TOWARDS ROADS AND STREETS FULFILLING
THEIR POTENTIAL as ECONOMIC ARTERIES

Simon Nicks, Urban Designer and Town and Regional Planner

CNdV Africa (Pty) Ltd, PO Box 16465, Vlaebeg, 8018, Email: simon@cndv.co.za

ABSTRACT: The purpose of this paper is to firstly, argue that roads’ primary purpose is economic and their movement function should be seen as secondary and, therefore, the implications this relationship has for access management. Secondly, to discuss three devices that can help roads to fulfil their primary (economic) role without unduly compromising their mobility functions; the Complete Streets approach, Roadside Development Environments (RDE), and Service/frontage roads. Thirdly, to outline the implications these devices have for implementing road access management guidelines. The paper raises concerns about the overly onerous application of access management guidelines in a socio-economic context where the formal sector is shrinking and people are seeking alternative livelihood opportunities. The paper acknowledges the principles relating to safety and mobility that must inform responsible access management but argues that the level of service targeted for the road network as a whole should be weighted less in favour of motor vehicle traffic and should promote public and non-motorised transport and access to economic opportunities more strongly.
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# GLOSSARY

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<td>AMG</td>
<td>access management guidelines</td>
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<td>BRT</td>
<td>bus rapid transit</td>
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<td>CBD</td>
<td>central business district</td>
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<td>COP21</td>
<td>conference of parties that ratified the UN framework Convention on climate change in Paris 2015 where 195 nations agreed to attempt to cut greenhouse gas emissions to a level that will limit the global average temperature to rise well below 2°C compared to pre-industrial levels.</td>
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<tr>
<td>FRH</td>
<td>functional road hierarchy</td>
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<td>GFC</td>
<td>global financial crisis (2008)</td>
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<td>ITP</td>
<td>integrated transport plan</td>
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<td>LOS</td>
<td>levels of service</td>
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<td>LSM</td>
<td>living standards measure</td>
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<td>MAYCO</td>
<td>mayoral committee</td>
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<td>PMV</td>
<td>private motor vehicles</td>
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<td>RDE</td>
<td>roadside development environment</td>
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<td>SDF</td>
<td>spatial development framework</td>
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<td>SMME</td>
<td>small medium and micro enterprises</td>
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<td>SPLUMA</td>
<td>Spatial Planning and Land Use Management Act (2013)</td>
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<td>TIA</td>
<td>Traffic Impact Assessment</td>
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<td>transit oriented development</td>
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1. PURPOSE OF PAPER

First, to argue that roads’ primary purpose is economic and their movement function should be seen as secondary and, therefore, the implications this relationship has for access management.

Secondly, assuming that this premise is accepted, to discuss three devices that can help roads to fulfil their primary (economic) role without unduly compromising their mobility functions;

- Complete Streets approach
- Roadside Development Environments (RDE); and,
- Service/frontage roads.

Thirdly, to outline the implications these devices have for implementing road access management guidelines.

2. ROADS ARE THE BLOOD VESSELS OF URBAN SETTLEMENTS

Transport routes can be likened to the blood vessels of cities and urban settlements. In the same way that rivers and streams carry the water and mineral necessary to the survival of the natural environment (and ourselves) and blood carries the oxygen and minerals necessary to the survival of the human body; road, and rail, networks enable the movement of goods and people necessary for the survival of rural areas and urban settlements.

Thus, it should be remembered, and sometimes it feels that it is forgotten in the quest for safety and efficient vehicle movement, that transport is a derived demand. If people and goods did not need to move around further than they could walk or be carried there would be no need for transport.

2.1 Roads for cars or streets for livelihoods

Given this realisation how do “we” react if we see people selling goods by the side of the road, see Figures 1 and 2?

Figure 1 Informal trading, Main Road, Burgersfort
Figure 2 New Burgersfort Mall
(Note: ‘we’ in the above sentence refers to the affluent car borne market, like those attending this conference, who comprise most motor vehicle drivers around the world and for whom road access management is a prime concern.)

- “Oh good, here’s a livelihood opportunity that doesn’t involve crime;
- How convenient, and hopefully, affordable;
- They shouldn’t be here, why aren’t they in the nearest shopping centre?
- This looks dangerous, is it dangerous? …haven’t seen anyone knocked down - yet:…”.

This paper suggests that there should be a bias towards the first two bullet points and less of an emphasis on the second two.

This is reinforced by the growing realisation amongst urban and transport planners worldwide that one of the key goals of sustainable urban planning is to reduce the need to travel, i.e. for there to be less infrastructure, less energy, and less time devoted to travelling.

Obviously, it is unrealistic to think motor vehicle travel in its entirety can be done away with, but there is a major move worldwide to substitute private motor vehicles with other less time and space consuming and pollution creating public and non-motorised transport modes.

