



Additional Network Standards and Guidelines

Part 2.10: Installation of convex mirrors on public roads

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1 Introduction

1.1 Scope

This Part provides guidance on the use and installation of convex mirrors on public roads as a traffic safety device. In particular, it outlines the legal issues involved in addition to the responsibilities and criteria for use and approval.

1.2 Background

Convex mirrors are used for safety reasons to overcome sight restriction problems. Their use is now widely accepted in low-speed vehicle and pedestrian conflict areas such as warehouse driveways, truck loading bays and parking areas. They are also used in the public road environment, private property accesses and occasionally at road intersections, at locations where sight distance is severely restricted.

However, convex mirrors should not be used as the first option when sight distance is restricted; there are alternative, more effective treatments that should be explored thoroughly before a mirror is installed.

2 Properties

The purpose of the convex mirror is to provide the driver with a view of vehicles or pedestrians that they must give way to. In order to provide an image sufficient to see large areas, it is necessary to use mirrors with a convex surface.

The convex shape of the mirror results in the image, speed and distance of the object being distorted. The degree of distortion depends on the radius of curvature and the size of the convex mirror; the larger the radius of curvature the less the distortion and vice versa. The image appears to be smaller, further away and travelling at a slower speed in a mirror with a smaller radius of curvature. It is difficult for road users to distinguish detail shown on, understand, and interpret the information provided by a convex mirror with a small radius because of the distortion effect.

In addition to distortion effects, the image of a vehicle in a convex mirror appears to be on the wrong side of the road due to the “lateral inversion” of the image created by the mirror. This lateral inversion or mirror image effect can result in road users misinterpreting the images.

Convex mirrors can be very effective at night as they allow a driver to see the headlights of an approaching vehicle. However, they are less effective if other lights are visible in the mirror.

Dark blue, black and other dark colours are difficult to detect in these mirrors in the early morning or late afternoon as these colours are difficult to discern against the road surface colour.

3 Road Safety Assessment

A road safety audit should be conducted before a decision is made to install a convex mirror on a public road. Considering the problems inherent in the design and in the use of convex mirrors, the road safety assessment must show that there are safety benefits in installing the mirror rather than installing other traffic management, engineering or safety measures.

The road safety assessment and consequent decision to install the convex mirror must be fully documented.

3.1 Application

Mirrors can be used to overcome sight restrictions in two distinctly different road environments:

1. Entering the road network, ie. from a driveway, and
2. Within the road network, ie. at intersections, junctions, or on single lane roads with opposing traffic flows (e.g. at hairpin bends).

Where there is a concealed entrance to a property, the following treatments should be considered first:

- relocation of the driveway or private access
- turning restrictions

- improvements to sight distance such as vegetation trimming
- bank/cutting soil removal
- alteration and/or relocation of property fencing
- shoulder acceleration or deceleration areas.

Convex safety mirrors shall **not** be installed:

- on public roads where alternative traffic management measures or engineering measures such as improvements to sight distance and road-realignment are available in the short term.
- to enhance the safety of pedestrian crossing movements. Other solutions should be considered, such as relocation of the crossing point or strategically located pedestrian refuges

Convex mirrors may be used as an interim measure until appropriate traffic management/engineering works are carried out.

3.2 Legal Issues

Convex safety mirrors are not considered traffic control devices and so do not require approval as a Major Traffic Control Device. However, the road authority may be legally liable for a negligence claim where a person has been injured through reliance on a convex mirror installed on a road under its care. To minimise the exposure to such a claim, the following three step process should be carried out:

1. Use documented road safety audit procedures to assess the road safety benefits relative to the risk of crashes in installing a convex mirror at a particular location,
2. Make a decision based on the assessment of the road safety benefits and the risk of crashes arising from the installation, and
3. Take all necessary steps to ensure safe and proper installation, operation, and use of the mirror.

All necessary precautions should be taken to securely install a convex mirror at the appropriate location and height to ensure safety of all road users (including pedestrians) and to prevent vandalism.

Under section 63 of the Road Management Act, a convex mirror may only be installed on a public road subject to any conditions stipulated in the written consent from the co-ordinating road authority.

Convex mirrors must be regularly inspected by the road authority to ensure that the mirror is adequately maintained, in a serviceable condition and is correctly aligned.

4 Detailed Requirements

Where property owners or developers believe that a convex mirror on the public road will assist safe access from concealed private driveways or private roads, they should approach the road authority for agreement/approval.

Convex mirrors should be installed by the road authority responsible for the care and control of the particular road.

To ensure safe installation and community acceptance, each convex mirror proposal on a public road should be in accordance with this traffic management note.

