

JOINT MEETING WITH
THE ENGINEERING GROUP OF THE GEOLOGICAL SOCIETY

Wednesday 8th February 2012 at 6.00pm

at the

Geological Society, Burlington House, Piccadilly, London W1J 0BG

“Söderströmstunneln: Geotechnical challenges for an innovative immersed tunnel in Stockholm”

Speakers:

JOHANNES GLUCKERT, ZUBLIN GROUND ENGINEERING

TILO SPAHN, ZUBLIN GROUND ENGINEERING

RALF ASTALOSCH, ZUBLIN GROUND ENGINEERING

The project Söderströmstunneln is one of the most challenging parts of the new Citybanan in Sweden, a 6 km long railway tunnel crossing the historical centre of Stockholm. The Design and Build contract for the tunnel was awarded to a Joint Venture consisting of the German contractor Züblin Ground Engineering, part of the Strabag SE Group, and the Danish E. Pihl & Søn A.S.

Major parts of this underground railway link are executed using the drill and blast method common in Sweden. Where the railway tunnel crosses the Söderström, an arm of the lake Mälaren, the bedrock forms a deep valley up to 40 m below mean water level of the lake. Here the tunnel will be constructed as an immersed tunnel of 300 m total length that is supported on 4 pile groups due to the soft soil overlying the deep bedrock. The distance between the pile groups is typically 55 metres, making the immersed tunnel an underwater bridge. The immersed tunnel consists of 3 prefabricated tunnel elements. The tunnel is divided into two tubes, with a 12 m wide twin track railway tube and a 5 m wide tube for service and rescue purposes.

Each pile foundation is formed by up to 46 steel core piles, a common Scandinavian micro pile system. The piles are drilled into strong bedrock with a total length of up to 20 m. Drilling and installation of the piles has been carried out from a barge in an average water depth of 20 m. The design of the piles has to cope with large horizontal deflections in combination with high vertical loads and very soft subsoil.

On both sides of the Söderström, deep excavation pits have to be constructed that are needed to build the cut and cover tunnels that will form the connection between the immersed tunnel elements and the northwards and southwards ongoing rock tunnels. The retaining walls have been executed as secant pile walls of 1.5 m diameter that are drilled into the bedrock. Several levels of struts and rock anchors are required to support the retaining walls. Where the bedrock lies above the final excavation depth the rock needs to be excavated in front of the bored piles. Base and curtain grouting has been performed in advance to seal the rock against the high water pressures. These construction pits are the deepest dry construction pits executed in Northern Europe to date.

Johannes Glückert joined the Berlin geotechnical design office of contractor Ed. Züblin AG about 15 years ago, where he was in charge of the design of various deep excavation pits and foundations. In 2004 Johannes transferred to Züblin Ground Engineering and has since then been based on major tunnelling projects within Europe, including four years working in the Netherlands, as design and project manager at the metro tunnelling projects Randstad Rail in Rotterdam and North-South-Line in Amsterdam. Since 2008 he has been working in Stockholm as the Technical Manager for the design and built project Söderströmstunneln.



Johannes Glückert

Tilo Spahn is an experienced project manager with nearly 20 years of wide international experience in city centre locations such as Stockholm, Abu Dhabi, Riga, Copenhagen, etc. His expertise includes all kind of general ground engineering, especially bored piling and diaphragm walling. He is currently the Project Manager for the Söderströmstunneln project in Sweden. The scope includes immersed tube tunnelling including bored piles and rock excavation.



Tilo Spahn

Ralf Astalosch is a Senior Construction Manager with wide international experience. He is an expert in the management of piling, diaphragm walling and other geotechnical techniques. He has worked for Züblin (a subsidiary of Strabag AG) since 1992. During his international career he was responsible for cut & cover tunnel works and diaphragm walling but also for ground engineering work to extend Munich's underground rail system. He is currently a Project Manager for the Crossrail C430 Farringdon Project in London. The scope includes piled foundation and secant piled perimeter retaining walls and the construction of ticket hall shafts.



Ralf Astalosch