3. A NOTE ON THE IMPORTANCE OF SAFETY AND EFFICIENT VEHICLE MOVEMENT

Some reading these comments may think that this paper is trying to argue that safety and efficient vehicle is not important. Not at all. What it is proposing is that when all the sustainable transport and land use options have been exhausted and the road network’s economic functionality and modal split in favour of public and non-motorised transport has been optimised, then of course efficient private motor vehicle movement and its safety must be maximised.

This paper is proposing that optimising private motor vehicle travel should be the end point rather than the starting point for considering the road network’s mobility and access performance.

4. THE IMPORTANCE OF TRANSPORT PLANNING INVOLVING LAND USE PLANNERS AND URBAN DESIGNERS AND VICE VERSA

Part of ensuring that transport planning and operating fulfils its economic and social roles requires understanding that the nature of the land use patterns between origins and destinations are the major determinant of the need to travel. It is not rocket science to realise that if residential areas are far from where people work, socialise, relax and shop there will be much more need for travelling than if all of these activities were in walking distance of each other.
Land-use planners and urban designers’ main role is determining land-use patterns and built form.

Thus, it is essential that transport planning and policy exercises include land-use planners and urban designers and vice versa.

Some readers may wonder why it is even necessary to make this point. It seems so obvious. Yet a recent presentation in a certain metro the MAYCO member for transport spoke for an entire hour on the roll out of transport proposals without mentioning property development or land use restructuring once. Drilling down into the transport proposals revealed that no land use response had been explicitly integrated into the proposals nor had the impact of greater residential densities and commercial activity intensity been systematically considered.

When told of how Curitiba does not implement a public infrastructure program like a transport corridor until it has been demonstrated how US$1 of public spending will crowd in US$9 of private investment there were only blank looks. If this example was applied in in Cape Town’s case the implementation of the reputed R4bn bus rapid transit system on the West Coast MyCity corridor would not have commenced until it could have been shown how R32bn of property development (public, private, residential, commercial, mixed use) could be initiated.

It is most concerning that seldom do many road transport planning exercises mention that if the land use pattern and modal split were changed there could be less demand for private motor vehicle movements.

The importance of understanding property development and spatial policy has been recognised in the revision process of the Western Cape road access guidelines, currently drawing to an end, insofar that a land-use planning and urban design firm was included on the team.

This has been useful from both parties’ point of view, particularly with making the land-use planners aware of some of the universal first principle realities of transport planning, for example, driver reaction time at various operating speeds to make decisions such as changing direction or avoiding obstacles and hazards. There are sound reasons why intersections should be spaced according to given vehicle operating speeds along a particular section of road.

5. ROADS AND STREETS ARE A LIFELINE FOR THE POOR

The transport engineers have also been continually reminded that at the end of the day streets and roads are for people. There is often a world of difference between what ideal road access management and traffic control propose should happen and what actually does happen – witness:

- signalized intersection traders;
• arterial kerbside informal furniture markets;
• door to door, spur of the moment, stopping points of mini-bus taxis; and,
• hole in the back wall shops facing onto higher order limited access arterials.

Readers will quickly note that these are all informal retail activities which have the potential to cause mayhem with good road management. Some may argue that retail activities should be confined to formal regional and neighbourhood shopping centres which take proper access off the correct level of route in the functional road hierarchy at the correct intersection spacing.

5.1 A world post the GFC and COP 21

The economic reality is that in South Africa and elsewhere as the world moves into a new economic order post the global financial crisis and the increasing decoupling of natural resource consumption from economic growth the formal sector is going to contract. Mid June 2016 saw the first South African economic analysts revising their GDP growth projections for the year down to 0.0%

Therefore, the informal sector will grow in response to economic forces such as business cycle downturns, retrenchments, inability of school leavers to find jobs and the arrival of more poorly skilled urban migrants. This will see more and more demands being made on urban infrastructure, particularly the road system, to provide low-barrier-to-entry livelihoods.

6. THE AESTHETIC AND SOCIAL VALUE OF ROADS AND STREETS

Another important consideration brought to the process by the urban designers and planners has been the importance of the aesthetic and social impact of the road system on urban and rural quality. Limited access arterial roads lined with, usually vibracrete back walls of houses turning their back on the main streets makes these routes unsafe, featureless, unwelcoming open tunnels through which car borne commuters wish to pass through as quickly as possible. Drivers offer thanks that they are not pedestrians and fervently hope that they won’t break down along these closed off road sections and become opportunistic crime victims, see Figure 3.
Indeed, feedback from recent work along Morgenster road in Mitchells Plain revealed that the road corridor itself, in between the vibracrete walls, has become a gang battle ground, away from the local surveillance of the nearby residential streets. The straight, wide, closed off arterial roads provide ideal locations for deadly gang fights, car getaways and street racing.

