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Downtime Modelling for the Post-Earthquake Building Assessment Phase

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Abstract : Downtime is one of the major sources (alongside damage and injury/death) of financial loss incurred by a structure in an earthquake. The length of downtime associated with a building after an earthquake varies depending on the time taken for the reaction (to the earthquake), decision (on the future course of action) and execution (of the decided course of action) phases. Post-earthquake assessment of buildings is a key step in the decision making process to decide the appropriate safety placarding as well as to decide whether a damaged building is to be repaired or demolished. The aim of the present study is to develop a model to quantify downtime associated with the post-earthquake building-assessment phase in terms of two parameters; i) duration of the different assessment phase; and ii) probability of different colour tagging. Post-earthquake assessment of buildings includes three stages; Level 1 Rapid Assessment including a fast external inspection shortly after the earthquake, Level 2 Rapid Assessment including a visit inside the building and Detailed Engineering Evaluation (if needed). In this study, the durations of all three assessment phases are first estimated from the total number of damaged buildings, total number of available engineers and the average time needed for assessing each building. Then, probability of different tag colours is computed from the 2010-11 Canterbury earthquake Sequence database. Finally, a downtime model for the post-earthquake building inspection phase is proposed based on the estimated phase length and probability of tag colours. This model is expected to be used for rapid estimation of seismic downtime within the Loss Optimisation Seismic Design (LOSD) framework.

Keywords : assessment, downtime, LOSD, Loss Optimisation Seismic Design, phase length, tag color
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