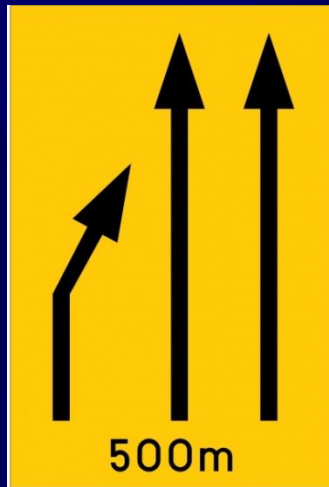


Traffic engineering tools and applications



Urban Transport 8.
András Gulyás PhD habil
associate professor

Content

- **Principles of traffic engineering**
- **Toolbox of traffic engineering**
- **Traffic engineering tools and applications**
 - **Signs**
 - **Guardrails**
 - **Restraint at roadworks**
 - **Data collection**

Principles of traffic engineering

Traffic engineering is dealing with the regulation and management of road traffic, among others:

- regulation of priority relations,
- traffic control, traffic signs and signals,
- one-way streets, prohibition of entry or turning,
- constraints, bans (speed, overtaking, entry, size, weight, standing and waiting),
- traffic calming,
- restricted zones, dwelling and resting areas,
- elements of pedestrian and bicycle traffic,
- parking control and fee collection,
- railway crossings,
- road tolling.

Principles of traffic engineering

Traffic engineering practice is the application of legal and technical regulations concerning traffic. Traffic engineering tools transmit local behaviour rules.

„Traffic order” is the realisation of traffic control, its physical appearance.

Traffic engineering is not merely a science rather craftsmanship. To learn it well is possible only in the practice at road operators, consultants or authorities.

Principles of traffic engineering

The road operator is responsible for the proper traffic order. In Hungary on the national road network it is the Road Management company, on urban roads the municipalities or their agent.

There are in addition as road operators a few concessionary motorway companies (M5, M6).

On private roads opened to public traffic the responsible for the traffic order is the owner (fuel stations, shopping centres parking, industrial parks and dwelling parks).

Toolbox of traffic engineering

Elements of the toolbox of traffic engineering (not in entirety):

- Road signs – traffic signs and pavement markings,
- Traffic signals (light signal devices),
- Speed reduction tools,
- Restriction kits (temporary and permanent),
- Tools for parking management and control,
- Equipment for entry restriction,
- Toll and fee collection systems,
- Data collection devices,
- Variable message signs,
- Intelligent (combined) systems.

Traffic engineering tools and applications - signs

Basic pillars of traffic order are traffic signs.

Elements of vertical system: posted signs, boards erected on roadside or put above roads.

Elements of horizontal system: painted signs on the pavement, marks

- **sometimes provide optical direction to drivers,**
- **pavement prisms for better visibility and separation.**

Traffic engineering tools and applications - signs

Main aspects of the application of signs

- visibility, recognition, readability,
- not too many signs at one post.

Main types of posted signs:

- priority regulation,
- danger indicative,
- prohibitive,
- mandatory,
- informative,
- road category.

Traffic engineering tools and applications - signs

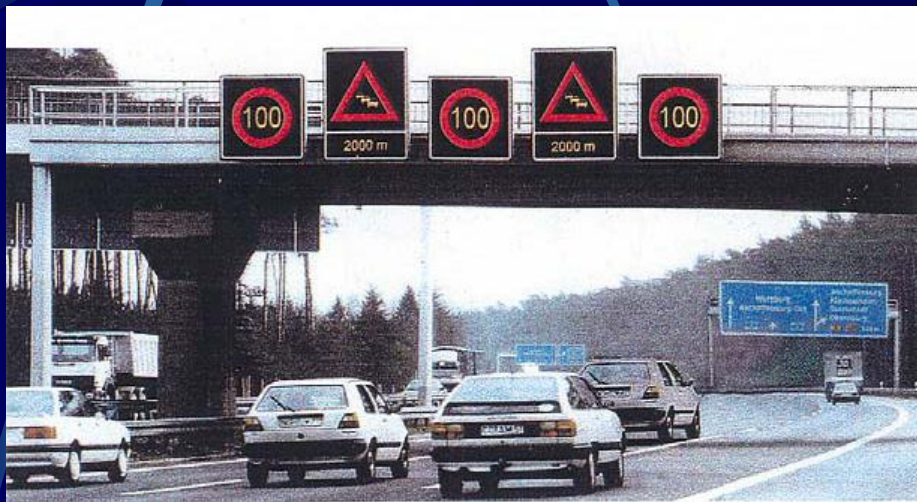
Further types of posted signs

- o direction signs on high-speed roads (blue in Hungary) and main roads (green in Hungary),
- o tourism sights (brown)
- o individual 😊



Traffic engineering tools and applications - signs

Variable message signs (VMS, on high-speed roads)



Traffic engineering tools and applications - signs

Types of pavement marks:

longitudinal

- centre line, optical line at the edge
- continuous line, broken line

perpendicular

- stop line, dedicated pedestrian crossing

pictograms

- pedestrian, bicycle warning, priority yield

Traffic engineering tools and applications - signs

In general weather circumstances, daytime, the visibility is good, the sight distance is normal, drivers may drive at permitted speed as usual.

