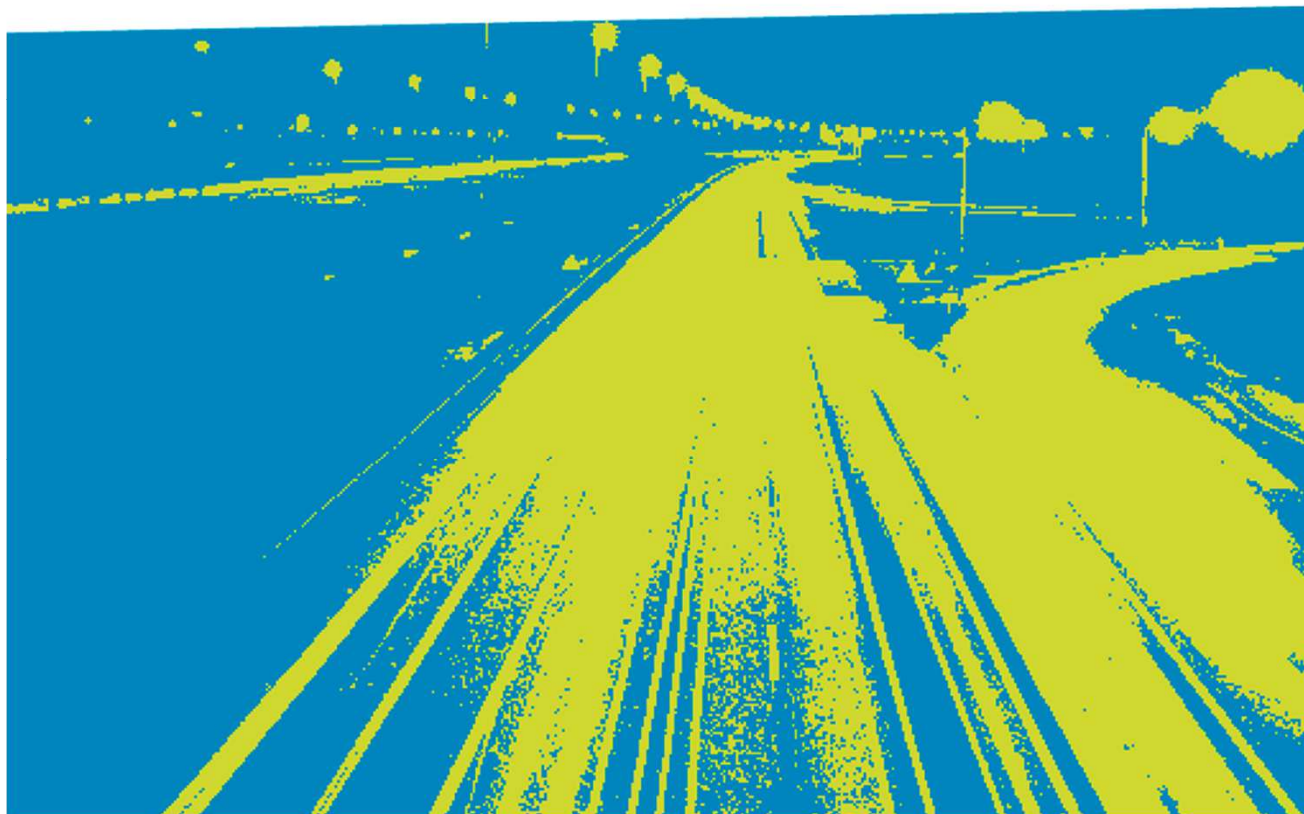


Traffic Management in the Netherlands

Systems and impacts

Henk Taale (with thanks to Rudi Kraaijeveld)

October 5th, 2016



TrafficQuest
CENTRE FOR EXPERTISE ON TRAFFIC MANAGEMENT

Historical example

- August 10th, 1925
- Twister in Borculo
- Severe damage
- Disaster tourism
 - 500.000 visitors in 2 weeks
 - One-way traffic needed

