

GREATER PRETORIA: PROPOSED SYSTEM OF REALMS, NODES AND CORRIDORS

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1. BACKGROUND

During February 1999 the City Council of Pretoria (CCP) commissioned a process “**to formulate land use management and policy directives to be used by officials as planning instruments to manage future development of the spatial structure of the City according to a system of nodes, development corridors, spines and streets**”.

The individual objectives of the study which also represent the different phases according to which the study was conducted, are as follows:

- To functionally assess the currently proposed system of nodes, corridors and activity streets (from the IDP process).
- To standardise on terminology related to nodes, corridors and activity streets based on technical literature.
- To define the order, functionality and interrelationships of the system of precincts, activity nodes, development corridors and activity streets in the CCP area.
- To formulate policy directives related to transportation and land use management and control of the development of each of the precincts, nodes, corridors and activity streets.
- To formulate an action plan for the implementation of the policy directives.

The study was completed during August 1999 and the following represents a summary of the main elements emanating from the study.

The study comprised two main components - a literature survey on the theory of urban town and structure (section 2) and then a proposed spatial development framework for Greater Pretoria based on the main findings from the literature survey (section 3 and 4).

2. LITERATURE SURVEY: URBAN FORM AND STRUCTURE

2.1 INTRODUCTION

Metropolitan areas are emerging as the hubs of the global economic network. The regions that will become the most successful competitors in this new environment are those that are the most efficient, well organized and well managed. Only those regions will have the ability to offer both the quality of life and the economic opportunities that will be in great demand.

However, as the 21st century approaches, cities face important changes in the way healthy economic growth is maintained. A coordinated growth strategy is imperative to help avoid potentially chaotic environments where fragmentation of infrastructure and transportation lead to inefficiencies (Gallis, p.1).

According to Devas et al (p.31) cities all over the world have similar problems regarding land use and transportation:

- **uncontrolled development,**
- **too rapid growth and change,**
- **congested circulation,**
- **uneven accessibility,**
- **unbalanced use of facilities,**
- **restricted choice of residence,**
- **unstable pattern of activity,**
- **high running cost, and**
- **a visually characterless and confused landscape.**

2.2 HISTORICAL DEVELOPMENT OF THE CITY

According to Newman and Kenworthy (p.1-4), throughout urban history, people have shown one characteristic that has shaped the nature of our cities: they do not like to travel more than half an hour to major urban destinations. This has caused different types of cities to develop as transport technologies have evolved towards greater speed and freedom.

2.2.1 The Walking City

Mainly comprising the medieval cities of Europe, the walking city comprised a compact and mixed land use urban form in which **all destinations could easily be reached by foot.**

2.2.2 The Transit City

The walking city was followed by the transit-city during the latter part of the 19th century. These cities pushed increasingly outwards as the train and tram allowed faster travel to occur. The trains and trams created linear development that followed the routes located in corridors. Medium-density, mixed use areas were formed at the rail nodes and along the tram routes. The city could now stretch over several kilometres based on these technologies. Where the rail lines met at the city centre, very intense activity resulted. **The central area became the dominant focus of the city.**

2.2.3 The Automobile City

Beginning in the mid 20th century, the automobile progressively became the transport technology that shaped the city. It made it possible to develop in any direction, first filling in between the train lines and then going outward. Low-density housing became feasible and function started to be separated by zoning. This increased journey distances, which could be managed due to the flexible and fast transport afforded by cars. **The city began to decentralize and disperse.**

2.2.4 The Information City

Although there is much dispute as to its relevance, international literature hints at a fourth type of city being developed, the information city. According to Knox (p.131-132), new communications and information technologies are just as much facilitators of urban form as were the tram and automobile. These technologies have freed many consumers and workers from some of the friction of distance, thus supporting the automobile in dispersing the urban landscape.

Indeed, some adjustments are already apparent. To some extent, the locational freedoms conferred by **information technology have simply reinforced the decentralization trends established by the successive innovations in intra-urban transportation. This trend will likely strengthen as the information technology sector of the economy continues to grow.**

2.3 HISTORICAL DEVELOPMENT OF MULTI-NODAL STRUCTURE

According to Atash (p.39-40) the dawning of the automobile city and its related suburbanization began with the movement of the middle and upper-income residents from the central cities to the outskirts of cities. The movement of people to the outskirts was followed by the decentralization of retail, industrial and office jobs throughout the city. Consequently the last two decades have seen the suburbs emerge as the focus of the vast majority of employment growth.

Post-modern cities are therefore multi-nodal.

2.4 ELEMENTS OF THE FUTURE CITY STRUCTURE

2.4.1 Urban Realms/Edge Cities and the Urban Core

According to Knox (p.124-133), the current overall framework of the city can best be thought of as a series of urban realms (edge cities) surrounding a core. The core should be thought of as the legacy of the industrial era, and was dominated by the CBD. Urban realms/edge cities are the product of suburban infill and freeway sprawl along with more recent development. Each is large enough to support a mix of land uses, which in turn allow their populations (up to 175 000-250 000 people) to function on a daily basis without necessarily having to visit, or be served by the core or other realms. **In other words, each urban realm/edge city will have retail, commercial and residential land uses of various kinds, as well as a retail node or nodes that functions as a first high-order central place for a majority of the residents.**

The idea of the urban realm/edge city is meant simply to convey a loose functional organization. Edge cities/Realms are not entirely self-sufficient, and many people will cross boundaries to work, shop, study or socialize. Nor are they to be considered equals. Some will center on manufacturing employment, while others will be oriented toward office employment; some will be mainly middle-class, with middle-class shops, while others will be working-class. **What the idea of urban realms/edge cities does suggest is that most residents of metropolitan areas do not make use of the entire metropolis, except for the occasional visit.**

In general, the recognition of the economic, demographic and political importance of the urban realms/edge cities has prompted some observers to announce the "end of suburbia", the point being to emphasize that the suburbs have matured into places with city-like qualities (Edge Cities). The size of the commercial cores and extent of production spaces in the urban realms have lessened the dominance of central cities in metropolitan areas. Indeed, the central cities are now "central" only in

the most limited geographical sense, their economic and demographic importance having been eclipsed by the surrounding urban realms/edge cities.

