BLASTING INDUCED GROUND VIBRATION IN ROCK QUARRIES AND APPLICABLE MITIGATION TECHNIQUES WITH SPECIAL CONCERN TO SRI LANKAN QUARRY MINING PRACTICES – A REVIEW

P.G.N. Nayanthara, K.M.G.S. Kariyawasam and L.P.S. Rohitha

Department of Earth Resources Engineering, University of Moratuwa.Katubedda.
rohithasudath@yahoo.com

In Sri Lankan rock quarries, the rock breakage is primarily done by blasting techniques. One of the major environmental issues associated with rock blasting operations is the ground vibration. Blasting near sensitive areas may cause damage to structures and nuisance to its inhabitants thus requiring utmost care to keep the vibration levels within stipulated values. The primary goal of this review study was to assess blast induced ground vibration in quarries and propose suitable mitigation techniques. In this study, a predictor was developed to estimate the safe maximum charge per delay to protect the nearby structures with special concern to Sri Lankan quarry mining practices. The widely used blast induced vibration parameter being Peak Particle Velocity (PPV), an empirical equation presented by United States Bureau of Mines (USBM) was used for the derivation of the proposed predictor. Further, the damage criteria proposed and used by the Geological Survey and Mines Bureau (GSMB) of Sri Lanka which states a maximum permissible level of 5 mm/s for PPV associated with blasting induced ground motion was used in the derivation. From the proposed estimator, if the distance to the dwelling area adjacent to the quarry from the centre of blasting location is known, the safe maximum charge per delay can be calculated. However, the predictor needs further revision since the analysis did not count the site specific parameters and frequencies associated with blast induced waves.

Keywords: Rock blasting, Charge per delay, Peak particle velocity, Empirical equation