Operational Instruction

20.26

Use of VSS and LUMS on Managed Roads

Government of South Australia
Department of Planning, Transport and Infrastructure

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ROAD MAINTENANCE & OPERATION
Operational Instructions

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AMENDMENT RECORD

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1	All	27/08/14	Draft (Prep by Chris Town)	CT
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1.1	All	08/07/19	Minor updates	CT
2	All	03/06/20	Revision of buffer definition, use of VSS and LUMS during planned roadworks, requirement to completely cover all regulatory signs clarified, requirement to consult with TMC about use of VSS and LUMS to supplement static roadworks signs clarified, references to guidance in AS 1742.3(2009) updated, TES 18923(c) and additional details on use provided.	IH

This document has been prepared by Traffic Services. It has been approved and authorised for use by Department of Planning, Transport and Infrastructure and its authorised agents by:

Manager, Traffic Services
28 / 05 / 2020

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CONTENTS

1. Scope

The purpose of this document is to describe the use of permanent Variable Speed Limit Signs and Lane Use Management Signs (VSS/LUMS) on DPTI roads for times during:

1) communications and/or power failure to ITS equipment,
2) planned maintenance work (Roadworks),
3) when emergency works are undertaken,
4) special events

Temporary VSS (i.e trailer mounted) used at construction zones do not apply to practices in this document.

2. Definitions/Acronyms

2.1 Acronyms

ITS Intelligent Transport System

LUMS Lane use management sign

TGS Traffic Guidance Scheme

TMC DPTI's Traffic Management Centre

TMP Traffic Management Plan

VSS Variable speed limit sign

LUMS Variable speed limit sign and lane use management sign (integrated)

2.2 Term Definitions

Buffer

A speed zone of minimal length and intermediate value, to reduce vehicle speeds in advance of the work site. Refer to *SA Standards for Workzone Traffic Management* section 6.2.3.

Critical fault

A critical fault of the VSS or LUMS is a fault that may cause an unsafe situation for road users or for onsite personnel.

Default Speed Limit

In case of failure of the variable speed limit system, it is necessary to specify a speed limit for motorists for normal travel. This is called the default speed limit and will be set to normal posted speed limit (had the road been a static speed zone.)

Non critical fault

A non critical fault of the VSS or LUMS is a fault that does not affect the safety of road users or of the work site. A non critical fault might be when a small number of LEDs fail.

TGS

An arrangement of temporary signs and devices to warn and guide road users through or past a work area or temporary hazard.

TMP

A detailed TGS that is prepared by following a risk based procedure that considers all essential traffic management matters in an ordered way.

Truck and Bus Restriction Zone

A section of road that restricts trucks and buses to a lower speed limit and the use of a specific lane/s only ie Princes Hwy (South Eastern Freeway).

3. Background

In recent years the department has been implementing ITS to manage roads in South Australia and there is growing need to standardise the use of VSS and LUMS. Lower speed limit zones are applied on a Freeway, Expressway or Motorway to allow a reduction in the posted speed limit at times when road safety and performance are compromised. In the past, communication and/or power failure of ITS, roadworks or planned events on these types of roads, that have required lower speed limits, have been implemented by the use of static signs. Currently, the use of VSS or LUMS is used during times of congestion, incidents, inclement weather to increase efficiency and safety.

There are two types of variable speed limit configurations: LUMS are integrated into a single set of signs as shown in Figure 1, and stand alone sided mounted VSS as shown in Figure 2.

