

# Green Architecture: theoretical interpretation and experimental design

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**Abstract.** The evolution of architectural practice is only possible through an essential understanding of the basic trends of development for architecture in the contemporary world. One of the most important trends is «green architecture». Our view concerning the green architecture will be presented in two sections: theoretical interpretation, and experimental design. Theoretical interpretations include three groups: architecture of barriers & stimulus; poetry of boundariness; and variable multilayered environment. Experimental projects will be demonstrated in three groups: nature-friendly, nature-dissolving, nature-similar, and nature-including.

**Keywords:** «green architecture»; sustainable development; theoretical interpretation; architectural structure; experimental projects.

## Introduction

The evolution of Russian architectural practice in its own right, its relevance and competitiveness on the international market are only possible through an essential understanding of the basic trends that set the direction of development for architecture in today's rapidly changing world.

One of the most important trends that modern architecture is facing today is sustainable methods of

construction that use green architecture [2-6]. Of course, green architecture is the most important step on the way towards sustainable development of city. We restrict ourselves to architecture and architectural environment problems.

Our viewpoint on green architecture will be presented in two sections: general scientific concepts and design experience.

## Theoretical interpretation

Theoretical concepts used in this paper are detailed in the article "Architectural Theory in Russia: Holding on the Past or Looking to the Future?", presented in the same issue of this journal. So we will not describe them in detail. We will just show their use in the "green architecture". We do not set ourselves the task to summarize and systematize the interpretation of "green architecture" existing in literature [2-6, etc.]. Our aim is to show our own opinion on this trend.

In this article, we would like to give our own interpretation of the theoretical concepts of green architecture. Theoretical interpretations include three units: architecture of barriers and stimulus; poetry of boundariness; and variable multilayered environment.

*Architecture of Barriers and Stimulus.* This position is fundamental and it is based on two theses. Thesis one – the phenomenological direction is oriented to establishing the fundamentals of spatial form organization from the standpoint of an individual with his corporeity. Thesis two – the system «barrier – stimulus» introducing the standpoint of a subject with biological stereotypes underlying it. «Barrier» limits movement and defines space for possible action; «stimulus» coordinates and stimulates possible movements of the individual [7] (Fig. 1).

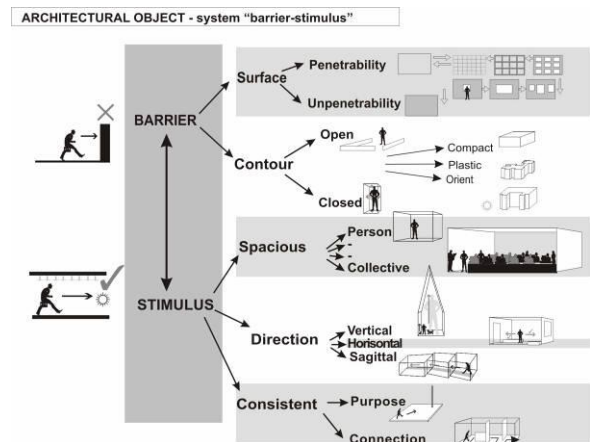


Fig. 1. System «barrier – stimulus»  
[Source: from author private archive]

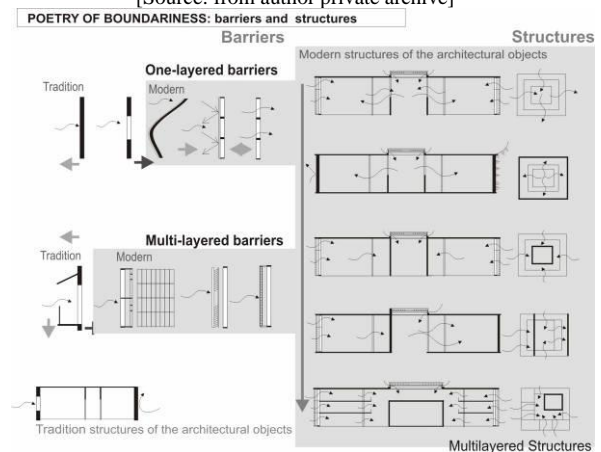


Fig. 2. Poetry of Boundariness: barriers and structures  
[Source: from author private archive]



Fig. 3. Changeability of the plastic and planning structures [Source: from author private archive]

