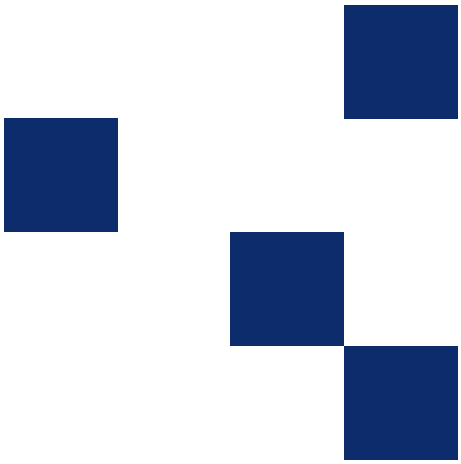
NATIONAL GUIDELINES FOR THE USE OF TRUCK & TRAILER MOUNTED ATTENUATORS (TMA'S)

TMA-NWP-01

November 2012



About this release

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Executive Summary

In September 2010, the first Truck Mounted Attenuator (TMA) Conference was held involving New South Wales' Roads and Maritime Services (RMS) then known as RTA, Queensland's Transport and Main Roads (TMR), and Victoria's Vic Roads representatives.

The prime objective of the 2010 Conference was to discuss and assess the dissimilarities that exist between each state authority's documentation in the "Guidelines for use of Truck Mounted Attenuators".

In October 2011, a National Road Authorities Truck Mounted Attenuator Conference was held with NSW's RMS, Queensland's TMR , Victoria's Vic Roads and Western Australia's Main Roads where a consensus was reached for the advancement of a National Guideline for Truck & Trailer Mounted Attenuators. On the second Day of the conference Industry representatives were invited to comment on the proposed developments of the National TMA Guidelines.

The outcome of the 2011 Conference was an agreement on a process to move forward, this being the formation of a working party with State representatives that would develop a National Document based on each States' existing Guidelines. During this timeframe Queensland Transport and Main Roads also consulted with Queensland Industry.

In the development of these guidelines, the working party acknowledges that differences will exist and will remain between the States and Territories in some specific areas of legislation. The intent is that all States and Territories will follow these guidelines except where overridden by relevant individual State Legislation.

It is also the intent that a National TMA Working Party group be constituted including representatives from each state authority, to review the National Document annually and ensure new innovations, concerns and required changes are made to enable continuity and integrity of the National Document.

An agreement was reached at the 2011 National TMA Conference between State Authorities and Industry partners, that on release of the National TMA Guidelines a "phasing in period" of three years be introduced, allowing all parties to meet the requirements of the National TMA Guidelines.

Table of Contents;

1.0 Purpose:

The purpose of these guidelines is to provide a set of Technical Specifications operational procedures, and the minimum training qualifications required by persons responsible for authorising, supervising and operating TMAs at road work sites in Australia.

2.0 Objectives:

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

The secondary objective is to provide standard guidance for planning works involving TMAs, including training of TMA operators, in order to develop a consistent approach in the use of TMAs in Australia.

3.0 Terminology:

This section provides abbreviations and definitions of terms used throughout the document.

Table 1: Acronyms

Acronym	Expansion
AASHTO	American Association of State Highway and Transportation Officials
ADR	Australian Design Rule
AIB	Automatic Impact Braking
AS	Australian Standard
NCHRP	National Cooperative Highway Research Program
TCGP	Traffic Control Guidance Plan
TL	Test Level
TMA	Truck or Trailer Mounted Impact Attenuator (See definition)

