CAREC Road Safety and Sustainable Mobility Course

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Road Standards and New Treatments – CASE Study Lithuania

Egidijus Skrodenis, MC Mobility Consultants

Key facts about Lithuania

Capital (and largest city): Vilnius

Official language: Lithuanian

Area: 65,300 km²

Population: 2,944 million

National currency: EURO

First mentioned: 9 March 1009

Borders' length: 1,732 km

Transport fleet: 2,275,977 (180,720 heavy)
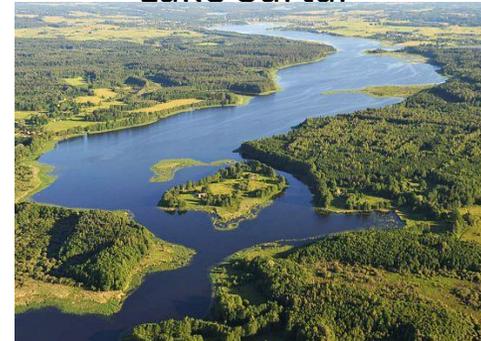
Membership: EU, NATO

Trakai Castle

Anykščiai Church

Lake Sartai

Kernavės Mounds
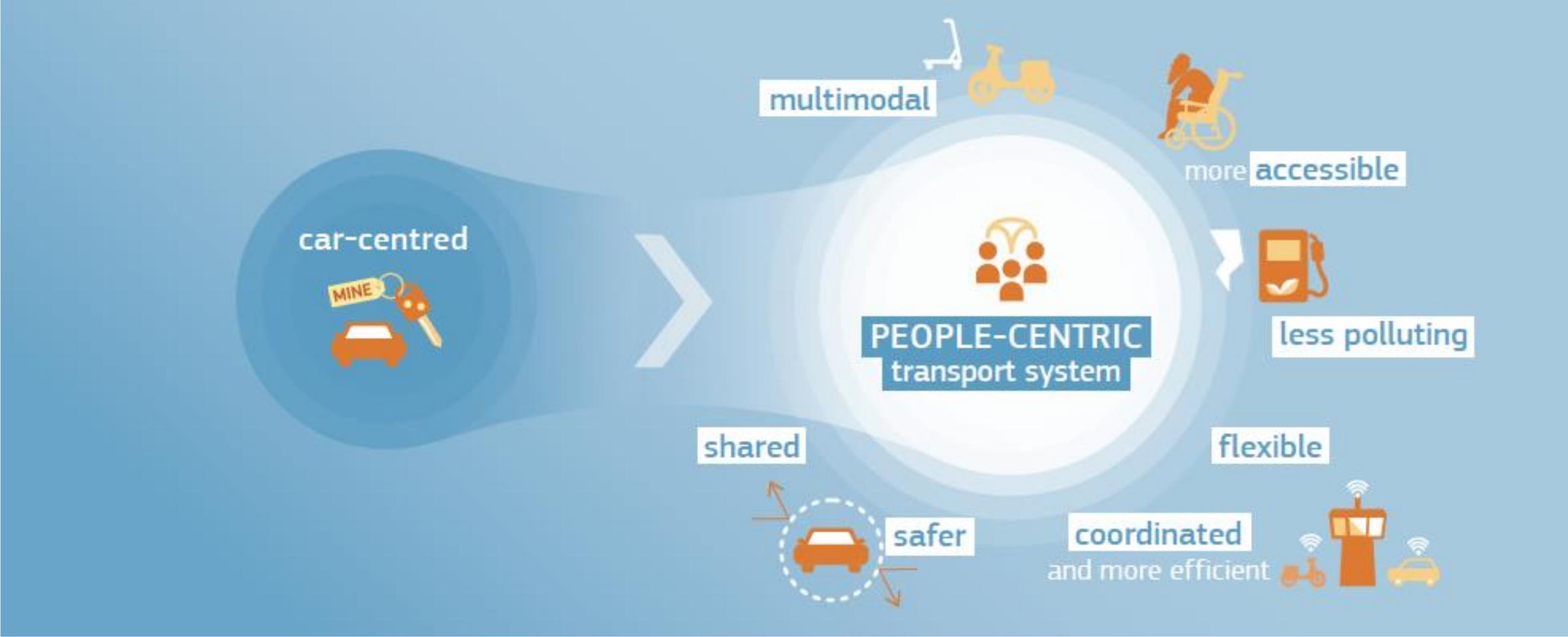
The problem

Source: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/future-road-transport

The vision

Main road safety actors

The most important in this system is
HUMAN !!!!!!
That's means, that vehicle, infrastructure must be adopted to human needs and capabilities

NEW TRAFFIC SAFETY APPROACH SINCE 2008

DIRECTIONS

Infrastructure

- Sustainable planning
- Design policy
- Categorization of the roads
- Safe infrastructure management
- Investigation of accidents
- Cost-benefit analysis

- Infrastructure

- ITS

Legislation

- Upgrade of legislation and technical norms

- Development of new legal acts and norms

- Timely (up to 5y) renewal of legislation and norms

Education

- Schools (children) education programs

- Drivers training programs

- Social campaigns, media

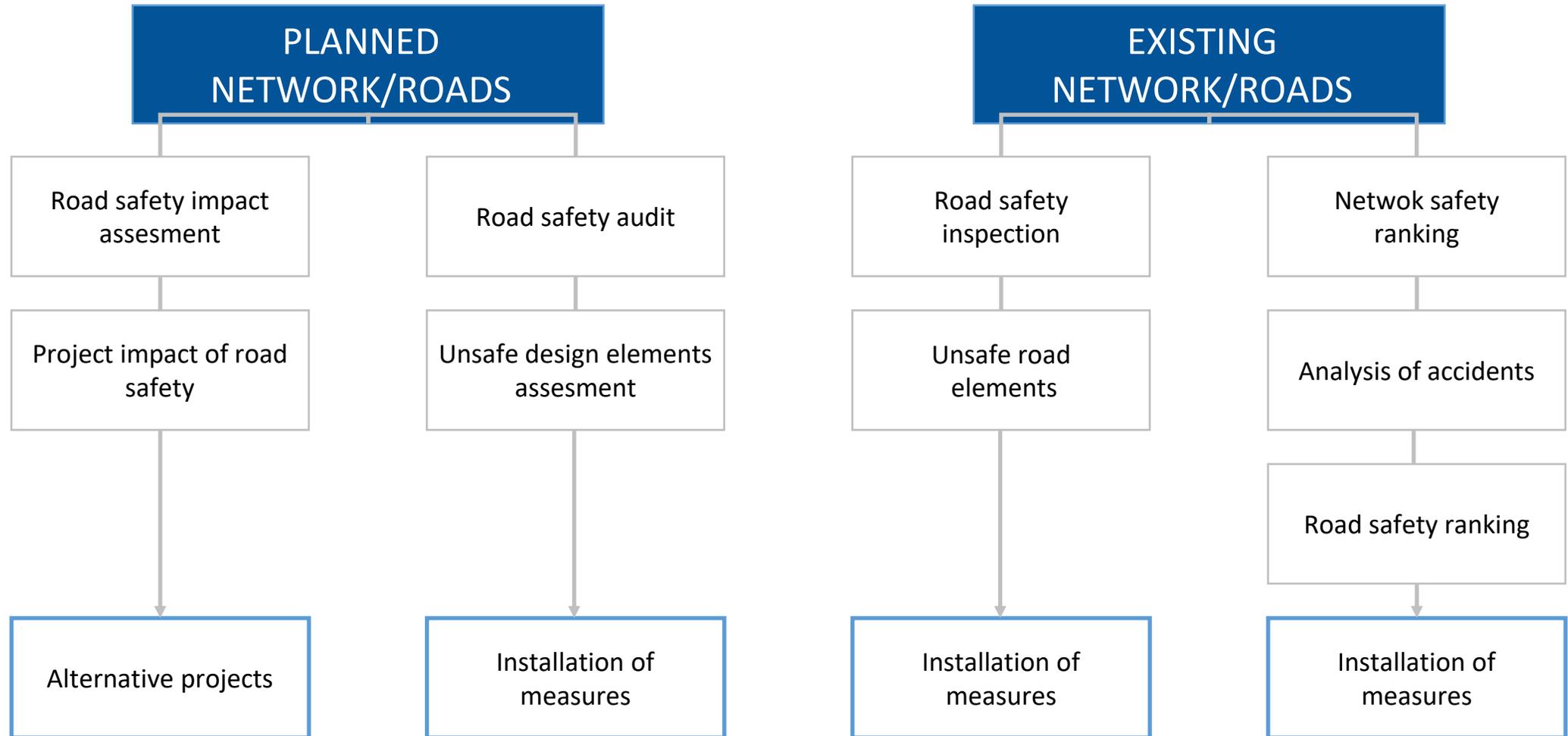- Trainings for specialists

Control

- Police enforcement
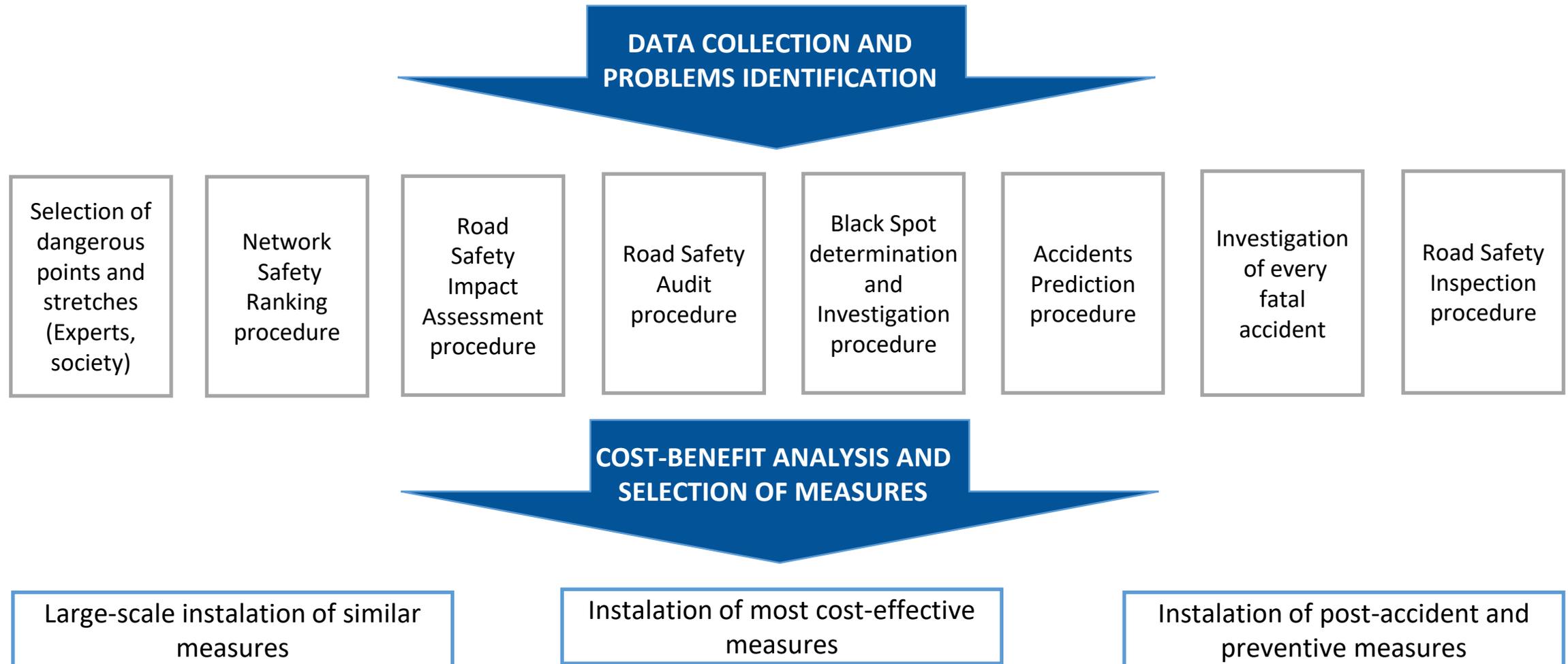
- Penalty system

- Speed cameras

- Joint stakeholders' actions

# Road safety infrastructure management procedure for all roads!!!

PLANNED NETWORK/ROADS		EXISTING NETWORK/ROADS	
Road safety impact assesment	Road safety audit	Road safety inspection	Netwok safety ranking
Project impact of road safety	Unsafe design elements assesment	Unsafe road elements	Analysis of accidents
			Road safety ranking
Alternative projects	Installation of measures	Installation of measures	Installation of measures

Road safety measures selection and installation process

DATA COLLECTION AND PROBLEMS IDENTIFICATION

| Selection of dangerous points and stretches (Experts, society) | Network Safety Ranking procedure | Road Safety Impact Assessment procedure | Road Safety Audit procedure | Black Spot determination and Investigation procedure | Accidents Prediction procedure | Investigation of every fatal accident | Road Safety Inspection procedure |

COST-BENEFIT ANALYSIS AND SELECTION OF MEASURES

| Large-scale instalation of similar measures | Instalation of most cost-effective measures | Instalation of post-accident and preventive measures |

Use of POGSE and LEAN's 5 why's methodologies

P	- Problem
O	- Origin
G	- Goal
S	- Solution
E	- Evaluation

PROBLEM

↓

Why?

