

# **REPUBLIC OF AZERBAIJAN**

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## **ABSTRACT**

of the dissertation for the degree of Doctor of Philosophy

### **FORMATION AND DEVELOPMENT OF NEW CITIES IN AZERBAIJAN (ON THE EXAMPLE OF CITIES OF MINGACHEVIR, SHIRVAN AND SUMGAIT)**

Speciality: 6405.01 – Urban development, planning of  
populated areas and landscape architecture

Field of Science: Architecture

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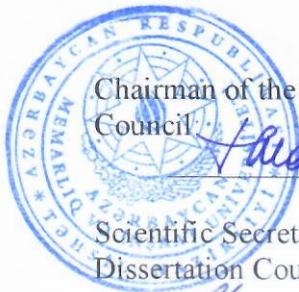
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## GENERAL DESCRIPTION OF THE RESEARCH

**The relevance of the research:** The Republic of Azerbaijan, which became independent at the end of the 20th century, encountered the challenge of rapid economic development. The establishment of new industrial enterprises that meet the requirements of modern development will necessitate the formation of new cities in the regions for the exploitation of natural resources, raw materials and energy resources.

New cities will vary greatly in location, size, urban basis, structure, and architectural appearance. Despite all the variety, they must meet the basic requirements: to be healthy and comfortable for human life, as well as cost-effective and efficient in terms of urban development.

This requirement is the basis for determining the optimal size of new cities, regulating their growth and shaping their planning structure.

In connection with the reorganization of the network of rural settlements and the establishment of agro-industrial complexes, new cities of different types and urban settlements will be built in agricultural districts.

The establishment of new resort cities in different regions of the country promised great prospects in the Republic of Azerbaijan. Over time, Istisu unique resort cities of Naftalan, Kalbajar and Lankaran regions have developed and gained universal and international resort importance.

**State of the Problem and level of its study:** Proper scientifically sound forecasting of the prospects for the development of new cities is of great importance for the formation and construction of their structure.

Scientific researches on all these questions by M. A. Useinov, Sh. S. Fatullaev, D.A. Akhundov, G. H. Mammadova, J. A. Giyasi, R. H. Abdulrahimov, L. S. Bretanitsky, A. V. Salamzadeh, G. M. Alizadeh, N. H. Naghiev, N. J. Abdullaeva, F. M. Huseynov, A. A. Hasanova, E. F. Huseynov, Sh. S. Gahramanova and other scientific works.

The scientific work by N. A. Aliev, A. M. Talibov, E. R. Abdullaev, E. H. Alaskarov, Y. A. Hajieva, A. M. Azizov, T. N. Naghiev, T. T. Teyyubov, N. O. Yusifov, S. I. Orujov and others contributed greatly to the solution of the planning and constructive aspects of urban reconstruction and the development of modern urban planning in Azerbaijan.

Theoretical foundations of the formation of the plan and structure of new cities and the problems of architectural and planning solutions and renewal of their centers are reflected in the scientific works of foreign scientists as L. N. Avdotye, Sh. D. Asgarov, M. G. Barkhi, Y. P. Bocharov, M. S. Bulatov, A. V. Ikonnikov, V. A. Lavrov, G. G. Salukvadze, I. M. Smolyar, Z. N. Yargina and several other scientists.

Along with all this, in many scientific works, the authors' research mainly refers to the problems of the reconstruction of the cities formed.

A small number of scientific works have been devoted to the study of the architectural-planning structure of new cities, the sequential planning of residential areas, centers, industrial and transport parts in the conditions of Azerbaijan, and there are absolutely no comprehensive studies explaining aspects of Planning Development.

**Purpose of the research:** The quality of the planning structure of new cities determines the living conditions of the population, the high comfort of work, household and leisure of people. Therefore, the practical creation of a modern progressive structure of new cities of various economic profiles characterizes the design and construction experience, determines the objectives of scientific research in this area.

The planning structure of the new city – the allocation of zones for production, residential, public centers and recreation on its territory, their structure and the organization of intra-city relations between them is determined by the economic profile of the new city, its place in the settlement system and the prospect of its development.

In project works, when designing the city on the new site, it is

necessary to take into account, first of all, the factors affecting the location of mining and production enterprises, as well as scientific centers that form the basis of the future city, their proximity to raw materials, energy, fuel sources, regions of product consumption and concentration of labor resources, as well.

The creation of a developed transport network is a decisive factor determining the possibilities of industrial development of new cities in promising regions of our country. For example, in the Kura-Araz lowlands, the area of the republic with the most unique resources, where the most important existing, developing, and new railroads connecting modern cities are being built, roads and transportation facilities are under construction.

The most favorable conditions for the construction and further development of new cities are present at transport junctions: at intersection points or junctions of railways, at developed nodes of railway, water, pipeline and other types of transport. This is the geographical position of Sumgait, Mingachevir, Shirvan, Neftchala, Alat, Aghstafa and other new industrial cities.

It is also important to establish short pedestrian connections between important points of mass access, to separate spatial and cross-traffic flows, and to isolate residential buildings, public shopping centers, and public recreation areas from transit traffic.

**Object of the research:** It is solved by comparing the options for location and development of new cities in the schemes of region planning and selecting the most appropriate integrated project objective. Its complexity lies in a better alignment and assessment of social needs, in a more efficient organization of labor, household and leisure of the population, if necessary sanitary and hygienic duties to protect the environment, the interests of economic development, as well as saving public funds.

The unsuccessful choice of a construction site for cities often occurs due to the lack of precisely designed district planning. At the same time, it should be noted that in many cases, when assessing the feasibility of possible options for the location of the village in district planning, not all factors affecting the cost of construction and operation of the reconstructed city are taken into account.

For a feasibility comparison of the options for placing the city, it is advisable to determine the cost of capital investment and operation for various elements of urban development on each of the areas under study. The volume of these costs is affected by: the nature of the relief; hydrological, geological and soil conditions; conditions for water supply, energy supply, sewage treatment and discharge; the presence of greenery; compactness, shape and size of the territory; conditions for the development of the construction base, contact with rail, water and other types of external transport; proximity of places of residence to places of work and other factors.

