

**TRANSFORMATION OF THE RAIL COMMUTER
SERVICE IN SOUTH AFRICA - THE NEEDS OF
COMMUTERS**

Dr H S Joubert
African Consulting Engineers Inc

Mr A Veldsman
Senior Manager, Metro Rail Services (Capital Investments)

Mr L H du Toit
Propenta (Pty) Ltd

ABSTRACT

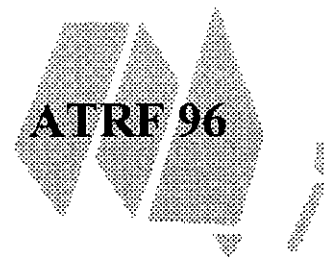
The paper describes the transformation of the rail commuter service in South Africa following the constitutional transformation in the country, as well as investigations into the needs of commuters and procedures to take these needs into consideration during the planning and design of stations.

The paper describes the institutional framework of rail transport and the extent of rail commuter services, commuter characteristics (modal split, trends, station utilisation, age, etc) and perceptions regarding the rail service is described.

A document on Norms, Guidelines and Standards for station design is discussed and illustrated in the paper. The document was developed to integrate, standardise and accelerate the planning and feasibility studies and approval of the design of station projects and is used in the contracting, project management and execution of projects. The paper describes the goals of the NGS, the planning and design process and application of the NGS document for various aspects of station design and implementation of projects

Contact Author

Dr H S Joubert
African Consulting Engineers Inc
P O Box 35007
Menlo Park 0102
Republic of South Africa
Tel: + 27 12 348 5880
Fax: + 27 12 348 5878
e-mail: accepta@cis.co.za



TRANSFORMATION OF THE RAIL COMMUTER SERVICE IN SOUTH AFRICA - THE NEEDS OF COMMUTERS

Dr H S Joubert PhD PrEng : African Consulting Engineers Inc

Mr A Veldsman : Senior Manager, Metro Rail Services (Capital Investments)

Mr L H du Toit : Propenta (Pty) Ltd

INTRODUCTION

The objective of this paper is to discuss the transformation of the rail commuter service in South Africa following the constitutional transformation in the country and how the needs of commuters have been taken into consideration. The paper describes the organisations involved in the provision of the rail commuter service, the goals of the transformation process, results of investigations into trip characteristics and needs of commuters, as well as the norms guidelines and standards applied in station design to cater for the needs of commuters.

ORGANISATIONAL FRAMEWORK

The South African Rail Commuter Corporation (SARCC) is a State corporation, established in April 1990, to provide rail commuter services to the people of South Africa.

Founded as a commercial body in terms of the Legal Succession to the South African Transport Services Act, 1989, the Corporation's business is "to ensure that, at the request of the Department of Transport or any local government body designated as a transport authority, rail commuter services are provided within, to and from the Republic in the public interest".

An 11-member Board of Control consisting of representatives of the private and public sectors, oversees the Corporation's activities.

The SARCC is structured as a group head office with two operational functions:

- Metro Rail Services

Presently operated under contract with Spoornet with a total number of 10 656 employees.

- Intersite Property Management Services

A wholly-owned subsidiary of the Corporation. Total number of 75 employees.

Metro's core business is to provide rail services that meet the country's need for affordable public transport. Each day 2 475 trains carry about 1,1 million people to and from the major centres of Johannesburg, Pretoria, Cape Town, Durban, Port Elizabeth and East London.

Intersite's objective is to manage and develop the R2 billion property portfolio in and around the 374 commuter stations and rail corridors.

The decade prior to the election of the new democratic government (April 1994) was marked by non-investment of the old South African Transport Services, in the suburban rail services (as part of their commercialising process). Also political violence, a spirit of non-payment for services of the black communities, vandalism, theft etc. caused a severe degradation of stations, rolling stock and infrastructure.

Since its inception in 1990, the Corporation has been moving from a phase when the priority was simply to provide affordable mobility and the basic restoration and protection of its assets, to an era where the emphasis will be on quality of service with better cost recovery.

The politically motivated violence is now something of the past. But a new challenge has arisen - ordinary criminality, vandalism and fare evasion. This is a worrying trend which the Corporation is determined to combat vigorously in collaboration with community structures.

