

# Vehicle parking, city logistics



**Urban Transport 6.**  
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**associate professor**

# Content

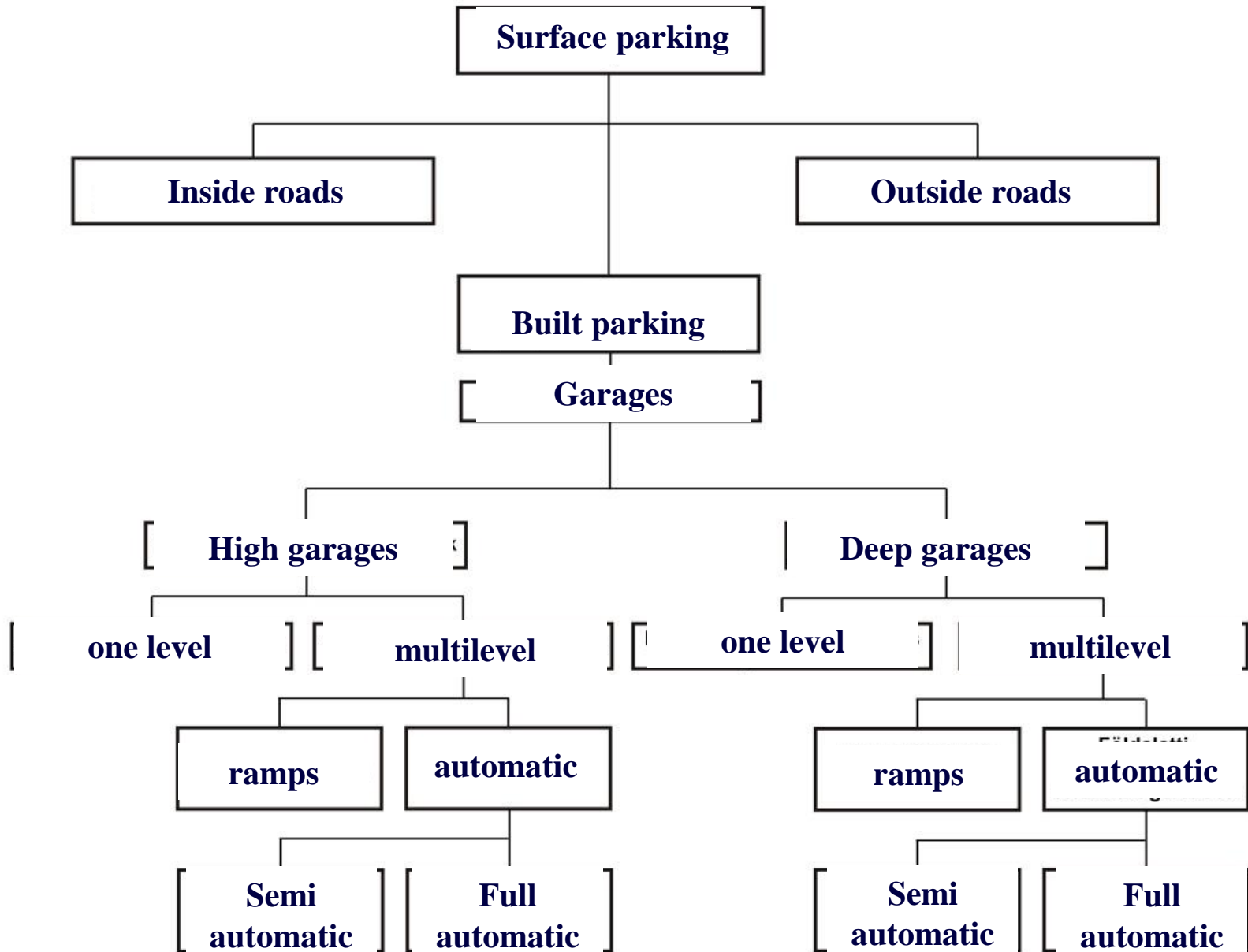
- **Parking demands and solutions**
- **Design of parking areas**
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- **Parking fee collection**
- **Garages, automated parking**
- **City logistics: solution for urban freight**

# Parking demand and solutions

**Parking demand standard is a legal order in Hungary. The standard determines the necessary parking places by area or capacity of attractive units for cars and buses.**

**A local legislative may determine different demand and may provide a possibility for financial taking out (i.e. to pay instead of to construct the parking area) but this really does not solve the situation.**

