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vic roads

Guidelines for the use of Truck Mounted Attenuators - TMAs

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Introduction

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

A TMA is defined as a combination of Host Vehicle (Truck) and Impact Attenuator Unit, either mounted on the Host Vehicle or towed by the Host Vehicle to protect road workers. The Impact Attenuator Unit, also known as a crash cushion or crash attenuator, is a device intended to reduce the damage done to structures, vehicles and motorists resulting from a motor vehicle collision. Impact Attenuator units are designed to absorb the vehicles' kinetic energy and/or redirect the vehicles away from the hazard, and from roadwork machinery or workers.

TMAs are required for the protection of works on or adjacent to all high speed roads. Their major application is for the protection of works on or adjacent to 'M' Classification Roads where they are mandatory. They are also applicable under the hierarchy of safety controls for the protection of works on all other roads where substantive speed limits are 80Km/h or more.

The following Acts, Regulations and Code of Practice are applicable to this work: Occupational Health and Safety Act 2004, Occupational Health and Safety Regulations 2007, Road Management Act 2004 and the Worksite Safety – Traffic Management Code of Practice 2010.

These guidelines reflect the experience gained by VicRoads through their application of TMAs on freeway upgrade projects, line marking, construction and maintenance works.

We also acknowledge the practices and experience of other road authorities in Australia and countries such as the United Kingdom, Europe and United States of America,

VicRoads acknowledge the National Guidelines for the Use of Truck and Trailer Mounted Attenuators (National TMA Guidelines) and in consultation with stakeholders in Victoria via the Government Reference Group for Worksite Safety – Traffic Management have endeavoured to meet recommendations, so far as is reasonably practicable at this time.

Purpose

The primary objective of these guidelines is to improve the safety of road workers through providing physical protection via TMAs against errant vehicle intrusion into worksites when road closure or temporary safety barriers are not reasonably practicable. TMAs also protect the occupants of errant vehicles through attenuating an impact that would otherwise 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.

- TMA Mass: For acceptable impact performance, the minimum TARE mass requirements of the attenuator manufacturer for the host vehicle or as specified by the US Federal Highway Administration (FHWA) product acceptance letter are to be met. As a general guide the TARE mass of the TMA should be within 5 percent of the mass of the host vehicle on which the attenuator was crash tested (recent recommendations are about 9000 kg).

  The host vehicle TARE mass is the mass of the host vehicle with all the components necessary for operation as a TMA i.e. this would include the vehicle, the attenuator and any other permanently mounted equipment such as arrow boards, equipment lockers, mounting brackets, ballast (where necessary), etc. Items that are not easily removed from the TMA vehicle.

  In addition to this TARE mass, VicRoads in consultation with stakeholders has previously established a requirement for all TMA host vehicles to be a minimum of 10.4 tonne GVM. Furthermore, it has been agreed by the Government Reference Group for Worksite Safety – Traffic Management, that from 1st January 2018 the minimum GVM requirement will be increased to 15 tonne GVM for all TMAs. All new TMAs in Victoria are required to be at least 15 tonne GVM effective immediately.

  As a minimum 15 tonne GVM TMAs with a TARE or unladen mass as described above shall be used on 'M' Classification Roads where the substantive speed limit is 100 km/h or more and a high volume of heavy interstate trucks are expected.

  The host vehicle GVM mass is the maximum operating mass of a vehicle as specified by the manufacturer including the vehicle's chassis, body, engine, engine fluids, fuel, accessories, driver, passengers and cargo but excluding that of any trailers.

  The shunt / roll forward performance of a TMA vehicle is directly affected by the mass of the vehicle. The minimum mass must meet as a minimum the TARE mass recommendations above to ensure that the TMA performs as crash tested. The increased requirement in GVM mass by road authorities are intended to ensure that the minimum manufacturer's recommended mass is adhered to.

  The TARE and GVM mass in kilograms are to be clearly displayed on the TMA operator's door.

