Traffic calming, speed reduction tools

Urban Transport 9.
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The aim of traffic calming

The aim of traffic calming is the reduction of harmful effect of road traffic on society and people.

Main achievements of traffic calming are:

- **forcing orderly traffic movements,**
- **Paying attention to a watchful, cautious driving,**
- **reduction of speed on the given roads,**
- **decreasing the traffic volume of the given section.**

Traffic calming measures affect human behaviour.

Very important is the societal participation, the acceptance by those who are concerned.

The aim of traffic calming

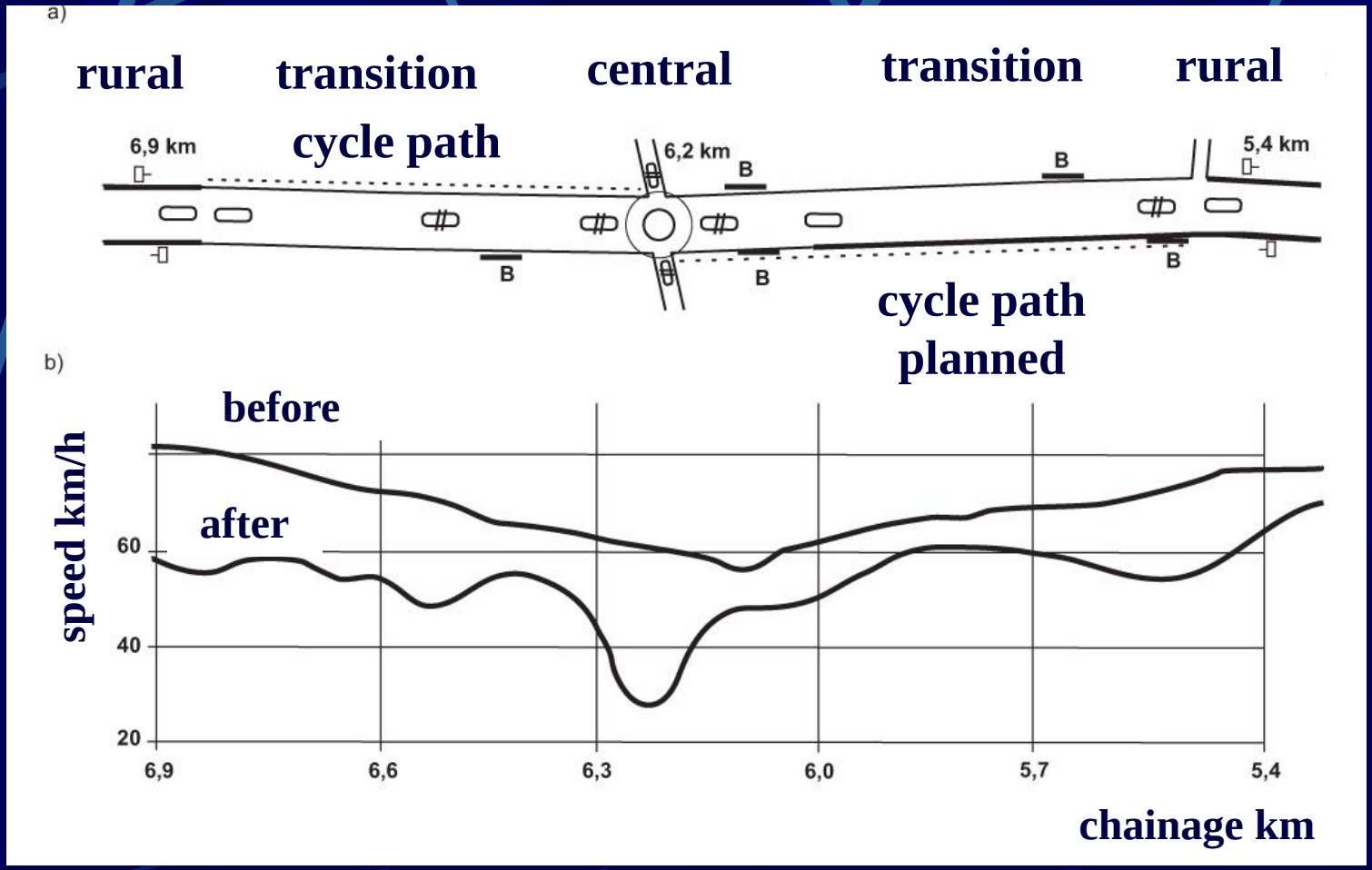
Traffic calming is recommended on the urban main road sections where the traffic volume (AADT) is less than 8000 pcu/d (personal car units / day) and the proportion of trucks is less than 20 %.

