

The Complete Calculation of the Foundation Symmetrical Plinth with Prescriptive Implications for Establishing the Shear Creep Stress

The complete calculation of the foundation symmetrical plinth has been undertaken with the following aims:

- to fill the gap left by this topic in the technical literature consulted;
- to introduce prescriptive elements for establishing the shear creep stress.

In fact, this evaluation may only be made with respect to the part of foundation which is delimited – in the diagram of the shear stresses – between the maximum working value in correspondence with the joint section and the prescriptive minimum value, below which it is not necessary to use the shear reinforcement.

A completely innovative aspect of this study concerns dividing up the bracket structure by actual cuts – rather than virtual – according to the vertical planes between the edges of upper pier and the corresponding edges of the foundation.

The method adopted is the classic “Trapezium” method, which, as we know, is based on the condition that the span of the individual brackets, into which the plinth is disassembled, is greater than the height of the joint section (principle of Saint-Venant), and on the hypothesis of the pressure linearity in the soil.

This schematization results from the condition that the contact surface between the foundation and the soil remains level during the working phase. With a greater rigidity of the foundation, this assumption will resemble real behavior.

The study examines three different situations of the structure:

- rectangular base plinth with eccentric load (eccentric compression);
- rectangular base plinth with centered load (axial compression);
- square base plinth with centered load (axial compression).

Each of these three situations has the triple property of treatment completeness, ease of calculation – despite the complexity of the shear creep stress formula with respect to the plinth with varying section – and particularly of organicity, understood as the use of the same symbolism and formulas for all the brackets of the structure.

I consider the proposed study to be interesting from a theoretical and teaching aspect, and useful from a technical-professional aspect, if, to the advantage of stability, we ignore the contribution of the bending moment when establishing the shear creep stress with respect to a plinth with varying section.