Operational Instruction

2.26

Warning Signs for Road and Environmental Conditions

Government of South Australia
Department for Infrastructure and Transport

Road and Marine Services Division

TRAFFIC MANAGEMENT
Operational Instructions

Warning Signs for Road & Environmental Conditions - 2.26

AMENDMENT RECORD

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5	Oct 2010		Draft status removed, approved for use
5	Nov 2012		Minor updates
5.1	Oct 2015		Gravel Roads sign added
6	June 2019		Maintenance signing added
7	Dec 2021	Sections 1, 2, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 4.2, 5; Appendix A	Maintenance condition signing, approval information added, format updates

This document has been prepared by the Traffic Engineering Section. It has been approved and authorised for use by Department for Infrastructure and Transport and its authorised agents by:

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DIT acknowledges the assistance of Victoria's Department of Transport in the development of Section 2 and Appendix A of this document.

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CONTENTS

1. Scope

This Operational Instruction is to be used in conjunction with Australian Standard *AS 1742.2 MUTCD Part 2: Traffic Control Devices for General Use* to describe general road and environmental conditions, which warrant the use of road surface and environmental condition warning signs. It aims to ensure that warning signs are installed on a consistent statewide basis.

The guidance in this document applies to roads under the care, control and management of the Commissioner of Highways. Councils may refer to this document for guidance on the use of these signs on their roads. The use of speed limits signs (R4-1 and G9-79 signs) require approval from DIT.

When used in accordance with this Operational Instruction, these signs (with the exception of R4-1 and G9-79 signs) may be installed by Councils on their roads under the Minister's *Instrument of General Approval and Delegation to Council* dated 22 August 2013. On DIT roads, these signs may be used under the *Instruments of Authorisation from the Commissioner of Highways* dated 10 March 2017. Traffic control devices which vary from this Operational Instruction require the separate approval of the Manager, Traffic Services for each location prior to installation.

The use of warning signs at road works (including warning signs and speed limits for new surfaces) is not discussed in this document but is described in the *SA Standards for Workzone Traffic Management*.

2. Maintenance Condition and Temporary Hazard Warning Signs

Sections of road may from time to time contain hazards that reduce the level of service for motorists. These hazards cannot be managed under normal routine maintenance, and include:

- significant potholes after wet weather
- shape loss
- significant and persistent roughness, especially that deteriorates with existing traffic loadings and/or wet weather between scheduled routine inspections
- significant slippery sections, e.g., visual flushing in high-speed zones (> 80 km/h)

Maintenance condition signing should not be considered as a final or long-term solution to a problem. Rather, corrective action should be programmed, and the sign should only be used as a warning to drivers until such time as remedial action is completed. To maintain credibility the signs shall be removed once the deficiency has been corrected.

Signage options may include warning signs, advisory speed signs and regulatory speed signs as discussed below.

The signs should be selected according to the following hierarchy:

1. Warning signs – to improve safety by advising road users of the road conditions. (Refer to Appendix A Figure 1)
2. Warning signs and speed advisory signs – to improve safety and advise of hazards that exist for road users in some conditions (Refer to Appendix A Figure 2 or 3)

3. Warning signs and regulatory speed signs – to improve safety and advise road users of hazards that affect all road users in all conditions. (Refer to Appendix A Figure 4)

In DIT, the appropriate use of these signs shall be determined by the Road Assets Section through a risk assessment process taking into account the following:

- Site safety inspection and assessment, including the extend of road to be signed
- Visual pavement condition inspection, including texture, polished aggregate, skid resistance, rutting undulations, crossfall and ponding
- Pavement condition compared to existing maintenance standards and intervention levels
- Crash history
- 85th percentile speeds
- Appropriate travel speed based on safety and vehicle occupant comfort, considering suspension bottoming, handling and passenger comfort

Signing a reduction in speed (either advisory or regulatory) would generally be recommended where the appropriate speed for traversing the deteriorated section is 15 km/h or more below the speed limit (or 85th percentile speed if actual speeds are likely to be above the posted speed limit). This is consistent with the approach in *AS 1742.2* for advisory speeds on curves.

Where advisory speeds or regulatory speed zone signage changes are being considered, this should be discussed with Manager Traffic Services.

2.1 Uneven Surface Sign

W5-43

The **UNEVEN SURFACE** (W5-43) sign should be used on sealed roads only to give warning to road users of an undulating stretch of road that is sufficiently uneven to cause considerable discomfort to vehicle occupants or to cause a shifting of the cargo while travelling at the posted speed limit.

