

SKILLS TRANSFER TRAINING PROGRAMME

CPD VALIDATION No. SARF19/1078/22 & SACPCMP /CPD/16/011

NEW ADVANCED TRAFFIC SAFETY OFFICER AND ROADWORKS TRAFFIC MANAGEMENT SAFETY CONTROL DEVICES

In Compliance with Legislation

Presented by
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AnFab Consult (Pty)Ltd
Sign Design, Training & Verification



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1

TRAFFIC ACCOMMODATION



TRAFFIC SAFETY OFFICER (TSO)
The **KEY** person for SAFE TRAFFIC FLOW



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2

LEARNING OBJECTIVES



- ✓
- ✓
- ✓
- ✓
- ✓



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COURSE CONTENTS



MODULE 1 (slide 30 -52) :

- Legislation: National Road Traffic Act and Regulations

MODULE 2 (slide 53-65) :

- Liability

MODULE 3 (slide 66-407) :

- Southern African Development Community (SADC) Road Traffic Signs Manual (RTSM)

MODULE 4 (slide 408-456) :

- South African Road Traffic Signs Manual (SARTSM) Volume 2 Chapter 13 – Roadworks Signing



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COURSE CONTENTS



- MODULE 5 (slide 457 - 577) :**
 - Roadworks Component Parts
- MODULE 6 (slide 578-588) :**
 - Signing Applications for Urban and Short Term Applications
- MODULE 7 (slide 589-596) :**
 - Signing Applications for Rural Applications
- MODULE 8 (slide 597-603) :**
 - Signing Applications for Freeway Applications



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COURSE CONTENTS



- MODULE 9 (slide 604-633) :**
 - COTO: Standard Specifications for Road and Bridge Works
- MODULE 10 (slide 634-671) :**
 - Traffic Safety Officer Roles and Responsibilities
- MODULE 11 (slide 672-759) :**
 - South African Bureau of Standards Specifications - SANS
- MODULE 12 (slide 762-816) :**
 - Flag procedures, STOP/GO and Signal Controls



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6

COURSE CONTENTS



- MODULE 13 (slide 817-881) :**
 - Road Restraint Systems: Containment Levels and Working Width
- MODULE 14 (slide 882-919) :**
 - Personal Protective Equipment(PPE) and Site Safety
- MODULE 15 (slide 920 - 932) :**
 - Site Inspections and Record Keeping
- MODULE 16 (slide 933-941) :**
 - Roadworks Safety Control Device Management System



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7

INTRODUCTION






**Potholes
for 20km**

TW331

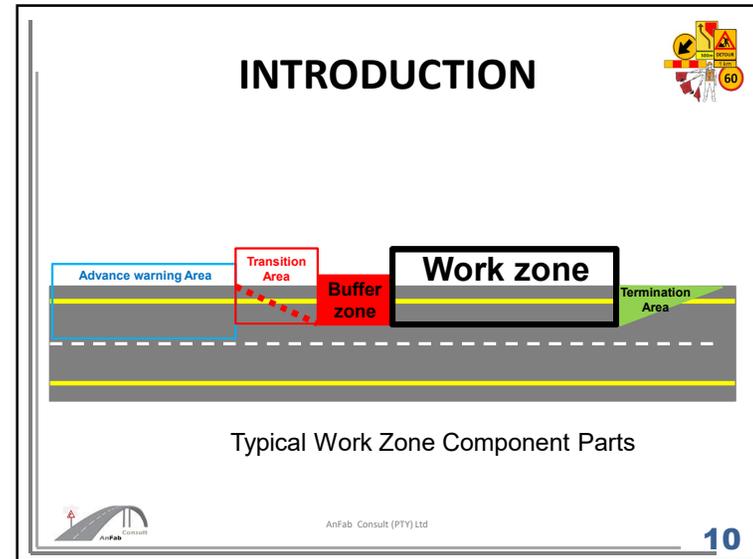
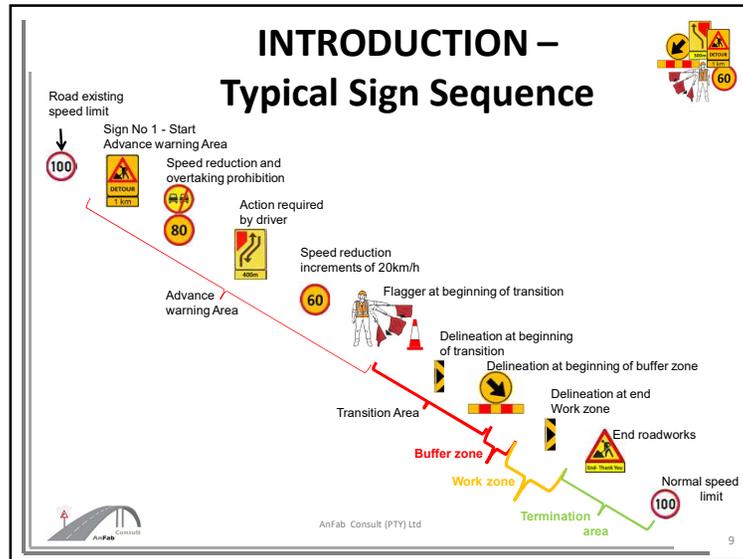


References
V1 3.4.14
V4 3.4.31

The UNEVEN ROADWAY warning sign W331 is to warn road users that there is a depression or ridge in the roadway or that the road surface is generally uneven or potholed.




8



ROAD FATALITIES

4. ROAD FATALITIES ANALYSIS

The section covers the data in relation to road fatalities. Fatalities are defined as when a person or persons that are killed during or immediately after a crash, or death within 30 days after a crash happened as a direct result on such crash. The section will encompass the number of fatalities and percentage distribution per road user, gender, race and per age.

4.1 Number of fatalities per province

Number of Fatalities per Province										
Year	EC	FS	GP	KZN	LT	MP	NC	NW	WC	RSA
2017	1 613	922	2 800	2 734	1 705	1 577	434	1 029	1 236	14 050
2018	1 675	945	2 539	2 473	1 581	1 313	352	979	1 064	12 921

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13

VEHICLE CRASHES TIME OF DAY

Time Interval	2017 (%)	2018 (%)
00:00 - 01:00	3.4%	3.4%
01:00 - 02:00	3.0%	3.0%
02:00 - 03:00	3.1%	3.1%
03:00 - 04:00	2.9%	2.9%
04:00 - 05:00	2.3%	2.3%
05:00 - 06:00	3.7%	3.7%
06:00 - 07:00	4.3%	4.3%
07:00 - 08:00	3.4%	3.4%
08:00 - 09:00	2.4%	2.4%
09:00 - 10:00	2.8%	2.8%
10:00 - 11:00	2.5%	2.5%
11:00 - 12:00	2.7%	2.7%
12:00 - 13:00	2.8%	2.8%
13:00 - 14:00	3.2%	3.2%
14:00 - 15:00	3.1%	3.1%
15:00 - 16:00	3.9%	3.9%
16:00 - 17:00	4.8%	4.8%
17:00 - 18:00	8.2%	8.2%
18:00 - 19:00	6.3%	6.3%
19:00 - 20:00	8.3%	8.3%
20:00 - 21:00	8.0%	8.0%
21:00 - 22:00	7.2%	7.2%
22:00 - 23:00	5.5%	5.5%
23:00 - 24:00	4.4%	4.4%
	2.7%	2.7%
	2.8%	2.8%

Figure 3: % distribution of fatal crashes per time of day for two years 2017 and 2018

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VEHICLE CRASH TYPES

Crash Type	2017 (%)	2018 (%)
Accident with pedestrian	36.6%	36.6%
Single vehicle overturned	19.8%	19.8%
Hit and Run	10.0%	10.7%
Head-on	10.4%	9.5%
Head rear	4.3%	4.8%
Accident with fixed object	4.2%	4.2%
Sideways opp dir	4.3%	3.9%
Single vehicle left (w. road	2.8%	2.8%
Approach at angle	2.5%	1.7%
Person left off	2.0%	2.0%
Sideways same dir	1.8%	1.8%
Accident with cyclist	1.6%	1.6%
Unknown	1.0%	1.0%
Accident with animal	1.28%	0.6%
Accident with train	0.0%	0.51%
	0.2%	0.1%

Figure 4: Percentage distribution of fatal crashes per crash type

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15

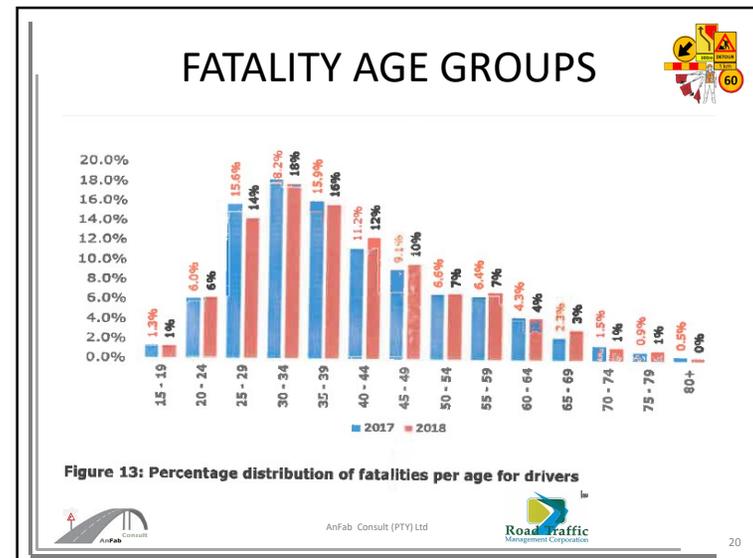
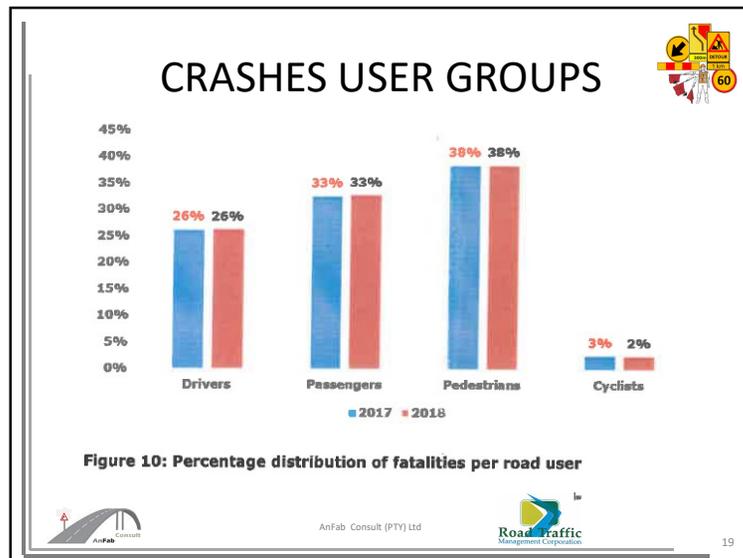
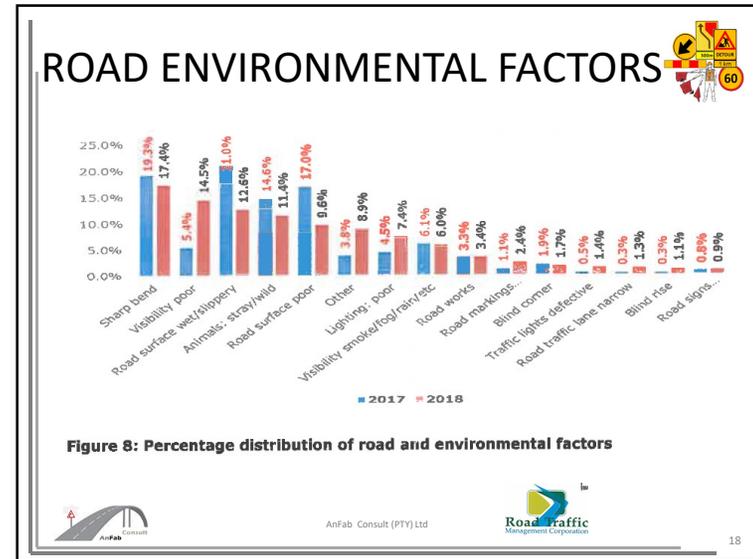
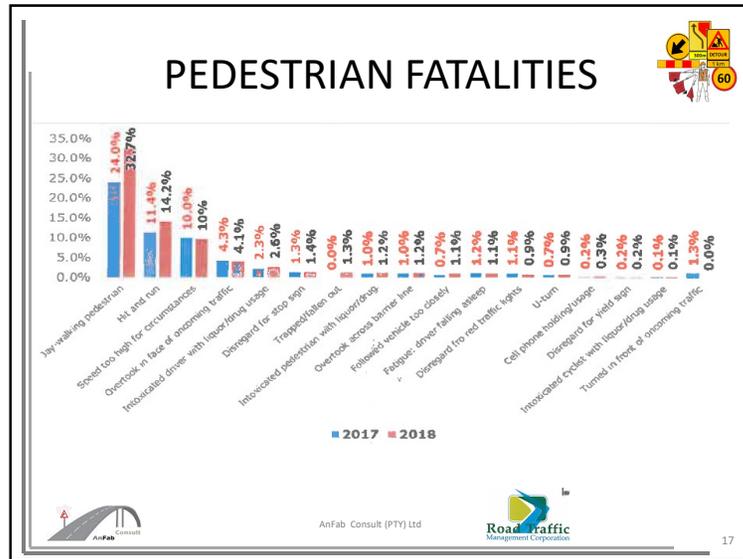
VEHICLE CRASH CONTRIBUTING FACTORS

Factor	2017 (%)	2018 (%)
Human factors	91%	89.3%
Vehicle factors	3%	4.2%
Roads & Environmental factors	5%	6.5%

Figure 5: Vehicle Crash Contributing Factors

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INTRODUCTION



And I **ONLY** had **ONE** drink !!!



21



INTRODUCTION



All appropriate road signs should be in position at the pre-warning area prior to the commencement of the roadworks control zone



23



OBJECTIVES OF ROADWORKS SIGNING



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OBJECTIVES OF ROADWORKS SIGNING



In order to achieve the safest possible operating environment the following objectives should be sought with disciplined attention to detail:

- ❑ (a) to establish, as far as possible, a standard pattern of traffic control devices for typical road construction and maintenance operations which is simple and clear to understand;



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OBJECTIVES OF ROADWORKS SIGNING



- ❑ (b) to develop in drivers, by means of exclusive signs which are visible and have a simple and easily understood message, a high level of awareness that a reduced standard of roadway exists ahead of them, and the knowledge that this requires their increased vigilance;
- ❑ (c) to generate a high level of driver respect and familiarity for the efficiency and adequacy of the traffic management used at roadworks;



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OBJECTIVES OF ROADWORKS SIGNING



- ❑ (d) to maintain roadway capacity and traffic flow at the highest possible levels, particularly on the higher class routes, where large traffic volumes would otherwise result in congestion, delay and accident potential;
- ❑ (e) to keep roadway related accident levels at a minimum;



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OBJECTIVES OF ROADWORKS SIGNING



- ❑ (f) to provide adequate information to redirect drivers via alternative routes when detours are implemented;
- ❑ (g) to provide designers of traffic management systems, and the site staff who implement them, with adequate tools with which to accomplish the above objectives;



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INTRODUCTION



All Actions required of a driver should appear obviously realistic to him or her. When work conditions are variable, the temporary signing must be maintained so that the signs correctly represent the conditions applicable the given time.



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MODULE 1 - NATIONAL ROAD TRAFFIC ACT AND REGULATIONS



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LEGISLATION – MINIMUM REQUIREMENTS



➤ Legislation:

The legislation pertaining to Road Traffic Signs is: **Sections 56 to 59 of the National Road Traffic Act 1996, (Act 93 of 1996)** and **Regulations 284 to 291 of the National Road Traffic Signs Regulations, 2000**



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LEGISLATION – MINIMUM REQUIREMENTS



NATIONAL ROAD TRAFFIC ACT 93 OF 1996

- Section 56 allows the Minister to prescribe road traffic signs.
- Section 57 determines the requirements for the display of road traffic signs and enables the various authorities to display road traffic signs.



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LEGISLATION – MINIMUM REQUIREMENTS 

NATIONAL ROAD TRAFFIC ACT 93 OF 1996

Section 56

(3) (a) A local authority, or any person in its employment authorized thereto by it either generally or specifically, may in respect of any public road within the area of jurisdiction of that local authority display or cause to be displayed in the prescribed manner any such road traffic signs as such authority or person may deem expedient.

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LEGISLATION – MINIMUM REQUIREMENTS 

NATIONAL ROAD TRAFFIC ACT 93 OF 1996

Section 57

(b) A local authority may **in writing authorise** any other person or body to display or cause to be displayed within its area of jurisdiction and in the prescribed manner any road traffic sign approved by it prior to the display of such sign.

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LEGISLATION – MINIMUM REQUIREMENTS 

NATIONAL ROAD TRAFFIC ACT 93 OF 1996

Section 89. Offences and penalties

(1) Any person who contravenes or fails to comply with any provision of this Act or with any direction, condition, demand, determination, requirement, term or request thereunder, shall be guilty of an offence.

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LEGISLATION – MINIMUM REQUIREMENTS 

NATIONAL ROAD TRAFFIC ACT 93 OF 1996

Section 89. Offences and penalties

The effect of this is that, if a specific sign is permitted and prescribed in the legislation and a sign, which do not conform to the legislation, is displayed, it is illegal in terms of section 89 and is technically an offence. A person would be able to lay a criminal charge against an authority that does not comply with the legislation.

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LEGISLATION – MINIMUM REQUIREMENTS



NATIONAL ROAD TRAFFIC REGULATIONS, 2000



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LEGISLATION – MINIMUM REQUIREMENTS



NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Applicable Regulations

Regulation 286A. Colours for manufacture of road traffic signs

(5) Subject to the provisions of this Part, the colour of the standard or post specifically erected for the display of a road sign shall, where the standard or post is-

(a) of steel, be grey: Provided that if the steel has been treated this requirement shall not apply;



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LEGISLATION – MINIMUM REQUIREMENTS



NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Applicable Regulations

Regulation 286A. Colours for manufacture of road traffic signs

(5) Subject to the provisions of this Part, the colour of the standard or post specifically erected for the display of a road sign shall, where the standard or post is-

(b) of wood, be the colour of the wood as treated or painted grey or brown; and.....



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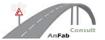
LEGISLATION – MINIMUM REQUIREMENTS



NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Regulation 286A. Colours for manufacture of road traffic signs

(c) of concrete, be the natural colour of the concrete, and in the case of a road signal the standard, post or cantilever shall be golden yellow, portions of which may be retro-reflective; Provided that this provision shall not be applicable to an overhead traffic signal mounted on a gantry.



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LEGISLATION – MINIMUM REQUIREMENTS

NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Roadworks sign:

COLOURS:

Triangle: Red retro-reflective
Symbol: Black semi-matt
Background: Yellow retro-reflective

Warns a road user that temporary road construction, maintenance or related work is in progress ahead.



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LEGISLATION – MINIMUM REQUIREMENTS

NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Part III – DIMENSION OF VEHICLES

Regulation 221. Overall Length of Vehicle : **22m**

Regulation 223. Overall Width of Vehicle : **2,6m**

Regulation 224. Overall Height of Vehicle : **4,65m**



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ABNORMAL VEHICLES



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LEGISLATION – MINIMUM REQUIREMENTS

NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Regulation 292. General Speed Limits

A general speed limit of-

- (a) **60 kilometres per hour** shall apply in respect of every public road or section thereof, situated within an **urban area**;
- (b) **100 kilometres per hour** shall apply in respect of every public road or section thereof, **other than a freeway**, situated **outside an urban area**; and



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LEGISLATION – MINIMUM REQUIREMENTS

NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Regulation 292. General Speed Limits



A general speed limit of-
(c) 120 kilometres per hour shall apply in respect of every **freeway**.

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LEGISLATION – MINIMUM REQUIREMENTS

NATIONAL ROAD TRAFFIC REGULATIONS, 2000

Applicable Regulations

- Regulation 316. Duties of Pedestrians
- Regulation 315. Pedestrian's Right of Way in Pedestrian Crossing
- Regulation 318. Convoys on Public Road
- Regulation 319. Hindering or Obstruction Traffic on Public Road
- Regulation 321. Damage on Public Roads

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Complete assignment questions 1



Please note the **slide number** with the question and forward to anfabconsult@gmail.com

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MODULE 2 - LIABILITY



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LIABILITY

Criminal Liability

In the case of a private company the directors would be responsible. A director is normally charged and not the servants, although it is possible to charge a servant as well.



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LIABILITY

Criminal Liability

Section 332 of the Criminal Procedure Act, 1977 allows for juristic persons to be criminally prosecuted. A director or servant of such a juristic person must then represent the legal person in court.



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LIABILITY

Tort Liability

In situations where a person or authority does not act according to the norm acceptable for the circumstances and situation and due to the actions or negligence of its directors or servants cause damage and are accountable for their actions.



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LIABILITY
Tort Liability

Tort liability arises when there is a legal duty to perform a certain task and the task is not performed or performed incorrectly.



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LIABILITY
Tort Liability

Guideline documents like the SADC Road Traffic Signs Manual and the Road Safety Manual will normally only be applicable to tort liability cases.



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LIABILITY
Tort Liability

If guidelines are not followed, an authority should document the details and reasons for the diversion



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LIABILITY
Tort Liability

Employees change or get promoted and it is not later possible to determine reasons for diversions from guidelines.



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LIABILITY

Tort Liability

Keep record of all signs displayed at each project for future reference.

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TRAFFIC SAFETY OFFICER

Crash Investigations and Criminal Liability Cases

In the case of a private company the directors would be responsible. A director is normally charged and not the servants (**TSO**), although it is possible to charge a servant (**TSO**) as well.



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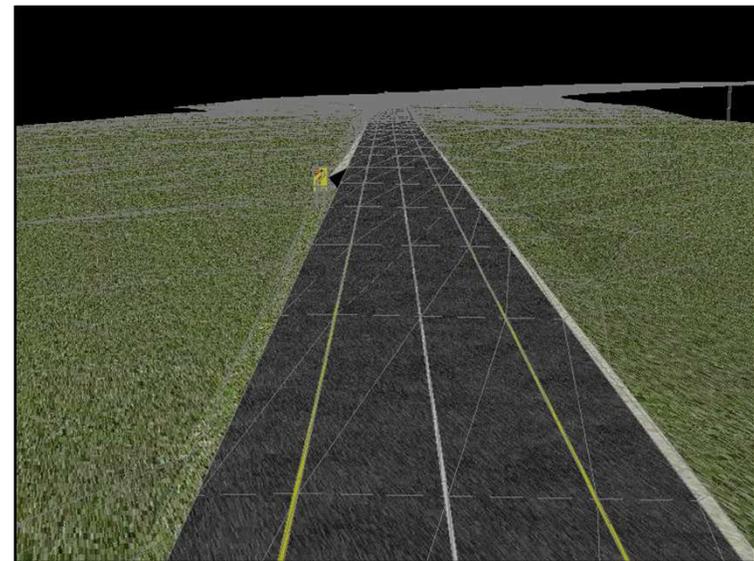
TRAFFIC SAFETY OFFICER

Crash Investigations and Liability

Documentation Required (TSO)

- Approved traffic control plan(TCP)
- Engineer approval certificate to proceed with deviation or detour
- TSO Inspection certificate and photos
- Traffic management plan(TMP)
- Remedial measures
- Traffic management system

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Complete assignment question 2



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MODULE 3 - SADC ROAD TRAFFIC SIGNS MANUAL VOLUME 1 AND 4



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SADC ROAD TRAFFIC SIGNS MANUAL VOLUME 1

Download - www.sartsma.co.za

- Chapter 1 – General Principles
- Chapter 2 – Regulatory Signs
- Chapter 3 – Warning Signs
- Chapter 4 – Guidance Signs
- Chapter 5 – Information Signs
- Chapter 6 – Traffic Signals



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1

- Chapter 7 – Road Markings
- Chapter 8 – Navigational Aids
- Chapter 9 – Variable Message Signs
- Chapter 10 – Glossary
- Chapter 11 – Index



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

- 1.2 Road Classification
- 1.3 Road Traffic Sign Classification
- 1.4 Shape, Size and Colour
- 1.5 Specification Manufacture
- 1.6 Sign Placement



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

- 1.7 Human Factors
- 1.8 Positive Guidance
- 1.9 Outdoor Advertising
- 1.10 Road Traffic Sign Maintenance
- 1.11 Road Traffic Sign Maintenance Management Systems



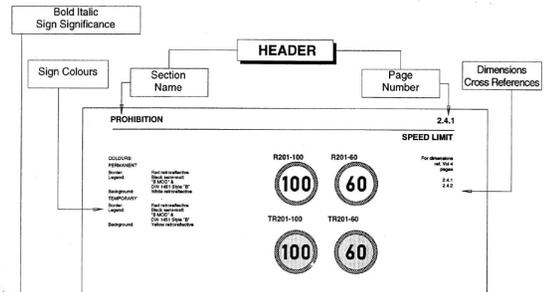
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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

1.1.2 INTRODUCTION



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

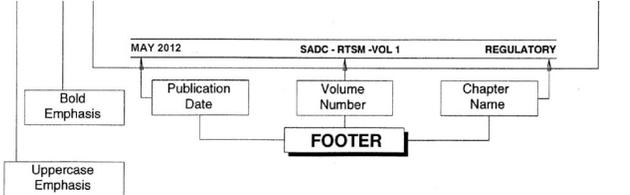


Fig 1.1 Typical Page Layout and Text Conventions

GENERAL PRINCIPLES SADC - RTSM - VOL 1 MAY 2012



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72



SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

There are three words used throughout the Manual dealing with the function, design and application of traffic control devices, the interpretation of which is fundamental to the use of the Manual. These words are the very common words **"SHALL"**, **"SHOULD"** and **"MAY"**. The meanings attached to these words for the purpose of interpreting the Manual shall be:

- (a) **"SHALL"** - a mandatory condition - when this word is used it means that the condition or conditions referred to must be complied with;
- (b) **"SHOULD"** - an advisory condition - when this word is used it is advisable or recommended to comply with the condition or conditions referred to (see also **"RECOMMENDED"** in paragraph 1.1.4.6);
- (c) **"MAY"** - a permissive condition - the conditions referred to are optional.



73

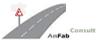


SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

1.1.18 Roadworks Signing

- 1 Motivation for an exclusive signing system for use at roadworks has also been a major factor in the technical revision process. A system of temporary signs has therefore been created for use at roadworks and other temporary situations.
- 2 The range of temporary signs is comprehensive. The following important aspects should be noted:
 - (a) there is no temporary version of STOP sign R1, YIELD sign R2, NO ENTRY sign R3 or ONE WAY ROADWAY sign R4 - the standard permanent forms of these signs shall be used in all circumstances;



74



SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

- (b) certain signs are ONLY available in a temporary form;
- (c) certain signs are ONLY available in a permanent form (in addition to those mentioned in (a) above).

- 3 The significance and application of all individual temporary signs is covered in this volume. The collective use of temporary signs at roadworks is covered in Volume 2, Chapter 13.



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

1.1.21 Awareness and Education

- 1 The extent of change in the sign system incorporated in this Edition makes it obligatory on all authorities to coordinate awareness and educational campaigns directed at:
 - (a) road users;
 - (b) road authority officials;
 - (c) traffic officers;
 - (d) those involved in vehicle driver training;
 - (e) traffic control device manufacturers;
 - (f) international visitors.
- 2 Awareness and educational effort should be directed at the operational principles of the signing system.



76

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

The Third Edition of the Southern African Development Community Road Traffic Signs Manual comprises four volumes:

Volume 1: Uniform Traffic Control Devices: Detailing signing policies and design principles together with specific information on the meaning and individual application of all traffic control devices.

Volume 2: Traffic Control Device Applications: Covers the use of sets of signs, markings and signals for specific applications.

Volume 3: Traffic Signal Design: Detailing, in depth, requirements for the selection and installation of traffic signals and their methods of control.

Volume 4: Traffic Signs Design: Dimensional detail for all road traffic signs and their signface components.



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

1.1.22 Legal Aspects

1 References are made regularly to the legal implications of the material contained in this Manual and in the relevant regulations. Authorities should be aware that in many instances the principles of common law also apply to their actions in addition to those of Road Traffic Legislation.



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles - Approved Colours

White		Black	
Red		Yellow	
Brown		Blue	
Green		Orange	
Grey			

Key to Colour Coding



Fluorescent YELLOW GREEN – Vulnerable Road Users – TO BE APPROVED



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles Road Traffic Sign Shape Size and Colour

	Permanent	Temporary
Control		
Regulatory signs	Command:	
	Prohibition:	
Reservation		
Warning signs	Advance Warning:	
	Hazard Markers:	



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Shape Size and Colour

81

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Shape Size and Colour

82

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Classification Class A1

83

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Road Classification Class A2

84

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Road Classification Class B: R = Regional



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Road Classification Class B: M = Metropolitan



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Road Classification Class D and E
– un numbered roads



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Classification

The basic ROAD SIGN classification is as follows:

- (a) REGULATORY signs - R numbering series and generally a circular shape
- (b) WARNING signs - W numbering series and generally a triangular shape;
- (c) GUIDANCE signs - G numbering series and generally a rectangular shape;
- (d) INFORMATION signs - IN numbering series and generally a rectangular shape.



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Shape Size and Colour



Detail 1.10.1 Temporary Regulatory Signs



Detail 1.10.2 Temporary Warning Signs

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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Shape Size and Colour



Detail 1.10.3 Temporary Guidance Signs

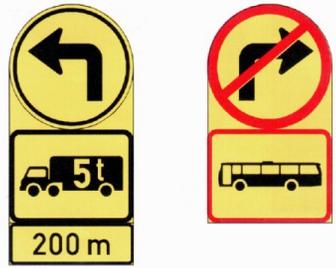


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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Shape Size and Colour



Detail 1.10.4 Selective Restriction Signs

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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign Shape Size and Colour



Detail 1.10.5 High Visibility Signs

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LEGISLATION – MINIMUM REQUIREMENTS

SADC Road Traffic Signs Manual
Volume 1

Uniform Traffic Control Devices
Detailing signing policies and design principles together with specific information on the meaning and individual application of all traffic control devices



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LEGISLATION – MINIMUM REQUIREMENTS

SADC Road Traffic Signs Manual
Volume 1 – Part 1
References
TW336 V1 3.4.16
V4 3.4.36



Roadworks



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ADVANCE WARNING AREA SIGNAGE

Step 1 - Roadworks Ahead

1200mm Urban



Lane Closure
300m

1500mm Rural



Pothole Repair
for 5km

1200 x 2000 Freeway



DETOUR
1 km

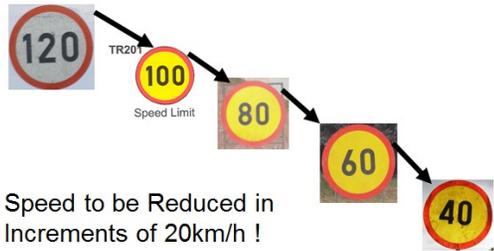
Daytime Slow Speed Night Time High Speed



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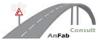
LEGISLATION – MINIMUM REQUIREMENTS

➤ SADC Road Traffic Signs Manual
Volume 1 – Part 1



Speed to be Reduced in Increments of 20km/h !

2. Step 2 -Speed reduction
Common Signs Displayed at Roadworks Construction sites



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LEGISLATION – MINIMUM REQUIREMENTS

➤ SADC Road Traffic Signs Manual
Volume 1 – Part 1

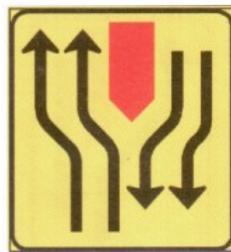



Step 3. Warning/Guidance Action Required by driver
Common Signs Displayed at Roadworks Construction sites – Day time Short term low speed

97

LEGISLATION – MINIMUM REQUIREMENTS

➤ SADC Road Traffic Signs Manual
Volume 1 – Part 1

3. Warning/Guidance Action Required by driver
Common Signs Displayed at Roadworks Construction sites – Long term night time high speed

98

LEGISLATION – MINIMUM REQUIREMENTS

SADC Road Traffic Signs Manual
Volume 1 – Part 1



Step 4 - Transition control

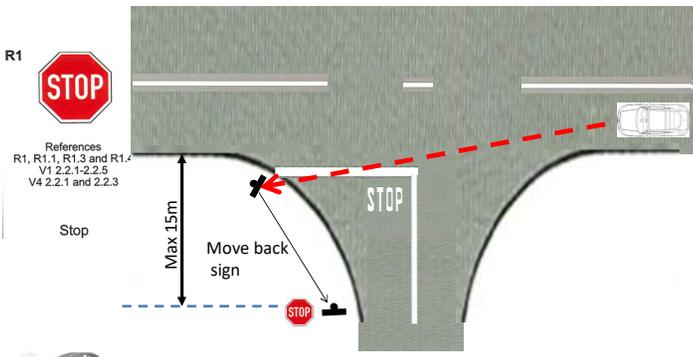




Common Signs Displayed at Roadworks Construction sites

99

Regulatory R1 Stop Control - Junction Sight Distance Consideration



References
R1, R1.1, R1.3 and R1.4
V1 2.2.1-2.2.5
V4 2.2.1 and 2.2.3

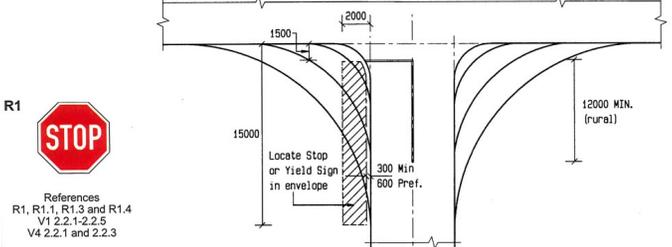
100

Regulatory R1 Stop Control - Junction Sight Distance Consideration



101

Roadworks Temporary Regulatory R1 Stop Control Signs



Detail 3.1.2 Position of Stop or Yield Signs

Fig 3.1 Junction Sight Distance Consideration

102

Roadworks Temporary Regulatory R1 Stop Control Signs



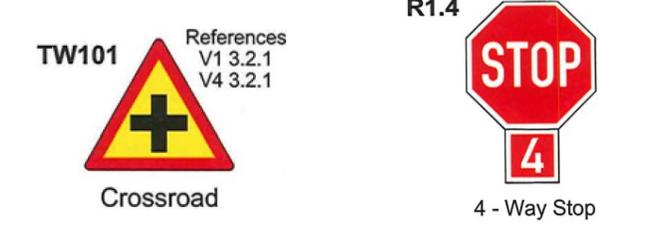
References
R1, R1.1, R1.3 and R1.4
V1 2.2.1-2.2.5
V4 2.2.1 and 2.2.3

Stop

TW103
References
V1 3.2.1
V4 3.2.1
Priority Crossroad on
Non-Priority Road

103

Roadworks Temporary Warning Road Layout Signs



TW101
References
V1 3.2.1
V4 3.2.1
Crossroad

R1.4
STOP
4
4 - Way Stop

104

Roadworks Temporary Regulatory Control Signs

TABLE 2.5 MINIMUM STOPPING SIGHT DISTANCES TABLE 2.5

Effective Approach Speed (km/h)	Minimum Sight Distance Required (m)
50	70
60	95
70	125
80	150
85	165

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105

Roadworks Temporary Regulatory Control Signs

R2

References
V1 2.2.6
V4 2.2.5
Yield

Speed-main Road (km/h)	P	S (m)	SU+T
60	95	140	
80	130	185	
100	195	230	
120	190	280	

Stop Condition

Speed-main Road (km/h)	W=7,5/P	S (m)	W=15/SU+T
60	120	250	
80	160	330	
100	195	420	
120	235	500	

R1

References
R1, R1.1, R1.3 and R1.4
V1 2.2.2.5
V4 2.2.1 and 2.2.3
Stop

Detail 3.1.1 Basic Sight Distance Criteria (Ref: Volume 1 - Chapter 2)

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106

Roadworks Temporary Regulatory R1.1 Stop Signs

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107

Roadworks Temporary Regulatory R1.2 Stop/Yield Signs

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108

Roadworks Temporary Regulatory Signs

R1.3



3 - Way Stop

R1.4



4 - Way Stop

3 WAY-STOP sign R1.3 shall be used if all-way stop control is required on a three-leg road junction; a 3 WAY-STOP sign R1.3 shall have the same mandatory requirements of a driver as STOP sign R1; additional requirements are covered in paragraph 2.2.1.4;

4 WAY-STOP sign R1.4 shall be used if all-way stop control is required on a four-leg road junction; a 4 WAY-STOP sign R1.4 shall have the same mandatory requirements of a driver as STOP sign R1; additional requirements are covered in paragraph 2.2.1.4;

All-way stop control should not be applied at road junctions when one or more of the following conditions pertain to the junction:

- (a) the road is a trunk road or major arterial road;
- (b) the junction has more than four approach legs;
- (c) the approach roads have a speed limit of 80 km/h or more or that the 85-percentile speed of traffic exceeds 85 km/h;
- (d) the junction is on a public passenger transport route;
- (e) where pedestrian movements on an average day exceed 200 persons in any one hour across any single approach road;
- (f) the junction lies on a route between junctions controlled by co-ordinated traffic signals.

109

Roadworks Temporary Regulatory Control Signs

R1.5A



References
V1 2.2.3
V4 2.2.1

Stop
(Stop/Go Control)

R1.5B



References
V1 2.2.3
V4 2.2.4

Go
(Stop/Go Control)

(e) STOP and GO signs R1.5A and R1.5B may be used for temporary traffic control at roadworks or other temporary public facility maintenance sites; display of sign R1.5A imposes:

- (i) a mandatory requirement that the driver of a vehicle shall stop such vehicle with its front end in line with the stop sign, and-
- (ii) a mandatory requirement that the driver shall not proceed until permitted to do so by the display of the GO sign, and then with caution.

Signs R1.5A and R1.5B shall be mounted back-to-back so that the legend STOP is displayed on one side and the legend GO on the other side. The signs may be mounted on a pedestal or staff to permit easy rotation. The colours of sign R1.5B have been altered to black on yellow from the white on green of the earlier sign to conform to the temporary sign colour code and to impart a message of "caution" consistent with the application of the sign.

	Operating speed (km/h)	
	100 or more	60 to 90
Circular sign diameter (mm)	1200	900
Rectangular sign- x/W (mm)	1200 x 900	900 x 675

110

Roadworks Temporary Regulatory Signs

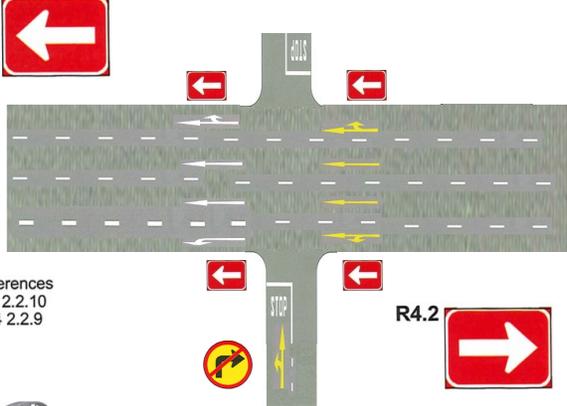


R4.3 One - Way (Straight - On)

References
V1 2.2.10
V4 2.2.9

111

Roadworks Temporary Regulatory Signs



R4.2

References
V1 2.2.10
V4 2.2.9

112

Roadworks Temporary Regulatory Signs

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113

Roadworks Temporary Regulatory Command Signs

TR108
Turn Left

TR109
Turn Right

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114

2.3.5 Turn Left and Turn Right

- The TURN LEFT and TURN RIGHT regulatory signs R108 and R109 impose a mandatory requirement that the driver of a vehicle shall proceed only in the direction indicated by the arrow on such sign, at the junction ahead. If the sign applies only to certain period(s) of the day or to a specific class of vehicle this may be indicated by a secondary message below the primary signs. The latter application will classify the combined sign as a SELECTIVE RESTRICTION sign (see Section 2.7).
- Signs R108 and R109 should only be displayed in advance, on an approach to a junction where traffic from that approach may only enter one leg of the junction as indicated by the sign.
- If the mandatory requirement excludes one class of vehicle the movement which that class of vehicle shall undertake should be signed separately.
- Signs R108 and R109 may be used in combination with ONE-WAY ROADWAY signs R4.1 or R4.2 to control traffic movements at a junction. The signs should be sized in accordance with Table 2.4.
- The signs should be displayed on the left side of the roadway at least 15 m in advance of the junction. If the roadway is a one-way roadway a second sign may be located on the right side of the roadway. Care shall be taken to see that no property access lies between the sign and the junction.
- Temporary regulatory signs TR108 and TR109 may be used under the same circumstances as permanent TURN LEFT and TURN RIGHT regulatory signs when a temporary detour is required in an urban area, particularly within a business or central business district.

Roadworks Temporary Regulatory Command Signs

TR105
Proceed Left Only

TR106
Proceed Right Only

TR107
Proceed Straight Only

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115

2.3.4 Proceed Left Only, Proceed Right Only and Proceed Straight Only

- The PROCEED LEFT ONLY, PROCEED RIGHT ONLY and PROCEED STRAIGHT ONLY regulatory signs R105, R106 and R107 impose a mandatory requirement that the driver of a vehicle shall proceed only in the direction indicated by an arrow on such sign.
- Signs R105 and R106 should be displayed on the far side of a one-way roadway facing traffic wishing to enter the one-way roadway from the stem of a T-junction or from an exit from a site generating significant volumes of traffic.
- Sign R107 should be displayed at the side of a roadway in advance of a junction to indicate that traffic shall only proceed straight on.
- Temporary regulatory signs TR105, TR106 and TR107 may be used at temporary roadworks or at other temporary traffic control situations under the same circumstances as permanent PROCEED LEFT ONLY, PROCEED RIGHT ONLY or PROCEED STRAIGHT ONLY signs. Signs TR105 and TR106 may commonly be used at a roadworks site when a temporary road closure is required and movement is only permitted to move to the left OR right as the case may be. Sign TR105 and TR106 SHALL NOT be mounted together if traffic is permitted to move to the left AND right of the road closure i.e. into a two-way cross road. In such a situation a T-JUNCTION CHEVRON hazard marker sign W409 should be used.
- Sign R105 and R106 or TR105 and TR106 should be located so that traffic obeying the signs turns in front of the signs. The signs should be sized in accordance with Table 2.4.

Roadworks Temporary Regulatory Command Signs

TR105
Proceed Left Only

TR108
Turn Left

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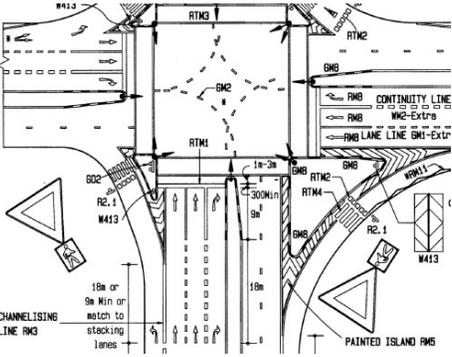
116

Roadworks Temporary Regulatory Signs

R2.1



References
V1 2.2.7
V4 2.2.6
Yield to
Pedestrians



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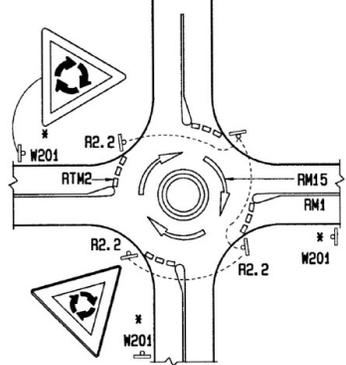
117

Roadworks Temporary Regulatory Signs

R2.2



References
V1 2.2.8
V4 2.2.7
Yield at
Mini Circle



Detail 3.20.1 Small Circle at Cross Road

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118

Roadworks Temporary Regulatory Control Signs

R3



References
V1 2.2.9
V4 2.2.8
No Entry

2.2.5 No Entry

- The NO ENTRY regulatory sign R3 is to indicate to the driver of a vehicle that the entry of all vehicular traffic is prohibited.
- Sign R3 should be displayed to prohibit "wrong way" entry to a roadway when confusion may exist as to the direction of travel in a roadway or at a road junction. Sign R3 may be particularly relevant when one or more ONE-WAY ROADWAY signs R4.1, R4.2 or R4.3 are not adequate or appropriate, for whatever reason. Likely locations are:
 - freeway off-ramp junctions with cross roads;
 - one-way exit only roadways from bus termini or car parks;
 - at junctions where one-way roadways become two-way roadways.
- Consistent with the philosophy of giving a POSITIVE message rather than a NEGATIVE message, wherever possible, the POSITIVE regulatory ONE-WAY ROADWAY signs R4.1, R4.2 or R4.3 are preferred to the NEGATIVE regulatory sign R3 at junctions of one way roadways. However, in special situations where the background environment to signs R4.1 or R4.2 or R4.3 is busy and/or confusing, emphasis may be provided by using both sign types (see Subsections 2.1.1 and 2.2.5 and Volume 2).
- NO ENTRY signs R3 should not be qualified by making them applicable only for a portion of the day, or to some classes of vehicle. If a need exists to reserve access to a portion of roadway or to some off-street facility used by vehicular traffic, to a specific class of vehicle or for a specific time of day, then an appropriate RESERVATION sign should be used. (See paragraph 2.1.1.6 and Section 2.5 and in particular Subsections 2.5.6 and 2.5.7.)
- Care should be taken in siting R3 signs to avoid the possibility of confusing drivers as to which roadway they apply to. The sign should normally be displayed on the left hand side, as near as possible to the beginning of the roadway to which entry is prohibited. Where additional emphasis is required, an additional sign should be displayed on the right hand side of the roadway. In some cases the signs may need to be sited a short distance into the roadway junction to improve visibility and it may often be desirable to orientate the sign to suit the direction of approach of traffic by mounting the sign at an angle to the edge of the road, kerb line or road reserve boundary.
- An R3 sign may be included in the sign face of a map-type direction sign to indicate in advance that the junction ahead is with a one-way roadway and that movement is limited to only certain legs of the junction (see Section 2.8).
- NO ENTRY sign R3 should be sized in accordance with the provisions of Table 2.4.

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119

Roadworks Temporary Regulatory Prohibition Signs

TR208



No Unauthorized
Vehicles

Ref.
V1 2.4.7
V4 2.4.10

2.4.8 No Unauthorised Vehicles,

- The NO UNAUTHORISED VEHICLES regulatory sign TR208 imposes an mandatory requirement that drivers of unauthorised vehicles shall NOT proceed beyond such sign. Use of the sign in its temporary form is particularly appropriate to temporary road closures as a result of roadworks.
- Sign R208 should be used to indicate that a roadway or entrance way is closed to general traffic. In the event of prosecution the onus shall rest with the driver of a vehicle to prove that he has authority from the responsible authority to proceed beyond signs R208 or TR208. This authorisation should be indicated by the display of an appropriate identity/authorisation, disc or other device. Authorised traffic may be permitted to proceed beyond the sign in order to gain access to private property or a work site.
- It is recommended that signs be located on both the left-hand and right-hand sides of the roadway or entrance.
- Temporary regulatory sign TR208 may be used under the same circumstances as a permanent NO UNAUTHORISED VEHICLES regulatory sign when temporary roadworks or other conditions require that a roadway or entrance be closed to normal traffic other than authorised vehicles. In such a case authorised vehicles will normally include construction vehicles and those belonging to local residents.
- Sign TR208 should not be used to indicate closure of a portion of a roadway such as a shoulder or lane if traffic flow is maintained through the section of roadway.
- When used to effect a temporary road closure to unauthorised vehicles, sign TR208 should be combined with a T-JUNCTION CHEVRON hazard marker sign TW409, a DEAD END/ROAD CLOSED CHEVRON hazard marker sign TW410 or a TEMPORARY BARRICADE hazard marker sign TW411.
- Signs R208 and TR208 should be sized in accordance with the provisions of Table 2.4.

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120

Roadworks Temporary Regulatory Signs

Detour – Proceed Left Only

Sharpe Curve Chevron

NO Entry – Road Closed

Road Closed Chevron

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121

Roadworks Temporary Regulatory Signs

Detour – Proceed Left

Sharpe Curve Chevron

Road Closed – Authorised Entry Only

Road Closed Chevron

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122

Roadworks Temporary Regulatory Command Signs

TR103

Keep Left

TR104

Keep Right

Ref. V1 2.3.3 V4 2.3.3

Ref. V1 2.3.3 V4 2.3.4

2.3.3 Keep Left and Keep Right

- The KEEP LEFT and KEEP RIGHT regulatory signs R103 and R104 impose a mandatory requirement that the driver of a vehicle shall pass only to the left-hand side or the right-hand side, as indicated by an arrow, of an obstacle in the roadway on which the sign has been placed. Signs R103 and R104 may be displayed as a SELECTIVE RESTRICTION sign in conjunction with a secondary message indicating a class of vehicle to which the mandatory requirement applies (see Section 2.7).
- Signs R103 and R104 must be displayed with extreme care, so that the arrow shall point downwards at an angle of approximately 45° towards the side on which traffic must pass. If the arrow is incorrectly aligned the meaning of the sign could be altered to that of the PROCEED LEFT ONLY, PROCEED RIGHT ONLY or PROCEED STRAIGHT ONLY signs R105, R106 and R107.
- The signs should normally be displayed with their lower edge 750 mm above the surface of the roadway. The height of display should, however, take into account the vertical alignment of the roadway. If the sign is located just beyond a crest curve it should be elevated to improve visibility. Sign R103 is commonly used to indicate the beginning of a median island. In this case it may be mounted lower in combination with a DANGER PLATE hazard marker W402, on one post, to indicate that traffic must pass the sign to the left. The sign does not need to be repeated at subsequent openings in an otherwise continuous median island unless special conditions require the repetition of the message. Sign R103 may, for instance, be displayed on the end of a median island to the left of a NO ENTRY sign R3, when there is a risk of traffic entering the opposing roadway.
- Signs R103 and R104 SHALL NOT be displayed side by side on a channelising island which traffic may pass either to the left or right of, even if by doing so traffic will reach the same destination e.g. pedestrian refuge in a one-way roadway. Such a device should be signed using SHARP CURVE CHEVRON hazard marker signs W406 and W405 mounted side by side or by DANGER PLATE hazard markers W401 and W402. (These contrabands should preferably be manufactured from one piece of material).
- A KEEP RIGHT sign R104 will normally be reserved for use in special situations such as the start of a dedicated and separate portion of roadway, on the left side of the main roadway, such as a cycle lane or a bus lane. In this case general traffic is directed to pass to the right of a channelising island whilst cyclists or buses may be directed to the left.
- Temporary regulatory signs TR103 and TR104 are widely used at temporary roadworks sites to indicate temporary obstructions in the roadway or temporary changes in direction of the roadway which traffic is required to negotiate. Signs TR103 and TR104 may be used in conjunction with TEMPORARY BARRICADE sign TR411 to demarcate roadway deviations. At the start of such deviations or at the beginning of a tapered reduction in roadway width it is recommended that two TR103 or TR104 signs, as appropriate, be mounted on the same pole, one above the other. The signs should also be elevated as high as is practical to improve visibility of this often critical point in a roadworks zone.
- Signs R103 and R104 should be sized in accordance with the provisions of Table 2.4.

