COURSE OVERVIEW SE0152
Road Construction & Commissioning

Course Title
Road Construction & Commissioning

Course Date/Venue
Session 1: June 29-July 03, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: November 24-28/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

3.0 CEUs (30 PDHs) AWARD

Course Reference
SE0152

Course Duration/Credits
Five days/3.0 CEUs/30.0 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using the simulators "Empirical Equation for Flexible & Rigid Pavement" and "Pavement Analysis and Design".

The successful completion of any road construction project is heavily dependent on the sound planning and development of works and resource programs reflecting the detailed specifications or desired outcomes. Equally as important is the need to rigorously monitor and maintain the programs throughout the project life, particularly programs associated with quality, financial and contract management.

The course provides information on the necessary planning and management of road construction, together with an overview of the resources required. This aspect is supported with an overview of the necessary elements required in planning and managing investigation works prior to commencement of major site works in road construction.

In this course, participants will learn about characterization and mechanical properties of road materials. Similarly, they will understand pavement failure mechanisms, causes and rehabilitation techniques. Furthermore, participants will acquire knowledge about mechanistic design, construction, maintenance, and rehabilitation of flexible pavements. The course also focuses on pavement evaluation, management systems, cost analysis, quality control and contracts.

Preliminary site investigations are essential prior to road construction to ensure that any impediments to construction activity are identified and managed. Understanding these aspects and thorough site investigation and subsequent informed management processes will minimize the potential for major problems or conflicts to arise which can result in construction delays and additional costs.

In addition, the course looks at the construction of a road to the alignment, gradient and cross falls selected by the designer, that often involve a considerable amount of earthworks. The necessary operations for the setting out, and control of earthworks operations are described and elaborated on together with a brief outline of the elements involved in geometric design. Note that the establishment of control lines and bench marks are specialized survey operations that are not covered in this course.

The course provides an understanding of the operations involved in the loosening, removing and depositing of earth, soil and rock and information on the construction of earthworks and the preparation of pavement foundations subsequent to the construction of a pavement structure.

The aspect of roadsides is also covered as they provide an important range of functions including access for the construction and maintenance of the road, control of surface water drainage, the provision of underground drainage, the provision of safety barriers, signs and lighting for the safe operation of the road. Worked examples and case studies are used throughout to facilitate practical learning.

Course Objectives

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

- Apply and gain an in-depth knowledge on road construction materials, construction technologies and pavement rehabilitation
- Identify the construction materials of road covering road embarkment, road pavement, soil and subbase, based course and bitumen material
- Carryout bitumen testing that includes bitumen grade test, softening point, ductility and solubility of bituminous materials in organic solvents
- Describe asphalt mixtures, asphalt mixing materials and the marshal method for design of asphalt mixtures
- Employ quality control and quality assurance in road construction through selecting of materials sources, testing of materials, inspection and testing of the executed work and filling the test result for quality assurance process
- Interpret road construction technology covering new equipments and new techniques used in road construction
- Describe the principles behind modern pavement designs, differentiate the construction, design life performance and failure criteria of concrete and flexible pavements
- Prepare site investigation reports, collect traffic, climatic & geological data necessary for pavement design
- Prepare and test subgrade-capping layers

- Describe the specifications and structural properties of unbound subases and bases, identify properties of cement-treated subgrades, subbases and bases & the properties of bituminous bases and surfacing
- Recognize pavement quality concrete and explain flexible pavement distresses and maintenance
- Discuss the approaches to pavement design and perform road tests as per AASHO and WASHO standards
- Measure pavement deflection and the life of asphaltic pavements
- Analyze structural and analytical design procedures for flexible and concrete pavements
- Describe heavy loaded industrial pavement design including the skid resistance and its measurement

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 techniques of road construction materials, construction technologies and pavement rehabilitation for civil, construction and road engineers responsible for the provision, approval, design, maintenance and rehabilitation of roads.

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.

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.

Accommodation

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

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:

Mr. George Soul, PE, MSc, BSc, is a **Senior Civil & Structural Engineer** with over **30 years** of extensive experience within the **Oil** & **Gas** and **Construction** industries. His expertise covers **Pavement Analysis & Design**, **Structural Design & Analysis**, **Road Pavement Design**, **Highway Geometric Design**, **Railway Engineering**, **Structural Design**, **Building & Construction Design**, **Steel Structures Design**, **Architectural** & **Mechanical Design Drawings**, **Plant Design Drawings**, **Engineering Drawings**, **Codes & Standards Implementation**, **P&ID Developmen**t, **Reading** & **Interpretation**, **Working Diagrams** & **Flow Charts** and **Field Sketching** as well as **Construction Management**, **Construction Site Management**, **Project Lifecycle Design**, **Project** Management, **Quality** Management and **Construction Health** & **Safety** Management. He is currently the **Chief Engineering Consultant** of **ArcPro** where he manages and oversees the design and master planning of all industrial construction projects, including project planning and management.