There are different sections of an urban main road based on land-use and building intensity:

- **rural like section,**
- **transition section with unique land-use function,**
- **central section with dense building and complex functions.**

The aim of traffic calming

Change of speeds before and after traffic calming



Tools for traffic calming

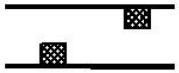
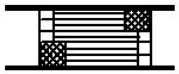
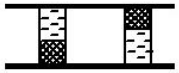
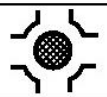
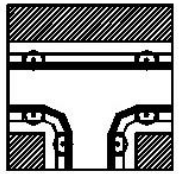
Tools for traffic calming on an urban main road section:

- **temporary constraint or prohibition of through truck traffic,**
- **settlement gate at the entry,**
- **roundabout type junctions,**
- **speed constraint on certain sections,**
- **signalised junctions against continuous traffic flow,**
- **reduction of lane width and/or the number of lanes,**
- **dedicated pedestrian crossing with middle isle,**
- **bicycle lane or path.**

Tools for traffic calming 1.

		type		Allowed speed km/h			AADT pcu/d	
		main	sec.	> 50	50	< 50	> 3000	≤ 3000
1.	Preliminary sign	×	×	×	×	×	×	×
2.	Entry gate	×	×	×	×	×	×	×
3.	Pavement level increase	(×)	×		×	×	×	×
4.	Speed reduction bump		×			(×)		×
5.	Lane moving, parking	×	×	×	×	×	×	×
6.	Lane moving, level incr.	(×)	×		×	×	×	×
7.	Middle island	×	×	×	×	×	×	×
8.	Lane width reduction	×	×		×	×	×	×
9.	Lane narrowing		×			×		×
10.	Lane narrowing, level incr.		×			×		×

Tools for traffic calming 2.

		type		Allowed speed km/h			AADT pcu/d	
		main	sec.	> 50	50	< 50	> 3000	≤ 3000
11.	 Lane narrowing, bump		×			×		×
12.	 Lane narrowing, moving		×			×		×
13.	 Narr., level incr., mov.		×			×		×
14.	 Narrowing, bump, mov.		×			×		×
15.	 Roundabout	×	×	×	×	×	×	×
16.	 Differing pavement	(×)	×		×	×		×
17.	 Narrowed junction, differing pavement	(×)	×		(×)	×	(×)	×

Tools for traffic calming

Traffic calming can be point-like, sectional or area-wide (pedestrian-cyclist, dwelling-resting or speed constrained zones).

Vegetation plantation is important on sections of traffic calming, because it makes the environment attractive and affects traffic and drivers.

Traffic calming measures are spatial, temporal, financial and legal means, in best case combining all these.

