

ROAD HIERARCHICAL CLASSIFICATION VERSUS ROADWAY ACCESS MANAGEMENT

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ABSTRACT

Road access management has been a much debated topic for a number of years, with much of this centred on 'roadway' access for vehicular traffic. It is suggested that insufficient attention is given to the increasingly important role that road based public transport, pedestrians, cyclists and even heavy goods vehicle must play in future. This in the context of a better understanding of movement systems, the notions of 'context sensitive' or 'complete street' design, and 'liveable' & 'sustainable' neighbourhoods, towns and cities, all resulting in the development of more sustainable integrated urban and rural development environments.

The paper briefly sets out the author's interpretation of current 'road access management' guidelines as recognised in the Republic of South Africa, and how these came about. It focuses on the principles that led to the development of a provincial guideline which preceded these national guidelines, and follows this with a discussion on how the authors believe the issue of road access management should be considered in future. In essence it is suggested that a clearer distinction needs to be made between the management of 'roadway' access for vehicular traffic on the one hand, and the hierarchical classification of roads as in the pursuance of holistic integrated planning, on the other. In support of the views expressed, the authors draw from work done in South Africa, international literature, and their collective experience in the fields of transportation planning and traffic engineering.

1. BACKGROUND

The use of a road functional classification approach in South Africa would no doubt have originated from the Buchannan 'Traffic in Towns' work, and was promoted through the South African Institution of Civil Engineering (SAICE) *Guidelines on the Planning and Design of Township Roads & Stormwater Drainage* (1). This was then adopted into the 'Blue Book', the CSIR's *Guidelines for the Provision of Engineering Services for residential Townships by the Department of Community Development (DCD)* (2). A shortcoming of this very significant work was that it gave little guidance with respect to the higher order roads, which was understandable.

Within the former Cape Province (now Western Cape Province), as was the situation in the remainder of South Africa, rural roads fell under the control of the Provincial Administrations Roads Department. This being regulated through the Roads Ordinance (Ord 19 of 1976). The Ordinance also provides for the Province exercising controls over certain roads that pass through municipal areas where, either the Province has elected to remain the road authority, or in respect of roads where the local municipality has elected that the road be proclaimed a Municipal Main Road in terms of the Roads Ordinance, and as such will be eligible for funding support from the Province; this being conditional on certain standards being maintained, which includes adherence to access standards. The mechanism aims at assisting municipalities with the financial burden of accommodating 'through' traffic.

The access standard applied across the board being a 500 m interval between intersections or property accesses; this regardless of the environment through which the road passed. The exception to this was a relaxation in respect of service stations. Other Provinces used a 600 m interval. These rigid access standards solicited considerable criticism from planners and property developers, which ultimately resulted in the Provincial Government of the Western Cape (PGWC) producing a Road Access Guideline (Draft in 1996, with a published version in 2002) (3). The Province having been unsuccessful in convincing national government at the time that research funding was needed on this matter.

Of significance is that the guideline considered roads as falling into five (5) categories, but that each could be influenced by five (5) defined development environments through which the roads could pass, and which could impact on whether or not an access opportunity could be considered as illustrated in table 1.

Table 1. Road Class Functional Classification.

Road Category		Function
1	Freeways & Expressways	High order arterials, for primary or principle movement
2	Primary Arterials	
3	District Distributors / Integrators	District distribution, integration & collection
4	Local Distributors / Integrators	Local distribution, integration & collection
5	Access Roads & Streets	Individual property access streets

An access opportunity would then be considered given that it met with suitable criteria that related to the road type and development environment, and certain other technical considerations as illustrated in table 2.

Table 2. Development Environment

Development Environment	Density Criteria Determination
Urban	>10 000 m ² Gross Floor Area (GFA) / ha
Intermediate	3 000 – 10 000 m ² GFA / ha
Suburban	1 000 – 3 000 m ² GFA / ha
Semi-rural	<1 000 m ² GFA / ha
Rural	Farmland or similar

In general terms this approach was well received by traffic engineers and town planners, and appears to have served the province adequately through the past 20 years. That does not suggest there were no critics.

The Gauteng Province were the next to look at the subject, and this led to a first 'national' guideline that was circulated for public consideration around 2005, then again later in 2006 by the National Department of Transport (NDoT) (4) & 2008 (5), with the most recent in 2012 by the Committee of Transport Officials (COTO) (6). As with the Western Cape Province's guidelines, these also have at their base the AASHTO approach, but retains its focus on the higher order roads, with no real consideration given to the development environment within which all roads exists.

