Parking in the centre of cities

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Foreword

I would like to say thank you all the people who helped me making this report about parking in the centre of cities. First of all I want to thank my supervisors for their lots of help: Gunnar Lannér, my supervisor at the Department of Water Environment Transport of Chalmers University of Technology for the nice meetings and his help in correcting my English and Tibor Horváth my supervisor in Budapest for the ideas and help he gave me. I would like to say especially thank to Jonas Nilsson at P-bolaget in Gothenburg for the lots of information about the Gothenburg situation and for showing me all the beautiful and interesting parking arrangements in the city and talking about them.

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Gothenburg in June 2002

Edina Tisza

Summary

Parking is a big problem all over the world in the cities. The traffic and number of the cars increased much quicker than engineers thought. There are not enough parking spaces in historical city centres, because the streets were not planned for such a big traffic. While people are looking for free parking spaces, the environmental pollution is bigger and bigger.

The aim of the work is to measure parking proportions in cities, to describe the systems used in practice and to examine the further development possibilities and parking regulation questions.

Parking houses, underground garages, parking lots and parking decks give waiting possibility for drivers, but usually there are not enough of them or the fee is too high that makes people put their car in a public place. But usually there is not enough public parking space in the cities, so we have to aim to the better utilization of them. In the interest of this we have to supply first of all the citizen demands, after that the short parking and the professional parking demands finally. The parking time limitation, administrative regulation and the controlled parking are the methods of parking control and we can choose the controlling tools we use in practice. The monitoring and enforcement are another part of parking regulation that is very important to work in case of people observing the rules.

First of all we have to plan the parking regulation to find the suitable methods and tools for the area. To solve the problems, there are methods those can be used in the area, but we have to think about the indirect methods of parking regulation as well. They are the Park and ride system that is for making people put their car out of the city centre and continue their way by public transport, and the parking information system, which shows people the free parking spaces, so they don't need to look for them. Traffic can be decreased in the city centres by these methods.

The methods and tools used in practice in two European cities, Budapest and Gothenburg, are illustrated in the report. There are good examples of the practical way of parking regulation.

Studying the situation in the two cities I found that we have bigger problem in Budapest. There are some interesting solutions in Gothenburg, but not all of them can be used in our capital. The most important thing is to decrease the traffic in the centre of Budapest that can be solved by building more Park and ride parking lots out of the centre and make a good parking information system. We can follow the Gothenburg example, because Budapest has the same road conditions to make a similar system. If we measure up that drivers accept the Park and ride and the parking information system, the traffic will decrease downtown and parking problems will be solved hopefully.

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1. Introduction

In these days the cities, particularly the regions of big cities, are put into a new position of evolution by the economical, social and communication processes, which are under way in the world. Big cities are the centres of knowledge, innovation, economy, culture, communication (which becomes more and more international) and co-operation. They are the engine of productivity, dynamism and evolution. At the same time cities are responsible for 75 % of the world resource-consumption, big cities cause the crowding, the distraction and pollution of the environment and they are the biggest obstructions of evolution. [1]

The influence of urbanisation and motorisation made it necessary to protect city centres from transit traffic. Near the alleviation of the traffic it was indispensable to consider parking problems as a complex question.

1.1 About the history

From the second part of the 50s in the west European countries, after the rebuilding which followed world war the 2nd, the objects of traffic development were set by the evolution of urbanisation and motorisation. Those days plans of traffic development were mostly dealt with providing enough places for the traffic. Parking and public transport were not a definitive question.

In the 1960s and at the beginning of the 70s growth of the economy and the quick evolution were characteristic to the west European society. The keyword of traffic development was mobility, and it's elementary principle to solve problems through building. Then there were built motorways, roads with fast moving traffic, multilevel city centres, pedestrian bridges and tunnels, parking garages in the cities and subway lines in big cities. They were the first to develop road systems in the interest of extending the individual mobility.

At the end of the 60s the purpose of development is not "city which is suitable for the cars" any more but the "city with suitable traffic". It is worthy to recall the conclusions of the report called BUCHANAN (1963):

- cities are not able to have the ever growing vehicle traffic;
- it is a must to set a limit to the quantity of traffic, use of the vehicles cannot be helped any more;
- important part of vehicle-users must change to public transport;
- connection between area-usage and traffic must be considered better than before.

BUCHANAN report unfortunately couldn't bring the expected evolution in time. Only the oil crisis that happened in the middle of the 70s started elementary changes in the west European developed countries. Although the absolute expansion of individual traffic, new ranks of development-purposes were created: recognition of public transport priority, importance of pedestrian and bicycle traffic and interests of environmental solution. By virtue of thoroughly reduced investments the solution of problems through controlling the traffic became the elementary principle of traffic development.

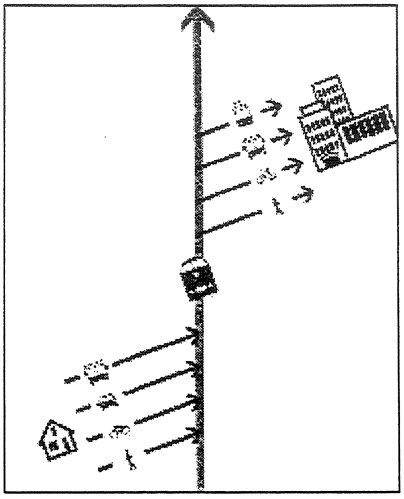


Figure 1: *The organizer line of intermodal transport system is the subway line*

After the traffic regulation, creating zones downtown seems to be a good solution. Higher and higher tariffs on the way to the city centre inspire also drivers to park with their cars somewhere else (for example in parking houses) instead of crowded and expensive central parking lots. When looking for free parking spaces, parking control system can give help. We have to provide the suitable working of it in case drivers could find easy, without too much time-input a parking space with the most favourable location for them.

By planning parking regulation we have to consider several demands and have to develop the following priority:

1. supplying citizen demands;
2. supplying short (administrator) parking;
3. supplying permanent (professional) parking demands.

Also have to ensure suitable loading possibilities for transit demands.

By planning parking regulation it is practical to create uniformity. Besides using uniform regulator systems and equipments it means the creation of a central organization monitoring, enforcement and ensuring the development of parking from parking incomes. Unfortunately the suitable database and legal framework are not always available for these exercises.

In some countries before starting development or plan design citizens' opinion is asked. They think that PR, public involvement is very important and take it so seriously that for example in Switzerland they decide almost everything by voting. There has happened that once they built and destroyed a parking house because people voted for it. Maybe not putting to the vote but it is good to take citizens into development by making plans and consider their demands if possible.

2. Parking problems and solutions in cities

2.1 Reasons why the present situation happened

The altering town economical and structural conformations, the new customs of working, free time and shopping, the rate of living which is much quicker and more dynamic than before affected the traffic of cities most of all. [1]

In cities of the ex-socialist countries were not built heavy-duty public roads, clearways, enough parking spaces in towns because of the automobile endowment and individual transport taken on a wittingly low quality there. In the 90s car tenure became free, moreover excited, and reached cities - within Budapest - with an undeveloped public road infrastructure while in the same time the state filed out the public transport that was taken on a high quality and financed until then. That's why public transport with a decreasing quality and provision couldn't compete with the increasing mobility demands. The consequence of this process: the present-day crushing environmental status of our cities in Hungary, in particular Budapest. The following mobility performance data show this as well: [1]

Automobile in the EU countries

1990:	115 million pc
2010:	167 million pc

Gas consumption in1999 (l/person)

Hungary	445 litre
Austria	812 litre

Carbon-dioxide emission per person (million tonne/year)

Czech Republic	11,74
Germany	10,77
EU	8,58
Hungary	5,69

Number of automobiles/1000 resident

Hungary 1998	230
EU 2030	580

The quick evolution of the motorisation is well demonstrated by the data of some European cities changes of the automobile stock per 1000 resident (Table 1). [3]

2.3.1 Labels in connection with parking period [3]

- *short parking* (2 hours)
- *middle parking* (2-6 hours)
- *long parking* (6-10 hours)
- *permanent parking* (over 10 hours)

2.3.2 Alignment by the purpose of parking [3]

Citizen parking (permanent parking over 10 hours)

Driver's purpose to put his vehicle as near as possible to his home, if it is possible every day in the same place. The typical period of it is from 17 o'clock to 7-8 a.m.

"Going to work" (professional) parking

The typical period of it is 6-10 hours long parking. The closeness to the object (workplace) is an important aspect by choosing parking place. Professional parking appear mostly in the period of 8 a.m. to 16 p.m., so the citizen parking can rotate it in time.

"Shopping-administrator" parking

Short parking (maximum 2 hours), therefore quick vehicle changing, better profiting of parking spaces is guarantied. It appears mostly from 9 to 12 a.m. (this is the dominant period) and from 14 to 16 p.m.

Other parking

Although in some ways it is not parking, important to mention is the *vehicle storage*, which is actually permanent citizen parking and is a reasonable demand of population and has to be considered.