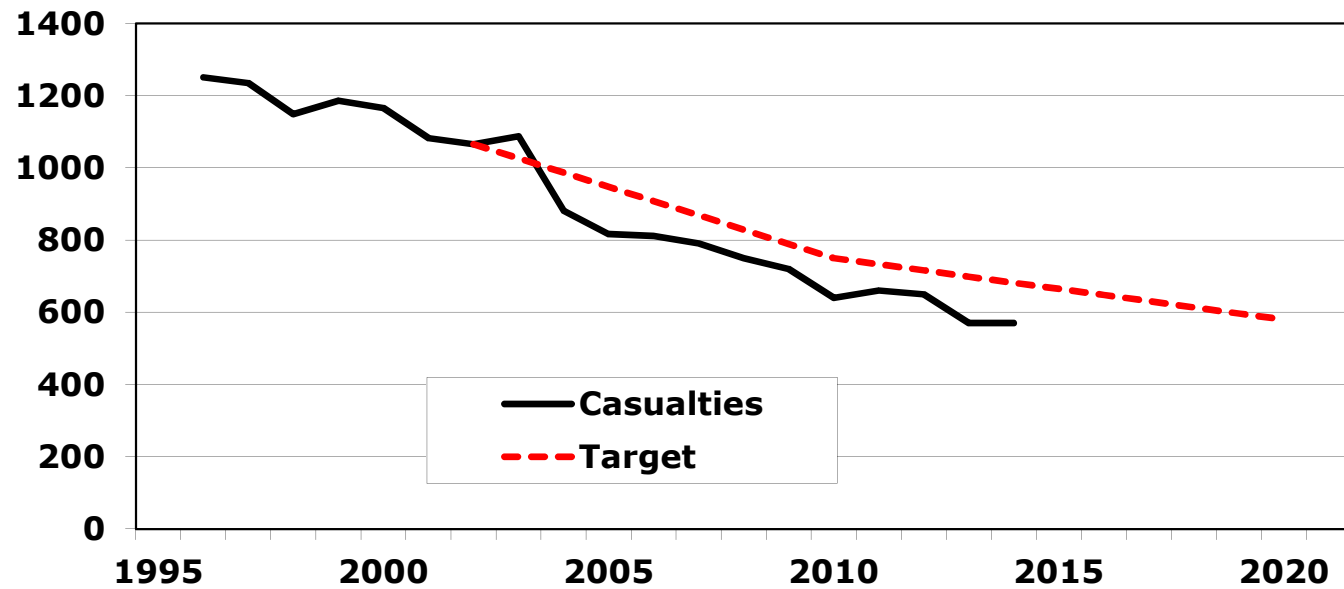


The Netherlands

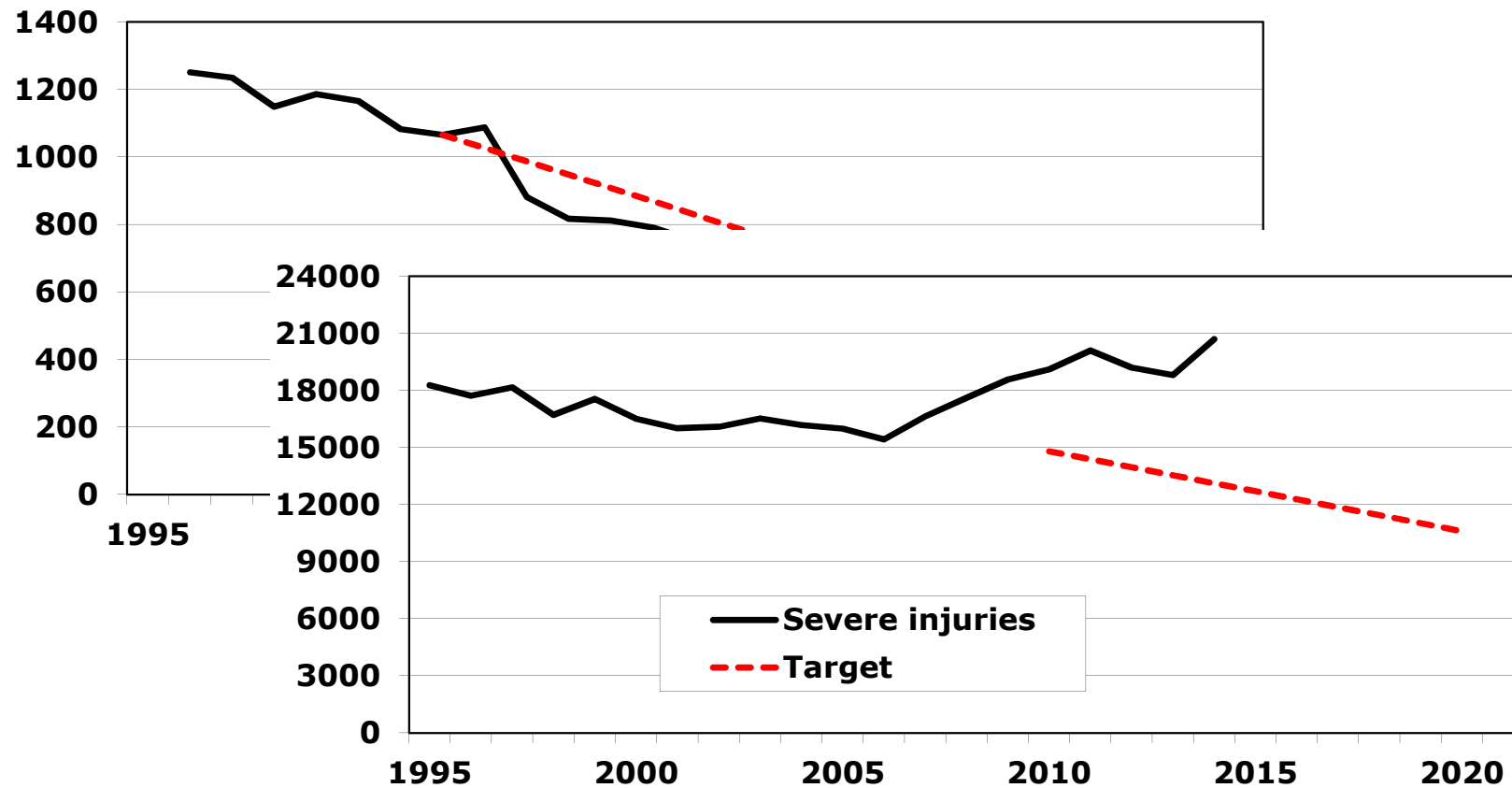
- Area: 41.543 km²
- Population: 17.0 million
- Main roads: 3065 km.
- Motorways: 2471 km.
- TDT: 67.8 billion km.
- Delay: 55.6 million veh.hrs



