NHVR

CICA
The Crane Industry Council of Australia

MOBILE CRANE INDUSTRY

Code of Practice

A registered Industry Code of Practice under Section 706 of the Heavy Vehicle National Law

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FOREWORD

Mobile cranes play an essential role in infrastructure and construction projects throughout Australia. Like any heavy vehicles using public roads, their use is regulated by the *Heavy Vehicle National Law* (HVNL), which applies to all vehicles over 4.5t in all states and territories, except Western Australia and the Northern Territory. The HVNL has many detailed requirements for heavy vehicles such as vehicle standards, mass and dimension limits, loading and loading performance standards and access requirements. It also imposes a duty on each party in the "chain of responsibility" (CoR) for a heavy vehicle. This duty, called the "Primary Duty", applies to businesses that operate and schedule mobile cranes, and to businesses that use mobile cranes to load or unload materials.

The Crane Industry Council of Australia (CICA) is the peak industry body in Australia representing the crane industry. CICA recognised that a code of practice would help the crane industry, and the businesses they work with, to comply with the Primary Duty.

CICA and the National Heavy Vehicle Regulator (NHVR) have worked together to develop the Mobile Crane Industry Code of Practice (Crane Code), based on input from a wide range of industry participants through public forums. A draft of this Code of Practice was released for public consultation on 15 April 2024 and was endorsed by the NHVR for registration on 12 August 2024.

This Registered Industry Code of Practice (RICP) was assessed as complying with the guidelines for the development and registration of industry codes of practice[1] published by the NHVR under section 706 of the HVNL.

ABOUT INDUSTRY CODES OF PRACTICE

What is a Registered Industry Code of Practice?

An industry code of practice is information, for a particular industry, about hazards and risks and ways to remove or reduce those risks. It is called an industry code because members of the relevant industry have had input into the code, and because it reflects what the industry knows and does.

Under the HVNL, the NHVR may register a code of practice that complies with its published guidelines. These guidelines describe the process for developing a code and the requirements for the content of a code. A key requirement is that the code promotes the safe use of heavy vehicles through the identification of known hazards and risks and recommendations of control measures.

How is a code of practice developed?

Typically, an industry group indicates the need for a code of practice and works with the NHVR to identify representatives from that industry who can contribute to the code's development. Industry members provide content for the code and give feedback as the document is produced. The NHVR drafts the document and manages the consultation process. Before a code can be registered, it is published for public consultation, then assessed by a panel of industry experts. If approved, it is published on the NHVR's website.

1 www.nhvr.gov.au/files/202202-0460-guidelines-for-industry-codes-of-practice.pdf

What is the purpose of a code of practice?

Codes of practice inform an industry about safe practice. Although the HVNL imposes a Primary Duty upon parties in the CoR to ensure safety, it doesn't specify exactly what they are to do. Each business has to work this out for themselves, according to their own circumstances. Codes are not exhaustive , but nevertheless help fill in some of those gaps by alerting CoR parties to relevant hazards and risks and contain recommendations about ways to manage those risks. This helps businesses that might not otherwise be aware of what is expected of them to find practical ways to improve safety. The value of a registered code is that it can provide consistent authoritative information and guidance.

What is the Primary Duty?

The Primary Duty requires a party in the CoR to ensure, so far as is reasonably practicable, the safety of its transport activities in relation to a heavy vehicle (See s26C, HVNL). Specifically, this is a duty to eliminate public risk so far as is reasonably practicable, and if it is not reasonably practicable to eliminate a risk, then to minimise the risk.

Public risk includes a risk to drivers, passengers, other road users and members of the public in the vicinity of roads and public places. It also includes the risk of damage to property, including vehicles and loads, damage to road infrastructure and harm to the environment.

A party's "transport activities" are anything it does that is associated with the use of a heavy vehicle on a road. The term would include, for example, business practices, facilities maintenance, human resource management, policy development and review, safety systems, and board decisions, as well as the activities typically associated with heavy vehicles such as loading, maintenance and scheduling.

More information about the Primary Duty can be found on the NHVR website.[2]

What is Executive Due Diligence?

If you are an executive of a business that is a party in the CoR for a heavy vehicle, you have a duty to exercise due diligence to ensure the business complies with its Primary Duty. If the business fails to do so, then you could be held personally liable for a breach of s26D HVNL. The term "executive" includes an executive officer, a manager or another person who takes part in the management of a business. It also includes a director of a company and a partner in a partnership.

Exercising due diligence requires you, among other things, to actively acquire and maintain up-to-date knowledge about conducting transport activities safely. If this code of practice is relevant to your business's activities, then as an executive you have a duty at least to familiarise yourself with its contents. The code should help you ensure that your business implements the safety systems necessary for it to comply with its Primary Duty.

More information about the Executive Due Diligence Duty can be found on the NHVR website.[3]

What does "Reasonably Practicable" mean?

'Reasonably practicable' means actions that are 'reasonably able to be done in relation to the duty, weighing up all relevant matters'.

Doing what is "reasonably practicable" is the standard for complying with the Primary Duty. Put simply, a CoR party must implement controls that are proportionate to the overall safety risk. Generally, the more potentially dangerous something is, and/or the more likely it is to happen, the more time, trouble and expense should be put into preventing the risk from occurring, or to minimising injury or damage if it does occur. However, this does not mean that something which amounts to a low overall safety risk can be ignored, or limited controls applied, if they are otherwise readily and easily applicable.

When a court assesses whether a party has done what is reasonably practicable, it takes account of what the party knew, or should have known about hazards, risks, risk assessments and controls. (This is where a registered code of practice becomes relevant.) A court also considers whether suitable, effective control methods were available, and the cost of implementing controls. Cost is the last factor that a court would consider. A party is not expected to implement a control if its cost would be grossly disproportionate to the risk, but cost will not itself be an excuse for failing to implement a control. There will be some risks that are so serious that if there are no available, effective, or affordable controls, then the party will have to avoid the action that creates the risk or find another way to do it.

See the glossary for the definition of "reasonably practicable" or follow the links to find more information about the term on the NHVR website[4], or to read Regulatory Advice[5] about the topic.

Sharing the duty between CoR Parties

The underlying principle of CoR is the recognition that many different parties influence the safety of a heavy vehicle on a road. This is why the law imposes a duty on each party in the CoR. The HVNL also states principles about how the duty is shared (see s26A & s26B, HVNL). Because CoR parties for a heavy vehicle each have different functions, and have different degrees of control over what happens, they aren't all expected to do the same things, or to go the same lengths to ensure safety, but each of them must still do what is reasonably practicable for them each to do.

It's important to understand that sharing the Primary Duty does not mean dividing it into smaller portions. As a CoR party, you can't rely on what another party should be doing to justify your business doing less. Each party still has to spend a proportionate amount of time, effort, and resources, based on the function it performs, the public risk created by its activities, and its capacity to control, eliminate or minimise the risk.

Parties should work together to identify and assess risks, and to understand what opportunity each of them has to eliminate or minimise a risk. In some circumstances the most practicable control will be one that only one party has the ability to implement. Failing to pay attention to or to act on concerns raised by other parties may be a breach of the Primary Duty.

2 www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/primary-duty
3 www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/executive-due-diligence-duty
4 www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/the-primary-duty/primary-duty-definitions
5 www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/regulatory-advice/reasonably-practicable

Does my business have to *comply* with a code of practice?

Codes of practice are recognised by courts, but a code is not a law and doesn't create new stand-alone obligations.

Parties in the CoR already have a Primary Duty. This is the legal obligation they must comply with, not the code itself, but a code will help guide them in meeting their Primary Duty obligations. Firstly, it will help them identify hazards and risks in their business. Secondly, it will recommend control measures to manage those risks.

There is no single blueprint for how all businesses must meet their Primary Duty. Once it has identified relevant hazards and risks, a business could implement some or all of the controls a code recommends, or it could implement different controls altogether. It could also use a combination of controls from the code and from elsewhere. So long as a business is doing what is reasonably practicable to eliminate or minimise risks to public safety from its activities to do with heavy vehicles, it will likely have met its Primary Duty obligations.

Does a code of practice identify every single hazard and risk?

No, a code of practice is not exhaustive. It should identify the main hazards and risks known to an industry, but it may omit some hazards and risks that are not widely known. As a CoR party, your duty is to identify and manage **all** hazards and risks to public safety associated with your heavy vehicle transport activities. This may mean you have to undertake additional enquiries to properly identify and assess additional risks and hazards. For hazards and risks not mentioned in the code, you still need to do what's reasonably practicable to eliminate or minimise them.

Does every CoR party have to do the same thing?

What is reasonably practicable for one business won't necessarily be reasonably practicable for another. Many factors affect risk and the potential for injury or damage. Differences between businesses will mean different risk profiles, and variation in how practicable it would be to implement control measures.

There will be some control measures that are so effective and practicable that every business should be using them. Other measures might only be required for operations that cause the greatest risk. Some control measures might be implemented to a different degree or in different way in different businesses e.g., an on-line training course, in-person training by a co-worker, or a TAFE qualification.

A business has to make its own assessment of the number and kinds of controls it needs to implement in order to reach the threshold of doing what is reasonably practicable. It needs to make this assessment based on what an ordinary reasonable member of the community would think is proportional, not based on its own opinion or interests.

How will a court use a code of practice?

If a CoR party is charged with a breach of the Primary Duty, a court may have regard to a registered code of practice as evidence of the party's safety knowledge. It could admit the code as evidence of what the CoR party knew or ought to have known, about hazards, risks, and controls in a particular industry.

In other words, the party facing a charge may then be assumed to know everything that was in that code of practice. It would be difficult to argue that they didn't know about a particular risk, or its seriousness, and they wouldn't be able to argue that they didn't know how to deal with the risk.

However, as noted above, the party would not have to show that it had implemented every control recommended by a code. It would only need to show that it had implemented sufficiently suitable controls to meet the standard of reasonable practicability, whether these were control measures recommended by the code, other measures not referred to in the code, or a combination of both.

Whether or not a business adopts controls recommended by a code, it's critical that it is aware of the contents of a code of practice, in order to understand the safety standard that is expected.

ABOUT THE CRANE CODE

The Crane Code of practice is relevant to any person or business that works with mobile cranes.

The Crane Code provides guidance about complying with section 26C of the HVNL but it does not provide express advice about compliance with the detailed requirements in the HVNL that apply to mobile cranes. For more information on topics such as vehicle standards, mass and dimension limits, loading and loading performance standards, access requirements or accreditation, refer to information on the NHVR website.

The Crane Code is regarded as a supplementary code because it does not address all hazards and risks associated with mobile cranes travelling on road. It should be read in conjunction with the HVNL, the Master Code of Practice (MCP), the Load Restraint Guide, WHS law, relevant Australian Standards, and other industry specific guidance. To be clear, all of those materials may be relevant in a consideration of whether a CoR party had done what was reasonably practicable to ensure safety and to eliminate (and, to the extent it was not reasonably practicable to eliminate, minimise) public risks.

The MCP is a general code written for the whole of the heavy vehicle industry. Where a topic covered by the Crane Code overlaps with content in the Master Code, you should consider all the guidance that is relevant.

The Crane Code does not address every risk and hazard associated with the operation of mobile cranes on roads and does not address the risks and hazards associated with the use of a mobile crane when it is off the road. You also need to ensure compliance with road rules, other transport law, WHS law, relevant Australian Standards, and other industry specific guidance.

Notes on terminology

Mobile Crane: in this code, the term refers to cranes such as All Terrain Cranes, Articulated Steering Cranes, Hydraulic Truck Cranes and City Cranes that are heavy vehicles. It does not include heavy vehicles with cranes mounted to them used for loading or unloading goods onto the vehicle.

Crane driver/operator: in this code, the term refers to the individual who drives a mobile crane and operates the lifting controls of a mobile crane.

Within the crane industry, the usual term for this person is an “operator”, but that term has a different meaning under the HVNL, and an “operator” is also a party in the Chain of Responsibility. For a full list of terms and their meaning, refer to the Glossary of definitions and abbreviations.

Who are the CoR parties for a Mobile Crane?

A person or business is a party because of the function they perform, not because a document states that they are (or are not) a particular party, or because of a job title. It is critical that you identify whether your business is a party in the CoR for a mobile crane, but it is not essential to determine which party it is. This is because all CoR parties have the same Primary Duty.

For a mobile crane, there are four relevant parties in the CoR:

Employer: The person or business that employs the driver of a mobile crane.

Prime Contractor: The person or business that engages the driver of a mobile crane under a contract for services.

Operator: The person or business responsible for directing or controlling the use of a mobile crane.

Examples include a crane business that supplies cranes and crews, a person who owns and operates a mobile crane, or a business that hires a mobile crane from its owner. (There are particular hazards associated with such “dry hire” arrangements. See section 6.3)

Scheduler: A person or business that schedules a mobile crane.

In some situations, the same person or business might be employer, operator, and scheduler. In another situation the employer and operator might be different entities. There may be more than one person or business that is scheduling a crane.

Who are the CoR Parties for a heavy vehicle loaded/unloaded by a mobile crane?

When a mobile crane is used to load or unload a heavy vehicle, there are more applicable parties. (This is because there are other parties defined in relation to material transported on a vehicle.)

Entities that may fit one or more of the ten defined parties include: the crane driver/operator and their employer, the operator of the heavy vehicle, the person or business that engaged the heavy vehicle, the persons on the ground directing the loading or unloading of the heavy vehicle and their employer, the person or business managing the work site and the business receiving or dispatching the loads.

Section 11 of this code describes some of the particular hazards relating to the loading and unloading of heavy vehicles using mobile cranes and proposes measures to manage the associated risks. Other general guidance about loading and unloading heavy vehicles can be found in the Master Code.

