

An Overview of Professional Practice of Geotechnical Engineering in Malaysia

S. S. Gue

Gue & Partners Sdn. Bhd., Kuala Lumpur, Malaysia

ABSTRACT: The professional practice of geotechnical engineers in Malaysia is regulated by the Board of Engineers, Malaysia under the rules and regulations of the Registration of Engineers Malaysia Act 1967 (Act 138). However, the act has no specific section on the registration and practice of geotechnical engineers. The rules and regulations apply to all engineers.

The paper traces the history on the development of geotechnical engineers and describes the possible trend of future development to ensure safety of the public. The role of geotechnical engineers has become more prominent as good land with straight forward or simple geotechnical design is scarce. Development has now moved towards soft ground, former mining and hilly lands. A proposal to register Geotechnical Engineers and Accredited Checkers has been recommended by The Institution of Engineers, Malaysia. The recommendation also includes classifying slopes in hill-site development into three categories. A Class 2 slope requires Geotechnical Engineer and Class 3 slope which has higher risk, requires a Geotechnical Engineer as well as an Accredited Checker.

1 BACKGROUND

The professional practice of engineers is regulated by The Board of Engineers, Malaysia (BEM), established in 1974 under the Registration of Engineers Act 1967 (Act 138) Malaysia.

The establishment of BEM and Registration of Engineers Act of Malaysia was mooted by The Institution of Engineers, Malaysia (IEM). IEM is the institution for all engineers. It was formed in 1959 and admitted as a member of the Commonwealth Engineers Council in 1962. The institution represents all disciplines of the engineering profession and is one of the qualifying bodies for Professional Engineers (P Eng) in Malaysia. The other qualifying and licensing body is BEM.

Another professional engineering organisation in Malaysia is The Association of Consulting Engineers Malaysia (ACEM), established in 1963. It is an association of consulting engineers and consulting engineering firms. Membership of ACEM is restricted to those licensed with the Board of Engineers Malaysia either as an individual or as a firm.

2 LEGAL REQUIREMENTS

In Malaysia, ACT 138; Registration of Engineers Act 1967 of Malaysia stipulates that all engineers including graduate engineers shall register with BEM to take up an employment as a Graduate Engineer. However, only graduate engineers from a recognised programme of university can register with the Board. The word 'Engineer' is protected under the law just like medical doctor to protect public safety.

The Act also stipulates that only registered Professional Engineers shall be entitled to use the abbreviation "Ir." before their name or the abbreviation "P.Eng." after their name.

Similarly, the law also stipulates all consulting firms in corporate bodies shall only be allowed to practise as consulting engineers upon BEM's approval. The Board of Directors of a corporate body shall consist of either entirely of registered Professional Engineers or majority of them. Other minority individual persons could be from registered professionals in Malaysia which include architects, quantity surveyors and land surveyors. However, professionals allied to the practice of engineering approved by BEM can also become a director. BEM is also in the

process of amending the Act, requiring all sole proprietors and partnerships to be registered with the Board.

On share equity of a body corporate, the law requires that registered Professional Engineers shall have a controlling interest.

3 ACCREDITATION OF DEGREE ENGINEERING PROGRAMME

Accreditation of a degree engineering programme was initially conducted by Institution of Engineers Malaysia. Section 10 (1) (a) of the Act 138 accepts any person who holds the required qualification for Graduate Membership of the Institution of Engineers (Malaysia) shall be entitled on application to be registered as a Graduate Engineer.

When the Board of Engineers Malaysia was established, the accreditation was later jointly carried out. The recent liberalisation of the Education Act in Malaysia which allows establishment of private institution has necessitated the formation of Malaysia Accreditation Board for private institutions of higher learning. The scope of the accreditation covers all courses including engineering programmes. Hence, a joint body called "Engineering Accreditation Council" was formed under the coordination of Board of Engineers Malaysia to accredit engineering degree programmes.

