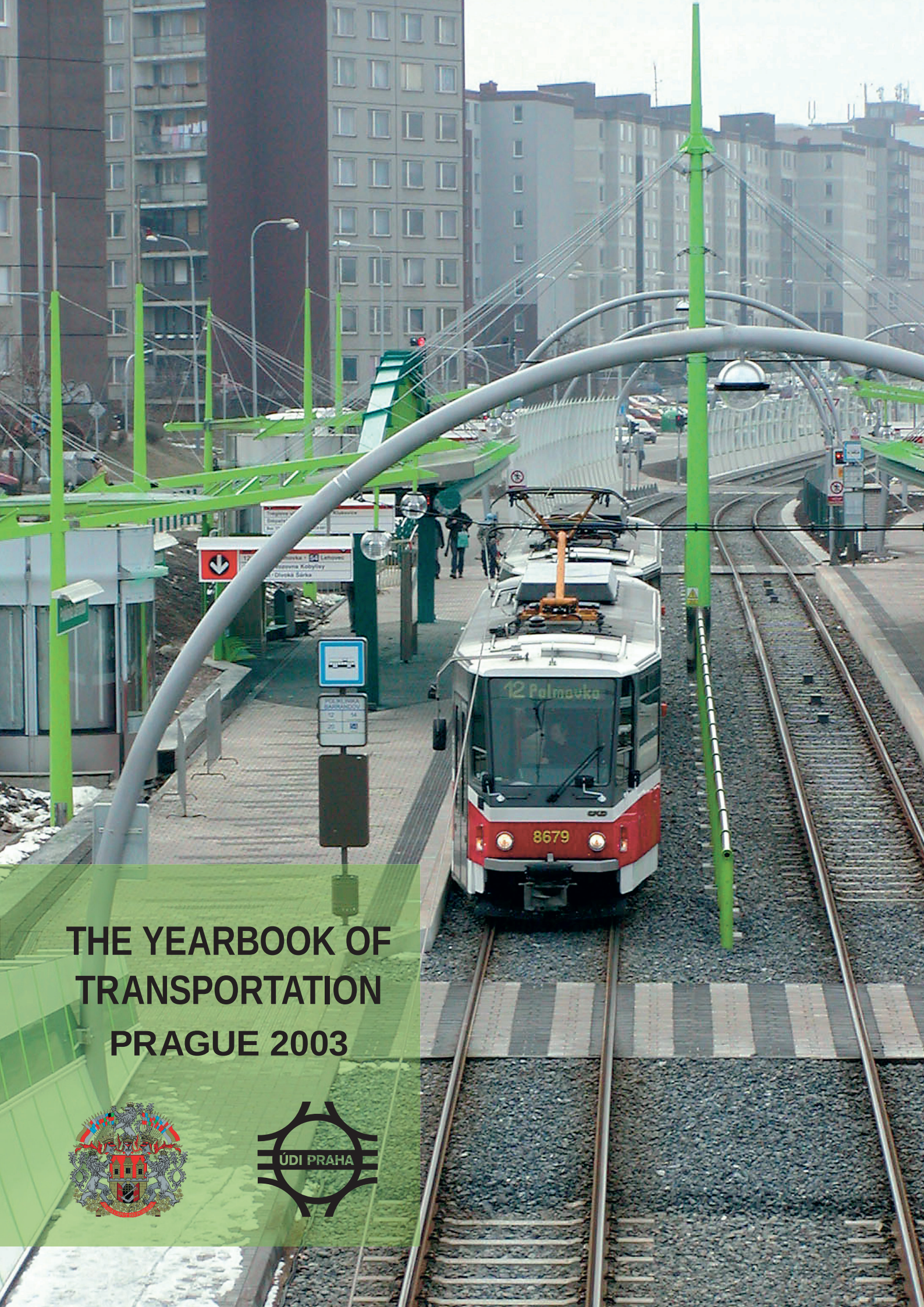
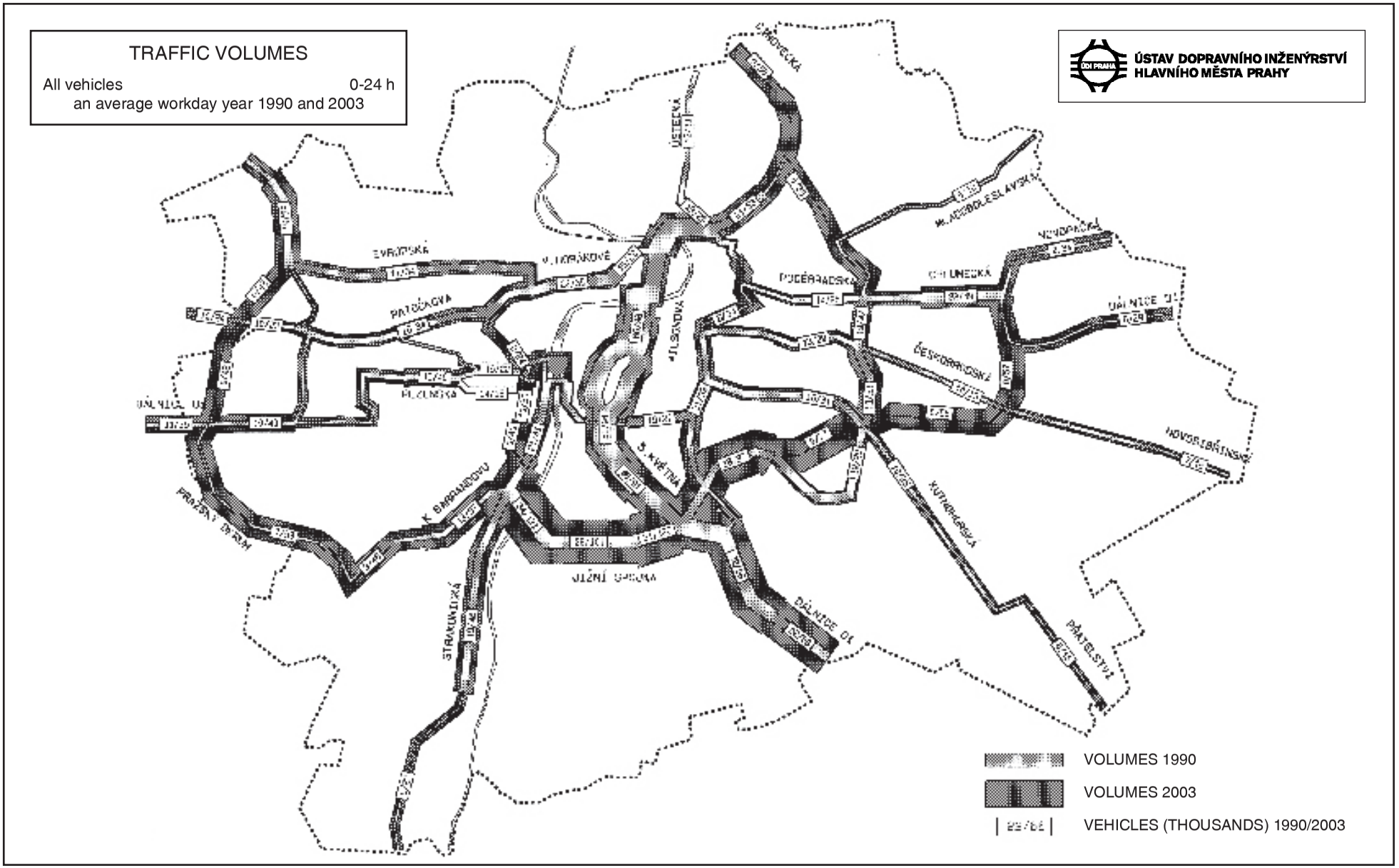


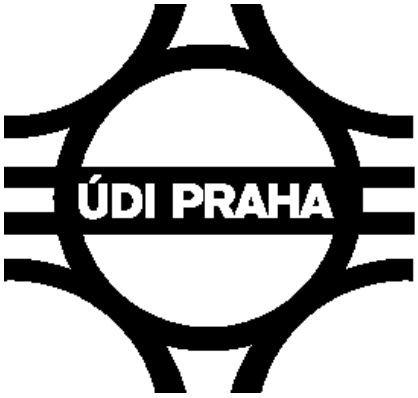
THE YEARBOOK OF TRANSPORTATION PRAGUE 2003

ÚDI PRAHA



THE YEARBOOK OF TRANSPORTATION

PRAGUE 2003



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
bill. 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:
Metroprojekt Praha, a. s., SBH CZ, s. r. o., SSŽ a. s., Eltodo DS, s. r. o., Satra, spol. s r. o., AŽD Praha s. r. o.

The yearbook was prepared in the Institute of Transportation Engineering of the City of Prague *(Ústav dopravního inženýrství hlavního města Prahy /ÚDI Praha/)* □ Editors: Ing. Zdeněk Balcar, Mgr. Eva Černá Translation: Mgr. Jiří Hedánek □ Data: *ÚDI Praha, České dráhy, a. s., České přístavy, a. s., ČSL, s. p., ČSÚ, DP hl. m. Prahy, a. s., EVD s. r. o., Evropark Praha, a. s., Letiště Brno, a. s., MD ČR, MHMP, PČR, Povodí Vltavy a. s., PPS, a. s., ROPID, ŘSD ČR, TSK hl. m. Prahy* □ Pictures: *ÚDI Praha* □ Production: *SOFIPRIN Praha* □ Copies: 750 pcs □ Praha, 2004

CONTENTS

Dear Readers,

over 5 million motor vehicles registered in the Czech Republic, more than 750,000 of them in Prague, are a proof that car traffic is a significant feature of today which cannot be avoided, only dealt with. Prague, the capital city of the Czech Republic, is no exception. The statistics provided by this Yearbook can help you to find out how the City has been successful in dealing with it.

It testifies that the authorities of the City of Prague are aware that creating a working traffic system both in and around the city is an absolute necessity and that local government upholds the accepted principles of traffic policy. The municipal public transport is being expanded and receives priority in various ways. Public transport obtained a subsidy of almost 8,000 million Czech crowns in 2003. At the same time, a new tram connection to *Barrandov* has been opened, the number of tram-priority traffic lights has grown substantially and construction of a new metro section on C line has continued in order to improve significantly the transport service for the north of Prague in June 2004 when it is planned to be put in operation.

Another responsibility the City takes care of is the completion of the main road network, notably the City (Inner) Ringroad. First cars will be able to use the *Mrázovka* tunnel in August 2004. Preparations for the adjoining sections of the City Ringroad have already started. The completed City Ringroad together with the completion of the Prague (Outer) Ringroad financed by the Government will enable a gradual regulation of traffic within the historic street network in the centre of our beautiful city which will improve the environment in Prague as well as the quality of life of its citizens.

March 15th, 2004

Radovan Šteiner
Councillor of the City of Prague

Dear Readers,

this Yearbook you are being offered documents the development of transportation throughout the Capital of Prague in 2003. During that year the effort continued to eliminate damage caused by one of the greatest floods that ever struck our city. The summer 2002 damage on the traffic network amounting to many thousands of millions could have been undone only in stages.

An enormous increase in car traffic that began after 1989 and lasted for almost a decade has slowed down in recent years. The number of passenger cars registered in the city grew by "only" 8,500 (+1.3 per cent) while the number of motor vehicles per head remains virtually unchanged. Still, its 555 passenger cars per 1,000 persons (i.e. 1.8 persons per passenger car) makes Prague one of the world's most car-populated cities. The vehicle kilometres travelled on Prague's traffic network, the most exact indicator characteristic of the traffic development on the streets of the city, has seen a rise by almost 6 per cent (by 1 million vehicle kilometres per day, in absolute figures). The car traffic performance in Prague multiplied by over 2.5 times in the last 13 years (an increase to 257 per cent of the 1990 condition). Nowadays, motor vehicles inside Prague cover almost 19 million kilometres per day.

The municipal public transport saw a slight rise, too. The seats per kilometre offered rose by 3.3 per cent and the number of persons transported went up by 1 per cent. 3.5 million persons use the various means of public transport in Prague daily.

The building pace of transport constructions, much needed as they are for the city, could not accelerate in the last year, also due to the impact of the catastrophic flood. Still, an important transportation work has been put in operation: a tram line connecting *Hlubočepy* with *Barrandov* housing estate. Many other transportation works have been in progress, most notably the section IV C 1 of the underground and the City Ringroad West. Also the work on design and pre-project preparation of other significant transportation investments did not stop (the section IV C 2 of the underground, line D underground, the City Ringroad North as well as the Prague (Outer) Ringroad North, South and South-East). Specialists from our Institute shared a great deal in most of these preparations and designs.

It is the responsibility of the **Institute of Transportation Engineering of the City of Prague** (*ÚDI Praha*) to provide, for the City of Prague as well as other cities and regions, services that belong to the principal tasks of traffic engineering so that a continuous optimization could be performed on organization and management of the municipal road operation, projects of traffic engineering measures to lower traffic-related accident rate, monitoring and evaluation of transport development and also systematic adjustment of further development of the overall municipal transport system.

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

March 15th, 2004

Ing. Ladislav Pivec
Director, *ÚDI Praha*

1. BASIC DATA

1.1 The Capital of Prague

Selected data on the Capital of Prague as of 31. 12. 2003

City area	.....	496	km^2
Population	.....	1 166 000	
Total road network	.....	3 520	km
specifically, motorways within the city	.....	10	km
other urban motor roads	.....	76	km
Number of bridges in road network	.....	592	
specifically, bridges across the river	.....	27	
grade-separated intersections	.....	212	
underpasses	.....	121	
Number of tunnels (total length 3 305 m)	.....	6	
All motor vehicles	.....	784 700	
including passenger cars	.....	647 400	
Motor vehicles per head			
in vehicles per 1 000 inhabitants	.....	673	
Passenger cars per head			
in cars per 1 000 inhabitants	.....	555	
***Metro* (underground) network** (in operation)	.....	49.8	km
Tram network	.....	140.9	km
specifically, dedicated trackbed	.....	52	%
Public Transport bus network	.....	686.1	km
Traffic lights	.....	445	
specifically, co-ordinated into “green waves”	.....	272	
with traffic-actuated control	.....	197	
with tram priority	.....	75	
separate pedestrian crossings	.....	61	
Vehicle kilometres travelled (VKT) in motor car traffic			
in an average workday	.....	18.8	mill. VKT
annually	.....	6.2	bill. VKT
Modal split (based on all trips in the city in a workday)			
public transport	.....	57	%
car transport	.....	43	%
Traffic accidents	.....	35 589	
Traffic accident injuries			
fatal	.....	65	
serious	.....	466	
slight	.....	3 509	
Relative accident rate (accidents per 1 million VKT)		5.7	

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
Motor vehicles (000s)		784	5 041	15.6
	specifically, passenger cars (000s)	647	3 702	17.7
Motor vehicles per head	(motor vehicles per 1000 persons)	673	494	
	(persons per 1 motor vehicle)	1.5	2.0	
Passenger cars per head	(passenger cars per 1000 persons)	555	363	
	(persons per 1 passenger car)	1.8	2.8	

Vehicle kilometres 1990 - 2003 (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	137.0**
Index 03/90 (%)	257.0	169.0**
Index 03/02 (%)	105.9	104.7**

* 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 2000–2003, the rise slowed down. Approximately 9,700 motor vehicles have been newly registered in Prague in 2003. The substantial share in the build-up of motor vehicles is brought about by passenger cars.

Registered motor vehicles in 1961 - 2003

	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⁺**	**784 700***	**183**	**647 400***	**193**	**10 219⁺**	**5 041 255**	**125**	**3 702 153**	**154**

100 % = 1990

⁺ preliminary data

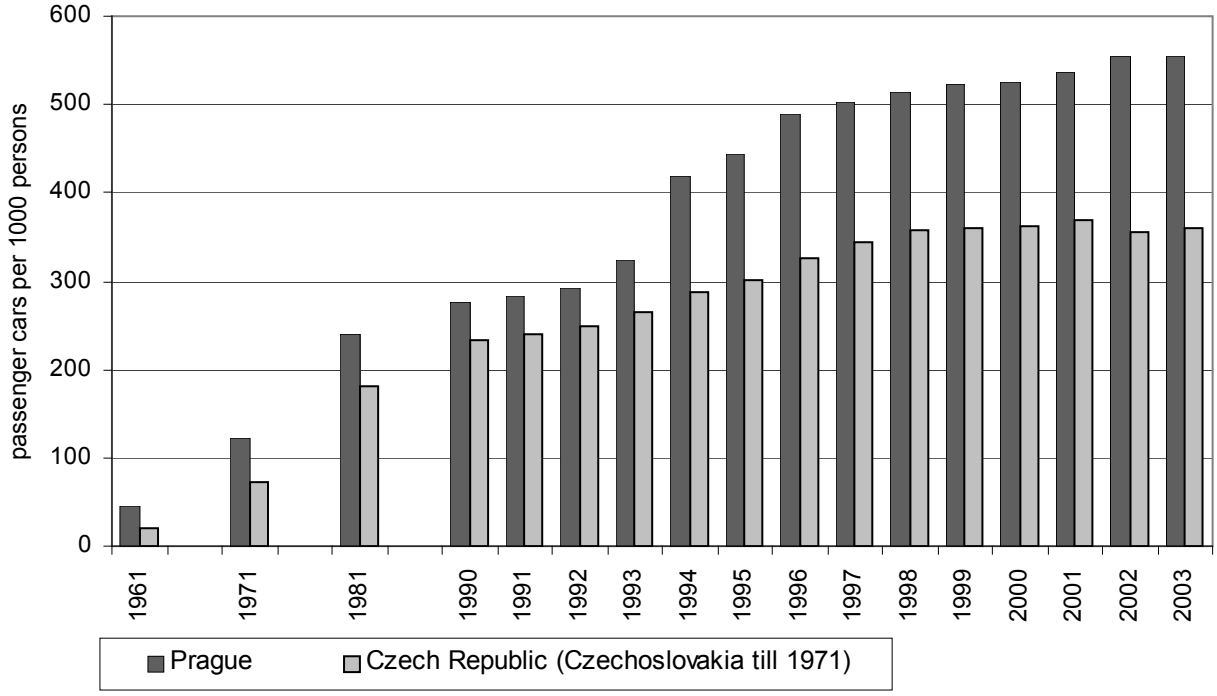
* a qualified estimate by *ÚDI Praha*

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 numbers given here for passenger cars in Prague in 2002 and 2003 are a qualified estimate by the Institute of Transportation Engineering of the City of Prague as the administrator for the Prague data did not discriminate types of vehicles registered after 1.1.2002, hence providing only comprehensive figures on motor vehicles in general.

