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# **Smart Freeways Supplement to Victoria's Managed Freeways Handbook for Lane Use Management and Variable Speed Limits**

9/10/2020

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# **Smart Freeways**

## **Supplement to Victoria's Managed Freeways Handbook for Lane Use Management and Variable Speed Limits**

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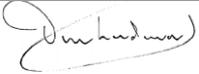
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# Smart Freeways

## Supplement to Victoria's Managed Freeways Handbook for Lane Use Management and Variable Speed Limits

### Document control

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### Revision

Issue Date	Description	Section / Page No.
<b>July 2020</b>	Smart Freeways: Supplement to Victoria's Managed Freeways Handbook for Lane Use Management and Variable Speed Limits. Initial release	All
<b>March 2021</b>	Title changed for VMS guidelines	Foreword
<b>Aug 2023</b>	Updated note on sign MR-RS-24 in Chapter 2, Table 2: Static signs associated with Main Roads' LUMS designs	Chapter 2, Pg 6

# Foreword

## Smart Freeways policy and guidelines

Main Roads Western Australia (Main Roads) has established a Smart Freeways policy and series of guidelines to guide overall planning, project development, delivery and ongoing operation of Smart Freeways in Western Australia.

The Smart Freeways documents were originally developed as part of the Managed Freeways Policy Framework in 2012. At that time Main Roads used the term 'Managed Freeways', which has now changed to 'Smart Freeways' with the implementation of the first Smart Freeways project on Kwinana Freeway northbound in 2019/20. The 2020 updated documents supersede the previous Managed Freeways documents.

While historically, the consideration of ITS on freeways was typically on a case-by-case basis, the current Main Roads' approach as outlined in the Smart Freeways Policy is that all freeways shall be considered for ITS provision at either foundation or higher order standard according to the Smart Freeways Provision Guidelines.

The Main Roads' Smart Freeways policy and guidelines providing direction and guidance include the documents listed in the table below. This document, Smart Freeways Supplement to Victoria's Managed Freeways Handbook for Lane Use Management and Variable Speed Limits is shown highlighted.

Document	Description
Smart Freeways Policy	One page high-level policy statement setting out Smart Freeways objectives and principles.
Smart Freeways Policy Framework Outline	Smart Freeways context, principles, corporate governance, processes and intended outcomes to achieve policy objectives.
Smart Freeways Provision Guidelines	Guidelines and warrants for application of Smart Freeways traffic management treatments and ITS devices.
Smart Freeways Operational Efficiency Audit Guidelines	Guidelines for formal examination of traffic analysis and design of all freeway projects.
Guidelines for Variable Message Signs	Guidelines for the design and use of variable message signs for traveller information for safe and efficient travel for road users.
Supplement to Victoria’s Managed Motorway Design Guide, Volume 2: Design Practice, Parts 2 and 3	Main Roads’ Supplement relating to: <ul style="list-style-type: none"> <li>• Network optimisation tools (benefits and operation of coordinated ramp signals).</li> <li>• Planning and design for mainline, entry ramps (including ramp signals), exit ramps and interchanges.</li> </ul>
Supplement to Victoria’s Managed Freeways Handbook for Lane Use Management and Variable Speed Limits	Main Roads’ Supplement relating to: <ul style="list-style-type: none"> <li>• Lane use management system (LUMS).</li> <li>• Variable speed limits (VSL).</li> </ul>

### Smart Freeways concept

Smart Freeways make the best use of the existing freeway network, particularly during times of high demand and traffic incidents. We use ITS technologies and operational strategies that enable dynamic network management and operation in real-time. Smart Freeways traffic management initiatives, complemented by appropriate mainline and ramp geometric improvements, work together as an integrated system to achieve and maintain optimal freeway traffic conditions, with minimal delays and congestion.

Over recent years, Victoria’s approach to managed motorways in Melbourne has achieved unparalleled, sustainable benefits to freeway operations for safety, productivity, efficiency and reliability. We have applied the same holistic principles and learnings, while also working towards national consistency.

