



# STMS MOBILE HANDBOOK

Waka Kotahi - NZ Transport Agency

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**Participant name:**

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## **More information**

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# About the STMS mobile training

## Outcomes of the STMS Mobile training

People who successfully complete the STMS Mobile training will **know**:

- How to complete risk assessment for the mobile operation
- How to calculate what vehicles and equipment are required for the mobile operation
- How to calculate layout distances for mobile operations
- How to manage mobile operations and closures

*If you are going to be in charge of mobile operations, you will be mentored and assessed.*

At the end of on-job mentoring and assessment you will have the:

- Skills to competently manage a mobile operation on a Cat A, B and on the shoulder of a Cat C road environment

## The STMS Mobile warrants



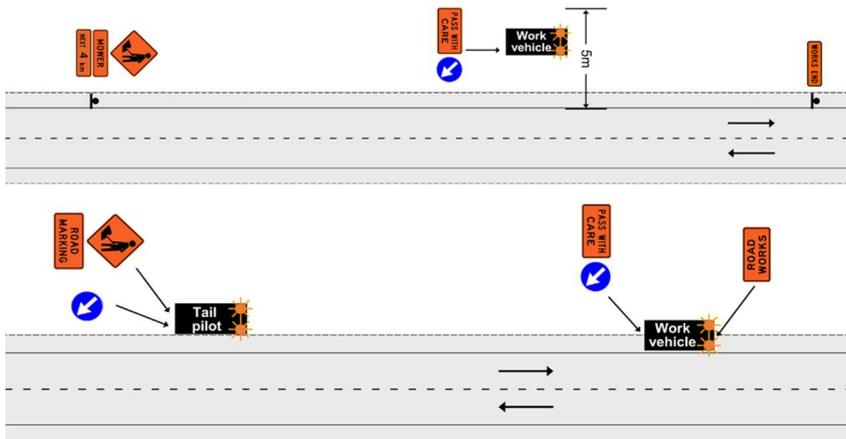
There is no unit standard for this learning block

## Assessment for Cat A practising

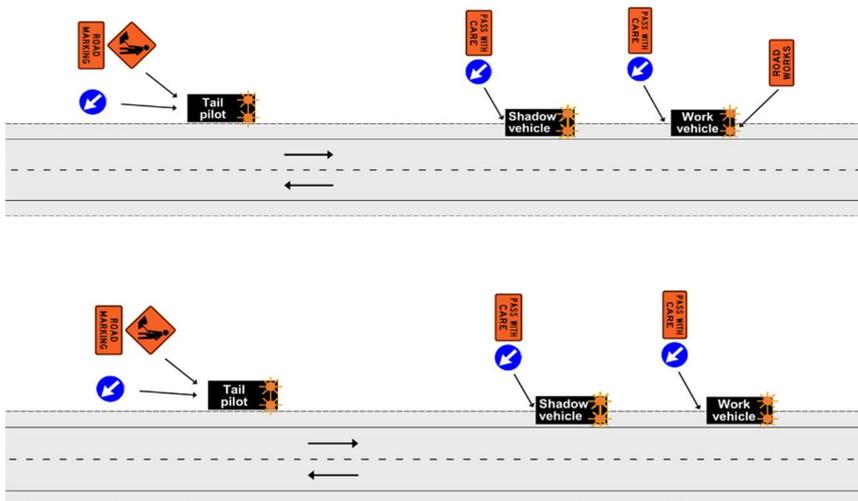
The trainee must complete 3 closures from the list of possible closures.

### Closures verified by a TTM Mentor

On a Cat A road – **work vehicle on shoulder** – no shadow required. Options include:

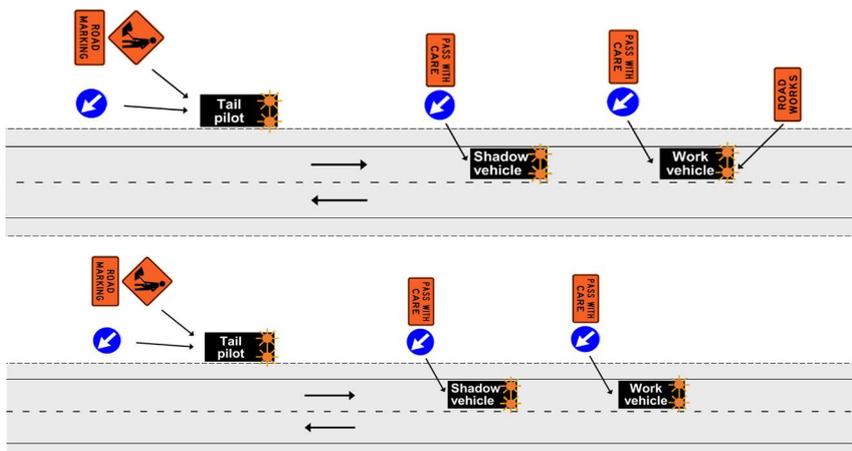


On a Cat B road – **work vehicle on shoulder** – shadow and tail pilot required. Options include:



### Closure observed by a TTM Assessor

On a Cat A or B road – **work vehicle on lane** – shadow and tail pilot required. Options include:



# About the STMS Mobile roles and responsibilities

## Who is the training for?

An additional STMS role has been added for those STMSs who regularly undertake work activities that move along the road or beside the road.

What activities are covered by the new training?	Mobile activities that occur off the live lane (like mowing a berm) Mobile activities that occur on the live lane (like road marking) Mobile activities that are stationary for no more than 10 minutes
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Where static advance warning and works end signs are used to replace a tail pilot these signs can be installed by the STMS mobile (practicing) as part of their duties.

