

Guidelines for the use of Truck Mounted Attenuators (TMAs)



Contents

Contents

Purpose	3
Objectives	3
Functional specifications for TMAs	3
Minimum training and qualifications	5
Parameters for when to use TMAs	5
Traffic management arrangement	6
TMA work instructions	6
TMA risk assessments	6
Appendix A – Training and Assessment	8
Appendix B – TMA Deployment Diagrams	11
Appendix C – Safe Work Method Statements	20
Appendix D – Hazard assessment	25

Purpose

These Guidelines have been produced for the deployment of Truck Mounted Attenuator Trucks (TMAs) to protect worksites on or beside active roads. TMAs may be deployed to protect short to medium term construction or maintenance works where it is not practicable to close the road or deploy temporary safety barriers for protection of workers. They may be deployed as 'barrier' or 'shadow' vehicles depending on the static or mobile nature of the works.

TMA's are required for the protection of works adjacent to all high speed high traffic volume roads. Their major application is for the protection of works on or adjacent to urban freeways where they are mandatory, but may also be applied to single lane undivided roads with appropriate traffic management and works on or adjacent to high speed roads in general.

For standardization purposes these guidelines are aligned with those produced by the Queensland Department of Main Roads, RoadTek, who were the first major users of TMAs in Australia. They also reflect the experience gained by VicRoads Major Projects Division through their extensive application on recent freeway upgrade projects, and the best practice research conducted in New Zealand with respect to the use of Variable Message Signs (VMS) for advance warning and improving the visibility of TMAs.

Objectives

The primary objective of these guidelines is to improve the safety of road workers through providing physical protection via TMAs when road closure or temporary safety barriers are not reasonably practical. TMAs also protect the occupants of errant vehicles through attenuating an impact that otherwise would be absorbed by a works vehicle.

The secondary objective is to provide standardized guidance for planning works involving TMAs including training and education of TMA operators and a consistent approach to the use of TMAs in Victoria.

Functional specifications for TMAs

This section provides standard functional specifications for TMAs used in Victoria. This includes areas such as seating, seatbelt harnesses, masts, visibility of the vehicle and standard control panel arrangement.

- TMAs are to be registered and have an applicable Permit issued by the road authority in the state of registration.
- All units are to be rated to a speed design of 100 km/h. This is the current maximum rating for a barrier vehicle.
- It is recommended that an Automatic Impact Brake System (AIB) be fitted to all TMA vehicles. The AIB is to meet Australian Design Requirements (ADR) in accordance with AustRoads standards.
- The rear of the attenuator is to be high visibility suitable for day and night use. Retro-reflective tapes and flashing yellow lights with an illuminated flashing arrow board are required. Black and yellow or red and white chevron markings at the rear of the crash attenuator are appropriate as a hazard warning.
- Cabin controlled Variable Message Signs (VMS) are recommended to further warn drivers of potential hazards and work zones in line with the TMA Work Instructions. VMS Displays may be pictorial (such as lane status arrows) or descriptive text (such as LANE CLOSED, MERGE RIGHT (or LEFT)).
- All trucks fitted with an attenuator must exceed the recommended weights specified by the TMA manufacturer or the US Federal Highway Administration (FHWA) acceptance letter. As a general guide a TARE of approximately 9 tonnes is required by the FHWA. A minimum of 10.4 tonne GVM is required in Victoria at this time. Note that 15 tonne GVM vehicles may be required in other states in future.
- As a minimum, the crash attenuator models shall meet both the mandatory and optional requirements as stated in the NCHRP 350 Report TL-3 level or the AASHTO Manual for Assessing Safety Hardware (MASH). Typical form of evidence of compliance would be, or may include, FHWA acceptance letter report of that particular make and model.
- All attenuator units shall have their test level rating clearly displayed on both side panels of the attenuator. The display shall be made up of a panel with black lettering (e.g. TL3) on a white 210mm x 300mm background. (Note that TMAs tested under the NCHRP 350 criteria and approved by the FHWA will be deemed to comply).



- All units are to be fitted with size "C" arrow-boards mounted above the height of the cabin. The control panel is to be able to be illuminated at night.
- All vehicles should be equipped with four point harness seat belts and approved mountings. These are only to be used when the vehicle is being used in the attenuator mode and must be utilised in conjunction with the vehicles standard seat belts.
- The seat is to be fitted with an adjustable headrest.
- All attenuator units are to be fitted with alarms to provide notice of the unit being raised or lowered.
- All vehicles are to be fitted with high strength steel headboards to prevent debris from crashing through the cabin in the event of a large impact. The back of these headboards are to be blacked out so as to contrast/highlight the arrow board and other detailing of the vehicle when viewed from the rear.
- All units are to be fitted with a minimum of four (4) flashing amber lights, two (2) on the top of the arrow-board, one (1) at the rear of the truck and one (1) on top of the cabin. The objective being to ensure the TMA is visible to vehicles approaching from behind or in front of the TMA.
- All units are to be equipped with standard multi channel UHF radios.
- All units are to be inspected by a suitably qualified inspector after a significant impact or accident that may affect the integrity of the vehicle and/or attenuator.
- At no time are loose items to be carried in the back of vehicles unless secured in lockers, while it is performing the duties of a TMA i.e. when in attenuator mode.
- TMAs used as stationary barrier vehicles are to be parked with brakes on so an impact will not force the TMA into the worksite or into trafficked lanes.
- Weight ballast attached to vehicles to increase their weight must be secured so that the engineered attachments are capable of safely restraining 20 times the ballast weight.
- Air Horns should be considered to warn workers of a vehicle approaching at a dangerous speed or on the off road side of the TMA.

Minimum training and qualifications

This section provides minimum training and qualification requirements for operators of TMAs.

Operators must have a minimum of the following training and qualifications before being eligible to drive a TMA:

- Possess a current licence applicable to the vehicle.
- Completed instruction in the use of TMA fixtures and equipment. This is to include passing a practical assessment in being able to operate a TMA.
- Completed instruction in the operation of the TMA including the roll-ahead distance at various impact speeds and vehicle weights.
- Completed instruction in the correct operation of the illuminated flashing arrow board when located in and off the operating lanes.
- Training in Traffic Guidance Schemes.

Note: The possession of a current Occupational First Aid Certificate is recommended but not compulsory. Whenever a TMA is used a person with a current Occupational First Aid Certificate should be on site.

