Key Aspects of Formation of Transportation Planning Framework and Selection of Accounting Parameters of City Street-Road Network

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***Abstract*—The street-road network, which plays the role of the main transport-planning axes in the planning structure of the city, is of great importance. The street-road network is a part of the road system of a settlement, between the separate functional zones of the settlement, within these zones and (or) in other areas of the city, providing passenger and freight traffic. This study aims to determine the main aspects of the formation of the planning framework and selection of calculation parameters of the street-road network system, which provides a comfortable, uninterrupted, fast and safe transport connection with all functional zones, other settlements of the settlement system, suburban facilities during the design of settlements.**

Keywords—street-road network, transport-planning framework, general plan, satisfaction rate, average distance between settlements, calculated parameters, main characteristics of traffic, highways, city-wide avenue, middle line

I. FORMATION OF URBAN TRANSPORTATION PLANNING FRAMEWORK

The transport planning structure of the settlement is the main element of the functional planning structure of the city, settlement. When planning the development of settlements, balanced development of the area and transport networks should be ensured, the structure of the planned street-road network should provide the possibility of alternative routes of movement in the same directions.

Urban highways include streets and avenues within the administrative-territorial boundaries of cities, including public roads. The road network (urban highways) forms part of the urban area, the boundaries are defined by a red line (demarcated by urban planning documents and separating the territories of neighborhoods, neighborhoods, as well as other planning structures from streets and squares) and for the placement of traffic, pedestrians and greenery. It is intended.

The transport planning framework should be developed in conjunction with the transport system of the adjacent areas. The framework of transport and planning, the functional purpose of streets and roads, taking into account the architecture and planning, the organization and perspective development of areas, taking into account the perspective intensity of transport, pedestrians, bicycles, should be designed as a hierarchically integrated system.

It is necessary to approach the solution of transport problems in each city individually. The practice of one city may not be effective in another. In this case, local conditions and the already established planning structure must be taken into account. The planning structure determined by the configuration of the street-road network of each city is individual and depends on the historical development features of the city, the location of the main attractions in the plan, the terrain, the presence of water barriers in the city, etc. depends.

Transport issues should be prepared on the basis of strategic or precise design, future urban transport scenarios should be taken into account in detail during the preparation of the city's Master Plan, and a comprehensive approach to the city's future transport system should be formed. The solution to the problem of transport planning will determine the appearance of the city in the next 100 years and the basis for solving transport problems. If proper transport planning is carried out today, each of these projects will play a key role in the future, even if they are not implemented in the coming years.

When designing a street and road network in cities, the level of automation (current and projected), as well as the distribution of displacements by private and public vehicles (existing and projected) should be taken into account. Adequate traffic capacity of the road network and transport junctions should be provided based on the projected level of automation for the approximate period.

The number of cars coming to the city from other settlements and transit traffic flows should be determined by calculations based on the number of permanent and temporary residents, the number of jobs, the number of expanding and suburban settlements towards the city and the expected level of automation.

When designing a street network of a settlement, priority conditions should be created for the development of public passenger transport and conditions should be created for safe cycling or walking. Bicycle traffic must be provided in residential, public and commercial, industrial and recreational areas.

The network of streets and roads in the settlements should be formed taking into account the following expectations for the estimated period [1]:

☑ estimated (project) number of permanent residents and temporary travelers;

- ☑ the number of jobs created by individuals and legal entities, taking into account transport requirements;
- ☑ taking into account the volume of daily movements in compliance with safety requirements;
- ☑ Ensuring accessibility of facilities and areas for various functional purposes in accordance with the norms.

The assessment of transport-planning factors takes into account the overall assessment of the degree to which the nearest area of the city is provided with transport communications. This includes a feature of the transport element, such as "provision of the area" and its following indicators: the availability of one or another type of transport, its class, the width of the road impact zone and the time spent on one way.

In planning, the transport availability of the center and sub-centers has a significant impact on the surrounding areas and characterizes these areas by the degree of satisfaction. The degree of satisfaction depends on the time of arrival at the district centers.

Our observations have identified the possibility of efficient and accessible use of the road network by people if satisfactory zones are distributed over the following optimal distances [1,2]:

- ➢ Up to 10 km from I-II class highways;
- ➢ Up to 5 km from III class roads;
- ➢ Areas located up to 2 km from IV class roads.

Limited-satisfactory zones:

- ✓ Up to 25 km from I-II class highways;
- ✓ Areas located up to 12.5 km from III class roads.

Areas outside these zones are considered unsatisfactory.

It is suggested to use formula (1) to determine the average distance between settlements.

$$P=\sqrt{S/N} \quad (1)$$

Here: P - average distance (km); S - area (km²); N - number of settlements.