What is the crane driver/operator’s role?

Apart from when they are loading a heavy vehicle (see the above section), an employed crane driver/operator is not a party in the CoR and the Primary Duty does not apply to them. However, CoR parties cannot uphold their Primary Duty without the involvement and co-operation of the crane driver/operator. Crane driver/operators must be trained in systems and procedures and will be involved in the implementation of many of the controls recommended in this code. Crane driver/operators and any other workers should also be encouraged to share their views on what control measure(s) might be effective. Communication and consultation helps to ensure that everyone is part of the solution.

USING THE CRANE CODE – A PRACTICAL GUIDE

Key components of risk management are:

1. Hazard identification
2. Risk assessment
3. Selection of control measures
4. Implementation and training
5. Systems to monitor and report on the effectiveness of controls
6. A process for periodic review of the system and a process for responding to incidents, lead and lag indicators, and new risks

Registered codes of practice will help you to identify hazards, assess risks, and choose suitable controls. A system that integrates all the components of risk management into a single system can be described as a safety management system (SMS). Such systems are prescribed for some transport sectors and represent best practice for the heavy vehicle industry as well.

For guidance on the principles of risk management, the NHVR recommends *AS/NZS ISO 31000:2018 Risk Management — Principles and Guidelines*. You might also find *AS/NZS ISO 45001: 2018 Occupational Health and Safety Management Systems* contains some useful guidance on managing your safety risks.

More information about risk management is available from Safe Work Australia, or your state or territory's workplace health and safety regulator.

On the NHVR website, you will find many resources which will help you to develop, document and implement an SMS.

1 Identifying hazards and risks (see Table 1)

Consider all the hazards and risks in the Crane Code to see whether they apply to your transport activities. This includes considering whether your activities contribute to risks affecting other CoR Parties. Some hazards and risks will be present in some businesses, but not in others, according to their circumstances.

Codes of practice document known hazards and risks in an industry, but they may not capture every one. As a party in the CoR, your duty is to eliminate or minimise all risks to public safety associated with your transport activities, so you also need to look for hazards and risks besides those mentioned in this code.

2 Risk Assessment

Assess the likelihood and seriousness of each risk that you identified whether from the Crane Code, or from your own investigations. The same hazard may create more or less risk in one business than another, because of differences in the way they operate, their location, staffing, equipment or work hours.

3 Selecting control measures (see Table 2)

You must choose the controls, or combination of controls, that will eliminate each risk that has been identified, or where it is not reasonably practicable to eliminate a risk, to minimise it so far as is reasonably practicable. These controls may be from the Crane Code, or they may be other controls from outside the code.

Choose controls that will likely be effective in your business. It may be necessary to use a combination of controls of different kinds. For example, to deal with one risk, you may need to purchase or adapt equipment, establish or change procedures, and train employees. Another risk may be eliminated by assigning employees to a new task and hiring a new staff member.

Co-operating to implement controls

In many situations, the best way to manage a risk will be for a number of parties to implement complementary controls. Because different parties do different things, at different times and places, they don't all have the same opportunity to manage each risk. For example, one business controls things at the start of a trip; another business only sees the end of the journey. Some control measures happen weeks in advance, monitoring happens during operations, and feedback is always after the fact.

You can collaborate with your business partners to work out which control measures each of you can implement, to create a more efficient and effective risk management system. If there is some doubling up in such a system, it should give you greater confidence. However, you should be cautious about relying entirely on other parties' control measures, unless you know or can assure yourself that the control measures are in place, are being used, and are effective.

(See also, Executive Due Diligence, p4 and Sharing the duty between CoR parties, p4)

Table 1. Identifying hazards and risks

Consider each hazard in the code to see if it applies to your business. If it does, assess the risk it creates.

	Company A	Company B	Company C
	Large construction company	**Crane Operator**	**Small building company**
	Manages sites Multiple contracts	Owns and hires out twenty cranes Two depots on city fringe	Dry hires cranes for loading
Risk			
Hazard	Yes - High	No	Yes - Medium
Hazard	No	Yes - Low	Yes - High
Hazard	Yes - Medium	Yes - Medium	No
Hazard	Yes - High	Yes - High	No
Other Hazard	High	?	?
Other Hazard	?	?	Low
Risk			
Hazard	Yes - Low	Yes - Medium	Yes - High
Hazard	Yes - Medium	Yes - High	Yes - High
Other Hazard	?	?	?
Risk			
Hazard	No	No	Yes - Low
Hazard	No	Yes - Low	No
Hazard	Yes - Medium	No	No
Other Risk			
Other Hazard	?	?	?
Other Hazard	?	?	?

Different businesses will have different hazard and risk profiles.

A code of practice may not identify every hazard. Some businesses will have extra hazards.

A code of practice might not identify every hazard and risk associated with your business. It is up to you to identify and manage each hazard and risk.

Table 2. Selecting control measures (for each hazard)

	Company A	Company B	Company C
Risk	Manages sites Multiple contracts	Owns and hires out twenty cranes Two depots on city fringe	Dry hires cranes for loading
Hazard	Yes - Medium	Yes - Medium	No
1. Code control	✓		
2. Code control		✓	
3. Code control	✓	✓	
4. Code control	✓		
5. Code control	✓		
6. Alternative control		✓	
7. Alternative control		✓	
Necessary control	1, 3, 4, 5	2, 3 and alternative controls	

If a hazard doesn't exist in a business, then the controls aren't required. (Controls will be necessary for other hazards.)

Controls that are effective for one business might not suit another.

Each business must put in place the control/s that will eliminate or minimise risk from each hazard to an acceptable level.

Is it compulsory to use control measures recommended in the Crane Code?

You do not have to use every control recommended by the Crane Code. You only need to implement sufficient controls to ensure safety so far as is reasonably practicable. You can also use different controls altogether - ones not mentioned in this code – if you can show that they eliminate or minimise risk just as effectively.

A control measure from outside the Crane Code might be more readily available, or more effective in your business because it suits your circumstances better. You can also use a combination of controls from the Crane Code and other controls. So long as you are eliminating or minimising each risk, to the required standard, then you are meeting your duty. The purpose of the Crane Code is to assist you to do this, the code does not create a new legal obligation.

If available controls will not be sufficient to eliminate or minimise a risk, you must find another way to achieve the same outcome, or cease carrying out the activity that creates the risk.

Other sources of information about hazards, risks and controls

You can find more information about managing risk by referring to codes of practice or other publications produced by safety regulators, such as Safe Work Australia and its state equivalents, in relevant Australian and International Standards (AS or ISO), or in bulletins published by industry representative organisations like CICA.

Guidance from sectors other than mobile cranes may also be relevant. For example, the CLOCS-A Standard focuses on safe transport in and around construction projects, and its content is broadly applicable to managing risks in transport generally. Your industry and its networks may be another source of advice and data that will help you. An example of organised information exchange is the “Safer Together” initiative in the oil and gas sector, whose regular working groups develop bulletins and safety alerts that are sent to members and subscribers.

Currency of technical standards and references

References in this code to technical standards and information resources were current at the time of publication. If you refer to any of them, you should ensure that you are consulting the current version.

4 Implementation and training

Once you have identified hazards, assessed each risk, and determined the appropriate control measures, you need to ensure that they are implemented in your business. It is critical that executives are involved in the process, as this sits squarely within their due diligence duty. They must be aware of the outcome of the assessment process, and should be leading, or at least, supporting the process of integrating control measures into the processes and systems of the business.

In order to implement new controls, your business will have to review its existing policies, procedures, equipment, premises, staffing, contracts, and business practices and make appropriate updates. If it is not possible to implement all suitable control measures immediately, then priority must be given to measures that eliminate or minimise the most serious risks. Executives should be involved in decisions about which control measures will be implemented, and when, and ensure that resources are available to allow them to be put in place.

It is recommended that you document the assessment process, including its scope and timing, the personnel involved, your sources of information and the reasoning supporting each decision. You should also document the decisions, timing, costs, and other actions relating to the implementation of each control measure. These records will be useful to your business in future.

Training will be an essential component of implementing new measures. In some cases, training will itself be one of the control measures, but training about all the new measures will be required. Develop all-staff training to introduce the overall changes, including an explanation of the risk assessment process and the business' legal obligations, so that staff understand the importance of the training.

Identify and deliver specific training for staff according to the functions they perform, where and how they work, and the equipment and resources they use. Include sales, human resources, and public relations staff in the training program. Deliver training in a way that suits the working environment and gives trainees enough time to learn and adapt. Provide training support during the change period and ensure that staff know how to access training documentation.

You should also identify training needs of your business partners and clients. In some cases, e.g., where you have changed procedures at your premises, it may be necessary to include their employees in on-site training with your own employees. In other cases, it may be sufficient to know that those employees have received comparable training. For your clients, it may be sufficient to provide written information or update web content.

> **Note:** Identifying and fulfilling training needs is part of a business' transport activities.

5 Monitor and report on effectiveness of controls

You will need a way to monitor whether the control measures you implement are actually effective. If you have already been monitoring appropriate safety indicators, you should be able to compare outcomes after the controls have been implemented and assess whether they are improving your business' safety.

Care needs to be taken in choosing what you measure or monitor. Some measures based on outcomes – e.g., the number of crashes – may not provide useful insights. For example, there may be long periods when by good fortune there are no crashes despite the existence of a hazard that could cause them, so this measure would provide no information.

Use what you learned from the risk assessment process, and your detailed knowledge of your own business, to identify indicators that will inform you whether the measures are being implemented consistently across your business, and what effect they are having on known hazards and risks. You may need to combine different kinds of information and information from several sources to achieve this, e.g., driver surveys, absenteeism rates, engine data, technical reports, near misses, maintenance records, customer complaints, audit reports etc.

It may be possible to perform continuous monitoring. If not, you should establish a monitoring cycle that's appropriate for the level of risk associated with your activities. Decide what should be considered normal variation in the indicators that you measure, and what changes warrant further investigation or intervention.

6 Review

There are a number of events that should prompt you to review your risk management system. Most importantly, it should be reviewed if your monitoring demonstrates that the measures in place are not effective at eliminating or minimising risk.

Other events that might trigger a review include:

- a serious incident or near miss,
- major changes to business operations e.g. new client, upsizing, new staff, or the introduction of new equipment or technology
- emerging hazards and risks
- changes to the physical or regulatory environment
- concerns raised by employees

You should also establish a cycle of periodic review. A combination of minor and incremental changes over time can escape notice but create a substantially different risk environment in a short period of time. Regular review allows a business and its executives to confirm that systems are still fit for purpose. They are an also opportunity for executives and staff to re-focus on safety and avoid complacency. The frequency of review should depend on the overall risk associated with your business. If the risk is higher, then reviews should be more frequent.

Your business may have the resources to conduct its own review. You may also consider engaging external experts from time-to-time, or to review some parts of your system. The review process should follow the same steps as the initial assessment, and the same requirements for implementation and documentation apply. If the outcome of the review is that changes should be made, then training should be developed and delivered for employees, business partners and clients (see above.)

OVERVIEW OF HAZARDS AND RISKS ASSOCIATED WITH MOBILE CRANES

Many of the risks associated with the use of mobile cranes arise because of their substantial mass and dimensions, the forward projection of booms, and their use in urban areas and high traffic environments. The dimensions of mobile cranes and the equipment they carry may reduce the minimum tolerances for safe passing and overtaking, or clearance of infrastructure above and beside roadways. Like drivers of other over-dimensional heavy vehicles, drivers of mobile cranes may have reduced visibility of other vehicles and road users, and of obstacles or infrastructure in the road corridor.

Booms that project forwards create hazards for other road users, and the solid construction of these components increases their potential to cause injury or damage. Cranes configured with dollies and the boom facing rearwards are associated with wider swept paths and tail swings, increasing the risks of lane encroachment or damage to infrastructure. Cranes in the heaviest range would impart massive forces in the event of a collision with other road users or infrastructure. Heavy cranes also pose a risk of damage to bridges and culverts and of general deterioration of road pavement due to their mass.

In some cases, the on-road performance of a crane is affected by its design as a lifting tool, and drivers require extra training to drive the vehicle safely. Articulated steering cranes in particular provide a different steering response and driver feedback compared to other heavy vehicles and require specific techniques.

Use in off-road environments may affect the longevity and performance of the crane's vehicle components. For example, rough and uneven ground may affect steering and suspension and apply uneven forces to the body and chassis of a crane. There may also be exposure to higher levels of dust or water, or to hazardous substances or fluids used at building sites, that could infiltrate or contaminate a crane's operating components, accelerate the decay or corrosion of hoses and cylinders, electrical cable connections and some road going components such as tyres or suspension. Greater exposure to those environments may warrant more frequent inspection and maintenance of a crane than would otherwise be recommended.

Some components of cranes need to be folded and secured to the crane body, and equipment necessary for the lifting task may need to be carried upon the mobile crane. Fixtures that keep those components and equipment in place may deteriorate through frequent use, exposure to the elements or from impacts with other equipment effecting durability.

Particular care needs to be taken to ensure that a crane is mechanically sound and roadworthy. Damage or wear to components such as brakes, steering and suspension are critical safety hazards. Other components that also affect the overall safety of the vehicle include lights, signals and horn which enable other road users to see a mobile crane and predict its movements. Effective rear vision mirrors or indirect vision devices improve a driver's awareness of the road environment.

Compartments, containers, attachment points, or equipment carrying areas that are part of or attached to the mobile crane should be designed to reduce the risk of equipment coming loose. Where possible, compartments or containers should have a lid or closure that can be positively secured. Consider the number, dimensions and mass of the items that need to be carried. Compartments, containers, and attachment points are all elements of a "load restraint system" and must meet the Loading Performance Standards in Schedule 7, *Heavy Vehicle (Mass, Dimension & Loading) National Regulation (HV(MDL)NR*[6].