Appendix A contains a performance assessment checklist for TMA operators and an outline of a suitable TMA training course. The performance assessment is to be completed by the Project Supervisor, Project Manager, Workplace Health and Safety Officer, or Workplace Trainer.

Parameters for when to use TMAs

General

When determining if a TMA should be utilized the criteria in Table 1 below should be considered.

If the work meets 1 & 2 first, then any of the other criteria, then a TMA shall be incorporated into the traffic management arrangements. Emergency works should have their own risk assessment to determine if a barrier/shadow vehicle is required, taking into account the obligation to apply the hierarchy of safety controls to all construction activities on or adjacent to a road used by traffic under the OHS Act 2004 and the OHS (Construction) Regulations 2007.

Emergency works

It has been the practice to deploy TMA for emergency road repairs for short duration without advance warning signage and delineation provided approaching vehicles have at least a 200 metre sighting distance of the worksite. However, conventional advance signage and bollard delineation is to be deployed as soon as practicable unless the worksite is located outside of a trafficked lane (fully off road, in verge or in emergency lane).

An advance warning VMS (either vehicle mounted, TMA mounted or trailer) is to be used should traffic lanes be blocked. This VMS is to warn drivers of the lane closure and the need to merge right or left.

A second TMA with a VMS is to be deployed on the verge providing advance warning if the TMA protecting the works is occupying a traffic lane and an adjacent lane, emergency lane or wide sealed shoulder exists on the off road side of the TMA to protect against errant vehicle intrusions. Refer to TMAs arrangement Diagram 4 on page 15.

Maintenance works

Note that to comply with the OHS Regulations a maintenance activity which presents a similar risk of exposure to an errant vehicle entering a roadwork site shall be protected by a TMA in the same way as for a construction activity.

Criteria	Yes/No
1. Substantive speed limit \geq 80 km/h (Note: Lower worksite speed limits should be posted for longer term deployment particularly for night works).	Yes
2. Highest control practicable under the hierarchy of safety controls for worksite traffic management. Road closure or temporary safety barriers are not practicable due to the short duration mobile nature of the works.	Yes
3. Work is adjacent to or on traffic lane(s) and includes erecting signage where applicable. A TMA is also mandatory for all progressively moving work utilising a trafficked lane.	Yes
4. Work is not protected by safety barriers or works are within the clear zone at the posted speed limit for the adjacent traffic (Refer Worksite Safety – Traffic Management Code of Practice 2010).	Yes
5. Work is required within the 'No Go Zone' behind temporary safety barriers.	Yes

Table 1 When to Use a TMA

Traffic management arrangement

This section provides indicative TMA Deployment Diagrams which illustrate various work site situations and circumstances. The diagrams are included as Appendix B. The plans indicate the appropriate positions of TMAs and works/shadow vehicles.

The plans include a new category of worksite named "Progressively Moving". This has been developed to address numerous situations where work is undertaken over long distances but it is considered of higher risk to erect and dismantle traffic control devices every two kilometres as required by a "Frequently Changing" worksite.

Progressively Moving work does not use fully protected worksites or mobile works convoys, and is for intermittent and low impact works. It is a short-term activity or work operation that is carried out on the roadway with work location moving as the work progresses. This is based on a risk analysis determining that workers would be at greater risk if they were exposed to passing traffic while erecting traffic control devices for a frequently changing or fixed lane closure.

Mobile Temporary Speed Zones are required if workers are on foot and close to traffic. Speed limits signs are required to be displayed on vehicles for advance warning including tail vehicle which may be a TMA and all other vehicles in the works convoy.

If the works are to be conducted at the one location for a significant period then a formal lane closure should be deployed as a combination of controls, particularly where works vehicles occupy a traffic lane.

Progressively Moving worksites are not permitted on two-lane two-way roads. Progressively Moving work includes but is not limited to the following activities:

- Lamp maintenance
- Help phone maintenance
- Wire barrier and guardrail repair
- Road inspection activities
- Road furniture repair
- Pavement repair (small scale e.g. potholes)
- Overhead/electrical sign repair
- Agreed works where it is not practical to close the road or install safety barriers

No one standard Traffic Management Plan can operate for every work site or for different operations at a particular site. Work site situations should be considered by the project manager during the planning stage of a project. The TMP's should be adapted to allow for site specific requirements for those situations not specifically covered by the diagrams. These project specific Traffic Management Plans should be included in the overall project plan.

Traffic Management Plans in Appendix B include use of the TMA for the following situations:

- Diagram 1
TMA Deployment in Emergency Lane or Verge
- Diagram 2
TMA Deployment on Undivided Road
- Diagram 3
TMA Deployment in Traffic Lanes - Low Traffic Volume
- Diagram 4
TMA Deployment in Traffic Lanes - High Traffic Volume
- Diagram 5
TMA Deployment Mobile Works in Traffic Lanes including Progressively Moving

TMAs may be deployed without advance signage provided they are not located in a trafficked lane (i.e. are fully located in an emergency lane, shoulder or adjacent to the road) and are visible to approaching traffic for at least 200 metres. An additional TMA should be considered if less than 200 metres approach sight distance is available. Very short term application in a trafficked lane is permissible provided advance signage and bollards are deployed as soon as practicable under emergency road repair or very short term protection of works vehicles during deployment.

TMA work instructions

This section provides a list of sample work instructions for how to operate a TMA. The work instructions are included as Appendix C. Work instructions include:

- Using TMAs to close a lane (deploy/remove traffic management devices)
- Using TMA's in a mobile situation or progressively moving work situation.

TMA risk assessments

Under the OHS (Construction) Regulations 2007 all work on or adjacent to a road used by traffic is classified as a high risk. An obligation is imposed on the Works Manager (who is in control of the site) to apply the highest level of control practicable under the circumstances.

For works where it is not practicable to close the road (due to unacceptable traffic congestion or unsuitability of alternative routes) the positive physical protection provided by a TMA is both practical and a proven level 3 safety control. TMAs are used in most states of Australia and have saved lives and serious injuries during their deployment in Victoria.

TMA Protection Required for All Works On or Adjacent to High Speed High Volume Roads

It is expected that TMAs will be used to protect all works conducted on or adjacent to high speed high volume roads where pedestrian workers are present. For protection of longer term works where TMAs are the highest practical control due to the transient nature of the works, the use of additional works vehicles to protect against lateral worksite intrusion by errant vehicles is recommended.

This section provides a generic Safe Work Method Statement (SWMS) for a lane closure on a multi-lane road including the use of a Truck Mounted Attenuator. The SWMS is included as Appendix D.

