### 1. Introduction

#### 1.1 Information about the Company

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location 1</td>
<td><strong>Own Organisation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.1</td>
<td>a) Discuss the size, history and internal culture of the trainee’s own organisation.</td>
<td>CCO</td>
<td>1.10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>b) Discuss an overview of the relationship between the trainee’s own organisation, government departments and other organisations.</td>
<td>CCO</td>
<td>1.10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>c) Discuss the structure and functions of different units within the trainee’s own organisation.</td>
<td>CCO</td>
<td>1.10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>d) Demonstrate the awareness to follow operational procedures and practices as required by the trainee’s own organisation.</td>
<td>CCO</td>
<td>1.10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>e) Discuss the objectives, requirements and processes that support the quality assurance system within the trainee’s own organisation.</td>
<td>CCO</td>
<td>1.10</td>
<td>11</td>
</tr>
</tbody>
</table>

#### 1.1.2 Training Programme, Prospects and Career Development

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location 1</td>
<td>a) Discuss an overview of the internal communication systems, training system and career development pathway within the trainee’s own organisation.</td>
<td>CCO</td>
<td>1.10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>b) Demonstrate a commitment to extend and develop up-to-date technical knowledge through reading relevant engineering publications, participating in seminars or conferences, and information searching.</td>
<td>CCO 1.2</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Location where Training will be done</td>
<td>Training Outcomes</td>
<td>Previous Reference</td>
<td>HKIE Competence Ref.</td>
<td>Length of Time (weeks)</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------</td>
<td>--------------------</td>
<td>----------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>c) Demonstrate a commitment to extend and develop up-to-date knowledge of local, regional and international current affairs through reading relevant engineering publications, participating in seminars or conferences, and information searching.</td>
<td></td>
<td>CCO 1.3</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>d) Demonstrate a commitment to participate in the local organisations or community services for general personal development.</td>
<td></td>
<td>CCO 1.3</td>
<td>11</td>
</tr>
<tr>
<td>Location 2</td>
<td>1.2 Information about the HKIE</td>
<td>Description 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Discuss an overview of the HKIE organisation as well as its history and role in society.</td>
<td></td>
<td>CCO 1.1</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>b) Demonstrate a commitment to participate in relevant activities organised by the HKIE.</td>
<td></td>
<td>CCO 1.1</td>
<td>11</td>
</tr>
<tr>
<td>2. Engineer as a Profession</td>
<td>Continous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location 3</td>
<td>2.1 Professionalism</td>
<td>Description 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Discuss the social and ethical responsibilities of engineers in society.</td>
<td></td>
<td>CCO 1.2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>b) Explain the rules and standard requirements of conducting engineering activities to the HKIE, employers, clients, general public and colleagues in accordance with the HKIE Rules of Conduct.</td>
<td></td>
<td>CCO 1.2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>c) Explain the ethical standards and responsibilities of professional engineers as required by the HKIE.</td>
<td></td>
<td>CCO 1.2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>d) Demonstrate the awareness to follow the codes of practice of professional engineers.</td>
<td></td>
<td>CCO 1.2</td>
<td>8</td>
</tr>
</tbody>
</table>
THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
ENVIRONMENTAL ENGINEERING

<table>
<thead>
<tr>
<th>Location 4</th>
<th>Description 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Demonstrate an understanding of the statutory health and safety requirements.</td>
</tr>
<tr>
<td>b)</td>
<td>Demonstrate an understanding of the responsibilities of professional engineers for the health and safety of the employers, employees and general public when engaging in engineering activities.</td>
</tr>
<tr>
<td>c)</td>
<td>Apply the safety management system in accordance with the industry standards and regulatory requirements.</td>
</tr>
<tr>
<td>d)</td>
<td>Examine the principles of quality assurance; and environment, health and safety standard.</td>
</tr>
<tr>
<td>e)</td>
<td>Apply the environment, health &amp; safety standard in the execution of tasks according to the policy of the trainee’s own organisation.</td>
</tr>
<tr>
<td>f)</td>
<td>Apply the quality assurance system according to the policy of the trainee’s own organisation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location 5</th>
<th>Description 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Demonstrate an understanding of the relevant statutory environmental requirements related to the trainee’s discipline.</td>
</tr>
</tbody>
</table>
### Location where Training will be done

