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The Relationship Between Road Safety and Infrastructure on 80 km/h Roads and Intersections: Using Accident Prediction Models

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FEHRL

FERSI

This presentation

- Introduction
- Aim of this study
- Accident Prediction Models
- Method
- Outlook

Introduction

- People killed in traffic crashes
  - Europe: 40,000 (2006)
  - the Netherlands: 817 (2006)
    791 (2007)
    750 (2008)

- To increase road safety
  - research & measures
  - in the Netherlands: Sustainable Safety vision

Introduction [2]

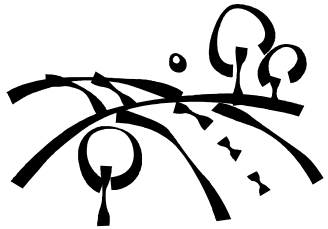
Introduction [3]

Sustainable Safety vision

- aims to prevent crashes and, when that is not possible, to reduce the risk of serious injuries
- covers several areas
  - e.g. vehicles, education, drink and drug driving, road infrastructure
- there still is a lack of knowledge about what a sustainably safe road infrastructure is

(Wegman and Aarts, 2005)

Introduction [4]



Infrastructure

-Physical characteristics

-Road link / intersection

Driving behaviour

Observed behaviour:

-Speed

-Time/distance headway

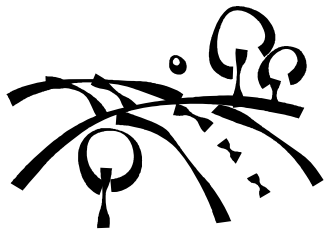
-Lateral position

Road safety

-Crashes

-Killed & seriously injured

Introduction [4]



Infrastructure

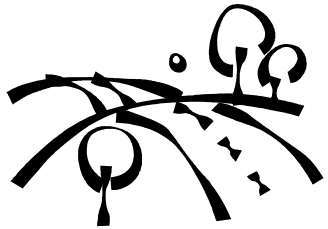
The effects of crash barrier and trees on driving behaviour

Driving behaviour

The effects of road width on the number of crashes

Road safety

Introduction [4]



Infrastructure

&

&

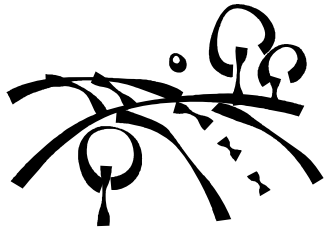
Driving behaviour

Road safety 

&

……not widely studied and described……

Introduction [4]



Infrastructure

Accident Prediction Models

$$E(\lambda) = \alpha Q^{\beta} e^{\sum \gamma_i x_i}$$

(Reurings et al., 2006)

Road safety

Introduction [4]

& Driving behaviour

most accident prediction models

Introduction [5]

- Models with driving behaviour?
  - 3 studies
  - different approach
  - not all succeeded

    (Abdel-Aty & Essam Radwan,2000; Caliendo, Guida & Parisi, 2007; Dietze et al., 2008)

→No common approach

Aim of this study

- To examine an approach of accident prediction models which express the safety performance in terms of traffic, geometric characteristics and driving behaviour

- Restricted to rural 80 km/h roads and intersections which are under provincial administration

Accident Prediction Models

Collision Prediction Models

Crash Prediction Models

Safety Performance Functions

Accident Prediction Models

Express the **safety performance**
of a **road / intersection** type
in terms of **traffic** and **geometric characteristics**

Accident Prediction Models [2]

From: Reurings & Janssen (2007a)

