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## D1 GENERAL

### D1.1 Introduction

Temporary traffic management for mobile operations is described and detailed in this section of the Code.

Each **Level** of temporary traffic management has different requirements and these are detailed in Section D5: Mobile Closure Requirements and Section D6: Semi-Static Closure Requirements.

Some mobile operations have specific requirements and these are detailed in Section D7: Special Mobile Operation Requirements.

### D1.2 Mobile Operation Definition

A Mobile Operation is an activity or work carried out within the road reserve that is not contained within a fixed site. The vehicle(s) associated with the activity travel along the road in the direction of the traffic flow, usually at slower speed or in a different manner, to normal traffic flow on the road.

There are two types of mobile operation:

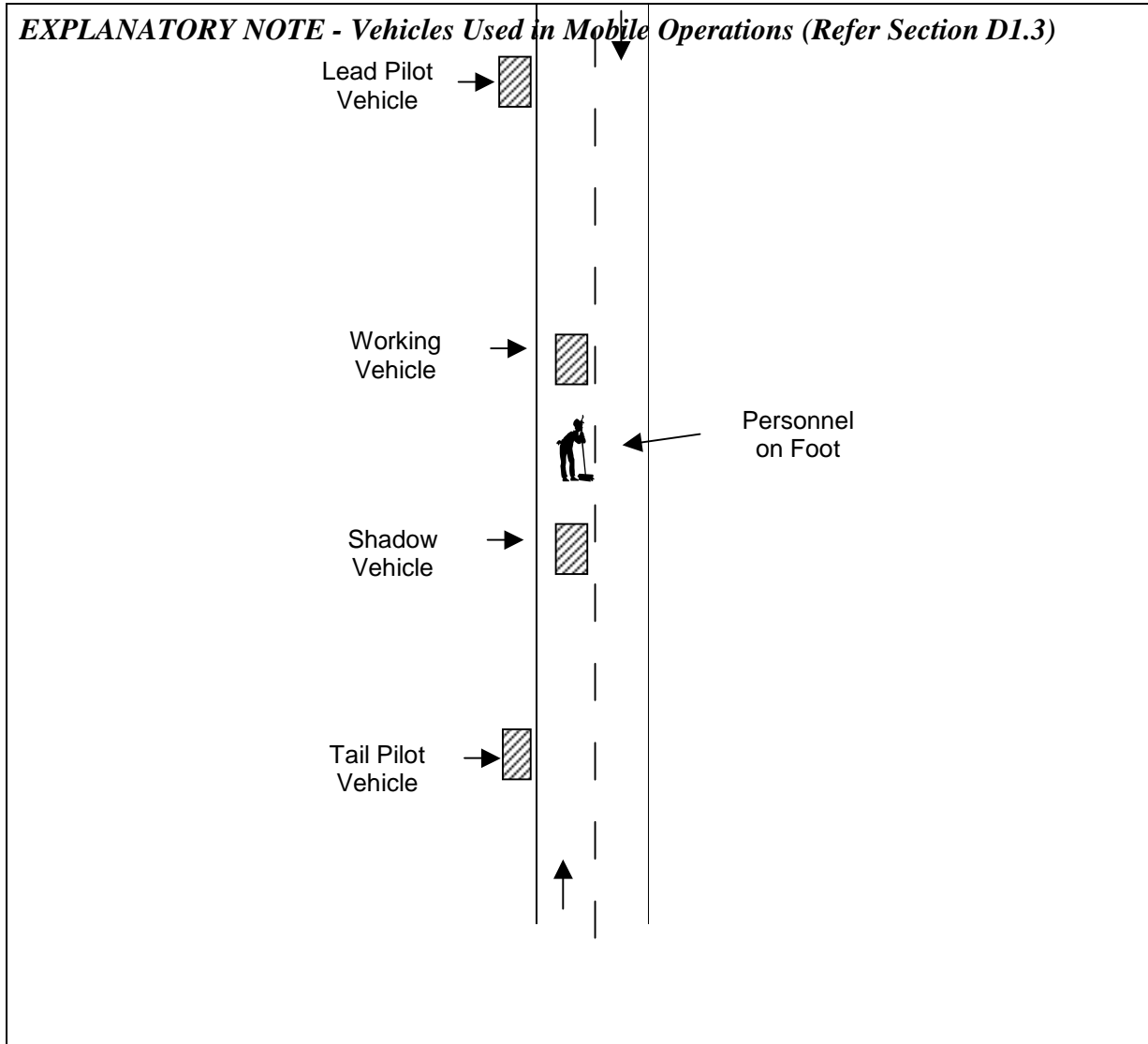
- (a) **Mobile Closure:** A normally continuously moving activity or work operation carried out *within the road reserve* that may also stop briefly at a particular location for a period of no more than ten (10) minutes.
- (b) **Semi-Static Closure:** A short term activity or work operation that is carried out *on the carriageway of a road* at a particular location that takes more than ten (10) minutes, and less than one (1) hour, to complete.

Mobile operations can be used for, but are not necessarily limited to:

- road marking,
- installing or removing raised pavement markers,
- pavement testing, road inspections and similar operations,
- mowing,
- weed spraying,
- shoulder grading,
- pavement sweeping,
- cesspit, sump or manhole cleaning,
- marker post maintenance,
- installation of road closures,
- sight rail and road safety barrier repairs,
- litter and debris pick up,
- pothole repairs,

(continued on next page)

- road skid and roughness testing,
- snow clearing/spreading grit,
- road inspections, and
- sporting/cultural/community events held on public roads.



