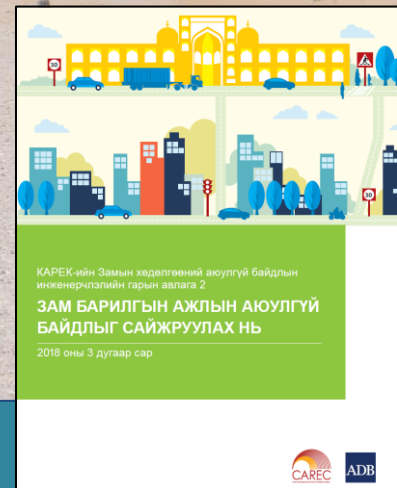
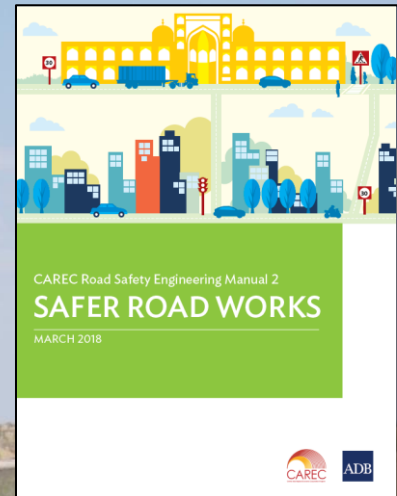




# Safe traffic control at road works – the essentials

Phillip Jordan





## Objectives of this presentation:

- To explain why safety at road works is important.
- To outline the new CAREC manual and the essential points for improved safety at road works.





**HOW MANY PEOPLE ARE INJURED OR KILLED IN ROAD CRASHES AT ROAD WORKS IN YOUR COUNTRY EACH YEAR?**



Road users have 3 times the risk of a serious crash in a road work zone compared with other parts of the road network (USA)

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

Road works that take longer and extend over longer distances have lower crash rates compared with short term works in short length zones.

Studies in Finland and Slovenia showed 'motorists are up to 5 times as likely to be injured travelling through a work zone'

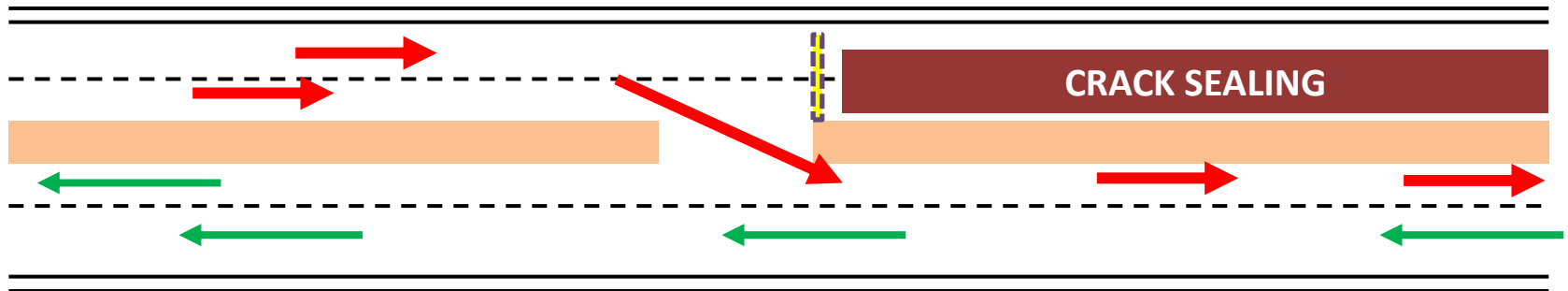




A photograph showing a large group of people, mostly men in light-colored shirts and trousers, gathered on a dirt road. In the foreground, a body is lying on the ground, completely covered by a white sheet. The scene appears to be a road construction or maintenance site, with a small plant growing from the dirt in the lower left. The overall atmosphere is somber and suggests a tragic event.

An unnecessary  
tragedy at road  
works!

# A tragedy waiting to happen.....



**← MUMBAI**

A divided national highway (NH76) in India had pavement cracks. The Contractor closed one carriageway (for crack-sealing) with rocks and simple signs. Traffic was directed two-way along the other carriageway. He did not inform on-coming traffic to expect two way traffic!