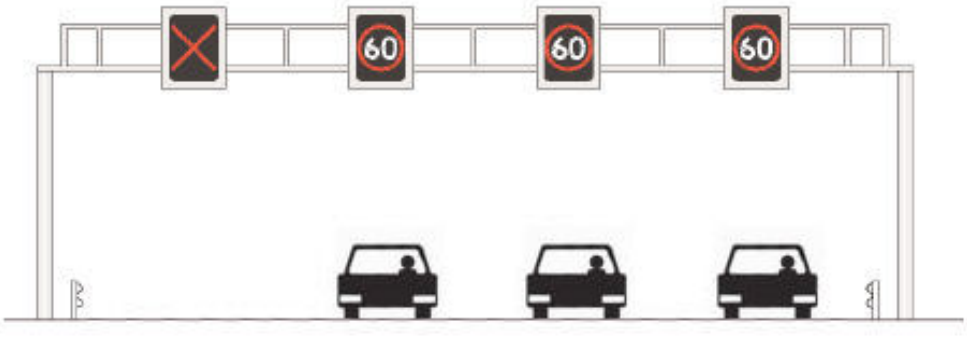


Figure 1 LUMS integrated into single set of signs

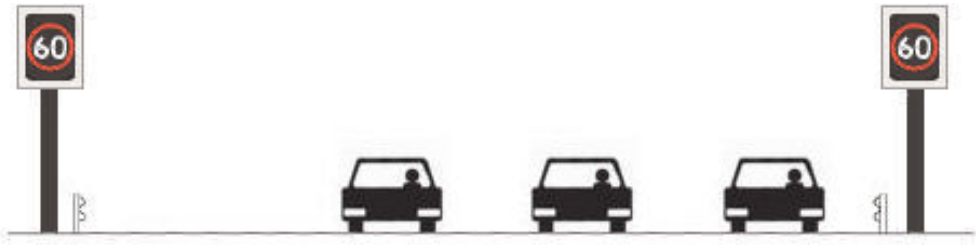


Figure 2 Standalone side mounted VSS

The above signs are connected to a central software control system (STREAMS or similar) which allows operators to manage the operation of the signs in accordance with the standards and other principles.

It should be noted that the spacing of signs along the mainline will vary according to the location of entrance and exit ramps, but should be typically spaced at 500 m apart in accordance with VicRoads *Manual for Managed Freeways* (existing spacings may be considerably higher in earlier SA installations)

Default static speed limit signs R4-1 are installed at entrance points to a variable speed limit zone and at changes of the default speed limit along the mainline carriageway.

4. The operation of VSS and LUMS:

4.1 When a failure occurs

Power Failure – Critical Fault

If a single electronic sign in an array (on a pole or gantry) fails or is blank, then all other signs in the array shall be blanked out.

Communications Failure - Non-Critical fault

When communication is interrupted to one or more electronic signs the last message displayed on the sign may be left on as a static display. Consideration can be given to blanking out all signs if the road situation changes.

Refer Appendix A General principles for the use of VSS or LUMS.

4.2 During planned roadworks

Issues

- The practice of using VSS for a buffer speed zone has resulted in falsely extending the length of the work site speed zones to the nearest upstream VSS, which is not in accordance with the Commissioner's authorisation regarding roadworks, or the *SA Standards for Workzone Traffic Management*, or the Workzone Traffic Management accreditation training.
- Workzones often require 25 km/h speed limits but some VSS cannot display a limit lower than 40 km/h.

During planned roadworks, the work site MUST display all of the temporary static roadwork speed limits and other signs in the normal manner.

Planning will comprise a fully documented TMP in accordance with *SA Standards for Workzone Traffic Management*. It is the responsibility of the permit requestor to develop and own this TMP.

The use of VSS or LUMS to advise drivers of lane closures and associated reduced speed limits ahead on the motorway involves detailed planning and liaison with TMC due to the complex traffic arrangements.

Flashing VSS or LUMS can be used to display a lower limit during setup of static work site signing.

Once signing for the work site is in place VSS and LUMS shall be blanked and traffic management of the work site will be based on static signs under the control of the Workzone Traffic Management provider. VSS or LUMS may be used to provide supplementary information where this has been discussed and planned with the TMC and included in the TMP.

Refer Appendix A General principles for the use of VSS or LUMS.

Static speed limit signs must be located in accordance with the requirements of the *SA Standards for Workzone Traffic Management*. It is advisable that static signs are not located within 50 m of a VSS or LUMS location to avoid potential conflict between the two signs.

Where VSS or LUMS located within the work site are supplemented with the "When Sign Above is Blank" TES 18371 sign, this sign must be completely covered.