2. PROBLEM STATEMENT

Clearly there are differences between the National guideline approach and that adopted earlier by the Province. The question then is whether the latter is to be totally discounted going forward? Which approach offers the better all-round advice?

There is no doubt that there needs to be in place access management guidelines that are based on sound traffic engineering principles, and thus gives guidance to vehicular access management issues. Further, there is no doubt that transport infrastructure, and in particular the road network gives structure to all urban areas. If not properly planned, safety could be compromised, and roadway performance not optimised. But it must also offer access solutions that are logical and meet with the demands of continually changing development environments, and thus find favour with all that have the responsibility for urban and rural development and management. This includes transportation and spatial development planners, and others involved in finding long-term sustainable urban solutions.

It would seem that a huge opportunity may have been missed with the publication of *TRH 26 (Technical Recommendations for Highways) South African Road Classification and Access Management Manual (August 2012)* due to its overly rigid adherence to a motor vehicle mobility argument, with insufficient consideration being given to the needs of urban transportation after the 'modernism' (7) resulting from the private car development era.

3. AIM OF PAPER

Thus the aim of this paper is an attempt at expressing a concern that the approach taken in TRH 26 is too restrictive, and appears a little out of touch with many local urban planning realities, and in the opinion of the authors, does not contribute sufficiently to the delivery of required 'liveable & sustainable' towns & cities.

In a country where some 70% of the population do not have access to private transport, where unemployment rates are high, migration to towns and cities are major issues, huge backlogs exist in the fields of transport & housing, where there are numerous environmental concerns at the local & global levels, and the prospect of

this significantly changing for the better in the next few decades is highly unlikely, there is an urgent need for practical easily interpreted road management guidelines.

Further, there is a real concern that TRH 26 may be deemed a ‘prescribed national guideline’ in terms of Section 2(c) of the National Land Transport Act (Act 5 of 2009). This would indeed be most unfortunate.

It is hoped that the discussion offered through this paper will lead to a rethink of the national guidelines, and the adoption of a more flexible, and more land-use / transportation friendly approach, which gives wider consideration to all transportation modes.

4. DISCUSSION

4.1 Some definitions

At this point reference to some definitions would not be out of place. These are drawn from the South African traffic legislation with discussion added.

***Public road** – means any road, street or thoroughfare or any other place (whether a thoroughfare or not) which is commonly used by the public or any section thereof or to which the public or any section thereof has a right of access, and includes-*

- (a) the verge of any such road, street or thoroughfare-,*
- (b) any bridge, ferry or drift traversed by any such road, street or thoroughfare; and*
- (c) any other work or object forming part of or connected with or belonging to such road, street or thoroughfare*

While from a transportation perspective the road is there to meet the need to move people, goods & services, this is not expressly stated. Thus there is scope to view all roads as linear public places.

***Roadway** – means that portion of a road, street or thoroughfare improved, constructed or intended for vehicular traffic which is between the edges of the roadway*

Vehicular traffic being virtually anything with wheels, with cars, buses, trucks, & motor-cycles all part of the ‘motor vehicle’ group. While roller-skates & skate-boards fit awkwardly into the pedestrian group. Bicycles & carts are vehicles and thus may use the roadway.

***Verge** – means that portion of a road, street or thoroughfare, including the sidewalk, which is not the roadway or the shoulder.*

Important is that the verge is that portion remaining after deciding what will be the ‘roadway’, and is the pedestrian domain. That domain continues across intersections

and driveways. While a driveway obviously connects a roadway across a verge to a property in order that vehicular access becomes legally possible.

***Sidewalk** - means that portion of a verge intended for the exclusive use of pedestrians.*

There appears to be nothing in South African law that states that vehicular access to property is a right, while pedestrian access can be restricted but not denied. This begs the question as to why road access management guidelines do not address the totality of property access, or is it that pedestrians are too low in the priority list, and that only the narrower field of 'roadway vehicular access' is perceived as relevant.

A roadway which is specifically designed with grade separated intersections is referred to as a motorway or freeway and only becomes a **Freeway** in the legal sense when 'a section of a public road (which) has been designated as a freeway by an appropriate road traffic sign'. It is that point where restrictions on pedestrian, etc., are imposed for the whole road reserve.

