capital city of Columbia and is located on the north, north-western border of South America. As of the year 2000 Bogotá had a population of approximately 6.4 million inhabitants spanning an area of 1,732 square kilometres. To the east, the city sits on a plateau which is framed by the Andes Mountains, of which the Monserrate sanctuary provides the primary reference point of the city. The capital is Colombia's biggest financial, political and cultural centre.



**Figure 23: Contextual Plan**

#### b. Basic Structure of the Transport System

The primary objective of the TransMilenio system is to *'improve the quality of life and productivity in Bogotá through a faster, safer and cheaper but less polluting and more equitable transport system'* (TransMilenio, 2003).

Improvements in public transport became a political imperative, and the Mayor adopted an enlightened policy with the following objectives:-

- I. Improving bus service quality to passengers;
- II. Improving the environment by reducing bus-caused emissions, and,
- III. Above all, to develop a more civilised city.

These principles therefore became the foundations of the TransMilenio bus mass transit system which was officially born in December 2000. Like many of the mass transit systems being developed around the world, the TransMilenio system is based on the highly successful Curitiba model. The system is reliant on bus transportation with an operating system which is similar to

that found rail-based systems. It has been designed with a series of primary trunk routes and secondary feeder routes, with stations along the corridors placed at strategic locations and other complimentary facilities. TransMilenio is comprised of four distinct components; specialised infrastructure including segregated right-of way centrally located lanes along existing movement routes; efficient operations through a public/ private venture, designed for operation by private contractors under the oversight of the government institution; advanced technologies for ticketing and control mechanisms; and a new institution for system planning, development, and control (TransMilenio S.A. 2003).

Concurrently, with the implementation of the centrally located mass transit system, a number of complementary measures to support the system have been employed. These include approximately 300 kilometres of *'new cycle ways, pedestrian and public space upgrades, a Sunday closing of 120 kilometres of road way to private motorised vehicles'* (Sorg, 2011) and the introduction of car restrictions through parking limitations, and a programme that only permits peak-hour vehicle use on certain days based on the digits on a vehicles license plate number.

According to TransMilenio S.A (2003) the system improves upon the Curitiba model because it runs without any operating subsidies from public authorities. Built into the TransMilenio design is a cost recovery approach which is based on financing it 100 percent of its costs and operations through passenger fares. *'The main advantage of TransMilenio over a rail system is its low cost. The total investment will be U.S.\$1.97 billion for the total route length of 388 kilometres up to the year 2016. The cost is U.S.\$5 million per kilometre which includes dramatic improvement of the public pedestrian space around the system, including sidewalks, plazas, trees, and the like, while the cost for a metro system reaches U.S.\$100 million per kilometre. It is cheaper to operate than a railway system and thus requires no additional subsidies'* (TransMilenio S.A., 2003).

Once the TransMilenio system is fully developed by 2016 it has been estimated to carry five (5) million passengers per day along 388 kilometres of main lines along 22 corridors. The main system is gradually being developed to meet the demand of the growing population (TransMilenio S.A, 2003).

The system operates around two alternatives, an express route which stops at a few stations along the route, as well as a system that stops at all stations. It allows passengers to transfer from a local to an express bus as well as from one route to another using the same ticket. The combination of express and local buses allows the system to carry up to 45 000 passengers per hour in each direction. Stations on the trunk lines are closed facilities, located in the median at an average distance of 500 meters intervals. They have between one to three berths vary from 40 meters to 180 meters in length. Pedestrian access infrastructure such as sidewalks, plazas, and overpasses form part of the TransMilenio system. Provision has been made for bus maintenance and parking facilities as part of the intermodal design of the stations (TransMilenio S.A, 2003).

Private providers carry out system operations, with strict conditions set out through concession contracts which are monitored through a centralized control. TransMilenio operators are made up of consortia of traditional local transport companies, associated with national and international investors that own the buses and hire drivers and maintenance personnel. Concessions are awarded through an open bidding processes and payment is related to the number of route kilometres served by each operator.

### **c. Evaluation of the Development**

The TransMilenio has had both supporters and detractors. Many transport engineers were proved wrong when the BRT system successfully demonstrated that it could adequately support a transit population greater than 12, 000 commuters per direction per hour at a reasonable travelling speed. It has been widely believed that this was impossible given the design of the system. In its success, the TransMilenio system radically transformed world-wide perceptions in this regard, providing concrete evidence that a BRT is capable of delivering high-capacity performance for the world's megacities.

TransMilenio (2003) has credited its success to a combination of elements. *'One important factor has been the city government's strong leadership with careful design and planning. This leadership has combined with the mobilization of necessary funds, state-of-the-art technologies*

*adopted to run the system, the establishment of a good management company, and a sound investment in infrastructure, and an efficient single fare pricing system'*(TransMilenio, 2003; 2).

Passenger rail services form only part of the service provided in the system. The provision of a successful, *'high quality bus-based mass transit system with many positive attributes such as high capacity vehicles; frequent services provided by trunk line buses; services, both express and stopping, geared to meet passenger demand; rapid and reliable services obtained through the use of exclusive and segregated lanes (bus ways); integrated fares and efficient fare collection; high level image and the appearance of a 'quality mode' with well designed bus stations with appropriate signage, bus livery, publicity, passenger assistance etc. (these aspects are often missing in bus schemes); rapid passenger entry, facilitated by high-level platforms, prepayment and multiple doors'* (Cracknell, 2003).

However there are shortcomings with the TransMilenio intermodal approach. The system has failed to match its transportation success in the arena of integrated land use. In part this failure can be attributed to the fact the BRT system has been retrofitted into the existing urban structure. From the outset there were limitations in an established urban form and inherited land use rights which may not support the multi use approach required. In this aspect of a lack of integration of transportation and land use the TransMilenio has encountered similar problems to other retrofitted transportation systems elsewhere in the world. The continued success and development of this system will require greater detailed exploration into marrying the successful transit component with the supporting land use. As Cracknell (2003) observed in the article *TransMilenio Busway-Based Mass Transit, Bogotá Columbia'* fact sheet states that the Bogotá model *'lacks the integrated land use transport approach, which makes Curitiba unique'*.

#### **d. Precinct Integration**

The Bogotá model lacks the integrated land use transport approach synonymous with the Curitiba model. This can be identified in the precinct image below, where the residential and commercial/ business complements of the city are divided by a major movement route. The residential component consists of small lots with a number of open spaces located within, whereas the commercial component is characterised by larger buildings on bigger lots. The

transit system however, is located within a well structured grid pattern that transverses both sectors, which enables the system to function more efficiently providing greater permeability. Although the system lacks the physical integration of land use, it still provides a successful transport system to the Bogotá population, as well as a model for international recognition.

A comprehensive analysis of the area is absent as a result of the limited knowledge of the surrounding precinct and the language barrier, which exists. Therefore only distinct land uses could be illustrated.

(Please see Figure 24 below – inner/ lighter circle denotes a 400 meter radii and the second, larger circular surrounding this illustrated an 800 meter radii)

#### **e. Key Performance Criteria**

As identified in the case of the Curitiba model, political commitment and leadership is of utmost importance for the successful development and implementation of a mass public transit system. The Bogotá model shares this successful attribute with the commitment and strong leadership by government structures together with careful design and planning. Many transit systems of this nature require a considerable amount of ‘retrofitting’ in order for the system to adequately mould into the existing built from environment. The Bogotá system however unsuccessfully addresses the land use component of the model thus demonstrating that integration may be a more difficult goal to achieve in the context of older cities. The transit system has been developed with the primary emphasis on the transport component and lacks the fundamental land use supportive mechanism.





Figure 24: Bogotá Public Transport Route Map

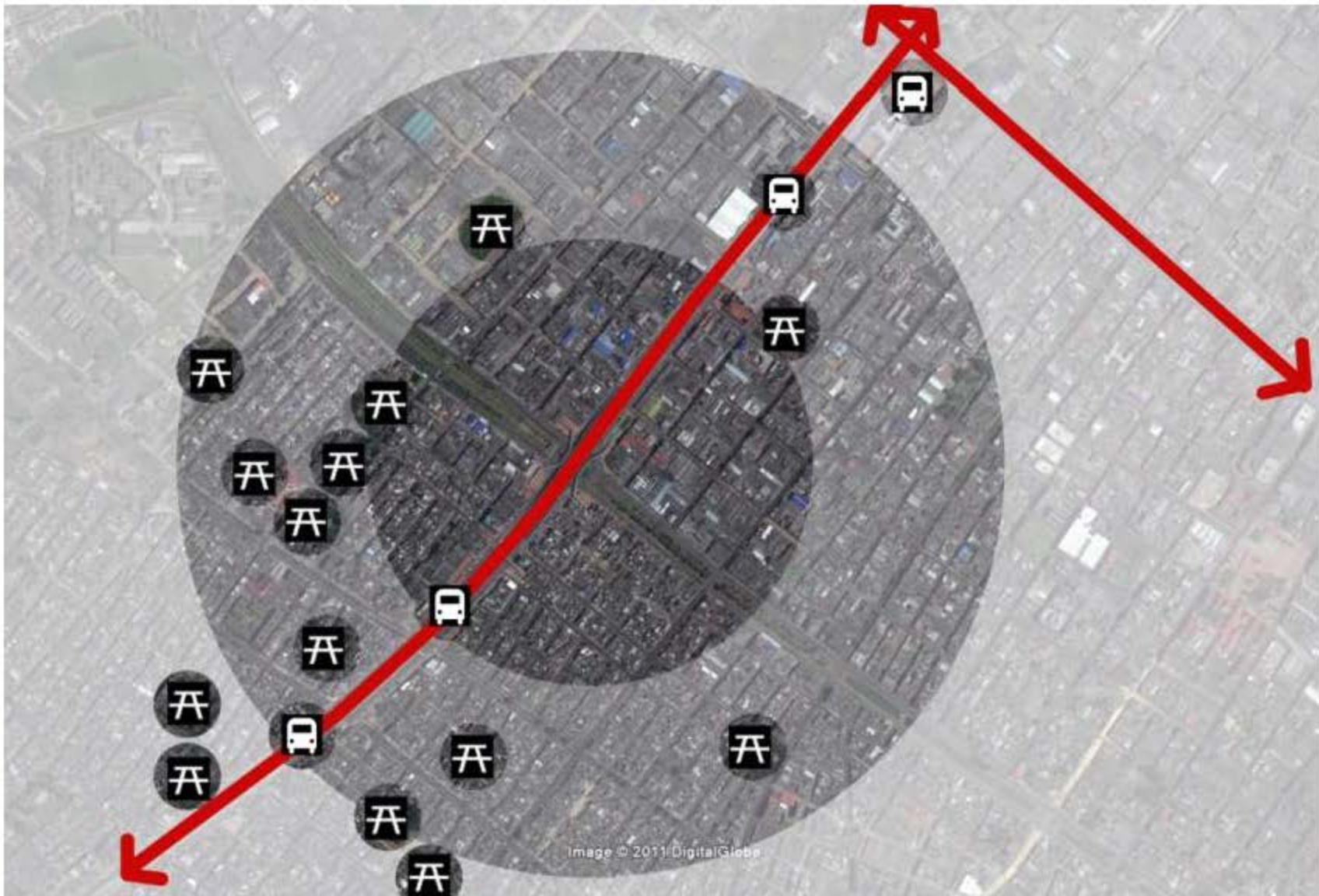


Figure 25: Plan illustrating Bogotá Transit Station within the Urban Context (Logan, 2011)



f. System Images and Precinct Examples



(Source: Naparstek, A. (2007))



(Source: Unknown)



(Source: Logan, S. (2008))



(Source: Unknown)



(Source: Logan, S. (2008))

Figure 26: Bogotá BRT System

### 3.3 LOCAL PRECEDENTS

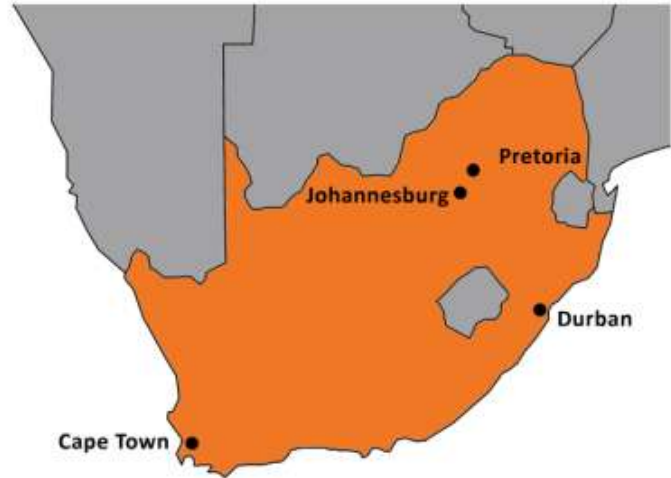
#### 3.3.1 Rea Vaya, Johannesburg

##### a. Background

Gauteng is the economic hub of South Africa, generating more than 36 per cent of the country's Gross Domestic Product (GDP), whilst covering less than two per cent of the country's total surface area. The Gauteng Spatial Development Framework (SDF) quotes the 2001 Population Census from STATS SA, recording the population of Gauteng at 3.2 million an estimate from one million

households, who reside in an area of

1,644km<sup>2</sup>. This translates to an average population density of 1,962 persons per km, however the contemporary estimates suggest that this figure has increased to four million people (Gauteng SDF, 2010-2011).



**Figure 27: Contextual Plan**

The metropolitan region of Gauteng therefore plays a vital role in the national economy and it is important to prevent this being undermined by traffic congestion. Furthermore, land development in city has historically been distorted and, in many cases, has not been supported by an adequate public transportation system (Gautrain EIA; 2002). The Gauteng region has been the subject of, two major advances within the realm of public transport which bear closer scrutiny for the purposes of this research. In 2010, Rea Vaya and the Gautrain opened for operation as part of the 2010 World Cup public transport infrastructure.

