



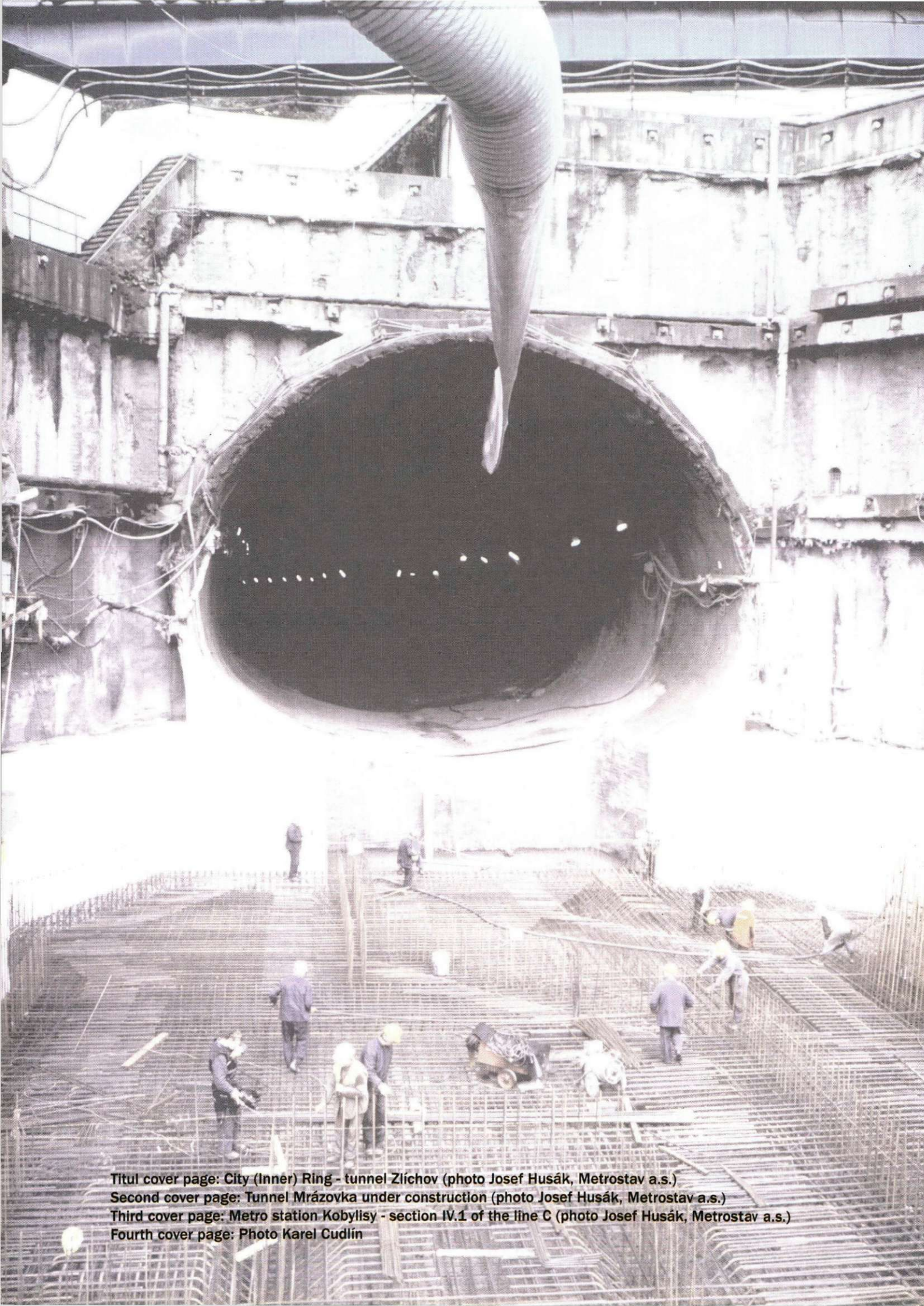
INSTITUTE OF TRANSPORTATION
ENGINEERING OF THE CITY OF PRAGUE



THE YEARBOOK OF TRANSPORTATION

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Titul cover page: City (Inner) Ring - tunnel Zličov (photo Josef Husák, Metrostav a.s.)

Second cover page: Tunnel Mrázovka under construction (photo Josef Husák, Metrostav a.s.)

Third cover page: Metro station Kobylisy - section IV.1 of the line C (photo Josef Husák, Metrostav a.s.)

Fourth cover page: Photo Karel Cudlín

THE YEARBOOK OF TRANSPORTATION PRAGUE 2002



**INSTITUTE OF TRANSPORTATION
ENGINEERING OF THE CITY OF PRAGUE**

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Dear Reader,

you are being provided with an annual digest of basic data on Prague transportation in the last year. The 2002 will for ever be recorded in history as the year of perhaps the greatest flood that has ever hit our Capital. This natural disaster have had an enormous impact on the city and its transportation. The flood damage reached about 8 billion CZK just on traffic infrastructure.



Much data in the present yearbook has been profoundly affected with traffic measures necessitated by the flood during the latter half of 2002. We had to use values obtained in the first half of the year to be able to follow the traffic development in comparisons. Still, these data are considered relevant and reliable for processing. The collected figures present a satisfactory picture of continuing growth in numbers of municipal public transportation customers in the last year, though the growth did not exceed one per cent. Simultaneously, vehicle kilometres travelled in car traffic also continued to grow, by about 3.5 per cent. This growth is due to steadily rising numbers of cars in the city (by about 1.8 per cent between 2001 and 2002) as well as, no doubt, their higher usage in daily travels. An important factor in this trend is an intensive urban development in communities around Prague, with their new housing and business facilities. It seems to be demonstrated by the fact that the outer city cordon saw an almost 6 per cent increase in car traffic while the central cordon levels stayed the same.

The work on multiple traffic constructions of key importance for the city went on in the last year, despite the odds, yet with no increase in pace. The key projects include most notably the section IV.1 line C of the underground, tram line to Barrandov housing estate and the City (Inner) Ring West. Also the work on pre-project and design preparation of other transportation investments did not stop (the section IV.2 line C of the underground, line D underground, the City (Inner) Ring North as well as the Prague (Outer) Ring North and South). No halt, rather an increased activity met urban traffic organisation and control due to many instant temporary measures that had to be taken in order to deal with the flood and post-flood conditions. Specialists from the **Institute of Transportation Engineering of the City of Prague** shared a great deal in all the preparations and designs as traffic engineering fundamental tasks include all these activities.

Dear reader, I will be pleased if you find this yearbook informative in gaining an insight in the current condition of Prague transport, or helpful in your decision-making on a further development of the Prague traffic system. We will be glad to provide additional detail to these data at our Prague office or via our web site on www.udi-praha.cz.

1 April, 2003



Ing. Ladislav Pivec
Director

1 BASIC DATA

1.1 THE CAPITAL OF PRAGUE

Selected data on the Capital of Prague as of 31. 12. 2002

City area	496	km ²
Population	1,152,000	
Job opportunities	cca 780,000	
Total road network	3,508	km
specifically, motorways within the city	10	km
other urban motorways	76	km
Number of bridges in road network	592	
specifically, bridges across the river	27	
grade-separated intersections	212	
underpasses	121	
Number of tunnels (total length 3,305 m)	6	
All motor vehicles	775 014	
including passenger cars	639 000	
Motor vehicles per head		
in vehicles per 1,000 inhabitants	673	
Passenger cars per head		
in cars per 1,000 inhabitants	555	
Metro (underground) network (in operation)	49.8	km
Tram network	137.5	km
specifically, dedicated trackbed	51	%
Public Transport bus network	684.8	km
Traffic lights	427	
specifically, co-ordinated into "green waves"	272	
with traffic actuated control	163	
with tram priority	60	
separate pedestrian crossings	56	
Vehicle kilometres travelled (VKT) in car traffic over the whole road network:		
in an average workday	17.7	mill. VKT
in a year	5.85	bill. VKT
Modal split (based on all trips in the city in a workday):		
public transport	57	%
car transport	43	%
Traffic accidents	35,888	
Traffic accident injuries:		
fatal	82	
serious	477	
slight	3,679	
Relative accident rate (accidents per 1 million VKT)	6.1	

1.2 PRAGUE COMPARED WITH THE CZECH REPUBLIC

The condition of Prague as the Capital of the Czech Republic is specific. In traffic it means the intensities, vehicle kilometres travelled (VKT), cars per head as well as traffic accident numbers are above the average.

Basic data as of 31. 12. 2002

	Prague	Czech Rep.	Prague/CZ (%)
Area (km ²)	496	78,864	0.6
Population (mil.)	1.15	10.18	11.3
Motor vehicles (000s)	775	4,961	15.6
specifically, passenger cars (000s)	639	3,619	17.7
Motor vehicles per head			
(motor vehicles per 1000 persons)	673	487	
(persons per 1 motor vehicle)	1.5	2.1	
Passenger cars per head			
(passenger cars per 1000 persons)	555	355	
(persons per 1 passenger car)	1.8	2.8	

Vehicle kilometres development in 1990-2002 (millions VKT/av. workday 0-24 h)

Year	Prague*	Czech Rep.+	Prague/CZ (%)
1990	7.3	80.9	9.0
2000	16.6	131.2	12.7
2001	17.1	124.9	13.7
2002	17.7		
Index 01/90	235 %	154 %	152.6
Index 02/01	103.5 %		

* = the whole road network

+ = motorways + roads, class 1 + 2 + 3, including sections inside Prague



2 CAR TRAFFIC

Car traffic in cities is a phenomenon whose impact both on population and urban environment grows steadily with rising numbers of cars and the density of traffic. It is true especially for Prague and our larger cities during the last few decades.

Registered motor vehicles in 1961 - 2002

Year	Prague					Czech Republic (Czechoslovakia till 1971)				
	Popul. (000s)	Motor vehicles		Personal cars		Popul. (000s)	Motor vehicles		Personal cars	
		number	%	number	%		number	%	number	%
1961	1 007	93 106	22	44 891	13	13 746	1 326 801		291 680	
1971	1 082	203 519	48	133 129	40	14 419	2 931 629		1 041 137	
1981	1 183	367 007	86	284 756	85	10 306	3 449 300	85	1 872 694	79
1990	1 215	428 769	100	336 037	100	10 365	4 039 606	100	2 411 297	100
1996	1 205	702 966	164	588 968	175	10 309	4 991 607	124	3 349 008	139
1997	1 200	721 962	168	602 246	179	10 299	5 208 529	129	3 547 745	147
1998	1 193	735 504	172	612 128	182	10 290	5 383 765	133	3 687 451	153
1999	1 187	744 125	174	620 586	185	10 278	5 238 776	130	3 695 792	153
2000	1 181	746 832	174	620 663	185	10 267	5 230 846	129	3 720 316	154
2001	1 170	760 726	177	627 891	187	10 270	5 357 727 ⁺⁺	133	3 788 627 ⁺⁺	157
2002	1 152[*]	775 014	181	639 000[*]	190	10 182[*]	4 961 169	123	3 619 374	150

100 % = in 1990

+ = preliminary figure

++ = as of 30. 6. 2001

* = a qualified estimate of the Institute of Transportation Engineering, Prague

Note: Up to 2001, the figures on registered motor vehicles both in Prague and nationwide were obtained from the Police of the Czech Republic. Since 2002, the data are received from their new data administrators, viz. Prague Municipality, the Traffic Administration Department, and the Czech Ministry of Transport, the Traffic Administration Department, for the city and the nation, respectively.

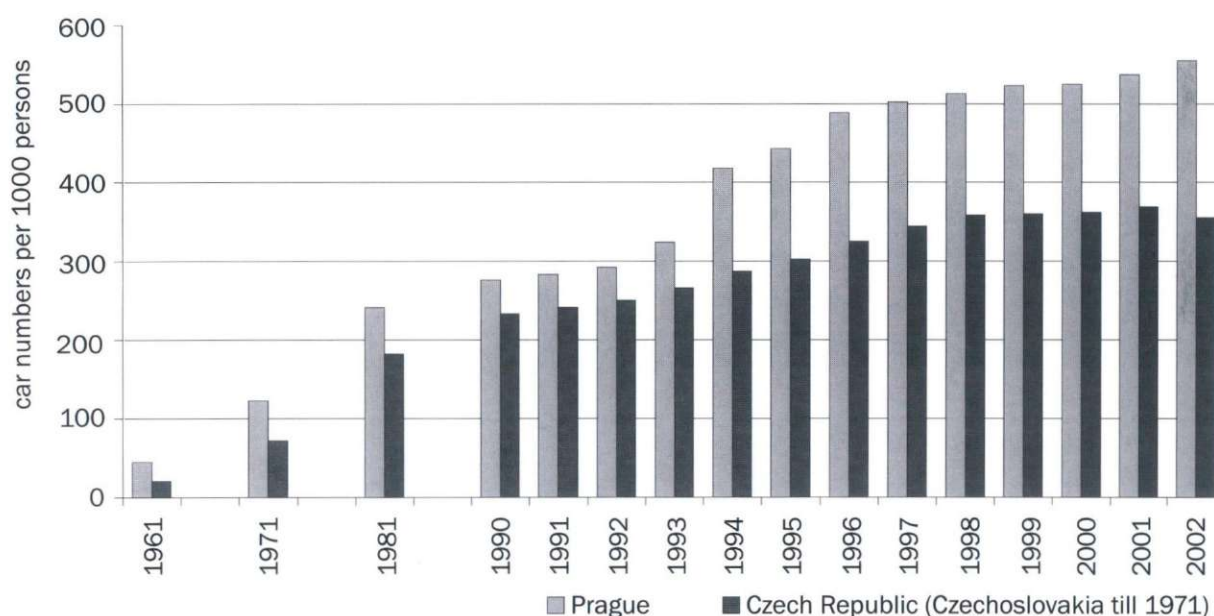
The new national data administrator shows the numbers of cars lower by about 7 per cent than the former administrator.

The passenger car numbers in Prague in 2002, as given here, are a qualified estimate of the Institute of Transportation Engineering of the City of Prague, since the Prague data administrator does not so far discriminate between types of vehicles registered after 1. 1. 2002, hence offering only comprehensive figures on motor vehicles in general. The explanation the data administrator provides reads as follows: "The reason is the technical method in the registry of vehicles (Act No. 56/2001 Coll.) has been altered. Earlier, a type of vehicle was drawn from the type of license plate ("SPZ"). That provided a basis for calculation of statistics on cars and their distribution in "type of vehicle" groups. The current legislation, however, made a fundamental change. In place of the former "SPZ" license plates, new registration numbers ("RZ") are allotted, which merge all the types except mopeds, "veteran" cars and special vehicles together in a single category. All the vehicle types (apart from the foregoing exception) are being gradually transferred to a single type of a "standard road vehicle". In other words: unless the methodical changes, we shall not be able to provide information concerning vehicle numbers differentiated by type any more, apart from their overall numbers".

Number of motor vehicles and cars per head from 1961 to 2002

Year	Prague				Czech Republic (Czechoslovakia till 1971)			
	Vehicles per head		Personal cars per head		Vehicles per head		Personal cars per head	
	Vehicles per 1,000 pers.	Pers. per 1 vehicle	Cars per 1,000 pers.	Pers. per 1 car	Vehicles per 1,000 pers.	Pers. per 1 vehicle	Cars per 1,000 pers.	Pers. per 1 car
1961	92	10.8	45	22.4	97	10.4	21	47.1
1971	188	5.3	123	8.1	203	4.9	72	13.8
1981	310	3.2	241	4.2	335	3.0	182	5.5
1990	353	2.8	276	3.6	390	2.6	233	4.3
1996	583	1.7	489	2.0	484	2.1	325	3.1
1997	601	1.7	502	2.0	506	2.0	344	2.9
1998	616	1.6	513	1.9	523	1.9	358	2.8
1999	627	1.6	523	1.9	510	2.0	360	2.8
2000	632	1.6	525	1.9	510	2.0	362	2.8
2001	650	1.5	537	1.9	522	1.9	369	2.7
2002	673	1.5	555	1.8	487	2.1	355	2.8

Cars per head 1961 - 2002



2.1 MOTOR CAR TRAFFIC VOLUMES ON WORKDAYS

The basic aggregated parameter of motor car traffic development in Prague is the vehicle kilometres travelled (VKT) indicator covering the total road network. The VKT have been monitored by the Institute of Transportation Engineering since 1978, utilizing an in-house database software "IDIS" (Information Traffic Engineering System).

In addition to VKT, Prague car traffic development trends are monitored by means of cordon surveys, i.e. periodic traffic counts taken on spots which together make a rounded-off cordon over all the important in-roads entering a defined area. The downtown traffic development is monitored via the central cordon, the extra-urban traffic development is monitored through the outskirts cordon. The two cordons' time arrays have been collected and available at the Institute of Transportation Engineering since 1961.

Note: all VKT data relate to a 24 h average of a normal workday; all car traffic data exclude public transportation buses.

In order to facilitate comparison of trends and development over the years, all VKT and traffic density data for 2002 are given for normal traffic conditions, i.e. spring 2002, seeing that, throughout the latter half of the year, Prague was profoundly affected by extraordinary measures due to August flood.

The conducted traffic counts lead to a conclusion that the car traffic in the city centre stagnated in 2002, while continuing to rise over the rest of the city area. The total traffic throughout the capital rose in 2002, in terms of its overall road network VKT, by an average of 3.5 per cent above the previous year.

The 2002 VKT over Prague (24 hours, an average workday, all motor vehicles) was 17,718 million vehicle kilometres. The passenger cars' share was 16,191 million vehicle kilometres, i.e. 91 per cent.