Numbers of motor vehicles and cars per head, 1961 - 2003

	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	**673**	**1.5**	**555**	**1.8**	**494**	**2.0**	**363**	**2.8**

Passenger cars per head, 1961–2003



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 outskirts cordon. The two cordons' time arrays have been collected and available at the Institute of Transportation Engineering since 1961.

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

The conducted traffic counts lead to a conclusion that **the car traffic in the city centre stagnated in 2003, while continuing to rise over the rest of the city area. The total traffic throughout the capital rose in 2003,** in terms of its overall road network VKT, **by an average of 5.9 per cent above the previous year.**

The 2003 VKT over Prague (24 hours, an average workday, all motor vehicles) was 18,771 million vehicle kilometres. The passenger cars' share was 17,123 million vehicle kilometres, i.e. 91 per cent.

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 2002. In comparison to 1990 though, 36 % more vehicles entered the greater inner city area. All the increase following 1990 has been brought about only by passenger cars (46 per

cent more) while the number of lorries and buses, on the contrary, has decreased by more than a half (54 per cent less) since 1990. In 2003, about 295,000 vehicles entered the greater inner city area during an average workday between 6 a.m. and 10 p.m., including 281,000 passenger cars.

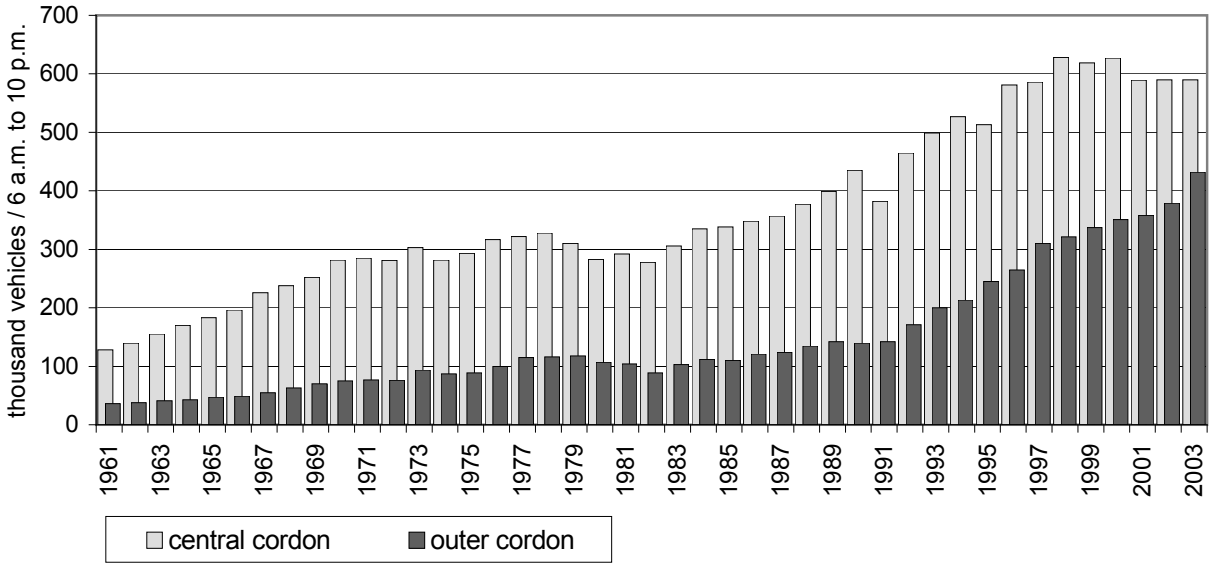
The fact that the traffic volumes in the inner city area in recent 5 years have ceased to grow seems to be due to traffic demands already reaching its capacity limits on many key crossroads during peak hours so that the road network overload is no more local, but rather sweeping in character.

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 14.0 % over the previous year. As compared to 1990, more than three times as many cars (+ 209 %) 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 (+ 272 %). About 216,000 vehicles entered Prague between 6 a.m. and 10 p.m. on an average workday of 2003, including 188,000 passenger cars.

Traffic volumes on central and outer cordon, 1961–2003

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



Traffic volume on central and outer cordon, 1961–2003

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**

100 % = 1990

Roads with the heaviest ADT (Average Daily Traffic) **in Prague in 2003** was an Inner Ring section – the *Barrandov* bridge, with a 0-24 h average of 121,000 VPD (Vehicles Per Day); **the grade-separated junctions with the heaviest ADT** was an Inner Ring junction to the *5. května* street and *Jižní spojka* (Southern Connection road) - 200,000 VPD); **the heaviest ADT level junction** was *Žitná–Mezibranská* (77,000 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**

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

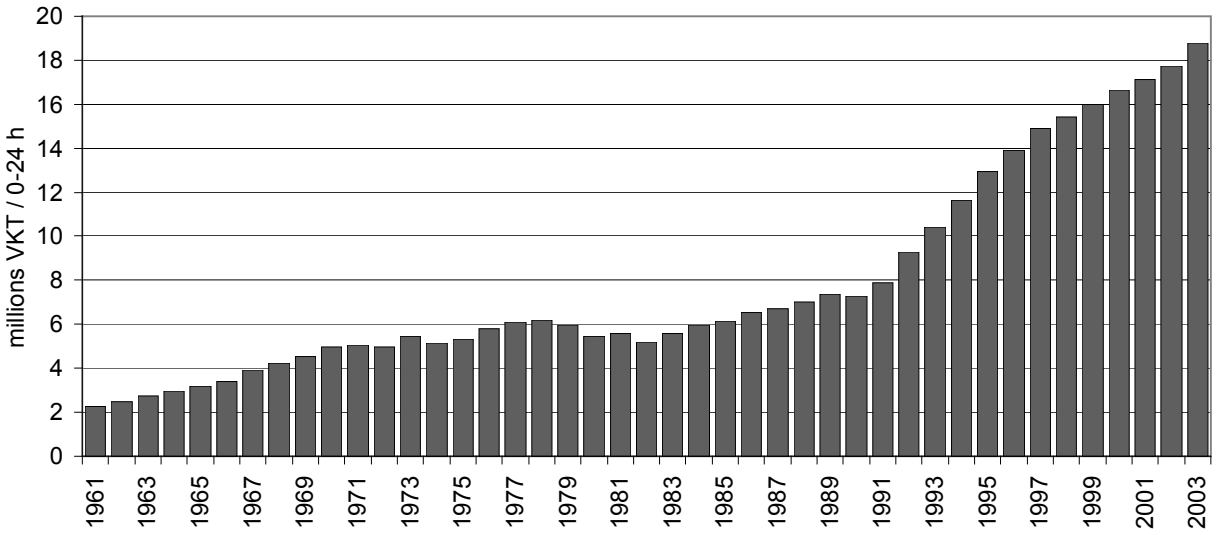
Since 1991, the numbers of cars and volumes of traffic have shown in Prague an explosive growth that has been without parallel anywhere in Europe, except cities of the former East Germany.

The pace of the VKT growth in Prague following 1990 in comparison with the 1980s can be seen in 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
specifically, 2001		+ 480 000	VKT/day
2002		+ 597 000	VKT/day
2003		+ 1 053 000	VKT/day

The daily VKT grew in the last 13 years (1991 to 2003) in all from 7.3 mill. VKT per day to 18.8 mill. VKT per day, i.e. by 11.5 mill VKT per day. Thus, the car traffic in Prague has swollen within the recent 13 years more than during the previous 100 years of motoring (from the end of the 19th century up to 1990).

Vehicle kilometres travelled, 1961 - 2003
All roads, an average workday



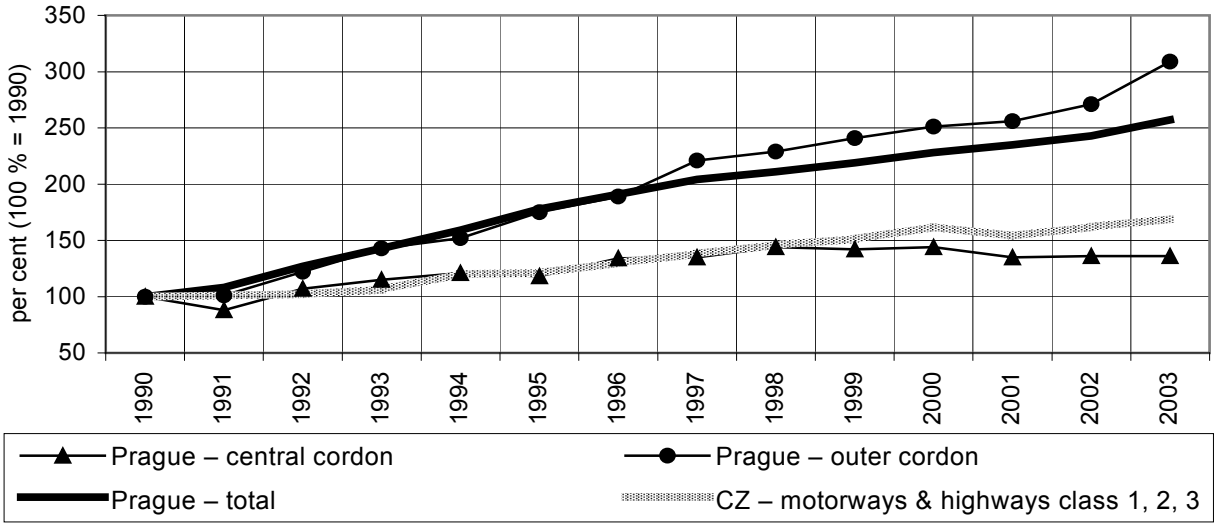
Vehicle kilometres travelled, 1961–2003
All roads, an average workday, 0-24 h

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**

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

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, 1990–2003
An average workday



Most of the rise in the car traffic in Prague following 1990 has been due to passenger cars. During 1991 to 2003, the VKT per vehicle in Prague went up as follows:

passenger cars	+ 193 %
lorries and buses	+ 10 %
all vehicles	+ 157 %

The car traffic grows differently in different city zones. From 1991 to 2003 the car traffic increased in the following way:

all-network average	+ 157 %
the greater inner city	+ 36 %
the outer zone	+ 209 %
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 Connection).
- 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 start" traffic's environmental impact, especially in the city centre, is obvious.

Outer haulage survey in 2003

Participating on the Trendsetter international project of the European Commission (subtask "Optimization and widening of the access restriction zones for vehicles over 6 tons"), the *ÚDI Praha* performed a survey on the outer traffic of vehicles over 3.5 t in 2003.

During the survey, altogether 55,027 goods vehicles of over 3.5 t GVW (Gross Vehicle Weight) as well as buses crossed the Capital of Prague border on the 14 most vital roads in both directions in an average workday. 70 per cent of the count were heavy vehicles over 6 t GVW.

The most intensive haulage over 3.5 t GVW heading out of Prague were found at:

D1 motorway: 4,889 vehicles in 6-22 h, including 64 % transit
D5 motorway: 3,527 vehicles in 6-22 h, including 52 % transit
D8 motorway: 3,488 vehicles in 6-22 h, including 81 % transit

The strongest transit relation was found between motorways D1 and D5. Within 6-22 h (6 a.m. to 10 p.m.) on a workday, this link was used by 2,151 goods vehicles of over 3.5 t GVW including 2,053 heavy lorries of over 6 t GVW.

Comparing with 1996, when a similar survey was done, the workday **count in heavy haulage** over 6 t GVW **more than doubled** (+ 118 %) on trace points, while specifically the count of the heavy haulage **transiting** Prague **more than trebled** (+ 205 %). In absolute figures, it is an increase in transiting heavy goods vehicles by about 8,000 a day (from 4 to 12 thousand heavy goods vehicles a day). Though the heavy lorries' mode share in the traffic flow is moderate, the rise in numbers is alarming. Especially so, considering that the intended road system, the Outer Ring, is ready only in one sixth of its planned length and its further construction is slow and difficult to prepare.

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 %

Concerning the local distribution, the passenger cars get the greater share the closer they are to the city centre. The share in 2003 was:

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

Percentage of mode share, 1961–2003
A workday, both directions total, from 6 a.m. to 10 p.m.

	Central cordon				Outer cordon			
Year	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**

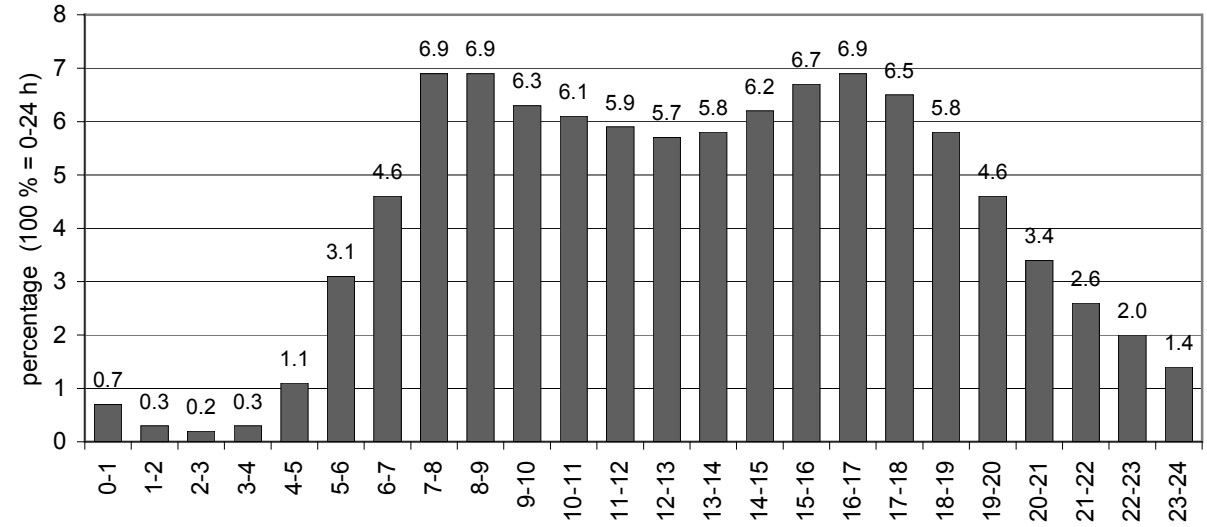
2.4 Temporal patterns in car traffic

Workday volume variations in car traffic show the following characteristics.

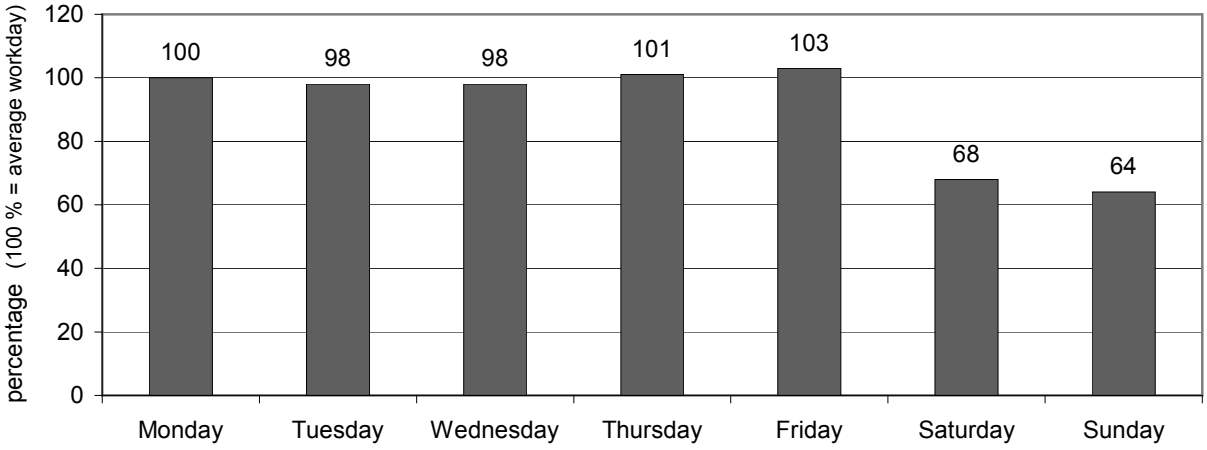
- The bulk of the daily traffic volumes is carried out during daylight, 70 % from 6 a.m. to 6 p.m., or 76 % from 6 a.m. to 7 p.m., while the period from 6 a.m. to 10 p.m. covers about 91 %.
- Following 5 p.m., the traffic volume displays a steep and largely linear drop till midnight.
- The morning peak 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 goods vehicles 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 goods vehicles 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 %.