## Supplements to Victoria's Managed Motorways Design Guides

Main Roads has been authorised by the Victorian Department of Transport in Victoria to use VicRoads Managed Freeways Handbook for: Lane Use Management, Variable Speed Limits and Traveller Information, as a primary reference for Smart Freeway design relating to lane use, incident management and variable speed limits for managing incidents and other events such as roadworks and periods of either recurrent or non-recurrent congestion. This document focusses on lane use management and variable speed limits. For information relating to traveller information, Main Roads' Smart Freeways Variable Message Signs Guidelines shall be the primary reference.

The traffic management tools and design principles in this handbook assist in improving safety, traffic operation and keeping motorists informed about incidents and travelling conditions. The tools combine with access control using coordinated freeway ramp signals to manage freeway flow and achieve high levels of safety, efficiency and reliability.

Accordingly, this Supplement has been developed to be read in conjunction with the Victoria's design guides. Victoria's handbook and design guides can be obtained via the VicRoads website:

<https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/traffic-engineering>

This Supplement follows the same structure as Victoria's handbook. The handbook is applicable to Main Roads unless this Supplement provides either additional or alternative guidance.

Main Roads' Supplement to Victoria's Managed Motorways Design Guide (MMDG) Volume 2: Parts 2 and 3 for Smart Freeways design and coordinated ramp signals are also available. Other parts of the MMDG are available as background relating to Smart Freeways traffic analysis, design and operation but are not be specifically endorsed for design in Western Australia.

In Western Australia, Main Roads' policies, guidelines and standards take precedence over Austroads Guides and Australian Standards.

# Abbreviations

ALR	All lane running
AADT	Annual average daily traffic
AAWDT	Annual average weekday traffic
ANPR	Automatic number plate recognition
AID	Automated incident detection
AIDS	Automated incident detection system
AP	Access point (for wireless detectors)
CCTV	Closed circuit television
CIC	Customer Information Centre
CMS	Changeable message sign
CRS	Coordinated ramp signals
DMS	Dynamic message sign
ESL	Emergency stopping lane
GPS	Global positioning system
ICT	Information and communications technology
IRS	Incident response service
ITS	Intelligent transport systems
LED	Light emitting diode
LUMS	Lane use management system
LUMS sign	Integrated lane use and VSL sign used in the lane use management system
MMDG	Managed Motorway Design Guide
PMTZ	Partially managed transition zone
pc/h/ln	Passenger cars per hour per lane
PTA	Public Transport Authority
PTZ	Pan, tilt and zoom
RC1	ramp control sign 1
RC2	ramp control sign 2
RC3	ramp control sign 3
RNOC	Road Network Operations Centre
RP	Repeater point (for wireless detectors)
RTMT	Real-time monitoring team
RTTO	Real-time traffic operations

SCATS	Sydney Coordinated Adaptive Traffic System
SF	Smart Freeways
STREAMS	ITS control system currently in use by Main Roads (refer Section 9.4)
TCSN	Traffic control system network
TIRTL	The Infra-Red Traffic Logger
UPS	Uninterrupted power supply
VDS	Vehicle detection station
veh/h	Vehicles per hour
veh/h/ln	Vehicles per hour per lane
VKT	Vehicle kilometres travelled
VMS	Variable message sign or signs. This generic term may include dynamic message signs (DMS) and changeable message signs (CMS).
VSL	Variable speed limits
WA	Western Australia
WAPOL	Western Australia Police
WIM	Weigh-in-motion

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# Main Roads Guidance Summary

These comparison tables are provided for information only. The user of this Supplement should ensure they make appropriate reference to the correct reference material.