**DIVERSION  
AHEAD  
200 M  
GO SLOW**

→ Madhucan Binapuri JV

76

Madhucan Binapuri JV













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!

Could a  
similar  
situation exist  
on a  
Mongolian  
highway?



- 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.

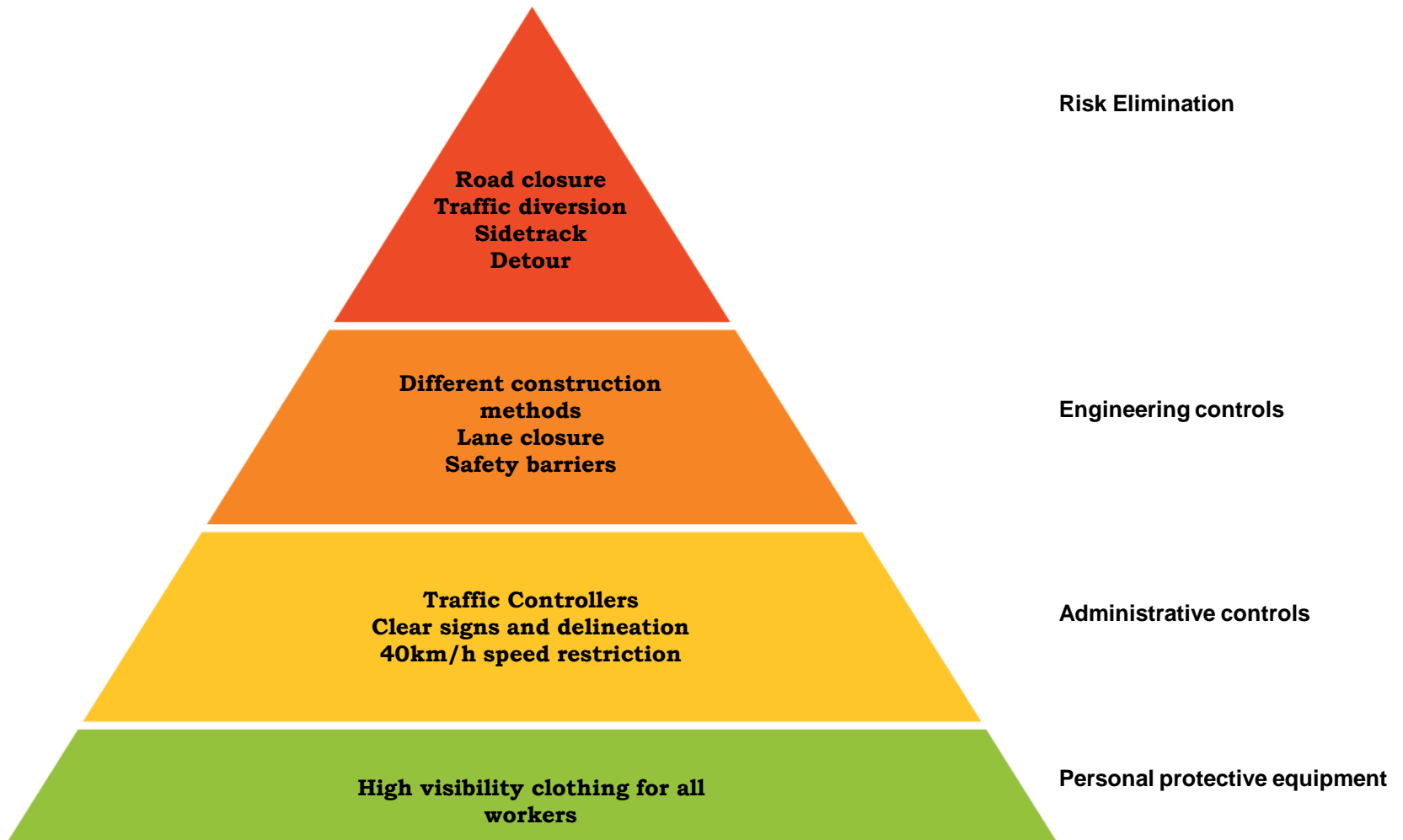


# The CAREC “Safer Road Works” manual

- 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.



