IS THERE ROOM FOR INNOVATION IN THE
SA ROAD TRAFFIC SIGNS MANUAL?

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SUMMARY

The third edition of the SA Road Traffic Signs Manual (SARTSM) has been in use since 1993. It constitutes a complete technical revision of the Manual in use earlier and provides guidelines for most situations to be encountered in the road signage environment. Due to the extensive expansion and upgrading of the facilities at the Johannesburg International Airport (JIA) and in particular the construction of the multi-storey parkade, changes had been made to the distribution roads within the Airport precinct. Road signage issues represented a large portion of the complaints received by Airport management in the past. The changes to the road system presented the opportunity to reconsider the way in which motorist guidance was given.

JIA is an exceedingly large trip generator. At the moment, it is estimated that these trips amount to more than 30000 vehicles daily. The planning for the airport is being done for some 20 million PAX annually by the year 2010. This would result in at least 50000 vehicle trips daily. Due to the extremely congested landside area the task of the motorist is equally difficult, especially so for the non-regular visitor to JIA. The brief given to Africon was to develop a signage system that would be user-friendlier and fit the proposed new usage pattern of the facilities available to the motorist.

The signage plan provided for the motorist to be led through a number of successive decisions to reach his destination.

Guidance towards available parking has been achieved through the linking of variable message signs (both rotating vane and LED display types) to a parking management system implemented in all the parking areas, thus providing dynamically changing information. Other frequently used or future facilities were included in the signage plan in such a way that the most logical routes to reach them were identified. This took cognisance of the need to balance the usage of the two approach roads (also in terms of road signage utilization) as far as possible.

This signage plan had been developed against the background of the guidelines contained in SARTSM. A number of principles in SARTSM were utilised in an unconventional way. Differently coloured background insert panels were used to provide a means whereby different routes could be colour-coded, for example. The colours so used are also not regular road signage colours, but were chosen to partly co-incide with a colour convention that has been utilised within the terminal buildings for some time already. With the co-operation of the signage manufacturer, it was even possible to provide these non-traditional colours in fully retro-reflective sheeting, thus ensuring that the signs look the same by night as by day.

It is concluded that the signage plan was successfully implemented in a very complicated environment, because it adhered strictly to certain important principles whilst it interpreted the SARTSM in an innovative way where possible.

1. INTRODUCTION

All road traffic sign systems acknowledge certain basic requirements for these systems to be successful. These basic requirements are conformity, accuracy, continuity, consistency and uniformity.

In South Africa the basis for all road signage is the SA Road Traffic Signs Manual (SARTSM). Sometimes the designer will be faced with a project that requires considerable skill in the application of these principles to ensure that the motorist can be properly guided.

This paper describes work that had been done at the Johannesburg International Airport (JIA), where a great deal of skill and innovation was applied to revise the road traffic sign system to improve motorist guidance within a very complex driving environment.

2. JOHANNESBURG INTERNATIONAL AIRPORT (JIA)

JIA is situated right on the systems interchange between the route R21 and route R24 freeways and forms the eastern terminal destination of the R24 freeway. JIA is an exceedingly large trip generator. Currently these trips are estimated to exceed 30 000 vehicle trips per day. The planning for the airport is being done on a basis of 20 million PAX (passenger movements) by the year 2010. It is estimated that such a level of activity would generate some 50 000 vehicle trips daily.

Because of the position of the airport relative to the interchange, the landside area between the interchange and the terminal facilities is extremely congested and most geometric standards already very tight. All motorist related facilities on the landside are reached from one of two main approach roadways. The lower roadway serves all the parking facilities west of the terminal building, but may also be used to reach the passenger drop-off area intended for domestic departures. The upper roadway serves the international passenger drop-off area situated on a viaduct immediately in front of the international departure terminals. A connecting roadway allows motorists to change from upper to lower roadway close to the terminal buildings.

All of these roadways and motorist movements take place in a very short length of approach. This makes the drivers' task very difficult, especially for those drivers not familiar with the layout of the airport or the routes that they have to take.

The road sign designer faces a daunting task in providing the motorist timeously with sufficient information to make the necessary decisions. His task is further compounded by the curvilinear alignment of the routes, making line of sight towards road traffic signs often confusing. It was therefore no surprise that airport management regularly received road sign related complaints.

The construction of the first multi storey parkade (MSP) on the airport (4000 parking bays) required the relocation of a section of the lower roadway. The lower roadway would also serve the MSP and facilities like car rental and would've required numerous changes to the road traffic guidance signs on the airport. These changes therefore offered an opportune time to reconsider the whole signage system on the airport.

Africon Engineering International was briefed to develop a road signage system for the airport that would be user-friendlier and would fit current facilities and proposed new developments for the foreseeable future.