OBJECTIVES OF THE RAIL SERVICE TRANSFORMATION

A major priority of SARCC is to promote modal integration as the single most important policy option for public transport. Another of the strategic objectives of the SARCC is to curb fare evasion (25 % average) to an acceptable level (< 15 %).

For this purpose the highest density corridors within each Metro Region were selected to provide over a period of 5 years, cost-effective access/exit control systems, station perimeter fencing and minimum station service levels. The following corridors were selected.

Table 1 : Rail Commuter Corridors identified for upgrading

Metro Rail Service	Corridor	Number of Stations	Estimated Total Cost R Million
Cape Town	Khayelitsha and Kapteinsklip to Cape Town	18	72
Durban	Umlazi to Durban and KwaMashu to Durban	14 7	84
Pretoria	Mabopane to Pretoria Greenview to Pretoria	18 14	72 56
Witwatersrand	Houtheuwel, Johannesburg, George, Goch, Kaserne West Naledi - Westgate/Faraday	30 13	120 52
TOTAL			456

The station, its environment and internal operations are considered to be the most important elements in promoting intermodal integration.

Due to high influx of people to the metropolitan areas, new stations have to be provided on the existing network. Not only station capacity, but also train and infrastructure capacity need to be increased.

Further more, requests are received from metropolitan authorities to extend the services to cater for new markets in areas of rapid urbanisation.

Another of the strategic objectives for the nineties is to increase the commuter numbers and so improve our cost recovery. We know that next to safety and affordability, one quality above all is vital if the Rail Commuter Corporation is to succeed, namely excellent customer care.

Top quality service, cleaner trains and better facilities all round are part of the "contract" with the commuters. And Metro is working to see that this happens - through training and a multimillion rand upgrading of the stations, infrastructure and rolling stock, which has already begun. The trend in passenger journeys for the period 1980 to 1996 is illustrated in Figure 1. The figure shows a steady decline during the decade prior to 1992 which was characterised by violence on trains and the emergence of the minibus taxi industry. During the past three years, a promising increase in passenger numbers has been experienced.

COMMUTER TRAVEL CHARACTERISTICS

The modal split for the major four metropolitan areas served by Metro Rail in South Africa is summarized in Table 2 (1993 values).

Table 2 : Modal split (Percentage)

Mode	Johannesburg	Durban	Cape Town	Pretoria
Train	18	4	56	36
Bus	19	41	17	13
Minibus taxi	49	44	17	29
Car	6	7	5	13
Walk	7	4	4	9
Other	1	0	1	0
TOTAL	100	100	100	100

The commuter rail service is almost exclusively a home-work service and passenger movements are concentrated during peak periods with extremely low off-peak demand.