Table 2: Definitions

Term	Definition
AIB	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.
AS1742.3	Australian Standard Manual of Uniform Traffic Control Devices Part 3: Traffic control for works on roads.
Competent Person	A person who has acquired through training, qualification and or experience, knowledge and skills to carry out a particular task.
GVM	GVM (gross vehicle mass) means 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
Host Vehicle	A Host vehicle is a vehicle that has an impact attenuator unit attached to it permanently or to which a trailer mounted impact attenuator unit can be attached.
Impact	In mechanics, an impact is a high force or shock applied over a short time period when two or more bodies collide. Such a force or acceleration usually has a greater effect than a lower force applied over a proportionally longer time period. An impact that may affect the integrity or operation of the vehicle and/or Impact Attenuator Unit.
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.
TCGP	A Traffic Control Guidance Plan is a diagram that illustrates the layout, signs, devices and general arrangement to warn and guide traffic around, past, or when necessary through a work site or temporary hazard. In AS1742.3, a TCGP is referred to as a traffic guidance scheme. ***Note:*** *A Traffic Control Guidance Plan can also be referred to as a Traffic Control Plan, Traffic Management Drawings and or Plan.*
TL2	Applies to Impact Attenuator Units that meet NCHRP Test level 2 (basic) requirements (TL2) 70km/h.
TL3	Applies to Impact Attenuator Units that meet NCHRP Test level 3 (basic) requirements (TL3) 100km/h.
TMA	A combination of Host Vehicle and Impact Attenuator Unit, either mounted to the Host Vehicle or towed by the Host Vehicle to protect road workers. The combination must meet the requirements of this document.
TMA Operator	A person meeting the requirements of Part B of this document.

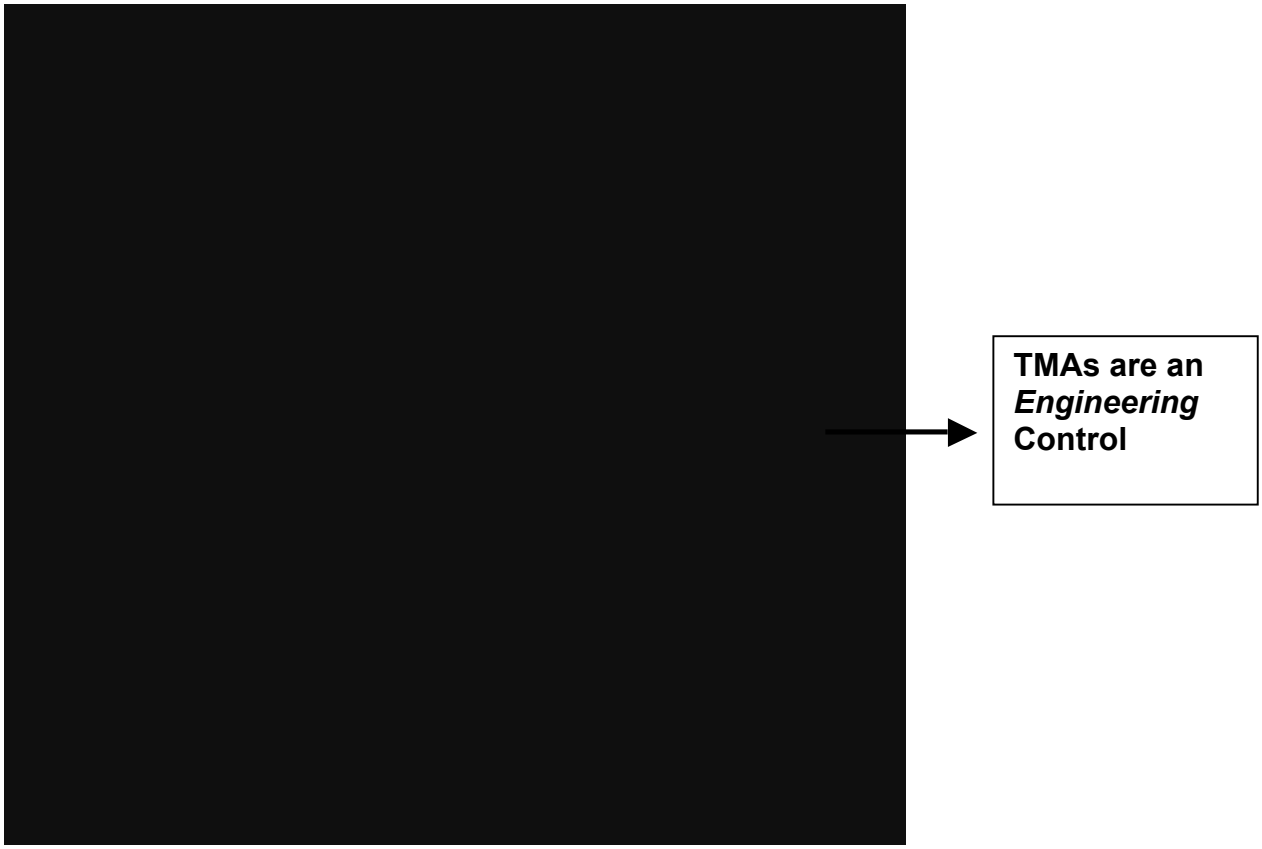
4.0 Reference and Applicable Documents:

