



Road Worker Safety Industry Guideline

May 2024





Disclaimer

‘This document refers to various standards, guidelines, calculations, legal requirements, technical details and other information.

Over time, changes in Australian Standards, industry standards and legislative requirements, as well as technological advances and other factors relevant to the information contained in this document, may affect the accuracy of the information contained in this document. While the document will be reviewed regularly, caution should be exercised in relation to the use of the information in this document.

Roads Australia accepts no responsibility for the accuracy of any information contained in this document or the consequences of any person relying on such information.’



ABN 68 004 620 651

National Transport Research Organisation Head Office:
80a Turner Street, Port Melbourne, 3207 VIC, Australia

Offices in: Adelaide, Brisbane, Canberra, Launceston,
Melbourne, Perth, Sydney, Wellington.

ntro.org.au

Foreword

The Road Worker Safety Working Group (RWSWG) was formed in 2019 by Roads Australia to reflect an appetite by key industry leaders to deliver improved safety outcomes for road workers through the use of innovative strategies and technological solutions to eliminate or further mitigate the risks faced.

The RWSWG is taking a leadership approach to embolden the roadworker industry to sign up to this Safer Workzone Commitment which goes above and beyond the minimum standards that the industry must adhere to. The companies involved in the RWSWG are committed to reshaping industry standards and practices to raise the bar and protect road workers and people travelling through work zones.

The National Road Safety Strategy for 2021-30 sets targets to reduce road trauma over the next 10 years, setting us on the path to achieve Vision Zero (zero deaths and serious injuries) by 2050¹.

Everyone accepts that losing lives on our roads is unacceptable, but what about those who risk their lives every day to build, operate and maintain the roads we travel on. These road workers need to be protected and the Safer Workzone Commitment will challenge the current standard practices and support and prioritise a vision zero future for the road worker industry.

This initiative is not a prescriptive set of treatments, it is intended to empower and enable the industry to use methods and technology that further mitigate the risks that roadworkers and those travelling through work zones face daily. It will be an ever-evolving document, building on, and updating knowledge as research and industry practices evolve.

We are all partners on the journey toward a safer road network. This initiative is an ambitious commitment, and we are seeking industry support for widespread adoption to raise the bar to a higher level of safety.

¹ www.roadsafety.gov.au

You can express your commitment to safety through this initiative by emailing a letter of support to RA CEO, Ehssan Veiszadeh – ehssan@roads.org.au





Road worker safety is vital to achieving Australia's infrastructure ambitions

The continued investment in Australia's road network is essential for connecting communities and ensuring our economy continues to grow. Road worker safety is fundamental. And while past and current risk management approaches and mitigation measures have played their part in ensuring that road workers return home safely at the end of their shift, a rise in the number of incidents, serious injuries and fatalities highlights the need to continually improve the safety of road workers and the public travelling through work zones.

Industry has long recognised there is a significant gap between minimum standards for road worker safety and a work environment that is intrinsically safe.

The Austroads Guide to Temporary Traffic Management provide practitioners with guidance on the planning, design and implementation of safe, economical and efficient traffic management. It is used in conjunction with Australian Standard AS 1742.3 Manual of Uniform Traffic Control Devices Part 3.

However, drivers do not always adhere to the rules, and hence the standard of controls need to be raised to counteract driver behaviour and close the gap where mistakes can be made.

In many sectors it is no longer acceptable to just meet bare minimum requirements, this should apply to our road networks too. Leading organisations must be supported to raise the bar in road worker safety above that of the minimum standards to ensure an intrinsically safe workplace that caters for human errors on the road. This support should be clearly demonstrated in the planning, pre-contract and contractual processes.

This Safer Workzone Commitment presents innovative methods, equipment, and measures, through the focused adoption of the established Safe System approach and hierarchy of controls principles.



1.1

What Road Workers are saying about the risks they face

Multiple sources of data confirm that roadworkers are regularly confronted with dangerous driving behaviours that put their lives at risk.

NTRO surveyed over 1100 industry practitioners to collect insights from practitioners who work in road work zones. Participants were asked if they had observed or been directly involved in incidents near road construction or maintenance work sites, and an overwhelming response indicated that they had experienced unsafe practices.

When asked what are the main safety concerns/risks for road workers, over a third of participants answered with the word ‘traffic’, and a consistent theme of speeding drivers was also reported.



