

Roadworks safety



- Accurate data on roadwork crashes in Australia are lacking, but it is estimated that each year at least 50 deaths and 750 injuries occur to workers and the public in road worksite crashes with a cost of more than \$400 million.¹
- Speeding in road worksites is a significant road safety issue.²
- Crash rates increase during roadworks compared to the pre-work period.³

State of the Road A Fact Sheet of the Centre for Accident Research & Road Safety - Queensland (CARRS-Q)

THE FACTS

- Road construction and repair is essential for maintaining and improving the mobility and safety of all road users, however, the process of building safer roads and roadsides needs to be managed to minimise risks to both motorists and roadworkers.
- There is a lack of detailed and accurate safety records on incidents in Australian worksites which prevents a thorough understanding of the relevant risks and hazards, and presents challenges to identifying appropriate safety treatments.⁴
- Studies show that crash rates increase during roadworks compared with pre-work periods.³
- Worksite crashes are reported to be more severe than other crashes.⁵
- Roadworks can be a cause of driver frustration, resulting from frequent stops, a perceived lack of work activity, perceived inappropriateness of reduced speed limits, and associated increased travel times. This may influence driver behaviour and compliance with worksite traffic controls.⁶

The key safety issues⁴

1. The approach area of a worksite is the most dangerous section.
2. Non-compliance with speed limits is a major issue.
3. Driver speed is influenced by other vehicles within worksites.
4. Improved driver education and awareness of worksite hazards is needed.

Common types of worksite incidents

Common types of incidents in worksites perceived by roadworkers include:⁷

- Public vehicle intrusion into work areas;
- Public vehicle hitting traffic controllers;
- Rear end crashes at roadwork approaches; and
- Reversing incidents involving work vehicles and machinery.

Main causes of worksite incidents

Common causes of incidents in worksites perceived by roadworkers include:⁷

- Motorists violating posted speed limits and driving too fast;
- Distracted driving by motorists;
- Motorists ignoring signage and traffic controllers' instructions; and
- Roadworkers misjudging or ignoring reversing beepers and ignoring spotters' instructions.

Slow down and obey posted speed limits in roadworks. There may be hazards you cannot see.

Speeding is a major cause of crashes in road worksites:²

- A study of driver speeds in Queensland worksites⁶ showed that almost all vehicles (76-98%) speed when approaching worksites, with a high proportion (66-89%) speeding inside work areas. This high rate of non-compliance with roadwork signage

poses a significant threat to roadworkers as well as to motorists themselves.

- Research indicates that the main influences on driver speeds in worksites are:
 - Presence of activity: Drivers will travel about 20% slower if they see workers than if they do not.^{8,9}
 - Speeds of other vehicles: Motorists are more likely to speed if other vehicles in the traffic stream are⁶ and drivers report feeling pressured when being tailgated in the traffic stream.
 - Location in the worksite: Motorists speed more when approaching a worksite and less towards the end of the worksite.⁶
 - Type of vehicles: Light vehicles are more likely to speed than trucks.⁶
 - Gap from front vehicle: Vehicles with large front gaps are more likely to speed than those with small gaps.⁶
 - Time of day: There are higher average speeds during night hours than during the day.⁶
- Interestingly, results from a US study showed that while a visible police presence reduces speeding⁹, the threat of higher penalties for speeding in worksites has little impact.^{8,9}

Common worksite hazards

Common hazards in worksites perceived by roadworkers include:¹⁰

- Speeding;
- Working in wet weather (slippery surface, reduced skid resistance, and reduced visibility);
- Driver frustration and aggression towards roadworkers (mostly to traffic controllers);



