



EXCERPTS OF GRADUATE TRAINING MANUAL FOR ENGINEERING GEOLOGISTS

MANUAL FOR THE INSTITUTE OF MATERIALS, MINERALS AND MINING

Introduction

Gammon Skanska Limited has established a training scheme for the training of Earth Science and Engineering Geology Graduates in accordance with the requirements of the Institute of Materials, Minerals and Mining (IMMM).

This document provides an excerpt of the Training Manual (Revision 3a, March 2003), with emphasis on the training objectives.

Abbreviations

EGG	-	Engineering Geology Graduates
EGGTS	-	Engineering Geology Graduates Training Scheme
ES	-	Engineering Supervisor
GSL	-	Gammon Skanska Limited
IMM	-	Institution of Mining and Metallurgy
TT	-	Training Tutor

Training Objectives Sheets

The schedule of Training Objectives in Appendix A has been adopted for use in the EGGTS. The objectives shown on the Training Objective Sheets have one of the following four achievement criteria (terminology consistent with that used in IMM documents):

- (a) P - Appreciation
- (b) K - Knowledge
- (c) E - Experience
- (d) A - Ability

APPENDIX A
TRAINING OBJECTIVES SHEETS

1. COMMON CORE OBJECTIVES	Code	ES initials and Date of Assessment			
		A	E	K	P
1.1 PROFESSIONAL INSTITUTION ACTIVITIES					
<p>(a) Know the history, role and organisation of :</p> <p>(i) Institute of Materials, Minerals and Mining (IMMM)</p> <p>(ii) Geological Society of London (GS).</p> <p>Refer to current publications of professional institutions given in Section 5.0.</p>	K				
<p>(b) Develop and maintain a general interest in professional institution affairs.</p> <p>(i) Participate in at least six meetings of IMMM or GS, or other professional institutions within the construction industry.</p> <p>(ii) Be involved in professional institution affairs.</p> <p>(iii) Where possible, attend AGMs of IMMM or GS and write a report of about 500 words for each meeting to the satisfaction of the ES and TT.</p>	E				
1.2 PROFESSIONALISM					
<p>(a) Understand the responsibilities of the engineer / geologist in society.</p>	K				
<p>(b) Rules of Conduct related to</p> <p>(i) IMMM</p> <p>(ii) GS</p> <p>(iii) Employers/clients</p> <p>(iv) General public</p> <p>(v) Colleagues</p>	K				

1. COMMON CORE OBJECTIVES	Code	ES initials and Date of Assessment			
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<p>(c) Inherent responsibilities for a professional geologist / engineer in relation to :</p> <p>(i) Ethics (ii) Codes of behaviour (iii) Expertise</p>	K				
<p>(d) Current Professional Affairs Keeping up-to-date with current technical developments. Achieved either by:-</p> <p>(i) Reading 'Hong Kong Engineer', 'Ground Engineering' and other relevant publications. (ii) Making use of Information Technology. (iii) Participating in Seminars, Conferences or Talks.</p>	P				
<p>1.3 GENERAL PERSONAL DEVELOPMENT</p>	P				
<p>(a) Keeping updated on local, regional and international current affairs in. Achieved either by:</p> <p>(i) Reading of periodicals, journals and newspapers. (ii) Making use of Information Technology. (iii) Participating in Seminars, Conferences or Talks.</p>					
<p>(b) Involvement with relevant local organisations or community services.</p>					
<p>1.4 DEVELOPMENT OF PERSONAL QUALITIES</p> <p>- Innovative Abilities - Interpersonal Skills - Negotiation Skills - Time Management Skills</p>	P				

1. COMMON CORE OBJECTIVES	Code	ES initials and Date of Assessment			
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1.5 OCCUPATIONAL SAFETY & HEALTH					
(a) Relevant Legislation	K				
(b) Responsibilities of Professional Engineers to:- (i) Employers (ii) Employees (iii) General Public	K				
(c) Safety Management Systems	A				
1.6 ENVIRONMENT					
(a) Relevant Legislation	K				
(b) Inter-relationship of technology with the environment in :- (i) The work place (ii) Society generally	A K				
1.7 COMMUNICATION					
Ability to communicate (English, and preferably also in Chinese) confidently and accurately:	A				
(a) Orally (i) Informally occasions (ii) Presentations (iii) Meetings					
(b) Written (i) Memos (ii) Letters (iii) Instructions (iv) Reports (v) Resumes					

