

# PERFORMANCE OF STONES UNDER DIFFERENT CONDITIONS: A STUDY OF METRO STATIONS

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Stone is one of the main natural materials used on building works around the world. Besides the characteristics of the stones and its variability (related to different stone types, different quarries of a given stone type, different places of a quarry, different cuts of a specific rock block), stone selection needs also to consider the conditions under which the stone would be placed.

Railway transport stations constitute promising case studies of stone durability since they are reasonable dated and several examples can be found spanning diverse exposition times and conditions. Among these, the Lisbon Metro system is a particular interesting case given the great number of stations built in different modern times (and still being built) with several stones (igneous, sedimentary, metamorphic) applied under varied conditions. These stones are subject to processes of alteration both under what can be assumed as normal and abnormal conditions of service (however, the frequency and persistence of some abnormal conditions of service can be considered relevant for options in future restoration or building works).

The inspection of the diverse stations show a great diversity of alteration features that can be placed on two main groups: chromatic and erosive (loss of material).

Chromatic alterations are linked to the invasion of the pore space of stones by percolating solutions and to deposition and precipitation processes of foreign matter at the surface. The visual impacts of these alterations depend on the initial characteristics of the stones.

Regarding erosive alterations, there are stones that show a markedly heterogeneous behaviour under the same conditions, highlighting the effect of variability of the stones. There are also situations where erosion features are related to what can be considered abnormal conditions of use resulting from solutions infiltration (in these situations alteration features of stone and other materials constitute markers of these infiltrations).

The diverse situations identified are considered in the discussion of possible recommendations bearing in mind the actual conditions found at the stations.

**Keywords:** Stone; Alterations; Recommendations; Metro stations.