When comparing different options for a comparable circle of indicators in each case, those that do not have significant differences are not taken into account, attention is paid to those that differ significantly in the effect of local conditions on their size.

Spatial and architectural planning of large cities, including high-value modern urban areas and major types of reconstructed buildings, including the developing cities of Azerbaijan like Sumgait, Mingachevir and Shirvan, as well as consistent development mechanisms in the conditions of reconstruction, renewal and modernization of urban development.

**Boundaries of the research:** It is limited to the issues of reconstructing the formed environment of the architectural-planning structure of new cities based on the consistent development of the architectural-planning and functional system in terms of time and space.

**Methodology of the research:** It is based on a systematic approach to the complex analysis of the problem of reconstruction of the architectural-planning structure of the new big city, systematization and analysis of archival, project, statistical and scientific-literary materials; assessment of the historical and cultural potential of the environment of new cities; systematic approach to formalization of the reconstruction process and graphoanalytic modeling.

**Scientific novelty of the dissertation:** It consists of systematic and consistent study of architectural-planning structure and formed environment of cities of Sumgait, Mingachevir and

Shirvan for the first time, detection of mechanisms of its transformation and adaptation to new conditions, disclosure of architectural-spatial and functional aspects of influence on development of planning structures of cities. At the same time, for the first time the scientific principles of reconstruction based on the consistent development, protection and use of historical and cultural values of the planning structure of the cities of Sumgait, Mingachevir and Shirvan were developed here.

**Issued to defense:** Regularities of consistent development of architectural-planning structures of the new cities like Sumgayit, Mingachevir and Shirvan and traditional stable signs of their evolution; characteristics of architectural-planning structure of formed urban environment and principles of separation of environment into zones; methods of reconstruction of new cities based on consistent development of architecture of urban areas and its main structural elements.

**Practical significance of the dissertation:** The results of the dissertation are aimed at improving the process of forming the historically established planning of Sumgait, Mingachevir and Shirvan in terms of redevelopment and consistent development of the planning structure of the new cities and its elements (residential zones, cultural and household service system, central part, transport system, industrial zone, greening, etc.). This determines the practical significance of the dissertation. The main results of the work are intended for the development of general plans, detailed plans, construction projects for the reconstruction of the territories of cities, taking into account the stages of development of the city, as well as determining the stages, forms and methods of reconstruction.

**Approbation of scientific work:** The main results of the dissertation Report were made at II International Conference on "Regional problems of development of new cities of Azerbaijan" (Baku-01.12.17), the Republican Scientific and Practical Conference on "Development and modernization of engineering networks in the context of reconstruction of the cities of Azerbaijan" (Baku 8/9.06.17), "Modern water problems in the

Republic of Azerbaijan" Republican Scientific and Practical Conference (Baku 14/15.11.17), "Scientific system of the new city and its impact on the development of the center" Republican Scientific and Practical Conference (Baku 28/11/18). 16 scientific articles on the dissertation were published.

**Structure and scope of the dissertation:** The dissertation consists of an Introduction, three Chapters, a Conclusion, and a list of References (252 titles) and **137** pages. The text section includes **65** table of illustrations with photographs and diagrams.

## **THE MAIN CONTENT OF THE DISSERTATION**

The "Introduction" part of the dissertation substantiates the relevance of the research. The purpose and objectives of the research, chronological and geographical boundaries are defined. The theoretical and methodological bases used are considered. This part of the research provides information about its scientific novelty, practical significance, approbation, structure and volume.

**Chapter 1:** The chapter entitled "**Basic principles of location and development of new cities under the conditions of technical and economic development of the regions of the Republic of Azerbaijan**" consists of three sections.

### **1.1 Location of new cities in the Republic of Azerbaijan, their types and place in the systems of group settlements**

The construction of new cities in the Republic of Azerbaijan is a natural process of modern urban planning. More than ten new cities were built in the 20th century in Azerbaijan, most of which appeared in the regions where new natural resources were used, hydroelectric power stations and hydrotechnical facilities were built, the main hydro-industrial districts formed, in the zones of influence of big cities such as Baku and Ganja.

In connection with the independence of Azerbaijan at the end of the 20th century, the most important objective in the development of industry, distribution of productive forces and improvement of territorial proportions will be the more rapid use of

natural resources and increasing the economic potential of all regions.

Along with the future development of the oil and gas industrial complex in the Absheron economic region, the government of the Republic of Azerbaijan planned to start the formation of the Mingachevir territorial-production complex as a part of the big hydroelectric power station in Mingachevir, as well as the establishment and development of non-ferrous metallurgy and steel production, mechanical engineering, electrical engineering, light and food industries in other cities. This will lead to the development of existing cities of the republic, its various regions and the creation of new cities, a qualitative solution to their planning structure. The quality of the planning structure of new cities affects the conditions of industry and, most importantly, the living conditions of the population, the high comfort of labor, comfort of life and recreation of people. Therefore, not the abstract "innovation", but the practical creation of a modern progressive structure of new cities of different economic profile characterizes the experience of design and construction, defines the objectives of scientific research in this area.

## **1.2. Analysis of the impact of the development of the production profile and its base on the architectural and planning structure of the new cities of Azerbaijan (Mingachevir, Shirvan, Sumgait)**

The objective of the master plan is not only to determine the planning structure of the new city in the calculation period, but also to consider the future development of the city as a whole and its individual components; industrial and residential areas, recreation areas, public centers, transportation networks etc.

New cities, especially those established in areas where large hydroelectric power plants were built, such as Mingachevir in the postwar years, usually reach their calculation volumes well before the end of the design period. Therefore, the need arises for the development of new planning projects, the main objective of which is a significant expansion of territories for the industrial and

residential zone of the city, increasing the density and number of floors of buildings, developing, or creating a new center, developing and complicating a network of highways, and introducing new types of transport, engineering networks and application of structures. For instance, new cities such as Navoi, Talyati, Rustavi, Zelenograd, Tappola, Kharlau etc.