This sign may be supplemented with a **Next** ___ **km** plate (W8-17-1). The use of the W8-17-1 sign is described in **Section 5.**

2.2 Rough Surface Sign

W5-SA117

The **ROUGH SURFACE** (W5-SA117) sign is used to warn road users that the pavement surface condition is in poor condition i.e., potholes, rutting etc.

2.3 Slippery Surface Sign

W5-20

The **SLIPPERY** surface (W5-20) sign is probably one of the most misused warning signs in this series. It should only be used to warn of where the road pavement surface may be slippery due to the low skid resistance, or where a significant water flow runs across the road or water pools on the road after rain and the risk is likely to contribute to the incidence of a crash.

Thus, a **SLIPPERY** surface sign shall only be used where the low skid resistance is at level P1 or P2 (refer to DIT's internal policy on skid resistance).

The location must also have clearly identified risk(s) and the risk(s) are likely to contribute to the incidence of a crash.

W8-7

At sites where water ponds on the road due to a lack of crossfall of the carriageway and drivers may lose control of their vehicles due to their vehicle aquaplaning across the road but the *skid resistance is satisfactory*, a **SLIPPERY** surface sign may be used with a **WHEN WET** (W8-7) supplementary plate.

If the road becomes slippery due to runoff from an adjoining private property or from an intersecting side road the sign may be used temporarily until the problem has been corrected.

Other supplementary plates that may be used with the **SLIPPERY** surface sign are contained in *AS 1742.2* (2009) clause 4.11.2.10.

On long sections of very slippery pavement consideration should be given to temporarily reducing the speed limit until the condition is rectified. Any change to speed limits must be discussed with and approved by Traffic Services.

Remember: *excessive, indiscriminate, or inconsistent use of any warning sign including* **SLIPPERY** *surface signs diminishes their effectiveness and credibility as a useful road safety device.*

This sign may also be supplemented with a **Next** ___ **km** plate (W8-17-1). The use of the W8-17-1 sign is described in **Section 5.** It should be repeated at intervals not exceeding 3 km.

2.4 Fuel Spill Sign

T3-3

After a fuel spill or similar spill, the temporary **SLIPPERY** (T3-3) sign should be installed until the spill has been cleaned.

Signs shall remain in place until the condition of the pavement, *under all likely weather conditions*, meets acceptable levels.

Note that this sign may be installed under the *Instrument of General Approval – Approval for the Temporary Use of Traffic Control Devices by Persons Other Than Road Authorities* dated August 2014.

2.5 Speed Signs

When using the option of a speed limit (R4-1) sign, it shall be supplemented with a Road Hazard (G9-SA114) sign. An advanced speed limit ahead (G9-79) sign may be used also if the speed limit drop is greater than or equal to 30 km/h.

R4-1

G9-SA114

G9-79

NOTE: When the pavement is replaced or rehabilitated to correct the defects, all sign/s shall be removed.

3. Road Condition Warning Signs

3.1 Gravel Road Signs

W5-19

The **GRAVEL ROAD** (W5-19) sign is to be used in accordance with *AS 1742.2 MUTCD Part 2: Traffic control devices for general use (2009)* clause 4.11.2.3 to give advance warning of a road surface change from a sealed road to a singular unsealed road.

W8-21

The **BOGGY WHEN WET** supplementary plate (W8-21) should only be used in conjunction with the (W5-19) gravel road sign where the boggy nature of the road surface would be unexpected i.e., it is normal to expect most unsealed roads to be boggy to some extent in wet conditions.

W5-SA73

The W5-SA73 sign is used only to give advanced warning of a change in road surface from a sealed road to a network of unsealed roads.

NOTE: Gravel roads may also be signed with an advisory 80 km/h maximum speed where appropriate, in accordance with *Operational Instruction 4.10 Maximum 80 km/h Advisory Sign on Unsealed Roads*.

3.2 Steep Descents

Steep descents shall be signed in accordance with *AS 1742.2 MUTCD Part 2: Traffic control devices for general use (2009)* clause 4.9.2.

For steep descents and long steep descents the R6-23 End Truck & Bus Low Gear Area in *AS 1742.2 (2009)* clause 4.9.2(b) is not recommended for use in South Australia. Rather, it is preferred that the R9-6-1 **Next** __**m** and the R9-7-1 **Next** __**km** should be used to define the extent of the area that the regulatory R6-22 Trucks & Buses Must Use Low Gear applies.

