Variable speed limits

The main purpose of VSL is to help drivers to travel at an appropriate speed considering the prevailing traffic or weather conditions. Sensitive road segments, like tunnels, are often subject to VSL deployment for safety reasons. VSL can also be used to mitigate negative effects for society in general, like pollution or noise and to increase throughput. The use of VSL for environmental purposes is small today, but an increase is expected.

Objective and benefits

The common main objective of VSL is to support drivers in travelling at a safe speed or to improve traffic fluency. In some cases these systems are also used to mitigate environmental effects, such as pollution or noise.

In most cases, the displayed speed limit should correspond to the conditions the drivers encounter, and therefore will be experienced as relevant. The drivers are then more likely to adhere to the speed limits. This will result in better safety, better mobility, smoother traffic, increased comfort and a reduced impact on the environment. However, there are cases when circumstances call for a reduced speed limit for which the reason is not obvious to the drivers, e.g. environmental reasons, problems downstream like incidents or work zones.

Safety

The deployment of variable speed limits offers the opportunity to optimize traffic safety depending on capacity and weather conditions. Traffic-related and/or weather-related VSL reduces the risk of congestion and accidents. The impact analysis of existing facilities confirms the positive effect on traffic safety.

VSL on motorways are expected to reduce accidents in the interval 15-40% or even up to about 60% during periods with heavy traffic loads (Bundesministerium für Verkehr, Bau- und Wohnungswesen, Heft 787, 2000), dependent on factors like traffic flow, congestion duration and severity, and speed limit without active VSL.

VSL at intersections have very different effects due to the situation, traffic flows, etc., but if locations are chosen wisely, a decrease in personal injuries and fatalities in the range of 15-40% can be expected (Results from Swedish trials with VSL, Swedish Road Administration, 2008).

VSL used in foggy conditions is proved to reduce accidents by up to 80% when used in combination with other Traffic Management measures like Dynamic Route Information Panels (Bundesministerium für Verkehr, Bau und Wohnungswesen, Heft 787, 2000).

Environmental impact

VSL systems on motorways positively affect the flow of traffic and reduce traffic-related congestion and accidents (and the consequence of further congestion development). Improving the free flow of traffic reduces noise and pollutant emissions (emissions reduced by between 2 % and 8 % depending on the individual pollutant considered with VSL on the M25 in the UK). VSL can also be used for environmental purposes, with a reduced speed limit to mitigate noise and emissions when there is no congestion.

Network efficiency

Demand-oriented speed control improves the flow of traffic in the complete network area concerned. The duration of congestion, and thus the loss in operational costs and time costs, is considerably reduced as the existing section capacity is optimally used. For motorways, traffic flow and throughput can be increased by up to about 15%. Another effect is a more even flow, which has a positive effect on both traffic safety and throughput. For example, on the French motorway A7, individual speed variability has decreased from 7 km/h to 2 km/h with VSL.

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Examples of applications

Variable speed limits may be used as stand-alone systems or combined with other traffic management services. Furthermore, VSL may be used in different operating environments (types of roads) and with different benefits in mind.

Stand-alone use of VSL

VSL can be an effective tool in many environments and on several types of roads, like motorways, trunk roads, urban and semi-urban road networks and also at intersections. Some examples:

- On motorways to mitigate throughput problems as well as to increase traffic safety due to high traffic volumes and recurring congestion.
- On urban and semi-urban roads and networks to mitigate environmental problems, e.g. low air quality or noise.
- At intersections to increase traffic safety and maintain a high through put when there is no conflicting traffic.
- On road segments where severe weather conditions occur on a regular basis.

VSL together with other traffic management services

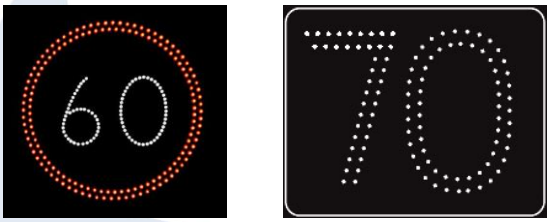
The most common use of VSL is as one part of motorway control systems including dynamic lane management and in some cases incident warning and other traffic management and traffic information services like journey times and traffic diversion. Other examples are:

- Hard shoulder running is most often used together with VSL to achieve an acceptable level of safety when the hard shoulder is used as a lane.
- Overtaking bans for heavy goods vehicles can be combined with VSL.

User interface – the variable speed signs

Variable speed signs may be "*discontinuous*", which in practise means, in most cases, that LED technology or some other light emitting technique is used. "*Continuous*" signs use reflective surfaces and are therefore similar to fixed speed signs.

Furthermore, variable speed signs can be either *mandatory* or *advisory*. Mandatory signs have the maximum speed enclosed by a red ring, whereas advisory speed signs are rectangular and the advised maximum speed can be enclosed by a white rectangle.



Examples of an advisory variable speed sign (left) and mandatory variable speed sign (right).

Further Information

dg.its-platform.eu

Questions and help

dg.its-platform.eu/user-support

www.its-platform.eu

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