In typical conditions, the area of a conventional settlement is 2000 km², and when the number of settlements is 50, $P = \sqrt{2500/100}=5$ km. Thus, the average distance between settlements in the administrative district will be 5 km. At the same time, it should be noted that the calculated average distance does not fully take into account the complex relief of the region, so the real distance will be slightly different.

However, this is one of the indicators of the compactness of the settlement and can be considered as a relatively positive factor in the deepening of economic, labor and cultural ties between the settlements.

The average distance between settlements characterizes these areas in terms of the degree of satisfaction of people's efficient and accessible use of the road network. The analysis revealed that over the past 20 years, there has been a significant increase in population in all areas of the local settlement system in major developed cities around the world and the development of satisfactory use of the road network in the context of intensive urbanization.

In addition to these and other factors, mathematical modeling should be used to determine the average radius of impact of a city on its surrounding settlements.

As a result of comprehensive analysis, it was determined that the degree of satisfaction with the efficient and accessible use of the street-road network (their radius of influence) can be assessed as an indicator of its relatively important role in the district settlement system and socio-economic development. The said radius of impact should be in line with the urban impact zone, which has been identified through the analysis of local labor and cultural migration. Limited and unsatisfactory zones will occur due to relatively weak traffic activity in the region and the existence of underdeveloped connections between settlements. At the same time, the limited and unsatisfactory level of efficient and accessible use of the road network will lead to relatively poor traffic activity and the development of underdeveloped connections between urban settlements.

In the context of intensive urbanization, it is necessary to calculate and take into account the prospective population of cities in order to determine the optimal displacement distances according to the degree of satisfaction of the efficient and accessible use of the street network.

The calculation of the prospective population of cities should be carried out by the component (cohort) method and the results obtained should be analyzed.

The component (cohort) method allows to obtain a more accurate forecast based on* the shift of sex-age groups. The method uses the demographic balance equation (2):

$$P_1 = P_0 + B - D + M_i - M_0 \quad (2)$$

Here: P_0 and P_1 - the number of population at the beginning and end of the year (period); B - number of births during the period; D - number of deaths during the period; M_i - arrival of migrants; M_0 is the departure of migrants. B, D, M_i and M_0 are called the components of population change [3].

In calculating the population of the city for the first time and for the reporting period, the author proposed to consider 3 options:

- high natural growth rate, very weak mechanical growth and perspective number in the conditions of negative mechanical growth - continuation of existing trends - inertia (extrapolation) scenario;
- a pessimistic (depressive) scenario with a relatively high natural growth rate and a perspective number of adverse mechanical action conditions;
- high natural growth rate and number of perspectives in conditions of positive mechanical growth - favorable dynamic scenario.

As a result of comparing all the options (scenarios) analyzed above, the project should select a dynamic (2-4%) scenario that is more suitable for the economic, social and demographic development of the city and its territories, and summarize its results. should be predicted.

The calculations for the above scenarios should be reflected in the determination of the optimal displacement distances in terms of the degree of satisfaction with the efficient and accessible use of the street-road network.

As a result of complex analysis, it was determined that the main characteristics of the demographic situation of cities for the forecast years are as follows:

- increase in the share of able-bodied population;
- faster population growth over the working age population;

*P.K. Whelpton, 1893-1964. bax: Bogoue D.J.Techniques for Making Population Projections: Age-Sex Projections. Chicago, 1980. P. 8. Reprinted in: Readings in Population Research Methodology. Volume 5. Population Models, Projections and Estimates. Chicago, 1993.

- reduction of the share of the population under working age;

- against the background of indicators of natural population growth, increase in longevity of the population and, as a result, increase in the average age of the population (observed);

- higher middle age of women.

These trends are mainly in line with changes observed around the world.

A comprehensive assessment of the urban area and urban planning analysis, as well as the optimal planning of the city's street network and the framing of the appropriate framework should be provided to identify the population potential for the future development of the city and identify problem planning situations that require optimal urbanization measures [4,7].

The general architectural-planning composition of the city should be determined by the historical features of planning and construction, the nature of the development of transport communications, the natural conditions of the area (climate, rivers and ravines) and other development features of the city.

II. REQUIREMENTS FOR THE CITY TRANSPORT NETWORK

The street-road network of settlements should be designed as a continuous, uninterrupted and integrated system, taking into account the functional purpose of streets and roads, the intensity of traffic, bicycle and pedestrian traffic, the nature of the architectural-planning organization and construction of the area, as well as their development characteristics.

The urban transport system depends on the city they serve, the location of its population and buildings, the terrain, social conditions, etc. should form a unity. The whole complex of planning, socio-economic, demographic, climatic and other characteristics of the city must be taken into account when forming the urban transport network [5].

