

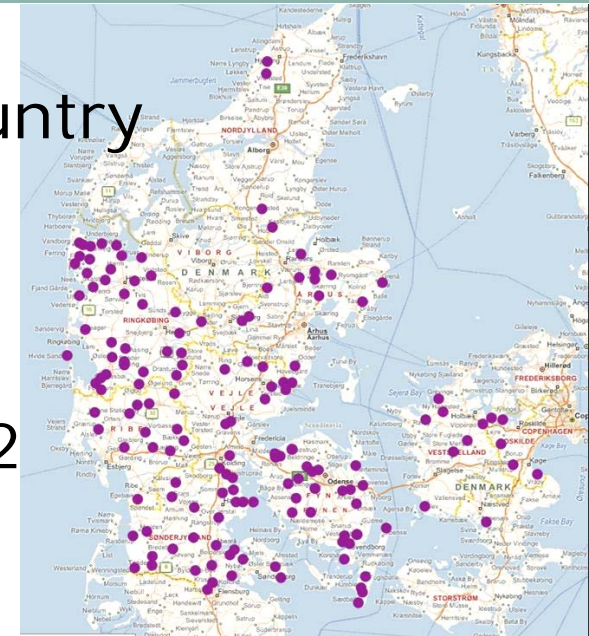
# **The Safety Effect of Danish Town Gates in Transition Zones between Rural and Urban Areas**



- Reduction of speed when entering the urban zone
- Town gate: Urban zone sign (E55) combined with physical and/or visual measure
- Some town gate designs gave rise to concern ->
- Analysis of accidents at existing Danish town gates



- 251 town gates spread over the country
  - 151 towns
  - Established in the period 1988-2002
- 
- Police recorded accidents 3-5 years before and after construction
  - Before-After effect corrected by use of a control group





Short physical extent

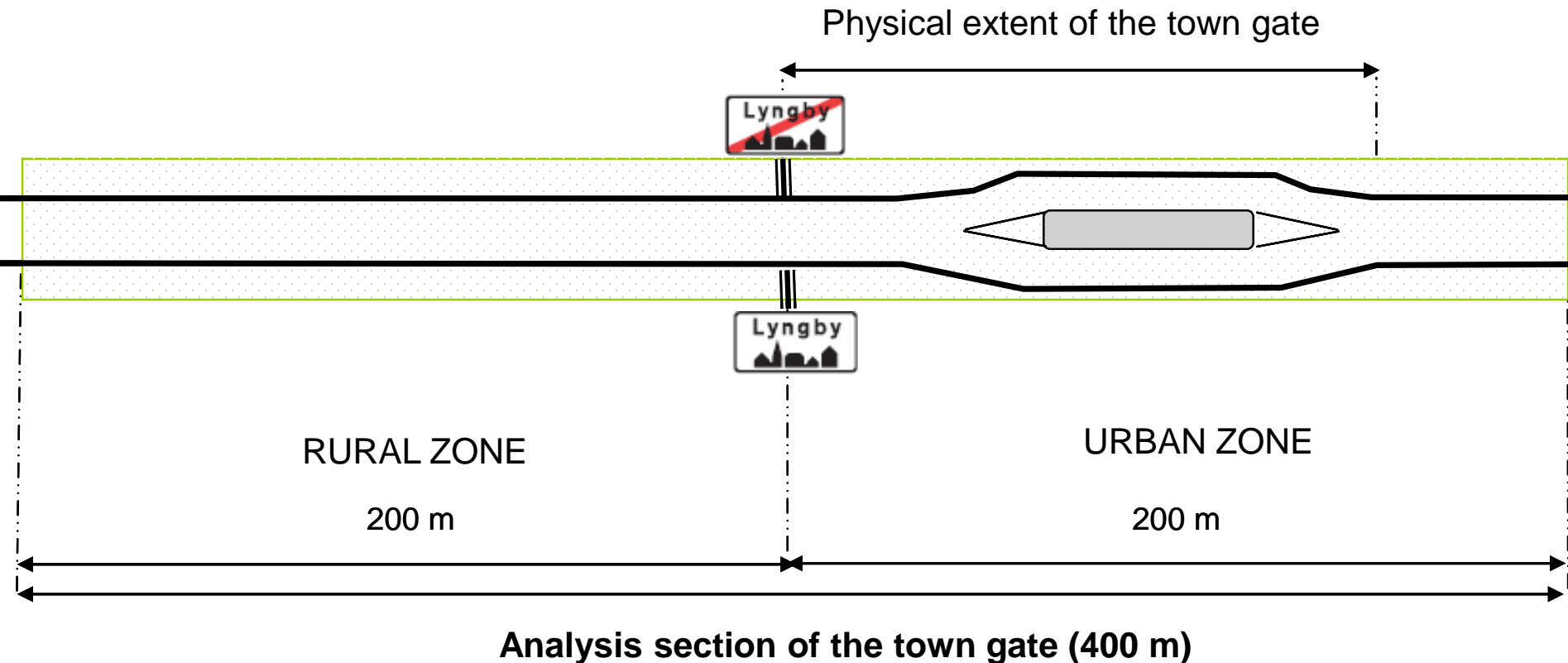
E55 (urban zone sign) placed on a special post

