AN INTEGRATED TRANSPORT PLANNING APPROACH FOR SANDTON – HOW DO WE BALANCE THE DEMANDS FOR ROAD SPACE

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ABSTRACT

During the past four decades, Sandton experienced significant land use growth, particularly in office and retail development. This is evident from the number of new buildings that have been built recently including the Ernest & Young and Alexander Forbes buildings on Rivonia Road, expansion of Sandton shopping centre and the construction of the Norton Rose Precinct on Fredman Street. The development of the transport system serving Sandton developed largely in response to the land use growth and is mainly rooted on private car based transport. Currently the roads in Sandton are wide and a disproportionate number serves a high-order mobility function. Pedestrian infrastructure and facilities are limited and not thoroughly planned and public transport has little impact on the travel choice of commuters. Due to the limited availability of residential development within or close to Sandton, the greater majority of trips are medium and long distance and therefore erodes the potential for non-motorised transport.

Sandton is in many aspects not a unique node and other established areas experience similar transport issues present in Sandton. This paper explores some of these transport issues within established nodes and also outlines solutions presented in the Sandton Integrated Transport Master plan recently developed for the area which may be applicable elsewhere. This plan realises that the current car-based transport network development approach, mainly fuelled by new developments adding to the road network cannot be maintained and that significant intervention is required. Future year scenarios include business as usual, a focus on public transport and a truly integrated land-use and transport view and the implications of each scenario were considered. To reach the desired transport outcome for Sandton over a period of 20 years, the master plan identified a number of structuring interventions addressing all modes of transport but also land use development issues. These interventions aim to create a balanced multi-modal transportation network that accommodates a high level of accessibility and rebalancing streets to provide space for people walking and cycling and in this way creating a liveable city environment. This paper advocates an alternative, more sustainable approach to maintaining the accessibility of established nodes.

1. INTRODUCTION

Sandton has been referred to as the richest square mile in Africa in the Liberty Life television advertisement. It has become the financial district of South Africa and is Johannesburg's most prominent business centre. Evidence supporting this statement is the presence of banking head office buildings such as Nedbank, Deutsche Bank and the Johannesburg Stock Exchange located on Maude Street. Sandton has and continues to attract investment from commercial and investment banks, financial consultants, legal firms and corporate head offices. New buildings are currently under construction including Sasol and Old Mutual headquarters and a new building for Discovery Health.

The node attracts daily commuters from all over Gauteng province. Figure 1 below shows a spatial representation of trip movements to Sandton based on the COJ Public Transport Information Register carried out by Arup in 2012. People travel not only from the neighbourhoods adjacent to Sandton but from places as far as Pretoria north, Roodepoort, Benoni, Vanderbijlpark and the East Rand.

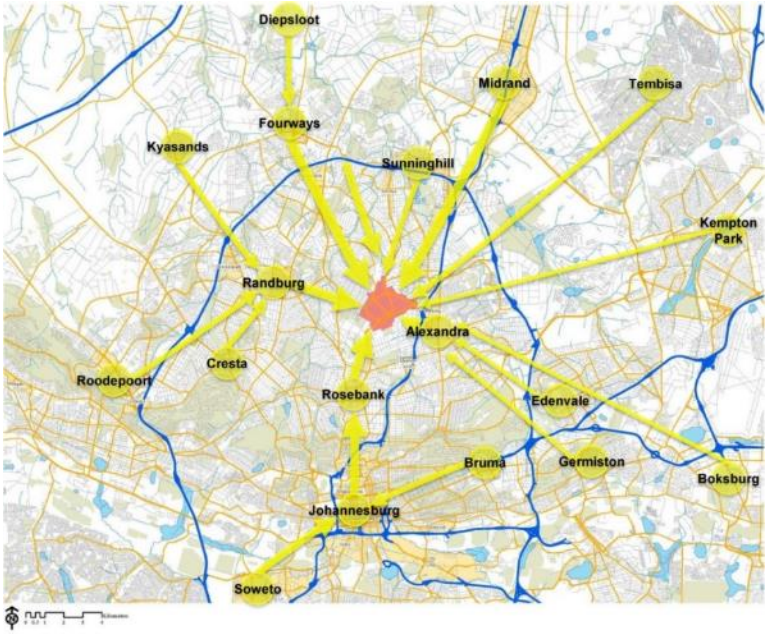


Figure 1: Daily travel patterns to Sandton

Residential development in Sandton is limited. The 2011 Census (Statistics South Africa, 2012) has shown that the permanent population of Sandton is less than 7,000 people. Therefore, it is reasonable to assume that the greater majority of the trips to Sandton is currently long distance, requiring a form of motorised transport.