7. BALANCING POLICY AND GUIDELINE CONSISTENCY AND FLEXIBILITY

A key challenge with road access management guidelines is policy consistency. This is because of the changing nature of settlement layout and urban development as a result of intensifying activities in different parts of settlements over time.

Thus, on the one hand authorities attempt to make decisions and promote policy that is consistent and gives clear guidelines as to how transport systems should be managed. This creates a tendency towards a more rigid policy and guidelines system.

However, on the other hand, there needs to be sensitivity, quick response times, and a minimum of red tape so as to promote economic growth and employment creation. This flexibility must increase in an economic environment facing often annual changes in public funding patterns, the business cycle and people's economic circumstances.

These forces are manifesting themselves in the increasing business and employment activities particularly along some class 2, 3 and 4 road sections each of which offer their own unique set of economic, social and transport opportunities to which formal and informal businesses are responding.

8. URBAN DEVELOPMENT AND TRANSPORTATION TRENDS SINCE WORLD WAR II

It is useful at this point to take a quick snapshot in the evolution of urban and rural settlements and the nature of their transport systems, as the two are inextricably intertwined. This provides an understanding of how current land use and transportation patterns and trends have arisen and where they might be heading to.

Four main urban development eras can be determined since the Second World War, see below. The relevant generational categories have also been noted to emphasise that transportation planning and road access guidelines exist in a dramatically changing socio-economic context:

8.1 Suburbanisation (the Baby Boomers): the 1960-1970s: driven by access to motor vehicles in affluent areas and apartheid spatial planning in poorer areas – the sprawling layout of the suburbs increased the need to travel, largely by private motor vehicle. In the beginning this wasn’t too much of a problem. Affordability was addressed through cheap small cars and cheap oil and there
was little congestion. Any congestion there was could be addressed by road widening.

South Africa had its own brand of sinister suburbanisation during this period in the discriminatory apartheid dormitory suburbs created on urban peripheries. Apartheid created a double whammy for these residents in that not only were existing social and economic networks smashed but they also became captive to expensive, inconvenient and erratic public transport systems or had to walk many kilometres to get anywhere.

There was no real need for road access guidelines during this period due to the relatively low level of car usage and congestion.

8.2 Decentralisation (generation X) the 1980 - 1990s: This period saw retail and offices leaving CBD’s for isolated nodes in the periphery; This was a reaction to the increased congestion that began to consume CBDs, the main focus of the private motor vehicle based transport systems at that time. There was little significant effort to change the modal split dominated by the private motor vehicle, rather the strategy was to create alternative destinations in the suburbs. Sandton was the first example of this trend in South Africa followed later by Century City in the Cape Metro and Umhlanga in eThekwini. This pattern further increased the need to travel as office blocks and shopping centres moved to nodes scattered around the urban periphery;

This period saw the development of road access guidelines around the world in an effort to try and have consistent access management policy with a view to minimise traffic congestion and maintain movement efficiencies. These were generally implemented informal urban areas and along major roads.

In townships and rural areas under traditional authorities road access guidelines were largely ignored. This enabled small businesses and traders to make use of verges along main roads and around intersections to create livelihoods. These enterprises were mostly subsistence but some larger businesses developed as well.

8.3 Information (millennials) the 2000s –; this period began to see the ability of office workers to work in remote locations but still communicate via the Internet; This started to make it possible not to travel so much as digital connectivity began to replace physical connectivity. However this potential was overshadowed by a massive increase in car ownership in South Africa and, therefore, increased private motor vehicle travel. The erratic state of the public transport systems and the enduring legacy of the separatist and apartheid land use also contributed to increasing the demand for travel.

It seems clear that up to this point transportation infrastructure was demand led, private car oriented and spatially generally merely followed where urban development was going. Although there were some public transport services the
main transport strategy was building and widening roads and managing access to facilitate private vehicle mobility and safety.

During this period road access guidelines became an important shaper of urban development and road planning through their impact on intersection and driveway spacing in particular.

8.4 Transportation (generation Y - in SA the Born Frees) post 2010 into the future?...: this period is seeing a two pronged shift affecting transport and urban development patterns where, instead of transport networks and services following urban development patterns, urban development patterns are responding to the availability of transport services, or even more radically, to try and do without formal transport networks and services to the greatest extent possible – i.e. the notion of live, work, play development.

First, there has been and continues to be the implementation of state of the art public transport systems , including the Gautrain and BRT systems in Gauteng and Cape Town as well as the somewhat hesitant promotion of non- motorised transport.

Secondly, there has been new public transport oriented urban policy including Transit Oriented Development (TOD) and programs such as Johannesburg’s Corridors of Freedom and the Voortrekker Road Corridor Program in Cape Town.

