



Two Days Short Course On New Fidic-Ita Conditions Of Contracts And Practical Workshop On Tunnelling Best Practices - A Quantum Leap

by Ir. Ong Sang Woh

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The Institution of Engineers Malaysia (IEM) held this two-day short course and practical workshop on 5th & 6th July 2018 at Wisma IEM, Petaling Jaya. This course was conducted by Professor Martin Smith and was attended by 13 participants. It was held as part of publicity for WTC2020 to be held in KLCC from 15th – 21st May 2020, and was organised jointly by both WTC2020 and TUSTD, and managed by IEM Academy Sdn Bhd.

Lecture 1: The New FIDIC-ITA Conditions of Contract: Concepts and Approach - Overview

The Speaker spoke on the new FIDIC - ITA “Emerald Book” for the Construction of Underground Works designed by a Contractor based on the latest version of the Yellow Book Plant and Design & Build in order to be able to better avoid disputes, especially due to unforeseeable physical ground conditions. The lists of proposed changes are as follows:-

- allocation of risk;
- disclosure of all available geological & geotechnical information;
- inclusion of a contractual geotechnical baseline;
- inclusion of an “unforeseeable physical conditions”;
- implementation of a ground classification system that properly reflects the effort of excavation & stabilisation;
- time for completion and influence by ground conditions; and
- provision of a flexible mechanism for remuneration according to ground condition, both foreseen and unforeseen

The above proposed changes & relevant clauses as well as examples of application showing variances in Geotechnical Baseline Report, GBR, production & adjustments in time and cost were explained.

Lecture 2: The New FIDIC-ITA Conditions of Contract: Concepts and Approach Workshop 1

After having gone through the numerous concepts and approach on a typical Underground Works project, the participants were divided into two teams to brainstorm on a topic “How to Solve A Problem” in a workshop. The participants drew up a list items that were further discussed and subsequently presented in the generic flow chart as shown in Figure 1.