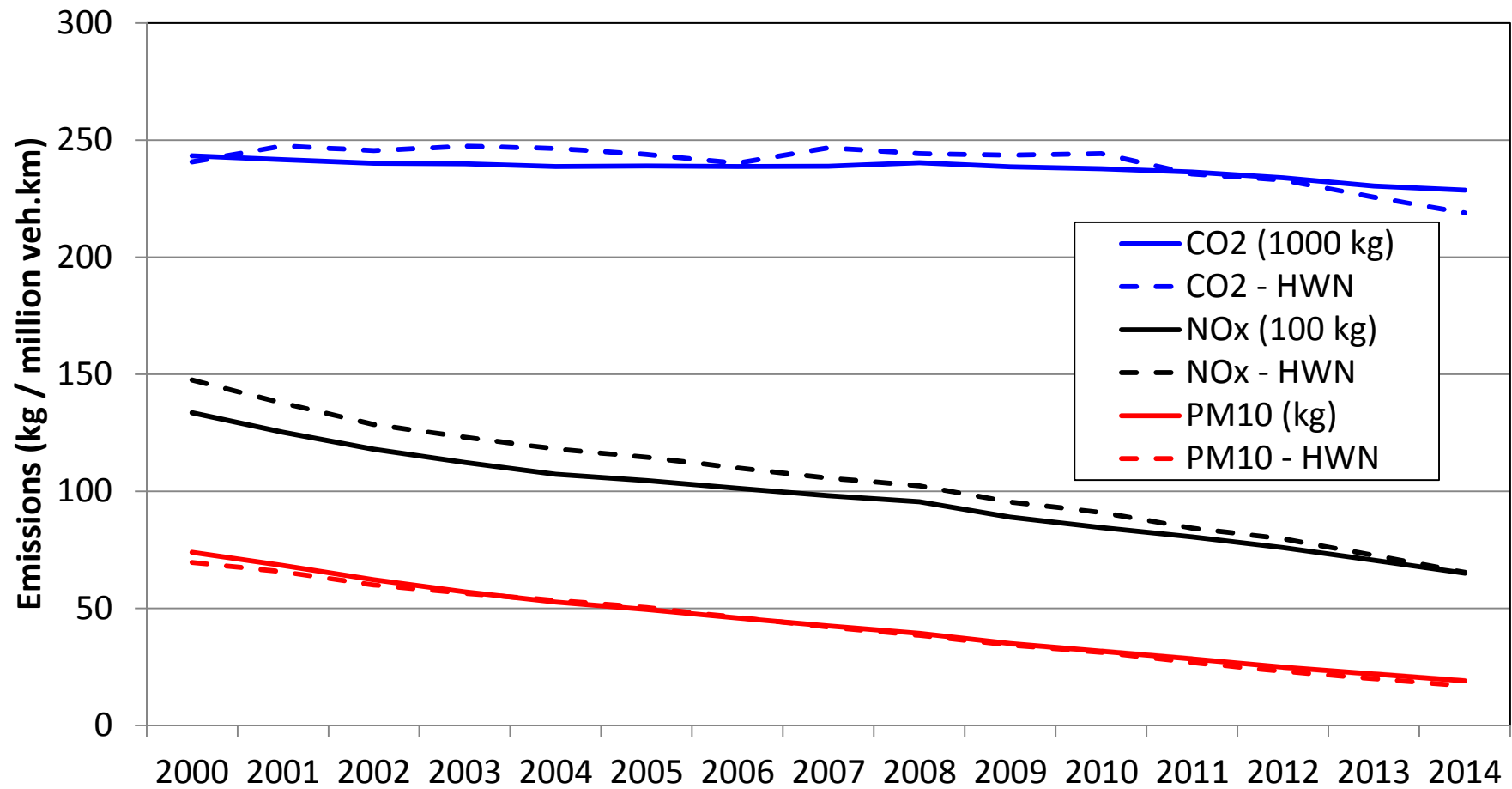
Safety



Safety



Emissions road traffic

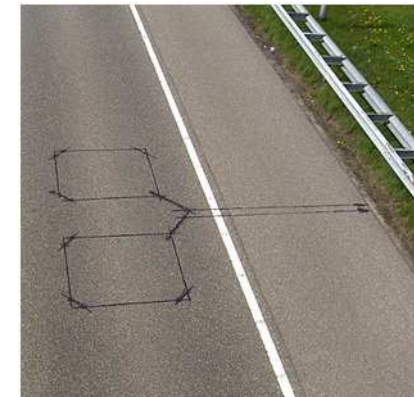


Traffic management systems - Overview

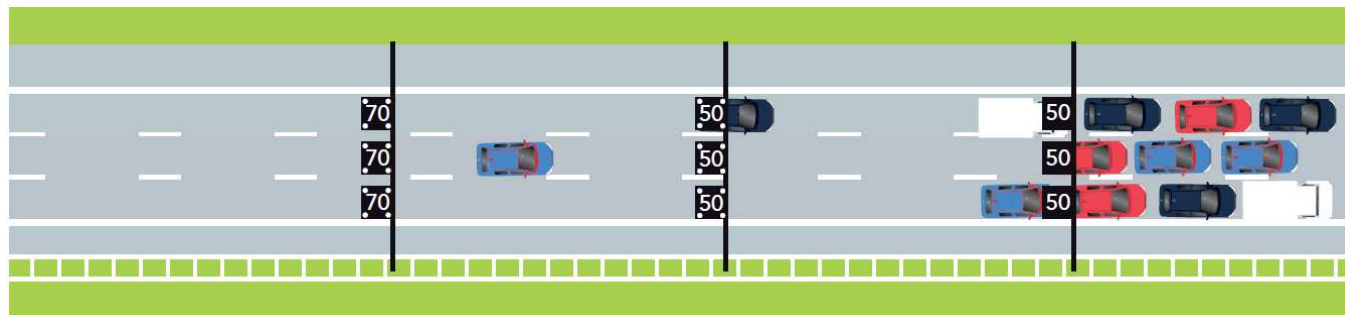
- 5 regional + 1 national traffic control centre
- Motorway Traffic Management System: 2675 km carriageway
- Monitoring with loop detectors: extra 1362 km carriageway
- Dynamic route information (VMS): 115 (text) + 297 (graphical)
- Ramp metering systems: 122
- Traffic signal control systems: 165 (in total ±5600 in NL)
- Hard shoulder running: 180 km
- Dynamic left lane: 158 km
- Lanes for trucks or busses: 337 km