In constrained visibility, adverse weather condition, night time, the visibility is worse, the sight distance is decreased.

On wet pavements the visibility and retro-reflexivity of marks is weaker. Special solution is needed for enhancing these features (glass beads).

Traffic engineering tools and applications - signs

Usual painting methods for pavement marks

Traditional (with chemical solution)

Environment friendly (with water solution)

Temporary signs

Durable signs

- **Thermoplastic**
- **Cold plastic**
- **Prefabricated**

Traffic engineering tools and applications - signs



Traffic engineering tools and applications - signs

Technological issues:

Retro-reflectivity is enhanced by micro glass beads sprayed onto the freshly painted surface

Water solution based paints are favourable for the environment.

Acoustic pavement marks for safety – ribbed, structured.

Traffic engineering tools and applications - signs

Acoustic pavement mark for safety, at the edge of the pavement on a high-speed motorway, generating noise and vibration in the car, to prevent the driver in leaving the lane.



Traffic engineering tools and applications - signs

Light reflecting prisms placed on the pavement



Traffic engineering tools and applications - guardrails

European standards determine the characteristics of the restraint systems based on crash tests performed with dummies.

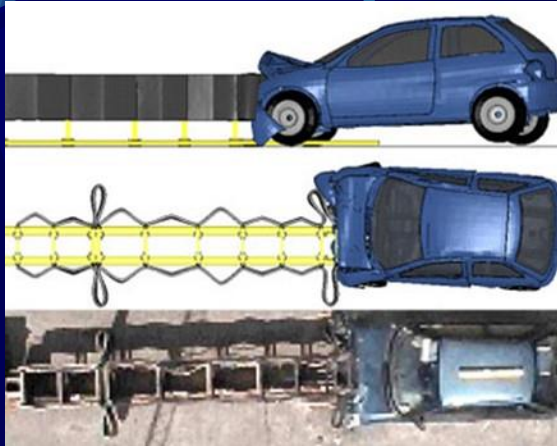
Main types of road traffic restraint systems

- Guardrails – traditional and safe
- Guardrail endings
- Energy absorption devices
- Bridge railings
- Pedestrian and bicycle path railings

Traffic engineering tools and applications - guardrails



Traffic engineering tools and applications - guardrails



Traffic engineering tools and applications - guardrails

Serves the interest of the driver and passengers as well as others at roadside or nearby.

There are different classes for characteristics:

- Intercept grades: H1, H2, H3, ...**
- Fierceness of crash: A , B; (C)**
- Shape deformation (effect range): W1, W2, ...**

The EU standard says: „the given country may choose where and what to apply based on an objective comparison of technical features”.

Traffic engineering tools and applications - guardrails

Energy absorption devices (fix and mobile)



Traffic engineering tools and applications - restraint at roadworks

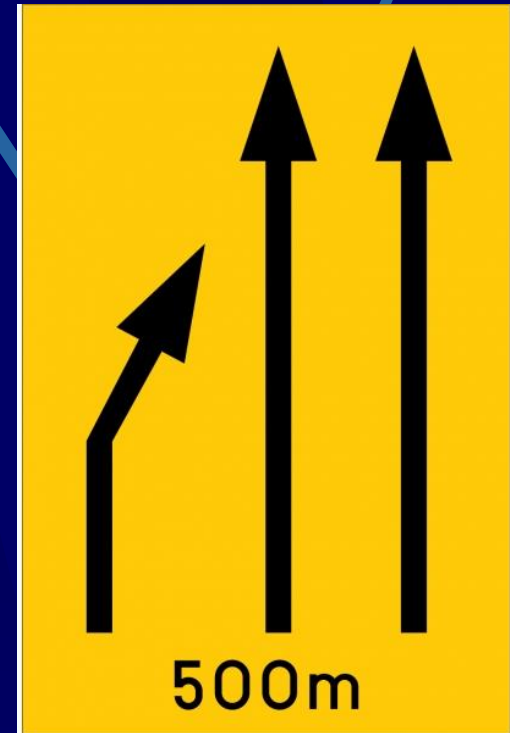
Traffic restraint at roadworks – temporary or constant at point, area or moving worksites.

The safety of road workers is important as well as of road users concerned.

