

TRADITION AND INNOVATION IN SERBIAN 21ST CENTURY ARCHITECTURE – TRADITIONAL MATERIALS, MODERN FORMS AND SUGGESTED DESIGNS

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Abstract

It would seem that the need to preserve traditional building heritage is slowly gaining importance in modern day Serbia. As well as the need to develop modern house types that resembles traditional ones. The old master builders, whilst building homes in local towns and villages not only left their mark on every building they created, but a mark of the times and conditions in which they lived and worked. Their ambitions were furthered by the wish of the inhabitants of the future house, who wanted their dwelling to have aesthetic value beside its functional value, which resulted in many shapes and forms of simple residencies. Traditional forms were always used as a base for developing modern dwellings, least in the sense of proportion and size of buildings. These parameters – the size of the building, rooms and objects – were determined over centuries, and were suited to the proportions of man, his age, height and movement through the building. As a result of these proportions came all the logic in the layout of the home as a whole, even the small details.

Keywords: **Innovation; Modern forms; Suggested designs; Tradition; Traditional materials.**

1. INTRODUCTION

“In every part of the house, be it the harmonic form of the entire home, elegant finish at the end of the eaves, the porch, or even the flamboyantly decorated chimney... you can feel the common farmers wish, to have more than a practical home, a home with appeals, a home that is better than other houses nearby, one that gives his family status and dignity” [1].

The village home is essentially aesthetically defined by its construction materials. The number of materials used is reduced to the simplest repertoire – brick shingles, stone, wood, earth, limestone, hay etc., and as such, with the lack of colours other than natural lime-white, wood tones, natural stone colours, red brick. However this did not limit the creativity of the builders of old, by combining these simple elements he attained splendid aesthetics, a tranquil abode, in

peace with the nature that surrounds it and stands firm. This first impression of a firm home has proved useful since prehistoric times, as a deterrent for any attackers on the home, which provided the host with safety to grow and expand his assets.

The visible constructive elements, practically integrated in the facade further strengthened this impression. This roughly carved elements breathe a fresh, natural strength into the home with their natural colours and texture. The finishing point of every home – the roof completes this strong impression with its protective and sturdy form, and gives an aesthetic touch with its mild colours and the flamboyant artistic figure of the chimney.

In modern times, as a result of economic advances and the modernization of every-day life and consumerist mentality, man has slowly started to lose sight of the beauty of traditional buildings.

2. TRADITIONAL MATERIALS AND MODERN FORMS

New materials, modern building techniques and the rise in needs of the populace have confused the modern man, who used to build houses for the most basic of needs using the materials he had within reach. It is evident that, in this period of “expansion” of mass building projects, bad aesthetics and lack of taste dominate the market. How uncontrollable this surge and questionable quality of modern buildings are, we have witnessed for many years and will be seeing more in the future.

However, for the sake of our architectural heritage, some individuals have taken up the task to revive it and incorporate it in a modern manner. Certainly there are many attempts at integrating the modern and traditional, but few can be considered successful.

Modern architecture dictates a certain fashion of building, recognizable for its minimalistic aesthetics, the exclusion of any ornamental elements and usage of dominantly flat surfaces. This fashion is complemented with an equally simple constructive system, which in turn gives it an airy appearance, but with an abundance of artificial materials that have no “soul”. This is a negative side effect of the use of machines that replace the labour of builders. So the treatment traditional materials get in Serbia today comes down to a use in mass building of something forced as traditional style. In reality, the best solutions are most often restorations and reconstructions of old, representative buildings that could later act as a base for more modern varieties.

Vojvodina is a home to buildings made predominantly of earth, using the rammed earth or *ćerpič* technique with a wooden frame and hay roofing. So the first step in the revival of old techniques should be the reconstruction of old buildings, through which the aspects of building using traditional materials could be thoroughly researched.

This is further encouraged by the fact that using earth in building construction is forbidden in Serbia (as it is around the world) since the 1950s, mostly because of the well-being and profiteering of industries that produce expensive artificial materials. Reconstructions, renovations and adaptations hold another challenge within – how to utilise the techniques of old to create something new? How to adapt them to the modern lifestyle?