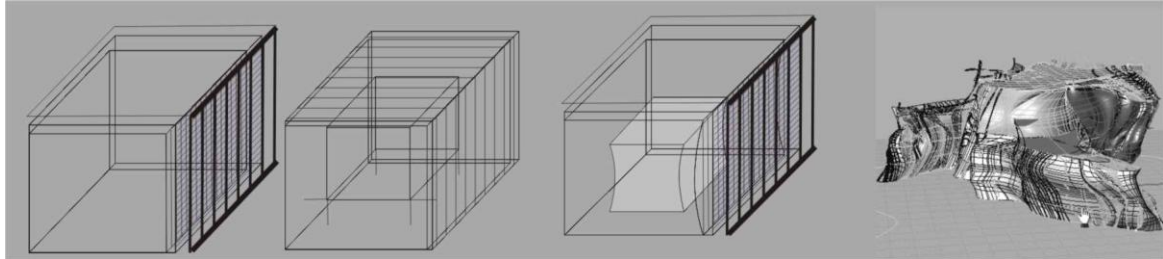


Fig. 4. Multilayered structures and enclosed systems [Source: from author private archive]

*Poetry of Boundariness.* Architectural form generation is revealed through the poetics of the barrier's contours, the art of creation of boundariness by means of which the individual enters into relations with Another: environment, culture, society. The character of the barrier (Fig. 2) may vary over a broad range: from a multilayered barrier to a nested system of spatial volumes (both principal and buffer ones) and relationships between them; in the degree of penetrability and optical characteristics of the material barrier; in the visual permeability and stability / instability of the optical barrier; the degree of inclusion of natural components as barriers (plants, water, etc.) [7]. The poetics of boundariness reveals the artistic aspects of contemporary architecture. The fundamental difference of the contemporary architecture is its processuality and dynamism of an architectural object. Processuality and dynamism of an architectural object manifest themselves through changeability of the structure of an architectural

object and its adaptation to various needs of individual. Means of the processual architecture: changeability of the planning structure, changeability of the plastic structure and use of systems with multilayered barriers of a different degree of penetrability.

*Variable Multilayered Environment.* The classical concepts of architectural objects as the architecture of buildings are becoming the past. The evolution of the contemporary architecture demonstrated the crossing from traditional concepts of static volumes to variable multilayered structures and enclosed systems (Fig. 4) as a basis for the concept of sustainable development of city [7]. The newest architectural objects are becoming multi-environment objects including: interior spaces, buffer spaces separating to a varying degree from exterior effects, open exterior environments with natural components.

### Experimental design

The creative potential that is available in Russian architecture can be fully discovered in the conceptual projects experience such as: students' degree projects; competitive projects; experimental projects. We want to show some interesting projects of our students who have accepted and developed our ideas of green architecture. All of these projects were carried out with our participation as leaders [1]. The projects will be demonstrated under three headings: nature-friendly; nature-dissolving; nature-similar; and nature-inclusive.

**The first group of «nature-friendly» projects** presents urban villas. The urban villas are a nature-friendly type of the residential building and basic trends that set the direction of development for harmonious and comfortable newest eco-

community. Environment-friendly planning of the flats provided maximum contact with nature. Every flat has a green family room or green atrium space and green terraces (Fig. 5). The emphasis in this project is made on disclosure of the idea of "poetry of boundariness".

Great opportunities to create multilayered barriers and adaptive and multi-environmental objects are offered by the treatment of public infrastructure in the form of Nature-Friendly Social and Welfare Complexes.

The main idea of this Educational and Welfare Complex is the creation of a nature-friendly environment for meeting various needs of contemporary children and residents of nearby territories (Fig. 6).

