Scanning the Bridge Deck Subsurface to Detect Damage.

Unseen deterioration represents major life-cycle cost.

Bridge decks represent the most expensive bridge component over the bridge life cycle. Properly timed preventive maintenance and rehabilitation can extend the deck’s life and reduce life cycle costs. To do this, owners need to decide which decks are in good condition, which need work (and what type of work), and which are not economical to repair and need to be replaced. These decisions require accurate assessment of the condition of a large number of decks, a requirement that cannot be met using traditional methods. Therefore, the VOTERS project is developing a high-speed subsurface scanning system to automatically determine and spatially map “healthy” from “unhealthy” reinforced concrete bridge decks areas. The scanning technology uses ground penetrating radar (GPR) and relates the GPR signals to the developing stages of the corrosion and deterioration process. One task of this research is to quantify the relationship between the electromagnetic response of a reinforced concrete deck and the state of deck corrosion and deterioration. To meet this objective, tests have carried out on sections of an actual deteriorated bridge deck removed from service and brought to the lab. Results show a spatial correlation of 90% between traditional corrosion measurements and GPR measurements (below).

Future work planned for this project includes developing statistical relationships between rebar reflection amplitudes and different levels of corrosion, and expanding our database of GPR and corrosion measurements on different structure types and corrosion states.

VOTERS: Innovative Solutions for Infrastructure Management.