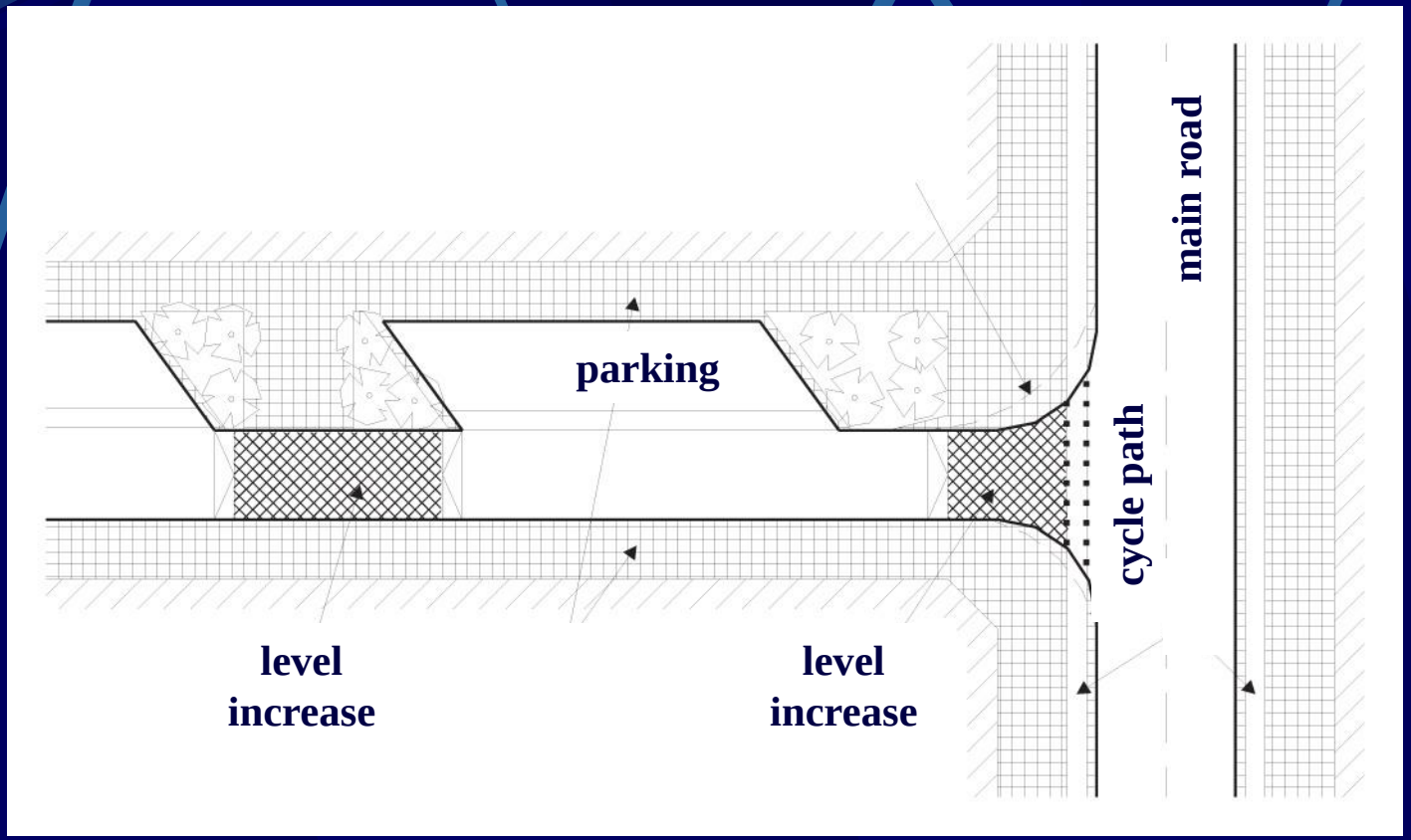
Tools for traffic calming

Toolbox for area-wide traffic calming:

- **Pavement material and colour changes,**
- **Lane narrowing, sidewalk widening,**
- **Pavement level increase (recommended),**
- **Speed reduction bump (not recommended),**
- **Moving of axis of junction branches,**
- **Applying a mini roundabout,**
- **Prohibition of certain traffic connections,**
- **Lane moving or drawing.**

