EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 12, December 2025
brightmindpublishing.com
ISSN (E): 3061-6972

HYGIENIC JUSTIFICATION OF NOISE PROTECTION MEASURES IN THE CITY OF TASHKENT

Sadullaeva Kh. A.
Salomova F. I.
Tashkent State Medical University

Abstract
This paper examines the impact of urban noise on the health of the Tashkent population and justifies a set of noise protection measures from an environmental health perspective. An assessment of the acoustic environment in various functional zones of the city (residential areas, highways, and industrial zones) was conducted, identifying the main sources of noise pollution and their contribution to the overall sound level. Based on an analysis of the obtained data, excesses of maximum permissible noise levels were determined and a hygienic assessment of the potential risk to public health was provided. Effective noise protection measures have been proposed and substantiated, including urban planning, architectural design, engineering, and organizational/administrative solutions. Particular attention is paid to the use of green spaces, noise barriers, rational zoning, and traffic flow optimization.
The study's findings support the need for a comprehensive approach to reducing noise pollution in Tashkent and the implementation of hygienically sound measures at the design and operation stages of urban infrastructure.

Keywords: Noise, hygiene, Tashkent, urban environment, noise protection measures, public health, acoustic pollution.

Introduction

The widespread increase in the vehicle fleet, rising traffic volumes, and expansion of the street and road network are leading to an increase in the area of urban areas subject to constant noise pollution and a deterioration in noise conditions in residential areas and within residential and public buildings. Acoustic discomfort is facilitated by the increasing number of storeys and density of residential buildings, as well as their proximity to noise sources, which violates one of the

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 12, December 2025
brightmindpublishing.com
ISSN (E): 3061-6972

hygienic requirements—observing sanitary breaks and ensuring standards for permissible sound levels in places of human habitation and recreation [1, 2, 3]. The excess of sanitary norms for permissible noise in large cities reaches 15-25 dBA in the area near highways, and 20 dBA or more in residential buildings [4]. High levels of urban noise are the cause of complaints from the population about interference with certain types of work activities, proper rest and sleep, cause masking (difficulty in perception) of speech, as well as functional disorders of the central nervous and cardiovascular systems, the organ of hearing [5, 6, 7]. In order to normalize the noise regime in a number of countries, various urban planning, engineering, design, and administrative-organizational measures are being implemented that have great socio-economic significance [8, 9, 10]. From a hygienic point of view, it is of interest to study the noise protection properties of architectural planning solutions for residential development, used to reduce noise in residential areas and in residential buildings, for their proper assessment.

The purpose of the study was to investigate noise propagation within a residential development with various building placement options relative to external noise sources, with the presence of individual noise protection elements.

Material and methods of the study

Noise measurements were carried out using an Oktava 101 AM noise meter and spectrum analyzer in accordance with the requirements of SanPiN 0267-09 "On ensuring permissible noise in residential and public buildings and on the territory of residential development", Sanitary norms and rules for the planning and development of populated areas of Uzbekistan, SanPiN No. 0339.

Sound levels were determined in areas adjacent to highways and within neighborhoods. Noise measurements were conducted in Tashkent. The studied neighborhoods were located near busy city highways. Noise recording points were selected based on the potential propagation path of the sound source in open and built-up areas, with the presence of screens in the form of residential and non-residential buildings. A single sound level measurement lasted at least 30 minutes at each point. It was established that the noise conditions in residential areas are determined by the location of external noise sources and the nature of their use. Transport noise accounts for the majority of the daily noise dynamics. The spatial

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 12, December 2025
brightmindpublishing.com
ISSN (E): 3061-6972

structure of the first building line significantly influences the propagation of traffic noise.

Results of the study and their discussion

Studies have shown that in open-plan developments with large gaps between buildings, traffic noise penetrates long distances (up to 200–250 m), creating a relatively high acoustic background (equivalent sound levels during the day reach 57–60 dBA, and at night, despite reduced traffic volume, 50 dBA). In edge-on developments near highways, sound levels at a distance of 50 m decrease by only 4–5 dB. The noise environment deep within a neighborhood depends primarily on the operation of intra-block noise sources and the activities of the population. Due to the episodic, short-term nature of these sources, significant fluctuations in sound levels are observed throughout the day (up to 15 dBA). When evaluating various planning and development options for residential areas, it is important to determine the area of the territory exposed to high levels of traffic noise, i.e., the acoustic discomfort zone. The acoustic discomfort zone is the area of residential territory within a microdistrict, located between the boundary of major transport routes and the curve corresponding to the permissible sound level for daytime (55 dBA) and nighttime (45 dBA). These zones characterize the acoustic environment of a residential area. They also indicate the area with excessive sound levels and allow for the determination of the population size. These zones can be plotted on a site plan based on in-kind measurements or, based on known noise propagation patterns, calculated using road network noise maps compiled with consideration of the development prospects and plans for the residential area or microdistrict. A comprehensive acoustic assessment of a residential area enables the design architect, even at the pre-design stage, to correctly locate residential buildings, playgrounds, recreational areas, etc., relative to major transport routes, and to develop the necessary noise protection measures . Using a calculation method based on measurement data, an acoustic discomfort zone was constructed for a microdistrict bounded on three sides by citywide and district highways (Mukumiy Street, Shota Rustaveli Street, and Furkat Street) with heavy traffic—up to 1,500 cars per hour and equivalent sound levels LAeq. of 60–75 dBA.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 12, December 2025
brightmindpublishing.com
ISSN (E): 3061-6972

Visual gradation of noise level and degree of acoustic discomfort

Indicator	**Meaning**	**Note**
Location of the microdistrict	It is bordered by highways on three sides.	st. Mukumiy, st. Shota Rustaveli, st. Furcata
Type of highways	Of citywide and district significance	High traffic load
Traffic intensity	Up to 1500 machines/hour	During peak hours the load is maximum
Equivalent sound level (LAeq)	60–75 dBA	Exceeds acceptable levels for residential development
The main source of noise	Traffic flow	Cars, trucks, public transport
Determination method	Calculation method based on measurement data	The zone was determined based on acoustic measurements
Characteristics of the zone	Acoustic discomfort zone	The noise level exceeds the maximum permissible level.
Impact on residential development	Increased noise level	Noise protection measures are required (screens, landscaping, etc.)