TES 18371

Where planned roadworks occur within the truck and bus restriction zones on the South Eastern Freeway, refer to Appendix B for the static signing requirements for the lane allocation and speed restrictions for trucks and buses at the end of the roadworks. If a speed limit of 25 km/h is used within the truck and bus restriction zone then the permanent speed limit signs for trucks and buses must be completely covered.

4.3 For emergency works

When emergency works are likely to be carried out in less than 20 minutes then VSS or LUMS can be used as an interim measure to warn motorists of the hazard ahead.

If the emergency works are likely to take longer, then static signs shall be used to set out the worksite, in conjunction with the VSS or LUMS.

Refer Appendix A General principles for the use of VSS or LUMS.

4.4 For planned events (Non roadworks)

Detailed planning for the work must commence well in advance of the event to allow discussion with the TMC to allow for any refinements to the event organiser's submitted traffic management plan. This will ensure traffic operations are safe and efficient and will allow sufficient time for any system changes to be implemented by the TMC in an orderly manner.

The Manager TMC or a delegate endorses the proposed traffic control methodology for the lane closures using the VSS or LUMS. This approval includes assessment of the impacts of the event/works on traffic flows and the integration of the VSS or LUMS into the traffic management plans.

Where a planned event e.g. major international bike race, is proposed to be allowed along a motorway where VSS or LUMS are installed, the above procedures in this guideline are to be followed.

However, there are a number of additional principles to be considered during the preparation of the traffic management and LUMS plans. These are:

i. Such an event would be considered as a mobile, or continually moving, event across all lanes of the motorway. Occupation of the sections of motorway should be limited to a short duration to minimize impacts on traffic using the motorway.

ii. A very high degree of safety security would need to be provided e.g. Police vehicles before and after the bike pack.

iii. On-ramps would need to be closed (using police control) on a continually moving basis to limit impacts on general traffic.

iv. All lanes should remain open and must be subject to the same speed e.g. 60 km/hr.

v. Preparation and approval of traffic management and LUMS plans needs to be in accordance with this guideline.

vi. Preliminary approval of the proposed event by Police, local government, TMC, emergency services etc

vii. Final approval would be given only after all conditions by the agencies in Item (vi) above have been met.

Refer Appendix A General principles for the use of VSS or LUMS.

Appendix A General Principles for the use of VSS or LUMS

Principle 1: Normal traffic control devices are required

All traffic management and control devices normally associated with work sites are required. This includes devices such as truck mounted attenuators, delineation and static signage.

Principle 2: Static speed limit signs are required at the work site

All planned work site speed limits must use static signs.

Principle 3: Variable speed limit signs within the work area

If, following planning and liaison with the TMC, VSS or LUMS within the work site are used, they should be set to the static speed limit signs displayed in the work site.

Principle 4 Entrance ramps

Where VSS or LUMS are installed on the entrance ramps, the variable speed limit on the entrance ramp should be the same as that on the mainline on approach to the entrance ramp merge. This will ensure that vehicles merge at the same speed. If no VSS or LUMS are installed on the entrance ramps, static signs should be used.

Principle 5 Exit ramps

If an exit ramp falls within the workzone then a static return to speed limit sign must be installed on the exit ramp.

Principle 6 Side mounted variable speed limit sign

Side mounted VSS (i.e. without LUMS) along the mainline are used in a similar manner to LUMS.

Principle 7 Flashing Annulus on variable speed limit signs

When reduced speed limits are in use, the red annulus rings can flash, however the most outer ring shall be static.

Principle 8: Static speed limit sign at the end of the worksite

Static speed limit signs (R4-1 type) are to be placed at the end of the work site to indicate the speed limit beyond the end of the work site and until the next variable speed limit signs are passed. The END ROADWORK (T2-16 or T2-17) sign is used together with the static speed limit sign.

Principle 9: Lane closure using LUMS

Lane closures shall not be implemented on the integrated LUMS until the speed limits have been reduced for the temporary road works

Principle 10: Merging white arrows and red crosses

A diagonally downwards white arrow (left or right) is used to indicate that the lane ahead is closed and traffic should look to merge into the adjacent lane. Normally, the diagonally downwards white arrow is followed by a continuous red cross at the next gantry.