<table>
<thead>
<tr>
<th>Training Outcomes</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Evaluate the inter-relationship of technology with the environment in the work place.</td>
<td>CCO 1.6</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>c) Demonstrate the awareness of the impact of technology on the environment in society.</td>
<td>CCO 1.6</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>d) Apply the environmental protection legislation in Hong Kong including relevant Technical Memoranda.</td>
<td>CO 2.1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>e) Apply the relevant environmental engineering guidelines and best practice notes.</td>
<td>CO 2.1</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

#### 2.4 Fundamentals of environmental protection

#### Location 6

#### Description 6

| a) Recognise the history and development of the global and local environmental issues and movements. | CO 1.1 | | 9 |
| b) Appreciate the concept of sustainable development and how it may affect engineering decisions. | CO 1.1 | | 9 |
| c) Recognise major international conventions, treaties, protocols or practices for the protection or improvement of the global and local environment. | CO 1.1 | | 1 |
| d) Demonstrate a commitment to maintain the role of engineering and technology in environmental protection. | CO 1.1 | | 11 |


#### Location 7

#### Description 7

| a) Comply with Codes of Practice of environmental engineering. | CO 3.1 | | 2 |
| b) Apply computer / mathematical modelling with clear awareness of assumptions and limitations. | CO 3.1 | | 3 |

#### 3.1 Professional practices

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>71</td>
</tr>
</tbody>
</table>

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### 3.2 Design or Design related Investigations / Modelling

<table>
<thead>
<tr>
<th>Description 8</th>
<th>Training Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Apply Briefs appropriately in design investigations or modelling.</td>
</tr>
<tr>
<td>b)</td>
<td>Collect and analyse data for design investigations or modelling.</td>
</tr>
<tr>
<td>c)</td>
<td>Develop evaluation criteria for design investigations or modelling.</td>
</tr>
<tr>
<td>d)</td>
<td>Carry out a design.</td>
</tr>
<tr>
<td>e)</td>
<td>Compare design alternatives with respect to short and long term engineering implications, and social, economic and environmental aspects.</td>
</tr>
<tr>
<td>f)</td>
<td>Select appropriate solution(s).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 3.2</td>
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<tr>
<td>CO 3.2</td>
<td>3</td>
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</tr>
<tr>
<td>CO 3.2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CO 3.2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CO 3.2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CO 3.2</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

### 3.3 Environmental Impact Assessment (EIA)

<table>
<thead>
<tr>
<th>Description 9</th>
<th>Training Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Appraise the stage of EIA process.</td>
</tr>
<tr>
<td>b)</td>
<td>Conduct EIA and/or environmental assessment.</td>
</tr>
<tr>
<td>c)</td>
<td>Develop mitigation measures.</td>
</tr>
<tr>
<td>d)</td>
<td>Carry out Environmental Monitoring and Audit.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 3.3</td>
<td>2</td>
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<tr>
<td>CO 3.3</td>
<td>9</td>
<td></td>
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<td>CO 3.3</td>
<td>4</td>
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</tr>
<tr>
<td>CO 3.3</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

### 3.4 Pollution Prevention and Control

<table>
<thead>
<tr>
<th>Description 10</th>
<th>Training Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Evaluate options to prevent or control pollution at source.</td>
</tr>
<tr>
<td>b)</td>
<td>Evaluate options to prevent or control cross or secondary pollution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 3.4</td>
<td>5</td>
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</tr>
<tr>
<td>CO 3.4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### 3.5 Environmental Management

