2010: THE NEED TO PROVIDE SAFE AND SECURE NON-MOTORISED TRANSPORTATION INFRASTRUCTURE AND AMENITIES

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ABSTRACT

Two important statements have been made regarding the role of transport as a critical success factor in the 2010 FIFA Soccer World Cup. They are: *Firstly*, quality transportation management is required in the form of safely functioning airports, proper road traffic enforcement measures, and quality public transport at the venue host cities. *Secondly,* host cities must accelerate implementation of concrete improvements in terms of urban public transport infrastructure, vehicles, services and management, and non-motorised transportation (NMT) infrastructure and amenities; travel demand management measures; and airport to city public transport. The purpose of the paper is threefold. *Firstly*, it argues that NMT must receive proper attention as an important component of the transportation system. *Secondly*, it highlights the different aspects that must be considered in providing safe and secure NMT facilities for pedestrians and cyclists at sport stadiums, public transport facilities and other public spaces. *Thirdly*, the paper proposes a methodology that host cities could use to conduct NMT audits at sport stadiums, public transport facilities and other public spaces. The paper conclude that a holistic approach is required with regard to the planning and design of non-motorised infrastructure by host cities; and also, that an effective transportation management system would not be effective unless it includes the provision of safe, secure, comfortable and convenient non-motorised transportation infrastructure at the host city level. The paper also suggests that the promotion of NMT facility usage is an important element not to be neglected by the host cities.

1. NON MOTORISED TRANSPORTATION (NMT) WITHIN THE CONTEXT OF THE 2010 SOCCER WORLD CUP

1.1 Background

The announcement that the 2010 Soccer World Cup will be hosted by South Africa was received with great enthusiasm and it is expected that the event will be to the benefit of various sectors of the economy. The country as a whole will have to cater for the needs of the estimated 3 million foreign World Cup spectators. Various sectors, including the transport sector, have already started to plan for this major event.

It is generally accepted that effective transportation management is considered to be one of the critical, “invisible” success factor to the 2010 World Cup. “To succeed on the world’s stage, South Africa will have to provide safely functioning airports, proper road traffic enforcement measures, quality public transport and non-motorised transport infrastructure at the venue host city level” (1). To this extent, major South African cities will have to accelerate the implementation of the first phases of their integrated transportation plans (ITP’s). The

accelerated transportation plans and projects will ensure the basics of safe, reliable, affordable, and appropriate transport systems.

The cities identified so far that would host soccer events are the following: Johannesburg, City of Cape Town, eThekwini, Nelson Mandela Metro, Mangaung, Rustenburg, Polokwane, Kimberley/Sol Plaatjies, Tshwane Metro, Mbombela/Nelspruit, and Orkney/Klerksdorp.

1.2 Management model for 2010 Soccer World Cup

It is generally accepted in government circles that transportation management for the 2010 World Cup cannot follow the path that other major events hosted by South Africa previously have taken. Transportation management for such events as the World HIV/Aids Conference, the World Summit for Sustainable Development, and the World Cups for various sporting events has been managed under a minimum commitment model. The minimalist approach will not provide mobility for visitors and South Africans to take advantage of the wealth of cultural and entertainment opportunities. It would not enable Black Economic Empowerment (BEE) in a meaningful way, or provide a return on the transport investment for the average South African commuter (1).

In is accepted that only careful provision of quality public transport, non-motorised transportation, integrated transportation management, and special event services will capture the full range of benefits of the 2010 event for South Africa and the large numbers of international guests expected for the events. For example, when the event is over, sport enthusiasts and commuters should still be able to benefit from the NMT infrastructure that was provided in conjunction with public transport amenities, sport stadiums and other public spaces.

1.3 The 2010 Transport Action Agenda

In the 2010 Transport Action Agenda (1), the DOT has identified a set of key activities for each potential venue host city and transport public entity. These activities are not listed as directives from the DOT; they are initial suggestions based on the existing priorities of cities and public entities, existing national mobility policy and the DOT's understanding of the needs of the 2010 events**.**

The Transport Action Agenda is meant to be a starting point for the fine elaboration of detailed Transportation Management Priority Statements at city, provincial and agency levels, as well as World Cup Period Transportation Operational Plans that will be ready by the end of calendar year 2008.