Most mobile cranes operate under National Special Purpose Vehicle (SPV) notices or State specific notices and need to comply with journey conditions that may increase travel time. Mobile crane driver/operators are generally responsible for driving to a site, preparing the crane for lifting, operating the crane at the site, reconfiguring the crane for road travel, and driving the crane again. This creates a risk that a crane driver/operator may drive a mobile crane on a road whilst feeling fatigued.

For all these reasons, mobile cranes may present different risks when compared with other vehicles or other types of heavy vehicles. These risks can be amplified if a mobile crane is not mechanically sound, is overloaded (including axle load limits), driven at an inappropriate speed for the conditions, or if the driver/operator of the crane is impaired by fatigued.

6 www.legislation.qld.gov.au/view/pdf/inforce/current/sl-2013-0077 Schedule 7

RISKS, HAZARDS AND CONTROLS

The sections above contain guidance on use of this code and on managing safety in your transport activities. The controls below are suggested actions to assist you to ensure your activities are safe.

The Crane Code provides guidance only. Your responsibility is to assess each circumstance on its own merits to ensure that so far is reasonably practicable, public risk is eliminated, and, to the extent it is not reasonably practicable to eliminate such risks, they are minimised. As noted above, that may require additional steps to those suggested below.

Many of the controls require action to be taken by workers, including crane driver/operators. These workers must be properly trained, supported, and empowered to make decisions and take actions that ensure safety within the course of the duties they perform on your behalf. Your responsibility is to support and instruct your workers, with good equipment, high-quality training and effective operating processes, so that they can do their job for you with confidence that they are working safely.

1 Risk: Collision caused by inappropriate speed

1.1 Hazard: Crane driver/operator does not know or adopt the appropriate speed to drive

1.1.1 **Control: Consult original equipment manufacturer (OEM) for information or recommendations about safe speeds to travel in different environments. [Operating Procedure] [Equipment Selection]**
Specific information should be sought about recommendations for safe travel for a crane fitted with a dolly.

1.1.2 **Control: Provide training to crane driver/operator about driving at an appropriate speed, having regard to the prevailing road and traffic conditions. [Training]**

1.1.3 **Control: If available, monitor the speed of a mobile crane using technology such as telematics. [Assurance Process] [Equipment Selection]**

1.1.4 **Control: Use the information provided by telematics to inform operational procedures and identify training needs [Training]**

1.1.5 **Control: Have the OEM crane operator manual available to the crane driver/operator for reference. [Operating Procedure]**

> **Note:** For articulated steering cranes, ensure a warning decal is fitted in the cabin, visible from the driver's position, that displays the speed limit of 80km/h.

1.2 Hazard: Crane driver/operator is pressured to meet a deadline

1.2.1 **Control: Schedule crane movements to allow sufficient travel time for crane driver/operators to reach destinations without needing to speed. [Scheduling] [Off-road Parties]**

1.2.2 **Control: Ensure contracts do not impose unrealistic time frames for crane movements which would require a crane driver/operator to speed. [Business Practices] [Off-road Parties]**

1.2.3 **Control: Provide information about lifting tasks in advance to inform scheduling of crane. [Feedback to other CoR Parties] [Off-road Parties]**

1.3 Hazard: The dynamic nature of work on site creates delay

As delay time on a project/work site can be expensive, there may be requests for driver/operators to meet changing deadlines.

1.3.1 **Control: Provide timely information to crane operator (not driver) if the lifting tasks will require additional time on site. [Feedback to other CoR Parties] [Off-road Parties]**
For example, assessment of sites for outrigger positioning.

1.3.2 **Control: Have contingency plans in place to ensure that the driver/operator does not speed in order to meet deadlines. [Operating Procedure] [Off-road Parties]**

1.3.3 **Control: Empower all members of a crane crew to speak up to identify scheduling risks before they become a problem. [Operating Procedure] [Business Practices]**

1.4 Hazard: Scheduling is inaccurate due to access restrictions and unexpected delays

Road access limitations for cranes may increase travel times. Caution should be used when calculating travel times using some scheduling tools (e.g., Google Maps), as they do not reflect the safe travel speed of a mobile crane, or the permitted route, and may provide inaccurate travel time estimates.

1.4.1 **Control: Schedule crane movements in accordance with the permitted route and any conditions such as speed limits or prohibited travel times. [Scheduling] [Route Planning] [Off-road Parties]**
Travel under notice/permit may not be permitted at certain times of the day to limit interaction with other road users.

1.4.2 **Control: Develop and use a method to estimate travel time on permitted routes. [Scheduling]**
Any method used should account for unpredictable scheduling situations, such as peak hour traffic.

1.4.3 **Control: Schedule journeys to avoid peak hour when travel time is less predictable. [Scheduling]**

1.4.4 **Control: Request information about local road and traffic conditions, potential delays, and travel times, from other parties. [Scheduling] [Route Planning]**

1.5 Resources

Gazette notices or permits which enable the use of mobile cranes on the road network may restrict the speed at which a mobile crane can travel, or the times during which their movement is permitted. Information about gazette notices and access permits for SPVs can be found on the NHVR website.[7]

7 www.nhvr.gov.au/road-access/access-management/applications/special-purpose-vehicle-permit

2 Risk: Collision caused by manner of driving

In addition to the specialist skills required to operate a crane for lifting, the crane driver/operator must also be able to competently and safely drive the mobile crane on the road.

2.1 Hazard: Crane driver/operator is assigned a crane they have not be trained to drive

Although a person may have a licence to drive a heavy vehicle that includes the category of a crane, the nature of cranes means the driving skill set required may be quite different to that of a standard heavy vehicle. Different types of cranes, and different makes and models of crane, may require different skill sets to drive. Crane driver/operators must be competent to manage the unique handling characteristics of the mobile crane and undertake emergency procedures in the event of the crane driving in an unexpected way.

2.1.1 Control: Verify the licences and competencies of the crane driver/operator for driving different types, makes, and models of cranes. [Assurance Process]

2.1.2 Control: Provide training for crane driver/operators in the safe operation of the driving systems and safe driving methods for each model of crane they will be driving. [Training]

2.1.3 Control: Develop a skills/qualifications matrix to ensure that skill sets of crane driver/operators are matched to vehicles. [Assurance Process]

2.1.4 Control: Plan trips and jobs having regard to the qualifications and skill set of the driver/operator. [Scheduling]

2.1.5 Control: Schedule crane driver/operators with the appropriate skills to drive specific cranes. [Scheduling]

2.2 Hazard: The crane driver/operator drives the crane in an inappropriate manner

2.2.1 Control: Provide training for crane driver/operator in the use of suitable driving methods. [Training]

The driver/operator of a mobile crane must be competent to ensure:

- The mobile crane is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations, OEM instructions and relevant vehicle handling procedures and in a manner that considers the forward projection of the boom.
- The braking system of the mobile crane is managed and operated efficiently to ensure effective control of the crane under all conditions and to allow for the increased stopping distance necessitated by the size and weight of the crane and the forward projection of the boom.
- Driving hazards are identified so they may be anticipated and avoided or controlled through defensive driving.
- Crash avoidance space is maintained.
- The mobile crane is driven to conditions including adverse weather, winding, or unsealed roads.
- The mobile crane is parked, shut down and safely secured according to traffic regulations.
- The crane driver/operator does not drive a mobile crane if feeling fatigued. See Section 3 of this code for further information about managing the risk of fatigue.

2.3 Hazard: An articulated steering crane is being driven in an inappropriate manner

Some mobile cranes have a permanent articulation point in their construction and are designed to lift and carry a load to its destination. These mobile cranes, known as articulated steering cranes, provide a different steering response and driver feedback compared to other mobile cranes. These vehicles respond differently to driver inputs including how the driver steers, accelerates, and brakes. Specific techniques are necessary for them to be operated safely. It is critical that driver/operators of this type of mobile crane receive specific instruction and training.

These cranes are usually fitted with emergency steering systems that include a back-up electric motor that powers a hydraulic pump for the steering cylinders. In addition, the steering geometry on articulated steering cranes generally doesn't self-centre like traditional steering.

2.3.1 Control: Provide training for driver/operator in the use of suitable driving methods before driving an articulated steering crane. [Training]

The driver/operator of an articulated steering crane needs to:

- Be able to test the emergency steering system is operating.
- Be aware that an articulated crane may need to be driven at a slower speed, especially on winding roads or on roads in poor condition.
- Know how to maintain control of the crane and what action to take if the steering malfunctions.
- Allow for the increased projection of the boom at the front of the crane when stopping at intersections.

Note: An articulated steering crane must comply with the following conditions at all times:[8]

a) the speed of the vehicle must not exceed 80km/h.
b) an 80km/h maximum speed sign must be fitted to the rear of the vehicle.
c) there must be a warning decal in the cabin, visible from the driver's position, that displays the speed limit of 80km/h.

3 Risk: Collision caused by driver fatigue

3.1 Hazard: Driver is impaired by fatigue

Note: Fatigue impacts decision making and reduces the effectiveness of all risk controls involving a person undertaking an action.
Management of driver fatigue can be a complex issue, requiring a suite of controls to address effectively. It may be necessary for your business to implement a combination of controls, or different parts of multiple controls, to build a framework which will manage driver fatigue. Fatigue is also an issue which develops over time, and it may be necessary for your fatigue management process to assess the fatigue of a driver at multiple points during a day. Remember, you only have to implement those controls which are reasonably practicable for your business.
For further guidance about the management of fatigue refer to the Master Code.

3.1.1 Control: Develop and implement a process for crane driver/operators to undertake medical checks at specified intervals, to monitor physical health. [Assurance Process]

As a guide, the Austroads Assessing Fitness to Drive guidelines[9] recommend examinations be undertaken every three years for drivers aged 49 and younger, and yearly for drivers aged 50 and over. The Railway Industry Worker Category 3 health assessment[10] requires a full health assessment every five years from age 40. A different examination frequency may be appropriate following an assessment of risk.

3.1.2 Control: Ensure that a crane driver/operator identified as fatigued or unfit for duty through Controls 3.1.3 – 3.1.5, does not drive a crane whilst unfit to do so. [Operating Procedure] [Off-road Parties]

3.1.3 Control: Develop and implement a procedure to assess a crane driver/operator's fatigue levels. [Assurance Process] [Operating Procedure]

The procedure should be adapted to the specific circumstances in which the business and employees operate, and consider the following principles:

- Numerous factors affect fatigue, including the nature of the work and the work environment, shift start times and duration, the work performed by the crane driver/operator over previous days and the crane driver/operator's general fitness and medical conditions.
- Self-assessment of fatigue levels is a basic element of fatigue management. It begins before the worker starts work and should continue throughout the shift. It is also part of a worker's own duty to keep themselves and others safe. Self-assessment is most effective when workers are trained about the causes, indicators and consequences of fatigue and where there are procedures in place that support them to stop driving when they identify that they are at risk of being impaired by fatigue. A properly trained worker may have the earliest opportunity to detect that they are at risk of fatigue.
- Fatigue risk management can be improved by also using objective fatigue assessment methods to support self-assessments. These include second-person assessments and the use of fatigue risk evaluation tools. Objective fatigue assessments reduce the risk that bias, or fatigue impairment, affects the assessment outcome.
- In-person assessments by a second person are preferred because that person is better able to identify physical signs of fatigue such as slow blinking, unsteadiness or lack of balance, or inattention to conversation/details. Where there is no other person present, a second-person assessment could be conducted via video call or phone call, though this may reduce the opportunity to observe non-verbal cues. An in-person, second-person assessment could also be conducted at the next sensible opportunity, for example, when the crane driver/operator meets up with other team members, or when administrative staff start work.
- A fatigue risk evaluation tool asks for information about factors which cause fatigue and uses this as the basis of an objective assessment. There are a variety of tools available, for example, online tools, smart phone applications, or paper-based tools that include calculations. There are some freely available software applications that perform this function. You should verify for yourself which tools are suitable, or whether a similar tool should be adapted for your operations.
- Also consider that a person's fatigue level changes over the course of a shift and should be re-assessed from time to time using objective fatigue assessment measures. Appropriate times to re-assess may include:
  - before the crane driver/operator resumes driving on a road
  - when there are indications of fatigue
  - at the time at which a fatigue risk evaluation tool predicts there will be an increased level of fatigue related risk.

The implementation of the procedure should include the development of relevant documentation and training for employees about how the procedure operates and how information is recorded and shared.

8 www.nhvr.gov.au/C2021G00652
9 https://austroads.com.au/drivers-and-vehicles/assessing-fitness-to-drive
10 support.riw.net.au/support/solutions/articles/51000129340-what-are-the-medical-categories-and-expiry-calculations-used-in-the-riw-system-

3.1.4 Control: Take practical steps to support a fatigued driver to rest immediately. [Operating Procedure] [Off-road Parties]

The assessment document should assist drivers to monitor their own levels of fatigue and fatigue risk. The assessment document could be a signed checklist completed by drivers declaring whether they are fit to drive, their mental and physical state, the amount of rest they have had, and whether they are impaired by alcohol or other drugs.

3.1.5 Control: Prohibit a crane driver/operator who assesses themselves as unfit to drive from operating a mobile crane. [Operating Procedure] [Training]

3.2 Hazard: Drivers and other employees do not understand the risks of fatigue or how to identify and manage it.

3.2.1 Control: Provide training for all employees to understand the risks of fatigue and how to identify and manage it. [Training] [Off-road Parties]

This training should include the steps to take if they self-assess as being fatigued as part of the pre-operational assessment, or if they become fatigued during their workday. See Section 3.5 Resources, for information about training modules available under the Australian Skills Quality Authority (ASQA) framework in relation to fatigue.