- Input: road characteristics, traffic volume
- Output: number of crashes

Expected number of crashes

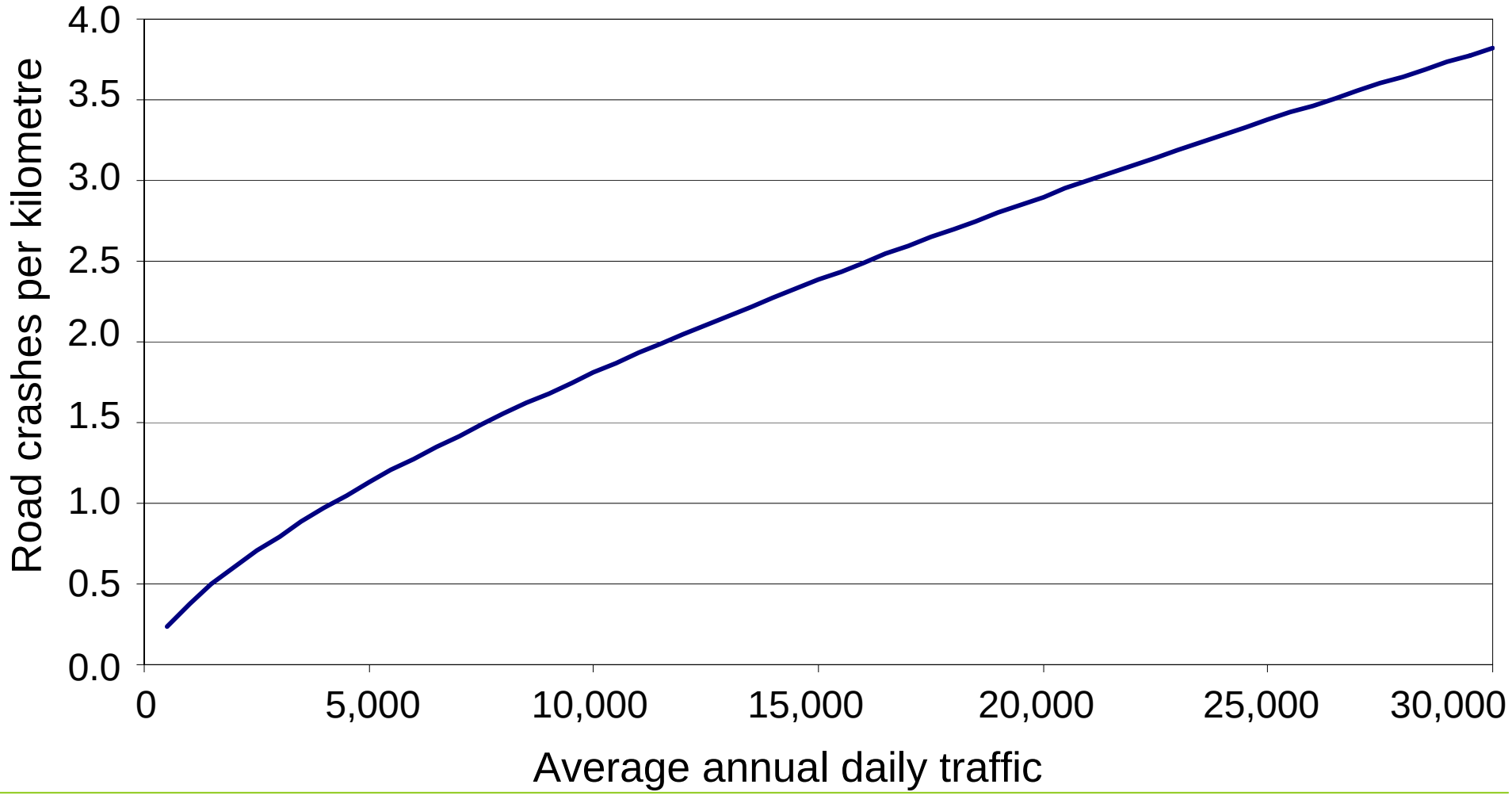
$$\hat{\mu} = 3.68 \cdot 10^{-4} \cdot L^{0.81} \cdot INT^{0.45}$$

Road link length

Traffic volume

Accident Prediction Models [3]

From: Reurings & Janssen (2007a)



Accident Prediction Models [4]

- Why developing these models?
  - Determine safety level of roads & intersections
  - Compare different designs
  - Proactive approach
  - For:
    - Researchers
    - Road authorities

Accident Prediction Models [5]

- Recommended to disaggregate to (Reurings et al. 2005)
  - Road category
  - Intersection type
  - Crash type