↓

Why?

↓

Why?

↓

Why?

↓

Why?

↓

ANSWER
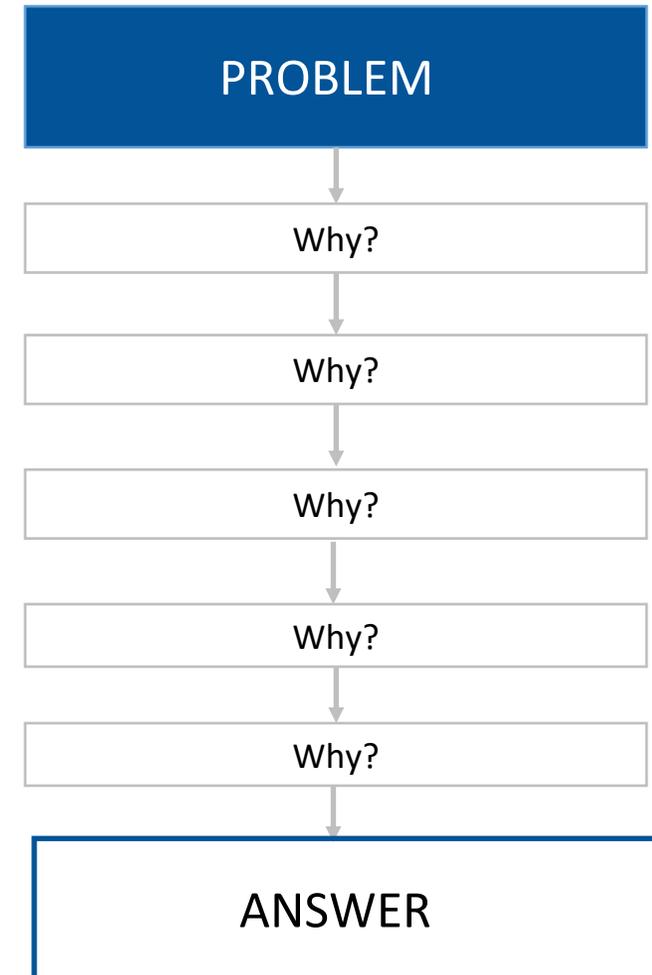
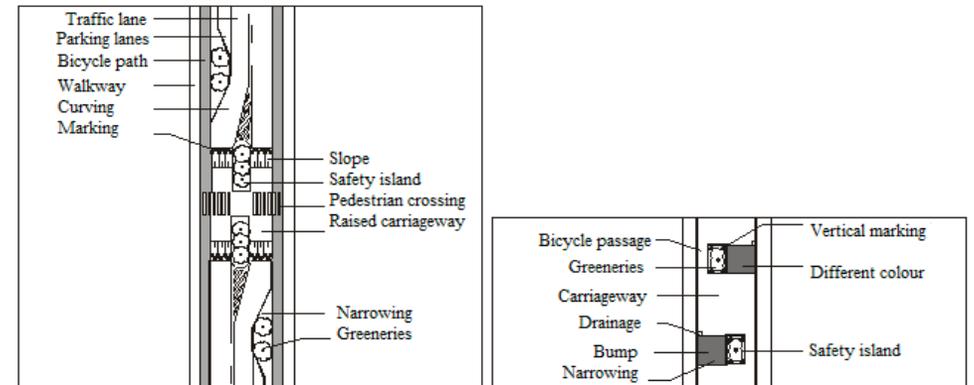# Rules for the organization of pedestrian crossing through roads and streets

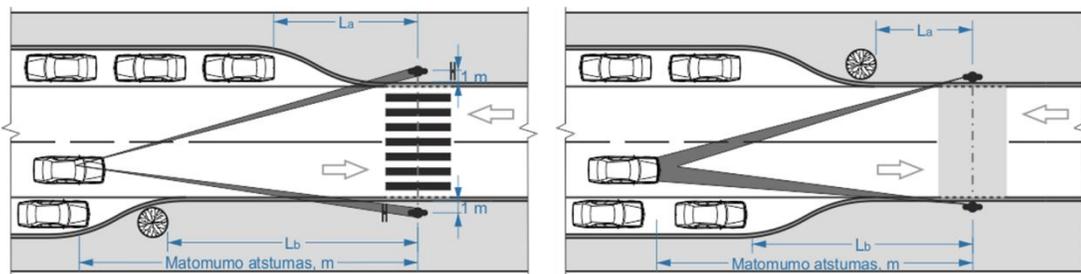Improper installation of a pedestrian crossing on a 4-lane street
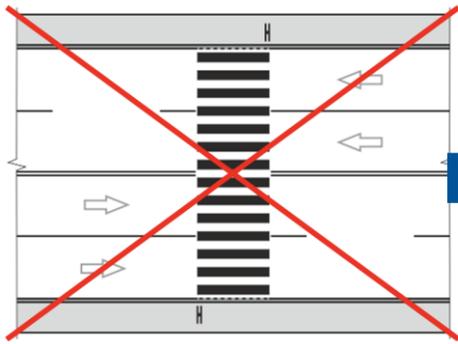
Pedestrian crossing on a two-way 4-lane street with a prominent safety island
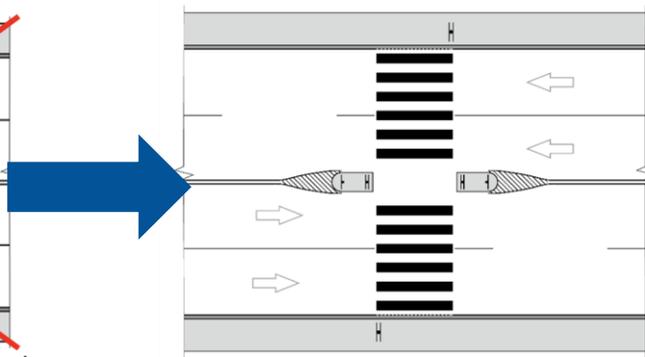
Combination of curving, carriageway narrowing, bumps, pavement of a different color and greeneries

Ensuring visibility and obstacle-free zones at unmarked crossings and pedestrian crossings where the width of the carriageway is the same

Example of installation of directional pedestrian crossing lighting
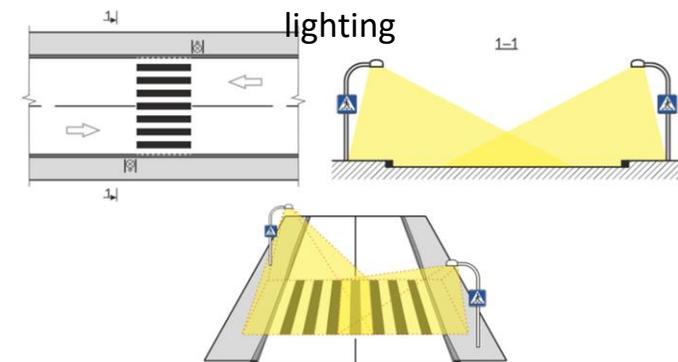
R ISEP 10 recommendations on the design and use of engineering traffic safety measures

- Principles of **road network planning**

- Principles of use of **speed reduction measures**

- Principles of **road junctions planning**

- Principles of **speed cameras installation**

- Principles of **lighting installation**

- Principles of **guardrails installation**

- Principles of **pedestrians' and bicyclists' infrastructure planning**

- Principles of **road signs installation and horizontal marking**

- Principles of **ITS implementation**

- Principles of **road maintenance**

Principles of road network planning

Road functions

Flow function
Distributor function
Access function

Residential area
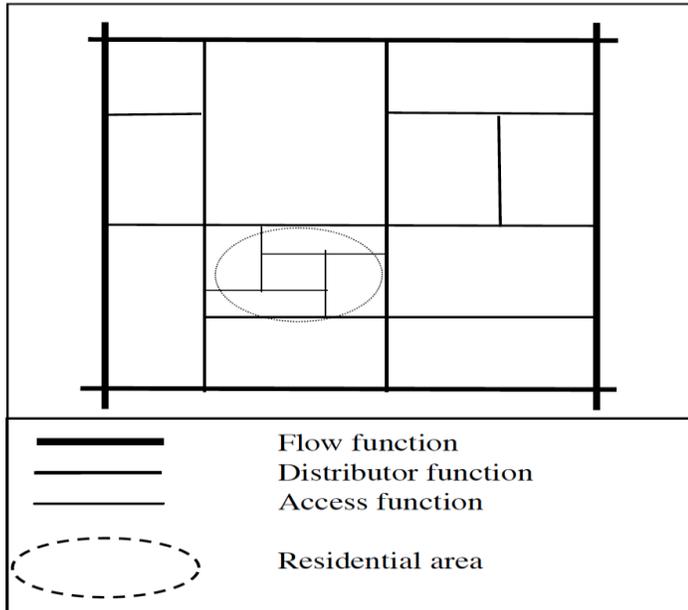
Recommended distances between accesses

Road function	Shortest distance between accesses[1], m
Transit	5000 (highway) – 1000 (2 lane transit road)
Distribution	500
Local	100

Characteristics	Purpose of roads				
	Transit			Distribution	Approach
Traffic quality level	Very high	High	High	Average	Minimal
Permitted speed v, km/h	$v \leq 110/130$	$v \leq 100/110$	$v \leq 90$	$v \leq 90$	$v \leq 90$
Road users	Prohibited pedestrian, bicycle, horse harness, tractor traffic and traffic of other low-speed vehicles		Pedestrian, bicycle, horse harness, tractor traffic and traffic of other low-speed vehicles are not recommended	Prohibited pedestrian, bicycle and horse harness traffic (when the average annual daily traffic intensity AADTI > 10 000 cars/day)	Pedestrian and bicycle traffic on the pavement itself
Minimal number of one-way traffic lanes	≥ 2		$\geq 1^{1}$	≥ 1	≥ 1
Parking lane	obligatory	obligatory[2]	non-obligatory	non-obligatory	non-obligatory
Separation of opposing traffic	Centre line and/or restraint		Centre line or horizontal marking	Horizontal marking	Horizontal marking
Junctions	Only at different levels	Only at different levels[3]	At different and same levels	At different and same levels	At the same level
Turning places	No turning places at one level		Not recommended	Allowed	Allowed
Descents	No junctions with local and district roads[4]	No junctions with local and district roads[4,5]	No junctions with secondary roads (when AADTI > 10 000 cars/day); limited descents[6]	No junctions with secondary roads (when AADTI > 10 000 cars/day); limited descents[6]	Slightly limited descents[7]
Bus stops	Not arranged	Not arranged[8]	Not recommended	Arranged	Arranged