Ground is in fact a very healthy material for use, very warm and friendly. It is everywhere around us and very accessible to all, it has been used in these lands

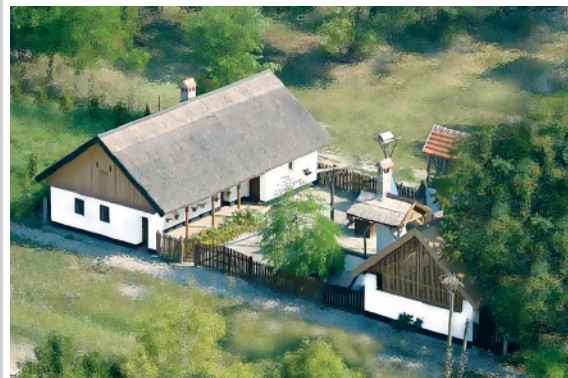


Figure 1 and 2.
Ethno complex “Carska Bara”, Belo Blato near Zrenjanin, 18th Century, reconstruction in situ (2006). (Source: <http://www.eko.vojvodina.gov.rs/index.php?q=node/124>)

for centuries, and almost any type of ground is suitable for use. It is completely recyclable if not treated with various additives. Among the other good sides of using ground for building are the lack of need for energy (except of course labour) in the production process, high acoustic comfort, non-flammability, flexible building style etc. In terms of heat insulation it is not so good, but when combined with cane or straw it can be considered a good insulator, whilst earth itself has the ability to absorb moist from the air and store/ release it as the temperature changes. This way homes are warmer in winter and cooler in the summer months.

In the terms of dimensions and shaping of the earth building elements there are a few rules to be followed due to the nature of the material. If it is rammed earth, the moulds used as casing should be at least 50–60 cm thick.

If unbacked bricks are used, they should be of same dimensions as the standard brick moulds. If the frame is wood interwoven with whittle and daub then the earth is used as mortar and the thickness of this mortar depends on the wooden pillar dimensions.



Figure 3 and 4. Family house in Subotica by Kosana Rošulj (2001). (Source: <http://www.kosana.rs/arhitektura1.html>)

The “cob” technique (a mix of ground and hay) is the most flexible in terms of thickness and form so it is the most used nowadays in the construction of organic forms. For this exact reason, the flexibility it offers, many examples of modern earth mound architecture show how modern forms can be enhanced with a traditional spirit using natural materials. In our country, specifically the region of Vojvodina, the attempt at reshaping the traditional house into something more modern can be seen in the family homes designed by Kosana Rošulj.

Due to the fact that our traditional building style, in Vojvodina as well as the entire country, does not age, through adaptation and restoration of old objects, done by architects like Dragana Marjanović, these homes attained a new glowing appearance [2]. Many examples of adaptations and reconstructions in the goal of creating traditional homes point towards a very good direction of developing new interpretations of the old architecture.

Concerning central Serbia, the question of combining modern forms and traditional ways of building has a primary role in the development of modern versions of traditional buildings and renovating old houses in the goal of creating so called ethno-villages and households for the growing ethno-tourism sector. The most used forms in the design of modern homes are the old “Šumadija” and “Morava” house types. Architecture professor Božidar Petrović has given a great contribution to the revival of architectural heritage, who designed residential buildings in central Serbia (the region he comes from) in the 1960s.

“By looking at the building process, utilised by Professor Božidar Petrović, as a whole, we can with great certainty say that he follows the greatest of feats of the traditional building style in the usage of local materials, as well as developing smart and simple

principles of interior organization. We can, with great pleasure, conclude that following the aforementioned principles, a new, specific style develops, which can be described as the style any anonymous builder of old would have used in our place, with their knowledge and our modern building capabilities” [3].



Figure 5. Miloradović house, Božurnja near Topola by Božidar Petrović (2006). (Source: <http://www.blic.rs/Vesti/Reportaza/222946/10-najlepsih-kuca-u-srpskom-stilu>)

The main characteristics of the houses of Božidar Petrović are a big roof, with long extensions that are richly decorated, a spacious porch, white walls and a stone base [4]. In spite of all these similarities, all of his houses have a unique identity. His works are of immense artistic quality as well. And, as all traditional buildings, they are very well dimensioned and of good proportion. This is best seen in the balanced relationship of the roof and housing cubes and in the ratio of openings and walls on the vertical plan. Another modern addition to traditional building is the attic, which is no longer a space with limited use, but a useful addition in the life of modern man. In the sense of materials, professor Petrović sticks to local materi-

als, as he acknowledges the need to respect the regional geography and climate and use them as a starting point for construction. We can conclude that professor Petrović succeeded in incorporating all that is good in the new technologies with traditional techniques and materials and creating something completely new as result.

Other than the “Božidarka” homes (named after professor Petrović) there have been several attempts to find a contemporary solution for our traditional heritage through competitions – The traditional Serbian home. However, since the main purpose of this competition is to develop buildings with traditional characteristics that are suitable for mass construction, these objects actually cannot be considered as solution of excellent quality. Hence it is interesting to show them in the context of this paper – the incorporation of traditional materials and modern forms.

