ROAD SIGNS MANAGEMENT

SECTIONS

MAY 2012

SARTSM – VOL 2

CHAPTER 16

TITLE

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL Volume 2 Chapter 16

ISBN	STATUS	DOT FILE	DATE
	Digitised Version	000/0/0/0	Digitised May 2012

DIGITISING CARRIED OUT BY

Transport and Traffic Technology Africa (Pty) Ltd
P O Box 1109
SUNNINGHILL
2157

COMMISSIONED BY

Department of Transport
Private Bag X193
PRETORIA
0001

ORIGINAL AUTHOR

J J Prinsloo

PUBLISHER ENQUIRIES

Director-General: Transport
Private Bag X193
PRETORIA
0001

It is impossible for a publication of this nature to free of errors. It would be appreciated if errors be brought to the notice of -

Director-General: Transport
Department of Transport
Infrastructure Network Management
Private Bag X193
PRETORIA
0001

KEYWORDS

ROAD SIGN, ROAD MARKING, REGULATORY, WARNING

COST: VOLUME 2

VOLUME SET	R		
Chapter 1	R	Chapter 11	R
Chapter 2	R	Chapter 12	R
Chapter 3	R	Chapter 13	R
Chapter 4	R	Chapter 14	R
Chapter 5	R	Chapter 15	R
Chapter 6	R	Chapter 16	R
Chapter 7	R	Chapter 17	R
Chapter 8	R	Chapter 18	R
Chapter 9	R	Chapter 19	R
Chapter 10	R		

CHAPTER 16:
ROAD SIGNS MANAGEMENT

CONTENTS

16.0.1 Sections and Subsections

16.0.2 Figures

16.0.3 Tables

CHAPTER 16:
ROAD SIGNS MANAGEMENT

16.1 INTRODUCTION

16.1.1 General

1 The purpose of this chapter is to give guidance to road authorities on the development of a Road Signs Management System. By maintaining road signs and markings cost-effectively, it ensures the functionality of these traffic control devices and protects them as a valuable asset. It also ensures that the increasing delictual claims against road authorities as a result of unserviceable road signs and markings are kept to a minimum.

2 When referred to, road signs in this chapter generally include road markings, however, specific issues with respect to road markings are addressed separately (see Chapter 18).

16.1.2 Road Management Systems

1 Road Management Systems (RMS) are formalised procedures used to assist the authority in assessing the current and future needs for maintenance, rehabilitation, upgrading and geometric improvements of the road system under the authority's jurisdiction. Road management comprises a number of diverse activities and in order to undertake the planning, organisation and control of these functions, some road authorities have developed a number of management systems to deal with these activities individually. The management system also forms the technical base for budgeting and application for funding.

2 A Road Signs Management System (RSMS) can be defined as a subsystem of a RMS which ensures the availability of accurate information concerning road signs on the road network.

3 The importance of a RSMS in this context has been acknowledged by the majority of the metropolitan and provincial road authorities in South Africa.

16.1.3 *Status Quo* of Road Signs Management

1 The road authorities in South Africa can be divided into different levels related to the institutional responsibilities of the different governmental levels, name:

(a) the Department of Transport / South African National Roads Agency - national and strategic roads;

(b) Provincial Road Authorities - provincial roads (nine provinces);

(c) Metropolitan Councils;

(d) Local Authorities.

2 The ability of these authorities to adequately manage and maintain the thousands of road signs on the road network depends on a systematic approach to the establishment of a RSMS.

3 The cost-effectiveness of a RSMS can only be tested when the ratio between resources (input) and output of benefits of existing systems are compared with those of a proposed effective RSMS, i.e. the implementation of an effective RSMS will ensure improvement in cost-effectiveness, not only for road users, but also for maintenance activities related to road signs.

4 Such a system is necessary to avoid deficiencies in the **planning, design, implementation and maintenance** stages of each road sign.

5 Deficiencies during any of these stages can result in a reduction in safety for motorists and increased liability exposure for road authorities. The timeous detection of these deficiencies is therefore essential and requires a committed effort, i.e. manpower and resources, from road authorities to fulfil the activities related to the implementation of a RSMS.

16.1.4 Motivation for a Road Signs Management System (RSMS)

1 The collection of relevant data, through prescribed procedures and methods, by authorised personnel, and the storage, processing and communication of the resulting information to the responsible people, can be described as an Information System.

2 With regard to road signs, data needs to be captured in a sign inventory and processed by an operational system to form the operational system. This information can then be extracted for use in the management of the road sign system through effective procedures.

3 The development of a RSMS is founded on the fact that, when a road authority knows:

(a) **what** it has invested in its road sign system;

(b) **when** it did so;

(c) **where** such investments are located;

(d) **what** is the **present condition** and expected **future condition** of each sign on the road network; and

(e) **what** is the **cost of maintenance** or rehabilitation of the road sign system;

it can more efficiently and effectively manage current and future investments in the system.

4 Through an effective RSMS it will then be possible to determine whether the road sign system:

(a) is incomplete;

(b) conforms or does not conform to the existing requirements;

(c) should be replaced; and

(d) performs according to acceptable norms.

5 In addition to the obvious advantages derived from the establishment of a RSMS, it is well known that road authorities at all levels are being affected by an upward trend in liability claims and insurance costs. The implementation of an effective RSMS will enable road authorities to act timeously in:

(a) identifying deficiencies in the road sign system;

(b) giving priority to corrective measures; and

(c) budgeting for and correcting the deficiencies.

16.1.5 Elements of a RSMS

1 Although the approach towards the development of a RSMS may differ for urban, provincial and national road networks, the elements and principles in applying such a system are the same. These elements are (see also Table 16.1):

(a) **Planning and Policy Formulation** which describes the necessary steps to firstly, establish a road signs system according to the standards and requirements in Volume 1, and secondly, to form a basis of information for the implementation of an effective RSMS - these steps are:

(i) definition of the road network within the boundaries of the road authority;

(ii) classification of roads on the network, i.e. the road hierarchy with respect to road signing;

(iii) classification of intersections according to intersecting road classes;

(iv) development of a route and guidance sign system for national, provincial and metropolitan road networks; this includes a route numbering system and the selection of destinations;

(v) the level of road sign information provision at different classes of intersections and on road links;

(vi) choice of road sign material to be applied on different classes of roads and intersections and in areas of different ambient lighting (refer to Volume 2, Chapter 17);

(vii) the standards of the substructure of road signs, i.e. footings, poles and framework (refer to Volume 2, Chapter 15);

(viii) installation guidelines for road signs;

(ix) the formulation of a policy which includes all the above mentioned aspects as they pertain to the appropriate road authority;

(b) **System Design** of road signs according to the requirements and guidelines provided in Volumes 1, and 2; this gives the layout of signs at intersections and the destination names in all directions as well as the type of road signs along road links; it normally consists of the diagrammatic layout of existing signs at an intersection on a road link and the proposed layout, should this differ;

(c) **Detail Design** of road signs, taking into account the actual conditions of the site where they will be erected (see Volume 4 for details of road sign signface detail design);

(d) **Implementation** of the road signs according to standard specifications and special conditions, normally handled as part of the Tender phase;

(e) the continuous **Maintenance and Rehabilitation** of road signs;

(f) **Schedule and Programme** for replacement of signs - cost control and budgeting from part of this element.

