

Sustainable Upgrade of Existing Heritage Infrastructure - Strengthening and Rehabilitation of The LH Ford Bridge

Authors : Vince Scolaro, Lakshman Prasad, Ted Polley, Sanjivan Deshpande

Abstract : The LH Ford Bridge, built in the 1960s, comprises 28 spans, is 800m long and crosses the Macquarie River at Dubbo, NSW. The main bridge spans comprise three spans with a 63m center span (25m drop-in section) supported by halving joints from the main cantilevers and back spans of 28m. The main bridge spans were built using complex construction staging (the first of this type in NSW). They comprise twin precast boxes, in-situ reinforced concrete infills, and cantilevered outriggers stressed both longitudinally and transversely. Since construction, this bridge has undergone significantly increased design vehicle loads and showed signs of excessive shrinkage and creep leading to significant sagging of the centre span with evidence of previous failure and remediation of the halving joints. A comprehensive load rating assessment was undertaken taking account of the original complex construction staging. Deficiencies identified included inadequate capacity of the halving joints, failure of the bearings at the halving joints, inadequate shear capacity of the girder webs and inadequate girder flexural capacity to carry B-Double design vehicles. A unique strengthening system comprising two new piers (under each of the halving joints), new bearings and installation of external prestressing to the soffit of both drop-in-span and back spans was adopted. A portion of the dead load had to be transferred from the superstructure to the new piers via innovative soft/stiff bearing combinations to reduce new locked-in stresses resulting from the new pier supports. Significant temporary works comprised a precast concrete shell beam forming the pile cap/pier structure, addition of a temporary suspended scaffold (without overstressing the existing superstructure) and the installation of jacking stays for new bearing top and bottom plates. This paper presents how this existing historic and socially important bridge was strengthened and updated to increase its design life without the need for replacement.

Keywords : strengthening, creep, construction, box girder

Conference Title : ICSBE 2024 : International Conference on Sustainability in Bridge Engineering

Conference Location : Venice, Italy

Conference Dates : August 15-16, 2024