The design of the street and road network of the settlement should be carried out as follows [5]:

- as part of general plans prepared within the general territorial planning of the territory of the country or territorial parts (regions, district territorial units) (administrative centers of the district);
- as part of the transport part of the general plan of the settlement;
- as part of programs for integrated development of transport infrastructure of settlements and urban areas;
- as part of spatial planning projects, including general and detailed spatial planning projects that provide for the location of the road transport system or several transport infrastructure facilities;
- while developing project documents.

At the same time, the solution of transport issues is based on the principle that different modes of transport should be developed not in isolation from each other, but in parallel and interconnected, and serve to ensure the movement of the population. No transport route should be limited to a single point without performing a logical function and should not transfer traffic to a small street network in the city. A transport route should not be completed without establishing a logical and physical connection. Failure to address this issue leads to transport chaos in these areas and, as a result, necessitates the creation of road junctions at various levels, as a result of which tens of hectares of this valuable urban area are occupied by transport facilities, and transport problems remain.

Roads connecting cities and individual district centers, national and local roads (roads directly connecting villages and settlements with cities and district centers) and measures for their development in the territory of the country and (or) territorial parts (regions and) district territorial units) should be taken into account and defined in the general plans prepared at the level.

Highways of cities, settlements and individual district centers, city-wide avenues, streets and roads, district avenues, streets and roads, inter-settlement and village roads and measures for their development should be taken into account and defined in the master plans of these settlements.

Streets and roads of settlements, villages, as well as roads in the neighborhood (except for roads owned by the municipality) and measures for their development should be taken into account and defined in the detailed plans of these settlements. Measures for the development of district and local importance, as well as municipal roads opened for public use and their development should be included in spatial planning schemes.

Motorways within the territory of municipal highways or municipalities (except for international, republican and local highways, city, branch and private highways), as well as local roads of cities and regional centers, as well as in the territory of villages and settlements and owned by municipalities Streets, crossings, other roads and road facilities and measures for their development should be included in the spatial planning documents ordered by municipalities

All streets and roads of the road network determined by the detailed plans of settlements shall be determined by general plans and general plans, and all streets and roads belonging to the road network determined by general plans shall be determined by general plans of those settlements (regions, administrative and district territorial units). It should be taken into account, coordinated and planned in accordance with all measures and development directions related to the planned and defined road transport network [7].

The following requirements are set for the city's transport network:

- ❖ coordination of passenger and cargo flows with the capacity of the transport network;
- ❖ Optimality of the movement of the rolling stock between the regions with mutual transport connection and the minimum amount of time spent by the population on transport;
- ❖ minimum construction costs;
- ❖ Minimum traffic accidents and related costs.

Depending on these requirements, transport planning solutions based on tangential-circular and rectangular (rectangular-diagonal) urban transport planning schemes should be considered in the design of cities, except for historically formed, previously formed and formed transport schemes. During the design of settlements, traffic must be bypassed from the center, sharp angles and complex transport junctions must not be allowed to complicate urban construction and limit the capacity of the transport network.

Table 1.