# Diagrammatical Representation of the Hierarchy of Controls Pyramid





# What is a Traffic Management Plan?

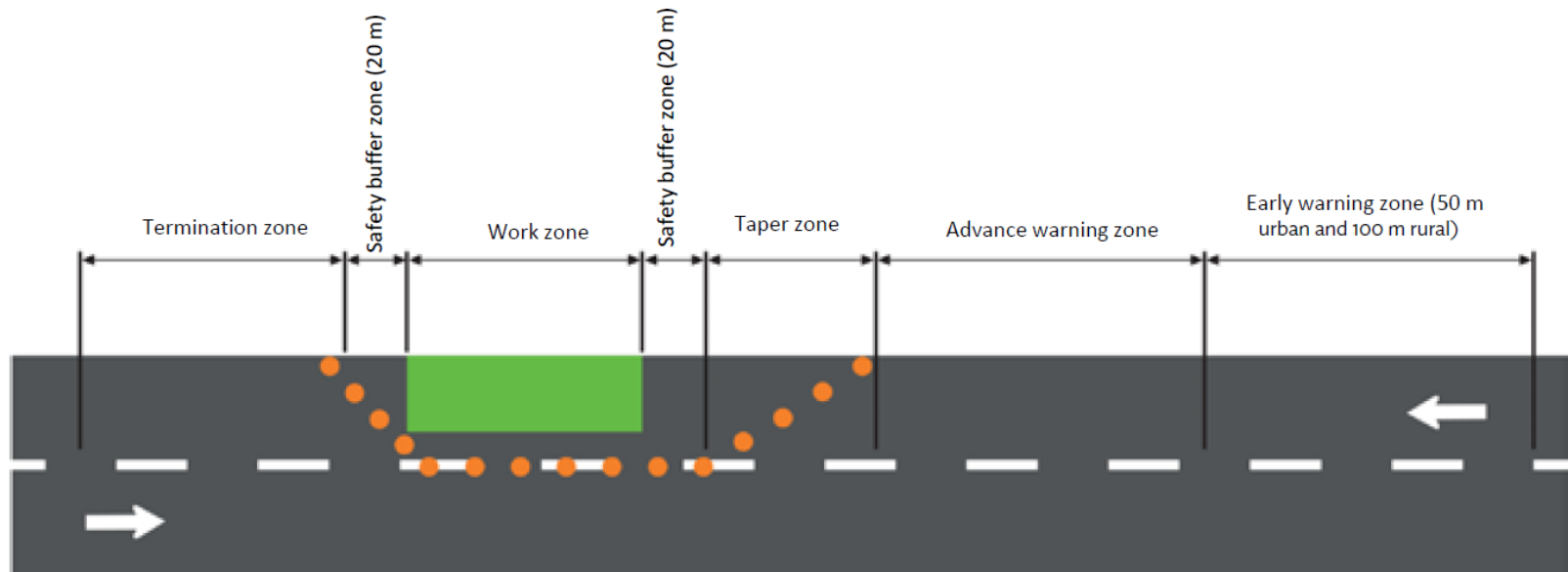
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A traffic management plan (TMP) shows clearly all the signs, barriers, barricades, and other devices to be installed and maintained at a worksite for the duration of the works. If work has several stages, there should be a TMP developed for each stage expected to last longer than 1 week.



# THE SIX ZONE CONCEPT

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 "Zone Concept" is a method of breaking a work site down into **6** individual zones.



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



Refer to the Tables in your  
CAREC manual



## 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



**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



**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

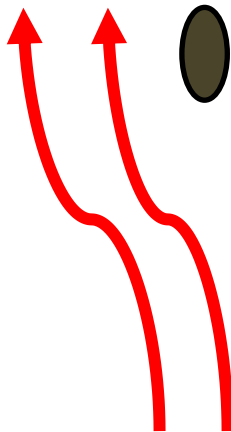
The taper zone length is based on:

- width of lane to be closed is typically 3.5 m,
- diverge taper length is equivalent to 1.0 m lateral shift,
- merge taper length equivalent to 0.5 m lateral shift, and
- use the operating speed of traffic to guide the taper length.