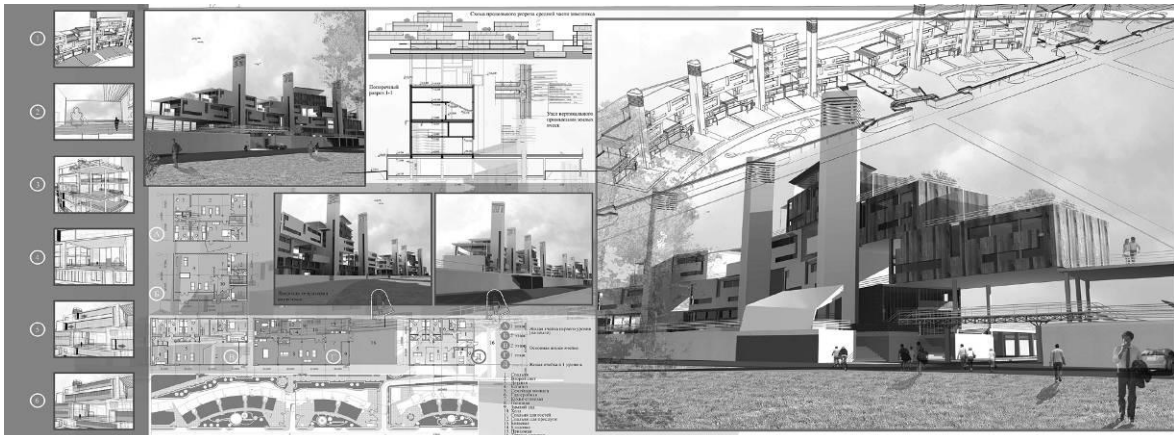


Fig. 5. The project «Urban Villas». by A. Shumakov [supervisor – prof. A. Merenkov]



Fig. 6. The project «Educational and Welfare Complex» by E. Abasheva [supervisors – prof. A. Merenkov, arch. V. Gromada]

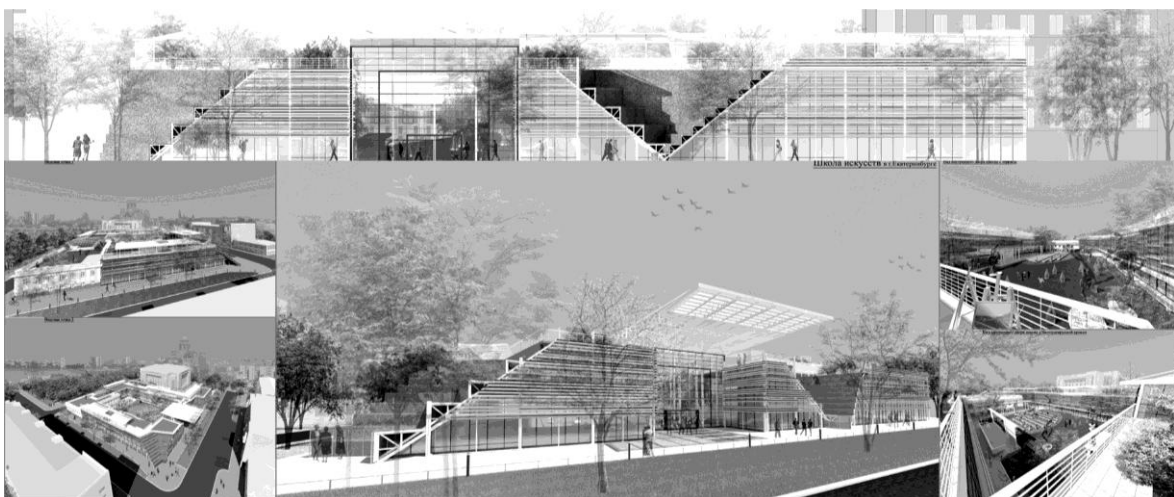


Fig. 7. The project «Art School – Center of Creative Education» by E. Grigoreva [supervisors – prof. A. Merenkov, M. Besirganov]

This complex can respond to the environment by:

- 1) transformed multilayered facade construction of the atriums and recreation spaces;
- 2) isolation from the street noise by vertical planning of the complex territory;
- 3) maximum orientation of playgrounds to the river;
- 4) environment-friendly planning of this complex provides maximum contact with nature by roof gardens with playgrounds, all season atrium-gardens and using green low-pitched-roofs/ramps. Variable multilayered environment.

Further development of this idea can be seen in the project Art School – Center of Creative Education (Fig. 7). These projects combine the motto «nature around, nature inside, nature on». The emphasis in these projects (Fig. 6, 7)

is made on disclosure of the idea of “variable multilayered environment”.

**The second group of projects are «nature-dissolving».** The idea of dissolving in nature demonstrates The Residential Complex «Biosphere» for the town Miass (South Ural). This nature-friendly Residential complex has south-oriented terraces and environment-friendly apartments that include natural elements as private mini courtyards and natural barriers. The main project purpose is to decide the contemporary human problem of separation from nature and there it includes nature in the residential environment (Fig. 8).

