

## Chartered Professional Guideline 3: Areas of Practice

### 1. Areas of Practice: Geotechnical (Mining)

A Geotechnical (Mining) professional investigates plans, designs and monitors the process of creating fit-for-purpose mining excavations associated with the surface or underground excavation of an in-situ rock mass, or matters directly associated therewith, including the construction or excavation of in-pit or underground infrastructure, the construction of waste dumps and stockpiles, or tailings dams, and the placement of backfill.

This discipline does not include geotechnical investigation and design for the construction of civil infrastructure on a mine site, specifically including access roads and rail lines, foundations for the construction of buildings and processing facilities. The discipline also does not cover civil tunneling or civil underground storage.

#### Areas of Practice

1. The following areas of practice are offered as examples of experience that is required for registration as a Chartered Professional (Geotechnical - Mining). Professional experience need not be limited to those listed and applications will be considered for appropriate areas of practice in addition to those listed below.
2. Site characterisation:
  - 2.1. follow industry standard mapping requirements and enhance proficiency in geotechnical mapping skills with the ability to identify and focus on important aspects of the geotechnical features of the site and the excavations/structures to be developed;
  - 2.2. ability to finalise sectional interpretations for geotechnical domain definition and structural models for mine designs and tailings dam foundations;
  - 2.3. ability to integrate geotechnical data into a field work component (e.g. sections, plans, etc);
  - 2.4. plan and supervise data acquisition programs, interpret and analyse the data and report appropriately;
  - 2.5. demonstrated ability to recognise and interpret the significance of lithological units, alteration and structural in the field;
  - 2.6. ability to review, identify and design drill hole programs;
  - 2.7. ability to manage daily drilling activities and daily supervision of contractors;
  - 2.8. compile databases and reports on rock mass parameters;
  - 2.9. ability to plan, implement and manage field projects;
  - 2.10. ability to recommend or undertake appropriate rock property testing and sample selection.
3. Geotechnical analysis and design
  - 3.1. develop a model of the major geologic structures and geotechnical features of the mine or tailings dam site;
  - 3.2. determine the geotechnical properties and domains within the mine / tailings storage facility site;
  - 3.3. assess rock mass quality within geotechnical domains;
  - 3.4. demonstrate familiarity with empirical, analytical and numerical design methods;
  - 3.5. carry out numerical modelling of stress and displacement and recommend actions resulting from this investigation;
  - 3.6. understand limitations of analytical and numerical modelling tools;
  - 3.7. design instrumentation programs and interpret data from instrumentation (e.g. ground movements from displacement monitoring equipment, stress/strain change, micro-seismicity, pore pressure, etc.);

### **Chartered Professional Guideline 3: Areas of Practice**

- 3.8. prepare and maintain key regulatory documentation (ground control management plan, open pit management plan, voids management plan, etc.);
- 3.9. demonstrate an understanding of the water balance model for a tailings storage facility and design of water management infrastructure;
- 3.10. design and implement ground support standards, or site-specific ground control installations;
- 3.11. review, update, and optimise geotechnical design guidelines for mine planning requirements.

#### **4. Monitoring:**

- 4.1. ensure rock mass parameters and ground movements are captured in the mine database and in a timely manner;
- 4.2. ensure information from rock mass assessments and ground movement monitoring is interpreted in a timely manner;
- 4.3. analyse and report trends in monitoring data;
- 4.4. analyse and report data from ground support quality testing programs (e.g. grout, groundwater, shotcrete, etc);
- 4.5. analyse and report on testing of mine fill;
- 4.6. design and specify instrumentation programs for monitoring;
- 4.7. supervise installation and maintenance of monitoring equipment;
- 4.8. implement instrument reading and data collation programs;
- 4.9. monitor ground performance and make recommendations accordingly;
- 4.10. ensure systems are in place to determine the effect stress changes are having and will have on the mine environment;
- 4.11. ensure systems are in place to monitor and assess mine seismicity in a timely manner;
- 4.12. ensure collection and analysis of groundwater from mine environment (grout and fill samples) for testing;
- 4.13. monitor ground vibrations resulting from development and stope blasting.

#### **5. Mining systems:**

- 5.1. sound practical understanding of common mining methods, mining equipment capability and their interaction with the mine environment;
- 5.2. provide appropriate information to mine management on the effect current mining practices are having on localised and mine-site wide ground stability issues in a timely manner;
- 5.3. communicate with and train the workforce on geotechnical hazard awareness.