- Truck Mounted Attenuators are to be registered and have a permit issued by the National Heavy Vehicle Regulator. More information may be found at: nhvr.gov.au/safety-accreditation-compliance/vehicle-standards-and-modifications/applications-and-forms. This is because they generally exceed the legal rear overhang for a vehicle of 3.7 metres, attenuators having a rear overhang of about 4.3 metres.
- Trailer Mounted Attenuators may also exceed the rear overhang requirement and operators will need to contact VicRoads Operational Policy Section (Regulatory Services) to obtain in principle approval to operate the combination of host vehicle and attenuator trailer.
- VicRoads Road Design Note RDN 06-04 Accepted Safety Barrier Products details VicRoads accepted Truck Mounted Attenuators for use in Victoria.
- All units are to be rated to a design speed of 100 km/h (TL3).
- An Automatic Impact Brake System (AIB) shall 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 or night use. Retro-reflective tapes and flashing yellow lights with an illuminated flashing arrow board (Class C) are required. Black, yellow, red and white chevron combination marking at the rear of the 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)).
- 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, United States of America Federal Highway Administration (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. (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 they may be fixed or retractable in height as determined by the TMA owner. The cabin control panel is to be able to be illuminated at night.
- All host vehicles shall be fitted with four point harness seat belts and approved mountings to comply with the national TMA guidelines. These are only to be used when the host vehicle is being used in attenuator mode and must be used in conjunction with the vehicles standard seat belts.
- To reduce the likelihood of rearward seat collapse in the event of a substantial rear impact the driver's seat and seat mountings must comply with the National TMA Guidelines either option 1 or option 2.
- The seat is to be fitted with an adjustable headrest to prevent operator whiplash during an errant vehicle impact.
- 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 into the cabin in the event of a high energy 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 cabin mounted standard multi channel UHF radios.
- After a significant impact or incident that may affect the integrity of the vehicle and / or attenuator all units are to be inspected by a suitably qualified inspector.
- All Attenuators are to be inspected for fatigue cracking in the mounting brackets at suitable intervals or as specified in the manufacturer's maintenance manual. These inspections are to be recorded in the unit's maintenance logbook.
- Loose objects are not to be carried on the back of the attenuator while it is in attenuator mode unless they are secured in lockers or so that the engineered attachments are capable of safety restraining 20 times the weight of the object. This particularly applies to 1000 litre bulk paint containers carried for line marking works. We discourage water as ballast and bulk paint containers being consumable are not suitable for ballast.
- TMAs deployed as stationary barrier vehicles are to be parked with brakes on and with wheels directed straight ahead. Directing the steering to one side can result in the TMA rolling when impacted or being directed into adjacent traffic lanes.
- Air Horns shall be fitted to warn workers of a vehicle approaching at a dangerous speed or on the off road side of the TMA. They also alert approaching errant vehicle drivers.
- The TMA shall be fitted with a CCTV Camera to allow the operator to observe traffic approaching from the rear. Consideration should also be given to the use of cameras suitable for both day and night operations, and installation of an associated data recording device to record vehicles approaching from potential impact areas.
- Rear marker plates must be fitted to the vehicle.
- TMA Repairs, Modifications and Inspections:
  - (a) All repairs and/or modifications to TMAs and attachments shall be carried out by a competent person.
  - (b) Following repair or modification TMAs and attachments must be inspected and have certification documentation prepared by a competent person.
  - (c) TMAs and attachments must be inspected at least once per year and have certification documentation prepared by a competent person.

Qualification Criteria for TMA Operators

Mandatory requirements for TMA Operator Training. VicRoads endorse the requirements as specified in Part B of the National TMA Guidelines.

In summary the following applies:

1. Hold a current and valid Heavy Vehicle Licence of a suitable class to operate the TMA.
2. Hold a General Construction Induction Card – CPCC0HS1001A (White Card).
3. Traffic Control Qualifications: TMA Operators must be able to produce evidence that they have completed and maintained currency in traffic control training equivalent to RIIOHS302 Implement Traffic Management Plan.

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 TMAs for emergency road repairs for short duration without advance warning signing and delineation provided approaching vehicles have at least a 200 metre approach sight distance of the worksite.

However, conventional advance signing 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).

Advance warning VMS

An advance warning VMS (either TMA mounted, Vehicle mounted or trailer) shall be used should works vehicles block traffic lanes, subject to a risk assessment. 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 14.

Maintenance works

Note that to comply with the OHS Regulations 2007 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.

Table 1 When to Use a TMA

Criteria	Yes/No
1. Substantive speed limit ≥ 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 signing 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

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 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 (AS 1742.3 clause 4.6.5) 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.

They are also a practical means to reduce passing traffic speeds avoiding long distance speed restrictions during mobile or progressively moving works.

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

Progressively Moving worksites are not permitted on two lane two-way roads (one carriageway). 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

Mobile works general

The provisions of AS1742.3 Section 4.6 apply including the deployment of two tail vehicles on freeways, one of which may serve as an advance warning vehicle with VMS. However, TMA protection should be considered where tail vehicles are placed in traffic lanes on 'M' classification roads.

No one standard Traffic Guidance Scheme 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. A Traffic Management Plan 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
- **Diagram 6**
  TMA Deployment on Multi Lane Freeways such as West Gate Bridge in Victoria *(note that for multiple lane closures each lane shall be protected by TMA in a taper arrangement, where reasonably practicable. Errant vehicle intrusion from the side is more likely where more than two active traffic lanes exist adjacent to the work area)*.

TMAs may be deployed without advance signing 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 signing 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 guidance scheme devices)
- Using TMA's in a mobile 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 a practical short term control and a proven level 3 safety control. TMAs are used in most states of Australia and have prevented fatalities 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 short term works conducted on or adjacent to high speed high volume roads where workers on foot 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.

