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The Ecological City Planning Aspects of the South Ural State University Main Building Complex Reconstruction

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Abstract

The issue of the ecological city-planning reconstruction of the socially significant structures in Chelyabinsk, the main building complex of the South Ural State University (SUSU), is presented in the paper. The ecological city planning methods for development of the ensemble perimeter; ordering the yard space with its ecological landscape design and planting, the landing stage with the exploited surface; organization of new recreational areas; development of the underground facilities in front of the main building are offered. In 2001–2012, the central part of the main building was reconstructed and its west- and east-side insertions were constructed under the author's control. As a result, the main building has the architecturally finished exterior making it a city planning dominance. Further development of the university campus and the adjacent areas according to the world standards is planned.

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1. Introduction

Currently, the issue of rational using the natural resources and environmental protection by city planning methods is of a paramount importance, which is caused by the need for quick and effective solving the urgent man-made environment problems quickly and effectively, including universities campuses.

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SUSU participating in the program for universities competitiveness increasing among the world leading research and education centers requires the further research on projects for the university reconstruction.

2. Ecological city-planning methods

The Architectural Department (SUSU) carries out the long-term research in the projects on city planning ecology, publishes monographs, textbooks, develops experimental and real projects [1,3-5,11,15].

The urgency of ecological city planning problems is proved with much research by well-known experts and prominent foreign architects who have created architectural masterpieces based on the environmental requirements [6,7,9]. The issues of city planning ecology are discussed by many prominent Russian authors. Ecological issues are closely related to the Environmental Architecture [8,13].

There are more than sixty projects by the author, twenty of them are reconstructions that had been already delivered.

At present, the main task is to create the landscaped university campus, according to the world standards. It will provide the university with an effective opportunity to grow the capacities among the universities at the global educational and research market.

The objective condition for this strategic task is the previously developed and implemented project of reconstructing the SUSU main building. Before the reconstruction, the building had seven storeys with a sloping covering and the total height of 28 meters. The central part of the main building was built in 2001 – 2003 and completed with the tower and spire of 86 meters high (Fig. 1).

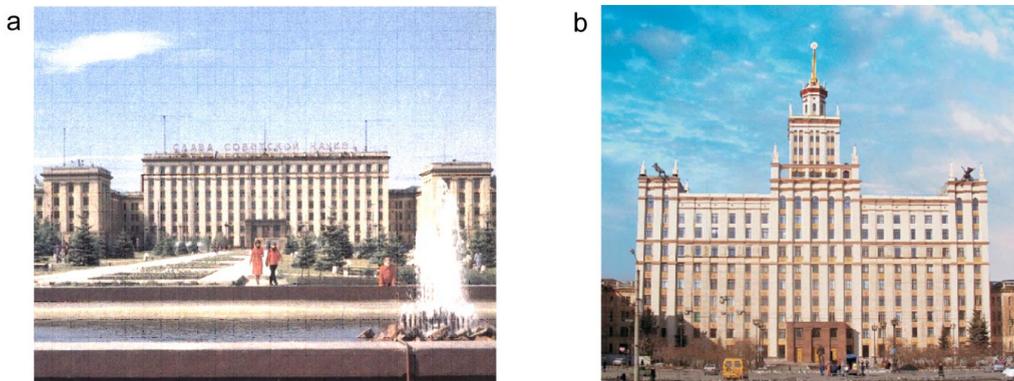


Fig. 1. (a) the southern facade of the SUSU main building before the reconstruction;
(b) the southern facade of the SUSU main building after the reconstruction, the actual photo.

The western and the eastern insertions were built in 2008 and 2012, which added architecturally finished exterior to the whole building[†]. It gave the university the necessary extra working space.