The challenge for Sandton is to facilitate continuous development growth in a context of additional travel demand and a limited transportation network that cannot be expanded easily.

It is proposed that the solution to keeping Sandton accessible lies in more intense and optimal use of available transport infrastructure, promoting alternative means of transport to the car and reallocate the use of street space to accommodate all users.

The solution does not stop there. Equally important, it also lies in establishing the right land use mix, balance and density to sustain public transport. This paper explores the proposed approach and solutions put forward in the Integrated Transport Master plan for Sandton to address the accessibility problem.

2. CHALLENGES

2.1 Introduction

Sandton is a business node facing challenges similar to many other nodes elsewhere in South Africa and arguably the world. Sandton, and other nodes such as Rosebank to the south, Menlyn in Tshwane, Randburg to the east of Johannesburg and Sunninghill to the north are nodes that developed spontaneously within established residential areas. Transport infrastructure providing access to these nodes was initially designed to accommodate residential type land uses and at most limited commercial land uses. To accommodate increased travel demand, it was possible to widen existing roads and sometimes even to establish one or two new links, creating more capacity on the transport network. However in time, most of the road upgrade opportunities have been exploited (i.e. the additional through lanes, left slip lanes and right turning lanes have been constructed). Little opportunities from that point onwards exists or alternatively opportunities involve the expropriation of high valued properties or introducing expensive solutions such as underground tunneling. Neither roads authorities nor developers would normally have the appetite to pay for such extravagance.

The node thus becomes entrapped in a confined area, surrounded by expensive residential properties while the transport demand grows, putting more pressure on the network. Developers are faced with a dilemma of losing investment opportunities which migrates to new nodes such as Waterfall, Modderfontein etc. These challenges are reviewed within the section below by specifically referring to Sandton.