These programs and policies have been a reaction to initially, the increasing oil price, although this has slowed somewhat recently (but in South Africa’s this case more than made up for increases in fuel tariffs) and unacceptable levels of private motor vehicle congestion.

Non-motorised transport, surprisingly slowly in South Africa’s context, given that it is so energy efficient and convenient for short trips and requires the least costliest infrastructure, but not so surprisingly when poor safety is considered, especially for cyclists and pedestrians, is also leading to fundamental shifts in land use patterns.

An interesting feature of “generation Y”, first noted in the US, was that school leavers no longer aspire to owning motor cars. This has sent shock waves through the international automobile industry. Responses have included the growth of various forms of car sharing schemes – Zipcars, Uber, as well as finally, seriously, developing the electric car.

Thus, the latest revision of the Western Cape access management guidelines is occurring in the Transportation Development Era. The changing trends described above are likely to intensify and unbridled car usage is unlikely to return for the next few decades, if ever. It is therefore vital that policy change proposals try to accommodate for the future rather than try to fix perceived wrongs of the past.
9 SUMMARY

All of the above amounts to radical transformation in the shape of urban settlements and transport networks and systems. To be relevant and effective similar radical changes in policy including road access guidelines are required.

Therefore, it would seem that a transportation and economic policy crossroads has been reached. South Africa is feeling this possibly more acutely than elsewhere with its extraordinarily dispersed urban patterns seldom found elsewhere. Major cities, and even towns, for instance Stellenbosch, have experienced exponential levels of private motor vehicle congestion in the past two or three years. Queuing theorists explain how a system suddenly becomes unstable after only a small incremental increase beyond a critical threshold. This can be seen in the increasing traffic jams and gridlock in Johannesburg and Cape Town, now reputed to be South Africa’s most congested city. At the same time economists now agree that the 2008 global financial crisis (GFC) was a structural inflexion point, again felt more acutely in South Africa with its resource-based economy. The same has happened with natural environmental resources consumption patterns from oil, gas, water and land. These changes are resulting in more and more people leaving the formal sector and seeking informal employment.

As a result, in addition to vehicle traffic congestion, transport routes in South African cities are experiencing major pressure from the immediate economic opportunities they offer not only alongside the kerb but also in abutting urban and suburban areas.

It is this paper’s contention that road access guidelines that do not take these realities into consideration are likely to be ineffective, impossible to enforce, and may create even more dangerous situations than they were intended to prevent in the first place.

9.1 The dangers of ignoring reality in favour of “best practise.”

There has been a tendency in certain policy arenas for reality to be ignored in favour of “best practice”. Best practice in these instances is often defined within very narrow parameters, for instance, to optimise the mobility of road based motor vehicles, especially on higher order roads. In this case “best practise” will entail intersection spacing being further rather than closer, parallel parking and direct access across the curtilage of higher order roads prohibited and roads will be single functional, either for mobility or access, but not a mixture of the two.

There are two possible outcomes of attempts to achieve such “best practise”:

First, success: - attempts to achieve a strict limited access approach are successful because there are high levels of private motor vehicle ownership and congestion is
limited. Guidelines are rigorously enforced and there is a high level of voluntary compliance from users;

Second; **anarchy:** - this approach has the same starting point as the first but degenerates into a kind of transportation anarchy as the socio-economic needs of people are great and desperate, and there are insufficient levels of strict enforcement achieve the required levels of limited access. This situation is already present on many urban roads in South Africa. In some cases high death tolls are occurring precisely on those roads designed with very high access management standards, e.g. pedestrians are being killed on high order roads. There is often conflict with high vehicle speeds along arterial sections with high levels of trading and informal trading activity.

Note: a seeming contradiction of achieving road safety was revealed when the experience of textbook planned roads strictly following previous road access guidelines in places like Mitchell’s Plain is considered. These wide, limited-access arterials along which long sections are closed off from driveway and minor street access appear to experience some of the highest accident rates in the City of Cape Town. While drivers must take responsibility for how they drive the geometric road design and access guidelines regime that was applied has a major impact on driver behaviour. These experiences suggest that limited access mobility routes separated from adjacent land uses are not the panacea to road safety. The use of “safety” to justify high levels of mobility should not be the first knee-jerk rebuttal to motivations for higher levels of access along class 2, 3 and 4 roads.

9.2 The need for a 3rd way

This suggests that another approach, which may be termed the **third way**, is required to achieve the primary aims of access management, not only safety, but also promoting economic activity, is to be effectively addressed.

The remainder of this paper describes three different elements of a road access guidelines strategy that could be comprised the 3rd way and attempts to take these new, changing realities into account.