The Transport Action Agenda is thus both a plan for successfully meeting the transportation needs of the 2010 events, and a basis for fine-tuning local and public entity 2010 plans.

2. SCOPE OF PAPER

The purpose of the paper is threefold:

- Firstly, it emphasizes that NMT is an important component of transportation management in South Africa, the latter that is regarded as one of the critical, "invisible" success factors to the 2010 Soccer World Cup.
- Secondly, it highlights the different aspects that must be considered in providing safe and secure NMT facilities for pedestrians and cyclists during the 2010 Soccer World Cup and thereafter. This covers both:
  - Network analysis and planning; and
  - Facility provision and design considerations.

- Thirdly, it proposes methodologies to facilitate the NMT implementation process at sport stadiums, public transport facilities and other public spaces. The promotional aspects of NMT are also covered.

3. NMT AS CRITICAL COMPONENT OF TRANSPORTATION MANAGEMENT IN SOUTH AFRICA

The country's spatial development and town planning practices have left many rural and peri-urban communities in the cold, without any links between them and urban settlements. The current city setting is predominantly designed to meet the needs of private cars with little room to promote the co-existence between the various modes of transportation.

Several government policies and actions plans point to the urgency for a more focused approach to non-motorised transportation in South Africa, both in urban and rural areas. According to the National Household Travel Survey 2003 (2), walking and cycling represent 23 per cent of the modal share, that is, a significant group of commuters who walk to work. The study further indicated that 76 per cent of the learners, including students walk to educational resource centres of which 3 million spend more than an hour walking to and from places of learning. Altogether 53 per cent of the rural population relies on non-motorised transportation to get to essential services and the low-income households are mostly affected. The challenge calls for measures to balance the travel patterns in the provision of government resources.

The Department of Transport is committed to take NMT to the next level in order to address mobility and access challenges facing communities. In his keynote address during a Car-Free Day held at the State Theatre, in Tshwane on 20 October 2005, the Minister of Transport set a target of delivering bicycles. He said *" The Department is committed to proceed with the promotion of NMT (promote the use of bicycles programme) beyond the demonstration phase. One million (1 000 000) bicycles shall be distributed countrywide in a period of ten years"*.

The strategic contributions in achieving the national objectives on NMT are on:

- Improving accessibility and mobility in the poorly serviced transport areas by integrating non-motorised transportation into socio-economic development activities.
- Connecting NMT to dispersed corridors and the priority service areas.
- Halving the poverty levels and creating job opportunities through labour absorbing programmes whilst producing an ecologically sustainable transport network.

However, the requirements to transform the cities, towns and rural areas depend on the following:

- Popularise the vision on NMT and have political ambassadors.
- Demystifying the notion of NMT as a gender issue.
- Eliminate the viewpoints about the use of NMT as a backward development or sometimes seen as a luxury.
- Different and innovative ways to design and re-design our towns and the public space.
- Optimise the travel demand management plans/measures and improve the conditions for pedestrians and cycling.
- Recognise towns as a meeting place and thus promoting a lively, diverse and safe environment for co-existence.

The 2010 Soccer World Cup could serve as a catalyst in creating a greater awareness among local decision makers on the needs of non-motorised transportation users.

4. USER-REQUIREMENTS FOR SAFE AND SECURE NMT FACILITIES AT SPORT STADIUMS AND PUBLIC TRANSPORT FACILITIES

4.1 Introduction

The planning and design of NMT involves two major focal areas. They are: firstly, network analysis and planning, and, secondly, facility provision and design based on the overall analysis of the need for NMT. Network analysis covers a broad assessment of the major pedestrian and potential bicycle movements, desire lines and patterns. Facility provision and design, on the other hand, focuses on the most appropriate NMT facilities to be provided and the various design considerations to be taken into account.