It would seem that, concerning the “Šumadija” house type, only a fully designed building, that surpasses a simple first-stage design project, has the needed contemporary note in its traditional form. This is primarily seen in the simple geometric form, inspired by traditional shapes. The splendour of these buildings is attained in another way, however, through the clever use of natural materials in a very contemporary way.

The Morava house, the traditional form in southern and south-eastern Serbia was also subject of research in the mentioned competitions. It is agreeable for this house as well that the first completed project was refreshing in the sense of its subtle change of form, which still attains the spirit of a traditional Morava home. Even though it appears more like a recon-

struction, this could be because of the architectural character of this type, which could be aesthetically weakened with further stylization.

Today the oriental townhouse (characteristic for southern Serbia) is almost completely forgotten in the sense of modern interpretation. Due to the fact that the new cultural surroundings and needs of the populace do not require such buildings, adapt to a peculiar lifestyle. Nowadays these houses are converted into museums or similar institutions, protected by the national institute for protecting heritage, and as such memorials they stand as witnesses of long past times and an old lifestyle.

A good example of such buildings, which could act as a base for modern interpretation is home to the Mozaka hotel in the Albanian town of Berat (originally Belgrad/Beograd), which is enlisted in the UNESCO list of protected ambient surroundings (“The city of a thousand windows”). On the territory of Serbia, in the vicinity of Kosovska Mitrovica, near Zvečan, there is the Banjska Monastery with its newly renovated chambers, which can also be a good example for further research on modern interpretations. These houses are of the “**bondruk**” type, in that sense there are a couple of subtypes that are currently used in construction the classic, advanced and ribbed “bondruk”. The classic system is mainly seen on buildings that are enlisted as building heritage of which we have already spoken.

The *advanced* “bondruk” is a product of the industrialization of house building and encompasses several constructive improvements. The elements used in the frame are premade to match calculated standards



Figure 6 and 7.

Hotel Muzaka, Berat, left (17th Century) and new chambers of the Banjska Monastery monks, right (1312-1316). (Sources: <http://www.albania-hotel.com/albania/berat/hotels/muzaka-hotel>http://www.kosovo.net/news/archive/2005/August_08/4.html)

and connected using more advanced means (screws, bolts, wooden pegs etc.). And the use of vertical beam systems instead of diagonal ones. The use of new tools and elements shifts the building process from craftwork towards industrial production.

The *ribbed* “bondruk” is a complete evolution of the aforementioned systems (which doesn’t mean it is of higher quality). The main goal of this system is the reduction of beam dimensions which would lead to industrial large scale production. The result is a base element – a 5×10 cm rectangular beam which makes up the whole frame (pillars, beams, counter beams etc.). As a result of this reduction in size, the spacing between beams is much tighter, 40–50 cm, and all the joints are made via nails and wedges. This system leads to mass development of simple prefabricated homes which are slowly albeit certainly taking their toll on quality architecture in Serbia. Even though these houses are result of the development of traditional “bondruk” techniques, they sometimes lack the quality and aesthetics of their predecessors shown below.

This of course is the case only in projects that are not thoroughly thought out. In the case of disproportion and use of traditional materials, this building could be used as a family home, but attains little of the traditional character of Dinaric loghouses, in the region of Dinaric Alps.

This of course is the case only in projects that are not thoroughly thought out. In the case of disproportion and use of traditional materials, this building could be used as a family home, but attains little of the traditional character of Dinaric loghouses, in the region of Dinaric Alps. Nowadays modern loghouses in Serbia are mostly prefabricated wooden buildings

made of long logs that are cut on the edges and stacked vertically.

These “loghouses” however are meant for mass production and do not trace their roots in traditional Dinaric loghouses, more so, they present a false picture of traditional homes in western Serbia. On the other hand they are excellent examples of reconstructed loghouses in Sirogojno, which form the open-air museum “Old village” in this town, high in Zlatibor mountain [5, 6, 7].

These houses show a clear picture of living in the mountain continental climate, and it is quite clear that they are the most suitable form of housing for this landscape. It is also evident that they are easily restored and rebuilt to their old glory, and suitable for the life of modern man. Their form is very simple so it fits well with modern architectural standards. The homes can also be considered as sculptural works of art. In the sense of materialization wood should be kept as a base material, both for construction and decoration, both interior and exterior with very little change. These changes are primarily structural, concerning insulation and thermic comfort [8].

A lot can be seen in the autochthonous architecture of much colder Northern lands, like Russia, Norway and Finland. There we can see that thermal insulation is reached through the use of various natural materials – wool, hay, cellulose or cork in the insulation of walls, floors and roofs. These materials are also 100% recyclable and natural.



