Guidelines for the use of Truck Mounted Attenuators (TMAs) in WA
## Document Control

<table>
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<tr>
<th>Owner</th>
<th>Executive Director Planning and Technical Services</th>
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<tbody>
<tr>
<td>Custodian</td>
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<tr>
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## Amendments

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1. INTRODUCTION

Main Roads has adopted the Safe System approach to the management of the road network, recognising that humans make mistakes which can lead to death or serious injury. Truck mounted attenuators (TMAs) accommodate for human error by protecting road workers and preventing road trauma by reducing crash forces to survivable limits.

This guideline has been produced for the deployment of truck mounted attenuators (TMAs) in Western Australia 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, mounted on 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 used for the protection of works on or adjacent to high speed roads with high traffic volumes. Their major application is for the set up or short term protection of works on or adjacent to Freeways (where they are mandatory, see section 4) or High Speed Multilane Carriageways.


These guidelines have been prepared following extensive consultation with Local Government, industry and other stakeholders through Advisory Group meetings and the TMA Operation Working Group meetings. Main Roads have endeavoured to meet recommendations, so far as is reasonably practicable at this time.

We also acknowledge the VicRoads Guidelines for the use of Truck Mounted Attenuators – TMAs and the National Guidelines for the Use of Truck and Trailer Mounted Attenuators (National TMA Guidelines).

2. 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 standardised guidance for planning works involving TMAs including training and education of TMA operators and a consistent approach to the use of TMAs in Western Australia.
### 3. DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Description / Explanation</th>
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<tbody>
<tr>
<td>AIB</td>
<td><strong>Automatic Impact Brake.</strong> A system that, in the event of an impact with the rear of the Impact Attenuator Unit, will apply the brakes of the TMA host vehicle automatically. The system must apply brakes on all wheels of the rear axle/s of the host vehicle.</td>
</tr>
<tr>
<td>Barrier Truck</td>
<td>Refers to the TMA host vehicle.</td>
</tr>
<tr>
<td>Blocker Vehicle</td>
<td>Vehicle parked in closed lanes to prevent errant vehicles entering the worksite (see diagrams 5 and 7).</td>
</tr>
</tbody>
</table>
| GVM                         | Gross Vehicle Mass. The maximum loaded mass of a vehicle:
   - (a) Stated on the vehicle’s compliance plate; or
   - (b) Stated in a way prescribed under a regulation.                                                                                                                                                                                                                                                                                                                |
| High Speed Road             | Posted speed limit of 90 km/h or more.                                                                                                                                                                                                                                                                                                                                     |
| Impact Attenuator Unit      | An 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. |
| IPPV                        | Impact Protected Push Vehicle (see section 7.1.1).                                                                                                                                                                                                                                                                                                                        |
| Metropolitan Area           | Means the Main Roads WA Metropolitan Region, see map in appendix E                                                                                                                                                                                                                                                                                                         |
| Multilane                   | Two or more running lanes in one direction.                                                                                                                                                                                                                                                                                                                                     |
| TARE Mass                   | The unladen mass of the vehicle only, i.e. not carrying a load.                                                                                                                                                                                                                                                                                                               |
| TL2                         | Test level 2. Applies to Impact Attenuator Units that meet NCHRP Test level 2 (basic) requirements (TL2) 70km/h.                                                                                                                                                                                                                                                                 |
| TL3                         | Test level 3. Applies to Impact Attenuator Units that meet NCHRP Test level 3 (basic) requirements (TL3) 100km/h.                                                                                                                                                                                                                                                                 |
| TMA                         | Truck Mounted Attenuator. A combination of Host Vehicle and Impact Attenuator Unit, mounted to the Host Vehicle to protect road workers. The combination must meet the requirements of this document.                                                                                                                                 |
| Traffic Lane                | Portion of the roadway allotted for single line of moving vehicles.                                                                                                                                                                                                                                                                                                          |
| Very Short Term             | Not longer than 5 minutes, as is described in clause 4.3.3 of AS1742.3.                                                                                                                                                                                                                                                                                                    |
4. PARAMETERS FOR WHEN TO USE TMAS

4.1 Mandatory use of TMAs

TMAs shall be used when all of the criteria are met in any of the below scenarios:

Scenario 1: Works on a Freeway in a Live Traffic Lane (including TM set up)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The works occur on a Freeway (includes mobile works)</td>
<td></td>
</tr>
<tr>
<td>2. The work area is within a traffic lane</td>
<td></td>
</tr>
<tr>
<td>3. The work area has not been separated or protected by a full road closure or road safety barrier</td>
<td></td>
</tr>
</tbody>
</table>

Scenario 2: Work on Freeway not within live traffic lane

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The works occur on a Freeway (includes mobile works)</td>
<td></td>
</tr>
<tr>
<td>2. Work area is within 3 m of the traffic lane</td>
<td></td>
</tr>
<tr>
<td>3. The works will take longer than 20 minutes (even if mobile)</td>
<td></td>
</tr>
<tr>
<td>4. The work area has not been separated or protected by a full road closure or road safety barrier</td>
<td></td>
</tr>
</tbody>
</table>

Scenario 3: Frequently Changing Work Area on Freeway

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Activities that involve slow moving vehicles* and/or a frequently changing work area that occurs on more than 1 km total length of the named road (e.g. litter collection).</td>
<td></td>
</tr>
<tr>
<td>2. The activity occurs on a Freeway</td>
<td></td>
</tr>
<tr>
<td>3. Work area is on or within 3 m of the traffic lane</td>
<td></td>
</tr>
<tr>
<td>4. The work area has not been separated or protected by a full road closure or road safety barrier</td>
<td></td>
</tr>
</tbody>
</table>

*slow moving vehicle is a vehicle traveling more than 20 km/h below the speed limit (e.g. 70 km/h in a 100 km/h speed zone).

