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TRENDS OF SHAPING ARCHITECTURE OF ECOLOGICAL TREATMENT AND REHABILITATION COMPLEXES

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Abstract. *The trends of shaping architecture of environmental rehabilitation complexes associated with environmental design principles and specific requirements of this type of building structures were considered.*

Keywords: ecology of the environment; environmental design; environmental treatment and rehabilitation complexes; trends.

1. Introduction

Hospital complex is an unique building, their design and construction must meet many criteria, according to their purpose [State…2001]. In recent decades, the natural balance in the environment has become particularly dramatic. The use of large piece of man-made building and finishing materials with high percentage of harmful substances leds to a sharp deterioration in health. One solution to these problems is ecological construction.

Ecological building relevant in designing treatment and rehabilitation complexes, because the use of certain principles of architectural design and construction provides support and promote the health of patients and their comfortable and safe stay in the complex [General…2003].

The **purpose** of the publication is to highlight the major trends in shaping architecture of environmental treatment and health engineering and specific construction requirements.

2. Analysis of research

In the broadest sense ecological building should be energy-saving and create a healthy microclimate through the use of environmentally friendly materials, as well as reduce the burden on the environment by using the latest technology (alternative energy, local wastewater treatment, waste management, etc.) [Diakonov, Doncheva 2002].

Key trends in shaping architecture of environmental treatment and rehabilitation complexes associated with environmental principles of architectural design, with special requirements of construction and design of environmental treatment and rehabilitation complexes, with ecological and comfortable interior space structures with the ecology of the environment and territory planning.

It should be noted that environmental planning of treatment and rehabilitation complexes based on ecological principles of architectural design: ecological cleanliness of building materials, energy saving, alternative energy sources (solar collectors, boilers of quality and energetically favorable combustion of raw materials) and the proper disposal of waste. Use of comfortable and healthy heating and cooling system of a building for a man should be radiating surfaces. Also according to ecological principles of architectural design must be considered energy savings and providing comfort with the help of well insulated walls.

Three main objectives of ecological planning are:

- Preservation of human health;
- Clean environment;
- Energy saving.

Ecological building is not a hothouse with a fully artificial atmosphere, which is just the same during the year. Passive ecological house - is a healthy home in which it's microclimate is as close to the natural environment as it can be, allowing the person to feel the changes in the external space, changes of the weather conditions while offering her the maximum thermal comfort and healthy atmosphere with constant humidity.

The Ecological Children's Rehabilitation Hippotherapy Center "Camellia" can be an example (Fig. 1).

The first hippotherapy center in Ukraine, which has no analogues either in Europe or in the former Soviet countries is planning to build for the treatment and rehabilitation of children with cerebral palsy and autism. Chief Architect of the project Anna Kiriy came up with a systematic solution to that issue, in the process taking into account a whole range of required for such a complex task services: treatment, rehabilitation and psychological relaxation.

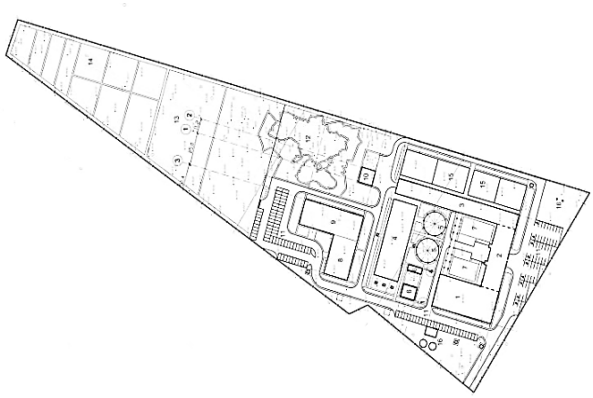

Fig. 1. Children's Environmental Rehabilitation Hippotherapy Center "Camellia" (Architect Anna Kiriy)

The very center is planning to be built with a help of alternative sources of energy and ecological technologies, which means creating solar panels, installation of combustion of biofuels, heat pumps, as well as an autonomous system of sewerage and water supply systems and closed loop irrigation. The project provides ecological agricultural complex and recycling of organic waste, making the whole complex area of over 5 hectares functioning according to the closed loop system (maintain their own needs).