10 COMPLETE STREETS.

Transport planning in general and road planning in particular has, historically, mostly concentrated on vehicle movement with an emphasis on private motor vehicles (PMV), generally the most frequently used vehicle for commuter transport. Roads have also become the main mode of transport for freight, (in some cases to such an extent that there appears to be a ratio of 1 PMV to 1 truck or even less along certain sections of the national routes). The focus of the functional road hierarchy and most transport modelling software is on facilitating vehicle movement. Although public transport and non-motorised transport modes are increasingly mentioned when
considering transport planning the prime concern remains optimising vehicle movements.

This has had the following consequence:
- road cross-sections were narrowly focused at accommodating private motor vehicle and freight transport and, in more urban settings, pedestrian sidewalks;
- scant attention was paid to cycling and public transport facilities;
- a high level of access were generally seen as inappropriate on higher-order roads because of the relatively high level of side fiction it created;
- more frequent intersection spacing was seen as a potential cause of more traffic accidents because of the greater number of possible conflict points; and,
- hoardings and large signs were also discouraged, not because of the urban clutter they cause, but because of the danger of distracting motorists.

Such a limited use of precious road space has had the consequence of significantly diminishing the possible social and economic opportunities offered by the road network.

As its name suggests the Complete Streets movement addresses this concern and takes a much more comprehensive view of what is possible in street cross-sections.

It is interesting that this movement gathered strength, particularly in the United States, at the same time as a new world economic order arose out of the restructuring following the 2008 global financial crisis (GFC).

Roads and streets were no longer seen as merely movement conduits to get motor vehicle traffic from A to B. They were seen, within themselves, as areas of economic opportunity and employment creation, i.e. places rather than lines. The conventional approach of trying to divorce commercial economic activity away from the main traffic streams by locating it off major driveways or side roads behind large car parks was seen as deficient in a number of important respects:

- it presupposed that most people had access to private motor vehicles and cheap fuel;
- it also presupposed that most people entering into business and other livelihoods could afford lease or to purchase formal expensive mono-use retail, commercial, and industrial floor space in locations to which all their customers could drive to;
- the urban quality arising from this approach was a major cause of urban blight, particularly in cities that were more than usually automobile dependent. Historic, contained, clear streetscapes framed by colonnaded sidewalks began to resemble large bomb sites with car parks occupying the gaps along street fronts and commercial buildings set far away to the rear as redevelopment according to the car based norms occurred. Sidewalks became
unsafe, unfriendly channels through “no persons land”, offering little surveillance other than the odd parking attendant kiosk; and,

- especially in developing countries, street curtilages and intersections increasingly became dominated by informal sector trading activity either from roadside kiosks or even within the traffic.

The Complete Streets approach changes the narrow focus of conventional transport planning from a number of aspects, see Figure 4:

![Figure 4 Complete Streets approach considering urban form, abutting land uses, all transport modes, sympathetic geometric design (Boston, 2013)](image)

- it requires that road cross-sections accommodate many more modes of transport than the historically dominant PMV and freight traffic especially on higher-order roads;
- accommodating all of these modes should comprise a single integrated design exercise taking into account private motor vehicles, public transport, cycling, walking and freight. For instance, recent bus rapid transit (BRT) planning, design and implementation does not seem to have taken into account cycle ways, possibly because they are not seen as BRT users, although they should be sharing the same road space. This single mode approach can severely compromise the possibility achieving a more modally inclusive cross-section in the future except at great expense.

Furthermore, it is not only more modes of transport that road cross-section design should consider.
10.1 The roadside, a major marketing opportunity.

As mentioned earlier, transport is a derived demand whose primary purpose is to enable economic and social transactions. Economic transactions in particular require access to markets. All businesses, small or large, are dependent on marketing exposure, some more so than others. Efficient marketing requires exposure to as many people as possible in the shortest amount of time. Although television, and more recently, the Internet are major marketing channels, road, and to a lesser extent rail, traffic is a major source of business opportunities for both corporate and SMME through to intersection traders. Roadside marketing opportunities manifest themselves in many different ways:

- large billboards attached to pylons or the sides of buildings along highways,
- line shops arranged along major arterials,
- street trading stalls along sidewalks and median islands; and,
- intersections where traders actually walk in the traffic lanes to sell their wares.

Why does this happen? The famous quote by Christopher Alexander makes it very clear:

“In Berkeley at the corner of Hearst and Euclid, there is a drugstore, and outside the drugstore, a traffic light. In the entrance of the drugstore there is a news rack where the day’s papers are displayed. When the light is red, people who are waiting to cross the street… have nothing to do, they look at the papers displayed on the news rack… Some of them just read the headlines, others actually buy a paper while they wait. This effect makes the news rack and the traffic light interdependent … everything forms a system – they all work together”

Thus, it can be seen that the road cross-section must not only accommodate transport modes, the focus of the transportation planning profession, but also economic activities - and some of these economic activities are trying to conduct themselves directly across the curtilage.