4.2 'Through traffic' as a component of total traffic

In opening the discussion, it is noted that TRH 26 uses the words 'exclusive', 'predominant' or 'major' to describe through traffic in support of mobility roads. These are confusing descriptors, as it can be argued that at any particular point on a roadway all traffic could be referred to as 'through' traffic if it was not leaving or entering the road at that point.

On any rural arterial the traffic at any one point could comprise long distance travellers, inter-town travellers, local farm to market, and farm to farm type travellers. Where are the through travellers? As one progresses along that same road the use mix can alter considerably, and as one approaches a town, local traffic can be added, thus the percentage long distance 'through' traffic may be very small component. In fact at some point even a rural arterial may be serving predominantly a local function. At no point on the road can traffic truly be described as 'exclusively', or 'predominantly' through traffic, and this surely holds true for all roads in one way or another. The important issue is not the use mix of traffic, rather the degree of mobility desired or permitted at any location.

4.3 Reach of connectivity & route continuity

It is agreed that different road classes will offer differing amounts of route continuity, and that the higher the order of road, the longer the reach offered. What is possibly of even greater importance is route continuity, not necessarily roadway geometric consistency.

On the one hand it is route continuity & connectivity that is important to the traveller, and thus the route guidance or navigation systems play a huge role in the road network optimisation process.

On the other hand, in order to secure consensus between planners and engineers on how a road is to be perceived and managed over time, it is necessary that a classification reference number is allocated, that all accept the standards attached thereto, and that this is registered in the Integrated Transport Plan and Spatial Development Framework for that municipality. This regardless of the standard of the roadway at that time. In other words it registers an intent to manage the road in an agreed manner.

There appears to be no logic in changing the road classification number as one progresses down that road. What may change are the 'roadway' standards.

4.4 Influence of the development environment

The 'through traffic component' discussion needs to be taken further. The closer that same rural arterial gets to an urban area, now burdened with a greater number of local travellers, there can be a steady slowing down of traffic operating speeds due to this added vehicular volume. In short, the roadway performance has been impacted on by the surrounding development environment, and it is at this point that the roadway designer has a choice. Either attempt to maintain the same geometric (with added traffic lanes) and access standards as being held consistent over the total length of the road, which can prove to be a costly and environmentally intrusive solution, or capitalise on the fact that operating speeds have reduced, and thus there is opportunity to offer a different, possibly less costly geometric and access management solution.

The reality is that at some point the road reserve width available becomes limiting and it also becomes necessary to question priorities and the sharing of that road space available.

4.5 Rural versus Urban Roadway Planning & Design

The point at which a rural road enters an urban area is defined legally by the presence of land that has been sub-divided into erven. The permanence of this point relates directly to the rate of urban expansion, and the extent to which an 'urban edge' can contain urban sprawl pressures. In reality this is a moving target, and it has been suggested that while many basic principles of rural roadway design apply to urban situations, there are a range of aspects this does not address in the urban environment. Not only is the point of rural / urban interface varying, there is also a need to view the design of roadways in urban areas differently due to local context, and differing movement demands.

4.6 Integration & the functional use of a road

The National Land Transport Act (Act 5 of 2009) requires of all municipalities that they produce Integrated Transport Plans. S31 of the Act further requires that *Land transport planning must be integrated with the land development and land use planning processes, and the integrated transport plans required by this Act are designed to give structure to the function of municipal planning mentioned in Part B of Schedule 4 to the Constitution, ...* with the word integration being often used.

The starting point for most is the much referred to AASHTO highway functional classification diagram shown in figure 1. The word integration doesn't directly appear, but is it not implied when referring to the middle group of collector / distributors by virtue of the fact that there is a wide range of access to property within this band. That shown below has been marginally modified that includes reference to 'integrators' that was borrowed from a Western Australian planning document (8). In other words it is within this band that there may be limitations on the extent of vehicular access to roadside properties, there is likely to be increasing levels of public transport activity and pedestrian related access to properties.