The generic assessment should be used as an indicative SWMS that should be expanded by the project manager to include other project specific risks in consultation with employees / contractors engaged in the works. All persons engaged in the work shall be inducted into the SWMS and their signatures appended to the document indicating that they understand the safe work method statement and that they agree with the system of work and will comply with the procedure.

Advance Warning VMS When TMA Occupies Trafficked Lane

An advance or TMA pre-warning VMS display is required alerting drivers that there is a lane closure ahead and to merge left or right is necessary on high volume roads such as urban freeways. The forward view of drivers is likely to be more restricted on high traffic volume roads.

TMA Performance Assessment Checklist

1.1 Routine checks on truck/TMA (non-critical)

- Standard pre-start vehicle checks are conducted in accordance with Fleet Management requirements
- Checks truck for attenuator defects
 - Checks for any damage to the attenuator
 - Checks flashing lights are working
 - Checks all communication devices/two-way radio/mobile phones
 - Checks for loose nuts and bolts, pins on attenuator and truck mounting.
 - Checks oil leaks
 - Checks attenuator in clean and tidy condition

Comments

1.2 Operational checks (non-critical)

- Completes operational checks as per Total Fleet Management requirements
 - Starts up truck and allows warm up
 - Completes vehicle log book
 - Checks brakes (small movement) including park brake
 - Checks operation of attenuator
 - Checks operation of arrow board
 - Checks operation of flashing lights
 - Checks all warning devices including air horn and truck horn.

1.3 Lane closure (critical)

- Meets the appropriate people to discuss work.
- Identifies work area
- Ensures workers are protected if erecting signs and traffic control devices
- Demonstrates adequate site distance for vehicles approaching from behind
- Ensures all warning devices are used before attenuator placed in the right position on the ground
- Communicates to other vehicles when to move into position
- Ensures correct distance from the vehicle/workers in front
- Ensures TMA (barrier or shadow application) is the first vehicle on road way
- Keeps alert at all times, looking into mirrors and looking around work area

Comments

1.4 after completion of lane closure (critical)

- Where required TMA is positioned to protect workers

Comments

1.5 Lane pick up (critical)

- Ensures workers are protected if erecting signs and traffic control devices
- Reverses along lane closure while traffic cones are removed to taper
- Drives around to the start of the taper and protects the closed lane while the taper is removed
- Drive around is performed twice more to remove pre-warning signs from both sides of road separately
- On completion raises attenuator first, then lowers arrow board and turns off all warning devices

Comments

1.6 TMA shutdown (non-critical)

- Allows idle down (turbo-charged)
- Sets park brake
- Parks in safe area
- Ensures there is at least 50% fuel in tank
- Removes keys
- Finishes paperwork

Comments

Outline of truck mounted attenuator training package

Section A: theory

Section B: practical

Purpose

Background

- History of TMAs
- TMA incidents
- Guide for use of TMA's

Qualifications

- Minimum training requirements shall include TMA application as per these guidelines and Traffic Guidance Schemes
- Assessments

Specifications of barrier vehicle

Legislation

- Occupational health and safety act & regulations Victoria
- Road management act
- Worksite safety – traffic management code of practice
- Required documentation

When to use TMAs

Progressively moving work

Traffic management plans

- Short Term Single Lane Closure
- Short Term Double Lane Closure
- Short Term Triple Lane Closure
- Short Term Lane Closure in Area of On Ramp
- Short Term Lane Closure in Area of Off Ramp
- Lane Closure Progressively Moving Work Site - Multi Lane Carriageway
- Shoulder Closure Progressively Moving Work Site - Multi Lane Carriageway
- Lane Closure Progressively Moving Work Site – Multi Lane Carriageway with Limited Shoulder Width
- Installation of Raised Pavement Markers Mobile Works
- Two TMAs Arrangement
- Mobile Works

Work instructions

Risk assessment obligations under ohs act and regulations

Communication and feedback

Assessment

- 85% pass required

Appendix B – TMA Deployment Diagrams

- Diagram 1
TMA Deployment in Emergency Lane or Verge
- Diagram 2
TMA Deployment on Undivided Road
- Diagram 3
TMA Deployment in Traffic Lanes - Low Traffic Volume
- Diagram 4
TMA Deployment in Traffic Lanes - High Traffic Volume
- Diagram 5
TMA Deployment Mobile Works in Traffic Lanes
including Progressively Moving

NOTE: Formal Lane Closures and Traffic Management shall comply with the Worksite Safety - Traffic Management Code of Practice 2010.

Diagram 1. TMA Deployment in Emergency Lane or Verge

The TMA, works vehicle or works personnel shall not intrude into trafficked lanes. Short term works may be conducted without speed reduction. Speed reduction shall comply with the Worksite Safety - Traffic Management Code of Practice 2010.