FEEDBACK INDICATING THE TOP FOUR ISSUES AFFECTING ROAD WORKERS ARE:

-  **Speeding** by members of the public
-  Receiving **abuse** from members of the public
-  **Disobeying** warning/control signs
-  **Dangerous manoeuvres** by members of the public

Following on from this question, participants were asked what additional risk management controls and/or changes to practice are required to increase safety. A desire for increased police presence, speed cameras and enforcement to control speeds around and through work zones were identified as key themes.

For the full set of results see Appendix A.



1.2

What insights can we gain from the incident data

The Australian Flexible Pavement Association (AfPA) has taken on a key role in improving the collection and reporting of data related to road worker incidents and near misses, and will undertake national reporting for the industry moving forward.

A desktop review of incident and crash data available from the Road Worker Safety Working Group indicated the top four incidents recorded at work zones in Australia were:

- Procedural breach,
- Property damage,
- Unauthorised site entry, and
- Speed breach.

However, it is well known throughout the industry that crashes and near misses in work zones are significantly underreported, and without reliable data and records on incidents that occur at these road work zones, it is difficult to quantify the actual size of the problem and understand the crash causation process.

Austrroads published data in 2022 that found over a ten-year period, 18 fatal worksite crashes were recorded annually, along with 245 serious injury crashes annually.

Considering around 1,200 fatal road crashes are recorded annually in Australia, this data suggests 1.5% of national fatalities occur in workzones.

1.3 Safe System as a Framework for Effective Change

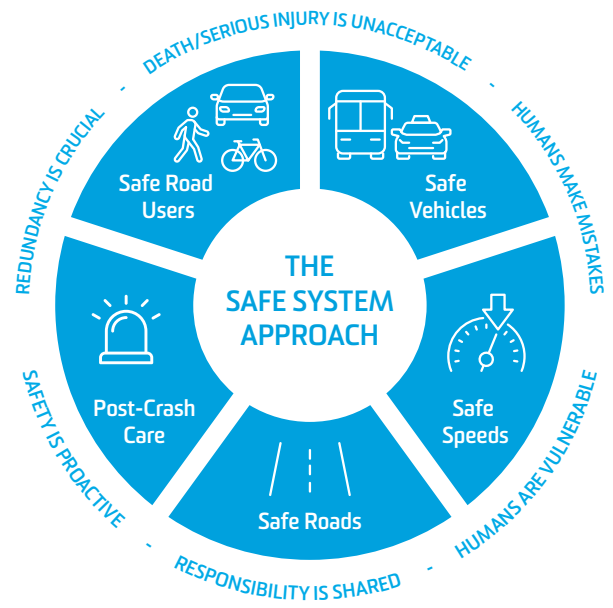


We are seeing unprecedented amounts of work being undertaken on our roads, and the risk of errors being made by road workers or drivers through these workzones should not result in fatalities or serious injuries. This gap is where we as an industry need to raise the bar and ensure that higher levels of safety and controls are implemented.

The Safe System approach involves all the elements of the road transport system working together to prevent crashes or limit crash forces, making them survivable and reducing the severity of injury.

The Safe System accepts that road users make errors and that the road system should be forgiving of those errors, however the application of this concept can be challenging to implement in a roadwork workzone and an effort is required to implement the Safe System approach to address factors such as:

- signage that does not clearly articulate required speeds, actions or directions
- speed limits that are appropriate for the location and nature of works
- protection for road workers against errant vehicles



Treatment options should be thought of in terms of their alignment with Safe System objectives – do they result in a zero-harm design?

The National Road Safety Strategy 2021-2030 recognises road workers as ‘vulnerable road users’ given that humans have little to no protection from crash forces.

This leaves the provision of a range of measures including how we design workzones and the use of devices on the infrastructure and speed management, as key principles in improving safety of workers and road users around road workzones.

Source: FWHA Federal Highway Administration (USA)



Implementation of Safer Workzones

2.1

How do we raise the bar?

Continual research into innovative treatments and practical solutions particularly by traffic management companies is contributing towards a safer working environment and removing or minimising the risk to road workers by raising the bar of critical controls.

In developing traffic management plans practitioners should consider the highest controls possible to improve road worker safety. A number of factors increase the risks in and around workzones, depending on the type of road, volume of traffic, speed environment and even time of day.

By considering these risks in a risk matrix it becomes more evident that some situations require immediate attention, and more controls should be introduced to lower the risk.