3. ROAD SIGNAGE PLAN

3.1   SA Road Traffic Signs Manual (SARTSM)

The current edition of SARTSM (3rd edition) has now been in use since 1993. At that time SARTSM was completely revised and re-written. This edition contains extensive guidelines for use in the road signage environment. Because of the multi-lingual South African society, SARTSM widely uses colour and symbols to indicate particular types of signs. Numerous practical examples of signage issues are contained in Volume Two of SARTSM (which unfortunately has not been officially made available yet).

One of the sign types developed after 1993 and described in the drafts of Volume Two of SARTSM, is that of local destination signs – having a distinct white background and black text.

The consultants recognised the need to adhere to the guidelines set in SARTSM as far as possible – ensuring that the basic signage principles are not violated and greater confusion introduced in the complex roadway situation.

3.2   Proposed road signage plan
3.2.1   Methodology

All the facilities on the airport to which motorists have access to were identified. It became clear that there is a basic choice available to the motorist – he either stays in or with his car or he leaves his car for a period of time. Most of the facilities where the driver and his car are separated from each other were primarily accessible from the lower roadway. Areas where the driver is involved with drive-through actions where he remains with his car were primarily accessible from the upper roadway. Alternatively it could be routed along the upper roadway up to a point and then deviated towards the lower roadway, if required. This suggested that all parking related activities be routed along the lower roadway and passenger drop-off along the upper roadway. During the same period of time airport management also decided to reconfigure the upper roadway so that all passenger drop-off could take place on the upper roadway in future.

This line of reasoning was continued in order to suggest that the decisions that the motorist have to make on entrance into the airport precinct would follow a hierarchical pattern of successive choices. It was postulated that an optimal solution could be found if no more than two options were given to the motorist to select from at any time. The primary decision hierarchy that the motorist was therefore presented with, was:

- Passenger drop-off of Parking?
- If parking, which of the <u>international</u> or <u>domestic</u> terminals was the eventual destination? and
- What was the level of comfort which the motorist required from his parking; parking situated close to the terminals in a parking garage (designated Parkade) or situated more remotely under shade netting or similar <u>carports</u>.

Other destinations were considered to be of a more secondary nature and included:

- Valet service vehicle drop-off
- Access to the future on-site hotel
- Car rental returns
- Access to the cargo facilities
- A recirculation route
- The Skystop fuel station and facilities
- Parking facilities for the disabled motorist
- Public transport areas
- VIP parking

It was reasoned that the latter two categories of vehicles required special permits. Drivers of such vehicles were therefore expected to be knowledgeable of the situation on the airport and would not require special advance warning towards their destinations.

Because of all the parking spaces that are available on the airport, and especially because they are situated in so many different parking areas, it was essential to introduce a parking management system. One of the functions of the system is to advise the motorist where parking spaces are available. This information has to be communicated to the motorist on his approach to the different parking areas, as the non-availability of parking in a particular parking area would influence the motorist's decision pattern.

The next challenge presenting itself was how to translate this signage philosophy into actual road signs.

3.2.2 Proposed road signs

SARTSM was scrutinised to establish how the proposed signage philosophy could be indicated on traffic signs conforming with SARTSM as far as possible and to identify the means to integrate the parking management information on the signs.

The following system was eventually decided upon and implemented:

(a)   Johannesburg International Airport

The need was felt to indicate to motorists that they have entered the JIA environment. Location panels have traditionally been installed on the freeway signs at the entrance to the airport.

Once beyond these entrances all signs are basically within the airport precinct. To indicate this change to the motorist all signs are shown as *local destination signs* – i.e. signs having a white background and blue reflective border. As a general rule, all text on the white backgrounds was specified as blue reflective. This deviates from SARTSM where black is specified. Black text is non-reflective and subject to a degree of overglow when seen against a reflective background. The use of reflective blue text (which still is a dark colour) reduces this overglow effect and was implemented.

(b)   Primary and secondary information

The signage philosophy identified Parking and passenger Drop-off as the primary information, whilst other destinations were considered of secondary importance.

To distinguish between these primary and secondary information on the signs, different letter sizes were used. This resulted in the primary information on the sign being legible from farther away.

The deliberate use of different letter sizes to distinguish between different items of information as used here, is not a regular practice covered by SARTSM.

(c)   Use of coloured insert panels

SARTSM describes the use of differently coloured insert panels on signs to designate specific types of destinations on guidance signs. This principle is normally applied to show insert panels with a brown background to designate tourism destinations, white insert panels to display street names or blue insert panels to accommodate trailblazing towards freeways.

This principle was adopted as a way to colour code the routes towards the primary destinations on the airport:

A bright orange insert panel was introduced as the background for all destination information leading to the passenger drop-off area on the airport. This orange insert panel was introduced as early as possible on signs to split the vehicle stream on entrance already.