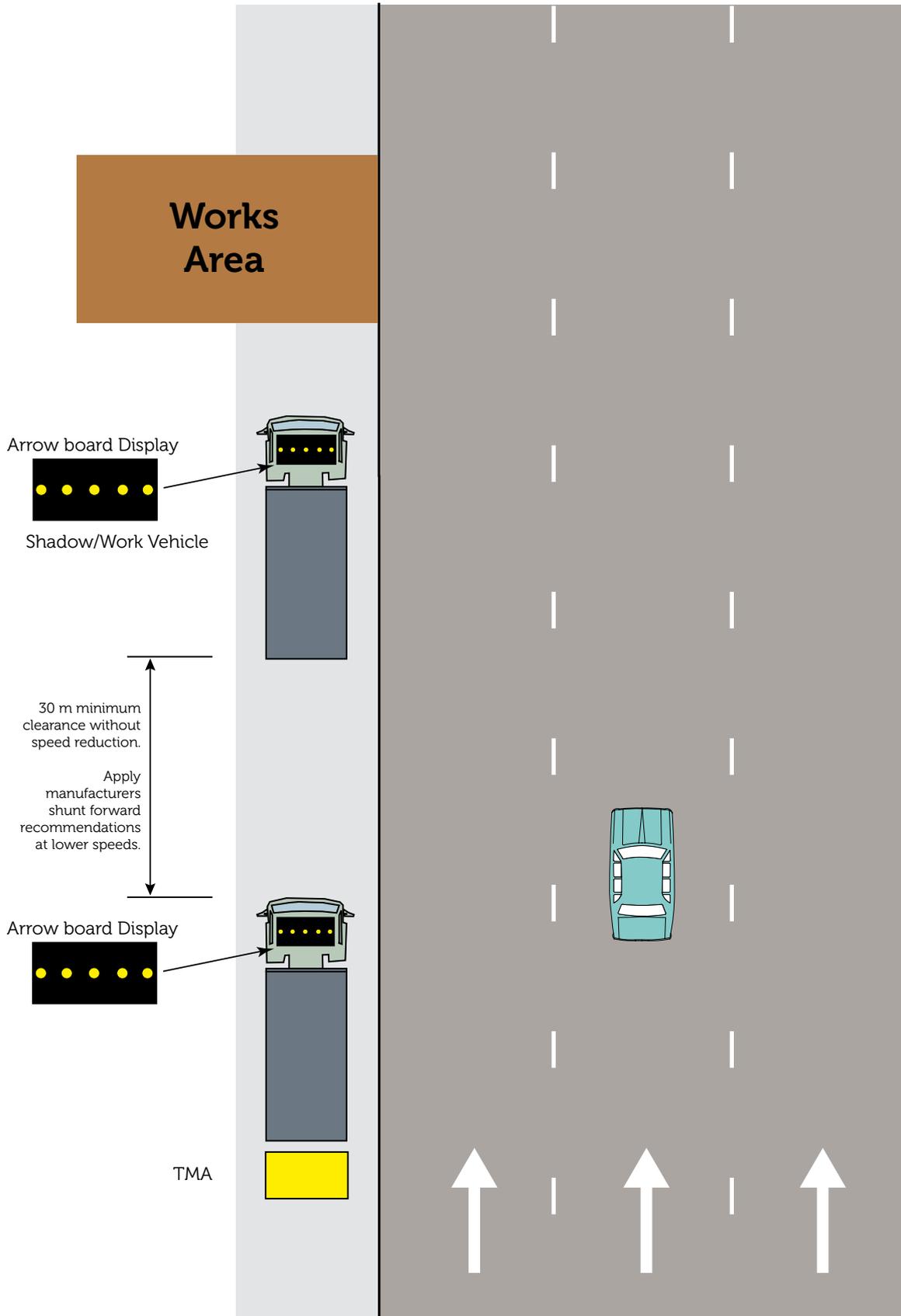


Diagram 2. TMA Deployment on Undivided Road

The TMA, works vehicle or works personnel shall not intrude into trafficked lanes without formal lane closure and traffic control to the Worksite Safety – Traffic Management Code of Practice 2010. Short term works in verge or off road may be conducted without speed reduction. Arrow board shall not display merge right or left arrows.

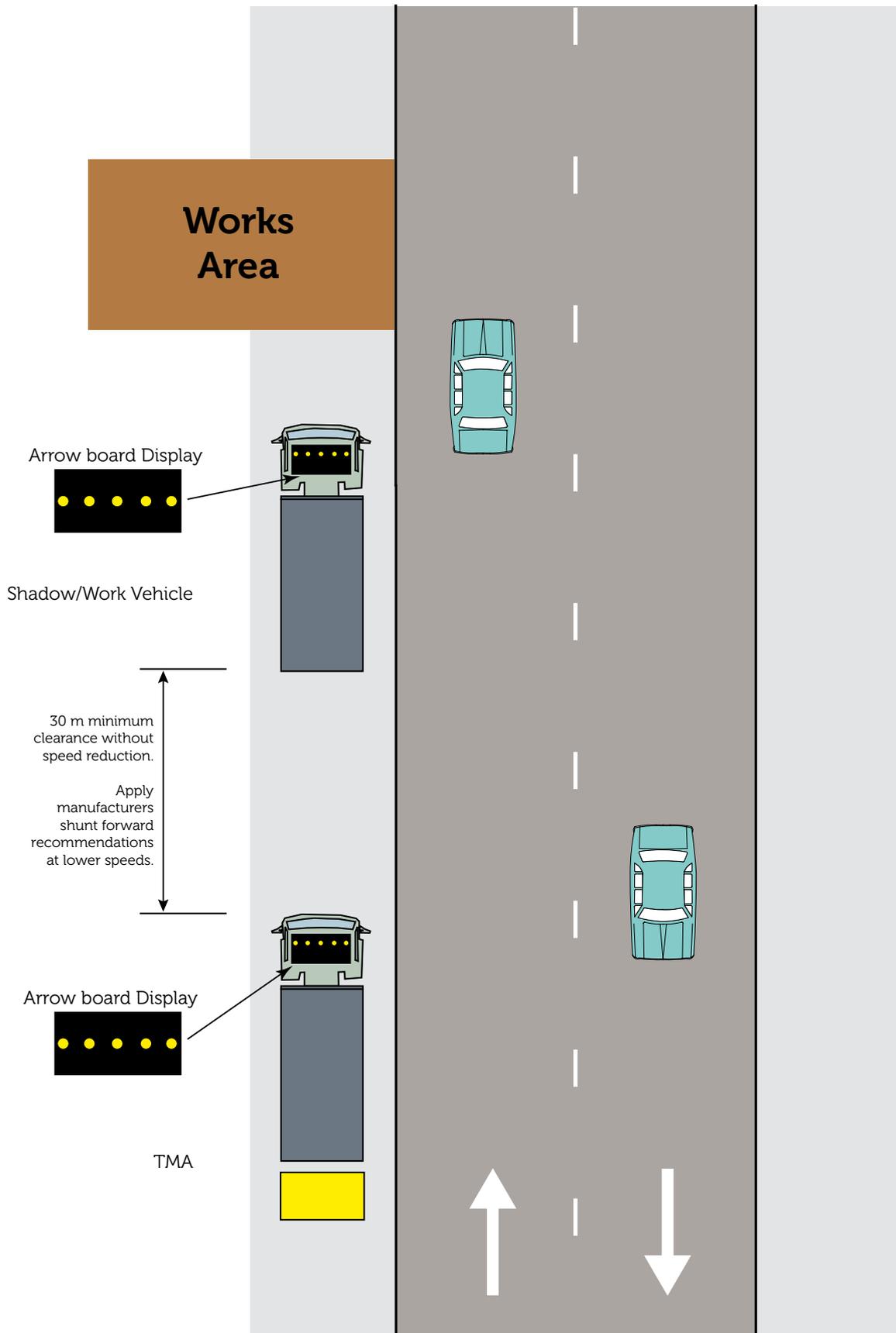


Diagram 3. TMA Deployment in Traffic Lanes – Low Traffic Volume

Short term emergency works may be conducted without speed reduction but a formal lane closure shall be established to the Worksite Safety – Traffic Management Code of Practice as soon as practical.