The table in Appendix C provides examples of safety initiatives, devices, and approaches that are available and will help lift the industry as a whole and improve safety in and around workzones. It includes a contemporary range of mitigation measures that can be considered and adopted but is not exhaustive. It includes a contemporary range of mitigation measures that can be considered and adopted but is not exhaustive. It is important that the range of options are dynamic, being updated regularly to include recently introduced and emerging measures.

2.2

Shifting the Balance to Greater Control

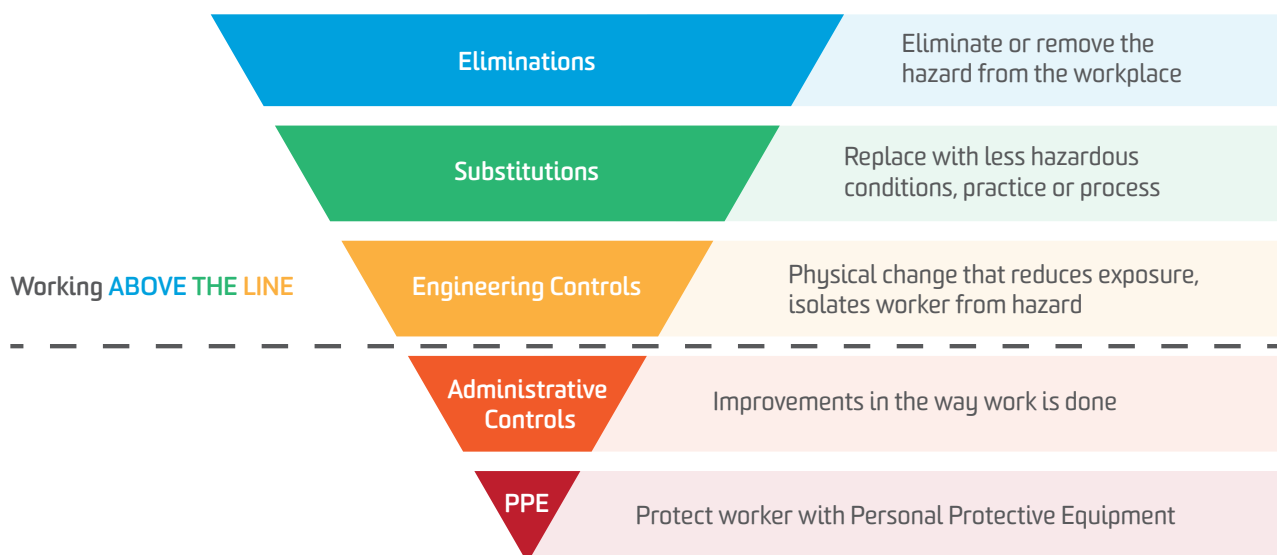
Controlling exposures to hazards in the workplace is vital to protecting workers.

Occupational Health and Safety performance is commonly governed by the assessment and management of risks through the Hierarchy of Control Measures, with mitigations ranging from the elimination of a risk/hazard down to the wearing of PPE.

The most effective and sustainable way of ensuring that road workers are safe, is to eliminate hazards and risks

Every effort must be made to work **ABOVE THE LINE** with the following controls to ensure a safer workzone:

1. Start with the most effective control of **ELIMINATION** such as road closures.
1. If elimination is not possible, then consider **SUBSTITUTION** controls such as the use of technology solutions rather than road workers
- 2. ENGINEERING CONTROLS** that isolate workers through protective barriers are the lowest form of control that can be accepted if we are serious about raising the bar.



Organisations should be supported to provide the highest and most reasonably practicable level of risk mitigation possible.

The barriers to being innovative and competitive in tendering processes must be revised and KPIs relating to safety and eliminating risks must be used to encourage safer system treatments and discourage adherence to only the minimum standards currently in use.

The types of risks encountered in workzones and some example treatments to mitigate these risks are presented in Appendix C.



2.3

Improving safety through harmonisation and innovation

Austrroads (the association of Australian and New Zealand transport agencies) has progressed three major initiatives to advance Temporary Traffic Management (TTM) practices and to improve safety outcomes:

Austrroads Innovative Temporary Traffic Management Device and Solution Assessment Scheme (AITDSA) (pronounced ATt-sa).

