

# Adaptive Signal Control in Aalborg

Skandinavisk

Trafiksignalkonference

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Ingeniør

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# Agenda

1. New Signal Monitoring System in City of Aalborg
2. Implementation of Adaptive control - SPOT - on Østre Allé
3. Effects of SPOT
4. Experiences and assessments



# The City of Aalborg



## Facts

Total population  
200,000 inhabitants

City population  
120,000 inhabitants

Road network:  
2000 km

111 Traffic signals



# New Signal Monitoring System

## Background

- **The Central needed to be replaced**
- **Updating of EC-Trak (old system) had stopped**
- **Several requirements considered:**
  - **Open protocols = expensive in the short run**
  - **Maintenance friendly solution = cheap in the short run**

## Final solution

- **Omnia Utopia platform**
- **Hosting based on a subscription agreement for 4 years**
- **Makes central coordination possible**
- **The supplier owns the central server**
- **Communication equipment installed in all controllers**

# New Signal Monitoring System

## Omnia Web Desktop



Oversigtskort



Anlægsbillede



Signal gruppe diagram



Vejtidsdiagram



Status rapporter



Trafik data



System Overview

**Map View**

**Signal Group  
Diagram**

**Status Reports**

**System  
Overview**

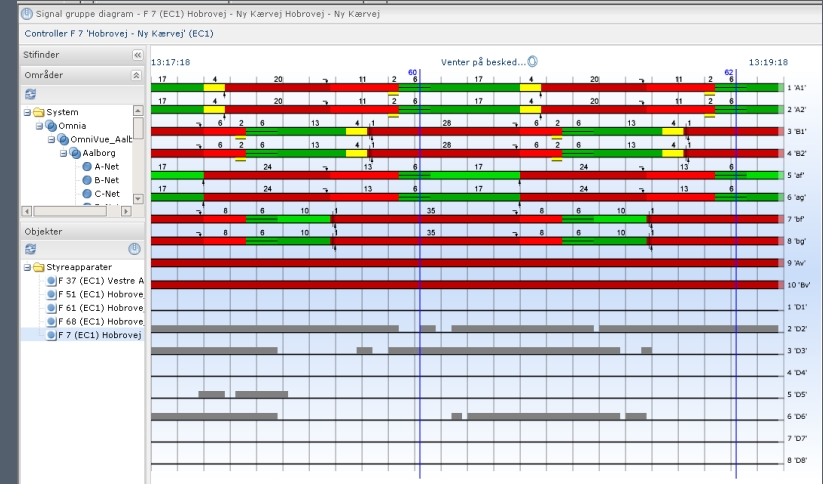
**Junction View**

**Time Space  
Diagram**

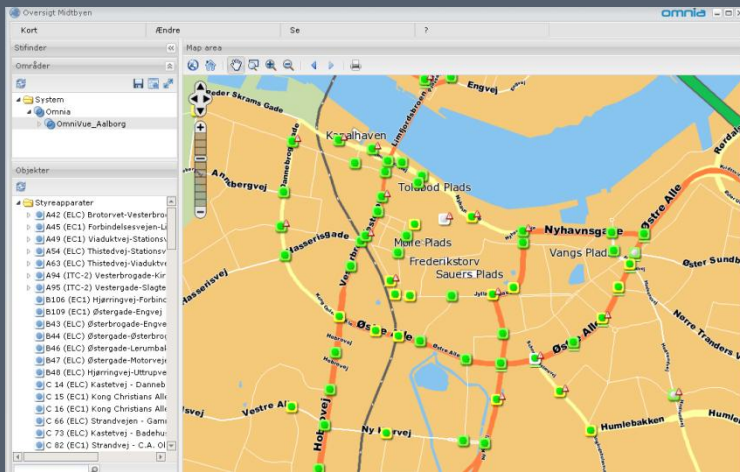
**Traffic Data**

# New Signal Monitoring System

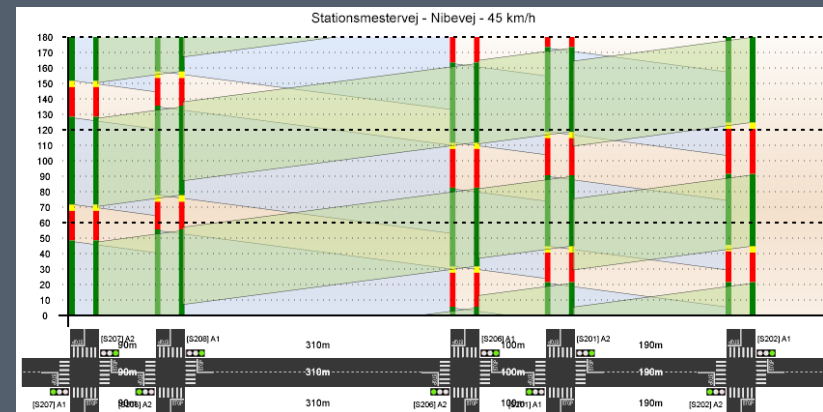
- Site acceptance test in October 2010
- Delivery in March 2011
- Some "teething problems"
- The Web platform has some limitations



Signal Group Diagram



Map View



Time Space Diagram

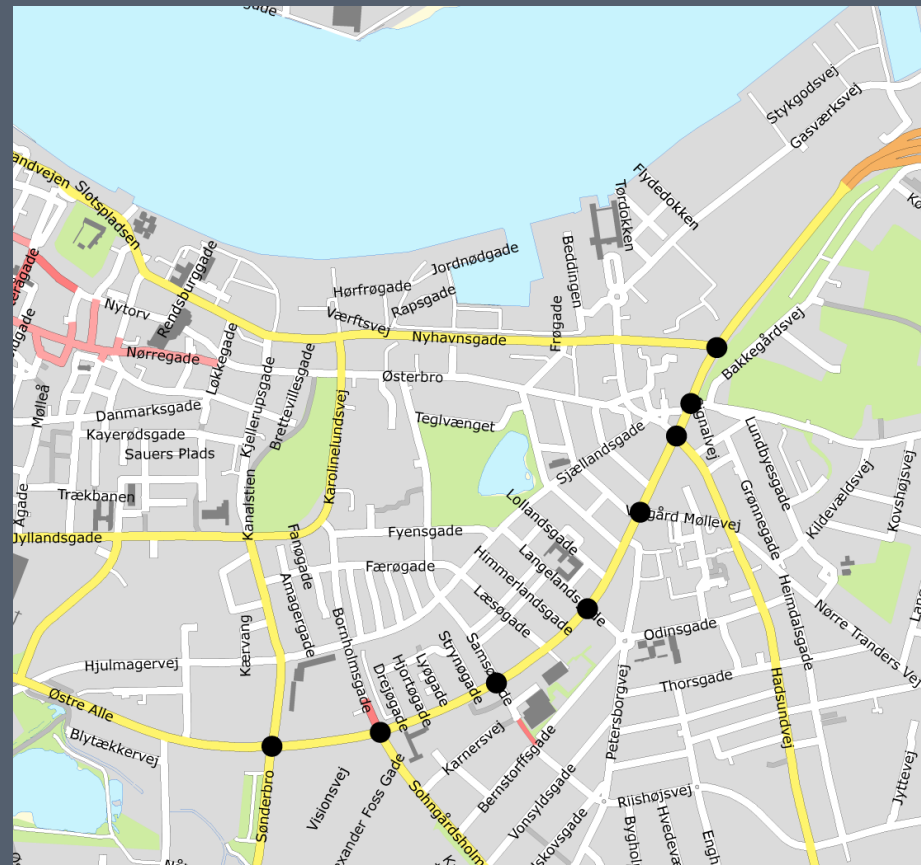
# Implementation of SPOT

## Background and purpose

- Dynamic signal control on Østre Alle aimed at reducing traffic along the harbour front
- Traffic flow on Østre Alle: 20,000 Vh/day
- Part of CIVITAS-ARCHIMEDES – EU project (Task: Congestion monitoring using telematics in Aalborg)

## What is SPOT?

An adaptive signal system, which continuously calculates incoming traffic to each intersection and makes a forecast of the total traffic flow through the system for the next two minutes. The forecasts are based on detecting traffic flow on 80 loops placed in the asphalt in the roadways around each intersection.



