

Road safety measures on Swedish roads



TRAFIKVERKET
SWEDISH TRANSPORT ADMINISTRATION

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Main accident types

- Head-on crashes

- Median barrier, centerline rumble strips... ..

- Roadside crashes, rollover accidents

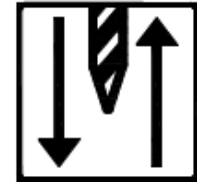
- Safety zone, roadside barrier, slopes

- Intersections



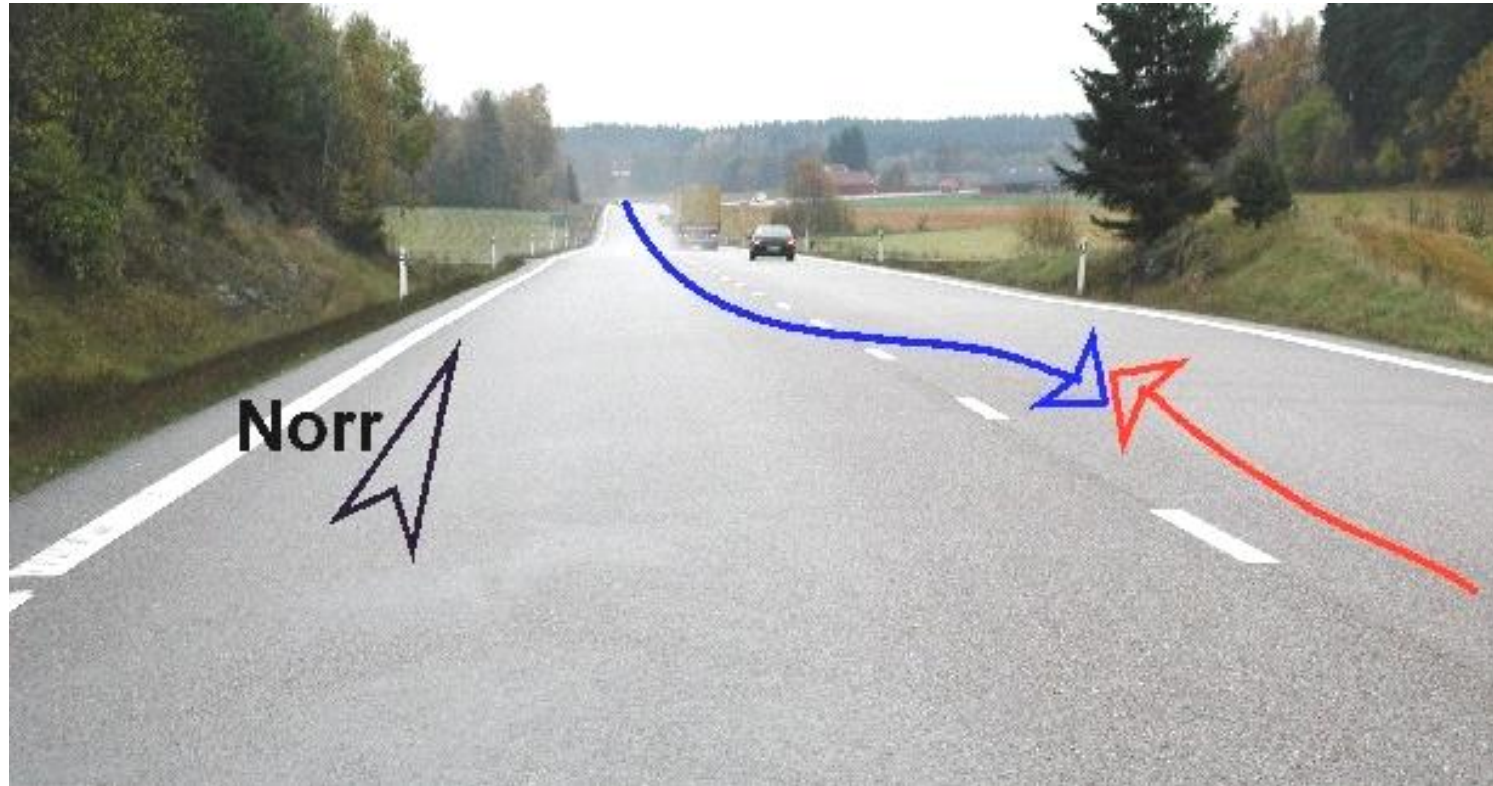
- Vulnerable roadusers

- Separation, traffic islands, speed reduction



Mae'r arwydd
ffordd "tei"

