

## **WHEN THEORY MEETS INTERACTIVE PRACTICE – JET GROUTING TAKES THE COMPLEX STAGE AT LISEBERG WEST**

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### **Abstract**

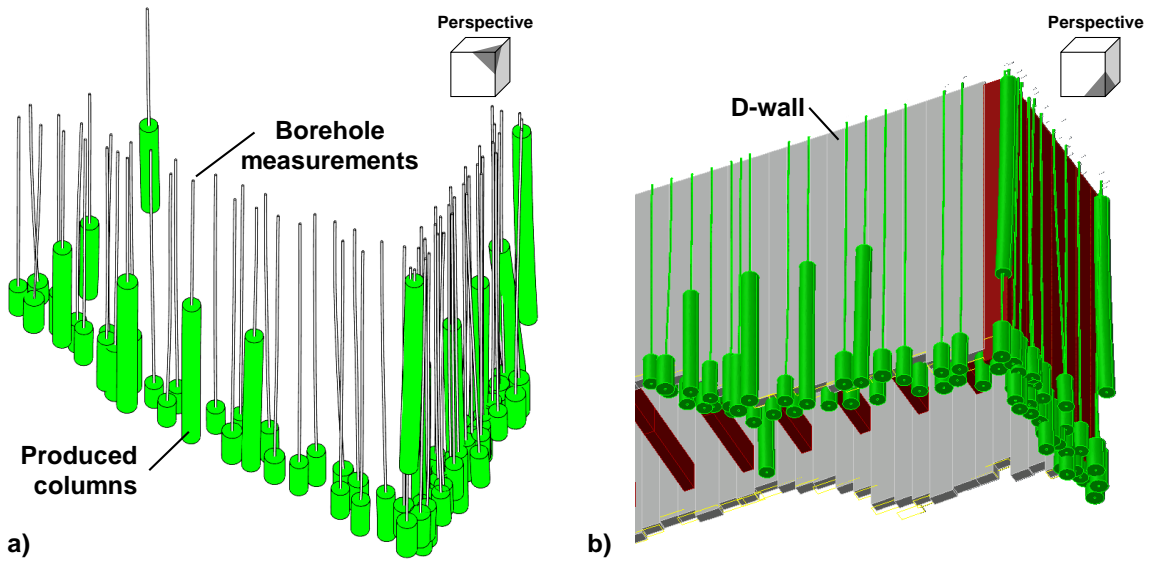
As part of the West Link project in Gothenburg, the joint venture *Special Foundations Liseberg West*, comprising *Keller Grundläggning AB* and *Wayss & Freytag Ingenieurbau AG*, is currently executing comprehensive jet and rock grouting works at the *Liseberg West* construction site.

This involves underpinning and sealing of a top-down excavation pit, built with diaphragm walls, in geo-hydraulically challenging conditions.

The complexity results from the partly hydraulically pressured conditions in combination with a large variation in the prevailing ground conditions ranging from cement-stabilised clay, densely bedded sand and a moraine layer with boulders to fractured and competent rock. Additionally, obstacles and over-concreting of the diaphragm wall increase the complexity for locating the jet-grouting columns at the foreseen positions.

The execution of the works comprises of the following steps: First, sacrificial casings are installed and the boreholes are measured using an inclinometer. Then, these measurements are analysed by the client to forecast the jet-grouting columns in the context with the existing diaphragm walls, adjacent jet-grouting columns and casings. Hereby, the client decides whether and how to execute specific columns, re-drill a casing or reject the point. Finally, the jet-grouting drilling is also measured, enabling the JV to continuously update an as-built 3D-model in Revit, as illustrated in the figure below, which is regularly provided to the client for further assessments.

Therefore, this project involves a highly interactive production engineering and planning process that needs to be established in terms of quality, time and costs. In conclusion, this article provides an overview of the opportunities and challenges of the interactive approach and concludes some lessons learned from the project.



**Figure: 3-D Model visualization of produced columns (a) within the context of the existing D-wall structure (b)**