UNITED NATIONS

E

Economic and Social Council

Distr.
GENERAL

ECE/TRANS/WP.6/AC.2/2008/2
3 October 2008

ENGLISH ONLY

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

Working Party on Transport Statistics

Ad hoc Group of Experts on the E-Road Traffic Census

Ninth session
Geneva, 10 November 2008
Item 4 (b) of the provisional agenda

RESULTS OF THE 2005 E-ROAD TRAFFIC CENSUS

Country notes to the 2005 E-Road Traffic Census

Note by the secretariat*

The secretariat produces below a summary of country notes that accompany the 2005 E-Road Census. The notes are related to the following Countries: Czech Republic, Finland, the former Yugoslav Republic of Macedonia, Poland and the United Kingdom of Great Britain and Northern Ireland.

* The UNECE Transport Division has submitted the present document after the official documentation deadline.

I. CZECH REPUBLIC

1. The data of the national traffic census on E roads in the Czech Republic in 2005 are based on results of general traffic counts on the entire motorway network of the country and on a major part of other roads on the Czech territory in the said year. The census was undertaken in the course of April – October in selected days during four hour periods. Counting took place at different time periods of the day. Using these results and relevant coefficients, values of annual average daily traffic (AADT) in 2005 were calculated. Supplementary night counts beyond normal limits of the census were carried out only at selected counting posts on the E roads. Traffic counts were conducted during two night periods. Traffic on motorways was counted by means of automatic traffic counters. Supplementary manual counts by categories of vehicles were executed to characterize traffic composition (categories A, B, C. D) on motorways.

2. Counting sections on E network were selected in conformity with the data obtained at the previous census; as a rule, the same locations were used as for the national traffic census in 2005. The numbering of counting posts also remained unchanged. Changes have been made only at places where new road construction projects or road modifications caused substantial changes of conditions.

3. Length of road sections has also been newly measured.

Notes to the tables and the map:

Table 2

4. The breakdown of Length of E Road sections by average annual daily traffic (AADT) has been carried out for non-urban roads only shown on the map (table 6).

Table 3

5. The length of each E road includes sections common with other E roads. Lengths of common sections are shown in brackets. The same applies to the numbering of counting posts.

Table 4

6. The values of average traffic have been calculated for sections of the E roads in non-urban (rural) areas.

Table 4bis

7. The values of average traffic have been calculated for sections of the E roads in non-urban (rural) areas.

8. Traffic on motorways was counted by means of automatic traffic counters. Supplementary manual counts by categories of vehicles were on selected counting post executed to characterize traffic composition (categories A, B, C, D) on motorways.

9. It is recommended to include data concerning peak traffic volumes in Table 7 for each counting section or a certain homogeneous part of a route.

Table 5

10. Volume of road traffic was estimated by means of a detailed analysis of the national traffic census 2000 and 2005 results on all motorways and other road network, including sections in urban areas.

Table 6

11. In order to ensure comparability of the data the sections are numbered identically with the 2000 census. Changes of routes of the E roads due to new construction or route modifications (shift to other roads) were included. Therefore some section numbers have been cancelled.

Table 7

12. For the numbering of sections, the same applies as in case of Table 6.

13. It is recommended to include the values of 50th peak hour in Table 7 for each section instead in Table 4bis for the whole E road.

II. FINLAND

14. Estimation of the road traffic performance in Finland is based on the data of traffic counts. The traffic counting system of public roads (managed by Finnish Road Administration) consists of two subsystems: Permanent Census and General Traffic Census (short-term counting). The biggest cities count traffic on main streets.

15. Permanent Counting System consists of 350 automatic counting posts, most of them on main roads (13,500 km). The system produces data for the estimation models required in General Traffic Census.

16. The General Traffic Census is used to obtain traffic volume per every road section (rural and other lower category roads are included). 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 3400 section 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 AADT of sections not been counted is updated to the same time level with AADT of the counted sections by using traffic growth factors. The factors for main roads are based on the permanent traffic counting system and for the lower category roads on the expert evaluations. Vehicles are classified into three classes: cars and vans, buses and lorries, semi-trailers and trailers. The AADT of general traffic census and also of the permanent census is stored in Road Data Bank (RDB). The traffic data of streets (managed by cities) and private roads is not in the RDB.

17. Road traffic performance (vehicle-kilometres) per year on public roads is calculated as follows: the AADT of each section is multiplied by the length of that section, then multiplied by the amount of days of the year and summed up as road traffic performance. On other roads (streets and private roads) the estimation of vehicle-kilometres per year is based on the expert evaluations, and the trend is based on the traffic counts in big cities.