## The additional STMS role does not cover all mobile operation activities

What activities are NOT covered by the new training?	Mobile operations to install, amend or maintain and remove TTM for static worksites A mobile operation that requires the work activity to be stationary for more than 10 minutes (eg a semi-static operation) Mobile activities within 2m of the edge line or on the lane of a category C road environment
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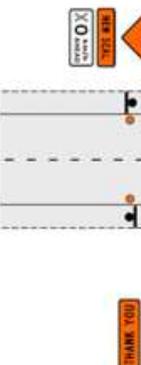
Where static advance warning and works end signs or a tail pilot is required on a Cat C road, an STMS Cat C must install and remove the TTM equipment.

## Installing static signs

A practising STMS M warranted person can install, replace and remove static advance warning and works end signs in the following situations:

- On Cat A roads where a tail pilot is not required and can be substituted with static advance warning and works end signs
- Mobile operations within a static worksite that requires the advance warning signs to be replaced to reflect the mobile activity.

For example a TR3/TR31 could be replaced by a T1A/T134 to reflect the mobile road marking activity.



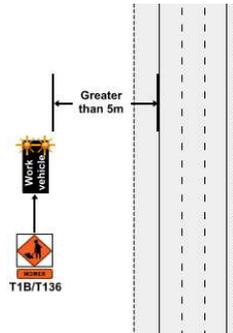
Installation methods may include:

- Using a work vehicle and a tail pilot
- Using an inspection activity with an inspection vehicle (with PASS WITH CARE and an arrow)
- Installing signs out of the carriage way as an inspection activity without the use of an inspection vehicle.

**Always check your TMP for the prescribed method which should be based on a risk assessment based on the environment.**

## Working on Cat C road environments

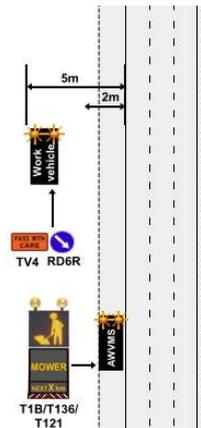
**Mobile activities more than 5m from the edgeline of a category C road environment**



An STMS M warranted person can be in charge of this type of activity under the following situations:

- Must have an approved TMP
- Must not park, place, unload or reload any equipment within 5m of the edgeline.

**Mobile activities less than 5m from the edge line on the lane of a category C road environment will require static signs or a tail pilot vehicle**



An STMS Cat C practicing must be in charge of installing and removing the equipment and can then delegate the site to an STMS M warranted person

- All work must remain more than 2m from the edgeline at all times
- The practicing STMS Cat C must be called if any signs need to be moved, replaced or reinstated

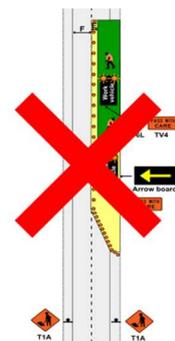
## Semi static activities

A semi-static operation is a mobile operation that allows work to be completed for up to 1 hour.

**Due to the additional risk and requirements with these types of operations they are not covered under the STMS M warrant.**

An STMS M warranted person **cannot** take charge of a semi-static type closure on any level of road, this includes:

- Placing delineation between the work and shadow vehicles
- Placement of a taper
- A mobile operation that requires the work activity to be stationary for more than 10 minutes



# STMS Mobile process for completing mobile operations

## 1. In the yard – Check TMP and resources



- Review TMP(s) for mobile operations during shift:
- Check correct vehicles are available and correct TTM loaded onto vehicles
- Pre-start checks of all vehicles
- Brief drivers about meeting point (safe location close to beginning of mobile operation route where briefing can be completed, and vehicles set up)
- Complete notification as required (eg TOC, TMC)
- Depart to meeting point

## 2. At the site – Get ready to start the mobile operation



- If required, complete drive through of mobile route:
  - Select location of static signs
  - Identify any obstacles to safe completion of the mobile operation (eg another worksite in place, parked vehicles)
- Compare TMP to mobile route - decide if fit for purpose (are risks managed by the controls). If not, what amendments can be made
- Complete Hazard ID and risk assessment **for the TTM during the mobile operation**
- Work out position of vehicles (site dimensions)
- Complete safety briefing for TTM Crew (including a Comms check)

## 3. At the site – Complete mobile operation



- Get underway
  - Install any static equipment
  - Install signs on vehicles (or activate displays on vehicles)
  - Move into position
- Lead the mobile operation crew to complete the mobile operation
  - Maintain position of vehicles
  - Ensure safety zones maintained
  - Continuously monitor risks/hazards and implement appropriate controls
- Complete monitoring:
  - Complete 30 min checks
  - Complete Mobile onsite record (MOSR)

#### 4. At completion of the mobile operation (or a mobile route) – Lead team to disestablish the mobile operation



- Brief crew on disestablishment procedure
- Remove any static TTM
- Travel to safe location
- Deactivate displays
- Remove vehicle mounted signs

#### 5. Repeat steps 2 to 4 for other mobile routes to be completed during the shift



##### ***Travel to start of next mobile route***

- Repeat the process for the other mobile operation routes to be completed during the shift

#### 6. In the yard - Complete back at yard actions



- Replace any damaged or below standard TTM equipment
- Report any vehicle issues
- Complete final yard actions as per company procedures
- If required, review tomorrow's work schedule and TMPs