Tools for traffic calming

Junction of a traffic calmed street and a main road

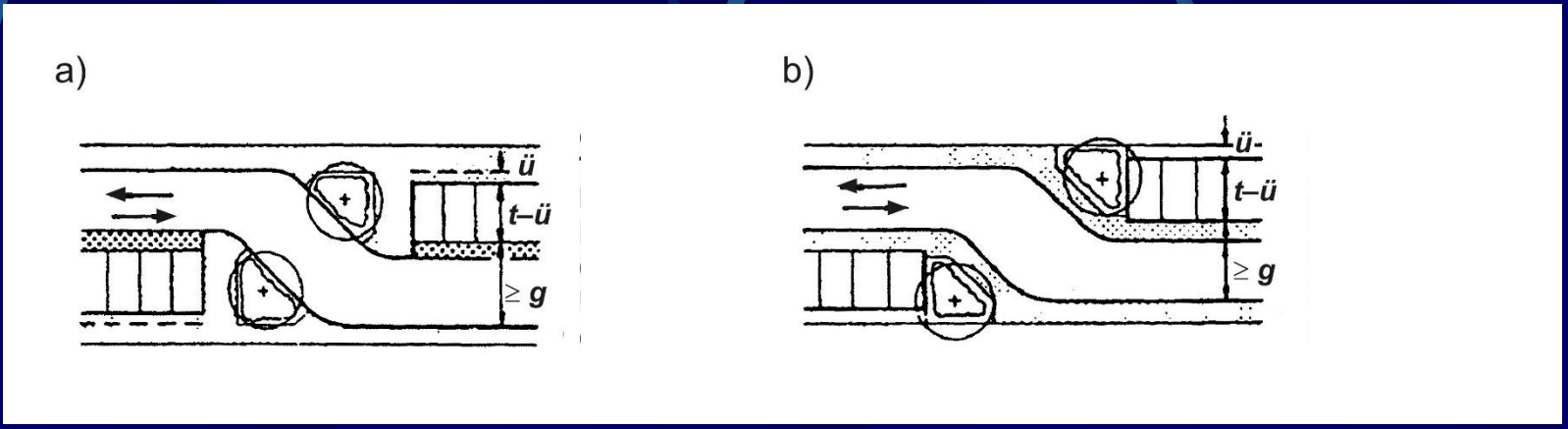


Tools for traffic calming

Lane moving for speed reduction

trees to emphasise the curves,

direct parking to reduce speed.



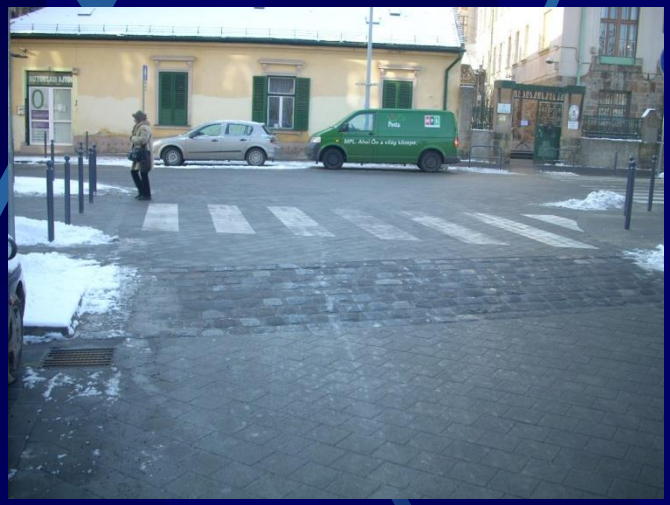
Examples of traffic calming

Pedestrian crossing with increased pavement level

Lane moving before a junction

Budapest Kis Rókus u. – Marczibányi tér

Examples of traffic calming



Speed reduction bump at the entry

Speed reduction bump at a pedestrian crossing

Budapest Marczibányi tér

Examples of traffic calming

Lane narrowing before a junction

Lane narrowing before parking

Budapest Lövőház u.

Dwelling-resting area, common usage

Conditions for establishment of a dwelling-resting area:

- **No through traffic,**
- **Differing inner road network,**
- **No traffic attractive institutions,**
- **No main roads inside,**
- **No public transport inside.**

Allowed maximum speed: 20 km/h

Dwelling-resting area, common usage

Source: Google Earth

Dutch example for a dwelling-resting area (woonerf).

Already in the seventies of the last century mixed usage pavements were constructed.

In these areas the material and colour of pavement is different.

Vegetation can be present on the pavement.

Dwelling-resting area, common usage

Common usage of pavement in the inner city shopping areas and on main roads of smaller cities is applied Europe-wide. This approach has been incorporated into Dutch and German standards.

There are no traffic signs or constraints on the common usage type pavement because the main idea is the voluntary changing of the relation among users of the public area.

Intentional uncertainty is created in these areas.

Nevertheless, it cannot be applied everywhere.

