

EVALUATING PARKING REQUIREMENTS IN SOUTH AFRICA WITH SPECIFIC REFERENCE TO REGIONAL SHOPPING CENTRES

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ABSTRACT

In South Africa, parking is required at a minimum rate, based on a characteristic of the particular land use. Research has shown that this approach to parking leads to the promotion of car use, low density urban development and urban sprawl. South African land use and transport policy, however, advocates higher density developments, curbing of urban sprawl and the promotion of public transport above that of the private car.

This paper reports on an evaluation of the way in which parking is provided in South Africa, and in particular at Regional Shopping Centres. It found that GLA is only indicative of parking demand when the private car is the predominant mode of transport. It concludes that the desired urban form should be decided upon and that a transport system should be designed that will sustain that urban form. Parking can be provided at the appropriate level once the role of the car has been defined within the transport system.

1. INTRODUCTION

The South African Parking Standards (DoT, 1985) requires that parking be provided at a minimum rate, based on the size of a particular land use. This policy is echoed through the requirements of the metropolitan and local councils in the country. Minimum parking standards were derived as a measure to ensure that vehicles can be taken off the street network quickly when reaching the destination end of a trip. This was needed to relieve congestion and allow other traffic to reach their destinations in the shortest possible time.

This policy was necessary as the private car became popular among the public and hence important to politicians. The private car allowed people to live further from Central Business Districts (CBD's), which lead to a decline in public transport use that did not extend into these areas. As the political focus shifted from investment in rail and bus services to investment in road infrastructure, public transport started to lose its competitiveness.

The process of decentralisation led to the development of attractive shopping centres near the suburban residential areas. These centres intercepted the work to home trip of people working in the cities, and provided convenient access to housewives to shop during daytime. Like the other land uses, minimum parking policies were employed at these centres to ensure that the trip demand could be accommodated off the road network to prevent congestion for passing traffic.

Many studies have shown that the provision of minimum parking rates promotes car use at

the cost of public transport. It also contributes to lower density developments and therefore urban sprawl. South African Land Use and Transportation Policies have changed to require higher density cities, and the prevention of urban sprawl.

This paper gives an overview of the policies and legislation that governs land use and transportation development in the country, and shows the basis on which an alternative parking policy could be derived.

2. REGIONAL SHOPPING CENTRES AND PARKING

Regional Shopping Centres are important trip generators in the urban environment in South Africa. The total size of these centres in South Africa has grown from a level of 200 000 m² in 1969 to over 1 million m² in 2004 (*Prinsloo, 2004*), a growth rate of about 6,5% per annum. This rate far exceeded the economic growth rate in the country over the same period. With this growth comes an ever increasing demand for parking space, for which the supply never appears to be enough.

In South Africa, parking is required at a minimum rate, based on some attribute of a land use, typically size, number of employees or beds in the case of hospitals and hotels. At a RSC the rate is based on the size, or Gross Leasable Area (GLA) of the centre.

The Parking Standards guideline document of the Department of Transport (1985) recommends that parking be provided at shopping centres at the rates shown in Table 1.

Table 1. SA Parking Standards for Shopping Centres.

Authority	Minimum Parking Rate (Bays/100 m ²)	GLA (m ²) of Shopping Centre
SA DoT, 1985	7	< 5 000m ²
	6	5 000 – 15 000m ²
	5	>15 000m ²

The table indicates that the parking requirement reduces with an increase in the size of the centre. The most important reason given for this is that a variety of land uses are combined into one centre. The variety and diversity of land uses may require parking at different rates and at different times. These are referred to as multi-purpose trips, or single trips that replace a number of other trips. An example is movie theatres that not only require parking at a much lower rate than retail stores, but also at different times.

The notion that the parking requirement should be reduced with an increase in GLA is consistent with many international examples. The American Institute of Transportation Engineers (*ITE, 1987*), however, applied the inverse and required more parking with an increase in GLA. From this contradiction it could be interpreted that the relationship between parking requirements and GLA are not well understood.

The parking rates presented in Table 1 depend on a number of factors. The impact that variations in these factors would have on parking demand have not been quantified in the guideline document. These factors are:

- Size and nature of the centre;
- Urban character, socio-economic structure, residential density, car ownership (frequency of use, occupancy);

- Public transport availability;
- Availability of other on- or off-street parking in the vicinity;
- Price of parking;
- Extent of traffic congestion;
- Land use combinations with non-overlapping parking demand.