In the greater downtown area of the city (according to counts on the central cordon, covering the bi-directional traffic over entry points to the greater downtown between Petřín Hill on the west, Letná Hill on the north, Rieger Park on the east and Vyšehrad Castle on the South) the car traffic volume was roughly the same as compared to 2001. In comparison to 1990 though, 36 % more vehicles entered the greater downtown area. All the increase following 1990 has been brought about only by passenger cars (45 per cent more) while the number of lorries and buses, on the contrary, has decreased by more than a half (54 per cent less) since 1990. In 2002, about 295,000 vehicles entered the greater downtown area during an average workday between 6 a.m. and 10 p.m., including 280,000 passenger cars.

In the middle zone of the city, the car traffic volume increased by 2 to 6 % over the previous year. As compared to 1990, the traffic has increased on some city roads in the middle zone from three to four times in the past 12 years.

In the outer zone of the city (according to counts on the outer cordon, covering the bi-directional car traffic over points where main trunk roads and motorways enter the densely populated urban area) the volume of car traffic grew by 5.9 % in 2002 as compared to 2001. About 200,000 vehicles entered Prague between 6 a.m. and 10 p.m. on an average workday of 2002, including 170,000 passenger cars. In comparison with 1990, approximately 171 per cent more vehicles entered Prague daily, the major portion of the increase following 1990 being passenger cars.

Road sections with the heaviest ADT on Prague's road network in 2001 were

- Jižní spojka at the section from 5. května to Vídeňská, whose ADT (Average Daily Traffic) was 112,000 VPD (Vehicles Per Day)
- Barrandov bridge (112,000 VPD)
- Wilson street on the bridge over Masaryk railway station (100,000 VPD)

Grade-separated junctions with the heaviest ADT in 2002 were

- 5. května - Jižní spojka (184,000 VPD)
- Jižní spojka - Vídeňská (150,000 VPD)
- Strakonická - Barrandov bridge (138,000 VPD)

Level junctions with the heaviest ADT in 2002 were

- Žitná - Mezibranská (77,000 VPD)
- Jiráskův bridge - Janáčkovo embankment (72,000 VPD)
- Anglická - Legerova (70,000 VPD)
- Argentinská - Plynární (70,000 VPD)
- Letenské square (70,000 VPD)

The Average Vehicle Occupancy (AVO) in 2002 was

- in the greater downtown area (on the central cordon): 1.37 persons per passenger car
- in the outer zone of the city (on the outer cordon): 1.42 persons per passenger car
- all-Prague average: 1.41 persons per passenger car

The development of car traffic in the Capital of Prague area since 1991 is characteristic for the following basic trends:

Since 1991, the numbers of cars and volumes of traffic have shown in Prague an explosive growth that has been without parallel anywhere in Europe, except cities of the former East Germany. The rising trend has continued in 2002 apart from the city centre. The pace of the growth has slowed down in the last four years, comparing to the early 1990s.

In comparison with the first half of the 1990s, when the average daily traffic performance had its annual increase of over 1 million vehicle kilometres, the annual growth rate of the average daily VKT subsided to about 0.5 to 0.6 million vehicle kilometres between 1998 and 2002. The daily VKT grew in the last 12 years (1991 to 2002) in all by 10.4 mill. vehicle kilometres per day. **That means that within the last 12 years the car traffic in Prague has swollen more than during the previous 100 years of motoring since the end of the 19th century up to 1990.**

Nearly all the rise in the car traffic in Prague following 1990 has been due to passenger cars, as the lorry and bus VKT have more or less stagnated. During 1991 to 2002 the VKT per vehicle in Prague went up as follows:

■ passenger cars	+ 176 %
■ lorries and buses	+ 6 %
■ all vehicles	+ 143 %

The car traffic grows differently in different city zones. From 1991 to 2002 the car traffic increased in the following way:

■ all network average	+ 143 %
■ the greater downtown	+ 36 %
■ the outer zone	+ 171 %
■ the middle city zone	+ 100 to + 300 %

The somewhat slower increase in volumes within the city centre is affected by the fact that the peak traffic demands have already reached the capacity limits of many key crossroads.

The explosion of car traffic in Prague during the 1990s has brought about a qualitative change in condition:

- The excessive load on the road network has already lost its local character. It is now spread across the whole of the centre and adjacent middle city zone, being delineated by a rectangle of about 7 x 6 km, between the Strahov hill on the west, the Barikádníků bridge on the north, the goods railway station at Žižkov on the east and the Pankrác neighbourhood on the south.
- Due to the outbreak of car traffic in Prague, congestions form ever more often in the centre and on many other locations throughout the road network. Traffic jams can develop even on capacity arteries (e.g. on the Barrandov bridge or the southern part of City Ring).
- The difference between peak and valley periods diminishes as traffic volumes can grow only during off-peak hours in many places since there is no additional capacity available during peak hours.
- The used-up capacity period grows longer with key intersections during the day, making thus congestions more frequent, larger and longer. Their environmental impact, especially in the city centre, is obvious.

Traffic volume on central and outer cordon from 1961 to 2002

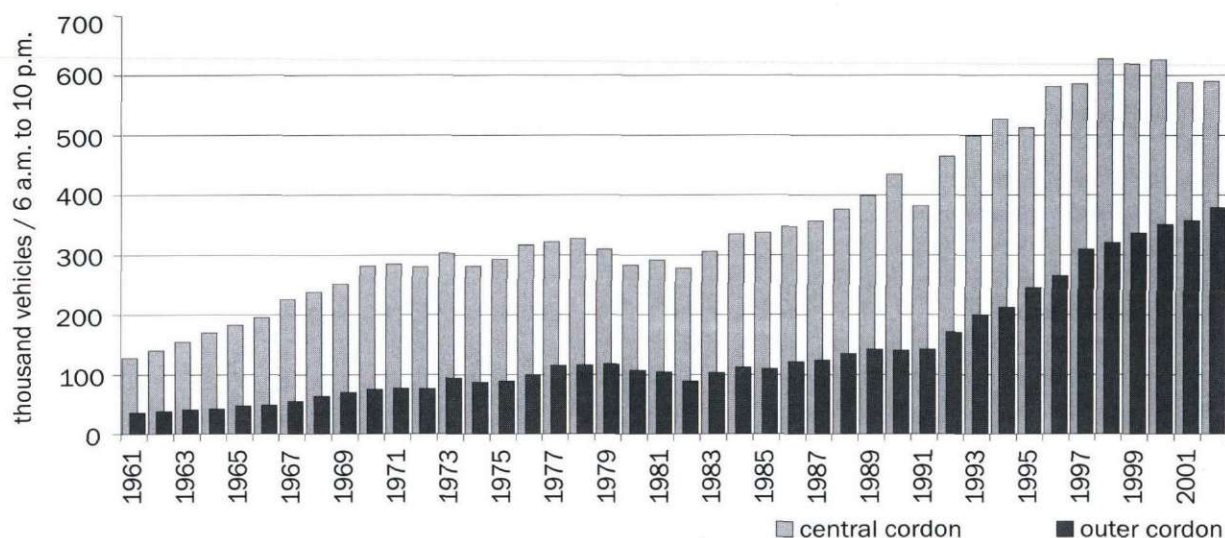
A workday, both directions in total, from 6 a.m. to 10 p.m.

Year	Central cordon						Outer cordon					
	Passenger cars		Lorries		All vehicles		Passenger cars		Lorries		All vehicles	
	number	%	number	%	number	%	number	%	number	%	number	%
1961	69 000	18	32 000	82	128 000	29	14 000	14	14 000	41	36 000	26
1971	241 000	63	38 000	97	299 000	69	50 000	50	23 000	68	77 000	55
1981	247 000	64	39 000	100	292 000	67	67 000	66	31 000	91	104 000	74
1990	385 000	100	39 000	100	435 000	100	101 000	100	34 000	100	140 000	100
1998	591 000	154	27 000	69	628 000	144	277 000	274	39 000	115	321 000	229
1999	584 000	152	25 000	64	619 000	142	290 000	287	42 000	124	337 000	241
2000	594 000	154	23 000	59	627 000	144	304 000	301	43 000	126	351 000	251
2001	556 000	144	21 000	54	589 000	135	310 000	307	43 000	126	358 000	256
2002	560 000	145	18 000	46	590 000	136	329 000	326	45 000	132	379 000	271

100 % = year 1990

Traffic volumes on central and outer cordon between 1961 and 2002

Average workday, both directions total, 6 a.m. to 10 p.m.



Traffic performance in VKT in Prague from 1961 to 2002

Total road network, an average workday, 0-24 h

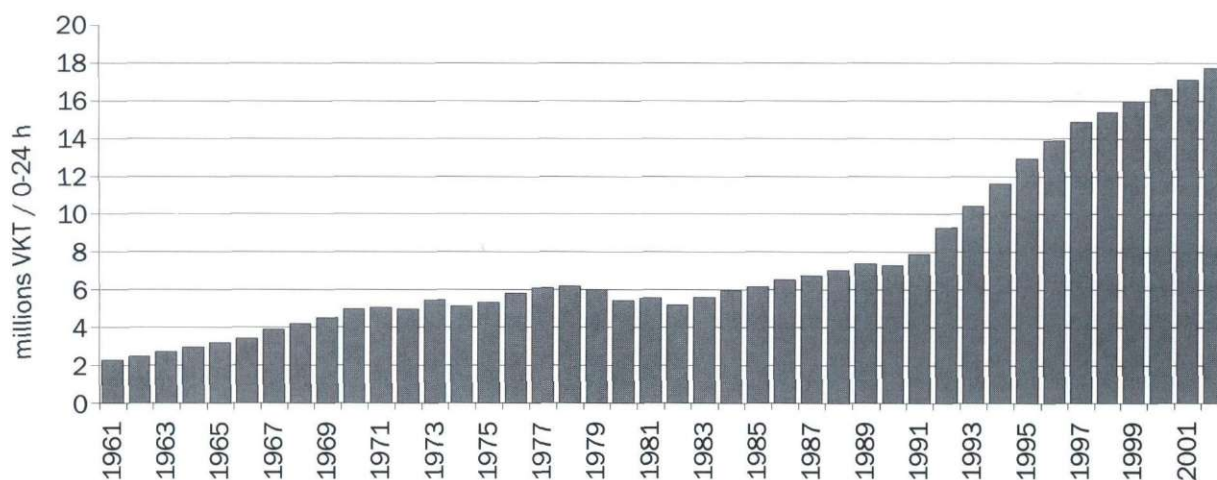
Year	All motor vehicles		Specifically, passenger cars		VKT percentage of passenger cars
	millions VKT	%	millions VKT	%	
1961	2,273*	31	1,273*	23	56
1971	5,061*	69	3,543*	65	70
1981	5,562	76	4,338	79	78
1990	7,293	100	5,848	100	80
1999	15,979	219	14,503	248	91
2000	16,641	228	15,131	259	91
2001	17,121	235	15,585	267	91
2002	17,718	243	16,191	277	91

100 % = year 1990

* = an estimate from volume trends on the central and outer cordon (VKT is monitored in Prague only since 1978)

VKT development from 1961 to 2002

Total road network, an average workday, 0 - 24 hours



2.2 A WORKDAY MODE SHARE

The traffic flow is made up largely of passenger cars. The car traffic volumes grow due to a rise in passenger vehicle trips. The resulting average mode share of passenger cars in the traffic flow has been rising steadily (the figures show network averages):

■ in 1961	56 %
■ in 1971	70 %
■ in 1981	78 %
■ in 1990	80 %
■ in 2002	91 %

Concerning the local distribution, the passenger cars get the greater share the closer to the city centre. The share in 2002 was:

■ in the central cordon	95 %
■ in the outer cordon	87 %
■ the network average	91 %.

Percentage of mode share from 1961 to 2002 (in %)

A workday, both directions total, from 6 a.m. to 10 p.m.

Year	Central cordon				Outer cordon			
	Passenger cars	Moto-cycles	Lorries	Buses (ex. PT)	Passenger cars	Moto-cycles	Lorries	Buses (ex. PT)
1961	53.7	19.4	29.4	2.0	38.6	22.1	34.4	4.9
1971	79.3	5.6	13.3	1.8	63.2	8.6	25.1	3.1
1981	84.3	0.4	13.2	2.0	65.1	0.6	30.3	4.0
1990	88.6	0.7	9.1	1.6	72.1	0.5	24.0	3.4
1999	94.3	0.7	4.0	1.0	86.2	0.2	12.4	1.2
2000	94.7	0.6	3.7	1.0	86.5	0.2	12.1	1.2
2001	94.4	0.9	3.6	1.1	86.5	0.3	12.1	1.1
2002	94.9	0.9	3.1	1.1	86.6	0.3	11.8	1.3

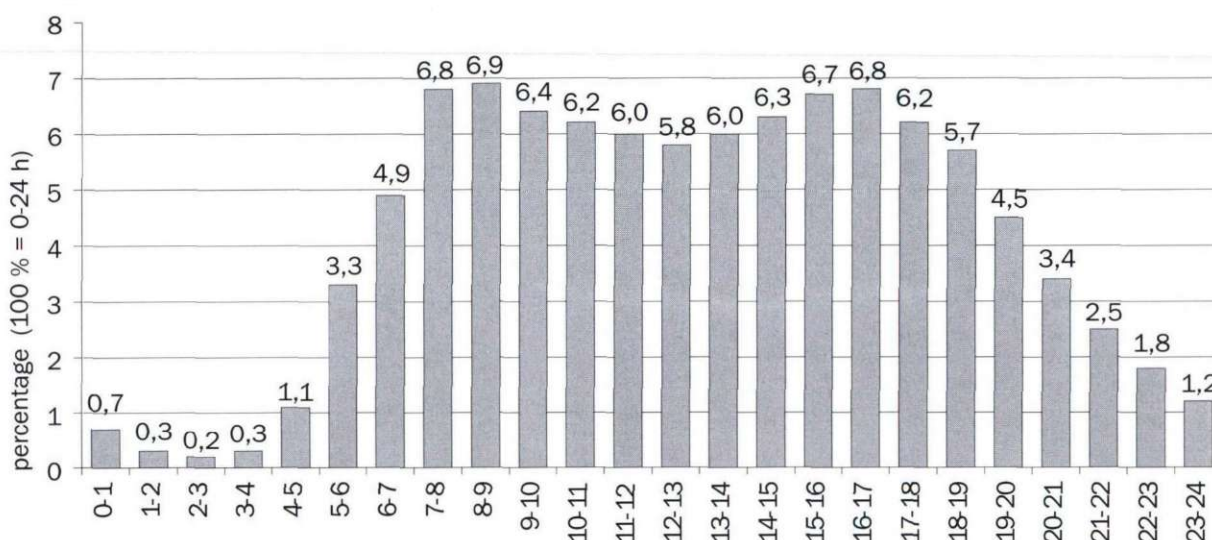
2.3 TEMPORAL PATTERNS IN CAR TRAFFIC

Workday volume variations in car traffic show the following characteristics.

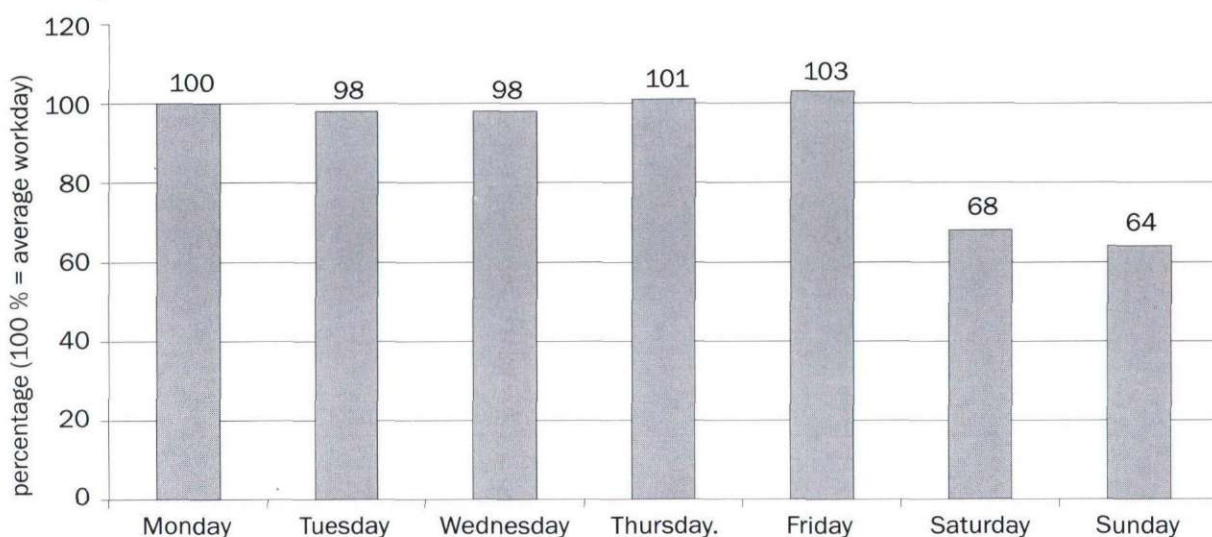
- The bulk of the daily traffic volumes is carried out during daylight, 75 % from 6 a.m. to 6 p.m., 81 % from 6 a.m. to 7 p.m., while the period from 6 a.m. to 10 p.m. covers about 91 %.
- Following 5 p.m., the traffic volume displays a steep and largely linear drop till midnight.
- The morning peak hour comes at 8 - 9 a.m., the afternoon peak hour is between 4 - 5 p.m.
- The morning peak hour's share is 6.9 %, the afternoon peak hour's share is 6.8 % (100 % = 0 - 24 h).
- The differences between peak hour share and morning off-peak share are not very sharp. The off-peak hour 12 - 1 p.m. makes 5.8 % of the whole day.
- Daily traffic density variation in lorries and buses (excluding public transportation) displays a different characteristic from the overall profile. Its peak hour is 8 - 9 a.m., making 10.0 % of the all-day heavy vehicle volumes. Following 9 a.m. there comes a mild decrease without any sag or next peak following. The density of traffic starts coming notably down as early as at 1 p.m. with a sharper decline coming about after 3 p.m.
- Consequently, the share of heavy vehicles in the traffic stream changes significantly during the day:
 - the all-day average is 9 %
 - it comes up to 16 % in the morning
 - it descends to 7 % in the afternoon
 - evening and night values range between 4 to 10 %.

