16 Austria

16.1 Urban roads: Vienna

16.1.1 Traffic information by floating car data in Vienna

Monitoring the current traffic situation – project description

Monitoring the traffic situation on the urban road system is one of the most important basic principles of transport management and traffic planning, due to ever increasing individual and business traffic. At present, mostly stationary sensors are being used for monitoring road traffic. These sensors count the vehicles passing by the test point and measure their actual speed.

Pilot Floating Car Data (FCD)

Local disturbances can be more easily eliminated by measuring the velocities and the number of vehicles in the vicinity of the sensor. It is more difficult though to precisely determine travel times between a given starting point and arrival point. To obtain this data, many stationary sensors have to be operated in urban areas which incur very high investment and maintenance costs.

For some time, a technology known as "Floating Car Data (FCD)" has been used to enhance the data of the stationary measuring systems. This technology records position data of "floating" vehicles in traffic and is being used to determine speed. If a sufficient number of FCD-reporting cars are available, traffic situation and travel time can be determined very precisely on the different road sections.

The following figure shows a traffic map on 3 June 2003. On this day, traffic was severely obstructed on the whole road network due to a strike in the local public passenger transport.

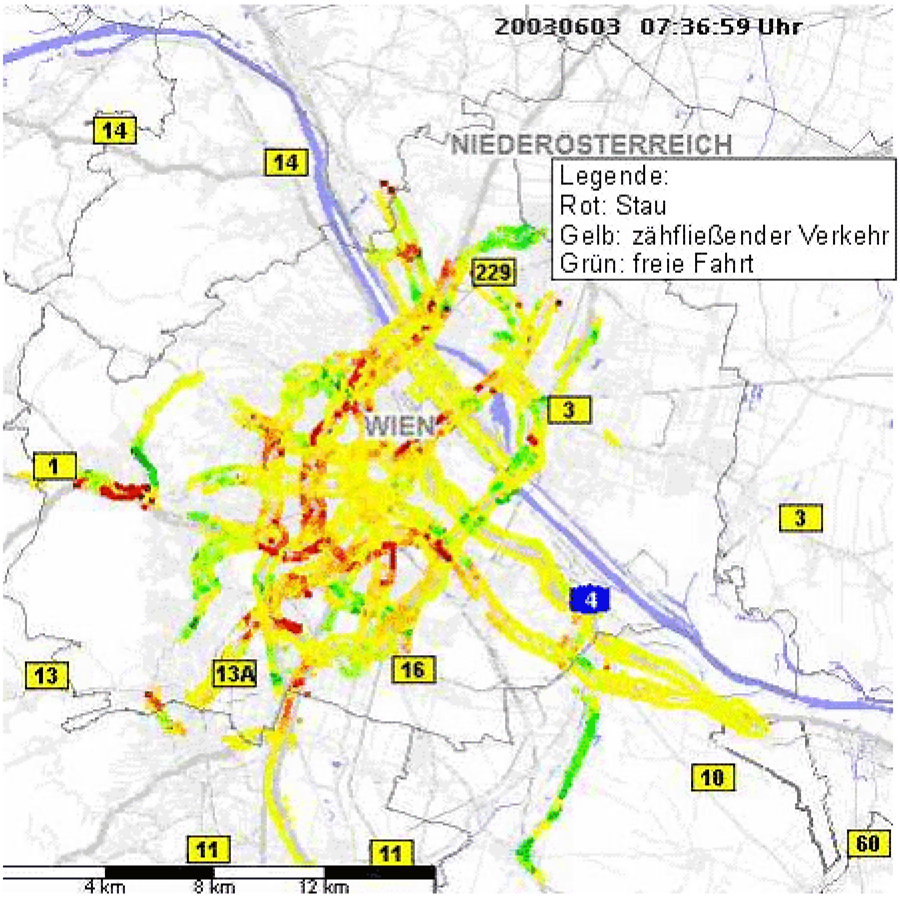


Figure 16-1: Online traffic map for Vienna recorded by floating car data 29.6.06, 10:15h Red = Congestion, yellow = bound traffic, green = free flow, grey = no current data. Source: http://www.wien.gv.at/verkehr/vema/verkehrslage/projekt.htm (29.6.06, 10.15 am).

Marginal conditions

Since September 2003, the magistrate of the Department of Transport Organisation and Technical Transport in Vienna (Abteilung Verkehrsorganisation und technische Verkehrsangelegenheiten, MA 46), the German Aerospace Centre in Berlin (Deutsches Zentrum für Luft- und Raumfahrt, DLR) and the Viennese taxicab headquarters (Wiener Taxizentrale WIHUP) have been implementing a common research project to gather traffic data based on FCD. This project is using measured data of up to 600 taxicabs in order to produce an online traffic map.

The online traffic map shows the actual driving speed of the vehicles (classified into three categories) on the road system in Vienna (national motorway A and S, main road B) as well as the quality of the current traffic. With the current number of reference vehicles in Vienna, the traffic situation on the major urban routes in Vienna can be recorded within one hour by means of FCD.

The online traffic map is given in real time by means of a thematic traffic map, on which for example congested road sections are marked in red. Additionally, travel times are being monitored in real time on ten predefined routes and are then being compared to the historically determined travel times on these routes.

Project Status

At present, approximately 200 taxicabs supply exploitable data for the FCD. Updating happens every ten minutes. Road sections, on which no taxicabs have been driving within the designated twenty minutes, are marked in grey on the map. On routes which are highly frequented with taxicabs, the quality of actual travel time estimations is very high.

Project Perspective

As described above, the quality of the online traffic map depends on the coverage of the routes by taxicabs. This project is a start. The intention is to include additional taxicabs. Furthermore, available data from stationary sensors shall be incorporated.

16.1.2 Travel times for selected routes in Vienna

Table 16-1 shows currently expected travel times on some predefined routes. The course of the routes and the update level of the data can be seen on the graphics in the last column of the table.

Note to the penultimate column 'Deviation from free-flow travel time' ('Abweichung zur freien Fahrzeit'): The indicated deviations refer to travel times achieved in congestion-free traffic.

Explanations to the table:

- 'Last data' ('letzte Daten'): point in time when data from a taxicab were recorded last on this route.
- 'Current travel time' (aktuelle Fahrzeit): Travel time determined by data recorded within the last twenty minutes. This value is calculated according to proportional coverage by current data. On sections with no available current data, a historical value is used for calculation.
- 'Deviation to free-flow travel time' (Abweichung zur freien Fahrzeit): The indicated deviations refer to travel times achieved in free-flow traffic.

Table 16-1: Travel times for selected routes in Vienna.
Source: http://amalthea.arsenal.ac.at/reisezeit.html (29.6.06, 9 am)

Number Nummer	**Route** Route	**Last data** letzte Daten	**Current travel time** aktuelle Fahrzeit	**Deviation to free-flow travel time** Abweichung zur freien Fahrzeit	**Graphics** Grafik
1	**Innerer Gürtel von Wiental bis Liechtenwerderplatz**	09:23 Uhr	20:35 min	+ 09:53 min	
	Äußerer Gürtel von Liechtenwerderplatz bis Wiental	09:23 Uhr	17:32 min	+ 06:56 min	
2	**Gürtel von Abfahrt A23 bis Eichenstraße**	09:23 Uhr	07:22 min	+ 00:34 min	
	Gegenrichtung	09:23 Uhr	11:41 min	+ 05:02 min	
3	**Rathausplatz bis Postbusgarage Erdberg**	09:23 Uhr	14:55 min	+ 05:00 min	
	Postbusgarage Erdberg bis Museumsquartier	09:23 Uhr	20:49 min	+ 09:13 min	
4	**Wagramer Straße und Lasallestraße von Rautenweg bis Praterstern**	09:23 Uhr	13:23 min	+ 01:17 min	
	Gegenrichtung	09:23 Uhr	15:46 min	+ 03:28 min	
5	**Donaukanal von Friedensbrücke bis Abfahrt Nordbrücke - Brünner Straße**	09:23 Uhr	06:23 min	+ 00:00 min	
	Gegenrichtung	09:23 Uhr	15:18 min	+ 06:18 min	
6	**Brünner Straße von Stammersdorfer Straße bis Auffahrt Nordbrücke**	09:23 Uhr	07:42 min	+ 00:47 min	
	Gegenrichtung	09:23 Uhr	22:41 min	+ 15:41 min	
7	**Triester Straße von Sterngasse bis Matzleinsdorfer Platz**	09:23 Uhr	20:46 min	+ 14:09 min	
	Gegenrichtung	09:23 Uhr	06:58 min	+ 00:29 min	
8	**A23 von Knoten Inzersdorf bis Knoten Kaisermühlen**	09:23 Uhr	10:01 min	+ 00:00 min	
	Gegenrichtung	09:23 Uhr	09:12 min	+ 00:00 min	
9	**A22 - Donauuferautobahn von A23 bis Nordbrücke**	09:23 Uhr	06:06 min	+ 00:00 min	
	Gegenrichtung	09:23 Uhr	07:51 min	+ 00:00 min	
10	**Donaukanal und A4 - Flughafenautobahn von Urania bis Flughafen**	09:23 Uhr	10:08 min	+ 00:00 min	
	Gegenrichtung	09:23 Uhr	15:56 min	+ 02:46 min	
11	**Westeinfahrt von Westautobahn bis Karlsplatz**	09:23 Uhr	04:18 min	+ 40:14 min	
	Gegenrichtung	09:23 Uhr	34:18 min	+ 10:40 min	

The symbols used in the column 'Graphics' ('Grafik') are based on actual traffic maps. As an example, travel information on routes 1 and 3 are shown in Figure 16-2.

Figure 16-2: Example for detailed travel information on routes 1 and 3. Last update 29.6.06, 8:51h. Source: http://amalthea.arsenal.ac.at/reisezeit.html (29.6.06, 9 am)

16.1.3 The Transport Barometer of Vienna

The transport barometer shows the actual mean travel speed in the city traffic of Vienna and on motorways (in and around Vienna) compared to the regular mean travel speed recorded in the past at the same time, on the same week day and in the same season.

Weblink of the Austrian Transport Barometer: http://amalthea.arsenal.ac.at/barometer.html

Explanations for city traffic

Actual travel times below regular values indicate a generally high traffic volume on Vienna's urban roads. The mean travel times also contain waiting times in front of traffic lights. Analyses of urban roads have shown that 25 kms/h are a good average speed in city traffic.

Explanations for motorways

Vienna's motorways have a general speed limit of 80 km/h. Only one very short section on the A4 has a limit of 100 km/h. This results in a mean speed of approximately 85 km/h under the best of circumstances. If the transport barometer drops below 70 km/h, this is already an indication for sectoral obstructions.

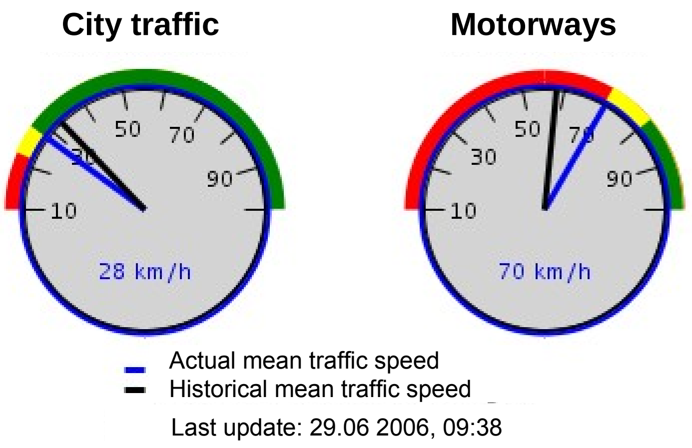


Figure 16-3: Traffic Barometer for Vienna (left: Vienna city traffic, right: motorways). Source: http://amalthea.arsenal.ac.at/barometer.html (29.6.06, 10 am)

16.2 Inter-urban roads, motorways

16.2.1 ASFINAG: real-time information systems for motorways

ASFINAG, the operator of the Austrian motorway network offers several online traffic information services. First, online webcams (which are updated every two seconds) from several locations of the Austrian motorway network are available on the internet (Figure 16-5).

Figure 16-4: Austrian motorway network. Source: www.asfinag.at

Figure 16-5: Livecam of the highway A2 'Süd-Autobahn' near Vieanna (Km 8.9, near exit Vienna Neudorf). Source: www.asfinag.at (30.08.06, 3 pm)

In addition to the webcams, ASFINAG has implemented two real-time traffic information pilot projects, called ASFINAG Road Pilot 1 and 2. Both projects aim to visualize the actual traffic situation on Austrian motorways in an online tool. The Road Pilot project 1 is a dynamic road map where actual traffic informations and roadworks are shown in real-time (Figure 16-6 and Figure 16-7). Additionally, information about the actual traffic flow is given. Until now, the Road Pilot 1 only covers part of the Austrian motorway network, mainly the Tirolian region.

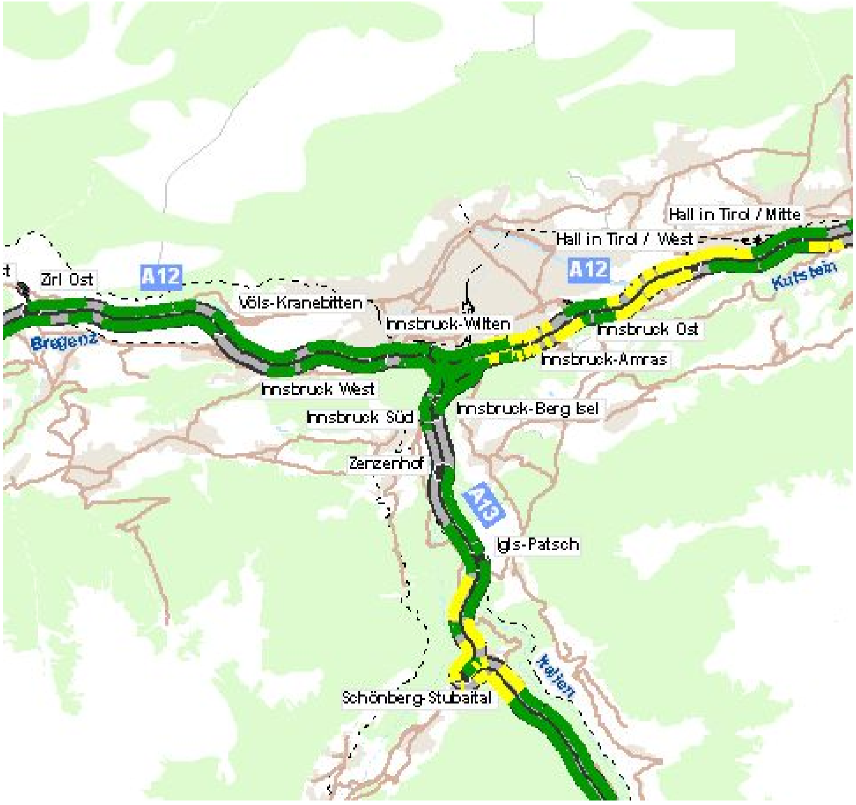


Figure 16-6: Actual traffic situation on the motorways around Innsbruck: online map of the project Road Pilot 1. Source: www.asfinag.at (30.08.06, 4 pm)

Figure 16-7: Actual traffic situation on the motorways around Innsbruck: 3-dimensional map of the project Road Pilot 1. Source: www.asfinag.at (30.08.06, 4 pm)

The Road Pilot project 2 visualises for the first time actual traffic notes and the real-time traffic flow situation in a dynamic 3-dimensional satellite picture with animated traffic flow (see

Figure 16-8 and Figure 16-9). Until now, the Road Pilot 2 covers the motorways in the Tirolian region.

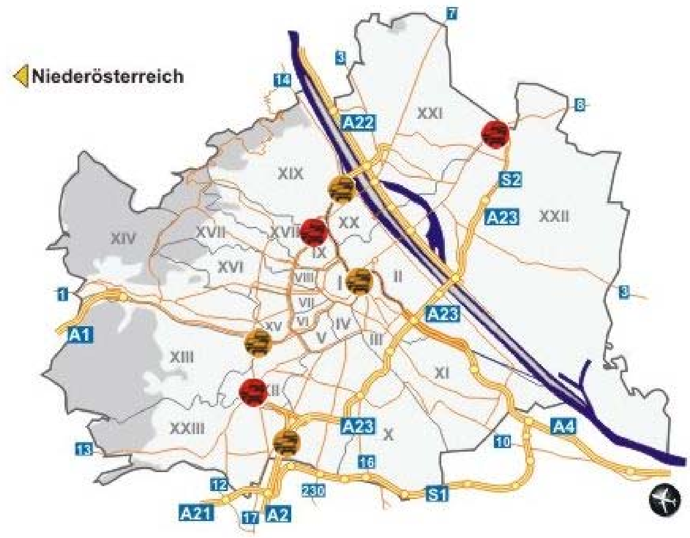
Figure 16-8: Road Pilot 2: Dynamic traffic information tool incl. traffic notes (red box on the left) for the motorway between Innsbruck and the Brenner (panorama view). The colours indicate the traffic situation. Green: free-flow, yellow: dense traffic, red: congestion. Source: www.asfinag.at (30.08.06, 4 pm)

Figure 16-9: Road Pilot 2: Dynamic traffic information tool incl. traffic notes (red box on the left) for the motorway between Innsbruck and the Brenner (3-dimensional). The colours indicate the traffic situation. Green: free-flow, yellow/orange: dense traffic, red: congestion. Source: www.asfinag.at (30.08.06, 4 pm)

16.2.2 ÖAMTC: real-time information systems

The Austrian automobile association ÖAMTC (Österreichischer Automobil-, Motorrad- und Touringclub) also provides online information about the actual traffic situation. In contrast to the systems of ASFINAG, data of the ÖAMTC do not only cover motorways but also other roads. The online system of the ÖAMTC covers A) all actual traffic informations/notes (Figure 16-10) and B) a forecast of the congestion situation within the next 2-4 days (Figure 16-11).

Figure 16-10: Online traffic information system of the ÖAMTC: situation for Vienna. Detailed traffic notes (for all exclamation marks) are given on the website. Source: www.oeamtc.at (30.08.06, 5 pm)



Congestion / long waiting times expected

Stagnant traffic / some waiting times expected

Delays / waiting times possible

Holidays / events

Figure 16-11: Online traffic information system of the ÖAMTC: 2-day forecast for Vienna. Detailed notes about the expected traffic probmlems are given on the website. Source: www.oeamtc.at (30.08.06, 5 pm)

16.3 External costs due to congestion

The external costs of road transport congestion in Austria have been quantified in a national study initiated by the ÖAMTC (Schierhackl, Glaser 1995). According to this study, 361 million hours were lost in 1995 because of congestion. The total costs resulting from the congestions was estimated on 87.3 billion Austrian Schilling ATS (about 6'700 million EUR)[39]. For detailed data see Table 16-2.

Table 16-2: Estimation of congestion costs in Austria 1995. All data in billion Austrian Schilling (ATS). Source: Schierhackl, Glaser (1995)

	Basis calculation in billion ATS/year	**Lower boundary** in billion ATS/year	**Upper boundary** in billion ATS/year
Time costs	83.6	53.2	139.7
Additional fuel costs	6.1	2.8	9.5
Saved accidend costs	-2.4	-5.7	-1.2
Total congestion costs	**87.3**	**50.3**	**148.1**

[39] The average exchange rate between Austrian Schilling (ATS) and ECU in 1995 was 0.0768.

16.4 Rail transport

There is no public data about punctuality of rail or other public transport companies available. ÖBB is monitoring punctuality internally. Public quality customer surveys are carried out by public transport authorities and by the VCÖ. Recent results show that Austrian customer are judging the punctuality of ÖBB as 'good'.

16.5 Aviation

Delays on the airports

The Association of European Airlines (AEA) annually publishes a punctuality data statistics for 27 of the largest European airports. In this statistics data from the largest Austrian airport in Vienna (VIE) are available, too (see Table 16-3). According to this statistics, 23.3% of the departing flights at Vienna airport are delayed, which means that Vienna airport is slightly below the average of all European airports. The main reason of delay is late arrival (reactionary), which is the cause of almost every second delay.

Table 16-3: Punctuality data for Vienna airport 2005. Source: AEA 2006.

Airport	Punctuality ranking*	% of flights delayed **	Average delay (min.)	Reason of delay (in % of flights) **				
				Load & Aircraft Handling Flight Ops	Maintenamce/ Equipment Failure	Airport & Air Traffic Control	Weather	Reactionary (late arrival)
Vienna VIE	17.	23.3%	32.1	3.5%	2.3%	6.6%	1.1%	10.1%

** Ranking out of 27 European airports.*

*** Flights delayed by more than 15 minutes are counted. Data are referring to departing flights.*

The following table shows the development of the delays on Vienna airport in the last three years. The congestion situation at Vienna airport got worse in the last two years, when more than 23% of the flights were delayed, whereas in 2003 the delay rate was clearly below 20%. At least, the situation improved slightly in 2005 compared to 2004, when Vienna's punctuality ranking was only 25th out of 27 European airports.

Table 16-4: Punctuality data for Vienna airport 2003-05. Source: AEA 2006.

Airport	Punctuality ranking*			% of flights delayed **		
	2003	2004	2005	2003	2004	2005
Vienna VIE	14.	25.	17.	18.6%	24.8%	23.3%

** Ranking out of 27 European airports.*

*** Flights delayed by more than 15 minutes are counted. Data are referring to departing flights.*

16.6 References

AEA (2006): “AEA Punctuality Data, Annual 2005”. Association of European Airlines (AEA), Brussels.

Schierhackl, Glaser (1995): “Staukosten in Österreich – Abschätzung der Einzel- und Gesamtwirtschaftlichen Belastungen”. K. Schierhackl, S. Glaser on behalf of the ÖAMTC, Vienna.

17 Switzerland

17.1 Inter-urban roads and motorways

17.1.1 Real-time traffic information systems

a. Viasuisse

In Switzerland, the organisation 'Viasuisse' is the most important player in real-time traffic information. Viasuisse is a company, jointly operated by the Swiss Broadcasting Corporation (SRG SSR idée suisse), the Touring-Club Switzerland (TCS, swiss automobile club), the Swiss Federal Railways SBB and Skymedia/Traffix. The main aim of Viasuisse is to provide real-time information about congestion on the Swiss road network. However, information about possible delays in rail and air transport is collected and distributed, too.

The trilingual Viasuisse central editorial office is located in Biel and works around the clock. Additionally, there are two local offices, one managed by the TCS in Western Switzerland and one magaged by Traffix in the Zurich/Eastern Switzerland region. The traffic information central Viasuisse is collecting information about congestion in close collaboration with:

- The police and their traffic control centers
- Motorists, via the free telephone number 0800 163 163
- Webcams and sensors on motorways
- Operations centers of the Swiss Federal Railways (SBB) and other public transport services
- Airports
- FEDRO, the Swiss Federal Office for Roads
- Partner organizations of the European automobile clubs and radio broadcasters
- Traffic information centers of other countries

The real-time traffic information collected by Viasuisse has to be distributed to the traffic users through suitable channels. Viasuisse provides different media with its information. The information channels range from simple written messages via detailed bulletins up to live reports in programs on the air:

- Traffic information in the radio programs of the Swiss Broadcasting Corporation (SRG SSR idée suisse)
- Internet offers by the Swiss Broadcasting Corporation (SRG SSR idée suisse) (see Figure 17-2)
- Coded data in the RDS-TMC (Radio Data System – Traffic Message Channel) service which supplements most car navigation systems with the latest information
- Telephone traffic information: 163
- Traffic information in Teletext (SWISS TXT, pages 490–496)

- Internet offers by the Swiss Federal Railways (SBB)
- Content-provider for the road hauliers information website: www.truckinfo.ch (see Figure 17-1)

Before, publishing the information, the news reports have to be verified, edited and suitably processed for the media. This work is done by Viasuisse and its 25 employees.

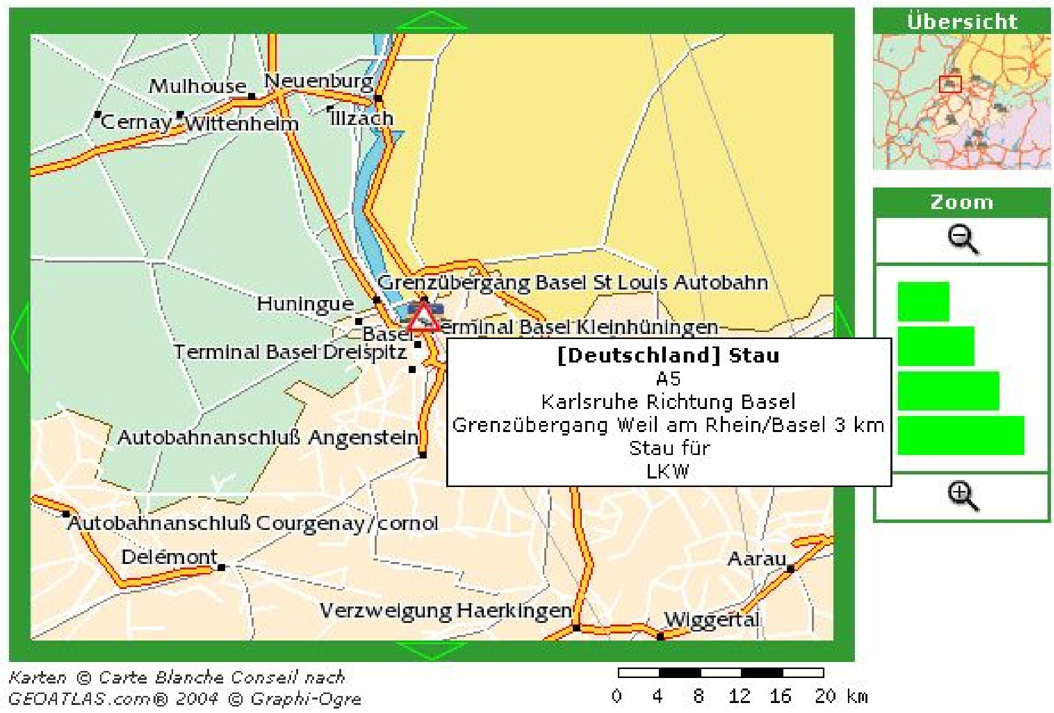


Figure 17-1: Real-time traffic information for road hauliers on the internet: www.truckinfo.ch (29.8.06, 11 am)

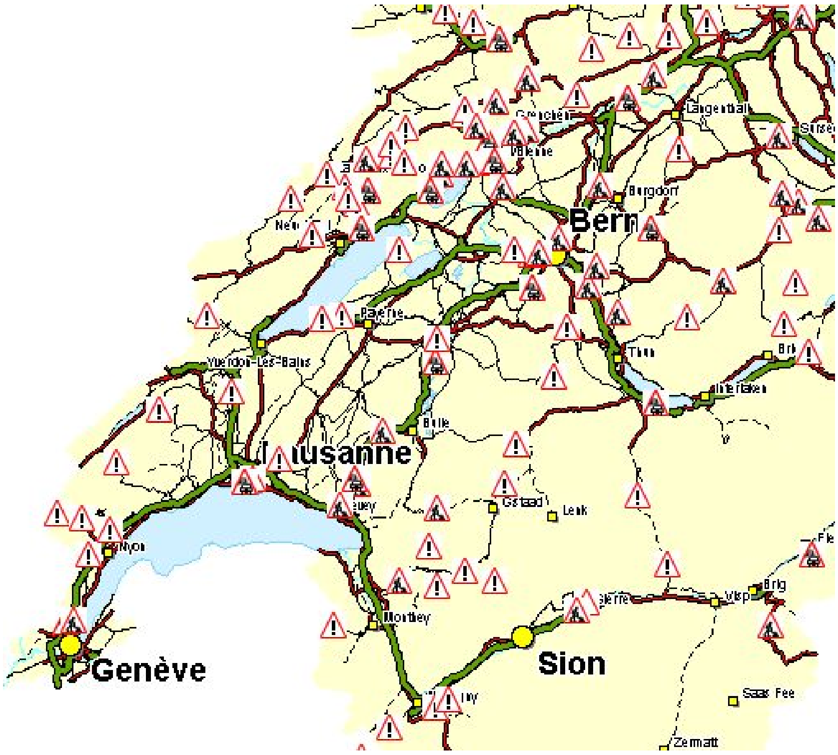


Figure 17-2: Real-time traffic information on the internet information portal of the Swiss Broadcasting Corporation (SRG SSR idée suisse): www.swissinfo.ch (29.8.06, 6 pm)

b. CNLAB: graphical presentation of real-time traffic data via the world-wide-web

A recent research project, which is still in process, aims to provide a new graphical presentation of real-time traffic data (on maps) via the internet. The project is carried out by the engineering company 'cnlab' in corporation with the Swiss Federal Office for Roads (FEDRO) and the University of appiled sciences Rapperswil (institute for internet technologies and applications).

The project aims to connect the existing online traffic monitoring systems with a real-time traffic information platform on the internet. At the moment, the information on the internet covers maps and data about six regions in Switzerland:

- Zurich metropolitan area
- Canton Aargau
- Berne
- Lausanne
- Neuchâtel/Fribourg
- Alpine transit roads (Gotthard and San Bernardino)

The internet program shows the data of different traffic monitoring sites in a map and provides additional information (see Figure 17-3). The following information is given (in each direction):

- Traffic quality (free flow, stagnant, congested)
- Traffic speed
- Tendencies (in quality and speed)
- Daily vehicle flow curves (see Figure 17-4)
- Additional remarks

The whole system described is a prototype. The data are not verified and because of ongoing development of the website, the system is not always available.