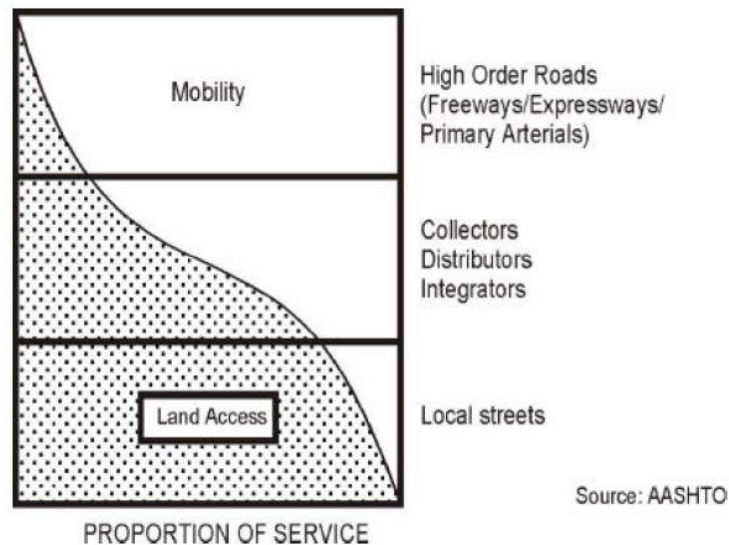


Fig 1. Mobility / Property Access Relationship (Mod AASHTO).

Surely then, the functional classification of roads must refer to its use to allow vehicular mobility with limited pedestrian activity at the top end, then in the middle band provides for increased transportation / land-use integration, with high portions of public transport, pedestrian, goods delivery with reducing private car activity, then at the bottom end the predominance of access to land at a pedestrian dominant scale. Then does it not follow that the roadway vehicular access management standard to be applied is a different classification to the 'functional classification'?

4.7 Mobility, access & integration

But this raises the next question, at what point does the mobility potential of a roadway need to be considered in the context of its ability to move people and goods, rather than just motorised vehicles. Admittedly this may be a step too far for now, but the longer term use of the road, and of the roadway in particular, will be adjudicated differently to the rather one dimensional traffic volume approach being offered.

It is very indicative that few of the publications in circulation dealing with the application of revised urban street design (context sensitive or complete street, etc.), place emphasis on the traditional functional classification approach. In fact it is interesting to note the direct rejection of the AASHTO approach in one notable case (9), and the classification of roads as *boulevards, avenues, streets and access lanes* with the priority for vehicular traffic high in the cases of boulevards, to very low in the case of access lanes. Each of these is then viewed in the context within a *city (+7 storeys), town (3-6 storeys), commercial (1-3 storeys), residential and industrial* development environment, as areas / streets with *no active frontage*. This reflects a certain similarity to the Western Cape Province's approach.

4.8 Class 3 – A common denominator

The five road class system has been in use for many years. It is so that within the urban context the **Class 3 - District Distributor / integrator** enjoys a wide measure of mutual understanding between some traffic engineers and town planners as being a common denominator around which the other road classes revolve. This being seen as the 'activity spine' which provides for a high degree of people mobility, but equally, a high degree of people access to land use activities. These are also the main carriers of public transport, thus do require a moderately high degree of vehicular mobility.

The extent to which vehicular access to land is considered relates not only to the subject roadway but also to the supporting road network, and to the priorities that will be given to different classes of vehicular traffic using the roadway. With the median or outer kerb location of bus (and even bicycle) priority measures playing a major role in decision making.

4.9 Pedestrian or other use classification

The separate classification (Class 6) of a pedestrian road appears superfluous. All roads, with the exception of a designated freeway, are pedestrian roads by legal definition. Adding a roadway means taking a portion of that away for a particular purpose, as could be the situation for a bicycle, bus or even dedicated truck lane, as well as bridle paths. Rather than establish an own pedestrian functional class, what seems necessary is to commence with the basic structured classified network where the relationships between arterials (refer to figure 2) and other roads are articulated, and which is then overlaid with;

- the roadway access management policy
- the classified pedestrian network (e.g., pedestrian district, city walkways, local service walkways, or some other descriptors)
- the classified bus network (BRT roadways, preferential lanes, other)
- the bicycle path network (e.g., the 4-class system used in RSA)
- the truck management policies (major & local truck routes, truck districts & truck restricted areas)

Figure 3 and 4 refers to the application of walkable catchments of an urban structure and its relationship with a structured classified network.