Motorway Traffic Management system

- Functions
 - Automatic Incident Detection (queue tail warning)
 - Dynamic speed limits
 - Lane management (red cross and arrow)
- Loops every 600-900 meters
- Using overhead gantries and VMS



Queue tail warning



- Decrease of 15%-45% in number of accidents (in total)
- Decrease with 35% in secondary accidents
- On average 2% higher capacity
- No effect on air quality or noise

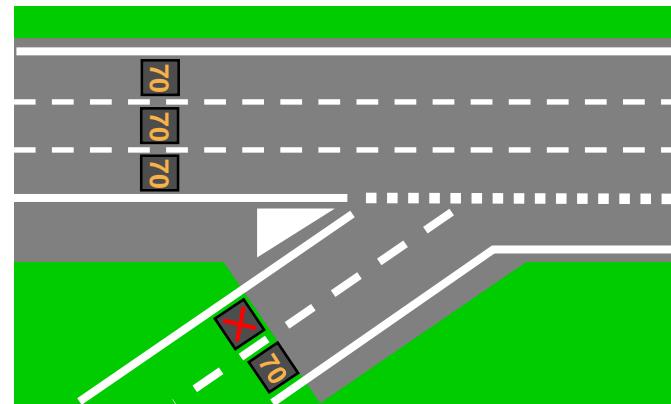
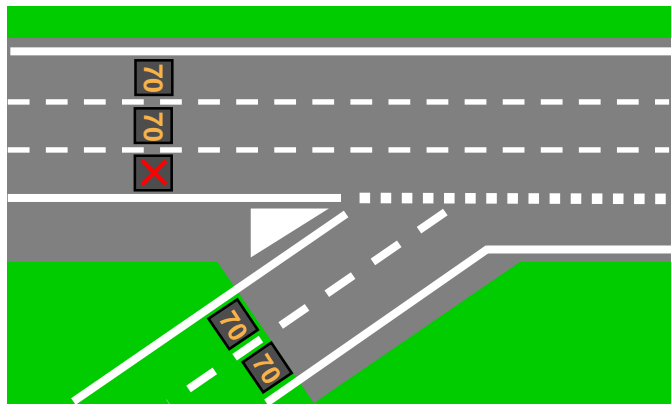
Dynamic speed limits

- Different goals
 - To smooth traffic and to dampen shockwaves
 - To reduce emissions
 - For safety reasons
- Impacts
 - Effect on capacity varies from -9% to +5%
 - Average speed without enforcement -5%, with enforcement -13%
 - Effect on delay is varying: from -24% to +36% (+2% on average)
 - Positive effect on shockwaves and emissions (not if limit is increased)
- Speed limit of 130 km/hr gives 2 to 4 km/u higher speeds



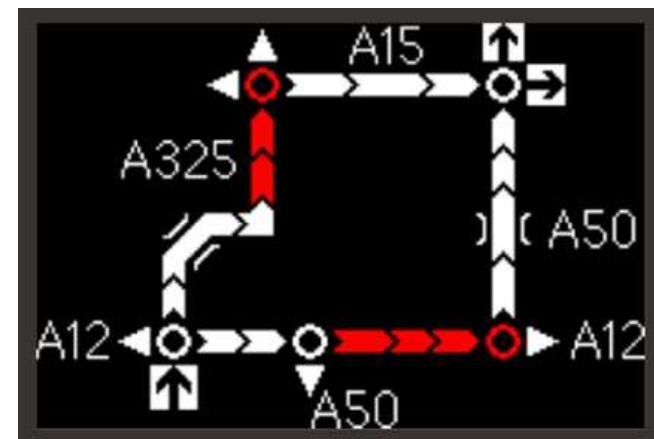
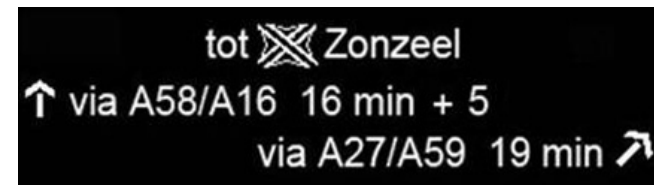
Lane management

- During road works and incidents
- Interchange merge control
- Impact on congestion: -3% to -37%



Dynamic route information

- Information on travel times
- Graphical information
- Impacts on road users
 - Changing route motorways: 4% to 12%
 - Changing route in the city: 2% to 3%
 - With incidents: 4% - 29%
 - Information is clear: 75% - 97%
 - Preference for travel time: 50%
- Impact on congestion: 7% - 30% less