Appendix A – Training and Assessment

Truck Mounted Attenuator Assessment Cover Sheet

Operator's name

Work Location

Driver licence

Expiry date

TMA Vehicle plant number

Location of assessment

Assessment date

Assessor

Assessment comments

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 devises 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 lest 50% fuel in tank
- ⊗ Removes keys
- ⊗ Finishes paperwork

Comments

TMA Operator Training

Gained qualifications & experience through competency based assessment.

All TMA operators must successfully complete TMA Operator Training before operating the TMA. When training has been successfully completed a statement that clearly identifies the trainee's name, when the training occurred (date of training), training content and trainer's details.

The following elements of competency need to be covered and assessed for training of TMA Operators:

1. Plan and Prepare

- Access, interpret and apply compliance documentation relevant to work activity.
- Obtain and discuss safety requirements for the site, e.g. Traffic Management Plan (TMP).
- Set up TMA signing as required by TMP.
- Select vehicles, plant and equipment consistent with requirements for the job.

2. Conduct truck and attenuator pre-operational checks

- Check truck and attenuator (including TMA pre-start check) and
- TMA features and Functions).

3. Check TMA devices and identify positioning of TMA

- Position and check TMA signs and devices.
- Check TMA vehicle warning lights and displays.
- Identify TMA position according to TMP.

4. Use Radio Communication

- Check radio.
- Test and verify radio contact between all vehicles and handheld.
- Check radio contact periodically.
- Use radio communication between vehicles to confirm correct positioning of vehicle.

5. Operate TMA

- Identify site hazards associated with TMA operations.
- Identify and apply safe operating techniques for TMA.
- Operate TMA to work instructions including closing lanes and working in a mobile / progressively moving work situation.
- Move TMA safely between worksites.

6. Carry out Operator Maintenance

- Conduct inspection and fault finding.

In addition, all support staff working with a TMA must be inducted into the TMA, including the communication processes.

Appendix B - TMA Deployment Diagrams

TMA Performance Assessment Checklist

- 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
- Diagram 6
  TMA Deployment in Traffic Lanes including Progressively Moving - Multiple Lanes

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.