- Working close to a traffic stream (errant vehicles, traffic throwing stones from pavement);
 - Distracted driving, particularly due to mobile phone use;
 - Roadworks during night, dawn, and dusk hours (more distracted and drink driving during night, motorists facing sun during dawn and dusk hours and not noticing signage and traffic controllers, and reduced visibility of traffic controllers during night hours);
 - Highway works more unsafe than urban and local street works when setting up signage; and
 - Working on hilly and curvy roads (limited visibility to traffic and no escape path).
- The approach area of a worksite (upstream of the work area) is considered the most safety critical area as identified from the perceptions of roadworkers and drivers' speed profiles.⁴ Common types of incidents, such as work area intrusion, rear end crashes, and a traffic controller being hit by a vehicle generally occur in this area. Moreover, motorists are guided to stop, change lanes and/or reduce speed while travelling through this area. These actions create more conflicts among vehicles and increase the variability of speeds in a traffic stream, thus increasing the likelihood of crashes.

Safety measures and controls

Worksite safety measures and controls can be broadly categorised as:

1. Informational

Informational measures may include speed limit and warning signs, regulatory speed limits, variable message signs (VMS) and speed feedback systems.

2. Physical

Physical measures may include rumble strips, narrowing lanes, reducing proximity of workers to traffic through the use of automated or hand-controlled traffic lights and anti-gawk screens.

3. Enforcement

- Enforcement measures seem to be the most effective means to reduce speeds in worksites but these demand allocation of significant resources.¹¹
- The presence of a speed camera or a police car with flashing lights has significant effects on reducing speed¹², however the effects often diminish once motorists have passed them.
- Imposing higher fines for violating speed limits (as done in the US) has little effect on speed reduction.¹¹ The perceived likelihood of detection is likely to be an important factor.

4. Educational

(e.g. public awareness campaigns, driver training) – have great potential to improve roadworks safety)

*Common safety measures suggested by roadworkers to mitigate the hazards include:*¹⁰

- Active police enforcement with speed feedback systems;
- Roadwork-oriented driver education and licensing program;
- Improving communication among and between workers and traffic controllers (mandatory radio use on a single channel for all);
- Physical separation from live traffic (portable barriers, bump trucks with both rear and side impact attenuators);
- Enhancing visibility of signage and workers (conspicuous and comfortable safety vest);
- Anti-gawk screens to reduce driver distraction and protect workers from projectiles;
- Portable traffic lights/robotic flagger to remove traffic controllers from road;
- Speed humps and posting the lowest speed limit ahead of traffic controllers;
- Higher penalties for violating roadwork traffic rules with active enforcement;
- Changing messages on Variable Message Signs (VMS) periodically.

Research indications

- Research indicates that removing lower speed limits while sites are inactive can reduce speeding,^{8,9} however, lower speed limits must remain at some inactive sites due to concealed hazards.
- Queensland research has shown that:
 - The presence of a pilot car can reduce motorists' speeds in roadworksites.¹³
 - Police enforcement coupled with the presence of VMS have greater effects of reducing speeding than these treatments alone.¹⁴
 - Remote-controlled stop/slow operation devices could effectively remove traffic controllers from the road.¹⁴

**Expect the unexpected!
Stay alert and minimise
distraction as you travel
through a worksite.**

Challenges for roadworks safety improvement in Australia

1. Lack of quality data⁴

The conventional safety assessment approach taken by researchers in many countries (i.e. analysis of historical crash records) to understand worksite safety issues is not possible in Australia, due to the lack of detailed and accurate crash records. Because of this, it is difficult to understand the safety hazards in Australian worksites and to make informed decisions about appropriate treatments for improving worksite safety. Alternative safety assessment approaches, informed by data collected from real-world worksites, are necessary to facilitate this process, and CARRS-Q has been active in undertaking research in this area.

2. Unpredictability of driver behaviour

A number of worksite hazards can be mitigated through effective control measures, but the unpredictability of driver behaviour, especially those who are impatient or inattentive, puts roadworkers at a higher level of risk.

3. Contractor acceptance

Trialling new and innovative worksite safety treatments for can be costly. Contractors are generally more likely to complete the work in accordance with the minimum requirements specified in contracts.

