

# Safety evaluations by the finite element method and the method of slices for fills with line-load on soft soil (Project work autumn 2006)

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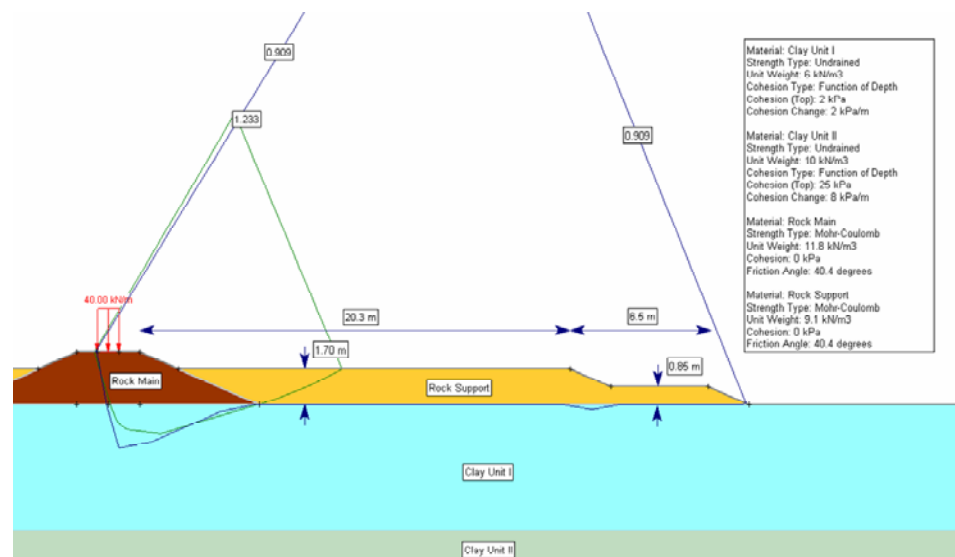


## ABSTRACT

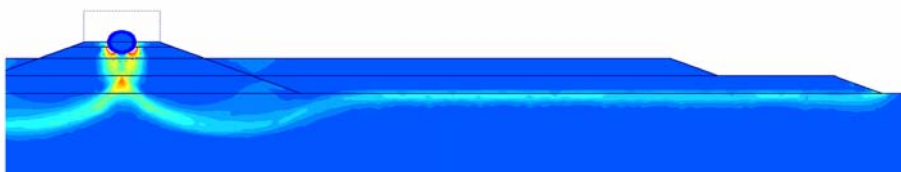
The work deals with the behavior and safety evaluations of gravel-fills on soft soil. The specific situation studied is “fills used for support of offshore pipelines”. The design often leads to long free spans of the pipe, making the load on the fill considerable. This together with the poor soil conditions makes it necessary to use long berms in design.

Safety evaluations of some simplified fills have been performed comparing result from the PLAXIS finite element method (FEM) and the method of slices (Morgenstern-Price method) in plane strain conditions. The results show large differences in both factor of safety and failure mechanism, when the pipe is applied with its full load over the diameter of the pipe. Up to 70% larger factor of safety is observed for FEM compared to the method of slices.

FEM is assumed to give the most correct answer. Based on this, two approaches on how to model the pipe load in the method of slices are studied. By manipulation of the input load from the pipe in the method of slices, according to the vertical loadspread observed from the FEM calculations, it was possible to obtain good agreement.



**Fill on flat terrain with pipe and small berm. Method of slices.**



**Fill on flat terrain with pipe and small berm. FEM calculation.**