

Work Zone Safety

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Objectives of this presentation:

- To explain why safety at road works is important for all.
- To outline the essentials in the new CAREC manual and to open up discussions for improved safety at CAREC road works.

HOW MANY PEOPLE ARE INJURED OR KILLED IN ROAD CRASHES AT CAREC ROAD WORKS IN ONE YEAR?

Unfortunately we do not know for sure.....



Road crashes at road work sites are a serious problem



Road users have three times the risk of a serious crash in a road work zone compared with other parts of the road network (USA)

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Agota Berces,
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Australia



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30–31 August 2017 • Dushanbe, Tajikistan

Проектирование более безопасных дорог: Ускорение реализации
Стратегии безопасности дорожного движения ЦАРЭС
30–31 августа 2017 г. • Душанбе, Таджикистан

Road crashes at road work sites are a serious problem

Studies in Finland and Slovenia showed that 'motorists are up to five times as likely to be injured when travelling through a work zone'



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Road crashes at road work sites are a serious problem

German research has shown that approximately one quarter of collisions happening on national routes occur at work zones.



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Road crashes at road work sites are a serious problem



Research has also identified that road works that take longer and extend over longer distances have lower crash rates as opposed to short term works in short length zones. (SWOV 2010)

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An unnecessary tragedy at road works!



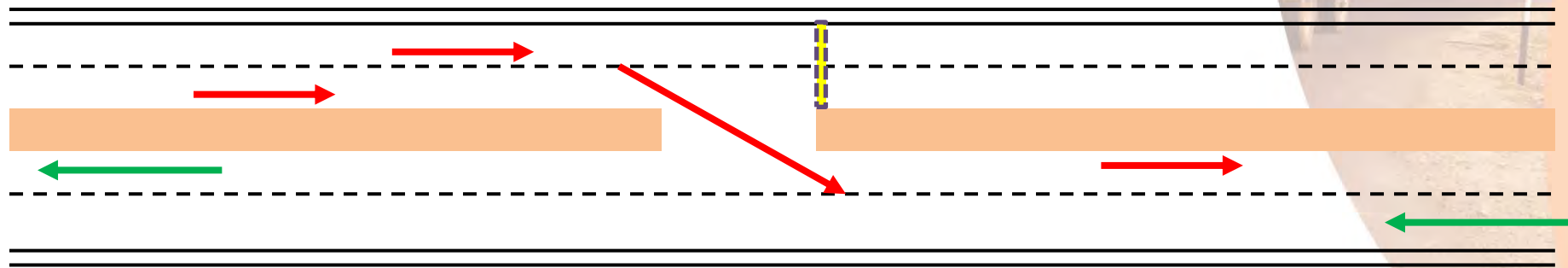
A national highway in northern India had pavement cracks.

The Contractor closed one carriageway (for crack-sealing) with some rocks and simple signs. Traffic was directed two-way along the other carriageway.

He did not inform the on-coming traffic to expect two way traffic!

A tragedy waiting to happen.....

DELHI →



← MUMBAI

The NH 76 was a divided highway (2 carriageways).
A contractor had closed the Delhi bound
carriageway for maintenance (crack sealing).

**DIVERSION
AHEAD
200 M
GO SLOW**
→ Madhucan Binapuri JV

76

Green directional sign



WORK IN PROGRESS
→ ROAD CLOSED →
TAKE DIVERSION →

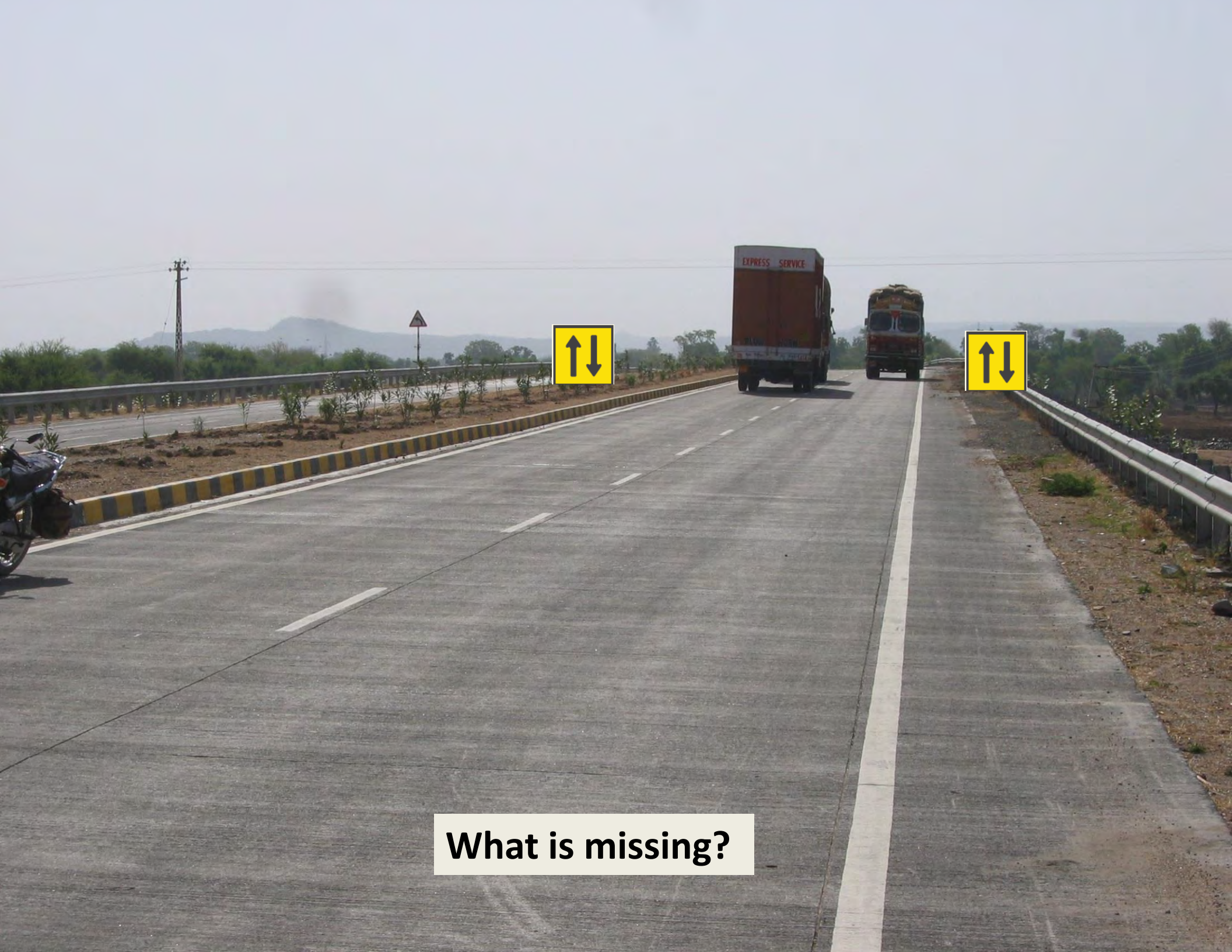




What is missing?



What is missing?



What is missing?



What happened?