TABLE 16.1 STEPS TO IMPLEMENT AN RSMS TABLE 16.1

Step	Description of Activities	Deliverable
STEP 1: Formulate road sign policy	• Network definition • Road classification • Route and Guide Sign System - route optimisation - route numbering - route description • Selection of orientation names • Tourism/Facility signs policy • Level of road sign provision (primary and secondary) • Choice of road sign materials • Substructure details • RTA/SADC-RTSM code numbers • Map, diagram or GIS • Letter types and sizes • Maintenance policy for road signs	A policy document that can be used as a manual to communicate policies from the management team through to the labourers in the field and back (vertical) and also to other departments and road authorities (horizontal). INPUT TO LIBRARY MODULE
STEP 2: System design of road signs	• Reference system for road signs • System information - existing signs (use information from step 4) • Application of policy guidelines • Site layouts, lane confirgurations and special conditions • Prepare system design systematically • Link system design to GIS if available	A system design document that describes the function, positioning, type and layout of road signs at each site along the road network. INPUT TO LIBRARY MODULE
STEP 3: Detail design of road signs	• Use policy guidelines and system design to prepare detail design of road signs • Link detail design through CAD to GIS if available Note: It is normally only necessary to prepare detail designs for guidance signs, as regulatory and warning signs can be described in detail by code numbers	A detailed design of all road signs on the road network - CAD drawings. INPUT TO INVENTORY MODULE
STEP 4: Inventory of road signs	• Capturing of data as described • Link to GIS database if available	INVENTORY MODULE
STEP 5: Maintaining of road sign performance and maintenance procedures	• Note: It is normally only necessary to prepare detail designs for guidance signs, as regulatory and warning signs can be described in detail by code numbers • Capturing of maintenance data through the maintenance procedures • Update information to inventory module • Link data to GIS database	MAINTENANCE / MONITORING MODULE
STEP 6: Management of road sign system	• Extract information from database and GIS • Enquiries through computerised system • Prepare reports as requested to support decision-making	EXECUTION MODULE

16.2 IMPORTANCE OF ROAD SIGNS MANAGEMENT (RSM)

16.2.1 General

1 Road signs play an essential part in **regulating** traffic, **warning** traffic of hazardous situations ahead, and providing **guidance** and general **information**.

2 Management of this asset on the road system is of utmost importance, but perhaps it is most clearly emphasised in court decisions in the United States of America [(1)] in the late 1980's which made it clear that:

(a) failure to be aware that a traffic control device is defective will not protect the transportation agency from tort liability - unless the agency can show that it has an on-going programme to discover and correct ineffective devices - this task should be clearly stated in job descriptions;

(b) a detailed log should be kept for every traffic sign - this information is necessary for legal purposes and for planning replacements - the log will also be useful in determining which products and materials are most cost effective - a good record system will list the sign type, date of installation, type of support and maintenance or replacement activities.

The benefits in the field with regard to road traffic accidents are obvious. In the US Department of Transportation 1998 Annual Report on Highway Safety Improvement Programs [(4)], a report on the highway environment as it relates to safety, improvements in traffic signing are reported as having the highest benefit-cost (B/C) ratio of any type of highway safety improvement. From data received from 50 states, road signs achieved a top ranking with a B/C of 20,9 out of 20 different improvement types, as shown in Table 16.2.

3 If road signs are incorrect, or incorrectly placed, and cannot convey the proper message, the traffic rules cannot be enforced. The direct consequence could be an increase of traffic hazards and an increase in the number and severity of accidents.

4 An effective RSMS will improve the productivity in the fields of planning, design, implementation and maintenance operations of the personnel involved with these tasks. Maintenance teams, for example, can be supplied with full details of the maintenance task to enable them to execute the task with maximum efficiency.

5 In view of the afore-mentioned benefits, it becomes clear that the role of a RSMS within a RMS cannot be ignored, and every road manager should strive to capitalise on the proven advantages of a RSMS.

TABLE 16.2 TOP 20 TYPES OF HIGHWAY SAFETY IMPROVEMENTS TABLE 16.2

Rank	Improvement Type	Benefit Cost Ratio
1	Trafic Signs	20.9
2	Illumination	10.3
3	Upgraded Guardrail	8.1
4	Upgraded Median Barrier	7.0
5	Upgraded Bridge Rail	6.5
6	Obstacle Removal	6.4
7	Bridge-Guardrail Transition	6.3
8	New Median Barrier	5.4
9	New Traffic Signals	5.1
10	Minor Structure Improvement	4.5
11	Impact Attenuators	4.0
12	Upgrade Traffic Signals	4.0
13	Pavement grooving	3.8
14	Sight Distance Improvements	3.6
15	Median Strip	3.3
16	Railway Crossing – New Gates	2.8
17	Channelisation	2.8
18	Shoulder Widening/Improvements	2.6
19	Railway Crossing – New Lights	2.2
20	Railway Crossing – New Lights and Gates	2.1

16.3 MAINTENANCE

16.3.1 General

1 The efficient maintenance or rehabilitation of road signs is an important element of a RSMS which will not only ensure the continuous functionality of the road sign system, but will also contribute to the protection of this valuable asset of the road system.

2 Suitable maintenance policies and procedures need to be established by road authorities to ensure:

(a) safety of the road users;

(b) control and setting of priorities for maintenance activities;

(c) up to date information on the condition of road signs;

(d) an acceptable maintenance level of service for road signs.

3 The maintenance level of service (MLOS) for road signs set by road authorities depends on the importance/classification of a road section. The selected MLOS will directly affect the maintenance activities and decisions on where, when and how much maintenance is required and how available resources should be utilised.

4 The maintenance policy set by road authorities needs to be spelled out and forms part of the road signs policy document. Examples of policy statements in this regard are:

(a) minimum standards for the retroreflectivity, colour and luminance factor of signs;

(b) immediate replacement criteria for certain types of damaged signs, while others can be replaced as soon as practical or according to a maintenance programme;

(c) record keeping of accurate maintenance actions and costs;

(d) cleaning of and clearing around road signs;

(e) painting/maintenance of substructures to prevent rusting;

(f) handling of signs during transportation from factory to store to site;

(g) procedures to order, purchase and keep records of road signs;

(h) handling of complaints regarding road signs from road users.

5 A wide variety of documentation on the subject of how to maintain road signs is available locally and abroad, which can be used by road authorities to assist in formulating their maintenance policies for road signs.

16.4 DEVELOPMENT OF A ROAD SIGNS MANAGEMENT SYSTEM

16.4.1 General

1 The function of a road signs information system which forms part of the RSMS is to provide information on each road sign on the total road network with regard to the different aspects of planning, implementation, monitoring, maintenance and replacement of road signs. This information can then be utilised to establish tendencies for different characteristics of road signs to enable managers of the system to take decisions for management actions. After identifying the proposed prerequisite elements of a RSMS in Section 16.1.5, this section concentrates on the step by step development of a proposed RSMS.

16.4.2 Typical Components of a RSMS

1 The following requirements for an information system have been identified to ensure efficiency of the system, namely:

(a) a dedicated team to manage the road sign system on the roads within the authority's boundary;

(b) a map of the area and classification of the road network (available on either hard copy or GIS);

(c) the position of each road sign indicated on the map or as per system design (diagrammatic layout per intersection or road link);

(d) an inventory of the characteristics, attributes and history of each road sign (computerised database); and

(e) description and layout of the road sign face (sketch, photograph or detailed drawing).

2 The information system should be supported by:

(a) prescribed procedures for the processing/updating of data;

(b) a computerised database of sign information (linked to a GIS if available);

(c) computer equipment (hardware) to process the data;

(d) computer software programs to assist in the running of the RSMS;

(e) the operational system.