# Implementation of SPOT

## Basic conditions:

- **8 Intersections**
  - 4 intersections with heavy side road traffic (major roads)
  - 4 intersections with less side road traffic (local roads)
  - Double intersection at Sohngårdsholmsvej
- Important bus line crosses at Bornholmsgade
- Prepared for bus priority in 4 more intersections
- Bicycle Commuter Route to the University crosses at Samsøgade
- New building area (stores, dwellings etc.) connected in a new signalised intersection

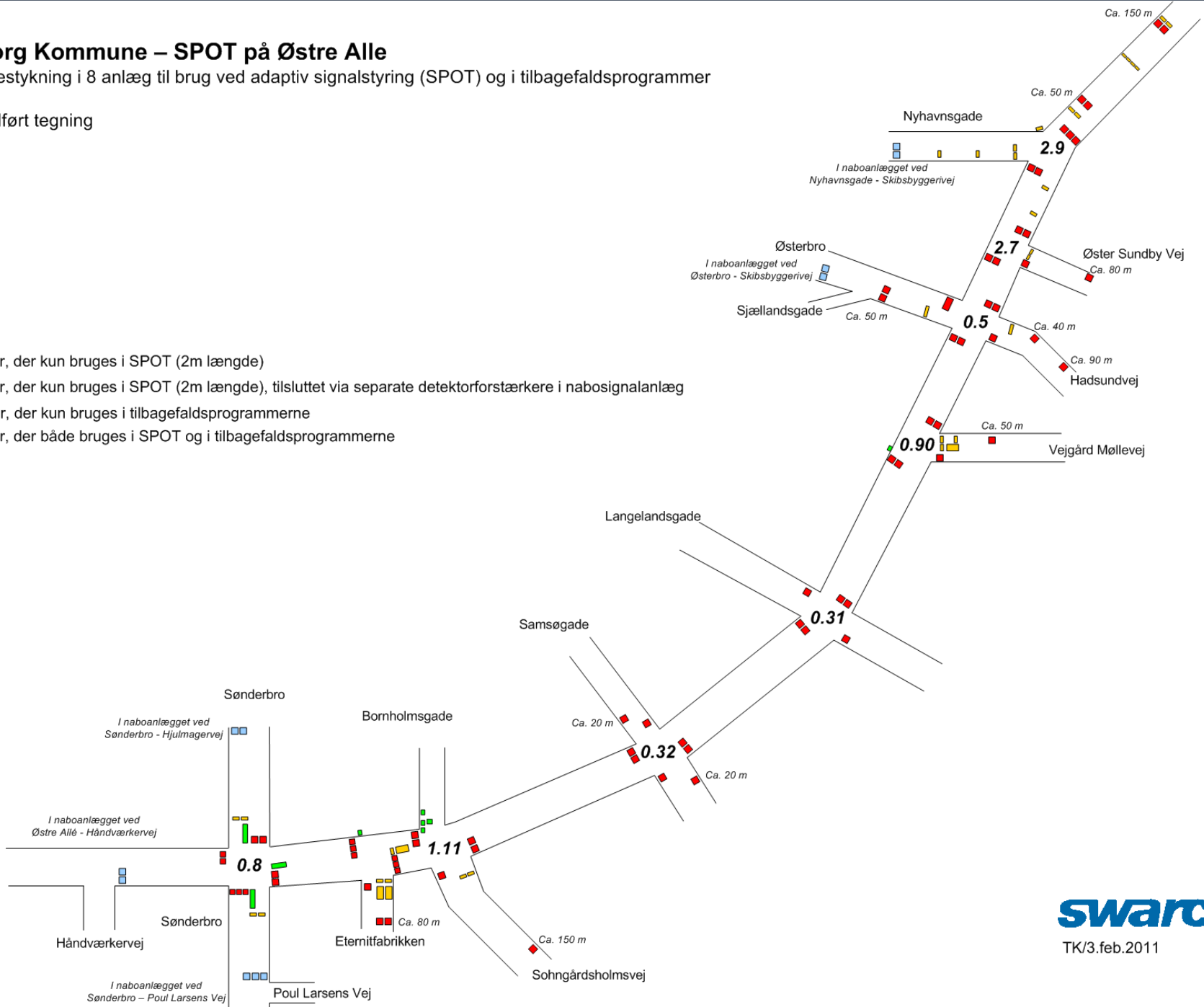


# Aalborg Kommune – SPOT på Østre Alle

Spolebestykning i 8 anlæg til brug ved adaptiv signalstyring (SPOT) og i tilbagefaldsprogrammer

Som udført tegning

- Spoler, der kun bruges i SPOT (2m længde)
