

Imaging of deteriorated floor slabs using a test model by ground-penetrating radar

*Kyosuke Onishi¹

1. Public Works Research Institute

The concrete floor slab of bridge sometimes has special deterioration, which is faster than standard deteriorations. Previous detecting methods without visual examination will be developed for sudden problems. Ground-penetrating radar (GPR) is frequently and widely used for survey underground cavities and it becomes one of effective tools to detect deterioration areas of floor slabs. However, GPR is difficult to detect deterioration of a concrete slab in many situations. One of the reasons is that the target depth is shallow. The deterioration of concrete slab occurs from the top surface. The depth of the top surface from the surface of road is decided from the thickness of pavement. The value of pavement thickness is frequently ranged from 5 cm to 10 cm. The thickness values is travel time including direct waves in air and on ground, which becomes difficult to separate important event signals. We made a model of floor slab and measured several GPR equipment. We show some results of GPR records. The model has a special design to remove an asphalt pavement layer and to easily change conditions of a concrete slab. We find GPR can detect anomalous areas in the upper zone with deterioration of a concrete slab, when dielectric characteristic shows enough different from around areas. However, it is difficult to detect abnormal conditions, such as thickness, particle size, moisture from characteristic signals detected on GPR records. We conclude that tests of slab model and numerical simulations should be used to understand characteristic signals of many conditions and to use them to interpret actual data acquired from bridges.

Keywords: ground-penetrating radar, floor slab