**Note:** Many mobile operations do not require all these vehicles.

**EXPLANATORY NOTE - Communications (Refer Section D1.4)**

Cellular phones do not work in all locations; therefore, a simple radio/telephone system may be most appropriate communication method. Outside calls should be discouraged during mobile operations.

### **D1.3 Vehicles**

The vehicles used in various combinations for mobile operations are:

- Lead Pilot vehicles,
- Shadow vehicles,
- Working vehicles, and
- Tail Pilot vehicles.

These must:

- (a) Be registered for normal use on the highway by the Land Transport Safety Authority (LTSA).
- (b) Have at least 4 rubber tyre road wheels.
- (c) Be task specific, ie. a pilot vehicle cannot be a working vehicle as well, or vice versa.

#### **D1.3.1 Vehicle Operation**

For mobile operations:

- (a) Vehicles should normally operate to the left of the road centreline.
- (b) All vehicles must face and move in the same direction as the traffic flow and, with the exception of pilot vehicle(s), should operate in unison and maintain the recommended vehicle spacings, wherever possible.
- (c) When an activity is completed all vehicles should accelerate together and maintain their set positions until they reach the normal operating speed of traffic on the road. After they have safely merged into the traffic stream all flashing beacons should be turned off and, when a suitable safe location is reached, the vehicles shall be stopped clear of the road and all signs and equipment that is no longer required or applicable must be covered or removed.
- (d) Non-operational stops, eg. to adjust equipment, must be carried out in a safe location and clear of the road.

### **D1.4 Communications**

A communication system appropriate to the work environment must be used for a mobile operation. The STMS must maintain absolute control of all facets of the mobile operation and the drivers of all vehicles must have appropriate and continuous communication with the STMS and each other at all times.

## D1.5 Vehicle Mounted Traffic Signs

Each vehicle in a mobile operation is required to have at least one traffic sign mounted on it. The signs that can be used for mobile operations include, but are not limited to:

- ROAD WORKS (TW - 1),
- GRADER (TW - 1.3),
- MOWER (TW - 1.3),
- SKID TESTING (TW - 1.3),
- ROAD MARKING (TW - 1.4),
- VULNERABLE ROAD USERS (TW - 2.13),
- STOCK (TW - 6),
- ROAD INSPECTION (TW - 27),
- ROAD WORKS (TW - 26),
- KEEP LEFT (RG - 17) and KEEP RIGHT (RG - 34), and
- PASS WITH CARE (TW - 34).

(e) Vehicle mounted traffic signs must:

- be removed, covered or folded to ensure they are not visible when the vehicle is not working,
- have retroreflective fluorescent orange backgrounds unless specified otherwise,
- be positioned such that their longitudinal axis is at right angles to the centre line of the vehicle, plus or minus five (5) degrees.
- be mounted such that it is clearly visible from the rear by the drivers of following vehicles, and
- be the correct sign for the activity on a Tail Pilot vehicle, eg. a TW - 1.3 MOWER sign should be used for mowing activities.

(f) A front mounted TW - 26 ROAD WORKS sign is required on all Lead Pilot vehicles.

(g) Where work is being carried out in a live lane on a two-way two-lane road, and a Lead Pilot vehicle is not required, a front mounted TW - 26 ROAD WORKS sign is required on the leading Work vehicle.

## D1.6 Flashing Beacons, Arrow Boards and Variable Message Boards

### D1.6.1 Flashing Beacons

All vehicles in a mobile operation shall be fitted with one, and preferably two, amber or yellow flashing beacons. These should be fitted on the roof of the vehicle, or in some other suitable position, where workers and other road users will have a clear view of them from at all times.

The beacons on Work vehicles:

- should remain on until the vehicles are safely inside a work site, or until they have reached a speed similar to other vehicles on the road when exiting a works site,
- should be turned off and the vehicles hazard lights turned on when they are within work sites that are clearly separated from live lanes by delineation devices, and
- must be kept on at all times when traffic is required to pass through a mobile operation work site.

### D1.6.2 Arrow Boards

Vehicle mounted arrow boards shall only operate in:

- (a) A **Single Sequential Arrow Mode** where the arrowhead, with a tail, moves left or right to direct traffic to the left or the right.
- (b) A **Caution Mode** where all 4 corner lights on the arrow board flash on and off simultaneously.

**Note:** Figures C17.1: Single Sequential Arrow Mode and C17.2: Caution Mode illustrate the two arrow board displays.

Where there is sufficient width, ie. more than 3.0m, for vehicles to pass a mobile operation either on the right without crossing the centre-line, or on the left, the arrow board should display the Single Sequential Arrow Mode in the appropriate direction.

Where there is not sufficient width for vehicles to pass a mobile operation on either side, or the operation does not encroach into a live lane, the Caution Mode should be displayed.

Arrow boards should be operated continuously, to ensure that all road users approaching a mobile operation receive adequate warning of the operation.

During nighttime operations arrow board light intensity should be dimmed to approximately half its normal intensity, to avoid blinding approaching drivers.