3 The afore-mentioned components form part of a typical computerised RSMS which could be divided into the following modules for implementation purposes:

(a) Inventory module;

(b) Library module;

(c) Maintenance/Monitoring module;

(d) Execution module.

16.4.3 Inventory Module

1 This module consists of the database of relevant data for each sign and it has to be designed properly to ensure that:

(a) information can be easily captured, maintained and extracted;

(b) priorities/weights can be allocated to certain attributes of road signs and set criteria for the extraction and evaluation of information;

(c) the data is compatible with other management systems such as a maintenance cost system;

(d) alpha-numeric data can easily be connected to a geographic information system (GIS) - Table 16.3 shows the typical information that needs to be included in a road sign inventory database - a more detailed description of some of the above-mentioned information, to be captured into an inventory's database, is given in Section16.6.

2 The inventory module can be described as the core of the RSMS, as all the information needed to effectively manage a sign system is captured in this module, and road authorities need to maintain it to ensure a high level of road safety for motorists. To provide this information, road authorities need to take steps to maintain some form of road sign inventory, ranging from paper files, maps, drawings, photo files to photo loggers. Sophisticated systems, such as combinations of computerised databases, video digital photo capturing databases, or mobile vehicles equipped with computers to capture sign data whilst moving, are available.

3 To date most South African road authorities concentrate mainly on the manual capturing of data through as-built drawings, or data collection forms and a manual filing system of road sign information. This valuable information can easily be transported into a computerised system and some road authorities have already embarked on such a system.

4 The advantages of a computerised sign inventory are somewhat obvious, namely:

(a) it can easily be connected to existing manual systems and existing information forms in use;

(b) it is a fast and efficient method of data management;

(c) it can handle record-keeping for the large number of road signs on the road network;

(d) reports on maintenance, condition, inspections, costs, type and quantity of road signs can easily be extracted from the system.

5 Data capturing is normally one of the most costly stages of a project. Research, however, has shown that sophisticated methods of road sign data capturing through computerised systems for large road authorities are more cost effective than traditional manual methods.

16.4.4 Library Module

1 The typical data which needs to be captured in this module to support the operations of the RSMS can be summarised as follows:

(a) the base information of the road network, be it a map, diagram or GIS;

(b) the level of road sign provision at different classes of intersections prescribed in the policy;

(c) prescribed letter sizes and letter types for all types of road signs;

TABLE 16.3 TYPICAL DATA STRUCTURE FOR A ROAD SIGN INVENTORY MODULE TABLE 16.3

Section	No	Description	Minimum Recommended Input
A. Position	1.	Reference system to allocate an identification number to each individual road sign	*
	2.	Urban and Metropolitan areas: Suburb, street name, between street A and street B, next to stand no. xx, etc.	*
	3.	Rural areas: Road number, chainage, distance	*
	4.	Route number	*
	5.	Direction of travel and direction of road sign face (N, S, W, E)	
	6.	Left or right side of road or at an intersection or on the median	
	7.	Does the road sign exist (is it planned or has it already been erected)?	*
	8.	Distance from centre line or exact position on the GIS	
	9.	Road function class (classification of road and intersection)	*
	10.	Description of environment (forest, coast line, wet, dry, etc.) through the GIS	
B. Characteristics	1.	RTA/SADC-RTSM code (code number allocated according to Volume 1)	*
	2.	Functional classification of road sign (linked to road class)	*
	3.	Sign face size (height, length, area)	*
	4.	Letter type and size	
	5.	Post (quality, size, profile, material)	
	6.	Sign board material (chromadek, wood, steel, other)	*
	7.	Signface material (background and script - class 1, 2 or 3)	*
	8.	Ground-mounted or overhead sign	*
	9.	More than one sign on one post	
	10.	Substructure and fastening details (fastening type)	
	11.	Legend of sign - message	*
C. Dates	1.	Manufactured	
	2.	Installed/Erected (motivation for erection)	*
	3.	Last maintained (actions taken and reason for maintenance)	*
	4.	Cancelled/Replaced (motivation)	*
	5.	Inspected (recorded information)	*
	6.	All dates and relevant information are captured in a history file	
D. Condition Evaluation	1.	Sign face natural weathering (SFNW) - scale 1-5	*
	2.	Sign face human damage (SFHD) - scale 1-5	*
	3.	Post natural weathering - scale 1-5	
	4.	Post human damage - scale 1-5	
	5.	Retroreflectivity measured by retroreflectometer or visually observed (sample measurement of color and luminance)	
	6.	Specific intensity per unit area (SIA) - Retroreflectivity available and required based on guidelines in Volume 2, Chapter 17	
E. General	1.	Sight distance of sign (horizontal or vertical curves)	
	2.	Complexity (urban, rural, industrial)	
	3.	Speed limit	
	4.	Lanes per direction of travel	
	5.	Flow - two-way or one-way	
	6.	Control - local authority, provincial authority, or contractor	*
	7.	CAD reference or photo ID	*
	8.	Comments - additional information (maximum 80 characters)	
	9.	Cost of different materials, manufacturing and erection of road signs	*
	10.	Maintenance cost (labour, material, equipment, transport)	*

(d) prescribed procedures to apply for the provision of a road sign (mostly applicable for tourism or local direction signs);

(e) code numbers of all types of signs as indicated in Volume 1, and a description thereof with respect to function, standard dimensions, cost parameters and materials description;

(f) guidelines set out in Volumes 1 and 4 or in the policy document of the road authority;

(g) description of numbered routes along the streets (street names) and roads (road numbers) on the road network.

16.4.5 Maintenance/Monitoring Module

1 The information in the maintenance or monitoring module consists of the updated actions and costs in relation to the day to day erection, maintenance and inspection of road signs. This information is normally extracted from job cards, work orders or inspection forms by maintenance teams as described in Section 16.7 as an example.

2 The important components of this module are:

(a) updating of information after erection, inspection or maintenance has been executed;

(b) preparation of tasks on job cards;

(c) dealing with complaints and capturing data related to road signs.

(d) inspection frequency;

(e) reason for maintenance (accidents, fire, vandalism, etc.);

(f) cost of maintenance per activity (labour, material, transport);

(g) details of claims where road signs are involved;

(h) set maintenance criteria linked to maintenance priorities, for example:

(i) If Sign Face Natural Weathering (SFNW) + Sign Face Human Damage (SFHD) is rated 2 - No maintenance;

(ii) If (SFNW) + (SFHD) is rated 5 - Urgent maintenance;

(iii) Criteria can also be set for other attributes such as minimum retroreflection levels of road sign material.

(i) after maintenance criteria have been established it is possible to list maintenance priorities according to the importance of the road (road class) or functional class of road signs;

NOTE:SFNW and SFHD are visual judgements of the condition of the sign, say on a 5 point scale where 1 means excellent condition and 5 means totally unacceptable, i.e. the road sign must be replaced immediately - see Section 16.6 for more details;

(j) maintenance action codes are selected to assist in the maintenance updating procedures and to link maintenance actions to a costing system;

(k) the cost of labour, materials, equipment and transport needs to be captured for every work order.

3 The maintenance of road signs normally forms part of a specific department at road authorities and in many cases the maintenance of road signs is only one aspect of road maintenance procedures. Section 16.7 summarises the proposed procedures related to the maintenance of road signs for road authorities.

16.4.6 Execution Module

1 The execution module serves as the management tool of the RSMS and consists mainly of reports and extraction of information in a prescribed or selected format. The process is indicated schematically in Figure 16-1.

2 The extraction of management information of road signs will vary from basic enquiries to more sophisticated enquiries as indicated in Figure 16-2. This information will enable road authorities to respond to, for example, the following questions:

(a) How many of what type of road signs are where?