Figure 1: Trend in Passenger journeys

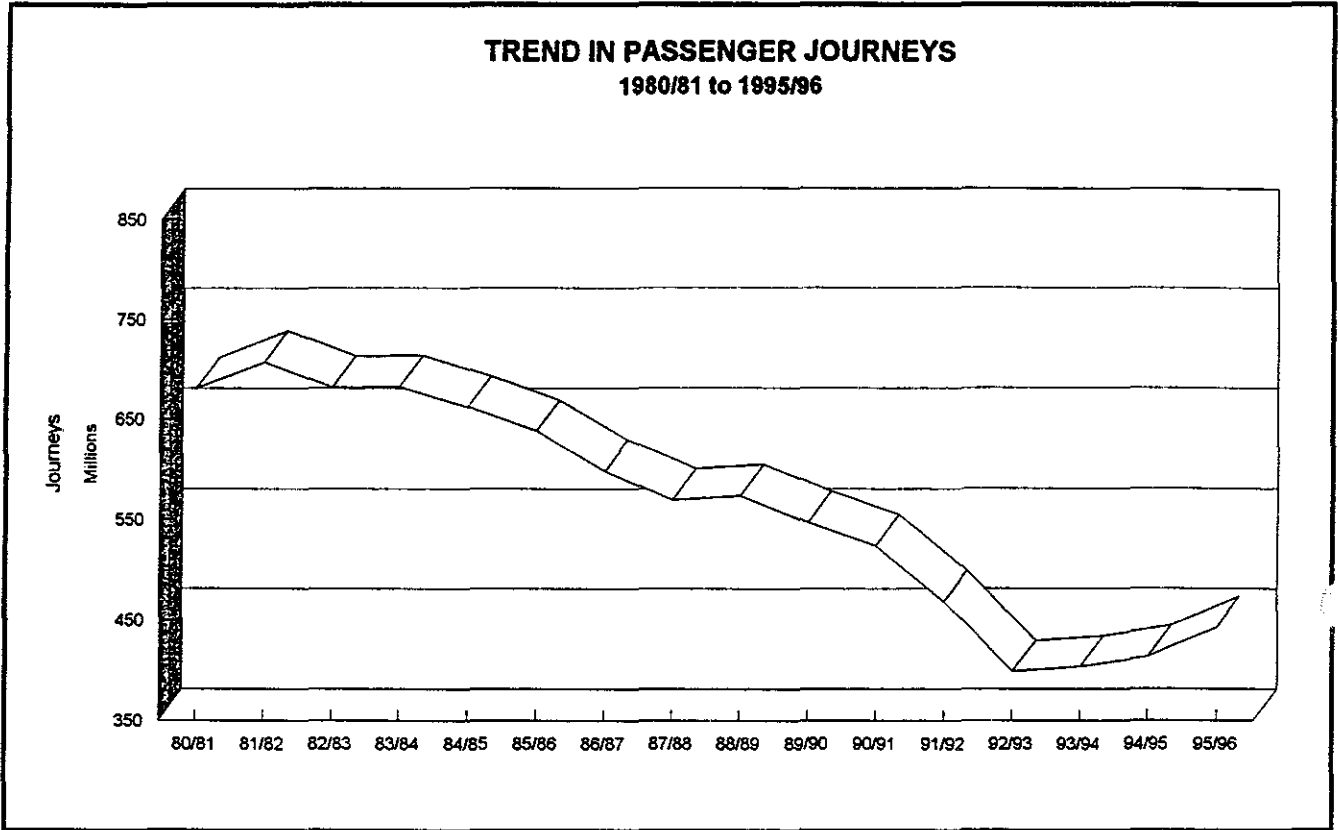
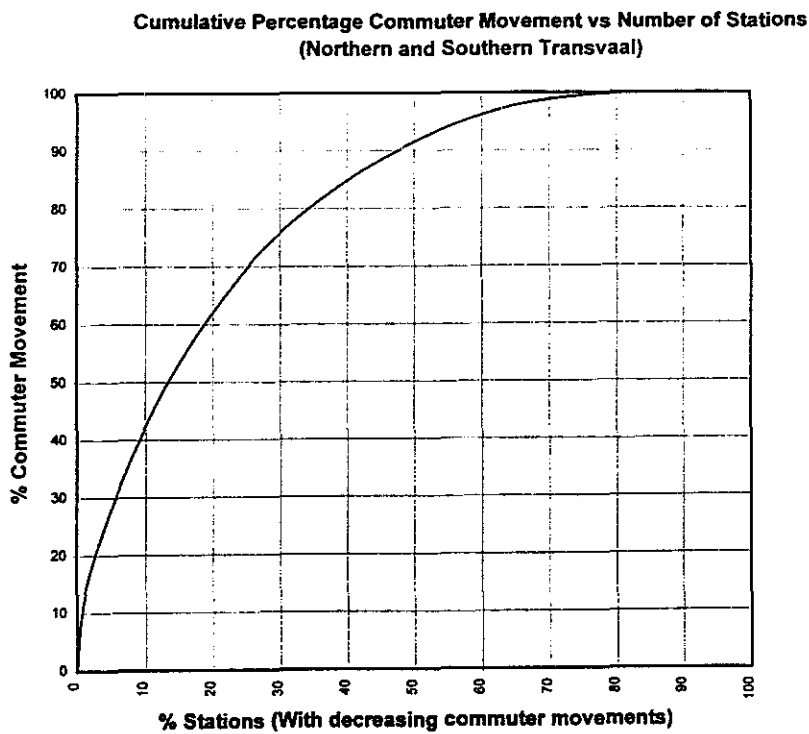


Figure 2: Commuter activity at station



PROFILE OF TRAIN USES

A number of characteristics of rail commuters have been observed in the major metropolitan areas. The frequency of use is shown in Table 3 which indicates a predominance of regular users.

Table 3 : Frequency (Percentage)

Description	Percentage
Daily	36
4 - 5 times/week	45
2 - 3 times/week	14
Less frequently	5
TOTAL	100

The gender split of rail commuters is 64 percent male and 36 percent female. The age distribution is given in Table 4.