## Legend

✓ no additional Main Roads' Smart Freeways guidance

+ additional Main Roads' Smart Freeways guidance

✗ Main Roads' Supplement overrides this section in the Victoria's Guides

Section #	VicRoads Managed Freeways Handbook for: Lane Use Management, Variable Speed Limits and Traveller Information Section Headings	Main Roads' Guidance
1.1	Safe, Reliable and Efficient Freeway Operation	✗
1.2	Managing Traffic Flow Impacts	✓
1.3	Managing Incidents	✓
1.4	Traffic Flow Impacts	✓
1.5	Effective Incident Management	+
1.6	Managing Congestion	+
1.7	An Integrated Managed Freeway System	✗
1.8	Legal Requirements for Installation of Devices	✗
1.9	Maintenance Regime and Reliability of Tools	✓
2.1	Lane Use Management	+
2.2	Integrated Lane Use and Speed Management	✓
2.3	Lane Use Signs	✗
2.3.1	Lane Use Sign Display Components	✓
2.3.2	Sign Size	✗
2.4	Lane Control Signals in Tunnels with Limited Headroom	✓
2.4.1	Displays	✓
2.4.2.	Signal Size	✓
2.5	Standards and Design Principles	✗
2.5.1	Design Sequence	✗
2.5.2	Location and Spacing of Gantries near Interchanges	✗
2.5.3	Longitudinal Gantry spacing between Interchanges	✗
2.5.4	Longitudinal Position of Lane control Signals in Tunnels	✗
2.6	Operational Principles	✓
2.6.1	Fundamental Rules Preventing Conflicting Symbols	✓
2.6.2	Policy Rules for Managing Traffic	✓

Section #	VicRoads Managed Freeways Handbook for: Lane Use Management, Variable Speed Limits and Traveller Information Section Headings	Main Roads' Guidance
2.7	LUMS Integration with Other Freeway Devices	x
2.7.1	Variable Message Signs	+
2.7.2.	Real Time Information Signs	✓
2.8	Operational Integration with Ramp Signals	✓
2.8.1	Ramp Signals Response to a Lane Closure	✓
2.8.2	Ramp Signals Response to Changing Speed Limits	✓
2.8.3	Ramp Signals Response to a Freeway Closure	✓
2.8.4	Emergency Vehicle Access when Ramp Signals are Operating	✓
2.9	Incident Management with CCTV Cameras	+
2.10	Trafficking of Emergency Stopping Lanes	x
2.10.1	Part-time Treatment	x
2.10.2	Permanent treatment	x
2.10.3	Issues to Consider	x
2.10.4	Emergency Stopping Bays	x
3.1	General Principles	+
3.2	VicRoads Speed Zoning Guidelines	x
3.3	Benefits of VSL	✓
3.3.1	Safety Benefits	✓
3.3.2	Environmental Benefits	✓
3.3.3	Capacity and Traffic Flow Benefits	✓
3.3.4	Conclusions and Summary of VSL Benefits	✓
3.4	Overview of Devices and Standards	x
3.4.1	Sign Size	x
3.5	Design and Installation Principles	✓
3.5.1	Longitudinal Spacing	✓
3.5.2	Lateral Position of Signs	✓
3.6	Overview of VSL Operation	✓
3.6.1	Speed Limit Operation during Incident Situations	✓
3.6.2	Sign failure	✓
3.6.3	Speed limit operation during congestion	✓
3.6.4	Speed limit operation during free-flow conditions	✓
3.7	Speed management for environmental reasons	x
3.7.1	West Gate Bridge High Winds Response	x
3.8	VSL Integration with Ramp Signals	✓
4	Traveller Information	x

Section #	VicRoads Managed Freeways Handbook for: Lane Use Management, Variable Speed Limits and Traveller Information Section Headings	Main Roads’ Guidance
Appendix A	LUMS Traffic Management Policy Rules	✓
Appendix B	VMS Pictogram and Sign Library	✗
Appendix C	M1 and M80 Travel Time Destinations	✗
Appendix D	Real Time Information Sign Fonts	✗
Appendix E	References	✗

# Overview

## Smart Freeways policy framework

Main Roads Western Australia (Main Roads) has established a Smart Freeways policy and series of guidelines to guide overall planning, project development, delivery and ongoing operation of Smart Freeways in Western Australia.