AITDSA provides a way for innovative devices and solutions, which can be used to improve TTM safety, to be assessed and recommended for use throughout Australia and New Zealand.

Innovative TTM devices and solutions may perform a diverse range of functions, including (but not limited to):

- Regulating traffic (i.e., to assign priority and indicate regulations in force)
- Informing motorists of hazards or regulatory controls ahead
- Warning of temporary hazards that could endanger motorists or workers and plant engaged in work on the road.

The acceptance of the emerging technologies and treatments by state road authorities is crucial to improve the safety for road workers.

AITDSA adopts a holistic end-to-end approach to the assessment and recognition of innovative TTM devices and solutions, by taking into account:

- What the innovative device/solution is intended to do
- Environment parameters (the environments it can or cannot be used in)
- Operational arrangements (the conditions necessary for safe use)
- Training requirements (the user training needed to ensure its safe use)
- The interface and updating the Austroads Guide to Temporary Traffic Management (to ensure there is an alignment) – see below.

Austroads Guide to Temporary Traffic Management (AGTTM).

The AGTTM is based on best TTM practices. It has been designed to help road authorities meet their legislative responsibilities for workplace and public safety. It covers the planning, design, and implementation of safe, economical, and efficient TTM .

The AGTTM encourages a consistent level of planning that supports a streamlined safe progress of work. It applies to all works on or near roads, as well as off-road development and other activities that interact with and impact the road environment.

Australian and New Zealand agencies are adopting the AGTTM into their practice at their own pace depending on their needs, resourcing, and their local instruments.



Harmonisation of training or Temporary Traffic Management (TTM) practitioners

The National Training Framework for TTM ensures individuals working in the industry are appropriately trained and that their knowledge and skills are maintained.

The National Training Framework is designed under the Vocational Education and Training (VET) framework based on Skill Sets and Units of Competencies and provides:

- Registration process for registered training organisations wishing to deliver the TTM National Training Framework. Once approved these registered training organisations are known as Approved Training Providers and are listed on the Austroads Website.
- Graduated learning across TTM categories
- Greater opportunities and a more structured genuine career path
- Theoretical (classroom) and practical training
- National recognition - individuals who have successfully completed the training requirements in one state/territory will have this training recognised in another participating state/territory, noting there may be additional localised training requirements in states and territories specific to the jurisdiction.



Conclusion

Deaths on our roads are unacceptable, and the health and safety of road workers needs to be prioritised.

This guidance has been prepared for the industry leaders who want to ensure their staff and those working in road work zones will always return home safely at the end of the day. The included treatments and technologies reflect best practice and contemporary knowledge regarding road worker safety both nationally and internationally.

Industry safety leaders are invested and passionate supporters of improving roadworker safety through the implementation of added safety measures.

They have gone above and beyond the minimum requirements at their own expense, to demonstrate that moving towards a Vision Zero outcome is possible with step change improvements, and we need a strong commitment by industry to make this change and help deliver safer outcomes for road workers and the community travelling through these workzones.

Without an improved industry safety standard, some companies will continue to meet the bare minimum requirements and the risk to the public and workers will remain high.

We encourage our industry colleagues to raise the bar to a higher standard and sign up to this safer workzone commitment. We want to remove the barriers to innovation in our industry and increase the collaboration and improvements in our industry.

The outcomes of this commitment have been developed with the intention of providing support to industry with practical, implementable, and informed decisions intended to reduce road trauma without adversely affecting productivity or performance. An ongoing commitment by industry to monitor and report incidents and evaluate effectiveness of controls implemented will be integral in achieving improved road safety outcomes in and around road workzones.



References

Altus Traffic 2022, 'Altus to introduce workzone traffic digitisation', blog post, Altus Traffic, 11 August 2022, accessed 11 October 2022, <<https://altustraffics.com.au/news-blog/nrsw2022-n8jtm-nkba3-llmn8>

Australian Government, Fact Sheet: Vision Zero and the Safe System, National Road Safety Strategy, <https://www.roadsafety.gov.au/>

Austroads (2022), Austroads Innovative Temporary Traffic Management Device and Solution Assessment (AITDSA) Scheme, <https://austroads.com.au/network-operations/temporary-traffic-management/AITDSA>

Downer n.d., 'Project summary: Ben Hur working in live traffic – 2020 focus', Downer, Australia, Ben Hur Project Summary - 2020 Focus v2.pdf

