



National Roads Authority

## **GUIDELINES FOR THE USE OF VARIABLE MESSAGE SIGNS ON NATIONAL ROADS**

### **PART A – GENERAL INFORMATION**

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# 1 PREFACE

## About this document

These guidelines are intended for use by anyone deploying or intending to deploy Variable Message Signs (VMS). They cover all prospective and existing VMS used on national roads in Ireland and should be read in conjunction with Chapter 3 of the Department of Transport's Traffic Signs Manual ("the TSM") and the relevant sections of the National Roads Authority's (NRA) Design Manual for Roads and Bridges ("the NRA DMRB").

## Guideline updates

This document will be maintained and periodically updated as required by the NRA.

## Guideline aims

A number of organisations in Ireland are developing Intelligent Transport Systems (ITS) that include or could potentially include VMS signs. Without clear guidance, the deployment and operation of VMS could lead to the inconsistent presentation of traffic information to the public. This in turn, could cause confusion and could reduce the public's confidence in and compliance with messages displayed on VMS.

In order to help avoid this situation, the NRA has prepared these guidelines. They are intended to assist anyone deploying or intending to deploy VMS to:

- Make best use of existing VMS infrastructure;
- Ensure effective introduction of new VMS infrastructure;
- Promote national and European harmonisation of VMS usage;
- Maximise the benefits that can be achieved from investment in VMS technology thus achieving more efficient use of the national road network.
- Bring consistency to the presentation format of messages

The guidelines have been based on the operational experiences of the NRA and other network managers worldwide. They are also designed to reflect current best practice.

Local authorities and consultants are encouraged to use the notes and VMS approval criteria described within these guidelines. However, responsibility for the design, development, procurement, installation and operation of all VMS remains with the sponsoring authority. Application of the guidelines contained herein needs to be considered with due care and forethought. The guidelines contained herein also needs to be considered with due reference to applicable legislation, standards, advice and information.

These guidelines should not be considered to be the formal or only solutions capable of meeting a particular requirement for VMS.

## Structure of the document

The document is divided into two parts. Part A is intended to provide an overview of the various types of VMS along with a review of the relevant legislation and standards.

Part B provides detailed guidance for anyone deploying or intending to deploy VMS. This includes guidance on the design and approval of new VMS schemes and best practice in their deployment and operation.

#### Contact Details

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# GUIDELINES FOR THE USE OF VARIABLE MESSAGE SIGNS ON NATIONAL ROADS

## PART A: GENERAL INFORMATION

### 1 VMS APPLICATIONS

There are three generally uses of VMS as follows<sup>1</sup>:

- **Driver information systems** providing drivers with information about current or future events on the road network;
  - **Tactical control** providing information to drivers in response to an incident or event occurring on the local network; and
  - **Strategic traffic management** enabling the network operator to provide drivers with information and advice on network-wide traffic conditions.
- Each of these applications is relevant to the use of VMS on national roads in Ireland.
- The **INSTANT** project (Information Management System for Multimodal Transport in the Republic of Ireland and Northern Ireland) which is a European funded project deploying a multimodal traffic management and information system for cross-border traffic between Dublin and Belfast. As part of INSTANT, seven VMS have been deployed on the M1.
  - The **STREETWISE** Euro-Regional Project which is also part funded by the European Union. This aims to provide seamless and effective travel information on the part of the Trans-European Road Network between the Republic of Ireland, Northern Ireland, Scotland, Wales and England.
  - **Major road widening projects** such as the M50 which have contained provision for the deployment of VMS.

### 2 VMS IN IRELAND

To date, the use of VMS in Ireland by the NRA has typically formed part of wider ITS deployments. These have included:

The NRA uses an Advanced Traffic Management System (ATMS) for controlling the VMS on national roads. In addition to controlling the VMS, the ATMS allows operators to inform motorists of

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<sup>1</sup> UK Design Manual for Roads and Bridges, TA83/99, Volume 9, Sections 4.

traffic events (such as incidents, roadworks and adverse weather conditions for example) and to implement VMS response plans. It also allows operators to schedule VMS messages to be displayed on specific VMS at a specified time.

In addition to the NRA, a number of other agencies have deployed VMS. This includes Dublin City Council which operates a number of VMS in the greater Dublin area. The signs are controlled from the Dublin City Council Traffic Control Centre and are used to inform drivers about network conditions and current/future events on the greater Dublin area road network. During peak hours, a Garda officer is present in the Control Centre and if necessary, can request that specific VMS messages are set.

Dublin City Council's experiences of designing, installing and operating VMS have been taken into account as part of developing these guidelines.



### 3 OPERATIONAL EXPERIENCES ELSEWHERE IN EUROPE

#### VMS: The European context

VMS deployment in Europe has evolved substantially since the first signs were installed in the late 1980s. The effectiveness of VMS in different traffic management scenarios is now well established and they are widely deployed across Europe's major highway networks.

