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ENVIRONMENTAL LOAD ESTIMATING MODEL FOR NATM TUNNEL USING CASE BASED REASONING IN THE PLANNING STAGE OF TUNNEL CONSTRUCTION

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Abstract

Energy and resource consumption in construction projects is one of major causes to global warming. In order to evaluate the environmental load of construction projects, previous approaches calculated the quantities of construction materials and energy consumption from the use of equipment based on detailed design information after the completion of design. As a result, it is difficult to estimate environmental loads prior to design completion. This study is to develop an estimating model which can assess environmental loads for tunnel construction based on information available at the planning stage utilizing a case based reasoning approach. To validate the developed model, 10 verification cases were evaluated. The result showed that the mean absolute error rate (MAER) and the standard deviation (SD) of the proposed model were 8.9% and 6.0%, respectively, while the basic unit method were 21.4% and 12.9%, respectively. These results demonstrate that the proposed model is more accurate and more reliable than the basic unit method. And the proposed model is expected to be a useful tool in reviewing environmental impacts of design alternatives and ensuring an environment-friendly design at the early stage of the project.

Key words: case based reasoning, environmental load, estimating model, tunnel

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