The analysis shows that in many cases this objective is complicated by the fact that the problem of the development of the city in the initial projects is not laid. Some new cities, initially effectively organized, lost these qualities in the development process. The following shortcomings, manifested by the growth of the planning structure of new cities, are inherent:

- for example, as a result of the uncoordinated growth of industrial and residential territories in opposite directions in Sumgait, there is a deterioration in the conditions of accommodation and an increase in the time spent on labor movements;

- the establishment of overlapping in the housing, industrial and transport zones in Mingachevir, which is a major concern for the life of the population and creates an uneconomical solution of the system of service, improvement and engineering equipment of the new city;

- capture of territories necessary for development by low-value and large residential and industrial buildings;

- the system of roads and community centers in Shirvan is not suitable for further development. The first center of the city of New Shirvan remained on the periphery of the construction as it developed, so the question of the formation of a new city center arises.

Analysis of the development of new cities shows that there are three interrelated problems:

- 1) deficiencies in project substantiations and planning of the development prospects of new cities;

- 2) unreasonable, random deviations from the project during the implementation of the project;

- 3) insufficient consideration of objective development trends

in the design of the city structure.

None of these problems should be considered as secondary factors. Analysis shows that the definition of their production and economic base was in many ways imperfect, especially during the formation of the first new cities in the postwar period and Only in the early 1960s were developed fundamental scientific provisions of the complex placement of industry in the new city, which allowed a lopsided (enterprise, management) approach to the issue and shielded planners from many of the mistakes made in the postwar years.

### **1.3. The economic basis for the formation of the new cities of Mingachevir, Shirvan, and Sumgait and the determination of their population**

The correct determination of the production profile of the new city is one of the most important problems of designing and a reliable basis for all measures to develop and improve it.

Currently, about 80% of people working in city-forming areas of new cities of Mingachevir, Shirvan and Sumgayit are employed in industry. The analysis shows that in the future, the role of industrial personnel in the formation of the population of new industrial cities will remain decisive (60% of the total number of city-forming personnel). A slight decrease in the share of industrial personnel will be the result of the trend that determines the growth of the contingent of employees in scientific and educational institutions (instead of the current 10%, in the future they will account for about 20% of all urban staff).

As an example of a new industrial city with a properly constructed production profile, one can cite the developed city of Sumgait as a centre of the petrochemical industry in close cooperation with the Baku oil refining industry. Sumgait, created as a satellite of Baku and being a part of the group placement system, helps to ease the work of Baku and has fully justified itself both in terms of economy and urban planning.

According to the general trend of strengthening the capacities of enterprises, the main condition for the rational formation of the

production base of the new city is the transition to their complex location, refusing the "one-on-one" placement of industrial enterprises.

The principles of complex deployment of industrial enterprises based on efficient use of raw materials can be followed in the analysis of the energy complex of New Mingachevir and Shirvan cities. The complex is built with a full processing cycle (ridge). The complex location of production provides advantages: in a separate position from each other compared with the construction of specialized enterprises of the same power. In addition, the connection of a number of auxiliary workshops, vehicles and engineering communications made it possible to reduce the size of the required area of the entire industrial complex (in comparison with the individual location of enterprises) and the number of employees.

**Chapter 2:** The chapter entitled "**Features of the formation and development of the planning structure of new cities of the Republic of Azerbaijan**" consists of three sections.

### **2.1. Consideration of the basis for the placement of industrial areas and the formation of the planning structure in the new cities of Mingachevir, Shirvan and Sumgait**

The main provisions related to the creation of the best working, living and leisure conditions for the residents of the new city formed the basis of the project of Sumgait and expressed its position in the division of the city into three functional zones:

1) A large industrial region on an area of 2 thousand hectares (a strong promising complex of metallurgical, chemical and related enterprises);

2) A compact residential zone with a predominance of multi-storey residential houses (mainly 9 and partly 16-storey), as well as a known number of 3-5-storey buildings; (The 1st line area)

3) A whole suburban recreation area (which has a large seaside boulevard) corresponding to the duration, program, and full complex of different types of recreation.

The adopted zoning method is typical for cities with large

metallurgical, chemical and thermal energy complexes; it was later used in the construction of such cities in the Republic of Azerbaijan.

The method of compiling and evaluating the options for substantiating the planning structure of the New Sumgait city was adopted. Usually, in practice, several initial sketch variants of the planning of the city are drawn up and compared. A different path is adopted in the project: compilation and sequential selection by the design stages are carried out. The first step is the choice of options for functional zoning; the second - the compilation and evaluation of options for the organization of each zone (industrial, residential, central, recreational and transport); the third - a complex comparison of the results of the second stage and the selection of the recommended option for the preparation of the master plan. This method can be characterized as an exception to the optimal planning solution and a method of sequential convergence.

Functional zoning options are compared according to the sanitary-hygienic conditions for the mutual placement of industrial and residential areas, the convenience of the connection between all zones of the city (with residential - working and recreational areas, with external transport - with industrial and residential areas, etc), the economic indicators of the development of the territory and equipment, the development opportunities of the city structure.

## **2.2. Analysis of settlement and structure of residential zones in new cities of Mingachevir, Shirvan and Sumgait**

The placement of industrial and residential zones determines the spatial division of labor relations and affects the most important indicator of settlement - time for massive and permanent labor movements of residents.

One of the necessary conditions for the spiritual development, education, recreation, social activity of a person is the reduction of the time spent on going to work.

With the accumulation of production features characteristic of chemical and metallurgical city like Sumgait in a single large area and significant separation of residential and industrial zones, labour attraction has a single character for the whole city (according to

points of attraction and direction). The nature of the relationship between the residential and industrial zones of the city - due to the significant tendency and strength of labor flows, the unilateral direction of these flows sharply reveals the problem of "balancing" settlements and flows of movement by placing local, food and light industrial enterprises, city centers and other points of mass orientation.

In the new small energy and engineering cities, such as Shirvan and Mingachevir (population 60-100 thousand), the nature of production determines the proximity of industrial and residential areas; a compact industrial zone is built on one side of the residential area. The location of a large part of the housing stock in the zone of 1.5-2 km from the workplace allows part of the population not to use daily transport to go to work. In the planning structure of such cities, it is necessary to pay much attention to the organization of pedestrian paths equipped with secure passages in places intersecting with traffic flow and alleys of independent structural importance.