Temporal patterns in car traffic, Prague, 2003

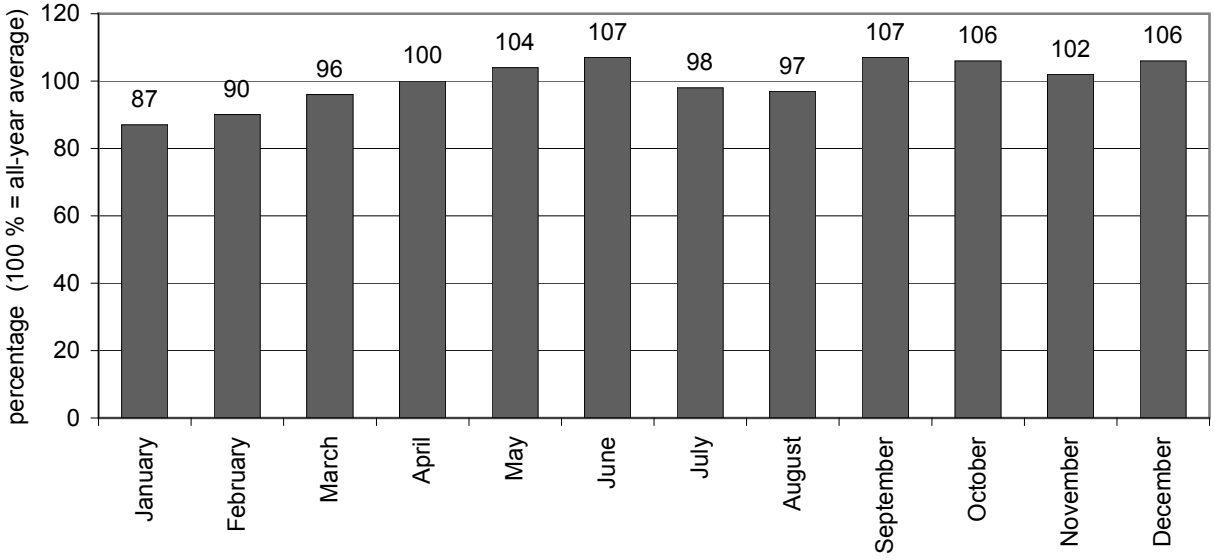
Daily variation



Weekly variation



Annual variation



2.5 Weekend car traffic

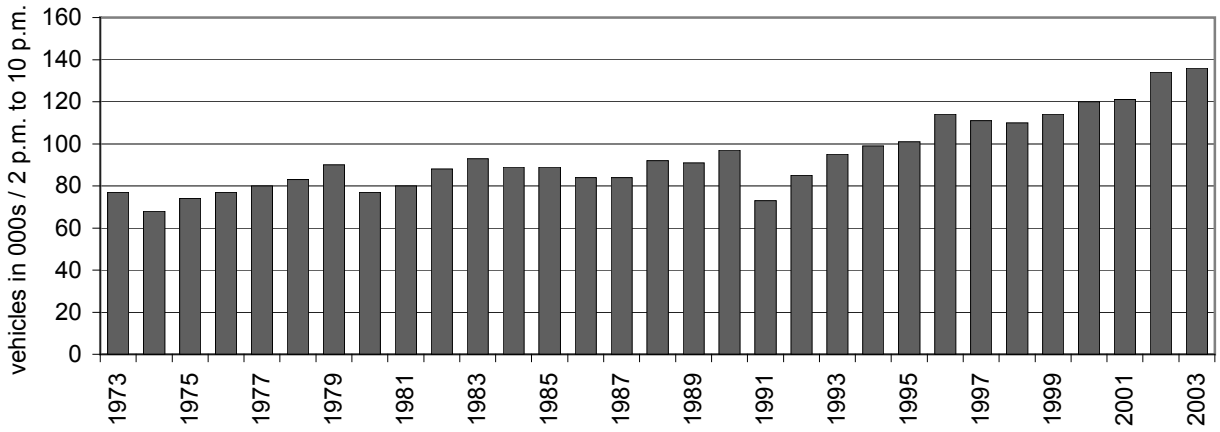
The *ÚDI Praha* Institute's annual survey of the car traffic volumes includes monitoring weekend traffic on the urban outer limit. Weekend departures are carried out on Friday afternoons between 3 to 7 p.m., on Saturdays between 8 to 11 a.m. and partially also on Sunday mornings. On the other hand, weekend 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, 1973–2003
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**

100 % = 1990

Weekend traffic volume development, 1973–2003
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 2003. **The Average Vehicle Occupancy (AVO)** in weekend traffic in 2003 was 2.14 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.

In 2003, the integrated system was further evolved by strengthening the capacity of some suburban bus lines and increasing the number of lines throughout the region, which improve traffic connections between important regional sites. 146 regional bus lines were operating by later 2003.

Numbers of operated bus lines

Operator	city territory*	region territory**
DP hl. m. Prahy, a. s. (incl. night and school lines)	182	20
Others	8	126
Total	190	146

* 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*), 1997–2003

Year	1997	1998	1999	2000	2001	2002	2003
Number of communities served by suburban *PID* buses	69	83	104	159	218	251	278
Number of railway stations and stops linked up with *PID*	181	181	181	190	200	219	221
Number of suburban *PID* bus lines	38	48	54	89	114	133	146
Millions of VKT in suburban *PID* bus lines	4.12	5.03	7.99	9.36	12.91	15.79	18.48
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
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

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 49.8 km and 51 stations (including three interchanges). Currently, 22 stations are barrier-free. The trains travel at an average commercial speed of 35.7 km/h with the average distance between stations 1,038 m. The Metro share of the number of transported passengers reached 41.4 % of all the passengers using the municipal public transport in 2003. Vehicle records register 660 items, the fleet in actual operation consists of 514 vehicles. In 2003, additional new M1 *Metro* trains were delivered, increasing the number of new trains in operation to 31.

The **tramway network** is 140.9 km long. A new tram line launch was celebrated on 28.11. 2003. The line connects *Hlubočepy* neighbourhood with the *Barrandov* housing estate. It runs on a dedicated trackbed 3.57 km long and climbs 130 m high. It offers 5 stops, all providing up-to-date features of safety and information.

Out of the total tramway network, 52 % run on a dedicated trackbed (a raised embankment or, in places, separate track lanes led outside of road), 48 % of the tracks are embedded in the roadway. The average stop distance throughout the network is 565 m. The trams share 30.2 % of all the transported persons. The tramway fleet included 964 vehicles, while in actual operation 926 carriages were recorded as of the year end, including 47 articulated three-segment vehicles.

The **buses** make up a complementary network to the *Metro* and trams. They provide spread coverage of the area, especially at the outskirts, and selected tangential connections. On 18. 4. 2003, line 291 was put in operation. It serves the health facilities in the municipal district *Praha 2*. The line operates only small low-floor "Citybuses".

The operational length of the network within the city territory is 686.1 km with an average distance between stops 687 m. The bus fleet has 1,393 vehicles registered, 1,364 buses in operation including 708 standard types, 277 low-floor, 346 articulated buses and 33 articulated low-floor. The bus share of the total transported persons is 28.4 %.

The **funicular** railway provides a connection between *Újezd* street and *Petřín* hill (via a mid-point stop, *Nebozízek*). Two carriages with their capacity of 100 persons travel on a 510 m long railway with an average commercial speed 6.12 km/h climbing to the height of 130.45 m. The rope (35.3 mm in diameter) linking the two carriages is moved by electrical power. The funicular transported almost 1.4 million passengers.

Basic data about Prague Integrated Transport, 2003 (operated by Prague Public Transit Co. Inc., *"DP"*)

	Metro	Trams	Buses	Total
Operational network length (km)	49.8	140.9	686.1	876.8
specifically, dedicated trackbed (%)	100	52	-	-
Operational network length outside Prague (km)	-	-	133.7	133.7
Average stop distance (m)	1 038	565	687	-
Average commercial speed (km/h)	35.7	19.6	26.3	-
VKT in Prague per year (000s)	40 181	47 756	64 955	152 892
VKT outside Prague per year (000s)	-	-	1 365	1 365
Passengers transported in Prague per year (000s)	458 642	334 949	314 776	1 108 367
Passengers transported outside Prague per year (000s)			22 421	22 421
Prague Public Transit Co. Inc. employees	12 991			
Revenue from tickets (mill. CZK)	2 765			
Operational costs (mill. CZK)	14 956*			
Revenue/costs ratio (%)	18.49			

* operation costs include emergency repairs of the flood damage totalling 3 265 mill. CZK

Development of selected characteristics of public transport

Year	Operational network length (km)+			Average commercial speed (km/h)			Public Transport performance on an average day	
	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++**

+ 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

The public transport operation has been severely affected by flood in 2002. The restoration of the affected *Metro* lines and stations as well as tram lines continued also in 2003. The full-length operation of the *Metro* (apart from 4 stations) was managed since 17. 2. 2003, its full-scale operation since 22. 3. 2003.

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. The Integrated Transport system has been extended in 2003 on railway lines to *Kladno* and *Kralupy nad Vltavou*.

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

Railway line	average peak hour frequency	average travelling time	distance
Praha-Klánovice - Praha-Masarykovo nádraží	16 min	22 min	18 km
Praha-Kolovraty - Praha-Hlavní nádraží	30 min	25 min	17 km
Praha-Radotín - Praha-Hlavní nádraží	24 min	16 min	13 km

Number of passengers in Prague transported by *PID* railway

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

The bus transportation covers mostly region-to-city transport relations. The performance of the suburban *PID* bus lines reached 18.48 mill. VKT in 2003; specifically, 5.83 mill. VKT was urban and 12.65 mill. VKT was countryside. The bulk of 2003 development was tangential, linking places of regional interest outside Prague.

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. On 1. 1. 2003, the Czech Railways (*ČD, s. o.*) divided in two separate enterprises, a state-governed Railway Transport Authority (*Správa železniční dopravní cesty*) and the operator Czech Railways Co. Inc. (*ČD, a. s.*). The division is expected to provide a fair access to the railway for railway carriers, consequently creating competition also in suburban transport.

10 railway tracks enter Prague, including 7 tracks 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 467 train connections across Prague on workdays, in which, as the operator indicates, an average of 130,000 passengers travel in both directions, including suburban trips.

Volumes at important Prague railway stations in 2003

	Outgoing (000s persons)	Incoming (000s persons)	Trains dispatched
Praha - Hlavní nádraží	6 720	6 432	70 448
Praha - Masarykovo nádraží	3 300	3 120	49 350
Praha - Smíchov	2 688	2 544	24 732
Praha - Vršovice	276	252	8 102
Praha - Libeň	360	324	79
Praha - Vysočany	408	420	44

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. From 5 a.m. to 10 p.m. of an average workday, Prague is entered and left by more than 2,600 regional and long-distance coaches (apart from *PID*).

4. TRAFFIC SIGNAL CONTROL

4.1 Construction and reconstruction of traffic signals

During 2003, traffic signal devices (TSD) continued to be developed, with the double objective: to bring the technology up-to-date, and support safer street conditions with responsive control aiming especially at pedestrian safety.

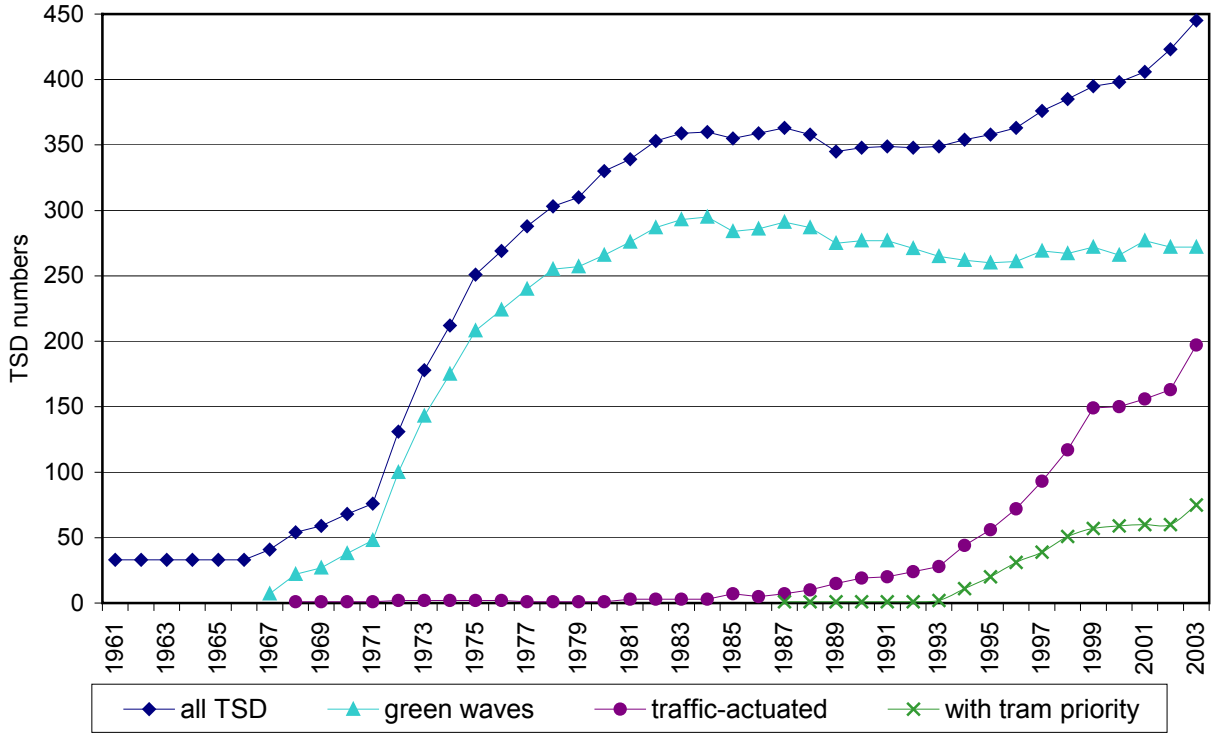
In 2003, 20 new TSDs were constructed in Prague, 7 TSDs were reconstructed, controllers were replaced in 6 TSDs and 2 TSDs were dismantled. By the end of 2003, all the TSDs operated in Prague numbered 445. In order to increase safety for blind pedestrians, 222 TSDs have been equipped with acoustic signal device.