Scenario 4: Works on High Speed Multi-lane Roads in the Metropolitan Area

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The posted speed limit prior to road works is 90 km/h or more (or a section of these roads reduced to 80km/h due to traffic signals).</td>
<td></td>
</tr>
<tr>
<td>2. The road is a multilane road in the metropolitan area with 15,000 vpd or more</td>
<td></td>
</tr>
<tr>
<td>3. The work area is within a traffic lane (includes mobile works)</td>
<td></td>
</tr>
<tr>
<td>4. The work area has not been separated or protected by a full road closure or road safety barrier</td>
<td></td>
</tr>
</tbody>
</table>

Example diagrams have been included in Appendix C to indicate the appropriate positions of TMAs and work/shadow vehicles.

Implementation of Traffic Control Diagrams (TCDs) shall comply with AS1742.3 and the Code of Practice, unless otherwise stated.
4.2 Incident Response and Emergency works

When responding to incidents and/or emergencies there are many different risks to consider compared with planned works.

TMAs or Impact Protection Push Vehicles (IPPV) shall be used to respond to emergencies/incidents on freeways and high speed multilane roads (90km/h or more) in the metropolitan area. However, if the speed of traffic has been significantly reduced (to less than 60km/h) due to an incident within a trafficable lane, then work vehicles are permitted to be positioned in advance of the incident without the use of a TMA or IPPV provided the following conditions are met:

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the incident a danger to road users and if <strong>left untreated</strong>, has the potential to cause serious harm?</td>
<td>Proceed to question 2.</td>
<td>No action required</td>
</tr>
<tr>
<td>Has traffic speed been reduced to <strong>less than 60km/h</strong> due to the incident? (This can be measured by travelling in the traffic stream on approach to the incident)</td>
<td>Proceed to question 3.</td>
<td>TMA or IPPV required</td>
</tr>
<tr>
<td>Is the lane to be blocked one of the <strong>outermost trafficable lanes</strong> (far left or far right) where traffic will not be travelling on both sides past the workers?</td>
<td>Proceed to question 4.</td>
<td>TMA or IPPV required</td>
</tr>
<tr>
<td>Is a <strong>lookout person</strong> available to watch for dangerous vehicles?</td>
<td>Proceed to question 5.</td>
<td>TMA or IPPV required</td>
</tr>
<tr>
<td>Is the work vehicle fitted with a <strong>flashing arrow board</strong>?</td>
<td>Vehicle can be positioned in advance of the incident without the use of a truck mounted attenuator.</td>
<td>TMA or IPPV required</td>
</tr>
</tbody>
</table>

*Incidents occurring in the emergency lane shall require TMA protection.*

4.3 Other use of TMA’s

In addition to the mandatory requirements for the use of TMAs as prescribed above consideration should be given to the use of TMAs when all of the criteria described below exist at a work site:

- The work area occupies the travel path; and
- The work area will not be separated or protected by a full road closure or road safety barrier; and
- The posted speed limit prior to road works is 100 km/h or more; and
- The road is a multilane road.

Note: There are other high risk activities that may require a TMA (e.g. TMAs should be used for mobile works when workers are on foot in a traffic lane, see clause 4.6 of AS1742.3).

When the above criteria are met, a decision not to use a TMA must be supported by a documented risk assessment conducted by a person with Advanced Worksite Traffic
Management (AWTM) accreditation and approved by the person who is responsible for the work activity. The risk assessment should include consideration of traffic volumes.

5. TRAFFIC MANAGEMENT ARRANGEMENTS

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

Temporary speed zones may be required if workers are on foot and close to traffic (see clause 4.2 and/or 4.6 of AS1742.3). Speed limit signs may be displayed on vehicles for advance warning including tail vehicles which may have a TMA.

When working in live traffic lanes it is vital a risk assessment is conducted to determine the advance warning and taper lengths that will be required for the road environment. For some short term worksites it may be determined that a traditional merge taper will not be used due to the risks involved with implementing and removing the taper at high speed high volume locations.

There have been instances where vehicles have entered a worksite via the emergency lane or shoulder. As a result static worksites on the Freeway that meet the criteria of scenario 1 in section 4 shall have a blocker vehicle with TMA to prevent vehicles entering the work area from the off-road side when only closing a single traffic lane (see diagram 5 of Appendix C). A blocker vehicle is not required when closing more than one lane of traffic for the following reasons: increased advanced warning, increased available stopping distance to the work area and reduced travel speed of road users (see diagrams 4 and 6 of Appendix C).

It is also recommended to use a second blocker vehicle (does not have to be TMA) adjacent to the worksite to prevent worksite intrusion by errant vehicles on the road side (see diagram 7 of Appendix C).

At other locations a risk assessment shall be conducted to determine if a vehicle entering the work area is a significant risk.

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 shall be required where tail vehicles are placed in traffic lanes on Freeways or multilane high speed (90 km/h or more) roads in the metropolitan area.

Tail vehicles are less exposed to errant vehicles when not in active lanes, it is therefore recommended that when using two tail vehicles the first is located on the shoulder or emergency lane (where possible). The first vehicle in the live traffic lane is the most likely to be hit and should be the vehicle fitted with a TMA (see diagrams 8, 9, 10 and 11 of Appendix C).
No one standard Traffic Control Diagram 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 prepared by a person with AWTM accreditation should be adapted to allow for site specific requirements.