3.2.2 Control: Provide training for all employees about the factors that cause fatigue. [Training] [Off-road Parties]

Factors to be included in such training may include:

- the quality of rest
- recognising mental health wellbeing
- physical health and diet
- the importance in properly preparing for work
- medication
- responsible use of alcohol and other drugs
- medical conditions, including sleep apnoea and other sleeping disorders
- exposure to environmental factors such as heat, cold, noise, vibration, dust
- lifestyle factors, other work or family demands.

3.3 Hazard: The operational schedule, or the nature of the operational task, cause the driver to become fatigued.

3.3.1 Control: Schedule operations so the risk of fatigue is avoided or minimised. [Scheduling] [Feedback to Other CoR Parties] [Off-road Parties]

Examples of scheduling practices which may reduce the risk of fatigue include:

- Plan lifting tasks on the job site and transport activities on the road in a way that would not cause the driver/operator to drive while fatigued.
- Allow enough time for the transport activity to be completed safely, including allowing for traffic congestion or other reasonable delays that may be experienced.
- Consider the different work activities conducted by the driver/operator during the day to plan work.

3.3.2 Control: Consider using more than one driver so that the driving task can be shared or rotated if necessary. [Business Practices]

In all cases, the driver/operator of the crane must not drive the crane if they are impaired by fatigue. If they are fatigued, a member of the crane crew who is fit to drive (and who is qualified to do so) should drive the crane.

3.3.3 Control: Minimise exposure to environmental factors that cause fatigue such as heat or cold, dust, noise or vibration. [Equipment Selection]

3.3.4 Control: Adjust operational schedules for driver/operators with increased exposure to environmental factors which cause fatigue. [Scheduling] [Operating Procedure]

3.3.5 Control: Develop contingency plans for when drivers are fatigued. [Scheduling] [Feedback to Other CoR Parties] [Off-road Parties]

Develop contingency plans in advance, including communication protocols and agreed actions to be taken in the event of delays.

3.3.6 Control: Use vehicles that do not contribute to fatigue – for example, that have good suspension, are well maintained, and that incorporate protection from glare, fumes and vibration. [Equipment Selection]

3.3.7 **Control: Provide timely communications to other CoR parties of delays or anticipated waiting times. [Scheduling] [Feedback to Other CoR Parties] [Off-road Parties]**

3.3.8 **Control: Plan for situations when a driver is no longer able to complete a trip without the risk of being impaired by fatigue, due to increasing delays from site lifting tasks and/or traffic conditions. [Scheduling] [Off-road Parties]**

3.3.9 **Control: Provide rest areas and facilities so a driver can rest. [Business Practices] [Off-road Parties]**

Examples of when this may not be possible include at a green field construction site where no rest facilities have been established.

3.3.10 **Control: Empower all members of a crane crew to speak up to identify fatigue risks before they manifest. [Operating Procedure] [Business Practices]**

3.4 Hazard: Contract arrangements encourage driving whilst fatigued

3.4.1 **Control: Ensure contracts do not cause or encourage a driver to drive whilst fatigued and allow drivers to stop and rest if fatigued, without incurring penalties for delay. [Business Practices] [Off-road Parties]**

3.5 Resources

Training modules are available under the Australian Skills Quality Authority (ASQA) framework in relation to the management of fatigue. Relevant units of competency include:

- TLIF0005 – Apply a fatigue risk management system
- TLIF0006 – Administer a fatigue risk management system
- TLIF0007 – Manage a fatigue risk management system

Safe Work Australia has published a Guide for Managing the Risk of Fatigue at Work.[11]

4 Risk: Collision involving the forward projection of a boom, or crane with boom rearward with a dolly

Careful planning is needed to ensure an appropriate route is selected for the crane or the crane supporting vehicle. Bridges, roundabouts, tight locations etc. that may impact on a crane's ability to reach site.

4.1 Hazard: Proposed route is unsuitable for the dimensions of the crane and its boom.

4.1.1 **Control: Only schedule travel on an authorised route, ensuring compliance with the HVNL and any conditions of a notice or permit e.g., travel times, signage, speed limits, load configuration or telematics requirements. [Route Planning]**

4.1.2 **Control: Ensure the proposed route is suitable for the dimensions and mass of the crane and will not cause a disruption to relevant services including electricity, communication, rail, gas, water or sewerage services. [Route Planning]**

The requirement to assess the route prior to travel is established in Schedule 8 of the *HV(MDL)NR*.[12]

Permits issued to authorise the travel of a crane along a particular route will account for the load carrying capacity of the roadway. However, it may be necessary for the route to be reviewed in advance of travel to identify issues arising from the dimension of the crane, and whether travel will disrupt relevant services along the route, having regard for the swept path of the crane or crane and dolly combination.

4.1.3 **Control: Note and record locations where road characteristics or infrastructure make it difficult for a crane of particular dimensions to negotiate. [Route Planning] [Off-road Parties]**

4.1.4 **Control: Share information about unsuitable routes for each kind of crane using available technology. [Route Planning] [Feedback to Other CoR Parties] [Off-road Parties]**

4.1.5 **Control: Have a system in place to have Gazette notice or permits available and accessible for over dimension and/or over mass vehicles. [Business Practices]**

4.2 Resources

Prescribed dimension limits are found in Schedule 6 of the *HV(MDL)NR*.[13] Conditions that apply to over-dimension vehicles travelling under notice or permit are found in Schedule 8 of that same regulation. More information about access permits can be found on the NHVR website.[14]

5 Risk: Collision because crane is not configured to specification for road travel

5.1 Hazard: The mobile crane is not configured for road travel in accordance with OEM specifications.

5.1.1 **Control: Obtain information from the OEM about the correct configuration of the mobile crane for road travel. [Operating Procedure]**

5.1.2 **Control: Consider installing warning devices or alarms which sound when parts of the crane are not properly configured for road travel. [Equipment Selection]**

5.1.3 **Control: Establish a procedure for checking the mobile crane is configured in accordance with OEM specifications prior to road travel. [Operating Procedure] [Assurance Process]**

5.1.4 **Control: Provide training to the crane driver/operator and crane crew about the correct configuration of the mobile crane for road travel and the procedure for ensuring the crane is properly configured. [Training]**

5.2 Hazard: Non-OEM-recommended road-travel hook configuration interrupts the crane driver's field of vision

5.2.1 **Control: Obtain information from the OEM about appropriate hook configurations for road travel. [Operating Procedure]**

5.2.2 **Control: Implement a procedure to ensure that only OEM-recommended hook configurations are fitted to the mobile crane for road travel. [Operating Procedure] [Assurance Process]**

11 www.safeworkaustralia.gov.au/doc/guide-managing-risk-fatigue-work
12 www.legislation.qld.gov.au/view/pdf/inforce/current/sl-2013-0077 Schedule 8
13 www.legislation.qld.gov.au/view/pdf/inforce/current/sl-2013-0077 Schedule 6
14 www.nhvr.gov.au/road-access/access-management

5.2.3 **Control: In circumstances when a non-OEM-recommended hook configuration is fitted for road travel, implement a procedure to ensure the crane driver's field of view remains adequate. [Operating Procedure] [Assurance Process]**

5.2.4 **Control: For those hooks which significantly impede the crane driver's field of vision, implement a procedure for removing the hook from the boom and transporting it separately during on-road travel. [Operating Procedure]**

5.2.5 **Control: Provide training about the procedures implemented and monitor their effectiveness. [Training]**

5.3 Hazard: After lifting operations are completed the crane or crane support vehicle is reconfigured in a different way and is over-dimensioned or over mass for travel on the intended route.

5.3.1 **Control: Establish a procedure for measuring, marking, or identifying the location of components of the crane or crane support vehicle when it is configured to comply with authorised dimension or mass. [Operating Procedure]**

For example, by performing training on road-going configurations, by taking photographs, or by developing other reference materials which document the proper configuration.

5.3.2 **Control: Provide training and equip crane driver/operators and crane crew to reconfigure a crane and crane support vehicle in accordance with the procedure and any documentation developed in 5.3.1. [Training] [Operating Procedure]**

5.3.3 **Control: For cranes that are not returned to their original configuration, plan an alternate route based on accurate information about the crane's new dimension or mass. [Route Planning]**

5.4 Hazard: A crane is driving close to powerlines

5.4.1 **Control: Conduct route planning having regard to overhead electrical infrastructure and the height of the crane. [Route Planning]**

5.4.2 **Control: Assess driving routes for the presence of overhead electric infrastructure such as powerlines. [Operating Procedure]**

5.4.3 **Control: Provide training for crane driver/operators about the risks of driving around overhead electrical infrastructure and safe clearances to be maintained. [Training]**

Consult resources such as the "Look up and Live" website and the WHS regulator codes and guides listed in the References section of this code.

5.5 Hazard: Crane driver/operator does not understand how to comply with the relevant laws, road rules, permit or notice for the crane.

5.5.1 **Control: Provide training about applicable laws, road rules, permits, notices, and any other access related conditions. [Training] [Operating Procedure]**

5.5.2 **Control: Nominate a person or resource to help drivers resolve issues to do with a permit or notice. [Operating Procedure]**

6 Risk: The mobile crane's mechanical condition causes a collision

6.1 Hazard: Crane driver/operator fails to perform daily pre-operational checks and mechanical and other equipment faults are not identified in advance.

6.1.1 **Control: Develop a daily pre-operational inspection template for crane driver/operators to use prior to road travel. [Operating Procedure]**

The inspection template should include checks of mechanical condition, including those components and systems identified by OEM.

It should also require checks of the following equipment prior to road travel:

- secure restraint of all equipment including items with mechanical restraint systems
- items that need to be restrained using lashings
- any crane dolly used for road travel (including OEM instructions for configuring the crane and attaching/detaching the dolly from the crane)
- the outrigger pad pins
- the condition of the rigging gearbox
- the condition of the fire extinguisher frame
- load restraint checks on crane outrigger, crane counterweights and crane secondary winch
- appropriate lashing equipment for restraining crane hook blocks
- storage compartments have lids and latches that close securely
- brackets and frames securely fasten the items they hold
- tyre condition, including tread wear and visible damage.

6.2 Hazard: The crane operator fails to organise periodic third-party inspection of the crane as specified in the Australian Standard.

6.2.1 **Control: Undertake programmed inspections and monitoring. [Vehicle Maintenance]**

Even though training and checklists give a good level of consistency to the application of standards, these too can deviate from a national standard. By using third party assessments/inspections, crane companies can ensure that their safety standards reflect that of national standards. Consider:

- engage a certified third-party inspection body to conduct annual inspections to the relevant Australian Standards for cranes
- the mechanical condition of the mobile crane should be inspected in accordance with the National Heavy Vehicle Inspection Manual (NHVIM)
- any findings in relation to roadworthiness and vehicle standards from the inspection must be recorded, verified, and rectified
- keep records of the inspection and corrective actions for future reference and/or review

6.3 Hazard: The mechanical condition of the crane is unknown to a person or business that hires a crane without a crane driver/operator or crane crew (dry hire)

6.3.1 **Control: Obtain information about the operating and mechanical condition of the crane from the crane owner. [Vehicle Maintenance] [Assurance Process] [Off-road Parties]**

Information obtained must be current, accurate and comprehensive and should include copies of the last routine inspection and periodic third-party inspection reports (to AS 2550), and each daily and pre-start inspection report since the last third-party inspection.

6.4 Hazard: On-site lifting activities cause damage to or deterioration of critical components which are not detected during daily or periodic inspections.

6.4.1 **Control: Provide training for crane driver/operators and crane crew to identify and report indications of damage or excessive wear to all crane components. [Training] [Feedback to Other CoR Parties]**

6.4.2 **Control: Ensure a crane is not driven on a road if on-site lifting activities cause damage to the driving or equipment restraint systems of the crane. [Operating Procedure] [Off-road Parties]**

6.5 Resources

OEM specifications provide detailed instruction for the frequency with which routine maintenance should be carried out on each part of a vehicle and recommend appropriate spare parts or replacements.

If OEM specifications are not available, a competent person should be engaged to develop a pre-start inspection checklist for the mobile crane or crane supporting vehicle.

The NHVR's National Heavy Vehicle Inspection Manual (NHVIM)[15] provides pass/fail criteria that assist a person maintaining a vehicle to assess whether a part is functioning at a safe standard. It also contains a pre-start inspection checklist. For further information about vehicle standards and modifications, refer to the NHVR website.[16]

7 Risk: Dolly de-couples while vehicle is being driven on a road

7.1 Hazard: Crane dolly is incorrectly attached to the crane

7.1.1 **Control: Identify and make records of compatible crane dolly identification information, such as Vehicle Identification Numbers (VINs) or chassis numbers. [Equipment Selection]**

7.1.2 **Control: Provide training for crew members to follow manufacturer's recommendations for configuring, attaching, and detaching the dolly to the crane. [Training]**

7.1.3 **Control: Provide training for crew members to follow OEM recommendations for configuring, attaching, and detaching the dolly and the crane. [Training]**

7.1.4 **Control: Provide training for crew members to identify when the dolly is not properly coupled to the crane. [Training] [Operating Procedure]**

7.2 Hazard: Crane dolly coupling mechanism is damaged

Without the correct use and maintenance of a dolly there is a risk that the dolly will not perform as expected and may cause serious injury to other road users or cause damage to the crane. The periodic inspection should verify the quality of the design and construction of the crane dolly and the integrity and functionality of the coupling.

7.2.1 **Control: Provide training for crane driver/operators to identify faults in the dolly's coupling mechanisms, or to observe that the coupling does not fully engage. [Training] [Vehicle Maintenance]**

7.2.2 **Control: Engage trained and qualified persons to conduct periodic inspections of the dolly's coupling components. [Vehicle Maintenance]**

> **Note:** section 3 in the National Heavy Vehicle Inspection Manual.[17] Rectify all faults and keep records.

