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Fabric related changes in water absorption and strength of Miocene porous limestones; the commonest dimension stones of Budapest

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The Miocene porous limestones are the most common dimension stones of Budapest. Various lithotypes have been used in several monuments such as fortresses, churches and public buildings throughout the city. Most of these buildings are now show signs of deterioration. The decay processes are related to air-pollution, salt crystallization and freeze-thaw. To understand the mechanism of decay and the behaviour of lithologies it is important to detect differences in water absorption and related physical properties. Four types of porous limestones from Sóskút quarry were tested under laboratory conditions by using three different methods of water absorption tests. Karsten tube test, water capillary rise and water immerision tests were applied. Besides water absorption rock mechanical properties such as compressive strength and tensile strength were compared by using air-dry and water saturated test specimens. Tested lithologies included coarse bioclastic limestone, two types of oolitic (micro-oncolitic) and a fine-grained micritic limestone. The fine-grained type is the most porous with porosities over 36%, while the oolitic-types have porosity values of 24 to 27% in average. Bioclastic very coarse limestone with its effective porosity of 20% has the lowest compressive and tensile strength. It was possible to detect differences in between the Karsten tube water absorption rates when the samples were tested perpendicular or parallel to bedding. The slowest capillary rise rate was measured on fine-grained specimens, while the fastest saturation was documented on one type of oolitic limestone. The saturation rate is not significantly different for the four lithologies. Water saturation significantly reduced the compressive strength of fine-grained limestone (from 6.29 MPa to 1.73 MPa), while water related decrease in strength was less well pronounced for other lithologies. Notably, the air-dry compressive and tensile strength

of fine-grained limestone is larger, than that of the coarse bioclastic type. The tests have proved that fine-grained limestone is the most sensitive to water. The results also showed that fabric analyses have an important role in predicting the behaviour and rock mechanical properties of limestones.