(b) What is the condition of road signs?

(c) What are the rehabilitation or replacement costs of road signs?

(d) What are the budget requirements for the next five years with respect to road signs on certain routes? (This should be attended to more effectively in order to provide sufficient funds timeously.)

(e) What are the rates of deterioration of different road sign materials?

3 A computerised database and GIS will make the aforementioned extractions and updating of information very easy. Such computerised databases have been developed locally and abroad and can also be bought "off the shelf". Examples of extractions from such a database are shown in Figures 16.3 to 16.5 and in Table 16.4.

16.4.7 Personnel and Equipment Requirements

1 The personnel and equipment requirements to implement and operate a RSMS depends on the size of road network and density and distribution of road signs on the authority's road network.

2 The largest cities in South Africa may need to have dedicated Road Traffic Sign Teams who will handle all road signs and markings work. Smaller cities and larger towns could divide their areas into wards or suburbs, and personnel from the Town Engineer's Department could then fulfil these tasks as part of other maintenance duties.

3 Rural and national road authorities can spread these tasks amongst their regional or district offices to form part of an overall maintenance effort of a RMS.

4 Personnel and equipment requirements can be met using existing resources. By clearly defining procedures and ensure computerisation, road authorities can efficiently implement a RSMS.

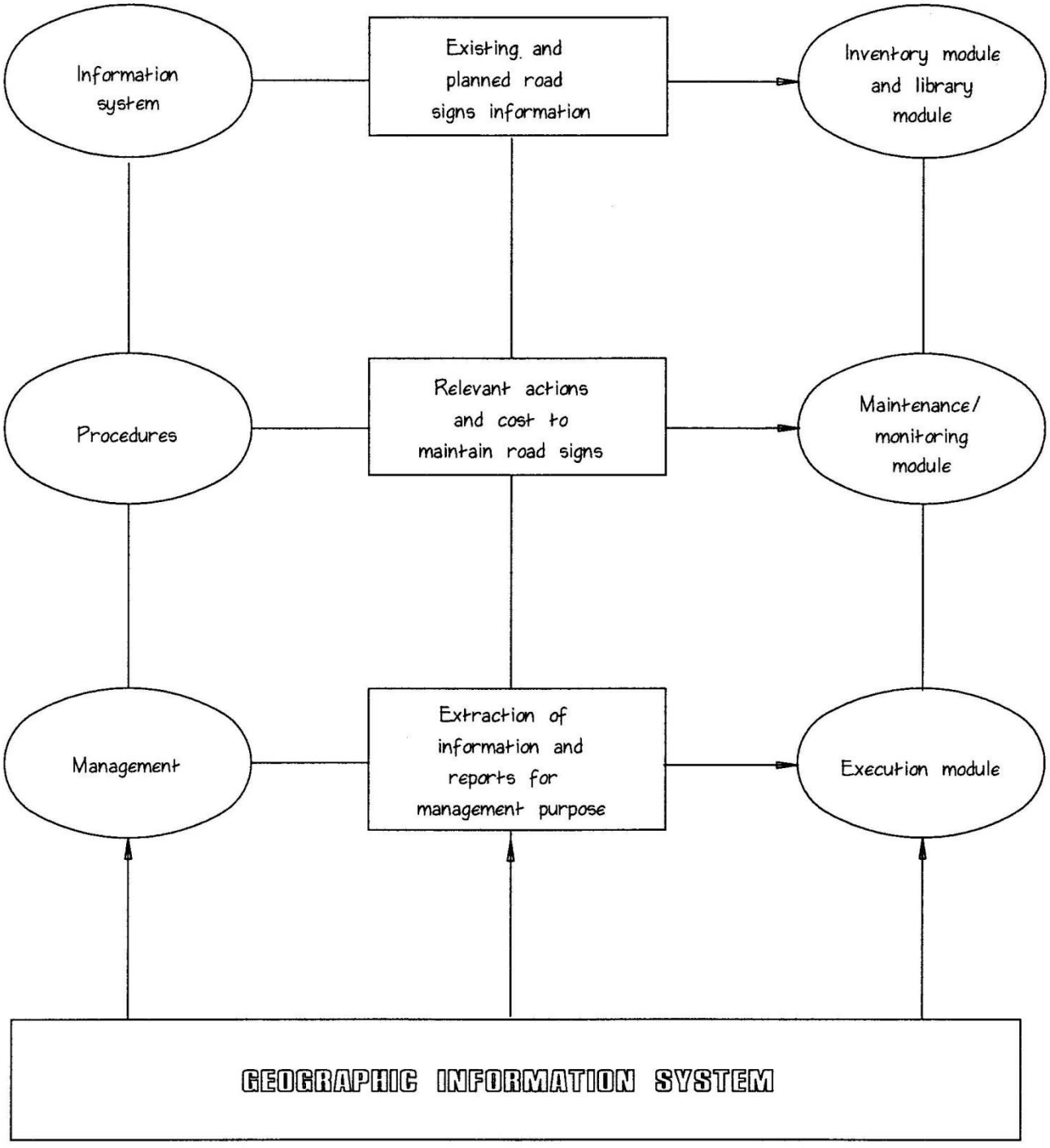
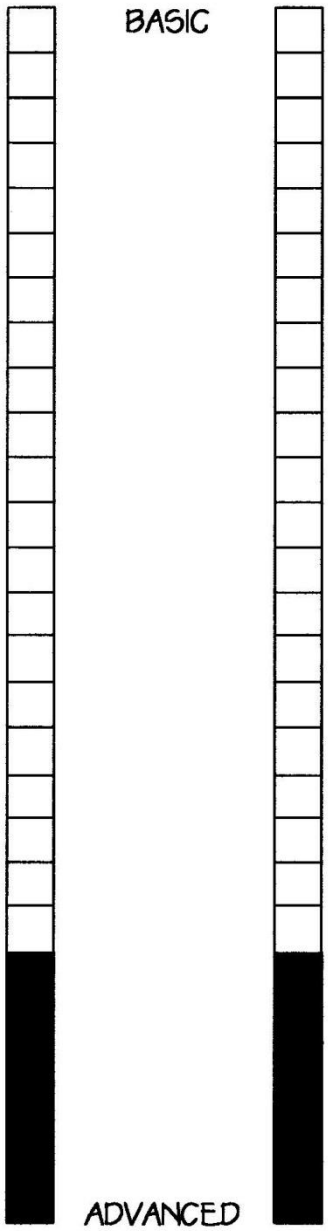
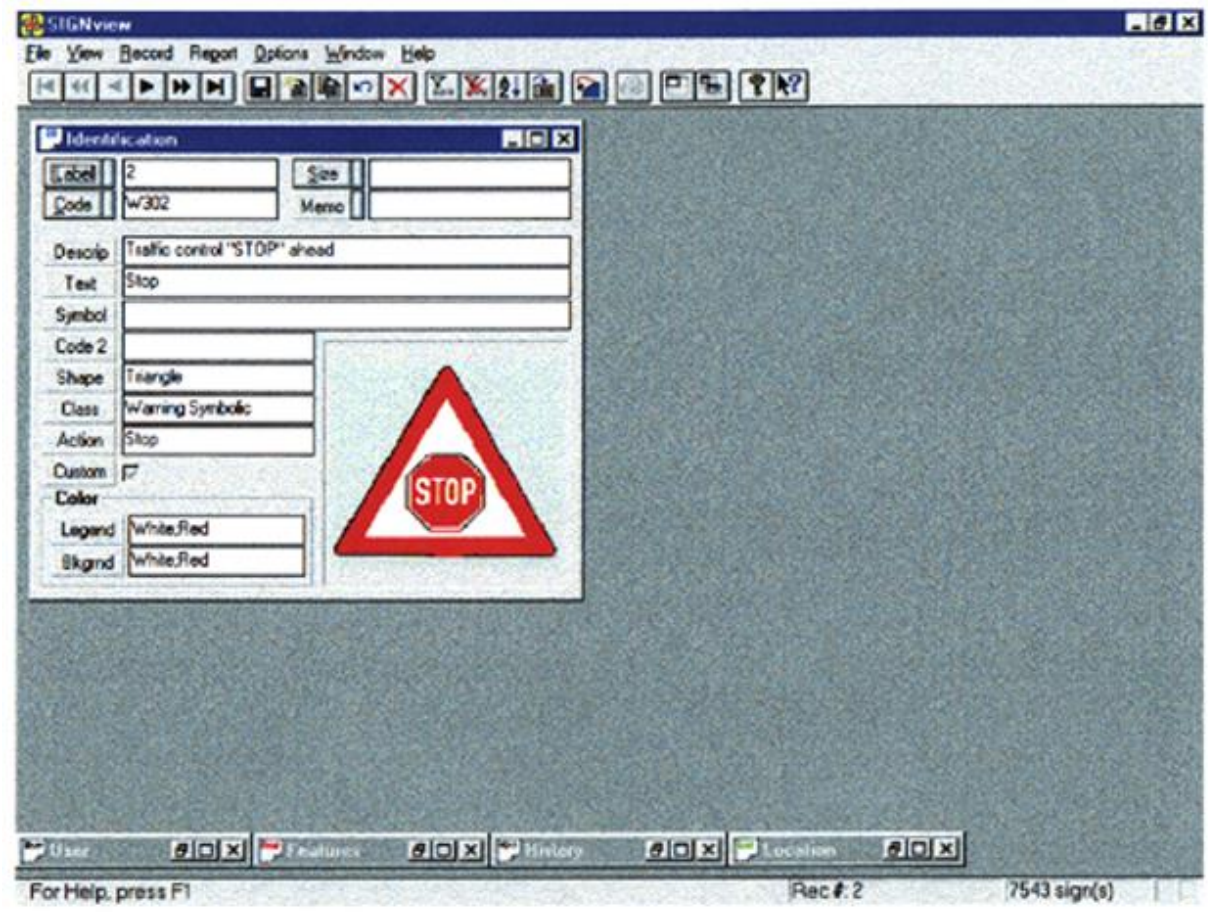