# TWO TYPES OF TAPER ZONES

## DIVERGE

Where traffic moves sideways to the left or right to pass the Work Zone



## MERGE

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

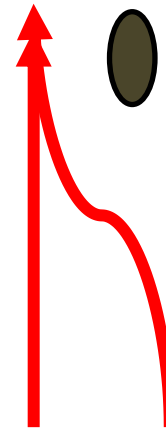
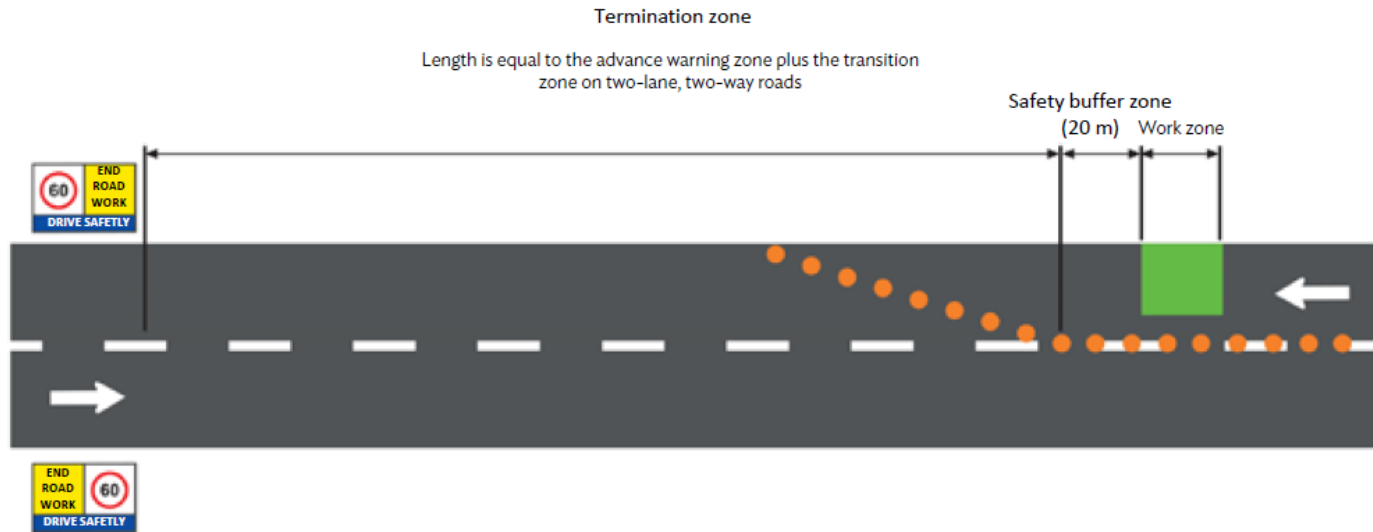




Figure 8: Typical Termination Zone



# HOW LONG SHOULD THE TERMINATION ZONE BE?

- Rural 100m
- Urban 50m

# 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	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



## WHAT SHOULD THE SPEED LIMIT BE IN YOUR WORK ZONE?

**Table 4: Speed Limits at CAREC Road Works  
Where Workers are not Working on the Road  
nor 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	60 km/h
Above 80 km/h	Not applicable	60 km/h



