



saice
YOUNG MEMBERS

Career In Geotechnical Engineering

1. What is Geotechnical Engineering?

Geotechnical Engineering deals with investigating and understanding soil and rock material behaviour and its stabilisation under natural and man-made conditions. It mainly involves assessing slope stability (landslides, rock fall, avalanches, seepage, slope and progressive failure), foundation design (bearing capacity, settlement, and structural deformation and foundation type) and excavation design (surface basement excavations, tunnelling and shaft sinking). A geotechnical engineer can be involved in projects such as tunnels, bridges, water dams, roads, railways, tailings dams, structural foundations and more with the application of soil and rock mechanics geotechnical engineering principles.

2. What does a Geotechnical Engineers do?

Geotechnical engineers figure out the impact that geological formations may have on construction projects. Their expertise in civil engineering construction, design, and application of numerical methods enables them to safely investigate and analyse site projects and determine their present and future stability before and after construction. They would 1) produce a design that is practical and environmentally compliant, 2) supervise and manage design changes during construction, 3) quality checks, 4) provide monitoring and maintenance recommendations.

3. What are the challenges in Geotechnical Engineering?

The high degree of variability of soil and rock parameters make geotechnical engineering both challenging and exciting. One of the main challenges is to have enough quality data of the material/site to verify your design assumptions. Geotechnical investigations can be perceived to be time consuming and costly. Clients, therefore, often tend to opt for the bare minimum.

- Design – Soil and water interaction are the largest challenge to overcome as water causes a loss of strength in the soil material. For example, Tailings dam design.
- Pollution – National Environmental Management and National Water Acts influences the design and operations of the deliverables.
- Limited number of geotechnical experienced and registered engineers to carry the Engineer of Record appointment as required per project.

4. What does the future of Geotechnical Engineering entail?

The scope of the geotechnical engineering profession will expand in the near future as a consequence of the demand in water and energy, population growth and land for occupancy, the need of rational and optimal use of natural resources in order to achieve a sustainable development. Geotechnical engineering can significantly contribute to find innovative solutions to current and future demands maintaining a safe and more sustainable environment for us all. A larger focus on:

- Researchers and practitioners to work together to redefine, optimise and produce design solutions to meet the increasing demands without harming the environment.
- Critical state soil mechanics within the tailings field, as well as advanced monitoring solutions of tailings storage facilities.
- Application of new construction models and numerical methods.
- As a relatively young science, there are many fields in soil mechanics where new discoveries are being made, e.g. recent developments in our understanding of soil suction can have a significant influence in geotechnical design.

5. Can you list a few typical projects that I might work on as a Geotechnical Engineer?

(Some of these projects have all three design, construction and monitoring phases)

- In-situ laboratory tests and analysis on soil and rock samples
- Foundation design – Piles, shallow and deep foundations
- Earth dams and retaining walls
- Tailings storage facility
- Seepage and Dam breach analysis
- Slope stability assessments and stabilisation
- Rehabilitation, ground improvement and application of geosynthetics
- Surveying
- Tunnelling and pipe jacking
- Shaft sinking
- Railways
- Bridges
- Roadworks

6. How do I become a Geotechnical Engineer?

One would need to obtain a diploma or a degree (BEng or BSc) in Civil Engineering to work in the field of Geotechnical Engineering. Ideally a post graduate degree in Geotechnical Engineering is required.

7. I do not have a degree in Civil Engineering. What next, if I'm interested in Geotechnical Engineering?

One would need to enrol at a University or Technical college and study Civil Engineering, which may take about a minimum of three years.

Contact details of the division

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