Head-on crashes



**Typical accident:
Blue car has by some reason
crossed the median.**

*(In Sweden 10-15% during overtaking
but in e.g. Germany 50-60% during overtaking)*

Head-on crashes



Result: Not enough space to survive

Head-on crashes



**Result: Less damages on the truck, but
it can loose steering ability**

Head-on crashes

What to do with:



Wide roads ?



Normal or narrow roads ?

Wide roads (13 m) (42ft 8in)

2+1 with median separation ??

Feasibility study in 1996:

400 fatalities/year on
100 000 km (62500 mi) public roads

On ~ 4 000 km (2500 mi) wide two-lane roads around 60 people were killed every year in head-on crashes.

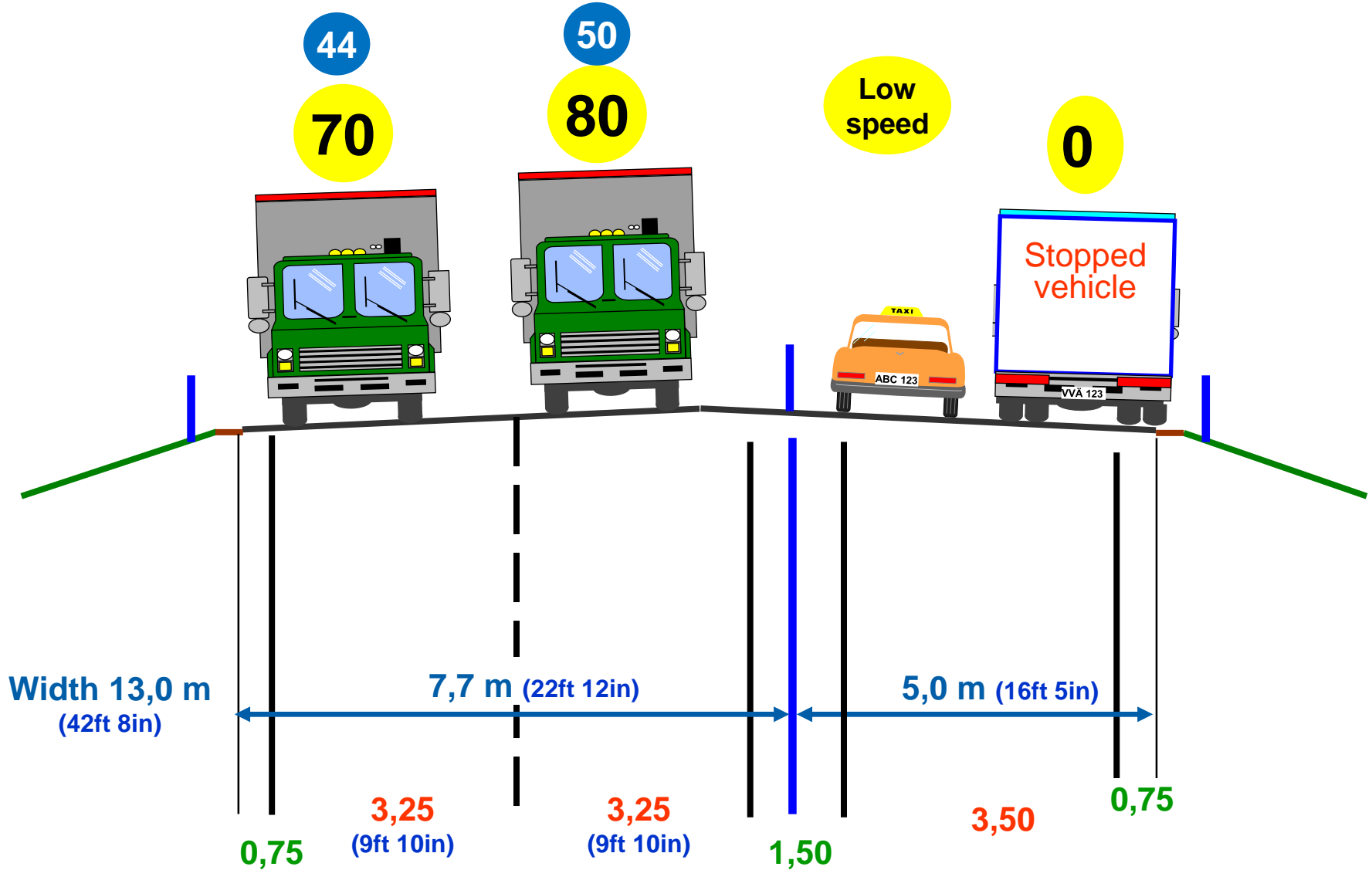
Those 60 should probably have survived

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if there had been a median barrier.



Cross section 2+1 road

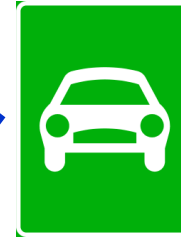


Experiences - safety



2+1 roads 1999 to 2016:

~ 400 km semi-motorway
~ 2500 km two-lane roads
~ 1800 mi



Experiences so far:

- ~ 50 people less killed every year
- 70-75 % less killed/severe injured (*80% less killed*)
