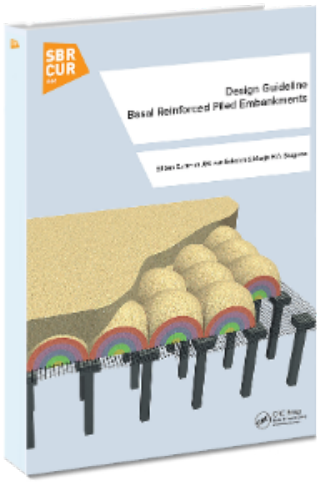
Piled embankments



Design Guideline Basal Reinforced Piled Embankments



The Design Guideline Basal Reinforced Piled Embankments can be purchased at Taylor&Francis Group/CRCPress or Amazon. This paper provides a summary and this excel file gives the main equations. The guideline:

- Offers the most reliable and complete guideline available for the design of basal reinforced piled embankments
- Features the most up-to-date insights in the behaviour of basal reinforced piled embankments, including the Concentric Arches model
- includes extensive calculation examples
- Provides construction details and many practical tips

Prof. Richard Bathurst has written a review of our design guideline. You can read it here, with free access on the Geosynthetics International website.

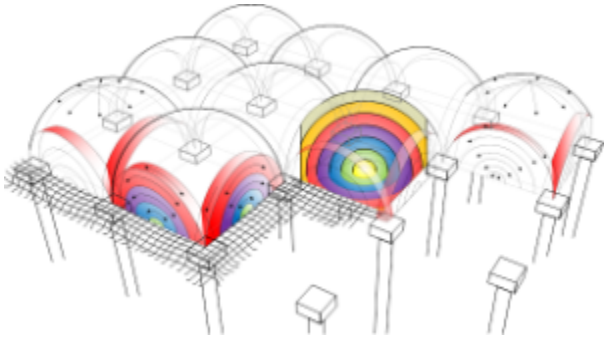
Doctorate study Basal Reinforced Piled Embankments

Suzanne van Eekelen received her PhD on basal reinforced piled embankments on 1 July 2015.

- Her PhD thesis: S.J.M. van Eekelen, Basal Reinforced Piled Embankments (ISBN 978-94-6203-825-7). If you are interested in a paperback version, please click here.
- Suzanne van Eekelen developed a design method for the geosynthetic reinforcement in the piled embankment. This model is available in excel: e xcel file with Concentric Arches model.



For the doctorate, the Deltares laboratory carried out a series of experiments, reported in Van Eekelen et al., 2012a. Based on this, Van Eekelen developed the new Concentric Arches - design model for the basal reinforcement of the piled embankment (Van Eekelen et al., 2012b, Van Eekelen et al., 2013). This model was validated with measurements from seven full-scale projects and four series of scaled model experiments (Van Eekelen et al., 2015). The calculated results are almost a perfect match with the measured results. Suzanne van Eekelen received several awards for her work on basal-reinforced piled embankments.

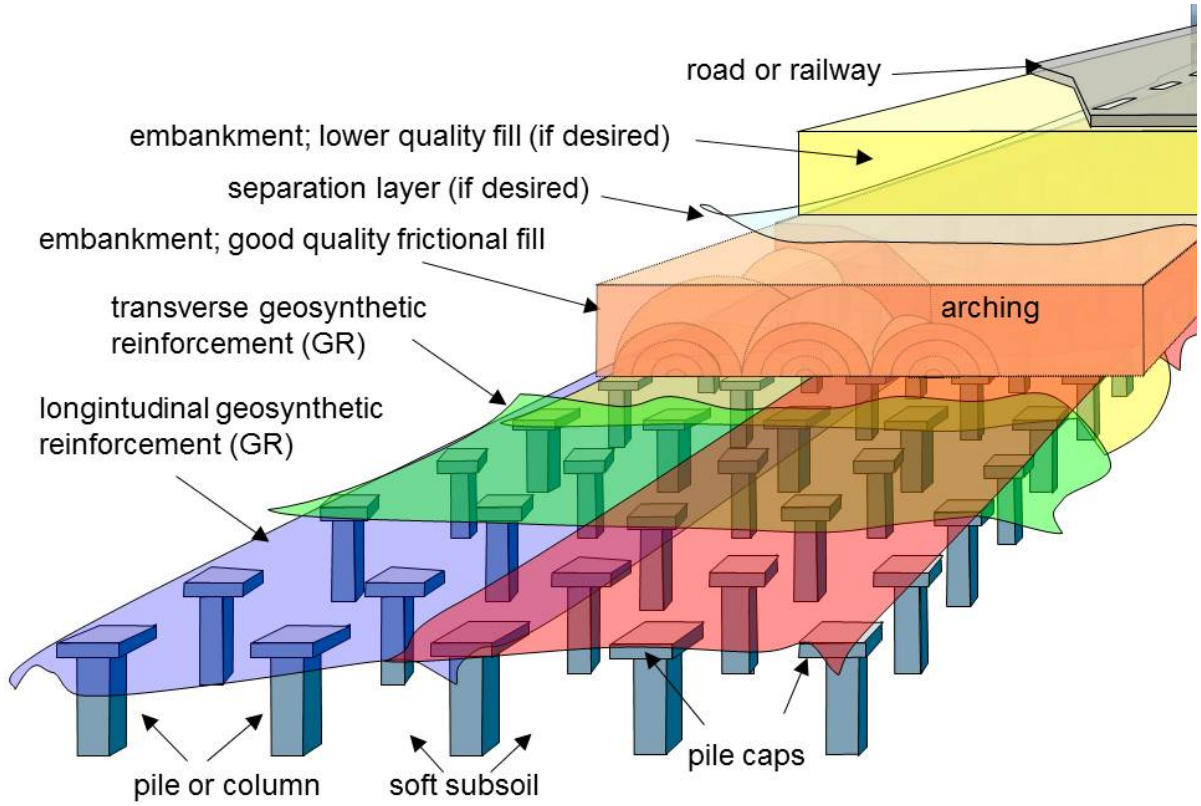


The Concentric Arches model. The loads are transported along the hemispheres and the 2D arches, towards the piles, the geosynthetic reinforcement and the subsoil. This model is available in excel: excel file with Concentric Arches model.

The results of the doctorate study were adopted in the 2016 update of the CUR226 Dutch Design Guideline for Basal Reinforced Piled Embankments.

What is a piled embankment?

A piled embankment consists of a foundation on piles, with on top of that an embankment. The bottom section of the embankment is composed of a granular material and reinforced with one or more geosynthetic layers. The embankment can be raised with sand or granular material. The piled embankment is finished with a road or a railroad construction.



Within the granular layer, a kind of arch occurs. The load is transferred along these arches. This phenomenon is called arching.

Why are piled embankments applied?

A basal reinforced piled embankment can be used for the construction of a road or a railway when a traditional construction method would require too much construction time, affect vulnerable objects nearby or give too much residual settlement, making frequent maintenance necessary.

-



Construction of the N210 in the Krimpenerwaard: sensitive existing road, very soft soil; Ballast Nedam Infra and Huesker Geosynthetics

Example projects

Please find a list of Dutch piled embankment projects here.

> *The Dutch version of Piled Embankment: Paalmatrassystemen.*