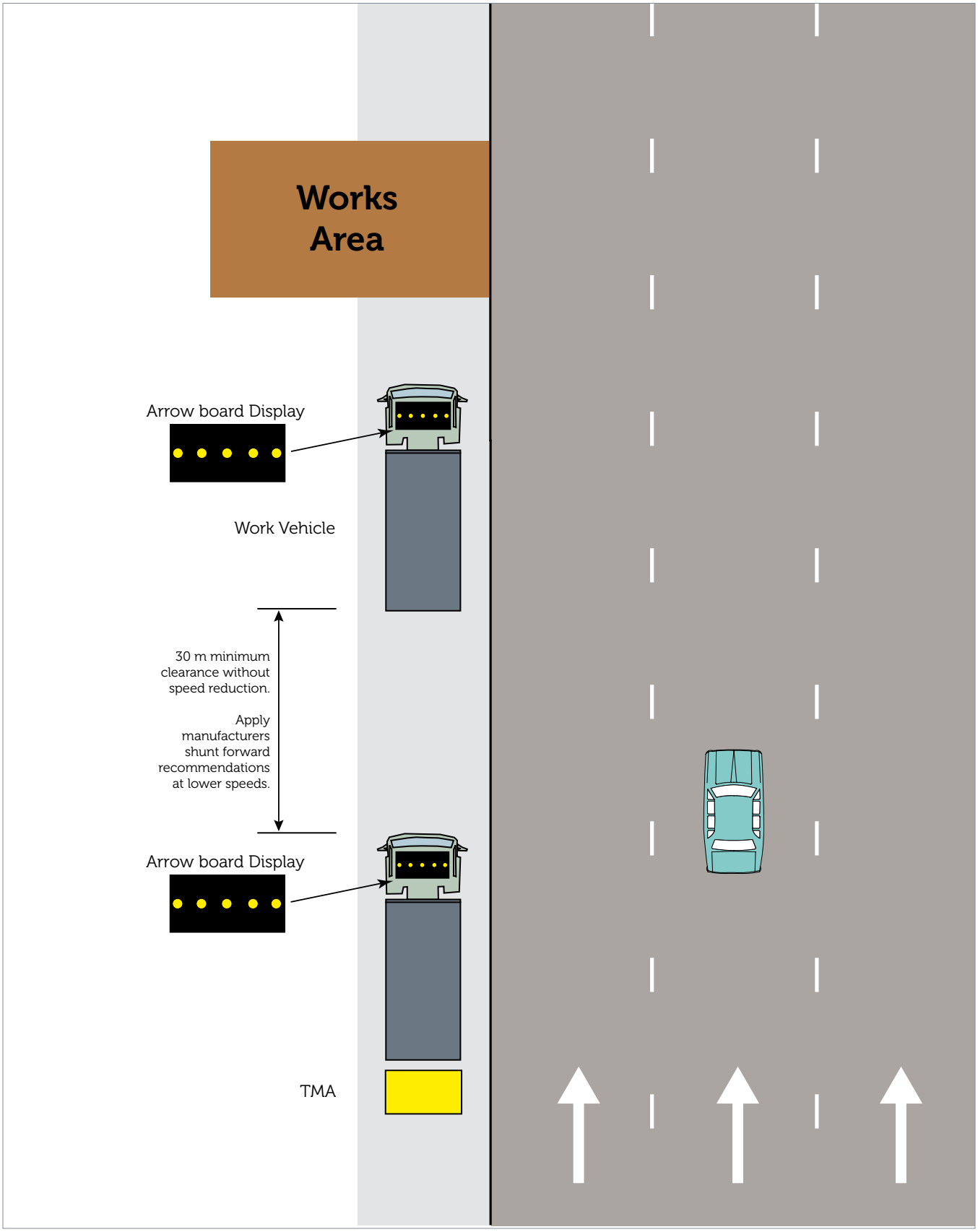


Diagram 2. TMA Deployment on Undivided Road

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.

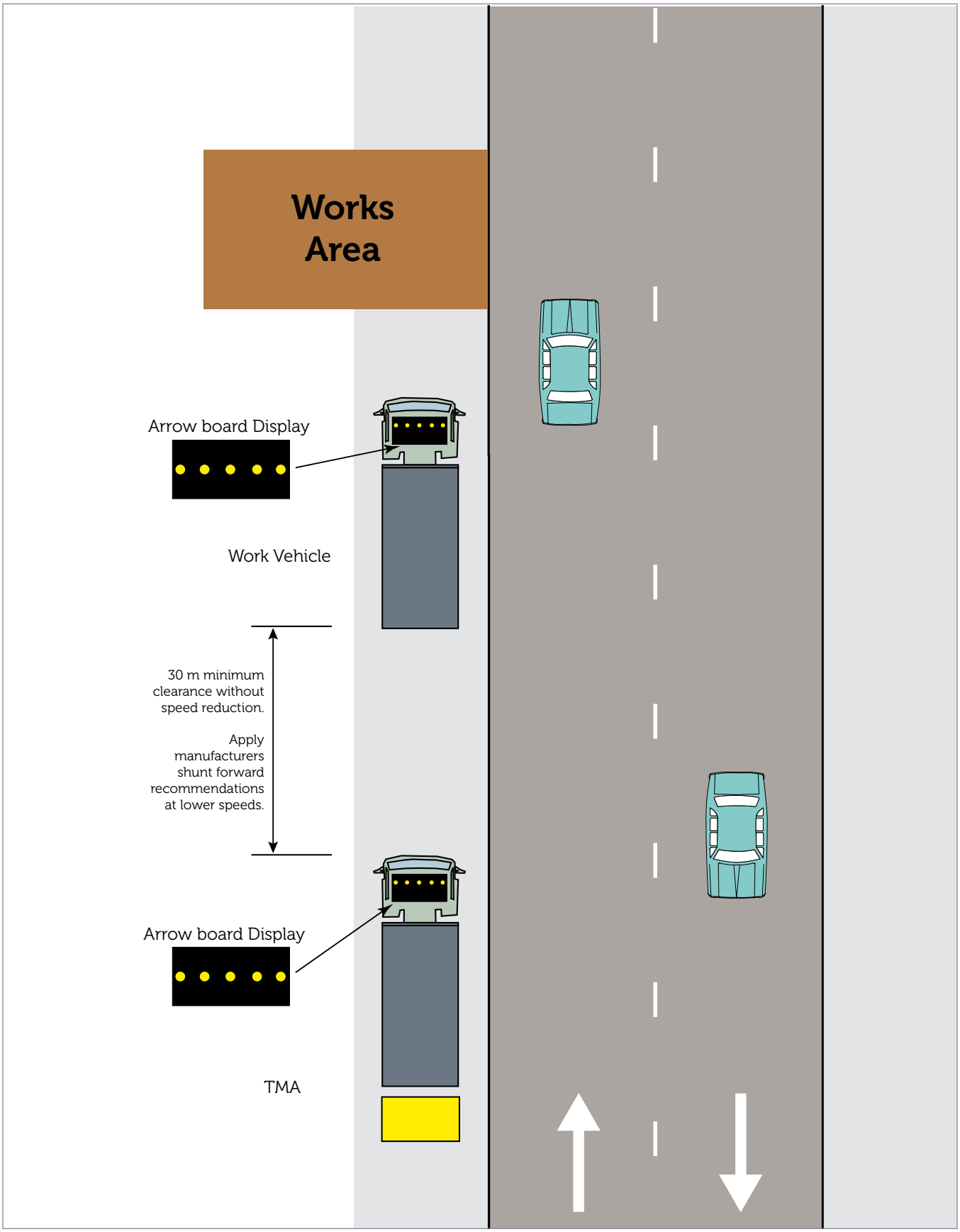


Diagram 3. TMA Deployment in Traffic Lanes – Low Traffic Volume

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.