10.2 The contradiction between access management, the road hierarchy and the strength of economic thresholds

It seems that in the perfect access management world direct small-scale transaction activities of the nature described in the quote above should only occur along the very lowest order streets, and especially away from intersections that warrant traffic signals.

Larger scale activities, for example, regional shopping centres, office estates, and industrial parks, should be located “off channel “rather than directly across the curtilage, taking indirect access off widely separated intersections on higher-order arterial roads.
This ideal promotes a “tree-like” relationship between the land-use and the transport system:

- small-scale activities taking access off many little streets (branches or capillaries); and,
- large scale activities taking access off a few large intersections off large roads (trunk roads or main stems- arteries/arterials).

Using retail as an example of an economic activity affected by road access guidelines one sees that the conventional access management approach is predicated on high-value shoppers using expensive modes of travel, mainly private motor vehicles, to travel to shopping centres in a world where high volumes of traffic are confined to higher-order roads, and, everyone occupies LSM levels 7 to 10.

This approach ignores a number of contextual economic realities currently facing South Africa. These include; declining levels of formal employment, declining levels of formal education, growing numbers of non-qualifiers for the SA social grant system including many foreigners, very low levels of economic growth, and a growing culture of financial prudence limiting access to credit. This is resulting in economic demand shrinking to fewer and fewer locations.

Small scale economic activities, i.e. those with the lowest barriers to entry, will try to access the strongest possible market thresholds. These are not found in quiet residential streets with few passers by. They are found on the higher order arterials. Hence, the proliferation of informal activities along the road reserves of higher order roads in South Africa. And, this trend is going to increase.

It is important that the revised AMG take these realities into account.

10.3 Complete Streets: Access Management’s 3rd way

The “third way” approach seeks to marry the non- negotiable safety aspects of access management best practice with ensuring that the road curtilage maximises access to economic activities at all scales along sections of roads where this is both needed and desirable.

Inevitably, situations will arise where compromise between access and mobility is required. In these instances the decision should be weighted in favour of promoting economic opportunities as follows:

- expanding traffic impact assessments to include cycling, pedestrian and public transport levels of service (LOS) assessments, not just the LOS for motor vehicle traffic;
- reduce operational speeds on higher-order roads lower than is currently generally the case;
- more sections of road falling under CBD and Intermediate roadside development environments (RDEs) than is currently the case;
- tolerance of higher levels of side friction, i.e. reduced driveway intersection spacing on to higher-order routes.

The Complete Streets approach requires that ALL modes of transport are given equal attention in the road cross-sections. Furthermore, the same or even greater level of attention should be extended to the horizontal and vertical land-use activities on either side of the road as well as urban design considerations relating to the positive performance and qualities of the streetscape as currently given to accommodating motor vehicle traffic.

Thus, levels of service (LOS) at intersections should not only consider the movement of private and freight motor vehicles but also public transport, cycles and pedestrians. There could be instances where reduced LOS for motor vehicles is considered appropriate because there will be improvements to the LOS for public transport, cycles and pedestrians.

Because the Complete Streets approach not only considers all modes of transport but also abutting land uses and their urban design implications it aligns well with the Roadside Development Environment (RDE) strategy developed in the previous Western Cape Road Access Management Guidelines.

11. ROADSIDE DEVELOPMENT ENVIRONMENTS (RDE) – a tool to integrate land use and transport planning;

A major criticism of transportation planning, the functional road hierarchy, and many approaches to road access management has been that that they have tended to regard transport routes as simplistic linear trip conduits. Furthermore, their behavioural modelling has mainly focused on the private motor vehicle. Little attention was paid to the intensity of the environments through which transport routes pass other than what may have been revealed by origin-destination studies (which are not required for traffic impact assessments). This was clearly a great shortcoming, particularly if transport’s economic and social functions are to be effectively considered.

The Roadside Development Environment (RDE) concept was developed to address this shortcoming. It is a methodology to take into account five broad roadside development environments depending on their intensity from most intense to least:

- Urban RDEs:
  - CBD,
  - Intermediate,
  - Suburban;
- Outside of the urban edge:
  - semi-rural; and,
  - rural.
Annexure A summarises their different traffic characteristics.

RDEs also help as a device to ensure the continuity of a road’s functional road hierarchy (FHR) classification as it passed through different rural and urban contexts. Intuitively, a road passing through a CBD should have shorter spacing between intersections than when passing through a rural area. One way of addressing this could be to change the road’s classification, say from Class 2 to Class 4. Changing the road classification of different sections of the same road was seen as potentially confusing. Instead, the concept of RDEs was devised to classify the nature of development on either side of the road and, therefore, whether shorter or longer intersection spacing are justified, without changing the FHR classification of that section of road.