Dwelling-resting area, common usage

Dutch example for a common usage type pavement.

Congestion charging in big city centres

In the central area of certain big cities a congestion charging or entry fee can be applied for reducing traffic volumes.

The restricted area is well defined and bounded.

The fee is usually differentiated in time, more in peak hours and it is collected automatically.

Acceptance by inhabitants is very important.

A proper enforcement must be implemented.

European examples: Stockholm and London.

Congestion charging in big city centres

Stockholm – peak hours congestion charging 1

Aim: to reduce congestion (primary), to increase the proportion of public transport in the modal split and to decrease harmful emissions (secondary).

Method: automated cordons around the city centre.

Tariff: fees are depending on the given hour of the day.

Use of income: only for road infrastructure and public transport development of Stockholm.

Technology: automatic license plate number reading, recognition and identification.

Deployment phases: a pilot operation in 2006 January – July, a referendum in 2006 September, real operation from 2007 August.

Congestion charging in big city centres

Stockholm – peak hours congestion charging 2

Responsible authority: Swedish Transport Administration

Related developments: significant development of public transport concerning vehicles, facilities and operation.

Acceptance by inhabitants: a 7 month pilot operation.

Results achieved:

- **20 % traffic volume reduction in the centre,**
- **10 - 14 % reduction of harmful emissions,**
- **2 - 10 % improvement of air quality.**

Congestion charging in big city centres

Stockholm – entry fees by periods:

Peak hours: 7.30–8.30, 16.00–17.30 SEK 20

Transition periods:

7.00–7.30, 8.30–9.00, 15.30–16.00, 17.30–18.00 SEK 15

Daytime periods: 6.30–7.00, 9.00–15.30, 18–18.30 SEK 10

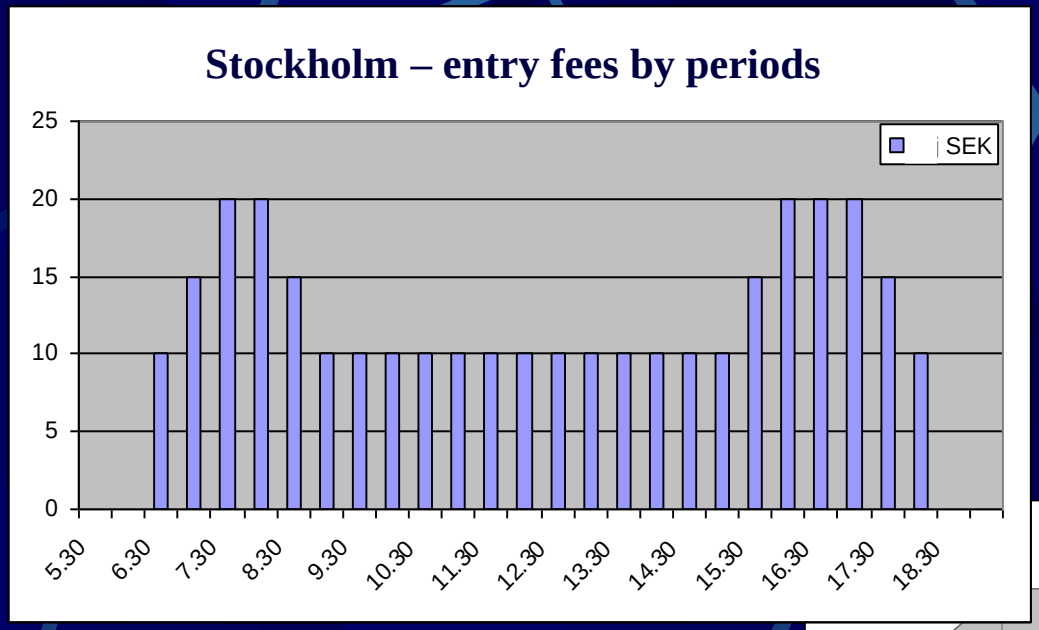
Maximum fee per vehicle: SEK 60 / day

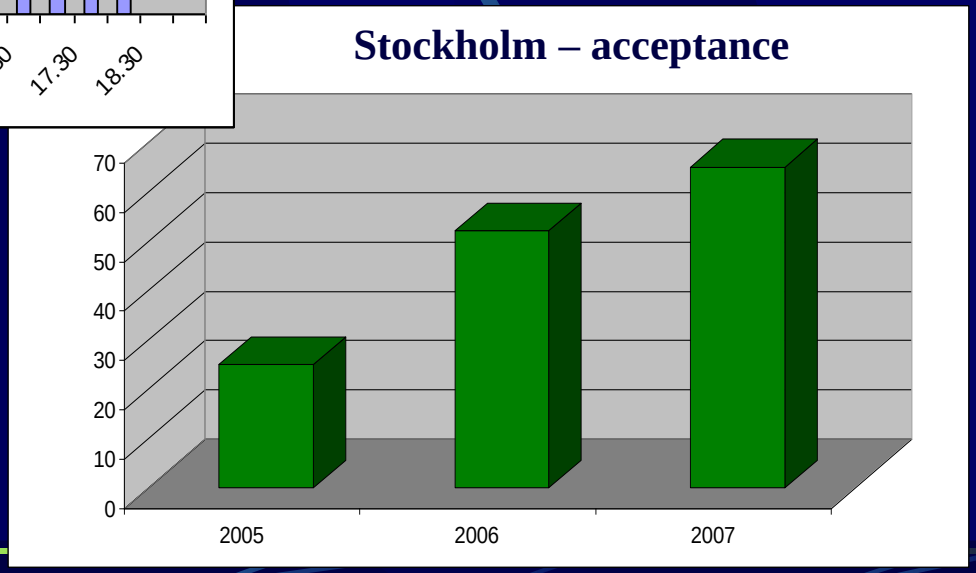
At nights, weekends and holiday free of charge.

Acceptance by inhabitants:

2005 – 25% 2006 – 52% 2007 – 65%

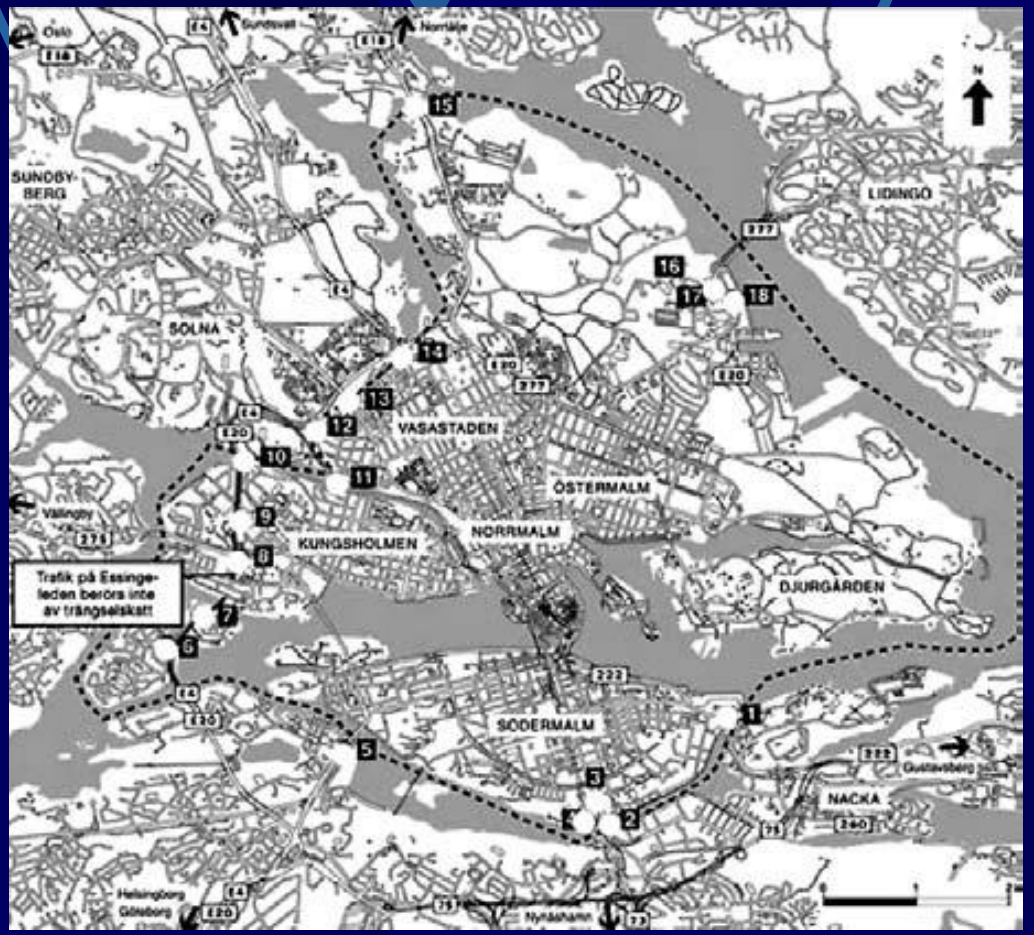
Congestion charging in big city centres





Congestion charging in big city centres

Stockholm cordons



Congestion charging in big city centres

Stockholm automatic toll gate

Congestion charging in big city centres

London – peak hours congestion charging 1

Aim: to reduce congestion (primary), to increase the proportion of public transport in the modal split and to decrease harmful emissions (secondary).

Method: automated cordons around the city centre.

Tariff: uniformly GBP (£) 8 / day (90% reduction of fee for inhabitants within the restricted zone)

Congestion charging in big city centres

London – peak hours congestion charging 2

Use of income: only for public transport (80 %) and road infrastructure (20 %) development of London.

Technology: automatic license plate number reading, recognition and identification.

Deployment phases:

- **start at 2003 February,**
- **fee increase in 2005 August,**
- **western extension between 2007-2010.**

Congestion charging in big city centres

Responsible authority : Transport for London

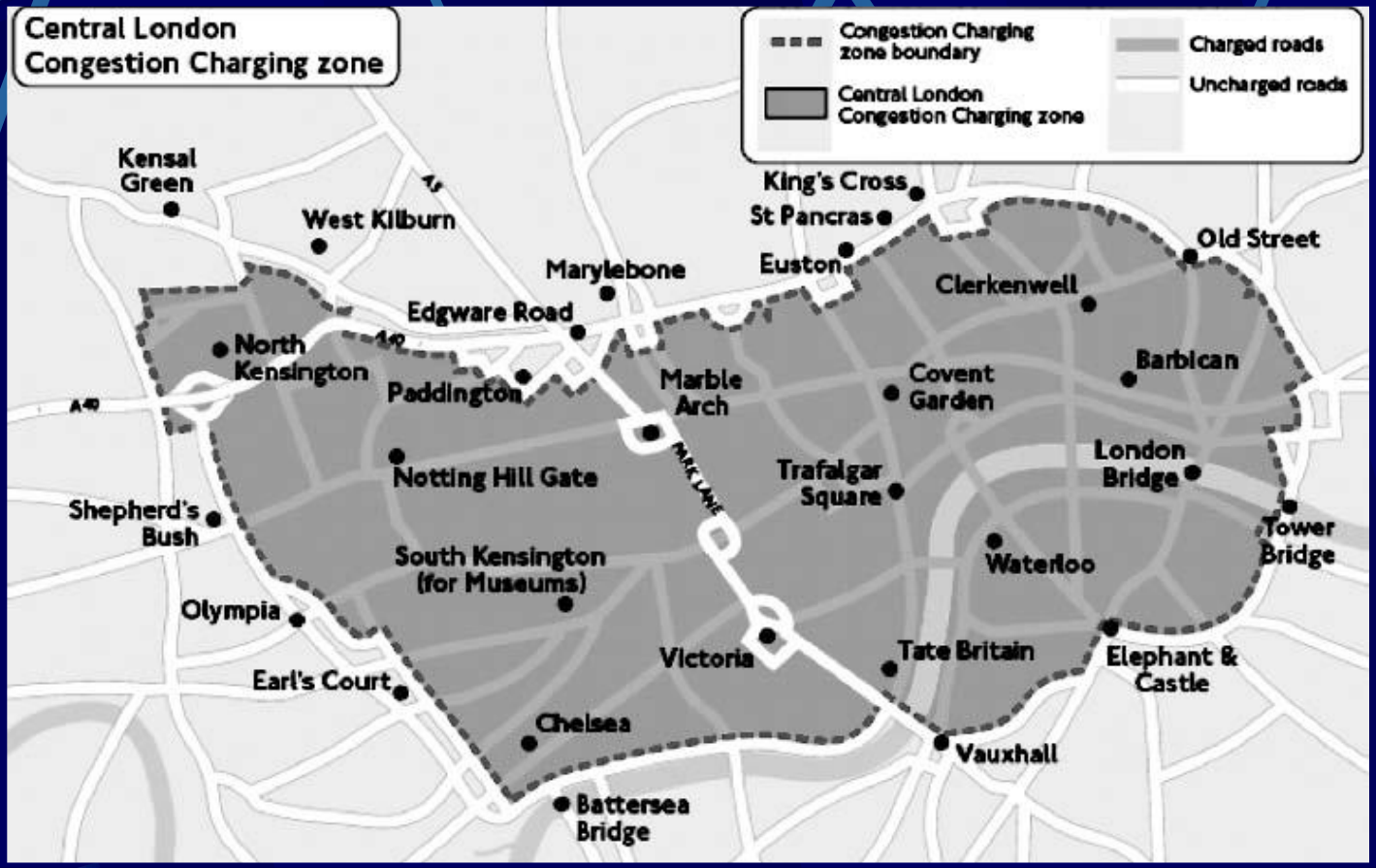
Further important facts: significant public transport development, withdrawal of the western extension in 2010, about 30 % of entering vehicles are exempted from paying.