Temporal patterns in car traffic in Prague in 2002

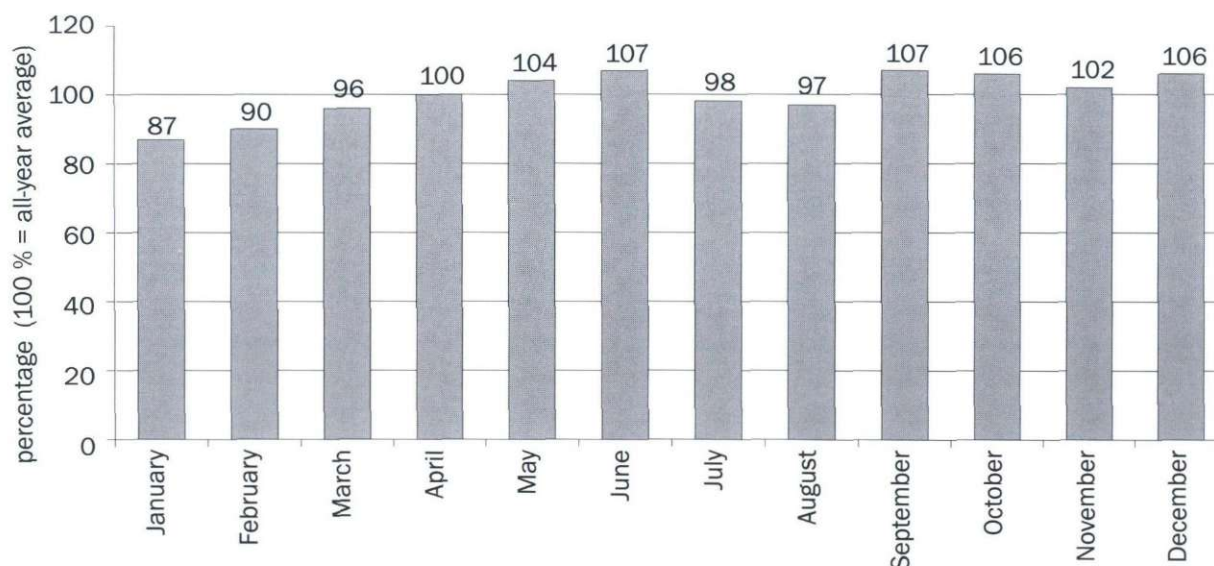
Daily variation in 2002



Weekly variation in 2002



Annual variation in 2002



2.4 OUTWARD BOUND CAR TRAFFIC IN PRAGUE

Two large directional surveys have been conducted during the last five years in order to find out destinations of the outward bound car traffic. The destinations have been categorised in three location types - Prague, its surrounding agglomeration zone, and the country. The "agglomeration" zone makes a ring around Prague, approximately 30 km wide, covering the former districts *Praha - západ*, *Praha - východ*, *Kladno*, larger portions of *Mělník*, *Beroun*, *Benešov* and lesser parts of *Kolín* and *Nymburk*.

Both survey results are digested in the following table:

Number of passenger car trips in both directions	Directional survey 1996	Directional survey 2001	index 2001/1996
	0-24 h	0-24 h	
Prague - agglomeration	164 000	267 000	1.6
Prague - the country	83 000	86 000	1.0
Transit (across Prague)	16 000	25 000	1.6
Total outward trips	263 000	378 000	1.4
Total city limits crossings *)	279 000	403 000	1.4

*) two Prague border crossings per one transit trip

As follows from these figures, **the crucial component in the growth** of the car traffic crossing the limits of Prague (+100,000 vehicles per day in both directions) during the five years of 1996 - 2001 **is made by** Prague-agglomeration and return trips, i.e. **the relationship of Prague with its closest surrounding**. The relationships between Prague and distant country are stagnating. The increase in transit traffic is quite notable, yet in absolute figures the change is not so significant.

The marked growth of traffic exchange between Prague and its neighbouring country relates to the ongoing suburbanisation processes, the spread of diffuse types of settlement (i.e. not just housing, also businesses and commercial facilities) into the countryside.



2.5 WEEKEND CAR TRAFFIC

The Prague Institute of Transportation Engineering's annual survey of the car traffic volumes includes monitoring weekend traffic on the urban outer limit. Weekend departures are carried out on Friday afternoons between 3 to 7 p.m., on Saturdays between 8 to 11 a.m. and partially also on Sunday mornings, on the other hand weekend arrivals concentrate in a narrow band of Sunday return time from 2 to 10 p.m. These are also intervals of periodic holiday traffic monitoring during spring survey time on the outer cordon.

The Institute of Transportation Engineering has been registering the weekend car traffic since 1973. Following a marked annual drop by 1/4 in 1991, brought about by doubling the petrol prices in 1990, the weekend car traffic reached its former 1990 level again in 1993 to 1994. In the latter part of 1990s, the traffic showed few vacillations (-3 to +4 %) during the respective years. The total weekend car traffic rose by 20 % during the 1990s, as compared with the condition in 1990. In 2002, a notable annual increase was seen in weekend car traffic by 11 %.

The weekend traffic modal share is dominated by passenger cars; they made 97 % in 2002.

The Average Vehicle Occupancy (AVO) in weekend traffic in 2002 was 2.15 passengers per car.

Weekend traffic volumes from 1973 to 2002

Sunday, outer cordon, Prague bound, from 2 p.m. to 10 p.m.

Year	Passenger cars		All types of vehicles	
	number	%	number	%
1973	70 000	74	77 000	77
1981	77 000	82	80 000	80
1990	94 000	100	100 000	100
1999	111 000	118	114 000	114
2000	116 000	123	120 000	120
2001	117 000	124	121 000	121
2002	130 000	138	134 000	134

100 % = year 1990

3 PUBLIC TRANSPORT

3.1 PRAGUE INTEGRATED TRANSPORT

3.1.1 Basic data

Prague Integrated Transport System is organized by Prague Integrated Transport Regional Organizer (ROPID), an allowance organization established by the Municipality of Prague.

Prague Integrated Transport (PID) System comprises the City of Prague and several communities outside of Prague, which help support operation of bus lines outside the territory of the Capital. The operators include Prague Public Transit Co. Inc. (*Dopravní podnik hl. m. Prahy, a. s. - DP*) operating the Metro (underground), tram lines, funicular railway and most of the bus lines, Czech Railways (*České dráhy, s. o.*) operating the railways and additional fifteen smaller bus line operators.

The blueprint for an integrated passenger transport system in and around Prague was ready as early as in late 1970s. The integrated transport system was launched in 1992 with the implementation of an integrated tariff in the first two suburban bus lines. Further development continued with the gradual linking up of railway routes with the integrated system, by increasing the range of suburban bus transport with a number of lines, by increasing the size of the territory covered and the number of communities served by the suburban PID buses. Simultaneously, the tariff system also developed, a zoned tariff has been implemented, with the number of tariff zones gradually increasing.

In 2002 the integrated system was further developed by both launching additional lines radially towards the city, and many lines throughout the region, which improve traffic connections between important regional sites. 133 regional bus lines were operating by later 2002. These bus lines have been operated by:

Operator	city territory	city-to-region lines	region lines
<i>Dopravní podnik hl.m. Prahy, a.s.</i>	153	20	0
Others	6	70	43

The city limits were crossed in both directions by over 2200 PID buses on an average workday.

Basic data about Prague Integrated Transport (PID) from 1996 to 2002

Year	1996	1997	1998	1999	2000	2001	2002
Number of communities served by suburban PID buses	55	69	83	104	159	218	251
Number of railway stations and stops linked up with PID	181	181	181	181	190	200	219
Number of suburban PID bus lines	31	38	48	54	89	114	133
Millions of VKT in suburban PID bus lines	2.552	4.123	5.030	7.994	9.357	12.91	15.79
Millions of VKT in all the PID lines except railway (i.e. metro + tramway + city and suburban buses)	152	150	149	156	157	163	161.6
Share of travel PID tickets in the railways integrated into the PID system (% of the total)	29.1	32.5	35.6	37.2	39.2	43.0	52.1

3.1.2 MUNICIPAL PUBLIC TRANSPORT (MHD)

The **Metro** (underground) makes a backbone network of the Municipal Public Transport (MHD). The Metro consists of three lines with a total operational length of 49.8 km and 51 stations (including three interchanges). Currently, 22 stations are barrier-free. The trains travel at an average commercial speed of 35.4 km/h, with the average distance between stations 1,038 m. The Metro share of the number of transported passengers reached 38 % of all the passengers using the municipal public transport in 2002. Vehicle records register 616 items, the fleet in actual operation consists of 491 vehicles. In 2002, additional new M1 Metro trains were delivered, increasing the number of new trains in operation to 22.

The **tramway network** is 137.5 km long. 51 % of the lines run on a dedicated trackbed (a raised embankment or, in places, separate track lanes led outside of road), 49 % of the tracks are embedded in the roadway. The average stop distance throughout the network is 563 m. The trams share 32.6 % of all the transported persons. The tramway fleet included 964 vehicles, while in actual operation 932 carriages were recorded as of the year end, including 47 articulated three-segment vehicles.

The **buses** make up a complementary network to the Metro and trams. They provide spread coverage of the area, especially at the outskirts, and selected tangential connections. The operational length of the network within the city territory is 684.8 km with an average distance between stops 690 m. The bus fleet has 1,394 vehicles registered, 1,376 buses in operation including 768 standard types, 244 low-floor, 351 articulated buses and 13 articulated low-floor. The bus share of the total transported persons is 29.4 %.

The **funicular** railway provides a connection between Újezd street and Petřín hill (via a mid-point stop, Nebozízek). Two carriages with their capacity of 100 persons travel on a 510 m long railway with an average commercial speed 6.12 km/h climbing to the height of 130.45 m. The rope (35.3 mm in diameter) linking the two carriages is moved by electrical power. The funicular transports about 1.3 million passengers a year.

Basic data about Prague Integrated Transport in 2002

(operated by Prague Public Transit Co. Inc., "DP")

	Metro	Trams	Buses	Total
Operational network length in Prague (km)	49.8	137.5	684.8	872.1
specifically dedicated trackbed (%)	100	51	-	-
Operational network length outside Prague (km)	-	-	133.2	133.2
Average stop distance (m)	1 038	563	690	-
Average commercial speed (km/h)	35.4	19.5	25.9	-
VKT in Prague per year (000s)	35 581	49 883	64 279	149 743
VKT outside Prague per year (000s)	-	-	1 374	1 374
Passengers transported in Prague per year (000s)	416 516	358 079	321 789	1 096 384
Passengers transported outside Prague per year (000s)			19 225	19 225
Prague Public Transit Co. Inc. employees	12 901			
Revenue from tickets (mill. CZK)	2 527			
Operational costs (mill. CZK)	14 263*			
Revenue/costs ratio (%)	17.72 %			

* = the costs have been adjusted for commercial papers sold and deposits, i.e. 18.5 mill. CZK; the operational costs include the flood expenses of 3,062.6 mill. CZK

Development of selected characteristics of public transport

Year	Operational network length (km) +, **			Average commercial speed (km/h) **			Public Transport Performance on an average workday ++	
	Metro	Trams	Buses	Metro	Trams	Auto-busy	Place-km (mil.)	Passengers transp'd (000s)*
1981	19.3	122.9	545.0	32.2	15.7	23.8	46.7	3 638
1990	38.5	130.5	607.3	34.6	18.7	23.7	57.6	4 189
1995	43.6	136.2	671.4	34.9	19.0	23.3	53.4	3 409
1996	43.6	136.2	724.6	34.9	19.0	23.8	54.5	3 423
1997	43.6	136.4	745.6	34.9	18.9	24.0	54.1	3 393
1998	49.8	136.4	759.7	34.9	18.7	24.3	54.4	3 349
1999	49.8	136.4	797.5	34.9	19.0	24.3	56.1	3 302
2000	49.8	136.4	812.4	35.7	18.9	25.2	56.0	3 290
2001	49.8	137.5	806.8	35.4	19.2	25.9	56.8	3 468
2002	49.8	137.5	818.0	35.4	19.5	25.9	56.4	3 492

+ = The operational length is the total length of regularly operated lines that are available to passengers (i.e. without service tracks, sidings, lay-bys, depots, yards, etc.), measured along the line axis, or street axis with bus lines. With Metro, it is the total length of the lines from terminal to terminal platform midpoint.

* = The number of transported passengers is shown as number of rides.

A ride means using a single means of public transport, each change counting as a separate ride.

** = incl. suburban PID lines operated by Prague Public Transit Co. Inc. (DP hl. m. Prahy, a. s.)

++ = since 1996 only performances and passengers transported by DP hl. m. Prahy, a. s., within the Prague territory

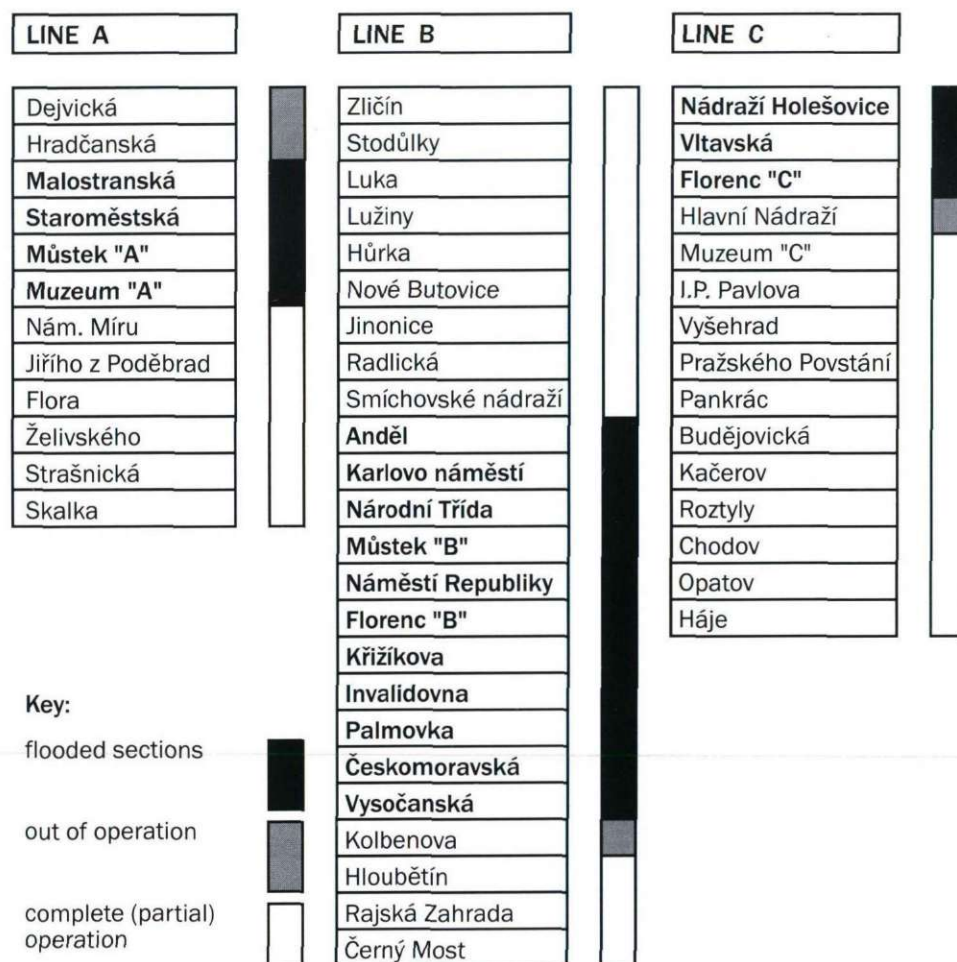
The public transport operation has been severely affected by flood in August, 2002. Sections of Metro were submerged and a number of bridges became inoperable. Passengers were transported with Metro on restricted routes and with emergency tram and bus lines. Many measures were taken to keep the transportation going, among them an increased priority for public transport on signal-controlled crossroads, dedicated bus lines, extensive restrictions on car traffic at the city centre and bridges across the river etc.

Out of the total operational length of Metro lines, almost 35 % were flooded and out of service had to be an additional 7 % lines. Only 58 % lines were kept in at least partial operation during the initial post-flood stage. The restoration of the affected Metro lines and stations has been in progress through the rest of the year and on during 2003.

