Finite Element Simulation of Embankment Bumps at Bridge Approaches, Comparison Study

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Abstract : A differential settlement at the end of a bridge near the interface between the abutment and the embankment is a persistent problem for highway agencies. The differential settlement produces the common 'bump at the end of the bridge'. Reduction in steering response, distraction to the driver, added risk and expense to maintenance operation, and reduction in a transportation agency's public image are all undesirable effects of these uneven and irregular transitions. This paper attempts to simulate the bump at the end of the bridge using PLAXIS finite element 2D program. PLAXIS was used to simulate a laboratory model called Bridge to Embankment Simulator of Transition (B.E.S.T.) device which was built by others to investigate this problem. A total of six numerical simulations were conducted using hardening- soil model with rational assumptions of missing soil parameters to estimate the bump at the end of the bridge. The results show good agreements between the numerical and the laboratory models. Important factors influencing bumps at bridge ends were also addressed in light of the model results.

Keywords : bridge approach slabs, bridge bump, hardening-soil, PLAXIS 2D, settlement

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