The two primary parking destinations (international and domestic) posed a further complication. It was eventually decided to introduce differently coloured insert panels for each. These colours were chosen to co-incide with a corporate colour convention that the Airports Company adopted during 1997. The insert panels for parking information pertaining to international flights were coloured *turquoise* and for domestic flights coloured *magenta*.

Understanding this principle it will be easy for motorists to follow the orange line, turquoise line or magenta line towards their primary destinations.

(d)   Secondary destinations

Due to the number of possible destinations that need to be served by the lower roadway, the signface layout became extremely crowded. In complete contrast to this, the signface layouts for signs on the upper roadway, were very simple.

Two facilities that would normally be accessed from the lower roadway, might equally well be reached via the upper roadway utilising the upper / lower roadway link close to the terminal building. These are the valet parking facility in the ground floor of the MSP and the airport administration building that will be refurbished as an on-site hotel.

Signposting these destinations along the orange line ensured a more equitable distribution of guidance information on the different signs. Redirecting the traffic to these facilities via the orange line has the additional advantage that motorists towards higher class service facilities on the airport are taken on to a less congested roadway further enhancing the quality of service offered by JIA.

(e)   Parking management information

The parking management system introduced on JIA keeps track of the total number of vehicles on each level of all the parking areas. This information can be utilised to advise the motorist of the availability or not of parking space in any particular location.

Because of the extreme tight geometry on entering the airport precinct it was decided not to provide all this information on a central road sign, but rather to introduce more limited but simpler information on the guidance signs. An algorithm had been developed whereby aspects like the hunting time for available parking, the walking time to the terminal building, waiting time for lifts, etc, were incorporated. This information is utilised to determine the optimum parking level of the MSP to guide motorists to. In other parking areas information on the total available parking spaces is used for guiding the motorist.

This information is dynamically changing and can only be relayed to the motorist via variable message signs. A total of nineteen rotating prism variable message signs were incorporated in overhead guidance signs on the lower roadway approaches to the different parking areas. These rotating prism signs were covered to normally display the same colour background sheeting as the rest of the sign at that position. When a particular parking area is closed the prism rotates to clearly display a red face with white text advising the motorist.

At the entrances to each level of the MSP, the existing basement parking areas and two open air parking areas, additional LED variable message signs were installed to advise the motorist of availability at that particular location. All of these variable message signs are being software-controlled to automate the guidance given to the motorist and to limit unnecessary manual intervention as far as possible.

(f)   Road signage materials used

In an area as complex as JIA, it is our belief that signs ought to look the same by night as by day. This can either be achieved through external lighting or by using fully reflective signs. The latter option was selected.

The use of insert panels with colours foreign to normal road signs presented some problems. This had been solved when the reflective sheeting manufacturer mixed special transparent process colours matching the turquoise and magenta colour specifications. These were then silk-screened on to reflective sheeting using a flood coating process.

(g)   Parking for the physically disabled

A large number of parking bays on the first level of the MSP is reserved for the physically disabled.

The consultants introduced the standard wheelchair symbol on all the signs leading towards the MSP to advise such motorists of the facility specially provided for them and to guide them on which lanes to be used.

This again, is an aspect not addressed in this way in SARTSM.

4. CONCLUSION

Johannesburg International Airport is an area that presents numerous challenges to the driver, especially for someone not familiar with its layout. It also challenges the road sign designer to prepare signs in such a way that the average driver does not cry out in despair. Although the SA Road Traffic Signs Manual goes a long way in providing the road sign designer with the necessary tools to guide the motorist within JIA, certain special tools are required to do this successfully.

The revised signage on JIA has been fully implemented at the beginning of December 1999. If the number of complaints by motorists received subsequently is seen as the measure of effectiveness of the signage, then the implemented signage system is a roaring success.

It is our belief that this success was made possible through the consultant's thorough understanding of the needs of the motorist within the airport precinct and their grasp of signage principles; the adherence to the really important ones and an innovative interpretation of the SARTSM to address special needs.

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He was intimately involved in the technical revision of the 3rd edition of the South African Road Traffic Signs Manual and has been responsible for the drafting of road traffic signs policies and procurement contracts for certain South African Provincial road authorities. He has extensive experience of the design, manufacturing and maintenance of road traffic signs for all different types of applications. He served on a number of technical committees of the South African Bureau of Standards tasked with retro-reflection in general and the formulation of specifications for road studs and road signs in particular.

His active involvement in road safety included various road traffic safety and operational reviews as well as formal road safety audit training. He also gave specialist advice on aspects contained in the recently prepared draft South African Road Safety Manual.