TRACING DEVELOPING DETERIORATION ZONES IN A DAMAGED DAM BY USING ELASTIC WAVE TOMOGRAPHY

Introduction
The concrete gravity dam built 40 years ago was partially damaged by the M=7.3 Chi-Chi Earthquake in central Taiwan in 1999. The elastic wave tomography method was applied to identify the safety conditions of the repaired dam in 2010. The resulting velocity profiles showed that the filled materials and cracks existed in some dam components. The total structure conditions were accepted as a good to questionable condition. Seven years later, the updating tracing investigation revealed that the pervious detrimental zones were spatially extended and associated with time. These testing results were also consistent with the findings from the ground penetrating radar inspection.

Discussion & Conclusions
The conventional and 3D wave tomography results indicate that different degrees of deterioration are found in concrete components with filled materials and cracks, and verified with the follow-up ground penetrating radar investigation. Most of concrete conditions are classified as a questionable (Q) or good (G) level. The detrimental zones are spatially extended and associated with time at 2010 and 2017 inspections. The concrete quality on the lowest wave velocity zones is identified as approaching the lower bound 3,000 m/s of questionable level Q. The follow-up monitoring is suggested to focus on these detrimental spots in concrete dam.