Visible difference between rural and urban area
2+1 roads instead of wide 1+1

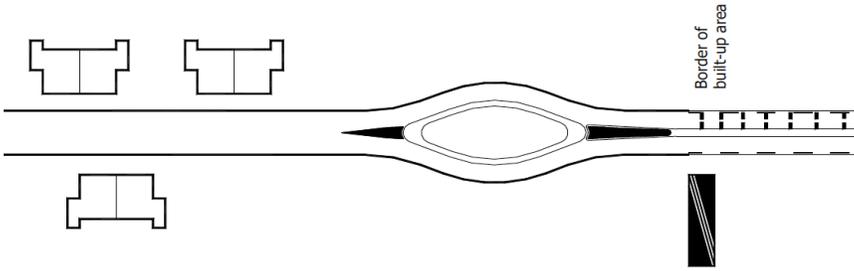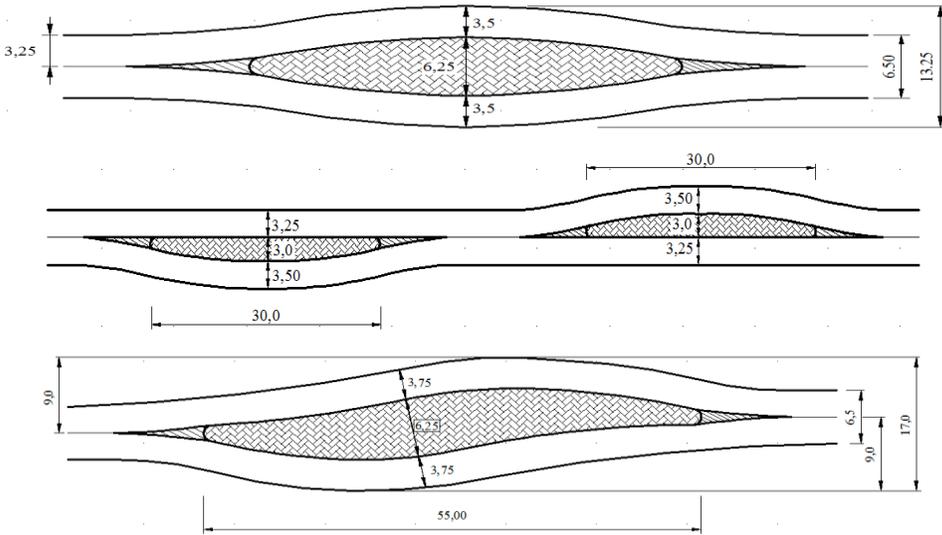**The rural road layout changes while entering to urban area**
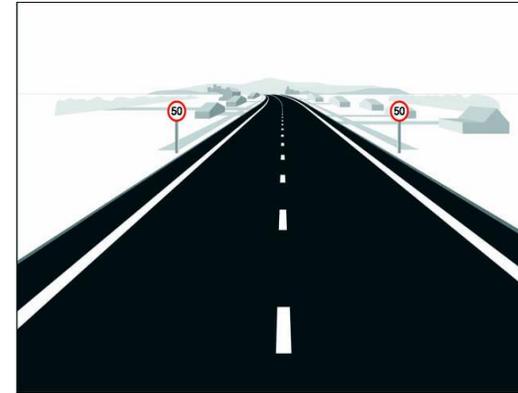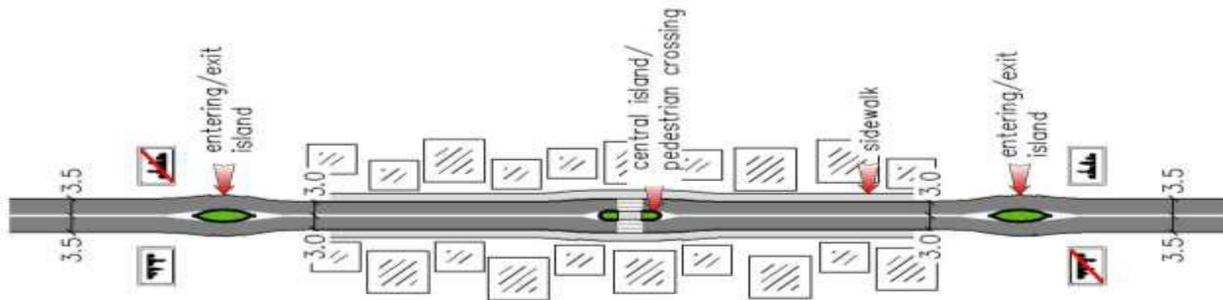
2+1 roads approval and reconstruction of wide 1+1 roads
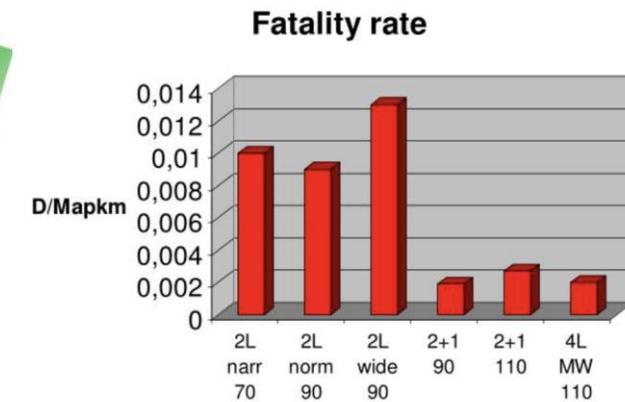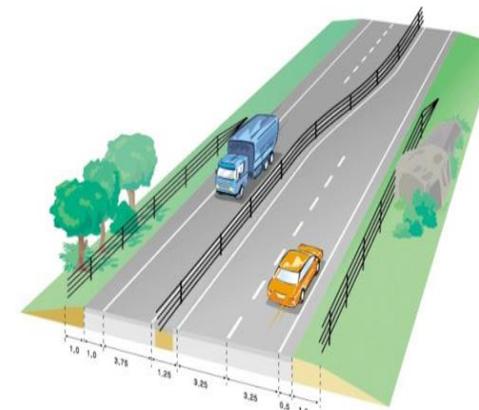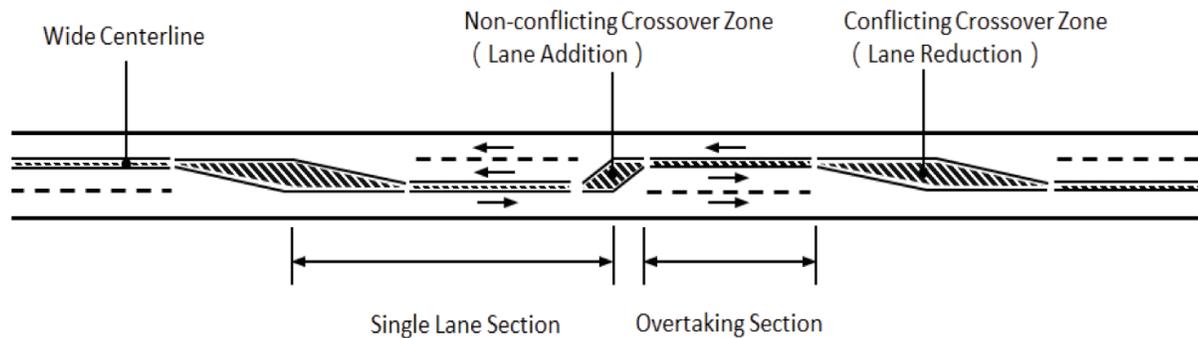
Install 1+1 road sections when possible and improve of left turns on 2+2 roads (mostly close)

City gates/islands for all area changes

Recommended measures considering a road/street category and permitted driving speed

Type of a measure	Street category	Stipulated speed, km/h		
		≥ 70	$70 > v^1 > 40$	≤ 40
Warning signs	A, B,C, D	A, B_1	B_2, C, D_1	D_2
"City gate"	A, B, C, D	A, B_1	B_2, C, D_1	D_2
Elevated speed reduction measures (bumps, elevated junctions)	B, C, D	B_1^2	B_2^3, C, D_1	D_2
Curving of a carriageway	B_2, C, D	–	B_2, C, D_1	D_2
Curving of a carriageway with an elevation area	C, D	–	C, D_1	D_2
Narrowing of a two-lane road using separation islands	(B_2), C, D	–	(B_2), C, D_1	D_2
Narrowing of a carriageway (from one or both sides)	C, D	–	C, D_1	D_2
Narrowing of a carriageway to one traffic lane (from one or both sides)	D_2	–	–	D_2
Combination of horizontal speed reduction measures with vertical ones	(C), D	–	(C), D_1	D_2
Safety islands	(A), B, C, D	(A), B_1	B_2, C, D_1	D_2
Roundabouts	B, C, D	B_1	B_2, C, D_1	D_2
Pedestrian crossings	B, C, D	–	B_2, C, D_1	D_2
Arrangement of green zones	A, B, C D	A, B_1	B_2, C, D_1	D_2
Road signs and marking	A, B, C, D	A, B_1	B_2, C, D_1	D_2
Traffic lights	(A), B, C, D	(A), B_1	B_2, C, D_1	D_2
Fences, barriers, studs	A, B, C, D	A, B_1	B_2, C, D_1	D_2
Mirrors	C, D	–	C, D_1	D_2
Electronic devices	A, B, C, (D)	A, B_1	B_2, C, (D_1)	(D_2)
Pedestrian and bicycle paths	B, C, D	B_1	B_2, C, D_1	(D_2^4)

$v^1 = 50$ km/h;

(A), (B_2), (C), (D) – can be used in exceptional cases;

^{2} – pedestrian and bicycle traffic is possible at a marked path of a carriageway;

^{3} – only elevated junctions can be used;

4 – only trapezoidal bumps and elevated junctions can be used.
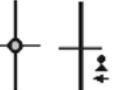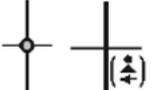
Wide use of speed reduction measures

Recommended distances between speed reduction measures depending on the permitted speed

Permitted speed, km/h	Distance between speed reduction measures, m Assessment	
	Good	**Satisfactory**
50	200–400	401–600
30	100–200	201–400

Types

Speed bump

Speed	Length, m	Height, mm
20 km/h	425	50
30 km/h	900	50

Sinusoidical

Speed	Length, m	Height, mm
20/h	2000	80
	3400	120
30/h	3500	80
	4800	120
50/h	6000	80

Plato

Speed	Length, m	Height, mm	Incline, %
20 km/h	3000-5000	80-120	1:6-1:10
30 km/h	3000-5000	80-120	1:10-1:15
50 km/h	3000-5000	80-120	1:20-1:30