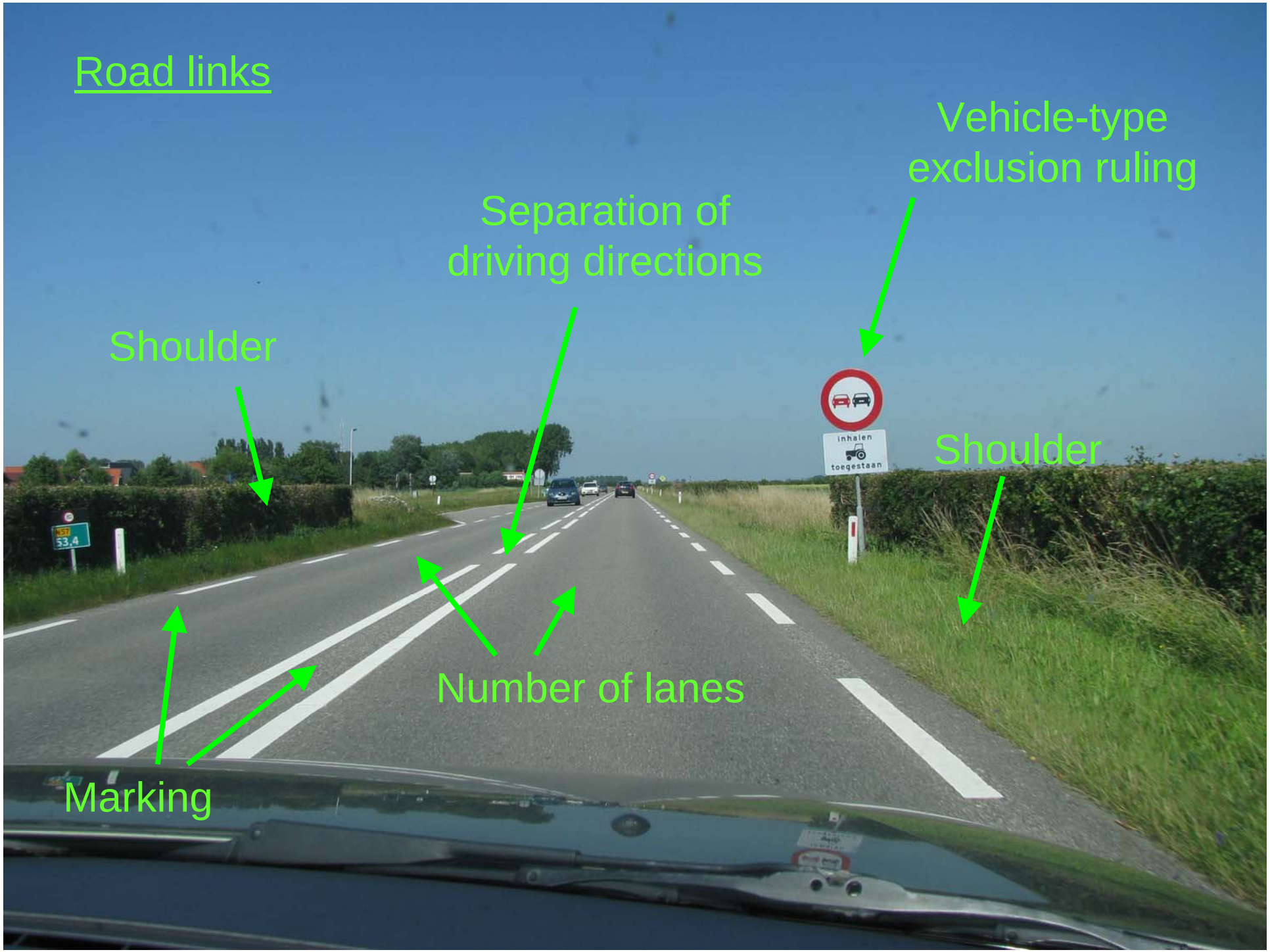
- Accident modification factors
  - Applied by some researchers
  - Describing the same as accident prediction models
  - Not in our models