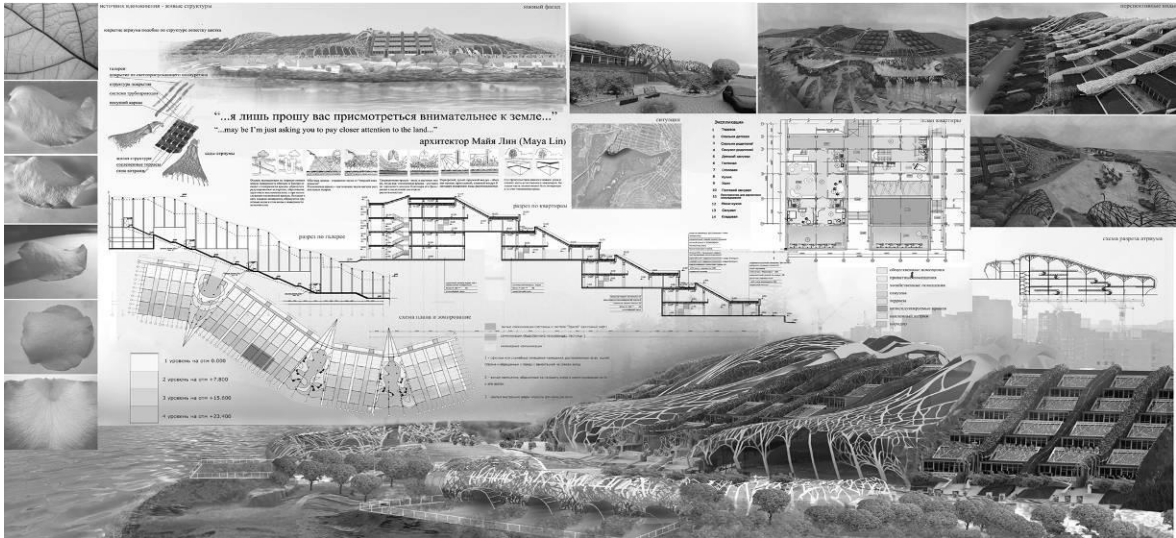


Fig. 8. The project «Residential Complex «Biosphere» by E.Kropaneva [supervisors – prof. Y. Yankovskaya, N. Akchurina]

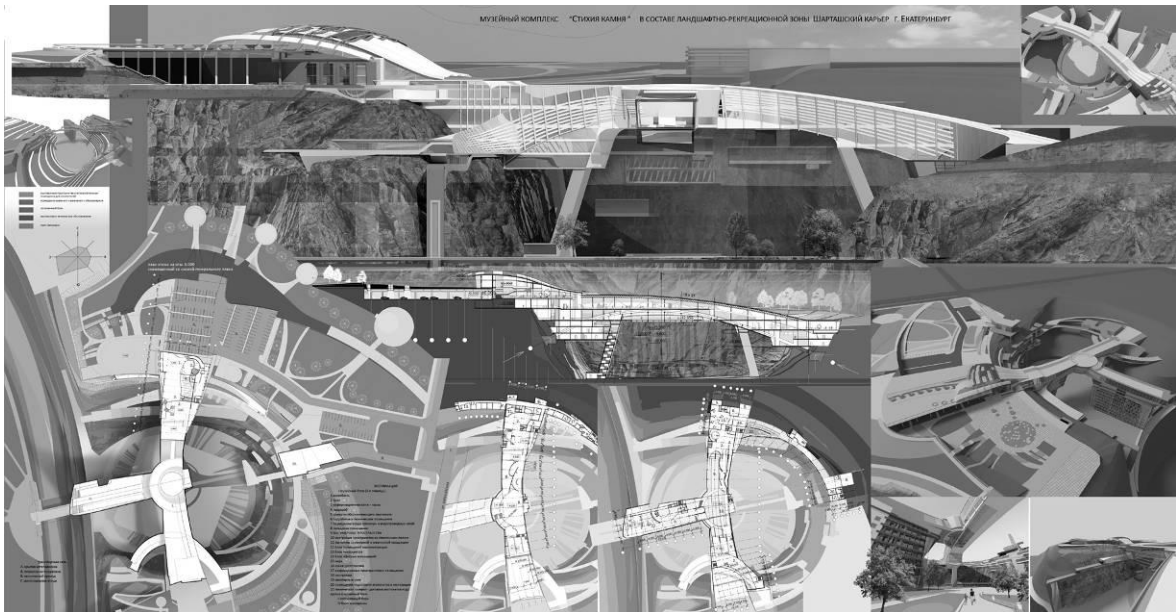


Fig. 9. The project «Museum complex» by S. Sitko [supervisors – prof. A. Merenkov, N.Doronina]