### **2.3. The principles of the formation of public centers and the organization of the system of cultural and domestic service**

Three main issues are resolved during the development of the master plan of the new city:

placement of cultural and household service enterprises (separate scheme);

building a system of public centers of cities (in the general planning structure);

planning of the center of urban importance (the basis of the architectural and planning composition).

The study of the master plans of Sumgait, Mingachevir and Shirvan cities and objects implemented in nature shows that often when designing projects of cities, the general principles of the organization of the "tier" service system, the characteristics of cities, economic requirements and the rational growth of public buildings and structures are applied without sufficient account.

It is recommended to divide enterprises and facilities into five

main categories, including closely related types, when designing public service system of the city.

At the same time, it is necessary to consider the feasibility of creating specialized centers (medical, educational, sports, recreational etc.) serving a group of settlements in individual cities that are part of the settlement system and not necessarily large in size. The composition and capacity of enterprises of intercity importance, as well as the requirements for their placement, depends on the nature of the settlement (group, centralized, linear, etc.), it is determined during the preparation of district planning projects based on the size of cities and the characteristics of their urbanization base, the characteristics of their natural location.

Facilities for cultural and domestic services should be designed as a unified system covering all parts of the dwelling - residential neighborhoods, industrial and recreational areas.

The main progressive principle of the organization of cultural and domestic services of the population of new cities is the concentration of service enterprises and the creation of public centers serving the city as a whole and its individual structural elements.

The organization of public centers, combining various institutions of the same radius, serving a city or a district, into structural centers or enterprises with a single functional purpose - medicine, sports, housing and utilities (specialized centers), creates the most convenient integrated service to the population, allows to unite a number of institutions and enterprises, to use territories more efficiently and to reduce construction and maintenance costs of a number of public buildings and enterprises.

**Chapter 3:** The chapter entitled "**Principles of organization of transport and engineering systems of new urban areas of Mingachevir, Shirvan, and Sumgayit**" consists of three sections.

**3.1. Consideration of the peculiarities of urban traffic and the organization of transport, the formation of the system of streets and roads in new cities**

The gap between the existing planning structure of new cities and modern requirements is more noticeable in urban transport. The revival of public life, high specialization and concentration in production and service, the emergence and development of agglomerations that have become group settlement systems, increase passenger and freight flows. This is facilitated by a change and duration of free time and its use, as well as an increase in the speed of transport, comfortable movement and reduced fare. The ability to develop is one of the most important requirements of the transport network system of cities.

A significant increase in the mobility of the urban population in transport is mainly due to changes in the location of mass residential houses relative to workplaces. Currently, for the majority of the urban population, the time spent on labor movements is 10-15% and the bulk of non-working time.

Deficiencies in transportation services are associated with the radial structure of the street and road network, in which intracity and external traffic flows are concentrated in the central area of the city, as well as with a large network of intersections with a limited number of highways, to which the main traffic flows. Most highway streets and roads do not meet technical requirements in terms of speed, traffic safety and throughput. For fast-growing and improving vehicles, a differentiated street and highway system is still rarely used.

Despite the great difference in the level of transport services in different cities, there are a number of common shortcomings: lack of developed highways and repeated (similar) streets in busy directions, intersection of public centers with transit traffic, insufficient width of the roadway and sidewalks, lack of equal traffic flow and multi-level crossings with pedestrians at intersections of highways, lack of special parking, insufficient insulation of residential buildings from noise and dust along the main streets. The necessary maneuverability to use the street network is not available. All this causes serious concern in most cities.

### **3.2. Analysis of engineering equipment systems of new cities such as Mingachevir, Shirvan and Sumgait and their further development**

The most important task of ensuring the normal functioning of the city is the construction of the entire engineering infrastructure complex. The development of engineering issues of the master plan should ensure the complexity of solving engineering systems and facilities. Schemes of engineering training and engineering equipment of new cities should be developed for the period of account in the following stages:

- the first stage - implementation of measures for engineering training and construction of networks and facilities necessary for the start of construction;

- the second stage - implementation of measures on construction of networks and facilities and engineering training for the first stage of construction;

- the third stage - the implementation of measures for the construction of networks and facilities and engineering training for the full assimilation of the city's territory with the selection of key decisions in the first 10 years.

The choice of optimal solutions of engineering facilities of cities and engineering training of the territory is based on a comparison of option solutions. When comparing options, all feasibility studies should be based on capital costs and annual operating costs.

### **3.3. The use of the territory in the design and construction of new cities and its landscape organization**

The functional use of territories in new cities is determined mainly by the nature of industrial specialization.

Depending on the industrial direction of the city, approximate proportions between the industrial and residential areas of the city can be recommended.

The rapid pace of construction of new cities requires the development of areas that do not require initial time and funds for engineering preparation, primarily for the construction of residential

buildings due to the need to provide housing for construction and operational personnel as soon as possible.

Analysis of the current (natural) balance of residential areas of new cities shows that this group has general advantages in terms of land use compared to existing cities. But in general, the residential areas of new cities are not used quite intensively. The density of housing on an area of 1 hectare is 400-900 m<sup>2</sup>. At the same time, it should be noted that in cities and free areas, where construction begins later, the density of development is higher than in areas where construction has already begun, and areas partially occupied by existing settlements before construction start.

For example, the total residential density in Sumgait and Mingachevir regions is 750-1000 m<sup>2</sup>/ha, and in Shirvan and Neftchala is 430-600 m<sup>2</sup>/ha.

The specific weight of residential quarters is quite high, which is due to the presence of a significant number of preserved temporary housing and low-rise housing stock built in the first years of construction. The same chronological principle is evident here - the older the city, the higher the share of these districts. For example, in the cities of Angarsk, Volzhsk, Novovolinsk is 60-61%; in Karaganda, Novokuznetsk is 72-73%.