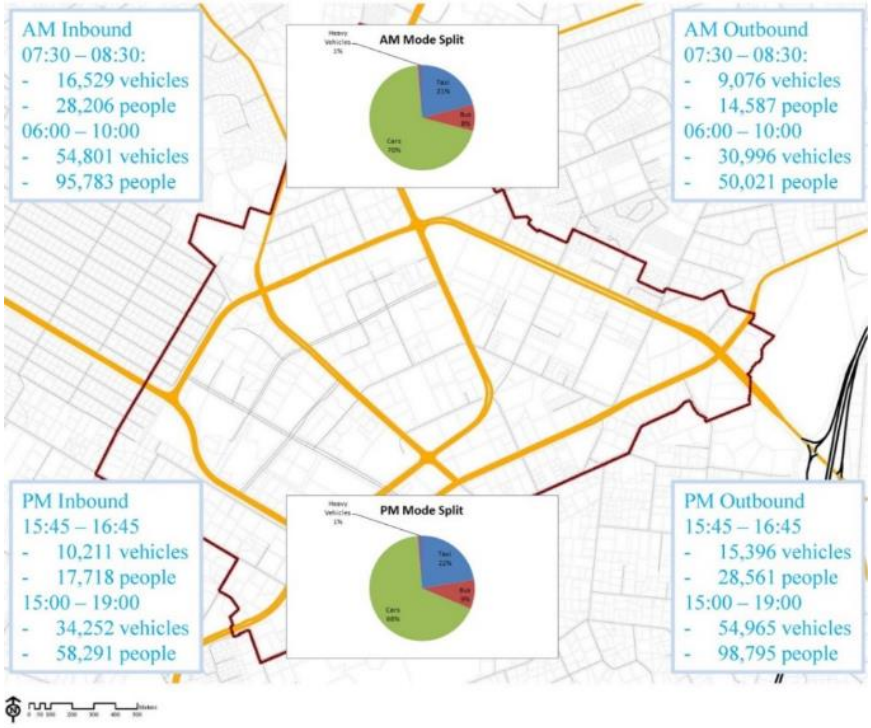
2.2 Growing demand

Figure 2 below shows traffic movements in and out of Sandton during a typical weekday. During both the morning and afternoon, around 100,000 people commute to or from Sandton (while relatively few people travel in the opposite or off-peak direction). Of these movements, only about a third is within the peak hour while the remainder travels outside of the peak. Continued land use growth is expected to cause more peak spreading and consequently more delay, vehicle queuing and driver frustration.

A simple projection of Sandton’s commuting numbers shows that at a rate of 3% the number of commuters travelling to and from Sandton would almost double within 20 years (historic development growth in Sandton is estimated at 3.4% per year based on 2013/2014). This growth is also evident at other currently successful nodes such as Menlyn and Rosebank.

Table 1: Commuter trip growth scenarios for Sandton

Timeframe	Trip Growth Rate				
	Current trips	2%	3%	4%	5%
10 years	100,000	121,899	134,392	148,024	162,889
15 years	100,000	134,587	155,797	180,094	207,893
20 years	100,000	148,595	180,611	219,112	265,330



Source: STES Traffic Engineering Services, 2013, Traffic Counts
Figure 2: Traffic movements in Sandton

2.3 Car dependency

Figure 2 also shows the 2013 modal split of the commuters travelling to Sandton on a typical weekday. Car dependency is very high at 70% and compared to previous transportation surveys, it seems that car dependency is increasing amongst commuters. Affluence within metropolitan areas increases leading to people able to buy cars.

2.4 Travel choice

The average commuter to Sandton is of the opinion that apart from private vehicles there is little viable means of alternative transport. Gautrain is definitely considered to be an alternative, and had a profound impact on many commuters living in its catchment area. However this service runs close or at full capacity during peak periods and is not necessary convenient for all users.

Mini-bus taxis, Metrobus and Putco bus services are available, but are not viewed as viable alternatives to the majority of the commuters travelling to Sandton every day.

Bus rapid transport schemes are currently being rolled out in many of South Africa's large cities providing additional travel choice. The success and the scale at which these modes of transport are being provided are debatable in terms of its impact on travel behaviour.

2.5 Transportation network improvement

Figure 3 shows six major roads and a number of lower order roads from adjacent residential areas serving Sandton. This can be reduced to 13 inbound and 13 outbound lanes accessing Sandton. These routes operate at capacity (or near) during peak periods and have become the bottlenecks to bringing more commuters into the node. These routes and especially the intersections along them have mostly been upgraded to their maximum capacity within available road reserves and road safety considerations. Further upgrades along existing routes therefore offer very little or no real option for improving accessibility to Sandton.

Similar to other nodes, Figure 3 also shows that Sandton is embedded within a completely built-up residential environment. This makes the provision of new transportation links to Sandton very difficult to establish as it would require expropriation of expensive properties. In addition to not being viable from a cost point of view, it would also be politically difficult due to public objections.

2.6 Demand for street space

According to a spatial analysis by Arup, around 20% of the total area of Sandton is dedicated to road reserve. 50% of this space is allocated to vehicles and 10% is allocated to pedestrians. The remainder is for street furniture, landscaping, services and utilities. The City of Johannesburg published the Complete Streets Design guideline which advocates that space in road reserves should be balanced amongst all road users including pedestrians, cyclists, public transport and vehicles. Sandton is currently imbalanced in terms of the make-up of road reserves. The imbalanced road space is also evident in nodes such as Randburg and Menlyn which both have been developed in an era where highways and roads were considered to be the future.