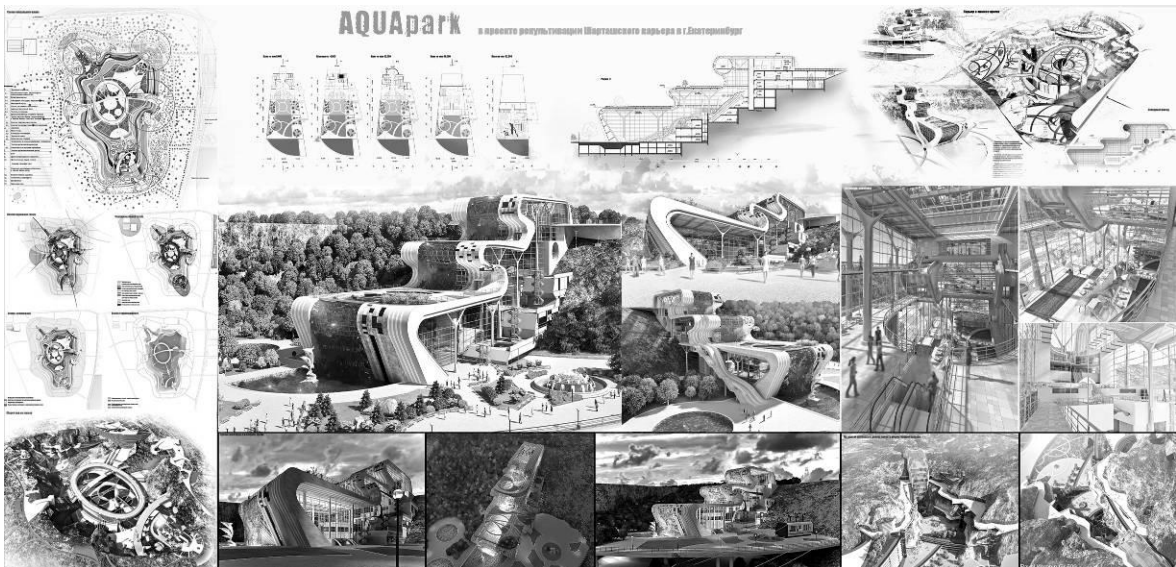


Fig. 10. The project «Water Park» by P.Korepin [supervisors – prof. A. Merenkov, N. Doronina]

Another aspect of nature-dissolving is demonstrated by civic building in reclaimed and restored natural territories. The museum complex is located in a reclaimed quarry zone near a lake (Fig. 9). The concept of this complex is directed at including surrounding natural elements and forming an eco-oriented nature-friendly humanistic and harmonious environment. Further development of this idea can be seen in the project Water Park (Fig. 10). The emphasis in these projects (Fig. 8-10) is made on disclosure of the ideas of “poetry of boundariness” and “architecture of natural barriers”.

**The third group of projects, «nature-similar»,** are devoted mainly to Social and Cultural Complexes. Two projects (Museum/Gallery of Contemporary Art and Theatre of Emotion) are developing artistic vision «gesture» and «trace» of the living creatures, abandoned them when converting dead matter.

Museum/Gallery of Contemporary Art and Architecture. Architectural form generation is revealed through the poetics of the nature and bionic forms. This project is developing the phenomenological direction in Form Generation in Architecture and it is oriented to form organization

from the standpoint of an individual with his corporeity. It demonstrates the fundamental phenomenological ideas of «thing as gesture», «trace», «shell-bound». The metaphor of the drop of water that can be carrier and keeper of information, it is becoming the basis of the creative environment that is encouraging creative development of the individual (Fig. 11, left).

Theatre of Emotion. The plastic image and form creation of the Theatre of Emotion is demonstrating the experience of the history of human relationships from origin to extinction (Fig. 11). The interior space is constructed by the principle of Enclosed Systems with multilayered atrium spaces pierced with vertical circulation structures (Fig. 11, right).