- Increased average speeds !
- No severe maintenance problems (except repairing barriers)

Experiences - costs



Average construction costs:
(From an existing road in good shape)

Semi-motorway: 300-350 000 £ / km (200 000 £/mi)

Normal 2+1: 325-500 000 £ / km (250 000 £/mi)

Average increased maintenance costs:

About 1500 £ / km /year (940 £/mi)

Barrier crashes

Winter maintenance

Road works (safety for road workers more expensive)

Median barrier - cable



Median barrier – steel beam



Median barrier - cable



10 tons 70 kph (44 mph) 15 degrees (H1)

Median barrier - cable

Motor cycles ?



Median barrier - cable

Motor cycles ?



The Swedish National Road and Transport Research Institute

Median barrier - cable

Motor cycles ?

The fatality risk for motorcyclists
related to other vehicles is

> 18 Times higher.

**The fatality risk or FSI-risk for motorcyclists
on collision-free roads have not increased.**

**On the contrary, it can be stated that FSI and
fatality risks for motorcyclists have been
reduced by 40-50% on 2+1 roads
(with cable barrier).**

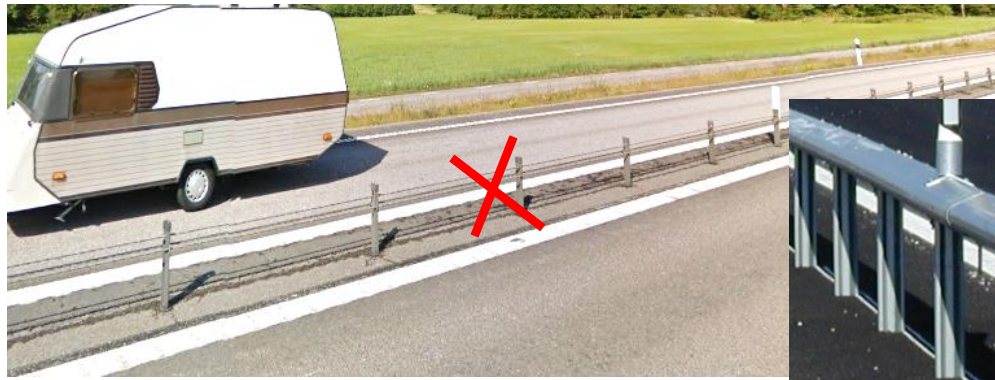


Median barrier – cable ?

