

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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Sign Design, Training & Verification



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TRAFFIC ACCOMMODATION




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

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LEARNING OBJECTIVES

- ✓ Learn how to design a traffic accommodation design in compliance with legislation
- ✓ Learn how to compile a method statement, traffic management plan(TMP), traffic control plan(TCP) and a safety control device management system.
- ✓ Gain a clear understanding of methods to identify dangerous roadside hazards and understand how to choose the correct option to correct the situation.
- ✓ Understand the issues facing pedestrian, bicyclist, motorcyclist, public transport and non-motorized vehicle safety
- ✓ Obtain an understanding of Work Zones & how they can be made safer for the motorist, worker, and pedestrians
- ✓ Learn how to conduct a traffic accommodation road safety audit and collect data for possible future claims and court cases.
- ✓ Learn how to create a road safety audit team and how to conduct a road safety audit



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COURSE CONTENTS

MODULE 1 (slides 30 -52) :

- Legislation: National Road Traffic Act and Regulations

MODULE 2 (slides 53-65) :


- Criminal and Tort Liability

MODULE 3 (slides 66-421) :

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

MODULE 4 (slides 422-499) :

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



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COURSE CONTENTS



MODULE 5 (slides 500 - 578) :

- Roadworks Component Parts

MODULE 6 (slides 579-587) :

- Signing Applications for Urban and Short Term Applications

MODULE 7 (slides 588-597) :

- Signing Applications for Rural Applications

MODULE 8 (slides 597 - 602) :

- Signing Applications for Freeway Applications



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COURSE CONTENTS



MODULE 9 (slides 603 - 704) :

- COTO: Standard Specifications for Road and Bridge Works

MODULE 10 (slide 705 - 742) :

- Traffic Safety Officer Roles and Responsibilities

MODULE 11 (slide 743 - 836) :

- South African Bureau of Standards Specifications - SANS

MODULE 12 (slide 837 - 886) :

- Flag procedures, STOP/GO and Signal Controls



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COURSE CONTENTS



MODULE 13 (slide 887 - 951) :

- Road Restraint Systems: Containment Levels and Working Width

MODULE 14 (slide 952 - 989) :

- Personal Protective Equipment(PPE) and Site Safety

MODULE 15 (slide 990 - 998) :

- Site Inspections and Record Keeping

MODULE 16 (slide 999 - 1011) :

- Roadworks Safety Control Device Management System



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INTRODUCTION



TW331

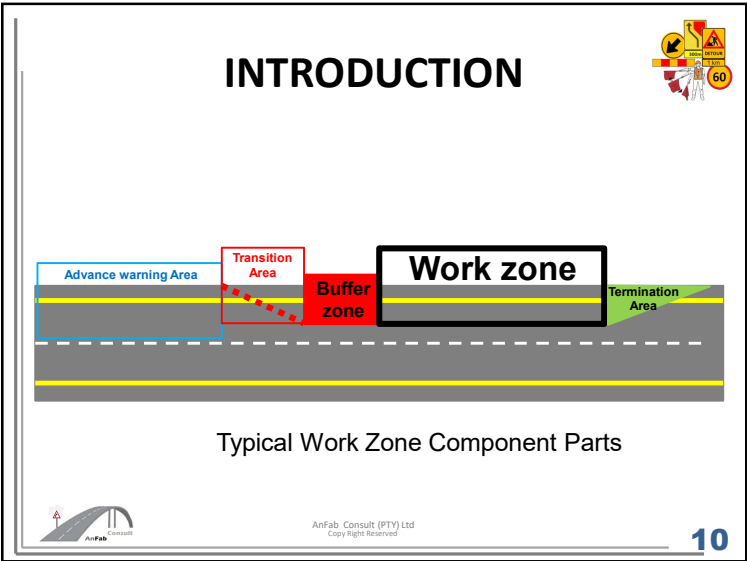
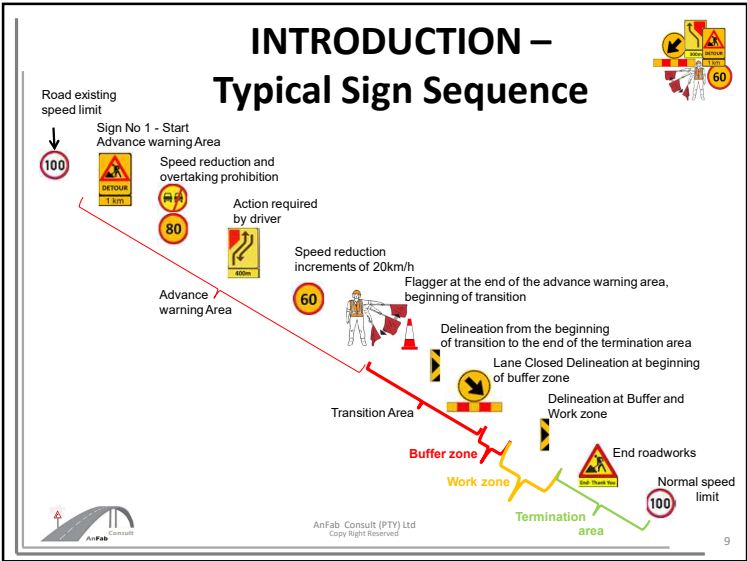
References
V1 3.4.14
V4 3.4.31

The UNEVEN ROADWAY warning sign W 331 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.



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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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VEHICLE CRASHES TIME OF DAY

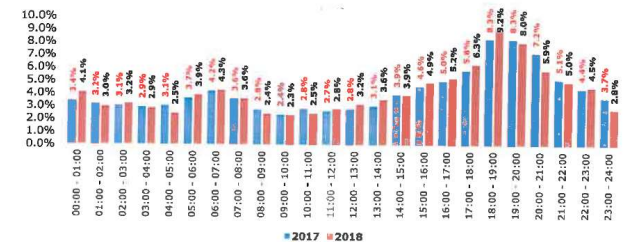


Figure 3: % distribution of fatal crashes per time of day for two years 2017 and 2018



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VEHICLE CRASH TYPES

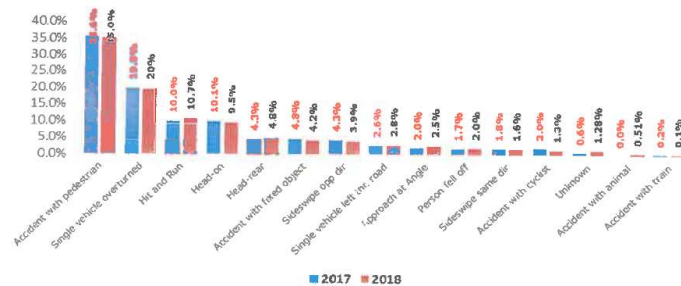


Figure 4: Percentage distribution of fatal crashes per crash type

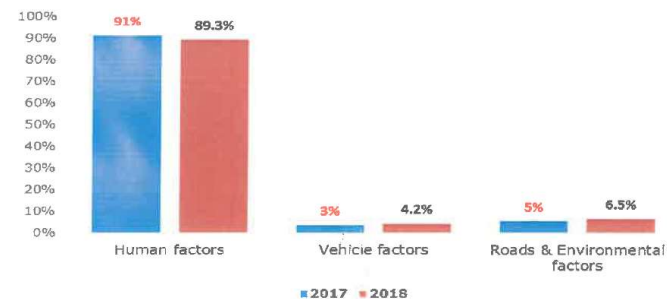


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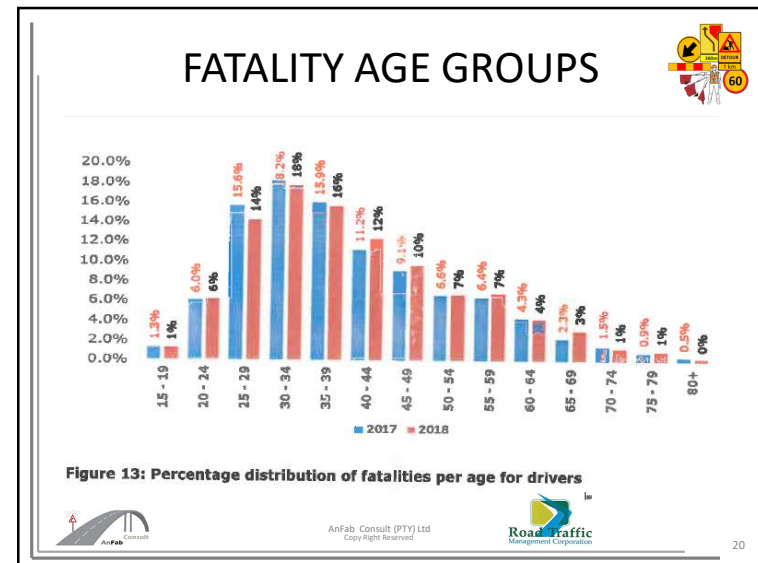
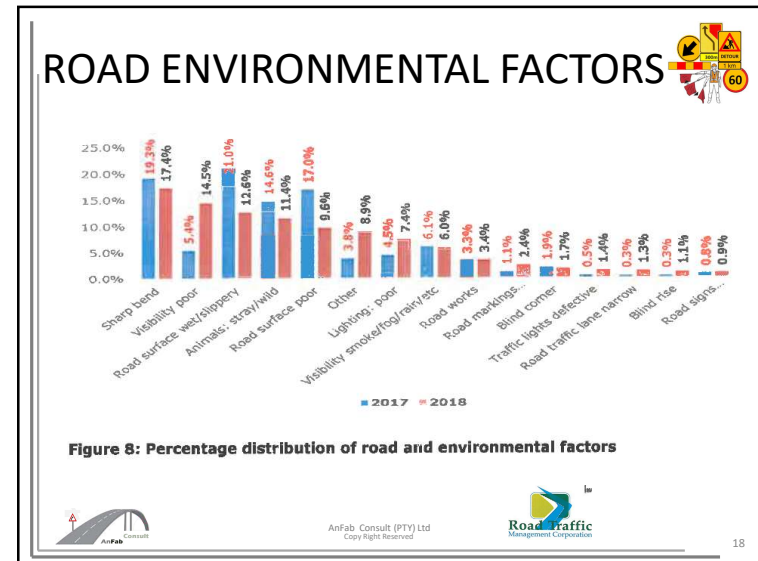
VEHICLE CRASH CONTRIBUTING FACTORS



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INTRODUCTION



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

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INTRODUCTION



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

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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 - LEGISLATION: 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

286. (1) (a) The minimum external dimensions in millimetres of regulatory and warning signs are given in relation to the speed limit in kilometres per hour pertaining to the section of public road on which the signs are erected: Provided that a tolerance of five percent below such minimum dimension shall be permissible.

(b) The minimum dimensions and speed referred to in subregulation (1) shall, subject to paragraph (c) be—

(i) for circular regulatory signs as shown in the table below:

| Speed limit | SIGN TYPE | 0 - 60 | 61 - 80 | 81 - 100 | 101 - 120 |
|-------------|----------------------|--------|---------|----------|-----------|
| Diameter | General | 600 | 900 | 1 200 | 1 200 |
| | Overhead | 900 | 1 200 | 1 200 | 1 600 |
| | Parking and Stopping | 450 | 900 | 1 200 | 1 200 |

TEMPORARY Regulatory SIGN SIZES
SARTSM VOL 2 CH 13 Item 13.1.3 (i)

URBAN **RURAL FREEWAY**

NATIONAL ROAD TRAFFIC REGULATIONS, 2000
REGULATION 286

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LEGISLATION – MINIMUM REQUIREMENTS

(ii) for triangular regulatory and warning signs as shown in the table below:

| Speed limit | 0 - 60 | 61 - 80 | 81 - 100 | 101 - 120 |
|-------------|--------|---------|----------|-----------|
| Side length | 900 | 1 200 | 1 200 | 1 500 |

URBAN **RURAL FREEWAY**

TEMPORARY Warning SIGN SIZES
SARTSM VOL 2 CH 13 Item 13.1.3 (i)

NATIONAL ROAD TRAFFIC REGULATIONS, 2000
REGULATION 286

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LEGISLATION – MINIMUM REQUIREMENTS

(i) Regulatory Signs:

(aa) Control Signs:

Stop sign:

COLOURS:

Border and symbol: White retro-reflective

Background: Red retro-reflective

Back of sign: White semi-matt



NATIONAL ROAD TRAFFIC REGULATIONS, 2000

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LEGISLATION – MINIMUM REQUIREMENTS

NATIONAL ROAD TRAFFIC REGULATIONS, 2000
Regulation 286A.Colours for manufacture of road traffic signs

2 (4) The reverse side of a road sign, other than a road sign with an aluminium background, shall be grey, except that, irrespective of the material of manufacture, **the reverse side of a stop sign shall be white semi-matt.**



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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- Module 1



Please note the **slide number** with the question and forward to
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MODULE 2 - CRIMINAL AND TORT 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

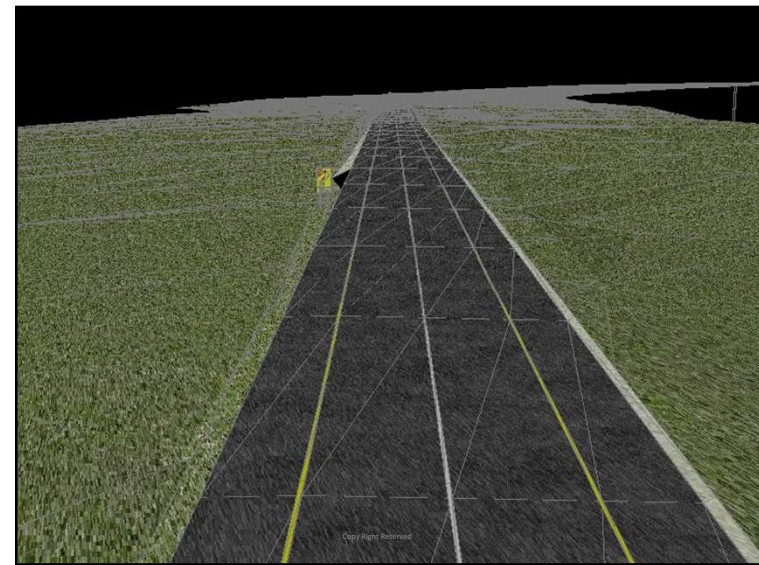
Documentation Required (TSO)


- 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 –
Module 2**




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**MODULE 3
SOUTHERN AFRICAN
DEVELOPMENT
COMMUNITY(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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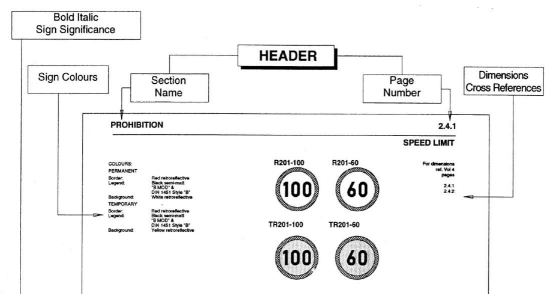
SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1



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

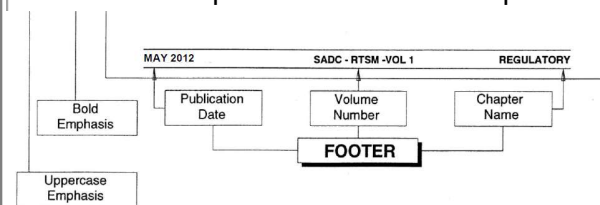


Fig 1.1

Typical Page Layout and Text Conventions

GENERAL PRINCIPLES SADC - RTSM - VOL 1 MAY 2012



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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.



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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;



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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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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 co-ordinate 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.



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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

- 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



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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 | | |
| Command | | |
| Prohibition | | |
| Reservation | | |
| 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

Location

Route Marker

Direction

Freeway Direction (Class A1)

Freeway Direction (Class A2)

Tourism Direction

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

Local Direction

Guidance signs

Diagrammatic

Pedestrian

Information signs

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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles Road Classification Class A1

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Road Classification Class A2

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Road Classification Class B: R = Regional



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Road Classification Class B: M = Metropolitan



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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
 Temporary 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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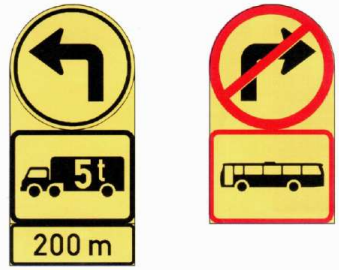
Detail 1.10.3 Temporary Guidance Signs

R714 Bethlehem →

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MANUAL Volume 1 – Part 1
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Detail 1.10.4 Selective Restriction Signs

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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

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TW336

References
V1 3.4.16
V4 3.4.36



Roadworks

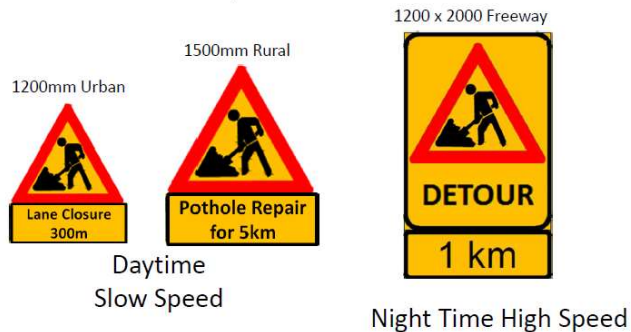


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ADVANCE WARNING AREA SIGNAGE

Step 1 - Roadworks Ahead



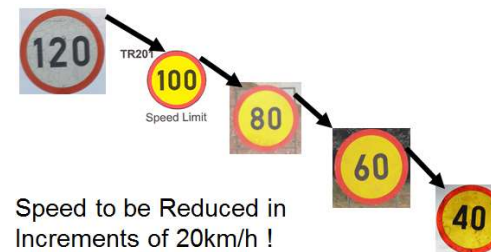
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2. Step 2 -Speed reduction

Common Signs Displayed at Roadworks Construction sites



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

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

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Step 4 - Transition control

Common Signs Displayed at Roadworks Construction sites

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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

Stop

Max 15m

Move back sign

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Regulatory R1 Stop Control - Junction Sight Distance Consideration



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Roadworks Temporary Regulatory R1 Stop Control Signs

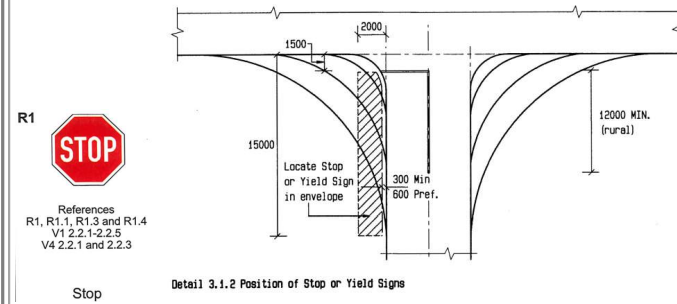


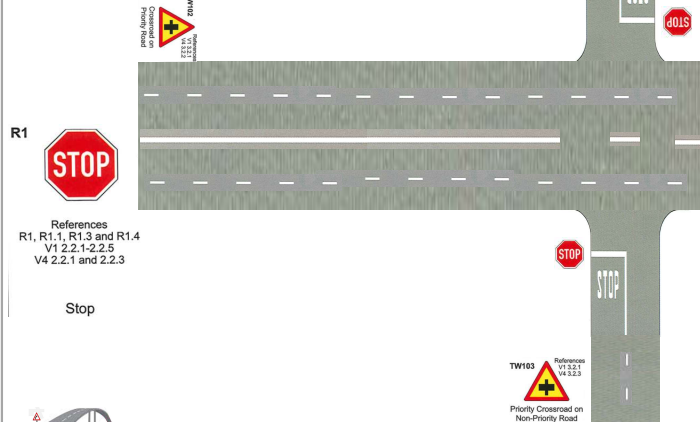
Fig 3.1 Junction Sight Distance Consideration



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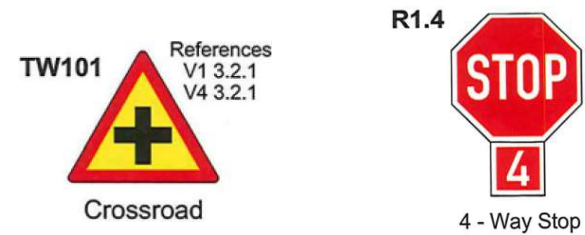
Roadworks Temporary Regulatory R1 Stop Control Signs



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Roadworks Temporary Warning Road Layout Signs



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Roadworks Temporary Regulatory Control Signs

TABLE 2.5 MINIMUM STOPPING SIGHT DISTANCES TABLE 2.5

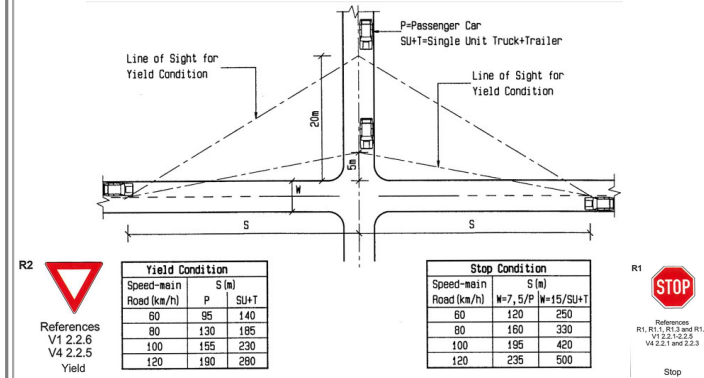
| Effective Approach Speed (km/h) | Minimum Sight Distance Required (m) |
|---------------------------------|-------------------------------------|
| 50 | 70 |
| 60 | 95 |
| 70 | 125 |
| 80 | 150 |
| 85 | 165 |



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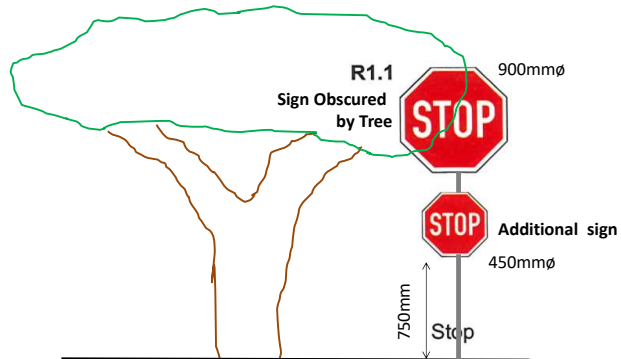
Roadworks Temporary Regulatory Control Signs



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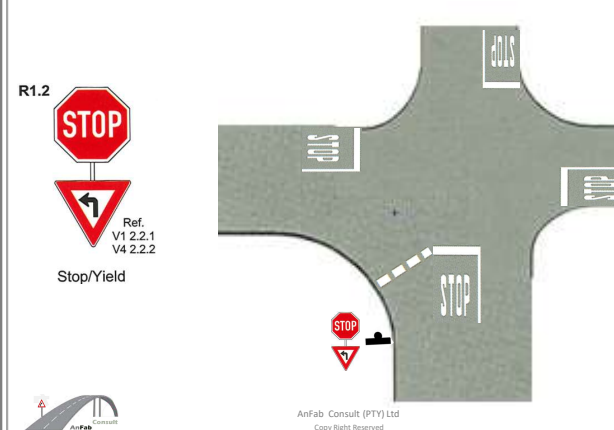
Roadworks Temporary Regulatory R1.1 Stop Signs



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Roadworks Temporary Regulatory R1.2 Stop/Yield Signs




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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.


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R1.5A
Stop
(Stop/Go Control)

References
V1 2.2.3
V4 2.2.1



R1.5B
Go
(Stop/Go Control)

References
V1 2.2.3
V4 2.2.4

(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:

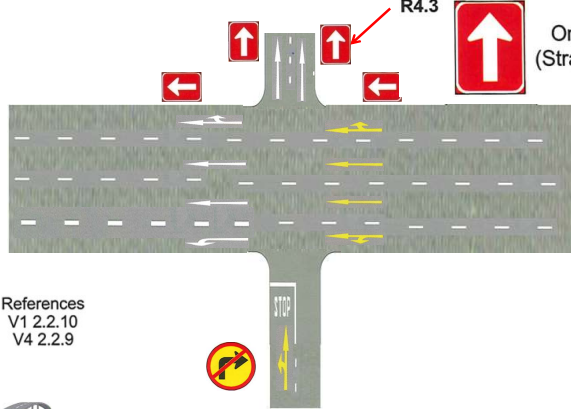
- (i) a mandatory requirement that the driver of a vehicle shall stop such vehicle with its front end in line with the stop sign, and-
- (ii) a mandatory requirement that the driver shall not proceed until permitted to do so by the display of the GO sign, and then with caution.

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.

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Roadworks Temporary Regulatory Signs



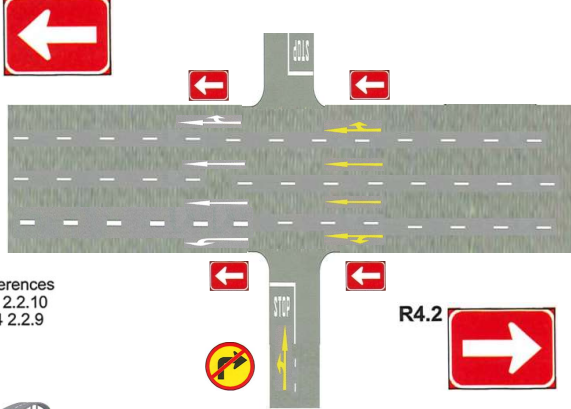
R4.3 One - Way (Straight - On)

References
V1 2.2.10
V4 2.2.9

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Roadworks Temporary Regulatory Signs



R4.1 R4.2

References
V1 2.2.10
V4 2.2.9

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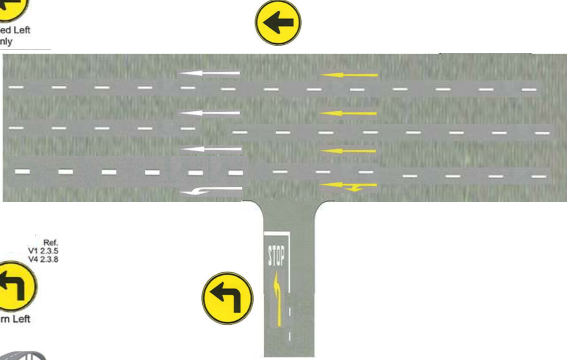
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Roadworks Temporary Regulatory Signs

Ref. V1 2.3.4 V4 2.3.5

TR105

Proceed Left Only



Ref. V1 2.3.5 V4 2.3.8

TR108

Turn Left

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Roadworks Temporary Regulatory Command Signs

Ref. V1 2.3.5 V4 2.3.8

TR108

Turn Left

Ref. V1 2.3.5 V4 2.3.9

TR109

Turn Right

2.3.5 Turn Left and Turn Right

1 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).

2 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.

3 If the mandatory requirement excludes one class of vehicle the movement which that class of vehicle shall undertake should be signed separately.

4 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.

5 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.

6 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.

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Roadworks Temporary Regulatory Command Signs

Ref. V1 2.3.4 V4 2.3.5

TR105

Proceed Left Only

Ref. V1 2.3.4 V4 2.3.6

TR106

Proceed Right Only

Ref. V1 2.3.4 V4 2.3.7

TR107

Proceed Straight Only

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

1 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.

2 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.

3 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.

4 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.

5 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.

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Roadworks Temporary Regulatory Command Signs

Ref. V1 2.3.4 V4 2.3.5


TR105

Proceed Left Only

Ref. V1 2.3.5 V4 2.3.8

TR108

Turn Left




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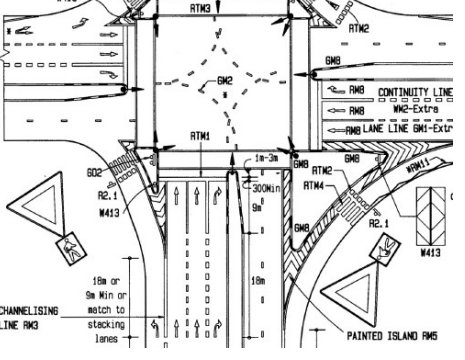
116

Roadworks Temporary Regulatory Signs

R2.1



References
V1 2.2.7
V4 2.2.6
Yield to
Pedestrians



CHANNELISING LINE RM3
15m or
9m Min or
width to
stacking
lanes


PAINTED ISLAND RM6

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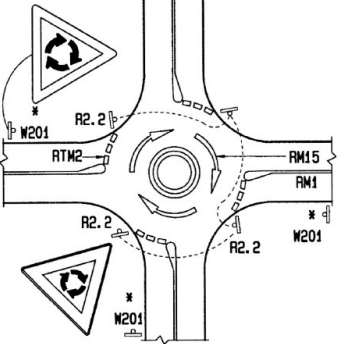
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Roadworks Temporary Regulatory Signs

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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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.)


- Cave 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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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 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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Roadworks Temporary Regulatory Signs

Detour – Proceed Left Only



Sharpe Curve Chevron

NO Entry – Road Closed



Road Closed Chevron



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Roadworks Temporary Regulatory Signs

Detour – Proceed Left



Sharpe Curve Chevron

Road Closed –
Authorised Entry Only



Road Closed Chevron



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Roadworks Temporary Regulatory Command Signs

2.3.3 Keep Left and Keep Right



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Roadworks Temporary Regulatory Prohibition Signs

2.4.1 Speed Limit



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Roadworks Temporary Regulatory Prohibition and Warning Height Limit Signs

2.4.4 Height Limit

Ref. V1 2.4.4
V4 2.4.6

TR204
Height Limit

Height Limit

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

height over any part of the full width of the roadway is less than 5.2 m. The actual clearance height, less a safety allowance of at least 75 mm, should be shown to two decimal places of a metre, and rounded down to the second decimal.

6 Advance warning of the height limit should be given by the use of the HEIGHT RESTRICTED warning sign W303 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 8km". 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.

References V1 3.4.8
V4 3.4.20

TW320
Height Restricted

Height Restricted

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Height Limit Regulatory Prohibition Signs

9000 Height Limit Signs Class III

300x1200 Danger Plates Class III

Typical Height Limit – Permanent Condition

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Height Limit Regulatory Prohibition Signs

9000 Height Limit Signs Class III

300x1200 Danger Plates Class III

Typical Height Limit – Permanent Condition

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Height Limit Regulatory Prohibition Signs

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

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Roadworks Temporary Warning Height Limit Signs

TW320  **Height Restricted**

References
V1 3.4.8
V4 3.4.20

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).

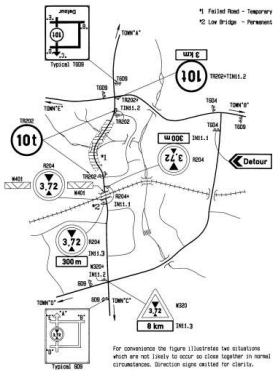


Fig 3.9 Height/Width or Other Restriction Ahead

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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

2.4.9 No Left Turn Ahead and No Right Turn Ahead

TR209  **No Left Turn Ahead**

Ref. V1 2.4.8 V4 2.4.11

TR210  **No Right Turn Ahead**

Ref. V1 2.4.8 V4 2.4.12

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



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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;

(iv) a motor tricycle;

(v) 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

(vi) 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;

Roadworks Temporary Regulatory Comprehensive Signs

R402



Single Carriageway
Freeway Begins



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(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;

(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.

Roadworks Temporary Regulatory Comprehensive Signs

TR402



References
V1 2.6.2
V4 2.6.2

Single Carriageway
Freeway Begins



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2.6.2 Single Carriageway Freeway Begins

1 The SINGLE CARRIAGEWAY FREEWAY BEGINS regulatory sign TR402 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

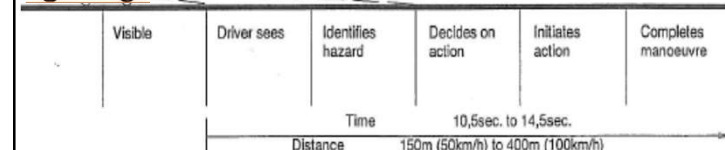
freeway or on a Class B roadway, to indicate the distance to the start of the Class A2 freeway.

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.

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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Roadworks Temporary Warning Signs

| TABLE 3.2 VISIBILITY DISTANCE TO WARNING SIGN | |
|---|-------------------------------|
| 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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Roadworks Temporary Warning Signs

| TABLE 3.1 ADVANCE WARNING SIGN LOCATION AND SIZE | | |
|--|--------------------------------------|-----------------------|
| Operating speed (km/h) | Location distance from hazard (m)(2) | Recommended size (mm) |
| 120 | 330 (400) | 1500 |
| 100 | 240 (320) | 1500 |
| 80 | 7 seconds 160 (218) | 1200 1500mm |
| 60 | 7 seconds 120 (160) | 900 1500mm |
| 40 | 7 seconds 80m | 1200mm |

Reaction Time (Distance) Available




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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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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)

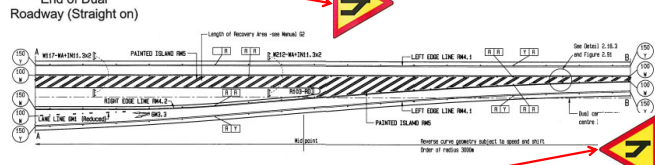



Diagram illustrating the placement of TW117 and TW119 signs in a road layout scenario, showing the sequence of signs and the resulting road configuration.



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Roadworks Temporary Warning Road Layout Signs

TW201 References V1 3.3.1 V4 3.3.1
Traffic Circle

R2.2 References V1 2.2.8 V4 2.2.7
Yield at Mini Circle

TR137 Ref. V1 2.3.17 V4 2.3.37
Roundabout

Regulatory Control and Command

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Roadworks Temporary Warning Road Layout Signs

TW202 References V1 3.3.1 V4 3.3.2
Gentle Curve (Right)

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 References V1 3.3.2 V4 3.3.4
Sharp Curve (Right)

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 References V1 3.3.2 V4 3.3.6
Hairpin Bend (Right)

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




**Combined Curves
(Right - Left)**

References
V1 3.3.4
V4 3.3.10

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.



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Roadworks Temporary Warning Road Layout Signs

TW212




Two - Way Traffic

References
V1 3.3.4
V4 3.3.12

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-WAY TRAFFIC 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).



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Roadworks Temporary Warning Road Layout Signs

TW215

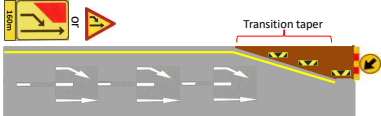


Left Lane Ends

References
V1 3.3.5
V4 3.3.15

3.3.8 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.



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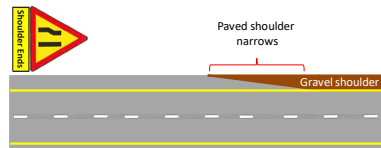
Roadworks Temporary Warning Road Layout Signs

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).




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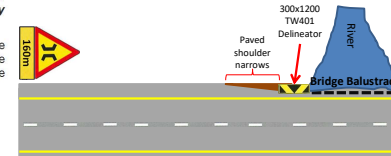
Roadworks Temporary Warning Road Layout Signs

TW326 References V1 3.4.12 V4 3.4.26



Narrow Bridge

- The NARROW BRIDGE warning sign W326 is to warn road users that the width of roadway is reduced over a short distance at a bridge on the roadway ahead.
- Sign W326 should be displayed in advance of bridge structures when the clear width over or under the bridge is more than 1m narrower than the clear width of the approaching roadway.
- 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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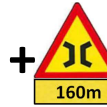
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Roadworks Temporary Warning Road Layout Signs


TW327 References V1 3.4.12 V4 3.4.27





One Vehicle Width Structure

+  160m If narrow structure is a bridge


or

+  If narrow structure is NOT a bridge

+  **STOP** +  **Proceed when clear**

Drivers must be able to see each other on both ends of the start of the narrow structure







- The ONE VEHICLE WIDTH STRUCTURE warning sign W327 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 W327 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 W326 should be displayed. The ROAD NARROWS FROM BOTH SIDES warning sign W328 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.

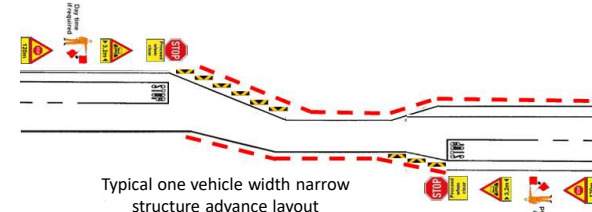


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 160m +  160m or  +  3,2m +  **STOP** +  **Proceed when clear**




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



- 1 The TRAFFIC SIGNALS AHEAD warning sign W301 is to warn road users of the presence of a traffic control signal ahead.
- 2 Sign W301 should be displayed in advance of:
 - (a) any isolated or new traffic control signal installation;
 - (b) 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;
 - (c) an isolated or midblock pedestrian crossing controlled by traffic signals.
- 3 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.
- 4 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.
- 5 Temporary warning sign TW301 should be used in advance of any temporary traffic signal.




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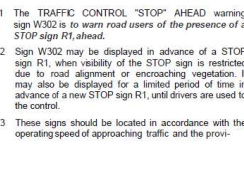
Roadworks Temporary Warning Road Layout Signs

TW302




Traffic Control "Stop" Ahead

References
V1 3.4.1
V4 3.4.2



- 1 The TRAFFIC CONTROL "STOP" AHEAD warning sign W302 is to warn road users of the presence of a STOP sign R1 ahead.
- 2 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.
- 3 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 W302 sign (see Section 3.6).
- 4 Temporary warning sign TW302 may be used under the same circumstances as permanent TRAFFIC CONTROL "STOP" AHEAD warning signs when temporary STOP controls exist at roadworks sites.




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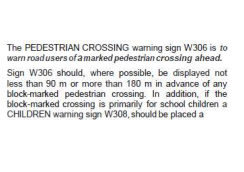
Roadworks Temporary Warning Road Layout Signs

TW306




Pedestrian Crossing

References
V1 3.4.3
V4 3.4.6



- 1 The PEDESTRIAN CROSSING warning sign W306 is to warn road users of a marked pedestrian crossing ahead.
- 2 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.
- 3 A temporary warning sign TW306 should be used if a temporary pedestrian crossing is installed as part of a roadworks detour.




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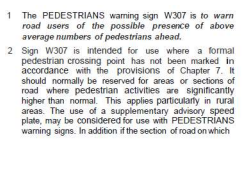
Roadworks Temporary Warning Road Layout Signs

TW307




Pedestrians

References
V1 3.4.4
V4 3.4.7



- 1 The PEDESTRIANS warning sign W307 is to warn road users of the possible presence of above average numbers of pedestrians ahead.
- 2 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).
- 3 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.
- 4 Temporary warning sign TW307 may be used under the same circumstances as permanent PEDESTRIANS warning signs if roadworks detours cross well used pedestrian routes.




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Roadworks Temporary Warning Road Layout Signs

TW321




Length Restricted

References
V1 3.4.9
V4 3.4.21




- 1 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.
- 2 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.
- 3 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).
- 4 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.




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Roadworks Temporary Warning Road Layout Signs




References
V1 3.4.10
V4 3.4.22




References
V1 3.4.10
V4 3.4.23



1:12
For 5 km





1:12
For 5 km

1 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.

2 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.

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.


4 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 GS505 (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).

5 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.

6 Sign W324 should be located in accordance with the provisions of Table 3.1 or Figure 3.1.

7 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 8 km" or IN114, 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).

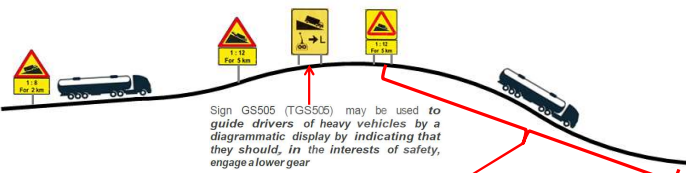
8 Temporary warning signs TW323 and TW324 may be used under the same circumstances as the permanent STEEP DESCENT and STEEP ASCENT warning signs when steep downhill or uphill sections of roadway occur on roadworks detours.



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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 | Minimum length (m) |
|-----------|--------------------|
| 5% (1)(2) | 1000 |
| 7% | 300 |
| 8% | 250 |
| 10% | 150 |
| Steeper | 90 |

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.


Steep Ascent and Descent Temporary Signage



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Roadworks Temporary Warning Road Layout Signs



References
V1 3.4.11
V4 3.4.25

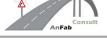
Gravel Road Begins

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



References
V1 3.4.14
V4 3.4.31

Uneven Roadway
OR POTHOLED



Potholes
For 12km


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.

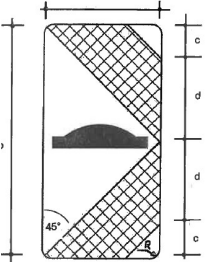


TW416 and TW417

- The SPEED HUMPS warning sign W332 is to warn road users of speed humps on the roadway ahead which require a reduction in speed.
- 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.
- 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.
- 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



Dimensions

| a | b | c | d | r |
|-----|-----|----|-----|----|
| 300 | 600 | 90 | 210 | 25 |

3.5.10 SPEED HUMP DANGER PLATES (proposed)

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

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Roadworks Temporary Warning Road Layout Signs

TW333



Slippery Road

References
V1 3.4.15
V4 3.4.33


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".

- 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.
- 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)**

References
V1 3.4.15
V4 3.4.35

TW334



**Falling Rocks
(From Right)**

- 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 cut- tings are relatively common. The signs may be retained.


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Roadworks Temporary Warning Road Layout Signs




TW336
References
V1 3.4.16
V4 3.4.36


Roadworks



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

If No Symbol Available

- 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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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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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;
 - 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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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, 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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Roadworks Temporary Warning Road Layout Signs



3.5.1 Danger Plates/Delineator Plates

- 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.
- 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.
- 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).
- 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.
- 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 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.



- Tapers, median crossovers and other temporary alignments at roadworks sites should be demarcated using sequences of DELINEATOR PLATES spaced according to Table 3.4.
- Details of applications of DELINEATOR PLATES are covered in Volume 2, Chapter 13.
- 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).
- 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).

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Roadworks Temporary Warning Road Layout Signs




TABLE 3.4 DELINEATOR SPACING

| 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.