Basic data concerning TSD, 1961 - 2003

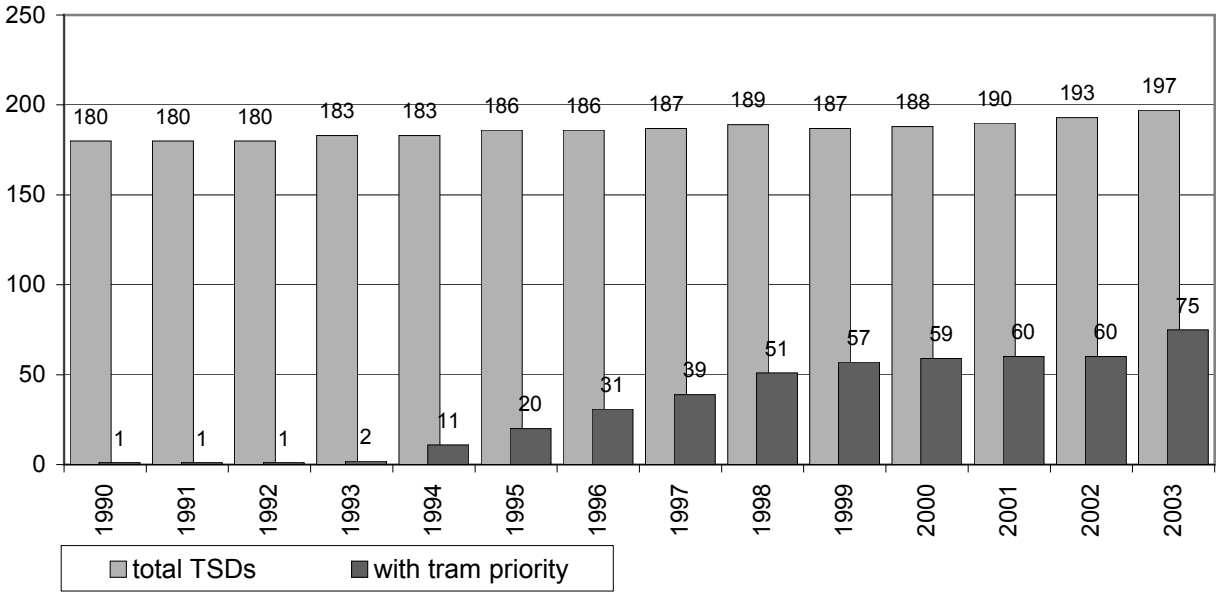
Year	1961	1971	1981	1990	1996	1997	1998	1999	2000	2001	2002	2003
TSD's total	33	76	339	348	366	376	385	395	398	406	427	445
incl. pedestrian crossings	-	9	37	45	49	51	54	55	57	55	56	61
in green waves	-	48	276	277	263	269	267	272	266	277	272	272
traffic-actuated	-	1	3	19	72	93	117	149	150	156	163	197
with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

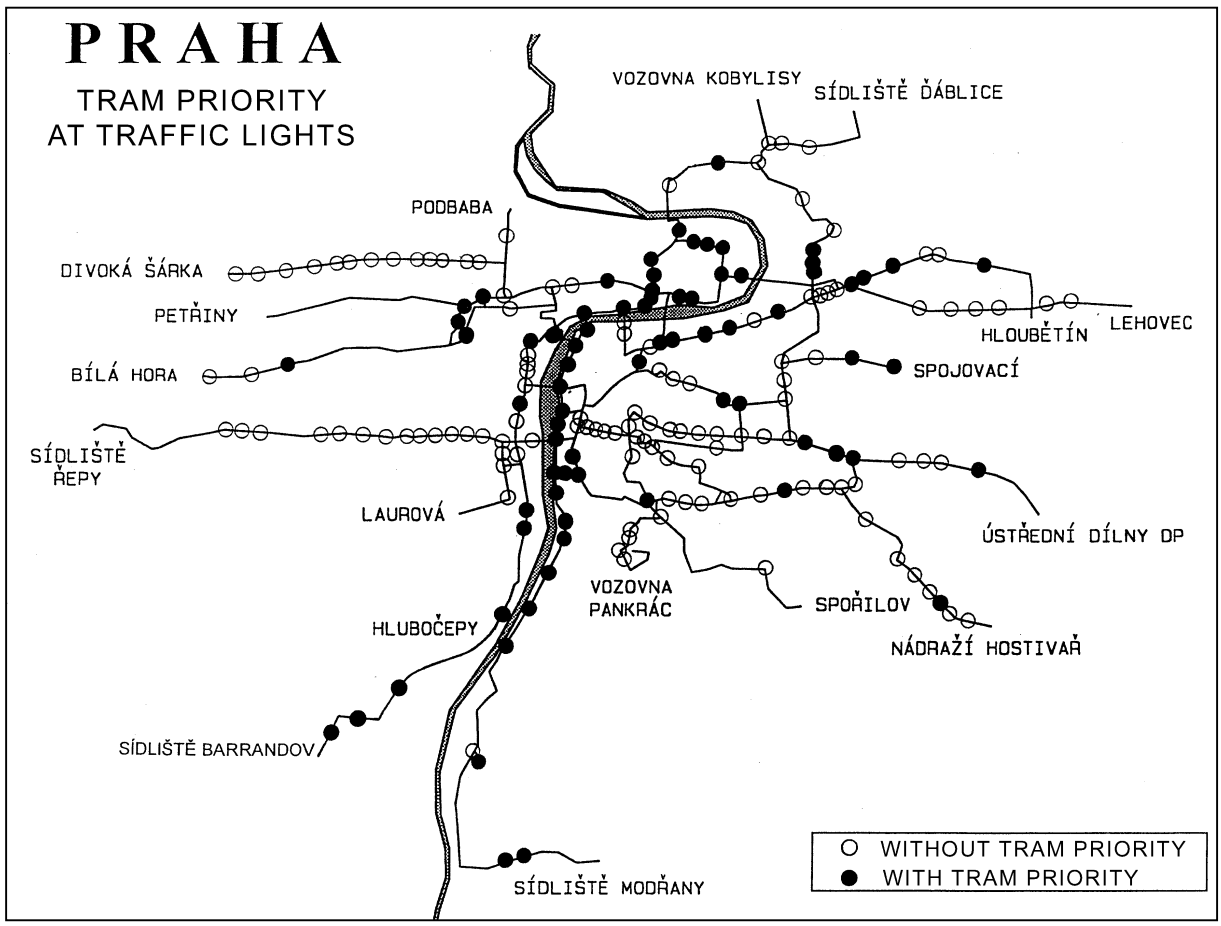
All newly built and reconstructed TSDs are equipped with traffic actuation by vehicle and passenger demand as well as with public transport (*MHD*) priority over passenger car traffic. As of 31. 12. 2003, the tram priority operated on 75 sites, which is 38 % out of the total 197 TSDs on Prague tram network. 35 crossroads with simple traffic conditions have an absolute tram priority, other locations have conditional tram priority. A pilot operation of *MHD* bus priority is run on two TSD-controlled crossroads (*Holečkova–Zapova* and *Barrandov* bridge–*Braník* ramp) under the Trendsetter project in 2003.

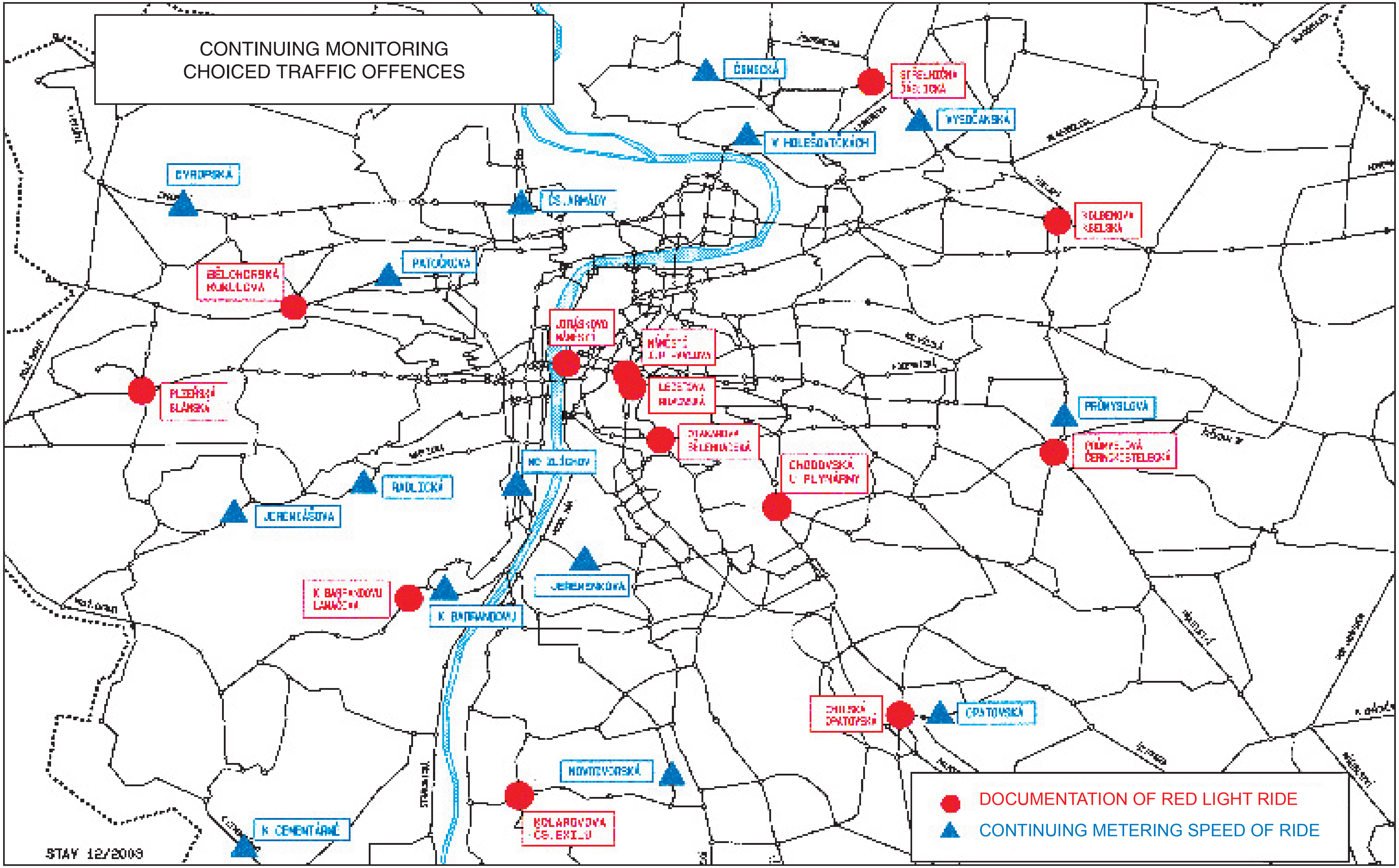
Traffic Signal Devices, 1961 - 2003



Traffic Signal Devices (TSD) on tram network, 1990 - 2003



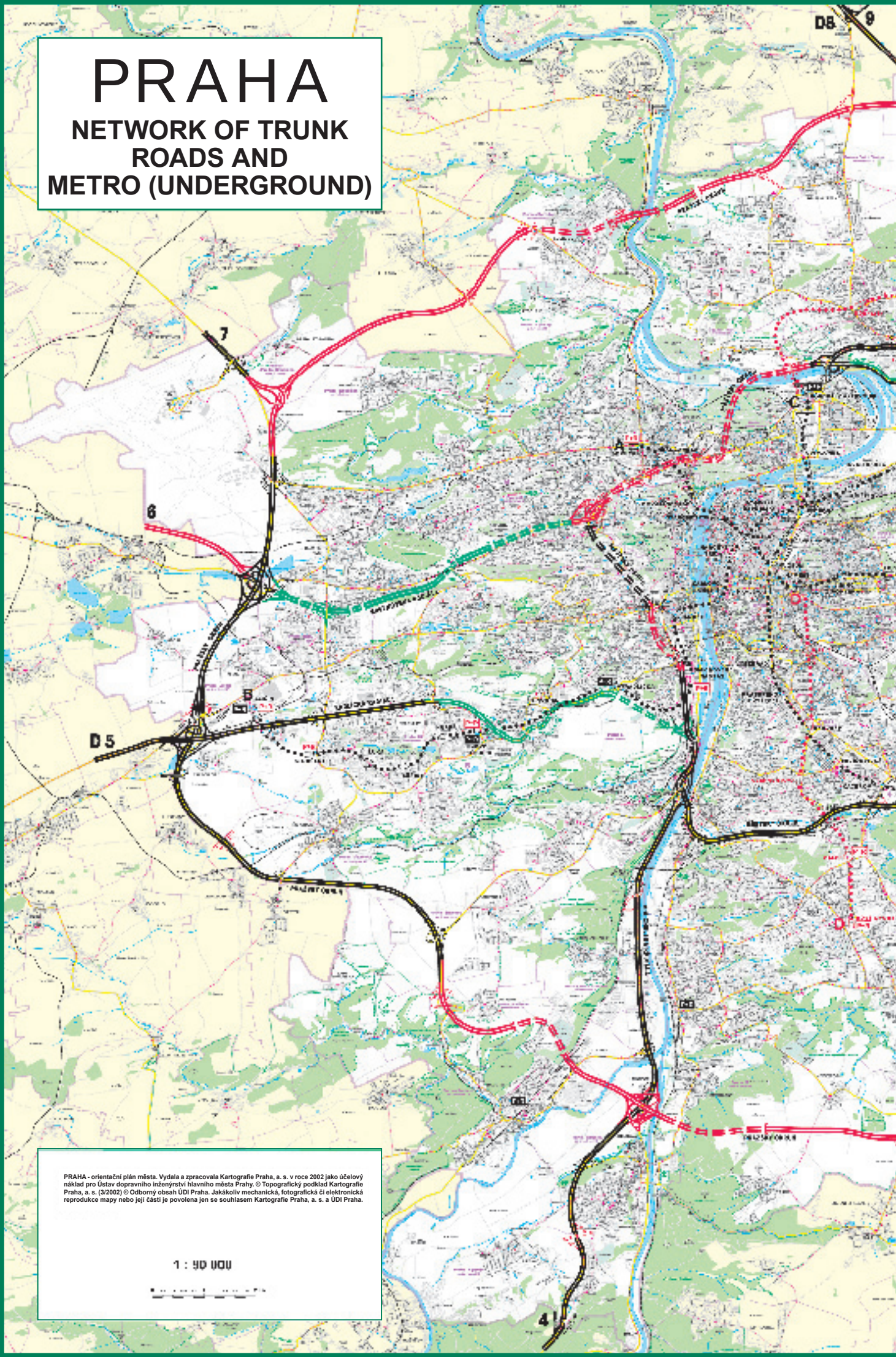




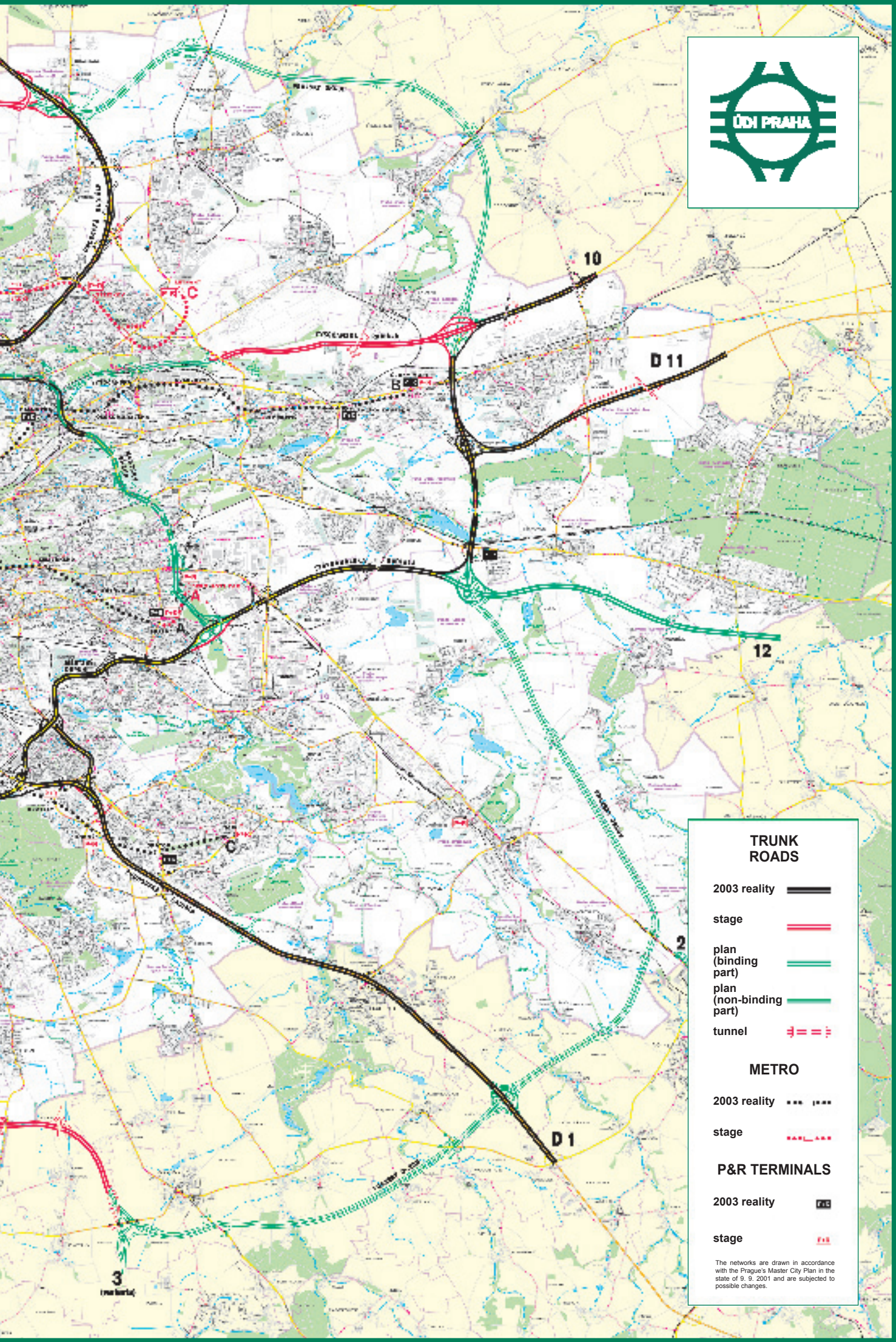
CONTINUING MONITORING
CHOICED TRAFFIC OFFENCES
DOCUMENTATION OF RED LIGHT RIDE
CONTINUING METERING SPEED OF RIDE
EVROPSKÁ
ČS. ARMÁDY
PATOČKOVA
BĚLOHORSKÁ KUKULOVA
PLZEŇSKÁ BLANSKÁ
RADLICKÁ
JEREMIÁŠOVA
K BARRANDOVU
JEREMENKOVA
NOVODVORSKÁ
K CEMENTÁRNĚ
OPATOVSKÁ
PRŮMYSLOVÁ
ČIMICKÁ
V HOLEŠOVIČKÁCH
VYSOČANSKÁ
STAY 12/2003

PRAHA

NETWORK OF TRUNK ROADS AND METRO (UNDERGROUND)