According to Hudnut (p.87) the message regarding inner cities is also clear: "Inner Cities should not try to offer people what the suburbs do, and therefore be in competition with them. They should be themselves.

They should build on their own strengths, find their own niche, emphasize their uniqueness, and concentrate on what they have to offer in contrast to the limitless low-density sprawl and haphazard growth that characterize much development on the periphery of cities".

2.4.2 Public Transportation and Corridors

Atash (p.43-44) notes that the public transit system needed for the future should go beyond the old one, which was a radial commuter service linking downtown to suburbs. In most growing metropolitan areas a diversity of transportation needs, such as dispersed suburban employment and non-work travel, require developing new forms of transit based on the specific features of particular areas. The new transit system should link the existing and emerging compact metropolitan centers to each other to serve suburb to suburb commuters, and to the radial commuter service to serve both traditional commuters and reverse commuters.

According to Gallis (p.7), corridors are primarily transportation and development arteries where rail lines, major arterial streets and highways run more or less parallel to one another. These corridors provide the foundation for high-density, mixed-use developments, due to the access created by the multiple and grouped transportation lines. On the other hand, the corridors encourage access to, and use of the public transportation systems located within the corridor, due to the concentration of a variety of activities close to these transportation systems. Corridors are therefore the spatial structure by which land use and transportation integration is achieved.

2.4.3 Transit Orientated Development (TOD)

TODs are defined as a unique mix of land uses located at a high density within a 400m walking radius of a railway station. TODs are purposely designed to facilitate access to the transit stations and so increase the use of the public transportation systems. TODs are therefore designed to achieve land use and transportation integration within corridors.

Newman et al (p.7) states that there is a new awareness that transit orientated planning makes economic sense:

- Transit investment has twice the economic benefit to a city of highway investment.
- Transit can enable a city to use market forces to build up densities near stations where most services are located, thus creating more efficient sub-centers and minimizing sprawl.
- Transit enables a city to be more corridor oriented where it is easier to provide infrastructure.

2.5 CONCLUSIONS

- **Modern-day Cities are Multi-nodal**
- **Multi-nodal Cities are Function-orientated**
- **Inner Cities are no longer Dominant in terms of all Functions**
- **Modern Cities have a Dual Commuter Pattern**

2.6 RECOMMENDATIONS

- **Provide for an Integrated Land Use and Transportation Policy**
- **Strengthen the Inner City by recommending different redevelopment strategies**
- **Identify a selected number of growth centers in the suburbs where future large-scale suburban development projects should be located**
- **Link the network of growth centers to each other and to the Inner City**
- **Promote mixed-use development along metropolitan transit corridors**
- **Retain residential areas for residential purposes**

3. CURRENT GREATER PRETORIA SPATIAL STRUCTURE

3.1 EXISTING STRUCTURE

3.1.1 Introduction

All of the problems experienced by modern cities as listed in Section 2 par. 2.1 are also evident in Pretoria. The following is a short summary of the main problems regarding the spatial structure and development trends encountered in Pretoria (from the IDP processes):

- The city has a spatially distorted pattern of settlement with low income communities (Atteridgeville and Mamelodi) situated at the edges of the city due to historic political policies.
- Due to these spatial distortions, Pretoria developed in such a way that the demand for, and the cost of providing public transport is very high.

- Decline/changes are taking place in the character and function of the Inner City.
- Unbalanced development is taking place with many economic activities relocating towards the southeastern suburbs and away from the central and western parts of the city.
- There is a general lack of development interest on the western side of the city.
- Uncontrolled urban sprawl results in greater demand for travel in the Greater Pretoria area in general.
- Alternative land uses disturb the residential character of established residential areas.
- Land use changes are taking place adjacent to the major arterials in the metropolitan area which impacts negatively on the mobility function of these routes.

3.1.2 Activity Areas

Pretoria comprises various types of activity areas, which are distributed throughout the city in a fashion that was largely determined by the natural environment (ridges) and by its main road and rail infrastructure. The most notable activity area is the inner city. Located in the heart of the city, the inner city is, despite a decline in its economic performance, still by far the largest provider of job opportunities (see table 1). Over the past few years it has, however, lost some ground to the high-income retail and private office sectors to the suburban nodes - and especially the southeastern suburbs. The inner city sectors that currently thrive are those that are national-scale related such as institutional/government functions, corporate offices, national health and education/ training facilities and services, and retail and office functions related/associated with the above functions and workers at these institutions.

Apart from the dominant inner city, Greater Pretoria has a few other notable activity areas which clearly depict its multi-nodal structure. There are four major retail areas that lie on the outskirts of Greater Pretoria, each of which is linked to a regional shopping centre with a floor area of more than 30000m². These are located at Menlyn, Centurion, Brooklyn and the Akasia/Wonderboom Area (Wonderpark and Kolonnade) to the north of the Magalies Mountain. Around each of these centres a number of other retail and entertainment facilities have developed, thus evolving them into mixed-use nodes (to a varying degree).