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123

Roadworks Temporary Regulatory Prohibition Signs

TR201

Speed Limit

Freeway

80

Rural

60

Urban

40

Ref. V1 2.4.1 V4 2.4.2

2.4.1 Speed Limit

- The SPEED LIMIT regulatory sign R201 imposes a mandatory requirement that drivers of vehicles on a public road shall not exceed the speed limit indicated in kilometres per hour, by means of a number on such sign, beyond such sign. Speed limits should preferably be displayed only in increments of 10 km/h. Sign R201 may be displayed as a SELECTIVE RESTRICTION sign in conjunction with a secondary message indicating a class of vehicle to which the mandatory requirement applies (See Section 2.7).
- Sign R201 may be displayed to indicate the general speed limit if doubt may exist in the minds of drivers as to the class of road. Due to occasional variations in statutory general speed limit, and to the difficulty which drivers may have in identifying a class of road, it is recommended that all changes in speed limit be indicated using a SPEED LIMIT sign R201. This applies to an increase or decrease in speed limit. When ordering signs it is recommended that the speed limit value be indicated after the sign number e.g. R201 - 100.
- Since R201 sign automatically cancels a different speed limit applicable to a roadway immediately prior to the sign, R201 signs should not be preceded or accompanied by a speed de-restriction sign. In terms of the above, the use of speed de-restriction signs is not recommended.
- When it is required to reduce a speed limit, particularly from the statutory maximum speed limit, this should normally be achieved in increments of 20 km/h e.g. 120 km/h to 100 km/h to 80 km/h to 60 km/h. The minimum distance between such signs should be 150 m. A distance of 200 m or more is preferred.
- The value of the speed limit indicated on a roadway must be a realistic safe speed taking into account the roadway alignment, surface condition, traffic volumes and proximity of roadside obstacles including road workers. In assessing a reduced speed limit, authorities should consider the driver's perception of the roadway conditions. If the reasons for the reduction in speed limit are not obvious consideration should be given to supplementing the speed limit sign with an appropriate message such as a warning sign, or a TOWN or CITY NAME sign GLS. The latter combination need not automatically be located at the town boundary.

If the area is not subdivided intoerven.

- Sign R201 should be displayed on the left-hand side of the roadway at a point where the speed limit is to commence. It is recommended that a second sign be provided on the right-hand side of one-way roadways, including cartways, of a dual carriageway roadway, which are demarcated into two or more lanes.
- Sign R201 may be displayed on the same post as a MINIMUM SPEED regulatory sign R101 with sign R201 above sign R101.
- It is recommended that a sign R201 be located approximately 450 m beyond the end of a freeway on-ramp taper when significant volumes of entering traffic occur and particularly beyond the junction of two freeway systems. When roads with different speed limits intersect it is recommended that appropriate SPEED LIMIT signs R201 be placed 50 m to 200 m beyond the junction on each exit roadway.
- Temporary sign TR201 may be used under the same circumstances as permanent SPEED LIMIT signs. A permanent SPEED LIMIT sign R201 indicating the appropriate general speed limit should be displayed at the end of a roadworks site in which the speed limit has been reduced.
- SPEED LIMIT signs R201 or TR201 may be incorporated into a guidance sign or a HIGH VISIBILITY background to indicate that a road, or lane of a roadway, is subject to a speed limit which is different to other adjacent road(s) or lane(s) (see Section 2.8).
- It is not generally recommended that signs indicating reduced speed limits be displayed for short sections of roadway if a local condition requires reduced speed the use of a supplementary information plate giving an advisory speed, combined with an appropriate warning sign, is recommended. However, in roadworks situations where localised conditions relating to safety, particularly of workers, is a primary consideration, reduced localised speed limits may be applied in conjunction with an appropriate warning sign.
- Signs R201 and TR201 should be sized in accordance with Table 2.4.

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124

Roadworks Temporary Regulatory Prohibition and Warning Height Limit Signs

TR204



Height Limit

2.4.4 Height Limit

Ref. V1 2.4.4, V4 2.4.6

1 The HEIGHT LIMIT regulatory sign R204 imposes a mandatory requirement that drivers of vehicles on a public road shall not proceed beyond the sign or drive under a height gauge or structure to which the sign is attached unless the height of the vehicle, including any load thereon, and, in the case of a height gauge, any radio antenna attached to the vehicle, is less than the clearance height indicated in metres by means of a number on such sign.

2 When required in terms of paragraph 2.4.4 sign R204 should be displayed on, and immediately in advance of:

(a) a height gauge located ahead of a railway crossing over which overhead electrical power cables are installed; and

(b) an overhead structure.

3 When displayed on a height gauge or an overhead structure sign R204 shall be flanked by two OVER-HEAD DANGER PLATE signs W415 (see Subsection 3.5.9 and Volume 2, Chapter 3 and Chapter 7).

4 When displayed immediately in advance of a height gauge or structure, sign R204 should be displayed on the left-hand side of the roadway.

5 Sign R204 shall be used when the clearance height over any part of the full width of roadway is less than 4.7 m and is recommended for use when the clearance

TW320



Height Restricted

References V1 3.4.8, V4 3.4.20

6 Advance warning of the height limit should be given by the use of the HEIGHT RESTRICTED warning sign W320 as provided in Subsection 3.4.16. A typical sign arrangement for a height restricted site is given in Volume 2.

7 Temporary regulatory sign TR204 may be used under the same circumstances as permanent HEIGHT LIMIT regulatory signs when temporary roadworks or other conditions require.

8 It may occasionally be necessary to indicate to drivers that a height limit exists some considerable distance away. In this case signs R204 or TR204 may be combined with a SUPPLEMENTARY PLATE sign IN11.4 which should preferably include the name of the geographical location of the restriction and the distance to it e.g. "At Nottingham Road in 8 km". When displayed in this manner, signs R204 or TR204 shall not apply to the point of roadway at which they are located. Such signs should be displayed in advance of an optional route selection point (junction or ramp terminal), or where suitable turning facilities exist (see Section 2.8).

9 Signs R204 and TR204 should be sized in accordance with Table 2.4.

125

Height Limit Regulatory Prohibition Signs



Typical Height Limit – Permanent Condition

126

Height Limit Regulatory Prohibition Signs



Typical Height Limit Signs, Danger Plates and Roadmaking – Permanent Condition

127

Roadworks Temporary Warning Height Limit Signs

TW320



Height Restricted

References V1 3.4.8, V4 3.4.20

3.4.16 Height Restricted

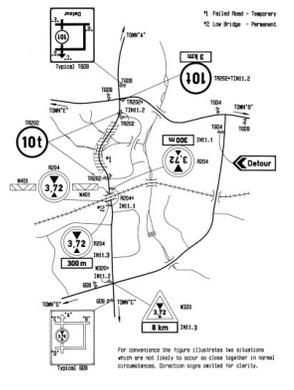
1 The HEIGHT RESTRICTED warning sign W320 is to warn road users that the clearance of:

(a) a height gauge located ahead of a railway crossing over which overhead electrical power cables are installed; or

(b) an overhead structure; is restricted.

2 Sign W320 should be displayed in advance of a height gauge or overhead structure when the clearance over any portion of the roadway is less than 4.7 m. The clearance height shown should be the same as shown on the HEIGHT LIMIT sign R204, which sign shall be displayed on the overhead structure flanked by two OVER HEAD DANGER PLATES signs W415. A typical sign arrangement for a height restricted site is given in Volume 2.

3 Sign W320 should be located in advance of the height restriction in accordance with the design speed of the road. The sign shall be of a size as indicated in Table 3.1. Sign W320 may, however, be located some distance from the hazard and in such circumstances should be supplemented by a distance information plate, giving the distance to the hazard (see Section 3.6).



128

Height Limit Advance Warning Sign



Typical Height Limit – Permanent Condition

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Height Limit Advance Warning Sign Recommendation



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Roadworks Temporary Regulatory Prohibition Signs

TR209
No Left Turn Ahead

TR210
No Right Turn Ahead

2.4.9 No Left Turn Ahead and No Right Turn Ahead

1 The NO LEFT TURN AHEAD and NO RIGHT TURN AHEAD regulatory signs R209 and R210 impose a mandatory requirement that drivers of vehicles shall NOT turn to the left or the right as the case may be, at the junction or entrance ahead. Signs R209 and R210 may be displayed as SELECTIVE RESTRICTION signs in conjunction with a secondary message indicating a class of vehicle to which the mandatory requirement applies OR the time of day for which it applies (see Section 2.7). If the prohibition requires a vehicle class secondary message but it only applies during certain hours the use of a variable message road traffic sign is recommended so that the appropriate sign shall only be displayed when the prohibition applies and at all other times NO SIGN should be visible.

2 Signs R209 and R210 shall only be displayed in advance, on an approach to a junction where traffic is prohibited from making a turn in the direction indicated. When used, signs R209 and R210 may be followed by NO LEFT TURN or NO RIGHT TURN signs R211 or R212 at the junction, although signing of one way roadways should preferably be by use of ONE WAY ROADWAY signs R4.1 or R4.2 (see Subsection 2.2.5).

3 Signs R209 and R210 may be used in advance of an intersecting one-way cross-road where ONE WAY ROADWAY signs R4.1 or R4.2 are displayed when it is important that drivers become aware that the intersecting roadway ahead is a one-way roadway well in advance of the junction. In addition signs R209 and R210 may be used to reduce congestion or collisions by prohibiting left or right turn movements even though the intersecting roadway is not part of a one-way system.

4 The signs should normally be displayed on the left hand side of the approach roadway between 15 m and 30 m from the junction to which they apply, provided that in the case of a one-way approach roadway it may be more appropriate to locate the sign on the right-hand side of the roadway.

5 It may be advisable to elevate the signs above the normal mounting height to improve visibility and thereby correct lane selection in a one-way system. Care shall be taken not to locate a sign so that a public access point lies between the sign and the junction ahead.

6 Temporary regulatory signs TR209 and TR210 may be used under the same circumstances as permanent NO LEFT TURN AHEAD and NO RIGHT TURN AHEAD regulatory signs particularly if a temporary detour is required during roadworks or other conditions.

7 Signs R209, R210, TR209 and TR210 should be sized in accordance with Table 2.4.

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Roadworks Temporary Regulatory Comprehensive Signs

R401



References
V1 2.6.1
V4 2.6.1

Dual Carriageway Freeway Begins

2.6.1 Dual Carriageway Freeway Begins

1 The DUAL CARRIAGEWAY FREEWAY BEGINS regulatory sign R401 indicates to drivers of vehicles that a dual carriageway freeway begins and that specific legislation becomes applicable on the section of public road beyond such sign. This has the effect that in South Africa drivers shall comply with a comprehensive range of regulations given in the Road Traffic Act, specific to the use of dual carriageway freeways.

2 It should be noted that it is the display of sign R401 or R402 which designates a roadway as a freeway in terms of legislation. For signing purposes a dual carriageway freeway is designated as a Class A1 road and a single carriageway freeway as a Class A2 road (see Chapter 1).

3 Sign R401 should be displayed on the left-hand side of on-ramps to a Class A1 freeway provided that if the on-ramp has more than one lane a second sign may be displayed on the right-hand side of the on-ramp roadway. Sign R401 should also be displayed on the left and right-hand sides of a freeway carriageway when this roadway is created from the continuation of a lower class road, including a Class A2 freeway. In this latter case sign R401 may be displayed with a SUPPLEMENTARY PLATE sign IN11.3, in advance of this point to indicate the distance to the start of the Class A1 freeway.

4 The special provisions relating to freeways which are brought into force by sign R401 are covered in legislation. The following items are a summary of the provisions of this legislation. For full details the legislation must be consulted.

4 The special provisions relating to freeways which are brought into force by sign R401 are covered in legislation. The following items are a summary of the provisions of this legislation. For full details the legislation must be consulted.

(a) No person shall operate on a freeway:

- (i) a vehicle drawn by an animal;
- (ii) a pedal cycle;
- (iii) a motorcycle with a cylinder capacity not exceeding 50 cm³ (c.c.) or which is propelled by electric power;
- (v) a motor tricycle;
- (vi) a vehicle with a mass not greater than 230 kg and specially designed, constructed or adapted for the use of a person suffering from a physical defect or disability; or
- (vii) a tractor;

(2) for a cause beyond the control of that person; or

(ii) leave or allow an animal to be on a freeway, except in or on a motor vehicle or within an area reserved for the stopping or parking of vehicles by an appropriate road traffic sign, OR leave an animal in a place where it may stray onto a freeway;

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Roadworks Temporary Regulatory Comprehensive Signs

R402



Single Carriageway Freeway Begins

(iii) stop a vehicle on a freeway, except:

- (1) in compliance with a road traffic sign or a direction given by a traffic officer;
- (2) within an area reserved for the stopping or parking of vehicles by an appropriate road traffic sign;
- (3) for a cause beyond the control of that person; or
- (iv) give a hand signal when driving a motor vehicle on a freeway, except for a cause beyond the control of the driver;
- (v) cause a vehicle on a freeway to travel in reverse, except:
 - (1) in compliance with a direction given by a traffic officer;
 - (2) within an area reserved for the stopping or parking of vehicles by an appropriate road traffic sign; or
 - (3) for a cause beyond the control of that person;
- (vi) cross the median between carriageways of a divided freeway, and/or cause a vehicle to execute a U-turn on a freeway except:
 - (1) in compliance with a direction given by a traffic officer; or
 - (2) for a cause beyond the control of that person;

(vi) cause a vehicle to travel on a roadway shoulder of a freeway in order to pass a slower moving vehicle.

5 The requirements listed in paragraph 2.6.1.4 may be varied during the course of temporary roadworks. It is recommended that the status of freeway be retained under roadworks conditions to maintain those of the requirements listed which are necessary even under temporary conditions. Any other variations may be indicated by relevant additional temporary signs. If roadworks require that one carriageway of a Class A1 freeway is closed to traffic and that the other carriageway shall operate with two-way traffic, the use of a temporary Class A2 freeway sign TR402 is recommended. The additional use of a temporary FREEWAY (CLASS A1) DE-RESTRICTION sign TR601 is optional (see Section 2.9).

6 The speed limit applicable to a freeway is catered for under the general speed limit legislation as amended from time to time. If it is required, a lower speed limit may be indicated by an appropriate version of the SPEED LIMIT sign -R201 or TR201. A speed de-restriction sign shall not be used for this purpose.

7 Sign R401 should be sized in accordance with Table 2.4 in Section 2.1.



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133

Roadworks Temporary Regulatory Comprehensive Signs

TR402



Single Carriageway Freeway Begins

2.6.2 Single Carriageway Freeway Begins

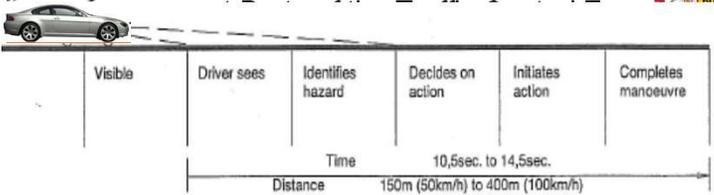
- 1 The SINGLE CARRIAGEWAY FREEWAY BEGINS regulatory sign R401 indicates to drivers of vehicles that a single carriageway freeway begins and that specific legislation becomes applicable on the section of public road beyond such sign. This has the effect that drivers shall comply with a comprehensive range of regulations given in the Road Traffic Act, specific to the use of single carriageway freeways.
- 2 It should be noted that it is the display of sign R401 or R402 which designates a roadway as a freeway in terms of legislation. For signing purposes a single carriageway freeway is designated as a Class A2 road and a dual carriageway freeway as a Class A1 road (see Chapter 1).
- 3 Sign R402 should be displayed on the left-hand side of on-ramps to a single carriageway freeway and at the commencement of this class of road when it is formed as a continuation of a lower class roadway, or of a Class A1 freeway. Sign R402 may be displayed with a SUPPLEMENTARY PLATE sign IN11.3, in advance of the start of the Class A2 freeway, either on a Class A1 freeway or on a Class B roadway, to indicate the distance to the start of the Class A2 freeway.
- 4 The provisions of paragraph 2.6.1.4 shall apply mutatis mutandis to the use of sign R402, with the exception of paragraph 2.6.1.4 (b)(vi) which shall have the requirement for this class of freeway that no person shall cause a vehicle to execute a U-turn.
- 5 The requirements listed in paragraph 2.6.1.4 may be varied during the course of temporary roadworks. It is recommended that freeway status be retained under roadworks conditions to maintain those of the listed requirements which are necessary even under temporary conditions. Any other variations may be indicated by relevant additional temporary signs. Sign TR402 is recommended for use when a Class A1 freeway is operating with two-way traffic on one of its carriageways and the other carriageway is closed to traffic to indicate this downgraded status.
- 6 Signs R402 and TR402 should be sized in accordance with Table 2.4 in Section 2.1.



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134

Decision Sight Distance Module



40km/h = 11m/s
 60km/h = 17 m/s
 80km/h = 22 m/s

100km/h = 28 m/s
 120km/h = 33 m/s
 160km/h = 44 m/s



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135

Roadworks Temporary Warning Signs

TABLE 3.1	ADVANCE WARNING SIGN LOCATION AND SIZE	TABLE 3.1
Operating speed (km/h)	Location distance from hazard (m)(2)	Recommended size (mm)
120	330 (400)	1500
100	240 (320)	1500
80	160 (218)	1200 1500mm
60	120 (160)	900 1500mm
40	80m	1200mm

Reaction Time (Distance) Available



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136

Roadworks Temporary Warning Signs

TABLE 3.2 VISIBILITY DISTANCE TO WARNING SIGN TABLE 3.2

Operating speed (km/h)	Clear visibility distance (m)
120	120
100	100
80	80
60	60
40	40

Reading Time (Distance) Required



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137

Roadworks Temporary Warning Road Layout Signs

TW116 References V1 3.2.4 V4 3.2.16



End of Dual Roadway (To Right)

TW118 References V1 3.2.4 V4 3.2.18



Beginning of Dual Roadway (Straight on)



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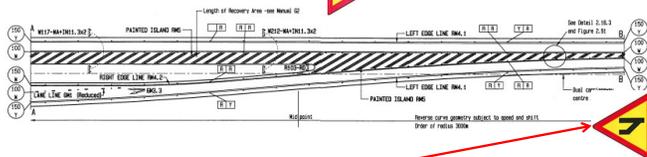
138

Roadworks Temporary Warning Road Layout Signs

TW117 References V1 3.2.4 V4 3.2.17



End of Dual Roadway (Straight on)



TW119 References V1 3.2.4 V4 3.2.19



Beginning of Dual Roadway (To Left)



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139

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TW201 References V1 3.3.1 V4 3.3.1

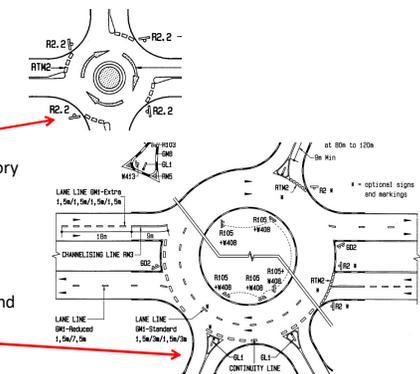


Traffic Circle

R2.2 Yield at Mini Circle

TR137 Roundabout

Regulatory Control and Command



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140

Roadworks Temporary Warning Road Layout Signs

TW202 **Gentle Curve (Right)**

References
V1 3.3.1
V4 3.3.2

3.3.2 Gentle Curve

- The GENTLE CURVE warning signs W202 and W203 are to warn road users of a gentle curve ahead to right or to left.
- These signs should be displayed in advance of an obscured curve that can only be negotiated comfortably by reducing speed by one tenth to one third of the operating speed of traffic travelling on the preceding straight. The comfortable safe speed should be determined by actual trial runs. Figure 3.1 should be used to determine the advance distance for location of the sign. The advisory safe speed may be indicated by displaying a supplementary information plate below the sign on the same post (see Section 3.6).
- Temporary warning signs TW202 and TW203 may be used under the same circumstances as permanent GENTLE CURVE warning signs when gentle curves exist within detours created at roadworks sites.

Reaction Time/Distance

Freeway	80km/h	160m
Rural	60km/h	120m
Urban	40km/h	80m

Reading Time/Distance/Size

80km/h	80m	1500mm
60km/h	60m	1500mm
40km/h	40m	1200mm

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Roadworks Temporary Warning Road Layout Signs

TW204 **Sharp Curve (Right)**

References
V1 3.3.2
V4 3.3.4

3.3.3 Sharp Curve

- The SHARP CURVE warning signs W204 and W205 are to warn road users of a sharp curve ahead to the right or to the left.
- These signs should be displayed in advance of an obscured curve that can only be negotiated comfortably by reducing speed by more than one third of the operating speed of traffic travelling on the preceding straight. The comfortable safe speed should be determined by actual trial runs.
- The signs should be located in advance of the beginning of the curve at a distance dependent on the average entering speed for the preceding straight and the safe speed determined from the trial runs. Figure 3.1 should be used to determine the advance distance. The advisory safe speed may be indicated by displaying a supplementary information plate below the sign on the same post (see Section 3.6).
- Temporary warning signs TW204 and TW205 may be used under the same circumstances as permanent SHARP CURVE warning signs when sharp curves exist within detours created at roadworks sites.

Reaction Time/Distance

Freeway	80km/h	160m
Rural	60km/h	120m
Urban	40km/h	80m

Reading Time/Distance/Size

80km/h	80m	1500mm
60km/h	60m	1500mm
40km/h	40m	1200mm

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Roadworks Temporary Warning Road Layout Signs

TW206 **Hairpin Bend (Right)**

References
V1 3.3.2
V4 3.3.6

3.3.4 Hairpin Bend

- The HAIRPIN BEND warning signs W206 and W207 are to warn road users of a sharp bend ahead which results in an almost complete change of direction to the right or to the left.
- These signs should be displayed in advance of an obscured sharp bend that can only be negotiated by reducing speed by more than half of the operating speed of traffic travelling on the preceding straight.
- The signs should be located in advance of the beginning of the curve at a distance dependent on the average entering speed for the preceding straight and the safe speed determined from the trial runs. Figure 3.1 should be used to determine the advance distance. The advisory safe speed may be indicated by displaying a supplementary information plate below the sign on the same post (see Section 3.6).
- Temporary warning signs TW206 and TW207 may be used under the same circumstances as permanent HAIRPIN BEND warning signs when hairpin bends exist within detours at roadworks sites.

Reaction Time/Distance

Freeway	80km/h	160m
Rural	60km/h	120m
Urban	40km/h	80m

Reading Time/Distance/Size

80km/h	80m	1500mm
60km/h	60m	1500mm
40km/h	40m	1200mm

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Roadworks Temporary Warning Road Layout Signs

TW208 **Winding Road (Right - Left)**

References
V1 3.3.3
V4 3.3.8

3.3.5 Winding Road

- The WINDING ROAD warning signs W208 and W209 are to warn road users of a series of curves in the road ahead. These signs should be displayed in advance of a section of road in which a number of reverse curves exist such that the safe comfortable speed is considerably below that for the remainder of the road.
- Signs W208 and W209 should be displayed where:
 - speed should be reduced by one tenth to one third of the operating speed of traffic travelling on the preceding straight; or
 - the length of the straight between curves is less than 120m; or
 - the nature of the reverse curves is not obvious to approaching traffic and therefore constitutes a hazard.
- The sign symbol should be chosen so that it correctly represents the direction of curvature of the first curve in the series. W208 when the first curve is to the right and W209 when the first curve is to the left.
- The length of a section of road consisting of several succeeding reverse curves should be displayed to the nearest kilometre on a supplementary plate below sign W208 or W209 and on the same post. If the section is longer than 10 km the sign should be repeated every 10 km with the reduced distances displayed (see Section 3.6).
- Individual curves where speed should be reduced by more than one third of the operating speed of traffic travelling on the preceding winding road section should be indicated by the appropriate SHARP CURVE warning signs W204 or W205, or HAIRPIN BEND warning signs W206 or W207.
- Signs W208 and W209 should be located in advance of the beginning of the winding section of road at a distance dependent on the average entering speed for the preceding straight. Figure 3.1 should be used to determine the advance distance.
- Temporary warning signs TW208 and TW209 may be used under the same circumstances as permanent WINDING ROAD warning signs on winding detours at roadworks sites.

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Roadworks Temporary Warning Road Layout Signs

TW210 References
V1 3.3.4
V4 3.3.10



**Combined Curves
(Right - Left)**

3.3.6 Combined Curves

- The COMBINED CURVES warning signs W210 and W211 are to warn road users of a combination of two sharp curves in opposite directions.
- Signs W210 and W211 should be displayed where:
 - speed should be reduced by more than one third of the operating speed of traffic travelling on the preceding straight; or
 - the length of the straight between curves is less than 120 m; or
 - the nature of the reverse curves is not obvious to approaching traffic and is therefore a hazard.
- Sign W210 is for a combined curve to the right and then to the left. Sign W211 is for a combined curve to the left and then to the right.

- These signs should be located in advance of the beginning of the curve at a distance dependent on the average entering speed for the preceding straight and the safe speed determined from the trial runs. Figure 3.1 should be used to determine the advance distance. The advisory safe speed may be indicated by displaying a supplementary information plate below the sign on the same post (see Section 3.6).
- Temporary warning signs TW210 and TW211 may be used under the same circumstances as permanent COMBINED CURVES warning signs when combined curves exist within detours at roadworks sites.



145

Roadworks Temporary Warning Road Layout Signs

TW212 References
V1 3.3.4
V4 3.3.12



Two - Way Traffic

3.3.7 Two-way Traffic

- The TWO-WAY TRAFFIC warning sign W212 is to warn road users in a one-way roadway that the roadway ahead carries traffic in both directions.
- Sign W212 should be displayed where a one-way roadway becomes a two-way roadway either at the end of a dual roadway or beyond a junction. The sign may also be used in similar circumstances where it is, for some reason, unclear to drivers that two-way traffic exists on a roadway.
- The sign should be located at a distance in advance of the point where the actual two-way traffic is achieved at normal roadway width in accordance with the provisions of Table 3.1 or Figure 3.1.

- It is recommended that the sign be displayed on both sides of the one-way roadway when the median island permits and that it be used in conjunction with END OF DUAL ROADWAY warning signs W116 and W117 (see Subsection 3.2.7).
- Temporary warning sign TW212 may be used under the same circumstances as the permanent TWO-WAYTRAFIC warning sign. Detours at roadworks sites commonly result in the temporary use of a one way roadway to carry two-way traffic. The use of HIGH VISIBILITY warning signs or diagrammatic signs is highly recommended in such situations (see Sections 3.6 and 4.10).

146

Roadworks Temporary Warning Road Layout Signs

TW215 References
V1 3.3.5
V4 3.3.15

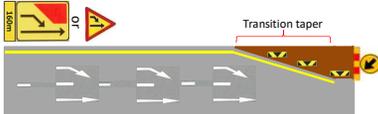


Left Lane Ends

- The LANE ENDS warning signs W214 and W215 are to warn road users that in the direction in which they are moving the roadway ahead is reduced in width by a full lane from the right side or from the left side.
- Signs W214 and W215 may be displayed on sections of minor Class "B", Class "C" or Class "D" roadways where a lane is ended. These signs shall NOT be displayed to indicate a reduction in width of roadway other than by a full lane width. If the roadway is reduced in width by less than a lane width and the number of lanes marked is not reduced ROAD NARROWS FROM BOTH SIDES warning sign W328 or ROAD NARROWS FROM ONE SIDE ONLY warning signs W329 or W330 should be used as appropriate.
- When a lane is ended on a freeway or major Class "B" road the use of the appropriate diagrammatic signs as

detailed in Section 4.10 is highly recommended in preference to signs W214 or W215.

- Signs W214 and W215 should be located in advance of the start of the lane ends taper in accordance with the provisions of Table 3.1 or Figure 3.1.
- Temporary warning signs TW214 and TW215 may be used under similar circumstances to the permanent LANE ENDS warning signs at roadworks and other temporary traffic management operations such as roadblocks or traffic surveys. The use of signs TW214 and TW215 should be limited to sites carrying light traffic and for short time periods. The use of temporary diagrammatic signs as detailed in Section 4.10 is highly recommended for any temporary traffic management operation dealing with moderate or greater traffic flows for periods greater than a few hours.



147

Roadworks Temporary Warning Road Layout Signs

TW330 References
V1 3.4.13
V4 3.4.30

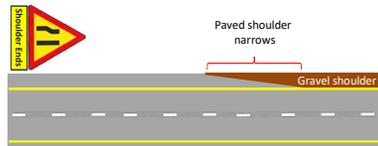


Road Narrows From Left Side Only

- The ROAD NARROWS FROM ONE SIDE ONLY warning signs W329 and W330 are to warn road users that the roadway ahead narrows from the right or left side only.
- Signs W329 and W330 should be displayed where the width of the roadway is abruptly reduced from the right side or the left side respectively, and continues at a reduced width for some distance. The sign need not be displayed on minor low volume roads with a width of more than 5m after narrowing.
- The signs should be displayed in advance of all sections of roadway with a width of less than 5 m. The signs should be located in advance of the point where the

narrowing begins in accordance with the provisions of Table 3.1 or Figure 3.1.

- Temporary warning signs 1W329 and 1W330 may be used within roadworks detours.
- Signs W329, W330, 1W329 and 1W330 shall not be used to indicate a road narrowing by a full lane width. Such a situation, when signed with a warning sign, shall be signed using a LANE ENDS warning sign W214, W215, TW214 or 1W215 as appropriate or an appropriate diagrammatic sign (see Section 4.10 and Subsection 3.3.9).



148

Roadworks Temporary Warning Road Layout Signs

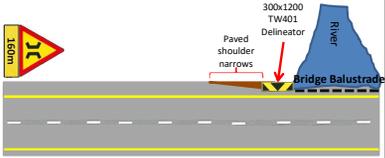
TW326



Narrow Bridge

References
V1 3.4.12
V4 3.4.26

- The sign should be located in advance of the narrow bridge at a distance in accordance with the provisions of Figure 3.1.
- Temporary warning sign TW326 may be used under the same circumstances as a permanent NARROW BRIDGE warning sign during road construction.



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Roadworks Temporary Warning Road Layout Signs

TW327



One Vehicle Width Structure

References
V1 3.4.12
V4 3.4.27

+



or



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- The ONE VEHICLE WIDTH STRUCTURE warning sign TW327 is to warn road users that the width of the structure on the roadway ahead is less than 5m and that traffic shall stop at the entrance thereto if a vehicle approaching from the opposite direction is already on the structure, or so close thereto as to constitute a danger.
- Sign TW327 should not be displayed in advance of a narrow structure which is wide enough to permit two vehicles to pass. If this structure is a bridge the NARROW BRIDGE warning sign TW326 should be displayed. The ROAD NARROWS FROM BOTH SIDES warning sign TW328 should be used if no structure is involved. A structure in this sense could include a gate or motorgate.
- The sign should be located in advance of the hazard, and be of a size, and at a distance as given in Table 3.1.
- Temporary warning sign TW327 may be required at construction sites where temporary or partly constructed structures are in use to carry detour traffic.

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Roadworks Temporary Warning Road Layout Signs



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or



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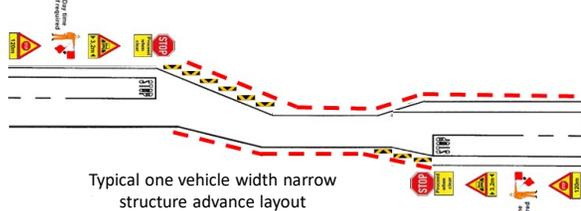


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Typical one vehicle width narrow structure advance layout

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Roadworks Temporary Warning Road Layout Signs

TW301



Traffic Signals Ahead

References
V1 3.4.1
V4 3.4.1



- The TRAFFIC SIGNALS AHEAD warning sign TW301 is to warn road users of the presence of a traffic control signal ahead.
- Sign TW301 should be displayed in advance of:
 - any isolated or new traffic control signal installation;
 - any junction controlled by traffic signals where approach speeds are 70 km/h or more, or where the signal is not visible within 180 m of the junction;
 - an isolated or midblock pedestrian crossing controlled by traffic signals.
- Subject to the other requirements in (3.4.1.2) above, a TRAFFIC SIGNALS AHEAD warning sign, which has been displayed in advance of a new traffic signal installation, may be removed after a period of three months.
- These signs should be located in advance of a traffic signal in accordance with the design speed of the road. They should be located as indicated in Table 3.1 or Figure 3.1.
- Temporary warning sign TW301 should be used in advance of any temporary traffic signal.

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Roadworks Temporary Warning Road Layout Signs

TW302 

References
V1 3.4.1
V4 3.4.2

Traffic Control "Stop" Ahead

- The TRAFFIC CONTROL "STOP" AHEAD warning sign W302 is to warn road users of the presence of a STOP sign R1, ahead.
- Sign W302 may be displayed in advance of a STOP sign R1, when visibility of the STOP sign is restricted due to road alignment or encroaching vegetation. It may also be displayed for a limited period of time in advance of a new STOP sign R1, until drivers are used to the control.
- These signs should be located in accordance with the operating speed of approaching traffic and the provisions of Table 3.1 or Figure 3.1. The use of a supplementary distance information plate is recommended to advise drivers of the distance to the STOP control, particularly if the STOP sign is not visible from the same circumstances as permanent TRAFFIC CONTROL "STOP" AHEAD warning signs when temporary STOP controls exist at roadworks sites.

TW303 

References
V1 3.4.2
V4 3.4.3

Traffic Control "Yield" Ahead

- The TRAFFIC CONTROL "YIELD" AHEAD warning sign W303 is to warn road users of the presence of a YIELD sign R2, ahead.
- Sign W303 may be displayed in advance of a YIELD sign R2, when visibility of the YIELD sign is restricted due to road alignment or encroaching vegetation. It may also be displayed for a limited period of time in advance of a new YIELD sign R2, until drivers are used to the control.
- These signs should be located in accordance with the operating speed of approaching traffic and the provisions of Table 3.1 or Figure 3.1. The use of a supplementary distance information plate is recommended to advise drivers of the distance to the YIELD control, particularly if the YIELD sign is not visible from the same circumstances as permanent TRAFFIC CONTROL "YIELD" AHEAD warning signs when temporary YIELD controls exist at roadworks sites.

153

Roadworks Temporary Warning Road Layout Signs

TW306 

References
V1 3.4.3
V4 3.4.6

Pedestrian Crossing

- The PEDESTRIAN CROSSING warning sign W306 is to warn road users of a marked pedestrian crossing ahead.
- Sign W306 should, where possible, be displayed not less than 90 m or more than 180 m in advance of any block-marked pedestrian crossing. In addition, if the block-marked crossing is primarily for school children a CHILDREN warning sign W308, should be placed a suitable distance in advance of sign W306. A pedestrian crossing controlled by a traffic signal should be preceded by a TRAFFIC SIGNALS AHEAD warning sign W301, as detailed in Subsection 3.4.1.
- A temporary warning sign TW306 should be used if a temporary pedestrian crossing is installed as part of a roadworks detour.

TW307 

References
V1 3.4.4
V4 3.4.7

Pedestrians

- The PEDESTRIANS warning sign W307 is to warn road users of the possible presence of above average numbers of pedestrians ahead.
- Sign W307 is intended for use where a formal pedestrian crossing point has not been marked in accordance with the provisions of Chapter 7. It should normally be reserved for areas or sections of road where pedestrian activities are significantly higher than normal. This applies particularly in rural areas. The use of a supplementary advisory speed plate, may be considered for use with PEDESTRIANS warning signs. In addition if the section of road on which pedestrian activities are significantly higher than normal exceeds 2 km the sign should be repeated at suitable intervals, not greater than 2 km apart. When used, a supplementary plate should be mounted below the warning sign on the same post (see Section 3.6).
- Since sign W307 commonly refers to sections of road the location of the sign should be sited to result in the best possible visibility of the sign consistent with the provisions of Figure 3.1.
- Temporary warning sign TW307 may be used under the same circumstances as permanent PEDESTRIANS warning signs if roadworks detours cross well used pedestrian routes.

154

Roadworks Temporary Warning Road Layout Signs

TW321 

References
V1 3.4.9
V4 3.4.21

Length Restricted

- The LENGTH RESTRICTED warning sign W321 is to warn road users that the permissible length of vehicles is restricted because the lateral clearances to bridge parapets, retaining walls, road traffic signs or other road furniture is limited due to road curvature or some other design feature of construction.
- Sign W321 should be displayed in advance of a section of roadway where the road alignment and cross-section is such that long vehicles will overhang the inner edge of the roadway on left-hand curves and the dividing line on right curves. The restricted vehicle length shown should be the same as shown on the LENGTH LIMIT sign R205, which sign shall be displayed in advance of the restricted section of roadway.
- Sign W321 shall be located in advance of the start of the length restricted section of roadway in accordance with the design speed of the road. The sign shall be of a size as indicated in Table 3.1. Sign W321 may, however, be located some distance from the hazard and in such circumstances should be supplemented by a distance information plate giving the distance to the hazard (see Section 3.6).
- Temporary sign TW321 may be used under the same circumstances as permanent LENGTH RESTRICTED warning signs if a roadworks detour contains sections of roadway with the characteristics given in (3.4.17.2) above.

155

Roadworks Temporary Warning Road Layout Signs

TW322 

References
V1 3.4.10
V4 3.4.22

Steep Descent

- The STEEP DESCENT warning sign W322 is to warn road users of a steep downhill section of roadway ahead which may, particularly for heavy vehicles, constitute a hazard; and the STEEP ASCENT warning sign W323 is to warn road users of a steep uphill section of roadway ahead.
- Sign W322 should be displayed in advance of a steep downhill section of roadway with a grade of 5 per cent or more and a length greater than the distances given in Table 3.3.
- The use of sign W323 for a gradient of less than 5% may be considered if the gradient continues for a distance of over 2 km. Such combinations of length and degree of grade may constitute a potential hazard to heavy vehicles.
- Sign W323 should be located in advance of the start of the downhill grade in accordance with the provisions of Table 3.1 or Figure 3.1. In the case of conditions as described in (3.4.18.3) the sign should be located further from the start of the downhill grade to allow provision of diagrammatic signs such as "ENGAGE LOW GEAR" sign G5505 (see Section 4.10). The signs should be "V" metres apart (where "V" is the operating speed of normal traffic excluding heavy vehicles in km/h).

TW323 

References
V1 3.4.10
V4 3.4.23

Steep Ascent

- Sign W324 may be displayed in advance of an uphill grade where the nature of the road alignment is such that the steep uphill grade is not obvious to approaching traffic.
- Sign W324 should be located in accordance with the provisions of Table 3.1 or Figure 3.1.
- It is recommended that SUPPLEMENTARY PLATE information sign IN11 be used with signs W323 and W324 to indicate the length and/or steepness of a gradient, particularly when the gradient is regularly used by heavy vehicles. SUPPLEMENTARY PLATE sign IN112, showing the length of the gradient in the form 'For 9 km' or IN11.4, showing the slope of the gradient in the form '1:12' are most appropriate. Under certain conditions both messages may be combined in one SUPPLEMENTARY PLATE sign. (See Volume 4, Chapter 9 for dimensional details).
- Temporary warning signs TW323 and TW324 may be used under the same circumstances as the permanent STEEP DESCENT and STEEP ASCENT warning signs when steep downhill or uphill sections of roadway occur on roadworks detours.

156

Roadworks Temporary Warning Road Layout Signs

Sign GS505 (TGS505) may be used to guide drivers of heavy vehicles by a diagrammatic display by indicating that they should, in the interests of safety, engage a lower gear

Grade	CRITICAL LENGTHS OF STEEP DESCENT	TABLE 3.3
	Minimum length (m)	
5% (1)(2)	1000	
7%	300	
8%	250	
10%	150	
Steeper	90	

Steep Ascent and Descent Temporary Signage

NOTES:
 (1) Grades of this order need not normally be signed unless there are significant numbers of heavy vehicles using the section of roadway.
 (2) The minimum length of grade given presumes a curving alignment which will add to the potential hazard of such grades for heavy vehicles.

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Roadworks Temporary Warning Road Layout Signs

TW325

Gravel Road Begins

References
V1 3.4.11
V4 3.4.25

- 1 The GRAVEL ROAD BEGINS/ENDS warning signs W325 and W363 to warn road users that the road surface on which they are travelling is about to change from asphalt or concrete to gravel, or vice versa, and that the point of change in surface, and the gravel road surface, may require a reduction in speed.
- 2 Signs W325 and W363 should be displayed in advance of the change in road surface. The point of change in surface commonly deteriorates rapidly to the extent that it may become a hazard. This condition depends on levels of maintenance but, although the condition is not constant, the use of the signs is recommended to warn drivers to exercise caution.
- 3 The signs should be located at a distance from the start or end of the gravel road as indicated by Figure 3.1.
- 4 Temporary warning sign TW325 and TW363 may be used under the same circumstances as the permanent warning signs when temporary changes in road surface occur at roadworks sites.

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Roadworks Temporary Warning Road Layout Signs

TW331

Uneven Roadway OR POTHOLED

References
V1 3.4.14
V4 3.4.31

- 1 The UNEVEN ROADWAY warning sign W331 is to warn road users that there is a depression or ridge in the roadway or that the road surface is generally uneven or potholed.
- 2 Sign W331 should be displayed in advance of a section of uneven or potholed roadway which is hazardous and requires a reduction in speed. Such a condition would normally indicate the start of the failure of the road. This sign should not be used to warn motorists of speed humps in the roadway.
- 3 This sign should be located in advance of the hazard at a distance dependent on the operating speed of approaching traffic. Figure 3.1 should be used to determine the appropriate distance.
- 4 A temporary warning sign TW331 should be used for an uneven or potholed roadway. The sign may be supplemented by an advisory speed plate, or a distance plate and/or repeated at suitable intervals (see Section 3.6).
- 5 GENERAL WARNING sign TW339 with a supplementary information plate with the text "Potholes" may be used as a short term alternative (see Subsection 3.4.32 on page 3.4.33).

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Roadworks Temporary Warning Road Layout Signs

TW332

Speed Humps

References
V1 3.4.14
V4 3.4.32

TW416 and TW417 - Delineator plates sign
(Approved by road signs subcommittee)

Speed Hump Delineator plate sign:
COLOURS:
Black semi-matt on yellow retro-reflective

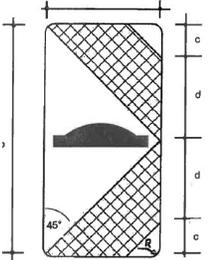
Warns a road user of a temporary speed hump in the road ahead that requires the user to slow down to less than 30 km/h.

TW416 and TW417

- 1 The SPEED HUMPS warning sign W332 is to warn road users of speed humps on the roadway ahead which require a reduction in speed.
- 2 Sign W332 should be displayed when speed control humps have been installed to reduce traffic speed in various environments. UNEVEN ROADWAY warning sign W331 should not be used to warn traffic of speed humps.
- 3 The sign should be located in advance of the hazard at a distance dependent on the operating speed or, in the case of a speed hump immediately after a turn, the average speed at which the hazard can be negotiated safely. If a number of speed humps are installed the sign should preferably be located within 30m of the first hump which should be placed within 50 m of the start of a section of roadway so that drivers encounter the hump at low speed. The sign should preferably be supplemented by an appropriate information plate indicating a "distance for", a recommended speed or some general message.
- 4 Temporary warning sign TW332 may be used when speed humps are used to reduce speeds at roadworks sites.

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Roadworks Temporary TW416 & TW417 Speed Hump Danger Plates



3.5.10 Speed Hump Danger Plates (SADC proposal)

The SPEEDHUMP DANGER PLATES warning signs W416 and W417 is to warn road users of a speed hump in the roadway which require a reduction in speed to less than 30km/h.

The signs W416 and W417 should be displayed in line with the position where the speed humps have been installed to warn the road users of the longitudinal position in the road way.

The SPEED HUMP warning marking WM10 shall be applied to the approach of the speed hump as specified in Vol. 1 page 7.3.1 and Vol. 4 page 12.2.6

Temporary warning sign TW416 and TW417 should be displayed at the longitudinal location where the temporary speed humps have been installed.

The display of the SPEED HUMP warning sign W332 or TW332 in advance of the speed hump should be displayed as specified in Vol. 1 page 3.4.14

Dimensions

a	b	c	d	r
300	600	90	210	25

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Roadworks Temporary Warning Road Layout Signs



TW333

Slippery Road

References
V1 3.4.15
V4 3.4.33

- The SLIPPERY ROAD warning sign W333 is to warn road users of abnormally slippery conditions on the roadway ahead for which a considerable reduction in speed is necessary.
- Sign W333 should be located in advance of the beginning of the section of slippery roadway in accordance with the provisions of Table 3.1 or Figure 3.1. The signs should be repeated at intervals of about 2 km, where necessary. Alternatively a supplementary distance information plate may be displayed on the same post below sign W333.
- When a section of slippery road is unlikely to be re-paired for some time the use of a permanent sign is in order. In such instances, if the slippery condition is occasional and occurs during wet weather, sign W333 may be supplemented by a plate with the text "When wet".
- Temporary warning sign TW333 should be used if slippery road conditions occur at roadworks sites or if the affected roadway is due to be repaired within a short time period.

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Roadworks Temporary Warning Road Layout Signs



TW335

Falling Rocks (From Left)



TW334

Falling Rocks (From Right)

References
V1 3.4.15
V4 3.4.35

- The FALLING ROCKS warning signs W334 and W335 are to warn road users of the possibility of falling rocks or stones on the right or left of the roadway ahead.
- Signs W334 and W335 should be displayed in advance of sections of roadway in loose rock cuttings where broken rock may be lying on the road surface. If the section is long the sign should be repeated at regular intervals of 2km or the affected distance may be displayed on a SUPPLEMENTARY PLATE sign IN11.2, mounted below signs W334 or W335 and on the same post for some time until the rock slope is deemed to have stabilized.
- Temporary warning sign TW334 and TW335 may be required at roadworks sites where freshly opened cuttings are relatively common. The signs may be retained.

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Roadworks Temporary Warning Road Layout Signs



TW336

Roadworks

References
V1 3.4.16
V4 3.4.36



1200mm Urban
Lane Closure
300m



1500mm Rural
Pothole Repair
for 5km



1200 x 2000 Freeway
DETOUR
1 km

- The ROADWORKS temporary warning sign TW336 is to warn road users that temporary road construction, maintenance or related work is in progress ahead.
- It should be noted that the function of this sign has been broadened from that of "Road Workmen" to the more general application of ROADWORKS.
- Sign TW336 should be displayed in advance of a roadworks site, however insignificant. For increased visual impact, sign TW336 may be repeated on the approach to the roadworks. In the case of a dual carriageway roadway the signs may also be repeated on the right-hand side of the roadway if the median width permits. When used at minor works in a portable form the reverse side of the sign should be marked with alternating black and yellow horizontal stripes 150mm wide. These may be retroreflective for improved visibility.
- Sign TW336 may be used on a HIGH VISIBILITY background as an advance warning sign at major roadworks sites (see Section 3.6).
- Supplementary distance information plates are recommended to indicate:
 - the distance to the hazard;
 - the extent of the work site or detour.
- TW336 signs should be located in accordance with the provisions of Figure 3.1.
- The use of sign TW336 should be standardised. Typical layouts for signing at roadworks are given in Volume 2. Special care should be taken to differentiate between when work is in progress and when no work is going on but roadway conditions are restricted in some way. Correct procedure in this regard will improve public perception of roadworks signing practices.
- A permanent version of the ROADWORKS warning sign should not be used.

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Roadworks Temporary Warning Road Layout Signs

TW339 References
V1 3.4.18
V4 3.4.39



General Warning

- The GENERAL WARNING sign W339 is to warn road users that there is a hazard of a general or random nature in the roadway ahead. The most common use of this sign should be in its temporary form as TW339 in keeping with the non-specific nature of the "General Warning" symbol temporary use of the sign is appropriate when unplanned events occur which create a normally short-term hazard.
- Sign TW339 should be displayed in advance of a section of roadway where a random temporary hazard such as fallen trees, subsidence, burst water mains etc., has occurred.
- The sign will commonly be portable so that it can be quickly erected, moved or removed as the nature of the hazard requires.
- The reverse side of a portable sign TW339 shall be marked with alternating black and yellow non-retroreflective horizontal stripes 150 mm wide.
- The sign should be located in advance of the hazard at a distance in accordance with Table 3.1.
- A SUPPLEMENTARY PLATE sign IN11.4 with a relevant text message such as "Ice", "Snow", "Potholes" or "Accident", etc., should be displayed immediately below the sign wherever possible. Maintenance and incident response units should carry a number of the most frequently used messages so that road users will receive a message appropriate to the circumstances prevailing.
- Sign TW339 may be used at roadworks sites or detours if it is considered more appropriate than a ROADWORKS temporary warning sign, TW336.
- At night the sign may be used in conjunction with a yellow flashing light as provided for in Section 3.6.
- The use of permanent GENERAL WARNING sign W339 should be strictly limited and, when used, it shall be used with a SUPPLEMENTARY PLATE sign IN11 appropriate to the circumstances.



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165

Roadworks Temporary Warning Road Layout Signs

TW344 References
V1 3.4.20
V4 3.4.44



Construction Vehicles Crossing (From Left)

- The CONSTRUCTION VEHICLES CROSSING temporary warning signs TW344 and TW345 are to warn road users that temporarily construction vehicles may enter or cross the roadway ahead, from the left and/or right side as appropriate, and that unless care is exercised this may constitute a hazard.
- Signs TW344 or TW345 should be displayed on the approach to a junction or access where construction vehicles, particularly heavy vehicles, regularly enter or cross the traffic stream. Sign TW344 should be used when construction vehicles represent a particular hazard when entering from the left, or the left and right. If the hazard is related mainly to construction vehicles entering from the right, sign TW345 should be used.
- The signs should be located in advance of the junction in accordance with the design speed of the road according to Table 3.1 or Figure 3.1. If the junction is already signed with another junction warning sign or an advance direction sign care should be taken with the location of signs TW344 or TW345.
- These signs are particularly relevant for use at roadworks or construction sites to warn of the movements of construction vehicles. Signs should be correctly oriented to indicate the actual direction from which construction vehicles are most likely to enter or leave the roadway and should be covered or moved when not applicable.



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166

Roadworks Temporary Warning Road Layout Signs

TW360 References
V1 3.4.26
V4 3.4.60



Width Restriction

- The WIDTH RESTRICTED warning sign W360 is to warn drivers that the width of the roadway or part of the roadway ahead is restricted and that a prohibition on vehicles with a width equal to or greater than that indicated in metres by means of a number on such sign may exist.
 - any specific narrow structure which cannot accommodate a single vehicle with a width equal to or greater than that displayed on the sign if the structure concerned carries one-way traffic;
 - any specific narrow structure which cannot accommodate two vehicles travelling in opposite directions at the same time, each of which vehicles having a width equal to or greater than that displayed on the sign if the structure concerned carries two-way traffic;
- Sign W360 should be displayed in advance of:
 - any section of narrow roadway which cannot accommodate two-way movement of vehicles having a width equal to or greater than that displayed on the sign.
- The width restriction shown on sign W360 should be the same as shown on the following WIDTH LIMIT sign R238.
- Sign W360 should be located some distance from the restriction in the roadway so that restricted vehicles have the opportunity to follow an alternative route. A typical sign arrangement for a width restricted site is given in Volume 2. (See Volume 2, Chapters 3 and 11).
- Temporary sign TW360 may be used under the same circumstances as permanent WIDTH RESTRICTED warning signs if construction or maintenance work requires that the normal roadway width be temporarily reduced to such an extent that a restriction needs to be applied.



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167

Roadworks Temporary Warning Road Layout Signs

TW353 References
V1 3.4.24
V4 3.4.53



Accident

3.4.44 Accident

- The ACCIDENT temporary warning sign TW353 is to warn road users that there is an accident ahead.
- Sign TW353 should be displayed in advance of an accident site which is being attended by police and/or emergency services and which represents a temporary hazard to approaching road users. If such a sign is carried by a member of the public it may be displayed immediately an accident occurs or is discovered, prior to the arrival of emergency services.
- The sign should be portable so that it can be quickly erected, moved or removed as circumstances require.
- The reverse side of sign TW353 shall be marked with alternating black and yellow horizontal stripes 150 mm wide. These may be retroreflective to improve visibility under poor light conditions.
- The sign should be positioned in advance of the accident site at a distance in accordance with Table 3.1. Particular attention should be paid to road vertical and horizontal curvature and sight distance to the sign. If necessary the sign should be placed further from the site than recommended in Table 3.1.
- At a major accident site the sign may be mounted in conjunction with a flashing yellow warning light or a SUPPLEMENTARY PLATE sign IN11. In circumstances where traffic queues are likely to form someone, if necessary a member of the public, should be given the task of moving the sign to keep it safely in advance of end of the queue of traffic.



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168

Roadworks Temporary Warning Road Layout Signs

3.5.1 Danger Plates/Delineator Plates

1 The DANGER PLATE warning signs W401 and W402 and the DELINEATOR PLATE temporary warning signs TW401 and TW402 are to warn road users of an obstruction or temporary obstruction, in the roadway, or alteration or temporary alteration, in the roadway alignment to the right or left side of the roadway.

3 Open ditches, high embankments and ill-defined curves, particularly where roadside space is limited in urban areas may be demarcated using a number of DANGER PLATE hazard markers (see Subsection 3.5.3 on page 3.5.4).

