



4th Regional Road Safety Engineering Workshop

16–17 April 2018 | Istanbul, Turkey

4-й Семинар по инженерному
обеспечению безопасности
дорожного движения

16–17 апреля 2018 года | Стамбул, Турция

Making Road Work Sites Safer

*How can we make all road works on CAREC
highways safer – for road users and workers?*

Phillip Jordan
ADB CAREC Road Safety Engineer



Objectives:

- To explain why road safety at road works is important.
- To outline the 6-zones at road work sites.
- To challenge you about safety at your work sites.
- To discuss options for improved safety at CAREC road works.



How many people are killed or injured in crashes
at CAREC road works in a year?

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





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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)

IMPROVING WORKER SAFETY THROUGH
BETTER VISIBILITY
Agota Berces,
Technical, Regulatory and Business
Development Manager
3M Traffic Safety Systems Division, Sydney,
NSW, Australia





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

IMPROVING WORKER SAFETY THROUGH BETTER VISIBILITY

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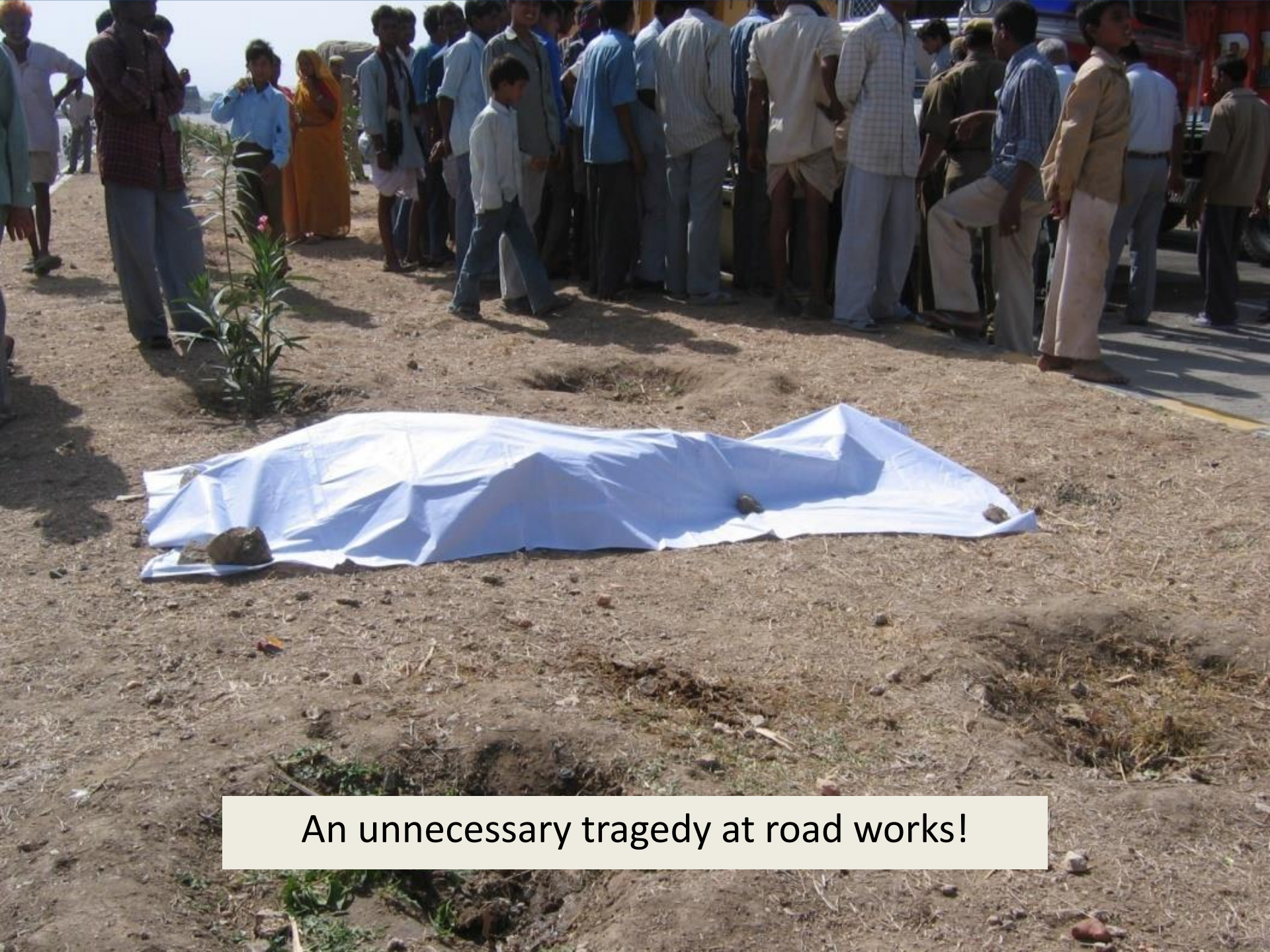