Whereas the above mentioned areas have developed around a shopping centre in a nodal pattern, there are several areas in Pretoria that have developed in a linear pattern. The most notable is the Hatfield area. This area primarily comprises private offices, which have mainly located along Burnett, Church, Pretorius and Schoeman Streets. Other notable strip developments which primarily function as retail areas, are located in Silverton (along Pretoria Road), Gezina (along Voortrekkers Road), Paul Kruger Street, Pretoria North (along Rachel de Beer Street) and Pretoria West (along Church Street West and Soutter and Mitchell Streets).

TABLE 1: MAJOR AREAS OF ECONOMIC ACTIVITY IN GREATER PRETORIA, 1996

Ranking	Area	Estimated Number of Job Opportunities	%	Retail %	Office %	Warehouse/Industrial %	Other* %	Total %
1	Inner City (Planning Zone 8)	234 100		13	49	13	25	100
2	Waltloo	36 500		10	4	64	22	100
3	Rosslyn	26 200		1		94	5	100
4	Pretoria West Church/Soutter/ Mitchell Streets	21 400		44	5	20	31	100
5	Hatfield/Colbyn	20 800		10	43	0,6	46,4	100
6	Pretoria West Industrial	17 700		0,3	2	42	55,7	100
7	Centurion City	13 600		20	49	8	23	100
8	Menlyn Node	10 000		44	37	2	17	100
9	Pretoria North	8 500		36	22	12	30	100
10	Silverton	8 500		26	28	19	27	100
11	Voortrekkers Road/Gezina	7 300		57	12	3	28	100
12	Centurion Strip	7 100		0,4	0,5	81	18,1	100
13	Hermanstad	6 000		5	3	50	42	100
14	Kirkney	4 000		1	0,5	55	43,5	100
15	Brooklyn	3 700		25	53	0,1	21,9	100
16	Paul Kruger/ Mayville	3 500		48	2	5	45	100
17	Sunderland Ridge	3 500		0	0	81	19	100
TOTAL		432 400	100	100	100	100	100	100

* "Other" includes medical and other local serving workers, workers in large institutions such as CSIR, Krygkor, SANDF, Correctional Services, etc. and outside workers such as transport and construction workers

Interesting to note is that these retail strips are all located on arterials leading to the Inner City.

Greater Pretoria has five strong industrial activity areas. The three largest areas are Waltloo located near Mamelodi, Pretoria West adjacent to the west of the Inner City, and Rosslyn/Klerksoord, located at Akasia. The two smaller areas are Kirkney and Hermanstad, both located in the Moot along Van der Hoff Drive.

Notable educational and recreation areas in Pretoria include Unisa, University of Pretoria, Pretoria Technicon, the CSIR, Minolta Loftus Stadium and Pilditch Stadium.

From the above, it is evident that Greater Pretoria's urban structure is multi-nodal, and that a strong delineation of function is already engraved in it. Distinctive areas of private offices, mixed-use, strip retail, industrial, education and recreation can be identified. Furthermore, this functional delineation can be extended to the inner city area, which clearly shows a tendency toward specific functions.

3.1.3 Transportation

The existing and planned provincial road network, as well as topographical features such as the Magaliesberg, has encouraged the development of a grid-like road network in the northwestern part of Greater Pretoria. This network primarily comprises the PWV9 and planned PWV2 freeways, and arterials such as Zambezi Drive. Although this grid system does not appear radial, it does function as such, since it serves a dominant desire line towards the inner city along D F Malan Drive, Paul Kruger Street and Voortrekkers Road.

In the eastern parts of Greater Pretoria, the road network changes shape to a more radial form. This is mainly due to the absence of the extreme topographical features, as are found in the northwest of Pretoria. This radial network comprises arterials that distinctly converge on the inner city, for example Charles Street, Atterbury and Lynnwood Roads, Pretoria Road, Church Street, Pretorius and Schoeman Streets.

The N1 Freeway is the only continuous concentric road on the eastern outskirts of Greater Pretoria. It does, however, not fulfill a concentric function, but a through-traffic function. This is the one discouraging aspect of Greater Pretoria's overall road network: the fact that it does not have a continuous concentric arterial road network. This restriction inhibits movement between the outlying activity areas of Pretoria. Partial concentric movement is provided by a few existing, discontinuous concentric roads, which include George Storrar, Duncan, General Louis Botha and Hans Strydom Roads.

The radial road network is continued in the southern and western parts of the metropolitan area, and specifically along Christina de Witt Road, Kwagga Road, Church Street West, Staatsartillerie Road and Van der Hoff Drive.

The concentric linkage in the western part of Greater Pretoria is largely established through Transoranje Road/Bremer Street.

Greater Pretoria comprises a circular commuter rail line, evolving around the Inner City area and which is supplemented by four line haul systems - one from the GaRankuwa/Soshanguve complex in the north, one from Atteridgeville in the west, another from Mamelodi in the east, and the fourth from the Witwatersrand in the south. This rail network has a close parallel relationship with various major arterials, the most notable of which are Michael Brink Street and Church Street West. This relation provides a high level of access to either business or residential locations within its vicinity, as is evident from the various well-established activity areas that it links to other destinations. The most notable linkage is to the Inner City. Other linkages to the rail are the Pretoria-West and Waltloo industrial areas, retail areas such as Gezina and Hatfield, educational facilities such as the Pretoria Technicon and University, Unisa and sport facilities such as Minolta Loftus and the Pilditch Stadium.

