REVIVAL OF ROMANIAN TRADITIONAL HOUSES WITH MODERN SOLUTIONS AND LOCAL, NATURAL MATERIALS (TRAROM PROJECT)

Lect. Dr. Andreea DUTU[1], **Arh. Daniel BARBU MOCANESCU**[2], **As. Prof. Dr. Mihai NISTE**[1], **Lect. Dr. Iulian SPATARELU**[1], **Lect. Dr. Dietlinde KOBER**[1]

[1] Technical University of Civil Engineering Bucharest - **Romania**
[2] Neuron ArhDesign, **Romania**

ABSTRACT

Nowadays, traditional residential houses are not built anymore, with few exceptions, although they represent valuable assets from the heritage point of view and also an important part in our cultural identity. In addition, they can be regarded as a seismically resilient typology and also as a cheap construction due to the use of local materials and especially of self-workmanship.

The construction details of traditional houses used to be done very carefully, but this habit got lost with time. In recent years, due to immigration of villagers to other countries, the self-builders who mastered those construction details disappeared together with their knowledge.

This project (TRAROM) aims at reviving traditional architecture for houses with timber frames and various infills, for new houses using improved construction details based on recent technological developments which make use of traditional materials. For this purpose, one typology of traditional house was taken as a reference and considering the materials and workmanship available on the Romanian market, a new typology is proposed for new timber houses.

Keywords: Traditional, Seismic, Modern technologies, Timber frames, Infills, Natural materials

INTRODUCTION

Starting from traditional houses typologies, such as, timber frames with different types of infills, described in [1] and observing also the houses in the National Village Museum “Dimitrie Gusti” in Bucharest (Fig. 1), the project TRAROM aimed to propose a new house, inspired by traditional architecture, but using modern available materials and methods. To be noted that traditional techniques for timber connections are not easily done anymore, due to the reduction of skilled workers. So in this case, modern, means actually less complicated and fast.

The available materials considered were regular timber plank that can be found in any material shop in Romania, timber with section 50x150 mm (in fact after processing is 42x144) and infill insulation panels made of straw, Naturami type locally produced from natural straw by the company involved in the project (Neuron ArhDesign).

These choices were based on extended discussion between the team members, and the experience of the architectural company involved which already build a house with similar construction details (Fig. 2).

Figure 1 – Traditional house in the National Village Museum "Dimitrie Gusti"

Figure 2 – New house made with a similar proposed solution

PROPOSED SOLUTION

The proposed solution can be used as prefabricated, modulated as panels in shops and brought to the construction site by trucks, already assembled. The internal structure is made of posts and beams with same section 50x150 mm (Fig. 3). Connection details for the beams are shown in Fig. 4. Screw nails were used for these connections, 5x120 mm. After infilling it with the straw panels, two layers of timber planks with 22x120 mm dimensions were used to cover both sides of the wall module (Fig. 5). The connection between the timber planks and internal structure was made with screw nails of 5x80 mm. The quality of the screw nails is a very important parameter, as it can strongly influence the behaviour in lateral force. The timber was softwood, the cheapest found on the market, having moderate defects.