To solve the problem, the following ecological city-planning methods were used:

- Developing the ensemble perimeter of the building complex, with adding a number of new storeys
- Improving the yard space by constructing new buildings
- Ecological improving and planting all the free space
- Improving the engineering infrastructure in the yard and constructing a landing stage with exploited surface
- Developing new recreational plots in the yard using hard landscaping
- Developing the underground facilities in front of the main building for parking and subway crossing

[†] The project-leading architect – S. Shabiev, architects E. Alexandrov and M.Tyurin

All the ecological city-planning reconstruction methods are based on the scientific principles for zoning the main building complex and other separate structures horizontally and vertically (Fig. 2).



Fig. 2. The general plan of the SUSU main building complex: 1 - the main building; 2 - the subway station; 3 - the two-level underground parking; 4 - the subway crossing; 5 - the warm road crossover; 6 - the entrance into the two-level parking; 7 - the public transport stop; 8 - the western and eastern insertions; 9 - the power substation; 10 - the repairing and construction administration; 11 - the publishing center; 12 - the dormitory; 13 - the parking lot; 14 - houses; 15-18, 23 - the academic and laboratory buildings; 19 - the exits from the underground parking; 20 - the Digital Systems Research Institute; 21 - the garage; 22 - the academic and entertaining building "Sigma".

To reconstruct such a complex and socially significant structure, the ecological city planning methods were used consistently and systematically under the author's control.

The reconstruction project for the main building, situated between the Lenin Avenue and 2 Institutsky Lane, and Communa Street and 1 Institutsky Lane, is based on all the previously developed and delivered projects.

The pre-design analyzing the current structure of this complex, having a square shape, showed the structure misalignment in the yard and inefficient volume-spatial elevation views in Communa Street, and 1,2 Institutsky Lane, except Lenin Avenue, where the main building was reconstructed. We also found the architectural styles inconsistency and difference in the height of the warehouse, garages, repair and construction management building, boiler house with a brick chimney, etc. It produces the ensemble imbalance and losing its original recreational function, making it a well-developed service zone only. The level of landscaping, including the asphalted passways, and planting is poor. It has no specialized site for a quiet and active recreation, which is widely used in universities project designs, except a small zone in front of the main building in Lenin Avenue and the academic building in the yard east corner. The pedestrian passways between the main building and the educational and laboratory buildings coincide with the auto passways, including trucks moving. The city planning and functional qualities decreasing leads inevitably to the aesthetic performance decline. Many buildings and structures obstruct the visual overview of the main building and make visual discomfort. All this determines the necessity to improve the yard development plan by demolishing the old buildings and finding the new conceptual solutions to harmonize all the city-planning structure of the adjacent area.

The ecological city-planning reconstruction uses a symmetry principle, which is the basis for all the planning area structure. The project protects the major structures and provides slum clearance. An entirely new architectural ensemble of renovated and new four and five-storey buildings is developed along the perimeter of all the yard space (Fig. 3).

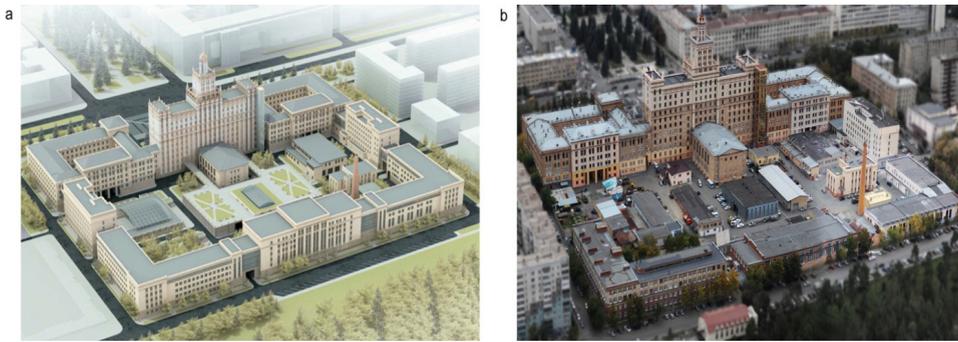


Fig. 3. (a) the projected general view of the SUSU main building complex; (b) a general view of the SUSU main building, an actual photo.

