Operational Instruction

Use of VSS and LUMS on Managed Roads
AMENDMENT RECORD

<table>
<thead>
<tr>
<th>Version</th>
<th>Page(s)</th>
<th>Date</th>
<th>Amendment Description</th>
<th>Init</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All</td>
<td>27/08/14</td>
<td>Draft (Prep by Chris Town)</td>
<td>CT</td>
</tr>
<tr>
<td>1</td>
<td>All</td>
<td>27/10/14</td>
<td>Approved (draft removed)</td>
<td>DBW</td>
</tr>
<tr>
<td>1.1</td>
<td>All</td>
<td>08/07/19</td>
<td>Minor updates</td>
<td>CT</td>
</tr>
</tbody>
</table>

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 / 06 / 2019

Excerpts may be reproduced providing the subject is kept in context and the source is acknowledged. Every effort has been made to supply complete and accurate information. This document is subject to continual revision and may change.

For information regarding the interpretation of this document please contact:
Traffic Management Centre
Telephone: 1800 31313

For additional copies or to confirm the current status of this document please contact:
Email: dpti.tassadminsupport@sa.gov.au
CONTENTS

1. Scope/Introduction .................................................................1
2. Definitions/Acronyms .............................................................1
3. Background.............................................................................2
4. The operation of VSS and LUMS when: ....................................3
   4.1 A failure occurs .................................................................3
   4.2 During planned roadworks ..................................................3
       4.2.1 Planned roadworks in Truck & Bus Zones .........................4
   4.3 For emergency works ........................................................5
   4.4 For planned events (Non Roadworks) ....................................5

Appendix A  General Principles for the use of VSS or LUMS ...............6
Appendix B  Truck & Bus Zone signing requirements ........................8
1. Scope/Introduction

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

Acronym

ITS Intelligent Transport System
LUMS Lane use management sign
TGS Traffic Guidance Scheme
TMC Traffic Management Centre
TMP Traffic Management Plan
VSS Variable speed limit sign
LUMS Variable speed limit sign and lane use management sign (integrated)

Term Definition

Buffer
A speed zone, of minimal length, and intermediate value between two speed limits that differ by no more than 59 km/h. For example, an 80km/h buffer zone would generally be used as a transition between speed limits of 110/100 km/h and 40 km/h, or 60 km/h between speed limits of 90 km/h and 25 km/h.

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 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 (S.E. Freeway) applies.

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
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 500m 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 when:

4.1 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 current practice of using VSS for a buffer speed zone, has resulted in falsely extending the length of the worksite speed zones to the nearest upstream VSS which is not in accordance with the Commissioner’s authorisation regarding road works, 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.
The worksite MUST display all of the temporary static roadwork speed limits and other signs in the normal manner with the VSS or LUMS considered as supplementary information only.

![Figure 3 Example of static signs with VSS](image)

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.

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.

If the first temporary static lower speed limit sign (ie 80 km/h buffer) placement falls in the order of 150 m past a VSS or LUMS location then the static sign can be extended out to that location where the VSS can be used to display the same speed limit.

Where a VSS cannot display a speed limit of 25 km/h then it shall be left blank within the 25 km/h zone.

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

### 4.2.1 Planned roadworks in Truck & Bus Zones

Refer to Appendix B for the static signing requirements for the lane allocation and speed restrictions for trucks and buses on the South Eastern Expressway.

*Note:*

If a lower speed limit of 40 km/h or 25 km/h is used by either static signs or VSS then the permanent speed limit signs for trucks and buses must be 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 DPTI's TMC to allow for any refinements to the event organisers 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 would need to remain open and be subject to the same speed e.g. 60km/hr.

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

vi. Preliminary approval of the proposed event by Police, local government, Department of Transport, Fire and Ambulance services etc

vii. Final approval would be given only after all conditions by the agencies in Item (vii) 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 worksites are to remain. This includes devices such as truck mounted attenuators, delineation and static signage.

Principle 2: Static speed limit signs are required at the worksite
All planned worksite speed limits must use static signs. In the instance that the electronic signs fail, the static lower speed limits will be displayed.

Principle 3: Variable speed limit signs within the work area
All VSS within the worksite should be set to the static speed limit signs displayed in the worksite.

Principle 4 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.

Principle 5 Exit ramps
If an exit ramp falls within the work zone 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 worksite to indicate the speed limit beyond the end of the worksite and until the next variable speed limit signs are passed. The END ROADWORK (T2-16) 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 80km/hr (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 work zone speed, reducing delays to drivers. This should be done in accordance with Table 4.6 and Section 4.8 of Australian Standards AS 1742.3. 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 road work e.g. ROADWORK AHEAD/REDUCE SPEED; LEFT LANE CLOSED/MERGE RIGHT.
Appendix B  Truck & Bus Zone signing requirements

With the introduction of lane allocation and speed restrictions for heavy vehicles and buses on the SE freeway, the following multi-message sign has been designed to be used on the down track of the SE freeway for when road works are undertaken between the start of the truck & bus restriction zone (just prior to the Crafers exit ramp) and at the end of the truck 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 for all trucks and buses. When the end of the roadwork falls within this truck & bus restriction zone, this sign must be displayed within 15m of the end of the roadworks where the standard default static return to speed sign is used or if appropriate the fixed VSS sign.

DPTI have a set of signs that can be accessed from two hut locations at Crafers and Stirling on the E-W side of the SE Freeway. Once a work permit has been approved, arrangements can be made with Metro Region’s Traffic Management Centre for the pickup and return of keys for access to the huts.

When a lower speed limit of 40 or 25 is use by either static signs or VSS within the truck & bus Zone, then the permanent speed limit signs for trucks must be covered up.

There are only two options for the use of this sign combination:

Option 1
When the roadwork ends between the start of the truck restriction zone (just prior to the Crafers exit ramp) and the END of the ‘USE LEFT LANE’ for trucks and Buses (just prior to Measday exit ramp).
Option 2

When the roadwork ends between the END of the ‘USE LEFT LANE’ for trucks and Buses (just prior to Measday exit ramp) and at the end of the truck restriction speed limit (permanent static 60 sign for all vehicles at the bottom of the Freeway).

TES 18923(b)