TABLE 3.4

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

All delineators to comply with **SANS 1555**



TW401



TW402

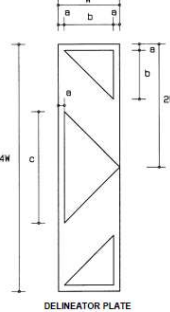
DIMENSIONS (mm)

| 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 |

➤ **Class III** reflective sheeting

➤ **Anchor pin** between blade and base

➤ Correct size **200x800** reflective



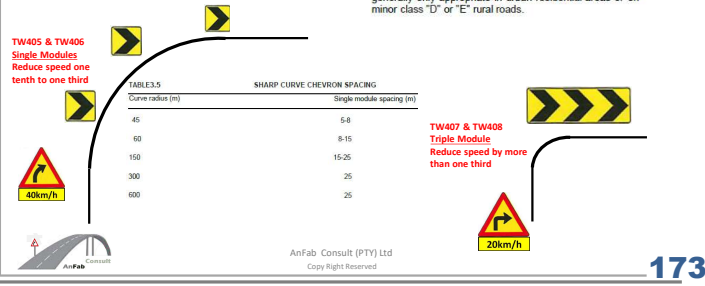
DELINEATOR PLATE

Transition Area - Delineators

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Roadworks Temporary Warning Road Layout Sharpe Curve Chevrons

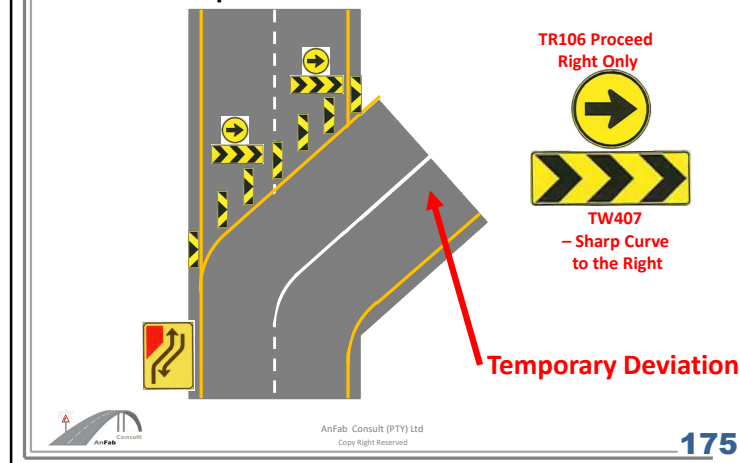
- 1 The SHARP CURVE CHEVRON warning signs W405, W406, W407, and W408 are to warn road users that the roadway ahead is diverted to the right or left through a sudden change of direction around a sharp curve.
- 2 The SHARP CURVE CHEVRON warning signs W405 and W406 shall be displayed in multiples of three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



Roadworks Temporary Warning Road Layout Signs Sharp Curve Chevrons

- TW405**
Single Module
Reduce speed one tenth to one third
- TW406**
- TW407**
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 that three 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 1.23).
 - 6 In terms of the recommendations given in paragraphs 3.5.3.2 to 3.5.3.5 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 gore areas (see Subsection 3.5.8).
 - 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 W406. 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 roadway 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 TW406, 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



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

- TW409**
- 1 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.
 - 2 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.
 - 3 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 G02. 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.
 - 4 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.
 - 5 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



- 1 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.
- 2 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.
- 3 The sign may be displayed in addition to CUL-DE-SAC information signs, IN4 to IN6.
- 4 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.

- 5 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).
- 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



- 1 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**.
- 2 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 been given.
- 3 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.

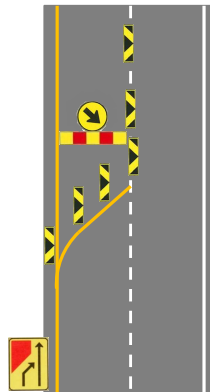
- 4 The use of TEMPORARY BARRICADE signs in conjunction with temporary PROCEED LEFT ONLY regulatory sign TR105, or temporary PROCEED RIGHT ONLY regulatory sign TR106 is not recommended. TR105 and/or TR106 signs should rather be used with temporary ROAD CLOSED CHEVRON warning sign TW410 if a road has 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.
- 5 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.
- 6 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

**Temporary Deviation
not Provided**



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Roadworks Temporary Warning Road Exit Ramp Signs

TW413



Urban

References
V1 3.5.8
V4 3.5.8

TW414



Rural

References
V1 3.5.8
V4 3.5.9

TGA4(E)



**Freeway Normal
Exit Position**

TGA4(V)



**Freeway Exit
Position Moved**

- 1 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**.
- 2 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.
- 3 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.
- 4 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

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

or

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

TW342 References V1 3.4.19 V4 3.4.42

Soft Shoulder

- 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.
- 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 at a distance in accordance with the operating speed of approach traffic and the provisions of the graph in Figure 3.1.
- The use of a SUPPLEMENTARY PLATE sign IN11.2 with sign TW342 is recommended if the condition exists for some distance.
- 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.

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Roadworks Temporary Warning Road Layout Signs

TW340 References V1 3.4.19 V4 3.4.40

Surface Step (Right)

TW341 References V1 3.4.19 V4 3.4.41

Surface Step (Left)

- The SURFACE STEP temporary warning signs TW340 and TW341 are to warn road users of a hazardous change in the level of the roadway.
- Signs TW340 and TW341 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.
- Sign TW340 should be used when the right-hand side road surface is higher than the left, and sign TW341 when the left-hand side road surface is higher than the right.
- Resurfacing operations tend to occur over some distance. SUPPLEMENTARY PLATE sign IN11.2 are therefore recommended or signs may be repeated at intervals.
- 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.
- 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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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles

Road Traffic Sign – Sign Placement

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

- longitudinally in relation to the road way alignment
- Laterally in relation to the roadway cross-section
- Vertically

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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:

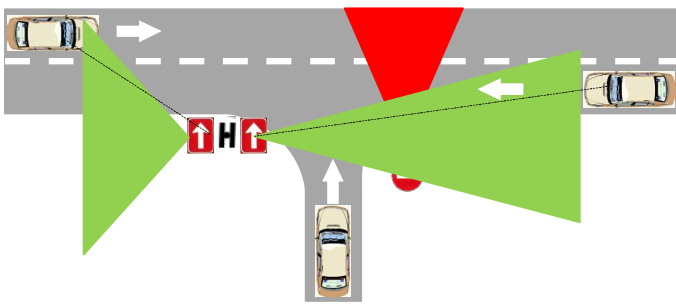
- (a) the commencement of a regulatory control;
- (b) a hazard to road users;
- (c) a road junction.



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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

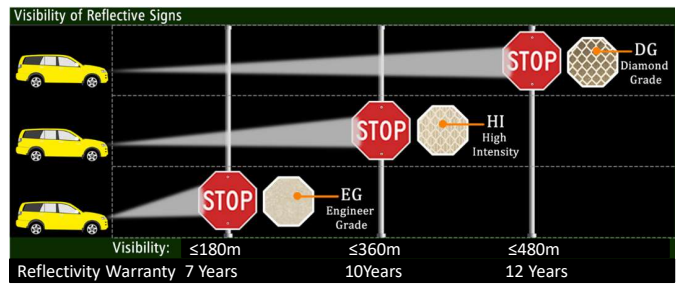


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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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

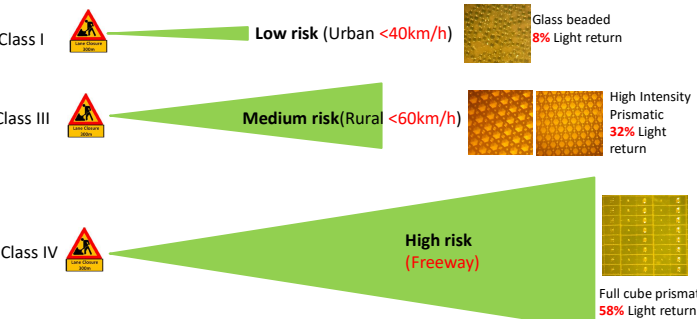
Visibility of Reflective Signs



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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1


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



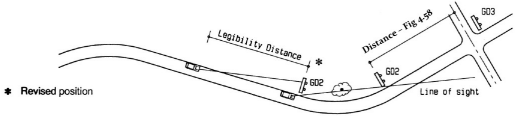
188

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

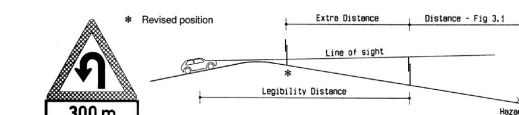
Chapter 1 – General Principles Road Traffic Sign – Longitudinal Placement



Detail 1.15.2 Guidance Sign Out of Sight (Horizontal Obstruction)



Detail 1.15.1 Warning Sign Out of Sight (Vertical Obstruction)




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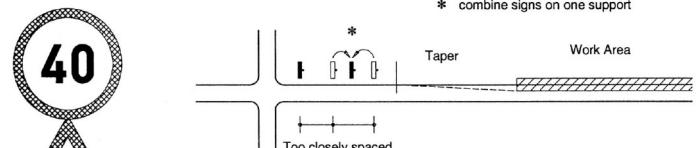
189

SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles Road Traffic Sign – Longitudinal Placement



Detail 1.16.1 Insufficient Longitudinal Space for Several Signs



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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

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

NOTES:

- As an alternative to repositioning signs the shaded area may be cleared or obstructions.
- 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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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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




TABLE 1.3 LATERAL AND VERTICAL PERMANENT SIGN PLACEMENT DIMENSIONS

| 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 | 1800 | |
| 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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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 1 – General Principles
Positive Guidance – Visual Information System

(a) formal information sources:

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

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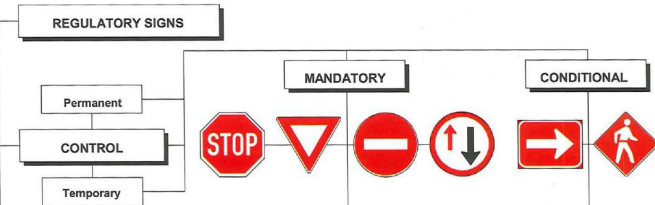
SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

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

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Chapter 2 – Regulatory Signs Control Signs

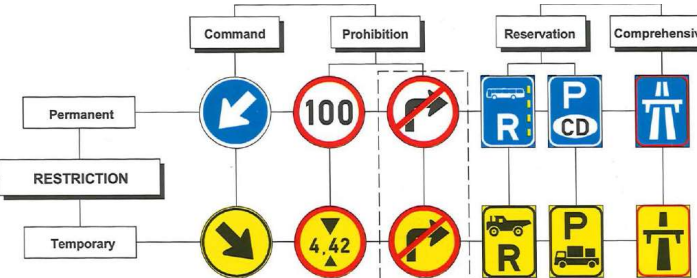


```

graph TD
    RS[REGULATORY SIGNS] --> P[Permanent]
    RS --> C[CONTROL]
    RS --> T[Temporary]
    C --> M[MANDATORY]
    C --> CO[CONDITIONAL]
    M --> STOP[STOP]
    M --> YIELD[YIELD]
    M --> NO_ENTRY[NO ENTRY]
    M --> ONEWAY[ONEWAY]
    CO --> RIGHTTURN[RIGHT TURN]
    CO --> PEDESTRIAN[PEDESTRIAN]
  
```

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Chapter 2 – Regulatory Signs Command, Prohibition, Reservation and Comprehensive



```

graph TD
    RS[REGULATORY SIGNS] --> P[Permanent]
    RS --> R[RESTRICTION]
    RS --> T[Temporary]
    P --> C[Command]
    P --> PR[Prohibition]
    P --> RE[Reservation]
    P --> CO[Comprehensive]
    R --> C
    R --> PR
    R --> RE
    R --> CO
    T --> C
    T --> PR
    T --> RE
    T --> CO
  
```

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Chapter 2 – Regulatory Signs

Selective Restriction

Permanent

SELECTIVE RESTRICTION

Temporary

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Chapter 2 – Regulatory Signs

Key to Information Given in Contents

permanent sign no

permanent sign colours

Volume 1 & 4 page references

Ref. V1 2.4.8 V4.2.12

temporary sign no

temporary sign colours

sign name

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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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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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Chapter 2 – Regulatory Signs

Command Signs

| | | | | |
|---|---|--|---|--|
| R101 TR101 Minimum Speed | R102 TR102 Vehicles Exceeding Mass Only | R103 TR103 Keep Left | R104 TR104 Keep Right | R105 TR105 Proceed Left Only |
| R106 TR106 Proceed Right Only | R107 TR107 Proceed Straight Only | R108 TR108 Turn Left | R109 TR109 Turn Right | R110 TR110 Pedestrians Only |

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Chapter 2 – Regulatory Signs

Command Signs

| | | |
|---|---|---|
| R125 TR125 Construction Vehicles Only | R127 TR127 Abnormal Vehicles Only | R137 TR137 Roundabout |
|---|---|---|

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Chapter 2 – Regulatory Signs

Prohibition Signs

| | | | | |
|---|--|---|---|--|
| R201 TR201 Speed Limit | R202 TR202 Mass Limit | R203 TR203 Axle Massload Limit | R204 TR204 Height Limit | R205 TR205 Length Limit |
| R206 TR206 No Excessive Noise | R207 TR207 No Hitch-Hiking | R208 TR208 No Unauthorized Vehicles | R209 TR209 No Left Turn Ahead | R210 TR210 No Right Turn Ahead |

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Chapter 2 – Regulatory Signs

Prohibition Signs

| | | | | |
|---|--|---|---|---|
| R211 TR211 No Left Turn | R212 TR212 No Right Turn | R213 TR213 No U-Turn | R214 TR214 No Overtaking - All Vehicles | R215 TR215 No Overtaking - Goods Vehicles |
| R216 TR216 No Parking | R217 TR217 No Stopping | R218 TR218 No Pedestrians | R219 TR219 No Cyclists | R220 TR220 No Cyclists and Pedestrians |

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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 2.1 m**
Ref. V1 2.4.21 V4 2.4.40

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Chapter 2 – Regulatory Signs

Comprehensive Regulatory Signs

R401 **TR401** **Dual Carriageway Freeway Begins**
References V1 2.6.1 V4 2.6.1

R402 **TR402** **Single Carriageway Freeway Begins**
References V1 2.6.2 V4 2.6.2

R403 **TR403** **Woonerf**
References V1 2.6.3 V4 2.6.3

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Chapter 2 – Regulatory Signs

De-Restriction Signs

R401-600 **TR401-600** **End of Dual Carriageway Freeway**
References V1 2.9.1 V4 2.8.7

R402-600 **TR402-600** **End of Single Carriageway Freeway**
References V1 2.9.1 V4 2.8.8

R403-600 **TR403-600** **End of Woonerf**
References V1 2.9.1 V4 2.8.9

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Chapter 2 – Regulatory Signs

Combinations

R214 **IN11.2** **For 2 km**
Detail 2.17.1 Distance "For" (IN11.2)

R133 **IN11.2** **For 5 km**

R402 **IN11.2** **For 3 km**

R132 **IN11.3** **400 m**
Detail 2.17.2 Distance "To" (IN11.3)

R402 **IN11.3** **800 m**

TR108 **(R)569** **TIN11.3** **200 m**

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Chapter 2 – Regulatory Signs

Combinations

Detail 2.17.3 Text Message (IN11.4)

Detail 2.17.4 Symbol (IN11.5)

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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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Chapter 2 – Regulatory Signs

Control Signs

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Chapter 2 – Regulatory Signs

Combinations

TR204-RF-SS3

TIN11.3

TR201-RB/RE

Detour

Detail 2.19.2 With Flashing Yellow Signals

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SADC ROAD TRAFFIC SIGNS MANUAL Volume 1 – Part 1

Chapter 3 – Warning Signs

Road Layout
W100 Series

Movement
W200 Series

Symbolic
W300 Series

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Chapter 3 – Regulatory Signs

Warning Signs

Permanent

HAZARD MARKERS

 Temporary

Object Marker

Curve Marker

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Chapter 3 – Warning Signs

ADD INFORMATION

 information plate

high visibility

 flashing yellow signal

high visibility plus flashing yellow signals

 200 m

1:20
For 7 km

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Chapter 2 – Regulatory Signs

Warning Signs - Key to Information Given in Contents

permanent sign no
 W101

permanent sign colours

 References
V1 3.2.1
V4 3.2.6

temporary sign no
 TW101

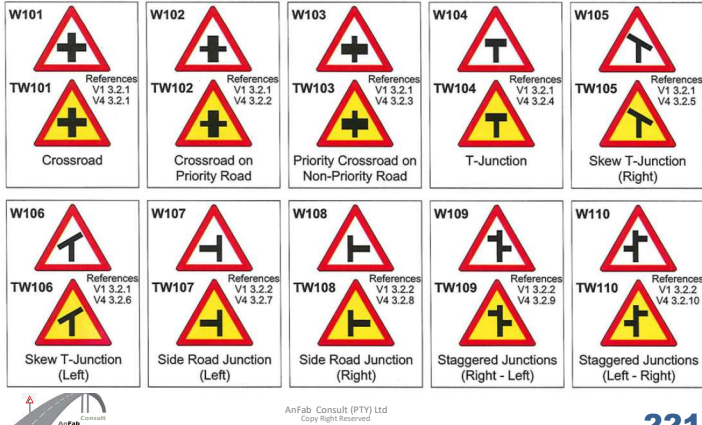
temporary sign colours

 Crossroad
 sign name

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Chapter 3 – Warning Signs

Road Layout W100 Series



This slide displays ten warning signs for road layouts, arranged in two rows of five. Each sign is shown in its standard triangular shape with a red border and a yellow background. The signs are labeled with their codes (W101 to W110) and descriptions. References to V1 and V4 standards are provided for each sign.

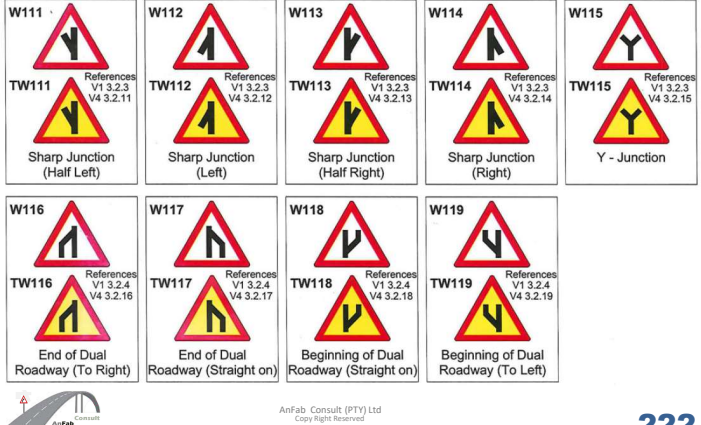
| Code | Description | References |
|------|---|---------------------|
| W101 | Crossroad | V1 3.2.1, V4 3.2.1 |
| W102 | Crossroad on Priority Road | V1 3.2.1, V4 3.2.2 |
| W103 | Priority Crossroad on Non-Priority Road | V1 3.2.1, V4 3.2.3 |
| W104 | T-Junction | V1 3.2.1, V4 3.2.4 |
| W105 | Skew T-Junction (Right) | V1 3.2.1, V4 3.2.5 |
| W106 | Skew T-Junction (Left) | V1 3.2.1, V4 3.2.6 |
| W107 | Side Road Junction (Left) | V1 3.2.2, V4 3.2.7 |
| W108 | Side Road Junction (Right) | V1 3.2.2, V4 3.2.8 |
| W109 | Staggered Junctions (Right - Left) | V1 3.2.2, V4 3.2.9 |
| W110 | Staggered Junctions (Left - Right) | V1 3.2.2, V4 3.2.10 |

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Chapter 3 – Warning Signs

Road Layout W100 Series



This slide displays ten warning signs for road layouts, arranged in two rows of five. Each sign is shown in its standard triangular shape with a red border and a yellow background. The signs are labeled with their codes (W111 to W119) and descriptions. References to V1 and V4 standards are provided for each sign.

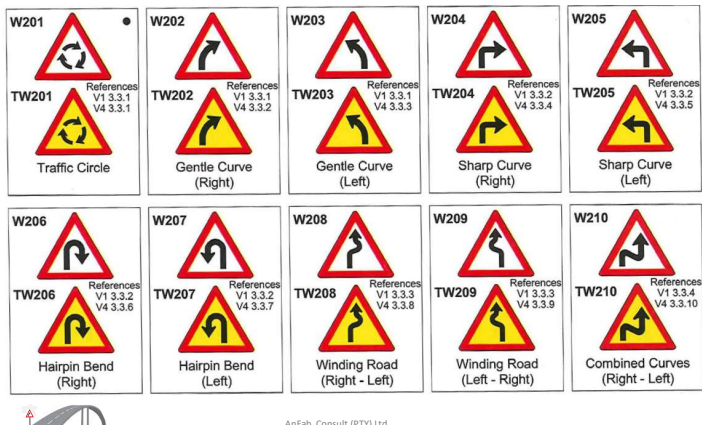
| Code | Description | References |
|------|---|---------------------|
| W111 | Sharp Junction (Half Left) | V1 3.2.3, V4 3.2.11 |
| W112 | Sharp Junction (Left) | V1 3.2.3, V4 3.2.12 |
| W113 | Sharp Junction (Half Right) | V1 3.2.3, V4 3.2.13 |
| W114 | Sharp Junction (Right) | V1 3.2.3, V4 3.2.14 |
| W115 | Y - Junction | V1 3.2.3, V4 3.2.15 |
| W116 | End of Dual Roadway (To Right) | V1 3.2.4, V4 3.2.16 |
| W117 | End of Dual Roadway (Straight on) | V1 3.2.4, V4 3.2.17 |
| W118 | Beginning of Dual Roadway (Straight on) | V1 3.2.4, V4 3.2.18 |
| W119 | Beginning of Dual Roadway (To Left) | V1 3.2.4, V4 3.2.19 |

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Chapter 3 – Warning Signs

Direction of Movement W200 Series



This slide displays ten warning signs for direction of movement, arranged in two rows of five. Each sign is shown in its standard triangular shape with a red border and a yellow background. The signs are labeled with their codes (W201 to W210) and descriptions. References to V1 and V4 standards are provided for each sign.

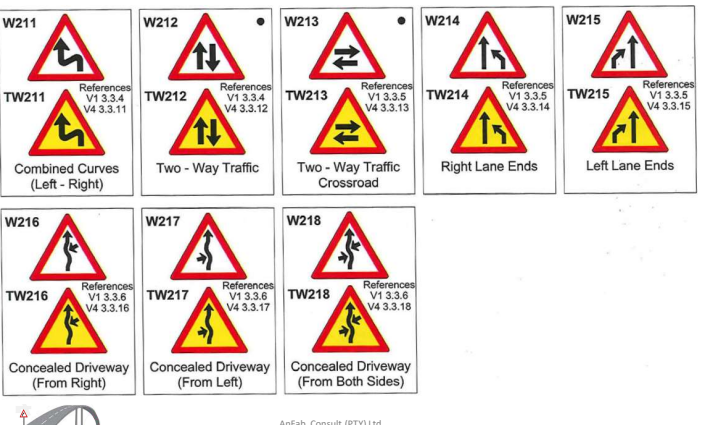
| Code | Description | References |
|------|--------------------------------|---------------------|
| W201 | Traffic Circle | V1 3.3.1, V4 3.3.1 |
| W202 | Gentle Curve (Right) | V1 3.3.1, V4 3.3.2 |
| W203 | Gentle Curve (Left) | V1 3.3.1, V4 3.3.3 |
| W204 | Sharp Curve (Right) | V1 3.3.1, V4 3.3.4 |
| W205 | Sharp Curve (Left) | V1 3.3.1, V4 3.3.5 |
| W206 | Hairpin Bend (Right) | V1 3.3.2, V4 3.3.6 |
| W207 | Hairpin Bend (Left) | V1 3.3.2, V4 3.3.7 |
| W208 | Winding Road (Right - Left) | V1 3.3.3, V4 3.3.8 |
| W209 | Winding Road (Left - Right) | V1 3.3.3, V4 3.3.9 |
| W210 | Combined Curves (Right - Left) | V1 3.3.4, V4 3.3.10 |

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Chapter 3 – Warning Signs

Direction of Movement W200 Series



This slide displays ten warning signs for direction of movement, arranged in two rows of five. Each sign is shown in its standard triangular shape with a red border and a yellow background. The signs are labeled with their codes (W211 to W218) and descriptions. References to V1 and V4 standards are provided for each sign.

| Code | Description | References |
|------|--------------------------------------|---------------------|
| W211 | Combined Curves (Left - Right) | V1 3.3.4, V4 3.3.11 |
| W212 | Two - Way Traffic | V1 3.3.4, V4 3.3.12 |
| W213 | Two - Way Traffic Crossroad | V1 3.3.5, V4 3.3.13 |
| W214 | Right Lane Ends | V1 3.3.5, V4 3.3.14 |
| W215 | Left Lane Ends | V1 3.3.5, V4 3.3.15 |
| W216 | Concealed Driveway (From Right) | V1 3.3.6, V4 3.3.16 |
| W217 | Concealed Driveway (From Left) | V1 3.3.6, V4 3.3.17 |
| W218 | Concealed Driveway (From Both Sides) | V1 3.3.6, V4 3.3.18 |

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Chapter 3 – Warning Signs

Symbolic W300 Series

References: V1 3.4.1, V4 3.4.1

References: V1 3.4.1, V4 3.4.2

References: V1 3.4.2, V4 3.4.3

References: V1 3.4.2, V4 3.4.4

References: V1 3.4.5, V4 3.4.5

References: V1 3.4.3, V4 3.4.6

References: V1 3.4.4, V4 3.4.7

References: V1 3.4.4, V4 3.4.8

References: V1 3.4.5, V4 3.4.9

References: V1 3.4.5, V4 3.4.10

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Chapter 3 – Warning Signs

Symbolic W300 Series

References: V1 3.4.5, V4 3.4.11

References: V1 3.4.5, V4 3.4.12

References: V1 3.4.6, V4 3.4.13

References: V1 3.4.6, V4 3.4.14

References: V1 3.4.7, V4 3.4.15

References: V1 3.4.7, V4 3.4.16

References: V1 3.4.7, V4 3.4.17

References: V1 3.4.7, V4 3.4.18

References: V1 3.4.8, V4 3.4.19

References: V1 3.4.8, V4 3.4.20

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Chapter 3 – Warning Signs

Symbolic W300 Series

References: V1 3.4.9, V4 3.4.21

References: V1 3.4.10, V4 3.4.22

References: V1 3.4.10, V4 3.4.23

References: V1 3.4.11, V4 3.4.24

References: V1 3.4.11, V4 3.4.25

References: V1 3.4.12, V4 3.4.26

References: V1 3.4.12, V4 3.4.27

References: V1 3.4.13, V4 3.4.28

References: V1 3.4.13, V4 3.4.29

References: V1 3.4.13, V4 3.4.30

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Chapter 3 – Warning Signs

Symbolic W300 Series

References: V1 3.4.14, V4 3.4.31

References: V1 3.4.14, V4 3.4.32

References: V1 3.4.15, V4 3.4.33

References: V1 3.4.15, V4 3.4.34

References: V1 3.4.15, V4 3.4.35

References: V1 3.4.16, V4 3.4.36

References: V1 3.4.17, V4 3.4.37

References: V1 3.4.17, V4 3.4.38

References: V1 3.4.18, V4 3.4.39

References: V1 3.4.19, V4 3.4.40

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Chapter 3 – Warning Signs

Symbolic W300 Series

References: V1 3.4.19, V4 3.4.41
TW341 Surface Step (Left)

References: V1 3.4.19, V4 3.4.42
TW342 Soft Shoulder

References: V1 3.4.20, V4 3.4.43
TW343 "Stop/Go" Control Ahead

References: V1 3.4.20, V4 3.4.44
TW344 Construction Vehicles Crossing (From Left)

References: V1 3.4.20, V4 3.4.45
TW345 Construction Vehicles Crossing (From Right)

References: V1 3.4.21, V4 3.4.46
TW346 Emergency Flashing Light

References: V1 3.4.21, V4 3.4.47
TW347 Temporary Police Flashing Light

References: V1 3.4.22, V4 3.4.48
TW348 Jetty Edge or River Bank

References: V1 3.4.22, V4 3.4.49
TW349 Crosswinds

References: V1 3.4.23, V4 3.4.50
TW350 Drift

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Chapter 3 – Warning Signs

Symbolic W300 Series

References: V1 3.4.23, V4 3.4.51
W351 Low Flying Aircraft

References: V1 3.4.24, V4 3.4.52
W352 Agricultural Vehicles

References: V1 3.4.24, V4 3.4.53
W353 Accident

References: V1 3.4.25, V4 3.4.54
W354 Reduced Visibility

References: V1 3.4.25, V4 3.4.55
W355 Congestion

References: V1 3.4.26, V4 3.4.56
W356 Horse and Rider

References: V1 3.4.26, V4 3.4.57
W357 Elephant

References: V1 3.4.27, V4 3.4.58
W358 Warthog

References: V1 3.4.27, V4 3.4.59
W359 Hippo

References: V1 3.4.28, V4 3.4.60
W360 Width Restriction

References: V1 3.4.29, V4 3.4.61
W361 Electrical Shock

References: V1 3.4.30, V4 3.4.62
W362 Tram

References: V1 3.4.31, V4 3.4.63
W363 Gravel Road Ends

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Chapter 3 – Warning Signs

Hazard Markers W400 Series

References: V1 3.5.1, V4 3.5.1
W401 Danger Plate/Delineator Plate

References: V1 3.5.1, V4 3.5.1
W402 Danger Plate/Delineator Plate

References: V1 3.5.2, V4 3.5.2
W403 Railway Crossing

References: V1 3.5.2, V4 3.5.2
W404 Railway Crossing (more than one line)

References: V1 3.5.3, V4 3.5.3
W405 Sharp Curve Chevron (Single)

References: V1 3.5.3, V4 3.5.3
W406 Sharp Curve Chevron (Single)

References: V1 3.5.3, V4 3.5.3
W407 Sharp Curve Chevron (Triple)

References: V1 3.5.3, V4 3.5.3
W408 Sharp Curve Chevron (Triple)

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Chapter 3 – Warning Signs

Hazard Markers W400 Series


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Chapter 3 – Warning Signs

Hazard Markers W400 Series



| | |
|---|---|
| W409  TW409  T-Junction Chevron References V1 3.5.5 V4 3.5.5 | W410  TW410  Dead End / Road Closed Chevron References V1 3.5.6 V4 3.5.6 |
| W411  TW411  Boom/ Barricade References V1 3.5.7 V4 3.5.7 | TW412  Traffic Signals Out of Order References V1 3.5.8 V4 3.5.8 |










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Chapter 3 – Warning Signs

Hazard Markers W400 Series



| | | |
|---|---|--|
| W413  TW413  Gore Plate References V1 3.5.8 V4 3.5.8 | W414  TW414  Gore Chevron References V1 3.5.9 V4 3.5.9 | W415  TW415  Overhead Danger Plate References V1 3.5.9 V4 3.5.11 |
|---|---|--|






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Chapter 3 – Warning Signs

Proposed Hazard Markers for Speed Hump









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Chapter 3 – Warning Signs

Hazard Markers for Obstructions and Speed Hump

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Chapter 3 – Warning Signs

Advance Warning Signs with Supplementary Plates

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

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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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Chapter 3 – Warning Signs

Examples: Symbolic Message – IN11.5

| | | |
|------------------|---------------------|---------------|
| | | |
| Blind People | Potholes | Ice |
| | | |
| Elderly People | Accident | Snow |
| | | |
| Dual Carriageway | Building Operations | End-Thank You |

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Chapter 3 – Warning Signs

High Visibility Signs

900mm x 1200mm

1200mm x 1800mm

1800mm x 2400mm

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

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Chapter 2 – Regulatory Signs

Warning Signs – High Visibility Signs

Examples: Warning Signs

W212-WA
IN11.3
200 m

W322-WF
+SS3
IN11.2
For 7km

TW345-WA

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Chapter 2 – Regulatory Signs

Warning Signs– High Visibility Signs

Examples: Dual Information Messages

W332-WB
IN11.1
Traffic Calming
40km/h

W302-WA
IN11.5
10t
IN11.3
1 km

W332-WB
IN11.4
Ice
IN11.2
For 12km

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Chapter 3 – Warning Signs

High Visibility Signs

Examples: Dual Warning or Regulatory and Warning Signs

W209 +
W322-WD
IN11.2
For 12km

R201-RC
60

TR201-RC
60

W218-WC
IN11.2
For 12km

TW331-WC
IN11.2
For 5km

TIN11.2

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Chapter 3 – Warning Signs

High Visibility Signs

Examples: Warning Signs with Flashing Yellow Lights

W209 +
W322-WD
IN11.2
For 12km

W218-WC
IN11.2
For 12km

TW331-WC
IN11.2
For 5km

TIN11.2

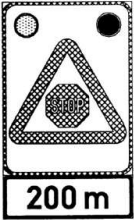
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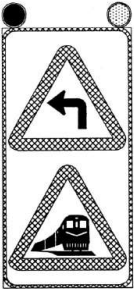
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Chapter 3 – Warning Signs

High Visibility Signs

Examples: High Visibility Backgrounds With Flashing Yellow Lights








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Chapter 3 – Warning Signs


Advance Warning Signs in High Visibility Backgrounds




TW338-WA
Refer V4 3.1.4
Type WA




W332-WB
Refer V4 3.1.5
Type WB




W212-WC
Refer V4 3.1.6
Type WC



W205 + W318 - WD
Refer V4 3.1.7
Type WD



TR201-RC+TW331-WC
Refer V4 3.1.6
Type RC + WC




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Chapter 3 – Warning Signs

with Flashing Yellow Signals - SS3


Multiple Combinations




Single
Signal
TW353 - SS3




Double
Signal
W204 - SS3




Four
Signals
W320 - SS3




W102 + IN11.5 + SS3




W302 - WA + IN11.5 + IN11.3




W322 - WE - SS3
Refer V1 6.7.4 / V4 3.1.10
Type WE




W336 - WF - SS3
Refer V1 6.7.4 / V4 3.1.10
Type WF



W339 + TIN11.4 + TIN11.2



W322 - WF + IN11.2 + SS3



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Chapter 3 – 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 |
| 70 | 140 | 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.

40

80m

1200mm



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Chapter 3 – 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 |



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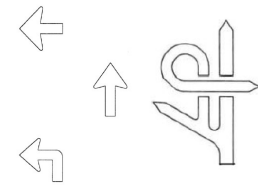
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Chapter 4 – Guidance Signs

- 4.1 Introduction



DESTINATION



DIRECTION



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Chapter 4 – Guidance Signs



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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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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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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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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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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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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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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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Chapter 4 – Guidance Signs
Lettering Styles

ABCDEFGHIJKLM
 NOPQRSTUVWXYZ
 1234567890&

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


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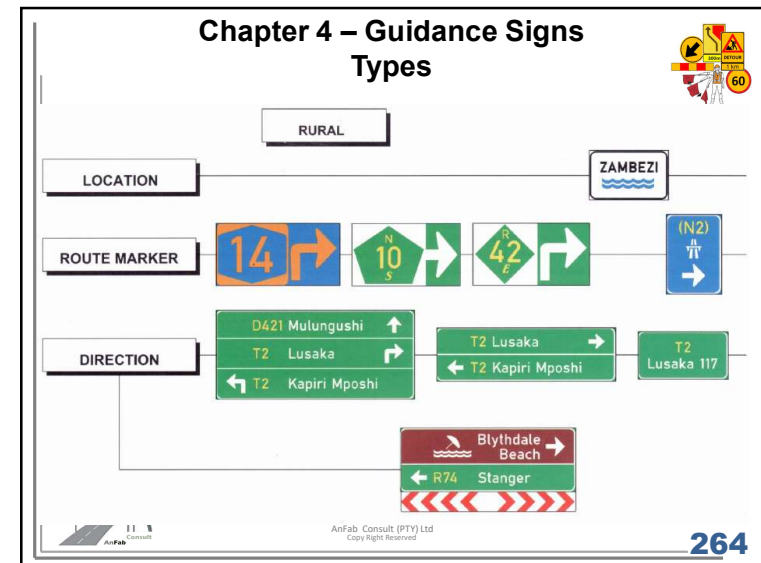
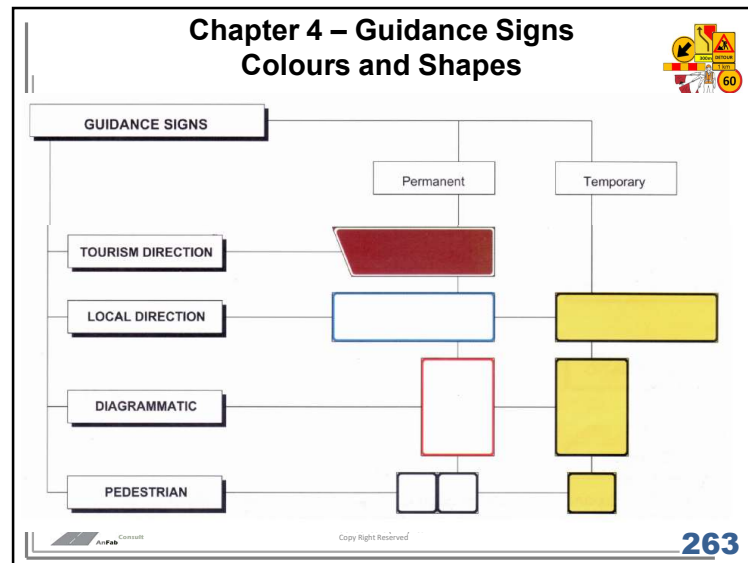
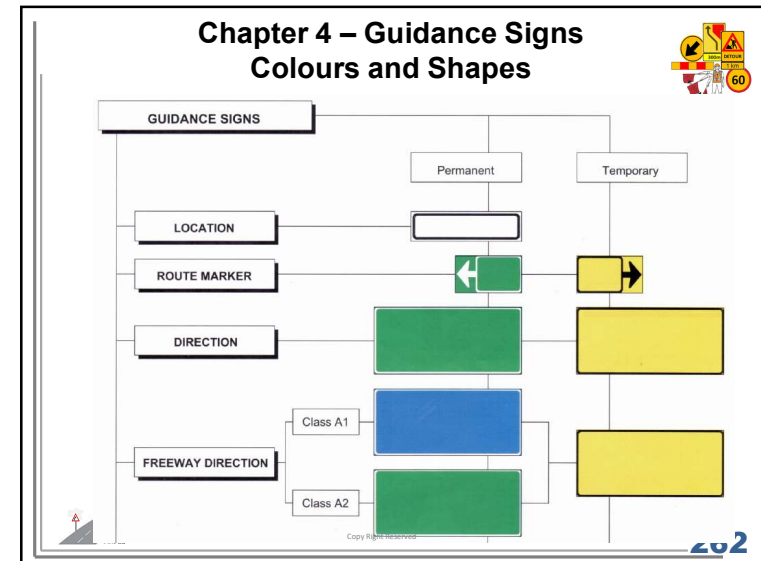
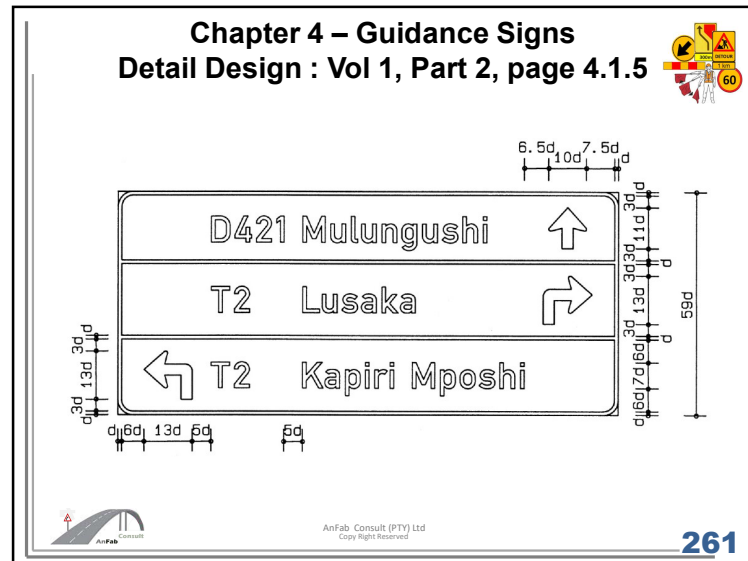
Chapter 4 – Guidance Signs
Arrow Types : Vol 1, Part 2, page 4.2.1

Map-Type 1 Diagram Map-Type 4
 Map-Type 5 Diagrammatic-Type F Map-Type 8
 Map-Type 9 Diagrammatic-Type K Map-Type 12

GE9

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Chapter 4 – Guidance Signs Types

The diagram illustrates four types of guidance signs:

- FREEWAY DIRECTION:** Shows a blue sign for R612 Park Rynie Ixopo (N2) and a green sign for R34 Vrede Frankfort (N3).
- TOURISM DIRECTION:** Shows signs for Kyalami, Serengeti Plains, uMkehelekehle, and Emmerentia.
- LOCAL DIRECTION:** Shows a sign for Emmerentia.
- DIAGRAMMATIC:** Shows four diagrams of lane configurations: two-lane road, one-lane road, two-lane road with a center turn lane, and a multi-lane road.

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Chapter 4 – Guidance Signs

The diagram illustrates various types of guidance signs:

- URBAN:** Shows a sign for MAPUTO.
- REPUBLIC ROAD:** Shows a sign for LOCATION.
- ROUTE MARKER:** Shows signs for T2, M9, and A3.
- DIRECTION:** Shows signs for A1 Chinhoyi, A3 Mutare, A5 Bulawayo, N3 (N1) Pretoria, N3 Germiston, and N3 Sandton.
- FREEWAY DIRECTION:** Shows signs for M9 Rivonia Rd and N1 Sandton.

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Chapter 4 – Guidance Signs

The diagram illustrates various types of guidance signs:

- TOURISM DIRECTION:** Shows signs for Witbank, Table Bay, and Nico Malan.
- LOCAL DIRECTION:** Shows signs for Market, Marie Louise, Savegate, and Khanya Kraft.
- DIAGRAMMATIC:** Shows signs for 3 km, 10t For 5 km, Busway, and a multi-lane road.
- PEDESTRIAN:** Shows signs for a pedestrian crossing and a pedestrian crossing with a zebra crossing.

