# BRIEF DESCRIPTION OF PASSENGER TRANSPORTATION TECHNOLOGIES IN AUTOMOBILES

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**Anatatsia.** The bus is equipped with information on the main qualitative characteristics that determine the degree of service (passenger traffic) and the efficiency of vehicle use.

***Keywords:*** Route, classification table, city bus, passenger traffic, traffic flow, bus capacity.

# КРАТКОЕ ОПИСАНИЕ ТЕХНОЛОГИЙ ПЕРЕВОЗКИ ПАССАЖИРОВ НА АВТОМОБИЛЯХ

**Анататсия.** Автобус оснащен информацией по основным качественным характеристикам, определяющим степень обслуживания (пассажиропотока)и эффективность использования транспортного средства.

***Ключевые слова:*** Маршрут, классификатсионная таблитса, городской автобус, пассажиропоток, транспортный поток, вместимост автобуса.

Passenger transportation by automobiles constitutes an integral part of the overall transport system of our country and, alongside other modes of passenger transport, performs the essential function of carrying passengers. Regardless of the mode of transport, certain general requirements are imposed on the organization of passenger transportation. These include delivering passengers to their destinations within the shortest possible time, ensuring precise and regular operation of vehicles along the entire route, efficient utilization of transport means, guaranteeing complete safety during transportation, providing passengers with high-quality and culturally appropriate services, and minimizing operational costs whenever possible.

Compared to other modes of passenger transport capable of carrying large passenger flows, automobile-based passenger transportation has several advantages. Chief among them is the high maneuverability of buses, which allows passengers to be transported closer to their workplaces and residences. Furthermore, on well-developed and paved road networks, buses achieve higher operational speeds than other ground-based passenger transport modes. Another advantage of bus transport lies in its flexibility — new routes can be introduced quickly whenever needed.

However, bus transport also has certain drawbacks. Compared to suburban railways, trams, and trolleybuses, bus productivity is relatively low. In addition, the higher cost of fuel and the resulting operational expenses, as well as the significant environmental pollution caused by harmful emissions, are major disadvantages.

The organization of bus transport is based on specific routes. Passenger transport routes within cities, districts, or regions are referred to as the transport route network. A network consisting exclusively of bus routes is termed the bus route network. Urban passenger transport routes are classified according to transport mode (bus, tram, trolleybus, metro, etc.), route configuration, operational speed, and service regime.

A bus route is defined as a designated path connecting the initial and terminal stops of buses and route taxis. Depending on operational characteristics, urban bus routes may be divided into regular, semi-express, or express services. On regular routes, buses stop at every designated stop. Semi-express routes only stop at major transfer points with significant passenger exchange. Express routes, by contrast, typically stop only at terminal stations or, in some cases, at a few selected intermediate stops, thus ensuring higher average speeds.

Semi-express and express services may be organized within existing regular routes, whereas such systems are not feasible for trams or trolleybuses. Routes are also categorized as permanent or temporary depending on service duration. Permanent routes operate consistently throughout the week with fixed vehicle frequencies, while temporary routes are introduced seasonally or in response to demand fluctuations.

Each bus route is assigned a numerical code, beginning with “1.” In large cities, urban routes are numbered from 1 to 99 (sometimes up to 199), suburban routes from

101 to 199 (or 201–299), while intercity routes receive subsequent numbering. Express routes are often marked with the letter “E,” semi-express routes with “T,” and shortened routes with the letter “Q.”

The primary qualitative indicators that determine the level of passenger service and the efficiency of vehicle utilization on bus routes include:

- Travel speed;
- Headway (interval between buses);
- Load factor of vehicle capacity;
- Passenger turnover coefficient;
- Average trip length.

The headway is the time interval between successive buses passing a given stop. Routes with high service frequency generally have headways not exceeding 10–15 minutes, whereas routes with lower frequency require strict timetables to ensure passengers can plan their trips reliably. The distance covered by a bus from the initial stop to the terminal stop is defined as a trip, while a round trip denotes a complete cycle of travel from the initial terminal to the final terminal and back again.

In major cities, buses remain the most widespread form of urban passenger transport. In small and medium-sized towns, they are often the only available means of public passenger transportation. The choice of a specific mode of transport depends primarily on its operational characteristics, initial capital investment requirements, and unit transportation cost. In large cities, however, the combined use of all available passenger transport modes is considered most effective.

Bus routes are organized to serve specific passenger flows depending on the spatial distribution of demand. The average travel distance between stops directly influences overall trip length. Extending average trip distances enhances connectivity and improves passenger travel speed between stops.

- ✓ The main requirements for suburban transport networks include:
- ✓ Direct accessibility to destinations with minimal transfers;
- ✓ Reduction of travel time;

- ✓ Passenger loads not exceeding the normative vehicle capacity;
- ✓ Assurance of passenger safety.

The design and justification of bus routes depend on the distribution of passenger flows. Properly selected routes reduce passenger travel times and improve transport efficiency. All route-planning decisions must therefore be based on accurate data regarding passenger flow characteristics.

In some cases, multiple bus routes may overlap within sections of the transport network. To assess the degree of coverage of urban streets by bus services, the route coefficient is applied. This coefficient is calculated as the ratio of the total length of all bus routes to the length of the street network traversed by these routes.

$$K_y = \sum Lu / \sum Lk;$$

$L_u$ – the total length of routes,

$L_k$ – the total length of streets traversed by the routes.

The route coefficient indicates the average number of routes passing through each segment of the bus transport network. The greater the route coefficient, the better the streets are covered by bus services, which in turn provides greater convenience for passengers. As a result, the walking time to reach bus stops decreases. In cities with a highly developed bus transportation system, the value of the route coefficient generally ranges between 1.2 and 3.5 [7–8].

Another indicator used to evaluate the level of service provided to suburban populations is the network density. Network density reflects the extent to which suburban areas are covered by bus routes. This measure also determines the amount of time passengers spend walking to reach bus stops. Network density is calculated as the ratio of the total length of bus routes to the surface area of the suburban territory:

$$\sigma = \frac{\sum L_m}{F}, \quad км/км^2;$$

$L_m$ – the total length of the network (km),

F – the surface area of the suburban territory ($km^2$).

In large cities, the network density should generally range between 2 and 2.5$km/km^2$..

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