The project «Museum of Nature» gives a different interpretation of nature-similar. The nature-similar is revealed through the metaphor of a tree. Tree as a symbol of evolution, beauty and power of nature was the basis of architectural form generation and structure of this project (Fig. 12). The emphasis in these projects (Fig. 11, 12) is made on disclosure of the phenomenological direction and ideas of “the poetry of boundariness” and “variable multilayered environment”.

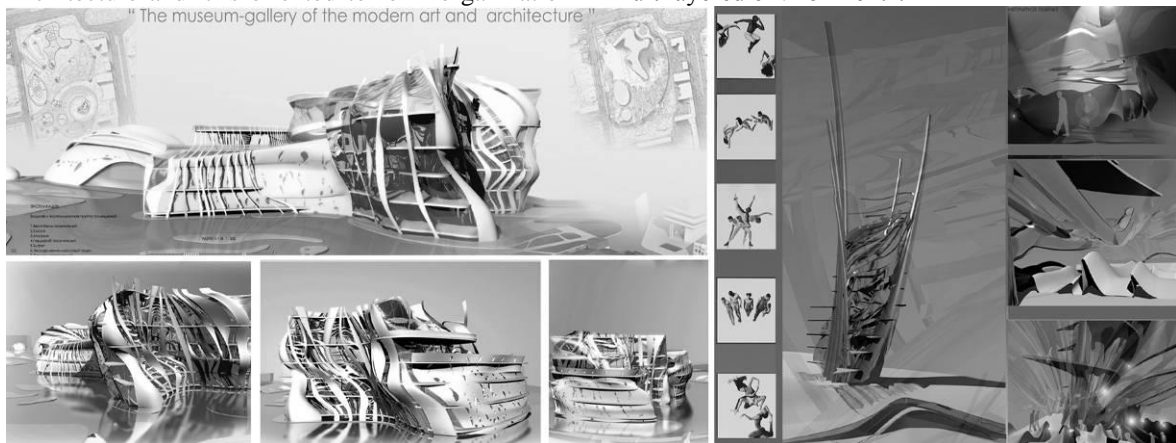


Fig. 11. Projects: «Museum/Gallery of Contemporary Art and Architecture» (left) and «Theatre of Emotion» (right) by V. Mehontcheva, A. Chebikina [supervisors – prof. Y. Yankovskaya, N. Akchurina]

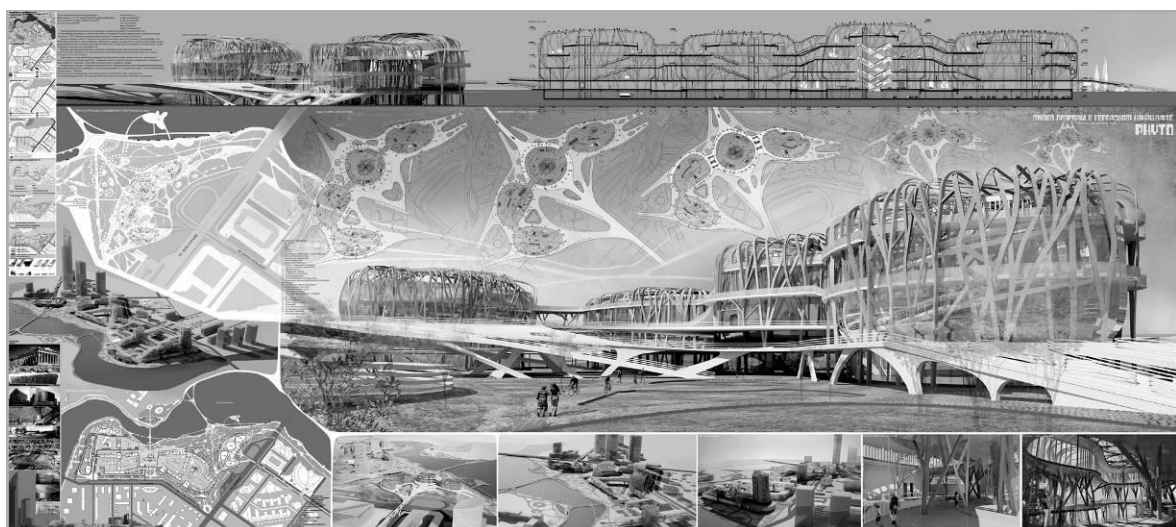


Fig. 12. The project «Museum of Nature» by Y. Davletbaeva [supervisors – prof. A. Merenkov, N. Doronina]