Other parking purposes those appear periodically, occasionally maybe in particular period of the day can be classified to the category of short and middle parking. These are particularly parking in connection with tourism, cultural and sport programs and the amusement sphere.

Loading (economical parking)

This short, daily parking demand appears usually in the early morning, morning hours. It is a must to mind its gratification because the cover of transit - incidentally with obligate administrative limits, for example time and weight limit – is an elemental, communal interest.

2.3.3 Location of vehicles [3]

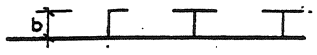
There are more results for location of waiting vehicles:

In a building

- small garage
- parking house
- underground garage

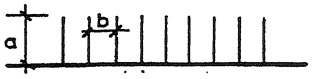
To put the car in the road is prosperous in the aspect of closeness to the destination. But it's practical to develop them in low traffic and by-pass roads because of their traffic disturbance effects and the accidents. Near the curb vehicles can be settled parallel, diagonal or perpendicular (Figure 3). To stop the car parallel the curb is the best in the aspect of traffic and safety. To stop diagonal and perpendicular the curb is unfavourable never the less it uses less specific place, because to pull cars in and out need more space and downsizes the useful width of the road particularly.

a Parallel placement



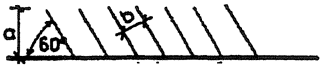
b : parallel width of parking space

b Perpendicular placement



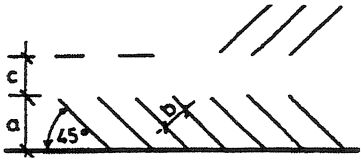
a : perpendicular length of parking space

c Placement in 60°



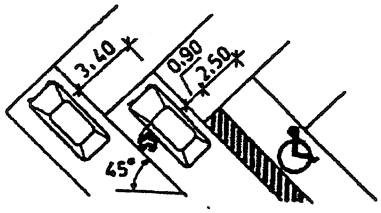
a : perpendicular length of parking space

d Placement in 45°

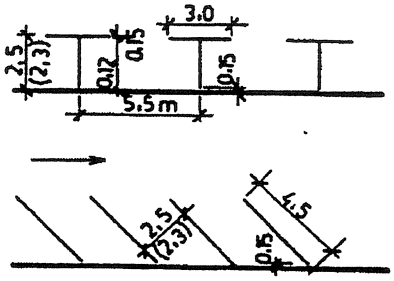


c : width of parking road

e Disabled people's parking space



f Proportions of road markings by marking car-parking space



g Proportions of parking spaces (m)

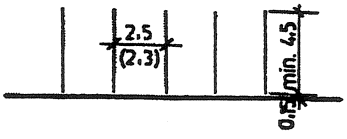


Figure 3: *Proportions of parking spaces (by ME.07-3713: 1994. Modified traffic sector standard)*

3. Underlying principles of parking control [5]

Motorisation evolution causes big problems in the placement of parking vehicles in cities, first of all in the city centres because free public places are usually not available and also cannot be created. Besides the ambitions oriented to the extension of parking space supply we have to aim to better utilization of parking spaces in order to make city parking conditions stand the necessary social-economical demands.

3.1 Transport and city-policy purposes

3.1.1 Traffic and parking demands

Traffic demands stemming from the function of city centre – without any priority – are the following:

- people's transport demands living in the city centre,
- people's "professional transport" working in administrative, educational-cultural, trading and public service institutions are settled into the city centre,
- traffic of public institutions,
- "educational and cultural" traffic,
- "shopping" traffic and tourism,
- transit of trade (transit and collecting transports and the loading).

The gratification of traffic demands happens by public and private vehicle.
Public parking – practically nearly in all case – belongs to the private transport. Accordingly the occurring *parking demands* in city centres, there are:

- people's parking space demands living in the city centre,
- parking space demands for vehicles of public institutions settled into the city centre,
- people's parking space demands working in the city centre,
- parking space demands of "administrator and trading (shopping, visiting)" traffic tending to the city centre.

3.1.2 Purposes of the solution

By the results of monitoring joint rate of parking in connection with shopping and administration in the city centre is 75-85 % of all parking. It follows that we have to take into consideration to supply parking demands of trading centres and institutions with heavy public service in city centres.

Practical purposes of solution:

- to limit going to work by car to the city centre,
- relieving crowded parking spaces to produce the possibility of multiply use.

Parking time limitation means to define the permissible longest parking period, so we affect parking time-structure by the help of parking time-limitation. Restricted short time parking comes into being in this way. Parking time control can be established together with parking fee or without it. The permissible maximum period, to observe the limitation, must be subjected in both cases to suitable controls.

3.2.1.2 Criteria of establishment

Parking time control can be reasonable established, if

- the parking space-supply doesn't correspond to the demand and people who want to park for some time (shorter than 2 hours) can't find free parking spaces not far from the end of way any more;
- the parking space utilization is over 90-95 %;
- there is a short time parking demand and the monitoring shows it;
- the index of parking space alternation is under 4 vehicles/parking space/12 hours and the rate of parking for more than 2 hours is higher than 20 % (out of the road, in a parking place control also can be established if the rate is under 20 %).

3.2.1.3 Time parameters of the rating

Parking analysis must determinate incremental the permissible longest parking period:

- in a Park and ride parking place: there is no time limit;
- on the brink of the city centre, in Park and walk parking lots the adaptation of time limitation and the rate of it can be determinate in 3-4 hours it depends on the default of parking spaces in the city centre;
- in a normal case it is enough downtown to limit the maximum parking period to 1-2 hours: in case of really little parking space-supply and multitudinous parking demands only for some time (usually by post office, bank, railway station, etc.) the allowable maximum parking period can be minimized to 30 minutes.

Parking period rating is correct to apply on weekdays (Monday to Friday) 8-18h, on Saturday 8-14h in the city centre. It can be used in seasons or has to be adapted in case of big programs to the speciality of holiday centre and program.

3.2.1.4 Place of adaptation

Parking period control can be established (if the criteria of adaptations exist)

- in the centre of cities (in parking spaces along the road and parking places out of the road),
- in some part of city centres, mainly in heavy, important parking spaces (by shopping centres and public institutions),
- in the centre of medium and small towns (by shopping centre and public institutions),
- in parking spaces of busy public institutions, supplier institutions and restaurants.

Underlying principles for making the rate staged:

- parking charge can be higher and higher proportionately the parking space-default going to the city centre;
- staged rate is practical to define to inspire for short parking;
- there must apply high rate in parking spaces in the city centre and lower rate in parking spaces on the margin of the city centre (outside the city centre): for example in case of pedestrian zone;
- rates in parking lots and parking spaces near the curb couldn't be applied to parking garage that is not public parking space;
- the use of staged-rated controlled parking system suppose that all use of parking spaces, parking lots and parking garages in the city centre is ratified not only inside the road;
- there must be free or lower rated parking possibility for people living in the city centre;
- Park and ride parking place is free.

3.2.4 Methods of collecting money [6]

Paying for parking in public place is a part of the general transport and traffic logistic of the city. But the ways to collect money can be different. All methods have also benefit and prejudice. The city has to choose the methods they want to apply. The reality is that parking automats are the most current also in Europe and Hungary.

So it is not uninteresting to compare the methods for collecting money short.

3.2.4.1 Parking ticket bought in advance

This result needs the less money that's why it is an alluring choice for most of the autonomies. Its great thing is that people have to buy parking ticket in advance and validate them on the site. So the direct cost is only the prime cost of tickets that can be depressed by use of advertisements. Tickets can be bought by gas stations, post offices and tobacco-shops. But the ticket-system has more features that depress significantly the benefit of low charge. Drivers, especially foreigners can hardly buy a ticket because they should know in advance that they must buy some and where they can. After that drivers have to validate the ticket that is sometimes not too easy. On the one part tickets have rather difficult structures and drivers have to know the date and time correctly.

Moreover the ticket permits only one kind of linear controlling, it cannot adapt to several demands adaptable. For example in case of a simple rise in prises tickets, printed in advance, have to be over stamped with new prises or must be simply exterminated. There can be some more demands like use of progressive and digressive tariff or the quick change of rate (for example the use of lower rate on a given holiday or not far from the border use of higher rate can be necessary at weekends). Besides users can buy parking time only in discrete steps (usually 30 minutes, 1 hour), even if they need only 10 minutes to park for example by a post office. This is profitable in the aspect of incomes of the city but we have to underline that rates cannot be only an economic question. And it is more profitable in the aspect of users if they can pay only for the waiting period chosen by them. Besides the above-mentioned things,

3.2.4.3 Pay & Display Machine

Electric equipments – can be practised also in public places – those collect money, give parking tickets too and all of these transactions record dependably, are Pay & Display Machines. To be sure these equipments demand on significant investments. But they are specifically cheaper than parking meters because they can supply more parking spaces. By the way high purchasing prise can be depressed by modern payment methods (interest-free loan, instalment). Producers – who mean business – usually accept this kind of payment because they get market by this and it is profitable for them.