Diagrams in Appendix C include use of the TMA for the following situations:

**Diagram 1**
TMA Deployment in Emergency Lane or Verge. Multilane one way carriageway.

**Diagram 2**
TMA Deployment in shoulder or verge. Two lane two way road.

**Diagram 3**
TMA Deployment in Traffic Lane. Single lane closure (not Freeway).

**Diagram 4**
TMA Deployment in Traffic Lanes. Two lane closure

**Diagram 5**
TMA Deployment in Traffic Lane with Blocker Vehicle. Single lane closure on Freeway.

**Diagram 6**

**Diagram 7**

**Diagram 8**
TMA Deployment for Mobile Works in Traffic Lane (not on Freeway)

**Diagram 9**
TMA Deployment for Mobile Works in Traffic Lane on Freeway (workers on foot)

**Diagram 10**

**Diagram 11**
TMA Deployment for Mobile Works in Traffic Lanes. Dividing Line Marking - Two lane one way carriageway (not Freeway)

TMA 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.

**Advance warning VMS**
On high speed high volume roads such as Freeways it is recommended an advance warning VMS (either TMA, vehicle or trailer mounted) is 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.
6. RISK MANAGEMENT

The Occupational Safety and Health Regulations 1996 define construction work on or adjacent to a road that is in use as high risk and prescribe the need to identify hazards and reduce risks.

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 2 safety control. TMAs are used in most states of Australia and have prevented fatalities and serious injuries during their deployment.

Limitations of TMA use

TMA’s are useful on high volume high speed roads. However where works are long term in nature additional protection for workers and road users (such as road safety barriers) is often more appropriate. This is to ensure the risk of lateral worksite intrusion by errant vehicles is mitigated.

7. TECHNICAL SPECIFICATIONS

7.1 Host Vehicle

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

The host vehicle shall conform to the following requirements:

a) In some cases a full engineering analysis by a suitable qualified person, supported by testing where applicable, will be necessary before the modified vehicle is
accepted. This testing may include determination of front axle loading when the impact attenuator unit is deployed.

b) Be approved for on road use by the Department of Transport (DoT).

c) Be a minimum of 15 tonnes GVM. (Refer to Appendix A).

d) Be a single cab truck with an automatic transmission.

e) The mounting of any fixtures are to be engineered to 20 times the weight of the fixture.

f) Be painted in accordance with the requirements of the Australian Standard AS1742.3 'Traffic control for works on roads' Clause 3.12.4 and fitted with retro-reflective rear marking plates in line with DoT requirements.

g) Be fitted with an Automatic Impact Brake (AIB) system that, in the event of an impact with the rear of the Impact Attenuator Unit, will apply the brakes of the TMA host vehicle automatically. In the event of such incidents it is critical to have an isolation switch or system which will allow the AIB system to be deactivated, this will allow for the impacted TMA vehicle to be removed from positions or locations that could cause an unnecessary obstruction or blockage to the roadway.

As a minimum, the AIB System must apply the brakes on all wheels of the rear axle/s of the host vehicle. It is recommended, that the AIB system be fitted, so activation of the system is automatic when the Impact Attenuator unit is fully deployed, and the host vehicle is travelling at a speed no greater than 40 km/h. The AIB system must only be activated when the Impact Attenuator unit is fully deployed.

Note: Modification of the braking system will affect ADR compliance and require approval through the DOT.

h) Be fitted with an AS /NZS 4192 'Illuminated flashing arrow signs' approved size "C" arrow-board. The arrow board assembly shall be positioned on the truck in accordance with the requirements of AS1742.3 (it is recommended the arrow board be two sided to allow the vehicle to be used for mobile works on two lane two way roads).

i) The arrow board and its mountings shall be engineered to a standard:

- That will allow for them to withstand the forces applied during forward travel motion based on maximum speed environment for heavy vehicles when travelling to site i.e. 100km/h; and
- To withstand a force of 20 times the total weight of the arrow board and its mountings; and
- If the arrow board assembly is designed to lift and lower it must lift or lower within 15 seconds.

j) Have an 'in-cabin' control panel placed in close proximity to the operator and illuminated at night. The panel shall include methods of control for, but not limited to, the following:

- Activation of communication equipment
- Activation of Warning lights
• Activation of Arrow Board
• Raising and lowering of Arrow board if applicable
• Activation of rear view camera
• Raising and lowering of the Impact Attenuator Unit.

k) Have cabin controlled Variable Message Signs (VMS) to further warn drivers of potential hazards and work zones in line with the TMA Work instructions. VMS displays may be pictorial and/or descriptive.

l) All seating within the TMA host vehicle that will be occupied while the TMA is deployed shall be fitted with an approved four point harness seatbelt and mountings. Four point harnesses 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 seatbelts.

m) Prevention of Rearward Seat Collapse.
   To reduce the likelihood of rearward seat collapse in the event of a substantial rear impact:

1. The driver’s seat (and any other seat that will be occupied) and seat mountings must be of sufficient strength to prevent rearward seat collapse when subjected to a loading of 740 ± 20 daN (daN - decanewton, a metric unit of force equal to 10 newtons) supplemented by a force equal to 6.6 times the mass of the complete seat

   Note: This loading must be applied horizontally rearward through the centre of mass of the seat/occupant combination and must be sustained for at least one second,

   Or;

2. An engineered and certified device, designed to restrict rearward seat collapse when the driver’s seat and seat mountings are subjected to the loading described in sub clause 1) see above, must be installed behind the driver's seat.

   Note: The device should not increase the likelihood of injury to the seat occupant.

Reference Appendix B for further information on rearward seat collapse.

n) Be fitted with high strength headboards to prevent debris from crashing through the cabin in the event of an impact.