When an arrow board is operating all flashing lights and beacons must be turned off or be located in positions that do not impair the visual performance of the arrow board

Extreme care should be taken to check that arrow boards are operating in the correct mode and direction at all times, and that they are switched off when the mobile operation is completed.

On **Level 3** roads the arrow board of the Shadow vehicle must repeat exactly the message on the Tail Pilot vehicle. This is vitally important because both arrow boards may be visible to road users at the same time.

### D1.6.3 Variable Message Boards

Variable Message Boards are optional devices that can be used to highlight specific hazardous situations, eg. where visibility is restricted or where additional useful messages can be shown to road users. They should be regarded as an additional form of traffic management and must not be used to replace the normal signs or devices used for temporary traffic management. Details of acceptable equipment are given in Section B9: Variable Message Signs.

The Regional Engineer of the LTSA **MUST** approve the use of a variable message board before it can be implemented any work site.

With the RCA's approval, permanently installed Automatic Traffic Management Systems (ATMS) signs may be utilised to advise road users of work site operations or specific hazards on the road ahead, and to direct traffic around those operations or hazards.

### D1.7 Truck Mounted Attenuators (TMAs)

The need for a vehicle in a mobile operation to be fitted with a rear mounted attenuator, commonly known as a truck mounted attenuator or TMA, varies with the **Level** of temporary traffic management required, in the following manner:

- (h) A TMA is not necessary on a Lead Pilot vehicle.
- (i) A TMA is not necessary on any vehicle used in a mobile operation on a **Level LV** or **Level 1** road.
- (j) A TMA is not needed on the Tail Pilot vehicle of a mobile operation on a **Level 2** road when the work activity is not on the carriageway and both the Tail pilot vehicle and Work vehicle are located more than two (2) metres from the edge line.
- (k) A TMA must be fitted to the Tail Pilot vehicle and the Shadow vehicle in a mobile operation on a **Level 2** road when the work activity is on the carriageway.
- (l) A TMA is necessary on all Pilot and Shadow vehicles in a mobile operation on a **Level 3** road.

### D1.8 Visibility Requirements

A mobile operation should be clearly visible to the drivers of approaching vehicles. The sight distances required to achieve this are:

- (a) **Rear Visibility** – the sight distance required by drivers travelling in the same direction as a mobile operation to a Tail Pilot vehicle, and/or Shadow vehicle, in a mobile operation.
- (b) **Forward Visibility** – the sight distance required by drivers travelling in the opposite direction to a mobile operation to the Lead pilot vehicle or, when the work activity is being carried out in a live lane on a two-way two-lane road and a Lead Pilot vehicle is not required, to the first Work vehicle.



### D1.8.1 Clear Sight Distance

Clear Sight Distance is measured from a driver's eye height of 1.05m above the carriageway surface to an object height of 1.15m above the carriageway surface. Its minimum value, in metres, is:

**Three (3) times the Permanent Speed Limit, in km/h, of the road.**

For Example: On a road with a permanent speed limit of 100 km/h the minimum Clear Sight Distance is:  $(3 \times 100) = 300\text{m}$ .

Note: Where the RCA has defined an Operating Speed for the road, that speed may be used instead of the Permanent Speed Limit for the calculation of Clear Sight Distance.

Pilot vehicle(s) must be positioned in such a manner that approaching drivers will have the appropriate Clear Sight Distance to them, ie. Forward or Rear Visibility, while at the same time maintaining a distance of between five (5) and ten (10) seconds travel time at the normal operating speed of traffic on the road from first the shadow or working vehicle(s). To maintain these distances drivers may have to stop their vehicles, or move them further ahead, as shadow and working vehicle(s) travel around a curve, or some other visibility obstruction. Where clear sight distances cannot be achieved in these situations additional pilot vehicles will be required.

Work shall cease and all traffic management shall be removed from the road if the clear sight distance is reduced by fog, rain or other weather conditions, unless the work is specifically required to deal with a climatic condition, eg. ice gritting and snow clearing. In these situations additional pilot vehicles will normally be required.

### D1.9 Safety Zones

The safety zone requirements for mobile operations are generally the same as for static operations, but with the following amendments:

- (m) The longitudinal safety zone for a mobile operation is the full length of the Shadow vehicle, plus ten (10) metres.
- (n) On the live traffic lane side the work zone of a mobile operation should never extend beyond the width of the Work or Shadow vehicle.
- (o) On **Level 2** and **Level 3** roads a Shadow vehicle must be used when mobile operation work activity is located two (2) metres, or less, from a live lane.

## **D1.10 Personnel on Foot**

### **D1.10.1 General**

The number of personnel on foot required for a mobile operation should be kept to the absolute minimum necessary to complete the work.

For safety reasons it is desirable that personnel on foot should not enter a live lane unless protected by a Shadow vehicle.

### **D1.10.2 Level LV, Level 1 and Level 2 Roads**

Personnel on foot should keep within the working space and safety zone of the work site. They should normally avoid entering a live lane, but when this is necessary, they must take the utmost care.

### **D1.10.3 Level 3 Roads**

With the exception of the STMS personnel on foot shall not enter a live lane at any time during the installation, maintenance or removal of traffic management equipment; or to undertake work activities.