1 : 50 000

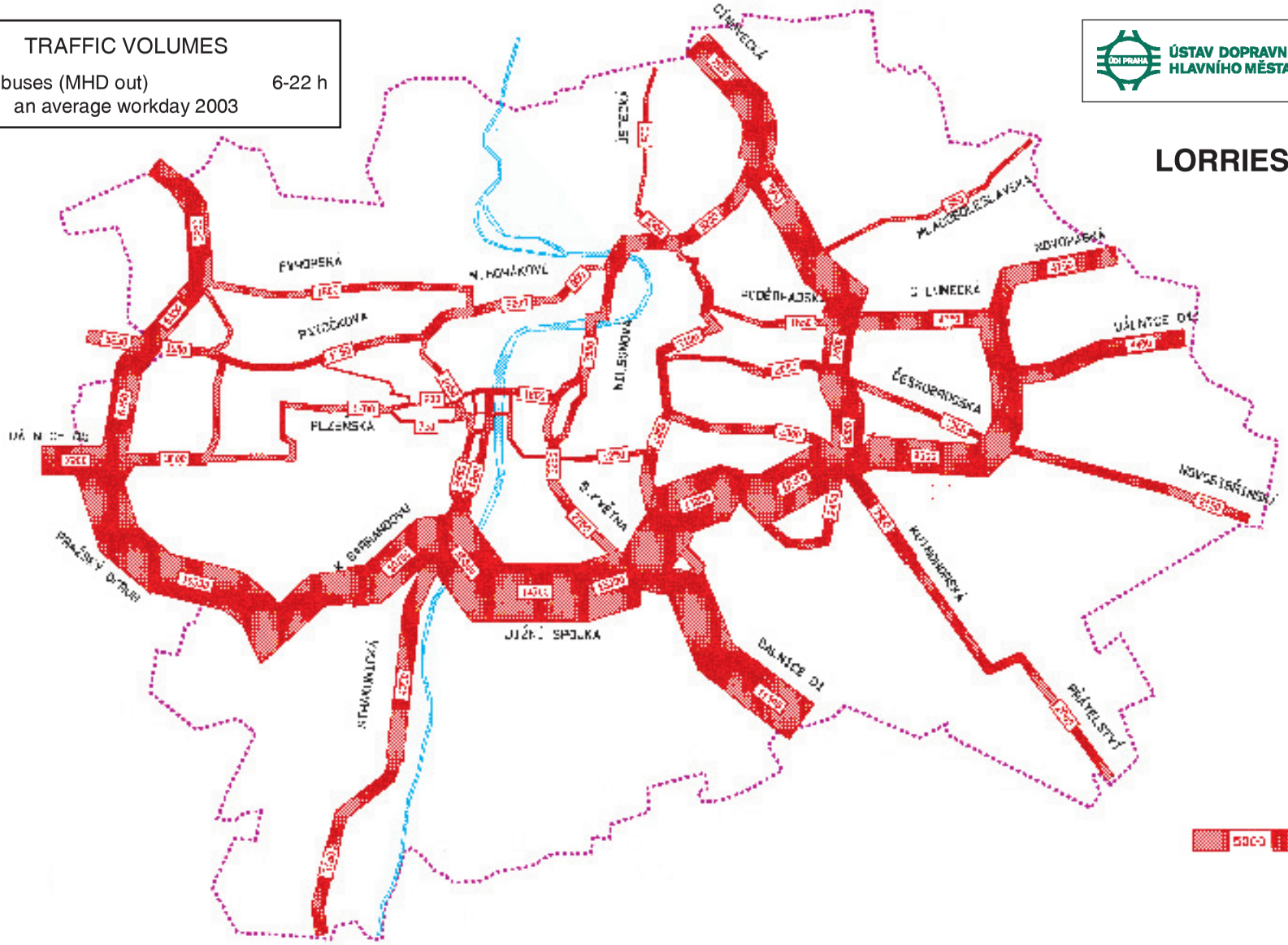

ÚDI PRAHA
10
D 11
12
D 1
2
3
TRUNK ROADS
2003 reality
stage
plan (binding part)
plan (non-binding part)
tunnel
METRO
2003 reality
stage
P&R TERMINALS
2003 reality
stage
The networks are drawn in accordance with the Prague's Master City Plan in the state of 9. 9. 2001 and are subjected to possible changes.

TRAFFIC VOLUMES

lorries + buses (MHD out) 6-22 h
an average workday 2003

ÚSTAV DOPRAVNÍHO INŽENÝRSTVÍ
HLAVNÍHO MĚSTA PRAHY

LORRIES + BUSES



4.2 Traffic control centres

The process of implementation of the project entitled “System of control and regulation of the urban road traffic” continued on in 2003. For the management and development of the system, Prague Road Maintenance (*Technická správa komunikací hl. m. Prahy*) is responsible.

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

The control computer (a BFR server) of the **VRS 2100** system is linked with regional control computers (GBR) for area 1 – *Holešovice-Letná* (since 2000) and area 5 – Centre (since 2001). The regional control area 1 links to 27 TSDs. The regional control area 5 – Centre links to 14 TSDs.

Currently, time-dependent signal plan selection is used with traffic-actuated programs on instant demand from vehicles, trams and pedestrians. Apart from traffic-actuated programs, the intersections can be controlled with sets of traffic-responsive plans, made from structural traffic-responsive plans by stopping in stop points. Simultaneously, traffic sensor data are collected and stored. Additionally, the **TRASSIS** control system has been launched – traffic responsive plans over eight TSDs of area 1 along the co-ordinated drive *Argentinská - Bubenské nábřeží - nábřeží Kpt. Jaroše*.

Local traffic control in area 8 – East was prepared in 2003, run on regional control inside a newly-built multipurpose structure of *Sazka* Arena in *Vysočany* neighbourhood. The area will be connected to an IT-based VRS 2100 control system.

The **MIGRA** regional control serves the area 3 - *Smíchov*. The Principal Traffic Control Centre dispatchers’ worksite enables visual control and adjusting the operation of all 27 on-line TSDs. 21 TSDs in a section of the area are controlled by the **MOTION** system in a pilot run. Based on the traffic density, it optimises the length of cycles, green signals and offsets of green appearances in co-ordinated flows.

The **ADT** control computer currently processes 50 TSDs in the area 10 - *Vinohrady, Nové Město*. The programming system was upgraded for SYDO V. Its control is performed by extending phases of the so-called structural signal plan by means of stopping points. Additional 18 TSDs comprising a co-ordinated group along the *Evropská* street in district *Praha 6* can be set from the Principal Control Centre for flashing amber signal.

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

- a control workstation for the *Strahov* car tunnel;
- a control workstation for the *Letná* car tunnel (temporarily limited to technology tunnel equipment);
- a control workstation for the *Těšnov* car tunnel;
- a control workstation for the *Zlíchov – Radlická* underpass (test operation).

The same control operates also a **TV supervision** (monitoring critical spots on the road network). The roads in Prague are set with 154 fixed and rotary TV cams. The control also includes a **P + R system** (Park & Ride) in the western part of the city. **Variable-message information boards**, installed in several urban locations, inform drivers on important current traffic changes in the area (congestions, accidents, traffic situation). Data and information are transmitted via the Prague Road Maintenance (*TSK hl. m. Prahy*) wireless network.

The Inner Ring segment *Zlíchov – Radlická*, equipped with variable information signs installed and 14 video-cameras to supervise the traffic (especially inside the short tunnel below the gridiron of the railway station *Praha-Smíchov*), continues to operate the **measuring the speed of the traffic flow** by means of videocameras UNICAM VELOCITY with data collection (speed). These are also linked to the Principal Traffic Control Centre (*HDŘÚ*).

4.3 Telematics in traffic

Traffic telematics integrates IT and telecommunication technology with traffic engineering for the purpose of helping current infrastructure increase traffic volumes, safety and amenity of travel. It makes possible to optimize driving of vehicles and the traffic flow with a positive impact on the environment. Given the current density of the car traffic in Prague, the urban traffic system cannot do without utilizing capabilities offered by traffic telematics.

Main principles to design an efficient system of telematics for traffic in Prague 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

In keeping with a **Study of telematics in the traffic of the Capital of Prague,** work started on the system of telematics in Prague. The system integrates subsystems that so far operated independently and makes data from the interlinked systems easier to operate with. This way the traffic control can be more efficient, the flow of traffic safer and traffic participants better informed.

Supplying information on traffic and travel before and during trips helps significantly the traffic to flow smoother and safer, and consequently, the urban environment to improve. That is why, in building Prague traffic telematics systems, a **Study on Traffic and Travel Information Service for the Public** and a follow-up **Concept of Traffic Information Service for the Public of Prague** were compiled in line with the approved principles in 2003. Based on the Concept is a project documentation for a **Traffic Information Centre**.

Governmental and private bodies operating in areas related to telematics in traffic worked jointly to test-run an **RDS-TMC** system (Radio Data System - Traffic Message Channel) during 2003. Its coverage includes the territory of Prague. The system transmits **traffic information** to users **while driving**, making possible to optimize their route in accordance with the current traffic condition by means of an FM radio broadcast. As the RDS-TMC system passed the test run successfully, its **localization tables** for Prague began to be compiled later in 2003. The tables, a selection of the most important locations on the road network to monitor their traffic, are a founding step to launch an RDS-TMC-based telematics system in Prague.

5. NEW TRAFFIC ARRANGEMENTS

In 2003, a draft plan for **widening of the environmental zone for vehicles over 6 tons** was processed for a broader inner city of Prague. The plan is a subtask of an international project Trendsetter. The first stage of the plan, the extending of the zone to a portion of *Praha 4* neighbourhood adjacent to the Prague Conservation Area (*Pražská památková rezervace*), was implemented in the 4th quarter of 2003.

Widening of the restriction zone for heavy vehicles over 6 tons GVW was preceded, in 2003, by a detailed survey on movements of goods vehicles across the area concerned. This survey has found that the area considered for the extension (*Praha 4*) was entered, between 5 a.m. and 10 p.m., by 16,116 vehicles including 688 vehicles over 6 tons (i.e. 4.3 % of all vehicles), of which 498 vehicles were transiting the area. The data has shown that after the 6-ton zone is extended to the portion of *Praha 4*, the transiting goods traffic might be trimmed down by as much as 19 %.

Several permanent changes have also affected **the arrangement of passenger car (PC) mobility** in Prague's inner city, the most important of which were adjustments of traffic regime in *Anděl* neighbourhood in *Praha 5* brought about by a new pedestrian zone on sections of *Nádražní, Štefánikova* and *Plzeňská* streets.

Other changes have affected **the arrangement of PC parking**. They consisted mostly in local adjustments of standing regime with regard to necessary daytime shop logistics. Several stopping points with a 15-minute limit have been marked out for goods vehicles supplying some businesses in *Praha 1*.

During 2003, **reconstruction of traffic infrastructure in the city centre following the August 2002 flood** continued on. Building sites were mostly in *Josefov*, *Staré Město* and *Malá Strana* quarters and affected roads and streets of lesser importance for traffic. Exceptions of higher traffic importance were *Dvořákovo nábřeží* embankment, *Senovážné náměstí* square and *Sokolovská* street.

Notable alterations in traffic arrangement that affected both city centre and most of the rest of the territory have been made **in municipal public transport** (PT) in relation with the start of the operation of the new tram line *Hlubočepy - Barrandov* since 29 November, 2003. Consequently, tram line transport has been changed throughout the city. The bus PT was affected in the area *Hlubočepy - Barrandov*.

Additional change in the PT arrangement in Prague's inner city has been the launch of small City-buses on the first line No. 291 in *Praha 2* neighbourhood. This bus line, bridging two important transportation nodes, the squares *I. P. Pavlova* and *Karlovo náměstí*, aims at enhancing transport coverage and accessibility of health facilities inside the area between *Karlov* and *Karlovo náměstí*, especially for impaired mobility persons. The first City-bus line was launched under the international Trendsetter project.

In order to reinforce PT priority in Prague, the total length of 1,058 m separators along tram lines were installed in streets *Na poříčí, Sokolovská, Havlíčkova, Komunardů* and *Národní třída* in 2003. A dedicated PT bus line 950 m long has been marked out in *Milady Horákové* street. As of 31. 12. 2003, the whole surface PT network had the total of 6,232 m track edging separator for tram priority, 6,530 m dedicated lanes for bus priority and 3,300 m dedicated lanes for buses on tram lines (apart from additional 1,600 m for night bus lines).

6. ACCIDENT RATE IN TRAFFIC

6.1 Road accidents

In 2003, there happened 35,589 accidents in Prague (1 % less than in 2002), 65 victims died (21 % less) and 3,975 victims were injured (4 % less). Pedestrians were involved in 908 accidents (7 % less) with 28 fatalities (22 % less) and 913 persons injured (6 % less). Pedestrians were themselves culpable in 454 accidents (7 % less) with 11 fatalities (35 % less) and 453 injured (5 % less). By far the dominant share rests with the drivers (34,630 out of 35,589 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 988 (4 % less).

Main causes of accidents

Year	2001	2002	**2003**	diff. 03/02 (%)
accidents	34 195	35 888	**35 589**	- 1
fatal injuries	67	82	**65**	- 21
serious injuries	452	477	**466**	- 2
slight injuries	3 521	3 679	**3 509**	- 5
accidents with injuries	3 243	3 398	**3 269**	- 4
accidents without injuries	30 452	32 490	**32 230**	- 1
Driver culpable due to	33 140	34 782	**34 630**	0
speed	3 298	2 860	**2 473**	- 14
passing	314	345	**299**	- 13
failure to give way	8 776	10 177	**9 588**	- 6
reckless driving	20 752	21 400	**22 270**	+ 4
Driver not culpable	1 065	1 106	**959**	- 13
due to road defect	147	138	**98**	- 29
due to pedestrian	470	487	**454**	- 7

General trend in 2003 accidents: mild decrease in accident number, marked 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.

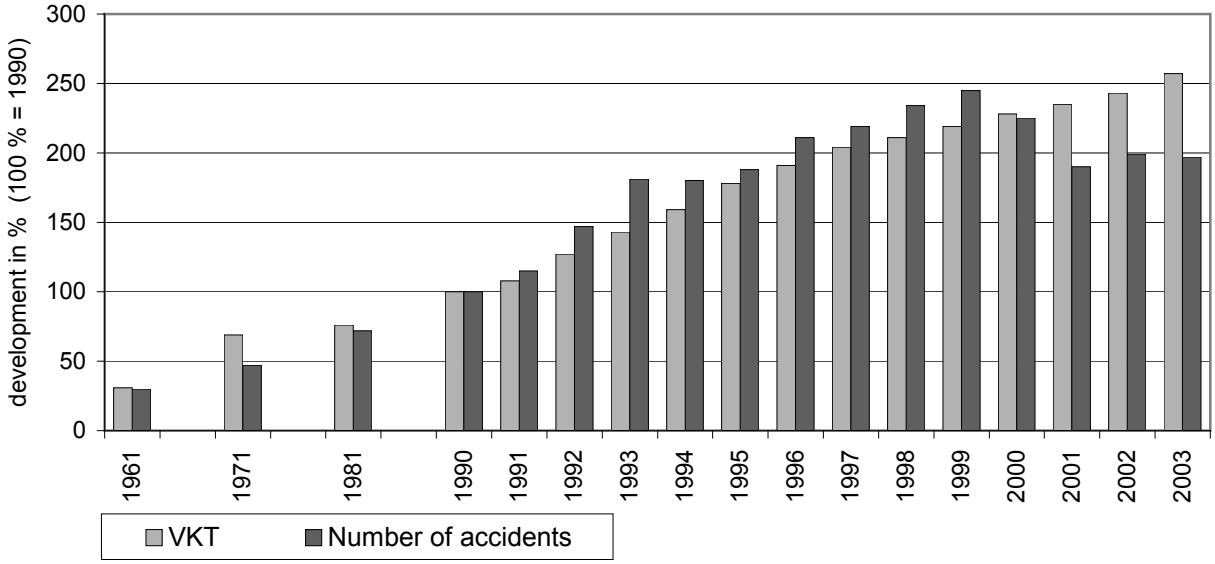
Since 2001, the number of registered accidents went down in spite of automobile traffic further increasing. Accordingly, the relative accident rate lowered also (to about one fourth of the 1990 value). In 2003, the all-Prague average was 5.7 traffic accidents per 1 million VKT.

Traffic accidents, injuries and relative accident rate, 1961 - 2003

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**

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

Accidents and VKT, 1961 - 2003
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. Most events concerned with prevention of traffic accidents is held jointly with the Ministry of Transportation and the Central Auto-Moto-Club of the Czech Republic (*ÚAMK*), which has been selected by the Ministry for nation-wide upholding of such activities.

In 2003, the traffic education events were funded from the municipal budget with CZK 1,560,000 and about CZK 200,000 from the funds of the Ministry of Transportation.

The following programmes of children's traffic education were made in 2003:

- Cyclist Starter Action (Cyclists' Traffic Contest)
- Systematic Training Effort on children's traffic playgrounds
- Fine arts/traffic combined education programme "Look out, kids, red's on!"
- Interactive theatre performances on traffic-educational topics
- A traffic education event for children's home clients.

Three children's traffic contests for deaf children and children of deaf parents were arranged jointly with the Auto-Moto-Club of Deaf Motorists. A joint project "Road Safety for All" of the *ÚDI* and Prague Constabulary was on throughout the year. Co-operating with the Czech Auto-Moto-Club, Driving Skills Spring and Autumn Cup were arranged for driving public, with about 180 drivers participating. In conjunction with Auto-Moto-Club of Handicapped Motorists, 2 contests were held for physically handicapped motorists.