Figure 8. Competition entry Brvnara (rewarded) by Tijana Kostić, Traffic institute CIP, Belgrade (2014). (Source: <http://www.gradjevinarstvo.rs/tekstovi/4367/820/srpska-tradicionalna-kuca-katalog-nagradjenih-i-otkupljenih-idejnih-resenja>)



Figure 9.
Competition entry Sumadija House (rewarded) by Milan Gočobija and Zoran Milošević, Traffic institute CIP, Belgrade (2014). (Source: <http://www.gradjevinarstvo.rs/tekstovi/4367/820/srpska-tradicionalna-kuca-katalog-nagradjenih-i-otkupljenih-idejnih-resenja>)



Figure 10.
Competition entry Šumadija House (rewarded) by Katarina Dubljanin, Traffic Institute CIP, Belgrade (2014). (Source: <http://www.gradjevinarstvo.rs/tekstovi/4367/820/srpska-tradicionalna-kuca-katalog-nagradjenih-i-otkupljenih-idejnih-resenja>)



Figure 11.
Competition entry Morava House (winning design) by Igor Štilić, Traffic Institute CIP, Belgrade (2014). (Source: <http://www.gradjevinarstvo.rs/tekstovi/4367/820/srpska-tradicionalna-kuca-katalog-nagradjenih-i-otkupljenih-idejnih-resenja>)



Figure 12.
Ethno village “Old village” Sirogojno, Zlatibor. (Source: <http://www.forum-srbija.com/viewtopic.php?f=398&t=161-06&start=50>)

Wool is almost over abundant in agricultural regions that rely on pastures and livestock. This material was once used in many areas of industry, mainly clothing. Nowadays, however, most of excess wool is disposed or burnt. On the contrary, one of wools most distinctive characteristics is its natural cold resistance, which makes it a first grade thermal insulator. Wool also absorbs moist from the air, similar to earth, without losing its thermal capabilities. In winter months the moist is warm and so wool helps keep it in the house interior, whilst in warmer periods it lets in cool moist which helps stockpile the warmth better. The only treatment raw wool needs before it is used in construction is a basic rinse in cold water (without the use of detergents or additives) and a mild chemical treatment against parasites. Further treatment could be pressing the wool, to make thinner stacks that are easier manipulated, but this is only optional.

Cellulose thermal insulation is made using completely recycled paper fibres, which are first milled and ground to tiny pieces and then treated with non-hazardous chemicals to be flame resistant. Using special spray cans the treated cellulose is sprayed on insulation panels. The thermal characteristics are equal to that of mineral wool. Due to the liquid like state of recycled cellulose it is also possible to cast into moulds and make bricks that are easier to use. Now that we've mentioned natural insulators for wooden mountain dwellings, it is a suitable place to mention good insulators for rammed earth homes typical for Vojvodina and northern Serbia.

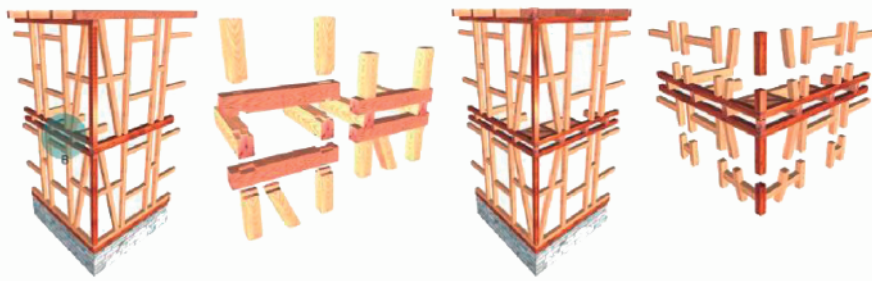


Figure 13.

Details in contemporary bondruk connections systems. (Source: <http://www.scribd.com/doc/125713173/Zgrada-Od-Drveta-Andrijano>)



Figure 14. Cellulose thermal insulation

(Source: <http://www.greenplanetremodeling.com/insulation-gallery.html>)

<http://www.archiexpo.com/prod/aveon/expanded-granular-cork-insulation-119689-1192103.html>)



Figure 15. Cork based thermal insulation

Hay is a by-product of agriculture, mainly grain farms, and has had its place in traditional construction works for centuries now. Besides being an insulator, hay can also be used as a building block, when pressed and shaped in a cube.

The strongest argument against the use of hay is the possibility of vermin and insect infestation. However, the hay bales are made of straw from many plant species (rice, barley, wheat), straw itself is not an edible material, and so mild treatment of the bales can make them completely unsuitable for any “unwanted guests”. Hay bales also contain no pollen so they can’t cause allergic reactions of the household.