Since 1995, the European Commission has supported the increasing use of ITS including VMS on the Trans-European Road Network. This has been done through a series of so-called "Euro-Regional Projects" designed to improve traffic management and traffic information on a European level. Efforts are focussing on developing a more coherent approach to message content along with exploring common policies and operational guidelines for the use of VMS.

#### French Experiences

VMS have been used in France since the emergence of the technology some twenty years ago. There are in excess of a thousand VMS deployed on the French motorway network. The VMS are operated by motorway company control centres. The real time information displayed typically includes:

- **Traffic conditions;**
- **Incidents;**
- **Weather conditions;**
- **Travel times.**

#### Dutch Experiences

In The Netherlands, there are two types of VMS commonly in use. The first type is used for lane control and is mounted over traffic lanes. These are used to provide lane control advice and can show many of the same kinds of information seen on static roadside signs (for examples, speed limits, etc) as well as graphics relating to a specific lane (for example, lane closed, etc). There are more than 15,000 of these types of signs in use covering more than 1000 km of motorway.

The second type of VMS is called Dynamic Route Information Panel (DRIP) and is mainly used for route guidance. These are placed close to decision points on the motorway network enabling the driver to choose between different routes to reach specific destinations. There are some 90 DRIP signs currently in operation.

## English experiences

In England, the Highways Agency uses a number of different types of VMS to display a wide range of messages. These typically include messages relating to:

- Incident management;
  - Driver information including journey times;
  - Strategic diversions;
  - Road works;
  - Controlled motorways;
  - VMS safety campaigns.
- The Highways Agency also uses lane control signs in much the same way as they are used in The Netherlands.

## 4 DESIGN CONSIDERATIONS

There are three key considerations that have to be taken into account when designing any new VMS scheme. These are as follows:

### Purpose of the VMS

The European FIVE Framework<sup>2</sup> identified three broad categories of VMS use which relate to the content of messages as follows:

- **Regulation** which involves the use of VMS to present mandatory information about a regulatory condition (for example, a change in speed limit) to road users and is designed to elicit an immediate response from drivers.
- **Warning** providing drivers with notification and/or guidance relating to a specific immediate hazard ahead
- **Information** providing drivers with useful information that may influence their travel behaviour, their route selection or keep them up-to-date with network conditions.

## VMS location

There are a number of criteria which determine where a VMS should be located. These primarily relate to the kinds of information each VMS is intended to display. In each case, the VMS location should be such that drivers have sufficient opportunity to react to the kind of information being displayed as follows:

- **Tactical messages** relate solely to the section of the highway network where the VMS is located. VMS displaying tactical information should therefore be located at points along a route where information might prove useful to drivers;
- **Strategic messages** differ from tactical VMS messages insofar as they relate to conditions on the entire network rather than to a specific link. VMS displaying strategic information should be located sufficiently far in advance of route decision points to provide drivers with the opportunity to modify their route choice or their travel plans as necessary; and
- VMS presenting diversion messages provide drivers with information relating to an alternative route(s) to a particular destination. This is typically in response to network conditions affecting the usual route to the destination in question. VMS displaying diversion advice should therefore be located sufficiently far in advance of the point at which the diversion begins to provide drivers with the opportunity to modify their route choice.



<sup>2</sup> Framework for harmonised Implementation of VMS in Europe (FIVE), Conference of European Directors of Roads, 2003

## Type of VMS

The type of VMS refers to the physical mounting of the sign and the type of display. Typical mounting options are:

- Post mounted in the verge;
- Cantilevered from the verge;
- Cross carriageway gantry; and
- Mobile VMS.

Each mounting type offers distinct advantages and disadvantages as follows:

- **Post-mounted signs** which are normally located in the near-side verge.
  - **Advantages:** relatively low cost to install and easy to maintain without the need for traffic management.
  - **Disadvantages:** high-sided vehicles travelling in the inside lane can obscure the VMS to other vehicles.
- **Cantilevered signs** are normally mounted in the near-side verge but with the sign “cantilevered out” over the motorway at a sufficient height to allow it to be seen by traffic in all the running lanes.
  - **Advantages:** signs are less likely to be obscured by high-sided vehicles. Depending on the design of the sign, maintenance can often be performed without the need for traffic management
  - **Disadvantages:** high-cost of the sign and its mounting base
  -
- **Cross carriageway gantries** are structures which span either a single carriageway or across both carriageways.
  - Advantages: can be used for traffic management and control as VMS can be positioned directly above each running lane.
  - Disadvantages: high initial cost and significant visual intrusion. In

addition, ongoing maintenance and installation can be disruptive and costly.