The National Land Transportation Transition Act, which prescribes all Municipalities to develop an Integrated Transport Plan (ITP), outlines the need for *'a safe and efficient transport system, with a public transport focus, that will support a world class city; connect businesses, people and*

*places in a sustainable and cost effective manner and through this, improve the standard of living and quality of life of all the city's inhabitants and the overall competitiveness and growth of the city's economy' (ITP, 2004; 3). This strategy therefore supports and contributed to the Johannesburg 2030 city vision, which is to provide 'a world-class City with service deliverables and efficiencies, which meet world best practice. Its economy and labour force will specialise in the service sector and will be strongly outward orientated such that the City economy operates on a global scale. The strong economic growth resultant from this competitive economic behaviour will drive up City tax revenues, private sector profits and individual disposable income levels such that the standard of living and quality of life of all the City's inhabitants will increase in a sustainable manner' (ITP, 2004; 3).*

#### **b. Basic Structure of the Transport System**

The Gautrain rapid rail transport model is not studied within this dissertation; however reference to it is made in support of both policy and infrastructure components as an essential feeder to the BRT network, and is thus key to achieving an enhanced public transport programme.

The Johannesburg Spatial Development Framework (SDF 2010 – 2011) provides for a 'Growth Management Strategy' which states that: *'The (future) urban form...will be anchored on an efficient public transport system, and a world-class network of transport infrastructure; The city form must be changed to bring jobs closer to people and people closer to jobs; Anchored on the Gautrain and a complete refurbishment of current infrastructure, rail will be a mode of choice for many people...; City functioning must improve to accelerate the pace of delivery of appropriate housing in good locations and to reduce the high cost of having to deliver services on the urban edge; and ... to ensure that movement systems in the city directly link with, and are supported by, strong high-intensity, mixed-use nodes and higher residential densities'.*

The Rea Vaya network is closely linked to Johannesburg's Spatial Development Framework (SDF). One of the primary aims is to connect different economic nodes and residential areas. The Spatial Development Framework, which was first drawn up in June 2002 has been expanded

and amended over the years, as a result of greater need for densification and more dominant nodal development along spines and corridors, while the Strategic Public Transport Network (SPTN) links all these nodes. The identified BRT system is multi-dimensional and therefore requires more than just transporting people. Aspirations for the network include the goal of transforming the city into a more liveable space through integrating progressive land-use policies, car-restriction measures and non-motorised transport (Rea Vaya/ BRT 2006 – 2011). *‘Once complete, Rea Vaya will consist of some 330 kilometres of bus routes across Johannesburg, with buses arriving at stations at five- to 10-minute intervals. Each station will be within walking distance of its commuters. Rea Vaya will be the physical link between the city’s economic and residential nodes’* (Rea Vaya/ BRT 2006 – 2011; 15).

The following ten principles were put forward, in order to capitalise on the opportunities that will be created by the Rea Vaya BRT system, and also encourage development characteristics that will both support and build-upon the transformative potential of BRT:-

- I. Densify around station nodes and along the BRT Corridors;
- II. Build housing within walking distance of BRT Stations;
- III. Utilise state-owned land to catalyse development;
- IV. Encourage vertical mixing of uses;
- V. Encourage active interfaces between buildings and streets;
- VI. Offer incentives for inclusionary development characteristics;
- VII. Create ‘anchor’ civic spaces around and close to stations;
- VIII. Prioritise pedestrian and bicycle movement over motor vehicle movement;
- IX. Increase pedestrian permeability into and through BRT Station Precincts; and,
- X. Encourage development characteristics that spread economic impact.

(Ikemeleng Architects et al, 2009)

A further target in this regard has been a broad transportation objective of *‘bringing people to the jobs and jobs to the people’* (Ikemeleng Architects et al, 2009; 1). The City of Johannesburg’s Integrated Development Plan (IDP) stipulates that by 2020, 80 % of the city’s population should live within one kilometre of a BRT station. One side of the process is aimed at achieving this target and centres on the roll-out of the BRT system across the city. The other key component of

the process is the proposed densification of the BRT route corridors, where a concentration of places of employment and higher residential densities are planned. For these transportation and land use objectives to be achieved, it is essential not only that higher densities are realised within the BRT route corridors, but also that certain development characteristics are encouraged that will promote and support a more walk-able and pedestrian-friendly urban environment.

### **c. Evaluation of the Development**

To ensure the success of the project, the City of Johannesburg showed its commitment to Rea Vaya, through the development of a number of guiding principles which can be outlined as:-

- I. All policy and planning documents produced, with particular reference to spatial and development planning documents by or for the City of Johannesburg must give priority to public transport strategies. The aim should be to reduce private car use, especially during peak traffic periods;
- II. Ensure public transport demands are matched by the correct mode of transport to maximise public transport integration;
- III. The Rea Vaya brand elements such as dedicated bus lanes, environmentally friendly, disability friendly and customer care being the norm remain pure to Rea Vaya;
- IV. Supporting a sustainable Rea Vaya future. This principle will involve sticking to the clean fuel promise as well as finding alternative sources of revenue in order for adequate funds to continue to be invested into the high quality infrastructure and maintenance of the system. At an institutional level, it involves taking time to build strong organizations and skills both inside and outside the City to manage different aspects of Rea Vaya; and
- V. Rea Vaya is required to 'live the City of Johannesburg's Transport Values'. This involves a focus on ensuring that all staff embraces the values of accountability, co-operation, honesty, respect and ubuntu, and that Rea Vaya enables and encourages passengers to embrace and practice the same values.

(Rea Vaya/ BRT; 2006 – 2011; 16)

Garner (2011) is critical about the lack of integration between the existing environment and the transit nodes. His concern stems from a lack of unique sense of place at each of the stations, as

well as inadequate public space around the station precincts. A number of stations are listed where the paving only extends a few hundred meters from the station, links to facilities such as neighbouring offices and shopping centres are insufficiently lit providing safety concerns; the links provided are also limited and in some cases open onto dead concrete facades instead of 'celebrating our outdoor climate and activate the city street'. Limited investment and effort has been made in terms of urban landscaping, extensive sidewalks, cycle lanes, public art and public squares to effectively integrate the new infrastructure into the existing environments. According to Garner (2011) *'an opportunity is being lost... and the onus is on the city councils of Twshwane, Ekurhuleni and Johannesburg to address this concern. South Africans, deserve liveable cities'* (2011; 48).

In the authors view a critical evaluation of the Rea Vaya and Gautrain transit nodes is presently premature. Both projects are in their early days of implementation. Development of this nature requires years for the land use to 'morph' or redevelopment in response to new opportunities. Alignment with the perceived vision may take many years to achieve. In addition, the implementation of such precincts requires the alignment between government department's budgets as well as the correct identification of funds with the appropriate budget cycles. If this is mismanaged, a delay in the implementation is certain. It however would be ideal for the transit stations and precinct development process to be married, in order for commuters and the city in general to generate the appropriate rewards. It is evident from both project visions that alignment between the existing city context and the station precincts is required and it is the hope that the full vision will be materialized in the near future for the full success of the systems.

#### **d. Precinct Integration**

The aim of the following sub-section is to assess the general integration or the lack thereof between the existing environment and the identified station precinct. The section will only identify one station within the overall system in order to identify where the theoretical objectives identified at the project outset have been achieved.

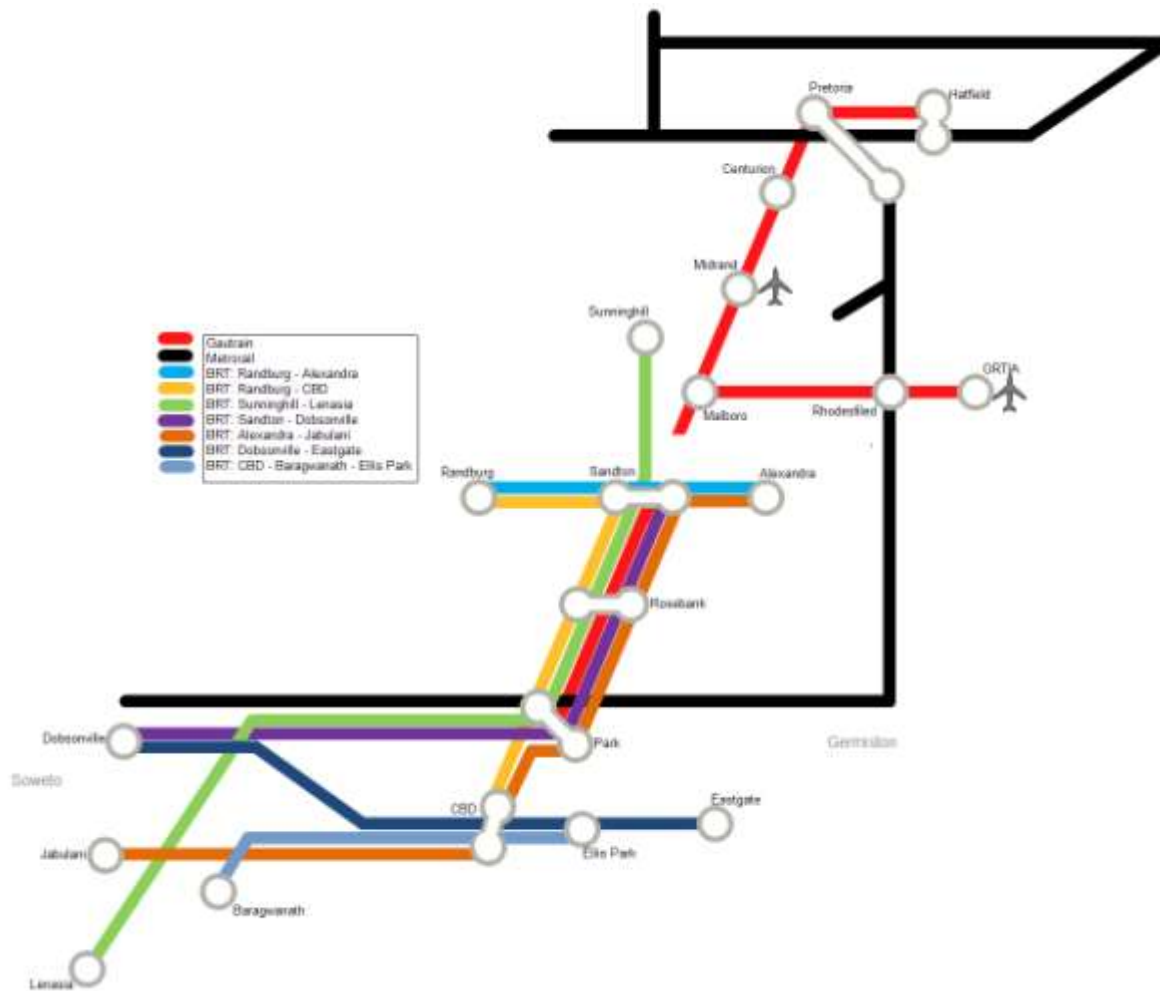
Although the study of any Gauteng station may be premature as the system has only been in operation for approximately one year, the Rosebank Station provides some interesting observations. This district provides a good precedent case study of a transect neighbourhood, the theory of which was detailed in chapter two. The central core is made up of medium to high intensity mixed use activities, including residential units, shopping malls, healthcare facilities, hotels, sports clubs, office and act as a station point for both the Gautrain and Rea Vaya. Surrounding the central node is a number of education facilities that are supported by a large residential neighbourhood. The core and supporting social and residential activities are all located within an 800 meter radius therefore allowing for effective pedestrian movement and support throughout the neighbourhood environment.

(Please see Figure 28 below – inner/ lighter circle denotes a 400 meter radius and the second, larger circular surrounding this illustrated an 800 meter radius)

#### **e. Key Performance Criteria**

As identified within the basic structure of the transport system through the work of Ikemeleng Architects et al (2009), the key performance indicators for the BRT transit systems within the Gauteng context include the densification and the selection of the appropriate land use, as well as vertical mix around station nodes and along the transit corridors; building a range of housing opportunities within walking distance of transit stations; the full utilisation of state-owned land to initiate development; the encouragement of active interfaces between building edges and the streets; prioritisation of non-motorised modes of transport together with increased permeability and access; the introduction of incentives for redevelopment or new development initiatives, as well as providing specific civic anchors in close proximity to, or within the station precinct.





The adjacent routing map illustrated the current public transport routing through the Gauteng province. The map illustrates the alignment between the road and rail based public transport facilities.

The following plan illustrates the Rosebank area in order to evaluate the integration between the station and its surrounding environment.