Ramp metering

- Goal
 - Improvement of the traffic conditions on the motorway
 - Take into account conditions on the on-ramp and connecting roads and junctions
- Discussion with road authorities of connecting roads
 - Queuing and blocking back
 - Alternative routes
 - Coordination with traffic signals

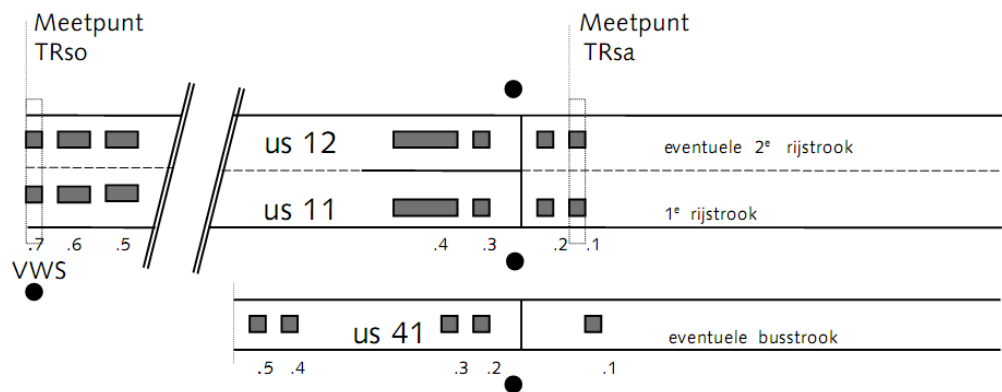


Video ramp metering



Impacts ramp metering

- Increase capacity motorway: 2% (5% max), speed: +3 km/hr
- Less delays: 11% on average
- Less (-50%) and less severe shockwaves
- Somewhat higher emissions: from 1% to 4%



Hard shoulder running

- Goal
 - To make a temporary usage of the hard shoulder possible in a safe manner to reduce congestion



Incident!

Hard shoulder running: bus only

- Measures
 - Speed limit for busses (50 km/h)
 - Emergency refuge areas
 - Static sign with ‘In case of traffic jam, bus on hard shoulder’
- Results depended on
 - Length road stretch
 - Number and severity of traffic jams
- Advantage in rush hour
 - Decrease of travel time: 10 min average
 - 8 min faster than car traffic



