

CONSTRUCTION PROBLEMS OF THE ADAPTATION OF THE BULGARIAN NATIONAL REVIVAL HOUSE FOR PRESENT-DAY USAGE

The Law on the Monuments of Culture classified our architectural monuments as: national, of local importance, "in an ensemble" and "for reference". This classification can to a great extent also specify the approach to their structural consolidation. This approach has, unfortunately, not been regulated and provides ample opportunity for a broad, often unjustified interference on the part of the designer-conservators (architects and engineers jointly) in the building constructions.

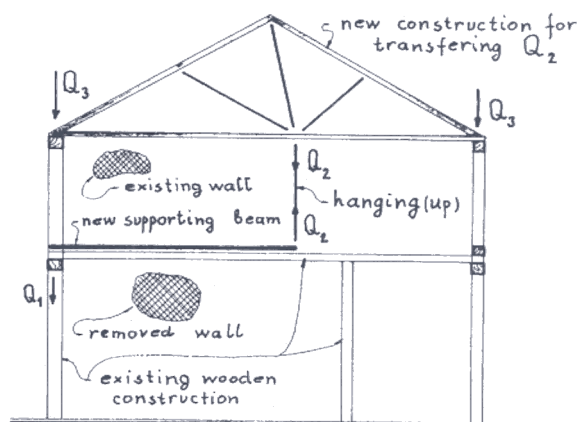
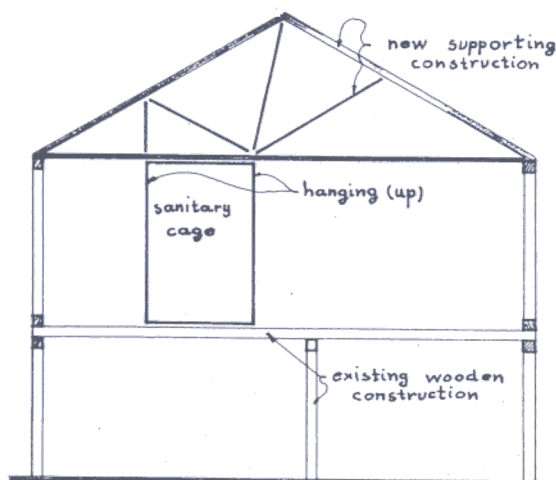
Our opinion on this question is the following: In monuments of national significance the original constructive elements (masonry, floor, beams, lath and plaster skeletons, roofs, etc.). should be fully preserved. Those wooden constructive elements which have lost their load-bearing capacity and cannot be restored should be *doubled* by new ones, made from other materials and bearing clear indications, while the old constructions should be preserved and left in their place. Only in exceptional cases, when the element is completely ruined and it is absolutely impossible to preserve it, it can be replaced by a replica made of the same material,

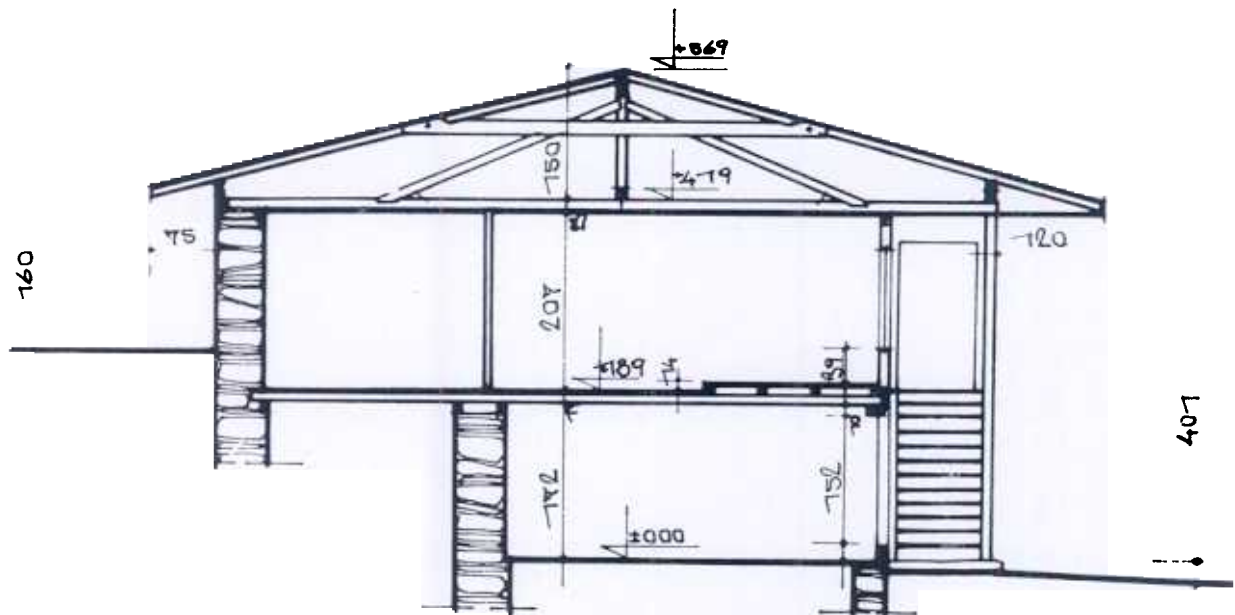
bearing a special inscription that it is a copy as well as the year of the substitution. The stonework and their wooden tie-beam systems can be replaced by new ones or preserved according to the methods adopted in this country and so far applied with success.

