Challenge to health monitoring of road embankment slope

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Abstract

The structural health monitoring (SHM) is a key technology for visualizing structural health. On the other hand, because road embankment extension is often long and its height is sometimes high, it is very difficult to place many sensors and to monitor continuously. In this research, some challenging monitoring systems that approximate the SHM were proposed and developed (Fig.1).

The two-dimensional surface wave exploration and electric resistivity exploration were carried out to understand the initial condition of pre-opened road embankment. The stiffness (Vs), initial ground water table and particle size distribution were continuously obtained for many sections of embankment slope with different fill materials as the initial reference data for future inspection.

The integrated geophysical exploration and microtremor linear array measurement were also carried out for embankment slopes which have passed more than 10 years since the service. Based on the comparison between initial reference data and those obtained some years later, the soundness of the embankment slope was evaluated.

A new vibration method of non-destructive evaluation for residual tensile load of ground anchor was applied to the piled anchor system which was constructed as the countermeasure against the future slope failure of the road embankment. This monitoring technique was found to be very accurate and effective to assess the soundness of a large number of ground anchors in a short time.

The developed monitoring technologies often demands the regulation of road traffic. In order to prevent such regulations, alternative monitoring techniques which enable remote measurement or use existing infrastructure such as optical fibers were discussed.

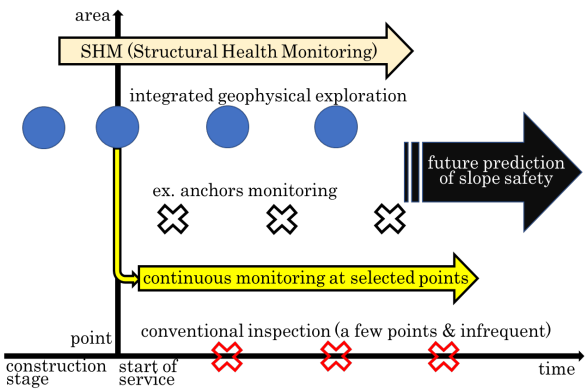

Fig. 1 SHM and development of some challenging monitoring system.

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