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Chapter 4 – Guidance Signs

The diagram illustrates a Ground-Mounted Freeway Direction Sign with the following components:

- CROSS STREET ROUTE NUMBER:** Yellow
- SYMBOL:** White
- CROSS STREET NAME:** Eadie St
- INDIRECT ROUTE:** Yellow
- EXIT NUMBER:** Black on White
- CITY or TOWN PLACENAME:** Black on White
- FREEWAY ROUTE NUMBER:** Yellow
- DESTINATION AWAY FROM CBD:** Highveld
- MAJOR TRAFFIC GENERATOR:** Witbank
- DISTANCE:** White

Detail 4.2.1
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Chapter 4 – Guidance Signs

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Chapter 4 – Guidance Signs Class A 1 Freeway

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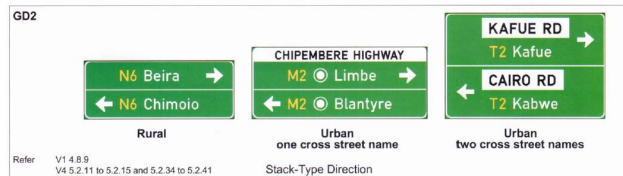
Chapter 4 – Guidance Signs Urban Numbered Route

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Chapter 4 – Guidance Signs Class B: Numbered Route

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Chapter 4 – Guidance Signs Class C: Numbered Route



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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

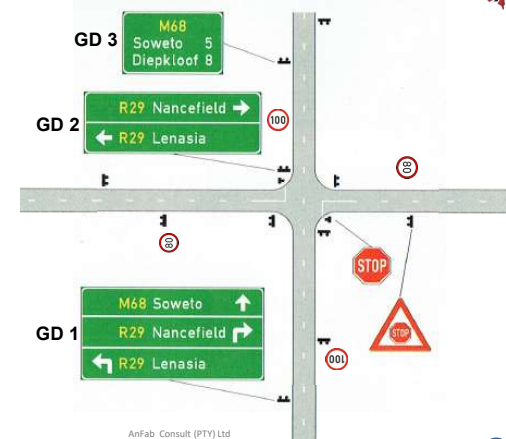
| Level 1 - Familiar Orientation Points | Level 2 - Control Orientation Points | Level 3 - Service Orientation Points |
|---------------------------------------|--------------------------------------|--------------------------------------|
| Gauteng | Gauteng | Gauteng |
| Johannesburg | Alberton | Akasia |
| Pretoria | Benoni | Bedfordview |
| | Boksburg | Bekkersdal |
| | Brakpan | Bronkhorstspuit |
| | Carletonville | Daveyton |
| | Centurion | Edenvale |
| | Germiston | Evaton |
| | Heidelberg | |
| | Kempton Park | Kagiso |
| | Krugersdorp | Kwa-Thema |
| | Nigel | Meyerton |
| | Randburg | Midrand |
| | Randfontein | Modderfontein |
| | Rodepoort | Sebokeng |
| | Sandton | Tembisa |
| | Soweto | Vosloorus |
| | Springs | Westonaria |
| | 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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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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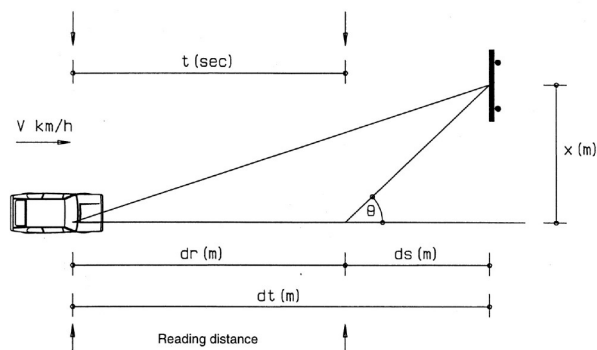
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Chapter 4 – Guidance Signs Determination of Letter Sizes



Beginning of available reading time

End of available reading time

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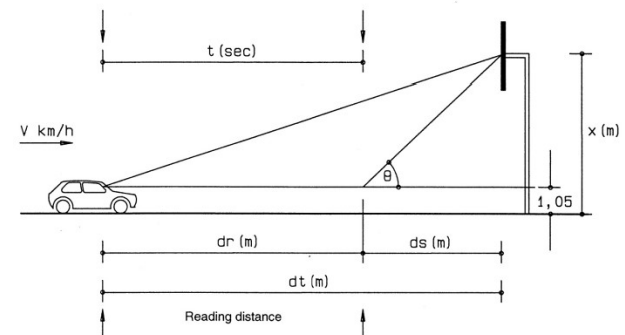
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Chapter 4 – Guidance Signs Determination of Letter Sizes



Beginning of available reading time

End of available reading time

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Chapter 4 – Guidance Signs

Determination of Letter Sizes

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

| Road Class | | Operating Speed (km/h) | Sign Displacement X(m) | Lettersize (mm) | |
|------------|----------------|------------------------|------------------------|-----------------|----------|
| Overhead | Ground Mounted | | | 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 |
| | A1 | 80 | 15 (3) | 350/250* | 210/150 |
| 8 | | 80 | 8 (2-3) | 350/250 | 210/150 |
| | B,C | 80 | 13 (2) | 280/200 | 210/150 |
| | | 60 | 8 (2-3) | 280/200 | 210/150 |
| | 8,C | 60 | 9 (2) | 210/150 | 140/100 |
| | 8,C,D | 60 | 6 (1) | 175/125 | 140/100* |
| | 8,C,D | 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

(M4)
S
←

TGE12.1

M
7
E
→

TGE13.4

←

C
477
S

TGD2-D

↑

←

→

Refer V1 4.8.11 V4 5.2.20
Detour Direction

GD4

Buyuni

Ambriz

Detour

Refer V1 4.8.15 V4 5.2.24
Fingerboard

GA4

152

←

GA4(E)

EXIT

←

TGA4(E)

EXIT

←

TGA4(V)

E
X
I
T

←

Refer V1 4.9.23
V4 6.2.13/
6.2.14

Gore Exit

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Chapter 4 – Section 4.12

Temporary Guidance Signs

DIAGRAMMATIC – GS100 Traffic Movement Affected by Obstructions

GS101

TGS101

Refer V1 4.12.9

V4 8.2.1

GS102

TGS102

Refer V1 4.12.9

V4 8.2.1

GS103

TGS103

Refer V1 4.12.9

V4 8.2.3

GS104

TGS104

Refer V1 4.12.9

V4 8.2.3

GS105

TGS105

Refer V1 4.12.9

V4 8.2.4

GS106

TGS106

Refer V1 4.12.9

V4 8.2.4

TGS107

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

Diagrammatic signs TGS109 to TGS116 are shown in a 2x4 grid. Each sign is a yellow square with a red border and a red arrow indicating the affected traffic movement. The signs are labeled with their respective codes and refer to specific traffic management scenarios.

| Sign Code | Refer V1 4.12.9 | V4 8.2.7 |
|-----------|------------------|-----------|
| 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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Chapter 4 – Section 4.12
Temporary Guidance Signs
DIAGRAMMATIC – GS100 Traffic Movement Affected by Obstructions

Diagrammatic signs TGS117 to TGS124 are shown in a 2x4 grid. Each sign is a yellow square with a red border and a red arrow indicating the affected traffic movement. The signs are labeled with their respective codes and refer to specific traffic management scenarios.

| Sign Code | Refer V1 4.12.10 | V4 8.2.13 |
|-----------|------------------|-----------|
| 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 | Refer V1 4.12.10 | V4 8.2.18 |
| TGS123 | Refer V1 4.12.10 | V4 8.2.18 |
| GS124 | Refer V1 4.12.10 | V4 8.2.19 |
| TGS124 | Refer V1 4.12.10 | V4 8.2.19 |

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

Diagrammatic signs TGS125 to TGS132 are shown in a 2x4 grid. Each sign is a yellow square with a red border and a red arrow indicating the affected traffic movement. The signs are labeled with their respective codes and refer to specific traffic management scenarios.

| Sign Code | Refer V1 4.12.11 | V4 8.2.21 |
|-----------|------------------|-----------|
| 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 |

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

Diagrammatic signs TGS133 to TGS140 are shown in a 2x4 grid. Each sign is a yellow square with a red border and a red arrow indicating the affected traffic movement. The signs are labeled with their respective codes and refer to specific traffic management scenarios.

| Sign Code | Refer V1 4.12.11 | V4 8.2.31 |
|-----------|------------------|-----------|
| 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 |

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

Refer V1 4.12.12 V4 8.2.37 Refer V1 4.12.12 V4 8.2.38 Refer V1 4.12.12 V4 8.2.39 Refer V1 4.12.12 V4 8.2.40

Refer V1 4.12.12 V4 8.2.41 Refer V1 4.12.12 V4 8.2.42 Refer V1 4.12.12 V4 8.2.43 Refer V1 4.12.12 V4 8.2.44

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

Refer V1 4.12.13 V4 8.2.45 Refer V1 4.12.13 V4 8.2.47 Refer V1 4.12.13 V4 8.2.49 Refer V1 4.12.13 V4 8.2.51

Refer V1 4.12.13 V4 8.2.52 Refer V1 4.12.13 V4 8.2.52 Refer V1 4.12.13 V4 8.2.54 Refer V1 4.12.13 V4 8.2.55

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

Refer V1 4.12.18 V4 8.4.1 Refer V1 4.12.18 V4 8.4.1 Refer V1 4.12.18 V4 8.4.3 Refer V1 4.12.18 V4 8.4.3

Refer V1 4.12.18 V4 8.4.4 Refer V1 4.12.18 V4 8.4.4 Refer V1 4.12.18 V4 8.4.5 Refer V1 4.12.18 V4 8.4.7

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

Refer V1 4.12.18 V4 8.4.8 Refer V1 4.12.18 V4 8.4.10 Refer V1 4.12.18 V4 8.4.12

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

GS401 TGS401 GS402 TGS402 GS403 TGS403 GS404 TGS404

Refer V1 4.12.20 V4 8.5.1 Refer V1 4.12.20 V4 8.5.2 Refer V1 4.12.20 V4 8.5.3 Refer V1 4.12.20 V4 8.5.5

GS405 TGS405 GS406 TGS406

Refer V1 4.12.20 V4 8.5.7 Refer V1 4.12.20 V4 8.5.7

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

GS505 TGS505

Refer V1 4.12.24 V4 8.7.4

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

GS601 TGS601 GS602 TGS602 GS603 TGS603

Refer V1 4.12.26 V4 8.8.1 Refer V1 4.12.26 V4 8.8.2 Refer V1 4.12.26 V4 8.8.3

GS604 TGS604 GS605 TGS605 GS606 TGS606

Refer V1 4.12.26 V4 8.8.3 Refer V1 4.12.26 V4 8.8.4 Refer V1 4.12.26 V4 8.8.4

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

GS6106 TGS6106 GS6106D TGS6106D

Refer V1 4.12.28 V4 8.8.10 Refer V1 4.12.28 V4 8.8.11

GS6406 TGS6406 GS6406D TGS6406D

Refer V1 4.12.28 V4 8.8.14 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

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

Display GM4.1 Marking
Traffic Direction Arrow

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

Refer V1 4.12.35 V4 8.11.1 Refer V1 4.12.35 V4 8.11.1

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Chapter 4 – Section 4.12 Temporary Guidance Signs Pedestrian Direction

R218 GP6+GP9 TGP4+TGP9

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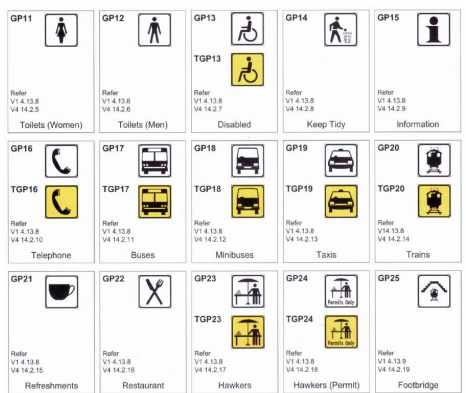
Chapter 4 – Section 4.12 Temporary Guidance Signs Pedestrian Direction

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

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Chapter 4 – Section 4.12 Temporary Guidance Signs Pedestrian Direction

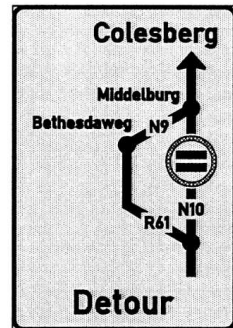


| | | | | |
|--|--|--|---|--|
| GP11 Refer V1 4.13.8 V4 14.2.5 Toilets (Women) | GP12 Refer V1 4.13.8 V4 14.2.6 Toilets (Men) | GP13 Refer V1 4.13.8 V4 14.2.7 Disabled | GP14 Refer V1 4.13.8 V4 14.2.8 Keep Tidy | GP15 Refer V1 4.13.8 V4 14.2.9 Information |
| TGP16 Refer V1 4.13.8 V4 14.2.10 Telephone | TGP17 Refer V1 4.13.8 V4 14.2.11 Buses | TGP18 Refer V1 4.13.8 V4 14.2.12 Minibuses | TGP19 Refer V1 4.13.8 V4 14.2.13 Taxi | TGP20 Refer V1 4.13.8 V4 14.2.14 Trains |
| GP21 Refer V1 4.13.8 V4 14.2.15 Refreshments | GP22 Refer V1 4.13.8 V4 14.2.16 Restaurant | TGP23 Refer V1 4.13.8 V4 14.2.17 Hawkers | TGP24 Refer V1 4.13.8 V4 14.2.18 Hawkers (Permit) | GP25 Refer V1 4.13.8 V4 14.2.19 Footbridge |

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



TG09

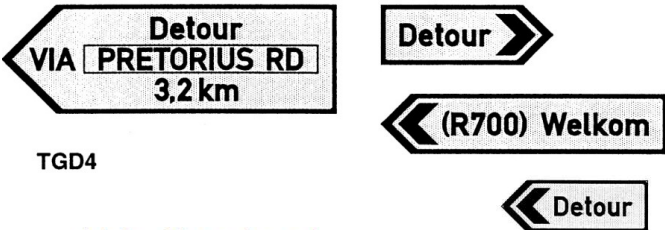
4.8.10 Map-Type Advance Direction

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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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.

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



TGA4(V)

TGA4 (E)

TGA4

EXIT

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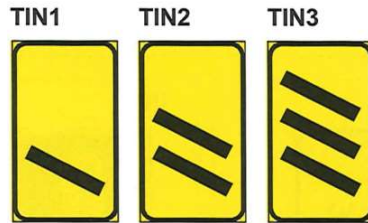
R28 Krugersdorp 500 m

Detail 4.73.9

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



Refer V1 5.2.1 V4 9.2.1

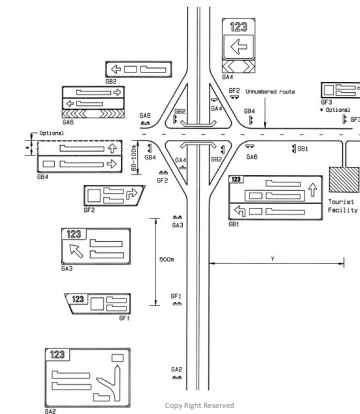
Countdown



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Chapter 4 – Section 4.10 Temporary Guidance Signs Freeway Signing Sequences



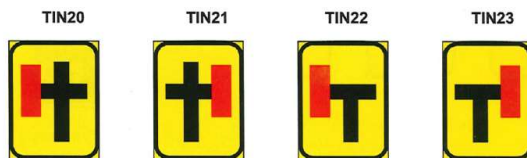
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Chapter 5 – Information Signs Culs - de Sac Signs



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



Refer V1 5.2.2 V4 9.2.4/9.2.5



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Chapter 5 – Information Signs Supplementary Plates



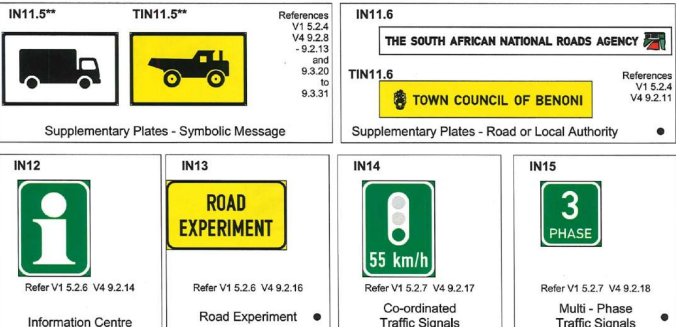
| | | | | | |
|---------------------------------------|-------------------|--|---------------------------------------|---------------------|--|
| IN11.1 80km/h | TIN11.1 60km/h | References V1 5.2.4 V4 9.2.8 - 9.2.13 | IN11.2 For 12km | TIN11.2 For 5km | References V1 5.2.4 V4 9.2.8 - 9.2.13 |
| Supplementary Plates - Advisory Speed | | | Supplementary Plates - Distance "For" | | |
| IN11.3 200 m | TIN11.3 1km | References V1 5.2.4 V4 9.2.8 - 9.2.13 | IN11.4 Blind People | TIN11.4 Accident | References V1 5.2.4 V4 9.2.8 - 9.2.13 |
| Supplementary Plates - Distance "To" | | | Supplementary Plates - Text Message | | |



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Chapter 5 – Information Signs Supplementary Plates



IN11.5** **TIN11.5**** References V1 5.2.4 V4 9.2.8 - 9.2.13 and 9.3.20 to 9.3.31
Supplementary Plates - Symbolic Message

IN11.6 **TIN11.6** References V1 5.2.4 V4 9.2.11
THE SOUTH AFRICAN NATIONAL ROADS AGENCY
TOWN COUNCIL OF BENONI
Supplementary Plates - Road or Local Authority

IN12 Refer V1 5.2.6 V4 9.2.14
Information Centre

IN13 Refer V1 5.2.6 V4 9.2.16
ROAD EXPERIMENT

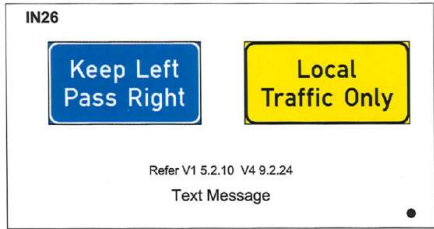
IN14 Refer V1 5.2.7 V4 9.2.17
55 km/h
Co-ordinated Traffic Signals

IN15 Refer V1 5.2.7 V4 9.2.18
3 PHASE
Multi - Phase Traffic Signals

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Chapter 5 – Information Signs Supplementary Plates



IN26

Keep Left
Pass Right

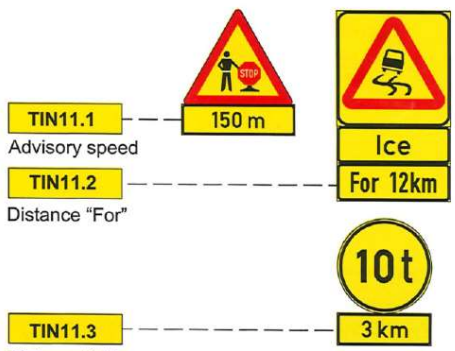
Local
Traffic Only

Refer V1 5.2.10 V4 9.2.24
Text Message

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Chapter 5 – Information Signs Supplementary Plates



TIN11.1 150 m
Advisory speed

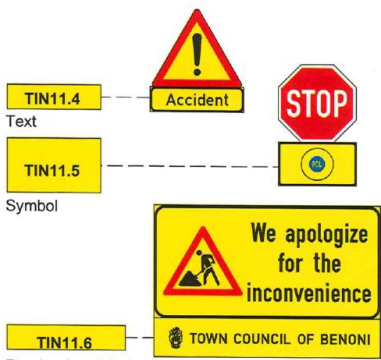
TIN11.2 For 12km
Distance "For"

TIN11.3 10t 3 km
Distance "to"

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Chapter 5 – Information Signs Supplementary Plates



TIN11.4 Accident
Text


TIN11.5 Symbol







TIN11.6 TOWN COUNCIL OF BENONI
Road or Local Authority


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Chapter 5 – Information Signs Supplementary Plates - Symbolic



| | | |
|--|---|--|
| IN11.501 TIN11.501  References V1 5.2.4 V4 9.3.17 Tow Away Zone | IN11.502 TIN11.502  References V1 5.2.4 V4 9.3.18 Arrow - left | IN11.503 TIN11.503  References V1 5.2.4 V4 9.3.18 Arrow - right |
| IN11.505 TIN11.505  References V1 5.2.4 V4 9.3.19 Reduced Width | IN11.506  References V1 5.2.4 V4 9.3.19 Prosecuting by Camera | IN11.504 TIN11.504  References V1 5.2.4 V4 9.3.18 Arrow - Both Ways |


IN11.570 **TIN11.570**

 References
 V1 5.2.4 V4 9.3.25
 Construction Vehicle



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Chapter 5 – Information Signs Road Experiment




For dimensions
ref. Vol. 4
Page

**ROAD
EXPERIMENT**

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



**We apologise
for any
inconvenience**

TIN26




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Road Traffic Markings



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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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TRAFFIC MANAGEMENT

Road Traffic Markings



Rumble Line

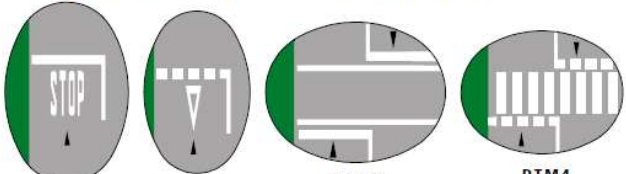
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TRAFFIC MANAGEMENT

Road Traffic Markings

Regulatory - Transverse Road Markings

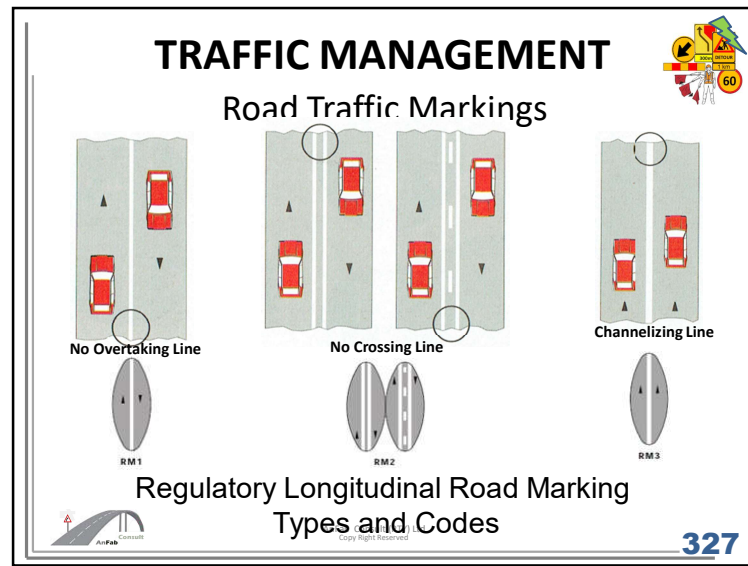
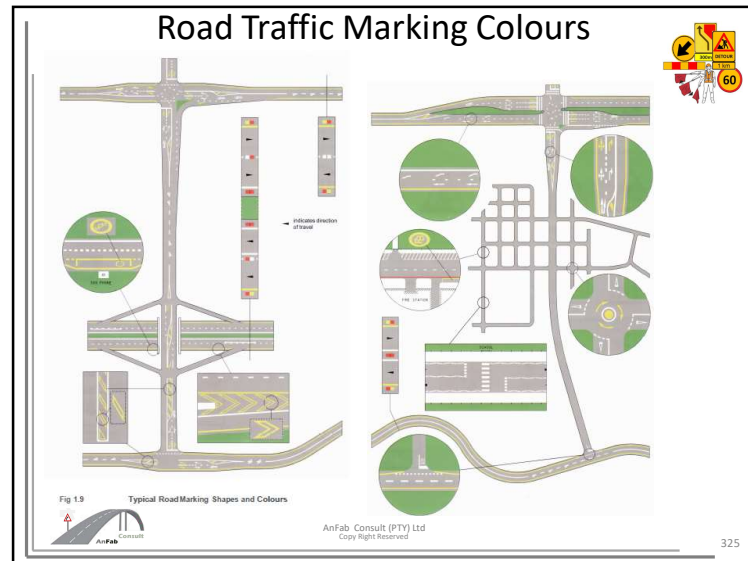


RTM1 RTM2 RTM3 RTM4

Regulatory Road Marking Types and Codes

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TRAFFIC MANAGEMENT

Road Traffic Markings



RM2 NO Crossing Line

329

TRAFFIC MANAGEMENT

Road Traffic Markings



RM2 NO Crossing Line – 3 line System

330

TRAFFIC MANAGEMENT

Road Traffic Markings



RM3 Channelizing Line

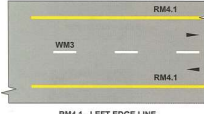
331

TRAFFIC MANAGEMENT

Road Traffic Markings

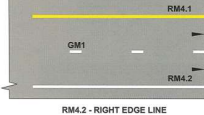
(a) in the case of a **LEFT EDGE LINE** marking RM4.1 marked on a roadway with more than one lane in either or both directions of travel:

- (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

332

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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Road Traffic Markings



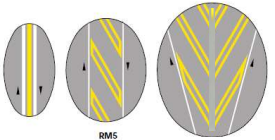
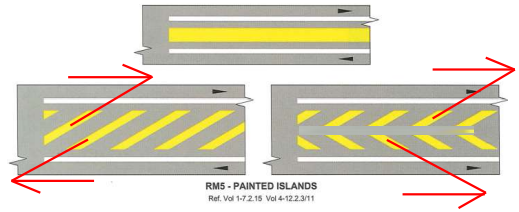

Road Edge Lines

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TRAFFIC MANAGEMENT

Road Traffic Markings

RMS - PAINTED ISLANDS
Ref. Vol 1-7.2.15 Vol 4-12.2.311

Painted Islands

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TRAFFIC MANAGEMENT

Road Traffic Markings





Painted Islands

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Road Traffic Markings



Open space on large painted island

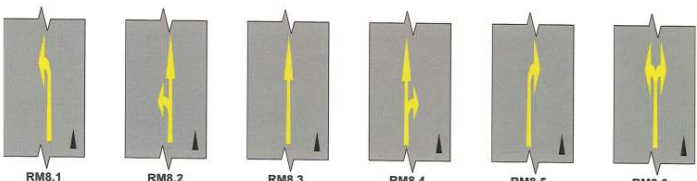
Painted Islands

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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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Road Traffic Markings



RM8 Arrows

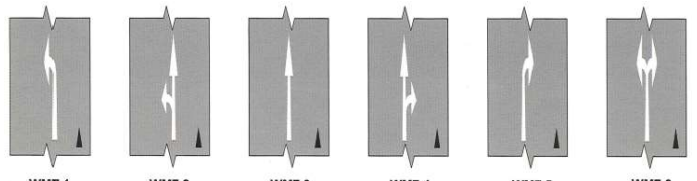
MANDATORY RM8 Direction Arrows

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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

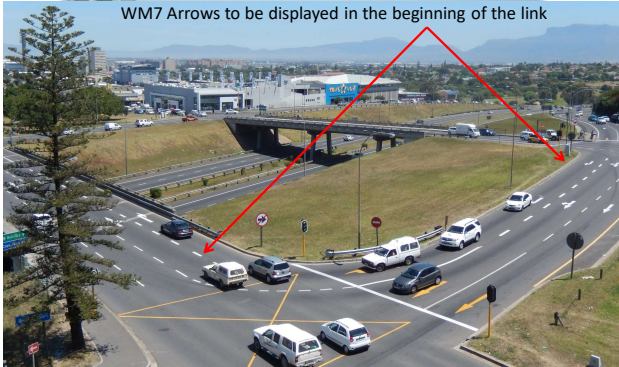
Warning Road Marking Types and Codes

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Road Traffic Markings



WM7 Arrows to be displayed in the beginning of the link

Warning Direction Arrows AHEAD



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Road Traffic Markings



WM7 Arrows

2009-04-04 06:57

Warning Direction Arrows AHEAD



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Road Traffic Markings



RM1 No Overtaking Line not Required

Zig Zag Zone Lines



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Road Traffic Markings

Regulatory Road Marking Types and Codes

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Road Traffic Markings

RM12 No Stopping Line on Bridge

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Road Traffic Markings

Regulatory Road Marking Types and Codes

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Road Traffic Markings

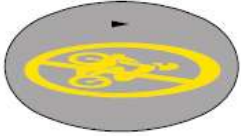

Regulatory Road Marking Types and Codes

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TRAFFIC MANAGEMENT

Road Traffic Markings

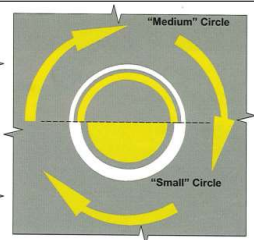

RM14 RM15

Regulatory Road Marking Types and Codes

349

TRAFFIC MANAGEMENT

Road Traffic Markings

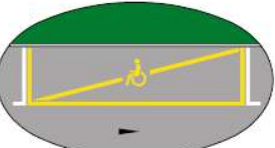
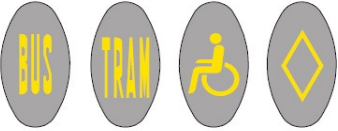
RM15 - TRAFFIC CIRCLE MANDATORY
DIRECTION ARROWS
Ref. Vol 1-7.2.29 Vol 4-12.3.5/6

Regulatory Road Marking Types and Codes

350

TRAFFIC MANAGEMENT

Road Traffic Markings

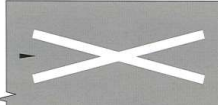

RM16 RM17

Regulatory Road Marking Types and Codes

351

TRAFFIC MANAGEMENT

Road Traffic Markings

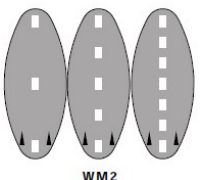

WM1 - RAILWAY CROSSING AHEAD
Ref. Vol 1-7.3.1 Vol 4-12.4.14

Warning Road Marking Types and Codes


352

TRAFFIC MANAGEMENT

Road Traffic Markings

WM2

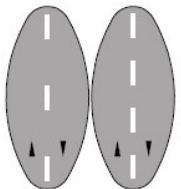



WM2 - CONTINUITY LINE
Ref. Vol 1-7.3.2
Warning Line and Codes


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TRAFFIC MANAGEMENT

Warning Road Traffic Markings

WM3



WM3 - DIVIDING LINE
Ref. Vol 1-7.3.3
Warning Road Marking Types and Codes

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TRAFFIC MANAGEMENT

Road Traffic Markings




WM5

Warning Road Marking Yield Control Ahead

355

TRAFFIC MANAGEMENT

Road Traffic Markings




WM6

3 sets minimum

Warning Road Marking Lane Reduction Arrows

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TRAFFIC MANAGEMENT
Road Traffic Markings



WM7



2009-08-06 11:49

Mandatory Direction Arrow Ahead

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TRAFFIC MANAGEMENT
Road Traffic Markings



WM8



2014-01-17 07:04

Warning Road Marking Types and Codes

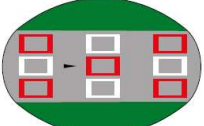
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TRAFFIC MANAGEMENT
Road Traffic Markings



WM9.1



WM9.2



2013-01-18 14:10

Arrestor Bed Marking

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Road Traffic Markings



WM10



Speed Hump Warning Road Marking

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Road Traffic Markings





WM 11


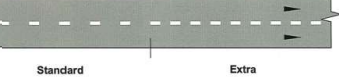
Warning Road Marking Types and Codes

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TRAFFIC MANAGEMENT

Road Traffic Markings

Standard
GM1 - LANE LINE
Ref. Vol 1-7.4.1

Extra

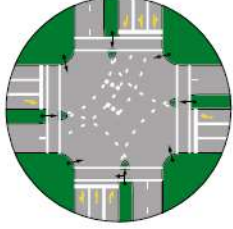
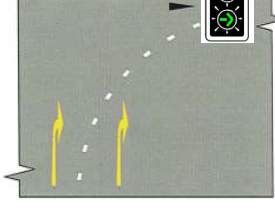
Guidance Road Marking Types and Codes

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Road Traffic Markings

GM2

Turning Guide Line

Guidance Road Marking Types and Codes

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TRAFFIC MANAGEMENT

Road Traffic Markings




GM3.1
GM3.2
GM3.3
BIFURCATION ARROWS
Ref. Vol 1-7.4.3 Vol 4-10.2.1/1/4


Bifurcation Arrows

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TRAFFIC MANAGEMENT

Road Traffic Markings

Guidance GM4.1 Direction of Traffic Arrows

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TRAFFIC MANAGEMENT

Road Traffic Markings




Guidance GM4.1 Direction of Traffic Arrow

366

TRAFFIC MANAGEMENT

Road Traffic Markings

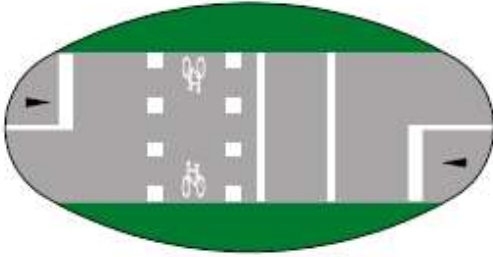



Warning Road Marking Types and Codes

367

TRAFFIC MANAGEMENT

Road Traffic Markings

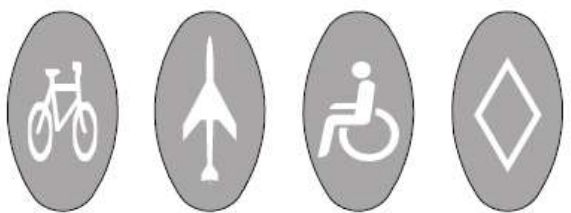


Bicycle Guide Lines

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TRAFFIC MANAGEMENT

Road Traffic Markings



GM6


Road Marking Symbols

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TRAFFIC MANAGEMENT

Road Traffic Markings



GM7

Word Guidance Road Marking Types and Codes

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TRAFFIC MANAGEMENT

Road Traffic Markings



GM8

Kerb face Markings

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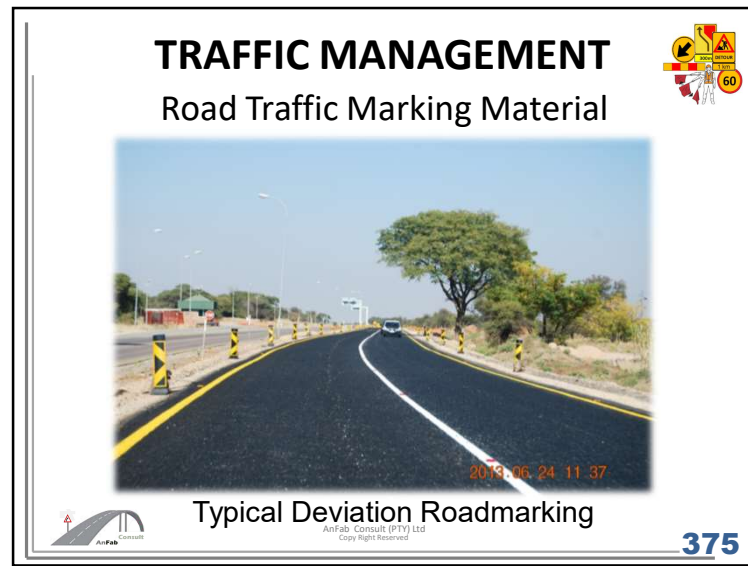
Road Traffic Marking Pre marking



2013 08 16 10:22

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Road Traffic Marking Material



Typical Hot Melt Machine Roadmarking

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Road Traffic Marking Material




Typical Hot Melt Thermoplastic From Melting Pot

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Road Traffic Marking Material



Typical Hot Melt Screed Application

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Typical Cold Plastic Application

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Road Traffic Marking Material



Display Approved Markings Only

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Road Traffic Marking Material



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

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TRAFFIC MANAGEMENT
Non Compliant Road Traffic Marking



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

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Road Traffic Marking Material



Black paint for emergencies only

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TRAFFIC MANAGEMENT

Road Traffic Markings



WET ROADS - Night-time Retro-Reflectivity

385


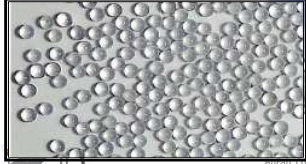
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ROAD MARKING MATERIALS

Reflective Roadmarking Material

Glass Beads

An optical effect
for better visibility

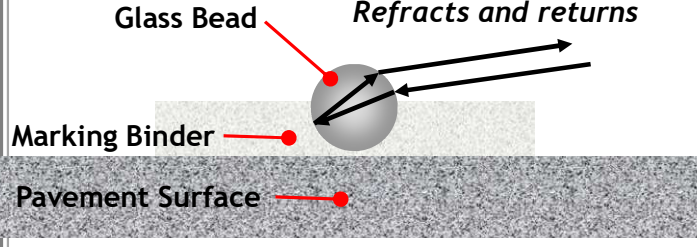



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Marking Retroreflection

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



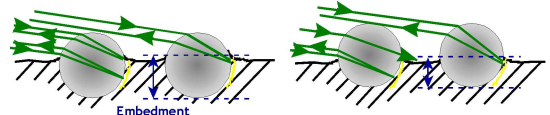
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Road Traffic Markings

Glass Bead Embedment



Good embedment Poor embedment

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ROAD MARKING MATERIALS

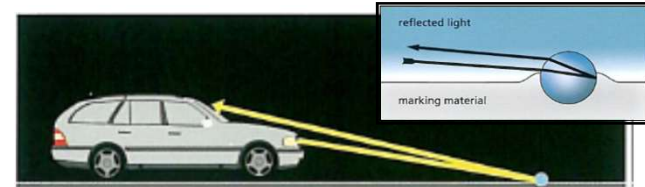
Glass Bead Loss.



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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



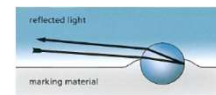
No glass beads – no retro-reflection



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ROAD MARKING MATERIALS

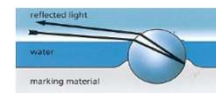
Retro- Reflectivity – Glass Beads



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



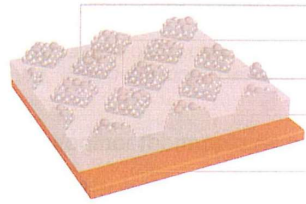
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TRAFFIC MANAGEMENT

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 MATERIALS


Glass Bead Sizes.



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TRAFFIC MANAGEMENT

Road Traffic Marking Material – Glass Beads




2013 08 16 11:11

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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 | New Materials | | | Used Materials | | | |
|---|---------------|--------|------------|----------------|--------|------------|-------|
| | White | Yellow | Red | White | Yellow | Red | |
| $x^{(1)}$ | 0.305 | 0.494 | 0.690 | 0.305 | 0.491 | 0.655 | |
| | 0.335 | 0.470 | 0.610 | 0.350 | 0.424 | 0.579 | |
| | 0.325 | 0.493 | 0.638 | 0.340 | 0.494 | 0.606 | |
| Colour | 0.295 | 0.522 | 0.690 | 0.255 | 0.054 | 0.690 | |
| | $y^{(1)}$ | 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 | 0.355 | 0.457 | 0.312 | 0.370 | 0.426 | 0.314 | |
| | 0.325 | 0.477 | 0.310 | 0.325 | 0.454 | 0.310 | |
| | 150 | 100 | ± 30 | 100 | 70 | ± 20 | |
| Coefficient of Retroreflection (minicandelas/lux/m ²) | 0.6 | 0.4 | ± 0.08 | 0.45 | 0.3 | ± 0.06 | |
| | 50 | | | 50 | | | |
| Skid Resistance BPN ⁽²⁾ | | | | | | | |

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 measurement method applicable to all colours of markings.

Reflectometer
Minicandelas/Lux/m²

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TRAFFIC MANAGEMENT

Road Traffic Marking Material

Road Studs

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ROAD MARKING MATERIALS

Road Studs

Two Way Street — No Overtaking

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ROAD MARKING MATERIALS

Road Studs

Two Way Street — Overtaking Allowed

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ROAD MARKING MATERIALS

Road Studs

Red Yellow

Red White

Red Red

One Way Street Overtaking Allowed



MODULE 3B

SADC ROAD TRAFFIC SIGNS

MANUAL VOLUME 4

SADC ROAD TRAFFIC SIGNS

MANUAL – VOLUME 4

Dimensional and Manufacturing Detail

COTO ref: A11.6.7.3 c)

NC-06-20

Class I
-7 year Warranty:
Expiry Date 06-27

Class III
-10 year Warranty:
Expiry Date 06-30

Class IV
-12 year Warranty:
Expiry Date 06-32

Reflective Expiry Date
Identification Code

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**.

SADC ROAD TRAFFIC SIGNS MANUAL – VOLUME 4


Dimensional and Manufacturing Detail Mild Steel Treated Backing Plate Specification

COTO ref: A11.6.5.2 c)



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 (Isacor Z275 Chromadek or approved equivalent), which has been treated on both sides with an epoxy primer followed by a silicon polyester topcoat. The total dry thickness of the treatment shall be at least 25 *µm*.