STREETS AND ROADS			
CLASSIFICA-TION OF STREETS AND ROADS	**Rate and distribution of streets and roads**	**The main characte-ristics of street and road traffic**	**Functional purpose of streets and roads**
MAIN HIGHWAYS	I	high speed and continu-ous move-ment	- provides high-speed and uninterrupted transport links between public and business and residential areas located far from large and very large cities; - connects suburban public roads, urban areas, as well as airports and seaports, railway stations, reserves and recreation areas, as well as provides access to large recreation areas (recreation areas) and settlements in the settlement system; traffic is high-speed, unobstructed and uninterrupted, provides high-speed traffic and high traffic capacity; it is prohibited to stop or stop vehicles on the carriageway; - Entrances of vehicles are provided through road junctions of different levels built at streets and road crossings, as well as there are no crossings at the same level as pedestrian lanes. Pedestrian crossings are organized at different levels, outside the carriageway. Intersections are provided at different levels on different levels of streets and roads; with the exception of separate locations or where temporary rules are established, there are separate lanes for traffic in opposite directions, and between these parts there is a demarcation line or other means, except in exceptional cases.
	II	Adjust-able move-ment	- provides transport connections between the districts of the city, access to the surrounding highways; - pass outside the living space. Movement is regulated; - access roads for vehicles through intersections and road junctions are organized not more than 300-400 m; movement is allowed for all modes of transport; - Intersections with roads and streets of different degrees are organized at the same or different levels; - provides services to surrounding and adjacent buildings through side or local crossings; - pedestrian crossings are organized at the same and different levels with the carriageway.
URBAN CITY SIGNIFI-CANT AVENUE	I	Continu-ous and sustain-able move-ment	- transport links between residential, public-business and industrial zonal and public centers within the boundaries of large, large and very large cities and with them and other main streets, urban and suburban public roads, as well as other avenues with highways in the city and connects roads between streets; - provides uninterrupted and continuous traffic flows in the main direction; organizes the main transport communications providing high-speed communication in the populated areas of cities; provides access to highways, provides services to surrounding and adjacent buildings through side or local crossings; movement is allowed for all modes of transport; pedestrian crossings are organized at different levels along the carriageway; - provides traffic (including entrances) through road junctions of different levels, as well as road junctions of the same level built at the intersections with other streets.
	II	Adjust-able move-ment	- provides transport links between residential areas, industrial (industrial, scientific-production, utility-warehouse) zones and the city center, the centers of planning areas; - provides access to public roads outside the city. Movement is regulated; - movement is allowed for all modes of transport; the organization of a special lane for the unimpeded movement of public ground passenger transport with appropriate justifications is allowed (including for the movement of special purpose, ambulance, emergency and rescue vehicles); - Intersections with roads and streets of different degrees are organized at the same or different levels; - pedestrian crossings are organized at different levels with the carriageway, and at the same level with the carriageway with the application of traffic lights.
URBAN STREETS AND ROADS	-	Adjust-able move-ment	- ensures the connection of roads within the city boundaries between residential areas and public centers, as well as between highways and other avenues and streets in the city, connecting different districts of the city, as well as different residential areas of the city; - traffic is regulated or traffic is organized through unregulated intersections (traffic is self-regulating); - movement is allowed for all modes of transport; - the organization of a special lane for the unimpeded movement of public surface passenger transport with appropriate justifications is allowed (including for the movement of special purpose, ambulance, emergency and rescue vehicles); pedestrian crossings are organized at the same and different levels with the carriageway.
DISTRICT IMPORTANT AVENUE	-	Adjust-able move-ment	- provides transport and pedestrian connections within the settlement areas, access to other main streets, transport connection with avenues and streets of city-wide significance located within the district, as well as access to inter-district and city-wide avenues, streets and roads; - traffic is regulated or traffic is organized through unregulated intersections (traffic is self-regulating); - traffic is allowed for all modes of transport, intersections with other streets are basically at the same level; - pedestrian crossings are organized at the same and different levels with the carriageway.
DISTRICT IMPORTANT STREETS AND ROADS!	-	Adjust-able move-ment	- provides transport and pedestrian connections and access to city-wide streets and roads within the boundaries of the residential area, within the settlements; - traffic is regulated or traffic is organized through unregulated intersections (traffic is self-regulating); - traffic is allowed for all modes of transport, intersections with other streets are at the same level; - pedestrian crossings are organized at the same level as the carriageway.
ROADS BETWEEN SETTLE-MENTS AND VILLAGES	-	-	- provides transport and pedestrian connections and access to city-wide streets and roads within the boundaries of the residential area, within the settlements; - traffic is regulated or traffic is organized through unregulated intersections (traffic is self-regulating); - traffic is allowed for all modes of transport, intersections with other streets are at the same level; - pedestrian crossings are organized at the same level as the carriageway.
	streets and local roads in residential areas	-	- transport and pedestrian connections in the areas of residential areas (micro-districts), access to the main streets of the district (streets and roads) and regulated streets and roads, as well as transport and pedestrian traffic within settlements and villages, micro-districts and other residential areas, direct access to buildings and areas provides.

STREETS AND ROADS OF SETTLE-MENTS, VILLAGES, AS WELL AS NEIGH-BORHOOD ROADS			- pedestrian crossings are organized at the same level as the carriageway.
	in public-business zones public streets and roads	-	- within settlements and villages, micro-districts and other residential areas, between public centers, departments and enterprises, service enterprises, as well as trade, office and administrative buildings, public service facilities, educational and scientific institutions (organizations), etc. provides transport and pedestrian connections within settlements and villages, micro-districts and other residential areas for access; - pedestrian crossings are organized at the same level as the carriageway.
	streets and roads in production areas	-	- provides transport and pedestrian connections within production zones (industrial, scientific-production, utility-warehouse) and territories, as well as for access to these zones and territories; - pedestrian crossings are organized at the same level as the carriageway.
	pedestrian streets and squares		- Landscaping, which is part of the street-road network, intended for pedestrian traffic and recreation, providing safe and high comfort for pedestrians. - provides pedestrian connections of high pedestrian attraction (collection) points. - traffic of all modes of transport is excluded. - access of special purpose vehicles (ambulance, emergency and rescue vehicles) is provided.
	park roads		Ecologically clean vehicles, bicycles, as well as special purpose vehicles (including cleaning equipment and vehicles, ambulance, emergency recovery, rescue and law enforcement activities to serve the park and forest-park area and users of these areas) for) are roads designed for movement.
	Passageways: -basic -secondary		These are roads that provide access to vehicles for residential and public buildings, offices, enterprises and other facilities of urban buildings within districts, micro-districts and neighborhoods.