Table 4 : Age distribution (Percentage)

Description	Percentage
16 - 25	8
25 - 34	35
35 - 49	45
50 +	12

STATION TYPES

Stations within the metropolitan areas can be classified into five types, according to the land use served by the station, namely residential, central business district, industrial areas, decentralised employment centres and transfer stations. The percentage of passenger movements at the various categories in the Pretoria area is given in Table 5.

Table 5 : Passenger movement at various station categories

Description	Percentage
Residential	25
CBD	24
Industrial	31
Decentralised employment	13
Transfer	7

It is interesting to note that a number of large stations serve a very high percentage of passenger movements, whereas a large number of small stations contribute very little to the total number of passengers served. A normalised curve of cumulative passenger movements versus the percentage of stations is shown in Figure 2. Less than 15 percent of stations serve half the passenger movements, while the 50 percent stations with the lowest passenger numbers serve less than 10 percent of all passenger movements. This illustrates the potential to improve the service to a high percentage of commuters by attending to a relatively limited number of stations.

NEEDS OF COMMUTERS

Market research studies and attitude surveys were undertaken to establish wants and needs of commuters (Market Support Associates, Markinor Black Metro Syndicate). These studies established the following main reasons why people do not use trains:

- No trains in area : 23 %
- Stations too far : 21 %
- Violence on trains : 7 %
- Trains too slow : 6 %

Other main reasons determining potential commuters from using the train are:

- Robbery and crime : 13 %
- Too crowded : 7 %
- No punctual : 5 %

- Too dirty : 5 %
- Intimidation : 5 %

The major reasons for selecting the rail node are:

- Low cost : 56 %
- Convenience : 18 %
- Proximity to destination : 21 %
- No alternative : 13 %
- Safety : 5 %

An analysis of the needs of commuters in respect of convenience, comfort, safety and security, indicated two primary focus areas, namely:

- Train upgrade and service performance
- Cleanliness/comfort standards at stations

A qualitative assessment of commuter attitudes indicated the following most important issues:

- Cleanliness standard : 26 %
(Toilets, buildings)
- Station facilities upgrade : 26 %
(Hawkers, shops, ticket office location)
- Coach/train upgrade : 22 %
- Security facilities : 13 %
- Commuter comfort : 7 %
- Commuter liaison : 7 %
(Information, customer support, public address system)

NORMS, GUIDELINES AND STANDARDS FOR STATION DESIGN

(a) Background

The Metro Commuter Station and Surrounding Intermodal Facilities form an integral part of the infrastructure supporting the rail commuting service. It accommodates the integration of all functional and physical elements necessary for transferring the rail commuter from arriving at the station to departure by train, or from arrival by train until he exits from the station.

Metro operates by means of its five regional networks (Wits, Cape Town, Pretoria, Durban and Port Elizabeth/East London) including 340 rail commuting stations. It is currently in the process of planning the development of new stations in the upgrading, rehabilitation or expansion of existing stations, as well as the implementation of upgraded or new systems (PA-system, CCTV, Perimeter Protection, Access Control etc). Metro is also responsible for the cost-effective operation of all rail commuter stations in the five Metro Regional Networks.

In order to integrate, standardise and accelerate the planning and feasibility studies and approval of detail design of these projects, it was decided to establish Norms, Guidelines and Standards (NGS) to be used in the contracting, project management and execution of such projects.