R6-22

R9-6-1

R9-SA105

If advance notice of the above sign (R6-22) is required, then the R7-SA100 can be used.

R7-SA100

For steep descents greater than 3 km additional advance warning shall be provided i.e., as installed on the South East Freeway. Steep descents longer than 3 km are rare and advice from the Manager, Traffic Services should be sought prior to installing any such advance warning signs.

4. Environmental Condition Warning Signs

4.1 Cross Wind Sign

W5-SA101

The purpose of this sign is to alert drivers to the possibility of high cross winds where they may be unexpected.

CROSS WIND signs (W5-SA101) are appropriate in isolated areas such as valleys, cuttings, and openings where strong intermittent winds or sudden gusts occur which can alter vehicle-handling capabilities. To enable road users to respond appropriately, the sign shall be supplemented with a **WINDSOCK** in the immediate vicinity.

Such devices provide drivers with an accurate guide to the strength and direction of the wind. Windsocks should be periodically checked and replaced when they become damaged, torn or tangled.

Signs should not be installed on relatively open roads where crosswinds occur over a long distance or where high crosswinds should be expected.

4.2 Water Hazard Sign

Water hazard signs are used to warn drivers of water hazards and hazardous road environments at water crossings in urban and rural areas. For remote areas reference should be made to *Operational Instruction 2.37 – Traffic Control Signs, Remote Area Unsealed Roads*. For other water hazard warning signs, refer to *AS 1742.2 (2009)* clause 4.10.

4.2.1 Creek & Creeks

W5-SA109

W5-SA110

CREEK sign (W5-SA109) and **CREEKS** sign (W5-SA110) shall be used in advance of locations to indicate that the road is trafficable with care through a creek or creeks. Such situations should only occur on unsealed roads across natural creek beds (i.e., those not constructed as part of a road).

Where a number of creeks occur across a road in close proximity (≤ 2 km apart) it may be appropriate to use the CREEKS sign (W5-SA110) supplemented with a **Next** ___ **km** sign (W8-17-1). The use of the W8-17-1 sign is described in **Section 5.** It should be repeated at intervals of 3 to 5 km. If creek crossings are greater than 2 km apart, the CREEK signs (W5-SA109) should be used at each crossing.

5. NEXT__km Supplementary Plate

W8-17-1

The **NEXT___km** supplementary plate (W8-17-1) should be used in conjunction with road and environmental conditions greater than or equal to 1 km. Only whole numbers of kilometres shall be shown.

Where it is used on a length of road subject to a series of discrete hazards (eg **CREEKS**) in close proximity (≤ 2 km apart), it should be repeated at intervals of 3 to 5 km. If each hazard location is greater than 2 km apart, consider signing each hazard location separately, or providing increased frequency of repeater signs.

Where the **NEXT__km** sign is used on a length of road subject to a continuous hazard, or a series of longer sections of the same hazard (eg **ROUGH SURFACE, UNEVEN SURFACE**), it should be repeated at intervals of 3 to 5 km. If there are gaps between sections of this hazardous condition of greater than 2 km, consider signing each section separately, or providing increased frequency of repeater signs.

