

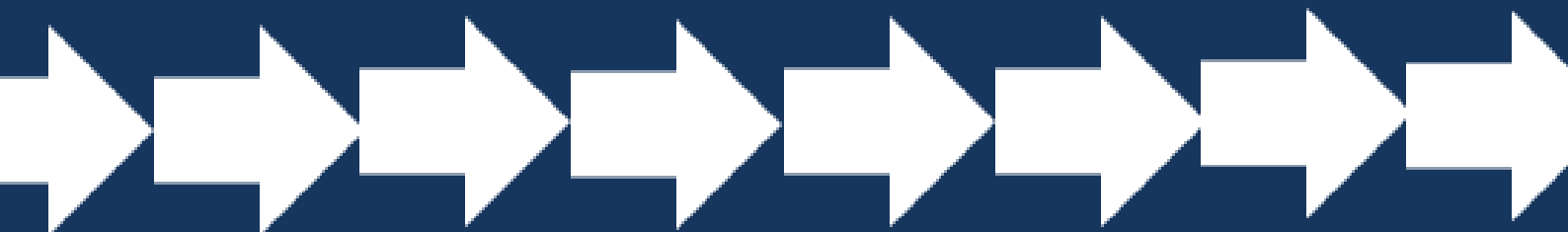


The New Zealand
Roadmarkers
Federation Inc

Practice Note



Best Practice Guide
Temporary Traffic Management for Roadmarking



New Zealand Roadmarkers Federation Inc.
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1 Purpose

This Practice Note had been developed to provide practical guidance to ensure that all workers involved with the delivery of roadmarking activities are as safe as is reasonably practicable from traffic-related hazards while carrying out their work, whilst also ensuring the safety of the travelling public. The document's purpose is to:

- Provide all PCBU's engaged in roadmarking activities with clear, consistent guidance in the use of TTM to enable safe delivery of roadmarking works; and
- Demonstrate that consideration has been given to the development of TTM layouts using risk assessment, industry experience, and a risk-based approach to solution delivery.

2 Who Should Read this Practice Note

This Practice Note is for any PCBU, Worker or Officer who is involved in the delivery of Roadmarking activities at any point in the contracting chain, for example:

- Roadmarking Assistants
- Roadmarking Operators
- STMS'
- Roadmarking PCBU's
- TTM delivery PCBU's
- Road Controlling Authorities
- PCBU's that create or issue roadmarking contracts
- TTM auditors
- H&S professionals engaged in the roadmarking contracting chain

3 Legal Disclaimer

This New Zealand roadmarking practice note has been compiled using all reasonable care based on the experience and knowledge of experts across the temporary traffic management and roadmarking industries. Relevant literature, legislation, experience and regulations were reviewed and applied throughout the development of this document.

Users of this document should apply and rely upon their own experience and judgment and should not rely on the practice notes contents in isolation from other sources of advice and information.

The New Zealand Road markers Federation cannot confirm that the controls outlined in the practice note are appropriate for each site; and it will be up to the individuals working on site (and any adjacent PCBUs) to determine that the practice note is fit for purpose and the risks are appropriate for each site. In applying their own experience and judgment, the standards of safety and serviceability explicitly required or implied by this practice note shall not be reduced.

4 Copyright Information

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5 Revision History

1.1 Details

Organisation	Date
NZRF – TTM for Roadmarking best practice review	2020 - 2022
NZRF – TTM workshop, risk assessment process	May 2022
NZRF – Practice Note development	2022 - 2023
NZRF – AGM / Conference, member Practice Note workshop	August 2023
NZRF – Minor TMD update	November 2023
NZRF – Review and rationalise Part 1. Update layouts in Part 2	March 2025

6 Document Control

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Date	Author	Description of Change
July 2023	NZRF	Draft Practice Note circulated to members
August 2023	NZRF	Practice Note endorsed by members
November 2023	NZRF	Minor update
March 2025	NZRF	Review & rationalise Part 1. Update layouts in Part 2
August 2025	NZRF	Further update to Part 2