During his career life, Mr. Soul held significant positions such as the **Chief Engineering Consultant**, **Design Consultant & Engineer**, **Construction Manager**, **Site Engineer** and **Project Manager** for numerous **EU projects** and international companies like the **Mobil Oil**. He has handled major projects which include water and waste water installation, electrical power and natural gas installation, roads, pavements, civil, commercial and industrial construction projects, using specific software for producing design drawings, schematic diagrams and process flow diagrams.

Mr. Soul is a **Registered Professional Engineer** with a **Post Graduate** degree in **Project Management** from the **University of Wales Zurich** (**Switzerland**) and has **Master** degrees in **Civil Engineering** and **Construction Management** from the **Aristotle University Thessalonoki** (**Greece**) and a **Certified Instructor/Trainer**. Further, he is an active member of **various professional engineering affiliations** such as the Technical Chamber of Greece (**TEE**), Verein Deutscher Ingenieure (**VDI**), Greek Civil Engineer (**SPME**) and the Swiss Institute of Steel Construction (**SZS**).

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 – 0900	***Construction Materials of Road*** *Road Embarkment ● Road Pavement (Grave Roads, Surface Dresses Roads, Paved Road, etc.) ● Soil & Subbase ● Based Course● Bitumen Material (Ashalt Cement, Cut Back Asphalt, Emulsified Asphalt)*
0900 – 0930	***Bitumen Testing*** *Bitumen Grade Test ● Softening Point ● Ductility ● Solubility of Bituminous Materials in Organic Solvents, etc.*
0930 – 0945	*Break*
0945 – 1025	***Asphalt Mixtures*** *Types of Asphalt Mixtures ● Hot Mix Asphalt Concrete ● Worm Mix Asphalt Concrete ● Cold Mix Asphalt Concrete*
1025 – 1105	***Asphalt Mixing Materials*** *Course Aggregate ● Fine Aggregate ● Mineral Filler, Binder, etc.*
1105 – 1145	***Marshall Method for Design of Asphalt Mixtures*** *Volumeric Relationships ● Optimum Bitumen Content ● Tolerance ● Job Mix Formula*
1145 – 1230	***Quality Control & Quality Assurance in Road Construction*** *The Importance of Quality Control in Road Construction Processes ● Selecting of Materials Sources ● Testing of Materials ● Inspection of the Executed Work ● Testing the Executed Work ● Filling the Test Result for Quality Assurance Process ● Quality Assurance in Road Construction Processes*
1230 – 1245	*Break*
1245 - 1420	***Road Construction Technology*** *Introduction to the New Technologies in Road Construction ● New Equipments ● New Techniques Used in Road Construction*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*End of Day One*

Day 2

0730 – 0830	***Modern Pavements and the Principles of Pavement Design*** *Objectives of Pavement Design • Pavement Types • Pavement Layers • Approaches to Pavement Design • Responsibilities of the Design Engineer • Basic Information Necessary to the Design of Pavements*
0830 – 0930	***Design Life-Performance and Failure Criteria*** *Design Life • Distresses versus Failure • Failure Criteria • Failure Criteria for Flexible Pavements • Failure Criteria for Concrete Pavements*

0930 – 0945	*Break*
0945 – 1040	***Concrete Versus Flexible Construction*** *Costs • Life Expectancy • Riding Quality • Road Noise • Construction Experience • Comparison of Concrete and Flexible Road Construction*
1040 – 1135	***Climatic Data*** *Rainfall and Evaporation • Temperature • Depth of Frost Penetration • Climate of the Middle East*
1135 – 1230	***Geological Data-Site Investigation*** *Preparation of the Site Investigation Report • Scope of the Site Investigation Report • Tests to be Carried Out on Samples*
1230 – 1245	*Break*
1245 - 1420	***Road Traffic and Axle Loading*** *Types of Commercial Vehicles in Use in Relation to the Prevailing Limits of Maximum Axle Load and Gross Vehicle Weight • Collection of Traffic Data • Distribution of Commercial Vehicles and Private Cars Between the Traffic Lanes • Types of Commercial Vehicles and Their Axle Loading • Traffic Loading Expressed in Terms of Standard Axles*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*End of Day Two*

