Road safety audits on mining operations

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Abstract

Road safety auditing is a formalised safety assessment that should be carried out during the design, construction or post-construction (existing) phases of a project by experienced professionals who are independent of the designer or asset owner.

It should be considered as an intrinsic component of project development and a critical element of an effective and robust traffic management framework.

Road safety auditing has been used on public road networks for a number of years and is recognised as an effective way of reducing road trauma. In recent years it has been successfully applied in improving safety at numerous mining operations across Australia.

The aim of road safety auditing is to identify existing or potential road safety issues and suggest design solutions or procedural improvements to address the issues. This paper will detail the process and application of road safety audits to the specific requirements of the mining industry.

Issues addressed during audits include:

- interaction between light vehicles, heavy vehicles, and pedestrians
- speed management
- road design and layout including intersections and other areas of traffic conflict
- signage, delineation and lighting
- parking arrangements
- evaluation of the existing land transportation management systems, i.e. documentation and processes.

Introduction

History of road safety audits

The development of the concept of road safety auditing started when road designers and road managers in the UK realised that despite roads being built to all applicable standards and guidelines they nevertheless occasionally experienced fatal crashes in which certain road features were later found to be contributing factors.

It became apparent that safety of road users, including pedestrians, was not being considered adequately during the design process of new roads. This revelation has lead to the gradual development of a new auditing process aimed at identifying safety issues before they contribute to occurrences of road crashes both on newly designed as well as on existing roads. This process became known as road safety auditing.

Road safety auditing is currently being used in a number of countries, Australia included, as part of Safe System. Safe Systems is a new systematic approach for addressing traffic hazards and reducing road trauma on public roads and comprises of four key elements: road users, vehicles, speeds and road environments. The system has human tolerance to physical forces at its basis and operates under the premise that road users should not be penalised with death or serious injury for innocent mistakes.

Two of the key concepts of Safe Systems are that roads should be designed to minimise the chances of crashes occurring and to minimise injury to drivers who have been involved in a crash. As such, road safety auditing is a recognised and effective tool for achieving the ambitious Safe Systems targets.

While previous safety improvement methods, such as Black Spot assessments, have been reactive in nature (i.e. improving safety at locations where crashes have occurred), road safety auditing is a proactive approach where safety issues are identified and addressed before they result in crashes.

The application of road safety audits in the Australian context is detailed in the *Guide to Road Safety Part 6: Road Safety Audit,* Austroads, 2009.

Road safety audits on public roads

A road safety audit is a formal examination of a future road or traffic project or of an existing road, in which an independent, qualified team reports on the project's crash potential and safety performance.

Road safety audits are becoming ever more prominent on public roads as it has been shown that they have a potential to:

- reduce the likelihood of road crashes
- reduce the severity of crash outcomes

- increase the awareness of road safety amongst designers, traffic engineers and road owners/managers
- reduce the need for costly remedial measures
- benefit the community by reducing crashes, disruptions, trauma, and costs.

Road safety auditing achieves best outcomes if audits are conducted throughout road project developments; from the conceptual stage to the commissioning stage. The earlier the potential issues, and remedial measures, are identified, the lesser:

- are the chances that unsafe features will become incorporated in designs and become unchangeable
- will be the costs of remedial measures.

Road safety audits can be undertaken at various project development stages, such as the:

- feasibility stage
- preliminary design stage
- detailed design stage
- pre-opening stage.

Road safety audits are frequently also conducted on existing road networks.

Road safety audit teams

Road authorities sometimes stipulate that leaders or members of audit teams on public roads have the required accreditation (i.e. Senior Road Safety Auditor or Road Safety Auditor). This accreditation requires having at least five years of experience in a relevant engineering field, completing formal and recognised training courses, participating in at least five audits and maintaining currency of professional experience.

One of the basic premises of road safety auditing is the independence of auditors from both designers and road owners. This is important so that the audits can be conducted without bias, without influences from involved parties and occasionally with an ‘outside the box’ approach.

It is preferable that road safety audits be conducted by a team of two or more (depending on the complexity of the project that is being reviewed) experienced auditors. This is because auditors usually have different levels or areas of experience, skills and may have a different approach to auditing. Discussions between team members often result in the development of new ideas or new approaches for treating safety issues. There is also the practical benefit of

having more observers during audits so that the tasks of discussing, taking notes and taking photographs can be split between members.