The specific indicator of green plantations for general use in the cities of free areas (Sumgait, Mingachevir) is also slightly higher (for 1 person 9-10 m<sup>2</sup>). However, in most new cities, green plantations occupy a small place in the total balance of living space (4-5%) and 4-7 m<sup>2</sup> per person.

A common lack of modern area balance for all of the cities analyzed is the low area of state-owned enterprises per capita. It almost does not exceed the same indicator as in older cities and is 4-8 m<sup>2</sup> per capita. This is due to the fact that until recent years in the new cities were built objects of daily services (schools, childcare facilities, stores), which require relatively small areas. All project balances are reserved for the development of cultural and domestic construction and the achievement of a higher standard indicator (16-18 m<sup>2</sup>) per person.

New urban projects are characterized by a higher intensity of

housing use than existing cities. According to the general plans of new and existing cities, the balances of residential areas characterize the economical use of them on individual elements of the territory.

The ratio of settlements and microdistricts in the total composition of residential areas of new cities is decreasing and ranges from 39.5-40% to 52-53%; in existing cities this figure is 54-75%.

An increase in the number of floors in residential buildings and, accordingly, a denser housing stock in the area of 1 ha of the territory of the microdistrict leads to a decrease in the specific weight of residential areas of new cities.

The predominance of multi-storey buildings in new cities leads to a higher density of housing stock compared to existing renewable cities. The density of housing stock in the new cities reaches an average of 2,700-3,200 m<sup>2</sup> per hectare. Analysis shows that the density of housing stock in the existing renewable cities does not exceed 1200-1300 m<sup>2</sup>/ha.

The decrease in the share of residential microdistricts in the new cities affects the structure of the balance of living areas in the direction of increasing the area of cultural and domestic service enterprises and green plantations for general use.

The increase in these areas is due to a future increase in calculation standards. A flawed approach to counting the area of non-micro-district public enterprises can be observed in one of the new cities, where the proportion of this area is projected to be 6% of the total residential area, the norm per capita was underestimated - 5 m<sup>2</sup>, which is 3.5 times less than the recommended norms.

The proportion of greenery in residential areas of new cities is 15-30%, and in some cities this figure reaches 25-30 m<sup>2</sup> per capita. In most existing cities, the proportion of greenery is 2-8%, and per capita is only 2-5 m<sup>2</sup>.

The reduction in the share of streets and squares in the total residential area is typical for new cities. The high weight of this element (25-35%) of the area in existing cities is explained by the predominance of small quarters with single and low-rise buildings.

## **MAIN RESULTS OF THE RESEARCH:**

The following results were obtained on the basis of the achievements of modern urban planning theory and practice, the study and analysis of experience in the design and construction of new cities in the Republic of Azerbaijan and abroad, as well as problem and methodological researches and design works of the dissertation.

1. The vast and comprehensive experience of building new cities filled with creative research has played an important role in the progressive development of urban planning in the country and is of great importance for further improvement of urban planning and construction. This creative activity was based on the humanistic principle, which is the main driving force of modern urban development.

2. For the first time during the construction of new cities, measures were developed and implemented more fully to ensure favorable living conditions for the entire urban population. For new cities, the installation of high-hygienic (slope lighting, ventilation, protection from harmful winds, low water table, availability of suitable water sources), as well as sanitary protection zones away from sources of air, water and soil pollution has become an urban law. The building density, the orientation of buildings and the size of the gaps between them, urban planning norms related to the level of greening and landscaping are based on these health protection requirements that meet modern hygiene requirements.

3. One of the most important conditions for the successful implementation of large-scale urban planning tasks in the short term and the prevention of many of the shortcomings inherent in the urban planning of the early 20th century, was the creation of a strong industrial base for the construction of cities based on the rapidly developing industry of the Republic. The construction of residential and public buildings by industrial methods made it possible to sharply increase the volume of construction and provide the rapidly growing population with housing and cultural and

domestic enterprises.

4. An analysis of the development of new cities shows that in all cases, the shortage in the determination of the prospective number of the population was due to the lack of adequate assessment of the prospective development opportunities of the city-forming base of the city. This was mainly due to the fact that the departments that were to carry out the first line construction task in the city, considered only the placement and subsequent development of subordinate industrial enterprises and could not determine the placement of other industries. In places where a complex approach to the formation of the city-forming base was implemented, the prospective population number of new cities was correctly determined and remained stable for the estimated entire period.

5. At present, in the new cities of the Republic of Azerbaijan, production complexes uniting groups of interrelated industrial enterprises are becoming more and more of a city-forming bases. In order to effectively form such complexes, it is necessary to have the appropriate plan and project-planning basis in the form of promising plans for the placement of production capacities for large territorial division of districts of large industrial construction and district planning projects. The development of a general perspective on the evolution of the industry provides a solid scientific and planning basis for the implementation of these measures.

6. Prospective plans for the deployment of productive forces allow to justify the development of settlements in the region and determine the need for the construction of new cities. The dimensions of cities are determined by the system of expedient settlement in the region, i.e., this should be solved on the basis of the district planning project. The planning of new cities is inherently related to the planning of industrial production. In the absence of a district planning project, the basis of urban formation of the new city is determined by comparing possible options for its deployment and further development.

7. The process of development of many new cities clearly shows that for urban planning is very important to choose a site

with large and convenient reserve areas, providing further natural development of the urban structure. No matter how precisely the city-forming base is defined in design, every city needs such resources. Land resources are needed for the possible addition of new elements to the city-forming base arising from scientific and technological progress in the development of production: these are also needed to further improve housing conditions and expand cultural and social services.

8. Industrial enterprises in new cities, as a rule, were located on sites isolated from apartments, which were selected taking into account the requirements of one or another type of production and were conveniently connected with residential areas. Residential areas should be located in favorable areas along the banks of rivers, reservoirs, green massifs.

9. The experience of solving issues of the functional organization of the territory has shown that, like the city of Shirvan in most cases, a simple scheme of compact and consistent placement of the main zones can be successfully applied for cities with a population of about 50-80 thousand people. At the same time, optimal solutions are obtained when the harmlessness of production allows to bring it close to residential areas.