An STMS may enter a live lane when it is necessary to erect a sign, place a delineation device or remove a hazard. This work must be carried out:

- in accordance with the guidelines set out in the contingency section of the approved TMP, and
- in the quickest and safest manner possible, and
- a lookout person must be used.

**Note:** The above conditions are the exception rather than the rule.

## **D1.11 One-Way Roads with Three or More Lanes**

Where a Mobile Closure is required for the centre lane of a three (3), or more, lane one-way road the nearest adjoining edge lane must also be closed. The Tail Pilot vehicle is used to close this lane and the Shadow vehicle used to close the centre lane.

Where Semi-Static Closure is required for the centre lane of a three (3), or more, lane one-way road the nearest adjoining edge lane must also be closed and cones placed:

- from the Work vehicle and the Shadow vehicle along the lane line that separates the work area from the live traffic lane, and
- to form a taper from the Shadow vehicle to the Tail Pilot vehicle, and
- to form a taper from the pilot vehicle to the edge of the carriageway.

## **D2 WORK VEHICLES**

### **D2.1 General**

A Work vehicle is a vehicle carrying out work adjacent to the road, or on the road carriageway, or supporting personnel on foot. Work vehicles include, but are not limited to:

- road marking vehicles,
- cone pick up vehicles,
- road survey vehicles,
- mowers,
- graders,
- sprayers,
- sweepers,
- snow ploughs, and
- vehicles spreading grit on icy road surfaces.

Working vehicles must pull over when 10 or more vehicles are delayed by the operation.

**Note:** A Work vehicle cannot also be a Pilot vehicle or a Shadow vehicle.

### **D2.2 Multiple Work Vehicles**

When a mobile operation or semi static activity contains more than one Work vehicle the distance between each Work vehicle shall be as follows:

- Level LV and Level 1 roads between 50m and 100m
- Level 2 and Level 3 roads, 50m

Where this is not possible, each Work vehicle must be treated as a separate mobile operation.

***EXPLANATORY NOTE - Lead Pilot Vehicle Position (Refer Section D3.2.2)***

Forward Visibility of at least Clear Sight Distance allows the drivers of vehicles travelling in the opposite direction to a mobile operation to react, and stop their vehicle if necessary, before reaching the Tail Pilot vehicle.

The maximum distance between the Lead Pilot vehicle and the nearest Work vehicle is longest length of road over which approaching drivers are likely retain the meaning of the message shown on the Lead Pilot vehicle sign and still recognise it as being relevant to a mobile operation on the road ahead of them.

The Lead Pilot vehicle should be positioned at the minimum distance in advance of the nearest working vehicle and where approaching drivers have Clear Sight Distance Forward Visibility to it. Where visibility is restricted, the Lead Pilot vehicle will need to advance further ahead to a position where Forward Visibility is achieved.

## D3 PILOT VEHICLES

### D3.1 General

A pilot vehicle is used to provide road users with advance warning of a mobile operation on the road ahead. The vehicle can be either a Lead Pilot or a Tail Pilot and it will be the first vehicle encountered by approaching drivers.

Pilot vehicles are not required on **Level LV**, **Level 1** and **Level 2** roads with permanent speed limits less than 65 km/h. Static signing, as detailed in Section D5.1.4 (a), **must** be erected when a pilot vehicle is not used in these situations.

Lead and Tail Pilot vehicles **are not** required when the working vehicle(s) can exceed 80% of the permanent posted speed. Static signing **is not** required in these situations.

### D3.2 Lead Pilot Vehicles

A Lead pilot vehicle is used to provide road users travelling in the opposite direction with advance warning of a mobile operation on the road ahead, and that there is a possibility that vehicles travelling in the direction of the mobile operation may be overtaking it.

#### D3.2.1 Requirements

- (a) A Lead Pilot vehicle must be used on undivided two-way roads with permanent speed limits greater than 65 km/h when:
  - Greater than the Clear Sight Distance Forward Visibility to the first working vehicle on the carriageway cannot be achieved on sections of road one (1) kilometre in length, or longer, ie. a Lead Pilot vehicle is **NOT** required when the length of road with restricted visibility is less than one (1) kilometre, or
  - the operation crosses the centreline.
- (b) A Lead Pilot vehicle is not required for snow clearing operations.
- (c) A Lead Pilot vehicle is not required for the Inspection Activities described in Section D7.2 when the vehicle used is not travelling slower than normal traffic and, if stopped, is parked clear of the live lane.
- (d) A Lead Pilot vehicle is *not* required on one way or multi lane divided roads.

#### D3.2.2 Vehicle Position

A Lead Pilot vehicle should be positioned as far to the left as practicable and, if possible, should straddle the shoulder. This position must also ensure that drivers of vehicles approaching from the opposite direction:

- have at least Clear Sight Distance Forward Visibility to the Lead Pilot vehicle, and
- will encounter first work vehicle between five (5) and ten (10) seconds travel time at the normal speed of traffic on the road after passing the Lead Pilot vehicle, and
- traffic travelling in the same direction as the mobile operation are not substantially delayed behind the Lead Pilot vehicle.

***EXPLANATORY NOTE - Tail Pilot Vehicle Position (Refer Section D3.3.2)***

A Tail Pilot vehicle should be positioned at the minimum distance behind the first Work vehicle or Shadow vehicle in a mobile operation, and where approaching drivers have Rear Visibility of at least Clear Sight Distance to it.