A fatal head-on collision







Five men killed

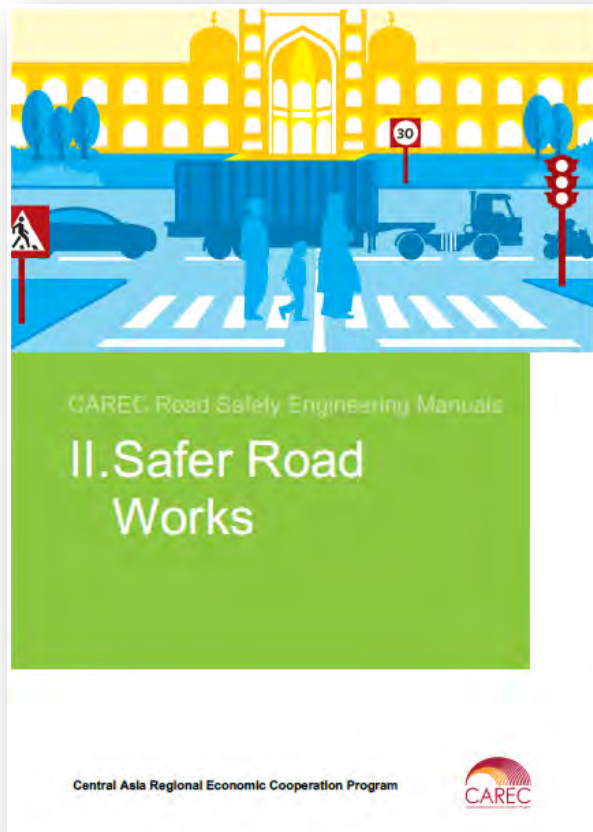


A few days later.....signs placed to face the truck's direction of travel. Too late to prevent five deaths!

As a Contractor, or as a MoT engineer responsible for issuing road construction contracts, and for managing road projects – **you have a responsibility to the road users and to the road workers to provide safe work sites.**



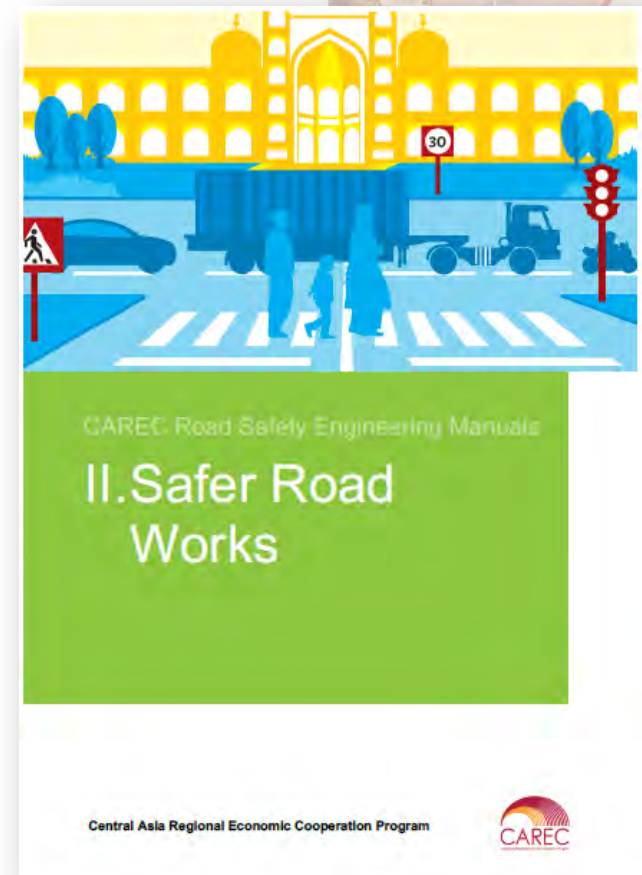
The CAREC “Safer Road Works” Manual



The new CAREC manual on Safer Road Works, provides you with the essentials to assist you to make work sites safer – for all.

The CAREC “Safer Road Works” manual

- Short, clear, practical
- Aimed at practitioners
- Outlines the basic requirements for safer traffic control at road works.
- CAREC road agencies will expect safer work sites from now on.



The manual asks you to remember.....

Road works should not surprise any driver or rider!



Always look at your road works through the eyes of the drivers/riders – not just as an engineer!

“Safer Road Works”

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CAREC Road Safety Engineering Manuals

II. Safer Road Works

Central Asia Regional Economic Cooperation Program

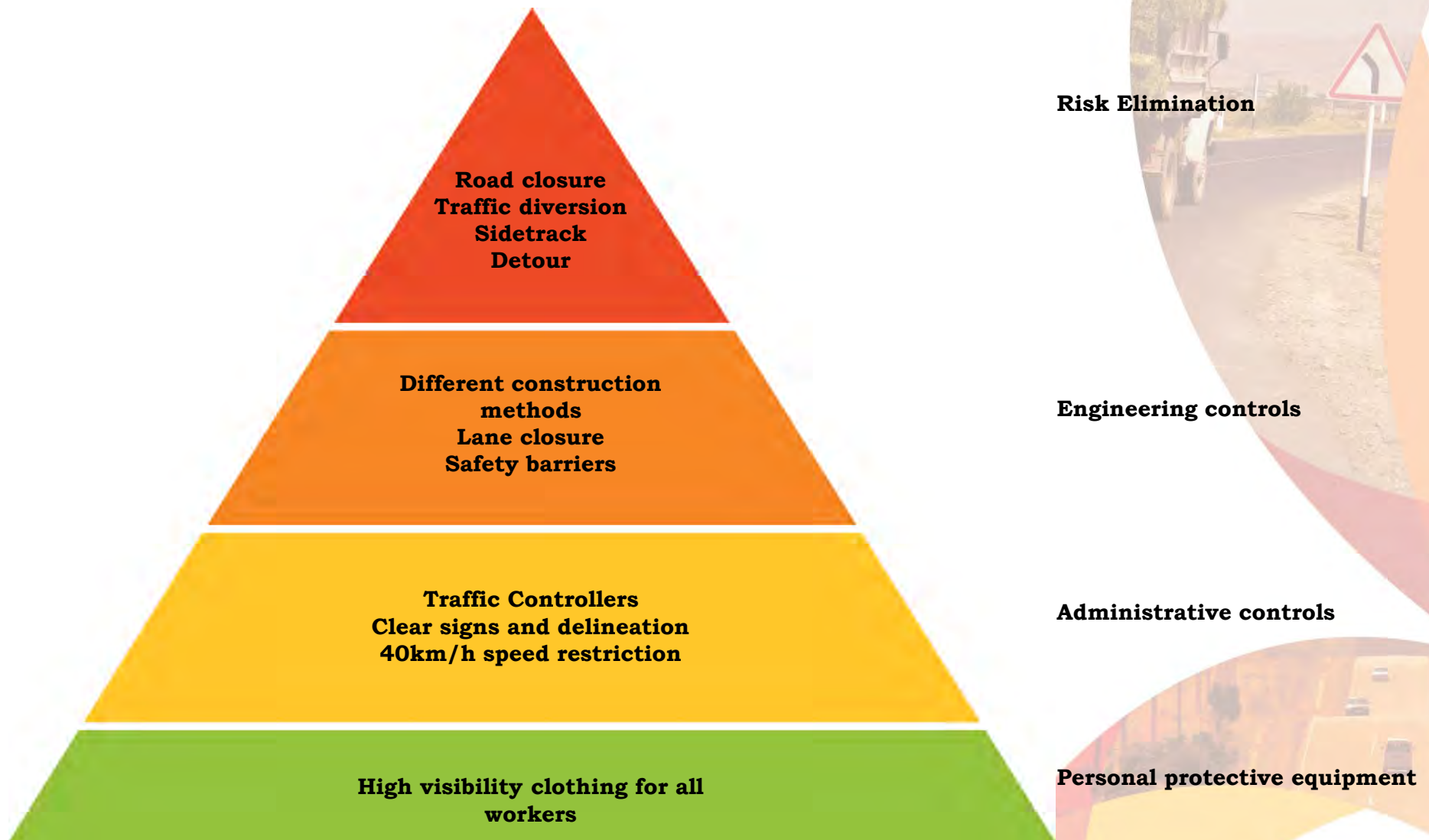


What is a TMP?