The condition of the Metro lines in August 2002

Line	A	%	B	%	C	%
Operational length (km)	9.971	100	25.704	100	14.145	100
flooded sections (km)	3.028	30	11.026	43	3.058	22
inoperable (km)	1.647	17	1.737	7	0.426	3
complete/partial operation (km)	5.296	53	12.941	50	10.661	75
total number of stations	12	100	24	100	15	100
flooded stations	4	33	11	46	3	2

Diagram of Metro sections flooded and kept going after the August 2002 flood



The task of keeping the transport in operation was shared by the railways. In August 2002, special trains for free transport of passengers were dispatched inside Prague on the following sections of railway lines:

Free transport by special trains in August 2002

Section	Days in operation	Number of connections	Number of transported passengers
<i>Praha hl.n. - Praha Smíchov</i>	12	960	115,200
<i>Praha Smíchov - Praha Zličín</i>	8	160	5,600
<i>Praha Smíchov - Praha H. Počernice</i>	12	432	34,560
<i>Masarykovo nádr. - Praha Běchovice</i>	12	732	87,840
<i>Masarykovo nádr. - Praha Vysočany</i>	12	564	56,400

Since September 2002, special passenger trains in the PID system, lines M1 and M2, operated in Prague, substituting for the inoperable sections of the Metro:

M1 Běchovice - Masarykovo (Hlavní) nádraží	96 connections per day
M2 Hlavní nádraží - Smíchov	166 connections per day



3.1.3 SUBURBAN PUBLIC TRANSPORT IN THE PID SYSTEM

The suburban public transport that is included in *PID* (i.e. the transport which extends beyond the territory of the Capital) is provided by railway and bus lines.

The **railway transport** is operated by Czech Railways (*České dráhy, s. o.*) on all the 10 railroads entering Prague. The length of the railroads throughout Prague territory is 145 km. The highest volumes transported have the *Praha - Kolín* and *Praha - Benešov u Prahy* railway lines.

Using a railway connection is very time-efficient for passengers travelling from the suburbs to downtown stations. The travelling times and peak hour interval for the three most important directions is indicated in the following table.

Railway transport from the suburbs

Railway line	per hour interval	travelling time	distance
<i>Praha-Klánovice - Praha Masarykovo nádraží</i>	30 min	20 min	18 km
<i>Praha-Kolovraty - Praha hlavní nádraží</i>	30 min	23 min	17 km
<i>Praha-Radotín - Praha hlavní nádraží</i>	30 min	18 min	13 km

The suburban **bus transport** in *PID* consists of 133 lines. The VKT reached on these lines within the city area in 2002 was approximately 5 mill. vehicle kilometres, while outside the city 11 mill. vehicle kilometres. Out of the total 133 lines, 43 lines goes completely outside of the city area.

3.2 LONG-DISTANCE PUBLIC TRANSPORT

3.2.1 Development at the border of Prague

For the development of the numbers of passengers transported across the border of Prague as found by surveys in 1997 and 2002, the following table is available.

Passengers transported in both directions across the border of Prague

in thousands, a workday, from 5 a.m. to 10 p.m.

		1997		2002		2002 - 1997
Railways	Express and international trains	25.6	14%	30.4	15%	+4.8
	ordinary and fast trains	62.6	36%	56.1	29%	-6.5
	Total	88.2	50%	86.5	44%	-1.7
Public bus transport	buses in <i>PID</i>	20.7	12%	56.1	28%	+35.4
	other buses and coaches	66.3	38%	55.4	28%	-10.9
	Total	87.0	50%	111.5	56%	+24.5
Grand total		175.2	100%	198.0	100%	+22.8

During the five years from 1997 to 2002, the total of passengers transported across the border of Prague rose by 23,000 persons, i.e. by 13 %. This rise was mainly carried out by the PID buses which transported by 35,000 passengers more, i.e. almost three times the original quantity. On the other hand, the transport on other regional and long-distance lines sank by 11,000 passengers. This was caused mainly by transferring some of the regional lines into the PID integrated system.

3.2.2 Railway transport

The railways offer transport connections between Prague and other places by means of local and long-distance trains. 10 railway tracks enter Prague, including 5 tracks fully integrated into the municipal transportation system (with mutual ticket acceptance). The municipal territory has 65 railway stations and stops. Czech Railways operate a daily average of 446 train connections across Prague on workdays, in which, as Czech Railways HQ indicate, an average of 127,000 passengers travel in both directions, including suburban trips.

Volumes at selected Prague railway stations in 2002

	Outgoing (000s persons)	Incoming (000s persons)	Trains dispatched
<i>Praha - Hlavní nádraží</i>	6 634	5 888	67 094
<i>Praha - Masarykovo nádraží</i>	3 525	3 264	47 124
<i>Praha - Smíchov</i>	2 481	2 297	23 587
<i>Praha - Vršovice</i>	437	367	7 922
<i>Praha - Libeň</i>	427	318	76
<i>Praha - Vysočany</i>	405	424	42

3.2.3 Coach services

Public coach services connecting Prague with other territories are offered by many operators from all over the Czech Republic, and some international lines are also offered by foreign operators. From 5 a.m. to 10 p.m. of an average workday, Prague is entered and left by approximately 2,100 regional and long-distance coaches that transported over 60,000 passengers daily in 2002. Moreover, the city border was crossed by an average of 1,400 non-public coaches that transported in both directions over 40,000 passengers daily, according to a survey from 2002 spring workdays.

4 TRAFFIC SIGNAL CONTROL

4.1 CONSTRUCTION AND RECONSTRUCTION OF TRAFFIC SIGNALS

The traffic signal devices (TSDs) in 2002 continued to be developed with the objectives both to bring the technology up-to-date, and support safer street conditions with responsive control aiming especially at pedestrian safety. This effort was interrupted by nature that brought flood in August. The rivers Berounka and Vltava have destroyed or heavily damaged controllers on many intersections in Prague districts 1, 5, 7 and 8.

At the end of 2002, the total of 427 TSDs were operated in Prague. 396 TSDs were run by Prague Road Maintenance (TSK), the rest of them was kept, for various reasons, by the respective investors.

The total TSDs include 56 locations with stand-alone pedestrian crossings that are equipped with push-buttons for on-demand walk signal. In order to increase safety for blind pedestrians, 199 TSDs have been equipped with acoustic signal device. 272 TSDs are interlinked in co-ordinated groups with control synchronization in order to provide for smooth flow of vehicles through series of intersections without stopping in front of traffic lights.

During 2002, 8 newly built TSDs (run by TSK) were launched in operation on the Prague territory and 7 TSDs were rebuilt.

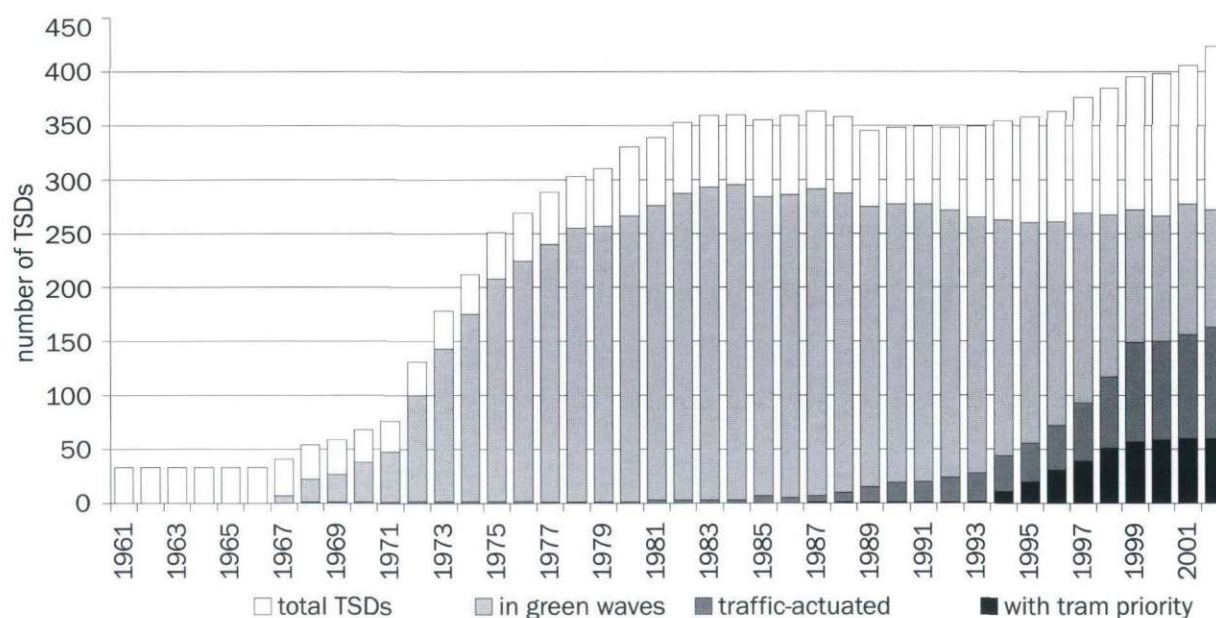
In the flood, TSDs on 17 intersections were destroyed or heavily damaged. Consequently, they had to be replaced.

Basic data on TSDs from 1961 to 2002

Year	1961	1971	1981	1990	1998	1999	2000	2001	2002
All TSDs	33	76	339	348	385	395	398	406	427
specifically, pedestrian crossings	-	9	37	45	54	55	57	55	56
in green waves	-	48	276	277	267	272	266	277	272
traffic-actuated	-	1	3	19	117	149	150	156	163
with tram priority	-	-	-	1	51	57	59	60	60

Up to 1998, only TSDs operated by Prague Road Maintenance (TSK) are included.

Traffic signal devices, 1961 to 2002



All newly built and reconstructed TSDs are equipped with traffic actuation by vehicle and passenger demand as well as with tram priority. The latter is important especially because the public transport vehicles that share their routes with other traffic are affected with the dense car traffic.

The tram priority by means of traffic lights has been stepwise introduced in Prague since 1993. As of 31. 12. 2002, the number of tram priority TSDs reached 60, which is 31 % of the total 193 TSDs on the tram lines of Prague. 26 crossroads with simple traffic conditions have an absolute tram priority, other locations have conditional (limited) tram priority. Regrettably, development of the signal-controlled tram priority has practically run to a halt in the last three years.

Tram priority TSDs from 1993 to 2002

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total of TSDs on tramway network	183	183	186	186	187	189	187	188	192	193
specifically, with tram priority	2	11	20	31	39	51	57	59	60	60
%	1	6	11	17	21	27	30	31	31	31

In 2002, the UNICAM equipment recording red light violations was introduced to additional selected intersections. By the end of 2002, the total of 10 crossroads have been equipped with this device, while on 3 others it is expected soon.

The boxes for **stationary speed measuring devices** are installed at 10 points in Prague. Additional 4 locations are prepared for their installation.

4.2 TRAFFIC CONTROL CENTRES

In 2002, the project "System of control and regulation of the urban road traffic" continued being implemented. This system's development, implementation and operation is covered by funds of the Prague municipality. The task of managing and developing the system was delegated by them to Prague Road Maintenance.

The principal traffic control centre (*Hlavní dopravní řídící ústředna - HDRÚ*) is installed in the building of Public Transport Central Control (*Centrální dispečink MHD*) in Na Bojišti street, Prague district 2. It is operated by Police of the Czech Republic (*Správa hl. m. Prahy*).

The TSDs are controlled by means of the VRS 2100, MIGRA and ADT systems in the control room. It is also equipped with a terminal worksite for control system of tunnels and a TV monitoring worksite.

The control computer (a BFR server) of the **VRS 2100** system is linked with regional control computers (GBR) for area 1 - *Holešovice-Letná* (since 2000) and area 5 - Centre (since 2001). The regional control area 1 links to 27 TSDs. This neighbourhood was most affected by the August flood, with the regional control being also swamped. By the end of the year, the equipment of the regional control has been renovated and the flooded controllers have been replaced by new ones. The regional control area 5 - Centre links to 14 TSDs.

Currently, time-dependent signal plan selection is used with traffic actuated programs on demand from vehicles, trams and pedestrians. Simultaneously, traffic sensor data are collected and stored. In autumn 2002, the **TRASSIS** control system has been launched - traffic responsive plans over eight TSDs of area 1 along the co-ordinated drive *Argentinská - Bubenské nábřeží - nábřeží kpt. Jaroše*. The traffic engineering design has been made by the Institute of Transportation Engineering (*ÚDI*) jointly with the Signalbau Huber CZ company.

New regional traffic control area 8 - *Východ* is under preparation. The traffic engineering design has also been made by *ÚDI*. The regional control is expected to be housed inside the new building of a multi-purpose sports hall.

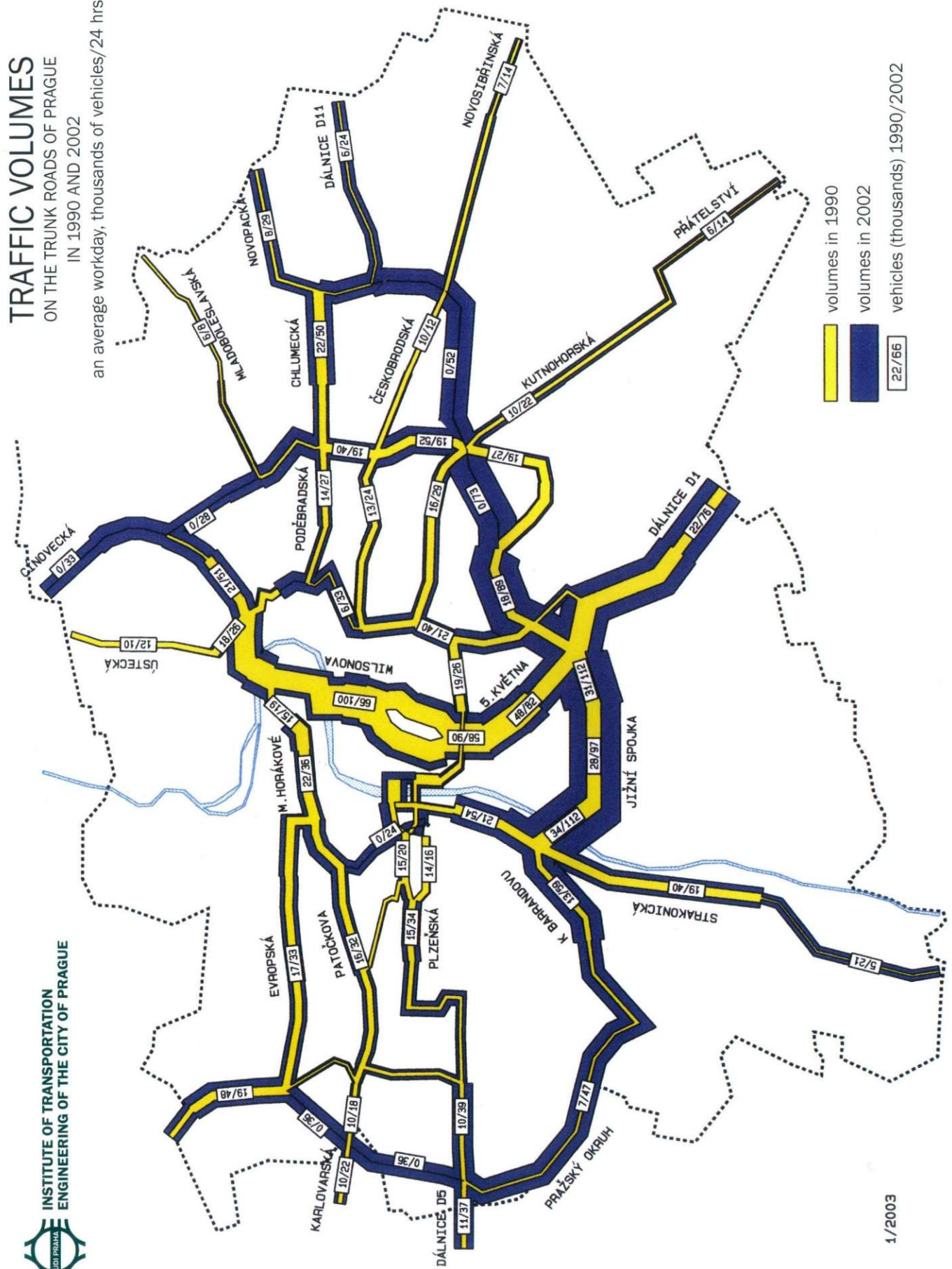


INSTITUTE OF TRANSPORTATION
ENGINEERING OF THE CITY OF PRAGUE

TRAFFIC VOLUMES

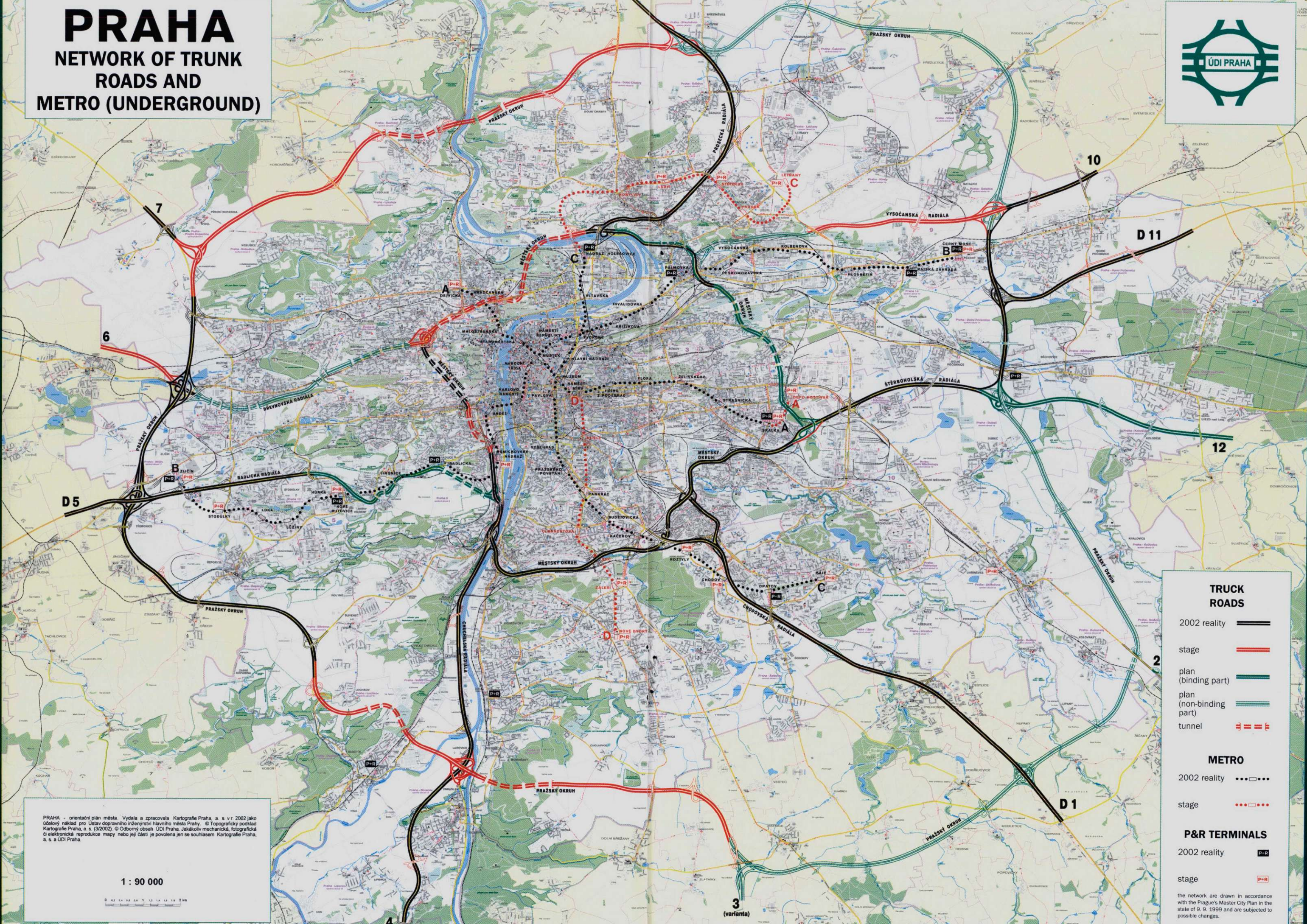
ON THE TRUNK ROADS OF PRAGUE
IN 1990 AND 2002

an average workday, thousands of vehicles/24 hrs



PRAHA

NETWORK OF TRUNK ROADS AND METRO (UNDERGROUND)