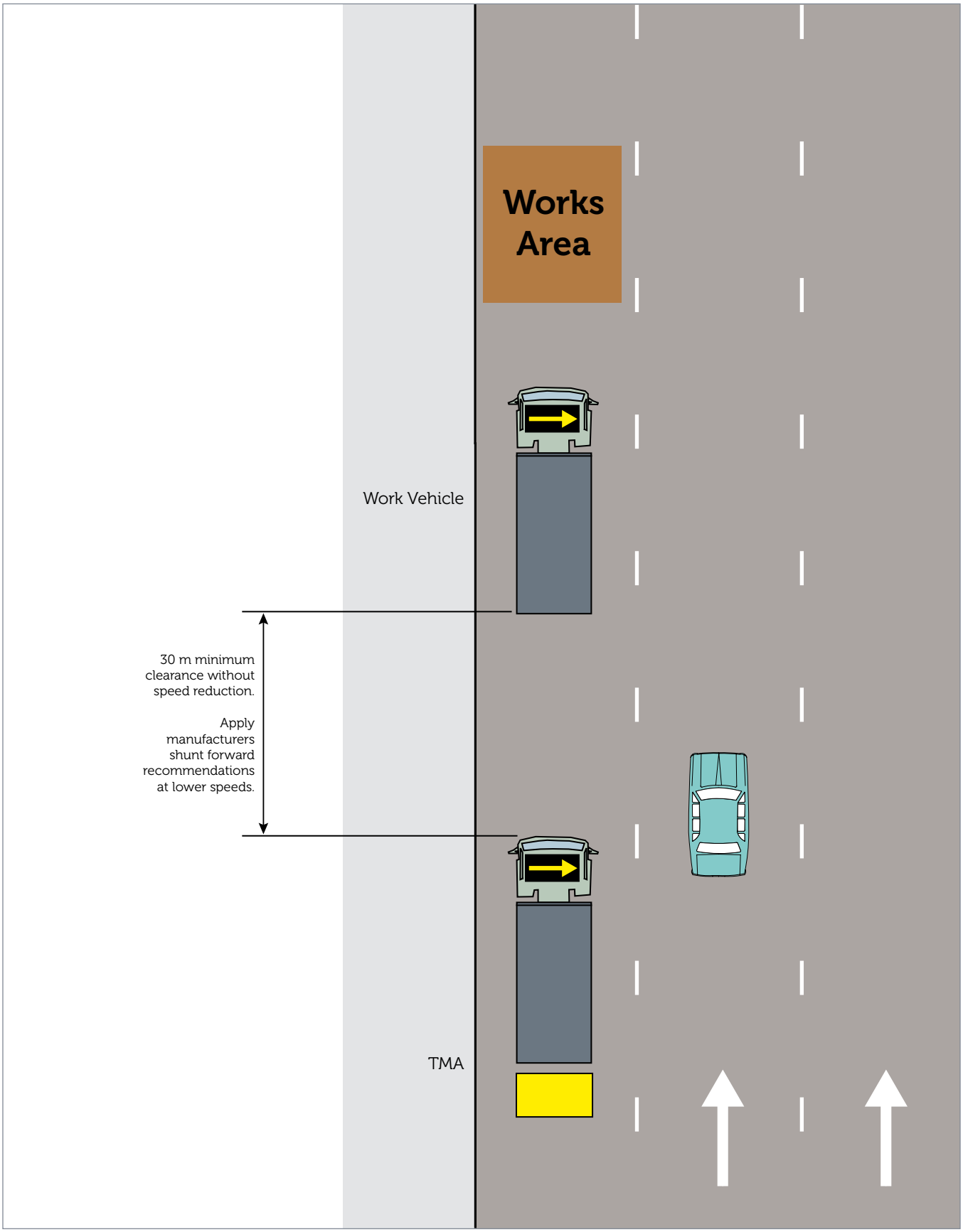


Diagram 4. TMA Deployment in Traffic Lanes – High Traffic Volume

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.