- Australian Standard AS1742.3 'Traffic control for works on roads'
- NCHRP Report 350 Recommended Procedures for the Safety Performance Evaluation of Highway Features (1993).
- The Traffic Signs Manual, Chapter 8: 'Traffic Safety Measures and Signs for Road Works and Temporary Situations' United Kingdom (2006).
- BS EN 1317-1 Road Restraint Systems - Part 1: Terminology and General Criteria for Test Methods.
- BS EN 1317-2 Road Restraint Systems - Part 2: Performance classes, acceptance criteria and test methods for safety barriers.
- ISO 6487 Road vehicles - Measurement techniques in impact tests - Instrumentation.
- AS 4192-2006 Illuminated flashing arrow signs.
- AASHTO Manual for Assessing Safety Hardware.
- AS/NZS ISO 31000 Risk Management.

5.0 Risk Management

The National Work Health and Safety Act 2012 classifies work on or adjacent to roads used by traffic as ***high risk work*** and prescribes the need to identify hazards and control risks.

The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the hierarchy of risk control. The WHS Regulations require duty holders to work through this hierarchy when managing risk under the WHS Regulations.



The Australian Standard AS1742.3 'Traffic control for works on roads' provides guidance in relation to hazard identification and risk control as it relates to all applications of road works. These guidelines embrace these requirements together with the principles as contained in AS/NZS ISO 31000 Risk Management.

Following is an extract of Clause 2.2.3 from AS1742.3

2.2.3 Risk Management:

Risk management entails the identification and analysis of all hazards likely to arise during works on road including the setting up, operating, changing and ultimate dismantling of a traffic guidance scheme, followed by the determination of appropriate measures to mitigate those risks. The process is appropriate at all levels of planning and operation including the following:

(a) When preparing standardized plans and work method statements for the conduct of minor routine and mobile works.

(b) When preparing traffic guidance schemes for more extensive or complex works where site specific risks will assume importance.

In each case the process should be carried out by first identifying all the hazards likely to arise, evaluating them in terms of likelihood of occurrence and adverse consequences using historical data, experience of other means. The proposed procedural statement or traffic guidance scheme should then be checking in detail to ensure that adequate means of controlling or reducing those risks found to be significant, are in place.

This Standard sets out guidance and minimum requirements. Variations below these minima shall only be made on the basis of a documented risk assessment prepared by a competent person in consultation with affected parties as appropriate. Where superior hazard controls are identified through this process they should be adopted in preference to minimum requirements.

***NOTE**: Road authorities should consider providing more detailed guidelines on the circumstances under which variations are permitted, the format of risk assessment documentation, who may carry out risk assessment and who should be consulted.*

Part A – Technical Specifications:

This section provides technical specifications in the following areas:

1. **Host Vehicle.**
2. **Impact Attenuator Unit Certification.**
3. **Truck Mounted Impact Attenuator Unit.**
4. **Trailer Mounted Impact Attenuator unit**
5. **TMA Repairs, Modifications and Inspections**
6. **Traffic Control Devices**

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.

Individual State or Territory authorities may have different or specific registration requirements; therefore it is advisable that the relevant authorities be contacted ***prior*** to modifications being made to any vehicles.

The host vehicle shall conform to the following requirements:

a) Must comply with the applicable regulatory requirements such as ADR, registration requirements and applicable State/Territory legislation. 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 State/Territory Authority where the vehicle is operating.

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.or relevant State/Territory road authority technical publications.

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. The AIB system must only be activated when the Impact Attenuator unit is fully deployed and the host vehicle speed is no greater than 40 km/h.

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.

Note: *Modification of the braking system may affect ADR compliance and require approval through the Heavy Vehicle Modification Scheme or State/Territory/Federal approval.*

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

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 mass 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.

k) 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.

l) Consideration may be given to fitting the driver's seating position with an approved four point harness seat belt and mountings. Fitting a 4 point harness that is non compliant with the ADR requirements makes a vehicle "non standard" thus requiring relevant State or Territory registration authority approval for use.