# Recap of levels & categories of road

## Levels of road

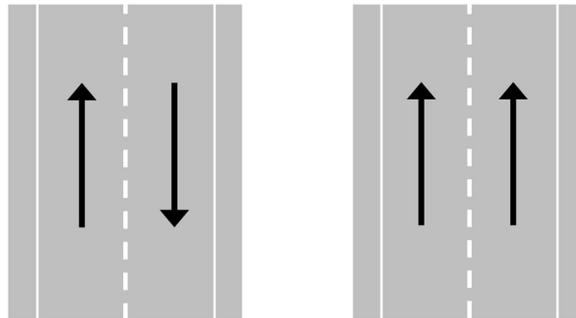
Level of TTM	Guidelines for AADT
<b>Level LV</b>	AADT less than 500vpd
<ul style="list-style-type: none"> <li>LV/low risk</li> </ul>	AADT less than 250vpd
<b>Level 1</b>	AADT up to 10,000vpd Rural - 15,000vpd Urban
<b>2LS</b>	AADT over 15,000vpd Urban and permanent speed 60km/h or less
<b>Level 2</b>	AADT over 10,000vpd Rural - 15,000vpd Urban
<b>Level 3</b>	Motorways and expressways

## Categories of road environment

There are 3 categories of road environment (Category A, B and C).

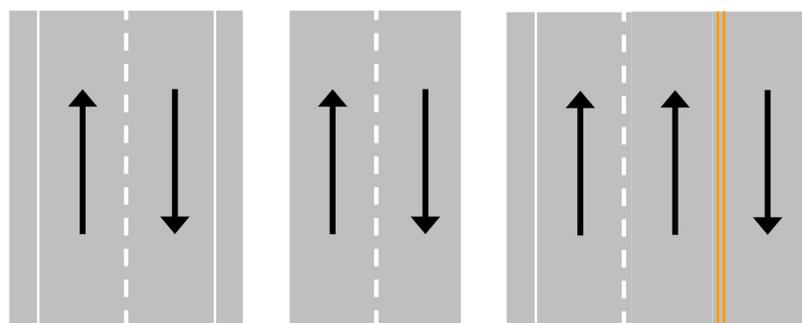
### Category A: Low speed roads (60km/h and less)

- Includes LV, L1, 2LS and L2 roads
- Includes two-way two-lane and multi-lane roads
- STMS M can be in charge of an operation in the lane and shoulder/berm areas of these types of roads.**



### Category B: High speed two-way two-lane roads (70km/h and more)

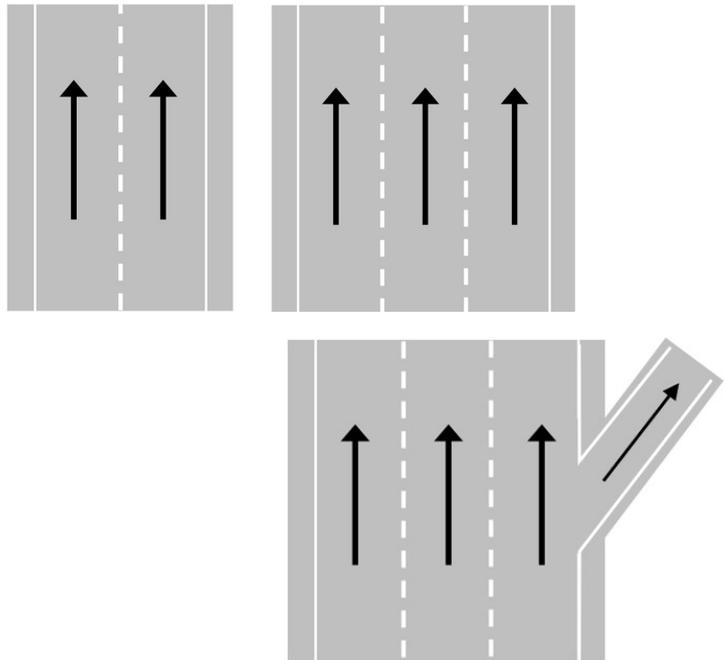
- Includes LV, L1 and L2 roads
- Includes roads with or without shoulders
- Includes passing lanes
- STMS M can be in charge of an operation in the lane and shoulder/berm areas of these types of roads.**



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**Category C: High speed multi-lane roads (70km/h and more)**

- Includes high speed L1, L2 and L3 multi-lane roads
- Includes on and off ramps
- **STMS M can only be in charge of an operation on the berm or shoulder of these types of roads under certain conditions**



# Risk assessment

## Safety

The Inspector role is all about safety for you, your crew and ALL road users.

You need to recognise when something is unsafe and if within your responsibility, do something about it or postpone or cancel the activity.

## Hazards, risks and controls



## Before commencing a mobile operation

Before the mobile activity is carried out the STMS completes a **risk assessment on the site** as part of ensuring the TMP is fit for purpose (right for site).

Where TTM signage is required to be installed as part of the mobile operation the STMS must complete a **risk assessment on the task of installing** the TTM at the worksite.

Once the mobile activity has started the STMS **continues to monitor risks** to identify:

- Changes to existing risks
- Hazards and their risks as they arise.

If any TTM signage needs to be removed at the completion of the mobile activity, the STMS completes a **risk assessment** on the task of removing the TTM.

STMS uses their company risk assessment tool to:

- Identify hazards related to the activity
- Determine a risk rating for each hazard
- Identify controls to be put in place
- Record on the risk assessment form
- Brief workers and visitors on the risks and controls.

Assess risks

Implement controls

Brief people on the risks and controls

## Considerations for mobile operations on Cat A roads

- Pedestrians and pedestrian crossings
- Cyclists and cycle lanes
- Shared pedestrian and cyclist paths
- Restricted parking areas in the form of bus stops, loading zones, taxi stands, coupon parking, resident parking etc
- Higher number of intersections and accessways
- Many distractions
- Merges and diverges.



