

# Traffic environment for children and elderly as pedestrians and bicyclists

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# **Aim**

Key issues for a design of a safe non-restrictive pedestrian and bicycle network

Summarise findings on physical safety measures for traffic safety of pedestrians and bicyclists

# Method

- *Before and after studies*
- Video filming
- Coding of parameters, behavioural studies
- Speed measurement with radar and laser
- Crash data analysis

# Removal of marked crosswalks



# Removal of marked crosswalks

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All pedestrians	Number not given priority	Number given priority	<i>% given priority</i>
Zebra crossing before reconstruction and change of code	<b>239</b>	<b>65</b>	<b>21</b>
Zebra crossing after reconstruction and change of code	<b>33</b>	<b>27</b>	<b>45</b>
No zebra crossing after reconstruction and change of code	<b>60</b>	<b>39</b>	<b>39</b>

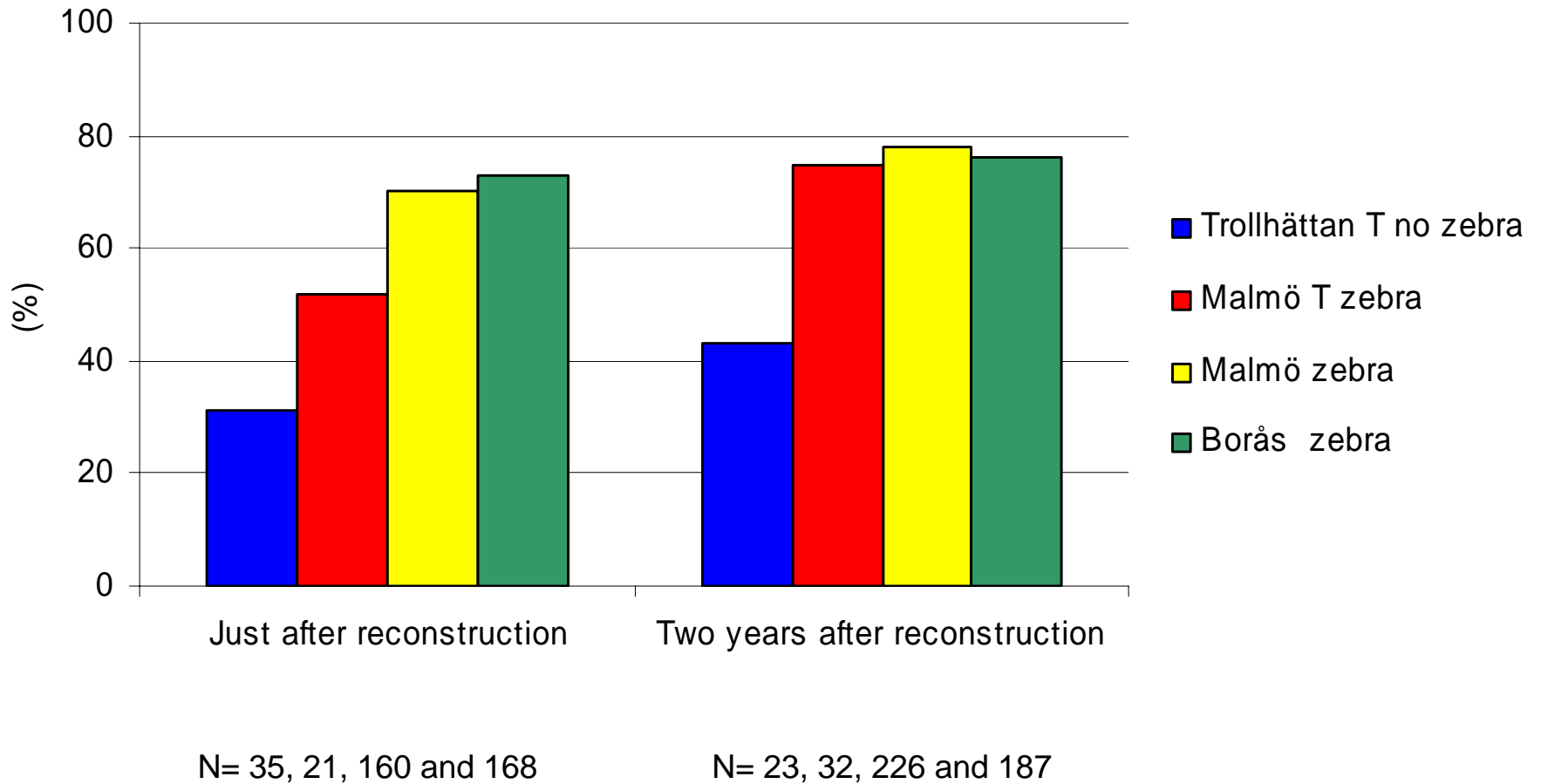
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# Removal of marked crosswalks