Principle 11: Exiting White arrows

A diagonally upwards white arrow (left or right) indicates that traffic in the applicable lane must exit at the next exit ramp.

Principle 12: Speed limits in conjunction with lane control

At the introduction of lane control signs (diagonally downwards & upwards white arrow), the speed limit shall be reduced to 80 km/h (maximum). This reduced speed limit should assist merging.

Where it is necessary to close two lanes with a separation between the taper for each lane closure, a similar staggered warning shall be provided to drivers on the LUMS.

At no time shall diagonally downwards white arrow be displayed in adjacent lanes, except where a parallel lane type merge is closed adjacent to a closed main motorway traffic lane.

Principle 13: Low flow conditions

In low flow conditions, extra lanes may be closed to provide sufficient space for worker safety and the method of work. This may increase lateral clearance and allow a higher workzone speed, reducing delays to drivers. This should be done in accordance with Table 5.6 and Section 5.9 of Austroads *Guide to Temporary Traffic Management Part 3: Static Worksites*. However, the available trafficable lanes must be able to service the traffic capacity.

Principle 14: Variable message signs

Where available, permanent variable message signs could be used to display a message about the roadwork e.g. ROADWORK AHEAD/REDUCE SPEED; LEFT LANE CLOSED/MERGE RIGHT.

Appendix B Truck and Bus Restriction Zone signing

With the introduction of lane allocation and speed restrictions for trucks and buses on the South Eastern Freeway, there are some specific sign requirements for roadworks located within this section.

If a speed limit of 25 km/h is used within the truck and bus restriction zone then the permanent speed limit signs for trucks and buses must be completely covered.

The following multi-message signs have been designed to be used on the down track of the South Eastern Freeway for when the end of the roadworks is located between the start of the truck and bus restriction zone (just before the Crafers pedestrian overpass / footbridge) and at the end of the truck and bus restriction zone (permanent static 60 sign for all vehicles at the bottom of the Freeway).

TES 18923 consists of 3 panels; 60 speed limit, “Use left lane”, “All trucks and buses”. When the end of the roadworks fall within this truck and bus restriction zone, this sign must be displayed within 15 m of the end of the roadworks where the standard default static return to speed sign is used.

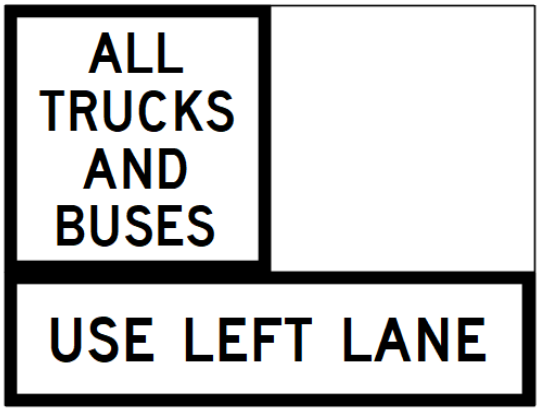
DPTI have a set of signs that can be accessed from the stone hut at Hillcrest Avenue, Crafers on the E-W carriageway of the South Eastern Freeway. Once a work permit has been approved, arrangements can be made with the TMC for the collection and return of keys for access to the hut.

When a lower speed limit of 25 km/h is used within the truck and bus restriction zone, then the permanent speed limit signs for trucks must be completely covered.