15 www.nhvr.gov.au/safety-accreditation-compliance/vehicle-standards-and-modifications/national-heavy-vehicle-inspection-manual
16 www.nhvr.gov.au/safety-accreditation-compliance/vehicle-standards-and-modifications
17 www.nhvr.gov.au/files/202110-0827-nhvim-section-3-couplings.pdf

7.3 Hazard: Crane driver/operator fails to perform pre-transport checks

7.3.1 Control: Develop a pre-transport inspection template for crane driver/operators to use before each trip. [Operating Procedure]

The inspection template should require checks of the following:

- secure restraint of all equipment including items with mechanical restraint systems
- any crane dolly used for road travel (including OEM instructions for configuring the crane and attaching/detaching the dolly from the crane)
- failure to configure the mobile crane and dolly for road travel in accordance with OEM instructions may result in the mobile crane operating with incorrect axle mass.

7.3.2 Control: Provide training for crane driver/operators to use the pre-transport inspection template immediately before a crane is driven on a road, both on its way to and from a site. [Training]

7.3.3 Control: Provide training for crane driver/operators to record their findings and provide the completed template to another person. [Training]

7.3.4 Control: Establish a system to collect and review completed pre-check templates, to triage non-compliances, and to immediately attend to defects that create risks to safety. [Assurance Process] [Vehicle Maintenance]

7.3.5 Control: Analyse pre-transport inspection records and periodic inspection reports to confirm that recommended maintenance or replacement periods are appropriate and to assess the accuracy of drivers' fault identification. [Assurance Process] [Vehicle Maintenance]

7.3.6 Control: If necessary, amend the pre-check template to provide more information and clarity and provide refresher training to crane driver/operators. [Assurance Process]

8 Risk: Parts of the crane protrude from or fall off the moving vehicle

Parts of the crane such as outrigger arms have the potential to cause serious injury or damage if they become free of their restraints and protrude beyond the ordinary travel dimensions of the crane. If they remain fixed to the crane, they present an extreme risk because they are moving at high speed, with the momentum of a large vehicle, and may present this risk for many minutes or kilometres before being detected. Depending on the type of crane and equipment, the loose element may protrude at a height approximately equal to the driver of a sedan, the rider of a motorcycle, of the driver of a truck.

8.1 Hazard: The pin or spring-loaded mechanism for holding the stabilisers/outriggers in place is missing, is damaged or is not operational.

8.1.1 Control: Design/configure and install locking or securing mechanisms to stabilisers/outriggers that provide a visual indication whether the mechanism is on or off/open or closed. [Equipment Selection] [Operating Procedure]

8.1.2 Control: Provide mechanical locks or hydraulic locking devices to prevent the movement of stabilisers/outriggers during transport and travel. [Equipment Selection]

8.1.3 Control: Install warning devices or alarms which sound when stabilisers/outriggers are not properly stowed for road travel, or in the event of locking mechanism failure. [Equipment Selection]

8.1.4 Control: Comply with requirements for transport and travel specified in Australian Standard AS2550 [Operating Procedure]

8.1.5 Control: Provide training to crane driver/operators to conduct visual inspection of stabiliser/outrigger locking mechanisms prior to road travel. [Training]

8.2 Hazard: Moveable or removable components are excessively damaged, worn, or insecure

Moveable components of the crane must have mechanisms for locking or securing them to the crane. Those mechanisms must be strong enough to restrain the components, even when subjected to the forces specified in the *loading performance standards*.[18]

8.2.1 Control: Develop a pre-transport inspection process for crane driver/operators to use before each trip. [Operating Procedure]

The inspection process should require checks of the following:

- secure restraint of all equipment including items with mechanical restraint systems
- items that need to be restrained using lashings
- the outrigger pad pins
- the condition of the rigging gearbox
- the condition of the fire extinguisher frame
- load restraint checks on crane outrigger, crane counterweights and crane secondary winch
- appropriate lashing equipment for restraining crane hook blocks
- storage compartments have lids and latches that close securely
- brackets and frames securely fasten the items they hold.

8.3 Hazard: Lifting equipment is not properly stowed or restrained

For pieces of equipment that cannot be contained, there must be enough attachment points on the mobile crane so that each piece of equipment can be attached to the mobile crane in a way that prevents it from moving. Consider all the possible configurations of equipment that may be carried, including the number of items and their weight and determine the number of attachment points that will be necessary and the number and weight of items that will be attached to each point.

8.3.1 Control: Follow OEM instructions for the fitment of crane equipment and for scheduled inspections. [Operating Procedure]

8.3.2 Control: Engage a trained and qualified person to conduct periodic inspections of all restraint mechanisms and equipment, to relevant Australian Standards. Rectify all faults and keep records. [Assurance Process]

18 www.legislation.qld.gov.au/view/pdf/inforce/current/sl-2013-0077 Schedule 7

8.3.3 **Control: Provide training for crane driver/operators and other employees to follow OEM instructions for the configuration and stowage of crane equipment. [Training]**

8.3.4 **Control: Carry out random checks to ensure crane equipment is being stowed in accordance with OEM instructions. [Assurance Process]**

8.4 Hazard: Restraint equipment is faulty or inadequate

8.4.1 **Control: Identify and document the number and kinds of lashing required to restrain each piece of equipment. [Operating Procedure]**

8.4.2 **Control: Make information about lashing equipment readily available to crane driver/operators and other workers who prepare cranes for travel. [Operating Procedure]**

8.4.3 **Control: Provide lashing equipment with sufficient capacity for its intended use. Refer to Australian Standard and Load Restraint Guide. [Operating Procedure]**

8.4.4 **Control: Periodically check the integrity of lashing equipment using equipment or information provided by OEM. [Assurance Process]**

8.5 Hazard: Storage compartments or attachment points become unsecured during transit and items fall out.

8.5.1 **Control: Ensure storage compartments, frames and brackets have secure lids or fastenings that are durable enough to withstand the forces applied to them. [Equipment Selection]**

8.5.2 **Control: If storage compartments are retrofitted to a mobile crane, design lids to open from the top, or if opening from the side have a design which resists opening. [Equipment Selection]**

Proper lid design will minimise the risk of lids opening during travel, or if a latch or lock malfunctions, it will be less likely that items will fall out.

8.5.3 **Control: Ensure the lids and closures for all storage compartments and fastenings for all removable equipment are checked and secure prior to road travel. [Operating Procedure]**

8.6 Resources

The loading requirements and Loading Performance Standards are found in Schedule 7 of the *HV(MDL)NR.*[19] For detailed guidance about compliance with the Loading Performance Standards and practical suggestions for restraining a range of load types, refer to the Load Restraint Guide.[20]

Effective load restraint is critical for protecting the safety of other road users. Loads that fall from heavy vehicles may injure other road users or damage their vehicles. They can also distract other drivers and can create an ongoing hazard upon the road surface.

Separate pieces of equipment required to operate the crane may be stored on the crane for the purpose of travel. If they become loose, these items have the potential to fall off the crane and create the risk of immediate injury to vehicle occupants, and damage to vehicles.

A further risk is that a vehicle will steer to avoid the falling object, and leave the road, or impact another vehicle.

9 Risk: Crane is over mass and causes damage to road infrastructure

Careful attention must be paid to the gross and axle mass of a mobile crane, to ensure they do not exceed the allowable limits for roadways over which the crane travels. Heavy vehicle mass limits protect road pavement and infrastructure from damage and are captured by the Primary Duty because of the way “public risk” is defined in the HVNL. This is particularly important if the crane carries additional equipment used for the lifting task which can be configured on the crane in multiple ways. In this situation, further attention must be applied to ensuring the axle mass limits for the vehicle are not exceeded.

When a vehicles operates at a greater mass than the prescribed limits, its steering, braking and stability may be compromised. In the event of a collision, an over-mass vehicle has greater potential to cause injury and damage. The bulk of a crane means the potential consequence in the event of a collision is more significant.

9.1 Hazard: Cranes and crane supporting vehicles carry additional equipment which causes them to be over mass

9.1.1 **Control: Verify the allowable mass limits and axle mass limits that apply to each crane and crane supporting vehicle and share the information with crane driver/operators. [Loading Procedure]**

Keep a copy of the crane's access permit with the crane or record it in an accessible document.

9.1.2 **Control: Determine the mass of each piece of crane equipment by weighing or using manufacturer's information. [Loading Procedure]**

Share the information with crane driver/operators and crane crew by labelling each piece of equipment, or by listing the mass of each item in the lifting equipment register. Alternatively, refer to the crane operator’s manual.

9.1.3 **Control: Establish a procedure for ascertaining and documenting the total mass of a crane before it drives on a road. [Operating Procedure]**

9.1.4 **Control: Ensure the total mass of the crane and the equipment it is carrying does not exceed the allowable total mass limit and axle/axle group mass limits established in 9.1.1. [Operating Procedure]**

9.1.5 **Control: Ensure the mass requirements detailed in the relevant notices, permits or other instruments issued by road authorities are not exceeded. [Operating Procedure] [Route Planning]**

9.2 Hazard: Crane or crane supporting vehicle is reconfigured in a way that results in different mass

9.2.1 **Control: Establish a procedure for crane crew to check the distribution of crane equipment on the crane and crane supporting vehicle after on-site work is finished. [Training] [Loading Procedure]**

19 www.legislation.qld.gov.au/view/pdf/inforce/current/sl-2013-0077 Schedule 7
20 www.nhvr.gov.au/files/202112-1285-load-restraint-guide-2018.pdf

Different crane configurations can result in different crane mass distribution. It is important to verify the mass of the crane after changing the crane's configurations for a specific task.

9.2.2 **Control: If a different crane configuration is needed, confirm the vehicle mass after re-configuring the crane. [Loading Procedure]**

If available, follow the OEM instructions on mass and dimension for different configurations. Alternatively, calculate and model appropriate mass distribution both for axles or axle groups, and the gross mass of the vehicle. If necessary, re-weigh the crane or the crane supporting vehicle.

9.2.3 **Control: For cranes that are not returned to their original configuration, plan an alternate route based on accurate information about the crane's new mass. [Route Planning]**

9.2.4 **Control: Ensure that the crane driver/operator knows the authorised route on which the crane can travel. [Route Planning]**

9.3 Resources

Check information from the OEM for the maximum safe load for each vehicle. Refer to the NHVR for information about permits and exemptions. Note that mass limits can apply for individual roads or bridges. As a rule, where there are conflicting limits, you should comply with the lowest limit.

10 Risk: A mobile crane being transported on a heavy vehicle is involved in an incident or collides with another vehicle or structure

10.1 Hazard: The transport provider lacks the skills or experience to safely transport large indivisible loads

10.1.1 **Control: Engage a transport provider who has experience transporting similar loads and who has appropriate vehicles and equipment. [Assurance Process] [Feedback to Other CoR Parties] [Off-road Parties]**

10.1.2 **Control: Provide training and equip staff to safely transport a mobile crane on a heavy vehicle. [Training] [Off-road Parties]**

Training should include:

- selecting the right vehicle
- choosing an appropriate route
- configuring the mobile crane correctly for transport
- positioning, loading and restraining the mobile crane
- driving a heavy vehicle loaded with a mobile crane

10.2 Hazard: The method of restraint is incorrect or inadequate

10.2.1 **Control: Consult with the OEM to identify proper methods for restraining the mobile crane. [Operating Procedure] [Off-road Parties]**

10.2.2 **Control: Develop a loading plan for the mobile crane, having regard to the loading performance standards in Schedule 7 of the *HV(MDL)NR*. [Loading Procedure] [Off-road Parties]**

Professional engineering advice may be required to develop a loading plan which meets the loading requirements and loading performance standards. Loading plans are particularly relevant if the mobile crane is to be transported by a heavy vehicle on multiple occasions.

10.2.3 **Control: Ensure the mobile crane is loaded and secured in accordance with the loading plan and relevant OEM instructions [Loading Procedure] [Off-road Parties]**

10.3 Hazard: The route is not suitable for the mass and dimensions of the combination transporting the mobile crane

10.3.1 Control: Ensure the person planning the movement has the information necessary to plan the route. [Route Planning] [Off-road Parties]

Required information would include:

- dimension and mass of the vehicle combination transporting the mobile crane
- the start and ends points of the journey
- the date and time of the movement
- network maps or permits applicable to the intended route.

10.3.2 Control: Ensure appropriate access permissions are sought prior to commencing travel. [Route Planning]

Permits issued to authorise the travel of a heavy vehicle along a particular route will account for the load carrying capacity of the roadway. However, it may be necessary for the route to be reviewed in advance of travel to identify issues arising from the dimension of the heavy vehicle, and whether travel will disrupt relevant services along the route, including electricity, communication, rail, gas, water or sewerage services.

For further information about access approval by third parties, see the NHVR website.[21]

10.3.3 Control: Ensure the permitted route is surveyed to establish whether it is suitable for the overall dimension of the combination transporting the mobile crane, including swept path and tail swing. [Route Planning]

10.3.4 Control: Ensure any requirements for the movement of over-size over-mass (OSOM) vehicles are complied with. [Route Planning]

10.4 Resources

Refer to Schedule 7 of the *HV(MDL)NR* for details on the loading performance standards for load restraint. Consult the Load Restraint Guide[22] for further advice on load restraint. Refer to the Master Industry Code of Practice[23] for further general advice about the movement of goods by heavy vehicle.