One great benefit of automats is that they are suited for the gratification of various demands by developed electronic structure of them and the system-programme. The adaptability of them can be characterized by below mentioned services:

- the adaptability of system programming,
    - progressive-digressive tariff,
    - various charges that can be chosen anyway according to the date from,
    - the validation of population fares depending on the area,

- to ensure more ways of payment,
    - coins,
    - magnet card,
    - chip card (like telephone card),
    - accepting the electronic wallet,

- information visualized on display for users,
    - date, time,
    - spent money,
    - expiration-parking date according to the given account,

- parking ticket printing that can be a bill for cost accounting as well,

- the buffering of statistic, financial data then transferring them to a computer system,
    - automatic printed statistic data by each money paying,
    - transferring the same data through portable computer,
        - by interface or
        - infra connection,
    - transferring data by radio or GSM on-line system (direct connection with the central computer),

- strong build-up that gives safety against the vandalism.

The great benefit of automats against parking meters is that there have to be used much less of them that's why – although the prise of a device is higher – their working and operational costs are more favourable. One automat is able to supply 20-40 parking spaces depending on the position.

The instalment of automats causes much less problem because there are less of them. Producers offer various kinds of ways in electric energy-supply. There are facilities working only by battery or operating by accumulator that can be charged for example at night

operated by chip card like automats. Only parking service can "charge" the card by the help of a facility that makes for this with the payment that was paid by users in advance. Drivers buy the parkulator and a card, which has parking time on it however with the synchronic buffering of rates of the optional city or city zones number. Arriving at the parking space drivers operate the parkulator by choosing the suitable city and zone and put it under the windscreen. By the march of time the device takes away the parking charge from the rest money automatically according to the topical tariff. After some time the parkulator card is going flat, parking time has to be bought again.

To be sure the benefit of the device – in the aspect of the city – is that people pay before parking but drivers needn't walk to the automats and they operate the devices, they can decide how much money they want to pay in advance – like in case of chip cards. There is no money circulation in the streets so safety questions amount to this don't crop up either. Drivers accept the device easier because they have it. Further extra profit of them that extra time won't be lost. For example the device was programmed for 2 hours period but in 1 hour was shot down after all, the rest one hour parking time can be used later on.

The only problem in connection with parkulator is that it can't be used independently only expletively because neither foreigners or countrymen nor people who want to park only sometimes mustn't be forced to buy the device. It can be operated together with the automat or parking ticket system. The use of them will clear for businessmen in any case.

3.2.4.6 Parking disc

Parking disc is used for the limitation of parking period and is operated also by drivers. This can be used in case of parking spaces where parking period is maximized but there is no fee. Drivers set waiting time on the parking disc and put under the windscreen. After the maximum time parking space has to be left. To set time on the disc again is not possible, drivers have to park their cars in another place.

This equipment is used usually in smaller cities where parking is not controlled everywhere but the use of it happens in bigger cities too (for example in Copenhagen). The monitoring is a bit hard because parking guards have to take care of people very much if they leave the parking space after the maximum time or set the disc again.

3.2.4.7 GSM, Internet parking

The possibility of buying some drink by mobile telephone is known in Hungary as well. In the same way people can pay also for parking by mobile phone if drivers buy parking time somewhere by phone that works in WAP system. Actually this system is comfortable though it is quite slow now and wants reliable competence in it because people have to know the correct residence and use of the telephone fully to pay for a simple parking. Besides the service charge of the phone is given to the parking charge. Further prejudice of it that it doesn't give any tickets so the control is also based on ask from Internet that is hard and costs a lot as well.

The most important thing is to underline that choosing a way of parking charge collection cannot be happened according to the less investment demand and less operational work. The purpose is not to spare money but to build and operate a reliable system.

3.2.5.2.1 Professional and economical comparison

Hereinafter there will be showed two kind of comparison. Table 4 is studying the gratification of professional demands and on the other hand the economical questions by ticket and automat systems.

Conventional parking ticket	**Parking automat**
Cheap investment	Expensive investment
Cannot be bought in the streets	It can be found in the streets (30-50 m walking distance)
Distribution is expensive somewhere (premium 10-20 %)	No distributor premium
Forgery is hardly avoidable	Forgery is impossible
Users pay for parking in advance	Use of cash can be ignored (magnet- or chip card, in this case parking charge is advanced)
Paying for parking is only possible in steps that ticket gives	People have to pay only for the real parking period
By taking sanctions certification is difficult (ticket can be filled in subsequently), that's why use of wheel clamp can be queried for example	By taking sanctions it is decisive because it can't be reproduced subsequently
Inadaptable (it makes possible only linear regulation)	Ensures a really adaptable (progressive, digressive, periodic etc.) regulation (to balance the supply and demand)
The beneficiary inhabitants can park free in the whole area of the zone (even if that overhangs the border of division)	For inhabitants living in the city can be ensured free parking surrounding their residence
It gives possibility only to make really quick estimated statistics	It gives possibility to make correct statistics
Israeli „world patent"	

Table 4: *General comparison*

As it is marking out from the table ticket system is not able to adapt to that adaptable and often changing tariff system.

Because of the above mentioned the use of ticket system could be offered mostly in suburban, local centers where the question of tariff adaptability is not cropping up.

hand money purchasing also because of the high cost of service. By using ticket system in parking after the decision of the city they have to give up the possibility of the adaptable traffic regulation and can practice in less critical areas because of the less investment costs of it.

Hungarian capital decided to realize automat payment system after the above thought.

3.2.6 Monitoring and enforcement

The indispensable condition of parking regulation is the monitoring of paying parking fees and in case of no paying the suitable enforcement. The monitoring has to be done by parking attendant or parking policy. In case of no paying they surcharge.

While in Hungary the system that knows the data of cars and owners doesn't work suitable enough, the enforcement is a bit hard and they can hard or cannot surcharge. In some countries the owner's data are registered by buying a car those are available for controllers after the registration number. That's why it is important to overwrite the old data with the new owner's data in case of selling the car, because paying for surcharge is always the owner's duty whose data are in the system.

Possible methods of enforcement are using wheel clamps or carrying the car. In the latest case the owner will get back the car only after the surcharge is paid. This is very inconvenient for the drivers because these yards are generally outside the city and can be reached mostly only by taxi. This method is usually used in that case when the car is parked out of one's crease that holds up the traffic. Also the wheel clamp is got off only when the surcharge is paid.

by parking regulation and the city center to parking-zones because in this way the good orientation of traffic and the comprehension of arrangements can be attained easy by less traffic sign and the control can be executed simply.

The monitoring of area-structure must be executed in regard to area-utilization and the road-system. Typical number and position of residents, workplaces, public institutes and the traffic rules of roads are in the controlled area or on the border of it can be detected loan on the traffic development project. By creating parking zones the effects to moving traffic have to be checked overall as well. Namely in the road junctions can crop up new traffic-flows those are coming from parking spaces and they can jam the traffic-procession. Also the loading relations must be checked in the concerned main roads.

To determinate the parking space supplies we have to review the public parking spaces those are staked off in the checked area outside and inside the road. If there are bombsites, possible number of parking spaces must be determined over there as well. If it demands not too much cost and time input, it is practical to use non-public parking spaces as well (for e. quad, garage, cellar etc.).

Surveying of the parking traffic

During the monitoring the general causal parking has to be surveyed that is necessary for defining the solid-temporal parameters of parking and instruction parameters of parking spaces (capacity-utilization), for that registration number counting has to be used.

It is profitable if parking reasons are known those are marking the professional, shopping, residence traffic and the employee traffic of public institutes from in the parking running. To survey the inward statutes of parking like that, the way of collecting data by asking people is necessary.

To determinate the instruction parameters of parking spaces

To introduce parking period restriction, the real value of prescribed criteria must be deduced from the surveyed data of parking traffic.

1.) Parking space-utilization

a) Area utilization: the parking space use (u) at a definite hour, number of used parking spaces (P_u) correlated to all parking spaces (P_a), stated in %. Consequently

$$u_{P,t} = (P_{u,t} / P_{a,t})*100\ (\%)$$

b) Temporal utilization (u_t): the rate of all time fundaments of parking space supplies (P_a) (stated in %) during parking times (t) used by parking vehicles (P) and the monitoring time (T). Consequently

$$u_t = (P*t / P_a*T)*100\ (\%)$$

Typical values of parking period structures those are the distribution of parking vehicles according to parking periods must be known for counting.

4.5 Objects connecting to the introduction of parking regulation

Before the introduction of parking period regulation the population must be informed suitable. The introduced arrangement must be controlled, effects of it have to be examined, analysed, sized up by sampling and if required corrective arrangements must be procured.

Information

Significant condition of the effectiveness of regulation is to inform the concerned population duly about

- the necessity and purpose of parking period regulation,
- the practiced method,
- parking spaces those are taken into regulation,
- the conditions of parking space use and the behaviour must be followed.

After examination and controlling

It is profitable to fix the effects of introduced arrangement by recent area and temporal parking-intake in two months and modification can be procure if necessary by collating the result of conditions with planning data.