In larger cities (such as Sumgait), there is usually a need for an improved layout of the main zones (formation of several industrial and residential districts), as well as a more complex recreational system for the population depending on local natural conditions.

10. The extensive urban planning experience allows to conclude that the functional organization of the main zones should be located so as to ensure optimal free development of the city without disrupting the normal relationship between working, residential and recreational areas. In this regard, the scheme of parallel placement of the main functional zones has even greater advantages.

Housing construction in Sumgait, Mingachevir and other new cities was concentrated in large areas and carried out by powerful construction organizations.

11. For modern urban planning practice, the transition from a neighborhood construction system to a complex construction of new cities according to the principle of the organization of residential microdistricts is of greater importance.

The development of transport also revealed shortcomings in the neighborhood system in terms of the organization of urban transport. The intensive movement of traffic seized residential streets and caused concern to the population of surrounding residential houses.

The development process of cities clearly demonstrated the need to make significant changes to the planning and construction of residential districts.

12. An important element of the greening of the residential area is greenbelts, which include high-speed urban roads and transport highways. These greenbelts should ensure that homes are insulated from noise and traffic waste.

The greenery of individual districts and microdistricts should be combined into a single system of interrelated gardens, boulevards and parks that meet the belt of the suburban forest park.

The size of the greenery should be determined depending on the size of the city and natural-climatic conditions.

13. The social progress of society determines the broad development of social and business life of the population. This increases the importance of urban community centers. The main role belongs to the city centers. Here are the buildings of executive organizations, business enterprises, buildings of public organizations, theaters, philharmonic, concert halls, cinemas, museums, exhibitions, shopping centers, restaurants, gardens and other cultural facilities serving the population. Popular festivities, demonstrations, military and sports parades, rallies and other mass events are held in city centers. The location of these buildings forms the image of the city center.

However, due to the working conditions here, it is inexpedient to locate all the enterprises of urban, district and even national importance in the centers of cities.

Outside city centers, medical, educational, scientific, and

sometimes sports centers should be built in more favorable natural conditions.

The general education center and public centers of residential districts and microdistricts form a branched system of public centers providing convenience and complexity of service to the population.

14. In the architectural image of industrial and residential districts and public centers, a significant role is played by the successful composition of greenery, methods of landscaping and the architecture of small forms. In the architecture of new cities, public centers are important as the main center of public life of the population and the leading architectural ensembles of the city. In particular, the importance of the city center, a place of popular demonstrations, rallies, meetings and festivities, the main element in the system of architectural ensembles of the city is increasing.

**The main content of the dissertation has been reflected in the following articles:**

1. Azərbaycan Respublikasında yeni şəhərlərin sənaye istiqamətinin (profilinin) təyin edilməsi. ŞÖBMA toplusu N2(14). Bakı-2017. s. 110-114
2. Azərbaycan Respublikasının yeni şəhərlərinin inkişaf məsələləri. AzİMETİ N2, Bakı-2017. s. 42-46
3. Azərbaycan Respublikasının yeni şəhərlərinin müasirləşməsi, yenidən qurulması məsələləri və metodikası. AzMİU-nun Elmi əsərlər jurnalı N1. Bakı-2017. s. 51-56
4. Azərbaycanda yeni şəhərlərin əhalisinin sayının formalaşması. AzMİU-nun Elmi əsərlər jurnalı N2. Bakı-2017. s. 17-19
5. Azərbaycanda yeni şəhərlərin inkişafının regional problemləri. “XXI əsr və tarixi İslam şəhərləri” adlı II Beynəlxalq konfrans. Bakı-2017. s.107-110
6. Azərbaycan şəhərlərinin yenidən qurulması şəraitində mühəndis şəbəkələrinin inkişafı və müasirləşdirilməsi. “Müasir istilik təchizatında proqressiv texnologiya” adlı respublika elmi-praktik konfrans. Bakı-2017. s.38-40

7. Azərbaycan Respublikasında müasir dövrün su problemləri. Şollar su kəmərinin çəkilməsinin 100 illiyinə hərs edilmiş “Müasir dövrün su problemləri” adlı respublika elmi-praktik konfrans. Bakı-2017. s. 33-36
8. Azərbaycan Respublikasında yeni şəhərlərin tikintisi üçün nəzərdə tutulan ərazinin müəyinə edilmə məsələləri. AzMİU-nun Elmi əsərlər jurnalı N1. Bakı-2018. s. 24-27
9. Yeni şəhərin magistral sistemi və onun mərkəzin inkişafına təsiri. Böyük şəhərlərinin nəqliyyat infrastrukturunun formalaşma və inkişaf problemləri adlı respublika elmi-praktik konfransı. Bakı-2018. s.147-151
10. Azərbaycan Respublikası şəraitində yeni şəhərlərin inkişaf xüsusiyyətləri. Urbanizm jurnalı N24. Bakı-2019. s. 65-72
11. Azərbaycanın yeni şəhərlərinin inkişafı şəraitində tikintinin birinci mərhələsinin formalaşması və şəhər magistralların həlli. ŞÖBMA toplusu N2(18). Bakı-2019. s.133-139
12. Bakıda yeni şəhərlərin planlaşdırma quruluşunun formalaşdırılması yolları Abşeron aqlomerasiyası. AzMİU-nun Elmi əsərlər jurnalı N2. Bakı-2019. s. 28-31
13. Инженерное оборудование территорий новых городов. Перспективы науки N12(123). Томск-2019. с.139-142
14. Azərbaycan Respublikasında yeni şəhərlərin yerləşdirilməsi, onların növləri və qrup məskunlaşma sistemlərindəki yeri. Elmi-praktiki konfrans. Bakı-2019. s.237-240
15. Mingəçevir, Şirvan, Sumqayıt yeni şəhərlərinin formalaşmasının iqtisadi bazası və onların əhalisinin sayının müəyyənləşdirilməsi. Elmi əsərlər N1. Bakı-2020. s. 19-23
16. Issues and methods of improvement, updating of new cities of the republic of Azerbaijan. Material of the International Scientific and Methodological Conference Modern Trends in Architecture and Construction: Energy efficiency, energy saving, BIM technologies, problems of the Urban environment. Almatı 2020. p.151-156

## Placement of new cities in the Republic of Azerbaijan, their types and place in group settlement systems.



● - New industrial cities of the Republic of Azerbaijan



"Mingachevir" Hydroelectric Power Station



"Yenikend" Hydroelectric Power Station.