From the above it is evident that Greater Pretoria has a strong radial transportation network, comprising various arterials and commuter rail lines, but a weaker concentric transportation network. This weaker concentric structure limits movement between the various activity areas located in the outlying suburbs of Pretoria. The dual transportation patterns that are characteristic of multi-nodal cities are in other words restricted by the incomplete concentric road network. This lack stands in contrast to the multi-nodal structure of Greater Pretoria, which is clearly defined.

3.2 CONCEPTUAL ANALYSIS

To fully understand the existing land use and transportation structure of Pretoria requires building a conceptual model of its realms/edge cities, nodes and corridors. The historical growth of Pretoria provides some insight as to how to build such a conceptual model, since it highlights the dual transportation network mentioned in the literature study and divides it geographically.

As mentioned in the literature study, the development of cities went through three phases, the first two taking place before the 1950's when the first freeways were built. Cities during this time, including Pretoria, were directed towards the inner city and largely used public transport (tram and train) to access it. The suburbs of this era were all located close to the inner city and were effectively linked to the public transportation system (one distinct urban realm). Even the townships that were established during these initial years of apartheid, such as Mamelodi and Atteridgeville, were linked to the public transportation system, giving these townships a strong linkage to the inner city and the employment opportunities it provided.

The 1960's saw the construction of the N1-freeway that passed the then outer eastern boundary of Pretoria. This freeway led to the development of three distinct urban realms (edge cities) on the outer rim of the freeway. These include Centurion, Menlyn and the beginnings of the Urban Port (Akasia/Rosslyn/Pretoria North) area north of the Magaliesberg. What also followed during this era was the decentralization of many of the inner city's functions, notably its higher-income retail and private office functions. Furthermore, this post-1950 era was characterized by a distinct bias towards the automobile and the areas that were developed during this era therefore have a lack of public transport infrastructure. Another important feature to note is that the internal layout pattern of streets changed from a grid pattern during the public transport era to a more free flowing layout pattern which is not necessarily conducive to public transport.

These so called edge city realms developed around the flexibility of the automobile, which resulted in non-residential land use developments being scattered throughout these areas. Also, the wide range of employment, shopping and entertainment facilities that were being developed led to these edge city realms becoming self-sufficient to a large degree. This meant that a large portion of the vehicle trips became focussed on the activity areas within the edge city realms, rather than the inner city of Pretoria.

A significant twist that accompanied the post-1950 era, was the development of mixed-use areas within the edge city realms, of which each edge city realm had one. These so-called edge city nodes started out as regional shopping centres, around which other land uses later developed. The additions were mixed in nature, but primarily included private office and entertainment uses. Each edge city node developed into the dominant activity area within its respective edge city realm and started to take the character and function of the old town centre which largely centred around being the focus of the surrounding residential communities. (In the case of the edge city north of the Magalies the Rosslyn/Klerksoord node is the dominant one).

Based on the historical analysis, two distinct entities of Pretoria's urban structure thus appear: its pre-1950 public transportation related structure and its post-1950 private automobile structure. Geographically these two entities are interpreted as follows:

- A public transportation dominant urban realm covering Atteridgeville, the Moot, the Inner City and Mamelodi.

- The three largely self-sustaining, private vehicle-orientated urban realms (edge cities) comprising:
 - the southeastern suburbs of Pretoria (old east and new east);
 - the Centurion area;
 - the area north of the Magaliesberg (collectively referred to as the Urban Port).

The most extensively developed edge city node in Greater Pretoria is Centurion City, which has a wide range of office, retail and entertainment facilities. The Menlyn area is fast becoming a fully fledged edge city node, with a large mix of office, retail and entertainment facilities being developed the past few years. The only largely undeveloped edge city node is the Urban Port area. The Urban Port Study of UrbanEcon, however, envisages this area developing to its full potential when PWV2 and the extension of PWV9 are constructed.

This model of Pretoria's urban structure satisfies the requirements of the dual transportation network, which was indicated by the literature study. The literature study stated that a multi-nodal city, such as Pretoria, needs a transport network that goes beyond the old one, which was a radial network orientated towards the Inner City. The new transport network should also link the major edge city nodes to each other, therefor creating a dual transportation structure. The fixed infrastructure of the pre-1950 era has historically provided access to the inner city and can therefor continue to do so with ease, thus providing one leg of the dual transportation system. Although the Edge City Realms will also require public transport systems (bus and taxi), they can largely concentrate on private vehicle transport that aims at providing access to and between the edge city nodes, thus providing the second leg of the dual transport system.

The next section of this document describes the proposed spatial model for Greater Pretoria more comprehensively.

4. PROPOSED SPATIAL DEVELOPMENT FRAMEWORK FOR GREATER PRETORIA

4.1 INTRODUCTION

Based on the principles emanating from the literature survey on urban form above, a spatial framework comprising the following elements is being proposed for Greater Pretoria:

4.2 LAND USE

4.2.1 Urban Realms

Greater Pretoria can be divided into four distinct areas according to its historic development - a central realm which developed during an era in which public transport dominated, and three private transport orientated realms (edge cities) which developed during a period of private vehicle dominance. The central realm has as its dominant node of economic activity the Inner City (the point of highest accessibility via public transport). Apart from this the central realm accommodates a variety of speciality nodes/areas, transit nodes and a range of shopping centers. The local corridor (Atteridgeville-Inner City-Mamelodi) runs through this area and provides the framework for future development in this area. Within this broad framework the nodal and transportation system for Greater Pretoria can next be defined.

4.2.2 Activity Nodes/Areas

A four-type nodal/activity area classification is proposed for Greater Pretoria: the Inner City, Edge City Nodes, Speciality Nodes and Transit Nodes (see table 2). This classification is based on the different functions each of these node-types perform.

a) Inner city

The inner city is in a class of its own, and therefor has specific functions attributed to it. These functions are not found in any other part of the city at the same density or of the same magnitude or mix.