FWHA Office of Safety (2022), The Safe System Approach, https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA_SafeSystem_Brochure_V9_508_200717.pdf

Monash University Accident Research Centre (2018), Australian Naturalistic Driving Study (ANDS), <https://www.monash.edu/muarc/news-and-events/articles/drivers-distracted-every-96-seconds-first-findings-from-australian-naturalistic-driving-study>

National Road Safety Partnership Program, Fact Sheet: Drink Driving <https://www.nrspp.org.au/resources/fact-sheet-drink-driving/#:~:text=This%20fact%20sheet%20focuses%20on,of%20fatal%20crashes%20in%20Australia.&text=Over%201%20in%204%20drivers,BAC%20exceeding%20the%20legal%20limit.>

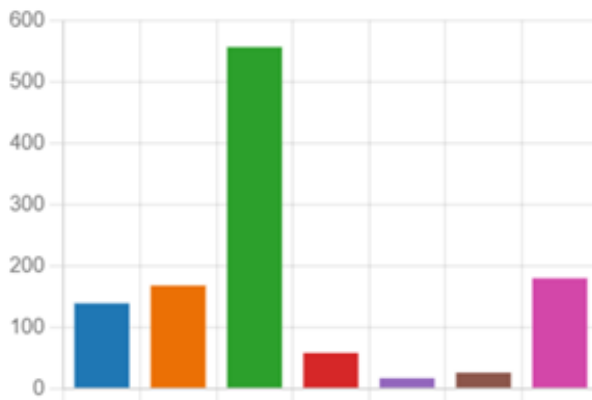
Traffic Management Association of Australia, National Traffic Safety Survey, 2023 Edition, <https://tmaa.asn.au/resources/Documents/2023%20National%20TC%20Safety%20Survey%20results.pdf>

Appendix A

Survey results

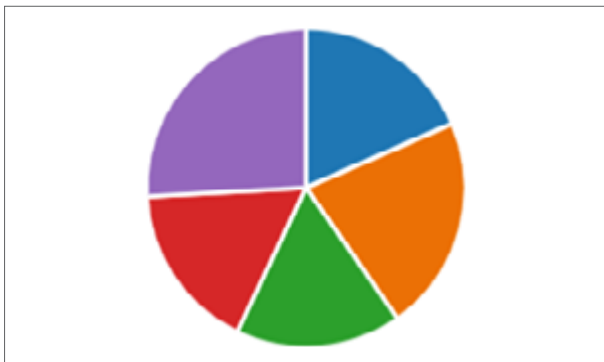
Q1. Which of these best matches your role description?

Roadworks supervisor / leading hand	139
Roadworker	168
Traffic controller	557
Traffic management implementer	58
Traffic management designer	17
Incident response crew member	26
Other	180



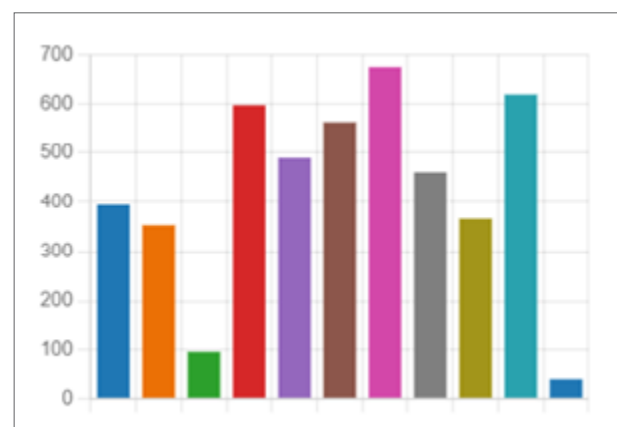
Q2. How many years of experience working in this role do you have?

Less than a year	211
1 – 3 years	250
3 – 5 years	193
5 – 10 years	195
More than 10 years	296



Q3. Have you observed or been directly involved in any incidents near to road construction or road maintenance work sites or incident response?

No	394
Near miss involving narrowly avoided collision between road worker and member of public	353
Hit by vehicle involving collision between road worker and member of public	96
Received abuse from member of public (verbal and physical abuse)	597
Heavy braking by member of public when approaching traffic control	490
Dangerous manoeuvres by member of public (including driving through traffic control)	563
Speeding by member of the public	676
Overtaking of queues by member of the public	461
Tailgating by member of the public	366
Disobeying warning/ control signs	618
Other	38



Appendix B

Traffic Management Association of Australia survey

In addition to the road worker survey, NTRO also conducted a survey for The Traffic Management Association of Australia (TMAA). TMAA is a peak body and a voice for traffic management industries in Australia and has 117 Members from 95 Member Companies. The survey was conducted consecutively over three years, with strong involvement from TMAA members and third-party stakeholders.