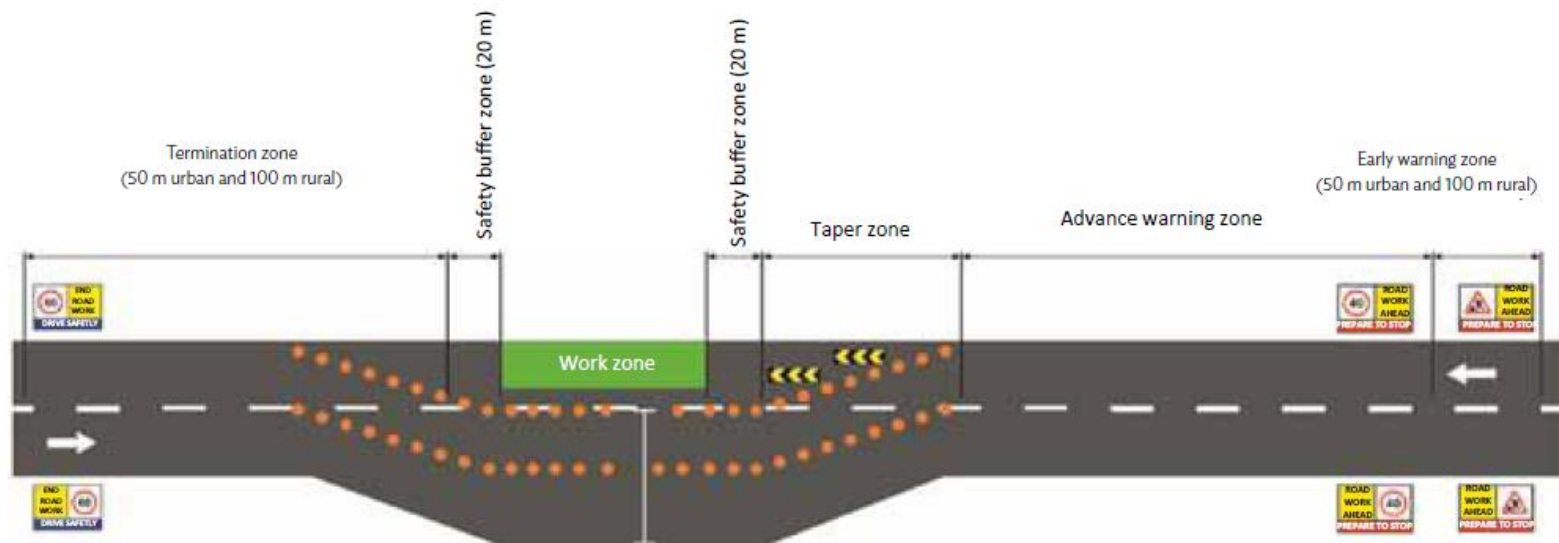








**Figure 13: A Reduction in the Available Road Width but with Sufficient Width for Two-Way Traffic**



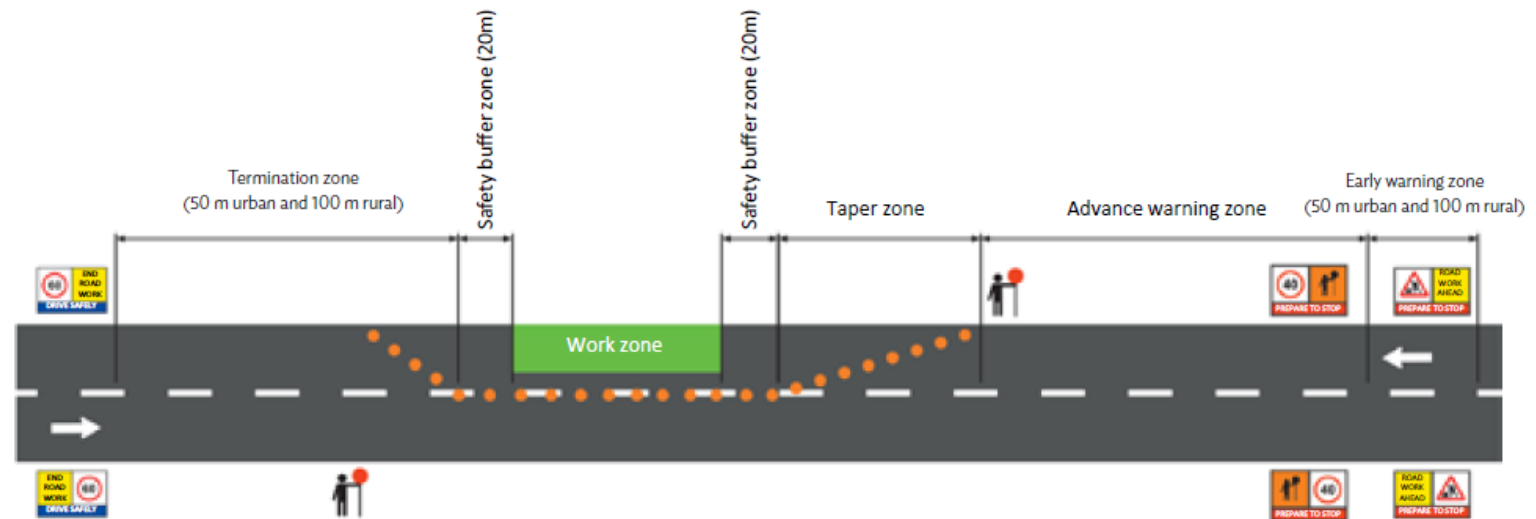
m = meter.