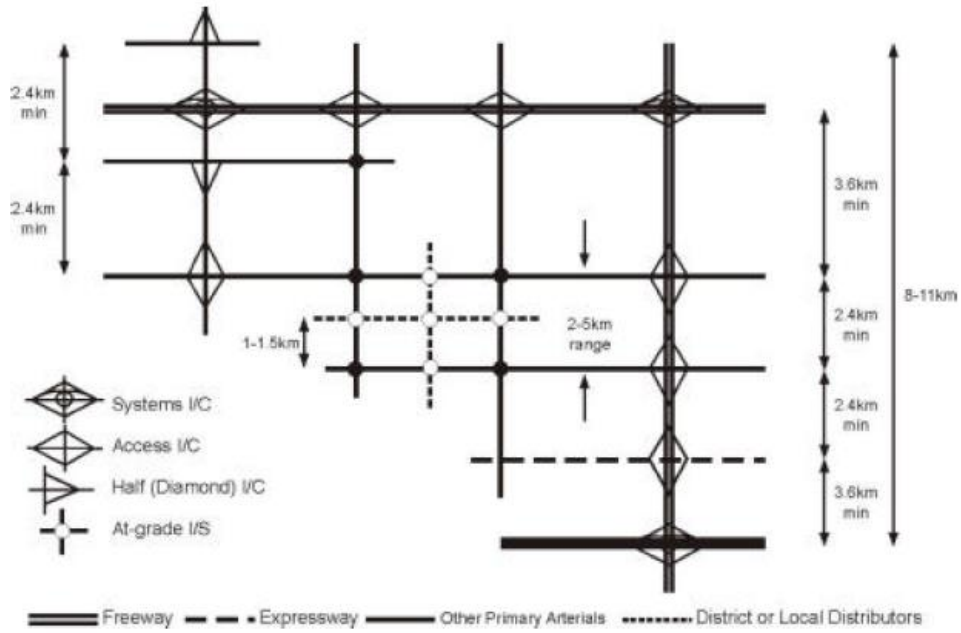


Fig. 2. Spatial relationship of arterial roads.

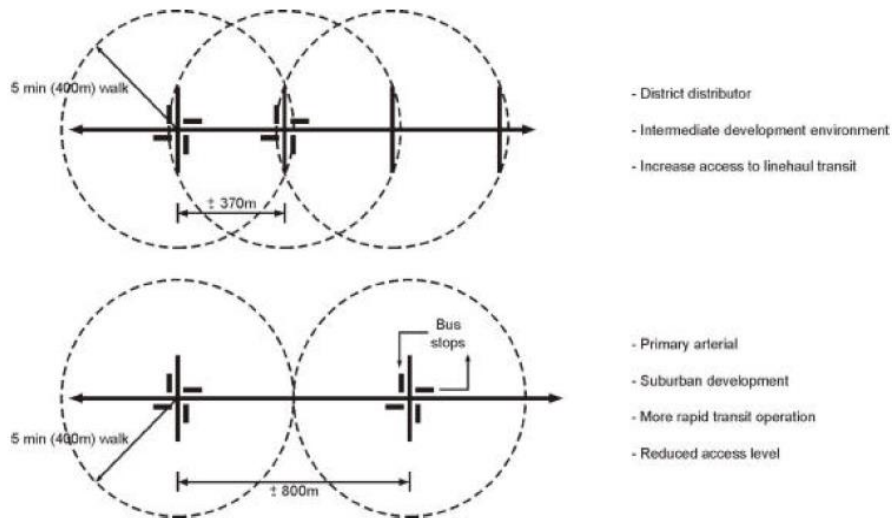


Fig. 3. Walkable catchments to conventional bus stops.