7 Glossary of Terms

a. Temporary Traffic Management Terms and Definitions

TTM Term	Definition
AADT	Annual average daily traffic.
Activity	A planned event or operation done within the road reserve or affecting the normal use of the road reserve.
Alternating flow	The movement of vehicles in alternating opposing directions, normally controlled by traffic signals or Manual Traffic Controllers.
Advanced warning variable message sign (AWVMS)	A specialist variable message sign used at roadworks to provide advance warning to approaching road users.
Beacon	See Flashing Beacon
Bi-directional flow	The controlled channelling of traffic flows, usually onto temporary alignments, to maintain traffic flow in both directions. Delineation devices or physical barrier systems are normally used to separate the traffic flows.
Carriageway	That portion of road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes. Divided roads are considered to have two carriageways.
Category A road	Low speed roads (60km/h and less) Using both Category A and Category B signs (dependant on RCA requirements) Includes two-way two-lane roads and multilane roads
Category B road	High speed two-way two-lane roads (70km/h and more) Using both Category A and Category B signs (dependant on RCA requirements)
Category C road	High speed multi-lane roads (70km/h and more)
Contra-flow	Traffic flow in a direction opposite to the normal flow. For example, directing traffic into a lane that normally operates in the opposing direction.
CoPTTM	Code of Practice for Temporary Traffic Management.
Crash	Any incident resulting in damage to any installed TTM equipment, vehicles, plant or injury to a person.
CSD	Clear Sight Distance: The distance a road user can clearly see along the road. Minimum CSD is expressed in terms of metres based on the permanent speed limit (PSL) or operating speed. Rear CSD – the clear sight distance required by drivers travelling in the same direction as an inspection activity. Posted speed limit of 50 km/h and under local roads = 75 meters (m)

Delineation device	A piece of equipment manufactured specifically for a wide range of purposes such as, but not limited to, marking temporary traffic lanes, and drawing attention to specific hazards.
Detour	A temporary route to guide road users around a worksite operation.
Flashing beacon	Refers to roof-mounted devices. Hazard warning lights should be used where appropriate but are not considered to be beacons. Flashing beacons consist of a light in an amber casing that may either flash (strobe) or appear to flash when circled by a rotating reflector.
Flush median	A painted median that may be used to assist turning vehicles or in some cases crossing pedestrians, or to increase the separation of traffic moving in different directions.
Emergency	An uncontrolled event that has caused, or is at risk of causing, loss of life, injury, or serious property damage. It can include declarations of civil defence emergencies, traffic crashes or other significant incidents. It does not include delays unless these are the result of one of the above situations.
Flag	A device made from flexible material primarily used by forward pilot vehicles to warn approaching traffic of the roadworks ahead.

Operating speed	The 85th percentile speed of vehicles on a section of a road or, for the purposes of TCD Manual Part 8 (CoPTTM) the operating speed as declared by the RCA.
PCBU	Person conducting a business or undertaking.
Peak	The times of the day or night, month, or year, when the road carries the highest traffic flows, in one or both directions.
Pedestrian	a. A person on foot on a road; and b. includes a person in or on any contrivance equipped with wheels or revolving runners that is not a vehicle and permitted to use a footpath.
Permanent speed limit	The legal speed limit for a specific section of road indicated by permanent speed limit signs.
Positive traffic management	A method of using signs, delineation devices, pavement markings, traffic signals or manual traffic controllers (MTC) together or separately to reduce speed at a worksite, while maintaining adequate safety and capacity.
Posted speed limit	The legal speed limit for a specific section of road indicated by permanent speed limit signs.
PPE	Personal protective

Shadow vehicle	Protects the work on live lanes and sealed shoulders being undertaken ahead fitted with arrow board/VMS and beacons.
Short-term operation	An operation occupying a location for less than one day on a level 2 or level 3 road. There is no differentiation between a short-term and long-term activity on a level 1 road.
Shoulder	A sealed or unsealed part of the road outside the edgeline, or an inferred edgeline, which is trafficable and flush with the pavement.
Shy line	The distance from a hazard beyond which a typical road user will not perceive it as an immediate danger so they will not normally change their vehicle's speed or placement.
Sign stand	A device used to hold a sign, so it is visible to road users.
Sign visibility distance	The minimum distance over which the driver of an approaching vehicle must be able to see the first advance warning sign. Where necessary, increase sign spacing's to achieve visibility distance.
Site traffic management specialist (STMS)	A qualified person who has specific responsibility for documentation and management of temporary traffic management (TTM). The STMS is the system installer

	• making public transport and freight networks more effective • improving road safety.
Warning distance	The minimum distance between the first advance warning sign and the start of the cone taper or the beginning of the closure or working space.
WorkSafe NZ	New Zealand's workplace health and safety regulator. It works to reduce work related death and injury rates, and support employers and employees in productive work. It provides information and guidance to workplaces on occupational safety and health issues and managing hazardous substances. It enforces health and safety legislation, researches workplace health and safety matters, and provides policy advice to government.
Work vehicle	In a mobile operation, a work vehicle is a vehicle carrying out activity adjacent to the road, or on the road carriageway, or supporting personnel on foot.
Work site	The area that is available for workers use to complete the activity.
Working space	The area within a site that is available for workers to complete the activity.