Where visibility is restricted, the Tail Pilot vehicle will need to hold back in a position where approaching drivers have Clear Sight Distance Rear Visibility to it. If this cannot be achieved without exceeding the maximum recommended distance from the working vehicle(s) because of continuous lengths of horizontal and/or vertical curves, etc, additional Tail Pilot vehicles should be considered.

The spacing between the Tail Pilot vehicle and the nearest working vehicle should be checked at regular intervals during the mobile operation to ensure that it remains at between five and ten seconds travel time at the normal speed of vehicles on the road. This may be done by selecting a vehicle in the traffic stream and noting the time it takes to travel between the Tail Pilot vehicle and the Shadow or Work vehicle.

### D3.3 Tail Pilot Vehicles

A Tail Pilot vehicle is used to provide drivers of vehicles travelling in the same direction a mobile operation with advance warning of the mobile operation on the road ahead of them.

#### D3.3.1 Requirements

- (a) A Tail Pilot vehicle is not required on **Level LV** and **Level 1** roads with permanent speed limits greater than 65 km/h where the working vehicle(s) is:

- within five (5) metres of the edge line,
- is not on the carriageway, and
- $\geq$  Clear Sight Distance Rear Visibility is available at all times

In these situations the appropriate TW – 1.x ROAD WORKS signs must be erected to warn road users of the mobile operation on the road ahead. These signs must be erected at spacings no greater than four (4) kilometres. A TW - 16 WORKS END sign must be erected at each end of the mobile operation site.

- (b) A Tail Pilot vehicle is not necessary on **Level LV**, **Level 1** and **Level 2** roads with permanent speed limits greater than 65 km/h for the Inspection Activities described in Section D7.2, when the inspection vehicle is:

- not travelling slower than the normal operating speed of traffic on the road, and
- if stopped, is parked clear of the live lane.

- (c) On **Level 3** roads multiple lane closures require multiple Tail Pilot vehicles. The first Tail Pilot vehicle shall close the nearest adjoining edge lane and the other Tail Pilot vehicle(s) shall close the subsequent lanes in a staggered manner. A Shadow vehicle must be used to protect the work zone in these situations.

#### D3.3.2 Vehicle Position

A Tail Pilot vehicle should be positioned as far to the left as practicable and, if possible, should straddle the shoulder so that other road users are not significantly disrupted while passing it. This position must also ensure that the drivers of vehicles approaching from behind:

- have at least Clear Sight Distance Rear Visibility to the Tail Pilot vehicle, and
- will encounter the nearest Work or Shadow vehicle between five (5) and ten (10) seconds travel time at the normal speed of traffic on the road after passing the Tail Pilot vehicle.

**Note:** To maintain the required Clear Sight Distance Rear Visibility a tail pilot driver may have to stop their vehicle while the working vehicle(s) travel around a curve or along a short section of road with restricted visibility.

***EXPLANATORY NOTE - Shadow Vehicle Position (Refer Section D4.3)***

The distance between a Shadow vehicle and the Work vehicle immediately in front of it needs to be carefully controlled.

If the Shadow vehicle is too close there is a danger of it running down personnel on foot, if the Shadow vehicle should be hit from behind by another vehicle.

If the Shadow vehicle is too far away other vehicles may get in between the Shadow vehicle and the Work vehicle.



## **D4 SHADOW VEHICLES**

### **D4.1 General**

A Shadow vehicle is used to provide close protection from the rear for personnel on foot and/or working vehicles in the work zone.

In situations where a Tail Pilot vehicle is not necessary the Shadow vehicle also provides advance warning of the mobile operation.

### **D4.2 Requirements**

- (a) On all **Level LV** roads a Shadow vehicle is not required unless personnel on foot are on the carriageway.
- (b) On **Level 1** roads where the permanent speed limit is less than 65 km/h a Shadow vehicle is not required unless personnel on foot are on the carriageway.
- (c) On **Level 1** roads where the permanent speed limit is greater than 65 km/h the use of a Shadow vehicle is optional, unless personnel on foot are on the carriageway.
- (d) On **Level 2** and **Level 3** roads a Shadow Vehicle must be used for mobile operations where the work zone is:
  - not on the carriageway but within two (2) metres of a live lane, or
  - on the carriageway.

If a Shadow vehicle is not available in these situations a static temporary traffic management operation must be implemented.

### **D4.3 Vehicle Position**

- (a) A Shadow vehicle must travel between 40 and 60 metres behind the working vehicle, and in the same lane.
- (b) The Rear Visibility sight distance required for a Shadow vehicle is at least:
  - 50 metres on **Level LV** and **Level 1** roads, and
  - 100 metres on **Level 2** and **Level 3** roads

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## D5 MOBILE CLOSURES

### D5.1 LEVEL LV and LEVEL 1 ROADS

#### 1. Common Requirements:

- (a) A TMA is not needed on any vehicle used in a mobile closure operation on any **Level LV** or **Level 1** road.
- (b) The minimum Rear Visibility required for a Tail Pilot vehicle is Clear Sight Distance for:
  - the Permanent Speed Limit, or
  - the Operating Speed, when this speed has been defined by the RCA.
- (c) The distance from the Tail Pilot vehicle to the first Shadow or Work vehicle may vary between 100 and 600 metres.
- (d) The minimum Rear Visibility required for a Shadow vehicle is 50 metres.
- (e) The distance from a Shadow vehicle to the first Work vehicle may vary between 40 and 60 metres.
- (f) TW-34 PASS WITH CARE sign(s) may be replaced with an Arrow Board.