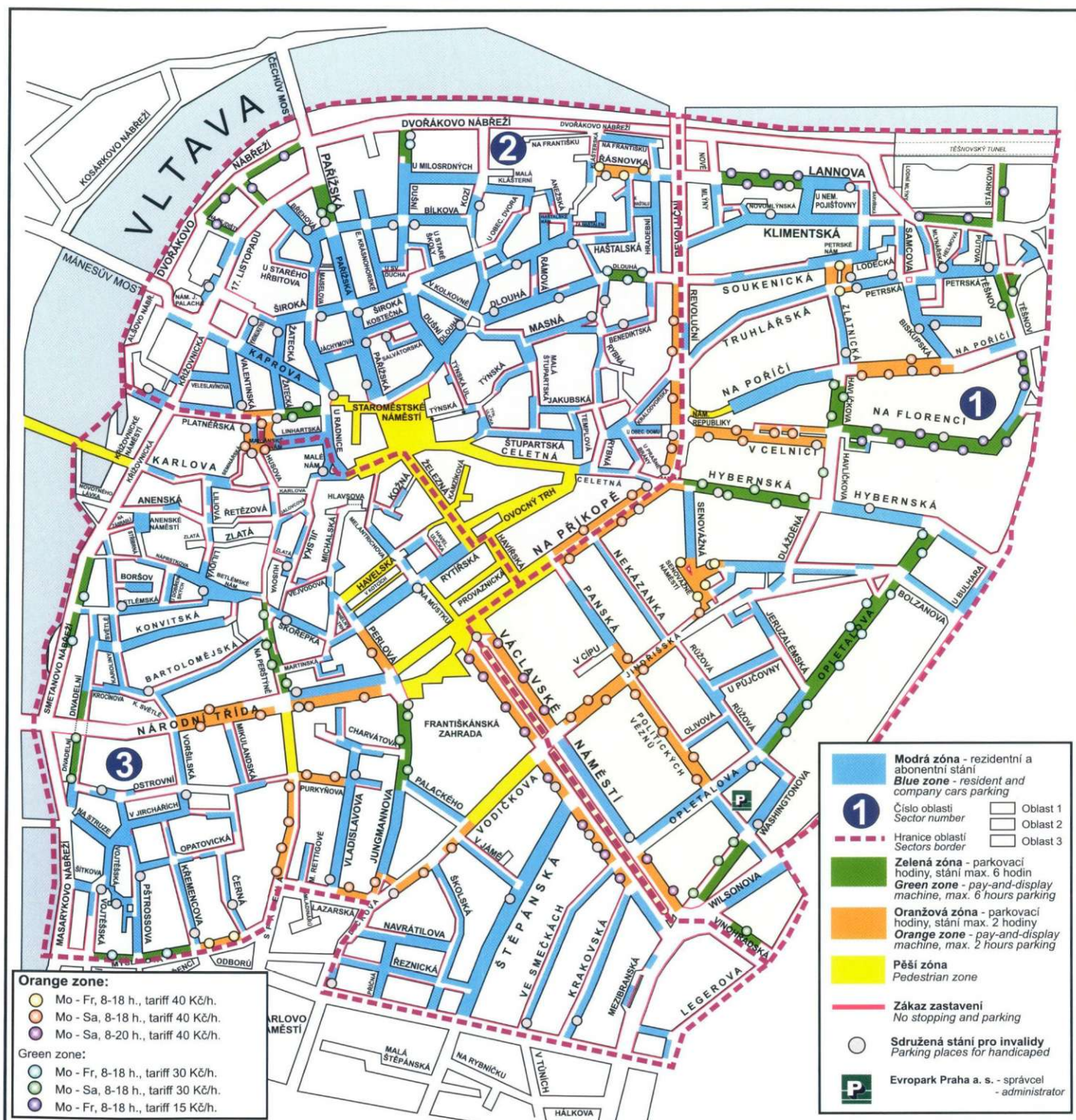


PRAHA - orientační plán města. Vydala a zpracovala Kartografie Praha, a.s. v.r. 2002 jako účelový náčrt pro Ústav dopravního inženýrství hlavního města Prahy. © Topografický podnik Kartografie Praha, a.s. (3/2002). © Oborný obsah ÚDÍ Praha. Jakákoliv mechanická, fotografická či elektronická reprodukce mapy nebo její části je povolena jen se souhlasem Kartografie Praha, a.s. a ÚDÍ Praha.

1 : 90 000

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 km

Orientation map of streets with zones of standing for a fee in Prague 1



Příklad svíslého dopravního značení



Modrá zóna (rezidentní a abonentní stání)



Určena držitelům parkovacích karet (obyvatelům s trvalým bydlištěm a podnikatelským subjektům se sídlem nebo provozovnou v zóně placeného stání v pravobřežní části Prahy 1)

Příklad svíslého dopravního značení



Oranžová zóna (parkovací hodiny)



Určena pro krátkodobé placené stání (max. 2 hodiny). Provozní doba, způsob platby a cena je uvedena na parkovacích hodinách označených oranžovou barvou.

Příklad svíslého dopravního značení



Zelená zóna (parkovací hodiny)



Určena pro střednědobé placené stání (max. 6 hodin). Provozní doba, způsob platby a cena je uvedena na parkovacích hodinách označených zelenou barvou.

The **MIGRA** regional control serves the area 3 - *Smíchov*. In 2002, traffic responsive plans have been fine-tuned with individual TSDs for this particular region. Since that time, the intersections work dynamically, being linked directly to the MIGRA traffic control. The Principal Traffic Control Centre dispatchers' worksite has been put in operation with a new regional map, which marks all the linked TSDs and enables their visual control and adjusting their operation. According to the plan of construction, additional TSDs are gradually connected to the control. Initial preparatory steps have been taken to put the **MOTION** for the Small *Smíchov* Ring control in motion.

The **ADT** control processes 71 TSDs. The programming system was upgraded for SYDO. 53 of all the TSDs are located in the city centre. Its control is performed by extending phases of the so-called structural signal plan by means of stopping points. Additional 18 TSDs comprise a co-ordinated group along *Evropská* street in Prague district 6.

The **Tunnel Control** worksite in the Principal Traffic Control Centre consists of:

- a control workstation for the *Strahov* car tunnel - SAT;
- a control workstation for the *Letná* car tunnel - LAT; (temporarily limited to technology tunnel equipment)
- a control workstation for the *Těšnov* car tunnel - TAT (test operation).

Technology have been replaced in two of these tunnels in 2002; the redevelopment of the LAT was planned in advance, while the TAT was damaged with the August flood. All the **SOS boxes** inside the tunnels are connected to a **security phone circuit** whose proprietary data network is also linked to the Principal Traffic Control Centre (*HDŘÚ*).

In 2002, a new City Ring segment *Zlíchov - Radlická* has been launched, with variable information signs installed as well as 14 videocameras to supervise the traffic - especially inside the short tunnel (fly-under) below the gridiron of the railway station *Praha-Smíchov*. Simultaneously, test operation has been started at the location for **measuring the speed of the traffic flow by means of videocameras UNICAM VELOCITY**. These are also linked to the Principal Traffic Control Centre (*HDŘÚ*).

Variable-message information boards have been installed in several localities of the city. These texts inform drivers on important current traffic changes in the area (congestions, accidents, traffic situation). Data and information are transmitted via the Prague Road Maintenance wireless network.

The Principal Traffic Control Centre also provides a **TV supervision** monitoring at critical spots on the road network cameras. There are 91 rotary or stationary TV supervision cameras throughout the Prague road network.

Also *P + R* (Park and Ride) system on the western side of the city has been included in the Principal Traffic Control Centre network. The car-parking information system shows the number of vacancies before the parking is reached.

4.3 TELEMATICS IN TRAFFIC

Given the current density of the car traffic in Prague, the urban traffic system could not do without utilising capabilities offered by information technologies.

Main principles to design an efficient telematics system for traffic in Prague were accepted with resolution of the Council of the Capital of Prague No. 0349 as of 19. 3. 2002. The resolution has defined 11 fundamental function areas of a traffic system where telematics can be efficiently utilised and which is to be developed in Prague:

- | | |
|---|---|
| ■ Road traffic control | ■ Electronic payments |
| ■ Information service on traffic and travel | ■ Vehicle systems |
| ■ Parking systems | ■ Haulage |
| ■ Public transport | ■ Data collection and management |
| ■ Systems of supervision and warning | ■ Traffic infrastructure administration |
| ■ Safety and rescue systems | |

Details have been worked out in the Study of telematics in the traffic of the Capital of Prague. It is the first comprehensive design of an intelligent traffic system not just in Prague, but in the nation. It specifies its limits, functions, individual function descriptions, data flow, links to other subsystems and its physical arrangement. The fundamental principles conceived in the Study are applied in designs of portions of the traffic system (e.g. TSDs control, parking systems). The aim of the work is to use the telematics principles so as to improve the transfer and availability of data and information for the participants in traffic in order for the whole of the urban traffic system to be able to function more efficiently.

5 NEW TRAFFIC ARRANGEMENTS

5.1 NEW TRAFFIC ARRANGEMENTS IN THE CENTRE OF PRAGUE

Prior to the flood in August, the following permanent traffic arrangements have been implemented in downtown Prague:

- *Klimentská* street has been made one way in the section *Holbova - Barvířská*,
- the traffic direction in *Valentinská* street from *Veleslavínova* to *Kaprova* was turned back,
- the entry to *Rytířská* street from *Uhlavý trh* and *Perlová* has been restricted,
- new speed limits to max. 30 km/h have been imposed e.g. on *Dvořákovo* embankment and *Masarykovo* embankment,
- speed limits to max. 20 km/h in front of pedestrian crossings at primary schools (e.g. *Vodičkova* street) and where speedhumps were implemented,
- "residential area" marked out e.g. at streets *Nový Svět*, *Kapucínská*, at *Hradčany*, and at streets *Michalská*, *Melantrichova*, in the Old Town and elsewhere.

5.2 NEW TRAFFIC ARRANGEMENTS OUTSIDE OF THE PRAGUE CENTRE

In 2002, another key construction of the City Ring has been put in operation: section *Radlická* street - *Barrandov* bridge. Thanks to availability of this City Ring section, the 1st traffic circle in the direction out of the centre has been rerouted to the new road.

5.3 PUBLIC TRANSPORT PRIORITY

In 2002, public transport priority continued being applied, especially in tram priority on signal-equipped cross-roads, in traffic arrangements and some construction measures.

Due to the flood that struck the city in August 2002, extraordinary measures had to be taken in public transport priority. At various stages, there were roads and bridges that were necessary to close for car traffic completely because of tram lines which had to function in place of the inoperable Metro lines. Multi-lane roads had one lane dedicated to PT buses to facilitate their smooth transit. Some of the measures became later permanent traffic arrangements.

Track edging with longitudinal pieces separating the tram lane in the roadway from car lanes has been implemented along 10 sectors in the total length of 1,800 m, e.g. in *Havlíčkova* street, on *Rašínovo*, *Smetanovo* and *Masarykovo* embankment, at *Karlovo* square and on *Štefánikův* bridge.

Dedicated PT bus lines have been marked out along *Milady Horákové* street from *Na Valech* to *Na Špejcharu* and along *Seifertova* street from *Italská* to *Bulhar*.

5.4 TRAFFIC ARRANGEMENTS AND THE FLOOD

The mid-August 2002 flood that deluged a portion of Prague had a deep impact on Prague traffic that lasted long after the flood subsided. The city would have to cope with the effects of this catastrophe of an unusual magnitude for many months that followed and will have to consider the threat for many years to come, as far as traffic service and other planning is concerned.

During and after the August flood, extraordinary measures had to be taken in traffic with the purpose of keeping especially the city-wide operation of ground-moving public transport of passengers.

Individual car traffic was severely restricted in the centre of Prague. One of the reasons was portions of Prague district 1 on the two river banks (*Malá Strana*, *Staré Město*, *Josefov* and a portion of *Nové Město*), *Holešovice* in Prague 7, *Karlín* in Prague 8 and in a lesser degree *Smíchov* in Prague 5 was swamped or waterlogged. The other reason was the need to give priority to the surface-operated public transport. Traffic arrangements were also made at the road approaching the city centre as well as many trunk and service roads in the centre which restricted considerably the access of cars to the city centre as well as their movement across the area.

The streets and roads closed to car traffic at various stages were especially the following:

- the whole of *Karlín* quarter
- a portion of *Holešovice* quarter
- a portion of *Staré Město* (Old Town)
- *Vyšehradský* tunnel, *Rašínovo* embankment, *Masarykovo* embankment, *Smetanovo* embankment, the streets *Křižovnická*, *17. listopadu* and *Pařížská*, *Dvořákovo* embankment, *Na Františku* embankment, *L. Svobody* embankment, *Těšnovský* tunnel
- *Modřanská* street (a portion from *Čs. exilu* to *Kolarovova*)
- *Libeňský* bridge
- bridges *Libeňský*, *Štefánikův*, *Čechův*, *Mánesův*, *Legií*, *Jiráskův* and *Palackého*
- the thoroughfare across *Malá Strana*
- *Chotkova* and *Badeniho* streets
- *Resslova* street
- *Letenský* tunnel
- *Nádražní* street (portion from *U Královské louky* to *Vltavská* centreward)
- *Roztocká* street (from *V Rokli* to the city limits)

In order to secure smooth movement of PT buses, a dedicated lane was separated for them on some multi-lane roads or their segments.

The above mentioned measures profoundly affected car traffic in Prague and helped cut down car trips toward the city centre. E.g. car traffic plummeted to less than a half the volume (by 52 per cent) on *Nuselský* bridge due to reducing the number of lanes and appeals to drivers that they would rather avoid the city centre.

Gradual alleviation of some, for drivers most annoying, restrictions could start only in relation to restarting service in sections of Metro underground later in 2002. The most affected areas (e.g. in *Karlín*) keep the measures also in 2003.

Such a severe reduction in urban road network capacity, which is insufficient even under normal traffic conditions due to ever increasing need for quality traffic service, led to deepening disproportions between traffic needs and the available road capacities which could not be solved by traffic restrictions. The outcome was frequent car congestions, often affecting the whole of the city.

The condition of car traffic in Prague brought about by the flood has confirmed also how essential it is to accelerate the construction of a quality and capacity system of traffic. It has proved that a way to a healthier urban environment would not lead through excessive reduction of road capacity and constricting the construction of the principal road network. Limiting the traffic by means of insufficient main road capacity is accompanied by long-lasting extensive traffic congestions, hence also by a significant rise in detrimental emissions. The construction of the two road rings (City and Prague Ring) is therefore a task of primary importance for solving impacts of calamities even such as this. Simultaneously, it is also essential to make the offer of quality and capacity public transport (including the railways) more varied having in mind the aim of positively affecting the modal split development in favour of public transport.

6 ACCIDENT RATE IN TRAFFIC

6.1 ROAD ACCIDENTS

In 2002 as much as 35,888 traffic accidents happened in Prague (5 % more than in 2001), 82 persons died (22 % more) and 4,156 were injured (5 % more). Pedestrians were involved in 979 accidents (3 % less). Pedestrians were themselves culpable of 487 accidents (4 % more), while 17 persons died (6 % more) and 477 persons were injured (8 % more). By far the dominant share rests with the drivers (34,782 out of 35,888 accidents, i.e. 97 %). The most frequent causes of driver's accidents were failure to give way and incorrect passing. The number of accidents with culprits found under the influence of alcohol was 1,028 (5 % more).

