COURSE OVERVIEW SE0060

Sloping, Benching, Embankments and Bundwalls

Course Title

Sloping, Benching, Embankments and Bundwalls

Course Date/Venue

Session 1: April 13-17, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Session 2: September 15-19, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

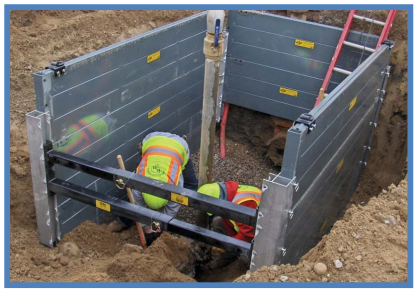
Course Reference

SE0060

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

The California Occupational Safety and Health program (Cal/OSHA) reports that more construction deaths occur in trenches than in any other form of construction work. This is not the whole story since a number of trench and excavation failures go unreported. It is evident from this that more attention needs to be paid to the planning, construction, monitoring, and supervisory aspects of excavations, trenching, sloping, benching, shoring embankments and bund walls.

This course provides guidance for analyzing the static stability of slopes of earth and rock-fill dams, slopes of other types of embankments, excavated slopes, and natural slopes in soil and soft rock. Methods for analysis of slope stability are described and are illustrated by examples and case studies. Criteria are presented for strength tests, analysis conditions, and factors of safety. The methods of stability analysis discussed in this course satisfy all conditions of equilibrium.

This course is basically designed to provide civil and structural engineers/supervisors with professional knowledge of embankment bund stabilization and slope protection, earthworks, excavation and shoring techniques. Further, the course provides practical knowledge about the safe practices required in carrying out all forms of excavations, including trenching, in various soil types; focusing on the provision of protective systems to prevent cave-ins, and to protect employees when cave-ins occur, protect employees from material that could fall or roll from an excavated face or from the collapse of adjacent structures.

During this interactive course, participants will learn the excavation/backfilling; the compaction and shoring; the soil stabilization/improvement; the embankments and bundwalls; and the protective systems requirements.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply the latest technology and techniques in sloping, benching, embankments and bundwalls
- Introduce the basic concept of limit equilibrium in static and quasi-static slope stability analyses
- Explain common methods of slope stability analysis, computer software and design charts
- Discuss design considerations for embankments, excavations and other man-made slopes
- Analyze stability of natural slopes in soils and soft rock as well as outline technologies for slope stabilization
- Practice slope stability analysis and design calculations via exercises and case studies
- Identify the various types of excavations and classify soil/rock deposits as well as select appropriate excavation protective systems
- Recognize the importance of excavation safety
- Determine the matching fill & compaction requirements and identify the compaction equipments & tests used
- Analyze the factors affecting compaction & compaction degree and identify the problems of remedial actions to field compaction
- Discuss shoring by identifying the appropriate protective system including the requirements for protective systems
- Identify the various types of shoring systems and determine the allowable slopes in accordance with soil classification & excavation depths
- Employ soil stabilization and improvement by identifying its requirements and types of material applied to side slopes, embankments & bundwalls
- Use a system approach in the selection of stabilization methods and soil improvement
- Carryout procedures on embankments and increase knowledge on benching excavation for embankments
- Plan, design & construct bunds and apply correct operation & maintenance of bunds

- Implement sloping, benching, embankments and bundwalls as per the OSHA regulations & standards
- Recognize the requirements of protective systems covering protection of employees in excavation and design of slopes, benching systems, support, shield and protective systems
- Discuss sloping and benching systems and shoring/shield systems

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of sloping and benching, embankments and bundwalls for geotechnical engineers, structural engineers, consulting engineers, design engineers, field engineers, technicians and technologists, and other individuals who need to build background on slope stability analyses and design. The course is also best suited for civil engineers, engineering geologists, soil scientists, city and public works officials, city planners, and other design professionals who deal with construction related slope stability and stabilization issues.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Professor Engin Aktas, PhD, MSc, BSc, is an **International Expert** with over **25 years** of extensive experience in **Structural Reliability**, **Earthquake Engineering**, **Design of Concrete and Steel Structures**, **Structural Damage Assessment & Safety Evaluation** and **Structural Health Monitoring**. He has been a **Senior Professor** to all personnel ranging from students to post graduate students at Universities and industrial clients. He has been teaching in the areas of **Theory of Matrix Structural Analysis**, **Engineering Mechanics**, **Mechanics of Materials**, **Civil Engineering System Analysis**, **Statistics for Civil Engineers**, **Structural Dynamics**, **Operations Research**, **Structural Optimization**, **Design of Reinforced Concrete Structures**, **Design of Steel Structures and Structural Reliability**.