11 Risk: A heavy vehicle loaded by a crane is improperly loaded

Mobile cranes are often used to load objects or material onto heavy vehicles. When that occurs, the operator of the crane, and the crane driver/operator are parties in the CoR in relation to the vehicle that is being loaded or unloaded, along with other CoR parties such as the construction company or site manager, the employer of the heavy vehicle driver, or the business contracted to supply or remove materials . Controls in the following sections may be reasonably practicable for any of these CoR parties to implement.

These controls are included here to inform crane companies and crane driver/operators of the kinds of information that should be supplied to them, or the information they should be seeking from other parties.

As with all controls listed in this code, a party can only be required to know or do something in relation to the safety of a transport activity to the extent they influence or control that activity.

See "ABOUT THE CRANE CODE" in the introductory sections of this code for further discussion about how CoR parties should work together when a heavy vehicle is being loaded by a mobile crane.

11.1 Hazard: A mobile crane is engaged to perform a specific lifting task at a site but is also used to load items or material onto heavy vehicles. Planning is focused on the lifting task and planning for safe loading or unloading of heavy vehicles is overlooked.

11.1.1 Control: Ensure that the mass, dimension and loading requirements of heavy vehicles are incorporated into work plans for the site. [Loading Procedure] [Off-road Parties]

11.1.2 Control: Obtain information from the operator of the heavy vehicle to be loaded about the mass limits that apply to the vehicle.[24] [Loading Procedure] [Off-road Parties]

11.1.3 Control: Choose heavy vehicles authorised to carry the expected mass [Equipment Selection] [Off-road Parties]

11.1.4 Control: Develop or require a loading plan [Loading Procedure] [Off-road Parties]

Loading plans are particularly relevant where:

- there will be many similar loads, or
- loads approach mass or dimension limits, or
- the load is a large indivisible item, or
- loads are not a uniform shape (e.g. fabricated steel, equipment used for the generation of electricity), or
- the nature of the load may result in uneven weight distribution (e.g., loads of mixed density).

11.1.5 Control: Ensure that the vehicle is loaded in accordance with the loading plan. [Loading Procedure] [Off-road Parties]

11.2 Hazard: The mass of objects or materials to be loaded is unknown prior to loading

11.2.1 Control: Estimate the mass of items and materials that will be loaded at the site and provide the information to relevant CoR Parties. [Loading Procedure] [Off-road Parties]

For example, assess the likely density of demolition or building material; use manufacturers' information about equipment or materials.

11.2.2 Control: Liaise with other parties to determine the available means for weighing or determining the mass of a load at the time of loading. [Loading Procedure] [Off-road Parties]

For example, by using on-board mass weighing equipment (OBM) on heavy vehicles, or a weighing device at or near the site.

For loads of irregular or unknown mass, decide which weighing equipment or method will be used and how information will be communicated to other parties. Alternatively, if there are multiple loads that will have similar mass, establish a method to assess the weight of

21 www.nhvr.gov.au/road-access/access-management/third-party-approvals
22 www.nhvr.gov.au/files/202112-1285-load-restraint-guide-2018.pdf
23 www.nhvr.gov.au/files/ricp-master-code.pdf
24 www.nhvr.gov.au/files/201707-0577-common-heavy-freight-vehicles-combinations.pdf

the first load, report it, then make necessary adjustments to subsequent loads or use different vehicles.

11.2.3 Control: Provide training and equip employees to implement a method for determining the mass of each load being lifted by the crane. [Training] [Off-road Parties]

11.2.4 Control: Use available information about the mass of a load to comply with mass limits when loading a heavy vehicle. [Loading Procedure] [Off-road Parties]

11.3 Hazard: The crane driver/operator does not know the mass or dimension limits that apply to a heavy vehicle

11.3.1 Control: Inform the crane driver/operator of the mass and dimension limits that apply to a heavy vehicle, before it is loaded. [Loading Procedure] [Off-road Parties]

11.3.2 Control: Provide training for the crane driver/operator to ask for a loading plan, or information about a loading method before commencing to load a heavy vehicle. [Training] [Loading Procedure]

11.3.3 Control: Provide a copy of a loading plan, or other guidance to the crane driver/operator before loading commences. [Loading Procedure] [Off-road Parties]

11.4 Hazard: The crane driver/operator cannot readily communicate with the driver of the heavy vehicle during loading.

11.4.1 Control: Establish a system for relaying information to the crane/driver operator during loading (e.g., information from OBM systems, information about the volume of material that has been loaded, information about the height of the load.) [Loading Procedure] [Off-road Parties]

11.5 Hazard: The heavy vehicle driver cannot determine whether the vehicle is safely loaded until loading is completed

11.5.1 Control: Enable the driver of a heavy vehicle to review a load before leaving the loading site, ensuring that they have time and a safe location to check and secure the load. [Loading Procedure] [Off-road Parties]

In some cases, a driver may need to climb above the deck height of the vehicle to make these checks.

11.5.2 Control: Manage traffic at the site so that a heavy vehicle with an unsatisfactory load can return to the loading area without substantial delay. [Loading Procedure] [Off-road Parties]

11.5.3 Control: Require a crane driver/operator to remove or rearrange loaded materials at the heavy vehicle driver's request, where necessary to comply with mass, dimension or loading requirements. [Loading Procedure] [Off-road Parties]

11.5.4 Control: Install a measuring device or mark a height limit on a surface close to the loading site, to enable the height of the loaded vehicle to be determined. [Loading Procedure] [Off-road Parties]

GLOSSARY

All terrain mobile cranes — A crane that has the following features and requirements:
(a) is a mobile crane; and
(b) has two tyres per axle; and
(c) has at least 50% of its axles steerable; and
(d) is not a truck mounted SPV; and
(e) has on road and off-road capability; and
(f) has separate driving and crane operating compartments.

Articulated steering crane — An articulated steering crane is a type of mobile crane that is designed to travel on public roads and is designed to lift and often carry a load to its destination on site. Different from slewing mobile cranes, articulated steering cranes normally do not have stabiliser legs or outriggers; they have a permanent articulation joint in their construction, allowing the crane to manoeuvre and place loads.

Business practices — Practices in running a business associated with the use of a heavy vehicle on the road, including:

- operating policies and procedures
- human resource and contract management arrangements
- the arrangements for preventing or minimising public risks associated with the person's practices.

Chain of Responsibility (CoR) — The list of parties in the transport supply chain for a heavy vehicle with a Primary Duty obligation to ensure the safety of their heavy vehicle transport activities.

City cranes — A multi-purpose-use crane that is uniquely designed to access and perform work in confined lifting areas, can travel and work on unimproved work sites and is operated and driven from only one cab. Over-sized tires, a short wheelbase, and crab steering all contribute to overall manoeuvrability.

Controls — The activities undertaken to eliminate or minimise risk. The hierarchy of controls includes elimination; substitution; isolation; engineering; administration; personal protective equipment.

Crane Crew Member — An employee assigned to assist with the operation of the mobile crane, including the driver/operator and the dogger/rigger.

With an appropriate heavy vehicle licence and training, both the crane driver/operator and the dogger/rigger can drive the crane or the crane supporting vehicle on a road.

Crane Driver/Operator — The person who drives or operates a mobile crane.

A competent person having complete physical control of a crane or hoist. The crane driver/operator can perform tasks including driving the crane on road (with an appropriate heavy vehicle licence) and operating the crane for lifting tasks.

Crane Supporting Vehicle — A heavy vehicle used to provide ancillary services to crane operation, including specially designed counterweight trucks and trucks carrying rigging gear, crane boom sections, or lifting accessories.

Dogger/rigger — A competent person who applies slinging techniques including the selection and inspection of lifting gear and directs the crane driver/operator in the movement of a load when the load is out of the operator's view. Crane driver/operators performing lifting operations on site are teamed up with doggers and/or riggers. The doggers/riggers are key members in the lifting operation as they are responsible for deciding where to place the load at the destination. The crane driver/operator does not make any decision outside the crane cabin.

Employer — A CoR party – the person or business that employs the driver/operator of a mobile crane.

Hazard — Anything with the potential to cause harm or loss, this could be an activity or behaviour, a physical object, a situation or a management practice.

Heavy Vehicle[25] — A vehicle with a Gross Vehicle Mass (GVM) or Aggregate Trailer Mass (ATM) of more than 4.5t (a heavy motor vehicle or a heavy trailer), or a combination that includes a vehicle with a GVM or ATM of more than 4.5t (a heavy combination).

HVNL[26] — *Heavy Vehicle National Law*

Hydraulic truck crane — A type of mobile crane that is named for the truck manufacturer who built the crane undercarriage using truck-style bogey drivetrain systems. The undercarriage is purpose built as a crane and cannot be returned to a truck chassis by removing the crane (unlike truck mounted vehicle loading cranes).

Loader — A CoR party that loads a heavy vehicle.

Master Code[27] — The Registered Industry Code of Practice developed as a practical guide to achieving standards of heavy vehicle safety and compliance under the HVNL. It applies to all parties in the supply chain of a heavy vehicle.

Mobile Crane — A crane capable of travelling over a supporting surface without the need for fixed runways (i.e., railway tracks).

Mobile cranes are heavy vehicles designed to perform lifting tasks, not for freight transport purposes. Driving and operating mobile cranes are two separate tasks and require different skill sets. As shown in Figure 1, when driving the mobile crane on road, the driver is positioned in the driving cabin, when operating the crane for lifting tasks, the crane driver/operator is positioned in the operating cabin. Even for the crane types that do not have separate cabins, the skills required are still different, see a picture of an articulated steering crane dashboard in Figure 2. An all-terrain mobile crane has these same characteristics.

NHVR — National Heavy Vehicle Regulator.

Operator — A CoR party – the person or business who directs the use and control of the mobile crane (in many cases, the "operator" and the "employer" would be the same business). Generally, the operator is the person or business that owns a mobile crane and gives instructions or orders for its use. An individual who owns, drives and operates their own mobile crane also fits the definition of an "operator".

A person or business that "dry hires" a crane and directs their own employees or others to use the crane, is also an operator, even though they do not own the crane.

Policies — Clear, simple statements of how your organisation intends to conduct its business practices. They provide a set of guiding principles to help with decision making.

Primary Duty[28] — The obligation imposed upon a party in the Chain of Responsibility to ensure the safety of the heavy vehicle transport activities they influence or control, so far as is reasonably

25 www.legislation.qld.gov.au/view/pdf/inforce/current/act-2012-hvnlq (*Section 6*)
26 www.legislation.qld.gov.au/view/pdf/inforce/current/act-2012-hvnlq
27 www.nhvr.gov.au/files/ricp-master-code.pdf
28 www.legislation.qld.gov.au/view/pdf/inforce/current/act-2012-hvnlq (*Section 26C*)

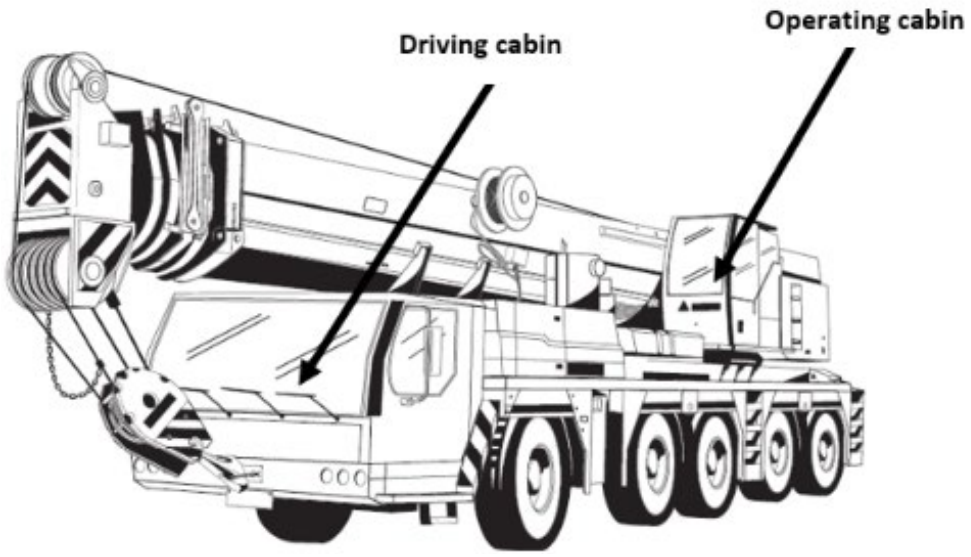

Figure 1. Example mobile crane (all-terrain crane) model

Left- Road travel mode

Right- Crane mode

Figure 2. Example mobile crane (articulated crane) dashboard picture

practicable. Also, the requirement not to cause or encourage the driver of a heavy vehicle to speed or cause or encourage the driver or a party in the CoR to contravene the HVNL.

Prime contractor — A CoR party – the person or business that engages the driver/operator of a mobile crane under a contract for services.

Procedures — Describe how policies will be put into action in your organisation. Procedures outline who will do what, the steps to take, and the documents or forms to use.

Process — A series of actions or steps taken to achieve a particular end, objective or outcome.

Public risk — A safety risk; or risk of damage to road infrastructure.

Public safety — The safety of persons or property, including the safety of the drivers of, and passengers and other persons in, vehicles and combinations; and persons or property in or in the vicinity of, or likely to be in or in the vicinity of, road infrastructure and public places; and vehicles and combinations and any loads in them.

Reasonably practicable — The legal standard for complying with the primary duty.

Put simply, it is how much trouble and expense a CoR party should go to so as to eliminate or minimise a risk, judged on what an ordinary, reasonable person would think was reasonable in the circumstance.

RICP — Registered Industry Code of Practice

Industry Codes of Practice exist to translate the requirements of the Heavy Vehicle National Law, or HVNL, into a practical, good practice methodology for industry to use. They provide information and guidance about hazards and risks in industries that work with heavy vehicles and describe control measures that can be used to manage those risks.