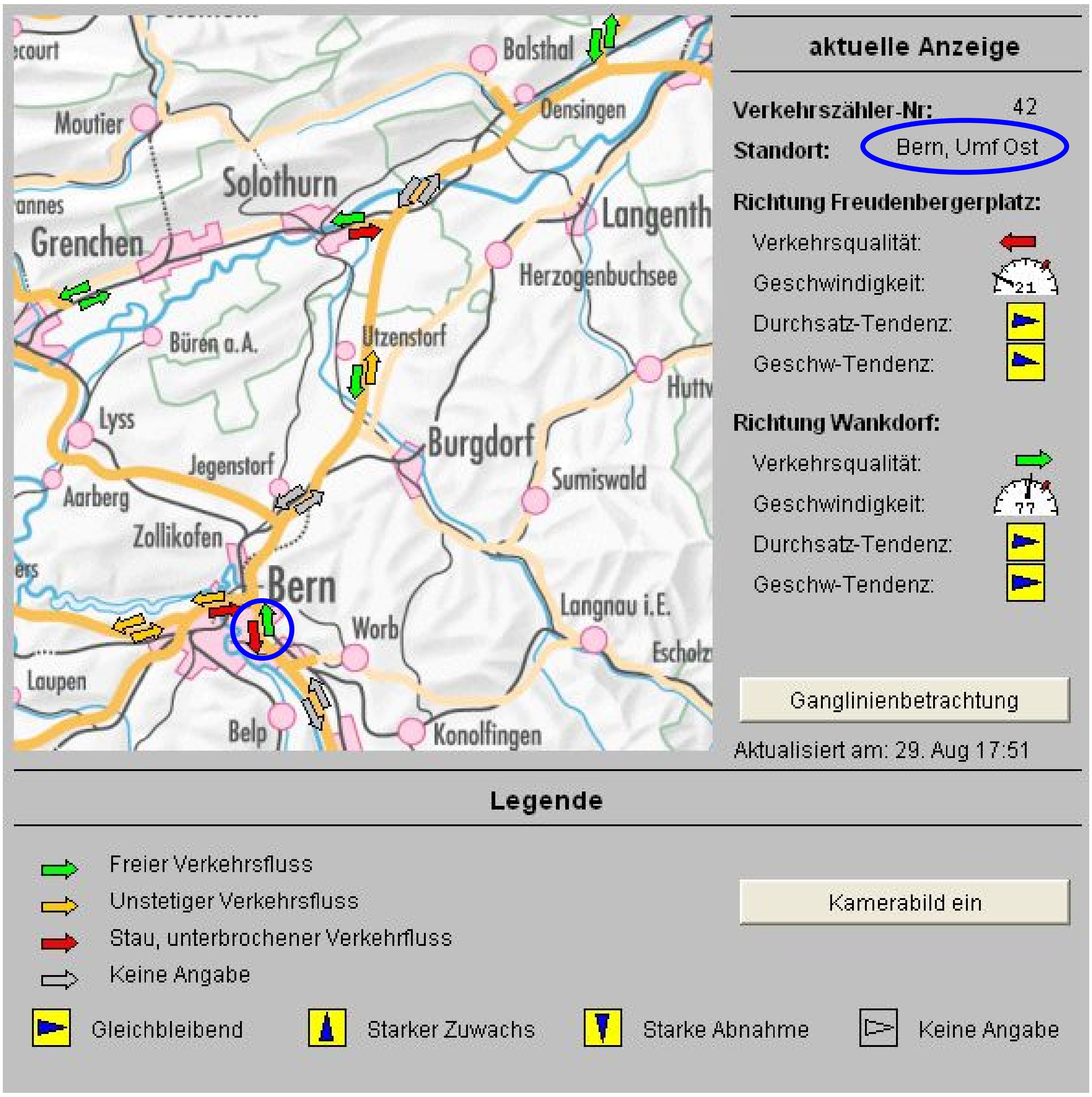


Figure 17-3: Real-time traffic data in the area of Berne: Detailed data for the traffic monitoring site on the eastern by-pass of Berne (congestion in southern direction). Green: free-flow, orange: affected, red: congestion, no colour: no data available. Source: http://verkehr.cnlab.ch (29.8.06, 6 pm)

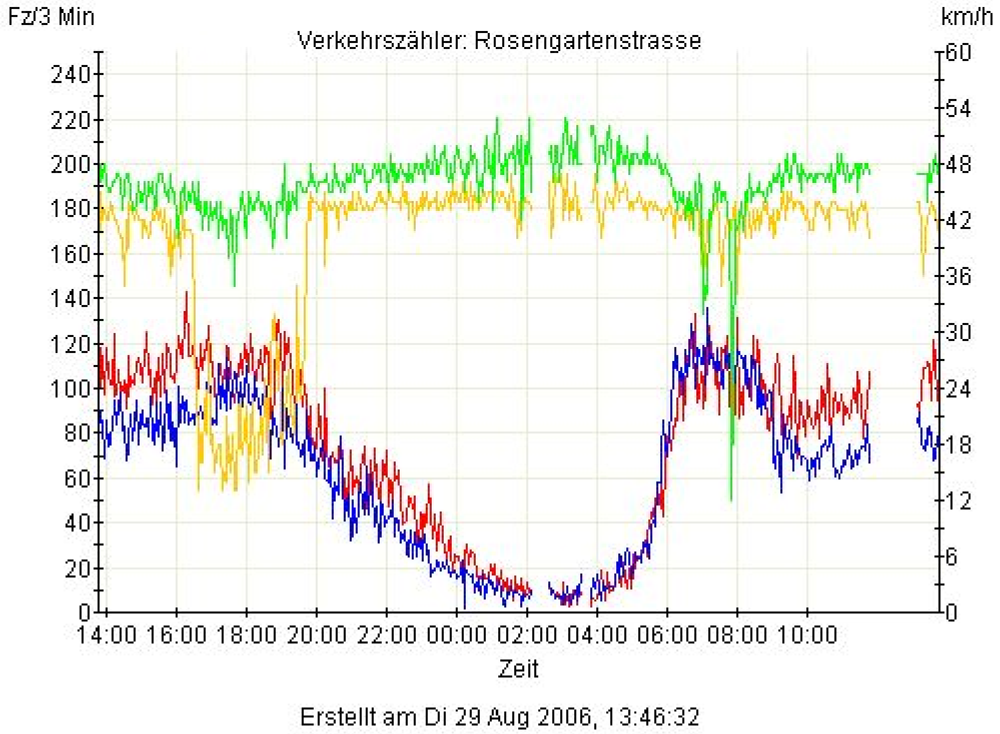


Figure 17-4: Vehicle flow curve of a main transit road in Zurich. The green and orange graphs show the average speed (right scale) for the two directions, the red and blue graphs show the vehicle flow (number of vehicles per 3 minutes) for both directions. The breakdowns of the average speed between 16.30h and 20h as well as before 8h show congestion situations.
Source: http://verkehr.cnlab.ch (29.8.06, 2 pm)

17.1.2 Annual congestion statistics for motorways

The Swiss Federal Office for Roads (FEDRO) annually publishes a congestion report (called 'Annual Congestion Report'). This report provides statistical data about reported congestions on federal motorways. The following data are included in the report:

- Annual number of congestion hours on motorways
- Causes of congestion
- Development in the last years
- Congestion vs. stagnant traffic

The latest report available is the Annual Congestion Report 2003 (FEDRO 2004a). According to this report, there were 11'413 congestion hours in 2003 in Switzerland.

The following tables and figures give an overview about the most important results of the report. It has to be underlined that the data only cover congestion on national motorways. Additionally, there are only data about the number of congestion hours available. However, the data do not say anything about the length of congestions and the number of vehicles involved.

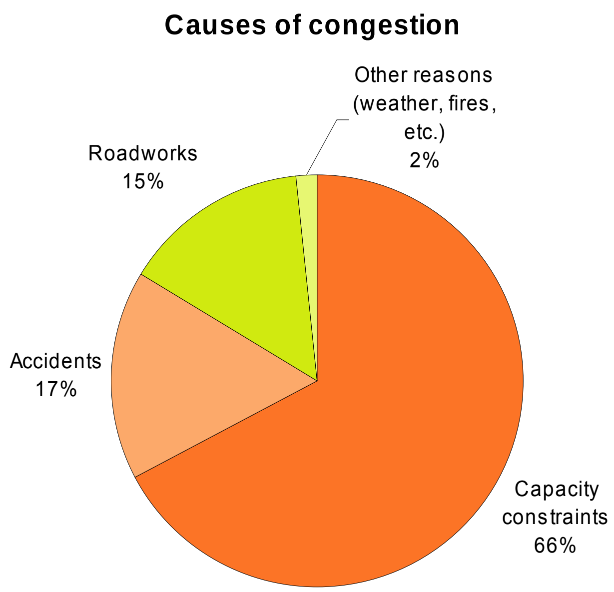


Figure 17-5: Causes of congestion: share of the different causes 2003. Source: FEDRO 2004a

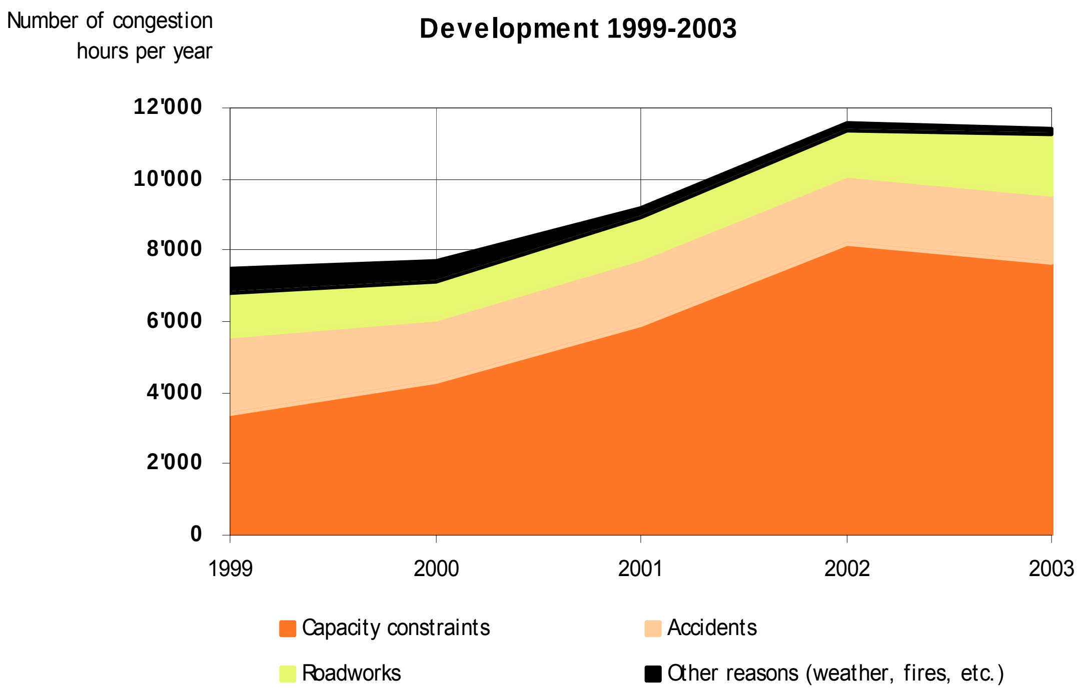


Figure 17-6: Congestion hours: development 1999 - 2003. Source: FEDRO 2004a

The total number of congestion hours on federal motorways has increased drastically in the last decade. In 1993, there were 2’400 congestion hours, in 1996 4’200 hours, in 2000 already 7’700 hours and in 2003 even 11’400 congestion hours. This means that congestion hours have multiplied almost five times in the last 11 years.

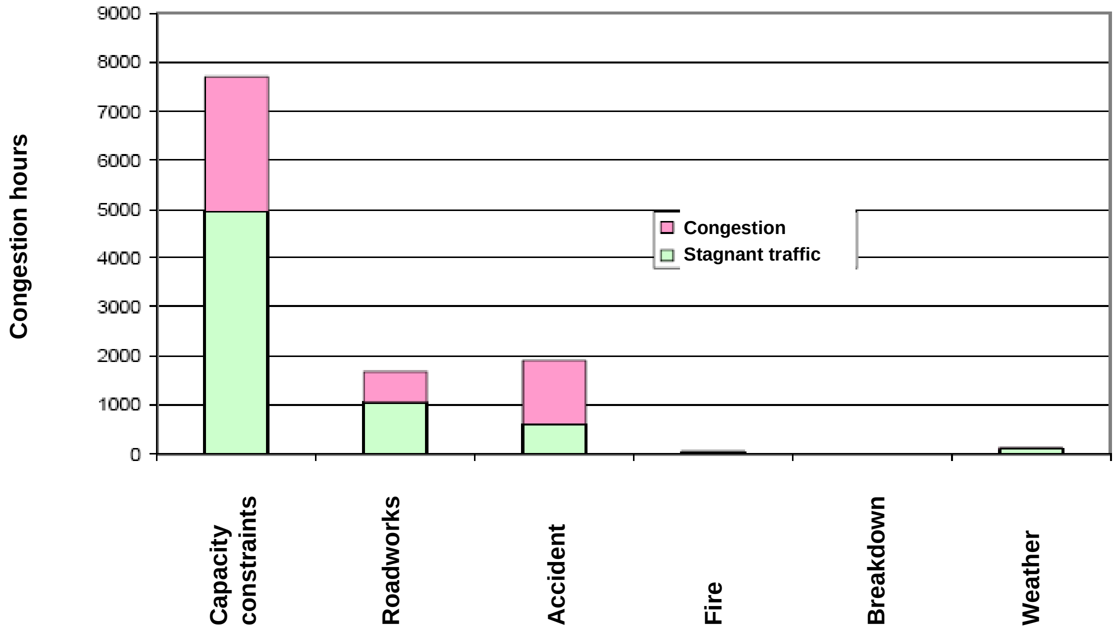


Figure 17-7: Congestion hours 2003: share of 'real' congestion and stagnant traffic. Source: FEDRO 2004a

17.1.3 Concept Study Capacity Management on national trunk roads

The Swiss Federal Office for Roads (FEDRO) has set itself the objective of improving the congestion situation on the network of national trunk roads. The goals include achieving a decrease in the number of congestion incidents, along with a reduction in the duration and extent of congestion. To reach these goals, the FEDRO has carried out a concept study called 'KABEWISTRA'[40]: capacity management for roads of national importance. The aim of this study was the identification and evaluation of short-term actions needed to improve the congestion situation.

Within this concept study, place, reason and extent of the congestions on the actual road network were compiled with the cantons. The result of this is a comprehensive congestion inventory, which is, however, not published. Most congestion happens in the agglomerations. The uppermost congestions happen on workdays, whereas only 13% of the total annual congestion time takes place at weekends and bank holidays.

The congestion inventory serves as a basis for the definition and evaluation of possible actions (FEDRO 2004b). The following actions have been analysed in detail:

- Opening of emergency lane, temporarily or permanently (as additional space for driving, etc.)
- Traffic management systems
- Ban on passing for trucks
- Ramp metering on motorways
- Improvement of the traffic flow after motorway exits

40 'KABEWISTRA' is an abbreviation of the German expression 'Kapazitätsbewirtschaftung von Strassen', which means 'Road Capacity Management'.

These actions have been evaluated according to their effectiveness to decrease congestion, their costs (cost effectiveness) and their acceptance (on the basis of a survey). On the basis of this evaluation, the actions have been prioritised.

17.2 Urban roads

17.2.1 Zurich: Real-time information and short-term forecasts

The urban traffic control centre of the city of Zurich has recently startet to implement a real-time traffic information web service, called 'Züritraffic' (www.zueritraffic.ch). This service provides the actual congestion situation on the complete urban road network. Additionally, a short-term forecast of the traffic situation in 30 minutes and in 60 minutes is also available on the website. Until now, the whole system has been working as a test operation.

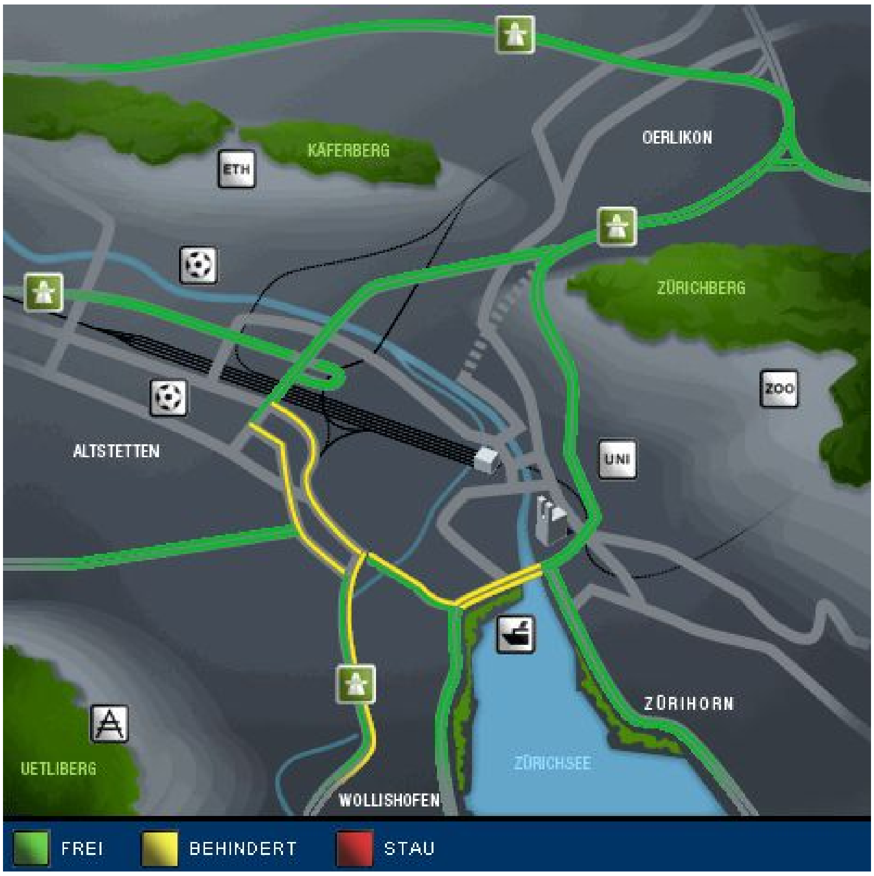


Figure 17-8: Real-time traffic situation for the city of Zurich - overview. Green: free-flow, yellow: affected, red: congestion. Source: www.zueritraffic.ch (29.8.06, 5 pm).

A. Actual situation B. Forecast (60 minutes)

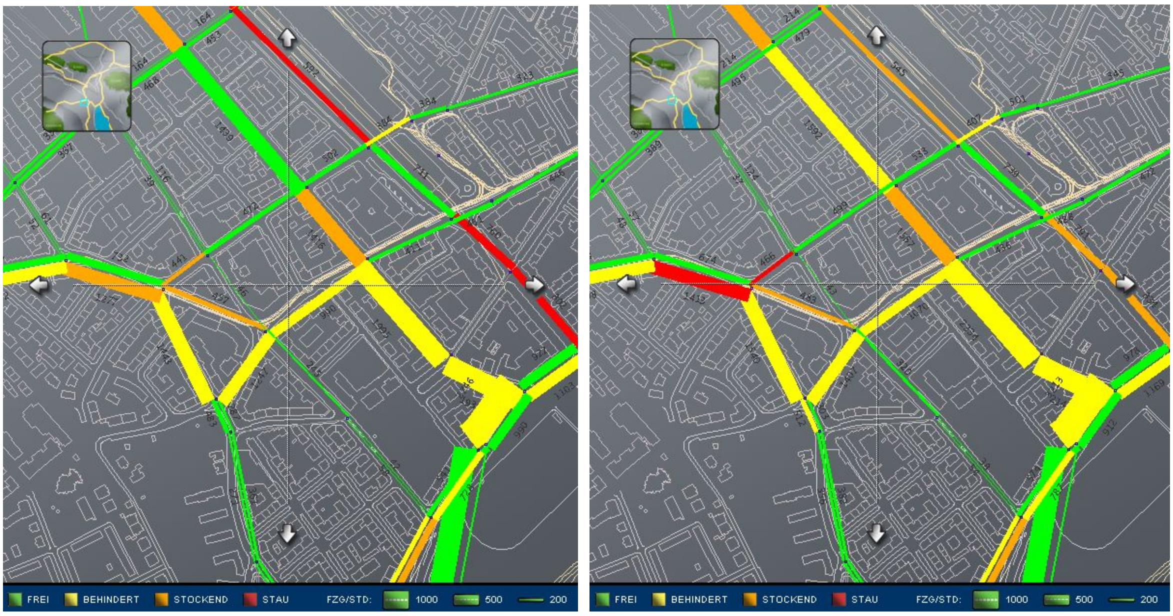


Figure 17-9: Real-time traffic situation for the city of Zurich – detailed map. Green: free-flow, yellow: affected, orange: stagnant, red: congestion. Source: www.zueritraffic.ch (29.8.06, 5 pm).

17.3 External costs due to congestion

The external costs of road transport congestion in Switzerland have been quantified in a national study initiated by the Swiss Federal Office for Roads (FEDRO) in 1998 (INFRAS 1998, data for 1995). At the moment, this study is being updated by the Swiss Federal Office for Spatial Development (OSD). However, data are not available yet since the study has not been finished until now.

According to the congestion cost study of 1998, in 1995 there were 4'350 congestion hours on the federal motorways, which means about 2.5 million vehicle-congestion-hours[41] (INFRAS 1998). If all capacity-related time losses are included, the study estimates these time losses on about 4 million vehicle-congestion-hours for 1995. If all roads are included the total time losses are around 20 million vehicle-congestion-hours. The greatest part of the time losses happens in the cities and agglomerations.

Table 17-1 gives an overview on the external costs of congestion on roads in Switzerland. If all time losses are included, the total road congestion costs in 1995 amounted to **1'230 million CHF** (=0.4% of the GDP), which is about 800 million EUR. If time losses of less than five minutes are not included in the calculation ('sensitivty calculation'), the total costs of congestion are only 756 million CHF (around 500 million EUR, 0.2% of the GDP). Compared to other European countries, where congestions costs of up to 2% of the GDP are reported, the costs are comparably low in Switzerland. Since the number of congestions has increased drastically in Switzerland since 1995 (see section 17.1.2), the total congestion costs are supposed to be considerably higher nowadays compared to the data of 1995.

---

41 If 100 vehicles stand in a congestion for two hours, this is counted as 200 vehicle-congestion-hours.

Table 17-1: Estimation of congestion costs in Switzerland 1995. Source: INFRAS (1998)

	Basis calculation in million CHF/year	**Sensitivity calculation*** in million CHF/year
A. Time costs	1'128	654
B. Energy costs	29	29
C. Environmental costs	5	5
D. Accident costs	68	68
Total congestion costs	**1'230**	**756**

* *Without time losses of less than 5 minutes.*

17.4 Rail transport

17.4.1 Rail passenger

The Swiss Federal Railways (SBB) and other railway and public transport companies continuously monitor the punctuality of their services. However, those statistics are generally not published in detail. The SBB, for example, only publishes the most important key figures of its punctuality statistics. Table 17-2 shows the data about the punctuality (arrivals) of the Swiss Federal Railways in the last few years.

Table 17-2: Punctuality (arrivals) of the Swiss Federal Railways (SBB). Source: SBB (2006)

	2000	**2001**	**2002**	**2003**	**2004**	**2005**
Passenger trains (delay < 5 min.)	94%	95%	94.9%	95.2%	95.5%	95.7%
Freight trains (delay < 31 min.)	95%	…	…	90.7%	92.2%	90.3%
Transit freight trains (delay < 31 min.)	…	…	…	68.6%	76.4%	70.1%

17.4.2 Rail freight

SBB monitoring

For the Swiss Federal Railways (SBB) detailed data on punctuality, including main delay causes, are available. Table 17-3 shows aggregated monthly figures from 2002 to 2004. Data show that the punctuality in freight transport remained more or less stable with around 91-92% punctuality (puntcual means with a delay of <31 minutes).

Table 17-3: SBB Cargo punctuality 2002-04. Puntcual means with a delay of <31 minutes. Source: CER (2004).

	2002		2003		2004	
	Punctuality at Departure	Punctuality on Arrival	Punctuality at Departure	Punctuality on Arrival	Punctuality at Departure	Punctuality on Arrival
Jan.	91.66	92.27	89.35	89.66	91.55	91.67
Feb.	92.49	93.58	88.33	88.61	92.65	92.74
Mar.	90.66	91.69	90.36	90.60	92.57	92.72
Apr.	91.40	92.37	90.73	91.03	91.40	91.53
May	89.39	90.59	90.65	90.79	91.51	91.64
June	87.57	87.89	88.69	88.87	91.18	91.35
July	91.35	91.69	92.69	92.80	93.34	93.45
Aug.	94.30	94.74	94.75	94.88	95.38	95.45
Sept.	89.61	89.76	92.39	92.54	91.61	91.68
Oct.	89.65	90.36	89.99	90.14	91.85	91.47
Nov.	88.75	89.53	89.48	89.61	91.70	91.82
Dec.	89.75	90.01	91.33	91.48	91.47	91.51
TOTAL	90.55	**91.21**	90.73	**90.92**	92.18	**92.25**

Monitoring the quality of transalpine combined transport

Based on the new legislation in Switzerland which aims at diverting transalpine road traffic towards rail, Switzerland is subsidising combined transport operators by financing service obligations (for trailers, container: unaccompanied combined transport) and for the rolling motorway (accompanied combined transport). In order to monitor the quality of these services, the Swiss Federal office of transport is requesting quarterly reports from the combined transport operators which show the amount and the reason of delays.

The following two figures show the results which were published in the official monitoring report, which has to be produced for the National Council every two years. More recent figures are used internally.

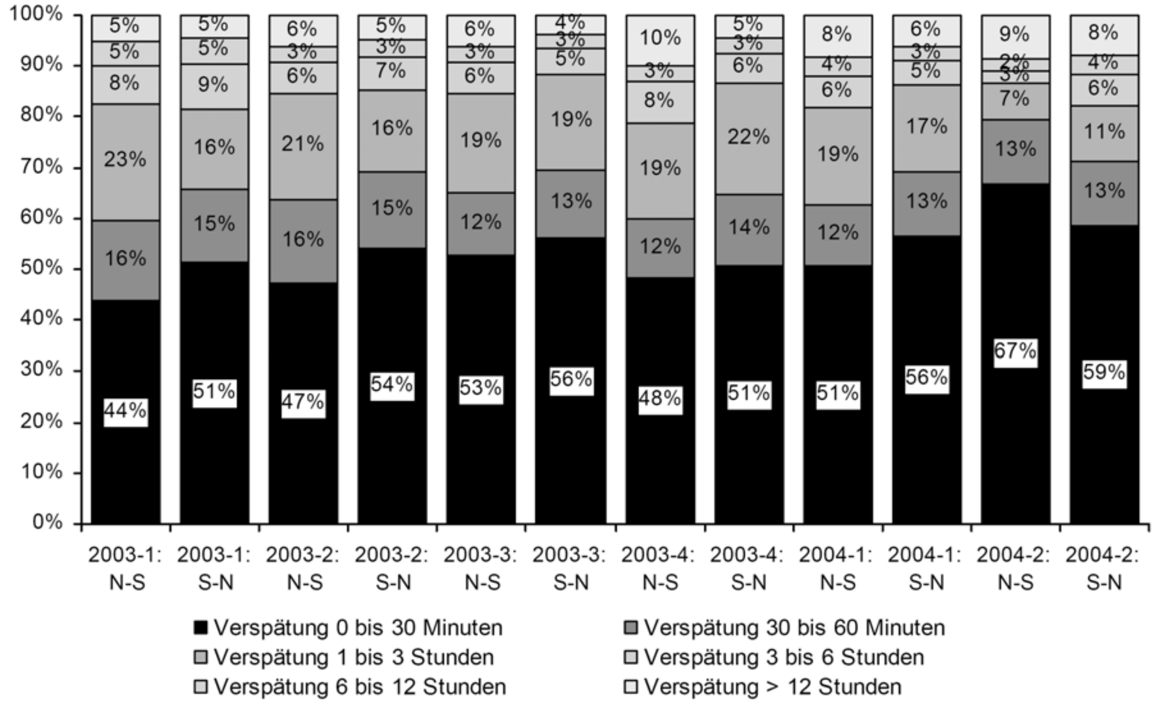


Figure 17-10: Delays of transalpine combined transport (source: Verlagerungsbericht 2004)
Explanation: Verspätung: Delay at the final destination; Minuten: minutes. Trains with a delay below 30 minutes are supposed to be in time (source: Verlagerungsbericht 2004)

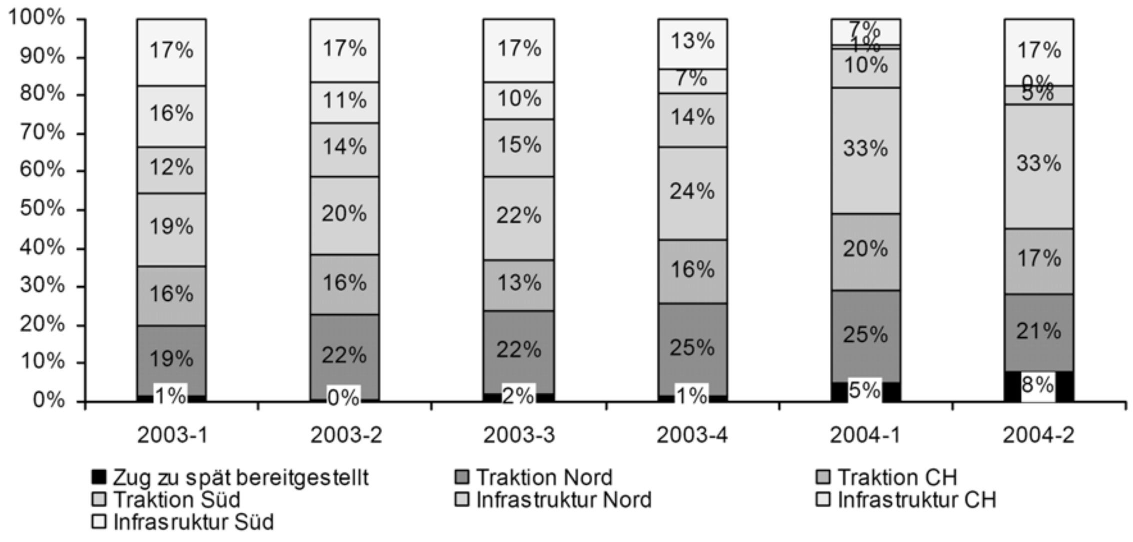


Figure 17-11: Reassons for delays of transalpine combined transport (source: Verlagerungsbericht 2004)
Explanation:
Zug zu spat bereitgestellt: Late traction disposal
Traktion Nord/CH/Süd: Traction problem at the northern/innerSwiss/southern border
Infrastructure: Infrastructure problems

17.5 Aviation

Delays on the airports

The Association of European Airlines (AEA) annually publishes a punctuality data statistics for 27 of the largest European airports. In this statistics data from the two Swiss airports of Zürich (ZRH) and Geneva (GVA) are available, too (see Table 17-4). According to this statistics, 21.3% of the departing flights at Zurich airport are delayed, which means that Zurich airport is about in the average of all European airports. At Geneva airport delay situation is somewhat better than in Zurich: Less than 20% of the incoming flights are delayed by more than 15 minutes. For both Swiss airports, the most important reason of delay is late arrival (reactionary), which is the cause of about 50% of all delays.

Table 17-4: Punctuality data for the two largest Swiss airports 2005. Source: AEA 2006.

Airport	Punctuality ranking*	% of flights delayed **	Average delay (min.)	Reason of delay (in % of flights) **				
				Load & Aircraft Handling Flight Ops	Maintenamce/ Equipment Failure	Airport & Air Traffic Control	Weather	Reactionary (late arrival)
Zurich ZRH	13.	21.3%	34.7	1.4%	1.3%	7.2%	1.4%	10.0%
Geneva GVA	7.	19.6%	41.9	1.8%	0.8%	5.2%	1.5%	10.3%

** Ranking out of 27 European airports.*

*** Flights delayed by more than 15 minutes are counted. Data are referring to departing flights.*

The following table shows the development of the delays on the two largest Swiss airports in the last three years. Zurich airport magaged to reduce the share of delayed flights drastically between 2003 and 2005. In 2003 and 2004, Zurich airport was one of the worst European airports concerning delays. In 2005, the situation improved significantly, amongst other reasons due to improvements in the air traffic management. At Geneva airport, the punctuality ranking remained stable. In absolute terms, however, delays increased from around 16% in 2003 to almost 20% in 2005.

Table 17-5: Punctuality data for the two largest Swiss airports 2003-05. Source: AEA 2006.

Airport	Punctuality ranking*			% of flights delayed **		
	2003	2004	2005	2003	2004	2005
Zurich ZRH	27.	26.	13.	29.9%	26.1%	21.3%
Geneva GVA	7.	8.	7.	16.1%	15.9%	19.6%

** Ranking out of 27 European airports.*

*** Flights delayed by more than 15 minutes are counted. Data are referring to departing flights.*

17.6 References

AEA (2006): "AEA Punctuality Data, Annual 2005". Association of European Airlines (AEA), Brussels.

CER (2004): "Rail Freight Quality: Meeting the Challenge". Community of European Railway and Infrastructure Companies (CER), Brussels.

FEDRO (2004a): „Jahresstaubericht 2003, Gemeldete Staus auf den Nationalstrassen". Swiss Federal Office for Roads (FEDRO), Berne.

FEDRO (2004b): „Vorschläge zur raschen und lokalen Verbesserung des Verkehrsflusses auf Hochleistungsstrassen". Swiss Federal Office for Roads (FEDRO), Berne.

INFRAS (1998): „Staukosten im Strassenverkehr". INFRAS on behalf of the Swiss Federal Office for Roads (FEDRO), Berne.

SBB (2006): „Statistisches Vademecum – Die SBB in Zahlen 2005". Schweizerische Bundesbahnen (SBB), Berne.

Verlagerungsbericht 2004: Swiss Federal Department of Transport: Report on the state of transalpine transport in regard to the aims of diverting road toward rail. http://www.uvek.admin.ch/dokumentation/

18 Denmark

18.1 Contacts and Interviews

So far the following contacts have been made:

General Transport

- Ministry of Transport
- Statistics Denmark,
- COWI,

road Transport

- DRI - Vejdirektoratet - Vejteknisk Institut (Danish national road research institute)

Rail Transport

- DSB Communications (Press contact)

Except for information delivered by COWI on the Copenhagen congestion study replies by the public authorities are still pending.

18.2 Road and urban public transport

On the national level the urban congestion study of the Copenhagen region (hvid 2004a and 2004b), jointly commissioned by the Copenhagen Municipality, the Greater Copenhagen Authority and the Danish Road Directorate is of particular methodological relevance. It defines urban congestion by assigning road traffic to one out of four traffic conditions: (1) negligible congestion, (2) beginning congestion, (3) high congestion and (4) critical congestion. The definitions depend on the density of vehicles on the road and on the travel speed relative to the free-flow speed.

The Copenhagen Congestion Study (Hvid 2004a and 2004b) reveals and indicates that most of the Copenhagen road network is not significantly affected by congestion. The calculations were made for morning peak hours in 2001 for municipal car and bus travel and for motorway car traffic. In total, delays make up less than 20% of the free-flow travel time. Taking the average delay per vehicle-kilometre as the indicator of the severity of traffic congestion, it can be stated that congestion only plays a significant role within the Copenhagen agglomeration. Table 18-1 presents some comparative results for Copenhagen municipal roads and the motorways in Denmark.

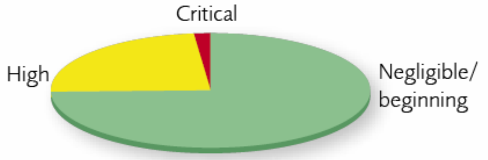
Table 18-1: Congestion levels in the greater Copenhagen region (data source: Hvid 2004)

Region	**Contribution of critical congestion to**:			**Average delays** (sec./pass.-km)	**Total delays** (hours)
	Traffic (veh.-km)	Network (road-km)	Delays (hours)		
Municipality	5%	2%	32%	50	4000
Motorways	13%	11%	51%	25	3500

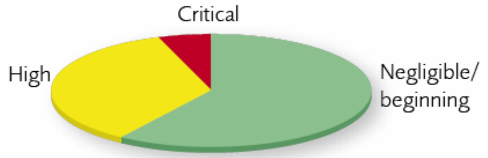
In the following, a number of results from the Copenhagen Congestion Study (Hvid 2004) are presented:

Figure 18-1: The level of congestion in car traffic during a morning peak hour in the Municipality of Copenhagen.