Accidents, injuries and main causes of accidents

Year	2000	2001	2002	% difference 2002/2001
accidents	40,560	34,195	35,888	+ 5
fatal injuries	80	67	82	+ 22
serious injuries	521	452	477	+ 6
slight injuries	3,260	3,521	3,679	+ 4
accidents with injuries	3,133	3,243	3,398	+ 5
accidents without injuries	37,427	30,452	32,490	+ 5
driver culpable due to	39,281	33,140	34,782	+ 5
- speed	2,950	3,298	2,860	- 13
- passing	465	314	345	+ 10
- failure to give way	9,863	8,776	10,177	+ 16
- manner of driving	26,003	20,752	21,400	+ 3
driver not culpable	1,279	1,065	1,106	+ 5
- due to road defect	189	147	138	- 6
- due to pedestrian	531	470	487	+ 4

Considering the long-term trends in traffic accidents, it may be concluded that the period from 1960s to 1980s used to have a relatively favourable trend in accident rate as the number of accidents followed approximately the VKT and grew slower than the VKT.

Since 1990 up to 1999, the basic tendency turned adversely as traffic accidents started to increase more than VKT. The total number of accidents in 1991 to 1999 grew by 145 % while the VKT increased by only 119 %. The accident risk rate indicated in relative accident rate, i.e. the number of accidents per one million VKT, also grew due to that. Happily, in 2000 to 2001 that unfavourable development seems to be interrupted. The number of accidents went significantly down in spite of automobile traffic still increasing, lowering notably also the accident risk rate expressed in relative accident rate to about one fifth of the 1990 value. In 2002 the number of accidents slightly rose again, the increase, however, is in proportion to the rise in VKT, thus leaving the accident risk rate expressed in relative accident rate for 2002 unchanged.

In 2002 there was an all-Prague average of 6.1 traffic accidents per 1 million VKT.

Traffic accidents, injuries and relative accident rate from 1961 to 2002

Year	Total accidents		Fatal injuries		Serious injuries		Slight injuries		Relative accident rate	VKT
	number	%	number	%	number	%	number	%		
1961	5 495	30	63	69	580	157	2 361	84	7.3	31
1971	8 496	47	123	135	567	154	4 046	144	5.1	69
1981	13 064	72	81	89	401	109	2 572	92	7.1	76
1990	18 024	100	91	100	369	100	2 806	100	7.5	100
1999	44 192	245	74	81	540	146	3 558	127	8.4	219
2000	40 560	225	80	88	521	141	3 260	116	7.4	228
2001	34 195	190	67	74	452	122	3 521	125	6.1	235
2002	35 888	199	82	90	477	129	3 679	131	6.1	243

100 % = year 1990

Relative accident rate = number of accidents per million VKT (average values, total road network)

VKT = vehicle kilometres travelled, total road network

6.2 TRAFFIC EDUCATION

The Institute of Transportation Engineering of the City of Prague takes an active part in traffic education of adult, children and youth road traffic participants. Most events concerned with prevention of traffic accidents is held jointly with the Ministry of Transportation and the Central Auto-Moto-Club of the Czech Republic (ÚAMK), which has been selected by the Ministry of Transportation upholding of such activities.

In 2002, the traffic education events were funded from the municipal budget with CZK 1,810,000 (including CZK 850,000 for a working relation project of the Institute of Transportation Engineering and Prague Constabulary, "Road Safety for All") as well as about CZK 300,000 from the funds of the Ministry of Transportation.

The following programmes of children's traffic education were made in 2002:

- Cyclist Starter Action (Cyclists' Traffic Contest, participated 5,300 children),
- Systematic Training Effort on children's traffic playgrounds (CTP, instructed 26,900 children),
- Fine arts/traffic combined education programme "Look out, kids, red's on!" (participated 7,000 children),
- Traffic education events for children's home clients at *Horní Počernice* and *Klánovice*,
- Interactive theatre performances on traffic-educational topics (participated 2,400 children).

The project made jointly with Prague Constabulary, "Road Safety for All", was participated by approximately 17,000 children.

These and other events were held in 2002 for adult road users:

- Driving Skills Spring and Autumn Cup intended for driving public (participated 100 non-professional drivers, jointly with the national ÚAMK Auto-club),
- a lecture concerning "New Traffic Signs" as well as a traffic-educational contest (participated 36 deaf drivers),
- driver counselling at the exhibition Prague Motor Spring,
- Prague's Total Cup for handicapped motorists (participated 71 drivers).



6.3 MEASURES TO ENHANCE ROAD SAFETY

A number of measures were implemented in 2002 to enhance the security of pedestrians, especially children. They consisted in optimizing the number and/or location of pedestrian crossings, setting concrete CITY BLOCK safety elements, setting transverse speedhumps, security railings and other minor adjustments around the current pedestrian crossings.

Traffic signs on yellow-green retroreflective sheeting with "Pedestrian crossing" and "Children" traffic symbols in colour across the carriageway have been installed at dangerous locations (e.g. *Českokobrodská* street). At some, mostly service roads, the speed limit of 30 km/h was imposed (e.g. *Podbělohorská*, *Na Hřebenkách* and *Jahodová* streets), elsewhere transverse speedhumps have been installed (e.g. at *Turnovského* and *V Olšinách* street as well as at service roads in *Solidarita* housing estate). Metal posts have been set on a few locations to prevent parking cars from driving over the pavement close to school establishments (e.g. *Žernosecká* street).

Additional permanent speed violation site was installed on *Evropská* alley between *Libocká* and *Drnovská* streets.

Security measures in 2002 in the framework of *BESIP* programme cost CZK 26.6 mill. in total.

7 TRAFFIC AT A STANDSTILL

7.1 PARKING

Parking in the city centre must be regulated seeing the vast demand and only moderate supply of parking places. Regulation is in the meantime thoroughly enforced in the territory on the right riverbank of Prague 1 (approx. 3 km²) by means of "Zones of paid standing" (ZPS). Rules for parking inside ZPS have been governed by Municipal Regulation No. 42/2000 Coll. since October 2000.

Street sections in ZPS are divided into:

- standing with a time limit, i.e. "orange and green zone", designated for vehicles of visitors,
- standing without a time limit, i.e. "blue zone", designated for the residents (car owners permanently living in ZPS) and subscribers (business or private individuals with a residency or a place of business in ZPS).

Number of parking places in ZPS:

■ short-term (orange and green zone)	2,258	places
■ long-term (blue zone)	6,045	places
■ handicapped	224	places
■ other (reserved for the Government and authorities)	387	places

Average occupancy of standing places in ZPS (2002):

■ short-term standing	92.3 %
■ long-term standing	89.3 %

Compliance rate with the regulations specified in ZPS for standing places utilization (2002):

■ short-term standing	32.5 %
■ long-term standing	52.0 %

Fees for the utilisation of standing places in ZPS:

■ short-term standing (orange zone)	40	Kč/h
■ short-term standing (green zone)	30	Kč/h
■ short-term standing (green zone - border sectors)	15	Kč/h
■ 1st vehicle of an individual	500	Kč/veh./yr
■ 2nd vehicle of an individual	5,000	Kč/veh./yr
■ 3rd and additional vehicles of an individual	10,000	Kč/veh./yr
■ a business vehicle	50,000	Kč/veh./yr

On the left riverbank of Prague 1 with the area of 2.4 km² and capacity of 1.5 thousand parking places, a zone is designated in which only vehicles of residents can be parked outside of reserved standing places and supervised parking places, marked with an approval from the Municipal Authority of Prague 1.

Additionally, 360 sites with off-street parking is registered in the city territory with their capacity of approximately 39,100 standing places (the records continue to be updated).



7.2 CAR PARKS

Currently, the greater city centre has available public car parks with the total capacity of 7,437 standing places, the largest capacities being at:

Location	Capacity
KOC Nový Smíchov	2,000
Kongresové centrum	1,090
Helios	520
Marriott	480
Palachovo náměstí	453
Zlatý Anděl	400
Hlavní nádraží - Bolzanova	371
Kotva	300

Private parking facilities in the greater city centre are at 30 locations with their total capacity of 4,180 standing places.

An all-Prague car park total is not available. It is estimated that the total capacity is approximately 160,000 standing places. In the meantime 188 sites are registered with car parks (including battery garages) that offer capacity of 10,360 places (they are mostly reserved car parks).

7.3 PARK AND RIDE (P+R)

The combined transportation by a passenger car and a means of public transport using the P+R system helps reduce the number of passenger car trips and the demand on car parking, especially within the city centre. This way of transportation offers economic advantage to drivers and additional environmental advantage to the city. In 2002, there were 13 P+R parking facilities operated in Prague with their capacity of 1,442 standing places.

Their utilisation is shown in the following table that compares P+R parking car numbers in Octobers of 2000, 2001 and 2002.

Vehicles parking at P+R from 2000 to 2002

Site	Capacity			Parked vehicles				Av. vehicles per place per month			
	2000	2001	2002	10/00	10/01	10/02	6/02	10/00	10/01	10/02	6/02
Zličín I	94	94	94	2 973	3 508	3 622		32	37	39	
Zličín II	70	70	70	2 085	2 111	3 432		30	30	49	
Nové Butovice	60	60	60	2 608	2 572	1 689	2 457	43	43	28	41
Radlická	37	37	37	1 391	1 272	948	1 157	35	34	26	31
Skalka	175	175	175	2 695	2 762	2 461		15	16	14	
Opatov	212	212	212	3 901	5 073	5 389		18	24	25	
Rajská zahrada	80	80	80	2 345	2 837	409	2 561	29	35	5	32
Černý Most	300	300	300	9 649	10 716	3 481	9 475	32	36	12	32
Holešovice	77	77	77	3 125	3 226	1 453	2 852	41	42	19	37
Palmovka	122	122	122	3 224	4 446	3 779	3 898	26	36	31	32
Radotín	62	62	62	158	463	878		3	7	14	
Běchovice	-	-	100	-	-	1 498		-	-	15	
Modřany	-	-	53	-	-	213		-	-	4	
Total	1 289	1 289	1 442	34 154	38 986	29 252		26	30	20	

The Metro operation was interrupted or reduced on certain sections during the August flood and because of that also the occupancy on related P+R sites dropped in the second half of 2002. For this reason we provide occupancies of some facilities in June 2002 as well.

Due to the interrupted operation of Metro following the flood, Prague was found in a difficult traffic condition. In order to help the city centre, 9 makeshift P+R sites were set up with the capacity of 785 standing places. They operated on a principle similar to the permanent P+R sites. The Metro operation being limited, those parking sites were situated close to tram or bus stops. Their makeshift nature prevented them from having all the parameters of the permanent sites. In most places, they were not enclosed in a fence and lacked permanent lights. They were manned from 4 a.m. till 1 a.m. next day. Their tariff was integrated into the Prague PID system by means of season tickets and discount daily tickets. The parking prices and the usage of discount daily tickets were the same as with the permanent P+R sites. As some of those P+R sites were made out of parking places of residents, the residents were allowed to continue to use the parking place free of charge.

A lower utilisation of the makeshift P+R sites (an instant check one October morning found out only 183 standing places used, i.e. 23 % of the capacity) is probably due to lack of information in the public, incomplete equipment of the facilities and less than smooth transition to public transport. The only exception was the *Thomayerova* parking site with substantially higher demand for parking. That is why it was recommended to use one of the two parking lots of the *Thomayerova* hospital in order to make it a regular P+R site. After the public transport system has settled again and all significant restrictions on the road network have been called off, the operation of all the makeshift P+R sites ended on 10. 1. 2003.

In autumn 2002, all permanent P+R sites have started to provide a supplementary service B+R (Bike and Ride), a bicycle storage service, which the P+R sites offer the bikers free of charge. The bikers will deposit CZK 20, against which they receive a lock from the site janitor to secure the bicycle with and return the key back to the janitor. He will hand the biker a card to be given back to him on the biker's return. Should the bike be kept on the P+R over the off-service hours, the biker is charged CZK 100 parking fee. No discount tickets for PT apply as bike safe-keeping is free of charge. So far 5-bike stands have been installed on P+R sites and one 10-bike stand at *Zličín I*. The stand utilisation has been very low so far.



7.4 COMBINED K+R PARKING

The combined mode of transit termed K+R (Kiss and Ride) is characteristic by approaching a Metro station in a car which stops there for a short time while the travelling companion gets out of car to switch for Metro train. This way of travelling is practiced in Prague spontaneously. In spite of that there are no safe conditions for the companions to get out or in next to numerous Metro stations. For that reason the Metro "B" stations *Černý Most* and *Radlická* had their K+R spaces marked out in 2001. This design seems to work well, that is why there are plans to make K+R sites available with more stations. As early as 2001, locations *Opatov* and *Nové Butovice* were studied, in 2002 also *Kačerov* where 392 persons used that combined mode of transit from 6 a.m. to 10 a.m. and from 2 p.m. to 6 p.m., out of them 264 travelled towards *Michle* and 128 towards *Krč*.

As the survey proved the demand for K+R parking, there are plans to implement it at the *Kačerov* station centreward after the temporary terminal for the bus lines 3xx is finished.

8 CYCLE TRAFFIC

The design of the basic system of cycle trails on the territory of Prague expects 450 km of cycle trails to be gradually built. Its pattern is shaped so that the trails may cover the whole city territory and the cyclist may have minimum contact with heavy vehicular traffic. The trails are placed as much as possible to street with low volumes of car transport, to roads where the cycle traffic may lead along with pedestrians or to dedicated cycle paths.

Currently, 180 km cycle tracks are demarcated. Out of this total, 60 km is led along car-free roads with pedestrian traffic, along available paths in parks and woods or on ways newly built specifically for cycling and walking.

In 2002, a new cycle trail *Řepy - Hlubočepy* has been demarcated in the section between *Plzeňská* and *Bavorská* street on the territory of Prague districts 13 and 5. Working jointly with JCDecaux company, new bicycle stands have been installed mostly in the Prague centre. They are available to biking public for short-term storage of bicycles close to sightseeing spots attractive for the public (e.g. squares *Staroměstské*, *Republiky*, *Ovocný trh* and *Kampa* neighbourhood).

The following new trails were under preparation in 2002:

- *Petrovice - Křeslice - Újezd* (section No. 11 ČR "*Praha - Tábor*"), 4 km long,
- *Braník - Radotín* - border of Prague in the section *Velká Chuchle - Radotín* - border of Prague, 5 km long,
- *Modřany* in the section *U Kina - U Soutoku*, 1.5 km long,
- Prague district 9, *Kolčavka - Freyova*, 2 km long,
- "*Pražské kolo*" Prague circular,

These trails, however, failed to get implemented due to extensive flooding and legal issues of ownership.

An inquiry survey concerning bicycle traffic in Prague was made in 2002. Its results show 2 % adult population of Prague use their bikes for their regular trips in Prague (covering more than 1,000 km annually). Two thirds of the total bike trips are made as leisure activity. The survey results are available on the Institute of Transportation Engineering's website.



9 PEDESTRIAN TRAFFIC

Walking is the most natural and most frequent mode of human locomotion. An estimated 23 % of all intra-urban trips is made only on foot, moreover walking opens and closes every trip by other transportation means. In spite of that the pedestrian traffic does not receive such attention as it should, considering its importance. Regrettably, handling the pedestrians' needs get often underestimated in favour of serving other, ever growing demands of urban transportation. It is visible the most when making traffic arrangements around construction or redevelopment sites along roads, in doing reconstruction or repair to roads or when designing parking facilities, especially in the close neighbourhoods of the city centre.

Yet it is inside the multifunctional urban centre, Prague district 1 being at its core, where almost one third of all the pedestrian journeys in Prague take place. Of all the intra-urban pedestrian trips (made without any means of transportation), 23 % of the journeys have their origin or destination in Prague 1, while additional 9 % of pedestrian trips is done exclusively within this area, i.e. does not cross the border of the neighbourhood.

The highest volumes of pedestrians in the centre are met on Václavské square (7,400 persons during the afternoon rush hour) and the adjacent streets *Na Můstku*, *Vodičkova*, *Jindřišská*, *Na Příkopě*, *Národní* (3,000 to 6,000 persons in the rush hour) and only slightly lower volumes are in selected streets of the Old Town and on the Charles Bridge (2,000 to 4,000 persons in the rush hour).

A well considered and pedestrian-aimed new function, especially commercial and social, turned out to be an asset in reviving many urban spaces, primarily so in neighbourhoods that are easily accessible to pedestrian and municipal public transport (e.g. a shopping mall close to *Anděl* in Prague district 5 at *Smíchov* is visited daily by about 20,000 persons coming by means of public transport and around 5,000 to 6,000 persons coming on foot).

The pedestrian traffic in the Prague centre increased significantly during and after the August flood, when due to the car traffic restrictions, the Metro inoperability and the overloaded ground public transport (i.e. trams and buses) many of Prague population made at least a portion of their daily regular trips, especially to and from work, on foot or by bike.

Also redevelopment of some urban spaces, e.g. portions of streets *Michalská*, *Melantrichova*, *Havelská*, section of *Senovážné* square and the reconstruction of *Karmelitská* street have, no doubt, contributed to a greater pedestrian ease, freedom and a sense of security.

An increased effort for greater pedestrian security makes itself felt ever more during the recent years. Most notably so concerning children and youth in the vicinity of kindergartens, primary and secondary schools as well as pedestrians on crossings close to tram stops (e.g. *Pohořelec*) and across important roads (e.g. *Podbělohorská*, *Radlická*). Providing for the safety of persons with a limited mobility and with sight impairments is also considered in a greater measure, especially at road crossings.