- Spoler, der kun bruges i SPOT (2m længde), tilsluttet via separate detektorforstærkere i nabosignalanlæg
- Spoler, der kun bruges i tilbagefaldsprogrammerne
- Spoler, der både bruges i SPOT og i tilbagefaldsprogrammerne

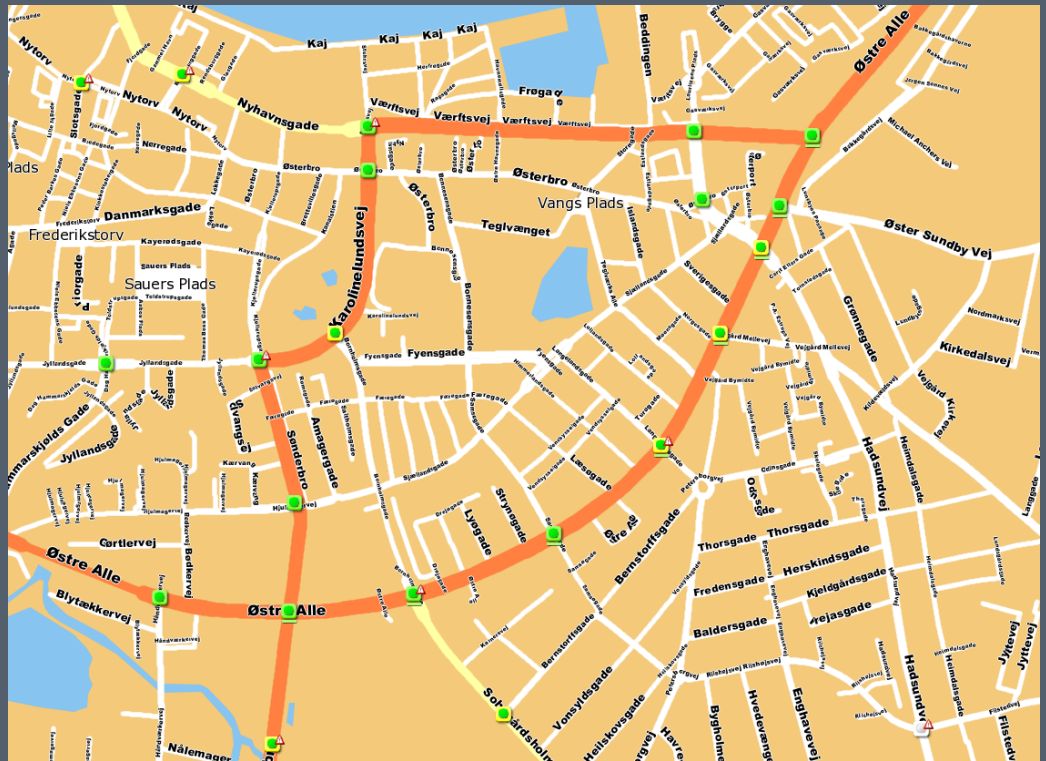


TK/3.feb.2011

# Implementation of SPOT

## Equipment and project design:

- New communication equipment in controllers
- 3 controllers replaced
- 80 new SPOT loops
- Fall back programs based on the original coordinated programs
- SPOT Traffic model based on Traffic counts and fall back programs



Map View – showing the 8 SPOT intersections

# Implementation of SPOT



- Was planned to start November 2010
- SPOT started as testsystem from March 2011
- Site Acceptance Test completed – yet not approved
- Modification on SPOT ongoing (modified last week)

