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PRINCIPLES OF ARCHITECTURAL AND PLANNING ORGANIZATION OF RESIDENTIAL AREA USING MODULAR STRUCTURES

The article is devoted to an important problem of finding new solutions for social housing in the Donetsk region. The definition of modular structures is given. The current state of housing problem is described and new material such as shipping containers is proposed. Authors explain reasons for using shipping containers in building industry, describe its advantages and disadvantages. Examples of Western experience in making up houses of shipping containers are given.

social housing, modular structures, ecological tendencies in architecture, recycling, shipping container

STATEMENT OF THE PROBLEM

Current state of existing housing stock in Ukraine in general and Donetsk region in particular brings out a lot of problems. There are many ways of solving those problems. Traditional ways include building new apartment houses we are all used to. But the costs of such buildings is very high for average people. Modern modular structures could be a cheaper alternative which could provide people with comfortable and appealing houses for a good price.

ANALYSIS OF THE RECENT RESEARCHES AND PUBLICATIONS

Scientific works and publications considering container [1] and portable architecture [2] were analyzed while preparing this article. Among authors dealing with those subjects are Jure Kotnic and Robert Kronenburg.

GOALS

To ground the possibility of using modular structures in current conditions of our region, to introduce shipping container as a building material, to show its advantages and disadvantages; basing on Western experience to show the potential of shipping containers in making low-cost, comfortable, green and nice-looking houses.

BASIC MATERIAL

Modular buildings are created by joining together standardized units or modules which can sometimes be subsequently moved, removed or added.

Modular structures of one particular type were widely used in our country and other countries of the post-USSR area. They are represented as sectional houses where many of us still live in. But we all agree that such buildings have very little architectural and artistic value as well as low conveniences.

In our region housing problem is very actual. Income level of most people doesn't let them buy personal house or a flat. In addition many old apartment houses depleted their life term and conditions they provide are far from being perfect. But the costs of such apartments are still very expensive.

New buildings are often more comfortable but again they are meant for people with high income and are not affordable for the rest. Considering existing problems we don't see any work on building low-cost but comfortable housing for ordinary people.

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In these terms modular structures are an object of high interest. Modular elements are prefabricated and only need to be set on a construction site. This way we can reduce the construction time. And its cost is decreased because of reduction of builders' salary and equipment rent what should lead to making final product cheaper.

In our research we focus on such unusual in our country building material as shipping containers. Those structures have become very popular in the United States and Europe especially as green tendencies are growing in popularity.

More and more people are turning to cargo container structures for green alternatives. There are countless numbers of empty, unused shipping containers around the world just sitting on shipping docks and taking up space because it's too expensive for a country to ship empty containers back. In most cases, it's just cheaper to buy new containers from Asia. The result is an extremely high surplus of empty shipping containers that are just waiting to become a home, office, apartment, school, dormitory, studio, emergency shelter, and everything else.

In our country we can see shipping containers being used only as poorly equipped summer residences or temporary accommodation for builders. But western experience shows us their high potential and capability of becoming functional, comfortable and nice-looking living space.

There are a lot of advantages of this material which could help to understand the reasons for using it [1]. Most important of them are: strength and durability, modularity, easy transportation, availability, low expense. But we can find some disadvantages as well: temperature and humidity (though, it can be fixed by using insulation), necessity to use crane during construction, careful cleaning of all surfaces before habitation.

And now some examples of houses made of shipping containers. While creating a small guest house in Texas (pic. 1) the emphasis was made on sustainable strategies. The planted roof provides shade and air-flow to reduce heat. Grey water from the sink and shower is captured for roof irrigation. Water closet is a composting toilet.



Picture 1 – Container house in San Antonio, Texas, USA.

Another example is a container house in Chile (pic. 2). The first purpose was to integrate the house into the landscape and especially mountains. That's why shapes of the house repeat the outlines of the slope. The second goal was to allow the external air to run smoothly and easily through the all house and its different parts in order to avoid mechanical cooling.



Picture 2 – Container house in Santiago, Chile.

Student dormitory in France is a bigger structure made of containers. It consists of 100 apartments (pic. 3). The goal was to make a lightweight transparent and not solid system to avoid the stacking effect and the feeling of living in a box. The solution was found in a metal frame that acts as a structural support to the old containers while allowing to stagger the units and create new space for walkways, patios and balconies.



Picture 3 – Student dormitory in Le Havre, France.

CONCLUSION

Despite some disadvantages which can be easily fixed and prevented, ecological impact made by recycling shipping containers is very high. Considering money problems which many people of our region have, buildings made of containers would be a social solution. To our opinion using such structures in Ukraine could become low-cost and green alternative to traditional apartment houses. Western experience shows us that such structures could be nice-looking as well.

REFERENCES

1. Jure, Kotnic. Container architecture [Текст] / Kotnic Jure. – Barcelona : Links Books, 2008. – 256 p. – ISBN 978-84-96969-22-3.
2. Kronenburg, Robert. Portable Architecture [Текст] / Robert Kronenburg. – Third edition. – Oxford : Elsevier/ Architectural Press, 2003. – 274 p.

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А. В. КОСТЯЄВА, Т. І. ЗАГОРУЙКО ПРИНЦИПИ МІСТОБУДІВНОЇ ТА АРХІТЕКТУРНО-ПЛАНУВАЛЬНОЇ ОРГАНІЗАЦІЇ ЖИТЛОВОЇ ЗАБУДОВИ З ВИКОРИСТАННЯМ МОДУЛЬНИХ СТРУКТУР

Донбаська національна академія будівництва і архітектури

Стаття присвячена важливій проблемі пошуку нових рішень для соціального житла в Донецькому регіоні. Дається визначення модульних структур, описується поточний стан житлової проблеми, як новий матеріал для будівництва пропонується морський контейнер. Автори характеризують передумови використання морського контейнеру в будівництві, його позитивні та негативні якості. Надаються західні приклади житлових будинків з морських контейнерів.

соціальне житло, модульні структури, екологічні тенденції в архітектурі, вторинне використання, морський контейнер

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ПРИНЦИПЫ ГРАДОСТРОИТЕЛЬНОЙ И АРХИТЕКТУРНО-
ПЛАНИРОВОЧНОЙ ОРГАНИЗАЦИИ ЖИЛОЙ ЗАСТРОЙКИ С
ПРИМЕНЕНИЕМ МОДУЛЬНЫХ СТРУКТУР

Донбасская национальная академия строительства и архитектуры

Статья посвящена важной проблеме поиска новых решений для социального жилья в Донецком регионе. Дается определение модульных структур, описывается текущее состояние жилищной проблемы, в качестве нового материала для строительства предлагается морской контейнер. Авторами охарактеризованы предпосылки использования морского контейнера в строительстве, его достоинства и недостатки. Приводятся западные примеры жилых домов из морских контейнеров.

социальное жилье, модульные структуры, экологические тенденции в архитектуре, повторное использование, морской контейнер