SEMINAR ON “BIG SHAFT”

Friday, 20 May 2016 (2:00 – 5:30pm)

Chiang Chen Studio Theatre, The Hong Kong Polytechnic University
Hunghom, Kowloon, Hong Kong

Supported by The HKIE Geotechnical Division

Introduction

Large shafts are sometimes used as a means for supporting deep excavations. Although Hong Kong is a relatively small place, many deep shafts have been constructed for various civil and building projects in the past. Although the concept of a circular shaft is easy to understand, the considerations needed for design and construction of a large, deep shaft are not as simple as it may appear. For instance, the shaft wall is no longer subjected to pure axial hoop stress when the radial stress acting on the shaft is not uniform across the shaft due to variation of soil profile or ground profile. Also, constructing a vertical deep wall panel for a deep shaft with strict tolerance is by no means a simple task.

In this seminar, case studies covering a few interesting projects of big shafts in Taiwan and Hong Kong are discussed. Topics discussed will include the use of construction of automatic boring machine for construction of vertical shaft for automated underground facilities, the technique of raised boring for construction of a deep shaft for drainage works, the design aspects of a twin-shaft for tunnelling works and the skills needed for construction of large diameter deep shafts to meet design requirements.

Invited Speakers

Mr Alex BARITO, Dragages Hong Kong Ltd

Title: Construction of Deep Shafts using Raise Boring Technique in Hong Kong

To alleviate flooding and meet the community’s increased expectations for higher flood protection standards, Drainage Services Department, back in 2007, commissioned the Hong Kong West Drainage Tunnel (HKWDT). At the time the largest and most complex underground project ever planned in Hong Kong.

Currently operational the HKWDT is a storm water drainage tunnel running between Tai Hang and Cyberport with an approximate length of 10.6km. The tunnel is designed to collect storm water from the upper catchments by a system of intake points, dropshafts and adits to relieve the flooding problem at the lower catchments of northern Hong Kong Island during heavy rainstorms.
Among the many challenges presented by the project the need for construction of about 2.5 Km of Vertical shafts to connect surface catchments to the Main Tunnel. This presentation will describe the operation and the challenges faced for the construction of the deepest vertical shafts ever built in Hong Kong.

Alex Barito is a Mining Engineer with extensive experience in Major Underground Civil Projects. Out of his 16 years’ International working experience he spent more than 8 in Hong Kong with operative position in major tunnel projects such as XRL820/821 and HKWDT. He is currently Tunnel Manager for the TBM tunnels Section of Hong Kong Liantang / Heung Yuen Wan Boundary Control Point Contract 2.

Mr Xavier HEURTAUX, VSL Intrafor Hong Kong Ltd

Title: Construction of large diameter shafts for tunneling works

Case study: Tuen Mun - Chek Lap Kok Northern Connection Sub-Sea Tunnel Section

As Hong Kong’s deepest, longest and largest sub-sea road tunnel, the Tuen Mun – Chek Lap Kok Northern Connection Sub-sea Tunnel section has the largest contract sum ever awarded in Hong Kong, a reflection of the project’s scale and complexity. This dual two-lane sub-sea tunnel will run between the western New Territories and Lantau Island. The world’s largest Tunnel Boring Machine (TBM) of 17.6 metres in diameter and two others TBM of 14 metres in diameter are being used to construct these road tunnels. Deploying the largest Tunnel Boring Machine combined to the geotechnical complexity of building TBM shafts in freshly reclaimed ground introduces new challenges to the already complex construction of deep and large diameter shafts. The speaker will present and review the challenges faced during the planning and construction of the shafts built and to be built on this very special project.

Xavier HEURTAUX is a Civil Engineer from France who has spent the last 18 years with the ground engineering specialist, INTRAFOR Hong Kong Ltd. Xavier has been involved in the management or major infrastructure and foundations projects that include Gautrain in South Africa, Perth New MetroRail in Australia, Chinatown Station in Singapore or ICC Tower in Hong Kong to name a few. Xavier is currently Business Development Manager for INTRAFOR.

Mr Charles P HUNG, H&C ParkTech Ltd

Title: Vertical Shaft Method and Automated Underground Carpark

U-PARK consist of 2 main components: a concrete silo by Vertical Shaft Method (VSM) from Herrenknecht AG, and an Underground Automated Car Parking System (UACPS) from Lüdige Industries utilising the automatic warehousing technique common to air cargo terminals.