Longer physical extent

E55 (urban zone sign) and traffic island/staggering



Analysis road section of the town gate:  
400 metre in total - 200 metre on each side of the urban zone  
sign location



Three main categories of town gates:

- Physical measures only (102 town gates)
- Visual measures only (40 town gates)
- Physical/visual measures in combination (109 town gates)

## Town Gate Measures

Physical measures	Visual measures	Other measures
Traffic island and staggering	E55 placed on a special post	E55 placed on a ordinary post
Traffic island (no staggering)	Special illumination	Facilities for cyclists
Hump	Change in road surface colour	Surfaced edge strips
Narrowing	Planting	Prewarning (sign)
Roundabout	Speed indicator	Street lightning (yes, partly, none)
Change in road surface		

The *physical town gates* are often characterized by:

- A central traffic island, often with staggering in both driving directions (85%)
- Bicycle facility (94%)
- Illuminated (99%)
- Pre-warning sign of the presence of the gate (77%)



The *visual town gates* are most frequently characterized by:

- An urban zone sign (E55) placed on a special post or background (73%)
- Special illumination at the urban zone sign (28%)
- Permanent speed indicator display (35%)
- Completely or partly illuminated (73%)





The *physical/visual town gates* are often characterized by:

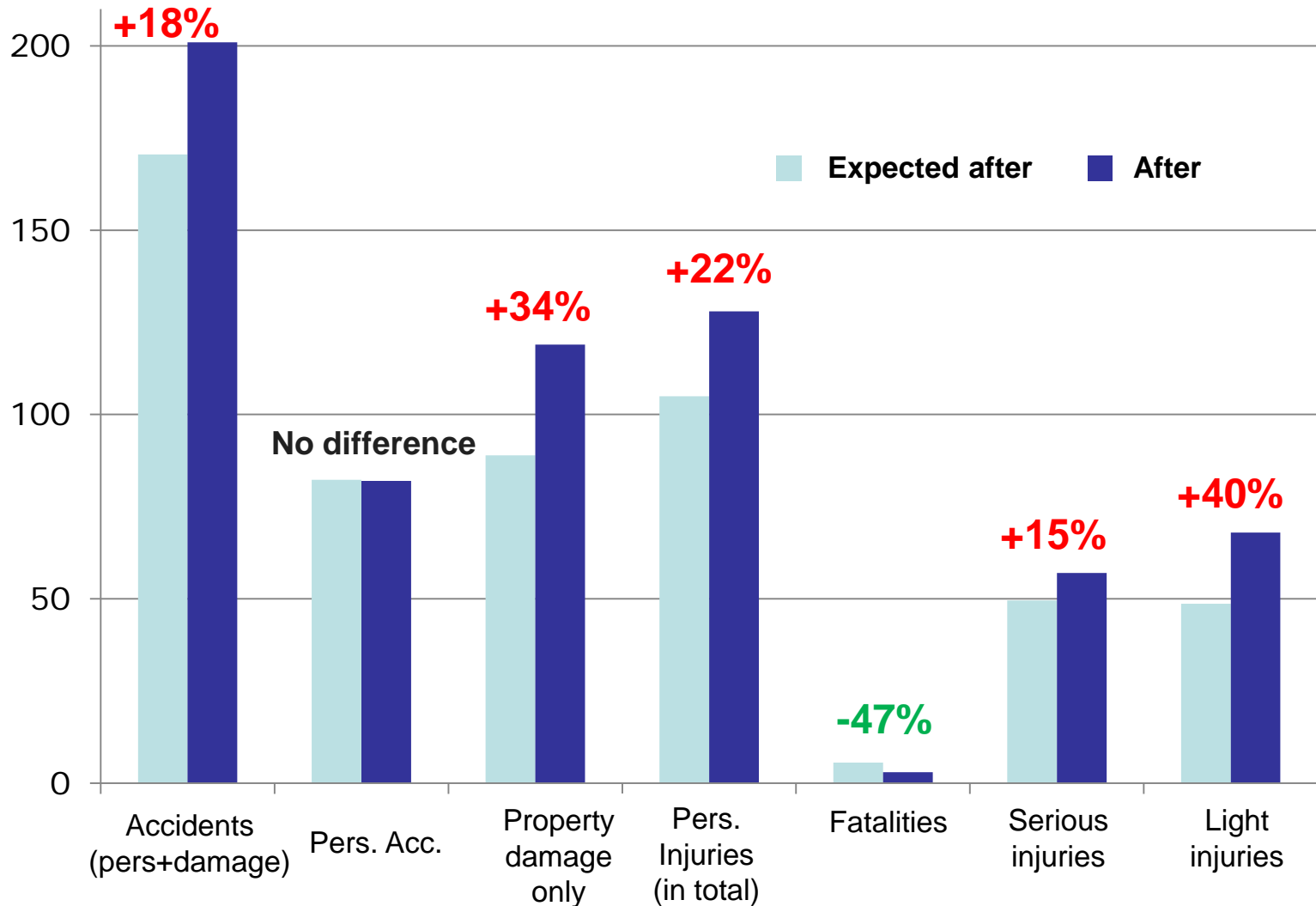
- Urban zone sign on a special post/background (72%)
- Special illumination (39%)
- Either a speed hump (39%) or central traffic island often with staggering in both driving directions (56%)
- Permanent speed indicator display (21%)
- Pre-warning sign of the presence of the gate (56%)
- Illuminated (100%)