Hard shoulder running: all traffic

Dynamic left lane



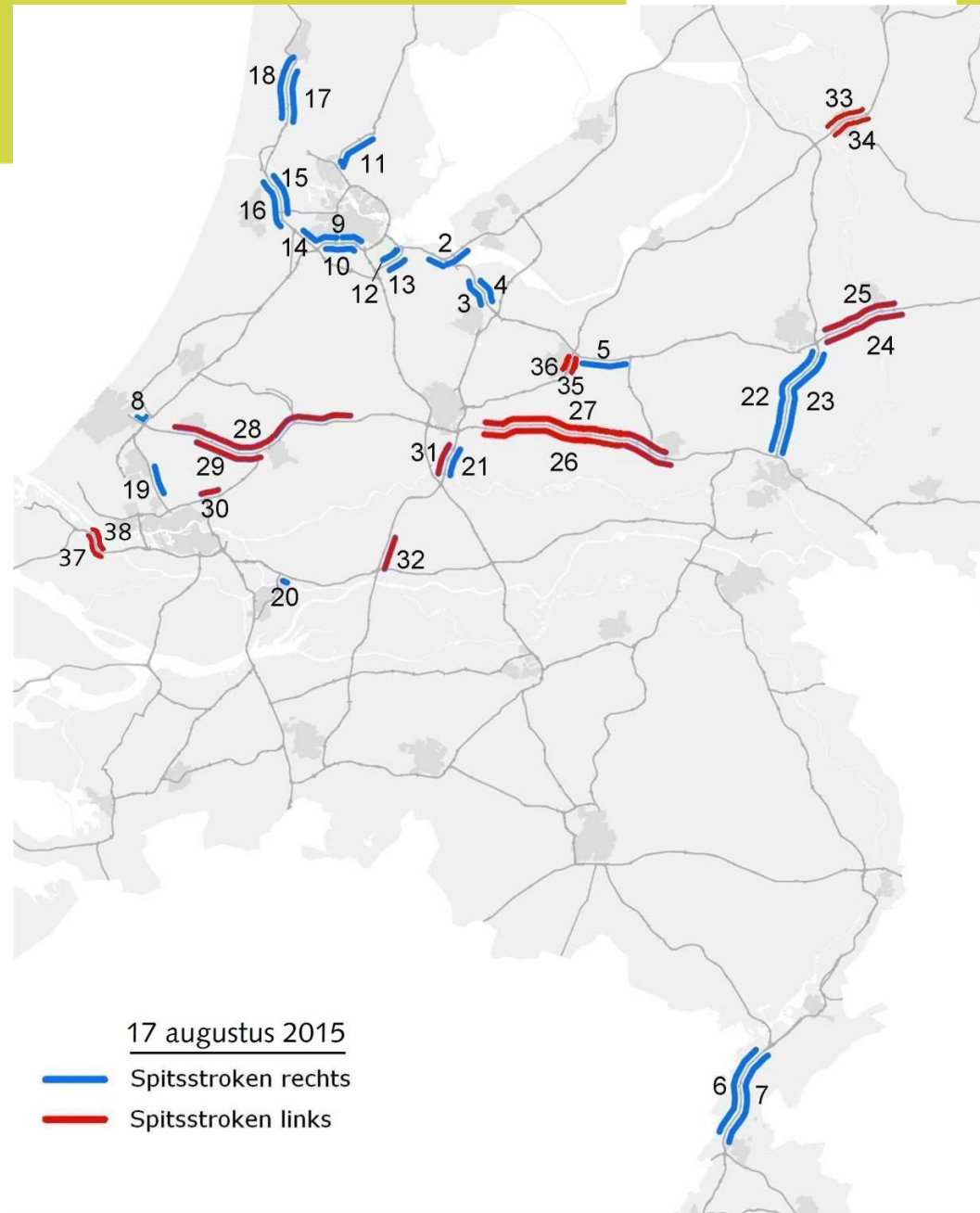
- Redistribution of carriageway
- Extra narrowed lane on the left
- Hard shoulder always available

Hard shoulder running (HSR)



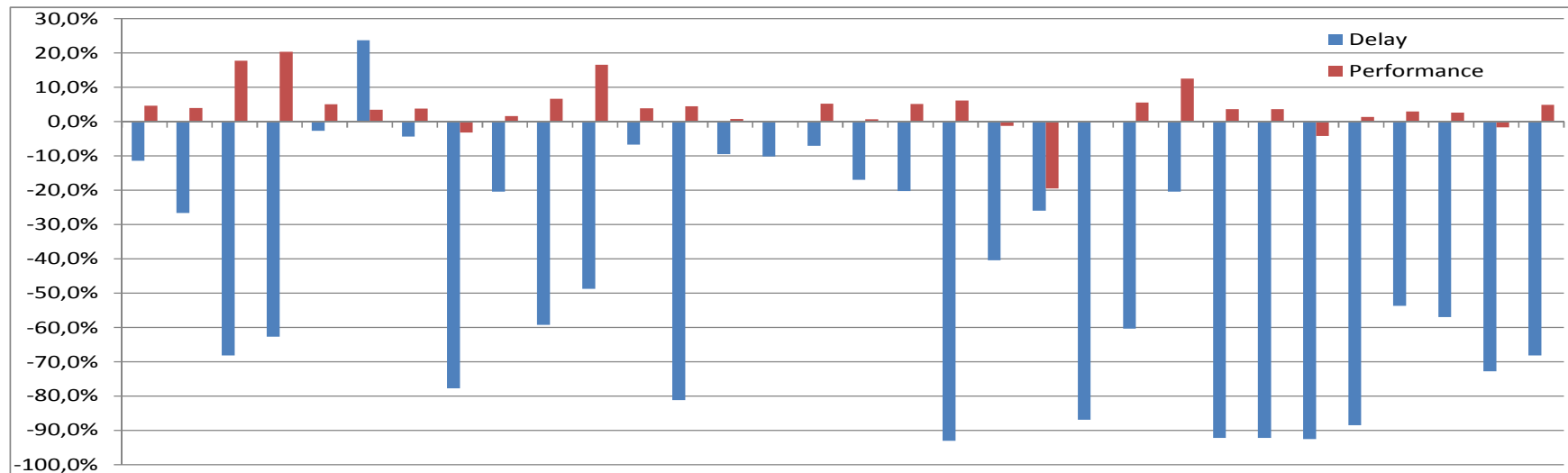
- No redistribution of carriageway
- Use of the hard shoulder during peak hours

