



Shortcut to the future.
Lisbon • November 16th-18th

Use of mobile variable signs at road works –

Experiences and evaluation results



Agenda

- Background
- General effects
- Different types of mobile variable signs
 - Swap signs
 - LED signs
- Evaluation results from M11 (LED signs)
- General experiences
- Questions



Background

- In connection with smaller and medium sized road works the Danish Road Directorate (DRD) has focused on improving conditions concerning:
 - The level of service (traffic flow)
 - Safety of workers
 - Traffic safety
 - Quality of service for the road user (information etc.)
- To improve these conditions the DRD has begun using mobile variable signs



General effects

- More accurate signposting
- Greater respect for signposting and increased safety for road workers
- Safer establishment and operation of variable signs
- Improvement of effective working time at road works
- Improvement of daily working hours to set up and dismantle signposting
- In case of accident or changed plans for road works the signposting can be changed immediately



Swap signs – some pictures





Swap signs

- Weighs almost the same as conventional signs
- Easy to install and remove
- Activated on-site by using remote-control or by a web-based management system
- Communication by GPRS

Swap signs can be used at all small and medium road works when:

- Only 2 traffic messages are required to be displayed
 - Work at crash barriers
 - Maintenance along the road



LED signs – some pictures





LED signs

- Weighs approximately 60 kg (including sign pole)
- Possible to show several traffic messages
- More difficult to install and remove than the swap signs
- Operated from the traffic management centre
- Communication by GPRS and positioning by GPS

LED signs can be used for small and medium road works when:

- More than 2 traffic messages are required to be displayed
- Road works are stationary more than two weeks
 - Bridge works
 - Road works requiring several changes in lane course

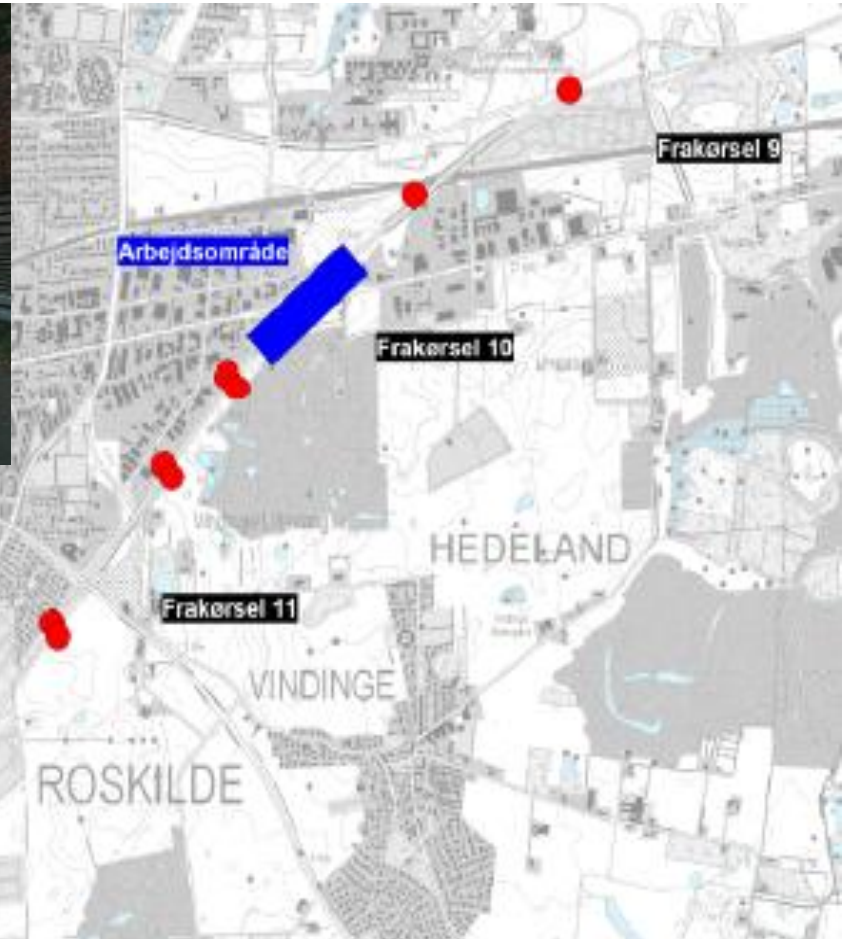


Evaluation results from M11 (LED signs)

Background

- Bridge works at motorway M11 - 30 km west of Copenhagen
- 2 bridges – 2 working areas
- 28 LED signs
- Typically 80 km/h in and between working areas
- Lower speed limit in shorter periods
- Signs controlled from traffic management centre

Design of ITS system





Evaluation focus and execution

Focus

- Traffic impacts
- User satisfaction
- Satisfaction among construction contractor personnel on site

Execution

- GPS data collected
- Questionnaire handed out
- Interviews with involved contractors



Traffic impacts

- In the before-situation when posting a fixed speed limit at 110 km/h – the road users drive approximately 100 – 110 km/h
- In the after-situation when posting a variable speed limit at 100 km/h – the road users drive approximately 90 – 100 km/h
- In the after-situation when posting a variable speed limit at 80 km/h – the road users drive approximately 80 km/h



User satisfaction

- 95 % answer that the variable signs are visible
- 90 % understand the signposting correct
- 75 % answer that they never or rarely drive faster than limited
- 33 % answer that they have a greater respect for variable signs than fixed signs
- 75 % believes that the variable signs have a positive effect on the traffic flow
- 80 % believes that the variable signs have a positive effect on the traffic safety



Satisfaction among contractor personnel

- The contractor personnel expressed that starting difficulties have had some influence on the system functionality
- The contractors have not experienced the working area as either more or less safe as a consequence of using mobile variable signs

General experiences

- Power consumption must be limited, so the device can be operated on battery power / solar cell
- Operation of the equipment shall be done remotely operated and contain a safe logging
- Equipment must be mobile and easily removable