

Managed Freeways

Freeway Ramp Signals Handbook





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Authors:

Maurice Burley (Consultant) and John Gaffney (VicRoads) from the Monash-CityLink-Westgate Upgrade (M1) Project, Ramp Metering Team.

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<ul style="list-style-type: none"> ■ Network and Asset Planning <ul style="list-style-type: none"> ■ David Nash, Adrian George and Andrew Somers. ■ Technical Consulting <ul style="list-style-type: none"> ■ Matthew Hall and Patrick Van Reyk (standards). ■ Technical and Information Services – Tim Strickland (data analysis applications). ■ Road Safety and Network Access. ■ Regional Services. ■ Major Projects. 	<ul style="list-style-type: none"> ■ Prof. Markos Papageorgiou and Ioannis Papamichail, Technical University of Crete. ■ A number of traffic consultants and interstate road authorities.

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FOREWORD

Managed Freeways

Freeway Ramp Signals Handbook

This Handbook has been issued by VicRoads to provide the rationale and criteria for managing freeway traffic flow with freeway ramp signals to control freeway access. The Handbook supersedes the 'Guidelines for Managing Freeway Operation with Ramp Metering' dated November 2005.

The Handbook is to be used as the primary reference for determining the need for freeway ramp metering as well as in the design and operation of ramp signals. The Handbook is the result of a major review of previous ramp metering guidelines and is based on contemporary traffic flow theory and state-of-the-art technologies as well as innovation associated with the design and operation of the Monash-CityLink-Westgate Upgrade (M1) Project.

A standardised system is essential to ensure that drivers acquire the information necessary to enable them to comply with road rules and to use the road system in a safe and efficient manner. In the interests of uniformity, other Victorian road authorities are encouraged to apply the requirements of this Handbook to freeways / tollways under their control.

This Handbook is one of a series of VicRoads guidelines relating to managed freeways including:

- Managed Freeway Guidelines;
- Managed Freeways: Freeway Ramp Signals Handbook; and
- Managed Freeways Handbook:
 - Lane Use Management
 - Variable Speed Limits
 - Traveller Information

Enquiries or comments relating to the Handbook may be directed to:

Director Network Policy and Standards
Policy and Programs
VicRoads
60 Denmark Street
Kew VIC 3101

Tel: 03-9854 2015 Fax: 03-9854 2918

<http://www.vicroads.vic.gov.au/Home/AboutVicRoads/ContactUs/FeedbackAndEnquiries.htm>

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Notations and Abbreviations

ALINEA	Asservissement Linéaire d' Entrée Autoroutière, i.e., Linear feedback control of a motorway on-ramp
ABC	Advanced bottleneck control
c_r	Cycle time of ramp signals (seconds)
c_a	Cycle time of the arterial road / entry ramp intersection signals supplying the arriving vehicle platoon to an entry ramp (seconds)
CCTV	Closed circuit television
FRS	Freeway ramp signals
HERO	HEuristic Ramp metering co-ordination
HOV	High occupancy vehicle
JUMA	Joint use mast arm
JUP	Joint use pole
LED	Light emitting diode
LUMS	Lane Use Management System
o_{cr}	Critical occupancy
pc	Passenger cars
PCE	Passenger car equivalents
PFN	Principal Freight Network
PHF	Peak hour factor
q_{us}	Freeway mainline flow upstream of entry ramp (veh/h)
q_{cap}	Freeway mainline capacity at critical bottleneck (veh/h)
q_{ra}	Ramp arrival (demand) flow (veh/h)
q_{rca}	Ramp arrival (demand) flow in vehicle platoon during cycle time c_a (veh/h)
q_{rn}	Metered entry ramp flow from a number of ramps (veh/h)
n_{r95}	Number of ramp vehicles in a 95 th percentile queue (No.)
$n_{rMax-wait}$	Number of ramp vehicles in a queue based on the maximum wait time (No.)
n_{rMean}	Mean number of ramp vehicles arriving in cycle time c_a (No.)
L_{rDes}	Length of desirable ramp storage (metres)
L_{rm}	Length of mean ramp storage (metres)
L_{r95}	Length of 95 th percentile ramp storage (metres)
L_{vs}	Average length of a vehicle storage space in a ramp queue (metres)
RRPM	Retro Reflective Pavement Markers
SCATS	Sydney Coordinated Adaptive Traffic System
$t_{Max-wait}$	Maximum wait time for vehicles in a ramp queue (minutes)
v_f	Mean free speed
VMS	Variable Message Sign
VSLs	Variable Speed Limit System
TMC	Traffic Management Centre

A Glossary of Terms and Traffic Flow Relationships is provided in Appendix E.