With architectural monuments of local significance constructive elements should also be fully preserved, while those elements which have lost their load-bearing capacity can be replaced by an exact copy in the same material which must bear an inscription or other sign that it is a copy as well as the year of substitution. In our opinion the longevity of a building requires constant maintenance, i. e. the worn-out elements should be periodically replaced by new ones (bricks, cracked plastering, rotten floor beams, columns, etc.). This natural process is not at variance with the conservating principles concerning the monuments of local significance.

We think that it is acceptable for those architectural monuments which are characterised as "pertaining to an ensemble" or "for reference" to preserve only their visible structural elements.

1. Cross-section of a house.





Cross section of

BASIC CONSTRUCTION PROBLEMS OF THE ADAPTATION

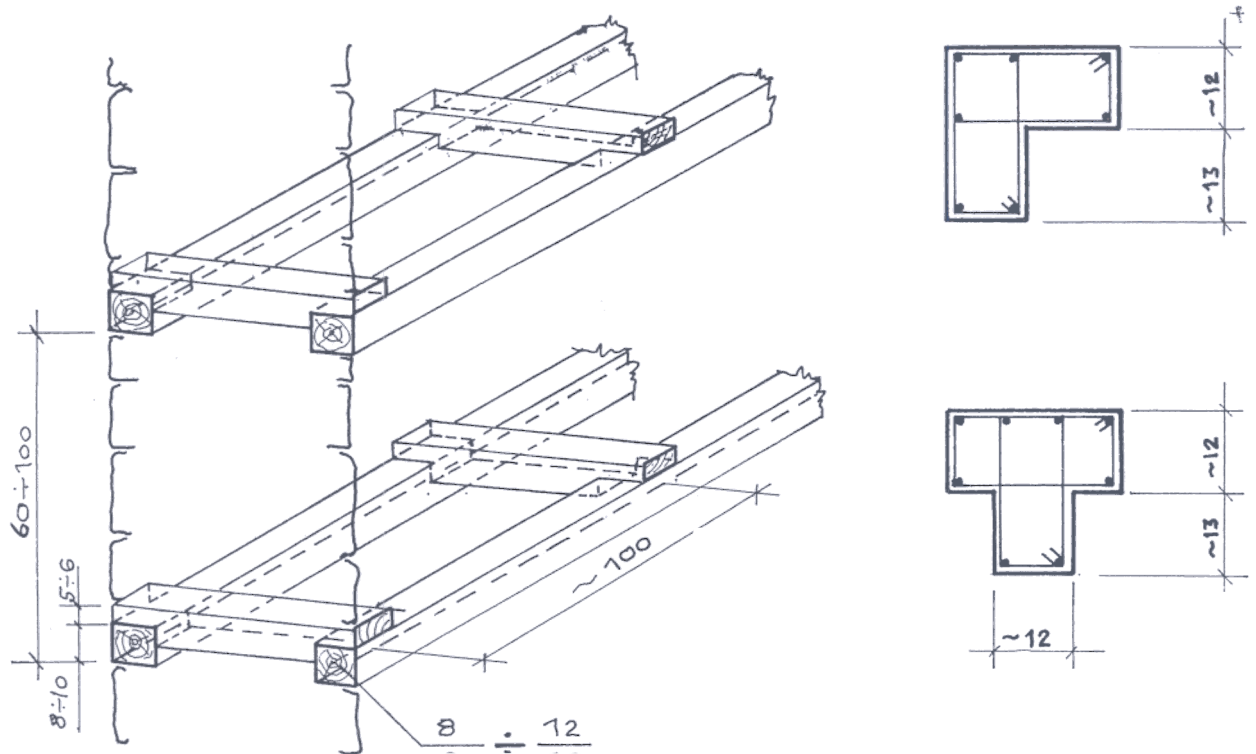
The adaptation of a building to new needs gives rise to constructional problems which are difficult to solve: a greater general loading on the floors, in many cases the introduction of new partition walls or the removal of the existing ones which have been load bearing walls for the upper floors or the roof, the building of sanitary installations on the floors piercing of the walls for new doors and windows, building of new staircases, etc. These problems should be solved jointly by the designing architects and the constructor within the limits of the conservation and restoration requirements.

The first obstacle to be surmounted is the existing state norms for the loading of the floors with useful loads as well as for the tension allowed and the limits on overhanging of elastic elements. We are of the opinion that the monuments of culture of national and local importance should be excluded from the stipulations of the Regulations for the Loading of Buildings and Equipments and the Regulations for Wooden Constructions. The designing constructor should have a free hand to determine and prove the real loading, the permissible tension of the material and the limit hanging-over of the wooden construction elements in the respective monuments of culture.