## Considerations for mobile operations on Cat B roads

- Higher speed – longer stopping distances
- More heavy vehicles
- Visibility of the worksite (vertical and horizontal curves)
- Shoulder and pull over areas
- Slower driver reaction time
- Side roads and property entrances/exits
- Stock movements

**65% of fatalities are on these type of roads**



## Considerations for mobile operations on Cat C roads

- Higher speed – longer stopping distances
- More traffic and more heavy vehicles
- Visibility of the worksite (vertical/horizontal curves - traffic)
- Shoulder and pull over areas
- Slower driver reaction times – drivers need more time to react
- Many distractions for drivers
- High speed merge and diverge zones (on/off ramps and passing lanes)



## Common issues that can affect mobile operations on all categories of road

**Sunstrike** Significantly reduces visibility, reaction time and therefore stopping distances. Activity may need to be temporarily postponed



**Glare during night work** Significantly reduces visibility, reaction time and therefore stopping distances. Activity may need to be temporarily postponed



**Wet or slippery roads** Can significantly reduce visibility, reaction time and can increase stopping distances by more than twice the normal stopping distances



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**Impatient road users & dangerous overtaking**

Increases the risk of a high-speed collision. Other TTM methods with better controls may need to be considered



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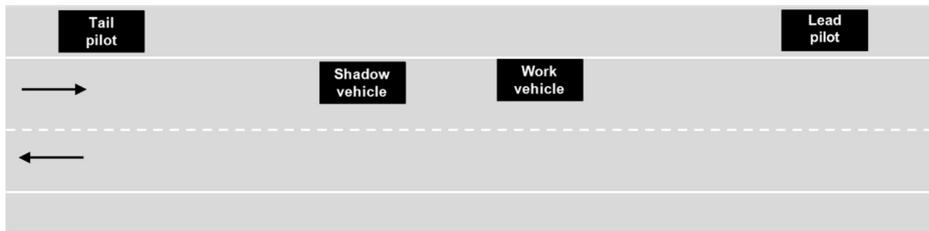
**Visibility obscured by the activity or environment**

May result in dangerous overtaking.  
TTM methods with better controls may need to be considered.  
Activity may need to be temporarily postponed.



# Mobile operations: Essentials

## Vehicles that can be used in a mobile operation



## Requirements for all vehicles

All vehicles in the mobile operation must have:

<p>An amber flashing beacon(s)</p>  <p>While beacons are flashing, it is OK to use indicators as turning signals but not as hazard warning lights</p>	<p>A traffic management sign (or display)</p> 
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When displays are being used, it is important that the message displayed on the tail pilot matches the message displayed on the shadow vehicle. This is vitally important because all messages may be visible to road users at the same time – road users could get confused with conflicting messages.

## Continuous communication



The STMS must have continuous communication with all mobile operation drivers. A consistently available channel is required. Mobile phones do not provide instantaneous communication and do not work in all locations. So do not use them as the primary method of communication. They are OK as a backup method.

## Clear sight distance (CSD)

A mobile operation must be clearly visible to approaching drivers. Clear sight distance (CSD) is the minimum visibility required.

Horizontal and vertical curves need to be considered when carrying out a mobile operation.

# 3

3 x the permanent speed limit (in metres)

100km/h x 3 = 300m  
70km/h x 3 = 210m  
50km/h x 3 = 150m

50km/h non state highway road environments only require a CSD of 75m

# Requirements for lead pilot vehicles

A lead pilot vehicle is used to provide advance warning for road users travelling in the opposite direction to a mobile operation. A lead pilot vehicle is required on Cat B roads when there is no CSD to the first vehicle in the operation.

## When a lead pilot is not required

One way or multi-lane divided roads.

On Cat A roads (lead pilot can be replaced by static advance warning and works end signs).

Where the work vehicle must be the lead vehicle (eg snow clearing).

Where the length of road that CSD cannot be achieved on is 1km or less.

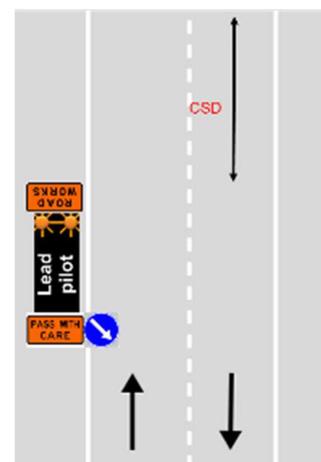


## Types of signs or displays on lead pilot vehicles



The lead pilot is positioned as far left as possible.

Approaching road users must have forward CSD to the lead pilot vehicle.



# Requirements for work vehicles

## Options for signs and displays on work vehicles

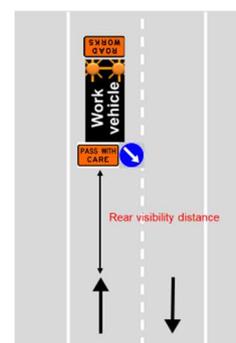


On Cat B roads, a TV2 roadworks sign is installed on the front of the work vehicle:

- If the vehicle is in the lane, and
- On a bi-directional road, and
- Where a lead pilot is not required

Road users approaching from the rear must be able to see the work vehicle within rear visibility distance

