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Evaluation of a Low-Volume Unpaved Road

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Low volume roads complement the national and regional networks, constituting a considerable extension of the existing road network, playing an important social and economic role. In most countries, EBVT networks also integrate unpaved roads and paths, normally connecting more distant and isolated places, often located in protected ecological and agricultural zones. The behavior of these roads is very dependent on the type of soil and its mechanical properties, as well as traffic actions and weather conditions. The evaluation of the mechanical characteristics and bearing capacity of the soils that constitute them is of great importance and is based on the execution of geotechnical characterization tests.

A study is presented of an unpaved road, 3.1 km long, located in the natural park of Montesinho, Bragança, which ensures circulation through the park, particularly, the access between two dams that supply water to localities in the region of Bragança. The proper conservation of this unpaved road, by the managing institution (CMB), requires that its structural and functional state be periodically evaluated. Thus, a functional evaluation was carried out, by using an adequate methodology, observing the state of degradation of its road surface and the drainage system, which is of great importance for its integrity. A structural, or geotechnical, assessment was also carried out at points located every 100 meters, based on which the length of the road was subdivided into homogeneous sections. This subdivision was carried out using the accumulated differences method, proposed by the American Association of State Highway and Transportation Officials (AASHTO), based on the results obtained in the following tests: Plate Load, Light Dynamic Penetrometer, Dynamic Load Tests, which include the Light Falling Weight Deflectometer (LFWD)) and dynamic CBR, and the standard CBR test. In the representative points of each homogeneous section, soil samples were extracted with the objective of carrying out the following laboratory tests: granulometric analysis and consistency limits (identification), Proctor Tests and California Bearing Ratio (CBR). It was taken care to ensure that this type of assessment was carried out annually in campaigns before and after winter.

From the results analysed, at the level of each homogeneous section, there was a convergence of results between the different types of tests in each evaluation campaign. It was also found that the evaluated parameters varied between different evaluation campaigns, concluding that these vary in time, with the climatic seasons and with the conservation interventions. A study and update of a relationship between the CBR and the Modulus of the soil of subgrade was also carried out, in order to contribute to a better mechanical characterization (E vs CBR) of road foundations, like of the type recommended in the scope of different methodologies for the design of flexible pavements.