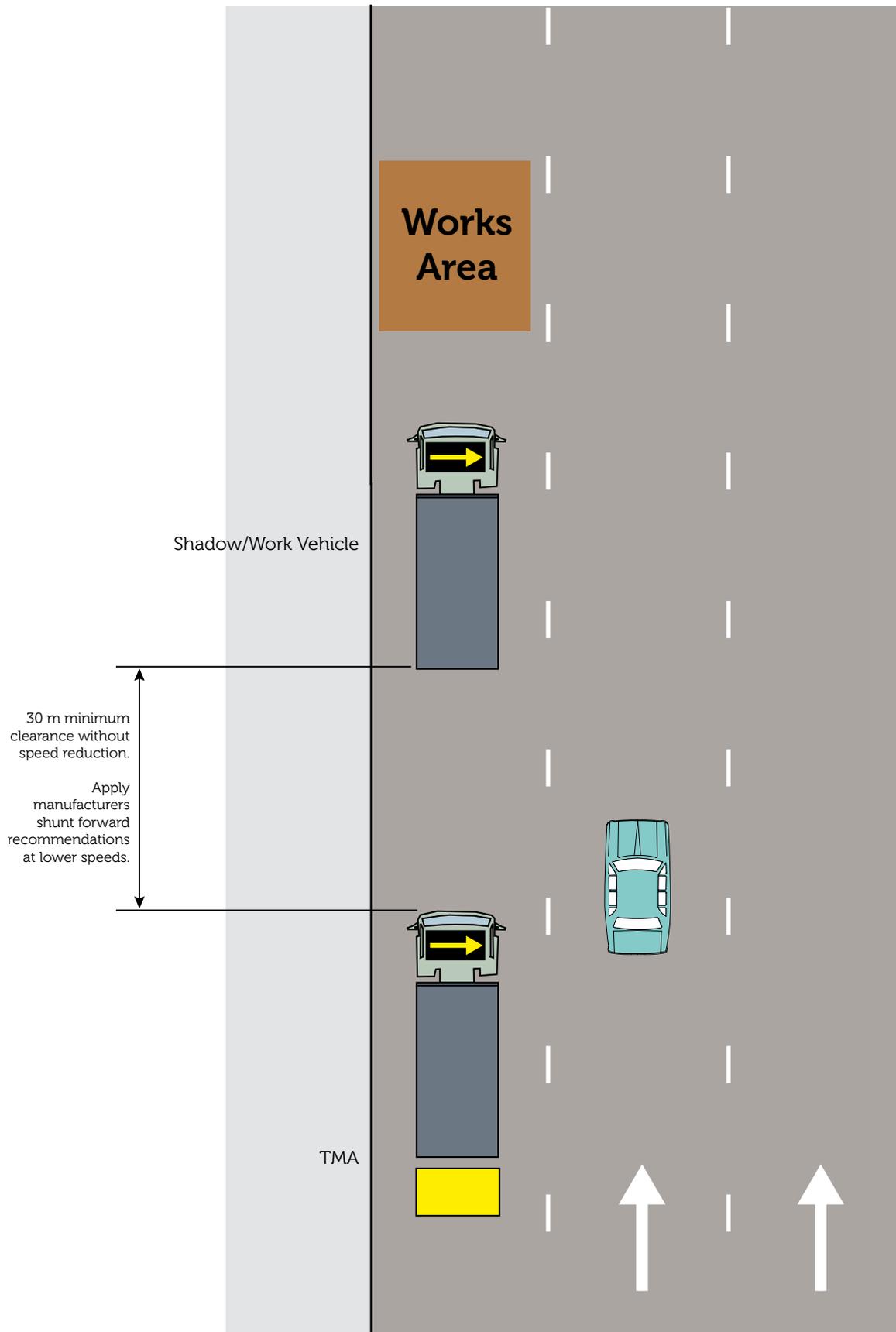


Diagram 4. TMA Deployment in Traffic Lanes – High Traffic Volume

Short term emergency works may be conducted without speed reduction but a formal lane closure shall be established to the Worksite Safety – Traffic Management Code of Practice as soon as practical. Advance warning TMA with VMS deployed in verge or emergency lane.