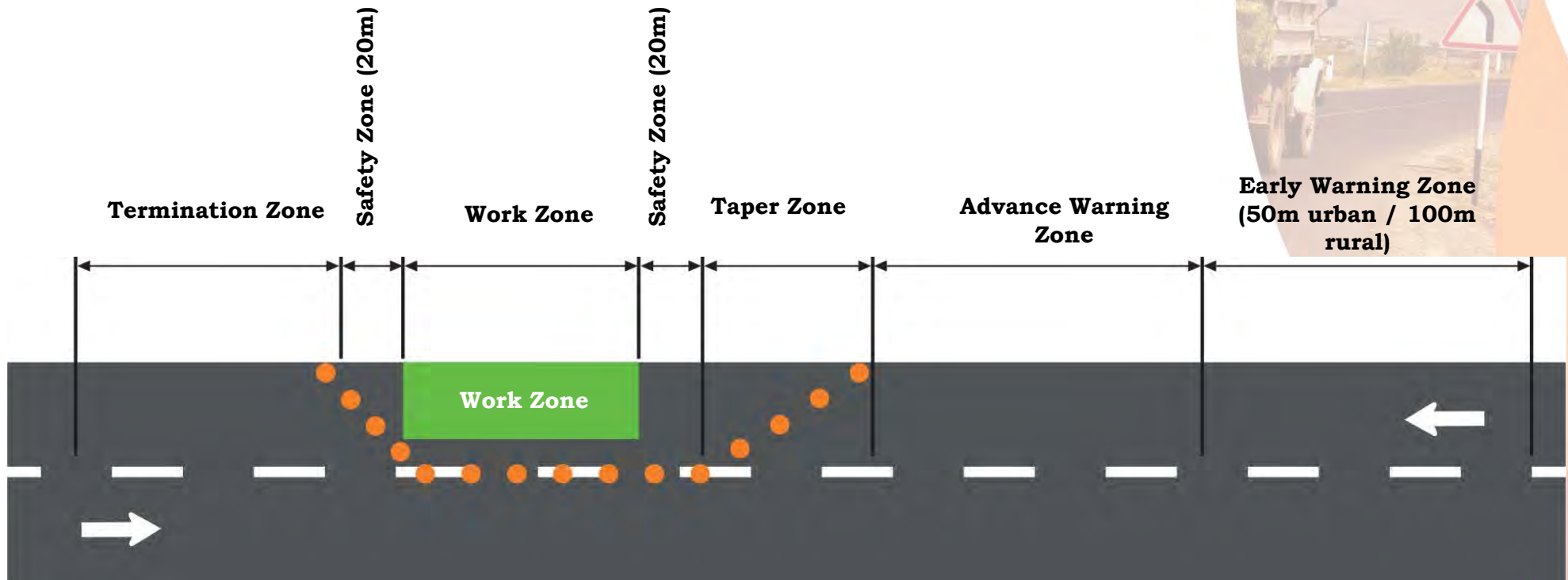
A traffic management plan (TMP) is a drawing showing the traffic control devices proposed for use at a road work site.

In other words, it is a design of how each of Zone is to be set out.

Diagrammatical Representation of the Hierarchy of Controls Pyramid



The "Zone Concept" is a method of breaking a work site down into six individual zones.



THE SIX ZONE CONCEPT

The Six Zone Concept

- 1 Early Warning Zone** – the first zone, in which signs are placed to alert approaching drivers/riders of the presence of road works ahead.
- 2 Advance Warning Zone** – alerts drivers/riders of the Work Zone ahead. It uses advance warning signs and regulatory signs to warn users of the Work Zone ahead, and to regulate their behavior.
- 3 Taper Zone** – is used if motorists are required to move from their lane to pass around a Work Zone.
- 4 Safety Buffer Zone** - is a longitudinal safety buffer immediately in advance of, and beside, the work area. At CAREC worksites it is to be at least 20m in length; it is kept free of equipment, materials and workers.
- 5 Work Zone** – is the area in which the works are carried out; it is set aside for workers, equipment and materials.
- 6 Termination Zone** – is the zone where traffic resumes normal operations after passing the Work Zone (the last of the six zones).

"The "Zone Concept" breaks a work site down into six separate zones and provides a simple clear way to think about your Traffic Management Plan"

Each zone has a particular purpose. They follow the path of the vehicles as they approach, pass through and depart from a work site.

A TMP shall show clearly that these six Zones have been considered during the design of the TMP. It shall show that the road signs, the delineators and the other safety devices have been planned around these six Zones.



THE LENGTH OF EACH ZONE IS DETERMINED BY THE MAXIMUM OPERATING SPEED ON THE ROAD WHERE WORKS ARE TAKING PLACE.

Table 2 : Early Warning Zone Lengths

SPEED ZONE	LENGTH OF EARLY WARNING ZONE
Up to 60km/h	50m
Above 60km/h	100m

Table 5: Minimum Length of Advance Warning Zones (in meters)

Approach speed (km/h)	Length of Advance Warning Zone (m)	
	Desired speed at the end of the advance warning zone	
	40 km/h	0 km/h (STOP)
50	30	75
60	60	100
70	120	160
80	170	225
90	200	295
100	250	370

Table 6: Recommended Lengths of Taper (Transition) Zones (in meters)

APPROACH SPEED ENTERING THE TAPER ZONE (KM/H)	DIVERGE TAPER (m)	MERGE TAPER (m)
40	50	90
50	50	100
60	60	120
70	70	140
80	80	160
90	90	180
100	100	200

THESE THREE ESSENTIAL TABLES ARE IN YOUR CAREC MANUAL

HOW LONG SHOULD THE ADVANCE WARNING ZONE BE?



Table 5: Minimum Length of Advance Warning Zones (in meters)

Approach speed (km/h)	Length of Advance Warning Zone (m)	
	Desired speed at the end of the advance warning zone	
	40 km/h	0 km/h (STOP)
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HOW LONG SHOULD THE TAPER ZONE BE?



Table 6: Recommended Lengths of Taper (Transition) Zones (in meters)

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TWO TYPES OF TAPER ZONES

DIVERGE

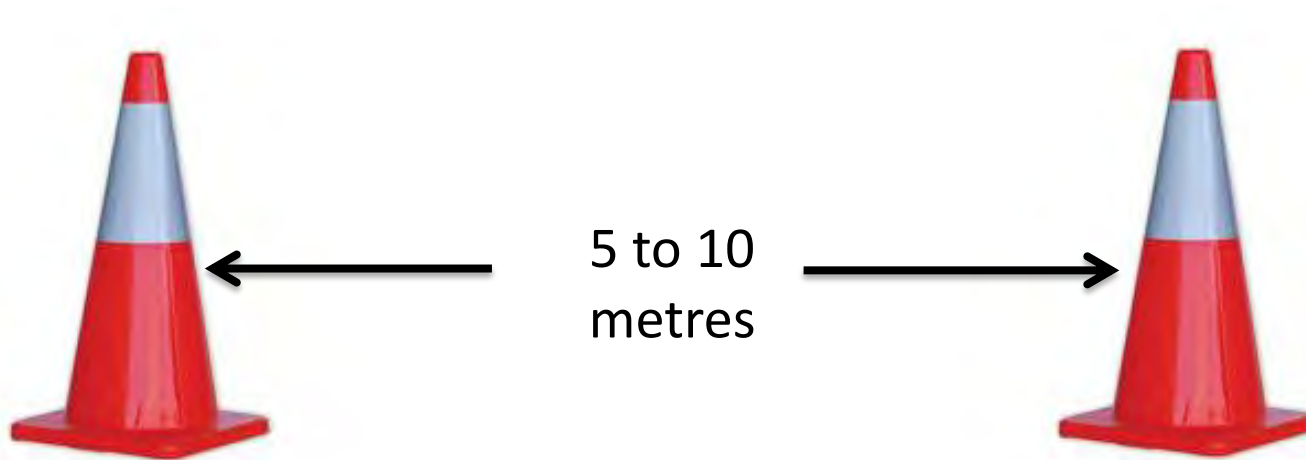
- Where a single lane of traffic moves (diverges) to the left (or right) to pass the Work Zone

MERGE

- Where two lanes of traffic must combine (merge) into one lane to pass the Work Zone

DISTANCE BETWEEN CONES/BOLLARDS

Traffic cones are to be placed at 5 metre intervals



Note: Traffic cones should never be spaced more than 10 metres apart

TRAFFIC CONES

If a sign, or traffic cone is knocked over or removed, it must be replaced as soon as it is safe to do so.