Hitherto, RDEs were applied ad-hoc, on a case by case basis usually for TIAs or when making applications for new intersections to serve development. The current draft AMG seeks to consolidate the use of RDEs as a consistently applied transport and land use planning tool, formally mapped to guide ‘forward’ planning as well as to control development applications.

This is exciting because it means that the future intensification of an area can be guided systematically rather than on an ad-hoc basis.

RDEs can also provide a practical bridge between transport and land use planning.

Spatial Development Frameworks prepared in terms of SPLUMA and Integrated Transport Plans prepared in terms of the National Land Transport Act should both contain maps of the same RDEs whose extent should be the same in both plans. A similar route classification terminology should also be used in both documents. Thus, a route labelled “Development Intensity Route” as proposed in the City of Cape Town’s Spatial Development Framework (SDF) should have a similar designation – preferably using the same nomenclature – in the City of Cape Town’s Integrated Transport Plan (ITP).

For example, there may be an area in the suburbs where urban development intensification is required. This area could be re-designated from a Suburban to a CBD RDE in both the SDF and the ITP, and a network of closer spaced intersections implemented.

Figure 5 indicates the difference in intersection spacing between a CBD and a Suburban environment to show how greater levels of access can be provided to promote more intense urban development along a given class of road in the CBD RDE, see Figure 5.
12. FRONTAGE/SERVICE ROADS – THE NEW CLASS 2 AND 3 ECONOMIC AND EMPLOYMENT GENERATING ROAD CROSS-SECTION.

This paper has already referred to the contradiction that higher order roads carry higher volumes of traffic which make them more desirable as business locations for all scales of business but that, in order to promote road safety and smooth traffic flow, access management guidelines seek to limit access from higher order routes. As mentioned above conventional transport policy prefers that business activities should locate themselves in formal shopping centres, office parks and industrial estates usually taking a single large access only off higher order roads. The Prevention of Ribbon Development and Roadside Advertising Act (1940) was aimed at just this issue. The main justification for this act seems to have been based on the intuitively sound principle that intense activity along the curtilage of a road is distracting, causes side-friction and reduces relative road safety.

However, it is argued throughout this paper that taking into account current economic and social conditions in in South Africa, the wheel should turn half circle for the access management approach embodied in the Prevention of Ribbon Development and Roadside Advertising Act and still prevalent in much transport policy today.

This all suggests that it is worth looking at other devices that are more encouraging of road side development but still address safety and mobility.

12.1 Frontage/service roads and one-way couplets

These devices include one way couplets and service/frontage roads.
The main rationale for frontage roads is that they provide:
- visual exposure to passing trade along higher order roads without interfering with these routes’ mobility functions by having too closely spaced intersections;
- high levels of direct access to abutting properties across the frontage road without interfering with movement flow on the mobility carriageways;
- high levels of parking off the frontage road.

The passing trade referred to here is mainly private motor vehicle traffic, the most lucrative market when compared with public and non-motorised transport modes and likely to remain so for the next couple of decades even as public transport and non-motorised transport intensify.

Frontage roads provide a high level of access but only link with the mobility section of the road through intersections at certain prescribed intervals, see Figure 6.

Figure 7 shows how this might be achieved using one way frontage roads taking slip lane access of the main mobility routes sections

In most instances service/frontage roads can take access off the main road at the intersection spacing recommended in AMG. Where this may not be possible a one way couplet with slip roads may provide a solution.

12.3 Some concerns regarding the AMG guidelines and the effective operating of frontage/service roads;

Ideally it should be easy for traffic on the mobility route to find its way onto the frontage road from time to time to access the abutting economic opportunities.
Informal and formal business activities and densification occurring in response to Node 2 potential

Informal activities facing NMB at rear of properties facing access internal access street

Figure 7  Nelson Mandela Boulevard, Thembalethu, George
Service/frontage roads are successful because they provide visual exposure to high volumes of passing traffic along class 2 and 3 roads but are able to accommodate high levels of direct access.

The critical element for the success of frontage/service roads providing access to the economic opportunities available along higher order routes is the nature of the link between the mobility route and the frontage road. Wayfinding should be clear and visual for such traffic. Ideally, there should be visually legible intersections directly off the mobility route on to the frontage road.

However, if road access guidelines limit intersection spacing off the mobility route on the downstream section from an intersection to 80m and at least 180m on the upstream intersection on a class 3 route then direct vehicle access will not be possible for over 200m of a highly visually exposed frontage. This could accommodate 40 to 50 kerbside traders at an average of 5m stall and circulation space frontages or 20 small shops with 10 m frontages. The preferred access/egress in such situations is that vehicle born customers should drive around behind the block and take access to the frontage road through other residential buildings. This is a long tortuous route especially for convenience purchases and is likely to severely weaken the economic potential of frontage roads.