Day 3

0730 – 0830	***The Soil Foundation*** *The Constitution of Soil • Particle Size Distribution • Description of Soils in Terms of Particle Groups • Relative Size and Surface Areas of Particles • Nature of Soil Particles • The Solvent Action of Water • The State of the Soil • Plasticity of Clay Soils • Soil Classification • Compaction of Soil • The Distribution and Movement of Water in Soil • Consolidation of Clay Soils • The Effect of Climate on the Moisture Distribution of Soil • The Strength of Soil • Elastic Properties of Soil*
0830 – 0930	***Preparation and Testing of the Subgrade-Capping Layers*** *Preperation of the Formation • The Testing of Subgrades • The Use of Subgrade Capping and Geotextile Fabrics in Eathworks*
0930 – 0945	*Break*
0945 – 1040	***Unbound Subbases and Road Bases*** *Specifications for Unbound Subbases and Bases • Compaction of Unbound Subbases and Bases • Structural Properties of Unbound Materials*
1040 – 1135	***Cement-Treated Subgrades, Subbases, and Bases*** *The Cement Treatment of Subgrades • Cement-Bound Granular Material • Lean Concrete • Influence of Sample Dimensions on the Measure Strength of Cement Materials • Practice in Relation to Cement Subbases and Bases • The Structural Properties of Cemented Base, Subbase and Capping Materials*
1135 – 1230	***Bituminous Bases and Surfacings*** *The Marshall Test Procedure • Specifications for Asphaltic Concrete Materials • The Elastic Properties of Bituminous Materials • The Fatigue of Bituminous Materials Under Repeated Loading*

1230 - 1245	Break
1245 - 1420	***Pavement Quality Concrete*** *Concrete Mix Design • Compressive Strength • The Relationship Between the Compressive Strength and Modulus of Rupture Concrete The Relationship Between Elastic Modulus, Compressive Strength, and Age • Poisson's Ratio of Pavement-Quality Concrete • Fatigue of Concrete Pavements • Relationship Between Fatigue and Age of Concrete*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*End of Day Three*

Day 4

0730 – 0830	***Flexible Pavement Distresses and Maintenance*** *Definition • Causes and Maintenance of Cracking (Fatigue, Longitudinal, Thermal, Block, Slippage and Reflection Cracking) • Distortion (Shoving, Rutting and Corrugation) • Disintegration (Raveling and Stripping) • Loss of Friction Resistance*
0830 – 0930	***The Approaches to Pavement Design*** *Empirical Procedures • The Mechanistic Empirical Approach*
0930 – 0945	*Break*
0945 – 1100	***The AASHO and WASHO Road Tests*** *Purpose of the AASHO Road Test • Site Details • Layout of the Experiment • Thickness Combinations and Materials Used for Flexible Pavements • Thickness Combinations and Materials Used for Concrete Pavements • The Concept of Present Serviceability • The Application of Present Serviceability to the Flexible Pavements • Evaluation of the Performance of Flexible Pavements • The Application of Present Serviceability to Concrete Pavements • Evaluation of the Performance of Concrete Pavements • The WASHO Road Test*
1100 - 1230	***Pavement Deflection and the Life of Asphaltic Pavements*** *Measurement of the Deflection of Flexible Pavements • Deflection Studies on Full-Scale Pavement Design Experiments • Discussion*
1230 - 1245	*Break*
1245 - 1420	***Design Procedures for Flexible and Concrete Pavements*** *Traffic • Thickness of Flexible Pavement Layers • Concrete Pavements • Design of Hard Shoulders • Design of Housing Estate and Similar Roads • The AASHTO Guide for Design of Pavement Structures • Flexible Pavements • The Asphalt Institute Design Procedure for Flexible Pavements • Thickness Design for Concrete Highway and Street Pavements*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*End of Day Four*

