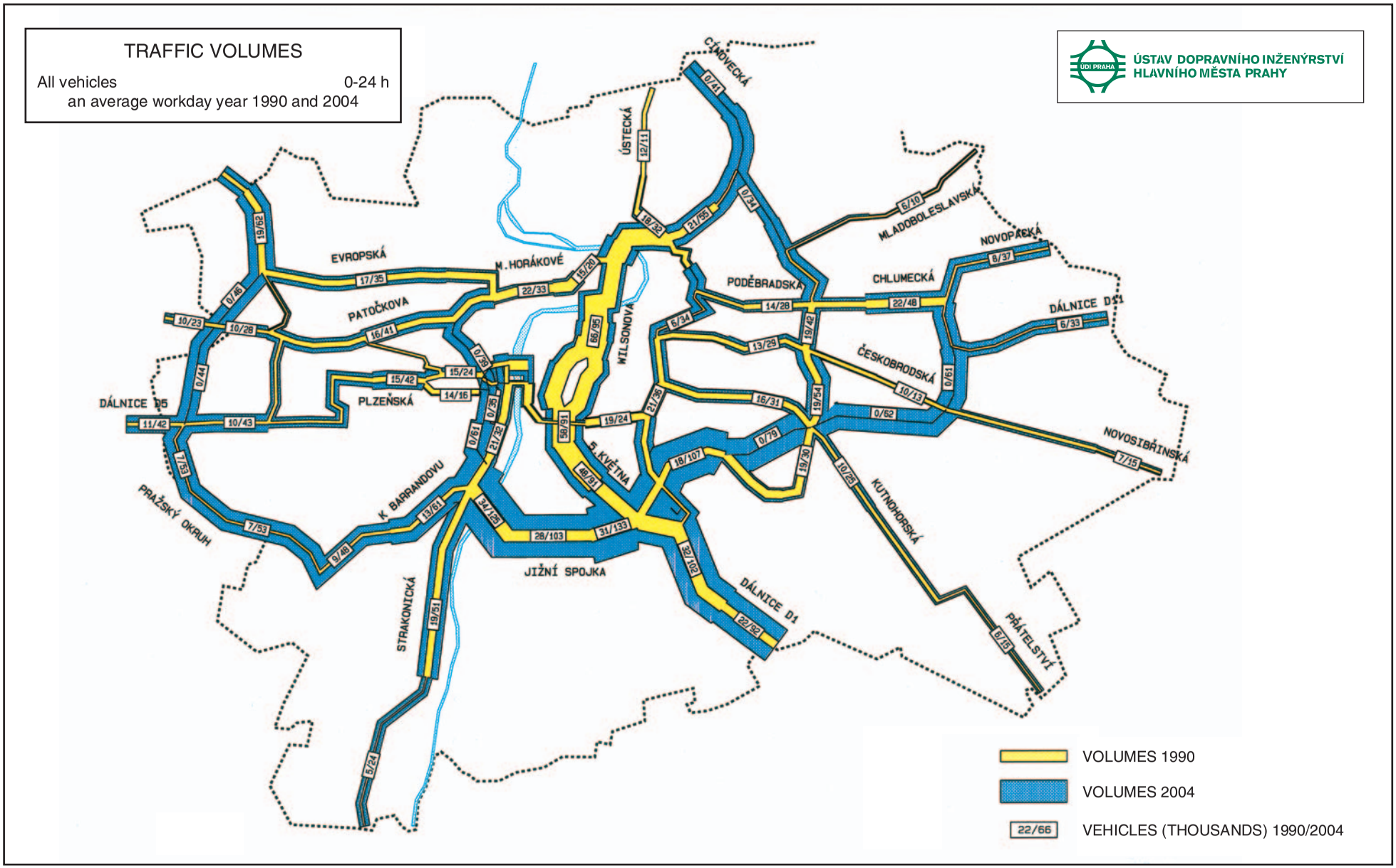
INSTITUTE OF TRANSPORTATION ENGINEERING
OF THE CITY OF PRAGUE

THE YEARBOOK OF TRANSPORTATION

PRAGUE 2004



THE YEARBOOK OF TRANSPORTATION

PRAGUE 2004

INSTITUTE OF TRANSPORTATION ENGINEERING OF THE CITY OF PRAGUE

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
bn.	billion(s) (1×10^9), thousand(s) of millions
B+R	Bike & Ride
cca	approximately
CTP	Children's Traffic Playground
Coll.	Collection of Laws and Ordinances
CZ	Czech Republic, Czechia
CZK	Czech crown (*Kč*)
DP hl. m. Prahy	Prague Public Transit Co. Inc.
GVW	Gross Vehicle Weight
h	hour(s) (unless specified by a.m./p.m., the 24 h cycle is used)
HQ	headquarters
IT	information technology
Kč	Czech crown (CZK)
K+R	Kiss & Ride
MHD	municipal public transport (i.e. PT)
MPR	*Městská památková rezervace* (see also PCA)
mill.	million(s)
PID	Prague Integrated Transport
PC	Passenger car
PCA	Prague Conservation Area (see also *MPR*)
PT	public transport service (i.e. *MHD*)
P+R	Park & Ride
TSD	Traffic Signal Device
TSK	Prague Road Maintenance
ÚDI Praha	Institute of Transportation Engineering of the City of Prague
veh.	vehicle
VKT	Vehicle Kilometres Travelled
VPD	Vehicles Per Day
y-o-y	year-on-year
yr	year
ZPS	Zones of Paid Standing
000s	thousands
%	per cent

The text has been published thanks to the kind support of the following companies:
AŽD Praha s. r. o., Eltodo DS s. r. o., Evropark Praha a. s, Metroprojekt Praha, a. s., Metrostav a. s., SBH CZ, s. r. o., SSŽ a. s., Satra, spol. s r. o., Subterra a. s.

The yearbook was prepared in the Institute of Transportation Engineering of the City of Prague *(Ústav dopravního inženýrství hlavního města Prahy /ÚDI Praha/)* □ Joint authorship: *Ing. Jan Adámek, Olga Boučková, Ing. Jana Coufalová, Ing. Věra Fenclová, Ing. Zorka Holá, Ing. Jaroslav Horník, Ing. Marek Karban, Ing. Eva Kosteasová, Ing. Jan Kreml, Ing. Drahoš Macoun, Ing. Jiří Medek, Ing. Jug Mikuškovic, Ing. Jaroslav Nerad, Ing. Ladislav Pivec, Ing. Martin Šubrt, Ing. Jan Trešl* □ Editors: *Ing. Zdeněk Balcar, Mgr. Eva Černá* □ Translation: *Mgr. Jiří Hedánek* □ Data: *ÚDI Praha, České dráhy, a. s., ČSL, s. p., ČSÚ, DP hl. m. Prahy, a. s., EVD s. r. o., Evropark Praha, a. s., Letiště Brno, a. s., Letiště Karlovy Vary s. r. o., Letiště Ostrava, a. s., MD ČR, MHMP, PČR, Povodí Vltavy s. p., PPS, a. s., ROPID, ŘSD ČR, TSK hl. m. Prahy* □ Pictures: *ÚDI Praha* □ Production: *SOFIPRIN Praha* □ Copies: 600 pcs □ *Praha*, 2005

CONTENTS

Dear readers,

last year was very important for Prague's transportation mainly thanks to the completion of two long awaited constructions. In June, first passenger trains travelled the new 4 kilometers of the "C" line of the Prague metro to *Kobylisy* and *Ládví*. From the technical point of view, this section was one of the most challenging parts of Prague metro due to the unique procedure of tunnelling under the *Vltava* River, the use of double-track tunnels and construction of the single-nave *Kobylisy* metro station. The extension of the Prague metro into the northern parts of the city has already at this stage tremendously improved transportation services particularly in *Kobylisy* and *Ďáblice* and also by connecting lines in other parts of Prague and its suburbs. Just one month before the ceremonial opening of this section, construction of a second extension of this line started. This last section will lead to *Letňany* terminal and as from 2008 will further improve public transportation in the northern part of our city.

A second very important transport construction that has been in operation since last August is the *Mrázovka* tunnel as a part of the City Ringroad. Thanks to this tunnel, transport connections mainly between Prague 6 and Prague 5 have improved and many streets in *Smíchov* have apparently been relieved. The City Ringroad will have to be completed also in its north-western part from *Malovanka* to *Pelc-Tyrolka* in order to secure necessary transportation services and to enable a gradual introduction of traffic regulation measures in the historical street network of Prague with the aim of improving the environment of the city.

The information in our yearbook gives proof that the City of Prague is aware of the necessity of creating a quality transportation system in the city and its suburbs and that its public administration fulfills all resolutions adopted in the field of transport policy. Apart from substantial investment, the city mainly promotes and enhances public transportation of passengers as is obvious from the subsidy of 8 billion Czech crowns for public transportation in 2004, as well as from a whole range of other measures such as laying longitudinal separators along tram lines (already 8 km), opening new bus lanes (11 km in total) or increase in the number of tram-priority traffic lights (89 traffic lights).

June 1st, 2005

Radovan Šteiner
Councillor of the City of Prague

Dear readers,

As every year, we offer you a yearbook documenting basic information about transportation in Prague. In 2004 the volume of motor transport has increased by 5 %. Cars drive a daily average of almost 20 million kilometres in Prague. Unfortunately, truck traffic accounted for 25% of the increase in motor transport in 2004. Although in past years haulage increased on the average by 1 % annually, in the last year this increase jumped 14 %. This sudden change is related to the fact that as of May 1, 2004 the Czech Republic became a member of the European Union and as a result customs clearance on frontier crossings was abolished. Therefore it is of crucial importance to complete the construction of the Prague ring as soon as possible.

A positive trend became noticeable over the past few years in the number of passengers using public transportation – last year the number of passengers increased by 2 %. That means that daily an average of 3,6 million passengers use public transportation.

Two very important transport structures were completed last year, which improved transportation in the city. In June operation was started on the new section of the metro C line going to the northern districts *Kobylisy* and *Ládví*. Thanks to this section, travelling time into the city centre has decreased, the overall quality of transportation has improved, and also a significant reduction in the number of city buses has occurred. In August another section of the City Ringroad between *Zlíchov* and the *Strahov* tunnel was opened. Thanks to the high-quality modern *Mrázovka* tunnel that became a part of the city ring, *Smíchov* has been relieved of unnecessary traffic while transport has become safe and environmentally friendly.

In 2004 a number of organizational measures were taken in order to enhance and promote public transportation and increase transport safety as a whole. Particular attention was paid to pedestrians and their safety on zebra crossings.

Permanent improvement of organization and management of the city road transport, new concepts in transportation engineering leading to a decrease in the number of road accidents, monitoring and assessment of traffic development, and systematic preparation for further development of the whole transportation network of the city are the main tasks in the field of transportation engineering. These services provided by the **Institute of Transportation Engineering of the City of Prague** cater not only to the needs of Prague Capital but also to other towns and regions.

Dear readers,

I will be pleased if the information provided in this yearbook enables you to see the current transport situation in Prague from a broader perspective and can serve as a basis for qualified decision-making about further transportation solutions. For more detailed information please contact our institute or visit our internet site **www.udipraha.cz**.

June 1st, 2005

Ing. Ladislav Pivec
Director

1. BASIC DATA

1.1 The Capital of Prague

Selected data on the Capital of Prague as of 31. 12. 2004

City area	.....	496	km^2
Population	.....	1 171 000	
Total road network	.....	3 538	km
specifically, motorways within the city	.....	10	km
other urban motor roads	.....	76	km
Number of bridges in road network	.....	591	
specifically, bridges across the river	.....	27	
grade-separated intersections	.....	210	
underpasses	.....	123	
Number of tunnels (total length 4 553 m)	.....	7	
All motor vehicles	.....	735 350	
including passenger cars	.....	594 100	
Motor vehicles per head			
in vehicles per 1 000 inhabitants	.....	628	
Passenger cars per head			
in cars per 1 000 inhabitants	.....	507	
Metro (underground) network (in operation)	.....	53.7	km
Tram network	.....	140.9	km
specifically, dedicated trackbed	.....	52	%
Public Transport bus network	.....	687.7	km
Traffic lights	.....	458	
specifically, co-ordinated into “green waves”	.....	262	
with traffic-actuated control	.....	226	
with tram priority	.....	89	
separate pedestrian crossings	.....	58	
Vehicle kilometres travelled (VKT) in motor car traffic			
in an average workday	.....	19.7	mill. VKT
annually	.....	6.5	bn. VKT
Modal split (based on all trips in the city in a workday)			
public transport	.....	57	%
car transport	.....	43	%
Traffic accidents	.....	29 598	
Traffic accident injuries			
fatal	.....	56	
serious	.....	428	
slight	.....	3 313	
Relative accident rate (accidents per 1 million VKT)		4.6	

1.2 Prague compared with the Czech Republic

		Prague	CZ	Prague/CZ (%)
Area (km²)		496	78 864	0.6
Population (mill.)		1.17	10.21	11.4
	specifically, the workforce	0.600	4.733	12.7
Motor vehicles (000s)		735	5 185	14.2
	specifically, passenger cars (000s)	594	3 816	15.6
Motor vehicles per head	(motor vehicles per 1000 persons)	628	507	
	(persons per 1 motor vehicle)	1.6	2.0	
Passenger cars per head	(passenger cars per 1000 persons)	507	373	
	(persons per 1 passenger car)	2.0	2.7	

Vehicle kilometres 1990 - 2004 (millions VKT / avg. workday 0-24 h)

Year	Prague*	CZ+
1990	7.3	80.9
2000	16.6	131.2
2001	17.1	124.9
2002	17.7	130.9
2003	18.8	138.4
2004	19.7	145.0**
Index 04/90 (%)	270.0	179.2**
Index 04/03 (%)	104.9	104.8**

* the whole road network

\+ motorways & roads, class 1, 2 & 3, incl. sections inside Prague

** preliminary data

2 CAR TRAFFIC

2.1 Development in number of motor vehicles and cars

The total number of motor vehicles registered in Prague rose steeply until 1999. During 2000–2004, the rise slowed down. The substantial share in the build-up of motor vehicles is brought about by passenger cars.

Registered motor vehicles in 1961 - 2004

	Prague					Czech Republic (Czechoslovakia till 1971)				
	Popul.	Motor vehicles		Passenger cars		Popul.	Motor vehicles		Passenger cars	
Year	(000s)	number	%	number	%	(000s)	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
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
2003	1 166	654 700*	153	534 100*	159	10 211	5 041 255	125	3 702 153	154
2004	**1 171**	**735 350***	**171**	**594 143***	**177**	**10 221**	**5 185 218**	**128**	**3 815 547**	**158**

100 % = 1990

* data for 2003 are contaminated with a registration error of up to 130 000 vehicles as explained in the note; data for 2004 are also contaminated with an error which magnitude, however, is unspecified

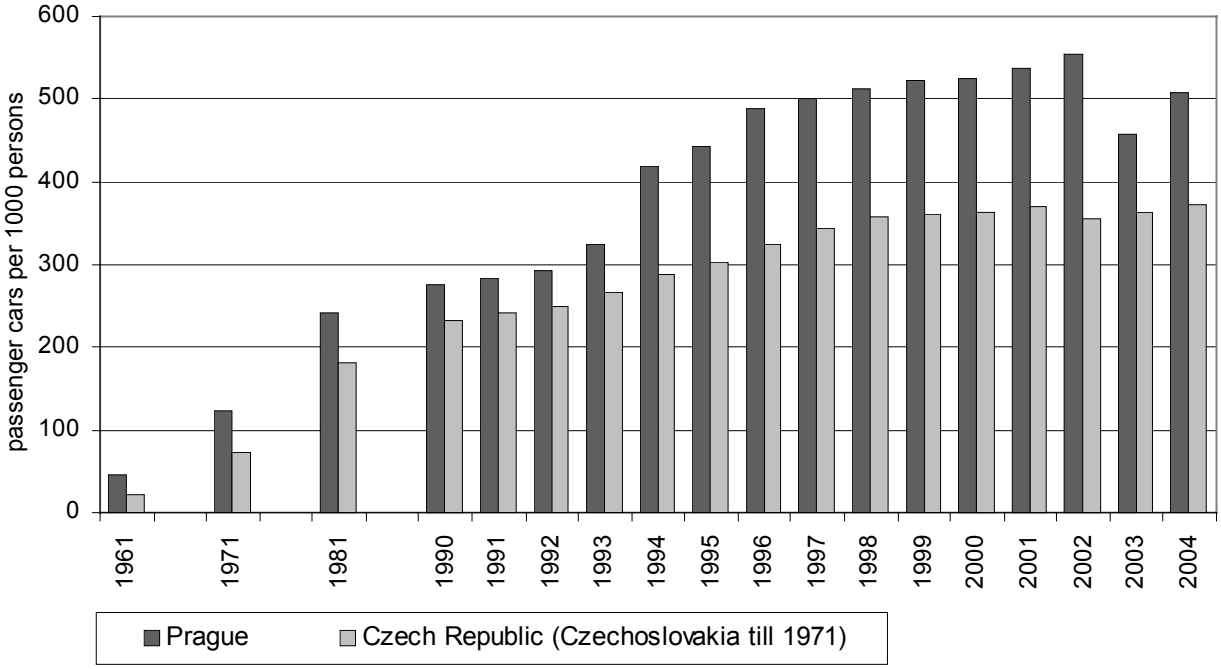
Please note that the figures concerning registered motor vehicles both in Prague and nation-wide were obtained from the Police of the Czech Republic up until 2001. Since 2002, the data are obtained from new administrators of the data: the Traffic Administration Department of the Prague Municipality, and the Traffic Administration Department of the Czech Ministry of Transport, for the city and the nation respectively. The figures in this overview meet the available IT capacities at regional registers.