4.2 Network analysis and planning

A number of network analysis methods exist that could be used to analyse potential pedestrian and bicycle networks at sport stadiums, public transport facilities and other public open spaces. Behrens (3) categorises these methods as follows: *infrastructure assessments, user counts, capacity analysis, connectivity analysis and user surveys.*

- *Infrastructure assessments* would normally cover aspects such as pedestrian and bicycle levels of service; walking, cycling and disability infrastructure, infrastructure quality indices, crash mapping, etc.
- *User counts* of existing NMT traffic could be obtained based on various methods of counting, e.g. manual, time lapse video, infrared laser, pneumatic tubes, etc.
- *Capacity analysis* would cover aspects such as walkway level of service and level of service in queuing areas.
- *Connectivity analysis* covers aspects such as pedestrian network connectivity ratios, desktop O-D desire line network comparison, survey based O-D desire line network comparison, plastic space mapping and space syntax.
- *User surveys* consist of personal and household surveys and on-site pedestrian and bicycle surveys.

These network analysis methods could be used to determine possible pedestrian and bicycle networks that could be established for longer-term usage, even beyond the 2010 FIFA Soccer World Cup.

4.3 Facility provision and design considerations

4.3.1 The need for NMT facilities and amenities

Following a proper network analysis that would indicate desire lines and overall travel patterns, a wide range of NMT facilities exists that could be considered at or in close proximity to sports stadiums, public transport facilities leading to sport stadiums and other public spaces. The focus should also be on providing facilities that would also be beneficial to communities after 2010. It will not be able to generalise for all sport stadiums, but it is recommended that the need for NMT facilities should be investigated in an area of at least two-kilometre radius around sport stadiums. With regard to the provision of bicycle ways, a wider study needs to be conducted.

The Pedestrian and Bicycle Facility Guidelines Manual (4) provides detailed guidelines to plan and design safe pedestrian and bicycle facilities. This section will only highlight some of the

pertinent issues to be considered.

NMT facilities to be considered by the host cities at sport stadiums, public transport facilities and other relevant public areas can be classified into the following groups:

- *At-grade midblock pedestrian crossings*. This would include yield controlled or signalised midblock pedestrian crossings across high volume roads as well as the provision of refuge islands across multilane roads that would assist spectators to reach the sports facility safely. The width of these pedestrian crossings should generally not be less than 3 metres.
- Road junctions at sport stadiums also need special attention to accommodate pedestrian and bicycle flows. These junctions should normally be equipped with pedestrian and bicycle signals. Block pedestrian crossing markings (RTM4) could be used on some legs of the intersections to accentuate the crossings.
- *Grade separated crossing facilities*. Footbridges or subways are normally provided at railway stations. Severe peaking normally occurs at these facilities. These facilities should also be considered across multilane roads (major arterials and freeways) at or in the vicinity of sport stadiums. Wherever possible, railway bridges and footbridges across roads should be linked so that pedestrian and cyclists can be channelled from the public transport facilities directly into the sport stadium without having to cross roads at-grade
- *Pedestrian ways*. Sidewalks of adequate width in the vicinity of sport stadiums are essential to ensure that spectators do not have to walk in the carriageway. Walkways within the sport stadiums leading to the playing field should be of adequate width. The Highway Capacity Manual (HCM) (5) recommends that Service Level C should be used for high usage areas alongside roads. Within sport centres where severe peaking occurs, Service Levels D or E should be considered. The HCM's six walkway levels of services are given in Table 1.

Table 1. Walkway levels-of-service (HCM, 2000).