Research has also identified that road works that take longer and extend over longer distances have lower crash rates as opposed to short term works in short length zones. (SWOV 2010)

IMPROVING WORKER SAFETY THROUGH
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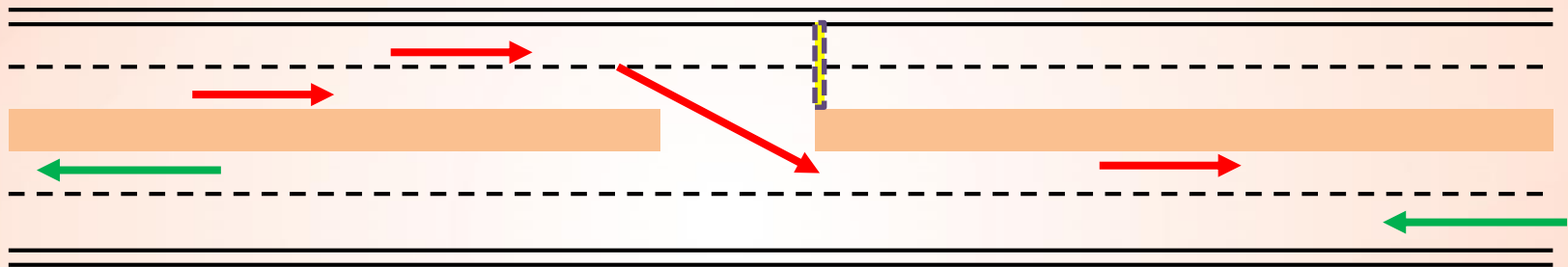


An unnecessary tragedy at road works!

A national highway in northern India had pavement cracks.
The Contractor closed one carriageway with rocks and simple signs. Traffic was directed two-way on the other carriageway.
He did not inform the on-coming traffic to expect two way traffic!



DELHI →



← MUMBAI

A tragedy waiting to happen..... the contractor had closed the Delhi bound carriageway for maintenance (crack sealing).



**DIVERSION
AHEAD
200 M
GO SLOW**

→ Madhucan Binapuri JV

NH
76

Madhucan Binapuri JV



WORK IN PROGRESS
→ ROAD CLOSED
TAKE DIVERSION →





What is missing?



What is missing?



What happened?



A fatal head-on collision







Five men killed



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

Work sites are planned and managed by engineers.
Any safety concerns at a road work site have been
created by engineers!
It is up to engineers to make their work sites safe
for workers and road users.



CAREC Highway February 2018
E60 eastbound



CAREC Highway February 2018

E60 westbound



CAREC Highway March 2018 (southbound)



CAREC Highway March 2018 (other direction)