   Where a headboard is not practical other cab protection that has been engineered and certified to protect occupants from debris is acceptable.

o) 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 safely 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.
p) The seat is to be fitted with an adjustable headrest to prevent operator whiplash during an errant vehicle impact.

q) Be fitted with a minimum of two flashing yellow lamps positioned on the vehicle in accordance with the requirements of AS1742.3.

r) Have mounting facilities for signs to be mounted to the tailgate or headboard that are secure and safe; that will not create dangerous projections, obscure lighting or registration plates, or cause the vehicle to exceed statutory dimension limits.

s) As a minimum be fitted with communication equipment that will enable simultaneous and independent communication to all relevant personnel, e.g. - 2 (two) 5 watt 41 channel UHF radios, operating on separate channels.

 t) Be equipped with an air horn of sufficient intensity and volume to be easily heard by workers carrying out their normal duties to warn of a vehicle approaching at a dangerous speed or on the off road side of the TMA.

u) Have an independent power back up system installed that will adequately cater for all auxiliary equipment associated with use of the host vehicle as a TMA. For example this may include the installation of auxiliary batteries or power packs.

v) Be fitted with a camera to allow the TMA operator to observe traffic approaching from the rear.

*Note: Consideration should 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.*

7.1.1 Special Build Incident Response Vehicles

The Main Roads Incident Response Service (IRS) deploys specially trained, mobile road crews on Perth’s freeways to assist with the quick and safe removal of broken down vehicles, debris and other obstructions, helping to restore normal traffic conditions as quickly as possible. As part of this service Main Roads uses a special build Impact Protected Push Vehicles (IPPV).

To protect the occupants of the IPPV Main Roads will mount an Impact Attenuator Unit to these vehicles. They will only be designed and built with MRWA approval and the approval from the Department of Transport (DoT). A risk assessment was undertaken on TMA’s and found that they were not suitable for the IRS role due to:

- Inadequate manoeuvrability on site at incidents.
- Inability to respond within designated response times.
- Inability to maintain a Cold side exit (may be dual cab where required).
- Inability to travel to incident site in Emergency Lane (width restrictions).

Having an IRS vehicle that met all of the TMA host vehicle requirements would not allow the incident response service to be delivered with an impact attenuator unit, thereby putting the occupants, as well as road users, at more risk of incidents.
Therefore these special build IPPV are required to meet all the Host Vehicle requirements of 7.1 with the following exemptions:

- Will not be required to have 15 tonne GVM, however must be at least 9 tonnes tare;
- The vehicle can be a dual cab;
- Do not require an air horn to be fitted;
- Do not require independent power back up.

These vehicles will not be referred to as a Truck Mounted Attenuator (TMA) but will have some characteristics of a TMA. When requiring these special build vehicles the builder and designer shall be made aware of the requirements in this guideline and they will be referred to as IPPV's. The unit shall be marked ‘NOT A TMA’ in letters at least 50 mm high.

Note: Operators of IPPV's shall obtain accreditation in Operate Truck Mounted Attenuator (see section 8).

7.2 Impact Attenuator Unit Certification

Impact Attenuators Units shall meet all mandatory and optional testing requirements of the following:

- AASHTO Manual for Assessing Safety Hardware for all other Impact Attenuator Units.

Typical form of evidence for compliance would be, or may include, United States of America Federal Highway Administration (FHWA) acceptance letter report of that particular make and model.

7.2.1 Impact Attenuator Unit Test Level Ratings:

The following table indicates Impact Attenuator Unit ratings.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Speed</th>
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<tbody>
<tr>
<td>TL2</td>
<td>70 km/h</td>
</tr>
<tr>
<td>TL3</td>
<td>100 km/h</td>
</tr>
</tbody>
</table>

Impact Attenuators Units shall have their test level rating clearly displayed on both side panels of the unit. The display shall be made up of a panel with black lettering (e.g. TL3) on a white 210mm x 300mm background.

7.3 Truck Mounted Impact Attenuator Unit

Host vehicle shall be as detailed in section 7.1.

a) Impact Attenuator Units shall be assembled and fitted to the host vehicle in accordance with the manufacturer’s specifications.
b) All units to be fitted with flashing beacons that will be visible from all angles, the lights should have a variable flashing pattern. The objective being to ensure the TMA is visible to vehicles approaching from behind or in front of the TMA.

c) The rear surface of the Impact Attenuator Unit when deployed shall consist of Class 1W retro reflective red diagonal striping at least 100 mm wide, on a white non-retro reflective background.

7.3.1 Truck Mounted Impact Attenuator Unit Configuration

In addition to the requirements above the following shall apply:

a) Dedicated yellow flashing light to automatically provide notice of the Impact Attenuator Unit being raised or lowered.

b) Automatic Impact Brake micro-switch is to be fitted to the rear of the Impact Attenuator Unit to activate the host vehicle brakes in the event of an impact.

c) In cabin and external audible alarms to automatically provide notice of the Impact Attenuator Unit being raised or lowered.

d) Travel lock system installed that prevents inadvertent deployment of the Impact Attenuator Unit.

e) When not deployed an adhesive type (black on yellow) warning sign stating: 'Caution keep clear this unit may lower at any time' must be visible from the rear of the Impact Attenuator Unit.

7.4 Trailer Mounted Attenuators

Due to issues such as the potential for gating into adjacent traffic lanes, the difficulty of correctly attaching them and issues with manoeuvrability Trailer Mounted Attenuators are no longer permitted in WA.