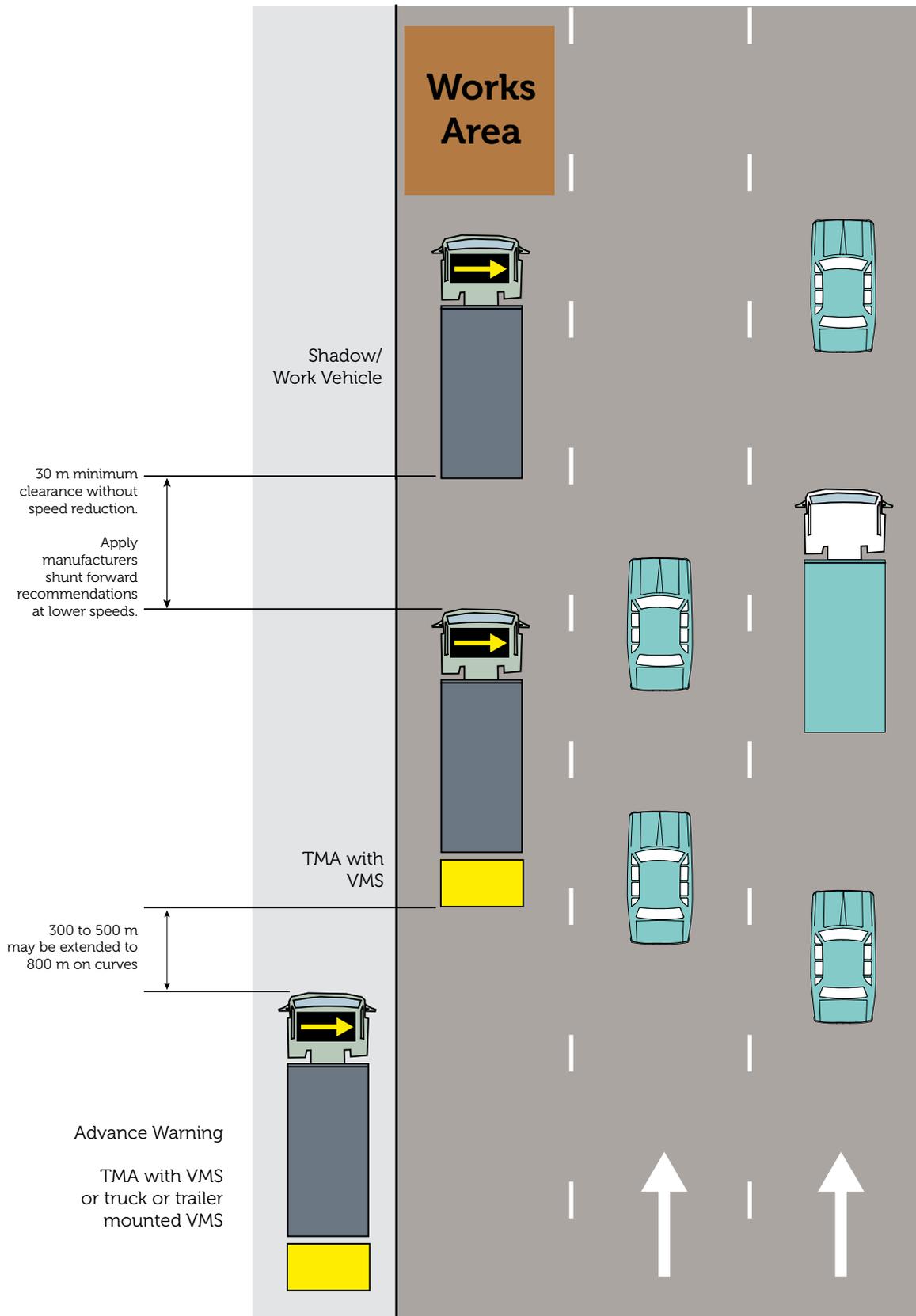
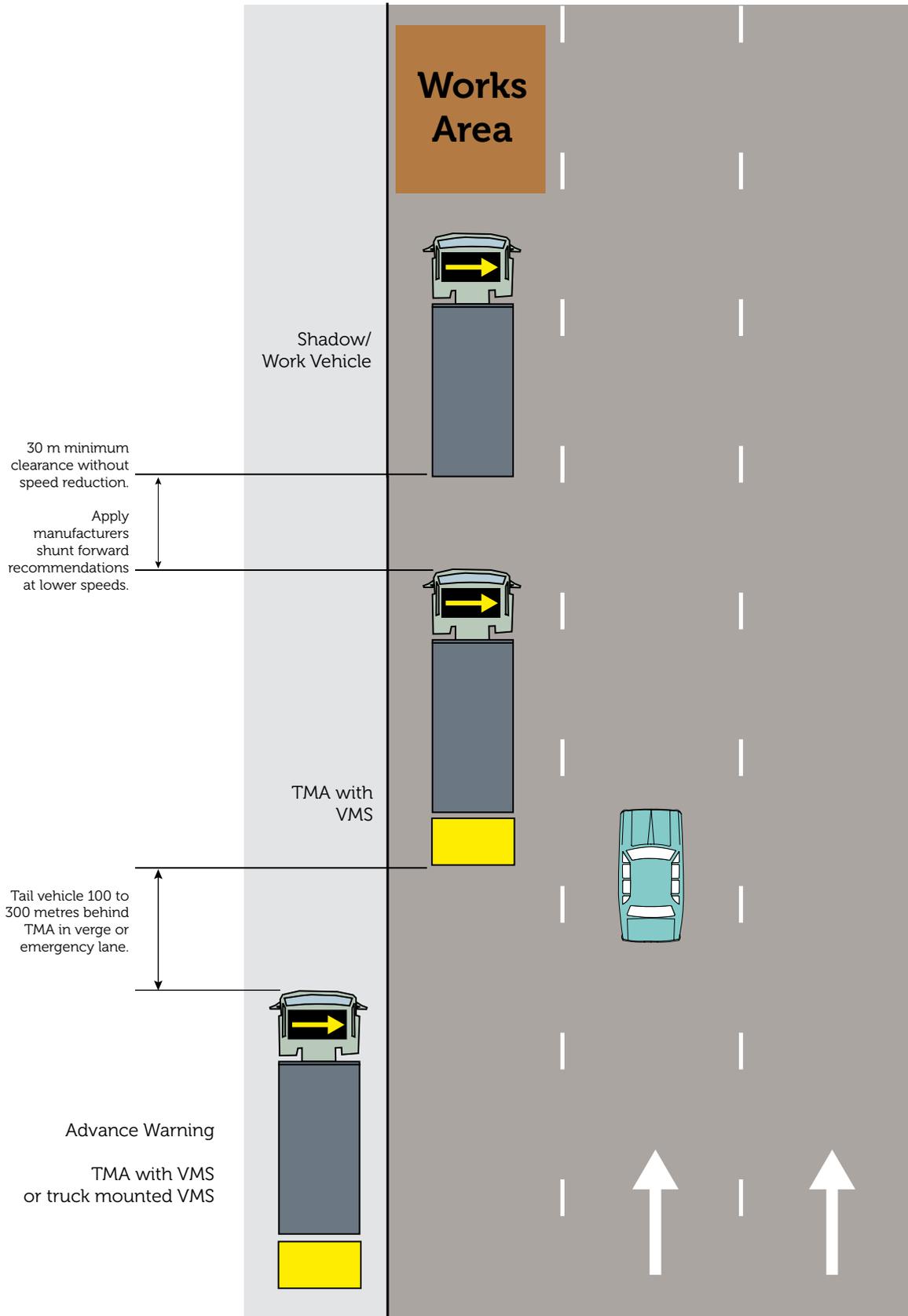


Diagram 5. TMA Deployment Mobile Works in Traffic Lanes Including Progressively Moving

Speed reduction shall comply with the Worksite Safety – Traffic Management Code of Practice 2010 Mobile Temporary Speed Zones and AS 1742.3 Section 4.6 Mobile Works.