The accreditation examines among others, the following:-

- a) academic programmes which include the curriculum programmes and syllabi laboratory works, industrial trainings and project work
- b) the academic staff and students
- c) learning facilities which include libraries, computers, laboratories and etc.
- d) Quality Management System

On the academic programme, the minimum credit hours are 120 for students with A-level or equivalent. One credit hour is defined as one hour of lecture per week for a minimum of 14 weeks in a semester excluding examination and mid-term break. Two-thirds of the credit hours should be on engineering core subjects and one-third on other related topics such as communication, management, law, economics, public safety and etc., laboratory work or workshop, final year project and industrial training are also included but with lesser weightage and limited to a certain maximum credit hours.

The academic full-time staff to students ratio should be at least 1:15. The academic staff should generally have a post graduate degree of Master level

or higher. A dynamic quality management system is also required.

4 THE ROUTE TO A PROFESSIONAL ENGINEER

The requirements for registration as a professional engineer and be licensed to practice independently are:-

- a) be registered as a Graduate Engineer with BEM and
- b) have satisfied the training requirements of BEM; and
- c) have passed the Professional Assessment Examination of BEM or a Corporate Member of IEM; and
- d) have been residing in Malaysia for a period of not less than six months immediately prior to the date of application

The training requirements for a registered Graduate Engineer include a minimum of three years of satisfactory practical experience, depending on the type of degree which shall include:-

- a) planning, design, execution or management of such works as comprised within the profession of engineering
- b) in engineering research; or
- c) in teaching a course leading to a degree qualification approved by the Board and

at least one year of such practical experience for adaptation shall be obtained in Malaysia under the supervision of a registered Professional Engineer of the same discipline or an approved allied discipline and shall be in the fields of engineering practice other than in research and teaching. Generally, most engineers take four to six years to acquire the required experiences before applying to sit for the assessment examinations.

Two reports are required for professional assessment. The report on training and experience should be of length 1500 – 2000 words and the other report on a design or feasibility study or research. The candidate documents on experience shall be assessed by two registered Professional Engineers and followed by an interview and essay examinations. The objectives are to ensure that an applicant has acquired the necessary practical experience under proper supervision and ability to communicate effectively for independent practice and public safety.

The essay examinations include two parts: one part covers the experience and the other on the code of ethics and engineers in society.

5 CONTINUING PROFESSIONAL DEVELOPMENT

All graduates who register after January 1998 are required to have attended the Continuing Professional Development (CPD) programme. It includes 60 contact hours on courses related to code of ethics, health and safety at work including relevant by-laws and regulations, engineering management practice and topics related to engineering. In addition, the mandatory training also includes 24 days of extended training. CPD for previously registered engineers are encouraged to have an average of 150 hours of CPD for three years. It is likely that this voluntary CPD would be mandatory beginning year 2003.

6 FOREIGN ENGINEERS

The Board (BEM) also registers foreign engineers under temporary registration. Generally, approval for registration is given to foreign engineers in a joint-venture or government project. Applicant should be licensed in his or her own country for individual practice and has more than ten years of experience in the relevant field. The foreign engineer has to be sponsored by a local counterpart who is a registered Professional Engineer in need of the service. The temporary registration is given for a period of not exceeding one year for a specific project(s) and may renew if deemed fit by the Board.

7 GEOTECHNICAL ENGINEERS

The present Act of Parliament and Regulations do not have a specific requirement for the registration of geotechnical engineers.

The Institution of Engineers Malaysia has taken an initiative to propose a registration of Geotechnical Engineers (IEM 2000) similar to the proposal in Hong Kong (Ref: Massey J. [2000]) to establish Registered Geotechnical Engineers. This initiative by IEM is essentially a follow up on the initial suggestions on ways to prevent the recurrence of the collapse of Block 1 of the Highland Towers (14 levels including 2 levels of carparks) which claimed 48 lives in December, 1993. Subsequently a number of landslides occurred within the same hill in 1999. Fortunately, no life was lost.

