EW Project Nr: SW2-02

A quick and cost effective investment that makes a difference
Project

- **What**
  - Measures on existing road within existing road area (approx. 15km)
  - Better accessibility/capacity and safety
- **How**
  - Addition of a lane
  - System to discover obstructions, monitoring the traffic and informing travellers.
- **Cost**
  - Approx 352 Msek = 35 M€
  - About 8% of building totally new
- **Time**
  - 3 years
- **In operations start of Nov 2012**
The stretch, E4
Background

The stretch Moraberg-Hallunda is:

• An important part of the national road network, also part of TERN.
• Most important south entry into Stockholm
• Very heavy traffic and a lots of goods

High requirement on accessability/capacity and safety.
What actions have been done? – the road

**Two lanes have become three**
- Barrier in the middle and hardshoulder -> Lane
- Increase in capacity approx. 40 %

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**8 emergency parking added**
- 4 between Moraberg and Salem
- 4 between Salem and Hallunda
What actions have been taken? – technical system

Equipment along the road.
- Motorway control system (~100 gantries)
- Cameras (~50)
- Radar (~25)
- WIM – Weight In Motion
- Information signs
- Weatherstation

System in cooperation gives better
- Capacity and safety
- Safer environment for working on the road
- Easier planning and maintenance
Motorway control system (MCS)

**What**
Controls the flow and speed on the stretch.
- Mandatory speed limits
- Lane closure

**Why**
- Increases capacity at rush hour
- Decreases risk of accidents, e.g. hitting from behind
Motorway control system – three functions

Queue warning with recommended speeds

Speed limit at heavy traffic, lowering to 80 km/tim.

Lane closures at accidents and roadworks mm
Incident detection with radar

What
Fast detection and localizing of obstructions.

Why
To make it possible for immediate actions to keep up the safety and accessibility.

Characteristics
• Independent of weather.
• Handles night, fog, snow, rain etc, contrary to cameras
Figure 1  A single stopped vehicle, in this case approximately 100 meters from the closest rada. The camera lens is starting to become obscured, with dust from passing traffic.
Figure 2. A single stopped works vehicle is detected, out of the slow of the moving traffic. The stopped vehicle is not visible all the time from the radar, there are occasional occlusions, however the tracker is robust enough to still generate reliable alarms, even in heavy traffic.
Alarm Number 1: at 09:26, 2nd October 2010
Vehicle slows and stops in nearside lane
Alarm Number 2: at 11:14, 22nd January 2011
Vehicle slows and stops in poor visibility, barely visible in the camera image due to fog
Alarm Number 3: at 14:42, 29th October 2010
Stopped vehicle in heavy traffic
Alarm Number 4: at 12:38, 30th November 2010
Stopped vehicle in Lane 2, vehicles passing on each side
Alarm Number 5: at 03:18, 2nd October 2010
Man Walking on the Northbound Carriageway

Same Man Walking across the Southbound Carriageway
Alarm 6 at 12:20, 15th October 2010
No Debris on the road, prior to the passage of the truck

Truck passes, and drops debris on the edge of the carriageway
Approximately 200m from Radar #1
Incident detection with radar – characteristic

- One unit for all lanes in both direction
- Up to 500 m in each direction.
- Line of sight
- 30 K€ each

ClearWay Radar Incident detection system
Radar, TS350
Navtech Radar Ltd

Tested in Stockholm, in a tunnel and on the motorway
< 1 false alarm/24 hrs
95 - 97% detection rate
Incident detection with radar - Scenario

- The radar detects an obstruction on the road
- Alarm is sent to TMC (Trafik Stockholm)
- An actionplan is triggered and suggest the best camera for verification, and the best actions for this incident
- The operator selects camera and verifies whatever it is
- The operator starts actionplan and:
  - the lane will be closed (MCS)
  - info sent out on all channels.
  - The road assistance car is directed to the spot
In TMC, experience

- Lots of alarms
  - More stops/night then imagined before installation
  - Parking in emergency parking
  - Short stopped vehicle
  - Pedestrian
  - ? How to handle all this?
    - Optimal alarm delay time?
Total cost

- Incident detection compared to cameras
  - No cleaning
  - Further apart, 1000m
  - Designed lifetime (20 years)
  - MBTF 75,000 hrs (8 years)
  - Still cameras for verification
  - During lifetime, half the cost
Weight In Motion

What
Scales that automatically monitor the vehicle with weight, length and distance between wheels when it passes through.

Why
To decrease overloads and increase safety
Weight In Motion – What is good for?

80% decrease in overload since operation of the system 2010

The use
- Overload and unbalanced loading is a safety risk
- Reduces the wearing and hence the maintenance costs
- The road operator has better control of the wearing and therefore better budget planning
- The traffic police is more efficient
- Makes more fair competition in transports
The number of vehicles over 3.5 ton has increased……

Measured during 6 days in October in lane 2, 2010 vs 2011
...but the number of vehicles with overload has decreased

Measured during 6 days in October in lane 2, 2010 vs 2011
Best practices

- 1 extra lane per direction for 8% of the cost for new road.
- Extensive use and integration of ITS systems increases safety, despite no hardshoulders
- 24/7 100% coverage incident detection (open air)
- 80% decreased overload -> decreased safety risks, maintenance costs and fair competition in the transport market.
The End