4 Signs TW401 and TW402 should be displayed at all obstructions at roadworks sites which are potentially hazardous. Sign TW401 should be used on the left side of the roadway so that traffic passes to the right of the plate. Sign TW402 should be used on the right side of the roadway so that traffic passes to the left of the plate. In addition delineator plates should be used to indicate temporary road alignments which occur at roadworks sites. 200 litre, or similar drums shall not be used for this purpose.

5 DANGER PLATES and DELINEATOR PLATES should have a minimum size of 600 mm height and 150 mm width. The ratio of height to width should be

2 Signs W401 and W402 should be displayed at all hazardous obstructions that occur within the shoulder or verge of a roadway such as bridge abutments, culvert head-walls or posts without guardrail protection. Sign W401 should be used on the left side of the roadway so that traffic passes to the right of the plate. Sign W402 should be used on the right side of the roadway so that traffic passes to the left of the plate.

6 Tapers, median crossovers and other temporary alignments at roadworks sites should be demarcated using sequences of DELINEATOR PLATES spaced according to Table 3.4.

7 Details of applications of DELINEATOR PLATES are covered in Volume 2, Chapter 13.

8 Variants of signs W401/W402 and TW401/TW402, numbered W413 and TW413 respectively, may be used to identify traffic island gore areas (see Subsection 3.5.8).

9 Variants of signs W401 and TW401, numbered W415 and TW415 respectively, are applicable for use to mark low level overhead structures (see subsection 3.5.9).

maintained at 4 to 1 up to a maximum size of 1 200 mm x 300 mm, which size should be used to indicate bridge abutments and columns at freeway underpasses.

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169

Roadworks Temporary Warning Road Layout Signs

Temporary condition	Delineator spacing (m)
Taper 1 in 10 ⁽¹⁾	3
Taper 1 in 20 ⁽¹⁾	5
Taper 1 in 30 ⁽¹⁾	7
Taper 1 in 40 ⁽¹⁾	10
Median crossover on curve ⁽²⁾	5 to 10
Crossover on straight	10
End taper 1 in 5 ⁽³⁾	5
End taper 1 in 10 ⁽³⁾	7
Short straight	10
Long rural straight	200 max.
High speed roadway	50 max.

Temporary condition	Delineator spacing (m)
Taper 1 in 10 ⁽¹⁾	3
Taper 1 in 20 ⁽¹⁾	5
Taper 1 in 30 ⁽¹⁾	7
Taper 1 in 40 ⁽¹⁾	10
Median crossover on curve ⁽²⁾	5 to 10
Crossover on straight	10
End taper 1 in 5 ⁽³⁾	5
End taper 1 in 10 ⁽³⁾	7
Short straight	10
Long rural straight	200 max.
High speed roadway	50 max.

NOTES:

(1) Tapers refer to those on the approach to a roadworks site or change in direction.

(2) Spacings given are for outer curves. Inner curve spacing may be increased to 10 to 20 m.

(3) End taper refers to a taper used to widen a roadway back to its normal width at the end of a roadworks site.

(4) Spacings greater than 50 m should be avoided on freeways.

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170

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

All delineators to comply with SANS 1555

TW401

TW402

DIMENSIONS (mm)

W	4W	2W	a	b	c
150	600	300	15	120	270
200	800	400	20	160	360
250	1000	500	20	210	450
300	1200	600	20	260	540

DELINEATOR PLATE

- Class III reflective sheeting
- Anchor pin between blade and base
- Correct size **200x800** reflective

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171

Roadworks Temporary Warning Road Layout Sharpe Curve Chevrons

1 The SHARP CURVE CHEVRON warning signs W405, W406, W407, and W408 are to warn road users that the roadway ahead is diverted to the right or left through a sudden change of direction around a sharp curve.

2 The SHARP CURVE CHEVRON warning signs W405 and W406 shall be displayed in multiples of three or more signs when it is required to mark sharp longitudinal curves which may constitute a hazard. A minimum of three separate signs, spaced in accordance with the provisions of Table 3.5, are necessary to give road users the required impression of sharp curvature. Subject to the prevailing speed limit this applies particularly

to curves with a radius in the range of 60 metres to 600 metres. Signs W405 and W406 may be used on curves of greater than 600 metres radius when the radius of the curve is significantly less than is common on adjacent sections of roadway.

3 When a sharp curve, or bend, has a radius of less than 60 metres the hazard may be marked by a composite modular warning sign W407 or W408 positioned so that the three included chevrons point in the direction of curvature. SHARP CURVE CHEVRON warning signs W407 and W408 shall be manufactured as one piece signs as specified in Volume 4. This application is generally only appropriate in urban residential areas or on minor class "D" or "E" rural roads.

TW405 & TW406 Single Modules
Reduce speed one tenth to one third

TW407 & TW408 Triple Module
Reduce speed by more than one third

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172

Roadworks Temporary Warning Road Layout Signs Sharp Curve Chevrons



TW405
TW405 & TW406 Single Modules
Reduce speed one tenth to one third



TW406



TW407
TW407 & TW408 Triple Module
Reduce speed by more than one third



TW408

4 When SHARP CURVE CHEVRON signs W405 and W406 are used to define the curvature of a road it is recommended that the first sign to be positioned should be located as close as possible to the line of sight of a driver on the tangent approach to the curve. All other W405 or W406 signs required for the curve should then be spaced forwards and backwards around the curve at 75 metre spacings as given in Table 3.5. Subject to the minimum requirement these signs shall be visible at all times (allowing for both horizontal and vertical curvature) it is recommended that sufficient W405 or W406 signs be provided to define the full length of the curve. The first sign in such a sequence of signs should ideally be positioned at or close to the beginning tangent point to the curve. In cases of particular hazard it may be advantageous to provide up to three signs in advance of the tangent point on the straight, on a flat taper, to enhance the warning effect.

5 When a guardrail is provided on a sharp curve W405 and W406 signs may be placed above and behind the guardrail in addition to GUARDRAIL DELINEATOR D1 (see Chapter 7) to enhance the visibility of the guardrail and improve delineation of the sharp curve (see Figure 3.23).

6 In terms of the recommendations given in paragraphs 3.5.2 to 3.5.5 the use of W405 or W406 signs singly or in pairs is not recommended. A variant of W405/W406 (and TW405/TW406) signs combined, numbered W414 (and TW414) may be used to identify traffic island gone areas (see Subsection 3.5.5).

7 SHARP CURVE CHEVRON signs may be combined for use at T-junctions. This variation is covered in Subsection 3.5.4 and is termed a T-JUNCTION CHEVRON sign W409. Recommendations on the sizes of SHARP CURVE CHEVRON signs and T-JUNCTION CHEVRON signs are given in Table 3.6.

8 A sequence of SHARP CURVE CHEVRON signs should be mounted at a constant height above shoulder level. Details of sign position and mounting height are given in Chapter 1.

9 Temporary warning signs TW405, TW406, TW407 and TW408 may be used under the same circumstances as permanent SHARP CURVE CHEVRON signs at roadworks and other temporary sites. However, they should be used to supplement DELINEATOR PLATE signs TW401 and/or TW402 where necessary and not to replace these signs at temporary changes of direction. Signs TW407 and TW408 are recommended when a directional message is required at barricades used at temporary roadworks or lane closures behind and above DELINEATOR PLATES. When used in this manner they may be combined with any of a wide range of temporary warning or regulatory signs used at the site. Care must be exercised in choosing the correct chevron signs for use at barricades. Refer also to Subsection 3.5.4 TEMPORARY T-JUNCTION CHEVRON sign TW409, Subsection 3.5.5, temporary ROAD CLOSED CHEVRON sign TW410 and Subsection 3.5.6, TEMPORARY BARRICADE sign TW411.

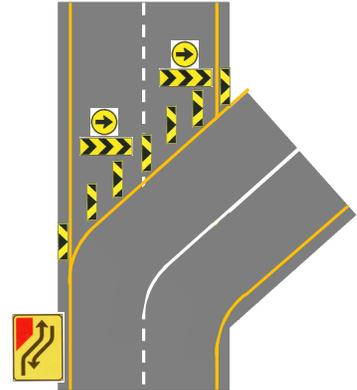
10 The provision of permanent and temporary SHARP CURVE CHEVRON signs is a significant change in practice. It is not intended that all existing signs be replaced with immediate effect. Details of timing for the completion of this exercise are given in Chapter 1 together with requirements for other road traffic signs on a class by class basis where appropriate. Each authority should prepare a phasing-in programme based on the following guidelines:-

- (a) all new permanent installations shall use red and white coloured chevrons;
- (b) a mixture of red and white, and black and yellow chevrons must not be permitted to occur at any specific site;
- (c) if it is necessary to replace one or more black and yellow chevrons at a site, due to damage or other maintenance requirements, ALL chevrons in the set shall be replaced by red and white chevrons, subject to the availability of used black and yellow chevrons from other sites which may be re-installed up to the limit of their useful life, OR until the replacement deadline referred to in Chapter 1.

11 Detailed examples of the use of various chevron signs are given in Volume 2.

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Roadworks Temporary Warning Road Layout Signs TW407 - Sharp Curve Chevrons – FULL ROAD CLOSURE





TR106 Proceed Right Only



TW407 – Sharp Curve to the Right

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Roadworks Temporary Warning Road Layout Signs TW 409 -T Junction Chevron



- The T-JUNCTION CHEVRON warning sign W409 is to warn road users that the roadway does not continue beyond the junction and that a turn must be made to the right or left.
- The recommended minimum module sizes for SHARP CURVE CHEVRON and T-JUNCTION CHEVRON signs in relation to various categories of road are given in Table 3.6. Certain sizes given in brackets allow alternate dimensions to permit more economical use of standard material sizes.
- A T-JUNCTION CHEVRON warning sign shall comprise a minimum of three right modules and three left modules. Sign W409 may be displayed on its own at a T-junction or in combination with a STACK-TYPE DIRECTION sign GD2. When used with a DIRECTION sign, the length of sign W409 shall be made the same as the DIRECTION sign. The number of right and left modules shall be increased as necessary so that there is always an equal number of each. Any extra length required to match the DIRECTION sign shall be located in the centre of the sign and be provided in the background colour. (For examples see Figure 4.45). When used with a DIRECTION sign, sign W409 shall be mounted immediately below the DIRECTION sign.
- Temporary warning sign TW409 may be used under the same circumstances as a permanent T-JUNCTION CHEVRON warning sign when a temporary T-junction is created at a roadworks or building construction site or by a temporary closure of the road ahead at a crossroad. Care should be exercised in choosing the correct chevron sign for use at a temporary road closure at a crossroad if the intersecting crossroad is a one-way road. Refer also to Subsection 3.5.3, temporary SHARP CURVE CHEVRON signs TW405 to TW408, Subsection 3.5.5, temporary ROAD CLOSED CHEVRON sign TW410 and Subsection 3.5.6, TEMPORARY BARRICADE sign TW411.
- Detailed examples of the use of various chevron signs are given in Volume 2.

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Roadworks Temporary Warning Road Layout Signs TW410 - Road Closed Chevron



- The DEAD-END CHEVRON warning sign W410 and the ROAD CLOSED CHEVRON temporary warning sign TW410 are to warn road users that the roadway does not continue beyond the sign and that traffic must return in the direction from which it has come, or proceed as directed by accompanying traffic signs.
- Sign W410 may be displayed at the physical limit of a cul-de-sac roadway to indicate to drivers that they must reduce speed and prepare to turn around. The sign is particularly recommended for use in cul-de-sac which have been created by road closure and/or where the view ahead is open and unobstructed at the end of the cul-de-sac.
- The sign may be displayed in addition to CUL-DE-SAC information signs, IN4 to IN6.
- The ROAD CLOSED CHEVRON temporary warning sign TW410, may be used to indicate the full, temporary closure of a roadway due to roadworks, building construction or maintenance operations which effectively makes the roadway concerned a temporary cul-de-sac. Sign TW410 should not be used at a partial roadway closure such as a lane or lanes closure. In such situations the use of TEMPORARY BARRICADE sign, TW411 is recommended normally in conjunction with KEEP LEFT or KEEP RIGHT temporary regulatory sign, TR103 and TR104.
- Care should be exercised when choosing a chevron sign for a temporary road closure barricade. Sign TW410 should only be used for full road closures when traffic can only return in the direction from which it has arrived at the barricade. When traffic is diverted at a barricade to the right and/or left SHARP CURVE CHEVRON or T-JUNCTION CHEVRON signs will be more appropriate (see Subsections 3.5.3, 3.5.4 and 3.5.6).
- Detailed examples of the use of various chevron signs are given in Volume 2.

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Roadworks Temporary Warning Road Layout Signs TW411 - Lane Closed Barricade Sign



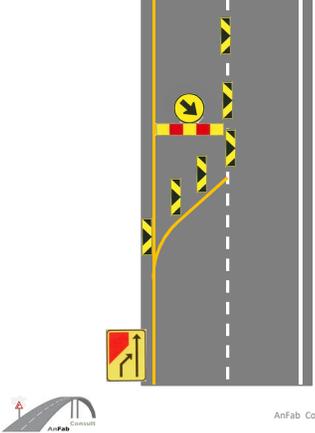
- The BOOM BARRICADE warning sign W411 is to warn road users that the roadway or access is closed to traffic whilst the sign is in a horizontal position, and the TEMPORARY BARRICADE warning sign TW411 is to warn road users that a portion of a roadway is temporarily closed to traffic.
- Sign W411 may be displayed in conjunction with a STOP sign R1, or a STOP sign R1 with flashing red disc signals, at a railway crossing to improve the visual impact of the crossing when it is closed to road users. Sign W411 may also be displayed at the entrance or access point to parking areas or other similar sites where it is desired to visually bar entry until payment has been made or access clearance has been given.
- Sign TW411 may be displayed behind DELINEATOR PLATE signs, TW401 or TW402 either on its own or with a temporary KEEP LEFT regulatory sign TR103, or a temporary KEEP RIGHT regulatory sign TR104 as appropriate to the direction of movement of traffic. Several TW411 signs spaced at regular intervals may be used in this manner to improve the visual impact of the signing of a temporary lane closure or partial road closure, or of a temporary crossover through a median island on a section of dual roadway.

TEMPORARY BARRICADE signs may also be used to demarcate a separation between vehicular traffic and pedestrian traffic under low operating speed road-works conditions.

- The use of TEMPORARY BARRICADE signs in conjunction with temporary PROCEED LEFT ONLY regulatory sign TR105, or temporary PROCEED RIGHT ONLY regulatory sign TR106 is not recommended. TR105 and/or TR106 signs should rather be used with temporary ROAD CLOSED CHEVRON warning sign TW410 if a road has been completely closed temporarily to through traffic or with one or more temporary SHARP CURVE CHEVRON warning signs TW407 and TW408 if traffic may still turn left or right in front of the road closure.
- On tapers or crossovers it is recommended that TW411 signs be located at approximately 50 m intervals for higher speed conditions and at 20 m to 30 m intervals for lower speed conditions.
- Details of typical roadworks applications involving TEMPORARY BARRICADE warning signs are given in Volume 2.

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Roadworks Temporary Warning Road Layout Signs Sharp Curve Chevrons – LANE/PORION ROAD CLOSURE



TW104 – Keep Right



TW411 - Lane Closed Barricade Sign



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Roadworks Temporary Warning Road Exit Ramp Signs

<p>TW413</p>  <p>Gore Plate</p> <p>Urban</p>	<p>TW414</p>  <p>Gore Chevron</p> <p>Rural</p>	<p>TGA4(E)</p>  <p>Freeway Normal Exit Position</p>	<p>TGA4(V)</p>  <p>Freeway Exit Position Moved</p>
--	--	---	--

References V1 3.5.8, V4 3.5.8 for TW413 and TW414. References V1 3.5.8, V4 3.5.9 for TGA4(E) and TGA4(V).

- The GORE MARKER signs GORE PLATE warning sign W413 and GORE CHEVRON warning sign W414 are to warn road users of a physical separation in the road ahead which they must pass either to the left or right of and that such an area, known as the "gore area", of a junction may contain road signs and/or kerbing which may constitute a hazard.
- Signs W413 and W414 are recommended for use in all gore areas where roadways for traffic travelling in the same direction diverge from each other and road users have to choose one path or the other to proceed. Such gore areas are common at all freeway off ramp exits from the main carriageway and at secondary splits in off ramps on fully directional ramps (common at systems interchanges). Gore areas are also common at high standard at-grade channelised road junctions in both rural and urban areas.
- GORE PLATE sign W413 is recommended for use on small channelised traffic islands which result in a split in traffic flow for streams of traffic travelling in the same direction.
- GORE CHEVRON sign W414 is recommended for use on larger channelising traffic islands and in gore areas on freeway off ramps. A variant of sign W414 is included in GORE EXIT sign GA4, which is specified for the initial gore area where an off ramp leaves the main carriageway.

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Roadworks Temporary Warning Road STOP/GO Signs

TW343 References V1 3.4.20, V4 3.4.43



"Stop/Go" Control Ahead

=   or  

Day time ONLY – > 200 vehicles per hour longer than 100m
R1.5A/R1.5B

Day time ONLY – < 200 vehicles per hour shorter than 100m
Flagger

- The "STOP/GO" CONTROL AHEAD temporary warning sign TW343 is to warn road users that traffic ahead is being temporarily controlled by a portable "STOP/GO" sign R1.5A/R1.5B.
- Sign TW343 should be used at roadworks in advance of a section of roadway which is subject to control by portable STOP sign R1.5A and GO sign R1.5B. The sign will commonly be used with temporary ROAD NARROWS warning signs TW328, TW329 or TW330. Sign TW343 signs should be located and sized as indicated in Table 3.1 or Figure 3.1.
- When the "STOP/GO" control is not operating, and sufficient roadway width for two-way traffic is available, and operation has to continue into the hours of darkness or outside work time, sign TW343 should be removed or suitably covered, e.g. at night time. When one way operation is required outside normal working hours, a 24-hour system of traffic control must be implemented such as temporary traffic signal control. Details of typical sign sequences and operational characteristics of "STOP/GO" control sites are given in Volume 2.
- A permanent version of the "STOP/GO" CONTROL AHEAD warning sign should not be used.

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Roadworks Temporary Warning Road Soft Shoulder Signs



TW401



TW342
Soft Shoulder

References
V1 3.4.19
V4 3.4.42

- 1 The SOFT SHOULDER temporary warning sign TW342 is to warn road users that the material of the shoulder is softer than would be reasonably expected and constitutes a hazard to anyone wishing to pull off the roadway.
- 2 Sign TW342 should be displayed in advance of sections of roadway where a soft shoulder is present due to incomplete road construction or unexpectedly high surface water or water table conditions. The sign should be located in advance of the section of roadway
- 3 The use of a SUPPLEMENTARY PLATE sign IN11.2 with sign TW342 is recommended if the condition exists for some distance.
- 4 A permanent version of the SOFT SHOULDER warning sign is most unlikely to be used, but if required it should be numbered and referred to as W342.

at a distance in accordance with the operating speed of approach traffic and the provisions of the graph in Figure 3.1.



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181

Roadworks Temporary Warning Road Layout Signs



TW340
Surface Step (Right)



TW341
Surface Step (Left)

References
V1 3.4.19
V4 3.4.40

References
V1 3.4.19
V4 3.4.41

- 1 The SURFACE STEP temporary warning signs IW340 and IW341 are to warn road users of a hazardous change in the level of the roadway.
- 2 Signs IW340 and IW341 should be displayed in advance of a section of roadway where there is a significant difference in level along the length of the roadway, usually as a result of resurfacing operations. The step will commonly coincide with the position occupied by a line marking prior to resurfacing. These signs should be located in advance of the section of roadway at a distance in accordance with the provisions of Figure 3.1.
- 3 Sign IW340 should be used when the right-hand side road surface is higher than the left, and sign IW341 when the left-hand side road surface is higher than the right.
- 4 Resurfacing operations tend to occur over some distance. SUPPLEMENTARY PLATE sign IN11.2 are therefore recommended or signs may be repeated at intervals.
- 5 Signs TW340 and TW341 should not be used for temporary steps across the width of the road surface. The UNEVEN ROADWAY temporary warning sign TW331 should be used to warn of such a potential hazard in accordance with the provisions of Subsection 3.4.25.
- 6 Permanent versions of the SURFACE STEP warning signs are unlikely to be used, but if required they should be numbered and referred to as W340 and W341.



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182

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Chapter 1 – General Principles
Road Traffic Sign – Sign Placement



The position of a sign can be specified in three ways, namely:

- (a) longitudinally in relation to the roadway alignment;
- (b) laterally in relation to the roadway cross-section;
- (c) vertically.



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183

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign – Longitudinal Placement



Road signs generally fall into one of two groups with regard to their longitudinal position. They are either located at the point of reference, or at a determined distance in advance of the point of reference. The point of reference may be one of:

- (a) the commencement of a regulatory control;
- (b) a hazard to road users;
- (c) a road junction.



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184

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign – Cone of Retro-reflectivity

185

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign – Distance of Retro-reflectivity

Grade	Visibility	Reflectivity Warranty
EG Engineer Grade	$\le 180\text{m}$	7 Years
HI High Intensity	$\le 360\text{m}$	10 Years
DG Diamond Grade	$\le 480\text{m}$	12 Years

186

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign – Cone of Retro-reflectivity

Class I			Low risk (Urban <math><40\text{km/h}</math>)		Glass beaded 8% Light return
Class III			Medium risk (Rural <math><60\text{km/h}</math>)		High Intensity Prismatic 32% Light return
Class IV			High risk (Freeway)		Full cube prismatic 58% Light return

187

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Road Traffic Sign – Longitudinal Placement

188

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles Road Traffic Sign – Longitudinal Placement

Signs combined on one support

Too closely spaced

* combine signs on one support

Taper Work Area

Detail 1.16.1 Insufficient Longitudinal Space for Several Signs

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189

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles Road Traffic Sign – Longitudinal Placement

TABLE 1.2

CLEAR SIGHT DISTANCE REQUIREMENTS

TABLE 1.2

Letter Size (mm)	Minimum Sight Distance (m)
490	380
420	340
350	300
280	260
210	220
140	180
112	160

NOTES:

(1) As an alternative to repositioning signs the shaded area may be cleared or obstructions removed to allow for observation of the sign prior to reading.

(2) The "Clear Sight Distance" values include the legibility distance for the letter size PLUS 100m to allow for observation of the sign prior to reading.

Detail 1.16.2 Clear Line of Sight to Larger Guidance Signs

Fig 1.16 Further Aspects of Longitudinal Positioning of Road Signs

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190

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles Road Traffic Sign – Lateral and Vertical Placement

shoulder (no kerb)

Min 1,2m
Max 2m

Diagrammatic Sign

Dimension	Minimum (mm)	Preferred (mm)	Maximum (mm)	Remarks
A	1200	1500	2000	See note (8)
B	500	750		See "R" and note (9)
C	600/300	2100	2500	See note (10)
D	2100	2500	3000	See note (11)
E	0	0	200	See Chapter 3
F	600	1200	2000	
G	800	1200	1600	
H			6000	See note (12)
J	2000	4000		See note (13)
K	1600	2000	2400	See note (12) and (14)
L	750			
M	5200	5700	6200	
N	1000	1500		See "R" and note (9)
P	50	1000		
R	600	1500		See "R", "N" and note (8)
T	1800		4200	See note (15)

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191

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Chapter 1 – General Principles Human Factors

The term "human factors" is used to describe the interaction of man with man-made objects and various processes within the natural and man-made environment. This interaction of man in the roadway environment is largely realised in the form of "driver behaviour". The efficient operation of the road traffic system ultimately depends on the performance of the system users, who are mainly drivers but can include pedestrians, AND on the understanding by road designers of the human factors involved in driver behaviour in the road environment.

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192

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Chapter 1 – General Principles
Human Factors



It is generally agreed that the prime cause of almost **95%** of all accidents **involves human factors**.

The understanding of human factors and the incorporation of this understanding into road design is therefore important to the safety performance of the road traffic system.



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193

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Chapter 1 – General Principles
Human Factors Checklist



The following critical items should be addressed in any phase of road design:

- What is the driver's task?
- What is the information need?
- What is the information source and when is it provided?
- Does the information contradict any other information?
- Does the information contradict driver expectation?
- Does anything interfere with the information transfer?
- What are the likely consequences of an error?



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Positive Guidance



"Positive Guidance" is a road safety philosophy that advocates the creation and maintenance of a public road environment which will provide road users with the optimum amount of visual information which is:

- useful - the limitation is that non-useful or non-pertinent information takes time to process - this reduces human performance for necessary information processing and reaction;
- prioritized for importance - the performance limitation again applies to human reaction;
- uniform (and without surprises - expectancy) - man develops response habits as a defence mechanism - driver expectancy results in automatic, and time saving, responses to standard stimuli- the ultimate objective of positive guidance techniques; and
- easily visible under the widest range of conditions - standards used must be as close to the ideal as possible.



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195

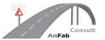
SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Positive Guidance – Visual Information System



(a) formal information sources:

- road signs (Chapters 2, 3, 4 and 5);
- road markings including other delineation devices (Chapter 7);
- traffic signals (Chapter 6 and Volume 3);
- vehicle tail lights;
- road maps, brochures etc.;



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196

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 2 – Regulatory Signs

- 2.2 Control Signs
- 2.3 Command Signs
- 2.4 Prohibition Signs
- 2.5 Reservation Signs
- 2.6 Comprehensive Signs
- 2.7 Selective Restriction Signs
- 2.8 Regulatory Sign Combinations
- 2.9 De-Restriction Signs

197

Chapter 2 – Regulatory Signs

Control Signs

198

Chapter 2 – Regulatory Signs

Command, Prohibition, Reservation and Comprehensive

199

Chapter 2 – Regulatory Signs

Selective Restriction

200

Chapter 2 – Regulatory Signs

Key to Information Given in Contents

permanent sign no
R210

permanent sign colours

Volume 1 & 4 page references

temporary sign no
TR210

temporary sign colours

No Right Turn

sign name

Ref. V1 2.4.8
V4 2.12

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201

Chapter 2 – Regulatory Signs

Control Signs

R1 References R1, R1.1, R1.3 and R1.4 V1 2.2.1-2.2.5 V4 2.2.1 and 2.2.3 Stop	R1.1 Stop	R1.2 Ref. V1 2.2.1 V4 2.2.2 Stop/Yield	R1.3 3 - Way Stop	R1.4 4 - Way Stop
R1.5A References V1 2.2.3 V4 2.2.1 Stop (Stop/Go Control)	R1.5B References V1 2.2.3 V4 2.2.4 Go (Stop/Go Control)	R2 References V1 2.2.6 V4 2.2.5 Yield	R2.1 References V1 2.2.7 V4 2.2.6 Yield to Pedestrians	R2.2 References V1 2.2.8 V4 2.2.7 Yield at Mini Circle

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202

Chapter 2 – Regulatory Signs

Control Signs

R3 References V1 2.2.9 V4 2.2.8 No Entry	R4.1 References V1 2.2.10 V4 2.2.9 One - Way (Left)	R4.2 References V1 2.2.10 V4 2.2.9 One - Way (Right)	R4.3 References V1 2.2.10 V4 2.2.9 One - Way (Straight - On)	R5 References V1 2.2.11 V4 2.2.10 Pedestrian Priority
R6 References V1 2.2.12 V4 2.2.11 Yield to Oncoming Traffic				

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203

Chapter 2 – Regulatory Signs

Command Signs

R101 Ref. V1 2.3.1 V4 2.3.1 TR101 Minimum Speed	R102 Ref. V1 2.3.2 V4 2.3.2 TR102 Vehicles Exceeding Mass Only	R103 Ref. V1 2.3.3 V4 2.3.3 TR103 Keep Left	R104 Ref. V1 2.3.3 V4 2.3.4 TR104 Keep Right	R105 Ref. V1 2.3.4 V4 2.3.5 TR105 Proceed Left Only
R106 Ref. V1 2.3.4 V4 2.3.6 TR106 Proceed Right Only	R107 Ref. V1 2.3.4 V4 2.3.7 TR107 Proceed Straight Only	R108 Ref. V1 2.3.5 V4 2.3.8 TR108 Turn Left	R109 Ref. V1 2.3.5 V4 2.3.9 TR109 Turn Right	R110 Ref. V1 2.3.6 V4 2.3.10 TR110 Pedestrians Only

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204

Chapter 2 – Regulatory Signs

Command Signs

R125
TR125
Construction Vehicles Only
Ref. V1 2.3.12 V4 2.3.25

R127
TR127
Abnormal Vehicles Only
Ref. V1 2.3.12 V4 2.3.27

R137
TR137
Roundabout
Ref. V1 2.3.17 V4 2.3.37

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Chapter 2 – Regulatory Signs

Prohibition Signs

R201
TR201
Speed Limit
Ref. V1 2.4.1 V4 2.4.2

R202
TR202
Mass Limit
Ref. V1 2.4.2 V4 2.4.4

R203
TR203
Axle Massload Limit
Ref. V1 2.4.3 V4 2.4.5

R204
TR204
Height Limit
Ref. V1 2.4.4 V4 2.4.6

R205
TR205
Length Limit
Ref. V1 2.4.5 V4 2.4.7

R206
TR206
No Excessive Noise
Ref. V1 2.4.6 V4 2.4.8

R207
TR207
No Hitch-Hiking
Ref. V1 2.4.6 V4 2.4.9

R208
TR208
No Unauthorized Vehicles
Ref. V1 2.4.7 V4 2.4.10

R209
TR209
No Left Turn Ahead
Ref. V1 2.4.8 V4 2.4.11

R210
TR210
No Right Turn Ahead
Ref. V1 2.4.8 V4 2.4.12

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Chapter 2 – Regulatory Signs

Prohibition Signs

R211
TR211
No Left Turn
Ref. V1 2.4.9 V4 2.4.13

R212
TR212
No Right Turn
Ref. V1 2.4.9 V4 2.4.14

R213
TR213
No U-Turn
Ref. V1 2.4.9 V4 2.4.15

R214
TR214
No Overtaking - All Vehicles
Ref. V1 2.4.10 V4 2.4.16

R215
TR215
No Overtaking - Goods Vehicles
Ref. V1 2.4.10 V4 2.4.17

R216
TR216
No Parking
Ref. V1 2.4.11 V4 2.4.18

R217
TR217
No Stopping
Ref. V1 2.4.12 V4 2.4.19

R218
TR218
No Pedestrians
Ref. V1 2.4.13 V4 2.4.20

R219
TR219
No Cyclists
Ref. V1 2.4.14 V4 2.4.21

R220
TR220
No Cyclists and Pedestrians
Ref. V1 2.4.15 V4 2.4.22

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Chapter 2 – Regulatory Signs

Prohibition Signs

R226
TR226
No Midi-Buses
Ref. V1 2.4.18 V4 2.4.27

R227
TR227
No Buses
Ref. V1 2.4.18 V4 2.4.28

R228
TR228
No Delivery Vehicles
Ref. V1 2.4.18 V4 2.4.29

R231
TR231
No Construction Vehicles
Ref. V1 2.4.19 V4 2.4.32

R232
TR232
No Vehicles Carrying Dangerous Goods
Ref. V1 2.4.19 V4 2.4.33

R233
TR233
No Abnormal Vehicles
Ref. V1 2.4.19 V4 2.4.34

R239
TR239
Width Limit
Ref. V1 2.4.21 V4 2.4.40

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Chapter 2 – Regulatory Signs

Comprehensive Regulatory Signs



<p>R401</p>  <p>References V1 2.6.1 V4 2.6.1</p> <p>Dual Carriageway Freeway Begins</p>	<p>R402 TR402</p>  <p>References V1 2.6.2 V4 2.6.2</p> <p>Single Carriageway Freeway Begins</p>	<p>R403</p>  <p>References V1 2.6.3 V4 2.6.3</p> <p>Woonerf</p>
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209

Chapter 2 – Regulatory Signs

De-Restriction Signs



<p>R401-600 TR401-600</p>  <p>References V1 2.9.1 V4 2.8.7</p> <p>End of Dual Carriageway Freeway</p>	<p>R402-600 TR402-600</p>  <p>References V1 2.9.1 V4 2.8.8</p> <p>End of Single Carriageway Freeway</p>	<p>R403-600</p>  <p>References V1 2.9.1 V4 2.8.9</p> <p>End of Woonerf</p>
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210

Chapter 2 – Regulatory Signs

Combinations



<p>R214</p>  <p>IN11.2</p>  <p>Detail 2.17.1 Distance "For" (IN11.2)</p>	<p>R133</p>  <p>IN11.2</p>  <p>Detail 2.17.1 Distance "For" (IN11.2)</p>	<p>R402</p>  <p>IN11.2</p>  <p>Detail 2.17.1 Distance "For" (IN11.2)</p>
<p>R132</p>  <p>IN11.3</p>  <p>Detail 2.17.2 Distance "To" (IN11.3)</p>	<p>R402</p>  <p>IN11.3</p>  <p>Detail 2.17.2 Distance "To" (IN11.3)</p>	<p>TR108</p>  <p>(R)569</p>  <p>TIN11.3</p>  <p>Detail 2.17.2 Distance "To" (IN11.3)</p>



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211

Chapter 2 – Regulatory Signs

Combinations



<p>R204</p>  <p>IN11.4</p>  <p>Detail 2.17.3 Text Message (IN11.4)</p>	<p>R216</p>  <p>IN11.4</p>  <p>Detail 2.17.3 Text Message (IN11.4)</p>	<p>R1</p>  <p>IN11.4</p>  <p>Detail 2.17.3 Text Message (IN11.4)</p>
<p>R217</p>  <p>IN11.503</p>  <p>Detail 2.17.4 Symbol (IN11.5)</p>	<p>R217</p>  <p>(R)502</p>  <p>IN11.510</p>  <p>Detail 2.17.4 Symbol (IN11.5)</p>	<p>R1</p>  <p>TIN11.5</p>  <p>Detail 2.17.4 Symbol (IN11.5)</p>



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212

Chapter 2 – Regulatory Signs Combinations

900mm x 900mm

1200mm x 1200mm

1800mm x 1800mm

Comparison with standard 1200mm regulatory sign with respect to border

Fig 2.18 High Visibility Regulatory Signs Sizes

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213

Chapter 2 – Regulatory Signs Control Signs

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214

Chapter 2 – Regulatory Signs Combinations

TR204-RF-SS3

TIN11.3

1km

TR201-RB/RE

60

Detour

Detail 2.19.2 With Flashing Yellow Signals

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215

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Road Layout W100 Series

Movement W200 Series

Symbolic W300 Series

4.42

4.42

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Chapter 3 – Regulatory Signs

Warning Signs

```

    graph TD
      HM[HAZARD MARKERS] --> P[Permanent]
      HM --> T[Temporary]
      P --> OM[Object Marker]
      P --> CM[Curve Marker]
      T --> OM
      T --> CM
      OM --- OM1[Red/White Striped]
      OM --- OM2[Black/Yellow Striped]
      CM --- CM1[Red Arrow]
      CM --- CM2[Black Arrow]
    
```

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Chapter 3 – Warning Signs

ADD INFORMATION

high visibility

high visibility plus flashing yellow signals

information plate

80km/h

flashing yellow signal

200 m

1:20 For 7 km

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218

Chapter 2 – Regulatory Signs

Warning Signs - Key to Information Given in Content

permanent sign no

permanent sign colours

Volume 1 & 4 page references

W101

temporary sign no

temporary sign colours

References V1 3.2.1 V4 3.2.6

Crossroad

sign name

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219

Chapter 3 – Warning Signs

Road Layout R100 Series

<p>W101</p> <p>References V1 3.2.1 V4 3.2.1</p> <p>TW101</p> <p>Crossroad</p>	<p>W102</p> <p>References V1 3.2.1 V4 3.2.2</p> <p>TW102</p> <p>Crossroad on Priority Road</p>	<p>W103</p> <p>References V1 3.2.1 V4 3.2.3</p> <p>TW103</p> <p>Priority Crossroad on Non-Priority Road</p>	<p>W104</p> <p>References V1 3.2.1 V4 3.2.4</p> <p>TW104</p> <p>T-Junction</p>	<p>W105</p> <p>References V1 3.2.1 V4 3.2.5</p> <p>TW105</p> <p>Skew T-Junction (Right)</p>
<p>W106</p> <p>References V1 3.2.1 V4 3.2.6</p> <p>TW106</p> <p>Skew T-Junction (Left)</p>	<p>W107</p> <p>References V1 3.2.2 V4 3.2.7</p> <p>TW107</p> <p>Side Road Junction (Left)</p>	<p>W108</p> <p>References V1 3.2.2 V4 3.2.8</p> <p>TW108</p> <p>Side Road Junction (Right)</p>	<p>W109</p> <p>References V1 3.2.2 V4 3.2.9</p> <p>TW109</p> <p>Staggered Junctions (Right - Left)</p>	<p>W110</p> <p>References V1 3.2.2 V4 3.2.10</p> <p>TW110</p> <p>Staggered Junctions (Left - Right)</p>

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220

Chapter 3 – Warning Signs

Road Layout R100 Series

<p>W111</p> <p>TW111 References: V1 3.2.3, V4 3.2.11</p> <p>Sharp Junction (Half Left)</p>	<p>W112</p> <p>TW112 References: V1 3.2.3, V4 3.2.12</p> <p>Sharp Junction (Left)</p>	<p>W113</p> <p>TW113 References: V1 3.2.3, V4 3.2.13</p> <p>Sharp Junction (Half Right)</p>	<p>W114</p> <p>TW114 References: V1 3.2.3, V4 3.2.14</p> <p>Sharp Junction (Right)</p>	<p>W115</p> <p>TW115 References: V1 3.2.3, V4 3.2.15</p> <p>Y - Junction</p>
<p>W116</p> <p>TW116 References: V1 3.2.4, V4 3.2.16</p> <p>End of Dual Roadway (To Right)</p>	<p>W117</p> <p>TW117 References: V1 3.2.4, V4 3.2.17</p> <p>End of Dual Roadway (Straight on)</p>	<p>W118</p> <p>TW118 References: V1 3.2.4, V4 3.2.18</p> <p>Beginning of Dual Roadway (Straight on)</p>	<p>W119</p> <p>TW119 References: V1 3.2.4, V4 3.2.19</p> <p>Beginning of Dual Roadway (To Left)</p>	

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Chapter 3 – Warning Signs

Direction of Movement R200 Series

<p>W201</p> <p>TW201 References: V1 3.3.1, V4 3.3.1</p> <p>Traffic Circle</p>	<p>W202</p> <p>TW202 References: V1 3.3.1, V4 3.3.2</p> <p>Gentle Curve (Right)</p>	<p>W203</p> <p>TW203 References: V1 3.3.1, V4 3.3.3</p> <p>Gentle Curve (Left)</p>	<p>W204</p> <p>TW204 References: V1 3.3.2, V4 3.3.4</p> <p>Sharp Curve (Right)</p>	<p>W205</p> <p>TW205 References: V1 3.3.2, V4 3.3.5</p> <p>Sharp Curve (Left)</p>
<p>W206</p> <p>TW206 References: V1 3.3.2, V4 3.3.6</p> <p>Hairpin Bend (Right)</p>	<p>W207</p> <p>TW207 References: V1 3.3.2, V4 3.3.7</p> <p>Hairpin Bend (Left)</p>	<p>W208</p> <p>TW208 References: V1 3.3.3, V4 3.3.8</p> <p>Winding Road (Right - Left)</p>	<p>W209</p> <p>TW209 References: V1 3.3.3, V4 3.3.9</p> <p>Winding Road (Left - Right)</p>	<p>W210</p> <p>TW210 References: V1 3.3.4, V4 3.3.10</p> <p>Combined Curves (Right - Left)</p>

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Chapter 3 – Warning Signs

Direction of Movement R200 Series

<p>W211</p> <p>TW211 References: V1 3.3.4, V4 3.3.11</p> <p>Combined Curves (Left - Right)</p>	<p>W212</p> <p>TW212 References: V1 3.3.4, V4 3.3.12</p> <p>Two - Way Traffic</p>	<p>W213</p> <p>TW213 References: V1 3.3.5, V4 3.3.13</p> <p>Two - Way Traffic Crossroad</p>	<p>W214</p> <p>TW214 References: V1 3.3.5, V4 3.3.14</p> <p>Right Lane Ends</p>	<p>W215</p> <p>TW215 References: V1 3.3.5, V4 3.3.15</p> <p>Left Lane Ends</p>
<p>W216</p> <p>TW216 References: V1 3.3.6, V4 3.3.16</p> <p>Concealed Driveway (From Right)</p>	<p>W217</p> <p>TW217 References: V1 3.3.6, V4 3.3.17</p> <p>Concealed Driveway (From Left)</p>	<p>W218</p> <p>TW218 References: V1 3.3.6, V4 3.3.18</p> <p>Concealed Driveway (From Both Sides)</p>		

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Chapter 3 – Warning Signs

Symbolic R300 Series

<p>W301</p> <p>TW301 References: V1 3.4.1, V4 3.4.1</p> <p>Traffic Signals Ahead</p>	<p>W302</p> <p>TW302 References: V1 3.4.1, V4 3.4.2</p> <p>Traffic Control "Stop" Ahead</p>	<p>W303</p> <p>TW303 References: V1 3.4.2, V4 3.4.3</p> <p>Traffic Control "Yield" Ahead</p>	<p>W304</p> <p>TW304 References: V1 3.4.2, V4 3.4.4</p> <p>Traffic Control Ahead</p>	<p>W305</p> <p>TW305 References: V1 3.4.3, V4 3.4.5</p> <p>Scholar Patrol Ahead</p>
<p>W306</p> <p>TW306 References: V1 3.4.3, V4 3.4.6</p> <p>Pedestrian Crossing</p>	<p>W307</p> <p>TW307 References: V1 3.4.4, V4 3.4.7</p> <p>Pedestrians</p>	<p>W308</p> <p>TW308 References: V1 3.4.4, V4 3.4.8</p> <p>Children</p>	<p>W309</p> <p>TW309 References: V1 3.4.5, V4 3.4.9</p> <p>Cyclists</p>	<p>W310</p> <p>TW310 References: V1 3.4.5, V4 3.4.10</p> <p>Farm Animals (Cattle)</p>

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Chapter 3 – Warning Signs

Symbolic R300 Series



<p>W311</p>  <p>TW311 References: V1 3.4.5 V4 3.4.11</p> <p>Farm Animals (Horses)</p>	<p>W312</p>  <p>TW312 References: V1 3.4.5 V4 3.4.12</p> <p>Farm Animals (Sheep)</p>	<p>W313</p>  <p>References: V1 3.4.6 V4 3.4.13</p> <p>Wild Animals Ahead</p>	<p>W314</p>  <p>References: V1 3.4.6 V4 3.4.14</p> <p>Gate</p>	<p>W315</p>  <p>References: V1 3.4.7 V4 3.4.15</p> <p>Motor Gate (Right)</p>
<p>W316</p>  <p>References: V1 3.4.7 V4 3.4.16</p> <p>Motor Gate (Left)</p>	<p>W317</p>  <p>References: V1 3.4.7 V4 3.4.17</p> <p>Motor Gate</p>	<p>W318</p>  <p>TW318 References: V1 3.4.7 V4 3.4.18</p> <p>Railway Crossing</p>	<p>W319</p>  <p>References: V1 3.4.8 V4 3.4.19</p> <p>Tunnel</p>	<p>W320</p>  <p>TW320 References: V1 3.4.8 V4 3.4.20</p> <p>Height Restricted</p>

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Chapter 3 – Warning Signs

Symbolic R300 Series



<p>W321</p>  <p>TW321 References: V1 3.4.21 V4 3.4.21</p> <p>Length Restricted</p>	<p>W322</p>  <p>TW322 References: V1 3.4.10 V4 3.4.22</p> <p>Steep Descent</p>	<p>W323</p>  <p>TW323 References: V1 3.4.10 V4 3.4.23</p> <p>Steep Ascent</p>	<p>W324</p>  <p>TW324 References: V1 3.4.11 V4 3.4.24</p> <p>Slow Moving Heavy Vehicle</p>	<p>W325</p>  <p>TW325 References: V1 3.4.11 V4 3.4.25</p> <p>Gravel Road Begins</p>
<p>W326</p>  <p>TW326 References: V1 3.4.12 V4 3.4.26</p> <p>Narrow Bridge</p>	<p>W327</p>  <p>TW327 References: V1 3.4.12 V4 3.4.27</p> <p>One Vehicle Width Structure</p>	<p>W328</p>  <p>TW328 References: V1 3.4.13 V4 3.4.28</p> <p>Road Narrows Both Sides</p>	<p>W329</p>  <p>TW329 References: V1 3.4.13 V4 3.4.29</p> <p>Road Narrows From Right Side Only</p>	<p>W330</p>  <p>TW330 References: V1 3.4.13 V4 3.4.30</p> <p>Road Narrows From Left Side Only</p>

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Chapter 3 – Warning Signs

Symbolic R300 Series



<p>W331</p>  <p>TW331 References: V1 3.4.14 V4 3.4.31</p> <p>Uneven Roadway</p>	<p>W332</p>  <p>TW332 References: V1 3.4.14 V4 3.4.32</p> <p>Speed Humps</p>	<p>W333</p>  <p>TW333 References: V1 3.4.15 V4 3.4.33</p> <p>Slippery Road</p>	<p>W334</p>  <p>TW334 References: V1 3.4.15 V4 3.4.34</p> <p>Falling Rocks (From Right)</p>	<p>W335</p>  <p>TW335 References: V1 3.4.15 V4 3.4.35</p> <p>Falling Rocks (From Left)</p>
<p>W336</p>  <p>References: V1 3.4.16 V4 3.4.36</p> <p>Roadworks</p>	<p>W337</p>  <p>References: V1 3.4.17 V4 3.4.37</p> <p>Grader Working</p>	<p>W338</p>  <p>References: V1 3.4.17 V4 3.4.38</p> <p>Loose Stones</p>	<p>W339</p>  <p>TW339 References: V1 3.4.18 V4 3.4.39</p> <p>General Warning</p>	<p>W340</p>  <p>References: V1 3.4.19 V4 3.4.40</p> <p>Surface Step (Right)</p>

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Chapter 3 – Warning Signs

Symbolic R300 Series



<p>W341</p>  <p>TW341 References: V1 3.4.41 V4 3.4.41</p> <p>Surface Step (Left)</p>	<p>W342</p>  <p>TW342 References: V1 3.4.19 V4 3.4.42</p> <p>Soft Shoulder</p>	<p>W343</p>  <p>TW343 References: V1 3.4.20 V4 3.4.43</p> <p>"Stop/Go" Control Ahead</p>	<p>W344</p>  <p>TW344 References: V1 3.4.20 V4 3.4.44</p> <p>Construction Vehicles Crossing (From Left)</p>	<p>W345</p>  <p>TW345 References: V1 3.4.20 V4 3.4.45</p> <p>Construction Vehicles Crossing (From Right)</p>
<p>W346</p>  <p>TW346 References: V1 3.4.21 V4 3.4.46</p> <p>Emergency Flashing Light</p>	<p>W347</p>  <p>TW347 References: V1 3.4.21 V4 3.4.47</p> <p>Temporary Police Flashing Light</p>	<p>W348</p>  <p>References: V1 3.4.22 V4 3.4.48</p> <p>Jetty Edge or River Bank</p>	<p>W349</p>  <p>TW349 References: V1 3.4.22 V4 3.4.49</p> <p>Crosswinds</p>	<p>W350</p>  <p>References: V1 3.4.23 V4 3.4.50</p> <p>Drift</p>

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Chapter 3 – Warning Signs

Symbolic R300 Series

References: V1 3.4.51, V4 3.4.51

References: V1 3.4.52, V4 3.4.52

References: V1 3.4.53, V4 3.4.53

References: V1 3.4.54, V4 3.4.54

References: V1 3.4.55, V4 3.4.55

References: V1 3.4.56, V4 3.4.56

References: V1 3.4.57, V4 3.4.57

References: V1 3.4.58, V4 3.4.58

References: V1 3.4.59, V4 3.4.59

References: V1 3.4.60, V4 3.4.60

References: V1 3.4.27, V4 3.4.27

References: V1 3.4.27, V4 3.4.27

References: V1 3.4.61, V4 3.4.61

References: V1 3.4.62, V4 3.4.62

References: V1 3.4.11, V4 3.4.11

References: V1 3.4.63, V4 3.4.63

229

Chapter 3 – Warning Signs

Hazard Markers R400 Series

References: V1 3.5.1, V4 3.5.1

References: V1 3.5.1, V4 3.5.1

References: V1 3.5.2, V4 3.5.2

References: V1 3.5.2, V4 3.5.2

References: V1 3.5.3, V4 3.5.3

References: V1 3.5.3, V4 3.5.3

References: V1 3.5.3, V4 3.5.4

References: V1 3.5.3, V4 3.5.4

230

Chapter 3 – Warning Signs

Hazard Markers R400 Series

2013.11.08 12:23

231

Chapter 3 – Warning Signs

Hazard Markers R400 Series

References: V1 3.5.5, V4 3.5.5

References: V1 3.5.5, V4 3.5.5

References: V1 3.5.6, V4 3.5.6

References: V1 3.5.6, V4 3.5.6

References: V1 3.5.7, V4 3.5.7

References: V1 3.5.7, V4 3.5.7

References: V1 3.5.8, V4 3.5.8

References: V1 3.5.8, V4 3.5.8

232

Chapter 3 – Warning Signs

Hazard Markers R400 Series



<p>W413</p> 	<p>W414</p> 	<p>W415</p> 
<p>TW413</p>  <p>Gore Plate</p>	<p>TW414</p>  <p>Gore Chevron</p>	<p>TW415</p>  <p>Overhead Danger Plate</p>
<p>References V1 3.5.8 V4 3.5.8</p>	<p>References V1 3.5.8 V4 3.5.9</p>	<p>References V1 3.5.9 V4 3.5.11</p>



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233

Chapter 3 – Warning Signs

Proposed Hazard Markers for Speed Hump



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234

Chapter 3 – Warning Signs

Hazard Markers for Obstructions and Speed Hump





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235

Chapter 3 – Warning Signs

Advance Warning Signs with Supplementary Plates



<p>W202</p>  <p>IN11.1</p> <p>Advisory Speed</p>	<p>TW336</p>  <p>TIN11.2</p> <p>Distance "For"</p>	<p>W302</p>  <p>IN11.3</p> <p>Distance "To"</p>	<p>TW339</p>  <p>TIN11.4</p> <p>Text Message</p>	<p>W102</p>  <p>IN11.5</p> <p>Symbolic Message</p>
<p>References V4 9.2.7 - 9.2.12</p>	<p>References V4 9.2.7 - 9.2.12</p>	<p>References V4 9.2.7 - 9.2.12</p>	<p>References V4 9.2.7 - 9.2.12</p>	<p>References V4 9.2.12</p>



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236

Chapter 3 – Warning Signs

Examples: Distance "To" – IN11.3

200 m

60 m

150 m

Examples: Distance Countdown

1km

600 m

400 m

Examples: Text Message – IN11.4

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237

Chapter 3 – Warning Signs

Blind People

Elderly People

Potholes

Accident

Ice

Snow

Dual Carriageway

Building Operations

End-Thank You

Examples: Symbolic Message – IN11.5

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238

Chapter 3 – Warning Signs

High Visibility Signs

400 m

900mm x 1200mm

400 m

1200mm x 1800mm

400 m

1800mm x 2400mm

Comparison with standard 1800mm warning sign in respect of border width and radius.

