

## RESEARCH OF GEOMETRIC SHAPES AND VOLUME-PLANNING SOLUTIONS OF BUILDINGS IN VARIOUS REGIONS OF UKRAINE

Bannyi T. Postgraduate student,

tarasbannyi@gmail.com

Stadniychuk D. Postgraduate student,

111222@ukr.net

Department of Architectural Structures

Kyiv National University of Civil Engineering and Architecture (Kyiv, Ukraine)

**Abstract.** *Ukrainian architectural heritage was formed under the influence of a complex interaction of climatic, geographical and historical and cultural factors. This study reveals characteristic geometric forms and spatial planning solutions in different architectural and climatic regions of Ukraine, analyzing the key factors of their formation.*

**Keywords:** *geometric shape of the building, spatial planning solutions, geometric modeling, architectural design.*

Ukraine has diverse climatic, historical-cultural and natural conditions that influence the architectural forms of buildings in different regions. The architecture of Ukraine is a pattern woven from climatic conditions, historical influences and material capabilities of each region. From the dense forests of the Carpathians to the endless steppes of the Black Sea region, from the rocky cliffs of the Crimea to the industrial spaces of the Donbass - each region has developed its own unique spatial planning solutions that combine functionality and aesthetics.

**Objective.** To analyze the geometry of spatial planning solutions for buildings for different regions of Ukraine.

**Research progress.** Research [1,2] was conducted for different regions of Ukraine.

1. *Western Ukraine* (Carpathians, Galicia, Bukovina).

Building forms. Use of high roofs (gable, four-pitched) with steep slopes for snow loads. Elongated rectangular plans (long houses) with porches and attics. Compact volumes with wooden log cabins or frame-column structures.

Factors that influenced. Climate – high precipitation (over 150 mm), snow loads (over 150 mm), temperature. Materials – availability of wood (spruce, fir). Traditions – influence of Hutsul, Boyko, Lemko architecture.

2. *Central Ukraine* (Podillia, Kyiv region, Poltava region) [3,4].

Building forms. Forms are close to cubic volumes with small roof slopes. Cross-symmetrical plans (houses with 3 or 5 windows). Use of white walls and wooden clay structures.

Factors that influenced. Climate – temperate, less snow than in the mountains. Materials – clay, wood, later brick. Historical influence – baroque, classicism in sacred architecture.

3. *Southern Ukraine* (Steppe zone, Black Sea region, Crimea) [5,6].

Forms. Flat or single-pitched roofs (due to low rainfall). Spacious layout with courtyards (from Turkish-Tatar architecture). Use of stone and adobe walls for thermal insulation.

Factors. Climate: arid, hot, windy. Influence of Crimean Tatar and Greek architecture.

4. *Eastern Ukraine* (Donbas, Slobozhanshchyna) [7,8].

Forms. Brick buildings with simple rectangular shapes. Tall brick pipes (due to industrial traditions). Combination of brick decor with wooden elements.

Factors. Industrial development (impact of mines, factories). Climate. Cold winters, dry summers.

**Conclusion.** Analysis of architectural and climatic regions of Ukraine allows us to identify fundamental patterns.

Geometric determination. A clear connection between climatic parameters and the geometry of forms, Mathematical expression of architectural proportions. Spatial organization as a function of natural conditions.

Volumetric and planning adaptation. Optimization of internal space for specific climatic requirements. Development of unique constructive solutions for each region. Formation of local architectural schools

Cultural and historical perspective. Accumulation and transfer of construction experience. Formation of regional architectural identities. Interpenetration of different construction traditions. This heritage is not only of historical value, but also contains the potential for modern architectural development. The study of traditional design principles allows us to create energy-efficient, environmentally balanced, green buildings that organically fit into the local context.

### *Reference*

1. Gutsulyak M. Folk housing of the Ukrainian Carpathians. – Lviv, 2005.
2. Logvin G. Ukrainian Carpathians. Architecture of folk housing. – Kyiv, 1993.
3. Zarembo R. Ukrainian folk architecture. – Kyiv, 1987.
4. Taranushenko S. Monumental wooden architecture of Left-bank Ukraine. – Kharkiv, 1926.
5. Belyaev L. Architecture of Crimea. – Simferopol, 2003.
6. Krykun E. Architectural monuments of Crimea. – Kyiv, 1991.
7. Petrenko V. Architecture of Slobozhanshchyna. – Kharkiv, 2010.
8. Shulyka V. Industrial architecture of Ukraine of the 19th–20th centuries. – Dnipro, 2008.