

# **Towards the integration of housing with a mass transport system in the Greater Johannesburg area**

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## **Abstract**

The current low-cost housing and residential development scenario unfolding in the Greater Johannesburg conurbation does not contribute to a more amenable and less spatially incongruous utilisation of space in the city by its residents. Sprawling, fragmented places of residence and far-removed work destinations cause severe frustration. This represents a major physical obstacle in commuters' daily lives, in particular those without a car. A survey was undertaken at Park Station in Johannesburg to ascertain the most severe problems that confront commuters and residents daily. Problems such as dominant single-function land uses and the overall reliance on either public transport or minibus taxis are very difficult to overcome.

Commuting times do not directly diminish as a result of improved mobility, but actually increase, especially as a result of urban sprawl and the increased demand on limited supplies of transportation infrastructure. Thus, increased mobility brought about by sophisticated transport and automotive engineering causes a trade-off between time and space. It is, however, the successful management and integration of these two components in relation to each other that will bring about a more cohesive and well-functioning city. The article examines how it might be theoretically possible to integrate the various components of the city by means of more co-ordinated urban planning and creative engineering solutions. The research indicated that at an urban level enhanced integration of land use planning with transportation can consolidate the urban structure.

## **1 Introduction**

The historical and evolving settlement pattern of Johannesburg is not conducive to integrated land use. This is mainly a direct result of apartheid planning and the effects of the Group Areas Act [1] that segregated black townships from the predominant employment nodes. Unintentionally, current housing policies and practices still produce housing dislocated from urban opportunities [2]. Although the existing heavy-rail train system provides commuter links between the townships and the central business district (please refer to Fig.1), the separated living spaces and the employment nodes within the urban structure have also resulted in the development of the minibus taxi as one of the two primary means of transport for lower income groups. While fulfilling a critical role in the provision of affordable transport within the city, the minibus taxi contributes to the fragmentation that is