7.5 TMA Repairs, Modifications and Inspections

a) After an impact or crash that may affect the integrity of the host vehicle and/or impact attenuator, TMAs and attachments must be inspected.

b) All repairs and/or modifications to TMAs and attachments shall be carried out by a competent person.

c) Following repair or modification TMAs and attachments must be inspected and have certification documentation prepared by a competent person.

d) TMAs and attachments must be inspected at least once each year and have certification documentation prepared by a competent person.

e) TMAs are to be inspected for fatigue cracking in the mounting brackets at suitable intervals or as specified in the manufacturer’s manual. These inspections shall be recorded in the unit’s maintenance logbook.
7.6 Operational Procedures

The following shall be observed when operating a TMA:

a) When performing the duties of the TMA all occupied seating shall have the same level of occupant protection as the driver’s seat.

b) 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 40km/h (the operator shall ensure no vehicles are in the lowering area of the attenuator).

c) While TMAs are deployed and the host vehicle is occupied all occupants shall use the four point harness seat belt. At longer term stationary work sites operators may exit the host vehicle when the TMA has been deployed and the site is set up. Operators exiting the vehicle shall do so in a safe manner, i.e. ensure it is safe to exit using the rear camera and/or mirrors, ensure gaps in traffic, move away from the vehicle as soon as possible, limit entering and exiting the vehicle as much as possible, etc.

d) When the Impact Attenuator Unit is in the deployed or lowered position, the vehicle may only travel within its own lane or carry out lane-changing manoeuvres in the same direction. The Impact Attenuator Unit must be raised when carrying out all other manoeuvres.

e) 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.

f) The Impact Attenuator Unit shall only be in the deployed/lowered position when the TMA is engaged at an approved road work site. This shall include the preparation and disassembly of an approved Traffic Management Plan.

7.7 Traffic Control Devices

All traffic control devices are to conform to the requirements of the Australian Standard AS1742.3 ‘Traffic control for works on roads’ and the Traffic Management for Works on Roads Code of Practice.

7.7.1 Vehicle Mounted Signs and Devices

All vehicle mounted warning devices shall be in accordance with the requirements contained in the Australian Standard AS1742.3 and Code of Practice. This includes all signs, illuminated flashing arrow sign and flashing yellow lamps.

- Illuminated Flashing Arrow Sign

Flashing yellow lamps may be used in conjunction with this sign provided that the lamps are either appropriately shielded or laterally or vertically displaced from the edge of the sign to avoid visually corrupting the arrow shape or its directional effect.

It is recommended to have an arrow on both sides of the vehicle so it can be used for mobile works on two way two lane roads.

- Variable Message Sign
All Portable Variable Message Signs must meet relevant Australia Standards, comply with applicable DoT requirements such as ADR, meet registration requirements and be approved for on road use.

7.7.2 Advance Warning Vehicles

Advance Warning Vehicles warn and inform of changes to traffic conditions ahead, and give motorists time to adjust their driving patterns.

Advance warning vehicles shall have 'B' size arrow board or variable message board. All signs shall be securely fixed to the advance warning vehicle.

8. QUALIFICATION CRITERIA FOR TMA OPERATORS

It is mandatory to conduct training in TMA operation with a MRWA approved training provider and gain an Operate Truck Mounted Attenuator accreditation before operating a TMA.

Mandatory prerequisites:

- an Australian Qualification Framework compliant Statement of Attainment in the Resources and Infrastructure Industry Training Package Unit of Competency RIICOM201D – Communicate in the workplace, or equivalent (or the replacement unit of competency if and when applicable);
- an Australian Qualification Framework compliant Statement of Attainment in the Resources and Infrastructure Industry Training Package Unit of Competency RIIRTM301D – Operate a truck or trailer mounted attenuator, or equivalent (or the replacement unit of competency if and when applicable);
- hold a current and valid heavy vehicle licence of a suitable class to operate the TMA;
- documentary evidence of at least 80 hours experience operating heavy vehicles in the last 6 months;
- hold a valid Work Safe WA Construction Safety Awareness Training card;
- hold a current MRWA Basic Worksite Traffic Management Accreditation;
- documentary evidence of at least 50 hours practical experience in traffic management in the last 6 months.

Note: Operators of IPPV will be required to hold the accreditation but may be offered exemptions for traffic management experience and/or heavy vehicle operation experience. Exemptions shall be obtained from the Main Roads WA Road Safety Branch.
Critical to the development of a TMA that affords protection to the public, the road workers and the TMA operator, is the selection of the host vehicle. The vehicle must be appropriate for the use intended and also comply with all legislative requirements.

There are a number of requirements that affect the selection of the host vehicle. A discussion of critical requirements follows.

**Minimum Tare Mass**
For acceptable impact performance, minimum tare mass requirements for host vehicles are set by the manufacturers of impact attenuator units. The two currently available impact attenuators have minimum host vehicle tare mass requirements of 7.3 tonnes (Safe Stop) and approximately 9.07 tonnes (20,000 lbs) (Scorpion).

The host vehicle tare mass is the mass of the truck with all the components necessary for operation as a TMA.

**Weight Distribution**
To enhance the effectiveness of the Automatic Impact Braking System (AIB) the rear axle/s should carry a significant proportion of the total TMA mass.

**Use of Ballasting**
The use of ballasting is discouraged. The mounting points of all attachments to a TMA host vehicle are required to withstand a force of twenty times the mass of the attachment. While the attachment of the ballasting to the truck body may meet this requirement, the attachment of the body with ballast to the chassis is unlikely to meet the twenty times mass requirement without significant modification to the mounting points on both the body and to the truck chassis.

**Chassis Size and Strength for Impact Attenuator Unit Mounting**
Under impact the loads imposed on an impact attenuator unit are transferred through the mounting assembly into the chassis of the truck. The truck chassis must be of a size that allows mounting of the impact attenuator unit in accordance with the manufacturer's specifications. The truck chassis must also be of sufficient strength to absorb applied loads without significant failure or distortion.

**Conclusion**
It is recommended that TMA host vehicles with a manufacturer's gross vehicle mass (GVM) rating of at least 15 tonnes will meet the above critical requirements.

Vehicles with a lesser GVM rating are not as likely to meet the above critical requirements and must be engineered and certified to meet the requirements listed above.
APPENDIX B

Prevention of Rearward Seat Collapse.