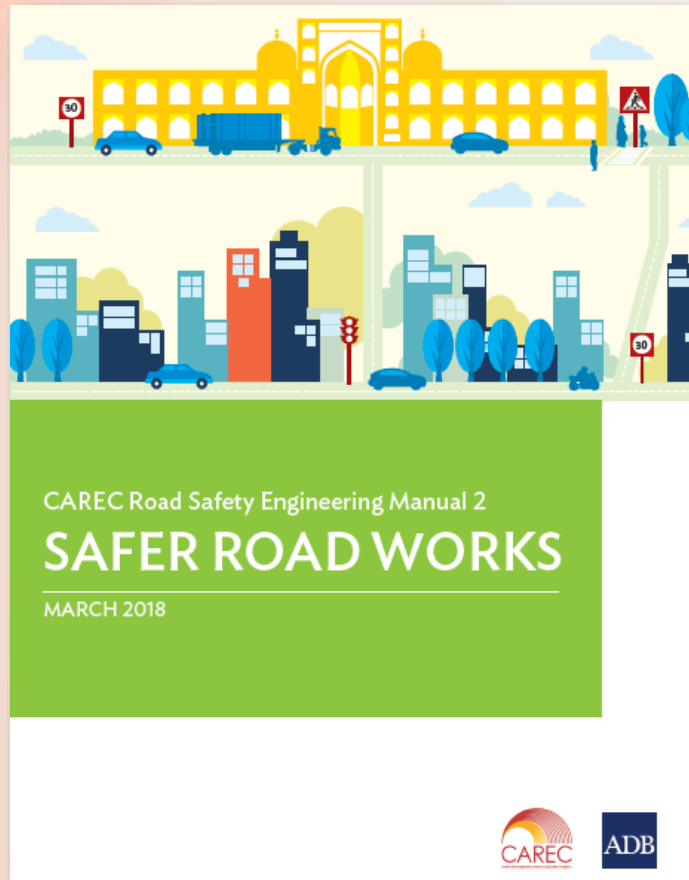


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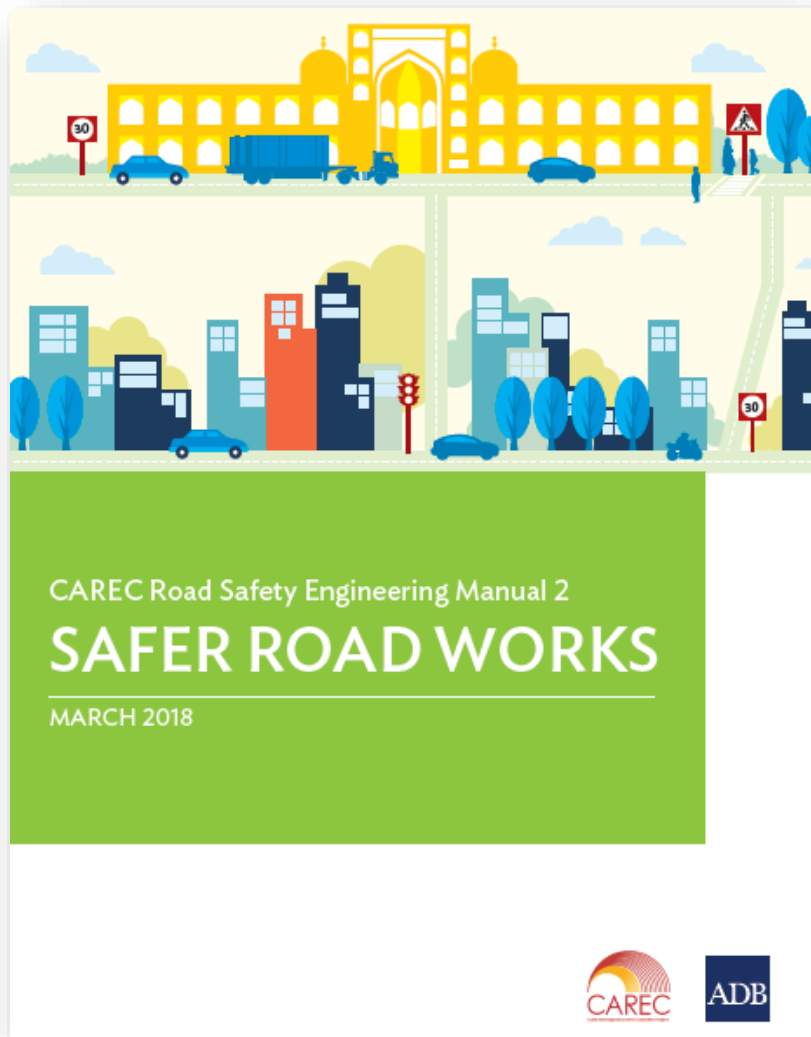
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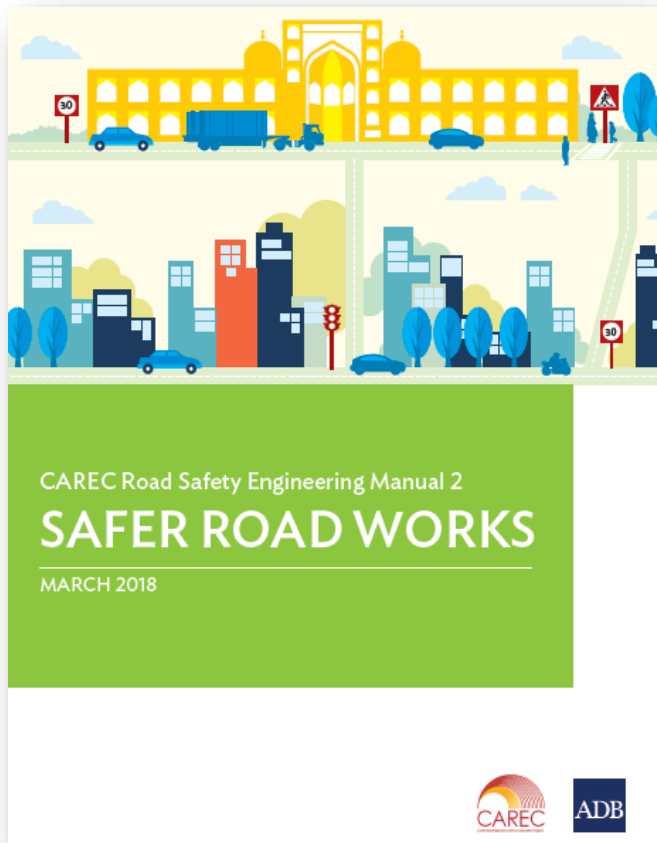
The new CAREC manual 2 “Safer Road Works”, provides the essentials to make road work sites safer for all.