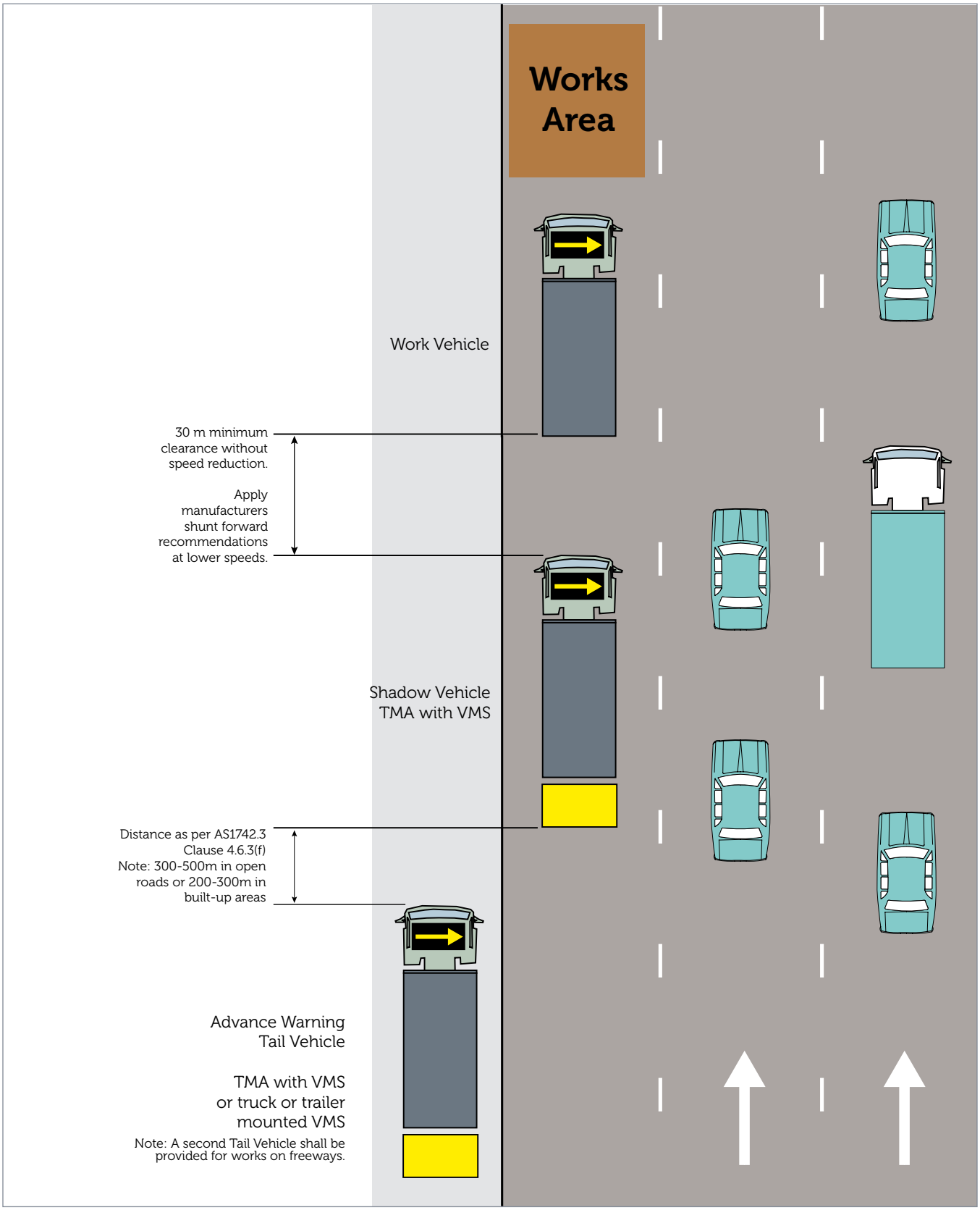


Diagram 5. TMA Deployment Mobile Works in Traffic Lanes Including Progressively Moving

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.