There are only three scenarios for the use of this sign combination:

Scenario 1

When the roadworks end between the start of the “Trucks and Buses Must Use Left Lane” restriction and the start of the “60 km/h All Trucks and Buses” restriction immediately prior to the Crafers Overpass bridge (refer Figure B1), use TES 18923(c):



TES 18923(c)

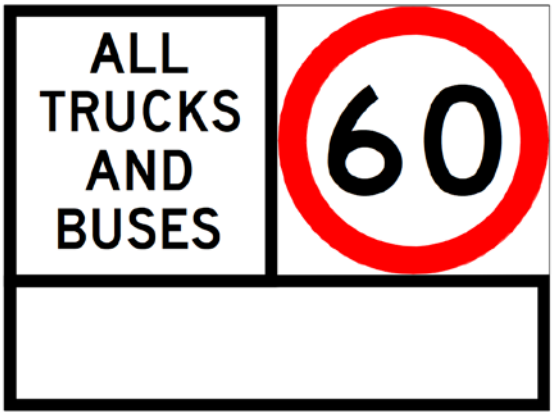
Scenario 2

When the roadworks end between the start of the "60 km/h All Trucks and Buses" restriction immediately prior to the Crafers Overpass bridge and the "END All Trucks and Buses Use Left Lane" restriction just prior the Measday exit ramp (refer Figures B1 and B2), use TES 18923(a):

TES 18923(a)

Scenario 3

When the roadworks end between the "END All Trucks and Buses Use Left Lane" restriction just prior to Measday exit ramp (refer Figure B2) and the end of the Trucks and Buses 60 km/h speed restriction, ie the permanent static 60 km/h speed sign for all vehicles at the bottom of the Freeway, use TES 18923(b):



TES 18923(b)

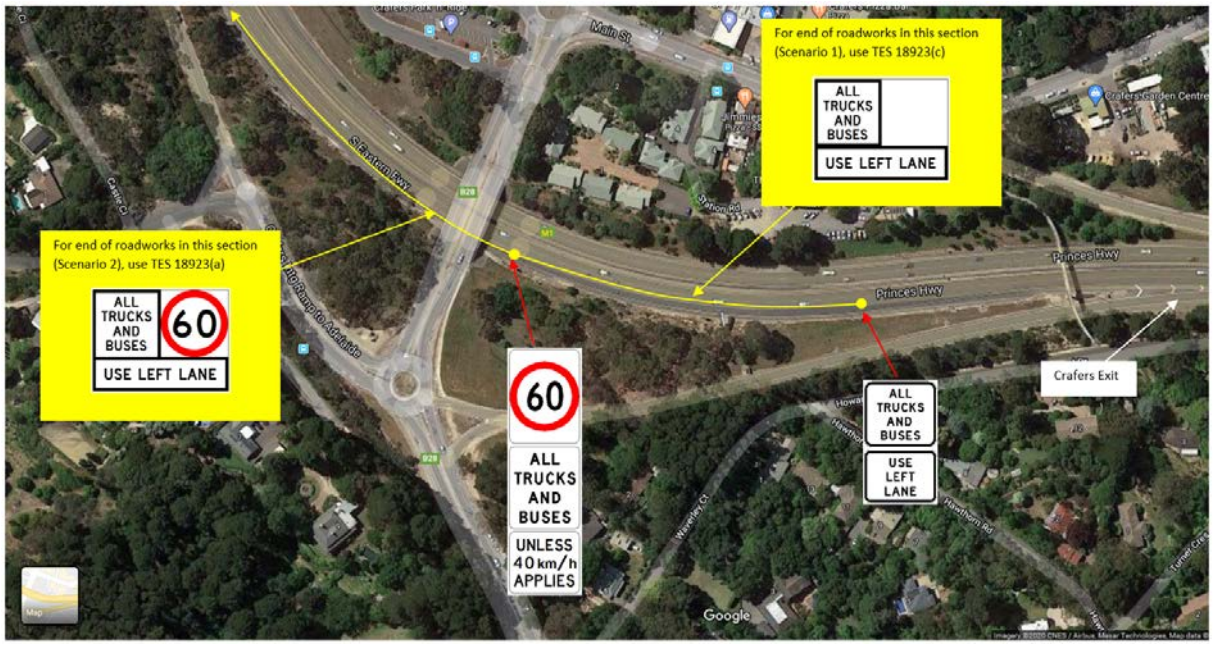


Figure B1: Use of TES 18923(a) or TES 18923 (c)

Figure B2: Use of TES 18923 (a) or TES 18923 (b)