#### 2. Where a work activity is more than five (5) metres from an edgeline:

- the only signing required is a TW - 1.x sign mounted on the rear of the Work vehicle(s).

#### 3. Where a work activity is within five (5) metres of an edge line and is:

- (a) **NOT on the live lane, and Greater than Clear Sight Distance, Rear Visibility is available:**
  - a TW - 1.x ROAD WORKS sign must be erected in advance of the work site,
  - additional TW - 1.x ROAD WORKS sign(s) must be erected at intervals no greater than four (4) kilometres throughout the length of the work site,
  - a TW - 34 PASS WITH CARE sign must be mounted on the Work vehicle(s), and
  - a TW - 16 WORKS END sign erected at the end of the work site.
- (b) **NOT on the live lane, and Less than Clear Sight Distance, Rear Visibility is available:**
  - where the permanent speed limit is less than 65 km/h the requirements of 3 (a) above apply,
  - where the permanent speed limit is greater than 65 km/h a Tail Pilot vehicle fitted with a TW - 1.x ROAD WORKS sign and an RG - 17 KEEP LEFT SIGN, or an RG - 34 KEEP RIGHT sign is required, and
  - the Work vehicle(s) must be fitted with rear mounted TW - 34 PASS WITH CARE signs.

**4. Where a work activity is ON the live lane and:**

**(a) the permanent speed limit is LESS than 65 km/h:**

- a TW - 1.x ROAD WORKS sign must be erected in advance of the work site,
- a Shadow vehicle fitted with a TW - 34 PASS WITH CARE sign is required when personnel are on foot within the work site,
- the Work vehicle(s) must be fitted with rear mounted TW - 34 PASS WITH CARE signs, and
- a TW - 16 WORKS END sign erected at the end of the work site.

**(b) the permanent speed limit is GREATER than 65 km/h:**

- a Tail Pilot vehicle fitted with a TW - 1.x ROAD WORKS sign, and an RG - 17 Keep Left sign, or an RG - 34 KEEP RIGHT sign, is required, and
- a Shadow vehicle fitted with a TW - 34 PASS WITH CARE sign is required when there are personnel on foot within the work site,
- the Work vehicle(s) must be fitted with rear mounted TW - 34 PASS WITH CARE signs,
- the leading Work vehicle must be fitted with a front mounted TW - 26 ROAD WORKS sign, unless a Lead Pilot vehicle is required, and
- where the work is on a two-lane road, and Clear Sight Distance, Forward Visibility to the first working vehicle on the live lane cannot be achieved on sections of road 1km in length or longer, a Lead Pilot vehicle fitted with a front mounted TW - 26 ROAD WORKS sign is required.

## **D5.2 LEVEL 2 ROADS**

**1. Common Requirements:**

- (a) The minimum Rear Visibility required for a Tail Pilot vehicle is Clear Sight Distance for:
- the Permanent Speed Limit, or
  - the Operating Speed, when this speed has been defined by the RCA.
- (b) The distance from the Tail Pilot vehicle to the first Shadow or Work vehicle may vary between 100 and 600 metres.
- (c) The minimum Rear Visibility required for a Shadow vehicle is 100 metres.
- (d) The distance from a Shadow vehicle to the first Work vehicle may vary between 40 and 60 metres.

**2. Where a work activity is more than five (5) metres from an edgeline:**

- the only signing needed is a TW - 1.x sign mounted on the rear of the Work vehicle(s).

- 3. Where a work activity is between two (2) and five (5) metres from an edge line and has:**
- (a) More than Clear Sight Distance Rear Visibility available:**
- a TW - 1.x ROAD WORKS sign must be erected in advance of the work site,
  - additional TW - 1.x ROAD WORKS signs must be erected at intervals no greater than four (4) kilometres throughout the length of the work site,
  - a TW - 34 sign must be mounted on the Work vehicle(s), and
  - a TW - 16 WORKS END sign erected at the end of the work site.
- (b) Less than Clear Sight Distance Rear Visibility available and:**
- (i) the permanent speed limit is less than 65 km/h:**
- the requirements of 3 (a) above apply.
- (ii) the permanent speed limit is greater than 65 km/h:**
- a Tail Pilot vehicle fitted with a TW - 1.x ROAD WORKS sign and an RG - 17 KEEP LEFT SIGN, or an RG - 34 KEEP RIGHT sign is required, and
  - the Work vehicle(s) must be fitted with a rear mounted TW - 34 PASS WITH CARE sign.
- 4. Where the work activity is on the Live Lane or is two (2) or less metres from an edgeline, and:**
- (a) the permanent speed limit is Less than 65km/h:**
- a TW-1.x ROAD WORKS sign must be erected in advance of the work site,
  - a shadow vehicle fitted with a TMA, an Arrow Board and a TW-34 PASS WITH CARE is required,
  - the Work vehicle(s) must be fitted with a rear mounted TW-34 PASS WITH CARE sign,
  - where the work is on a two-lane two-way road the leading Work vehicle must be fitted with a front mounted TW-26 ROAD WORKS sign unless a Lead Pilot is required' and
  - a TW-16 WORKS END sign is erected at the end of the work site.
- (b) the permanent speed limit is Greater than 65 km/h:**
- a Tail Pilot fitted with a TMA, an Arrow Board and a TW-1 ROAD WORKS sign is required,
  - a shadow vehicle fitted with a TMA, an Arrow Board and a TW – 34 PASS WITH CARE is required,
  - the Work vehicle(s) must be fitted with rear mounted TW – 34 PASS WITH CARE sign,
  - where the work is on a two-lane two-way road the leading Work Vehicle must be fitted with a front mounted TW-26 ROAD WORKS sign unless a Lead Pilot is required,