Note: A well maintained worksite adds to its credibility.



WHAT SHOULD THE SPEED LIMIT BE IN YOUR WORK ZONE?



Table 3: Speed Limits at CAREC Road Works where Workers are on the Road or Within 1.5 meters of Moving Traffic

SPEED LIMIT	BUFFER ZONE	ROADWORK SPEED LIMIT
Up to and including 80km/h	N/A	40km/h
Above 80km/h	60km/h	40km/h



USE A 40 KM/H SPEED LIMIT THROUGH ALL YOUR CAREC WORK SITES – BUT ONLY WHEN WORKERS ARE ON-SITE AND WITHIN 1.5M OF TRAFFIC



??









??

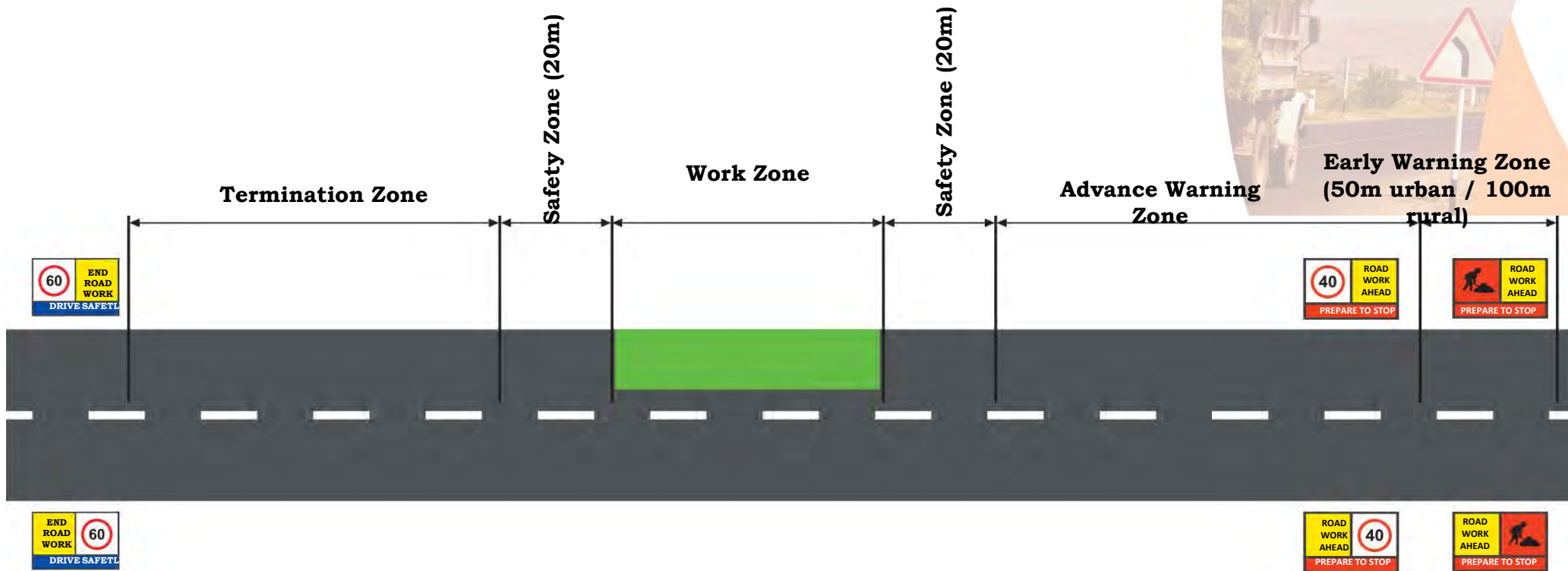


HOW LONG SHOULD THE TERMINATION ZONE BE?