Figure 28: Gauteng Intermodal Route Map (Source: Unknown)



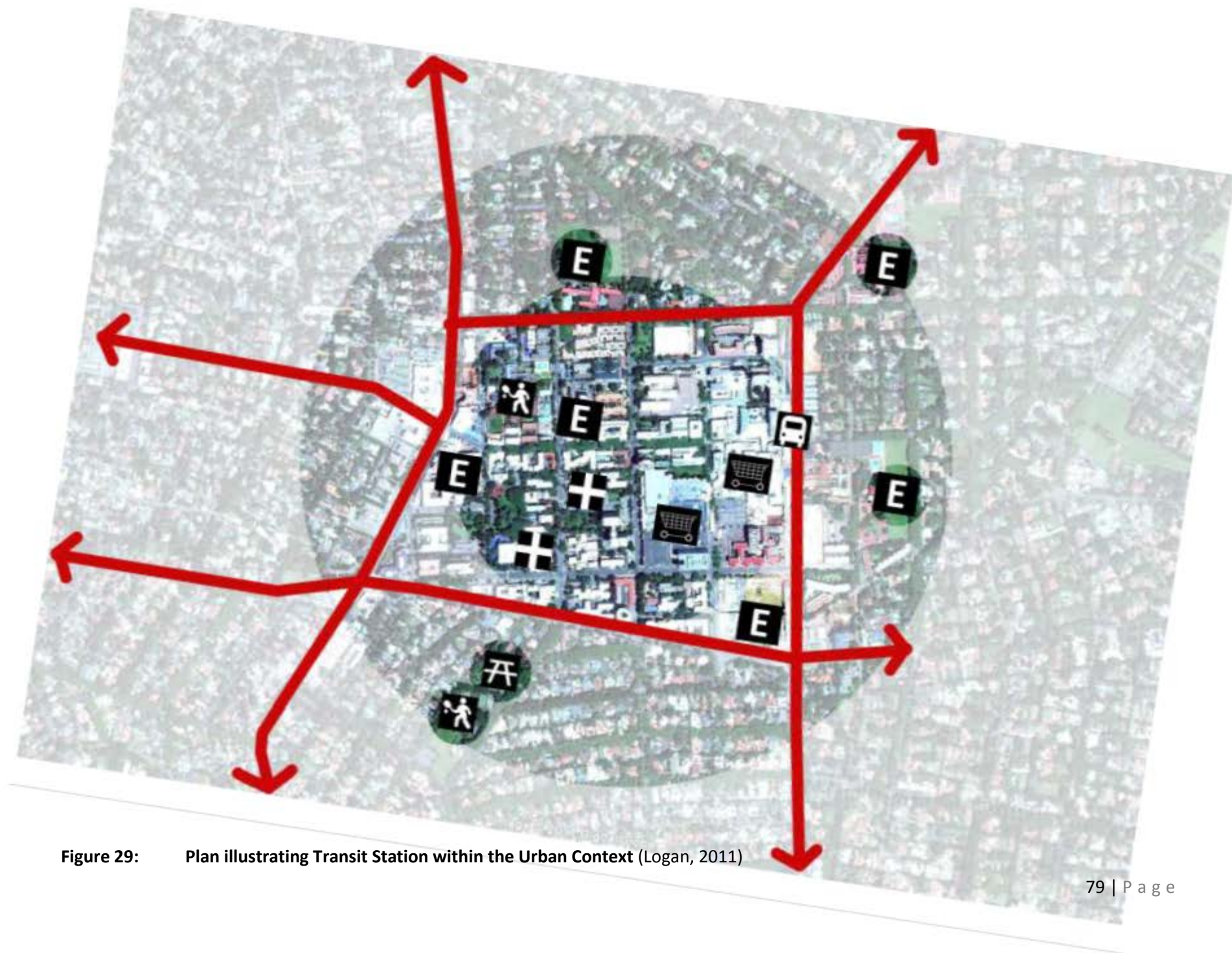


Figure 29: Plan illustrating Transit Station within the Urban Context (Logan, 2011)



f. System Images and Precinct Examples

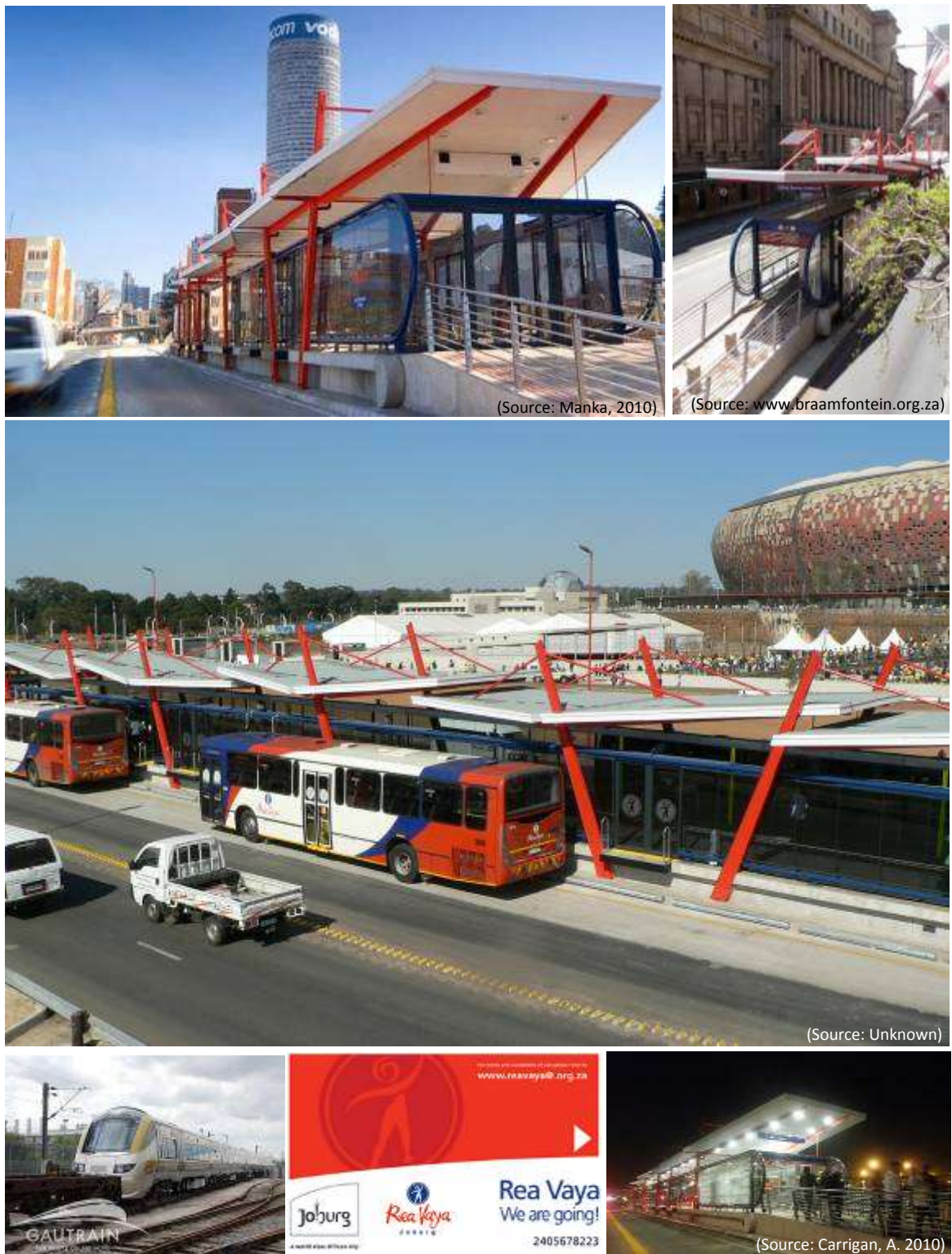
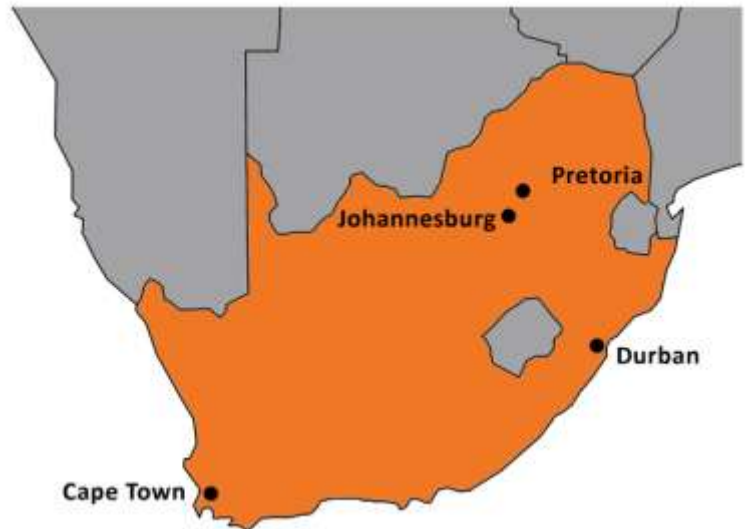


Figure 30: Rea Vaya and Gautrain System Images

### 3.3.2 MyCiti, Cape Town

#### a. Background

The city of Cape Town stretches over 2461 kilometres squared, with a population of 3.5 million as of 2007. Cape Town is ranked as South Africa's second-largest city both in terms of population and economic gross value added (GVA). It is similar to most metropolitan cities found in South Africa in that it has a large concentration of people, resources, services and infrastructure (Cape Town IDP Review; 2011 – 2012;).



**Figure 31: Contextual Plan**

The City guiding framework – the Integrated Development Framework, has adopted eight strategic focus areas that effectively form the framework and function as internal strategic levers to facilitate shared growth and development, as well as to enhance urban efficiency and institutional effectiveness. The primary overarching vision is a prosperous city that is able to supply effective and equitable service delivery and a well-governed and efficiently run administration. Through this vision eight strategic focus areas have been identified, namely:-

- I. Shared economic growth and development;
- II. Sustainable urban infrastructure and services;
- III. Energy efficiency for a sustainable future;
- IV. Public transport systems;
- V. Integrated human settlements;
- VI. Safety and security;
- VII. Health, social and community development; and,

VIII. Good governance and regulatory reform.

(Cape Town IDP Review; 2011 – 2012; 12)

‘In June 2007 the City of Cape Town approved an Integrated Transport Plan (2006 – 2011). The vision is to *‘provide a world class sustainable transport system that moves all its people and goods effectively, efficiently, safely and affordably’*. In alignment with this vision, the City decided to investigate the development of an Integrated Rapid Transit System for Cape Town, based on the concept and principles of a Bus Rapid Transit System. As a multi-year initiative, the system is designed to transform public transport by dramatically improving the customer experience’ (City of Cape Town, 2010).

**b. Basic Structure of the Transport System**

Like all towns and cities the Cape Town transport system is guided by specific transport policy which sets out detailed guidelines in order to reach a particular vision or objectives. The primary principles of the Cape Town system have been identified as:-

- I. Extracting the best out of existing systems and networks through asset renewal, maintenance of infrastructure, upgrades, operational efficiency, and enhancements of services and systems;
- II. Travel demand management; and,
- III. Adding additional capacity to the current system, networks and infrastructure.

(Cape Town IDP 2007 – 2012; 30)

The City’s vision is therefore not mode-based, *‘rather driven by the need for integration of the various modes into an effective single seamless public transport system. To achieve this, the City has approved the implementation of an Integrated Rapid Transit (IRT) system, over a provisional timeframe of 15 to 20 years, including the establishment of a full public transport network, with*

*high-quality rail and road services, that will place at least 75% of Cape Town's population within 500 meters of the system' (MyCiti Business Plan, 2010; 7).*

To facilitate the City's vision of an integrated public transport system, a number of spatial planning principles have been identified for consideration while planning the route alignment of the BRT component of the IRT system. The spatial planning considerations must inform the IRT trunk and feeder routing alignment to ensure that maximum development intensity can be achieved along identified routes and at station precincts. The following spatial planning principles are relevant for consideration:-

- I. Ensure consistency with Spatial Planning Policy;
- II. Ensure that the land use potential along IRT routes can be maximised;
- III. Take long term growth potential into account when determining the short-medium term IRT routing; and,
- IV. Assess IRT route potential for City restructuring.

(MyCiti Business Plan, 2010; 148)

Based on these principles, *'the IRT system should: reinforce the city's envisioned long term spatial structure and contribute towards establishing a multidirectional, grid based movement system; reinforce existing corridor development along development routes, activity routes and activity streets where the IRT system is fulfilling an accessibility function; consider the ability of land uses to respond to IRT flows/ opportunities created along the IRT routes and at identified station locations; take a long term perspective in traffic modelling scenarios and consider growth projections and new development areas in the City's growth corridors; and be used as a tool to restructure the City and integrate previously disadvantaged areas of the City to areas of economic opportunity' (MyCiti Business Plan; 2010; 148).*

In addition to these principles, planning for the MyCiti system is guided by the following values:-

- I. **Quality** – delivering a car-competitive service that is based around customer needs, including rapid travel times and frequent services, few transfers, safety and security, service integration, universal access, comfort and convenience, clean vehicles, and helpful staff;
- II. **Equity** – ensuring that all segments of society receive an equal, high-quality public transport experience, especially through consideration of the special needs of low-income earners, women, children, the elderly, and those with physical disabilities;
- III. **Security** – a system that gives customers confidence in their personal safety and security;
- IV. **Sustainability** – a system that is economically viable, environmentally responsible, and which promotes social equity; and,
- V. **Integrity** – implementing in an open, transparent, and participatory manner.

(MyCiti Business Plan; 2010; 8)

This philosophy translates into the following design principles: universal access, passenger mobility, accessibility, modal integration, customer convenience, safety and security, transport that is sustainable, congestion management, optimal use of scarce resources, and transport that supports economic development.

A crucial motivation for devolving public transport to metropolitan governments is the need to integrate public transport with other 'built environment' related functions. Not only is alignment between these functions necessary, but there are opportunities for synergy if integration is well managed. Public transport can unlock a variety of urban planning possibilities, while well-designed urban forms can facilitate the provision of sustainable public transport solutions.

The City's Integrated Transport Plan (2006 – 2011) vision is to '*... provide a world-class sustainable transport system that moves all its people and goods effectively, efficiently, safely and affordably.*'

### **c. Evaluation of the Development**

Despite the best intentions and the integrated development vision, it has been established through discussion held with members of the MyCiti Planning Team, that the development on the ground for the project has principally been conducted and driven by Transportation Planners. Spatial planning and integration of transit stations are being assessed and knitted into the urban fabric after implementation of the routing and station module. As indicated within the Rea Vaya and Gautrain section above, it is premature to critically evaluate the system, as it takes many years for the surrounding system to fully develop and mould around the new defining structuring elements. However greater integration between complimentary planning disciplines from the outset, and during planning phases of the system would allow for a more seamless approach and potential for resolution or alignment of different approaches. There are conflicting views on the appropriateness of some station precincts and routing choices. Despite the project having an integrated and well-rounded vision and principles for its development, the indication of a lack of integration in its execution of the project could affect the desired outcomes. The project goals may not be efficiently achieved because of a lack of institutional agreement in the implementation of the project.

