



# Motorways 2017



## What is a motorway?

A motorway is a road, specially designed and built for motor traffic, which does not serve properties bordering on it, and which: a) is provided, except at special points or temporarily, with separate carriageways for traffic in two directions, separated from each other, either by a dividing strip not intended for traffic, or exceptionally by other means; b) has no crossings at the same level with any road, railway or tramway track, or footpath; c) is especially sign-posted as a motorway and is reserved for specific categories of road motor vehicles.

## What does science say?

### Safety benefits of motorways in general

Motorways exhibit much lower accident rates (injury accidents per million vehicle kilometres) than other road types. Studies comparing motorways to standard rural and urban roads indicate 50% to 90% lower accident rates for motorways. Before and after studies indicate that when a new motorway is constructed, the resulting reduction in the number of accidents is not that large: an average decrease in the number of injury accidents of around 7% has been identified. This can be justified considering firstly, that not all traffic using the existing roads transfers to the new motorway, and secondly that the construction of a motorway often generates new traffic.

### Safety benefits of central medians

Central medians (with or without barriers) have been found to reduce accident rates in most situations, however, the relevant study results are not consistent. As a general observation, medians affect the distribution of accidents by type: reduced numbers of head-on collisions have been reported, but often increased numbers of less severe accidents can also be expected.

### Safety benefits of grade separated interchanges

Replacing at-grade intersections with grade separated interchanges is related to a reduction in the number of accidents in the range of -15% to -57%

### Safety benefits of access restriction

Studies in Norway have estimated an average rate of 0,08 to 0,11 accidents per million vehicle kilometres in motorways with full access restriction, compared to 0,38 accidents per million vehicle kilometres in rural roads with 16 to 30 access points per kilometre.

### Safety benefits of dynamic speed limits

Research results have indicated that variable (dynamic) speed limits could reduce accident rates by 5% to 18%.

## Motorway accidents: problem and solutions

Three types of accidents on motorways are of particular interest: (a) accidents caused by the improper use of emergency lanes, (b) cross-median head-on accidents, and (c) accidents involving wrong way driving.

### Improper use of emergency lane:

- The severity of these accidents tends to be significantly higher than of most other accidents on motorways. In Dutch motorways, although multiple accidents on emergency lanes accounted for only 1,5% of injury accidents (1992-1995 period), the corresponding share of fatalities was 8%.



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- An indication of accident risk on motorways emergency lanes is the number of stopped vehicles on emergency lanes per 100Km of motorway. A 1987 study in the Netherlands indicated a total of 4,1 vehicles per 100Km (at both sides of the motorway), while a 1997 study found a 10,9 vehicles per 100Km.
- Measures that have been proposed in order to reduce accidents on emergency lanes are:
  - installation of rumble strips on the border between the carriageway and the emergency lane,
  - widening of emergency lanes,
  - information campaigns on the use of emergency lanes on motorways,
  - installation of lighting on motorways, especially in sections where emergency lanes and/or through lanes are narrow.

## **Cross-median accidents:**

- Head-on cross-median accidents typically occur when a vehicle crosses the median and crashes with a vehicle travelling in the opposite direction, and they are usually very severe in nature.
- In order to reduce cross-median fatalities, engineering, enforcement and education measures are proposed with the following objectives:
  - to keep vehicles from departing the travelled way,
  - to minimize the likelihood of head-on accidents with an oncoming vehicle,
  - to reduce the severity of median-barrier accidents that occur,
  - to enhance enforcement and awareness of traffic regulations, and
  - to improve coordination of agency safety initiatives.

## **Wrong-way driving accidents:**

- A wrong-way accident is defined as a traffic accident caused by a wrong-way driver, who is a driver travelling in the wrong direction along a one-way street or on a physically separated motorway.
- Although the number of wrong-way driving accidents is relatively limited, their consequences are much more severe than the consequences of other motorway injury accidents.
- Young drivers, older drivers and drivers under the influence (DUI) of alcohol or drugs are most commonly involved in wrong-way accidents.
- Proposed countermeasures for wrong-way driving include engineering (signage, pavement marking, roadway geometry, and ITS), education (training), and enforcement (emergency response, confinement, and radio messages) measures.

## **Managed (urban) motorways**

The future of motorways is possibly related to actively managed motorways, i.e. urban motorways that have intelligent information, communications and control systems (ITS tools) incorporated in and alongside the road. These include coordinated on-ramp signalling, variable speed limits, lane control, incident detection and traffic flow data, traveller information and closed circuit television surveillance. A further typical characteristic of managed motorways is hard shoulder running. Managed motorways increase journey reliability and throughput of a motorway through speed management and increase capacity by shoulder running.

## Notes

### 1. Country abbreviations

	Belgium	BE		Italy	IT		Romania	RO
	Bulgaria	BG		Cyprus	CY		Slovenia	SI
	Czech Republic	CZ		Latvia	LV		Slovakia	SK
	Denmark	DK		Lithuania	LT		Finland	FI
	Germany	DE		Luxembourg	LU		Sweden	SE
	Estonia	EE		Hungary	HU		United Kingdom	UK
	Ireland	IE		Malta	MT			
	Greece	EL		Netherlands	NL		Iceland	IS
	Spain	ES		Austria	AT		Liechtenstein	LI
	France	FR		Poland	PL		Norway	NO
	Croatia	HR		Portugal	PT		Switzerland	CH

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5. Please refer to this Report as follows:

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