Appendix A – Placement of maintenance condition warning signs

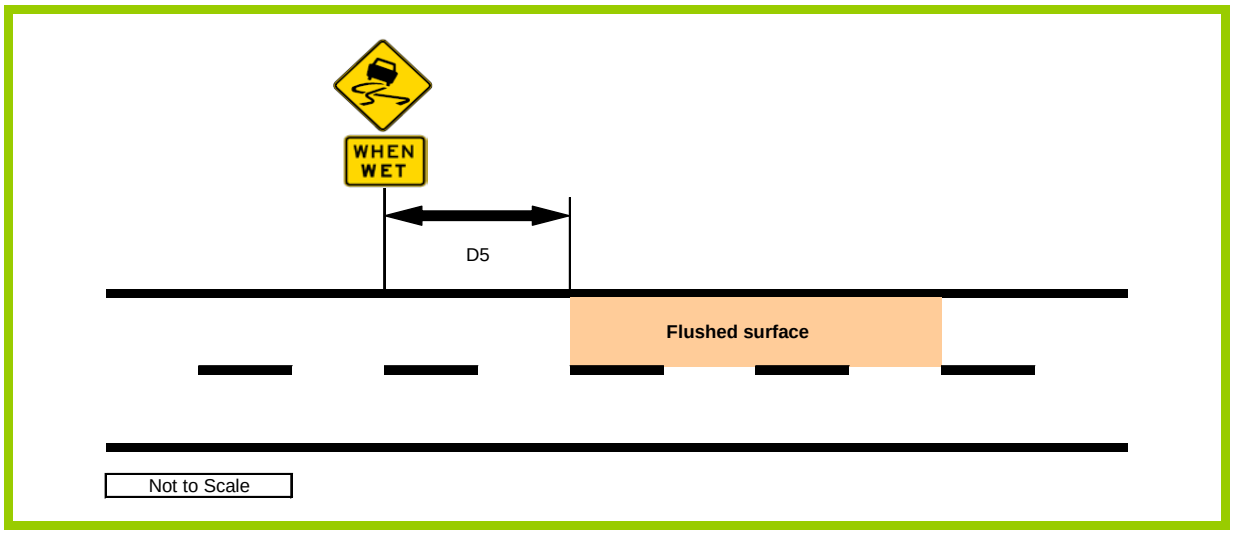

Figure 1: Short site (< 1 km) without an advisory or regulatory speed restriction.

NOTE: Refer Section 5 for use of "Next __ km" sign for longer sites. Refer Table 1 for D5.

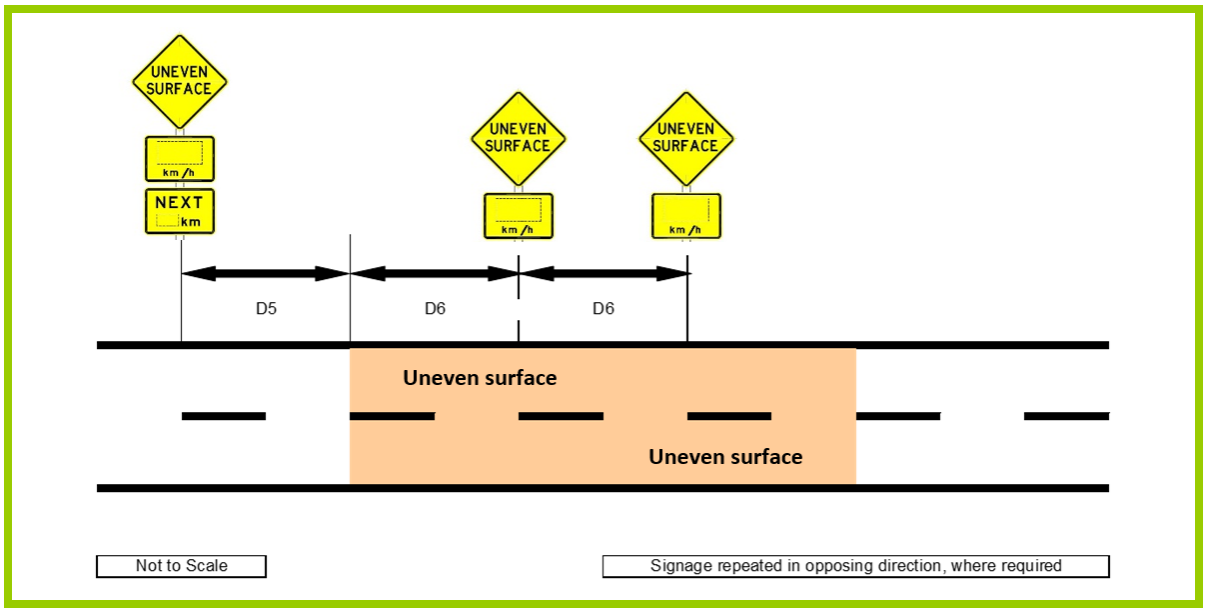

Figure 2: Long site (≥ 1 km) with an advisory speed

NOTE: The above shows a warning sign and speed advisory sign used to enhance safety for an uneven surface site. The speed advisory should be chosen based on the condition of the site. Refer Table 1 for D5 and D6. Refer TES 19152 for sign combination shown here (W5-43, W8-2 and W9-17-1)