In case of roadworks the worksite

- must be limited by restraint systems,**
- must be signed properly on the spot,**
- preliminary signing is necessary.**

Traffic engineering tools and applications - restraint at roadworks



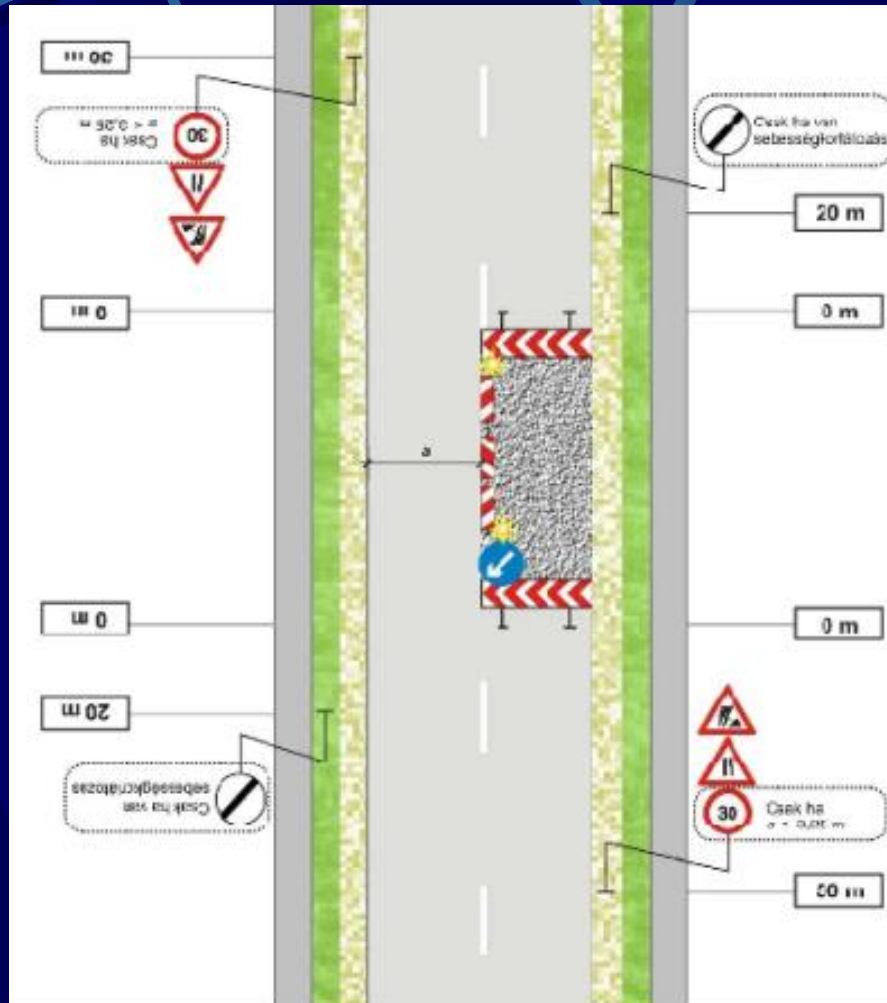
Traffic engineering tools and applications - restraint at roadworks



Traffic engineering tools and applications - restraint at roadworks



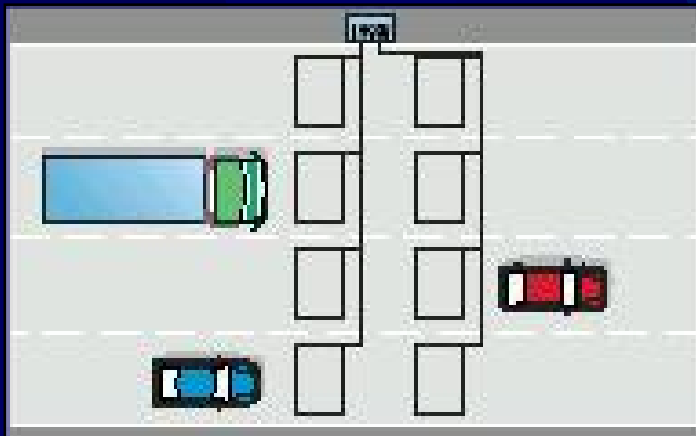
Traffic engineering tools and applications - restraint at roadworks



Traffic engineering tools and applications - data collection

Inductive loop detector for traffic volume count and nowadays for simple vehicle classification.

With 2 loops per lane the speed can be measured.



Traffic engineering tools and applications - data collection



Traffic engineering tools and applications - data collection

**Piezo electric detector and quartz detector:
suitable for measuring in a dynamic way**

- axle load,
- vehicle class,
- speed,
- traffic volume,
- headway.



Summary

Traffic engineering practice is the application of legal and technical regulations concerning traffic.

Traffic engineering tools transmit local behaviour rules.

„Traffic order“ is the realisation of traffic control, its physical appearance.

The road operator is responsible for the proper traffic order.

In case of roadworks the worksite must be limited by restraint systems, must be signed properly on the spot and its preliminary signing is necessary.

Thank you for your attention!

András Gulyás
associate professor
e-mail: gulyasandras@hotmail.com