



## PROJECT PROFILE

# FHWA NDE Validation Center

Study of FRP Strengthening Methods for Box Beams | McLean, VA



### CLIENT

Department of Transportation,  
Federal Highway Administration

### BACKGROUND

The Federal Highway Administration (FHWA) selected WJE to provide engineering services for the development and operation of the Nondestructive Evaluation (NDE) Validation Center, a national center dedicated to the advancement and validation of nondestructive technologies with highway applications.

The FHWA and NYSDOT wanted to investigate the feasibility of using bonded composite laminates such as FRP to strengthen existing prestressed concrete box beams. The primary objectives were to 1) investigate the behavior of deteriorated prestressed concrete box beams under service and ultimate load conditions; 2) improve understanding of the behavior of simply supported prestressed concrete box beams retrofit with bonded composite laminates; and 3) develop design and construction guidelines for the use of composite laminate materials.

### SOLUTION

WJE developed the test plan prepared by the New York Department of Transportation (NYSDOT), which called for monitoring of strain, load, deflection, and rotation. Five deteriorated, prestressed concrete box beams from a bridge in New York State were removed to achieve these objectives and were transported to the FHWA facilities for testing under controlled load conditions. WJE tested a severely deteriorated beam to initial cracking and to ultimate failure. Several severely deteriorated beams repaired with composite laminates were tested to initial cracking and ultimate failure. Based on this testing, WJE developed recommendations for surface preparation and application of FRP to strengthen deteriorated box beams.