# Parking demand and solutions



# Parking demand and solutions

<b>Advantages disadvantages</b>	<b>Surface pay parking</b>	<b>Garage</b>
<b>Area required</b>	<b>bigger</b>	<b>smaller</b>
<b>Time management</b>	<b>penalty after time limit</b>	<b>no time limit</b>
<b>Cost of construction</b>	<b>lower</b>	<b>higher</b>
<b>Cost of usage</b>	<b>space dependent, can be high</b>	<b>usually higher</b>

# Design of parking areas

**Types of parking: stop, short wait, storage**

**Short time parking is less than 30 min**

**In case of new construction the parking issue must be solved within its building site**

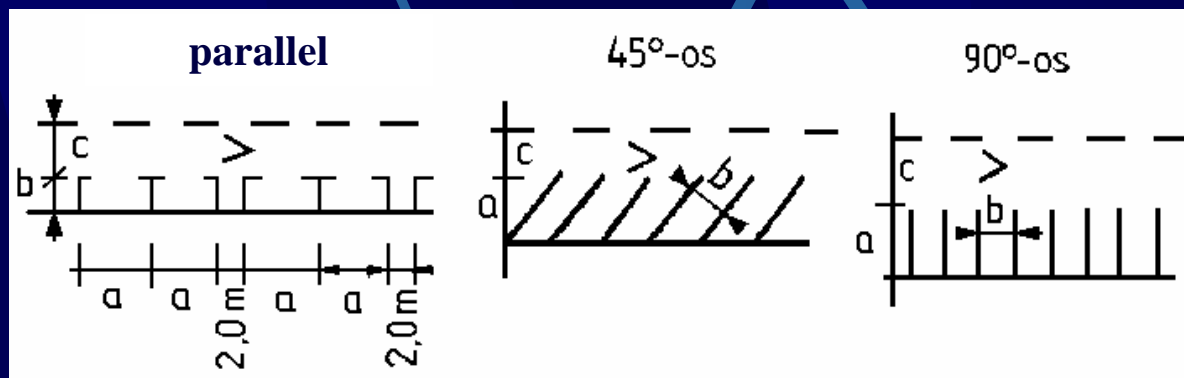
**Possibilities: on road pavement, at independent area, in special building (garage)**

**Place required for one personal car:**

- width 2.50 (min 2.30) m
- length 5.50 (min 5.00) m.

# Design of parking areas

## Dimensions for parking at curbs [m]



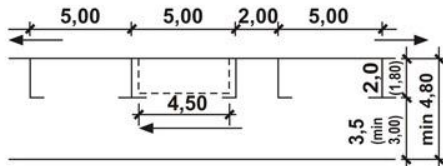
	parallel			45°			60°			90°		
	a	b	c	a	b	c	a	b	c	a	b	c
<b>recommended</b>	6,0	2,5	3,0	5,2	2,5	3,5	5,7	2,5	4,0	5,5	2,5	5,0
<b>minimal</b>	5,5	2,3	3,0	4,7	2,3	3,0	5,2	2,3	4,0	5,0	2,3	5,0

a)  $b < 4,80$  m

**No parking**

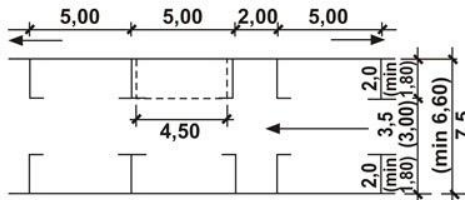
b)  $b = 4,80 - 6,50$  m

$h = 6,00$  m  $F = 28 - 38$  m<sup>2</sup>



c)  $b = 6,60 - 7,70$  m

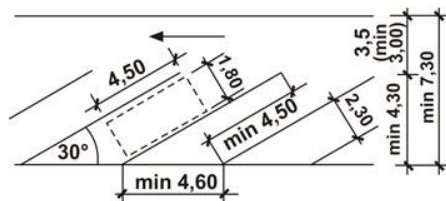
$h = 3,00$  m  $F = 20 - 23$  m<sup>2</sup>



d)  $b = 7,30 - 7,70$  m

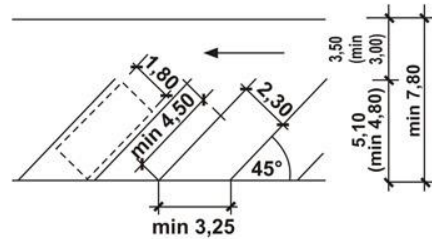
$h = 4,30$  m  $F = 33 - 35$  m<sup>2</sup>