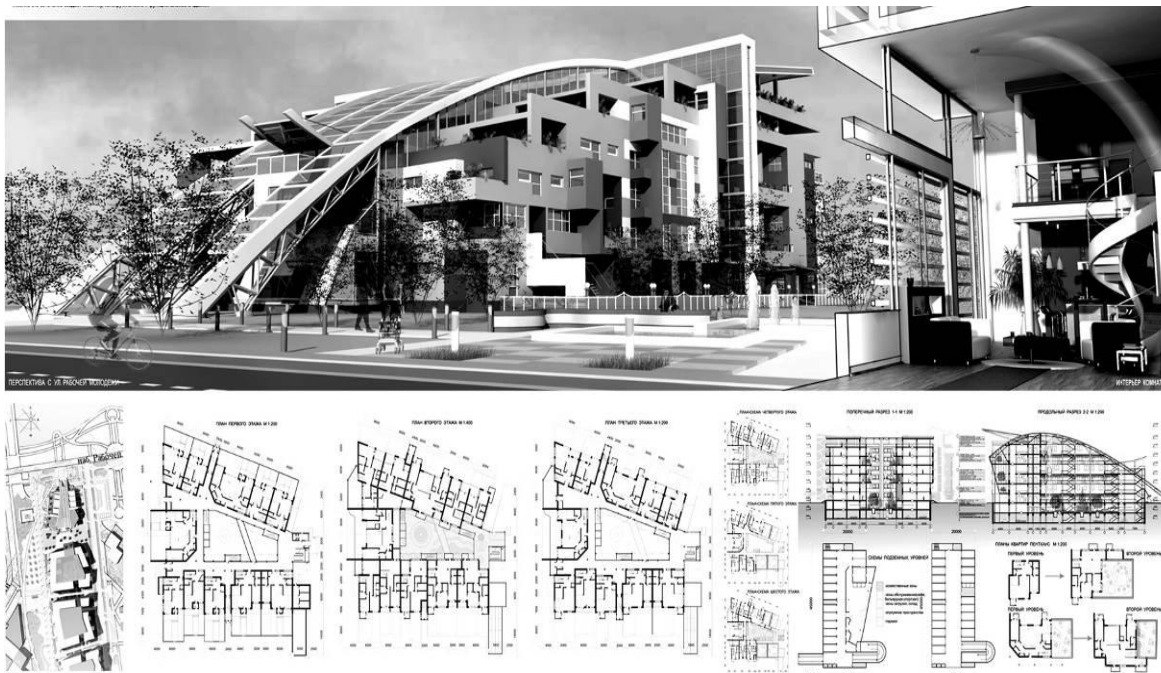


Fig. 13. The project «Club-Type Residential Building» by A.Chirkov [supervisors – prof. A. Merenkov]