Protected natural, historical and cultural monuments (ancient buildings, cemeteries, paleontological, archeological objects, mounds, objects of special interest to the local population, etc.), as well as unique natural phenomena (special geological forms, water sources, protected) are protected in the construction zone of the highway. natural heritage, etc.), the application of special engineering solutions for the protection of these facilities must be ensured.

In order to ensure the rational use of the road-transport system, the possibility of traffic should be provided with a gradual increase (decrease) in the indicators of street classifications used [8]:

☑ accesses (entrances) to the local street-road network from the neighborhood areas should be provided;

☑ access (entrances) from streets and roads of local importance to avenues of district significance, streets and roads, avenues of district significance, avenues of citywide significance from streets and roads, streets and roads, as well as to highways;

☑ accesses (entrances) from the street-road network of the settlement (including city highways) to other public highways and from other public highways to the street-road network of the settlement (including city highways) must be provided. Under the conditions of reconstruction, entrances (exits) to streets and roads of different functional importance (level) should be in accordance with the above hierarchy, and if necessary, additional development of streets and roads with low classification indicators (low level) should be provided.

When designing a street-road network in settlements, parking lots of buildings, engineering and technical facilities, as well as relevant structural elements (carriageway, sidewalks, bicycle lanes, public transport) necessary for the construction, operation, repair, maintenance and protection of the road structure itself , taxi parking lots, parking lots, water supply and protection facilities, bathtub and road shoulder, decorative greenery).

When designing a street-road network of a settlement, based on the requirements of the current normative acts, streets and roads with all classification indicators and objects located along the streets and roads must be accessible for people with limited mobility, pedestrian safety and unimpeded movement of pedestrians.

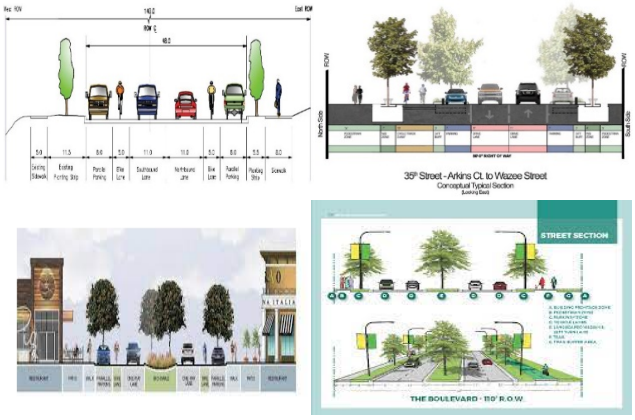
III. CLASSIFICATION OF CITY STREETS AND ROADS. PLANNING AND ACCOUNTING PARAMETERS

Urban highways are classified as follows for the importance of traffic and accessibility (*):

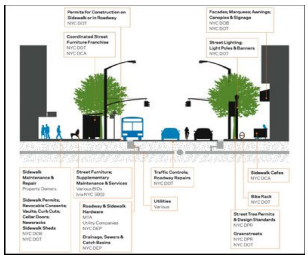
1. highways;
2. avenues, streets and roads of citywide importance;
3. avenues, streets and roads of regional significance;
4. roads between settlements and villages;
5. Streets and roads of settlements, villages, as well as roads within the neighborhood (except for roads owned by the municipality).

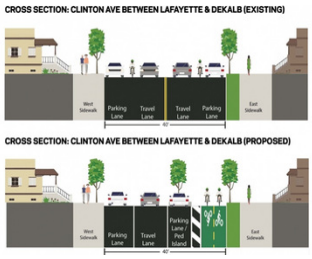
When preparing spatial planning documents and planning settlements, highways, city-wide and district avenues, streets and roads, inter-settlement and inter-village roads, as well as streets and roads of settlements, villages, as well as neighborhood roads should be identified as part of the street-road network. The main planning indicators of streets and roads are determined depending on the calculated speed. When designing streets and roads of different importance in settlements, the calculated speed should be determined in accordance with Table 2. The determination of the geometric parameters of the street and road should be carried out taking into account the calculated vehicles moving on the street or road in question [9-13]. The calculation of streets and roads of very large, large and large cities should be adopted in accordance with Table 1.

Figure 1.



(*)- The classification of urban highways in the Republic of Azerbaijan is determined on the basis of "Classification indicators of highways in the Republic of Azerbaijan" approved by the Resolution of the Cabinet of Ministers of the Republic of Azerbaijan No. 91 dated July 1, 2004.