Background
Qld Transport and Main Roads experienced a TMA incident where the driver’s seat failed in a rearward direction. The driver’s head hit the rear of the cabin and the driver also suffered back injuries which have permanently prevented his return to work.

Rearward Seat Collapse
The purpose of this requirement is to reduce the likelihood of rearward seat collapse in the event of a substantial impact to the rear of a TMA. This will reduce the likelihood of injury to a TMA occupant.

The purpose of this requirement may be achieved by either of two methods:

1. By design or testing, determine that the seat and mountings are of sufficient strength to withstand in the rearward direction, similar loading to that applied to the seat and seat mountings in a forward direction for Australian Design Rules (ADR) compliance.

2. By fitting a device behind the seat to restrict rearward seat collapse when the same loadings are applied in a rearward direction.

The rearward loading requirements are based on ADR 5/05 requirements.
ADR 5/05 relates to seat belt anchorage strength required to restrain an occupant in a frontal impact. In a rear impact the seat belt has no effect and rearward movement of the occupant is restrained by the seat structure and seat mountings only.

The TMA guideline requirement is intended to afford a seat occupant a similar level of protection in the event of a rear impact that the ADRs provide in a frontal impact.

ADR 5/05 requires that for heavy goods vehicles (GVM > 12t) with lap belt anchorages located wholly within the seat structure the seat and the belt anchorages must withstand the following loading in the forward direction:

A test load of $740 \pm 20$ daN supplemented by a force equal to 6.6 times the mass of the complete seat.

The TMA Guideline requirement imposes the same loading in a rearward direction to simulate the effects of a rear impact.

Evidence of compliance with these rearward loading requirements can be either by design verification or by representative test results. This evidence would give blanket cover (type approval) to that seat/vehicle combination and the vehicle/seat supplier or verifying engineer would supply certification of same.

If evidence of compliance with additional rearward loading requirements is not available, a device to prevent rearward seat collapse would be fitted.

Note: ADRs require that to test seat and seat anchorage strength, a rearward longitudinal deceleration of 20g is applied to the whole shell of the vehicle, without an occupant.

Given this requirement and that the seat assembly is certified to withstand applied loads in a forward direction, the original equipment seats may meet the TMA Guideline requirements.
APPENDIX C
TMA DEPLOYMENT EXAMPLE DIAGRAMS
Diagram 1: TMA Deployment in Emergency Lane or Verge
Multilane one way carriageway

The TMA, works vehicles or works personnel shall not intrude trafficked lanes. Diagram does not include all required signs and devices (e.g. speed reduction)

*Notes
1. See section 4 for TMA requirements
2. A risk assessment shall be conducted if using a TMA on unpaved surfaces or surfaces that are wet or not clean of debris - this may require the distance between the TMA and work are be increased.

Worker clearance to traffic shall comply with clause 4.2 of AS1742.3

Apply manufacturers shunt forward recommendations
No Go Zone

Advanced Warning / Tail Vehicle
VMB or Static Advanced Warning Signs may be used based on a risk assessment.

Shadow Vehicle
TMA*

Work Area

Diagram does not include all required signs and devices (e.g. speed reduction)
**Diagram 2: TMA Deployment in Shoulder or Verge**

*Two lane two way road*

The TMA, works vehicles or works personnel shall not intrude trafficked lanes. Diagram does not include all required signs and devices (e.g. speed reduction)

*Notes*

1. A TMA may not be required on two lane two way roads (see section 4)
2. A risk assessment shall be conducted if using a TMA on unpaved surfaces or surfaces that are wet or not clean of debris - this may require the distance between the TMA and work area be increased.

Worker clearance to traffic shall comply with clause 4.2 of AS1742.3

Apply manufacturers shunt forward recommendations

No Go Zone

---

Shadow Vehicle

TMA*

Advanced Warning / Tail Vehicle

VMB or Static Advanced Warning Signs may be used based on a risk assessment.
Diagram 3: TMA Deployment in Traffic Lane
Single lane closure (not Freeway)

Diagram does not include all required signs and devices (e.g. speed reduction, merge taper, etc.)

Worker clearance to traffic shall comply with clause 4.2 of AS1742.3

Appropriate advance warning, taper length and safety buffer shall be provided for the speed of traffic and road environment

*Note
See section 4 for TMA requirements
Diagram 4: TMA Deployment in Traffic Lanes
Two lane closure

Diagram does not include all required signs and devices (e.g. speed reduction, merge taper, etc.)

- Apply manufacturers shunt forward recommendations
- No Go Zone
- Worker clearance to traffic shall comply with clause 4.2 of AS1742.3

Appropriate advance warning, taper length and safety buffer shall be provided for the speed of traffic and road environment
Note: The distance between tapers shall be at least 1.5D.

VMB or Static Advanced Warning Signs may be used based on a risk assessment.

*Note
See section 4 for TMA requirements
Diagram 5: TMA Deployment in Traffic Lane with Blocker Vehicle
Single lane closure on Freeway

A blocker vehicle shall be used when closing a single lane to help prevent road users from cutting down the off-road side of the TMA and entering the worksite. Diagram does not include all required signs and devices (e.g. speed reductions, merge taper, etc.)

- Worker clearance to traffic shall comply with clause 4.2 of AS1742.3
- Blocker Vehicle to have front of cab in line with the rear of the shadow vehicle and have a maximum gap of 1.5-2.0 m between the vehicles to ensure a vehicle cannot pass in between.
- Large Vehicle blocks forward view and vehicle unable to merge right due to other vehicles.
- Appropriate advance warning, taper length and safety buffer shall be provided for the speed of traffic and road environment

- Shadow Vehicle TMA
- Blocker Vehicle with TMA
  - To prevent vehicles entering worksite from off-road side of TMA.
- Advanced Warning / Tail Vehicle
  - VMB or Static Advanced Warning Signs may be used based on a risk assessment.