Motor cycles ?

The new Road design Guideline (2015)
requires "softer" barriers.

No sharp edges, no posts above horizontal beam etc



MPS



Barrier – Motorcyclist crash

All crash tests follows European standard EN1317.
Pre-standard for Motor cycle drivers.



Normal roads (7-10 m)

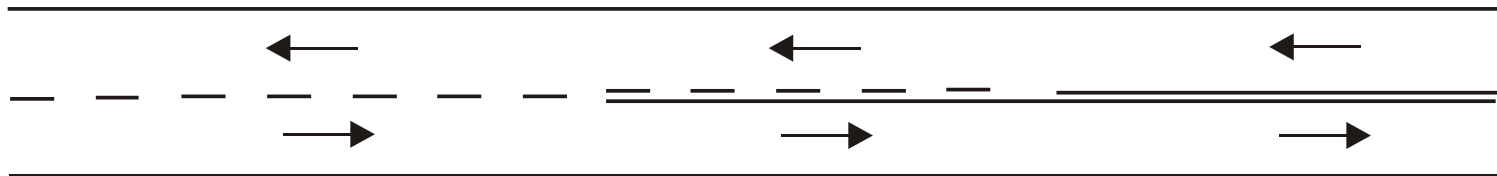
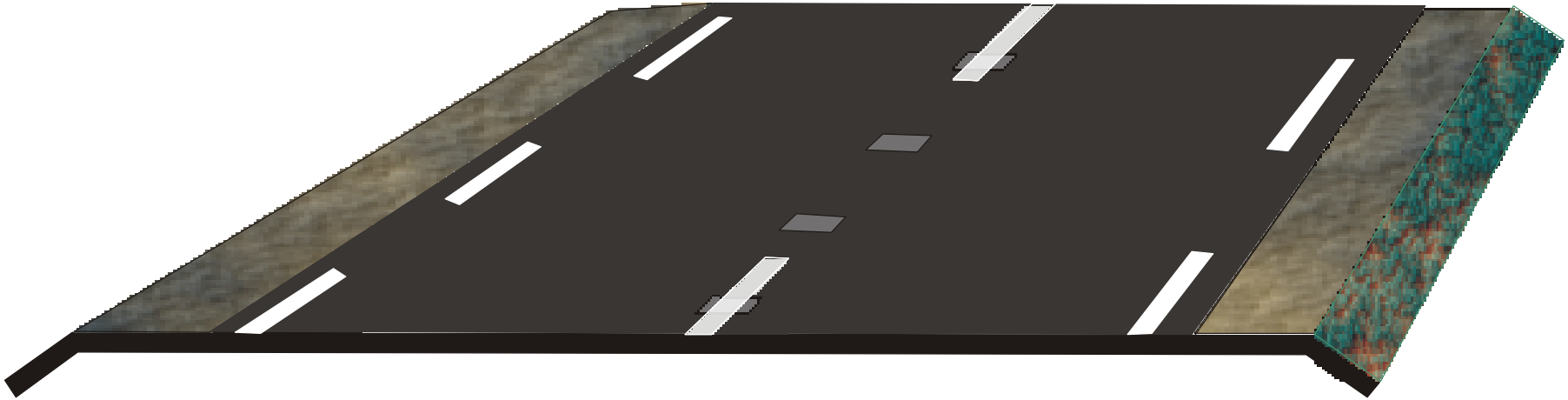


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Normal roads (7-10 m)

Milled center line rumble strip (~5000 km so far)

