IT IS IMPORTANT TO UNDERSTAND CLAY...

If you walk through the old parts of Aarhus, looking at the buildings it is obvious that some of the facades does not look the way they were build many years ago. Since the buildings were built, the soil under them has been compressed by the weight of the buildings. The process is in engineering called consolidation. The compression is largest under the heaviest parts of the buildings, which is why these parts will settle more than lighter parts. This difference in settlements will often cause cracks in the facades and skew lintels over windows and doors. Fortunately, good tools exist for prediction and accounting for the consolidation during design of buildings. However, for a certain type of clays, called Palaeogene clay, the tools and knowledge of the engineers are not as good.

An example of the poor performance of the usual tools is the Little Belt Bridge from 1935, connecting Funen and Jutland with railway tracks and a highway. The bridge is constructed on Palaeogene clay. During the lifetime of the bridge, the piers have settled up to 75 cm vertically. This caused Banedanmark to set up a working group to investigate the bridge in 2012. The working group found that the foundation of the bridge should be strengthened. The bridge was strengthened in 2014 by dumping 125.000 m³ rock around the bridge piers. The total budget for the operation was in excess of 100 mio. DKK. Probably, the strengthening could have been avoided if more knowledge on this type of clays was available during the design phase of the bridge.

These Palaeogene clays are of focus of the industrial PhD-project carried out by Michael Lodahl (COWI A/S and AU). By making artificial samples and testing of the consolidation behaviour, Michael tries to understand how the different minerals within the clay influence the consolidation process. He hopes that this will enable the engineers to better understand the troublesome soils and in the future to design better and cheaper buildings.

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