BHARATMALA
ROAD TO PROSPERITY

भारतीय राजमार्ग अभियन्ता अकादमी
(सड़क परिवहन एवं राजमार्ग मंत्रालय, भारत सरकार)
Indian Academy of Highway Engineers
(Ministry of Road Transport and Highways, Govt. of India)

Design and Construction of High Embankment with Free Slope/ RE Wall/ Retaining Wall, Ground Treatment of Soft Soil

Time Period	Description of Topic
1st Day	
09:45-13:00	**Sub-soil Investigations for High Embankment** ❖ Planning sub-soil investigation ❖ Machinery/Equipment for sub-soil investigation ❖ In-situ testing for soil & rock ❖ Disturbed and Un-disturbed Soil sampling ❖ Rock coring ❖ Laboratory Investigations on soil/rock samples ❖ Determination of SBC ❖ Problems encountered during sub-soil investigations
14:00-17:15	**Design & Construction of High Embankment on Firm Soil** ❖ Stability Analysis of High Embankments ❖ Demonstration of Software for Embankment Design ❖ Earthquake effects to be considered during embankment design ❖ Fill Material Specifications and Embankment Construction Methodology as per MORTH
2nd Day	
09:45-13:00	**Design and Construction of High Embankment with RE Wall by using Geo-synthetics / Steel strips** ❖ Need for retaining structures ❖ safe slope angles ❖ Introduction to reinforced soil and RE wall ❖ Concept of reinforced soil embankment ❖ Design concept, design codes and manual, design methods for High Embankment with RE Wall with different options (RCC panel/Wrap around/Gabion Wall facia) ❖ General arrangements details, CQA Plan, provision for drainage ❖ Comparison of AASHTO and BS Standards for reinforced soil wall design ❖ Case Study
14:00-17:15	**Soft and Problematic Soils** ❖ Types of Soft and Problematic Soils ❖ Occurrence of Soft and Problematic Soils ❖ Properties ❖ Problem associated with different Soft and Problematic Soils ❖ Consolidation ❖ Settlement Calculations ❖ Improvement method
3rd Day	
09:45-13:00	**Ground improvement Techniques** ❖ Use of PVDs ❖ Instrumentation and Monitoring of Embankment on soft grounds

	(Piezometer, settlement gauge, Inclinometer) ❖ Observational procedure for settlement prediction and degree of consolidation
14:00-17:15	**Ground Improvement Techniques** continue… ❖ Deep Compaction (Granular Piles, Vibro Compaction) ❖ Dynamic Compaction ❖ Deep mixing of lime/ cement ❖ Case Study
4th Day	
09:45-13:00	**Soil Nailing Technique** ❖ Introduction ❖ Field Application • ROB/ RUB Construction • Stabilizing cut slopes, • Deep excavations • Advantage • Case Study
14:00-17:15	**Geo-synthetics materials** ❖ Introduction ❖ Application of in Road Works - As separator, drainage, basal reinforcement, etc ❖ Advantage ❖ Case Study
5th Day	
09:45-13:00	(a) Erosion Control and Bioengineering techniques for embankment side slopes (b) Use of Waste materials like fly ash for high embankment construction
14:00-15:30	Application of Innovative Geotechnical Engineering Techniques in Highway Projects
15:45-17:15	Test of participants, Feedback and Evaluation of Programme
17:15-17:30	Concluding and Distribution of Certificates
11:15-11:30- Tea | 13:00-14:00 lunch | 15:30-15:45 Tea	

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