

Guide for installation of markings on concrete vertical deflection devices

Background

There is increased use of raised platforms for speed management on both State Highways and local government networks. These are used to control travel speeds and improve road safety.

They may be:

- speed humps;
- speed cushions;



- raised tables; and
- pedestrian platforms.



Guidelines to assist with the selection, application, and design of vertical deflection devices are set out in the [Waka Kotahi Speed Management Guide toolbox](#). This Manual describes the signs and road marking to be used for vertical deflection devices.

Marking formats for vertical deflection devices are set out in section 14 of the [Traffic Control Devices Manual Part 5](#) section 14

The Traffic Control Devices Rule Clause 7.9(3) requires that any vertical deflection device must either:

- be illuminated; or
- have reflective delineators; or
- have reflective signs installed.

Failures of markings on concrete surfaces

As concrete cures, efflorescence occurs.

Efflorescence is the migration of a salt to the surface of a porous material, where it forms a coating. The essential process involves the dissolving of an internally held salt in water, or occasionally in another solvent.



The Road Controlling Authority will typically require installation of markings immediately after construction and before the facility is opened to traffic.

Efflorescence means that any initial marking is likely to suffer from adhesion failure.

There are other barriers to adhesion on concrete surfaces but these are typically specialised treatments on concrete floors in buildings such as parking or warehouse facilities.

These include:

- Curing compounds – wax or other coatings some designed to degrade and some not
- Densifiers – sodium or lithium silicates on warehouse and other floors that need protecting of cleaning
- Sealers – acrylics, epoxies or urethanes may have been applied.

Installation of initial sacrificial marking

Efflorescence is an expected curing process following the installation of concrete.

Monitoring of failure is important to ensure that the marking system remains effective until a permanent marking system is installed. Remarketing may be necessary.

Contractors have observed that an effective installation of the sacrificial marking maybe to installed a thin film of thinned marking material. This should soak into the concrete surface and provide a better bond to a second coat shortly afterwards at normal application thickness.

Preparation for a permanent marking system

Not less than six weeks and up to twelve months after the installation of the sacrificial marking, the permanent marking system should be installed.

It is recommended that work be scheduled in the most cost-effective way with a network treatment being carried out to minimise establishment cost and such that contractor resources are optimised.

Successful installation of the permanent marking system requires adequate surface preparation. This means removal of surface material and texturing of concrete to provide a surface that the marking surface can bond with.

To minimise cost this should only be carried out on that part of the surface that the marking system will be installed onto.

Alternative removal methods are:

Water blasting. High pressure water blasting is likely to be the most cost-effective preparation method and when used in association with a vacuum system have a low environmental impact



Blasting. Abrasive blasting can be carried out using various blasting medium including steel, garnet and glass. The system should incorporate a recycle process where the blasting medium is recycled into the equipment and used continuously through the blasting process

Grinding. A revolving head using disks with abrasives such as carbide, diamond or steel cuts into the surface. The disk head should match the width of parallel lines however would not match the format of leading edge triangles.

Acid. This dissolves the Calcium Carbonate (CaCO_3). The time the acid is left will determine the profile of the resultant surface.

In addition to surface preparation, an appropriate primer should be used in accordance with the suppliers recommendation for all marking systems.

Permanent marking in long-life product

It is recommended that markings installed in traffic lanes including all of those associated with vertical deflection devices be installed using a long life marking system. Long-life marking systems include cold applied plastic, thermoplastic and tapes.

Consideration should be given to installing a structured marking system which will improve wet night visibility of the marking system.

Use of long-life product minimises disruption to motorists and risk to roadmarking operatives installing the markings.

Because the cost of traffic control is significant the life cycle cost of installing a long-life product is likely to be more economic than frequent remarking using a paint marking system.

In addition, the marking system will perform for a longer duration with better day and night time visibility compared to a paint marking system which will have a series of degradation cycles.