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(16 PDHs)

2-DAY COURSE

FEE: \$2,060/PERSON
INCLUDES: COURSE
MATERIALS, LUNCH &
BREAKS, AND CEU
CERTIFICATE

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-TRAINING COURSE-

Effective Retrofits for Select Steel Bridge Details

Ineffective or incorrect retrofits and repairs of the aging steel infrastructure have done more harm than good and cost state agencies millions of dollars. This course will lead each participant through a series of discussions filled with concepts, case studies, and tutorials that develop understanding of effective retrofits and repairs that will extend the service life of steel bridges. The course is designed with an emphasis on being practical, or hands-on, and will take advantage of the expansive facilities of the S-BRITE Center and Bowen Laboratory. Participants will not only learn about effective retrofits, but will be performing those retrofits to become familiar with proper technique and application; lessons better learned through experience. Additionally, full size bridge specimens at the S-BRITE Center Bridge Component Gallery will provide real-world examples of effective retrofits helping to enrich the instruction. Participants will leave this course enabled to determine, inspect, plan and perform effective steel bridge retrofits and repairs.

MEET THE INSTRUCTORS

Robert Connor, Ph.D., is an associate professor of civil engineering at Purdue University and Director of the Steel Bridge Research, Inspection, Training, and Engineering (S-BRITE) Center. Dr. Connor is nationally recognized as an expert in fatigue and fracture of steel bridges and ancillary steel structures.

Jason B. Lloyd, PE, is a Research Engineer at the S-BRITE Center at Purdue University and Robert L. and Terry L. Bowen Laboratory for Large Scale Civil Engineering Research. Mr. Lloyd has performed numerous field instrumentation, laboratory, and fitness-for-service studies on various steel bridge types.

Thomas Bradt is a Research Engineer at the Robert L. and Terry L. Bowen Laboratory for Large Scale Civil Engineering Research. Mr. Bradt has several years of steel and concrete fabrication and research experience.



LEARNING OBJECTIVES

- Understand a number of case studies of effective and ineffective retrofits;
- Know how to determine urgency of repair;
- Experience hands-on examination of real-world specimens with fatigue and fracture damage that include good and poor retrofits;
- Be able to install a number of steel bridge retrofits and repairs for fatigue and fracture prone details, including:
 - Stop-hole drilling
 - Surface defect removal
 - Weld toe improvements
 - Web gap stiffening for Distortion-induced fatigue
 - Web gap softening for Distortion-induced fatigue
 - Constraint relief methods for Constraint-Induced-Fracture (CIF) or “Hoan” details

The class size will be limited to 8 attendees so as to maximize the instructor-student interaction and enhance the course quality. Special attention will be given to identifying details which are sensitive to fatigue and fracture and understanding how an effective retrofit or repair can extend service life. Instruction includes case studies that help to illustrate effective and ineffective retrofits and repairs. This course builds upon other short courses offered through the S-BRITE Center, such as *Design of Steel Bridges for Fatigue & Fracture*, *Inspecting Steel Bridges for Fatigue*, and *High Strength Structural Bolting*.

Register at <https://engineering.purdue.edu/CAI/SBRITE/Training>



AGENDA—Day 1

- 8:00 – Welcome and Introduction
Safety briefing
- 8:20 – Session 1: Intro to Fatigue
- 9:00 – Session 2: Intro to Fracture
- 9:30 - Break
- 9:45 – Session 3: Effects of Geometry & Residual Stresses
- 10:15 – Session 4: Stop-hole Drilling
- 11:00 – Stop-hole drilling practicum
- 12:00 – Lunch Break (provided)
- 12:45 – Session 5: Surface Treatments
- 1:25 – Surface treatment practicum
- 2:45 - Break
- 3:00 – Session 6: Out-of-plane Distortion
- 3:30 – Out-of-plane distortion practicum
- 5:00 – Adjourn, end of Day 1

AGENDA—Day 2

- 8:00 – Session 7: Constraint-Induced Fracture
- 8:45 – CIF practicum
- 9:45 – S-BRITE Center field trip
- 11:15 - Lunch Break (provided)
- 12:00 – Discussion on Urgency
And review of concepts
- 12:30 – Divisions 1 and 2 begin written test
– Divisions 3 and 4 begin practicum test
- 1:30 – Divisions 1 and 2 complete written test
– Divisions 1 and 2 begin practicum test
– Divisions 3 and 4 continue practicum test
- 3:10 – Divisions 1 and 2 continue practicum test
– Divisions 3 and 4 begin written test
- 4:10 – Testing completed
- 4:10 – Break
- 4:20 – Exam review and discussion
- 5:00 – Course completed