

Survei geofizik permukaan dalam pengesanan lohong batu kapur: Kajian kes di Batu Caves

(Surface geophysical measurement in subsurface cavity detection: A case study at Batu Caves)

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Pengesanan punca bencana geologi kejuruteraan di kawasan batu kapur seperti lohong batu kapur, kewujudan lubang benam dan gua-gua batu kapur telah menjadi amat penting dalam penyiasatan tapak sebelum sesuatu pembinaan seperti jalan raya, jambatan dan bangunan dilakukan. Bagitu juga dalam kerja-kerja penerowongan dan perlombongan, pengetahuan asas sifat kejuruteraan jasad batuan amat perlu diketahui untuk menilai kesesuaian dan keselamatan bangunan yang bakal dibina. Teknik geofizik telah digunakan secara meluas dalam kajian geologi kejuruteraan untuk menangani masalah yang terdapat di tapak-tapak binaan yang mempunyai batu kapur sebagai batuan dasar. Dalam kajian ini teknik seismos pantulan cetek dan kaedah geoelektrik dwikutub-dwikutub telah digunakan untuk mengesan rongga batu kapur yang terdapat di kawasan Batu Caves, Kuala Lumpur. Kedudukan dan kedalaman rongga baru kapur di kawasan kajian telah ditentukan melalui data lubang gerudi dan laporan yang diperolehi daripada Jabatan Kajibumi Malaysia. Berdasarkan data lubang gerudi tersebut terdapat beberapa rongga yang terisi air dan pasir halus berlodak di kedalaman 15.7 m hingga 17.8 m, 20.2 m hingga 21.1 m dan 21.4 m hingga 25.7 m. Tiga profil seismos pantulan cetek telah dibuat di kawasan berongga tersebut dan hasil survei menunjukkan rongga dalam batu kapur tersebut membentuk palung sepanjang hampir 20–30 m pada kedalaman antara 15 m hingga 30 m. Rentisan survei geoelektrik dwikutub-dwikutub yang dilakukan pada profil seismos satu dan tiga juga memperlihatkan kehadiran lohong dan palung dalam batu kapur tersebut.

Identification of a possible source of engineering geological hazard in the limestone area such as cavities, sinkholes and an underground cavern have become necessity for site investigation before any construction of roads, bridges and buildings are carried out. The study is also necessary for tunneling and underground mining works where knowledge of the engineering properties of the rock mass is very important in order to assess the suitability and safety of a proposed building. Geophysical techniques have been widely used in engineering geological study to deal with such problems that normally arise at construction sites with limestone bedrock. In this study, shallow seismic reflection technique and dipole-dipole geoelectrical methods were used to detect the presence of cavity in limestone area of Batu Cave, Kuala Lumpur. The exact location and depth of cavities in the area were determined from the existing bore hole data and report provided by the Geological Survey Department of Malaysia. Based on the bore hole data, several cavities that were filled-up with water and fine silt are encounter at depths of 15.7 m to 17.8 m, 20.2 m to 21.1 m and 21.4 m to 25.7 m.

Three shallow seismic reflection profiles were established on the cavity area and the results show that the cavities in the limestone occur in the form of 20 to 30 m long subterranean channel of 15 to 30 m depth. Dipole-dipole resistivity survey conducted on seismic lines one and three also indicates the presence of the channel and cavities in the limestone.