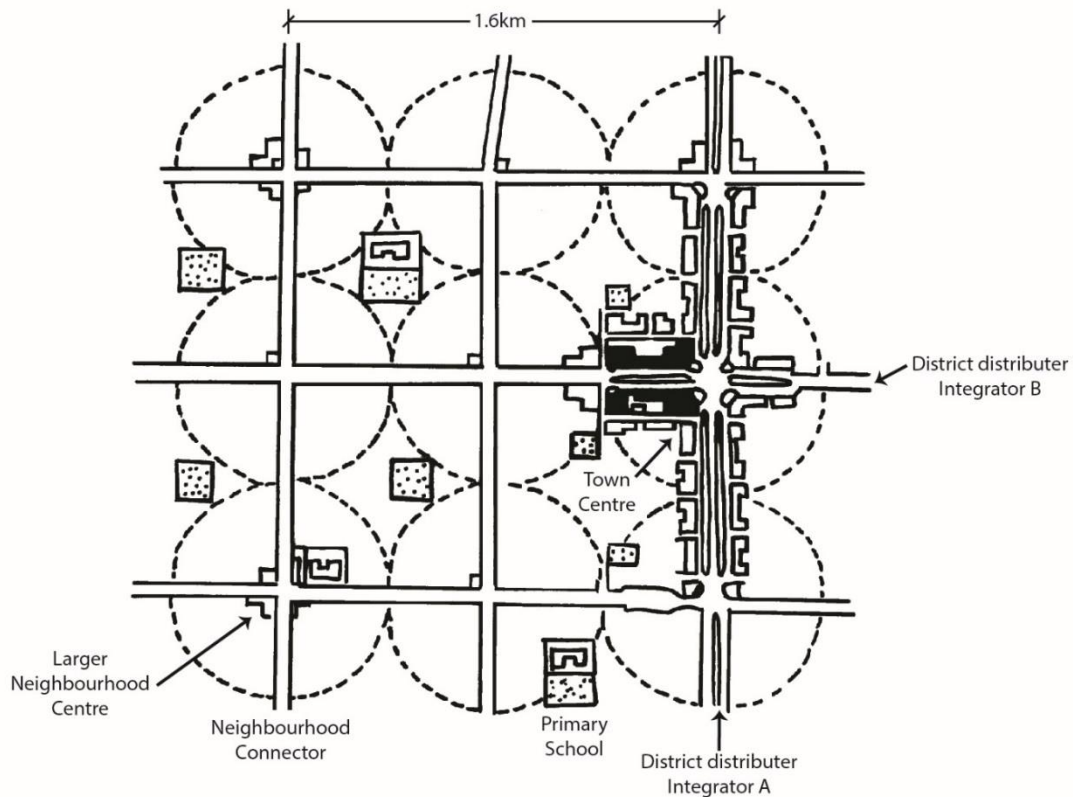


Fig. 4. Application of walkable catchments to an urban structure.

Added to this should be policies relating to greening, speed management zones, or any other specific intervention or management policies. All of which needs wider agreement, and recording / registration in a legally binding framework.

5. CONCLUSIONS

The authors of TRH 26 must be complimented on producing a very thoroughly considered report when considering vehicular access management. The argument presented here suggests that the report misses the mark in assisting local municipal planners, engineers and politicians with the management of the urban and rural road networks. Bear in mind that within South Africa, municipalities are wall to wall, thus covering both urban and rural situations, while the responsibility for the road network is shared by municipalities, the provinces, and national government.

In conclusion, it is suggested there is a confusion between the **functional classification of a road**, and the **roadway access management standard** that is selected for application on any road segment.

6. RECOMMENDATIONS

That we accept the following within the South African context;

- (a) That the basic **five road class functional classification** should continue to hold, and that the predominance of the motor vehicle is seen to diminish with increase in number as illustrated in table 3. With the primary functions of Classes 1 & 2 being vehicular mobility roads, Classes 3 & 4 land-use / transportation integration, and Class 5, minor vehicular access with non-motorised transport mobility domination.

Table 3. Road Class Functional Classification.

Road Category		Function	Access Interval
1(f)	Freeways	High order arterials, for primary or principle vehicular movement roads	Interchange only
1(e)	Expressways (often the forerunner of a freeway)		Basic 800 m I/S interval, no frontage access, & occasional grade separation
2	Primary Arterials		Basic 600 m I/S interval with no frontage access
3	District Distributors / Integrators	District distributors, integrators / activity spine roads & collectors	Varying I/S interval dependent on development environment & related appropriate targeted vehicle operating speed
4	Local Distributors / Integrators, including streets in <u>commercial</u> & <u>industrial</u> areas. (Could be viewed as sub-groups of Class 4)	Local distributors, integrators / activity streets & collectors	Varying I/S interval dependent on development environment & appropriate targeted vehicle operating speed
5	Access Roads & Streets Together with sub-groups	Individual property access streets	Minimal vehicular access controls other than where joining a higher order road

- (b) That prominence be given to the role of the **development environment within which a roadway exists** as illustrated in table 4. The classification adopted by the Western Cape Province represents a good starting point, but should be supplemented by density considerations.

Table 4. Development Environment.

Development Environment	Density Criteria Determination	
Urban	>10 000 m ² GFA / ha	+7 storey buildings
Intermediate	3 000 – 10 000 m ² GFA / ha	3-6 storey buildings
Suburban	1 000 – 3 000 m ² GFA / ha	1-3 storey buildings
Semi-rural	<1 000 m ² GFA / ha	Small holdings
Rural	Farmland or similar	

- (c) That the access rules to be applied to a particular **roadway segment** be reviewed in the context of the road functional classification and corresponding development environment; thereby making a clearer statement as to the function the road segment aims at serving, as distinct from the access standard being applied or recommended.
- (d) That the above be the subject of further discussion.

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