

УДК 656.13:656.08

## ***SAFETY ISSUES OF URBAN PUBLIC TRANSPORT STOPS IN THE CITY OF KROPYVNYTSKYI***

**D.V. Holyb**, *Assoc. Prof., PhD tech. sci,*  
**O.M. Livitskyi**, *Senior Lecturer, PhD tech. Sci*  
**V.S. Lytvynenko**, *student of the group TT -24Mz,*  
**Ye.A. Ovcharov**, *student of the group TT -24Mb,*  
*Central Ukrainian National Technical University, Kropyvnytskyi*

Safety at public transport stops means compliance with all legislative norms of Ukraine aimed at ensuring complete safety at stopping points through improvements in infrastructure and the city's route network as a whole.

The necessary conditions for ensuring the safety of mass passenger transportation include serviceable passenger vehicles (PVs) that meet road conditions and transport volumes; high qualification and discipline of drivers and all service personnel; properly maintained roads with the required infrastructure; and a rational organization of traffic that provides priority to public transport where necessary.

Well-coordinated operation of the route-based passenger transport system reduces the use of private cars, especially for commuting, thereby decreasing the load on the road network. Thus, coordinated organization of passenger transportation and vehicle movement on routes is currently a global issue for the organization of urban traffic as a whole.

The main tasks for ensuring passenger transportation safety include:

- compliance with legislative and regulatory requirements of Ukraine regarding driver qualification, health condition, behavior in traffic, and work-rest schedules (ensuring professional reliability of PV drivers);
- maintaining vehicles in technically sound condition and preventing failures or malfunctions during operation;
- ensuring safe road conditions along bus routes;
- organizing the transportation process using technologies that guarantee safe conditions for passenger travel.

Mass passenger transportation by urban public transport its speed, safety, and efficiency is crucial for public convenience.

Experimental studies of stopping points revealed the following:

- At the "Bus Station No. 2" stop, route vehicles stop in two rows; passengers are forced to step onto the roadway; due to the significant length of the stop, maneuvering time increases, queues form, and traffic jams and critical situations often arise, leading to road accidents.
- At the "Administrative Services Center" stop, buses stop in one row, but due to a nearby traffic light, queues of route vehicles accumulate. The parameters of this stop do not allow all accumulated vehicles to pass through simultaneously, so they must wait for space to load and unload passengers.
- At the "Main Post Office" stop, route vehicles stop in one row. This stop is not equipped with a pull-in bay. Its length is small on average 13 meters so queues form while waiting for space, negatively affecting the operation of the stop.

It was found that due to a traffic light located approximately 10 meters before the stops, route vehicles accumulate. Drivers unload passengers not at the designated area but before the traffic light, reducing traffic safety. Surveys conducted in different years revealed a trend: a

decrease in municipal public transport routes and an increase in private carriers. While the number of routes increased only slightly, the intensity of incoming vehicle flow grew by an average of 44%. The increase in the number of small-capacity vehicles leads to overload not only of the street-road network but also of stopping points, since more such vehicles are required to transport the same number of passengers.

Existing stop parameters do not allow accommodating a large number of route vehicles, resulting in congestion at stops, reduced traffic safety, and increased service time at stops from 3 to 119 seconds. On average, service time at stops equipped with pull-in bays is 30% longer than at stops without bays.

Experimental studies revealed the following trend: when the stop is completely free, a route vehicle tends to occupy the middle position (out of three available in the bay). Large-capacity vehicles line up at the end of the queue, while small-capacity vehicles try to move forward and take available space. Most small-capacity vehicles either stop in the second or even third row to load/unload passengers or pass without stopping.

The study made it possible to identify the following safety problems of urban passenger transport:

1. Lack of safety barriers (“bollards”, “posts”) separating the passenger zone.
2. Absence of pull-in bays, causing loading/unloading to occur directly on the traffic lane.
3. Loading/unloading passengers outside the designated bay or in the second row.
4. Incorrect placement of traffic light objects.
5. Improper location of stopping points (e.g., before intersections, creating queues and increasing accident risk).
6. Underdeveloped infrastructure, particularly the absence of stop shelters.

#### References

1. Аулін В. В., Митник М. М., Ляшук О. Л., Гевко І. Б., Цьонь О. П., Лисенко С. В., Гудь В. З., Гриньків А. В., Голуб Д. В., Бабій М. В. Формування та функціонування логістичних центрів в регіональних транспортно-логістичних системах України: монографія за заг. ред. д.т.н., проф. Ауліна В. В., д.т.н., проф. Ляшука О. Л. - Тернопіль : ФОП Паляниця В. А., 2024. - 393 с.
2. Методологічні основи проектування та функціонування інтелектуальних транспортних і виробничих систем : монографія / В. В. Аулін, А. В. Гриньків, А. О. Головатий [та ін.] ; під заг. ред. В. В. Ауліна. - Кропивницький : Лисенко В. Ф., 2020. - 428с.
3. Аулін В.В., Великодний Д. О., Тирса Я. В., Кабак В. Д. Оцінка ефективності функціонування міського пасажирського транспорту з урахуванням вибору маршруту пасажиром. Матеріали VIII-ої міжн. наук.-практичної інтернет-конф. «Проблеми і перспективи розвитку автомобільного транспорту», 14-15 квітня 2020 року: зб. наук. праць / МОН України, ВНТУ [та ін.]. Вінниця: ВНТУ, 2020. С.15-16.
4. Аулін В.В., Голуб Д.В., Дібровний В.С., Талалаєв О.М., Шерстюков В.В., Ніколенко Б.М. Інформаційна модель забезпечення надійності та ефективності транспортних процесів пасажирських перевезень. Матеріали Міжнародної науково-практичної конференції “Підвищення надійності машин і обладнання. Increase of Machine and Equipment Reliability”, 15-17 квітня 2020 р. Кропивницький: ЦНТУ, 2020. С.230-232.