Numbers of motor vehicles and cars per head, 1961 - 2004

	Prague				Czech Republic (Czechoslovakia till 1971)			
	Vehicles per head		Passenger cars per head		Vehicles per head		Passenger cars per head	
Year	Veh. per 1 000 pers.	Pers. per 1 vehicle	Cars per 1 000 pers.	Pers. per 1 car	Veh. 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
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
2003	561*	1.8*	458*	2.2*	494	2.0	363	2.8
2004	**628***	**1.6***	**507***	**2.0***	**507**	**2.0**	**373**	**2.7**

* data for 2003 are contaminated with a registration error of up to 130 000 vehicles as explained in the note above; data for 2004 are also contaminated with an error which magnitude, however, cannot be specified

Passenger cars per head, 1961-2004



Notice: Data for 2003 and 2004 are contaminated with a registration error (see also page number 8)

2.2 Motor car traffic volumes on workdays

The motor car traffic in cities is a phenomenon which increasingly affects both the people and urban environment as the number of vehicles and the traffic grow. This is especially true in the last decades for larger Czech cities and particularly Prague. The position of the Capital of Prague in car traffic in the Czech Republic is specific, as evidenced in outstandingly high volumes and vehicle kilometre values in comparison with other Czech cities or countryside motorways and highways.

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 inner city traffic development is monitored via the central cordon, the extra-urban traffic development is monitored through the outer 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.

The conducted traffic counts lead to a conclusion that **the car traffic in the city centre stagnated in 2004, while continuing to rise over the rest of the city area. The total traffic throughout the capital rose in 2004,** in terms of its overall road network VKT, **by an average of 4.9 per cent above the previous year.**

Motor cars covered the total of 19.691 million vehicle-kilometres throughout the Prague area around the clock on an average workday (the condition in autumn of 2004). The passenger cars' share was 17.815 million vehicle kilometres, i.e. 91 per cent. Comparing with the previous year, it means that

in autumn of 2004, motor cars covered in Prague daily by 920 thousand vehicle-kilometres more than in 2003.

A specific phenomenon of the traffic development **in 2004 is a sharp rise in heavy lorries traffic.** While from 1990 to 2000 the heavy lorries traffic (over 6 tons in gross weight) on the territory of the Capital of Prague almost stagnated (it grew by an average of 0.5 % a year) and during 2001-2003 it rose by an annual average of 5.4 %, in 2004 it was by 18 % (an annual rise in traffic volumes by 127 thousand vehicle-kilometres a day). This jump was brought about by the rise in numbers of heavy lorries (international transport) crossing Prague since May 2004 when the Czech Republic acceded the European Union and customs procedures on the border crossings were dropped.

In the greater central area of the city (according to counts on the central cordon, covering the bi-directional traffic over entry points to the greater inner city 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 2003. In 2004, about 294,000 vehicles entered the greater inner city area during an average workday between 6 a.m. and 10 p.m., including 279,000 passenger cars.

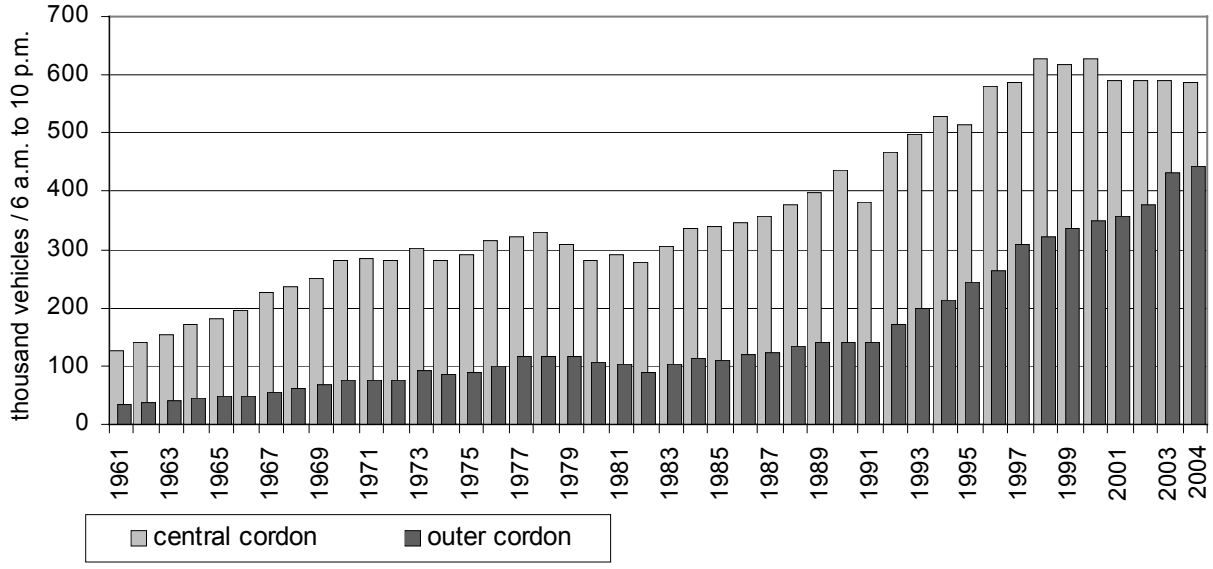
The fact that the traffic volumes in the inner city area in recent 6 years have ceased to grow seems to be due to traffic demands already reaching its capacity limits on many key crossroads during peak hours so that the road network overload is no more local, but rather sweeping in character.

In the middle zone of the city, the car traffic volume increased by 3 to 10 % over the previous year. Since 1990, the traffic has been sharply and continually increasing. As compared to 1990, it intensified three to four times on some city roads.

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 2.3 % over the previous year. As compared to 1990, more than 3.2 times as many cars (+ 216 %) entered Prague each day from its environs (the suburban area, the country and other communities as well as from abroad). The major portion of the increase following 1990 was passenger cars, whose number has now increased almost four times (+ 278 %). The car traffic in the outer zone of the city is rising steadily from 1990. About 221,000 vehicles entered Prague between 6 a.m. and 10 p.m. on an average workday of 2004, including 191,000 passenger cars.

Traffic volumes on central and outer cordon, 1961-2004

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



Traffic volume on central and outer cordon, 1961-2004
Average workday, both directions total, 6 a.m. to 10 p.m.

	Central cordon						Outer cordon					
	Passenger cars		Lorries		All vehicles		Passenger cars		Lorries		All vehicles	
Year	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
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
2003	561 000	146	18 000	46	590 000	136	376 000	372	50 000	147	432 000	309
2004	**558 000**	**145**	**18 000**	**46**	**587 000**	**135**	**382 000**	**378**	**54 000**	**159**	**442 000**	**316**

100 % = 1990

Sections with the heaviest traffic on Prague road network in 2004 were the City ring road section between *5. května* and *Vídeňská* street with 133 000 vehicles daily (0-24 h) passing through and also the *Barrandovský* bridge (125 000 vehicles per day). The City Ringroad grade-separated junction with the *5. května* street was the most heavily used fly-over (215 000 VPD). The heaviest ADT level junction was *Žitná–Mezibranská* (74 000 VPD).

Average Vehicle Occupancy (AVO) – persons per passenger car

Year	Inner city (central cordon)	Outer zone (outer cordon)	all-Prague average
1990	1.57	1.90	1.71
2000	1.37	1.49	1.44
2003	1.37	1.43	1.41
2004	**1,36**	**1,44**	**1,41**

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.

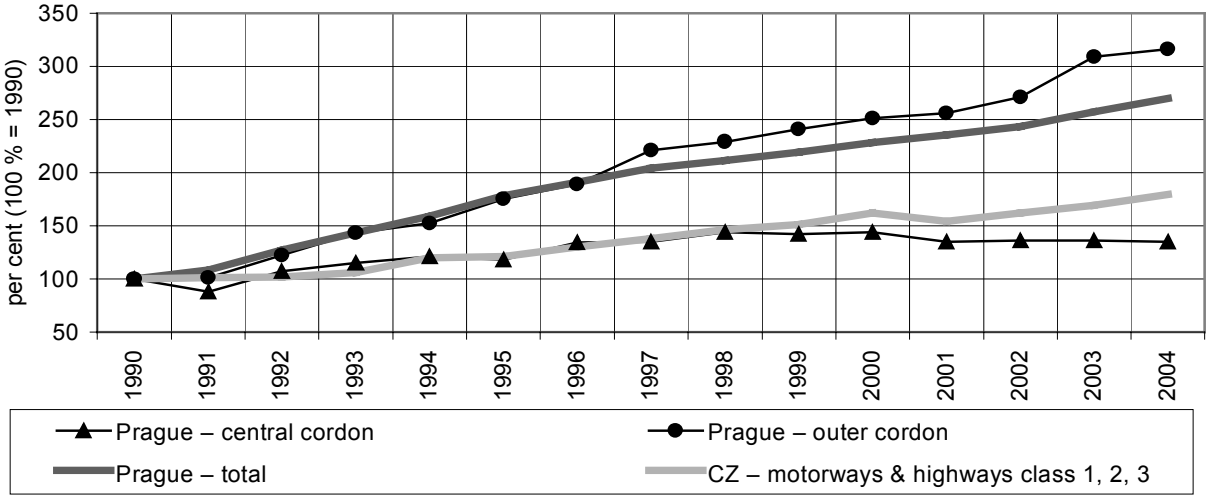
The pace of the VKT growth in car traffic in Prague following 1990 in comparison with 1980s used to be over 5 times higher in the early 1990s, almost 4 times higher in the late 1990s and over 6 times higher in 2004, as is shown by setting side by side the average year-on-year growth of the daily VKT throughout the overall road network:

1981–1990	y-o-y	+ 192 000	VKT/day
1991–1995	y-o-y	+ 1 134 000	VKT/day
1996–2000	y-o-y	+ 736 000	VKT/day
2001–2003	y-o-y	+ 710 000	VKT/day
2001-2004	y-o-y	+ 763 000	VKT/day
specifically, 2001		+ 480 000	VKT/day
2002		+ 597 000	VKT/day
2003		+ 1 053 000	VKT/day
2004		+ 920 000	VKT/day

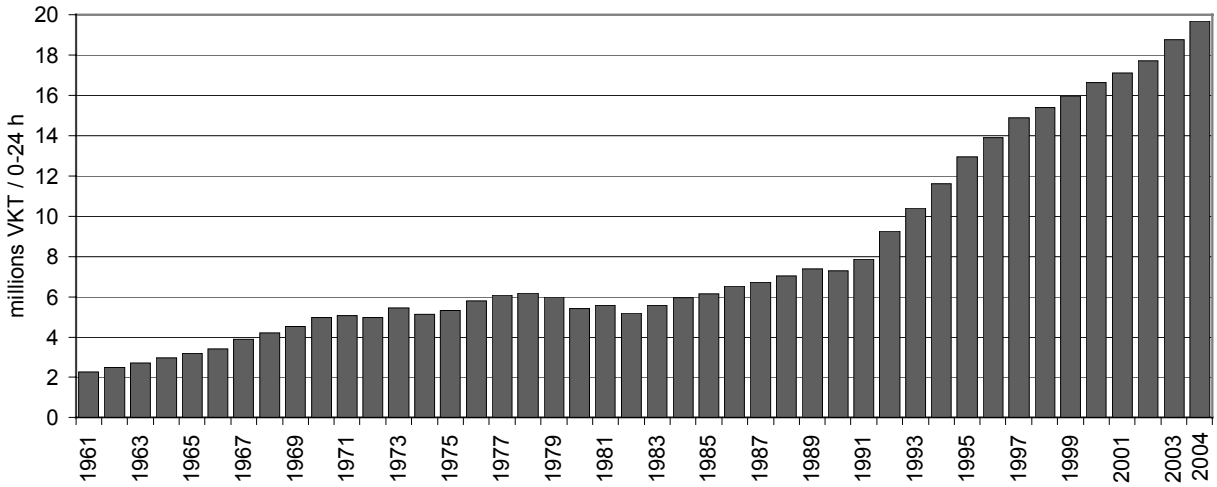
The daily VKT grew in the last 14 years (1991 to 2004) in all from 7.3 mill. VKT per day to 19.7 mill. VKT per day, i.e. by 12.4 mill VKT per day. Thus, the car traffic in Prague has swollen within the recent 14 years more than during the previous 100 years of motoring (from the end of the 19th century up to 1990).

The increase in Prague during the specified period was approximately 1.5 times higher than the increase in car traffic on national motorways and highways.

Car traffic volume development in Prague and the Czech Republic, 1990-2004
An average workday



Vehicle kilometres travelled, 1961-2004
All roads, an average workday



Vehicle kilometres travelled, 1961–2004
All roads, an average workday, 0-24 h

Year	All motor vehicles		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
2000	16.641	228	15.131	259	91
2001	17.121	235	15.585	267	91
2002	17.718	243	16.191	277	91
2003	18.771	257	17.123	293	91
2004	**19.691**	**270**	**17.815**	**305**	**91**

100 % = 1990
* an estimate from volume trends on the central and outer cordon (VKT is monitored in Prague only since 1978)

Most of the rise in the car traffic in Prague following 1990 has been due to passenger cars. During 1991 to 2004, the VKT per vehicle in Prague went up as follows:

passenger cars	+ 205 %
lorries and buses	+ 30 %
all vehicles	+ 170 %

The car traffic grows differently in different city zones. From 1991 to 2004 the car traffic increased in the following way:

all-network average	+ 170 %
the greater inner city	+ 35 %
the outer zone	+ 216 %
the middle city zone	+ 100 to + 300 %

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 Ringroad).
- 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. This „stop and go" traffic's environmental impact, especially in the city centre, is obvious.

2.3 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 rose steadily (the figures show network averages):

- in 1961 56 %
- in 1971 70 %
- in 1981 78 %
- in 1990 80 %
- in 2000 91 %
- in 2003 91 %
- in 2004 91 %

Concerning the local distribution, the passenger cars get the greater share the closer they are to the city centre. The share in 2004 was:

- in the central cordon 95 %
- in the outer cordon 86 %
- the network average 91 %.

Percentage of mode share, 1961-2004
A workday, both directions total, from 6 a.m. to 10 p.m.

Year	Central cordon				Outer cordon			
	Passenger cars	Moto-cycles	Lorries	Buses (exc. PT)	Passenger cars	Moto-cycles	Lorries	Buses (exc. 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
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
2003	95.0	0.9	3.1	1.0	86.9	0.3	11.5	1.3
2004	**95.0**	**0.9**	**3.1**	**1.0**	**86.4**	**0.2**	**12.2**	**1.2**

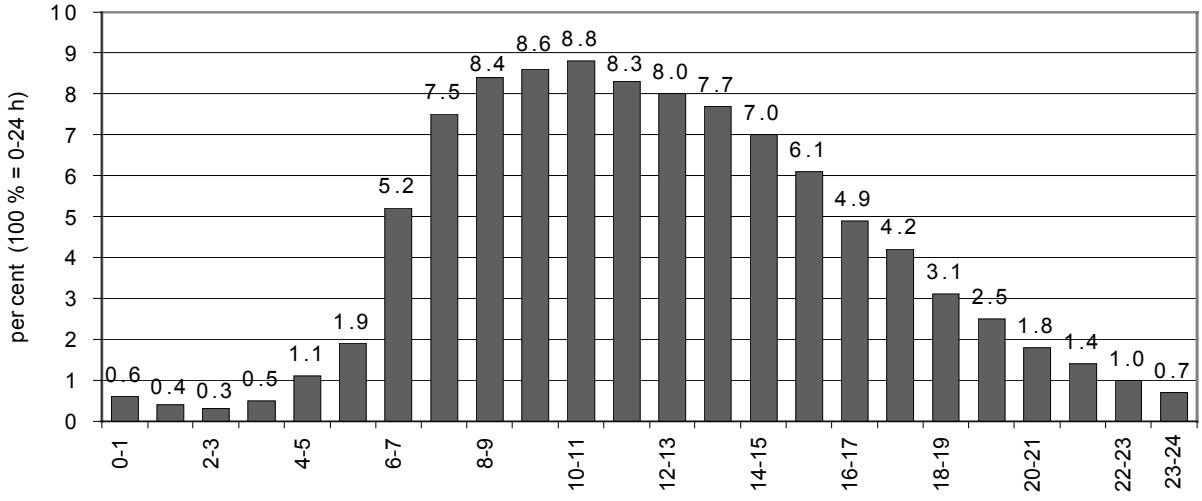
2.4 Temporal patterns in motor vehicles traffic

Workday volume variations in motor vehicles 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., or 80 % 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 7-9 a.m., the afternoon peak hour is between 4-5 p.m.
- The peak hour's share is 6.9 % (100 % = 0-24 h).
- The differences between peak hour share and off-peak share are not very sharp.
- Daily traffic density variation in lorries and buses (excluding public transportation) displays a different characteristic from the overall profile. Their peak hour is 10-11 a.m., making 8.8 % of the all-day goods vehicle and bus volumes. Following 11 a.m. there comes a mild and more or less regular decrease without any sag or next peak until midnight.
- Consequently, the share of lorries and buses in the traffic flow changes significantly during the day:

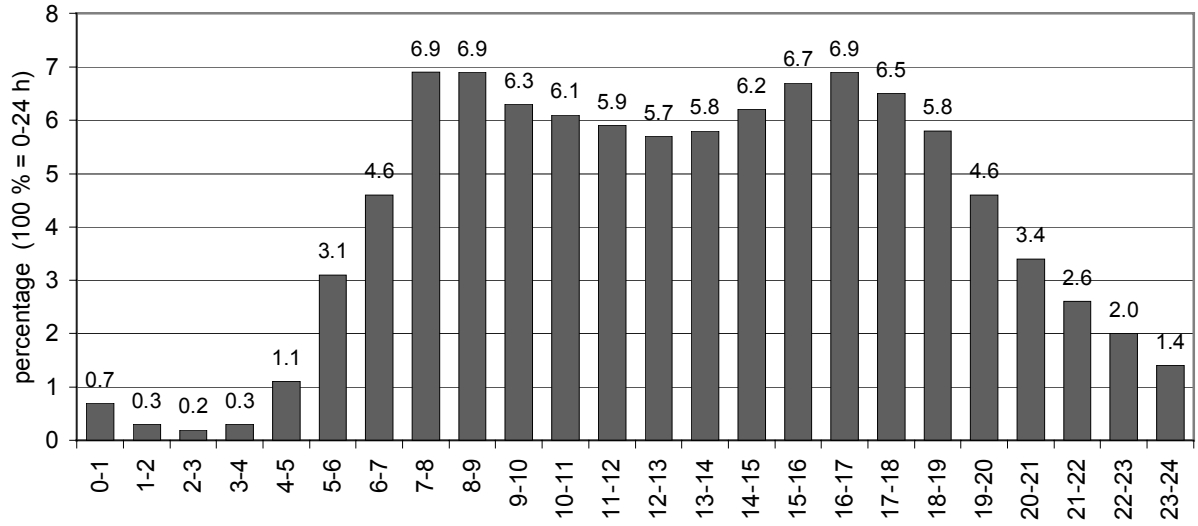
- the all-day average is 9 %
- it rises up to 16 % in the morning
- it descends to 7 % in the afternoon
- evening and night values range between 4 to 10 %.