After the introduction of regulator arrangement it is profitable to check the evolved effects and parameters by sampling considering

- the parking period structure,
- parking space utilization and
- the evolved, average circulation index.

The after examination is practical to be generalized also to the monitoring of nearby parking spaces – those are maybe not taken into regulation at all – because of the cognition of interacting effects.

The observance of rules that is drivers' parking behaviour and their customs in controlled parking lots have to be checked by reckoning with regular parking, formal usage of regulator devices and the observance of allowed parking period.

5.1.2 Settlement and development of Park and ride parking place systems

Park and ride parking place must be settled by near the terminal or station of public transport and ensured a perspicuous connection with the road system. Parking place must be planned not far from the main and minor road system with safety and good passable vehicle connection. Out of the parking place coming traffic must be connected to the road system by a road junction with safety development and regulation.

Park and ride parking lots can be parking decks, parking houses and underground garages. In case of aboveground parking lots the possibility of latter expansion must be appropriated. It is profitable to plan parking main-road (outside-inside circuit or ascent with turnouts) by the inside development of big parking lots. We have to reckon with conformation of traffic jams by in- and out coming.

Park and ride parking lots have to be connected with the station of public transport by safety loaded, short, maximum 200-300 m long footpaths. On the parking place footpaths have to be loaded out of the parking roads in the separating zone or on the brink of parking area – up the heading of vehicle or crossing that – due to guarantee the visibility.

Park and ride parking lots have to be set up by public lighting and planned the forestation, landscaping of them as well.

Next to big Park and ride parking lots can be developed shopping and supplier institutes as well. In this case possibilities of settlement correlated to supplier institutes are practical to considered. The most favourable solution can be developed by assuming the succession of use on the way of station, shopping- and supplier institute, parking place.

5.1.3 Orientation and directions

Good orientation belongs close to the use of Park and ride system by using traffic signs with correct design and content. Because the acceptation or the choice of Park and ride system depends on the drivers' free-will decision, in the aspect of effective work of the system the directions and the signs in advance leading drivers to Park and ride parking lots and giving duly enough information for them have special meaning. Leading traffic on the shortest way to Park and ride parking lots must be solved firstly in main roads going to the city.

Informative signs of Park and ride system have to be adapted to the direction system. Directions have to be given until getting into the parking place. The system of signs in advance and directions is the following:

- information about Park and ride system,
- direction of Park and ride system that can be combined with other signs in advance,
- direction of Park and ride system (can be also combined with other directions).

The first before sign of Park and ride system can be settled already before the city border in a given case. Information can be settled in 4-8 minutes time travel-length. Because of the improvement of understanding information in advance can be shared out

- information sign that gives also the length of Park and ride parking place and

5.2.1 Keynote and parameters of the system

The keynote of parking control that is controlled depending on the traffic to inform drivers duly about parking possibilities in the area of destination and lead them to free parking spaces by the help of traffic signs. The parking information system takes over the exercise and function of the solid distribution of traffic looking for free parking spaces and implements with the help of variable traffic signs those are controlled depending on the fullness of parking spaces.

Purpose of using parking information system:

- to lead the traffic looking for spaces to the free parking spaces,
- to ensure the even and complete utilization of available parking spaces,
- to relieve the road system of concerned area by the mitigation of traffic looking for parking spaces,
- to extend the safety of transport,
- to depress the environmental pollution and the gas-consumption.

Two basic system of the parking control can be differentiated:

- *the informative-offer system* can show the way for drivers to the free parking spaces in the area of their destination, in case of the fullness of them gives traffic signs to the free parking spaces in the neighbouring zone;
- *the obligatory system* gives information covered all parking spaces in the area of destination about
  - the entry is free or not into the destination,
  - in case of "no entry" it gives hint in the same time to some Park and ride parking place,
  - gives hints to the free parking spaces of the area of destination or the neighbouring zone.

Joining together the two kind of system a combined system is evolved that has the benefit allowing always only one dominant version depending on the situation.

In respect of the scope of parking information system it can work in three kind of way:

- in case of *isolated system* the charge and the control are confined only to one parking institute;
- by *traffic zone-regulation* the parking control system controls the entry to the zone, in this case directions have to be signed always before the entry into the zone;
- *complex system* covers the whole area of city centre, in this case drivers are orientated in more steps:
  - *on the brink of the city* information must be given about parking possibilities in the important vehicle zones or rather – in case of the fullness of parking spaces in the centre – it is necessary to give directions to Park and ride parking lots,
  - *on the brink of the vehicle zone* information must be given about the free parking spaces in the zone or it is necessary to give directions to neighbouring zones,
  - *by parking institutes* "free" or "close" sign regulates the entry, in the latter case it is necessary to give directions to the neighbouring parking place.

Information must be given direct by parking place if it is free or not. To stay inside the system must be ensured on the distances between the heading signs and the parking place by the use of the above mentioned fixed directions.

The development of automatic parking information system demands on high technical requirements because

- inductive hitch-scanners are necessary for the measurement of the entry and exit traffic of parking lots,
- flow- or micro computer and suitable transformation system is necessary for the control,
- remote controlled, variable traffic signs are necessary for the communication of information.

5.2.5 Effects of the use

By data coming from post controls was determined that

- people who know the local relations lean on signs of the system in less rate (46 %) while the foreigners lean on them in higher rate (74 %),
- the number of parking increase 10 %,
- the traffic looking for parking spaces decrease 14-25 %,
- the traffic on the road system decrease, the traffic and the environmental effects work out more favourable,
- in the traffic looking for parking spaces the gas-savings seen by one parking space can be 50-64 litre/year.

and the regulation of out of work vehicle that is now over about ten modifications and is still not suited for introducing a really uniform parking system in the capital. One reason of this is that public places in Budapest have 24 owners (the 23 regional autonomies and the capital autonomy) and all owners want to subordinate the professional regulation for their own interests. [6]

6.1 Ways of parking regulation, applied results

Parking regulation is quite young in Hungary and although there were steps for solving parking problems, we cannot say that the situation is solved.

The first two parking houses (Szervita square, V.; Aranykéz street) were built at the end of the 70s. We can talk also about parking regulation from these years. Because at the end of the 70s, in the beginning of the 80s was working the "parkometer" (waiting time-checker machine) the ancestor of parking automats in Budapest (for example in Andrássy street). Maximum parking period was 2 hours. People had to insert coins into the machine and turn mechanically a turn knob. The disc was turning on the screen proportionately with the money and the calibrated dial showed how much minutes could people wait (15, 30, 45, 60 etc.). So time limit and fee were together here.

In the V division of Budapest there has been a protected area since 1989. This is the middle third of the city (in the area bordered by József Attila street - Károly boulevard - Kossuth L. street - Duna) where people can drive in only with a citizen or institutional licence (for example to an own garage inside a property). People need a licence also for parking in public place of the zone. Disabled people's cars or the vehicles those are transporting them, communal vehicles, like garbage truck, police, ambulance, etc. can also drive in. After this more protected area were also made in the city, but the experiences are unfavourable. Although the traffic has decreased in these areas, and the streets are not as crowded as before, there are many misuses because of the defect of control. That's why the solution would be the liquidation of administrative regulation and the introduction of short time (limited) waiting zone besides the fee.

There are historical buildings mostly downtown in Budapest. They were counting on the increase of traffic by architectural development and planned the streets wide enough after this, but the traffic has increased much quicker than they thought and placing the parking traffic became bigger and bigger problem. Namely they are parking on the place of moving traffic, in turn there is no possibility downtown to wide the cross sections of roads.

The number of parking arrangements in the city is rather few because of place- and money deficit. Parking houses or underground garages are built mostly together with shopping centres. And they don't supply all of the parking space demands, most of the drivers park in public places.