Road congestion (km)	
Negligible/beginning congestion	362,7
High congestion	115,5
Critical congestion	8,3
Total	*486,5*



Car congestion (car km)	
Negligible/beginning congestion	212.509
High congestion	125.692
Critical congestion	19.165
Total	*357.366*



Delay (hours)	
Negligible/beginning congestion	729
High congestion	2.015
Critical congestion	1.263
Total	*4.006*

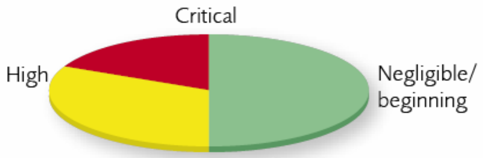


Figure 18-2: Illustration of key findings of the Copenhagen Congestion Study for municipal car travel in the morning peak, 2001.

18.2.1 Definition of congestion

(Source: DK\COWI_Traengsel_summary-en.pdf)

"Congestion expresses the impediments which road users cause each other in terms of reduced manoeuvrability when travelling in the traffic system"

The reduced manoeuvrability applies to both the longitudinal and the cross directions and is measured in terms of (reduced) speed and (increased) density. Reduced speed may cause e.g. delays, while increased density may cause reductions in manoeuvrability, service levels, security, etc.

<u>CAR: The following parameters were selected for car traffic:</u>

(Source: DK\COWI_Traengsel_summary-en.pdf)

Negligible congestion: Density is insignificant (≤ 20% of Tmax), travel speed is not significantly reduced (≥ 80% of Vfree) – road users experience no significant impediments.

Beginning congestion: Density is an impediment to road users (> 20% of Tmax), but travel speed is still not significantly reduced (≥ 80% of Vfree).

High congestion: Density is now high (≥ 23% of Tmax) and travel speed is significantly reduced (< 80% of Vfree) – road users experience impediments in terms of both density and delays.

Critical congestion: Traffic flow is 'stop-and-go'. Density is very high (≥ 60% of Tmax) and travel speed is greatly reduced (≤ 40% of Vfree) - the traffic flow is unstable and travel time unpredictable.Travel speed is measured in km/h. Density is measured in cars per km road lane.

Travel speed index, i.e. travel speed (km/h) relative to free-flow travel speed (km/h). The travel speed index can be calculated on the basis of speed measurements or estimates. This parameter provides a more accurate description of the traffic flow on individual sections than the levels of congestion listed above, but is not as easily illustrated for a large road network, and does not directly reflect the impediments encountered.

Total delay, measured on all road sections and vehicles in the system (hours or monetary terms). Delays are measured relative to free-flow and may be divided into the above four levels of congestion.

Road congestion, i.e. the total length of a congested road (km). Road congestion is best measured by the four levels of congestion.

Vehicle congestion, i.e. the total amount of kilometres of cars at the time of congestion. Car congestion is best measured by levels of congestion.

<u>BUS: The following parameters were selected for bus traffic:</u>

(Source: DK\COWI_Traengsel_summary-en.pdf)

Travel speed index, i.e. travel speed (km/h) relative to free-flow travel speed (km/h) (excluding intervals at bus stops). This index may be illustrated on maps.

Total delay, measured on all routes and departures being monitored (hours or monetary terms). Delays are measured for buses and passengers respectively, and may be presented by level of congestion.

Congested departures, i.e. the number of departures where travel time exceeds the free-flow travel time or the scheduled time.

<u>Traffic performance: Roads. railways. seaports and airports</u>
(Source: DK\ Trends_in_Danish_Transport_2004.pdf)

Road traffic performance. i.e. vehicle-kilometres. is calculated by The Danish Road Directorate. primarily from measurements of traffic flows recorded by permanent census takers.

For motorcycles. buses. vans and small lorries. Vehicle-kilometres are calculated on the basis of the total stock and a rough estimate of vehicle-kilometres.

For lorries over 6.000 tons the results of the sample survey of national goods transport conducted by Statistics Denmark are used. Because of ongoing revision of the time series data for 2003 is not yet available.

Train-kilometres exclude shunting work and transport of empty wagons. Source: Danish State Railway and other railway operators.

Until 1996 the statistics on freight ships calls at Danish ports were compiled by and from 1997 by Statistics Denmark on the basis of data reported by Danish ports. The statistics on ferry services are compiled by Statistics Denmark on the basis of data reported by shipping companies.

Air traffic is compiled by The Danish Civil Aviation Administration. Takeoffs by scheduled flights. Charter flights and taxi flights are included.

18.2.2 Methods of observation and assessment

CAR:

(Source: DK\COWI_Traengsel_summary-en.pdf)

On motorways, it is possible to estimate travel speed on the basis of measured mean speed at selected cross sections, as there is no waiting time at intersections. Density may be assessed on the basis of measurements of traffic volume and speed.

On artery and urban roads, travel speed may be calculated as a function of average speed measured at selected points and the measured or estimated delay in signal-controlled intersections.

During one week in May 2001, extensive data was collected on these three road sections,using a wide range of methods. The data collection on car traffic included data from the Danish Road Directorate's ITS system TRIM, automatic counts by means of portable and permanent counters, manual counts, licence plate readings and floating car surveys.

BUS:

(Source: DK\COWI_Traengsel_summary-en.pdf)

Congestion in bus traffic on artery roads and urban roads may, like congestion in car traffic, be assessed by means of travel speed (travel time). Time spent at bus stops is not included in the calculation of buses' travel speed.

The data collection for buses used handheld terminals and licence plate readings, and data was extracted from the Greater Copenhagen Authority's passenger counting system.

Suggestion for measuring in the future:

In cross sections, where measured speed may subsequently be enumerated into speed on road sections. Recordings in sections may involve manual traffic counts or automated counts (portable or permanent). Certain automated counting stations record both volume and speed.

Between two cross-sections, where travel speed on the section between the two cross sections is measured directly. Licence plate readings may be used for this, by means of manual or automated counters with licence plate recognition. Systems based on electronic licence plates may also be used.

In vehicles moving in traffic. This could be a probe vehicle registering travel data while moving in traffic. Alternatively, a fleet of cars could be equipped with GPS as well as a computer logging the trips.

18.2.3 Results

CAR

(Source: DK\COWI_Traengsel_summary-en.pdf)

However, although critical congestion is only found on 2% of the road network, it involves 5% of total traffic and makes up 32% of total delays. In total, delays constitute 29% of total travel time during the morning peak hour in the Municipality of Copenhagen.

On motorways too, only a minimum of the road network is affected by critical congestion during the morning peak hour. However, the share (11%) is higher than in the Municipality of Copenhagen. The same applies to the traffic affected (13%) and delays (51%). As is the case with car traffic on urban roads in the Municipality of Copenhagen, a significantly higher part of the road network and traffic is affected by high congestion than by critical congestion.

Calculations show that the total delay in car traffic in the Municipality of Copenhagen is comparable to the total delay on the motorways, although the traffic load (vehicle-km) on motorways is approx. twice as high. The average delay for car traffic on motorways is approx. 25 seconds per passenger kilometre during the morning peak hour. For car traffic on urban roads and for bus traffic, delays on the selected sections are approx. 50 seconds per passenger kilometre.

<u>Marginal Cost of congestion:</u>

The calculations show that the marginal costs of increased and varying travel times are noticeably higher than those of accidents and air pollution.

BUS:

(Source: DK\COWI_Traengsel_summary-en.pdf)

Calculations based on data from the Greater Copenhagen Authority's passenger counting system on selected bus lines show that 5-10% of trips face critical congestion. The delays constitute 30-40% of total delays in bus traffic on these routes. This applies to buses as well as passengers.

18.3 Rail

According to TRM (2005) congestion on roads and in rail transport is considered a unique challenge for the future Danish transport policy. The railway line between Copenhagen and Ringsted is considered the major bottleneck in the Danish rail network, which will be relieved by future capacity extension measures.

19 Slovak Republic

19.1 Inter-urban road

19.1.1 Measurement of traffic conditions

Intensity:

Manual traffic counts are used (national census on the territory of the Slovak republic is conducted regularly since 1963, starting from 1980 regularly each 5 years according with the unified methodology.

Automatic counting posts (Golden River -ASD) were introduced at Slovakia highways, there are 35 inter-crossing segments defined.

The following data on census on the road network of Slovakia on the state and its performance and Road database are published on the web pages of the Slovak Roads Administration (*Slovenska sprava ciest*) : www.ssc.sk

19.1.1.1 National traffic census held on the road network of the Slovak republic in 2005

National traffic census has been performed on the territory of the Slovak republic within the European census in 2005, organized by the ECE UN in Geneva. Slovakia by this move has joined to fulfilment of the resolution No. 254 declared by the Committee for inland transport ECE UN on the traffic census and inventory of standards and parameters on the main roads with international transport in Europe („E"- roads) in 2005. National census has been performed since 1963, from 1980 regularly every 5 years, based on the unified methodology, in the centrally determined time periods and at the same counting locations, with the objective of:

- To determine the development of the intensity of the road transport,
- To gather the data necessary for census on the trans-European roads,
- To determine the intensity range on the road network,
- To get data necessary for guidance for further investment and transport planning.

The scope of the national census

The national census is a profiling survey, determining numbers of vehicles, motorcycles and cyclists according to their types on the communication's profile. Counting posts are located trough the whole road network – on highway segments, rapid roads, road of I. and II. Class and on selected segments of the III. Class roads, including their urban parts.

In the year 2005 the census has been performed on approx. 2650 counting posts by 4480 counters.

The census has been performed in 10 counting dates at the defined locations in period from April till October 2005, during 7 work days and 3 Sundays in the summertime, always within the 4-hour counting periods. At selected locations the counting has been performed on the same days in 16-hour counting period from 5:00 till 21:00 or continuously, with the use of automatic counting posts.

Responsibility

The national census in 2005 has been declared by the Ministry of Transport, Post and Telecommunications of the Slovak republic. The performance of the census and evaluation of its resuts has been delegated to Slovak roads administration (Slovenská správa ciest Bratislava, Mileti□ova 19, 826 19 Bratislava).

Actual census has been performed by several institutions, according with their responsibilities for respective parts of the road network– National Highways Company, a.s.(Národná dia□-ni□ná spolo□nos□, a.s.) for highways, Slovak roads administration (Slovenská správa ciest), respective regional governments (VÚC), Municipality of Bratislava (Magistrát mesta Bratislavy) and Municipality of Kosice (Magistrát mesta Košice) in cooperation with regional and district offices of road transport and surface communications.

Census' results

The results of the national census will be published on the Web pages of the Slovak roads administration in the middle of 2006, detailed tables and graphs till the end of 2006. Results concerning the "E"-roads will be forwarded to EC UN in Geneva to be incorporated in the European census.

19.1.1.2 DATA IN THE ROAD DATABASE OF SLOVAKIA (CESTNÁ DATABANKA - CDB)

The CDB system stores data on the road network of the Slovak republic – on the nodes of localisation system (ULS), which forms the skeleton of the road network layout, data on the technical parameters of the roads – technical invariable parameters (TNP), data on the road surfaces – technical variable parameters (TPP), data on objects and finished constructions, concerning the road network and its parts. These data form base of the technical documentation, with the responsibility given to the Branch of Road Database since 1.1.1998.

Traffic conditions are measured in the framework of cyclic nation-wide counting (census) organised by the Slovak Roads Administration (SSC). Measurements are performed in the 5-year cycles on the whole spectre of the highways and roads network during 10 counting days in different months and different hours of the day during the year. The whole day load of the measured profile is evaluated (RPDI - Average Annual Daily Traffic AADT) according with the relevant statistical methods. There are also further attributes evaluated, such as: composition of traffic flows, ratio of the freight transport (heavy lorries), ratio of the directions, traffic characteristics. All transport modes are observed. The results are used in the state transport planning of the roads network, in the projects of maintenance of existing and construction of new roads. Data are gained mostly by manual counting, evaluated with the help of information technology.

For the purpose of management on lower level of the roads network, irregular, dedicated surveys are performed, to find out the necessary attributes of the traffic flows, usually by manual counting or by filling of the questionnaires. On the international level, the results of the national surveys are completed by the data from the load of the boundary crossing points.

Results from all surveys are used for the analytic evaluation and for modelling and simulation experiments of the roads network load. The software used for these experiments is PTV VISION and emme2.

19.1.2 Current situation

Congestion is the most severe in the passes through the district towns, unless the road by-passes have been constructed. Main reasons for the congestions are the low capacity of the transit roads and their interconnection to the urban roads network. Individual cases are being solved, so it is possible to find them in the investment studies. Serious problems are developing in connection with the construction of the new highway segments, where with the limited possibility of bypasses and diversions even the existing capacity is (even temporarily) decreased.

As the most critical parts of the I. class road network have been designated following locations:

- I/18 Žilina – Martin,
- I/18 mountain pass Branisko,
- I/65 Žarnovica – Nová Baňa

In most cases this concerns roads with two streams with the intensity of traffic higher than 20 000 vehicles/24 hours in either directions or roads in the mountain areas with limited possibility of overtaking.

In the framework of all planning and investment projects activities the economic analysis of the impacts of the transport intensity has to be performed. Independent studies on the effects of congestions have not been so far (to our knowledge) performed.

19.1.3 Forecasts of traffic congestion

Development of congestion follows similar trends as in the most developed EU member countries. It is driven by the relatively high increase of economic development of the Slovakia, changes in the commodity structure of transport, decrease in the freight and passenger transport by rail and increased demand on the freight and passenger transport by road, rapid increase of motorisation and individual passenger transport.

Prospective development of macroeconomic indicators is given in the following table:

Table 19-1: Prospective development of macro economic indicators until 2009

	Reality		Prognosis				
	2003	2004	2005	2006	2007	2008	2009
GDP In billions of SKK	1201,2	325,5	1437,6	1574,1	1702,5	1821,8	196,7
GDP growth in %	4,5	5,5	5,6	5,8	6.4	5,4	5,1
Yearly Inflation in %	8,5	7,5	2,7	3,5	2,0	2,0	2,4
Productivity growth in %	3,6	5,2	3,7	4,8	5,5	4,5	4,2
Unemployment in %	15,2	14,3	11,6	10,9	10,	10,6	10,3

According with the trends in GDP growth, it might be expected, that there will be congestions on all types of roads.

Expected growth of congestions on the roads of I. Class category is alarming. The delay in the construction of highways and rapid transport roads means, that whole number of road network segments did not suffice in capacity already in the year 2000. GDP growth and arrival of new investor and increased capacity demands on the infrastructure are not satisfied by her recent state and quality. The performed studies consider this reality; however, the realization of proposed measures has been inhibited by lack of financial resources. The demand on funding is high also due to the geological conditions and necessity to build tunnels. Further development at the mentioned segments, where the capacity has been overreached at present, can be very dangerous from the view of road transport safety.

Table 19-2: Population growth in Slovakia

Year	Mid-year population		Live-births	Deaths	Natural increase
	Total	of which: Females	Per 1 000 inhabitants		
1998	5 390 866	2 767 780	10,7	9,9	0,8
1999	5 395 324	2 771 244	10,4	9,7	0,7
2000	5 400 679	2 774 988	10,2	9,8	0,4
2001	5 379 780	2 767 096	9,5	9,7	–0,2
2002	5 378 809	2 767 357	9,5	9,6	–0,1
2003	5 378 950	2 768 078	9,6	9,7	–0,1
2004	5 382 178	2 770 082	10,0	9,6	0,4

The estimated overreaching of the projected intensity of the segments of Slovakia road networks is shown in the next picture. The increase of the intensity will logically lead to development of congestions.

In magenta colour are the segments, where the intensity was overreached in the year 2000

In orange are the segments, where the intensity was overreached in the year 2005

In blue are the segments, where the intensity will be overreached in the year 2010

In green are the segments, where the intensity will be overreached in the year 2015 and later.

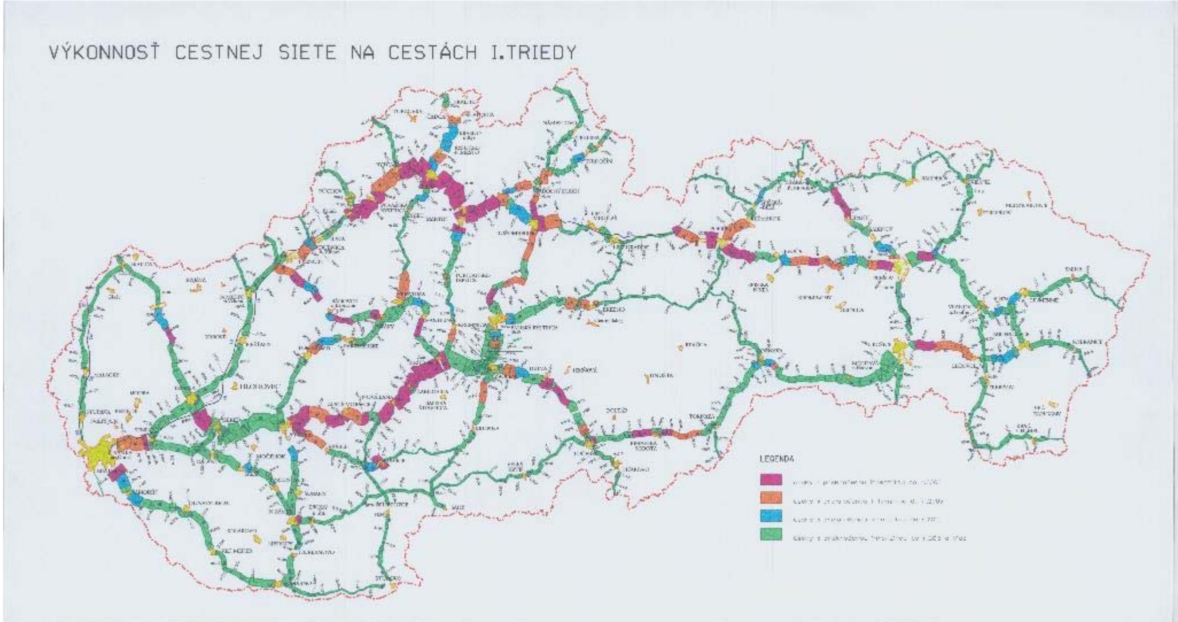


Figure 19-1: Performance and Intensity of Road Transport in Slovakia

19.1.4 Policy plans

19.1.4.1 General policy plans

Specific priority 1.1 of the Slovak republic transport policy is the transport infrastructure and development of public passenger transport. It is oriented in concert with the European transport policy towards realisation of international infrastructure construction projects (TEN-T networks) and towards increase of the efficiency and quality in transport services in public passenger transport. The purpose is to increase quality of the road, rail and intermodal infrastructure, with orientation towards full inclusion of the Slovak transportation systems into the European one. Further steps are oriented towards development of conditions for sustainable mobility in connections with fulfilment of the demands of the economy and increase of the quality of transport.

Specific priority 1.1 (SP 1.1.) has four operational priorities:

- Modernisation and development of road transport infrastructure,
- Modernisation and development of rail transport infrastructure,
- Modernisation and development of intermodal transport infrastructure,
- Development of public passenger transport.

SP 1.1 is oriented mostly towards:

- Construction of the transport infrastructure for the purpose of increase of efficiency and quality of the transport system on the international and national/regional levels,
- Improvement of the parameters of the transport infrastructure and their approximation to the EU standards,
- Improvement of the equality of the respective regions in access to the transport infrastructure,
- Proportional development of the respective modes of transport,
- Reduction of the negative impacts of transportation on environment.

19.1.4.2 Specific inter-urban road plans

The construction of the highway from Bratislava to Košice continues in the northern Slovakia. The great impulse has been the agreement concerning the construction of the automobile factory KIA Motors in Žilina. There are other parts under construction in the segment Žilina – Košice, also the construction of roads for rapid transport is planned. The plans are available from National highways company (Národná diaľničná spoločnosť- www.ndsas.sk). The construction of highway connection to Poland is continuing in the segment of Žilina- Skalité-Poland. Due to the natural conditions there and difficulties with the international agreements no results in a short-term can be expected there. The highway toll as well as tolls for the I. Class roads has been introduced to regulate the traffic demands, electronic tolling is planned.

Table 19-3: Planned investment projects in road and rail transport

No.	Funding	Description	Estimated costs (In millions of SKK)	Estimated year of the end of preparation
1	TEN-T	D1 Turany-Hubova	150	2009
2		D3 Cadca-Bukov	50	2008
3		D1 Jablonov-Studenec	80	2009
4		D1 Fricovce-Svinia	120	2010
5		D1 Presov zapad-Presov juh	180	2010
6		D3 Kysucke Nove Mesto-Oscadnica	100	2008
7	Cohesion fund	D3 Hricovske Podhradie –Zilina Strazov	5 523	Started
8		D1 Sverepec-Vratizer	11 324	2006
9		D1 Ivachnova-Hubova	14 194	2008
10		D1 Janovce-Jablonov	10 240	2009
11		D1 Matejovce-Janovce Finishing works		2009
12		D1 Turany-Hubova	17 685	2010
13		D1 Fricovce-Svinia	7 058	2010
14		D1 Presov zapad-Presov juh		2010
15	Structural funds	R1 Nitra zapad-Selenec	4 111	2009
16		R1 Selenec-Beladice	2 658	2009
17		R1 Beladice-Tekovske Nemce	2 921	2008
18		R1 Zarnovica-Sasovske Podhradie II. stage	2 955	2007
19		R2 Pstrusa-Krivan	2 366	2009
20		R2 Krivan-Lovinobana	1 524	2010
21		R2 Bypass Ziar nad Hronom	2 676	2009
22		R2 Ozdany-Zacharovce	1525	2010
23		R2 Zacharovce-Batka	1 447	2010
24		R2 Batka-Figa	1 340	2009
25		R2 Ruskovce-Prvotice	2 130	2009
26		R4 Kosice-Milhost	3 467	2008
27		R4 Presov northern bypass	10 422	2009
28		R7 Dunajska Streda-Trstice	3 851	2011
29		R7 Trstice-Neded	2 342	2012

Investment in the new capacity of the highway system and rapid transport roads network is the most important planed measure. The main sources of funding for these projects are EU projects (in the framework of multimodal and road corridors No. 4, 5, 6). The most demanding projects are planned as PPP (public-private partnership) projects.

19.2 Urban roads

19.2.1 Measurement of traffic conditions

Manual counting is used mostly to determine the frequency and load of the most important parts of the urban roads network. These surveys are performed mostly in connection with the planning of the highway connections' construction and bypasses of the municipalities.

In the two largest towns of Slovakia, in Bratislava and Košice, the sensors of the automatic counting posts are built in the roads at the most important crossings. They are used to monitor the traffic flows intensity during 24 hours. With the use of these data the transport may be re-directed to other direction with lower intensity. In some large cities video surveillance systems are used (e.g. in Bratislava, Košice, Žilina), and based on the concrete situation it is possible to make immediate regulations of the transport flows.

Apart from the above described surveys, in the municipalities with more than 5000 inhabitants each five years the surveys on traffic flows' directions are performed, in order to analyse the out-bound, in-bound and transit transport characteristics. For the purpose of land-use planning documentation the irregular surveys by questionnaires are performed, concerning the structural variables, influencing the traffic volumes in urban regions. The survey is oriented towards inhabitants and the purpose is to determine sources of in- and out-bound transport, inter-regional relations, distribution of transport needs and resulting demand and load on the from the capacity of the networks.

19.2.2 Current situation

The congestions in the towns develop mostly on crossroads with several types of public passenger transport, usually on limited peak days and peak times. Specific situation exists in Bratislava with the Danube river bridges.

The reasons for congestions in the respective towns are known. They are caused by the insufficient capacity of existing infrastructure, rapid growth of individual motorisation after 1989, frequent reconstruction and maintenance of the infrastructure (caused by weather condition, poor quality of construction, reconstruction of city centres, etc.), new development of concentrated shopping or industrial zones without appropriate transport infrastructure.

19.2.3 Forecasts of traffic congestion

In large towns is the congestion caused by the economic growth, partly by migration of the employees. It can be expected, that in Bratislava, but also in Trnava and Žilina, as well is in other large towns the congestions will be on increase, even if the economic and industrial development brings with itself also the development of new or improvement of the old infrastructure.

In the town of Žilina the level of motorization is 1:3,8. The prognosis estimates, that if no solution would be taken within 10 years, its growth will be 142 % and the losses will reach level of 80 billion Euros/year. It is understood, that the problem of congestions cannot be simply solved by building of the new road infrastructure. The effectiveness is further influenced by demands for the land area for the road and the increased capacity produces increased demand etc. Slovak society on one hand demands ever increasing mobility, on the other hand becomes less tolerant against delays, decrease of environmental quality and low level of services.

Most municipalities, also connected with the decentralization of responsibilities from the central government, are becoming active in the quest of finding the solutions of transport problems. From the available economic resources point of view, it cannot be expected, that the radical improvement can happen sooner than in 5-10 yeas, depending on the region.

19.2.4 Policy plans

Problems with congestions are solved on the level of Municipalities and their Offices for Transport. The measures taken are variable transport markings of recomended speeds, city centres by-passes, reduced access for the freight transport in certain periods of time.

Important projected measure is introduction of the Intelligent Transport Systems (ITS) and Electronic Tolling. Department of Road and Urban Transport of the University of Zilina is participating in the state funded project VEGA No. 1/2616/05, which objective is to determine the explicit price of the infrastructure capacity and use it in the model for pricing of the Access to central parts of the towns of medium size.

19.3 Rail transport

19.3.1 Measurement of traffic conditions

For development of the train schedules the volumes of passenger and freight transport are statistically observed. In the passenger transport the data collected at the centres of Comprehensive passenger services (KVC) are used, which compose 80 % of such observations. On the local lines individual surveys are conducted, usually twice in the year in selected months in duration of one week. Observations on the train use are collected by the train crews. Marketing surveys on the services extent, level and quality are also performed.

In the freight transport the statistical data are collected from the transport documentation according to decisive commodities and performance in the in-land transport, in imports, exports and transit. Concrete volume and performance are observed through defined qualitative and quantitative indicators, which are observed and evaluated operatively and are published yearly in official publications of respective railway companies (ŽSK, ZSSK a. s. a Cargo a. s.) and used also for national statistics.

The census is performed in the 5 –year period (first time in 2005). The subjects of the census were number of trains, train-kilometres on the rail segments of the AGC, AGTC and TEN networks. The census has been performed on behalf of UN ECE and EUROSTAT for the purpose of development of database on the European transport network.

19.3.2 Current situation

Congestions in the rail transport are manifested through the delays of passenger an freight trains, caused either by extreme weather conditions, accidents or technological problems or also due to the reconstruction of rail corridors, topical in the Slovakia. Solutions are found with the use of short time scheduling or with the replacement of passenger rail transport by the buses.

The rail infrastructure is considered to be sufficient in capacity; however the demands for levels of quality and reliability are not met, mostly due to the obsolete technological means in use.

Studies on the economical impact of congestion in rail transport have not been conducted. For the modernization of rail „Feasibility Study" has been prepared, in which the time saving and its economic impact are considered.

19.3.3 Forecasts of traffic congestion

Problems in the rail transport, mostly in passenger transport, will remain for certain period, connected with the reconstruction of the base corridors of the rail network. Problems for freight transport can be solved thanks to sufficient capacity of the rail network by diversion to other parts of the network.

The results of the prognostic modelling of transport relations and demands (based on the scenario of supposed economic growth – development of automobile industry, industrial parks, GDP creation on the level of the 80 % of the EU average) show, that the recent capacity is sufficient till the year 2015.

The recent rail performance is on the 50% level of the performance before the year 1989 and due to the on-going modernization of the trans-European corridors passing the Slovak territory (corridor no. IV, V and VI) it can be estimated, that the increase of freight or passenger demands on transport by rail could prove to be any problem. The negative impact of modernization is manifested by numerous delays and diversions of the trains.

19.3.4 Policy plans

The problems of the rail transport are being mapped recently in connection with the planned restructuring and privatisation of the rail freight transport (Cargo a.s.). The material is in preparation at Transport research institute (VÚD) and respective branches of the Slovak Rail (ŽSR, ZSSK a. s. and Cargo a.s.). Methodology fort he evaluation of economic losses caused by congestion has been prepared by the Department of Rail Transport of the University of Zilina in the framework of project No. 59/PEDaS/2001. It is necessary to solve the problems of congestions in connection with negative externalities, which are caused by respective types of transport. The problem of congestion in the rail transport is subject of further research at the University of Zilina.

19.4 Urban public transport

19.4.1 Measurement of traffic conditions

Manual counting and calculated data from transport models are used. In larger cities the surveys are performed for planning purposes in the tram, bud and trolleybus transport.

Data in bus transport are collected on peak days and peak hours. These data are used for schedule and lines optimization, for investment planning for development of the cities, reconstruction of important crossings etc.

University of Zilina collects manually urban transport data for 30 years. The data is used for survey on the traffic load of the urban road infrastructure, directions and types of transport means used.

19.4.2 Current situation

The same as for the urban roads applies.

19.4.3 Forecasts of traffic congestion

Problems with congestion will become apparent in further towns in Slovakia. Partial solutions are reached by reconstructions of roads and crossroads, diversions of transport flows. Some cities inning more modes of transport (usually bus, tram, trolleybus and train) and introduced integrated transport systems (Bratislava, Žilina, Zvolen-B. Bystrica, Košice).

It has been recognized, that the congestions are mostly cause by the individual transport. To increase the role of public transport, measures such as optimization of the bus and tram lines, designation of special streams for public transport, are necessary.

19.4.4 Policy plans

The responsibility for the urban transport lies within the municipal authorities, so the problems are being solved at the level of Transport departments of Municipal offices, in coopertion with the public transport companies. It is partly also the role of privatised urban transport companies, such as Slovak bus company (Slovenska autobusova spolocnost- SAD), and National bus company (Narodna sutobusova spolocnost-NAD). Municipalities cooperate with the Regional gvernment offices.

The planned measures contain construction of the new transport infrastructure, R+R parking places, introduction of integrated transport systems.

The most widely used transport means used are the buses. Trams are used only in two largest towns- Košice and Bratislava. The plans for building the metro in Bratislava re-emerge time to time, but due to the difficult geological conditions they are usually abandoned. Rapid tram and light rail are supposed to solve the passenger transport problems in Bratislava, as well as connection to Vienna.

Trolley-buses are used in Bratislava, Kosice and Zilina, due to the economic conditions of their use this ecological form of transport has been abandoned in he town of Banska Bystrica.

19.5 Waterborne transport

19.5.1 Measurement of traffic conditions

Waterborne transport performance on the Danube river on the Slovak territory is observed visually at the passing through Gabčikovo gate and in the respective ports (Komárno, Bratislava) and at the officicial counting post in Bratislava. Passenger transport is insignificant and serves only recreational purposes. The data are collected and processed by the National waterways administration (Štátna plavebná správa -ŠPS) and published in the statistical yearbook of Slovakia.

19.5.2 Current situation

The congestion happens only in case of accidents at the critical parts of the Danube waterway (ship accidents, troubles with the Gabčikovo gate) or extreme weather conditions (low water level).

Problem of congestion as such is not relevant for the Slovak waterways (Danube, Vah river waterway – VVC (segment Komárno – Šaľa), waterway Bodrog (border Slovakia -Hungary – port Ladmovce).

19.5.3 Forecasts of traffic congestion

New waterways are being in development in the eastern Slovakia, mostly for recreational passenger use and freight transport of specific raw materials.

Due to the limited use the development and/or increase of the congestion (apart from accidents) is not supposed.

19.5.4 Policy plans

The only possible congestion situations concern the Danube international navigation, where the problems are solved by common international „Danube Commission". The use of the navigable parts of the Váh river, from the confluence with Danube to Sereď, is mostly for recreational purposes and very rarely for freight transport.

Planned maintenance and completion of existing connections is bound to the completion of the Danube dams system (Nagymaros) and construction of the new ones. The approach used in projects preparation stages should eliminate the problem of congestions in long-term perspective.

19.6 Aviation

19.6.1 Measurement of traffic conditions

Is observed according to data on flights at the airports. Most significant are the airports in Bratislava and Košice, currently privatised.

Aviation transport is not used significantly for the freight transport. Increase in the number of passengers is mostly due to the joining of the EU and increased number of budget flights to and from Bratislava airport.