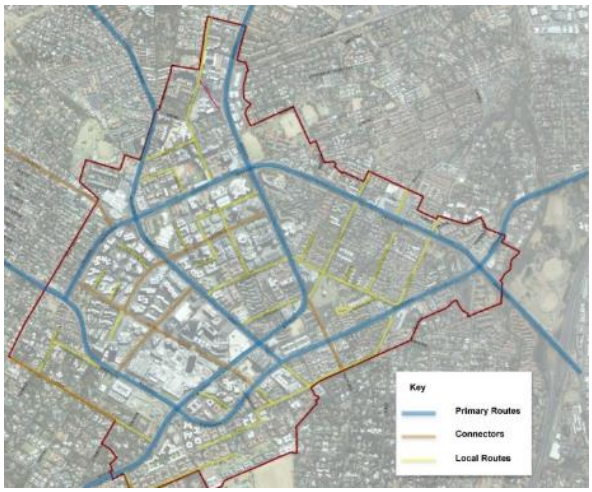


Figure 3: Access to Sandton

Figure 4 Street block sizes

2.7 City block sizes

Sandton is a difficult place for pedestrians to negotiate not only because of wide roads, fast moving traffic and a poor pedestrian network, but also because of the existing large street blocks. Some of these blocks are longer than 700m, see Figure 4, along one side which means that pedestrians have to walk very far to reach destinations.

This challenge is also evident in Menlyn, Randburg and Sunninghill, by reviewing aerial photography.

2.8 Conclusion

These nodes, such as Sandton requires continuous investment to remain vibrant and renewed. Relying on ever expanding transport infrastructure as a response to accommodate the transport demands is not sustainable nor viable due to the constraint of being embedded within a residential area.

To continue as a successful business and financial node, the transportation network of the node will need to be transformed. The remainder of the paper explores some of the interventions that were recommended for Sandton which are also applicable to similar commercial nodes.

3. CHANGING DIRECTION

Overall the current trend in Sandton is that vehicular traffic continues to grow and it takes longer and longer to travel to this destination. Sandton is in competition with other business nodes within the City of Johannesburg area, considered to offer easier access compared to Sandton. Drastic interventions are required to maintain the node's accessibility and the interest of new investors.

Figure 5 shows three future scenarios for Sandton that was considered in the study. The first shows a minimum intervention trajectory, where limited public transport is introduced. It shows a car dependency to remain high. This scenario will require significant additional road links to be provided to Sandton. As outlined before, the existing road network cannot be expanded and introducing new road links will be difficult to establish. It is not considered to be a feasible option for Sandton.

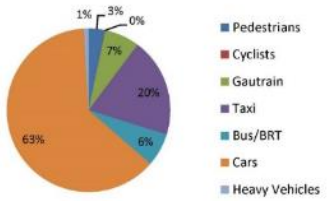
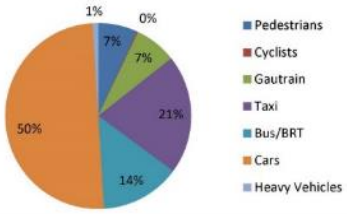
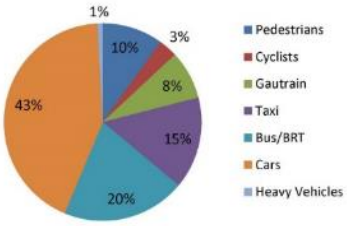
Scenario	Target Modal Split	Interventions
1. Business as usual – current trajectory		BRT services introduced, pressure for commercial development in core continues, reliance on private cars, provision and allocation of road space for private cars continues
2. Improved public transport		Infill frequent bus services introduced, park and ride facilities, HOV lanes, public transport priority
3. Desired urban form, livable accessible node ✔		Liveable accessible node, integrated transport, residential densification along pt corridors promoted, permeable pedestrian network, clear public transport corridors, strategic cycle corridors connected to core, street space reallocated for nmt, connected green spaces, integrated PT services, ticketing and information

Figure 5: Mode share target scenarios

The second scenario includes the introduction of substantial public transportation infrastructure, currently not in the planning of the node. Such intervention is expected to use the existing road reserves more optimally and provide overall additional access capacity (estimated to be around 25% to 30%) to Sandton. However, considering that the demand in 20 years could be almost double what it currently is, this intervention would not be sufficient in the long term.