Unfortunately the general introduction of controlled parking was started too late in Budapest. Pay & display machine is used almost everywhere but neither paying moral nor legal regulation are suitable for the system to work without any problems. It has happened that automats were standing and people were not informed that they don't need to pay. But machines were working and the unsuspecting drivers paid needlessly, they gave money for testing the system. There are lots of areas where people are protesting because of the high

autonomies the area supplied by CPPC decreased at the end of 1999, 2000 and evolved the present situation (Figure 6). [9]

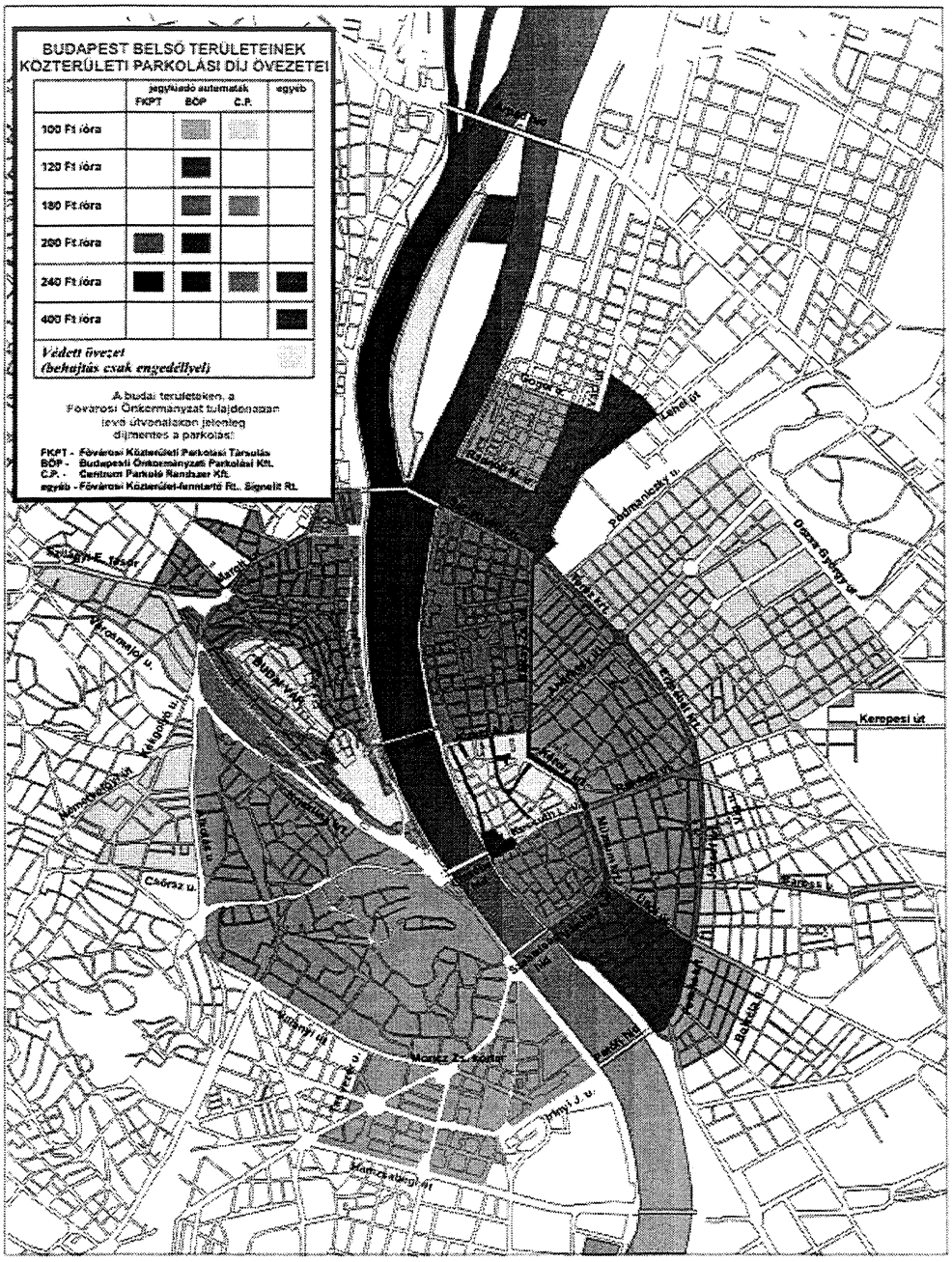


Figure 6: *Public parking zones of the inner divisions in Budapest*

People have to pay for parking usually between 10-18 o'clock at weekdays. Parking is free in the evenings. In the Buda area parking is free presently in the streets those are in the own of the Capital Autonomy. Besides the fares quoted there are some places where operators give discount as well, for example the first half an hour or one hour is free.

The standard of time limitation in the V division is usually 2 hours. In some places 3 or 4 hours are allowed too.

- they have an own car,
- after what they pay the weight duty in the division,
- permanent resident who has a car that is in the own of an own economic company that is in his flat and working before 15. 01. 1996.

If these conditions are realized, the autonomy gives maximum two free citizen parking licences (Figure 7) per flats. The citizen parking licence doesn't exempt people of observing the rules of the roads. In the V division residents have to pay parking fee only in the areas those are owned by the autonomy of the capital (not the division). But they can park free also there at holidays. [9]

Figure 7: *Citizen parking licence that can be pasted on the windscreen*

In the VI division they don't insist on paying weight duty in the division. There are eleven theatres in the division and the Music Academy and citizen are not able to find any parking spaces in the afternoon or evening because of the visitors. They would extend the period of controlled parking in the problem area because a lot of complaints arrived from the residents in this case. [8]

Firm cars those have seat or park in the division can park with 20 % discount and get release from time limit as well if they bought a licence from the division. This licence is valid for one year but it doesn't entitle of its own for parking, but people can buy preferential parking card to it. People who have this licence get release from time limit in most areas and can park preferential10 hours also in those places where time limitation is 2-3 hours. Places are written on the card where they can't step over the time limit with the card and the discount is not valid either. In these areas automats draw attention by showing "NORMAL TARIFF" after inserting the card that there is no discount, but full prise parking ticket can be bought also in this case. [9]

6.1.2 Parking lots

There are a great number of parking lots in the capital, but their development is not a purpose because there are not enough inbuilt plots those are owned by the autonomies.

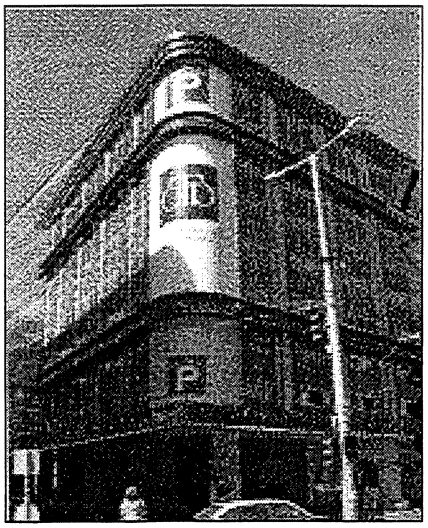


Figure 10: *Parking house in Szabó Ervin square*

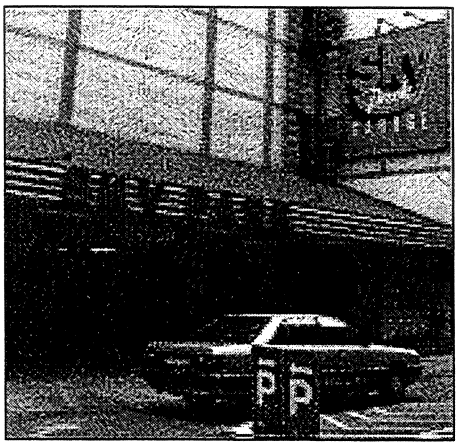


Figure 11: *Parking house in Osvát street*

There is a nice example of Budapest parking houses in Nyár street (Figure 12).

Figure 12: *Multilevel parking house – Nyár street*

6.1.5. Park and ride parking lots

There are about 4000 Park and ride parking spaces all together in Budapest at 29 places of the public transport stations, which give the combined transports (individual + public transport). The use of most of them is free.

The newest parking lots (Figure 13-15) offer higher service standard and permanently tended parking possibility for the prise of one BKV (Budapest Transporting Company) ticket. People who are going downtown for working or administration can leave their car also for 14 hours in the parking lot daily between 05-19h for the prise of one ticket occasionally. The fee is 50Ft/hour between 19-05h. [10]

the city. The profit is significant: Park and ride travel is at least 30 % cheaper than travelling by car, which depends on the period of stay downtown (parking cost).

6.2. Public involvement in traffic development

From the beginning of the 80s have been laid emphases on taking residents into planning processes in Hungary. Ambitions in the area of traffic planning appeared first of all in the capital to develop public involvement or some elements of it at least. But we still cannot talk about real and wide scale public involvement; build of it needs a long time. In most of the cases to take society into the development made them stop, stay, or slow, so negative influence has happened. [11] However the purpose of taking the people into developments would be to get some ideas, opinions from them, in case of help in the projects not set them back. So there are a lot of excercises left in Hungary to develope the system, but the first steps were made in case of making the situation better.

6.3 Monitoring and enforcement

The employees of parking companies make the monitoring. They have a manual computer and they make parking surcharge by the help of it. If they don't find any valid parking ticket or citizen parking licence in the car when they reached it, they look at the nearest parking automat if there is a person buying ticket or not. If there is somebody they are waiting which car he takes the ticket. If they can't see anybody, they put parking surcharge on the car.

The rate of surcharge depends on more factors. People have to pay one hour parking fee in all the cases besides the surcharge as a parking margin. Moreover the surcharge depends on the type of the car, the place and time of paying for them. They multiply one-hour parking fee in the area with a number that increases by time and the product gives the real amount of the surcharge. The amount is higher in case of busses or trucks than in case of cars because the rate of parking fee depends on the type of the vehicles as well.