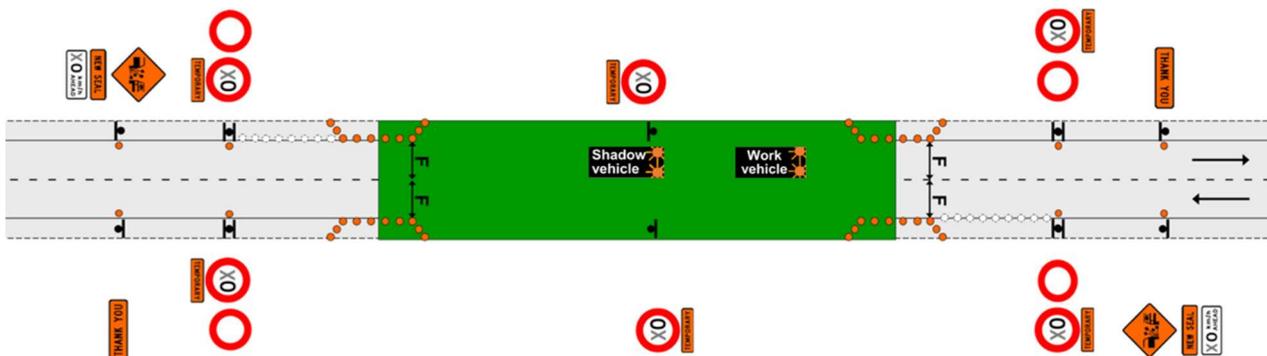
- LV, L1 & L2LS **minimum 50m**
- L2 & L3 **minimum 100m**



## Operations within a static worksite

The requirement for a tail pilot vehicle for a mobile operation is waived where a mobile operation is contained completely within an existing fixed static worksite which has:

- Advance warning and direction and protection signs
- Approved temporary speed limit (TSL) signs.



This dispensation must only be applied to worksites with a **minimum of CSD to the work vehicle at all times** during the operation.

This dispensation will apply to mobile activities such as:

- Sweeping excess chip from a chip seal /reseal worksite
- Road marking a newly sealed road that has been swept.

All other requirements for a mobile operation (eg shadow and work vehicle) must still be applied

The STMS M can replace the advance warning signage on these types of static sites to match the mobile activity taking place (a TR3/TR31 could be replaced by a T1A/T134 to complete the mobile road marking activity).

The TTM methodology for the replacement of an advance warning sign will be outlined in the TMP.

### Multiple work vehicles

If there are multiple work vehicles in the mobile operation, then they should be no more than **50 meters apart**.

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

## Requirements for shadow vehicles

### Options for signs and displays on shadow vehicle



### Shadow vehicle essentials

#### Distance between work and shadow vehicles

On Cat A roads shadow vehicles must always stay between **15m and 40m** distance from the work vehicle

On Cat B and the shoulder of Cat C roads shadow vehicles must always stay between **15m and 60m** distance from the work vehicle

#### Rear visibility for shadow vehicle

Road users approaching from the rear must be able to see the shadow vehicle within rear visibility distance:

- LV, L1 & L2LS **minimum 50m**
- L2 & L3 **minimum 100m**

Rear visibility dimensions apply to the work vehicle if there is no shadow vehicle.

Where rear visibility can't be achieved, additional shadow vehicle(s) may be added.

#### People seated in the cab of the shadow vehicle

People seated in the cab of the **shadow vehicle** must each wear a standard 3 point seat belt (or better).

Workers cannot be on the rear of a shadow vehicle. The driver must remain in the cab when working as part of a mobile operation.

## When is shadow vehicle required?

### LV, L1 & 2LS roads

Shadow vehicle is **required** when a work vehicle is in the live lane **AND** workers are on the rear deck of (or behind a) moving or stationary work vehicle.

Shadow vehicle **NOT** required when work vehicle is stopped:

- in the live lane **AND** worker is unloading/loading TTM from the non-traffic side of the work vehicle
- out of the live lane **AND** the TM crew is not working in the live lane (they must be on the roadside or in the shoulder)

### Level 2 roads

Shadow vehicle is required when work vehicle is **Not** on the carriageway but within 2m of the live lane, or on the live lane.

## Horizontal arrow board display on shadow vehicle

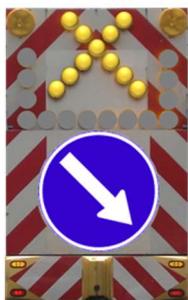


Can be used on:

- L1 & L2LS roads
- L2 roads that are non state highways (with the RCA's permission)

**Must not be used to direct traffic into oncoming traffic flows.**

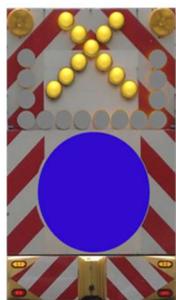
## Standard rear display for LAS



**Shoulder closed**  
Pass right when safe



**Lane change right required**



**Lane closed or**  
**Rolling block**  
Do not pass



**Lane change left required**



**Shoulder or median closed**  
Pass left when safe

**Straight down arrow (or straight up) not legal and not permitted.**

**Arrow must be obscured when performing a rolling block.**

# Requirements for tail pilot vehicles

## Options for signs and displays on tail pilot vehicles



Basic tail pilot

L1 & 2LS



Light TMA



AWVMS

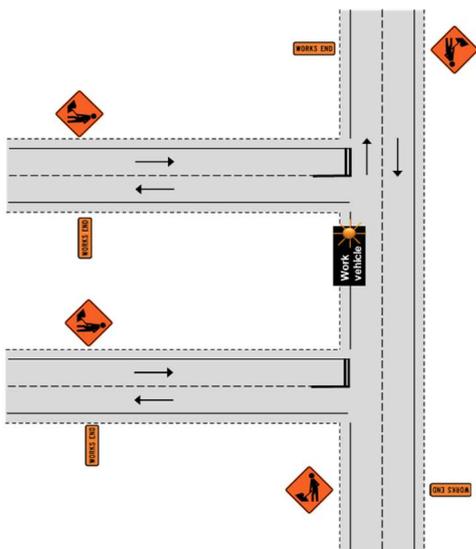
L1, 2LS, L2 & L3



The AWVMS must be used on L2 & L3 roads.



On Category A roads, the tail pilot vehicle can be replaced with static advance warning and works end signs.



