

Impact capacity reduction in railway prestressed concrete sleepers with vertical holes

Chayut Ngamkhanong¹, Dan Li¹ and Sakdirat Kaewunruen^{1,2}

¹Department of Civil Engineering, The University of Birmingham, UK

²Birmingham Centre for Railway Research and Education, The University of Birmingham, UK

E-mail: s.kaewunruen@bham.ac.uk

Abstract. Railway prestressed concrete sleepers (or railroad ties) are principally designed in order to carry wheel loads from the rails to the ground as well as to secure rail gauge for dynamic safe movements of trains. In spite of the most common use of the prestressed concrete sleepers in railway tracks, the concrete sleepers are often modified on construction sites to fit in other systems such as cables, signalling gears, drainage pipes, etc. This is because those signalling, fibre optic, equipment cables are often damaged either by ballast corners or by tamping machine. It is thus necessary to modify concrete sleepers to cater cables internally so that the cables or drainage pipes would not experience detrimental or harsh environments. Accordingly, this study will extend from the previous study into the design criteria of holes and web openings. This paper will highlight structural capacity of concrete sleepers under dynamic transient loading. The modified compression field theory for ultimate strength design of concrete sleepers will be highlighted in this study. The outcome of this study will improve the understanding into dynamic behavior of prestressed concrete sleepers with vertical holes. The insight will enable predictive track maintenance regime in railway industry.