Equally important trend in the design of this type of structures meets the specific requirements of construction and design of ecological treatment and rehabilitation complexes.

According to the special requirements of building and designing, buildings of medical and health institutions should be designed, usually not more than within nine floors. You can go higher only with the consent of the territorial State Fire Service: must be designed and installed aids and appliances for patients (ramps, handrails, handles, levers, rods, etc.).

Meeting the specific requirements of construction and design of ecological treatment and rehabilitation complexes includes:

– Use of less energy for production of building materials, heating, cooling and ventilation of buildings;

– The use of energy that have the ability to restore itself;

– Recycling and reuse of waste without harmful effects on environment;

– Use of natural and environmentally friendly materials;

– Ensuring natural flow processes in the environment.

Efficiency of energy saving and ecology of the building determined by a combination of such factors as:

– Site selection for construction, ecological materials and structures;

– Passive and active use of energy with the ability to recover;

– Energetically favorable engineering equipment etc.

An example is the Thermal ecological resort in Spain (Fig. 2). Hotel, restaurants, spa, laboratory and cosmetics production fully supplied with energy, hot water and heating with the help of advanced geothermal installation.

Fig. 2. Thermal ecological resort in Spain

The hotel received the award for eco-architecture: it is constructed from natural lava and highly durable wood. The whole set fits perfectly into the landscape of fantastically blue lake and volcanic formations, covered with moss. For five consecutive years the Resort is receiving the Blue Flag that indicates the ecological purity of its water and shores.

Creating ecology and comfort of interior space of the structure to support and promote the health, safety and convenience of people in ecological treatment and rehabilitation complexes - yet another example of architectural trends of shaping architecture of ecological treatment and rehabilitation complexes.

Choosing finishing materials for modern therapeutic facilities determined by the desire to reduce the risk of accidents and fires, in other words materials must be noncombustible or not to allocate toxic fumes and gases in the combustion process.

The choice of materials in hospitals must meet specific requirements, such as for easy cleaning, washing, disinfection, and match the concept of the natural environment of human existence (paper wallpaper, paint colors, tile, wood and linoleum - this is the "minimum design" which will make Interior sophisticated and ecologically safe).

Ecology of the internal space of the building is achieved through:

– The use of ecological building and finishing materials that do not emit harmful emissions during their operation;

– Placing a large number of windows in the south location which will provide an excellent insolation, additional "free", very pleasant and healthy heat and constant eye contact with the environment;

– Complete closure of the building from the north (blank wall without windows), positioning subsidiary zones in the north that would be "thermal buffer" between the cold and warm living space;

– Installation of quality insulation;

– The use of natural diffusion-open materials in the interiors areas that would equilibrate relative humidity of air indoors, constantly keeping it at 50%;

– Rejection of convection heating and cooling buildings, which leading to overheating and drying air in winter and high overcooling in summer.

Controlled ventilation creates conditions where warm, "used" air is not thrown right out of the window into the atmosphere, but passes through the special equipment and through the heat exchanger gives its heat to fresh air. So, first, the warm air is not going into the atmosphere and have nothing to do with a global warming, and secondly: fresh air that enters the room is already preheated what ensures a lack of unpleasant for human processes - drafts.

The new approach focuses on passive ecological buildings that naturally maintain stable comfortable conditions for life. Therefore, to the construction includes the following technical specifications:

– Ventilated and shaded bedroom modules;

– Lake, which provides thermal balance;

– Windows of chambers, shaded from the sun in the summer;

– Atrium with a winter garden.

An example is the Madrid Suburbs Rey Juan Carlos Hospital (Fig. 3).

Maximum functionality, light, air and tranquility reflected in this project of Rafael de La-Hoz Arquitectos studio. Corridors are located near the center side of annular housings of the building. From there, through the transparent glass wall, curved in the form of the building, opens up a beautiful view of the atrium and recreation areas.

Fig. 3. Hospital Rey Juan Carlos Rafael de La-Hoz Arquitectos' studio

The hospital is designed to service 180,000 people in 20 municipalities. Tower body made in the form of concentric buildings with courtyards - atriums, closed from all sides. At the top the atriums with gardens protected with roof-awnings, set at an angle. Thus they are provided with a natural ventilation system.

