

Comparing Different Frequency Ground Penetrating Radar Antennas for Tunnel Health Assessment

Authors : Can Mungan, Gokhan Kilic

Abstract : Structural engineers and tunnel owners have good reason to attach importance to the assessment and inspection of tunnels. Regular inspection is necessary to maintain and monitor the health of the structure not only at the present time but throughout its life cycle. Detection of flaws within the structure, such as corrosion and the formation of cracks within the internal elements of the structure, can go a long way to ensuring that the structure maintains its integrity over the course of its life. Other issues that may be detected earlier through regular assessment include tunnel surface delamination and the corrosion of the rebar. One advantage of new technology such as the ground penetrating radar (GPR) is the early detection of imperfections. This study will aim to discuss and present the effectiveness of GPR as a tool for assessing the structural integrity of the heavily used tunnel. GPR is used with various antennae in frequency and application method (2 GHz and 500 MHz GPR antennae). The paper will attempt to produce a greater understanding of structural defects and identify the correct tool for such purposes. Conquest View with 3D scanning capabilities was involved throughout the analysis, reporting, and interpretation of the results. This study will illustrate GPR mapping and its effectiveness in providing information of value when it comes to rebar position (lower and upper reinforcement). It will also show how such techniques can detect structural features that would otherwise remain unseen, as well as moisture ingress.

Keywords : tunnel, GPR, health monitoring, moisture ingress, rebar position

Conference Title : ICCEA 2021 : International Conference on Civil Engineering and Architecture

Conference Location : Montreal, Canada

Conference Dates : May 24-25, 2021