Fig 16.1 **Process of Executing an RSMS**



- Position of a road sign (GIS)
- Type of signs
- Materials used to manufacture a sign
- Dimension of signs
- Sketch or drawing of sign
- Condition of sign
- History of sign (maintenance, inspection)
- Dates of manufacture, erection, maintenance, etc.
- Reason for rehabilitation or maintenance
- Cost of maintenance or replacement
- Retroreflectivity of signs
-
-
-
-
-
-
-
-
-
- Average life of different sheeting
- Influence of orientation on the life of a road sign
- Tendencies related to reasons for sign damages
- Implementation cost for different levels of signage
- Cost savings after implementation of a RSMS
-
-

Fig 16.2 Hierarchy of Management Enquiries on Road Signs Through an RSMS



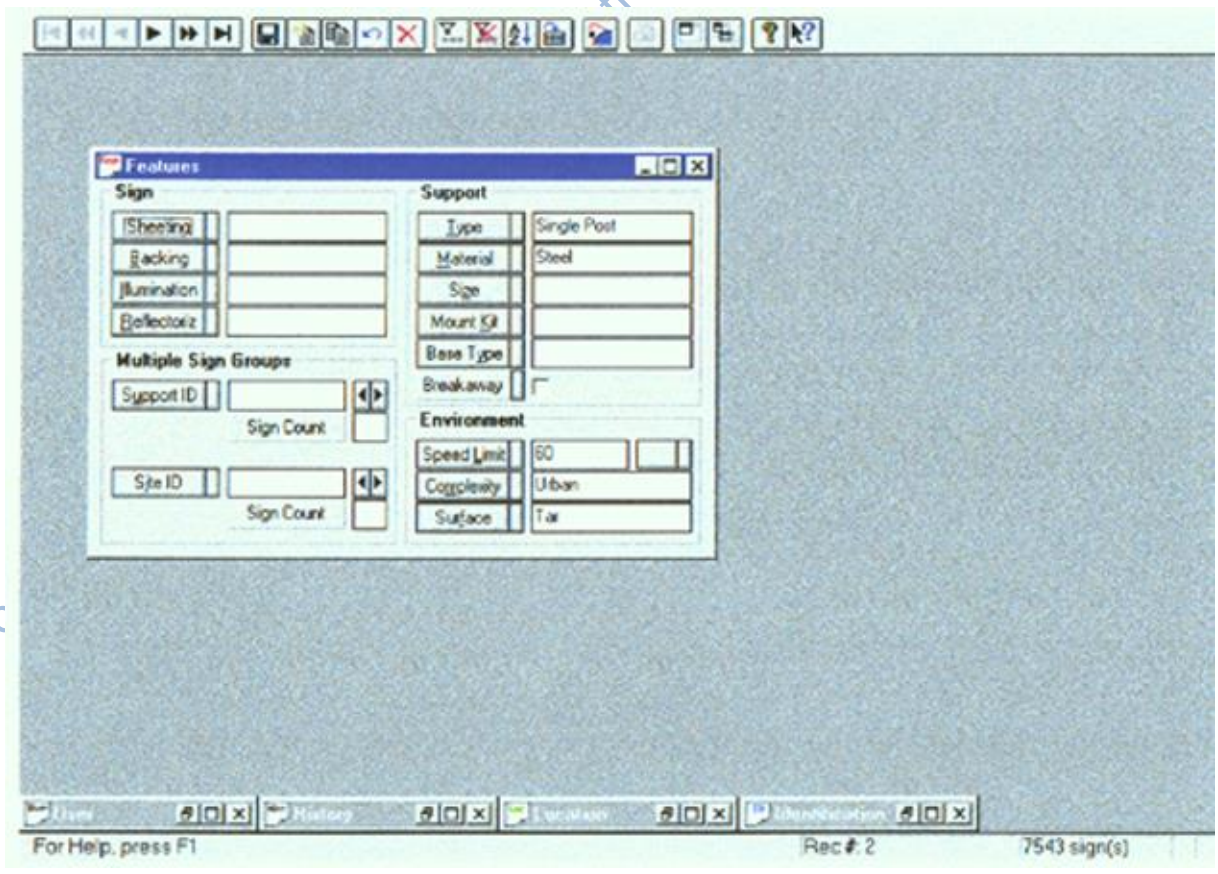
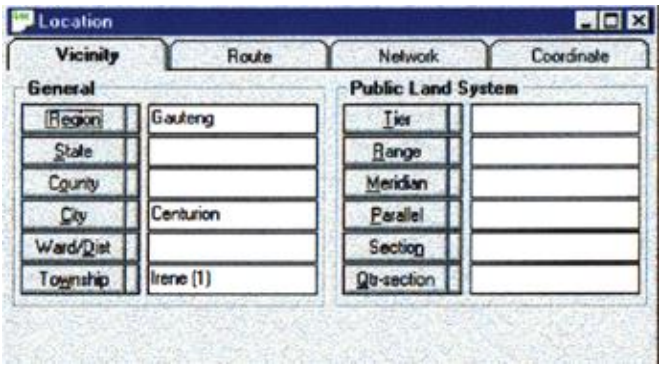
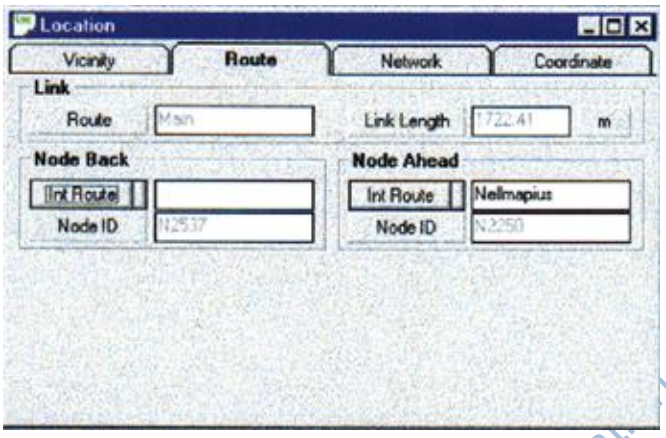
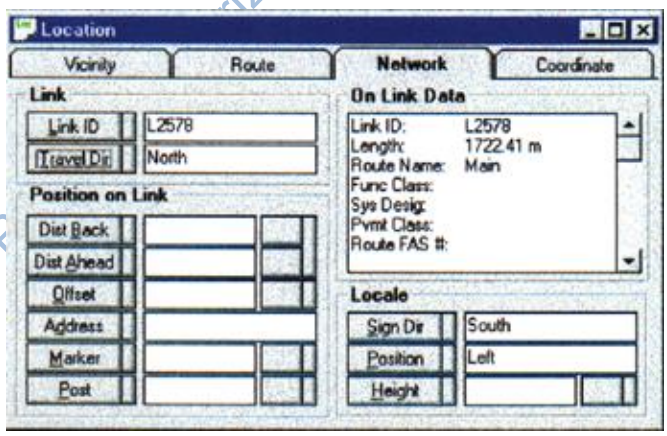