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SADC ROAD TRAFFIC SIGNS MANUAL

Volume 4 Dimensional Detail

1.2.2 ROAD TRAFFIC SIGN SIZES

| Road Traffic Sign (mm) Type | Function | Min. External Dimensions | | | |
|---|---------------------------|--------------------------|------------|------------|------------|
| | | 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 | 600 x 150 | 600 x 150 | 800 x 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 |

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SADC ROAD TRAFFIC SIGNS MANUAL

Volume 4 Dimensional Detail

1.2.2 ROAD TRAFFIC SIGN SIZES

| Road Traffic Sign (mm) Type | Function | Min. External Dimensions | | | |
|-----------------------------|--|--------------------------|-----|-------|-------|
| | | 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 |

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SADC ROAD TRAFFIC SIGNS MANUAL

Volume 4 Dimensional Detail

1.2.2 ROAD TRAFFIC SIGN SIZES

| Road Traffic Sign (mm) Type | Function | Min. External Dimensions | | | |
|---|--------------------|--------------------------|------------|-------------|-------------|
| | | 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 | 800 x 675 | 1200 x 900 | 1200 x 900 |
| | Overhead | 900 x 675 | 1200 x 900 | 1200 x 1600 | 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 |

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SADC ROAD TRAFFIC SIGNS MANUAL



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



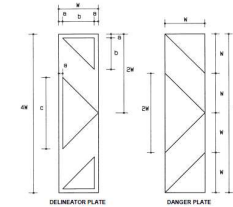
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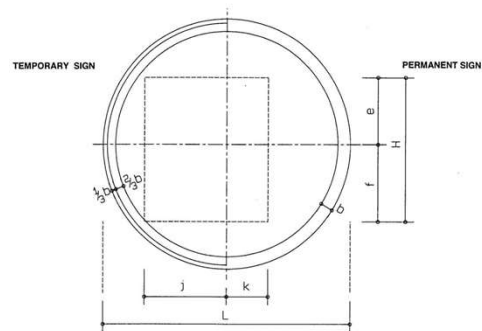
**Volume 4 -
Dimensional
Manufacturing
Detail**

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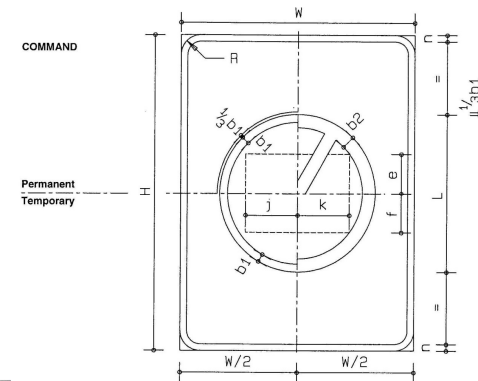
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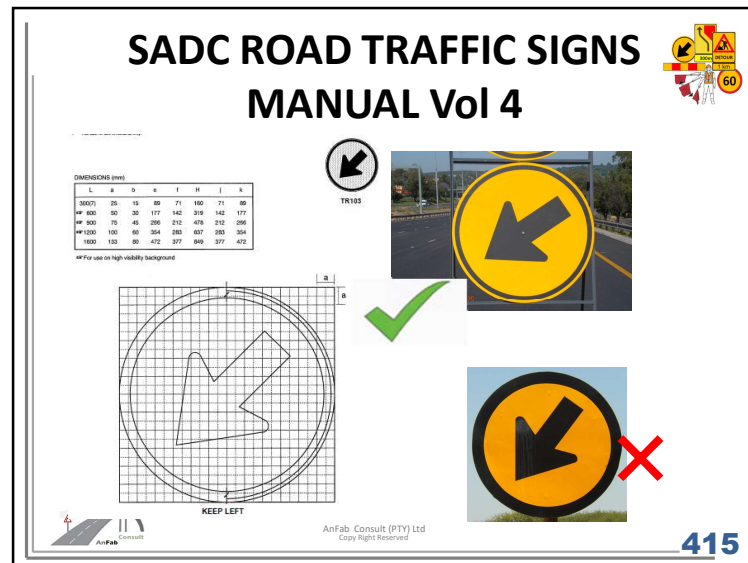
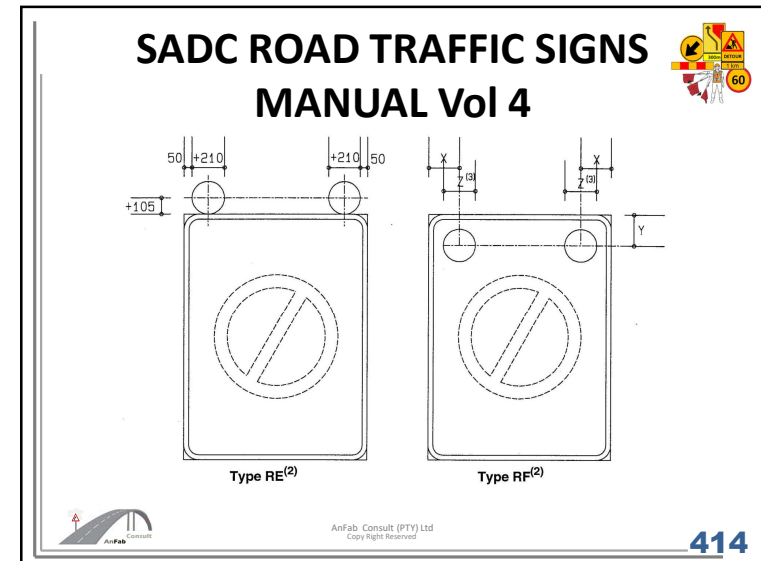
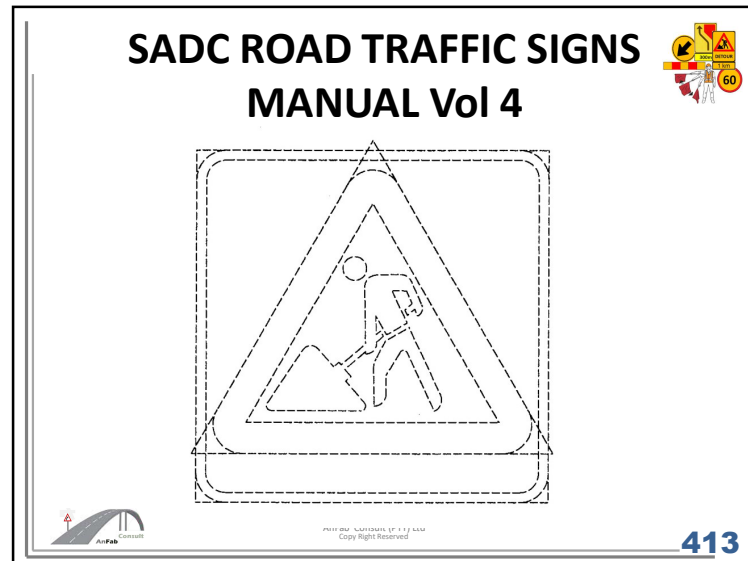
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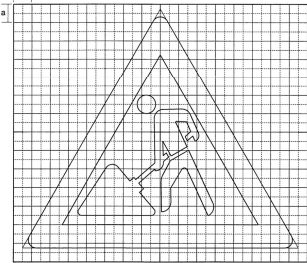
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| | S | a | b | c | d | e | f | g | h | r |
|------|-----|-----|-----|-----|----|-----|------|------|------|-------|
| 900 | 60 | 75 | 185 | 175 | 30 | 390 | 640 | 704 | 754 | 7525 |
| 1000 | 80 | 100 | 254 | 233 | 40 | 520 | 854 | 970 | 1000 | 10000 |
| 1200 | 100 | 125 | 324 | 293 | 50 | 650 | 1067 | 1206 | 1256 | 12500 |
| 1500 | 125 | 150 | 400 | 369 | 60 | 800 | 1300 | 1507 | 1557 | 15500 |
| 1800 | 150 | 180 | 500 | 469 | 70 | 950 | 1550 | 1787 | 1837 | 18300 |


For use on high visibility background

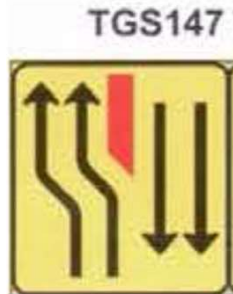
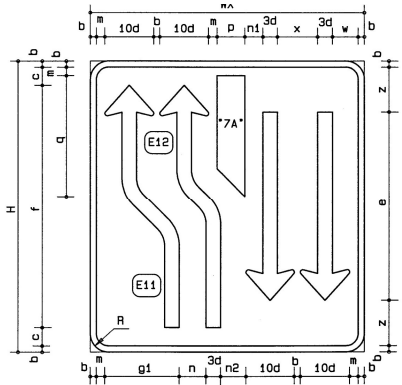


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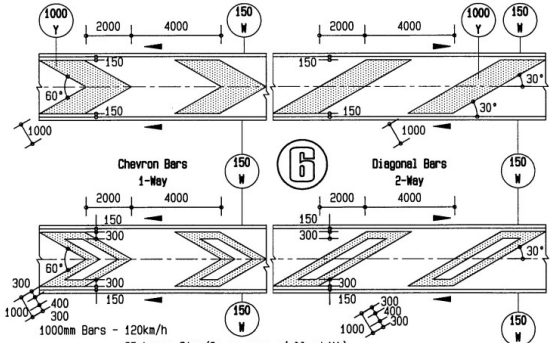



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SADC ROAD TRAFFIC SIGNS MANUAL Vol 4 Chapter 12






Detail 12.4.6
Bar/Chevron Size for 120km/h


Roadmarking Dimensions

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Complete assignment Module 3





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

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MODULE 4 B SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM)

VOLUME 3 TRAFFIC SIGNAL DESIGNS



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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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SADC ROAD TRAFFIC SIGNS MANUAL



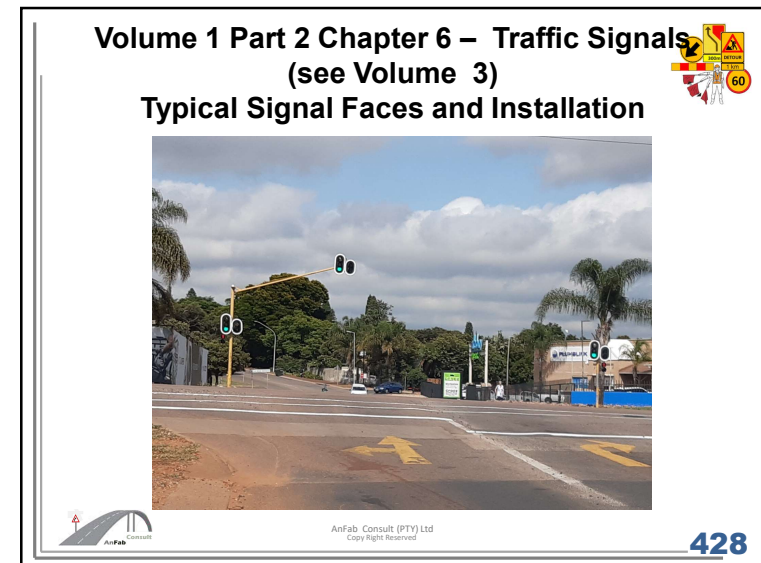
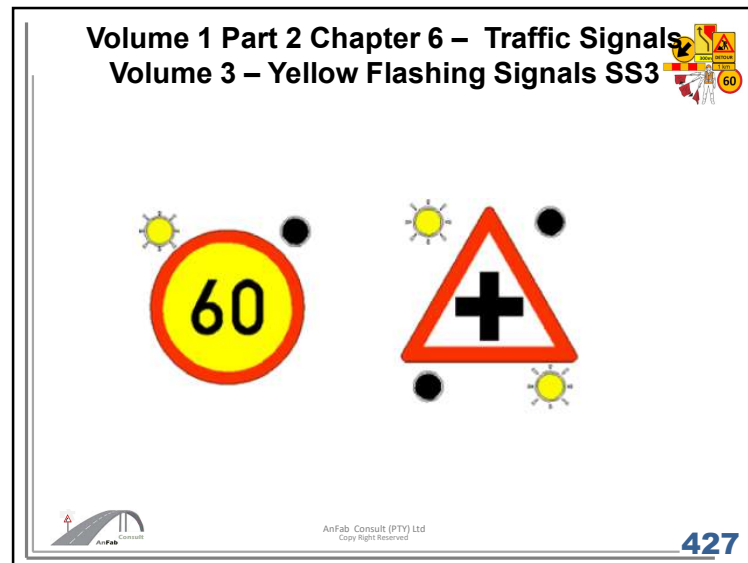
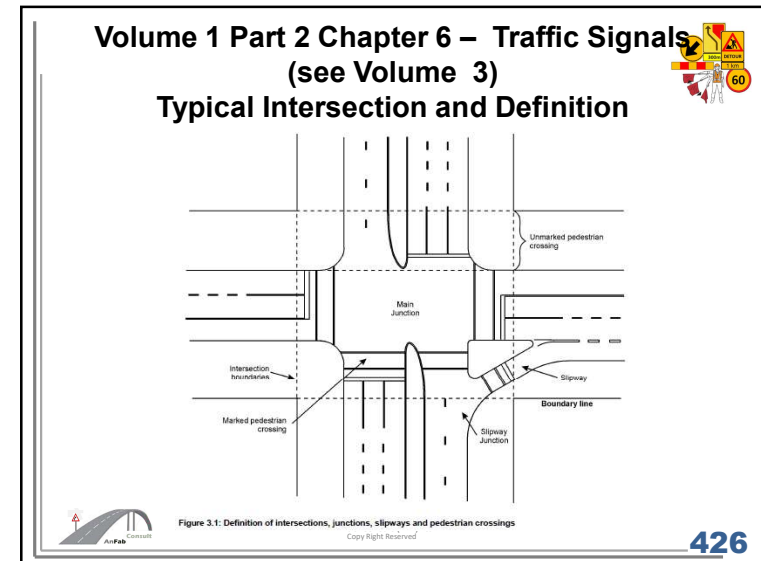
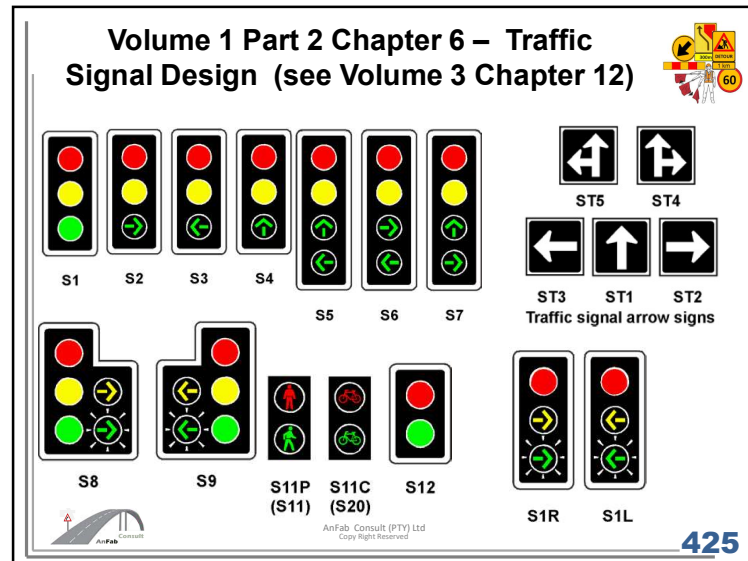
Volume 3 – Chapter 12 : Traffic Signals

- (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 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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(see Volume 3)

Typical Signal Faces and Installation

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(see Volume 3)

Signal Faces Cone of Vision

Figure 3.6: Cone of vision in horizontal plane

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(see Volume 3)

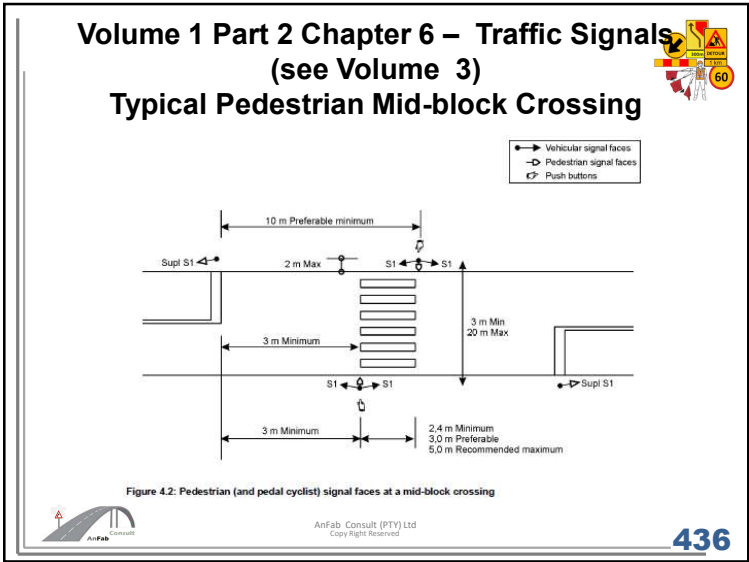
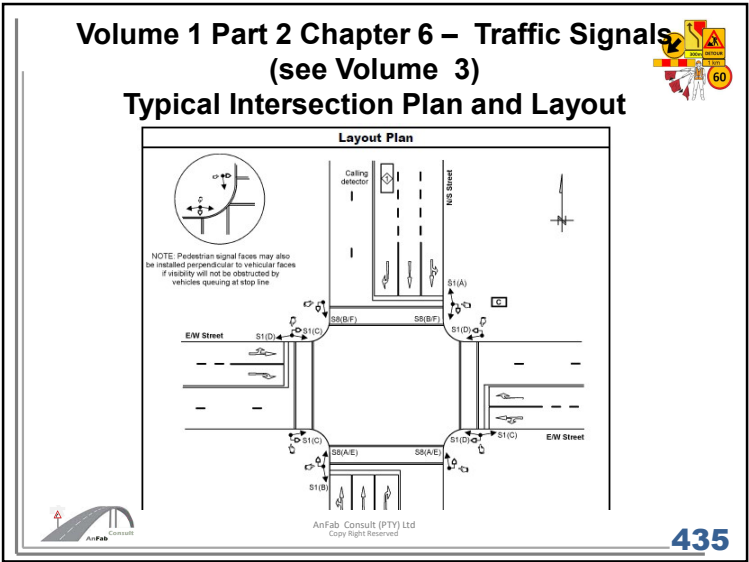
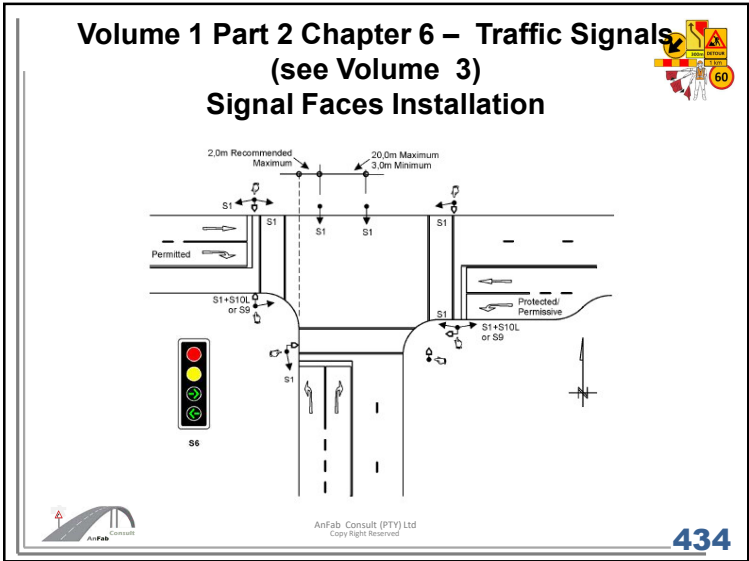
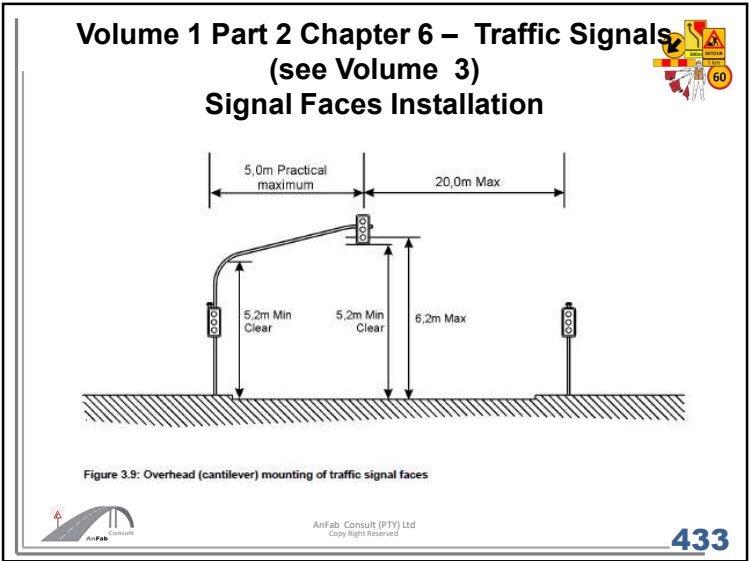
Signal Faces Installation

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

1.2m min Lateral Buffer Zone Recommended

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

45°

Median set back and width reduced to accommodate vehicle swept path

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

Controlled Island

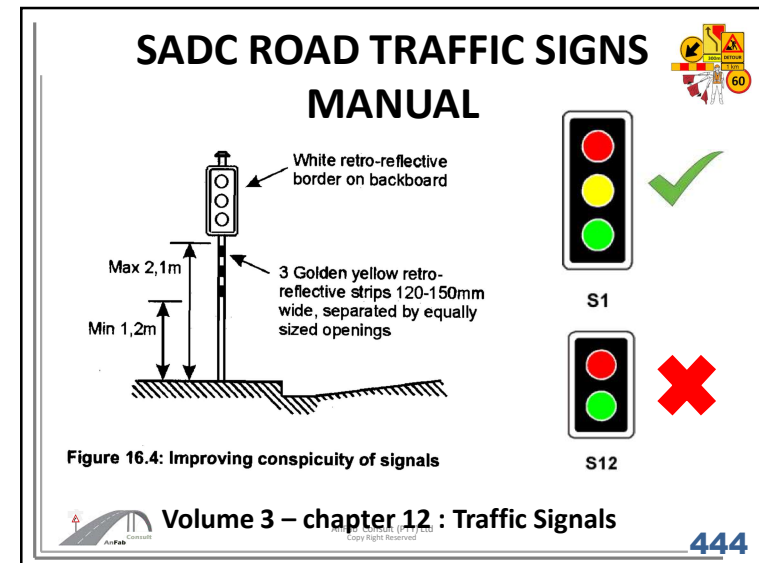
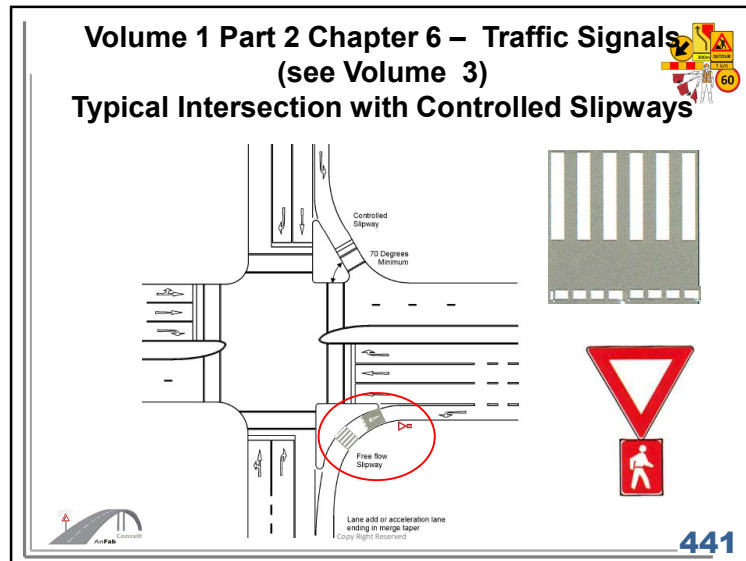
Protected Island

Continuity Area (WMS)

Figure 5.2: Provision of right-turn lanes at a signalised junction

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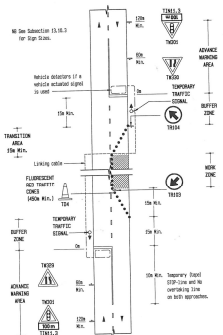
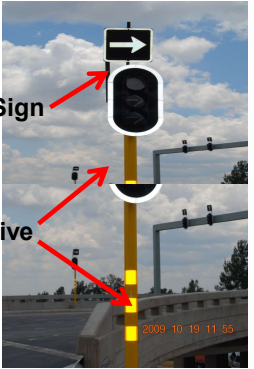


Fig. 13.57 Temporary Traffic Signals

ST Sign

Reflective



Volume 3 – chapter 12 : Traffic Signals

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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

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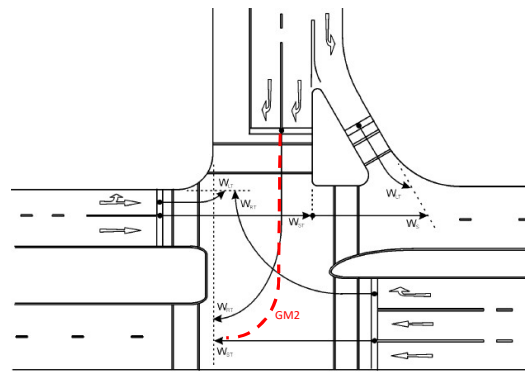
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The declaration shall be kept by the road authority in control of the traffic signal concerned.

Volume 3 – chapter 12 : Traffic Signals

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SADC ROAD TRAFFIC SIGNS MANUAL



Volume 3 – chapter 12 : Traffic Signals

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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

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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

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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

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TRAFFIC MANAGEMENT Traffic Control



2013-12-12 12:10

Temporary Traffic Signals



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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.

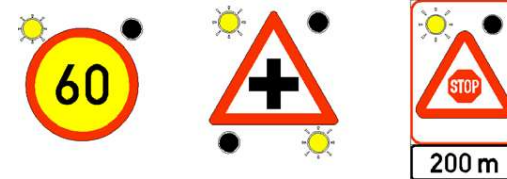
The stop line must be suitably located on the wider part of the road so that opposing traffic can pass vehicles waiting at the stop line.



Volume 3 – chapter 12 : Traffic Signals

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



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MODULE 4C 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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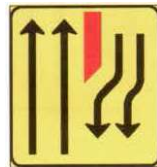
458

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:
 - red retro-reflective areas shall be used to indicate an obstruction in the road ahead;
 - one arrow shall be used per lane of traffic in the direction of travel to which the sign applies;
 - 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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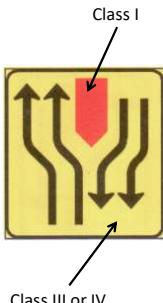
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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

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;



Class I

Class III or IV

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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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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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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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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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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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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;



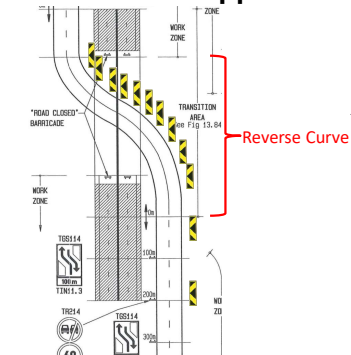
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RSA RTSM : Volume 2 – Chapter 13 ROADWORKS SIGNING

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;



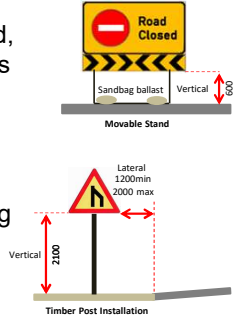
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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
 13.1 Introduction

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)




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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
 RSTUVWXYZ
 abcdeēfghijklmnop
 qrstuvwxyz!/?/()%
 1234567890-“.‘;’><&


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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;



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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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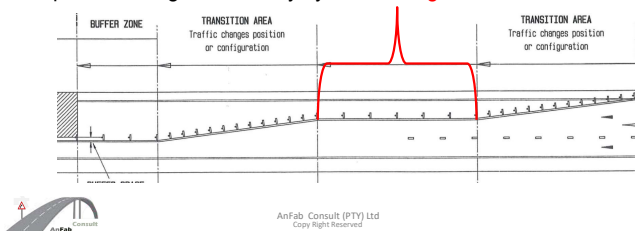
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RSA RTSM : Volume 2 – Chapter 13 ROADWORKS SIGNING

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**;



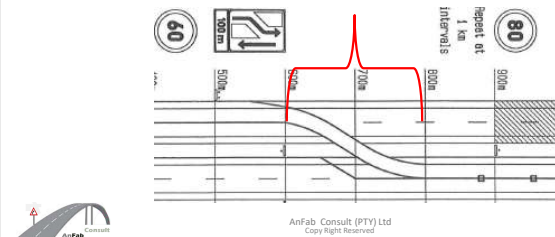
473

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; ;



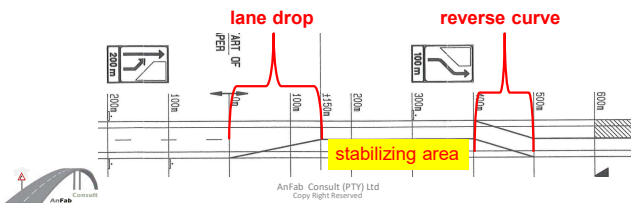
474

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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RSA RTSM : Volume 2 – Chapter 13 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 | 85thile Approach Speed | | |
|---------------------|------------------------|-------------------|-----------|
| | <60 km/h | 60 km/h – 80 km/h | > 80 km/h |
| Short term (4) | 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 (5) | 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 windcreens 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.



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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
 13.1 Introduction
Temporary Signs Colour Coding

Detail 13.1.2 Permanent Regulatory Signs

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 TW336-WA TW336-WB TW336-WA/TIN11.3

Ref: Vol1-3.4.30 Vol4-3.4.36 Ref: Vol1-3.6.4 Vol4-3.1.6 to 3.1.9

Detail 13.4.1 Roadworks Ahead

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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
 13.1 Introduction
Types of Temporary Signs

T01 Guardrail Delineator Ref: Vol1-7.6.1 Vol4-12.6.1

T04 Cones Ref: Vol1-7.6.4

FLAGMAN

T05 Delineator Tape

Detail 13.8.2 Other Warning Devices

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ROADWORKS SIGNING
 13.1 Introduction
Types of Temporary Signs

TW202-TIN11.1 TW331-TIN11.1 TW208-TIN11.2 TW341-TIN11.2

TIN11.1 Advisory Speed

TIN11.2 Distance For

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ROADWORKS SIGNING
 13.1 Introduction
Types of Temporary Signs

TIN11.3
Distance To

TIN11.4
Text

TW336-TIN11.3 TW336-TIN11.3 TW336-TIN11.4

TW339-TIN11.4 TW336-TIN11.4 TW345-TIN11.5

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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+TW208-WC-TIN11.2

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RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
 13.1 Introduction
Types of Temporary High Visibility Signs

Detour
600 m

400 m

Building
Operations

For 5 km

TW336-WB-TIN11.3 TW302-WA-TIN11.3 TW345-WB-TIN11.5

TW209-TW324-WD-TIN11.2

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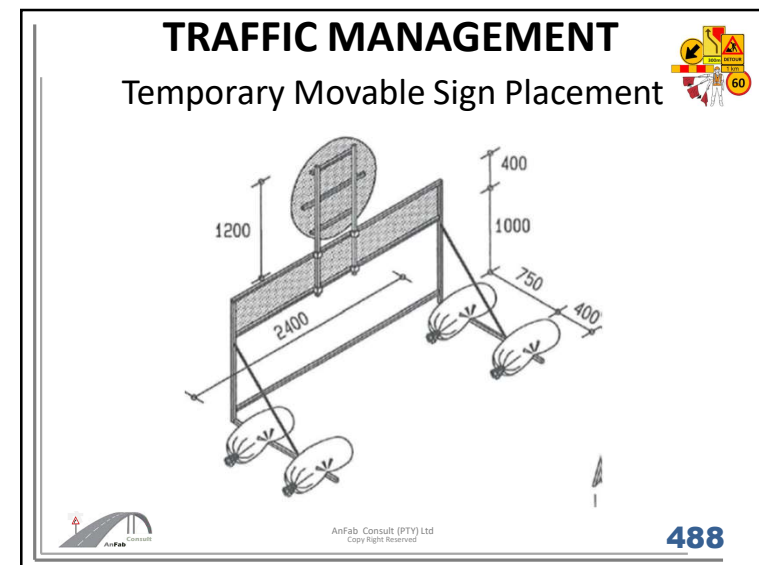
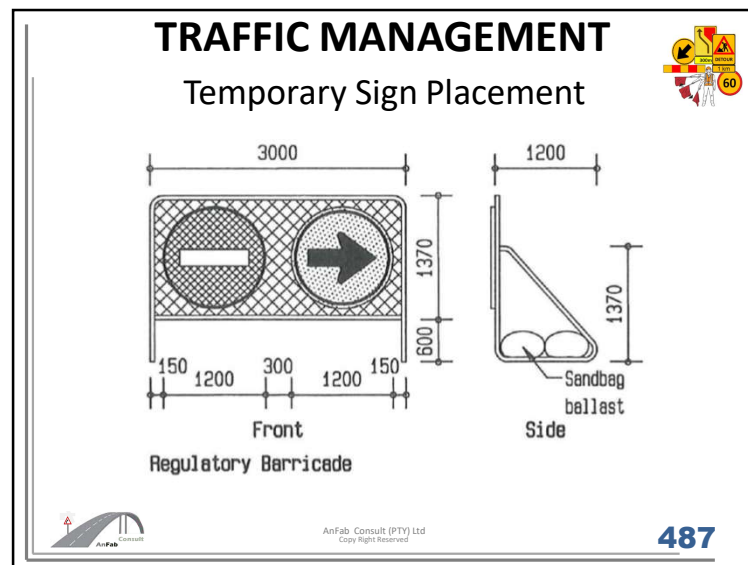
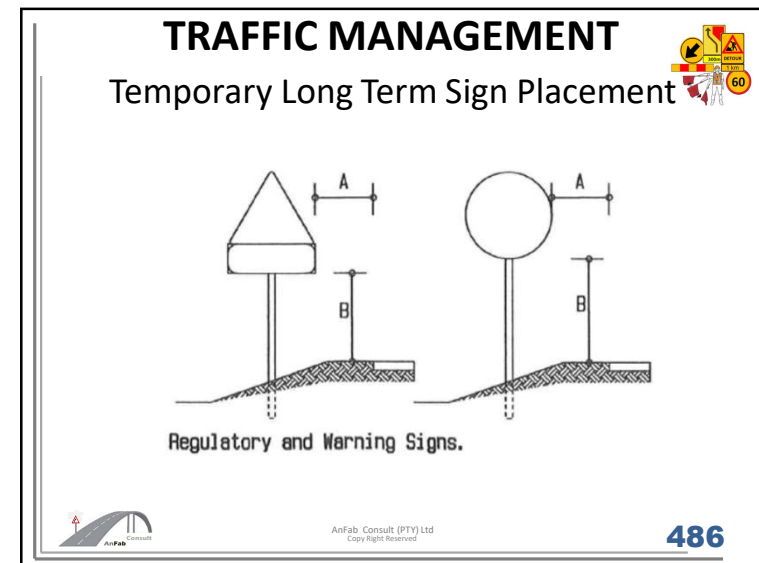
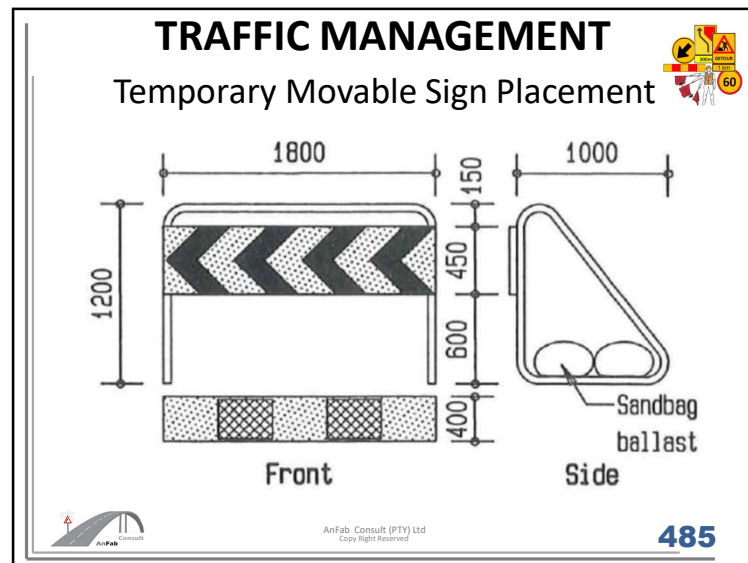
RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING
 13.1 Introduction
Types of Temporary Diagrammatic Signs

T6S121 T6S122 T6S123 T6S124

T6S125 T6S126 T6S127 T6S128

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TRAFFIC MANAGEMENT

Temporary Short Term Sign Placement

Pivot/Folding Frame

Fixed Frame

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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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TRAFFIC MANAGEMENT

Temporary Sign Placement

200
600
600
1200
1200
1500
200 MIN.

Sandbag Ballast

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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 | | TW336 WB + TW411 | 1200 x 1000 + 400 x 1200 | Class IV Fluorescent Yellow | Stand | | | m ² | |
| 2 | Speed Limit + No Overtaking | | TW201-80 + TW218 | 1200mm Dia | Class IV Fluorescent Yellow | Stand | | | m ² | |
| 3 | Right Lane Ends + 900m | | TW38xxx + TW411.3 | 1200 x 1000 + 400 x 1200 | Class IV Fluorescent Yellow | Stand | | | m ² | |
| 4 | Flagger | | Fluorescent High Visibility Clothing + Hard Hat | 600 x 600 | Level 3 Distinctive Clothing | | | | Number | |
| 5 | Keep Right + Lane Closed | | TR104 + TW411 | 1200mm Dia + 400x2400 | Class IV Fluorescent Yellow | Stand | | | Number | |
| 6 | Roadworks + End Thank You | | TW336 + TW411.4 | 1500mm x 300x1500 | Class IV Fluorescent Yellow | | | | m ² | |
| 7 | Traffic Cone | | TD4 - Flexible | 750mm | Fluorescent Red Orange | | | | Number | |
| 8 | Delineators | | TW401 / TW402 | 200x800 SAN1535 | Class III | 3mm base Footing With Male Female Connected | | | Number | |
| 9 | PVC Barricade | | 100mm x 6mm Crushed Stone Layer | Reflective Strip 30mm Wide | III | | | | Linear Metre | |
| 10 | Movable Concrete Barrier | | H4 Containment Level | 3m Sections + Approved Couplings | GMS 200mm Wide 200mm x 200mm x 200mm | Steel Connecting Devices | | | Linear Metre | |

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Road Traffic Sign Sizes

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

Fig. 3.4 Standard High Visibility Sign Sizes

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TRAFFIC MANAGEMENT

Road Traffic Sign Maintenance

Non-compliant signs should be replaced! **494**

TRAFFIC MANAGEMENT

Road Traffic Sign Maintenance

2013-11-09 12:17

Non-compliant signs should be replaced! **495**

TRAFFIC MANAGEMENT


Objective for road traffic signs maintenance.

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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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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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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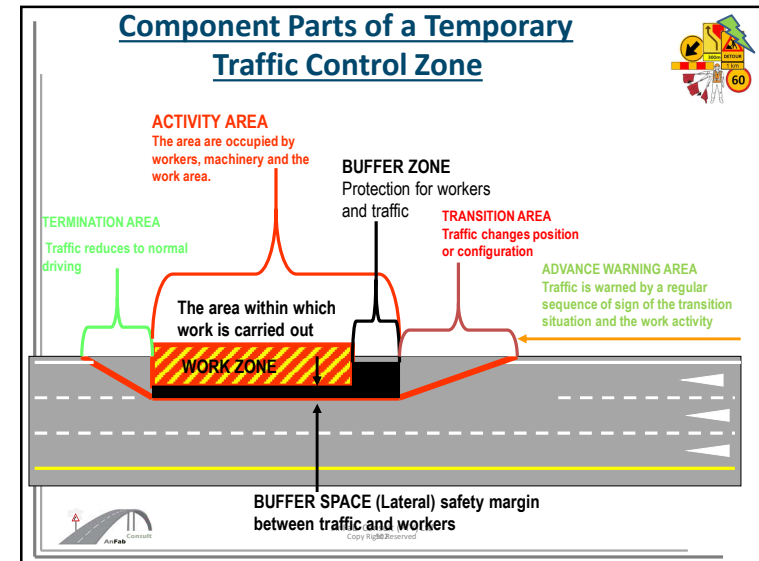
RSA RTSM : Volume 2 – Chapter 13
ROADWORKS SIGNING

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

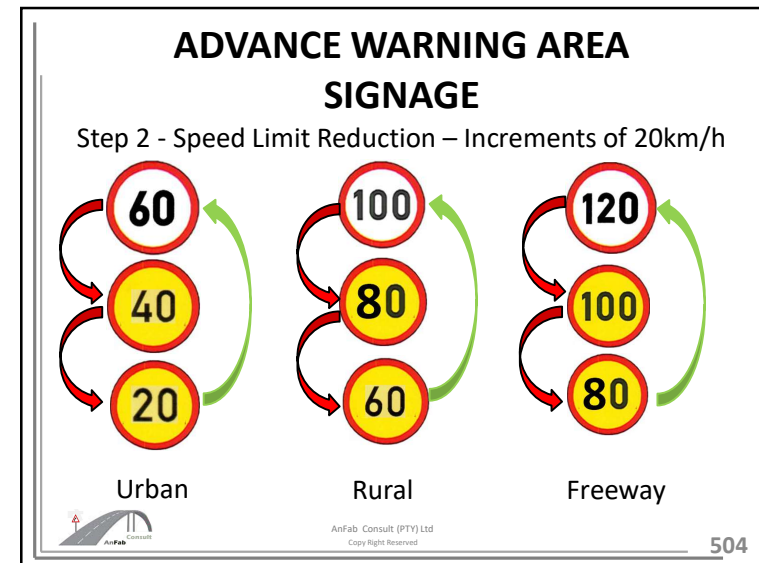
1200 x 2000 Freeway

 DETOUR
 1 km

Daytime Slow Speed

Night Time High Speed


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SPEED REDUCTION

The Advance Warning Area




3. Speed reduction and Law Enforcement!!

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TRAFFIC MANAGEMENT

Advance Warning Area



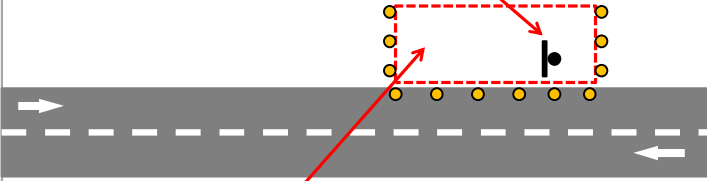
The area is used to advise motorists that there are temporary conditions ahead of them which require particular care!

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Step 1. IDENTIFY THE WORK ZONE ACTIVITY AREA

Road sign to be maintained



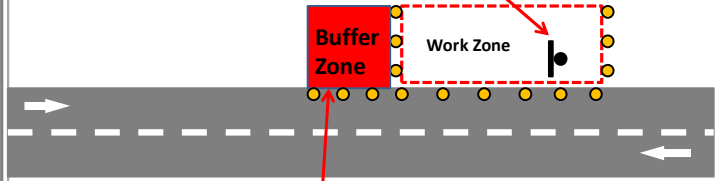
Construction zone clearly identified! Park All vehicles in this demarcated area. Workers shall NOT walk outside this area.