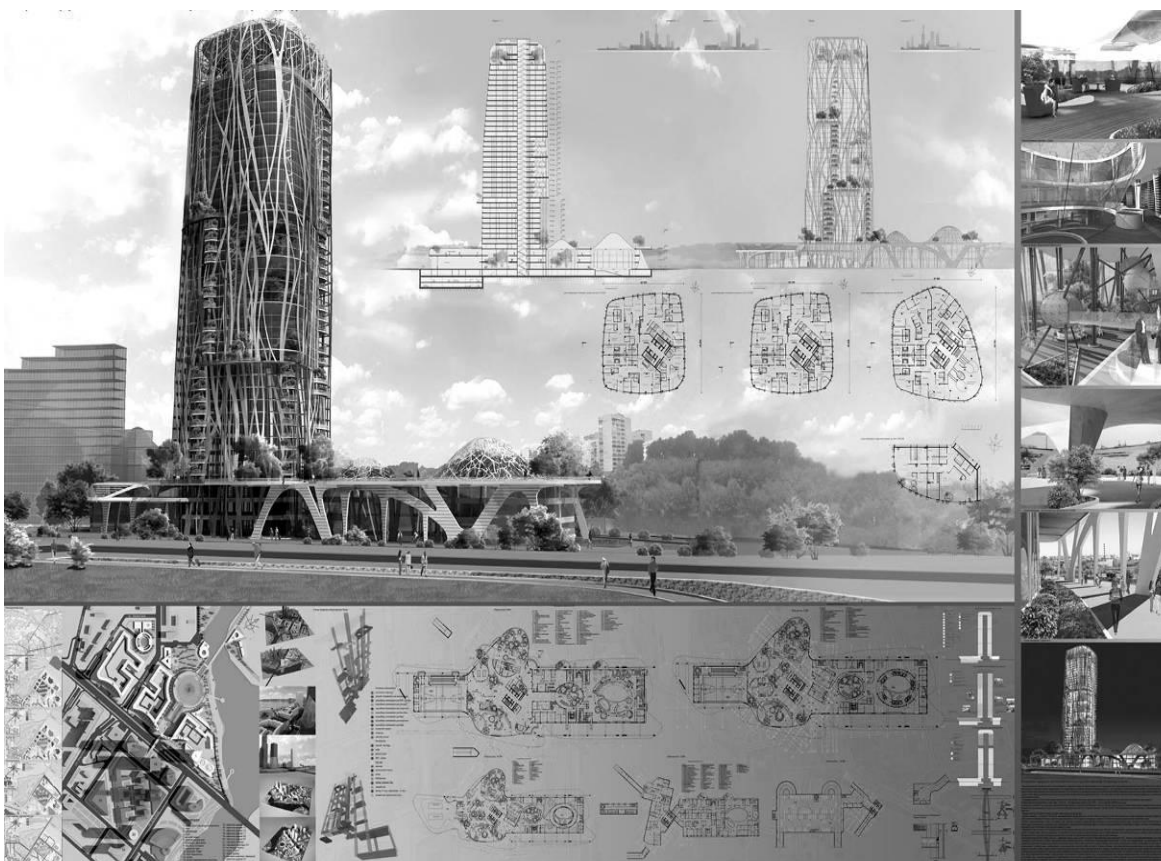


Fig. 14. The project «High-rise apartment buildings» by A. Grigoreva [supervisors – prof. A. Merenkov, N. Doronina]

The fourth group of projects, «nature-inclusive», is devoted to Residential and Multifunctional City Complexes. The main ideas of nature-inclusive complexes are compensation of the adverse effects of the industrial urban environment and introduction of nature components into architectural objects. The roof gardens and green

walls are located on the architectural volumes; green atriums and winter gardens are integrated into the buildings.

Club-Type Residential Building is located in the civil urban complex «Yekaterinburg-City» (Fig. 13). The green atrium space is integrated into the building's structure and connects all apartments of

this club-house into a social community with welfare facilities. The structure of the ground floor includes small apartment gardens and flats' own entrances. Nature is included in other flats by two-level green family rooms.

High-rise apartment buildings with well-developed public services. High-rise apartment buildings in a large industrial city become an

### Conclusion

The theoretical interpretation of "green architecture" as stated in the first part is disclosed in our students' projects in various ways, becoming a way to attaining the design objectives as well as a metaphor for defining the artistic appearance of the architectural object.

Eco multilayered vertical garden that compensates adverse effects of urban environment and responds to seasonal and climatic changes (Fig. 14).

The emphasis in these projects (Fig. 13, 14) is made on disclosure of the ideas of "architecture of barriers and stimulus" and "variable multilayered environment".

Theoretical concepts have many interpretations in project work, but they are meant to stimulate design experimentation and discovery of new approaches to architectural form generation and implementation of the ideas of «green architecture».

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**Kopsavilkums.** Arhitektūras prakses attīstība ir iespējama tikai caur būtisku izpratni par galvenajām arhitektūras attīstības tendencēm mūsdienu pasaulē. Viena no svarīgākajām tendencēm ir "zaļā arhitektūra". Šajā rakstā viedoklis par "zaļo arhitektūru" tiek prezentēts divas daļās: teorētiskā interpretācija un eksperimentālais dizains. Teorētiskās interpretācijas iekļauj trīs grupas: arhitektūras šķēršļi un stimuli; robežu poēzija; daudzslāņaini mainīgā vide. Rakstā vizuāli tiek demonstrēti dažādi eksperimentālie projekti, kas ir izdalīti dažādās grupās.