Proceedings of the 2nd World Congress on Civil, Structural, and Environmental Engineering (CSEE'17)
Barcelona, Spain – April 2 – 4, 2017
ISSN: 2371-5294
DOI: 10.11159/icgre17.1

Soil-Structure Interaction of Integral Abutment Bridges

Hany El Naggar
Department of Civil and Resource Engineering, Dalhousie University
Canada
Hany.elnaggar@dal.ca

The use of integral abutments to accommodate thermal expansion of bridges is common practice in Canada, and is also seen throughout the World. The main benefit of integral abutments is the complete elimination of the expansion joints and bearings, which are expensive to install and maintain during the lifetime of the bridge. During seasonal temperature change, the structure undergoes expansion and contraction, moving toward and away from the backfill. This movement causes sequentially variations in stresses in the backfill behind the bridge, in earth pressures acting on the abutment, and in the stresses in the supporting piles. Integral abutment bridges are generally characterized by their complex soil-structure interaction of the abutment walls and foundations as they are subjected to cyclic loading on a daily basis. As the backfill soil of such bridges is subjected to loading-unloading-reloading process during which the stiffness of the soils keeps on changing, the soil stress-strain behavior is complicated and special modeling procedure is needed. This paper investigates different aspects of integral abutment bridges analysis and there implications on the predictability of the employed finite element model.

Keywords: Integral Abutment Bridges, seasonal temperature change, expansion and contraction, loading unloading, SSI, finite element,