Where the work vehicle is in the lane (or partially in the lane):

- If static signs are installed **every side road** impacted must have advance warning and works end signs installed

**If a tail pilot vehicle is used signs on side roads are not required.**

# Mobile operations: Equipment

## Condition of signs and displays

Signs and displays must be always in acceptable condition.

This includes:

- LEDS
- LAS Lamps
- Xenon Strobes
- Beacons
- Vehicle mounted signs

Report any faults immediately

## Truck mounted attenuators (TMA)

When operating on a L2 Category A or B road with a permanent speed of 70kmh or greater and in the lane, or partially in the lane, or within 2m of the lane the shadow vehicle must be fitted with a LAS and TMA unit.

The RCA may also require these to be used on some L1 roads - **Always check the TMP**

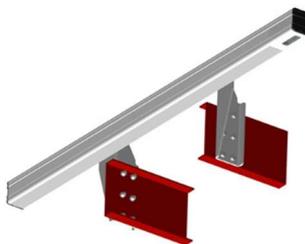
If you are operating a shadow vehicle on any L2 road with a permanent speed of 70kmh or greater the TMA must be **MASH TL3 compliant** - you can check this on the side of the unit.



The STMS should always do an equipment check before leaving the yard. This includes all electronic displays and TMAs. Even slight damage can considerably degrade the performance of the TMA.

## Rear underarm protection devices (RUPDs)

Truck/trailer mounted rear underarm protection devices are designed to stop vehicles running under a heavy vehicle when struck from the rear.



- RUPDs may be used on vehicles deployed on Cat A roads
- From 1 January 2029 the minimum requirements for level 2LS, level 2 and level 3 roads will be as follows:

Permanent Speed Limit	Minimum requirement
60km/h or less	RUPD
70km/h or greater	MASH TL3 TMA

# Mobile operations: Pedestrians & Cyclists

Cyclists can ride on all categories of road except for expressways or road tunnels.

The TMP and mobile methodology should address any hazards your operation poses to cyclists and pedestrians.

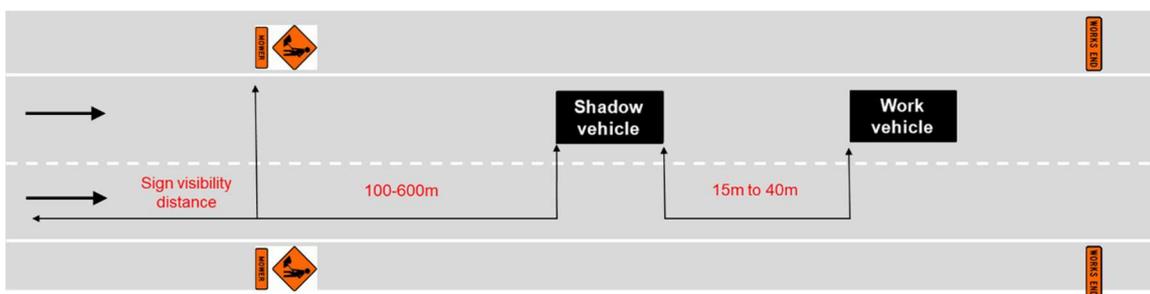
Your risk assessment should include how cyclists and pedestrians are kept safe during the mobile operation.

Consider how you can reduce risk to cyclists and pedestrians by:

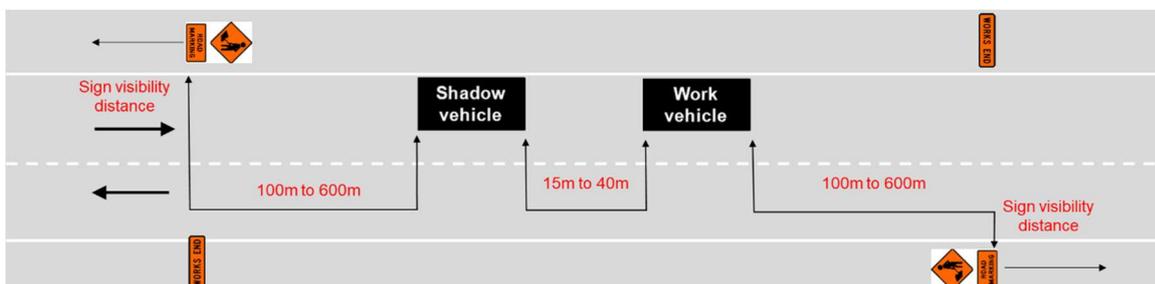
- Maintaining good communication
- Knowing your contingency process
- Having a clear plan to manage cyclists and pedestrians when impacting cycle lanes and walkways.

## Distances between vehicles in a mobile operation

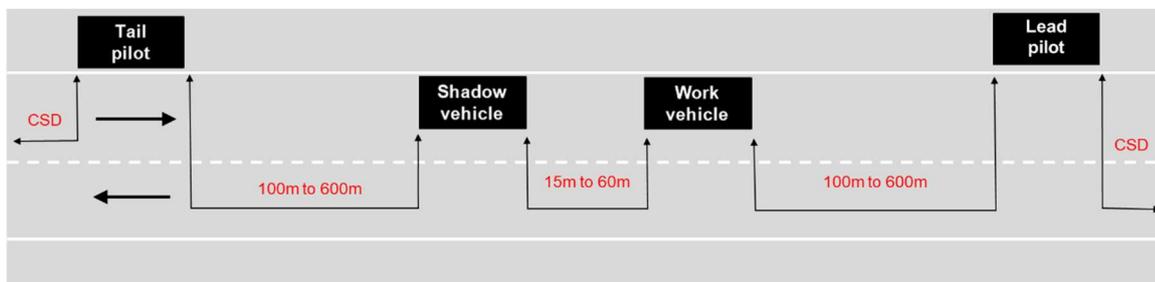
### Cat A multi-lane road - shadow vehicle with tail pilot substituted with static signs