The majority of respondents surveyed (85% in 2022, 76% in 2021 and 82% in 2020) reported that they have a system to record near misses and accidents, however the industry currently has more than 25 different tools / systems. Consolidation of these tools is imperative to address these preventable incidents and design mitigation measure.

When asked about fatalities, three companies in 2022 reported having encountered fatalities in their workplace.



In March 2023, the Traffic Management Association of Australia (TMAA) launched the National Traffic Controller Safety survey which is aimed at assessing the safety of traffic controllers in their work environment. The survey found the average safety perception score stands at 6.3, which suggests a fairly low level of perceived safety for traffic controllers in their workplace.

2020

Survey Total Fatalities in Jan–Dec 2019

- Total responses: 58
- 98% (57/58) of respondents DID NOT encounter fatalities
- Only 1 respondent claimed to have encountered 1 fatality

2021

Survey Total Fatalities in Jan–Dec 2020

- Total responses: 57
- 100% (57/57) of respondents DID NOT encounter fatalities

2022




Survey Total Fatalities in Jan–Dec 2021




- Total responses: 62
- 95% (59/62) of respondents DID NOT encounter fatalities
- 5% (3/62) of respondents encountered fatalities



As the closing statement from the survey articulates:




“To drive down injuries and fatalities, a continued focus on all aspects of worker safety is paramount. This includes access to training, improved availability of safety metrics and increased awareness of safety campaigns”.



Treatments




What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Separating workers from traffic</p>	<p>Road Closures</p>			<ul style="list-style-type: none"> • Closure of a road at a point prior to the workzone and the direction of traffic through a detour. 	<p>Elimination</p>
	<p>Contraflow</p>			<ul style="list-style-type: none"> • Traffic flow is diverted around the work zone to flow on the opposite side of the road. • Often used on a divided road where both directions of traffic use one side of the road. 	<p>Elimination</p>
	<p>Traffic lights</p>	<p>Portable Traffic Lights</p>		<ul style="list-style-type: none"> • Controllers can control temporary traffic lights, using a handheld remote control, from a safe distance • The technology enhances visibility for drivers and is safer and more efficient for traffic control operators • Provides improved visibility and can be seen from a greater distance away, as well as being clear in foggy or overcast weather conditions • Systemised by Design's 'TriLight' product is AITDSA approved (https://austroads.com.au/network-operations/temporary-traffic-management/AITDSA/aitdsa-recommendations-for-use) 	<p>Elimination</p>



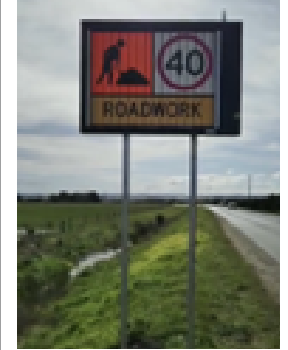
What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
Separating workers from traffic	Traffic Lights	Combined traffic signal and barrier system		<ul style="list-style-type: none"> The System is operated using a remote control rather than a paddle to control traffic movement. It enables the traffic controller to be positioned outside the travel lane Pictured is Arrowes' 'eBOOM' product Traffic Logistics also have a transportable boom gate/traffic light module product (the 'TLB') 	Elimination
	Boom gates/ barriers	PORTABOOM®		<ul style="list-style-type: none"> Portable boom gate to manage temporary traffic control sites, operated by a remote control Provides enhanced safety through the presence of clear and visible physical barriers, reducing the risk of motorists ignoring traffic controllers This product has TIPES approval (https://www.arrb.com.au/productcertification) and is approved by NSW, Qld, Vic, Tas, WA and SA for use on their roads 	Elimination
		GIBNEY® Barrier		<ul style="list-style-type: none"> Fulton Hogan, in collaboration with BlackRoo Industries and DeNeeffe Signs/ Traffic Technologies Ltd, have developed an innovative SLOW/STOP bat titled the GIBNEY® Barrier. This product has TIPES approval (https://www.arrb.com.au/productcertification) and AITDSA approval (https://austroads.com.au/network-operations/temporary-traffic-management/AITDSA/aitdsa-recommendations-for-use) 	Substitution



