# On Lateral Spreading and Stability of Columns-Supported Embankments

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**Abstract**

Columns supported systems, now a popular technology in infrastructure projects ---- such as: bridges abutments, railroad projects, etc. --- facilitate rapid construction of the fill when dealing with soft/poor soil conditions, if other ground improvements techniques (e.g. stage construction, deep soil replacement, wick drains, etc.) does not attenuate issues associated with: 1) serviceability criteria in the fill and/or adjacent structures; and/or 2) ultimate condition such as basal stability. Many efforts have been put in understanding the mechanisms behind the vertical load transfer [1][2]. However, there is a remaining concern with the lateral spreading associated with fracturing of the unreinforced grouted inclusions due to the unbalanced loads in the perimeter columns. In this study, an extensive review of the field cases was done to understand the typical CSE geometry conditions, subsoils profiles, and typical performance, regarding basal stability. Then a 3D parametric finite element study was defined using typical conditions found in the field cases, to assess the basal stability and lateral spreading of the systems. This parametric study indicates that the presence of an over consolidated stiff crust may enhance the system, reducing the lateral spreading. The column fracturing does not necessarily produce basal instability, thus designing to prevent bending failure [3] can be conservative since it precludes the potential for more economic designs.

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**References**

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