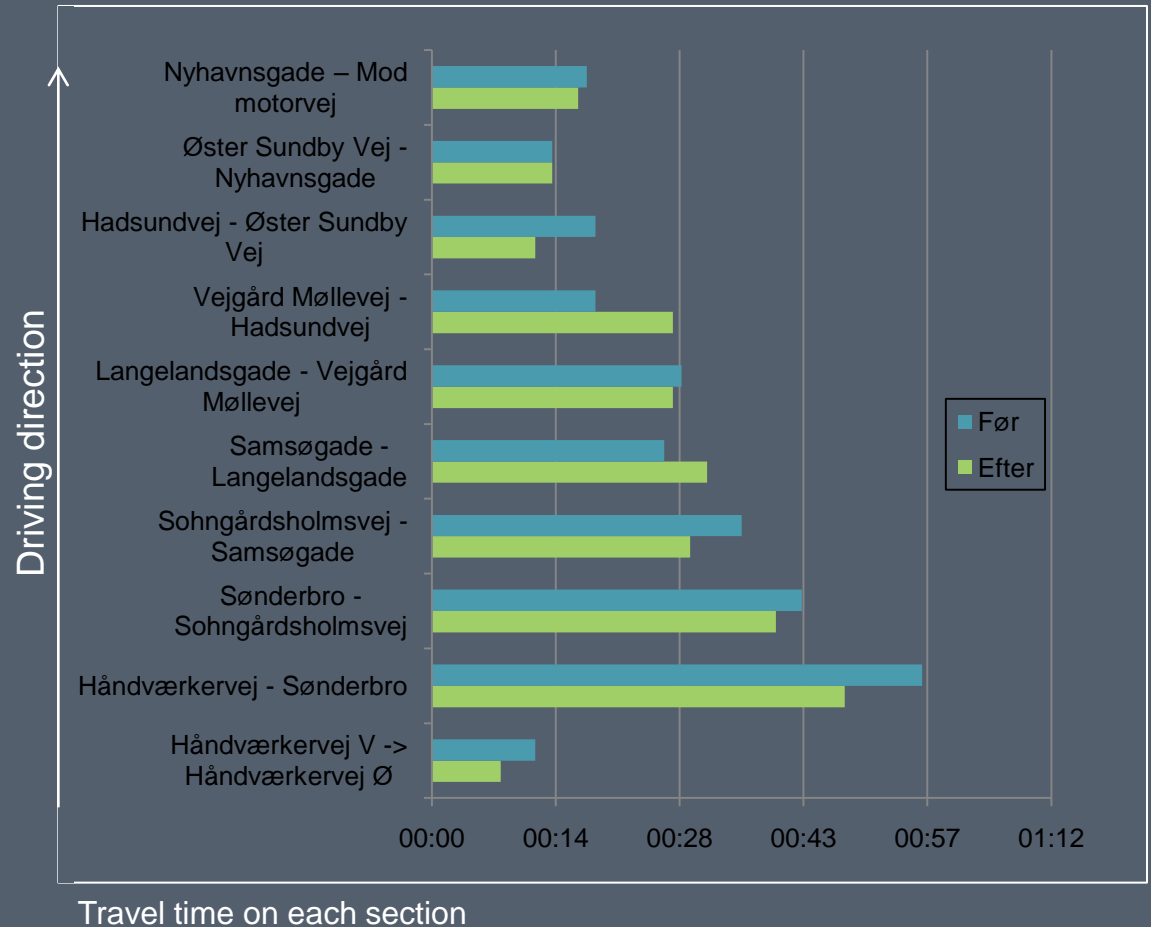




# Effects of SPOT

## Temporary results before modification of SPOT

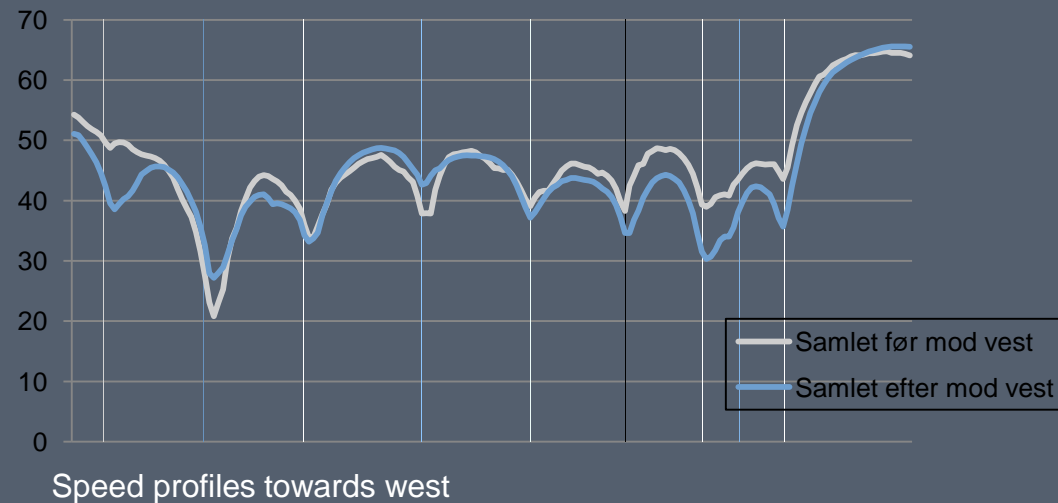
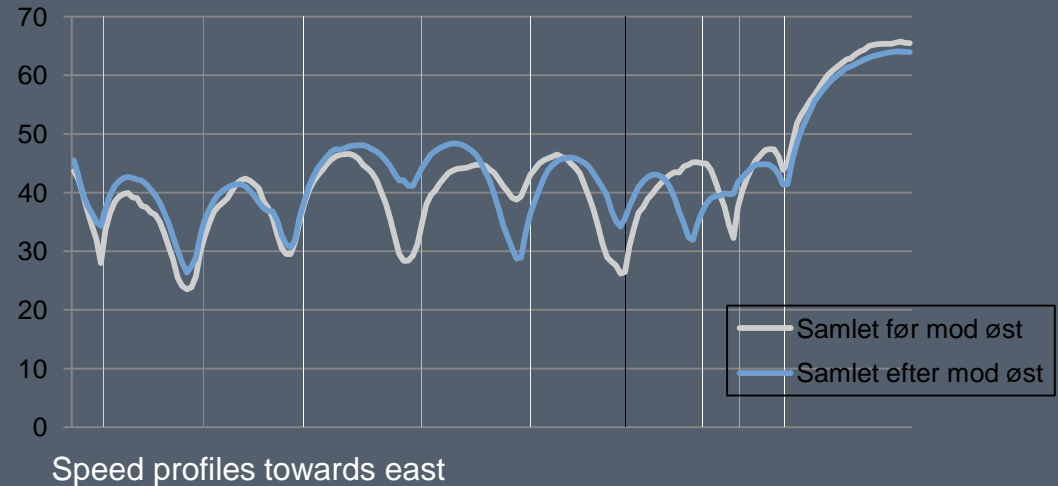
- **Travel time (total)**
  - - 5 % towards east
  - +7% toward west
- **Travel time in the afternoon**
  - - 15 % towards east
  - - 5 % toward west
- **Overall no significant changes regarding travel time**



# Effects of SPOT

## Speed profiles

- Towards east :  
The lowest speed levels have increased on the majority of sections
- Towards west :  
The lowest speed levels have increased on the western parts - decreased on the eastern parts.
- In general no significant changes in the speed profiles
- Equalising of the speed levels - the lowest speed levels have increased



# Experiences and assessments

## Omnia hosted websolution

- **Advantages:** The web solution is acceptable - useful functions - automatic update of versions - flexible user entrance
- **Disadvantages:** "Teething problems" - update speed - time consuming use of signal group diagram

## SPOT

- **Only short working time - still adjusting settings etc.**
- **The effect is positive - but limited and not significant so far**
- **Black Box - Road authority has to devote extra time "using" SPOT**
- **Depends on the supplier**