18. The person traffic performance of road traffic (person-kilometres) is calculated by multiplying the road traffic performance with the average occupancy of the vehicle which is 1.4 persons in a car and 13 passengers in a bus. The average occupancy of the vehicle is based on the national person traffic survey.

III. THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

19. The international E road traffic Census in 2005 is realized on the whole of the E road network.

20. The total length of the E road network in the former Yugoslav Republic of Macedonia is 547.6 km. This data does not include the length of the sections that pass through inhabited places in the country.

21. Total length of "non E roads" in the country is presented as a summary of the sections length where counting of the transport was conducted, and this data does not include the length of regional and local roads.

22. The Census is realized with 7 manual counting and 20 automatic counters.

23. Compared to 2000, 14 automatic counters are new and they register 14 categories of vehicles and give much more qualitative records necessary for analysis.

24. The system of counting posts is presented with the basic network of 27 counting posts.

25. For the data of the 2005 Census to be comparable with the data of 2000, the results are presented on the level of 23 counting posts.

26. The manual counting is conducted by hired staff, and the counting was supervised by the employees of State Statistical Office along a specific counting schedule.

A. Automatic counters

27. In the former Yugoslav Republic of Macedonia, on E road network the counting with automatic counters is realized at 12 counting posts. There are three types of automatic counters on the roads in the former Yugoslav Republic of Macedonia.

28. The first type does not classify the vehicles during the period of counting and it is marked with SBH. The second type classifies the vehicles in light vehicles (shorter than 6 m) and heavy vehicles (longer than 6 m) and it is marked with OHIS. The third type classifies the vehicles in 14 categories and is marked with STERELA.

29. The recording is made every hour for each day in memory chips.

30. In order to obtain the required structure of the traffic, five day manual counting was conducted over the year.

B. Manual counting

31. Manual counting is conducted five days a year.

C. Vehicle categorization

32. Data from the Census of E roads are calculated on 10 categories of vehicles:

1. Bicycles and tricycles with or without motor
2. Mopeds, motor scooters and motor tricycles
3a) Vehicles without trailer
3b) Vehicles with trailer, vans and vehicles up to nine seats
4. Buses with or without trailer
5. Light freight vehicles with capacity till 3.5 tones
6. Freight vehicles from 3.5 to 7 tone capacity, without trailer
7. Freight vehicles with trailer, heavy freight vehicles from 7.5 tones with and without trailer
8. Agricultural tractors and tractors with and without trailer or semi-trailer
9. Special type of vehicles, including construction machines and military vehicles

D. Calculation method

1. An average annual daily traffic (AADT) of the manual counting
   AADT= 1/ 4 (C+ M) + 1/6 (D+G+I) + 1/3 (ND+NB+ NI)
2. An average annual daily traffic (AADT) of automatic counters is obtained by dividing the total number of vehicles with the number of working days of the counters.
3. An average annual daily traffic (AADT) on the pay-tolls is calculated as a quotient between the total number of vehicles that passed the pay-toll and 365 days.
4. An average annual daily traffic (AADT) for every E road is calculated by collecting the AADT of every counting post on the road divided by the total number of counting posts on that road.
5. An average night traffic per counting post during vacations is calculated by dividing the total transport between 10:00 p.m. and 06:00 a.m. with the number of days for which there are data.
6. An average number of vehicles per counting post during vacations is calculated by dividing the total of 24 hour traffic for two months (July and August) with the number of days of these two months, for the days for which there are data.
7. An average number of vehicles in traffic-jam is calculated as maximal 1 hour of transport at 3:00 p.m.

E. **Traffic classification** is shown as:

1. Total transport (light + heavy motor traffic)
1.2. Light motor traffic (A+B)
1.3. Heavy motor traffic (C+D)

F. Calculation method of passed kilometres

33. The average traffic for each category is multiplied by the length in km.

IV. POLAND

34. The 2005 Census of Motor Traffic on Main International Traffic Arteries was carried out within the framework of the National Traffic Census which General Directorate for National Roads and Motorways designs and undertakes every five years over the whole national road network in Poland. Counting posts were located in such a way that each road section with homogeneous traffic would have at least one post. The direct counts were performed at 547 counting posts located on E Roads of total length 5024 km. Vehicles were recorded manually by trained observers under supervision of the local road administration. Additionally, data from 40 automatic traffic count stations were used for data elaboration.