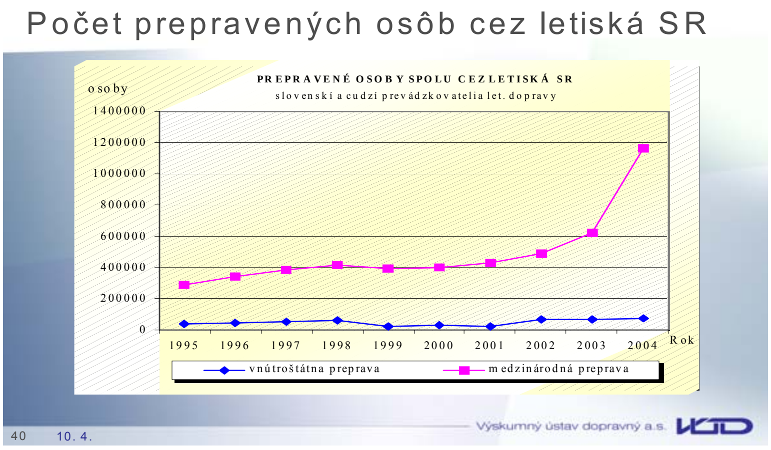


Figure 19-2: Traffic development at Bratislava airport

Statistical data on number of passengers, passengers according to segments and number of arrivals and departures are collected.

Development of number of air passengers is shown in the picture; in blue is the inland transport, in red the international transport.

19.6.2 Current situation

Congestion happens only in case of extreme weather conditions.

19.6.3 Forecasts of traffic congestion

The solution will be found after privatisation of the airports. There are no reported problems with congestion so far.

19.6.4 Policy plans

With the ongoing privatisation of the most important airports (Košice, Bratislava) increase of the air transport can be expected, however due to the characteristics of air transport demands in Slovakia so far there is no necessity to solve congestion problems there.

20 Finland

20.1 Institutions contacted:

General Transport

- VATT Government Institute for Economic Research
- VTT Department Transport, Traffic, Logistics, Transport Systems and Impacts
- Ministry for Transport and Communications (MINTC)

Road Transport

- Finnish Road Administration (FinnRA)

Rail Transport

- Finnish Rail Administration RHK (Ratahallintokeskus)

Inland waterways, coastal and maritime shipping

- Finnish Maritime Administration (FMA) (Merenkulkulaitos)

Aviation

- Civil Aviation Administration

20.2 Inter-Urban Road

20.2.1 Measurement and definition of congestion

The Finnish Road Administration (Finnra) manages the measurement system of traffic condition for public roads. Such system is based on the *Permanent Traffic Counting System*, the *Travel Time System*, the *Road Weather System* and s short term counting *General Traffic Census*.

The *Permanent Traffic Monitoring System* consists of 350 automatic counting posts, most of them on main roads over the distance of 13500 km. The system produces real-time data of traffic flow and speeds, which is updated every 10 minutes (Figure X.Y).

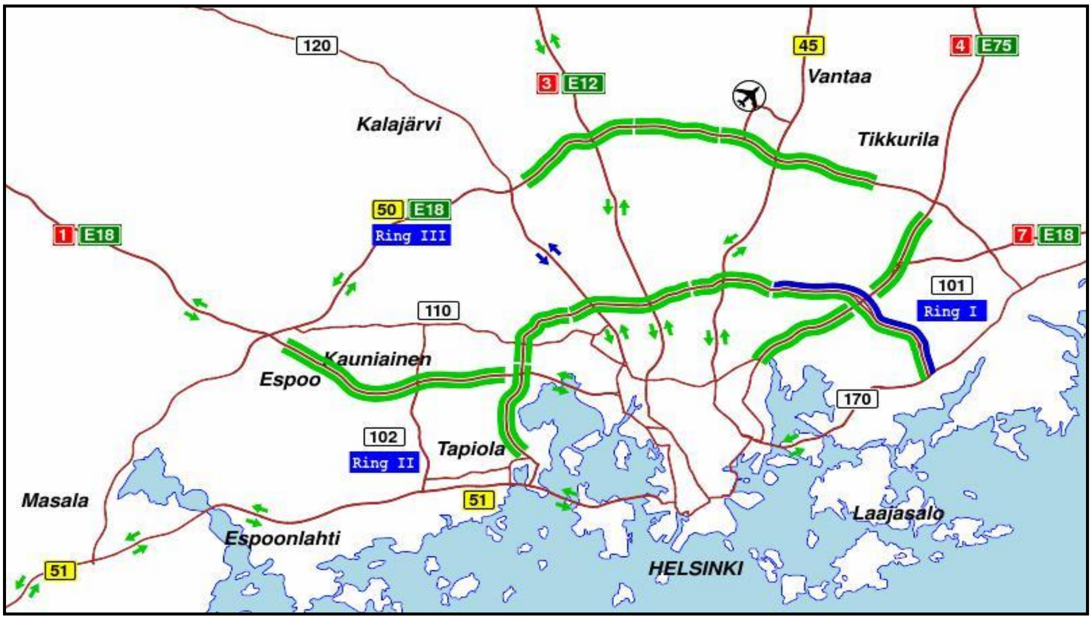


Figure 20-1: Real Time Traffic in Helsinki - 16.05 at 9:40GMT. (green–free flowing traffic, blue–heavy traffic)

The *Travel Time System* is used only in the capital area and is based on the register plate recognition technology. The real-time traffic information, as well as the travel times are processed and presented in the form of traffic flow information to the road users.

The *Road Weather System* consists of more than 350 road weather stations (Figure 20-1). During the winter period information on road weather is updated at least three times an hour. Information is updated more frequently if the temperature is near to 0°C due to the rapid change of road conditions at that time, posing greater difficulties for road users and the road maintenance service. During the summer period information is updated about once an hour. Road weather is estimated with the help of little censors that are laid on the road surface. There are about 300 weather cameras on the main roads. Pictures from weather cameras and information from road weather stations serve mainly winter maintenance. A new picture is taken 2 to 6 times per hour or even more frequently in winter if the weather is changing rapidly. Information from the nearest road weather station is written below the picture taken by a weather camera.

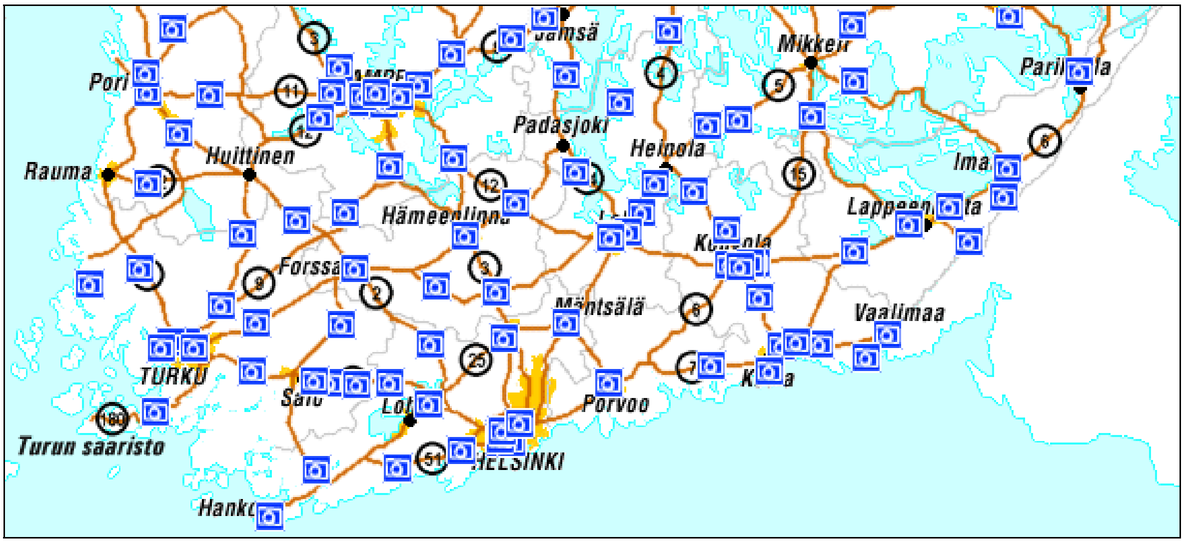


Figure 20-2: Allocation of weather cameras in the Southern Finland.

In the *General Traffic Census* the whole public road network (79.000 km) is counted by sample counting. The public road network (79.000 km) is divided into 15.000 sections and the measurements of all road sections are carried out in 4 or 8 years period (about 3.400 sections per year). These sections are measured during 2 to 3 seasonal periods: winter, summer and/or autumn. During each period the counting lasts for 2 to 5 days per point. Statistical models based on the data of the continuous counting system have been developed to produce Annual Average Daily Traffic (AADT).

The real-time traffic information uses a definition for congestion based on the change of the average speed of the traffic flow compared to the free speed of the traffic flow:

- Traffic flowing freely - the decrease of the average speed is less than 10 %,
- Heavy traffic - the decrease of the average speed is 10 - 25 %
- Slow traffic - the decrease of the average speed is 25 - 75 %
- Queuing traffic - the decrease of the average speed is 75 - 90 %
- Stationary traffic - the decrease of the average speed is more than 90 %.

Source: COMPETE-Questionnaire_en-brief (combined).doc, pages 4,6

Finnish Road Administration: www.tiehallinto.fi/alk/english/

20.2.2 Current situation

Outside urban areas traffic is congested few times per year on national holidays and summer weekends over the distance of few hundred kilometres of 2-lane highways leading from Helsinki Metropolitan Area to Eastern and Northern Finland. The main reason for the congestion is the limited capacity of 2-lane highways due to poor geometry.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 6

20.2.3 Congestion forecasts

No information available

20.2.4 Policies to reduce congestion

According to the Finnra the following policy measures are planned to reduce congestion in the future:

- Investments in new capacity by building passing lanes or new motorways,
- Providing traffic management services to the road users,
- Decreasing speed limits from 100 km/h to 80 km/h.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 10

20.3 Inter-Urban Rail

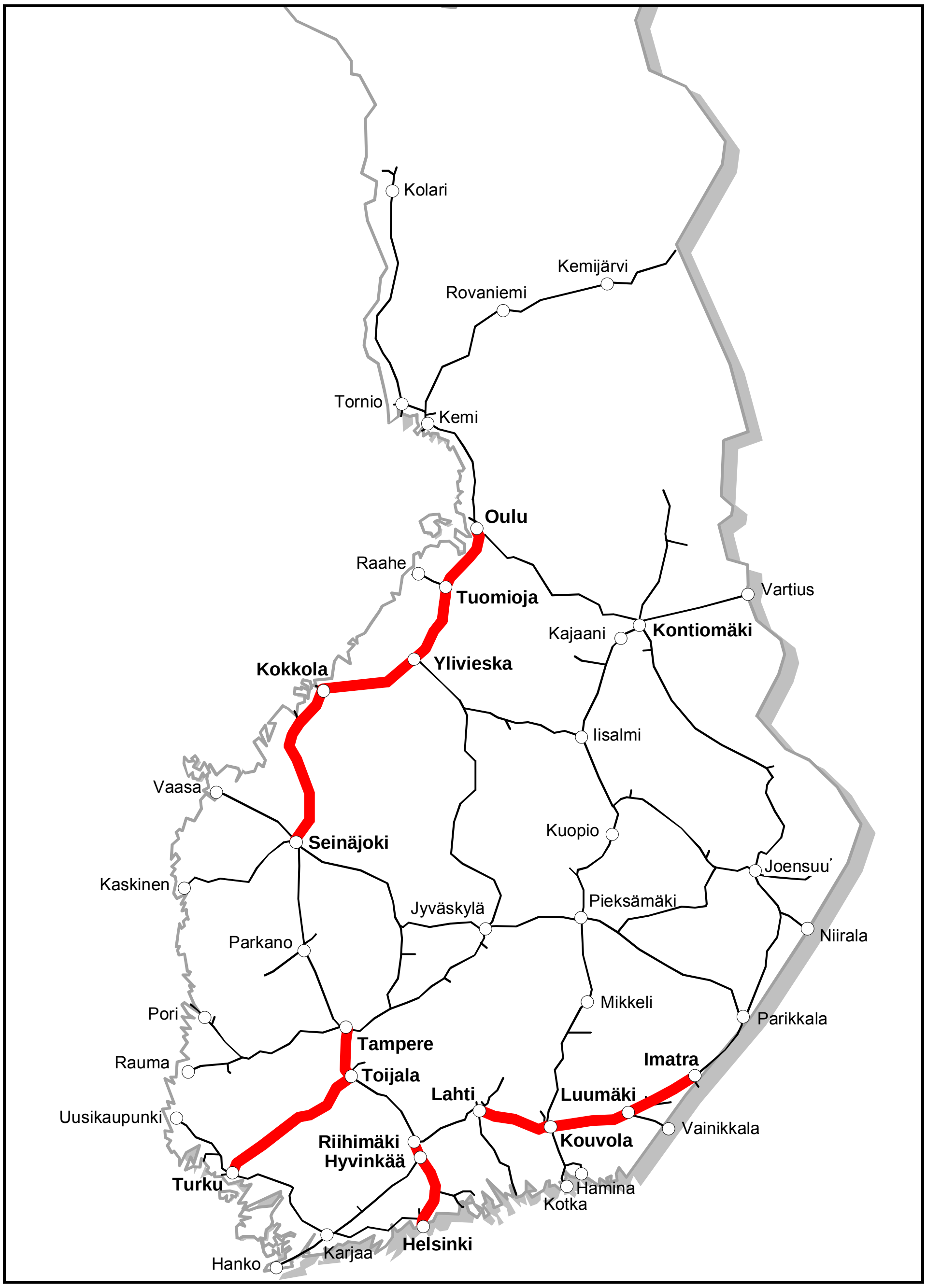
20.3.1 Methods of delay observation

Railway transport is based on timetables with the railway infrastructure specifying, what kind of timetables it is possible to make. Based on capacity and timetable analysis, it is possible to estimate traffic conditions. The other way around, capacity bottlenecks on the network can be identified based on timetables. Train traffic is controlled and monitored with the help of a centralised traffic system. Almost real-time traffic situation is represented in the JUSE system (a train monitoring system). Statistical delay records are gathered on regular basis.

Rail traffic control systems provide data on current traffic flow. Traffic control personnel add delay codes to the data. Data is collected 24/7 on the whole network and analyzed monthly by the traffic operator. Urban, interurban and freight are analyzed separately. Reasons for delays are analyzed in order to improve operational quality. The infrastructure manager Finnish Rail Administration (RHK) uses the data for long term planning of improvements on the rail network.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 5

In urban passenger transport arrivals over 3 min an in interurban passenger transport 5 min behind schedule at end stations are considered delayed. Punctuality rates in 2005 were for urban rail 97,6% and interurban rail 90% respectively. These rates are very high even though there are congested tracks due to the capacity shortages as calculated by RHK and shown in the Figure X.Y.



Source. Email communication with RHK

Figure 20-3: Capacity bottlenecks in the Finnish rail network

One can see that the main congested tracks are:

- Urban passenger transport in Helsinki region during (morning) peak hour, as well as Helsinki – Riihimäki,
- Turku – Tampere,
- Lahti – Vainikkala (freight and passenger) and,
- Seinäjoki – Oulu (freight and passenger at night).

Traffic delays lasting over 5 minutes due to track maintenance will not affect more than 6% of passenger trains. Delays affected 3.3% of passenger trains. The reason for this good result is that delays caused by track work (25,650 minutes) were substantially lower than the target (38,100 minutes). However, delays caused by malfunctions in safety equipment (31,432 minutes) exceeded the target (20,030 minutes). Track work was clearly more difficult from a traffic viewpoint last year than in 2003.

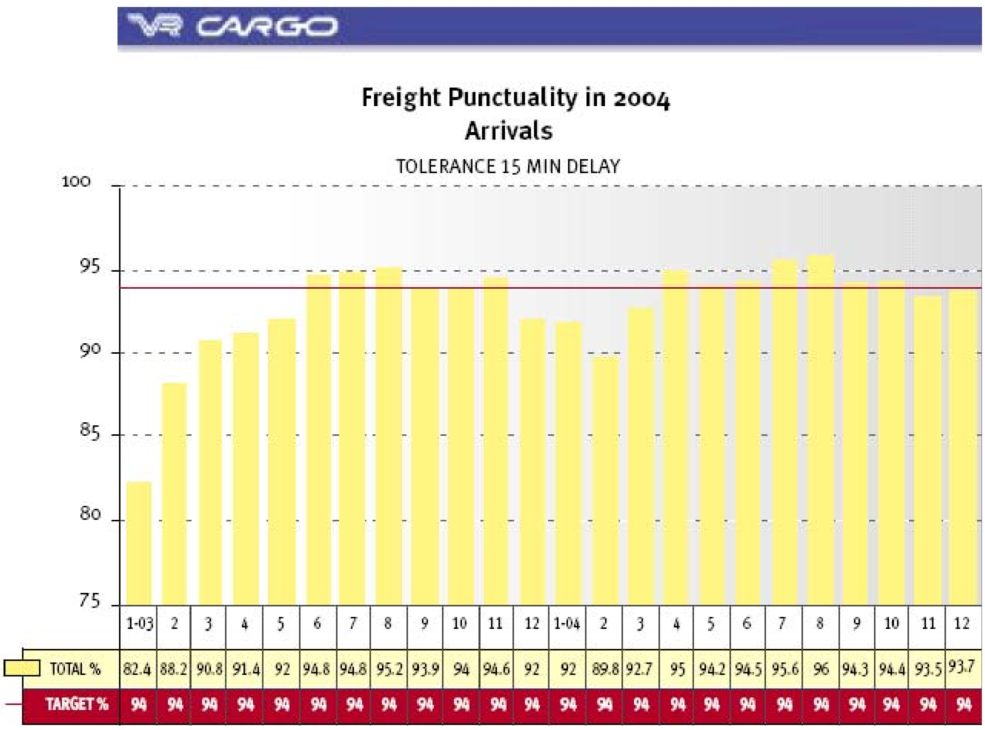
(Source: FI\ RHK_Annual-Report_2004_eng.pdf, Page 22)

20.3.2 Current situation

20.3.2.1 PunctualityI

n one of the most important success factor for rail transport, punctuality, objectives were exceeded in both commuter and long-distance traffic. The punctuality index was 98.7% in commuter traffic and 91.7% in long-distance traffic. This is excellent by international standards (shown in Figure 1).

(Source: FI\ RHK_Annual-Report_2004_eng.pdf, Page 8)



Source: CER (2005)

Figure 20-4: VR-Cargo punctuality in 2004

There can be congestion on the network on two levels. First, when the transports are planned and timetables are created, it can lead to a situation, where there is not enough capacity for all lines. This kind of issue can also be seen in a capacity allocation process, when capacity requests of railway undertakings[42] are co-ordinated. This is not actual congestion,

[42] Definition: Railway undertaking is a company or other association under private law whose main activity is to operate rail traffic on the basis of an appropriate operating licence issued in the European Economic Area and which has in its possession rolling stock needed for traffic operating (Source: RHK_Network-Statement_2006.pdf, page 11).

but it is a situation, when there is not enough capacity for the whole demand. In such cases RHK (Finnish Rail Administration) declares an infrastructure capacity[43] as congested infrastructure and applies a priority order for the capacity allocation process as shown in Table 20-1.

Table 20-1: Priority order on congested infrastructure

Priority	Traffic
1.	Synergic passenger traffic entity
2.a	Express train traffic
2.b	Transport for the processing industry
3.a	Local and other passenger traffic
3.b	Other regular freight traffic
4.	Freight traffic not requiring strict transport times
5.	Other traffic

Secondly, there are some disruptions in the operative traffic from time to time, which can create congestion and cause delays. Traffic control assists in solving these incident situations. Different reasons for congestion are e.g. disruptions in line traffic and in shunting yards, weather, opening hours of shunting yards and harbours.

20.3.2.2 Other information

(Source: FI\ RHK_Annual-Report_2004_eng.pdf, Page 26)

Extraordinary income and expenses include the costs of delays resulting from track damage and track work and related compensation.

Compare source at page 28 for "Statement of Income and Expenses"

20.3.3 Forecasts

In the railway transportation, network capacity set the limits for amount of the traffic. On those lines, where is just a small amount of traffic, capacity or congestion is not a problem. Capacity and congestion problems occur, when the transport volume is getting bigger, but infrastructure capacity stays the same.

Freight demand forecast for the Finnish rail network for the year 2025 has been done.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 8

[43] Definition: Infrastructure capacity is the capacity of a train path to carry train traffic over a particular period of time and depending on the characteristics of the rail network, except train traffic directly connected with infrastructure maintenance (Source: RHK_Network-Statement_2006.pdf, page 10).

20.3.4 Policy measures to reduce congestion

Investments in new capacity is considered the main policy instrument to reduce congestion in the Finnish rail network. The EC White Paper on Transport Policy for 2010 is considered being very much in favour of the railways and thus supports decisions to invest in railways.

The relatively small scale of congestion and lack of capacity are solved by investments into new capacity. Small capacity needs and congestions can be handled with the help of changes and developments in the timetable structure.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 10

20.4 Waterborne transport

20.4.1 Measuring traffic conditions

In 2003, the numbers of pilotage and piloted nautical miles and thus earnings from pilotage increased compared with last year's figures. This can be explained by the fact that vessel traffic in the Gulf of Finland had to be redirected to the "winter route" due to the severe ice conditions. This route was used from the end of January to the end of April. From the point of view of icebreaking, the winter 2002 – 2003 was a difficult one, even if it was considered an average winter in terms of ice coverage. However, winter arrived exceptionally early and lasted longer than the average. The ice in the Gulf of Finland was also thicker than normal.

(Source: FI\FMA_Annual-Report_2003.pdf, Page 31)

Statistics on Shipping between Finland and foreign countries by the ports is collected on monthly and yearly bases. (Data includes information on number of ships by ship type, volume of transports by cargo type, volume of passengers, ship sizes etc). Information about all seaborne shipping is gathered via PortNet, which is a national data-system. A representative of shipping company enters the information about the in/out-going cargo, passengers etc. to Portnet. This information is used, among other purposes, to make shipping statistics about import and export, ships entering Finnish ports, passenger traffic etc.

Statistics are also collected about waterborne shipping/inland navigation in Finland (Statistics on Domestic Waterborne Traffic, collected annually). For this purpose the information is partly obtained via PortNet, but mainly from other sources, for instance, annual questionnaires. All statistics are public and they are used by administration, shipping companies, maritime organizations, researchers etc. for different purposes. (Internet: http://www.fma.fi/e/services/statistics/)

Vessel Traffic System (VTS) follows the vessel traffic continuously in real time and records the ship movements. The resulting databases still need to be developed to be useful for statistical / research purposes.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 5

20.4.2 Current situation

There is no severe congestion problem in Finnish waterborne traffic. The port capacity is generally sufficient although there are regional development needs for certain types of traffic.

There is no systemical gathering of information about congestions in shipping except the waiting times for ice-breaker assistance during winter period. The aim for winter 2005-2006 is that the 90-95% of ships have to get through without waiting and for the rest waiting time must be less than 4 hours. It is not known yet how this aim is achieved.

To some extent there is congestion in the land connections of the main ports, e.g. Helsinki. Although not congested, one problematic area concerning maritime safety is the axis Helsinki-Tallinn and the crossing east-west traffic (e.g. oil transports from Russia). The traffic has in recent years increased considerably in this area.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 7

20.4.3 Congestion forecasts

No congestion problems in the waterborne transport are expected in the short run. If the increase of cargo volumes will be high (as a result of GDP growth, foreign trade growth etc.), it usually implies the growth of vessel size. This means that the increase of number of vessels is not as strong as the increase of cargo volume.

One unpredictability element in the case of some Finnish ports is the development of the Russian transit traffic. It can vary strongly from year to year and it is difficult to forecast.

A forecast until 2030 regarding the development of maritime transports has recently been completed (will soon be published).

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 8

20.4.4 Policies to reduce congestion

At the moment the situation in the waterborne transport does not require actions in order to fight congestions. However, if cargo volumes will continue to grow extensively, there will be a need to invest in deeper approach channels in some ports because of the growth of ship sizes.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 10

20.5 Urban Road Transport

20.5.1 Measurement and definition of congestion

Traffic condition measurements in the public urban roads are based on the same system as described for the section of inter-urban roads, i.e. Permanent Traffic Counting System, Travel Time System, Road Weather System and s short term counting General Traffic Census. Moreover, cities collect real-time traffic data with cameras and traffic signal loops. The biggest cities count traffic on their main streets usually a one week period once a year.

In Finnish Road Administration the costs due to the congestion in Helsinki metropolitan area were calculated in 2000. The congestion was defined as follows: the decrease of the average speed of the traffic flow compared to the free speed is more than 10 %. Results were:

- costs for the bus transportation are 2.620.000 EUR / year
- costs for the society due morning and evening rush hour are117.800 EUR / 2 hours
- cost due all congestion together are 29.700.000 EUR / year

- costs due serious congestion are (decrease of the average speed compared to the free speed is more than 30 %) 17.600.000 EUR/ year

Source: Tomi Laine, Hannu Pesonen: Costs of the congestion in the Helsinki metropolitan area. (Pääkaupunkiseudun ruuhkat ja niiden kustannukset). Finnra Internal Reports 35/2002.

Source: COMPETE-Questionnaire_en-brief (combined).doc, pages 4,6

20.5.2 Current situation

The most congested roads are located in the Helsinki metropolitan area: Ring I, Ring III, and all the access roads of the length of 20-30 km from Helsinki. The main reason for the congestion is the limited capacity of the roads and junctions during the rush hour.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 6

20.5.3 Congestion forecasts

According to Finnra congestion in the Helsinki metropolitan area has increased especially on the cross-town ring roads. The rush hours in the morning and evening last longer at the moment.

The increase of the congestion in urban areas is caused by the migration from the country side to the metropolitan areas, especially in the Helsinki metropolitan area. Moreover, the urban sprawl has become worse due to the costs of living in the centres. The car density has increased due to the GPD growth and poor public transportation in the outskirts of the urban areas.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 8

20.5.4 Policies to reduce congestion

According to the Finnra the following policy measures can be implented in order to minimize congestion in the urban road transport:

- Investments in new capacity by improving existing motorways and building up multi-level junctions,
- Providing better traffic management services to the road users,
- Improving public transportation and providing park and ride facilities,
- Encouraging the use of public transportation by parking taxation policy in the cities,
- No plans for adopting congestion taxes.

Source: COMPETE-Questionnaire_en-brief (combined).doc, page 10

20.6 References

FINRA Finish Road Administration (2003): Road Statistics 2003. Finish Road Administration. Helsinki, 2004

FINRA Finish Road Administration (2004): Road Statistics Express 2004. Finish Road Administration, Pikatilasto, 21.02.2005

FINRA Finish Road Administration (2005): Road Facts 2005. Finish Road Administration. Helsinki, 2005

FMA Finish Maritime Administration (2003): Annual Report 2003. Finish Maritime Administration. Helsinki, 2004

FRA Finish Rail Administration (2004): Finnish Railway Statistics 2004. Finish Rail Administration. Helsinki, August 2004

FRA Finnish Rail Administration (2004): Annual Report 2004. Finnish Rail Administration,

Espoo 2005

FRA Finnish Rail Administration (2004): Finish Network Statement 2006. Publication of Finish Rail Administration, F2/ 2004. Finish Rail Administration. Helsinki 2004

Tomi Laine, Hannu Pesonen: Costs of the congestion in the Helsinki metropolitan area. (Pääkaupunkiseudun ruuhkat ja niiden kustannukset). Finnra Internal Reports 35/2002.

20.6.1 Annex: Research Projects with Finnish participation

Reports found

http://www.strafica.fi/tipp/reports.html

http://www.transport-pricing.net/CUPIDPDFS/DEL5.pdf

http://www.tiehallinto.fi/alk/english/

Extract from above document.

REVIEW OF EUROPE-WIDE PRICING ISSUES

In Appendix B the current situation regarding road pricing in the majority of European countries is described. The information is given for each country:

- Tax structure for private cars.
- Tax structure for goods vehicles.
- Previous examples of urban road pricing.
- Ongoing examples of urban road pricing.
- Future commitments to urban road pricing.
- Details of Relevant ongoing Projects.
- Current legal situation regarding urban road pricing.
- Institutional structure for road pricing.
- Other Key Documents.
- WWW links.
- Any upcoming events of relevance.
- Any other relevant issues

Sections 3.1 – 3.12 summarise the main taxes, current road pricing developments and legal / policy issues in 11 countries.

For the purposes of information and comparison, this section has been augmented to include a range of non-European experience. These summaries were prepared between 2001 and

2004 by local experts, sometimes from the CUPID or PRoGRESS consortia, but also from other organizations. Each of the summaries in Appendix B indicates the date of authorship. Key issues, such as details of local urban pricing schemes, have been updated in 2004, but whilst every attempt has been made to ensure that the information for each member state was accurate at the date upon which it was written, the changes in national legislation mean that some information will have been superseded.

20.6.1.1 Taxes

Initial vehicle taxation is the responsibility of the Customs.

Automobile tax - The tax is equal to the so called taxation value, which is the import price including toll, if relevant, minus 760 euros + some additional minor reductions. This means as an example that the vehicle tax for an ordinary passenger car is some 85 % of the import price.

Vehicle tax - The vehicle tax is 84 euros for vehicles registered prior to 1994, and 117 euros for vehicles registered in or after 1994. The vehicle tax taxation period is one calendar year.

Diesel tax - The diesel tax is determined based on the total vehicle mass (vehicle mass + capacity) and other technical specifications (vehicle type, axle structure, hitch facilities), which are or should have been noted in the vehicle registration. Examples of the tax are: passenger car 25,20 euro/ each 100 kg vehicle mass, vans correspondingly 4,56 and for other vehicles like lorries ranging from 4,56 to 10,56.

Fuel tax - There is a tax on all liquid fuels ranging from 46 to 54 eurocents for gasoline and 28 to 30 eurocents for diesel fuel.

VAT is 22 %

Taxes for HGVS - all goods vehicles are subject to diesel tax and may, depending on the actual fuel they use, be subject for fuel fee and surtax. All goods vehicles pay fuel tax.

20.6.1.2 Current Road Pricing Developments

In Finland urban road pricing has not been applied. Proposals for urban pricing have been made and alternatives studied and analysed with a few years intervals since the early 1990'ies for the whole Metropolitan Area of Helsinki or the Helsinki City Centre only. However, the proposals were doomed by many political parties, the media and motorist organisations and thus withdrawn. Since then the issue has been discussed more or less on an academic level only, as the lack of political acceptance has been very obvious.

The main goal of Helsinki being partner in PRoGRESS is to produce and disseminate knowledge on the issues and the effects of a potential pricing scheme in order to build up acceptance. Finland is also participating in the following projects relating to road pricing;

- *VIKING in the MIP / Domain 6*:- Euroregional project 2001-2006 supporting the development of interoperable Electronic Fee Collection.
- *CARDME* – European Discussion forum on interoperable in Electronic Fee Collection
- *CESARE 2* - EU-project aiming at a complete MoU including technical specification for interoperable motorway tolling in Europe.

20.6.1.3 Legal / Policy Issues

According to existing laws, no charges can be applied for the use of the road network. The Ministry of Finance has consequently stated, that any fee charged for the use of road infrastructure is to be considered as a tax. Currently, there is no institutional structure for road pricing. If road urban pricing were implemented, it is likely, that a special law for each pricing scheme would have to be in place.

21 Ireland

21.1 Inter-urban road transport

21.1.1 Measuring congestion

The "National Survey of Transport of Goods by Road" is carried out as part of an EU wide project, in accordance with Council Regulation (EC) 1172/98 on statistical returns in respect of the carriage of goods by road.

Data on all vehicles taxed as goods vehicles is made available by the Department of the Environment and Local Government for the survey. From this a basic survey register is constructed.

Information is collected regarding one week's transport activity for a random sample of goods vehicles. The sample is spread evenly over each week during the year. Each week a sample of vehicles is selected from the register and a questionnaire, seeking information on the vehicle and an account of the vehicle's activity during that week, is issued to the owner of the vehicle. For the purposes of sample selection vehicles are divided into 3 strata depending on their unladen weight. A random sample is taken within each of the three unladen weight strata. Different sampling rates are applied in each unladen weight stratum to maximise sampling accuracy for the overall sample. Steps are taken to ensure that the sample rates remain constant across the three vehicle age categories. The sampling rates remain constant throughout the years and accordingly, since newly registered goods vehicles are added to the register at regular intervals, the weekly sample size increases gradually.

Survey questionnaires are issued during the week prior to the survey week to which they refer. When necessary, reminders are issued 10 days and 20 days after the survey week.

Survey returns are processed on a quarterly basis and in each year the results obtained for each of the four quarters are combined to provide annual results. The same processing scheme is used for each quarter and this involves stringent checking of returns including comparisons with activity levels in previous quarters.

For the grossing up of survey returns to the level of the goods vehicle fleet as a whole, vehicles are classified into a total of 20 strata by subdividing the 3 strata used in sample selection via three additional criteria.

In each stratum the total number of vehicles on the register is first adjusted to take account of the estimated number of scrapped vehicles. The resultant total number of non-scrapped (i.e. active) vehicles is then divided by the number of non-scrapped vehicles in the sample to provide the stratum vehicle grossing factor.

The weekly activity measures (tonnes carried, tonne-kilometres done etc.) for each sample vehicle are multiplied by 13 to expand them to quarterly levels and then by the relevant vehicle grossing factor to obtain the quarterly estimate covering all active vehicles. The estimates for each quarter are then added together to provide the annual results.