The Smart Freeways documents were originally developed as part of the Managed Freeways Policy Framework in 2012. At that time Main Roads used the term 'Managed Freeways', which has now changed to 'Smart Freeways' with the implementation of the first Smart Freeways project on Kwinana Freeway northbound. The 2020 updated documents supersede the previous Managed Freeways documents.

While historically, the consideration of ITS on freeways was typically on a case-by-case basis, the current Main Roads' approach as outlined in the Smart Freeways Policy is that all freeways shall be considered for ITS provision at either foundation or higher order standard according to the Provision Guidelines.

Main Roads' Smart Freeways direction and guidance includes the documents listed in Table 1. This document, Smart Freeways Supplement to Victoria's Managed Freeways Handbook for Lane Use Management and Variable Speed Limits is shown highlighted.

Table 1: Smart Freeways Policy Framework documentation

Document	Description
Smart Freeways Policy	One page high-level policy statement setting out Smart Freeways objectives and principles.
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Smart Freeways Variable Message Signs Guidelines	Guidelines for the design and use of variable message signs for traveller information for safe and efficient travel for road users.
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### Smart Freeways concept

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Over recent years, Victoria’s approach to managed motorways in Melbourne has achieved unparalleled, sustainable benefits to freeway operations for safety, productivity, efficiency and reliability. We have applied the same holistic principles and learnings, while also working towards national consistency.

### Supplements to Victoria’s Managed Motorways Design Guides

Main Roads has been authorised by the Victorian Department of Transport in Victoria to use parts of VicRoads Managed Freeways Handbook for: Lane Use Management, Variable Speed Limits, and Traveller Information as a primary reference for Smart Freeway understanding and design relating to lane use, incident management and variable speed limits for managing incidents and other events such as roadworks and periods of congestion.

Accordingly, this Supplement has been developed to be read in conjunction with Victoria's handbook, copies of which can be obtained via the VicRoads' website:

<https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/traffic-engineering>

The traffic management tools and design principles in this handbook assist in improving safety, traffic operation and keeping motorists informed about travelling conditions. The tools combine with access control using coordinated freeway ramp signals to manage freeway flow and achieve high levels of safety, efficiency and reliability.

In relation to traveller information, Main Roads' Variable Message Signs Guidelines shall be the primary reference for understanding and design.

Main Roads' Supplement to Victoria's Managed Motorways Design Guide (MMDG) Volume 2: Parts 2 and 3 for Smart Freeways design and coordinated ramp signals are also available. Other parts of the MMDG are available as background relating to Smart Freeway traffic science, operation and reference but are not be specifically endorsed for design in Western Australia.

In Western Australia, Main Roads' policies, guidelines and standards take precedence over Austroads' Guides and Australian Standards.

### **Supplement structure and terminology**

This Supplement has the same structure as Victoria's handbook and only additional requirements, clarifications, or practices different from the handbook appear. Where appropriate, this Supplement may also contain additional sections and figures not covered by the handbook, but the numbering sequence found in the handbook remains. Where indicated, the figures and tables in this Supplement replace those in the handbook. Information in the handbook shall also be read in the context of Main Roads' information in the Smart Freeways Policy Framework Overview, Provision Guidelines and other design guidelines.

The Smart Freeway terminology used in this Supplement is to have an equivalent meaning to managed freeway or managed motorway in Victoria's design guides and Managed Freeway in previous Main Roads' guides.

References to VicRoads (now part of Department of Transport Victoria) shall be understood to have equivalent application to Main Roads Western Australia. Where specific aspects of design require endorsement or approval within VicRoads, reference shall be made to the Main Roads' governance requirements provided in the Smart Freeways Policy Framework Overview.

# Chapter 1: Introduction and Overview

## Section 1.1: Safe, Reliable and Efficient Freeway Operation

The efficient use of freeways is essential in providing a safe and reliable level of service that maximises the productivity of the arterial road infrastructure and provides optimum operation for safety, throughput and travel time.

The Main Roads' outline of 'active traffic management' tools and ITS technologies and devices is provided in the Smart Freeways Provision Guidelines as well as in the other guides summarised in Table 1.