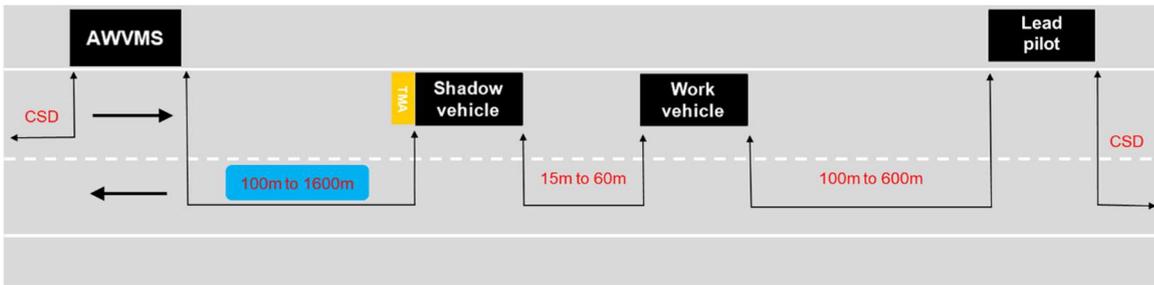
### Cat A bi-directional road - shadow vehicle with tail pilot substituted with static signs



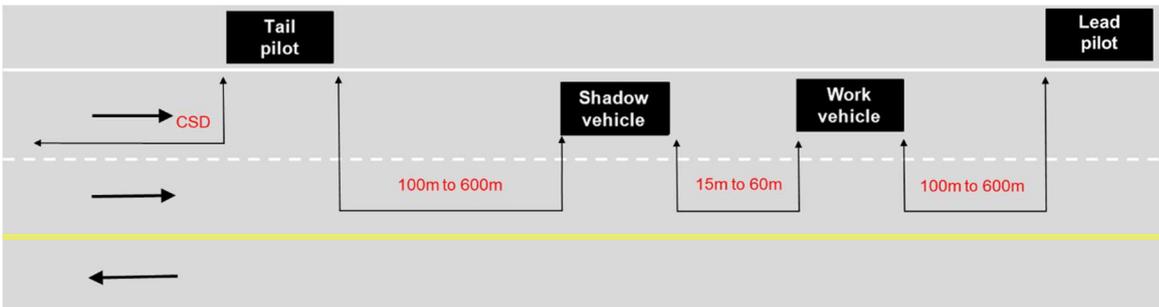
### Cat B level 1 bi-directional road - shadow vehicle with tail pilot



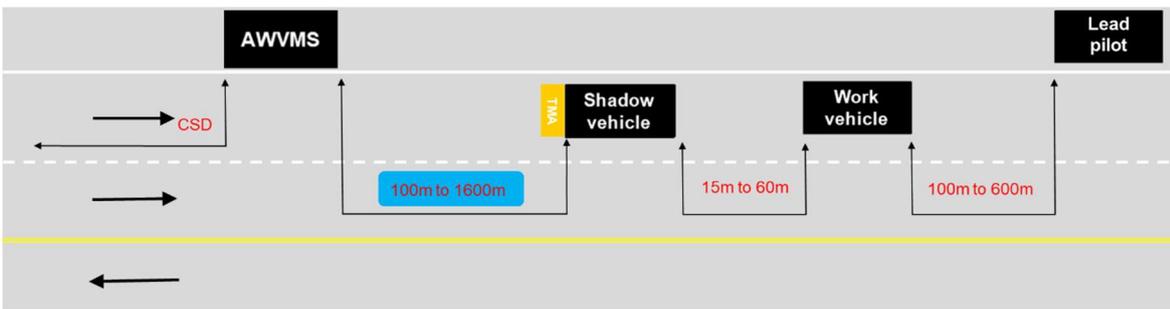
### Cat B level 2 bi-directional road - shadow vehicle with tail pilot



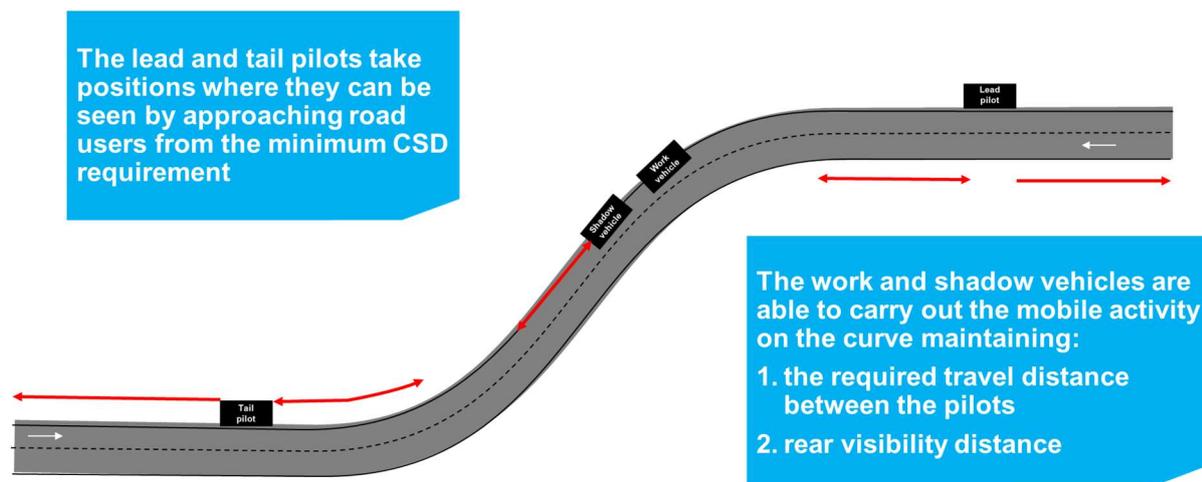
### Cat B Level 1 passing lane - shadow vehicle with tail pilot