The CAREC “Safer Road Works” manual

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



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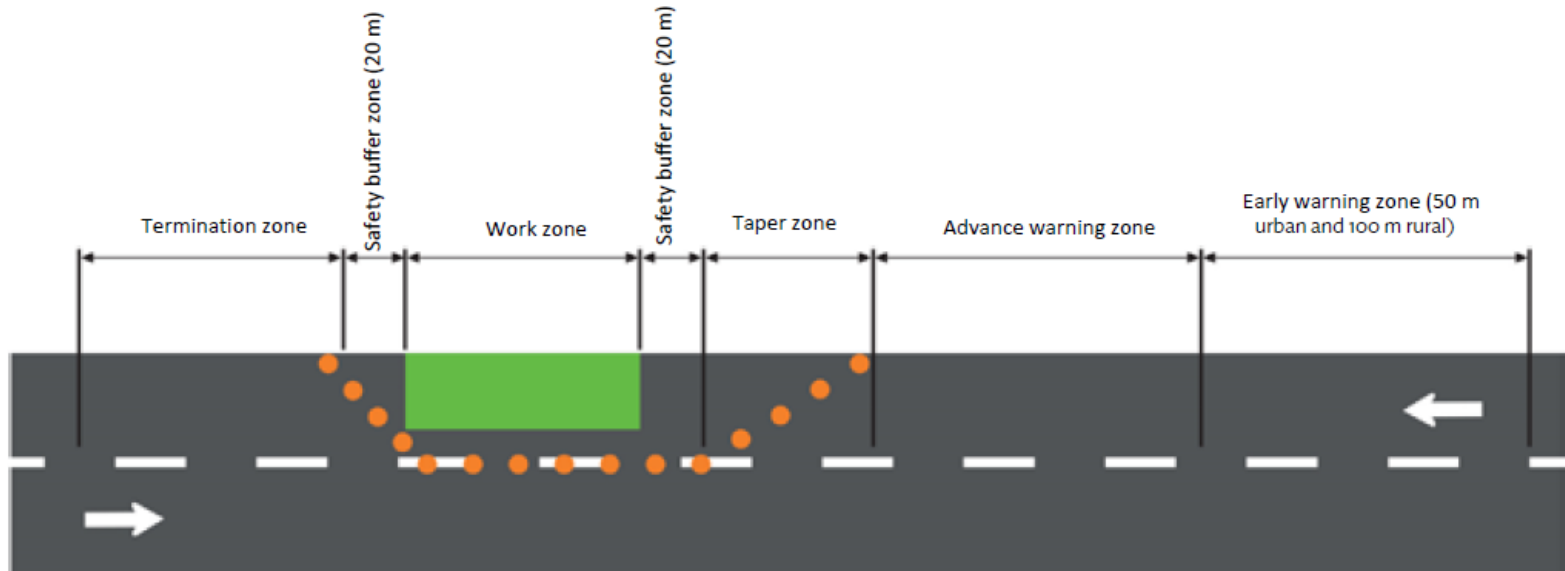
“Safer Road Works”

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.

Figure 4: The Six-Zone Concept



m = meter.

Note: The traffic management plan is for one direction of travel only.

Source: Asian Development Bank.

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.

3 Taper Zone – is used if motorists are required to move from their lane to pass around a Work Zone.

4 Safety Buffer Zone - a longitudinal safety buffer immediately in advance of, and beside, the work area. For CAREC it is to be 20m in length, 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 (last of the six zones).

The length of each zone is determined by the operating speed where works are taking place.

Table 2: Early Warning Zone Lengths

Speed Zone	Length of Early Warning Zone
Up to 60 km/h	50 m
Above 60 km/h	100 m

HOW LONG SHOULD THE ADVANCE WARNING ZONE BE?

Table 5: Minimum Length of Advance Warning Zones

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

HOW LONG SHOULD THE TAPER ZONE BE?