The third paragraph information relating to Melbourne's freeway network and traffic use is replaced by the following information applicable to the Perth arterial road network:

- Freeways and high standard arterial roads comprise 22 per cent (or 166 km) of the Metropolitan state road network (755 km), yet include 48 per cent of the total vehicle kilometres travelled (VKT) in the AM peak and 51 per cent of total VKT in the PM peak.

## Section 1.5: Effective Incident Management

Additional information and Main Roads' warrants relating to automated incident detection (AID) are provided in the Main Roads' Smart Freeways Provision Guidelines.

## Section 1.6: Managing Congestion

As additional information, variable speed limits can be used for safety and crash prevention by lowering the speed limit to match operating speeds during congestion, including back of queue protection (also see Section 3.6.3). Further Main Roads' guidance relating to VSL in this situation is provided in the Main Roads' Smart Freeways Provision Guidelines.

## Section 1.7: An Integrated Managed Freeway System

This section shall be read in the context of Main Roads' Smart Freeways ITS technologies as outlined in the Smart Freeways Policy Framework Overview and the Smart Freeways Provision Guidelines. Main Roads' central control system also uses STREAMS.

## Section 1.8: Legal Requirements for Installation of Devices

This section shall be replaced with the following information:

- In Western Australia Lane Use Management System (LUMS) signs integrate lane control signals and variable speed limit (VSL) signs under the Road Traffic Code 2000. Various regulations define a driver's responsibilities when approaching these devices.
- Main Roads' Executive Director Network Operations must give approval to erect, establish, display, maintain or remove these traffic management devices.

# Chapter 2: Lane Use and Incident Management

## Section 2.1: Lane Use Management

Further principles relating to lane use management systems (LUMS) are in the Main Roads' Smart Freeways Provision Guidelines. These guidelines also provide information relating to warrants and Smart Freeway applications (with and without all lane running).

## Section 2.3: Lane Use Signs

As indicated in the Smart Freeways Provision Guidelines, Main Roads uses the term 'LUMS signs' to allocate and manage lane use across the carriageway, rather than the term lane use signs (LUS) as in the VicRoads handbook (understood to be an earlier legacy and not current practice).

LUMS signs indicate the status of the lanes to road users, including lanes open (displaying the speed limit), lane change (angled arrow) and lanes closed (red cross). Austroads (2016) defines 'LUMS signs' as having the capability to display both VSL and lane control signals.

The principles and road users' responsibilities relating to LUMS signs outlined in the handbook are the same in Western Australia. However, the relevant regulations in the *Road Traffic Code 2000* shall be used rather than the regulations in Road Rules – Victoria.

Main Roads' intended colours for Smart Freeways VSL signs are black numerals on white background within the red annulus, with a black background outside the red annulus (action to incorporate this sign within the *Road Traffic Code 2000* in association with the Smart Freeway – Kwinana Northbound project is underway as of June 2020).

Main Roads recommend consideration of flashing part of the VSL signs annulus or use flashing yellow conspicuity lanterns for older signs during operations when the signs display speeds lower than the default speed limit if the reduced speed limit is not likely to be immediately apparent to the approaching driver.

### Section 2.3.2 Sign Size

The sign size guidance in this section of the handbook shall be replaced by:

- The size of all LUMS signs, i.e. applicable to all default speed limits, is 'C' size signs.

### Section 2.3 (Additional Information): Static Signs Associated with LUMS

The additional guidance in Table 2 is provided for static signs associated with Main Roads' LUMS designs. The guidance applies to all LUMS designs (i.e. may, or may not, include an emergency stopping lane or shoulder).

For emergency stopping bay designs (with or without all lane running) additional guidance is provided for Section 2.10.4.