10 AIR TRANSPORT

Air passenger and freight transport is conducted mainly at the *Praha-Ruzyně* airport. The other three Prague airports are usually used for other, special purposes. The *Praha-Ruzyně* airport has three take-off and landing runways, two of them equipped for instrument traffic with the maximum capacity of 36 movements (take-offs and landings) of aircraft per hour. The airport overall annual transport capacity by prolonging its check-in section B has been increased to 6.2 million passengers in 2002. Several new destinations have been introduced, e.g. Prague - Colombo, Sri Lanka; Prague - Cologne, Germany, and Prague - Venezia, Italy. In 2002, the airline companies operating on regular lines numbered 33, while about 30 companies operated charter lines. Regular direct connections are provided to almost 70 world destinations, including connections to many cities in Europe and New York that are offered almost every day. The international position of the *Praha-Ruzyně* airport follows from the following comparison.

Passenger volumes processed at selected airports

(million passengers / year)

Airport	1994	1995	1996	1997	1998	1999	99/94
Chicago O'Hare	66.47	67.25	69.15	70.39	72.49	72.61	109.2%
London Heathrow	51.37	54.13	55.73	57.85	60.36	61.98	120.7%
Frankfurt Rhein-Main	34.38	37.40	38.02	39.61	42.08	45.41	132.1%
Paris Ch. de Gaulle	28.36	28.00	31.43	35.10	38.47	43.44	153.2%
Amsterdam Schiphol	23.07	24.86	27.26	31.02	33.95	36.43	157.9%
Madrid Barajas	18.22	19.57	21.27	23.12	24.92	27.59	151.4%
Roma Fiumicino	19.91	20.71	22.71	24.62	25.00	23.61	118.6%
Bruxelles National	11.24	12.50	13.36	15.82	18.40	19.97	177.7%
Copenhagen Kastrup	13.67	14.31	15.59	16.61	14.49	17.27	126.3%
Stockholm Arlanda	12.77	12.71	13.88	14.95	16.15	17.13	134.1%
Vienna Schwechat	7.52	8.37	8.95	9.59	10.49	11.05	146.9%
Lisboa	6.32	6.01	6.19	6.63	7.76	8.44	133.5%
Praha Ruzyně	2.75	3.21	3.80	4.36	4.63	4.82	175.3%
Budapest Ferihegy	2.87	2.94	3.31	3.62	3.94	4.33	150.9%
Warsawa Okęcie	2.38	2.74	3.09	3.55	3.82	3.40	142.9%
Bratislava M. R. Štefánika	0.14	0.19	0.25	0.28	0.32	0.27	192.9%

Source: *Transportation Yearbooks of MT CzR (ICAO) and The Chicago Department of Aviation*

The total volume of cleared passengers at the four international airports in the Czech Republic (*Praha, Brno, Ostrava, Karlovy Vary*) rose by 4.1 % as against 2001, while the volume of cargo (goods and mail) by as much as 22.3 %.

Comparing the previous years, when the *Praha-Ruzyně* airport's share on the total volume of air traffic in the Czech Republic increased, the 2001 data reveal certain stagnation and a drop in 2002.

Share of airports in passenger transport performance

% from the overall volume of cleared passengers



Share of airports in cargo transport performance

% from the overall volume of cleared air cargo including postal air service



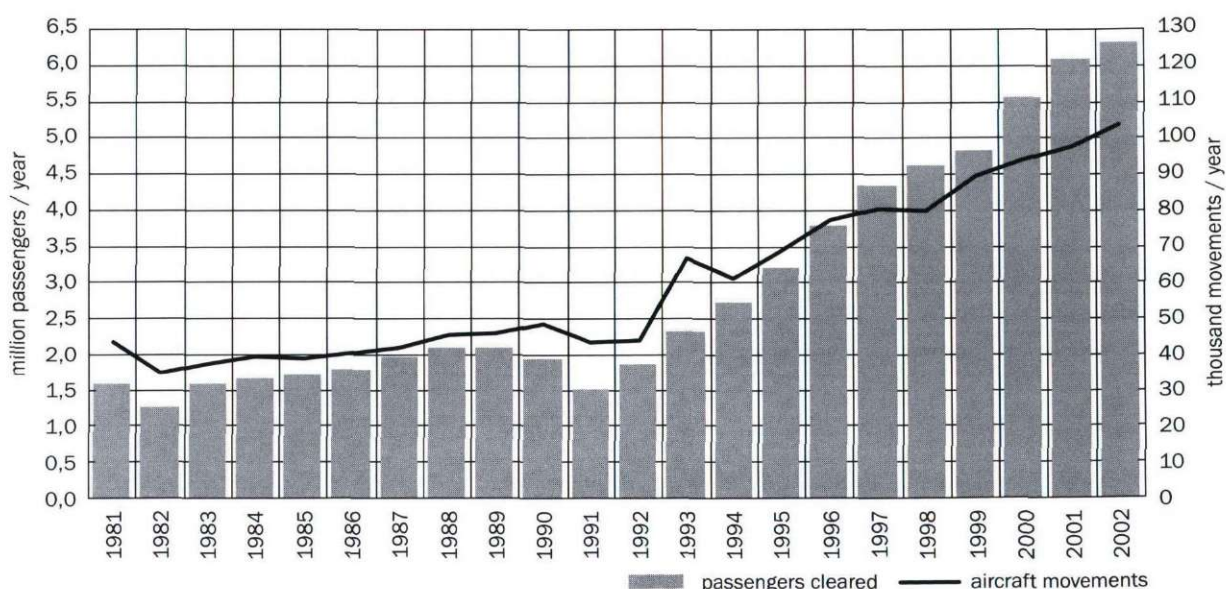
In 2002, 6,314,700 passengers were cleared through the Praha-Ruzyně airport, which represents an increase of 3.5 % compared with 2001. The numbers consist of 78.6 % passengers transported by regular lines, and the remaining 21.4 % by special lines. The greatest passenger turnover (661,000 persons) was on lines linking London with Prague, while links to Frankfurt am Mainz, Paris and Amsterdam follow with significantly lower figures (294,000 - 354,000 persons). The most passengers were cleared in July (702,700 persons), the least in January (334,100 persons). Compared to 2001, the monthly high was by 5 % higher in 2002.

In cargo transport 34,828.8 tons of goods and 4,760.6 tons of mail were cleared away. Hence the total cargo transport reached 39,589.4 tons and was higher by 16.6 % as compared to 2001. The most cargo volumes were transported in May (4,198 t), the least in January (2,574 t). The monthly high reached in 2002 was by 24 % higher than the monthly high reached in 2001.

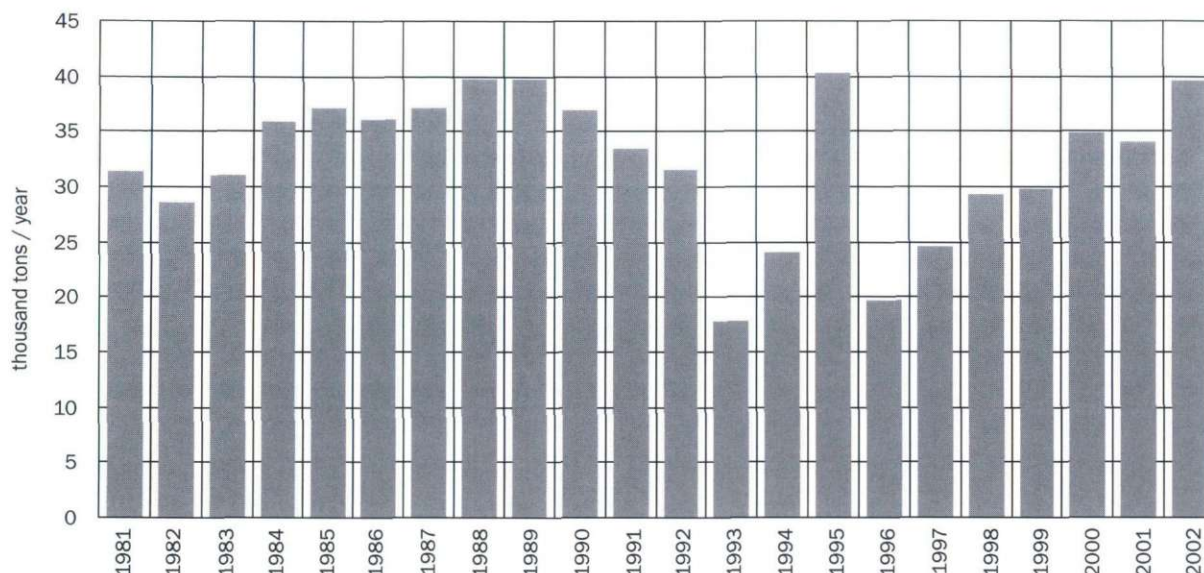
The number of aircraft movements in 2002 was 103,904 moves/year, which is by 6,362 moves/year more than in 2001 (by 6.5 %). The highest number of movements (10,065) was recorded in August, the lowest (6,534 moves) in February. Compared to 2001, the maximum monthly number of movements in 2002 was higher by 5.5 %.

After 1991, which was in passenger transport the weakest since 1982, the number of cleared passengers began to grow rapidly so that 1993 exceeded the airport's all-time high (approximately 2.2 mill. passengers per year in 1978 - 1979). Simultaneously, the aircraft movement numbers also grow. The cargo transport, however, in its long-time average still keeps below the average highs of the past.

Development of the Praha-Ruzyně airport volumes passengers cleared and aircraft movements



Development of the *Praha-Ruzyně* airport volumes freight handled (goods and mail)



The origin and destination of the aircraft passengers and companions in Prague is 60 %. The *Praha-Ruzyně* airport is found approximately 11 km away from the city centre where a downtown air terminal is located. Connection to the airport is provided for air travellers by a special commuter bus service. Additionally, the airport is serviced by urban public bus transport that runs radially to *Dejvice* line A Metro station, tangentially via *Břevnov* and *Motol* to SW *Jihozápadní Město* housing estate. In 2002 a new express bus route was launched heading to the line B Metro terminal at *Zličín*. Cab service is also available, operated with passenger cars and minibuses (taxi lines) as well as many car rental companies. The majority share of airport-to-city passenger transport is provided by passenger cars.

The total number of lay-by and parking places in the north airport grounds (i.e. around the main terminal building) offered to public, airport employees and airport-based companies, is about 6,500 stalls. Over 2,900 stalls is currently open to the general public and another 332 stalls is reserved for car rental companies. The new parking facility provides an open-air parking place able to receive 24 coaches. The airport south reserves 125 stalls to the public.



11 RIVER TRAFFIC

Shipping on the Vltava river, flowing through Prague, provides both passenger and cargo transport. The waterway capacity is limited by the capacity of the sluices Podbaba (5.2 mill. tons/year) and Smíchov (2.8 mill. tons/year).

Passenger traffic and its operation is carried out by several companies. Passenger shipping is mostly of holiday type. The companies specialize in various sorts of cruises through Prague and boat trips along the lines Praha - Mělník, Praha - Slapy, Praha - Troja. Disco trips are also arranged by some radio broadcasters. The largest passenger shipping operators are the Prague Steamship Company (Pražská paroplavební společnost, a. s.), the owner of 2 parlour steamships and 5 motor ships. The other is the European Water Transport (Evropská vodní doprava s.r.o.), the owner of 5 passenger motor ships. Apart from these, there is a number of smaller companies that offer cruises and social events on individual orders.

The operation of river traffic in 2002 was affected by the extraordinary flood in August that hit almost the whole river basin. The deluge damaged particularly bank reinforcement on the rivers, the sluices and also silted waterways in many places. The flood afflicted severely the Prague Steamship Company. Its HQ at Rašínovo embankment were destroyed, zapped are also data with passenger statistics. Despite the ships remained undamaged, the company, seeing the river bed had been silted and sluices damaged, cancelled line operation till the year end and suspended also cruises. The European Water Transport interrupted its operation only at the critical period of flooding. As soon as the water condition returned to normal, their river operations restarted.

Various carriers including foreign companies operate **cargo ship traffic** along the Vltava river. One of the largest carriers is the European Water Transport (Evropská vodní doprava s.r.o.), which provides domestic and international transport of mass substrates, containers, heavy pieces, liquids etc. Their fleet includes 24 vessels, 2 tankers with total tonnage of 18,800 tons, floating machinery - platforms for construction or other purposes.

Annual cargo volumes shipped from 2000 to 2002

Sluice	Tons of freight handled		
	2000	2001	2002
Modřany	108 168	109 282	71 136
Smíchov	197 740	175 941	126 206
Mánes	238	360	7 251
Štvanice	201 712	176 936	117 296
Podbaba	370 037	374 692	214 173

The freight river traffic was also heavily affected and restricted with the flood in August.



Ships used (passenger, cargo, other)

Sluice	2000				2001				2002			
	passg	cargo	other	total	passg	cargo	other	total	passg	cargo	other	total
<i>Modřany</i>	583	339	976	1898	524	313	1015	1852	356	209	742	1307
<i>Smíchov</i>	18751	1302	1663	21716	19547	1043	1701	22291	15421	992	1316	17729
<i>Mánes</i>	3115	50	582	3747	3060	25	349	3434	1916	195	493	2604
<i>Štvanice</i>	3055	1770	950	5775	3538	1101	1093	5732	2445	479	679	3603
<i>Podbaba</i>	103	1109	685	1897	178	1010	663	1851	144	566	493	1203

Three harbours are found on the municipal territory - Holešovice, Smíchov and Radotín. The most important is the Holešovice harbour, which enables water-road and water-railway transshipment relations. The harbour has also its container transship point. This is presently the most utilised of the harbours. As soon as the southern segment of the Prague Ring is built, it is expected the Radotín harbour will also gain in significance.



12 TRANSPORTATION INFRASTRUCTURE DEVELOPMENT

12.1 ENGINEERING INFRASTRUCTURE

In 2002, the traffic construction in Prague was seriously disturbed with a catastrophic flood that hit the city and caused damage on the transportation infrastructure estimated to 8 billion CZK. The slowing down of the construction in progress was made, in some cases, by direct swamping (Metro C line), in other cases by the necessity to redirect building capacity to reconstructions of the lines, stations and roads damaged by the flood and obviously also by the need to reallocate portion of the funds to accelerated elimination of the flood damage. Despite such problems, the constructions of the Metro line C section IV.1 between "Nádraží Holešovice" and "Ládví", of the tram line to the *Barrandov* housing estate, of the City Ring West as well as the reconstruction of the *Berounka* bridge at *Lahovice* went on. The pre-project and design preparation of the City Ring North (section *Strahovský tunnel - Pelc-Tyrolka*) did not stop either, as well as the Prague Ring (section *Ruzyně - Suchbát - Březiněves* and *Slivenec - Lahovice - Jesenice - D1*) and Metro line C section IV.2 (between *Ládví* and *Letňany*).

The following constructions were put in service in 2002:

- The City Ring section *Zlíchov - Radlická* with a makeshift connection to the current *Radlická* street, which significantly cut short the trips of cars going from *Strakonická* street to *Radlice* valley and *Jinonice*, and back. The merit of this construction in solving traffic issues in *Smíchov* neighbourhood is so far very limited due to the insufficient capacity of *Radlická* street. The substantial increase in utilisation of this construction for the *Smíchov* car traffic is expected after the next section of the City Ring, the *Mrázovka* tunnels, is put in operation.
- The P+R site at *Modřany* neighbourhood, which enables to change from car to tram, PT bus as well as train.
- Barrier-free access to the Metro station *Chodov* through building a slant elevator.

Of the many traffic reconstructions finished in 2002, the most important include:

- *Karmelitská* street, with a complete two stage redevelopment over the whole street cross-section including the reconstruction of underground mains and utility network as well as changes in lateral arrangement and location of tramway tracks. Also trees have been planted wherever the street was sufficiently wide in order to make the street look more pleasantly;
- tram line along *Černokostelecká* street (between *Vinice* and the Central Plant *Hostivař*). The reconstruction of this segment included the refurbishment of track junction *Černokostelecká - Starostrašnická* and a siding to the tram loop "*Černokostelecká*";
- *Letenský* tunnel, including the reconstruction of the carriageway inside the tunnel and securing the southern tunnel front against its sliding and separating from the tunnel structure;
- *Vysočanská* street between *Ke Klíčovu* and *Na Jetelce*. The redevelopment included putting all the overhead of the elevated road down and replacing for a new one;
- 1st stage of the construction of a new railway bridge over *Seifertova* street (western bridges). The *Seifertova* street has been redeveloped in its original latitudinal arrangement, its widening and formation line change will be made in the 2nd stage with the eastern bridges.

Apart from these planned and prepared reconstructions which had their investment funding secured, it was necessary to respond to the damage made by the flood in August and provide their elimination in a flexible way and as quickly as possible. By the end of 2002, a reconstruction sufficient enough for restoring traffic was achieved at the Metro stations *Vltavská*, *Nádraží Holešovice*, *Florenc* (on line C), *Můstek* (on line A), *Anděl*, *Karlovo náměstí* and *Palmovka* (on line B). Work continued on making operable the rest of the stations damaged by the flood: *Staroměstská* and *Malostranská* (on line A), *Národní třída*, *Můstek*, *Náměstí Republiky*, *Florenc*, *Křižkova*, *Invalidovna* and *Českomoravská* (on line B). Reconstruction of these stations was connected also to essential repairs in tunnel sections.