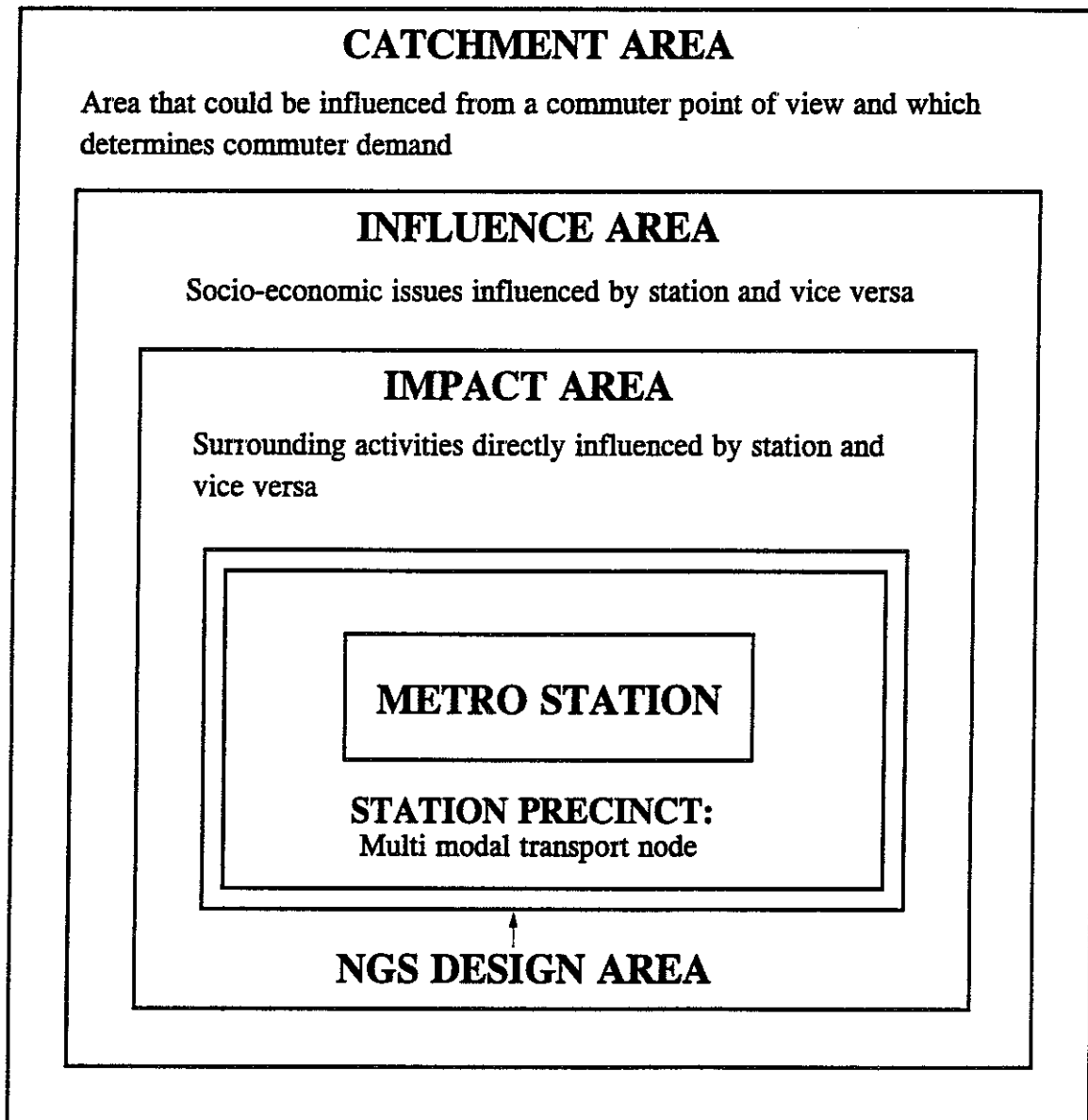
(b) Goal of the NGS

The objective of the NGS is to ensure a station concept that would maximise the Metro business "profit" equation. It is however appreciated that this process can only be effective if the needs of commuters are specifically taken into consideration and if station elements are designed to serve future demand. The definition of the Station Environment for application of the NGS is illustrated in Figure 3.

Specific objectives of the NGS document are the following:

- To integrate line concept design with individual station concept designs

Figure 3 Station Environment Definition



- To establish uniform station planning process
- To establish standards for station design
- To explain the Metro station acquisition principles and environment to all stakeholders in the process.