The third scenario proposes not only a dramatic intervention on the type of transport infrastructure provided but also a change in the land use density, the urban design and improving the pedestrian experience. It also assumes the densification of existing corridors and creation of new corridors into the node that would make public transport and non-motorised transport options viable. It aims to reduce the need for long distance travel by providing a variety of living, shopping and working opportunities within walkable distances and easy access of high capacity public transport building on existing flows along current corridors. The third scenario provides the target mode split Sandton should aim for and the remainder of this paper outlines recommendations to reach this goal.

4. PROPOSED INTERVENTIONS

A range of interventions were recommended, but this paper, due to its limited length will only explore interventions which are universal to similar nodes to Sandton and can be applied elsewhere:

4.1 Public transport hierarchy

It is of benefit to define a public transport hierarchy for a node to ensure that the node is accessible from other cities, from other nodes and from the immediate surroundings.

In the case of Sandton, three tiers of public transport were identified. The first is 'Inter City Services' linking Sandton to other origins and destinations beyond the borders of COJ. Gautrain is an example of such a service linking both Tshwane and Ekurhuleni to Sandton. Plans to expand this service and provide additional capacity linkages to Sandton are underway.

A second tier of public transport services is the proposed Rea Vaya BRT services. An extensive network of BRT services are proposed for Sandton linking the node to Alexandra to the west, Randburg to the east, Sunninghill to the north and Rosebank and the City of Johannesburg to the south. The function of these services is to link nodes within Johannesburg to one another. The third tier of public transport is local bus services. Currently this function is provided by Metrobus and minibus taxis.

The above services and much of the planning thereof should be integrated for the user to experience an uninterrupted journey no matter what tier of transport is used. This is currently not the case. It is also proposed that a more extensive local bus network should be introduced to Sandton. A reliable bus service is required to cover short distance (5-7km trips) currently made by private vehicle. It is estimated that around 60% of car based trips travel from within the boundary posed by the N1 eastern and N3 western bypass. A high quality extensive bus service to cover this area can have a profound impact on current car drivers travel behavior particularly if combined with an effective park and ride system.

Figure 6: Proposed Local Bus Services

4.2 Transit Oriented Development (TOD)

TOD is a walkable, high density, mixed use form of development typically focused within a 600m radius of a major public transport station. The three key ingredients for TODs are successful inclusion of high land use density, a pedestrian friendly environment and public transport availability. The Sandton Gautrain station is an ideal location for establishing a TOD and guidelines were developed for the area. Figure 7a shows the 600m radius around the station. For practical purposes the recommend TOD area follows physical property boundaries.

The TOD concept was also applied to smaller nodes (stations) along BRT corridors as shown in Figure 7b. Typically high density, mixed use development with pedestrian oriented design is proposed for these areas.

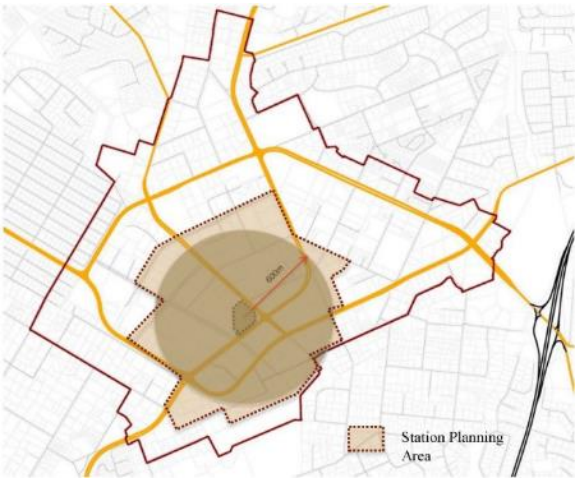


Figure 7a: TOD area

Figure 7b: Corridor Development

The above concept can be applied to other nodes. Corridor development will also eventually lead to various nodes being linked to one another. In the case of Johannesburg, Sandton can be linked by corridors to Randburg, Rosebank Sunninghill and Johannesburg CBD. This can also be applied to Tshwane by linking Menlyn to Brooklyn, Hatfield and Lynwood.

4.3 Cycling

As mentioned around 60% of the car users travelling to Sandton live within the suburbs surrounding Sandton. An elaborate cycle network is proposed to target this population to consider cycling to work instead of driving.