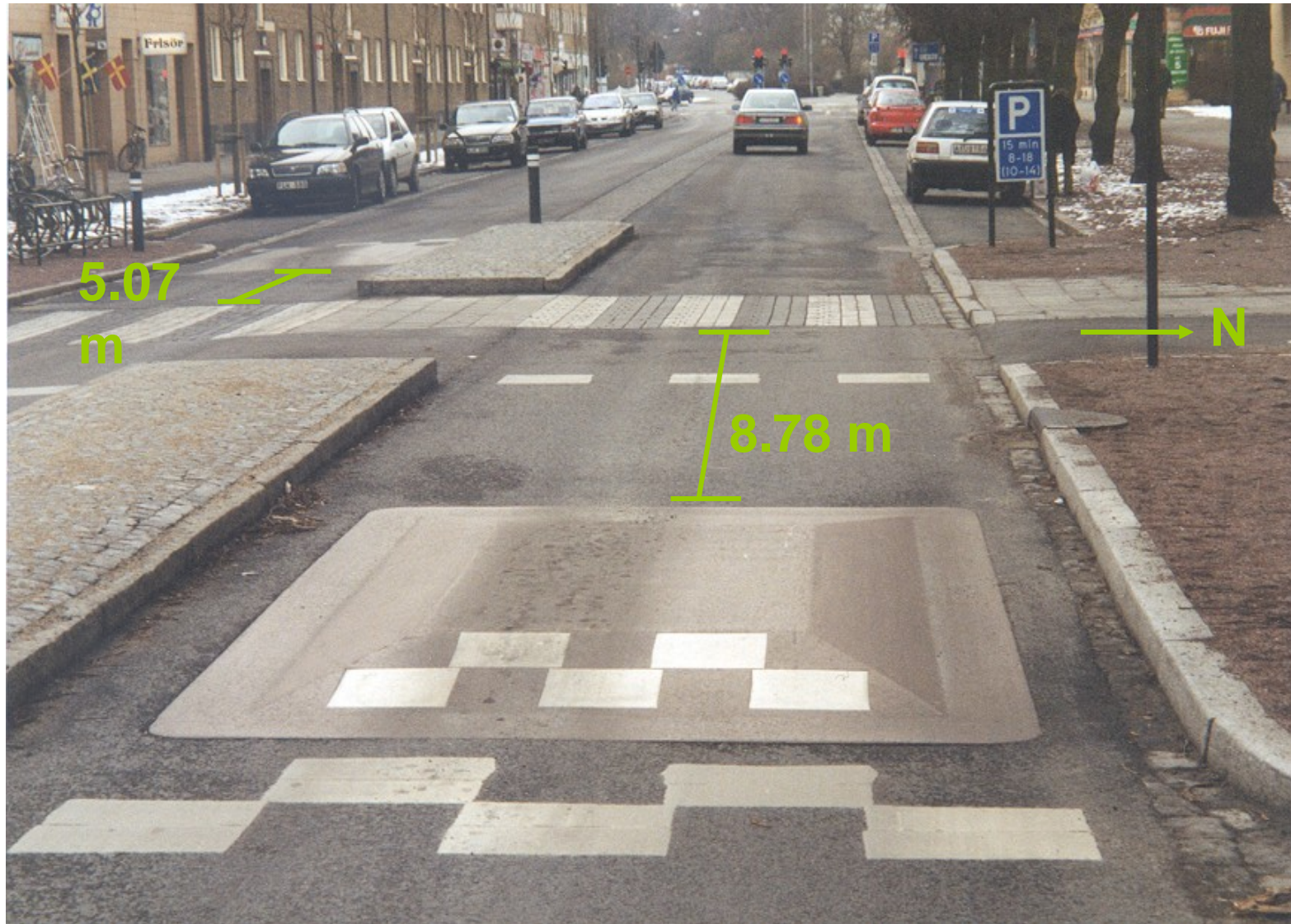
Indicates where pedestrians are supposed to cross but vehicle drivers does not have to give way