Principles of junctions' type selection

Use modern roundabout as main layout of the junction

Four leg junction
32 conflict points
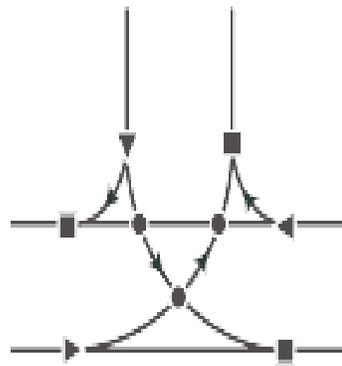
Three leg junction
9 conflict points
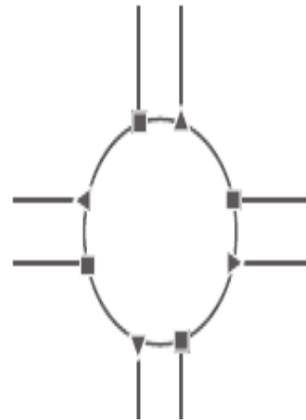
Roundabout
8 conflict points
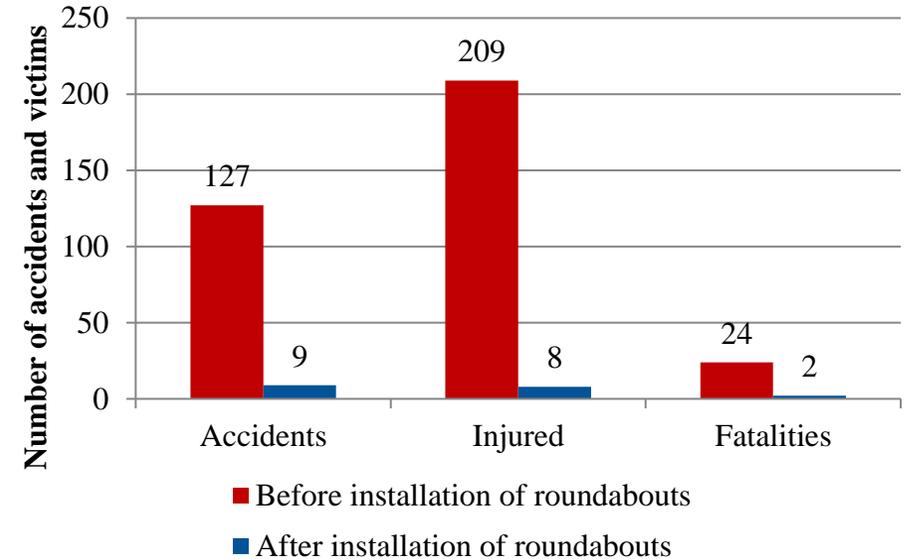
Type	Change after installation, %
Accidents	- 92,91
Injured	- 91,67
Fatalities	- 96,17

Use modern roundabout as main layout of the junction
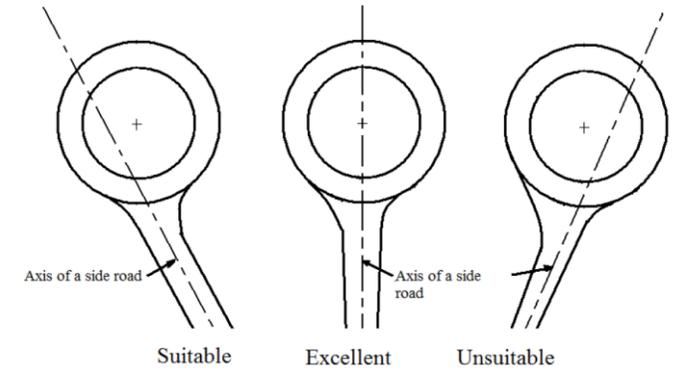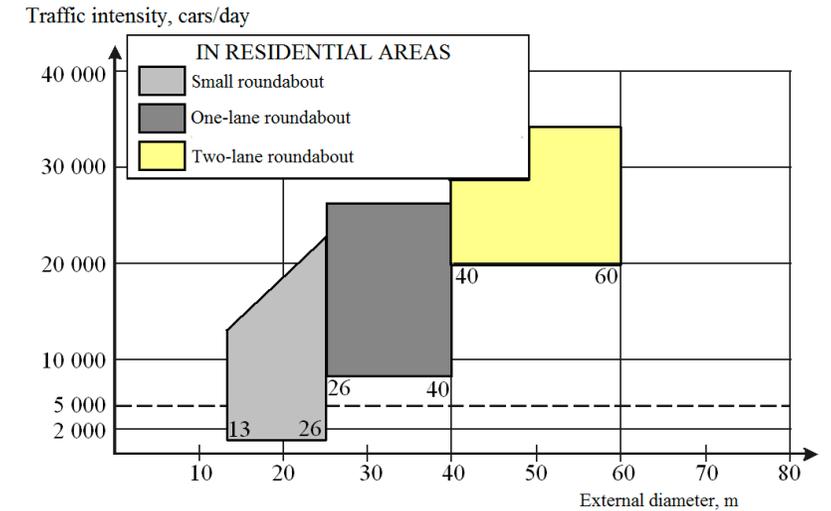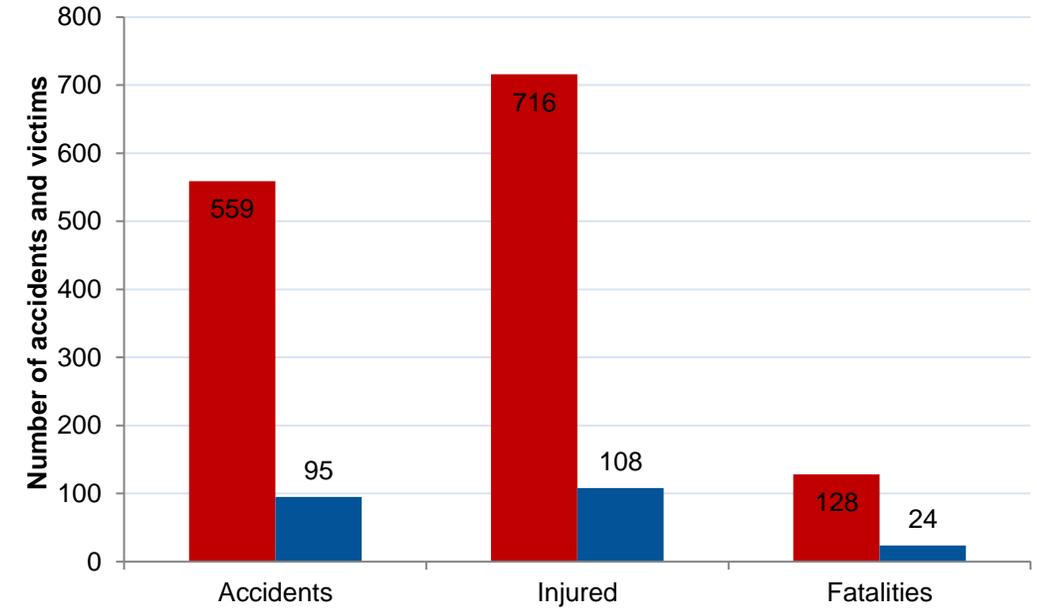
Traffic islands for all junctions
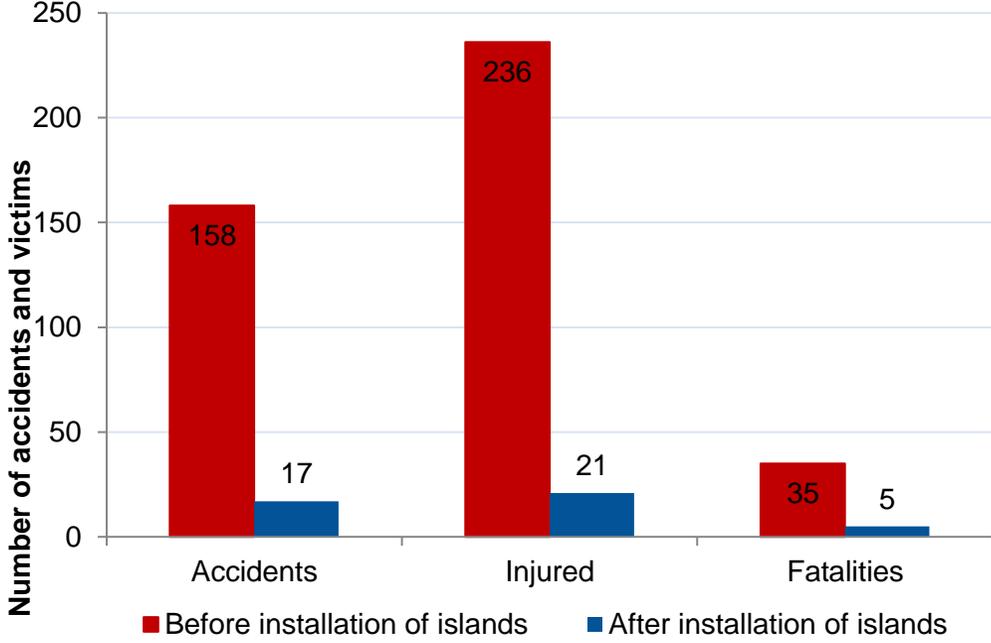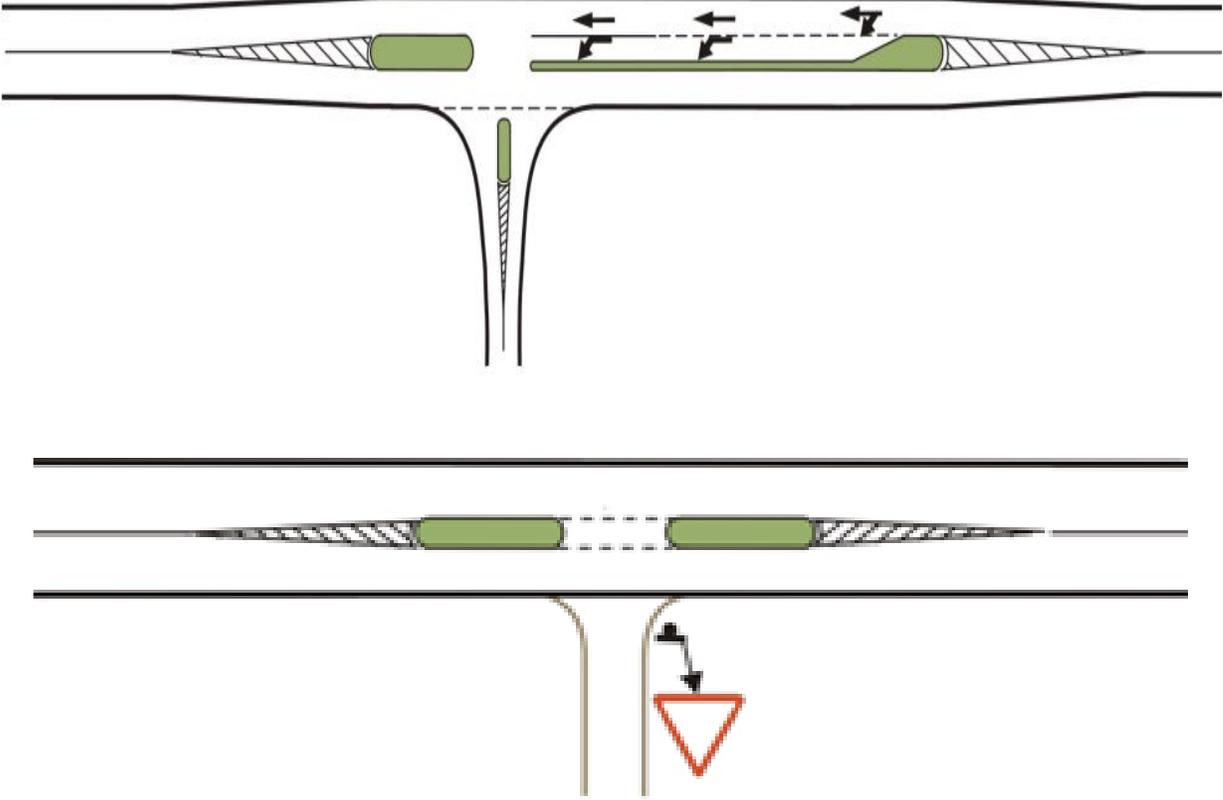
Type	Change after installation, %
Accidents	-89,2
Injured	-91,1
Fatalities	-85,7