Table 6: Recommended Lengths of Taper (Transition) Zones

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

TWO TYPES OF TAPER ZONES

DIVERGE

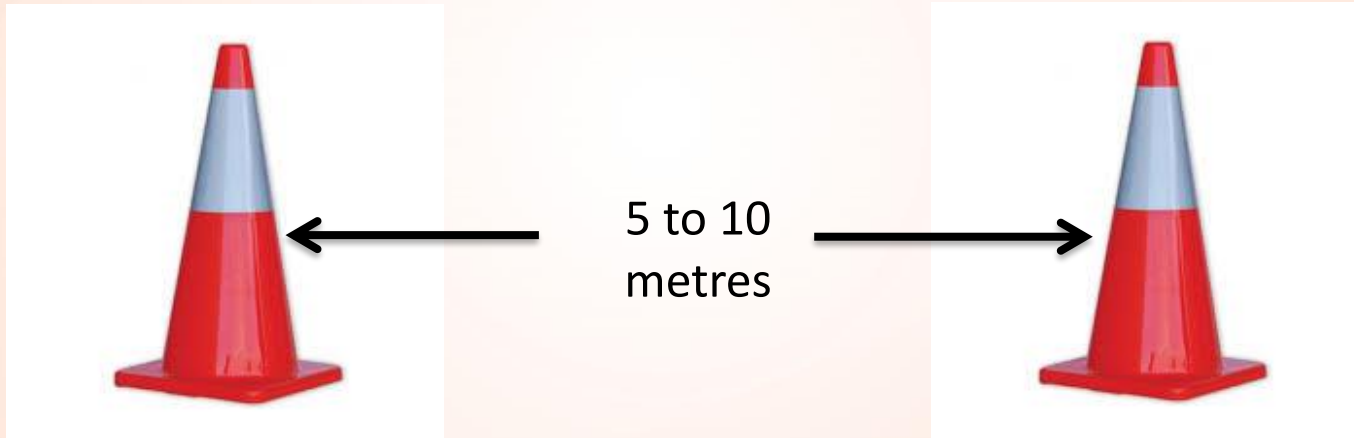
- Where a single lane of traffic moves (diverges) to the left (or right) to pass the Work Zone

MERGE

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



Traffic cones are to be placed at 5 metre intervals



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



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



Table 3: Speed Limits at CAREC Road Works Where Workers are on the Road or within 1.5 Meters of Moving Traffic

Speed Limit	Safety Buffer Zone	Road Work Speed Limit
Up to and including 80 km/h	Not applicable	40k m/h
Above 80 km/h	60k m/h	40 km/h



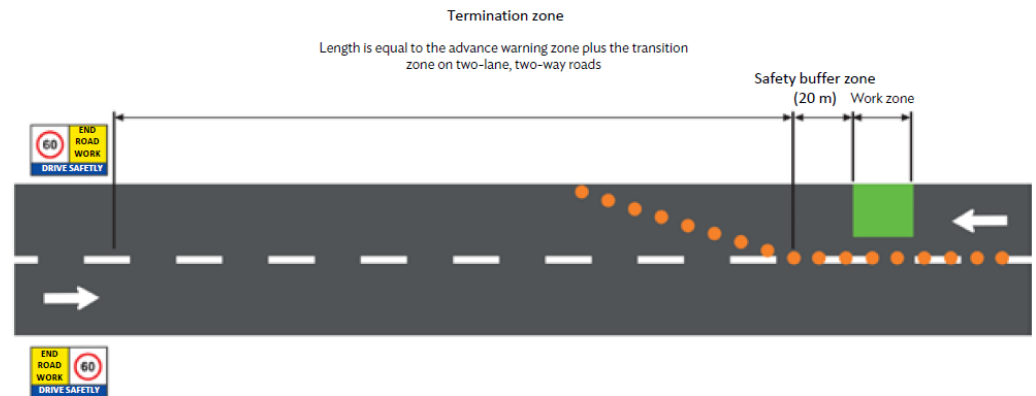
Use a 40 km/h speed limit through CAREC work sites – but only when workers are on-site and within 1.5m of traffic.



HOW LONG SHOULD THE TERMINATION ZONE BE?

- Rural 100m
- Urban 50m

Figure 8: Typical Termination Zone



m = meter.

Note: The traffic management plan is for one direction of travel only.

Source: Asian Development Bank.