Figure 8 shows the proposed cycle route network linking Sandton to surrounding areas. Cycling is not only about having routes available but also cycle awareness, marketing of the mode of transport and cycling end facilities such as safe parking, showers and changing facilities.

The residential areas that entraps the node can therefore be changed into an opportunity where commuters live within a short enough distance to make use of non-motorised transport.

4.4 Pedestrians

One of the key components in a successful transport network is accommodating pedestrians. This is perhaps both the biggest challenge and the biggest opportunity for improving the transport system as a whole since all users of public transport, cyclists, tourists, business people visiting or those living within the node and even car users typically walk the last leg of their journey. Walking is also the essential connector between different transport modes. The general view is that Sandton and nodes such as Menlyn is not very pedestrian friendly and car oriented. Therefore it proposed that not only should more space be provided for pedestrians, but spaces such as parks should be linked and integrated to develop usable pedestrian networks. Guidelines were developed to create active street frontages, breaking barriers, improve safety and effective utilizing the space from building edge to building edge.

The amount of clutter (dustbins, signage, utility boxes etc.) is one of the major issues with current pedestrian routes making walking an unpleasant experience (see photo below). 'Decluttering' projects have been proposed as a short term initiative to improve the pedestrian experience.

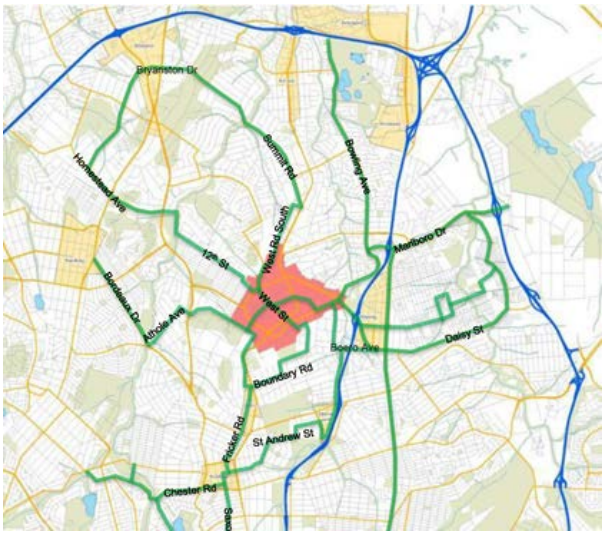


Figure 8: Proposed cycle route network

Figure 9: Proposed pedestrian network

A pedestrian master plan is proposed for Sandton, engineered around the topography of the area. Two high streets, West Street and Maude Street were identified as catalysts for pedestrian activity. Both are located centrally within the identified TOD area. In addition, to shorten walking distances for pedestrians and to improve the permeability of Sandton, new roads, referred to as midblock roads were introduced as shown in Figure 9. The on-going challenge is to ensure that the mid-block roads are pedestrian friendly and are developed in accordance with the guidelines.

5. CONCLUSION

This paper outlines the challenges facing commercial nodes such as Sandton, Menlyn, Randburg and Sunninghill which requires growth and reinvestment to maintain their success. The provision of more transport infrastructure is however limited by existing land uses adjacent to the node that requires expensive expropriation or structural solutions. The paper advocates that the traditional process of planning i.e. provide more road space to facilitate demand is not regarded as feasible not only because of the costs involved but also because of limited space available to provide more infrastructure.

It is argued that significant interventions are required at these nodes. These interventions should be more than the provision of additional transport infrastructure and services and should include the densification of existing public transport corridors. It would also involve addressing the transportation problem by land use interventions (providing housing variety, local services), introducing new corridors and focused planning bent on reducing the need for long distance travel.

A key ingredient to achieve the desired change is to consider the local environment and ensure that all modes of transport are well integrated with each other, that pedestrians experience Sandton as a convenient place to walk and that places are well connected. The long-term success of this plan depends entirely on the willingness of the businesses to adapt as well as cooperation between the business owners and the local authority to jointly shape and support the sort of quality environment that is desired for Sandton.

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