Traffic islands for all junctions
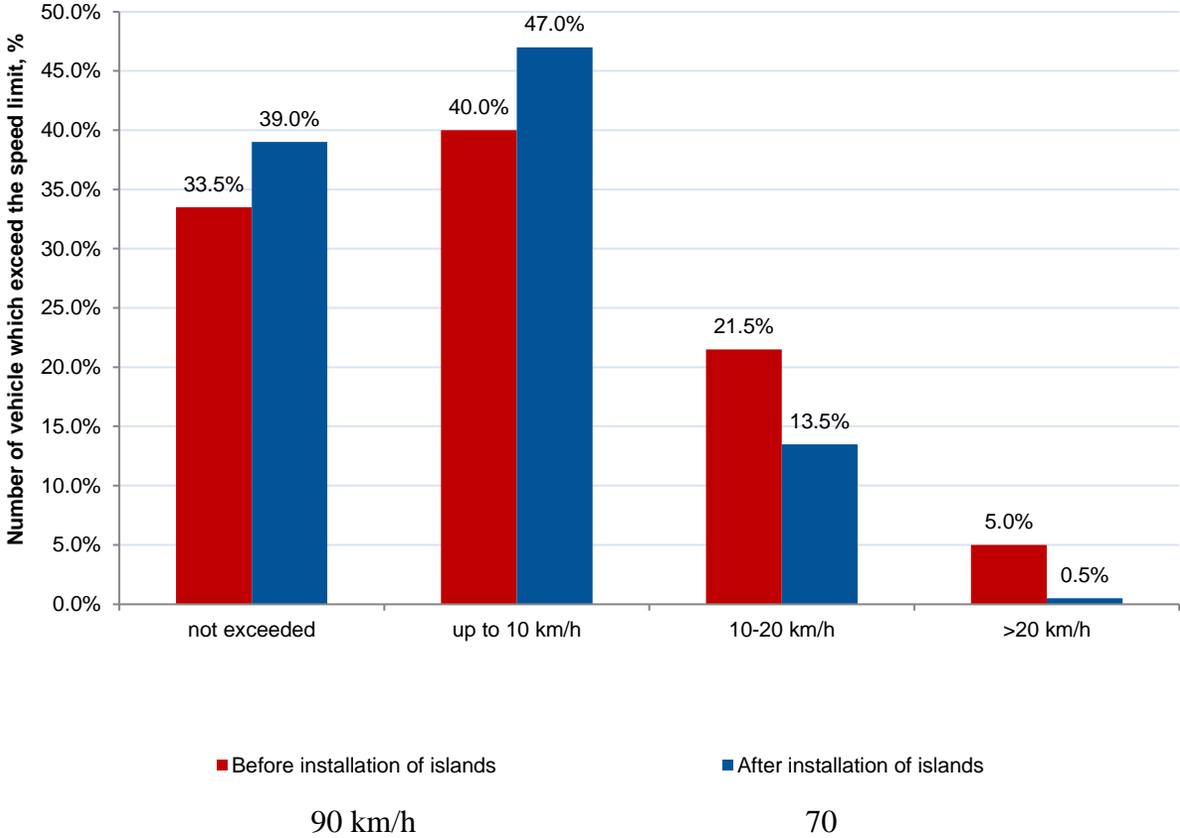
Cover all road network with speed cameras

Type	Change after installation, %
Accidents	-83,0
Injured	-84,9
Fatalities	-83,3

Cover all road network with average speed cameras
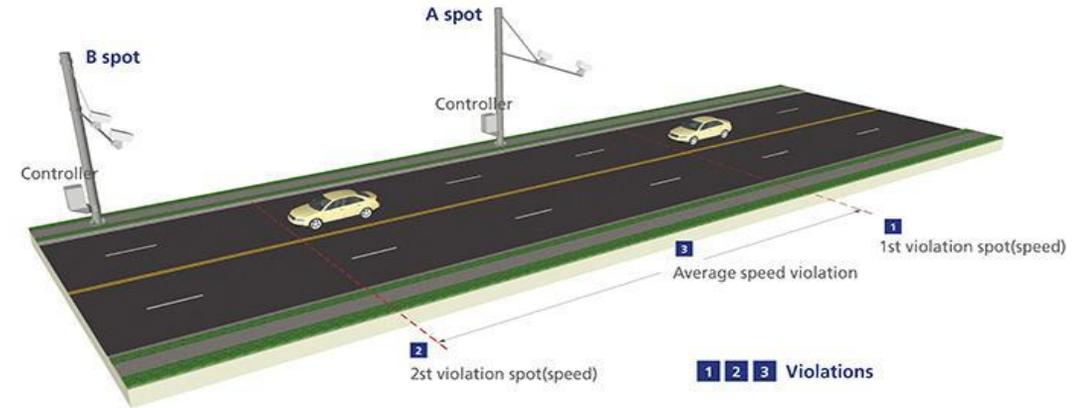
Install lightening in all dangerous points

Accident density chart:

Category	Before lightening	After lightening
Collision	0.95	0.68
Collision with bicycle	0.21	0.02
Collision with pedestrian	1.58	0.45
Collision with obstacle	0.18	0.1
Overturning	0.03	0.05
Other accidents	0.05	0.02

