

BGA Evening Meeting

13th May 2015 at 6pm

**Institution of Civil Engineers, One Great George Street
Westminster, London SW1P 3AA**

Excavation Works and Geotechnical Challenges of the Warsaw Metro Line 2 Construction

Dr. Eng. Federico Bizzi, Astaldi-Gulermak- PBDiM Metro JV

**Dr. Eng. Andrea Pettinaroli, Studio Andrea Pettinaroli srl
(Milan)**

**Dr. Eng. Elena Rovetto, Studio Ingegneria Balossi Restelli e
Associati (Milan)**

Summary:

The new Central Section of Warsaw Metro Line 2 connects the historical “Downtown” area in the west to the old quarters on the east side (the so called “Praga District”), passing under the River Vistula. The new Metro Line 2 comprises seven underground stations, six underground ventilation shafts and 12 km of underground tunnels. Station shafts and box excavations were constructed in highly urbanized areas, and were connected by tunnels excavated with EPB machines. The ground conditions were very challenging, being highly variable and encompassing a wide range of lithologies (clays, silts, sands and gravels). These constituted difficult conditions for the construction of an underground metro.

This lecture will present the solutions adopted for excavation of shafts and boxes and the associated geotechnical problems. Particular attention will be given to “Nauki Kopernik – Powisle” Station, also known as “C13”, which is located very close to the River Vistula, the longest and largest river in Poland. Station C13 passes beneath the highly trafficked Wislostrada Highway. At this location, artificial ground freezing allowed the excavation of twin bored tunnels plus a central mezzanine tunnel under complex geotechnical and hydraulic soils conditions. The tunnels connected two shafts to create the station complex, while enabling the Wislostarda traffic to be relatively uninterrupted during all the activities.

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Biographies:

Dr. Eng. Federico Bizzi, Astaldi-Gulermak- PBDiM Metro JV

Federico Bizzi graduated Civil Engineering from Ateneo di Parma in 2000. He is currently working for the construction company, Astaldi S.p.A., as Technical Manager for public infrastructure projects. He has been responsible for the design and construction of the Metro Line 2 subway project in Warsaw, from Daszyński Roundabout to Wileński Station, which was awarded to Astaldi S.p.A. by the Municipality of the City of Warsaw in 2009. Dr Bizzi's experience has been on the delivery of important public infrastructure projects including, amongst others:

- The A1 - Milan - Naples Highway: Development of the new Bologna-Firenze highway between Sasso Marconi and Barberino del Mugello - LOTTO 3;
- The A1 - Milan - Naples Highway: Development of the new Bologna-Firenze highway between Sasso Marconi and Barberino del Mugello - LOTTO 1.



Dr. Eng. Andrea Pettinaroli, Studio Andrea Pettinaroli srl (Milan)

Andrea Pettinaroli obtained a degree in Civil Engineer from Politecnico di Milano in 1992. He worked from 1994 as geotechnical engineer in Studio Ing. Achille Balossi Restelli in Milan, and since 2011 in his own company. He has a wide experience in soil treatment for tunnelling, large openings, foundations and water supply. His experience ranges from concept design through to on-site supervising and construction. Among the most important works he has undertaken are: Metro lines in Milan, Rome, Naples, Turin, Brescia & Warsaw; the foundations of the new Theatre "La Fenice" in Venice and the restoration and new construction of several hydro-power plants in Italy and Bulgaria. He was a lecturer in the Post Graduate Master Course "Tunnelling and Boring Machine", at Politecnico of Turin in 2008, 2010 and 2012.



Dr. Eng. Elena Rovetto, Studio Ingegneria Balossi Restelli e Associati (Milan)

Dr. Eng. Elena Rovetto is Partner of Studio Balossi Restelli e Associati established in 2011. She graduated from Milan Politecnico University in 1986 and after graduation she developed her thesis with Studio Geotecnico Italiano Srl. From 1986 to 2011 she worked first as junior, then senior engineer with Dr. Eng. A. Balossi Restelli. Eng. Rovetto's experience includes soil mechanics, foundation, structures, monitoring system design and works supervision. Her main areas of specialisation include consolidation and grouting for water control in soil and rock for tunnelling and underground excavations, ground improvement for tunnels, underpinning of pre-existing civil structures and infrastructure, structural rehabilitation/ protection of ancient buildings of key artistic importance and ground freezing for tunnelling excavations. She is a lecturer in the "Continuing Education Program" at Politecnico di Milano.