6.3 Measures to enhance road safety

In 2003, traffic measures were designed and implemented with the primary focus on enhancing the security of pedestrians on and around pedestrian crossings.

Speedhumps and BOCH type separators (e.g. *Ruská, Národních hrdinů, Peroutkova, Na Hřebenkách* streets) have been installed to lower speed.

Traffic signs on yellow-green retroreflective sheeting with "Pedestrian crossing" and "Children" traffic symbols in colour across the carriageway have been installed at dangerous locations (e.g. *Plzeňská* and *Vrchlického* street).

Structural adjustments to facilitate roundabouts were made at intersections *Solidarity* x *V olšinách*, *Opatovská* x *Bohúňova* and *Opatovská* x *Novomeského*.

In order to cut down the accident rate, pavement surface chipping was made on sections of certain roads, concrete crush barriers, cable guard fence (e.g. in *5. května* street) and road mirrors were installed.

Security measures in 2003 in the framework of road safety *BESIP* programme totalled CZK 43.3 mill., including CZK: 15.0 mill. to strengthen lighting on pedestrian crossings,
4.6 mill. for speedhumps,
2.4 mill. to set guard rails,
3.4 mill. for structural modifications of crossroads,
1.5 mill. for traffic measures near schools.

7. TRAFFIC AT A STANDSTILL

7.1 Parking in the inner city

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 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)	2 217 places
- long-term (blue zone)	6 051 places
- handicapped	251 places
- other (reserved for the Government and authorities)	364 places

Average occupancy of standing places in ZPS (2003)

- short-term standing	89.8 %
- long-term standing	89.4 %

Compliance rate with the regulations specified in ZPS for places utilization remains low. According to e.g. survey made by Evropark, a. s., in 2003 the rates are

- on short-term standing	41.7 %
- on long-term standing	53.2 %

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	500 CZK/veh./yr
- 2nd vehicle of an individual	5 000 CZK/veh./yr
- 3rd vehicle of an individual	10 000 CZK/veh./yr
- a business vehicle	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 8,517 standing places, the largest being at:

KOC Nový Smíchov	2 000 places
Kongresové centrum	1 090 places
Garáže Helios (*Wilsonova* st.)	520 places
Zlatý Anděl	500 places
Marriott Hotel (*V celnici* st.)	480 places
Parking *Palachovo náměstí*	453 places
Anděl City	400 places
Hlavní nádraží (*Wilsonova* st.)	371 places

Moreover, 34 **private parking facilities** with the capacity of about 4,800 places are available within the broader inner city.

The total of Prague parking is not available. An estimate of the general capacity is roughly 160,000 places.

Additionally, 365 sites with off-street parking is registered in the city territory with their capacity of approximately 39,700 standing places (the records continue to be updated), including 43 % supervised.

7.3 Park and Ride (P + R)

14 P+R parking facilities with their capacities totalling 1,511 places have been operated in the combined transportation Park and Ride system in 2003. During the year, another facility was launched into operation, *Černý Most II* with capacity 138 parking places. The facility *Skalka* was moved to a new location in the same area.

The utilization of P+Rs is shown in the following table which compares the numbers of parking cars on P+R sites in Octobers of 2001 – 2003.

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

	Capacity			Parked vehicles			Av. vehicles per place per month		
Site	2001	2002	**2003**	10/2001	10/2002	**10/2003**	10/2001	10/2002	**10/2003**
Zličín I	94	94	**88**	3 508	3 622	**3 510**	37	39	**40**
Zličín II	70	70	**70**	2 111	3 432	**2 505**	30	49	**36**
Nové Butovice	60	60	**60**	2 572	1 689	**2 136**	43	28	**36**
Radlická	37	37	**37**	1 272	948	**1 169**	34	26	**32**
Skalka	175	175	**112**	2 762	2 461	**3 408**	16	14	**30**
Opatov	212	212	**212**	5 073	5 389	**5 732**	24	25	**27**
Rajská Zahrada	80	80	**80**	2 837	409	**2 697**	35	5	**34**
Černý Most I	300	300	**300**	10 716	3 481	**9 818**	36	12	**33**
Černý Most II	0	0	**138**	0	0	**2 042**	0	0	**15**
Holešovice	77	77	**77**	3 226	1 453	**3 299**	42	19	**43**
Palmovka	122	122	**122**	4 446	3 779	**4 183**	36	31	**34**
Radotín	62	62	**62**	463	878	**918**	7	14	**15**
Běchovice	0	100	**100**	0	1 498	**180**	0	15	**2**
Modřany	0	53	**53**	0	213	**310**	0	4	**6**
Total	1 289	1 442	**1 511**	38 986	29 252	**41 907**	30	20	**28**

The parking utilization in 2002 was affected by the special PT regime following the flood, especially with restrictions on sections of *Metro* lines. Lifting the after-flood regime had an adverse impact on the site *Běchovice*, cutting its occupancy down.

Parking facilities with regular low utilization offer some of their places to residents. Residential places are at sites *Opatov, Skalka* and *Radotín*. The *Radotín* facility with very low use offers up to 50 per cent of its capacity for residential parking. Private individuals pay CZK 500 a month, business entities CZK 800 for one standing place.

Another supplementary service on P+R sites is a bike storage service. Bikers are offered this service at all P+R facilities free of charge.

An inquiry was conducted on selected P+R sites in 2003. The parking drivers 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.

P+R usage breakdown into trip origins

	Number of respondents				%			
P+R site	Praha	environs	other	total	Praha	environs	other	total
Černý Most I	9	39	52	100	9	39	52	100
Opatov	7	37	13	57	12	65	23	100
Skalka	6	2		8	75	25		100
Palmovka	26	24	4	54	48	44	8	100
Zličín I		18	6	24		75	25	100
Holešovice	7	11	12	30	23	37	40	100
Rajská Zahrada	17	12	7	36	47	33	20	100
Total	**72**	**143**	**94**	**309**	**23**	**46**	**31**	**100**

The most frequent purpose was commuting - 74 %.

The main reasons to use the P+R facility were indicated as follows: the destination is within the reach of PT - 29 %, difficult to find parking place at the destination - 20 %, supervision at the P+R facility - 18 %.

An average occupancy was found 1.24 persons per vehicle.

The P+R sites were reached with the following frequency: from the distance of 0-10 km - 27 % vehicles, from 11-20 km -27 % vehicles and 4 % vehicles came from a distance greater than 150 km. An average distance to a P+R site was 38.5 km.

Drivers were asked concerning their destination in Prague. The results showed that the distance of P+R site from the destination plays no role in reaching the goal.

In 2003, the *ÚDI* took part in collecting information arranged by Dublin Transportation Office concerning the way the combined transport P+R is designed in some European cities. The following table shows a general information:

City (Nation)	Population (mill.)	City area (km^2)	Number of P+R facilities	Number of standing places	Standing places per 1 000 people
Stockholm (Sweden)	1.85	6 500	70	6 000	3.24
Athens (Greece)	3.7	1 450	2	600	0.16
Madrid (Spain)	5.1	8 028	64	17 084	3.34
Paris (France)	11	12 000	422	107 000	9.73
London (Great Britain)	7.3	4 042	68		
W. Midlands (G. Britain)	2.6	902	43	5 172	2.02
S. Yorkshire (G. Britain)	1.3	1 561	24		
Moscow region (Russia)	13	46 000	1	320	0.025
Brisbane (Australia)	2.2	10 458	105	16 009	7.27
Dublin region (Ireland)	1.5	6 987	33	4 748	3.17
Prague (Czechia)	**1.2**	**496**	**14**	**1 511**	**1.3**

7.4 K+R stopping places

The combined mode of transit termed K+R (Kiss and Ride) takes advantage of using both passenger car and public transport: a travelling companion switches from a passenger car to a means of public transport while the driver takes the car immediately away. Alternatively, the PT passengers get into a waiting car, taking the rest of their trip with the driver.

This way of travelling is practice in Prague next to many *Metro* stations, in spite of there often being no safe conditions for the companions to get out or in.

As early as in 2002, K+R places were marked out next to *Černý Most, Radlická* and *Kačerov* underground stations. A count of the K+R-type traffic was conducted in May 2003 next to the *Vltavská* underground station between 6 a.m. and 6 p.m. The following table shows the data obtained.

Vehicles and passengers using the K+R system during count

hour period	To city centre			Out of city centre		
	vehicles	pers. getting in	pers. getting out	vehicles	pers. getting in	pers. getting out
6-10	89	17	86	15	3	10
10-14	27	2	26	3	0	3
14-18	44	8	41	10	1	7
Total	160	27	153	28	4	20

Registering the time vehicles stood close to the *Metro* station was also part of the survey. The following table counts frequencies in several intervals of waiting.

Waiting tally

Time of waiting (minutes)	0 - 1	1 - 2	2 - 5	5 - 10	> 10
to city centre	141	8	4	2	5
out of city centre	18	5	3	0	2

The survey proved a demand for that type of parking. Later on, a K+R standing was provided at the *Vltavská* station in the centre-bound direction.

8. BICYCLE TRAFFIC

The design of the basic system of cycle routes on the territory of Prague, expects 450 km of cycle routes to be gradually built. Currently, 180 km cycle routes are demarcated. Out of this total, 60 km is led along car-free roads with pedestrian traffic, along available paths in parks and woods or on ways newly built specifically for cycling and walking. The key trails for bikers on the territory of Prague are marked according to the Regulation of the Ministry of Traffic and Communications with cycle route signs.

Another section of cycle route was added to the already implemented and exploited routes of the municipal cycle network in September 2003. The *Modřany* section was open in support of the European Week of Mobility.

The following new routes were under preparation in 2003:
Petrovice - Křeslice - Újezd (section No. 11 ČR *"Praha – Tábor"*), 4 km long; *Braník - Radotín* – border of Prague in the section *Velká Chuchle - Radotín* – border of Prague, 5 km long; district *Praha 9, Kolčavka - Freyova,* 2 km long; Prague circular trail.

In 2002 and 2003, bikers were counted for density on selected cycle routes and selected entrances to Prague Conservation Area (PCA).

Bikers' density at entries to PCA was monitored in April and May as part of a survey concerning transiting and targeted traffic on the circumference of PCA. The survey was done on streets entering the PCA (32 posts). The total number of bikers in both directions from 6 a.m. to 10 p.m. was 1,923. The biker density's modal share on traffic flowing across the PCA circumference is close to 0.5 %.

The survey was complemented with counting biker traffic at additional selected approaches to PCA, not serving motor traffic. The densities found (July - August 2003) varied between 55 bikers (parkways under *Nuselský* bridge) up to 251 bikers (*Šeříková* street) on a workday between 6 a.m. and 8 p.m.

The total density of bikers crossing the PCA circumference on a workday in 2003 reached the count of 3,200 between 6 a.m. and 10 p.m.

9. PEDESTRIAN TRAFFIC

Walking is the most natural and most frequent mode of human locomotion. It is part and parcel of any trip, whatever its traffic means is; it always starts and ends by walking.

An estimated 23 % of all trips inside Prague is made only on foot. In the city centre, district *Praha 1* being at its core, almost one third of all the pedestrian journeys in Prague takes place. Of all the intra-urban pedestrian trips (made without any means of transportation), 23 % of the journeys have their origin or destination in Prague 1, while additional 9 % of pedestrian trips is done exclusively within this area. In spite of pedestrian traffic being so important in the inner city, it often finds no operational mode adequate for specific locality on sections of traffic space intended for pedestrians, capacities, conditions or conveniences of pedestrian routes.

Throughout the territory of the city, an increased attention is paid to greater pedestrian security on road crossings, especially where children and youth concentrate (in the vicinity of schools and tram stops) or where walking route leads across multi-lane roads for motor vehicles.

Permanent solutions that helped significantly improve movement, safety and comfort of pedestrians in the street network of the inner city of Prague, or enhance aesthetic quality of pedestrian routes were implemented in 2003 in the following structural and traffic engineering measures:

- a pedestrian precinct with tramway traffic around *Anděl* place in *Praha 5* quarter on redeveloped sections of *Štefánikova*, *Nádražní* and *Plzeňská* street,
- *Michalská* street (*Praha 1*) revitalization completed,
- about 20 pedestrian crossings across service or (exceptionally) trunk roads in *Praha 1*, marked out with upright traffic signs and road signs,
- replacing footwalk asphalt coat for mosaic pavement in some areas of *Staré* and *Nové Město* (*Praha 1*), *Vinohrady* (*Praha 2*) and *Smíchov* (*Praha 5*).

Permanent solutions of traffic regime take ever more in account the safety needs of walkers with limited movement and orientation (esp. sight), close to pedestrian crossings and elsewhere. Necessary measures are implemented to help these people move (mainly splay curbs at footwalks next to crossings, pointing and leading strips for the blind on pavements close to pedestrian crossings, etc.) both in new road constructions and reconstructions as well as separate projects of footwalk modifications.

10. AIR TRANSPORT

Air passenger and freight transport is conducted mainly at the *Praha-Ruzyně* airport. The other three Prague airports are usually used for other, special purposes. The *Praha-Ruzyně* airport has three take-off and landing runways, two of them equipped for instrument traffic with the maximum capacity of 36 movements (take-offs and landings) of aircraft per hour. The airport overall annual transport capacity in 2003 was 6.6 mill. passengers, specifically 0.2 mill. passengers in terminal South and 6.4 mill. passengers in terminal North. The annual cargo capacity of the two terminals is 120,000 ton in total. In 2003, regular lines were operated by 35 companies, that offered regular connection of Prague with 76 destinations in Europe and other three continents of the world. In 2003, a direct link to Great Britain was expanded, making immediately accessible 11 airports. Next in accessibility is Germany (8 airports). The direct links offered are much more that in neighbouring Central European countries. The position of the *Praha –Ruzyně* airport in an international comparison can be seen in the following table.

Passenger volumes processed at selected airports (mill. passengers / year)

Airport	1996	1997	1998	1999	2000	00/96 (%)
Chicago O'Hare	69.15	70.39	72.49	72.61	72.14	104.3
London Heathrow	55.73	57.85	60.36	61.98	64.28	115.3
Frankfurt Rhein-Main	38.02	39.61	42.08	45.41	48.96	128.8
Paris Ch. de Gaulle	31.43	35.10	38.47	43.44	47.80	152.1
Amsterdam Schiphol	27.26	31.02	33.95	36.43	39.27	144.1
Madrid Barajas	21.27	23.12	24.92	27.59	32.57	153.1
Roma Fiumicino	22.71	24.62	25.00	23.61	25.88	114.0
Bruxelles National	13.36	15.82	18.40	19.97	21,52	161.1
Stockholm Arlanda	13.88	14.95	16.15	17.13	18,26	131.6
Copenhagen Kastrup	15.59	16.61	14.49	17.27	18,16	116.5
Vienna Schwechat	8.95	9.59	10.49	11.05	11,79	131.7
Lisboa	6.19	6.63	7.76	8.44	9,21	148.8
Praha Ruzyně	**3.80**	**4.36**	**4.63**	**4.82**	**5,79**	**152.4**
Budapest Ferihegy	3.31	3.62	3.94	4.33	4,67	141.1
Warsawa Okecie	3.09	3.55	3.82	3.40	4,33	140.1
Bratislava M. R. Štefánika	0.25	0.28	0.32	0.27	0,28	112.0

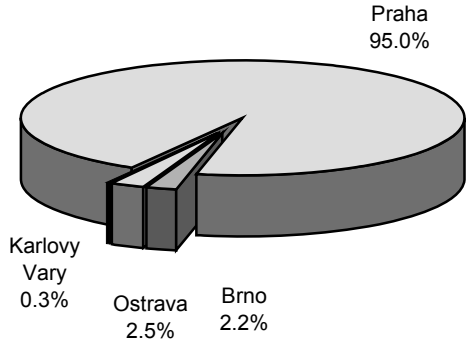
Source: Transportation Yearbooks of MT CzR (ICAO), The Chicago Department of Aviation

The total volume of cleared passengers at the four international airports in the Czech Republic (*Praha, Brno, Ostrava, Karlovy Vary*) rose by 18.3 % as against 2002, while the volume of cargo (goods and mail) by as much as 22.2 %.

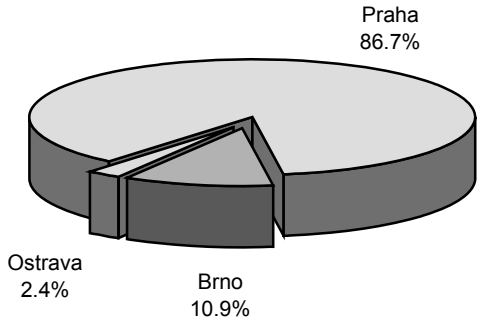
The share of the *Praha - Ruzyně* airport on the total volume of air transport in the Czech Republic is 95 % in passenger transport and nearly 87 % in cargo transport. The share of other Czech airports is almost negligible especially in passenger transport.

Comparing the previous years, when the Praha-Ruzyně airport's share on the total volume of air traffic in the Czech Republic increased, the 2001 data reveal a stagnation, then a drop, recognizable also in 2003. Comparing with 2002, The airport of Prague's share in passenger transport sank in 2003 by 0.2 % and in cargo transport by 3.9 %.