#### **6. Tailings Facilities Design and Management**

- 6.1. Investigation, planning, design, operation and monitoring of the performance of structures for the storage of tailings, or associated matters;
  - 6.1.1 planning of tailings management processes, investigation of foundations for tailings facilities and associated infrastructure, design of embankments, managing quality assurance and control of construction, design and implementation of tailings discharge processes;
  - 6.1.2 confirming achievement of required conditions, periodic raising of storages and safe closure of facilities on completion of filling;

### **Chartered Professional Guideline 3: Areas of Practice**

- 6.2. Knowledge of relevant Legislation, Guidelines and Standards;
  - 6.2.1 demonstrate a knowledge and understanding of relevant legislation leading industry practice in accordance with national and international guidelines and standards related to tailings facility design, construction, management and subsequent closure.
- 6.3. Tailings Management Process Selection:
  - 6.3.1 ability to identify and evaluate potential tailings management process options;
  - 6.3.2 ability to select the most appropriate tailings management process through an industry standard multi-criteria assessment process and risk assessment;
  - 6.3.3 ability to select an appropriate site for tailings disposal using the process determined;
  - 6.3.4 be able to competently determine the Consequence Category of the tailings storage at the chosen site, using industry guidelines;
  - 6.3.5 understand the requirements of the tailings storage at the chosen site through the lifetime of the storage including the initial development, operations, progressive raising, eventual closure and the potential long-term post-closure performance.
- 6.4. Tailings Storage Site Characterisation:
  - 6.4.1 follow industry standard mapping requirements, and enhance proficiency in geotechnical mapping skills with the ability to identify and focus on important aspects of the geotechnical features of the site and the structures to be developed;
  - 6.4.2 ability to finalise sectional interpretations for geotechnical domain definition and structural models of foundations;
  - 6.4.3 ability to integrate geotechnical data into a field work component (e.g. sections, plans, etc.);
  - 6.4.4 plan and supervise data acquisition programs, interpret and analyse the data and report appropriately;
  - 6.4.5 demonstrated ability to recognise and interpret the significance of lithological units, alteration and structure in the field;
  - 6.4.6 ability to review, identify and design drill hole programs;
  - 6.4.7 ability to manage daily drilling activities and daily supervision of contractors;
  - 6.4.8 compile databases and reports on rock mass parameters;
  - 6.4.9 ability to plan, implement and manage field projects;
  - 6.4.10 ability to recommend or undertake appropriate foundation and construction property testing and sample selection.
- 6.5. Tailings Dam Geotechnical Analysis and Design
  - 6.5.1 develop models of the major geologic structures and geotechnical features of the foundations;
  - 6.5.2 develop structural concepts for dam embankments including zoning and internal features such as filters, drainage, foundation treatment including interaction with tailings if appropriate;
  - 6.5.3 determine the geotechnical properties of the components of the design;
  - 6.5.4 demonstrate familiarity with empirical, analytical and numerical design methods for embankment dams;

**Chartered Professional Guideline 3:  
Areas of Practice**

- 6.5.5 carry out numerical modelling of stress and displacement and recommend actions resulting from investigation;
  - 6.5.6 understand limitations of analytical and numerical modelling tools;
  - 6.5.7 design instrumentation for the tailing's storage including ground movement, internal pore pressure and seepage flow;
  - 6.5.8 demonstrate an understanding of the water balance model for a tailings storage facility and design water management infrastructure;
  - 6.5.9 prepare and maintain key regulatory documentation; review, update, and optimise geotechnical design guidelines for mine planning requirements.
- 6.6. Operation, Maintenance and Surveillance:
- 6.6.1 establish and manage tailings discharge operations documentation including an Operation, Maintenance and Surveillance (OMS) Manual and Dam Safety Emergency Response Plan;
  - 6.6.2 prepare tailings and water management plans for long, medium and short-term use by operators;
  - 6.6.3 prepare and manage surveillance inspections to industry standards;
  - 6.6.4 analyse and report trends in monitoring data;
  - 6.6.5 design and specify instrumentation programs;
  - 6.6.6 supervise installation and maintenance of monitoring equipment;
  - 6.6.7 be cognizant of operational processes supporting closure designs and post-closure sustainable land use.
7. Safety, health and risk. Implementation of workplace health and safety systems that provide for:
- 7.1 hazard identification;
  - 7.2 risk assessment;
  - 7.3 implementation of controls;
  - 7.4 effective monitoring;
  - 7.5 comprehensive review.