Continuity line (Con dots)	A longitudinal broken line used to indicate the edge of that portion of the carriageway assigned to through traffic and which is intended to be crossed by traffic turning at an intersection, or entering or exiting an auxiliary lane, a motorway or expressway.
Cycle lane	A longitudinal strip within a roadway reserved by a marking or sign designed for the passage of bicycles.
Dual control	Dual control allows drivers to control the vehicle from either side as there are two separate steering wheels and controls. When the driver is on the left-hand side of the cab, closest to the kerb/edge line it enables a better view when painting the edge line.
Edge line	A broken or continuous white line marking (or kerb) used to indicate the far left or far right side of the roadway.
Entrance	The paved area adjacent to the through lanes of a motorway or expressway that is intended for vehicles entering and merging from a local road via an on-ramp.
Flush Median	A flush median comprises an area marked by white diagonal lines that are painted along the middle of the roadway

On ramp	A carriageway to allow vehicles to join an expressway or motorway, specifically the section of carriageway between the local road intersection and the motorway or expressway entrance. Also known as an 'entry ramp'.
Operator mounted vehicle	A vehicle where the operator is mounted on the vehicle, like a ride on B Type applicator.
Pedestrian controlled vehicle	A vehicle which has the operator walking behind it controlling the application.
Pedestrian crossing	A pedestrian crossing established and marked on a roadway in accordance with clause 8.2 of the TCD Rule.
Raised reflective pavement marker (RRPM)	A device that is applied or attached to the roadway: in a regular pattern to define a lane line (white or yellow); or to mark the edge of the safe, useable portion of roadway (red); to mark the presence of a fire hydrant or other water source for firefighting (blue); to mark the presence of a culvert or other drain under the roadway (green). They may be retroreflective or illuminated and are often referred to as cats' eyes.
Retroreflective material	Material designed to reflect incident light back towards the light source, or in a specific direction, but does not, for the purposes of the TCD rule, include a reflector. More commonly called reflective material.
Rural	In relation to a road, is one having a speed limit of 70 km/h or more.
Tail pilot vehicle	Advanced warning vehicle fitted with arrow board/VMS and beacons – located behind the road marking vehicle to give warning to vehicles travelling in the same direction.
TCD manual	The Traffic control devices manual (TCD manual) provides guidance on industry best practice, including, where necessary, practice mandated by law in relation to the use of traffic control devices
TCD Rule	Land Transport Rule: Traffic Control Devices 2004, including any subsequent amendments.
Umbilical	A form of Type B applicator which draws its paint and/or power from a remote source, termed the mother vehicle. The mother vehicle can be either a Type A truck, an operator mounted Type B, or a purpose-built umbilical supply vehicle
Urban	In relation to a road, is a road having a speed limit of 60 km/h or less.

8 Practice Note Structure

The Practice Note is divided into 2 Parts:

Part 1: Supporting Discussion

- Background to the development of this document
- What is roadmarking
- TTM for roadmarking risk assessment
- Risk mitigation methodologies
- Specific risk-based approach outcomes
- Training and competency process

Part 2: TMDs and Guidance for Roadmarkers

- TMDs for delivery of TTM for roadmarking
- Limitations on the use of TMDs
- Guidance for STMS' during implementation of TMDs