Fig 16.3 Examples of Typical RSMS Data Entry Screens - 1







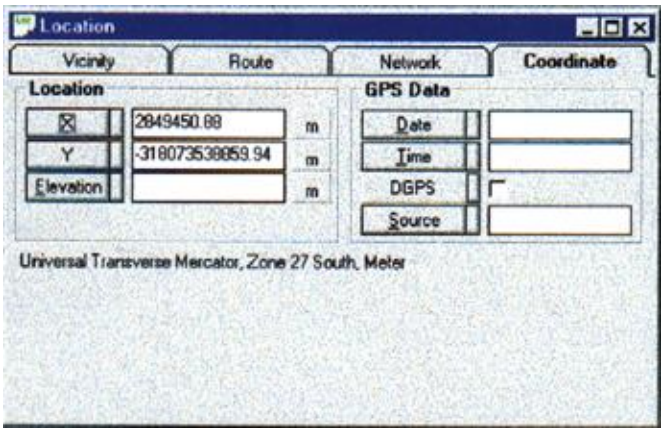


Fig 16.4 **Examples of Typical RSMS Data Entry Screens – 2**
Sign Location Data Entry Fields

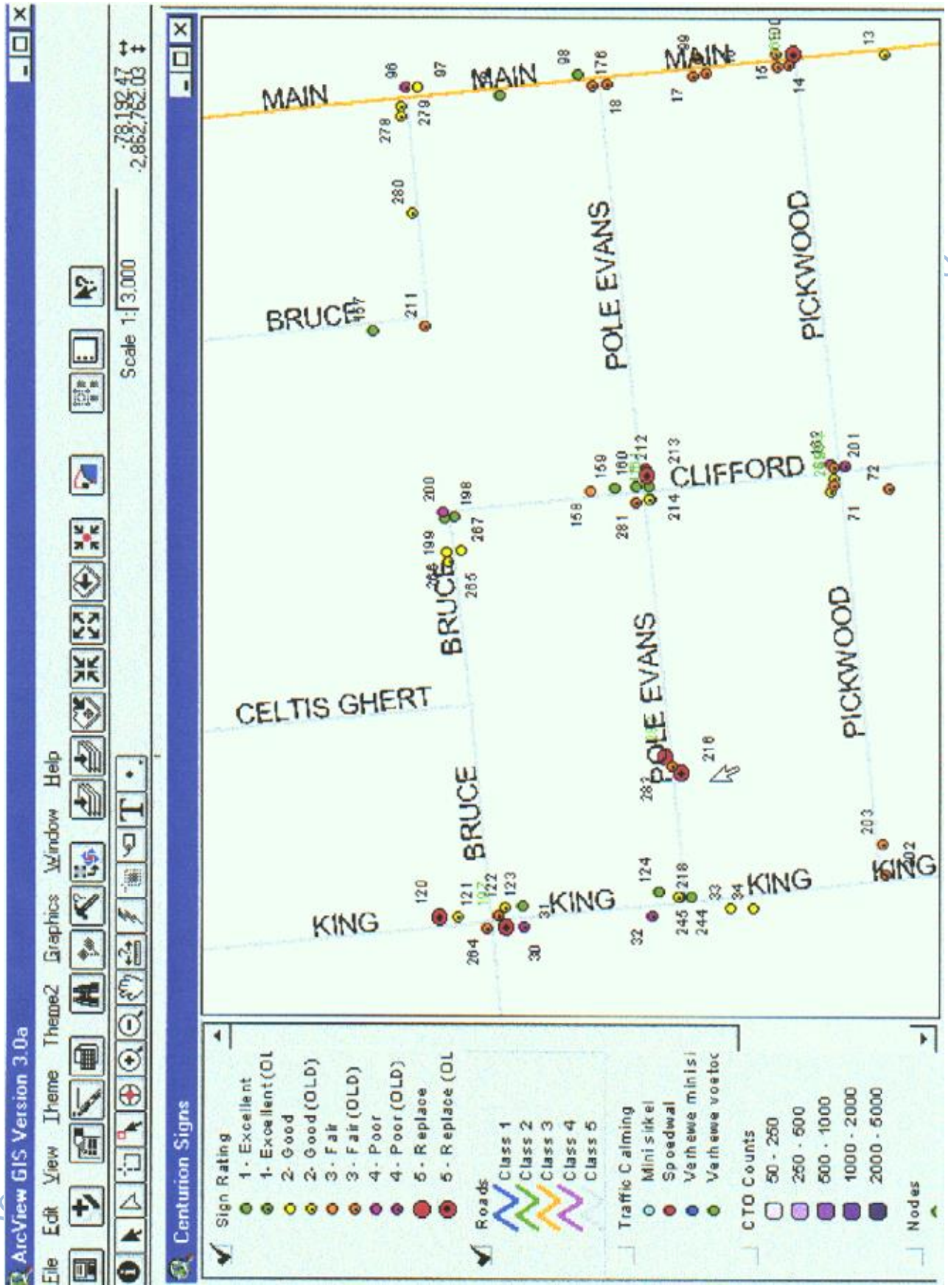


Fig 16.5 Typical GIS Representation of RSMS Sign Rating Status

TABLE 16.4 EXAMPLE OF RSMS SIGN REPLACEMENT PRINTOUT TABLE 16.4

Road Signs to be Replaced – 06/29/97

Label	Code	Sign Rating	Link ID	Route Name	Township	Position	Sign Direction
282	W402	5 - Replace	L2289	Pole Evans	Irene (1)	Road Surface	West
30	R1	5 - Replace (OLD)	L2479	King	Irene (1)	Left	South
303	W107	5 - Replace (OLD)	L2299	Nellmapius	Irene (1)	Left	West
262	R1	5 - Replace (OLD)	L2312	Verbena	Irene (1)	Left	West
216	W401	5 - Replace (OLD)	L2289	Pole Evans	Irene (1)	Road Surface	East
213	R210	5 - Replace (OLD)	L2289	Pole Evans	Irene (1)	Left	East
173	W406	5 - Replace (OLD)	L2581	Main	Irene (1)	Left Parallel	East
120	TW305	5 - Replace (OLD)	L2481	King	Irene (1)	Left	North
119	R1	5 - Replace (OLD)	L2542	King	Irene (1)	Left	North
106	R217	5 - Replace (OLD)	L2581	Main	Irene (1)	Left	North
102	R217	5 - Replace (OLD)	L2582	Main	Irene (1)	Left	North
100	R217	5 - Replace (OLD)	L2583	Main	Irene (1)	Left	North
101	W301	5 - Replace (OLD)	L2583	Main	Irene (1)	Left	North
134	R1	5 - Replace (OLD)	L2512	Krige	Irene (1)	Left	North
337	R1	5 - Replace (OLD)	L1179	Ewald	Celtisdal	Left	West
336	R2	5 - Replace (OLD)	L1179	Ewald	Celtisdal	Left	North
529	R1	5 - Replace (OLD)	L1126	Lenchen	Clubview	Left	West
423	W405	5 - Replace (OLD)	L1123	Hendrik Verwoerd	Clubview	Left	North
487	IN4	5 - Replace (OLD)	L1146	Kilkenny	Clubview	Left	West
488	R201	5 - Replace (OLD)	L1136	R28-WEST	Clubview	Left	West
489	R1	5 - Replace (OLD)	L1147	Limerick	Clubview	Left	West
528	R3	5 - Replace (OLD)	L1126	Lenchen	Clubview	Left	West
418	W406	5 - Replace (OLD)	L1121	Hendrik Verwoerd	Clubview	Right	North
408	R4_3	5 - Replace (OLD)	L1136	R28-WEST	Clubview	Right Parallel	North
525	R201	5 - Replace (OLD)	L1162	Die Uitsig	Clubview	Left	West
419	W405	5 - Replace (OLD)	L1121	Hendrik Verwoerd	Clubview	Left	North
406	R3	5 - Replace (OLD)	L1136	R28-WEST	Clubview	Right Parallel	North
397	R4_3	5 - Replace (OLD)	L1109	Jean	Clubview	Left	North
394	R1	5 - Replace (OLD)	L1130	M1-NORTH	Clubview	Left	North
392	W405	5 - Replace (OLD)	L1107	Von Willlich	Clubview	Left	North
391	W405	5 - Replace (OLD)	L1107	Von Willlich	Clubview	Left	North
365	R2	5 - Replace (OLD)	L1116	Aspen	Clubview	Left	South
349	R530	5 - Replace (OLD)	L1107	Von Willlich	Clubview	Left	South
348	W311	5 - Replace (OLD)	L1107	Von Willlich	Clubview	Left	South
340	R216	5 - Replace (OLD)	L1101	M1-SOUTH	Clubview	Cul de Sac	South
407	R3	5 - Replace (OLD)	L1136	R28-WEST	Clubview	Left	North
574	R1	5 - Replace (OLD)	L1199	Jan Kemp	Bronberri	Left	West
581	R1	5 - Replace (OLD)	L1202	Suikerbekkie	Bronberri	Left	West
557	R208	5 - Replace (OLD)	L1190	Jacobus	Bronberri	Left	East
535	R1	5 - Replace (OLD)	L1188	N1-SOUTH	Bronberri	Left	South
583	R208	5 - Replace (OLD)	L1204	Suikerbekkie	Cranbroo	Left	South
Etc.							

16.5 IMPLEMENTATION OF AN RSMS

16.5.1 General

1 The implementation of a comprehensive RSMS will, to a great extent, depend on the motivation of the road signs managers and their teams to cost-effectively maintain and operate the system.

2 The data capturing and evaluation of road signs information is a task that has to be undertaken on a continuous basis. This task can be started by firstly including new signs that are erected or existing signs that require maintenance until the complete system has been covered.