35. For the census purposes, vehicles were divided into the following categories:

(a) motorcycles, scooters,
(b) passenger vehicles (up to 9 seats including driver) with or without trailer,
(c) light goods vehicles (vehicles with permissible maximum weight not higher than 3,5 t) with or without trailer,
(d) heavy goods vehicles with permissible maximum weight higher than 3,5 t without trailers, special heavy vehicles, tractors without semi trailers,
(e) heavy goods vehicles with permissible maximum weight higher than 3,5 t with one or more trailers, tractors with semi trailers, ballast tractors with standard or low chassis trailers,
(f) buses, coaches, trolley-buses,
(g) agricultural tractors with or without trailers, mobile machines (graders, excavators, rollers, etc.).

36. One-year cycle of counts covered 9 „day" periods from 6 a.m. to 10 p.m. and 2 "night" periods from 10 p.m. to 6 a.m. (at some selected locations only nine "day" periods from 8 a.m. to 4 p.m.). Periods of traffic counts were chosen in a way, which makes possible to define the annual average daily traffic with required accuracy.

Method used for calculation of daily averages

$$AADT = \frac{M_R \times N_1 + 0{,}8 \times M_R \times N_2 + M_N \times N_3}{N} + R_N$$

Where:

AADT - Annual Average Daily Traffic
M_R - average "day" traffic per workdays
M_N - average "day" traffic per Sundays and holidays
R_N - average "night" traffic
N_1 - number of working days in year, $N_1 = 249$
N_2 - number of Saturdays and pre-holidays days, $N_2 = 56$
N_3 - number of Sundays and official holidays, $N_3 = 60$
N - number of days in year, N = 365.

$$M_R = \frac{1}{3}\left(\frac{x_1 + x_4}{2} + \frac{x_2 + x_6}{2} + \frac{x_3 + x_8}{2}\right)$$

$$M_N = \frac{1}{2}\left(\frac{x_5 + x_7}{2} + x_9\right)$$

$$R_N = \frac{x_{10} + x_{11}}{2}$$

Where:

x_1, x_2 ..... x_9 – "day" traffic (6^{00} - 22^{00})
x_{10}, x_{11} – "night" traffic (22^{00} - 6^{00})
on the days of counting.

V. UNITED KINGDOM

How the national traffic estimates are made

A. Introduction

37. In 2005, motor vehicles travelled about 499 billion kilometres while pedal cycles travelled 4.4 billion kilometres along the public roads of Great Britain. How do we know this? We know this from the traffic counts conducted about many different types of roads and information on road lengths. However it is not easy to convert count data to total traffic data.

38. The road network consists of about 50 thousand kilometres of motorways and class "A" roads, with a further 338 thousand kilometres or so of minor roads. The road system as a whole is thus much too extensive to allow the collection of comprehensive traffic data for every part. Moreover, the density of traffic carried (and the mix of traffic by vehicle type) varies enormously from place to place and from hour to hour. Flows are less than 100 vehicles a day on many minor roads but exceed 160 thousand a day on some motorway links. Even within a road class, one site may easily carry ten times as much traffic as another. Flow also varies by time of day, by day of week and by month of year. Furthermore, there is variation within the variation - car traffic levels, for example, may change relatively little over the seven days of the week, but goods traffic is usually at far lower levels on Saturdays and Sundays than on other days. These characteristics mean that estimating national traffic volumes requires a fairly complicated sampling design, the collection of substantial volumes of data and complex computational procedures. This note describes the new methodology used for the traffic estimates from 1993 onwards.

39. Estimation of traffic levels uses information from both manual and automatic counts. They are each described briefly below.

B. The manual counts (previously referred to as the rotating census and the biennial counts)

40. These counts operate somewhat differently for major and minor roads. The major roads are split into five road classes: motorways, trunk roads and principal roads with the latter two divided into urban and rural roads. Urban[1] roads are defined as those within the boundaries of the Urban Area polygons for settlements of 10,000 populations or more, based on the 2001 Population Census. On the outskirts of urban areas, bypasses are normally treated as rural even if part of the road may lie within the urban area polygon. Conversely, roads between urban areas with short lengths outside the polygons are normally treated as urban. Minor roads are divided into 6 classes: B class, C class and U (unclassified) roads, each sub-divided into urban and rural.