Depending on the planning structure, accessibility, feasibility and administrative significance, urban highways (streets and roads) are divided into technical grades according to different indicators in Table 2 for very large, large and large cities, and according to different indicators for medium and small cities. The following key indicators related to the street and road network should be identified within the area planning projects: number and width of the carriageway, number and width of lanes, width of sidewalks, locations of public passenger parking lots, vehicles and other elements of the street-road network system , including places for placement of technical means of traffic organization, as well as elements of landscaping and landscaping. When designing streets, it is not recommended to take the carriageway larger than four lanes. If an expensive large number of lanes are required, they should be divided into two free-lanes, for example, the main one for public transport and the additional one for local transport. As the number of lanes increases, the efficiency of the carriageway decreases: in terms of throughput, one lane is lost in the case of a four-lane carriageway, and two lanes in the case of a six-lane carriageway.

Table 2.

Rate and distribution of streets and roads	Calculated speed, km / h	The width of the lane, m	Number of lanes (total in the direction of interaction)	The smallest radius of curves (with / without twist), m	The largest longitudinal slope, ‰	The smallest radius of the vertical convex curve, m	The smallest radius of the vertical depression curve, m	The smallest width of the sidewalk, m	The height of the curb from the carriageway), cm	Width of streets and roads between red lines, m	Width of dividing strips, m				
											Central separator	Between the main moving part and the local or side passages	Between the carriageway and the tramway line	Between the carriageway and the sidewalk	Between the sidewalk and the tramway line
Highways															
I	130	3,50-3,75	4, 6, 8, 10	1200/1900	40	21500	2600	-	-	50-100	6,0 2,65*	-	-	-	-
	110			760/1100	45	12500	1900								
	90			430/580	55	6700	1300								
II	90	3,50-3,75	4, 6, 8	430/580	55	5700	1300	-	-	50-80	5,0 2,65*	3,0	-	-	-
	80	3,25-3,75		310/420	60	3900	1000								
	70			230/310	65	2600	800								
Citywide avenues															
I	90	3,50-3,75	4, 6, 8, 10	430/580	55	5700	1300	4,5	20-25	40-100	6,0 2,65*	-	3,0	-	-
	80	3,25-3,75		310/420	60	3900	1000								
	70			230/310	65	2600	800								
II	80	3,25-3,75	4, 6, 8, 10	310/420	60	3900	1000	3,0	18-22		4,0 2,65*	3,0	3,0 2,0	3,0	2,0
	70			230/310	65	2600	800								
	60			170/220	70	1700	600		15-20						
Streets and roads of citywide importance															
-	70	3,25-3,75	4, 6, 8	230/310	65	2600	800	3,0	12-15	40-80	3,5 2,65*	3,0 2,0	1,0 -	3,0	1,25-1,5 -
	60			170/220	70	1700	600								
	50			110/140	70	1000	400		3-12		1,5-2	1,5-2		1,5	
Avenue of regional importance															
-	70	3,25-3,75	2, 4, 6	230/310	60	2600	800	2,25	12-15	20-60	3,5	-	-	2,0 -	-
	60		2, 4	170/220	70	1700	600								
	50			110/140	70	1000	400		10-15	20-40	1-1,5				
Streets and roads of district importance															
-	60	3,25-3,75	2, 4, 6	170/220	70	1700	600	2,25	3-12	20-40	2-3,5	-	1,0 -	1,5-2 -	1,25 -
	50		2, 4	110/140	70	1000	400	2,0		15-40					
Roads between settlements and villages															
-	70	3,25-3,75	2, 4	230/310	60	2600	800	1,5	15-20	15-40	2 -	-	-	1,5-2 -	-
	60	3,25-3,5		170/220	70	1700	600								
Streets and roads of settlements, villages, as well as roads in the neighborhood															
streets and local roads in	50	3,0-3,5	2, 4	110/140	80	1000	400	2,0	3-12	15-30	0,75-1 -	-	1,0 -	0,5-1 -	1 -
	40			70/80	80	600	250								
	30			40/40	80	600	200		3-10		-			-	-

residential areas															
park roads	40	3,0	2	75	80	600	250	-	3-10	Per a project	-	2 -	1,0 -	0,5-1 -	1 -
Passageways: -basic -secondary	40 30	3,0 3,5	2 1	50 25	70 80	600 600	250 200	1,0 0,75	3-10	Per a project	-	-	-	0,25-0,75 -	-
pedestrian streets and squares	-	by calculation	by calculation	-	50	-	-	Per a project	-	Per a project	-	-	1,0 -	-	-
in public-business zones public streets and roads	50 40 30	3,0-3,5	2, 4	110/140 70/80 40/40	80 80 80	1000 600 600	400 250 200	2,0	3-12 3-10	15-30	1-1,5 - -	-	-	0,5-1 - -	-
streets and roads in production areas	50	3,5	2, 4	110/140	60	1000	400	2,0	15-25		1-2 -	-	-	1-1,5 -	-

Note:

1. Prices for new construction are given in Table 2, and the denominator is given for dense and reconstruction conditions.