### **d. Precinct Integration**

The aim of the following sub-section is to assess the general integration or the lack thereof between the existing environment and the identified station precinct. The section will only identify one station within the overall system in order to identify where the theoretical objectives identified at the project outset have been achieved. The routing map below (Figure 32 illustrates the current public transport routing through the first phase of the Cape Town MyCiti Integrated Rapid Transit system. Out of the routing plan, the Hertzog Boulevard Station was extracted to assess the degree of integration it has with the surrounding urban environment. The plan tries to identify specific land uses which generate commuter interest such as healthcare, shopping, municipal offices and other commuter stations within an 800 meter walking distance. It can be argued that as with the Gauteng case studies, the evaluation of these station precincts is premature. The stations have only been in operation for approximately one year. However it is important to note that a number of Cape Town CBD

Business Owners have developed a forum out of which they have identified a number of inner city regeneration and renewal projects that have been funded by the Business Owners Organisation. This private sector initiative has resulted in a remarkable improvement in the urban environment, generating renewed interest through the upgrading of street facades, street paving and on street cafés - all of which increase the visual security within the city centre. As a result, the MyCiti IRT system within the city centre has been supported well. The node identified has great potential in the area, as it sits within a developed city grid, allowing for maximum accessibility and permeability, enjoys good proximity to the rail station, as well as a number of public functions - such as the municipal offices, shopping complexes as well as healthcare services. The City Centre is also well developed in terms of its mixed residential capacity, catering for most demographics and income groups.

(Please see Figure 32 below – inner/ lighter circle denotes a 400 meter radius and the second, larger circular surrounding this illustrated an 800 meter radius)

#### **e. Key Performance Criteria**

The primary goals of the Cape Town MyCiti system are to ensure the use of existing systems and networks through asset renewal, maintenance of infrastructure, upgrades, operational efficiency, and enhancements of services and systems as well as adding additional capacity to the current system, networks and infrastructure. In addition, from a spatial planning perspective there is need to ensure consistency with Spatial Planning Policy; that the land use potential along IRT routes can be maximised; and to ensure that the long term growth potential is taken into account when determining the short-medium term IRT routing; and assess the IRT routing potential for City restructuring.







Figure 33: Plan illustrating MyCiti Transit Station within the Urban Context (Logan, 2011)



f. System Images and Precinct Examples



Figure 34: MyCiti System Images

### 3.4 CHAPTER SYNOPSIS – KEY FINDINGS

The four precedent studies briefly examined above give a very constricted overview of the some of the successes and concerns associated with the development and implementation of integrated public transport systems. It is however very clear that each system has its own unique set of challenges and constraints which need to be addressed according to the local context in which it is found. However a comparative analysis allows for the extraction of a generalised or common set of issues or lessons from practice, which can be used to develop a set of criteria for benchmarking or informing similar projects.

This analysis has recognised that a typical set of criteria needs to be acknowledged and put into motion for the system to achieve the desired vision. Due to the fact that integrated rapid transit systems have become such an important feature within the built environment system, in part restructuring and redefining urban context, the political will and drive for the overall development approach is paramount to the success of the system. The crucial part this political endorsement plays in the success of the project has been clearly established in the two international studies considered. A further important feature is the need for full integration between land use planning and transport planning. Land use planning cannot be an afterthought. Without the correct or appropriate land use to support the transportation system within station precincts, the development will not achieve its full seamless vision. The iterative set of criteria which should guide transit precinct development has been identified as follows:-

- I.    Densify land use around station nodes as well as along the transit corridors;
- II.   Build an assortment of housing types within walking distance of transit stations;
- III.   Where possible, utilise state-owned land to initiate development;
- IV.   Encourage a robust vertical mix of uses;
- V.    Encourage active interfaces between buildings and streets;
- VI.   Building interfaces should provide a human-scale appearance as well as an abundance of visual security characteristics;
- VII.   The overseeing municipal council should offer incentives for inclusionary development characteristics;
- VIII.   The precinct development surrounding the transit facility should create ‘anchor’ civic spaces;

- IX. The development of pedestrian and bicycle movement zones must be prioritised and in some instances given precedence over motor vehicle movement;
- X. Increase pedestrian permeability into and through transit station precincts; and,
- XI. Encourage development characteristics that spread economic impact.

The current position of the South African integrated transport systems is uncertain as it is too premature to be fully critical of the projects so far implemented in terms of the new integrated approach. As identified, there are a few station precincts which will evolve successfully due to the existing conditions – however, there are a number of concerning aspects which need to be reconsidered. Firstly, the need for a fully integrated project team is required, as land use planning cannot be an afterthought. Despite integrated project objectives developed at the outset, full integration in the implementation phase is lacking. Secondly, the political will and drive, if all members of the multidisciplinary team throughout the municipality, do not receive the support from the necessary sphere of government, the development will constantly require revision and new strategies to achieve and retro-fit a preferred outcome. It is also concerning that the predominance of transportation planners in the Cape Town example harkens back to the historical disjuncture between different disciplines in the built environment when the nature of the project is intended to be one of integration. Institutional and professional alignment is as important as the implementation of the principle of integration in the project. The ultimate combined vision for the planned integrated rapid transit system is envisaged to operate along a network of routes and corridors, and which will be unlike any previous public transport services in South Africa, providing a world-class experience.

## **CHAPTER FOUR – VIEWS OF PROFESSIONALS ABOUT INTEGRATION OF TRANSPORT AND URBAN PLANNING**

#### **4.1 INTRODUCTION**

The purpose of this chapter is to understand the current views of professionals within private and public institutional in regards to the integration of transport and urban planning.

The following chapter outlines comments received from both the public and private sectors interviewees in regard to this dissertation's hypothesis – that greater integration between transport and urban planning will yield more successful urban environments, and more specifically within the parameters of a transit oriented development. As identified in Chapter One the key informants are;

##### Transport Planners

- I. Transport Planner – Jarendra Reddy
- II. City Official - Manoj Rampersad

##### Urban Planners

- I. Private Sector – Tony Markewicz
- II. City Official – Soobs Moonsammy

Development Planning, Environment and Management Department is supportive of the project, however when presented with the research question, the representative indicated that this research proposal related specifically to the eThekweni Traffic Authority and advice should be sought there. Therefore the table below will only indicate the first three interviewee responses.

#### **4.2 STRUCTURED INTERVIEW RESPONSES**

A number of structured questions were put to the selected key informants, not all the questions asked however will be detailed below as some questions served as introductory matter to get the author and the interviewee comfortable.

The following table indicates the grouped responses provided by the interviewees. This table is structured in a particular manner so that all responses to the questions are documented alongside one another, to allow for easy evaluative comparison and analysis

MUNICIPAL TRANSPORT PLANNER	PRIVATE SECTOR TRANSPORT PLANNER	PRIVATE SECTOR PLANNER
<b>QUESTION: What existing BRT or light rail system should be used as a precedent for the eThekwini IRPTN?</b>		
<p>The general thinking for the eThekwini IRPTN system is based on the well-known South American models – Curitiba and Bogotá. The contexts of these models were important as they presented similar development concerns within a comparable context. It is however important to adjust the concept to fit the South African context. The Team is also looking carefully at the two South Africa examples – Rea Vaya in Johannesburg and MyCiti in Cape Town. The South African examples are being considered very cautiously, in order to prevent the duplication of mistakes in the eThekwini context.</p>	<p>The South American examples namely Curitiba (Brazil) and the Bogotá TransMilenio and Pereira MegaBus (Colombia) have been used as precedent for the eThekwini IRPTN system. A number of the project team members as well as Municipal officials working on the project have visited the South American examples in a lead-up to this project.</p> <p>The two South African examples have and will continue to guide the eThekwini IRPTN.</p> <p>The Bus Rapid Transit Planning Guide (2007) published by the Institute of Transport and Development Policy, edited by Wright and Hook will provide the basis for the eThekwini IRPTN planning framework.</p>	<p>Land within the European context is scarce and therefore available land becomes very valuable. Dutch examples, with regards to BRT systems, could provide interesting technical solutions to the restructuring of cities as a result of the land scarcity. Other examples which could be of use within the South African context are systems located in Asia and South America where living conditions and income variations are similar. However, the densities associated with these systems are far greater than any South African example.</p>



MUNICIPAL TRANSPORT PLANNER	PRIVATE SECTOR TRANSPORT PLANNER	PRIVATE SECTOR PLANNER
<b>QUESTION: Can the eThekweni IRPTN team learn from any of the mistakes made by other IRPTN teams?</b>		
<p>The Johannesburg and Cape Town BRT systems or part thereof were implemented to assist the transfer of visitors during the 2010 Soccer World Cup. In the rush to complete these phases a number of details were overlooked. These include; the misalignment of particular aspects such as intersection, signalisation, ramps, scoops, light posts and staircases.</p> <p>As a result, the Department of Transport has appointed a Universal Access Assessor to assess the levels of compatibility of the stations with the user's needs.</p> <p>In order to curb these issues within the eThekweni context the municipality is planning to address all these design elements together and appoint an independent professional at the design and implementation stage to check drawings and implementation details. A document is currently being produced by the National Department outlining all the potential issues and concerns which can be avoided in the proceeding phases of development.</p>	<p>The premise of the public transport framework is to predict and provide. This is the past planning approaches characterised by the UK and USA examples. The contemporary approach is to try and control the demand and be more proactive.</p> <p>Key failures found in other systems are the inadequate design for pedestrians. All commuters are pedestrians at some point along their journey. The journey always focuses on the driving function of transport and while little regard is given to the walking environment.</p> <p>Another observation is to plan with the intention to implement. Most often failure occurs because there is a lag time between the planning, design and implementation. Plan and design must happen together and therefore will be done at a detailed level from the beginning.</p> <p>In the case of the eThekweni IRPTN, the project team has taken the view to not reflect any bias to specific mode or route or area. The team will not be hinged on the apartheid planning structures and decisions.</p>	<p>The IRPTN team needs to have a champion or leader to guide and integrate the process in order for it to proceed as a streamlined project. Without political will and full support it will be difficult for the project to reach its full potential. The project needs sufficient drive and energy to achieve great success and for it to have far reaching effects.</p>

MUNICIPAL TRANSPORT PLANNER	PRIVATE SECTOR TRANSPORT PLANNER	PRIVATE SECTOR PLANNER
<b>QUESTION: What criteria should be used to develop or identify the main routes and station locations within the eThekweni Context?</b>		
<p>The locations of stations and specific intervals have been positioned around the demand and the desires of commuters, i.e. where people want to be, where people need to go, daily requirements – employment, social, residential. These qualities provide the clues for the routing of the new system. Routes identified need to be multi-directional in order for greater sustainability throughout the system.</p>	<p>The IRPTN concept was born from the vision put forward by the eThekweni's Municipality in the IDP. As a result the objectives for the project have been identified as;</p> <ol style="list-style-type: none"> <li>1. Equity of access to opportunities – a system which assist with all city functions (work, live and play), a system that does not discriminate between age, race and location etc.</li> <li>2. Reduce the overall impact of transportation on the environment;</li> <li>3. Promote liveable cities – focus on precinct area surrounding the station, not just the station module;</li> <li>4. Rectify and enhance spatial structure (to minimise costs you need to minimise the distance travelled);</li> <li>5. Quality of service that is acceptable to current car users;</li> <li>6. Must have a positive impact on the city economy.</li> <li>7. The unbiased approach to mode selection used the</li> </ol>	<p>The routing of a BRT system needs to be multi-functional, especially if a route is intra-metropolitan, then specific criteria would be required. Within a City context the criteria would take different approaches - specifically; densities, current capacity of networks, future potential of networks, the effects of the route to restructure a city, existing links within the City fabric and the potential for greater sustainability within its context, as well as the opportunities which are generated from the surrounding brown-field or green-field developments.</p>

	<p>following criteria to determine the appropriate mode for specific sections of the system;</p> <ol style="list-style-type: none"> <li>8. Demand vs. capacity; and,</li> <li>9. Ability of mode to encourage densification (light rail has the ability to get higher densities vs. BRT needs critical mass to maintain service and manage. Plus need to minimise transfers and fleet.</li> </ol> <p>The designs put forward to date are specific to people's/ commuters needs. As a result the routes designed will ultimately be more expensive as it reflects the demand and not the topography or current alignments born during the apartheid era.</p> <p>The promising aspect of the project lies in the fact that the system provides options for the first time – operating as a network and not as a pure transfer from point A to Point B.</p>	
--	--	--

MUNICIPAL TRANSPORT PLANNER	PRIVATE SECTOR TRANSPORT PLANNER	PRIVATE SECTOR PLANNER
<b>QUESTION: What criteria should be used to integrate transit stations into their existing environment?</b>		
<p>The IRPTN requires a total restructuring of land use. This inevitably will cut down the transfers between routes. Each node must have a collection of complimentary uses.</p> <p>The development of nodes and corridors with a complete set of complement uses will require patience, as it will take a long time for the restructuring to occur. However, the restructuring needs to take place.</p> <p>As a result there is a need to introduce the transect approach to the development – greater densities and land use range within the core tapering out to a purely residential low density suburban neighbourhood. The full scale of which should take place in approximately a kilometre. This is required for the systems to work. Land use plays a large role in the overall development vision and objectives. If the land uses are not aligned with the transport system and nodes, the overall system will fail.</p>	<p>Full integration between transport and land use can only occur if there is integration from an institutional perspective.</p> <p>The ultimate project philosophy and approach, is that the users are the centre of the design - everything else must be ‘retrofitted’ to suit commuters.</p>	<p>Station locations should be designed around or located within existing or new focal points of a community. Transfer points will become nodes in own right overtime.</p> <p>The specific walking distance of 400 meter – 800 meters for a comfortable commuter walk is critical in the location of a station. Opportunities for areas to change, as well as the availability of land around a proposed transit node and the convergence of other modes at specific points also become critical defining elements for the position of a node/ station.</p>