Table 2: Static signs associated with Main Roads’ LUMS designs

Location	Sign
<p>The MR-RS-24 sign is used to assist with degraded operation of VSL signs. It is installed on the gantry leg where LUMS or VSL signs are installed. If the gantry is a cantilever structure then the sign may also be installed on the verge opposite the gantry leg, if appropriate. Signs shall be installed on every gantry.</p>	 <p>MR-RS-24</p>
<p>The MR-RS-25 sign is used to assist with degraded operation of VSL signs. It is installed on entry ramps where the ramp enters a LUMS or VSL environment - located beneath the Start of Freeway sign and VSL sign.</p>	 <p>VSL Sign</p>  <p>MR-GE-22B</p>  <p>MR-RS-25</p>

### Section 2.5: Standards and Design Principles

Additional guidance relates to the vertical clearance to LUMS gantries or cantilevers. The clearance to the underside of the lowest fixture on the structure shall be in accordance with the vertical clearance requirements of the map document D19#246647.

As the gantries / cantilever supports are considered non frangible roadside hazards, the installation shall include a safety barrier. The requirements of Main Roads’ Supplement to Austroads’ Guide to Road Design – Part 6 and Austroads’ Guide to Road Design – Part 6: Roadside Design, Safety and Barriers must be met at all locations.

In positioning the gantries / cantilevers, appropriate allowances should be made for the deflection of the barrier, vehicle roll and the width of signs on the gantry leg. As a general guide the following deflection distances should be adhered to:

- Concrete barrier - zone of intrusion deflection from face of barrier as per Main Roads standards.
- W-Beam – 1.5 metres from the face of the barrier.
- Wire rope barrier – 2.0 metres from the face of the barrier.

### Section 2.7: LUMS Integration with Other Freeway Devices

Additional information relating to freeway and arterial road VMS is provided in the Main

Roads' Variable Message Signs Guidelines.

### Section 2.7.1: Variable Message Signs

As well as freeway VMS on the mainline, Main Roads uses tactical VMS to provide real time warning and instruction to road users to support LUMS and incident management operations (see Figure 1).

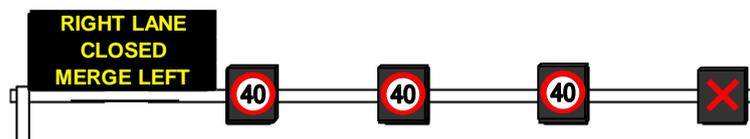


Figure 1: Example of tactical VMS operating as part of a LUMS response

Tactical VMS are generally installed on every second gantry to provide frequent messages relevant to the traffic situation, and in advance of emergency stopping bays in all lane running sections.

Additional information for provision and design of tactical VMS is provided in the Main Roads' Smart Freeways Variable Message Signs Guidelines.

### Section 2.9: Incident Management with CCTV Cameras

Additional Main Roads' guidance relating to the design and use of CCTV cameras (full and overlapping coverage) is in Main Roads' Smart Freeways Provision Guidelines.

### Section 2.10: Trafficking of Emergency Stopping Lanes (Sub-sections)

The Victorian Road Safety Rules are not applicable. Western Australia's *Road Traffic Code 2000* Regulation 76 relates to not driving in an emergency stopping lane.

#### Sub-sections 2.10.1 to 2.10.3: Part-time and Permanent Use of Emergency Stopping Lane

These sections are not applicable to freeways in Western Australia.

Main Roads does not use part-time use of the emergency stopping lane or freeway shoulder.

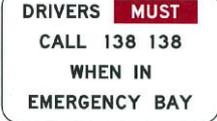
Permanent use of the shoulder equates to all lane running (ALR) and shall be considered according to warrants and guidance in the Main Roads' Smart Freeways Provision Guidelines.

#### Section 2.10.4: Emergency Stopping Bays

This section shall be replaced with guidance and information in the Main Roads' Guideline for Emergency Stopping Bays and Roadside Help Phones. These guidelines include guidance for static signs where emergency stopping bays are provided.

The following additional guidance in Table 3 is provided for static signs on projects with all lane running (i.e. no ESL or shoulder).