(c) Planning and Design process

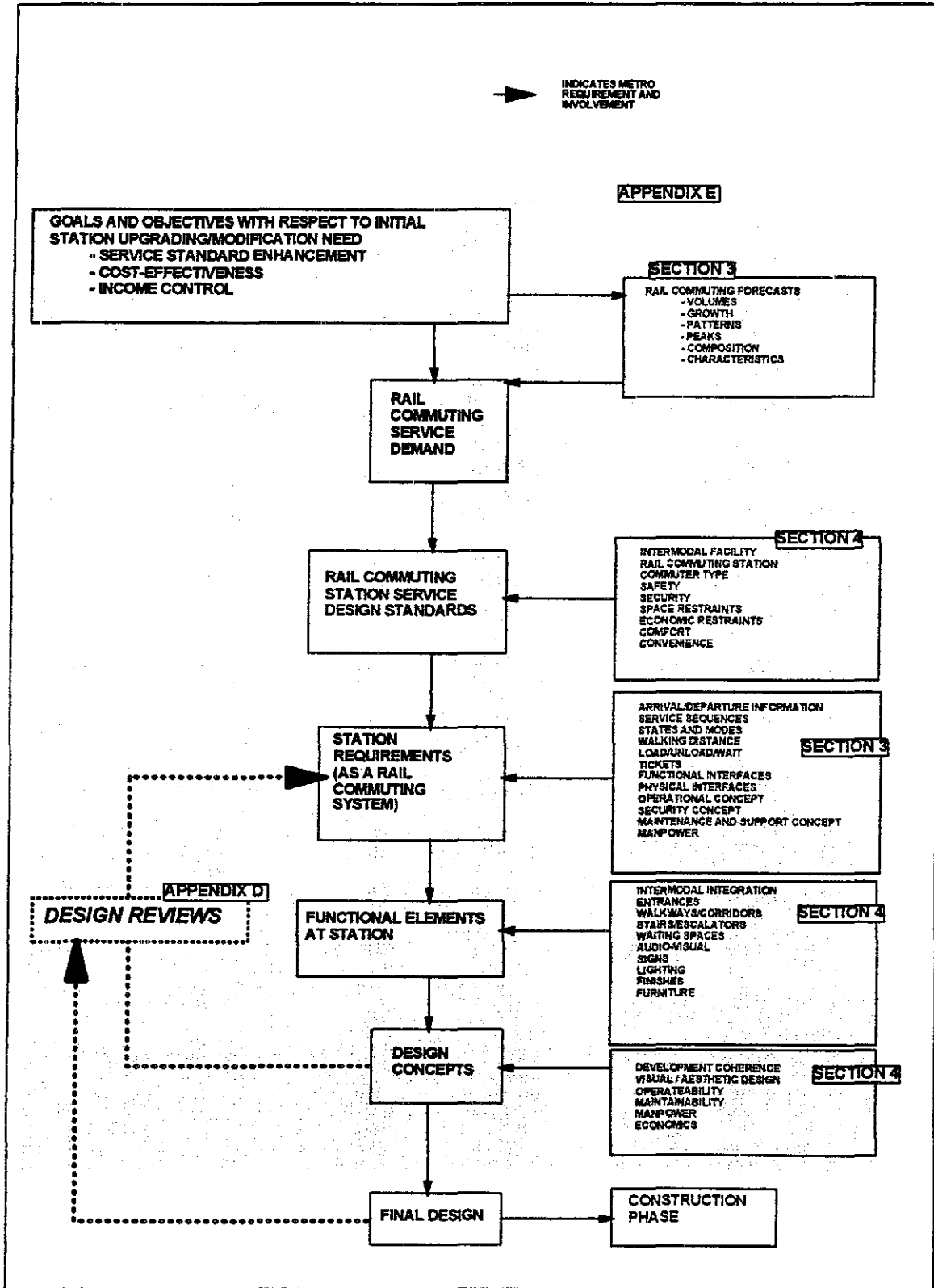
The parameters that determine the effectiveness and efficiency commuter rail of stations are derived from the following:

- i. Transport demand requirements (origin/destination market, intermodal facilities, transport modes, land use, etc).
- ii. Commuter requirements (fare, comfort, convenience, safety and security).
- iii. Operational requirements.
- iv. Financial requirements (income, fare evasion, operational and maintenance cost and capital cost).
- v. External interface requirements.
- vi. Commercial requirements development of area surrounding stations.

The stations are currently being investigated for relevance, rehabilitation, modification upgrading. Planning and detail design of new and extended rail commuting lines are also undertaken. The Requirement Logic and Approval procedure for the Station Development programme are illustrated in Figure 4.

In order to streamline and standardise the feasibility studies (conceptual design) of a station or a group of stations on a line, it was necessary to set norms, guidelines and standards. This document shall be used by project managers, station hardware element designers, consultants, engineers and architects involved in station development. The application of the document is illustrated in Table 6.

