

Applications of Ground Penetrating Radar in Civil Engineering and Geology: case studies from Pakistan

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Ground Penetrating Radar (GPR) is widely popular these days for the assessment of infrastructure and related structures such as building walls, floors, bridges, road pavements culverts, railway tracks inspections and runways, etc. This paper demonstrates the applications of GPR in geology and civil engineering, Three case studies are presented here to demonstrate the applications of GPR, i.e., i) Motorway M1 Islamabad-Peshawar, ii) Roof floor of the buildings in Islamabad, and iii) Investigation of rupture in Balakot developed due to the 2005 Kashmir earthquake. This paper in fact reviews the operation of GPR systems together with a discussion of data processing and data interpretation techniques. In the area of Indus Bridge M1 GPR techniques have been used nondestructively to estimate the thickness of different layers, nature of cracks, voids spaces. In road structure surveys, GPR has been used to measure layer thickness, to detect subsurface defects and to evaluate base course quality, to estimate air void content of asphalt surfaces and to detect mix segregation. Similarly, the different floors of the buildings have been examined for weak zones developed due to cracks. In addition, GPR was used to measure the displacement of the large rupture produced in Balakot area by the 2005 Kashmir Earthquake. Future possibilities are described where the technique has great prospects in assisting engineers with their new pavement designs and in determining the optimal repair strategies for deteriorated roadways, and geologists/geophysicists as well to examine the hidden resources.