The tendency to use "external" (outwardly directed) ecology in shaping the architecture of ecological treatment and rehabilitation complexes is equally important.

There are some principles of "external" environment:

– Use of less energy to manufacture building materials and structures;

– Use of construction materials, production, operation and disposal of which are friendly to the environment (no harmful effects and emissions);

– Recycling and reuse of production waste without harmful effects on the environment;

– Use of less energy for heating, cooling and ventilation of buildings;

– The use of energy-base engineering systems with a high efficiency that have the ability to restore themselves.

An example is the project "Ukrainian Center of Maternal and Child Health - Children's Hospital of the Future" in Kyiv (Fig. 4).

It is unusual for Ukraine because of its size (active area – 53,000 sq m, capacity – 250 beds), as well as the active use of the achievements of "green" architecture. Because of the help of the artificial lake, which is a part of the ensemble of the hospital, it is possible to get rid of conditioners: rooms will be cooled with the use of thermal inertia of the water, during the construction of the hospital active use of wood as one of the most environmentally friendly materials will have place.

Next trend is related to the architecture shaping of ecological treatment and rehabilitation complexes, mainly to the planning [Ustinova 2004]. When choosing a location for the building, one should consider:

– Climatic conditions;

– Topography;

– The orientation of the building by the cardinal;

– Light and dark sides of the particular place;

– Strength and direction of winds;

– Security of the building that is provided by greenery.

Place for medical and health facilities should be selected according to four main criteria:

1. Surrounding factors. The area should be as smoother as possible and located far enough from the pollution and noise sources.

2. Geological characteristics. One should avoid areas prone to earthquakes or a seismic choice in design.

3. Urban factors. The chosen place should be easily accessible for potential users, service and fire engines, convenient delivery and waste disposal. Public transport and public utilities (such as water, gas, electricity, sewage) must be available out there.

4. Sufficient amount of territory. The area should allow some expandability.

An example of this is the Moscow suburbs sanatorium project (Fig. 5).

The location with the magnificent landscape was selected as a place for the building. The total area of the occupied territories – is 43.64 hectares. Architects store available territory entering ways, combining them into a ring of circular movement near the front entrance of the main building.

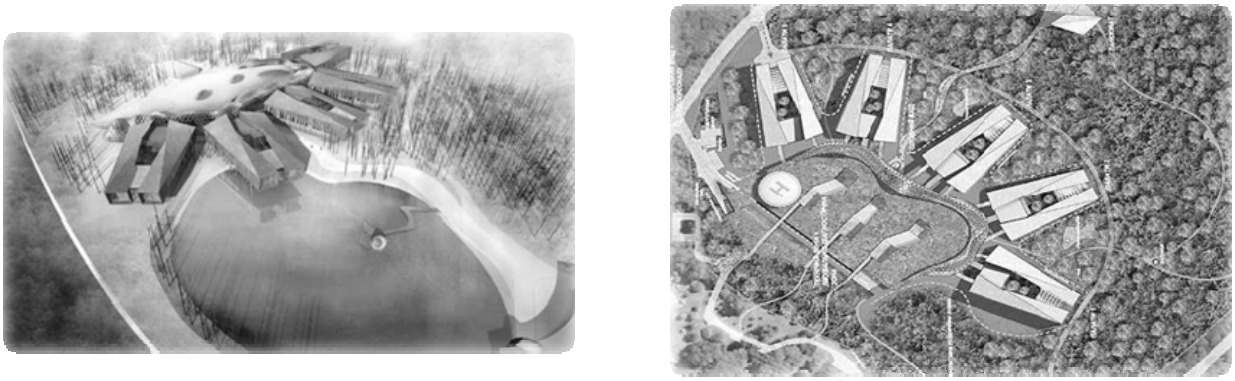

Fig. 4. The "Ukrainian Center of Maternal and Child Health Children's Hospital of the Future"