Daily variation - lorries and buses (exc. PT)

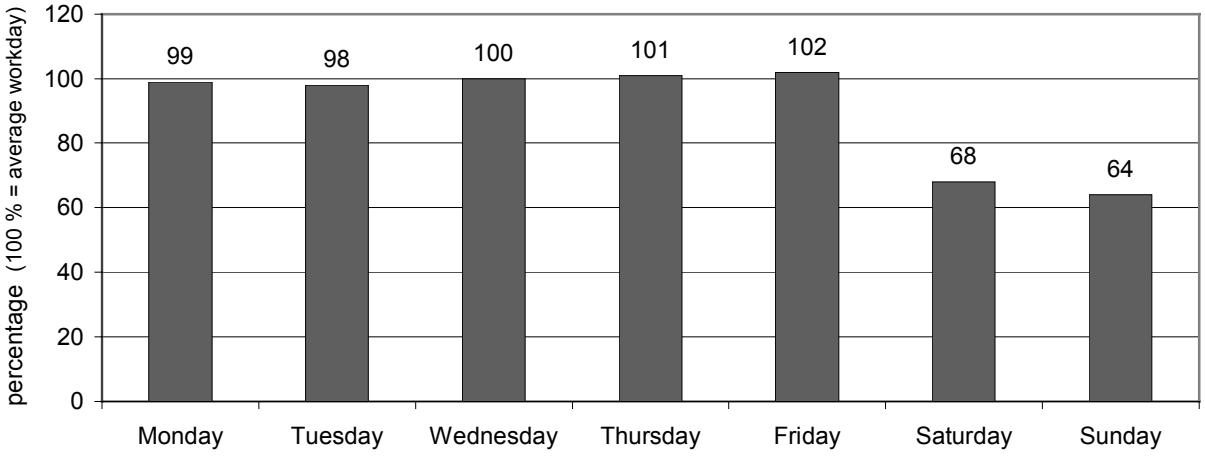


Temporal patterns in motor vehicles traffic, Prague, 2004

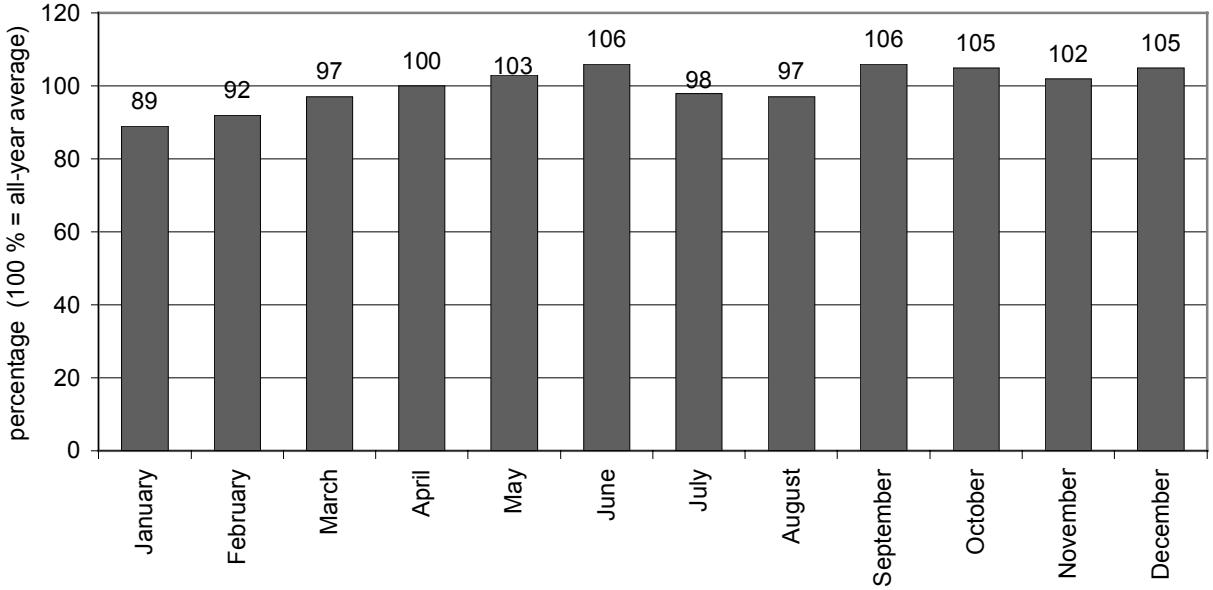
Daily variation



Weekly variation



Annual variation



2.5 Weekend car traffic

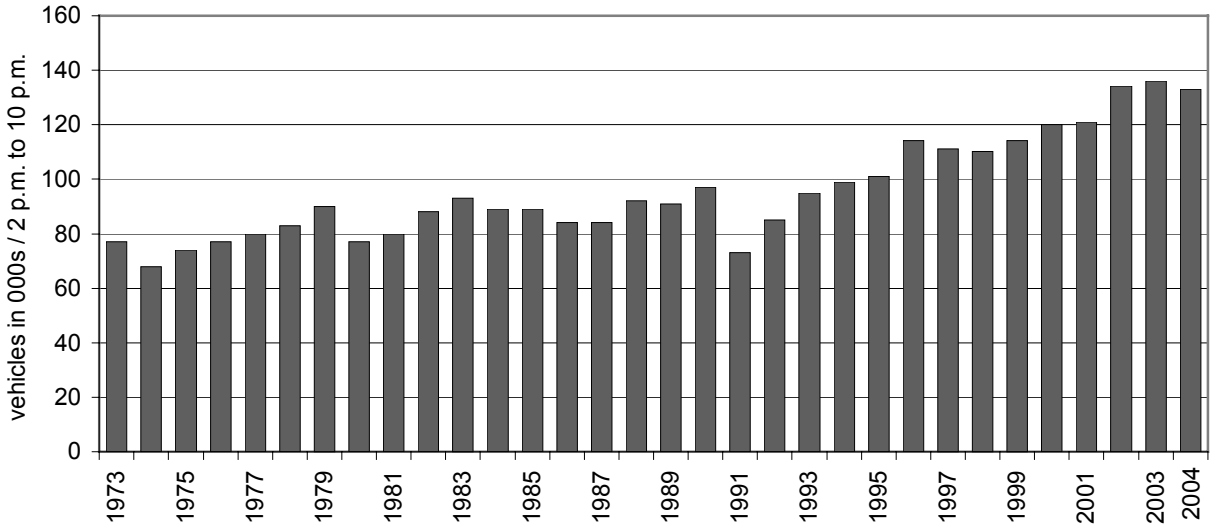
The *ÚDI Praha* Institute's annual survey of the car traffic volumes includes monitoring weekend traffic on the urban outer limit. Weekend departures are carried out on Friday afternoons between 3 to 7 p.m., on Saturdays between 8 to 11 a.m. and partially also on Sunday mornings. On the other hand, weekend arrivals concentrate in a narrow band of Sunday return time from 2 to 10 p.m. This is also the frequency of periodic holiday traffic monitoring during spring survey time on the outer cordon. The *ÚDI Praha* has been registering the weekend car traffic since 1973.

Weekend traffic volumes, 1973-2004
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
2000	116 000	123	120 000	120
2001	117 000	124	121 000	121
2002	130 000	138	134 000	134
2003	131 000	140	136 000	136
2004	**129 000**	**137**	**133 000**	**133**

100 % = 1990

Weekend traffic volume development, 1973-2004
Sunday, outer cordon, Prague bound, from 2 p.m. to 10 p.m.



The weekend traffic modal share is dominated by passenger cars; they made 97 % in 2004. **The Average Vehicle Occupancy (AVO)** in weekend traffic in 2004 was 2.16 passengers per car.

3 PUBLIC TRANSPORT

3.1 Prague Integrated Transport

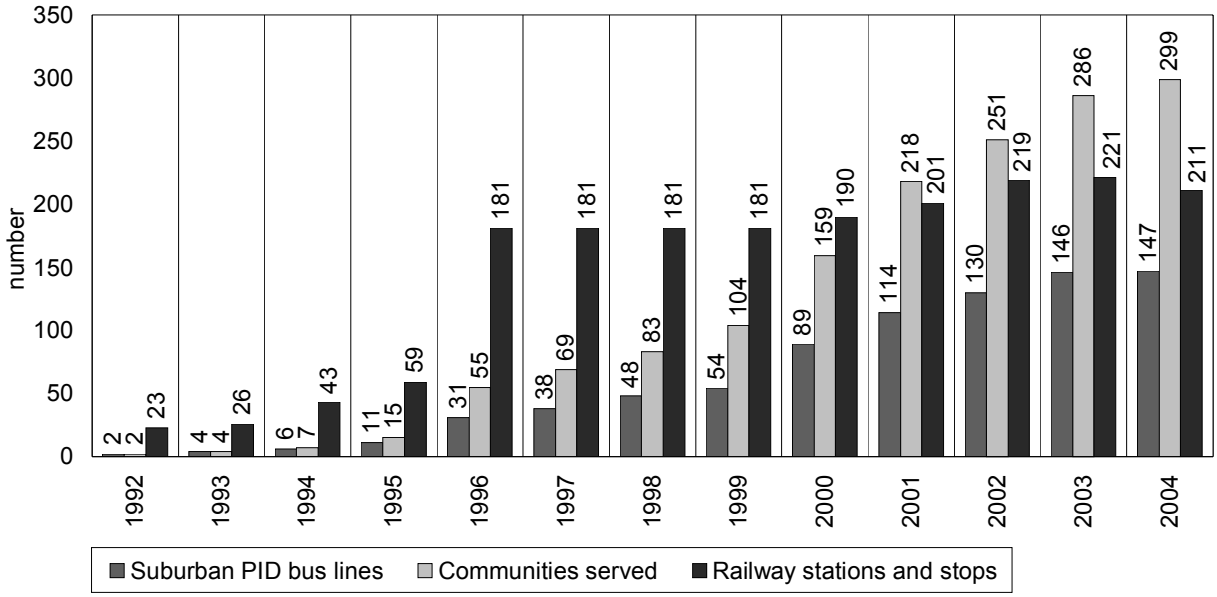
3.1.1 Basic data

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 (including the Central Bohemia county) 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, a. s.*) operating the railways; and additional thirteen smaller bus line operators.

The blueprint for an integrated passenger transport system in and around Prague was ready as early as in late 1970s, nevertheless it was launched only in 1992. Its 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. The gradual development of the *PID* system is shown on the following graph:

***PID* System Development**



In 2004, the integrated system saw further development with the full integration of railway lines *Praha - Kolín*, *Praha - Nymburk* and *Praha – Beroun* where different tickets are accepted, with expanding the *PID* system over *Štěchovice, Davle, Slapy, Nový Knín* and with extending the night suburban transport to other areas. In the end of 2004, the total of 147 regional bus lines were in operation.

Numbers of operated bus lines

Operator	city territory*	region territory**
DP hl. m. Prahy, a. s. (incl. night and school lines)	179	20
Others	6	127
Total	185	147

* lines within the territory of the city
** city-to-region lines and lines outside the city territory

The city limits were crossed in both directions by over 2,700 regional *PID* buses on an average workday, carrying about 65,000 passengers.

Basic data about Prague Integrated Transport (*PID*), 1997-2004

Year	1997	1998	1999	2000	2001	2002	2003	**2004**
Number of communities served by suburban *PID* buses	69	83	104	159	218	251	278	**299**
Number of railway stations and stops linked up with *PID*	181	181	181	190	200	219	221	**211**
Number of suburban *PID* bus lines	38	48	54	89	114	133	146	**147**
Millions of VKT in suburban *PID* bus lines	4.12	5.03	7.99	9.36	12.91	15.79	18.48	**20.20**
Millions of VTK in all the *PID* lines except railway (i.e. Metro + tramway + city and suburban buses)	150	149	156	157	163	161.6	172.89	**177.75**
Share of travel *PID* tickets in the railways integrated into the *PID* system (% of the total)	32.5	35.6	37.2	39.2	43.0	52.1	56.5	**57.7**

3.1.2 Municipal Public Transport

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 53.7 km and 53 stations (including three interchanges). Currently, 24 stations are barrier-free. In 2004, another operational section on the "C" line of the underground was launched between the *Nádraží Holešovice* station and *Ládví,* measuring 3.9 km and having two stations. The trains travel at an average commercial speed of 34.6 km/h with the average distance between stations 1,074 m. The count of passengers made in 2004 has shown that the number of persons transported by underground on a workday was 43.8 % of the total count of passengers that used the public transportation. The Metro stations frequented most heavily are *Dejvická* (126.7 thousand incoming and outgoing passengers from 5 a.m. to 12 p.m. on a workday), *I. P. Pavlova* (116.8 thousands) and *Můstek* (109.0 thousands).

In 2004, additional new M1 Metro trains were delivered, increasing the number of new trains in operation to 42. The fleet is 715 cars in stock, 490 cars operated including 265 cars type 81-71, 15 cars of the modernized type 81-71 and 210 new cars type M1.

The **tramway network** is 140.9 km long. Out of the total tramway network, 52 % run on a dedicated trackbed (a raised embankment in roads, and in some places, on separate track lanes led outside of road), 48 % of the tracks are embedded in the roadway. The average stop distance throughout the network is 529 m. The trams share 30.2 % of all the persons transported. The tramway fleet comprised of 968 cars, including 928 cars operated with 45 three-segment cars.

The **buses** make a complementary network to the Metro and trams. They provide a spread coverage of the area and selected tangential links especially in the outer zone of the city. The operational length of the network within the city territory is 687.7 km. An average distance between stops is 688 m. The Prague Public Transit Co. Inc. (*DP*) bus fleet registers 1,321 buses, operated are 1,293 vehicles including 623 standard types, 325 low-floor, 292 articulated buses and 53 articulated low-floor. The bus share of the total transported persons is 26.0 %.

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. In 2004 the funicular transported almost 1.45 million passengers.

Basic data about Prague Integrated Transport, 2004 (operated by Prague Public Transit Co. Inc., *"DP"*)

	Metro	Trams	Buses	Total
Operational network length (km)	53.7	140.9	687.7	882.3
specifically, dedicated trackbed (%)	100	52	-	-
Operational network length outside Prague (km)	-	-	134.4	134.4
Average stop distance (m)	1 074	529	688	-
Average commercial speed (km/h)	34.6	19.3	26.1	-
VKT in Prague per year (000s)	44 705	49 702	63 020	157 427
VKT outside Prague per year (000s)	-	-	1 414	1 414
Passengers transported in Prague per year (000s)	496 013	342 844	294 887	1 133 744
Passengers transported outside Prague per year (000s)			26 788	26 788
Prague Public Transit Co. Inc. employees	12 974			
Revenue from tickets (mill. CZK)	2 971			
Operational costs (mill. CZK)	13 212			
Revenue/costs ratio (%)	22,49			

Development of selected characteristics of public transport

	Operational network length (km)+			Average commercial speed (km/h)			Public Transport performance on an average day	
Year	Metro	Trams	Buses	Metro	Trams	Buses	Seat-km (mill.)	Passengers (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++
2003	49.8	140.9	819.8*	35.7	19.6	26.3*	58.3++	3 530++
2004	**53.7**	**140.9**	**822.1***	**34.6**	**19.3**	**26.1***	61.3++	3 599++

+ 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.

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

++ performances and passengers transported by Prague Public Transit Co. Inc. (*DP hl. m. Prahy, a. s.*)., within the Prague territory

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, a. s.*) on all the 10 railroads entering Prague. The length of the railroads throughout Prague territory is 145 km. The highest volumes transported are achieved by the *Praha - Kolín* and *Praha - Benešov* railway lines.

Number of passengers in Prague transported by *PID* railway

Year	1999	2000	2001	2002	2003	**2004**
Passengers (000s)	8 093	10 048	14 932	15 700	16 032	**15 998**

Usage of important railways in suburban railway transport in 2004 (both ways)

Railway line	*Praha - Kolín*	*Praha - Benešov*	*Praha - Beroun*	*Praha - Kralupy*	*Praha - Lysá n. Labem*
000s pers.	8 208	3 801	4 863	2 836	2 769

The bus transportation covers mostly region-to-city transport relations. The performance of the suburban *PID* bus lines reached 20.20 mill. VKT in 2004; specifically, 5.39 mill. VKT was urban and 14.81 mill. VKT was countryside.

3.2 Long-distance passenger transport

3.2.1 Railway transport

The railways offer transport connections between Prague and other places by means of local and long-distance trains. The transport is operated by the Czech Railways Co. Inc. (*ČD*), the rail network is run by a government agency Railway Track Authority (*Správa železniční dopravní cesty – SŽDC*).