Figure 4: Metro Requirement Logic and approval procedure within station development program



The process followed in the NGS document includes the following elements:

- Definition of the station. The station definition is illustrated in Figure 5.
- Definition of commuting activities in terms of the state of the service (dormant, off-peak, peak), mode of operation (normal, abnormal, emergency) and commuting activities. This process is illustrated in Figure 6.
- Definition of Metro stations in terms of schematic layout, commuting cycles, states and modes and station functions.
- Sets out the functional and physical requirements of a station.
- Prescribes relevant standards.
- Defines the station acquisition environment.

The NGS procedure includes data collection, design processes, and application of appropriate standard and provides for the input of a multi-disciplinary professional team. It is believed that the NGS document would contribute the needs of commuters as a result of:

- (a) The promotion of safe, affordable and co-ordinated public transport.
- (b) Ensure accountability through involvement.
- (c) Acknowledgement of the disabled and handicapped requirements.
- (d) Support and ensure integrated land use and transport planning.
- (e) Promotion of security and safety.
- (f) Improvement of transport related facilities for rural areas.
- (g) Ensure effective and efficient long-term transport planning.
- (h) Support of community and commuter involvements.

Figure 5: Station definition

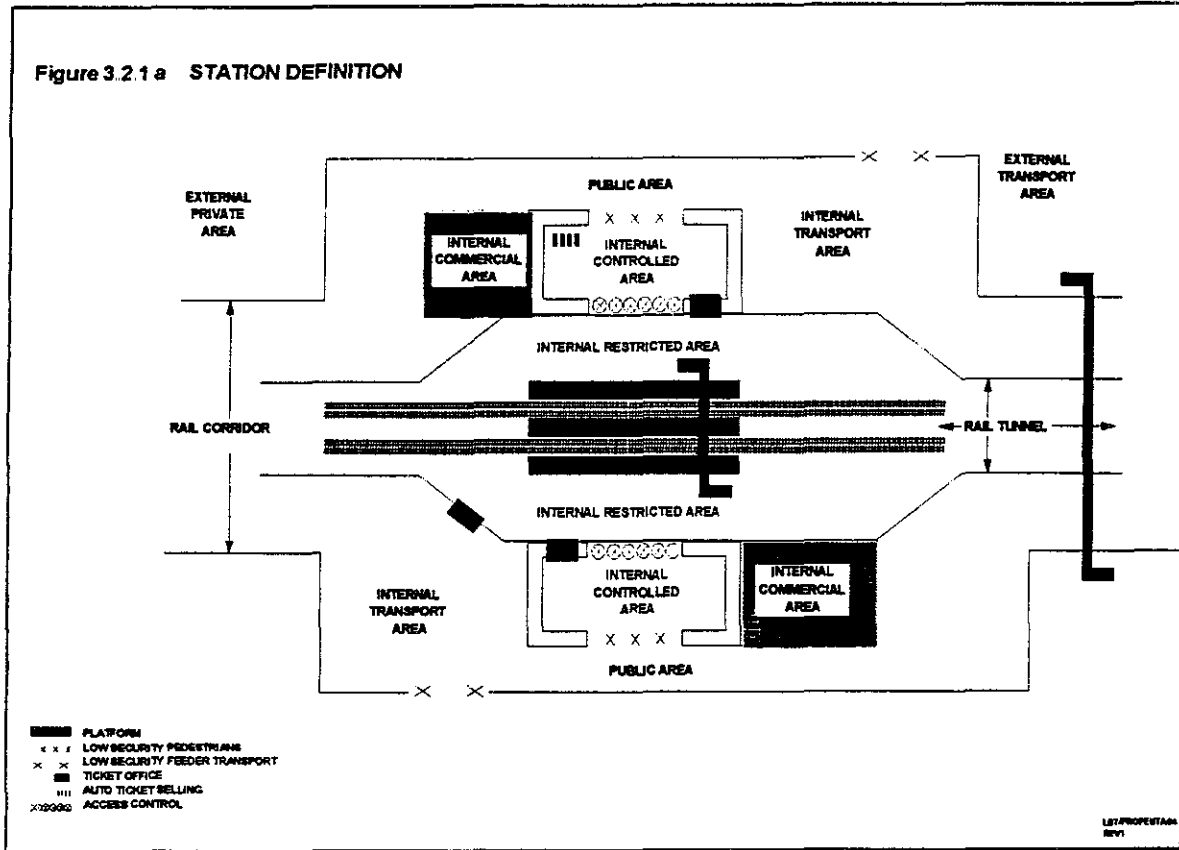


Figure 6: Commuting Activities