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Step 2 . IDENTIFY THE BUFFER ZONE

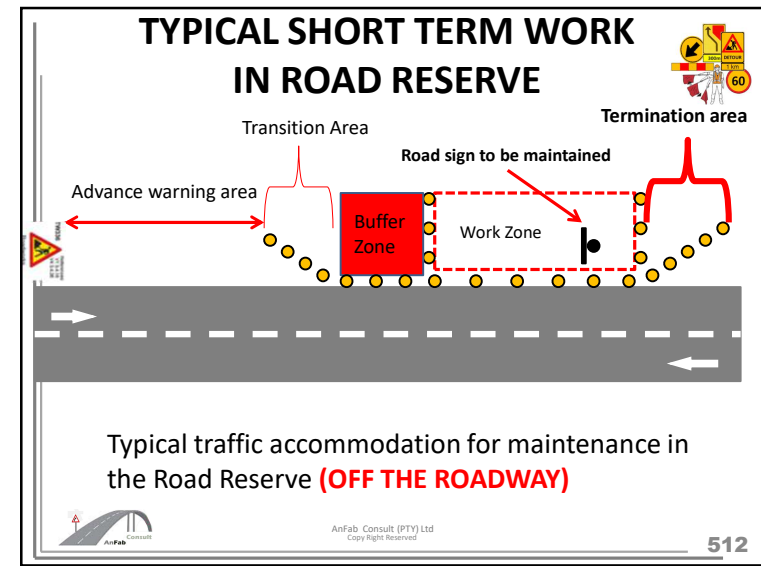
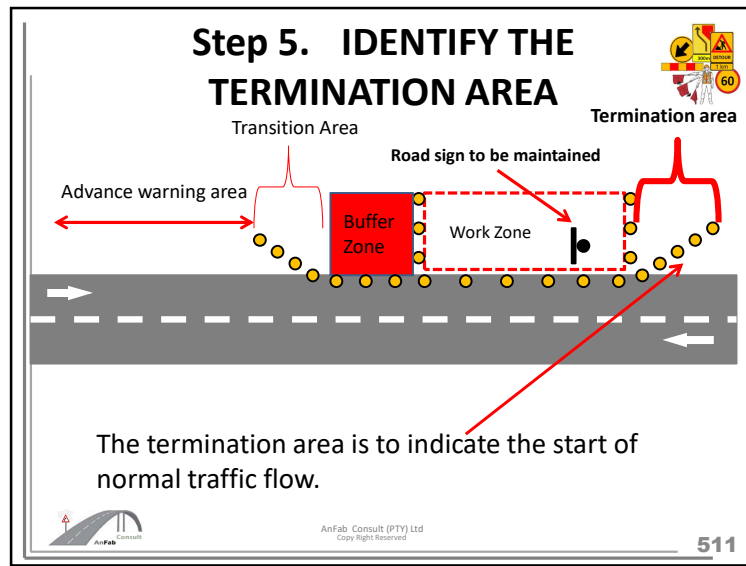
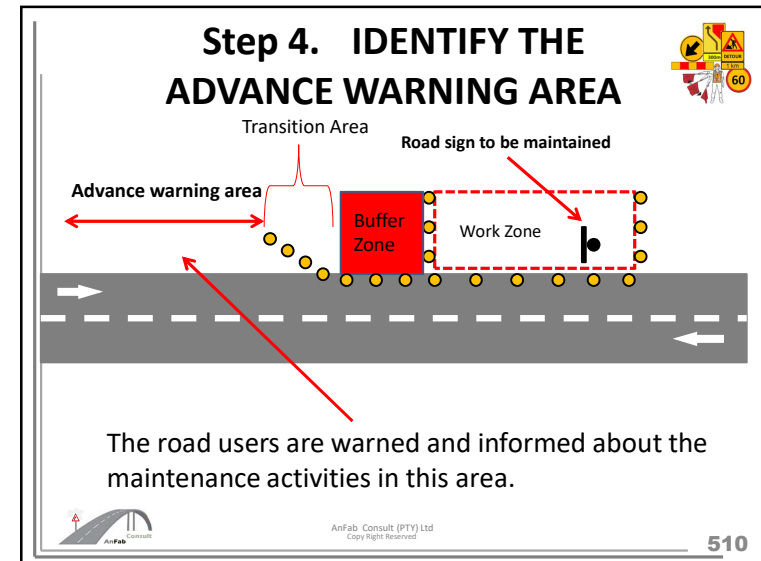
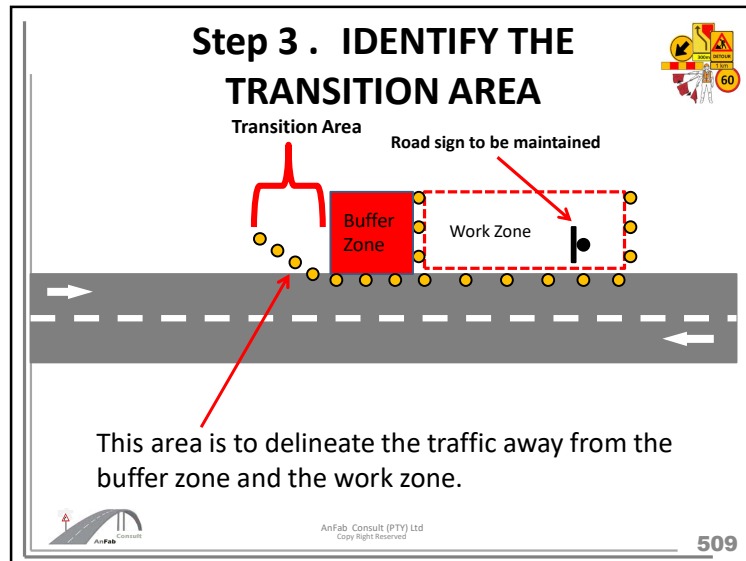
Road sign to be maintained

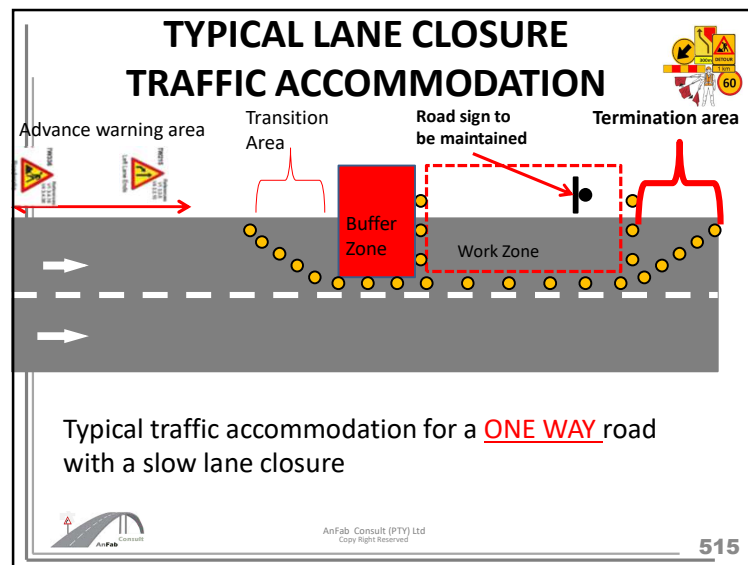
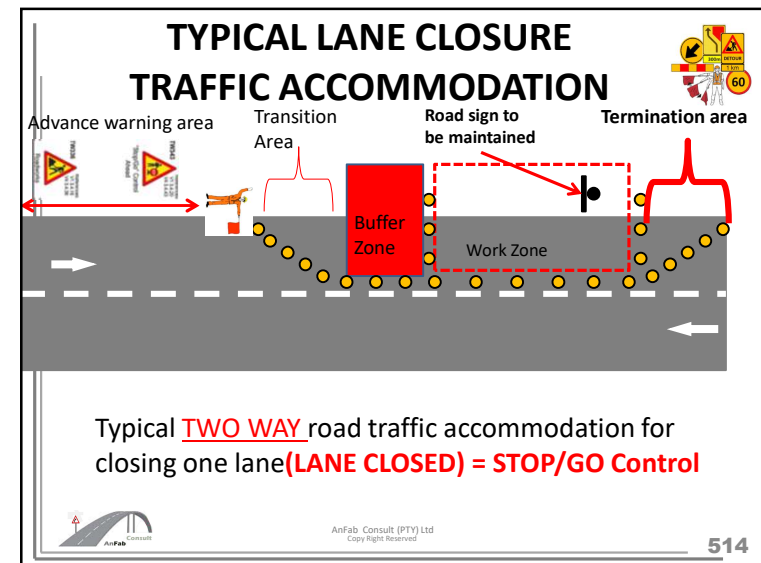
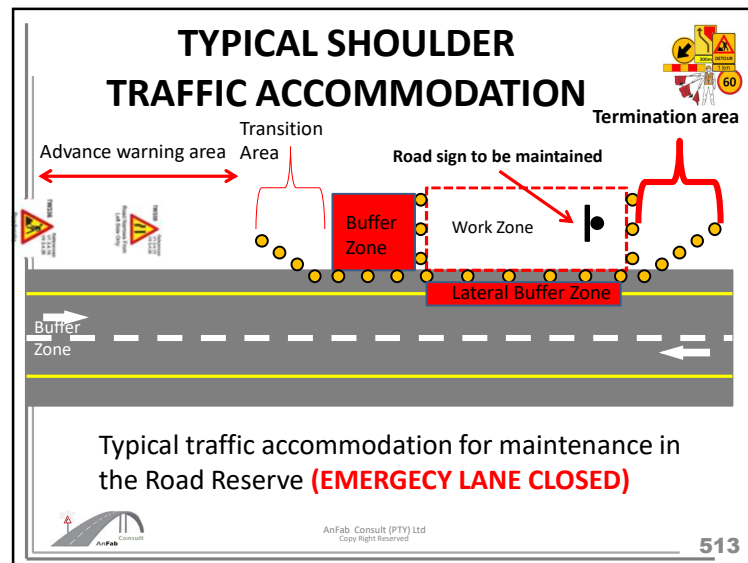


No activities are allowed in the buffer zone.

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Transition Area and Buffer Zone

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Pre-warning Area

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Component Parts of the Traffic Control Zone




Pre-warning Area – Rumble Strips

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Component Parts of the Traffic Control Zone



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

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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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Component Parts of the Traffic Control Zone



Transition Area

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Component Parts of the Traffic Control Zone



Transition Area - Deviation

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Component Parts of the Traffic Control Zone



Transition Area – Section of Road Closed

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Component Parts of the Traffic Control Zone



Transition Area – Deviation

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Component Parts of the Traffic Control Zone



Transition Area – Deviation


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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

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

All delineators to comply with **SANS 1555**



TW401

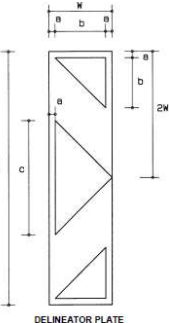


TW402

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 |

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



Transition Area - Delineators

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone




Transition Area

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone





Transition Area delineation devices

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Component Parts of the Traffic Control Zone



Transition Area

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Component Parts of the Traffic Control Zone



Transition Area

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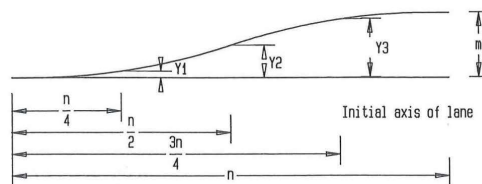
534



Detail 13.24.2

This method allows rapid site calculation and setting out of reverse curves based on a design speed of 50 km/h.

EXAMPLE : Shift = 6 m Offset Y1 = 0.5 m
 L = 120 m Y2 = 3.0 m
 Y3 = 5.5 m



Transition Area – Reverse Curve design

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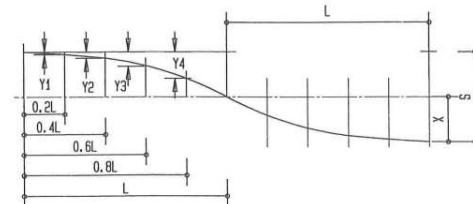
Detail 13.24.3

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

$$Y_1 = X_1 \frac{1}{L^2}$$

Where S = total shift

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

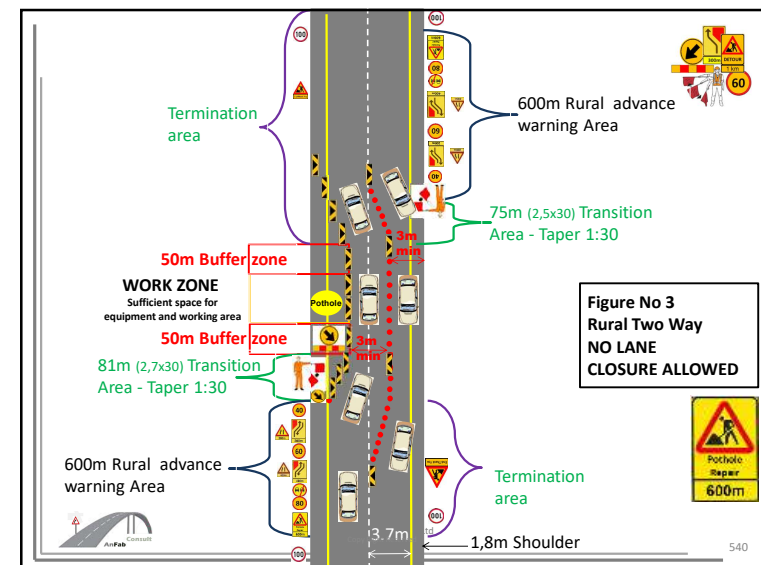
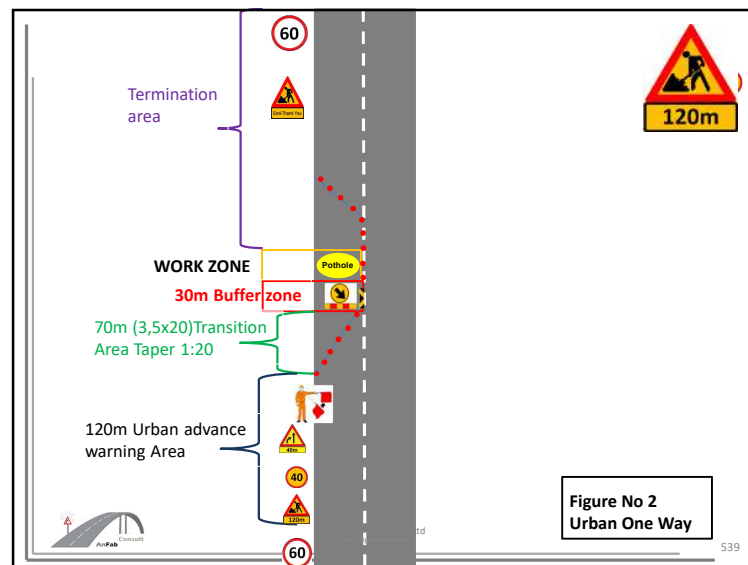
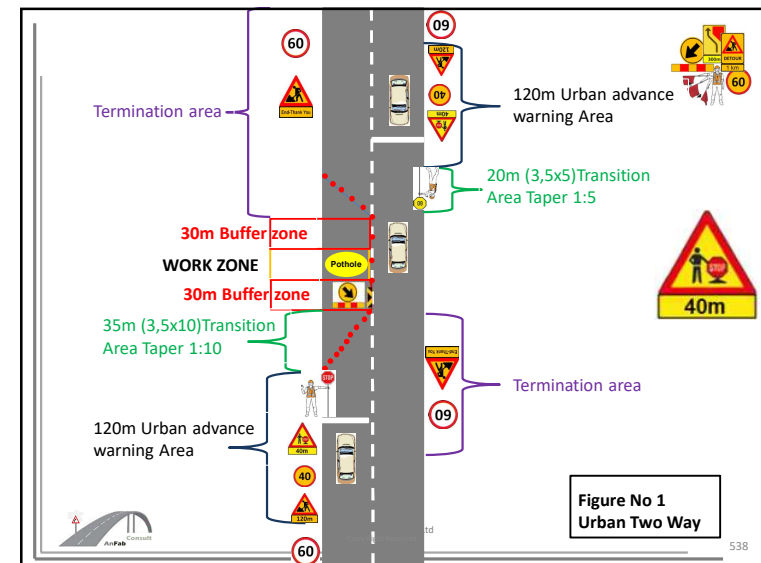
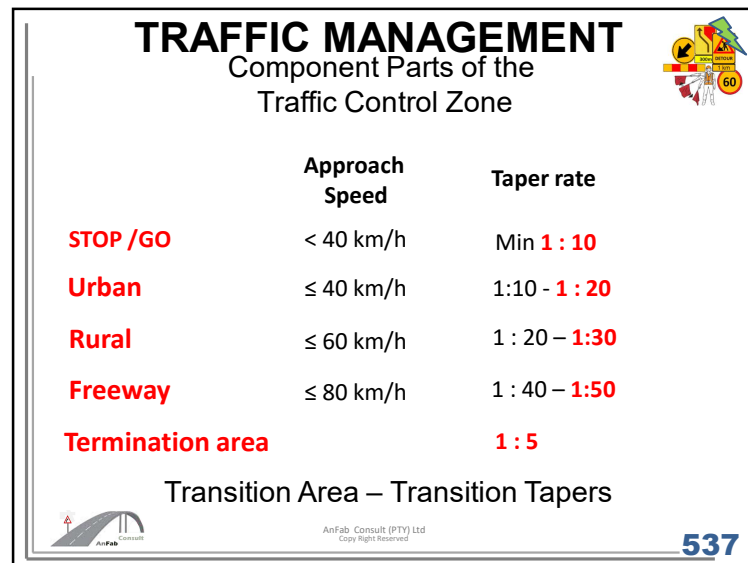


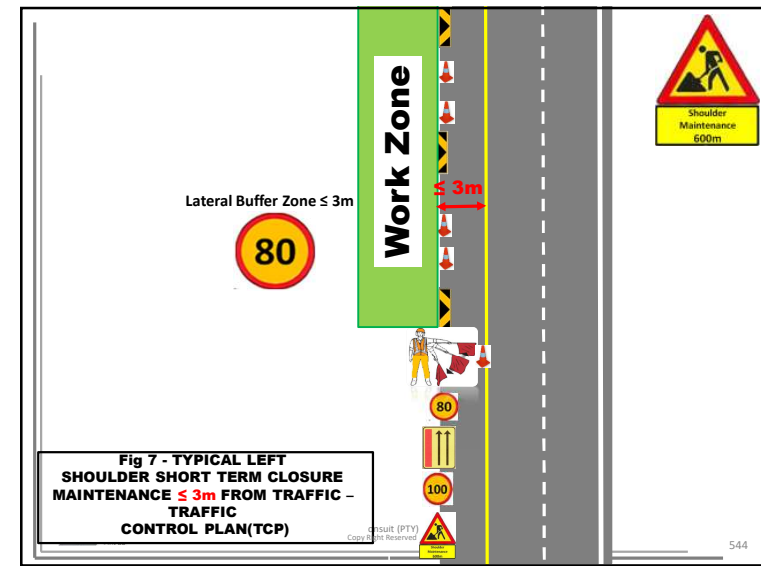
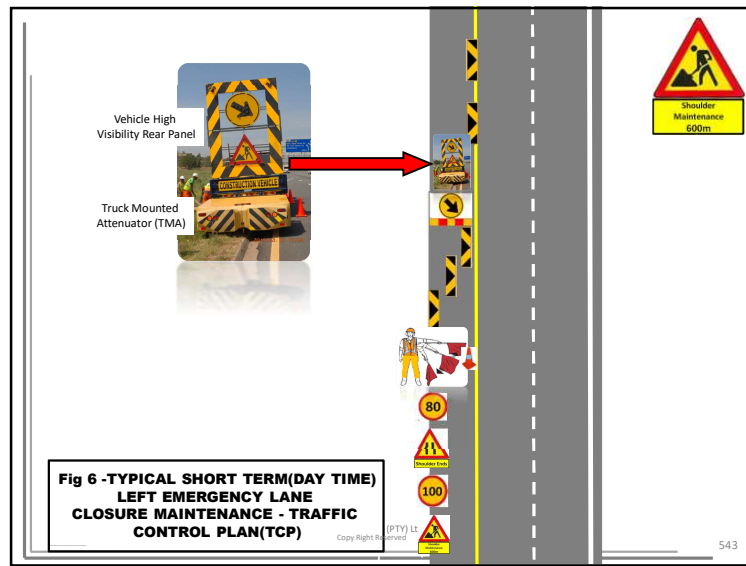
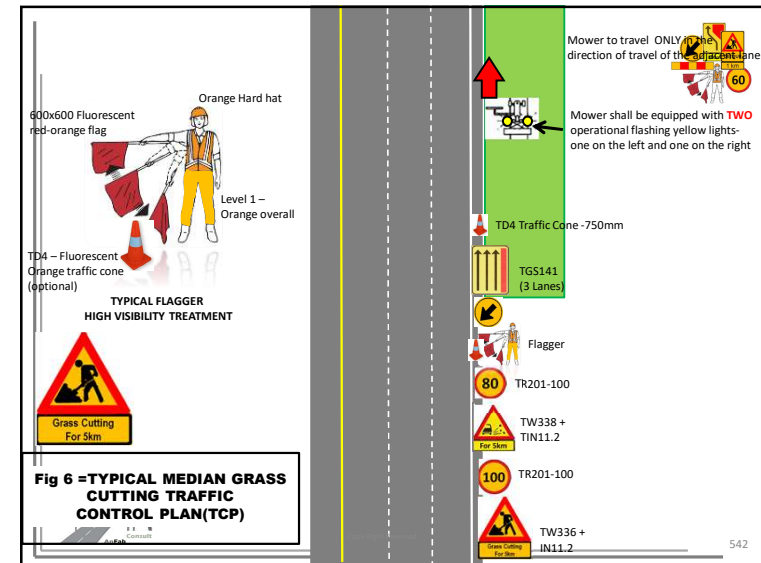
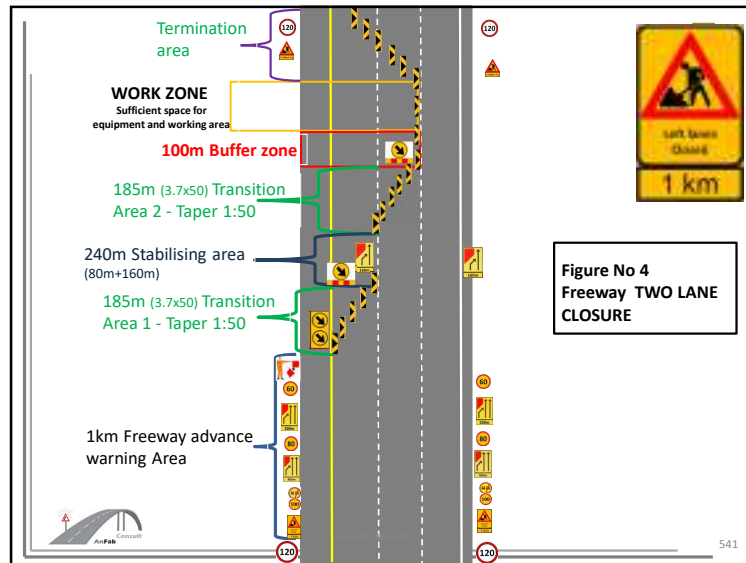
Transition Area – Reverse Curve Design

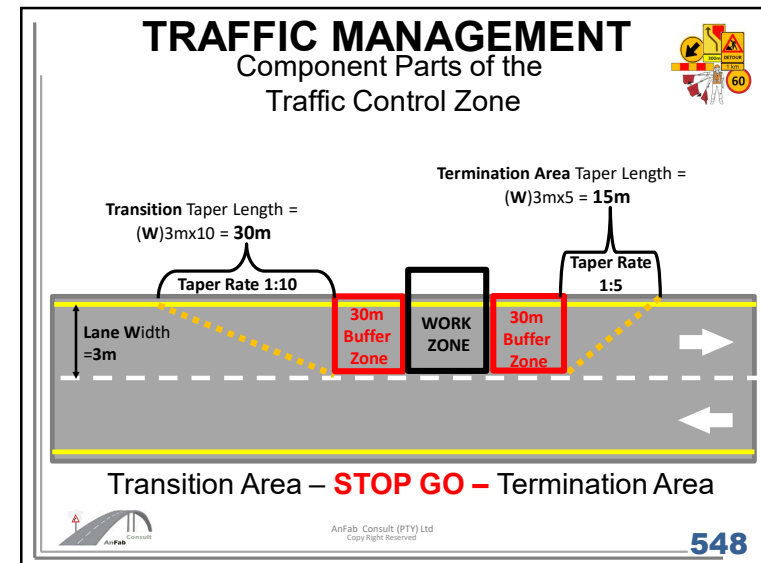
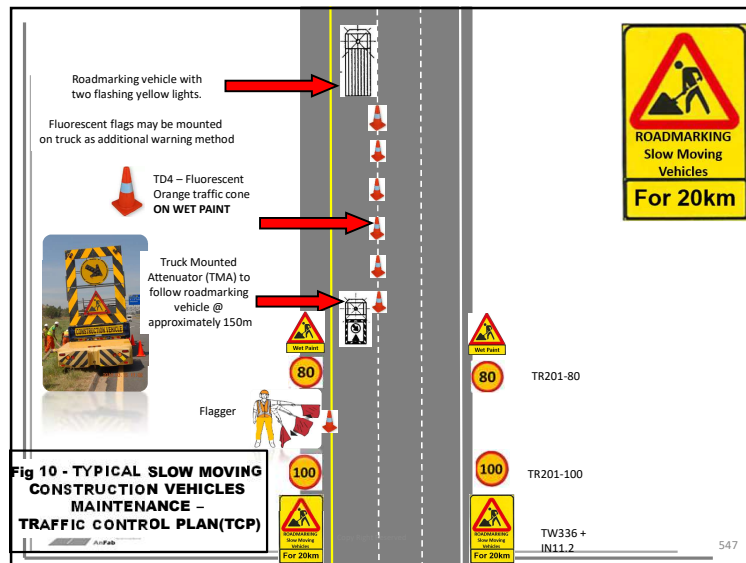
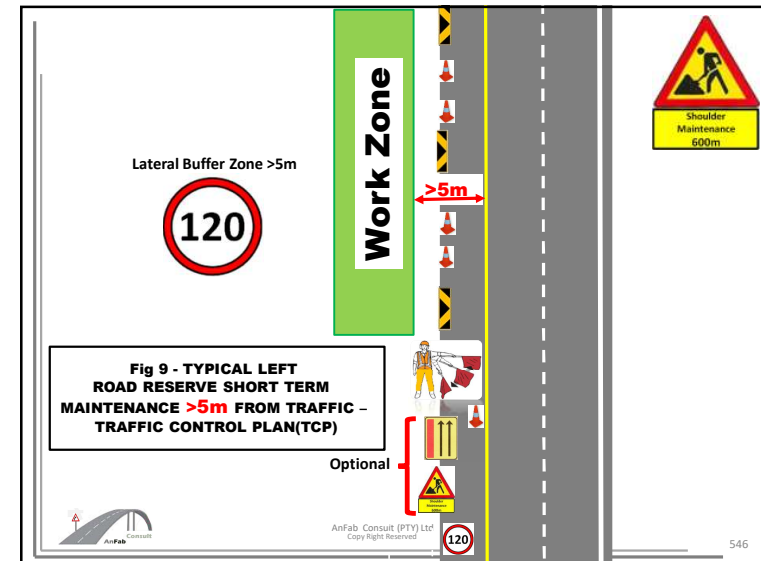
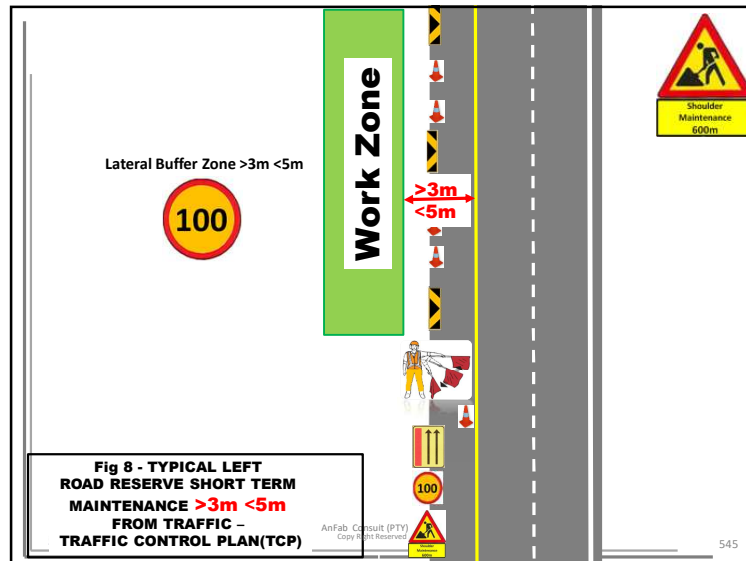
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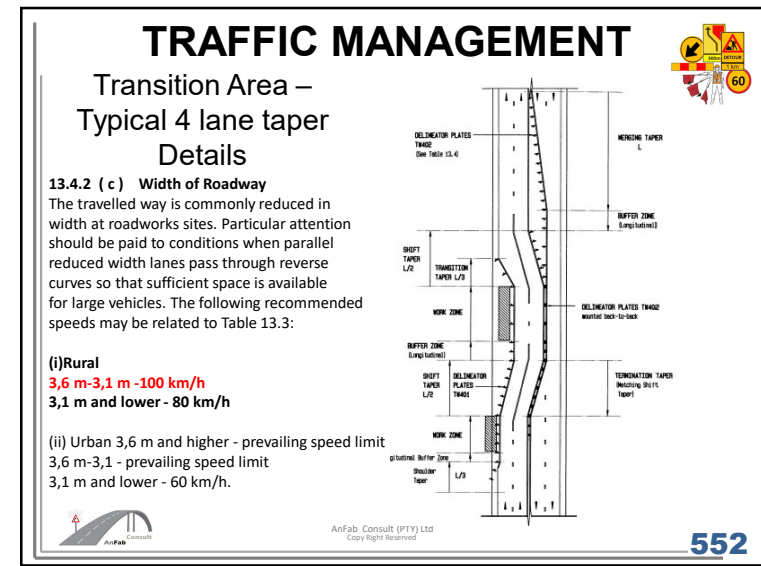
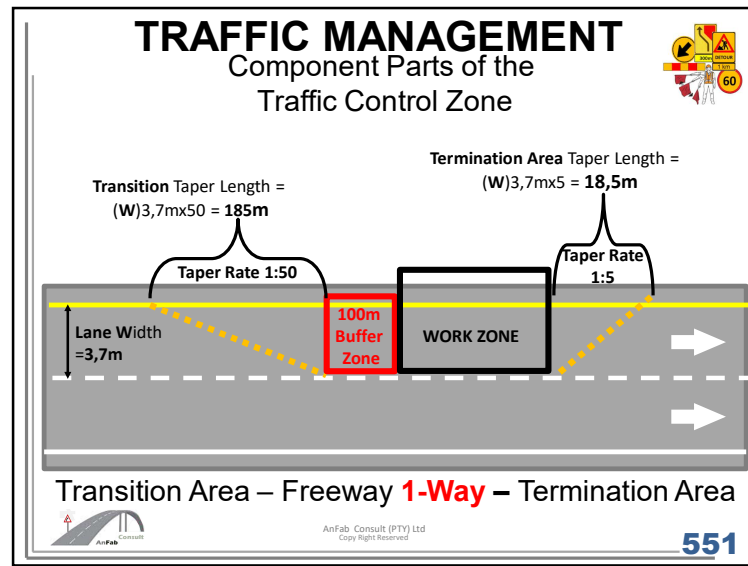
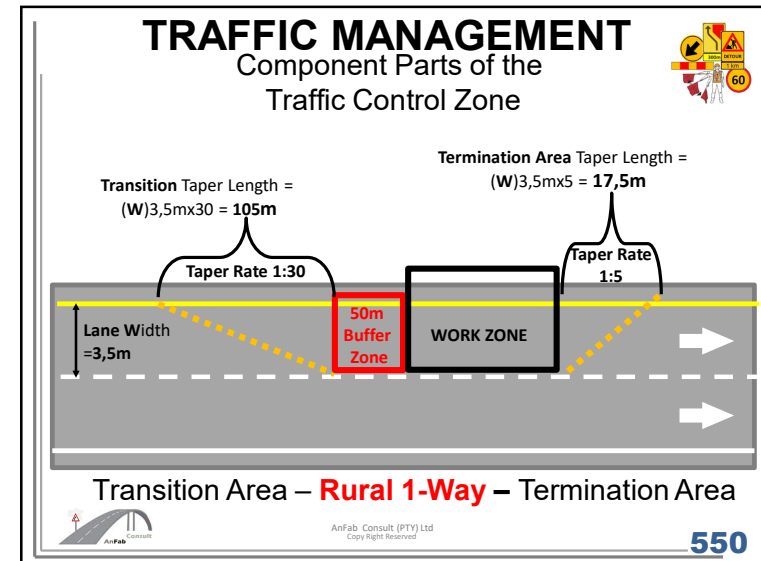
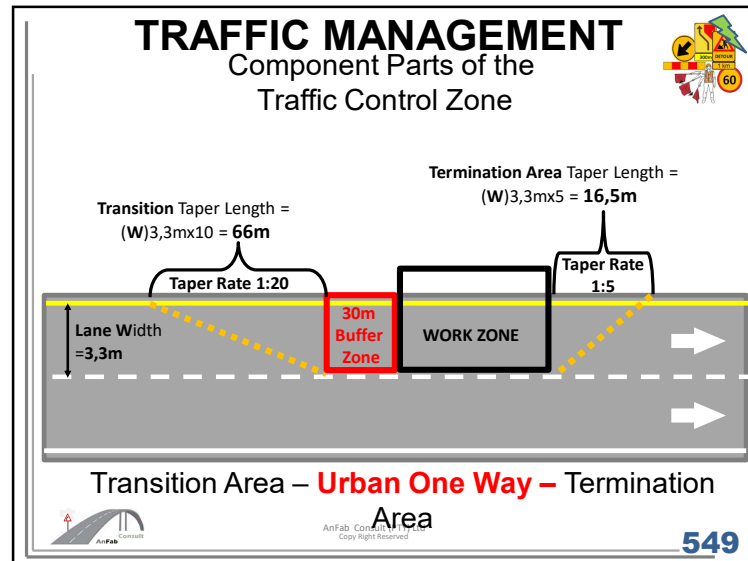
536











TRAFFIC MANAGEMENT

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) | | |


Transition Area – Cone, delineator and roadstud spacing

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



Concrete barriers

Transition Area delineation devices

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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

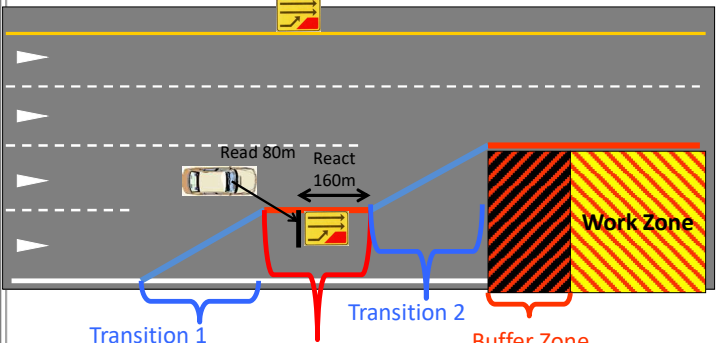


Height Restriction Beams

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SIGNING APPLICATIONS FOR FREEWAYS



Lane Closure – 2 Right Lane Long Term

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STABILIZING AREA





| 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



| 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



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



2013.11.08 12:34

The Lateral Buffer Zone

561

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



2014.01.15 11:02

The Work Area – Lateral Buffer Zone

562



TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



2013.08.07 11:01

Termination Area

564

TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

R201



Ref. V1 2.4.1

Display permanent sign at end of construction zone



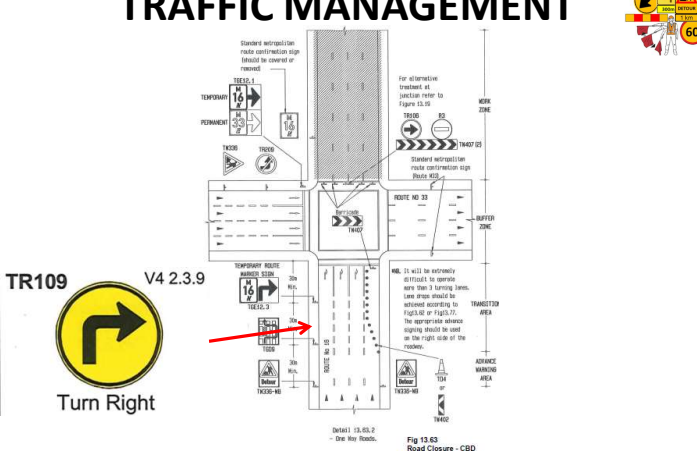
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TRAFFIC MANAGEMENT

Road Closures



TR109 V4 2.3.9

Turn Right

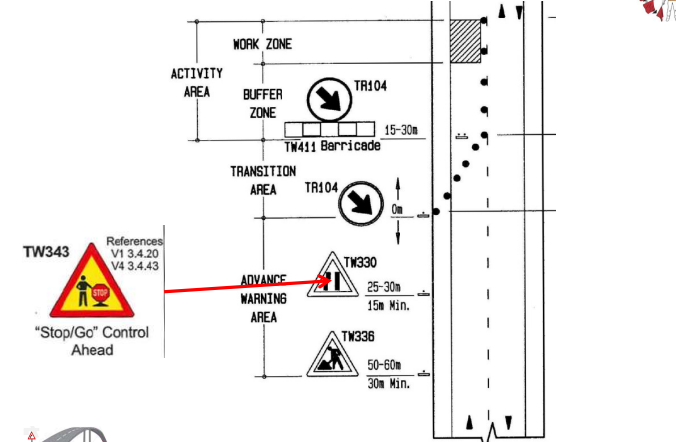
Fig 13.63 Road Closure - CBD

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TRAFFIC MANAGEMENT

Temporary Sign Placements



References V1 3.4.20 V4 3.4.43

"Stop/Go" Control Ahead

ADVANCE WARNING AREA

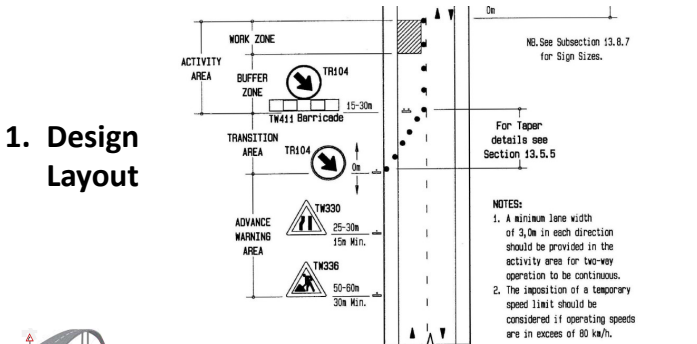
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SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

1. Design Layout



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.

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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, 803. 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 spans 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 "basic medium" type of message and/or flashing lights should be considered for such signs (see Figure 13.18).





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SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

3. Device Requirements Inventory

| MAINTENANCE UNIT INVENTORY | | | |
|---|---|-----------------|---------------|
| Sign | No | Size (mm) | Quantity |
|  | FLAGS | 450 X 450 | 3 |
|  | TRI03 | 1200 | 1 |
|  | Vehicle High Visibility Rear Panel TRI03/TRI04 plus TKS05 | To suit Vehicle | 2 |
| | | 900 | 2 |
| | | 1200 | 2 |
|  | Yellow Flash Light | | 2 Per Vehicle |

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SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL

Volume 2 Chapter 13 – Roadworks Signing

- ☐ 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?