"Shamkir" Hydroelectric Power Station.



"Varvara" Hydroelectric Power Station.

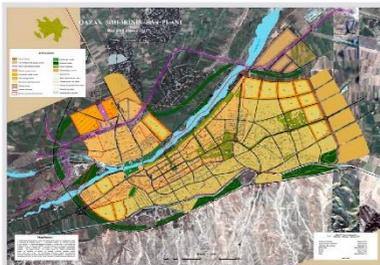
**Placement of new cities in the Republic of Azerbaijan,  
their types and place in group settlement systems.**



General plan of Yevlakh city



General plan of "Dashkasan" city



General plan of "Gazakh" city



General plan of "Agstafa" city



Photographs of several industrial enterprises in Azerbaijani cities

**Placement of new cities in the Republic of Azerbaijan,  
their types and place in group settlement systems.**



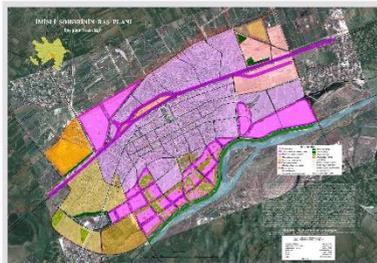
General plan of "Shirvan" city



Shirvan Araz Plant L.L.C



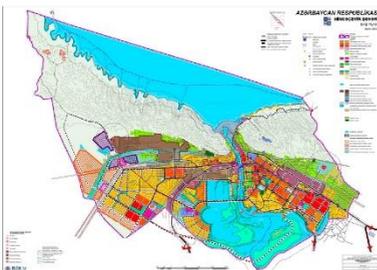
Mingachevir Industrial Park



General plan of "Imishli" city



Imishli sugar factory

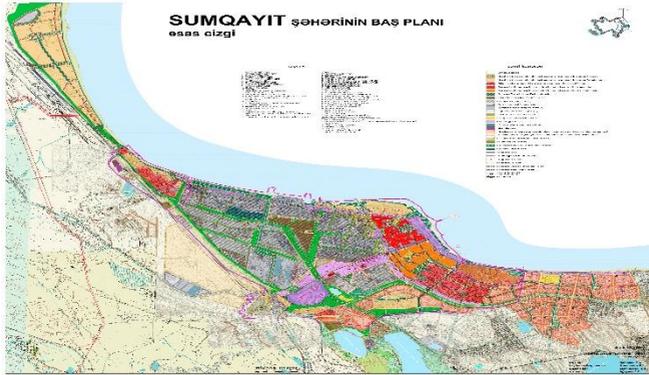


General plan of "Mingachevir" city



Mingachevir I High Technology Park

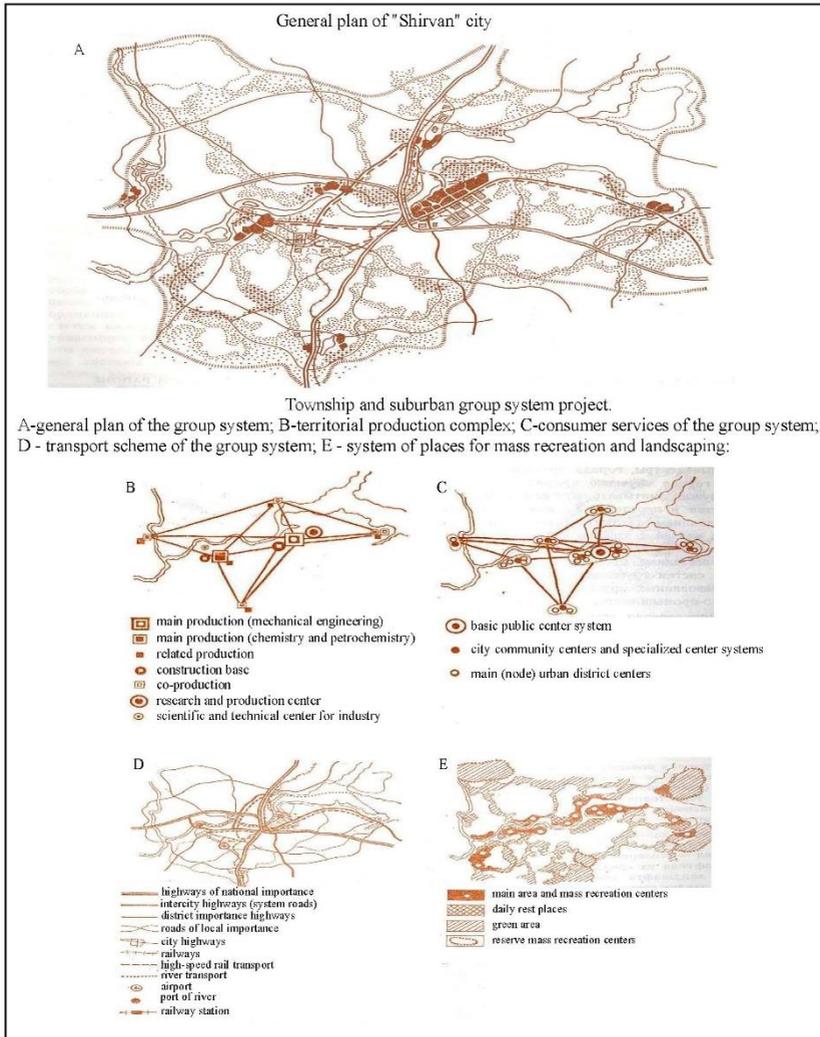
**Placement of new cities in the Republic of Azerbaijan,  
their types and place in group settlement systems.**



Photos of several residential buildings in Sumqayıt.