Rural 100m

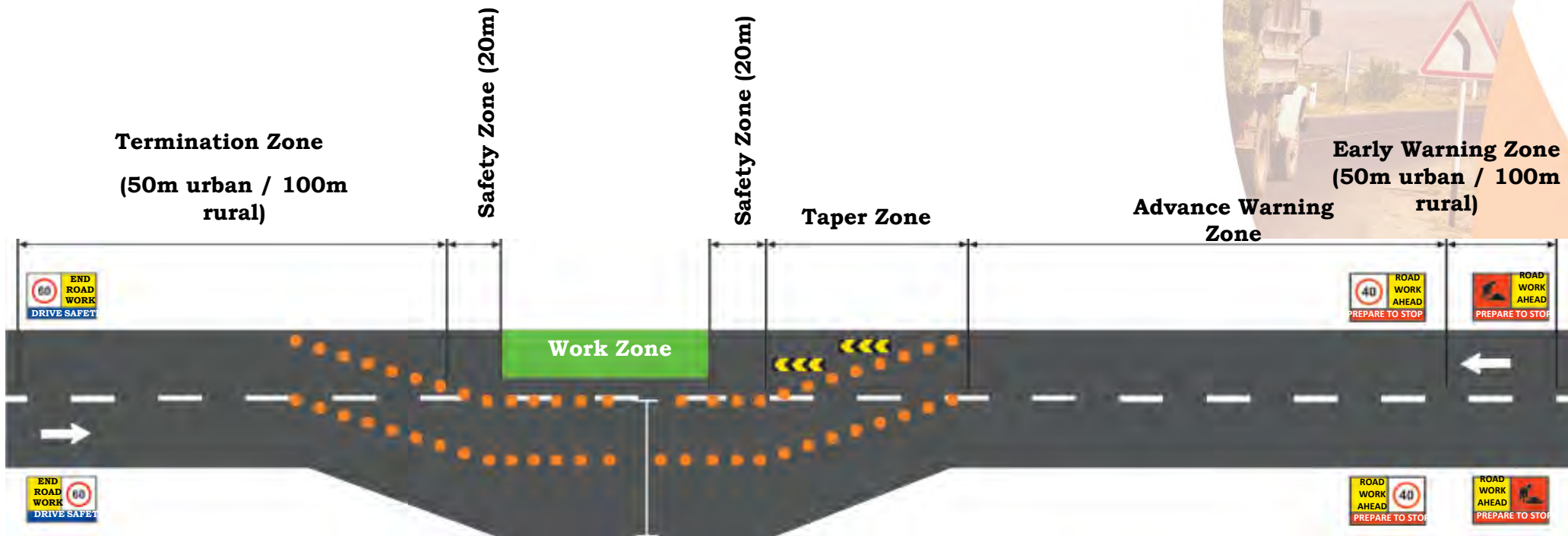
Urban 50m

Figure 12 Works Along the Shoulder or Beside the Road



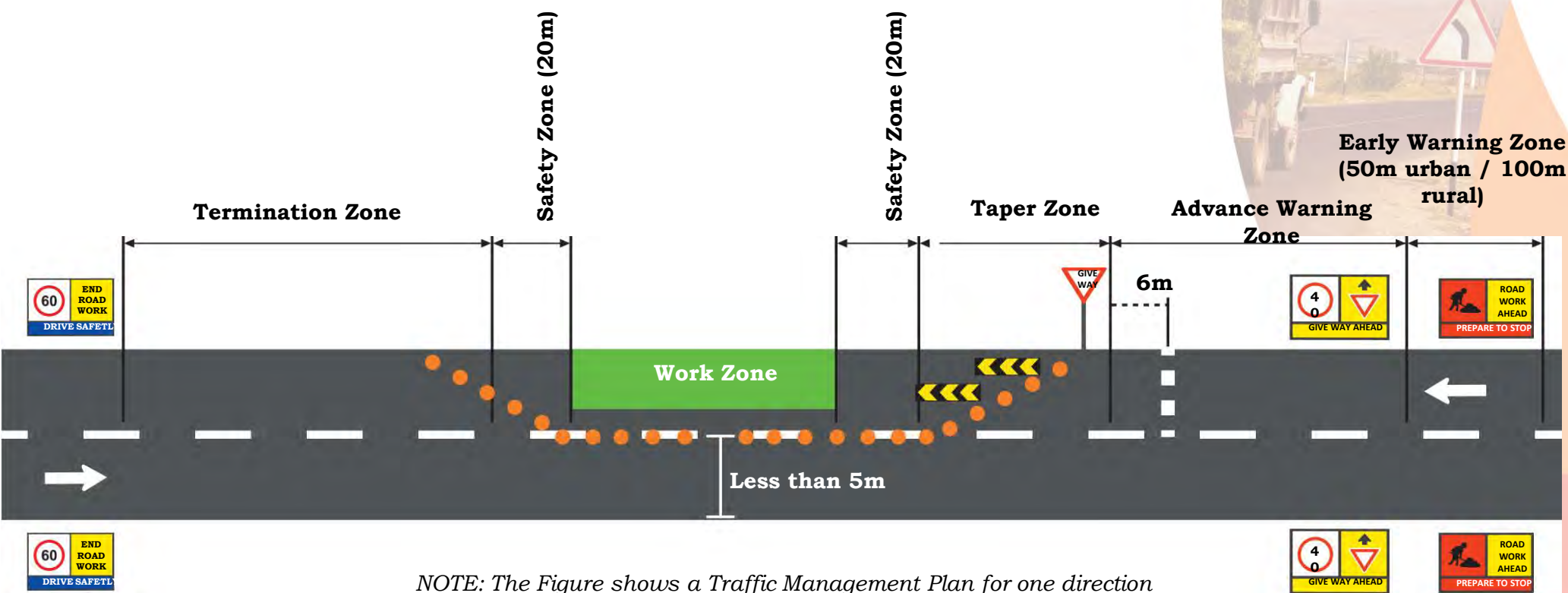
NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 13: A Reduction in the Available Road Width but with Sufficient Width for Two-Way Traffic



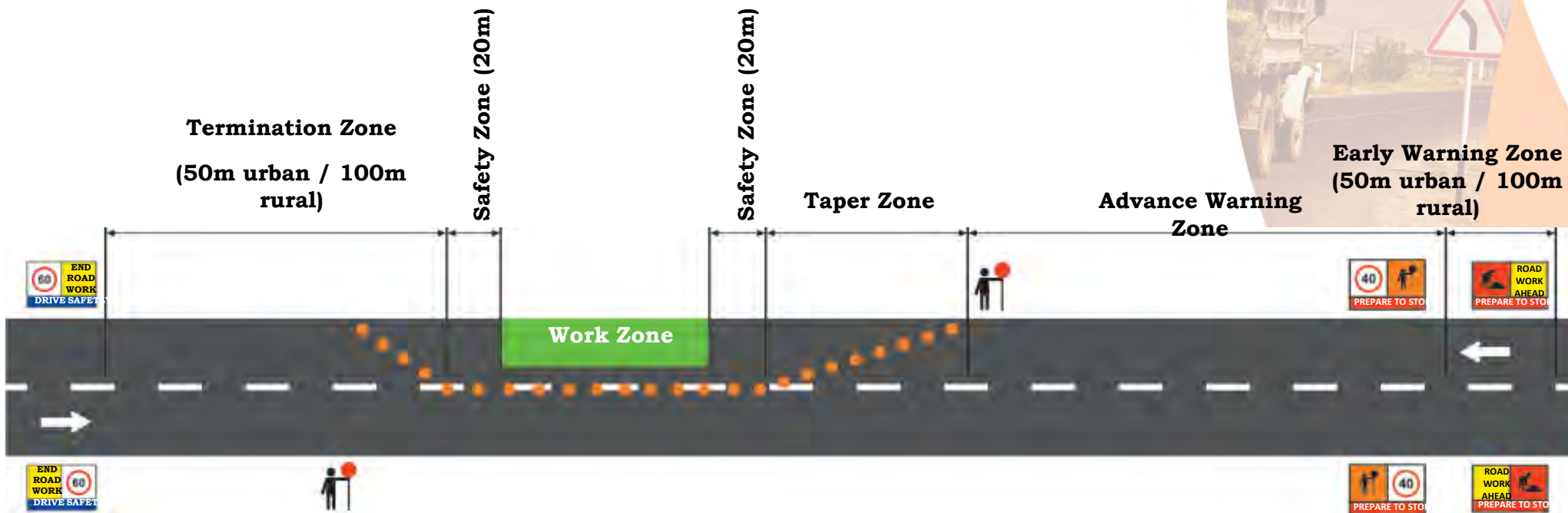
NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 14: Works on a two-Way Highway Requiring Closure of One Lane (with Give Way Sign Control).



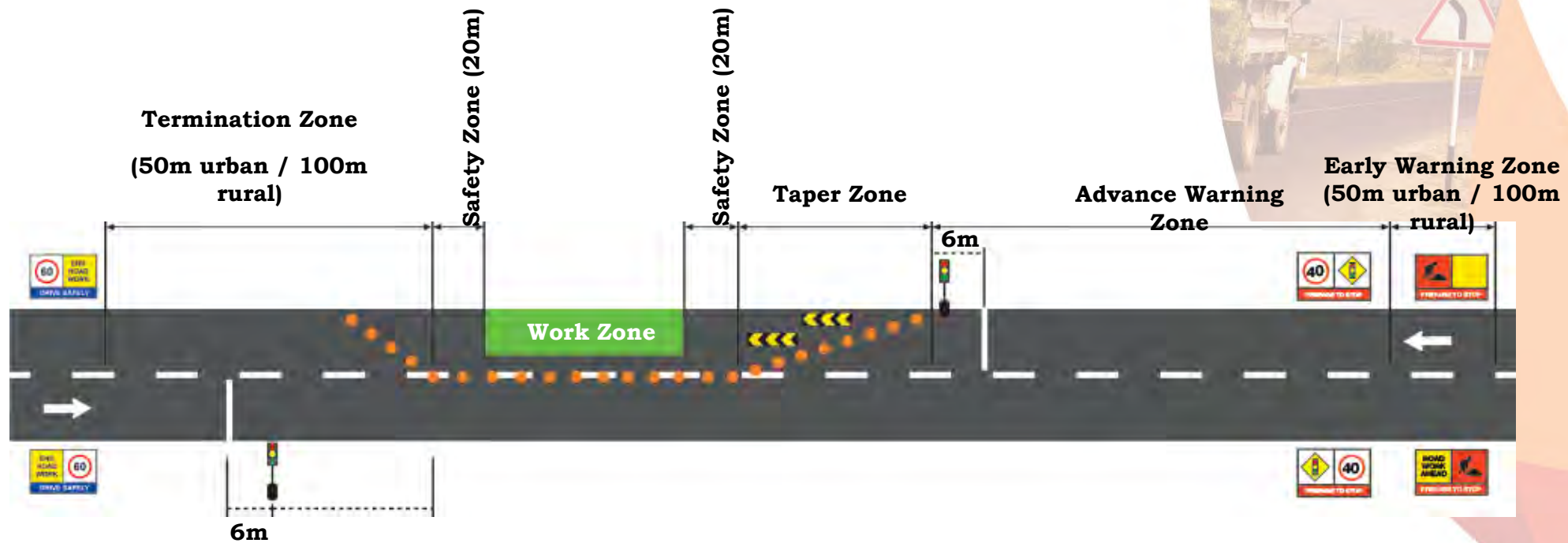
NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 15: Works on a Two-Way Highway Requiring Closure of One Lane
(the remaining single lane is controlled by Traffic Controllers)



NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

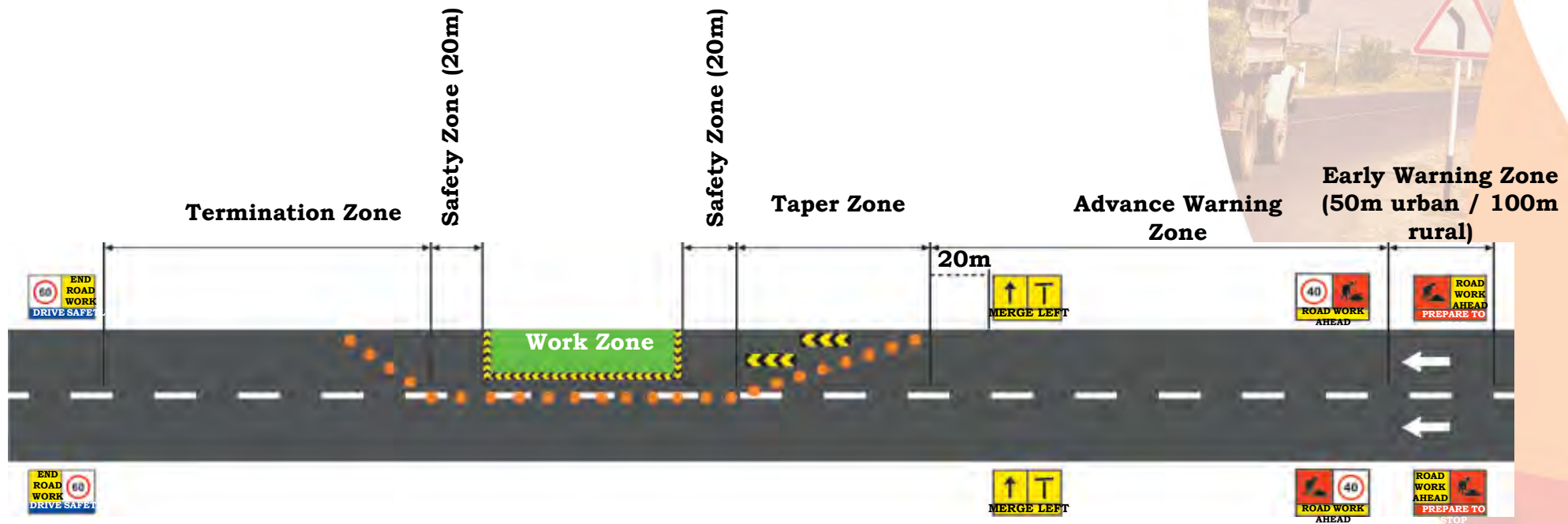
Figure 16: Works on a Two-Way Highway requiring Closure of One Lane
(with temporary traffic signal control)



**30m to provide clearance
between opposing traffic
directions**

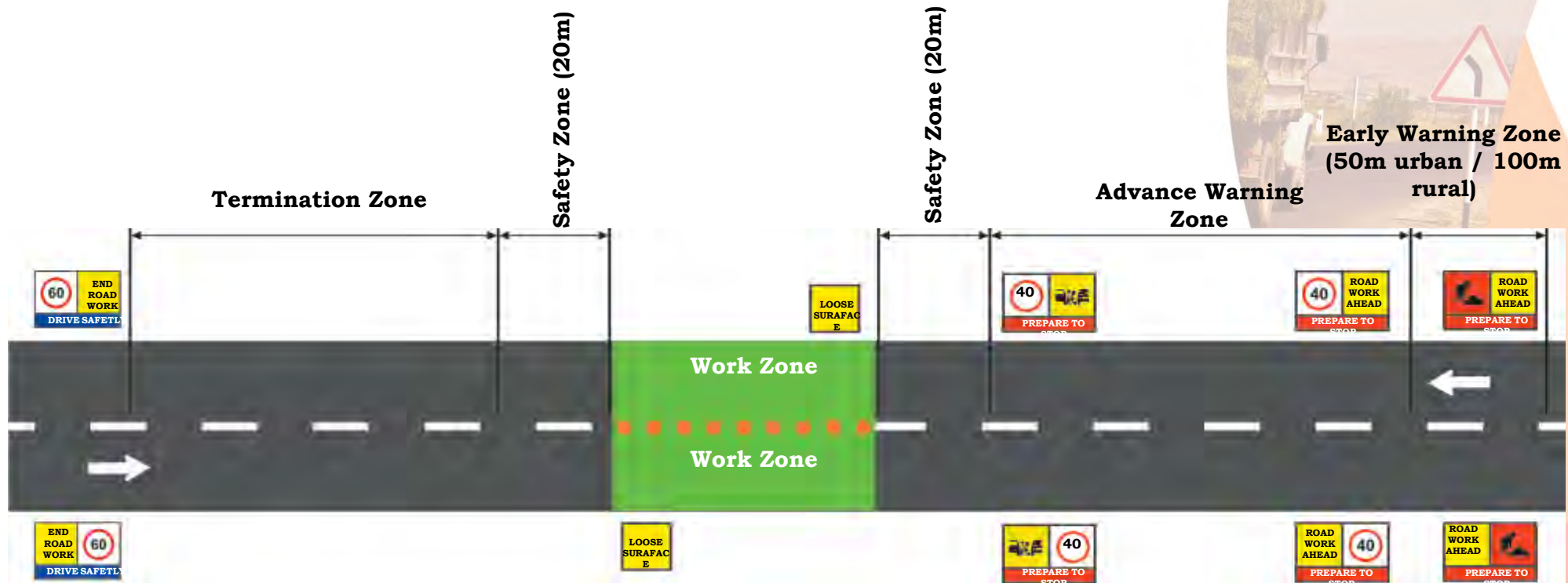
*NOTE: The Figure shows a Traffic Management Plan for one direction
of travel only*

Figure 17: Closure of the Right-Hand Lane of a Multi-Lane Carriageway



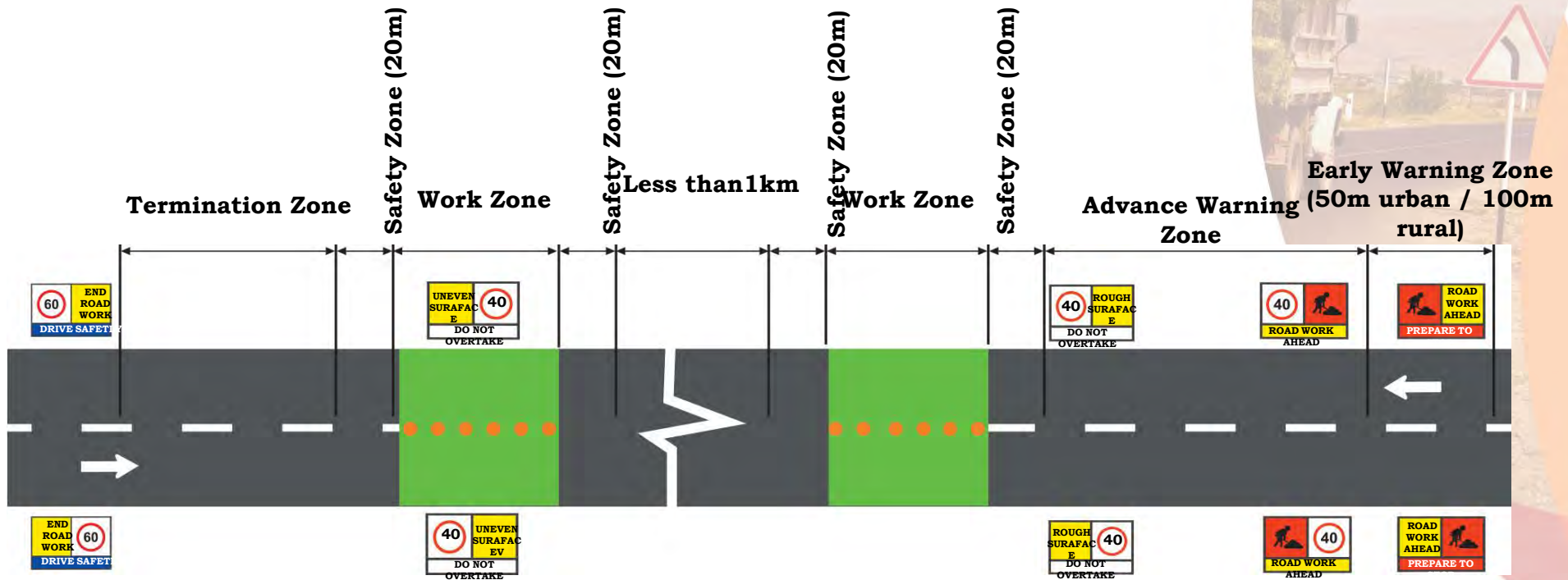
NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 18: Road Works Extending Across a Road