Type of the vehicle	**Parking fee (Ft/hour)**	**Surcharge paid in five days + parking margin**	**Surcharge paid after five days + parking margin**	**In case of paying on the same date in operating hours, the decreased surcharge + parking margin**
Cars	n	11*n	26*n	6*n
Trucks or busses	m=3*n	11*m	26*m	6*m

Table 6: *Rate of surcharges depending on time and type of vehicles*

Set out date doesn't count into the deadlines. So it is practical to pay the surcharge on the same day. If surcharge haven't been paid after 30 days either, it has to be collected by civil

7. Parking in Gothenburg

Gothenburg is today the most important city for trade and industry in Sweden. After Stockholm it is the second largest city of Sweden with 850000 inhabitants.

Gothenburg lies in the centre of Scandinavia. 50 % of Scandinavia's industry lies within a 300 km radius. The port of the city is the largest in Northern Europe.

Besides the huge transit traffic a great number of tourists come here every year. That's why the traffic regulation and the solution of parking problems are indispensable.

7.1 Ways of parking regulation, applied results

Parking regulation has begun in the 60s in Gothenburg. They encountered parking problems in the city first between 1965-70. There were based parking companies first in these years. The first step was building parking lots where the parking was controlled. The first parking houses were built from this amount. Parking houses built these years are still standing but most of them need rebuilding, thanks to the designers who were using probably not the suitable constitution of building material (concrete).

Towns in Sweden are not too densely populated that's why they don't have any problem that there is not enough place to make parking arrangements. The streets are wide enough in the towns too, so there are enough places also where the parking next to the curb is allowed. In the historical parts of the city where there are narrow streets the parking is not allowed at all. Namely these streets are not suitable to settle the standing traffic. Disabled people can drive to these areas too and they can park maximum 3 hours here.

There are a great number of examples for all the usual solutions of parking car settlements in Gothenburg. A lot of parking lots, parking houses, underground garages and parking decks give waiting possibilities. I noticed, that there are not too much permanent parking cars next to the curb daytime. Usually the residents use the streets for night parking. They use parking arrangements close to the working places daytime. It's lucky that the stadium, bath, museum and the amusement park are in the same area in the city where there are lots of companies as well. So people can alternate the parking spaces here: working people can use them on weekdays and people who are looking for the pleasure grounds at weekends. Checking the parking houses and parking lots I realized that the utilization is usually close to 100 %, so the city could find the best places for them.

They prefer the controlled parking from the regulator methods. The city is divided into zones and people have to pay for parking everywhere. They don't use only time-limitation anywhere for longer time; it is always combined with controlled parking. (There are some parking spaces in the city centre where drivers can park free for 10 minutes.) In one of the parking lots (Feskekörka) time limitation was entered besides controlled parking because although the fee was 10SEK/h, people who are working in that area have been using the parking lots during the whole day and displaced the short time parking demands. This parking place is next to a fish market that transacts a big shopping transport every day. But P-bolaget didn't want to steepen the parking fee more, so besides the fee they maximized parking time in 2 hours.

Zone	Parking fee	Period*	Every other periods**
1	20 SEK/h	9-22 (9-22)	2 SEK/h
2	20 SEK/h	9-18 (9-15)	2 SEK/h
3	15 SEK/h	9-22 (9-22)	2 SEK/h
4	15 SEK/h	9-18 (9-15)	2 SEK/h
5	12 SEK/h	9-18 (9-15)	2 SEK/h
6	9 SEK/h	9-18 (9-15)	2 SEK/h
7	6 SEK/h	9-18 (9-15)	1 SEK/h
8	4 SEK/h	9-18 (9-15)	1 SEK/h
9	2 SEK/h	9-18 (9-15)	1 SEK/h
	* Periods in the brackets are for Saturday and the days before holidays ** Including Sunday and holidays		

Table 7: *Parking fees in the zones of Gothenburg*

They solved citizen parking by „selling" public places. It means that people living downtown pay monthly an amount for parking in their streets. But if they don't find any free parking spaces there and have to park somewhere else, they must pay for parking according to the local tariffs again. However if another house is built there, they sell parking spaces again. So this fee is only for "hunting", it doesn't ensure parking space for everyone. Citizens get a card to their car after paying and there are written in which zone their parking licence is valid. Namely citizen parking is also divided into zones (Figure 17), and monthly parking fees depend on the settlement of the zones.

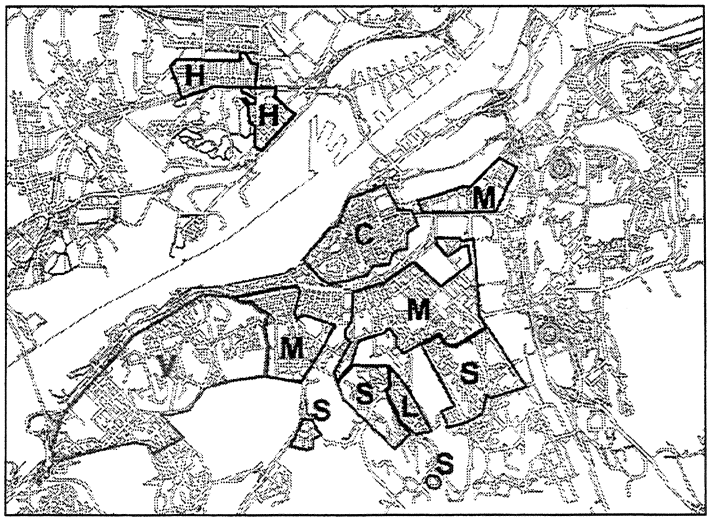


Figure 17: *Citizen parking zones*

Meanings of letters:

V (Väster) – West;
S (Söder) – South;
L (Landala) – name of the division;
C (City) – city centre;
Ö (Öster) – East;

through the Internet. Although there is no possibility to use parking disc (Figure 22) in the city, this tool is used in the suburbs.

Figure 21: *Parkulator*

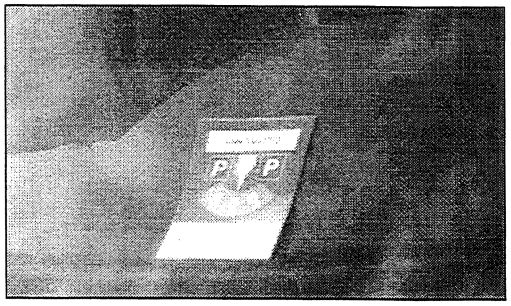


Figure 22: *Parking disc*

7.1.2 Parking lots

There is enough space in Gothenburg, so there are many parking lots in the city (also in the city centre) with lots of parking spaces and they don't think about give them up. There is a parking place in one division of the city (Heden) with 800 spaces. This is also close to the shopping centre, but people who are going to work use it mostly. The utilization is almost 100 %. After all politics would like to obtain to build a parking house for shopping people here, instead of this parking place (the utilization of parking house in the centre is low thanks to the high prices). This would not be a practical solution because favourable prices would run very high, the number of parking spaces would decrease (almost to the half of present number), and we have to think about that during the construction they could not settle these cars anywhere. So this parking place is working in the right way, they don't need any new parking house here.

7.1.3 Parking decks

This way of parking is very popular in Gothenburg. There are a great number of temporary and final parking decks in the city. They are temporary built if there is planned a parking house close to them later on. These are made from structural elements those can be transferred and rebuild in another place. Sometimes temporary parking decks become for their surroundings (Figure 23-24) but some of them are not too nice. There are final arrangements those are built to houses for people who are living there (Figure 25), but there are also freestanding solutions (Figure 26).

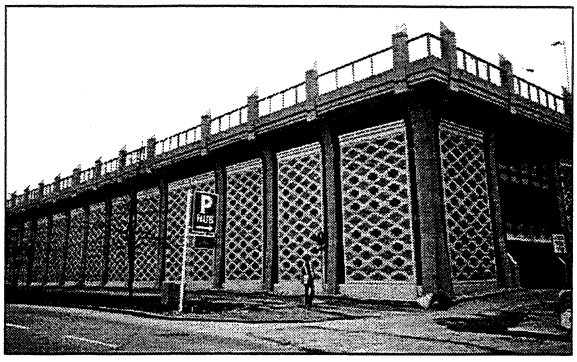


Figure 27: *Parking house outside the city centre –*
also a town house could envy the architectural development

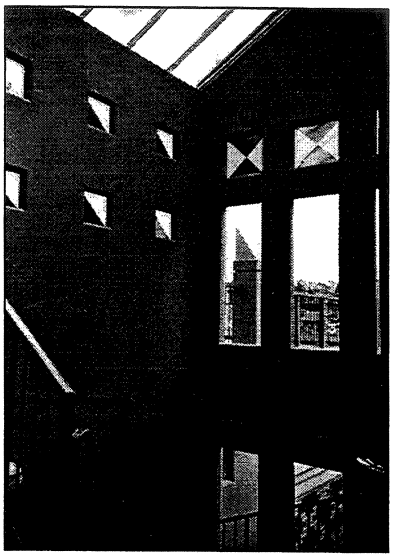


Figure 28: *The staircase –*
Is it not beautiful?