3 The expected average life-span of signs varies between five and ten years. It is therefore clear that the RSMS has to be operational for at least five years before the complete benefits can be obtained from the system. However, it can be expected that the effective implementation of maintenance procedures will have an immediate positive effect on the system.

4 The estimated cost to implement a RSMS will differ from one road authority to another but it was calculated that for the metropolitan areas the cost of implementation over a five-year period varies between 5% and 10% of the budget for maintenance/replacement of road signs. The initial cost will be relatively high but the benefits in the long-run will be worthwhile and the system could save maintenance cost, but are also cost-related to road safety and legal claims.

5 Road signs are implemented according to the new SARTSM and the implementation of a RSMS will ensure continuity of the road signs system and should be promoted as such amongst all road authorities in South Africa.

16.5.2 Bibliography for Road Sign Management Systems

1 The following references are recommended as a reading list for those wishing more detail on the development of Road Sign Management Systems (RSMS):

1. U.S. Department of Transportation: Federal Highway Administration, Sign Management System, October 1990.
2. U.S. Department of Transportation: Federal Highway Administration, Guide to Safety Features for Local Roads and Streets, 1991.
3. U.S. Department of Transportation, The 1988 Annual Report on Highway Safety Improvement Programs, Report of the Secretary of Transportation to the United States Congress, Report No. FWHA - SA-88-003.
4. South African Roads Board; Research and Development Advisory Committee, Guidelines for the Development and Implementation of a Traffic Signs and Markings Management System, Project Report PR 88/004/3, March 1991.
5. Transportation Research Board, National Research Council, Maintenance Management of Street and Highway Signs, September 1990.
6. CSRA-CUTA, Seminar on new Traffic Signs, Sign Maintenance, J G H le Roux, May 1988.
7. Stanway Edwards Associates Inc., A Comprehensive Road Signs Maintenance Management Software Package, September 1992.
8. Barton-Aschman Associates Inc., Traffic Control Device Inventory, City of Pasadena, January 1984.
9. Stanway Edwards Associates Ing., PREMET Vervoerstudie in Loodsstudie vir die Ontwerp en Implementering van 'n Inligtingstelsel vir die Bestuur van Padtekens.
10. Sator, W.H.J., Durability of Road Signs: Field Survey, CSIR Roads and Transport Technology, Research Report DPVT 78, 1989.
11. Micheall Bernhardt, Street Scene Management, 3M, Europe
12. Freeway Guide Sign: Replacement: Policies and Criteria, FWHA Transportation Research Board, National Research Council Report 155, April 1991.

16.6 A DETAILED DESCRIPTION OF A TYPICAL DATA STRUCTURE FOR A ROAD SIGN INVENTORY MODULE

16.6.1 General

1 The description of data items to be included in the proposed data structure of the Road Signs Inventory Module of the RSMS, is given in more detail in this appendix. Refer to Table 16.3 for a summary of these data items.

16.6.2 Position

1 Data is linked to a specific position of the road sign, firstly to road sign data and secondly to road link data. The ID number of a road sign is therefore linked to its position and to the link number. The following are examples of a reference system to allocate ID numbers:

(a) Urban areas:

Grid system
- Block number in grid;
- Intersection number in block or link/node number;
- Link number at intersection;
- Road sign number on link.

(b) Rural areas:

Road number and chainage along road from starting point; a link will then be described between two points (normally intersections) on the chainage along the road.