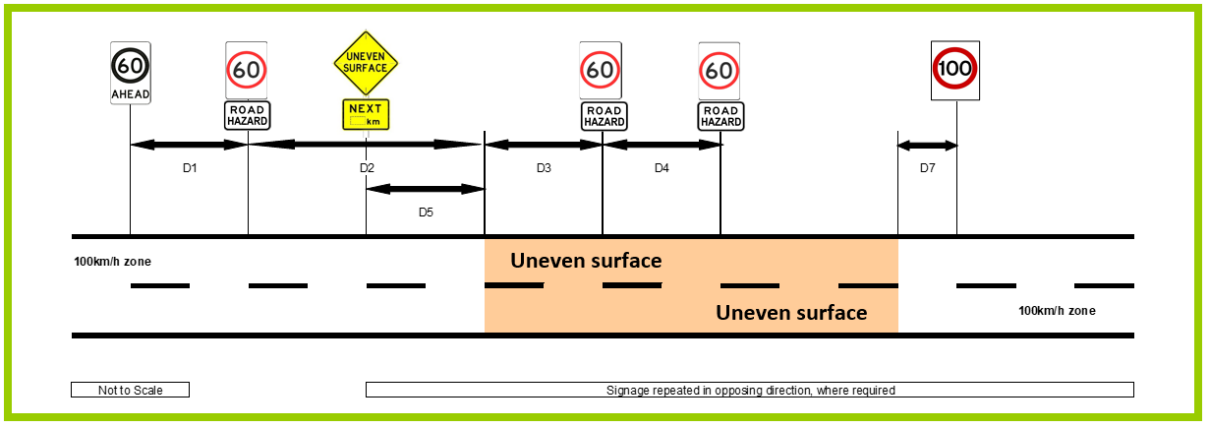

Figure 3: Long site in 100km/h zone with a lowered speed limit

NOTE: The above shows a 60 km/h zone used to enhance safety for an uneven surface site. The speed zone should be chosen based on the condition of the site and considering the road/section environment. Refer Table 1 for distances.

Posted Speed Limit	Temp Speed Limit	Minimum length for speed reduction	Buffer sign (G9-79) 	Distance between Buffer sign & R4-1 sign [1]	Speed limit sign (R4-1) 	Distance Between R4-1 sign & start of hazard site [2]	Repeater R4-1 Sign 			Warning signs 		Return to Speed Sign
							Speed	Distance from start of hazard site	Repeater sign(s) distance [3]	Distance between warning sign & start of hazard site	Repeater warning sign(s) distance (when used with advisory speed) [3]	
(km/h)	(km/h)	(m)		D1 (m)	(km/h)	D2 (m)	(km/h)	D3 (m)	D4 (m)	D5 (m)	D6 (m)	D7 (m)
60	-	-	-	-	-	-	-	-	-	60-80	N/A if length of hazard is less than 500 m Repeater sign at midpoint if length of hazard is greater than 500 m and less than 1 km 500 m repeater distance if length of hazard is greater than 1 km	-
70	50	400	-	-	50	140	50	150	500	60-80		50
80	60	400	-	-	60	160	60	300	500	80-120		50
90	80	400	-	-	80	180	80	300	500	80-120		50
90	60	400	60 AHEAD	180	60	180	60	300	500	80-120		50
100	80	400	-	-	80	200	80	300	500	120-180		50
100	60	400	60 AHEAD	300	60	200	60	300	500	120-180		50
110	80	400	80 AHEAD	220	80	220	80	300	500	120-180		50
110	60	400	60 AHEAD	300	60	220	60	300	500	120-180		50

Table 1 – Sign positions for warnings signs in conjunction with regulatory or advisory speed signs

NOTES

1) Positioning of AHEAD signs (D1) determined in accordance with *AS 1742.4* (2020) Section 3.1.3(c) for reduction of greater than 30 km/h. For reduction of 30 km/h, the AHEAD sign location is determined based on the guidance in Austroads *Guide to Temporary Traffic Management Part 3: Static Worksites* (2021) Section 5.5.1 Temporary Speed Limits i.e., double the distance of the speed in advance of the R4-1 sign.

2) Positioning of first R4-1 sign (D2) determined to provide a minimum of 0.6V to the condition warning sign.

3) Where a side road intersects the signed section (of the main road), additional warning & speed signs should be placed near the intersection. Repeater sign spacing is based on the guidance in Austroads *Guide to Temporary Traffic Management Part 3: Static Worksites* (2021) Section 5.5.1 Temporary Speed Limits.