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239

Chapter 2 – Regulatory Signs

Warning Signs – High Visibility Signs

Examples: Warning Signs

W212-WA

200 m IN11.3

W322-WF+SS3

For 7km IN11.2

TW345-WA

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240

Chapter 2 – Regulatory Signs

Warning Signs– High Visibility Signs

Examples: Dual Information Messages

W332-WB IN11.1

W302-WA IN11.5 IN11.3

W332-WB TIN11.4 TIN11.2

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Chapter 3 – Warning Signs

High Visibility Signs

Examples: Dual Warning or Regulatory and Warning Signs

W209 + W322-WD IN11.2

R201-RC TR201-RC

W218-WC TW331-WC TIN11.2

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Chapter 3 – Warning Signs

High Visibility Signs

Examples: Warning Signs with Flashing Yellow Lights

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Chapter 3 – Warning Signs

High Visibility Signs

Examples: High Visibility Backgrounds With Flashing Yellow Lights

200 m

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Chapter 3 – Warning Signs

Advance Warning Signs in High Visibility Backgrounds

 TW338-WA <small>Refer V4 3.1.4</small> Type WA	 W332-WB <small>Refer V4 3.1.5</small> Type WB	 W212-WC <small>Refer V4 3.1.6</small> Type WC	 W205 + W318 - WD <small>Refer V4 3.1.7</small> Type WD	 TR201-RC+TW331-WC <small>Refer V4 3.1.6</small> Type RC + WC
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245

Chapter 3 – Warning Signs

<p>with Flashing Yellow Signals - SS3</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> TW353 - SS3 </div> <div style="text-align: center;"> W204 - SS3 <small>Refer V1 6.7.4</small> </div> <div style="text-align: center;"> W320 - SS3 <small>Refer V1 6.7.4</small> </div> </div> <div style="text-align: center; margin-top: 10px;"> W322 - WE - SS3 <small>Refer V1 6.7.4 / V4 3.1.10</small> Type WE </div> <div style="text-align: center; margin-top: 10px;"> TW336 - WF - SS3 <small>Refer V4 3.1.6</small> Type WF </div>	<p>Multiple Combinations</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> W102 + IN11.5 + SS3 </div> <div style="text-align: center;"> W302 - WA + IN11.5 + IN11.3 <small>Refer V1 3.6.1 - 3.6.6 and 6.7.3 - 6.7.5 V4 3.1.4 - 3.1.6 and 9.2.7 - 9.2.12</small> </div> </div> <div style="text-align: center; margin-top: 10px;"> TW339 + TIN11.4 + TIN11.2 Ice For 12km </div> <div style="text-align: center; margin-top: 10px;"> W322 - WF + IN11.2 + SS3 For 7km </div>
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246

Chapter 3 – Warning Signs

Operating speed (km/h)	Location distance from hazard (m)(2)	Recommended size (mm)
120	330 (400)	1500
100	240 (320)	1500
80	160 (218)	1200
70	140	1500
60	120 (160)	900

NOTES:

(1) Hazard marker warning signs are located at the hazard - see Section 3.5 for sizes.

(2) If advance warning signs are provided on gravel roads the distances in brackets are recommended.

40	80m	1200mm
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247

Chapter 3 – Warning Signs

Operating speed (km/h)	Clear visibility distance (m)
120	120
100	100
80	80
60	60

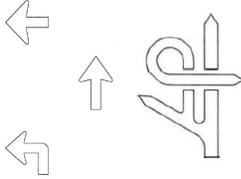
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248

**SADC ROAD TRAFFIC SIGNS
MANUAL Volume 1 – Part 2**

Chapter 4 – Guidance Signs

- 4.1 Introduction



DESTINATION + DIRECTION

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249

Chapter 4 – Guidance Signs



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250

**SADC ROAD TRAFFIC SIGNS
MANUAL Volume 1 – Part 2**

Chapter 4 – Guidance Signs

- 4.1 Introduction
- 4.2 Arrows
- 4.3 Legend
- 4.4 Determination of Letter Sizes
- 4.5 Urban Guidance Signing
- 4.6 Location
- 4.7 Route Marker

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251

**SADC ROAD TRAFFIC SIGNS
MANUAL Volume 1 - Part 2**

Chapter 4 – Guidance Signs

- 4.8 Direction
- 4.9 Freeway Direction
- 4.10 Tourism
- 4.11 Local Direction
- 4.12 Diagrammatic
- 4.14 Toll Direction
- 4.15 National Variants

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252

**SADC ROAD TRAFFIC SIGNS
MANUAL Volume 1 - Part 3**

Chapter 5 – Information Signs

- 5.1 Introduction
- 5.2.1 Count Down Signs
- 5.2.1 Cul de Sac
- 5.2.3 Right of Way
- 5.2.4 Supplementary Plates
- 5.2.6 Information Centre
- 5.2.7 Co-Ordinated Traffic Signals



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253

**SADC ROAD TRAFFIC SIGNS
MANUAL Volume 1 - Part 3**

Chapter 5 – Information Signs

- 5.2.6 Information Centre
- 5.2.7 Co – Ordinated Traffic Signals
- 5.2.8 Bus Stop/Pick Up Point
- 5.2.9 Toll Tariff Board
- 5.2.10 Text Message



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254

**SADC ROAD TRAFFIC SIGNS
MANUAL Volume 1 - Part 3**

Chapter 8 – Navigational Aids

Chapter 9 – Variable Message Signs

Chapter 10 – Glossary of Terms

Chapter 11 – Index



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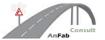


255

Chapter 4 – Guidance Signs
Lettering Styles : Vol 1, Part 2, Page 4.3.1

ABCDEFGHIJKLMNOPQRSTUVWXYZ
RSTUVWXYZ
abcdeêëfghijklmnop
qrstuvwxyz!?(%)
1234567890-”.,:’;><&

Style 'A' (Compressed Lettering)



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256

Chapter 4 – Guidance Signs Lettering Styles



ABCDEFGHIJKLM
 NOPQRSTUVWXYZ
 abcdeêëfghijklmn
 opqrstuvwxyz!/?/()
 1234567890%-'",:;,>&

Style 'B' (Standard Lettering)
 Detail 4.16.1 DIN1451 Part 2 Lettering Styles



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257

Chapter 4 – Guidance Signs Lettering Styles



**ABCDEFGHIJKLM
 NOPQRSTUVWXYZ
 1234567890&**

Detail 4.16.2 'B MOD' Style (Increased Stroke Width)



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258

Chapter 4 – Guidance Signs Arrow Types : Vol 1, Part 2, page 4.2.1




Map-Type 1



Diagrammatic



Map-Type 4



Map-Type 5



Diagrammatic-Type F



Map-Type 8



GE9



Map-Type 9



Diagrammatic-Type K



Map-Type 12



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259

Chapter 4 – Guidance Signs Detail Design : Vol 1, Part 2, page 4.1.5



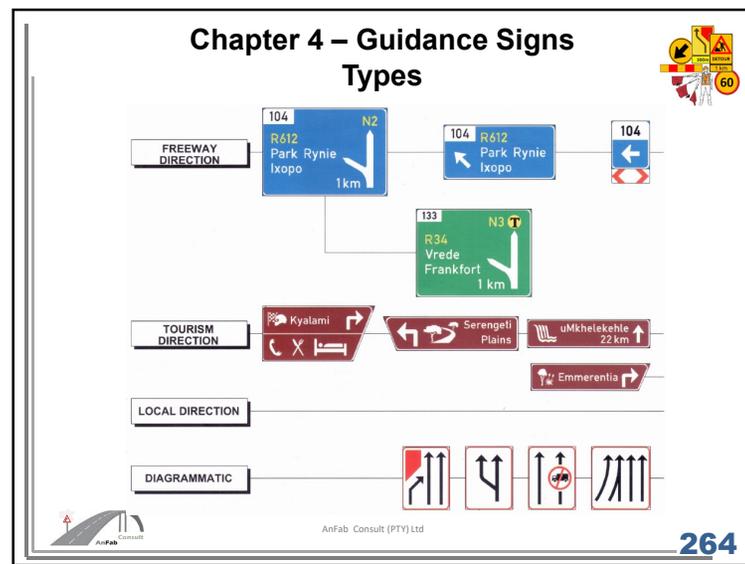
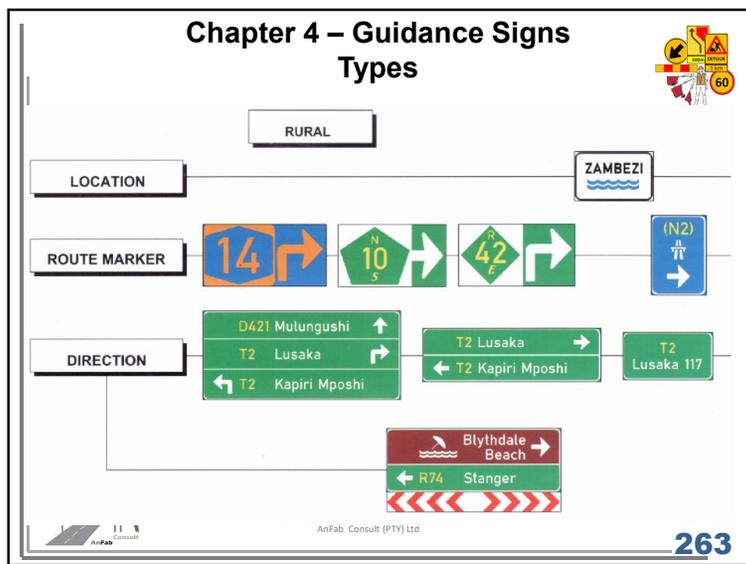
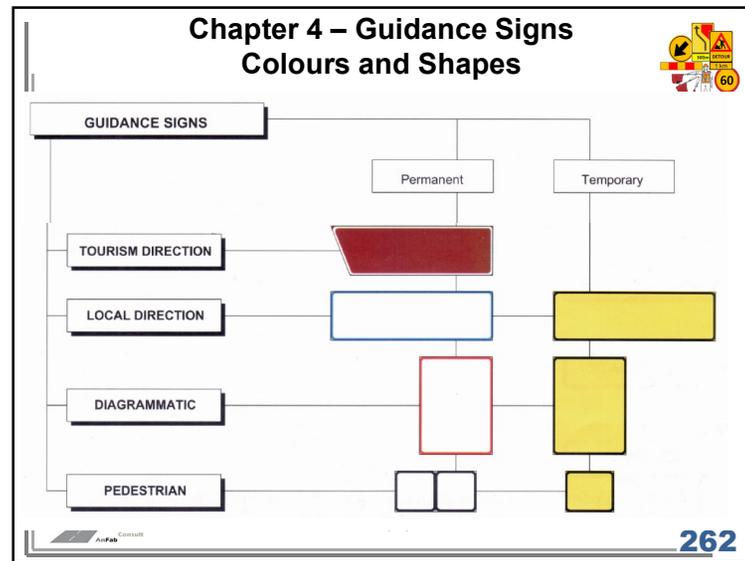
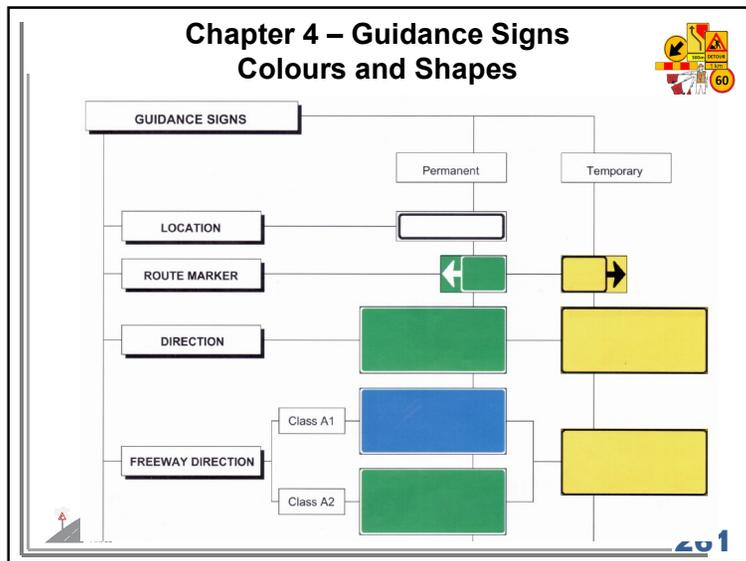

Dimensions: $6.5d$, $10d$, $7.5d$, $3d$, $13d$, $11d$, $3d$, $3d$, $13d$, $3d$, $3d$, $3d$, $5d$, $5d$, $59d$

D421 Mulungushi ↑
 T2 Lusaka →
 T2 Kapiri Mposhi ←



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260



Chapter 4 – Guidance Signs

URBAN

REPUBLIC ROAD

LOCATION

ROUTE MARKER

DIRECTION

FREEWAY DIRECTION

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265

Chapter 4 – Guidance Signs

TOURISM DIRECTION

LOCAL DIRECTION

DIAGRAMMATIC

PEDESTRIAN

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266

Chapter 4 – Guidance Signs

EXIT NUMBER
Black on White

CITY or TOWN PLACENAME
Black on White

CROSS STREET ROUTE NUMBER
Yellow

SYMBOL
White

CROSS STREET NAME

INDIRECT ROUTE
Yellow

FREEWAY ROUTE NUMBER
Yellow

DESTINATION AWAY FROM CBD

MAJOR TRAFFIC GENERATOR

DISTANCE
White

Detail 4.2.1 Ground-Mounted Freeway Direction Sign

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267

Chapter 4 – Guidance Signs

ADVANCE EXIT / THROUGH DIRECTION SIGN

DESTINATIONS SERVICED BY NEXT EXIT

DESTINATIONS IN A STRAIGHT - ON DIRECTION

NEXT EXIT INTERCHANGE NUMBER

COMMON ROAD SECTION - TWO ROUTE NUMBERS

THROUGH ROUTE NUMBER

FAMILIAR DESTINATION ON R24

FAMILIAR DESTINATION ON N12

TRANSPORT TERMINAL ON R24

ARROW CLUSTER SHOWING EXIT SHARED AND THROUGH LINES

DISTANCE TO NEXT EXIT

FAMILIAR DESTINATION REACHED INDIRECTLY BY N3 THEN N1

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268

Chapter 4 – Guidance Signs Class A 1 Freeway

GC4D

<p>136 PRETORIA</p> <p>M9 Rigel Avenue (R50) Delmas</p> <p style="text-align: center;">↓</p>	<p>75 ROODEPOORT</p> <p>R24 Maraisburg Road Industria</p> <p style="text-align: center;">ONLY ↓ 500 m</p>
---	--

Shared Exit Lane Exclusive Exit Lane
Refer V1 4.9.35 V4 6.4.7
Exit Direction

GC3D

N3 Germiston
Durban

M1 Johannesburg

↓

Refer V1 4.9.35 V4 6.4.5/6.4.6

Through (Straight-On) Direction

269

Chapter 4 – Guidance Signs Urban Numbered Route

GD12

M27 N R55 M27 S

Parktown Braamfontein

(M1) ↑ N

↑

↑

↑

150 m 200 m

○ Johannesburg

Refer V1 4.8.20 V4 5.3.6

Overhead-Upward Arrows
Advance Exit/Through Direction

270

Chapter 4 – Guidance Signs Class B: Numbered Route

GD1

<p>N1 Gorongosa ↑</p> <p>N6 Beira →</p> <p>N6 Chimoio ←</p>	<p>↑ Chileka ↑</p> <p>CHIEMBERE HIGHWAY</p> <p>M2 ◉ Limbe →</p> <p>M2 ◉ Blantyre ←</p>	<p>↑ Lusaka City ↑</p> <p>KAFUE RD →</p> <p>T2 Kafue ↗</p> <p>CAIRO RD ←</p> <p>T2 Kabwe ↖</p>
---	--	--

Rural Urban one cross street name Urban two cross street names
Refer V1 4.8.6 V4 5.2.1 to 5.2.10 and 5.2.34 to 5.2.41 Stack-Type Advance Direction

Level 1 – Destinations Displayed (National Roads)
Level 2 if Familiar Destination not on Road

↩

Detour to
N12 eMalahleni

Temporary Colours
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Chapter 4 – Guidance Signs Class C: Numbered Route

GD2

<p>N6 Beira →</p> <p>N6 Chimoio ←</p>	<p>CHIEMBERE HIGHWAY</p> <p>M2 ◉ Limbe →</p> <p>M2 ◉ Blantyre ←</p>	<p>KAFUE RD →</p> <p>T2 Kafue →</p> <p>CAIRO RD ←</p> <p>T2 Kabwe ←</p>
---------------------------------------	---	---

Rural Urban one cross street name Urban two cross street names
Refer V1 4.8.9 V4 5.2.11 to 5.2.15 and 5.2.34 to 5.2.41 Stack-Type Direction

272

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68

Chapter 4 – Guidance Signs Destination Analysis

8.1.5 Node or Destination Classification

1 Nodes or destinations are selected by way of a methodology described in Section 8.S, and are then classified into the following :

- (a) FAMILIAR destinations - those orientation points which are assumed to be known to virtually all drivers, including foreign visitors, in terms of the general direction required to be taken to reach them, and the approximate distance to be covered in order to reach them;
- (b) CONTROL destinations - are orientation points which offer drivers *en route* checks or verifications as to their position or progress;
- (c) SERVICE destinations- are points on routes where road users would expect to be able to obtain various services such as vehicle service, food and accommodation.



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Chapter 4 – Guidance Signs Destination Analysis – Orientations Points

Level 1 - Familiar Orientation Points	Level 2 - Control Orientation Points	Level 3 - Service Orientation Points
Gauteng	Gauteng	Gauteng
Johannesburg	Alberlon Benoni Boksburg Brakpan Carletonville Centurion Germiston Heidelberg Kempton Park Krugersdorp Nigel Randburg Randfontein Roodepoot Sandton Soweto Springs	Akasia Bedfordview Bekkersdal Bronkhorstspruit Daveyton Edenvale Evaton Kagiso Kwa-Thema Meyerton Midrand Modderfontein Sebokeng Tembisa Vosloorus Westonaria
Pretoria	Vanderbijlpark Vereeniging	



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Chapter 4 – Guidance Signs Class : Numbered Routes



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Chapter 4 – Guidance Signs “Bits” on Guidance Signs

“BITS”: is a measure of amount of information displayed on a road sign, typically a guidance or information sign – All sign face components such as text, arrows, symbols, route numbers etc. have been allocated “bit” values – the maximum recommended number of “bits” of information on a sign face is 10 “bits”.



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Chapter 4 – Guidance Signs “Bits” on Guidance Signs



- (i) Words up to/including 8 letters = 1 bit
- (ii) Words more than 8 letters = 2 bits
- (iii) Arrow (stack type) = 0,25 bit
- (iv) Route number = 0,5 bit
- (v) Symbol = 0,5 bit
- (vi) Distance information = 0,5 bit
- (vii) Interchange number = 0,5 bit



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Chapter 4 – Guidance Signs “Bits” on Guidance Signs





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Chapter 4 – Guidance Signs Maximum Legibility Distance (dt)



TABLE 4.2

Letter Heights (mm)	Legibility distance (m)
175/125	62
210/150	75
280/200	100
350/250	125
420/300	150



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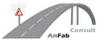
279

Chapter 4 – Guidance Signs Reading Time Available (T)



TABLE 4.3

Letter Heights (mm)	Reading distance (m)	Speed (km/h)			
		60	80	100	120
175/125	6	0,36	0,27	0,22	0,18
210/150	19	1,14	0,86	0,68	0,57
280/200	44	2,64	1,98	1,58	1,32
350/250	69	4,14	3,11	2,48	2,07
420/300	94	5,64	4,23	3,38	2,82



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Chapter 4 – Guidance Signs Reading Time Required (t)

TABLE 4.4

"Bits" of Information (N)	Reading Time (sec)
4	1,34
6	2,14
8	2,94
10	3,74
12	4.54

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Chapter 4 – Guidance Signs Determination of Letter Sizes

Beginning of available reading time End of available reading time

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Chapter 4 – Guidance Signs Determination of Letter Sizes

Beginning of available reading time End of available reading time

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Chapter 4 – Guidance Signs Determination of Letter Sizes

TABLE 4.5 RECOMMENDED LETTER SIZES - RURAL SIGNS **TABLE 4.5**

	Road Class		Operating Speed (km/h)	Sign Displacement X(m)	Letter size (mm)	
	Overhead	Ground Mounted			Direction	Tourism
A1		A1,A2	120	8 (2-3)	490/350	
8		8, C	120	15 (2)	350/250	280/200
		8, C, D	100	8 (2-3)	420/300	
8		8, C, D	120	8 (1)	280/200	210/150
		8, C, D	100	8 (1)	280/200	175/125
		8, C, D	80	8 (2-3)	350/250	
		8, C, D	80	8 (1)	210/150	175/125

For D=1,0 N=8(Direction) N=S(Tourism) D=1.5(Overhead)

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Chapter 4 – Guidance Signs Determination of Letter Sizes

TABLE 4.6 RECOMMENDED LETTER SIZES - URBAN SIGNS TABLE 4.6

Road Class	Operating Speed (km/h)	Sign Displacement X(m)	Lettersize (mm)	
			Direction	Tourism
A1	100	8 (2-3)	350/250	280/200
A1	100	15 (3)	350/250	280/200
A1	80	8 (2-3)	350/250	210/150
8	80	15 (3)	350/250*	210/150
8	80	8 (2-3)	350/250	210/150
8	80	13 (2)	280/200	210/150
8	60	8 (2-3)	280/200	210/150
8	60	9 (2)	210/150	140/100
8	60	6 (1)	175/125	140/100*
8	50	6 (1)	175/125*	112/80

For D=1,5 N=6(Direction) N=3(Tourism) D=1.5(Overhead)

Where * =Next lower letter size is optional.

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Chapter 4 – Temporary Guidance Signs

NOTE:
Temporary versions of almost all trailblazer and route marker signs may be used - see Section 4.7

TGE6

TGE12.1

TGE13.4

Temporary Route Marker Signs

TGD2-D

Refer V1 4.8.11 V4 5.2.20
Detour Direction

GA4

GA4(E)

TGA4(E)

TGA4(V)

Gore Exit

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Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS100 Traffic Movement Affected by Obstructions

GS101

Refer V1 4.12.9 V4 8.2.1

TGS101

Refer V1 4.12.9 V4 8.2.1

GS102

Refer V1 4.12.9 V4 8.2.1

TGS102

Refer V1 4.12.9 V4 8.2.1

GS103

Refer V1 4.12.9 V4 8.2.3

TGS103

Refer V1 4.12.9 V4 8.2.3

GS104

Refer V1 4.12.9 V4 8.2.3

TGS104

Refer V1 4.12.9 V4 8.2.3

GS105

Refer V1 4.12.9 V4 8.2.4

TGS105

Refer V1 4.12.9 V4 8.2.4

GS106

Refer V1 4.12.9 V4 8.2.4

TGS106

Refer V1 4.12.9 V4 8.2.4

GS107

Refer V1 4.12.9 V4 8.2.5

TGS107

Refer V1 4.12.9 V4 8.2.5

GS108

Refer V1 4.12.9 V4 8.2.5

TGS108

Refer V1 4.12.9 V4 8.2.5

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Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS100 Traffic Movement Affected by Obstructions

TGS109

Refer V1 4.12.9 V4 8.2.7

TGS110

Refer V1 4.12.9 V4 8.2.7

TGS111

Refer V1 4.12.9 V4 8.2.8

TGS112

Refer V1 4.12.9 V4 8.2.9

TGS113

Refer V1 4.12.10 V4 8.2.8

TGS114

Refer V1 4.12.10 V4 8.2.9

TGS115

Refer V1 4.12.10 V4 8.2.11

TGS116

Refer V1 4.12.10 V4 8.2.11

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288

Chapter 4 – Section 4.12
Temporary Guidance Signs
DIAGRAMMATIC – GS100 Traffic Movement Affected
by Obstructions

TGS117 Refer V1 4.12.10 V4 8.2.13	TGS118 Refer V1 4.12.10 V4 8.2.13	TGS119 Refer V1 4.12.10 V4 8.2.14	TGS120 Refer V1 4.12.10 V4 8.2.14
TGS121 Refer V1 4.12.10 V4 8.2.15	TGS122 Refer V1 4.12.10 V4 8.2.17	GS123 TGS123 Refer V1 4.12.10 V4 8.2.18	GS124 TGS124 Refer V1 4.12.10 V4 8.2.19

289

Chapter 4 – Section 4.12
Temporary Guidance Signs
DIAGRAMMATIC – GS100 Traffic Movement Affected
by Obstructions

TGS125 Refer V1 4.12.11 V4 8.2.21	TGS126 Refer V1 4.12.11 V4 8.2.23	TGS127 Refer V1 4.12.11 V4 8.2.25	TGS128 Refer V1 4.12.11 V4 8.2.26
TGS129 Refer V1 4.12.11 V4 8.2.27	TGS130 Refer V1 4.12.11 V4 8.2.29	TGS131 Refer V1 4.12.11 V4 8.2.29	TGS132 Refer V1 4.12.11 V4 8.2.30

290

Chapter 4 – Section 4.12
Temporary Guidance Signs
DIAGRAMMATIC – GS100 Traffic Movement Affected
by Obstructions

TGS133 Refer V1 4.12.11 V4 8.2.31	TGS134 Refer V1 4.12.11 V4 8.2.31	TGS135 Refer V1 4.12.11 V4 8.2.32	TGS136 Refer V1 4.12.11 V4 8.2.33
TGS137 Refer V1 4.12.12 V4 8.2.34	TGS138 Refer V1 4.12.12 V4 8.2.34	TGS139 Refer V1 4.12.12 V4 8.2.35	TGS140 Refer V1 4.12.12 V4 8.2.37

291

Chapter 4 – Section 4.12
Temporary Guidance Signs
DIAGRAMMATIC – GS100 Traffic Movement Affected
by Obstructions

TGS141 Refer V1 4.12.12 V4 8.2.37	TGS142 Refer V1 4.12.12 V4 8.2.38	TGS143 Refer V1 4.12.12 V4 8.2.39	TGS144 Refer V1 4.12.12 V4 8.2.40
GS145 TGS145 Refer V1 4.12.12 V4 8.2.41	GS146 TGS146 Refer V1 4.12.12 V4 8.2.42	GS147 TGS147 Refer V1 4.12.12 V4 8.2.43	GS148 TGS148 Refer V1 4.12.12 V4 8.2.44

292

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS100 Traffic Movement Affected by Obstructions

GS149 TGS149 <small>Refer V1 4.12.13 V4 8.2.45</small>	GS150 TGS150 <small>Refer V1 4.12.13 V4 8.2.47</small>	GS151 <small>Refer V1 4.12.13 V4 8.2.49</small>	GS152 <small>Refer V1 4.12.13 V4 8.2.51</small>
GS153 TGS153 <small>Refer V1 4.12.13 V4 8.2.52</small>	GS154 TGS154 <small>Refer V1 4.12.13 V4 8.2.52</small>	GS155 TGS155 <small>Refer V1 4.12.13 V4 8.2.54</small>	GS156 TGS156 <small>Refer V1 4.12.13 V4 8.2.55</small>

293

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS300 Lane Use Control by Direction Traffic

GS301 TGS301 <small>Refer V1 4.12.18 V4 8.4.1</small>	GS302 TGS302 <small>Refer V1 4.12.18 V4 8.4.1</small>	GS303 TGS303 <small>Refer V1 4.12.18 V4 8.4.3</small>	GS304 TGS304 <small>Refer V1 4.12.18 V4 8.4.3</small>
GS305 TGS305 <small>Refer V1 4.12.18 V4 8.4.4</small>	GS306 TGS306 <small>Refer V1 4.12.18 V4 8.4.4</small>	GS307 TGS307 <small>Refer V1 4.12.18 V4 8.4.5</small>	GS308 TGS308 <small>Refer V1 4.12.18 V4 8.4.7</small>

294

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS300 Lane Use Control by Direction

GS310 TGS310 <small>Refer V1 4.12.18 V4 8.4.8</small>	GS311 TGS311 <small>Refer V1 4.12.18 V4 8.4.10</small>	GS312 TGS312 <small>Refer V1 4.12.18 V4 8.4.12</small>
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295

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS400 Lane Merges

GS401 TGS401 <small>Refer V1 4.12.20 V4 8.5.1</small>	GS402 TGS402 <small>Refer V1 4.12.20 V4 8.5.2</small>	GS403 TGS403 <small>Refer V1 4.12.20 V4 8.5.3</small>	GS404 TGS404 <small>Refer V1 4.12.20 V4 8.5.5</small>
GS405 TGS405 <small>Refer V1 4.12.20 V4 8.5.7</small>	GS406 TGS406 <small>Refer V1 4.12.20 V4 8.5.7</small>		

296

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS500 Heavy Vehicle Control

GS505 TGS505

Refer V1 4.12.24 V4 8.7.4

1:20
For 7 km

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297

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS600 Overhead Specific Situations / Lane Use Control

GS601 TGS601

500 m

Refer V1 4.12.26 V4 8.8.1

GS602 TGS602

Refer V1 4.12.26 V4 8.8.2

GS603 TGS603

60 60

Refer V1 4.12.26 V4 8.8.3

GS604 TGS604

10t 10t

Refer V1 4.12.26 V4 8.8.3

GS605 TGS605

10t 10t

For 5 km For 2 km

Refer V1 4.12.26 V4 8.8.4

GS606 TGS606

10t 10t

For 5 km For 2 km

Refer V1 4.12.26 V4 8.8.4

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298

Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS6000 Overhead Versions

GS6106 TGS6106

Refer V1 4.12.28 V4 8.8.10

GS6106D TGS6106D

500 m 250 m

Refer V1 4.12.28 V4 8.8.11

GS6406 TGS6406

Refer V1 4.12.28 V4 8.8.14

GS6406D TGS6406D

250 m 400 m

Refer V1 4.12.28 V4 8.8.15

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Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS800 Grade Lane

TGS861 TGS862 TGS863

Refer V1 4.12.33 V4 8.10.13

Refer V1 4.12.33 V4 8.10.14

Refer V1 4.12.33 V4 8.10.15

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Chapter 4 – Section 4.12 Temporary Guidance Signs DIAGRAMMATIC – GS900 Junction with Warning

GS901 **TGS901**

Refer V1 4.12.35 V4 8.11.1

GS902 **TGS902**

Refer V1 4.12.35 V4 8.11.1

301

Chapter 4 – Section 4.12 Temporary Guidance Signs Pedestrian Direction

R218

GP6+GP9

TGP4+TGP9

302

Chapter 4 – Section 4.12 Temporary Guidance Signs Pedestrian Direction

<p>GP1</p> <p>TGP1</p> <p>Refer V1 4.13.6 V4 14.2.1</p> <p>Arrow-Straight/Up</p>	<p>GP2</p> <p>TGP2</p> <p>Refer V1 4.13.6 V4 14.2.1</p> <p>Arrow-Down</p>	<p>GP3</p> <p>TGP3</p> <p>Refer V1 4.13.6 V4 14.2.1</p> <p>Arrow-Right</p>	<p>GP4</p> <p>TGP4</p> <p>Refer V1 4.13.6 V4 14.2.1</p> <p>Arrow-Left</p>	<p>GP5</p> <p>TGP5</p> <p>Refer V1 4.13.6 V4 14.2.2</p> <p>Arrow-Half Right</p>
<p>GP6</p> <p>TGP6</p> <p>Refer V1 4.13.6 V4 14.2.2</p> <p>Arrow-Half Right</p>	<p>GP7</p> <p>TGP7</p> <p>Refer V1 4.13.6 V4 14.2.2</p> <p>Arrow-Half Left</p>	<p>GP8</p> <p>TGP8</p> <p>Refer V1 4.13.6 V4 14.2.2</p> <p>Arrow-Half Left</p>	<p>GP9</p> <p>TGP9</p> <p>Refer V1 4.13.8 V4 14.2.3</p> <p>Pedestrian(s)</p>	<p>GP10</p> <p>TGP10</p> <p>Refer V1 4.13.8 V4 14.2.4</p> <p>Toilets</p>

303

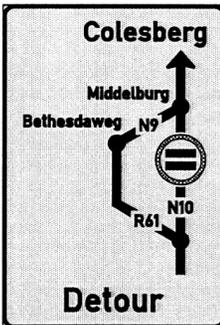
Chapter 4 – Section 4.12 Temporary Guidance Signs Pedestrian Direction

<p>GP11</p> <p>Refer V1 4.13.8 V4 14.2.5</p> <p>Toilets (Women)</p>	<p>GP12</p> <p>Refer V1 4.13.8 V4 14.2.6</p> <p>Toilets (Men)</p>	<p>GP13</p> <p>TGP13</p> <p>Refer V1 4.13.8 V4 14.2.7</p> <p>Disabled</p>	<p>GP14</p> <p>Refer V1 4.13.8 V4 14.2.8</p> <p>Keep Tidy</p>	<p>GP15</p> <p>Refer V1 4.13.8 V4 14.2.9</p> <p>Information</p>
<p>GP16</p> <p>TGP16</p> <p>Refer V1 4.13.8 V4 14.2.10</p> <p>Telephone</p>	<p>GP17</p> <p>TGP17</p> <p>Refer V1 4.13.8 V4 14.2.11</p> <p>Buses</p>	<p>GP18</p> <p>TGP18</p> <p>Refer V1 4.13.8 V4 14.2.12</p> <p>Minibuses</p>	<p>GP19</p> <p>TGP19</p> <p>Refer V1 4.13.8 V4 14.2.13</p> <p>Taxis</p>	<p>GP20</p> <p>TGP20</p> <p>Refer V1 4.13.8 V4 14.2.14</p> <p>Trains</p>
<p>GP21</p> <p>Refer V1 4.13.8 V4 14.2.15</p> <p>Refreshments</p>	<p>GP22</p> <p>Refer V1 4.13.8 V4 14.2.15</p> <p>Restaurant</p>	<p>GP23</p> <p>TGP23</p> <p>Refer V1 4.13.8 V4 14.2.17</p> <p>Hawkers</p>	<p>GP24</p> <p>TGP24</p> <p>Refer V1 4.13.8 V4 14.2.18</p> <p>Hawkers (Permit)</p>	<p>GP25</p> <p>Refer V1 4.13.9 V4 14.2.19</p> <p>Footbridge</p>

304

Chapter 4 – Section 4.8 Temporary Guidance Signs Map Type – Advance Direction

TG09



Detour

4.8.10 Map-Type Advance Direction

1 MAP-TYPE ADVANCE DIRECTION signs GD5 to GD9, may be used on Class B roads to give advance guidance to drivers regarding the shape of the junction ahead, the numbers allocated to the routes leaving the junction ahead, when appropriate, and the destinations which may be reached by following each exit road from the junction.



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305

Chapter 4 – Section 4.8 Temporary Guidance Signs Direction Fingerboard

TGD4



4.8.9 Fingerboard

1 FINGERBOARD direction sign GD4 may be used to guide drivers towards minor destinations or destinations on lightly travelled routes. Sign GD4 is generally appropriate to Class C or Class D rural roads.

TGDL3



Detour



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306

Chapter 4 – Section 4.9 Temporary Guidance Signs Freeway Direction Gore Exit



TGA4 (E) TGA4

TGA4(V)

EXIT

EXIT

152



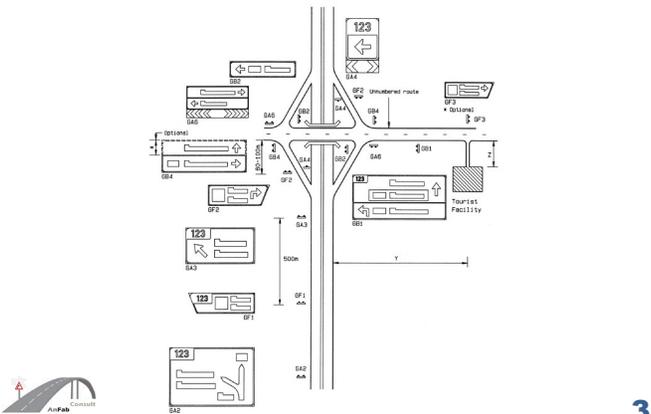
Detail 4.73.9



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307

Chapter 4 – Section 4.10 Temporary Guidance Signs Freeway Signing Sequences





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308

Chapter 5 – Information Signs Freeway Off-Ramp Count Down Signs

TIN1

TIN2

TIN3

Refer V1 5.2.1 V4 9.2.1

Countdown

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309

Chapter 5 – Information Signs Culs - de Sac Signs

TIN4

TIN5

TIN6

See also IN26 to IN29
Refer V1 5.2.2 V4 9.2.2/3

TIN20

TIN21

TIN22

TIN23

Refer V1 5.2.2 V4 9.2.4/9.2.5
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310

Chapter 5 – Information Signs Supplementary Plates

<p>IN11.1 TIN11.1</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">80km/h</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">60km/h</div> </div> <p style="font-size: x-small;">References V1 5.2.4 V4 9.2.8 - 9.2.13</p> <p style="text-align: center; font-size: x-small;">Supplementary Plates - Advisory Speed</p>	<p>IN11.2 TIN11.2</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">For 12km</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">For 5km</div> </div> <p style="font-size: x-small;">References V1 5.2.4 V4 9.2.8 - 9.2.13</p> <p style="text-align: center; font-size: x-small;">Supplementary Plates - Distance "For" ●</p>
<p>IN11.3 TIN11.3</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">200 m</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">1km</div> </div> <p style="font-size: x-small;">References V1 5.2.4 V4 9.2.8 - 9.2.13</p> <p style="text-align: center; font-size: x-small;">Supplementary Plates - Distance "To"</p>	<p>IN11.4 TIN11.4</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">Blind People</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">Accident</div> </div> <p style="font-size: x-small;">References V1 5.2.4 V4 9.2.8 - 9.2.13</p> <p style="text-align: center; font-size: x-small;">Supplementary Plates - Text Message ●</p>

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311

Chapter 5 – Information Signs Supplementary Plates

<p>IN11.5**</p> <p style="font-size: x-small;">Supplementary Plates - Symbolic Message</p>	<p>TIN11.5**</p> <p style="font-size: x-small;">References V1 5.2.4 V4 9.2.8 - 9.2.13 and 9.3.20 to 9.3.31</p>	<p>IN11.6</p> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: x-small;"> THE SOUTH AFRICAN NATIONAL ROADS AGENCY </div> <p>TIN11.6</p> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: x-small;"> TOWN COUNCIL OF BENONI </div> <p style="font-size: x-small;">References V1 5.2.4 V4 9.2.11</p> <p style="text-align: center; font-size: x-small;">Supplementary Plates - Road or Local Authority ●</p>	
<p>IN12</p> <p style="font-size: x-small;">Refer V1 5.2.6 V4 9.2.14</p> <p style="text-align: center; font-size: x-small;">Information Centre</p>	<p>IN13</p> <div style="border: 1px solid black; padding: 2px; text-align: center; font-weight: bold; font-size: x-small;"> ROAD EXPERIMENT </div> <p style="font-size: x-small;">Refer V1 5.2.6 V4 9.2.16</p> <p style="text-align: center; font-size: x-small;">Road Experiment ●</p>	<p>IN14</p> <p style="font-size: x-small;">Refer V1 5.2.7 V4 9.2.17</p> <p style="text-align: center; font-size: x-small;">Co-ordinated Traffic Signals</p>	<p>IN15</p> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: x-small;"> 3 PHASE </div> <p style="font-size: x-small;">Refer V1 5.2.7 V4 9.2.18</p> <p style="text-align: center; font-size: x-small;">Multi - Phase Traffic Signals ●</p>

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312

Chapter 5 – Information Signs Supplementary Plates

IN26

Keep Left
Pass Right

Local
Traffic Only

Refer V1 5.2.10 V4 9.2.24
Text Message

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313

Chapter 5 – Information Signs Supplementary Plates

TIN11.1

Advisory speed

150 m

Ice

TIN11.2

Distance "For"

For 12km

TIN11.3

Distance "to"

3 km

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Chapter 5 – Information Signs Supplementary Plates

TIN11.4

Text

Accident

TIN11.5

Symbol

We apologize
for the
inconvenience

TIN11.6

Road or Local Authority

TOWN COUNCIL OF BENONI

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Chapter 5 – Information Signs Supplementary Plates - Symbolic

<p>IN11.501 TIN11.501</p> <p>References V1 5.2.4 V4 9.3.17</p> <p>Tow Away Zone</p>	<p>IN11.502 TIN11.502</p> <p>References V1 5.2.4 V4 9.3.18</p> <p>Arrow - left</p>	<p>IN11.503 TIN11.503</p> <p>References V1 5.2.4 V4 9.3.18</p> <p>Arrow - right</p>	<p>IN11.570 TIN11.570</p> <p>References V1 5.2.4 V4 9.3.25</p> <p>Construction Vehicle</p>
<p>IN11.505 TIN11.505</p> <p>References V1 5.2.4 V4 9.3.19</p> <p>Reduced Width</p>	<p>IN11.506</p> <p>References V1 5.2.4 V4 9.3.19</p> <p>Prosecuting by Camera</p>	<p>IN11.504 TIN11.504</p> <p>References V1 5.2.4 V4 9.3.18</p> <p>Arrow - Both Ways</p>	

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316

Chapter 5 – Information Signs Road Experiment



For dimensions
ref. Vol.4
Page



TIN13

5.2.7 Road Experiment

1 A temporary ROAD EXPERIMENT sign TIN13 may be used to *inform drivers that a temporary experiment or research activity is underway on the section of road on which they are travelling.*



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Chapter 5 – Information Signs Supplementary Plates - Wording



TIN26



318

Questions



Please note the **slide number** with the question and forward to anfabconsult@gmail.com



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319



TRAFFIC MANAGEMENT

Road Traffic Markings



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321

SADC ROAD TRAFFIC SIGNS

MANUAL Volume 1 - Part 3

Chapter 7 – Road Markings

- 7.1 Introduction
- 7.2 Regulatory
- 7.3 Warning
- 7.4 Guidance
- 7.5 Roadstuds
- 7.6.1 Guardrail Delineators
- 7.6.3 Traffic Cones



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322

TRAFFIC MANAGEMENT

Road Traffic Markings



Rumble Line



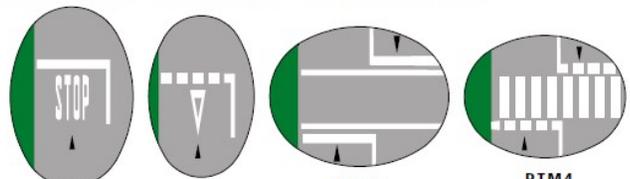
AnFAB Consult (PTY) Ltd

323

TRAFFIC MANAGEMENT

Road Traffic Markings

Regulatory - Transverse Road Markings



RTM1 **RTM2** **RTM3** **RTM4**

Regulatory Road Marking Types and Codes



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Road Traffic Marking Colours

Fig 1.9 Typical Road Marking Shapes and Colours

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325

TRAFFIC MANAGEMENT

Road Traffic Markings

Markings and signs omitted

W306

RTM4 - BLOCK PEDESTRIAN CROSSING MARKINGS
Ref. V08-1-7.2.4

2013-11-01 12:05

Pedestrian block crossings shall warned and controlled

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326

TRAFFIC MANAGEMENT

Road Traffic Markings

RM1
No Overtaking Line

RM2
No Crossing Line

RM3
Channelizing Line

Regulatory Longitudinal Road Marking Types and Codes

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327

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Road Traffic Markings

RM1 NO overtaking Line

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328

TRAFFIC MANAGEMENT

Road Traffic Markings



RM2 NO Crossing Line



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329

TRAFFIC MANAGEMENT

Road Traffic Markings



RM3 Channelizing Line



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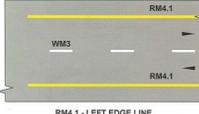
330

TRAFFIC MANAGEMENT

Road Traffic Markings

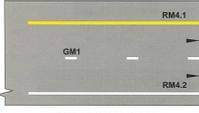
(a) in the case of a **LEFT EDGE LINE** marking **RM4.1** marked on a roadway with more than one lane in either or both directions of travel:

- (i) not to drive on the area (shoulder) to the left of such a line;*
- (ii) not to use the area (shoulder) to the left of such a line for the purpose of overtaking another vehicle;*
- (iii) to make every reasonable effort to move their vehicle completely to the left of such a line in the event of an emergency stop;*



RM4.1 - LEFT EDGE LINE

(b) in the case of a **RIGHT EDGE LINE** marking **RM4.2** when such marking is used on the right edge of a one-way portion of roadway to demarcate a dividing space or barrier which is not protected by barrier or unmountable kerbs **not to drive a vehicle in such a manner that it crosses such RIGHT EDGE LINE so as to travel on, over, across or within the median island, dividing space or barrier.**



RM4.2 - RIGHT EDGE LINE

Road Edge Lines



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TRAFFIC MANAGEMENT

Road Traffic Markings

Prohibition on **driving on shoulder** of public road, except in certain circumstances.



Regulation 298A. (1) Subject to subregulation(2) and regulation 298(1), **no person shall drive** a motor vehicle on the shoulder of a public road.

(2) Notwithstanding subregulation (1), The driver of a motor vehicle may, during the period between sunrise and sunset, drive such motor vehicle on the shoulder of a public road which is designated for one lane of traffic in each direction -

- (a) While such motor is being overtaken by another vehicle; and
- (b) If he or she can do so without endangering himself or herself, other traffic, pedestrians or property on such public road;
- (c) If persons and vehicles upon a public road are clearly discernible at a distance of at least 150 metres

Road Edge Lines



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332

TRAFFIC MANAGEMENT

Road Traffic Markings



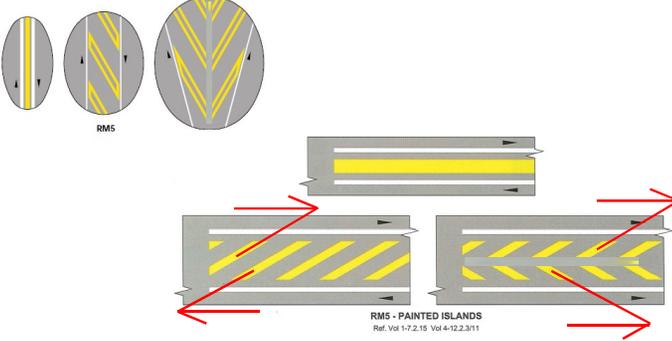
Road Edge Lines

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TRAFFIC MANAGEMENT

Road Traffic Markings



Painted Islands

RM5 - PAINTED ISLANDS
Ref. Vol 1-7.2.15 Vol 4-12.3/11

AnFab Consult

334

TRAFFIC MANAGEMENT

Road Traffic Markings



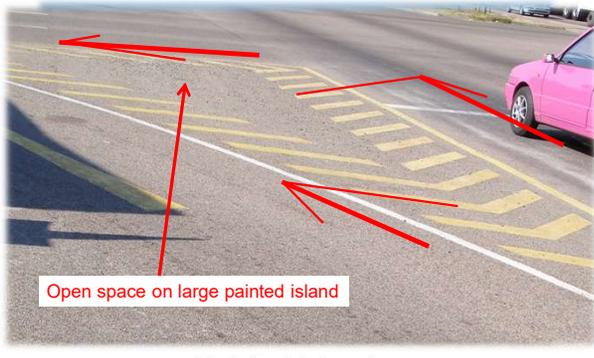
Painted Islands

AnFab Consult

335

TRAFFIC MANAGEMENT

Road Traffic Markings



Open space on large painted island

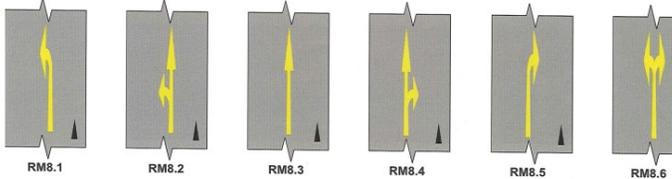
Painted Islands

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336

TRAFFIC MANAGEMENT

Road Traffic Markings



RM8.1 RM8.2 RM8.3 RM8.4 RM8.5 RM8.6

RM8 - MANDATORY DIRECTION ARROWS
Ref. Vol 1-7.2.20 Vol 4-12.3.2 to 12.3.4

Regulatory Road Marking Types and Codes

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337

TRAFFIC MANAGEMENT

Road Traffic Markings



RM8 Arrows

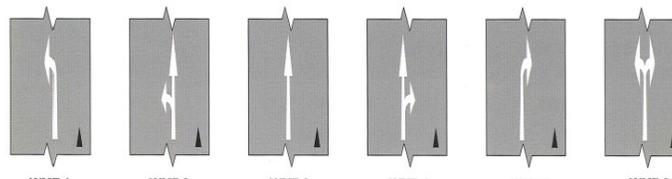
MANDATORY RM8 Direction Arrows

AnFab Consult (PTY) Ltd

338

TRAFFIC MANAGEMENT

Road Traffic Markings



WM7.1 WM7.2 WM7.3 WM7.4 WM7.5 WM7.6

WM7 - MANDATORY DIRECTION ARROW AHEAD
Ref. Vol 1-7.3.7 Vol 4-12.3.2 to 12.3.4

Warning Road Marking Types and Codes

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339

TRAFFIC MANAGEMENT

Road Traffic Markings



WM7 Arrows to be displayed in the beginning of the link

Warning Direction Arrows **AHEAD**

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340

TRAFFIC MANAGEMENT

Road Traffic Markings



Warning Direction Arrows **AHEAD**

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WM7 Arrows



TRAFFIC MANAGEMENT

Road Traffic Markings



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TRAFFIC MANAGEMENT

Road Traffic Markings



Zig Zag Zone Lines

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343



TRAFFIC MANAGEMENT

Road Traffic Markings



Regulatory Road Marking Types and Codes

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344



TRAFFIC MANAGEMENT

Road Traffic Markings



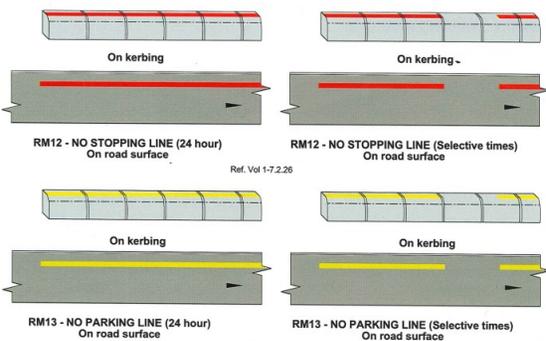
RM12 No Stopping Line on Bridge

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345

TRAFFIC MANAGEMENT

Road Traffic Markings



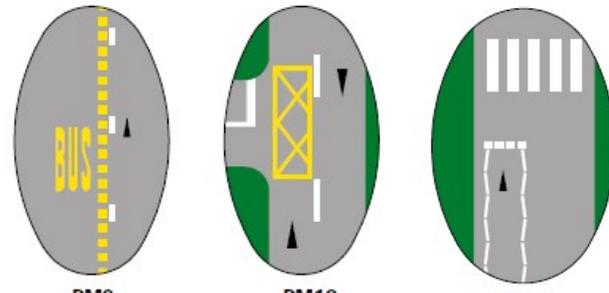
Regulatory Road Marking Types and Codes

AnFab Consult (PTY) Ltd

346

TRAFFIC MANAGEMENT

Road Traffic Markings



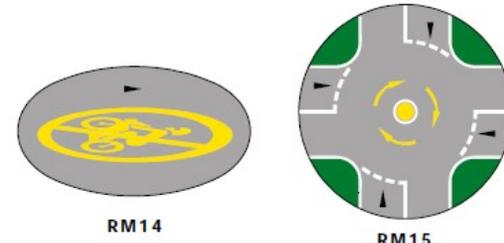
Regulatory Road Marking Types and Codes

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347

TRAFFIC MANAGEMENT

Road Traffic Markings



Regulatory Road Marking Types and Codes

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348

TRAFFIC MANAGEMENT

Road Traffic Markings

RM15 - TRAFFIC CIRCLE MANDATORY DIRECTION ARROWS
Ref. Vol 1-7.2.29 Vol 4-12.3.56

Regulatory Road Marking Types and Codes

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349

TRAFFIC MANAGEMENT

Road Traffic Markings

RM16

RM17

Regulatory Road Marking Types and Codes

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350

TRAFFIC MANAGEMENT

Road Traffic Markings

WM1 - RAILWAY CROSSING AHEAD
Ref. Vol 1-7.3.1 Vol 4-12.4.14

Warning Road Marking Types and Codes

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351

TRAFFIC MANAGEMENT

Road Traffic Markings

WM2

Warning Line and Codes

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352

TRAFFIC MANAGEMENT

Road Traffic Markings

WM3

100mm WM3

2014.01.17 07:00

Standard Extra

WM3 - DIVIDING LINE
Ref: Vol 1-7-3.3

Warning Road Marking Types and Codes

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353

TRAFFIC MANAGEMENT

Road Traffic Markings

WM5

2009.08.18 10:11

Warning Road Marking Yield Control Ahead

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354

TRAFFIC MANAGEMENT

Road Traffic Markings

WM6

3 sets minimum

2009.09.19 16:29

Warning Road Marking Lane Reduction Arrows

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355

TRAFFIC MANAGEMENT

Road Traffic Markings

WM7

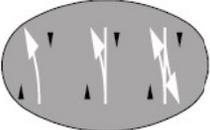
2009.08.06 11:49

Mandatory Direction Arrow Ahead

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356

TRAFFIC MANAGEMENT
Road Traffic Markings



WM8



2014 01 17 07 01

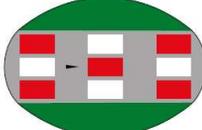
Warning Road Marking Types and Codes



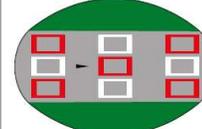
AnFab Consult (PTY) Ltd

357

TRAFFIC MANAGEMENT
Road Traffic Markings



WM9.1



WM9.2



2013 01 18 14:10

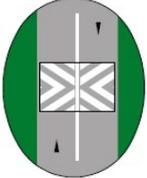
Arrestor Bed Marking



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358

TRAFFIC MANAGEMENT
Road Traffic Markings



WM10



Speed Hump Warning Road Marking



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359

TRAFFIC MANAGEMENT
Road Traffic Markings



WM11



2013 07 13 12:31

Warning Road Marking Types and Codes



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360

TRAFFIC MANAGEMENT

Road Traffic Markings



100mm GM1



Standard Extra

GM1 - LANE LINE
Ref. Vol 1-7.4.1

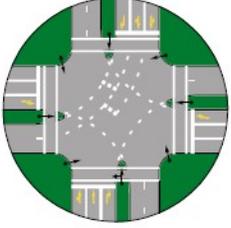
Guidance Road Marking Types and Codes

AnFab Consult (PTY) Ltd

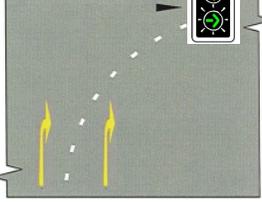
361

TRAFFIC MANAGEMENT

Road Traffic Markings



GM2



Turning Guide Line

Guidance Road Marking Types and Codes

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362

TRAFFIC MANAGEMENT

Road Traffic Markings




GM3.1 GM3.2 GM3.3

GM3 - BIFURCATION ARROWS
Ref. Vol 1-7.4.3 Vol 4-10.2.10/14

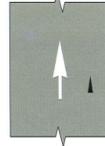
Bifurcation Arrows

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363

TRAFFIC MANAGEMENT

Road Traffic Markings



GM4.1

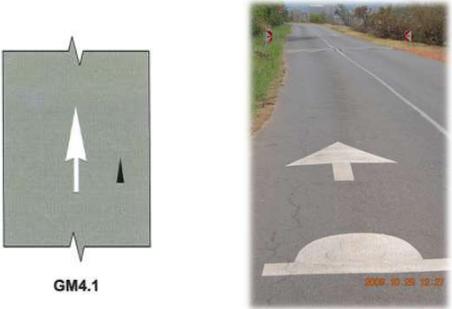


Guidance GM4.1 Direction of Traffic Arrows

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364

TRAFFIC MANAGEMENT
Road Traffic Markings



GM4.1

Guidance GM4.1 Direction of Traffic Arrow

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365

TRAFFIC MANAGEMENT
Road Traffic Markings



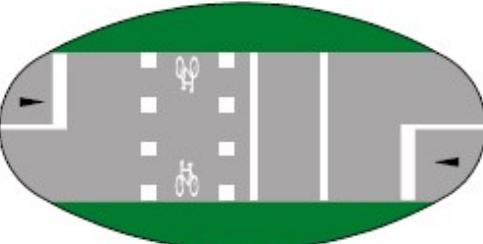
WM4

Warning Road Marking Types and Codes

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366

TRAFFIC MANAGEMENT
Road Traffic Markings



GM5

Bicycle Guide Lines

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367

TRAFFIC MANAGEMENT
Road Traffic Markings



GM6

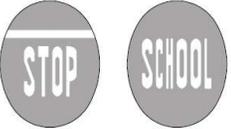
Road Marking Symbols

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368

TRAFFIC MANAGEMENT

Road Traffic Markings



GM7



Word Guidance Road Marking Types and Codes

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369

TRAFFIC MANAGEMENT

Road Traffic Markings



GM8

Kerb face Markings

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370

Road Traffic Marking Pre marking

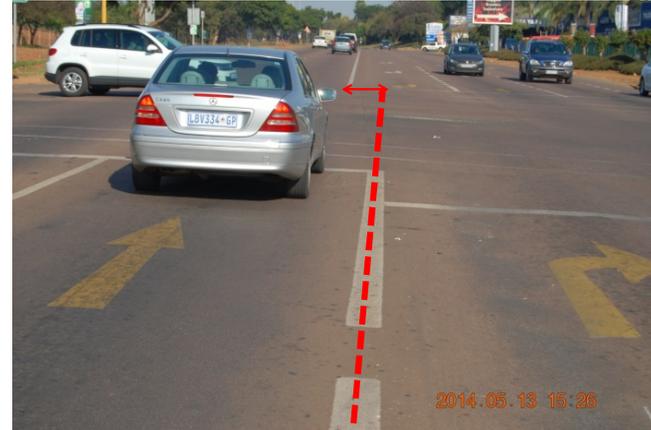


2013.08.16 10:22

AnFab Consult (PTY) Ltd

371

Road Traffic Marking Pre marking



2014.05.13 15:26

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372

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Typical Hot Melt Texture Marking Roadmarking

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373

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Typical Deviation Roadmarking

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374

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Typical Hot Melt Hand Work Texture Marking Roadmarking

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375

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Typical Hot Melt Machine Roadmarking

AnFab Consult (PTY) Ltd



376

TRAFFIC MANAGEMENT
Road Traffic Marking Material



180 ° C

Typical Hot Melt Thermoplastic
From Melting Pot



377

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Road Traffic Marking Material



Typical Hot Melt
Screed Application



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378

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Typical Cold Plastic Application



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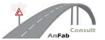


379

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Display Approved Markings Only



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380

TRAFFIC MANAGEMENT
Road Traffic Marking Material



No advance pre warning or control signs

2012.08.02 13:07

Display Approved Markings in Conjunction with Correct Traffic Signals or Control Signs



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381

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Non compliant marking symbols to be approved by the Minister of Transport.