Charles P HUNG studied Mechanical Engineering. Founder of H&C companies in Hong Kong and Taiwan and brought in innovative construction techniques: Slip-forming of airport runway - 1st in Asia; Aerial Cableway for large dam concrete pouring before the days of personal computer; Full Span Method of viaduct box girder weighing 800+ tons at 24 hour per span.

Mr Peter A. THOMPSON, ARUP

Title: Innovative Launch Shaft Design for the World’s Largest TBM

Groundbreaking in every sense, the Tuen Mun to Chek Lap Kok northern section tunnel will complete the main arterial transport link between Hong Kong, Zhuhai and Shenzhen with sections reaching depths of up to 50m below sea level. Incorporating the world’s largest diameter boring machine, the project presented a number of different
challenges including a critical launch from the northern end in Tuen Mun at a shallow depth in newly formed reclamation with barely more than a single tunnel diameter of cover. To facilitate the entry of this large TBM into these challenging ground conditions the Arup team devised an innovative launch shaft design made up of three cells that work together in a hoop action ("the caterpillar") to create an open excavation with minimal strutting which had the advantage of not only expediting the construction works programme but also to made it easier to maneuver and work on the TBM once inside. This presentation describes the evolution and development of this critical design structure for the project.

Mr Thompson is a Geotechnical Director of Ove Arup and Partners Hong Kong Limited with more than 26 years of experience in the management of the design and implementation of major works projects in both Hong Kong and overseas which includes his recent role as the Design Manager for the ongoing Tuen Mun to Chek Lap Kok Northern Section Design and Build Project.

**Tentative Programme**

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<td>1:45 – 2:00pm</td>
<td>Registration</td>
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<td>2:00 – 2:05pm</td>
<td>Introduction</td>
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<td>2:05 – 2:45pm</td>
<td><strong>Vertical Shaft Method and Automated Underground Carpark</strong></td>
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<td>Mr Charles P HUNG, Founder, H&amp;C ParkTech Ltd, Taiwan</td>
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<tr>
<td>2:45 – 3:25pm</td>
<td><strong>Construction of Deep Shafts Using Raise Boring Technique in Hong Kong</strong></td>
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<td>Mr Alex BARITO, Tunnel Manager, Dragages Hong Kong Ltd</td>
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<td>3:25 – 3:50pm</td>
<td>Coffee Break</td>
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<td>3:50 – 4:30pm</td>
<td><strong>Innovative Launch Shaft Design for the World’s Largest TBM</strong></td>
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<td>Mr Peter A THOMPSON, Geotechnical Director, Ove Arup and Partners Hong Kong Ltd</td>
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<td>4:30 – 5:10pm</td>
<td><strong>Construction of Large Diameter Shafts for Tunneling Works</strong></td>
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<td><strong>Case Study: Tuen Mun - Chek Lap Kok Northern Connection Sub-Sea Tunnel Section</strong></td>
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<td>Mr Xavier HEURTAUX, Business Development Manager, VSL Intrafor Hong Kong Ltd</td>
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<td>5:10 – 5:30pm</td>
<td>Q&amp;A / Discussion</td>
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**Remarks:**

- The seminar will be conducted in English.
- The seminar is designed for a 3-hour CPD-day. Attendance certificate will be distributed after the seminar.
REGISTRATION FORM

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Supported by The HKIE Geotechnical Division

Name : (Ir/Prof/Dt/Mr/Ms) ________________________________________________________________________________
(First Name)              (Surname)

Company : ______________________________________________ Position: ______________________________________

Tel : ___________________________________________ Email : _________________________________________________

Registration Fee
Registration (please “√” as appropriate)

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<tr>
<td>Early-Bird Registration</td>
<td>Member of HKIE: $400</td>
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<td>(on or before 15 April 2016)</td>
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<td>Full Registration</td>
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Remarks :
- The fee includes a copy of seminar notes and a coffee break.
- No refund will be given for cancellation, but registrant can nominate another participant as replacement.
- A week before the seminar starts, an E-letter of confirmation which contains the receipt of payment and seminar details will be sent to you.

Payment :
I enclose a crossed cheque no. ________________ for the amount of HK$____________ payable to "Centre for Research & Professional Development".

Please complete the form and return it together with appropriate payment to

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