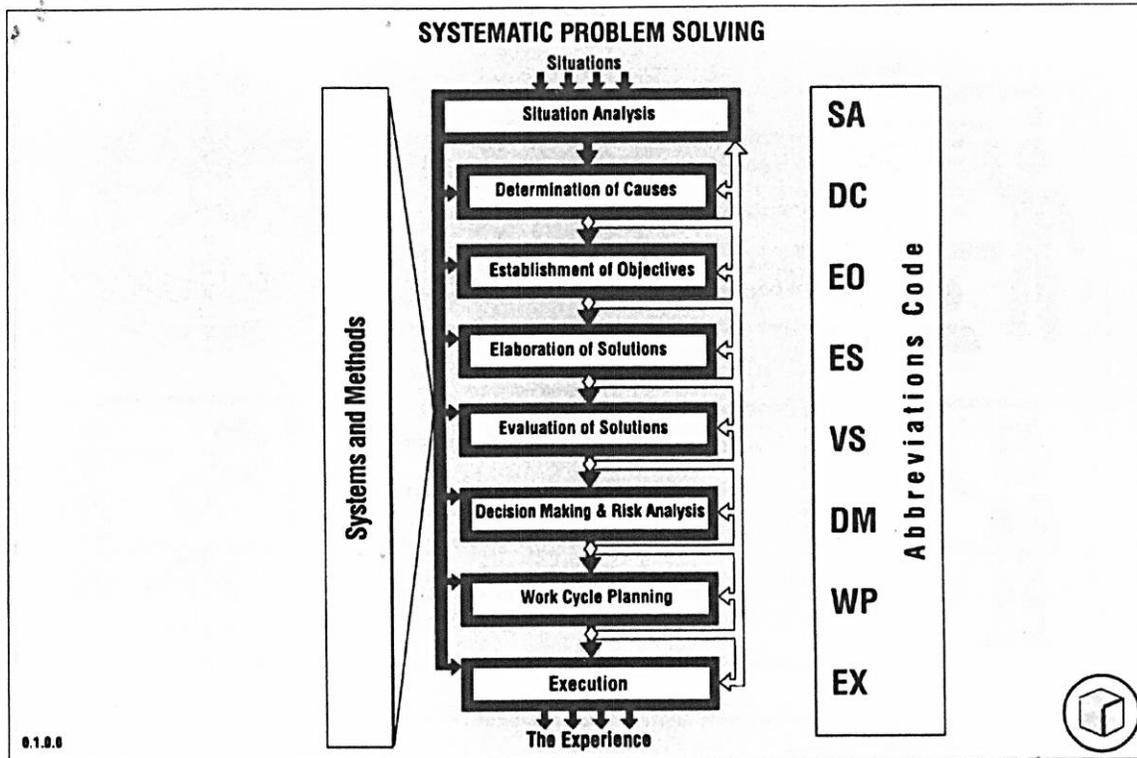


Figure 1: Problem Solving Flow Process

Lecture 3 The New FIDIC-ITA Conditions of Contract: Concepts and Approach – Details

The salient difference between Underground Works (UW) and Other Works is the space within natural ground where the behaviour or response of which is impossible to know perfectly in advance. As such, for the creation of space for UW, excavation and support including all ancillary measures and lining requires the calls for adjustment of both “time and remuneration” in the new FIDIC to be based on fairness. The Allocation of Risk (namely ground and groundwater related risks or unexpected ground conditions performance related risk) should be assigned to a party (either the Employer or the Contractor) that could best control these risks.

Lecture 4: Risk Management based on a Complex Metro Project

The Speaker spoke on critical elements of Risk Assessment, Risk Identification and compilation of Risks Register. Issues on types of rock condition, rock mass condition and quality as well as ground variation being affected by the presence of ground water were highlighted. Other important factors related to Risk Management such as Time, Quality, Cost, Risk Responsibility and Control were also elaborated. All risk elements were both categorised and summarised in the Risk Evaluation Matrix as shown in Figure 2.

		Consequences				
		Insignificant (1) No injuries / minimal financial loss	Minor (2) First aid treatment / medium financial loss	Moderate (3) Medical treatment / high financial loss	Major (4) Hospitable / large financial loss	Catastrophic (5) Death / massive financial loss
Likelihood	Almost Certain (5) Often occurs / once a week	Moderate (5)	High (10)	High (15)	Catastrophic (20)	Catastrophic (25)
	Likely (4) Could easily happen / once a month	Moderate (4)	Moderate (8)	High (12)	Catastrophic (16)	Catastrophic (20)
	Possible (3) Could happen or known it to happen / once a year	Low (3)	Moderate (6)	Moderate (9)	High (12)	High (15)
	Unlikely (2) Hasn't happened yet but could / once every 10 years	Low (2)	Moderate (4)	Moderate (6)	Moderate (8)	High (10)
	Rare (1) Conceivable but only on extreme circumstances / once in 100 years	Low (1)	Low (2)	Low (3)	Moderate (4)	Moderate (5)

Figure 2: Matrix of Risk Evaluation Categories

Lecture 5: Risk Management Workshop 2 and Problem Solving

The second workshop is related to the rail tunnel project, where participating team members were assigned different roles. For instance, to plan, manage, execute and construct a railway project. The roles assigned were Employer, Railway Expert, Engineers (Geotechnical, Alignment, Planning and Costing), QA

Manager and Contractor. For each specific role, participant was required to highlight and feedback on project related matters and issues for brainstorming and getting the accepted solution to move forward.

Lecture 6: Preparing the Project Documentation

The sole objective of the Project Documentation is to form the basic documents of a project for tendering. A tendering exercise is a process undertaken by the Project Owner in collaboration with either the Architect or Consultant and Quantity Surveyor to select the most appropriate proposal from prospective Bidders. The types of tenders could be Open Tender, Selective Tender or Negotiated Tender. Also, the Pricing Method could be either Fixed Price (Lump Sum and/or Unit Price Schedule of Rates) or Cost Plus Contracts in Construction. FIDIC General Conditions of Contract for Underground Works have all the comprehensive details indicated in The Emerald Book. Major contentious issues arising in underground works contract should all be stated in the Geotechnical Baseline Report and the Interpretive Report together with the Baseline Schedule.

