Talk on "Site Supervision of Installation of Bored Piles" by Ir. Neoh Cheng Aik

Ir. Liew Shaw Shong is currently the Advisor of IEM Geotechnical Engineering Technical Division (GETD). He is the Senior Director of G&P Geotechnics Sdn Bhd.

A technical talk was delivered at Four Points by Sheraton Hotel, Puchong by the past IEM GETD Chairman, Ir. Neoh Cheng Aik, and chaired by Ir. Liew Shaw Shong on 19 November 2015. The talk was attended by 112 participants.

Ir. Neoh commenced his presentation with quoting a few extracts below from an article titled "My Thought on Site Supervision in the Consulting Engineering Practice vis-à-vis the Submission of Plans and Certification of the Completed Works in the Construction Industries in the Interest of Public Safety" by an IEM senior member, Ir. T T Chiam.

"Site supervision is the weakest link in the civil consulting engineering practice …."

"Many construction failures on sites were due to poor or lack of site supervision …."

"Construction supervision is in the last chain of the Consulting Engineering practice …."

During the talk, Ir. Neoh had made good references to BS EN 1536:2000 - "Execution of Special Geotechnical Works – Bored Piles", FHWA-IF-99-025 - "Drilled Shafts : Construction Procedures & Design Methods" and FHWA-NHI-10-016 - "Drilled Shafts : Construction Procedures & LRFD Design Methods".

The role and responsibility of supervising personnel were highlighted briefly and details of scope were illustrated in the entire construction process presented subsequently. To attain such objectives, the supervising personnel shall possess necessary knowledge and skill in order to act due diligently in reviewing the methodology, appropriateness of machine and drilling tools, observing construction, identifying and preventing foreseen problems, checking validity of design assumptions, keeping critical records during construction and report of any non-conformity to the designer, but principally it shall avoid delaying or interfering the contractor's operation unnecessarily.

Ir. Neoh highlighted that the Ground Investigation can affect significantly on pile design and construction, which is crucial for the designer and also the site supervision staff. Secondly, the method statement shall not only describe about construction sequence, but shall also touch on the methodology, materials, machines and man-power. The details shall cover the boring operation (drilling tools, stabilisation techniques in drilled shaft, base cleaning, record documentation), reinforcement fabrication and placement, controls in concreting and post installation testing.

Different types of drilling tools were shown to illustrate the effective cutting on different subsurface materials in the ground, chisels for breaking the rocks and also cleaning tools for base cleaning as well. Some other ancillary tools like airlifting pipe, down-the-hole sand pump and de-sanders were presented and explained.

Ir. Neoh cautioned that timely completion of the drilled shaft for concreting has better chance of avoiding stress relief that can detrimentally reduce the pile shaft resistance significantly.

In short, Ir. Neoh summarised the following common problems affecting pile performance in bored piling construction:

a. Compliances in boring operation

b. Improper stabilisation method and procedures

c. Inadequate base cleaning

d. Poorly fabricated reinforcement cage

e. Poor concreting technique

Bored pile design performance with high load capacity is very sensitive to construction processes, thus design and construction aspects are inseparable. Consequently, close supervision by experienced site staff with necessary skill and knowledge is the key element to ensure work compliance in every construction process in addition to the good ground investigation information and proper design calculation with clear design assumptions to be validated at site, clear construction drawings and specifications.

Some discussions during the Q&A session are summarised below:

a. What is the best remedial practice in handling the deviated piles? – Redesigning pilecap, use of tied beams to redistribute the induced moments or adding additional piles to rectify the support centroid in line with the column centre. It would be solely the design preference by the designer.

b. Tremie concrete problems – Different types of tremie concrete mixes, use of additives (retarder) for workability and slump control.

The talk ended with a presentation of memento and certificate of appreciation by IEM GETD chairman, Ir. Yee Thien Seng, to Ir. Neoh Cheng Aik as shown in Figure 1.

Despite of lacking of time to present all the presentation materials in the usual evening talk with time limit, Ir. Neoh has kindly provided full set of the prepared presentation slides *(http://www.myiem.org.my/download/downloadlink.aspx?fn=9287_GETD_Bored%20pile%20supervision_19112015.pdf&id=9287)* in IEM website for downloading by any interested members.

Figure 1: Ir. Neoh Cheng Aik during the presentation

Figure 2: Participants at the events

Figure 3: Presentation of momento and certificate of appreciation to Ir. Neoh Cheng Aik by IEM GETD Chairman, Ir. Yee Thien Seng.