Risk — The effect of uncertainty on objectives (an effect can be a positive or negative deviation from the expected outcome).

The possibility or probability of suffering harm, loss, or deviation from expected outcome or earnings

Risk management — The coordinated activities to identify and control the risks arising from the activities of an organisation. The risk management process consists of four key steps, including identifying hazards; assessing risks; controlling risks; and monitoring and reviewing controls.

Road and road related area[29] — A **road** is an area open to or used by the public for the driving or riding of motor vehicles (includes bridges, culverts and railway crossings) and

A **road related area** is an area that divides a road or a shoulder, footpath, nature strip, bicycle path, shared path, parking area, kerb etc.

Schedule — The journey task provided to the driver. The schedule includes time, distance, route and rest options.

Scheduler — A CoR party – the person or business that schedules the operations of the mobile crane.

Special Purpose Vehicle (SPV)[30] — A motor vehicle or trailer, other than an agricultural vehicle or a tow truck, built for a purpose other than transporting goods by road or a concrete pump or fire truck.

Mobile cranes covered under this code are SPVs.

This Code — The Crane Code covers the following types of mobile cranes:

- All terrain cranes
- Articulated steering cranes
- Hydraulic truck cranes
- City cranes

Any reference to a crane in this code is intended as a reference to a mobile crane.

Transport activities — Encompasses the business practices and components of a transport business (for example, physical, management, labour and service), and the associated activities for which the parties in the CoR are expected to be responsible – for example, driving, directing, employing or contracting drivers, or consigning, scheduling, packing, loading, unloading and receiving goods. Transport activities also include carrying out other activities associated with the use of a heavy vehicle (such as maintaining or repairing the vehicle).

Unloader — A CoR party that unloads a heavy vehicle

WHS — Work Health and Safety (also known as Occupational Health and Safety or OH&S).

29 www.legislation.qld.gov.au/view/pdf/inforce/current/act-2012-hvnlq (*Section 8*)
30 www.legislation.qld.gov.au/view/pdf/inforce/current/act-2012-hvnlq (*Section 116*)

REFERENCES

Australian Standards

AS 2550 – Safe use of Cranes, Hoists and Winches
AS 1418 – Crane Hoists and Winches

WHS Guides and Other Relevant Materials:

National

Safe Work Australia – General Guide for Cranes
www.safeworkaustralia.gov.au/doc/general-guide-cranes

Safe Work Australia – Guide for Managing the Risk of Fatigue at Work
www.safeworkaustralia.gov.au/system/files/documents/1702/managing-the-risk-of-fatigue.pdf

Safe Work Australia – Guide to Mobile Cranes
www.safeworkaustralia.gov.au/system/files/documents/1703/guide-to-mobile-cranes.pdf

QLD

WorkSafe QLD – Mobile Crane Code of Practice
www.worksafe.qld.gov.au/__data/assets/pdf_file/0019/17128/mobile-crane-cop-2006.pdf

NSW

Safe Work NSW – Hazards A-Z: Mobile Cranes
www.safework.nsw.gov.au/hazards-a-z/mobile-cranes

Transport for NSW – Information about Approval and Registration of non-complying Mobile Cranes
www.nsw.gov.au/sites/default/files/2021-02/RMS-15.101-Exemption-permit-process-non-complying-special-purpose-vehicles-Vehicle-Standards-Information-No-46-Februray-2014.pdf

VIC

Department of Transport and Planning VIC – Operating a mobile crane in Victoria Industry Guide
www.vic.gov.au/heavy-vehicles

SA

SafeWork SA – Managing the Risks of Plant in the Workplace
www.safework.sa.gov.au/__data/assets/pdf_file/0006/136275/Managing-risks-of-plant-in-the-workplace.pdf

CODE ADMINISTRATION

This Code will be maintained by the NHVR in accordance with the conditions of registration in Section 706(2) of the HVNL, and the Guidelines for Preparing and Registering Industry Codes of Practice (February 2022).

As Sponsor of this Code of Practice, the Crane Industry Council of Australia (CICA) will support the maintenance of this code and contribute to its review. This code is registered for a period of 5 years and will be subject to review by August 2029.

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Revision History

Version	Release date	Comment
0.1	15/04/2024	Date of publication for public feedback
0.2	12/08/2024	Date of registration

APPENDICES

Appendix A – Control type tables

The following tables list all the controls contained in the Crane Code, grouped according to their control type. Control types are another way for CoR Parties to think about the kinds of things they could be doing to ensure heavy vehicles are driven safely. The tables are intended to assist users of the Code and CoR Parties to quickly identify controls which may be relevant to them and their business.

If a CoR Party has a particular area of interest, or if different employees of the same CoR Party had separate expertise, for example vehicle loading or maintenance, the tables below will help identify all the controls which relate to those topics and make it easier to find relevant parts of the Code.

Controls relevant to off-road parties are also listed below. Off-road parties are businesses other than crane companies which use mobile cranes in their operations. These would include construction companies and civil contractors. Controls for off-road parties describe the ways off-road parties can influence the safe operation of a mobile crane.

Assurance Processes: **Controls which provide information about the effectiveness of policies or procedures, or the way in which work is done.**	
1.1.3	If available, monitor the speed of a mobile crane using technology such as telematics.
2.1.1	Verify the licences and competencies of the crane driver/operator for driving different types, makes, and models of cranes.
2.1.3	Develop a skills/qualifications matrix to ensure that skill sets of crane driver/operators are matched to vehicles.
3.1.1	Develop and implement a process for crane driver/operators to undertake medical checks at specified intervals, to monitor physical health.
3.1.3	Develop and implement a procedure to assess a crane driver/operator's fatigue levels.
5.1.3	Establish a procedure for checking the mobile crane is configured in accordance with OEM specifications prior to road travel.
5.2.2	Implement a procedure to ensure that only OEM-recommended hook configurations are fitted to the mobile crane for road travel.
5.2.3	In circumstances when a non-OEM-recommended hook configuration is fitted for road travel, implement a procedure to ensure the crane driver's field of view remains adequate.
6.3.1	Obtain information about the operating and mechanical condition of the crane from the crane owner.
7.3.4	Establish a system to collect and review completed pre-check templates, to triage non-compliances, and to immediately attend to defects that create risks to safety.
7.3.5	Analyse pre-transport inspection records and periodic inspection reports to confirm that recommended maintenance or replacement periods are appropriate and to assess the accuracy of drivers' fault identification.
7.3.6	If necessary, amend the pre-check template to provide more information and clarity and provide refresher training to crane driver/operators.
8.3.2	Engage a trained and qualified person to conduct periodic inspections of all restraint mechanisms and equipment, to relevant Australian Standards. Rectify all faults and keep records.
8.3.4	Carry out random checks to ensure crane equipment is being stowed in accordance with OEM instructions.
8.4.4	Periodically check the integrity of lashing equipment using equipment or information provided by OEM.
10.1.1	Engage a transport provider who has experience transporting similar loads and who has appropriate vehicles and equipment.

Business Practices: **Controls which relate to the way a business operates.**	
1.2.2	Ensure contracts do not impose unrealistic time frames for crane movements which would require a crane driver/operator to speed.
1.3.3	Empower all members of a crane crew to speak up to identify scheduling risks before they become a problem.
3.3.2	Consider using more than one driver so that the driving task can be shared or rotated if necessary.
3.3.9	Provide rest areas and facilities so a driver can rest.
3.3.10	Empower all members of a crane crew to speak up to identify fatigue risks before they manifest.
3.4.1	Ensure contracts do not cause or encourage a driver to drive whilst fatigued and allow drivers to stop and rest if fatigued, without incurring penalties for delay.
4.1.5	Have a system in place to have Gazette notice or permits available and accessible for over dimension and/or over mass vehicles.

Equipment Selection: **Controls about the types of equipment used or purchased, or how equipment is designed.**	
1.1.1	Consult original equipment manufacturer (OEM) for information or recommendations about safe speeds to travel in different environments.
1.1.3	If available, monitor the speed of a mobile crane using technology such as telematics.
3.3.3	Minimise exposure to environmental factors that cause fatigue such as heat or cold, dust, noise or vibration.
3.3.6	Use vehicles that do not contribute to fatigue – for example, that have good suspension, are well maintained, and that incorporate protection from glare, fumes and vibration.
5.1.2	Consider installing warning devices or alarms which sound when parts of the crane are not properly configured for road travel.
7.1.1	Identify and make records of compatible crane dolly identification information, such as Vehicle Identification Numbers (VINs) or chassis numbers.
7.1.2	Use a crane dolly that is adapted to the mobile crane.
8.1.1	Design/configure and install locking or securing mechanisms to stabilisers/outriggers that provide a visual indication whether the mechanism is on or off/open or closed.

8.1.2	Provide mechanical locks or hydraulic locking devices to prevent the movement of stabilisers/outriggers during transport and travel.
8.1.3	Install warning devices or alarms which sound when stabilisers/outriggers are not properly stowed for road travel, or in the event of locking mechanism failure.
8.5.1	Ensure storage compartments, frames and brackets have secure lids or fastenings that are durable enough to withstand the forces applied to them.
8.5.2	If storage compartments are retrofitted to a mobile crane, design lids to open from the top, or if opening from the side have a design which resists opening.
11.1.3	Choose heavy vehicles authorised to carry the expected mass

Feedback to Other CoR Parties: **Controls which describe when information should be provided or requested from other CoR Parties.**	
1.2.3	Provide information about lifting tasks in advance to inform scheduling of crane.
1.3.1	Provide timely information to crane operator (not driver) if the lifting tasks will require additional time on site.
3.1.5	Request business partners to provide feedback about fatigue incidents.
3.3.1	Schedule operations so the risk of fatigue is avoided or minimised.
3.3.5	Develop contingency plans for when drivers are fatigued.
3.3.7	Provide timely communications to other CoR parties of delays or anticipated waiting times.
4.1.4	Share information about unsuitable routes for each kind of crane using available technology.
6.4.1	Provide training for crane driver/operators and crane crew to identify and report indications of damage or excessive wear to all crane components.
10.1.1	Engage a transport provider who has experience transporting similar loads and who has appropriate vehicles and equipment.

Loading Procedure: **Controls which address how the loading process is undertaken safely.**	
9.1.1	Verify the allowable mass limits and axle mass limits that apply to each crane and crane supporting vehicle and share the information with crane driver/operators
9.1.2	Determine the mass of each piece of crane equipment by weighing or using manufacturer's information.
9.2.1	Establish a procedure for crane crew to check the distribution of crane equipment on the crane and crane supporting vehicle after on-site work is finished.
9.2.2	If a different crane configuration is needed, confirm the vehicle mass after re-configuring the crane.
10.2.2	Develop a loading plan for the mobile crane, having regard to the loading performance standards in Schedule 7 of the HV(MDL)NR.
10.2.3	Ensure the mobile crane is loaded and secured in accordance with the loading plan and relevant OEM instructions.
11.1.1	Ensure that the mass, dimension and loading requirements of heavy vehicles are incorporated into work plans for the site.
11.1.2	Obtain information from the operator of the heavy vehicle to be loaded about the mass limits that apply to the vehicle
11.1.4	Develop or require a loading plan
11.1.5	Ensure that the vehicle is loaded in accordance with the loading plan
11.2.1	Estimate the mass of items and materials that will be loaded at the site and provide the information to relevant CoR Parties.
11.2.2	Liaise with other parties to determine the available means for weighing or determining the mass of a load at the time of loading.
11.2.4	Use available information about the mass of a load to comply with mass limits when loading a heavy vehicle.
11.3.1	Inform the crane driver/operator of the mass and dimension limits that apply to a heavy vehicle, before it is loaded.
11.3.2	Provide training for the crane driver/operator to ask for a loading plan, or information about a loading method before commencing to load a heavy vehicle.
11.3.3	Provide a copy of a loading plan, or other guidance to the crane driver/operator before loading commences.
11.4.1	Establish a system for relaying information to the crane/driver operator during loading (e.g., information from OBM systems, information about the volume of material that has been loaded, information about the height of the load.)
11.5.1	Enable the driver of a heavy vehicle to review a load before leaving the loading site, ensuring that they have time and a safe location to check and secure the load.
11.5.2	Manage traffic at the site so that a heavy vehicle with an unsatisfactory load can return to the loading area without substantial delay.
11.5.3	Require a crane driver/operator to remove or rearrange loaded materials at the heavy vehicle driver's request, where necessary to comply with mass, dimension or loading requirements.
11.5.4	Install a measuring device or mark a height limit on a surface close to the loading site, to enable the height of the loaded vehicle to be determined.

Off-road Parties: **Controls which describe the ways off-road parties can influence the safe operation of a mobile crane.**	
1.2.1	Schedule crane movements to allow sufficient travel time for crane driver/operators to reach destinations without needing to speed.
1.2.2	Ensure contracts do not impose unrealistic time frames for crane movements which would require a crane driver/operator to speed.
1.2.3	Provide information about lifting tasks in advance to inform scheduling of crane.
1.3.1	Provide timely information to crane operator (not driver) if the lifting tasks will require additional time on site.
1.3.2	Have contingency plans in place to ensure that the driver/operator does not speed in order to meet deadlines.
1.4.1	Schedule crane movements in accordance with the permitted route and any conditions such as speed limits or prohibited travel times.
3.1.2	Ensure that a crane driver/operator identified as fatigued or unfit for duty through Controls 3.1.3 – 3.1.5, does not drive a crane whilst unfit to do so.
3.1.4	Take practical steps to support a fatigued driver to rest immediately.
3.1.5	Request business partners to provide feedback about fatigue incidents.