4.1 Criteria for Use

Convex mirrors are not for general use and should only be installed as a traffic safety device if there is a severe problem with sight distance and there are no other viable options available. They should only be considered where an intersection or driveway does not meet the requirements for 'Safer Intersection Sight Distance' (SISD) and 'Minimum Gap Sight Distance' (MGSD) as stated in the Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.

Convex mirrors should only be used in low-volume, low-speed road environments. The traffic being viewed in the mirror should have an 85th percentile speed of 60 km/h or less. The image of a vehicle travelling faster than this would be very small at the required sight distance.

Convex mirrors are typically where the lateral sight distance is poor at locations such as obscured T-junctions, concealed driveways, acute bends of a narrow road, such as hairpin bends in mountain passes, parking areas with acute exit driveways, or approaches to skewed railway level crossings.

Convex Mirrors for concealed entrance should only be considered as a last resort. Where there is a concealed entrance, the following treatment should be considered first:

- Relocation of the driveway or private access;
- Turning restrictions;
- Improvements to sight distance such as vegetation trimming;
- Bank/cutting soil removal;
- Alteration and/or relocation of property fencing;
- Shoulder acceleration or deceleration area;
- **CONCEALED ENTRANCE** signage.

4.2 Mirror Selection

Convex mirrors must be suitable for outdoor use. They should be durable, vandal resistant, and of weather proof material and construction. Acrylic, highly polished stainless steel or polycarbonate convex mirrors should be used. The highly polished stainless steel mirrors appear to offer greater resistance to vandalism and scratching than do glass or acrylic mirrors.

Although convex mirrors are readily available in a range of sizes, very few options of curvature radius appear to be available. Generally, with commercially available mirrors, the smaller the mirror size, the smaller the radius of curvature. For on-road use typical mirror diameters are 600mm, 800mm and 1000mm.

It is important to appreciate that the smaller the radius of curvature (ie. the greater the curvature) the greater the linear distortion. The greater the distortion, the smaller the image of the vehicle and the faster it appears to accelerate as it approaches. Small curvature radius mirrors will also provide vision of a broad area that may hamper the driver's ability to detect a vehicle in the mirror. Hence, a larger mirror with less distortion is preferred to a small mirror with more distortion.

4.3 Installation Details

Convex mirrors must be securely mounted to a pole, wall or other high point to deter vandalism and ensure road user safety. Appropriate signs must be included and these are detailed in the following section.

The convex mirror should be fitted with a visor at its top. This will reduce the accumulation of dust on the mirror surface. The fitting of a brightly coloured protective outer band (target board) will assist in improving the conspicuity of the mirror which could be of assistance to road users who are not regular visitors to the area.

The convex mirror should be installed at a location that provides the best view of the road and the oncoming vehicles concerned. It is also necessary to test for a variety of driver eye heights, e.g. car, truck, etc. Mirrors should be positioned such that the driver required to give-way can see the conflicting vehicle in approximately the centre of the mirror. It may be necessary to use two mirrors when one mirror does not give a complete view of the road scene. Consideration should also be given to potential problems resulting from headlight glare at night and the effect of glare from the sun, particularly at dawn and dusk.

4.4 Signage Required

The 'DISTORTED IMAGE' (P1-V141) sign must be installed below the mirror. An advance sign 'CONVEX MIRROR AHEAD' (P1-V140) may be required if the location of the convex mirror is not obvious. This sign would be used to warn road users of the presence of the convex mirror as they approach the intersection where it is located.



P1-V141



P1-V140

5 Funding

If as a result of works undertaken by VicRoads, within the last 10 years has resulted in sight distance below the requirements of Section 4.1 and other alternatives have been considered. VicRoads would fund the installation of a convex mirror. If there is reported vandalism of the convex mirror funded by VicRoads, a site inspection will be carried out to determine the appropriate maintenance.

On municipal roads, the relevant municipal council would fund the installation and maintenance. However if the minimum sight distance requirements have been met and the property owner insists on the installation of the convex mirror, then the property owner will be responsible for the cost of installation and the ongoing maintenance of the mirrors used for entering the road network from a private driveway or private road, regardless of who is responsible for managing the road.

6 References

Department of Planning, Transport and Infrastructure South Australia, Traffic Management Operational Instructions – Convex Traffic Mirrors – 2.3 (2010)

Transport and Main Roads Queensland, Traffic and Road Use Management Manual – Convex Mirrors (2012)

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Previous versions of this document are available on request by contacting the VicRoads – Network Standards team.

For enquiries regarding this supplement, please contact the VicRoads – Network Standards team via tem@roads.vic.gov.au or 9854 2417.