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**



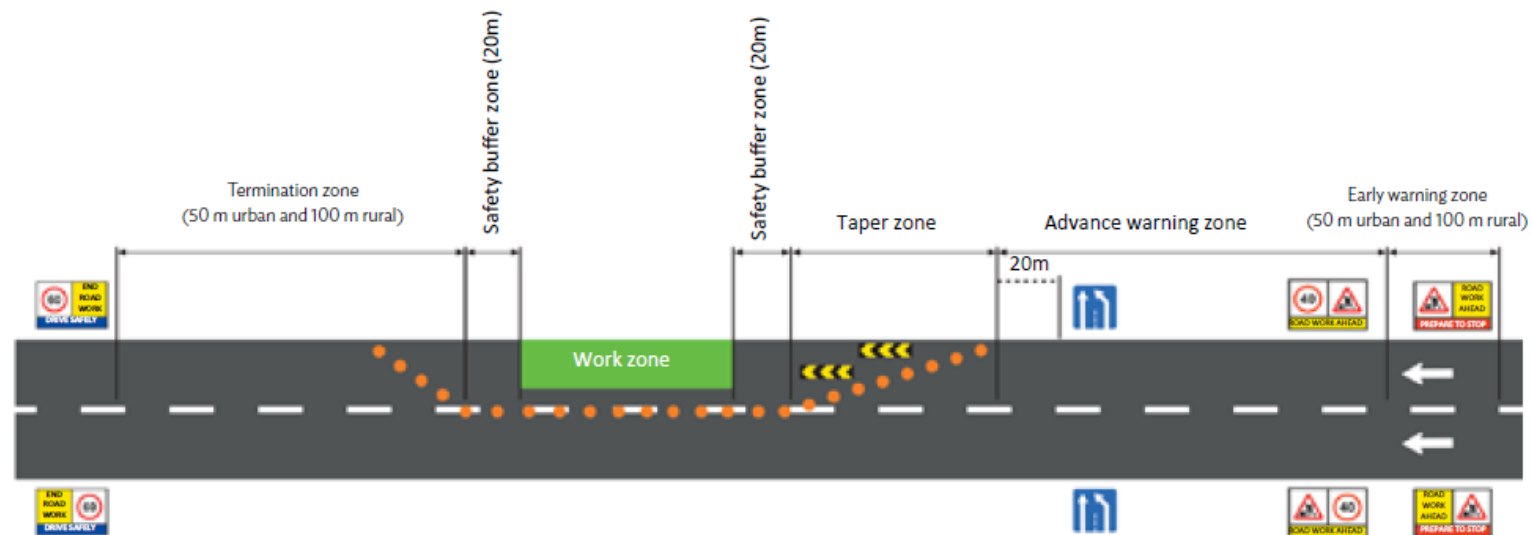
m = meter.

