



# Economic and Social Council

Distr.: General  
30 January 2024

Original: English

## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on Transport Statistics

##### Seventy-fifth session

Geneva, 24–26 April 2024

Item 8 (b) of the provisional agenda

##### Traffic censuses: Countries' experience

### Poland's experience in road traffic census

#### Submitted by the Government of Poland

##### *Summary*

This document presents Poland's approach to conducting traffic censuses, with a focus on road network segmentation practices. It aims to provide insights that could be beneficial for member States in preparation for the 2025 UNECE E-Road traffic census.

## I. General traffic census and data sources

1. The national road network in Poland is managed by the General Directorate of Roads and Motorways (GDDKiA). It manages approximately 18,000 km of national roads, located outside the boundaries of presidential cities in Poland (mostly large cities with populations over 100,000).
2. In Poland, traffic data for national roads are derived from various sources, including general traffic census (GTC), automatic traffic counting (ATC), and other short-time/ad-hoc traffic measurements.
3. The GTC, a primary source of traffic data in Poland, provides information on general traffic characteristics, such as average annual daily traffic (AADT), ADT during summer months, average traffic at each time of day, and vehicle classification into seven distinct categories. It is conducted every five years, in a standardized manner, covering both national and voivodeship roads.<sup>1</sup> The GTC encompasses around 2,300 counting sections, totalling about 18,000 km of national roads. For sections without automatic traffic counters, Poland conducts 9, 5 or 3-day counts<sup>2</sup> using video cameras. These counting days (Tuesdays, Wednesdays, Thursdays, and Sundays) are distributed through the year and conducted in January, March, May, July, August, and October. Video cameras proved to be the best

<sup>1</sup> A voivodeship road refers to a category of public road administered by a voivodeship, an administrative region or province in Poland.

<sup>2</sup> In the year of measurement.



solution for short-time traffic counting as they document the whole traffic survey day and allow for thoroughly verification of registered data.

4. ATC complements the traffic measurement system in Poland by offering detailed information on traffic characteristics (daily traffic distribution, seasonal traffic distribution, peak hours, etc.). However, due to costs related to the maintenance and analysis of traffic data from ATC, it only covers about 300 selected sections of the national road network. Poland mainly employs inductive loop detectors (that divide vehicles within 8+1 classification scheme) and non-intrusive traffic detectors (such as LIDARs and video detection technologies). Poland put a lot of effort to gain as accurate data as possible, each ATC managed by GDDKiA is thoroughly verified twice a year using video cameras to confirm the accuracy level.

5. GTC data support multiple policy-making activities, including road planning and development, road and adjacent infrastructure design process, traffic management, road maintenance, and environmental and economic analyses. Furthermore, these data are instrumental in contributing to the UNECE E-Road traffic census.

6. The figure below provides a visualisation of the Polish national road network as captured in the GTC for the years 2020 and 2021. The following colours represent the types of traffic counting points assigned to counting sections:

- Blue: type FV/HV/H – sections with semiautomatic or 9-day counting calendars.
- Green: type GV/G – sections with 5-day counting calendars (AADT below 6,000 vehicles/day);
- Orange: type EV – sections with 3-day counting calendars (selected sections below 2 km in length, adjacent to sections with 9-day or automatic counting, and having similar daily traffic distribution); and
- Red: type A – sections with fully automatic counting using laser detectors from the Electronic Toll Collection system.

#### **Polish national road network from GTC 2020/2021 with highlighted traffic counting points**



Source: GDDKiA (2024).

## **II. Segmentation of national road network**

7. The primary objective of GTC in Poland is to obtain basic traffic parameters and characteristics for all sections of the national road network, while maintaining comparability with previous general measurements. Therefore, the basic criterion for dividing the network into counting sections is the quantitative uniformity of traffic volume on a given road section. Based on previous experience and analyses, it is assumed that this criterion is met if the

changes caused by incoming or outgoing traffic between the beginning and end of the counting section are less than 1,000 vehicles per day. Consequently, the boundaries of counting sections are primarily located at intersections and junctions where such significant traffic volume changes may occur. In addition, counting section boundaries are established at other points where traffic does not always change significantly but is necessary for various reasons, such as the start or end of a particular road, state borders, and change of road manager.