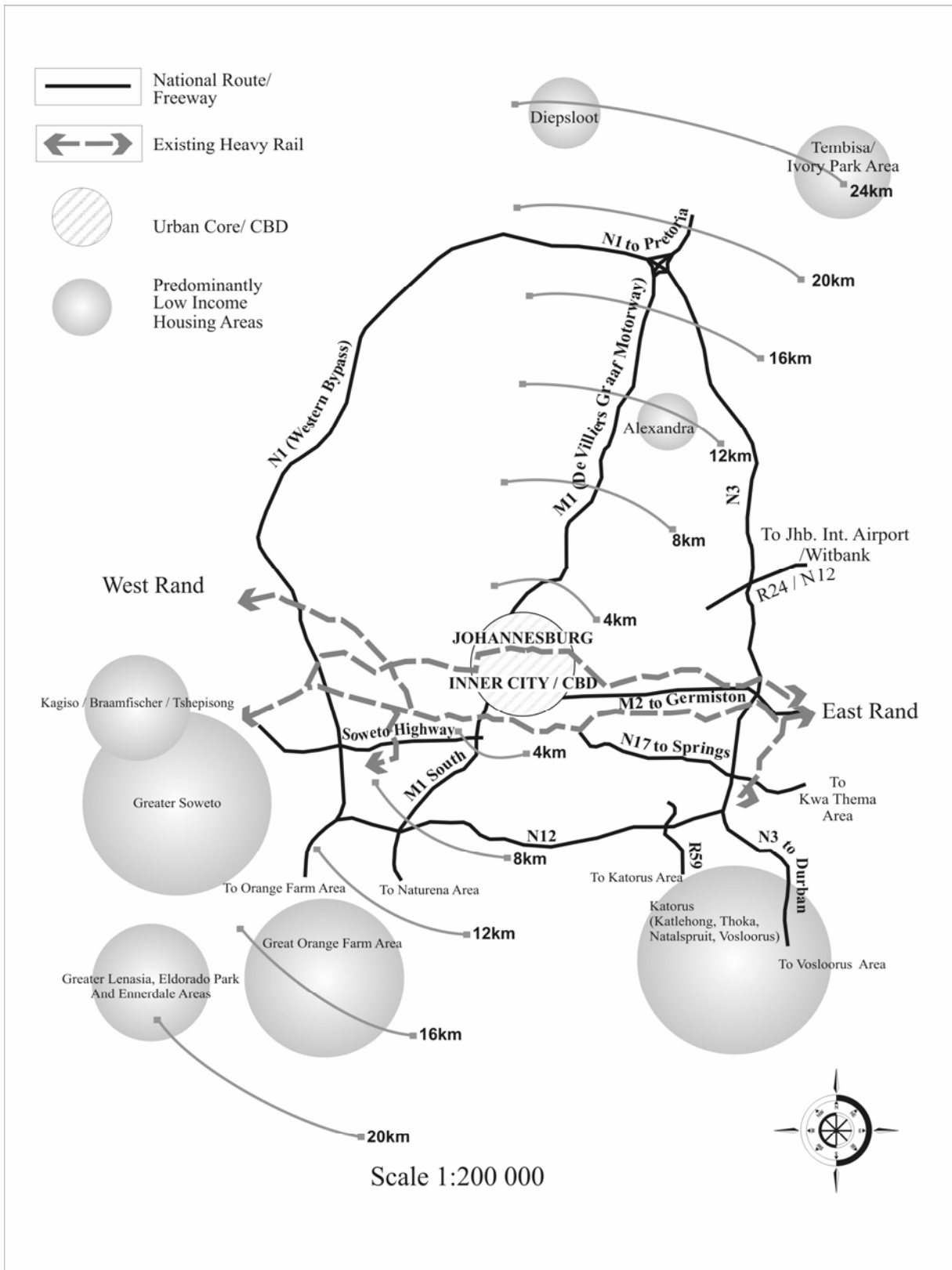


Fig no 1: Predominantly Low Income Housing Areas in Relation to the Inner City

characteristic of the city and in fact entrenches it. Road-based transportation continues to determine the future pattern of the city's development. Without increasing residential densities to assist in the formation of a more compact city, the highway-orientated structure will continue to encourage suburban and peri-urban sprawl. Thereby extending the transportation problem over a larger geographical area and diverting concentrated investment away from the older, inner centres of the towns, while contributing to traffic congestion (especially in peak periods) Internationally, increased mobility has not decreased but rather increased commuting times as a result of urban sprawl [3].

## **2 Housing, jobs and transport**

Both sets of paradigms have been operative in the delivery of housing, namely the supply and the support paradigms [4 & 5]. The supply paradigm focuses mainly on the product, namely the house, and the control of the whole process rests in the hands of whoever acts as developer (i.e. local authorities or private developers). Hamdi [6] argues that since the support paradigm postulates that resources are made available to clients in order to manage the building of their own houses, the focus of this theory has shifted from the product to the process and the participants. The providing (supply) paradigm is operating with quantifiable or measurable elements, namely data, houses, and standards, whereas the enabler (support) paradigm focuses on the immeasurable, ideals, flexibility, and participation. The intervention in officially unplanned urban or peri-urban settlements in South Africa is also product-orientated [7]. It is assumed that the recipients of the supply paradigm will be less satisfied and have less participation, less ownership and less flexibility than the participants in the support paradigm [8].

The intra-urban spatial organisation in the South African city, as it is in cities generally, is inseparably bound up with the social formation of the society in which the city is embedded. The economic system underpinned by and integrated with political and ideological forces, not only articulates functional relationships between groups in society, but serves also as the space-forming processes within cities. Intra-urban spatial organisation, moreover, is not only likely to reflect the social formation, but in important respects contribute to its support and maintenance [9]. It is important to note that the low-cost housing areas of Johannesburg continue to burgeon on the urban periphery, mostly as a result of more centrally located land being too expensive, but also as a result of settlement agglomeration and even natural segregation. In spite of housing policy trying to deal with the problem through numerous strategies that advocate densification coupled with shorter trips to work [10], because of the South African mindset leaning towards the one dwelling per erf housing typology - (that, in low cost terms, calls for a minimum erf size of approx. 250m<sup>2</sup> and a small, usually 30m<sup>2</sup>, brick and mortar house) - it will be difficult to discontinue urban sprawl.

In support of the sprawling pattern, large low-cost residential areas continue to form the elongated outward spread of the city. Starting as temporary host areas for rural-urban immigrants, because of various complex difficulties such as the need to relocate existing informal dwellers from unsuitable locations in order to achieve dedensification or the difficulties involved with upgrading squatter settlements *in situ*, for example, they become firmly entrenched in the urban fabric. In general, homeless people arriving in the city select such areas on the basis of affordability and the strength of the group or social and cultural vernacular. In this way, informal settlements make up a significant part of the urban fabric, but because they emerge spontaneously, they are frequently poorly located [11].