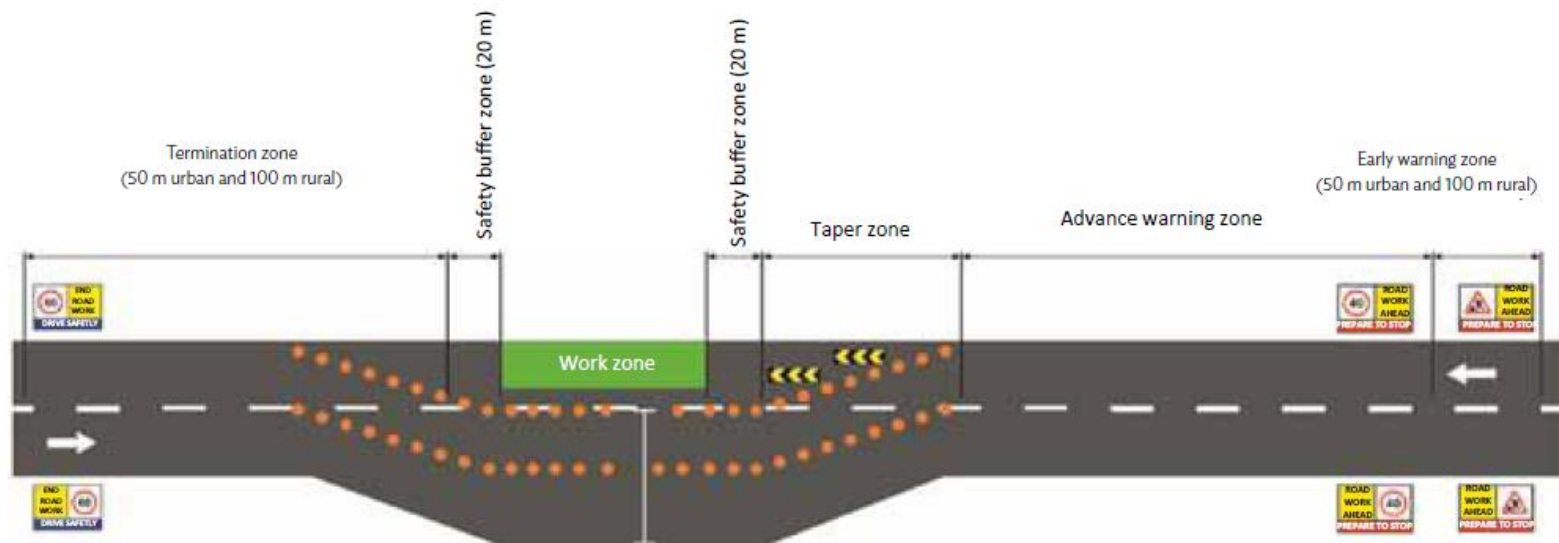


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In other words, it is a design of how each of Zone is to be set out.

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

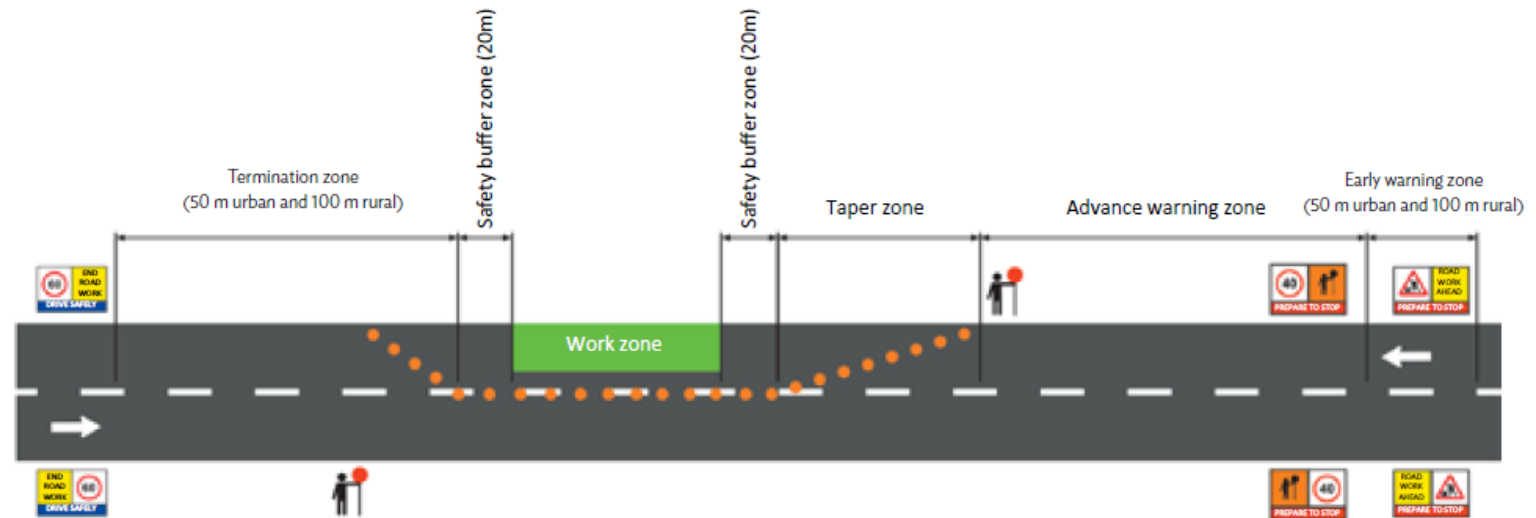


m = meter.