Locations



Impacts on traffic

- Capacity increases: from 7% to 37%, 20% on average
- Performance (extra traffic) increases: 3% on average
- Delays decrease: 42% on average

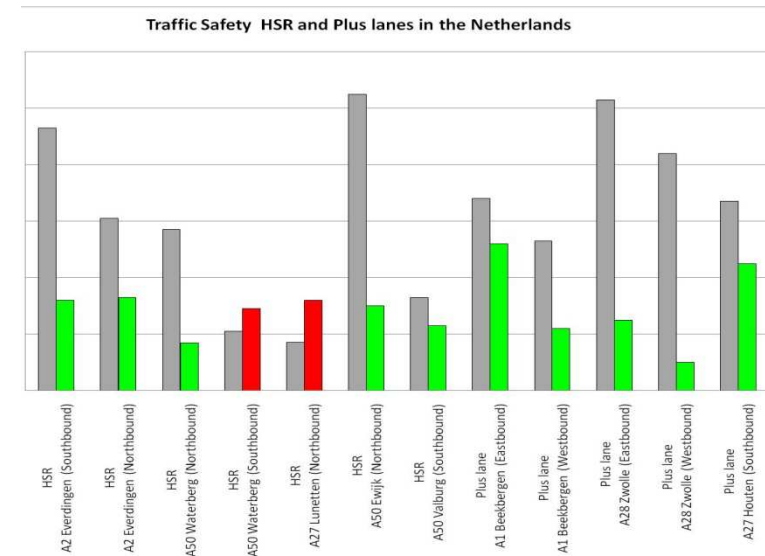


October 5th, 2016

2016-12/20

Impacts on safety

- Significant improvement traffic safety: 25 - 85% less accidents
- Profits for most part by elimination of upstream congestion
- 4 rear end accidents due to breakdown vehicles (2000 – 2014)
- 2 locations (red coloured) negative impact due to complex design -> solved with re-design



Additional safety measures HSR

- Emergency rescue areas (every 1000 m)
- CCTV surveillance on total length of HSR section (200-250 m)
- Trigger warns operator of start of congestion
- Overhead signals and Variable Message Signs
- Dynamic speed reduction to 100 km/h or 80 km/h
- Public Lighting
- Overtaking ban for trucks
- Incident Management (Traffic officer within 15 min on scene)

Opening procedure

HSR closed

1. Pre-inspection



2. Turning Signs

3. Arrows on overhead signals

4. Final inspection (within 60 sec!)



5. Removing red cross

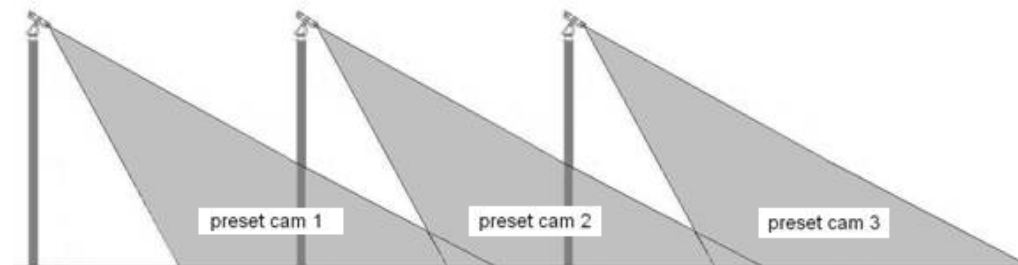
6. Turning of route signing

HSR open



Cameras

- Cameras along the hard shoulder available for operator
- PTZ-camera's (approximately) every 250 m
- For IM during opened and closed hard shoulder
- For inspection of the hard shoulder before opening
 - Designed to see an object of 50x20x20 cm
 - Max. 60 sec (24 cameras) before opening hard shoulder section
 - Predefined settings:



Truck lane

- Goal: less delay for trucks on A16
- 90% of trucks uses lane
- Travel time trucks: -1 min
- Travel time other traffic: +1 min
- Emissions: no change
- Noise: lower
- Safety: no change



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