2. It is allowed not to build a central dividing strip or to accept the width of the strip less than the values indicated in the table, provided that the calculated speed of traffic does not exceed 70 km / h on highways and city-wide avenues with regulated traffic in dense and reconstructed conditions.

3. It is allowed to build a left-turn lane on the streets of city-wide and district significance, where traffic is regulated, by reducing the width of the central dividing strip.

4. * - Taking into account the installation of protective devices.

The width of streets and roads is determined by calculation, taking into account the requirements of sanitary-hygienic and civil defense, depending on the intensity of traffic and pedestrian traffic, the composition of the elements located within the transverse profile (roadway, technical lanes for laying underground communications, sidewalks, greenery, etc.). is done. In the conditions of reconstruction of streets and roads of settlements, villages, as well as roads in the neighborhood, as well as when the calculated pedestrian traffic in both directions is less than 50 people / hour, it is allowed to build sidewalks and sidewalks with a width of 1 m [8].

It is recommended that the width of sidewalks on city-wide avenues, streets and roads be at least 3 m, unless other technical solutions are provided for the placement of short-term snow accumulations in climatic zones with frequent icing, in areas with a snow depth of more than 200 m / m [9].

The width of the designed streets and roads should be determined by calculations based on their classification (including rates), including the purpose and urban conditions, traffic and pedestrian flows, composition and number of transverse profile elements (including areas for engineering networks), red lines and s. should be taken into account. The cross-sectional profile of the street network and the number of lanes should be determined based on the expected hourly peak traffic. Typical cross-sectional patterns are shown in Figure 1.

If there are buildings of the same type on both sides of the street, the cross-sections should be designed symmetrically. In the case of one-sided residential or public buildings, it is allowed to arrange an asymmetrical street profile (cross section) in terms of sidewalk design. At the intersections of the designed or reconstructed street-road network, the central axes of the roads in different directions should be placed symmetrically relative to each other. At intersections of the same level, the cross-sections of streets and roads must be symmetrical and of equal size (cross-sections).

It is recommended to make changes in the cross sections of streets and roads at the same or different levels of intersections. Transverse profiles of bridges, overpasses, piers and tunnels must be designed in accordance with the requirements of SNiP 2.05.03 and legislation.

Transverse profile elements of streets and roads of settlements may include the carriageway (including crosswalks, dividing lanes, parking lanes, lanes for stopping and stopping vehicles), sidewalks, bicycle lanes, central and side dividing lanes, boulevards. can.

The cross-sectional profile of the street-road network may include high-speed bus transport (metrobus-BRT) with a special lane, as well as electrified railway transport lines (trams, high-speed trams and surface parts of metro transport). Within the street-road network determined by these norms, separate lanes may be established for the movement of metrobus transport along their dividing lanes [10].

Separation strips should be provided to separate the individual elements of the cross-section of the street-road network, to separate adjacent carriageways, as well as to ensure the safety of road users and the environment. The minimum width of the dividing strips shall be taken in accordance with Table 2. Fences, landscaping and

boulevards (taking into account the requirements of applicable building codes and relevant legislation) should be placed within the side and central dividing strips or a hard flat surface should be arranged.

Boulevards may be arranged on regulated highways (including city-wide and district-wide avenues) and on city-wide and district-wide streets and roads with a dividing strip of 6 m or more.

On main highways and avenues of city-wide importance, external safety lanes shall be provided on both sides of the carriageway between the carriageway and the curbstone (or fencing). The width of the outer safety lanes shall be determined depending on the type of fences adopted and the conditions of visibility, but shall not be less than 0.75 m [11].

IV. SPIRITUAL LINE PRINCIPLE WHEN LOCATIONS ARE ORGANIZED IN SPACE

Taking into account the existing (defined concrete) dimensions of traffic and pedestrian traffic, it is necessary to reserve underground space and area for perspective construction by gradually achieving the calculated dimensions of highways, city-wide and district avenues, streets and roads, road junctions.

The street network of settlements should be designed as a sustainable integrated system, and service areas should be interconnected with each other and with the city center. The reliability of the transport framework is ensured by the creation of recurring (alternative) routes for city-wide avenues, streets and roads.