Service level	Space m^2/person	Flow rate (ped/min/m)	Vol/cap. Ratio
A	12.08 or more	0.08 or less	0.08 or less
B	12.07 – 3.72	0.09 – 0.28	0.09 – 0.28
C	3.71 – 2.23	0.29 – 0.40	0.29 – 0.40
D	2.22 – 1.39	0.41 – 0.60	0.41 – 0.60
E	1.38 – 0.56	0.61 – 1.00	0.61 – 1.00
F	0.55 or less	1.01 or more	1.01 or more

- *Bicycles facilities*. Some of the host cities are considering providing bicycle ways to the sports venue. In these cases, spectators will travel with bicycles from townships and other residential areas to sport stadiums and therefore secure bicycle ways also need to be provided. In addition, safe and secure bicycle parking must also be provided at the sport stadiums and along the route if required. The planning and provision of these bicycle ways must consider routes that will benefit commuters in the long run.
- *NMT Amenities*. Various amenities must be considered to supplement NMT facilities. This would include road and pedestrian signing and markings (e.g. regulatory, warning, guidance and information signs) as specified in the SADC and SA Road Traffic Signs Manual (6). Furthermore, amenities such as lighting, pedestrian barriers, speed control measures (e.g. traffic calming and policing) must also be provided where necessary.

- *Persons with special needs*. All NMT facilities (road/rail environment and within sport stadiums) should be accessible for disabled persons, children and elderly people. Various means are available to facilitate access, such as ramps, kerb ramps, audio and tactile devices, hand railings, etc. Street furniture must be positioned in such a way that it does not obstruct the travelled way that would impede on the normal flow of pedestrian and bicycle traffic. Street furniture near road crossing points must be avoided because it could obstruct driver's sight distance with regard to children. Guidelines to enhance the mobility of disabled people are covered comprehensively in the TRL/DFID Overseas Road Note 21 (7).
- *Hawkers and street traders*. This sector will largely benefit from the presence of large volumes of people at sport stadiums and public transport facilities, especially international spectators. They will require prime spots to display their merchandise to the public. Special care, however, has to be taken to provide these traders with accessible sites alongside street and off-street pedestrian and bicycle ways but in such a manner that they do not obstruct the flow of people. Authorities should, however, take note of the restrictions regarding the selling of items in terms of the FIFA Agreement. There will be no-trader zones in the vicinity of the sport stadiums that must be taken into account during the planning phase.

4.3.2 User needs and requirements

The planning and design of NMT infrastructure should focus on the needs of the people that would be using these facilities. Furthermore, NMT facilities should be planned in close conjunction with public transport facilities and car parking areas that would be the feeder lines for NMT. The Pedestrian and Bicycle Facility Guidelines Manual (4) contains a number of considerations that planners should consider in planning safe and secure NMT facilities. These considerations could be classified in three board categories, namely, *security and safety requirements, operational requirements and environmental issues*.

4.3.2.1 Security and safety requirements

The main considerations to cater for are: security, safety, traffic safety and legal requirements.

- *Security* is perhaps the most important need of pedestrians and cyclists and also the users of public transport. Fear of muggers and other criminals is a concern of all passengers, pedestrians and cyclists. The elderly, women, children and the disabled are particularly vulnerable to criminal attacks and other antisocial behaviour. The following situations should be avoided: Routing through areas with high security risks; noisy and polluted environments which cause people not to pay attention to the need of other persons, the provision of subways without open sight lines. For cyclists, bicycle theft is a major concern at parking or storage areas.

  The Manual for Crime Prevention through Planning and Design (8) states that the environment can play a significant role in influencing perceptions of safety. Certain environments can impart a feeling of safety, while others can induce fear, even in areas where levels of crime are not high. In this regard, planning and design measures can be utilized very successfully to enhance feelings of safety in areas where people feel vulnerable. The Manual covers a wide range of design recommendations to plan safe environments including pedestrian-

friendly environments, pedestrian subways, taxi ranks, train stations and other transport interchanges, informal trading, and so on.

- *Safety* is another important issue to consider. Pedestrian and bicycle facilities should be designed and built to be free of safety hazards. These hazards include slippery walkways or walkways that are not level, which may result in persons slipping, tripping, stumbling and falling. Protruding obstacles or road signs, which pedestrians sometimes inadvertently walk into should be avoided. Such obstacles can create severe bodily harm, such as loss of sight because of an object that was located at eye level.