The total fleet size for which estimated analyses are provided in the annual publication is the average of the number of active vehicles in each quarter. Thus the total of vehicles analysed does not relate to the actual goods vehicle fleet at any particular time during the survey year but to the average fleet size during the year. Similarly the fleet classifications provided refer to the average position during the year.

Estimation of survey results from data relating to only one week's activity for a sample of vehicles introduces a statistical variability which would not be present if a full year's data had been collected for every vehicle. This means that the survey results cannot be taken as accurate to the full degree shown in the annual publications.

The variability is expressed by means of the coefficient of variation. This coefficient gives the relative size of the "sampling error" (variability) present in an estimate compared with the estimate itself. In general, estimates can be said to have a relative precision of twice their coefficient of variation.

In general, the more detailed the classification provided the greater the coefficient of variation of the estimates. In deriving the results it is always assumed that non-respondents had similar characteristics and activity levels to those of respondents in the same stratification cell. This assumption, which is a standard one in surveys such as this, could result in some slight bias being introduced into the results. Moreover, although every effort is made to ensure that the returns received are correct in all respects it is inevitable that some minor non-sampling errors will remain undetected.

In 2003, the DTO initiated regular monitoring on various elements of road users experience. The work in 2003 included surveys and collation of data on travel mode share, journey time, traffic volumes, and facilities for pedestrians and cyclists. The objective of the monitoring exercise is to compare performance against objectives set out in the DTO Strategy A Platform for Change 2000 - 2016, and to aid local authorities and other agencies in identifying areas where the strategy is making progress and areas where improvements are required.

Traffic counters provide information on the volume of traffic by hour of day and vehicle class, i.e., motorcycle, car, goods vehicles distinguished by number of axles etc. with up to twelve vehicle classes being identified.

Data collected from the automatic traffic counters, supplemented by a visual traffic census undertaken by local authorities, form the basis of the annual National Roads and Traffic Flow reports published by the Authority. These reports provide an estimate of annual average daily traffic volumes for every section of the national road network.

For buses, the methodology that is used is as follows: data is collected annually on: the journey times of buses and cars within strategically selected sections of each QBC, the pattern of bus flows along each QBC, passenger waiting times, bus usage, modal split for city-bound trips, bus priorities/traffic management schemes, passenger waiting facilities, passenger information, the quality and accessibility of buses, and passenger satisfaction levels. In 2003, reports were produced for the following QBCs: Blanchardstown, Finglas, Lucan, Malahide, North Clondalkin, Rathfarnham, Stillorgan, Swords and Tallaght. Additionally surveys were undertaken on two other corridors on a pre QBC basis and reports produced: The Service 7 corridor from Sallynoggin to City Centre via Dun Laoghaire, Blackrock, Rock Road & Merrion

Road and the service 77 corridor from Tallaght to City Centre via Greenhills Road & Crumlin Road.

21.1.2 Current situation

An NRA report found the following with regard to current congestion in Ireland/Dublin. NRA traffic counter data, and supplemental DTO and Dublin City Council traffic survey results indicate:

□ Traffic flows on national radial roads increased substantially between 2003 and 2004, with increases averaging 8.6% over the year. An increase in traffic flows of 8.3% on the M50 was recorded.

□ Significant increases in traffic flows on national radial roads outside the M50, and on the M50 were experienced before 07:00hrs, indicating a wider morning peak period.

□ A relatively flat profile of traffic flows at a sample of M50 crossing points during the morning period (07:00 to 10:00hrs), with the maximum flow across the cordon points occurring between 07:00 and 07:30hrs. This peak occurred in the 07:30 to 08:00hrs time period on the same roads in 2003. Inbound morning peak general traffic flows (07:00-10:00hrs) on the sample of M50 crossing points decreased by 0.8%. These two findings indicate that the sample of M50 crossing points surveyed are operating at, or above their optimal capacity during the 3-hour morning peak period, and a spread in morning peak period traffic flows to before 07:00hrs.

□ An extremely flat profile of traffic flows across the city centre Canal cordon during the morning period (07:00 to 10:00hrs), with the maximum cordon flow occurring between 08:30 and 09:00hrs. In total, 69,071 vehicles crossed the cordon over the 3-hour survey period, representing a fall of 1.1% on November 2003 flows and a fall of 5.3% on November 2002 flows. This extremely flat profile of traffic flows, coupled with the slight fall in flows over the year would tend to indicate that Canal cordon crossing points are operating at, or above their optimal capacity during the morning peak period.

□ A peaked profile of cyclist and pedestrian flows across the city centre Canal cordon. Peak flows for both modes across the Canal cordon occurs between 08:30 and 09:00hrs. Cycle flows and pedestrian flows across the Canal cordon have fallen significantly between 2003 and 2004. Cycle flows were down 15.7% and pedestrian flows are down 11.2%. The corresponding falls between 2002 and 2004 were 17.3% for cyclists and 9.7% for pedestrians. Cycle movements within the city centre were down 21.4% between 2003 and 2004.

Average journey speeds, as measured by the DTO in 2003 and 2004 fell considerably over the year. A reduction in average speeds over the year was most pronounced in the A.M. Peak, where a 12% fall was recorded. Average journey speeds fell by 1% and 3% Journey times also seem to have become significantly more variable over the year, in particular in the A.M. and Off-peak time periods.

The tables and figures below summarise the current situation:

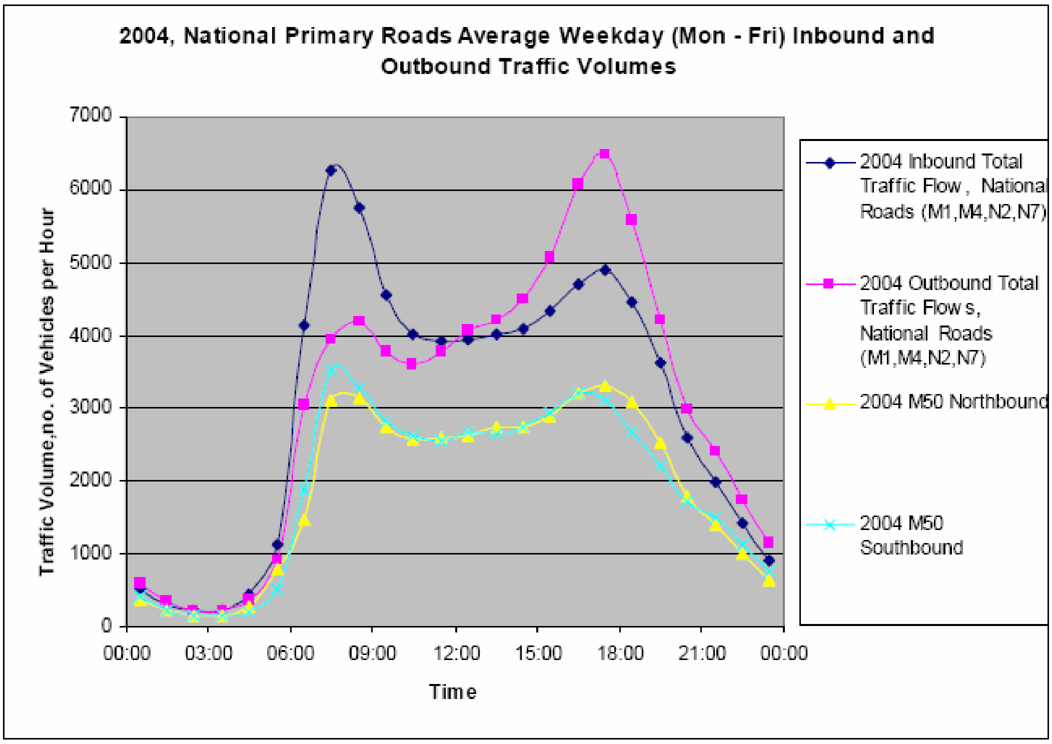


Figure 21-1

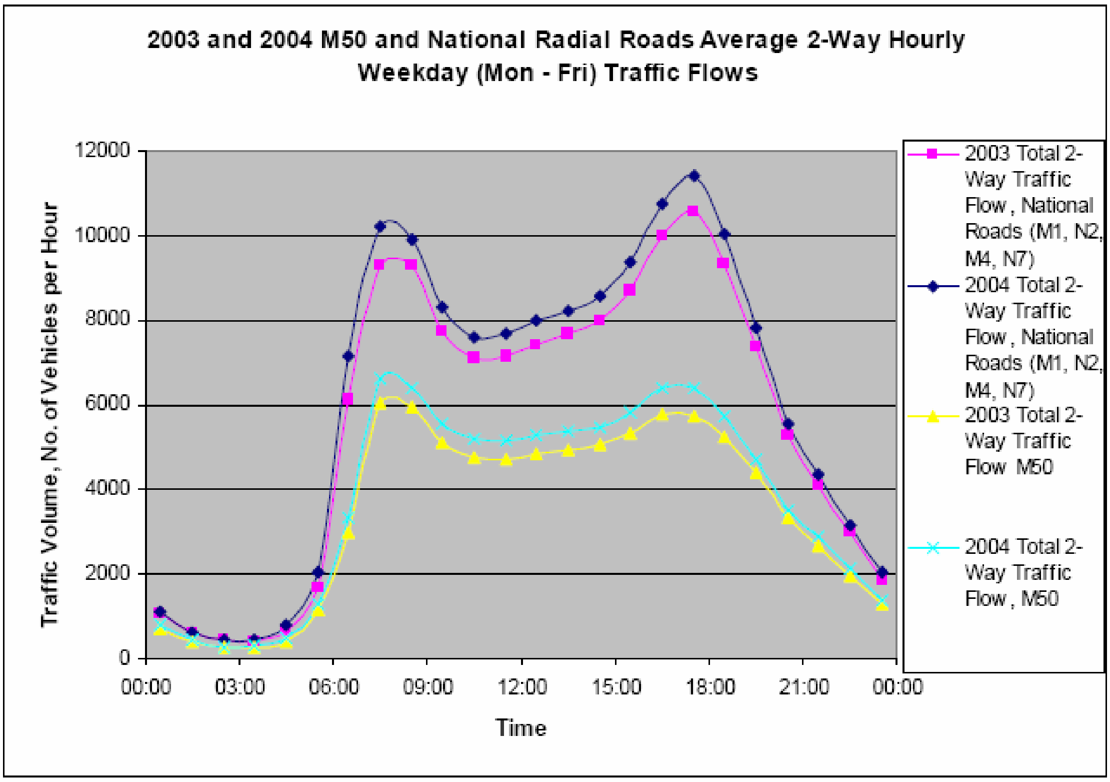


Figure 21-2

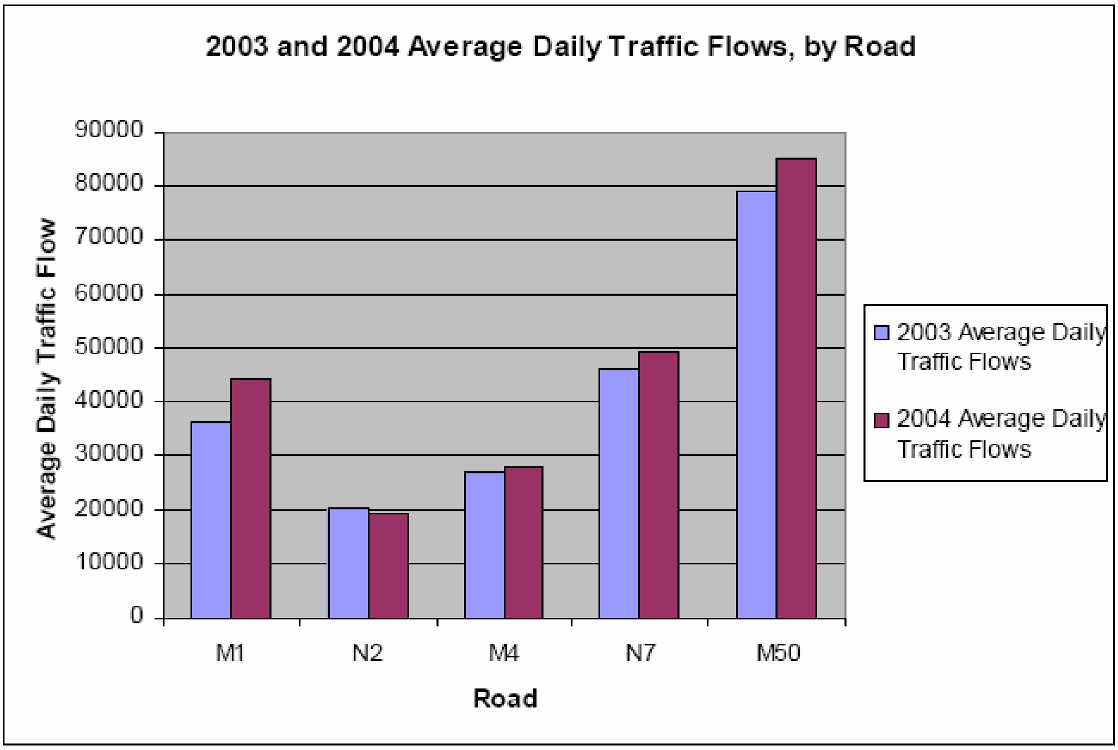


Figure 21-3

Table 21-1

Year	Tonne-Kilometres	Tonnes Carried	Vehicle Kilometres	Average Number of Vehicles
	million	*thousand*	*million*	
1993	5,095	80,761	807	30,669
1994	5,258	84,587	826	32,669
1995	5,493	85,317	974	36,107
1996	6,316	88,322	1,175	40,255
1997	6,998	103,836	1,208	45,256
1998	8,203	142,911	1,344	51,037
1999	10,275	163,972	1,452	58,388
2000	12,348	194,135	1,657	68,278
2001	12,405	203,849	1,668	76,875
2002	14,448	230,591	1,973	78,753
2003	15,898	259,465	2,124	81,024

21.1.3 Forecasts

The graph below shows a forecast of HGV and LGV traffic on roads in the Irish Republic by the National Roads Authority.

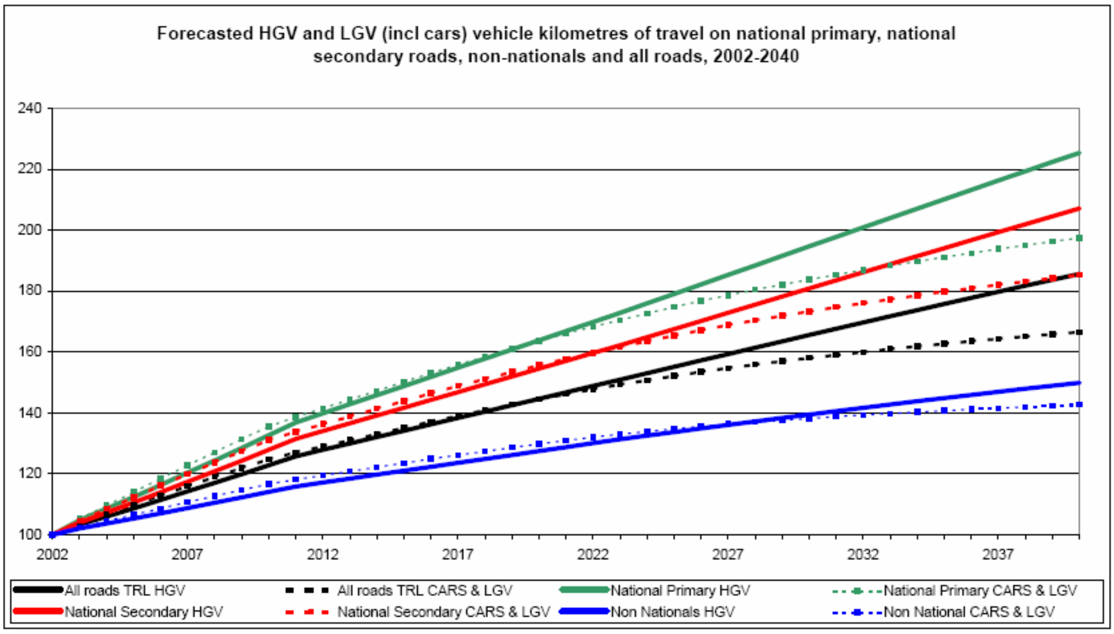


Figure 21-4

More detailed forecasts are given below:

Table 21-2

	All roads TRL HGV	All roads TRL CARS & LGV	National primary HGV	National primary CARS & LGV	National secondary HGV	National secondary CARS & LGV	Non-nationals HGV	Non-nation-als CARS & LGV
2002	100	100	100	100	100	100	100	100
2005	109	110	112	114	111	112	105	107
2010	123	125	133	136	128	131	114	117
2015	134	135	149	150	142	144	121	124
2020	145	144	164	164	155	156	127	130
2025	155	152	179	175	168	165	134	135
2030	166	158	195	184	181	173	139	138
2035	176	163	210	191	194	180	145	141
2040	186	167	225	197	207	185	150	143

Table 21-3

Table 2.2 Future Growth in Morning Peak Hour (8am-9am) Trip Origins

	2001		2008		2016	
	Car	Public Transport	Car	Public Transport	Car	Public Transport
City Centre						
Peak hour person trips	26,216	14,900	28,961	15,113	26,703	21,171
Mode share	64%	36%	66%	34%	56%	44%
% Increase from 2001			10%	1%	2%	42%
Between canals and M50						
Peak hour trips	113,417	69,002	123,898	73,868	121,091	96,396
Mode share	62%	38%	63%	37%	56%	44%
% Increase from 2001			9%	7%	7%	40%
Outside M50						
Peak hour trips	138,563	31,513	167,053	45,074	178,498	87,714
Mode share	81%	19%	79%	21%	67%	33%
% Increase from 2001			21%	43%	29%	178%
Total						
	278,196	115,415	319,912	134,053	326,292	205,282
Mode share	71%	29%	70%	30%	61%	39%
% Increase from 2001			15%	16%	17%	78%

Table 21-4

Table 2.3 Future Growth in Travel Demand and Changes in Journey Speed[7]

	2001			2008			2016		
	Vehicle hours	Vehicle km	Speed kph	Vehicle hours	Vehicle km	Speed kph	Vehicle hours	Vehicle km	Speed kph
City Centre									
8am-9am	11,261	135,194	12.0	17,607	179,437	10.2	14,125	157,844	11.2
% Increase from 2001				56%	33%	-15%	25%	17%	-7%
Between Canals and M50									
8am-9am	38,183	758,129	19.9	64,281	1,151,621	17.9	83,313	1,590,362	19.1
% Increase from 2001				68%	52%	-10%	118%	110%	-4%
Outside M50									
8am-9am	96,999	3,435,598	35.4	166,203	5,222,109	31.4	215,710	6,472,338	30.0
% Increase from 2001				71%	52%	-11%	122%	88%	-15%
Total									
8am-9am	146,443	4,328,922	29.6	248,091	6,553,167	26.4	299,022	8,062,699	27.0
% Increase from 2001				69%	51%	-11%	104%	86%	-9%

21.1.4 Policy plans

Sustainable Transport Policies identifies the challenge as bring CO2under control whilst minimising negative economic and quality of life impacts. The Department identifies 'Sustainability' as a key objective in Statement of Strategy. The major programme is Transport 21. The two key outputs are:

- Sustainable development considerations mainstreamed into transport policy

- Targeted policies to reduce the level of greenhouse gas emissions from transport in a sustainable way

On the supply side, Government will:

- Total capital funding is over €34 billion over the next 10 years
- About €9.4 million per day being invested in Irish transport for the next ten years
- Major rebalancing of investment in favour of public transport
- About €16 billion of the total funding
- Expand capacities of bus and metro capacities and improved commuter links into and out of Dublin.

On the demand side:

Get the most out of the network, e.g.–Expansion of QBC network in cities under Transport 21 –Transport 21 will support the further development of Park and Ride facilities, with a particular focus on rail-based public transport

Support EU Voluntary Agreements between government and industry–Target to reduce CO2emissions to 140g/km by 2008/2009–Considering the reduction of CO2emissions to 120g/km by 2012

The main policies are contained in the document entitled "A Platform for Change". In the background, the document notes that total peak hour trips have grown by 78,000 or 45% between 1991 and 1997. However, the bulk of that growth has been accounted for by private car commuting (+71,000). In 1991 the private car accounted for 64% of peak hour trips; by 1997 that had increased to 72%. The average journey time by car increased from 31 minutes in 1991 to 43 minutes in 1997, reflecting greater congestion and longer journeys.

In the vision statement of the following objectives (inter-alia) are set out, under the "Quality of Life" heading:

- Reducing travel times and congestion;
- Ameliorating the direct environmental effects of transport – noise severance, air pollution and greenhouse gas emissions;
- Promoting cycling and walking as safe, sustainable and healthy means of transport;
- Improving transport safety.

During the course of the update, the Steering Committee set two additional quantitative objectives:

- reduce the level of congestion on the road network to 1991 levels, when the average speed in the morning peak hour was 22kph;
- to provide adequate capacity for all journeys to work and education, which make up the vast majority of trips in the morning peak hour.

The DTO Strategy is an integrated one. It will only be effective when both elements are implemented together in a coherent way. Going ahead with the infrastructure element alone will not be enough. It must be accompanied by the demand management element and the complementary policies if the Strategy is to achieve its overall objectives.

The Strategy also briefly describes the principal components of the integrated transportation strategy. It includes:

- an integrated public transport network which provides for a radical transformation in the quality and quantity of services provided;
- strategic, but limited, improvements to the road network which will be managed in a way which does not encourage peak hour car commuting;
- traffic management policies which will optimise the use of the road network for all users, including car drivers and passengers, public transport passengers, cyclists and pedestrians;
- a freight management policy designed to provide the basis for a detailed strategy to facilitate the movement of goods and improve freight access to ports and airports;
- good quality cycling and pedestrian networks;
- a statement of policy on demand management which will provide the basis for the development of a detailed demand management strategy;
- guidance on complementary land use policies.

The DTO Strategy is integrated across the various modes of transport. There will be numerous interchange stations on the METRO, DART/Suburban Rail, LUAS and bus networks, particularly in the city centre. There will be bus feeders to rail-based public transport. It will be possible to make almost all journeys on the public transport networks with just one interchange. All public transport networks will be fully accessible by people with mobility impairments and disabilities. A series of public transport nodes will be developed in the city centre and in the northern, western and southern suburbs. Real time travel information and public transport information services by telephone and on the internet will be introduced.

Park and Ride will integrate the car with public transport. There will be Park and Ride facilities for commuters at strategic locations where the national road network meets the public transport networks. All proposed Park and Ride sites will be assessed to ensure that cars accessing them do not unduly add to congestion.

Cycle parking facilities will be provided at all Park and Ride sites, DART/suburban rail and METRO station, and at LUAS and bus stops where appropriate.

The development of the national road network in the Greater Dublin Area meets national economic policy objectives and, accordingly, a number of national road projects are included in the DTO Strategy. The projects fall into two general categories. The first is the upgrading and completion of the orbital motorway around Dublin (M50, the Dublin Port Tunnel and Eastern By-Pass). The second comprises upgrading the arterial national routes outside the orbital motorway. The Strategy includes a number of non–national road projects that have a strategic influence (as distinct from local impacts). The main criteria for inclusion are that the project should:

- provide for proper management of access to the M50 and/or national arterial routes;
- complement the Strategic Planning Guidelines;
- serve critical economic development needs in the Metropolitan Area or in the development centres identified in the Strategic Planning Guidelines;
- provide other environmental or safety benefits;
- increase capacity for public transport.

21.1.4.1 Traffic management

The primary objective of traffic management is to optimise the use of road space for all users. Traffic management will be particularly important in the short term, before the high-capacity rail-based public transport schemes are completed. In 2006, there will be an additional 60,000 public transport users in the peak hour, most of them travelling by bus. This alone will require the traffic management system to provide additional bus priority as well as catering for the extra 120,000 pedestrian trips (ie 60,000 at each end of the public transport journeys). There will be a Regional Traffic Management Strategy, which will include:

- the definition of a hierarchy of roads in the network, setting out the purposes and objectives for each level in the hierarchy;
- a monitoring system, to measure how well the highway network is meeting its objectives;
- a control system, enabling adjustment of the network;
- a series of firm proposals comprising a traffic management policy.

The second, interdependent element of the Strategy is demand management, which seeks to reduce the growth in the demand for travel while maintaining economic progress, and which is designed to encourage a transfer of trips to sustainable modes. The Strategic Planning Guidelines state that the success of the land use strategy for the Greater Dublin Area is contingent on the introduction of effective demand management measures, since physical planning policies and measures can only partially reduce demand for travel. Analysis by the DTO shows that the introduction of the infrastructure and service improvements element of the Strategy alone will not achieve the overall objectives. A demand management strategy is therefore a critical element of this Strategy. A comprehensive Demand Management Study is necessary to develop the strategy. The goals of the demand management strategy will include the following:

- To reduce the growth in demand for travel by motorised modes;
- To reduce the number of peak hour car trips from 250,000 to 180,000 (ie by 28%) in 2016;
- To reduce the level of congestion on the road network to 1991 levels, when the average speed in the morning peak hour was 22kph.

The following mechanisms exist in other countries and cities to manage travel demand, and are among those that will be examined during the Demand Management Study:

- Land Use Policies
- Economic/Fiscal Instruments
- Parking control
- Mobility Management
- Information Technology measures
- Reorganisation of work

Each demand management mechanism will generate different types and levels of behavioral reaction. Travellers may:

- Retime journeys to travel outside busy periods;
- Transfer to a mode with sufficient capacity to ensure arrival at the preferred time;
- Change trip origin or destination (more likely over the longer term);
- Link trips to other trips that they wish to make to avoid travelling twice;
- Share a private vehicle with others for some or all of the trip;
- Decide to forego the trip entirely.

21.2 Bus

Buses are the most flexible form of public transport. The Bus is, consequently, the most extensive form of public transport in the Strategy in terms of route length and geographic coverage. There will be a tight mesh of radial and orbital routes linking the suburbs with each other and with the city centre. The network will comprise Quality Bus Corridors and extensive bus priority measures on other parts of the network.

21.3 Rail transport

21.3.1 Measuring congestion

The Rail Statistics survey is conducted in accordance with the following EU Legislation;

Regulation (EC) No. 91/2003 the European Parliament and of the Council of 16 December 2002 on rail transport statistics and Commission Regulation (EC) No. 1192/2003 of 3 July 2003 amending Regulation (EC) No. 91/2003 of the European Parliament and of the Council on rail transport statistics.

There are nine annexes to Regulation (EC) No. 91/2003 and each annex describes one or more datasets to be provided to Eurostat. Seven of these nine annexes apply to Irish Rail. There are different reference periods for each dataset but most are either quarterly or annual. The survey covers Irish Rail, the only railway undertaking operating within the Republic of Ireland.

21.3.2 Policy plans

The public transport elements of the Transport Strategy will provide for approximately 300,000 trips in the morning peak hour in 2016, compared with about 70,000 today. To achieve this it will be necessary to create an integrated public transport network comprising the following principal components:

- an improved DART/Suburban rail network including improved passenger carrying capacity on the existing network and the development of more tracks on existing alignments, an interconnector between Heuston Station and East Wall and other new rail lines;
- an extension of the on-street light rail network (LUAS);
- the development of a higher capacity segregated light rail network (METRO);
- a much expanded bus network, comprising an integrated mesh of radial and orbital services and a substantial increase in passenger carrying capacity;
- a package of measures designed to improve the integration and attractiveness of the public transport network, including park and ride facilities, integrated fares and ticketing, quality interchange facilities and improved passenger information.

21.3.2.1 DART/Suburban Rail

Heavy rail systems, such as DART and Arrow, have high potential capacities but are very expensive to build. DART is now experiencing capacity problems during peak hours especially in the city centre. There is a severe bottleneck on the suburban rail services on the northern and Maynooth lines approaching Connolly Station. The Arrow service from Kildare terminates at Heuston Station, which is more than 2km from the city centre. The DART/suburban rail strategy is designed to make the maximum use of existing rail lines, in particular by eliminating the capacity constraints in the existing system. This requires:

- upgraded signalling on the Dundalk, Maynooth and Kildare lines to allow a substantial increase in the number of peak hour trains;
- lengthening of platforms to allow the operation of 8-car DART and Arrow trains;
- new platforms in Connolly Station;
- the removal of or restrictions on the use of level crossings on the DART and suburban rail lines;
- the segregation of intercity services from suburban services on the Dundalk and Kildare lines. This requires three- or four-tracking from Connolly Station to north of Howth Junction and four-tracking from Cherry Orchard to Sallins.

21.3.2.2 LUAS (on-street light rail)

The LUAS system is appropriate in corridors where passenger numbers are too high to be accommodated on bus but not high enough to justify the expense of DART/Suburban Rail or METRO. The LUAS system in this Strategy is founded on LUAS lines that are already under construction. LUAS Line A (Tallaght to Abbey Street) is under construction. Line B (Sandyford Industrial Estate to St Stephen's Green) is under construction as a LUAS line but will be upgraded to METRO later (see under METRO). LUAS Line C (Abbey Street to Connolly Station) is under construction and will be extended to Docklands.

21.3.2.3 METRO

METRO is a light rail system that is similar to LUAS except that it is completely segregated throughout its entire length (that is, it has no on-street sections). This means that it can have long trains, operating at higher speeds and higher frequency and therefore has the potential to provide very high passenger capacity. Tunnels are needed to maintain segregation in densely developed areas. The METRO system will have a spine from Swords to Shanganagh. This line will run via Dublin Airport, Finglas, Broadstone, the city centre, Ranelagh, Sandyford and Cherrywood. The section between Broadstone and Ranelagh will be in tunnel and will interchange with DART at Tara Street Station. Construction of this line will entail the upgrading of LUAS Line B to METRO between the Sandyford Industrial Estate and Ranelagh.

Integrated fares and ticketing will be introduced. This will allow all public transport users to complete a full journey with only one ticket, even if the journey involves more than one bus and/or LUAS and/or DART/suburban rail and /or METRO trip.

21.4 Waterborne transport

21.4.1 Measuring congestion

The Maritime survey is conducted in accordance with the following EU Legislation; Council Directive (95/64/EC) of 8 December 1995, Commission Decision (98/385/EC) of 13 May 1998, Commission Decision (2000/363/EC) of 28 April 2000, Commission Decision (2001/423/EC) of 22 May 2001 and with the following National Legislation; Statutory Instrument No. 501 - Regulations entitled European Communities (Statistics in respect of Carriage of Goods and Passengers by Sea) Regulations, 2001.

The survey covers 21 Irish ports. These same ports provide data to the CSO for every reference year. Data collected is transmitted to Eurostat and also published in the CSO annual Statistics of Port Traffic release.

Different data reporting requirements apply to the different ports depending on the volume of goods and number of passengers handled by them. Two thresholds are specified in the Directive, one each for volume of goods and number of passengers. The threshold for passengers is 200,000 passenger movements annually. The threshold for goods is 1,000,000 tonnes of goods annually. Ports which are over one threshold or the other or both send data electronically to the CSO via the CSO secure deposit box facility. The smaller ports provide data to the CSO on a survey form.

The tables for the Statistics of Port Traffic release are prepared from the Directive datasets sent by the larger ports and the data from the survey forms sent by the smaller ports. A spreadsheet system on Microsoft Excel is used to prepare the tables. Before the release is published each port is given the opportunity to check the aggregates calculated for it to ensure that the totals match their own records and to check out any major increases or decreases on the previous years figures.

21.4.2 Current situation

The table below has statistics on port traffic in 2004.

Table 21-5: Statistics on port traffin in 2004

		'000 tonnes
Category of Goods	**2003**	**2004**
Roll-on/Roll-off	9,857	10,570
Lift-on/Lift-off	6,574	7,022
Liquid Bulk	12,966	13,315
Dry Bulk	15,024	14,828
Break Bulk & Other Goods	1,743	1,984
Total	46,165	47,720

Irish ports handled 47.7m tonnes of goods in 2004 compared with 46.2m tonnes in 2003 - an increase of 1.6m tonnes (+3.4%). Goods received increased by 4.4% in comparison with 2003, while goods forwarded increased by 0.7%. Break bulk & other goods traffic increased by 13.8% in the year, roll-on/roll-off traffic by 7.2%, lift-on/lift-off traffic by 6.8% and liquid bulk traffic by 2.7%, while dry bulk traffic fell by 1.3%.

The annual analysis also shows that:

- The number of vessels arriving in 2004 was 16,323 compared with 17,183 in 2003 – a decrease of 5%.
- Imports accounted for 73% of the total goods handled while exports accounted for 27%.
- Of the total goods handled, dry bulk accounted for 31.1%, liquid bulk 27.9%, roll-on/roll-off 22.1%, lift-on/lift-off 14.7% and break bulk 4.2%.

21.5 Aviation

21.5.1 Measuring congestion

The Aviation Statistics survey is conducted in accordance with the EU Legislation: Regulation (EC) No. 437/2003 the European Parliament and of the Council of 27 February 2003 on statistical returns in respect of the carriage of passengers freight and mail by air and Commission Regulation (EC) No. 1358/2003 of 31 July 2003. The following National Legislation also applies: European Communities (Statistics in respect of Carriage of Passengers, Freight and Mail by Air) Regulations 2003.