41. For major roads (motorways and A-roads), the traffic on every link - normally a section of road between consecutive junctions with other major roads - must be regularly assessed. This is done by counting the traffic at a statistically random point on most links at regular intervals – traditionally, once every three years in England and Wales and once every six years in Scotland.[2] It is recognised that with the exception of motorways, traffic levels will vary along the length of a link. However, the procedure of counting at a statistically random point on each link can be expected to lead to good estimates at national level although estimates on some individual links may be less reliable.

42. In total, about 5,100 major road sites are scheduled to be counted in 2006. In addition to traffic count data, information is collected about the characteristics of each link, such as its length and the road class and road width at the place of the count. At each chosen point, trained enumerators count vehicles of each of eleven types (pedal cycles, two-wheeled motor vehicles, cars and taxis, buses and coaches, light vans, and six separate categories of goods vehicle) for the 12 hours from 7 a.m. to 7 p.m. These counts are all scheduled to take place on weekdays, but not on or near to public holidays or school holidays. To minimize the effects of possible seasonal factors, counting is confined to the so-called "neutral weeks". These are namely most weeks in March, April, May, June, September and October.

43. Some major road links are unsafe to count or are too short to be worth counting in the normal way. In these cases, traffic estimates are derived from the judicious use of flow data on adjacent links. These are called derived links. Further, because all links are now defined as ending at a local authority boundary, some links are treated as dependent links. In these cases, it is assumed that the flow is the same along all of the link. So, a count in one local authority can be used as a proxy for the flow on the dependent link. In the calculation of 2005 annual road traffic estimates, there were 15,558 normal links, 1,242 derived links and 1,038 dependent links. Complete coverage of the minor road network is not attempted as it is too extensive. It is not

[1] Prior to 1993, traffic was estimated for built-up and non built-up roads, with built-up roads defined as those with a speed limit of 40 mph or less (irrespective of whether there are buildings or not) and non built-up roads as those with a higher speed limit.. This definition was originally introduced to identify roads in built-up areas. However, there has been an increase in the adoption of speed limits of 40 mph or less in rural areas in recent years. As a result, the new classification of roads as urban or rural (see above) has been adopted for traffic estimates from 1993.

[2] Since 1999, the frequency of counting has been broadly based on the variance of the traffic of the link (variance of average flow * link length) generally at intervals of every one, two, four and eight years.

practicable to define the minor road network in terms of individual links; even if all the links could be identified, their number would be far too great to allow traffic data for each link to be collected. Minor road traffic estimates are therefore made by grouping minor roads into one of the six road classes.[3] An attempt is then made to measure the average flow on each of these road types by carrying out a number of counts along them. A random sample of approximately 4,500 sites across United Kingdom is visited each year. These same sites are counted each year. Most of these counts are carried out in neutral weeks. However about 220 counts per year, the "summer-winter counts", are carried out in non-neutral weeks and on weekends. These 220 or so sites are visited each year and are mainly used to provide extra information about two-wheeled traffic throughout the year. This is because pedal cycles and motor cycles are not always accurately identified by automatic counters (see paragraph 9).

44. The manual counts have the advantage over automatic counts of complete coverage of major road sites and moderately good coverage of minor roads. However, the data (hourly by vehicle type), are very sparse since traffic is counted for only 12 hours on each visit. Thus these counts give no information about traffic at night, at weekends, over public holiday periods, and little about the seven non-neutral months. In calculating national traffic estimates, therefore, use must be made of data from automatic counters.

C. The automatic counts (previously referred to as the core census)

45. The automatic counters fill the gaps left by the manual counts. There are some 190 sites in United Kingdom outside of London where traffic is monitored continuously using automatic sensors, which classify the traffic into vehicle type. The numbers of vehicles of each type detected are combined into hourly totals and stored on-site until it is downloaded during the night to a computer in the DfT headquarters building. The automatic counting equipment recognises 22 different types of vehicle; these are then combined to provide estimates for the eleven vehicle types[4] used by DfT.

46. The automatic counters do not give 100 per cent accuracy. For example, the equipment cannot classify vehicles into their different types when the traffic is moving very slowly (5 mph or less). They also have a tendency to malfunction, though the new sensors recently introduced, are more reliable than the previous ones. The equipment cannot distinguish between cars and car-based vans and can also have difficulty distinguishing between some types of buses and coaches and goods vehicles having similar axle spacing and chassis height. The equipment is also prone to failing to identify two-wheeled vehicle traffic, both bicycles and motorcycles.[5] Nevertheless, they do have the big advantage over manual counts that they operate continuously and so can give a complete picture of traffic at the points where they are sited.