In the past hay was a material within reach in any part of the country, readily available and useful for roof cover. This type of roof was very warm and resistant to rain and snow. The bad side was its flammability, so the hay need be treated with various chemical compounds to become more resistant. Besides wheat straw, the other notable type is rye straw, which is said to be the best in all terms.

Due to this, the most fertile patches of land are

devoted to growing rye specially for covering buildings. Ripe rye is harvested using the scythe, so the stem sustains as little damage as possible. When the seeds are harvested, the remaining straw is ready for use. The framework for hay roofs is traditionally made of crossed poles, 4–5 cm in diameter, a newer technique implies the use of small beams 48 × 48 mm in base. These poles or beams are placed in a raster with 25–35 cm between them.

Reeds are a very suitable plant species for use in household insulation because they are practically indestructible. It grows in marshland, surrounded by various insects, and has evolved in such a way that insects do not eat it, this is why it has been used throughout centuries by traditional builders. The processed reed sticks are weaved together using wires or plastic, without the use of mortar. Like wool, reeds can also be pressed to become denser, the result is a compact plane that has a very low coefficient of conducting, and hence it is an excellent insulator.

Traditional reed roofs are made of the best quality reeds that are specially chosen for the occasion.

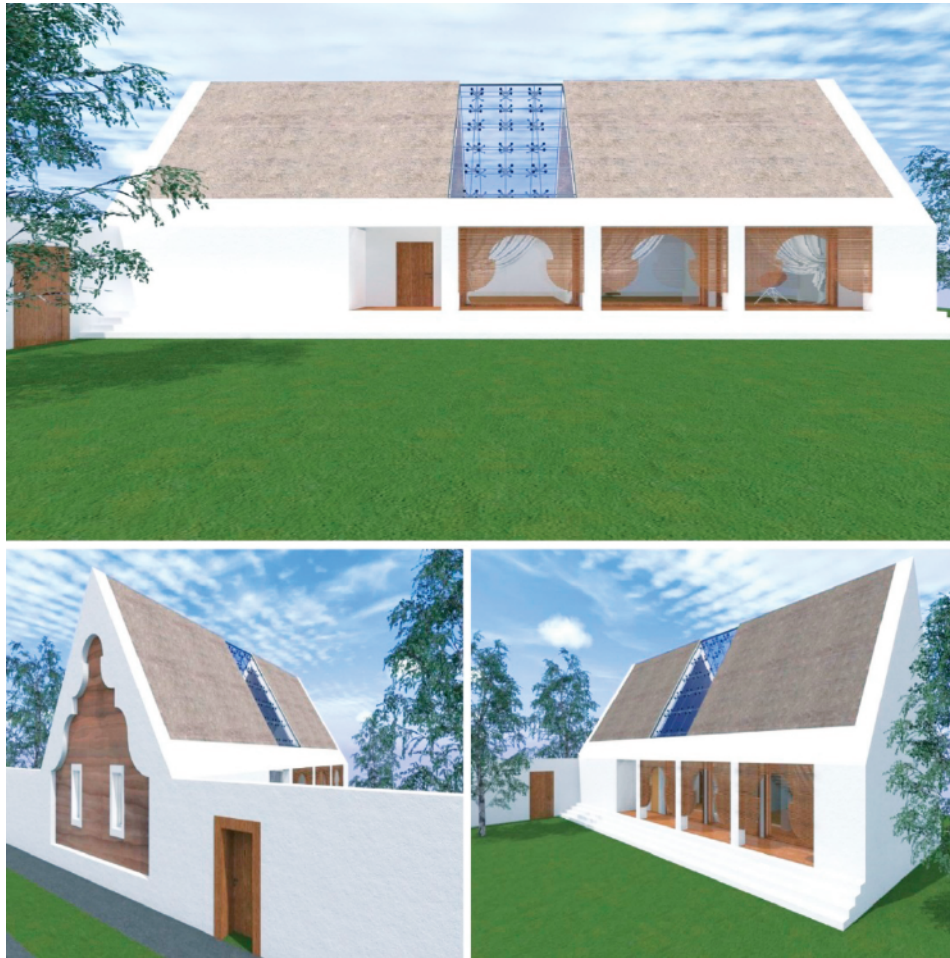


Figure 16. North Serbia, Vojvodina House Type, elevation views (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

The quality sorting is done during the picking because thatching requires the thinnest pieces. The roof framework is the same as for standard tile covered roofs, with beams on every 50 cm and a thick cover of hay, ranging 25–35 cm, depending on climate and reed quality. The roofs top can be executed in a few ways, depending on the slope or request of the owner. The average lifespan of a reed roof, with regular fixes and maintenance every 20 or so years is over 200 years. The maintenance comes down to changing the upper most layer of reeds to give the roof a fresh new look. This material is also an excellent acoustic insulator, so it is fact that there is no need for additional insulation, a fact that considerably lowers building costs.