Two outcomes are likely to enforcing such constrained access conditions.

The first is that there is extremely effective policing that manages to chase away rogue vehicles that attempt to park in the shoulder to access such businesses, or;

Secondly, the shoulders may become de facto parking lots to get access providing access to adjacent trading stalls with vehicles pulling out directly into the traffic flow along the adjacent mobility traffic lanes.

The solution would seem to be to permit hybrid situations with an access management regime significantly reduced along strategic sections of such routes to permit slip lands, one way access lanes, speed reductions and upgrading of RDE’s to a minimum of intermediate along these route sections.

13. CONCLUSION

The latest revision of access management guidelines has demonstrated conclusively, see other papers at this conference, that there are certain realities relating to driver reaction time, operating speeds, and intersection spacing that cannot be changed. This is due to the inherent physical abilities and limitations of the average driver.

The relationships are clear:… in contexts where private motor vehicle travel is proposed to be the dominant transport mode, and high levels of mobility are to be achieved, for example, level of service (LOS) A are to be achieved then intersection
spacing must be further rather than closer apart. Furthermore, parking off higher-order roads under these conditions should also be prohibited.

However, this paper argues that, under the following circumstances:

- a world economic order moving into a low or no growth era after the global financial crisis;
- a post COP 21 climate change context that seeks to decouple natural resource consumption, including oil, from economic growth and promote zero carbon emissions;
- a South African socio-economic context of high and likely increasing levels of formal sector unemployment coupled with zero or little economic growth;
- the arrival of the transportation development era where locational decisions are made not in terms of suburbanisation or decentralisation, but rather to reduce the need to travel; and,
- an urban transport policy regime that increasingly seeks to promote transit oriented development (TOD), already given effect by massive and continuing investments in public transport, and increasingly, hopefully, non-motorised transport, and discouraging high parking ratios;

a “high motor vehicle performance” approach to access management guidelines in South African urban centres is inappropriate. Indeed, such an approach could well, in aiming for a first prize of highly efficient, relatively unconstrained private motor vehicle movement, result in inappropriate and anarchic traffic/informal trading/illegal parking situations increasingly found along many high order roads in South Africa.

A ‘third way’ approach is argued, which could have some or all of the following characteristics:

- accepts a lower level of service (LOS) norm or targets on all routes, say LOS C;
- assessment of levels of service (LOS) for all transport modes in TIAs and ITPs, and acceptance of decreased LOS for motor vehicle traffic if there are complimentary improvements in levels of service for public, cycling and pedestrian transport modes;
- reduces designated average operating speeds on classes 2, 3 and 4 routes, see Figure 8;
- where necessary, breaks away from the road hierarchical relationship that sees the longer a route, the higher its classification. Thus, a 20 to 30 km route that links a large number of urban nodes along its length, like the proverbial beads on a string, and which routes have been found to be major generators of economic opportunity through all South Africa’s large urban centres, could be designated as class 4, rather than class 2 or 3 routes;
- accepts short-term, kerb-side parking opportunities, outside of CBD RDEs. This is more likely to be possible along class 4 routes;
Figure 8  Diagrams from “Activity Corridors as an Urban Strategy” for CSIR Transtek: 1989
adopts the ‘Complete Streets approach’ which, in addition to holistically considering the accommodation of all transport modes, and not one or other in isolation, gives equal consideration to the nature of land uses and their intensity and type on either side of the road. Currently in South Africa this approach only appears to be formally in use in Johannesburg, City of Johannesburg, 20150;

- the use of roadside development environments (RDEs) as a ‘forward’ planning tool for both transport and land use plans to be coordinated and aligned in both integrated transport plans and spatial development frameworks;
- the use of the same nomenclature to describe the same routes in both integrated transport plans and spatial development framework; and,
- the promotion of a mixed access, mobility road cross-section along class 2, 3 and 4 routes with clear access from the main mobility carriageways.

The intention is to create an access management regime which gives greater levels of access along major routes to the stronger economic markets. These markets are likely to remain car borne for the short and medium term, see figure 9.

In so doing it is hoped that the most direct and convenient access to higher order economic opportunities across the curtilage of major roads will be possible for the increasing number of South Africans for whom private motor vehicle travel and high-powered formal sector jobs will remain a dream for the short and medium term.

Finally, it should be noted that a particular focus needs to be on class 3 roads. Most class 3 roads are highly strategic with respect to the economic potential due to their alignment through high-intensity urban nodes, the volumes of traffic they carry and the long distances they cover, see figure 8. They are likely to become the battleground of access management guidelines if an innovative and economically enabling approach is not taken to them.
REFERENCES
ANNEXURE A
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<th>LAND USE</th>
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