The shopping centres defined as Regional Shopping Centres, having a GLA greater than 15 000 m², typically shared the following attributes:

- Are large, isolated centres that are not within comfortable walking distance (<10 min) from either residential or other business areas;
- Are situated in higher income areas, serving the private car market almost exclusively. There is a high correlation between income and private car usage (higher income equates to lower occupancy and higher trip frequency per household);
- Public transport is generally only available to wage earning staff at the centre, and not used by customers;
- There is little or no other parking within walking distance of the centre;
- Parking is mostly free;

Factors like the availability of suitable public transport; other parking within close proximity of the centre, and paid parking would lead to a reduction in parking demand. It could therefore be expected that the rates shown in Table 1 would be a conservative requirement, and that the rates could be reduced when some of the above variables change.

Shopping centres today do not look like or function as they did 20 years ago. Some of the significant changes that have occurred over the past 20 years, since the last revision of the South African Parking Standards, are:

- Free parking is no longer the norm and some centres have only paid parking;
- Operating hours have been extended to:
 - between 18h00 and 21h00 on weekdays;
 - between 17h00 and 21h00 on Saturdays;
 - between 14h00 and 21h00 on Sundays;
- A shift in consumer patterns lead to more convenience shopping;
- Where 30 000m² constituted a large centre in 1985, many Regional Shopping Centres today exceed 100 000m² in GLA.

It is concluded that the basis on which parking was requirement in 1985 was not necessarily scientifically founded. With the significant changes that occurred in shopping patterns over the past 20 years, it has to be considered that the parking requirements could be very different today to what it was when the South African Parking Standards were published.

3. EVALUATING MINIMUM PARKING STANDARDS

There is a growing body of evidence which shows that growing urban areas need to increase in density to be sustainable (Shoup, 1999; Office of the Deputy Prime Minister, 2003; Scottish Executive, 2004). This can only be achieved with the support of higher occupancy transit facilities such as frequent bus services, light rail and ultimately metro rail systems. The unrestrained use of the private car works against the development and sustainability of a public transport system, and hence in achieving higher urban densities.

One mechanism to restrain private car use is through the containment of parking opportunities at the destination end of trips.

This logic has been accepted by the South African policy makers as is reflected in points described by the following policy and legislation documents.

3.1 Development Facilitation Act (Act No 67 of 1995)

- optimise the use of existing resources including ... bulk infrastructure, roads, transportation and social facilities;
- discourage the phenomenon of “urban sprawl” in urban areas and contribute to the development of more compact towns and cities;
- should co-ordinate the interests of various sectors involved in or affected by land development so as to minimise conflicting demand on scarce resources

3.2 White Paper for Transport in South Africa (DoT, 1996)

The vision for South African transport as set out in the White Paper is of a system which will:

“Provide safe, reliable, effective, efficient and fully integrated transport operations and infrastructure which will best meet the needs of freight and passenger customer at improving levels of service and cost in a fashion which supports government strategies for economic and social development whilst being environmentally and economically sustainable”

The following Strategic Objectives are listed in the White Paper for Transport and has a direct or indirect influence on parking policy:

- To promote the use of public transport over private car travel, with the goal of achieving a ratio of 80:20 between public transport and private car usage;
- The effective functioning of cities and industrial areas must be enhanced through integrated planning of land use, transport infrastructure, transport operations and bulk services;
- Development priority will be given to infilling, densification, mixed land use and the promotion of development corridors and nodes;
- Containment of urban sprawl and sub-urbanisation beyond the urban limits will be addressed through provincial spatial development plans;
- Unrestricted car usage and subsidised car parking will be contained through the application of policy instruments which could include strict parking policies, access restrictions for private cars, higher licence fees, road pricing or area licensing. Restraint on private car usage will however not be implemented independently of improvements in the quality of public transport.

3.3 Moving South Africa: The Action Agenda (DoT, 1998)

The Moving South Africa document (MSA) shows that the number of cars in South Africa increased by 72% in the 24 year period between 1972 and 1996. It also quotes forecasts that it will increase by another 64% in the 20 year period to 2020. The four factors that drive this trend are listed as:

- *Low car operating costs;*
- *Land use patterns;*
- *Poor public transport alternatives, and*
- *Infrastructure investment in roads.*

It also states that a variety of subsidies for parking and car ownership warp the natural economics of the decision to own and use a car. One of the strategic actions identified to reach the vision for transport in the “Optimisation of modal economics and service mix to meet customer needs”. This strategy includes implementing tough road space management and car restrictions to improve the performance of public transport, i.e. to break the natural transport cycle of increased car use and poorer public transport services.