1. COMMON CORE OBJECTIVES	Code	ES initials and Date of Assessment			
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1.8 HUMAN RESOURCES MANAGEMENT	K				
(a) Employment Criteria					
(b) Labour Deployment					
(c) Staff Training					
1.9 LEADERSHIP & MANAGEMENT	K				
(a) Qualities required of a leader					
(b) Responsibilities of a leader					
(c) Good management skills					
(d) Relationship between good leadership and good management skills					
1.10 OWN ORGANISATION	K				
(a) Size, History, Subsidiaries					
(b) Relationships with Government Department and other organisations					
(c) Organisation Structures and Functions					
(d) Office Manuals, Procedures and Practices					
(e) Communication Systems					
(f) Training Career Developments					
1.11 BUSINESS OPERATIONS	P				
(a) Intellectual Property Rights					
(b) Productivity					
(c) Quality Assurance System					
(d) Information Technology					
(e) Research and Development					
(f) Finance					

2. CORE OBJECTIVES	Code	TT initials and Date of Assessment			
		A	E	K	P
2.1 INVESTIGATION AND DESIGN					
(a) Site Investigation					
(i) Be able to collect and collate information, and to conduct desk studies and API.	A				
(ii) Be able to conduct and record results of field inspections and mapping.	A				
(iii) Be able to plan a ground investigation.	A				
(b) Material Testing					
(i) Understand laboratory practice and techniques for selecting, preparing and testing soil, rock and construction materials specimens.	K				
(ii) Be able to specify laboratory test requirements and interpret test data in deriving design parameters.	A				
(c) Ground Modelling					
(i) Be able to identify, describe and classify soil and rock materials and mass characteristics.	A				
(ii) Be able to formulate geological/geotechnical models from desk study and field data.	A				
(d) Be able to identify engineering problems and technical and financial evaluation of alternative solutions.	A				
(e) Be able to produce sketches and working drawings and correlate them with technical specifications.	A				
(f) Be familiar with computer techniques applicable to engineering geology, geotechnical analysis and design which are in regular use in the office.	E				
(g) Be able to assess effects of engineering works on adjacent land and properties including the surface and ground water regime, and vice versa.	A				

2. CORE OBJECTIVES	Code	ES Initials & Date of Assessment			
		A	E	K	P
<p>(h) Be competent in the assessment of an geotechnical design of works associated with at least two, and preferably more, of the following :-</p> <ul style="list-style-type: none"> (i) slope/retaining wall stability (ii) rockfall/natural terrain hazards (iii) foundations (using non-prescriptive approach) (iv) deep excavations (v) tunnels/underground caverns (vi) dredging and reclamation (vii) ground improvement (viii) sub-surface drainage measures (ix) natural resources exploitation (such as quarrying) 	A				
<p>2.2 CONSTRUCTION AND SITE SUPERVISION</p>					
<p>(a) Have experience in planning and programming works on site to meet changing conditions.</p>	E				
<p>(b) Have experience in keeping site records.</p>	E				
<p>(c) Be familiar with supervising ground investigation work, field tests and installation of field instruments.</p>	E				
<p>(d) Be familiar with geotechnical monitoring methods and procedures.</p>	E				
<p>(e) Understand the use of surveying and setting out techniques in construction.</p>	K				
<p>(f) Be familiar with plant and equipment commonly used in the execution of geotechnical works.</p>	E				
<p>(g) Be able to supervise the execution of at least two, and preferably more, of the following geotechnical works:-</p> <ul style="list-style-type: none"> (i) slope/retaining wall construction (ii) rockfall/natural terrain hazards control (iii) foundations (iv) deep excavations (v) tunnels/underground caverns construction (vi) site formation/reclamation (vii) ground improvement (viii) sub-surface drainage measures (ix) natural resources exploitation (such as quarrying) 	A				