The primary theme around the Inner City should thus be **international identity** and **institutional authority**.

Together with the institutional function of the Pretoria Inner City goes **Corporate Head Offices** of large institutions, **Public Health** facilities and services, **Education and Training**, and **Regional Sports and Recreation**. This is the most highly accessible area in the entire metropolitan area (both by private and public transport (bus, taxi and rail)), and therefor it should retain these higher order/regional functions. Together with these higher order functions goes the **associated retail** and **office uses** which will primarily serve the public service workers and public transport users.

b) Edge city centres

Edge city centres have a very specific function, which is to provide **community identity** to its respective edge city. This is the place where people living in the edge city primarily gather to work, shop, use community facilities and be entertained. The land uses allowed in these edge city nodes should therefor aim at enhancing these functions.

To obtain community identity, edge city centres must enhance the largely **retail** experience they offer to date, by embracing the town centre concept (Thomas, 1994: 24). This concept implies adding enough complementary uses, such as **entertainment** centres, **offices**, **libraries**, **medium density housing** and **hotels** to the largely retail complex. This mix of uses creates a synergy, which intensifies the social and focal function of the retail complex to the surrounding communities.

c) Speciality nodes/areas

Speciality areas, as the name suggests, are areas with specific functions attributed to them. Five primary categories of speciality areas exist: **industrial**, which include areas such as Waltloo, Pretoria West and Hermanstad, **retail** which include areas such as the Voortrekkers Road and Silverton strip, **private offices**, which include the Hatfield-Brooklyn complex, **education, training and research** like Unisa, CSIR, Pretoria University etc., and **sports and recreation** like Minolta Loftus and Pilditch Stadiums.

TABLE 2: NON-RESIDENTIAL CLASSIFICATION, FUNCTION AND POLICY

Type	Name/Type	Function	Primary Land Use Function
Inner City	<ul style="list-style-type: none"> • Inner City 	International identity	<ul style="list-style-type: none"> • Government offices • Corporate offices • Regional Medical Facilities • Regional Educational Facilities • Regional/High order Tourism/Sport/Conferencing/Entertainment/Information Centre • Retail • High density residential
Edge City Nodes/ Areas	<ul style="list-style-type: none"> • Menlyn • Urban Port • Centurion 	Community identity to edge city realm residents	<ul style="list-style-type: none"> • Retail • Private offices • Medium to high density residential • Community facilities • Entertainment/Sport and Recreation
Speciality Nodes/ Areas	<ul style="list-style-type: none"> • Industrial • Retail • Private Office • Education, Training and Research • Sports and Recreation 	Special area for exclusive functions	<ul style="list-style-type: none"> • Retail • Private offices • Industrial/Commercial • Education/Training/Research • Hi Tech Offices • Sports and Recreation
Transit Nodes (TOD)	<ul style="list-style-type: none"> • Along Ring Rail 	Development aimed at strengthening public transport	<ul style="list-style-type: none"> • Any land use or combination of land uses - depending on location and local circumstances • Medium to high density • Pedestrian Orientated

d) Transit nodes

Transit nodes are Transit Orientated Developments (TOD's) and function as the integration element between land use and public transportation systems, notably the rail transit system which evolves around Pretoria's inner city. TODs are a unique mix of land uses located at a high density within a 400m walking radius of a transit station, and are purposely designed to facilitate access to the transit stations. These design specifications imply that these areas need to be specifically designed to fulfill their defined functions, e.g. pedestrian orientated, human friendly environments.

e) Shopping Centre

Within each of the functional areas defined above, and apart from the system of activity nodes/areas proposed for the Pretoria City Council Area, the full range of shopping centres as provided for in the Council Policy can/should be provided/allowed; subject to the various qualitative and quantitative requirements as stipulated.

4.3 TRANSPORTATION

4.3.1 Introduction

Pretoria has a poorly developed concentric road network with no direct links (apart from the N1 Freeway) that link the edge city nodes. Apart from inhibiting inter-nodal access, it also inhibits concentric traffic movement towards the edge city nodes themselves. Transport movement of multi-nodal cities, such as Pretoria, are no longer only orientated towards the inner city, but also to and between edge city nodes. The development of such a concentric road network is therefore imperative if one is to have an efficient network in future that supports the strong multi-nodal urban form of Greater Pretoria.

4.3.2 Corridor Classification

Three distinct corridors can be identified in Greater Pretoria.

a) National Corridor (Maputo-Walvis Bay)

This is in essence a transportation corridor linking Maputo to Walvis Bay and which passes through Greater Pretoria along N4 East, N1 North and PWV2.

b) Regional Corridor (Mabopane-Centurion)

This corridor is of regional importance as it crosses the boundaries of several local authorities (and even two provinces). The corridor broadly follows the alignment of PWV9.

c) Local Corridor (Atteridgeville-Inner City-Mamelodi)

This corridor runs through the entire central realm of Greater Pretoria and links Atteridgeville and Mamelodi to one another while passing through various speciality areas, transit nodes and the Inner City.

In the west the corridor comprises a combination of the railway line, Church Street West, Vom Hagen Street and the N4 West.

In the central part it comprises the railway line and Michael Brink Street/K16, and in the east it comprises the railway line, Storm-vôël/Tsamaya Road and eastern extension to K16.

4.3.3 Roads Classification

Various road classification systems have been developed in recent times to assist officials of the City Council of Pretoria with the management of the road network in its complexity. Table 3 presents a summary of different road classification systems together with the proposed system for this development framework (see last column).