The perimeter buildings entity includes a symmetric five-storey educational and laboratory building with ground floor, having a height equal to the building of the Digital Systems Research Institute in the western part of the complex. It allows to fill the “gap” zone along 1 Instiutsky Lane, based on city planning principles. Improving and restoring the original recreation function of the yard includes constructing a landing stage with the exploited coating and two pedestrian passways joined to the main building in the second floor. Symmetrically located green areas of the landing stage emphasize the whole city planning axis of the main building, which is intensified with the volume of the central laboratory building in Communa Street. To be noted, in the 20th century, the famous architect Le Corbusier called for the active using the roof terraces as an extra recreational area [7]. Under the landing-stage, the warehouse and garage facilities, functionally interconnected with the developed road network, are located. Both passways are completed with wide staircases, connecting the laboratory buildings in Communa Street. The opposite side of the landing stage has extra descents to the landscaped yard area with a developed system of small architectural forms.

The new building for training vehicles, having a two-level parking lot under it, is located in the eastern part of the yard.

Together with the underground parking in front of the main building, it provides the sufficient volume for parking. There are the retained two-storey repair and construction administration building, designed and built in 2009, a three-story publishing center and one floor electric substation (developed by the Architecture Department). The whole yard area, free of buildings and driveways, is landscaped and planted according to the current environmental requirements for selecting pavement materials and kinds of trees, shrubs and lawns.

The neo-classicism style dominates the educational complex, with its features used in the main building exterior. Particularly, one can observe them in the central part and the insertions. The architectural style of the western and eastern wings facades, facing 1, 2 Institutsky Lane determined the facades style of other buildings along these streets. The composite neoclassicism leitmotif traces in the central laboratory building in Communa Street. Its middle part is highlighted with the coupled vertical window openings having arched completions, decorative belts and components.

Of particular difficulty are two angular laboratory buildings and the Thermothechnical building. Their composition analysis reveals the volume and style inconsistency with the main building. The project aligns the upper mark of the buildings with the height of the western and eastern wings in the main building along 1,2 Institutsky Lanes by adding one more floor. The extra floors are compositionally separated from the lower floors with the horizontal line of glass ribbon, performing the role of connecting decoration for the angular laboratory buildings. At the crossroads of the 1 Institutsky Lane and Communa Street, 2 Institutsky Lane and Communa Street, the angular laboratory buildings are accented with small protrusive volumes. These volumes are similar to the end facades of the western and eastern wings along Lenin Avenue. At the ends of the Thermothechnical and laboratory buildings in this street, the identical architectural and compositional principle is used to limit the areas of the facades with a glass ribbon. The laboratory buildings in Communa Street are projected to increase the height of the central laboratory building with two floors, which helps to enlarge the floor space significantly and to landscape

the campus area effectively. All these allow volume-spatial improving the elevation views along Communa Street and 1, 2 Institutsky Lanes and compositionally are subordinated to the main building in Lenin Avenue. The four driveways evenly located around the complex perimeter, accented with tinted glass serving as a transitional element between the multi-styled buildings.

Thus, the developed landscaped campus is proposed, meeting the current requirements for the educational process, conducting research, providing comfortable conditions for students and faculty work and recreation.

3. Conclusion

Implementing the methods for ecological and city-planning reconstruction using the SUSU main building as an example, showed their high efficiency and the acceptability to be used for complex and socially significant facilities.

The reconstruction project of the SUSU main building received the wide public recognition in Russia. It was awarded with the first-degree diploma and the main prize of "Master's Hands" at the Urals Federal District Contest. The author reported on SUSU main building reconstruction at the foreign scientific conferences in Vancouver (Canada), Melbourne (Australia), Shanghai (China) and received the certificates [2]. In 2015, the monograph "Reconstructing of the South Ural State University Buildings and Structures" (authors – G. Vyatkin and S.Shabiev) was published.

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