

**MAPPING THE INTERNAL ELEMENT OF A WATER RESERVOIR
AND COMPARING WITH A LABORATORY CONCRETE MODEL
AND GPRMAX 2D MODEL**

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Non-destructive testing has become a very useful tool in identifying the internal structural elements and defects accurately. Ground Penetrating Radar (GPR) is being used as a very effective and efficient technique to be used as a non-destructive testing method in civil engineering (concrete bridges, concrete buildings, dams and road) since the recent past. The GPR technique has not been used in Sri Lanka in the field of civil and structural engineering. This study was carried out with the aim of introducing the GPR technique as a non-destructive testing method and for improving the current methodology of use. In addition, result interpretation method for defect identification and accuracy of the results were also studied.

A laboratory experiment was carried out to understand the GPR wave behavior and its accuracy and then it was applied to a real structure. During the laboratory experiment, a 1 x 0.5 x 0.2 m³ concrete slab panel was prepared including a conduit, 10, 12, 16 mm rebars and two air voids. A computer model was prepared exactly similar to the slab panel and GPR wave simulation was carried out using the GprMax 2D. Actual GPR data were collected using Pulse EKKO Pro GPR system with 1000 MHz transducers. A cover meter test was also carried out to check the cover to rebars. Based on the experience and understanding of the laboratory tests, a water reservoir belongs to the National Water Supply and Drainage Board (NWS&DB) was tested following the same data collection and analysis procedure.

According to the laboratory model, GprMax 2D gave 100% accuracy, the GPR survey results gave 96.6% accuracy and the cover meter gave 92.8% accuracy. Using the same GPR survey results, 2D and 3D images could be produced for better understanding of the internal structures. GPR results of the water reservoir showed a higher accuracy when compared with the structural drawings. 2D and 3D images were developed and direction of the reinforcement bars, spacing and reinforcing pattern could be viewed.