What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Separating workers from traffic</p>	<p>Hard Barriers</p>	<p>Hill & Smith Zoneguard® temporary steel barrier</p>		<ul style="list-style-type: none"> • Lightweight configuration. • Meets both NCHRP 350 (TL-3 & TL-4) and MASH (TL-3) crash test standards • Assessed and accepted by Transport for NSW • Recommended by the Austroads Safety Barrier Assessment Panel (https://austroads.com.au/safety-and-design/barrier-assessment/products-recommended) 	<p>Elimination</p>
		<p>Trinity Highway's Vulcan® moveable steel barrier</p>		<ul style="list-style-type: none"> • Lightweight, galvanized steel segments designed to help the operator work from either side of the barrier. • Tested to NCHRP Report 350 Test Level 3 and Test Level 4, and EN1317 H2 and N2 specifications. • Assessed and accepted by Transport for NSW. • Recommended by the Austroads Safety Barrier Assessment Panel (https://austroads.com.au/safety-and-design/barrier-assessment/products-recommended). 	<p>Substitution</p>



What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Separating workers from traffic</p>		<p>Worksite Safety Barrier Screens known as anti-gawk screens</p>		<ul style="list-style-type: none"> • Reduce driver distraction and protect workers from projectiles. • Screens are typically used on high speed roads or where safety barriers are used on heavily trafficked roads • It is the responsibility of the contractor to ensure the design is appropriate for the site and is approved by the relevant road authority. 	<p>Elimination</p>
	<p>Hard Barriers</p>	<p>Moveable Barriers</p>		<p>The QuickChange Moveable Barrier System is designed to increase capacity and reduce congestion by making more efficient use of new or existing roadways & highways</p> <ul style="list-style-type: none"> • The system can be used to move barrier from one side of a lane to the other to create workspace and reopen lanes again to restore capacity • Assessed and accepted by Transport for NSW • Recommended by the Austroads Safety Barrier Assessment Panel (https://austroads.com.au/safety-and-design/barrier-assessment/products-recommended) 	<p>Elimination</p>
	<p>Automated Cone Trucks</p>	<p>Automated Machine for Cone Placement and Retrieval</p>		<ul style="list-style-type: none"> • Arrowes have developed an Automated Cone Truck (ACT) that can mechanically place and retrieve cones • Ensures workers are not exposed to the risk of traffic • The ACT can retrieve cones from both sides of the vehicle while driving forward or reversing 	<p>Elimination</p>


What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
Influencing driver speeds	Police presence			<ul style="list-style-type: none"> • Police presence and enforcement will influence driver behaviour • Note that this is not innovative but has been included for completion 	Engineering
	Mobile Automated speed enforcement			<ul style="list-style-type: none"> • Mobile speed cameras can be used to target speeding drivers • These don't necessarily prevent incidents from occurring and should be used appropriately • Note that this is not innovative but has been included for completion 	Engineering




What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Influencing driver speeds</p>	<p>Speed feedback radars</p>	<p>Mobile speed camera and messaging board</p>		<ul style="list-style-type: none"> • These devices give visual feedback to drivers • Solar powered and aim to facilitate behavioural change • Provide smiley faces or travelling speed or other messaging • Many products on the market – <ul style="list-style-type: none"> • Novecom’s Intercepta (trailer mounted mobile speed camera) • Arrowes’ eSAS (electronic speed awareness sign) • Acusensus’ ‘Heads-Up’ (captures real time images of mobile phone use, vehicle speeding and seatbelt offences) 	<p>Engineering</p>
		<p>Speed Reader Boards</p>		<ul style="list-style-type: none"> • Promote safer driver behaviour prior to entering workzones through displaying the drivers’ travelling speed • Pictured is Voxson’s ‘Mobile Trailer Mounted Radar Speed Sign’ 	<p>Engineering</p>
		<p>Radar Drone</p>		<ul style="list-style-type: none"> • Texas DoT US trials (not currently used in Australia) • Radar drones simulate the presence of law enforcement by continuously emitting radar signals. Vehicles with radar detectors may decelerate when they detect the radar transmission • Not as effective as a speed trailer 	<p>Engineering</p>