The distances (distances) between the network of streets and roads of settlements, which determine the size of micro-districts and neighborhoods, should be taken as follows:

o 300-500 m for main streets in the areas where apartment buildings are located;

o 150-250 m for streets of local importance (depending on the specific urban situation).

Grade I-III highways should, as a rule, pass through residential areas with access roads built.

To ensure the future reconstruction of these roads, the distance from the edge of the landfill to the construction line of settlements should be not less than 200 m in accordance with the General Plan of settlements and General Plans and the width of the road to protect buildings from noise and harmful gases 10 m of green space should be provided [11].

If, on the basis of technical and economic calculations, it is considered expedient for roads of I-III classes to pass through settlements, their design should be carried out in accordance with the requirements of the normative documents in force. In cases where it is not possible to provide this condition, the degree and calculation indicators of roads within the settlements shall be determined in accordance with the requirements of these norms. If, on the basis of technical and economic calculations, it is considered expedient for roads of I-III classes to pass through settlements, their design should be carried out in accordance with the requirements of the normative documents in force.

I and II classes roads designed at a distance of about 50 meters from the settlements should have sound protection boards along the residential part of the settlement [11-12].

In case of impossibility to pass the existing and designed I-III classes roads outside the settlements, unimpeded operation of the street-road network of the settlement, connection of its territories, transport service, safety of the adjacent area and construction and ecological protection must be provided.

Based on feasibility studies, when different levels of roads pass through the territory of settlements, depending on the development prospects of the adjacent areas, these roads should be designed as urban highways or streets.

Figure 2.

Figure 3.

During the design of highways and city-wide avenues, their perspective expansion, management, repair, maintenance, protection and protection of the surrounding areas from various impacts of vehicles (environmental, noise pollution, etc.), from the edge of the main road to the border of buildings. the size of this area should be determined depending on the nature of the structures and the design speed, taking into account the presence of obstacles in the area and the limited territorial conditions.

The distance from the edge of the main carriageway of the highway to the line of regulation of residential buildings should be not less than 50 m, and in the case of the use of sound protection devices - not less than 25 m [13].

The distance from the edge of the main carriageway of the first-class city-wide avenues to the line of

regulation of residential buildings shall be not less than 30 m, and in the case of application of sound protection devices - not less than 15 m.

The distance from the edge of the main carriageway of the avenues of city-wide importance of II class to the line of regulation of residential buildings shall be not less than 15 m, and in the case of application of sound protection devices - not less than 7.5 m.

The distance from the edge of the main carriageway, local or side crossings to the construction regulation line should not exceed 25 m. If the specified distance is increased, a 6 m wide strip suitable for the passage of fire engines, not closer than 5 m to the construction line, shall be provided [14].

When designing a settlement system (territory) consisting of low-rise residential buildings of new development areas in existing settlements or existing settlements, to provide opportunities for construction or repair, reconstruction, rehabilitation and perspective development of transport and engineering-communication systems, as well as healthy and safe people During the spatial organization of cities and other settlements for the purpose of ensuring the living environment, protection and restoration of the environment, residential buildings (including construction sites) shall not be located within the direct boundaries of the red lines of public roads and buildings. In this case, the yard areas of residential buildings (including construction sites) should form a border with public roads, and they should be located within the boundaries of adjacent land plots (along the boundaries of adjacent walls, diagonally or adjacent).

Figure 2 shows a typical urban planning option in the United States. Under this scheme, the houses are located in the center of the rectangular planning scheme, and the protection strips of the highways are provided by maintaining the appropriate distances from the street-road network.

Figure 3 shows the planning scheme of a new planned settlement in Azerbaijan. This architectural-planning solution is a traditional method and has a number of serious shortcomings. It is currently used in most developing countries. Under this scheme, the houses are located directly on the side of the highway along the boundaries of the red lines, which leads to the non-observance of environmental and sanitary norms, as well as completely limiting the possibility of possible expansion of the road in the future. Currently, there are serious difficulties in this regard.

In the new approach proposed by us, during the spatial organization of cities and other settlements, residential buildings (including construction sites) are located along the middle neighborhood line, directly beyond the red lines of public roads and buildings. From this point of view, this architectural-planning solution can be called the middle line principle. During the design of the settlement system with the application of this system, the construction or repair, reconstruction, rehabilitation and perspective development of transport and engineering-communication systems, as well as the provision of healthy and safe living environment, protection and restoration of the environment Adequate protection strip will be maintained between.

At the same time, as a result of the application of this architectural-planning solution, a green and wooded area is placed between the buildings (mainly residential buildings), which, unlike the traditional method, provides protection of human health and ecologically clean environment.

The proposed mid-line principle can be effective if the architectural-planning solution is applied in completely redeveloped settlements in the liberated areas.

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