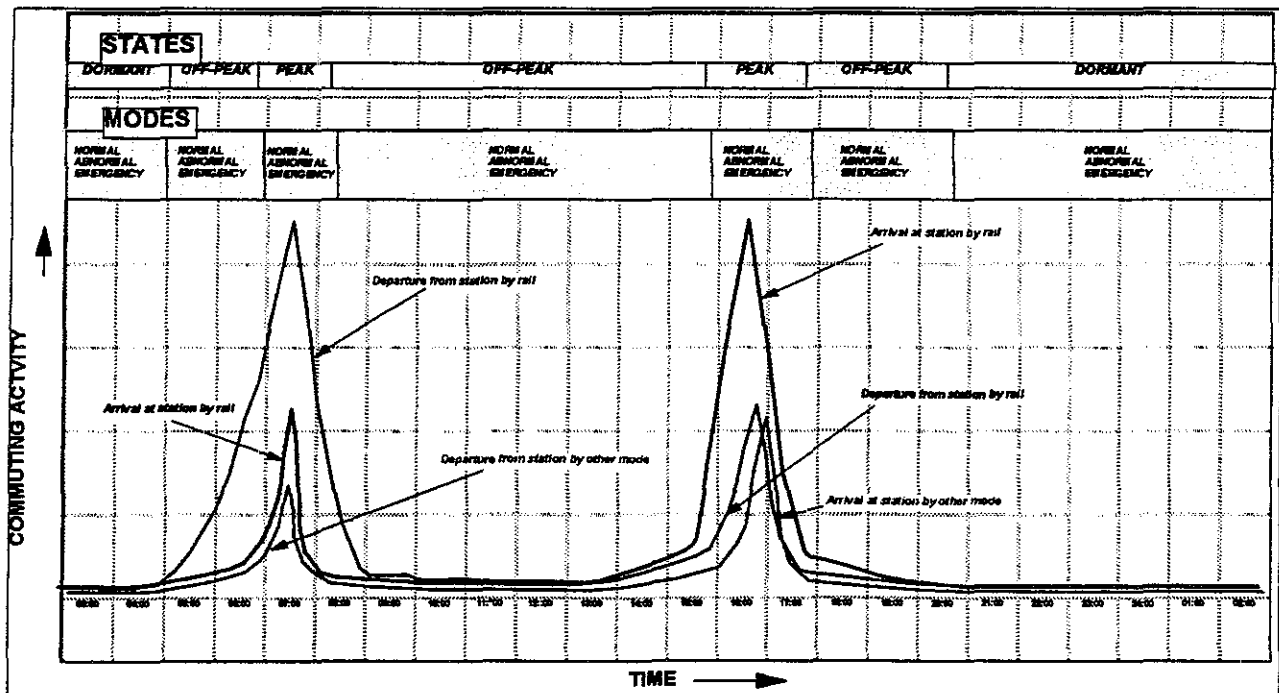


Table 6 : Application of NGS document

Application	Purpose of Application
A. As a request for tender	To appoint consultants (transport planning, project managers, station system designers, specialists, etc) for feasibility studies, conceptual design, etc.
B. As a project management Reference	To accelerate consultants orientation with respect to station projects: <ol style="list-style-type: none"> 1. Plan - station function, station project phases 2. Organise - responsibilities within Metro, interface between Metro/ Intersite 3. Monitor/control - design reviews
C. As a Quality assurance checklist	To qualify and conceptual design/detail design against Metro Rail Commuting Standards.
D. As a station facility design directive	To ensure: <ol style="list-style-type: none"> 1. Logic steps in the design of a functional Rail Commuter Station 2. Standardisation 3. Conformance to standards
E. As a station-development implementation planning and prioritisation resource	the outputs of A, B, C and D shall result in: <ol style="list-style-type: none"> 1. Cost/Income information per station 2. A prioritisation list per station 3. Information per region This shall support the 5 year implementation planning of Metro.

CONCLUSION

Efforts are under way to transform the South African Rail Commuter Industry to better serve the Needs of Commuters. The wants and needs of Commuters have been specifically taken into account in the development of Norms Guidelines and Standard for the development of rail commuter stations.