Appendix C – Indicative Safe Work Method Statements for TMA Operation

Work Instruction

Using Impact Attenuator to set up Lane Closure on Multi Lane Road

Steps	Hazard	Additional PPE	Notes/Controls
<ul style="list-style-type: none"> ■ Consider potential hazards and control measures. ■ Undertake and complete a risk assessment. <p>Note that no personnel are to cross road on foot as per prohibition notice</p>	Hit by fast moving vehicle		<ul style="list-style-type: none"> ▢ Police may be used ▢ No work to be undertaken during rain periods or poor visibility ▢ Undertake mandatory daily pre-start meeting prior to commencing. ▢ Consider the speed and road environment ▢ Consider lane closure restrictions
Ensure plant has been serviced and adjusted	Defective plant		<ul style="list-style-type: none"> ▢ Perform pre-start check of vehicle and fittings as per PHS Total Fleet Management requirements (lights, attenuator, horn, oil, water, etc.) ▢ Complete defect notice ▢ Fill in log book
Specify appropriate traffic control strategy to suit work area.		High Visibility Garments	Refer to TMD's (supervisor to advise operator)
All vehicles shall have a reliable communication system	Comms system not working		All vehicles fitted with UHF radios, test communication at the time of pre-start check.
<p>Notes specific to Barrier Truck and driver</p> <ul style="list-style-type: none"> ■ Only the driver is to be in the barrier truck when the attenuator is in operation, except when being instructed or assessed by a qualified instructor. ■ The barrier truck driver shall not exit the vehicle while in open traffic lanes. ■ No personnel are to be behind, beside or within 30 metres of the front of the barrier truck. ■ The barrier truck driver shall use air horns fitted to the truck to highlight a dangerous situation to warn personnel in the work zone. ■ Once the procedure commences the driver of the barrier truck in consultation with the site supervisor has the authority to order all vehicles off the road if the driver believes the situation has become dangerous. 	Struck by vehicle		Ensure correct buffer distance
Determine the work area from works order or supervisors instructions			Consider the site risk assessment including inclement weather, traffic flow, speed environment and poor visibility etc.

GUIDELINES FOR THE USE OF TRUCK MOUNTED ATTENUATORS (TMAs)

Steps	Hazard	Additional PPE	Notes/Controls
<p>Preparation for Lane Closure.</p> <ul style="list-style-type: none"> ■ Work vehicles to be positioned in front of barrier vehicle a suitable distance before work site ■ All vehicles shall activate beacon lights and/or arrow boards ■ Proceeding to work site all vehicles to remain as a convoy ■ The attenuator may be lowered into operational position while stationary and clear of traffic lanes or once in moving convoy at a maximum speed of 80KPH (the operator shall ensure no vehicles are in the lowering area of the attenuator) 	<p>Vehicle crash and lowering attenuator onto vehicle</p>		<p>Flashing beacon lights and/or arrow boards to be used.</p> <p>All vehicles to stay in constant contact via UHF radio.</p> <p>Barrier truck driver to use discretion when lowering attenuator.</p>
<p>Establish traffic control</p> <ul style="list-style-type: none"> ■ Traffic control is to be in accordance with Traffic Management Plans. ■ Barrier Truck to shadow traffic control vehicle while approach signs are being erected. This may include temporarily positioning the barrier vehicle in the traffic lane to protect the workers erecting signs. ■ This operation will take a minimum of 2 passes. The 1st to set up prewarning signs on side of the road. The 2nd to set up pre-warning signs and traffic cones on other side of road. ■ Barrier Truck to shadow traffic controller by being positioned in the traffic lane while traffic cones in the taper are being placed. ■ Barrier Truck then follows in the closed lane as the traffic cones are placed along the lane line. ■ No personnel to cross road on foot as per prohibition notice. ■ Where work is to be within 1.2m of traffic the speed is to be reduced to forty (40) Km/h as soon as practicable. <p>Do the work</p> <p>When the lane has been closed the barrier truck may be positioned in the closed lane.</p> <p>Within a lane closure the barrier truck driver may safely exit the vehicle to work with the crew keeping clear of the front of the vehicle and as far as possible from trafficked lanes.</p>	<p>Struck by passing vehicles</p> <p>Hit by debris</p> <p>Struck by vehicle</p>	<p>High visibility garments</p>	<p>Traffic control as per TMD's</p> <p>Barrier vehicle with attenuator in position</p> <p>Beacon lights and/or arrow boards in operation</p> <p>All vehicles to stay in constant contact via UHF radio</p> <p>Barrier truck driver to sound air horn if unsafe traffic situation arises</p> <p>Ensure that approaching traffic has minimum 200m sight distance to the barrier truck</p> <p>Police may be used</p> <p>No personnel to cross road on foot as per prohibition notice</p> <p>Refer to risk assessment</p>

<p>Remove Traffic Control</p> <ul style="list-style-type: none"> ■ Barrier truck shall reverse along lane closure while traffic controllers remove traffic cones. Taper to remain in place. ■ To remove taper the barrier truck shall drive around to the start of the taper as with setup unless the shoulder width permits it to remain within the taper closure. The shoulder width should accommodate the width of the IMPACT ATTENUATOR.. ■ Barrier truck protects the closed lane while the taper is removed. ■ The drive around is performed twice more to remove pre-warning signs from both sides of road separately. ■ When re-entering traffic the vehicles shall accelerate in the lane, deactivate beacon lights and arrow boards and continue as part of general traffic. ■ The attenuator may be raised at a maximum speed of 80KPH 	Vehicle crash		All vehicles to stay in constant contact via UHF radio
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Using Truck Mounted Attenuator in Progressively Moving or Mobile Works on Multi Lane Roads

Steps	Hazard	Additional PPE	Notes/Controls
<ul style="list-style-type: none"> ■ Consider potential hazards and control measures ■ Undertake and complete a risk assessment. ■ Note that no personnel are to cross road on foot as per prohibition notice 	Hit by fast moving traffic		<ul style="list-style-type: none"> ■ Police may be used ■ No work to be undertaken during rain periods or poor visibility ■ Undertake mandatory daily pre-start meeting prior to commencing ■ Consider the speed and road environment ■ Consider lane closure restrictions
<ul style="list-style-type: none"> ■ Ensure plant has been serviced and adjusted 	Defective plant		<ul style="list-style-type: none"> ■ Perform pre-start check of vehicle and fittings as per PHS Total Fleet Management requirements (lights, attenuator, horn, oil, water, etc.) ■ Complete defect notice ■ Fill in log book
<ul style="list-style-type: none"> ■ Specify appropriate traffic control strategy to suit work area. 		High Visibility Garments	Refer to TMD's (supervisor to advise operator)
<ul style="list-style-type: none"> ■ All vehicles shall have a reliable communication system 	Communication system not working		<p>All vehicles fitted with UHF radios</p> <p>Test communications at the time of pre-start check</p>

