Full-Scale Laboratory Testing of Slab Track and Ballasted Track on Two Embankment Systems

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Summary

This project was funded by the UK Engineering and Physical Sciences Research Council (EPSRC) under Grant Numbers EP/N009207/1 with industry support from Tensar and Max-Bögl. This collaborative research, with Leeds University and the University of Dundee, aims at lowering the costs of railway tracks construction using preformed systems. It investigates the immediate and long-term settlement behaviour of conventional and Geosynthetically Reinforced Soil with Retaining Wall (GRS-RW) systems subject to cyclic loading for two track forms: a concrete slab track and a ballasted track. First, a three-sleeper concrete slab section is constructed at full-scale under controlled laboratory conditions, followed by a ballasted track. Both are supported by a 1.2m deep subgrade and a frost protection layer in accordance with railway design standards. Two different axle load magnitudes are applied statically, and then cyclically/dynamically, using 6 actuators to replicate moving train axle loads.

Conclusions highlight

- ✓ The ballasted track shows more settlement when compared to the concrete slab track, under the same loading conditions, even though the ballasted track was tested at a slightly higher compacted state due to the concrete slab track test being conducted first.
- ✓ For both track forms, it is observed that the slab track performs significantly better in terms of elastic and plastic deformation.
- ✓ Pressure cells show that for GRS-RW the stress levels on the wall remain negligibly small during loading, demonstrating the positive stabilisation effect of the geosynthetic material.

Publications

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