■ Before lightening ■ After lightening
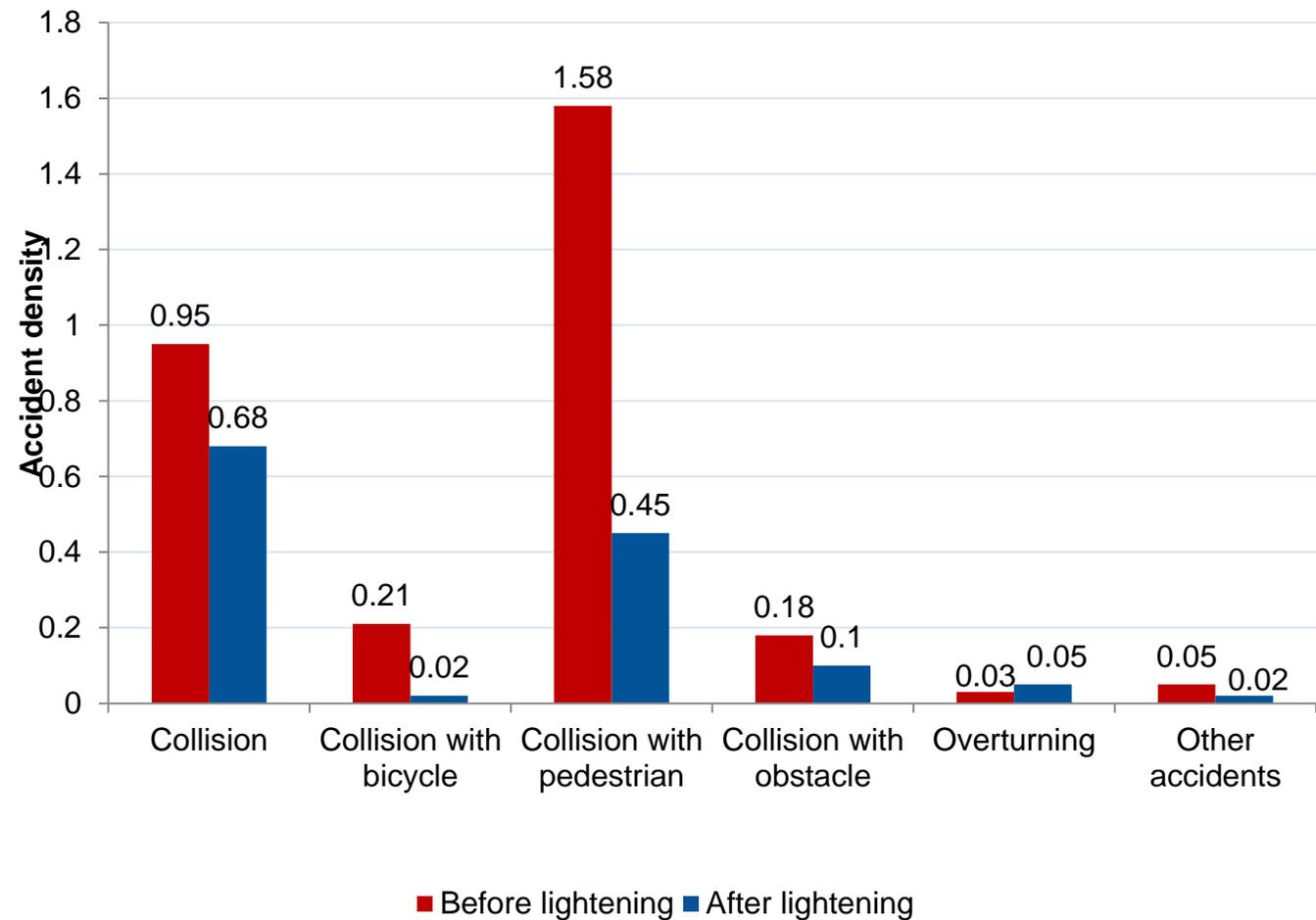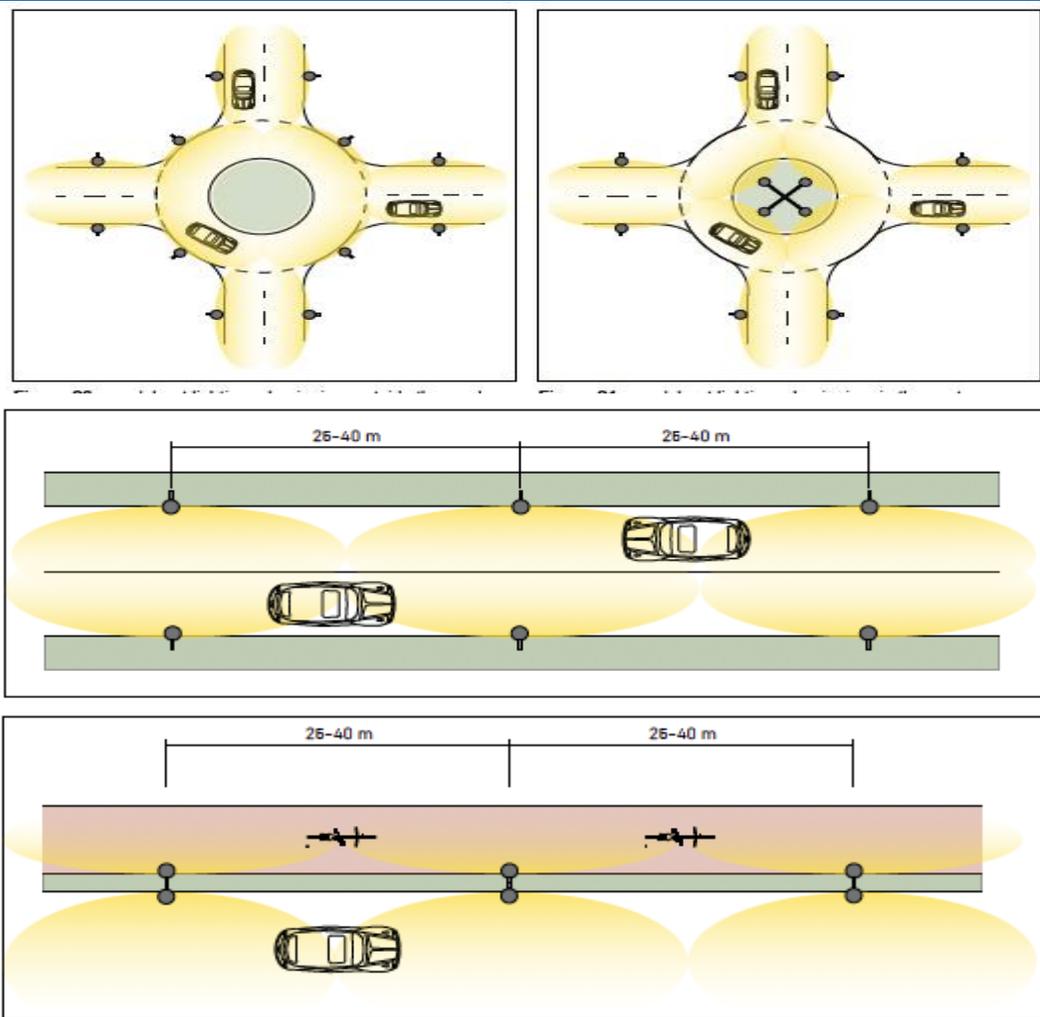
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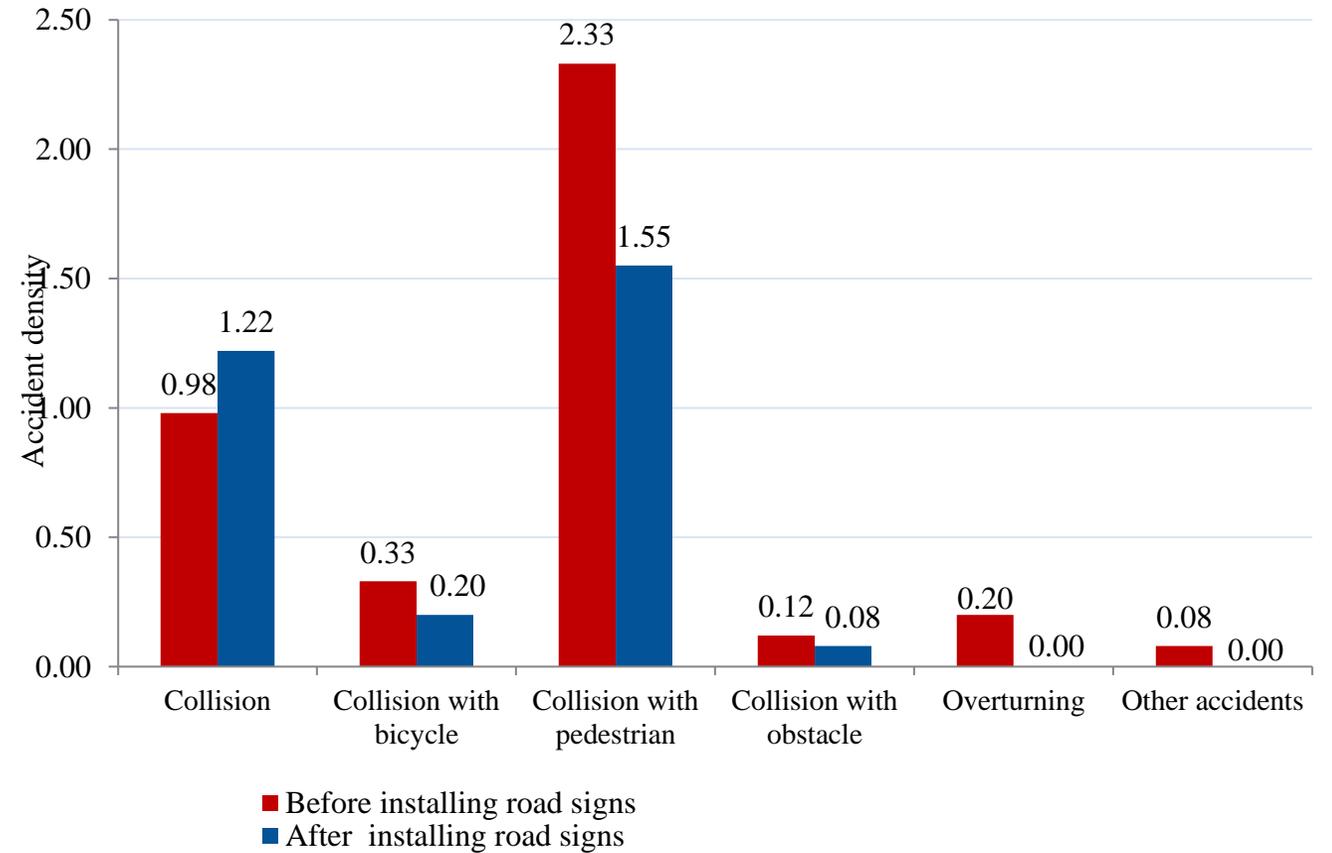
Install guardrails in all dangerous points
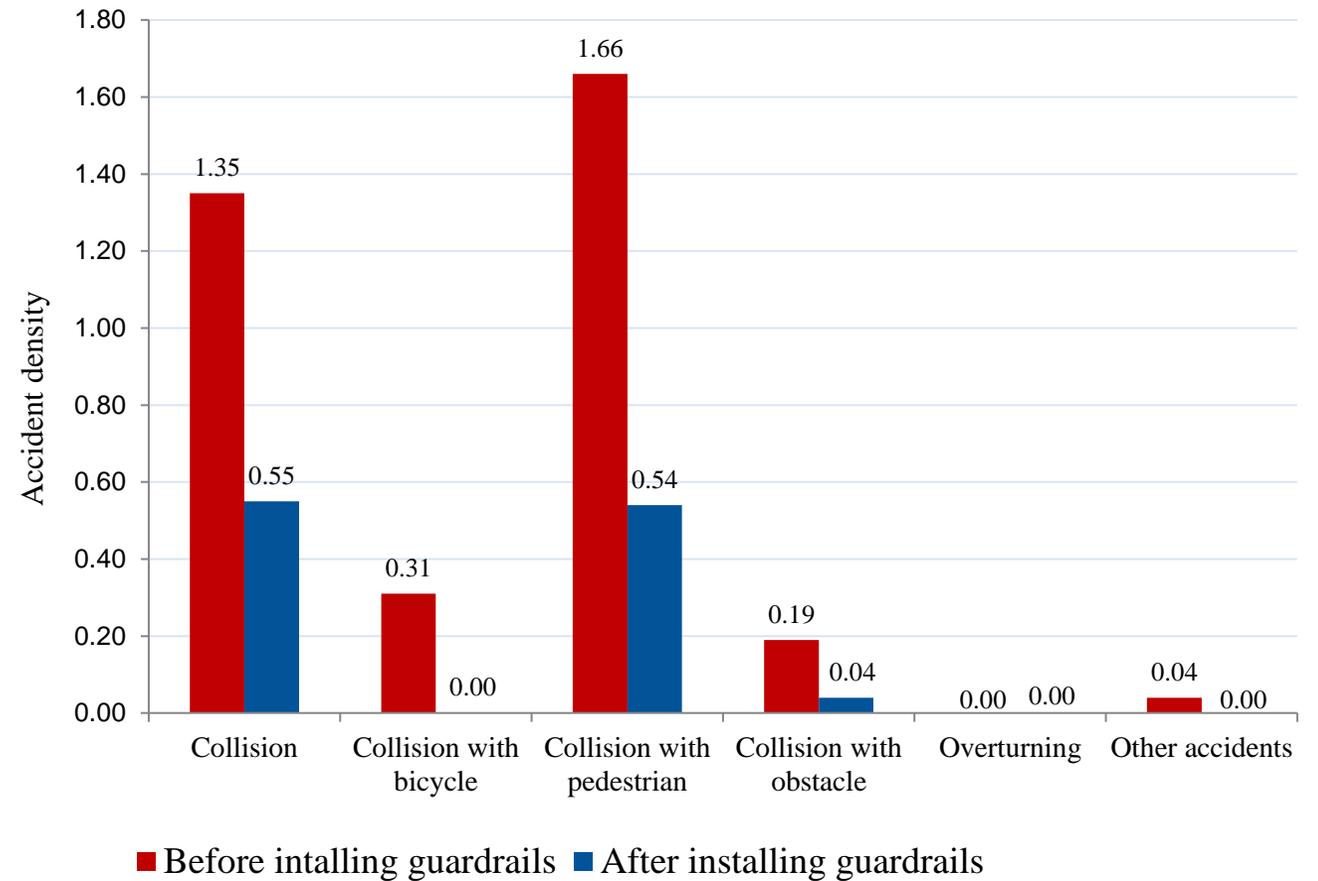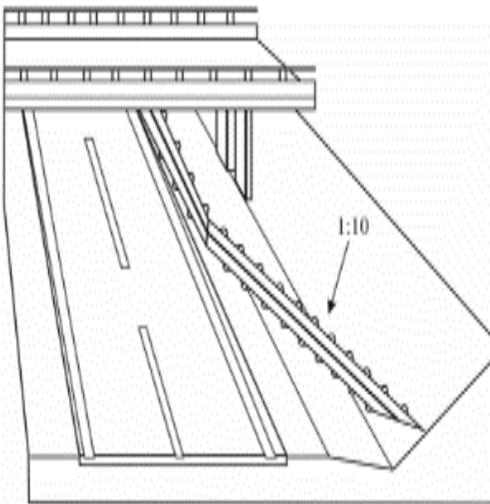
Extend/build new pedestrian/bicycle users' infrastructure

Chart: Accident density

- 0.69 / 0.00 — Collision
- 0.31 / 0.00 — Collision with bicycle
- 0.92 / 0.15 — Collision with pedestrian
- 0.23 / 0.15 — Collision with obstacle
- 0.15 / 0.15 — Overturning
- 0.15 / 0.00 — Other accidents