**One side parking only**



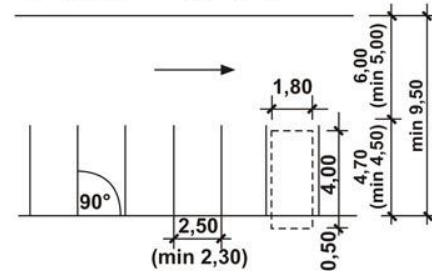
e)  $b = 7,80 - 9,40$  m

$h = 3,25$  m  $F = 25 - 30$  m<sup>2</sup>



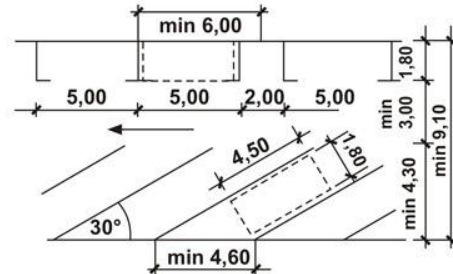
f)  $b = 9,50 - 11,50$  m

$h = 2,30$  m  $F = 22 - 27$  m<sup>2</sup>



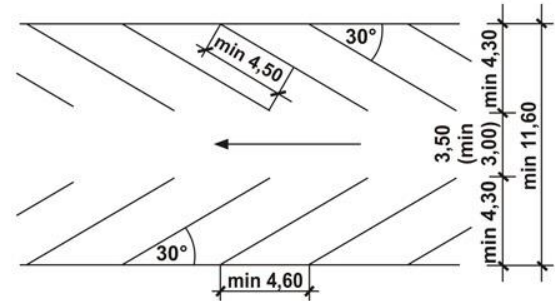
g)  $b = 9,10 - 11,50$  m

$h = 2,50$  m  $F = 30 - 38$  m<sup>2</sup>



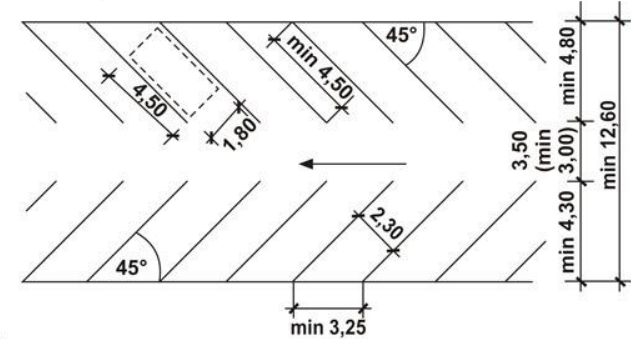
h)  $b = 11,60 - 12,50$  m

$h = 2,30$  m  $F = 26 - 28$  m<sup>2</sup>



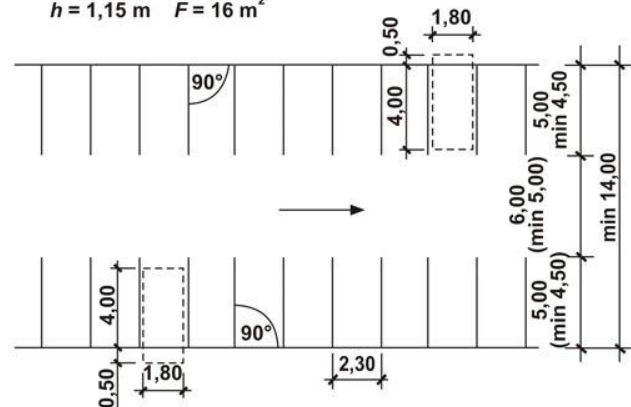
i)  $b = 12,60 - 13,90$  m

$h = 1,63$  m  $F = 20 - 22$  m<sup>2</sup>



j)  $b \geq 14,0$  m

$h = 1,15$  m  $F = 16$  m<sup>2</sup>

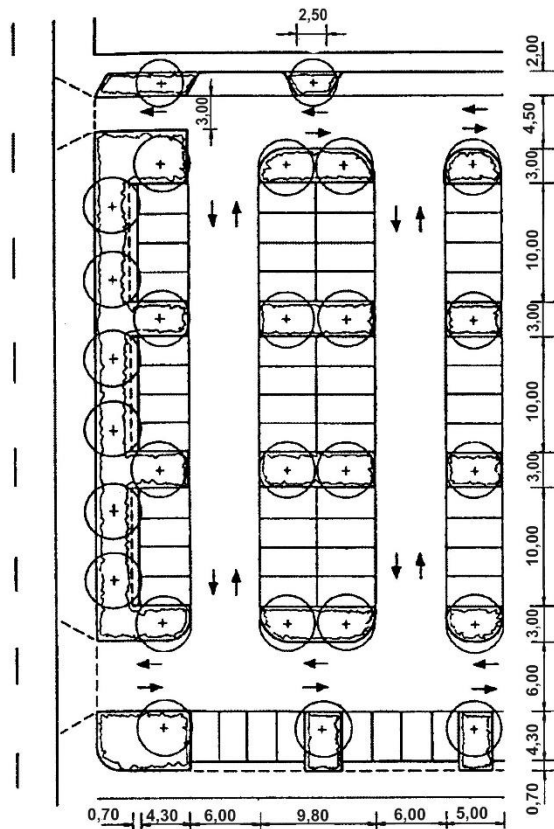


# Design of parking areas



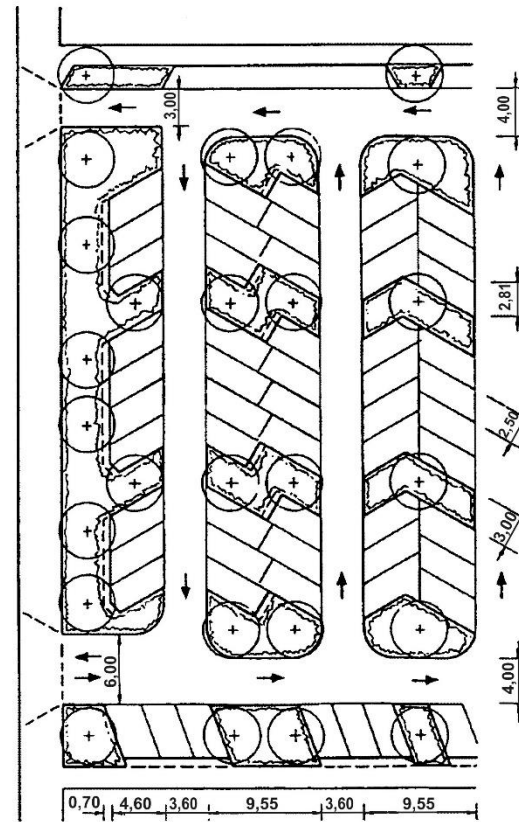
# Design of parking areas

a)



b)

With trees



# Design of parking areas

**In big cities bus parking areas needed for tourists near metro stations or even within the centre itself. In the latter case the waiting time is limited.**