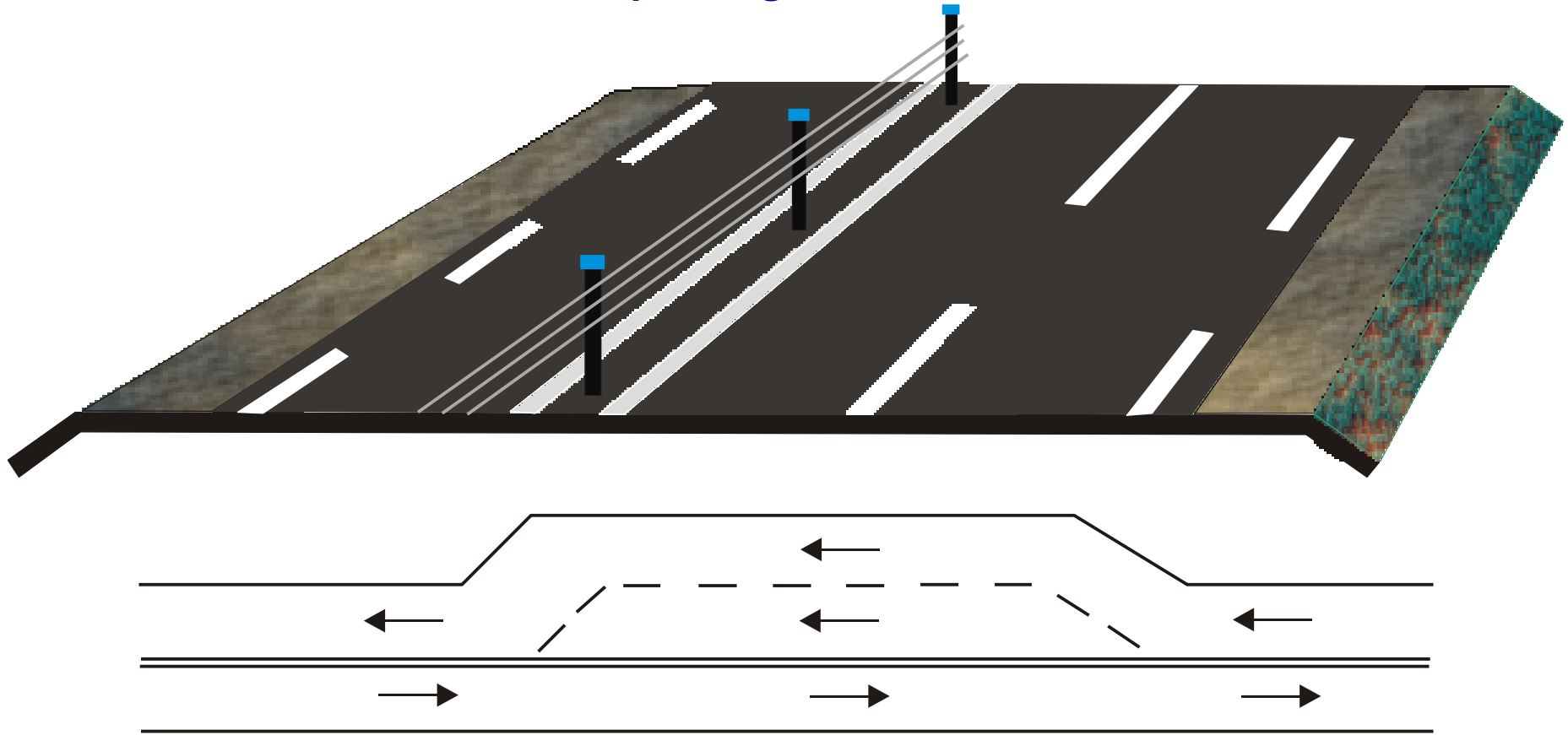


Effects?

- Accident reduction up to 15 % in all

Normal roads (7-10 m)

Guard rail with passing lane



Roadside

Alternative measures

Less run-offs
(e.g rumble strips)

• guard rails

Swedish
experience
most safe !!

• safety zone

• smooth slopes



Roadside safety



Which car are you using?