47. The automatic counters in London are slightly different to those outside London. There are 54 automatic counters in London and they are "volumetric" classifiers that only distinguish between short (up to 5.2 metres) and long (greater than 5.2 metres) vehicles. They need 24-hour manual counts every three months to provide estimates of the breakdown of traffic by vehicle

[3] These include: urban and rural "B" roads, "C" roads and unclassified roads.

[4] These include: Pedal cycle, two-wheeled motor vehicle, car, light goods van, bus, rigid 2 axle lorry, rigid 3 axle lorry, rigid 4 or more axle lorry, 3 axle or 4 axle articulated, 5 axle articulated and 6 axle or more articulated.

[5] This deficiency underpins the need for the extra sites for manual counting on minor roads in the summer and winter months.

type in each hour of the day. These counters suffer from similar problems as those outside London, but are more reliable than the automatic counters used outside London.

D. Annual Average Daily Flows (AADFs)

48. The data for all manual counts done in neutral months[6] are combined with information from automatic counters on similar roads to provide an estimate of the AADF at that site. This is normally done by multiplying the raw count data by factors derived from the automatic counts in that same year. There are a large number of such expansion factors since there are separate factors for each vehicle type, day of counting and expansion factor group.[7] Because these counts are done in neutral weeks, the expansion factors used do not usually vary too much from year to year, except when bad weather has restricted traffic during the winter months. For cars, the factors are usually between 1.00 and 1.25 (except on motorways and in London where the factors are higher) while for goods vehicles the factors vary between 0.75 and 1.25 - lower because of the greater drop in goods vehicle traffic at weekends.

49. The automatic counters provide a reasonable guide to changes in traffic over time. This information is used in two ways. Firstly, it is used to provide provisional quarterly estimates of traffic, which are published on the sixth Thursday following the end of a quarter. Secondly, they are used to provide growth factors between consecutive years. These growth factors are used for links not counted, or not counted satisfactorily in the latest year. In these cases, the AADF for the previous year is multiplied by the appropriate growth factor to give a reasonable estimate of the AADF for the latest year.

E. Use of AADFs in Calculation of Annual Traffic Estimates

50. Different procedures are used for major and minor roads in converting AADF data to traffic estimates. The difference arises because the link concept cannot be applied to minor roads.

F. Major roads

51. A major road link of length 2 km with an AADF of 50,000 has a traffic figure of 100,000 vehicle-kilometres (2*50,000). This equates to 36.5 million vehicle kilometres a year. Because every major road link is counted, in principle, total traffic on major roads can be obtained by summing the traffic figures for every link.

52. As mentioned in paragraph 6, some links are not counted. In these cases, the traffic flows are derived from adjacent links using suitable formulae (derived links) or using the flow of the adjacent link as a proxy (dependent links).

G. Minor roads

53. In the base year (currently 1999), for each minor road class in each local authority an AADF is estimated based on a sample of traffic counts, including those projected forward from counts done in earlier years. These AADFS are then multiplied by the total road length for the relevant minor road category to give an estimate of traffic for that road category.

---

[6] Counts done in the summer and winter months are not grossed-up: the sites are normally counted at the same time of the year each year and so are compared directly with each other.

[7] There are now 22 expansion factors groups. These are based on type of area (from holiday area to Central London), road category and, in some cases, traffic flow level.

54. Traffic for the latest year is then obtained by calculating changes in traffic flows, after taking into account any changes in road length. For the 2000 to 2003 estimates, the flows were derived from the automatic road counts. For the 2004 and 2005 estimates, traffic flows from the manual counts were used. This is plausible, since some of the newest will be quiet roads on housing estates whilst others will be busy roads recently declassified from major road status.

H. Quarterly and annual estimates of traffic

55. As mentioned in paragraph 12, the automatic counters are used to provide provisional quarterly estimates throughout the year. A first estimate for the year is published in early February, and this is largely based on automatic count data. A final estimate for the year is normally published in early July and this is produced by putting together the estimates for major and minor road traffic as detailed above.

I. Availability of data

56. Basic quarterly data are included in the quarterly statistical bulletin Traffic in Great Britain, which can be obtained by contacting Road Traffic Statistics The data are also included on the DfT website. They can be downloaded from the correct PDF file which can be located under
<http://www.dft.gov.uk/pgr/statistics/datatablespublications/roadstraffic/traffic/qbtrafficgb/>.

- - - - -