### Cat B Level 2 passing lane - shadow vehicle with tail pilot



### Mobile operation operating on curves



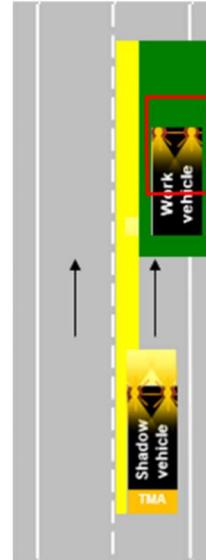


## Maintaining safety zones when exiting a vehicle

A driver must be in control of the vehicle at all times while performing a mobile operation.

Crew may need to exit the vehicle on the traffic side in some mobile operations.

Manoeuvring the work vehicle as far right as possible will ensure that sufficient lateral safety space between passing traffic and crew is maintained.

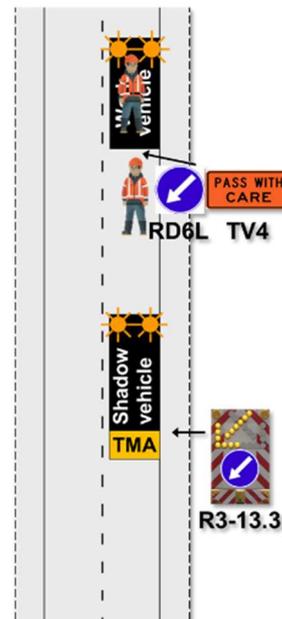


## Workers on the back of a working vehicle

Workers on the back of a working vehicle in the lane or partially in the lane must be protected by a shadow vehicle.

Workers on foot behind a work vehicle must be protected by a shadow vehicle.

This applies to all categories of road.



## Additional safety controls

Make sure you are aware of your own company health and safety procedures when working off a work vehicle these might include:

- The requirement to wear a body harness attached to a fall arrestor or lanyard system which must be attached to the vehicle when it is moving
- The requirement to ensure that when travelling on the back of a vehicle for short distances 3 points of contact must be maintained at all times or that personnel must be seated
- The requirement for deck persons to have working communication devices to communicate instructions and emergency procedures

**Never ride on the back of a shadow vehicle**

**Never ride on the work vehicle during setup or removal loops**

# Mobile onsite record form (MOSR)

There is an onsite record form which has been designed to be used when carrying out mobile operations. The form has been developed to be used across multiple sites such as when the same type of mobile activity is carried out repeatedly.

This form should not be used for static sites – use the original OSR. The up-to-date MOSR and a guideline can be accessed from the Waka Kotahi CoPTTM website.

ON-SITE RECORD MOBILE OPERATIONS (On-site record must be completed and retained with the applied TMP for 12 months)						Today's date
						17/11/21
STMS in charge of TTM						
<i>Nareesh Patel</i>		<i>STMS M</i>	<i>123456</i>	<i>2/11/24</i>	<i>Nareesh Patel</i>	<i>9am</i>
Name	NZTA warrant	TTM ID Number	NZTA warrant expiry date	STMS signature	Time	
In charge STMS pre-start check						
Mandatory items to be checked as fit for purpose	High-visibility garments are fit for purpose, in an acceptable condition and worn correctly?	Vehicle Xenon (or LED) Beacons are fit for purpose?	LAS/RD6/AWVMS/VMS/Horizontal arrow boards are fit for purpose?	TMA's are fit for purpose	Two-way radios available, operating OK and batteries are fully charged	Correct signs for work operation are fitted to all vehicles and are fit for purpose
	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Not required Lt</i>	<i>Yes</i>	<i>Yes</i>
Time the check was completed:	<i>9.30am</i>	In charge STMS signature:	<i>Nareesh Patel</i>			

Operation record (To be completed for all inspection worksites/runs, mobile runs, semi-static sites)				
Affected Road Environment Details			Work Activity Timing	
Affected Road name(s)	Worksite start point	Worksite end point	Start	End
<i>Anderson Road</i>	<i>No#1</i>	<i>No# 83</i>	<i>9.45am</i>	<i>10.45am</i>
<i>DeSilber Road</i>	<i>Anderson Road Int</i>	<i>Monteiths Street Int</i>	<i>11.00am</i>	<i>11.45am</i>
<i>Monteiths Street</i>	<i>No# 5</i>	<i>No# 167</i>	<i>12.30pm</i>	<i>1.00pm</i>

Checks (must be completed and documented at least every 30 minutes)							
Mobile closure							
Time	Distances between vehicles maintained	Lateral positioning of vehicles maintained	LAS/RD6/AWVMS/VMS/Horizontal arrowboards continue to operate correctly	Road clear and available for planned work?	Static equipment maintained?	Safety zones maintained?	Working space adequate and maintained?
<i>9.45am</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Yes</i>	<i>Yes</i>
<i>10.15am</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>N/A</i>	<i>Yes</i>	<i>Yes</i>
<i>11.00am</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>11.30am</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>12.30pm</i>	<i>Yes</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Comments relating to any changes and or improvements to the approved TTM/TMP							
Time of comment	Detail						
<i>10.00am</i>	<i>Waited 15minutes for rubbish collection to be completed based off risk assessment.</i>						
<i>12.30pm</i>	<i>Horizontal arrow board stopped working another vehicle was brought to site to complete the work</i>						
<i>1.15pm</i>	<i>Mobile was completed at 1pm all vehicles vacated Monteith's Street at 1.15pm</i>						