## **3 Balancing jobs and housing**

Cervero [12] shows that trip lengths of inter-suburban commuting have increased with the decentralization or suburbanisation of office employment. The result is not a more balanced urban

structure with less traffic congestion and greater accessibility, but rather, as in the case of Johannesburg, a jobs-housing imbalance (or an insufficient supply of housing). This, in turn, leads to a situation where commuters arrive in the morning and leave in the evening from dominant employment nodes. In other words, jobs are located further away from the place of residence. Using specific criteria to identify and characterize suburban employment centres, it is the responsibility of land-use and transportation planners to allow for the creation of multi-functional communities, thereby reducing the spatial mismatch between jobs and homes to be reduced [13]. Balancing jobs and housing is therefore a viable land-use alternative to shortening commuting distances and integrating housing with employment.

#### **4 Sample survey: Park Station Johannesburg**

The effect of residential and business land uses on each other is complex and can only really be understood by investigating the role that transport plays in shaping their development. Structured open ended questionnaires were applied in face-to-face interviews among commuters at Park Station between 06h00 and 09h00 over five working days to determine:

- Where do the majority of people commute to on a weekday morning
- Where are the predominant transport interchange points
- What mode of transport is used
- Where are the principal places of attraction located
- What are the fundamental problems being experienced.

Being the primary railway destination the primary mode of transport was train. The respondents indicated that 65% use trains, 25% taxis and 10% busses. The reasons given were firstly the higher cost of bus than train fares and secondly in comparison with busses taxis offered a more flexible service. The predominant combinations of modes of transport were trains and taxis, with 60% of the respondents using both modes on a daily basis. This indicates the importance of a multi-modal system for the city as well as a wider range of combinations of modes of transport. The Inner City (40%) and adjacent Braamfontein (40%) emerged as the two primary employment/ education destinations while only 20% of the respondents were commuting from Park Station to other more dispersed suburban centres. This illustrates the importance of the CBD of Johannesburg as a predominant place of employment and institutional land uses such as education and social facilities.

Most of the respondents (85%) were employed and it was interesting to note the correlation between Park Station, commuting and employment in the Central Business District (CBD). Only 10% of the employed respondents indicated that they worked in the informal trading market in the CBD while the majority was formally employed. The Inner City (40%) and Braamfontein (40%) emerged as the two primary employment/ education destinations with only 20% of the respondents commuting from Park Station to more dispersed suburban centres. Given that the foremost (35%) of the respondents traveled 45 minutes in the morning between their residences and places of employment it is apparent that commuters are currently experiencing commuting times of less than 60 minutes which is on par with worldwide trends. For residents from Orange Farm (please refer to Fig 1) traveling times of approximately two hours or longer were the norm. The daily expenditure on transport was R5 for 25%, R10 for 30%, R15 for 25% and R20 or more for 20% of the respondents. Compared to the high cost of commuting by private motor vehicle these amounts are relatively little to spend. In order to be successful any transport system must be affordable to the commuter.

Regarding the type of residence 75% of the respondents indicated that they lived in houses as opposed to 20% living in informal settlements (shacks) and 5% in flats/apartments. The large number of house dwellers closely corresponds to the majority of respondents being employed (85%), thus leading to the

further assumption that shack dwellers would not be as economically strong as those employed. It is also note worthy that the number of shack dwellers was significantly higher than the flat dwellers. The majority (45%) of the respondents rented their dwellings while only 20% were the actual owners and a furthermore 35% of the respondents indicated that they were staying with friends or relatives. Given the young age of the majority of the sample group (25-30 years) this reveals that many young township residents are largely depending upon others for accommodation.

The major concerns that the respondents had about commuting in Johannesburg were crime (30%), minibus/ taxi vehicle safety (25%), availability of transport (15%), queuing for transport (10%), traffic congestion (10%) and other like long distances or transport restricted to certain routes (10%).

