

COUNTERMEASURE DESIGN FOR BRIDGE SCOUR AND STREAM INSTABILITY

Lesson Outline

Lesson	Topic	Method of Instruction	Manual Reference	Length	Time
Day 1					
Lesson 1	Introduction	Course Outcomes, Participant Expectations, and Ground Rules Animations	HEC-23	60	8:00-9:00
Lesson 2	Overview and Analysis Procedures	Discussion Q&A	HEC-18 HEC-20 HEC-23	45	9:00-9:45
	Break			15	9:45-10:00
Lesson 3	Overview of Counter-measure Performance	Discussion Q&A and Case Studies	HEC-23 Chapters 3 and 8	60	10:00-11:00
Lesson 4	Strategies for Developing a Plan of Action for Scour Critical Bridges	Discussion Q&A	HEC-23 Chapter 2	60	11:00-12:00
	Lunch			60	12:00-1:00
Design Workshop #1	Design Guideline 4 – Riprap Revetment	Group Workshop	HEC-23 DG4	60	1:00-2:00
Lesson 5	Selection of Countermeasures	Discussion Q&A Workshop	HEC-23 Chapter 2	60	2:00-3:00
	Break			15	3:10-3:15
Design Workshop #2	Design Guideline 16 – Filter Design	Group Workshop	HEC-23 DG16	75	3:15-4:30
Day 2					
Lesson 6	Countermeasure Design Concepts	Discussion Q&A Problem Session	HEC-23 Chapter 4	60	8:00-9:00
Design Workshop #3	Optional Topic No. 1	Group Workshop	HEC-23 Vol. 2	60	9:00-10:00
	Break			15	10:00-10:15
Design Workshop #4	Design Guideline 11 – Rock Riprap at Bridge Piers	Group Workshop	HEC-23 DG11	60	10:15-11:15
Design Workshop #5	Optional Topic No. 2	Group Workshop	HEC-23 Vol. 2	45	11:15-12:00
	Lunch			60	12:00-1:00
Design Workshop #6	Design Guideline 14 – Rock Riprap at Bridge Abutments	Group Workshop	HEC-23 DG14	60	1:00-2:00

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Lesson	Topic	Method of Instruction	Manual Reference	Length	Time
Lesson 7	Scour Monitoring Instrumentation – Fixed Instruments	Discussion, Case Study, and Video	HEC-23 Chapter 9 DP97	60	2:00-3:00
	Break			15	3:00-3:15
Lesson 8	Scour Monitoring Instrumentation – Portable Instruments	Discussion and Video	HEC-23 Chapter 9 DP97	30	3:15-3:45
Design Workshop #7	Optional Topic No. 3	Group Workshop	HEC-23 Vol. 2	45	3:45-4:30
Day 3					
Design Workshop #8	Optional Topic No. 4	Group Workshop	HEC-23 Vol. 2	60	8:00-9:00
Lesson 9	Countermeasure Failures Evaluation Workshop	Group Workshop	HEC-23 Chapters 5 and 8	60	9:00-10:00
	Break			15	10:00-10:15
Design Workshop #9	Optional Topic No. 5	Group Workshop	HEC-23 Vol. 2	45	10:15-11:00
Design Workshop #10	Optional Topic No. 6	Group Workshop	HEC-23 Vol. 2	45	11:00-11:45
Lesson 10	Summary and Evaluation (Course Evaluation, Course Critique, Certificates)	Discussion Q&A	-----	30	11:45-12:15
OPTIONAL WORKSHOPS WILL BE SELECTED FROM HEC-23, VOLUME 2					
	Design Guideline 1 – Bendway Weirs/Stream Barbs Design Guideline 2 – Spurs Design Guideline 3 – Check Dams/Drop Structures Design Guideline 5 – Riprap Design for Overtopping Flow Design Guideline 8 – Articulating Concrete Block Systems for Bank Revetment, Bed Armor, or at Bridge Piers Design Guideline 9 – Grout-filled Mattresses for Bank Revetment, Bed Armor, or at Bridge Piers Design Guideline 10 – Gabion Mattresses for Bank Revetment, Bed Armor, or at Bridge Piers Design Guideline 12 – Partially Grouted Riprap Bridge Piers Design Guideline 15 – Guide Banks				
OPTIONAL LESSON FROM HEC-23, VOLUME 1, CHAPTER 6					
	Optional Lesson 11 – Biotechnical Countermeasures				

NHI Course 135048

Countermeasure Design for Bridge Scour and Stream Instability

Mandatory Workshops	
Title	Description
DG4 – Revetment Riprap	Rock riprap for stream bank protection and stabilization
DG11 – Riprap at Piers	Rock riprap for protecting bridge piers from scour.
DG14 – Riprap at Abutments	Rock riprap for protecting bridge abutments from scour.
DG16 – Filter Design	Designing filters (geotextile or granular) to prevent loss of soil from beneath an armor system.
Optional Workshops (Select 6)	
Title	Description
DG1 – Bendway weirs / stream barbs	Linear structures that project into the channel from the bank to reduce flow velocity along the bank. Structure is normally submerged and can also be used to realign the flow direction.
DG2 – Spurs	Linear structures that project into the channel from the bank to realign flow direction, induce deposition, or reduce flow velocity along the bank.
DG3 – Check dams / drop structures	Low dam or weir across a channel for maintaining the upstream channel bed elevation in a degrading stream.
DG5 – Riprap for overtopping flow	Design of rock riprap for protecting embankments that are overtopped and thus subjected to steep slope, high-velocity flow.
DG8 – Articulating concrete block systems	Manufactured interlocking or cable-tied blocks for bank, pier and abutment protection.
DG9 – Grout-filled mattresses	Geotextile mat sewn into pillow-like compartments and pumped full of grout for bank, pier, and abutment protection.
DG10 – Gabion mattresses	Wire mesh mattresses filled with rocks for bank, pier, and abutment protection.
DG12 – Partially grouted riprap	Rock riprap that is glued together with cement grout, allowing the use of smaller rock to create a flexible and porous armor layer.
DG15 – Guide banks	Dike extending upstream from an abutment to move scour away from the abutment and direct the flow smoothly through the bridge opening.
<p><i>Note: If no strong preference is indicated, it is suggested that optional workshops DG1, DG2, DG3, DG8, DG12, DG15 be selected. These workshops will provide a broad range of topics of interest to most bridge owners.</i></p>	