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- where the work is on a two-lane two-way road and Forward visibility to the first working vehicle on the live lane, or to a working vehicle with two (2) metres of the edgeline, cannot be achieved on sections of road 1km in length or longer, a Lead Pilot vehicle fitted with a front mounted TW-26 ROAD WORKS sign is required.

### D5.3 LEVEL 3 ROADS

#### 1. Common Requirements:

- (a) The minimum Rear Visibility required for a Tail Pilot vehicle is Clear Sight Distance for:
  - the Permanent Speed Limit, or
  - the Operating Speed, when this speed has been defined by the RCA.
- (b) The distance from the Tail Pilot vehicle to the first Shadow or Work vehicle may vary between 100 and 600 metres.
- (c) The minimum Rear Visibility required for a Shadow vehicle is 100 metres.
- (d) The distance from a Shadow vehicle to the first Work vehicle may vary between 40 and 60 metres.

#### 2. Where a work activity is more than five (5) metres from an edgeline:

- the only signing needed is a TW - 1.x sign mounted on the rear of the Work vehicle(s).

#### 3. Where a work activity is between two (2) and five (5) metres of an edge line and NOT on the carriageway, and:

- (a)  $\geq$  Clear Sight Distance Rear Visibility sight distance is available:
  - a TW - 1.x ROAD WORKS sign must be erected in advance of the work site,
  - additional TW - 1.x ROAD WORKS signs must be erected at intervals no greater than four (4) kilometres throughout the length of the work site,
  - a TW - 34 sign must be mounted on the Work vehicle(s), and
  - a TW - 16 WORKS END sign erected at the end of the work site.
- (b)  $\leq$  Clear Sight Distance Rear Visibility is available:
  - a Tail Pilot vehicle fitted with a TMA, a TW - 1.x ROAD WORKS sign and an RG - 17 Keep Left sign, or an RG - 34 KEEP RIGHT sign is required, and
  - the Work vehicle(s) must be fitted with a rear mounted TW - 34 PASS WITH CARE sign.

- 4. Where a work activity is two (2), or less, metres from an edge line and NOT on the carriageway, or is ON the carriageway:**
- a Tail Pilot vehicle fitted with a TMA, a TW - 1.x ROAD WORKS sign and an Arrow Board required,
  - a Shadow vehicle(s) fitted with a TMA, an Arrow Board and a TW - 34 PASS WITH CARE sign is required, and
  - the Work vehicle(s) must be fitted with a rear mounted TW - 34 PASS WITH CARE sign.

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## D6 SEMI-STATIC CLOSURES

### D6.1 General

Where a mobile closure *on the carriageway of the road* cannot be completed within ten (10) minutes, it becomes a semi-static closure, *by definition*.

A semi-static closure is a short-term work operation *on the carriageway of the road* that is more than ten (10) minutes and less than (1) hour in duration. Where the work cannot be completed within one hour it becomes a static closure, *by definition*.

Semi-static closures are not permitted on two-lane two-way roads. However, they may be used on two-lane two-way roads with a painted flush median where they may extend onto a painted flush median provided TW-1x ROAD WORKS signs are erected for both directions of travel.

### D6.2 Site Layout

- (a) The visibility, vehicle spacing and signing requirements for a semi-static closure mobile closure on the carriageway of a road are exactly the same as those for an equivalent mobile closure in the same situation.

For example: On a **Level 1** road where the permanent speed limit is higher than 65 km/h the requirements of Section D5.1 4(b) apply to semi-static closure on the carriageway of that road.

- (b) *In addition the following requirements also apply to all semi-static closures:*
- (i) cones must be placed between the Shadow vehicle and the Work vehicle(s),
  - (ii) a cone taper must be installed in advance of the work area or, the Shadow vehicle when one is necessary,
  - (iii) Cone spacings must conform to the requirements for delineation devices given in:
    - Table C2.1 for **Level LV** Traffic Management,
    - Table C2.2 for **Level 1** Traffic Management,
    - Table C2.3 for **Level 2** Traffic Management,
    - Table C2.4 for **Level 3** Traffic Management, and

### D6.3 Signs

On one-way multilane roads TW-1.x ROAD WORKS signs must be placed at each end of the closure and on both sides of the road. For traffic travelling in the same direction as the semi-static closure the advance warning sign mounted on the Tail Pilot vehicle performs this function for one side of the road and a static sign erected on the other side of the road. For traffic travelling in the opposite direction static TW-1 signs must be erected on both sides of the road.