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382

TRAFFIC MANAGEMENT
Road Traffic Marking Material



Black paint for emergencies only

2013.11.02 10:16



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383

TRAFFIC MANAGEMENT
Road Traffic Markings



WET ROADS - Night-time Retro-Reflectivity

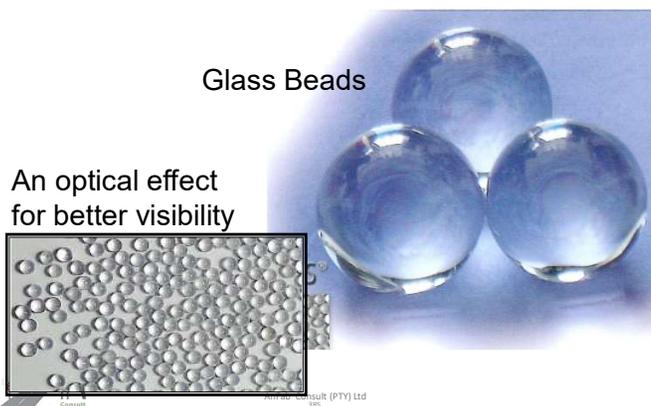


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384

ROAD MARKING MATERIALS

Reflective Roadmarking Material

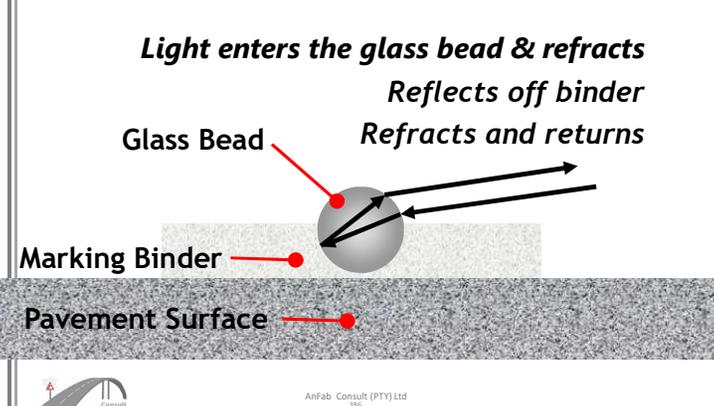


Glass Beads

An optical effect for better visibility

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Marking Retroreflection



Light enters the glass bead & refracts
Reflects off binder
Refracts and returns

Glass Bead

Marking Binder

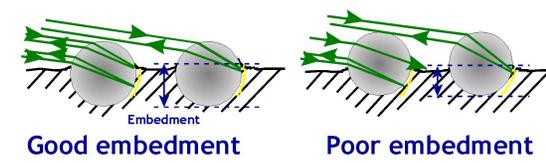
Pavement Surface

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TRAFFIC MANAGEMENT

Road Traffic Markings

Glass Bead Embedment



Good embedment

Poor embedment

Embedment

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ROAD MARKING MATERIALS

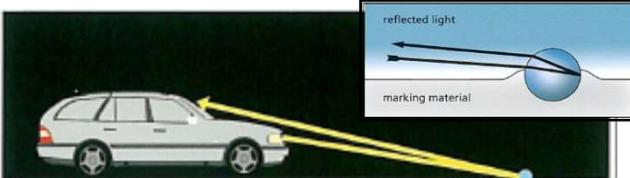
Glass Bead Loss.



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ROAD MARKING MATERIALS

Retro- Reflectivity – Glass Beads



With glass beads of good optical quality, Retro-reflection works perfectly

RETROREFLECTION MEANS ROAD SAFETY !

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ROAD MARKING MATERIALS

Retro- Reflectivity – Glass Beads

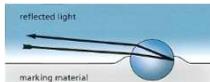


No glass beads – no retro-reflection

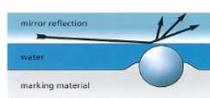
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ROAD MARKING MATERIALS

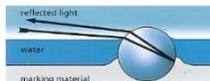
Retro- Reflectivity – Glass Beads



The effect of retro-reflection works perfectly under dry conditions.



However, when it is raining at night, Retro-reflection with conventional glass beads is reduced to almost zero.



Larger glass beads improves night time visibility

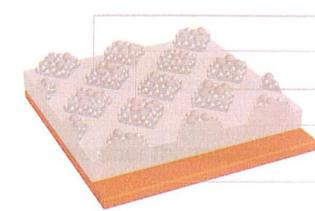
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TRAFFIC MANAGEMENT

Road Traffic Markings

3M Durable Pavement Markings Products
Stamark™ Pavement Marking Tape Series A380

Product composition:



- Ceramic beads
- Ceramic skid particles
- Polyurethane topcoat
- Rubber conformance layer
- Pressure sensitive adhesive

Thickness: 2 mm

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ROAD MARKING MATERIAL

Glass Bead Sizes.



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TRAFFIC MANAGEMENT

Road Traffic Marking Material – Glass Beads



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TRAFFIC MANAGEMENT

Road Traffic Markings



Hot Melt Thermoplastic Drop On Texture for Sound Effect

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TRAFFIC MANAGEMENT

Road Traffic Markings Retro-Reflectivity

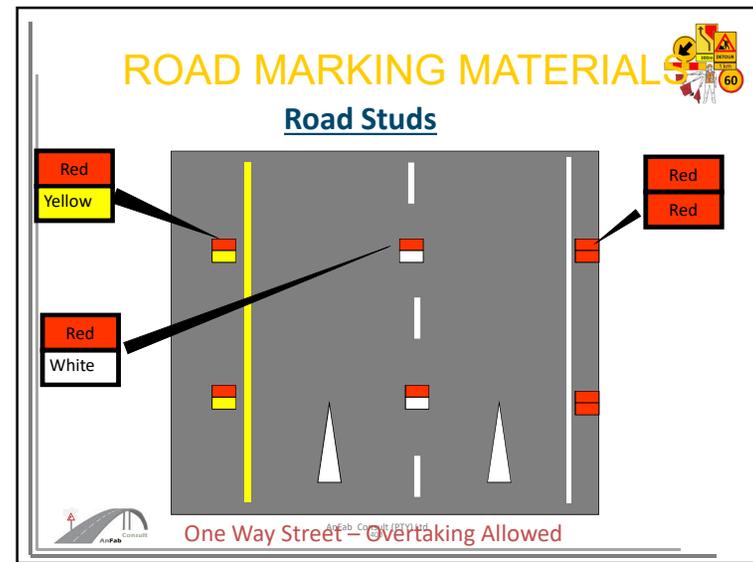
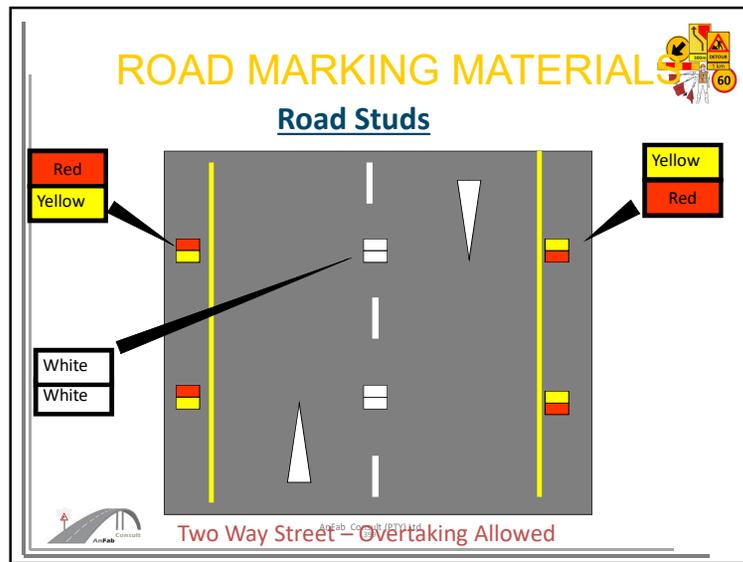
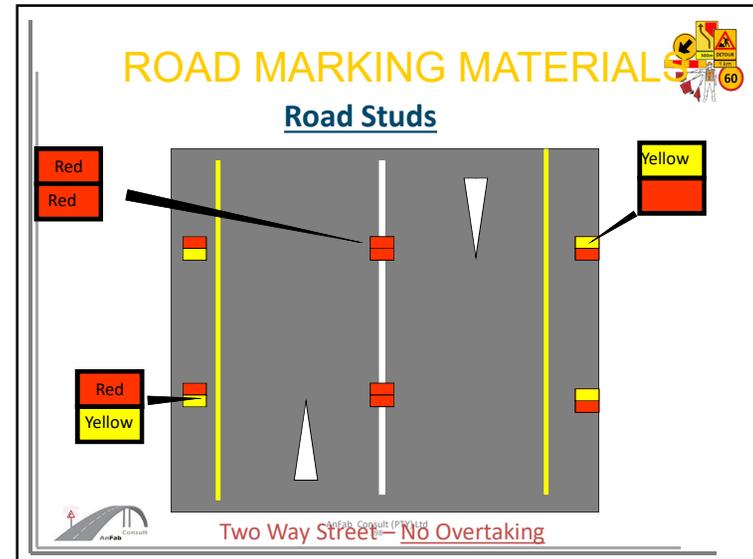
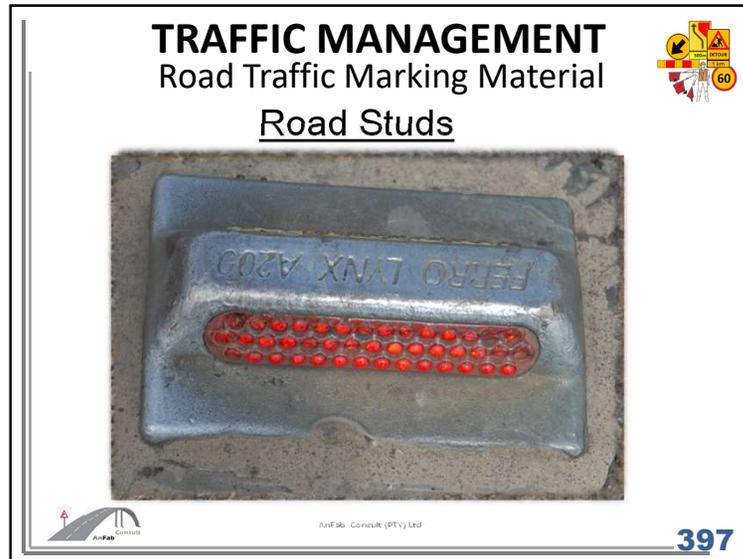
Factor	ACCEPTABLE VALUES FOR FACTORS APPROPRIATE TO THE SPECIFICATION OF ROAD MARKINGS						
	New Materials			Used Materials			
	White	Yellow	Red	White	Yellow	Red	
Colour	$x^{(1)}$	0.305 0.335 0.325	0.494 0.470 0.493	0.660 0.610 0.638	0.305 0.350 0.340	0.481 0.444 0.494	0.655 0.579 0.506
	$y^{(1)}$	0.295	0.522	0.690	0.295	0.054	0.690
		0.315	0.505	0.340	0.315	0.518	0.345
0.345		0.480	0.340	0.360	0.476	0.341	
Luminance Factor	0.365	0.457	0.312	0.370	0.426	0.314	
	0.325	0.477	0.310	0.325	0.454	0.310	
	0.6	0.4	±0.08	0.45	0.3	±0.06	
Coefficient of Retroreflection (micandelas/lux/m ²)	150	100	±30	100	70	±20	
Skid Resistance BPN ⁽²⁾	50			50			

NOTES:

(1) The co-ordinates given refer to the Chromaticity Chart in Figure 1.20. The co-ordinates measured for the colour should fall within the area defined by the co-ordinates given.

(2) "BPN" stands for a value determined by the British Portable Pendulum Number measurement method applicable to all colours of markings.

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Complete assignment questions 3



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MODULE 4 - SADC ROAD TRAFFIC SIGNS MANUAL VOLUME 4



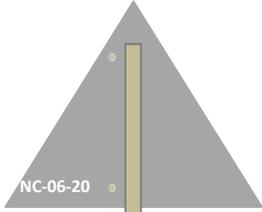
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403



SADC ROAD TRAFFIC SIGNS MANUAL – VOLUME 4

Dimensional and Manufacturing Detail

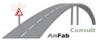


The manufacturer **shall** paint an **identification code** on the reverse side of every completed road sign board in the lower corner nearest to the road surface in a position where the code will not be obscured by the framework or the erection posts.

The code shall be in the form **X-MM-JJ** where X is the letter used by the manufacturer to identify the manufacturer and MM-JJ indicates the month and year of the manufacture. These letters shall be painted in **white** (black on STOP signs) and shall not be larger than **50 mm in height**.

Class	Warranty	Expiry Date
Class I	-7 year	06-27
Class III	-10 year	06-30
Class IV	-12 year	06-32

Reflective Expiry Date
Identification Code



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SADC ROAD TRAFFIC SIGNS MANUAL – VOLUME 4

Dimensional and Manufacturing Detail Mild Steel Treated Backing Plate Specification



1.0mm Thick Steel Backing Plate (Steel frame – movable stand)



1.4mm Thick Steel Backing Plate with Stiffeners (Single support – Long term)

Steel plate for road signs shall be **1,40 mm (single support) & 1,0 mm (frames)** thick prepainted galvanized steel plate (Iscor G275 Chromadek or approved equivalent), which has been treated on both sides with an epoxy primer followed by a silicon polyester top coat. The total dry thickness of the treatment shall be at least 25 *µm*.

405

SADC ROAD TRAFFIC SIGNS MANUAL

Volume 4 Dimensional Detail

1.2.2 ROAD TRAFFIC SIGN SIZES

TABLE 1.1 MINIMUM ROAD TRAFFIC SIGN SIZES		TABLE 1.1			
Road Traffic Sign (mm) Type	Function	Min. External Dimensions			
		Speed Limit (km/h)			
		60	80	100	120
Road Signs					
Triangular Regulatory and Warning (Side Length)		900	1200	1200	1500
Sign R2.1 - plate (Height x Width)	Yield to Pedestrians	300 x 225	450 x 338	600 x 450	750 x 563
Signs W401 and W402 (Height x Width)	Hazard Marker/ Delineator	600x 150	600 x 150	800x 200	800 x 200
Signs W403 and W404 (Diagonal)	Railway Crossing	800	1200	1200	1200
Signs W405 to W410 (Height)	Hazard Marker	450	450	600	600
Sign TW 411 (Height x Width)	Barricade	200 x 1200	300 x 1800	400 x 2400	400 x 2400

406

SADC ROAD TRAFFIC SIGNS MANUAL

Volume 4 Dimensional Detail

1.2.2 ROAD TRAFFIC SIGN SIZES

TABLE 1.1 MINIMUM ROAD TRAFFIC SIGN SIZES		TABLE 1.1			
Road Traffic Sign (mm) Type	Function	Min. External Dimensions			
		Speed Limit (km/h)			
		60	80	100	120
Road Signs					
Traffic Signals					
Circular Disc Aspect	Signal Indications (including symbols)	210	210	210	210
Road Markings					
Longitudinal (Width)	Regulatory, Warning and Guidance	100	100	100	100
Longitudinal (Length)	Regulatory			Urban 9000	Rural 12000

407

SADC ROAD TRAFFIC SIGNS MANUAL

Volume 4 Dimensional Detail

1.2.2 ROAD TRAFFIC SIGN SIZES

TABLE 1.1 MINIMUM ROAD TRAFFIC SIGN SIZES		TABLE 1.1			
Road Traffic Sign (mm) Type	Function	Min. External Dimensions			
		Speed Limit (km/h)			
		60	80	100	120
Road Signs					
Circular Regulatory (Diameter)	General	600	900	1200	1200
	Overhead	900	1200	1200	1600
	Parking/ Stopping	450	900	1200	1200
Rectangular Regulatory (Height x Width)	General	600 x 450	900 x 675	1200 x 900	1200 x 900
	Overhead	900 x 675	1200 x 900	1200 x 900	1600 x 1200
	Parking Stopping	445 x 338	900 x 675	1200 x 900	1200 x 900
	Bus & Minibus Stop	450 x 225	600 x 300	800 x 400	900 x 450

408

SADC ROAD TRAFFIC SIGNS MANUAL



**Volume 4 – Traffic Signs design:
Dimensional detail for ALL road traffic
signs and their signface components.**



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SADC ROAD TRAFFIC SIGNS MANUAL Vol 4



**Volume 4 -
Dimensional
Manufacturing
Detail**

NOTE:
1. The sign face size shall be as shown in this table.
2. The sign face shall be as shown in this table.

TABLE:
SIGNFACE SIZE (mm)

TYPE	100	150	200	250	300	350	400	450	500
1	100	150	200	250	300	350	400	450	500
2	100	150	200	250	300	350	400	450	500
3	100	150	200	250	300	350	400	450	500
4	100	150	200	250	300	350	400	450	500

TABLE:
SIGNFACE SIZE (mm)

TYPE	100	150	200	250	300	350	400	450	500
1	100	150	200	250	300	350	400	450	500
2	100	150	200	250	300	350	400	450	500
3	100	150	200	250	300	350	400	450	500
4	100	150	200	250	300	350	400	450	500

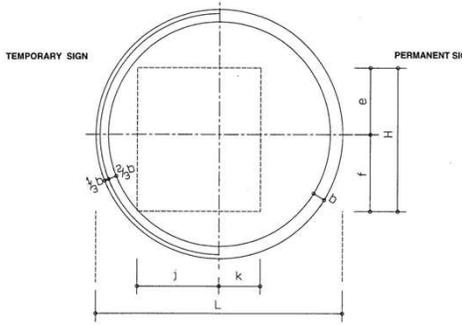


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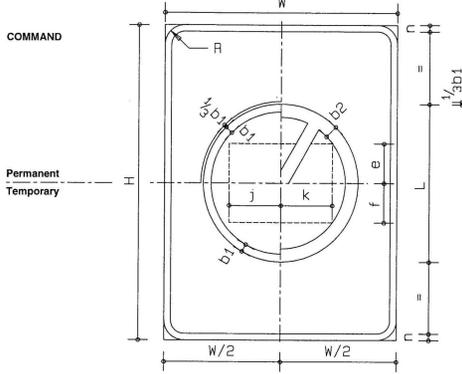


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413

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Type RE⁽²⁾ Type RF⁽²⁾

414

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DIMENSIONS (mm)	L	B	S	a	F	H	I	K
3007	25	15	89	71	150	71	89	
600	50	30	177	142	319	142	177	
900	75	45	266	212	439	212	266	
1200	100	60	354	283	637	283	354	
1500	125	75	442	371	859	371	442	

**For use on high-visibility background

415

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416

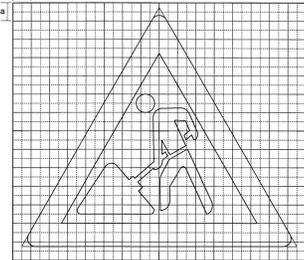
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DIMENSIONS (mm)										
S	a	b	c	d	e	f	g	h	i	r
900	60	75	355	175	30	390	640	704/754	75/25	
1000	80	100	354	233	40	520	854	1000	30	
1250	80	110	354	233	40	520	854	970	100	
1500	100	125	442	291	50	650	1067	1256	43	
1800	120	150	530	349	60	750	1280	1507	62	
1854	120	180	530	349	60	750	1280	1438	150	

** For use on high visibility background



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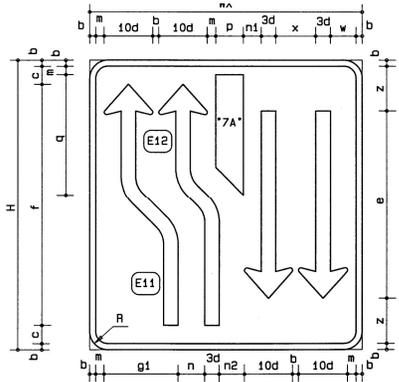
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TGS147





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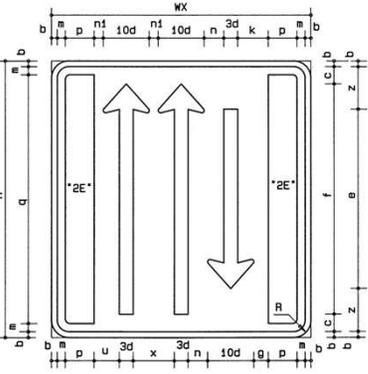


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419

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MODULE 5

**SOUTH AFRICAN ROAD TRAFFIC
SIGNS MANUAL (SARTSM)**

VOLUME 3

TRAFFIC SIGNAL DESIGNS

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422

**SADC ROAD TRAFFIC SIGNS
MANUAL** 

Volume 3 – Chapter 12 : Traffic Signals

1 . Temporary traffic signals may be provided at roadwork construction sites for the following purposes:

- (a) to successively give right of way to two-way traffic approaching from opposite directions, along a single traffic lane, in place of a manually operated STOP-GO sign;

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423

**SADC ROAD TRAFFIC SIGNS
MANUAL** 

Volume 3 – Chapter 12 : Traffic Signals

- (b) to control the movement of traffic, including site vehicles, where a public road enters or crosses a road that is under construction, or haul road;

or

- (c) as an interim measure to control traffic where a permanent traffic signal is to be provided, altered or replaced as part of a roadworks project.

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Volume 1 Part 2 Chapter 6 – Traffic Signal Design (see Volume 3 Chapter 12)

S1 S2 S3 S4 S5 S6 S7

S8 S9 S11P (S11) S11C (S20) S12

S1R S1L

ST3 ST1 ST2

ST5 ST4

Traffic signal arrow signs

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Volume 1 Part 2 Chapter 6 – Traffic Signals (see Volume 3)

Typical Intersection and Definition

Unmarked pedestrian crossing

Main Junction

Intersection boundary

Marked pedestrian crossing

Slipway

Boundary line

Slipway junction

Figure 3.1: Definition of intersections, junctions, slipways and pedestrian crossings

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426

Volume 1 Part 2 Chapter 6 – Traffic Signals

Volume 3 – Yellow Flashing Signals SS3

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Volume 1 Part 2 Chapter 6 – Traffic Signals (see Volume 3)

Typical Signal Faces and Installation

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Typical Signal Faces and Installation

Figure 3.4a: Signalling for protected-only right turn at a T-junction

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Typical Signal Faces and Installation

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Signal Faces Cone of Vision

Figure 3.6: Cone of vision in horizontal plane

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

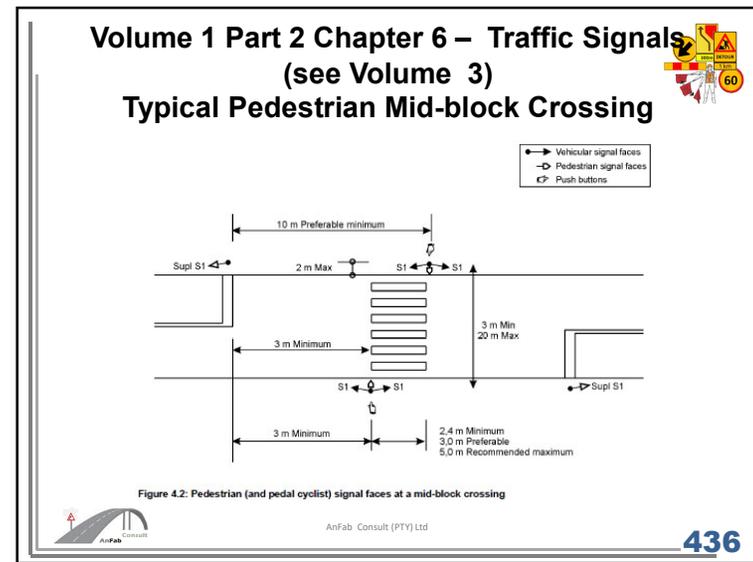
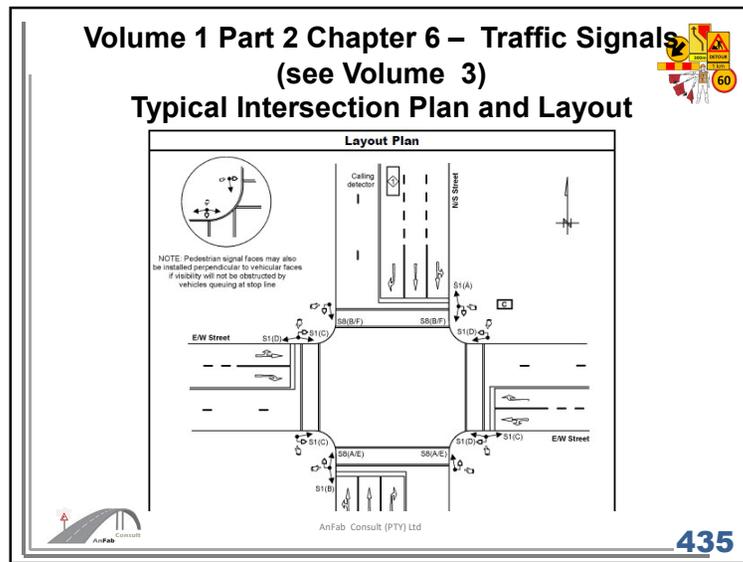
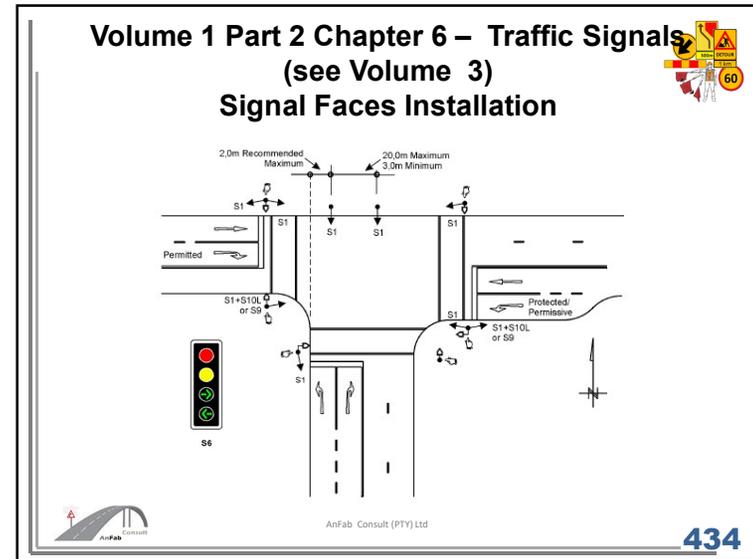
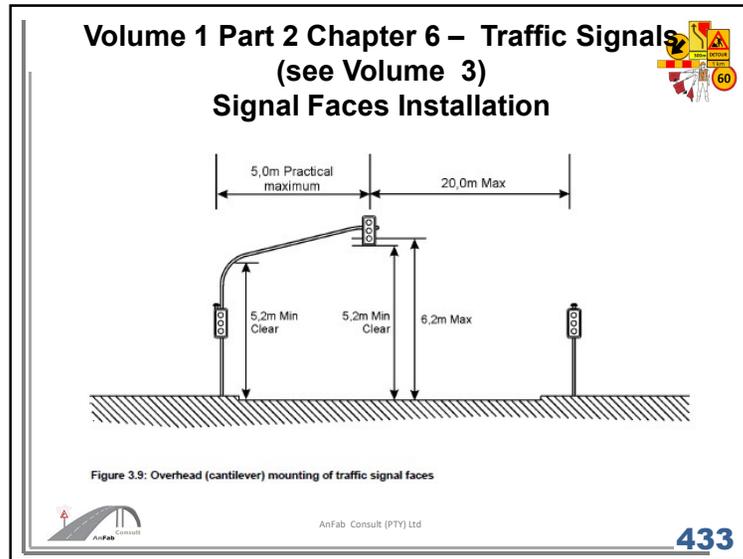
Signal Faces Installation

Figure 3.7: Standard post mounting

Figure 3.8: Extended post mounting

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Typical Pedestrian Crossing

2.4m Minimum width
3.0m Recommended
5.0m Recommended maximum

Pedestrian crossing lines RTM3

Pedestrian crossing blocks RTM4

Recommended minimum 1.2m

Min 1.0m

Figure 4.5: Pedestrian crossing road markings at a junction

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Typical Pedestrian Crossing

Red pedestrian or pedal cyclist signal aspect not higher than lowest vehicular green aspect

1.1m Recommended

2.1m Min

3.0m Max

Figure 4.6: Mounting pedestrian and pedal cyclist signals

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Typical Intersection Vehicle Swept Paths

Parking

Sidewalk widened to protect parking area, reduce pedestrian crossing width and to provide space for traffic signals

Right-turn stop line set back to accommodate vehicle swept path

Median set back and width reduced to accommodate vehicle swept path

45°

Figure 5.1: Vehicle swept paths through a signalised junction

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Volume 1 Part 2 Chapter 6 – Traffic Signals
(see Volume 3)

Typical Intersection and Definition

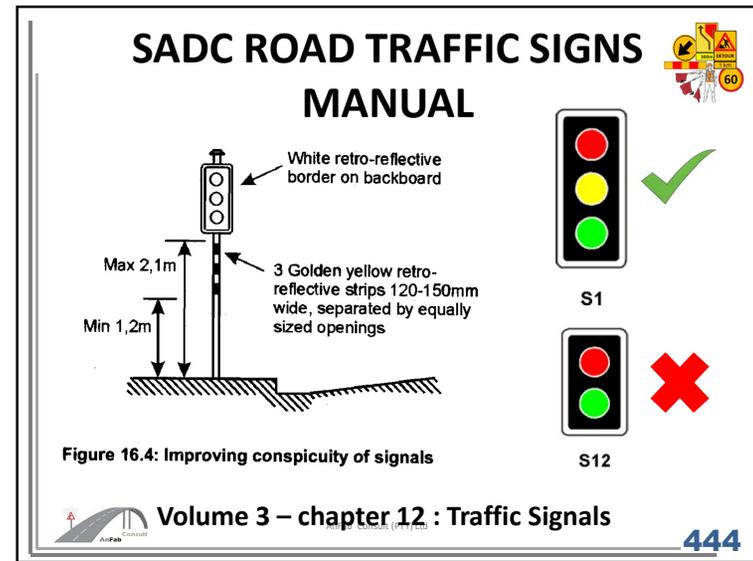
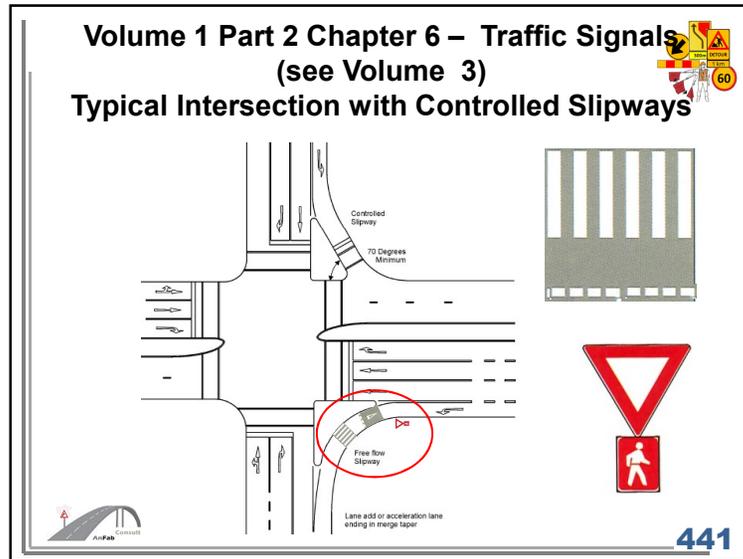
Printed island

Continuity line (VMS)

Figure 5.3: Provision of right-turn lanes at a signalised junction

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440



SADC ROAD TRAFFIC SIGNS MANUAL

ST Sign

Reflective

Volume 3 – chapter 12 : Traffic Signals

445

SADC ROAD TRAFFIC SIGNS MANUAL - Volume 3 Chapter 6

The National Road Traffic Regulations require that a responsible registered **PROFESSIONAL ENGINEER** or registered professional **TECHNOLOGIST** (engineering) of the road authority concerned **SHALL approve** every traffic signal installation at a signalised junction or pedestrian or pedal cyclist crossing, and sign a declaration containing the following:

- scaled drawing of the layout of the junction or crossing, indicating lane markings and road layout;
- number, type and location of traffic signal faces;
- pedestrian and pedal cyclist facilities, including pedestrian push buttons;
- phasing, time plans and offset settings;
- date of implementation; and
- name, signature and registration number of the engineer or technologist(engineering) who approved the signal, and date of signature.**

Volume 3 – Chapter 12 : Traffic Signals

446

SADC ROAD TRAFFIC SIGNS MANUAL

The declaration shall be kept by the road authority in control of the traffic signal concerned.

Volume 3 – chapter 12 : Traffic Signals

447

SADC ROAD TRAFFIC SIGNS MANUAL

Volume 3 – chapter 12 : Traffic Signals

448

SADC ROAD TRAFFIC SIGNS MANUAL



The principles of traffic signal control at permanent installations apply equally to temporary installations. This means that the numbers and locations of signal faces, the compulsory provision of background screens (backboards), sight distances, etc. also apply to temporary traffic signals. The **speed limit** at the traffic signals shall also **not exceed a maximum of 80 km/h**.



Volume 3 – chapter 12 : Traffic Signals

449

SADC ROAD TRAFFIC SIGNS MANUAL



It is recommended that **three yellow retro-reflective strips** be provided on the signal posts and that **white retro-reflective borders** be used on backboards. Temporary traffic signals are often used in locations with poor background lighting and where they may be more subject to failure than permanent signals. The signals are also often used in locations where traffic signals would not normally be expected by drivers. It is therefore important that more attention should be given to the visibility of the signals.



Volume 3 – chapter 12 : Traffic Signals

450

SADC ROAD TRAFFIC SIGNS MANUAL



Precaution should be taken to ensure the uninterrupted operation of the signals, by securing them against theft and vandalism, and by providing an effective power source. Lights and plant should wherever possible be securely anchored down and **cables should be buried**.



Volume 3 – chapter 12 : Traffic Signals

451

TRAFFIC MANAGEMENT Traffic Control



Temporary Traffic Signals

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452

SADC ROAD TRAFFIC SIGNS MANUAL



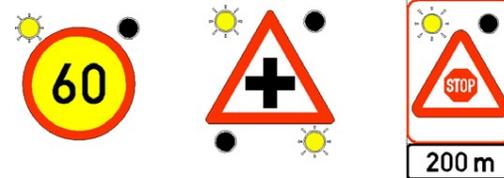
At least two traffic signal faces of type S1 shall be provided on a two-way single lane road at roadworks, one on each side of the road, at a position not less than 6 m (but preferably not less than 10 m) beyond the **stop line RTM1**. However, where the traffic signal is manually operated, only one such signal face may be provided.

The stop line must be suitably located on the wider part of the road so that opposing traffic can pass vehicles waiting at the stop line.

 Volume 3 – chapter 12 : Traffic Signals

453

Volume 1 Part 2 Chapter 6 – Traffic Signals Volume 3 – Yellow Flashing Signals SS3



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Questions



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456



MODULE 5
SOUTH AFRICAN ROAD TRAFFIC
SIGNS MANUAL (SARTSM)
VOLUME 2 – Chapter 13
ROADWORKS SIGNING (1999)

Confirm ALL signs with SADC RTSM
Volume 1 Part 1
Good Practice Guidelines

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SOUTH AFRICAN ROAD TRAFFIC SIGNS
MANUAL (SARTSM)
Volume 2 – Chapter 13
Roadworks Signing

- 13.0 Contents
- 13.1 Introduction
- 13.2 Types of Temporary Signs
- 13.3 Traffic Management
- 13.4 Setting of Speed Limits
- 13.5 Temporary Delineation
- 13.6 Contract Specification

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SOUTH AFRICAN ROAD TRAFFIC SIGNS
MANUAL (SARTSM)
Volume 2 – Chapter 13
Roadworks Signing

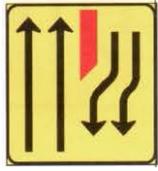
- 13.7 Other Site Factors
- 13.8 Signing Application for Short Term Works
- 13.9 Signing Applications for Rural Roads
- 13.10 Signing Applications for Urban Streets
- 13.11 Signing Applications for Dual Carriageway Roads
- 13.12 Enlarged Standard details – All Applications

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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
13.1 Introduction
Norms to be Applied to Roadworks Signing

- ✓ All signs to comply with National Traffic Regulations and SADC RTSM
- ✓ All signs to be reflective
- ✓ Diagrammatic guidance signs should generally use a vertical rectangular format and display a pictorial representation of the road condition immediately ahead



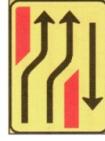
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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ The design of temporary diagrammatic guidance signs embodies the following principles:
 - (i) red retro-reflective areas shall be used to indicate an obstruction in the road ahead;
 - (ii) one arrow shall be used per lane of traffic in the direction of travel to which the sign applies;
 - (iii) unless necessary for effectiveness of the sign message, one or more lanes of opposing traffic shall be indicated by one arrow;



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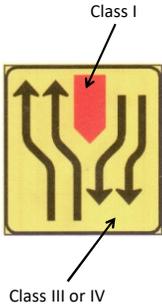
461

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ When red areas of retro-reflective material are applied to yellow retro-reflective background materials the reflective index of the yellow material should be at least 3,5 times that of the red material;





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462

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ Distance information plates shall be used wherever possible to:
 - (i) indicate the length of a site (only appropriate to sites over 2 km in length – distances given in kilometres only e.g.. "6 km");



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463

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ Distance information plates shall be used wherever possible to:
 - (ii) indicate the distance to a change in road conditions (transition area - normally 100 m, 200 m, 300 m or 400 m, up to 1 km);
 - (iii) indicate the distance for which a particular traffic configuration applies (can be used to "countdown" a long site to reassure motorists e.g. "For 14 km");



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464

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (h) speed limits should be applied realistically and should, where appropriate, be capable of being altered to suit changing local conditions and/or time of day;



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465

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (i) regulatory and warning sign sizes **should be increased** for **rural** applications to a minimum size equivalent to that applicable to a **100 km/h** design speed, irrespective of the speed limit within the roadworks; the same principle should be applied in **urban** areas wherever possible using a minimum sign appropriate to a **80 km/h** design speed;



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466

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (j) when high approach speeds and/or large traffic volumes pertain, sign messages should be repeated along the length of a roadway, and, in the case of dual carriageway roadways should be displayed on both sides of the roadway (see paragraph 13.1.4.6),



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467

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (k) the **minimum spacing** between repeated signs along the length of a roadway should be 100 metres on high speed roads and 60 metres on lower speed roads where space permits;



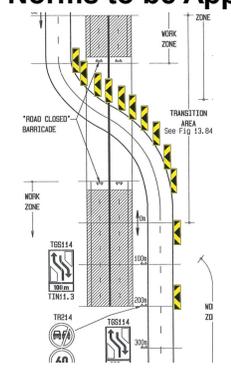
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468

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
13.1 Introduction

Norms to be Applied to Roadworks Signing



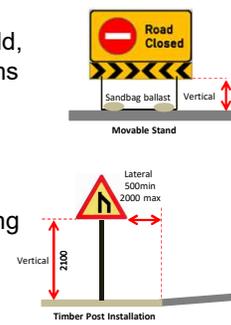
- ✓ (l) the spacing of delineation devices should be related to the rate of change of direction, using closer spacing for sharper changes of direction;

469

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (m) the lateral and vertical positioning of temporary signs at roadworks should, wherever possible, adhere to the norms applicable to permanent signs - see Volume 1, Chapter 1, Table 1.4 – (slide 191) however, it will often not be possible to adhere to these norms - recommended norms for the positioning of temporary signs in such instances are given in Table 13.1; (slide 476)



470

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (n) temporary direction signs used to redirect traffic to alternative routes should use the exclusive colour code and comply with all other design parameters of permanent direction signs; the use of DIN 1451 **Style "A" compressed lettering is recommended for temporary direction signs to minimise sign area;**



ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz!?!%
1234567890- .,:;><&

471

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
13.1 Introduction

Norms to be Applied to Roadworks Signing

- ✓ (o) standard road markings, which may cause confusion, particularly at changes of direction, should be obliterated (sand blasted); temporary road markings should be used to emphasise the new alignment;



472

RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

✓ (p) to maintain the capacity of the roadway, taper and crossover design should be directly related to the design speed of the temporary change of alignment;



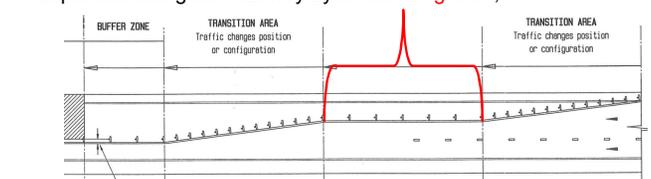
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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

✓ (q) a lane reduction taper should **never** extend over a width of more than one lane (or at the most a lane plus a shoulder); if the required reduction in width amounts to two lanes or more, two or more tapers should be used, each to extend over a maximum of one lane at a time and be separated along the roadway by a **stabilizing area**;



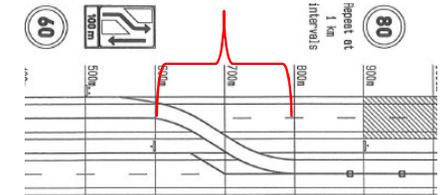

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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

✓ (r) to achieve a major change in alignment, without significant or further reduction in roadway width, a **reverse curve** should be used; ;



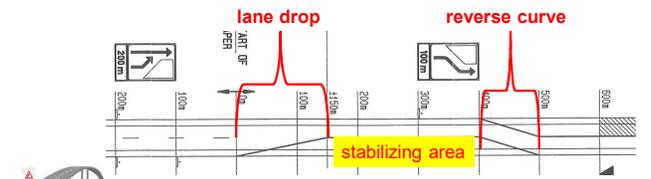
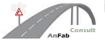

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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

13.1 Introduction

Norms to be Applied to Roadworks Signing

✓ (s) to reduce complex traffic management conditions to an acceptable level of simplicity, complex changes in width and alignment should be undertaken one stage at a time i.e.. a **lane drop** and a **reverse curve** should not occur at the same place.

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ROADWORKS SIGNING
13.1 Introduction

Placement of Temporary Signs at Roadworks

TABLE 13.1 RECOMMENDED MINIMUM VERTICAL CLEARANCE (mm) FOR TEMPORARY TRAFFIC CONTROL DEVICES (1)

Sign Class or Type	85%ile Approach Speed		
	<60 km/h	60 km/h – 80 km/h	> 80 km/h
Short term (1)	200	200	200
Cluster stand	200	N/A	N/A
Delineators	200	200	200
Barricades	600	750	750
Chevrons	600	750	1200
Regulatory (2)	200	750	1500
Advance warning (2)	200	750	1500
Diagrammatic	800	800	1200
High visibility	800	800	1200
Traffic signals (2)	2300	2300	2300

NOTE:

- (1) The recommended minimum vertical clearance given is between the underside of the sign and the edge of the travelled way.
- (2) Wherever possible a greater than minimum vertical clearance should be provided.
- (3) Signs should preferably not be mounted in the vertical clearance range 1500 mm to 2000 mm to avoid the risk of signs hitting vehicle windshields during collisions.
- (4) Short term work should be limited to work of duration of 24 hours or less.
- (5) The vertical clearance of a traffic signal is specified as being between the centre of the lowest lens and the edge travelled way.

TABLE 13.1



477

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ROADWORKS SIGNING
13.1 Introduction

Temporary Signs Colour Coding



R201-120



R201-100



R201-80



R201-60

Ref: Vo11-2.4.1 Vo14-2.4.1/2.4.2

Detail 13.1.2 Permanent Regulatory Signs



TR201-100



TR201-80



TR201-60



TR201-40

Ref: Vo11-2.4.1 Vo14-2.4.1/2.4.2

Detail 13.1.3 Commonly Used Temporary Regulatory Signs

KEY TO COLOUR CODE:

RED
 BLACK

YELLOW
 BLUE

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ROADWORKS SIGNING
13.1 Introduction

Types of Temporary Signs



TW336

Ref: Vo11-3.4.30 Vo14-3.4.36

Detail 13.4.1 Roadworks Ahead



TW336-WA



TW336-WB

Ref: Vo11-3.6.4 Vo14-3.1.6 to 3.1.9



TW336-WA/TIN11.3



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479

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ROADWORKS SIGNING
13.1 Introduction

Types of Temporary Signs



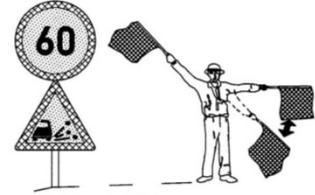
TD1
Guardrail
Delineator

Ref: Vo11-7.6.1 Vo14-12.6.1



TD4
Cones

Ref: Vo11-7.6.4



FLAGMAN

TD5 Delimiting Tape

Detail 13.8.2 Other Warning Devices



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480

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ROADWORKS SIGNING
 13.1 Introduction

Types of Temporary Signs



TK202-TIN11.1



TK331-TIN11.1



TK208-TIN11.2



TK341-TIN11.2

481

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ROADWORKS SIGNING
 13.1 Introduction

Types of Temporary Signs



TK336-TIN11.3



TK336-TIN11.3



TK336-TIN11.4



TK339-TIN11.4



TK336-TIN11.4



TK345-TIN11.5

482

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ROADWORKS SIGNING
 13.1 Introduction

Types of Temporary Signs



TR104-RC



TR103+TR103-RD



TR601-RA-B-TIN11.3




TR201-RC+TK208-WC-TIN11.2

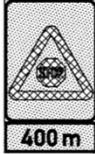
483

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ROADWORKS SIGNING
 13.1 Introduction

Types of Temporary High Visibility Signs



TK336-WB-TIN11.3



TK302-WA-TIN11.3



TK345-WB-TIN11.5



TK209-TK324-WD-TIN11.2

484

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ROADWORKS SIGNING
 13.1 Introduction

Types of Temporary Diagrammatic Signs

T6S121 T6S122 T6S123 T6S124
 T6S125 T6S126 T6S127 T6S128

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TRAFFIC MANAGEMENT
 Temporary Movable Sign Placement

Front Side

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TRAFFIC MANAGEMENT
 Temporary Long Term Sign Placement

Regulatory and Warning Signs.

