

BRIDGE MAINTENANCE PLANNING SYSTEM CONSIDERING DETERIORATION PROCESS AND LIFE CYCLE COST

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ABSTRACT : Tremendous numbers of bridges have been constructed in Japan and they contribute to formation of infrastructures. On the other hand, maintenance costs are increasing every year, as ages of bridges are getting older. Many bridges are needed some treatments, such as repairing, strengthening and monitoring, because of deterioration of the bridge and/or increasing of traffic loads. Bridge management systems (here after BMS), which assist road owners with maintaining bridges, are developing in many organizations. BMSs give a order of priority, which bridge should be mended first among bridges to be managed, to make the best use of limited maintenance budget. And also, they show an outline of countermeasures should be applied to bridges.

Recently we developed a bridge maintenance planning system, named BMCE. This system is little different from BMSs. The BMCE assists contractors when they propose countermeasures to owners for a specific concrete bridge deteriorated by salt damage or carbonation. First, the system judges the deterioration grade and evaluates the soundness of the bridge according to inspection results. Then the system predicts the deterioration process and speed of the bridge. Finally, the system proposes detailed countermeasures if necessary taking service life of the bridge and life cycle costs into account. Bridge data and proposals are output in a sheet.

The S-Bridge, a prestressed concrete T-girder bridge, was constructed in 1974 in a severe environment. The bridge, crossing an inlet on the Sea of Japan, was suffered from salt damage. Crackings of concrete and corrosions of reinforcing bars and prestressing tendons were found in a regular inspection in 1982. Then, removal of damaged concrete, patching and surface coating were carried out. However, re-deterioration were found in an inspection in 1999. Some breakings of the prestressing tendons were found. Then, the bridge was repaired again and strengthened. The BMCE was applied on the S-Bridge to evaluate the efficiency of the system. Countermeasures proposed by the system were similar to actual countermeasures have been adopted on the bridge. It was confirmed that the system is able to diagnose deteriorated bridges same as a skilled engineer and is helpful with making a maintenance plan.

KEYWORDS: bridge management system, life cycle cost, repair, strengthening

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