



Ultimate load of a masonry bridge

/ 2007

Owner

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Due to the construction of a new road GT-131, The Road Network Authorities depending upon the Diputación Foral de Guipúzcoa projected the demolition of the old railway bridge at Plazaola in Urnieta, Guipúzcoa. It ceased to offer functional usage in 1958 when the railway closed down. It is a fine example of its kind and was built according to the set terms of practice established at the beginnings of the 20th Century.

The structure consisted of four vault round arches with a total span of 10m built using sandstone masonry. The spandrel and piers employed limestone masonry.

Upon deciding to demolish the bridge, a proposal was made to investigate its ultimate capacity as a means to increase knowledge by real size testing as well as contribute to shed light on some unknown areas regarding the behavior of masonry bridges, in this particular case.

The estimation of fracture load, previous to the test, was carried out using data obtained from the height of the cemented fill obtained by a series of inspection excavations in the adjacent flood arches. Internally developed computer tools were employed for the state limit analysis with tensile estimations. The values obtained compared satisfactorily with the test results.

The device designed for the load application consisted of a metal framework which received loads from three jacks, each with a 3000KN capacity. These were placed at one third of the span, and acted transmitting the reactions through pre-stressed bars which were connected to another metal framework anchored to the ground.

The test was carried out on 16 May 2007; measuring an ultimate load of 7350KN. Failure occurred at the splay in the spandrel area due to wear under compression.

After testing, demolition took place as well. Samples of the fill and masonry of the bridge were taken for an internal morphological study. The results of these measurements and mechanical tests will allow the adjustment of the calculation models and the comparison of experimental and theoretical behavior.



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