2. CORE OBJECTIVES	Code	ES initials and Date of Assessment			
		A	E	K	P
2.3 FINANCIAL					
(a) Understand the economic aspects of project appraisal including cost benefits, discounting and financial risks.	K				
(b) Understand the processes and elements of project cost control.	K				
(c) Be familiar with the preparation of cost estimates.	E				
(d) Be familiar with the measurement and payment certification procedures.	E				
(e) Understand the procedures for and assessment of cost variations.	K				
(f) Understand the use of cost and price fluctuation clause in a contract.	K				
2.4 CONTRACTUAL					
(a) Understand the relative merits of implementing construction works by using various forms of contracts.	K				
(b) Be familiar with preparation of technical specifications.	E				
(c) Be familiar with the preparation of tender/contract documents.	E				
(d) Be familiar with taking off quantities and preparing Bills of Quantities in accordance with a Standard Method of Measurement.	E				
(e) Understand the contractual relationship and relative roles and responsibilities between the Client/Employer, Engineer and Contractor in project implementation.	K				

2. CORE OBJECTIVES	Code	ES initials and Date of Assessment			
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(f) Understand the role of the Engineer and his Representative and their responsibilities under the Contract, to the Client/Employer and to the public.	K				
(g) Understand the circumstances and risks which may affect contract costs and construction period.	K				
(h) Know the procedures in dealing with contract risks and claims.	K				

3. SPECIFIC OBJECTIVES	Code	ES initials and Date of Assessment			
		A	E	K	P
3.1 ENGINEERING GEOLOGY					
(a) Understand the principles and know how to interpret engineering geology maps.	K				
(b) Understand the material and mass behaviour and the engineering properties of common rock and soil types in Hong Kong.	K				
(c) Be capable of assessing and improving the stability of a rock slope, including discontinuity data collection, kinematic analysis and design of improvement or remedial works.	E				
(d) Have experience in the classification and assessment of rock masses for foundation design.	E				
(e) Have a working knowledge of petrology, petrography and sedimentology.	K				
3.2 HYDROGEOLOGY					
(a) Understand and have some familiarity with the occurrence of groundwater, hydraulic boundary conditions, flow systems and hydrogeological parameters.	K				
(b) Understand the theory and principles of groundwater hydraulics and be able to assess the effect of groundwater on slope stability, including its representation in computer software based on limit equilibrium analytical techniques.	K				
(c) Understand how groundwater flow systems can be analysed by use of flownets and mathematical modelling.	K				
3.3 GROUND INVESTIGATION AND LABORATORY TESTING					
(a) Understand the capabilities of different ground investigation techniques and equipment.	A				

3. SPECIFIC OBJECTIVES	Code	ES initials and Date of Assessment			
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<p>(b) Be capable of carrying out technical supervision of ground investigation including land and marine-based drilling and boring, land and marine-based geophysics, trial pitting, slope stripping, sampling, insitu testing and piezometer installation.</p>	A				
<p>(c) Gain practical experience in installing, reading and reporting on data from instrumentation in relation to:</p> <p>(i) Piezometers (ii) Settlement Gauges (iii) Inclinometers (iii) Strain Gauges and Extensometers (iv) Tell-tales</p>	A				
<p>(d) Have experience in insitu test methods such as:</p> <p>(i) Permeability Tests (ii) Plate Bearing Tests (iii) Standard Penetration Tests (iv) Density Tests (v) Shear Vane Tests (vi) Rock Strength Tests</p>	A				
<p>(e) Have experience in laboratory test methods such as:</p> <p>(i) Particle Size Distribution Tests (ii) Moisture Content Tests (iii) Specific Gravity Tests (iv) Atterberg Limits Tests (v) Triaxial Compression Tests</p>	A				
<p>3.4 CONSTRUCTION SITE EXPERIENCE</p>					
<p>(a) Be capable of supervising the construction of temporary and permanent geotechnical works such as :</p> <p>(i) site formation, including slopes (cut and fill), and retaining walls, (ii) foundations and deep excavations, (iii) tunnels and rock caverns, and (iv) site drainage.</p>	A				

3. SPECIFIC OBJECTIVES	Code	ES initials and Date of Assessment			
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(b) Understand the principles of concrete production and quality control of the end product and constituent materials.	A				