Results achieved:

- **25 % traffic volume reduction in the centre,**
- **19 % traffic volume reduction in the western extension,**
- **£ 137 million net yearly income in 2008.**

Congestion charging in big city centres

London congestion charging zone



Tools for speed reduction

Control of speed – how much?

- Parameters of the same road section (alignment, pavement condition, width etc.) prove safe for one driver (big routine, known road, good driving ability) while dangerous for another driver (uncertain, conceited, poor vision).
- A road section may be safe for one vehicle but dangerous for another vehicle (large mass and size, poor maintenance, worn-out tyres).
- A road section can be safe in given circumstances but it can be dangerous at other situations.

Tools for speed reduction

A given speed limit therefore is suitable for a certain driver with a certain vehicle at given weather, sight and traffic conditions although another driver may be dissatisfied and even gets a speeding punishment.

The aim of traffic engineers and authorities to put an end to groundless constraints and at the same time to provide better enforcement for the well-founded reasonable constraints in order to enhance traffic discipline and driver behaviour.

Tools for speed reduction

Differentiated speed regulation at inhabited areas

- 70 km/ó: outer sections of settlements, if there are good sight conditions and adequate width, the land-use is industrial, trading or service, sidewalks are available, less crossing pedestrians, less junctions.
- 60 km/ó: outer sections of settlements, if there are good sight conditions and adequate width, the land-use is industrial, trading or service, sidewalks are available, there are crossing pedestrians or vehicles but the crossings are signalised or multi-level.
- The elevated speed limit must be obtained on longer sections (at least 800 - 1000 m).

Examples of existing speed reduction

Examples of existing speed reduction

Constrained speed zone (Tempo 30)

Aim of establishment:

- **improving the life quality of inhabitants within the zone,**
- **increasing the road traffic safety,**
- **decreasing harmful environmental effects,**
- **Regulated and ordered land-use development.**

Important are the societal public participation and the enforcement.

Examples of existing speed reduction

„Low cost” solution from Norway

1.flv

Summary

The aim of traffic calming is the reduction of harmful effect of road traffic on society and people. It can be point-like, sectional or area-wide.

Important is the societal participation, the acceptance by those who are concerned.

Common usage of pavement provide intentional uncertainty by the lack of regulation.

In centres of certain big cities congestion charging can be applied for reducing traffic volumes.

Differentiated speed regulation, and constrained speed zone can be deployed in settlements.

Thank you for your attention!

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