Lecture 7: BIM Modelling 6D for Underground Works – Introduction

The Speaker started with introduction of 6D BIM, which refers to the intelligent linking of 3D CAD assemblies to schedule constraints (4D), cost-related information (5D) and other aspects of project life-cycle management information (6D). Both risks and responsibilities allocation between multi-parties were emphasized, of which their roles should be contractually defined in both BIM Execution Plan and Employer's Information Requirements. Other key subjects include Intellectual Property (IP) rights management at different stages of the project, tendering considerations and future promotion on BIM development in underground contract requirements.

Lecture 8: Practical Requirements Workshop 3

The objective of this workshop is to construct a “tunnel” using a practical model set to transport a TBM over two hills where there was no access and also it was not practical to construct a logistic access road. The team members worked together and successfully completed this task within the permitted time of 30 minutes (see Figure 3).



Figure 3: Photo of Physical model set for transporting the TBM

Lecture 9: The Geotechnical Baseline Report

This lecture was on the Geotechnical Baseline Report prepared by Independent Geotechnical Specialist Engineers. The Geotechnical Baseline Report (GBR) is a statement representing the known ground conditions in a project site. When the GBR is part of the contract, it sets the range of adverse physical ground conditions that ought to be provided for and included in the contract price. Conversely, site conditions differing from those considered in the GBR are deemed to be 'unforeseen' under the contract and are carried out at the Employer's risk. Properly drafted GBRs reduce construction costs and set clear terms between the parties in the event of more adverse ground conditions, thus contributing to dispute avoidance.

Lecture 10: The Baseline Schedule

The Baseline Schedule was also covered in the short course.

Lecture 11: Developing the Time Schedule

The basis of the completion schedule (time schedule) is to link the Time for Completion to Milestones and Baselines Activities as shown in Figure 4. Furthermore, It is also advantageous to link completed Activities to Schedule of Payments and if required, to carry out Adjustment of Time for Completion when the milestones have been delayed.

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Figure 4: Typical Time Schedule of Activities

Lecture 12: Preparing the Cost Model and Controlling Underground Works

In general, the project cost model shall comply with the Specification clauses and cross match with the deployment of the relevant machinery types (preferably from Contractor's owned or plant to be hired if necessary) and labour required. These input time and cost (include material & labour) for the activity shall be claimed according to the Bill of Quantities work items to ascertain the profit and loss margin, if any. Any temporary works and other incidental related cost incurred have to be accounted for in the cost estimates as well.

Lecture 13: Practical Workshop 4

The individual team members have to come up with the tender cost estimates for a typical tunnel project. The tender cost shall cover all aspects relating to the construction work elements and activities. The participants made use of the lessons learned and utilised the knowledge acquired earlier on during this course to provide a tender costing. In summary, there were great variations in the final cost estimates from the various participants due to the different approach and assumptions adopted in the tender exercise. Most participants have given very detailed cost breakdown but some have missed-out on some cost items due to the aggressive and non-conservative tendering approach to win the Tender for the project which was to submit the bid with the lowest price. In fact, this approach is the norm and practised by all Contractors in the industry.

Lecture 14: Monitoring Progress and Avoiding Claims

This relates to the existing natural ground conditions as represented in the Project Documentation and table as in both the Geotechnical Baseline Report and the Interpretive Report together with the Baseline Schedule. Issues arise due to the unforeseen existing and varying ground conditions (presence of faults, cavities and ground water, etc.) and the contractual arrangement of risks management. Disputes become the subject matter between the Contractor who submit the time & cost claims and the Employer who naturally refute such claim based strictly on the interpretation in the Contract provisions.

It will be in the Contractor's interest to closely monitor the physical work progress (and document claim matters and prepare records) according to the different Zones along the tunnel alignment in terms of planned/actual progress against distance and productivity. Although claims can never be avoided, nevertheless, the adoption of the New FIDIC Emerald Book could level the playing field between the Employer and the Contractor by means of risks management and risks apportionment.

Q&A

There were active discussions during the sessions.

Conclusion

Professor Martin Smith had shared his vast hands-on experience and knowledge on the **NEW FIDIC-ITA CONDITIONS OF CONTRACTS for Underground Works** projects that he had gained throughout his career. He had both emphasized and advocated a fairer sharing of risks on the unknown natural ground conditions between both Employer and Contractor in the New FIDIC Emerald Book, which will be launched at WTC2019 in Naples, Italy in May 2019.