Note: *Fitting of four point harness seat belts to the Host Vehicle of TMAs is compulsory in Queensland.*

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 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. The backs 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.

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

p) Have mounting facilities for signs to be mounted to the tailgate or headboard as required by relevant State/Territory road authority technical publications.

q) (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.

r) Be equipped with a warning device of sufficient intensity and volume to be easily heard by workers carrying out their normal duties a least 30 metres from the TMA.

s) 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.

t) 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.*

u) Rear marker plates must be fitted to the rear of the Vehicle.

2. Impact Attenuator Unit Certification

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

- NCHRP 350 Recommended Procedures for the Safety Performance Evaluation of Highway Features (1993) for Impact Attenuator Units built before the introduction of the following standard.
- AASHTO Manual for Assessing Safety Hardware for all other Impact Attenuator Units.

Typical form of evidence for compliance would be, or may include, test specification report of that particular make and model.

2.1 Impact Attenuator Unit Test Level Ratings:

The following table indicates Impact Attenuator Unit ratings.

Rating	**Speed**
TL2	70 km/h
TL3	100 km/h

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.

3 Truck Mounted Impact Attenuator Unit.

Host vehicle shall be as detailed in *Part A Section 1*

a) Impact Attenuator Units shall be assembled and fitted to the host vehicle in accordance with the manufacturer's specifications.

b) Flashing yellow light/s shall be fitted to the rear of the Impact Attenuator Unit.

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.

3.1Truck 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 anytime' must be visible from the rear of the Impact Attenuator Unit.

4. Trailer Mounted Impact Attenuator Unit.

Trailer Mounted Impact Attenuator Units must be equipped with anti-rotational damper systems (designed to restrict gating of the unit into adjacent traffic lanes). Break away cables shall also be used to ensure that the electronic braking system is activated should the anti rotational damper system fail.

The minimum recommended weight for the tow or host truck is 4,536 kgs. Gross Vehicle Weight (GVM). There is no specified **maximum** GVM for the tow or host vehicle. (NCHRP report 350 conducted on Trailer Mounted Impact Attenuator Units with a TL3 rating).

It is important to note, that as the weight of the support or host truck is ***increased*** the “roll ahead distance” upon impact is ***reduced.***

5. 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 each year and have certification documentation prepared by a competent person.

6. 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 installed in accordance with relevant State/Territory Road Authority technical publications.

6.1 Vehicle Mounted Signs and Devices

All vehicle mounted warning devices shall be in accordance with the requirements contained in the Australian Standard AS1742.3 'Traffic control for works on roads'. 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.

- **Variable Message Sign**

  All Portable Variable Message Signs must meet relevant Australia Standards, comply with applicable regulatory requirements such as ADR, meet registration requirements and applicable State/Territory legislation and be approved for on road use by State/Territory Authority where vehicle is operating.

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

Part B – Qualification Criteria for Operators.

This section provides guidance in TMA Driver Training requirements.

Part B – Qualification Criteria for Operators.

Mandatory requirements for training as TMA operators:

1. Hold a current and valid Heavy Vehicle licence of a suitable class to operate the TMA.
2. Hold a General Construction Induction Card – CPCCOHS1001A (*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 RIIOHS302A ***"Implement Traffic Management Plan".***

Examples of currently accepted equivalent courses:

- NSW "apply traffic control plans" (yellow card)
- QLD "Implement Traffic Guidance Scheme – 30846QLD"

All other states and territories deliver RIIOHS302A in Work site/zone traffic management courses.

Traffic Control Work Zone skill set "Implement traffic control guidance plan" from the Resources and Infrastructure Training Package (RII09).

This skill set outlines the key competencies for a person involved in the implementation of traffic control at a worksite (eg TMA operator).

(attach below extract from the Austroads' Report for "Implementing National Best Practice for Traffic Control at Roadwork Sites – June 2011)

Functional Role	**Profile Functions/duties summary**	**Recommended skill set** **(national training package competencies)**
Implement Traffic Control Guidance Scheme	Personnel are required to identify and select traffic control signs and devices and correctly position them in accordance with the approved TCGP. It may be necessary for personnel to adjust the location of signs and devices within stated tolerances to suit the specific road environment. Personnel will be required to inspect and maintain signs and devices specified in the TCGP during the work program.	**RIIOHS201A** – Work safely and follow WHS policies and work procedures. **RIICOM201A** – Communicate in the work place. **RIIOHS302A** – "Implement traffic management plan".