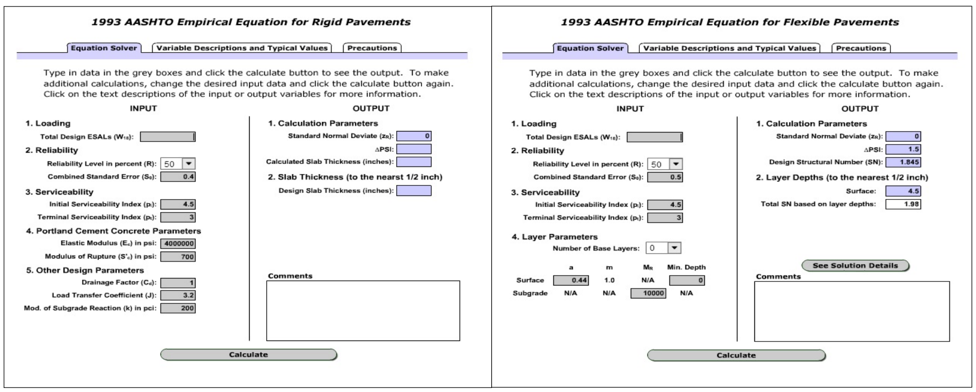
Day 5

0730 – 0830	***The Structural Design of Flexible Pavements*** *Principles of Structural Analysis of Pavements • The Finite-Element Method • The Application of Structural Analysis to Pavement Deflection Measurements • The Application of the Finite-Element Method to Flexible Pavement Design*
0830 – 0930	***The Analytical Design of Concrete Pavements*** *Thermal Stresses in Concrete • Compressive Stress • Restraint Stress • Thermal Warping Stress • Combination of Warping, Foundation Restraint, and Traffic-Induced Stress • Design Criterion for Concrete Pavements • Application of the Structural design Approach to Concrete Road Pavements • Structural Design and the Concept of Standard Axies*
0930 – 0945	*Break*
0945 – 1100	***The Design of Heavily Loaded Industrial Pavements*** *Design Approach for Heavily Loaded Industrial Pavements • Examples of Structural Design Applied to Industrial Pavements*
1100 - 1230	***The Skid Resistance of Pavements and Its Measurement*** *Measurement of the Slipperiness of Road Surfaces • The Development of Skid Resistance Criteria for Different Types of Road • Factors Which Affect the Skid Resistance of Road Pavements • Research Studies into the Factors Which Influence the Skid Resistance of Pavements • The Surface Characteristics Influencing Resistance to Skidding • Fine Texture or Microtexture Coarse Texture or Macrotexture*
1230 – 1245	*Break*
1245 – 1345	***Antisplash Surfacings*** *The Use of Open-Textured Wearing-Course Material • Influence of Antisplash Layer on Pavement Strength • Influence of Antisplash and Other Surfacings on Road Noise*
1345 -1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*End of Course*

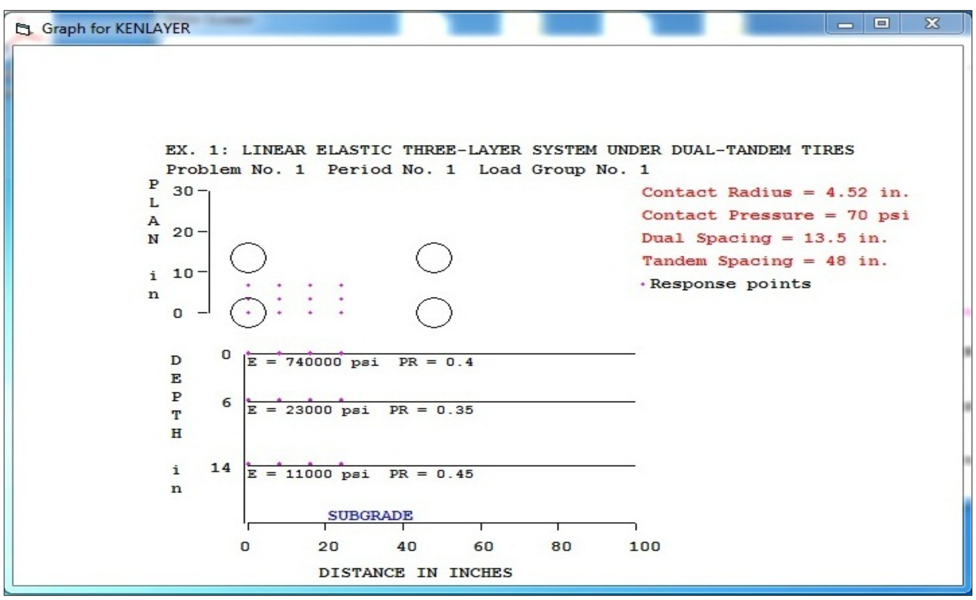
Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Empirical Equation for Flexible & Rigid Pavement" and "Pavement Analysis and Design" simulators.

(1) Empirical Equation for Flexible & Rigid Pavement



(2) Pavement Analysis and Design



Course Coordinator

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