Table 3: Static signs associated with emergency stopping bays for all lane running designs

Location	Sign
Install adjacent to the mainline prior to the start of the all lane running section.	 <p>MR-SAD-15</p>
Install 300 metres in advance of all emergency stopping bays (distance may vary as appropriate).	 <p>MR-SAD-16</p>
Install at all emergency stopping bays (see example in Figure 2).	 <p>MR-RPK-26</p>  <p>MR-RA-31</p>
Install at all emergency stopping bays (see example in Figure 2).	 <p>MR-RPK-27</p>
Install at all emergency stopping bays (see example in Figure 2).	 <p>MR-SAD-18</p>
Install at all emergency stopping bays (see example in Figure 2).	 <p>MR-SAD-19</p>

Location	Sign
Install at emergency stopping bays where gated access is provided from an area adjacent to the freeway (see example in Figure 2).	 MR-RM-23

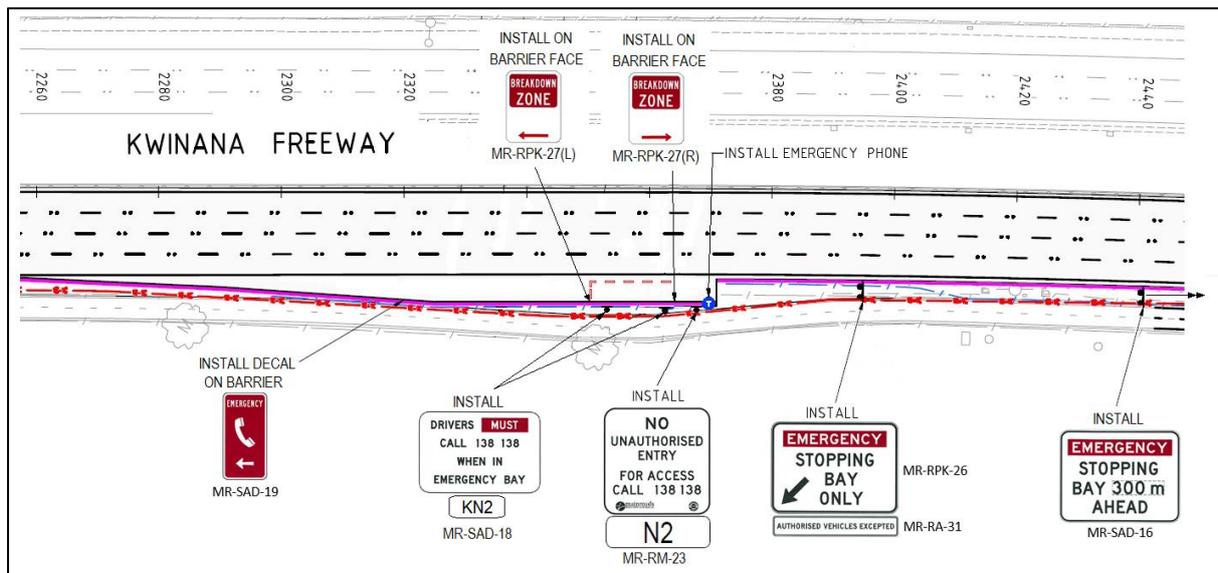


Figure 2: Example of static signing at emergency stopping bay on a freeway with all lane running

# Chapter 3: Variable Speed Limits

## Section 3.1: General Principles

Further principles relating to variable speed limits (VSL) are in the Main Roads' Smart Freeways Provision Guidelines. These guidelines also provide information relating to warrants and Smart Freeway applications.

## Section 3.2: VicRoads Speed Zoning Guidelines

The VicRoads supplement to the Austroads guides and the Traffic Engineering Manual Volume 1: Traffic Management, Chapter 7, Speed Zoning Guidelines, are not applicable in Western Australia.

## Section 3.4: Overview of Devices and Standards

The relevant regulations in Western Australia relating to sign format are in the *Road Traffic Code 2000*, which shall be used rather than the Road Rules – Victoria.

Main Roads' intended colours for Smart Freeways VSL signs are black numerals on white background within the red annulus, with a black background outside the red annulus (action to incorporate this sign within the *Road Traffic Code 2000* in association with the Smart Freeway – Kwinana Northbound project is underway as of June 2020).