What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
Influencing driver speeds	Speed humps and other slowing measures	Temporary Rumble Strips		<ul style="list-style-type: none"> Used around the world these are a cheap and simple solution to alert drivers and reduce speed Saferoads' 'RoadQuake' (pictured) is approved for use in Vic, NSW, Qld, SA and WA 	Engineering
		Temporary Stop Bars		<ul style="list-style-type: none"> Ministry of transportation and infrastructure – British Columbia (not currently used in Australia) Temporary stop bars /stop lines may be used by traffic controllers to help define a specific stopping location in advance of the traffic controller's position 	Engineering
	Remote speed sign changes	Multi Message Sign		<ul style="list-style-type: none"> TriSign – Remote access Multi Message Signage It is a changeable message sign for traffic management and is managed through a phone app This product has AITDSA approval (https://austroads.com.au/network-operations/temporary-traffic-management/AITDSA/aitdsa-recommendations-for-use) 	Engineering

What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Reducing the likelihood and consequences of impact</p>	<p>Mobile barriers and attenuators</p>	<p>Truck Mounted Attenuator (TMA)</p>		<ul style="list-style-type: none"> • Innov8 Equipment - provides a high level of impact protection, while enabling clear communication with road users at work sites. • The technology is designed to safely absorb impact from vehicles travelling within 100km/hr. • It is approved according to the MSH safety standards • Recommended for acceptance by the Austroads Safety Barrier Assessment Panel (https://austroads.com.au/safety-and-design/barrier-assessment/products-recommended) • Adheres to National Heavy Vehicle Regulator • Also known as Impact Protection Vehicle 	<p>Substitution</p>
		<p>Bump trucks with both rear and side impact TMAs</p>		<ul style="list-style-type: none"> • Truck Mounted Attenuator Trucks (TMAs) 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 • Also known as Impact Protection Vehicle 	<p>Substitution</p>

What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Reducing the likelihood and consequences of impact</p>	<p>Mobile barriers and attenuators</p>	<p>Mobile Barriers MBT-1®</p>		<ul style="list-style-type: none"> • A highly mobile traffic barrier system for incident response • Allows rapid work zone set up / removal • Tested and accepted under NCHRP 350 & MASH for TL-2 and TL-3 usage • Pictured is Traffic Logistics' 'Mobile Barriers MBT-1®' • It has been assessed and accepted by Transport for NSW and recommended by Austroads Safety Barrier Assessment Panel (https://austroads.com.au/safety-and-design/barrier-assessment/products-recommended) 	<p>Elimination</p>
<p>Active intervention</p>	<p>Data analytics on vehicle speeds and behaviours</p>	<p>Portable ITS Technology for Work Zone Traffic Management</p>		<ul style="list-style-type: none"> • US DoT (not currently used in Australia) • Systems such as variable message signs (VMS), highway advisory radio (HAR), and queue length detectors have been utilized by Missouri Department of Transportation on various construction projects to detect traffic conditions, and determines appropriate messages to display to motorists 	<p>Engineering</p>

What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Better communication with drivers</p>	<p>Portable ITS Technology</p>	<p>Mobile Gantry</p>		<ul style="list-style-type: none"> • Large portable gantries for use on major arterials and worksites. • Provide motorists with important road information • Not currently used in Australia 	<p>Engineering</p>

What action can we take?	What types of treatments can help us implement this?	Example	Image	Description	Hierarchy of Control
<p>Providing robust, real-time warnings</p>	<p>Work zone digitisation systems</p>	<p>Automated Early Warning System</p>		<ul style="list-style-type: none"> • Smart assets such as signage, delineation, vehicles, boom gates, alarm units, lidar detectors and a growing number of new devices, can provide instant warning of workzone or exclusion zone incursions and incidents, providing valuable warning to people working onsite • Highway Resource Co in the UK have partnered with Altus to bring the MyWorkZone technology to Australia 	<p>Engineering</p>
		<p>Internet of Things Integration by collaborating to supply real-time disruption information to drivers</p>		<ul style="list-style-type: none"> • Mooven have a performance monitoring product that provides real time monitoring and reports on journey times and congestion delays • This could be used to report on temporary work zones 	<p>Engineering</p>
		<p>Intelligent Transport Systems</p>		<ul style="list-style-type: none"> • Provide improved communication with the driver • Variety of use cases and suppliers 	<p>Engineering</p>