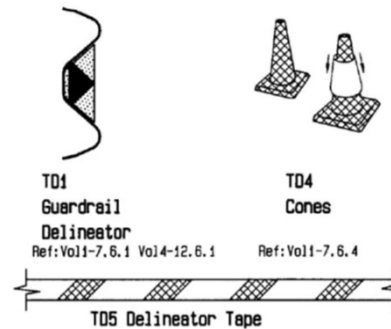
4. Checklist – Risk Analysis

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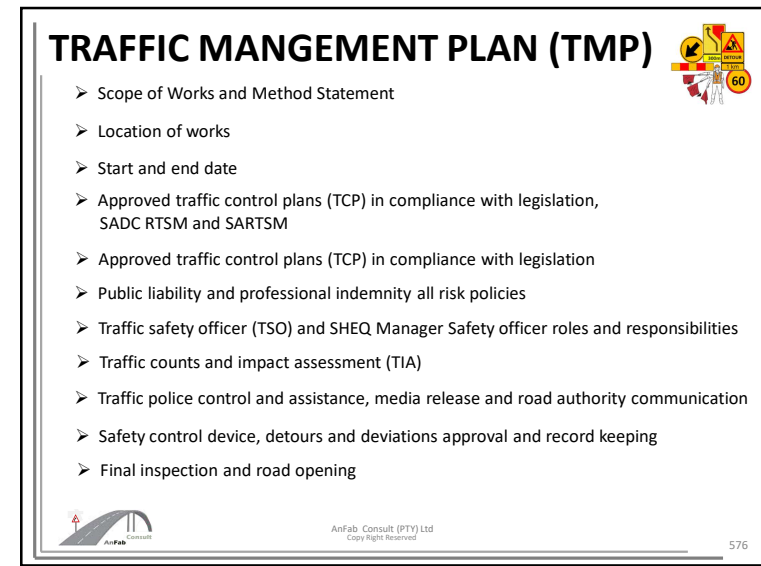
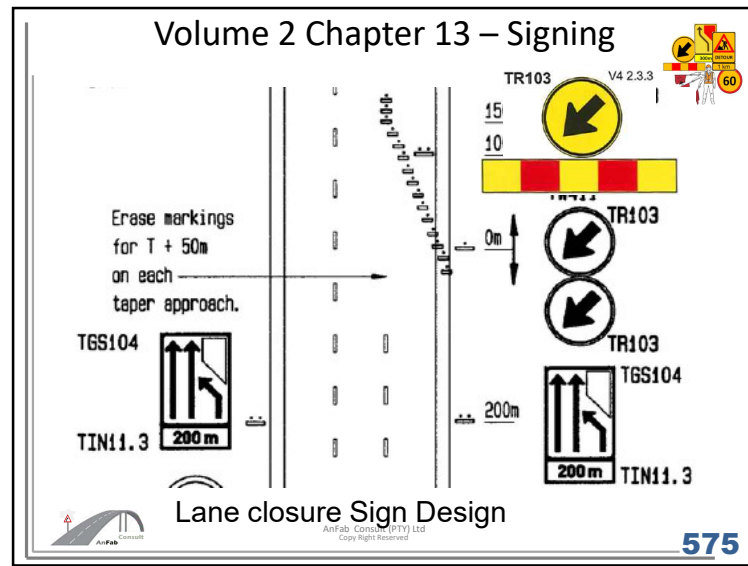
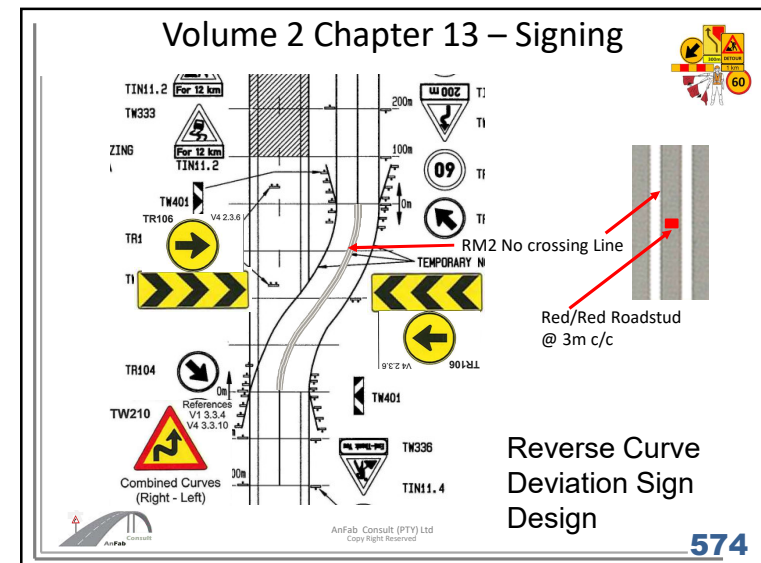
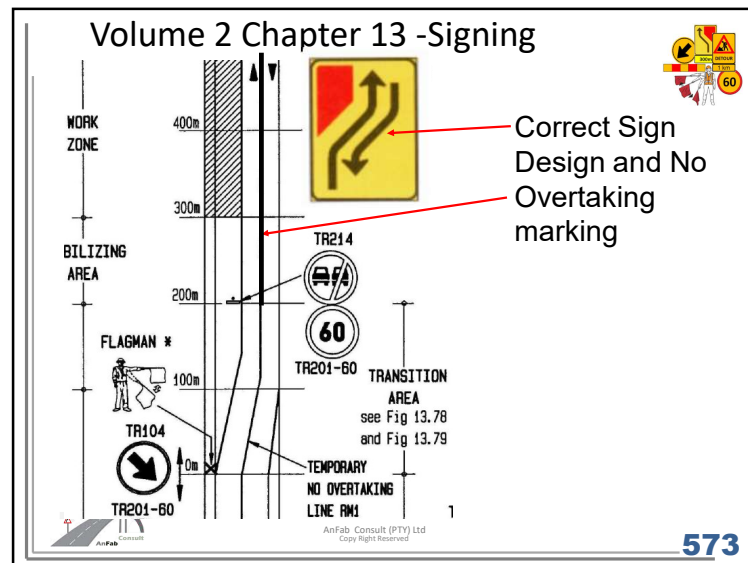
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Volume 2 Chapter 13 – Roadworks Signing




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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

- The temporary signing of urban roadworks situations is commonly influenced by the following factors, either separately, or in combination:
 - limited space to accommodate signs and traffic;
 - high traffic volumes (even moderate urban traffic flows are high by rural standards);
 - the presence of pedestrians;
 - the need to maintain access to many properties.
- Roadworks situations in urban areas vary widely in their signing requirements and operational characteristics including, as they do, such environments as:
 - quiet residential streets;
 - high capacity arterial streets;
 - congested central business districts
- Factors which commonly mitigate against the effectiveness of temporary road signs in urban areas, and which must be recognised and taken into account, include:
 - 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;
 - obscuration of signs by trees, street furniture and by large vehicles;
 - limited sight distances.
- 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.
- 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.



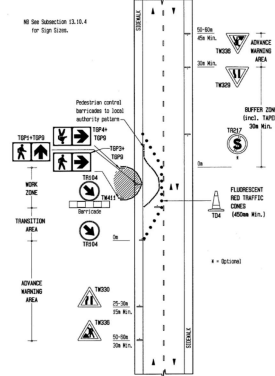
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Volume 2 Chapter 13 – Typical
Signing Applications for Urban Streets



Typical
Layout -
Footway
Deviation






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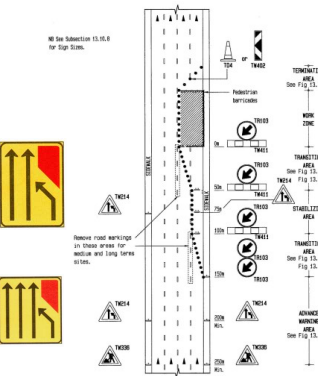
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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone



One way lane closures






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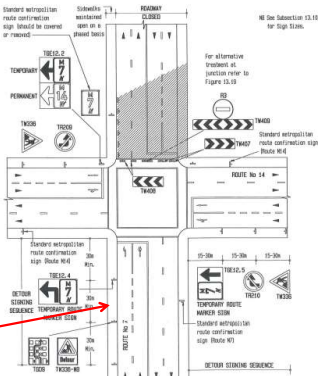
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TRAFFIC MANAGEMENT

Road Closures



T-Junction





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TRAFFIC MANAGEMENT

Component Parts of the Traffic Control Zone

Urban junction sign placement

References
V1 3.3.5
V4 3.3.15

Left Lane Ends

ADVANCE WARNING AREA

WORK ZONE

BUFFER ZONE

FLUORESCENT RED TRAFFIC CONE (450mm Min.)

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Volume 2 Chapter 13 – Typical Signing Applications for Urban Streets

Typical Layout – Lane Closed Beyond a Junction

Fig 13.60

Lane Closed Beyond a Junction

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Volume 2 Chapter 13 – Typical Signing Applications for Urban Streets

Typical Urban Method Statement, Checklist and Sign Requirements

13.10.8 Work in a One-Way Street

1. In an urban context the signing application illustrated in Figure 13.62 could apply to a multi-lane one-way street in a central business district (CBD) environment, or to one carriageway of a dual carriageway roadway. The signing described requires the likely shortage of space to accommodate signs, common in a CBD. As a result, LANE CLOSURE advance warning signs TW214 (or TW215) are specified. If this specification is used, then the TW214/TW215 signs shall be mounted at an adequate height, likely to be well above the minimum recommended in Table 13.1, to ensure that visibility.

2. When space is available, as would be more likely on a dual carriageway roadway, it is recommended that the appropriate DIAGRAMMATIC signs be used in place of signs TW214/TW215. For details of such an application see Figure 13.60.

3. The specific application shows two out of four lanes dropped to create a work area. When two lanes are dropped, they shall be dropped one lane at a time with a suitable STABILISING AREA between the two lane drop TRANSITION AREAS. If necessary, one lane shall be dropped within the preceding city block or section of road. Adequate longitudinal and lateral BUFFER ZONES must be provided. For medium to long term sites, road markings shall be removed over the lengths of the lanes.

4. Due to the proximity of pedestrians to the WORK AREA, it is essential that this area be well barricaded.

5. For full details of the setting out of signs on tapers see Tables 13.4 and 13.5, and Figures 13.77 and 13.78.

Checklist

□ Is there sufficient space for DIAGRAMMATIC signs?

□ Are the advance warning signs mounted high enough for good visibility?

□ If traffic cones are used do they have clear retroreflective lenses?

| Sign | No | Size (mm) | Quantity |
|-------|------------|-------------------------------|----------|
| TW208 | 800 | 2 | |
| TW214 | 900 | 2 | |
| TR103 | 900 | 5 | |
| TW411 | 300 x 1000 | 13 Min | |
| TD4 | 450 | Taper 30' 10' or 10' per 100m | |
| TW402 | 800 x 200 | Taper 30' 10' or 10' per 100m | |

(1) TD4 and TW402 are alternatives.

(2) The number of pedestrian barricades required depends on the size of the work area.

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MODULE 7

SIGNING APPLICATIONS FOR RURAL ROADS

Fig 13.60

Lane Closed Beyond a 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

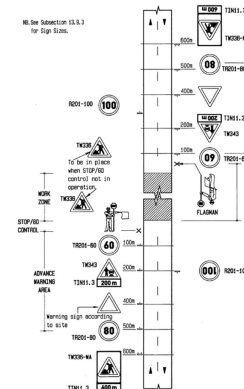


Fig 13.44
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STOP/RY-GO Operation

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Volume 2 Chapter 13 – Typical Signing Applications for Rural Roads

Typical Gravel Blading/Re- shaping layout.

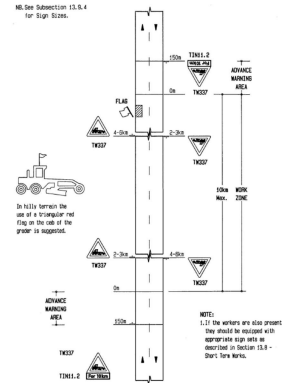


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Typical Signage Improvements

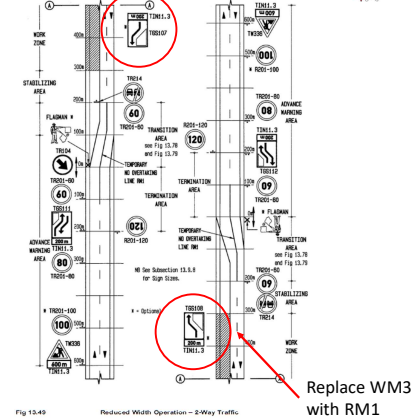


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Typical Bridge/Road Closure Sign Layout

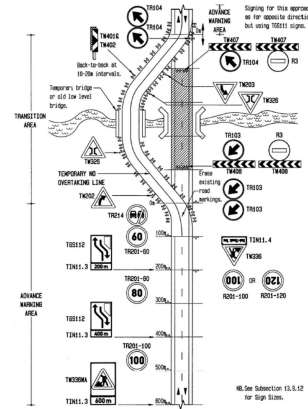
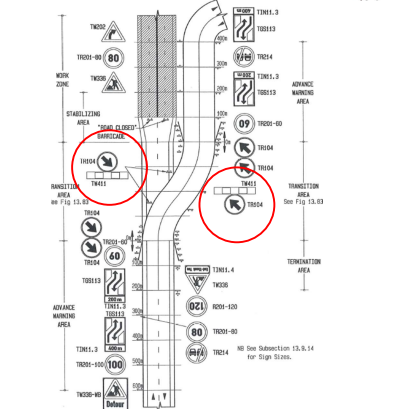


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Typical Rural Deviation Sign Layout




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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.**

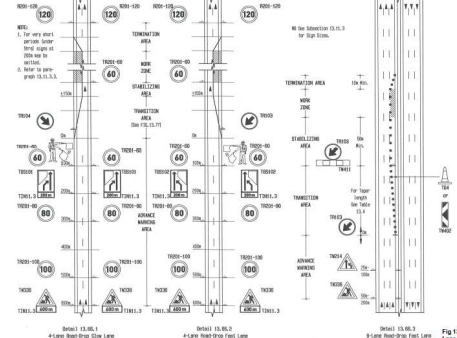



Fig 13.66 Lane Closure - Daytime Only



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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.

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

Typical Advance
Warning Area
1km
200m Buffer Zone

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MODULE 9

Standard Specifications for Road and Bridge Works for South African Road Authorities

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PART A: SPECIFICATIONS

A1.5.1 SCOPE

This Section covers the accommodation of vehicular and non-motorised traffic and pedestrians on, over or through the site of the Works. This involves:

- The construction, maintenance and eventual removal of temporary deviations and detours
- The construction and eventual removal, if required, of temporary gates, fences, drainage works and other incidental items that may be required.
- The provision, erection, relocation, maintenance and removal of traffic control facilities and traffic safety items.
- Painting and removal, if required, of temporary road markings and placing of temporary road studs.
- The issuing of public notices.

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PART A: SPECIFICATIONS

A1.5.1 SCOPE

This Section covers the accommodation of vehicular and non-motorised traffic and pedestrians on, over or through the site of the Works. This involves:

- The issuing of public notices.
- Liaison with the relevant traffic authorities, motorists and other affected persons.
- The removal and reinstatement/landscaping of temporary deviations when they become redundant.

The purpose of providing the traffic accommodation measures discussed in this Section is to ensure the safety of road users, pedestrians and the Contractor's and Engineer's employees who are engaged on the Works.



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- **Barriers** - consist of concrete, plastic or steel sections which are placed across or along the road to stop or divert the traffic or alongside /around the work area to separate the traffic and pedestrians from the work area. Barriers may be used either as channelization devices or as vehicle restraining systems depending on their type and on their fixing arrangements.
- **Channelization devices** - moveable channelization devices used for diverting and/or separating vehicles, non-motorised traffic and pedestrians from the work areas include barriers, delineators and traffic cones. These moveable channelization devices may be supplemented by additional temporary road markings and road studs.
- **Delineators** - are rectangular warning signs with a directional chevron on one or both sides which indicates which side of the roadway is open for use by the vehicles, non-motorised traffic and/or pedestrians.
- **Road markings** - include all the regulatory road markings painted on the surface of existing or newly constructed roads as well as temporary road markings painted on the surface of deviations and detours.



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COTO - A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS A1.5.2 DEFINITIONS



- **Partial width or half width construction** - this is a construction strategy wherein part of a roadway is constructed or reconstructed/rehabilitated as a phase without encroaching on the remaining width of the roadway in order to accommodate traffic. (Typically, a two-lane two-way road will usually be constructed in two half width phases whereas a multi-lane road will be constructed in several partial width phases.)
- **Road signs** - include all the regulatory road signs erected along existing or newly constructed roads as well as the temporary road signserected along temporary deviations and detours.
- **Road restraint systems** - temporary road restraint systems used for preventing vehicles from leaving the permitted lanes, or for separating two opposing streams of traffic, during the construction of the Works may consist of either movable precast concrete or steel barriers or steel guardrails that comply with the specifications given in Chapter 11.



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COTO - A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS A1.5.2 DEFINITIONS




- **Temporary deviation** - a temporary deviation can be partial width, single or multi-lane roads that are used to accommodate vehicular and nonmotorized traffic while the Works are in progress. They are either a portion (part width) of the road that is under construction or they are newly constructed roads (with a gravel or a bituminous surface) constructed alongside or in close proximity to the Works.
- **Traffic** - means all vehicles, non-motorised vehicles and pedestrians that need to pass around, alongside or through the work areas.
- **Traffic calming devices** - are used to reduce vehicle speeds and they generally consist of temporary or permanent rumble strips, humps or circular bumps placed in an overlapping strip pattern across the width of the traffic lane/s.
- **Traffic safety devices** - include flashing warning lights, illuminated and/or flashing traffic arrows and signs, electronic variable message boards, vehicle restraint systems, impact attenuation devices and guardrails.



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A1.5.3 GENERAL
A1.5.3.1 Access to properties


The Contractor shall provide and maintain access to all public and private properties which fall within or adjoin the Works at all times, unless alternate provision is specified in the Contract Documentation.



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A1.5.3 GENERAL
A1.5.3.2 General Requirements

The Contractor may not commence any part of the Works until adequate provision has been made for the accommodation of vehicular, nonmotorized and pedestrian traffic. Traffic shall be accommodated in accordance with the requirements given in the Contract Documentation unless the Contractor has submitted an alternative incorporating an amended method of traffic accommodation and this alternate method has been accepted by the Employer.


The Contractor shall ensure that all employees and all visitors to the site are equipped with approved safety vests / jackets utilizing retroreflective and/or fluorescent panels in red, yellow, white and/or silver and that the safety vests/ jackets are worn whenever his personnel and visitors are on the site of the Works.



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A1.5.3 GENERAL
A1.5.3.2 General Requirements

Any person found not wearing a safety vest/jacket while on the site of the Works, including any of the Engineer's or the Employer's staff, shall be instructed to leave the site until they are in possession of and wearing a safety vest/jacket.

All safety vests/jackets shall be kept clean and in good condition and any safety vests/jackets that are, in the opinion of the Contractor's safety officer and/or the Engineer, ineffective shall be immediately replaced by the Contractor, Engineer or Employer, as applicable.


The Contractor shall be responsible for maintaining all existing or temporary road surfaces within, and on the approaches to, the Works area in a safe and trafficable condition at all times of the day or night for the duration of the contract.



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A1.5.3 GENERAL
A1.5.3.2 General Requirements

Any construction material that is driven onto or spilt on temporary roads, public roads or privately-owned roads during the haul of material, or while any construction operations are being carried out, shall be cleaned off the road surface as soon as practically possible and removed to an approved spoil site.

During non-working hours, or when construction work is not taking place on a certain section of road, all superfluous obstructions to the traffic shall be removed and all signs no longer applicable to the situation shall be removed to an approved safe location or effectively covered with an opaque, weather proof material bag made from durable material that is firmly fixed over the sign.



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**A1.5.3 GENERAL****A1.5.3.2 General Requirements**

The overnight parking of construction vehicles and/or equipment within the road reserve may be permitted in areas alongside the road carriageway, in consultation with the Engineer.

The minimum clearance between the parked vehicles and/or equipment and the edge of the nearest traffic lane shall be 6,0 m.

The parked equipment and vehicles shall be placed behind reflective chevron delineators which are placed to face the traffic at a maximum spacing of 10m between each delineator.



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**A1.5.3 GENERAL****A1.5.3.2 General Requirements**

If the construction vehicles and/or equipment need to be parked overnight closer than 6,0 m from the nearest traffic lane, then they shall be separated from the lane by guardrails correctly installed on guardrail posts or by vehicle restraining systems which consist of concrete or steel barriers correctly placed, assembled and fastened together in a sufficient length to create an effective vehicle restraint system.

The guardrails or vehicle restraining systems shall be fitted with red reflectors or reflective chevron signs which are fixed to face the traffic at a maximum spacing of 10 m between each reflector or reflective chevron sign.

The use of drums, lightweight plastic barriers, concrete or steel barriers that are not correctly placed and fastened together or guardrails that are not attached to correctly installed guardrail posts will not be permitted.

When requested by the Engineer, the Contractor shall provide lane closures for road inspections and testing. This must be done in advance of the actual time programmed for the inspection and testing work.



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**A1.5.3 GENERAL****A1.5.3.3 Lane Width**

The clear width of any traffic lane which is provided along any section of a detour, a temporary deviation or any partial / half width construction area shall not be less than 3,5 m unless a narrower width is specified in the Contract Documentation or approved by the Engineer in writing.

If a lane width less than 3,5 m is specified or approved by the Engineer then temporary width restriction warning signs shall be erected at approved locations along the narrow section of the detour, temporary deviation or partial / half width construction areas.



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**A1.5.3.4 Late occupation of traffic lanes, interchange ramps and crossroads**

If specified in the Contract Documentation the Contractor shall be charged a lane occupation levy for any occupation of traffic lanes, interchange ramps and any crossroads beyond the completion dates and times agreed with the Employer.

The lane occupation levies shall be specified in the Contract Documentation and they shall be deducted from payments due on the relevant interim payment certificates.

If specified in the Contract Documentation the Contractor shall also be charged a lane occupation levy for traffic lanes, interchange ramps and crossroads occupied by the Contractor for the purpose of carrying out remedial work during or after completion of the Works.



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A1.5.3.5 Legal requirements

In addition to the specifications given in the Contract Documentation all traffic accommodation arrangements shall also conform to the specifications and provisions given in the latest edition of the South African Road Traffic Signs Manual (SARTSM) and all other current legislation and regulations.

The Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.


His staff and operators shall obey the permanent and temporary road traffic signs at all times and shall not consider themselves exempt from the road traffic laws and regulations because the Contractor has been given occupation of the site of the Works.



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A1.5.3.5 Legal requirements

The Contractor shall indemnify the Employer against all proceedings, claims, actions, damages to vehicles or property, injury or death of persons and all costs which may arise from, or be related to:

- The absence, improper functioning or incorrect placement of road traffic signs, barriers, channelization devices, road markings, traffic control facilities, traffic safety devices and vehicle restraint systems.
- Any construction related items, materials or surfacing aggregates that were dropped, deposited, spilt, left or come loose from any access roads, haul roads, detours, temporary deviations and newly opened sections of completed roads.


The Contractor shall submit written confirmation that his insurance cover complies with the requirements specified in the Contract Documentation and shall supply a copy of the relevant insurance policy/policies to the Engineer for his records.



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A1.5.3.5 Legal requirements

The Contractor shall within seven calendar days after receipt of a third-party claim acknowledge receipt to the claimant and submit the claim to his insurance company for processing.

The Contractor shall then follow up the processing of the claim and inform the claimant of the outcome as soon as the matter has been dealt with by the Contractor's insurance company.

The Engineer shall be copied on all correspondence regarding third party claims.


The Contractor shall report on the latest status and outcome of all the third-party claims at every site meeting.



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A1.5.3.6 Other traffic control measures ordered by the Engineer

The Engineer may instruct the Contractor to provide any other road sign, reflective tape, etc. not measured in standard payment items.

Such road signs shall conform to the requirements given in Volume 2 Chapter 13 of the SARTSM and/or specified in the Contract Documentation or by the Engineer in writing.


To ensure that the travelling public is kept fully informed and warned on matters relating to the accommodation of traffic, construction sign posting and the effect of the construction on the free flow of traffic through the site, the Engineer may instruct the Contractor to arrange for advertising in the press, on the local radio stations and/or for other forms of publicity.



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A1.5.3.7 Penalty events

Whenever the Contractor fails or refuses to take the necessary steps to ensure the safety and convenience of the public and/or to accommodate the traffic, pedestrians and non-motorised traffic and maintain the temporary detours, deviations, traffic accommodation facilities and traffic safety devices correctly in accordance with all the requirements and specifications given in the Contract Documentation, the Contractor shall be subject to the following penalty conditions:

- ❖ A fixed penalty amount as stated in the Contract Documentation per occurrence shall be deducted for each and every occurrence of non-compliance


A time-related penalty amount as stated in the Contract Documentation per hour over and above the fixed penalty shall also be deducted for non-compliance to rectify any defects in the accommodation of traffic requirements within the allowable time after the Engineer has given an instruction to this effect.



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A1.5.3.7 Penalty events


- ❖ A time-related penalty amount as stated in the Contract Documentation per hour over and above the fixed penalty shall also be deducted for non-compliance to rectify any defects in the accommodation of traffic requirements within the allowable time after the Engineer has given an instruction to this effect.
- ❖ The Engineer's instruction shall state the allowable time, which shall be the time in hours for reinstatement of the defects. Should the Contractor fail to adhere to this instruction, the time-related penalty shall be applied from the time the instruction was issued.



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A1.5.3.8 Property pegs and survey beacons


Temporary deviations shall be constructed so as not to damage or displace existing cadastral beacons or trigonometrical-survey beacons. In exceptional cases where this is not possible, the Contractor shall notify the Engineer in good time so that the Engineer can arrange to have them suitably referenced before they are displaced. Cadastral beacons shall be replaced at the cost of the Contractor, unless removal is specified by the Engineer.



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A1.5.3.9 Right of way


The travelling public shall have the right of way on public roads, existing roads used as detours and on all temporary deviations for the entire contract period. The Contractor shall make use of approved methods to control the movement of the construction equipment and vehicles so as not to constitute a hazard on the road or impede the public right of way.



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A1.5.3.10 Safety of the travelling public and the Contractor's employees

The safety of the travelling public, and of the Contractor's and the Engineer's employees is of paramount importance and shall take priority over all aspects of the Works.


The Contractor shall be responsible for the safe and easy passage of all vehicular, non-motorised and pedestrian traffic past and/or over the Works in a manner which will protect the road users, pedestrians, the Contractor's employees and the Engineer's employees.



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A1.5.3.11 Services

Services affected by temporary deviations shall be located, protected and relocated in a similar manner as services affected by the permanent Works as specified in Clause A2.1.3.2 of Chapter 2.


The requirements given in the Contract Documentation shall also be applicable to any services affected by the construction of temporary deviations.



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A1.5.3.12 The use of public roads by the Contractor


The Contractor shall have the right to use public roads, including any detours and temporary deviations open to public traffic, subject to the provisions and restrictions specified in Clause A4.1.7.1 of Chapter 4 and in the Contract Documentation.



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A1.5.3.13 Traffic over completed pavement layers and structures

Traffic over the completed pavement layers and structures on an uncompleted road shall be restricted to the vehicles and equipment required for the construction of the remaining Works. All construction vehicles will be restricted to the maximum axle loads permitted on public roads by the statutory provisions.

If it is necessary to temporarily accommodate public traffic over the completed pavement layers and structures on an uncompleted road this shall only be done if agreed to by the Engineer.


The Contractor shall be responsible for protecting and maintaining the pavement layers. Any damage to the layers shall be repaired or rectified at the Contractor's own cost unless the Engineer agrees in writing to pay for some or all of these costs.



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A1.5.3.14 Vertical clearance

The minimum vertical clearance over any section of a temporary deviation shall be 5,2 m. If the minimum vertical clearance is less than 5,2 m then approved warning signage shall be erected at approved locations on the overhead obstruction itself as well as in advance of the obstruction.

The advance warning signs shall be erected at distances of 1,0 km, 400 m and 200 m in advance of the overhead obstruction.

The warning signs shall show the actual clearance height in metres (to 2 decimal places) less a safety allowance of at least 75 mm.


Where the overhead obstruction or its support structure is likely to collapse if it is struck by a vehicle or by its load, and thereby represent a danger to the public or to the persons working on the site, then such an obstruction shall, in addition to the warning signs, have an approved height restriction warning gantry erected at least 200 m in advance of the overhead construction, or at the distance specified in the Contract Documentation or specified on site by the Engineer.



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A1.5.3.14 Vertical clearance

The lower edge of the warning gantry shall be at least 5,2 m above the road surface and reflective chevron plates, spaced not more than 0,3 m apart, shall be suspended beneath the gantry to the same height above the road surface as the overhead obstruction less a safety allowance of 75 mm.

The warning gantry shall be fitted with a beam triggered alarm that is audible to all employees working on the obstruction over the road.

A properly trained flagman shall also be placed on the side of the road 50 m after the warning gantry to wave down and stop any vehicles whose loads touch any of the chevron warning plates.


Where the temporary deviation passes under a high voltage electric powerline the minimum vertical clearance height specified by the service owner shall be provided.



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A1.5.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS


If, during the Contract, the Contractor would like to amend any of the specified traffic accommodation arrangements he shall provide his reasons for doing so in writing and obtain the Engineer's prior written approval. If the Engineer's prior written approval has been obtained, the Contractor will be remunerated for the revised traffic accommodation arrangements in accordance with the contract rates only up to an amount that does not exceed the tendered amount for the specified traffic accommodation arrangements that have been replaced.



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A1.5.5 MATERIALS

A1.5.5.1 Material used for construction of temporary deviations

All material required for the construction of temporary deviations, which includes the earthworks, pavement layers, stabilised layers, asphalt and bituminous surfacing layers shall comply with the specifications for these materials given in Chapters 4, 9 and 10 respectively.

A1.5.5.2 Temporary culverts


Temporary culverts of the type and size required shall comply with the specifications given in Section A3.2 of Chapter 3 as well as with any additional specifications that may be given in the Contract Documentation.



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A1.5.5.3 Temporary road restraint systems

Where specified in the Contract Documentation or instructed by the Engineer, the Contractor shall provide, install, move and re-install and subsequently remove temporary road restraint systems, if so required for the construction of temporary deviations.


All work shall be carried out in accordance with the specifications given in Section A11.4 of Chapter 11.



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A1.5.5.4 Temporary fencing and gates

Where specified in the Contract Documentation or instructed by the Engineer, the Contractor shall provide either new fencing and gates, or move and subsequently reinstate existing fencing and gates, if so required for the construction of temporary deviations.


All work shall be carried out in accordance with the specifications given in Section A11.5 of Chapter 11.



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A1.5.5.5 Temporary road signs


Temporary road signs shall comply with the specifications given for road signs given in Section A11.6 of Chapter 11.

A1.5.5.6 Temporary road markings and road studs

Temporary road markings and road studs shall comply with the specifications given for permanent road markings and road studs given in Section A11.7 of Chapter 11.

A1.5.5.7 Traffic accommodation facilities and safety devices


All road signs, barriers, channelization devices, guardrails, reflectors and other traffic safety devices shall be manufactured with materials that comply with the specifications given in the latest current edition of Volume 2 of the SARTSM, or any applicable international design standards that may be given in the Contract Documentation, and in accordance with the specifications given in Sections A11.4.5 and A11.6. of Chapter 11 as well as any additional specifications that are given in the Contract Documentation.



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A1.5.6 CONSTRUCTION EQUIPMENT


Specifications for the traffic control facilities and traffic safety items are given in the following Clauses A1.5.6.1 to A1.5.6.4.

A1.5.6.1 Traffic control facilities

a) Barriers

Barriers manufactured from plastic and ballasted with sand or water, shall only be used to barricade work areas to close off sections of the Works from members of the public and non-motorised traffic.


They shall not be used to prevent vehicular traffic from encroaching on or entering the work zone except at stop/go points where they may be used to supplement the stop/go sign or traffic signal which is operated by the traffic controller.



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A1.5.6.1 Traffic control facilities

a) Barriers

Where specified in the Contract Documentation, steel guardrails may be used as channelization devices provided they comply with the specified requirements and are installed as specified in Clauses A11.4.4, A11.4.5 and A11.4.7.2 of Chapter 11. They may not be affixed to drums or other moveable objects.

Guardrails shall not be used for the purpose of preventing heavy vehicles from leaving the permitted lanes or deviations and the Contractor shall use approved vehicle restraining systems for this purpose.


Temporary road restraint systems which are erected for the purpose of preventing vehicles from leaving the permitted lanes or deviations shall be movable barriers manufactured from steel or concrete with an approved safety shape design (e.g. New Jersey, F-shape or single slope).



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A1.5.6.1 Traffic control facilities

a) Barriers

The movable barriers shall be obtained from approved suppliers and placed between the trafficked lane/s and/or the construction areas.

They shall comply with the specified requirements and be installed as specified in Section A11.4 of Chapter 11 which refers to either of the following specifications:


The European Specification EN 1317 with a minimum containment level H1 or as indicated in the Contract Documentation
or
The American Federal Highways Administration Specification AASHTO MASH, or NCHRP 350 where no MASH compliant device is available, with a minimum containment level TL4 or as indicated in the Contract Documentation.



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A1.5.6.1 Traffic control facilities

b) Delineators

Delineators shall comply with the manufacturing and reflective requirements of SANS 1555. In addition, they shall also:


- Have blades that are reversible with dimensions as specified in the SARTSM and/or as indicated in the Contract Documentation.
- Have blades that are reversible with dimensions as specified in the SARTSM and/or as indicated in the Contract Documentation.
- Be designed such that they, together with their mounting base, will collapse in a safe manner under traffic impact.
- Have the lower edge of the reflective part of the delineator mounted at least 100 mm above the road surface.



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A1.5.6.1 Traffic control facilities

b) Delineators

- Have the lower edge of the reflective part of the delineator mounted at least 100 mm above the road surface.
- Be capable of withstanding the movement of passing heavy vehicles travelling at speeds of up to 80 km/h and gusting winds with a wind speed of up to 60 km/h without falling over.

The base area shall be at least 0,18 m² and ballasted by its own weight or with durable sandbags filled with fine, clean sand of adequate mass. (The sand bags shall be partially filled to ensure a flattish surface without bulging and they shall not be filled with anything other than fine, clean sand).



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c) Temporary signs
All temporary signs shall be manufactured to the sizes and in accordance with the specifications given in Volume 2 of the SARSTM and in Section A11.6 of Chapter 11 as well as with any additional specifications that are given in the Contract Documentation.




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d) Traffic cones
Traffic cones shall be manufactured in a fluorescent red-orange or red impact resistant plastic material. The minimum height of traffic cones shall be 750 mm. The design and weight of the traffic cone shall be such that it will not be displaced or blown over by passing heavy vehicles travelling at speeds of up to 80 km/hr and gusting winds with a wind speed of up to 60 km/h.




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e) Traffic signals
Temporary traffic signals shall conform with the requirements of traffic signals and conform to the size and visibility requirements specified for permanent traffic signals in Volume 3 of the SARTSM. The traffic signals shall be provided with either a permanent electricity supply or with a generator and/or batteries that are capable of powering the signals continuously for the full duration that they are required to be operational. Temporary traffic signals used for manual control of vehicles in alternate directions shall be actuated to turn green for adjustable green phases and thereafter automatically default to red to ensure that two directional green is avoided should operators be absent or in-attentive.




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- **f) Traffic control stations**
- Traffic control stations shall be provided at each traffic control point that is in operation during hours of darkness. They shall have the following:
 - A trained traffic controller.
 - An effective communication system that allows the controllers at each end of the deviation to communicate effectively with each other.
 - An all-weather shelter with at least three square metres floor area fitted with a clear window facing the oncoming traffic that can be opened if required and a stable door.



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A red/green stop/go electric traffic signal system consisting of two No. 200 mm diameter LED cluster lights mounted in circular light shields on a backing board attached to 3,0 m high steel poles complete with all electrical wiring.

- A 400W metal halide or a 100W LED floodlight mounted on a 9,0 m high steel pole to illuminate the traffic control point as well as the approach to the traffic control station where the traffic will start to queue. The light must shine downwards and shall be positioned so that it does not shine towards oncoming vehicles.



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Additional 400W metal halide or 100W LED floodlights mounted on 9,0 m high steel poles to adequately illuminate the full length of the vehicle queuing area (number and spacing to be discussed with the Engineer and amended to suit varying traffic conditions whenever necessary). The lights must shine downwards and shall be positioned so that they do not shine towards oncoming vehicles.

- An electrical power supply to operate the traffic signal lights and the floodlights at each traffic control point that is capable of continuously powering the lights for the full duration that they are required to operate.

A moveable yellow or orange barrier fitted with a STOP sign facing the oncoming traffic to prevent vehicles from utilising the closed road lanes. The barrier shall be moved by the traffic controller to open and close the relevant lanes for road users as required.



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A1.5.6.2 Illuminated traffic signs and safety devices

a) Flashing illuminated arrow board

The illuminated arrow board shall be made up of LED light sources powered by battery or other suitable means, mounted on a backing board. A single shaft arrow will be required that can be used for both left and right directions. This illuminated flashing arrow board shall be used at lane drops on multi-lane highways or at other locations as directed by the Engineer.



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b) Illuminated road signs


The illuminated road signs shall be made up of LED light sources powered by battery or other suitable means, mounted on a backing board. The illuminated colours must match the regulation sign colours specified in the SARTSM. If specified in the Contract Documentation, these illuminated road signs shall be used on multi-lane and/or heavily trafficked highways during night time hours.



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c) Mobile Variable Message Sign

The Variable Message Sign (VMS) shall be mounted on a trailer and located in a safe position where it is easily seen by the travelling public. It is used to provide information regarding the road and/or traffic conditions ahead or to inform a motorist of his actual travelling speed.


The mobile VMS system must be equipped with solar panels combined with deep cycle batteries to provide an output of at least 600W. It shall be capable of withstanding shocks up to 3G and wind speeds up to 120 km/h.



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The sign face shall not be less than 3,0 m² to provide a full matrix LED with at least 2050 pixels per square metre. Each pixel shall have a LED and the pixel spacing shall not be less than 25 mm. The sign shall be able to display any configuration which contains letters, symbols, icons etc. The cone of vision is to be 30° and the light intensity must be automatically controlled by a daylight sensor; the light intensity shall also be capable of being controlled manually.

The lower edge of the sign face shall be at least 1,5 m above ground level.


The information displayed on the VMS sign face shall be controllable remotely from a computer via an internet connection.



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d) Sign mounted flashing lights

Sign mounted flashing lights shall consist of two rectangular amber flashing lights, each at least 120 mm wide x 45 mm high using 10W LED's.

The lights shall be visible from a distance of at least 800 m.


Depending on the width of the advance warning signs, the two flashing lights shall be mounted either 900 mm apart centre to centre on a 1 200 mm wide x 200 mm high white non-reflective sign board or mounted 600 mm apart centre to centre on a 900 mm wide x 150 mm high white non-reflective sign board.



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The sign board with the two flashing lights shall be mounted on top of each of the first advance warning signs positioned before the start of temporary deviations, lane closures, stop/go points for one-way traffic zones, vertical height restrictions and at any other potentially hazardous positions. They shall be placed where specified in the Contract Documentation or by the Engineer.

The lights shall have a separate solar panel power source with batteries that are mounted in a lockable steel box mounted on the back of the sign board. The power supply shall be sufficient to power the lights for at least 12 hours and the batteries shall be replaced or recharged as necessary to ensure that the flashing lights are always operating when required.


The lights shall be operated during all the hours of darkness and also during daylight hours if specified in the Contract Documentation or by the Engineer.



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e) Warning flags
Flags shall be made from durable, bright red material and shall be square with a minimum side length of 600 mm. The flag shall be attached to a flagpole staff at least 1,0 m in length. The warning flags shall be replaced whenever they become dirty or worn to the point where they are no longer easily visible and effective.




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f) LED strobe light wands
LED strobe light wands shall be hand held, battery powered LED wands with an amber lamp tube at least 200 mm in length which can be operated in continuous or flashing mode.



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A1.5.6.3 Traffic safety vehicle
The traffic safety vehicle to be used for transporting, placing, relocating and removing the traffic accommodation facilities and the traffic safety devices shall be a truck with a load capacity of at least 5 tons fitted with:


- A high visibility rear panel in accordance with the requirements specified in the SARTSM.
- A rear mounted impact attenuation device which is capable of attenuating head-on impacts of at least Test Level TL2 (70 km/hr) in accordance with AASHTO MASH, or NCHRP 350 where no MASH compliant product is available.




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An amber-coloured flashing LED light or light bar mounted on top of the roof of the cab, or on top of the rear canopy whichever is the highest, which shall be clearly visible in daylight in all directions for a distance of at least 800 m. It shall be switched on continuously while the vehicle is on site, is manoeuvring in or out of traffic or is travelling or parked alongside roads open to public traffic within the work areas.




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A warning sign with the wording **TRAFFIC CONTROL** in retro-reflective Class 3 red letters at least 200 mm high on a retro-reflective Class 3 white background, mounted in a visible position at the rear of the vehicle.



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A1.5.6.4 Traffic safety officer's vehicle


The traffic safety officer's vehicle shall be provided for his sole use to enable him to carry out his supervisory duties.



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The traffic safety officer's vehicle shall both be equipped with the following:


- An amber-coloured flashing LED light or light bar mounted on top of the roof of the cab, or on top of the rear canopy whichever is the highest, which shall be clearly visible in daylight in all directions for a distance of at least 800 m and it shall be switched on continuously while the vehicle is on site, is manoeuvring in or out of traffic or is travelling or parked alongside roads open to public traffic within the work areas.
- A warning sign with the wording **TRAFFIC CONTROL** in retro-reflective Class 3 red letters at least 200 mm high on a retro-reflective Class 3 white background, mounted in a visible position at the rear of the vehicle.



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A1.5.7 EXECUTION OF THE WORKS

A1.5.7.1 Accommodation of pedestrian traffic

The Contractor shall pay specific attention to the accommodation of pedestrian traffic wherever the safety of pedestrians could be compromised. Safe, correctly marked and signposted pedestrian crossing points shall be provided at locations agreed to by the local community and the Engineer to ensure that the pedestrians are safeguarded and shall be able to cross the site without being endangered. The pedestrians should not be able to enter areas where Works are taking place.



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Should a walkway be required, it shall have a clear opening of at least 1,2 m wide and 2,1 m high and shall be uniformly illuminated during hours of darkness. The surface of the walkway shall be free from obstructions and shall be clearly signposted to guide the pedestrians towards the walkway. If steps are required to reach the level of the walkway, these shall comply with the occupational health and safety requirements and have proper handrails. No ramps shall be steeper than 1 (vertical) to 8 (horizontal). Where specified by the Engineer a traffic safety meeting shall be organised to inform persons living in the local community about the safe use of the designated pedestrian crossing points and to highlight all dangers associated with getting too close to the construction vehicles and equipment.



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A1.5.7.2 Accommodation of non-motorised traffic

In areas where non-motorised traffic is present, the Contractor shall ensure that there is sufficient width available to permit vehicles to pass the slow moving non-motorised traffic safely. If this is not possible then the Contractor shall provide separate temporary deviations or alternative detours to accommodate the non-motorised traffic.



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A1.5.7.3 Accommodation of traffic where the road is constructed in half or partial widths

Where, for reasons related to traffic, geometric or other restraints, the provision of a detour, or the construction of a temporary deviation alongside or in close proximity to the roadworks, is not possible or impracticable, the Contractor shall construct the Works on a half or partial width of the existing



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Half or partial width traffic accommodation shall be carried out in accordance with the requirements of this Section, any additional requirements given in the Contract Documentation and any further written instructions issued by the Engineer. The specifications given in this section shall also apply to a road that is being constructed in half or partial widths. The length of the half or partial width construction sections where the traffic can only pass in one direction at a time shall not exceed the length specified in the Contract Documentation. The number of one-ways sections under construction at any one time shall not exceed the number permitted in the Contract Documentation and two-way traffic sections of at least 2.0 km in length shall be provided between each of the one-way construction sections.



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The start and end points of the half or partial width construction sections shall be as specified in the Contract Documentation or as decided on site by the Engineer and confirmed to the Contractor in writing. All start and end points shall be positioned to ensure that there is sufficient traffic queueing length before the traffic control point to ensure that oncoming traffic has a sufficient stopping sight distance as specified in Figure 13.25 given in Chapter 13 of Volume 2 of the SARTSM before the traffic queueing area.

The work zone and the one-way traffic lane shall be separated from each other by delineators and/or temporary barriers as specified in Volume 2 of the SARTSM and/or in the Contract Documentation and by the Engineer where applicable.



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The Contractor shall maintain the portion of the road which is being used to accommodate the traffic in a safe, clean and trafficable condition at all times.

The one-way traffic shall be controlled by a STOP / GO system manned by an adequate number of traffic controllers, flagmen and/or traffic signals, signs, barricades, lights and the necessary supervisory staff to ensure a reasonably free flow of traffic alternately in each direction throughout the entire period when the roadway is open to one-way traffic only.



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Whenever the one-way STOP / GO system is operation during hours of darkness the use of traffic signals to control the traffic in addition to the traffic controllers shall be compulsory. Flashing amber lights shall be mounted on top of the initial advance warning signs (usually positioned 1,0 km before the control point) and the traffic stopping and queueing length areas shall be illuminated with pole mounted floodlights.