MUNICIPAL TRANSPORT PLANNER	PRIVATE SECTOR TRANSPORT PLANNER	PRIVATE SECTOR PLANNER
<b>QUESTION: Who should make up the eThekwini IRPTN project team?</b>		
A full team including all line departments and associated parastatals are required for a project of this nature. Commitment and support from these groups will allow for the development of a successful system.	<p>The appointed project team is multi-disciplinary. The Transport Planners and Engineers however have taken the lead on this project as it is primarily a transport related project, despite the strong urban planning dimensions; one discipline needs to drive and manage the project.</p> <p>The Project Steering Committee includes;</p> <ol style="list-style-type: none"> <li>1. eThekwini Traffic Authority;</li> <li>2. Framework Planning</li> <li>3. Architecture department;</li> <li>4. Environmental Department;</li> <li>5. PRASA;</li> <li>6. Economic Development;</li> <li>7. National Department of Transport;</li> <li>8. KZN Transport;</li> <li>9. Housing (Need to align housing projects to the new vision and infrastructure for the city)</li> </ol>	<p>The project team for the eThekwini IRPTN system should consist of; Transport Planners, Town Planners - including strategic planners, urban planners and Land Use Management Specialists, Economists, Housing Specialists, Infrastructural Engineers, Property Economists as well as Social Specialists.</p> <p>The project outcomes are hinged on a leader of the project, who will drive the process, insuring total integration between sectors through the project duration. How the team is briefed at the outset will also be critical to the final project deliverable.</p>

**Table 6: Key Informants Interview Responses**

### **4.3 CHAPTER SYNOPSIS – KEY FINDINGS**

The key informant's interviews illustrate a number of key influences with regards to the development of the eThekweni IRPTN system. The exploration of the South American and possibly the Dutch systems will provide a number of clues for the effective development and implementation of a complimentary, integrated system to restructure the South African city context, specifically the eThekweni Municipality. It is significant that during the interviews participants identified the fundamental need to have an interdisciplinary team and a range of specialists which should be involved from the outset of the project. The broader team would need to include the professional multi-disciplinary team, city officials as well as other influential parastatals such as PRASA. The full involvement of these professionals should result in a well integrated process, however as identified, without a proper briefing session to all parties involved, the desired outcome and objectives may differ. The project set-up and initial stages together with guidance through these phases by a project manager will provide the adequate foundation for a well-rounded end product.

The multi-disciplinary team will provide the structuring elements for the project, together with precedent studies, a literature review, and a thorough study of the local area context to provide the criteria for developing routes and station locations. These elements are the fundamental components of the system - therefore well informed decisions need to be made in order for the system to function efficiently. The selection of routes within the eThekweni context is primarily based on commuter demands. Identifying the current city commuter demands and establishing new dedicated routes will begin to correct some of the ills of the past and allow greater permeability and accessibility for the greater eThekweni population.

Once routes are located, stations are acknowledged as beads along the string to 'complete' the infrastructural system. The international rule of thumb for the location of stations is centred on a comfortable walking distance, which has been recognised as between 400 meters and 800 meters. City officials have recognised the need for a transect approach around the station transit points, allowing for greater mixed use densities to be concentrated around the transit corridors and nodes, dissipating gradually to lower density purely residential clusters on the fringes.



## **5.1 INTRODUCTION**

The purpose of this chapter is to develop a set of criteria which will assist in the evaluation of the eThekweni CBD case study. The guiding criteria will be developed through the findings of the three preceding chapters. Chapter two provides criteria which are grounded from a theoretical base, chapter three puts forward aspects from the precedent studies of systems, which are currently running locally and internationally, and the fourth chapter provided a set of criteria which were obtained via the interview process conducted with specific city officials and private sector professional's perspectives.

## **5.2 SYNOPSIS OF ISSUES**

As detailed in chapter one, the primary motivation of this study was to identify the need for greater alignment between the primary building blocks of an urban system and the fundamental need for complete integration of the urban planning and transport planning processes. The intention of the research is specifically to consider the land use component and urban design qualities of urban planning and the public transport element of transport planning. The misalignment of either of these components will result in an unsustainable and inefficient system and city, which will continue struggle to compete successfully with similar counterparts. The integration of these two planning rudiments will assist in the restructuring and alignment of our South African cities, which were separated and categorised with purpose decades ago.

The theoretical underpinning, precedent studies and structured interviews of this study will identify below an integrated performance filter through which an appropriate evaluation of the eThekweni CBD case study. The integrated performance filter, together with the outcomes from the case study evaluation will identify and put forward suitable recommendations and concluding remarks which are presented in the final chapter of this study.

### **5.2.1 SYNOPSIS OF CHAPTER TWO – COMPONENT A**

Chapter two touched on the myriad of new policies which have been promulgated within the last two decades by the post-Apartheid government, in an attempt to create the policy and legal frameworks for development and to create a desirable, equal, integrated and sustainable country. The chapter also outlined a number of influential spatial structuring and urban design concepts such as corridors, nodes, new urbanism principles, transit-oriented development and bus-rapid transit ideologies which share



similar attributes. These attributes influence the key performance indicators, comprised of the following;

- I. Continued development of policy guidelines to instil greater integration and equal opportunities for all metropolitan inhabitants;
- II. Increased densities at specific target locations;
- III. Greater accessibility and permeability for both vehicular and non-vehicular transport as well as smart transport solutions;
- IV. A greater mix of uses and activities within a node;
- V. The encouragement of good urban design and architectural principles to promote environments designed for people; and,
- VI. The development of traditional neighbourhood structures which endorse intensities within the core dissipating toward a lower intensity residential component on the fringes.

#### **5.2.2 SYNOPSES OF CHAPTER THREE – COMPONENT B**

The third chapter identified four precedent studies, locally and internationally. The chapter acknowledged an iterative set of criteria which should guide transit precinct development. The criteria are:-

- I. Densify land use around station nodes as well as along the transit corridors;
- II. Build an assortment of housing types within walking distance of transit stations;
- III. Where possible, utilise state-owned land to initiate development;
- IV. Encourage a robust vertical mix of uses;
- V. Encourage active interfaces between buildings and streets;
- VI. Building interfaces should provide a human-scale appearance as well as an abundance of visual security characteristics;
- VII. The overseeing municipal council should offer incentives for inclusionary development characteristics;
- VIII. The precinct development surrounding the transit facility should create 'anchor' civic spaces;
- IX. The development of pedestrian and bicycle movement zones which are prioritised over motor vehicle movement;
- X. Increase pedestrian permeability into and through transit station precincts;
- XI. Encourage development characteristics that spread economic impact;

- XII. Political support and drive; and
- XIII. Integrated land use planning from the outset of the project

### 5.2.3 SYNOPSIS OF CHAPTER FOUR – COMPONENT C

The key informants interviewed reiterated the need for a multi-disciplinary team would be required for the successful implementation of the eThekwini IRPTN system. This quality would be earmarked as a directive for the overall approach rather than specific criteria.

The informants identified that the primary route selection should be based on commuter demands. This analysis is anticipated to developed and identify a system of new dedicated routes which will begin to correct some of the ills of the past and allow greater permeability and accessibility for the greater eThekwini population. Once routes are located, stations are acknowledged as beads along the string to ‘complete’ the infrastructural system. It was recognised that the international rule of thumb for the location of stations is centre around a comfortable walking distance, which has been recognised as between 400 meters and 800 meters, as well as a transect approach around the station transit points, allowing for greater mixed use densities to be concentrated around the transit corridors and nodes, dissipating gradually to lower density purely residential clusters on the fringes.

### 5.3 IDENTIFICATION OF KEY CRITERIA AND ESTABLISHMENT OF EVALUATION/ DESIGN CRITERIA

The criteria for which the eThekwini CBD case study will be evaluated have been established as a result of the above listed findings. The criterion is multi-layered. Firstly there is a need for a set of criteria to identify the appropriate **routes** along which the IRPTN system should be based. A second set of criteria is required for the identification of the **station locations**, and a final set of criteria is necessary to **integrate** the identified route and station within the existing **urban environment**. This multi-layered approach is a pre-requisite for the successful integration and implementation of the systems, which intends to restructure the current city structure to allow for greater connection and integration at an overall level. The three tiered approach recommended as:-

- I. Criteria for appropriate route selection;
  - Origin and destination demands;
  - Future capacity potential of route;

- Routes ability to retain maximum mobility, however providing accessibility for pedestrian movement; and
- Routes ability to contain mixed land use activities along the edges to support the system (It is not however envisaged that the mixed use activity continues for the full length of the route. The land use response should be appropriate to the nature of the area and the route.)

II. Criteria for the identification of station locations;

- Approximate station location should be positioned at a comfortable walking interval for approximately 400 meters to 800 meters apart;
- The promotion and ability to generate a traditional neighbourhood structure. Therefore endorsing specific density gradients and a mix of uses;
- The ability to promote greater accessibility and permeability;
- Specific land use motivation for a station is preferable, for example - a focus on either a civic component, shopping, sporting, industrial etc.

III. Criteria for the integration of stations within the existing environment;

- Densify land use around station nodes as well as along the transit corridors and nodes;
- Increase pedestrian and non-motorised modes of transport to improve permeability and accessibility into and through transit station precincts;
- Build an assortment of housing types within walking distance of transit stations;
- Optimise state-owned land to initiated development;
- Encourage a robust vertical and horizontal mixing of uses;
- Encourage active interfaces between buildings and streets;
- Building interfaces should provide a human-scale appearance as well as an abundance of visual security characteristics;

The above listed criteria are immaterial if the political will and drive for the project is not at the forefront of the development agenda. A second overarching approach to the project is the integrated nature in which the project is structured and developed both from the policies guidelines to the

implementation. Once these two primary principles are in place the above, listed criteria will assist with the remaining tasks of establishing or identifying an appropriate transit model.



## 6.1 INTRODUCTION

*‘The development momentum within South Africa has reached a critical climax. Urban centres have achieved significant thresholds which warrant efficient and effective public transport systems. The Department of Transport, has therefore through the study of international best practice, made it clear that the BRT System is crucial to the success of South Africa's transport system and cities. Without a good transport service that is accessible, affordable and attractive to a broad range of people, local transport simply cannot work’* (<http://www.arrivealive.co.za/pages.aspx?i=2874>)

With these ideals forming the foundations of the study, the previous chapters have tried to set the context and define a set of criteria which would be relevant in the eThekweni case study. To this end, the development of transport related infrastructure and the associated land use is at the forefront of South African Municipal visions, including that developed by the eThekweni Municipality. The following chapter will assess the eThekweni Municipality CBD context, with particular emphasis on the Umgeni Road corridor, in light of the criteria established in the preceding chapter.

## 6.2 CASE STUDY CONTEXT

### 6.2.1 eThekweni IDP Policy Vision

The eThekweni Municipality's vision as identified within the 2010/ 2011 IDP Annual Review states that *‘By 2020, eThekweni Municipality will be Africa's most caring and liveable city’ – this is eThekweni Municipality's vision for the next 10 years’*. To accomplish this vision the Municipality has put forward a number of basic elements which need to be addressed. These include but are not limited to:-

- Ease of movement in the Municipality;
- A safe environment in all parts of the Municipality;
- Access to economic opportunities;
- Resources to afford what the Municipality offers;
- A clean and green Municipality, capable of delivering a range of ecosystems goods and services;
- Homely neighbourhoods;

- Access to services, in particular municipal, health and educational services.

In order to achieve this vision, the Municipality through the IDP process will need to make a number of 'Key Choices' which will need to have the political and official commitment to observe them. Two of the key choices pertaining to this study are identified as:-

- Choice Two: Promoting densification and strategic management for new growth areas; and,
- Choice Four: A good public transport system.

### **6.2.2 Spatial Development Framework**

eThekweni's Spatial Development Framework (SDF), as established through the Integrated Development Plan<sup>1</sup> process, firmly seeks to reinforce the development, intensification and improved functioning of the existing development structure. The SDF provides a spatial context for the implementation in space of the vision and principles of the IDP, reflecting the investment intentions and development management approach of the municipality. The key principles emanating from the SDF include, inter-alia, the following:

- Strive towards a compact city model;
- Emphasis on accessibility and convenience in a compacted urban area;
- Durban Town Centre and Umhlanga as the focus of major investment areas;
- Regeneration of existing areas;
- Supporting smaller priority nodes which provide social support;
- Supporting a public transport network;
- Utilisation of available infrastructure capacity in development areas inside the urban edge rather than extending the platform infrastructure to new areas;
- Suburban areas beyond the Urban Edge within which limitations exist, the current and additional provision of services is not cost effective;
- A northwards investment direction in response to private sector development needs. Development outside the current urban edge in the next 5 to 10 years will be restricted;

---

<sup>1</sup> Compliant with Chapter Five requirements of the Municipal Systems Act (Act No. 32 of 2000)

- Changes to the urban edge will be limited with the only changes being movement of the urban edge northwards to include the next catchment;
- Urban edge concept used as a tool to curb urban sprawl, promote compaction & achieve associated efficiencies, secure agriculture and upper catchment environmental assets; and,
- Rural development will be aligned with the intent of the SDF.

### **6.2.3 eThekwinini Regional Context**

The basic structure of the KwaZulu-Natal region is characterised by the undulating ridge and valley systems which run towards the coastline. These systems have defined and shaped the growth and development of the city structure from the genesis of the harbour town centuries ago. The growth and development of the region is currently defined by the primary movement systems. *‘Initially the rail and main road systems structured settlement and organic growth along north/ south and western axes. More recent development has been shaped by the establishment of the main national freeway systems and associated main roads that link various settlements in an east – west system’* (Iyer, 2009).