<p>Notes specific to Barrier Truck and driver</p> <ul style="list-style-type: none"> ■ Only the driver is to be in the barrier truck when the attenuator is in operation, except when being instructed or assessed by a qualified instructor. ■ The barrier truck driver shall not exit the vehicle while in open traffic lanes. ■ No personnel are to be behind, beside or within 30 metres of the front of the barrier truck. ■ The barrier truck driver shall use air horns fitted to the truck to highlight a dangerous situation to warn personnel in the work zone. ■ Once the procedure commences the driver of the barrier truck in consultation with the site supervisor has the authority to order all vehicles off the road if the driver believes the situation has become dangerous. 	<p>Struck by vehicle</p>		<p>Ensure correct buffer distance</p>
<ul style="list-style-type: none"> ■ Determine the work area from works order or supervisors instructions 			<p>Consider the site risk assessment including inclement weather, traffic flow, speed environment and poor visibility etc.</p>
<p>Preparation for Lane Closure.</p> <ul style="list-style-type: none"> ■ Work vehicles to be positioned in front of barrier vehicle a suitable distance before work site ■ All vehicles shall activate beacon lights and/or arrow boards ■ Proceeding to work site all vehicles to remain as a convoy ■ The attenuator may be lowered into operational position while stationary and clear of traffic lanes or once in moving convoy at a maximum speed of 80KPH (the operator must ensure no vehicles are in the lowering area of the attenuator) 	<p>Vehicle crash Lowering attenuator onto vehicle</p>		<ul style="list-style-type: none"> ■ Flashing beacon lights and/or arrow boards to be used ■ All vehicles to stay in constant contact via UHF radio ■ Barrier truck driver to use discretion when lowering attenuator

<p>Establish traffic control</p> <ul style="list-style-type: none"> ■ Traffic control is to be in accordance with Traffic Management Plans. ■ One person is to act as the team leader co-ordinating the traffic control. They are to take the leadership role for all aspects associated with traffic control. ■ IMPACT ATTENUATOR and work vehicle to slow down gradually to a stop as they approach the work site and if all tail vehicles are in position work may commence. ■ If parked on the shoulder, once tail vehicle is in position the IMPACT ATTENUATOR is to move out into the trafficked lane. ■ Once the IMPACT ATTENUATOR is positioned in the trafficked lane the work vehicle and workers may move into the closed lane. ■ Note that a minimum distance of 30 metres is to be maintained between the work zone and the shadow vehicle. ■ The handbrake is to remain off when the IMPACT ATTENUATOR is acting as the tail vehicle. ■ The barrier truck driver shall not exit the vehicle. ■ The work crew shall carry out works as per the appropriate works procedure ■ No personnel to cross the road on foot as per prohibition notice 	<p>Struck by passing vehicles Hit by debris</p>	<p>High visibility garments</p>	<ul style="list-style-type: none"> ▶ Traffic control as per MUTCD and/or TMD's ▶ Barrier vehicle with attenuator in position ▶ Beacon lights and/or arrow boards in operation ▶ All vehicles to stay in constant contact via UHF radio. ▶ Barrier truck driver to sound air horn if unsafe traffic situation arises ▶ Ensure that approaching traffic has minimum 200m sight distance to the barrier truck Police may be used ▶ Police may be used
<p>Remove Traffic Control</p> <ul style="list-style-type: none"> ■ All vehicles in the traffic lanes are to move away onto the shoulder or accelerate to combine with the passing traffic. ■ Work vehicles and barrier truck are to accelerate in their lane. Work vehicles deactivate lights and arrow-boards. Barrier truck operator lifts attenuator before deactivating lights and arrow-board. 	<p>Vehicle crash</p>		<p>All vehicles to stay in constant contact via UHF radio</p>

Appendix D – Hazard assessment

Workplace health & safety hazard analysis & treatment sheet

Part A - Hazard analysis

Works activity: Shoulder or Lane Closure on Multi Lane Road including use of a Truck Mounted Attenuator (TMA)

NOTE: Where a minimum standard for any item / activity is prescribed as law, NO Risk Assessment shall lower that standard!

Business unit:	Workplace location:
Project/works Order no:	Lot/activity:

No.	Specific activity	Hazard – risk (what can harm you? – What could go wrong?)	Existing risk controls/treatments	L	C	Risk level
	List each specific task or steps taken to do this work activity eg. Place out signage, Lift pipe, Remove wheel.	List the hazards and risks identified when doing each specific step or task eg Moving vehicles, size or weight of object, slope or slippery batters.	List existing controls used to reduce the risk for each specific step or task eg use barrier truck, use of crane.	Note: Calculate the L, C, Risk Level using the risk calculator eg. likely, severe, E(20)		
1	Consider potential hazards, control measures and appropriate PPE.	1.1 <ul style="list-style-type: none"> Struck by moving object Crushed by vehicle, plant or object High risk work. 	<ul style="list-style-type: none"> Keep clear of moving plant or vehicles Keep clear from between plant and trailers Reduce speed limit Staff do not cross any multi lane carriageways on foot PPE as per department policy 	unlikely	major	H(4)
		1.2 <ul style="list-style-type: none"> Muscular Strain 	<ul style="list-style-type: none"> Manual handling training 	unlikely	minor	L(4)
2	Ensure plant has been serviced and adjusted	Use of unsafe plant	<ul style="list-style-type: none"> Plant servicing and pre-start checks to be carried out and recorded in logbooks 	rare	minor	M(3)

3	Establish traffic control	<p>3.1</p> <ul style="list-style-type: none"> Struck by moving object 	<ul style="list-style-type: none"> Traffic control setup and devices utilised as per TMP's Qualified personnel PPE as per departmental policy Where possible exit vehicle on opposite side to passing traffic If exiting vehicle on traffic side always check for approaching vehicles Vehicles are to display arrow boards and use communications (UHF radio) 	unlikely	major	H(4)
			<p>Work Using a Truck Mounted Attenuator (TMA)</p> <ul style="list-style-type: none"> Consider the use of a TMA as per Traffic Management Diagrams and Work Instructions included in the "Guide for Use of TMA's." If a TMA is required then use in accordance with the above Guide. TMA to shadow personnel and vehicle placing traffic control devices 			
		<p>3.2</p> <ul style="list-style-type: none"> Driver aggression - verbal 	<ul style="list-style-type: none"> Monitor traffic build-up during works Open lane until normal traffic flow is achieved. 	likely	insignificant	M(4)
4	Disestablish traffic control	As per Establish Traffic Control	As per Establish Traffic Control			



For further information please phone **13 11 71**
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