Regarding the place of residence 35% of the respondents lived in the Greater Soweto while 20% lived in the East Rand/Katorus residential belt (please refer to Fig.1). Based on these findings, Soweto and the eastern residential conurbation of Katorus and the East Rand townships (please refer to Fig.1) emerged as the leading dormitory areas. When asked where, if possible, they would like to stay 45% of the respondents chose Johannesburg and Braamfontein. The areas surrounding a large shopping centre and mall to the south of Johannesburg were chosen as the third most popular place in which to live. This indicates that major retail centres could be seen as desirable residential locations. From the sample it became apparent that township residents aspired to live in closer proximity to the inner city and employment centres.

Although the need to improve the current system exists, it is not entirely necessary (or indeed possible) to completely reconsider the urban system. Incremental upgrading and constant improvement in terms of increased variety, flexibility and affordability should enable the urban pattern to operate more effectively.

## **5 Current planning and policy to manage the housing and transportation patterns**

With the introduction of democratic governance and the widely accepted ideals of reconstruction and development, planning has been infused with a new purpose and potential for meaningful intervention. Transformation in the planning field required new legislation, new institutions, new policy frameworks and mechanisms for the rapid delivery of services and infrastructure to previously disadvantaged communities [14]. According to the Municipal Systems Act (act no 32 of 2000) municipalities in South African are required to compile an Integrated Development Plan (IDP) that considers issues such as spatial planning, housing and economic development. The IDP of Johannesburg includes a Housing Master Plan that reinforces the housing vision of the city namely to create habitable environments for communities with adequate infrastructure through the delivery of sustainable housing opportunities. The key emphasis being among others well located land, access to social amenities and public transport as well as job/business opportunities [15]. One of the desired outcomes of the Integrated Transport Plan of the Johannesburg IDP is to improve standards of living by providing safe and affordable access to employment, education, recreation and markets.

From a land-use perspective, the Gauteng Spatial Development Framework (GSDF) sets out to rectify the historically problematic settlement pattern of disconnected, distorted and sprawling land uses by means of coordinated land use structure planning. As the GSDF explains, the prominent features of the segregated urban pattern inherited from the past is the result to a large extent of economic and mining activities that have caused developments to be physically separated and made unsuitable for in-fill development either because of under-mining, mine dumps or sites being removed from main centres

and racial segregation of apartheid legislation that caused artificial fragmentation in the urban form, which is socially and politically very difficult to overcome [16]. According to the Spatial Development Framework of Johannesburg housing should not be addressed in isolation, but in conjunction with infrastructure services, transportation and economic opportunities among others. It should also be addressed in terms of security of tenure as well as access to rental stock, services and facilities. Proper integration between road, rail and air transport is essential. Therefore the feeder system servicing nodes and stations needs to be developed. This will allow passengers to make more choices between transport modes and would result in greater economies of scale and urban efficiencies [17].

The Gauteng Rapid Rail Link is one of ten large-scale proposals being developed by the Gauteng Provincial Government as part of their Strategic Development Initiative (SDI) programme. The projects will comprise technology, transport, manufacturing and tourism expansion initiatives in Johannesburg and other key areas of the province. While the SDIs will have a significant impact on the economy of the region, as a mass transit system the Gauteng Rapid Rail-Link will have the most substantial influence on the movement and residential patterns in the city. The Gauteng Rapid Rail Link aims to establish a high-speed train that will travel at speeds of  $\pm 200$  km per hour between Pretoria, Johannesburg and the Johannesburg International Airport. Conceived at a regional rather than at a metropolitan scale, this project gears up the latest rail-based technology within a transit-orientated planning paradigm in order to improve mass mobility and integrate land uses with transport. Reduced traveling times will be achieved by means of through-ticketing and an integrated line-haul (i.e. arterial) and feeder distribution system with the capacity to carry in excess of 100,000 passengers daily. In spite of the probability that motorists will not easily abandon their cars for a new mode of transport, the excessive traffic on the highways and the shortened commuting times should make the Rail Link attractive to prospective commuters. In redirecting the spatial pattern, the Rail Link also highlights the advantages of a transit-orientated approach to resolving the transportation problem.

Currently there is no indication of the final cost of the project as well as the prices of train tickets. An investigation of the feasibility of an integrated ticketing and fare system is being researched to: compare the existing fare structures and levels across the major public transport modes, namely train, bus and minibus taxi; assess the broad implications of these fare structures based upon a range of income groups and to assess the implications of a range of alternative fare structures aimed at minimizing the cost of public travelling [18].