10 railway lines enter Prague, including 7 lines fully integrated into the municipal transportation system. The municipal territory has 65 railway stations and stops. Czech Railways (*ČD a. s.*) operate a daily average of 439 train connections across Prague on workdays, in which, as the operator indicates (*ČD a. s.)*, an average of 145,000 passengers travel in both directions, including suburban trips. It represents 27.1 million incoming and 25.6 million outgoing passengers across the city throughout the year.

The railway transport development across Prague in volumes

		2002	2003	**2004**
Total passengers transported (000s persons)		46 296	47 481	**52 739**
Average usage of lines (000s pers./km)		2 359	2 211	**2 686**
Trains dispatched from Prague	outgoing	162 578	170 706	**159 681**
	incoming	162 990	170 324	**160 888**
	total	325 568	341 030	**320 569**

Development in volumes at key Prague stations from 2002 to 2004 (incoming and outgoing passengers in 000s)

	2002	2003	**2004**
Praha-Hlavní nádraží	12 522	13 152	**14 854**
Praha-Masarykovo nádraží	6 789	6 420	**7 694**
Praha-Smíchov	4 778	5 232	**6 123**
Praha-Vršovice	804	528	**865**
Praha-Libeň	745	684	**826**
Praha-Vysočany	829	828	**916**
Praha-Holešovice	162	175	**177**

3.2.2 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. It is estimated that on an average workday from 5 a.m. to 10 p.m., Prague is entered and left by over 2,500 regional buses and long-distance coaches (in addition to *PID*).

4. TRAFFIC SIGNAL CONTROL

4.1 Construction and reconstruction of traffic signals

During 2004, incremental redevelopment was in progress on traffic signal devices (TSDs). The innovation of the whole system aims at securing higher road safety and streamlining its control. One of the means to achieve it is progressive linking of TSDs to the Principal Traffic Control Centre (*Hlavní dopravní řídící ústředna – HDŘÚ*). A special stress is laid on improving conditions for pedestrians' safer crossing of streets.

In the end of 2004, as many as 458 TSDs were in operation in the Capital of Prague. These include 262 TSDs on crossroads interconnected in synchronized groups with synchronized signal programs (green waves). 314 TSDs are equipped with sound signals to increase the safety for the blind.

18 new TSDs were built, 7 TSDs reconstructed, 9 TSDs had their controllers replaced, 3 TSD were enhanced and expanded while 2 TSDs were removed in Prague in 2004.

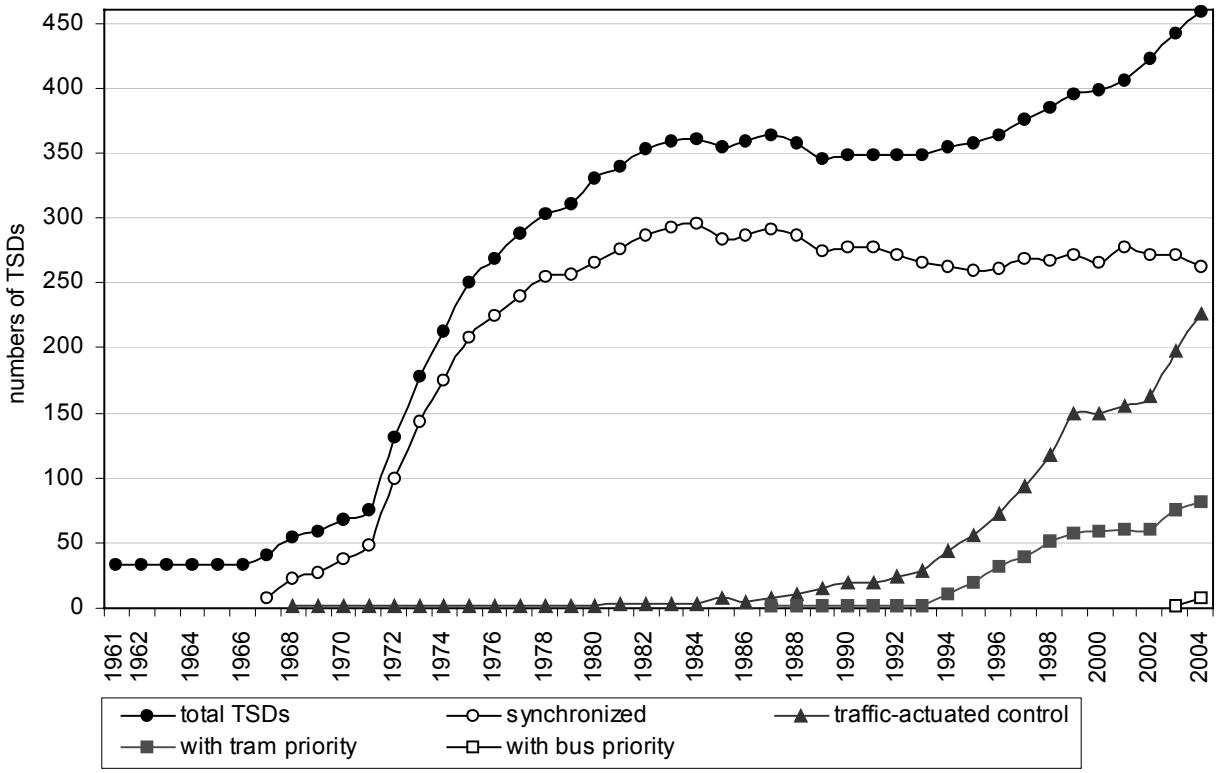
Basic data concerning TSD, 1961 - 2004

Year	1961	1971	1981	1990	1996	1997	1998	1999	2000	2001	2002	2003	**2004**
TSDs total	33	76	339	348	366	376	385	395	398	406	427	445	**458**
incl. pedestrian crossings	-	9	37	45	49	51	54	55	57	55	56	61	**60**
in green waves	-	48	276	277	263	269	267	272	266	277	272	272	**262**
traffic-actuated	-	1	3	19	72	93	117	149	150	156	163	197	**226**
with tram priority	-	-	-	1	31	39	51	57	59	60	60	75	**82**
with bus priority	-	-	-	-	-	-	-	-	-	-	-	2	**7**

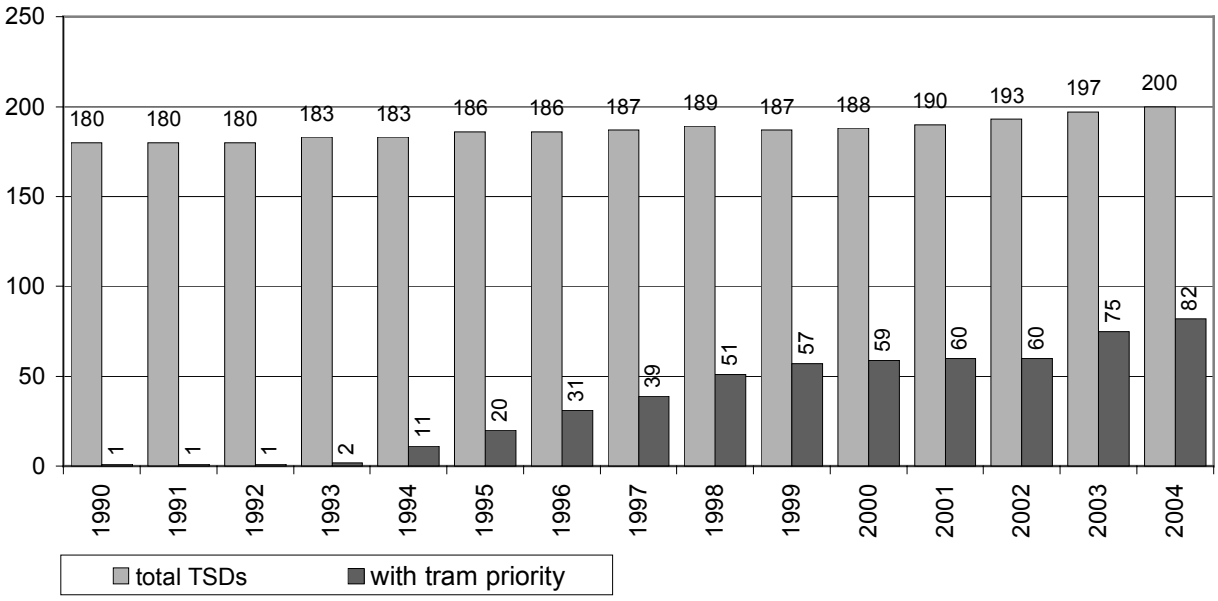
Newly built as well as renovated TSDs are equipped with devices of traffic actuation by vehicle and passenger demand, and also public transport priority over passenger car traffic. During 2004, the number of TSDs with a preference went up by additional 7 locations. As of 31. 12. 2004, the tram priority operated on 82 sites, which is 41 % out of the total 200 TSDs on Prague tram network. The absolute tram priority (that enables the tram driver always to go through the crossroads without having to stop) is programmed on 35 intersections with simpler traffic conditions. The other locations have conditional preference that takes into consideration requirements of other means of transport or trams approaching from different directions. In every case it makes part of a traffic-actuated TSD control which is provided on demand.

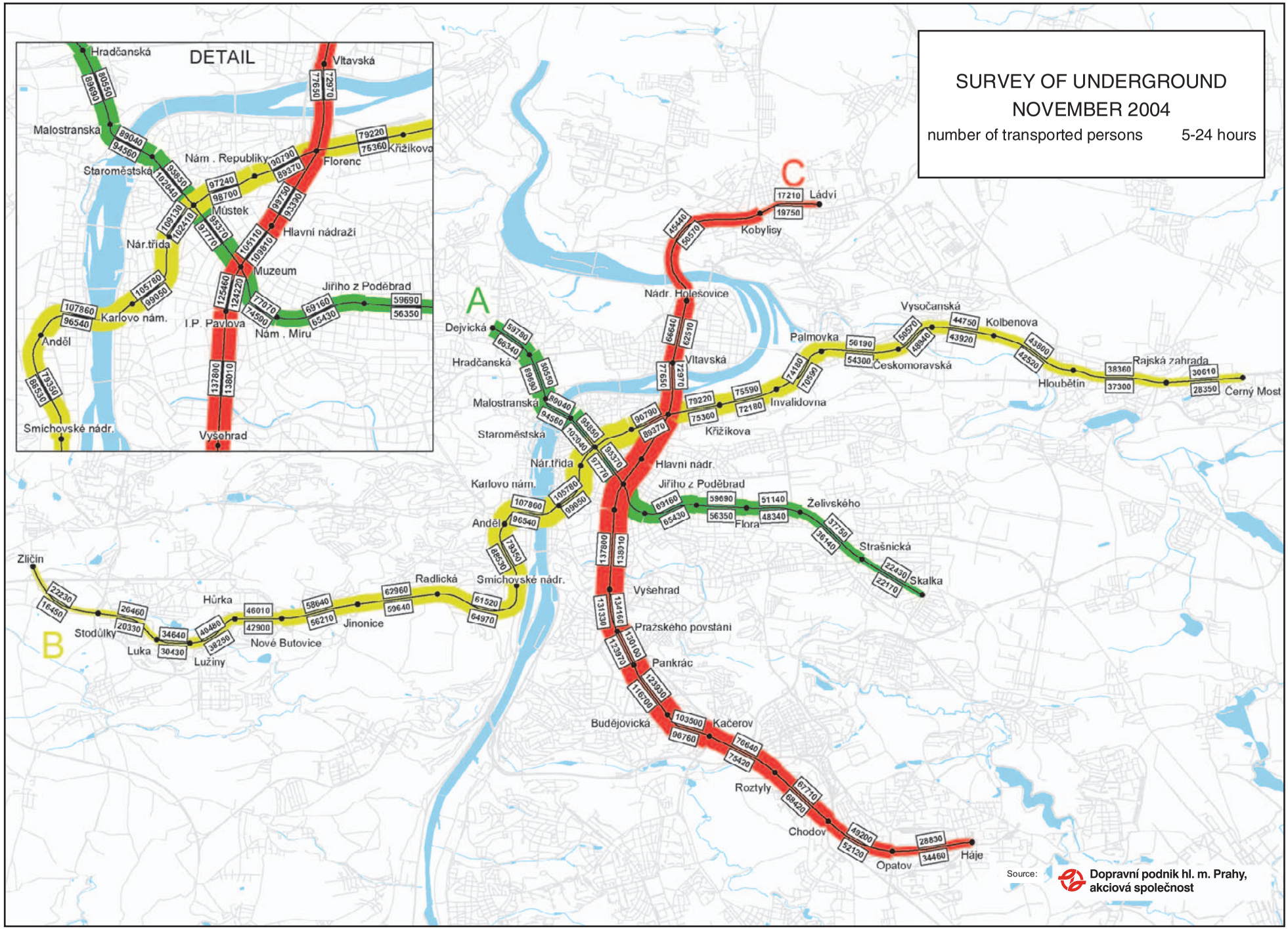
Already in 2003, a pilot operation was launched in *Trendsetter* project of testing public transport bus priority on two TSD-controlled crossroads. In 2004, the project test results made possible to implement bus line priority in *Čimická* street in relation to the incipient operation of the new section of the "C" line of Prague Metro between *Nádraží Holešovice* and *Ládví* stations.

Traffic Signal Devices, 1961 – 2004



Traffic Signal Devices (TSD) on tram network, 1990 – 2004




SURVEY OF UNDERGROUND
NOVEMBER 2004
number of transported persons 5-24 hours
DETAIL
A
B
C
Hradčanská
Malostranská
Staroměstská
Nám . Republiky
Florenc
Křižíkova
Vltavská
Můstek
Hlavní nádraží
Nár.třída
Muzeum
Jiřího z Poděbrad
Karlovo nám.
I.P. Pavlova
Nám . Míru
Anděl
Smíchovské nádr.
Vyšehrad
Dejvická
Nádr. Holešovice
Ládví
Kobylisy
Palmovka
Invalidovna
Hlavní nádr.
Želivského
Flora
Strašnická
Skalka
Vysočanská
Kolbenova
Českomoravská
Hloubětín
Rajská zahrada
Černý Most
Zličín
Stodůlky
Luka
Lužiny
Hůrka
Nové Butovice
Jinonice
Radlická
Pražského povstání
Pankrác
Budějovická
Kačerov
Roztyly
Chodov
Opatov
Háje
Source:
Dopravní podnik hl. m. Prahy, akciová společnost