In a response to the defining regional structures, the development pattern can be characterised as a dominant linear settlement corridor running along the coast on the north/ south axis and the inland east/ west axis, developing what is formally known within the region as the ‘Golden T’. The ‘Golden T’ is primarily founded on the apartheid principles; therefore it is dominated by the White middle to upper class. In the shadows of the ‘Golden T’ lie the previously marginalised and disadvantaged Black, Asian and Coloured communities within the peri-urban areas. In relation to this settlement pattern and the dominant structuring techniques of the previous government regime, the socio-economic conditions of the region echo these characteristics; with the highest levels of underdevelopment and poverty existing outside of the dominant corridor systems and the higher performing areas in terms commerce and conveniently well located residential neighbourhoods are those which are closely aligned with the established development corridors.

It is therefore acknowledged that the primary challenge that faces the eThekwinini Municipality region is the current disconnection between the existing settlement patterns and the distribution of resources and opportunities. The dysfunctional city spatial form results in the poorest and those



most in need, living the furthest away from city's economic opportunity (Iyer, 2009). These structuring elements explained above, are graphically illustrated in the diagram on the left below where the red lines indicate the 'Golden T', which cradles the broader development patterns. The more affluent communities, as well as the commerce sector straddle the main movement lattice. Previously marginalised communities lie in the quadrants inland of the 'Golden T' removed from the main activity corridors.



**Figures 35 and 36: eThekweni Municipality Structuring Context (Iyer, 2009)**

As indicated above and in the previous chapters, historical and to some extent contemporary planning practices across South Africa have reinforced single access routes into large residential townships. These planning mechanisms were used to control the movement of the Black, Asian and Coloured inhabitants from and to the outlying areas. This structural historical formation developed from this, continue to hinder the spatial performance of the city.

As identified above in the eThekweni's IDP and SDF, a primary development imperative is to correct the historical spatial form of the city through the restructuring of the overall movement network in a manner that integrates and provides greater accessibility and permeability. Creating additional

linkages north, south, east and west at a metropolitan scale is crucial. This concept is crudely illustrated in the above diagram, Figure 34: eThekweni Municipality Structuring Context, on the right. The ultimate vision for the Municipality includes a generous lattice system for transportation which links communities, and is supported by an efficient public transport system. The introduction of this network would be an essential ingredient toward an improved overall city performance. The primary corridors which encapsulate the rail system, presents a substantial opportunity for the main stream public transport to exist.

The eThekweni Municipal structure is hinged on the primary corridors identified and the *'primacy of the CBD core represents important elements of the city scale structure, and is likely to continue to be of the primary centres for investment, development and opportunity. These serve as development corridors at a metropolitan scale'* (Iyer, 2009). The future restructuring and planning around these nodes and corridors should encourage the integration of these existing settlements, which lie in the shadows of the dominant structuring elements with those which are located along the primary corridors. Simultaneously, key routes forming part of the overall lattice system should be identified and developed as Activity Spines allowing for improved access to opportunity outside of the dominant metropolitan corridors (Iyer 2009).

Through the existing structuring elements and recent urban reconstruction planning projects, the eThekweni region has over a number of decades established a polycentric or multi-nuclei spatial form. This can be characterised by a series of metropolitan centres serving a diverse range of functions that emerged naturally through the growth of small towns located along key axes routes. The development and re-investment in 'township' centres more recently represents another key aspect supporting the distribution of opportunities rather than the centrality of them. This decentralisation concept is illustrated above in figure 34: eThekweni Municipality Structuring Context, above. A polycentric city structure coupled with a city scale activity system underpinned by public transport, are important drivers for change toward establishing a more 'equitable' and 'high performance' city (Iyer, 2009).

### 6.3 EVALUATION OF ETHEKWINI CBD AGAINST IDENTIFIED DESIGN CRITERIA

The policy and structural context outlined above, provides the background for the proposed restructuring process, for the eThekweni Municipality, through the implementation of an integrated public transport system. The criteria for which the eThekweni CBD, Umgeni Road Corridor case study will be evaluated has been established as a result of the overall study findings in chapter five. A three tiered approach recommended and will address:-

- I. Route selection;
- II. Station location; and
- III. Integration of stations within the existing urban environment.

The following analysis will begin to evaluate the eThekweni CBD in light of these criteria above, in order to establish the most appropriate routing, station location and over integration of the system. It must be noted that whilst the intention of this study is to provide criteria for the establishment of routes and station locations, the route selection in terms of this study will be conceptual as the development of a full traffic model to determine the commuter demand as it is outside the scope of the project. Therefore the route selection will be determined through the use of the remaining criteria. It should also be noted that the selection of routes and station locations are specific to this study as a result of the information at hand. The execution of a project of this nature requires a full team of professionals whom are fully interactive and integrated from the project inception. However this research deals primarily with the Town Planning and Urban Design characteristics only.

### 6.4 THE ETHEKWINI IRPTN

*'Public Transport in the South African cities is characterised by a myriad of problems emanating from the historical inequalities of the apartheid city structure. It's in this context that Government's Public Transport Action Agenda has been crafted to redefine and restructure the current disjointed and unresponsive system'* (Moodley et al, Unpublished).

Chapter Two outlined a number of policies that are guiding and facilitating the restructuring of the South African landscape for, which public transport is one of the implementing mechanisms. The key objectives of restructuring the Public Transport (PT) system are:-

- I. To provide an adequately frequent service for passengers in terms of national government policy;
- II. To ensure a more reliable service through the operation of monitored contracts; and
- III. To eliminate the uncertainty inherent in non-contracted services and to reduce duplication and efficiencies (Moodley et al, Unpublished).

The new integrated rapid public transport systems within South African, together with the eThekweni IRPTN was initiated on the premise and principles of the Public Transport Action Plan (NDoT, 2007). The approach adopted by the eThekweni Municipality was to ensure the development of a 'wall to wall' public transport network that was free of competing segments and could be incrementally implemented over time. The aim of the network is provide a robust and responsive plan, to serve the largest percentage of the municipal population in the most cost efficient manner, without compromising the quality of service. As a result the compliment of the network is made up of a number of components, specifically; Trunk Routes, Feeder Routes, Complementary Routes, Transfer Stations, Park and Ride Facilities (Moodley et al, Unpublished).

The full approach adopted by council for the implementation of an Integrated Rapid Public Transport Network within the eThekweni context, as identified by Moodley et al (Unpublished), is to ensure that;

- I. A full wall to wall public transport system inclusive of trunks, complimentary and feeder services is provided;
- II. Phase 1 of the Public Transport Action Plan is part of the full IRPTN plan for eThekweni;
- III. Consultation with the affected stakeholders is part of the process to ensure full buy-in before implementation;
- IV. Implementing a single corridor at a time, the process of change can thus be piloted and the transition more manageable;
- V. Implementing the corridors in phases will also assist in National Government and eThekweni Municipality in terms of funding the roll-out of the plan over a number of financial years;

- VI. The approach to the planning of eThekweni's IRPTN was based on the following motto, 'short-term wins, jeopardizes long term goals'.

Therefore ensure the project is not a 'short-term win' the eThekweni Municipality Development Planning Unit has recognised the need to integrate land use planning within the transportation planning 'especially with the objective of making public transport sustainable within the corridors proposed' (Moodley et al, (Unpublished). Therefore the trunk corridors within the network have been identified with the Development Planning and Economic Development Planning Departments. *'Thus ensures that the land uses and economic activities within these corridors will support public transport in terms of derived demand to sustain the public transport system. The City's spatial development and local area plans focus on densification, infilling and mixed land-use of particularly urban development to support public transport. In order to optimize the usage of public transport infrastructure and facilities, and especially to promote the integration of land-use and transport, the IRPTN supports and provide for development in the nine trunk corridors identified'* (Moodley et al, Unpublished).

## **6.5 UMGENI ROAD: THE INTEGRATED MODEL**

As noted in Chapter One and above, a traffic modelling exercise had not been conducted as part of this study, as it is a study in its own right. Assumptions in this regard however, can be drawn from existing settlement patterns and locations of industrial and commercial nodes, to the movement found within the municipal district.

At a district scale, a large number of the commuters travel from outlying areas to the CBD. This municipal node serves as a large interchange point from which commuters transfer to more local destinations, north, south or west of the CBD. In part the method of interchange is related to the way in which the various transportation options operate across the city e.g. the taxi industry have clear routes and nodes where routes intersect. The formalisation of these district routes within the eThekweni Integrated Rapid Transport Network (IRPTN) will result in the necessary connection and restructuring of the settlement landscape within the municipal context, rather than remain fragmented.

### 6.5.1 Route Selection

At a local scale, as outlined in Chapter One, the researcher will seek to identify an appropriate transit development spine within corridor that exists between the Durban CBD and the districts which lie immediately north of the Umgeni River.

ROUTE SELECTION CRITERIA		CASE STUDY	EVALUATION
1	Origin and destination demands	Yes	<p>Umgeni Road can be defined as a destination point in its own right - it houses a mix of uses relating to civic functions, commercial, retail, social and recreational opportunities.</p> <p>The Umgeni Road system also provides a link between the eThekweni CBD to the northern suburbs as well as Springfield Industrial Park.</p>
2	Future capacity of route	Yes	<p>The author assumes that future public and private initiatives/ development, should they take place, the system ought to be able to accommodate these advances. The route is surrounded by a number of other regional and local lattices, which provide the necessary supporting functions through the growth and development of this system.</p> <p>Regardless of the possible spatial constraints provided along the Umgeni route, increased bus frequency along the system should deal with increased demands, without requiring road to widths increase.</p>
3	Routes ability to retain maximum mobility, however providing accessibility for pedestrian filtering and movement	Yes	<p>Umgeni Road primarily provides a mobility function. The adjoining roads enable the system to offer an accessibility function for both motorised and non-motorised commuters.</p> <p>The development of interconnected street grids which have distinct hierarchical structure, help disperse vehicular traffic, ease walking, and creates distinctive spaces assisting with the navigation of the area.</p>
4	Routes ability to contain	Yes	<p>The Umgeni Road strip currently consists of a robust</p>

ROUTE SELECTION CRITERIA		CASE STUDY	EVALUATION
	mixed land use activities along the edges to support the system		<p>mix of land uses, which provide a basic structure for the development of a successful transit corridor. Increased densities along the strip will further improve its viability.</p> <p>The Umgeni Road system holds the characteristics of a traditional neighbourhood structure – high intensive mixed use core, scaling down to lower intensity residential neighbourhoods. A wider range of opportunities and experiences available in the area, will guarantee that there is a diverse range of people of different ages, classes, cultures and race.</p>





**Figure 37:** Route Selection – Umgeni Road Corridor (Logan, 2011)



### 6.5.2 Umgeni Road Corridor - Station Selection

STATION SELECTION CRITERIA		CASE STUDY	EVALUATION
1	Station interval approximately 400 – 800 meters	Yes	The Umgeni Road is able to accommodate stations at the prescribed commuter intervals; 400 meters – 800 meters. However at the outset of the project the initial phases will not be able to support the full vision. Over time and increased densities along this route may warrant the implementation of additional stations. The author is of the view that a maximum of two to four stations will currently be sustainable along this corridor.
2	Ability to generate a Traditional Neighbourhood Structure	Yes	Berea North provides a fitting example of a traditional neighbourhood structure – Higher intensity, mixed use development located along Umgeni Road, behind which, lower intensity uses such as professional offices and residential communities is located within 400 meter of the high intensity strip.  The character and integrity of this traditional neighbourhood structure will hopefully be protected over time by the road structure and topography of the area.
3	Promote accessibility and permeability	Yes	As indicated above the grid-like system provides good opportunities for the promotion of accessibility and permeability of the area through motorised and non-motorised modes of transport. Greater emphasis needs to be made to allow for increased pedestrian mobility within the areas surroundings of the Umgeni Corridor structure.
4	Land Use motivation (i.e. sport precinct, civic node, shopping cluster)	Yes	A number of destination specific land uses are located along the Umgeni strip. This are identified as; the Moses Mabhida Stadium, Mr Price Kings Park Stadium, the Moses Mabhida Rail Station, Umgeni Road Station, the Department of Home Affairs,

STATION SELECTION CRITERIA		CASE STUDY	EVALUATION
			Game City as well as a number of other destination oriented activities. These specific destinations, present opportunities for station clusters at these points.