Table 4 presents a summary of the proposed functions of each of the road classes.

i) Freeways

Freeways play a very important role in the development of a city. The N1-North for instance is one of the main reasons for the development of the Menlyn Shopping Centre and with it the Eastern Edge City. It is however very important to protect its main function which is regional mobility, and not local mobility. The N1 is currently used as a Mobility Spine between, for instance, Atterbury Road and the Schoeman/Pretorius/Church Streets links to the Inner City of Pretoria. This road should be protected from this by developing a strong road system (Mobility Spines) secondary to the freeway.

The freeway combination of N1 North, PWV2 and PWV9 provides a concentric freeway system around the metropolitan area which functionally links the three Edge City Nodes to one another.

ii) Mobility Spines

As indicated in Table 2, the main function of a Mobility Spine is to be a linkage between Activity Spines and to ensure metropolitan mobility.

- a) The road network in the eastern side of Pretoria forms a radial road system and needs a strong defined and protected "ring road" system. Hans Strijdom Drive forms the outer ring road and General Louis Botha the middle and Duncan the inner ring road. It is important to protect mobility function among these roads. Continuity of these roads is very important. The discontinuity of General Louis Botha north of Lynnwood Road is one of the main reasons for the misuse of the N1 as mentioned above. The continuation of General Louis Botha to fulfil the ring road function is very important to protect the regional mobility function of the N1. A more direct link between General Louis Botha and Lynburn and again from Watermeyer to Dykor should be investigated.

For the time being it is proposed that the Lynnwood Road section connecting to Simon Vermooten be defined as the continuation of General Louis Botha. Although this will assist the mobility between activity spines, it will in this case not protect the N1 from being misused as mentioned, because this alternative will be a longer journey to the main focuses of attractions which lay to the west.

A clearly defined ring road is lacking in the south and west. The function of a ring road is jointly performed by George Storrar onto Nelson Mandela (R21), Andries, Bosman, Skinner or Visagie onto D F Malan as an inner ring road and from George Storrar onto Eeufees, Roger Dyson, linking up with the Trans Oranje, Bremer as an outer ring road.

Although Zambesi and Rachel De Beer seems to form a northern ring road, their orientation will be stronger towards the north western Edge City (Pretoria North/Rossllyn) in future and may therefore rather be defined as an Activity Spine. K8 linked to Zambesi, onto a section of Baviaanspoort and then connected to Derdepoort, Dykor may, however, complete the middle ring road. It is believed that the completion of this ring road (Mobility Spine) will stimulate development in the Eersterus-Mamelodi area and assist with the needed integration of these areas with the rest of Pretoria.

TABLE 3: SUMMARY OF DIFFERENT ROAD CLASSIFICATION SYSTEMS CURRENTLY IN USE IN GREATER PRETORIA

Proposed General Road Classes			Road Signs Hierarchy	Filling Station Road Classes	Access Management Road Hierarchy (LOA)	Pavement Management and Data Management Road Hierarchy	EMME 2 Modeling Road Hierarchy	Street Lighting Road Hierarchy	GPMC Road Hierarchy	Development Framework Road Classification	
Class A	Class1	Freeway	Class A: Numbered and Freeways	Class A: Arterial with a speed limit of 70-100km/h in all areas	Freeways LOA 0	Level 1: Provide mobility in national context Primary roads	Class 1: Freeway	Class A1: Freeway Expressway Speed limit >90km/h	Class A: Provide mobility	Freeway: Regional mobility	
Class B	Class2	Arterial Primary Distributor Principal Arterial	Class B: All numbered routes (non freeway) National (N) Provincial (Rxx) Regional (Rxx) Metropolitan (M) Sub-classes: B1: Preliminary Arterial	Class B1/B2 P: Arterials with speed limits of 70-80km/h in built up area Class B2: Dual-carriageway with speed limits <70km/h	Major Arterial Streets LOA 1- LOA 3	Level 2: Provide mobility in regional context Secondary roads	Class 2: Expressway Class 3: One-way arterial without parking Class 4: One-way arterial with parking	Class A2: Major arterials Speed limit not exceeding 90km/h Class A3: Important urban traffic routes (arterials) Speed limits not exceeding 60km/h	Class B: Provide mobility and limited access	Mobility Spine: Metropolitan mobility	
											Class C
			Class C1: Unnumbered arterials Sub-Classes: C1: Tertiary arterial								
Class D	Class4	Major Collector Local Distributor	C2: Collector/Local Distributor								
Class E	Class5	Residential Streets Access Roads	Class D: Local residential Streets	Class D: Two-way arterial with a speed limit of 60km/h Class E/F: Collector with speed limit of 60km/h	Minor Arterial Streets LOA4-LOA6	Level 3: Provide mobility in the context of magisterial district Main tertiary roads Level 4: All local access roads Tertiary roads	Class 7: Collectors	Class A4: Minor arterials Connecting roads	Class C: Balance between mobility and access	Class C: Balance between mobility and access	Activity Spine: Class 2: Linlinear Development
					Major Collector Streets LOA7						
					Minor Collector Streets LOA8						
					Local Streets LOA9						
						Class 8: Centroid connectors Class 9:	Classes B1& B2: Collector roads High to medium traffic volumes	Class D: Mainly provide access	Activity Street High accessibility		
					Public transport and mass transit links	Classes B3, C1+2: Residential streets – Shopping malls	Class E: Provide access				