- *Traffic safety* is an important need of pedestrians and cyclists because of their vulnerability. Pedestrians and cyclists should be protected from vehicular traffic, while pedestrians should also be protected from bicycle traffic. The potential conflicts between pedestrians and cyclists who share facilities must be carefully considered during the planning on NMT facilities.

  Traffic safety problems can be expected when pedestrians and cyclists have high levels of contact and exposure to vehicular traffic; where vehicles travel at high speed; where there is inadequate visibility and sight distance; insufficient lighting; and insufficient provision is made for the safety of people with special needs, such as children, the elderly and the physically handicapped.

- *Legal requirements* must be adequately covered. Road traffic signs and markings in South Africa may only be installed and provided in accordance to requirements contained in the National Road Traffic Act and its Regulations (9), as well as the SADC and SA Road Traffic Signs Manual (6). The installation of road signs and markings that do not comply with these requirements can result in road safety problems, which could have serious repercussions for the road authority concerned. The Road Traffic Signs Manual continuously warns authorities about the risk of litigation in the event of an accident resulting from non-compliance to requirements. Many of the international visitors will not be familiar with the traffic rules and regulations of South Africa. Therefore, the NMT component (and all other transport components for that matter) should be as user-friendly as possible to accommodate these people.

4.3.2.2 Operational requirements

The main aspects to be considered are: *accessibility; convenience and comfort*.

- *Accessibility* is an important consideration in the planning and design of NMT facilities. Pedestrian facilities should be accessible to all users, regardless of age or ability. Persons with disabilities have the following needs with regard to public travel ways: larger dimensions to accommodate mobility aids such as crutches, wheelchairs and guide dogs; continuous travel corridors (in three dimensions) along sidewalks, across driveways and roadways; way finding for pedestrians who are blind or who are visually impaired.

- *Convenience* is another issue to be considered. The following aspects are particularly important:

  - Pedestrians and cyclists desire quick, direct and convenient routes to chosen destinations. Detours and delays will deter use of the facilities;

- Pedestrian and cycling infrastructure should form a coherent unit that links origins and destinations. Routes should be continuous and be of a consistent standard – there should be no gaps in a route. Connectivity of destinations is very important;

- People should easily find routes to their destinations – route signing and guidance to sport stadiums, especially for international visitors;

- Pedestrian and bicycle facilities should be integrated with other transportation systems. Adequate parking and storage space should be provided for bicycles at sport stadiums where they will be secure from theft and vandalism.

- *Comfort* in the usage of pedestrian and cyclist facilities is another important consideration.

  - Topography affects both pedestrian and cyclist and may have a considerable effect on route selection. Grades more than 5 per cent are undesirable, especially if they are fairly long. Preference should be given to gentle road gradients.

  - The pavement should be fairly smooth and well maintained, without potholes and other undulations, which make it difficult for pedestrians, cyclists and wheelchairs to use.

  - Walk and bicycle ways should be properly cleaned and not covered by debris, dirt, leaves and other loose matter which can be hazardous for both pedestrians and cyclists.

- *Environmental needs*

  Pedestrians and cyclists prefer environments that are attractive to use. An interesting, attractive, clean and noise-free environment should be provided on the route to and at sport stadiums. This environment should be supplemented with amenities such as shelters, ablution facilities, lighting, and so on.

5. METHODOLOGIES TO FACILITATE THE NMT IMPLEMENTATION PROCESS AT SPORT STADIUMS AND OTHER PUBLIC SPACES

5.1 Introduction

The Pedestrian and Bicycle Facility Guidelines Manual (4), the SADC and SA Road Traffic Signs Manual (6) and the South African Road Safety Manual (10) describe methodologies that could be used to ensure that NMT is properly considered during the construction of new or the upgrading of existing sport venues.

Furthermore, the local road and traffic conditions prevailing in each host city, for example the category of roads in close proximity to the sport stadium, location of the stadiums in relation to public transport facilities such as railway stations, bus and taxi routes, etc. will dictate what kind of NMT facilities would be required. Of importance, however, is the fact that there should be uniformity and consistency in the provision of each type of facility at all host city venues throughout the country. It will therefore be important for all host cities to apply the standards and guidelines as contained in the abovementioned resources.