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TRAFFIC MANAGEMENT
 Temporary Sign Placement

Front Side

Regulatory Barricade

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TRAFFIC MANAGEMENT

Temporary Movable Sign Placement

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489

TRAFFIC MANAGEMENT

Temporary Short Term Sign Placement

Pivot/Folding Frame

Fixed Frame

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490

TRAFFIC MANAGEMENT

Temporary Movable Sign Placement

1200mm for 60km/h

1500mm for 80km/h

1000 for 60km/h

1500 for 80km/h

1220

1320

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491

TRAFFIC MANAGEMENT

Temporary Sign Placement

200

600

800

1200

1500

1200

600-1200

200 MIN.

Sandbag Ballast

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492

TRAFFIC MANAGEMENT

Typical Inventory – Required Safety Control Devices

Item	Device Description	Device Symbol	SADC Code	Dimensions	Class Reflective	Pole or Stand	Number/length Required	Estimated Rate	Unit	Estimated Total Cost
1	Roadworks + Lane Closed + 1km		TW326 WB + Lane Closed 1km	1200 x 1600 + 400 x 1200	Class IV Fluorescent Yellow	Stand			m ²	
2	Speed Limit + No Overtaking		TR201 40 + TR218	1200mm Dia	Class IV Fluorescent Yellow	Stand			m ²	
3	Right Lane Ends + 600m		TGSxxx + TRN1.3	1200 x 1600 + 400 x 1200	Class IV Fluorescent Yellow	Stand			m ²	
4	Flagger		Fluorescent High Visibility Clothing + Hard Hat	600 x 600	Fluorescent Red Orange	Flag With 1m Staff	Level 3 Distinctive Clothing		Number	
5	Keep Right + Lane Closed		TR104 + TW411	120mm Dia = 400x2400	Class IV Fluorescent Yellow	Stand			Number	
6	Roadworks + End Thank You		TW326 + TRN1.4	1500mm + 300x1500	Class IV Fluorescent Yellow				m ²	
7	Traffic Cone		TD4 - Flexible	750mm	Fluorescent Red Orange				Number	
8	Delineators		TW401 / TW402	200x800 SANS1555	Class III	3000 2550 Footing 900 Male Female Connected			Number	
9	PVC Barricade		Reflective Strip	100mm x 6mm Crushed Stone Layer 50mm Wide					Linear Metre	
10	Movable Concrete Barrier		H4 Containment Level	3m Sections + Approved Couplings	GMS 200mm Wide 200micandelta sflux/m	Steel Connecting Devices			Linear Metre	

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TRAFFIC MANAGEMENT



Objective for road traffic signs maintenance.

- ❑ The primary objective for road traffic sign maintenance is to ensure that the signs displayed on the road satisfy criteria like conspicuity, legibility, comprehensibility, credibility and uniformity in a cost effective way so that information can be clearly transferred to the motorist.



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497

TRAFFIC MANAGEMENT



Objective for road traffic signs maintenance.

- ❑ Because the physical appearance of signs is to apparent to all road users, the quality of this appearance has a high profile in crediting and discrediting the authority or authorities responsible for the provision and/or maintenance of signs.



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498

TRAFFIC MANAGEMENT



Road Traffic Sign Maintenance

It is essential that the perception by motorists is influenced positively by the condition of road traffic signs and that signs should comply with the driver expectancy.



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TRAFFIC MANAGEMENT



Road Traffic Sign Maintenance

To be effective they should meet the following requirements:

- Fulfil an important need
- Command attention
- Convey a clear, simple meaning
- Command the respect of road users
- Give adequate time for response



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MODULE 4

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM)

VOLUME 2 – Chapter 13

ROADWORKS SIGNING

Roadworks Component Parts

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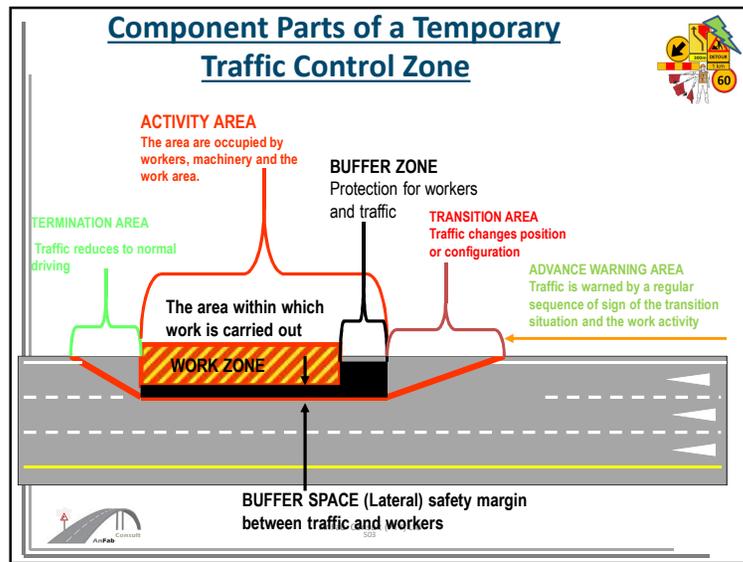
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ROADWORKS SIGNING

Component Parts of a Temporary Traffic Control Zone

- Advance Warning Area
- Transition Area No 1
- Stabilizing Area
- Transition Area No 2
- BUFFER ZONE**
- Work zone
- Termination Area

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ADVANCE WARNING AREA SIGNAGE

Step 1 - Roadworks Ahead

1200mm Urban



Lane Closure
300m

1500mm Rural



Pothole Repair
for 5km

1200 x 2000 Freeway



DETOUR
1 km

Daytime Slow Speed Night Time High Speed

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ADVANCE WARNING AREA SIGNAGE

Step 2 - Speed Limit Reduction – Increments of 20km/h

Urban Rural Freeway

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SPEED REDUCTION

The Advance Warning Area

3. Speed reduction and Law Enforcement!!

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TRAFFIC MANAGEMENT

Advance Warning Area

The area is used to advise motorists that there are temporary conditions ahead of them which require particular care!

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Step 1. IDENTIFY THE WORK ZONE ACTIVITY AREA

Road sign to be maintained

Construction zone clearly identified! Park All vehicles in this demarcated area. Workers shall NOT walk outside this area.

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Step 2 . IDENTIFY THE BUFFER ZONE

Buffer Zone

Work Zone

Road sign to be maintained

No activities are allowed in the buffer zone.

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Step 3 . IDENTIFY THE TRANSITION AREA

Transition Area

Buffer Zone

Work Zone

Road sign to be maintained

This area is to delineate the traffic away from the buffer zone and the work zone.

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Step 4. IDENTIFY THE ADVANCE WARNING AREA

Transition Area

Advance warning area

Buffer Zone

Work Zone

Road sign to be maintained

The road users are warned and informed about the maintenance activities in this area.

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Step 5. IDENTIFY THE TERMINATION AREA

Transition Area

Advance warning area

Buffer Zone

Work Zone

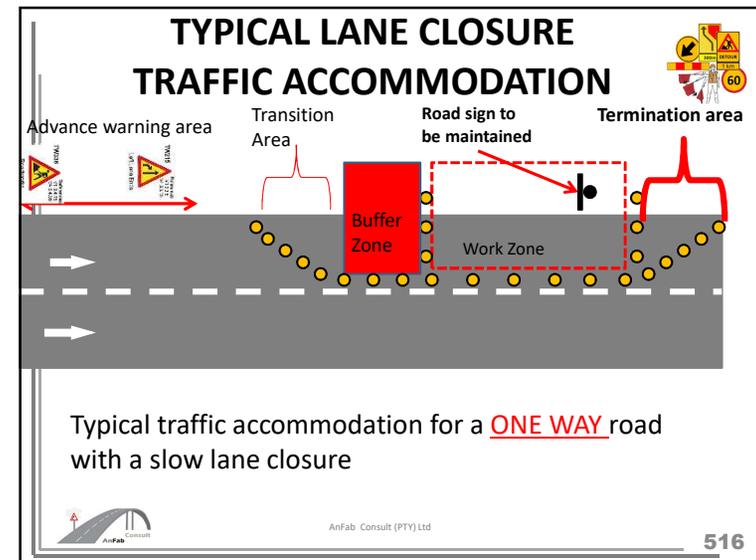
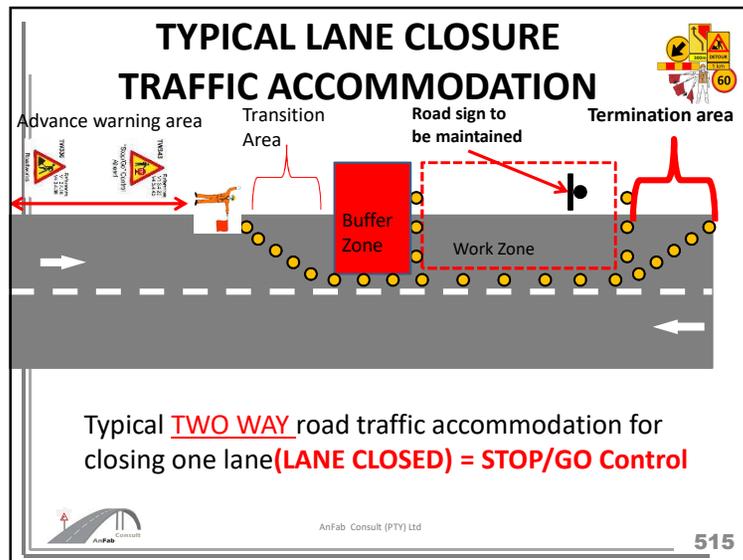
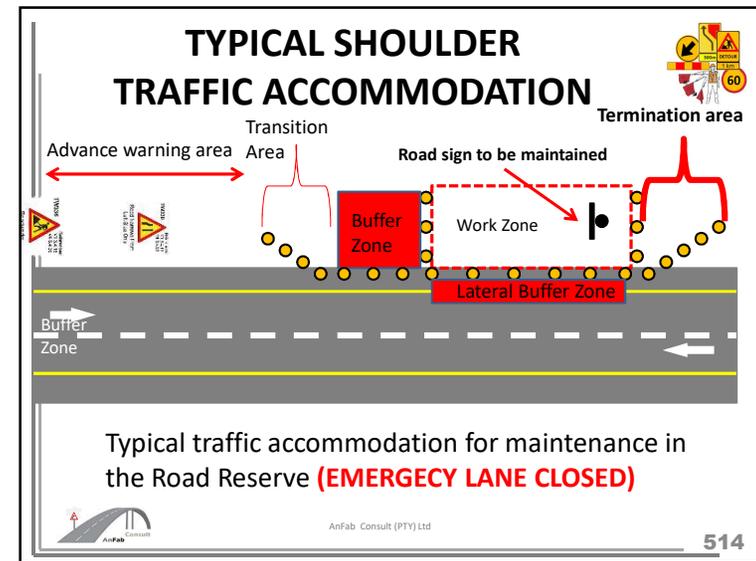
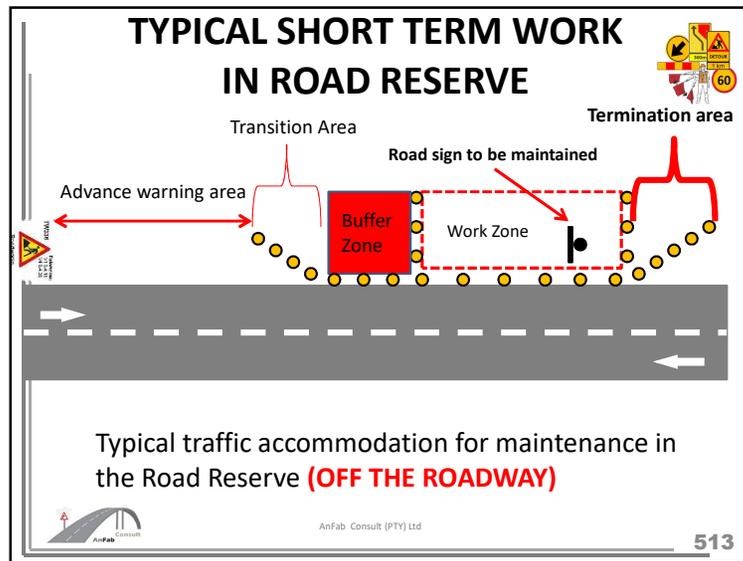
Road sign to be maintained

Termination area

The termination area is to indicate the start of normal traffic flow.

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512



TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Pre-warning Area

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Transition Area and Buffer Zone

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518

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Pre-warning Area

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Pre-warning Area – Rumble Strips

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TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone



Pre-warning Area - Speed reduction : COSBI Blocks
(Control of Speed by Illusion)

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TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone



Pre-warning Area

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TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone

The purpose of speed limits is therefore to reduce the number and severity of accidents to minimum levels consistent with the provision of smooth and efficient traffic flow.

Pre-warning Area - Speed reduction

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TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone



Pre-warning Area - Speed Kills

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TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone



15.01.2014 12:11

Transition Area
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525

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Component Parts of the Traffic Control Zone



2013.11.08 12:11

Transition Area - Deviation
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526

TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone



2013.12.19 13:11

Transition Area – Section of Road Closed
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TRAFFIC MANAGEMENT
Component Parts of the Traffic Control Zone



2013.12.19 13:12

Transition Area – Deviation
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528

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Transition Area – Deviation

529

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

The transition area must be clearly defined using delineator plates (night time) and **traffic cones (day time)** and should conform to the layout depicted on the guidance signs preceding it.



Transition Area

530

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

All delineators to comply with **SANS 1555**



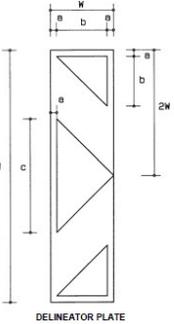
TW401



TW402

DIMENSIONS (mm)

W	4W	2W	a	b	c
150	600	300	15	120	270
200	800	400	20	160	360
250	1000	500	20	210	450
300	1200	600	20	260	540



DELINEATOR PLATE

- Class III reflective sheeting
- Anchor pin between blade and base
- Correct size **200x800** reflective

Transition Area - Delineators

531

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone




Transition Area

532

TRAFFIC MANAGEMENT

Detail 13.24.3
REVERSE CURVE DESIGN-METHOD 3 - PARABOLIC CURVES

This method allows flexibility for quick curve design and is adequate for smaller work areas particularly in urban streets.

$$Y1 = X \cdot \frac{1}{L^2}$$

Where S = total shift

$$X = \frac{S}{2}$$

Transition Area – Reverse Curve Design

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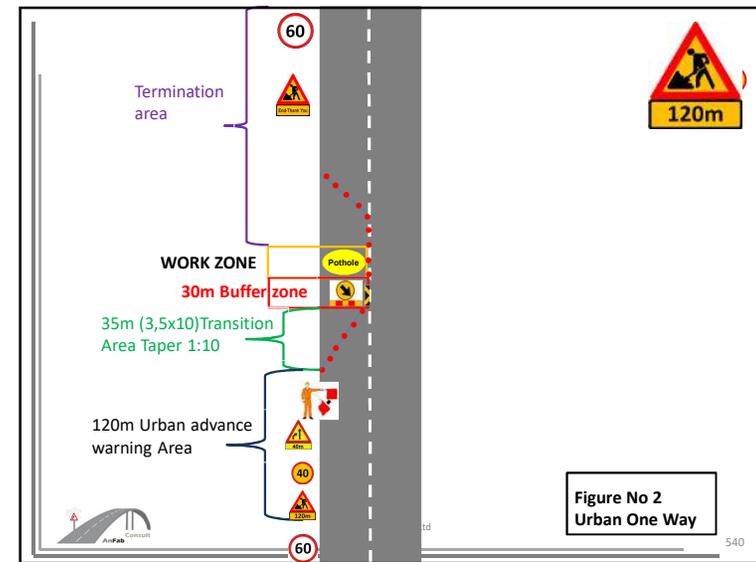
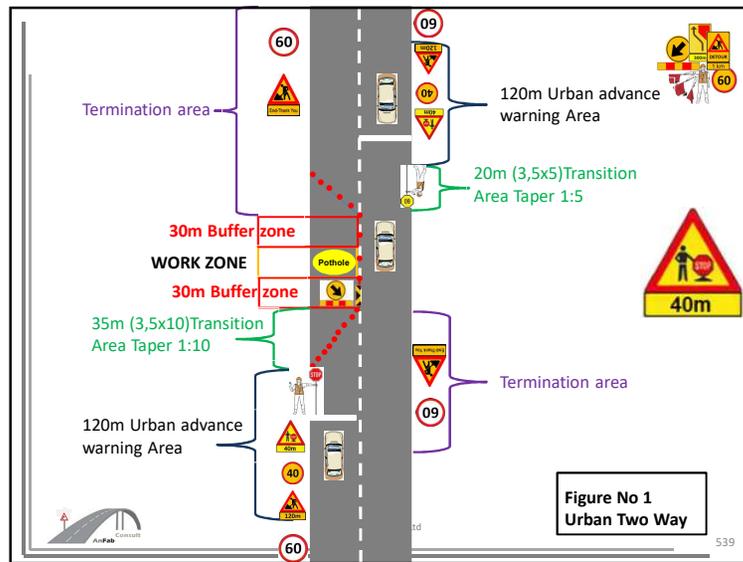
TRAFFIC MANAGEMENT

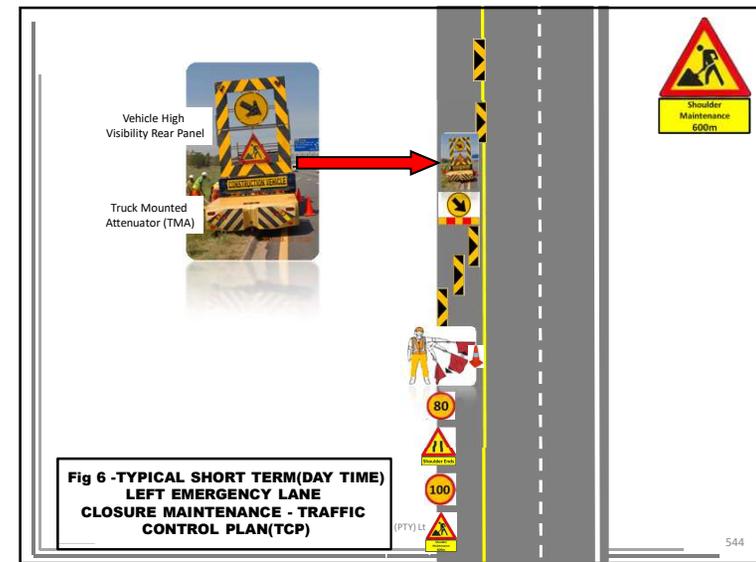
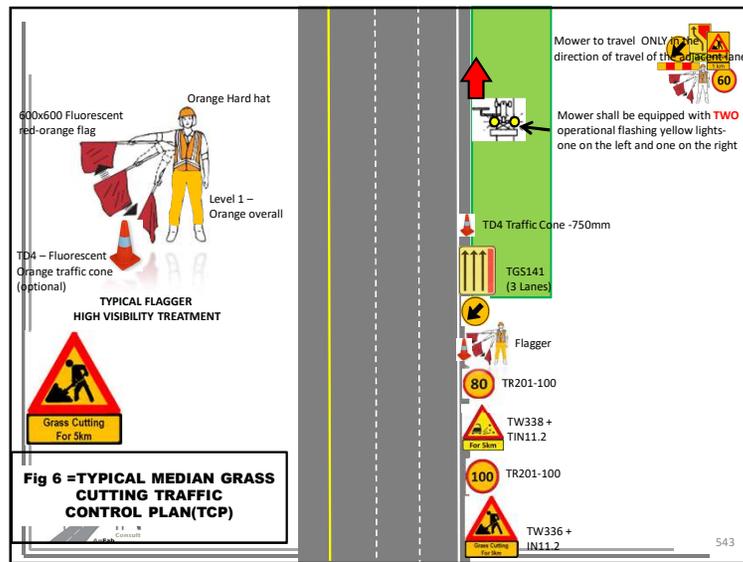
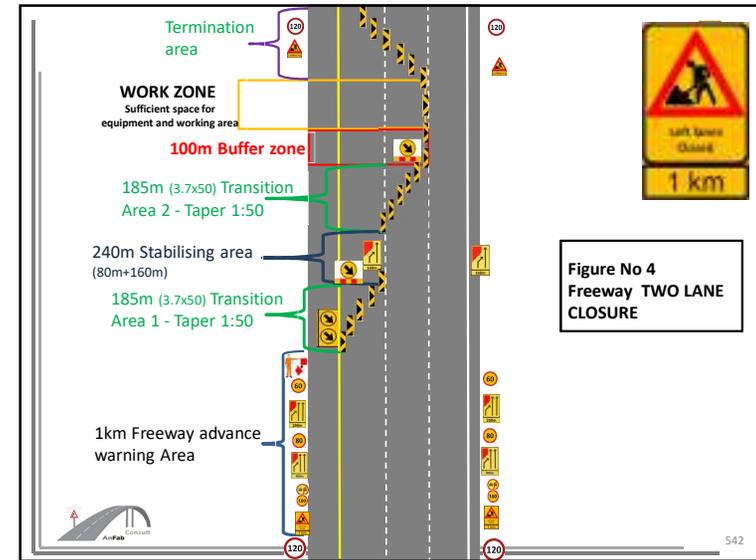
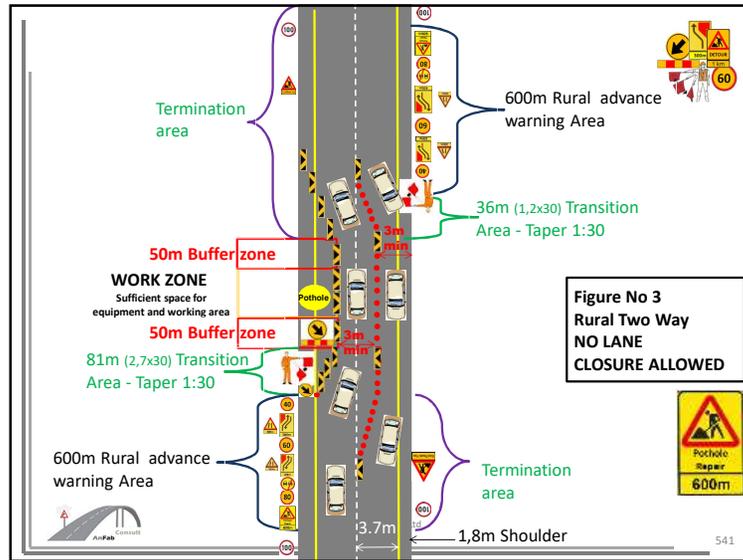
Component Parts of the
Traffic Control Zone

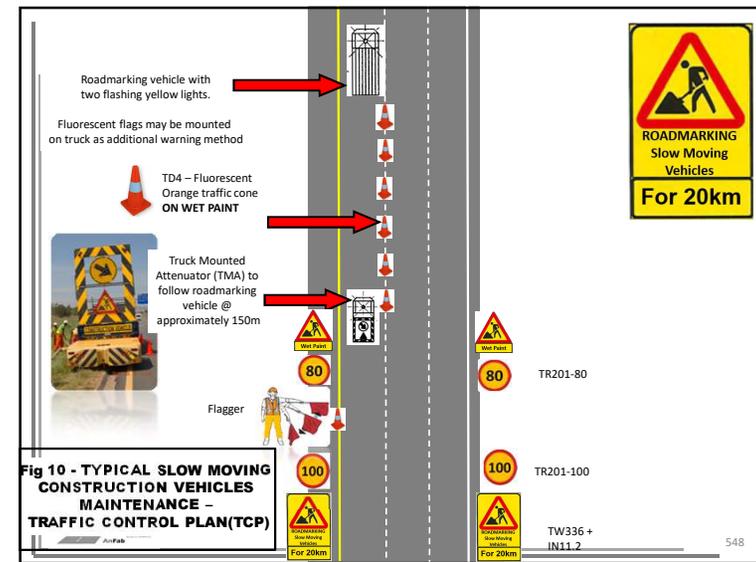
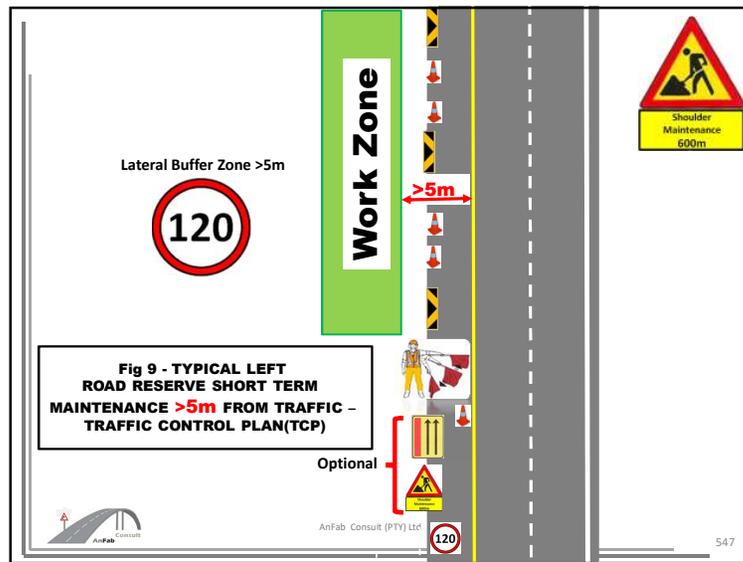
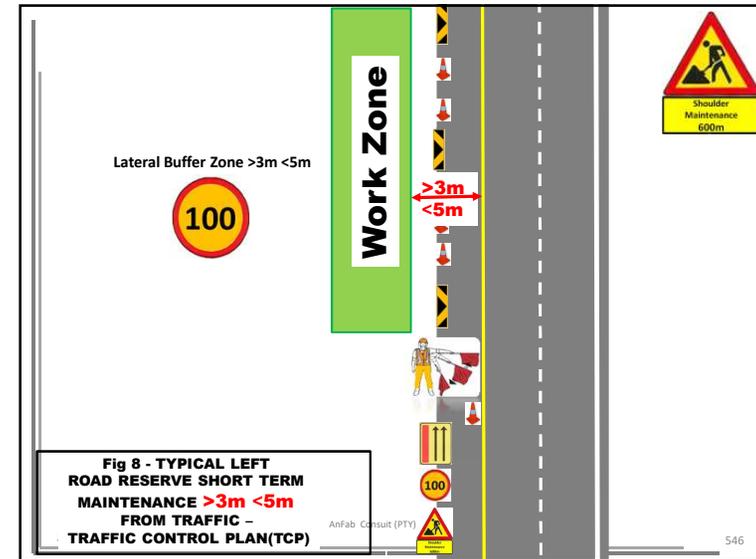
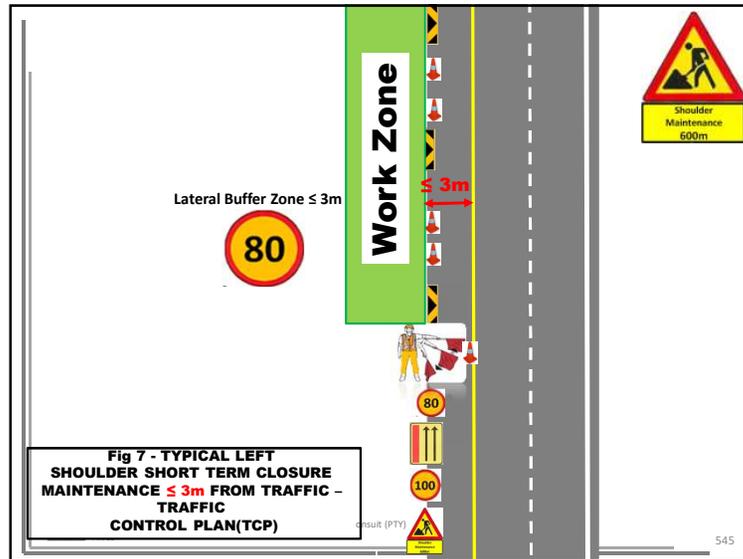
	Approach Speed	Taper rate
STOP /GO	< 40 km/h	Min 1 : 10
Urban	≤ 40 km/h	1:10 - 1 : 20
Rural	≤ 60 km/h	1 : 20 – 1:30
Freeway	≤ 80 km/h	1 : 40 – 1:50
Termination area		1 : 5

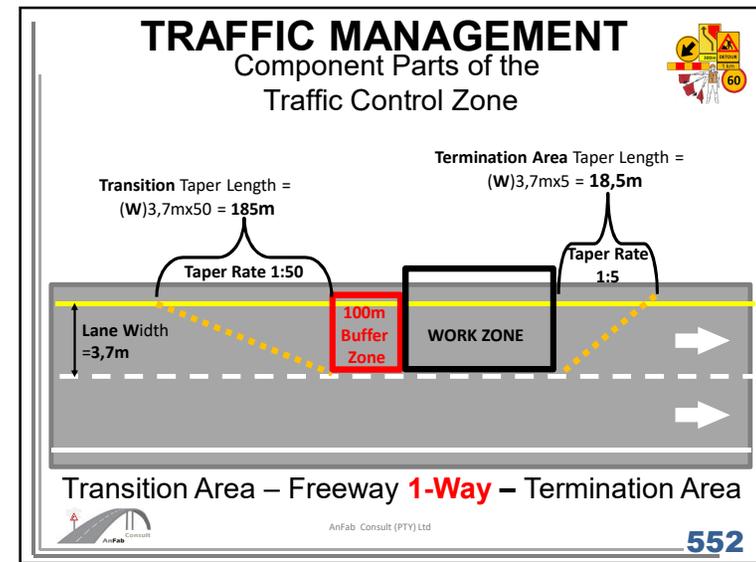
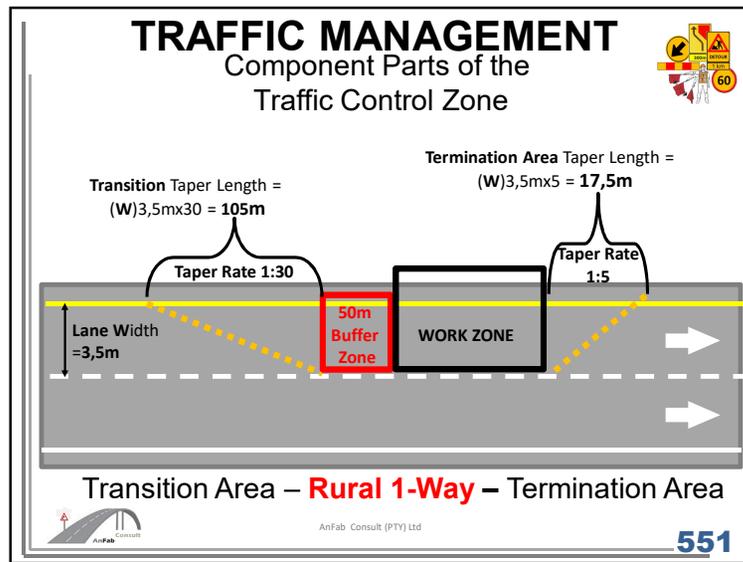
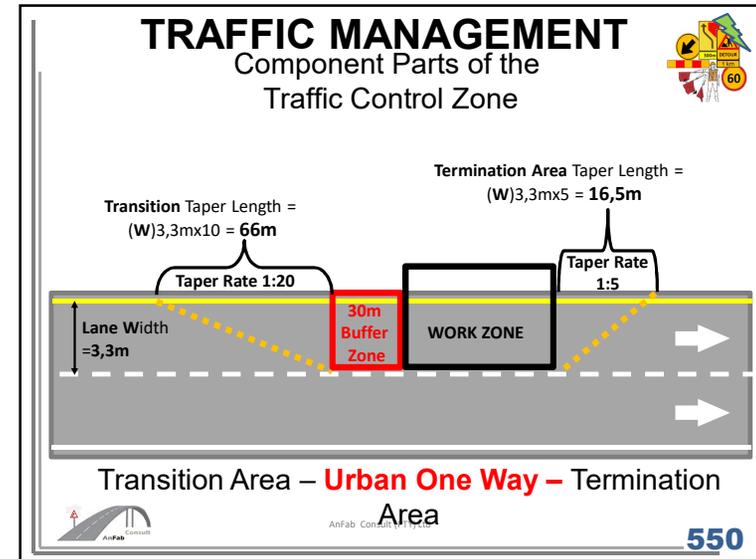
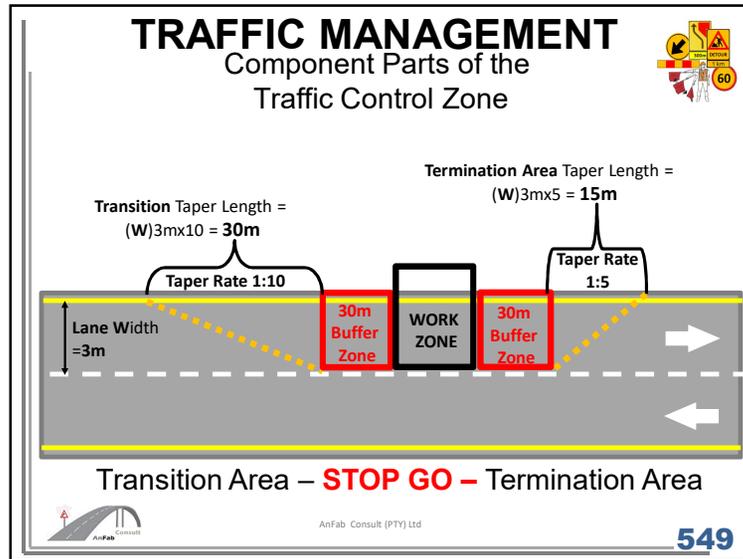
Transition Area – Transition Tapers

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TRAFFIC MANAGEMENT

Transition Area – Typical 4 lane taper Details

13.4.2 (c) Width of Roadway
The travelled way is commonly reduced in width at roadworks sites. Particular attention should be paid to conditions when parallel reduced width lanes pass through reverse curves so that sufficient space is available for large vehicles. The following recommended speeds may be related to Table 13.3:

(i) Rural
3,6 m-3,1 m - 100 km/h
3,1 m and lower - 80 km/h

(ii) Urban 3,6 m and higher - prevailing speed limit
3,6 m-3,1 - prevailing speed limit
3,1 m and lower - 60 km/h.

553

TRAFFIC MANAGEMENT

Transition Area – Cone, delineator and roadstud spacing

TABLE 13.4 DELINEATOR, CONE AND ROADSTUD SPACING AT ROADWORKS TABLE 13.4

Temporary Condition	Delineator or Cone Spacing (m)	Roadstud Spacing (m)	
Transition taper	- 1 in 10	3	1-2 (4)
	- 1 in 20	5	5 or 6 (1)
	- 1 in 30	7	5 or 6 (1)
	- 1 in 40	10	5 or 6 (1)
Transition crossover	- curve (2)	5 to 10	1-2 (4)
	- straight (3)	10	12
Stabilising of work area (according to site conditions)		10 to 15	12
		20 to 50	24
Termination taper	- 1 in 5	5	12 or 24
	- 1 in 10	7	12 or 24
Straights	- short	10	12
	- long rural (5)	200 max	(6)
	- freeway or	50 max	(6)
	high speed road (7)		

554

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

Concrete barriers

Transition Area delineation devices

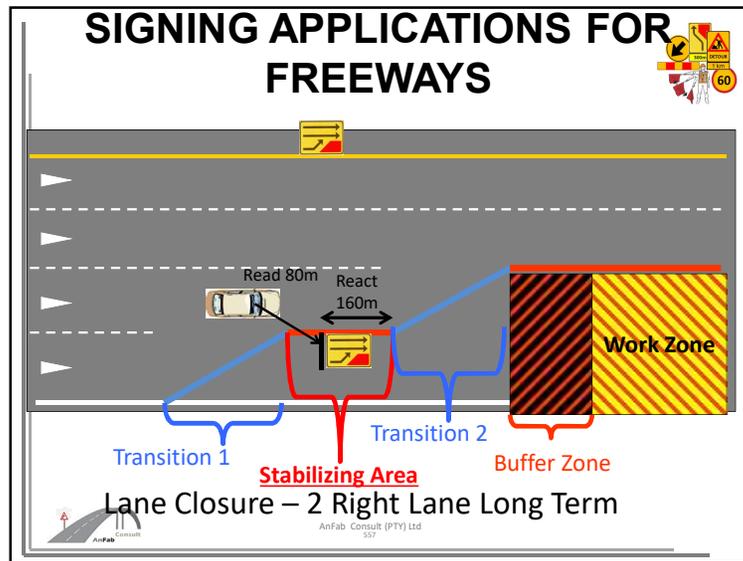
555

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

Height Restriction Beams

556



STABILIZING AREA

TABLE 3.1 ADVANCE WARNING SIGN LOCATION AND SIZE TABLE 3.1

Operating speed (km/h)	Location distance from hazard (m)(2)	Recommended size (mm)
120	330 (400)	1500
100	240 (320)	1500
80	A 160 (218)	1200
60	120 (160)	900

NOTES:
 (1) Hazard marker warning signs are located at the hazard - see Section 3.5 for sizes.
 (2) If advance warning signs are provided on gravel roads the distances in brackets are recommended.

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STABILIZING AREA

TABLE 3.2 VISIBILITY DISTANCE TO WARNING SIGN TABLE 3.2

Operating speed (km/h)	Clear visibility distance (m)
120	120
100	100
80	B 80
60	60

A + B = 240 meter minimum

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Work Zone

This area must be adequately defined by delineators in the less complex conditions. Where there is a risk to traffic or workers of vehicles entering the work area, temporary barriers of a standard sufficient to prevent vehicle penetration are recommended (see Subsection 13.5.3).

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TRAFFIC MANAGEMENT

Urban 30m *if possible*
Rural 50m
Freeway *min 100m 200m recommended*

The diagram shows a cross-section of a road with a central 'Work Zone' (red rectangle) and 'Lateral Buffer Zones' (yellow triangles) on both sides. A 'Buffer Zone' is indicated by a red double-headed arrow above the work zone. Arrows on the road surface point towards the work zone.

Buffer Zone

Work Zone

Lateral Buffer Zone

The principal function of a buffer zone in such situations is to separate the traffic from the workers at the site in the interest of worker safety !
NO workers shall be allowed in the buffer zone!

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

The photograph shows a roadwork site with a white van, a truck, and workers. A red arrow points to the area between the traffic and the workers, which is the lateral buffer zone. A timestamp '2013.11.08 12:30' is visible in the bottom right of the photo.

The Lateral Buffer Zone

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

The photograph shows a roadwork site with workers and traffic cones. A timestamp '2014.01.13 11:03' is visible in the bottom right of the photo.

The Work Area – Lateral Buffer Zone

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Termination Area
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TRAFFIC MANAGEMENT

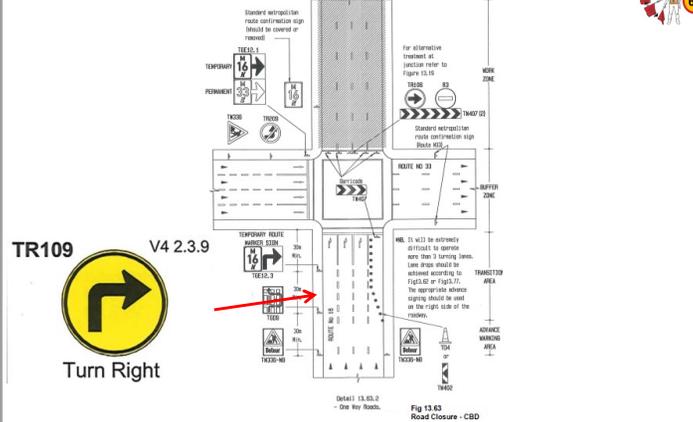
Component Parts of the Traffic Control Zone



566

TRAFFIC MANAGEMENT

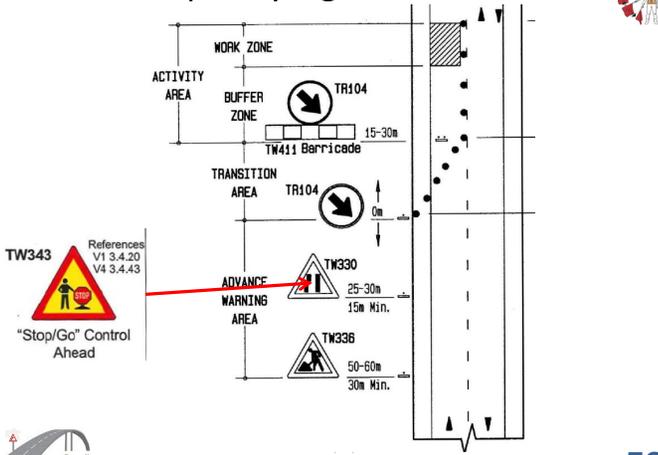
Road Closures



567

TRAFFIC MANAGEMENT

Temporary Sign Placements



568

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

1. Design Layout

NOTE: See Subsection 13.8.7 for Sign Sizes.

For Taper details see Section 13.5.5

NOTES:

1. A minimum lane width of 3,0m in each direction should be provided in the activity area for two-way operation to be continuous.
2. The imposition of a temporary speed limit should be considered if operating speeds are in excess of 80 km/h.

569

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

2. Scope of Works – Construction Phases

13.8.13 Mobile Maintenance In Centre of Carriageway

1. Mobile maintenance in the centre of the roadway or carriageway is always likely to be a hazardous operation, particularly on high speed rural roads. Detail 13.42.1 shows such an operation on a two-lane two-way roadway and Detail 13.42.2 a similar operation on a two-lane one-way carriageway.
2. The operation on a two-way roadway is particularly hazardous and requires the services of three flagmen as illustrated. The vehicle carrying out the work, or in direct support of it, shall be provided with a HIGH VISIBILITY REAR PANEL, and at least two FLASHING YELLOW WARNING LIGHTS, (603). The two flashing lights shall be positioned so that they define the front and rear of the vehicle, and, if practical for this type of work, the width of the vehicle as well, since it will be passed by traffic on both sides.
3. In Detail 13.42.2 two High visibility treated vehicles are specified and traffic is controlled to pass only to one side of the two vehicles. The rear most vehicle effectively closes one lane. It could be the left lane or the right lane subject to the nature of the work and local traffic conditions). The second vehicle travels some 100 m in front, either undertaking the work, or in support of it if the work is being done manually.
4. In each case the vehicles should be supported by alert, well trained flagmen, who shall operate in accordance with Figure 13.23.
5. When traffic speeds are high, it is recommended that at least one advance sign be placed to warn drivers of the activity ahead. A "public reaction" type of message and/or flashing lights should be considered for such signs (see Figure 13.18).

570

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

3. Device Requirements Inventory

MAINTENANCE UNIT INVENTORY			
Sign	No	Size (mm)	Quantity
	FLA65	450 X 450	3
	TR103	1200	1
	Vehicle High Visibility Rear Panel	To suit Vehicle	2
	TR103/TR104 plus	900	2
	TW336	1200	2
	Yellow Flash Light		2 Per Vehicle

571

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

4. Checklist – Risk Analysis

- are workers equipped with high visibility clothing?
- are flagmen alert and well trained?
- are all flags clean and bright?
- are the signs on the HIGH VISIBILITY REAR PANEL correctly set?
- are all flashing lights working?

572

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

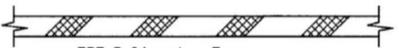
Volume 2 Chapter 13 – Roadworks Signing



TD1
Guardrail
Delineator
Ref: Vol1-7.6.1 Vol14-12.6.1



TD4
Cones
Ref: Vol1-7.6.4

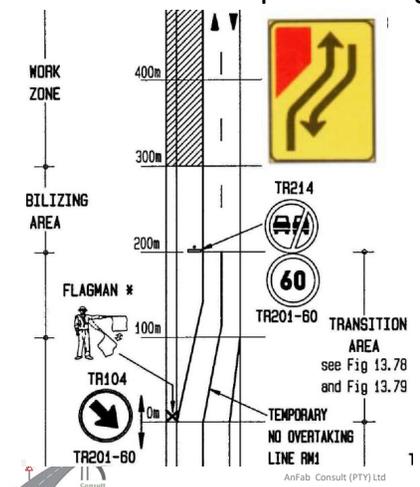


T05 Delineator Tape



573

Volume 2 Chapter 13 -Signing

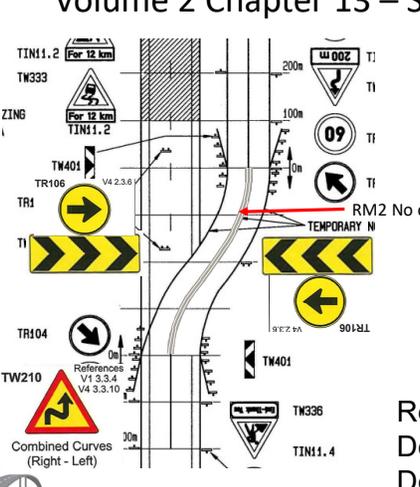


Correct Sign Design



574

Volume 2 Chapter 13 – Signing



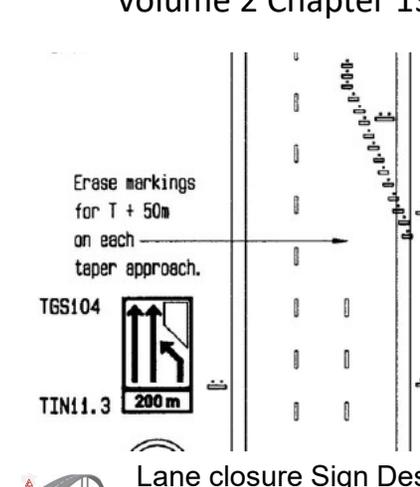
Reverse Curve Deviation Sign Design



575

Volume 2 Chapter 13 – Signing

Erase markings for T + 50m on each taper approach.



Lane closure Sign Design



576



Complete assignment questions 5



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MODULE 6 SIGNING APPLICATIONS FOR URBAN ROADS



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Volume 2 Chapter 13 – Typical Signing Applications for Urban Streets

Introduction

- 1 The temporary signing of urban roadworks situations is commonly influenced by the following factors, either separately, or in combination:
 - (a) limited space to accommodate signs and traffic;
 - (b) high traffic volumes (even moderate urban traffic flows are high by rural standards);
 - (c) the presence of pedestrians;
 - (d) the need to maintain access to many properties.
- 2 Roadworks situations in urban areas vary widely in their signing requirements and operational characteristics including, as they do, such environments as:
 - (a) quiet residential streets;
 - (b) high capacity arterial streets;
 - (c) congested central business districts
- 3 Factors which commonly mitigate against the effectiveness of temporary road signs in urban areas, and which must be recognised and taken into account, include:
 - (a) street lighting - which may not, as might be expected, improve signing at night, due to stray reflections and reduced luminance contrast so that signs need to be positioned with care;
 - (b) obscuration of signs by trees, street furniture and by large vehicles;
 - (c) limited sight distances.
- 4 The examples covered in this section illustrate individual situations. In practice a large urban roadworks site may include several such situations within the one site. The signing treatment must therefore take into account the individual situations and the collective effect of all situations from a driver's perspective.
- 5 Many roadworks tasks in urban areas will be of short term duration, commonly undertaken between morning and evening peak traffic. Those examples within an obviously urban environment are included in this section, but many of the examples given in Section 13.8 are also relevant to urban areas.



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Volume 2 Chapter 13 – Typical Signing Applications for Urban Streets

Recommended Sign Sizes

Signs should be sized as recommended in Volume 1. As a rule of thumb the following sizes are appropriate for regulatory, warning and diagrammatic signs:

- (a) Gravel roads:
 - (i) circular signs - 1200 mm diameter;
 - (ii) triangular signs - 1200 mm side length;
 - (iii) diagrammatic signs - 1200 mm x 1600 mm;
- (b) Bituminous, concrete or brick surfaced roads:
 - (i) circular signs - 1200 mm diameter;
 - (ii) triangular signs - 1500 mm side length;
 - (iii) diagrammatic signs - 1200 mm x 1600mm.
- (c) Urban streets:
 - (i) circular signs - 900 mm/1200 mm diameter;
 - (ii) triangular signs - 900 mm/1200 mm side length;
 - (iii) diagrammatic signs - 1200 mm x 1600 mm.




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Volume 2 Chapter 13 – Typical Signing Applications for Urban Streets

Typical Layout - Footway Deviation

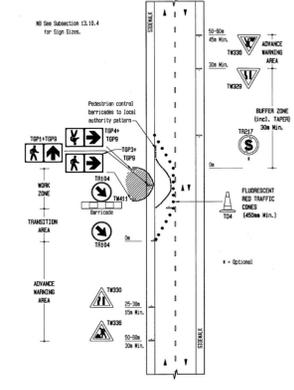


Fig 13.06
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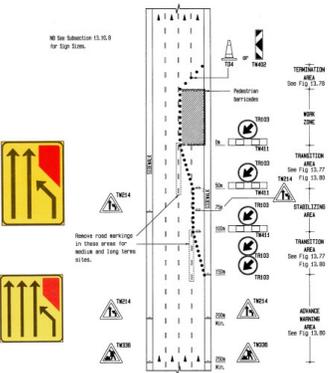


582

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

One way lane closures



Remove road markings in these areas for narrow and long term sites.

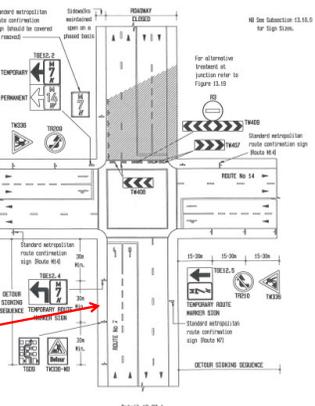


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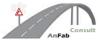
TRAFFIC MANAGEMENT

Road Closures



References
V1 3.2.1
V4 3.2.4

TW104
T-Junction



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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads Recommended Sign Sizes



Signs should be sized as recommended in Volume 1. As a rule of thumb the following sizes are appropriate for regulatory, warning and diagrammatic signs:

(a) Gravel roads:

- (i) circular signs - 1200 mm diameter;
- (ii) triangular signs - 1200 mm side length;
- (iii) diagrammatic signs - 1200 mm x 1600 mm;

(b) Bituminous or concrete surfaced roads:

- (i) circular signs - 1200 mm diameter;
- (ii) triangular signs - 1500 mm side length;
- (iii) diagrammatic signs - 1200 mm x 1600 mm.



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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads Typical STOP/GO Operations



- 1 STOP/RY-GO operation may be required to control traffic at a wide variety of roadworks sites where the remaining roadway is reduced to less than two lanes in width, for whatever reason. As such, STOP/RY-GO traffic control is effectively a temporary signing sub-system. It may be used on its own or it may be used locally, in more than one place, within a long roadworks site. The detail in Figure 13.44 may therefore be incorporated into other layouts in this Chapter.
- 2 If a daytime STOP/RY-GO operation cannot be opened to traffic by dusk, temporary traffic signals must be provided for night time operation. A portable power source may be required in order to operate the signals, and such an installation will need to be well secured.
- 3 All obstructions close to a one-way site of this nature must be marked adequately by DELINEATOR PLATE signs TW401 and/or TW402 and/or flashing yellow lights. This includes any working or parked construction vehicles.
- 4 The STOP/RY-GO operators must also be equipped with flags and must be well trained/experienced flagmen (see Subsection 13.3.9 and Figure 13.23).



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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads Typical Checklist



Checklist

- do the advance signs for the STOP/RY-GO control clash with other roadworks signing within the site?
- is the flagman fully visible to oncoming traffic?
- are all signs fully visible to oncoming traffic?
- is the flagman standing in a safe position?
- is the lateral Buffer Zone within the site adequate for worker and public safety?
- can the restriction be eliminated to permit two-way traffic by dusk?



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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads

Typical STOP/GO Advance Warning Area Minimum 600m and Component Part Layout



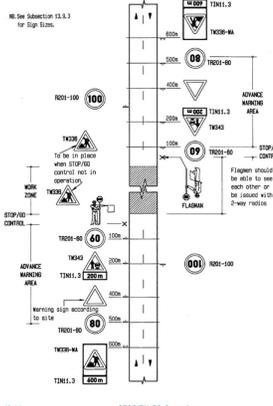
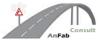


Fig 13.44
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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads

Typical Gravel Blading/Re- shaping layout.



Fig 11.45 Gravel Road Blading/Reshaping
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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads

Typical Signage Improvements



Fig 13.49 Reduced Width Operation – 2-Way Traffic
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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads

Typical Bridge/Road Closure Sign Layout



Fig 13.63 Deviation at a Bridge Site
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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads

Typical Rural Deviation Sign Layout



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MODULE 8 SIGNING APPLICATIONS FOR FREEWAYS



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Volume 2 Chapter 13 – Typical Signing Applications for Freeway and Dual Carriageway Roads



Freeways and dual carriageway roads carry large volumes of traffic at the highest possible level of service. It is therefore imperative that the traffic management and temporary signing of such roads during roadworks be of the highest possible standard. The traffic management and signing techniques illustrated in the examples in this section have been used widely, and, when correctly operated, have proven to be very effective.