The survey covers 11 Irish airports. These same airports provide data to the CSO for every reference year. Data collected is transmitted to Eurostat.

Council Regulation 437/2003 specifies 3 different monthly and annual datasets that must be provided to Eurostat. Different data reporting requirements apply to the different airports. 4 categories of airport are defined in Regulation 1358/2003 based on the number of passenger units handled. The reporting requirements for an airport are determined by which category it falls into.

All-freight and mail air service: Scheduled or non-scheduled air service performed by aircraft carrying revenue loads other than revenue passengers, i.e. freight and mail.

Airline (Commercial air transport operator): An air transport undertaking with a valid operating license for operating commercial air flights.

21.5.2 Current situation

Key air traffic statistics for the 2004 were as follows:

- En route overflights (i.e. all aircraft using Irish controlled airspace whether landing in Ireland or en route elsewhere) rose by 3.7 per cent to 263,000 movements
- Terminal commercial traffic (i.e. traffic landing at the three State airports) fell by 0.9 per cent to 226,000 movements
- North Atlantic airspace communications traffic rose by 5.4 per cent to 351,000 movements. (The IAA radio station at Ballygirreen, Co. Clare provides the vital radio link between air traffic controllers and pilots over the eastern half of the North Atlantic.)

Table 5a Passenger Throughput at State Airports (million persons)

	2001	2002	2003	2004
Dublin	14.33	15.08	15.86	17.13
Shannon	2.40	2.35	2.40	2.39
Cork	1.78	1.87	2.18	2.25

21.6 Dublin urban road transport

21.6.1 Background

The Final Report of the Dublin Transportation Initiative (DTI) was published in August 1995. It recommended an integrated transportation strategy for the Greater Dublin Area for the period up to 2011. The Government decided that the DTI Strategy should provide the planning framework for the future development of the transport network in the Greater Dublin Area.

Amongst others, the Committee follows the objective to reduce the level of congestion on the road network to 1991 levels, when the average speed in the morning peak hour was 22kph;

21.6.2 Current situation

There has been an unprecedented level of economic growth since the DTI Strategy was published in 1995. This has led to very large increases in the levels of traffic, resulting in much greater congestion. The average journey time by car increased from 31 minutes in 1991 to 43 minutes in 1997, reflecting greater congestion and longer journeys.

21.6.3 Forecasts

According to the Dublin Transportation Initiative, by 2016, total peak hour trips are forecast to be 488,000, a 95% increase on the 1997 level. Total trips in the off-peak hour in 2016 will be 256,000. That is six thousand trips more than there were in the peak hour in 1997.

21.6.4 Policy plans

The technical work showed that, even with a comprehensive, high quality, high capacity public transport network, congestion on roads would be even worse than today. This is because many commuters would still prefer to use private cars.

21.7 Dublin urban public transport

21.7.1 Background

The Dublin Transportation Office (DTO) assumed responsibility for Quality Bus Corridor (QBC) monitoring in November 2002. To date, monitoring has been carried out in November 2002, November 2003 and November 2004. The undertaking of monitoring on an annual basis measures QBC performance both at a point in time, and over time.

The further development of an expanded Quality Bus Network is a key element of the DTO transport strategy as outlined in A Platform for Change. Monitoring the performance of the Quality Bus Corridors in operation helps to measure the efficiency and effectiveness of the bus mode in the delivery of the transport objectives set out in the strategy.

21.7.2 Methodology

12 QBCs were monitored over a 4 week period in November 2004. Traffic Cordon Counts were undertaken by Dublin City Council measuring the volume of citybound traffic and persons in the morning peak period with a view to reporting on modal share. This data included the counting of all bus passengers. The Railway Procurement Agency undertook an all day passenger count on Luas which included measuring the volume of citybound passengers during the morning peak period.

Data from the surveys was used to report on passenger wait times in the morning peak and off peak periods, and the age and quality of buses operating on each QBC. An infrastructure audit including the use of GPS tracked video footage was used to report on QBC attributes including the levels of bus priority, passenger waiting facilities and passenger information. Passenger satisfaction levels were recorded for each QBC using the data from a survey carried out by Dublin Bus in 2002.

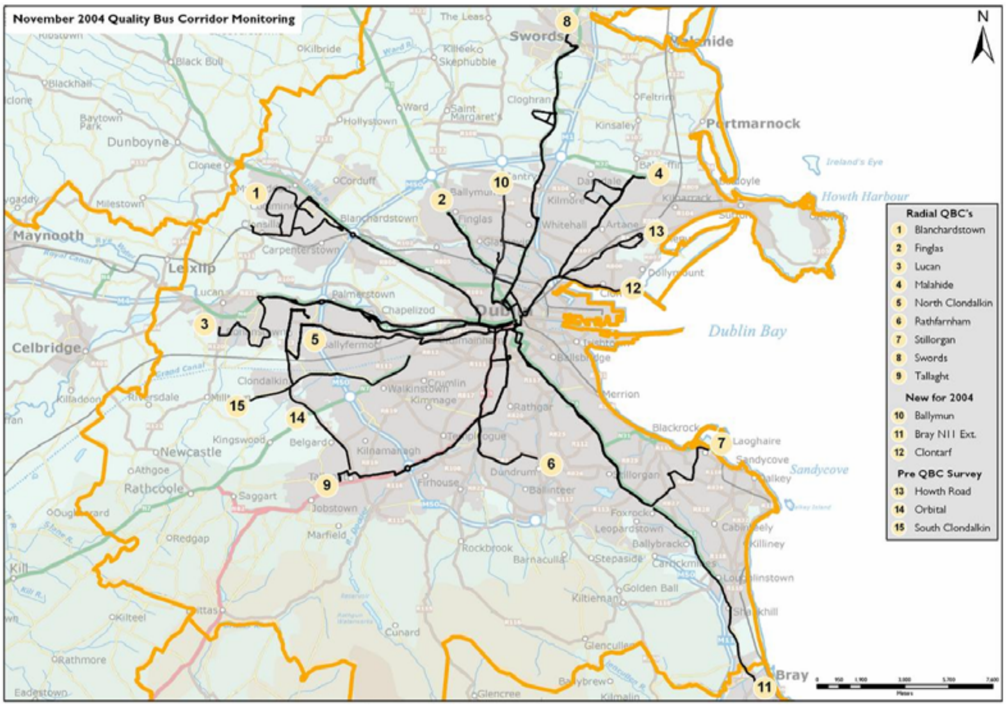


Figure 21-5: Quality bus corridors monitored by the Dublin Transportation Office 2004

Key results – current situation

The findings are reported by a high level of detail for each section of the 12 Quality Bus Corridors monitored giving actual averag speeds for cars, all busses and dedicated "quality buses" by detailed tables and graphs. An example of the results is given by Figure 21-6

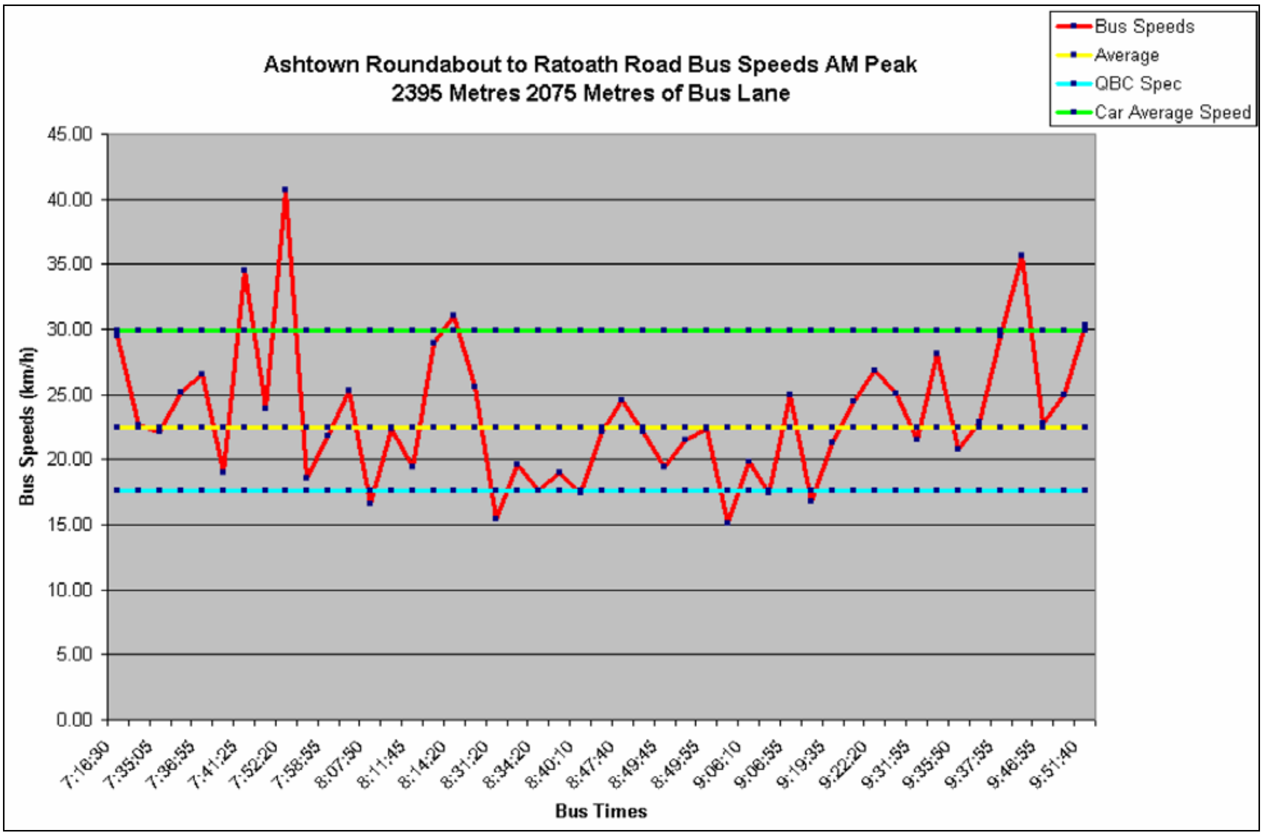


Figure 21-6: Example monitoring results: Blanchardstown QBC

The study reports the following selected findings:

- Bus average journey times in the morning peak were less than the corresponding car average journey times in 9 out of the 12 QBCs monitored, with significant (greater than 10%) variations in 7 QBCs.
- Bus average journey times in the morning peak have reduced in 5 of the 9 QBCs that were monitored both in 2003 and 2004.
- Bus mode share at the canal cordon crossing points between 0700 and 1000 has declined from 52.44% in November 2003 to 51.93%.

All over the congestion situation is found to slightly increase for the Quality Bus Corridors which takes affect on the system's market share.

22 Lithuania

22.1 Contacted Entities

The information on the situation of congestion in Lithuania was sought through key contacts from the following institutions:

- Road: Ministry of Transport and Communications – Road Department http://www.transp.lt/Default.aspx?Element=IManagerData&TopicID=27&DL=E&UL
- Railway: Ministry of Transport and Communications – Railway Department http://www.transp.lt/Default.aspx?Element=IManagerData&TopicID=26&DL=E&UL
- Ports: Ministry of Transport and Communications – Water Transport Department http://www.transp.lt/Default.aspx?Element=IManagerData&TopicID=29&DL=E&UL
- Airports: Civil Aviation Administration (http://www.caa.lt/en.php. Relevant information in the Ministry of Transport and Communications site, http://www.transp.lt/Default.aspx?Element=IManagerData&TopicID=143&DL.

Answers to the questionnaire were received from the road, rail and aviation sectors.

22.2 Overview

Given its small size (3,60 million inhabitants), Lithuania has a lower tendency for congestion problems when compared with average size countries of the EU context. This is confirmed by the information obtained from the key contacts from the road and aviation sectors. Such problems may however arise in the near future due to the development of the economy.

22.3 Roads

22.3.1 Overview

According to their capacity, social and economical significance, the roads in Lithuania are divided into: national, local and urban. The total length of the road network is equal to 79.000 km. From that number, the national roads have a total length of 21.279 km, of which:

- Trunk roads (with improved pavement): 1.750 km, of which 309 km of and 1.511 km of "E" roads;
- National roads: 4.945 km, of which 4.849 with improved pavement;
- Regional roads: 14.584 km, of which 6.084 km with improved pavement.

The national road network has a density of 326,9 km per 1000 sq. km.

The current strategic plans for the road sector are aimed at the reconstruction and upgrade of the existing roads and railway lines engaged in international carriages in accordance with the development principles of the international transport corridors.

Figure 22-1: Lithuanian main road network.

22.3.2 Measuring traffic conditions

Assessment of traffic conditions is carried out by automatic counting posts, manual traffic counts, inquiries and video cameras. These data are used for investment plans, road maintenance, development of road safety measures, etc. Traffic data (AADT) are stored in Lithuanian Road Data Bank. On main roads traffic data are renewed every year.

22.3.3 Current situation

Mainly congestion is defined as transcendence of AADT over standard limit for particular road category. In addition to it, congestion is defined as speed decrease and travel time increase. Congestion was not a severe problem on Lithuanian inter-urban roads so far. Most of Lithuanian state road network is congestion free. There are temporary problems (in summer) in the west of the country near the Baltic Sea resorts on road A13 Klaipeda – Liepoja and on intersection of this road with road A1 Vilnius – Kaunas – Klaipeda. There are congestion problems near the capital Vilnius in few sites and an economic impact study of Vilnius southern bypass was prepared.

22.3.4 Forecasts of congestion

The risk of congestion is evaluated by predicting traffic growth and comparising it with present road capacity.

22.3.5 Policy plans

The main tool for fighting with congestion in Lithuania is investment in new capacity of roads. National plans are synchronized with the EC transport policy. There are no national programs for fighting with congestion.

22.4 Railways

22.4.1 Overview

The length of railway lines in Lithuania totals 1.775,3 km including 1.520 mm track (1.753,5 km) and 1.435 mm track (21,8 km). The 1.520 mm track railways extend to the Baltic States and the Russian Federation, while the 1.435 mm track railways connect Lithuania with Poland and, through the latter, with West European countries. The geographical position of Lithuania has determined that the country is crossed by two European transport corridors:

- North-South direction Corridor I: Tallinn-Riga-Kaunas-Warsaw with its branch IA Siauliai-Kaliningrad-Gdansk;
- And the branches IXB Kiev-Minsk-Vilnius-Kaunas-Klaipėda and IXD Kaunas-Kaliningrad of the East-West direction Corridor IX.

The technical level of the Lithuanian rail sector infrastructure is still below the European standard. Therefore, the modernization and development of the Lithuanian railway sector infrastructure is a basic condition of its successful integration into the European railway system. Priority is given to the renovation and modernization of the railway sector infrastructure on the international transport corridors.

Figure 22-2: Lithuanian railway network

22.4.2 Measuring traffic conditions

Railway traffic is being performed duly according to the timetable.

Occasional traffic congestions are recorded using delay records. These data are accumulated, processed and provided to officials concerned.

22.4.3 Current situation

As there is no traffic congestion in railway transport sector, an official definition of congestion has not been made.

The main reasons of occasional congestion are serious accident or incidents in railway transport, natural disasters or maintenance of railway infrastructure. To avoid the negative effect of the mentioned possible factors, the timetable is adjusted accordingly for the needed period of time.

22.4.4 Forecasts of traffic conditions

Investments in modernization of public railway infrastructure are being carried out. Therefore is it expected that no occasional traffic congestion will appear.

22.4.5 Policy plans

Legal entities responsible for railway traffic control have elaborated programmes of actions in the case of congestion.

22.5 Ports

The port sector in Lithuania is mainly concentrated on the Klaipėda Port, which is a big transport hub connecting sea, land, and rail routes from East and West. The shortest distances connect the port with the most important industrial regions of the Eastern countries (Russia, Belarus, the Ukraine, etc). The main shipping lines to the ports of the Western Europe, South-Eastern Asia, and America pass via Klaipėda port.

The recent modernisation of the Klaipėda State Seaport infrastructure involved quay reconstruction and port dredging works as well as the reconstruction and development of the access railway and roads are being carried out in Klaipėda State Seaport. A port information systems development programme was carried out during the reporting period.

There are 902,3 kilometres of inland waterways in Lithuania, including 476,7 kilometres of waterways used for the carriage of passengers and goods. The inland waterway Kaunas-Klaipėda down the river Nemunas (278,3 km) and the way across the Curonian Lagoon are included into the list of inland waterway routes E41 and E70 of the United Nations, which connect Kaunas via Klaipėda port with the international routes, and via Kaliningrad (Russia) – with the Western European inland waterway system.

It was not possible to receive on time a questionnaire for the port sector in Lithuania.

22.6 Airports

22.6.1 Overview

The Civil Aviation Department of the Ministry of Transport and Communications has regulatory powers concerning the air transport sector. The management of the air transport sector is carried out by the Civil Aviation Administration. There are four state-managed airports in Lithuania of international category, one military and three civil airports: Vilnius, Palanga and Kaunas. Lithuanian airspace, the total area of which exceeds 76.000 square kilometres and is crossed by 12 main aircraft flight routes. The Vilnius International Airport had 1.281.872 passengers in 2005.

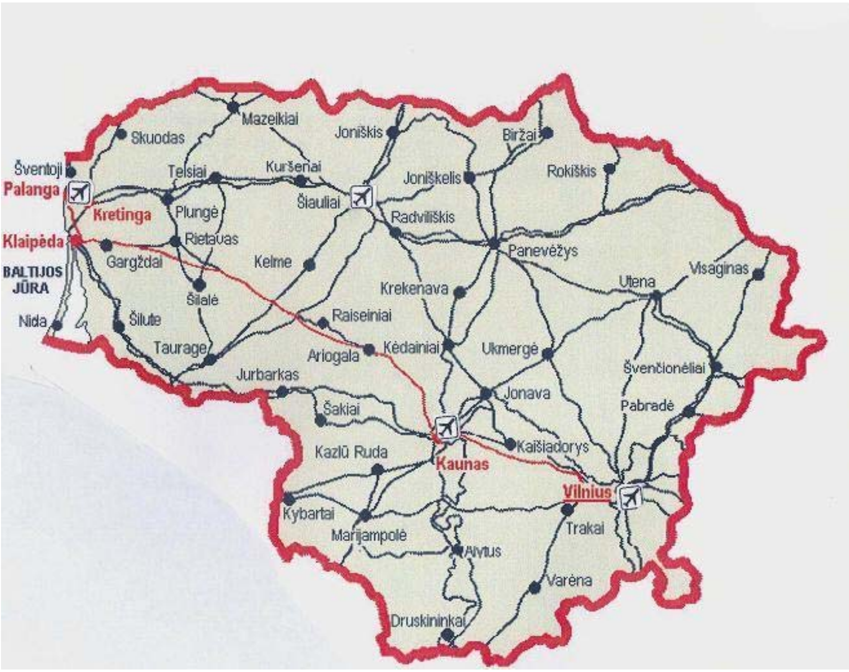


Figure 22-3: International civil airports in Lithuania

22.6.2 Measuring traffic quality

Statistical air traffic counting is an internal matter of airports. The Civil Aviation Administration is not involved in counting air traffic flow.

22.6.3 Current situation

In theory, two main types of congestion are defined: aircraft congestion at airports and in the skies and surface traffic congestion around airports. Access to runways is directly controlled by agreement between airlines and Air Traffic Service Providers, through the number of available slots and then by slot allocation under EC law.

There are presently no congestion problems with any of Lithuania's four airports.

22.6.4 Forecasts of traffic conditions

There is a future possibility of congestion in the biggest one (Vilnius airport). Because of reconstruction, Vilnius airport will not have enough space to accommodate all new start-up carriers, which will be forced to turn to secondary airports (Kaunas airport).

22.6.5 Policy plans

Given that congestion problems are not an actual problem Lithuania, there is no information concerning future policies.

23 Latvia

23.1 Contacted Entities

The responsible entity for high level matters concerning the transport field is the Ministry of Transport (http://www.sam.gov.lv/, not in English). The following departments were contacted through relevant contact persons:

- Roads: Ministry of Transport – Road Department;
- Railways: Ministry of Transport – Railway Department;
- Ports: Ministry of Transport – Maritime Department;
- Airports: Ministry of Transport – Aviation Department;

It was possible to receive answers to the questionnaire for the sectors of railways and aviation.

23.2 Overview

The information provided by the key informants of the railway and aviation sectors point at a low level of congestion in their modes. Such problems may however arise in the near future due to the ongoing development of the economy, as recognized e.g. on the aviation sector.

23.3 Roads

In Latvia are registered 69.829.546 km of roads and streets. The average density of the roads network is 1.081 km per km2. The average density of the state roads network is 0,312 km per km2.

Figure 23-1: Latvian road network

It has not been possible to receive information on congestion issues from the questionnaire sent.

23.4 Railways

23.4.1 Measuring traffic quality

Congestion may be measured in the deficient timetable slots. Short term congestions can be caused by the sudden actions like incidents or delays in track repair, and in this case they result into train delays as well as train cancellations, which however cannot be related to the specific place on the rail network. Finally, some congestion in freight trains movements can be caused by problems in ports, if ports are the destination: delay of ship, bad weather conditions, etc. In this case it may be measured by the "left trains", i.e. trains which movement is stopped for some time.

23.4.2 Current situation

Generally, congestion happens in the situation than the demand for the infrastructure capacity exceeds the capacity available (in the long term planning). Therefore it may be measured as the deficient timetable slots.

Presently there are no specifically congested parts in the network.

23.4.3 Forecasts of traffic conditions

In future some congestion problems may arise in the Riga region in case of development of the passenger traffic in this region. But at the same time there are long term plans of the diversion of freight traffic around the Riga centre. Presently it is difficult to mention any congestion drivers.

Forecast for a congested part for the long term planning reveals it may in happen in the main freight corridors (Sebez)-Rezekne/(Bigosovo)-Daugavpils-Krustpils-Riga/Jelgava-Ventspils. These lines are also affected by port caused problems. Studies on economic impact are not carried out due to small impact of the existing congestions.

23.4.4 Policy plans

The policy predicted is development of the infrastructure capacity. Due to specific nature of the rail traffic in Baltic region (i.e. mostly freights coming from third countries to the ports) there are no any specific impacts of EU policy to this issue.

23.5 Airports

23.5.1 (Measuring traffic quality

The main indicators for measuring traffic conditions are the number of passengers travelling in airports and the tonnes of cargo traffic (which have a very small proportion of the total traffic).

23.5.2 Current situation

Congestion is defined as the non-availability of slots. Presently there are no conges-tion problems.

23.5.3 Forecasts of traffic conditions

Congestion problems in Riga airport are expected in the short term (2 to 3 years). The increase in traffic is considered to be caused mainly by economic growth.

23.5.4 Policy plans

Enlargement of capacity is not a considered option presently. Congestion problems are intended to be solved through slots regulation and through giving preference to larger aircrafts.

24 Slovenia

24.1 Institutions and individuals contacted

- Luka Koper, port and logistic system, public limited company
- Vojkovo nabrežje 38, 6501 Koper, Slovenia
- Tel: +386 5 6656 100
- Fax: +386 5 63 95 020
- E-mail: portkoper@luka-kp.si
- Website: www.luka-kp.si

24.2 Inter-urban road transport

24.2.1 Measuring traffic conditions

24.2.1.1 Motorways:

The traffic volumes are measured by automatic counting posts (microwave detection, video detection and induction loop at specific motorway sections and by manual traffic counts in specific time period. The traffic conditions are described on the basis of traffic congestions and the data recorded by video cameras, placed at the significant locations of the motorways.

The values collected by the measures are: the number of vehicles per time unit, average speeds (groups and by type), time distance between vehicles, momentary speeds, number of vehicles by type (at toll stations), the share of freight vehicles, average traffic per hour in a day/week/month/year.

The yearly average traffic per day is recorded by automatic counting posts and by manual counts at the specific section of the motorway.

Automatic counting posts record the traffic by the type of the vehicle differentiating the road lane, while recent automatic counting posts (QLD6) also record the speed of the vehicle and the average speed in ten minute period.

The data collected is evaluated as yearly average of daily traffic and yearly average of hourly traffic. The data on traffic in 5 and 15 minutes periods (continuous measuring) are also available even in case of manual counts.

The motorway sections Vransko – Blagovica and Klanec – Ankaran are covered by the measures listed under item 01, toll stations and tunnels on other sections are covered by induction loops.

The complete motorway and expressway (fast roads) network is covered by automatic counting posts which are positioned on all directions especially between larger towns, at the entrances of the city centers (Ljubljana, Maribor, Celje, Koper, Novo mesto) and at Ljubljana ring. The counting posts record the traffic at the specific section continuously 24 hours a day.

The data is presented as unit(s) per day, unit(s) per hour and unit(s) per 10 minutes. It is differentiated by 7 vehicle types:

- motorcycles,
- passenger cars,
- buses,
- light freight vehicles up to 3 tones,
- medium freight vehicles from 3 up to 7,5 tones,
- heavy freight vehicles over 7,5 tones
- freight vehicles with a trailer

Each type is differentiated to foreign and domestic (by the Directorate of the Republic of Slovenia for Roads).

The data are published yearly by the Directorate of the Republic of Slovenia for Roads in the publication Traffic and on the CD-ROM

24.2.1.2 State roads:

The performance of the systematic data collection of traffic on the state roads in Slovenia started in 1954. Since then the volume of the data collection has been changed due to building up the road network, increase of the traffic density and the specific needs for the data.

The recorded data in the past years served as a basis to evaluate the extent of traffic and the ratio between the extent of traffic on particular main and regional road sections. In addition, the analyses of the results showed that within normal circumstances the ratios of the extents of traffic among specific road sections in some years mostly remain unchanged. Due to this fact and to reduce the cost of the data collection a few years ago a new counting system was introduced. It does not perform yearly counting on the whole road network but:

- on characteristic location of the road network the traffic density is recorded by automatic counters,
- on other locations regular manual counting every five years are preformed

All counting locations have been grouped and in a five-year cycle counting is performed on particular part of counting locations so that within a five-year period the traffic density is recorded on all counting locations, on significant locations even more times. On the basis of growing traffic factors on particular counting locations where traffic is recorded in the particular year the estimation of the traffic growth for other parts of the road network is made.

The data of the traffic density is recorded:

- manually,
- by automatic counters.

Estimations of the traffic density are made for the road sections with no counting locations.

The counting locations for manual and automatic recording are situated on the 'open' parts of the road sections in order not to be affected by the local traffic of the nearest settlements. The recorded traffic density is ascribed to the whole road section.

The traffic density on a particular road section is presented with a value of AADT (average annual daily traffic). Hence some other values are interesting to the particular users of the traffic data, especially those representing time variations in traffic; they are published in an extensive report within the basic data on regular traffic counting.

The values collected by the measures (per hour) are the structure of the traffic: motorcycles, cars, buses, light truck, medium truck and heavy truck, truck with a trailer or semi-trailer. The ratio between domestic and foreign vehicles is estimated upon manual counting.

The automatic counting posts operate continuously; the data are saved every hour. Modern automatic counters save data every ten minutes. Manual counting is comprised of 12-times, 4-times and 1 time counting.

In the first case the counting is performed within seven (or three) days a week in each month. Nightly counting is also performed. This type of counting has not been performed in the past years since the traffic is counted by automatic counters at all the important locations. In the second case the counting is performed within seven (or three) days a week every three months i.e. in each quarter of the year. In the third case the counting is performed within seven (or three) days a week in May.

The counters are located on most of the significant sections of the motorways, fast roads (expressways), main roads and on some regional roads. Locations of the counters are presented on the picture bellow:

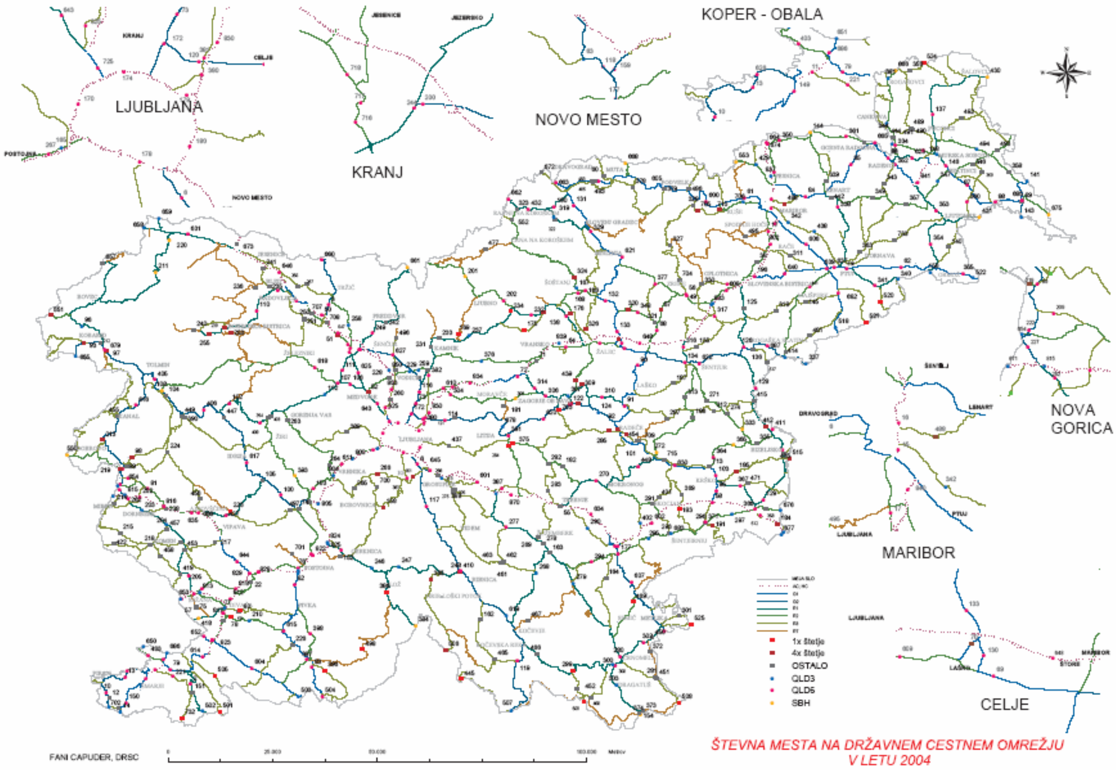


Figure 24-1: Locations of counting posts on the Slovenian state road network

The data are collected on hourly basis. Modern automatic counters save data every ten minutes. The vehicles are differentiated by type.

The traffic density is recorded by the type of the vehicle. Ten categories are recorded by manual counting, differentiating domestic and foreign vehicles.

Older types of automatic counters differentiate light and heavy vehicles.

Modern automatic counters differentiate motorcycles, passenger cars (also with a trailer), vans (also with a trailer), light trucks up to 3 tones (also with a trailer), medium trucks from 3 up to 7 tones, heavy trucks over 7 tones, freight trailers, semi-trailers, buses and buses with a trailer.

The data are published yearly as printed and electronic version.

24.2.2 Congestion indicators

To define congestion at the measuring post i a condition comprised of mathematical functions on at least one driving lane j is to be fulfilled.

The congestion could be defined as a ratio between the volume of traffic in time unit (V) and the capacity of the road section in time unit (C). The congestion occurs, when the ratio V/C > 1, meaning that the number of vehicles in the section is higher than the capacity of the section.

The congestions are also measured as a number of vehicles in one driving lane per hour. The higher the number of vehicles per hour, the thicker the congestion. When the number reaches the specific value (dependant on the type of the road) the congestion (the exceeded road capacity) occurs.

At specific sections, mainly in the morning and in the afternoon peak hours and during the tourist season (weekends), congestions occur at the toll stations, on the roads through towns and at the exits from the motorways to the unfinished sections of the motorways. The congestions in such cases are measured as a queue in meters, mainly before toll stations, where the traffic volumes change extremely under the influence of the tourist season.

The congestions are defined as the length of the queue which, due to the exceeded road capacity cannot pass the course desired. In this case the demand (the number of vehicles) over exceeds the supply (the capacity of the road). The capacity of the road depends on several factors: the type of the road, the width of the road, the number of the driving lanes, the distance of the side hindrances, the inclination of the road and the structure of the traffic.

24.2.3 Current situation

Recently modern software is involved in the studies of the congestions, which allows the precise microscopic simulation of the traffic on the model of the actual traffic network. These simulations are accurate to the extent that they actually include the elements of the road, branches, junctions etc. The key results of the studies are the length of the backup, travel time and additional travel time (hours lost in congestions) with respect to travel time assumed within normal traffic conditions. Users' cost reduction could be derived from these studies assuming the improvement of the traffic network which could actually diminish the effects of the congestions.

