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Surface movement monitoring of large landslide at Mount Pass, Malaysia

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A series of landslides was occurred since the beginning of the earthworks in 1999 for a cut slope at the 44th kilometer of the Simpang Pulai – Kuala Berang Highway, also known as Mount Pass, in a mountainous area of the State of Perak Malaysia. In geological aspect, the landslide occurred in schist, which outcrops in a narrow belt contained within the granites which form the mountain range. A large landslide was visible in April 2000 has developed by September 2001 into a failure approximately 75m high and 120m wide. After re-profiling works completed in September 2003, the visible landslide size is about 190m high and between 200m to 430m wide. Estimated volume of the unstable mass is about 2 to 3 million cubic meters. The total station survey to monitor landslides surface movement was started on 16 October 2003, on weekly frequency basis. Starting November 2007, the manual total station was then replaced by automatic or robotic total station (SOKKIA SRX) with hourly frequency survey. Based on data since October 2003, the landslide movement pattern was quite similar to the first two phases of movement pattern as mentioned by Varnes in 1978 where he divided the movement into three phases: i.e. primary creep, secondary creep and tertiary creep. In term of velocity, the landslide was move in the average rate of below 10mm/day and the maximum velocity reached during surges is about 100mm/day. With this velocity, it can be classified as slow movement type of landslide or Velocity Class 3 according to velocity scale proposed by Cruden and Varnes in 1996.