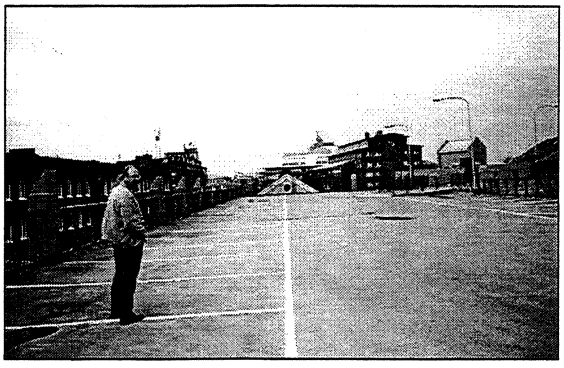


Figure 29: *The top floor of P-house seen on Figure 27 – they wanted to build a tennis court here*

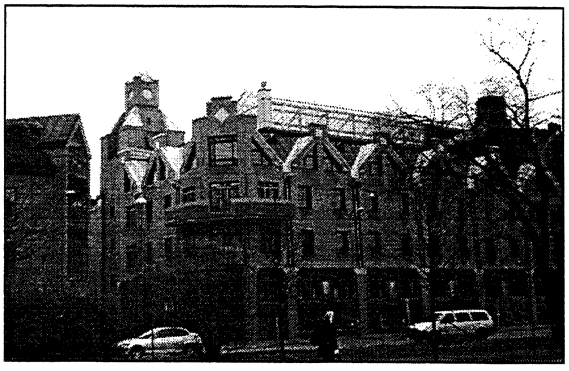


Figure 30: *The office building of P-bolaget and the P-house in it*
– it can be done like this too

By planning the parking house seen on Figures 27-29 the architect mixed the style of the opposite building (English architecture) with the architecture of Arabian countries. Originally they wanted to make a tennis court on the top floor, that's why the layout of it is bigger than the others. The city planned to cease the tennis court by the old Ullevi Stadium and build the opera house there. But they found a better place for the opera and didn't need to cease the court, that's why there are also parking spaces on the top floor of this parking lot. There was a joke from the architect: on Figure 29 we can see the top of the columns shape; they are the same like the top of the big building in the background, but they have only one and we have a lot! There are locker garages in the parking house as well, which are built for the Volvo staff (of course they don't use them). Unluckily the utilization doesn't reach the 50 %.

There is a parking house under building on Figures 31-32 marked out for people travelling to Denmark by ship. The architect wants the trip to begin already by parking. That's why there will be lots of light, colour and plant in the building. Different coloured decoration will be for example on each floor for people to mention easier where they parked their car. Maybe it is not too good idea, because people usually forget the colours (I didn't remember either on

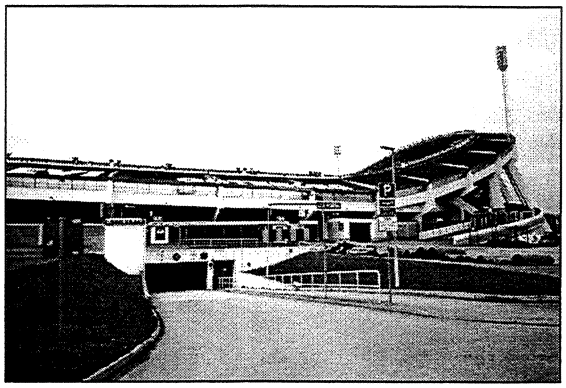


Figure 35: *Parking garage of Ullevi Stadium*

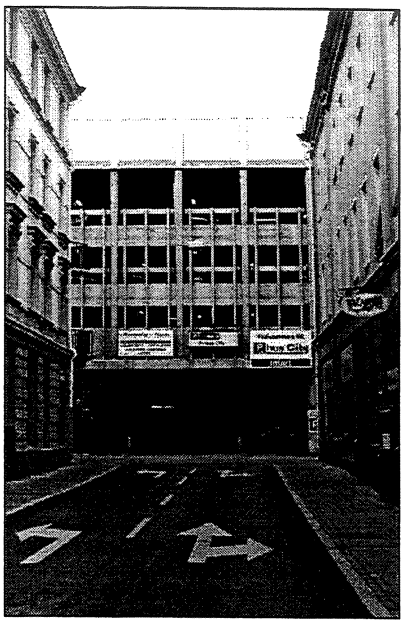


Figure 36: *EuroPark*

Of course there are parking houses from the 60s, 70s too those are falling back on rebuilding. Although their architecture is not too aesthetic, they are up to the task of them. One of them is an EuroPark parking house downtown (Figure 36.). The development of it inside is very good: besides the usual ramps there is an acceleration ramp as well that helps in leaving the building quicklier. The scheme of it is well seen on Figure 37.

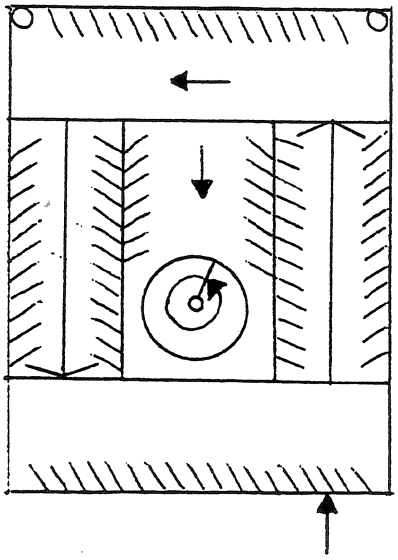


Figure 37: *The layout scheme of EuroPark parking house inside with the acceleration ramp in the middle*

The work is very organized: usually they are waiting only five minutes after the drivers leave the car (this is enough for buying a parking ticket); after that they check the car and if it is necessary, they put surcharge on it (Figure 39.).

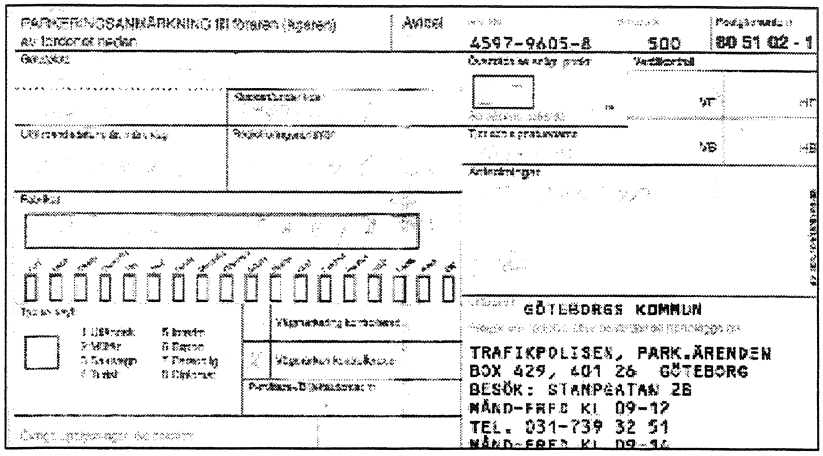


Figure 39: *Parking surcharge in Gothenburg*

There are about 100.000 parking spaces in the city and they write only 250 parking surcharges a day. This is trace and people used to pay 50 % of them in the first round. The next 25 % is paid after some discussion and the rest is sometimes not paid.

To punish foreigners if they don't pay for parking is very difficult because it is hard to find them. But they don't want it really because their number is trace to the usual parking and anyway they like foreigners very much!

7.4 The operation of parking information system

Parking information system is working very efficient in Gothenburg. There are the elements of the system (Figure 40) in the whole city and they give a big help for drivers in looking for parking spaces. Not only foreigners (who don't know the placement of parking arrangements) use the signs of the system, but also the citizens or people who are working in the city use them and believe if they show that there is not any free parking space in the lot. In this case they are looking for the next parking place with free space on their way following the signs.

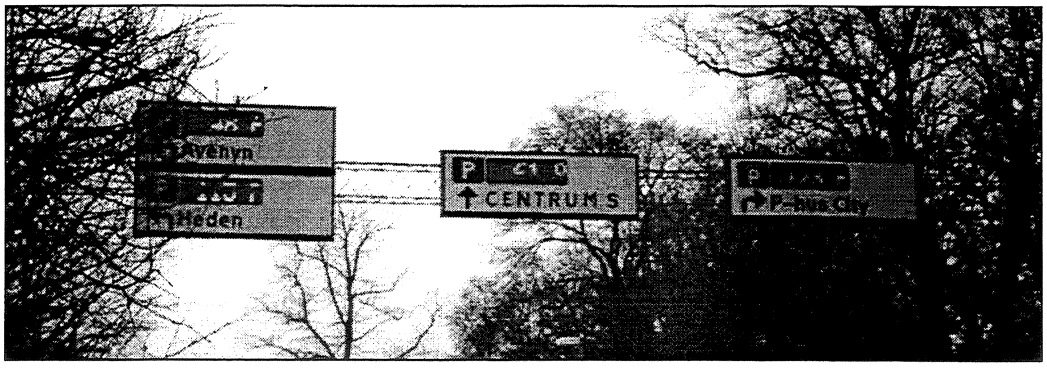


Figure 40: *Signs of parking information system*

7.5 Results in the future

Although the parking-control system is working very well in Gothenburg and there is not too much parking space deficit, they are always thinking hard about new solutions. One of them was the development of a fast bus service through the city centre, which would have transported people from the Park and ride parking houses on the brink of the centre to working places (Figure 43). Busses would have travelled in every 5-10 minutes. Plans were ready and it looked a very good idea but the project didn't come true. That is probably because the public transport downtown is already very big and a thick bus service like this wouldn't have fit into the schedule.