Note: The traffic management plan is for one direction of travel only.

Source: Asian Development Bank.

Figure 15: Works on a Two-Way Highway Requiring Closure of One Lane with Traffic Controllers Controlling Remaining Single Lane

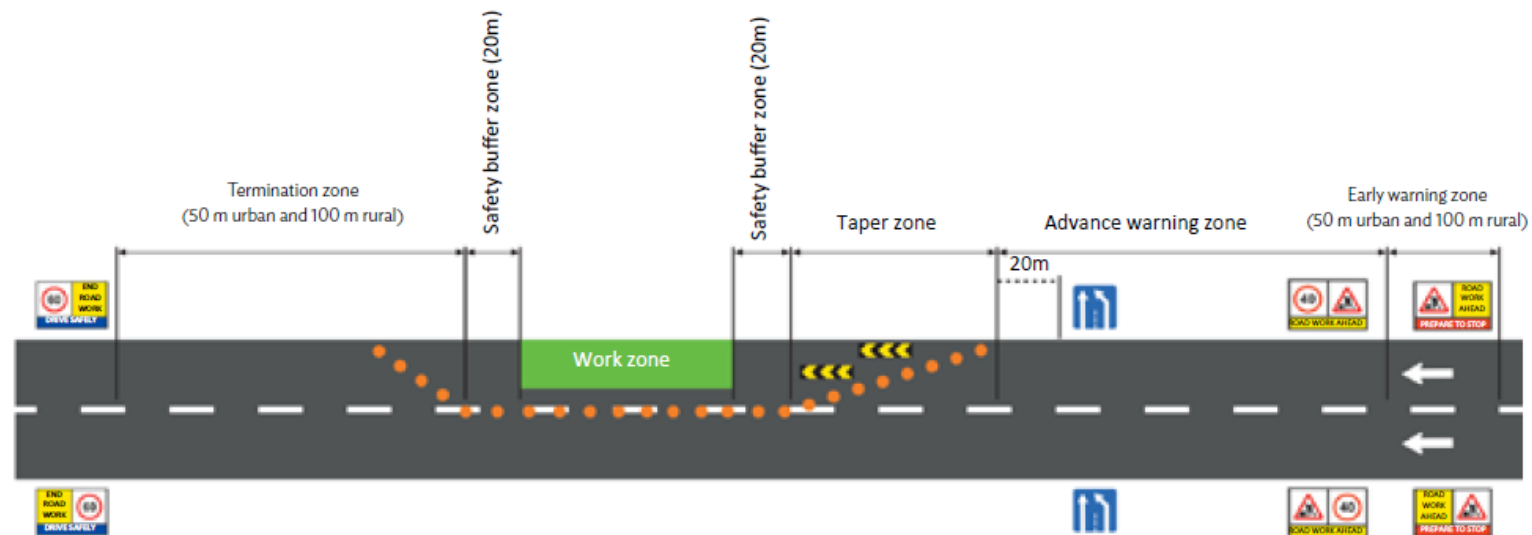


m = meter.

Note: The traffic management plan is for one direction of travel only.

Source: Asian Development Bank.

