

# Introduction to Basement Design

CIVIL & STRUCTURAL ENGINEERING TECHNICAL DIVISION

reported by



Ir. Siow Yun Tong

The Civil & Structural Engineering Technical Division (CSETD) organised an evening talk on Basement Design, on 20 April, 2017, at Auditorium Tan Sri Prof. Chin Fung Kee in Wisma IEM.

The speaker was Mr. Tony Chin, a chartered professional engineer in Australia with 15 years' experience in the building structures industry. Mr. Chin spoke on a few topics, including Project Requirement, Client Expectations, Geotechnical Aspects & Constraints, Structural Design Basis and Examples of Projects completed in the Middle East, Singapore & Australia. The talk, attended by 77 participants, was chaired by Ir. Siow Yun Tong of CSETD.

Mr. Chin listed some Codes which an engineer should use when communicating with the client as well as showed a few examples and images on basement standard. Gravity wall and embedded wall are two common basement walls. These are designed to resist earth and water pressure. He said surcharge loads of between 5 and 10 kN/m<sup>2</sup> must be considered in the design. Examples of surcharge load are vehicles, road finishes and construction plant.

There are three types of construction sequences for basements. The first is Open-Cut where construction is done in open excavation. The basement is excavated to formation level, leaving battered slopes to support the surrounding ground.

The second method is Top-Down, where perimeter secant wall piles are installed, followed by bearing piles with the plunge columns. Then the ground floor slab, first

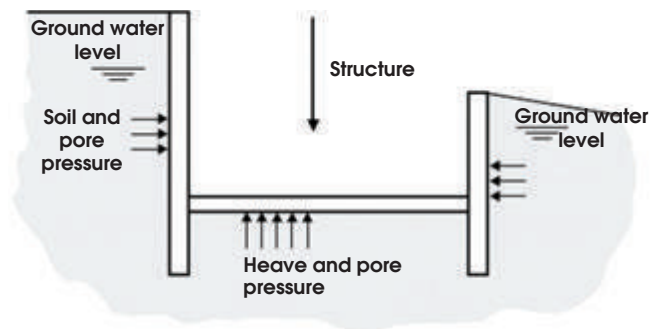


Figure 2: Forces on Basement Structure

floor slab, second floor slab and middle basement slab will be cast accordingly.

The third type of basement construction sequence is Bottom-Up, which has a few advantages as it is move safe, faster and requires minimum propping.

Mr. Chin also shared his experiences in the design of the retaining wall. He had adopted two types of wall systems: Gravity wall and embedded wall. He showed participants images of both systems and explained their advantages and disadvantages. He emphasised the importance of structural design considerations and advised engineers to consider future rises in ground water, unplanned excavations and surcharge loading. He ended his presentation with a few case studies of his completed projects. ■



Figure 1: Open-Cut Basement Construction

## IEM DIARY OF EVENTS

**Title: 2-Day Course on "Integrating Operational Perspective for Cohesive Design of Plant and Building Facilities"**

**25-26 October 2017**

Organised by: Oil, Gas and Mining Engineering Technical Division

Time : 9.00 a.m. - 5.00 p.m.

CPD/PDP : 12

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