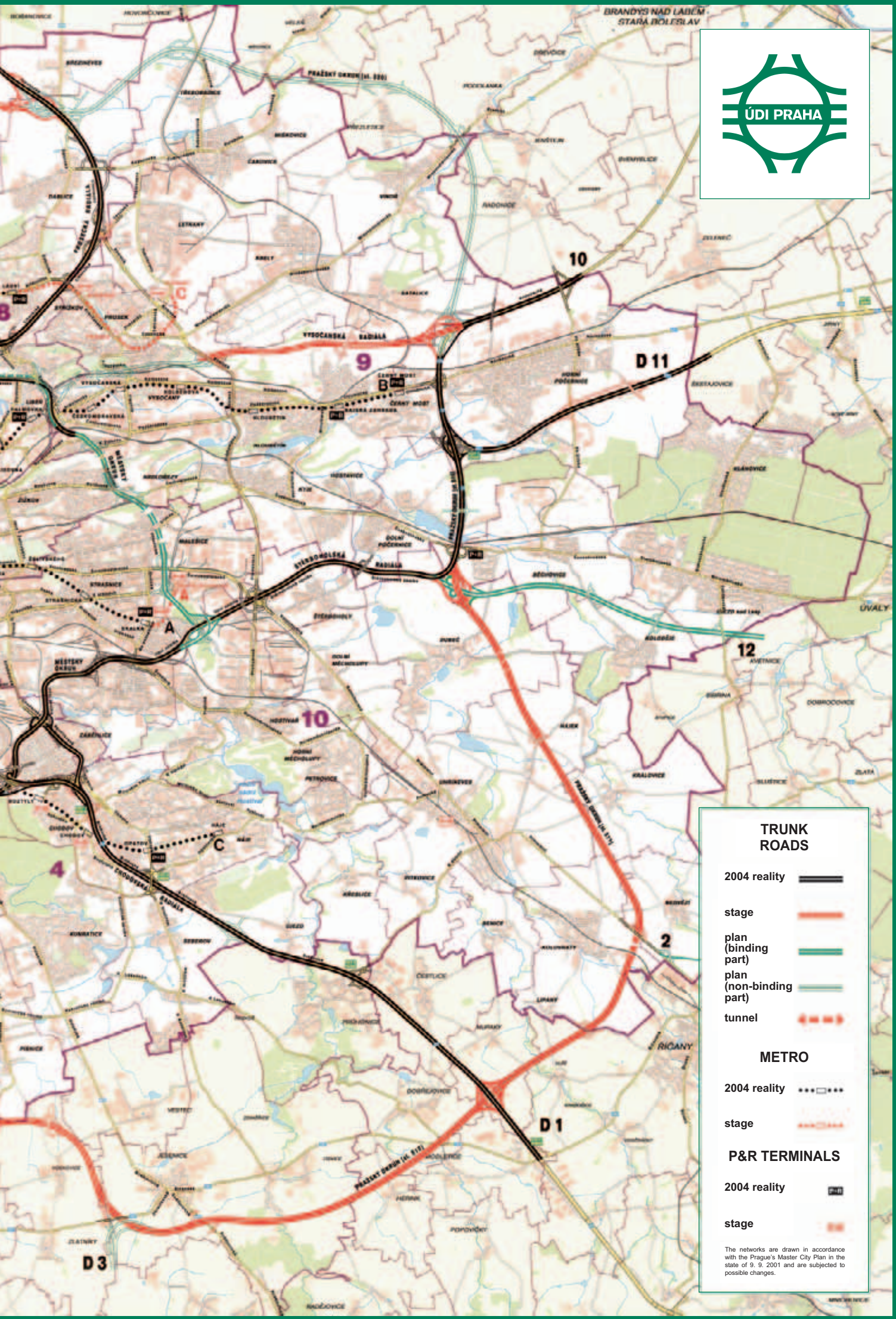
PRAHA

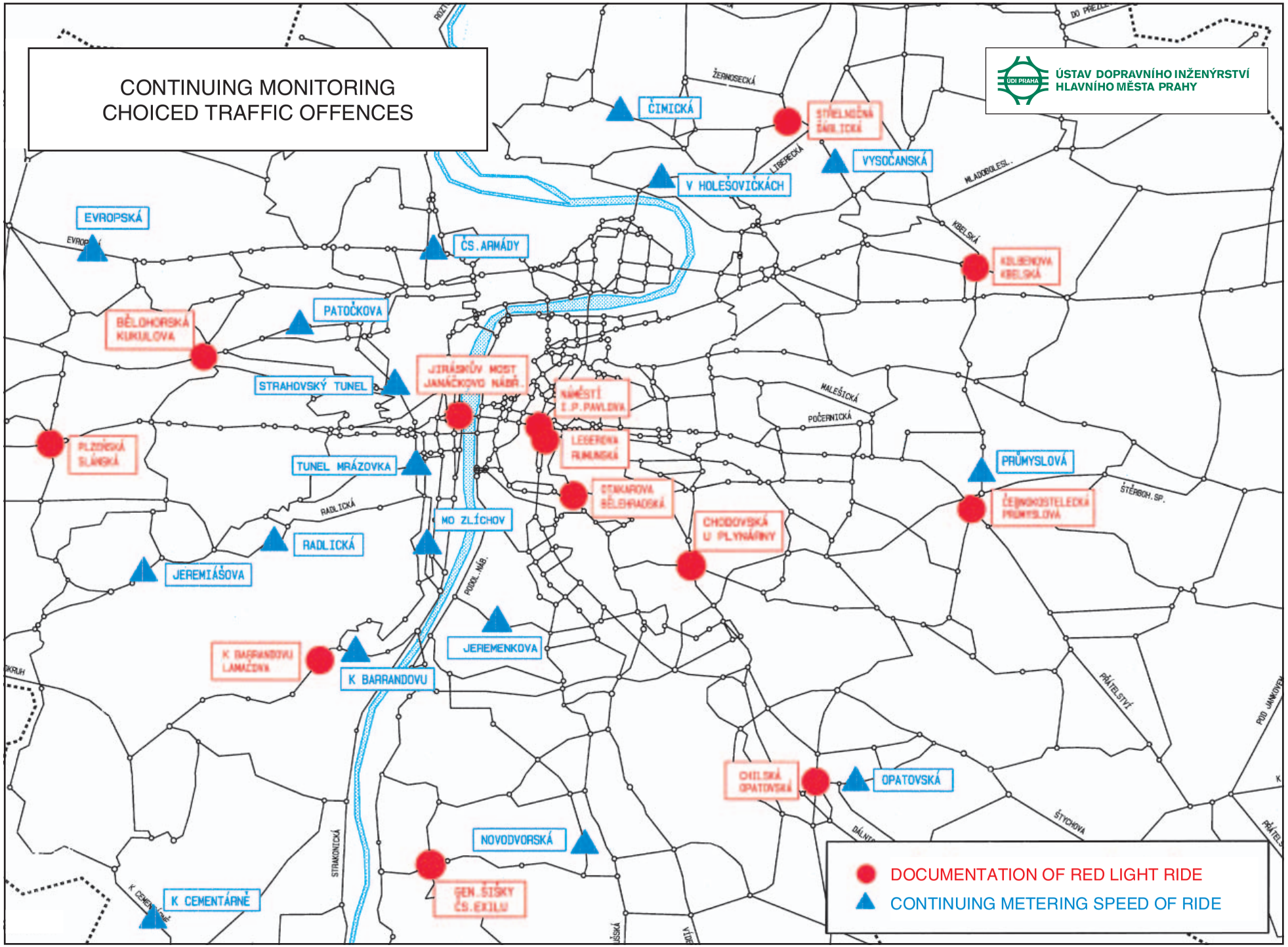
NETWORK OF TRUNK ROADS AND METRO (UNDERGROUND)

ÚSTAV DOPRAVNÍHO INŽENÝRSTVÍ
HLAVNÍHO MĚSTA PRAHY

110 00 Praha 1, Bolzanova 1
Tel.: +420 221 197 111
Fax: +420 224 211 380
e-mail: udi@udipraha.cz
http://www.udipraha.cz

1 : 90 000


ÚDI PRAHA
TRUNK ROADS
2004 reality
stage
plan (binding part)
plan (non-binding part)
tunnel
METRO
2004 reality
stage
P&R TERMINALS
2004 reality
stage
The networks are drawn in accordance with the Prague's Master City Plan in the state of 9. 9. 2001 and are subjected to possible changes.
BRANDÝS NAD LABEM - STARÁ BOLESLAV
PRAŽSKÝ OKRUH (st. 511)
VYSOČANSKÁ RADIÁLA
SVĚTOMĚŘICKÁ RADIÁLA
D 11
D 1
D 3
10
9
12
2
4
A
B
C


CONTINUING MONITORING
CHOICED TRAFFIC OFFENCES
ÚSTAV DOPRAVNÍHO INŽENÝRSTVÍ
HLAVNÍHO MĚSTA PRAHY
ČIMICKÁ
STŘELNIČNÁ
ŽABLICKÁ
VYSOČANSKÁ
V HOLEŠOVIČKÁCH
EVROPSKÁ
ČS. ARMÁDY
PATOČKOVA
BĚLOHORSKÁ
KUKULOVA
STRAHOVSKÝ TUNEL
JIRÁSKŮV MOST
JANÁČKOVO NÁBŘ.
NÁMĚSTÍ
I.P.PAVLOVA
LEGERova
RUMUNSKÁ
PLZEŇSKÁ
SLÁNSKÁ
TUNEL MRÁZOVKA
RADLICKÁ
MO ZLÍCHOV
OTAKAROVA
BĚLEHRADSKÁ
CHODOVSKÁ
U PLYNÁRNY
JEREMIÁŠOVA
PODOL. NÁB.
JEREMENKOVA
K BARRANDOVU
K BARRANDOVU
LAMAČOVA
NOVODVORSKÁ
GEN. ŠIŠKY
ČS. EXILU
K CEMENTÁRNĚ
STRAKONICKÁ
MALEŠICKÁ
POČERNICKÁ
PRŮMYSLOVÁ
ČERNOKOSTELECKÁ
PRŮMYSLOVÁ
ŠTĚRBOH. SP.
KBELSKÁ
KBELSKÁ
KBELSKÁ
OPATOVSKÁ
ŠTYCHOVA
PŘÁTELSTVÍ
DOCUMENTATION OF RED LIGHT RIDE
CONTINUING METERING SPEED OF RIDE

4.2 Traffic control centres

Management and development of the urban control and regulation road operation system is the responsibility of Prague Road Maintenance (*Technická správa komunikací hl. m. Prahy*).

The Principal Traffic Control Centre (*Hlavní dopravní řídicí ústředna – HDŘÚ*) is installed in the building of Public Transport Central Control (*Centrální dispečink MHD*) in *Na bojišti* street, district *Praha 2*. It is operated by Police of the Czech Republic (specifically, *Správa hl. m. Prahy*).

The Control Centre operates the VRS 2100, MIGRA and ADT systems to control TSDs. It is also equipped with a control worksite of the Prague road tunnel system which integrated the control and supervision over the newly opened *Mrázovka* tunnel in 2004. Additional worksite is a TV monitoring to watch and analyze the current traffic condition in the city. It scans TV pictures from over 200 cameras placed on key road sections and crossroads.

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), area 5 – Centre (since 2001) and, since the spring of 2004, also with portions of area 8 - East. This particular location was linked to the VRS system due to the Ice Hockey World Championship held in Prague in May, 2004, immediately after a new multi-purpose sports hall was completed in the *Libeň* neighbourhood and responding to changes in traffic operation around the hall. The regional control area 1 links to 27 TSDs. The regional control area 5 – Centre links to 14 TSDs and regional control area 8 can control directly 24 TSDs.

The VRS 2100 system offers an automated control with time-dependent or traffic-responsive program selection, or alternatively a manual program selection, manual TSD control or change to flashing amber. The Control Centre also provides for making traffic-responsive plans made from structural signal plans and assign individual TSDs to co-ordination sets. The operator can manually alter data and set up time and status control parameters. The main screen shows the current traffic condition on the city plan based on current volumes and engagement of sensors. The data are then evaluated and archived. The VRS 2100 control also operates a **TRASSIS** control system – traffic-responsive signal plans for eight TSDs of the area 1 on synchronized drive of *Argentinská - Bubenské nábřeží - Nábřeží kpt. Jaroše*.

The **MIGRA** regional control serves the area 3 - *Smíchov*. The operator worksite at the control room provides a map of the area with all the 27 TSDs marked out, whose operation can be visually checked and/or adjust individually. The MIGRA system features several levels of control. The adaptive control can follow the input from strategic, prolongation and demand detectors in order to optimize the length of cycles, green signal offsets on follow-up crossroads and limit values of green. Rather than select a predefined programs, the system optimizes traffic in real time.

The Centre's **ADT** control computer, by the end of 2004, operated 72 TSDs in the area 10 – *Vinohrady* and *Nové Město* neighbourhoods. The software, made in the 1980s, was updated to SYDO V with a new software version. The system can, just as the ones mentioned above, monitor the condition of software and hardware in the on-line controllers, switch TSDs off and over to flashing amber. The traffic control is managed from the Centre by extending phases of the structural signal plan by means of checkpoints (positions in the cycle which allow for the current condition to prolong for a period of time). Based on the values of traffic counts, a time-driven program selection is set up, with a manual intervention by the operator being always possible (in altering the length of delay in a checkpoint, selecting any program or a green wave). Due to a disrepair of cables, 18 TSDs making a synchronized drive through crossroads on *Evropská* street in Prague 6, allow only flashing amber to be selected from the Control Centre in this location.

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

- a control workstation for the *Strahov* road tunnel; *SAT*;
- a control workstation for the *Mrázovka* road tunnel; *MAT*;
- a control workstation for the *Letná* road tunnel, *LAT* (temporarily limited to technology tunnel equipment);
- a control workstation for the *Těšnov* road tunnel, *TAT*;
- a control workstation for the *Zlíchov – Radlická* underpass, *Zl-Ra*.

The Control Centre operates also a **TV supervision control** which monitors critical spots on the road network. Prague has 219 fixed and rotary TV monitoring cams, the pictures of which are available to the Control operators and Prague Public Transport dispatchers. The West Side **Park & Ride** (**P+R**) system is also included in the control system. **Variable traffic information signs** that inform drivers by means of text messages on relevant changes in the current traffic condition of the area (congestions, accidents, traffic condition) are gradually installed on other locations of the city. The operator is Prague Road Maintenance which provides information and data transmission by means of its radio network.

The Inner Ring section *Zlíchov – Radlická*, inside the *Strahovský* tunnel, and since 2004, inside the recently opened *Mrázovka* tunnel, operates the **measuring of the speed of the traffic flow by means of UNICAM VELOCITY camcorders**. The system is also linked to the Control Centre and collects, evaluates and archives information on violations made by drivers on the Inner Ring section. The section is also equipped with variable information signs and 115 camcorders to supervise the traffic.

The Prague road network has also **devices for permanent speed measuring and cameras detecting and documenting red light violations on the TSD**. In the end of 2004, red light violation was documented in 13 TSDs and there was 15 spots of permanent vehicle speed measuring.

4.3 Telematics in traffic

Traffic telematics integrates IT and telecommunication technology with traffic engineering for the purpose of assisting current infrastructure to increase traffic volumes, safety and comfort of travel.

Main principles to design an efficient system of telematics for traffic in *Prague („Zásady rozvoje dopravní telematiky na území hl. m. Prahy")* were accepted in 2002. 11 fundamental function areas of a traffic system were defined to be developed in Prague:

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

Individual function areas are developed over the general system outline since 2002. Putting the Capital of Prague telematics system in practice is a long-time business that must be, due to its magnitude, built in steps. In 2004, the approved strategy continued to support the development of the "road traffic control", and related to options opened up by traffic centres, a traffic information system was launched to provide information on the density of traffic around *Sazka Aréna* sports hall and other traffic information such as views from selected TV supervision cameras as well as the figures concerning vacancies on P+R parking via internet and mobile phones. Devices have been installed in the city centre for operational information, offering drivers current data on the number of vacancies at parking lots of *Slovan* and *Wilsonova*.

Texts compiled on traffic and travel information in previous years confirmed the general public is indeed interested about information of this type. That is why preparations were launched to set up a traffic information centre of the Capital of Prague (*DIC Praha*) in 2004. The *DIC Praha* is going to process traffic information from the Prague area and provide them via the internet, mobile phones, media and devices for operational information to drivers and passengers. The *DIC Praha* has a brand-new information platform in Prague and in the Czech Republic. It will make possible the usage of the RDS-TMC system which is a fully standardized system to provide traffic information to the drivers that had their cars equipped with a built-in navigation system with TMC functionality. The implementation is made jointly by many entities, both private and public. The pilot operation is to start in 2005.

5. NEW TRAFFIC ARRANGEMENTS

A profound change in traffic arrangements in public municipal transport affecting especially the northern quarters of the city was the start of operation of a new section (IV) of Metro line "C" *Nádraží Holešovice – Kobylisy – Ládví*. Simultaneously bus lines have been significantly altered in that most buses from the North Side have been terminated at the new Metro stations. The feed bus lines formerly went as far as the *Nádraží Holešovice* underground station. Cutting them short have brought about saving in bus fleet and the density of bus traffic on affected roads, notably on the *V Holešovičkách* street. A new P+R parking facility has been made next to the *Ládví* underground station as well as other stopping opportunities of the K+R sort (Kiss and Ride) close to the two new stations.

In order to reinforce PT priority in Prague, almost 1,500 m separators along tramway tracks to facilitate smooth tram operation were installed last year coming close to 8 km of this fitting in total length. Concerning the bus network, a dedicated PT bus lane was marked out in 2004 in *Modřanská* street in the direction from the centre in front of the approach to the ascent to the *Barrandovský* bridge measuring 120 m. The total of 6.6 km on the city roads has been achieved in dedicated bus lanes and an additional almost 5 km on tramway track beds.

Concerning passenger car mobile traffic arrangements, another outstanding change was launching the City Ringroad section between streets Radlická and the southern foreground of the *Strahovský* tunnel whose most important portion is the *Mrázovka* tunnel. The tunnel is equipped with the latest technology of road signs and traffic control (stripe signs, informative signs, gates should tunnel or a portion of which be closed). The safety devices for emergencies in the tunnel (independent air vents, linear automatic fire alarm detection, coverage along the full length of the tunnel with the radio signals of all security forces including GSM operators, the *Radiožurnál* broadcasting station with the option of voice intervention, evacuation broadcast and SOS boxes with a standard safety equipment) are also top level. Launching the *Mrázovka* tunnel made possible to widen the Environmental Zone (no entry for goods vehicles over 6 tons of gross weight) in the larger city centre to a portion of *Praha 5* area, which was implemented in the 3rd quarter of 2004.

Other small but permanent alterations in traffic arrangements have been made in Prague inner city (especially *Praha 1* area) in 2004. Occasionally, they relate to completions of local road network constructions.

6. TRAFFIC ACCIDENTS

6.1 Road accidents

In 2004, there happened 29,598 accidents in Prague (17 % less than in 2003), 56 victims died (14 % less) and 3,741 victims were injured (6 % less). Pedestrians were involved in 825 accidents (9 % less) with 26 fatalities (7 % less) and 835 persons injured (9 % less). Pedestrians were themselves culpable in 384 accidents (15 % less) with 12 fatalities (9 % more) and 392 injured (13 % less). By far the dominant share rests with the drivers (28,695 out of 29,598 accidents, i.e. 97 %). The most frequent causes of driver's accidents were reckless driving, failure to give way and speeding. The number of accidents with culprits found under the influence of alcohol was 820 (17 % less).

Main causes of accidents

Year	2001	2002	2003	**2004**	diff. 04/03 (%)
accidents	34 195	35 888	35 589	**29 598**	-17
fatal injuries	67	82	65	**56**	-14
serious injuries	452	477	466	**428**	-8
slight injuries	3 521	3 679	3 509	**3 313**	-6
accidents with injuries	3 243	3 398	3 269	**3 086**	-6
accidents without injuries	30 452	32 490	32 230	**26 512**	-18
Driver culpable due to	33 140	34 782	34 630	**28 695**	-17
speed	3 298	2 860	2 473	**2 821**	+14
passing	314	345	299	**222**	-26
failure to give way	8 776	10 177	9 588	**8 463**	-12
reckless driving	20 752	21 400	22 270	**17 189**	-23
Driver not culpable	1 065	1 106	959	**903**	-6
due to road defect	147	138	98	**121**	+23
due to pedestrian	470	487	454	**384**	-15

General trend in 2004 accidents: an outstanding decrease in accident number, decrease in fatal injuries and a mild decrease in serious and slight injuries comparing to the previous year.

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. In 1990s traffic accidents started to increase more than VKT. Consequently, the accident risk rate indicated in relative accident rate, i.e. the number of accidents per one million VKT, also went up. Since 2001, the number of registered accidents went down in spite of automobile traffic further increasing. Accordingly, the relative accident rate lowered also (by 38 % in 2004 comparing with 1990). In 2004, the all-Prague average was 4.6 registered traffic accidents in 1 million of vehicle-kilometres covered.

