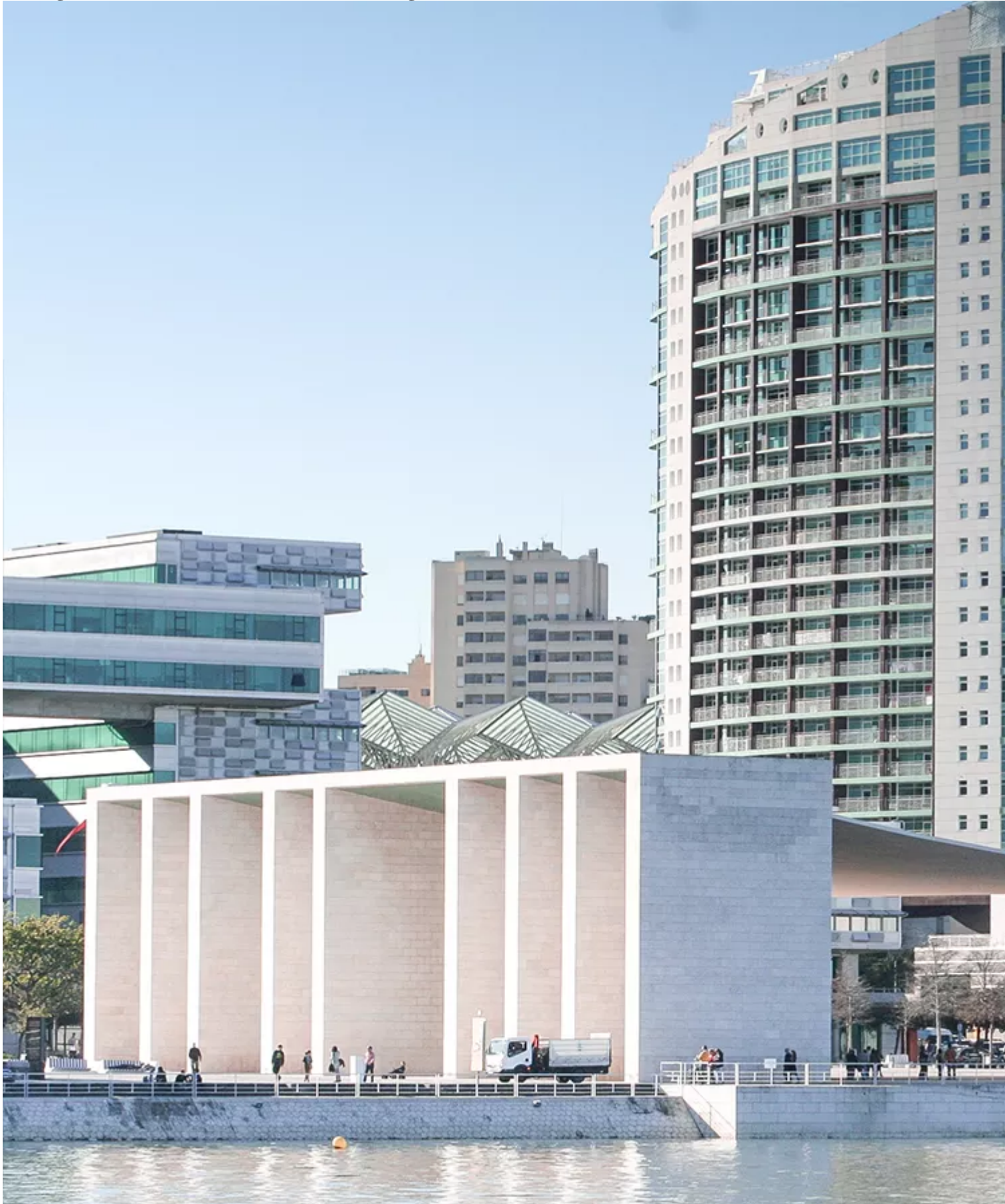




Portuguese National Pavilion, Lisbon, Portugal



Expo'98 International Exhibition - Lisbon took place in 1998, focusing on the oceans and their future importance. Several exceptional structures were realized for the event, and one of the most spectacular was that of the Portuguese National Pavilion, which includes an arched parabolic membrane slab ceiling cast through Lightweight Concrete (LWAC). The canopy dimensions are 65m x 50m, and the thickness of the

slab is 20 cm.

FACTS

Project Designer: Architect Siza Vieira

Ready-mixed concrete supplier: Betecna Betao Pronto SA

Contractors: Construtora do Tamega, OPCA, H. Hagen, Obrecol

Supplier of Leca® lightweight aggregates: Leca

The Portuguese National Pavilion consists of the three-story main building and a canopy, which is described below. The canopy structure is a 20 cm thick parabolic membrane Leca® lightweight concrete slab hung on prestressed tendons anchored along the two short sides in slabs placed on top of a reinforced concrete structure of shear walls and reinforcements. Leca® lightweight concrete was chosen as the material due to its low dead weight, so that horizontal forces on the roof and supports could be reduced to a minimum while maintaining adequate strength and rigidity. The total weight of the roof was reduced by approximately 430 tonnes using lightweight Leca® concrete.

Structural system:

The arched roof induces large horizontal forces on top of the shear wall with gussets. Due to the use of lightweight Leca® LWAC concrete, these forces were minimized. The shear walls ensured the transfer of force for horizontal deadweight, wind and earthquake loads between the roof and the underground foundations.

The roof itself has a 20 cm thick parabolic membrane slab in lightweight Leca® concrete. Membrane stress due to sag is compensated for by the use of long tension cables anchored to support slabs on top of the shear walls.