



Dimension stone of historic monuments of the UNESCO site Banská Štiavnica and its significant resources

Martin Bednarik, Rudolf Holzer, Marek Laho, Martin Dunčko, and Ivana Šimková

Comenius University, Faculty of Natural Sciences, Dept. of Engineering Geology, Bratislava, Slovakia
(mbednarik@fns.uniba.sk)

Results of the research of natural building stones used in the historic time for the construction of various buildings of such a significant commercial and technical centre of the former crown city Banská Štiavnica in the Slovak Republic are presented in the contribution. The intense progress of the institutionally important region with the dominant mining of precious metals started after the German colonisation in the 12th and 13th century, when important mining-operative, sacral, residential and other building objects were built. Many of them although in the rebuilt state have been preserved till now. Different historical development events of this city caused, that the urbanization and the general character of the extraordinary building configuration is the result of all historical factors.

The mostly used building material was the natural stone produced by the mining activity and independently opened quarries, as well. The favourable factor for the selection of an appropriate stone was the rugged terrain of the Štiavnické vrchy Mts. stratovolcano, built up predominantly by neovolcanite andesites with various mineralogical composition and accompanying tuffs as a product of several volcanic phases. The increased claims were posed on the building stone already in historic times. Used stones had to respond to the following basic characteristics: required blockiness, appropriate workability, durability and the decorativeness through its colour, texture and structure.

Our research was focused on the documentation of the stones state of main historic monuments and identification of their petrography. The main aim was to obtain the information where to get the appropriate natural stone for restoration works. Taken samples of stones were laboratory tested to assess main physical-mechanical properties and to evaluate their durability. The following characteristics were estimated according to the European technical standards: density (s in $g.cm^{-3}$), bulk density (σ in $g.cm^{-3}$), porosity (n %), absorption capacity (N %), uniaxial compressive strength (dry - σ_c , saturated - σ_w and after 25 freeze/thaw cycles of samples - σ_f in MPa), calculated softening ($k_1 = \sigma_w/\sigma_c$) and freezing ($k_2 = \sigma_f/\sigma_c$) coefficients. To confirm the original sources of natural stone, macroscopic comparison and properties of stone samples taken from objects and existing and abandoned quarries were evaluated.

Results of investigation are processed in database with the photo documentation of monuments and sites of historic stone excavation with recommendations for possible sources of replacement stones. Deteriorated stone on buildings and monuments of Banská Štiavnica should be preferably replaced by stone varieties of the same composition, properties and appearance from the same or similar quarries.