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

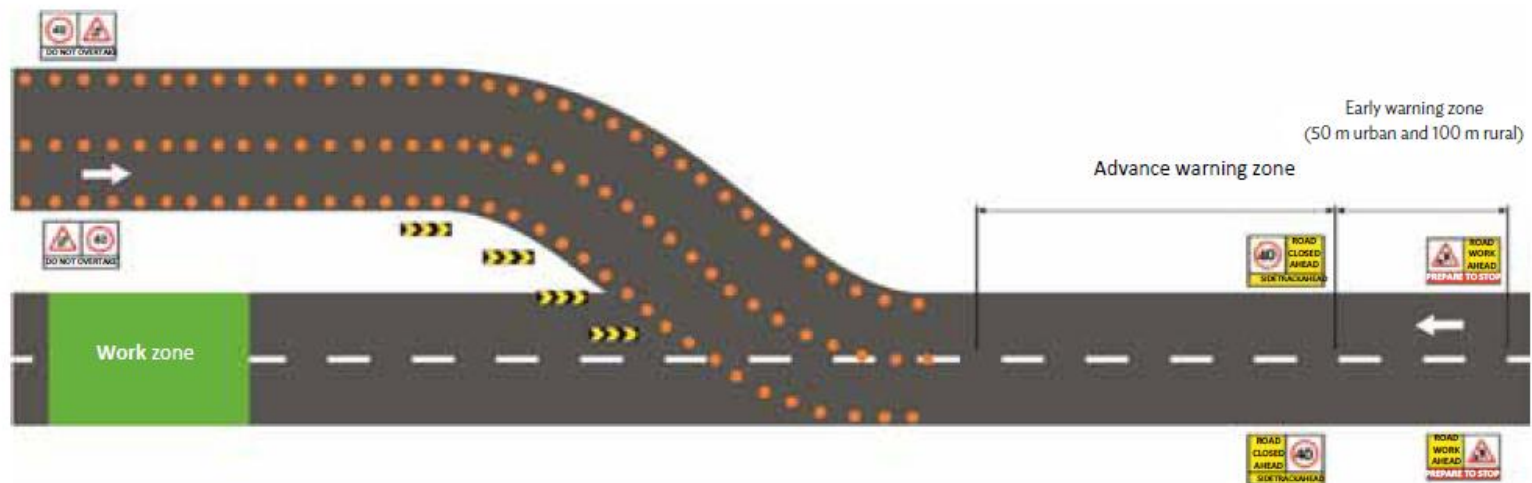


m = meter.

Note: The traffic management plan is for one direction of travel only.

Source: Asian Development Bank.

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



m = meter.

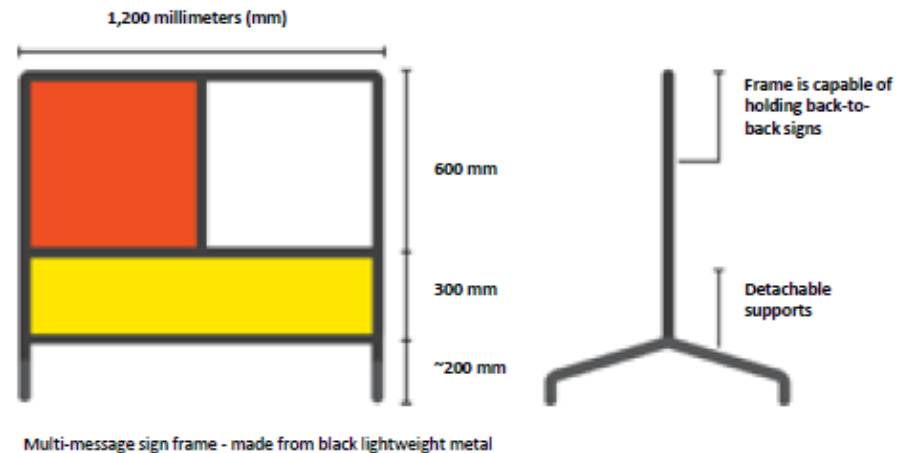
Note: The traffic management plan is for one direction of travel only.

Source: Asian Development Bank.

Multi message signs are very useful for road works.

The CAREC manual encourages you to consider these.

Figure 10: Modular Multimessage Frame



Source: Asian Development Bank.





Flagmen can
offer more for
safety than they
do at present.





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).

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

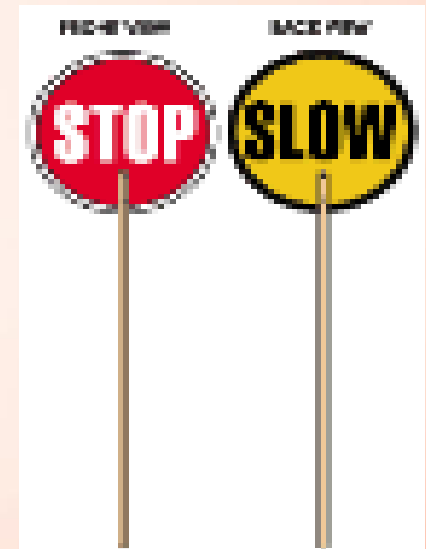




Источник: Консультант по инженерному обеспечению БДД ЦАРЭС

Instructions for Traffic Controllers

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.



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.







When positioning signs, ensure that they

- Are within driver/riders line of site
- Are 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



Road safety at
your road works -
remember the
key points:

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

Road safety at
your road works -
remember the
key points:

- Use consistent road work speed limits.
- 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.
- Trained traffic controllers have advantages over flagmen.
- Supervise - and expect the best!

You can save lives by managing safer road works



How will you do this in your country?