2 Other data items in Section A of Table 16.3 are self-explanatory.

16.6.3 Characteristics

1 The RTA/SADC-RTSM code for a road sign explains its exact function. The functional classification of the road sign is, however, linked to the road classification indicated in Section A of Table 16.3 and is important for prioritisation of management actions. This functional classification can indicate the importance of the road sign for example, with regard to:

(a) the classification of the road on which the sign is located, i.e. road hierarchy;

(b) traffic volumes and lanes;

(c) the cost of the specific sign.

2 The maintenance priorities set in the maintenance module, for instance, depend on the functional classification of the road signs.

3 The different types of sign face materials can generally be classified as class 1, 2, 3. Cognisance needs to be taken of the characteristics of each class, and the cost and guarantee given by suppliers, before decisions are made on what type of material should be used. See Chapter 17 for a proposed selection criteria for sign materials.

4 The other items in Section B of Table 16.3 are self-explanatory.

16.6.4 Dates

1 The capturing of dates into the database is important to establish a record of events within the life-span of a road sign, giving the reason for erection and the reason for cancellation. This information will help to determine the performance of the road signs with respect to aging, effect on orientation, inspection frequency, rate of vandalism, etc.

16.6.5 Condition Evaluation

1 Condition evaluation can be conducted in various ways. A method used by road authorities to ensure consistent evaluations is to prepare photographs displaying different conditions that relate to the evaluation process. This is then linked to a detailed description or drawing. A scale that can be used for the condition evaluation of road signs can be described as follows.

2 The sign face natural weathering (SFNW) and sign face human damage (SFHD) can be visually evaluated on a five point scale namely:

(a) 1 - Excellent condition; new;

(b) 2 - Good condition; few signs of aging;

(c) 3 - Fair condition; shows some sign of deterioration but will be serviceable for more than three years;

(d) 4 - Poor condition; should be replaced within one to two year period; and

(e) 5 - Replace road sign immediately as it is unserviceable.

The same evaluation can be done for sign posts.

3 Research was done on the durability of road signs in South Africa [(2)] and the following are the main problems related to durability:

(a) the discolouration of the sign face;

(b) the reduction of the retroreflective value of the sign face;

(c) corrosion of the sign backing board, stiffening structures and fixing bolts.

4 The high ultra-violet content of sun rays in South Africa is responsible for (a) and (b) related to durability, whilst poor specifications are the main reason for corrosion (c).

5 Minimum standards for retroreflective values are given in Volume 2, Chapter 17. The deterioration rate of retroreflectivity values on road signs during their life-span and the influencing factors contributing to the rate of deterioration should be built into the models to allow the prediction of the condition of road signs in advance.

16.6.6 Other

1 The items under Section E of Table 16.3 are self-explanatory and provide useful information for a comprehensive database.

16.7 TYPICAL PROCEDURES FOR THE MAINTENANCE AND MONITORING OF ROAD SIGNS

16.7.1 General

1 The procedures involved in the maintenance and/or monitoring module of a RSMS are important for the following reasons:

(a) improved productivity of maintenance teams;

(b) better control of resources;

(c) objective performance measurement is possible;

(d) better control of maintenance budgets and exact cost allocation for jobs.

These procedures should be implemented by means of computerisation of a RSMS.

2 The procedures are normally fulfilled at one of two levels of detail, namely:

(a) Level 1 (see Figure 16.6):

A comprehensive set of procedures, where all maintenance, rehabilitation and inspection activities with respect to every road sign on the network, is linked to the allocation and availability of personnel, materials, equipment and transport; this level is also linked to a costing system for labour costs, machine costs, material costs and transport costs; this procedure is based on a pre-planning process of tasks on job cards;

(b) Level 2:

The afore-mentioned procedures are normally executed on a less comprehensive scale by maintenance teams - road signs maintenance is only one of their various maintenance duties and is often neglected - rehabilitation and maintenance on road signs is normally done after routine inspections and urgent requests - a few important aspects of signs are recorded on forms as input to a database.

3 Different types of forms can be used by the system to capture or transfer maintenance/monitoring information. These forms are not discussed in detail as each road authority will have its own design and form layout. However, some typical examples are:

(a) defect report or list;

(b) inspection form or list;

(c) job card for internal team;

(d) job card for contractor.

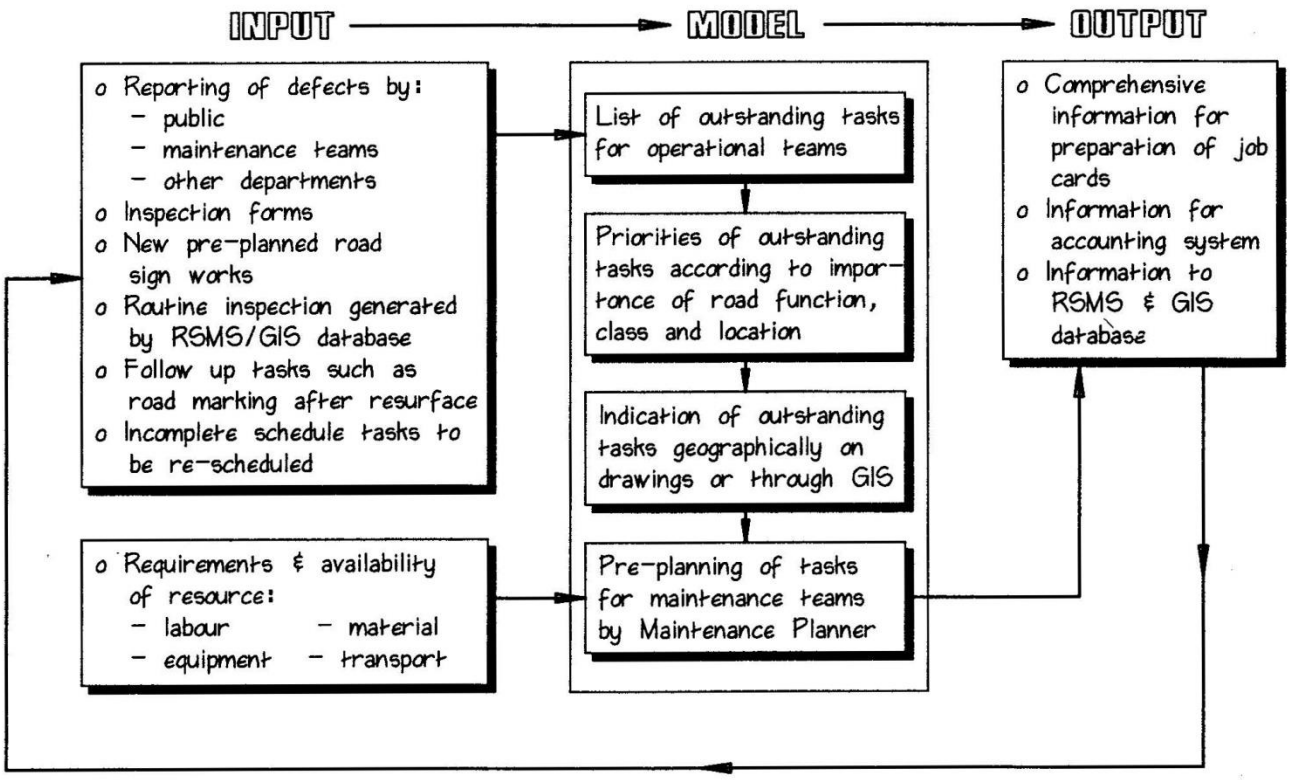


Fig 16.6 Maintenance Procedure Model