The most congested parts of the road network are: the branches, urban arterials, crossings of the European traffic corridors, city by-passes, toll stations (during the tourist season):

- 1. H 3 – the north by-pass of Ljubljana, congestions are caused by the volume of the traffic, extreme traffic peaks and many branches and their low capacity
- 2. A 2 before the branch Sentvid, R 1-211 and G 1-8 (Medvode – Ljubljana ring),
- 3. G 2-111 Koper – Izola – Valeta – double-lane road with high traffic volumes
- 4. G 1-8 Vrba – Podtabor– double-lane road with high traffic volumes
- 5. R 1 – 209 Lesce – Bled – double-lane road with high traffic volumes and ascent
- 6. G1-11 Koper – Smarje, G1-6 Postojna - Jelsane (during the summer tourist season)
- G1-9 Maribor – Ptuj – Gruskovje (extreme traffic peaks)

The most congested time periods are: peak hours in the morning (7-9) and in the afternoon (15-17), tourist migrations in the summer: Friday afternoon, Saturday morning, Sunday evening, the days before European national holidays and the days before Slovene national holidays. Congestion are daily. Congestions described under item B 12 (5) occur during the tourist season and on most of the weekends.

Congestions occur on specific days during the tourist season and national holidays. Congestions affect passengers the most (children, elderly or ill persons). Congestions under item B 12 (1, 2, 3 and 4) affect domestic vehicles the most. Congestions affect passenger cars, foreign (tourist traffic) and domestic, the most. Congestions affect foreign passenger cars and freight vehicles (at Ptuj - Gruskovje) the most.

24.2.4 Forecasts

Due to the estimation of the future traffic volume growth the increase of the congestions is to be expected mainly at the urban arterials in the morning and afternoon peak hours (going to/back from work, school) and during the tourist peaks, mainly on weekends.

At all previously mentioned locations the expected congestions will affect also the neighboring sections and branches. The possibilities to redirect the traffic are almost none.

In the future the congestions are to be limited and under control by adequate systems (traffic prognosis, past years analysis), but will probably not be eliminated completely

The factors considered the main drivers of the congestion are: false travel timing, false selection of the mean of transport, non-usage of the public transport, transport policy, high level of motorization, growth of transit and national traffic, public parking lot policy etc.

24.2.5 Policy plans

By completing the motorway network the congestions are to be diminished to the acceptable level. It still doesn't solve the problem of the tourist peaks, but they occur only a few days a year and are Europe-wide known. The implementation of the intelligent systems (information portals, centralized control of the motorway network and upgrade of the safety installations in the tunnel) to the motorway network will improve and partly control the traffic flow and consequently the occurrence of the congestions by informing the drivers to adjust the speed and improve the traffic flow.

The envisaged arrangements are different due to the specific parts of the network:

1. H 3 – the north by-pass of Ljubljana: the possibilities of widening the actual by-pass or building the new north/north by-pass are being considered.
2. A 2 before the branch Sentvid, R 1-211 and G 1-8 (Medvode – Ljubljana ring): the building of the motorway section Sentvid – Koseze.
3. G 2-111 Koper – Izola – Valeta: the building of the fast road (expressway) Koper – Izola - Lucija
4. G 1-8 Vrba – Podtabor: the building of the motorway Vrba - Podtabor
5. R 1 – 209 Lesce – Bled: the possibilities of the reconstruction are being considered.
6. G 1-11 Koper – Smarje: the building of the fast road (expressway) Koper – Smarje
7. G 1-6 Postojna – Jelsane: the building of the fast road (expressway) Postojna – Jelsane
8. G 1-9 Ptuj – Gruskovje : the building of the motorway Slivnica – Drazenci – Gruskovje

The information on the traffic congestion is used to plan and implement the road users' information systems.

European transport policy is being active in: improvement of the quality of the transport by implementing new technologies, improvement of the national market and increase of the engagements of the transporters by improving the traffic connections among the states. The EC policy supports the development of the modern traffic connections, equipped with modern technologies in order to assure greater safety to the users.

Additional remark: Unique policy measures against congestions and the cooperation various transport authorities (bus, taxi, train, flight) should be taken at the state level.

24.3 Rail transport

24.3.1 Measuring traffic quality

The data on trains, wagons, freight and haul vehicles is collected by the information system in real time.

The values collected are: the number of the trains, gross ton, net ton and axle kilometres in passenger and freight transport and the weight of the freight, the travel time and the delays. The number of the passenger is established on the basis of the tickets sold and once a year by the weekly (sample) counting of the passengers.

The data are collected continuously (24 hours/day, 7days/week, 365 day/year) and are being evaluated in daily, weekly, monthly or periodic (quarterly, half-yearly) terms. The complete railway network and both sorts of traffic (passenger and freight) are being covered by the measures. The majority of the data is differentiated by daily measures. The data are differentiated by the type of the haul engine.

The data are published in business and statistical reports.

24.3.2 Congestion indicators

The congestions as such are not defined. Only the records of the causes of the congestions (rail blocks, slow runs, strikes), which are to be reported to the train conductors and the records of the trains being held in the network due to the rail blocks or strikes in the neighbouring countries are kept.

There are no congestion measures.

24.3.3 Forecasts

Due to the growing of the traffic volumes and the worsening of the state of the infrastructure the growing of the traffic congestions is to be expected.

The main factors considered to be the drivers of the congestions are: the actual state of the infrastructure (single rail, slow runs, and low axle-loads) and the retaining of the trains at the border crossings.

24.3.4 Policy plans

The modernization of the railway infrastructure, the rationalization and the promotion of the procedures at the border crossings are envisaged.

The information on congestion is used for analysis and the preparation of the solution proposals.

The Impact of European policy is visible by the implementation of the interoperability and the harmonization (TEN-T).

24.4 Waterborne transport

24.4.1 Measuring traffic quality

Traffic volumes are collected via IT system, on a disposition basis. Luka Koper collects data for vessel loading and unloading throughput and number of moored vessels per year.

The data is acquired within terminals (General Cargo Terminal, Container and Ro-Ro Terminal, Car Terminal, Liquid Cargoes Terminal, Fruit Terminal, Timber Terminal, Terminal for Minerals, Terminal for Cereals and Fodder, Alumina Terminal, European Energy Terminal, Livestock Terminal).

The measures are collected monthly. Traffic volumes collected via IT system cover the maritime throughput. The data is differentiated by monthly and annually measures.

The form of cargo is grouped by terminals (for Container and Ro-Ro Terminal the measures are TEUs and tons, for Car Terminal the measures are pieces and tons, for Timber Terminal the measures are m3s and tons, for all other terminals the measure is ton).

The data is published on Luka Koper website: www.luka-kp.si and in the Annual Report, which is also available on Luka Koper website.

25 Estonia

25.1 Inter-Urban Road

On inter urban roads the traffic is measured by Estonian Road Administration (ERA) using the automatic counting points. ERA will be interviewed in the beginning of March.

25.2 Urban road transport

25.2.1 Measurement of traffic conditions

On urban roads the traffic is measured manually, regularly once a year (September) by Tallinn Technical University. The methodology used is based on two closed cordon rings, one is located at the city boarders, and another is surrounding the central business district of the city of Tallinn. There are also some additional counting stations on most crowded intersections.

Automatic counting is used only on some minor streets, using the traffic signal loops or in special cases (projects).

Measurements are performed annually, once a year on workdays (excl Monday and Friday) in the mid of September.
Data is segmented by 15 minute periods.

Data is published in a special report, published by Technical University, Institute of Transportation in a paper format with 4 copies + electronic form (pdf) in Estonian language.

25.2.2 Evaluation of congestion

There is no existing certain definition of congestion. During two last years a special extra study was introduced in Tallinn (and two other bigger cities) in order to estimate time losses in traffic for personal cars. In 2005 a special study was also introduced in order to estimate the time losses for public transport passenger and to introduce a comparison between the time losses for personal cars and public transport on some main routes in Tallinn. In addition , during last 12 years a traffic modelling has been used in Tallinn in order to make some traffic forecast but also give a general description of traffic conditions in Tallinn. (Figure 25-1).

The studies mentioned before allowed to estimate some general characteristics of the traffic flow, both for personal cars and public transport (buses and trolleybuses in this case). The characteristics used were as follows: average speed, time loss at bus stops and intersections, travel time between some important areas (PT vs cars), etc.

The Tallinn traffic model can also give some additional information as output of model runs (evening peak period)- like total time spent on network, average speed on links and areas, delays at intersections, queue information of intersections, saturation levels capacity used percentage, etc. (Annex 1).

The most congested network parts are the most important intersections at the centre area or at the city entries. (Figure 25-1).

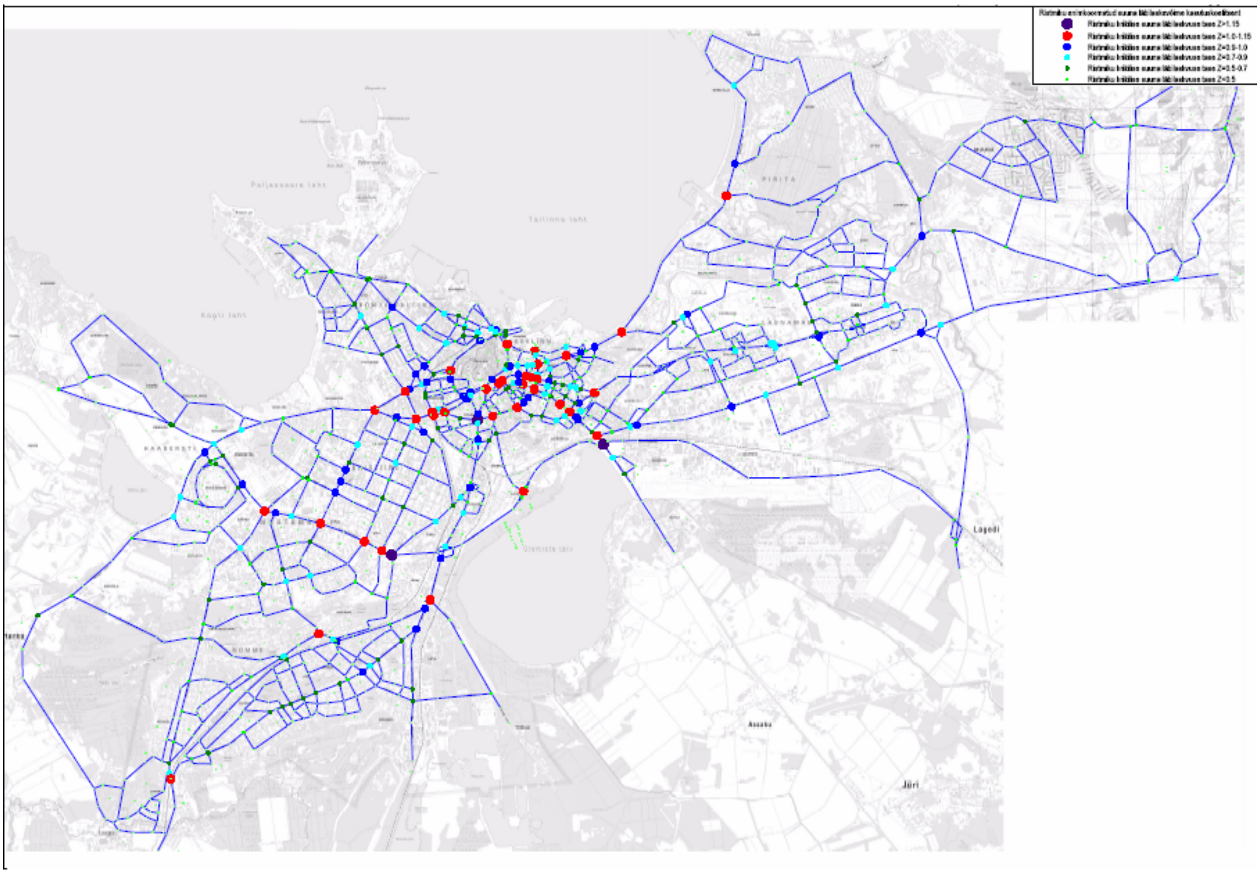


Figure 25-1: Congested Talin network parts

25.2.3 Policy plans for the future

There are two main areas of development planned by the Municipality:

- introducing the public transport priority systems (bus lanes, bus priority at intersections) - the SMILE- project
- developing the road network of the city, including some main intersections, due to the General Plan of Tallinn and some extra project development (Mainland connections of the Corridor I in Tallinn. The main consultant- BCEOM, France).
- These network development plans are connected with two important road project developments- the Northern Highway, which should connect the eastern and western parts of the city as a ringroad from North of CBD, and
- the Southern Highway, which is a connection between eastern and western parts of Tallinn from the south.

(Figure 25-2 to Figure 25-4)

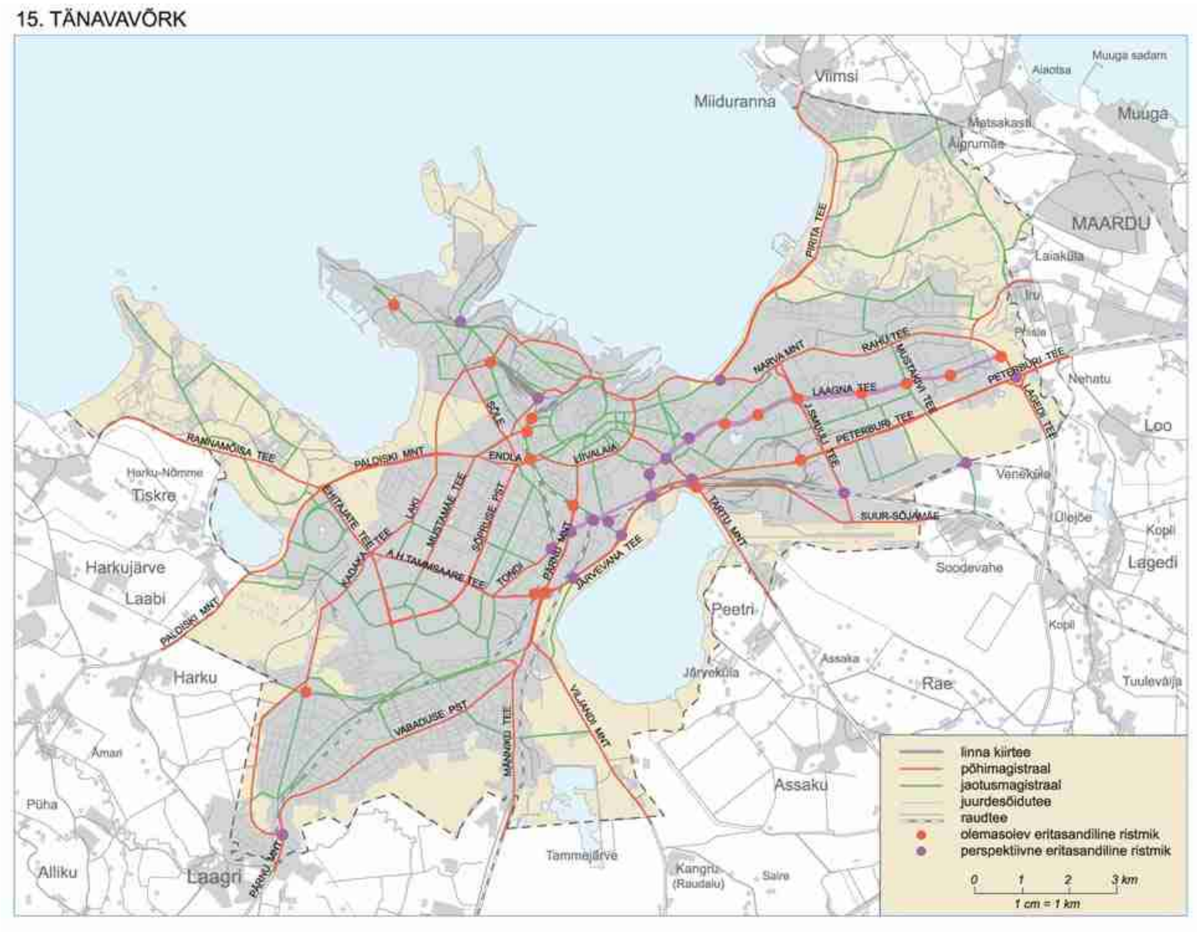


Figure 25-2: Talin road network develop

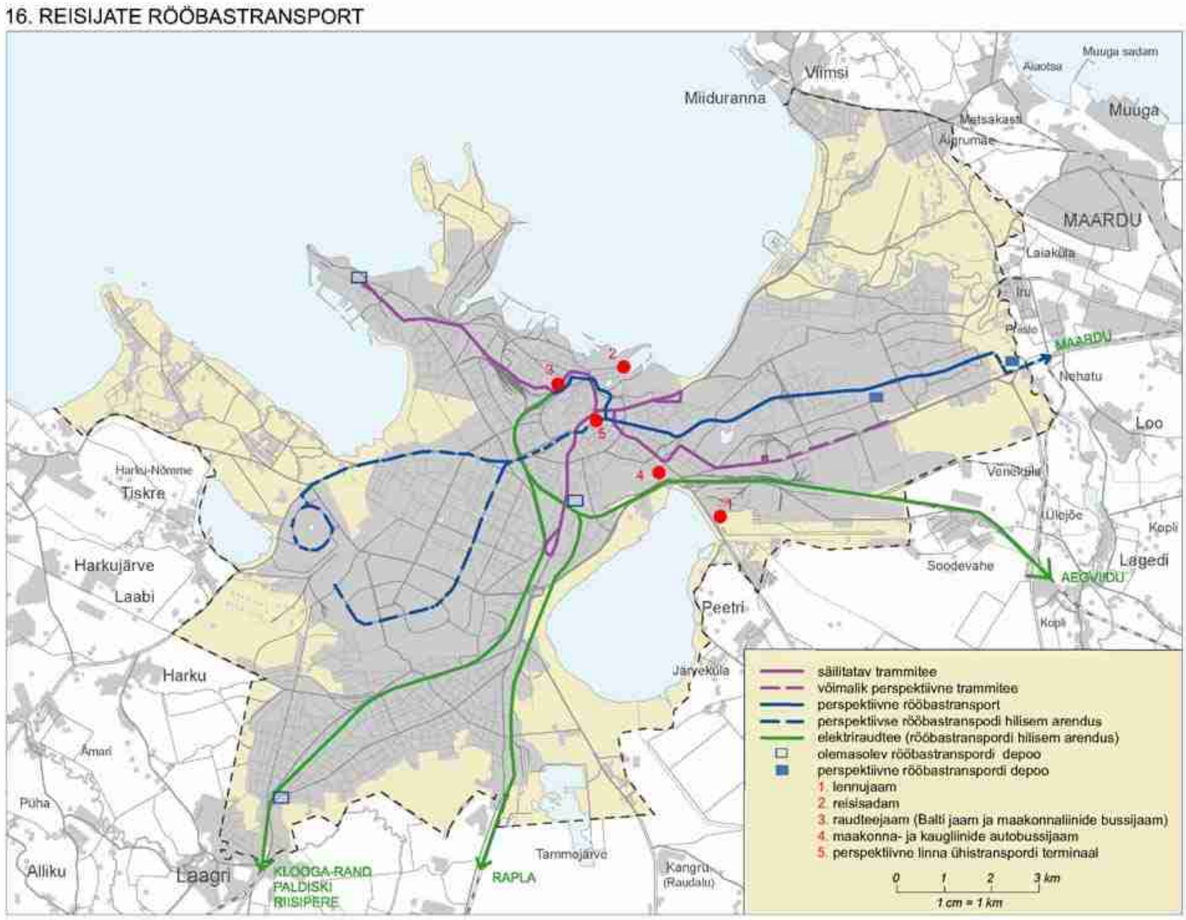


Figure 25-3:Tallinn PT development

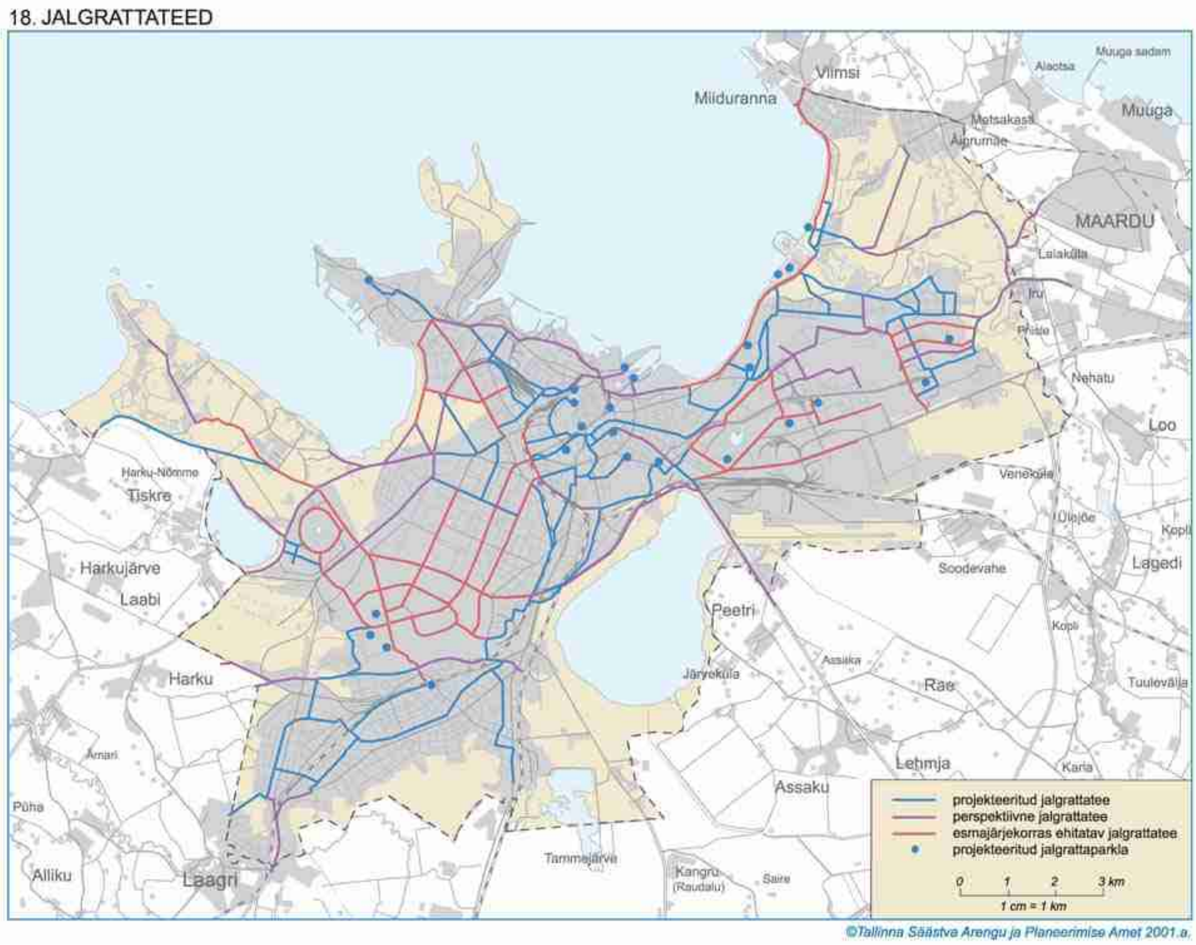


Figure 25-4: Tallinn Cycle route development

European Transport Policy guidelines have been accepted and used when working out Tallinn Transportation Development Plans. The structure of the Sustainable Tallinn project includes a number of subprojects (Tallinn Main street network, Public Transport Development, Traffic Engineering Development, Pedestrian and Bicyclist Road development, etc.) which are partly finished, and partly under way. The whole package of plans should be finished during the period 2006-2007.

The urban congestion problem is fully put on the responsibility of the Municipality, but the last works in cooperation with some private institutions (consultants on traffic engineering or environmental issues) and Universities.

26 Cyprus

Abbreviations

ADT	Average Daily Traffic
CPA	Cyprus Ports Authority
EC	European Commission
EU	European Union
HGV	Heavy Goods Vehicles
HMS	Highway Management System
LGV	Light Goods Vehicles
PCU	Passenger Car Units

PWD Public Works Department

26.1 Introduction

26.1.1 Report Structure

The present report is divided into five sections. The first section presents some basic transport data monitoring the transportation systems in Cyprus and in some cases some key transport figures. Brief descriptions of the bodies that have been questioned are also provided.

The remaining four sections correspond to the four fields examined by the questionnaire that has been used to collect information from the competent national stakeholders. Thus, they include respectively a) the methods for transport condition measurement and presentation of data, b) congestion and delay current situation, c) projected situation in the future and d) policy issues for handling congestion.

Each section is composed of five subsections corresponding to each one of the transport modes discussed in the Cypriot case, i.e. road (distinguishing urban and inter-urban), aviation, waterborne and urban public transport.

26.1.2 The Transport Modes of the Cypriot Case Study

The modes covered by COMPETE study are road, public transport, maritime transport and aviation. The level of disaggregation into types of networks, means of transport and user groups for the case of Greece is provided in the following table. In Cyprus, there is no rail and inland waterways transport, and thus no results are considered.

Table 26-1: The items considered in the Cypriot Case Study

Transport modes	**Network differentiation**	**Modes**
Road	Motorways Outside settlement Areas (National – Municipal – Rural Roads) Inside Settlement Areas (Urban Roads)	Passenger cars Light goods vehicles LGV Medium size good vehicles Heavy goods vehicles HGV
Public transport	Urban Interurban	Urban Buses Interurban buses
Aviation	Airports	Passenger & Freight transport
Maritime Transport	Ports	Passenger & Freight transport

Our team tried to find the appropriate related studies, established contacts with some key persons from relevant transport bodies and managed to provide some valuable input responding to the requirements of the project. The major difficulties experienced in data collection by the means of questionnaire were mainly related to delays in replying and sometimes to poor data availability.

26.1.3 Basic Transport Data and Institutional Basis

The following table presents the basic transport data for Cyprus for all modes.

Table 26-2 Basic Transport Figures for Cyprus

		1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of vehicles (total licensed at the end of year)	No.	316.437	387.559	394.667	402.586	419.446	430.974	444.183	459.106	465.367	484.477	515.233	534.966
Passengers Cars	No.	178.602	219.749	226.832	234.976	249.225	256.989	267.589	280.069	287.622	302.501	335.634	355.134
Private saloon cars (incl. learners and invalid)	No.	171.425	212.152	219.432	227.695	241.800	249.752	260.026	270.348	277.554	291.645	324.212	344.953
Taxis	No.	1.732	1.589	1.569	1.586	1.607	1.611	1.648	1.641	1.559	1.696	1.770	1.845
For rental (self-drive)	No.	5.445	6.008	5.831	5.695	5.818	5.626	5.915	8.080	8.509	9.160	9.652	8.336
Buses	No.	2.308	2.670	2.801	2.800	2.754	2.835	2.949	3.003	2.997	3.275	3.199	3.217
Goods conveyance vehicles	No.	74.325	101.182	104.043	105.652	109.294	111.125	114.666	117.942	117.792	119.646	117.825	118.355
Mechanised cycles	No.	50.953	50.393	46.855	45.226	44.337	44.756	43.315	41.985	40.276	41.516	41.396	40.381
Tractors	No.	8.517	11.244	11.740	11.913	11.733	13.013	13.291	13.594	13.932	14.284	13.941	14.368
Other vehicles, n.e.c.	No.	1.732	2.321	2.396	2.019	2.103	2.256	2.373	2.513	2.748	3.255	3.238	3.511
Persons per private saloon car	%	3.4	3,1	3.0	2.9	2,8	2.7	2,7	2,6	2,6	2,5	2,3	2,2
Registration of motor vehicles (new and used)	No.	38.768	34.475	34.768	31.857	38.798	33.973	32.165	38.075	40.367	40.362	54.037	48.712
Roads infrastructure in Cyprus (total)	Km	9.043	10.150	10.415	10.654	10.820	11.009	11.141	11.408	11.593	11.760	12.059	12.146
Public Works Department	Km	2.195	2.218	2.258	2.272	2.307	2.347	2.359	2.435	2.488	2.518	2.648	2.692
(Motorways)	Km	(120)	(161)	(173)	(195)	(204)	(216)	(240)	(257)	(268)	(268)	(268)	(276)
District Offices	Km	2.430	2.456	2.448	2.493	2.502	2.520	2.532	2.538	2.553	2.571	2.641	2.650
Municipalities	Km	2.787	2.839	3.015	3.103	3.155	3.221	3.271	3.352	3.404	3.481	3.577	3.666
Forestry Department	Km	2.631	2.637	2.694	2.784	2.856	2.921	2.979	3.083	3.148	3.190	3.193	3.138
Person killed in road accidents	No.	101	118	128	115	111	113	111	98	94	97	117	102

Table 26-2 Basic Transport Figures for Cyprus (continued)

Deaths in road accidents per 100.000 population	%	17.4	18,1	19,4	17,2	16,3	16,5	16,0	14,0	13,2	13,5	15,9	13,5
Aircraft landings	No.	18.713	22.134	21.756	22.840	23.590	24.860	26.540	29.195	28.810	29.177	30.146	30.664
Ship arrivals at Cyprus Ports	No.	5.638	4.743	5.088	4.593	4.476	4.858	5.289	5.246	4.698	4.375	4.297	4.649
Passenger movements													
Arrivals (total)	No.	1.933.583	2.685.321	2.512.270	2.646.363	2.871.042	3.142.293	3.534.880	3.554.314	3.263.822	3.182.929	3.381.159	3.620.235
By Air	No.	1.607.397	2.289.706	2.168.619	2.288.729	2.503.359	2.730.557	3.016.832	3.203.815	3.028.939	2.941.729	3.131.657	3.339.106
By Sea	No.	326.186	395.615	343.651	357.634	367.683	411.736	518.048	350.499	234.883	241.200	249.502	281.129
Departures (total)	No.	1.906.165	2.681.438	2.509.473	2.647.289	2.870.465	3.145.956	3.528.983	3.558.873	3.243.742	3.174.752	3.385.060	3.621.908
By Air	No.	1.604.352	2.290.074	2.168.027	2.288.523	2.501.290	2.734.117	3.012.411	3.211.410	3.008.345	2.934.861	3.136.433	3.340.250
By Sea	No.	301.813	391.364	341.446	358.766	369.175	411.839	516.572	347.463	235.397	239.891	248.627	281.658
Freight movements	M/T												
Loaded (total)	"	2.774.180	2.255.126	2.441.953	2.264.567	1.439.210	1.467.142	1.647.096	1.421.032	1.291.121	1.580.523	1.419.868	1.920.872
By Air	"	17.439	26.409	19.650	16.377	20.738	16.679	16.018	14.986	14.393	15.117	17.446	18.981
By Sea	"	2.756.741	2.228.717	2.422.303	2.248.190	1.418.472	1.450.463	1.631.078	1.406.046	1.276.728	1.565.406	1.402.422	1.901.891
Unloaded (total)	"	4.422.793	5.036.837	5.395.489	4.691.987	5.095.342	4.721.653	5.300.924	5.254.945	5.269.652	5.699.922	5.776.386	6.155.323
By Air	"	9.351	13.715	13.303	14.443	15.470	16.160	30.914	17.460	16.963	16.998	19.842	20.346
By Sea	"	4.413.442	5.023.122	5.382.186	4.677.544	5.079.872	4.705.493	5.270.010	5.237.485	5.252.689	5.682.924	5.756.544	6.134.977
Ships on the Cyprus Register	No.	2.075	2.778	2.733	2.798	2.673	2.686	2.669	2.239	2.153	2.031	1.913	1.802

Source REPUBLIC OF CYPRUS, STATISTICAL SERVICE, 2006

26.2 Methods for transport condition measurement and presentation

The first part of the questionnaire aims to cover in general the methods that are used for measuring and presenting traffic congestion conditions. The data that were obtained per mode are presented in the following respective subsections and paragraphs.

26.2.1 Road

Urban road network

Automatic counts on the urban road network are done via the SCOOT system (a signal optimisation system developed by SIEMENS) through various loops. The coverage includes the cities of Nicosia, Limassol and Larnaca and will also be expanded to Paphos in the near future.

Traffic counts on urban roads are usually done on an as-needed basis i.e. during traffic studies or on request. The same applies for delay estimations, junction counts (these are also done manually by the PWD to establish the need for signalising a junction or for setting signal plans).

Data for the urban roads are included in the various traffic studies done by consult ants such as the Nicosia Traffic Study (2005) and the Limassol Traffic Study. Other more specific studies include the Old GSP Stadium Area Traffic Management Study in Nicosia and the Technological University Traffic Management Study in Limassol.

Counts on urban roads are done randomly and at various times of the year. Most junction counts are done during the school season (September-June) when traffic is heavier.

Counts done on urban roads are usually targeted on the various peaks of the day i.e. morning, mid-day and evening peak

Vehicle classification on urban roads are included in the various traffic studies done by consultants as explained in the previous section

An Annual Census is put together on a yearly basis that includes classification percentages, daily traffic estimates and lengths of segments for all motorways, B Roads as well as other urban and rural roads

Results for various traffic studies done by the PWD or Consultants also include data for urban roads as presented in formatted tables for this purpose. Inter-urban road network

Automatic traffic counters are installed on various parts of the inter-urban road network. Currently all counters are being replaced with a state of the art system of counters using remote access dialling and Bluetooth technology (a total of 29 counters around Cyprus will be gradually be installed) – This system is managed by the Public Works Department (Transport Planning Section). A new database is under construction and will link into the PWD's Highway Management System (HMS) that will eventually have historical data from 1998-2006 and onwards.