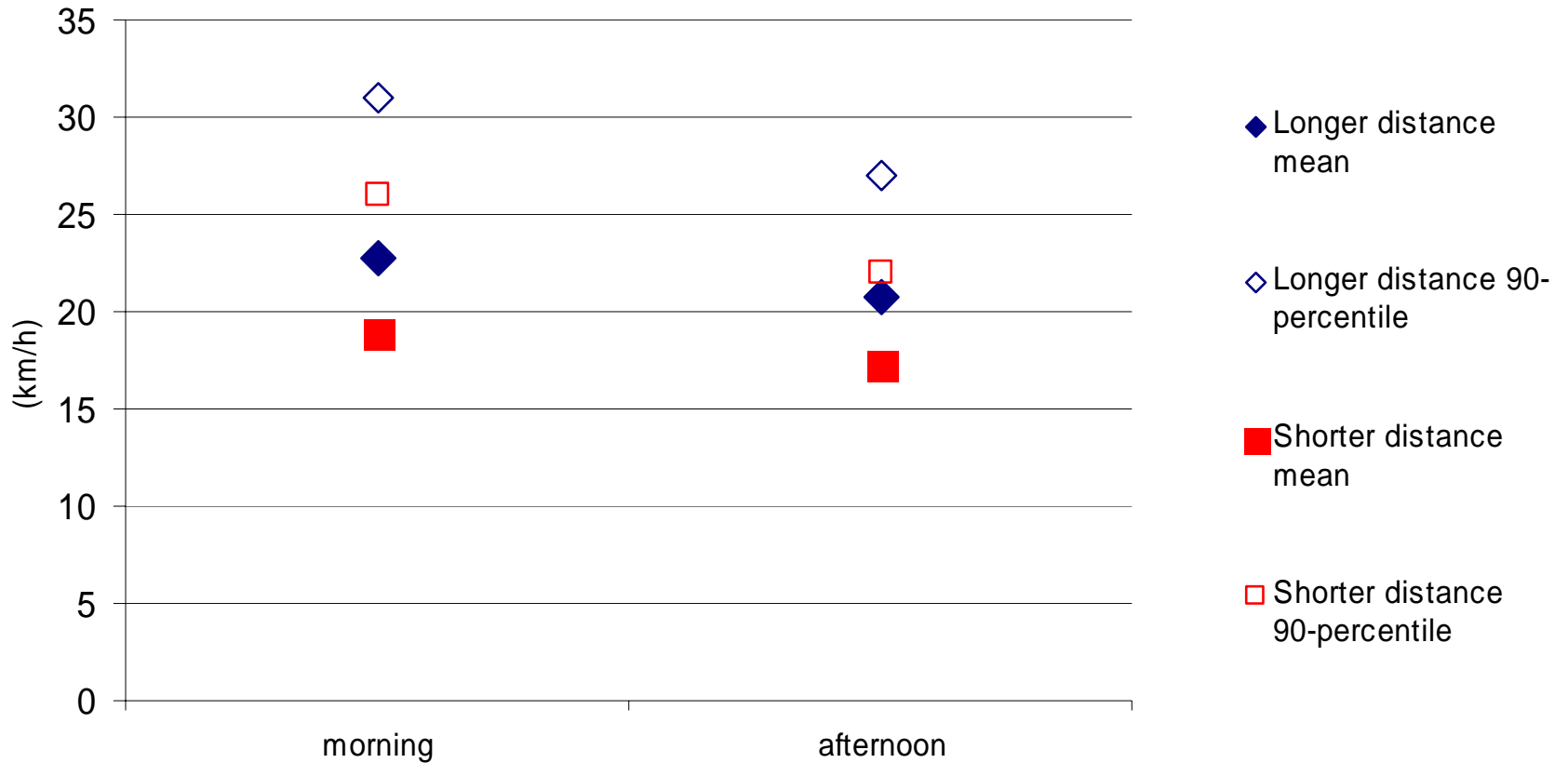
## Child pedestrians that encountered a vehicle and were given way to