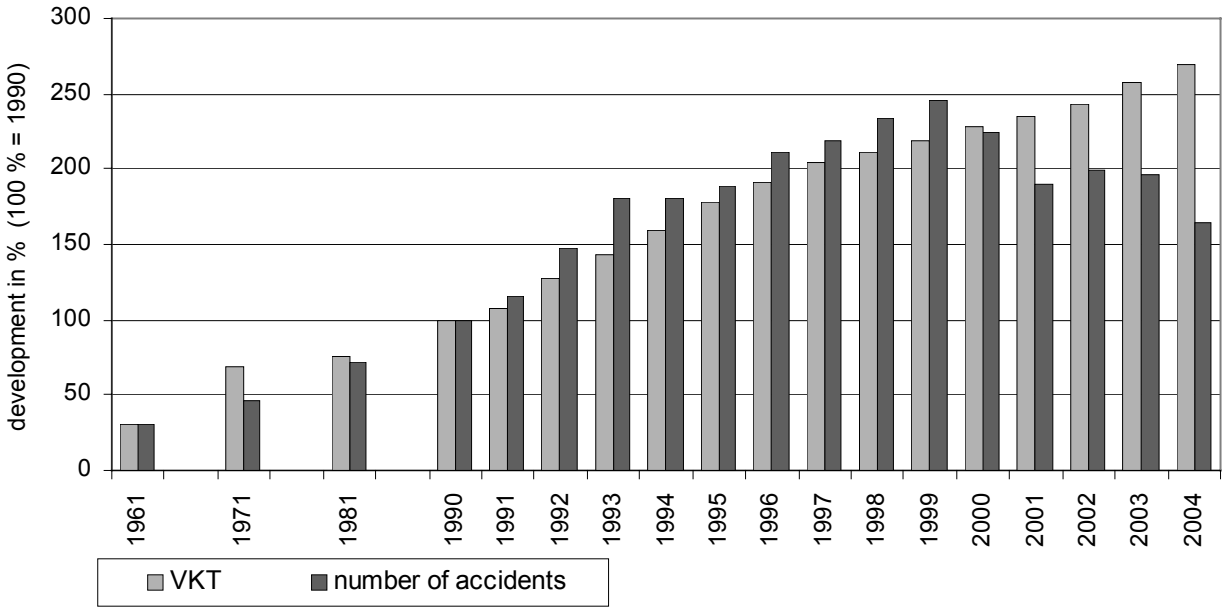
Traffic accidents, injuries and relative accident rate, 1961 - 2004

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
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
2003	35 589	197	65	71	466	126	3 509	125	5.7	257
2004	**29 598**	**164**	**56**	**61**	**428**	**116**	**3 313**	**118**	**4.6**	**270**

100 % = 1990
Relative accident rate = number of accidents per million VKT (average values, total road network)
VKT = vehicle kilometres travelled, total road network

Note: The drop in registered traffic accidents since 2001 was also affected by the regulation of the Road Traffic Act, No. 361/2000 Coll., which, since January 2001, makes mandatory to report to police only accidents with injuries or material damage obviously exceeding CZK 20,000 while till the end of 2000 it was obligatory to report to police the accidents with injuries or material damage obviously exceeding CZK 1,000.

Accidents and VKT, 1961 – 2004
Total road network, annual summaries



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. Some of the events concerned with prevention of traffic accidents is held jointly with the Czech Ministry of Transportation. In 2004, the traffic education events were funded from the municipal budget with CZK 1,560,000 (including CZK 550,000 for the joint project of the Institute of Transportation Engineering of the City of Prague and the Prague Constabulary entitled "Road Safety for All") and approximately CZK 200,000 from the funds of the Ministry of Transportation.

The following programmes of children's traffic education were made in 2004:

- Cyclist Starter Action (Cyclists' Traffic Contest)
- Systematic Training Effort on children's traffic playgrounds
- Traffic education broadcasts for children and youth
- Interactive theatre performances on traffic-educational topics
- A traffic education event for children's home clients.
- A school starting event focused on the youngest pupils of all Prague schools
- A workshop for workers on children's traffic playgrounds
- A workshop for primary school teachers.

6.3 Measures to enhance road safety

Multiple traffic measures were implemented in 2004 with the primary focus on enhancing the security of pedestrians on pedestrian crossings and around school facilities.

Speedhumps, built in or assembled, have been introduced on many spots to reduce the speed of vehicles.

Reinforced lighting at pedestrian crossings has been installed on 70 locations. Traffic signs with retroreflective fluorescent sheeting have been used at 20 pedestrian crossings.

Some streets have been equipped with BOCH-type separators or City block elements.

The other traffic safety items include anti-parking columns, traffic mirrors, security railing and optical brakes.

A friendly speed-measuring signs have been introduced close to educational facilities on *Ke Kateřinkám* street in *Praha 11* and on *Ankarská* street in *Praha 6*. A vehicle approaching with a speed below the limit will light a green message "**THANK YOU**", a speeding vehicle would trigger a message shining in red "**SLOW DOWN**".

Security measures in 2004 in the framework of road safety *BESIP* programme totalled CZK 47.2 mill., including CZK:

- 17.1 mill. to strengthen lighting on pedestrian crossings,
- 4.8 mill. for speedhumps,
- 3.2 mill. to set guard rails,
- 4.9 mill. for traffic measures, road mirrors implementation and carriageway surface corrugation.

7. TRAFFIC AT A STANDSTILL

7.1 Parking in the inner city

Inside Prague Conservation Area (8.7 km^2), i.e. in *Praha 1* and portions of *Praha 2, 4* and *5* municipal areas, there are:

on the streets	16 150 places to stand,
inside yards	2 842 places to stand,
the total is	18 992 places to stand (excluding garages)

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 km^2) 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 **on the right riverbank of *Praha 1*** 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 cars of the residents (individuals 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)	2 198 places
- long-term (blue zone)	5 986 places
- handicapped	233 places
- other (reserved for the Government and authorities)	353 places

Average occupancy of standing places in ZPS (2004)

- short-term standing	96.2 %
- long-term standing	87.1 %

Fees for the utilization of standing places in ZPS

- short-term standing (orange zone)	40 CZK/h
- short-term standing (green zone)	30 CZK/h
- short-term standing (green zone – border sectors)	15 CZK/h
- 1st vehicle of an individual	700 CZK/veh./yr
- 2nd vehicle of an individual	7 000 CZK/veh./yr
- 3rd vehicle of an individual	14 000 CZK/veh./yr
- 1st business vehicle of an individual	12 000 CZK/veh./yr
- any vehicle of a business legal entity or 2nd or more business vehicles of an individual	50 000 CZK/veh./yr

On the left riverbank of Prague 1 with the area of 2.4 km^2 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.

7.2 Car parks

Currently, the greater city centre has available public car parks with the total capacity of 9,357 parking places. The largest ones are:

KOC Nový Smíchov	2 000 standing places
Kongresové centrum	1 090 standing places
Garáže Palác Flora	800 standing places
Garáže Helios (*Wilsonova* st.)	520 standing places
Zlatý Anděl	500 standing places

Furthemore, 34 private parking facilities are available there comprising 4.8 thousand places.

The total capacity of parking in Prague is not available. It is estimated at roughly 160 000 parking places. So far, 188 locations of car parking facilities (including battery garages) is registered outside of the sites listed above. Mostly they are not public.

Additionally, 365 off-street localities are registered on the city territory having capacity about 39 700 standing places, including 43 % supervised.

7.3 Park and Ride (P+R)

In the first half of 2004, the P+R system operated 14 parking facilities. Since June, when the "C" Metro line extended to *Ládví*, another parking site was opened close to the *Ládví* underground station with the capacity of 81 parking places.

The total parking places for the P+R users as of 31. 12. 2004 on 15 sites was 1,482 stání + 52 places for handicapped. The number of parking places for the public in individual localities is shown in the following table:

Park and Ride

	Number of standing places			
Site	P+R	handicapped	residents + other	Total
Běchovice	94	6		100
Černý Most I	294	6		300
Černý most II	131	7		138
Holešovice	74	2	1	77
Ládví	81	4		85
Modřany	51	2		53
Nové Butovice	57	2		59
Opatov	182	4	26	212
Palmovka	119	3		122
Radlická	35	2		37
Radotín	21	2	40	63
Rajská Zahrada	87	3		90
Skalka	107	5	65	177
Zličín I	85	2	1	88
Zličín II	64	2		66
Total	1482	52	133	1 667

The utilization of P+R is shown in the following table which compares the numbers of parking cars on P+R sites in Octobers of 2001 – 2004.

Vehicles parking at P+R in October 2001, October 2002, October 2003 and October 2004

Site	Parked vehicles			
	10/2001	10/2002	10/2003	**10/2004**
Běchovice	-	1 498	180	**140**
Černý Most I	10 716	3 481	9 818	**9 714**
Černý Most II	-	-	2 042	**2 934**
Holešovice	3 226	1 453	3 299	**2 759**
Ládví	-	-	-	**2 184**
Modřany	-	213	310	**0 ***
Nové Butovice	2 572	1 689	2 136	**1 988**
Opatov	5 073	5 389	5 732	**5 890**
Palmovka	4 446	3 779	4 183	**3 521**
Radlická	1 272	948	1 169	**1 003**
Radotín	463	878	918	**768**
Rajská Zahrada	2 837	409	2 697	**2 626**
Skalka	2 762	2 461	3 408	**3 336**
Zličín I	3 508	3 622	3 510	**3 618**
Zličín II	2 111	3 432	2 505	**2 609**
Total	38 986	29 252	41 907	**43 090**

* The P+R site *Modřany* not available due to road reconstruction

The parking utilization in 2002 was affected by the special PT regime following the flood, especially with restrictions on sections of Metro lines. Since 2003, these parking facilities have been mostly showing a rise in occupancy. Maximum usage (number of vehicles on a place per month) shown the *Zličín I* P+R in October 2004.

Considering the growing demand on parking places for residents, a suggestion was to use unoccupied places at some parking facilities in times of low demand and during night hours when P+R parkings are out of operation. Occupancies of P+R sites has been evaluated, showing that some parking sites might be used for parking residents from 6 p.m. to 7 a.m.

A supplementary service on P+R sites is a bike storage. Bikers are offered this service free of charge, that is why they cannot use the public transport discount.

In June 2004, an inquiry was conducted on 10 P+R sites. The users were asked on the origin, destination and purpose of their trip as well as the reason for using the P+R facility and the occupancy of the vehicle.

The P+R sites were reached with the following frequency: from the distance 0-10 km – 26 %, 11-20 km – 30 %, 4 % vehicles came from a distance greater than 130 km. An average distance to a P+R site was 34.7 km.

The most frequent purpose indicated was commuting, in 70 %. The reason to use the P+R facility was for 32 % respondents saving time while 18 % indicated having their car supervised and 17 % mentioned problems with parking at destinations.

An average occupancy was found 1.29 persons per vehicle.

7.4 K+R stopping places

The combined mode of transit called K+R (Kiss and Ride) has the advantage that a driver can park for a short moment, the accompanying passenger gets out to continue by a public transport while the car goes on. In Prague, this way of parking is often practiced next to Metro stations in spite of lacking safe conditions at some stations for passengers to get out or in. In order to secure adequate conditions for this way of parking, it is needed to mark out, in stages, the portions of roads close to Metro stations for vehicles to stop and passengers to get safely out or in. A car is allowed to stand on the marked out places for 5 minutes.

Places are already demarcated for this manner of parking next to the *Černý Most* station on the "B" Metro line in the direction from the centre and next to the *Kačerov, Vltavská, Opatov, Kobylisy* and *Ládví* stations on the "C" line in the direction to the centre.

In May, 2004, an 8-hour survey was conducted at 3 Metro stations where K+R type of parking is observed. The maximum demand in the peak fifteen minutes (from 7 to 7:15 a.m., from 3:30 to 3:45 p.m.) reached as many as 15 vehicles per locality.

8. BICYCLE TRAFFIC

The concept of development of the basic system of bicycle routes across Prague was approved by the Resolution of *"RHMP"* No. 0544 as of 29. 4. 2003. The concept serves to prepare and introduce all the envisioned 450 km bicycle routes. The routes of the basic system are selected in order to cover the whole area of the Capital. They are found, provided local conditions allow for it, in streets with low intensity car traffic, in roads which bikers share with pedestrians or on dedicated paths for bikers only. The basic system of bicycle routes throughout Prague are marked out in line with the Regulation of the Ministry of Transportation No. 30/2001 Coll. with the traffic signs for bikers.

By the end of 2004, the total of 185 km of the municipal bicycle route system was already demarcated and is operated. It includes roughly one third (63 km) of them led on ways with no car traffic and jointly with pedestrians along available ways in parks and woods or along newly built separate ways for bikers and pedestrians.

A new section of a bicycle path was opened in 2004 running in *Vysočany* along the banks of *Rokytka* between *Nad Kolčavkou* and *Freyova* streets (1.6 km), a prolonged bicycle path along the *Berounka* river approaching the *Radotín* harbour (1.5 km), and a new section with bikers and pedestrians sharing has been built along the *Botič* brook behind the block in *Sámova* street between *Petrohradská* and *U vršovického nádraží* streets (0.5 km).

The following new routes were designed in 2004:

- *Troja* – Prague border, 4 km long; expected construction date: spring 2005
- *Troja* – *Ďáblice*, 8 km long
- *Staroměstské náměstí - Klárov - Pohořelec*
- *Modřany* – *Lhotka* – *Cholupice* – Prague border, 13 km long
- *Modřany* – the *Závodu míru* bridge, 3 km long
- Ring Route around Prague
- *Radotín* – *Černošice*, bicycle path along the *Berounka* river

9. PEDESTRIAN TRAFFIC

Walking is the most natural and most frequent mode of human locomotion. Any trip by whatever traffic means starts and ends by walking. An estimated 23 % of all trips inside Prague is made only on foot.

The greatest number of intra-urban trips (almost one third) is made in the city centre on the area of the district *Praha 1.* Its origin or destination on the territory of *Praha 1* have 23 % of all intra-urban walks while other 9 % of walking trips are made only within its borders.

The width of some roads in the city, especially in the centre, is not adequate for the volumes and significance of pedestrian traffic. The reason is the narrow space in some streets and lanes in the city centre which does not allow for parallel movement of all the means of transport in an appropriate qualitative conditions. Another reason is some of the space utilized today for transport used to be populated by pedestrians only, aggravated by the current demand on parking space. In spite of mild year-to-year improvements due to pedestrian or residential zones extended or made new, the problems of this type compound notably in residential areas.

A new residential area was established in 2004 in sections of narrow lanes of the Old Town with dense streams of pedestrians, linked to the pedestrian precinct around the Old Town Square.

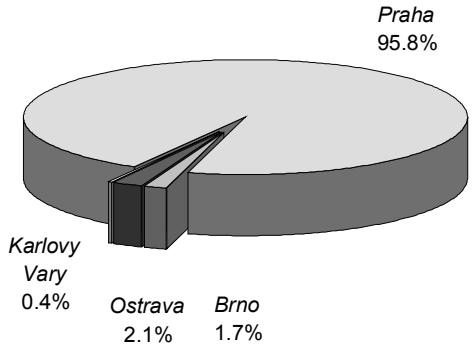
The pedestrians obtained a larger space and a quality equipment also on the *náměstí Republiky* square in the space between the rear of the *U Hybernů* palace and the redeveloped building of the Old Customs. The solution has been made possible also thanks to constructing capacity underground garages available to public while new hotels and administrative buildings were being built around the *V celnici* street.

The city and local administrations focused again in 2004 on enhancing security at locations known as dangerous for pedestrians, especially where more people have to cross the road lanes. Measures were taken in keeping with local conditions to make their exposure as short as possible, provide for a better visibility and, last but not least, having the crossings visibly stand out. Designs of enhanced pedestrian crossings in the years to come will be made easier with a methodical instruction compiled by *ÚDI* containing types of solution how to enhance crossings between intersections.

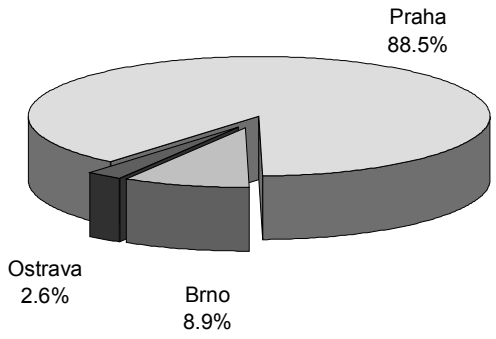
10. AIR TRANSPORT

Air passenger and freight transport is conducted mainly at the *Praha-Ruzyně* airport. The other three airports in and close to Prague (Točná, Kbely, Odolena Voda) 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 in 2004 was 6.6 mill. passengers (theoretical capacity), specifically 0.2 mill. passengers in terminal South and 6.4 mill. passengers in terminal North. The operating capacity of the airport is 203,000 aircraft movements/year. Two terminals are available for clearing cargo, each with the capacity of 100,000 t/yr. In 2004 the *Praha–Ruzyně* airport was operated on by 50 companies with regular lines and 346 entities with chartered lines. Regular connections to different parts of the world further expanded, reaching 108 as the total number of destinations in Europe and other continents this year. The biggest volumes of passengers were cleared to European destinations, viz. London, Paris, Frankfurt am M., Amsterdam, Copenhagen, Moscow, Manchester a Zürich.