Main Roads recommend consideration of flashing part of the VSL signs annulus or use flashing yellow conspicuity lanterns for older signs during operations when the signs display speeds lower than the default speed limit if the reduced speed limit is not likely to be immediately apparent to the approaching driver.

### Section 3.4.1 Sign Size

The sign size guidance in this section of the handbook shall be replaced by:

- The size of all VSL signs, i.e. applicable to all default speed limits, is 'C' size signs, including signs on entry ramps entering a freeway with a LUMS or VSL system.

## Section 3.7: Speed Management for Environmental Reasons

The specific application in the handbook relating to high winds on the West Gate Bridge is not applicable in Western Australia.

The general principles in this section may have future application on Western Australia's freeways where environmental factors are applicable.

## **Chapter 4: Traveller Information**

This chapter is not applicable to Main Roads. It shall be replaced with guidance and information in the Main Roads' Smart Freeways Provision Guidelines and Smart Freeways Variable Message Signs Guidelines.

### **MMDG Appendix A: LUMS Traffic Management Policy Rules**

This appendix shall be read as background information only.

### **MMDG Appendix B: VMS Pictogram and Sign Library**

This appendix is not applicable to Main Roads.

Reference shall be made to the Smart Freeways Variable Message Signs Guidelines.

### **MMDG Appendix C: M1 and M80 Travel Time Destinations**

This appendix is not applicable to Main Roads.

Reference shall be made to the Smart Freeways Variable Message Signs Guidelines.

### **MMDG Appendix D: Real Time Information Sign Fonts**

This appendix is not applicable to Main Roads.

Reference shall be made to the Smart Freeways Variable Message Signs Guidelines.

### **MMDG Appendix E: References**

This appendix shall be read as background information relating to Victoria's handbook.

Further references are provided in Appendix A in this supplement.

## References

- Austrroads Guide to Traffic Management (various parts), Austrroads, Sydney, NSW.
- Austrroads Guide to Road Design (various parts), Austrroads, Sydney, NSW.
- Main Roads' Supplements to Austrroads Guide to Traffic Management (various parts), Main Roads, Perth, WA.
- Main Roads' Supplements to Austrroads Guide to Road Design (various parts), Main Roads, Perth, WA.
- Main Roads' Guideline for Emergency Stopping Bays and Roadside Help Phones, 2018, Main Roads, Perth, WA.
- Main Roads' technical publications and specifications available on the website (various): <https://www.mainroads.wa.gov.au/BuildingRoads/StandardsTechnical/Pages/home.aspx>
- Smart Freeways Policy, 2020, Main Roads, Perth, WA.
- Smart Freeways Policy Framework Overview, 2020, Main Roads, Perth, WA.
- Smart Freeways Provision Guidelines, 2020, Main Roads, Perth, WA.
- Smart Freeways Operational Efficiency Audit Guidelines, 2020, Main Roads, Perth, WA.
- Smart Freeways Variable Message Signs Guidelines, 2020, Main Roads, Perth, WA.
- Supplement to Victoria's Managed Motorway Design Guide, Volume 2: Design Practice, Parts 2 and 3, 2020, Main Roads, Perth, WA.
- Transportation Research Board, Highway Capacity Manual 2016, TRB, Washington DC.
- VicRoads (Victorian Department of Transport) Managed Motorway Design Guide (MMDG) Volume 2: Design Practice, Part 2: Managed Motorway – Network Optimisation Tools, 2019, Melbourne, VIC.
- VicRoads (Victorian Department of Transport) Managed Motorway Design Guide (MMDG) Volume 2: Design Practice, Part 3: Motorway Planning and Design, 2019, Melbourne, VIC.
- VicRoads (Victorian Department of Transport) Managed Motorway Design Guide (MMDG) Volume 2: Design Practice, Part 4: Lane Use Management, Variable Message Signs and Traveller Information, 2013, Melbourne, VIC.