3. SUGGESTED DESIGNS

North Serbia, Vojvodina house type

The materialisation of a home characteristic for Vojvodina is made up of constructive and interior walls made of rammed earth (painted white, except on the gable, where the wall structure is clearly visible) The thickness of retaining walls is 50 cm, whilst the interior partitions are 20 cm. Due to the continental climate, better thermal and acoustic insulation, the retaining outer walls are clad in mud mortar and painted white. It is interesting how the retaining walls are vertical to a point of 235 cm, and then incline inwards to a height of 3 m under a certain angle, thereby forming a two sided roof. The roof is covered in 35 cm thick piles of reeds, which allows for a steep slope (around 60 degrees) but does not require additional acoustic or hydro insulation.

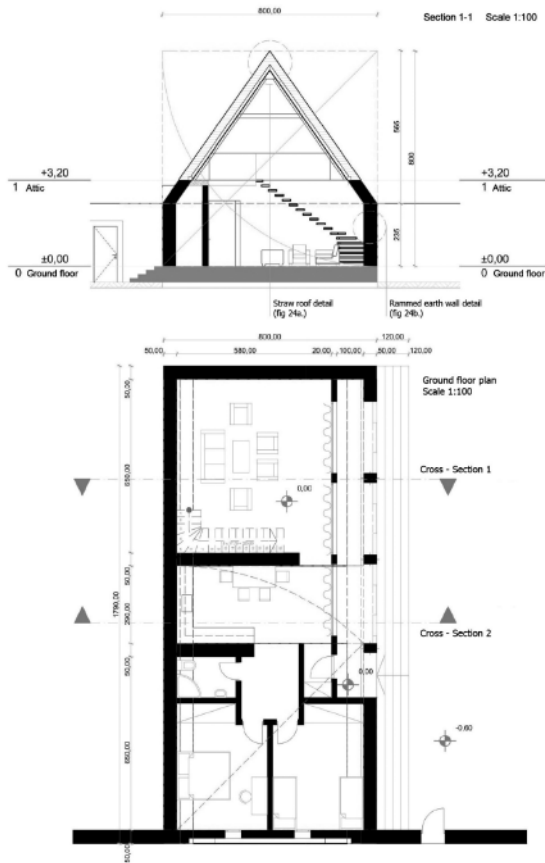


Figure 17.
North Serbia, Vojvodina House Type, ground floor and section (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

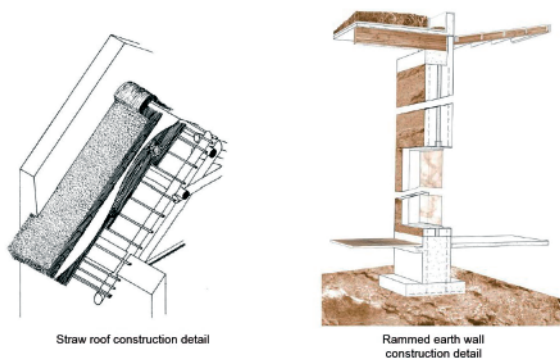


Figure 18.
North Serbia, Vojvodina House Type (2016), roof and interior detail by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

The roof framing is made of wooden beams that are connected to the cellar floor, which is also wooden, and further connected and fixed to the rammed earth walls. The form of the house is clean, simple straight lines and geometric shapes. Decorative elements,

that are structurally visible as well on the street facing facade and the front porch. Namely the street facing gable wall is a notable characteristic of the Vojvodina house type, its main decorative element.

This example treats it so, and shapes it so the main constructive material can be visible. The porch, traditionally the most decorated part of the house, is enriched with the same motif as the street side, here represented in a modern matter using a traditional material – wood. The interior spatial organisation is composed of a residential area on the ground level, organised with a night area (two bedrooms and a bathroom) and daytime area (kitchen, dining and living area) that is attached to the porch.