■ Before building footpaths and cycling paths   ■ After building footpaths and cycling paths
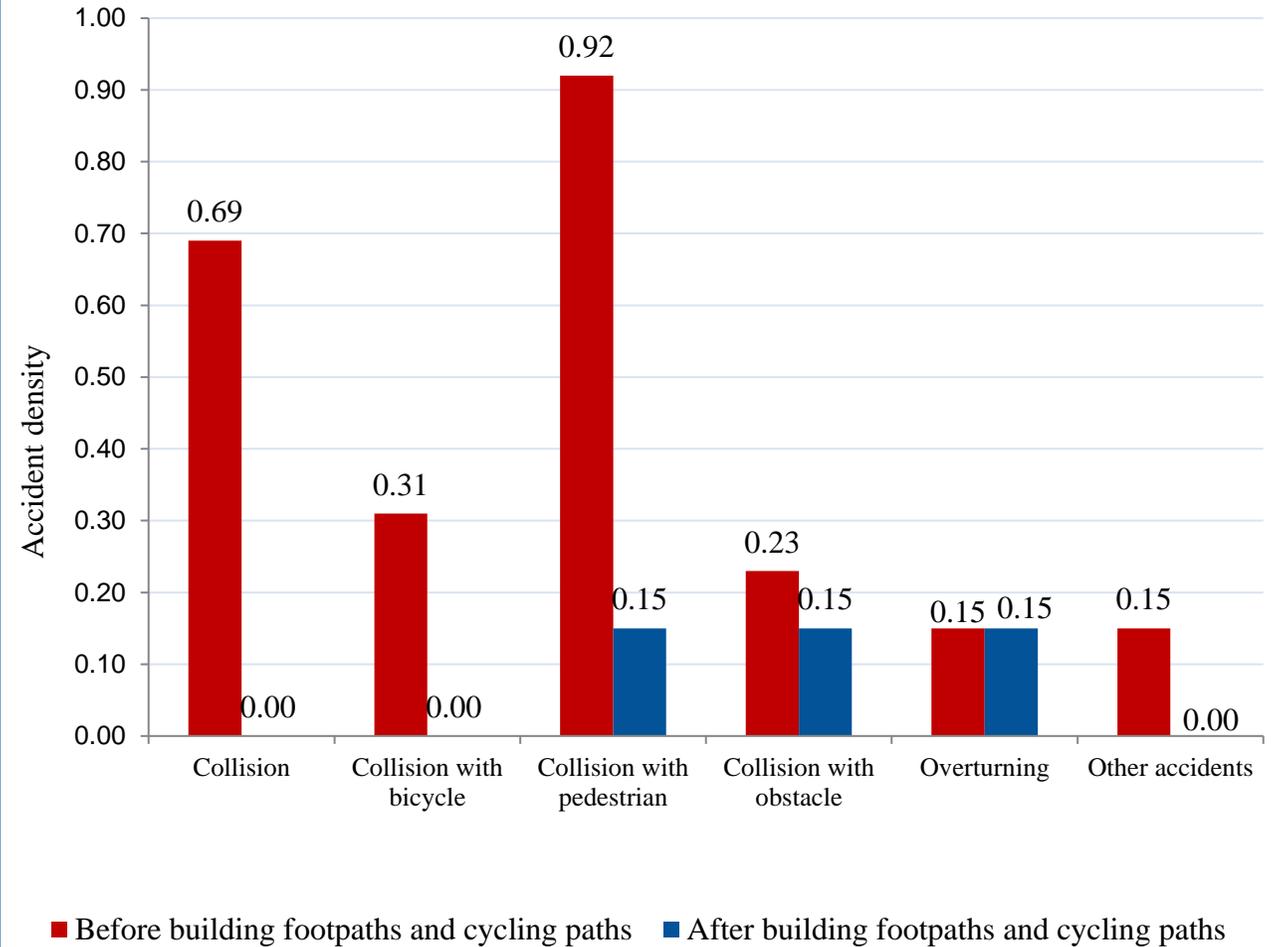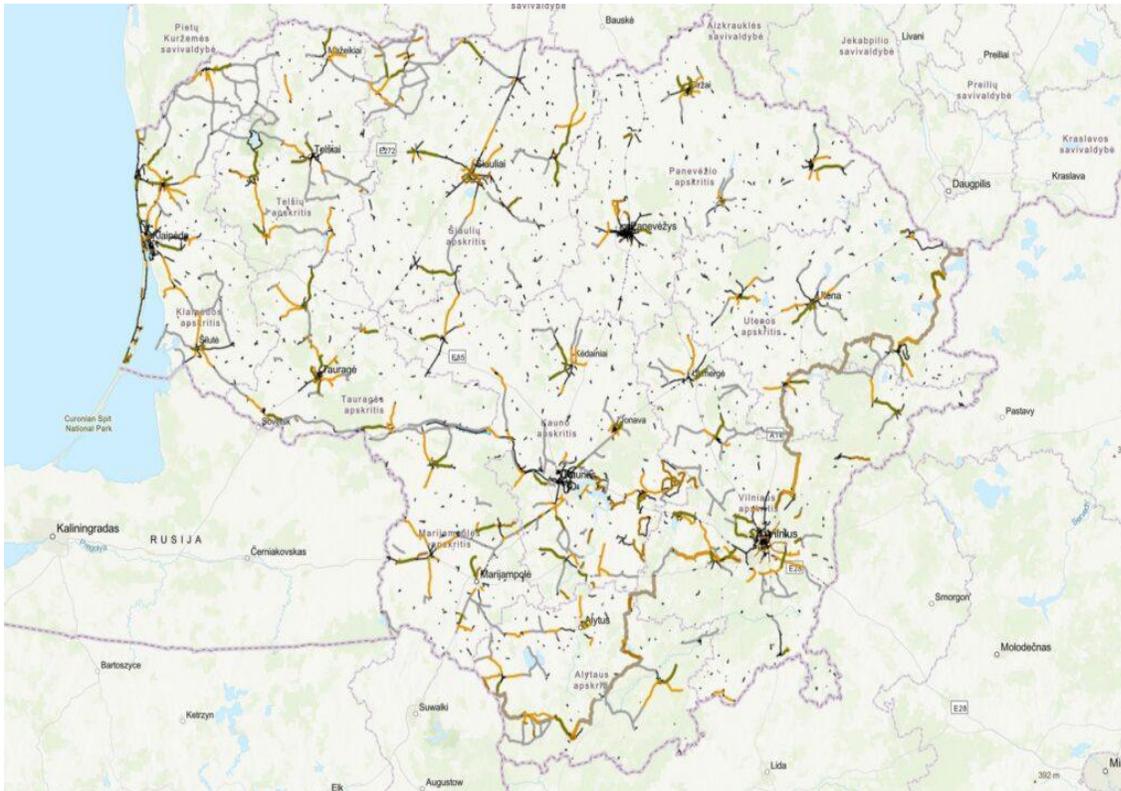
Extend/build new pedestrian/bicycle users' infrastructure
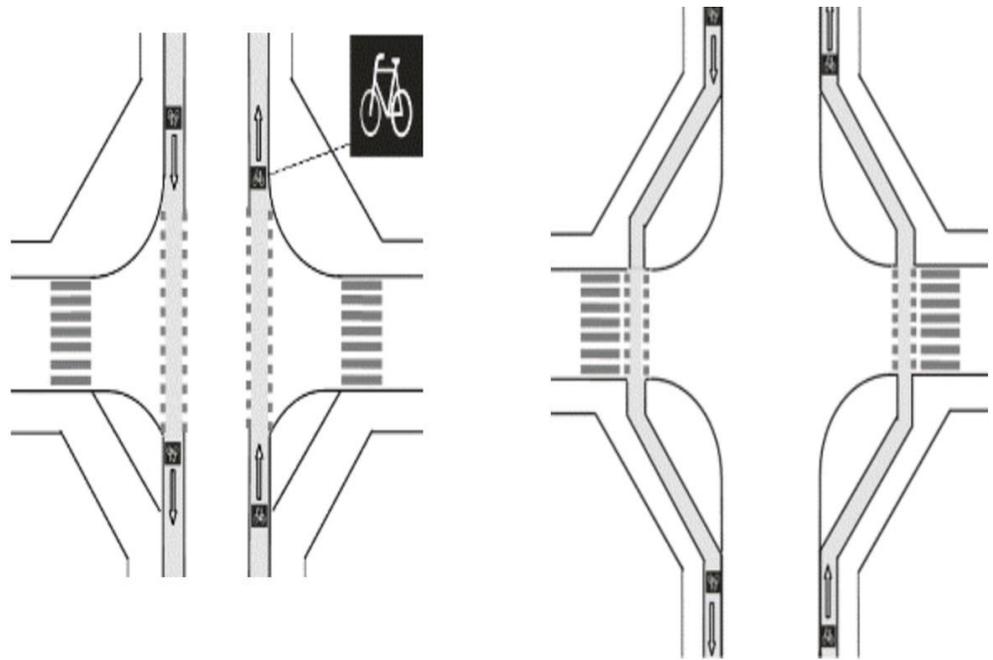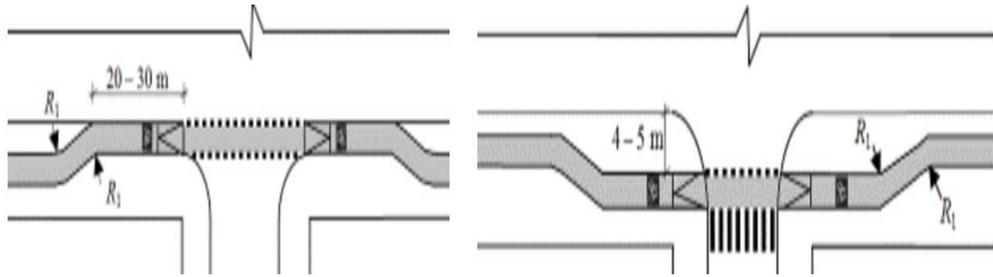
Use of only needed road signs

Signs should be very good visible
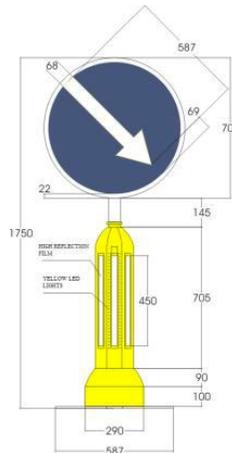
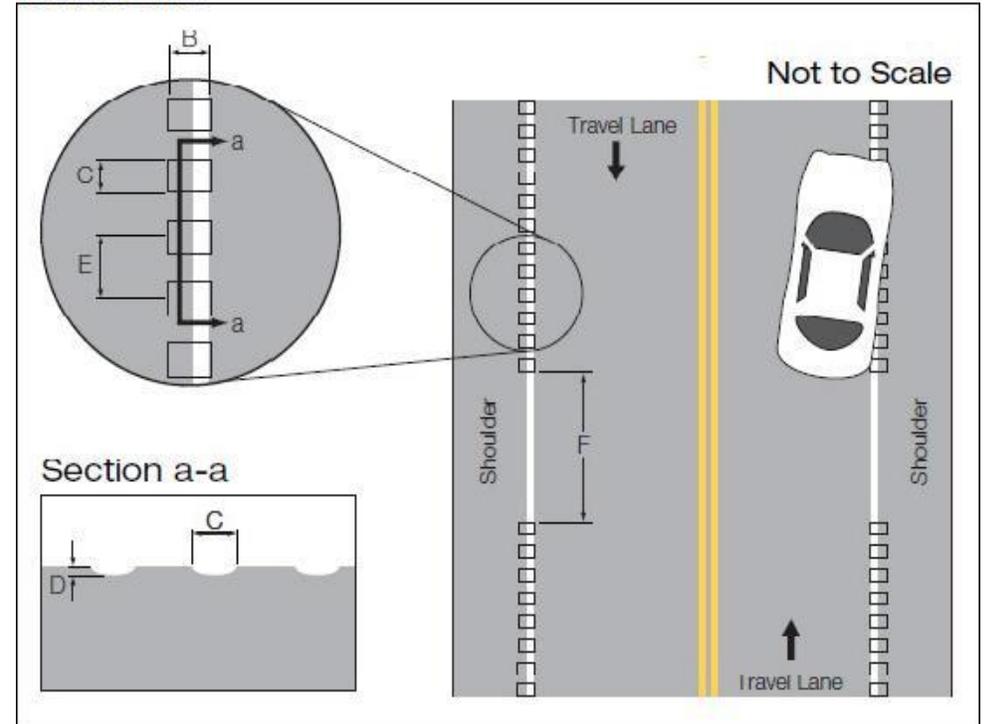| Form of a road sign	Dimensions of a road sign in use, mm	Recommended speed, km/h
△	3600x1500	70–90
	4000x2000	70–90
	6000x2500	> 90
◯	3000x2000	70–90
	4000x2000	70–90
	6000x2500	> 90
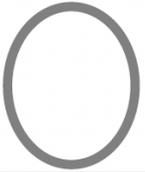
Best quality horizontal road marking all year round
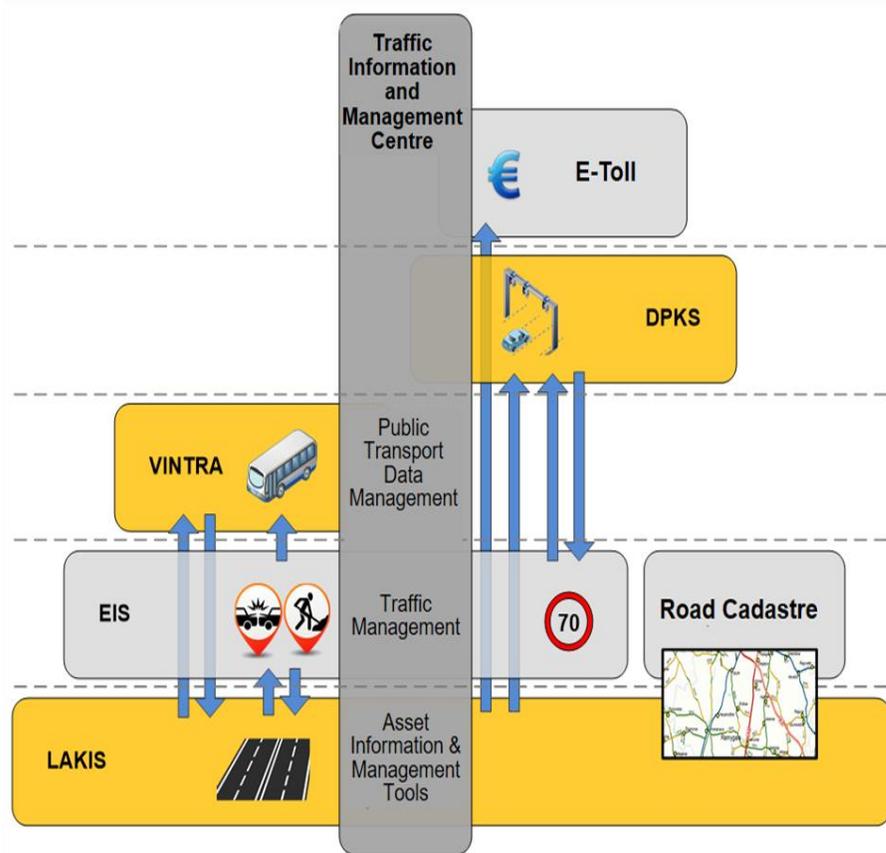
Install rumble strips where possible

