

Development of Technology for Diagnosing Trafficability in the Event of Earthquake and Fire

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1. Background and Objective of Research

In the case of a Tokyo inland earthquake and a Nankai trough earthquake, which are expected to occur in the future, enormous damage, such as the collapse of buildings, as well as fire, is expected to occur. For example, according to estimates by the Central Disaster Management Council of the expected damage from a Tokyo inland earthquake, approximately 410,000 buildings will be destroyed by fire and approximately 16,000 people will die in the fire (Figure 1). To reduce such human damage, it is necessary not only to improve the fireproof performance of buildings but also to reduce the influence of fire on the passage of evacuating and emergency vehicles.

In light of these circumstances, NILIM decided to initiate the development of technology for basic diagnosing of trafficability in the event of a fire in the city caused by an earthquake starting from 2017. This technical development is expected to improve proactive measures, such as improvement of the initial response and urban development, and improve a reduction in the influence on the traffic of evacuating and emergency vehicles in the event of an earthquake and fire.

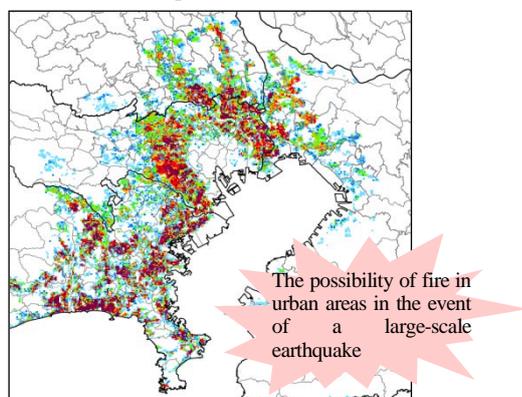


Figure 1 Distribution of the number of buildings burned down (Estimate of expected damage)

(Source) Central Disaster Management Council "Estimates of the expected damage caused by and countermeasures against a Tokyo inland earthquake"

2. Research Content

This research consists of the following three items:

- Development of methods for identifying the size and location of areas where fires can spread simultaneously and for calculating heat value, considering weather conditions
- Technology for diagnosing trafficability in the event of an earthquake and fire in accordance with the conditions of buildings along roads.

- Establishment of easy indications of trafficability in the event of an earthquake and fire, as well as consideration of the effect of countermeasures

In concrete terms, we will develop the method for identifying the size and location of areas where fires spread simultaneously, as well as the method for calculating the amount of heat generated from such areas in the places where the fire started, assuming a fire occurs in the event of an earthquake (Figure 2). Furthermore, based on this amount of heat, we also develop a technology for diagnosing trafficability in the event of an earthquake and fire, considering urban area conditions, such as the structure, height, and location of buildings along the road (Figure 3). And furthermore based on the above, we will also work on the preparation of easy indications of trafficability.

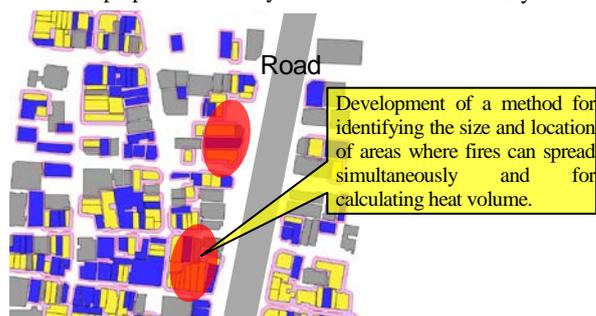


Figure 2 Identification of areas where fires spread simultaneously and calculation of heat value

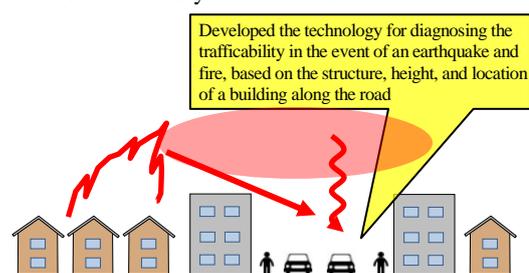


Figure 3 Diagnosis of the trafficability considering the situations of urban areas

3. Scheduled Utilization of Achievements

Concerning the research outcome, we are planning to provide technical support to contribute to the improvement of proactive measures, such as the initial response operation and urban development, and improve the related disaster response organizations.