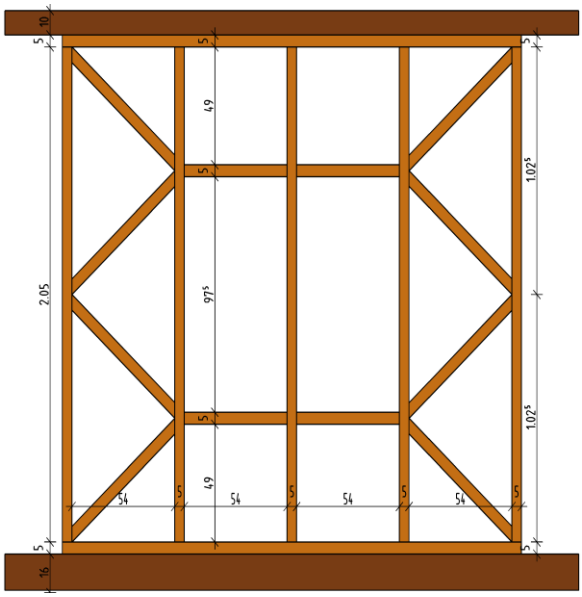

Figure 3 – Internal structure of the proposed wall

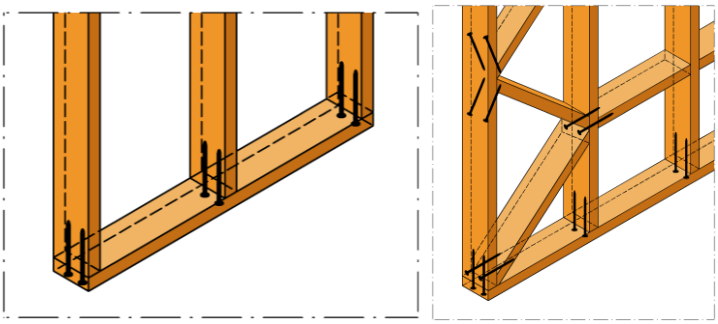

Figure 3 – Connection details of the proposed wall

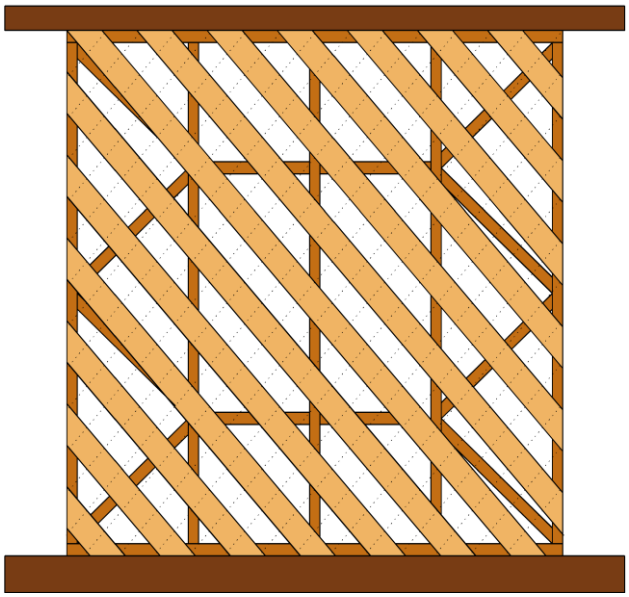

Figure 4 – Timber plank cover (on both sides) of the proposed wall

CONSTRUCTION OF WALLS

In the JICA Structural Testing Lab of UTCB, an experimental campaign is ongoing and specimens were built having the proposed layout to be tested in-plane in a static cyclic regime under lateral force. The construction was done with non-specialist people, and the purpose of using non-skilled workmanship was to obtain a kind of modulated wall to be as easy as possible to be constructed by anyone. Thus, in 5 people, the execution of 4 walls took about 2 days. The modulated panel aimed to be able to be lifted by 3 people, for an easy handle on the construction site. The connections were just by overlapping the elements and reinforcing them with screw nails. The main objective was to reduce as much as possible the human error, often found on any construction site in any developing country such as Romania.

Figure 5 – Execution of the internal structure of the modulated wall

The execution was done in the horizontal position, and started with the internal structure of the wall (Fig. 5). The nails were applied by using two electric screw drivers. The nails had a plain part, just underneath the head, in order to connect tightly the 2 timber elements. If the screw nails would have fully threaded length, the two elements would not be firmly tight together, as it was observed.

Figure 5 – Connecting the posts with the beams (bottom and upper) by means of screw nails

After the internal structure was built, the timber planks were overlapped on the diagonal direction on it and the out triggering parts were cut with a small chain saw (Fig. 6). Two screw nails were used at each intersection between the posts and the planks.

Figure 6 – Cutting the out triggering parts of the timber planks

The wall can easily be lifted (Fig. 7) and turned on the other side (Fig. 8), in order to apply the other layer of planks, in orthogonal direction related to the timber planks on the first side.

Figure 7 – Lifting the wall during execution

Figure 8 – Applying the timber planks on the other side

CONCLUSION

The walls with the proposed layout were built easily, and this was tested by using non-skilled workmanship. The access to materials is very easy because the section of the timber used in the study can be found in any construction materials shop. Although it often presented defects, it was used aiming to simulate what would regular people use in case of building their houses.

The main objective of this project is to offer an easy and cheap solution to various social status people that want to build their houses with a reference to the traditional architecture. The layout of the walls, aims to offer to owners the possibility to make wider spans, when compared to the actual traditional houses. Another objective is to have a solution for reconstruction of a destroyed area after a disaster (earthquake, flood, etc.) and in the same time keeping the traditional architecture, as a cultural identity. An inspiration for this was the solution for Pakistan, after the Kashmir 2005 earthquake [2], where the “dhajji dewari” local traditional house was used for reconstruction.

The walls built and presented above will be subjected to lateral force, and results will be presented in a further paper.

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