**Urban Building Structure Concrete Cracks Detection Using Image-Based Non-Destructive Geotechnical Technique**

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**ABSTRACT:** Buildings and infrastructures need to be maintained regularly throughout the entire of their operational life. The building structural health monitoring system is produced to prevent the hazardous incident to occur. However, the health information of these building (e.g.: condition or fitness of the concrete, rebar, etc.) are not being recorded and reported by the building industry. Hence, issue of deterioration of building structure concrete in recent years has become an alarming issue that highlighted extensively throughout the world. The building infrastructure management, rehabilitation or maintenance is needed indeed to extend the service lives of these buildings, especially those historical building that representing the landmark for a country. As such, assessment of building structure concrete health, especially the concrete cracks is crucial for ensuring the safety and health of the building as cracks are one of the earliest indications of the degradation of concrete structures. Therefore, non-destructive geotechnical technique was introduced in this paper to determine the physical conditions of the concrete and visual examination was conducted for results verification purposes. In doing this, experiment was conducted by exerting hydraulic load on a reinforced concrete slab to produce cracks in precast concrete beam. Then, the common used non-destructive electromagnetic device, ground penetrating radar (GPR) with 2 GHz high frequency bi-polar antenna was employed to scan the reinforced concrete beam to detect cracks that produced by exerting hydraulic load. After that, visual inspection was conducted for validation of concrete cracks on the beam. The high similarity in the radar profile obtained by GPR and visual inspection proved that the advantages of utilizing non-destructive technique for inspection of building structural health, where the cavity and rebar of the inner structure of the concrete can be taken into granted as well in the future through refinement of the results of this study. With such new benchmark, it opens up new application for ground penetrating radar for civil infrastructure maintenance and management.