## 251 town gates

- About 200 accidents (injury+damage only) both before and after construction
- About 125 personal injuries (fatalities+severe+light) both before and after construction
- About 1/3 of the town gates:  
No recorded accidents both before and after construction
- About 2/3 of the town gates:  
No serious injuries (fatalities+ severe) both before and after construction

## Number of accidents and injuries - expected after and after construction All 251 town gates



# Which design category is the best?

Design Category	Property damage only accidents	Personal injury accidents	Personal injuries
Physical measures	68% *	43%	59% *
Visual measures	-29%	-5%	47%
Physical/Visual	36%	-28%	-15%

Best safety effect:  
Driving direction *out* of the urban zone



## Town gates with hump or staggering Which have the best effect?

### Town gates with physical measures

86 gates with traffic island/staggering, 6 gates with hump:

- Hump: **Reduction** or no change (insufficient data)
- Traffic island/staggering: **Increase**

### Town gates with physical/visual measures

55 gates with traffic island/staggering, 42 gates with hump:

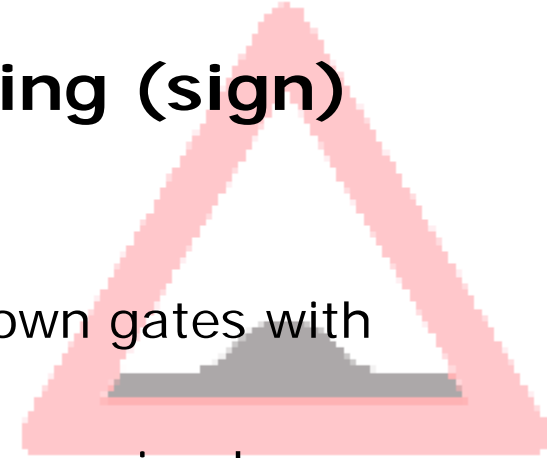
- Hump: **Reduction**
- Traffic island/staggering: **Reduction**
- The difference between the effect is not distinct

The combination of physical and visual measures has the most beneficial effect when traffic island forms part of the town gate

## Extent and effectiveness of prewarning (sign)

### Town gates with physical/visual measures

- All most all 'physical' as well as 'physical/visual' town gates with hump have a prewarning sign
- 75% of 'physical' town gates with traffic island/staggering have a prewarning sign
- 35% of 'physical/visual' town gates with traffic island/staggering have a prewarning sign



### Effectiveness of prewarning of traffic island/staggering

Nothing indicate that town gates with traffic island/staggering and a prewarning sign (rural zone -> urban zone) are more effective than those *without* a prewarning sign.

## Difference in speed limit between rural and urban area

30 km/h: 218 town gates (80/50 km/h, 60/30 km/h)

20 km/h: 9 town gates (70/50 km/h, 80/60 km/h, 60/40 km/h)

10 km/h: 24 town gates (60/50 km/h)

### **Town gates with physical or visual measures:**

Town gates with a difference in speed limit of less than 30 km/h (10 and 20 km/h) have larger reductions in the number of accidents and injuries compared to town gates with a difference in speed limit of 30 km/h.

### **Town gates with physical/visual measures:**

The difference in speed limit is not quite as conclusively for the effect of the town gate.

## Which kind of measures are run into?

### Town gates with physical and physical/visual measures:

1/3 of both the accidents and the personal injuries in the period after construction are related to collisions with design elements of the town gate (traffic island/kerbstone/E55 on a special post, etc.)