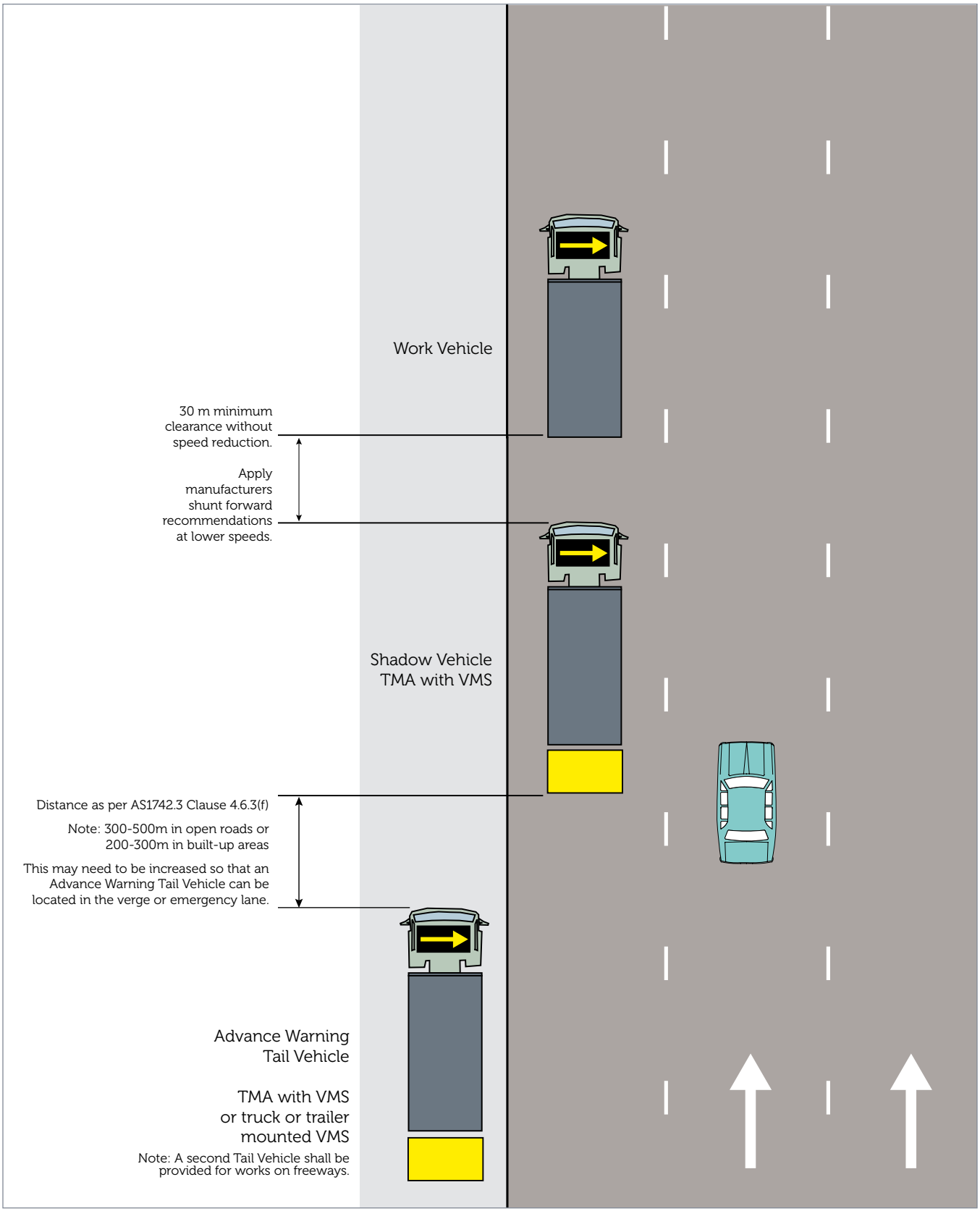
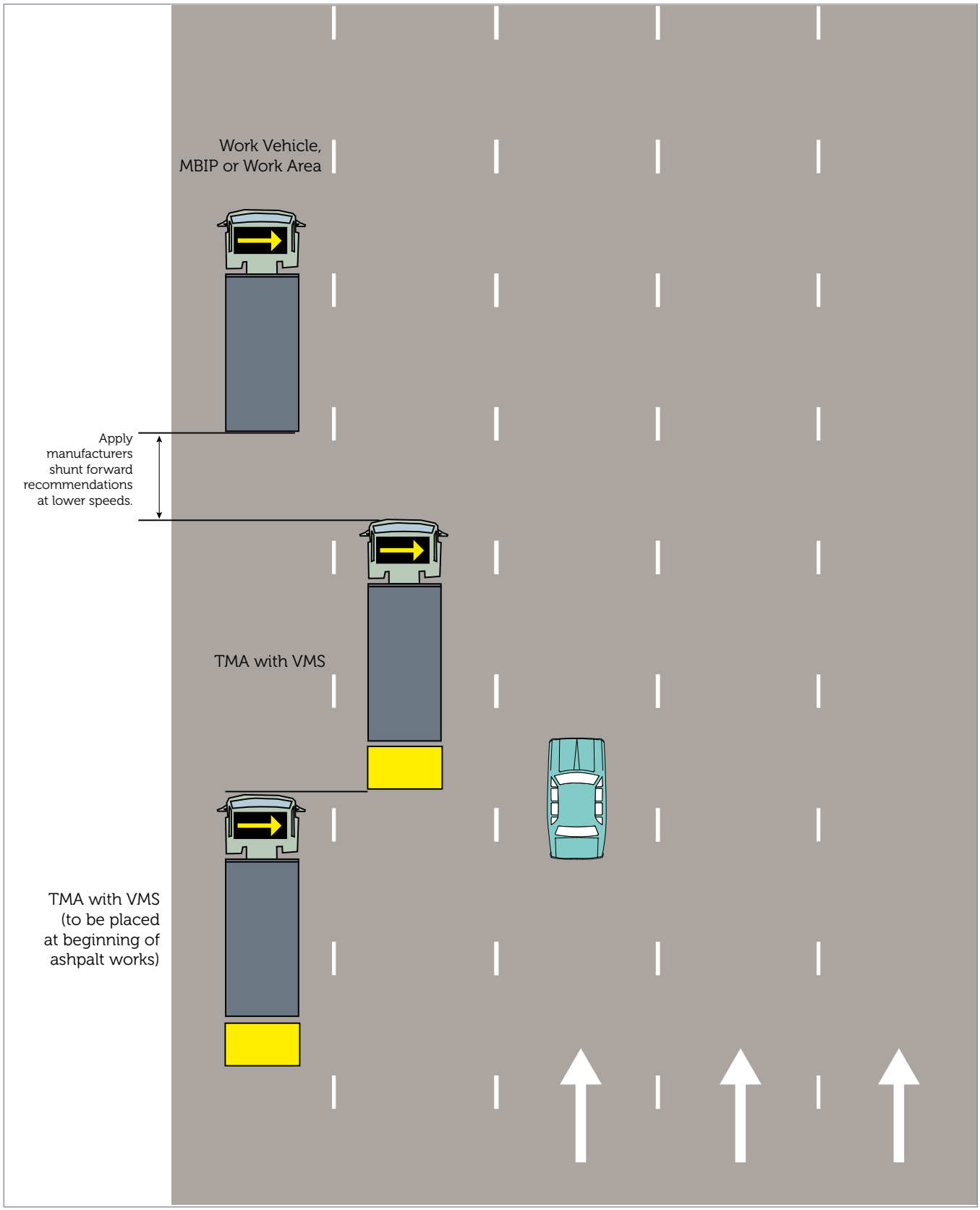