**Map shows information on Budapest bus parking.**



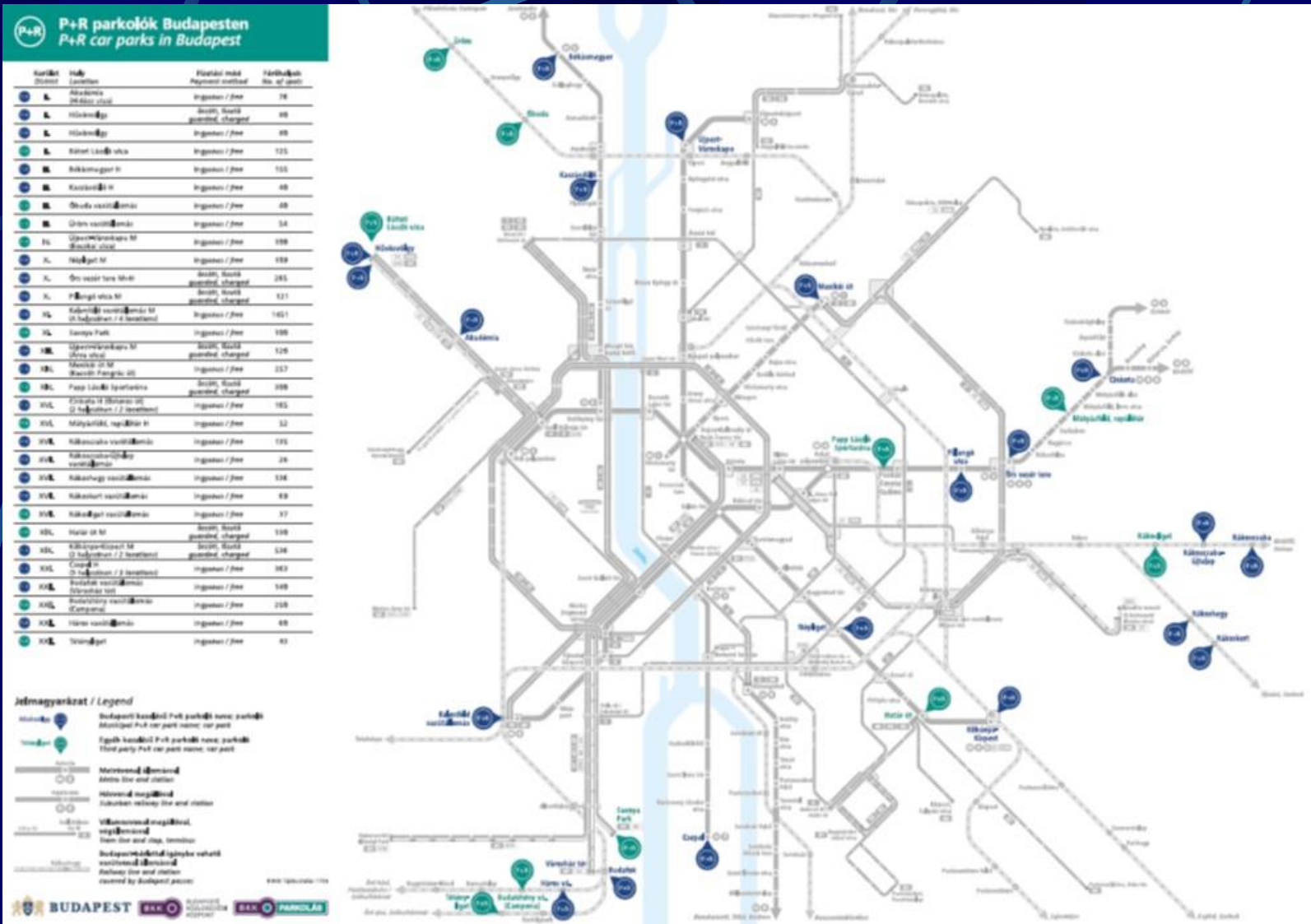
# Park and ride system

**The park and ride (P+R) system is a car parking at a railway or bus station, usually in suburbs, in order to redirect travels to city centre onto public transport.**

**Advantages: no need for parking places in the centre, environment friendly, cost effective (for one person), less traffic volume on the urban network and in the city centre.