## Different distance marked crosswalk and speed cushion



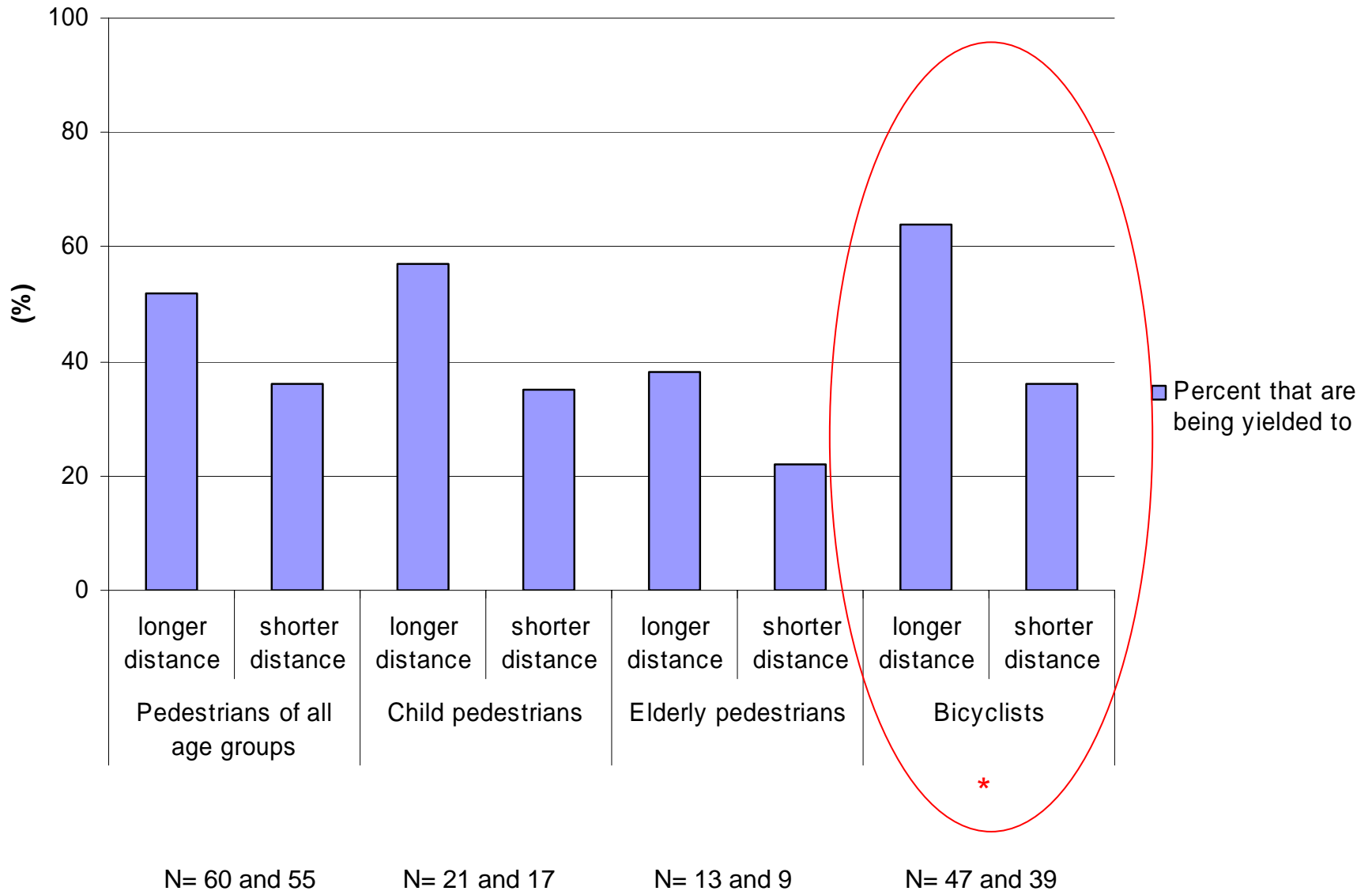
## Vehicle speeds when different distance marked crosswalk and speed cushion