1. 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, eg Traffic Management Plan (TMP) and Vehicle Management Plan (VMP)
   - Set up TMA signage 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.

2. Proposed Unit of Competency for TMA Operating.

The TMA steering committee supports the establishment of a nationally recognised unit of competency titled "Operate a Truck Mounted Attenuator," to be positioned within the Resources and Infrastructure Industry training package (RII09).

This unit based on the above listed competency elements, once approved, will be delivered by Registered Training Organisations (RTO) who will issue statement of attainments.

Part C – Operational Procedures

This section provides guidance in the Operation of TMAs.

Part C – Operational Procedures

1.0 Operational Specifications.

The following shall be observed when operating a TMA:

a) At all times the host vehicle's standard seat belts shall be used.

and

If fitted with a four (4) point harness seat belt and performing the duties of a TMA the four (4) point harness seat belt shall be used in conjunction with the standard seat belt.

b) After an impact or crash that may affect the integrity of the host vehicle and/or impact attenuator unit, TMA's and attachments must be inspected (see Part A, Clause 5).

c) No items to be carried in the back of a host vehicle while it is performing the duties of a TMA.

d) The mounting of any fixtures or equipment to the TMA shall be engineered to 20 times the weight of the fixture.

e) Only the operator to be in vehicle when performing the duties of a TMA, except in the following circumstances;

If the operator is undergoing training or assessment, the trainer or assessor must occupy a seating position that has the same level of occupant protection as the driver's seat (see Part A Section 1 – Host Vehicle clauses l & m).

f) On request operators shall produce evidence of successful completion of an approved competency based TMA training course.

g) When the Impact Attenuator Unit is in the deployed/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.

h) The Impact Attenuator Unit may only be in the deployed/lowered position when the TMA is engaged at an approved road work site. This may include the preparation and disassembly of an approved Traffic Control Guidance Plan (TCGP).

2.0 Use of TMAs.

In addition to the requirements for the use of TMAs as prescribed in the Australian Standard and the relevant State/Territory Road Authority documents and TCGPs, consideration should be given to the use of TMAs when all of the criteria described below exist at a work site.

- Workers on foot; and
- The work area occupies the travel path; and
- It is not practicable to protect or separate the work area from traffic; and
- The posted speed limit prior to road works is 100 km/h or more; and
- The road is a multilane road.

When the above criteria are met, a decision not to use a TMA must be supported by a documented risk assessment approved by the person who is responsible for the work activity. The risk assessment should include consideration of traffic volumes.

An example diagram is included in Appendix B to indicate the appropriate positions of TMAs and work/shadow vehicles.

Implementation of Traffic Control Guidance Plans (TCGPs) must comply with AS1742.3, and applicable regulatory requirements and applicable State/Territory legislation.

3.0 TMA Work Instructions.

Work instructions shall be produced for the safe operation of TMAs.

Typically these instructions should include information relating to the following:

- Using TMAs to undertake a static lane closure.
- Using TMAs in a mobile convoy situation or progressively moving work situation.

Appendix A:

15 Tonne Gross Vehicle Mass Rationale.

15 Tonne Gross Vehicle Mass (GVM) Requirement for TMA Host Vehicle

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 unlikely to meet all or possibly any of the above critical requirements.

Appendix B:

Rearward Seat Collapse.

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 drivers 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 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 ± 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:

Traffic Control Guidance Plans.

The National TMA Working Party acknowledges that differences will exist between the individual State and Territory authorities in relation to the size and type of traffic control signs and devices and the distances for placement of those signs and devices.

However, the design, selection and implementation of traffic control measures should be based on Australian Standard 1742.3 ***Traffic control devices for works on roads***.

It is of paramount importance in ensuring the safety of all persons, including members of the public at work sites, that there is a high standard of traffic control around, past or through those worksites. This can only be undertaken with a systematic consideration of conditions to be encountered at each site and selecting or designing a specific plan for the control of traffic.

Example: Traffic Control Guidance Plan