Intersections



Roundabout:
Large (R 25-30m)
Two lanes
Lighting

Intersections

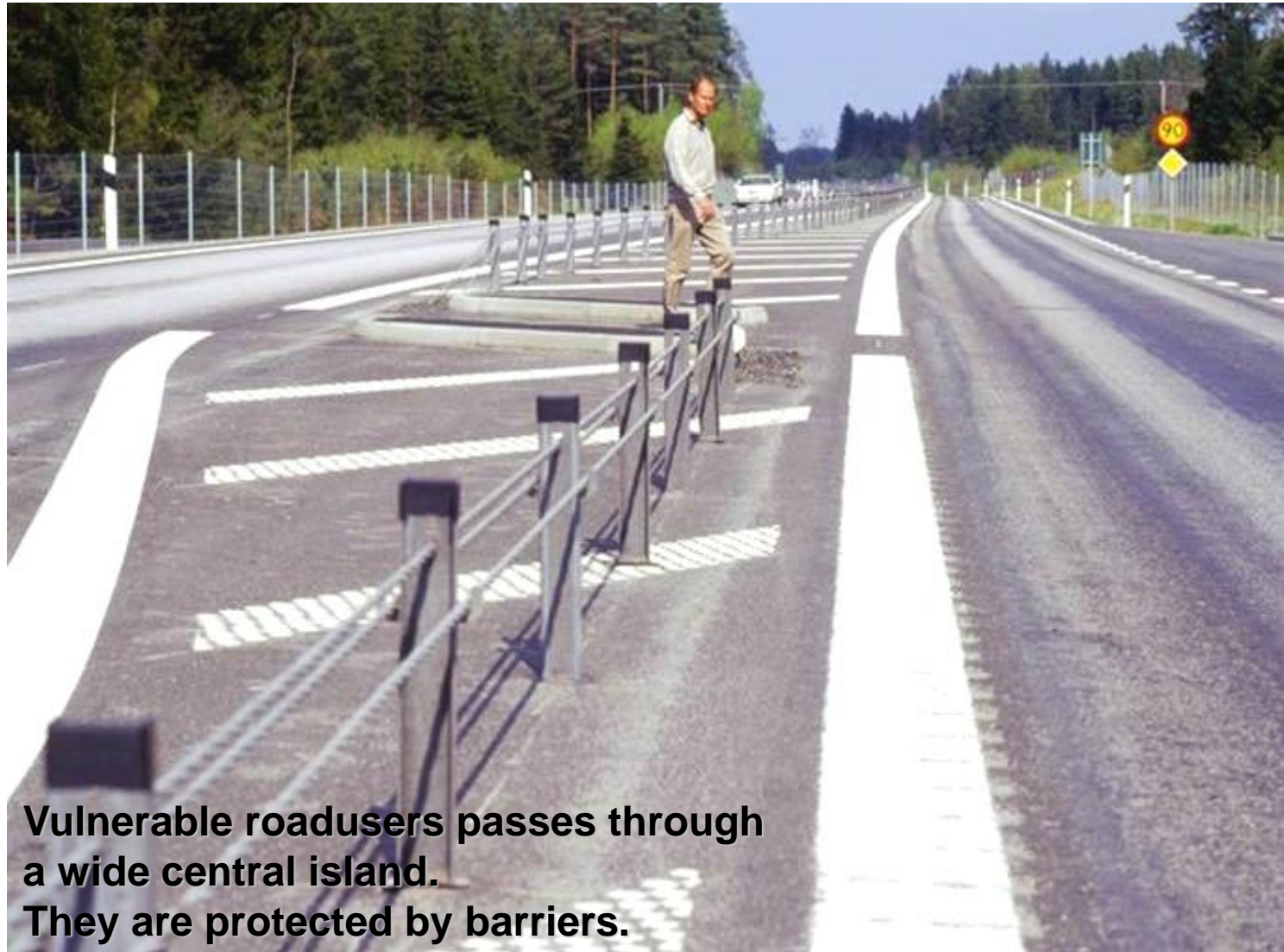
Effect:

Average
speed
reduction
~ 5 km/h



Radar
detected
speed limit
warning

Pedestrians



Vulnerable roadusers passes through a wide central island. They are protected by barriers.

Pedestrians



Result: Average speed: 51 km/h → 40 km/h
Speed 85%: 59 km/h → 51 km/h

Questions ?



Questions ?

Today ?