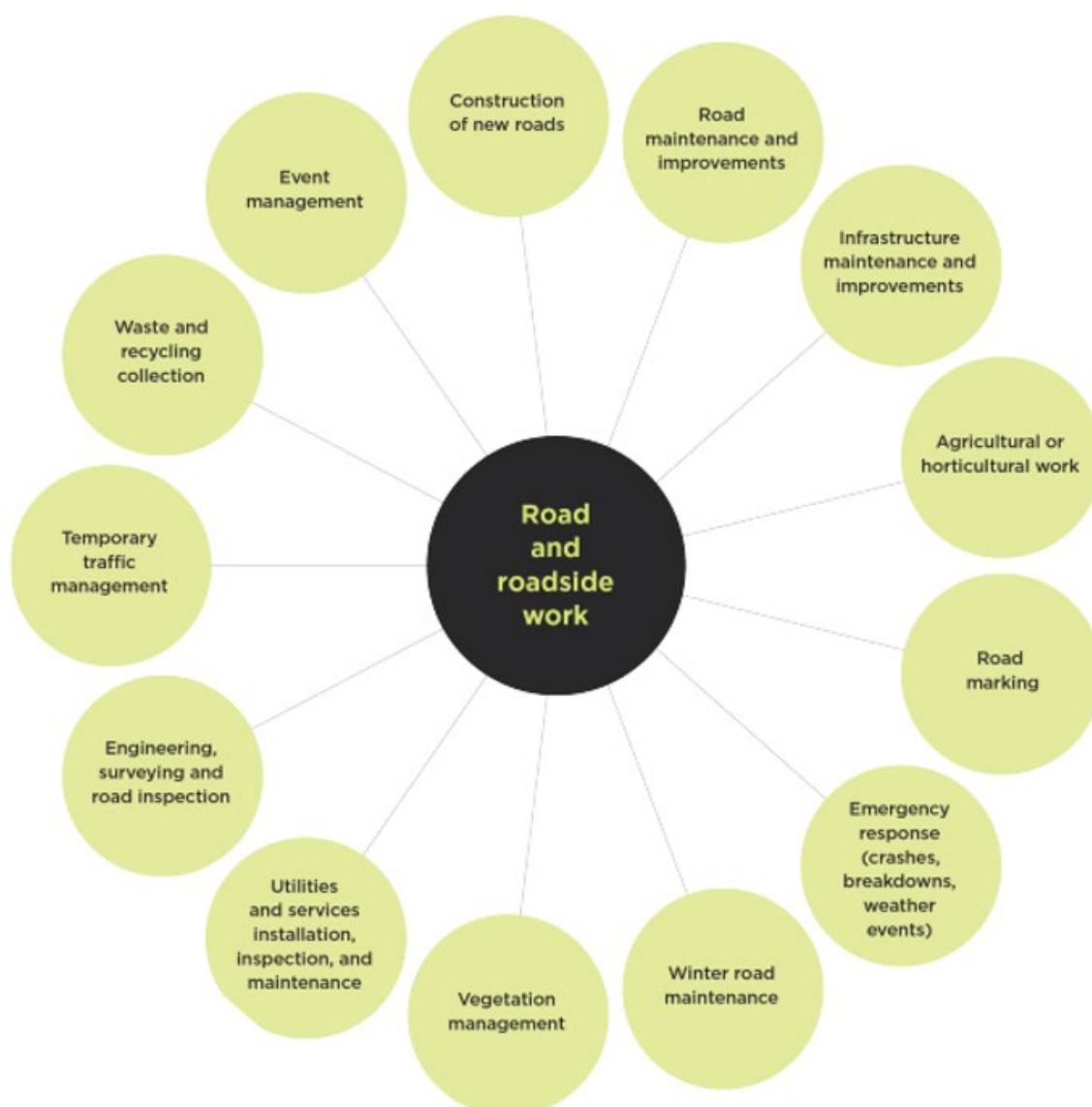
9 Background

The New Zealand Roadmarking Federation and its members have been developing this Practice Note continuously since 2018. Numerous workshops, reviews and updates have been made with input from individuals and organisations across New Zealand including roadmarking operators, contracting PCBUs, RCAs, auditors, and H&S professionals. The result is this Practice Note which captures current industry best practice in the delivery of TTM for roadmarking, but this remains a live document and will continuously evolve.

The WorkSafe Guide for PCBU's "Keeping healthy and safe while working on the road or roadside" (the WorkSafe Guide) in Section 19 Working Near Live Traffic, advises "WorkSafe recommends you read this section in conjunction with Waka Kotahi's NZGTTM which provides more detailed guidelines for TTM planning, documentation, implementation and review" [WorkSafe Guide pg101]. This document has been developed after careful review of both the WorkSafe Guide and the NZGTTM.

10 Roadmarking

Roadmarking on public roads is a highly specialised maintenance activity which requires highly skilled operators and produces a critical component of the road safety infrastructure. It is a small industry when compared to other maintenance activities, such as sealing or other cyclic maintenance functions. The unique nature of the roadmarking industry is recognised by both WorkSafe and the Waka Kotahi, demonstrated in the following diagram from the NZGTTM [pg. 12] referencing the same diagram in the WorkSafe guide [pg. 15]:



Some of the key features that create this unique nature when combined are:

- The mobile nature of the work
- The kms of carriageway travelled while delivering the work
- The short duration of the activity in any one place
- The highly specialised plant required to deliver the work

The result of this is that roadmarking is a specialised and unique activity that, when operating on the carriageway, requires a specialised approach to the provision of TTM to ensure it is delivered safely and efficiently.

10.1 Roadmarking Application

Roadmarking can be grouped into types and these in turn result in distinct methods of application and therefore equipment used to install them:

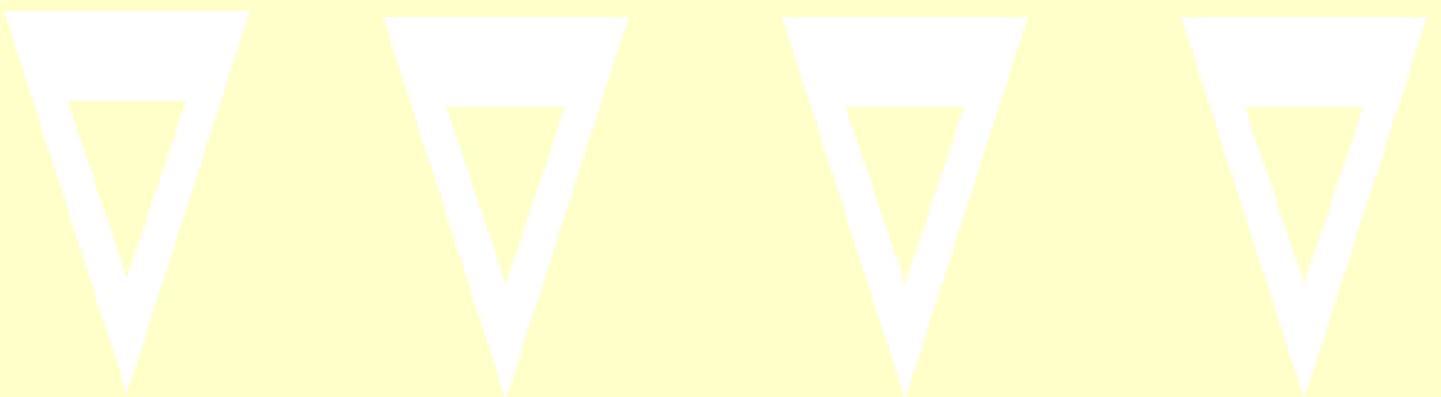
- Longitudinal Markings
- Lateral Markings
- Raised Reflectorised Pavement Markers
- Coloured Surfacing

10.1.1 Longitudinal Markings

Longitudinal markings are long-run lines that are usually parallel to the traffic lane. They include edge lines, centrelines, no-stopping lines etc. These are generally painted by an A-type applicator (see below).

The application of longitudinal markings is a process where the application vehicle and its support vehicles are constantly moving i.e., there is not a fixed site.

This requires a specific approach to risk assessment and mitigation for the hazards specific to this type of operation. The TMDs associated with this type of operation are defined as **Mobile** in Part 2.



10.1.2 Transverse Markings

Transverse markings are generally not parallel to the traffic lane and are often in the lane itself. These include arrows, limit lines, alphabetical characters, diagonal hatching etc. and are applied to the road with a B-type applicator.

The application of transverse markings involves stopping for a short period in the location of the markings to then utilise the B-type applicator to install the markings i.e., there is a fixed site for the very short duration of the works.

This requires a specific approach to risk assessment and mitigation for the hazards specific to this type of operation. The TMDs associated with this type of operation are defined as **Static** in Part 2 (although there are some circumstances where a mobile is the most appropriate control and these are captured in Part 2).



11.2 TTM Risk in Roadmarking

This Practice Note had been developed to ensure that all workers involved with the delivery of roadmarking activities are as safe as is reasonably practicable from **traffic-related** hazards while carrying out their work, whilst also ensuring the safety of the travelling public.

There are many non-traffic related risks involved with the delivery of roadmarking, many of which are captured in the Risk Matrix in 11.2, that must also be managed by the contracting PCBU, but these fall outside the scope of this Practice Note. This Practice Note is only concerned with the use of TTM to mitigate the risk to Roadmarkers from traffic and the risks faced by the travelling public from the roadmarking activity.

The following are key underlying principles that are used in the development of the TMDs in Part 2:

This concept comes into practice in the TMDs in the following ways:

1. Installation of the TG2 “Works End” sign on the same stand as the T1A “Road Works” sign. This significantly reduces the number of locations that workers must exit their vehicles and access the berm (often with swale drains or other roadside hazards) to deploy and recover TTM equipment. Reducing the requirement to do this therefore results in a corresponding reduction in risk exposure. This reduction in risk is balanced with the inconvenience that may be experienced by a road user not seeing the TG2 as they leave the area of works because the TG2 is on the right-hand side of the road, rather than the left. This is a clear case of safety vs convenience and the TMDs reflect this. Given the compact nature of road marking worksites covered by this Practice Note, it will be self-evident to road users that they have left the works area in any case.
2. Holding traffic while painting is completed. Several TMD layouts utilise a Stop paddle or an electronic message sign to hold traffic while painting is completed. This reduces risk exposure to both the workers and the road users at the expense of a short delay to travel for the road user.

11.2.4 Lowest Total Risk or Net Risk

The NZGTTM describes Lowest Total Risk as follows: “Sometimes a control for one risk may increase or transfer risk to another group of people or it may introduce another risk. This is where the concept of lowest total risk applies.” [NZGTTM pg. 32]

This is supported by the Austroads Guide to Temporary Traffic Management (AGTTM) describes the same concept, which it describes as Net Risk, as follows: “Risk management often requires the balancing of competing risk outcomes to establish the best net risk outcome. For example, providing TTM protection for a short duration task may reduce the risks for road workers but increases the risk exposure for TTM workers.” [AGTTM 2019, Section 10, pg. 18].