Longer distance:  $s=0,8$  and  $0,8$ ,  $N=73$  and  $95$

Shorter distance:  $s=0,7$  and  $0,5$ ,  $N=73$  and  $58$

# Pedestrians and bicyclists being yielded to when different distance marked crosswalk and speed cushion



# **Design principles of a safe road environment for children**

**Actual vehicle speeds should be no more than 30 km/h wherever children (regularly) cross streets**

**Streets with parking have kerb extensions**

**Approaches should have only one entry lane**

**Refuge islands in the middle of a street**

## **Design principles...**

**Railings to prevent children to cross outside the crossing area or to run out into the street**

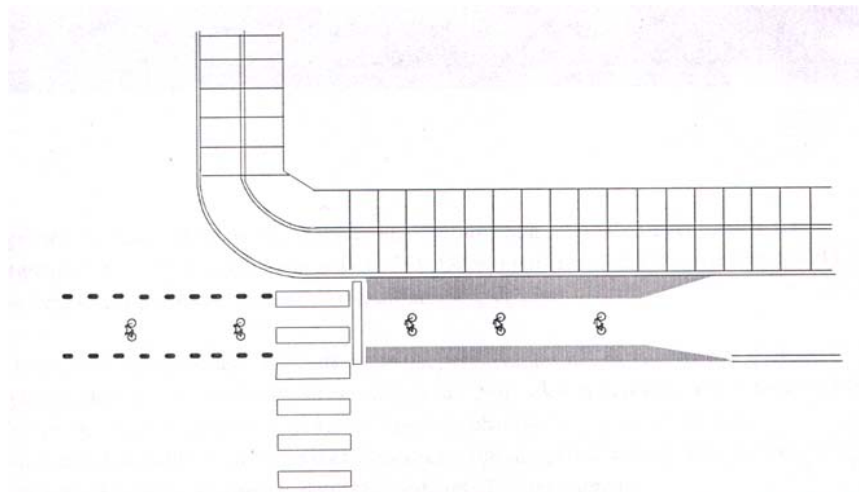
**Given that the vehicle speed is low; pedestrian and bicycle crossings should be located mid-block**

**Until more research is gained; marked pedestrian crosswalks are kept at streets with a speed limit 30 km/h**



**Advanced stop line**

(Photo Edinburgh council)



# Truncated bicycle track

(Herrstedt et al, 1994)

# The main principle proposed

***Vehicle speeds should be no more than 30 km/h wherever children or elderly (regularly) cross streets***

During a three-year period studied, if crashes with heavy traffic are excluded, no children were killed at speeds below 30 km/h according to Finnish and Swedish crash data

When heavy vehicles involved, the outcome of crashes is more or less independent of the speed

Therefore, the countermeasures have to be trusted to avoid crashes with heavy vehicles

# Measures for safety

- Humps and speed cushions

Meta-analysis by Elvik and Vaa (2004), humps reduce the number of crashes by 48%

- Raised marked crosswalk and bicycle track to the level of the sidewalk and one directional bicycle tracks

Study by Leden, Gårder & Pulkkinen (1998), raised bicycle track attracted more than 50 % more bicyclists, safety per bicyclist was improved by approx. 20%, additional 10% to 50% due to the improved layout. However, total number of bicycle accidents was expected to increase. Migration of flows should mean that accident numbers are reduced at other locations.

- **Mini roundabout**

Three common ways of accommodating bicyclists

1. No special facility for cyclists
2. When above 8000 motor vehicles/24 hours separate cycle track with ordinary pedestrian and bicycle crossings outside the roundabout
3. A special cycle lane within the roundabout

Design 3 is not recommended under any conditions

Proper design of mini roundabouts that function well for children and elderly as well as for disabled people are to be investigated further

# Future research

1. To establish demo-projects Cities for Children and to evaluate their effects
2. To establish a network Cities for Children
3. To evaluate how information campaigns affect traffic behavior and decision making for children, and show how it can be combined with implementation of countermeasures to improve safety and mobility for children
4. To show that children can be involved in the planning process by using innovative tools

## Future research...

5. To develop, formulate and systematize relevant planning indicators regarding life quality, health, environment and safety of children
6. To show how prerequisites and objectives concerning life quality, health and safety of children can be integrated into the planning process on a comprehensive and detailed level
7. To develop tools promoting analysis of children's life quality, health and safety
8. To develop tools promoting the development of new innovative urban patterns