

NDTitans in action



Case 8.3 Duct inspection of a three-span bridge in the West of Ireland with the DOCTer



Conducted by Infrastruct Ireland, a Special Inspection was first performed to examine the condition of the concrete elements forming the bridge (designed in 1966), incl. surveys for cover, half-cell potential, resistivity, UPV and localised breakouts to examine the type and condition of the reinforcement and concrete sampling to establish the compressive strength of the concrete, the carbonation depth, the cement content of the concrete and the chloride ion content.

During the Special Inspection, post-tensioning ducts were located using GPR and a couple of exposures were made to the ducts and tendons. In two of the four ducts opened, fully voided ducts with corroded tendons were found. There was no evidence of water ponding within the ducts.



Left, injected duct. The right figure show a voided duct with corroding tendons in the down stand beam of the bridge. Corrosion was visible but no severe pitting evident

The main cause of structural concern was that a number of tendons were found to be loose (the Infrastruct team were able to easily move the tendons with hand tools and little effort). This indicated to the team on site that the tendons were not stressed as would be expected for post tensioned strands.

The Special Inspection raised serious concerns about the overall structural integrity and capacity of the bridge and the long-term durability of the post-tensioned system. Further PTSI investigations were carried out and included:

High resolution GPR to locate and map the duct profiles on the external faces of the post-tensioned downstand beams.

Impact echo testing using the DOCTer Impact Echo system carried out above the post-tensioned ducts to quantify the extent of voiding in the ducts.

Selected duct and tendon exposures to confirm the findings of the Impact Echo testing.



Impact Echo testing using the DOCTer Impact Echo system underway to determine the ducts condition

2000 Impact Echo tests were completed. 50% of the ducts were partially voided, 4% of the ducts were fully voided and only 46% of the ducts were found to be fully grouted.

The bridge was replaced after the findings of the PTSI.

Testing supervised/reported by **NDTitan Tom Callanan**