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The Contractor shall programme the Works in such a way to ensure that there are no STOP / GO one-way traffic sections in operation and that two-way traffic can be accommodated safely within the contract limits during the Contractor's annual shutdown period between December and January or during any other shutdown periods which may be specified in the Contract Documentation. The Contractor shall endeavour to ensure that there is no vertical step between two opposing traffic lanes during a shutdown period. If a step between opposing traffic lanes is unavoidable then delineators or barriers shall be erected between the opposing traffic lanes as specified in the Contract Documentation or as instructed by the Engineer. These traffic accommodation measures must be maintained by the traffic safety personnel for the full duration of the shutdown period.

The Contractor shall programme his work taking due cognizance of all restrictive conditions associated with accommodating the traffic in half or partial width construction sections.



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A1.5.7.4 Crossing the median or the road centreline

All entry, exit and turning points on a single or dual carriageway road should be at existing intersections wherever possible. Where not possible all access points shall be located at safe points which have been planned in advance and agreed with the Engineer. They shall only be located at points where there is sufficient sight distance at least 300 m in a 60 km/hr construction zone or temporary detour, 400 m on a road with an 80

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km/hr posted speed limit, 500 m on a road with a 100 km/hr posted speed limit and 600 m on a road with a 120 km/hr posted speed limit. They shall be well signposted with advance heavy vehicle turning warning signs and speed limit restriction signs in accordance with the requirements given in the South African Road Traffic Signs Manual.



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No vehicles belonging to the Contractor or the Engineer's staff and no construction equipment shall be allowed to cross the median of a dual carriageway road. Approved access points shall always be used by all vehicles and construction equipment.

No vehicles belonging to the Contractor or the Engineer's staff and no construction equipment shall be allowed to cross the centreline of a single carriageway road unless the traffic accommodation arrangements, road markings and signage specifically allows for this.



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A1.5.7.5 Display of existing permanent signs

The Contractor shall adhere strictly to the sign layout and spacing specified in Chapter 13 of Volume 2 of the SARTSM, specified in the Contract Documentation or as directed by the Engineer. Any sign not required, or which is in contradiction with the prevailing situation, shall be removed to storage or covered with a non-transparent, weather proof and durable cover without delay.

The covers shall be in the form of a sack made from a durable, opaque material with a drawstring or ties at the open end so that the cover may be placed over the sign and fastened in position. The use of thin plastic bags or a single layer of material taped over the front of the sign will not be permitted.

The Contractor shall be responsible for the care and maintenance of all existing permanent signs and take the necessary precautions to prevent them from being scratched or damaged in any way. Any permanent signs that are scratched or damaged by the Contractor's staff and/or vehicles or equipment shall be replaced by the Contractor as his own cost.



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A1.5.7.6 Maintenance of existing roads used as detours

Where specified in the Contract Documentation, all existing roads used as detours by public traffic, and/or by the Contractor's vehicles, for bypassing the Site of the Works shall be maintained by the Contractor in a good and safe trafficable condition for the entire period during which such roads are used as detours.

Maintenance of these roads used as detours shall include grass cutting, removal of rubbish, cleaning of all drains and culverts and repair of potholes and surface failures as instructed by the Engineer. Unless otherwise specified in the Contract Documentation the maintenance work shall also include the care and maintenance of all road markings, road signs, delineators and guardrails.



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**A1.5.7.7 Liaison with traffic authorities**

The Contractor shall liaise with the relevant provincial and/or municipal traffic authority, and with the Employer's traffic management centre if applicable, at the start of the contract period and as often as required thereafter to keep them continually informed in advance about the expected Works being carried out and the detour and deviation and lane closure arrangements that will be in place.

A daily report covering the expected work and traffic control arrangements for the following day shall be submitted to the relevant traffic authorities or to the traffic management centre not later than 10h00.

For exceptional traffic accommodation impacts, such as lane closures in peak hours, short term contra flow conditions, lane closures over weekend peak periods etc., the relevant traffic authorities, and the Employer's traffic management centre if applicable, shall be informed seven days prior to the event.



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The Contractor shall inform the relevant traffic authorities, and the Employer's traffic management centre if applicable, about all traffic related incidents as soon as he becomes aware of the incident. The Contractor's site agent and his traffic safety officer must always have the relevant telephone numbers and email addresses with them so that contact can be made as soon as any traffic related incidents occur.

The Contractor shall, in appropriate circumstances that have been agreed with the relevant provincial and/or municipal traffic authorities, be responsible for acquiring the services of a provincial or municipal traffic officer and traffic vehicle (equipped with a blue light) to assist in the accommodation of traffic. The traffic officer and traffic vehicle will be required when lanes are to be closed, or where directed by the Engineer.



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If the road under construction forms part of an abnormal load route the Contractor shall liaise with the relevant provincial abnormal load office that issues permits to ensure that permits are not issued when horizontal and/or vertical restrictions do not allow passage of the abnormal load.



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**A1.5.7.8 Informing the road users**

The Contractor shall on a continual basis, and at least one week prior to a major event, inform the road users of the intended road Works, construction period and accommodation of traffic arrangements through press releases in local and provincial newspapers and via local radio channels.


Any temporary road closures required for blasting operations, or for any other reason, shall also be advertised on sign boards erected in appropriate positions along the section of road to be closed at least fourteen calendar days prior to each closure.



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A1.5.7.9 Lighting of construction access points during night work

Where work is required to be done during the night the Contractor shall make adequate provision for additional lighting to ensure that all vehicle and equipment entry and exit points are adequately lighted. The Contractor shall provide floodlights to ensure that a minimum 200 lux lighting level is provided at all these areas.


The floodlights must be mounted on masts at least 9m high to ensure that they illuminate the required areas without being directed into the vision of oncoming drivers.



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A1.5.7.10 Construction of temporary deviations

a) General

Unless otherwise specified in the Contract Documentation, or instructed by the Engineer in writing, the construction of temporary deviations shall be done in conformance with the requirements and specifications given in this section as well as in other relevant chapters of this Standard

Specification as follows:


- Clearing and grubbing – Chapter 1, Section A1.6
- Drainage – Chapter 3.



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- Earthworks and pavement layers – Chapters 4 and 5.
- Asphalt surfacing – Chapter 9.
- Bituminous surfacing – Chapter 10.
- Ancillary road works – Chapter 11.


The proposed location and layout of all temporary deviations, including the signage required, shall be agreed with the Engineer before construction of the temporary deviation commences.



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b) Drainage works for temporary deviations

The Contractor shall construct the necessary temporary drainage works such as side drains, catch-water drains, mitre drains, culverts, etc., to deal adequately with any storm water and surface water run-off.

Temporary culverts of the type and size specified by the Engineer shall be installed on existing drainage channels. Any suitable prefabricated culverts salvaged from an existing road or an abandoned temporary deviation may be re-used if they are in a good condition and are accepted by the Engineer.

All drainage works shall be maintained in a clean condition and in good working order.

Any flood damage caused to a temporary deviation shall be repaired by the Contractor as soon as the flood water has subsided.



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**c) Earthworks for temporary deviations**

The Contractor shall perform the necessary clearing and grubbing, including the removal of all trees and stumps. The Contractor shall then shape and grade the temporary deviation and prepare the roadbed. The Contractor shall make full use of all suitable material that can be obtained from alongside the temporary deviation, from side cuts or from the immediate vicinity for the construction of any fills that are required. If an adequate quantity of acceptable fill material cannot be obtained in this manner it shall be imported from other approved sources. Where necessary, cuttings shall be made to obtain additional fill material and/or to achieve a satisfactory vertical alignment. The earthworks across stream crossings shall be constructed from rock fill or coarse material so as to limit, in so far as is possible, damage caused by flood water.



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**d) Earthworks and pavement layers for temporary deviations**

The Contractor shall provide the fill and pavement layers required for the temporary deviations in accordance with the requirements specified in the Contract Documentation or as instructed by the Engineer. The cross fall shall be maintained between 3 % and 4 % on gravel deviations and between 2 % and 3 % on surfaced deviations. If existing gravel shoulders are to be used for the accommodation of traffic and they are unsafe and/or not wide enough, the shoulders shall be reconstructed. All grass and unsuitable material shall be bladed from the surface and, where necessary, roadbed preparation shall be done. Additional wearing course gravel material shall be imported from the road reserve or from borrow pits as required to provide a layer of wearing course gravel at least 150 mm thick after compaction. The gravel shall then be placed and compacted as specified in the Contract Documentation.



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**e) Surfacing of temporary deviations**

The Contractor shall surface the temporary deviations in accordance with the requirements specified in the Contract Documentation or as instructed by the Engineer. Unless otherwise specified in the Contract Documentation, or instructed by the Engineer, the surfaced width of a temporary deviation accommodating two-way traffic shall be 8,5 m to provide two 3,5 m wide traffic lanes with a 0,75 m wide surfaced shoulder on each side. A further 0,75 m wide gravel shoulder shall also be provided on each side to provide a minimum total roadway width of 10,0 m. Where temporary deviations consist of two separate one-way lanes, the minimum surfaced width of each lane shall be 3,5 m. A further 0,5 m wide gravel or surfaced shoulder shall also be provided on each side to provide a minimum total roadway width of 4,5 m in each direction.



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**f) Maintenance of temporary deviations**


All temporary deviations shall be maintained by the Contractor in a safe trafficable condition at all times. All potholes and surface failures shall be repaired as soon as possible. The Engineer may also instruct the Contractor to resurface the temporary deviation or existing road being used as a detour if it becomes necessary. Whenever required by the Engineer, temporary gravel deviations shall be bladed by means of self-propelled road graders to provide a smooth riding surface free from corrugations. The Engineer may also instruct the Contractor to water the temporary gravel deviations to keep down dust or to facilitate the proper blading of the surface.




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g) Removal of temporary deviations
 After traffic is rerouted permanently onto the new road, and on the written instructions of the Engineer, the Contractor shall remove temporary deviations. All roadwork materials, drainage structures, temporary signage, barricades and guardrails etc. will be removed either to spoil or to temporary storage for re-use elsewhere in the Works.
 All temporary signage and road markings on the approaches to the temporary deviations shall also be removed.




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**A1.5 ACCOMMODATION OF TRAFFIC
PART A: SPECIFICATIONS**




A1.5.7.11 Temporary traffic control facilities
a) General
 The Contractor shall provide, erect and maintain the necessary temporary traffic-control facilities, which are comprised of traffic control devices, road signs, channelization devices, barricades, warning devices and road markings, in accordance with the specifications given in Chapter 13 of Volume 2 of the SARTSM, in this Section or as specified in the Contract Documentation. The details shown for spacing and placement of traffic control facilities may also be revised by the Engineer in writing where deemed necessary to accommodate local site geometry and traffic conditions.



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**A1.5 ACCOMMODATION OF TRAFFIC
PART A: SPECIFICATIONS**



The Contractor shall ensure that all the temporary traffic control facilities devices are present where required at all times and are always functioning properly.
 Traffic control facilities no longer required at a particular site shall be moved and stored safely for re-use.
 All traffic control facilities which are scratched, bent, broken or otherwise damaged by the Contractor's staff and/or vehicles, construction equipment or by any other road users to the point where the Engineer considers them to be no longer usable or compliant shall be replaced by the Contractor at his own cost if they were not:


- Carefully stored, handled or transported.
- Correctly attached to their support bases, poles or frames.
- Correctly erected or ballasted.
- Erected in the correct position and/or not maintained in their correct position which made them likely to be damaged by passing vehicles.




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**A1.5 ACCOMMODATION OF TRAFFIC
PART A: SPECIFICATIONS**



If, due to poor storage, handling, transportation or old age, the co-efficient of retro-reflection of any of the signs fall below 80% of the value specified in the current edition of SANS 1519-1 for the grade and colour of the material used, the sign shall be considered defective and it shall be replaced at the Contractor's own cost.
 All correctly erected, ballasted and positioned temporary traffic control facilities which are damaged by public road users shall be replaced and paid for under the relevant payment item.
 All lost or damaged items shall be replaced as soon as possible within a maximum period of two hours of the Contractor becoming aware of it or of receiving instructions from the Engineer.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



b) Channelization devices

Channelization devices may consist of either delineators or traffic cones or a combination of both as specified in the Contract Documentation.

The use of drums as channelization devices shall not be permitted.

Delineators shall be placed at the spacing specified in the Contract Documentation. They shall be positioned with the reflective chevron facing the oncoming traffic to indicate the side of the road or deviation on which the vehicles should travel.

Traffic cones may only be used only at short deviations where both ends of the deviation are visible to the drivers of the approaching vehicles.

They may only be used in conjunction with flagmen stationed at each end of the deviation. If the length of the deviation exceeds 100 m then cones shall not be used on their own but shall be interspersed with delineators at a ratio not exceeding 3:1 and, if considered necessary by the traffic safety officer and/or the Engineer, additional flagmen shall be stationed where the work is taking place.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



Traffic cones may only be used during daylight hours. Deviations and lane closures which are still in place at sunset shall be demarcated with reflective delineators only.

Where traffic is being accommodated on new sections of road where no road markings have yet been painted, double sided reflective delineators shall be erected along the centre line of two way roads at a spacing not exceeding 20m. Delineators shall also be placed along the outer edges of the surfaced roadway at a spacing not exceeding 80 m on straight sections of the road and 40m around curves in the road.

Alternatively, the Engineer may request or permit the use of temporary road studs where appropriate.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



c) Erection of temporary vehicle restraint systems

Before ordering and erecting any temporary vehicle restraint systems the Contractor shall first take cognizance of his liabilities relating to the installation of temporary works to provide protection to the permanent Works and to ensure the safety to his personnel before he selects a vehicle restraint system appropriate to his chosen work methodology. Particularly pertinent is the working width rating of the vehicle restraint system as the displacement width of the system shall not exceed the available safe width to the nearest edge of the construction area. All vehicle restraint systems shall be installed and connected in accordance with the manufacturer's instructions and shall be submitted to the Engineer for review and comment.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



If the Employer makes his own temporary vehicle restraint system available for the Contractor to use, no transfer of responsibility for use of that system shall pass to the Employer. The Contractor shall retain the responsibility for ensuring that the barrier system provided by the Employer provides an adequate and appropriate level of protection. Before deciding to make use of the Employer's vehicle restraint system the Contractor shall obtain full details of the system and the approved connecting system to confirm and satisfy himself that the system is compliant with one or both of the two international specifications specified in Clause A1.5.6.1a) and to confirm that the working safe working width classifications behind the barriers for the various vehicle classes and impact characteristics are compliant with the requirements of the construction section where the vehicle restraint system will be installed.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



d) Cleaning of traffic control facilities

All road signs, delineators, traffic cones, flashing arrow boards, illuminated signs, variable message boards and the reflectors on vehicle restraint systems and guardrails shall be cleaned at least once a week or more often if they are in a position where they are splashed with dirt by passing traffic and/or construction vehicles. All dust, mud, concrete, bituminous or other foreign material shall be cleaned off.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



e) Flagmen and traffic controllers

Flagmen shall be provided at the positions specified in the Volume 2 of the SARTSM or specified in the Contract Documentation. These positions may be varied to suit local geographic or traffic conditions if so instructed by the Engineer. Flagmen shall also be positioned in advance of all work zone construction vehicle exit points to control construction vehicles re-entering the trafficked lane/s. During the daytime, at least one flagman shall be provided at each traffic control point in addition to the STOP/GO sign and/or traffic signal operator. One flagman shall also be positioned at the first speed reduction sign and a second roving flagman shall be positioned at least a 100m behind the last vehicle in the queue at STOP/GO points to warn the oncoming traffic to stop. Additional flagmen shall be positioned at least 100m in advance of any possible traffic conflict points such as lane closures and lane drops.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



e) Flagmen and traffic controllers

The number of flagmen and traffic controllers to be employed each day shall be agreed with the Engineer at the commencement of the Works and thereafter whenever the numbers required on site change. Flagmen and traffic controllers shall not work for periods exceeding four hours without being given a rest period of at least one hour and sufficient additional flagmen and traffic controllers shall be available to relieve them as required.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



All flagmen and traffic controllers shall be provided with conspicuous orange or bright yellow clothing as well as approved safety vests/jackets utilizing retro-reflective and/or fluorescent panels in red, yellow, white and/or silver. The clothing and/or the safety vests/ jackets must be kept clean and they shall be replaced by the Contractor at his own cost when they are no longer in good condition. During hours of daylight all flagmen and traffic controllers shall be equipped with a red warning flag as specified in Clause A1.5.6.2e). During hours of darkness all flagmen and traffic controllers shall be equipped with an amber LED strobe light wand as specified in Clause A1.5.6.2f). No flagman or traffic controller shall work on site longer than one 8 hour shift per day. Including transport to and from work no flagman or traffic controller should be on duty for a period of more than 10 hours per day.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



Flagmen shall be adequately trained in the standard flagging techniques as described in Volume 2 of the SARTSM. Flagmen shall have in their possession at all times a certificate showing that they have attended training provided by an accredited training company.

In terms of lateral clearance and safety, flagmen and traffic controllers shall stand on the shoulder of the lane of traffic that is being controlled and shall not be permitted to stand within the traffic lane.

The traffic controllers and any flagmen acting as STOP / GO controllers shall have an approved two-way communication system if they are not within an easily visible signalling distance of each other.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



f) Temporary road markings and road studs

Temporary road markings may be required on bituminous and concrete surfaces. The road markings shall normally be applied using retroreflective road marking paint in accordance with the specifications given in Section A11.7 of Chapter 11. However, in some instances, the temporary road markings may consist only of, or a combination of, heavy pre-marking, temporary road studs and reflective road marking tape, as directed by the Engineer.

Temporary road studs shall be fixed to the road surface with a flexible bitumen rubber sealant material, as opposed to an epoxy adhesive, for easy removal by application of low heat.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



f) Temporary road markings and road studs

Temporary road markings shall not be painted onto the final, new road surface except where instructed by the Engineer. Where possible, reflective road marking tape, capable of being easily removed from the road surface by the application of low heat, shall be used for any temporary road markings required on a new road surface. Should temporary road marking be approved but require removal, they shall be removed, when no longer required, only by means of sandblasting or water jetting. Covering existing road marking with black paint will not be allowed under any circumstances.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



g) Temporary road signs

All temporary road signs that are required to remain in position for some time shall be pole mounted as for permanent signs in the positions shown on the drawings. All temporary road signs that need to be moved more often shall be mounted on portable support frames which are designed to support the signs in a stable, upright position. The signs may not be displayed with their sign faces more than 20° off the vertical plane. (i.e. a maximum slope of 1 horizontal to 3 vertical will be permitted). The only permitted method of ballasting the temporary road sign support frames shall consist of durable sandbags filled with clean, fine sand of adequate mass to prevent the signs from being blown over by passing heavy vehicles travelling at speeds of up to 80 km/hr or by gusting wind with wind speeds of up to 60 km/hr. The filling of sandbags with stone of size greater than 2mm shall not be permitted.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



h) Traffic calming devices

Traffic calming devices will be installed in positions as specified in the Contract Documentation or as instructed by the Engineer. These devices may include rumble strips, rumble humps or speed reduction humps / bumps that shall conform to the dimensions and specifications given in the Contract Documentation.

If any of these traffic calming devices are used, then temporary advance warning signs shall be erected in accordance with the specifications of the SARTSM. If the Engineer considers it necessary, the warning signs shall be supplemented with flagmen to warn motorists of the presence of the temporary traffic calming devices.

Movable variable message signs warning the traffic of the required speed limit, the actual speed being travelled and/or a message telling the driver to slow down may also be used as traffic calming devices if specified in the Contract Documentation or instructed by the Engineer.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



i) Traffic control measures

Traffic control measures shall be provided at either end of all deviations and at all side roads within the deviation. The traffic control points may comprise any of the following and shall be provided / used as specified below.

Day time traffic control for short deviations

Flagmen with STOP/GO signs may be used to control traffic over short deviations where both ends of the deviation are visible to the drivers of the approaching vehicles. The flagmen operating the STOP/GO signs must have an effective communication system if they are not within an easily visible signalling distance of each other they shall be equipped with an effective communication system.

No such day time closures shall be permitted during hours of darkness and the Contractor shall ensure that he completes the required work and reopens the road to traffic before nightfall.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



i) Traffic control measures

Day time traffic control for long deviations

On long deviations where both ends of the deviation are not visible to the drivers of the approaching vehicles moveable barriers, fitted with a STOP sign facing the oncoming traffic, shall be provided at the traffic control point to prevent vehicles from utilising the closed road lanes. These barriers shall be moved by the traffic controller to open and close the relevant lanes for road users as required.

Each traffic controller shall be provided with an effective communication system that allows the controllers to communicate with each other in order to coordinate and control the one-way traffic safely and efficiently. Records of the time period and the number of vehicles going through shall be kept at each traffic control point and submitted daily to the traffic safety officer who shall submit a copy of these records to the Engineer.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



Night time traffic control

The Contractor shall provide traffic control stations manned by trained traffic controllers as specified in Clause A1.5.6.1f) for all deviations which are used during the hours of darkness.

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Records of the number of vehicles going through during each shift period shall be kept at each traffic control point and submitted daily to the traffic safety officer who shall submit a copy of these records to the Engineer.


Traffic control on side roads

The Contractor shall provide a traffic controller equipped with a STOP/GO sign at the intersection of all side roads that fall within a one-way deviation. The traffic controller shall have an effective method of communication with the traffic controllers at either end of the deviation to enable him to control any vehicles entering from the side roads to ensure that they do not travel against any oncoming traffic.




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MODULE 10

TRAFFIC SAFETY OFFICER ROLES AND RESPONSIBILITIES



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS

A1.5.7.12 Traffic safety officer

The Contractor shall appoint a knowledgeable, experienced and conscientious person as his traffic safety officer who shall be responsible for the arrangements and maintenance of all accommodation of traffic measures required for the duration of the contract. The Contractor shall submit details of the person's qualifications, training and experience to the Engineer for comment before appointing him.


The traffic safety officer shall be able to communicate in the languages of the area and shall be a dedicated official who shall have no other responsibilities on site unless permitted otherwise on small projects in the Contract Documentation or by the Engineer.

The traffic safety officer shall be equipped with a dedicated vehicle and a cellular telephone and shall have sufficient labour and a Traffic Safety Vehicle, as specified in Clause A1.5.6.2, at his disposal 24 hours a day.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS

A1.5.7.12 Traffic safety officer

The traffic safety officer shall always have a direct line of communication with the police and traffic officers responsible for the area within limits of the contract and shall be responsible for maintaining liaison with them in accordance with the requirements given in Clause A1.5.7.7.


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

- Ensure that all the Contractor's personnel, all the Engineer's site staff and all visitors are wearing approved, clean safety jackets utilizing retro-reflective and/or fluorescent panels in red, yellow and/or white when they are on the site of the Works.
- Make himself available to discuss road safety and traffic accommodation matters whenever required by the Engineer and shall be responsible for keeping the temporary traffic accommodation requirements up to specification 24 hours a day 7 days a week.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS

A1.5.7.12 Traffic safety officer

- Set out and record the position of each sign, barricade, delineator, cone, amber flicker light, guardrail and permanent or temporary painted road marking feature and every other traffic control facility for each closure or temporary deviation as specified on the drawings and Contract Documentation. The position of each facility 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 as correctly positioned and erected by the Traffic Safety Officer, and shall be signed by him before being submitted to the Engineer.
- Take digital photographs and/or video footage covering the full extent of the temporary traffic accommodation arrangements on the site of the Works whenever any new arrangements are made. The digital photographs / video footage shall be submitted to the Engineer in electronic format for his records.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



A1.5.7.12 Traffic safety officer

- Inspect the position and condition of each traffic accommodation feature on the whole site of Works twice per work shift, once before the start of the morning and evening peak traffic periods and again during the middle of the work shift if both day and night shifts are in operation.
- Record all irregularities discovered and the remedial action taken and then date and sign the record sheets off as correct and submit copies to the Engineer by 10h00 the following working day. The above inspections must at least take place before the commencement of peak traffic periods.
- Collate and submit the daily labour returns of flagmen, stop/go, and traffic signal control personnel employed and the open/close periods and traffic count data recorded at each traffic control point to the Engineer each morning.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



A1.5.7.12 Traffic safety officer

- 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, safety jackets, the operation of amber flashing lights and the display and cleanliness of "Construction Vehicle" signs, all as specified.
- Ensure that all road signs, delineators, barrier reflectors and traffic cones are always kept clean and visible as specified in Clause A1.5.7.11d).
- Attend to the training and performance of flagmen and all other personnel involved in the control of traffic.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



A1.5.7.12 Traffic safety officer

- Attend to the training and performance of flagmen and all other personnel involved in the control of traffic.
- Attend to all complaints and claims from the public with respect to traffic safety and report on such matters to the Engineer.
- Ensure that all obstructions that are caused by Contractor's vehicles, equipment, materials and tools or other objects related to the work activities are removed out of and away from the trafficked area, or suitably barricaded off as specified, so that the roads are safe to use by the travelling public.
- Arrange for the removal of stationary or broken down vehicles off the roadway in conjunction with the traffic authorities.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



A1.5.7.12 Traffic safety officer

In the event of an accident within the Site of the Works, the traffic safety officer shall implement any actions requested by the traffic authorities with respect to the work to be carried out and he shall be responsible for the erection and maintenance of all traffic signs necessary for the accommodation of traffic. He shall record in a written report the details of the accident and record the position of all temporary road signs, barricades, delineators, flagmen and any other devices used for traffic accommodation. The report shall include a neat, accurate dimensional sketch, photographs and notes about any identifiable permanent features related to the accident, together with any other relevant information. As soon as it is available he shall obtain the accident case number from the traffic authorities and attach it to the report before submitting a copy of the report to the Engineer for his records.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



A1.5.7.13 Towing of public vehicles

If specified in the Contract Documentation, the Contractor shall arrange for tow trucks to be on call for removing broken down light and/or heavy vehicles for the duration specified in the Contract Documentation. Payment for towing trucks off the road and/or on to a storage or repair facility will not be made as this cost is to be recouped from the owner of the towed vehicle.



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A1.5 ACCOMMODATION OF TRAFFIC PART A: SPECIFICATIONS



A1.5.8 WORKMANSHIP

The Contractor shall implement a process control system which shall ensure that all traffic control facilities and signs are erected in the correct position and are regularly maintained and kept clean. The Contractor's process control system shall also ensure that all safety personnel are correctly trained and that they are carrying out their duties correctly.



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B1.5 ACCOMMODATION OF TRAFFIC PART B: LABOUR ENHANCEMENT



CONTENTS

B1.5.1 SCOPE

B1.5.2 DEFINITIONS

B1.5.3 GENERAL

B1.5.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS

B1.5.5 MATERIALS

B1.5.6 CONSTRUCTION EQUIPMENT

B1.5.7 EXECUTION OF THE WORKS

B1.5.8 WORKMANSHIP



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B1.5 ACCOMMODATION OF TRAFFIC PART B: LABOUR ENHANCEMENT



B1.5.1 SCOPE

The nature of the work required to accommodate the traffic is labour intensive and no additional labour enhancement requirements are specified for Section A1.5.

B1.5.2 DEFINITIONS

Definitions as provided in Clause A1.5.2 shall also apply. Clauses B1.5.3 to B1.5.8 are not applicable to this Section.



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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT

(i) Preamble

The tendered rate for each item shall include full compensation for providing, operating, maintaining and decommissioning upon completion, of all the construction equipment, labour, tools, incidentals and supervision to carry out the activity or construct the works in the item, unless otherwise stated.

Any prime cost or provisional sums shall be paid in accordance with the provisions of the conditions of contract. The charge or mark-up tendered or allowed for is a percentage of the amount actually paid under the prime cost or provisional sum. This percentage shall cover all the Contractor's handling, supervision, profit and liability costs to provide the services in the prime cost or provisional sum item.



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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT

(i) Preamble

The tendered rate for each item shall include full compensation for providing, operating, maintaining and decommissioning upon completion, of all the construction equipment, labour, tools, incidentals and supervision to carry out the activity or construct the works in the item, unless otherwise stated.

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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT

(ii) Items that will not be measured separately

The following required activities will not be measured or paid for separately and the Contractor shall include the cost thereof in other items as deemed appropriate:

1. Removal of any material that is driven onto or spilt on any temporary roads, public roads or privately owned roads that are being used to accommodate traffic during the haul of material or while any construction operations are being carried out.
2. The provision of lighting for construction access and exit points during night work. All costs related to illuminating the area of the access and exit points at night, as specified in Clause A1.5.7.9, shall be included in the relevant payment items applicable to the work being carried out at night.



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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT

3. The provision of the flashing amber lights / light bars and "Construction Vehicle" warning boards which shall be fitted to the Contractor's vehicles and construction equipment. All costs related to the provision of these warning devices shall be included in the relevant payment items applicable to the work being carried out.
4. The provision of safety clothing, warning flags and amber LED strobe light wands for traffic safety officers, flagmen and traffic controllers; the cost of these shall be included in the rate for providing these personnel.



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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT



5. The cleaning, repair or replacement of any traffic control facilities damaged by the Contractor's staff and/or vehicles and construction equipment or were dirtied / damaged because they were:

- ❑ not correctly stored, handled or transported,
- ❑ not correctly attached to their support bases, poles or frames,
- ❑ not correctly erected or ballasted OR
- ❑ erected in the incorrect position and/or not maintained in their correct position which made them likely to be damaged by passing vehicles.



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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT



5. The cleaning, repair or replacement of any traffic control facilities damaged by the Contractor's staff and/or vehicles and construction equipment or were dirtied / damaged because they were:

- not correctly stored, handled or transported,
- not correctly attached to their support bases, poles or frames,
- not correctly erected or ballasted OR
- erected in the incorrect position and/or not maintained in their correct position which made them likely to be damaged by passing vehicles.

6. The replacement of any traffic control facilities that are stolen from the Site of the Works. (All traffic control facilities provided on the Site of the Works shall be covered by the Contractor's insurances or by the Contractor should he elect not to insure them.)



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C1.5 ACCOMMODATION OF TRAFFIC PART C: MEASUREMENT AND PAYMENT



See complete list in COTO Manual



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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.


  **729**

RISK ASSESSMENT




  **730**

STANDARDS




South African Bureau of Standards

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



  **731**

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

  **732**



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.



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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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HIGH VISIBILITY TREATMENT CLOTHING TECHNIQUES



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UNIFORM APPROVED TESTED SAFETY CONTROL DEVICES



2013.05.16 11:07

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UNIFORM APPROVED TESTED SAFETY CONTROL DEVICES



SANS 1555

Anchor pin compulsory

2013.05.16 11:18

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UNIFORM APPROVED TESTED SAFETY CONTROL DEVICES



SANS 51317

Steel connection plate compulsory

22.10.2012 10:14

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TRAFFIC MANAGEMENT Road Traffic Signs



50 m


Check Detail


2013.05.16 11:18

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Complete assignment Module 10





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





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MODULE 11A SANS and SARTSMA 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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SARTSMA
South African Road Traffic Safety Management Association

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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SARTSMA
South African Road Traffic Safety Management Association

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:

As a SARTSMA Member, I agree to:

- 1. Comply with the Rules and Regulations of the Association, as set by the SARTSMA Council.
- 2. Comply with all the relevant National Standards and/or customer's specification in the manufacture and supply of their goods.
- 3. Maintain a high standard of design and manufacture of products and uphold the highest commercial and professional ethics of sales and advertising activities.
- 4. Freely submit to an investigation if it is alleged that they are in breach of the Rules and/or Obligations of Membership.

MEMBER'S NAME: _____ SARTSMA NUMBER: _____ 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

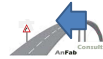


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Legal Reference

- 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 I / 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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SARTSMA
South African Road Traffic Safety Management Association


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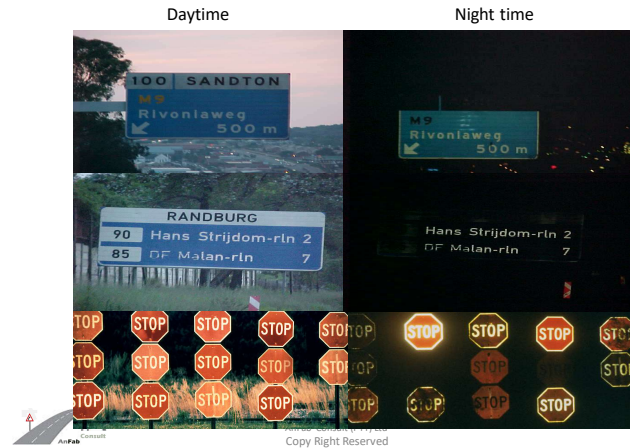
**Road Traffic Signs need to be as effective
at night as they are during the day**



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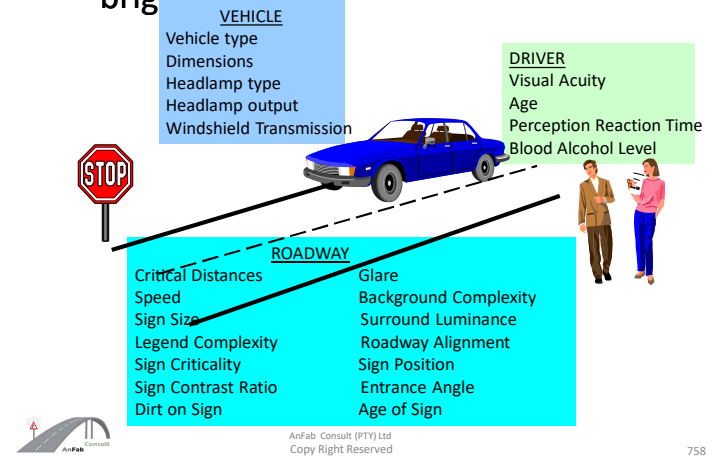
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Sometimes this requirement is not always met



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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

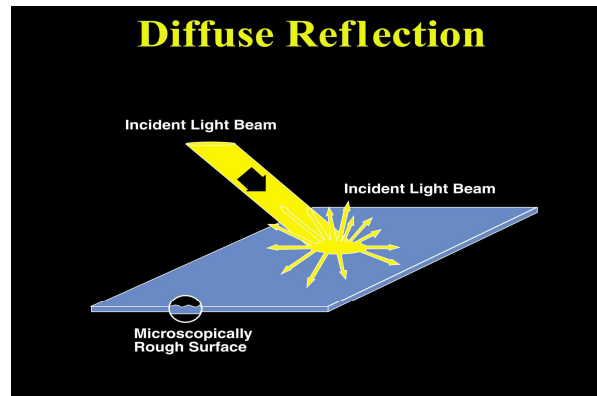


- Types of Reflection
- Reflective Elements & Design used in Retro-Reflective sheeting
 - Glass Bead Technology
 - Enclosed Lens
 - Encapsulated Lens
 - Prismatic Technology
 - Truncated Cube Corners
 - Full Cube Corners
- Angles that effect Retro-Reflective Performance

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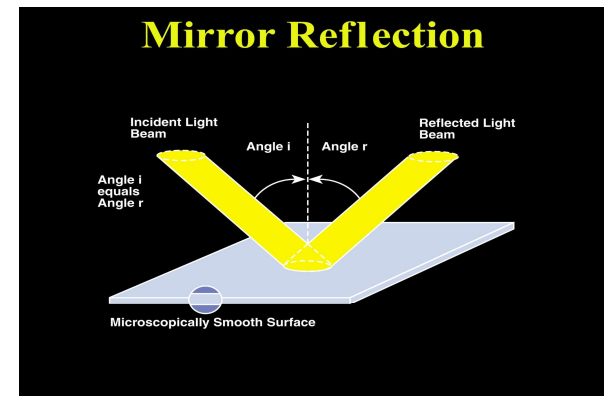
Diffuse Reflection

Diffuse Reflection

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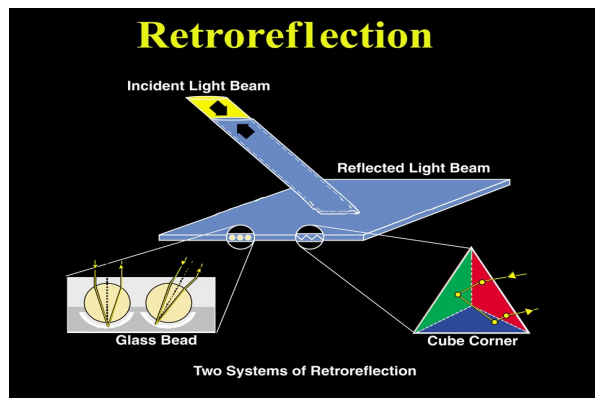
Mirror Reflection

Mirror Reflection

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Retroreflection

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.



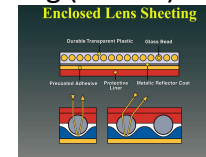
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Glass Bead Technology

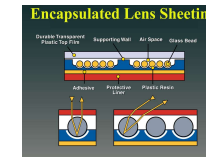
• Enclosed Lens Sheeting (Class 1)

- Introduced 1940's
- Narrow Ent. Angle
- **Efficiency – 8%**
- Durability – 7 years



• Encapsulated Lens Sheeting (Class 3)

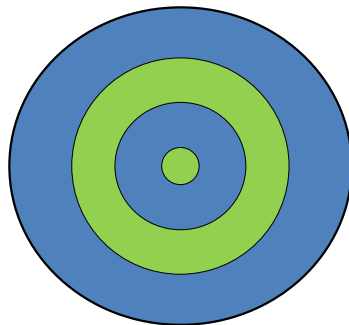
- Introduced 1970's
- Wider Ent. Angle
- **Efficiency – 14%**
- Durability – 10 years



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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

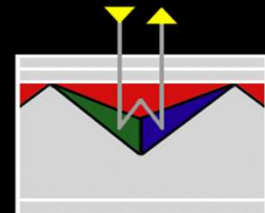



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How Prismatic Technology Works

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.

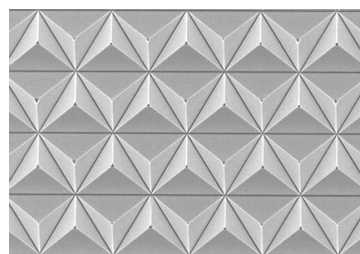




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Prismatic Technology

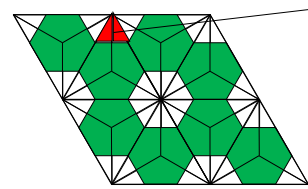
– Truncated Cube Optics

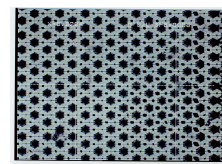
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Truncated Cube Optic Limitation




Light entering the corner of the cube only reflects twice



This light is **not** retroreflected

65% of the truncated cube surface is retroreflective

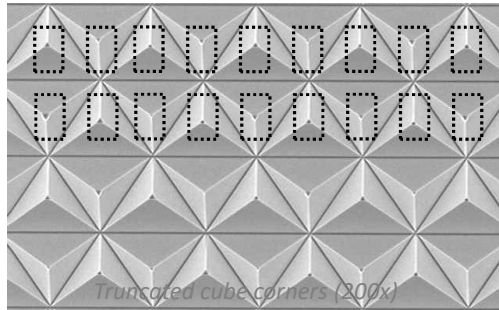


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Technology Improvement Full Cube Optics

Making



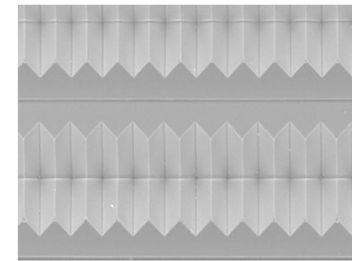
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Prismatic Technology



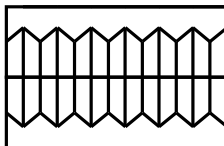
- Full Cube Optics



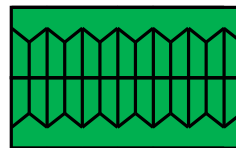
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Full Cube Optics



Still uses mirror
reflection



There are no dead
corners

100% of full cube surface is retro-reflective



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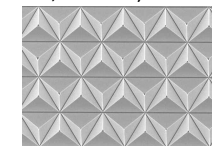
775

Summary - Prismatic Technology



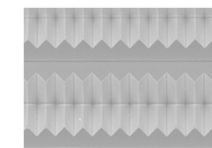
- Truncated Cube Optics (Class 1, Class 3, Class 4a)

- Introduced
 - Class 4 1987
 - Class 3 2003
 - Class 1 2009
- Durability – 7 to 10 yrs
- **Efficiency – 32%(4X EGB)**



- Full Cube Optics (Class 4a + 4b)

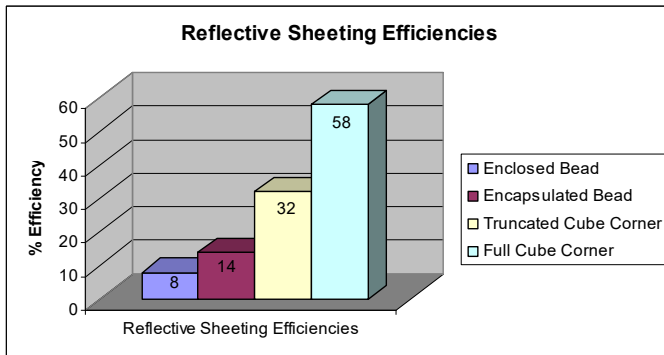
- Introduced 2005
- Durability – 10 to 12 yrs
- **Efficiency – 58%(2X Truncated Cube)**



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Summary - Reflective Sheeting Efficiency



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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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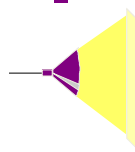
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Reflectivity - Units of Measurement

Intensity of a Light Source = Candela cd



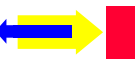
Illuminance: Light falling on a unit area lux



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

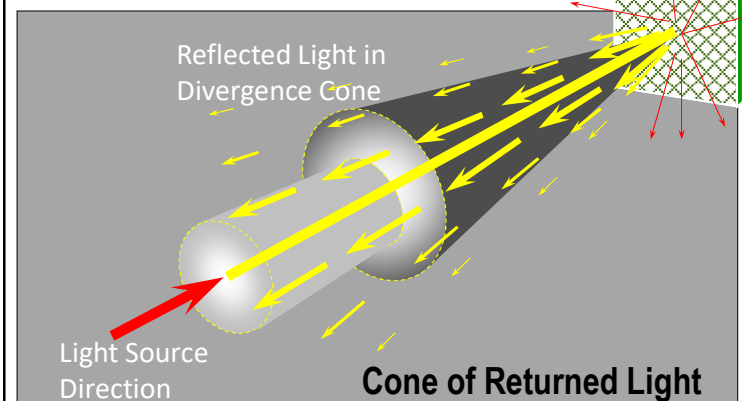


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TRAFFIC SAFETY OFFICER TRAINING

Road Traffic Signs Manufacturing and Display



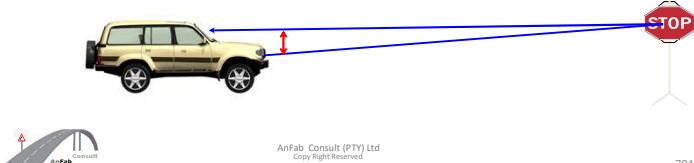
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Observation Angle



- 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)



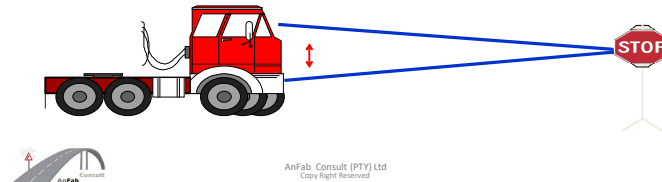
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Observation Angle



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



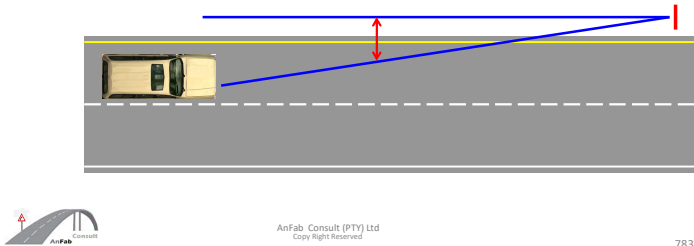
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Entrance Angle



- 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.