For all of these reasons, a team approach usually results in outcomes that are greater than the sum of the individual members' contributions. Road safety auditors continually learn and gain new skills and experience from each audit that they participate in. Each new audit builds upon the experiences from previous audits resulting in better outcomes for clients.

Road safety audits on mining operations

Road safety is recognised as one of the major risk areas on Australian mining operations. As part of a systematic approach for improving safety on mining transportation networks, the safety of the road infrastructure should be one of the primary areas addressed by mining organisations.

However, mining roads are often seen as 'associated' features of mining operations without a full appreciation of their importance for safe and efficient movement of mining vehicle fleets. As a result, mining operations often give insufficient consideration to appropriate road design, construction and maintenance methods.

Similarly to the audits carried out on public roads, the application of road safety audits on mining road networks can result in the following benefits:

- The likelihood and severity of crashes can be reduced.
- Road safety becomes more prominent in designers' minds.
- The need for costly remedial work is reduced.
- Whole of life project costs are reduced.
- Costly disruptions to operations can be avoided.

Conducting road safety audits on mining operations

In order to achieve the most out of road safety audits on mines, it is important that an appropriate audit team is selected. While there are no requirements for specific accreditation, experience level, and similar when carrying out audits on mine sites (as opposed to public roads), clients should ensure that the audit team members have adequate experience in the areas of traffic safety, traffic engineering and management, road design and construction or road user behaviour but with a good understanding and appreciation of the specific conditions on mining operations.

Prior to the commencement of a site visit, the audit team and the client should agree on the scope, deliverables and timeframes to avoid misaligned expectations. It is also preferable that the relevant site documentation be provided to the audit team for review prior to the site visit. This includes

documents such as traffic management plans, driving procedures, induction and training materials, and any other documents that define the driving environment on a particular operation.

Once on site, the audit team should be escorted at all times by an experienced person who is able to provide background information about the operation. Ideally, this would be a person with knowledge about the historical developments on the site and also about, at least to a certain extent, future plans or directions for the operation. Ideally, this is the person who would be ultimately tasked with the coordination of the implementation of the audit findings. This would ensure that the operations benefit not only from implementing the provided recommendations but also from gaining an understanding of the context under which specific recommendations have been developed.

The audit team should take large amounts of visual records and notes about their observations. While some areas will be adequately covered by just driving through, other locations may require the team to walk through or even to spend time observing the traffic. Occasionally the auditors may request to spend some time on board mining equipment to gain a better appreciation of the issues from the operators' perspectives.

Site visits should also include night-time inspections. There are a number of issues, predominantly related to visibility of roads and associated features, which can only be observed under artificial lighting conditions.

Some of the issues addressed during audits include:

- interaction between light vehicles, heavy vehicles, and pedestrians
- speed management
- road design and layout including intersections and other areas of traffic conflict
- signage, delineation and lighting
- parking arrangements
- evaluation of the existing land transportation management systems, i.e. documentation and processes.

Road safety audit reporting

Following the site visit, the audit team starts working on the audit report which includes all the findings, usually stating what the associated risks are, and recommendations for addressing specific issues. Some recommendations are generic in nature and are applicable to multiple locations while others are very specific and directive.

The recommendations from the report are summarised in a tabulated form called a corrective actions report (CAR). The CAR provides an opportunity for clients to initiate a review of the audit recommendations.

During the review of the recommendations it is important that an internal risk assessment be conducted, particularly with issues that have been deemed as more critical. This review and risk assessment assists the operations with the development of an action plan based on priorities of importance.

When carrying out a review of the recommendations from road safety audit reports, clients should be aware of auditors' limitations. For example, auditors will most likely lack a detailed understanding of all operational conditions or other existing plans that may exist. Furthermore, by their nature, road safety audits will focus mainly on road safety issues. Consequently, clients need to translate the findings into a workable action plan that takes all considerations into account.

Responding to road safety audit reports

The CAR table includes columns where clients can note their acceptance of each recommendation, or note those recommendations that have not been accepted. There can be numerous reasons why a recommendation is not accepted, such as:

- budgetary constraints
- addressing other, more urgent issues
- operational reasons
- considering alternative solutions to the identified finding.