Share of Czech airports in passenger transport performance
% from the overall volume of cleared passengers

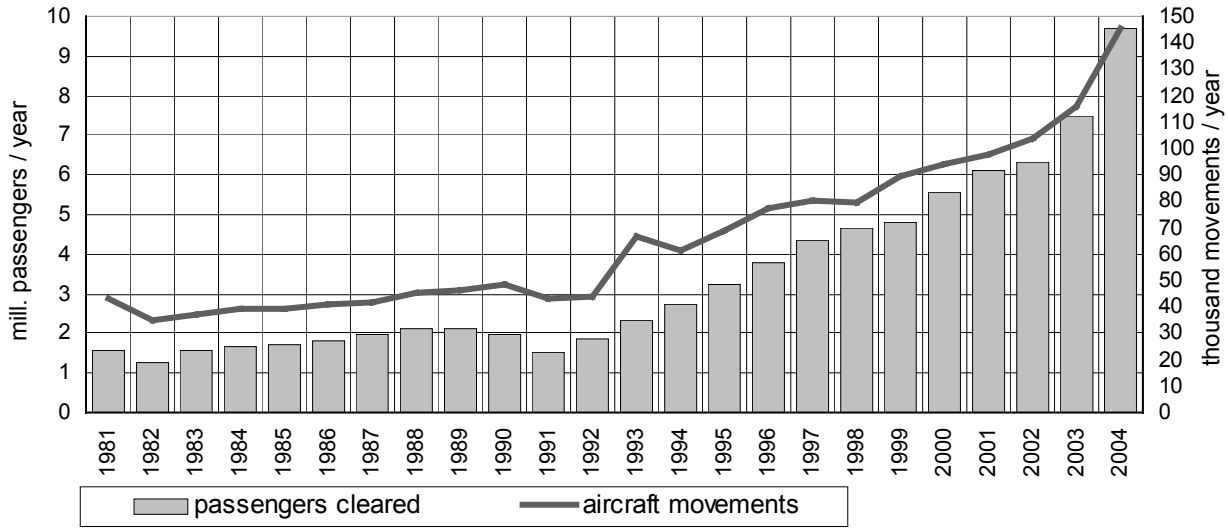


Share of Czech airports in cargo transport performance
% from the overall volume of cleared cargo incl. mail



The total of 9,696,400 passengers were cleared through *Praha–Ruzyně* airport (capacity of which was exceeded) in 2004. Comparing with 2003, it is a record annual increase by 2.2 mill. passengers (28.9 %). The numbers consist of 83 % passengers transported by regular lines, the remaining 17 % by special lines. The most passengers were cleared in August (1,068,500 persons), the least in January (495,500 persons). Compared to 2003, the monthly high was by 22.7 % higher in 2004.

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

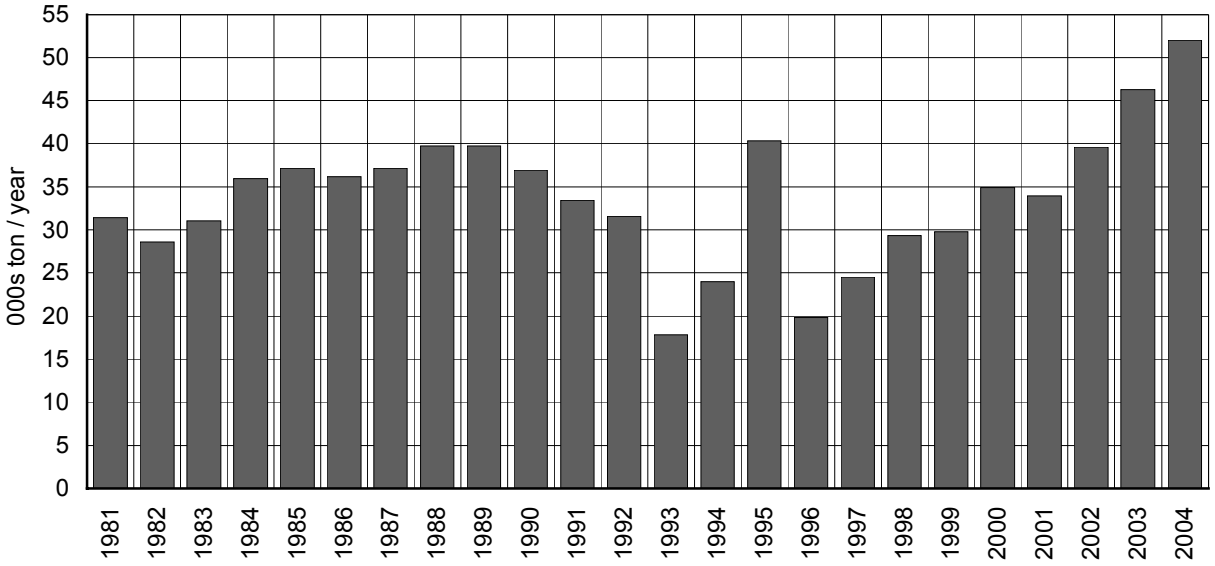


The number of aircraft movements in 2004 was 144,962 moves/year, which is by 29,206 moves more than in 2003 (by 25.2 %). The highest number of movements (14,062) was recorded in August, the lowest (8,714) in February. Compared to 2003, the maximum monthly number of movements in 2004 was higher by 26.1 %.

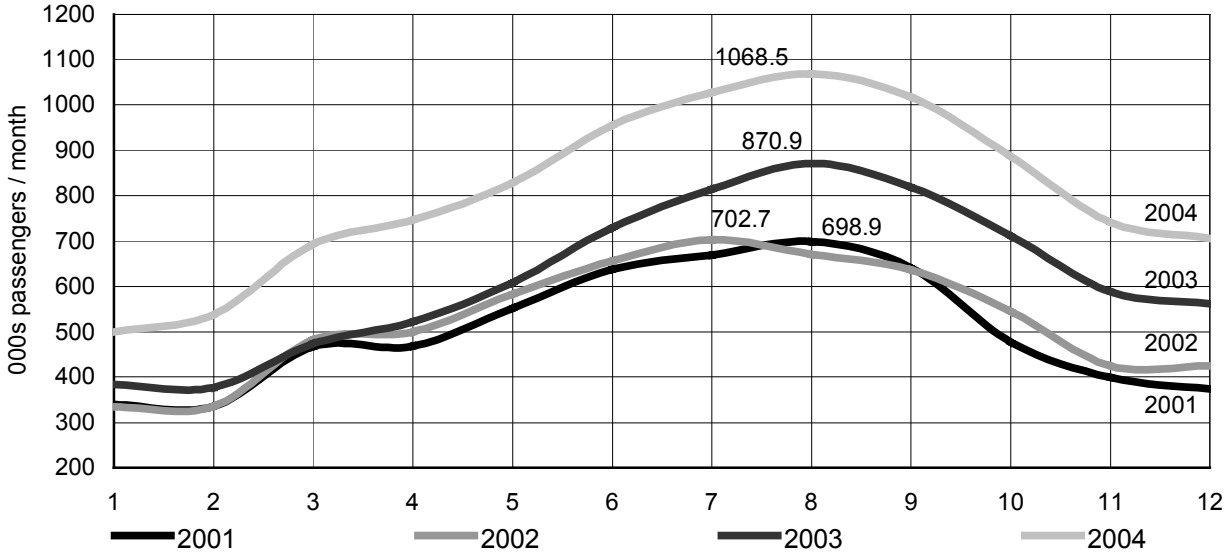
In 2004, cargo transport handled 46,884.7 t of goods and 5,201.3 t of mail. The total cargo transport reached 52,086 t, increasing by 12.5 % against 2003. The most cargo was transported in November (5,223.5 t), the least in July (3,461.4 t). The monthly high was in 2004 higher by 23.2 % than in 2003.

After 1991, which was the weakest year in passenger transport since 1982, the number of cleared passengers started to ascend sharply, beating the all-time high of the airport as early as 1993 (about 2.2 mill. passengers/year in 1978-79). Simultaneously, numbers of aircraft movements also rise. The cargo transport goes steadily up, too, so that in a long-time average it almost reaches the maximum average volumes achieved in the past.

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

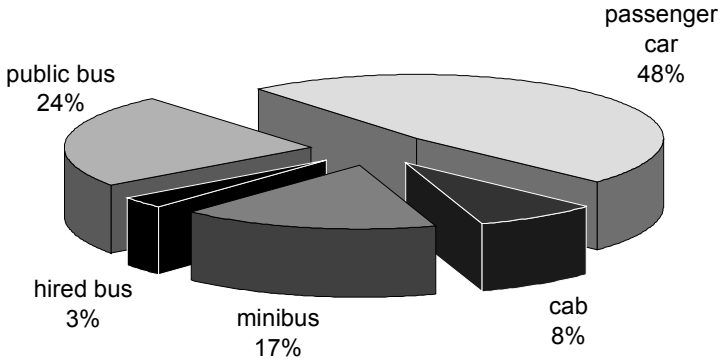


Number of passengers cleared at *Praha – Ruzyně*, monthly, 2001 – 2004



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 two municipal PT bus express lines linked to the Metro terminals at *Dejvice* (line A) and *Zličín* (line B). Other bus lines connect *Jihozápadní Město* housing estate. 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.

Airport-to-city modal split, October 2003



The total number of lay-bys and parking places at the Air Terminal North (i.e. next to the main terminal building) serving the general public, airport employees and business companies that operate at the airport, is approximately 6,400 places. The number of places slightly decreased in 2004 as a public outdoor short-term parking had to be dismantled due to the construction of another terminal. The parking facility in the building "C" provides over 2,700 places for the public, 332 more places are here reserved for car renting companies and 63 places is kept for immobile persons. The parking "C" services include coach lay-bys. The Air Terminal South provides 125 parking places for the public.

11. WATER TRANSPORT

Shipping on the *Vltava* river 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 shipping and its operation which is mostly of holiday type is carried out by several companies. The operators specialize in various sorts of cruises through Prague as well as boat trips from Prague to *Slapy* or to *Praha–Troja* or to *Mělník*. Ships can be hired for social events, river disco or as a sightseeing restaurant.

The largest passenger shipping operators are the Prague Steamship Company (*Pražská paroplavební společnost, a. s. – PPS*) and the European Water Transport (*Evropská vodní doprava s. r. o. – EVD*).

The Prague Steamship Company is the oldest company, established as early as 1865 when it owned its first steamship. The last steamships were purchased by the company in 1940s, two of them still being operated. They are the parlour steamships *Vltava* and *Vyšehrad* with restaurants and capacities of 200 and 300 places. Also in operation are two motor restaurant ships with capacities 164 places and two sightseeing motor ships with capacities 200 places each. In 2004, the *PPS* transported 110,150 passengers. Most of their clients were foreigners – 61,900 passengers (about 56 %). The regular lines transported 46,240 passengers – i.e. 42 %, a special transport was used by 63,910 passengers, i.e. 58 % out of the total number of persons transported. The number includes 8,200 domestic (13 %) and 55,710 foreign persons (87 %).

The European Water Transport operate 8 modern passenger ships. The total capacity of the largest one, paddle-wheel-propelled, is 400 places. Four ships have the capacity of 140 places, two ships are 124 places in capacity and one ship takes 185 persons. The *EVD* transported the total of 181,600 persons in 2004.

Apart from these, there is a number of smaller companies that offer cruises and social events on individual orders.

The ship transportation is all-year round, either along regular timetables, or on demand from individual customers.

Various carriers including foreign companies operate cargo ship traffic along the *Vltava* river. One of the largest carriers is *Evropská vodní doprava s.r.o.*, which provides domestic and international transport of mass substrates, heavy pieces, containers, liquids etc. Their fleet includes 37 vessels. The total tonnage of all vessels is 28,000 t. The company owns also floating machinery - platforms for construction or other purposes.

The volume of the cargo shipping and numbers of ships flown in 2004 as compared with 2002 and 2003 are presented in the table below.

	Freight handled (t)			Ships used		
Sluice	2002	2003	**2004**	2002	2003	**2004**
Modřany	71 136	63 158	**86 254**	1 307	1 785	**2 413**
Smíchov	126 206	77 398	**130 404**	17 729	21 617	**23 967**
Mánes	7 251	6 523	**4 018**	2 604	2 878	**2 998**
Štvanice	117 296	83 289	**126 295**	3 603	4 118	**5 330**
Podbaba	214 173	241 000	**293 027**	1 203	1 415	**1 690**

Three harbours are found on the municipal territory: *Holešovice, Smíchov* and *Radotín*. They serve to reload various freight. The operator is Czech Harbours Company(*České přístavy a. s.*). The harbour users are carrier, warehousing, loading and producing companies and entities that use the land, buildings and infrastructure for road, railway and river transport.

12. TRANSPORTATION INFRASTRUCTURE DEVELOPMENT

12.1 Engineering infrastructure

In 2004, several important traffic constructions were put in operation. Their completion substantially ameliorated the quality of public transport and brought about an improvement in the conditions of car traffic in the city.

In June, passenger transport was launched on the new, 3.9 km long section of Metro IV. C1 from the *Nádraží Holešovice* station through *Kobylisy* to *Ládví*. At *Kobylisy* there is an interchange for urban and suburban bus lines as well as 6 tramway lines. The station is the first one in Prague Metro drawn single-nave. At *Ládví* it is possible to change for other bus and tram lines. Closely linked to this makeshift line "C" Metro terminal is a new P+R facility with the capacity of 85 parking places. A short-term K+R stop is provided on the *Střelničná* street at the entries to the station. The public transport ride to the city centre is now shorter by 10 minutes. Connecting the northern terrace to the underground network affected substantially the bus lines which are shorter now (the feeding lines had earlier terminated as far as the *nádraží Holešovice* underground station, while today they go only to *Kobylisy* or *Ládví)*. The measure brought about savings in bus fleet and reductions in bus traffic density on the affected roads, especially *V Holešovičkách*.

In August, another, about 1.3 km long section of the City Ringroad – tunnel *Mrázovka* was put in operation. It connects *Radlice* with the *Strahovský* tunnel.

Altogether 31,900 vehicles went through the *Mrázovka* tunnel in both directions from 6 a.m. to 10 p.m. on a workday in the 4th quarter of 2004, according to a survey. The number includes 1,700

goods vehicles, buses and coaches. It helped reduce traffic volumes in the streets of *Smíchov* as well as travelling times in both passenger car traffic and public transport.

In August, a portion of an important bridge was put back into service on the *Strakonická* road. The reconstructed *Lahovický* bridge when complete provides two lanes in each direction, a turn-out lane to *Radotín* in the direction from *Strakonice* and a merging lane from the *Výpadová* street in the direction form the city centre. A new bicycle path runs on the bridge. A grade-separated junction to the *Výpadová* street was also included in the reconstruction of the bridge as well as raising its headroom by over a meter to 4.5 m. The grade line of the *Výpadová* street in the headroom was also raised to the level of "quinquennial water" (a five year flood expectancy).

In September 2004 following a long-time closing, the railway underbridge in the *Seifertova* street was re-opened as a portion of a building complex interconnecting railway stations *Praha–Hlavní nádraží* and *Praha–Masarykovo nádraží* with the *Praha–Libeň* railway station (called the "New Connection"). The road in the underbridge was widened so as to make possible to provide a separate raised tram trackbed, two lanes in front of the *Bulhar* crossroads close by and one lane, wide enough, leading toward the *Žižkov* neighbourhood. The footwalks on both sides of the road are also on a raised grade. The grade line of the underbridge road and of the deck above was made possible by raising the headroom. The construction included a foot bridge over the *Seifertova* street in the level of the *Příběnická* street.

In 2004, traffic infrastructure in the city centre was still being reconstructed after the August 2002 flood. One of the key efforts was the *Sokolovská* street between *Šaldova* and *Zenklova* streets. Relaunching the *Sokolovská* street in its full operation was preceded by a large-scale construction works on the trackbed and carriageway including road-bed reconstruction and grouting cavities discovered, footwalks and utilities damaged by the flood.

Following the two years when it was impossible to make regular maintenance of tramway tracks due to flood damage repairs, these sections have been repaired in 2004:

- the *Podolské nábřeží* embankment including track replacement *Dvorce* and *Podolská vodárna*
- the *Chotkova* street including road and gallery reconstruction
- *Spálená – Národní, Lazarská – Spálená*
- the *Masarykovo* and *Rašínovo nábřeží* embankments including the *Výtoň* crossroads
- the *Ječná* street including the *Sokolská* and *Legerova* cross-over
- *Českomoravská* (a complete reconstruction including road enlargement was made jointly with putting the *Sazka Aréna* in service)

The road network saw larger repairs, too, e.g. *Jižní spojka, Kutnohorská, K Měcholupům, Kolbenova*.

Apart from constructions completed in 2004, other traffic constructions started or continued. The biggest ones include:

- the "C" Metro line elongation to the section *Ládví – Letňany*
- the "New Connection" (i.e. interconnecting the *Praha–Hlavní nádraží* and *Praha–Masarykovo nádraží* railway stations with the *Praha–Libeň* and *Praha–Vysočany* stations).
- the Metro station *Depo Hostivař*
- another Outer Ring section, *Slivenec – Lahovice*
- drawing exploration gallery for car tunnels on the Prague Outer Ring section *Lahovice – Jesenice*
- linking the present roads to the new airport *Ruzyně* terminal

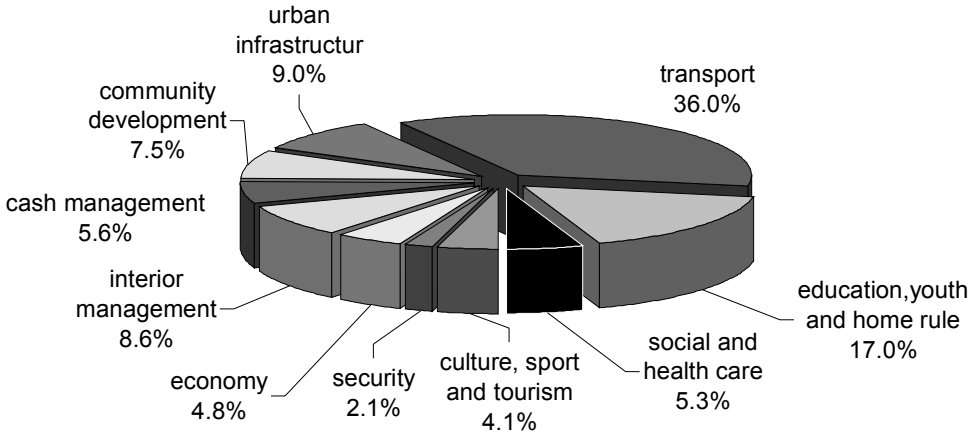
12.2 Funding the transport and traffic construction

The urban transport operation and engineering infrastructure in 2004 were covered from the Prague's municipal budget, with further 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.

