
Preface

What's it all about?

The structure of this book is to provide a sequence of theory, workshops and field practical sessions that mimic a simple survey project, designed for civil and mine engineers. The format of the book is based on a number of years of experience gained in presenting the course at undergraduate and postgraduate levels. The course is designed to guide engineers through surveying tasks that the engineering industry feels is necessary for students to have in order to demonstrate competency in surveying techniques such as; data gathering and reduction, and report presentation. The course is not designed to make engineers become surveyors, rather, it is designed to allow an appreciation of the civil and mine engineering surveyor's job. There are many excellent textbooks available on the subject of civil engineering surveying, but they address the surveyor, not the engineer. Hopefully this book will distil many parts of the standard text book. A lot of the material presented is scattered through very disparate sources and has been gathered into this book to show what techniques lie behind a surveyor's repertoire of observational and computational skills, and provide an understanding of the decisions made in terms of the presentation of results. The course has been designed to run over about 6 weeks of a semester, providing a half unit load which complements a computer-aided design (CAD) based design project. The following is an example of a generic course structure.

The Civil Engineer. A role in ambitious construction projects

http://courses.curtin.edu.au/course_overview/undergraduate/civil-engineering

Civil engineers design and construct infrastructure such as:

- bridges
- roads
- harbours
- highways
- dams
- buildings.

As a built environment becomes increasingly complicated, ambitious construction projects are completed by teams of people with different skills, working together. The civil engineer plays an important role in this process.

The Mining Engineer. A stepping stone to Mine Management

http://courses.curtin.edu.au/course_overview/undergraduate/mining-engineering

Mining engineers plan and direct the engineering aspects of extracting mineral resources from the earth.

Mining engineers plan and manage operations to exploit minerals from underground or open-pit mines, safely and efficiently. They design and direct mining operations and infrastructure including:

- drilling
- blasting

- loading and hauling
- tunnel creation and maintenance
- access road planning and maintenance
- water and power supplies.

Mining engineers may supervise other engineers, surveyors, geologists, scientists and technicians working on a mine site and may find employment in metropolitan or regional locations or in different countries.

The tasks with which a mining engineer may be associated include:

- conduct investigations of mineral deposits and undertake evaluations in collaboration with geologists, other earth scientists and economists to determine whether the mineral deposits can be mined profitably
- determine the most suitable method of mining the minerals taking into account factors such as the depth and characteristics of the deposit and its surroundings
- prepare the layout of the mine development and the procedure by which the minerals are to be mined
- prepare plans for mines, including tunnels and shafts for underground operations, and pits and haulage roads for open-cut operations, using computer-aided design (CAD) packages
- plan and coordinate the employment of mining staff and equipment with regard to efficiency, safety and environmental conditions
- talk to geologists and other engineers about the design, selection and provision of machines, facilities and systems for mining, as well as infrastructure such as access roads, water and power supplies
- coordinate with the operations supervisor to make sure there is proper implementation of the plans
- operate computers to assist with calculations, prepare estimates on the cost of the operation and control expenditure when mines begin production
- oversee the construction of the mine and the installation of the plant machinery and equipment
- make sure that mining regulations are observed, including the proper use and care of explosives, and the correct ventilation to allow the removal of dust and gases
- conduct research aimed at improving efficiency and safety in mines
- establish first aid and emergency services facilities at the mines.

In broader terms a qualification in engineering is a prerequisite to an advancement in engineering management. For mining engineers in Western Australia it is a statutory requirement proscribed by Act and regulation (the Mining Act). For civil engineers advancement in management depends on demonstrated competencies in a number of fields; investigation, design, analysis, costing, quantity surveying, tender documentation and presentation, project coordination and management, project delivery, safety and human resource management.

Essentially, engineering is about management of the project and the resulting built environment, about the integration of diverse groups of skilled professionals to achieve a common goal.

Then, “Why Surveying?”

You will have a team of surveyors intimately involved in controlling the placement of your design. They ensure not only adherence to the design dimensions, but also, through licences surveyors, ensure the legal location of the project in terms of cadastral boundaries. Encroachment on another property is an expensive business.

So, “Why Me? Won’t the Surveyor do it?”

Yes, but, sometimes you may need to do a simple task on a small job; check an invert level before a pour, understand the origin of survey data, calculate rough quantities, understand quantities before signing off on invoices, evaluate proposed survey control for a project, check structural setout. All the little things that your industry expects you to be able to do in the field.

As projects become larger and more complex; as surveying becomes more automated both in the field and in the design process; as machine control relies on both terrestrial data and GNSS (GPS) data, the need for basic surveying techniques seems a distant memory. It's not, you still have to understand the basics, and understand positioning from a whole new spectrum of positional precision and accuracy.

Hopefully you will find this course provides that understanding.

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Theory, Workshops, and Practicals

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