3.2.1	Provide training for all employees to understand the risks of fatigue and how to identify and manage it.
3.2.2	Provide training for all employees about the factors that cause fatigue.
3.3.1	Schedule operations so the risk of fatigue is avoided or minimised.
3.3.5	Develop contingency plans for when drivers are fatigued.
3.3.7	Provide timely communications to other CoR parties of delays or anticipated waiting times.
3.3.8	Plan for situations when a driver is no longer able to complete a trip without the risk of being impaired by fatigue, due to increasing delays from site lifting tasks and/or traffic conditions.
3.3.9	Provide rest areas and facilities so a driver can rest.
3.4.1	Ensure contracts do not cause or encourage a driver to drive whilst fatigued and allow drivers to stop and rest if fatigued, without incurring penalties for delay.
4.1.3	Note and record locations where road characteristics or infrastructure make it difficult for a crane of particular dimensions to negotiate.
4.1.4	Share information about unsuitable routes for each kind of crane using available technology.
6.3.1	Obtain information about the operating and mechanical condition of the crane from the crane owner.
6.4.2	Ensure a crane is not driven on a road if on-site lifting activities cause damage to the driving or equipment restraint systems of the crane.
10.1.1	Engage a transport provider who has experience transporting similar loads and who has appropriate vehicles and equipment.
10.1.2	Provide training and equip staff to safely transport a mobile crane on a heavy vehicle.
10.2.1	Consult with the OEM to identify proper methods for restraining the mobile crane
10.2.2	Develop a loading plan for the mobile crane, having regard to the loading performance standards in Schedule 7 of the HV(MDL)NR.
10.2.3	Ensure the mobile crane is loaded and secured in accordance with the loading plan and relevant OEM instructions.
10.3.1	Ensure the person planning the movement has the information necessary to plan the route.
11.1.1	Ensure that the mass, dimension and loading requirements of heavy vehicles are incorporated into work plans for the site.
11.1.2	Obtain information from the operator of the heavy vehicle to be loaded about the mass limits that apply to the vehicle.
11.1.3	Choose heavy vehicles authorised to carry the expected mass
11.1.4	Develop or require a loading plan
11.1.5	Ensure that the vehicle is loaded in accordance with the loading plan.
11.2.1	Estimate the mass of items and materials that will be loaded at the site and provide the information to relevant CoR Parties.
11.2.2	Liaise with other parties to determine the available means for weighing or determining the mass of a load at the time of loading.
11.2.3	Provide training and equip employees to implement a method for determining the mass of each load being lifted by the crane.
11.2.4	Use available information about the mass of a load to comply with mass limits when loading a heavy vehicle.
11.3.1	Inform the crane driver/operator of the mass and dimension limits that apply to a heavy vehicle, before it is loaded.
11.3.3	Provide a copy of a loading plan, or other guidance to the crane driver/operator before loading commences.
11.4.1	Establish a system for relaying information to the crane/driver operator during loading (e.g., information from OBM systems, information about the volume of material that has been loaded, information about the height of the load.)
11.5.1	Enable the driver of a heavy vehicle to review a load before leaving the loading site, ensuring that they have time and a safe location to check and secure the load.
11.5.2	Manage traffic at the site so that a heavy vehicle with an unsatisfactory load can return to the loading area without substantial delay.
11.5.3	Require a crane driver/operator to remove or rearrange loaded materials at the heavy vehicle driver's request, where necessary to comply with mass, dimension or loading requirements.
11.5.4	Install a measuring device or mark a height limit on a surface close to the loading site, to enable the height of the loaded vehicle to be determined

Operating Procedure: **Controls about how a mobile crane is used safely on a road.**	
1.1.1	Consult original equipment manufacturer (OEM)for information or recommendations about safe speeds to travel in different environments.
1.1.5	Have the OEM crane operator manual available to the crane driver/operator for reference.
1.3.2	Have contingency plans in place to ensure that the driver/operator does not speed in order to meet deadlines.
1.3.3	Empower all members of a crane crew to speak up to identify scheduling risks before they become a problem.
3.1.2	Ensure that a crane driver/operator identified as fatigued or unfit for duty through Controls 3.1.3 – 3.1.5, does not drive a crane whilst unfit to do so.
3.1.3	Develop and implement a procedure to assess a crane driver/operator's fatigue levels.
3.1.4	Take practical steps to support a fatigued driver to rest immediately.
3.3.4	Adjust operational schedules for driver/operators with increased exposure to environmental factors which cause fatigue.
3.3.10	Empower all members of a crane crew to speak up to identify fatigue risks before they manifest.
5.1.1	Obtain information from the OEM about the correct configuration of the mobile crane for road travel.
5.1.3	Establish a procedure for checking the mobile crane is configured in accordance with OEM specifications prior to road travel.
5.2.1	Obtain information from the OEM about appropriate hook configurations for road travel.
5.2.2	Implement a procedure to ensure that only OEM-recommended hook configurations are fitted to the mobile crane for road travel.
5.2.3	In circumstances when a non-OEM-recommended hook configuration is fitted for road travel, implement a procedure to ensure the crane driver's field of view remains adequate.

5.2.4	For those hooks which significantly impede the crane driver/operator's field of vision, implement a procedure for removing the hook from the boom and transporting it separately during on-road travel.
5.3.1	Establish a procedure for measuring, marking, or identifying the location of components of the crane or crane support vehicle when it is configured to comply with authorised dimensions or mass.
5.3.2	Provide training and equip crane driver/operators and crane crew to reconfigure a crane and crane support vehicle in accordance with the procedure and any documentation developed in 5.3.1.
5.4.2	Assess driving routes for the presence of overhead electric infrastructure such as powerlines.
5.5.1	Provide training about applicable laws, road rules, permits, notices, and any other access related conditions.
5.5.2	Nominate a person or resource to help drivers resolve issues to do with a permit or notice.
6.1.1	Develop a daily pre-operational inspection template for crane driver/operators to use prior to road travel.
6.4.2	Ensure a crane is not driven on a road if on-site lifting activities cause damage to the driving or equipment restraint systems of the crane.
7.1.4	Provide training for crew members to identify when the dolly is not properly coupled to the crane.
7.3.1	Develop a pre-transport inspection template for crane driver/operators to use before each trip.
8.1.1	Design/ configure and install locking or securing mechanisms to stabilisers/outriggers that provide a visual indication whether the mechanism is on or off/ open or closed.
8.1.4	Comply with requirements for transport and travel specified in Australian Standard AS2550.
8.2.1	Develop a pre-transport inspection process for crane driver/operators to use before each trip.
8.3.1	Follow OEM instructions for the fitment of crane equipment and for scheduled inspections.
8.4.1	Identify and document the number and kinds of lashing required to restrain each piece of equipment.
8.4.2	Make information about lashing equipment readily available to crane driver/operators and other workers who prepare cranes for travel.
8.4.3	Provide lashing equipment with sufficient capacity for its intended use. Refer to Australian Standard and Load Restraint Guide.
8.5.3	Ensure the lids and closures for all storage compartments and fastenings for all removable equipment are checked and secure prior to road travel.
9.1.3	Establish a procedure for ascertaining and documenting the total mass of a crane before it drives on a road.
9.1.4	Ensure the total mass of the crane and the equipment it is carrying does not exceed the allowable total mass limit and axle/axle group mass limits established in 9.1.1.
9.1.5	Ensure the mass requirements detailed in the relevant notices, permits or other instruments issued by road authorities are not exceeded.
10.2.1	Consult with the OEM to identify proper methods for restraining the mobile crane

Route Planning: **Controls which influence the route a mobile crane should travel along.**	
1.4.1	Schedule crane movements in accordance with the permitted route and any conditions such as speed limits or prohibited travel times.
1.4.3	Request information about local road and traffic conditions, potential delays, and travel times, from other parties.
4.1.1	Only schedule travel on an authorised route, ensuring compliance with the HVNL and any conditions of a notice or permit e.g., travel times, signage, speed limits, load configuration, or telematics requirements..
4.1.2	Ensure the proposed route is suitable for the dimensions and mass of the crane and will not cause a disruption to relevant services including electricity, communication, rail, gas, water or sewerage services.
4.1.3	Note and record locations where road characteristics or infrastructure make it difficult for a crane of particular dimensions to negotiate.
4.1.4	Share information about unsuitable routes for each kind of crane using available technology.
5.3.3	For cranes that are not returned to their original configuration, plan an alternate route based on accurate information about the crane's new dimensions or mass.
5.4.1	Conduct route planning having regard to overhead electrical infrastructure and the height of the crane.
9.1.5	Ensure the mass requirements detailed in the relevant notices, permits or other instruments issued by road authorities are not exceeded.
9.1.6	Ensure that the crane driver/operator knows the authorised route on which the crane can travel.
9.2.3	For cranes that are not returned to their original configuration, plan an alternate route based on accurate information about the crane's new mass.
9.2.4	Ensure that the crane driver/operator knows the authorised route on which the crane can travel.
10.3.1	Ensure the person planning the movement has the information necessary to plan the route.
10.3.2	Ensure appropriate access permissions are sought prior to commencing travel.
10.3.3	Ensure the permitted route is surveyed to establish whether it is suitable for the overall dimension of the combination transporting the mobile crane, including swept path and tail swing.
10.3.4	Ensure any requirements for the movement of over-size over-mass (OSOM) vehicles are complied with.

Scheduling: **Controls which influence the road travel schedule of a mobile crane.**	
1.2.1	Schedule crane movements to allow sufficient travel time for crane driver/operators to reach destinations without needing to speed.
1.4.1	Schedule crane movements in accordance with the permitted route and any conditions such as speed limits or prohibited travel times.
1.4.2	Develop and use a method to estimate travel time on permitted routes.
1.4.3	Request information about local road and traffic conditions, potential delays, and travel times, from other parties.
2.1.4	Plan trips and jobs having regard to the qualifications and skill set of the driver/operator.
2.1.5	Schedule crane driver/operators with the appropriate skills to drive specific cranes.
3.3.1	Schedule operations so the risk of fatigue is avoided or minimised.
3.3.4	Adjust operational schedules for driver/operators with increased exposure to environmental factors which cause fatigue.
3.3.5	Develop contingency plans for when drivers are fatigued.
3.3.7	Provide timely communications to other CoR parties of delays or anticipated waiting times.
3.3.8	Plan for situations when a driver is no longer able to complete a trip without the risk of being impaired by fatigue, due to increasing delays from site lifting tasks and/or traffic conditions.

Training: **Controls which relate to training employees about the use of a mobile crane.**	
1.1.2	Provide training to crane driver/operator about driving at an appropriate speed, having regard to the prevailing road and traffic conditions
1.1.4	Use the information provided by telematics to inform operational procedures and identify training needs.
2.1.2	Provide training for crane driver/operators in the safe operation of the driving systems and safe driving methods for each model of crane they will be driving.
2.2.1	Provide training for crane driver/operator in the use of suitable driving methods.
2.3.1	Provide training for driver/operator in the use of suitable driving methods before driving an articulated steering crane.
3.2.1	Provide training for all employees to understand the risks of fatigue and how to identify and manage it.
3.2.2	Provide training for all employees about the factors that cause fatigue.
5.1.4	Provide training to the crane driver/operator and crane crew about the correct configuration of the mobile crane for road travel and the procedure for ensuring the crane is properly configured.
5.2.5	Provide training about the procedures implemented and monitor their effectiveness.
5.3.2	Provide training and equip crane driver/operators and crane crew to reconfigure a crane and crane support vehicle in accordance with the procedure and any documentation developed in 5.3.1.
5.4.3	Provide training for crane driver/operators about the risks of driving around overhead electrical infrastructure and safe clearances to be maintained.
5.5.1	Control: Provide training about applicable laws, road rules, permits, notices, and any other access related conditions.
6.4.1	Provide training for crane driver/operators and crane crew to identify and report indications of damage or excessive wear to all crane components.
7.1.3	Provide training for crew members to follow manufacturer's recommendations for configuring, attaching, and detaching the dolly to the crane.
7.1.4	Provide training for crew members to identify when the dolly is not properly coupled to the crane.
7.2.1	Provide training for crane driver/operators to identify faults in the dolly's coupling mechanisms, or to observe that the coupling does not fully engage.
7.3.2	Provide training for crane driver/operators to use the pre-transport inspection template immediately before a crane is driven on a road, both on its way to and from a site.
7.3.3	Provide training for crane driver/operators to record their findings and provide the completed template to another person.
8.1.5	Provide training to crane driver/operators to conduct visual inspection of stabiliser/outrigger locking mechanisms prior to road travel.
8.3.3	Provide training for crane driver/operators and other employees to follow manufacturers' instructions for the configuration and stowage of crane equipment.
9.2.1	Establish a procedure for crane crew to check the distribution of crane equipment on the crane and crane supporting vehicle after on-site work is finished.
10.1.2	Provide training and equip staff to safely transport a mobile crane on a heavy vehicle.
11.2.3	Provide training and equip employees to implement a method for determining the mass of each load being lifted by the crane.
11.3.2	Provide training for the crane driver/operator to ask for a loading plan, or information about a loading method before commencing to load a heavy vehicle.

Vehicle Maintenance: **Controls which identify the maintenance requirements of a mobile crane.**	
6.2.1	Undertake programmed inspections and monitoring.
6.3.1	Obtain information about the operating and mechanical condition of the crane from the crane owner.
7.2.1	Provide training for crane driver/operators to identify faults in the dolly's coupling mechanisms, or to observe that the coupling does not fully engage.
7.2.2	Engage trained and qualified persons to conduct periodic inspections of the dolly's coupling components.
7.3.4	Establish a system to collect and review completed pre-check templates, to triage non-compliances, and to immediately attend to defects that create risks to safety.
7.3.5	Analyse pre-transport inspection records and periodic inspection reports to confirm that recommended maintenance or replacement periods are appropriate and to assess the accuracy of drivers' fault identification.

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