Diagram 6. TMA Deployment in Traffic Lanes Including Progressively Moving - Multiple Lanes

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. Use of Lane Utilisation Managemnt System (LUMS) where available and formal lane closures established to the *Worksite Safety - Traffic management Code of Pactice*. Example applicable to West Gate Bridge or Ashpalt Works where TMAs cannot stand on ashpalt.



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
■ 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 vehicle		■ 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		■ 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.
Notes specific to Barrier Truck and driver ■ 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.

Steps	Hazard	Additional PPE	Notes/Controls
Preparation for Lane Closure ■ 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)	Vehicle crash and lowering attenuator onto vehicle		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.
Establish traffic control ■ Trafic 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.	Struck by passing vehicles Hit by debris	High visibility garments	Traffic control as per 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 arrises Ensure that approaching traffic has minimum 200m sight distance to the barrier truck Police may be used No personnel to cross road on foot as per prohibition notice
Do the work When the lane has been closed the barrier truck may be positioned in the closed lane. 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 traffiked lanes.	Struck by vehicle		Refer to risk assessment

Steps	Hazard	Additional PPE	Notes/Controls
Remove Traffic Control ■ 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

Using Truck Mounted Attenuator in Progressively Moving or Mobile Works on Multi Lane Roads

Steps	Hazard	Additional PPE	Notes/Controls
■ 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		■ 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		■ 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	Communica-tion system not working		All vehicles fitted with UHF radios Test communications at the time of pre-start check

Steps	Hazard	Additional PPE	Notes/Controls
Notes specific to Barrier Truck and driver ■ 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.
Preparation for Lane Closure ■ 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)	Vehicle crash Lowering attenuator onto vehicle		■ 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

Steps	Hazard	Additional PPE	Notes/Controls
Establish traffic control ■ 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	Struck by passing vehicles Hit by debris	High visibility garments	■ 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
Remove Traffic Control ■ 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.	Vehicle crash		All vehicles to stay in constant contact via UHF radio

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 signing, 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** ■ Struck by moving object ■ Crushed by vehicle, plant or object ■ High risk work.	■ 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 ■ Muscular Strain	■ Manual handling training	unlikely	minor	L(4)
2	Ensure plant has been serviced and adjusted	■ Use of unsafe plant	■ Plant servicing and pre-start checks to be carried out and recorded in logbooks	rare	minor	M(3)

No.	Specific activity	Hazard – risk (what can harm you? – What could go wrong?)	Existing risk controls/treatments	L	C	Risk level
3	Establish traffic control	3.1 ■ Struck by moving object	■ 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)
			Work Using a Truck Mounted Attenuator (TMA)			
			■ 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			
		3.2 ■ Driver aggression - verbal	■ 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			

Workplace health & safety hazard analysis & treatment sheet

Part B – hazard control

No.	Possible risk treatments control measures	L	C	Residual Risk level	Responsible Person to action treatments	Remarks/review
	List possible control measures that will further reduce the risk for the specific step or task eg. Reduce traffic speed to 40 kph, place concrete barrier, use of vehicle mounted crane, construct steps into batter.	Note: Calculate the L, C, Risk Level using the risk calculator eg. unlikely, moderate, M(6)			List the person who would be responsible for the implementing the controls eg. Work crew supervisor	Any comments that will assist the work crew in implementing controls. Provide credible reason as to why higher level controls are not practical as per the WS-TM Code 2011.
	Utilise TMA where necessary to reduce likelihood of workers being struck by passing vehicle	unlikely	Major	H(4)	Work crew supervisor	Apply Guide for Use of TMA's

Is a Change to Procedure Required? ⊗ Yes ⊗ No If "Yes" Raise C.A.R. & Forward to System Coordinator.

Prepared by	Date	Workplace location

Approved by Project Manager	Date	Lot/activity

Team for approval	Remarks

Risk assessment escalated to Business Management due to risk level remaining i.e H4.

For further information please phone **13 11 71**
or visit **vicroads.vic.gov.au**

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