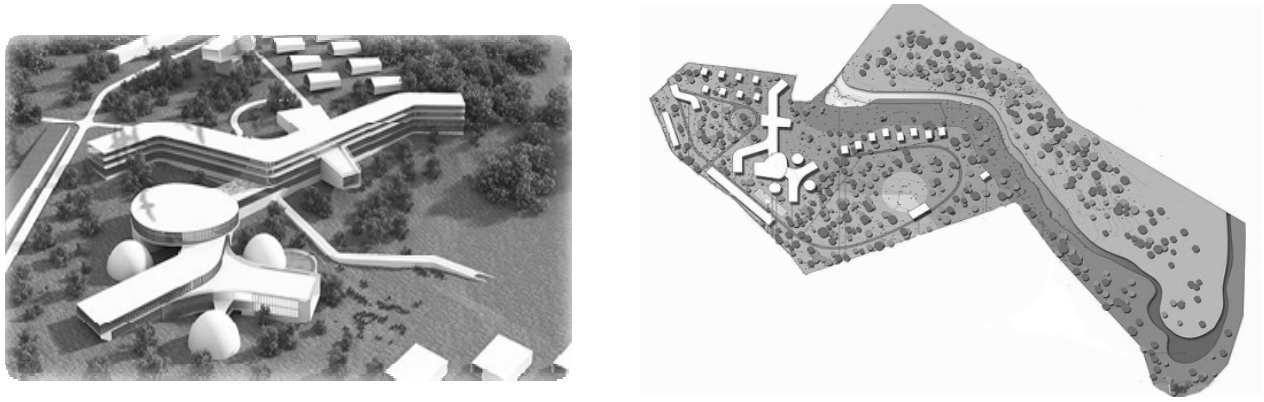

Fig. 5. Moscow suburbs sanatorium project

Between the entrances along the western border of complex economic zone of the complex with the water scoop station, campus and boiler room were placed. Thus, the infrastructure facilities are used in the way of screen that protects the main resort objects of the complex from being seen from the road. The only exception is an entertainment and conference center's building, which is projected at the main northern entrance and is the face of the entire complex.

Such branched structure of the complex emerged because of several reasons. Firstly, architects were aiming to collect all basic features of the future resort into one entire block: so that when too cold winter or damp autumn days will come their visitors will be able to move from their rooms into dining and spa without even going outside. Secondly, the height of buildings should not exceed the limit in 3-4 floors, and this also contributed to their elongated shape.

It is also important that due to the small number of floors and because of the surrounding trees, it will not be possible to see near located buildings from the windows of the sanatorium.

3. Conclusions

So, we can conclude from the above mentioned that the design of modern ecological treatment and rehabilitation complexes requires not only rules and regulations of this type of structures, they must be designed and constructed according to specific "systems": a separate ecological standard must be created for them.

The essence of the special requirements for treatment and rehabilitation complexes is the adaptation of external guidance to the subjective parameters that give the ability to make predictions about the comfort level of patients and staff.

By using considered trends of architecture's shaping of ecological treatment and rehabilitation complexes the support and promote of the health of patients will be provided as well as their comfortable and safe stay in the complex.

Trends that were mentioned above about ecology in construction are making possible to follow standards of this type of structures, which creation is very popular at the moment. But this still will take a lot of time before the final transition to sustainable architecture and construction will take place.

The treatment and rehabilitation complexes, associated with ecological principles of design and the construction of this type of buildings specific requirements were considered.

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О.Ю. Запорожченко[1], В.С. Дугіна[2]. Тенденції формування архітектури екологічних лікувально-оздоровчих комплексів
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Розглянуто тенденції формування архітектури екологічних лікувально-оздоровчих комплексів, які пов'язані з використанням екологічних принципів проектування і специфічними вимогами будівництва даного виду споруд.

Ключові слова: екологія зовнішнього середовища; екологічне проектування; екологічний лікувально-оздоровчий комплекс; тенденції.

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Рассмотрены тенденции формирования архитектуры экологических лечебно-оздоровительных комплексов, связанные с использованием экологических принципов проектирования и специфическими требованиями строительства данного вида сооружений.

Ключевые слова: тенденции; экологический лечебно-оздоровительный комплекс; экологическое проектирование; экология внешней среды.

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