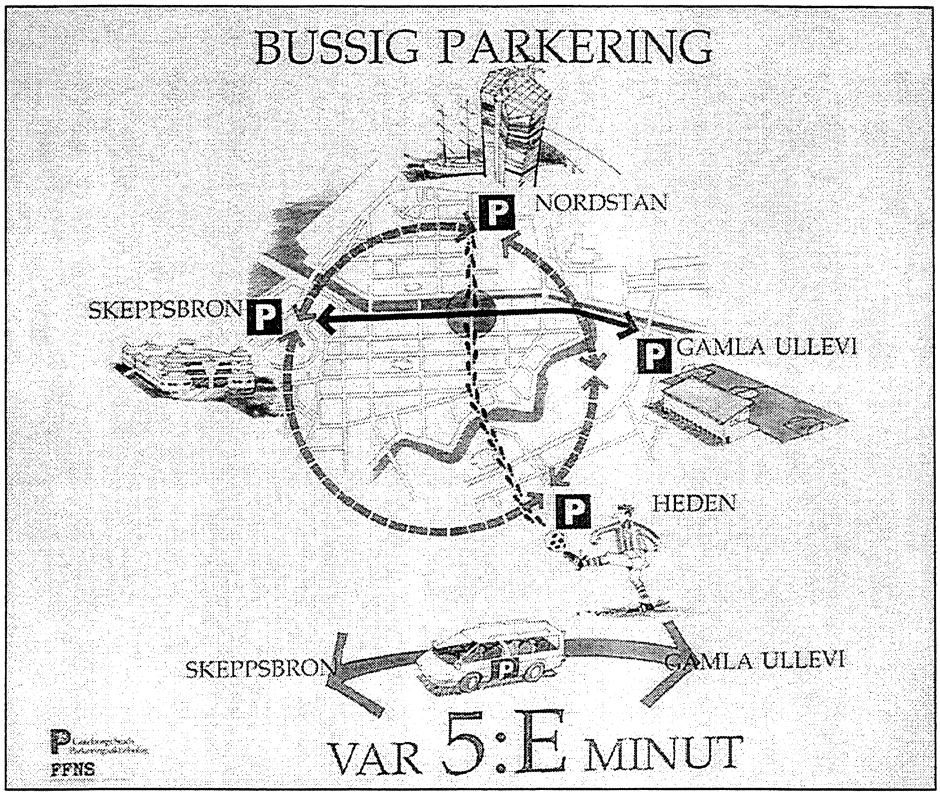


Figure 43: *The plan of fast bus service*

The other idea was following cars by the help of GIS (Geographical Information System). The system would permit of the localization of cars namely which parking zone they are and also the drivers would use this: made connection with the information centre they would get the position of their friend's car and by this they would know how to meet the easiest and quickest way.

There are relatively a great number of parking arrangements in the city but there are still areas where people need more parking spaces. They are planning to develop almost 2000 new parking spaces in the way of parking house, parking deck or underground garage. Planned place and number of the new parking arrangements can be seen on Figure 44.

8. Conclusions

8.1 Estimating the experiences

We can't compare the two cities, Budapest and Gothenburg, because there are big differences in the number of citizens and in the city-architecture facilities as well. Budapest is a capital with 2 million people, where parking demands coming in the historical city centre forward cannot be supplied because the cross sections of the streets are limited. In the interest of the protection of architectural values we have to realize the traffic to avoid these areas. Our national monuments, most of the statues are made of limestone, for that status the flue gas coming from the cars has very bad effects. We have to consider this by all plans of traffic regulation. Contrarily although Gothenburg with its 850.000 residents is the second most populous city of Sweden and transacts a big trading transport, it is in a point of vantage: the streets are wide enough also for parking traffic. Besides that their parking information system is developed as well. While the registration of cars is not too developed in Hungary, it is working here also very well.

Because the economics are very different too, there are some well-tried solutions in Gothenburg those cannot be used in Budapest. Probably it would be very unpopular for example if the citizen parking would be not free any more, the institutional parking would be not reduced, or fee would be defined for the night too. People's circumstances are much worst; the present parking fees are already very high.

The development of parking houses and underground garages is not a real purpose, because they are very expensive and autonomies have not enough money to build them. But to build parking decks would be worth considering, because their development – firstly in case of warrens – would result more parking spaces. By chance we could think about building parking decks in the place of the present parking lots too.

My exercise was to make a monitoring and suggestion for the solution of parking problems in historical city centres. Parking companies in Budapest engaged themselves – properly – to use parking automats. They have to be intent on making this system perfect in the centre, for example to think the fees and periods of parking over. It doesn't pay to run on making a new system in the close future. To decrease and control the traffic going to the city centre is a more important exercise. In connection with it a real purpose can be to develop Park and ride and parking information system and the intermodality. All of them appropriate to relieve the centre. Building these systems we could realize the better and steadier utilization of the present parking spaces in the centre too.

Parking information system is working very well in Gothenburg. Experiences are very favourable as I already wrote it in the 7th chapter. But in Budapest there are only some information signs, so we cannot talk about real parking information system there. In turn if we could build a good system there, that would be very favourable in the aspect of traffic mitigation of the city centre. Number of cars looking for empty parking spaces would be less; herby air pollution would decrease too.

Because of these favourable prospects, I'm looking for a solution in the following that can be used in Budapest.

but they cost too much and attract traffic that the city is still dying from. And there are the traffic-mitigation ambitions too.

2. Building and operating a whole parking information system costs more 10 millions of Ft. But parking houses in the city are not interested in it, because most of the operators are own investors, not the autonomy. And these parking houses are full anyway (so there are enough income); and who cannot pay the high parking fee, that would be not able to do it if there would be parking information system either.

So developing a system like this not a real purpose either.

8.2.3 Combined system

This system is a combination of the two above-mentioned parking information systems. This type of system is suggested to introduce in Budapest.

There would consist of a parking information system in advance that signs should be put already before Hungária ring road to the junctions of radial main roads. Besides this it is necessary to put information signs directly by the ring road showing the incidental Park and ride parking lots. Right here before Hungária ring road and the junctions of introduction radial roads (for example in the starting section of lane assort, 50-100 m from the junctions) it is necessary to put signs in advance those show the smaller zones where there are parking houses inside the Hungária ring road. For example: City – parking house in Aranykéz street, parking house at Szervita square, etc.; Middle Ferencváros – parking house in Páva street, parking house in Mester street, etc.

Getting at Nagylörút or Kiskörút it is necessary to put signs at least with the direction to them.

There is working that kind of ring parking information system in Gothenburg as it was written in the 7th chapter. Experiences are very favourable, this solution ensures to stay inside the system. We have the possibility to build this in Budapest too, our ring roads are given: Kiskörút, Nagykörút, Hungária ring road (Figure 45).

parking lots operated by autonomies. Development of the other necessary signs, information areas and information giving would be the private parking house operators' exercise.

Operation is a serious question (capital/capital and private – together), and if there is political intent or not. There will be no excursion in the short run.

References

(1) New challenges of urbanization towards the public transport with overhead wire– László Molnár, City Transport review 6/2000, p.334-339.

(2)

(3) Parking problems coming forward in the centre of cities – diploma work, Tibor Horváth, Budapest University of Technology Civil Engineering Transport 1994

(4) Parking capacity- and custom monitoring in the VI division of the capital Budapest – dr. János Tóth, City Transport review 4/2001, p.226-228.

(5) Principles pf the parking regulation – Tibor Jakab, Budapest: KDV, 1985

(6) Parking development in Budapest 1991-2001

(7) Development of the transport in Budapest – Mihály Csordás, City Transport review 2/2001, p.100-102.

(8) www.origo.hu 2002-05-14

(9) CPPC (2002) Capital Public place Parking Company, www.fkpt.hu 2002-05-14

(10) Hungaropark (2002) Hungaropark Budapest, www.hungaropark.hu 2002-05-18

(11) Public involvement in traffic development – dr. Pál Lukovich, dr. Zsolt Pápay, City Transport review, 2/1993, p. 82-94.

(12) Gothenburg Guide 2002

(13) Trafikkontoret (2002) Trafikkontoret Göteborg, www.trafikkontoret.goteborg.se 2002-05-20

(14) Budapest map 1996

(15) Ideas for the development of the parking management of Budapest – László Molnár, László Sipos, City Transport review 1/1993, p.32-36.