- **Mobile VMS** are primarily used for local traffic management purposes such as providing signing for events and road works. Mobile VMS are physically limited in size and therefore the scope of the messages they can display.
  - **Advantages:** can be quickly deployed at a range of locations to suit various requirements
  - **Disadvantages:** requires electrical supplies to allow the operation of non-solar mobile devices in anything other than the short-term. Hard standings may also need to be protected with some form of safety fence.

In terms of the type of display, the following six factors should be considered:

- **Location** – Does the sign attract appropriate attention in its immediate environment and are there sufficient lines of sight to the sign face? Is the location suitable for the intended purpose of the sign?
- **Legibility** – Can drivers easily read the text or pictograms displayed?
- **Information Load** – Do drivers have sufficient time to read the entire message?
- **Comprehensibility** – Can the driver readily understand the entire message?
- **Response** – Does the driver have sufficient time to safely and correctly react to the message?
- **Credibility** - Can the driver rely on the information being displayed?

*It should also be noted that messages should not be used for advertising or promotions with the exception of the promotion of road safety campaigns, for example a ‘Don’t Drink and Drive’ message.*

## 5 GUIDANCE AND LEGISLATION

### Introduction

The NRA has chosen not to adopt a legislative approach to the implementation of VMS on national roads in Ireland. Instead, it has chosen to integrate European legislation and good practice with its own experiences of operating VMS to form the basis of these Guidelines. As a result, Part B of the Guidelines provides advice and guidance on a number of issues relevant to VMS deployment and operation including:

- VMS location;
- VMS size;
- Optical requirements
- Character size requirements; and
- Message structure.

Where appropriate, the following documents have been included in the NRA's VMS guidelines.

#### ***European standards***

EN12966 is the European standard which describes the requirements for the development, manufacture and testing of VMS. Suppliers whose VMS are certified as having met the requirements of EN12966 can use the European Commission's conformity marking (the CE mark) on their products.

#### ***European guidance***

The Conference of European Directors of Roads (CEDR) initiated Action FIVE (Framework for harmonised Implementation of VMS in Europe) in 1997 to prepare an inventory of needs and priorities for international harmonisation of VMS<sup>3</sup>. It prepared a set of recommendations intended to promote the consistent operation of VMS on the Trans European Road Network. Of particular interest is the recommendation to promote the use of pictograms and symbols as VMS displays to minimise text.

<sup>3</sup> Framework for harmonised Implementation of VMS in Europe (FIVE), Conference of European Directors of Roads, 2003.

The Mare Nostrum VMS Group grew from cooperation between a number of Euro-Regional projects and focused on the use of multipurpose VMS on the long distance corridor from Seville (Spain) to Trieste (Italy). Similar to the FIVE framework, Mare Nostrum promotes the consistent use of pictograms as one of the main tools in conveying information to road users.

#### **Guidance in Ireland**

The primary guidance for the use of VMS on national roads in Ireland is provided by this document. In addition to the European standards and guidance indicated above, it draws on two other key documents are follows:

The Traffic Signs Manual was first published in 1996<sup>4</sup>. It provides details of the traffic signs which may be used on roads in Ireland, including their layout and symbols, the circumstances in which each sign may be used and rules for positioning them. Chapter 3 of the Manual relates to the use of VMS on roads in Ireland and should be read in conjunction with these Guidelines. The Department of Transport have revised this manual over the years to reflect changing circumstances an update version is expected to be available in 2010.



The Design Manual for Roads and Bridges (DMRB) provides a comprehensive manual system which accommodates all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads including motorways. It was introduced in 1992 in England and Wales, and subsequently in Scotland and Northern

<sup>4</sup> Traffic Signs Manual, Department of Environment, December 1996

Ireland. A modified version, the National Roads Authority Design Manual for Roads and Bridges (NRA DMRB)<sup>5</sup> was formally introduced for use in Ireland from 2001. This adapts the DMRB for use on national roads in Ireland through a series of NRA Addenda to the documents contained in the DMRB and, in some cases, complete replacement of NRA Standards.

## **6 NRA VMS FRAMEWORK AGREEMENT**

Local authorities are encouraged to procure any VMS through the NRA's Framework Agreement. This was established in 2008 to provide a procurement mechanism for the supply and installation of a variety of VMS and structure/mounting types based on the NRA's specifications. The key objectives of this Agreement are to:

- provide economies of scale, which can be realised by all relevant Irish Authorities;
- promote standardisation in the design, deployment and usage of VMS/LCS; and
- provide all local authorities with a defined approach for the procurement of VMS/LCS.

Using the Framework Agreement will ensure that any signs procured reflect international standards and can be used to comply with recognised best practice. It will ensure consistency of sign type and layout as well as promoting consistency of operation. It should also streamline the procurement process for local authorities.

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<sup>5</sup> National Roads Authority Design Manual for Roads and Bridges, National Roads Authority, December 2007