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Signs must be located so they meet the sign visibility distance requirements given in:

- Table C2.1 for **Level LV** Traffic Management,
- Table C2.2 for **Level 1** Traffic Management,
- Table C2.3 for **Level 2** Traffic Management, and
- Table C2.4 for **Level 3** Traffic Management.

## **D7 SPECIAL MOBILE OPERATIONS**

### **D7.1 Road Marking**

#### **D7.1.1 General**

Road marking using Type A applicators may be carried out as a mobile operation.

Road marking using Type B applicators may only be carried out as a mobile operation when all work activities fully comply with the requirements for a mobile operation.

Flexible lines for transporting air, paint and other products are considered to be part of the work vehicle(s) and are required to fully comply with the requirements of this Code in regard to maintaining safety zone widths.

#### **D7.1.2 Protection of New Road Markings**

The cones used for protecting new road markings shall have a minimum height of 450 mm. All other cones used in pavement marking operations shall have a minimum height of 900 mm.

When cones are used solely for the protection of new road markings they must be placed in a manner that ensures:

- at least three cones will be visible to drivers users at any one-time,
- they ones are at no greater than 50 metre spacings on straight sections of road,
- they are placed at closer spacings on curves, when necessary, so that at least three cones will be visible to drivers users at any one-time, and
- they are deployed only for the short time pavement markings are vulnerable to damage by vehicles.

#### **D7.1.3 Installation of Raised Pavement Markers**

A mobile operation may be used to install raised pavement markers. This work must not, however, be carried out during times of peak traffic flows.

#### **D7.1.4 Waste Collection (Rubbish Truck) Activities**

For regular household and commercial waste or rubbish collection the activity shall be undertaken as follows:

- a TMP shall be prepared by an STMS
- prior to starting work and at regular intervals, (at least every 3 months), an STMS shall brief all staff involved in the activity on the safety requirements of the TMP and Health and Safety issues
- the approved TMP must be on site (in vehicle) at all times
- operations must take place outside the peak flow times

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- on Level 2 and 3 roads the times of operation shall be defined by the RCA
- the vehicle shall operate in accordance with the Traffic Regulations and the Road Code and keep as far as possible to the left hand side of the road
- the vehicle shall be fitted with two yellow rotating flashing beacons and a rear mounted TW-34 Pass with Care sign
- beacons and signs must be visible from the rear
- all staff involved must wear a CoPTTM compliant safety garment.

## D7.2 Road Inspection Activities

The temporary traffic management measures required for the activities involved in road inspections, investigations, measurement and/or testing, etc. depend on:

- the time taken for the activity,
- the Clear Sight Distance required for the permanent speed limit on the road, or the operating speed as defined by the RCA for the road; and
- the traffic volume on the road at the time.

The general principle for inspection activities is that the person undertaking the inspection shall move to avoid traffic on the road, ie. they must not expect traffic to move or slow down for the inspection activity.

Temporary traffic management for inspection activities shall meet the following requirements:

- (a) The drivers of vehicles approaching the inspection activity must have at least Clear Sight Distance, Forward and Rear visibility to the activity, eg. for a road with a permanent speed limit of 70 km/h the Clear Sight Distance required is  $(3 \times 70) = 210\text{m}$ .
- (b) Vehicle(s) must be parked clear of the carriageway at the inspection activity site fitted with:
  - one, and preferably two, amber or yellow rotating flashing beacons, and
  - a rear mounted sign indicating the type of activity taking place.

**Notes:** (i) The TW - 27 ROAD INSPECTION sign is appropriate for most inspection activities.

(ii) A vehicle-mounted sign is not necessary for inspections on Level LV roads

- (c) An inspection activity may only be carried out by one person when:
  - it can be performed from a safe position outside the edge line of the road, or
  - it is within a live lane of a **Level LV** road with more than Clear Sight Distance to the activity, with traffic volumes of less than 250 vpd and it will take no more than five (5) minutes to complete the activity.

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- (d) An additional "Lookout" person:
- must be used on all Level 1 roads and on Level LV roads with more than 250vpd to warn an inspector in a live lane of approaching vehicles. Note: There must be more than Clear Sight Distance to the "Lookout" person and the activity must be completed within five (5) minutes.
- (e) A semi-static temporary traffic closure or static temporary traffic management system applicable to a fixed site shall be implemented where the inspection is to be carried out:
- is an activity more than five (5) minutes in duration and in a live lane, or
  - is on a live lane on a road requiring **Level 2 or Level 3** temporary traffic management, or
  - is unable to meet the Clear Sight Distance visibility requirement of (a) above.

### **D7.3 Training requirements for Inspection Activities**

For inspection activities on Level LV, and Level 1 Roads, where the activity is totally outside the edgeline on the shoulder of the road, the minimum training requirement is Traffic Controller (TC) subject to the following:

- the person is a TC for the Level of road on which the activity will take place
- the TMP for the activity must be designed by an STMS
- the STMS must brief the TC undertaking the inspection activity
- all the above actions must be documented by the STMS.

For inspection activities where it is necessary to walk onto the live lane of a Level LV or Level 1 road, the activity must be under the control of an onsite STMS.

For inspection activities on a Level 2 or Level 3 road where the activity is totally outside the edgeline on the shoulder of the road, it must be under the control of an on site STMS-NP.

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