This concept is important in the mitigation of risks faced by Roadmarkers. Roadmarking is a short-duration activity at any specific location and this Practice Note is intended only for use in these short-duration circumstances. As a result, the T

11.2.4.2 TTM Controls not to be Excessive

Unnecessarily complex TTM controls can negatively impact the total risk of a site as discussed in the NZGTTM:

“Make sure controls are not excessive. For controls to remain effective, the public must trust that the controls are in place for a reason. Using controls excessively, such as deploying them early or leaving them installed when the site is completed, will undermine the public’s trust. Making sure there are no excessive controls is the responsibility of the contractor PCBU. If the public aren’t paying attention to the TTM equipment, it becomes ineffective at managing risk and safety of current and future workers and the public is weakened.” [NZGTTM pg. 51].

In addition to the points from the NZGTTM above, excessive use of TTM controls relative to the works being undertaken (short-term, highly-mobile works) impacts the total risk of roadmarking sites in two further ways:

11.2.5 Traffic Speed Risk

The speed that traffic is traveling when passing or interacting with TTM controls for roadmarking operations is fundamental to the level of risk it poses to those carrying out roadmarking activities.

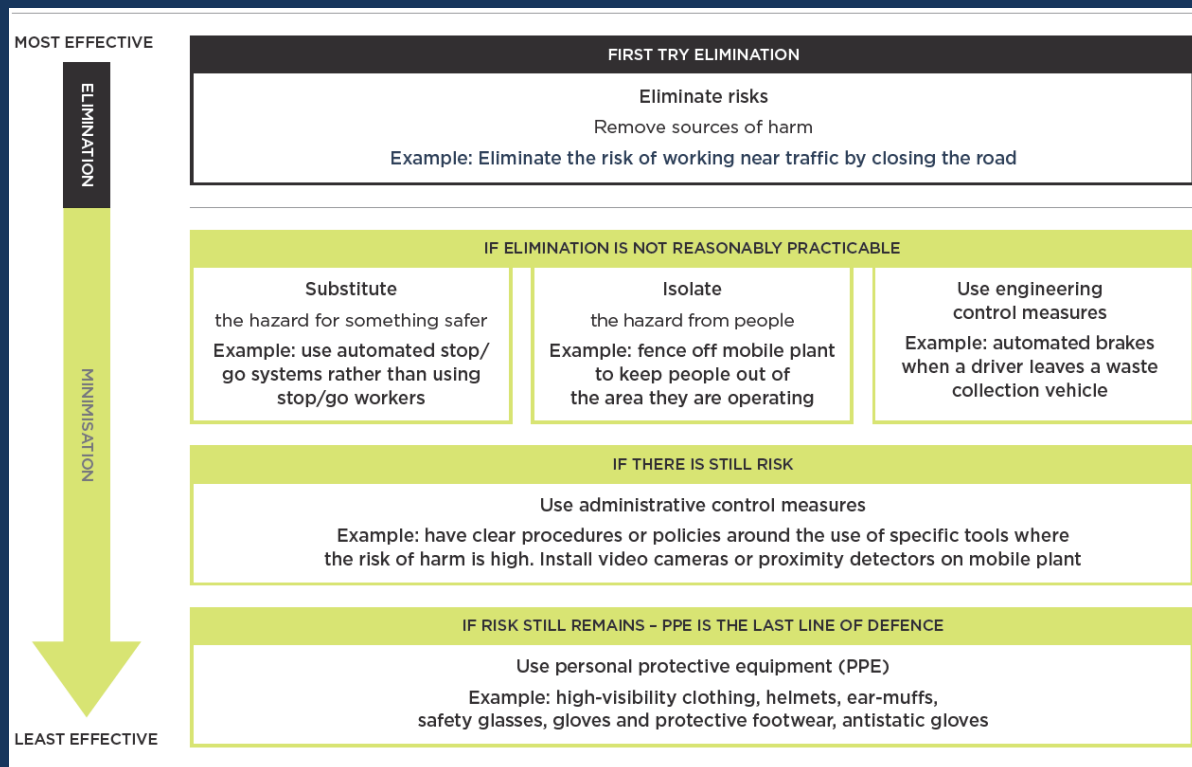
The NZGTTM provides recommended targeted safe speeds for these operations:

Activity - sites with	Target safe system speed
possible crashes between motorised vehicles and: ▪ workers on foot ▪ pedestrians ▪ cyclists ▪ any other person affected and not protected by a vehicle.	30 km/h
possible side-on crashes between vehicles	50 km/h
possible head on crashes between vehicles	70 km/h

11.2.6 Hierarchy of Controls

The WorkSafe Guide describes the use of the Hierarchy of Controls as follows:

“You must take all reasonably practicable actions to eliminate risk to health and safety. If elimination is not reasonably practicable, you must minimise those risks so far as is reasonably practicable. The ways of managing risks are ranked from the highest level of protection and the reliability to the lowest. This ranking is known as the hierarchy of control measures. Using the hierarchy of control measures to manage risks will help you make sure you are using the most effective control measures first.” [WorkSafe Guide pg21].