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

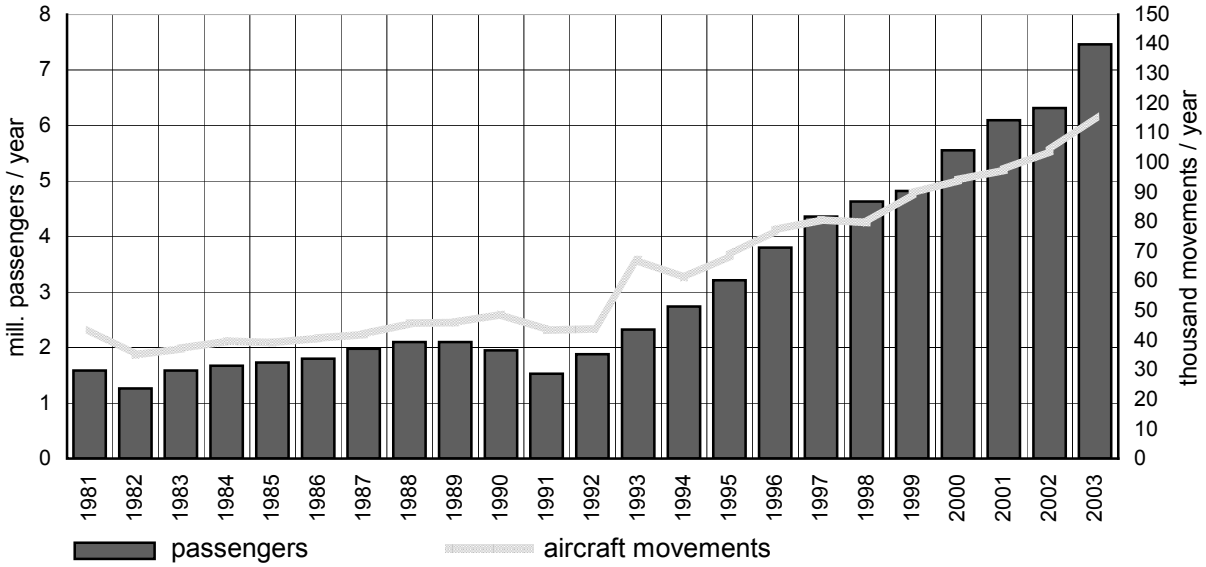


Share of airports
in cargo transport performance
% from the overall volume of cleared cargo incl. mail



The total of 7,463,100 passengers were cleared through the *Praha-Ruzyně* airport in 2003, which represents comparing with 2002, so far greatest annual increase by 1.15 mill. passengers (18.2 %). The numbers consist of 80.3 % passengers transported by regular lines, and the remaining 19.7 % by special lines. The most passengers were cleared in August (870,900 people), the least in February (377,500 people). Compared to 2002, the monthly high was by almost 24 % higher in 2003.

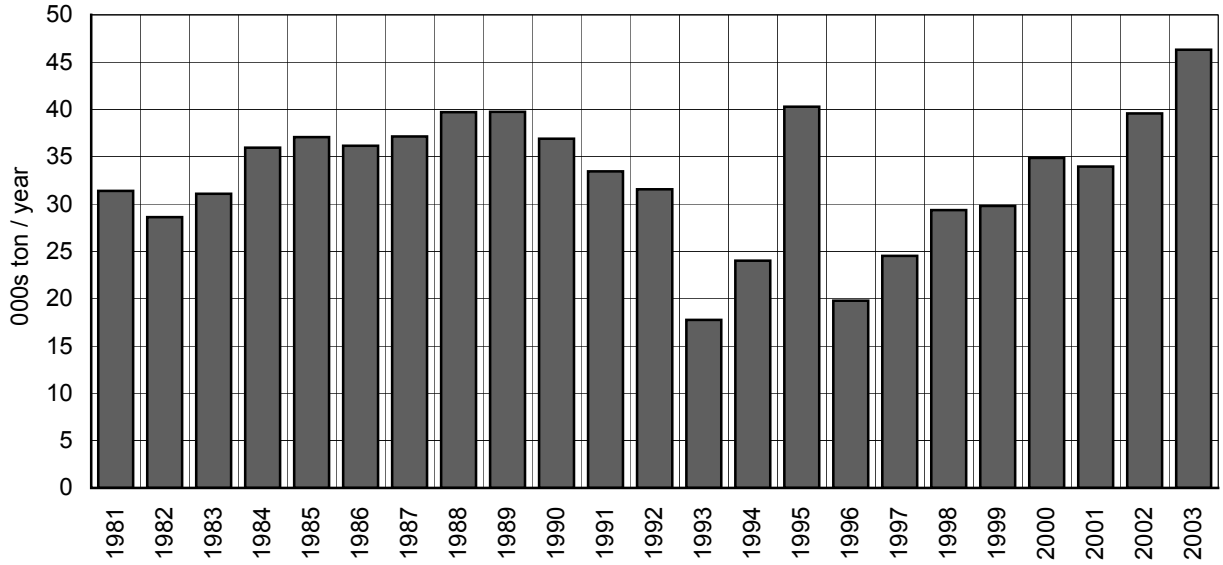
Development of the *Praha-Ruzyně* airport volumes
passengers cleared and aircraft movements



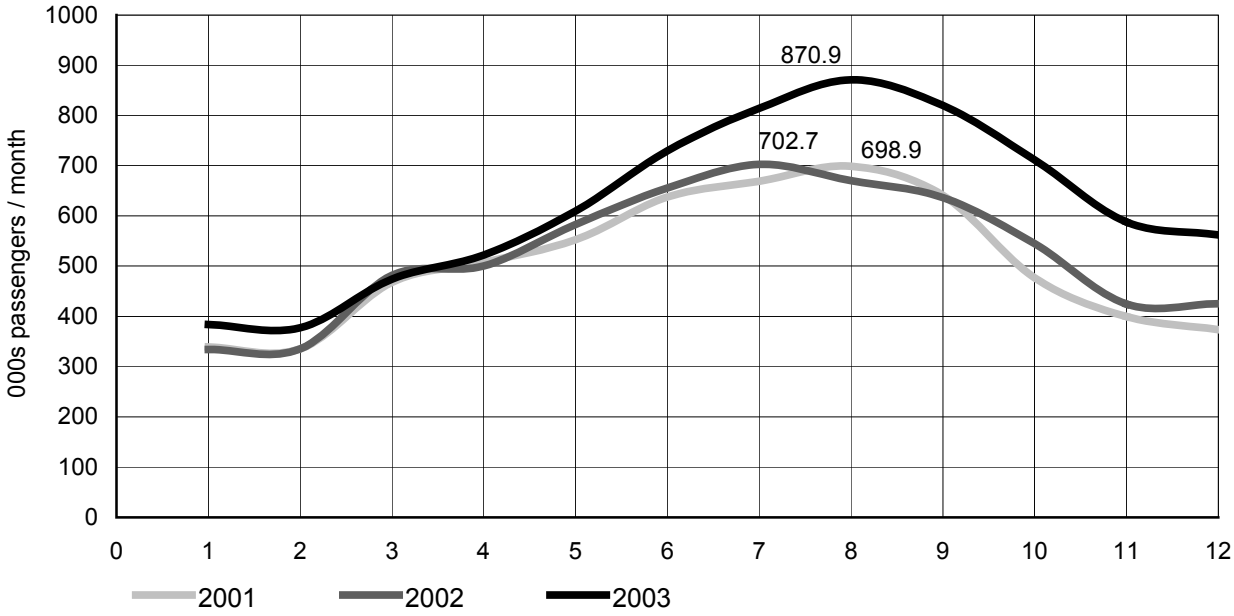
The number of aircraft movements in 2003 was 115,756 moves/year, which is by 11,852 moves more than in 2002 (by 11.4 %). The highest number of movements (11,154) was recorded in August, the lowest (7,299) in February. Compared to 2002, the maximum monthly number of movements in 2002 was higher by 10.8 %.

In 2003, cargo transport handled 41,439.8 t of goods and 4,870 t of mail. The total cargo transport reached 46,309.8 t, increasing by 17 % against 2002. The most cargo was transported in November (4,239.7 t), the least in July (3,284.1 t). The monthly high was in 2003 higher by 1 % than in 2002.

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



Number of passengers cleared at *Praha – Ruzyně*, monthly, 2001 – 2003

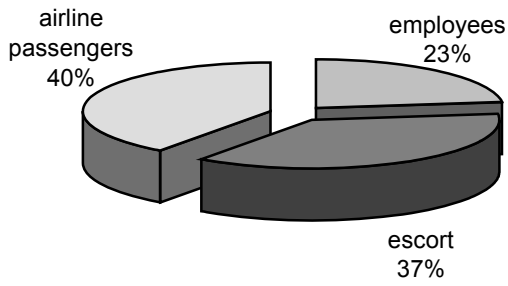


The *Praha-Ruzyně* airport is found approximately 11 km away from the city centre where a downtown air terminal is located. Connection to the airport is provided for air travellers by a special commuter bus service. Additionally, the airport is serviced by two municipal PT bus express lines linked to 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.

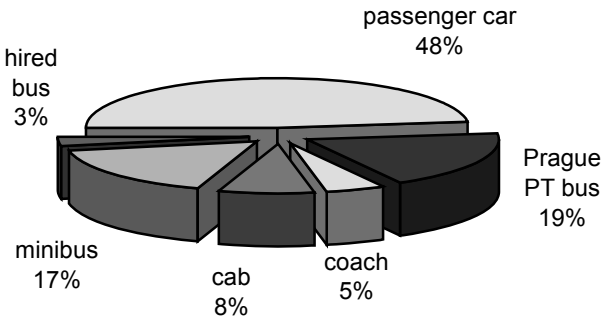
During October 2003, a comprehensive traffic survey was conducted inside the *Praha –Ruzyně* airport. It consisted of several subenquiries: car traffic densities and parking on the ground, public transport, questionnaires for employees, airline passengers and airport visitors. The enquiries were conducted stepwise on workdays: Tuesday, Wednesday and Thursday from 5 or 6 a.m. to 10 p.m.

The results showed that the total number of airport-bound trips made by airline passengers, their escort, employees and other visitors on a workday (Thursday) grew from 49,400 in 2000 to 63,100 trips in 2003, i.e. by 28 %. Out of the total trips to and from the airport, airline passengers make 40 % and their escort 37 %.

Passenger categories to the number of trips



Transport categories to the number of trips



The origin and destination for the airline passengers and escort is Prague in almost 50 %. Employees working in the airport live 47 % in Prague and 40 % commute from *Kladno*. The modal split in coming to the airport and leaving its grounds has majority of passenger cars (48 % of all trips). Significant and growing is a share of minibus and cab transport (25 % of all trips).

The workday car traffic count registered 14,300 vehicles across *Aviatická* and *K letišti* streets entering the airport grounds from 6 a.m. to 10 p.m., including 570 goods vehicles and buses. Comparing with 2000, the total number of vehicles grew by 29 %, on the other hand the number of goods vehicles and buses sank by 29 %.

The survey on 23. 10. 2003 from 5 a.m. to 10 p.m. on PT bus lines found the total of passengers at the border of the airfield grounds in both directions 10,300 passengers / 5-22 h. The total turnover at the stops inside the grounds, as observed in the survey, was 12,500 persons / 5-22 h, specifically 55 % was the turnover of the airport *Ruzyně* bus terminal.

The total number of lay-bys and parking places at the North air terminal is approximately 5,500 places, which is an increase by about 2,500 places more than in 2000. The public uses Parking C and Parking A buildings and a short-term paid parking lot with the approximate total capacity 4,000 places, including 228 places at the short-term parking. On 30. 10. 2003 (Thursday), an average hourly usage of all spaces at the air terminal North was found as 35 %, maximum usage was 45 %. The short-term parking reached an average of 53 %, the maximum was 100 %.

11. RIVER TRAFFIC

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 is mostly of holiday type. Its all-year operation is carried out by several companies that specialize in various sorts of cruises through Prague, boat trips *Praha - Slapy, Praha – Troja* and *Praha - Mělník*. Ships can be hired for social events, river disco or just as a 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 (*PPS*) is the oldest company. They arrange regular sightseeing and holiday cruises and ordered cruises all year round. Currently, they own 2 parlour steamships with capacities 300 an 200 places, 3 motor restaurant ships with capacities 124 to 164 places and 3 sightseeing motor ships with capacities 124 to 200 places.

In 2003, the *PPS* transported 92,600 passengers. Most of their clients were foreigners (about 60 %). The regular lines transported 38,960 passengers – i.e. 42 %, a special transport was used by 53,640 passengers, i.e. 58 %.

The *EVD* operate 8 modern passenger ships. The total capacity of the largest one, paddle-wheel-propelled, is 400 places. Capacities of 7 other ships are from 124 to 185 places. They operate all the year round, both at regular frequencies as well as on individual customer orders.

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

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 19 vessels with tonnage from 460 t to 1,280 t and one tanker. The total tonnage of all ships is 17,600 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 2003 as compared with 2001 and 2002 are presented in the tables below.

	Freight handled (t)			Ships used		
Sluice	2001	2002	**2003**	2001	2002	**2003**
Modřany	109 282	71 136	**63 158**	1 852	1 307	**1 785**
Smíchov	175 941	126 206	**77 398**	22 291	17 729	**21 617**
Mánes	360	7 251	**6 523**	3 434	2 604	**2 878**
Štvanice	176 936	117 296	**83 289**	5 732	3 603	**4 118**
Podbaba	374 692	214 173	**241 000**	1 851	1 203	**1 415**

Three harbours are found on the municipal territory: *Holešovice, Smíchov* and *Radotín*. They serve to reload various freight. All of them were heavily affected with the devastating flood in 2002. By the end of 2003, only the *Radotín* harbour was managed to restart operation.

The following table shows manipulated debris and sand in tons in these harbours during 2001, 2002 and 2003.

Harbour	2001	2002	**2003**
Holešovice	78 338	38 303	-
Smíchov	51 260	32 700	-
Radotín	63 316	41 728	**62 000**

12. TRANSPORTATION INFRASTRUCTURE DEVELOPMENT

12.1 Engineering infrastructure

In 2003 the traffic construction in Prague was still affected with repercussions of the flood that hit the city in August 2002. Large reconstructions of transportation infrastructure damaged with the flood was still in progress during the first half of the year. It was only in February that the line B of the underground could be re-launched along its full length with the exception of four stations where the flood damage was most severe (*Invalidovna, Křižíkova, Národní třída* and *Náměstí Republiky*). The trains went through them without stopping. In several other stations, only one vestibule was available. Since the end of March, the *Metro* managed to renew its full operation in its pre-flood extent, while completion had to continue until the end of the year. Similar was the condition of the tramway track on *Sokolovská* street in *Karlín* neighbourhood where the flood seriously disturbed the subsoil of the road. The reconstruction of the street where utilities (water, gas, sewage) needed to be repaired first and only after that the carriageway and tramway track were to be rebuilt, was underway throughout the year 2003. The tramway renew its operation on 5 September, 2003.

Despite carrying out the unexpected work indicated above, the construction of the section IV C1 of the *Metro* (from *Nádraží Holešovice* to *Ládví*) kept on last year, as well as building the City Ring West (section *Radlická - Strahovský* tunnel), reconstruction of the bridge across *Berounka* at *Lahovice*, reconstruction of streets *Českomoravská* and *Poděbradská*, an exploration gallery for a tunnel at *Komořany* as a part of the Prague (outer) Ring. Also Stage 2 of the reconstruction of railway bridges over Seifertova street started with redevelopment of the street in the section between *Italská* and *Husitská* streets.

Other large traffic constructions entered preparatory stage – City Ring North in section *Strahovský* tunnel – *Pelc-Tyrolka*, Prague Ring North-West, South and South-East as well as the track of the *Metro* IVC2 from *Ládví* to *Letňany*.

In 2003, several new traffic constructions was put in operation, including a *Barrandov* tramway track, a grade-separated junction *Beranových*, a road section *KOMOKO* at *Modřany* and others. The most important construction was the tramway from *Hlubočepy* to *Barrandov* housing estate. This technically and economically demanding work was put in service at the end of November. The implementation of the line significantly improved the transport coverage of the whole of *Barrandov* housing estate, thanks to tram capacity larger and travelling comfort greater than bus service could offer, and more importantly, a substantial acceleration over bus lines, which means shorter time for trips between the housing estate and the inner city.