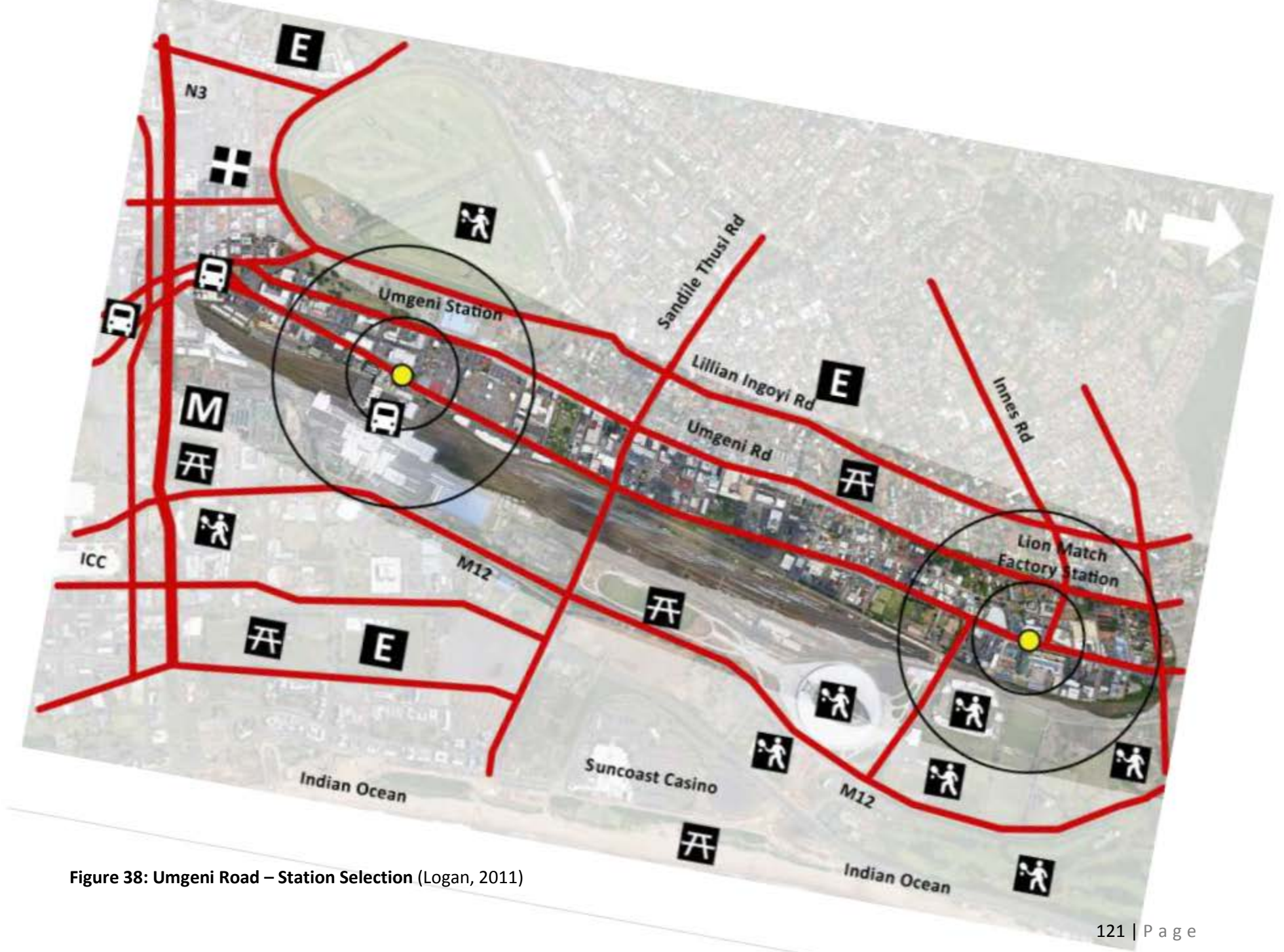


Figure 38: Umgeni Road – Station Selection (Logan, 2011)

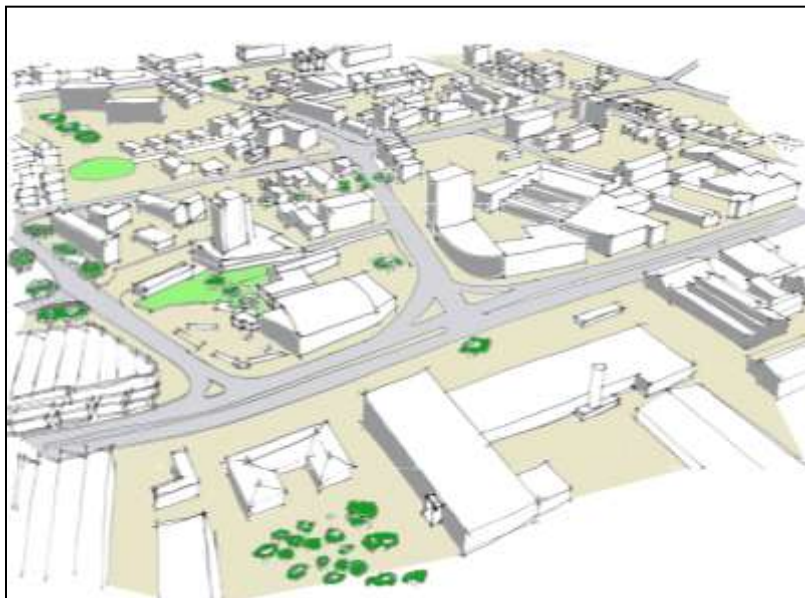
### 6.5.3 Umgeni Road - Station Integration

STATION SELECTION CRITERIA		CASE STUDY	EVALUATION
1	Ability for increased densities around station node	Yes	<p>Increased densities allow for large thresholds to support the environment in which they live. The provision of activities and building densities permits a live, work, play environment that enables a more efficient use of resources and services.</p> <p>Higher densities and intensity of uses should be located along the Umgeni Corridor, steadily depleting moving up the Berea ridge to purely low density residential neighbourhoods.</p>
2	Increase pedestrian and non-motorised modes of transport	Yes	<p>Precincts should primarily be designed to facilitate an 800 meter or 10 – 15 minute walk between places of desire/ origin and destination. However in the case of the Umgeni Corridor a continuous band of stations along the road is excessive as there need cannot be fulfilled. The author is of the view that two to four stations along the Umgeni Road Corridor from the CBD to the Umgeni River. The current thresholds will not warrant additional stations. Stations can be added in time should the system be unable to facilitate the growing demand.</p> <p>The aim of the precinct should be to create wide pedestrian friendly streets which are framed by buildings lined with colonnade edges. Wider roads should be narrowed to divert through-traffic and to encourage and increase 'pedestrian-friendliness', however balance and not stunt the mobility aspect of the corridor.</p> <p>The implementation of traffic calming to discourage fast moving cars and in special cases streets should be free of cars allowing for fully pedestrian priority areas – in the case of the Umgeni Road this may not be applicable. These calming mechanisms should not</p>

STATION SELECTION CRITERIA		CASE STUDY	EVALUATION
			disrupt the flow of the rapid transit system. Urban landscaping and beautification therefore becomes an important feature in these zones.
3	Selection of residential housing types, as well as potential for new developments	Yes	A range in types, prices and sizes of housing opportunities within a precinct will also increase the dynamic nature of an area. A diverse environment increases levels of choice available to its users. The development of affordable housing along the corridor will assist lower income users to access a range of urban benefits within their environment and walking distance. Medium and Higher income users can remain in the foreground of the corridor, benefiting from the opportunities through increased accessibility and permeability of the precinct.
4	Optimise state-owned land	-	Specific state-owned land is not applicable within this context. However, state-owned landholding within other station location could be utilised as a catalyst for development.
5	Robust vertical and horizontal mix of uses	Yes	<p>A rich mix of uses along the street façade will induce an increased public awareness and interaction along the Umgeni Corridor. The promotion of high densities around the station precinct, with mixed use activities taking place on the first two floors and residential above will assist in a work, live, play environment.</p> <p>The robust vertical mix together with human scale buildings will instil a level of visual security, creating a friendly, safer environment.</p>
6	Human-scale and urban design qualities	Yes	Developing a 'sense of place' along the Umgeni Road Corridor is fundamental for the precinct to develop its own image and identity. The development of an

STATION SELECTION CRITERIA	CASE STUDY	EVALUATION
		<p>areas identity is significant for its success amongst a range of similar nodes along the route. The orientation of the node should therefore reinforce and reflect the unique identity and quality of its surrounding, adopting a consistent and distinctive architectural style that draws on local history, culture, geography and climate – with regards to this node the orientation and unique identity should be focused around the Kings Park Sport Precinct. Through the design of this nature, qualities such as human scale, aesthetically inquisitive, emphasis placed on the sports functions and uses, as well as human comfort and safety should be harnessed.</p>

#### 6.5.3.1 Umgeni Road Integrated Vision

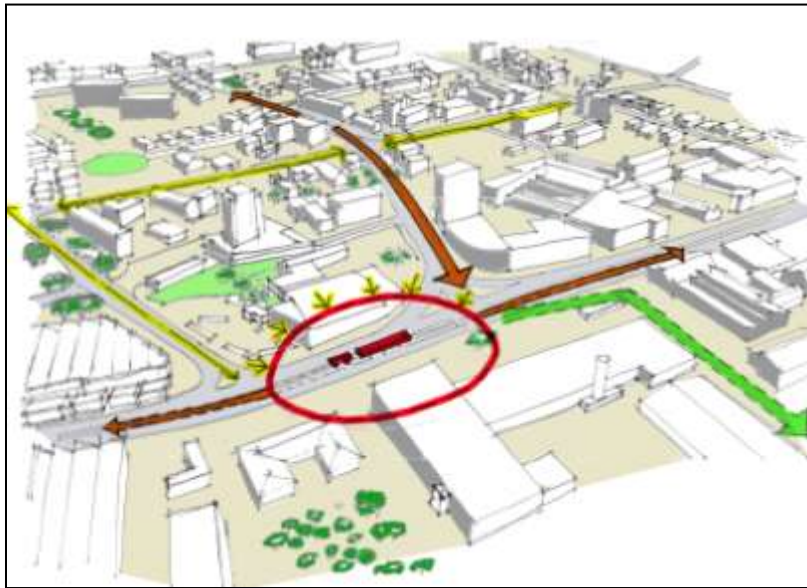


**Figure 39: Umgeni Road Integrated Vision – Existing Condition** (Logan, 2011)

The existing conditions surrounding the Umgeni/Innes Road Station illustrates:

- I. A wasteful and disorganised land use structure;
- II. Unorganised urban form;
- III. Non-responsive facades to existing movement lines;
- IV. Vehicular oriented environment.





The Umgeni and Innes Road Station zone is the confluence of the primary movement arteries. A further pedestrian link is proposed to stem from this, to the Kings Park Sport Precinct.

**Figure 40:** Umgeni Road Integrated Vision – IRPTN Movement Influences (Logan, 2011)



The building use and scale is intensified along the primary feeder routes, with a new public interface created. Infill along street edges is encouraged to create a continuous edge. Better permeability and accessibility will be generated.

**Figure 41:** Umgeni Road Integrated Vision – Redefined Urban Grain (Logan, 2011)



Streetscape upgrades together with a public square and plaza at the base of a mixed use precinct of retail, residential and office gives this station is communal identity – The Lion Match Factory Station.

**Figure 42: Umgeni Road Integrated Vision – Final Form**  
(Logan, 2011)

## 6.6 CONCEPTUAL FRAMEWORK RELEVANCE WITHIN THE UMGENI ROAD CORRIDOR

Chapter Two's literature review put forward a number 'recommendations', from a theoretical point-of-view, urban planning concepts could draw. Within the Umgeni Road context the following aspects are utilised;

- I. **Strategic Planning** – a range of guiding documents, from broad overarching policies such as the eThekweni SDF to specific origin and destination travel patterns form the bases of the strategic planning of the eThekweni IRTPN. The strategic intent of these documents is to guide appropriate future development along the identified corridors/ trunk routes, and stimulate investment potential within these strategic land parcels along the Umgeni Corridor. The development of strategic plans is to promote structure and order within environments, creating quality urban spaces;
- II. **Institutional Arrangements** – As identified in previous chapters, the development of clear organisational structures to facilitate the growth and development of this project is paramount to the success and longevity of this project. Appropriate partnerships between implementers', funding agents, investors, managers and beneficiaries form the foundation of the project. Without the correct partnerships and clear understanding of the task at hand



by all parties the full vision and aspirations of the project will not be achieved. Further to the basic institutional arrangements the co-ordination of budget and expenditure is critical, for example the line department within eThekweni Municipality should align their budget as well as strategic policies to reflect the consolidated vision put forward by the IRPTN project;

- III. Urban Design Elements** – Urban design elements within a project of this scale and complexity are important to portray the overall strategic intentions. As indicated above these elements introduce a people centred approach to the development, encouraging robust mix of uses, human scale environments, permeability through the built landscape and the integration between streetscapes and the encroaching street facades. The introduction of urban design elements along the Umgeni strip will uplift the existing environment, promoting a safer, user-friendly, people centre distinct. Through this approach, it is the authors hope that the illustrations presented above become a reality;
- IV. Land Use Management** – The development of an efficient system is dependant on a proper land use management system. The management of, which can be supported by a set of plans – structure plans, precinct plans, site development plans, development controls as well as architectural guidelines, to ensure the suitable development of this Corridor;

## **6.7 CHAPTER SYNOPSIS**

Like many of the South African Cities, the eThekweni Municipality is still trying to grapple with the effects of planning decisions made under the apartheid regime. The implementation of an IRPTN system will provide a number of sought after solutions, for the restructuring and connection of the previously fragmented outlying neighbourhood.

The Umgeni Road through the guidance of the strategic policies and the identified three tiered approach, provides an opportunity to develop a sustainable land use and public transport integrated system. This route is a powerful linkage connecting the CBD with areas north of the Umgeni River. As identified through the evaluation the Umgeni Route link, it is able to achieve all criteria set out in Chapter five, to varying degrees. The development and evolution of the system, through political will and support, as well as continued guidance from an integrated project team should generate a robust and dynamic system, which is commuter oriented, providing for all

essential day functions to be achieved within this environment – live, work, play. The Umgeni Road network provides a significant opportunity to successfully stream-line urban planning and transport planning ideals to develop a successful, sustainable integrated model.



## **7.1 INTRODUCTION**

The study hypothesis set out to evaluate whether greater integration between transport and urban planning would lead to more successful and sustainable cities and urban spaces, systems and environment. The assessment of this assertion has been undertaken through the structured research methodology identified in Chapter one, the development of a detailed literature review looking at specific guiding policy documents and planning trends - both within an urban planning and transport planning context, as set out in Chapter Two, the analysis of international and local precedents (relevant case studies) in Chapter Three, from which key structuring elements can be extracted for the use within the eThekweni case study; as well as the recommendations outlined within Chapter Four structured interview. All of the foregoing analytical materials have been used to create a framework within which to assess the appropriateness of the proposed Umgeni Road integrated model.

In this final part of the dissertation, a number of recommendations are presented which can be used to guide and facilitate the appropriate development of an integrated rapid transit system within the eThekweni context.