Gradation of noise level and degree of discomfort

Sound level range (LAeq), dBA	**Degree of acoustic discomfort**	**Impact assessment**	**Color coding (for cards)**
up to 55	Acceptable level	Comfortable acoustic environment	Green
56–60	Mild discomfort	Possible irritation with prolonged exposure	Yellow
61–70	Moderate discomfort	Disturbance of peace, especially at night	Orange
71–75	High discomfort	Not suitable for residential development	Red
>75	Very high discomfort	Urgent noise protection measures are required	Dark red/purple

The depth of noise penetration in the neighborhood varies: it is less pronounced on Furkata Street, which is recessed into a ditch and partially bordered by a residential building. The largest zone of acoustic discomfort is located along Mukumiy Street, near the highway. which has open development with large gaps between the ends of adjacent buildings, which contributes to significant noise pollution of the intra-block space. Extended buildings that perform a noise protection function must

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 12, December 2025
brightmindpublishing.com
ISSN (E): 3061-6972

provide for: enhanced soundproofing of external enclosing structures and windows or a special layout solution for apartments with the orientation of quiet (sleeping) rooms towards the courtyard, i.e., these residential buildings must be noise-proof. Standard window designs in ventilation mode (with an open vent) provide a reduction in external noise by only 10-13 dBA (depending on the area of the open window element). Sanitary standards provide for the determination of calculated and actual levels of penetrating noise with open vents or other window ventilation elements, based on the requirements for ensuring standard air exchange in the premises. Therefore, increasing window insulation by increasing glass thickness, increasing the air gap, and using triple-glazing will only be effective if the window itself cannot be opened for ventilation. Therefore, window designs are needed that provide increased sound insulation and the required air flow into the room.

Conclusion

The conducted research, as well as the review of design documentation, confirmed the need to assess the acoustic conditions of living conditions for their compliance with regulatory sound levels. The required reduction in sound levels to acceptable values can be determined by calculation, based on the noise level generated by the source, the distance to the protected facility, the presence of noise-shielding structures, the terrain, and green spaces, taking into account future changes in the acoustic situation. The noise protection measures used must not degrade the living and recreational conditions of the population in terms of microclimate, aeration, and insolation of buildings.

References

1. Levanchuk A. V., Kopytenkova O. I., Afanasyeva T. A. Hygienic justification of methods for reducing acoustic load in residential premises // Population health and habitat. - 2020. - No. 10 (331). - P. 46-51.
2. Lebedev K. Yu. et al. Hygienic aspects of urban development activities in aerodrome areas // Population health and habitat. - 2019. - No. 10 (319). - P. 46-49.
3. Kholopov Yu. A., Khmelnitsky Yu. N., Musatkina B. V. Analysis of the effectiveness of noise protection measures in railway transport // Protection from increased noise and vibration. - 2019. - P. 710-717.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 01, Issue 12, December 2025
brightmindpublishing.com
ISSN (E): 3061-6972

4. Kuznetsova E. B., Bulavina I. D. Justification of the volume of research of physical factors on the construction site from the point of view of hygienic standards // Hygiene and Sanitation. - 2017. - V. 96. - No. 7. - P. 651-656.
5. Baranova T. F., Tikhomirova N. A. Hygienic aspects of modern housing construction // Preventive medicine as a scientific and practical basis for maintaining and strengthening public health. - 2019. - P. 8-12.
6. Salomova, F. I., Mavlonov, A., & Abdukadirova, L. K. (2024). Talabalar o'rtasida gastritning tarqalishi va to'g'ri ovqatlanishning ahamiyati.
7. Rudneva E. A. Experience of conducting measurements and assessment of aircraft noise in the territory of Moscow Federal Budgetary Institution of Health "Center for Hygiene and Epidemiology in the City of Moscow" // Protection from increased noise and vibration. - 2023. - P. 174-181.
8. Kartyshev O. A., Nikolaikin N. I. Criteria for assessing aircraft noise for zoning the aerodrome territory of airports and justifying protective measures // Scientific Bulletin of the Moscow State Technical University of Civil Aviation. - 2017. - V. 20. - No. 3. - P. 30-40.
9. Levanchuk A. V., Ryabets V. V. Features of assessing the comfort of the environment of urban settlements taking into account vibroacoustic impact in the zone of influence of transport railway junctions // Bulletin of Eurasian Science. - 2021. - Vol. 13. - No. 6. - P. 53.
10. Klepikov O. V. et al. Comprehensive assessment of the environmental condition of an industrial city // Hygiene and Sanitation. - 2018. - Vol. 97. - No. 8. - P. 686-692.
11. Alekseev V. B., Klein S. V., Koshurnikov D. N. Transport noise as a risk factor for population health and the establishment of restrictions on the use of land in urban and rural settlements // Population health and habitat. - 2022. - V. 30. - No. 10. - P. 25-32.