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Volume 2 Chapter 13 – Typical Signing Applications for Freeway and Dual Carriageway Roads



Due to widely varying operating characteristics during a single 24-hour period, one freeway roadworks traffic management solution normally has to be effective for conditions ranging from severe congestion, to high speed free-flowing traffic. Under these circumstances, accident levels are almost certain to be higher than those pertaining prior to the roadworks. **Careful attention to detail and frequent monitoring of signs and conditions will ensure that any increase in the accident rate will be kept to a minimum.**



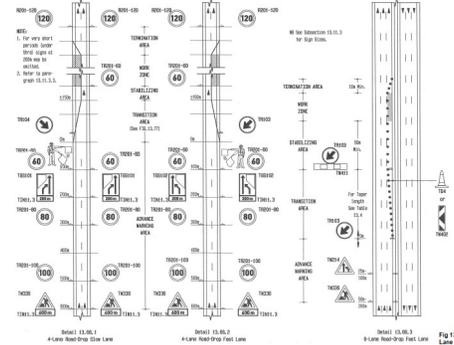
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Volume 2 Chapter 13 – Typical Signing Applications for Freeway and High Speed Roads



**Typical Advance
Warning Area
600m Daytime
only.**




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Volume 2 Chapter 13 – Typical Signing Applications for Freeway and High Speed Roads

Typical Advance Warning Area **1km Night Time** Long Term.

Volume 2 Chapter 13 – Typical Signing Applications for Freeway and High Speed Roads

Typical Advance
Warning Area
1km
200m Buffer Zone

MODULE 9

Standard Specifications for Road and Bridge Works for State Road Authorities

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ACCOMMODATION OF TRAFFIC

**COTO 1998 - Section 1500 –
COTO (2020 to be published) Chapter 1 - A1.5.1**

SCOPE

This section covers the **construction and maintenance of the necessary detours and bypasses**, barricades and signs, and everything necessary for the safe and easy passage of all vehicular and pedestrian traffic during the construction and defects liability periods.

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APPOINTMENT TO PROCEED WITH CONSTRUCTION 

COTO – 1500 : ACCOMMODATION OF TRAFFIC

Safe and easy passage of traffic
During the construction and defects liability periods **the Contractor shall be responsible** for the safe and easy passage of vehicular and pedestrian traffic over, underneath, past or alongside the Works.

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APPOINTMENT TO PROCEED WITH CONSTRUCTION 

COTO – 1500 : ACCOMMODATION OF TRAFFIC

During all his operations and when using his machinery, plant and equipment, **the Contractor shall at all times take the necessary care** to protect the public and to facilitate the traffic flow.

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APPOINTMENT TO PROCEED WITH CONSTRUCTION 

COTO – 1500 : ACCOMMODATION OF TRAFFIC

The **failure or refusal of the Contractor** to construct or to maintain or to construct and maintain bypasses and detours at the proper time, or to take the necessary precautionary measures for the safety and convenience of the traffic as required by the relevant statutory authorities or as ordered by the Engineer, shall be sufficient cause for ordering all the work under **this Contract to be suspended** until the Contractor has complied with all the specified requirements to the satisfaction of the Engineer.

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APPOINTMENT TO PROCEED WITH CONSTRUCTION 

COTO – 1500 : ACCOMMODATION OF TRAFFIC

The Contractor shall timeously submit detailed proposals for haul and construction roads to the Engineer so that the Engineer's written approval can be obtained **before** construction commences.

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APPOINTMENT TO PROCEED WITH CONSTRUCTION



COTO – 1500 : ACCOMMODATION OF TRAFFIC

The **Contractor shall not commence** with the construction of a bypass or a detour or any section thereof **until he has obtained the Engineer's written permission** to do so.



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APPOINTMENT TO PROCEED WITH CONSTRUCTION



COTO – 1502 General Requirements

(a) Safety

The contractor shall be responsible for the safe and easy passage of public traffic past and/or over sections of roads of which he has occupation. The contractor shall at all times in all his operations and in using his constructional plant take the necessary care to protect the public and to facilitate the flow of traffic.



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WIDTH AND CLEARANCE



COTO – 1500 : ACCOMMODATION OF TRAFFIC

Width and vertical clearance

The **minimum usable width** of bypasses and detours accommodating two-way vehicular traffic **shall be 9 m**



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BYPASSES AND DETOURS



COTO – 1500 : ACCOMMODATION OF TRAFFIC

For **pedestrian bypasses** and detours the minimum usable **width shall be 1,2 m** and the minimum **vertical clearance shall be 2,5 m**.



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MINIMUM VERTICAL CLEARANCE



COLTO – 1500 : ACCOMMODATION OF TRAFFIC

1502(c) Minimum vertical clearance:
If the minimum clearance available is **less than 5,2 m**, the minimum clearance **shall be Indicated on approved signs** at approved locations on and in advance of the obstruction.



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ACCESS TO PROPERTIES



COTO – 1500 : ACCOMMODATION OF TRAFFIC

In accordance with the requirements of the General Conditions of Contract, **the Contractor shall at all times** provide and allow pedestrian and vehicular access to properties that fall within or adjoin or are affected by the area in which he is working.



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APPOINTMENT TO PROCEED WITH CONSTRUCTION



COTO – 1502 General Requirements

(a) Safety
The contractor may not commence with any part of the works before he has made **adequate provision** for the accommodation of traffic.



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APPOINTMENT TO PROCEED WITH CONSTRUCTION



COTO – 1502 General Requirements

(b) Temporary Deviations
The contractor shall obtain the **engineer's written approval**



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REMEDIAL WORK

COTO – 1218 Remedial Measures

When any part of the works or any equipment or material is found, upon examination by the engineer, **not to conform to the requirements** or at any stage before final acceptance is damaged so that it no longer conforms to the requirements of the specifications, the engineer may order its complete removal and replacement, at the contractors expense, with satisfactory work, equipment, or material, or he may permit the contractor to apply remedial measures in order to **make good any such defects or damage.**



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TRAINING INFORMATION SESSIONS AND INDUCTIONS

Training

OCCUPATIONAL HEALTH AND SAFETY ACT, (Act 85 of 1993)

Section 8(2)(e) – Provide information, TRAINING and SUPERVISION to ensure:

- Health; and
- Safety



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TRAINING INFORMATION SESSIONS AND INDUCTIONS

Induction

OCCUPATIONAL HEALTH AND SAFETY ACT, (Act 85 of 1993)

Risk Analysis



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TRAINING INFORMATION SESSIONS AND INDUCTIONS

Induction

OCCUPATIONAL HEALTH AND SAFETY ACT, (Act 85 of 1993)

CONSTRUCTION REGULATIONS, 2003 / 2014



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TRAINING INFORMATION SESSIONS AND INDUCTIONS

CONSTRUCTION REGULATIONS

“competent person” means any person having the knowledge, training, experience and qualifications specific to the work or task being performed: Provided that where appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act, 1995 (Act No. 58 of 1995), these qualifications and training shall be deemed to be the required qualifications and training.



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TRAINING INFORMATION SESSIONS AND INDUCTIONS

CONSTRUCTION REGULATIONS

“risk assessment” means a program to determine any risk associated with any hazard at a construction site , in order to identify the steps needed to be taken to remove, reduce or control such hazard;



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RISK ASSESSMENT CONSTRUCTION REGULATIONS

7.(1) Every contractor performing construction work shall before the commencement of any construction work and during construction work, cause a risk assessment to be performed by a competent person appointed in writing and the risk assessment shall form part of the health and safety plan to be applied on the site and shall include at least—

- (a) the identification of the risks and hazards to which persons may be exposed to;
- (b) the analysis and evaluation of the risks and hazards identified;
- (c) a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards that have been identified;
- (d) a monitoring plan; and
- (e) a review plan.

(2) A contractor shall ensure that a copy of the risk assessment is available on site for inspection by an inspector, client, client’s agent, contractor, employee, representative trade union, health and safety representative or any member of the health and safety committee.



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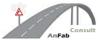


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RISK ASSESSMENT



elRellano.com



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SPECIFICATIONS

COTO – 1998 Publication

- Section 1500 : Traffic Accommodation
- Section 5400 : Guardrails
- Section 5500 : Fencing
- Section 5600 : Road Signs
- Section 5700: Road Markings



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STANDARDS

South African Bureau of Standards

- SANS 1519 Retro Reflective Sheeting
- SANS 1555 - Delineators
- SANS 731 : Road Marking Paint
- SANS 51317 : Barrier Containment Level



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TRAINING INFORMATION SESSIONS AND INDUCTIONS

INDUCTIONS

- The Minimum Personal Safety Equipment
 - The Safety on Site
 - The Buffer Zone on Site
- The Identified Construction Zone
- The Do's and Dont's on Site



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Questions ?



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**MODULE 10
TRAFFIC SAFETY OFFICER ROLES
AND RESPONSIBILITIES**



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TRAFFIC MANAGEMENT

Traffic Safety Officer

The safety of the travelling public is of utmost importance and every effort must be made to ensure that all road signs, barricades, delineators, flagmen and speed controls are maintained and effective and that courtesy is extended to the public at all times.



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TRAFFIC MANAGEMENT 

Traffic Safety Officer

The contractor shall nominate a knowledgeable member of his staff on site who shall be the responsible person for the arrangements and maintenance of all accommodation of traffic measures required for the duration of the contract.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

The traffic safety officer will be required to perform the following duties and this list shall not be deemed to be comprehensive. He shall:

(i) be responsible for keeping the temporary traffic accommodation requirements up to specification 24 hours a day 7 days a week;

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

(ii) compile and maintain a complete daily record of traffic signs installed and the traffic signs sequence at each location during the execution of the contract

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

(iii) inspect and report to the engineer on the state of all required road signs as often as the engineer may require but in any event not less than once a day or at such other intervals as may be specified

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TRAFFIC MANAGEMENT

Traffic Safety Officer

(iv) exercise control in terms of traffic safety over the safe movement of personnel, visitors and plant on site including the wearing of high visibility clothing, the operation of amber flicker lights, and the display and cleanliness of "construction vehicle" signs, all as specified;



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637

TRAFFIC MANAGEMENT

Traffic Safety Officer

(v) be responsible for keeping all road signs and traffic cones clean and visible at all times. The contractor shall remove all bituminous and other foreign matter from road signs and traffic cones or provide new road signs and traffic cones all at the contractor's own cost, and all as directed by and to the satisfaction of the engineer;



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638

TRAFFIC MANAGEMENT

Traffic Safety Officer

(vi) compile complete records of traffic accident scenes which are in any way connected with construction activities, and draw up accident reports (including amongst others photographs);



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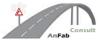


639

TRAFFIC MANAGEMENT

Traffic Safety Officer

(vii) attend to the training and performance of flagmen and all other personnel involved in the control of traffic;



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640

TRAFFIC MANAGEMENT



Traffic Safety Officer
(viii) attend to all complaints and claims from the public with regard to traffic safety and report on such matters to the engineer;



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TRAFFIC MANAGEMENT



Traffic Safety Officer
“The contractor shall submit a CV of the candidate to the engineer for approval before the candidate is appointed as the traffic safety officer.;

Make himself available to discuss road safety and traffic accommodation matters whenever required by the engineer.



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TRAFFIC MANAGEMENT



Traffic Safety Officer
(ii) Record on neat and dimensioned sketches and submit to the engineer the position and sign reference number, where applicable, of each sign, barricade, delineator, cone, amber flicker light, guardrail and permanent or temporary painted road marking feature.



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TRAFFIC MANAGEMENT



Traffic Safety Officer
The position of each shall be adequately referenced from the marker boards or other surveyed points on the site of the works.
These records shall also show the date and time at which the recorded traffic accommodation features are certified correct by the traffic safety officer, and shall be signed by the traffic safety officer before being submitted to the engineer.
The records shall similarly account for whatever changes are made in the field.



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TRAFFIC MANAGEMENT 

Traffic Safety Officer

Such changes shall record the position of flagmen and stop/go control men and their associated traffic accommodation equipment wherever they are used.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

(iii) Personally inspect the position and condition of each traffic accommodation feature on the whole site of works twice each day by 9h30 and by 16h30, to record all irregularities discovered and the remedial action taken, and to sign off as correct and submit to the engineer such record sheets by midday of the next working day.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

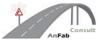
The traffic safety officer shall keep a duplicate book for this specific purpose. The traffic safety officer shall also submit with this report the daily labour returns of flagmen, stop/go and traffic signal control men employed.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

The inspections must at least take place before the commencement of peak traffic periods. The traffic safety officer shall keep a duplicate book for this specific purpose.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

The traffic safety officer shall also submit with this report the daily labour returns of flagmen, stop/go and traffic signal control men employed.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

(ix) The traffic safety officer shall be equipped with a cell phone and shall have a traffic safety vehicle and sufficient labour at his disposal 24 hours a day, including all prescribed non-working days, and shall not be utilised for other duties.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

He shall be directly answerable to the contractor's site agent. The traffic safety officer shall have his own vehicle to carry out inspections and at least one assistant to accompany him full time.

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TRAFFIC MANAGEMENT 

Traffic Safety Officer

Furthermore the traffic safety vehicle shall be a truck with a capacity of 3 ton and shall be equipped with a high visibility rear panel in accordance with the requirements of the SARTSM as well as a truck mounted attenuator –

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TRAFFIC MANAGEMENT



Traffic Safety Officer

.....ALPHA 70 K as supplied by Armco Road Safety Products, or similar approved complying with TL-2 criteria when tested in accordance with NCHRP 350 or N1 criteria when tested in accordance with EN 1317; certification of compliance to be provided by the contractor at the request of the engineer.



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TRAFFIC MANAGEMENT



Traffic Safety Officer

The attenuator shall be used when the vehicle is utilized to close traffic lanes or when attending to stationary or broken down vehicles or accident scenes.



2011-11



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TRAFFIC MANAGEMENT



Traffic Safety Officer

The words TRAFFIC CONTROL shall be written on a warning sign in highly legible letters, not less than 150 mm high, and the sign shall be mounted on both the traffic safety officer's vehicle and the traffic safety vehicle at least 1,5 m above ground level.



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TRAFFIC MANAGEMENT



Traffic Safety Officer

The proposed sign and letter dimensions shall be submitted to the engineer for his approval.



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TRAFFIC MANAGEMENT

Traffic Safety Officer

The vehicles shall also be equipped with an amber-coloured flashing light of the rotating parabolic reflector type with a minimum intensity of 100 W. The warning light shall be switched on at all times and the sign shall be displayed when the vehicle is used on site.



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TRAFFIC MANAGEMENT

Traffic Safety Officer

The traffic safety officer shall have a direct line of communication at all times with the police and traffic officers responsible for the area within limits of the contract.



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658

TRAFFIC MANAGEMENT

Traffic Safety Officer

The provision of the road safety vehicle, fuel, vehicle maintenance costs, driver, labourers and the cost of the cell phone shall be deemed to be included in the rates tendered for the contractor's establishment on site.



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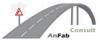


659

TRAFFIC MANAGEMENT

Traffic Safety Officer

(x) Ensure that all obstructions related to the contractor's activities be removed at nightfall or at the end of each work shift where applicable as instructed by the engineer and that the roads are safe for the travelling public.



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660



TRAFFIC MANAGEMENT

Traffic Safety Officer

(xi) The traffic safety officer shall, in addition to the duties listed in paragraph 1502(i), also be responsible to arrange for the removal of stationary or broken down vehicles off the roadway in conjunction with the routine maintenance contractor and/or traffic

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TRAFFIC MANAGEMENT

Traffic Safety Officer

.....authorities and implementing actions requested by the traffic authorities with regard to the work to be carried out and be responsible for the erection and maintenance of all traffic signs necessary for the accommodation of traffic.

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TRAFFIC MANAGEMENT

Traffic Safety Officer

(xii) In the event of an accident the traffic safety officer shall record in a written report the details of the accident, record the position of all temporary road signs, barricades, delineators, flagmen and any other devices used for traffic accommodation.

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TRAFFIC MANAGEMENT

Traffic Safety Officer

In addition the report shall include a neat dimensional sketch, photographs, identifiable permanent features, and any other relevant information.



Use kilometre markerboards on photos as references

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TRAFFIC MANAGEMENT

Traffic Safety Officer

(xiii) At least two separate traffic safety officers and teams shall be employed when construction is carried out simultaneously during the day and night."



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HIGH VISIBILITY TREATMENT CLOTHING TECHNIQUES



2013.03.15.11:09



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666

UNIFORM APPROVED TESTED SAFETY CONTROL DEVICES



2013.03.15.11:07

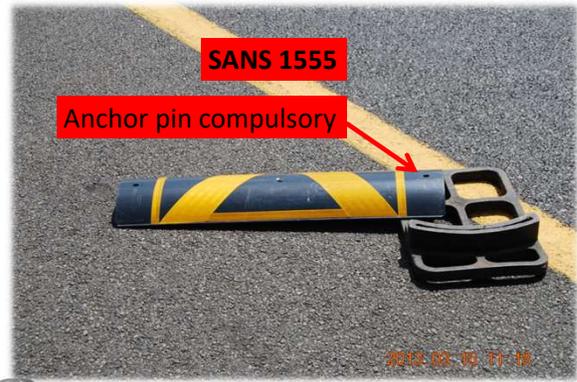


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667

UNIFORM APPROVED TESTED SAFETY CONTROL DEVICES



SANS 1555

Anchor pin compulsory

2013.03.15.11:10



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668

UNIFORM APPROVED TESTED SAFETY CONTROL DEVICES



SANS 51317
Steel connection plate compulsory

22.10.2012 10:18



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669

TRAFFIC MANAGEMENT

Road Traffic Signs



50 m

Check Detail



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Complete assignment questions 9 to 10



Please note the **slide number** with the question and forward to anfabconsult@gmail.com



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MODULE 11A ROAD TRAFFIC SIGNS MATERIAL, RETRO-REFLECTIVITY AND SANS SPECIFICATIONS



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South African Road Traffic Safety Management Association

www.sartsma.co.za

An Introduction to Reflective Sheeting for Road Traffic Signs



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Vision Statement

“The Association seeks to benefit Members through its representative role and to influence technological developments to improve standards in Road Traffic Safety engineering and operations”



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Association Constitution

Members agree, as a condition of membership, to:

- comply with all relevant National Standards and/or customer's specification in the manufacture and supply of their goods.
- maintain a high standard of design and manufacture of products and uphold the highest commercial and professional ethics of sales and advertising activities.
- freely submit to an investigation if it is alleged that they are in breach of the Rules and/or Obligations of Membership.



SARTSMA
SOUTH AFRICAN ROAD TRAFFIC SAFETY MANAGEMENT ASSOCIATION

Membership is hereby granted to

MEMBERSHIP IS GRANTED TO: NATIONAL MEMBER DATE



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SARTSMA
South African Road Traffic Safety Management Association

Effective Road Traffic Signs are an important factor when considering any Safe Road Infrastructure

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Ineffective / Non-Compliant Signs

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Ineffective / Non-Compliant Signs

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SARTSMA
South African Road Traffic Safety Management Association

Legal Reference

- Regulation 286A (important extracts)
 - Paragraph 2(a) – Road Traffic Signs shall comply with SANS 1519
 - Paragraph 4 – Reverse side of a sign board shall be grey, except for reverse side of a Stop Sign, which shall be white
 - Paragraph 8 – Reflective sheeting shall bear a permanent mark to identify the manufacturer and class

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SABS National Standards



- SANS 1519-1:2006 Road signs Part 1:Retro reflective sheeting material
 - Reflectivity (Class 1 / Class 3 / Class 4a & 4b)
 - Colour/ Impact / Scratch & Durability performance
- SANS 1519-2:2004 Road signs Part 2: Performance requirements for road signs
 - Coatings on finished sign (printing/vinyl/overlay etc.)
 - Structural requirements (substrate)
- SANS 1555:2011 Roadworks delineators
 - SANS 1519-1 Material Reference (Class 3 minimum)
 - Flexible sign blade performance requirements



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Other Reference Standards



- Committee of Transport Officials (COTO) Standard Specifications for Roads & Bridgeworks Revision
 - Section 11.6 (ex 5600) Road Signs
 - 1.4mm Mild Steel Substrate
 - 1.0mm Mild Steel Profiles
 - Z 275 Galvanised coating
 - SANS 1519-1 / 2 compliance
 - Sign Manufacturer shall be affiliated to recognised traffic sign manufacturer association (such as SARTSMA) or a permit holder under SANS 1519-2



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General Policy and Sign Design Principals are contained in the **Southern African Development Community (SADC) Road Traffic Signs Manual**



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Requirements of a Road Sign or Safety Device



- Fulfill a need
- Command attention
- Convey a clear, simple message
- Command the respect of road users
- Allow adequate time for the correct response from road users



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Road Traffic Signs need to be as effective at night as they are during the day



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Road Traffic Signs need to be as effective at night as they are during the day



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Sometimes this requirement is not always met

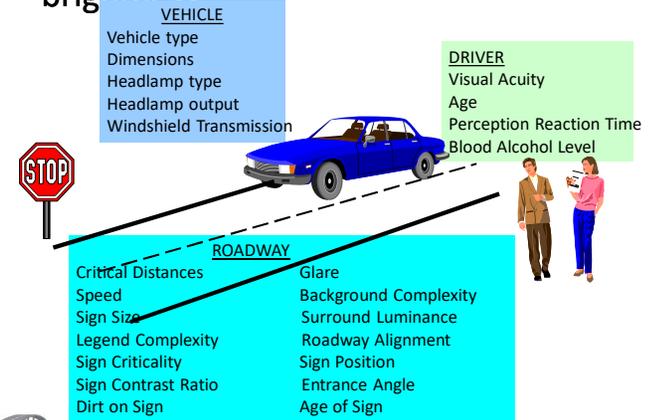
Daytime

Night time



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Many factors can determine sign brightness



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So How does Reflectivity Work?



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Reflectivity Training Agenda

- Types of Reflection
- Reflective Elements & Design used in Retro-Reflective sheeting
 - Glass Bead Technology
 - Enclosed Lens
 - Encapsulated Lens
 - Prismatic Technology
 - Truncated Cube Corners
 - Full Cube Corners
- Angles that effect Retro-Reflective Performance

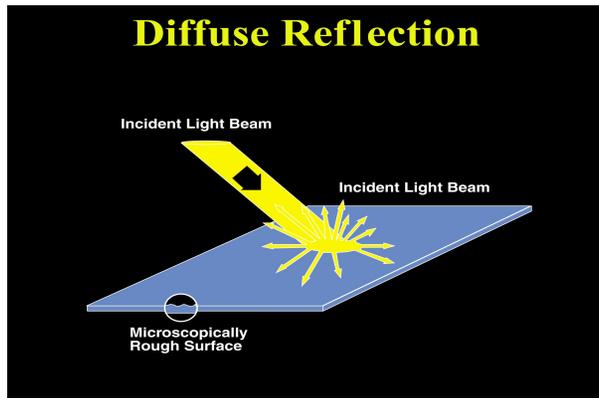


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Diffuse Reflection

Diffuse Reflection



Incident Light Beam

Incident Light Beam

Microscopically Rough Surface

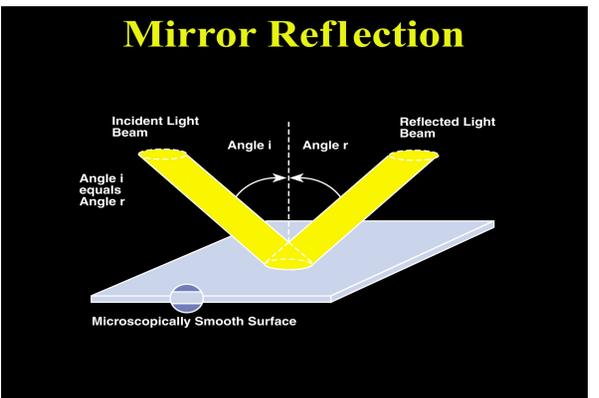


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Mirror Reflection

Mirror Reflection



Incident Light Beam

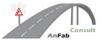
Reflected Light Beam

Angle i

Angle r

Angle i equals Angle r

Microscopically Smooth Surface



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Retroreflection

Retroreflection

The diagram illustrates the principle of retroreflection. An incident light beam strikes a surface and is reflected back towards the source. Two systems are shown: Glass Bead, where light enters a spherical bead, reflects off the back surface, and exits back out; and Cube Corner, where light enters a corner of a cube and reflects off all three internal surfaces before exiting back out.

Two Systems of Retroreflection

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Reflectivity Training Agenda

- Types of Reflection
- Technology used in Retro-Reflective sheeting
 - Glass Bead Technology
 - Enclosed Lens
 - Encapsulated Lens
 - Prismatic Technology
 - Truncated Cube Corners
 - Full Cube Corners
- Angles that effect Retro-Reflective Performance

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How Glass Bead Technology Works

In glass bead retroreflection, an incoming light beam bends as it passes through a glass bead and is reflected off of a mirrored surface behind the bead. The light then passes back through the bead, bending again as it leaves the bead, and returns toward the light source.

This type of retroreflection is less efficient compared to cube corners.

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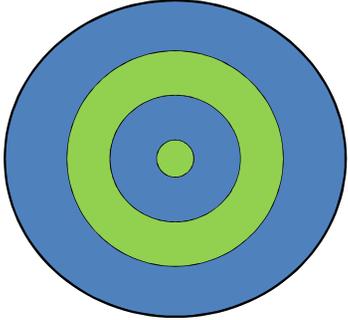
Glass Bead Technology

- Enclosed Lens Sheeting (Class 1)
 - Introduced 1940's
 - Narrow Ent. Angle
 - Efficiency – 8%
 - Durability – 7 years
- Encapsulated Lens Sheeting (Class 3)
 - Introduced 1970's
 - Wider Ent. Angle
 - Efficiency – 14%
 - Durability – 10 years

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Glass Bead Technology Limitation



Only 28% of Spherical Bead Surface Bends the light just right to cause Retro-reflection



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Reflective Sign Performance

- Glass Bead Optics Technology was at Optimum Performance
- New Technology Required to Improve the Reflective Performance
- Introduction of Prismatic Corner Cube Optics



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Reflectivity Training Agenda

- Types of Reflection
- Technology used in Retro-Reflective sheeting
 - Glass Bead Technology
 - Enclosed Lens
 - Encapsulated Lens
 - Prismatic Technology
 - Truncated Cube Corners
 - Full Cube Corners
- Angles that effect Retro-Reflective Performance

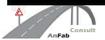
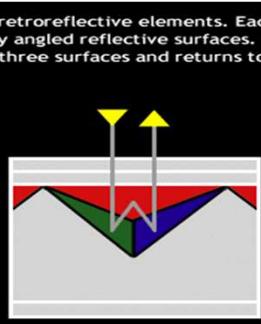


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How Prismatic Technology Works

Cube corners are retroreflective elements. Each cube corner has three carefully angled reflective surfaces. Incoming light bounces off of all three surfaces and returns to its source.

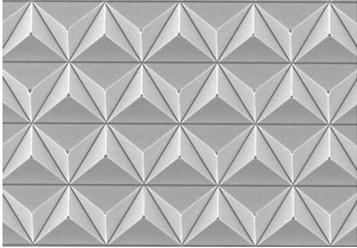


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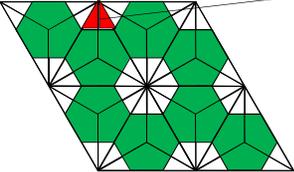
Prismatic Technology

– Truncated Cube Optics



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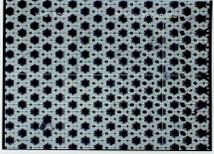
Truncated Cube Optic Limitation



Light entering the corner of the cube only reflects twice

This light is **not** retroreflected

65% of the truncated cube surface is retroreflective

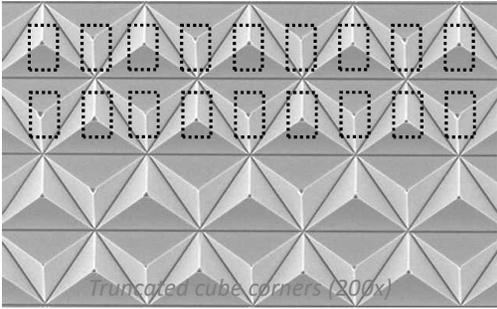


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Technology Improvement

Full Cube Optics

Making



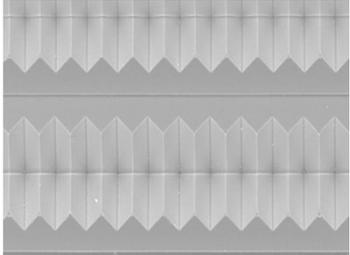
Truncated cube corners (200x)



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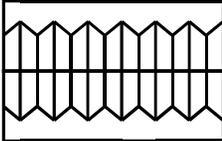
Prismatic Technology

- Full Cube Optics

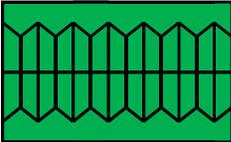


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Full Cube Optics



Still uses mirror reflection



There are no dead corners

100% of full cube surface is retro-reflective

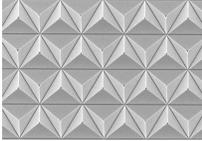


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Summary - Prismatic Technology

- Truncated Cube Optics (Class 1, Class 3, Class 4a)
 - Introduced
 - Class 4 1987
 - Class 3 2003
 - Class 1 2009
 - Durability – 7 to 10 yrs
 - Efficiency – 32%(4X EGB)



Truncated



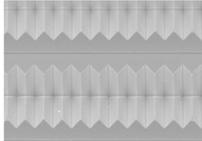
VS

Full-Cube Prisms



100% efficient

- Full Cube Optics (Class 4a + 4b)
 - Introduced 2005
 - Durability – 10 to 12 yrs
 - Efficiency – 58%(2X Truncated Cube)



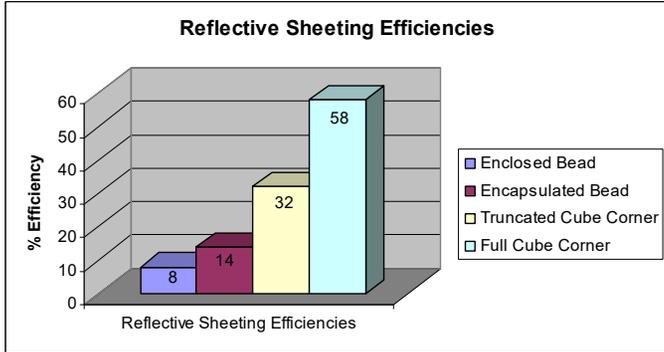


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Summary - Reflective Sheeting Efficiency

Reflective Sheeting Efficiencies



- Enclosed Bead
- Encapsulated Bead
- Truncated Cube Corner
- Full Cube Corner



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Reflectivity Training Agenda

- 3 Types of Reflection
- Reflective Elements used in Retro-Reflective sheeting
 - Beads
 - Truncated Cube Corners
 - Full Cube Corners
- Angles that effect Retro-Reflective Performance



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Reflectivity - Units of Measurement

Intensity of a Light Source = Candela cd

Illuminance: Light falling on a unit area lux

Luminance: measured brightness of the reflected light from a surface
Intensity / unit area cd / m²

Coefficient of Retroreflection: R_A
Luminance / Illuminance cd / lux / m²

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TRAFFIC SAFETY OFFICER TRAINING

Road Traffic Signs Manufacturing and Display

Reflected Light in Divergence Cone

Light Source Direction

Cone of Returned Light

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Observation Angle

- The angle between the line formed by a headlight beam striking a sign surface and the line formed by the retro-reflected light beam at the driver's eye
- This angle is usually small (e.g. 0,2 / 0,33 degrees)

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Observation Angle

- Observation angle is a critical factor when determining how bright a sign appears
- As the observation angle increases the sign will appear less bright

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Entrance Angle

- The angle between the line formed by a light beam striking the sign surface at some point and a line perpendicular to the sign surface at that same point.

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Entrance Angle

- The position of the vehicle in relation to the sign will determine the Entrance Angle
- Larger angle (e.g. 5deg/30deg/60deg etc)

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Entrance Angle

- The wider the Entrance Angle becomes will reduce the reflective performance (brightness) of the sign

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Angularity Factors to Consider

- Where is the vehicle on the roadway
- What type of vehicle is it (e.g. truck or car)
- What is the position of the reflective sign in relation to the roadway
- Where is the reflective sign in relation to the vehicle

Reflective Sheeting Type	% Efficiency
Enclosed Bead	8
Encapsulated Bead	14
Truncated Cube Corner	32
Full Cube Corner	58

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Research Model for Drivers Using Signs

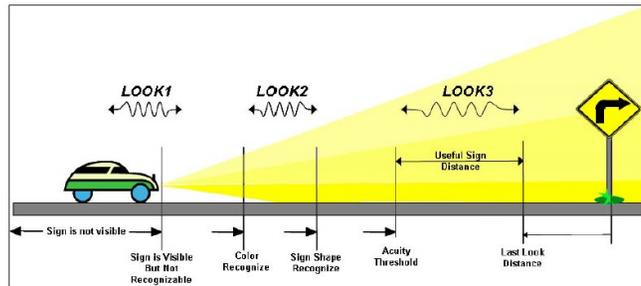


Figure 7. A Three-Look Model.

Paulus, S.C., "A Retroreflective Sheeting Selection Technique for Nighttime Drivers' Needs, Texas A&M Masters Thesis, May 2010



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Recommended Luminance Levels

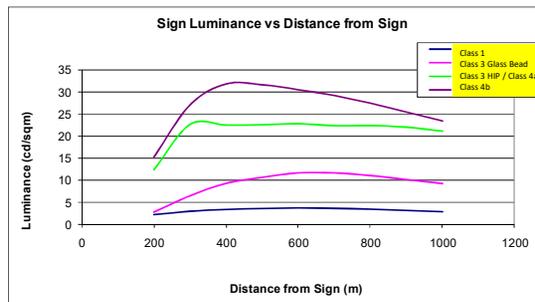
- 2.5 cd/m²
 - Replacement Luminance
- 10 cd/m²
 - Adequate Luminance
- 30 cd/m²
 - Desirable Luminance

Paulus, S.C., "A Retroreflective Sheeting Selection Technique for Nighttime Drivers' Needs, Texas A&M Masters Thesis, May 2010



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Luminance Model – Driver's View



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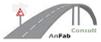
Sheeting Selection Recommendations

- Class 4 Full Cube Prismatic
 - Provides Desired Luminance More Often
 - Provides Adequate Luminance for a Longer Life
 - Provides Highest Luminance in Complex Applications
- Class 3 Truncated Cube / High Intensity Prismatic:
 - Provides Adequate Luminance in Most Standard Applications.
- Class 3 Glass Bead
 - Provides Adequate Luminance in Limited Standard Applications
- Class 1 Glass Bead
 - Provides Limited Luminance in Most Applications



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Why Brighter Signs are Required



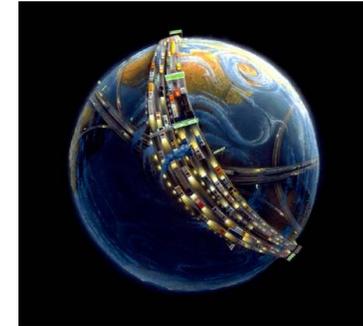
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Signing Considerations & Trends



- Aging Population
- *Growing Truck Fleet*
- *VOA Headlamps*



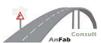
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Older Drivers



- Aging produces a natural decline in sensory, cognitive and motor (physical) functioning
- Studies show that required light need doubles every 13 years after the age of 20
- Studies have determined that easier-to-see-and-read signs can help older drivers retain their freedom of mobility and reduce the likelihood of being involved in traffic accidents



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Older Drivers



* Night Lights - Lighting the way (Answering Your Questions about Traffic Sign Reflectivity), U.S. Department of Transportation, Federal Highway Administration

724

Signing Considerations & Trends

- Aging Population
- *Growing Truck Fleet*
- *VOA Headlamps*



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Larger Observation Angle for Trucks



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Larger Observation Angle for Truck Drivers

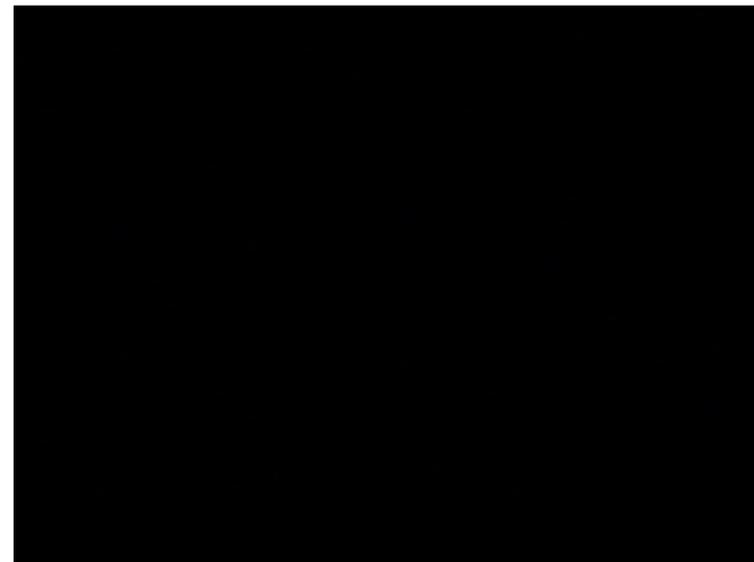
Camera 535mm above Headlight

Camera 1270mm above Headlight



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Signing Considerations & Trends



- Aging Population
- *Growing Truck Fleet*
- *VOA Headlamps*





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Visually Optically Aimable Headlights



VOA Headlights





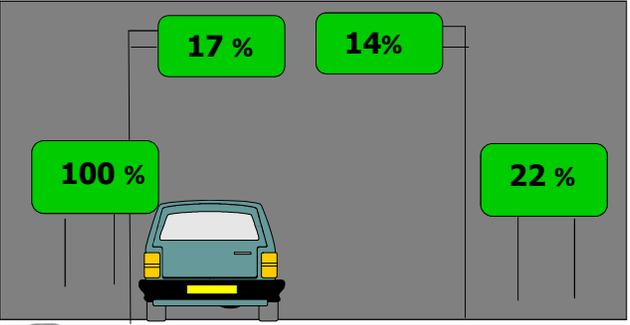
AnFab Consult (PTY) Ltd

730

Sign Design Principles



The amount of light available to the traffic sign varies depending on the position of the sign and the vehicle.





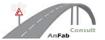
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Summary - Reflective Sheeting Performance



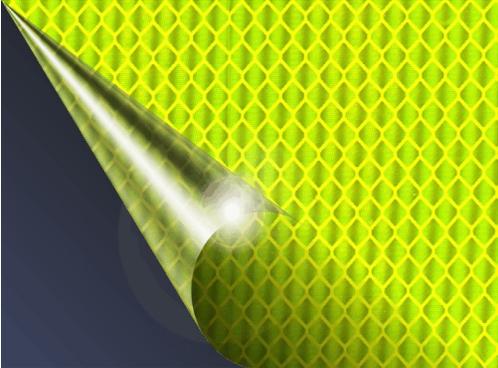
- Why Upgrade to more Efficient Retro-Reflective Technology?
 - Changing Driving Infrastructure
 - Older drivers
 - Larger vehicles
 - Changing headlamp pattern
 - Increasing urbanization
- Benefits of Higher Luminance
 - Increased Efficiency provides
 - Increased conspicuity
 - Increased legibility
 - Improved information acquisition time
 - Increase in safety



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Fluorescent Sheeting Technology



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Fluorescent Sheeting Technology



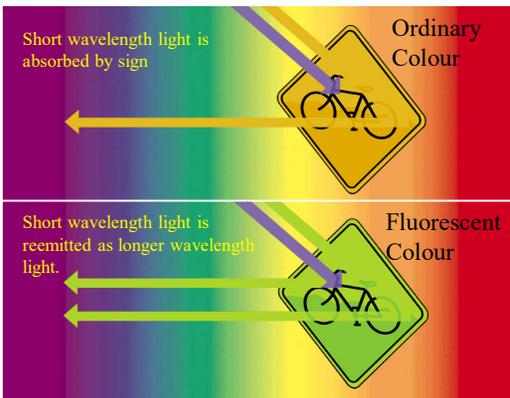
- Fluorescence refers to the sheeting **COLOUR performance**
- Provides improved daytime colour and low light performance of signs (e.g. dusk, dawn, misty conditions)
- Fluorescent sheeting is available in a range of colours (e.g. 519-1)



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How Fluorescence Works



Short wavelength light is absorbed by sign

Ordinary Colour

Short wavelength light is re-emitted as longer wavelength light.

Fluorescent Colour

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Fluorescent Sign Performance (Daylight)



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Fluorescent Sign Performance (Daylight)



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Cost Effective Road Traffic Signs

Rank	Improvement Description	Benefit/Cost Ratio
1	Illumination	22.8
2	Upgrade Median Barrier	22.6
3	Traffic Signs	22.4
4	Relocated/Breakaway Utility Poles	17.7
5	Remove Obstacles	10.7
6	New Traffic Signals	8.5
7	Impact Attenuators	8.0
8	New Median Barrier	7.6
9	Upgrade Guardrail	7.5
10	Upgrade Traffic Signals	7.4
11	Upgrade Bridge Rail	6.9
12	Improve Sight Distance	6.1
13	Median for Traffic Separation	6.1
14	Groove Pavement for Skid	5.8
15	Improve Minor Structure	5.3
16	Turning Lanes and Channelization	4.5
17	New RR Crossing Gates	3.4
18	New RR Crossing Flashing Lights	3.1
19	Pavement Markings and Delineation	3.1
20	New RR Crossing Lights and Gates	2.9



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AN FAB/TA TABLE 11 - HIGHWAY SAFETY IMPROVEMENTS WITH THE HIGHEST BENEFIT-COST RATIOS 1974 - 1995

738

Cost Effective Road Traffic Signs



- Components of a Road Traffic Sign
 - Reflective Sheeting (SANS 1519-1 Class1, 3, 4)
 - Sign Backing
 - Sign Manufacturing Labour costs
 - Sign Pole
 - Transport & Installation costs



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Key Points to Remember



- A developed roadway infrastructure is needed for road safety -- Effective Traffic Signs are a key part of this!
- High brightness signs (day and night) are used to improve roadway safety – They are cost effective!
- The distances at which higher brightness is provided is important – Critical Distance
- Truck Drivers and Older Drivers need signs which provide more brightness (especially at high observation angles)
- Daytime conspicuity of traffic signs can be increased through the use of fluorescent reflective sheeting.
- Nighttime brightness of traffic signs can be increased through the use of more efficient sheeting technology.



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TRAFFIC MANAGEMENT

Road Traffic Signs



CONSTRUCTION WORK ZONES AND MAINTENANCE OPERATIONS

40% More reaction time is needed when situations are not anticipated..



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Class IV Fluorescent Yellow Retro-reflective Sheeting



A photograph of a road construction site. In the foreground, there are several yellow and black chevron-shaped reflective markers. A white van is driving on the road in the background. To the left, there are two circular yellow signs with black arrows pointing downwards. A signpost also has a rectangular sign that says 'CAUTION CONSTRUCTION WORK'. The road is bordered by a concrete curb and a grassy area.



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Road Traffic Signs



A photograph of a severely damaged black car that has rolled over onto its side. The car is crushed and mangled, with its front end completely destroyed. It is parked on a paved area next to a road. Other cars are visible in the background.

And I ONLY had ONE drink !!!



747



A dashcam view of a multi-lane highway. The road is clear with a few vehicles in the distance. There are overhead signs and streetlights. The sky is overcast.

UNREGISTERED :)
downloadhelper.net

More at vidiload.com

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Лефортово-тоннель смерти

Accidents can be prevented! **749**

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TRAFFIC MANAGEMENT

Road Traffic Signs

W201

TW201

References
V1 3.3.1
V4 3.3.1

Traffic Circle

Pre-Warning

R2.2

References
V1 2.2.8
V4 2.2.7

Yield at Mini Circle

Regulatory Control

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Road Traffic Signs

W327

TW327

References
V1 3.4.12
V4 3.4.27

One Vehicle Width Structure

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The Effectiveness of Road traffic Signs



1. The effectiveness of road traffic signs depends largely on road user interpretation of signs. It is therefore necessary that a road user should see these signs. The message on a sign must be readable or the symbol clearly understandable and the road user must perceive the message to be true or appropriate under that particular condition.



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The Effectiveness of Road traffic Signs



2. Significant factors in determining the effectiveness of road traffic signs are an assessment of the uniformity of the display of signs and an assessment of the performance of the signs based on their condition.



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The Effectiveness of Road traffic Signs



3. Greater standardization of the display of signs should reduce response time and limit the risk of confusion that drivers may experience when driving in an unfamiliar area. Uniformity of design should be pursued to improve recognition and comprehension and will help convey the message to drivers more clearly.



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The Effectiveness of Road traffic Signs



Uniformity in application promotes road user's observance and avoids excessive or unwanted use of road traffic signs. Uniformity of location will reduce the possibility of a driver not seeing a particular sign.



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The Effectiveness of Road traffic Signs

4. The condition of a sign may be determined objectively by measuring the contrast and retro-reflectivity of the sign with standardization equipment, or subjectively by assessing the night-time visibility of the sign under bright and dim headlight illumination and its daytime contrast to background clutter



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TRAFFIC MANAGEMENT

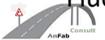
Road Traffic Signs Colours

Fluorescent Colours for Better Night-time Visibility



Fluorescent **YELLOW**

Fluorescent **Green**



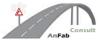
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MODULE 11B

ROAD TRAFFIC MARKING MATERIAL, REFLECTIVITY AND SANS SPECIFICATIONS



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TRAFFIC MANAGEMENT 

SANS 731 - Road Traffic Marking paint

The objectives to be aimed for in providing road marking are:

- ◆ (a) road safety
- ◆ (b) conformity of practice
- ◆ (c) good traffic management leading to optimum road capacity
- ◆ (d) provision of the correct marking first time Road Marking Application

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TRAFFIC MANAGEMENT 

Road Traffic Markings

THE FUNCTION OF ROAD MARKING

- ◆ To improve traffic flow
- ◆ To improve traffic safety
- ◆ To improve driver comfort

BY

- ◆ Providing visual guidance
- ◆ Directional and lateral guidance
- ◆ Regulating traffic
- ◆ Warning traffic

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TRAFFIC MANAGEMENT 

Road Traffic Marking Material

Road Marking Paint

Hot Melt Thermoplastics

Cold Plastic

Road Studs

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Questions ?

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MODULE 12 FLAG PROCEDURES AND TEMPORARY TRAFFIC SIGNALS



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FLAG TECHNIQUES COURSE OBJECTIVES

- ✓ to train the flag person the correct procedures to warn, slow down, stop traffic and traffic to proceed
- ✓ to provide the flagman the skills to determine a safe location on site with adequate lateral buffer zone
- ✓ to provide the flag person with the knowledge to determine realistic vehicle queue lengths at STOP/GO control flagman stations
- ✓ to provide the flagman with the knowledge to determine the flagman position prior to the last vehicle in the queue length at the STOP/GO control flagman station



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FLAG TECHNIQUES COURSE OBJECTIVES

- ✓ to establish a standard pattern of the traffic control devices prior to the flagman stations and flag man locations
- ✓ to generate a high level of driver respect for the flag person
- ✓ to keep the roadway capacity at the flagman stations and traffic flow at the highest possible levels
- ✓ to keep the roadwork related accidents levels at a minimum
- ✓ to provide the driver of the vehicle with a clear simple standard flag procedure and easy to understand and reaction time



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THE RISK TO ROAD SAFETY AT CONSTRUCTION ZONES

Some work zones might have a speed-monitoring device to alert motorists of their speed prior to entering the work zone.

Even though they are marked and signposted as areas where motorists must slow down and drive with extra caution, many drivers speed up to get through the construction area as quickly as possible.

Construction or maintenance zones will have roadway signs in advance to warn motorists that road work is being done.

Active work zones are designated as such to notify motorists when they enter and leave the work zone.



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THE RISK TO ROAD SAFETY AT CONSTRUCTION ZONES

Road construction zones present a deadly hazard for workers, motorists, and pedestrians. This hazard is brought about by high speed limits, impatient drivers, and widespread traffic congestion.

To this we can add heat, driving stress, and long stretches of highway under construction - creating a recipe for extreme driving hazards for motorists and road workers alike.

The construction zones are also called "Cone Zones" - those portions of the highways marked by cones, barrels, and signs where road construction is taking place.



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THE RISK TO ROAD SAFETY AT CONSTRUCTION ZONES

The main causes of deaths and injuries at construction zones are:

Speeding traffic - the number one cause of death and injury in highway construction work zones.

Inadequate sign posting and lighting and drivers failing to notice road workers.

Drivers do not pay attention to work zone signs or flaggers indicating they should slow down or come to a stop



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THE RISK TO ROAD SAFETY AT CONSTRUCTION ZONES

Drivers are distracted by cellular phone calls, conversations, and activities at roadside and are not merging properly.

Drivers are driving right up to the last second and then try to force themselves in - if the other driver doesn't let them get in, they enter the work zones and endanger the lives of workers.



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THE RISK TO ROAD SAFETY AT CONSTRUCTION ZONES

Road construction zones present a deadly hazard for workers, motorists, and pedestrians. This hazard is brought about by high speed limits, impatient drivers, and widespread traffic congestion.

To this we can add heat, driving stress, and long stretches of highway under construction - creating a recipe for extreme driving hazards for motorists and road workers alike.

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FLAGGER ROLES AND RESPONSIBILITIES

[Flaggers](#) are the people on construction sites who control traffic. They are the men and women along roads and highways who help traffic keep flowing through a construction zone, despite a shutdown of lanes. Flaggers often work in teams, with each person controlling the flow of traffic in a certain direction.

Flaggers need to stand on their feet for long periods of time and understand how to control traffic to the best of their ability.



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FLAGGER ROLES AND RESPONSIBILITIES

Flaggers may put out traffic cones and use signs and hand signals to communicate with motorists. Flaggers need to be confident enough to stand in front of cars, sometimes in blazing heat, sometimes in the middle of the night, to make sure that traffic is no more snarled than it has to be. And if motorists do not obey the signs, flaggers may record license plates to report to the police.



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FLAGGING PROCEDURES IN COMPLIANCE WITH LEGISLATION



Flagging procedures are prescribed in the National Road Traffic Act and must be standardised so that the travelling public throughout South Africa can expect to be given the same signals by flaggers controlling traffic.



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FLAGGING PROCEDURES IN COMPLIANCE WITH LEGISLATION

The purpose of flagging procedures and STOP/GO control is to regulate and control traffic flow, and to warn drivers of a potential danger ahead, Regulation and control by flaggers will normally be under taken to allow access by construction vehicles or to operate one-way traffic flow.

Such interruptions in an already restricted traffic flow should be kept to a minimum. Drivers will become irritated by delays in excess of two minutes.



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FLAGGING PROCEDURES IN COMPLIANCE WITH LEGISLATION

Impatient drivers will be inclined to disobey traffic control measures and speed limits at roadworks, to the risk of site staff and themselves. Flagging procedures can be very effective in drawing attention to hazardous features of a roadworks site because of the flag movement involved.



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TYPICAL STOP/GO LAYOUT



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FLAGGER TRAINING

Careful Selection for Training

- ✓ Flagger – Good Eyesight and Hearing
 - ✓ Mentally Alert
- ✓ Only talk on cell phone **in case of emergency**
 - ✓ No earphones
- ✓ **Do not stand** in the line of the traffic



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PERSONAL PROTECTIVE EQUIPMENT (PPE)

Safety shoes



Orange Distinctive High Visibility Clothing



Fluorescent Coloured Helmut



Safety Goggles





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DISTINCTIVE CLOTHING



2016.02.15.10:00

Level 1 Clothing - Minimum requirement. Clothing is appropriate for **daytime use** only – the possible need to supplement the above articles of clothing with fluorescent harnesses or vests must be considered – if a work function is likely to be carry over into darkness then the work unit must carry adequate supplies of removable retro-reflective vests or harnesses. Distinctive clothing should be worn by flaggers on duty that public will recognise them and respect indications given by them. They should be issued with fluorescent-coloured helmets and safety jackets. Bright fluorescent red-orange, orange or yellow material.