However, if a recommendation is not accepted, as a formal response to the audit findings, clients should include a comment in the table as to why it has not been accepted.

Whatever the reasons for not accepting a recommendation are, it is important that clients understand the risks associated with the findings and appreciate the intent behind the recommendation. This could result in alternative solutions developed by the client (to be documented in the CAR).

Clients should be aware that there are certain implications stemming from commissioning a road safety audit. As a fictitious scenario: in a legal proceeding following a road crash, a mining operation could argue that they have not been aware of certain features that may have been identified during a formal investigation as contributing factors. While this position would certainly be difficult, it would be even more difficult if the investigation uncovered that a road safety audit had been conducted in the past and that a contributing feature had been raised as a potential issue which the client decided not to act upon, or provide an acceptable explanation for this decision.

When commissioning a road safety audit, be aware that you have been made aware!

Road safety auditing of design drawings

A similar process to that described above is carried out when auditing design drawings. The site visit is replaced by a meeting between the audit team and the designers. This is the opportunity for the design team to outline the design process, assumptions, principles, standards, etc. enabling the auditors to gain a better appreciation of the design and to adjust the auditing process accordingly.

In both approaches to auditing, good communication between the parties must be established and maintained if the audit is to be done effectively and without wasted time and effort. Designers and clients need to consider audit findings or recommendations objectively and gain from the experience, and recognise that the project helps avoid their project being constructed with safety problems which are much more expensive to fix later on.

Ongoing road safety auditing

The two auditing scenarios described previously, i.e. auditing of existing roads or new road design plans are the most typical applications of road safety auditing.

However, as the appreciation of road safety issues and the benefits of road safety auditing increases amongst mining operations, it can be expected that road safety audits would be conducted on a continual basis to ensure that the achievements in road safety do not deteriorate.

As such, it is important to implement a program of auditing on a regular basis (i.e. every one or two years) and to focus on developments on mining operations that are likely to have a significant impact on the traffic management. These developments could include changes in:

- the composition or size of the vehicle fleet
- road networks
- mining methods
- relevant corporate policies, etc.

Recurring road safety auditing should become part of an overall site auditing schedule to ensure that risks for road users on mining road networks continue to be minimal and adequately managed.

Standards

There is a frequent belief amongst those that are not fully conversant with traffic safety experience that preparing a design in accordance with applicable standards and accepted guidelines will result in outcomes that meet all safety requirements and legal obligations.

From this belief stems the frequent observation made by site people that ‘this is how I have seen it built on the main road and hence it must be good for our roads, too’. It should be appreciated that although public road owners are often aware of unsafe features on their networks they simply lack the funds to remedy them all at once. They usually set up a prioritisation list and allocate their funds accordingly. The reality is that there will always be unsafe features on public roads and these should not be used as examples or benchmarks.

Although it is appreciated that standards are an important starting point and that many safety issues would be eliminated if standards are followed, this does not guarantee a safe outcome.

It should be recognised that standards, including those relating to road design, do not warrant a safe outcome as they often define the minimum requirements, do not cover all circumstances and design requirements and have not been developed specifically with safety considerations in mind. There are also numerous instances where standards do not exist.

For these reasons, road safety audits are not restricted to checking compliance with standards. Their intention is to ensure that safety is not compromised. They consider individual features in the context of the entire system and not purely on their own.

Conclusions

Road safety auditing can be a very effective tool for improving safety on Australian mining roads. Adopting the principles of road safety auditing on public roads and modifying them to suit the specific mining applications, road safety issues can be identified in a proactive manner.

The audits should be conducted throughout the design stages of road construction projects as well as on existing road networks. The benefits increase when auditing is conducted at the very early project stages so that the need for costly remedial works is reduced.

It is important that audits are conducted by a team of experienced auditors with full support by mining personnel.

The audit findings, as presented in a road safety audit report, should be considered and reviewed by site management. Risk assessments should be conducted prior to deciding on the best course of action.

Clients have the option of not accepting any of the provided recommendations. However, they should provide and document a formal response to the audit noting the reasons for not accepting specific recommendations.

If conducted on a regular basis, or whenever operational circumstances change significantly, road safety audits can assist mining organisations to minimise the risks for their road users.