CARRS-Q'S WORK IN THE AREA

- Integrating technological and organisational approaches to enhance the safety of roadworkers.¹⁵
- Understanding common roadwork hazards and their mitigating measures.¹⁰
- Understanding driver speeds in roadwork sites.^{2,6}
- Examining the influential factors of driver speeds.¹⁶
- Understanding the effectiveness of speed control measures in worksites.¹
- Identifying the potential safety treatments to improve worksite safety.⁴
- Evaluating the effectiveness worksite safety treatments.^{13,14}

CARRS-Q's Roadworks Safety research publications can be accessed with the reference list or at QUT ePrints (<http://eprints.qut.edu.au/>) by searching 'Roadworks'.

Merge early. Crashes occur when vehicles rush to the lane closure and then try to merge in. Traffic flow is optimal when motorists maintain a safe, steady speed and leave a safe gap.

TIPS FOR STAYING SAFE

When driving through a road worksite, protect the safety of yourself and others:

- **Slow down! Obey posted speed limits,** regardless of activity that can be seen. There may be hazards that are not immediately obvious. Do not return to the pre-worksite posted speed limit until you see a sign to confirm that you've left the worksite.
- **Watch the signs** and observe their instructions.
- **Maintain a safe distance** between your vehicle and other traffic, barriers, construction equipment and workers.
- **Allow a minimum two second gap** of braking distance between you and the car in front. Rear end crashes in worksites are common. Remember the faster you are driving, the longer it will take you to stop.
- **Expect the unexpected.** Normal speed limits may be reduced, lanes may be changed, lane merges may be required, and people or vehicles may be working on or near the road.
- **Stay alert and minimise distraction.**
- **Dedicate your full attention to the road** and avoid changing the radio station, using technology or eating at this time. Watch the traffic around you and be prepared to react. Remember driving through worksites is different to normal road sections.

- **Merge early.** Crashes may occur when vehicles rush to the lane closure and then try to merge in. Traffic flow will remain optimal when motorists observe speed signage, maintain a safe steady speed, and move to the appropriate lane at first notice.
- **Follow the instructions of traffic controllers.** Remember that traffic controllers are there to guide you safely through worksites.
- **Stay calm and be patient.** Worksites aren't there to inconvenience you, but to improve the roads for all. Without roadworks, our roads would be full of potholes.
- **Take extra care after dark and in poor weather.** Low light and rain conditions will reduce visibility and increase the slipperiness of the road and stopping distance. Slow down and allow extra space between your vehicle and the one you are following.
- **Avoid roadworks when you can.** If long term roadworks are occurring on a route you frequently take, investigate and take alternative routes if you can to avoid frustration. Queensland Government's 131940 Traffic and Travel Information website (<http://131940.qld.gov.au/>) provides accurate and timely road condition reports for the state network. Other state transport departments offer a similar service.



FUTURE DIRECTIONS

- The increased risk in worksites warrants urgent research attention to improve the safety of roadworkers and motorists.
- The limitations of Australian data mean that future research efforts to improve roadworker safety will rely on data collection from real-world worksites. This benefits the safety treatment identification process by allowing analysts to incorporate the views of road users, roadworkers, road transport authorities and enforcement agencies about the feasibility and likely effectiveness of safety treatment implementation to maximise safety improvement and resource allocation.
- Research efforts should be given to make roadwork safety management practices 'proactive' so that crashes and incidents could be prevented in worksites.
- Emerging worksite safety treatments include enforcement, portable rumble strips, perceptual measures, automated or remotely-operated traffic control devices, end of queue measures, more visible and meaningful signage, etc.⁴ It is important that new treatments are tested and trialled on Queensland worksites.



Avoid roadworks when you can. If you must travel through them, stay calm, be patient and follow the directions of traffic controllers.

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STATE OF THE ROAD is CARRS-Q's series of Fact Sheets on a range of road safety and injury prevention issues. They are provided as a community service and feature information drawn from CARRS-Q's research and external sources. See the reference list for content authors.

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CARRS-Q is a joint venture initiative of the Motor Accident Insurance Commission and Queensland University of Technology

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