Fluorescent/retro-reflective harness to be used over overalls during poor visibility and night conditions.



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DISTINCTIVE CLOTHING



Level 2 Clothing - Night or reduced visibility
Bright fluorescent red-orange, or yellow material with fixed retro-reflective tape. Clothing is appropriate for use at night (or at other times of reduced visibility) at roadworks sites where vehicle **speed are under 50km/h** – level 2 clothing should incorporate a visible minimum of 0,50m² of background material 0,13m² of Class 3 retro-reflective material – the retro-reflective materials should be in bands of not less than 50mm width – for larger sizes of clothing to comfort to these requirements the retro-reflective material banns will need to exceed 50mm (i.e. for a 107 mm chest the bands will need to be 62mm wide).

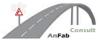


ALT3



ALT2

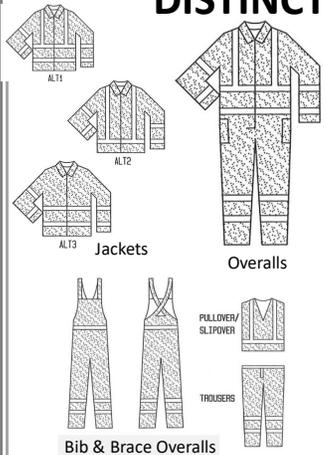
WAISTCOAT (or PULLOVER)



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DISTINCTIVE CLOTHING



Level 3 Clothing - Night or reduced visibility

Bright fluorescent red-orange, or yellow material with fixed retro-reflective tape. Clothing is appropriate for use at night (or at other times of reduced visibility) at roadworks sites where vehicle speeds are over 50km/h – level 3 clothing should incorporate a visible minimum of 0,80m² of background material 0,13m² of Class 3 retro-reflective material – the retro-reflective materials should be in bands of not less than 50mm width – for larger sizes of clothing to comfort to these requirements the retro-reflective material bands will need to exceed 50mm (i.e. for a 107 mm chest the bands will need to be 62mm wide).

785

GENERAL FLAG PROCEDURES: FLAG WARNING – SLOW MOVING VEHICLES



Walk 300 paces in front of moving vehicle while raising and lowering flag continuously from side of leg to shoulder height. - At sharp curves or when visibility of vehicles is reduced stand still, facing and visible to oncoming traffic, and continue to raise and lower flag to warn traffic – use flag in arm nearest to

786

TRANSITION AREA

Flagger Control



Flag Control.
Less than 200 vehicles per hour,
See 100m flag to flag

Daytime ONLY
40

R1.5A & R1.5B
STOP/GO. Over 200 vehicles per hour – more than 100m apart -two way radio

787

TRANSITION AREA

Night time One Way Traffic Control



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Traffic Signals

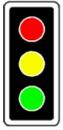
788

TRAFFIC MANAGEMENT

Night Time Traffic Control



Temporary **Traffic Signals S1** should be used if one lane one-way traffic is required to operated at **night**.



S1

Road Traffic Sign (mm) Type	Function	Min. External Dimensions			
		60	Speed Limit (km/h) 80	100	120
Road Signs					
Traffic Signals					
Circular Disc Aspect	Signal Indications (including symbols)	210	210	210	210

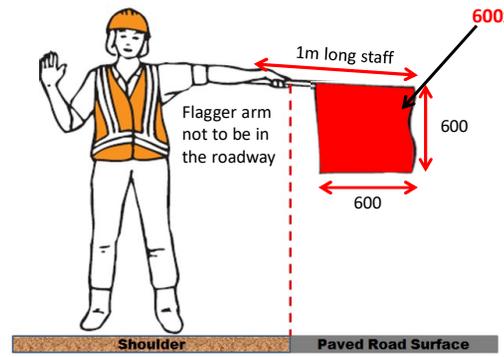


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FLAG SPECIFICATIONS







Green Flags Shall **NOT** be used at work zones



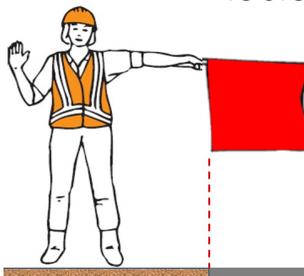
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GENERAL FLAG PROCEDURES:

TRANSITION AREA





TO STOP TRAFFIC

- 1 Stand facing traffic looking directly at the driver
- 2 Flag in left hand
- 3 Move flag up and down from side of leg to shoulder until vehicle is 100 paces away
- 4 Looking at driver directly
- 5 Hold flag at shoulder height with outstretched arm
- 6 Raise right hand with palm to face traffic –

Flagger Control.
Less than 200 vehicles per hour and be able to see other flagger max 100m apart



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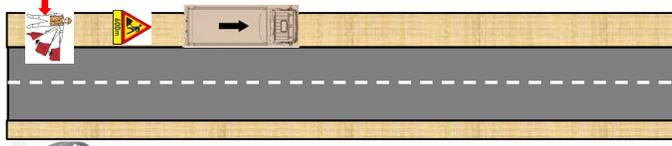
791

FLAGGER POSITION

Warning Traffic - Step 1



Stand facing traffic looking directly at the driver – flag in left hand – move flag up and down from side of leg to shoulder height continuously – for added effect move right arm up and down as well.





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FLAGGER POSITION

Warning Traffic – Step 2
Stand facing traffic looking directly at the driver – flag in left hand – move flag up and down from side of leg to shoulder height continuously – for added effect move right arm up and down as well.

Move forward

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FLAGGER POSITION

Warning Traffic – Step 3
Stand facing traffic looking directly at the driver – flag in left hand – move flag up and down from side of leg to shoulder height continuously – for added effect move right arm up and down as well.

Move forward

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FLAGGER POSITION

Warning Traffic – Step 4
Stand facing traffic looking directly at the driver – flag in left hand – move flag up and down from side of leg to shoulder height continuously – for added effect move right arm up and down as well.

Move forward

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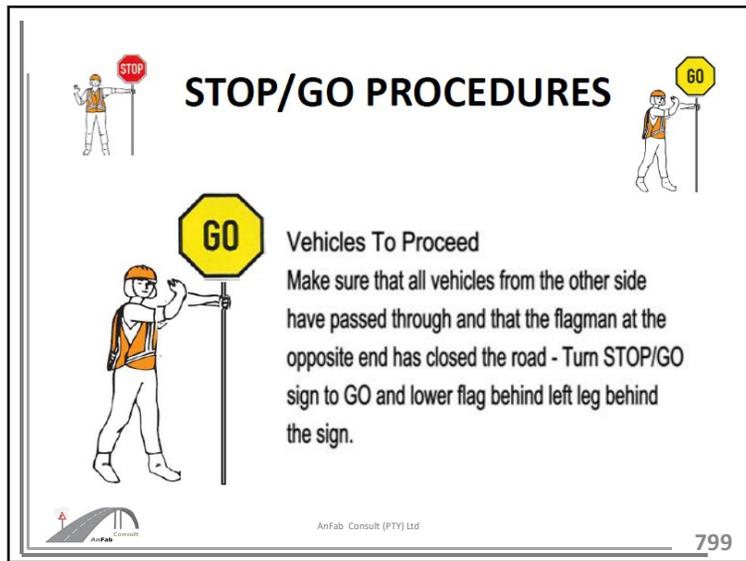
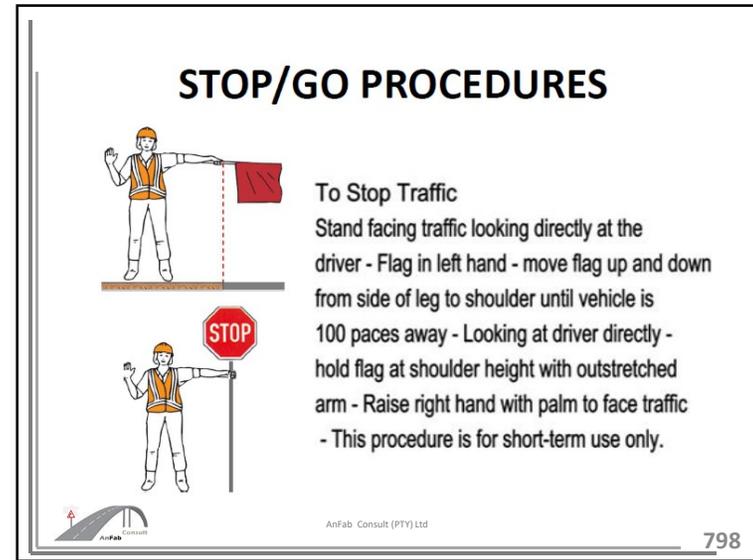
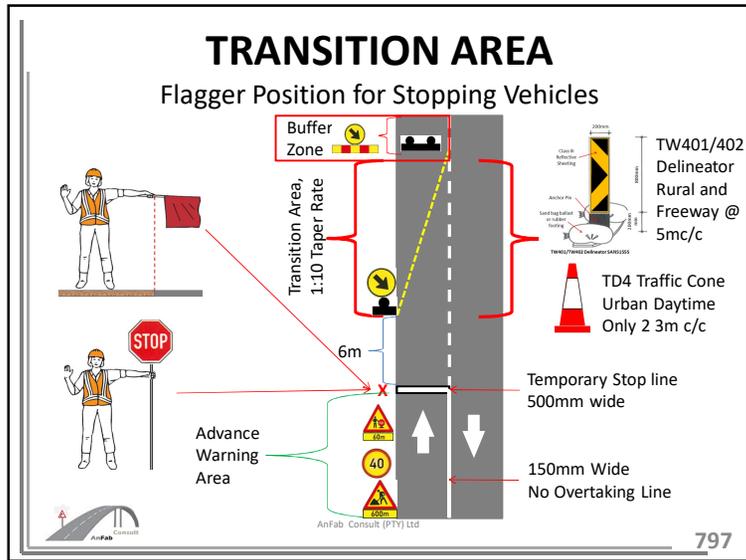
FLAGGER POSITION

Control Traffic – Step 5
Flag control or STOP/GO sign control

Move forward

Buffer Zone

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FLAGGER TRAINING AND SAFETY



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FLAGGER TRAINING AND SAFETY



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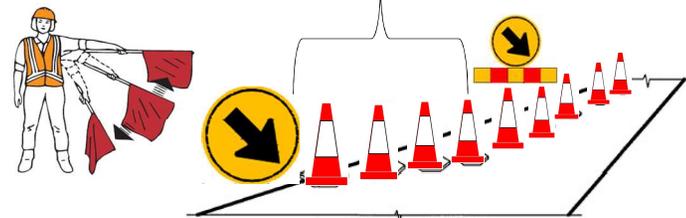
FLAGGER TRAINING AND SAFETY



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Transition Area –
Taper 1:10
TD4 Traffic Cone
Spacing 3m c/c

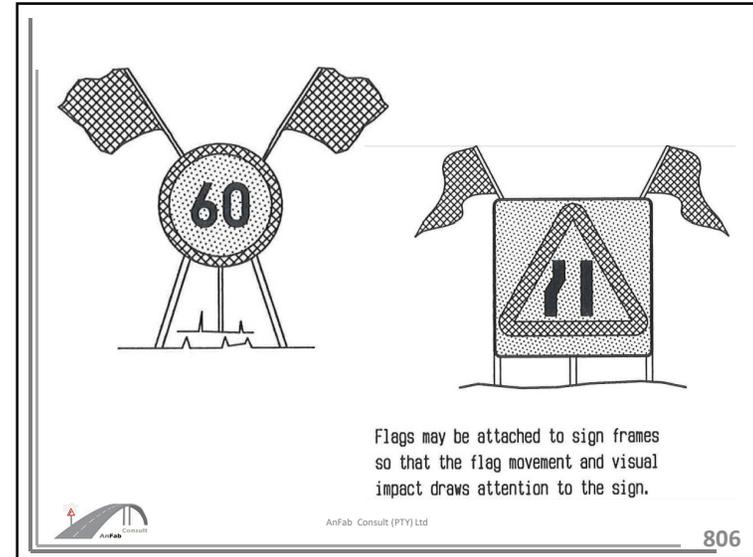
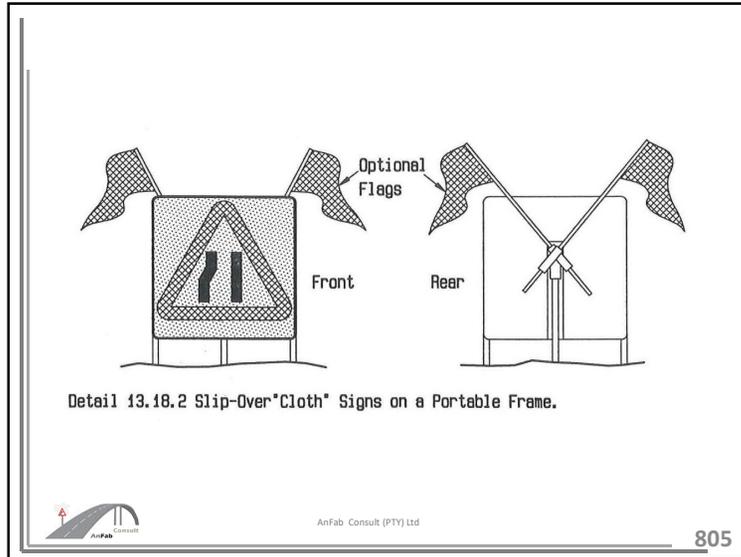


Flagger
Position



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SAFETY OF WORKERS AND FLAGGERS IN AREAS OF ROAD CONSTRUCTION

- Workers in areas of road construction are worthy of protection. On the Arrive Alive website we find information on safe driving in areas of construction activity.
- The most important safety precaution for drivers is to obey the Rules of the Road, road signage and the directions from flagmen.
 - This will allow for safe sharing of the roads by normal road traffic, construction vehicles as well as workers in the area.
 - It is important for construction companies to ensure that those employees regulating the flow of traffic are doing so with the necessary training and safety awareness

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SAFETY OF WORKERS AND FLAGGERS IN AREAS OF ROAD CONSTRUCTION

incorrect positioning of the flagmen:

Who is ultimately responsible for ensuring the safety of the flagmen?
The contractor / employer of the flagman and so the direct supervisor and appointed manager for that section of work.

Are there specific regulations applying to how these flagmen should operate?
There are guidelines stated in Chapter 13 Volume 2 of the "South African Road Traffic Signs Manual"

Are they provided with any training to gain an understanding of what should and should not be done? Is this something you would recommend?
Training should be given required under both OHS Act Section 8 and Construction Regulation 7. I believe SARF "South African Road Federation" has formal training available or can recommend.

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SAFETY OF WORKERS AND FLAGGERS IN AREAS OF ROAD CONSTRUCTION

What is the correct positioning of the flagmen at a stop-go – and are there different workers with different duties?

There are clear set up guidelines in the SARTSM Chapter 2 Volume 13 for Roadworks Signing.

Can specific engineering or design recommendations enhance the safety of these workers at the stop-and go- - and what would these be?

Yes barriers can be used and/ or temporary traffic lights, this requires special permissions, permits etc.

Are there specific guidance either from the labour law side or a safety side as to work hours and how long their shifts should be?

No specific requirements in the Construction Regulations except that a risk assessment should be performed and if this were done properly then restrictions could be identified.



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TRAFFIC MANAGEMENT

Traffic Control



Flagmen stations should be located far enough from the roadworks to ensure that drivers have **sufficient distance to slow down before entering the work-site** but not so far away that the drivers will tend to increase speed before passing the work-site



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TRAFFIC MANAGEMENT

Traffic Control



The flagmen should stand either on the shoulder adjacent to the lane of traffic they are controlling or in the barricaded lane.



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CONCLUSION

Many motorists view road construction workers as an inconvenience, but they should rather look at them as a service. Road and maintenance workers are doing their best to minimize motorist inconvenience. No matter how it seems to the motorist, road workers **and flaggers** are striving to improve traffic safety conditions, and it is up to the driver to be alert, aware, and responsive



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Complete assignment questions 11 to 12

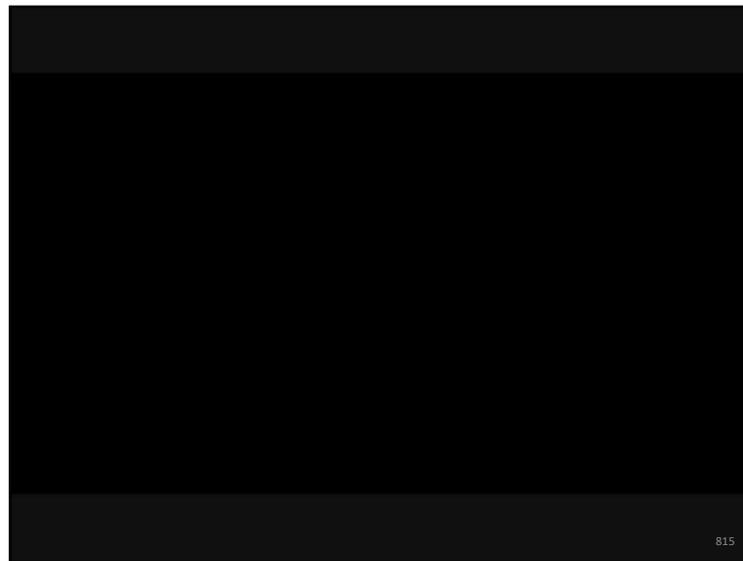


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MODULE 13 ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS



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817



ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS

Roads should be designed and constructed to provide for the safe, convenient, effective and efficient movement of people and goods. However, standards adopted for the design of roads are influenced by terrain, traffic volumes, vehicle types and travel speeds, and must consider the costs the community is prepared to pay.



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS

Community costs include initial construction costs, ongoing maintenance costs, user operating costs and costs associated with road crashes. The significant costs associated with crashes are borne by both individual road users and the community as a whole.



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS

It is expected that drivers travelling at speeds appropriate to the conditions and driving with due care will remain on the road and reach their destinations safely. Inevitably there are occasions when vehicles leave the roadway due to factors that may include:



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS



- driver fatigue
- driver error or inattention
- excessive speed
- influence of alcohol or drugs
- road conditions
- mechanical fault
- Weather conditions
- unexpected events



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS



When drivers lose control and leave the road there is a risk of injury and damage due to collisions with unyielding objects (e.g. trees and poles) or non-traversable features (e.g. drains, berms or rough surfaces) that may cause the vehicle to vault (i.e. become airborne), rollover over or stop abruptly.



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS



The process includes an assessment of risk and economic analysis to assess the benefit of barrier installations compared with other alternatives.

Notwithstanding that there are physical, environmental and economic constraints, the preferred treatments (in order of preference) of roadside hazards are:



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS



- Removal
- Relocation to reduce the chance of them being hit
- Redesign so that they can be safely traversed
- Redesign to be frangible or break away, or to otherwise reduce severity
- Shield with a safety barrier or crash attenuator
- Delineate the hazard if the above alternatives are not appropriate



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ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS

The performance goal of a longitudinal safety barrier, end treatment or crash attenuator (i.e. terminal) is that when under impact by the design vehicle it will:

1. Safely contain and redirect the vehicle away from the hazardous area
2. Decelerate the vehicle to a stop over a relatively short distance
3. Allow a controlled penetration of the barrier



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ROAD RESTRAINT SYSTEMS

Barrier containment level

SANS 51317-2:2009
Edition 1

EN 1317-2:1998
Edition 1



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ROAD RESTRAINT SYSTEMS



NJ barriers

F shape barriers

2013.11.08 08:52

Rigid Barriers



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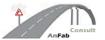
ROAD RESTRAINT SYSTEMS



W- Section guardrail on creosoted timber posts with terminal end treatment

2013.11.08 10:06

Semi - Rigid Barriers



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ROAD RESTRAINT SYSTEMS



Wire Rope Barriers

2013.11.08 10:07

Flexible Barriers
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ROAD RESTRAINT SYSTEMS



Wire Rope Barrier Maintenance is Crucial

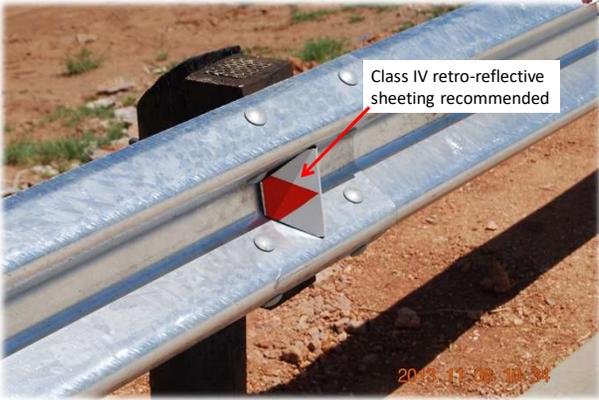
2010.07.29 11:08

Flexible Barriers
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Wire Rope Barriers

830

ROAD RESTRAINT SYSTEMS



Class IV retro-reflective sheeting recommended

2013.11.08 10:07

W-Section Guardrail Reflectors
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ROAD RESTRAINT SYSTEMS



2012.09.05 10:52

Semi Rigid Connections to Rigid
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ROAD RESTRAINT SYSTEMS

Z-Profile

Zigma Profile

2012.09.05 10:51

2012.09.05 11:31

W-Section Guardrails on Z- and Zigma Steel Profiles – use approved posts only

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ROAD RESTRAINT SYSTEMS

2011.05.10 13:39

F Shape Barriers Highest Test Level

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ROAD RESTRAINT SYSTEMS

2012.09.12 13:09

Crash Cushions

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ROAD RESTRAINT SYSTEMS



2011.01.10 08:58

Concrete barrier containment level

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837

This slide shows a concrete barrier on a road. In the foreground, there are several bags of material. A yellow sign with two upward-pointing arrows and a '200 m' distance marker is visible. A speed limit sign for 60 km/h is also present. The AnFab Consult logo is in the bottom left corner.

ROAD RESTRAINT SYSTEMS



2011.09.27 11:07

Crash Cushions

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838

This slide shows a crash cushion installed on a road. A date stamp '2011.09.27 11:07' is visible. The AnFab Consult logo is in the bottom left corner.



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This slide is a close-up view of a yellow crash cushion, showing its internal structure and the black padding.

ROAD RESTRAINT SYSTEMS



2011.09.27 11:07

Sloped Barrier End vs Approved Crash Cushion

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840

This slide compares a sloped barrier end with an approved crash cushion. A date stamp '2011.09.27 11:07' is visible. A 'NO LEFT TURN' sign is also present. The AnFab Consult logo is in the bottom left corner.



ROAD RESTRAINT SYSTEMS

Containment Level Testing

Table 1 : Vehicle impact test criteria

Test	Impact speed km/h	Impact angle degrees	Total vehicle mass kg	Type of vehicle
TB 11	100	20	900	Car
TB 21	80	8	1 300	Car
TB 22	80	15	1 300	Car
TB 31	80	20	1 500	Car
TB 32	110	20	1 500	Car
TB 41	70	8	10 000	Rigid HGV
TB 42	70	15	10 000	Rigid HGV
TB 51	70	20	13 000	Bus
TB 61	80	20	16 000	Rigid HGV
TB 71	65	20	30 000	Rigid HGV
TB 81	65	20	38 000	Articulated HGV

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ROAD RESTRAINT SYSTEMS

Containment Level Testing

Table 2 : Containment levels

Containment levels	Acceptance test
Low angle containment T1 T2 T3	TB 21 TB 22 TB 41 and TB 21
Normal containment N1 N2	TB 31 TB 32 and TB 11
Higher containment H1 H2 H3	TB 42 and TB 11 TB 51 and TB 11 TB 61 and TB 11
Very high containment H4a H4b	TB 71 and TB 11 TB 81 and TB 11

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ROAD RESTRAINT SYSTEMS

Working Width

Table 4 : Levels of working width

Classes of working width levels	Levels of working width m
W1	W ≤ 0,6
W2	W ≤ 0,8
W3	W ≤ 1,0
W4	W ≤ 1,3
W5	W ≤ 1,7
W6	W ≤ 2,1
W7	W ≤ 2,5
W8	W ≤ 3,5

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ROAD RESTRAINT SYSTEMS

Working Width

Figure 1 - Dynamic deflection (D) and working width (W)

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ROAD RESTRAINT SYSTEMS

Working Width

Working Width W4

Working Width W4

700 600

Containment Level TL4

Work Zone

Dynamic Deflection

WORK ZONE - Activity area

WORKING WIDTH

ROAD ACTIVE LANES

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ROAD RESTRAINT SYSTEMS

Working Width

Element above the level of the safety barrier

Working width during impact

(Source RTA 1996)

Figure 4.4 - Working Width for Concrete Barrier

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ROAD RESTRAINT SYSTEMS

Warrants for W-Beam Barriers on Embankments

Fill batter slope

Barrier not required

Barrier required

Fill height (m)

Fill height

Toe

Hinge point

Notes:

1. Figure applies only to W-beam installations.
2. Barrier is required for shaded area unless a detailed assessment proves otherwise.
3. Assumes that batter is reversible and clear of hazards.
4. Source: Austroads (2002).

Figure 2.7 - Warrants for Barrier on Embankments

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ROAD RESTRAINT SYSTEMS

Median Barrier Guideline for High-Speed Roadways

Note: Average daily traffic is based on a 5 year projection. Median width is the distance between the edges of the through traffic lanes that are adjacent to the median.
(Source: AASHTO 2002)

Figure 2.10 — A Median Barrier Guideline for High-Speed Roadways

849

ROAD RESTRAINT SYSTEMS

Devices not tested for containment levels is **NOT** barriers but rather called **delineation devices**

850

ROAD RESTRAINT SYSTEMS

Hazards of Barriers

Concrete barrier off-sets

851

ROAD RESTRAINT SYSTEMS

Barrier End Protection

Concrete barriers with **unprotected** ends

Transition Area delineation devices

852

ROAD RESTRAINT SYSTEMS

Testing



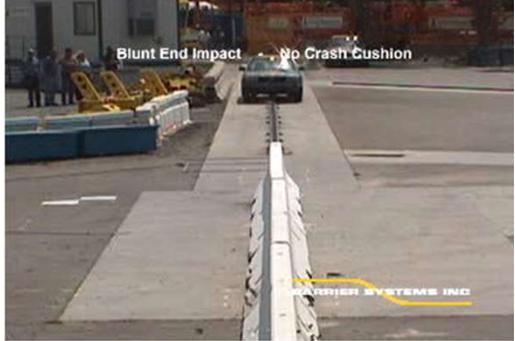
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853

This slide features a title 'ROAD RESTRAINT SYSTEMS' and a subtitle 'Testing'. It includes a traffic sign icon with a '60' speed limit. The main image is an aerial photograph of a red car on a road with a white line. The bottom left corner has a small road sign icon and the text 'AnFab Consult'. The bottom right corner has the number '853'.

ROAD RESTRAINT SYSTEMS

Testing



Blunt End Impact No Crash Cushion

Concrete barrier containment level

AnFab Consult (PTY) Ltd

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This slide features a title 'ROAD RESTRAINT SYSTEMS' and a subtitle 'Testing'. It includes a traffic sign icon with a '60' speed limit. The main image shows a car crashing into a concrete barrier. Text 'Blunt End Impact' and 'No Crash Cushion' is overlaid on the image. The bottom left corner has a small road sign icon and the text 'AnFab Consult'. The bottom right corner has the number '854'.

ROAD RESTRAINT SYSTEMS



Concrete barriers with **crash cushion**
Transition Area delineation devices

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855

This slide features a title 'ROAD RESTRAINT SYSTEMS'. The main image shows concrete barriers with crash cushions used as transition area delineation devices. The bottom left corner has a small road sign icon and the text 'AnFab Consult'. The bottom right corner has the number '855'.

ROAD RESTRAINT SYSTEMS

Testing



Crash Cushions

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856

This slide features a title 'ROAD RESTRAINT SYSTEMS' and a subtitle 'Testing'. It includes a traffic sign icon with a '60' speed limit. The main image shows a car crashing into a crash cushion. The bottom left corner has a small road sign icon and the text 'AnFab Consult'. The bottom right corner has the number '856'.

ROAD RESTRAINT SYSTEMS



Concrete barrier containment level

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(Icons: Roadwork, Caution, 60km/h)

ROAD RESTRAINT SYSTEMS



Concrete barrier containment level

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(Icons: Roadwork, Caution, 60km/h)

ROAD RESTRAINT SYSTEMS



Barrier containment level

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ROAD RESTRAINT SYSTEMS

Testing

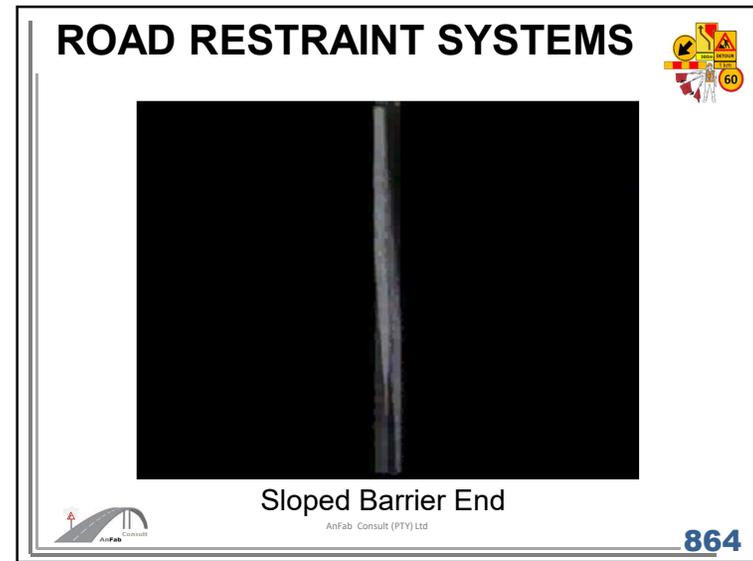
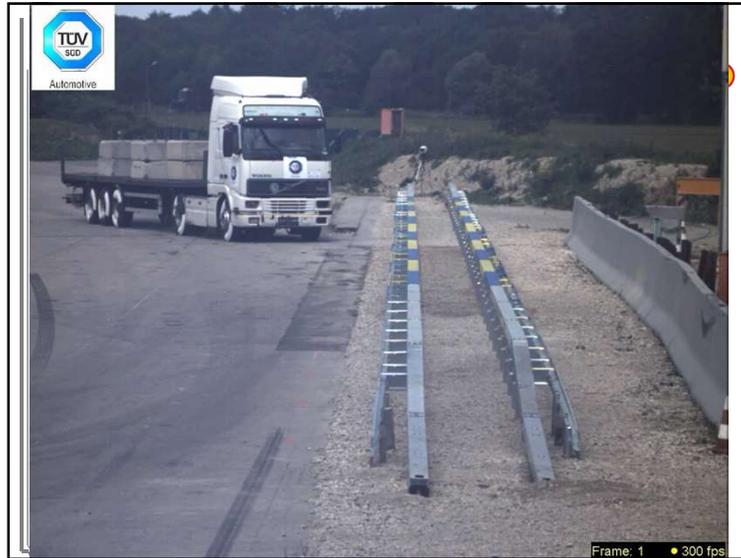


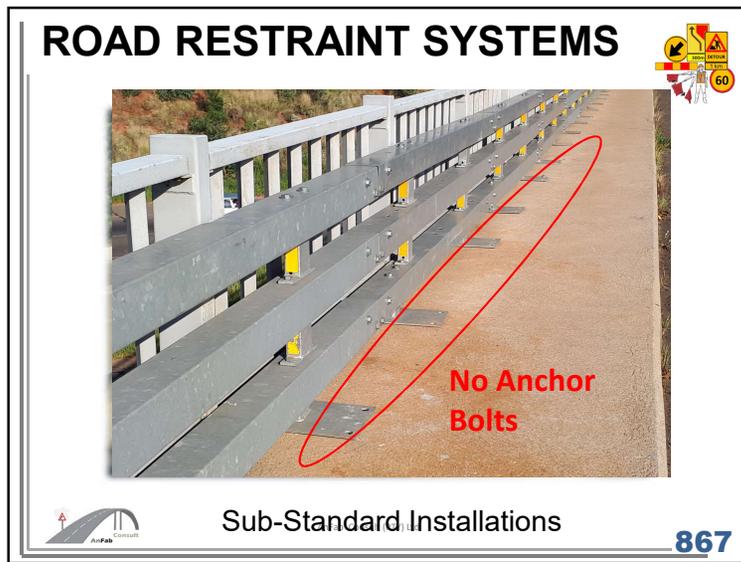
Crash Cushions

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(Icons: Roadwork, Caution, 60km/h)





ROAD RESTRAINT SYSTEMS

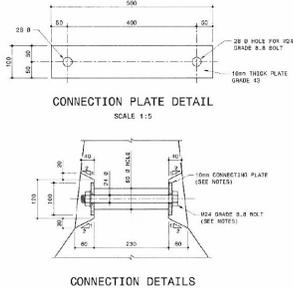


Concrete barrier without connection plates!

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ROAD RESTRAINT SYSTEMS



Remove unnecessary barriers

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Install concrete barriers with a 6m offset and a taper range between 1:6 to 1:10.

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ROAD RESTRAINT SYSTEMS



Provide approved connections between semi-rigid and rigid balustrades

873

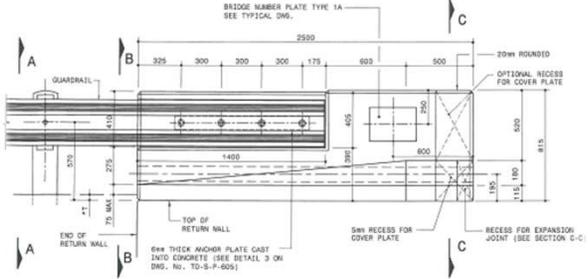
ROAD RESTRAINT SYSTEMS



W Section guardrails

874

ROAD RESTRAINT SYSTEMS



INSIDE ELEVATION OF END BLOCK
SCALE 1:15

W Section Guardrails End Block Detail

875

ROAD RESTRAINT SYSTEMS



W Section guardrails without approved connection can be fatal!

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Display temporary Delineator to warn drivers of vehicles

W Section guardrails without terminal section!



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ROAD RESTRAINT SYSTEMS



W Section guardrails without terminal section!



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ROAD RESTRAINT SYSTEMS



uidman.ca

Concrete barrier containment level



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Complete assignment question 13

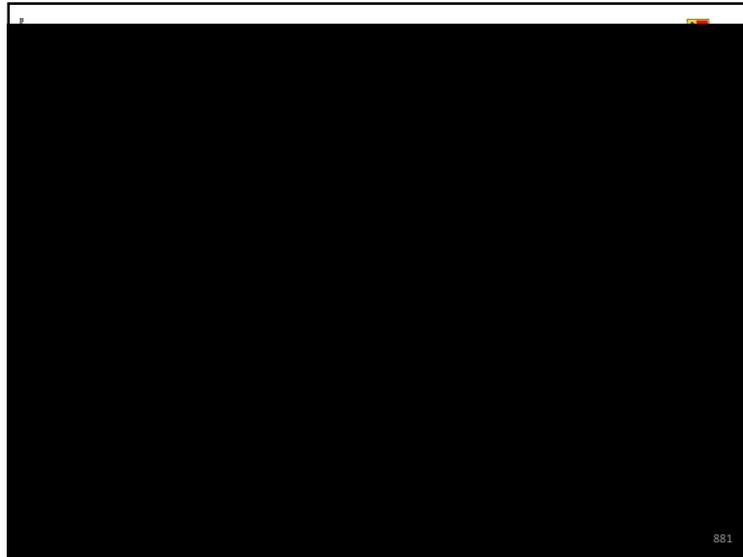


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SESSION 14 – SITE SAFETY AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

Section 8(1) – Employer SHALL provide and maintain working environment which is:-
Safe ; and
Without risk to health

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



The work zone shall be clearly demarcated

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The pedestrians shall be protected!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Ensure safe pedestrian walkways!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Ensure safe pedestrian walkways!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Repair walkways after construction!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Prevent dangerous manoeuvres !

889

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Provide training and information!

890

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Provide training and information!

891

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Ensure safe pedestrian walkways!

892

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Remedial measures required !

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Use only approved safety devices!

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Check dangerous access panels !

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Urgent remedial measures required!

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Don't remove critical road signs !

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Don't use drums and or hard objects !

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Replace incorrect road traffic signs!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

- Section 8(2)(e) – Provide information, TRAINING and SUPERVISION to ensure:
- Health; and Safety

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL
ROADWORKS SIGNING

Provide training and information!

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SHORT TERM WORKS

13.8.18 13.8.11 STOPRY-GO Traffic Control-Minor Works

1 STOPRY-GO operation may be required to control traffic at a variety of short term roadworks sites where the remaining roadway is reduced to less than two lanes in width, for whatever reason. As such, STOPRY-GO traffic control is effectively a temporary signing sub-system. It may be used on its own or it may be used in conjunction with other signs. For short periods within a long roadworks site, the detail in Figure 13.40 may therefore be incorporated with other short term applications and is particularly appropriate for urban sites.

2 The signing plan in this detail is a minimum treatment for a very short term application lasting only one or two hours. For longer applications the signing should be upgraded to that covered by Subsection 13.8.3 and Figure 13.44. It should be considered as a daytime operation unless the site is very well illuminated or signs NO OVERTAKING signs TR214 should be used by the maintenance unit and added to the illustrated sign equipment if required.

3 If operating speeds are in excess of 80 km/h additional operational signs TR203 should be displayed in accordance with a maximum of 20 km/h, or in 20 km/h increments to 80 km/h or 60 km/h as appropriate (see Section 13.6).

4 Flagmen must be well trained and shall operate in accordance with Figure 13.28. Night and low-visibility conditions are likely to be short in length. If inter-visibility between flagmen is not guaranteed the flagmen should be equipped with two-way radios.

5 TRAFFIC CONE operation devices TR4 and DELINEATION PLATE based marker signs TR201/TR202 shall be applied in accordance with Table 13.4 and all signs shall conform to the provisions of Table 13.5. When cones are to be used during adverse light conditions, they shall be fitted with retroreflective devices. The mounting height of cones shall be at least that given in Table 13.1 or higher. If the work site's support vehicle is equipped with flashing yellow warning signs, it may control the safety of workers for the vehicle to be parked on the shoulder, at the work end of the approach Buffer Zone, between the workers and approaching traffic.

MAINTENANCE UNIT INVENTORY			
Sign	No	Size (mm)	Quantity
	TR203	1200	2
	TR204	1200	2
	R1, G1 / R2, G2	750	2
	TR203	1200	1
	TR204	1200	2
	TR411	300 X 1800	2
	FLAG	400 X 600	2
	T24	400 Min. plus 10 mm side length	2
	TR214	1200	2
	TR201-G0	1200	2
	TR201-G1	1200	2

Checklist

- are operating speeds in excess of 80 km/h?
- do advance signs for the STOPRY-GO control chain with other restriction signs within the site?
- are the flagmen alert and well trained for their task?
- are the flagmen fully visible to approaching traffic?
- are the flagmen standing in a safe position?
- can the restriction be eliminated to permit two-way traffic by dusk?

NOTES:

- Flagmen should be able to see each other or be heard with two-way radios.
- Apply temporary STOP Zone markings (like using reversible tape).
- Spacing of signs should be increased to 200m and a temporary reduced speed limit imposed if operating speeds exceed 80 km/h.

Fig. 13.40 STOPRY-GO Traffic Control - Minor Works

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

Provide personal protective equipment!

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TRAFFIC SAFETY OFFICER TRAINING

Approved Personal Protective Equipment (PPE)

DISTINCTIVE CLOTHING
level 1, 2 or 3 for the applicable work conditions

The TSO shall provide information and training to all workers with regard to the wear of applicable PPE.

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

<p>A) WHITE:</p>	<ul style="list-style-type: none"> • Supervision • Architects • Supervising engineers • Project managers • Visitors 	<p>C) GREEN:</p>	<ul style="list-style-type: none"> • First Aiders • Safety Officers • Safety Reps • Emergency Team
<p>B) YELLOW:</p>	<ul style="list-style-type: none"> • All construction workers 	<p>D) BLUE:</p>	<ul style="list-style-type: none"> • Direct employees • Contractor own key personnel • Foreman • Site supervisor
		<p>E) ORANGE:</p>	<p>CONTRACTORS:</p> <ul style="list-style-type: none"> • Sub-contractors

Hard hats colour code specification!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

2014 03 13 09 19

Provide personal protective equipment!

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SITE SAFETY

The principal function of a buffer zone in such situations is to separate the traffic from the workers at the site in the interest of worker safety !

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Provide safe working environment!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

Provide personal protective equipment!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

Provide personal protective equipment!

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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Provide lights in low light conditions!

913

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993

Transporting of persons on a goods vehicle: Construction vehicles and mobile plant

23.
(2) A contractor must ensure that-

- (a) no person rides or is required or permitted to ride on a construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose;
- (i) **Vehicles used to transport employees have seats firmly secured and adequate for the number of employees to be carried;** and
- (ii) All construction vehicles or mobile plant traveling, working or operating on public roads comply with the requirements of the National Road Traffic Act, 1996.

Construction Regulations 2014

914

NATIONAL TRAFFIC REGULATIONS, 2000

Transporting of persons on a goods vehicle in the goods compartment:

Regulation 247. No person shall operate on a public road a goods vehicle conveying persons unless that portion of the vehicle in which such persons are being conveyed is enclosed to a height of—

(a) at least 350 millimetres above the surface upon which such person is seated; or

(b) at least 900 millimetres above the surface on which such person is standing, in a manner and with a material of sufficient strength to prevent such person from falling from such vehicle when it is in motion.

Provided that no person shall be conveyed in the goods compartment together with any tools or goods, except their personal effects, unless that portion in which such persons are being conveyed is separated by means of a partition, from the portion in which such goods are being conveyed."

Regulation 247

915



OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993
Construction Regulations 2003/2014

- Site Safety Officer
- Appointed in writing
- Job description / responsibilities
- Risk assessment
- Health and safety plan
- Safety meetings

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Questions 

Please note the **slide number** with the question and forward to anfabconsult@gmail.com

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GAKyyy

هذه اعادة اعادة خصيصا للشه

WWW.SQ8S.COM

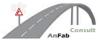
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GAKYYYY

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MODULE 15
DAILY RECORD KEEPING AND
AUDIT

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TRAFFIC MANAGEMENT



Record Keeping Minimum Requirements for Incidents and Accidents




921

DAILY RECORD KEEPING AND AUDIT

TYPICAL TRAFFIC ACCOMMODATION SIGN ASSESSMENT
Page 1 of 2

CONTRACT DETAILS	
CONTRACT NUMBER :	
CONTRACT DESCRIPTION :	
CONTRACTOR :	
TRAFFIC SAFETY OFFICER:	
CONSULTANT : RE	

ROAD SECTION DESCRIPTION			
ROAD NUMBER :		SECTION :	
ROAD NAME :			
BETWEEN :		AND :	
AUTHORITY :		SUBURB :	

DETAIL DESIGN	
TRAFFIC ACCOMMODATION DESIGNED BY :	ECSA REG NO :
CHECKED BY :	DATE :



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DAILY RECORD KEEPING AND AUDIT

INSPECTION DETAIL	
DATE :	
NAME OF ASSESSOR :	
Photographs No's :	
Comments / Incidents for the past 24 hours	
Vehicle accidents	
Theft	
Construction damage	
Storm damage	
Weather Conditions : Rain (time / mm)	Good Weather :
Other Incidents (specify) :	

DRAWING DETAIL			
Drawing No. :		Sign No's :	
Drawing No. :		Sign No's :	
Drawing No. :		Sign No's :	
Drawing No. :		Sign No's :	



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923

DAILY RECORD KEEPING AND AUDIT

DRAWING DETAIL			
Drawing No. :		Sign No's :	
Drawing No. :		Sign No's :	
Drawing No. :		Sign No's :	
Drawing No. :		Sign No's :	

REMEDIAL MEASURES REQUIRED	
NO	YES (specify on reverse of page)
Comments	See reverse page

I, hereby certify that all specified signs and safety control devices were inspected and checked by me on / / 20 ... and comply as specified on the approved drawings.



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924

DAILY RECORD KEEPING AND AUDIT

TEMPORARY SIGNS / DEVICES CHECKLIST										Page 2 of 2
CONSTRUCTION ZONE COMPONENTS										
Component		In Compliance	Not in Compliance	Remedial Measures Required						
Pre-Warning Area:										
Transition Area:										
Buffer Zone:										
Construction Zone:										
DEVIATION	Y / N	SIGNS IN COMPLIANCE	SIGNS NOT IN COMPLIANCE	Lane Width ... x ... m	1/2 Way	Gravel / Bluminous	Road Marking In Order			
DETOUR	Y / N	SIGNS IN COMPLIANCE	SIGNS NOT IN COMPLIANCE	Media Release	Detour Signs at each change of direction Y / N	Roadmarking	Detour Distance km			
SIGNS POSITION		LATERAL		TRANSVERSAL		VERTICAL				
SIGN DESIGN		Sizes Compliant	Sizes Not in Compliance	Design Compliant	Design Not in Compliance	Colour Compliant	Colour Not Compliant	Designed By:		
YELLOW FLASHING LIGHTS TYPE S83		Y / N		In Working Condition	Out of Order	N/A	Recommended			
REFLECTIVE SHEETING - CLASS				DATE CLEANED :						
POSTS/STANDS:		IN ORDER	NOT IN ORDER	SAND BALLAST :						
DELINEATORS SANS 1959		Y / N	SIZE: mm x mm	CONDITION	GOOD	POOR	SAND BAG/BASE	HARD OBJECT AT BASE		
FLAGMEN		TRAINED	Y / N	N/A	IN CORRECT POSITION	NOT IN CORRECT POSITION	DISTINCTIVE CLOTHING Y/N	HARD HAT Y / N		
STORMWATER DRAINAGE CONDITION : Y / N				N/A	Provided	Required	Blocked	Sufficient		
HEIGHT RESTRICTION BEAM: Y / N				IN ORDER:	DAMAGED:	Recommendation				
HEIGHT RESTRICTION ALARM: Y / N				IN WORKING CONDITION		OUT OF ORDER :				

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DAILY RECORD KEEPING AND AUDIT

CONCRETE REMOVABLE BARRIERS:	Y / N	END PROTECTION	OFF SET	REFLECTORS	DRAINAGE OPENINGS	CONNECTOR PLATES	DAMAGE
W SECTION GUARDRAILS: Y / N		TERMINAL SECTION	END WING	REFLECTORS	600mm HEIGHT TO CENTRE	LAP DIRECTION	DAMAGE
ROAD MARKING CONDITION :		GOOD		FAIR			POOR
ROAD STUDS : Y / N		GOOD		FAIR			POOR
ROAD SURFACE CONDITION :		CLEAN :	Accident Debris	Gravel / sand	Water Leak	Oil / Chemical Spilt	Potholes
HALF WIDTH	Lane width m	Delineator spacing m c/c	Signal Control	Stop Go Control	Flagmen	Total Length km	
FULL WIDTH	Road width m	No. of Lanes	Two Way	One Way			
MEDIAN CONSTRUCTION	Safe Vehicle Access Y / N		Flagmen available to assist construction vehicles Y / N		Fast lane closure available	Fast lane closure recommendation	
SHOULDER CONSTRUCTION		Vertical drop protection Y / N	Delineator Spacing in Compliance Y / N				
REMEDIAL MEASURES REQUIRED							
DEVICE		DEFECT			RECOMMENDATION		

Sign assessment received by for (Contractor) on / / 20....

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TRAFFIC MANAGEMENT

Daily Inspections

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TRAFFIC MANAGEMENT

Sign Design and Placement

Step 1 - Identify Hazard
 Step 2 - Identify Sign
 Step 3 - Reaction Time Distance
 Step 4 - Clear Sight Visibility Distance

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TRAFFIC MANAGEMENT

Sign Characteristics



- 5 - Size
- 6 - Colours
- 7 - Class reflection sheeting: Warranty
- 8 - Supplementary sign message
- 9 - Substrate
- 10 - Support
- 11 - Vertical height
- 12 - Transversal position

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TRAFFIC MANAGEMENT

Daily Signs and Device Inventories



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TRAFFIC MANAGEMENT

Record Keeping



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TRAFFIC MANAGEMENT

Road Opening



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MODULE 16 ROAD TRAFFIC SIGN MANAGEMENT SYSTEM



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM

Information management systems normally include functions such as the development of infrastructure inventories and procedures for the updating thereof and for periodic or special report generation. Maintenance management systems utilise the inventory information to identify deficiencies, prioritize maintenance needs, schedule maintenance efforts and to monitor conditions.



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM

Information management systems normally include functions such as the development of infrastructure inventories and procedures for the updating thereof and for periodic or special report generation. Maintenance management systems utilise the inventory information to identify deficiencies, prioritize maintenance needs, schedule maintenance efforts and to monitor conditions.



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM

Modules Recommended:

- **Daily inspection**
- **Inventories**
- **Risk assessment**
- **Remedial Measures**
- **Monitoring**
- **Record Keeping**



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM

Daily Inspections:

- Early in the morning
- Before site closure
- Risk assessment
- Photos and Videos (Date and time)
- Safety Control Device Assessment
- Incident reports
- Updating of Inventory and records

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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM

Road Traffic Sign Assessment:

- Message/Symbol and Supplementary Sign Information
- Size
- Colours
- Clear visibility Distance
- Transversal Distance
- Longitudinal Distance
- Reflective Sheeting Warranty and Night Visibility
- Vertical Clearance
- Manufacturers Specification

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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM

Road Traffic Marking and Surface Assessment:

- Marking Symbol
- Dimensions
- Colours
- Retro Reflection Minicandelas/lux/m²
- Paving Surface Clean
- Skid Resistance
- Water Drainage
- Road Studs Colours, spacing and visibility.
- Marking Visibility

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TYPICAL SIGN ASSESSMENT

Typical Traffic Accommodation Sign Assessment																
National Road N1 Section 19 Chamape 10.9 N to 14.8 N - Road speed limit prior to construction works = 100km/h																
Component Part	Sign Number	Change	SADC Code	Description	Supplementary Sign Code and Description	Symbol Photo	Manufacturing date	Class reflective Sheeting	Night time visibility	Clear visibility distance	Size	Transversal Distance	Vertical Clearance	Longitudinal Distance	Compliant	Remedial measures required
Advance Warning Area	1	W1-12 11.2 N	TR202 WB	Roadworks far ahead	TN11.3		Jan-15	IV Fluorescent	120m	120m	1200 x 2000	800mm	1200mm	1km	Yes	No
	2	W1-18 11.0 N	TR201 80	80km/h Speed limit	None		Jan-15	IV Fluorescent	120m	120m	1200 x 2000	800mm	2100mm	800m	Yes	No
	3	W1-18 11.2 N	TG5104	Left lane clo	TN11.3		Jan-15	IV Fluorescent	120m	120m	1200 x 2000	800mm	1200mm	800m	Yes	No
	4	W1-18 11.4 N	TR201 80	80km/h Speed limit	TN11.3		Jan-15	IV Fluorescent	120m	120m	1200 x 2000	800mm	2100mm	400m	Yes	No
	5	W1-18 11.6 N	TG5104	Right lane closed	TN11.3		Jan-15	IV Fluorescent	120m	120m	1200 x 2000	800mm	1200mm	800m	Yes	No
Traffic Sign Area	6	W1-18 11.8 N	TR462	Delimeter	none		Feb-17	I	40m	40m	200 x 800	500mm	200mm	10m c/c	No	Class III Required
Buffer Zone Area	7	W1-18 12.2 N	TR103 100	Lane closed keep left	None		Dec-09	I	120m	120m	1200 x 2000	800mm	1200mm	800m	No	Reflective warranty expired
Termination Area	8	W1-18 14.6 N	TR330	Roadworks End	TN11.4		Feb-17	IV Fluorescent	120m	120m	1500 mm	800mm	2100mm	800m	Yes	No
	9	W1-18 14.8 N	R201 100	Speed limit	None		Jan-20	III	120m	120m	1200 x 2000	800mm	2100mm	800m	Yes	No

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Complete assignment traffic control plans figures 1 to 4



Please note the **slide number** with the question and forward to anfabconsult@gmail.com



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CONCLUSION

Course Evaluation Survey Monkey

Complete **assignment** (freehand) and forward within 7 days to anfabconsult@gmail.com



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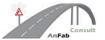


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