**

**Disadvantages: longer travel time, less comfort, less cost effective (for more person), car safety issue.**

# Park and ride system



# Parking fee collection

**Parking fee collection is possible by manual, automatic or mobile phone app methods.**

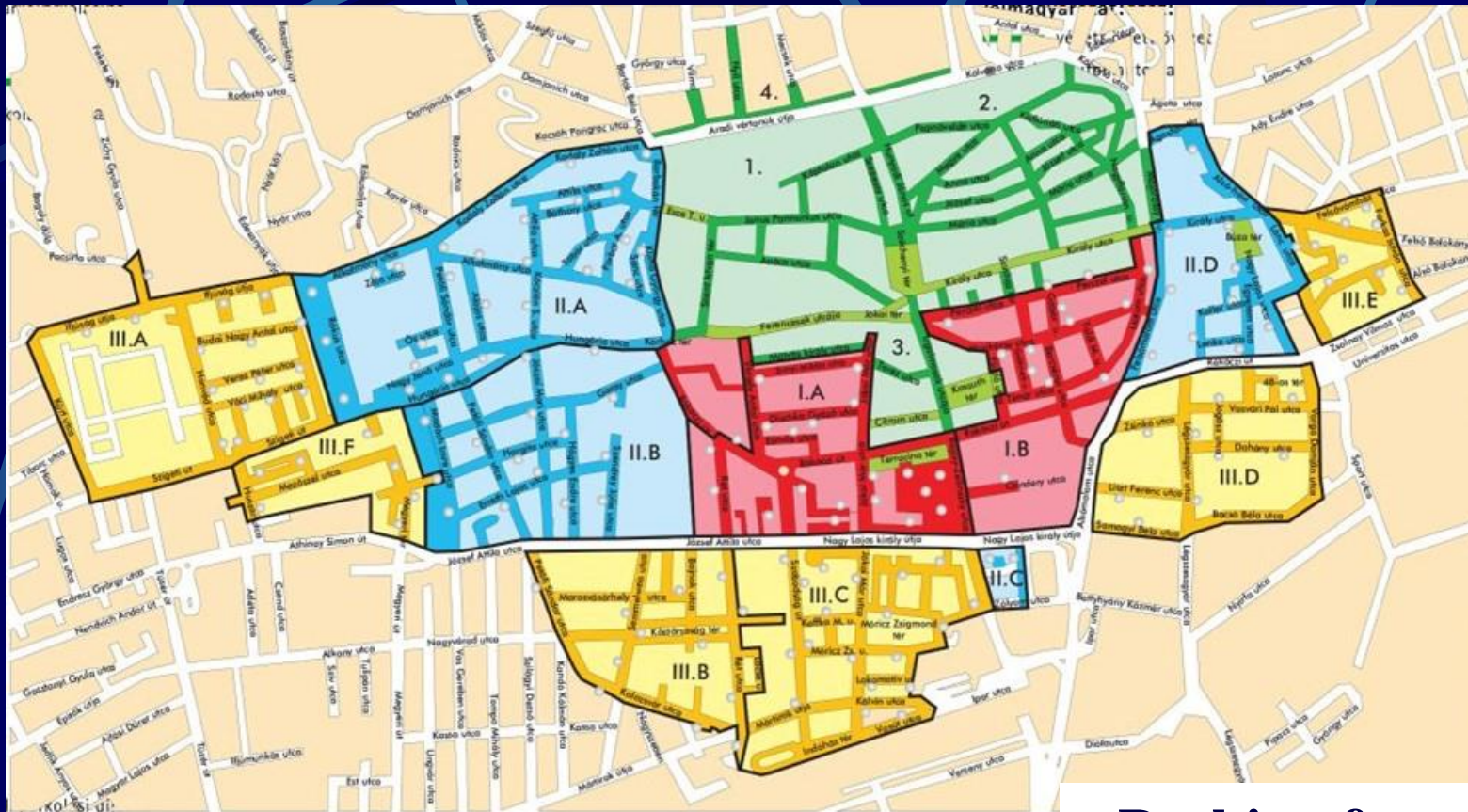
**Usually the time of parking is limited.**