Apply manufacturers shunt forward recommendations
No Go Zone

20-40 m
Diagram 6: TMA Deployment in Traffic Lanes
Three lane closure on Freeway

Diagram does not include all required signs and devices (e.g. speed reduction, merge taper, etc.)

- **Work Area**
- **Advanced Warning / Tail Vehicle**
- **Shadow Vehicle TMA**
- **No Go Zone**
- **20 - 40 m**
- **Apply manufacturers shunt forward recommendations**
- **VMB or Static Advanced Warning Signs may be used based on a risk assessment.**

**Worker clearance to traffic shall comply with clause 4.2 of AS1742.3**

**Appropriate advance warning, taper length and safety buffer shall be provided for the speed of traffic and road environment.**

**Note:** The distance between tapers shall be at least 1.5D.
Diagram 7: TMA Deployment in Traffic Lane with Second Blocker Vehicle - Freeway

In addition to the blocker vehicle used to help prevent road users from cutting down the off-road side of the TMA an additional vehicle may be used to prevent errant vehicles entering from the road side. Diagram does not include all required signs and devices (e.g. speed reductions, merge taper, etc.)

- **Worker clearance to traffic shall comply with clause 4.2 of AS1742.3**
- **Appropriate advance warning, taper length and safety buffer shall be provided for the speed of traffic and road environment**
- **Apply manufacturers shunt forward recommendations**

**Diagram Notes:**
- Work Area
- Blocker Vehicle (Truck)
  - To prevent errant vehicles entering worksite from road side.
- Shadow Vehicle TMA
- Blocker Vehicle with TMA on Freeways
  - To prevent vehicles entering worksite from off-road side of TMA.
- Advanced Warning / Tail Vehicle
  - VMB or Static Advanced Warning Signs may be used based on a risk assessment.
**Diagram 8: TMA Deployment for Mobile Works in Traffic Lanes (not on Freeway)**

TMA should be fitted to the first vehicle in the live traffic lane. Diagram does not include all required signs and devices (e.g. speed reduction).

Note: The distance between the tail and shadow vehicle shall be based on a risk assessment. AS 1742.3 Clause 4.6.3 (f) gives the following distances:
- 300-500 m in open roads or
- 200-300 m in built-up areas
However, generally 2D will be an adequate distance to warn road users. Traffic Management planners shall consider geometric alignment, sight distance, road user behaviour, speed environment and traffic volume when determining the distance.

It is recommended that the first tail vehicle is located on the shoulder or emergency lane to help give advance warning to approaching road users to avoid collisions.
Diagram 9: TMA Deployment for Mobile Works in Traffic Lanes on Freeways (Workers on foot)

Diagram does not include all required signs and devices (e.g. speed reduction).

**Note:** The distance between the tail and shadow vehicle shall be based on a risk assessment.

AS 1742.3 Clause 4.6.3 (f) gives the following distances:

- 300-500 m in open roads or
- 200-300 m in built-up areas

However, generally 2D will be an adequate distance to warn road users. Traffic Management planners shall consider geometric alignment, sight distance, road user behaviour, speed environment and traffic volume when determining the distance.

Clause 4.6.5 of AS 1742.3 shall be followed.

First tail vehicle should be located on the shoulder or emergency lane to help give advance warning to approaching road users to avoid collisions.
Diagram 10: TMA Deployment for Mobile Works in Traffic Lanes
Dividing Line Marking - Two lane two way road

TMA should be fitted to the first vehicle in the live traffic lane.
Diagram does not include all required signs and devices (e.g. speed reduction)

Notes
The advance warning distance given for the lead and tail vehicle shall be based on a risk assessment.
AS 1742.3 Clause 4.6.3 (f) gives the following advanced warning distances:
Lead Vehicle
200 m to 400 m in open areas
30-100 m in built-up areas
Tail vehicle
300-500 m in open roads or
200-300 m in built-up areas
However, generally 2D will be an adequate distance to warn road users. Traffic Management planners shall consider geometric alignment, sight distance, road user behaviour, speed environment and traffic volume when determining the distance.

It is recommended that the first tail vehicle is located on the shoulder or emergency lane to help give advance warning to approaching road users to avoid collisions.

Advanced Warning / Tail Vehicle
With VMB
Off traffic lane if possible
Diagram 11: TMA Deployment for Mobile Works in Traffic Lanes
Dividing Line Marking - Two lane one way carriageway (not Freeway)

TMA should be fitted to the first vehicle in the live traffic lane.
Diagram does not include all required signs and devices (e.g. speed reduction)

Notes
The advance warning distance given for the lead and tail vehicle shall be based on a risk assessment.
AS 1742.3 Clause 4.6.3 (f) gives the following advanced warning distances:
Lead Vehicle
200 m to 400 m in open areas
30-100 m in built-up areas
Tail vehicle
300-500 m in open roads or
200-300 m in built-up areas
However, generally 2D will be an adequate distance to warn road users. Traffic Management planners shall consider geometric alignment, sight distance, road user behaviour, speed environment and traffic volume when determining the distance.