## **6 The housing, employment and transportation patterns of Greater Johannesburg**

The unfolding of the housing scenario in post-apartheid Johannesburg is inextricably intertwined with the political struggle of the eighties and the Housing Policy of the African National Congress (ANC) government since it came to power in 1994. The mass housing developed in the townships during the first five years of democracy is typical of the product/supply approach to delivery and was mostly by means of private development. Subsequently municipalities have assumed the role as developers and have largely continued to entrench the existing patterns. All of this is financed by means of a once-off national government capital subsidy, currently of R31 929 for people classified as “hard core poor” [19], made available for the development of a house on a serviced stand, mostly allocated to large-scale projects.

In terms of the current urban mobility patterns, the role of the taxi as the primary means of transportation is very prominent. The same applies to the heavy-rail tracks that snake through the landscape between the townships and the edge of the city. The intermediate, transitional area between the central business district and the outlying townships frequently consists of profusely sterilised areas

of no-man's land consisting of mine dumps and disused mining land. Transport services to other more propitious or potentially beneficial areas and access to adequate shelter (shacks for the desperate and housing for the more advantaged) are therefore the principal elements shaping the (peri)-urban structure and are integral to the theoretic planning of any proposal for a mass transit system.

Marcuse [20] articulates the concept of positive government intervention or affirmative action in creating residential opportunities for people previously discriminated against or denied the choice of where to live. The idea of integration therefore means maximizing choice, individual freedom and letting all people live where they want to live. This is a solid theory, but difficult to establish in reality. Given the extremes of economic, class and racial disproportion that exist, particularly in terms of the life-style characteristics of various groups and areas, integration (i.e. enabling people to live in areas from which they have in the past been excluded) is very difficult to achieve. Money is the main limitation on the freedom to locate without restriction and those with more money can outbid those with less money for any given location, thus furthering racial and class-based segregation.

## **7 Conclusion and recommendations**

The trends discussed have been extracted specifically to gain a better understanding of Johannesburg's development pattern and to relate some of the relevant theoretical considerations to the actual (or perceived) situation. In doing so, it has become clearer that planning problems such as density, the re-establishment and/or densification of employment centres and the need to place a limitation on urban sprawl, provide the rationale for the need to integrate housing areas and urban centres by means of a mass transit system. Given the spatial distances to be covered in terms of the existing housing pattern around Johannesburg, it may also be concluded that, although improvements to the transport system will enable longer distances to be covered more efficiently, the duration of the journeys will nevertheless remain fairly lengthy. An effective transport system requires public investment in infrastructure in order to increase the opportunities for safer and more efficient transportation for a wider community. Yet, a range of operating mechanisms, primarily driven by private investors on a profit basis, can lead to greater efficiency and competitiveness for the industry.

Although public expenditure on large-scale transportation improvements is entirely justified to ease urban mobility, an investigation of the planning theory related to transportation and urban density reveals that unless the costs of reducing the friction of space (caused by scattered settlements all over the globe) can be minimised, interpersonal contact between people will not grow. Nevertheless, the application of a wider range of different technologies gives rise to more appropriate solutions and decreased costs in terms of time, money and inconvenience, and enables longer distances and wider areas to be serviced. If well planned, soundly engineered and efficiently managed (via profitable public-private partnerships or joint ventures), an efficient transit system combined with an integrated land-use environment can increase urban opportunities for residents.

In support of the above, it is primarily the new development of mixed land uses that will present the best opportunities for multipurpose transportation. Corridor development, transport engineering and integrated land use solutions, coupled with political buy-in will achieve increased urban mobility and residential choice, and give further sanction to the accepted need to reduce traveling distances. It is also apparent that a split of modes is crucial to the successful management of a transit system and that a variety of different means of transportation will be able to serve different purposes. Trips that are highly concentrated in time and space are best served by train or other high occupancy modes, whereas trips that originate or terminate in widely dispersed places, can only be adequately served by the private car. What has emerged from the evaluation of the above issues is that the effects of spatial

separation can therefore only really be reduced or improved, rather than completely eliminated. In order to integrate housing areas by means of mass transit the following approaches should be adopted:

- the requirement to reduce the need to travel by consolidating development in order to ameliorate the jobs-housing imbalance and
- the need to adapt transportation to the way in which the city is developing, especially as far as housing is concerned.

In order to do this, extensive public funding must be made available to increase the viability, attractiveness and level of collective service that could be brought about by a change in the mindset and operating environment.

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