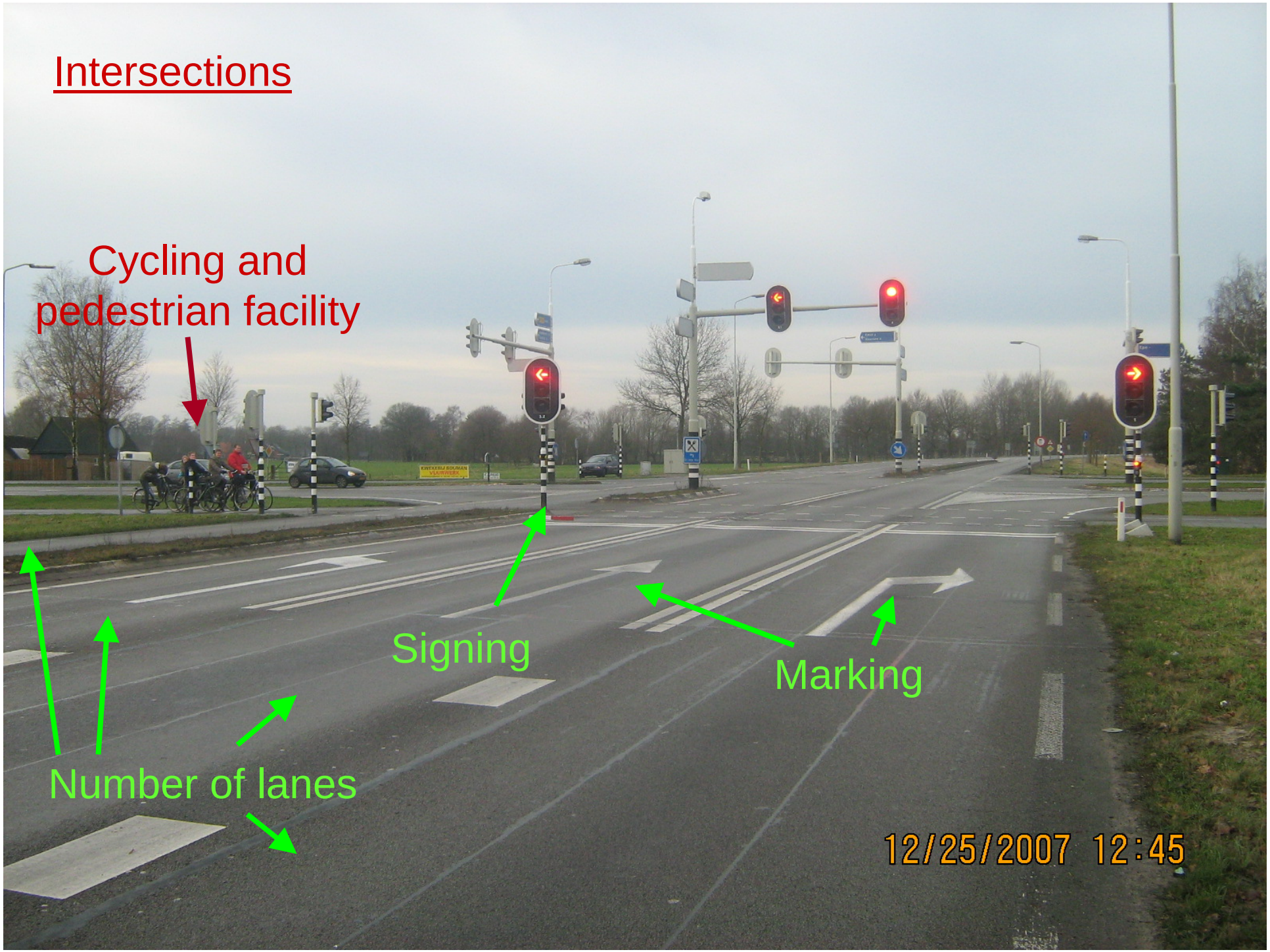
Method

- Required data
  - Traffic data ✓
  - Crash data ✓
  - Geometric data → to be collected

↓

from 2 provinces:
- 1,200 km road length
- 500 intersections

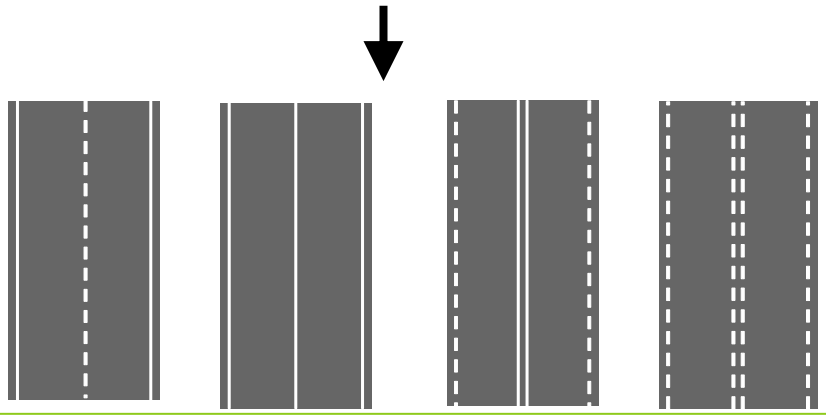

Road links
Vehicle-type exclusion ruling
Separation of driving directions
Shoulder
Shoulder
Number of lanes
Marking
inhalen toegestaan


Intersections
Cycling and pedestrian facility
Signing
Marking
Number of lanes
12/25/2007 12:45

Method [2]

- Study area: 80 km/h roads and intersections
  - Classified homogenous groups

- Intersections – 3 groups → Roundabout
  3-arm
  4-arm
- Road links – 4 groups



Method [3]

- Initial models
  - AADT and road link length
  - Adding other correlating variables

Results

Project is ongoing…

…no results yet…

Outlook

- To study how and what kind of variables on driving behaviour should be included

Thank you for your attention!

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