3.4 National Land Transport Transition Act (Act No 22 of 2000, NLTTA)

- Land transport planning must be integrated with the land development process;
- discourage urban sprawl where public transport services are inadequate;
- give higher priority to public transport by ensuring the provision of adequate public transport services and applying travel demand management measures to discourage private transport;
- minimise adverse impact on the environment;
- integration of transport and land use planning within the context of the Development Facilitation Act, 1995 (Act No 67 of 1995), or any other similar provincial law.

3.5 Western Cape Policy on Access Management

The Road Access Guidelines (RAG) of the Western Cape Provincial Government (PGWC, 2002) recommends that the minimum number of parking bays required for a development can be reduced if public transport is prevalent in its vicinity. Two types of public transport areas have been defined in terms of the extent of availability and use public transport. These areas are defined as either a Zone 1 or a Zone 2.

3.6 Summary

South African Transportation and Land Use Policy calls for integrated planning that will result in higher density urban areas that will curb “urban sprawl” and support the efficient development of public transport, while discouraging private car usage. These policies are in line with recent changes in international practice and policies in parking standards.

South African parking policy is, however, still one of providing enough parking bays for an unmanaged demand for parking. This policy therefore stands against broader land use and transport policies.

4. EVALUATING GLA AS BASIS FOR PARKING PROVISION

If minimum parking standards are not supportive of land use and parking policies, then an alternative method of determining the level of parking that should be provided has to be found. This section looks at the factors that determine parking demand and test the suitability of using GLA as an indicator for determining parking provision.

The demand for parking depends on the number of cars arriving at the centre and the length of time they stay. These issues are described by the following four factors:

- Person Trip Generation;
- Modal Split;

- Occupancy Rate of Cars;
- Duration of Stay.

When the other factors are kept constant, parking demand will increase for an increase in *person trip generation*, *modal split* towards cars and *duration of stay*, and a decrease for a decrease in the *occupancy rate* of cars. If an increase in GLA would have the same impact on these variables, then it can be deduced that an increase in GLA would also lead to an increase in parking demand.

4.1 Person Trip Generation

As shown before, shopping centre space has exceeded population growth over the past 20 years. This growth happened mainly due to the following factors:

- The gradual decay of the inner cities of most South African cities lead to a shift in the market share from CBD shops to shopping centres, hence leading to shopping centres attracting a larger share of the total market;
- A shift in consumer patterns to more convenience shopping means that the total market for shopping has increased relative to other activities;
- Shopping centre development pre-empts urban growth due to the strong competition between developers of these facilities. This indicates that more GLA is currently provided than is likely to be filled by growth in the retail market in the short term.

Shopping centres, like any facility, can accommodate an optimal number of customers. It has not been established what this ratio of persons to GLA would be. When this level is exceeded as a result of growth in the market, there would be a need to increase the total GLA by either increasing the GLA at existing centres or by constructing new centres. The spare capacity that is currently provided shows that the ratio of persons to GLA is below the optimum in most South African cities.

In the past, the number of parking bays has been increased at many centres without an increase in GLA. This indicates that the ratio of persons to GLA increased at these centres. In a system where the private car is the predominant mode, a lack of parking space restricted the optimal person trip generation to be reached. Once the optimal person trip generation is reached, however, the GLA would have to increase together with an increase in parking space. On a macro scale it therefore appears that a positive correlation exists between person trip generation rates and the gross leasable area of shopping centres.

According to the DoT (1985) some of the factors that would impact on parking demand is the urban character, socio-economic structure, residential density and car ownership of the catchment area of the centre. Even if equilibrium is reached between optimal person trip generation rate and total GLA of shopping centres in an area, a change in any one or more of the above factors could lead to a new equilibrium.

The next step in the research will be to establish the optimum ratio of persons per GLA for different urban characteristics.

4.2 Modal Split

Parking space is provided solely for that portion of the market arriving by private car. For a fixed number of customers, the higher the proportion arriving by car, the higher the demand for parking will be. Where the modal split is constant and person trip generation increases with an increase in GLA, parking demand will also increase.

Two centres with similar customer numbers but vastly different modal splits will experience very different parking demands. This principle confirms the discussion in Chapter 3 about the effect higher density and efficient public transport can have on reduced parking demand and *vice versa*.

