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Proof load testing of the viaduct De Beek

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Abstract

Proof load testing can be a suitable method to show that a bridge can carry the required loads from the code without distress. This paper addresses the preparation, execution, and analysis of a proof load test on a four-span reinforced concrete solid slab bridge, viaduct de Beek. The bridge has one lane in each direction, but was restricted to a single lane, since an assessment showed that the capacity is not sufficient to allow both lanes. For this proof load test, the bridge was heavily equipped with sensors, so that early signs of distress can be seen. The difficulty in this test was that, for safety reasons, only the first span could be tested, but that the lowest ratings were found in the second span. A direct approval of the viaduct by proof loading was thus not possible, and an analysis was necessary after the field test. The result of this analysis is that only by allowing 6.7% of plastic redistribution in the second span, sufficient capacity can be demonstrated.

Keywords: existing bridges; load testing; proof load testing; reinforced concrete bridges; bending moment capacity; sensors; slab bridges

1 Introduction

For existing bridges, proof load testing (1-4) can be a suitable method to show that a bridge can carry the required loads from the code without distress. Practically, a proof load test is carried out by placing a load that corresponds to the factored live loads on the bridge, and verifying if the bridge can carry this load without signs of distress. Proof load testing can be used for structures where information is lacking, such as the structural plans (1), or where the effect of material degradation on the capacity is not known, such as for bridges with alkali-silica reaction damage (5). Proof load testing is one type of load testing, in which high loads are applied. A type of load testing at lower load levels is diagnostic load testing (6-8). In a diagnostic load test, a lower load level is applied to verify the structural behavior of a bridge. This behavior could include the transverse distribution, or the

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