## **7.2 RECOMMENDATIONS**

The Umgeni Road precinct provides a good example of an integrated urban and transport planning model for the eThekweni Municipality. However, the following recommendations drawn from the previous work are suggested as being relevant to ensure the success of integrated land use and transportation projects in the future;

- I. The eThekweni Municipality is encouraged to develop a revitalised Strategic Planning Unit to drive the planning, design, implementation and future running of the eThekweni IRPTN system. This units' primary objective would be to lead, and champion the project and to ensure an integrated approach is adopted. It would employ a range of built environment professionals such as Town Planners, Urban Designers, Land Use Management Specialist, Transport Planners, Architects, Environmental Specialists, Engineers, Economists, Land Legal Experts, Socio-Economic Specialists, Facilitators as well as a Branding and Marketing Team;

- II. The development of the eThekwini IRPTN system is still in its infancy and therefore it is strongly suggested that the project implementation team would be briefed in an appropriate manner who would be responsible for emphasising the importance of the integrated nature in which the project would need to be planned, designed and implemented. The form and function of this organisational aspect should mirror the integration it seeks to achieve through the planning process and implementation of the project;
- III. It is crucial that the project managers of the eThekwini IRPTN plan manage and implement the institutional and financial aspects of the project. In cases where attention is not paid to these key project components, there is the potential of having to cut project costs towards the end of the development, as witnessed within the local precedent studies. Where the financial aspects of urban integration projects are not carefully managed, it can result in a truncated implementation process. In local precedents, this project management weakness has resulted in the development of the station precinct being removed from the project process. The removal of the transportation hub from the project can seriously impact upon the success of the system since it compromises the intended urban integration. When stations are not integrated into their surrounding and the land uses do not support the station precinct the overall integrity of the precinct and system will be compromised and the validity of the project principles questioned;
- IV. Appropriate Urban design characteristics need to be implemented to knit the environments effectively and provide influential people centred environments. The development of a Strategic Planning Unit, as identified above, will provide the appropriate channels for which strategic plans can be implemented and managed. The objectives of these plans will ensure a well-rounded sustainable, accessible, people-centred development for which the wider public and City can benefit.

### **7.3 CONCLUSIONS**

For the most part, South African Cities are yet to experience the true nature of a fully integrated urban and transport planning system. Despite the overarching policy documents dictating and encouraging the development of an integrated, sustainable urban environment for the city to operate in, the

achievement of these goals is still part of a longer term achievement. The functions of the city still work as individual units, without meaningful integration. Projects are run by individual departments with minimal contributions of other departments. Line department of the Municipality are funded individually by government, therefore funds are spent in a similar manner. These departments rarely consolidate their funds in order to achieve a greater, integrated vision.

The author, in the preceding chapters, has tried to illustrate the role in which urban planning and transport planning should fulfil within the restructuring process. However, until a paradigm shift is achieved throughout the existing Governments structures, the full potential of projects, such as the eThekweni IRPTN will not achieve the intended vision of urban reconstruction and integration. Urban planning trends such as the new urbanism principles or contained nodal and corridor development will only achieve a fraction of the intended vision, as line departments within the municipal structures still function as separate, uncoordinated units. The potential of the eThekweni IRPTN project to achieve the intended goals and vision is high, if all procedures, visions and overarching policy are adhered to fully. Two precedent studies have been developed within the South African context from, which eThekweni Municipality can learn and improve upon. Other international case studies identified through this study illustrate the key factors to be considered for optimum success of this project – ultimately will and continued support.

The current opportunities, which exist, to fully restructure and integrate the fragmented landscapes, which characterise cities in South Africa, specifically the eThekweni Municipality are rare. As planners within the current times, there is an opportunity to make a meaningful contribution to our urban environments and fundamentally enrich people's lives. The correct integration and development along the individual activity corridors and spines, such as the Umgeni Road network will encourage the continued growth and incremental restructuring and evolution of the City. The Umgeni Road Corridor, specifically the Lion Match Factory Precinct, provides an opportunity to incorporate the theoretical observations identified in Chapter Two, and the key influences from international and local precedents in Chapter Three, to create a well integrated urban transport oriented node, which fulfils the greater needs of the public within eThekweni.

## REFERENCES

Agência Curitiba De Desenvolvimento S/A (2010) The Investors Guidebook, Informações Socioeconômicas – Guia do Investidor. 3.ed. – Curitiba, 2010.

Arrive Alive (2011) Bus Rapid Transit System (BRT) and Road Safety (Available at <http://www.arrivealive.co.za/pages.aspx?i=2874> Accessed 16 June 2011)

Baldwin-Ragaven, L., London, L., du Gruchy, J. (1999). An ambulance of the wrong colour: health professionals, human rights and ethics in South Africa. Juta and Company Limited. p. 18

Bohlweki Environmental (Pty) Ltd (2002) Environmental Impact Assessment for the Proposed Gautrain Rapid Link Project – Issues Report

Brosch, G. L. (ED) (2002) Journal of Public Transport, Vol 5, No 2, Center for Urban Transportation Research, University of South Florida.

Behrens, R. Wilkinson, P. Housing and Urban Passenger Transport Policy and Planning in South African Cities: A Problematic Relationship? In Harrison, P., Huchzermeyer, M, & Mayekiso, M. (Eds). (2003) Confronting Fragmentation: Housing and Urban Development in a Democratising Society, University of Cape Town Press.

Calthorpe, P. (1994) The next American Metropolis: Ecology, Community, and Planning, Princeton, NJ, Princeton Architectural Press in The City of Calgary Land Use Planning & Policy: Transit Oriented Development, Best Practice Handbook

Cervero, R., S. Murphy, C. Ferrell, N. Goguts, T. Yu-Hsin, G. B. Arrington, J. Boroski, J. Smith-Heimer, R. Golem, P. Peninger, E. Nakajima, R. Chui, R. Dunphy, M. Myrres, S. McKay, and N. Witenstein. 2004. Transit-oriented development in the United States: Experiences, challenges and prospects. *TCRP Report* 102. Transportation Research Board, in Currie, G. (2006) Bus Transit Oriented Development – Strengths and Challenges Relative to Rail, Journal of Public Transport, Vol 9, No 4.

Commission for Architecture and the Built Environment (200) By Design, Urban Design in the planning system: towards better practice, Department of Environment, Transport and the Regions.

Cracknell, J. (2003) TransMilenio Busway-based Mass Transit, Bogotá Columbia. World Bank



Day, K. (2003) Journal of Planning Education and Research, New Urbanism and the Challenges of Designing for Diversity, Vol 23: 83 – 95

Department of Land Affairs (2007) Interventions To Reverse Undesirable Settlement Growth Patterns, Land Planning and Information, Parliamentary Portfolio Committee

Dewar, D & Todeschini, F. (2004) Rethinking Urban Transport after Modernism: Lessons from South Africa, Ashgate

Dittmar, H. Ohland, G (ED) (2004) The New Transit Town: Best Practices in Transit-Oriented Development, Island Press.

Gaines, J., Jager, S. (2009) A Manifesto for Sustainable Cities: Think Local, Act Global, Prestel Publishing.

GAPP. (2007) La Mercy Baseline Study: The potential for an urban Corridor (Unpublished Paper)

Garner, G. (2011) Urban Green File, Gautrain Precinct Disappointment, Brooke Patrick Publications (Pty) Ltd

Green, C. Aberman, L. Naude, A. (2000) Land Use Corridor and Node Study: Phase 1, CSIR- Transportek.

Griffin, K.W. (2004) Building Types Basics for Transit Facilities. John Wiley & Sons, Inc.

Hall, P. Pain, K (2009) The Polycentric Metropolis: learning from mega-city regions in Europe, Earthscan.

Harrison, P., Huchzermeyer, M, & Mayekiso, M. (Eds). (2003) Confronting Fragmentation: Housing and Urban Development in a Democratising Society, University of Cape Town Press.

Harrison, P. Todes, A. Watson, V. (2008) Planning and transformation: learning from the post-apartheid experience, Taylor & Francis.

Hayakawa, L.M (2002) Curitiba Orienting Urban Planning to Sustainability, ICLEI, Case Study 77, Municipality of Curitiba, Brazil.

Holden, R.M. (2011) South African Property Review: A tale of two Cities: A Matrix of Nodes, Pangram Publishing (Pty) Ltd

Ikemeleng Architects & Muhammad Mayet Architects & Urban Designers (2009) Rea Vaya Bus Rapid Transit (BRT) Urban Design Guidelines, City of Johannesburg, Department of Planning and Facilitation

IPPU, Rabinovitch and Hoehn, (1993) and Creating a Linear City with a Surface Metro, R. Cerero, UC Berkeley, 1995 in TCRP 90, 2002

Integrated Transport Plan 2003/2008 (2004) City of Johannesburg

Iyer Rothaug Collaborative (2005) South Coast Road Economic Framework Report

Iyer Urban Design Studio (2009) Shongweni Local Area Plan, Status Quo Report

JDA, (2010) Gauteng Spatial Development Framework 2010- 2011

Marrian, B. (2001) Towards a General Theory of Corridor Development in South Africa, 20<sup>th</sup> South Africa Transport Conference – ‘Meeting the Transport Challenges in Southern Africa’. Transformation Technologies, CSIR Transportek.

Moodley, G.Y., Chett, R., Reddy, J., Simmer, C., (Unpublished) Developing the Integrated Rapid Transport Network (IRPTN) for the eThekweni Municipal Area, eThekweni Transport Authority & GOBA

MyCiti Business Plan (2010) Phase 1A of Cape Town’s MyCiti Integrated Rapid Transit System, as approved by Council

Naparstek, A (2007) The Bogotá Transformation: Vision & Political Will

(<http://www.streetsblog.org/2007/10/29/what-it-looks-like-when-bikes-are-part-of-the-transit-system/> last accessed 27.10.11)

National Department of Transport (1998) Moving South Africa. Pretoria

National Department of Transport (1999) Moving South Africa: The Action Agenda. Pretoria.

National Department of Transport (2001) An Overview of the National Land Transport Transition Act (Act 22 of 2000)

New Urbanism.org (Unknown) Creating Livable Sustainable Communities. [www.newurbanism.org](http://www.newurbanism.org) last accessed 10.10.11)

Pienaar, P.A., Krynauw, M.N., Perold, A.D. (2005) Public Transport: Lessons to be learnt from Curitiba and Bogotá, Proceedings of the 24<sup>th</sup> South African Transport Conference, Document Transformation Technologies cc, Pretoria.

Provincial Planning and Development Commission. (2007) Development Corridors: Towards appropriate planning within KwaZulu-Natal, Phase 2 Report.

Provincial Planning and Development Commission (2008) Development Corridors: Towards Appropriate Planning with KwaZulu-Natal, Volume 2: Guidelines Document.

Rabinovitch, J., Leitmann, L. (1993) Environmental Innovation and Management in Curitiba, UNDP-UNCHS (Habitat)-World Bank, Urban Management and Environment, Working Paper 1, in TCRP Report 90, (2002) Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit, Transit Cooperative Research Program.

Renne, J. (2009) From Transit-Adjacent to Transit-Oriented Development, *Local Environment*, Vol. 14, No. 1, pp. 1-15, in Victoria Transport Policy Institute (2011) Transit-Oriented Development, Using public transport to create more accessible and livable neighbourhoods, TDM Encyclopedia.

Smart Growth BC. (2007) *What is Smart Growth?*  
(<http://www.smartgrowth.bc.ca/AboutUs/tabid/56/Default.aspx> last accessed 16 June 2011)

South African Cities Network (Unknown) Creating Sustainable Communities: A History  
([www.sacities.net/knowledge/studies/history](http://www.sacities.net/knowledge/studies/history) last accessed 11.10.2011)

Sorg, D (2011) Bus Rapid Transit Systems and Beyond, Exploring the limits of a popular and rapidly growing transport system, IVT ETH Zürich

Takemoto, N. (2001) Form-based planning 'OS' Key to Knowledge Economy, Urban-Rural Transect. ([www.cooltownstudios.com/site/comments/form-based-planning-os-key-to-knowledge-economy/](http://www.cooltownstudios.com/site/comments/form-based-planning-os-key-to-knowledge-economy/), last accessed 10.10.11)

TCRP Report 90, (2002) Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit, Transit Cooperative Research Program

TCRP Report 90, (2003) Bus Rapid Transit, Volume 2: Implementation Guidelines, Transit Cooperative Research Program

The City of Calgary (Unknown) Transit Oriented Development, Best Practice Handbook, The City of Calgary Land Use Planning & Policy

The City of Cape Town (2011) Five-Year Plan for Cape Town 2007 – 2012, Integrated Development Plan (IDP) 2011 – 2012 Review

The City of Johannesburg (Unknown) Rea Vaya/ BRT – Transforming the Face of Public Transport, End of Term Report 2006 – 2011

The City of Johannesburg, (Unknown) Spatial Development Framework (SDF) 2010 - 2011

Thwaites, K. Porta, S. Romice, O. Greaves, M. (2007) Urban Sustainability through Environmental Design: Approaches to time-people-place responsive urban spaces, Routledge.

TransMilenio S.A. (2003) TransMilenio Bus Rapid Transit System of Bogotá, Columbia. Asia-Pacific Environmental Innovation Strategies (APEIS) Research on Innovative and Strategic Policy Options (RISPO) Good Practices Inventory

Van Wyk, J. (1999) Planning Law, Principles and Procedures of Land-use Management, Juta & Co, LTD.

Wilkinson, P. (Unpublished) Transit Oriented Development: A Strategic Instrument for Spatial Restructuring and Public Transport System Enhancement in South African Cities. School of Architecture, Planning and Geometrics, University of Cape Town.

Williams, K (Eds) (2005) Spatial Planning, Urban Form and Sustainable Transport, Oxford Brookes University, UK.

Wright, L (2003) Bus Rapid Transit, Sustainable Transport: A Sourcebook for Policy-Makers in Developing Cities, Module 3b, Institute for Transportation and Development Policy.

Wright, L. Hook, W. (ED) (2007) Bus Rapid Transit: Planning Guide. Institute for Transportation and Development Policy.