It is therefore clear that there is no correlation between modal split and the size of a shopping centre. If an existing shopping centre were to employ higher occupancy modes to transport its customers, the space currently used for parking could be converted into GLA.

4.3 Occupancy Rate

Occupancy rates of cars during commuter trips are typically in the order of 1.5 persons per vehicle, with the vast majority of cars having only a single occupant. Occupancy rates of cars visiting regional shopping centres were counted during Saturday mornings at the N1 City and Tygervalley centres in Cape Town. It was found that occupancy rates can be very different at different shopping centres and that it also varied over time, as shown in Figure 1.

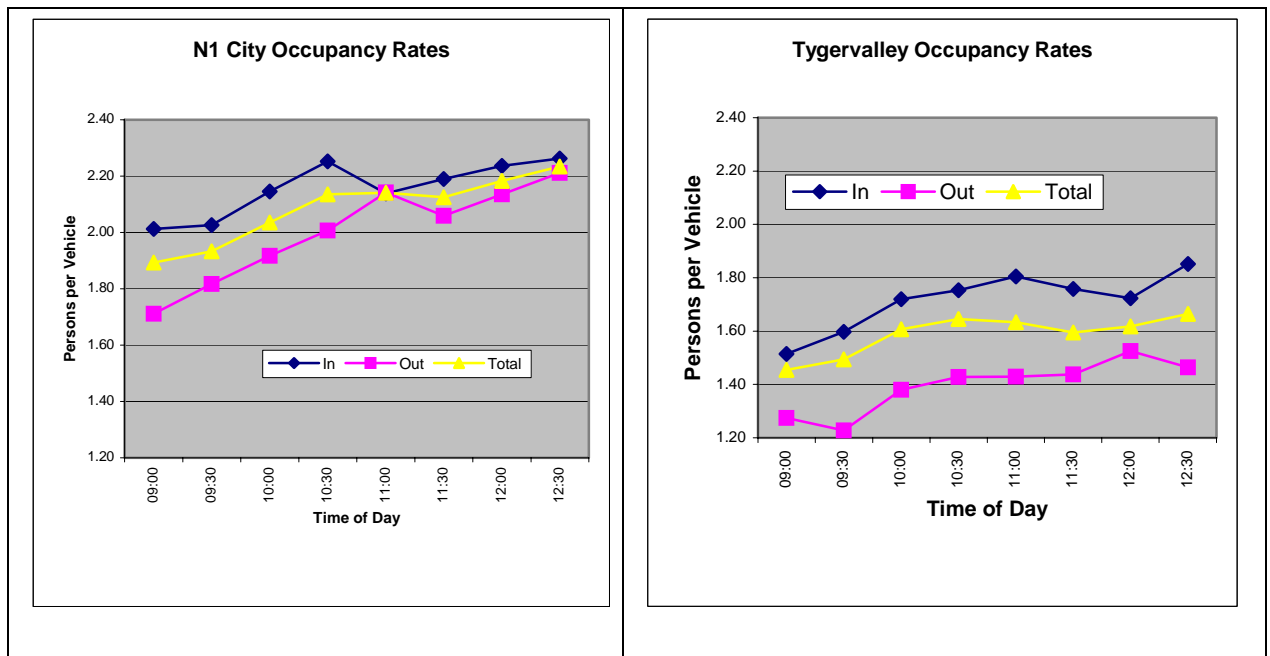


Figure 1. Occupancy Rates at N1 City and Tygervalley.

The occupancy rate at the Tygervalley centre was similar to that of commuting trips and averaged around 1.6. The rate observed at the N1 City Mall averaged around 2.1, about 30% higher than at Tygervalley.

In both instances, the occupancy rate was observed to increase during the morning. It is expected that the occupancy rate will again decline during the afternoon. The surveys at both centres were done on a single day. More surveys are necessary to obtain statistically more reliable trends.

It is not clear why the variation in occupancy rate occur, but it is possible that the shortage of parking during peak periods could lead to people combining trips to shopping centres, where they may otherwise have made the trip in more than one vehicle. It is also considered that more families visit a centre after completing other activities earlier in the morning, like sports events.

The difference in occupancy rate at the centre could be contributed to the fact that the Tygervalley centre is located in a more affluent area than the N1 City Mall. Higher income areas are associated with higher car ownership, lower occupancy rates and more frequent trips.