The other legislations relevant to the professional practice of Geotechnical Engineers are:-

- 1) ACT 133, Street, Drainage and Building Act 1974 and its Uniform Building By-Laws 1984 (UBBL)
- 2) ACT 514 Occupational Safety and Health Act 1994

In general, this Act 133 prohibits commencement of work either building or earthworks without approval from a local authority. However, local authorities and their officers shall not be liable for design and construction supervision. The responsibility on these rests on professionals particularly engineers for engineering work as stipulated in Section 71 of Act 133 and By-law 258.

8 SUPERVISION OF WORK

The UBBL spells out the necessary by-laws which include among others, the need and responsibility of registered engineer to supervise the construction work. The registered engineer for the work shall certify various stages of completion including setting out, completion of foundations and certificate of fitness for occupation. In all these certifications, the registered engineer has to certify that the work has been carried out according to the design, requirements of the by-laws; construction drawings as well as supervision and take full responsibility of the work.

The responsibility of submitting person (registered engineer) on supervision of work includes supervision for subsurface investigation. The level of supervision is left to the submitting person to decide. It is generally expected that the submitting person would delegate significant part of the supervision to his team that he or she has a direct control with a system to ensure a construction complies to the drawings and specifications.

9 SPECIFICATION AND CODES OF PRACTICE

Specifications of work are left to the registered engineer according to general practice. The codes of practice used in Malaysia generally follow Malaysian Standards. If the Malaysian Standard is not available for a specific work, then British Standards or other the acceptance Standards could be used. Most of the Malaysia Standards for geotechnical works are largely adopted from the British Standards.

10 SCALES OF FEES

One of the functions of the Board (BEM) is to fix the scale of fees to be charged by registered engineers for a professional service. Malaysia is one of the very few countries in the world to have official scale of fees. One of the objectives of the scales is to prevent undercutting among engineering consultants. This would maintain the necessary professional input to ensure public safety. However, it is difficult for BEM to enforce this provision in the Act due to difficulties in getting evidence. General, in private practice, it is a free market with negotiation guided by the scale of fees.

11 ENGINEERS' RESPONSIBILITY & LIABILITY

The responsibility and liability of an engineer are spelt out in the UBBL where it places the liability on the submitting engineer (registered engineer) for failure. In Malaysia, the existing legislations place engineers under the potential threat of liability for an indefinite period and no provision in sight yet to limit that liability.

12 FUTURE TRENDS

12.1 *Registration of Geotechnical Engineer*

The Institution of Engineers, Malaysia intends to recommend BEM to register Geotechnical Engineer to enhance safety. A geotechnical engineer shall be a registered professional engineer with the Board and among others shall have a minimum of three (3) years of experience in geotechnical engineering over the last five (5) years and not less than one (1) year each in the design and construction supervision of geotechnical works.

12.2 *Registration of Accredited Checker*

An accredited checker shall be a registered professional engineer with the Board. Among other requirements, an Accredited Checker shall have a minimum of 10 years experience as a geotechnical engineer and have published at least five (5) technical papers on geotechnical works in local or international conferences, seminar or journals accepted by panel of the Board.

The above registration is aimed for hill-site development only, although some agency such as Public Works Department has already implemented the requirement of Geotechnical Engineer and Accredited Checker for some of her road projects. IEM recommends only Class 2 slopes need to have a registered Geotechnical Engineer for the design and report. For Class 3 slopes, in addition to have a registered Geotechnical Engineer in the consulting team, an Accredited Checker is also needed to check the adequacy of design and safety of a hill-site development.

Class 2 slopes are slopes generally having overall height of more than 6m but smaller than 15m and overall slope angle larger than 27° or localised slope larger than 30° for a localised height more than 3m. Class 3 slopes are slopes generally having overall height taller than 15 metres and overall slope angle larger than 27° or a localised slope larger than 30° for a height of more than 3m. Class 1 slopes are slopes not belonging to either Class 2 or Class 3. For Class 1 slope, the existing practice could be maintained. The details on the classification of slopes are shown in Table 1 and Figure 1.