The second important structural obstacle is the

thinness of the walls in the upper floors of the Revival houses — it does not surpass 12—16 centimetres including the plastering. This does not permit new vertical bearing constructions of ferro-concrete columns to be hidden in the walls as the smallest dimensions of the main columns according to the norms is 25/25 cm. We permit ourselves a more liberal interpretation of the Regulations for concrete and ferro-concrete constructions in the sense that the small dimension of a column with regard to its knuckling should not be less than 25 cm. This enabled us after a few controlled experiments to apply angle and T-form columns in ferro-concrete. Framework constructions can be filled in with such columns. These columns can be applied only in the angles of the rooms. In smooth walls with a thickness of 12 cm it is possible only to insert steel columns.

The third obstacle to the structural solution of conversion is the new sanitary installations. The main requirement here is to secure the complete waterproofing of the floor and the walls. This is achieved by a ferroconcrete floor, covered with mosaic and coated brick walls. This is difficult to apply to the existing wooden floors and requires a separate support which leads to other complications of an architectural and structural nature. That is why three light weight sanitary systems are at the moment being worked out. They have a steel frame with a proper waterproof sheet iron plating and external



3. Details.

and internal insulation. These systems can be supported on wooden floor constructions or be suspended from above.

One of the most difficult kinds of reconstruction of building elements is the removal of walls or other elements bearing vertical loads for the sake of the adaptations. In this case it is often necessary for the loads to be transported by means of hangers to the upper floor or to the roof from where, with the help of another construction, they can be passed to the load-bearing end walls or specially inserted hidden columns.

BASIC CONSTRUCTION SOLUTIONS:

With a view to the type of the Revival house and the approach adopted to its structural support, in our practice we apply the following construction solutions:

A steel "Prosthesis": a spatial steel construction consisting of floor beams, columns and the respective stabilizing ties, by means of which horizontal and vertical anti-wind and anti-earthquake supporters are created. This construction is used mainly in cultural monuments of national importance.

A wholly reinforced concrete construction (slabs, beams and columns) which is adopted for monuments "In ensembles" and "for reference", or for the restoration of demolished structures.

A composite construction of wooden floor beams with steel supporters and partially reinforced concrete slabs which is applied for the monuments of local significance.

ASSESSMENT OF THE CONDITION OF THE EXISTING LOAD-BEARING CONSTRUCTIONS AND THE METHODS FOR THEIR PRESERVATION ON THE SPOT

This problem applies to the determination of the type of construction (brick or stone) and the extent of the loss of the strength of wooden elements (the loss of their load-bearing capacity).

For the determination of the type of stone and mortar, and therefore of the general load-bearing capacity of the masonry, methods have been developed by the National Institute for the Monuments of Culture. These have been published and describe the methods of preservation by means of injecting fast setting mortars.

The loss of the strength of the wooden construction

elements is determined by drilling them with 5—6 mm hollow drills until the appearance of sound wood. At present intensive work is being done in the National Institute for the Monuments of Culture about the methods for conservation on the spot. For the improvement of the construction ties among the individual wooden elements as well as among the ferro-concrete and wooden elements, new tying elements have been built: tying timbers, stirrups, hangers, anchors, dubels, angle ties and others. A complete structural strengthening has been carried out on 97 Revival houses, 14 monasteries and eight towers and belfries. A total of 20% of the houses

were monuments of national importance, 60% of local significance and the remaining 20% of monuments "in ensembles" and "for reference". The structural strengthening of 75% of the monuments was done by ferroconcrete constructions, while in 25% partial substitutions of the old wooden structural elements with new ones or with complete or partial steel "prosthesis" were carried out.

Vesselin VENKOV
Kiril GEORGIEV
Todor TODOROV
Bulgari

RESUME

Lors de la restauration du patrimoine architectural, les principes suivants doivent être respectés:

- 1. Il faut conserver les éléments de constructions d'origine des monuments d'intérêt national, on peut envisager, dans certains cas, leur remplacement partiel par des copies.*
- 2. Certains éléments de l'ossature des monuments d'intérêt local peuvent être remplacés par des copies, faites dans le même matériau.*
- 3. Lorsque les monuments font partie d'un ensemble, on peut ne conserver que les éléments de construction visibles. L'assainissement sera assuré par l'installation de groupes sanitaires à ossature d'acier et par l'utilisation de matériaux imperméables et isolants.*

Voici quelques solutions souvent employé s:

- pose d'une „prothèse“ d'acier, surtout pour des monuments d'intérêt national;*
- emploi d'une ossature complète en béton armé, dans le cas de monuments conservés pour „référence“;*
- utilisation d'une ossature mixte avec poutres de bois et piliers d'acier, pour des monuments d'intérêt local.*

De 1970 à 1975, 97 maisons du Réveil national bulgare, 14 monastères et 8 tours et clochers ont été ainsi consolidés.

- 1. Coupe schématique d'une maison.*
- 2. Coupe transversale d'une maison*
- 3. Détails.*