**Enforcement is very important.**

**Free spaces for disabled people are necessary.**



# Parking fee collection



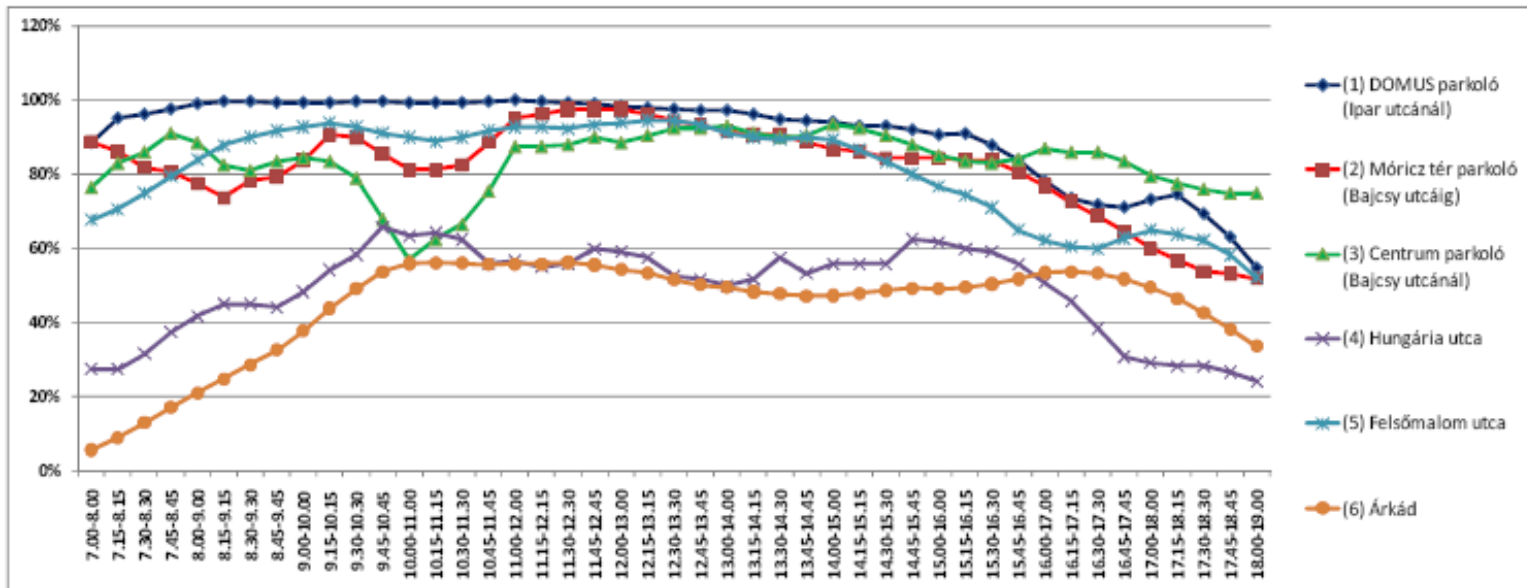
Jelmagyarázat:

-  restricted
-  Zone I.
-  Zone II.
-  Zone III.
-  collector

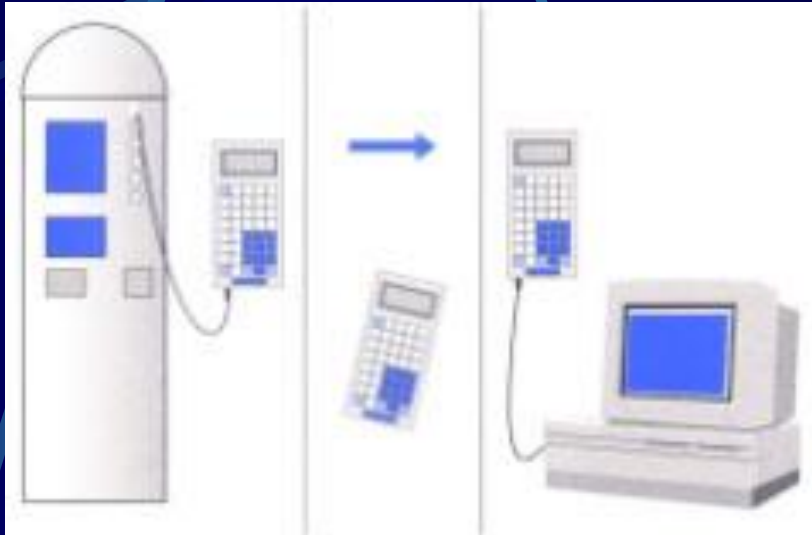
**Parking fee  
zones in Pécs**

# Parking fee collection

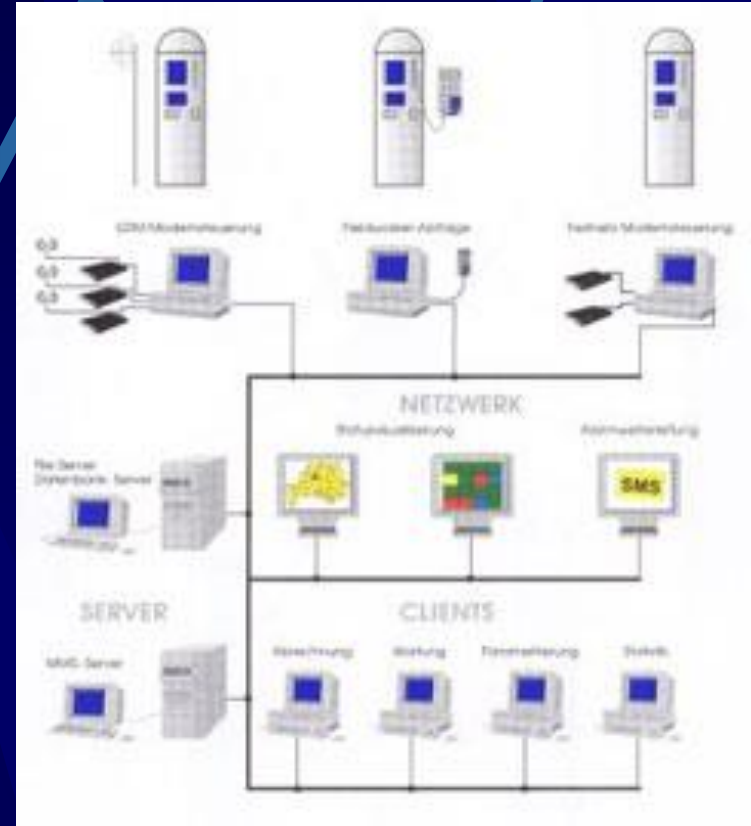
## Daily utilisation of parking areas and garages in the inner city of Pécs



# Parking fee collection



**Network of parking fee collector units**





# Parking fee collection

parking  
fee  
collector  
units



# Garages, automated parking

**In garages level differences are cleared by ramps or by the help of a mechanical equipment.**

**Garage level area for one personal car in case of ramps is 24 - 30 m<sup>2</sup> (gross area).**

**Outer radius of a curved ramp:  $R_{\min} = 9$  m**

**Maximum elevation of ramps:**

- **In case of moving ramps 10 - 20%,**
- **In case of parking ramps 5%.**

# Garages, automated parking

**In Budapest in the inner city there are two automated garages by robotic technology. An example is in district VII. (Akácfa u.) near the Opera House, the Music Academy and theatres.**

**The building has a ground area of 721 m<sup>2</sup> which would be sufficient for only 140 cars in a traditional garage. The advanced technology provides 340 places.**



# Garages, automated parking

Cars are moved and placed into storage area by robots directed by remote supervision in 60 - 90 s.

At giving back the car is reversed for comfort.

The technology has been developed by a South-Korean firm MP-System.