Fastened ITS legislation adaptation and implementation
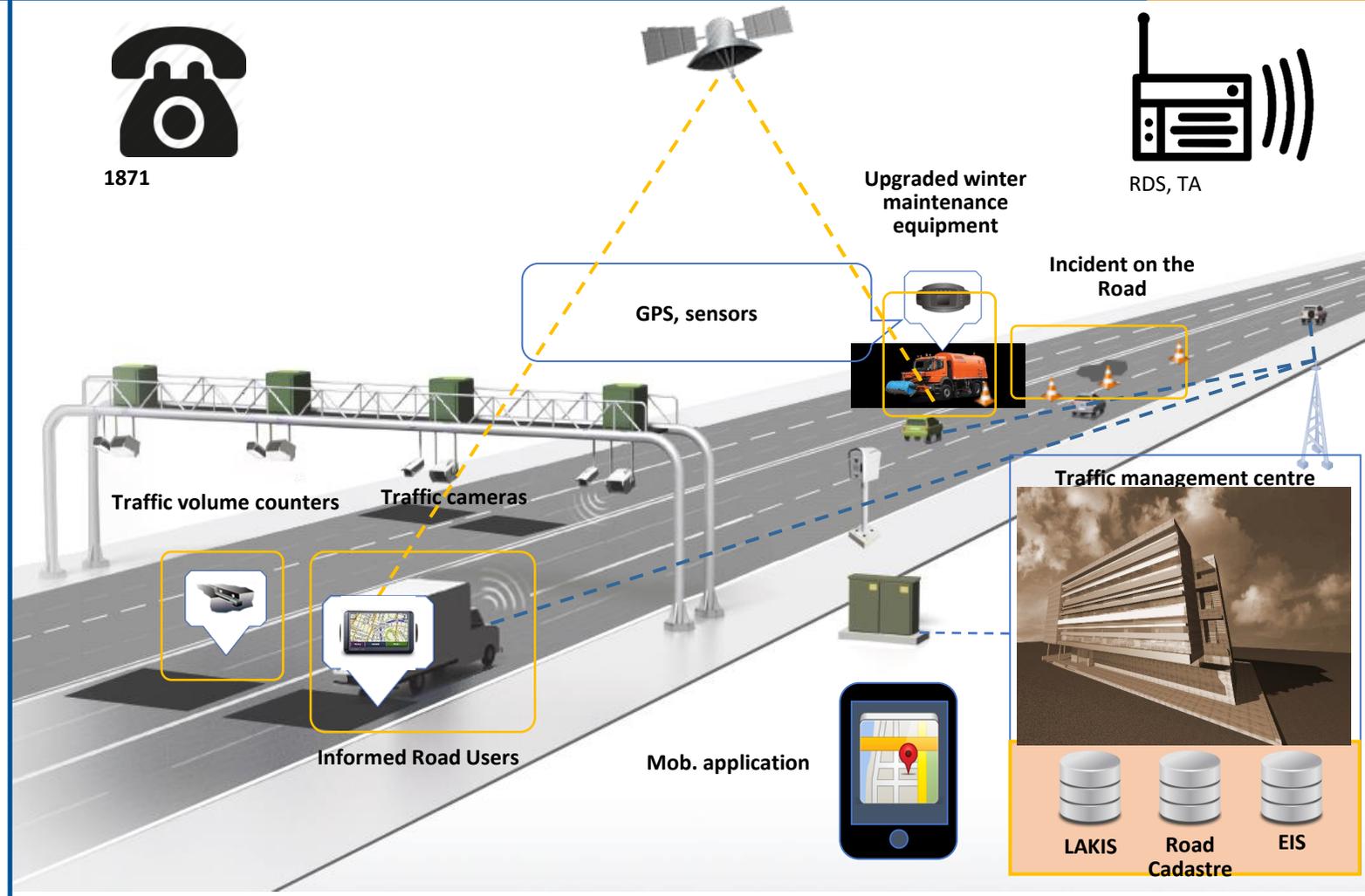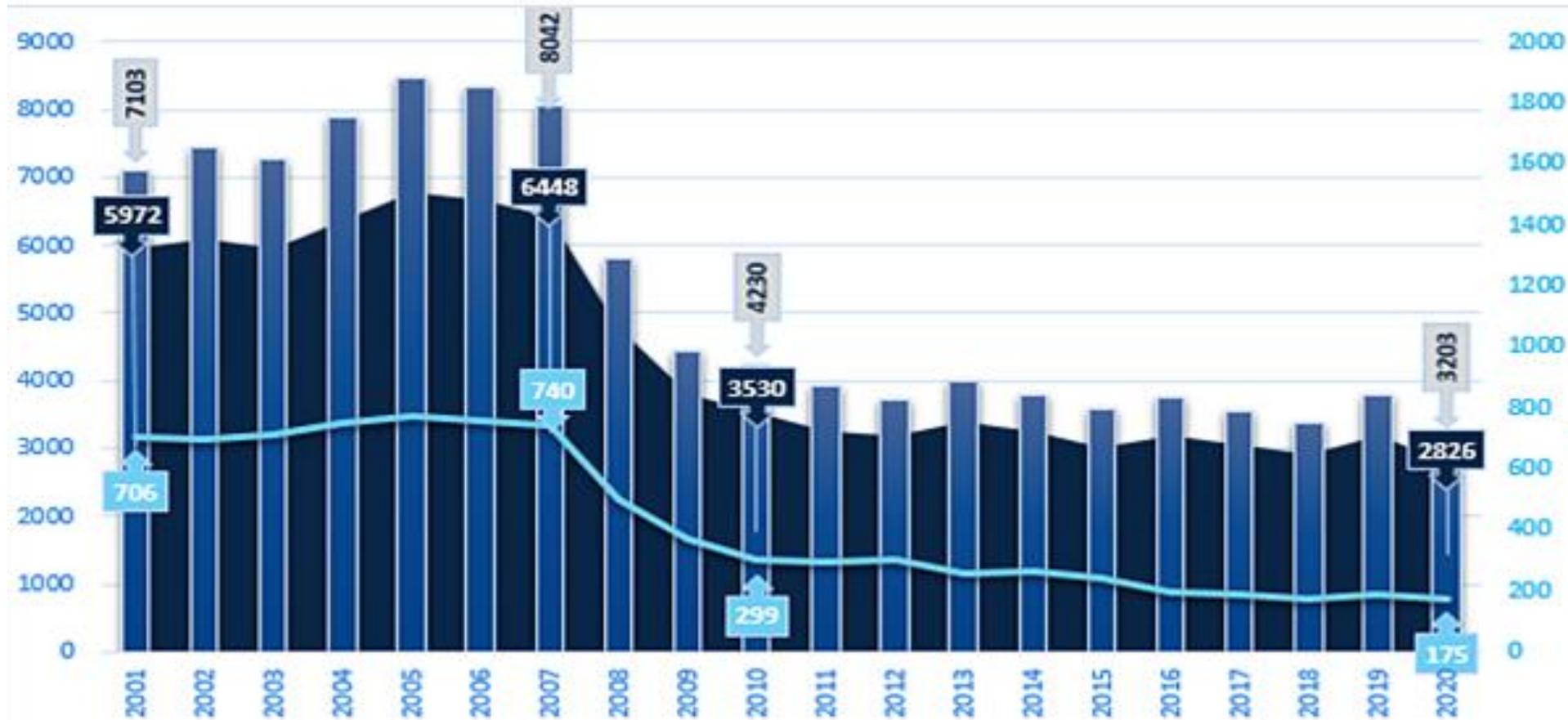
New standards to ensure best quality road maintenance
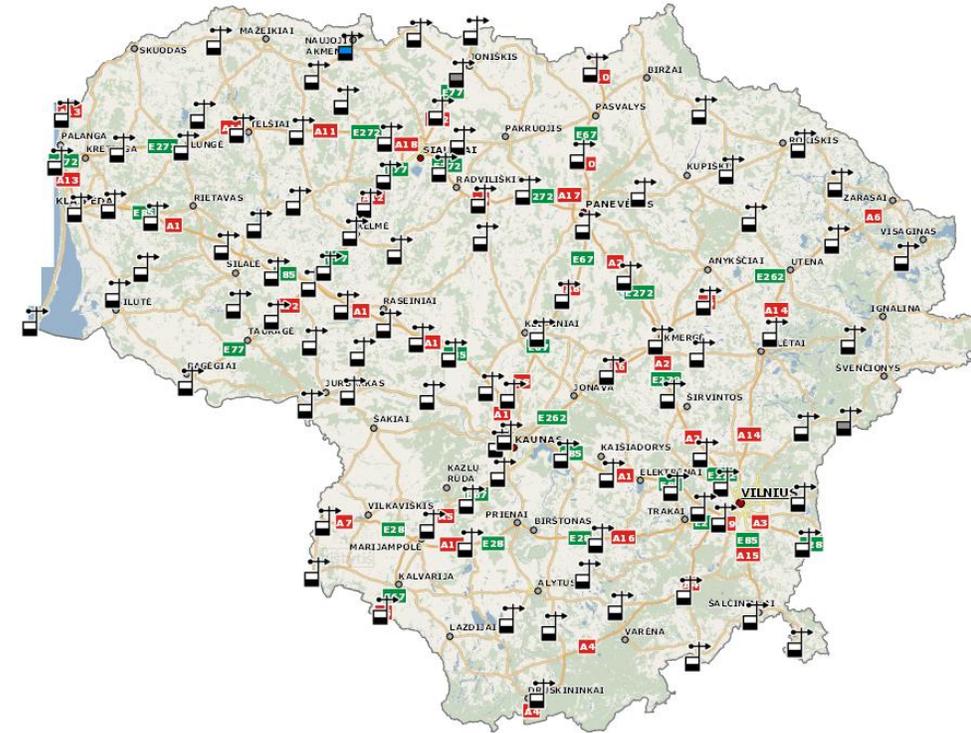
Hard work results led to success story and a lot of saved lives

EC PIN award in 2012

Thank You!