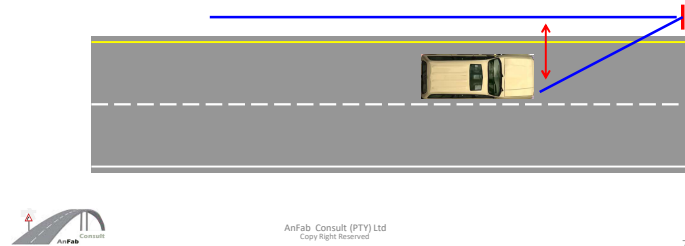
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Entrance Angle



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

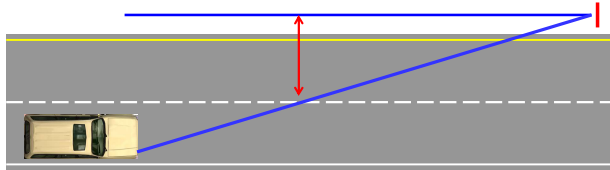


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Entrance Angle

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

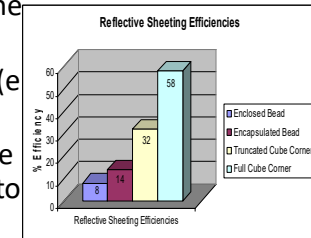


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Angular Factors to Consider

- 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



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Research Model for Drivers Using Signs

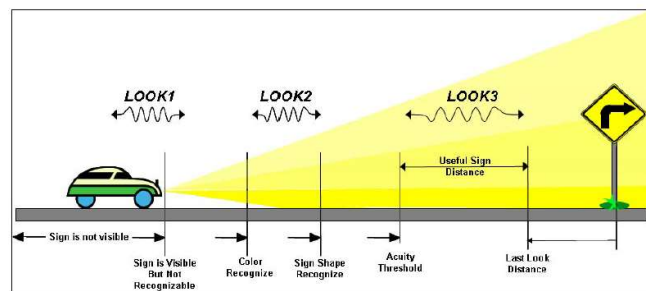


Figure 7. A Three-Look Model.

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

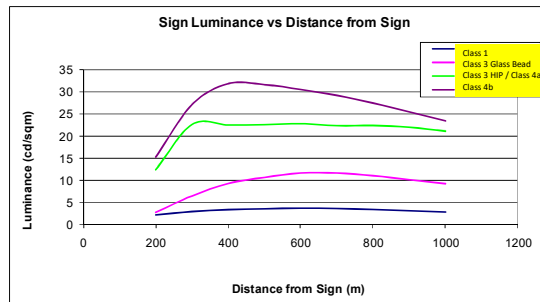
- 2.5 cd/m²
 - Replacement Luminance
- 10 cd/m²
 - Adequate Luminance
- 30 cd/m²
 - Desirable Luminance

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

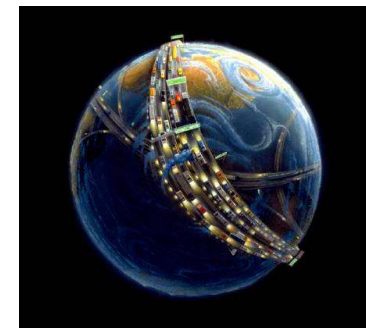
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Signing Considerations & Trends



- 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



20 Year-Old



40 Year-Old



60 Year-Old



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

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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

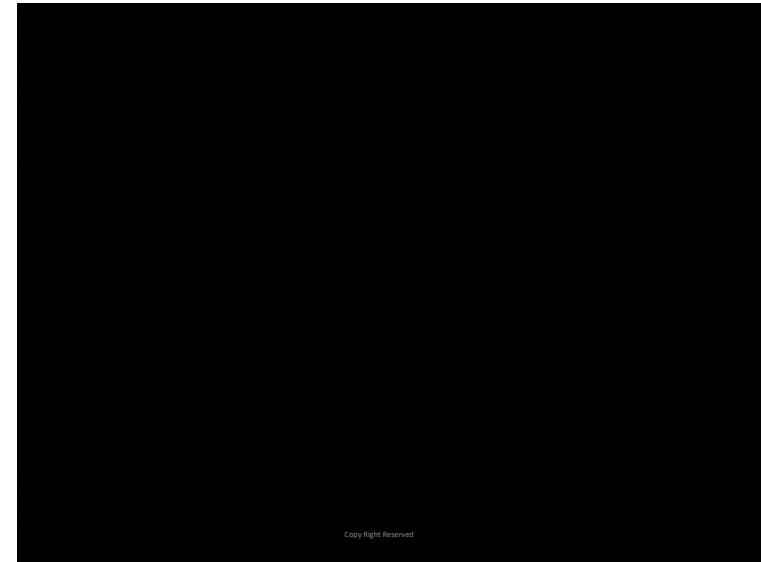
Kipling
Parkway
EXIT 2 MILES

Kipling
Parkway
EXIT 2 MILES



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Signing Considerations & Trends



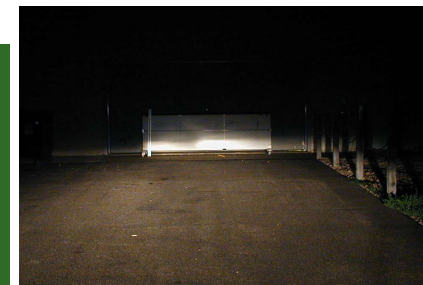
- Aging Population
- *Growing Truck Fleet*
- **VOA Headlamps**



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Visually Optically Aimable Headlights



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Sign Design Principles

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

100 % 17 % 14 % 22 %

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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

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How Fluorescence Works

Short wavelength light is absorbed by sign

Ordinary Colour

Short wavelength light is reemitted 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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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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Sheeting Identification Guide

| SARTSMA Retro-Reflective Sheeting for Road Traffic Signs Identification Guide – 2016 | | | | | | | | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| RETROREFLECTIVE SHEETING MATERIALS MADE WITH GLASS BEADS | | | | | | | | | |
| Examples of Sheeting | | | | | | | | | |
| Material | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC |
| Class | Class 1 | Class 2 | Class 3 | Class 4 | Class 5 | Class 6 | Class 7 | Class 8 | Class 9 |
| ASTM D4958 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Manufacturer | 3M | 3M | 3M | 3M | 3M | 3M | 3M | 3M | 3M |
| Sheet Name | 3M 100 | 3M 200 | 3M 300 | 3M 400 | 3M 500 | 3M 600 | 3M 700 | 3M 800 | 3M 900 |
| Sheet Number | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |

| SARTSMA Retro-Reflective Sheeting for Road Traffic Signs Identification Guide – 2016 | | | | | | | | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| RETROREFLECTIVE SHEETING MATERIALS MADE WITH MICRO PRISMS | | | | | | | | | |
| Examples of Sheeting | | | | | | | | | |
| Material | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC | 100% PVC |
| Class | Class 1 | Class 2 | Class 3 | Class 4 | Class 5 | Class 6 | Class 7 | Class 8 | Class 9 |
| ASTM D4958 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Manufacturer | 3M | 3M | 3M | 3M | 3M | 3M | 3M | 3M | 3M |
| Sheet Name | 3M 100 | 3M 200 | 3M 300 | 3M 400 | 3M 500 | 3M 600 | 3M 700 | 3M 800 | 3M 900 |
| Sheet Number | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |



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Thank You for Your Attention

Questions?

Garry Savill
SARTSMA Chairman

SARTSMA
South African Road Traffic Safety Management Association
info@sartsma.co.za

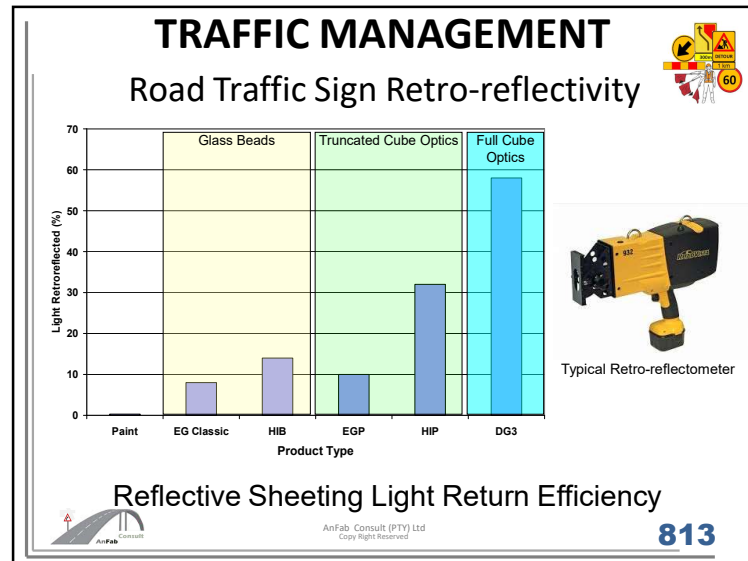


www.sartsma.co.za



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TRAFFIC MANAGEMENT

Road Traffic Signs

ROAD SAFETY

SUMMARY REFLECTIVE SHEETING

Brighter sheeting and better angularity provide all drivers with a longer reaction time, and therefore a longer time to act in a safe and wise manner.

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TRAFFIC MANAGEMENT

Road Traffic Signs

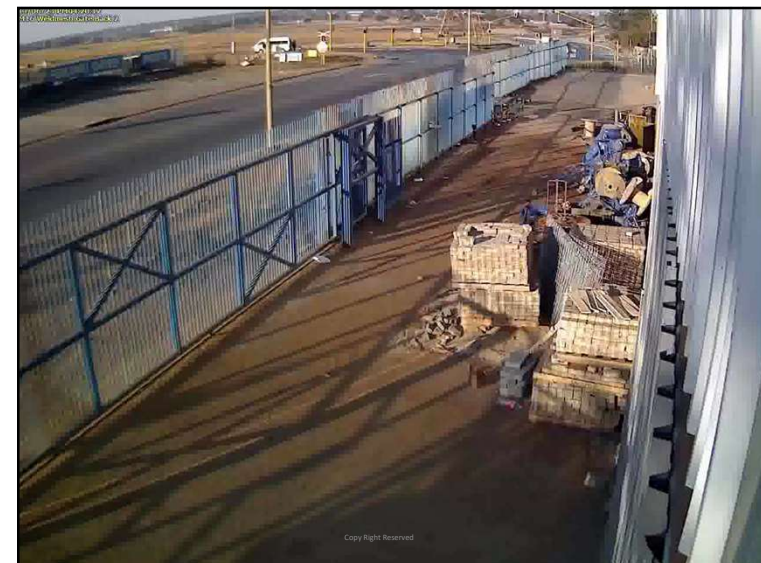
CONSTRUCTION WORK ZONES AND MAINTENANCE OPERATIONS

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

815

Class IV Fluorescent Yellow Retro-reflective Sheeting


816




TRAFFIC MANAGEMENT

Road Traffic Signs

W201



TW201




Traffic Circle

References
V1 3.3.1
V4 3.3.1

Pre-Warning

R2.2



References
V1 2.2.8
V4 2.2.7

Yield at
Mini Circle

Regulatory Control

821

TRAFFIC MANAGEMENT

Road Traffic Signs



SARF

W327



TW327



References
V1 3.4.12
V4 3.4.27

One Vehicle Width
Structure

822

TRAFFIC MANAGEMENT

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.

823

TRAFFIC MANAGEMENT

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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TRAFFIC MANAGEMENT

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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TRAFFIC MANAGEMENT

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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Complete Assignment Module 11


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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.

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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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

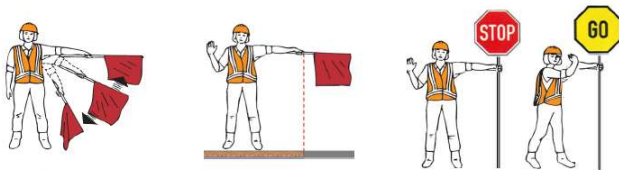
Flaggers may put out traffic cones and use signs and hand signals to communicate with motorists. Flaggers need to be confident enough to stand in front of cars, sometimes in blazing heat, sometimes in the middle of the night, to make sure that traffic is no more snarled than it has to be. And if motorists 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 undertaken 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



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



ALT3



ALT2

WAISTCOAT (or PULLOVER)



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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 **speeds 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).

DISTINCTIVE CLOTHING



ALT1

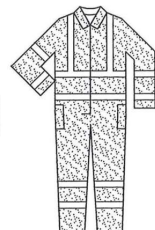


ALT2



ALT3

Jackets



Overalls



Bib & Brace Overalls



PULLOVER/SLIPOVER



TROUSERS



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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 banns will need to exceed 50mm(i.e. for a 107 mm chest the bands will need to be 62mm wide).

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

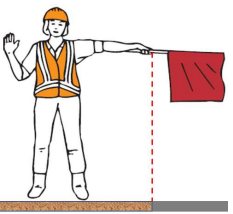


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TRANSITION AREA

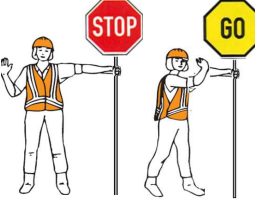
Flagger Control



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



Daytime ONLY



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

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TRANSITION AREA

Night time One Way Traffic Control



2013-12-12 12:10

Traffic Signals
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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**.



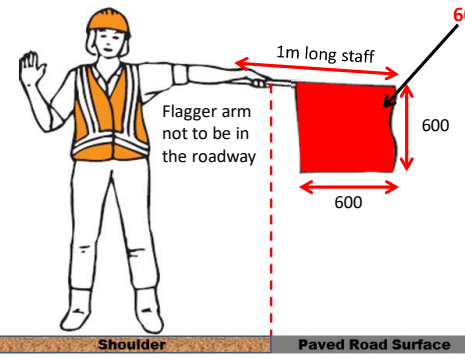
S1

| Road Traffic Sign (mm) Type | Function | Min. External Dimensions | | | |
|-----------------------------|--|--------------------------|-----|-----|-----|
| | | 60 | 80 | 100 | 120 |
| Road Signs | | | | | |
| Traffic Signals | | | | | |
| Circular Disc Aspect | Signal Indications (including symbols) | 210 | 210 | 210 | 210 |

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FLAG SPECIFICATIONS



1m long staff


Flagger arm not to be in the roadway

600

600

Shoulder **Paved Road Surface**

Durable fluorescent red-orange cloth 600x600mm



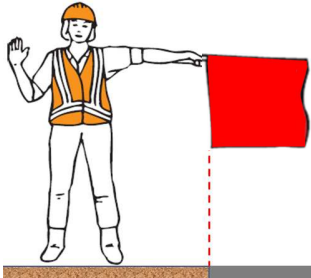
Green Flags Shall **NOT** be used at work zones

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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 –


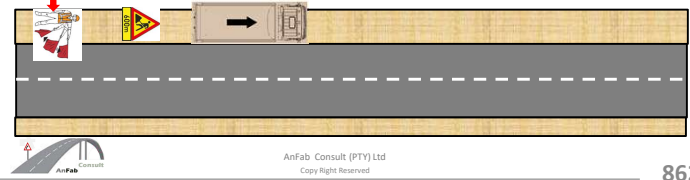
Flagger Control.
Less than 200 vehicles per hour
and be able to see other flagger
max 100m apart

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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.


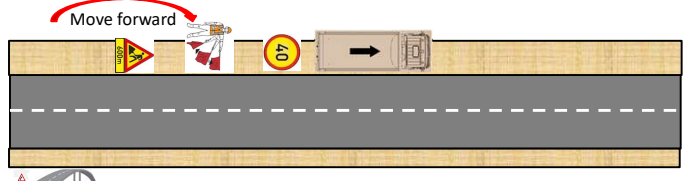



862

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.


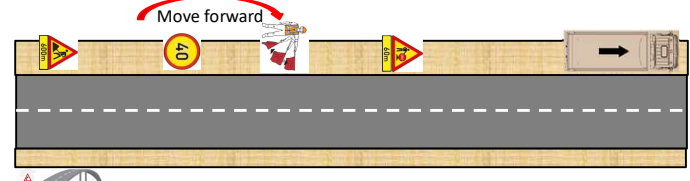



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FLAGGER POSITION

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.

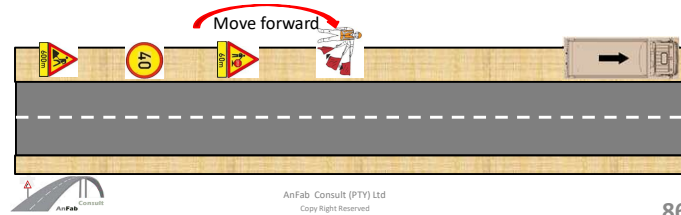
864

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.



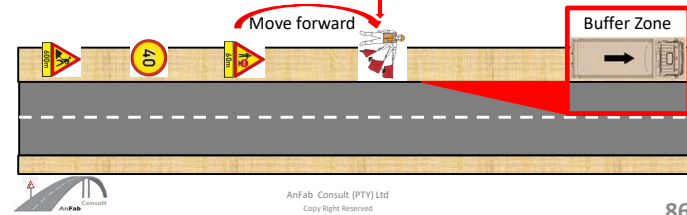
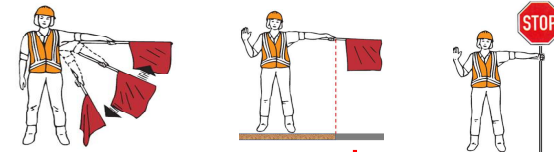
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FLAGGER POSITION

Control Traffic – Step 5

Flag control or STOP/GO sign control

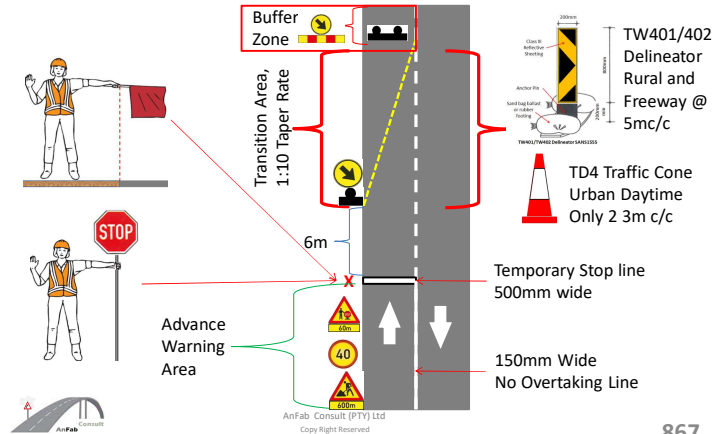


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TRANSITION AREA

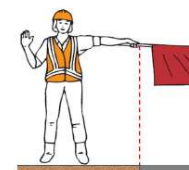
Flagger Position for Stopping Vehicles



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STOP/GO PROCEDURES




To Stop Traffic


Stand facing traffic looking directly at the driver - Flag in left hand - move flag up and down from side of leg to shoulder until vehicle is 100 paces away - Looking at driver directly - hold flag at shoulder height with outstretched arm - Raise right hand with palm to face traffic - This procedure is for short-term use only.

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STOP/GO PROCEDURES



Vehicles To Proceed
Make sure that all vehicles from the other side have passed through and that the flagman at the opposite end has closed the road - Turn STOP/GO sign to GO and lower flag behind left leg behind the sign.

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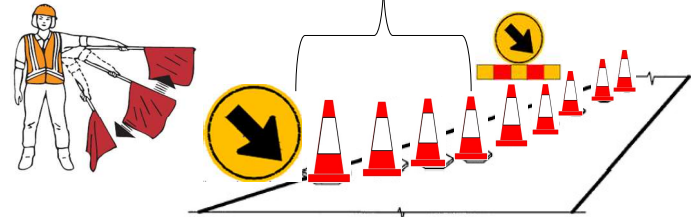
FLAGGER TRAINING AND SAFETY



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

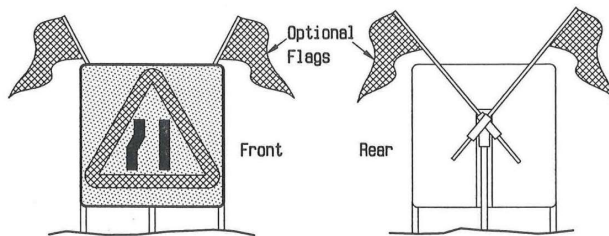


Flagger
Position



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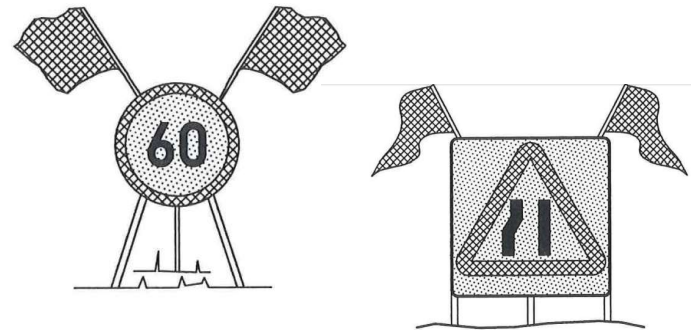


Detail 13.18.2 Slip-Over*Cloth* Signs on a Portable Frame.



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Flags may be attached to sign frames
so that the flag movement and visual
impact draws attention to the sign.



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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 for 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 Module 12



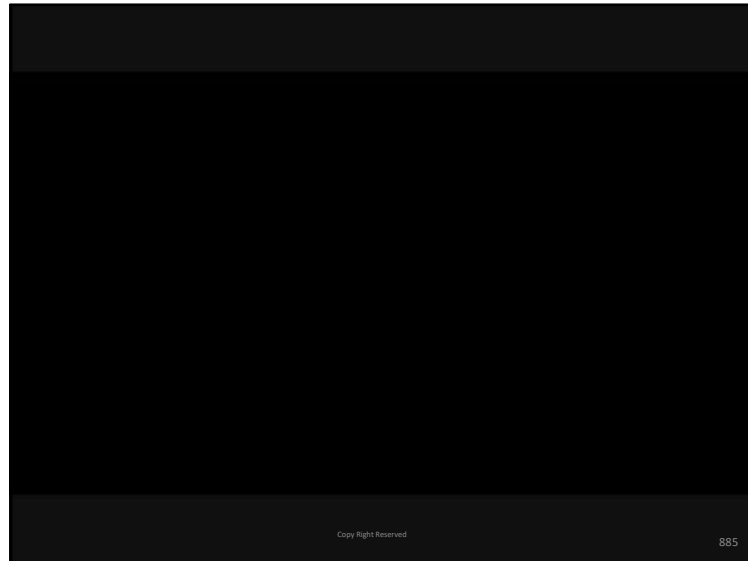
Please note the **slide number** with the question and forward to
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MODULE 13 ROAD RESTRAINT SYSTEMS AND CONTAINMENT LEVELS



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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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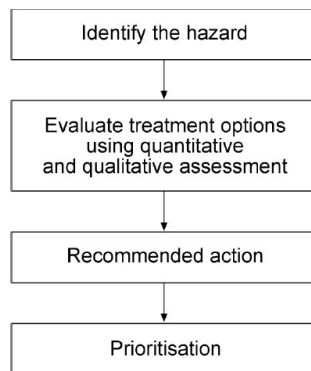
ROAD RESTRAINT SYSTEMS



Sloped Barrier End vs Approved Crash Cushion

ROAD RESTRAINT SYSTEMS

ASSESSING THE NEED FOR A BARRIER



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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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 | $W \leq 0,6$ |
| W2 | $W \leq 0,8$ |
| W3 | $W \leq 1,0$ |
| W4 | $W \leq 1,3$ |
| W5 | $W \leq 1,7$ |
| W6 | $W \leq 2,1$ |
| W7 | $W \leq 2,5$ |
| W8 | $W \leq 3,5$ |

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ROAD RESTRAINT SYSTEMS

Working Width

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

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Working Width

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ROAD RESTRAINT SYSTEMS

Working Width

Working width during impact

Element above the level of the safety barrier

(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)

Notes:

- Figure applies only to W-beam installations.
- Barrier is required for shaded area unless a detailed assessment proves otherwise.
- Assumes that batter is traversable and clear of hazards.
- Source: Austroads (2003).

Figure 2.7 — Warrants for Barrier on Embankments

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ROAD RESTRAINT SYSTEMS

Median Barrier Guideline for High-Speed Roadways

Average daily traffic (Thousands)

Evaluate need for barrier

Barrier optional

Barrier not normally considered

Median width (m)

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

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

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ROAD RESTRAINT SYSTEMS

Hazards of Barriers



6m offset

Concrete barrier off-sets

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ROAD RESTRAINT SYSTEMS

Barrier End Protection



Concrete barriers with **unprotected** ends

Transition Area delineation devices

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Testing



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Testing



Blunt End Impact No Crash Cushion

Concrete barrier containment level

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



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Testing



Crash Cushions



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Concrete barrier containment level



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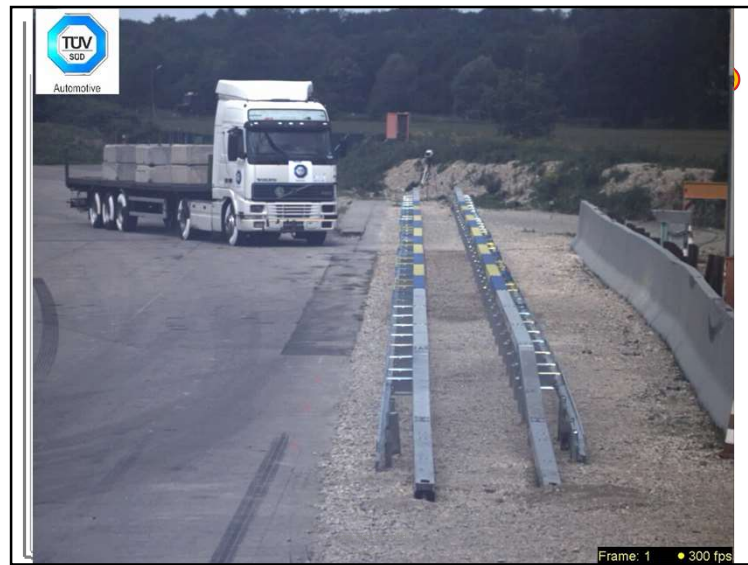
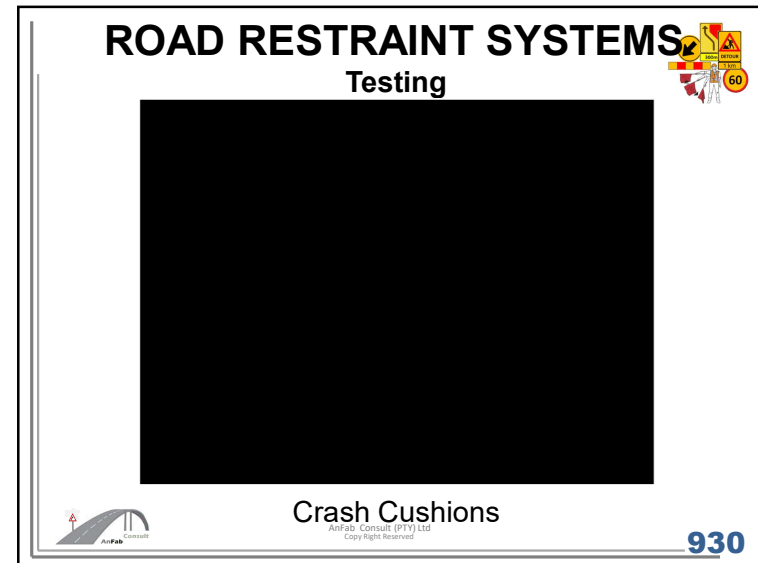


Concrete barrier containment level



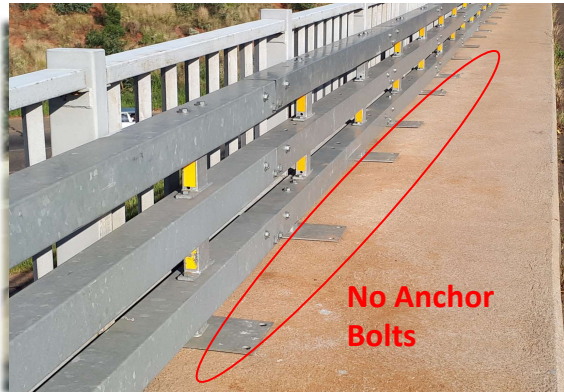
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ROAD RESTRAINT SYSTEMS



Sub-Standard Installations

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Concrete barriers without tested
containment levels

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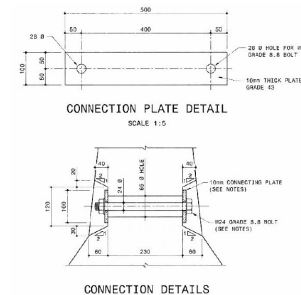


Concrete barrier without connection plates!

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Typical NJ Barrier
Connection Plate DetailAnFab Consult (PTY) Ltd
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Remove unnecessary barriers



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ROAD RESTRAINT SYSTEMS



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



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Provide approved connections between semi-rigid and rigid balustrades



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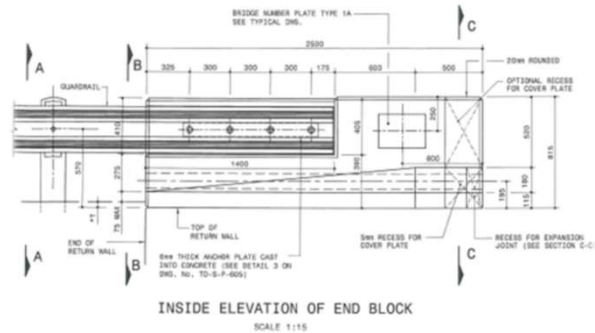
W Section guardrails



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W Section Guardrails End Block Detail



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W Section guardrails without approved connection can be fatal!



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W Section guardrails without terminal section!



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W Section guardrails without terminal section!



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Concrete barrier containment level

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

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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

953

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



The pedestrians shall be protected!

954


OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Ensure safe pedestrian walkways!

955

OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Ensure safe pedestrian walkways!

956

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 !



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Provide training and information!



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Provide training and information!



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Ensure safe pedestrian walkways!

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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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- Health; and Safety



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Provide training and information!



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13.8.18

13.8.11 STOP/RY-GO Traffic Control-Minor Works

1. STOP/RY-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, STOP/RY-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 roadwork site. The detail in Figure 13.40 may therefore be incorporated with other short term applications and is particularly appropriate for urban areas.

2. The signing given in this detail is a minimum standard for every short term application lasting only one or two hours. For longer applications the signing should be upgraded to that contained in Subsection 13.8.2 and Figure 13.44. It should be considered as a daytime operation unless the site is very well illuminated at night. NO OVERLAPPING signs T1014 should be used by the maintenance unit and added to the Mainstage sequence if required.

3. If operating speeds are in excess of 60 km/h additional speed limit signs T1001 should be displayed to reduce speed by a maximum of 20 km/h, or in 20 km/h increments to 60 km/h or 80 km/h as appropriate (see Subsection 13.4.5).

4. Flares must be well timed and shall operate in accordance with Figure 13.25. While short term sites are they to be used in conjunction with the provisions of Table 13.4 and all flares shall conform to the provisions of Table 13.5. When cones are to be used during adverse light conditions, they shall be fitted with reflective lenses. The mounting height of flares shall be at least that given in Table 13.1 or higher. If the work with respect to the safety of workers and the vehicle is to be carried on the shoulder, at the work end of the approach Buffer Zone, between the workers and approaching traffic.

Checklist

- are operating speeds in excess of 60 km/h?
- do advance signs for the STOP/RY-GO control exist with other roadwork signs within the site?
- are the flares used and well timed to their best?
- are the flares fully visible to approaching traffic?
- are the flares standing in a safe position?
- can the restriction be eliminated to permit two-way traffic?

| Sign | No | Size (mm) | Quantity |
|--------|----|------------|----------|
| T1001 | 1 | 1200 | 2 |
| T1002 | 1 | 1200 | 2 |
| PL 501 | 1 | 750 | 2 |
| PL 502 | 1 | 750 | 2 |
| T1003 | 1 | 1200 | 1 |
| T1004 | 1 | 1200 | 2 |
| T1005 | 1 | 300 x 1500 | 2 |
| FL 401 | 1 | 450 x 450 | 2 |
| T1014 | 1 | 450 x 450 | 2 |
| T1015 | 1 | 450 x 450 | 2 |
| T1016 | 1 | 450 x 450 | 2 |
| T1017 | 1 | 450 x 450 | 2 |
| T1018 | 1 | 450 x 450 | 2 |
| T1019 | 1 | 450 x 450 | 2 |
| T1020 | 1 | 450 x 450 | 2 |
| T1021 | 1 | 450 x 450 | 2 |
| T1022 | 1 | 450 x 450 | 2 |
| T1023 | 1 | 450 x 450 | 2 |
| T1024 | 1 | 450 x 450 | 2 |
| T1025 | 1 | 450 x 450 | 2 |
| T1026 | 1 | 450 x 450 | 2 |
| T1027 | 1 | 450 x 450 | 2 |
| T1028 | 1 | 450 x 450 | 2 |
| T1029 | 1 | 450 x 450 | 2 |
| T1030 | 1 | 450 x 450 | 2 |
| T1031 | 1 | 450 x 450 | 2 |
| T1032 | 1 | 450 x 450 | 2 |
| T1033 | 1 | 450 x 450 | 2 |
| T1034 | 1 | 450 x 450 | 2 |
| T1035 | 1 | 450 x 450 | 2 |
| T1036 | 1 | 450 x 450 | 2 |
| T1037 | 1 | 450 x 450 | 2 |
| T1038 | 1 | 450 x 450 | 2 |
| T1039 | 1 | 450 x 450 | 2 |
| T1040 | 1 | 450 x 450 | 2 |
| T1041 | 1 | 450 x 450 | 2 |
| T1042 | 1 | 450 x 450 | 2 |
| T1043 | 1 | 450 x 450 | 2 |
| T1044 | 1 | 450 x 450 | 2 |
| T1045 | 1 | 450 x 450 | 2 |
| T1046 | 1 | 450 x 450 | 2 |
| T1047 | 1 | 450 x 450 | 2 |
| T1048 | 1 | 450 x 450 | 2 |
| T1049 | 1 | 450 x 450 | 2 |
| T1050 | 1 | 450 x 450 | 2 |
| T1051 | 1 | 450 x 450 | 2 |
| T1052 | 1 | 450 x 450 | 2 |
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| T1078 | 1 | 450 x 450 | 2 |
| T1079 | 1 | 450 x 450 | 2 |
| T1080 | 1 | 450 x 450 | 2 |
| T1081 | 1 | 450 x 450 | 2 |
| T1082 | 1 | 450 x 450 | 2 |
| T1083 | 1 | 450 x 450 | 2 |
| T1084 | 1 | 450 x 450 | 2 |
| T1085 | 1 | 450 x 450 | 2 |
| T1086 | 1 | 450 x 450 | 2 |
| T1087 | 1 | 450 x 450 | 2 |
| T1088 | 1 | 450 x 450 | 2 |
| T1089 | 1 | 450 x 450 | 2 |
| T1090 | 1 | 450 x 450 | 2 |
| T1091 | 1 | 450 x 450 | 2 |
| T1092 | 1 | 450 x 450 | 2 |
| T1093 | 1 | 450 x 450 | 2 |
| T1094 | 1 | 450 x 450 | 2 |
| T1095 | 1 | 450 x 450 | 2 |
| T1096 | 1 | 450 x 450 | 2 |
| T1097 | 1 | 450 x 450 | 2 |
| T1098 | 1 | 450 x 450 | 2 |
| T1099 | 1 | 450 x 450 | 2 |
| T1100 | 1 | 450 x 450 | 2 |

Fig. 13.40 STOP/RY-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

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



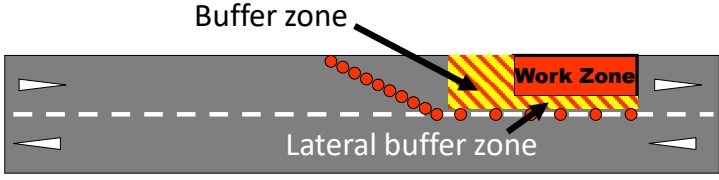
2014 03 13 09:19

Provide personal protective equipment!

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SITE SAFETY




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 !

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2011-08-04 13:53

 **Provide safe working environment!**
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2011-08-04 14:00

 **Provide personal protective equipment!**
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Provide personal protective equipment!



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OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993



Provide lights in low light conditions!



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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

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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

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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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Complete Assignment Module 14




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



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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



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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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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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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 | 1/5 Way | Gravel / Blumious | 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 | Signs Compliant | Signs Not in Compliance | Design Compliant | Design Not in Compliance | Colour Compliant | Colour Not Compliant | Designed By: | | | |
| YELLOW FLASHING LIGHTS TYPE 553 | 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 1555 | 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 Spill | Potholes |
| HALF WIDTH | Lane width m | Delineator spacing m o/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

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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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



Traffic Management Plan (TMP)

- ✓ Scope of Works
- ✓ Construction period Dates
- ✓ Location of Works - Map
- ✓ Risk Assessment
- ✓ Traffic Counts Impact Assessment (TIA)
- ✓ Method Statement
- ✓ Safety Control Device Specifications
- ✓ Legislation – Road Traffic Act and Regulations



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM



Traffic Management Plan (TMP)

- ✓ SADC Road Traffic Signs Manual
- ✓ SARTSM Volume 2 Chapter 13
- ✓ Road Safety Manual
- ✓ COTO Standard Specifications for Road and Bridge works for South African Road Authorities.
- ✓ Component Parts of a Roadworks Zone
- ✓ Traffic Control Plan (TCP) – Design and Check
- ✓ Safety Control Device Inventory
- ✓ Safety Control Device Procurement



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM



Traffic Management Plan (TMP)

- ✓ Good Practise Guidelines:
 - ❖ SARTSM Volume 2 Chapter 13
 - ❖ SADC Road Traffic Signs Manual
 - ❖ SADC Road Traffic Signs Manual
 - ❖ Road Safety Manual
 - ❖ COTO Standard Specifications for Road and Bridge works for South African Road Authorities.
- ✓ Component Parts of a Roadworks Zone
- ✓ Traffic Control Plan (TCP) – Design and Check
- ✓ Safety Control Device Inventory



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TEMPORARY ROAD TRAFFIC SIGN MANAGEMENT SYSTEM



Traffic Management Plan

- ✓ Roles and Responsibilities
 - ❖ Traffic Safety Officer (TSO)
 - ❖ Site Agent
 - ❖ SHEQ Manager
- ✓ Engineer Approval to proceed with Costruction
- ✓ Monitoring of Pedestrian Safety
- ✓ Mitigation Measures
- ✓ Final Inspection
- ✓ Road Opening



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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 10 Chainage 10.9 to 14.8 km - Road speed limit prior to construction works = 100km/h | | | | | | | | | | | | | |
| Component Part | Sign Number | SADC Code | Description | Supplementary Sign Code and Description | Symbol Photo | Manufacture date | Class reflective sheeting | Light visibility | Clear visibility distance | Size | Transverse Distance | Vertical Clearance | Longitudinal Distance |
| Advance Warning Area | 1 | N1-19 TW326 - WB | Roadworks (lanes closed) | TN11.3 | | Jan-15 | IV Fluorescent | 120m | 120m | 1200 x 2000 | 800mm | 1200mm | 1km |
| | 2 | N1-19 TR201 - BS | 60km/h Speed limit | None | | Jan-15 | IV Fluorescent | 120m | 120m | 1200w | 800mm | 2100mm | 600m |
| | 3 | N1-19 TGS104 | 4th lane closed | TN11.3 | | Jan-15 | IV Fluorescent | 120m | 120m | 1200 x 2000 | 800mm | 1200mm | 800m |
| | 4 | N1-19 TR201 - BS | 60km/h Speed limit | TN11.3 | | Jan-15 | IV Fluorescent | 120m | 120m | 1200w | 800mm | 2100mm | 400m |
| | 5 | N1-19 TGS104 | Right lane closed | TN11.3 | | Jan-15 | IV Fluorescent | 120m | 120m | 1200 x 2000 | 800mm | 1200mm | 800m |
| | 6 | N1-19 TR142 | Delimitator | none | | Feb-17 | I | 40m | 40m | 200 x 800 | 500mm | 200mm | 10m c/c |
| Transitional Area | 7 | N1-19 TR102 + TR141 | Lane closed keep left | None | | Dec-08 | I | 120m | 120m | 1000 x 800 | 800mm | 1300mm | 800m |
| Termination Area | 8 | N1-19 TW326 | Roadworks End | TN11.4 | | Feb-17 | IV Fluorescent | 120m | 120m | 1500 mm | 800mm | 2100mm | 800m |
| | 9 | N1-19 R201 - 100 | Speed limit | None | | Jan-20 | III | 120m | 120m | 1200w | 800mm | 2100mm | 800m |



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CONCLUSION



Course Evaluation Survey Monkey

Complete **assignment** (freehand)
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