



## **The white marble used in Brasília, a World Heritage and the capital of Brazil**

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Created as the Brazilian capital, in the central western part of Brazil, Brasilia is a definitive example of 20th century modernist urbanism. It was built in only four years, from 1956 to 1960, following the project of urban planner Lucio Costa and architect Oscar Niemeyer that intended that every element – from the layout of the residential and administrative districts (often compared to the shape of a bird in flight) to the symmetry of the buildings themselves – should be in harmony with the city's overall design. This description is from the World Heritage Centre, of Unesco, that nominated Brasilia as a Cultural Heritage Property in 1987.

Most of the remarkable buildings designed Oscar Niemeyer, cited by Unesco, are around the Plaza of Three Powers, as the Planalto (“Plateau”) Palace, the National Congress, the Supreme Court, the Cathedral, the National Theatre among others.

Aside from the worldwide recognition of the architectonic value of these buildings, it is barely mentioned the expressive use of white marble as cladding. Very few are found in the literature about specification criteria, provenance, fixation method and conservation.

According to Oscar Niemeyer Foundation, at this moment they know that the stone come from a supplier in the State of Rio de Janeiro. A preliminary research indicated that the marble used in most of Brasilia buildings are from the municipality of Italva, in the northwest of the State of Rio de Janeiro (DRM-RJ, 2012).

In a study carried out by DRM-RJ, in 2003, it is mentioned two white marble commercialized as dimension stone in Italva: “Sparkling Marble” (SM) and “Italva White Marble” (IWM), respectively dolomite-calcite marble and dolomite marble. Their main characteristics are: bulk specific gravity: 2,792 kg/m<sup>3</sup> (SM) and 2,852kg/m<sup>3</sup> (IWM); water absorption: 0.08 % (SM) and 0.10 % (IWM); uniaxial compression strength: 84.3 MPa (SM) and 88.2 MPa (IWM); modulus of rupture: 9.92 MPa (SM) and 8.75 MPa (IWM); coefficient of linear dilatation: 6.0 10<sup>-3</sup>mm/m.oC (SM) and 5.2 10<sup>-3</sup>mm/m.oC (IWM).

This data indicate that in spite the marble specification had not followed any technical or scientific criteria, or at least they are not easily available, they show good engineering properties and most of the slabs are still in the buildings.

The preservation of this cultural world heritage is an urgent demand, as pointed by Unesco, and one of the main challenges is the stone conservation planning, to which is already necessary serious multidisciplinary technical and scientific studies.

### References

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