

Location of a Temporary Site to Earthquake Waste Separation. Case study: Mexico City

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Abstract

Given the high probability of occurrence of environmental disasters in Mexico, it is necessary to have emergency and response plans that attend the most urgent needs of the victims, as well as the subsequent recovery and reconstruction processes of the affected areas. After the 2017 earthquake in Mexico City, the project “Earthquake Waste Management Proposal in Mexico City” was launched, which includes the removal of waste from the disaster site to a temporary site separation, which is a temporary storage and waste classification site before being sent to their respective recycling chains or for their proper final disposal. The selection of optimal locations for temporary sites is important for efficient management of the supply chain and humanitarian logistics. This work presents the optimal location of the temporary site based on the Transportation Model of Mixed Integer Linear Programming, which evaluates the average distance between the collapse points caused by the earthquake (demand) and the sites authorized by the Government of the Mexico City, to select n temporary sites (facilities) whose distance must be minimal. All above is necessary, in order to achieve the reduction of risks to public health and support the efficient management of waste for their proper recycling or final disposal. The methodology of the present study includes the application of the Transportation model, case study earthquake of September 19th, 2017 in Mexico City, considering next constraints: 14 collapse buildings, 8 possible sites according to official data provided, 46 439 m³ (11 482 ton) earthquake waste generation according with previous estimations by the same Project and the location of a single temporary site. The results show that the minimum total distance between each origin point and the temporary site is 534.29 km. The minimum distance traveled between the points of origin and destination is 51% less than that of the farthest site, while it is 7.95% less than that of the next nearest site. The study concludes that the location of temporary waste separation sites through the proposed model contributes to the planning of pre-disaster actions. It is necessary to continue working on this issue to increase the resilience of Mexico City and in the long term of other vulnerable municipalities of the country.

Keywords

Solid waste by earthquake, Earthquake waste management, Temporary site separation of waste, Installation location, Mixed Integer Linear Programming

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