# Garages, automated parking



# Garages, automated parking

**Car traffic looking for parking places increases the traffic volume on narrow inner city streets.**

**There is a need for on-line information and guidance on the approaching road sections.**

**Dynamic messages on available free places help in choosing the parking facility.**

**Guidance must be unambiguous and consequent, using advanced traffic engineering tools.**

**In large garages inner information is needed, too.**

# Garages, automated parking

**Example of a parking guidance and information system in Budapest, district XIII.**

**The display shows total free places in the area and directions. Later on the way other displays show actual free places in each facility.**

**Co-financed by the EU Easyway intelligent transport systems program.**



# **City logistics: solution for urban freight**

**City logistics means freight traffic services within cities. Its essence is in mobility, sustainability and liveability.**

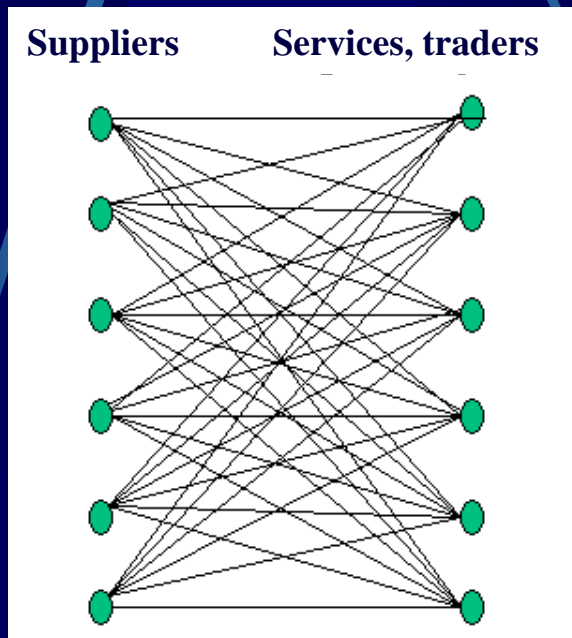
**Deliveries are co-ordinated among traders and haulers including common warehouse storage and distribution points.**

**The city logistics centre organizes freight flows and co-ordination of carriers in the city this way the environmental pollution may be decreased.**

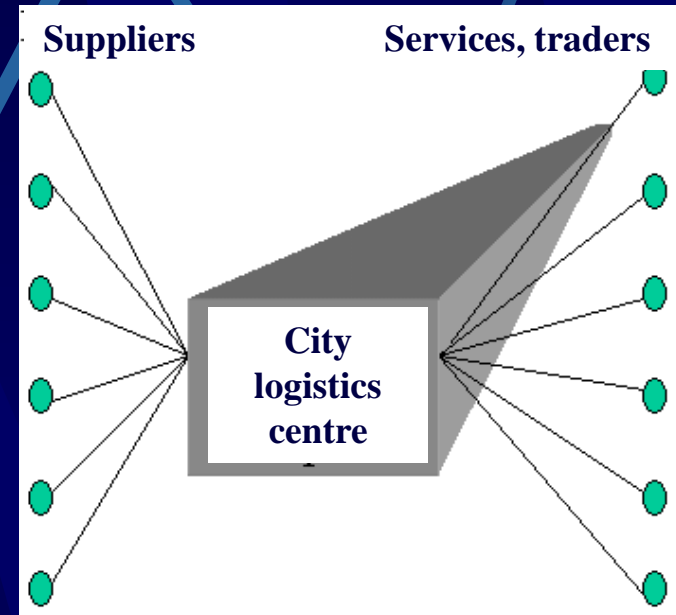


# City logistics: solution for urban freight

## Traditional way



## City logistics



# City logistics: solution for urban freight

In the planning and operation of city logistics there are some important partners:

- Product manufacturers, warehouses, goods distribution points generating delivery transport
- Target points like shops, services, institutions, flats etc.
- Hauliers, movers, freight operators, companies' own vehicles (i.e. Coca Cola)

# **City logistics: solution for urban freight**

**Warehouse capacity is a problem for shops in the inner city because of the high slot prices and renting fees depending on the area occupied.**

**From a city logistics centre the reliable and fast delivery of goods can be provided, in some cases using electric vehicles.**

**Vehicles on their backward route may carry packing material and waste.**

# City logistics: solution for urban freight

**Environment friendly solution of the city freight traffic requires:**

- **infrastructural development,**
- **land-use management,**
- **conditions for entry,**
- **traffic management,**
- **preservation of historical centres,**
- **marketing.**

# City logistics: solution for urban freight

Dedicated stowage place in the inner city on weekdays



# Summary

**Parking demand is determined by area or capacity of attractive units for cars and buses.**

**Park and ride systems are advantageous.**

**Parking fee collection requires advanced technology and organisation.**

**Automated garages provide a good solution in big cities.**

**City logistics means freight traffic services within cities, promoting preservation of historical centres and decrease of the environmental pollution.**

Thank you for your attention!

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