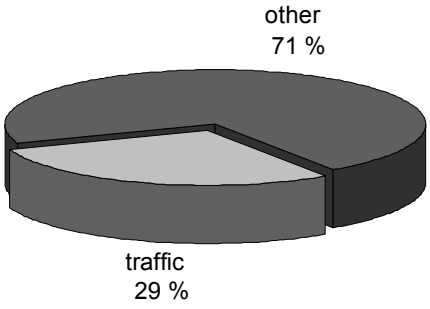
The Prague's municipal budget, adjusted on 30. 6. 2004, reached to expenditures of approximately CZK 58.7 bn., including CZK 21.2 bill in the chapter 03 Transportation, which again in 2004 was the most substantial chapter of the municipal budget's expenditures. The traffic investments were 47 % of capital expenditures in all investments funded from the municipal budget.

Breakdown of expenditures in municipal budget in 2004
budget adjusted as of 30. 6. 2004

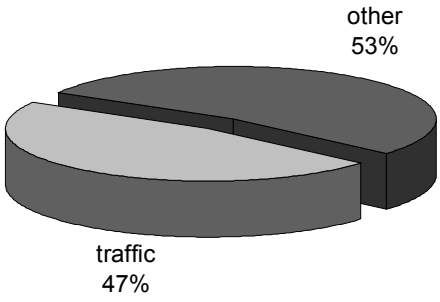
Total expenditures



Share of traffic in operational expenditures



Share of traffic in capital expenditures



The amount of CZK 21.2 bn. included also CZK 10.2 bill earmarked to cover running operational expenditures and 11.0 bn. for capital expenditures.

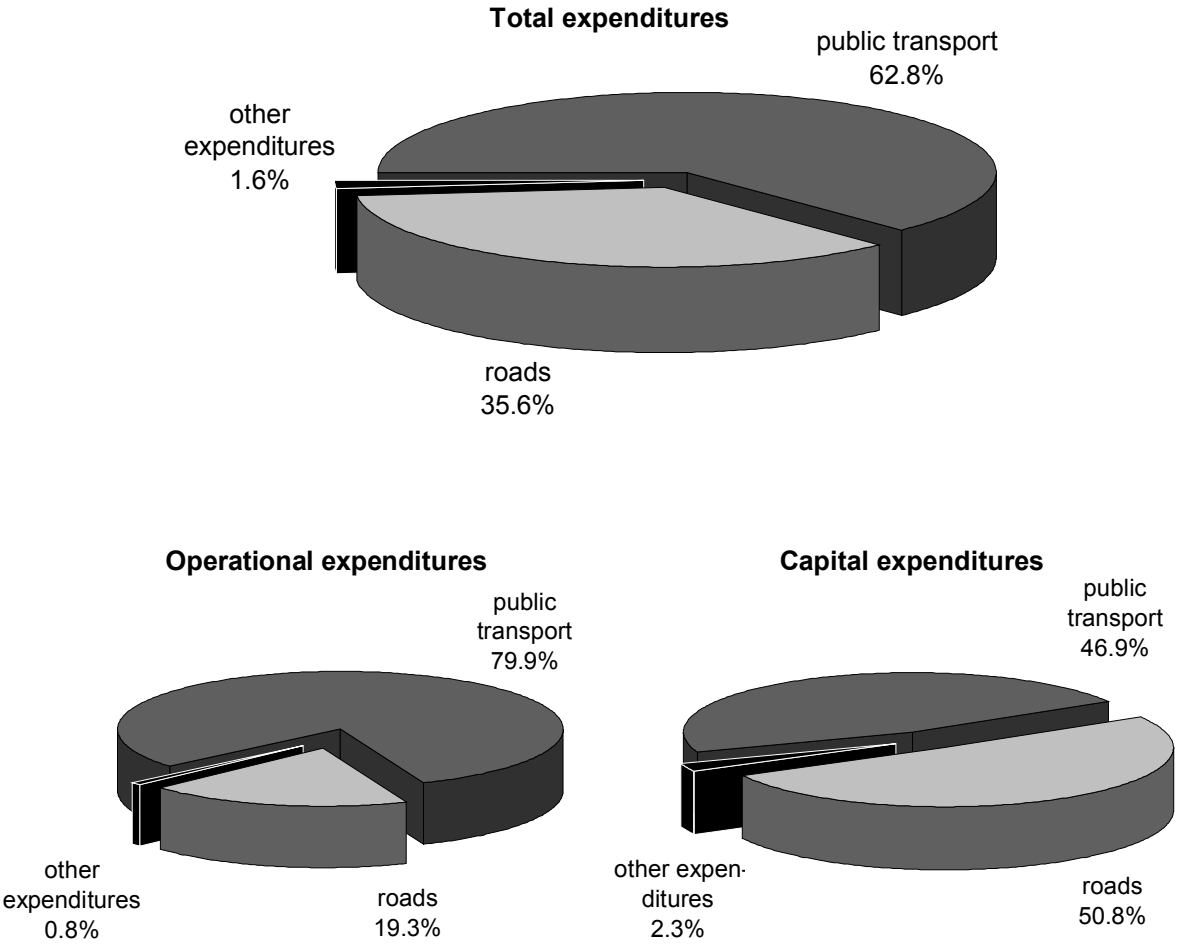
The **operational expenditures** in transportation cover, predominantly, subsidies for public passenger transport in and around the city. The total of CZK 8 bn. was allotted in the adjusted budget for this purpose. Almost CZK 2 bn. were set aside to cover repairs, maintenance and operation of the roads.

The **capital expenditures** covered mostly investment in development, i.e. construction of new roads, Metro lines and other transportation facilities (53 %) as well as larger repairs and

redevelopment of traffic routes, equipment and renewal of technical devices (44 %). Out of the total amount of almost CZK 11 bn., it was earmarked for renewal and development of road network CZK 5.6 bn. and for investments to public transport CZK 5.1 bn.

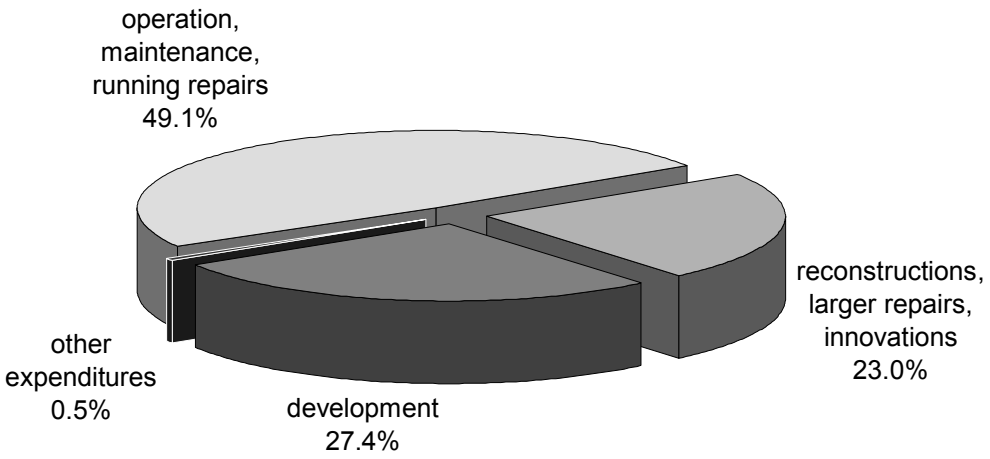
Expenditures for providing operation, modernization and development of public transport prevailed in the 2004 budget. Their share in the total expenditures in the chapter of transportation amounted to 63 %.

Structure of transportation expenditures in the 2004 municipal budget
(budget adjusted as of 30.6.2004)

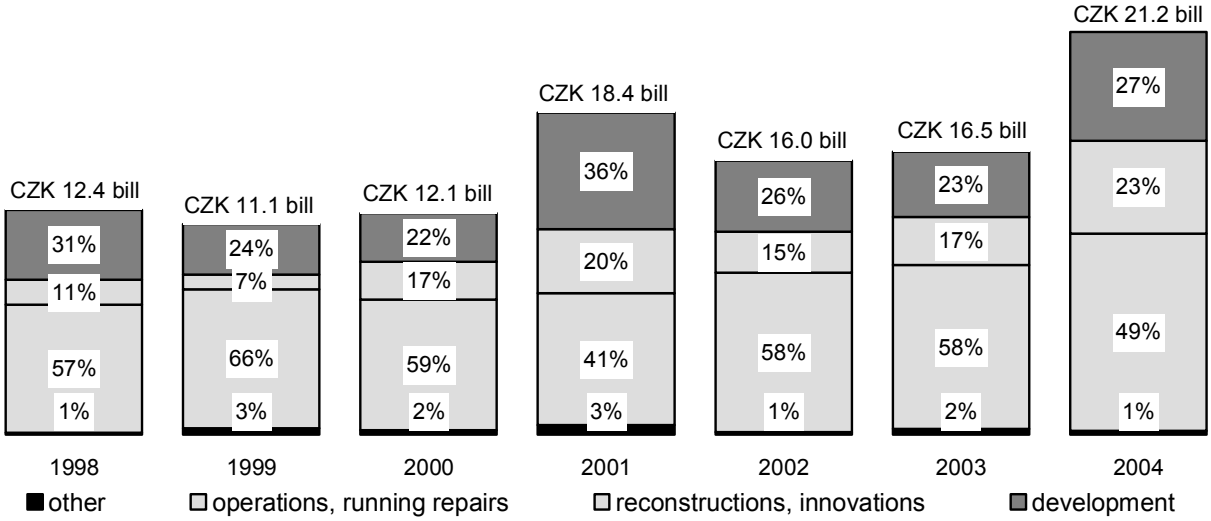


A more detailed analysis of the items listed in the breakdown of expenditures shows that CZK 10.4 bn. was directed toward operation, running repairs and maintenance of the urban transport system, CZK 4.9 bn. to provide for larger repairs, redevelopment and renewal of the technical equipment, CZK 5.8 bn. was earmarked for investments into development and almost CZK 100 mill. for other expenditures.

Total transportation expenditures in the 2004 budget
the budget adjusted as of 30.6.2004



Traffic expenditure development in Prague's municipal budget



The targeted contributions from the national budget and from the means of the National Fund for Traffic Infrastructure were provided to the Capital of Prague for repair and maintenance of roads and for the construction of selected road segments, the Metro construction and purchase of buses. The Government also participates in the Prague Outer Ring construction, for the financing of which the Government had already assumed and guaranteed full responsibility. The Prague Public Transit Co. Inc. contributed to investment constructions from its own resources. Funding of suburban transport was shared by communities around Prague whose population are users of the *PID* integrated transport. The Government also contributed to ensure the basic transportation service in the suburbs.

13. EUROPEAN UNION PROJECTS

In 2004 the Capital of Prague and its organizations took part in traffic solutions of the Trendsetter project advertised by the European Commission.

TRENDSETTER (Setting Trends for Sustainable Urban Mobility)

The project was approved by the European Commission in 2001 as one of the eight projects of the CIVITAS program. The project aims at higher utilization of public transport, improvement of goods transport, cars and traffic infrastructure systems, and use of new services, making possible to preserve acceptable environment in cities. Under the supervision of Stockholm, partners from Stockholm, Lille, Graz, Prague and Pécs participate on the project.

Prague takes part in dealing with three subtasks that concern introducing a Citybus line in the city centre targeted for a specific group of passengers (patients, the handicapped, mothers with children), an active preference for buses on traffic light-controlled crossroads and a regulation of goods vehicle traffic. The subtasks are dealt with by Prague Public Transit (*DP hl. m. Prahy, a. s.*), *ÚDI Praha*, City Council (*Magistrát hl. m. Prahy*) and the Prague Road Maintenance (*TSK hl. m. Prahy*).

The Citybus line No. 291 was put in operation in April 2003 in order to provide connection that was lacked so far between the health care facilities in *Karlov* neighbourhood and the closest transportation nodes, the *I. P. Pavlova* crossroads and the *Karlovo náměstí* square. Medium buses ("midibuses") are deployed on the line, with an average occupancy of 20 persons/bus. The line makes part of the *PID* tariff system.

The active bus traffic signal priority has been tested and operated on two crossroads with PT bus traffic. The system provides priority for buses passing through the crossroads, based on a radio link between the vehicle with the TSD controller, i.e. consists of a stationary and a mobile portions. The vehicles are localized by means of an infra-transmitter put in front of the crossroads. The priority system is synchronized with timetables of the particular lines. The solution makes possible from detecting the actual passage of a bus to evaluate its time setting on the timetable and from a detected difference to transmit a request in the commensurate magnitude of preference. The priority according to the predefined conditions is then available only to the vehicles that actually need it. Later the active priority system for PT buses has been expanded to additional 5 TSDs in the *Praha 8* neighbourhood in relation to the new Metro line (IV) C1 operation.

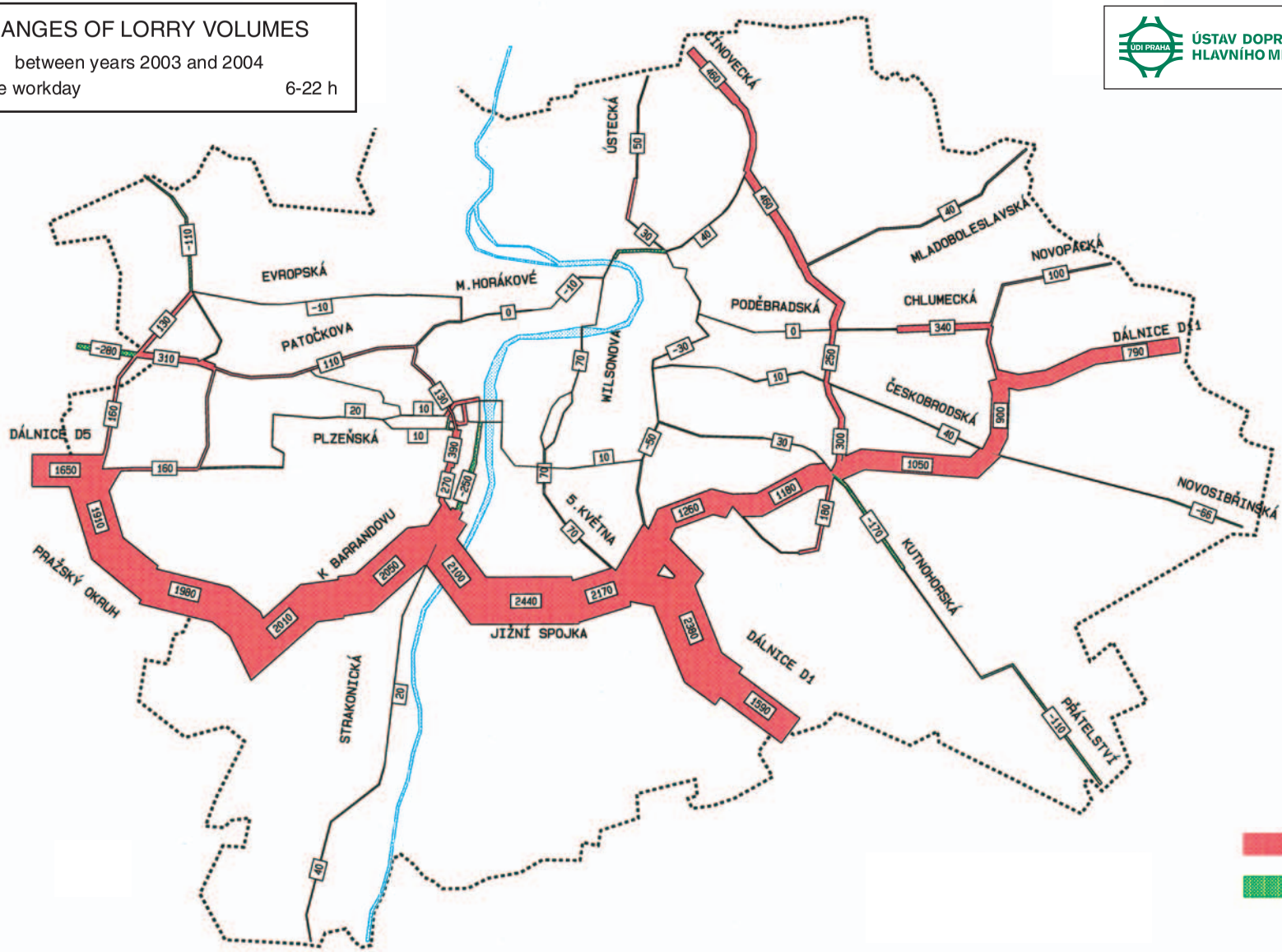
Concerning the subtask "Widening of the Environmental Zone for Vehicles over 6t", a testing survey was conducted in March 2004 on the area of the *Praha 4* neighbourhood with the aim to find out what changes occurred in the area after the widening of the Environmental Zone restriction for goods vehicles over 6 tons both in volumes and composition of the haulage and types and directions of trips. The travel volume of heavy haulage inside the area dropped by 11 %. In August 2004 (after launching the *Mrázovka* tunnels), the Environmental Zone restricting the goods vehicles with gross weight over 6 t was extended over a portion of the *Praha 5* area.

CHANGES OF LORRY VOLUMES

between years 2003 and 2004

average workday 6-22 h

ÚSTAV DOPRAVNÍHO INŽENÝRSTVÍ HLAVNÍHO MĚSTA PRAHY



PRA HA
PRA GUE
PRA GA
PRA G

ÚDI PRAHA

INSTITUTE OF TRANSPORTATION ENGINEERING OF THE CITY OF PRAGUE
CZ-110 00 Praha 1, Bolzanova 1, Czech Republic
Tel.: +420 221 197 111
Fax: +420 224 211 380
e-mail: udi@udipraha.cz
http://www.udipraha.cz