Central Serbia, Šumadija house type

Wood is the dominant material on this modern interpretation of the Šumadija house. So the constructive system is wooden framework, filled between with unbacked brick, all clad in mud mortar and painted white. The basement walls are somewhat thicker and are preferably made of unbacked brick (darker colour and larger size, $30 \times 8 \times 15$ cm). The roof frame is completely wooden, four pronged above the square plan, centred right beside the chimney. The slope is thirty degrees, which means it can be covered in unbacked “ćeramida” brick – the traditional roof covering option in central Serbia, Šumadija. The spatial organisation is as follows – the house has only a ground floor, split in the daytime (kitchen, dining and living) and night time (bedrooms and bathroom) zone.

The square as the base shape is seen in the base plan, all its segments and on the porch (both front and back). This geometry is suitable for all annexes and integrations of constructive elements. This example also respects on of the key traits of any Šumadija house – it is free standing and on sloped terrain.

South Serbia, Prizren house type

Southern Serbian houses (for instance in Prizren) are typically constructed using the “bondruk” technique, and this example is no exception. The well-known wooden framework of crossed beams is a welcome suggestion for this house, but with contemporary changes, mostly regarding the joints and connections between elements. The idea was to keep the “bondruk” system and reform the internal composition and form of the house that are supposed to adapt the old style to modern needs. The dominant material is, of course, wood, with its well-known darker brown tone.

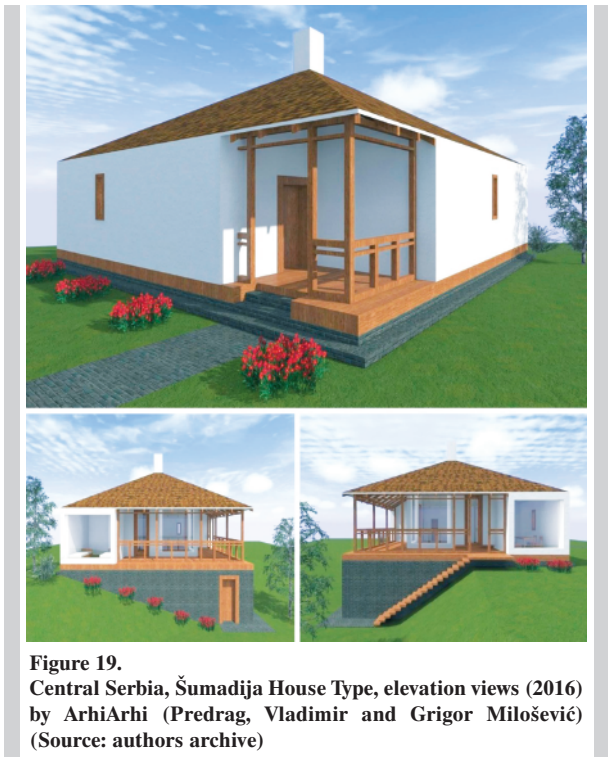


Figure 19. Central Serbia, Šumadija House Type, elevation views (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

Besides wood, unbacked bricks are used as filling, mud mortar for cladding and white colour (quicklime) for the typical oriental facade look. The roof is wooden framework covered with brick shingles.

The interior organisation has a typical day-night type, with the living, dining and kitchen area on the ground floor and the bedrooms, bathroom and terraces on the higher level. The form is a modern geometric interpretation of the traditional shape. The house is a composition of two square floors, the upper being 70cm larger on all sides topped by a four pronged roof, with a mild thirty degree slope.

The modern tendency to break this monotonous “roof pyramid” led to the replacement of part of the roof, which covers the terrace, by a simple wooden pergola. The windows have a peculiar rhythm and they shift vertically on the walls, even the frames are nonstandard, 40 × 200 cm.

