The present paper aims at enhancing a solution approach proposed by Anders & Nishijima (2011) to real-time decision problems in civil engineering. The approach takes basis in the Least Squares Monte Carlo method (LSM) originally proposed by Longstaff & Schwartz (2001) for computing American option prices. In Anders & Nishijima (2011) the LSM is adapted for a real-time operational decision problem; however it is found that further improvement is required in regard to the computational efficiency, in order to facilitate it for practice. This is the focus in the present paper. The idea behind the improvement of the computational efficiency is to “best utilize” the least squares method; i.e. least squares method is applied for estimating the expected utility for terminal decisions, conditional on realizations of underlying random phenomena at respective times in a parametric way. The implementation and efficiency of the enhancement is shown with an example on evacuation in an avalanche risk situation.