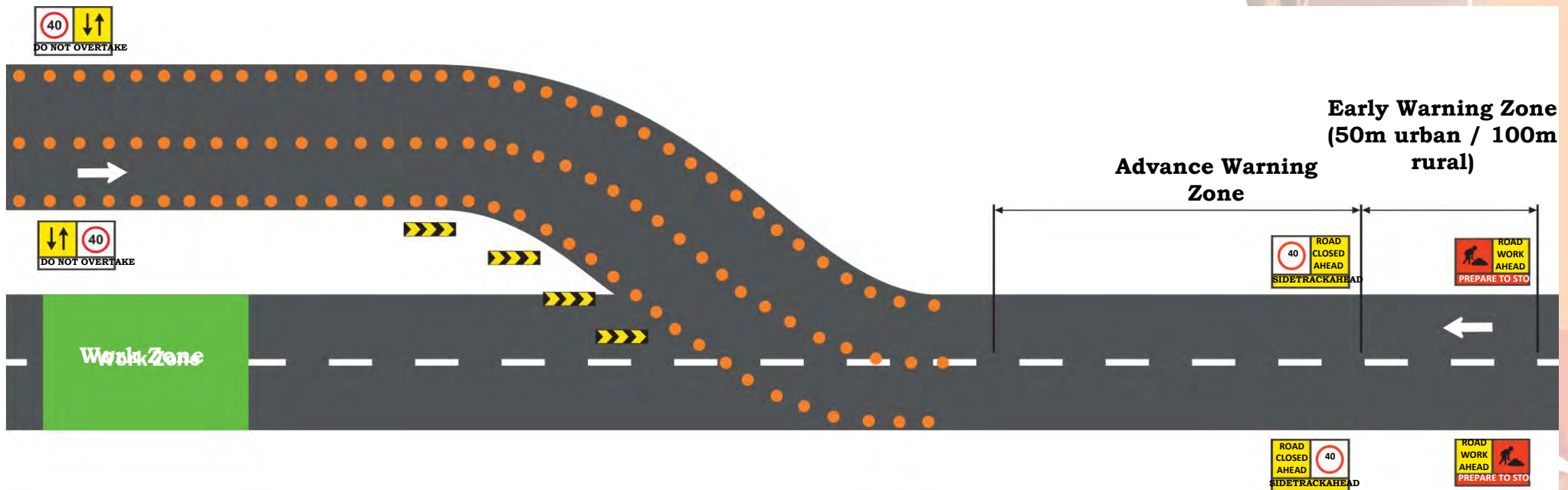
NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 19: Closely Spaced Works Across the Road (less than 1 Kilometre apart) in a long worksite



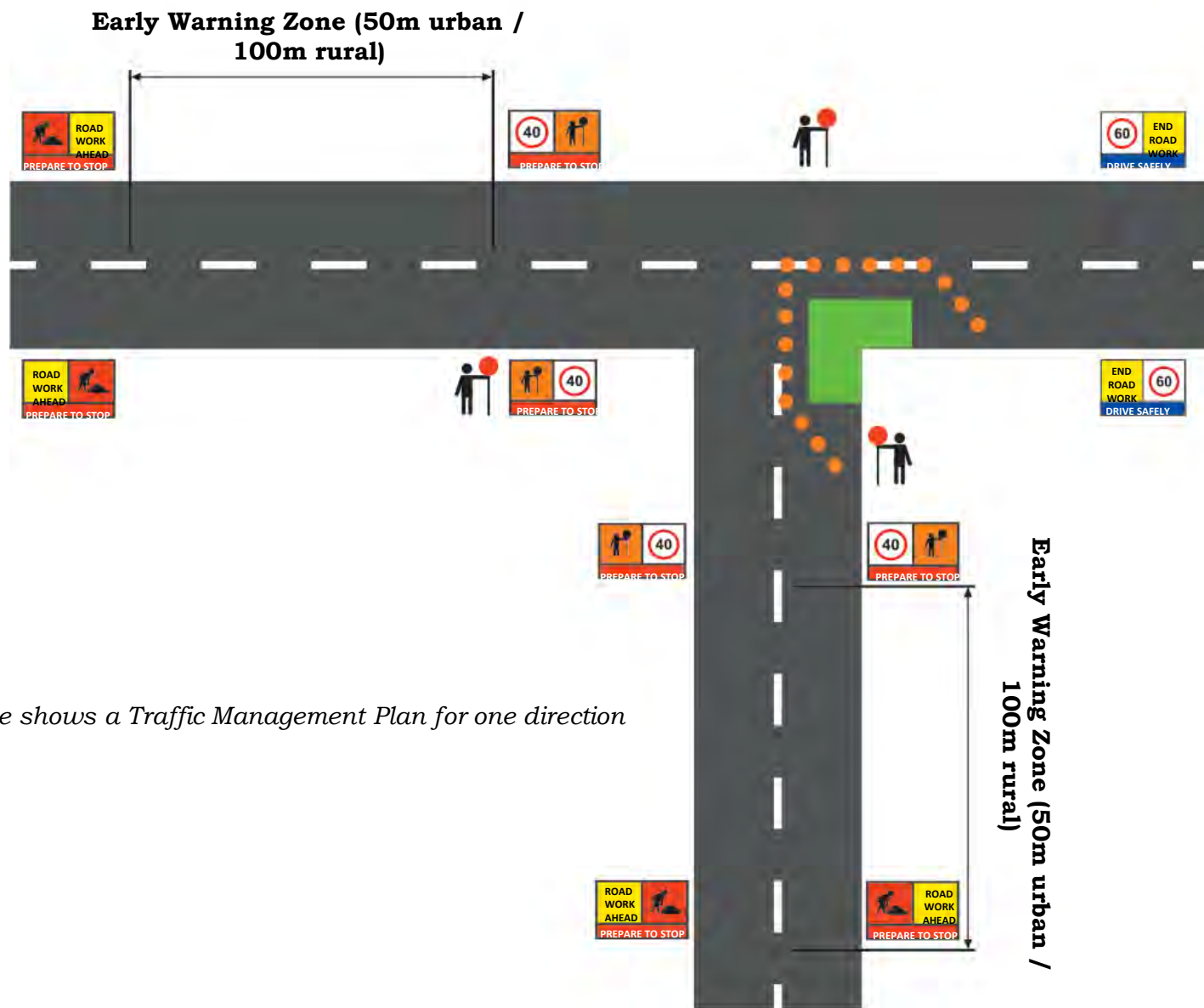
NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 20: Two-Way Side Track due to a Full Road Closure