<table>
<thead>
<tr>
<th>Description 11</th>
<th>Training Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Set up or implement Environmental Management Systems.</td>
</tr>
<tr>
<td>b)</td>
<td>Use renewable resources appropriately.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CO</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>New CO</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Location where Training will be done</td>
<td>Training Outcomes</td>
<td>Previous Reference</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td>c) Carry out carbon and energy audit with consideration of life cycle aspects.</td>
<td>New CO</td>
</tr>
<tr>
<td></td>
<td>d) Carry out sustainability analysis.</td>
<td>New CO</td>
</tr>
<tr>
<td>4. Engineering Administration and Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Communication of Project Requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location 12</td>
<td>Description 12</td>
<td></td>
</tr>
<tr>
<td>a) Develop or appraise project requirements through specifications, conditions of contract and drawings.</td>
<td></td>
<td>CO 4.1</td>
</tr>
<tr>
<td>4.2 Procurement Procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location 13</td>
<td>Description 13</td>
<td></td>
</tr>
<tr>
<td>a) Evaluate different forms of contracts such as: Design-and-Build, Design-Build-Operate, Build-Operate-Transfer and Build-Operate-Own.</td>
<td></td>
<td>CO 4.2</td>
</tr>
<tr>
<td>b) Carry out procurement procedures including tender preparation, evaluation and contract award.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3 Estimating Project Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location 14</td>
<td>Description 14</td>
<td></td>
</tr>
<tr>
<td>a) Assess capital costs.</td>
<td></td>
<td>CO 4.3</td>
</tr>
<tr>
<td>b) Assess operational and maintenance costs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Assess life cycle cost.</td>
<td></td>
<td>CO 4.3</td>
</tr>
<tr>
<td>4.4 Project Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location 15</td>
<td>Description 15</td>
<td></td>
</tr>
<tr>
<td>a) Formulate work plan and budget.</td>
<td></td>
<td>CO 4.4</td>
</tr>
<tr>
<td>b) Carry out contract administration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Environmental Engineering Field Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 Environmental Field Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location 16</td>
<td>Description 16</td>
<td></td>
</tr>
<tr>
<td>a) Carry out or examine mitigation measures of environmental impacts.</td>
<td></td>
<td>CO 5.1</td>
</tr>
<tr>
<td>b) Comply with contract documents, drawings and manuals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Produce site records.</td>
<td></td>
<td>CO 5.1</td>
</tr>
<tr>
<td>d) Propose a solution for trouble shooting.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 5.2 Environmental Survey and Monitoring

**Location 17**

<table>
<thead>
<tr>
<th>Description 17</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Develop a survey and monitoring plan.</td>
<td>CO 5.2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>b) Formulate a quality control plan.</td>
<td>CO 5.2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>c) Carry out environmental sampling.</td>
<td>CO 5.2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>d) Assess the sampling results.</td>
<td>CO 5.2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>e) Develop a system for data storage and retrieval.</td>
<td>CO 5.2</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### 6. Consolidation Stage

This section covers any activities related to environmental engineering. It should aim to develop skills and knowledge relating to personal qualities, communication, human resources management and business operational sense in addition to the technical, commercial and engineering knowledge acquired by the trainees during earlier parts of their training. Latest developments in the discipline should be included. All Training Outcomes, if not yet achieved in earlier parts of training, should be completed here.

### 7. Other Common Core Outcomes for Continuous Development

#### Location 18

<table>
<thead>
<tr>
<th>Description 18</th>
<th>Previous Reference</th>
<th>Continuous</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Discuss the various leadership qualities required of a leader including accountability, conflict management and resources management etc.</td>
<td>CCO 1.9</td>
<td>6</td>
</tr>
<tr>
<td>b) Explain the importance of accountability and responsibility required by a leader for making decisions on engineering activities.</td>
<td>CCO 1.9</td>
<td>6</td>
</tr>
<tr>
<td>c) Apply various management skills in engineering projects.</td>
<td>CCO 1.9</td>
<td>6</td>
</tr>
<tr>
<td>d) Distinguish the relationship between good leadership and good management skills.</td>
<td>CCO 1.9</td>
<td>6</td>
</tr>
<tr>
<td>e) Demonstrate an understanding of the importance of teamwork and partnering skills in engineering projects.</td>
<td>CCO 1.9</td>
<td>6</td>
</tr>
</tbody>
</table>
# Development of Personal Qualities

