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Cycle Notes

No. 18 - October 2006

Providing a Smooth Surface for Cyclists

Welcome to CYCLE NOTES No. 18. The purpose of CYCLE NOTES is to provide information on the design of bicycle facilities for engineers and planners.

CYCLE NOTES should be read in conjunction with:

- AUSTROADS Guide to Traffic Engineering Practice, Part 14 – Bicycles.
- Australian Standard 1742.9, Manual of Uniform Traffic Control Devices, Part 9 Bicycle Facilities.
- VicRoads Traffic Engineering Manual Volumes 1 and 2.

Introduction

The purpose of this edition of Cycle Notes is to provide guidance on providing a smooth surface for cyclists.

Providing a smooth surface for cyclists is one of the five basic requirements for cyclists identified in Austroads Guide to Traffic Engineering Part 14 - Bicycles.

Smooth Surfaces are Critical for Cyclists

Surface imperfections such as potholes, pavement patches and cracks, depressed utility covers, drainage pits and grates, timber bridge decks and excessive debris can make cycling uncomfortable and unsafe.

In fact, cyclists have indicated that surface quality is twice as important as traffic volumes and the availability of bicycle facilities on their choice of route.

Figure 1 – Drainage grates with bars parallel to the direction of travel pose a serious risk to cyclists

Surface Quality

Most cyclists prefer to ride on asphalt or concrete surfaces that are free from cracks and potholes. On spray sealed surfaces, cyclists prefer an aggregate size of 10 mm or less and surfaces that have had minimal crack sealing undertaken.

Figure 2 – The groove to the left of this pit lid is in the travel line for cyclists and poses a serious risk

Utility Covers, Drainage Pits and Grates

It is common for asphalt to be built up around utility covers so that the cover is below the level of the road pavement. It is also common for drainage pits and lids to become cracked and broken and for drainage grates to be placed unecessarily in the path of cyclists.

The best way to eliminate these hazards is to ensure that:

(a) manholes are raised to match new surface levels when resheeting is undertaken; and

(b) new drainage pits are located behind the kerb and channel and away from the path of cyclists.

Manholes, Drainage Pits and Grates

Where possible, manholes and drainage pits should be located behind the kerb and channel and away from the path of cyclists.

In situations where the drainage pit is located under the pavement, it is important that the grate has perpendicular bars to the direction of travel as indicated in Figure 3. This design complies with VicRoads' standard as specified in SD1431 and SD1441.

Section 4.2.6.3 and Appendix D of Australian Standard AS 3996 – Metal Access Covers, Road Grates and Frames – 1992, outlines the requirements for testing grates for bicycle safety.

Figure 3 – Drainage grate with perpendicular bars in bicycle lane on La Trobe Street, Melbourne

Hydraulic Performance of Drainage Grates

Clearly, the purpose of drainage grates is to drain water from the kerb and channel into the storm water drainage system. Since the water is travelling parallel to the direction of travel, drainage grates with bars parallel to the direction of travel are likely to facilitate a higher flow rate than those with perpendicular bars.

As a result, a compromise needs to be achieved between the needs of cyclists for perpendicular bars and the need to drain storm water away from the road. Such a compromise can be achieved by increasing the distance between the perpendicular bars to achieve an appropriate flow rate at the same time as maintaining compliance with Appendix D of Australian Standard AS 3996. It can also be achieved by innovative designs such as parallel bars with weaving and "Vane" grates.

Parallel Bars with Weaving

Parallel bars with a weaving pattern offer a good compromise between hydraulic efficiency and bicycle safety.

Studies have shown that these types of grates comply with Appendix D of Australian Standard AS 3996 for bicycle safety when the distance between the return of the weaving section is 100 mm or less. These grates also provide a high flow rate for drainage purposes.

However, these types of grates are not favoured by some cyclists who ride road bikes with narrow, high pressure tyres. The performance of these grates could be improved for cyclists by installing the grates with the bars perpendicuar to the direction of travel.

Figure 4 – Parallel bars with weaving are often avoided by some cyclists

"Vane" Grates

As indicated in Figure 5, "Vane" Grates use bars that are perpendicular to the direction of travel at 100 mm spacings. This feature allows cyclists to travel over the grates and is likely to comply with Appendix D of Australian Standard AS 3996.

In addition, the perpendicular bars have been angled to increase the flow rate through the grate.

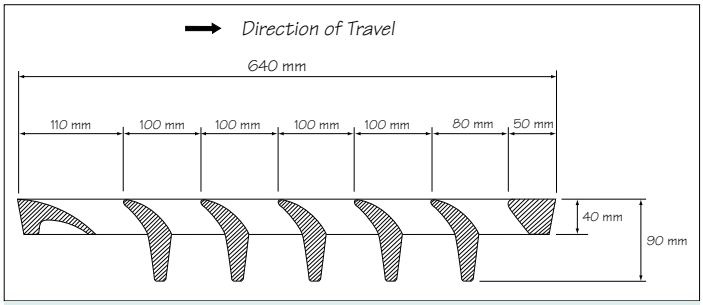

Figure 5 – "Vane" grates have bars perpendicular to the direction of travel and maximise flow rate

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