Data on motorways is continuous and usually grouped on a weekly basis and then on an annual basis. Continuous data are also available on several rural roads and with the new traffic counters installed the coverage will be wider.

Data are differentiated by hour, weekly and also attention is paid to peak hours (am and pm peak). Classification counts will soon be available via the new traffic counters currently being installed.

An Annual Census is put together on a yearly basis that includes classification percentages, daily traffic estimates and lengths of segments for all motorways, B Roads as well as other urban and rural roads. The average daily traffic in the major sections varies from 20.000 – 30.000, where 10% are buses, 60% private cars and 30% trucks[44]. In the other national roads the traffic varies from 10.000 – 20.000, where 65% are private cars, 3% buses and 32% trucks. In the municipal roads the traffic is much lower with an average around 4.000 ADT.

26.2.2 Urban Public Transport

The Bus Operators perform daily counts of buses on planned routes. Cyprus has no tram or metro systems. Data are gathered on a daily basis. Data are differentiate by route, destination and peak times. Data are published through the statistical service of the Government of Cyprus and an annual report.

26.2.3 Aviation

The Department of Civil Aviation collects data on a monthly basis in regards to aircraft movements, passengers and freight by airport (Larnaca or Paphos). The data provided exclude military flights. A standard spreadsheet presents the comparative figures for 2004-2005 (latest data available).Data are gathered monthly and grouped annually in a standard format spreadsheet.

Data are differentiated by aircraft movements, passenger and freight for each airport

Data is published by the Department of Civil Aviation as well as via the Statistical Service of the Republic of Cyprus. Data are also published by EUROSTAT.

26.2.4 Waterborne Transport

The Cyprus Ports Authority (CPA) gathers data in regards to waterborne movements at all Cyprus ports on a continuous basis. Results for the last 2 years are attached. The data are grouped by port and classification. Data also include information regarding cargo handled at each port as well as passenger movements as presented in the Annex.

Data are gathered daily and grouped annually.

Data are differentiated by category and port as well as type of cargo handled and passenger data for each port (cruise ships etc).

The Cyprus Ports Authority publishes data by means of tables directly or via the Department of Statistics of the Cyprus Government. The traffic statistics are posted on the CPA website: www.cpa.gov.cy. Data are also published by EUROSTAT.

---

[44] Annual Traffic Census - 2005

26.3 Current congestion and delay situation

26.3.1 Road

Urban road network

Main city corridors such as Makarios and Griva Digenis Avenues in Nicosia, Limassol Beach Road and Makarios Avenue in Limassol and usually the central arteries of each of the four major cities. Unless any of the above mentioned facts and trends there no any requirement for a specific traffic study, so the PWD does not currently evaluate congestion and delay as described in this document.

Inter-urban road network

Unless any of the above mentioned facts and trends there no any requirement for a specific traffic study, so the PWD does not currently evaluate congestion and delay as described in this document.

Most congested segments on the inter-urban roads are the approaches to the cities on the motorway network i.e. section of A1 from Ayia Varvara to Nicosia, the entry to Larnaca on the A2 Motorway as well as the segments of the roundabout junctions on the Nicosia-Limassol and Limassol-Paphos motorways (A1 and A6)

26.3.2 Urban Public Transport

There no any specific information regarding public transport congestion, so the facts already presented for road sector remain the same as above.

26.3.3 Aviation

Data are examined and emphasis is usually given on peak times such as the holiday season (tourist peak times in July/August) in the summer and winter (Christmas) or also during major events such as elections. From the two International Airports in Cyprus, the Larnaca International Airport is the busiest.

26.3.4 Waterborne Transport

The CPA and its consultants analyze the data gathered annually with several studies on an as-needed basis in order to identify trends etc.

There is any method or results applicable though from the ports of Cyprus, the Limassol Port is the more congested one by being the largest as well as the one with the most complete facilities to handle cargo and big cruise ships.

26.4 Forecasts of congestion level (2020)

The Ministry of Communications and Works and CPA have not carried out such studies.

26.5 Policy measures envisaged to fight congestion

26.5.1 Road

All the above are currently under evaluation by the Ministry of Communications and Works and its Road Transport Department as well as the PWD, Ministry of Interior and its Town Planning and Housing Department. Until now no specific policies are in place.

Cyprus is currently working towards reducing road fatality accidents by 50% as per the EU White Paper. Also the Ministry is pursuing measures towards sustainable development and the use of other modes of transport other than the private vehicle giving an emphasis on the enhancement of public transport.

26.5.2 Urban Public Transport

All the above are currently under evaluation by the Department of Road Transport, Ministry of Communications and Works and the various Bus Companies operating such as the Nicosia Buses, Limassol and Larnaca Bus Companies.

26.5.3 Aviation

All the above are currently under evaluation by the Department of Civil Aviation, Ministry of Communications and Works

26.5.4 Waterborne Transport

All the above are currently under evaluation by the Cyprus Ports Authority (CPA)

26.6 References

- Ministry of Communications and Works Public Works Department report for COMPETE study

26.7 Annexes

Table 26-3 Cypriot Ports Transport Data

YEAR 2005
FINAL
ANNUAL REPORT

NUMBER OF SHIPS CALLING BY CATEGORY AND PORT

	2004					**2005**				
	LEMESOS	LARNAKA	VAS.	O.T.*	**TOTAL**	LEMESOS	LARNAKA	VAS.	O.T.*	**TOTAL**
Passenger/Cruise	459	53	0	0	**512**	433	49	0	0	**482**
Conventional	918	133	123	0	**1.174**	1.017	209	127	1	**1.354**
Container	922	13	0	0	**935**	967	12	0	0	**979**
Ro-Ro	550	76	0	0	**626**	593	56	0	0	**649**
Bulk Carriers	110	22	38	0	**170**	96	18	8	1	**123**
Tankers**	380	141	27	293	**841**	461	188	38	308	**995**
Reefer	17	17	0	0	**34**	32	21	0	0	**53**
Seabee	3	0	0	0	**3**	15	1	0	0	**16**
Other***	206	59	0	0	**265**	280	52	1	0	**333**
TOTAL	**3.565**	**514**	**188**	**293**	**4.560**	**3.894**	**606**	**174**	**310**	**4.984**

* Oil Terminals: (Larnaka Oil terminal, Dekeleia, Moni, Akro-tiri)
**Tankers: include ship calls that supply bunkering services
***Other: Include all calls irrespective of size

NET REGISTERED TONNAGE OF SHIPS CALLING BY CATEGORY AND PORT (000s)

	2004					2005				
	LEMESOS	LARNAKA	VAS.	O.T.*	**TOTAL**	LEMESOS	LARNAKA	VAS.	O.T.*	**TOTAL**
Passenger/Cruise	3.213	271	0	0	**3.484**	3.919	367	0	0	**4.286**
Conventional	1.498	137	172	0	**1.807**	1.725	221	226	3	**2.175**
Container	5.027	130	0	0	**5.157**	5.671	94	0	0	**5.765**
Ro-Ro	3.019	740	0	0	**3.759**	3.444	535	0	0	**3.979**
Bulk Carriers	670	33	99	0	**802**	618	20	23	neg.	**661**
Tankers	2.005	186	175	929	**3.295**	2.452	340	223	966	**3.981**
Reefer	14	42	0	0	**56**	13	68	0	0	**81**
Seabee	neg.	0	0	0	**0**	32	neg.	0	0	**32**
Other	95	12	0	0	**107**	186	21	neg.	0	**207**
TOTAL	**15.541**	**1.551**	**446**	**929**	**18.467**	**18.060**	**1.666**	**472**	**969**	**21.167**

* Oil Terminals (Larnaka Oil terminal, Dekeleia, Moni, Akrotiri)
**Tankers: include ship calls that supply bunkering services
neg.: negligible

CARGO HANDLED (In metric tonnes) (000s)

	IN			OUT			**TOTAL**
	CYPRUS	TRAN.	COASTAL	CYPRUS	TRAN.	COASTAL	
2004 LEMESOS (Limassol)	2.587	224	0	594	413	0	**3.818**
LARNAKA	402	58	0	110	49	0	**619**
LARNAKA*	1.004	214	0	0	7	70	**1.295**
VASSILIKO	720	51	0	346	0	0	**1.117**
MONI*	121	0	23	0	0	0	**144**
DEKELEIA*	457	0	46	0	0	0	**503**
TOTAL	**5.291**	**547**	**69**	**1.050**	**469**	**70**	**7.496**
	IN			**OUT**			**TOTAL**
2005 LEMESOS (Limassol)	2.536	307	0	633	516	0	**3.992**
LARNAKA	644	29	0	158	24	0	**855**
LARNAKA*	1.223	0	0	0	0	0	**1.223**
VASSILIKO	910	0	0	289	0	0	**1.199**
MONI*	192	0	0	0	0	0	**192**
DEKELEIA*	532	0	0	0	0	0	**532**
TOTAL	**6.037**	**336**	**0**	**1.080**	**540**	**0**	**7.993**

* Oil Terminals
Note: Cargo Imported for Bunkers Not Included above

CONTAINERISED CARGO HANDLED (In metric tonnes-Net Weight)

	2004			2005		
LEMESOS (Limassol)	**IN**	**OUT**	**TOTAL**	**IN**	**OUT**	**TOTAL**
Cyprus	1.226.515	410.978	**1.637.493**	1.281.186	439.938	**1.721.124**
Transit	175.811	365.756	**541.567**	224.598	225.217	**449.815**

Total	**1.402.326**	**776.734**	**2.179.060**	**1.505.784**	**665.155**	**2.170.939**
LARNAKA						
Cyprus	1.116	10	**1.126**	751	2	**753**
Transit	39.347	38.057	**77.404**	23.163	19.493	**42.656**
Total	**40.463**	**38.067**	**78.530**	**23.914**	**19.495**	**43.409**
LEMESOS and LARNAKA						
Cyprus	1.227.631	410.988	**1.638.619**	1.281.937	439.940	**1.721.877**
Transit	215.158	403.813	**618.971**	247.761	244.710	**492.471**
Total	**1.442.789**	**814.801**	**2.257.590**	**1.529.698**	**684.650**	**2.214.348**

CONTAINERS HANDLED (TEUs)						
	2004			**2005**		
	IN	**OUT**	**TOTAL**	**IN**	**OUT**	**TOTAL**
LEMESOS (Limassol)						
FULL						
Cyprus	131.315	35.857	**167.172**	137.862	37.519	**175.381**
Transit	13.384	12.987	**26.371**	16.547	16.609	**33.156**
Sub-total	**144.699**	**48.844**	**193.543**	**154.409**	**54.128**	**208.537**
EMPTY	6.660	97.906	**104.566**	5.666	105.927	**111.593**
TOTAL	**151.359**	**146.750**	**298.109**	**160.075**	**160.055**	**320.130**
LARNAKA						
FULL						
Cyprus	78	1	**79**	68	5	**73**
Transit	3.424	3.311	**6.735**	2.538	2.088	**4.626**
Sub-total	**3.502**	**3.312**	**6.814**	**2.606**	**2.093**	**4.699**
EMPTY	101	102	**203**	17	16	**33**
TOTAL	**3.603**	**3.414**	**7.017**	**2.623**	**2.109**	**4.732**
LEMESOS and LARNAKA						
FULL						
Cyprus	131.393	35.858	**167.251**	137.930	37.524	**175.454**
Transit	16.808	16.298	**33.106**	19.085	18.697	**37.782**
Sub-total	**148.201**	**52.156**	**200.357**	**157.015**	**56.221**	**213.236**
EMPTY	6.761	98.008	**104.769**	5.683	105.943	**111.626**
TOTAL	**154.962**	**150.164**	**305.126**	**162.698**	**162.164**	**324.862**

Passenger Arrivals - Departures						
	LEMESOS (Limassol)			**LARNAKA**		
	ARRIVALS	DEPA/RES	TOTAL	ARRIVALS	DEPA/RES	TOTAL
2004	228.379	226.602	**454.981**	27.066	27.092	**54.158**
2005	250.448	250.817	**501.265**	33.385	33.938	**67.323**

27 Luxemburg

27.1 Introduction

Contacted:

- Tom Juttel:
  Ministère des transports, Luxemburg
  email: Tom.Juttel@tr.etat.lu

27.2 Inter-urban roads

27.2.1 Measuring traffic conditions

There are automatic counts on motorways in all Luxemburg.

They can be consulted at any time of the day on the web site of the Ministère des ponts et chaussée (roads and bridges ministry) (CITA department: "Contrôle et information du trafic sur les autoroutes" – Control and traffic information on motorways). (1)
http://www.pch.public.lu/trafic/flash/index.html

Traffic data can be ordered at CITA.

The CITA system gives permanent and continuous information on the traffic on all motorways, based on the permanent countings. It also gives information on accident and incident.

There are traffic management tools on specific roads. For instance, the Plan de Gestion du traffic "Bruxelles-Langres" has for objective to manage the cross-boarder traffic and inform the road users before and during their journey. It is managed by roads authorities from Belgium, Luxembourg and France. In Luxemburg, it is managed by CITA.

In case of any incident/accident on the network in one country, the two other ones are ready to adapt their network and inform the users.

Any other traffic counts or specific OD survey can be conducted when needed, for specific purposes studies, etc.

27.2.2 Congestion definition and current situation

The CITA gives information on the motorway level of service and indicates whether the level of traffic if is low, high or saturated (comparison of traffic volumes and road capacity).

The main reasons for congestion are the commuting traffic. There is congestion at peak hours mainly on the city of Luxemburg beltway. Specific congestion points vary according to the time and any event (accident, incident).

With only 80 000 inhabitants in the city Luxemburg for 80 000 jobs, there is a lot of traffic gen-erated by commuters in the city. It generates traffic jam at peak hours on the main roads en-tering the city and at border cross points, as cross boarder commuters occupy about 30% of the jobs in Luxembourg.

Motorways represent only 4% of the total network (in km) but carries 26% of the annual traffic, which is very compared to other national and European roads.

Traffic has seriously increased in the pas and energy final consumption of the transport sector is 4.5 times higher than the European Community average. This is highly influenced by the low price of gas in Luxemburg and the consumption of transit vehicles and cross boarders.

Transit traffic represents 10% of the light vehicle traffic, and 18% of HGV traffic (4).

27.2.3 Forecasts of traffic congestion

There are no specific congestion forecasts but rather demand/traffic forecasts. Based on current system of transport diagnosis, the Luxemburg authorities wish to decrease the share of roads traffic (cf questions 4, IVL). Therefore studies look at transport demand and its distribution between modes.

The CMT (Cellule Modèle de Trafic – Traffic Model Department) from the ministry of transport has made traffic forecasts and planned an increase of traffic of 30% up to 2020 in the whole country.

The traffic demand generated by the city of Luxembourg only will increase by 36% from 2001 up to 2020.

This is based on several macro economics assumptions, al listed in document n° (2)

The most important one in growth/year is the increase of cross boarders commuters from France and Belgium (+3%/year from 2001 up to 2020). (3)

From 1997 up to 2001, the growth of these commuters was 11%/year. This traffic mainly from France and to a lesser extent from Belgium generates high traffic and traffic jams at peak hours (to Luxemburg in the morning and from in the evening) on the roads entering the coun-try (borders and urban motorways).

27.2.4 Policy plans

Luxemburg authorities work on long term plans on land planning and on transport.

It has firstly launched an integrated plan on land planning (IVL: Integratives Verkehrs und Landesentwichlungsonzept). It aims at combining land and transport planning. Regarding transport, this plan will settle the basis for a national road transport plan and public transport plan.

The government and parliament want to reach a national modal share between public transports and cars of 25%/75%. It is 11%/89% now. The authorities want to decrease the car share to reduce pollution (gaz emission) and traffic congestion, and ensure the transfer of traffic demand on clean modes, in a sustainable environment.

Besides, a Plan Sectoriel des Transports (Sectorial Transport Plan) has been defined. Its goals are (4):

- reduce nuisances from road transport;
- integrate urban development with existing transport infrastructure: promote city and city-centres as residence location, concentrate publics equipment, jobs location, residence loca-tions in similar locations.
- maintain jobs in small cities to avoid the increase in commuters to Luxemburg city.
- internalize external costs of transports (tax on energy and increase in gas price, tolls on main motorway links);
- optimise the use of existing road infrastructures and do not build new roads.
- reduce park places in companies to transfer commuting traffic from cars to public transport,

Regarding public transport, an important effort will be made on the development of rail services, the government wants to develop public transport and its use. For instance, now, only 9% of the cross boarder commuters use public transport. At the beginning of 2006, the government of Luxembourg and the French Region of Lorraine have signed an agreement to develop train services between the two countries.

Different other actions in favour of rail services have been launched (4):

- improvement of existing railways infrastructure to increase frequency and speed of trains;
- improvement of stations;
- increase in train frequencies; etc
- development of park and ride system;
- development of the intermodality

For freight transport: adapt the development of companies along the railway network;

Based on the IVL and its economic assumptions (population, employment, cross-boarders commuters evolution…(2)) the road department of the ministry of transport has written a stra-tegic paper on the roads in 2020 (Route 2020).

It aims at restructuring the roads network in the country to reach the goal of the modal split 25%/75% and to fit in the national integrated plan on land planning.

Based on demand forecasts presented in question 3, Route 2020 (2) defines a functional classification of road projects in the country up to 2020, by type of roads (European links, cross-boarder roads, regional roads and local roads).

The main stakeholders group in transport policy are the following:

- the ministry of transport;
- the ministry of bridges and roads (Ministère des ponts et chaussées)
- the ministry of public works
- the ministry of environment.

These ministries are also involved in the land planning forecasts together with:

- the ministry of internal affairs
- the ministry of economy
- the ministry of housing

27.3 References

(1) http://www.pch.public.lu/trafic/flash/index.html

(2) www.route2020.lu/introduction

(3) http://www.tr.etat.lu/mob/20060306_tram/Dossier-de-synthese_2006-03-01-chapitre-3.pdf

(4) http://www.ivl.public.lu/fr/etapes/index.html

28 Malta

28.1 All modes

28.1.1 General issues

Congestion problems in Malta are limited to urban roads, derived from the high use rate of the private transport. The main policy document is the 1990 Structure plan for the Maltese Islands. The transport section details the project to be launched. More detail can be found at:

http://www.mepa.org.mt/planning/index.htm?sp_14.htm&1

28.2 Road

28.2.1 Programmes

Recently, a plan has been launched to introduce some type of cordon pricing in Valetta in order to reduce urban congestion. Cameras will register number plates of cars entering and leaving Valetta, and any car staying more than half an hour would receive a bill. However, there is no reference to additional public transport services, scheduled to compensate the pressure on private transport with more supply.

The Ministry of Urban Development and Roads through the Network Infrastructure Directorate within the Malta Transport Authority is heavily involved in overseeing the execution of Malta's most ambitious road upgrade programme covering a total of 16-kilometre corridor of arterial and distributor roads in the centre of the island.

A total of 13 projects were proposed, worth €315 million, to bring the roads belonging to the TEN-T up to European standard. All the projects proposed are aimed at making the roads safer to use or removing the bottlenecks that are choking the network at some strategic points. The Cabinet of Ministers finally approved 12 of these proposed projects to proceed to the public consultation process. Amongst the 12 approved, 3 projects were given top priority.

The Ministry for Urban Development and Roads through the Malta Transport Authority (ADT) is also responsible for the construction of new roads in residential and urban areas. Such works are funded under the national budget and are aimed at increasing connectivity and soften urban congestion problems. In 2004, the Government funded the construction of 80 roads in urban and residential areas. 50 of these were tendered by Local Councils through an agreement with the ADT. The remaining 30 were tendered by the Authority directly. Works on a further 70 residential roads have been tendered by the ADT recently and are at different stages of completion. The Ministry is has recently embarking on an exercise to formulate a programme of works to be carried out on around 400 residential roads requiring upgrade, maintenance or construction.

http://www.mudr.gov.mt/pages/main.asp?sec=4

28.2.2 Definitions of delay

No definition was found in the consulted sources

28.2.3 Models

No models for congestion were found in the consulted sources

28.2.4 Studies

No specific studies were found in the consulted sources

28.2.5 Real time monitoring

None found

28.3 Public Transport

Public transport between Malta and Gozo (the two islands) takes place by ferry and helicopter, and public transport on the islands takes place by bus, and thus suffers the same congestion problems as the other road users. No special programs have been implemented addressing specifically public transport congestion problems.

28.4 Rail

Not applicable, as there are no railways right now. However, an underground tunnel fixed rail cargo link from Valetta Grand Harbour to Malta Freeport (Marsaxlokk) is foreseen.

http://w2.vu.edu.au/malta/newsletter/consular_v5i25JulAug2003.htm

28.5 Aviation

There are no congestion problems known at Malta airport, nor any initiatives to increase capacity in the near future. No relevant bottlenecks can be identified.

28.6 Maritime

The Malta Maritime Authority, through its Ports Directorate, is the authority responsible for port services in Malta. Whilst the Malta Maritime Authority is responsible for passenger handling operations, cargo operations are carried out by the private sector.

The main freight port is the Freeport at Marsaxlokk, which suffers no congestion at the moment.

The European Union has shortlisted three proposals submitted by Malta for the implementation of priority projects of the Trans-European Transport Network (TEN-T) by the year 2020. The first of these projects involves the inclusion of Malta on the West Mediterranean Motorway of the Sea, which is one of the four motorways of the sea identified for all the EU community waters. Malta will be closely working in the near future with Italy, France and Spain to develop pilot projects in this regard and will benefit from EU assistance through, for example, the Marco Polo Programme.

The second project concerns the upgrading of the port infrastructure in the Grand Harbour (Valetta) involving the creation of new quays at Ras Hanzir and at Barriera Wharf; investment in modern cargo-handling equipment; and provision of port hinterland for storage space and an underground tunnel fixed rail cargo link to Malta Freeport. The construction of additional warehousing and RTG cranes at the Freeport are also included. Out of the total value of this project - around Lm100 - 80% would be financed by the EU under Cohesion Funds. These investments pursue the modernisation and increase of capacity of the Grand Harbour, they do not address congestion problems. At this moment, no relevant bottlenecks can be identified in the Maltese port sector.

http://www.freeport.com.mt/ar/2000.pdf

29 Congestion Questionnaires

29.1 COMPETE Questionnaires

The information for the country case studies has been obtained through a set of interviews using standardized questionnaires. These have been translated into international language by the COMPETE partners and subcontractors where appropriate.

For each question in the interviewees where asked to provide answers along six modes of transport:

- Inter-urban roads:
- Urban roads:
- Rail (passenger and / freight):
- Urban public transport (Bus, tram, metro, etc.):
- Waterborne (ferry, inland navigation, short-sea- or maritime shipping)
- Aviation (passenger and / or freight)

Subsequently the three English versions of the COMPETE congestion questionnaires are presented:

29.1.1 Brief questionnaire (4 questions)

(01) By which means are traffic conditions measured and which kinds of results are provided by these measures?

Examples: Automatic counting posts, manual traffic counts, time tables, delay records, census, inquiries, transport models, etc. Multiple answers are possible. Please give short descriptions by whom and in which context each measure is applied (investment plans, household surveys, market observations, etc.), Please briefly characterise the resulting data bases by periodicity, area and network parts covered and the differentiation of results. Please provide available data.

(02) How is congestion defined and what is the situation of traffic conditions in the single modes?

Where is congestion the most severe problem, which network parts are congestion free, what are the main reasons for congestion? Are there studies on the economic impact of congestion?

(03) What is the projected development of traffic congestion and which are the most relevant congestion drivers?

Examples: Total or relative increase until a particular forecast year, drvan by economic growth, demography, infrastructure capacity or quality, etc. Please describe briefly the basic assumptions (GDP growth, migration and demographic change, etc.) and the results of rele-

vant studies, policy expectations or positions. Please provide study results.

(04) Which policies are envisaged to fight congestion in the future?

Examples: Investment in new capacity, road pricing for traffic demand management or for raising investment funds, market liberalisation, privatisation of network or service operation, no measures planned so far, no actions required, etc. Please indicate official policy plans and programmes as well as positions of relevant stakeholder groups. What impact does EC transport policy have on national plans?

29.1.2 Short questionnaire (12 questions)

<u>A. Measurement of traffic conditions</u>

(01) By which means are traffic conditions measured and which kinds of results are provided by these measures?

Examples: Automatic counting posts, manual traffic counts, time tables, delay records, census, inquiries, transport models, etc. Multiple answers are possible. Please give short descriptions by whom and in which context each measure is applied (investment plans, household surveys, market observations, etc.) and briefly characterise the re-sulting data bases. Please provide available data.

(02) How often and for which network parts are the measures applied or is the data evaluated and which costs are associated?

Examples: Irregularly, annually, quarterly, monthly, continuously on motorways, trunc roads, border crossings, main railway lines international ports / airports, etc. A short description of procedures and contexts would be desirable.

(03) How is the data differentiated?

Examples: By time segments (Peak and off-peak, hourly, daily, weekly, etc), by vehicle types or by regions. A short description of the type of outputs would be desirable.

(04) How is the data published?

Examples: Governmental reports, detailed data by statistical office or public research institutes, business reports, confidential data), etc. A short description of the type of publications (e.g. website with URL, book reference), publishing entities, availability and costs would be desirable. Electronic sources are preferred. Please provide data as far as possible.

B. Evaluation and results of traffic condition measure-ments

(05) How is congestion and delay defined in the single modes and how is the observation data transferred into these measures?

Examples: Welfare measure computed by equilibrium models, travel time losses, no computation of congestion measures, etc. Please briefly describe the methodology of relevant studies. Please provide any results.

(06) What are the key results of traffic congestion studies?

Examples: Total annual values, share of gross domestic product, hours lost in conges-tion, share of traffic or network parts suffering from congestion, etc. Please give a brief overview of the central findings of the relevant studies. Please provide results and data.

(07) What are the most congested network parts, time periods and user groups?

Examples: Motorways urban arterials, border crossings, high speed rail links, seaports, water gates, international hubs, peak hours, holiday periods, passenger vs. freight, business / leisure / commuting travel, etc. If possible please indicate specific location and / or names of infra-structures.

C. Prediction of congestion levels and policy measures

(08) What is the projected development of traffic congestion and which are the most relevant congestion drivers?

Examples: Total or relative increase until a particular forecast year, drvan by economic growth, demography, infrastructure capacity or quality, etc. Please describe briefly the basic assumptions (GDP growth, migration and demographic change, etc.) and the results of rele-vant studies, policy expectations or positions. Please provide study re-sults.

(09) Which policies are envisaged to fight congestion in the future?

Examples: Investment in new capacity, road pricing for traffic demand management or for raising investment funds, market liberalisation, privatisation of network or service operation, no measures planned so far, no actions required, etc. Please indicate official policy plans and programmes as well as positions of relevant stakeholder groups.

(10) Impact of European transport policy?

How far is the EU White Paper "European Transport Policy for 2010: time to decide" or other European guidelines or legislations expected to impact past and future national, modal or local design of policies relating to transport congestion? Please give a short expectation whether EC policy is considered to actively support combating traffic con-gestion.

(11) What are the types of goods most sensitive to congestion?

Example: Statistical information on the transport volumes (domestic and import-export) by goods category and estimates / expectations of the sensitivity of each commodity type to increasing transport costs.

D. Additional information

(12) Which other bodies are of relevance in the field of congestion determina-tion and policy-making?

Examples: National and local ministry departments, public and private research insti-tutes, operator and lobby associations, other stakeholder groups, etc. Please indicate activity fields and contact data.

E Narrative of Study Cases

Optional. Please insert here additional descriptions, history and background of the case study or country development.

29.1.3 Long questionnaire (21 questions)

A. Measurement of traffic conditions

(01) By which means are traffic volumes and traffic conditions measured?

Examples: Automatic counting posts, manual traffic counts, time tables, delay records, cen-sus, inquiries, transport models, etc. Multiple answers are possible. Please give short descrip-

tions by whom and in which context each measure is applied (investment plans, household surveys, market observations, etc.).

(02) Which values are collected by the measures?

Examples: Traffic loads, travel speeds, travel times, journey times, delay times, access times, etc. A short description of the data base would be desirable. Please provide available data.

(03) In which time intervals (periodicity) are the measures performed or is the data collected evaluated?

Examples: Irregularly, annually, quarterly, monthly, continuously, etc. A short descrip-tion of procedures and contexts would be desirable.

(04) Which parts of the network are covered by the measures listed under (01) and which share of traffic does this relate to?

Examples: Motorways, trunk roads, county and district roads, arterial roads, border-crossings, main railway lines, international / national airports, inland waterways, chan-nels, seaports, etc. The traffic share captured by the individual measures may be esti-mated roughly. A short description of procedures and contexts would be desirable.

(05) How is the data differentiated by time segments?

Examples: Peak and off-peak, hourly, daily, weekly, etc. traffic patterns. A short de-scription of the type of outputs would be desirable.

(06) How is the data differentiated by vehicle types?

Examples: Light and heavy vehicles, freight and passenger, road vehicle, train, vessel and aircraft classes, by weight, by size, by speed, single vehicles and combinations, etc. A short description of the type of outputs would be desirable.

(07) How is the data published?

Examples: Governmental reports, detailed data by statistical office or public research institutes, business reports, confidential data), etc. A short description of the type of publications (e.g. website with URL, book reference), publishing entities, availability and costs would be desirable. Electronic sources are preferred. Please provide data and sources as far as possible.

B. Evaluation and results of traffic condition measure-ments

(08) How is congestion in the single modes defined?

Examples: Minimum acceptable travel speed, traffic density, journey time, maximum arrival / departure delay against schedule, security of intra- / inter-modal connections, etc. Multiple answers are possible. Please shortly describe by whom and in which con-text the definitions are applied.

(09) How is the observation data transferred into measures of traffic conges-tion?

Examples: Welfare measure computed by equilibrium models, travel time losses, no computation of congestion measures, etc. Please briefly describe the methodology of relevant studies. Please provide any results.

(10) How are the key parameters for calculating traffic congestion in the studies defined?

Examples: Economic basis for the value of travel time savings, definition of speed-flow-curves, minimum acceptable delay time, etc. Some key values for the value of time used by key studies would be desirable.

(11) What are the key results of traffic congestion studies?

Examples: Total annual values, share of gross domestic product, hours lost in conges-tion, share of traffic or network parts suffering from congestion, etc. Please give a brief overview of the central findings of the relevant studies. Please provide results and data.

(12) What are the most congested network parts?

Examples: Motorways in / near agglomeration centres, urban arterials, border cross-ings, high speed rail links, seaports, water gates, international hubs, etc. If possible please indicate specific location and / or names of infrastructures.

(13) What are the most congested time periods?

Examples: Peak vs. off-peak traffic, holiday periods, weekends, etc. Multiple answers per mode are possible.

(14) What are the most affected user groups?

Examples: Passenger vs. freight, business, commuting, private and leisure travel, in-come groups, age classes, commodities, service sectors, etc. Multiple answers per mode are possible.

C. Prediction of congestion levels and policy measures

(15) What is the projected development of traffic congestion?

Examples: Total or relative increase until a particular forecast year, etc. Please de-scribe briefly the basic assumptions (GDP growth, migration and demographic change, etc.) and the results of relevant studies, policy expectations or positions. Please pro-vide study results.

(16) What factors are considered the main drivers of traffic congestion?

Examples: Growth of local, national or transit traffic, demography, shortage in budgets for capacity extension, deterioration of networks, despatch procedures at border cross-ings, etc. Please briefly summarise the respective results or assumptions of the rele-vant studies or positions of stakeholder groups.

(17) Which policies are envisaged to fight congestion in the future?

Examples: Investment in new capacity, road pricing for traffic demand management or for raising investment funds, market liberalisation, privatisation of network or service operation, no measures planned so far, no actions required, etc. Please indicate official policy plans and programmes as well as positions of relevant stakeholder groups.

(18) What purpose is the information on traffic congestion used for?

Examples: Investment plans, cost-benefit-analyses, environmental impact assess-ments, preparation of regulation and traffic demand management policies, etc. Multiple answers are possible.

(19) Impact of European transport policy?

How far is the EU White Paper "European Transport Policy for 2010: time to decide" or other European guidelines or legislations expected to impact past and future national, modal or local design of policies relating to transport congestion? Please give a short expectation whether EC policy is considered to actively support combating traffic con-gestion.

D. Additional information

(20) Which other bodies are of relevance in the field of congestion determina-tion and policy-making?

Examples: National and local ministry departments, public and private research insti-tutes, operator and lobby associations, other stakeholder groups, etc. Please indicate activity fields and contact data.

(21) Other relevant information

Examples: Additional references of data sources and congestion studies not mentioned in Parts A (question 02) and B (question 09) Important: Data and study results should be pro-vided for further processing as far as available. Please also indicate anything relevant in the field of congestion determination and policy-making, that was not ad-dressed by the previ-ous questions.

E Narrative of Study Cases

Optional. Please insert here additional descriptions, history and background of the case study or