During his career life, Professor Aktas performed the design, construction and installation of numerous buildings and industrial structures. Previously, he was the **Structural Design Engineer** with an international company handling multi-million design projects. He is renowned for his enthusiasm and tremendous instructing skills. Moreover, he had been a **Post-Doctoral Fellow** of **NRL/ASEE** and the recipient of the **Naval Research Laboratory/American Society for Engineering Education Fellowship** for his dedication and contributions to his field and was engaged with the **US Naval Research** for a project on "**Damage Detection on Composite Wing of Unmanned Air Vehicle using FBG sensors**".

Professor Aktas has **PhD** and **Master** degrees in **Civil Engineering** from the **University of Pittsburgh** (**USA**) and **Bachelor** degree in **Civil Engineering** from **Middle East Technical University** (**Turkey**). Further, he had served as a **Post-Doctorate** in **US Naval Research Laboratory** (**ASEE/NRL Fellow**) in **Washington DC**, **USA**. Moreover, he is a **Certified Instructor/Trainer** and a well-respected member of the **Union of Chambers of Engineers and Architects of Turkey**, the **Earthquake Engineering Association of Turkey** and the **International Association for Bridge Maintenance and Safety** (**IABMAS**).

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Excavation/Backfilling*** *Identifying Soil/Excavation/Backfilling Equipment in Accordance with Soil Type and Different Excavation/Backfilling Purposes (General Excavation, Formation of Channels, Ditches/Trenches, Underwater Excavation/Dredging, Shallow Grading, Sloping, etc.)*
0930 – 0945	*Break*
0945 – 1100	***Excavation/Backfilling (cont'd)*** *Types of Excavations ● Estimating Soil Excavation Production Rates*
1100 – 1230	***Excavation/Backfilling (cont'd)*** *Classifying Soil/Rock Deposits & Cave-Ins and Selecting Appropriate Excavation Protective Systems*
1230 – 1245	*Break*
1230 – 1420	***Excavation Safety***
1420 - 1430	*Recap*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Compaction*** *Matching Fill and Compaction Requirements*
0930 – 0945	*Break*
0945 – 1100	***Compaction (cont'd)*** *Identifying Compaction Equipment/Tests in Accordance with Soil Type and Excavation/Backfilling Purposes*
1100 – 1230	***Compaction (cont'd)*** *Identifying Compaction Degree Required for Structural/Non-Structural Areas*
1230 – 1245	*Break*
1245 – 1420	***Compaction (cont'd)*** *Factors Affecting Compaction/Compaction Degree ● Identifying Problems of/Remedial Actions to Field Compaction*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Shoring*** *Identifying Appropriate Protective Systems/Protective System Selection (Shoring of Excavation Sides)*
0930 – 0945	*Break*
0945 – 1100	***Shoring (cont'd)*** *Types of Shoring Systems • Sloping/ Benching*
1100 – 1230	***Shoring (cont'd)*** *Maximum Allowable Slopes in Accordance with Soil Classification & Excavation Depths*

1230 – 1245	*Break*
1245 – 1420	***Shoring (cont'd)*** *Failure Modes of Shoring*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Soil Stabilization/Improvement*** *Identifying Requirements of Soil Stabilization & Different Types of Material Applies to Side Slopes, Embankments & Bundwalls*
0930 – 0945	*Break*
0945 – 1100	***Soil Stabilization/Improvement (cont'd)*** *Identifying Soil Improvement Required in Accordance with Soil Types and Technique Adopted*
1100 – 1230	***Soil Stabilization/Improvement (cont'd)*** *Selection of Stabilization Methods*
1230 – 1245	*Break*
1245 – 1420	***Embankments*** *Benching Excavation of Embankment • Embankments*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 5

0730 – 0930	***Embankments (cont'd)*** *In-Place Embankment ● Rock Embankment*
0930 – 0945	*Break*
0945 – 1100	***Fundamentals of Planning, Designing & Constructing Bunds*** *Net Capacity of the Bund ● Packaged Storage ● Materials Used for Bunding ● Bund Heights and Tank Distance from the Wall ● Storage of Liquid Classed as a Dangerous Substance ● Drainage ● Piping and Pumping Facilities ● Roof Design*
1100 – 1230	***Operation & Maintenance of Bunds***
1230 – 1245	*Break*
1245 – 1345	***OSHA Regulations/Standards***
1345 - 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical, highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org