## Placement of new cities in the Republic of Azerbaijan, their types and place in group settlement systems.



**Development of production profile and its base in Azerbaijan (Mingachevir, Shirvan, Sumgayit) analysis of the impact of new cities on the architectural-planning structure.**

City of Tolyatti, Russia.



12A

**Development of production profile and its base in Azerbaijan (Mingachevir, Shirvan, Sumgayit) analysis of the impact of new cities on the architectural-planning structure.**

**New cities in foreign countries**



City of Bracknell, England.



**Development of production profile and its base in Azerbaijan (Mingachevir, Shirvan, Sumgayit) analysis of the impact of new cities on the architectural-planning structure.**

**General plan of Zelenograd, one of the new cities of Russia, and photos from the city.**



**Formation of new cities Mingachevir, Shirvan, Sumgayit  
determining the economic base and their population**

**Construction and formation of residential buildings in Mingachevir.**

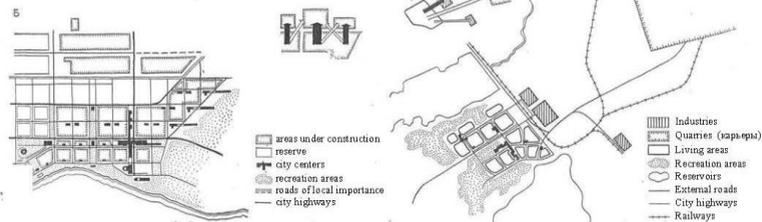
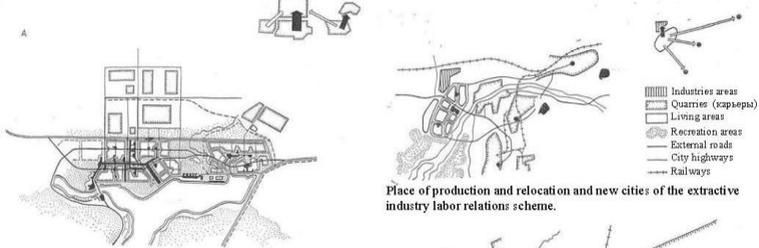


Currently, the construction of residential areas in most new cities is 5, 9 and more is carried out using multi-storey houses. Sumgayit, Mingachevir, Shirvan and new micro-districts of other cities are being built.



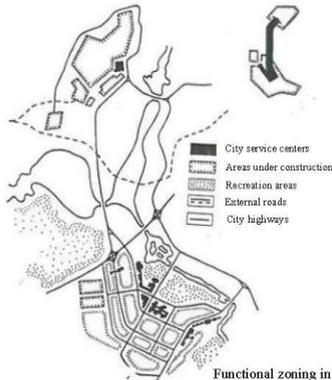
## Formation of new cities Mingachevir, Shirvan, Sumgayit determining the economic base and their population

Analysis of the construction of micro-districts in Sumgayit and Mingachevir in the 60s, step by step in residential buildings to study different methods of building a service system and the expediency of these methods allows you to evaluate. Community centers built in micro-districts provide daily services to the population which fully meets the demand. From this point of view, the construction of primary service blocks is unnecessary at this stage.



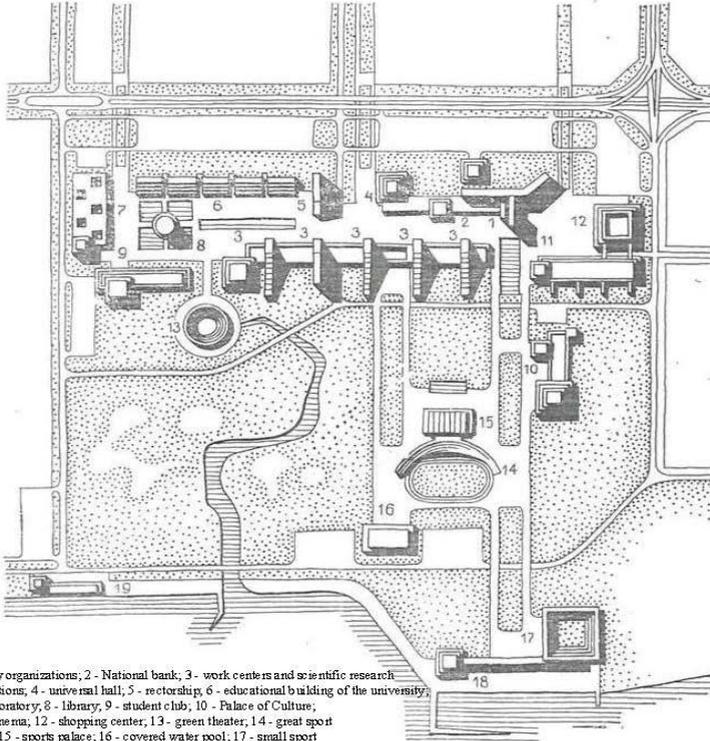
Metal processing industry and mechanical engineering production and resettlement in new cities location (options A, B), schemes.

Place of production and relocation and mining and production new cities based on industry.



**Formation of a public center and cultural and household services principles of organization of the system.**

Architectural and spatial organization of the center



- 1 - city organizations; 2 - National bank; 3 - work centers and scientific research institutions; 4 - universal hall; 5 - rectorship; 6 - educational building of the university; 7 - laboratory; 8 - library; 9 - student club; 10 - Palace of Culture; 11 - cinema; 12 - shopping center; 13 - green theater; 14 - great sport pitch; 15 - sports palace; 16 - covered water pool; 17 - small sport pitch; 18 - yacht club;

In foreign practice, urban centers are often considered independent subsidiaries, isolated from neighboring residential buildings to make the center more accessible and as compact as possible, and limited to public buildings. Therefore, it can be said that the composition of the buildings in the centers has different features:

- In general, enterprises are not designed for daily and periodic use, for example, ordinary profile daily necessities stores are not provided, only specialized shops for urban purposes are opened.

**From the area in the design and construction of new cities  
use and organization of its landscape.**

**New cities of the Republic of Azerbaijan are Sumgayit, Mingachevir and Shirvan  
landscaping and landscaping works in cities.**





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