TABLE 4: DEVELOPMENT FRAMEWORK ROAD CLASSIFICATION

Road Definition	Level of Access (LOA)	Function
Freeway	0	Regional mobility
Mobility Spine	2-4	Metropolitan mobility <ul style="list-style-type: none"> • Ring road • Nodal connector • Connecting activity spines • High mobility • Low access • High density mixed land use and high density residential development not encouraged along route (eg. Hans Strydom)
Activity Spine: Class 1	2-5 (6 if one-way)	Nodal connector and string of beads development <ul style="list-style-type: none"> • Connecting more than one node of which one a Metropolitan Node (CBD or Edge City) • Mobility still high (limited access) • High public transport • Mixed land use in nodes along route • High residential densities in nodes along route • Activity streets to boarder these routes • Development encouraged along route (limited accesses) (eg. Atterbury)
Activity Spine: Class 2	5-7	Linear development <ul style="list-style-type: none"> • Higher degree of accessibility • High public transport • Mixed land use along the routes (specially public transport related uses) • High residential densities along the route • Mobility still important (eg. Church Street West/ Voortrekkers Road)
Activity Street	7-9	Activity Street <ul style="list-style-type: none"> • Local Road • High degree of Accessibility • Connected to Activity Spine Classes 2 and 3 • High residential densities and mixed land use along route (eg. Burnett)

iii) Activity Spines: Class 1

It is proposed that a high quality public transport service be focused along these roads. Mobility is still one of the primary functions of these roads and should be strongly protected.

Direct access to these roads should therefore be limited, but high density and public transport related land uses encouraged. If there is a need for continuous development along these roads it should be accommodated by providing service roads rather than allowing more accesses. Public transport facilities (lay-byes) should also be provided along these routes.

iv) Activity Spines: Class 2

This class should be encouraged in the local corridor, that is the Atteridgeville-Inner City-Mamelodi corridor. It is, however, important to provide sufficient mobility to any area. A Class 2 Activity Spine should therefore only be encouraged when an alternative route exists to provide the needed mobility. In the corridor developments the connection between the different road classes and rail links is very important and should be well developed to stimulate the growth of such areas in the appropriate way.

Although the rail will contribute to the mobility function, economic growth is and will stay very much dependent on road transport.

Mobility on these roads remain important and should be monitored and measures should be taken to keep it high. Things like high occupancy vehicle (hov) lanes can be developed along these routes when mobility becomes impeded. Mixed land uses should also be encouraged along these areas to limit trip lengths and to encourage the supply of all the needs of an individual along a single linear strip.

v) Activity Streets

Although this level of road does not really feature in this study it is important to define it as part of this development framework. Activity Streets can play a major role in supporting the above-defined systems and should be encouraged along both Activity Spines Classes 1 and 2. A typical example of an Activity Street is Burnett Street in Hatfield.

4.3.4 Corridor Development

As mentioned, there is a distinct public transport corridor, comprising rail and road arterial infrastructure, which links the Moot, Atteridgeville and Mamelodi to the Inner City. The transport infrastructure also links important activity areas to the abovementioned residential areas, such as the Pretoria West industrial area and Pretoria Technicon. Furthermore, they concentrate on the areas that contain the majority of public transport users.

Given the advantage of the above, it is logical to regard this public transport corridor as the primary and only local/metropolitan corridor within the Greater Pretoria region. Regarding it as such, it is necessary to enhance the role of this corridor by concentrating the bulk public transportation infrastructure improvement and development within this corridor. Taking into account the historical development of the edge cities and the vehicle-orientated pattern they have developed, it makes no sense to regard the edge cities equal to the metropolitan corridor when it comes to the public transportation improvement and development. Even the most dedicated public transportation development programme for the edge cities would in the end turn out to cost too much. It must, however, be noted that by proposing public transportation improvement and development concentrated in the metropolitan corridor does not mean that public transport should not be provided in the edge cities. The edge city nodes do need bus and taxi links to the inner city and to each other.

Public transport should be concentrated along Activity Spines Classes 1 and 2. Improvements to the level of service (for instance frequency) should be along these routes and not to keep on stretching services to reach new developments in the outskirts of town, as was always the case.

As mentioned, transit nodes (TOD's) are the means by which land use and transportation integration within a corridor can be achieved. Investing parts of public transportation budget in developing such transit nodes are therefore of great importance. Without land use and transportation integration, the activity corridor will not function as such, but only remain a transport link.

5. THE WAY FORWARD

The model discussed in section 4 provides a broad framework to guide the future development of Greater Pretoria. It will, however, be necessary to refine some elements of the model as part of the implementation process by means of creating a Management Framework for each of the following elements/ components:

- Freeway
- Mobility Spine
- Activity Spine Class 1
- Activity Spine Class 2
- Activity Street
- Activity Node/Area

Figure 1 for example indicates that a Management Framework will have to be designed for development around activity streets in the Greater Pretoria Area.

This will comprise two main components:

A generic policy statement regarding aspects such as urban form, land use, movement and transport, infrastructure and services, public amenities and urban conservation around activity streets in Greater Pretoria; and

- b) Development principles to guide the way in which elements typical to an activity street e.g. minor crossing, left in-left out crossing, road closure at crossing, abutting nodes, gateway/termination focal points and streets between crossings need to be addressed.

The policy and development principles related to typology then guides the detail planning (context) of any specific activity street in Greater Pretoria. The specific activity street may comprise several distinct precincts - each for which elements such as character statement, land use typology, planning controls, design guidelines and engineering requirements then needs to be addressed in detail.