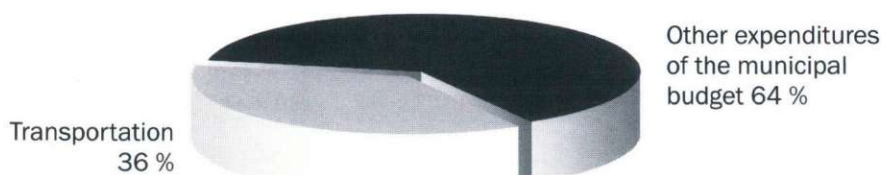
Out of the damaged tram lines, reconstruction was achieved by the end of the year in the sections *Nádraží Braník - Nádraží Modřany*, *Smetanovo nábřeží - Křižovnické náměstí* and tramway bridge in *Troja* up to and including the stop *Trojská* and the section *Komunardů - Osadní - Dělnická - Libeňský most*. The trackbed reconstruction in *Sokolovská* street still goes on as it necessitates extensive rebuilding of underground utilities and hampered by anxieties concerning statics of some adjacent buildings.

12.2 FUNDING THE TRANSPORT AND TRAFFIC CONSTRUCTIONS

The urban transport operation and engineering infrastructure in 2002 were covered from the Prague's municipal budget, with contributions from the national budget and corporate resources of the Prague Public Transit Co. Inc. (*DP hl. m. Prahy, a. s.*) and other municipal enterprises.

The Prague's municipal budget, following a number of adjustments made during the year, reached to expenditures of approximately CZK 45 bill., including almost CZK 15 bill. in the chapter 03 Transportation, which again in 2002 was the most substantial chapter of the municipal budget's expenditures. Adding the amounts included in other chapters, the municipal expenses on transportation exceeded CZK 16 bill. The yield from the bonds and loans of the European Investment Bank helped cover the expenditures from the deficit budget of the City of Prague.

The share of transportation in 2002 municipal budget expenditures



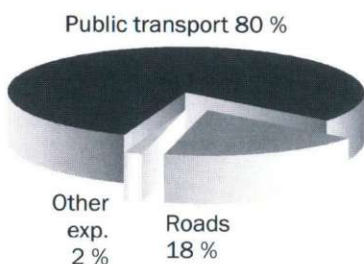
The amount of CZK 16 bill. included CZK 9 bill. earmarked to cover running operational expenditures and almost CZK 7 bill. for capital expenditures.

The **operational expenditures** in transportation cover, predominantly, subsidies for public passenger transport in and around the city. The total of CZK 7.5 bill. was allotted in the budget for this purpose, including over CZK 1 bill. to offset ticket discounts. Almost CZK 2 bill. were set aside to cover repairs, maintenance and operation of the roads.

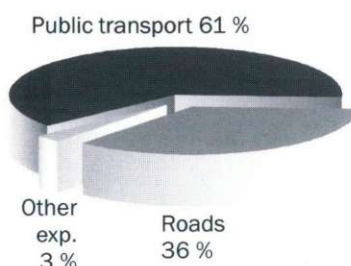
The **capital expenditures** covered mostly investment in development, i.e. construction of new roads, Metro lines and other transportation facilities (63 %) as well as larger repairs and redevelopment of traffic routes, equipment and renewal of technical devices (36 %). Expenditures allotted for improving the condition of public passenger transport prevailed also in the capital portion of the budget - out of the total almost CZK 7 bill., over CZK 4 bill. was earmarked for public transport investments, almost CZK 3 bill. for rebuilding and development of the road network. Expenditures for providing operation, modernisation and development of public transport dominated in the 2002 budget. Their share in the total expenditures in the chapter of transportation amounted to 73 %.

Structure of transportation expenditures in the 2002 budget

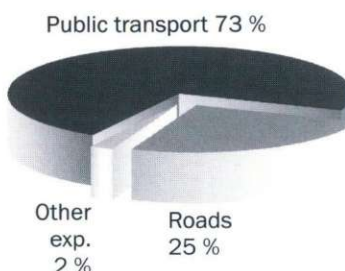
Operational expenditures



Capital expenditures

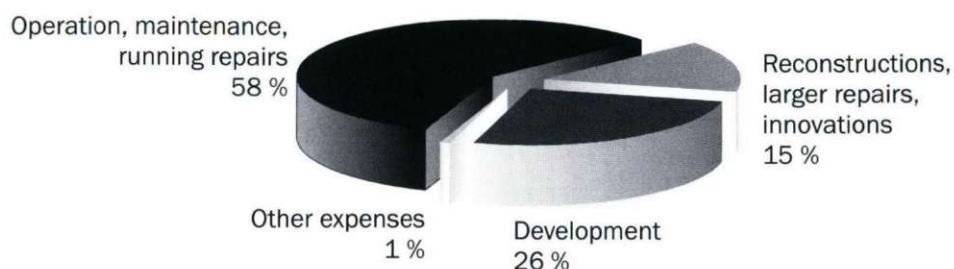


Total expenditures

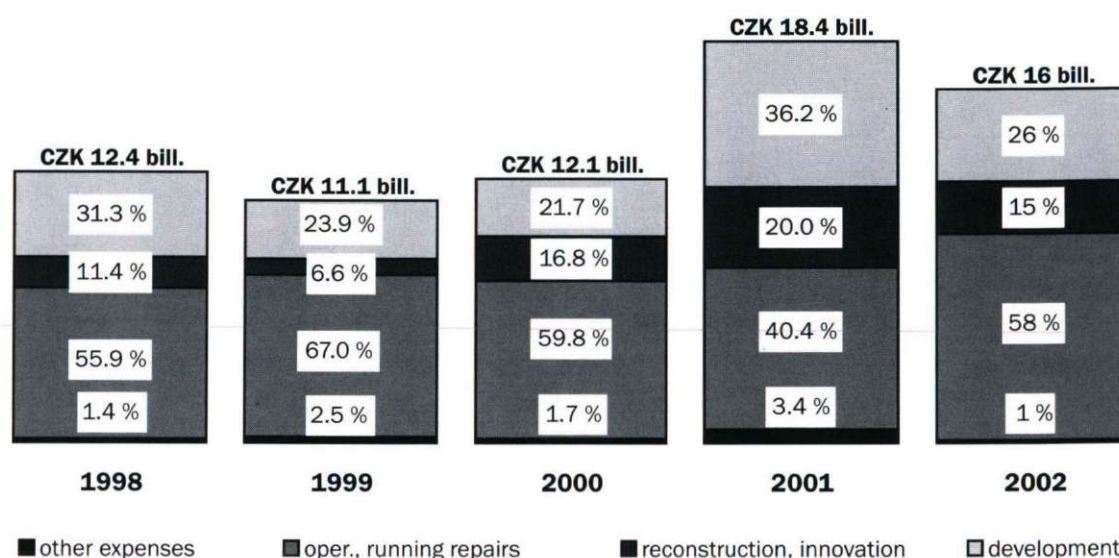


A more detailed analysis of the items listed in the breakdown of expenditures shows that over CZK 9 bill. was directed toward operation, running repairs and maintenance of the urban transport system, almost CZK 2.5 bill. to provide for larger repairs, redevelopment and renewal of the technical equipment and over CZK 4 bill. was earmarked for investments into development.

Total transportation expenditures in the 2002 budget



Traffic expenditure development in Prague's municipal budgets



The targeted means from the national budget and the means of the National Fund for Traffic Infrastructure were provided to the Capital of Prague as contributions for repair and maintenance of roads and for the construction of selected road segments (CZK 411 mill.), for the construction of Metro and purchasing of buses (CZK 517 mill.) and to cover the operation of the protective systems in underground traffic constructions (CZK 45 mill.). The government in the past years already accepted a commitment to build stepwise a ring road around Prague. As little as CZK 99 mill. were spent in 2002 for this purpose from the national resources for the completion of the section Řepy - Ruzyně already in operation. A construction of a next section of the Prague Ring could not start that year.

The Prague Public Transit Co. Inc. contributed to investment constructions out of its own resources with CZK 3.4 bill., including almost CZK 0.5 bill. for elimination of the flood damage. Funding of suburban transport was shared by communities from around Prague, whose population are users of the PID integrated transport, and minimum contributions provided by the Government were made in compliance with the Act on Road Traffic in order to ensure the basic transportation service in every locality.

13 EUROPEAN UNION PROJECTS

The Capital of Prague and its organisations took part, in 2002, in the solution of several projects advertised by European Commissions.

HEAVEN (Healthier Environment through Abatement of Vehicle Emission and Noise)

The project that focuses on integration of data about traffic, air pollution and noise and on their utilization for operational management of traffic as related to a particular condition of the environment is dealt with by a consortium of cities: Rome, Berlin, Paris, Rotterdam, Leicester and Prague under the direction of STA Rome. Concerning Prague, those participating in the solution process are *Útvar rozvoje hl. m. Prahy*, *ÚDI Praha* and *Český hydrometeorologický ústav*. The main emphasis in Prague is placed on possibilities of predicting levels of air pollution on the basis of modelling (AIRVIRO) and on the decision-making strategies during traffic management based on the results of model evaluation. The database collects data in order to model specifically *Holešovice* neighbourhood.

In 2002, the HEAVEN project solution entered the stage of completion. All the components of the model system were run and the stage of verifying the validity of the air pollution model values began. The project result is a system for modelling air pollution both in real time, i.e. dependent on the immediate condition of car traffic, and for various model variants of the traffic load on the urban road network. The project is to end officially in the first quarter of 2003 but its principal output has already been made available to the public on the website www.premis.cz.

MOST (MObility Management STRategies for the Next Decades)

The purpose of the project is to develop managing means of mobility, analysis of the available management tools, defining policies, strategies, scenarios and their propagation. The solution shared by participants from 16 countries divides into 6 thematic groups. Prague represented by *DP hl. m. Prahy, a. s.*, is engaged in "Centres of mobility and consultation on mobility".

The work on the project has been concluded in 2002. The result is a case study, made as a proposal for launching an *intermodal centre of mobility* in Prague that defines the mission of the centre, its functional chart, the extent of the services it would provide as well as its spatial design and equipment. Preliminary negotiations concerning the redevelopment of the check-in hall of the Main Railway Station have already started with a potential investor and the centre might be included in the new hall design.

PRISMATICA (PRo-active Integrated System for Security Management by Technological Institutional and Communication Assistance)

The project is worked on by 15 partners from France, Great Britain, Portugal, Italy and the Czech Republic. It is aimed at public transport safety in cities. The Prague participant is *DP hl. m. Prahy*, mostly in the sub-task 3.5 dealing with legal issues related to TV monitoring of traffic, data protection and safety instruments in transportation. The project is expected to be completed in the first quarter of 2003.

In 2002, electronic surveillance and supervisory systems were tested and experiences of individual carriers were collected. The agenda also included issues of co-operation between municipal constabulary and national police in dealing with regular safety problems in traffic as well as approaching other security issues arising in traffic during significant social and political events (e.g. a session of the International Monetary Fund and the World Bank, the NATO Summit) and also the issue of property protection (an antigraffiti programme, a perimeteric protection at depots).

TRENDSETTER

The project aiming at establishing trends for sustainable urban mobility was approved in 2001 by European Commission as one of the eight tasks of the CIVITAS programme, concerned with saving energies, utilizing clean fuels and improving the environment. The Trendsetter project intends to describe such methods for these purposes that lead to increased usage of public transport, improving systems of haulage, vehicles and infrastructure, potentially also to employing new services that enable sustainable environment in cities. The task is

planned from 2002 to 2004. Under the leadership of Stockholm, partners from Stockholm, Lille, Graz, Prague and Pécs take part in the solution. Prague participates on solving three sub-tasks concerned with operation of lorries, city-buses and bus priority on signal-controlled junctions. DP hl. m. Prahy, a. s., Ústav dopravního inženýrství hl. m. Prahy, odbor rozvoje dopravy Magistrátu hl. m. Prahy and Technická správa komunikací hl.m. Prahy are responsible for the solution.

In 2002 concerning the subtask "Widening the environmental zones for heavy traffic", four city areas were determined that were eligible for potential widening of the current zone, a detailed survey on heavy traffic was conducted and the collected data were processed for evaluation. Concerning the subtask "A study on experimental introduction of a line of Bus-taxi (City buses) in the city centre", a particular variant was selected out of several candidates for this type of public transport and preparations were made to introduce a citybus line in the Karlov area in Prague 2. The new line (No. 291) is to be launched early in 2003. Concerning the subtask "More adaptive signal control in a bus priority system", introduction of an adaptive signal was prepared aiming at a similar preference for buses in the traffic as already utilised by trams in many signal-controlled crossroads. Active detector segments were installed at two signal-controlled crossroads and in eleven buses. The test run of the system started in late 2002.



Abbreviations

AADT	Average Annual Daily Traffic (a 24 h average, with seasonal correction)
ADT	Average Daily Traffic (a 24 hour average, no seasonal correction)
av.	average
AVO	Average Vehicle Occupancy
bill.	billion(s) (1×10^9)
B+R	Bike & Ride
cca	approximately
CTP	Children's Traffic Playground
Coll.	Collection of Laws and Ordinances
CZK	Czech crown (Kč)
h	hour(s)
HQ	headquarters
Kč	Czech crown (CZK)
K+R	Kiss & Ride
MHD	municipal public transport (i.e. PT)
mil.	million(s)
PID	Prague Integrated Transport
PT	public transport service (i.e. MHD)
P+R	Park & Ride
TSD	Traffic Signal Device
veh.	vehicle
VKT	Vehicle Kilometres Travelled
VPD	Vehicles Per Day
yr	year
ZPS	Zones of Paid Standing
000s	thousands
%	per cent

This text has been published thanks to the kind support of the following companies:

**Evropark Praha a. s., Metroprojekt Praha a. s., Metrostav a. s., Satra, spol. s r. o.,
Signalbau Huber CZ, s. r. o., SSŽ, a. s., Subterra a. s.**

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Yearbook was compiled by Institute of Transportation Engineering of the City of Prague.

Data: ÚDI Praha, České dráhy, s. o., ČSL, s. p., Letiště Brno, a. s., ČSÚ, DP hl. m. Prahy, a. s.,
EVD s. r. o., Evropark Praha, a. s., PČR, Povodí Vltavy a. s., PPS, a. s., ROPID, ŘSD ČR,
České přístavy (přístav Kolín), OMI hl. m. Prahy, TSK hl. m. Prahy

Photograph: ÚDI Praha, Ing. Danko Remek

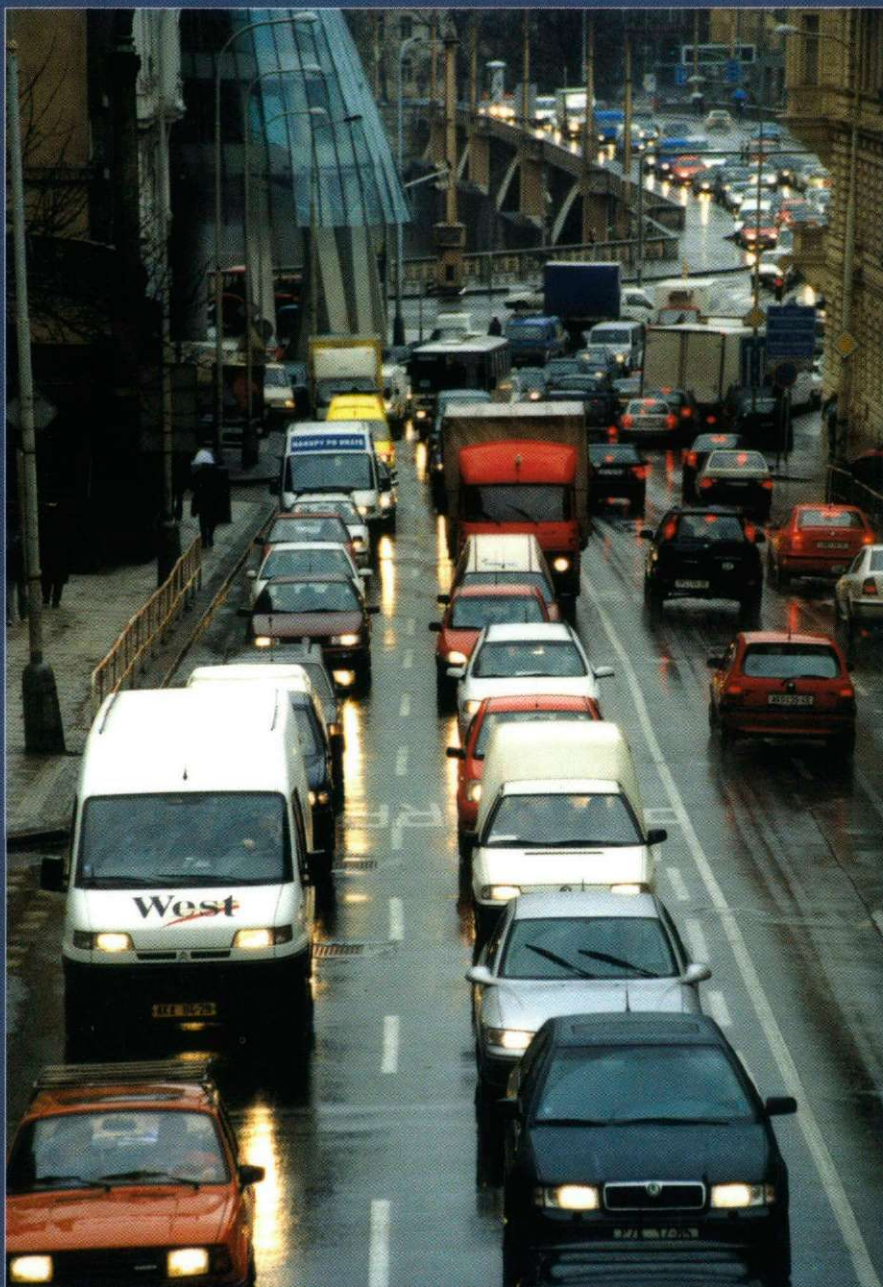
Publish: ÚDI Praha

Number of copies published: 700

Design and print: REPRO servis, s. r. o., Praha 5

Prague 2003





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