Those accidents are very often:

- Accidents related to driving direction *into* the urban zone and within the urban area
- Accidents related to town gates with a traffic island/staggering
- The speed limit in the rural area immediately before the urban zone was 80 km/h and the difference in speed limit between rural and urban area 30 km/h

When running over kerbstones: Typically bevelled kerbed central islands with a height above 5 cm (excl. bevel)



# How is the results used?

Departmental order no. 381, 27. of May 2008

## Departmental order in relation to road humps and other speed reducing measures

According to the Road Traffic Act the following premises are layed down:

### Chapter 2

#### *Premises*

**§ 12.** I relation to new constructions of staggering, kerbstone should be bevelled and the kerbstone should not have a hight of more than 5 cm (excluding the bevel)

**§ 2.** Staggerings are physical measures which affect the vehicle driver of an acceleration from the side with the purpose of reducing the drivers speed

# Hump



# Staggering



# Planting




Collision friendly planting





Edge of carriageway marking is lead on the outside of the kerbstone


# Speed

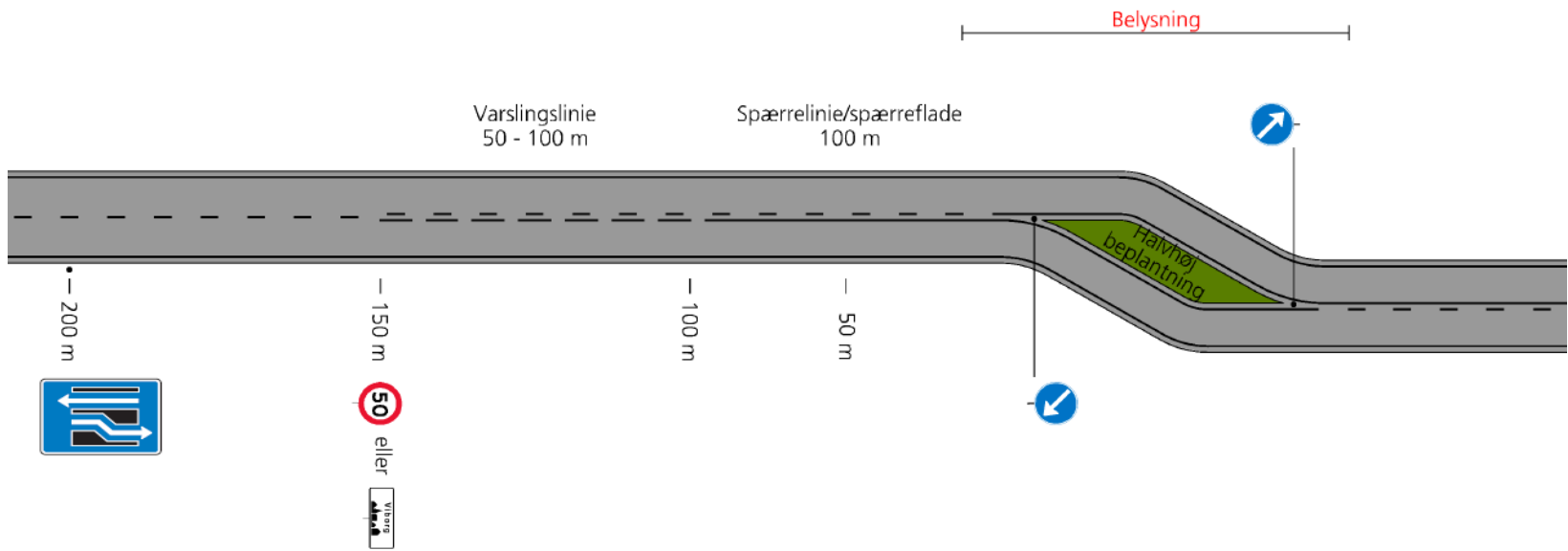
Information about speed should be located at least 150 metres before the staggering

C 55	Lokal hastighedsbegrænsning		
	H: 70	III: 90*)	3
	M: 70	II: 90	
	L: 50	I: 70	
	ML: 50		

E 39	Anbefalet hastighed		
	H: ---	III: *) 90	3
	M: ---	II: 90	
	L: ---	I: 70	
	ML: ---		

E 53	Område med fartdæmpning		
	H: 60	III: ---	3
	M: 50	II: ---	
	L: 50	I: ---	
	ML: 30		

E 55	Tættere bebygget område		
	H: ---	III: 60	3
	M: ---	II: 60	
	L: ---	I: 60	
	ML: ---		



- Town gates with physical measures have a speed reducing effect – but need to have a visual marking too, to have a beneficial effect on road safety
- Speed adaptation in the transition zone from rural area to urban area is necessary