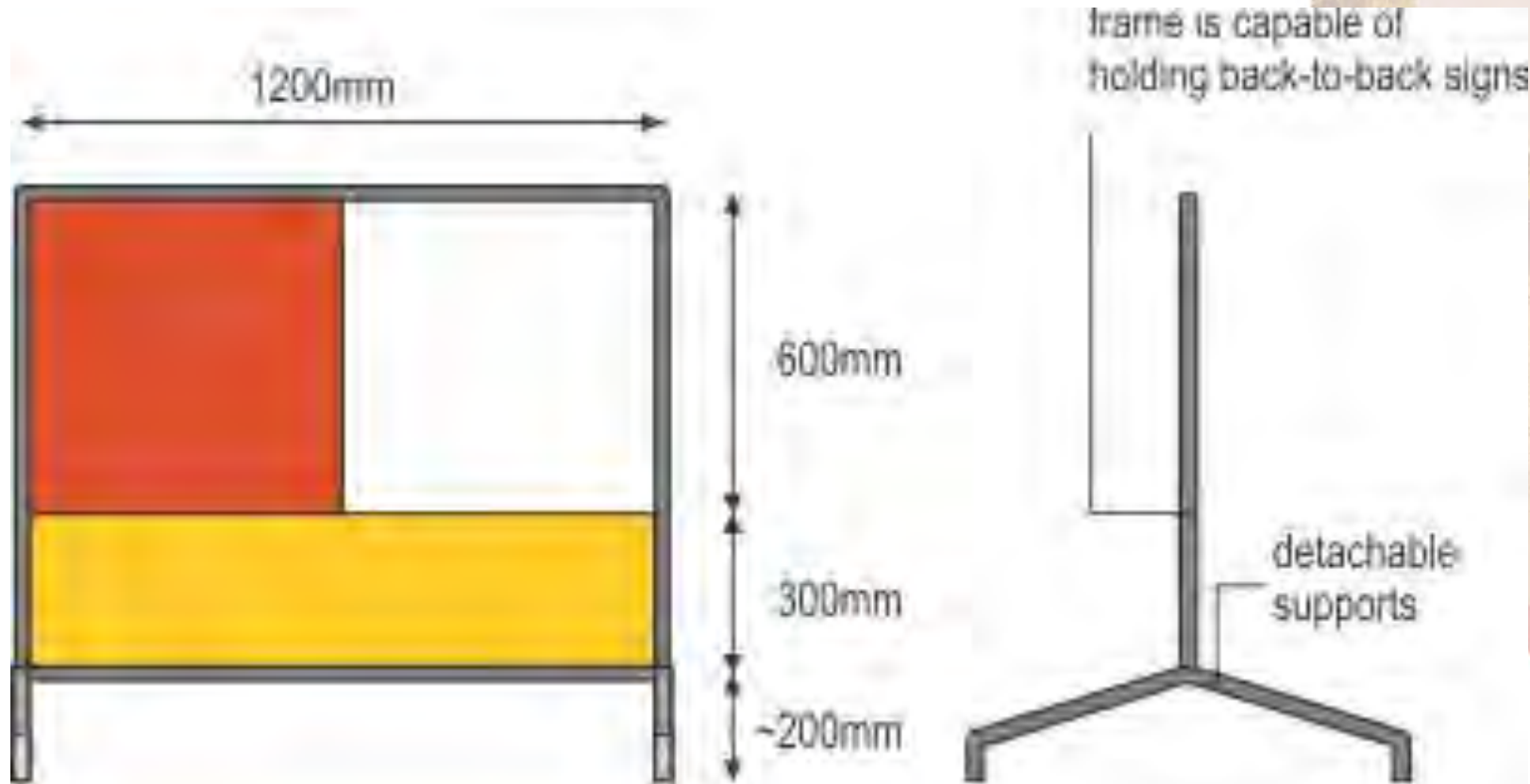


NOTE: The Figure shows a Traffic Management Plan for one direction of travel only

Figure 21: Roadwork Within an Intersection



NOTE: The Figure shows a Traffic Management Plan for one direction of travel only



▲ *Multi-message sign frame - made from black lightweight metal*

**Multi message signs are very useful for road works.
The CAREC manual encourages you to consider these.**



PREPARE TO STOP





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INSTRUCTIONS FOR TRAFFIC CONTROLLERS

A Traffic Controller is the person on a work site who is responsible for the safety of traffic and pedestrians to pass through the work site safely (and with minimal delay).



A TRAFFIC CONTROLLER



....is the person who sets up the zones according to the TMP

INSTRUCTIONS FOR TRAFFIC CONTROLLERS

Traffic controllers are used when signs and devices for works are considered insufficient to provide for personal safety, public convenience and efficient control and management of traffic around the worksite.

Traffic controllers are responsible for:

- Placing the signs in a safe and effective manner
- Placing the cones/ bollard to the correct lengths
- The safety of all motorists and pedestrians who pass through the site
- Assisting the Safety Officer with the safety of all workers on the site

Instructions for Traffic Controllers



Stop the Traffic



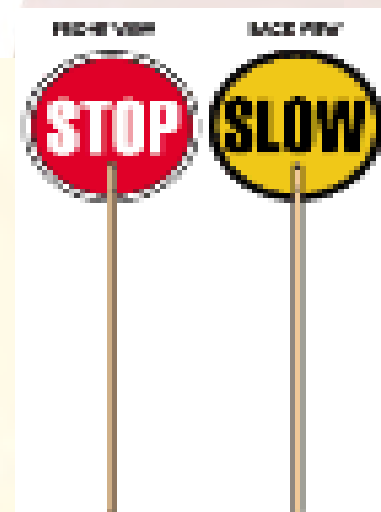
Allow Traffic to Proceed



Slow the Traffic

Источник: Консультант по инженерному обеспечению БДД ЦАРЭС

The STOP baton is a regulatory sign. It must be obeyed. Traffic Controllers display the STOP baton as an indication to drivers to stop and remain stationary for as long as the baton is displayed to them. (Traffic from the other direction will usually be able to travel through the work site facing the SLOW baton).



- Give definite and clear signals to drivers/riders as follows:
 - To stop traffic, turn the baton to “Stop”, face the traffic, and raise your other hand into the stop position with the palm towards the traffic.
 - To allow traffic to proceed, wait until all traffic from the other end of the work has passed, move to the side of the road, then turn the baton to “Slow”. Turn side on to the traffic, and with your other hand give a “Go” indication.





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PERSONAL PROTECTIVE EQUIPMENT (PPE)

Traffic Controllers work in live traffic
and around machines and plant
therefore it is essential to wear the
appropriate PPE

WET WEATHER GEAR

Where personnel are required to work in wet conditions, they should be provided with, and required to wear, waterproof, warm and reflective clothing (PPE)



ROAD SIGNS

Signs at road work sites should comply with the 6C's of good signage.

Good signage is essential for safety through the work site.



REQUIREMENT	SIGN REQUIREMENT	CONTRACTOR TO ENSURE
Conspicuous	Each sign shall be able to be readily seen.	That all signs can be seen by approaching drivers and/or riders. This requires all signs to be reflective, and in good condition, and located suitably.
Clear	Each sign shall be clear and easy to read.	All signs are to be kept in good, clean condition.
Comprehensible	Each sign shall be easy to understand	All signs used comply with national standards.
Credible	Each sign shall be reasonable and believable by road users	No sign shall be used that does not show a credible (believable) message.
Consistent	The same sign shall be used for the same situation at all road works everywhere across the country	That standard signs only are used at road work sites so drivers/riders can quickly understand the message.
Correct	The sign shall be the correct sign for that situation – there are some warning signs that appear the same but have quite different meanings.	That only correct signs are used. Near enough is not good enough. Do not use “any” sign if the correct one is missing. Rather, get a correct one and install it.

SIGN POSITIONING



When positioning signs, ensure that they

- Are within driver/riders line of site
- Generally placed 1 meter clear of the travel path
- Cannot be obscured by vehicles or other objects
- Do not obscure other devices
- Are not a hazard to workers or public
- Do not direct traffic into an unsafe path
- Are securely mounted

Remember the following key points:

- Always prepare a traffic management plan.
- Use the Six Zone Concept from the CAREC manual.
- Make sure the zones are long enough.
- For larger projects, have the TMP audited by an independent team.
- Work with Traffic Police to keep speeds low.
- Ensure the Contractor has sufficient signs/cones

Remember the following key points:

- **Adopt a consistent road work speed limit.**
- **Ensure all carriageway changes are signed 500m and 250m in advance; correct information and warning signs.**
- **Use a 20m Safety (Buffer) Zone at each end of the Work Zone to protect your workers.**
- **Use “Two Way Traffic” signs in single lane operation.**
- **All workers to wear reflective safety vests.**
- **Employ trained traffic controllers employed (not flagmen) who use Stop/Slow batons.**

You can save lives by managing safer road works



How can this best be done in your country?