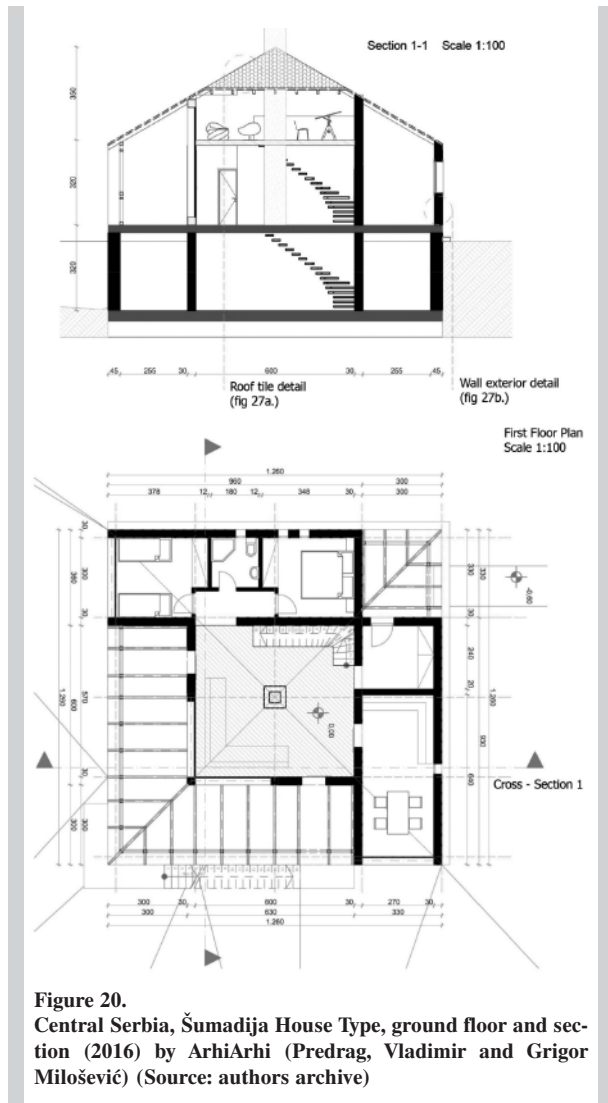


Figure 20. Central Serbia, Šumadija House Type, ground floor and section (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)



Figure 21. Central Serbia, Šumadija House Type, details (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)



Figure 22.
South Serbia, Prizren House Type, elevation views (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

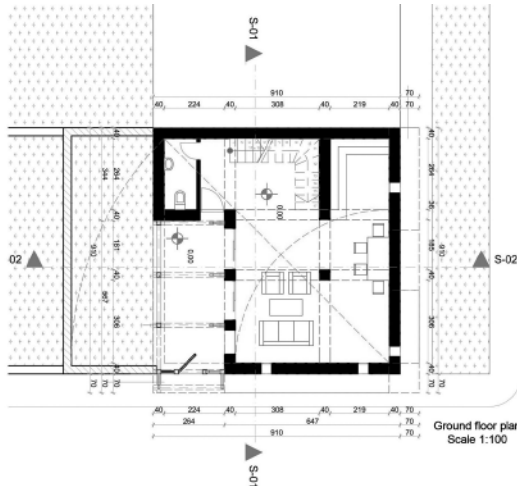


Figure 23.
South Serbia, Prizren House Type, ground floor (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

4. CONCLUSION

“Our countryside today lacks the bond with nature it once had in homes such as the Dinaric loghouse. A new symbiosis of the positive and negative happenings, events and forms is needed, and it can be reached only through a long, completely scientific analysis. This analysis of functions will speed up the synthesis and merge of the good aspects of the past and negative aspects of contemporary building in Serbia. Our building craftsmanship requires a lot of

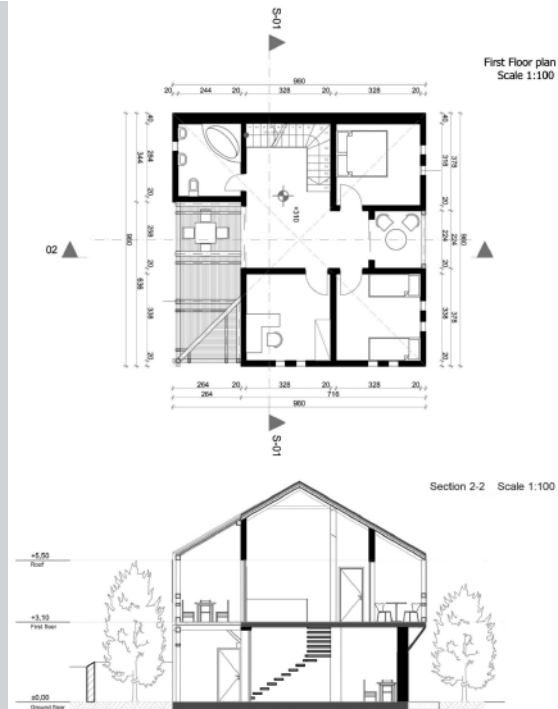


Figure 24.
South Serbia, Prizren House Type, first floor and section (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

hard work to return to its roots and use them as an inspiration for innovation” [9].

The will for profit of many industries and companies is propagating a new assortment of building materials and various other products. This bunch of “products” claimed to be eco-friendly and a rhetoric of ecological building (using these materials) the idea of a quality and cosy home is altered to a complete opposite, something fast, simple and cheap [10, 11].

All this pressure means people can’t think straight and stray away from the right choices in terms of materials. Other than the negation of all tradition, this also defies the logical way of building development of (un)healthy buildings [12, 13, 14].

With all this in mind, we can conclude that the beauty of our home comes directly from nature and makes it a happier and more pleasurable place to live [15, 16, 17, 18].

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