11.2.6.1 Eliminate the Hazard

Elimination of the traffic hazard, achieved through closing the road, should be used wherever reasonably practicable. Examples of how this is achieved are:

- Full motorway closures
- Major rehabilitation or resurfacing sites
- Long-term closures

PCBUs should utilise these wherever possible, but they fall outside the scope of this Practice Note.

This document is intended to mitigate risk associated with highly mobile, minor works, where elimination is not reasonably practicable (with one exception, discussed below).

Elimination of the traffic hazard requires closing the road to the road user. This is not reasonably practicable for the majority of highly mobile roadmarking operations for the following reasons:

11.2.6.2 Minimize the Hazard

As discussed in Section 11.3.7.1, due to the highly mobile nature of roadmarking activities covered by this Practice Note, elimination of the traffic hazard is almost always not reasonably practicable. Using the hierarchy of controls, the next step is to minimise the hazard through one or more of the following methods:

- Substitution
- Isolation
- Engineering

Substitution

It is not possible to substitute the task of painting markings on roads, as these must be renewed insitu to ensure they continue to effectively perform their safety-critical task. It is possible, however, to substitute the product used to achieve a reduction in risk exposure. Long Life marking systems maintain minimum required safety levels for much longer periods. As a result, marking operations are required less frequently, reducing the risk

- Short-term static closures are used to provide isolation for workers on locations where mobile closures are not reasonably practicable. This is usually due to the need to manage traffic flows around the works while marking is being undertaken or the paint is drying. Isolation is achieved using cones to maintain separation from the work location and the carriageway available to the road user. Traffic flow and road geometry influences the most appropriate way to provide information and direction for the road users. A range of options are provided in the TMDs in Part 2 to suit different conditions. The PCBU will select the appropriate control depending on the specific conditions present.

Engineering

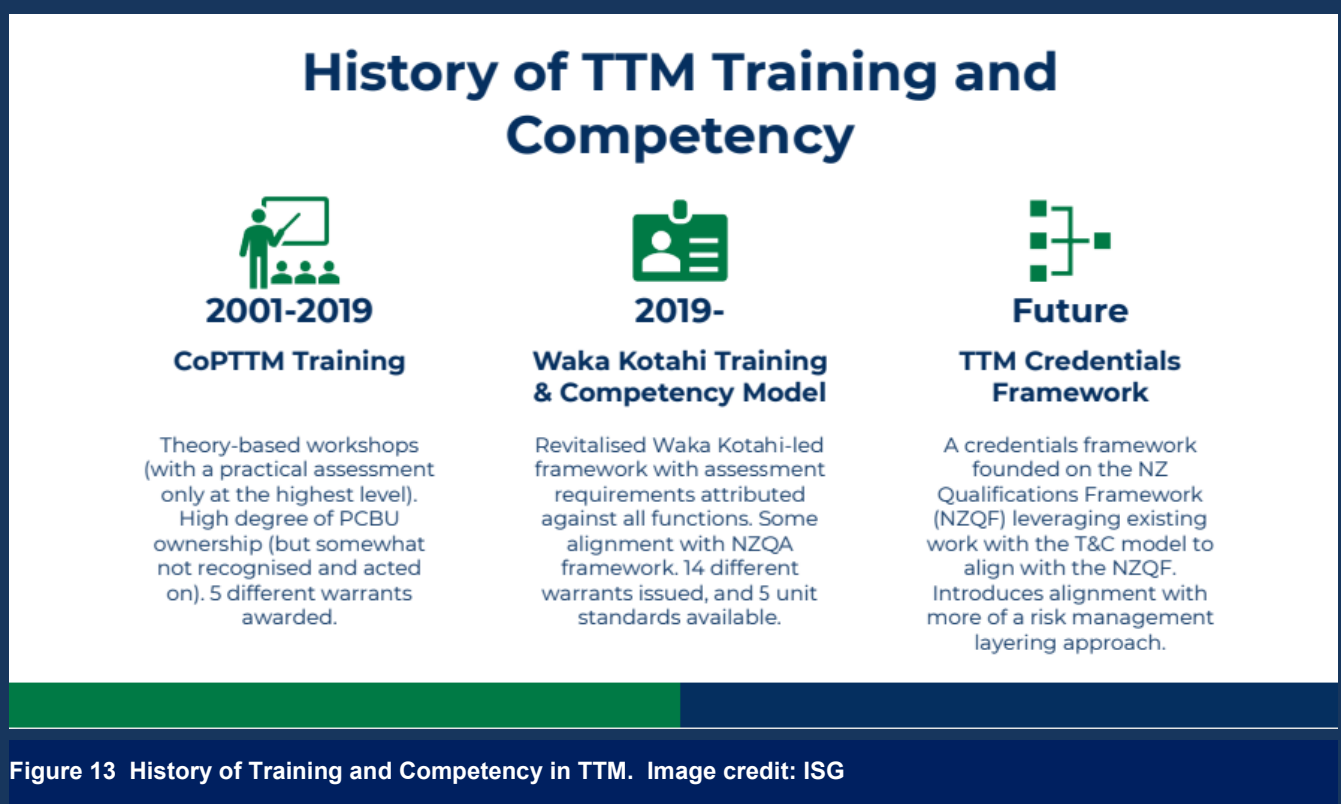
Engineering solutions don't currently provide the primary method of risk minimization, but many PCBUs may have specific engineering solutions that help supplement the isolation tools mentioned above. Examples include:

- Additional beacons or reflective material to ensure the operation is highly visible at night;
- VMS boards to provide road users with more effective communication of the operation in progress and any information to help them negotiate the works

12 Roadmarking TTM Qualification

Historically, TTM warrants, managed by Waka Kotahi, have been required in order to deliver TTM for roadmarking activities. In effect, a client of some of the industry was responsible for providing training, assessing, and certifying competence for the entire industry. This system did not align with the responsibilities of the various PCBUs in the supply chain under HSWA.

The TTM industry is currently developing a credentials framework that will offer qualifications that can be tailored to the risks and responsibilities of those needing the training, as determined by the contracting PCBU, see diagrams below.



The TTM Credentials Framework

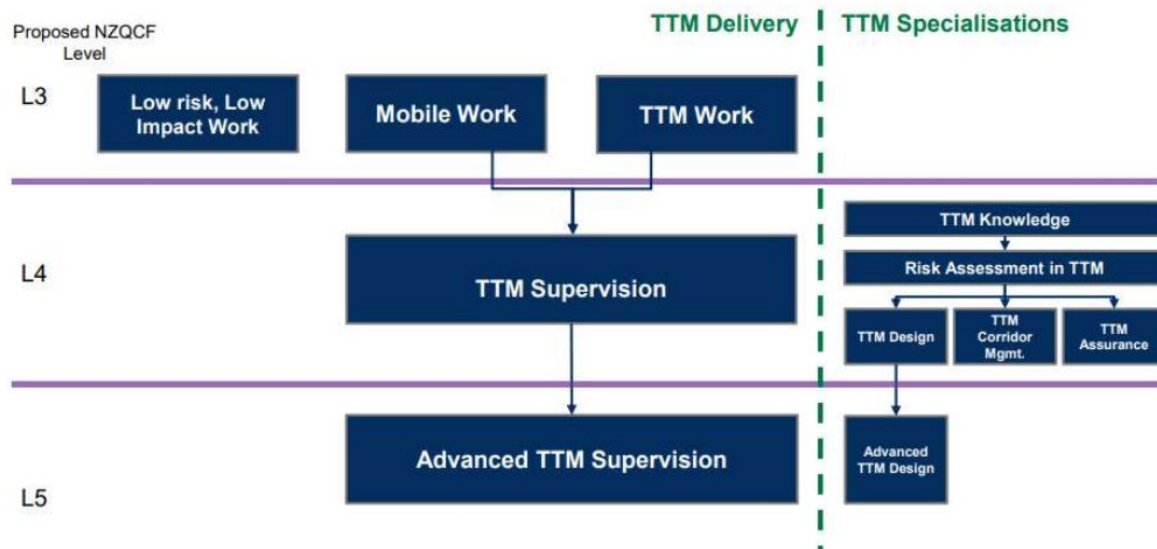


Figure 14 Proposed Credential Framework. Image credit: ISG

12.1 Relevant Training and Assessment

The components of an effective system to train workers in the task of safely delivering TTM for roadmarking are made up of the following:

- **Training** imparting knowledge to the worker on the theoretical and legal aspects of the work;
- **On the job instruction** providing practical application of the above and the opportunity to learn by doing, under the supervision of a qualified person;
- **Verification** of acquired knowledge and competence achieved by the worker, carried out by the PCBU;
- Independent **assessment** of the workers knowledge and skills by an external party.

Training

Waka Kotahi NZTA's current Training & Competency model provides a range of qualifications based on the role the worker will be performing. **TTM Work**