8. The general rule is that the length of a counting section should not exceed 30 kilometres, with exceptions made for sections between interchanges on motorways and expressways. However, any exceptions are subject to thorough analysis by the road authority.

9. To ensure comparability with the results from subsequent general measurements, it is recommended to maintain the division of the road network from the last GTC, unless necessary changes arise due to:

- The construction of new sections of national roads;
- Alterations in the routes of existing sections of national and voivodship roads;
- Transfer of road sections to other lower-tier road managers, such as voivodship road managers;
- Optimization of the current division of the road network into counting sections based on experiences, observations and analysis of previous GTC results. This may involve adjusting the boundaries of counting sections to better represent the distribution of road traffic volume on the national road network or at crossing/passages through cities;
- Simultaneous traffic surveys at rail and road crossings;
- Division of an existing counting section into multiple parts, e.g. due to a significant increase in traffic volume from a local road or other traffic-generating centre, planned road investments, etc.; and
- Merging of counting sections, especially when there has been no significant change in traffic volume in adjacent sections during the previous GTC.

10. The boundaries of counting sections on national roads are mandatory at the following points (often associated with reference points of the national road network reference system):

- Intersections with national roads;
- Intersections with voivodship roads with AADT volume exceeding 1,000 vehicles per day from the last GTC, except in cases where two such intersections are located on a national road within a distance of less than 2 kilometres (in such cases, the boundary should be placed at the intersection with the voivodship road with higher traffic volume) or when division is necessary for network optimization or planned road network changes;
- The start or end of a given road;
- Country borders; and
- Borders of presidential cities.

11. In exceptional cases, analysed and individually approved by the road authority team responsible for traffic counting activities, boundaries of counting sections may be located at points other than those mentioned above if a significant change in road traffic (over 1,000 vehicles per day) has been observed since last GTC. This applies to the following locations:

- Intersections with other public roads;
- The boundaries of cities other than presidential cities with a population exceeding 10,000 inhabitants, provided counting sections are present or will be divided within these cities (counting sections described as crossings/passages through such cities); and

- Other significant traffic-generating or attracting locations, such as large investment areas, recreational centres, industrial plants, shopping centres, etc.

12. Additional information regarding counting sections that constitute bypasses or crossings/passages through cities with a population of over 10,000 inhabitants: In each case where the estimated difference in AADT volume (based on data from the last GTC) on the bypass road or a road running directly through the city, and AADT volume on an adjacent road section exceeds 1,000 vehicles per day, at least one independent counting section is established. Given the nature of such sections, often characterised by substantial traffic volume fluctuations on short sections between intersections with city streets, the survey should be conducted at the location with the highest observed traffic volume for a selected counting section (considered to be traffic homogeneous). If particularly justified (e.g., city size, layout of main roads, significant traffic volume changes between intersections with main city streets etc.), it is also permissible to divide the bypass or city crossing/passage into multiple counting sections (the previously stated rules for the mandatory location of counting section boundaries do not apply in such cases).

13. It is worth noting that the boundaries of the country's territorial/administrative units, including voivodeships, poviats, etc., are not criteria for dividing counting sections since they do not impact changes in traffic volume. Counting section boundaries are also not established at locations where the road cross-section changes from single carriageway to dual carriageway, unless this change occurs at an intersection that causes a significant change in traffic volume on the road section.

### **III. Concluding remarks**

14. According to the Polish road authority, the described methodology is considered optimal and represents the best compromise between traffic census costs and the obtained results. It allows for a detailed division of the road network and provides insights on fundamental traffic characteristic for each counting section. The data collected for each counting section allows for the calculation of detailed characteristics and statistics for the entire national road network, such as traffic volume changes between GTCs and the number of vehicle-kilometres. Consequently, in conjunction with ATC data from selected road network sections, it facilitates the monitoring of traffic volume changes over the years and enhances planning for new road investments, maintenance of existing roads, organization of roadside infrastructure during roadworks, support for private entities (fuel stations, charging points), implementation of safety measures and equipment, and more.

15. Member States are encouraged to share their experiences and methodologies in traffic data collection and analysis to promote mutual learning and improve the overall approach to the UNECE traffic censuses.

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