It is recommended that the first tail vehicle is located on the shoulder or emergency lane to help give advance warning to approaching road users to avoid collisions.
### Example Work Instruction

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

<table>
<thead>
<tr>
<th>Steps</th>
<th>Hazard</th>
<th>Additional PPE</th>
<th>Notes/Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Consider potential hazards and control measures. • Undertake and complete a risk assessment.</td>
<td>Hit by fast moving vehicle</td>
<td>• No work to be undertaken during rain periods or poor visibility • Undertake mandatory daily pre-start meeting prior to commencing. • Do not allow personnel to cross the road on foot • Consider the speed and road environment. • Consider lane closure restrictions • Consider police attendance and/or speed enforcement</td>
<td></td>
</tr>
<tr>
<td>Ensure plant has been serviced and adjusted</td>
<td>Defective plant</td>
<td>• Perform pre-start check of vehicle and fittings as (lights, attenuator, horn, oil, water, etc.) • Complete defect notice • Fill in log book</td>
<td></td>
</tr>
<tr>
<td>Specify appropriate traffic control strategy to suit work area.</td>
<td>High Visibility Garments</td>
<td>Refer to TMP</td>
<td></td>
</tr>
<tr>
<td>All vehicles shall have a reliable communication system</td>
<td>Comms system not working</td>
<td>All vehicles fitted with UHF radios, test communication at the time of pre-start check.</td>
<td></td>
</tr>
<tr>
<td>Notes specific to Barrier Truck and driver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• While the attenuator is deployed and the host vehicle is occupied all occupants shall use the four point harness seat belt. • At longer term worksites when the site is set up and the TMA is deployed the driver may exit the vehicle. Operators exiting the vehicle shall do so in a safe manner, i.e. ensure it is safe to exit using the rear camera and/or mirrors, use gaps in traffic, move away from the vehicle as soon as possible, limit number of times exiting and entering vehicle, etc. • No personnel are to remain behind, beside or within the No Go 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.</td>
<td>Struck by vehicle</td>
<td>Ensure correct buffer distance</td>
<td></td>
</tr>
<tr>
<td>Determine the work area from works order or supervisors instructions</td>
<td></td>
<td>Consider the site risk assessment including inclement weather, traffic flow, speed environment and poor visibility etc.</td>
<td></td>
</tr>
<tr>
<td><strong>Preparation for Lane Closure</strong></td>
<td>Vehicle crash and lowering attenuator onto vehicle</td>
<td>• 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.</td>
<td></td>
</tr>
<tr>
<td>• 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. • 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 40km/h (the operator shall ensure no vehicles are in the lowering area of the attenuator)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Establish traffic control
- Traffic control is to be in accordance with Traffic Management Plan.
- 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.
- Barrier Truck to shadow traffic management personnel 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.

<table>
<thead>
<tr>
<th>Struck by passing vehicles</th>
<th>High visibility garments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hit by debris</td>
<td></td>
</tr>
</tbody>
</table>

- Traffic control as per TMP
- 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
- Consider police attendance and/or speed enforcement
- Do not allow personnel to cross the road on foot

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 ensuring they exit in a safe manner.

<table>
<thead>
<tr>
<th>Struck by vehicle</th>
<th>Refer to site risk assessment</th>
</tr>
</thead>
</table>

Remove Traffic Control
- Traffic control devices shall only be removed when the work area has been packed up.
- To remove a taper the barrier truck should drive around to the start of the taper as with setup.
- Barrier truck protects the closed lane while the taper is removed.
- 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 40 km/h

<table>
<thead>
<tr>
<th>Vehicle crash</th>
<th>All vehicles to stay in constant contact via UHF radio</th>
</tr>
</thead>
</table>

Using Truck Mounted Attenuator in Mobile Works on Multi Lane Roads

<table>
<thead>
<tr>
<th>Steps</th>
<th>Hazard</th>
<th>Additional PPE</th>
<th>Notes/Controls</th>
</tr>
</thead>
</table>
| • Consider potential hazards and control measures  
  • Undertake and complete a risk assessment. | Hit by fast moving traffic | • 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  
  • Do not allow personnel to cross the road on foot  
  • Consider police attendance and/or speed enforcement | |
| • 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 TMP |
| • All vehicles shall have a reliable communication system | Communication system not working | All vehicles fitted with UHF radios  
  Test communications at the time of pre-start check | |
### Notes specific to Barrier Truck and driver
- The barrier truck driver shall not exit the vehicle while in open traffic lanes.
- No personnel are to remain behind, beside or within the No Go 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

### Determined 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 40 km/h (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

### Establish traffic control
- Traffic control is to be in accordance with the Traffic Management Plan.
- 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.
- The handbrake is to remain off when the Impact Attenuator is 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

### Struck by passing vehicles
- High visibility garments
- Traffic control as per TMP.
- 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.
- Consider police attendance and/or speed enforcement
- Do not allow personnel to cross the road on foot

### Vehicle crash
- Hit by debris
- Ensure that approaching traffic has minimum 200m sight distance to the barrier truck.

### 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

### Struck by passing vehicles
- All vehicles to stay in constant contact via UHF radio
deactivate lights and arrow-boards. Barrier truck operator lifts attenuator before deactivating lights and arrow-board.
STATE ROAD NETWORK
Metropolitan Region
RESPONSIBILITY AREA MAP (External Use Map)

For up-to-date information on conditions on state roads, contact the Main Roads 24 hour customer information centre on 138 138

To report any damage to roadside rest area facilities, signs or road surfaces to Main Roads, call 1800 800 009

MAP INFORMATION
The focus of this map is the pictorial representation of State Roads in each Main Roads’ Regional Responsibility Area. State Roads depicted on this drawing are those for which Main Roads Western Australia has responsibility as defined by the Main Roads Act 1930, as amended. Where accuracy is a consideration, a more detailed tourist map such as the Travellers Atlas should be used.

Geographic Coordinate System: Geocentric Datum of Australia 1994

Original Page/Map Size A3.

LEGEND
- Highway (State Road)
- Main (State Road)
- State Road Outside Responsibility Area
- Local Road
- Regional Boundary

More information on what’s happening around WA. SCAN for information on Metro and Regional Events.

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- WA Roads (www.twitter.com/wa_roads)

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TRIM Doc: 201421-0014/02
Data Source: IRIS (c2441)
Data Currency: 26/08/2015
Date of Print: 26/08/2015