5.2 Road safety audits

It is recommended that all host cities should undertake road safety audits in the case where existing sport stadiums will be upgraded or new stadiums will be constructed; for public transport facilities linked to these stadiums and all other relevant public spaces. The South African Road Safety Manual (10) defines a road safety audit as "*the formal examination of a future or existing road or traffic project or any project where interaction with road users takes place, in which an independent, qualified examination team reports on the accident potential and safety performance of the project".*

Road safety audits are undertaken independent of the project design team to ensure all relevant safety requirements are built into the design. The road safety audit team normally consists of people with experience in road safety engineering principles and practices, accident investigation and prevention, traffic engineering and road design. Members with experience in traffic law enforcement, road maintenance and human factors also form a vital part of the team.

5.3 Road safety audit checklists

The South African Road Safety Manual (10) contains road safety audit checklists, which host cities should use to ensure that safe and secure NMT facilities will be provided at existing, upgraded or new sport stadiums, public transport facilities and other public spaces. Some of the more pertinent questions contained in the checklists are the following:

- Are there any pedestrian desire lines requiring that provision should be made for pedestrians?
- Was consideration given to the needs of cyclists?
- Are pedestrians guided or prevented from crossing the road at dangerous locations?
- Is there a need for pedestrian refuge islands and are they wide enough to ensure safety?
- Is there a need for pedestrian crossings? Are pedestrian crossings provided along desire lines?
- Has sufficient measures been provided to ensure that pedestrians do not walk in the roadway?
- Is there a need for bicycle lanes, or can shared pedestrian-cycle facilities be provided?
- It the expected operational speed appropriate for the pedestrian facilities that are provided?
- Has the need for the special provision of facilities for vulnerable road users such as the disabled, children and the elderly been catered for?
- Was special consideration given to the provision of adequate sight distances at pedestrian crossings? Is the sight distance adequate for both day and night sports events?
- Is lighting levels within the road environment and sport stadium adequate to ensure safety and security?
- Are pedestrians considered in the traffic signal phasing?

6. PROMOTION OF NMT FACILITIES

De Langen and Tembele (11) point to the fact that in cities without an established cycling culture, the construction of a network of separated bicycle tracks has a high chance of resulting in failure. The provision of cycling facilities does not mean that there will immediately be a high volume of cyclists using it. This emphasizes the need for careful planning and promotion of a cycling culture.

In their publication “Productive and Liveable Cities – Guidelines for Pedestrian and Bicycle Traffic in African Cities” – Part IV, De Langen and Tembele (11) comprehensively cover user participation in municipal programmes to improve mobility.

It is therefore important that municipal authorities that will be incorporating bicycle ways into their designs for the 2010 Soccer World Cup and with the aim of longer term usage by communities, will have to take due cognisance of this fact. Pedestrian and cycling routes around stadiums should be promoted through “Pedestrian and Cycling Plans” which indicate the routes, parking facilities and other amenities to guide potential users of the system.

7. CONCLUSIONS

An effective transportation management system is considered to be one of the critical, “invisible” success factors to the 2010 World Cup. Such a system, however, would not be effective unless it includes the provision of safe, secure, comfortable and convenient non-motorised transportation infrastructure at the venue host city level. Consultants dealing with this aspect will have to manage a wide range of considerations as high lighted in this paper and more comprehensively covered in the relevant guideline manuals as listed.

A holistic approach is required with regard to the planning and design of non-motorised transportation infrastructure. It must be planned and designed in relation to the different transport modes involved, e.g. rail, bus, taxi, but also including the private vehicle mode. Furthermore, walkways and other facilities within the sport stadiums should comply with acceptable levels of service, bicycle locking facilities and the like.

The promotion of NMT usage is an important element not to be neglected and is seen as an integral part in the provision of NMT facilities. Pedestrian and cycling routes around stadiums should be promoted through “Pedestrian and Cycling Plans” which indicate the routes, parking facilities and other amenities to guide potential users of the system.

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