12.3 *Site Supervision*

As site supervision has been repeatedly identified as one of the major causes of poor quality work and failures. Hence, enhancement of regulations related to site supervision will likely be implemented. Among others, it is likely that construction work could only be carried out after the names and qualifications of the site supervision team are submitted to the local authority before permission to commence work is given.

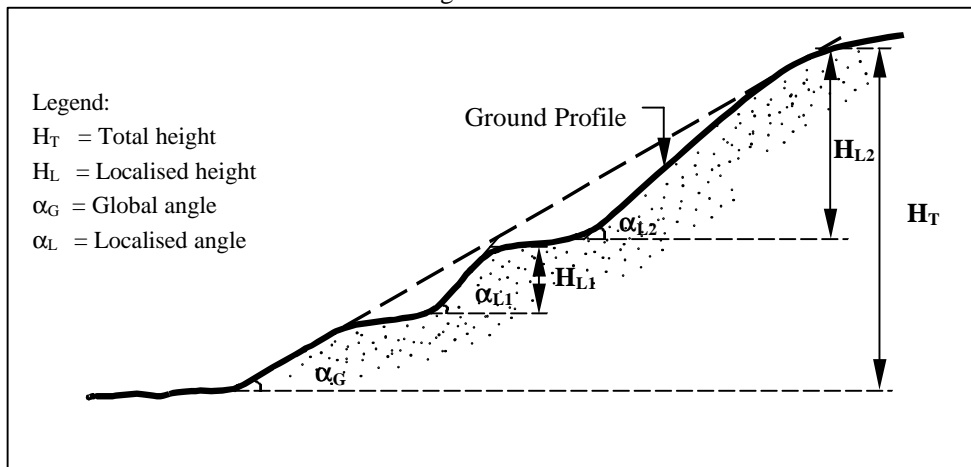
12.4 *Supporting Professional*

The supporting professional for geotechnical work such as engineering geologists, geophysicists and etc. are engaged directly by engineers. Presently, there is no act of parliament to regulate the practice, as these professionals as they do not deal directly with lay public. Nevertheless, steps have been taken by geologists to push for enactment of an act to regulate geologists for mining and engineering services.

Table 1 Classification Of Risk Of Landslide On Hill-Site Development

Class	Total Height (H_T)	Global Angle (α_G)	Localised Height (H_L)	Localised Angle (α_L)
CLASS 1 (Low Risk)	> 15 m	< 19°	< 3 m	< 27°
	6 m – 15 m	< 27°	< 3 m	< 30°
	< 6 m	-	-	< 34°
CLASS 2 (Medium Risk)	> 15 m	19° - 27°	-	-
		-	≥ 3 m	27° – 30°
	6 – 15 m	$\geq 27^\circ$	-	-
		-	≥ 3 m	$\geq 30^\circ$
< 6 m	-	≥ 3 m	$\geq 34^\circ$	
CLASS 3 (High Risk)	> 15 m	> 27°	-	-
		-	≥ 3 m	$\geq 30^\circ$

Figure 1



REFERENCES

- Act 133: Street, Drainage and Building Act, 1974 of Malaysia
- Act 138: Registration of Engineers Act 1967 of Malaysia
- Act 154: Occupational Safety and Health Act 1994 of Malaysia
- Board of Engineers Malaysia (1998) "Background information on Review of Scale of Fees (1982) leading to Scale of Fees (Revised 1988)"
- Uniform Building By-laws 1984 of Malaysia
- IEM (2000) "Policies and Procedures for Mitigating the Risk of Landslide on Hill-site Development" by the Institution of Engineers, Malaysia
- Board of Engineers Malaysia (2001) "Draft Guidelines for Accreditation of Engineering Programme"
- Board of Engineers Malaysia (1995) "Route to Professional Engineer"