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

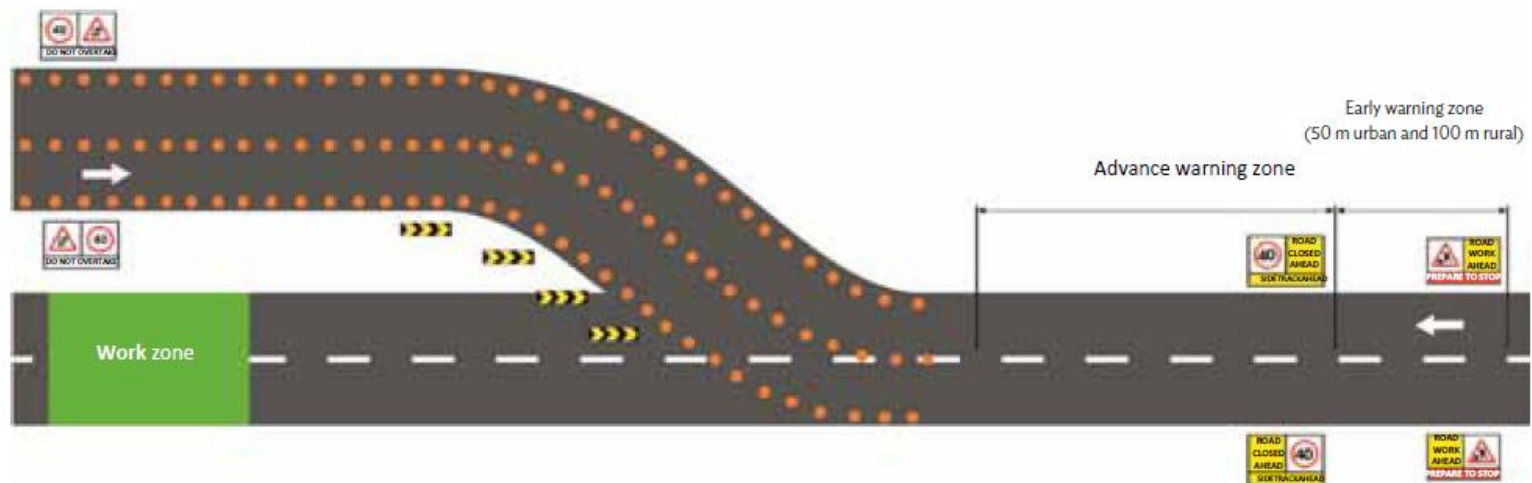


m = meter.

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

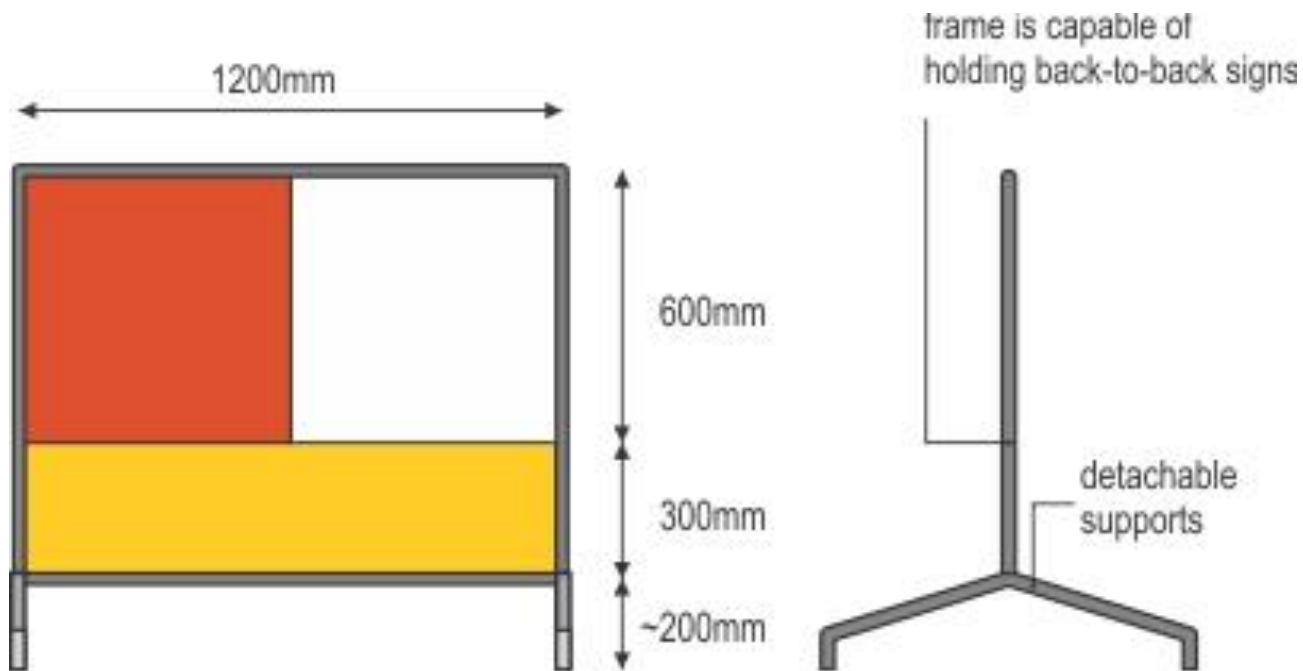


m = meter.

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.



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





PREPARE TO STOP







## 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 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 though 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

# 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
<b>Conspicuous</b>	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.
<b>Clear</b>	Each sign shall be clear and easy to read.	All signs are to be kept in good, clean condition.
<b>Comprehensible</b>	Each sign shall be easy to understand	All signs used comply with national standards.
<b>Credible</b>	Each sign shall be reasonable and believable by road users	No sign shall be used that does not show a credible (believable) message.
<b>Consistent</b>	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.
<b>Correct</b>	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.
- Work with Traffic Police to keep speeds low.
- Ensure the Contractor has sufficient signs/cones
- 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

---

Remember the 6 Zone concept and put yourself into the shoes of the road users. You can make your road works safer for all.