The most important of the many reconstructed traffic structures completed in 2003:

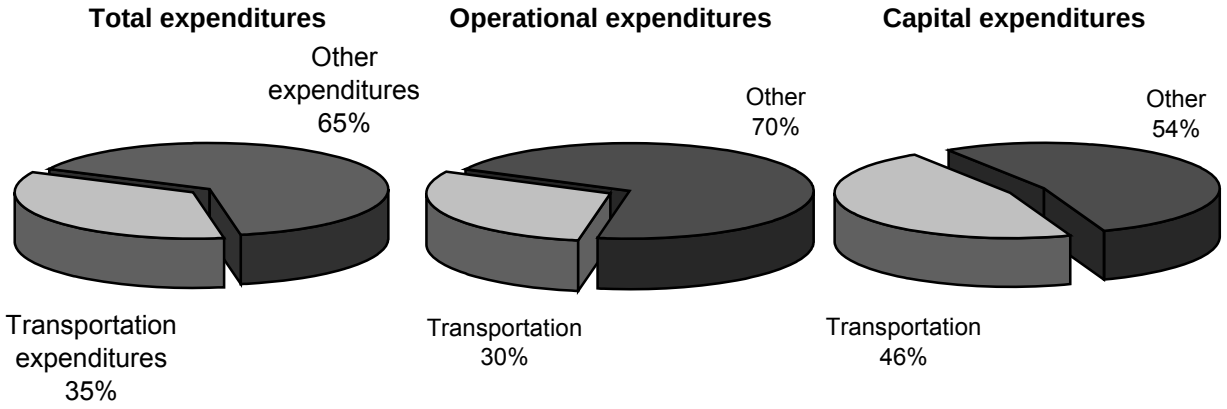
- reconstruction of tunnels and stations of the *Metro* line B, damaged by flood
- reconstruction of the *Karlín* portion of *Sokolovská* street
- reconstruction of track structure around *Senovážné náměstí*
- reconstruction of the *Na poříčí* crossroads
- reconstruction of the dual lane carriageway on *Barrandov* bridge toward *Smíchov - Braník*
- reconstruction of the roads including tramway tracks around *Kobyliské náměstí* with the construction of the *Metro* station *Kobylisy*
- reconstruction of the carriageway of a lane on Southern Connection between *V korytech - Švehlova*
- reconstruction of the tramway track in *Švehlova* and *Průběžná* street
- modernization of the railway track *Bubeneč - Roztoky*

12.2 Funding the transport and traffic constructions

The urban transport operation and engineering infrastructure in 2003 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. 2003, reached to expenditures of approximately CZK 47.3 bill., including CZK 15.4 bill in the chapter 03 Transportation, which again in 2003 was the most substantial chapter of the municipal budget's expenditures. Adding the amounts included in chapter 05 (Health and social services), the municipal expenses on transportation reached CZK 16.5 bill. The yield from the bonds and loans of the European Investment Bank helped cover the expenditures from the deficit budget of the City of Prague.

The share of transportation in 2003 municipal budget expenditures
the budget adjusted as of 30. 6. 2003



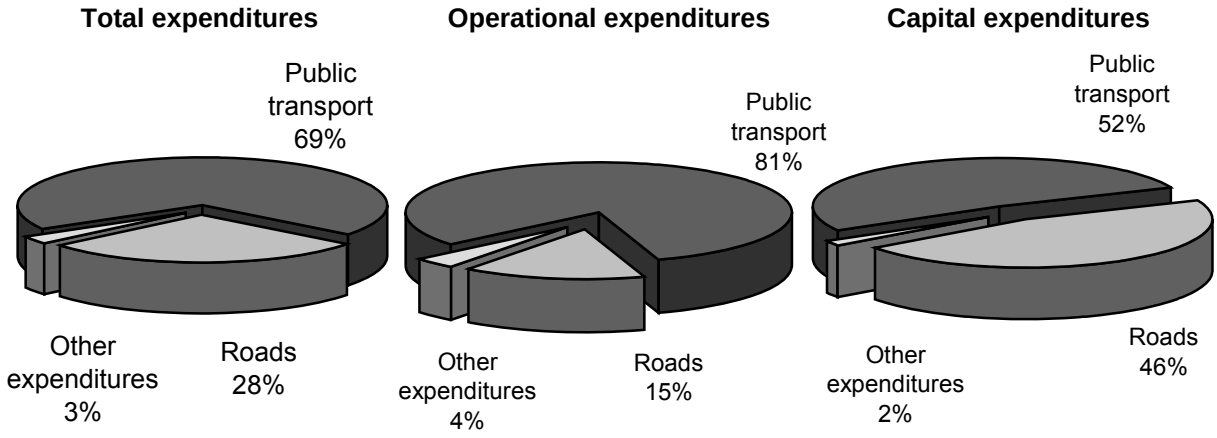
The amount of CZK 16.5 bill. included also CZK 9.6 bill earmarked to cover running operational expenditures and 6.9 bill. for capital expenditures.

The **operational expenditures** in transportation cover, predominantly, subsidies for public passenger transport in and around the city. The total of CZK 7.8 bill. was allotted in the adjusted budget for this purpose, including over CZK 1 bill. to offset ticket discounts. Almost CZK 1.5 bill. were set aside to cover repairs, maintenance and operation of the roads.

The **capital expenditures** covered mostly investment in development, i.e. construction of new roads, Metro lines and other transportation facilities (55 %) as well as larger repairs and redevelopment of traffic routes, equipment and renewal of technical devices (40 %). Expenditures allotted for improving the condition of public passenger transport slightly prevailed also in the capital portion of the budget - out of the total almost CZK 7 bill., over CZK 3.6 bill. was earmarked for public transport investments, almost CZK 3.2 bill. for rebuilding and development of the road network.

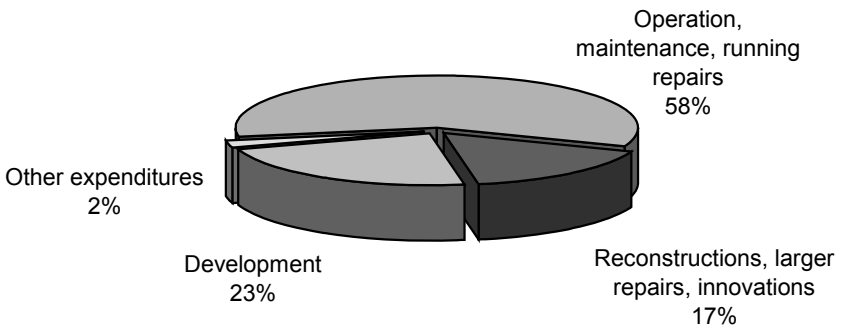
Expenditures for providing operation, modernization and development of public transport prevailed in the 2003 budget. Their share in the total expenditures in the chapter of transportation amounted to 69 %.

Structure of transportation expenditures in the 2003 budget
the budget adjusted as of 30. 6. 2003

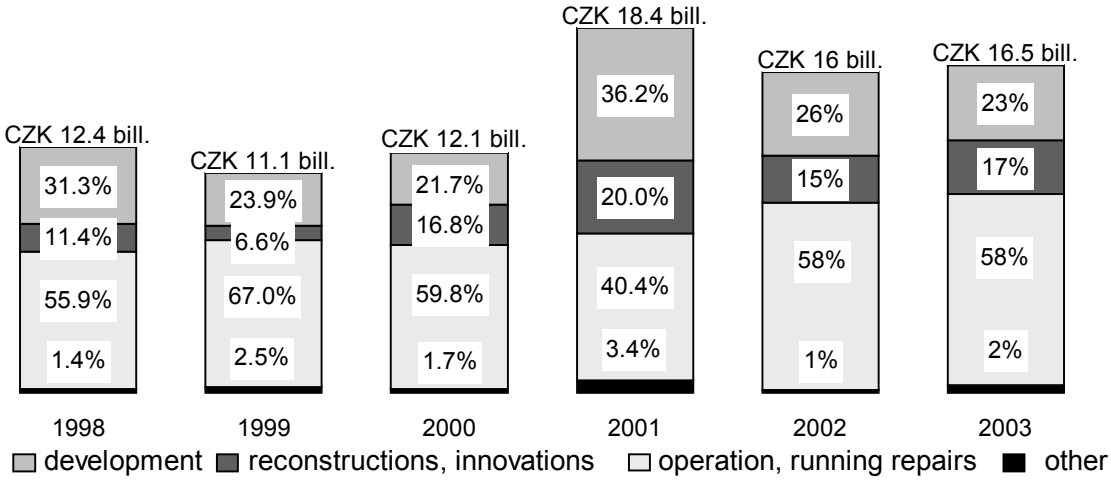


A more detailed analysis of the items listed in the breakdown of expenditures shows that CZK 9.6 bill. was directed toward operation, running repairs and maintenance of the urban transport system, CZK 2.7 bill. to provide for larger repairs, redevelopment and renewal of the technical equipment, CZK 3.8 bill. was earmarked for investments into development and almost CZK 400 mill. for other expenditures.

Total transportation expenditures in the 2003 budget
the budget adjusted as of 30. 6. 2003



Traffic expenditure development in Prague's municipal budgets



The targeted means from the national budget and the means of the National Fund for Traffic Infrastructure were provided to the Capital of Prague as contributions for repair and maintenance of roads and for the construction of selected road segments (CZK 423 mill.), for the construction of *Metro*, other structures for public passenger transport and purchasing of buses (CZK 537 mill.). The government in the past years already accepted a commitment to build in stages a ring road around Prague. The construction of the Prague (outer) Ring, however, went on in 2003 only in the section *Jesenice - Lahovice*, where heading an exploration gallery was started, while surveys and documentation processing for planning proceedings or construction permit were performed for individual building sections of *Běchovice* - D1 - *Slivenec* and *Ruzyně - Březiněves*. All this work drew approximately CZK 200 mill. from government resources.

The Prague Public Transit Co. Inc. contributed to investment constructions out of its own resources with CZK 2.4 bill. and additional CZK 0.4 bill. invested to renew its bus fleet.

Funding of suburban transport was shared by communities from around Prague, whose population are users of the *PID* integrated transport. The Government also contributed CZK 130 mill. to the Municipal budget of Prague in order to ensure the basic transportation service in the suburbs.

13. EUROPEAN UNION PROJECTS

The Capital of Prague and its organizations took part, in 2003, in the solution of several projects advertised by European Commissions.

HEAVEN (**H**ealthier **E**nvironment through **A**batement of **V**ehicle **E**mission and **N**oise)

The project aims at healthier environment in large cities that are ever more adversely affected with emissions and traffic noise. The project focuses on integration of data about traffic, air pollution and noise and on their utilization for operational management of traffic as related to a particular condition of the environment. It was dealt with by a consortium of cities: Rome, Berlin, Paris, Rotterdam, Leicester and Prague under the direction of STA Rome. On behalf of Prague, several institutions participated in the solution process: *Útvar rozvoje hl. m. Prahy*, *ÚDI Praha* and *Český hydrometeorologický ústav*. The project officially concluded in the first quarter of 2003.

The result of the project is a modelling system that, for the needs of zoning, nature conservation, traffic control and alternatively healthcare also, provides monitoring and modelling air pollution depending on properties and quantity of polluting sources as well as meteorological condition. The modelling system presents data in an easy-to-comprehend map of air pollution. The main asset of the project for general public is the ability to obtain instant and graphic information on the current condition of air pollution throughout Prague on the web site of Prague environmental monitoring and information system at www.premis.cz.

PRISMATICA (**PR**o-active **I**ntegrated System for **S**ecurity **MA**nagement by **T**echnological **I**nstitutional and **C**ommunication **A**ssistance)

The project is aimed at public transport safety in cities. It was worked on by 15 partners from France, Great Britain, Portugal, Italy and the Czech Republic. The Prague participant was *DP hl. m. Prahy* that worked in the sub-task 3.5 dealing with legal issues related to TV monitoring of traffic, data protection and safety instruments in transportation. The project completed in 2003. Information concerning the project are published at www.prismatica.com.

TRENDSETTER (Setting Trends for Sustainable Urban Mobility)

This project was approved in 2001 by European Commission as one of the eight tasks of the CIVITAS programme. The Trendsetter project intends to describe methods that lead to increased usage of public transport, improving systems of haulage, vehicles and infrastructure, potentially also to employing new services that enable sustainable environment in cities. The task is planned from 2002 to 2004. Under the leadership of Stockholm, partners from Stockholm, Lille, Graz, Prague and Pécs take part in the solution. Prague participates on solving three sub-tasks concerned with operation of city-buses, bus priority on signal-controlled junctions and restriction for transit of heavy vehicles. *DP hl. m. Prahy, a. s.*, *ÚDI Praha,* the Transport Development Department at the City Hall of Prague (*odbor rozvoje dopravy Magistrátu hl. m. Prahy*) and Prague Road Maintenance (*Technická správa komunikací hl. m. Prahy*) are the organizations that are mainly responsible for the solution.

A citybus line 291 from *I. P. Pavlova* to *Karlovo náměstí* and back was launched in April, 2003. The semicircular line enhances accessibility of many healthcare centres and is utilized all the time. Surveys repeatedly find occupancy of small buses between 10 to 15 passengers.

Adaptive signal control in a bus priority system operates on two selected crossroads since March 2003. Articulated buses are monitored on the elevated approach from *Modřanská* street to *Barrandovský* bridge and standard buses at the intersection *Holečkova* x *Zapova* (*Praha 5*). The system reliability (the count of buses completely and correctly checked in and out including the correctly detected line and sequence as compared with the real number of passes by vehicles equipped with the appropriate profile) ranged between 94 - 97 % by the end of the year. Verification show the bus priority cuts ride time and saves from 20 sec. during the early morning rush hour to 40 sec. during the later morning traffic slump.

The access restriction zone for heavy traffic over 6 t was extended to an area in *Praha 4* in December. It is expected that, by reducing the goods traffic transiting the extended zone, the other traffic will flow more smoothly, up to 19 % less heavy lorries will enter the zone and, consequently, negative environmental impacts of the heavy haulage in the area will also be reduced.

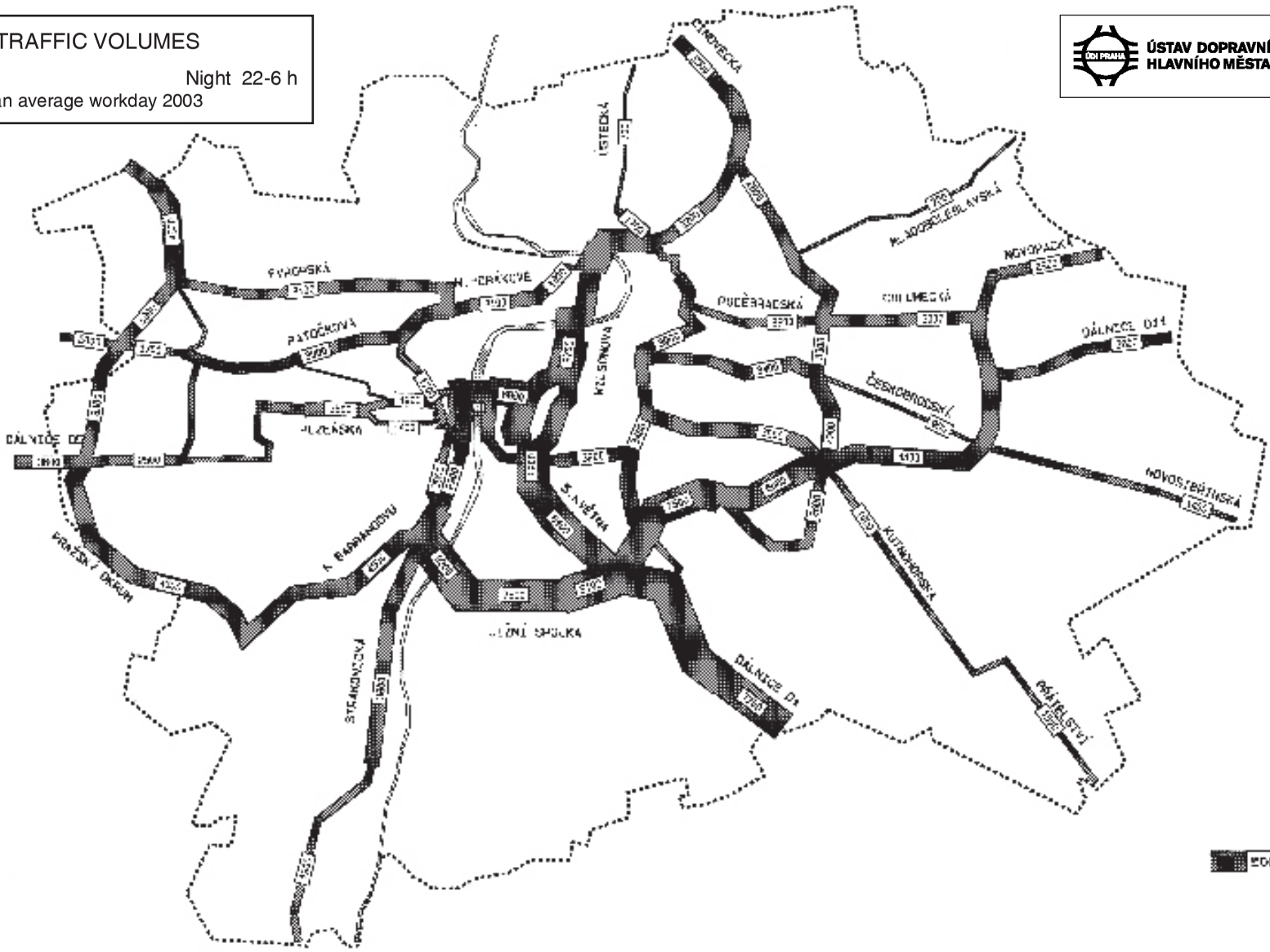
TRAFFIC VOLUMES

All vehicles Night 22-6 h

an average workday 2003

ÚSTAV DOPRAVNÍHO INŽENÝRSTVÍ HLAVNÍHO MĚSTA PRAHY

NIGHT



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@udi.mepnet.cz
http://www.udi-praha.cz