Shoup (1999) found that occupancy rate increase with an increase in the cost of parking for work related trips as the cost of parking is typically shared equally among the occupants. As shopping trips are typically done by family members, this principal will probably not hold for shopping trips.

No correlation could be found between an increase in GLA and an increase in occupancy rate for customer arriving by car. A shortage of parking space could possibly lead to an increase in occupancy rate, but this needs to be researched further.

4.4 Duration of Stay

Figure 2 illustrates the difference in parking demand for a 100 vehicles that require parking within the same period, but with different durations of stay. The distribution of incoming vehicles is kept constant while the distribution of the exiting vehicles is shifted. This example shows that the demand for parking is about 70% higher in the longer stay scenario (Parked L) than for the shorter stay (Parked S). It also shows that the peak demand is experienced over a longer period, indicating that parking demand is also more sensitive at longer durations of stay.

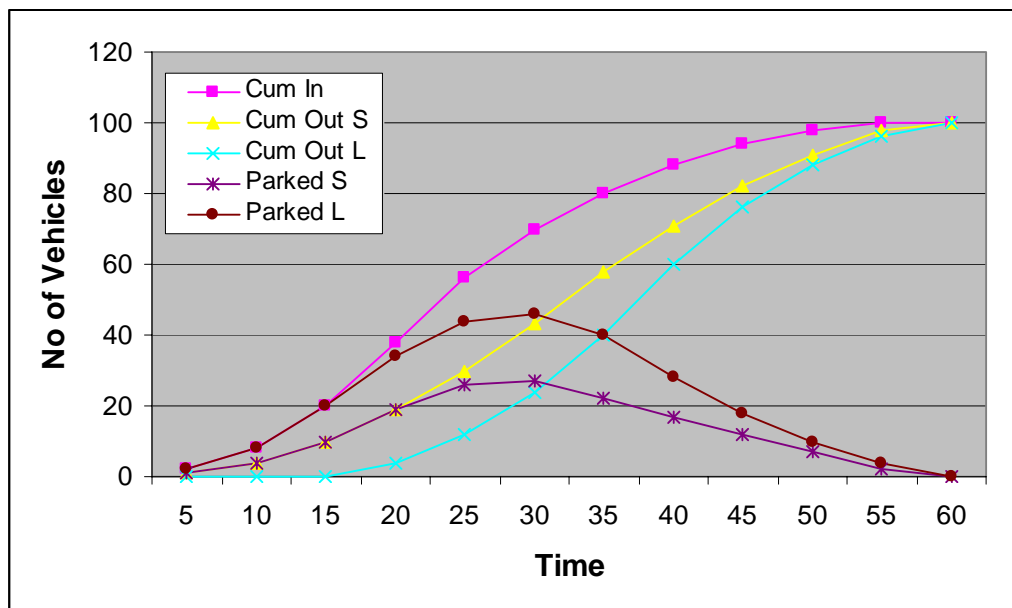


Figure 2. Parking Demand as a Function of Duration of Stay.

The distance to the primary shop visited as well as the number of shops visited is likely to increase with an increase in the size of a shopping centre. If the number of parking bays increase with GLA, the average walking distance from a car to the shop will also increase. Both these factors will lead to an increase in the time that a car is parked.

Shoup (1999) described how the duration of stay will decrease with an increase in the cost of parking. Duration of stay is also influenced by trip purpose, family / group size and even the time of year.

It is concluded that the duration a car is parked will increase with an increase in the size of the shopping centre. The duration of stay would decrease with an increase in the cost of

parking. If alternative modes of transport are available, long duration parking can be discouraged by increasing the parking rate with time to make the other modes more attractive.

5. CONCLUSIONS

Current parking standards for regional shopping centres do not support current land use and transport policies. It is therefore concluded that the policy of providing parking at a minimum rate should be revised.

GLA is only an indicator for parking demand when the car is the predominant mode of transport for shopping trips. Modal split and occupancy rates depend on the urban environment from which the centre attracts its customers, and is not dependent on the size of the centre. Should the environment change in support of higher occupancy modes, parking will play a very different role at Regional Shopping Centres and many other land uses.

More work is necessary to quantify the relationships that influence the demand for parking. A better understanding of these relationships would make it possible to estimate the effect that changes in parking policy would have on the urban environment.

It is proposed that the desired urban form for an area should be defined in terms of density and land use mix. The transportation system can then be designed to support the desired urban form. The role that the private car plays in this system should then form the basis on which parking strategies are planned and ultimately how parking is provided.

6. REFERENCES

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