**Location 19**

**Description 19**

<table>
<thead>
<tr>
<th>Training Outcomes</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Identify appropriate innovative approach and/or tools for professional development.</td>
<td>CCO 1.4</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>b) Demonstrate interpersonal skills for professional development.</td>
<td>CCO 1.4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>c) Demonstrate negotiating skills required for various engineering activities.</td>
<td>CCO 1.4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>d) Demonstrate sound time management skills for professional development.</td>
<td>CCO 1.4</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>e) Demonstrate a commitment to continuous development and enhancement.</td>
<td>CCO 1.4</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

## Communication

**Location 20**

**Description 20**

<table>
<thead>
<tr>
<th>Training Outcomes</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Communicate ideas orally in an accurate and clear manner under various situations (including presentations and meetings).</td>
<td>CCO 1.7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>b) Formulate an oral presentation of complicated data and information in an effective and persuasive manner.</td>
<td>CCO 1.7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>c) Produce grammatically correct, clear and concise documents (including memos, letters, instructions, reports, resumes and technical papers) which meet the business objectives.</td>
<td>CCO 1.7</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>d) Evaluate the needs of the intended readers to design appropriate technical contents for communication.</td>
<td>CCO 1.7</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

## Human Resources Management

**Location 21**

**Description 21**

<table>
<thead>
<tr>
<th>Training Outcomes</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Demonstrate the awareness of the duties and employment criteria for different job positions in an engineering project.</td>
<td>CCO 1.8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>b) Demonstrate an understanding of the relevant legal requirements and regulatory issues of labour employment and management.</td>
<td>CCO 1.8</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
### Location where Training will be done

<table>
<thead>
<tr>
<th>Training Outcomes</th>
<th>Previous Reference</th>
<th>HKIE Competence Ref.</th>
<th>Length of Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>c) Discuss the appropriate staff training and development programmes in the organisation.</td>
<td>CCO 1.8</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

#### 7.5 Business Operations

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td></td>
</tr>
<tr>
<td>a) Recognise the importance of intellectual property to business operations.</td>
<td>CCO 1.11</td>
</tr>
<tr>
<td>b) Describe the legal requirements in Hong Kong relevant to intellectual property rights.</td>
<td>CCO 1.11</td>
</tr>
<tr>
<td>c) Identify appropriate tools and method to measure and improve the productivity of business operations.</td>
<td>CCO 1.11</td>
</tr>
<tr>
<td>d) Identify appropriate information technology applications to manage business information and to facilitate business operations.</td>
<td>CCO 1.11</td>
</tr>
<tr>
<td>e) Recognise the importance of research and development towards business operations.</td>
<td>CCO 1.11</td>
</tr>
<tr>
<td>f) Demonstrate the awareness of financial considerations in operating business.</td>
<td>CCO 1.11</td>
</tr>
<tr>
<td>g) Recognise the importance of business development in business operations.</td>
<td>CCO 1.11</td>
</tr>
</tbody>
</table>

**N.B.**

1. The training period must not be less than 156 weeks (36 months).
2. The programme set out is for guidance only but substantial departure should not be made. Employers should endeavour to provide training to their trainees in as many areas as possible as is appropriate to the sector of employment.
3. This guide should be read in conjunction with Section 3 of the M3 Routes to Membership.
4. During the training, each trainee is required to maintain a Graduate Training Log Book, Record of Continuing Professional Development and Record of Training Outcomes.
Additional Notes for Scheme “A” trainees in Environmental Discipline:
Trainees should aim to develop basic understanding and general knowledge in major issues related to protection of the environment including:
(a) History and development of the global and local environmental protection movements, green groups and relevant stakeholders.
(b) Current status of global and local environmental quality.
(c) The social context of environmental protection, and how it may affect engineering decisions such as site selection and technological solutions.
(d) The concept of Environmental Costs and Life Cycle Analysis.
(e) The role of engineering and technology in the protection and enhancement of the natural and urban environmental quality.
Moreover, trainees should be familiar with the contents and the application of:
(a) Major international conventions, treaties, protocols or practices for the protection or improvement of the global environment
(b) Environmental protection ordinances in Hong Kong, including supporting Technical Memoranda and relevant guidelines and best practices.
(c) Hong Kong Planning Standards and Guidelines.