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GREATER PRETORIA: PROPOSED SYSTEM OF REALMS, NODES AND CORRIDORS

TABLE OF CONTENTS

		<u>Page</u>
1.	BACKGROUND	1
2.	LITERATURE SURVEY: URBAN FORM AND STRUCTURE	1
2.1	Introduction	1
2.2	Historical Development of the City	2
2.2.1	The Walking City	2
2.2.2	The Transit City	2
2.2.3	The Automobile City	2
2.2.4	The Information City	3
2.3	Historical Development of Multi-Nodal Structure	3
2.4	Elements of the Future City Structure	3
2.4.1	Urban Realms/Edge Cities and the Urban Core	3
2.4.2	Public Transportation and Corridors	4
2.4.3	Transit Orientated Development (TOD)	4
2.5	Conclusions	5
2.6	Recommendations	5
3.	CURRENT GREATER PRETORIA SPATIAL STRUCTURE	5
3.1	Existing Structure	5
3.1.1	Introduction	5
3.1.2	Activity Areas	6
3.1.3	Transportation	8
3.2	Conceptual Analysis	9
4.	PROPOSED SPATIAL DEVELOPMENT FRAMEWORK FOR GREATER PRETORIA	10
4.1	Introduction	10
4.2	Land Use	11
4.2.1	Urban Realms	11
4.2.2	Activity Nodes/Areas	11
4.3	Transportation	13
4.3.1	Introduction	13
4.3.2	Corridor Classification	13
4.3.3	Roads Classification	14
4.3.4	Corridor Development	18
5.	THE WAY FORWARD	18
	REFERENCES	20

LIST OF FIGURES

Figure 1: Management Framework: Activity Street

LIST OF TABLES

Table 1: Major Areas of Economic Activity in Greater Pretoria, 1996

Table 2: Non-Residential Classification, Function and Policy

Table 3: Summary of Different Road Classification Systems currently in use in Greater Pretoria

Table 4: Development Framework Road Classification

FIGURE 1

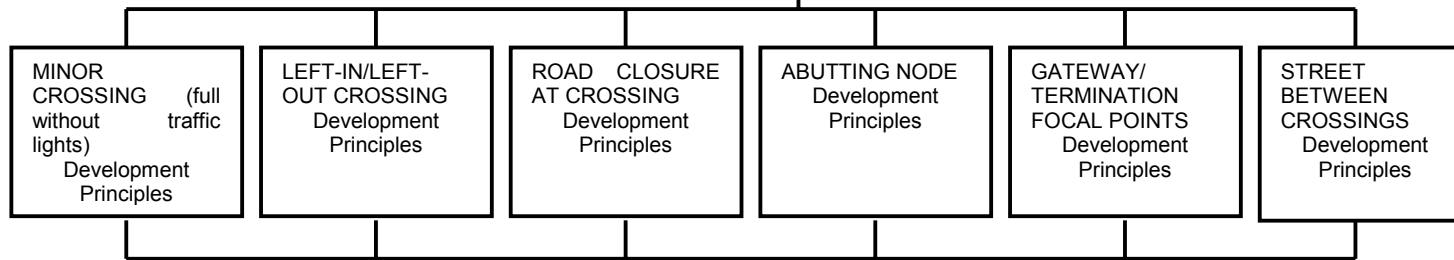
MANAGEMENT FRAMEWORK: ACTIVITY STREET

POLICY

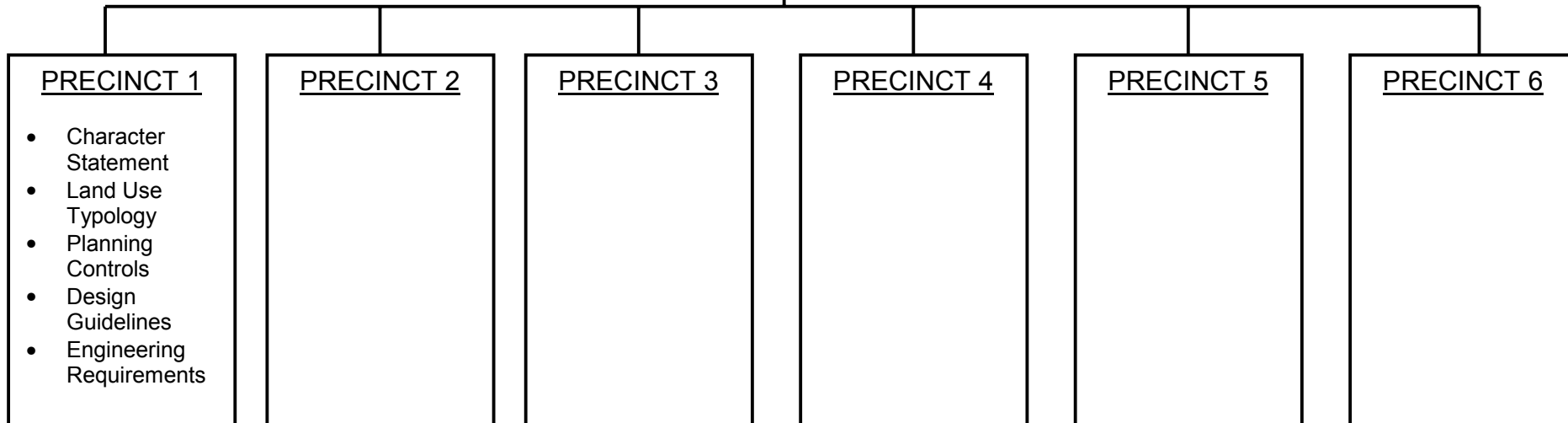
POLICY STATEMENT

- Urban Form
- Land Use
- Movement and Transport
- Infrastructure and services
- Public Amenities
- Urban Conservation

TYPOLOGY



CONTEXT



GREATER PRETORIA: PROPOSED SYSTEM OF REALMS, NODES AND CORRIDORS

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