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Tevfik Terzioglu, Madhu M. Karthik, Stefan Hurlebaus, Mary Beth D. Hueste, Stefan Maack, Jens Woestmann, Herbert Wiggenhauser, Martin Krause, Patrick K. Miller, Larry D. Olson

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Nondestructive Evaluation of Grout Defects in Internal Tendons of Post-Tensioned

2 Girders

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Abstract

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7 Post-tensioning systems provide safe and efficient construction solutions for long span bridges. Despite the improved grouting practices over the past decade, existing post-tensioning systems 8 9 may have significant amount of grout defects, which could lead to corrosion of the strands. 10 Condition assessment of post-tensioning systems is necessary to allow bridge owners to take timely, proactive actions to mitigate or prevent further deterioration and unanticipated tendon 11 12 failures. A detailed experimental study conducted to assess the performance of nondestructive evaluation techniques in detecting grout defects within internal tendons is presented herein. 13 14 Nondestructive evaluation techniques that include Ground Penetrating Radar, Impact Echo, 15 Ultrasonic Tomography, and Ultrasonic Echo are evaluated in terms of detecting the location and severity of fabricated grout defects in a full-scale post-tensioned U-girder mock-up specimen. 16 17 While Ground Penetrating Radar can identify the location and profile of the internal tendons, 18 particularly metal ducts due to strong reflections, this method did not provide any information 19 about the defect conditions within the tendon. Both Impact Echo and Ultrasonic Echo techniques 20 are effective in identifying the location of grout defects, but could not differentiate between 21 water, void, or compromised grout conditions. The study clearly demonstrates the need for NDE

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