

# **Location of a Temporary Site to Earthquake Waste Separation. Case Study: Mexico City**

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## **Abstract**

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, the last is a temporary storage and waste classification site, that is used before waste being sent to their respective recycling chains or for their proper final disposal. 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 collapsed buildings caused by the earthquake and the sites authorized by the Government of the Mexico City, to select  $n$  temporary sites whose distance is minimal. The methodology of the present study includes the application of the transportation model, to case study earthquake of September 19<sup>th</sup>, 2017 in Mexico City, considering next constraints: 14 collapse buildings, 8 possible sites according to official data provided, 1878.63 m<sup>3</sup> (97.83 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 distance traveled between the points of origin and destination is 51% less than that of the farthest site.

## **Keywords**

Earthquake Solid Waste, Earthquake Waste Management, Temporary Solid Waste Separation Site, Installation Location, Mixed Integer Linear Programming

## **1. Introduction**

Mexico is in an area with high seismic activity because it is located within the area known as the Circumpacific Belt or Ring of Fire, a place that releases between 80 and 90% of the Earth's annual seismic energy, and on the interaction of five tectonic plates (Sistema Geológico Mexicano, 2017). 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 victims, as well as the subsequent recovery and reconstruction processes in the affected areas. An important part in the elaboration of these plans involves the definition of strategies related to the management of waste generated by the disaster. This was motivated by the fact that efficient waste management influences the environmental impact caused by these events, the public health of the population involved and the process of recovering normality (Brown et al.).

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. This strategy allows the recovery of the waste generated by the earthquake and reduction of the environmental damages.

In this type of chaotic and complex circumstances the time is a key factor in safeguarding human lives that are in danger therefore the location of temporary sites with a minimum distance to disaster sites contributes to the prompt release of primary routes, the timely care of affected people and the reduction of risks to public health due to the