

# Research Trends and Results

## Simple method to evaluate the effect of improving the disaster mitigation effect of redeveloping dense urban areas

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### 1. Introduction

The basic housing plan (nationwide plan) (cabinet decision passed on March 15, 2011) states a target to eliminate most of about 6,000 ha of dense urban areas that are especially vulnerable in disasters, such as earthquakes (hereinafter referred to as “high-risk dense urban areas,” Fig. 1) by 2020. It is an urgent task to accelerate the redevelopment of dense urban areas.

This paper introduces the overview of the simple evaluation sheet to measure the effect of improving disaster mitigation effects in relation to the risk of spreading fire and the difficulty of evacuation that the National Institute for Land and Infrastructure Management (NILIM) developed to assist local governments to effectively and efficiently redevelop dense urban areas.

### 2. Development of the simple evaluation sheet to measure the effect of improving disaster mitigation effects

#### (1) Objective

High-risk dense urban areas are found based on unique criteria of individual local governments based mainly on (1) risk of spreading fire (how easily fire spreads among buildings) and (2) difficulty of evacuation (difficulty of evacuation caused by obstacles in evacuation routes caused by collapsed buildings). The evaluation uses macro disaster mitigation indexes (risk of spreading fire: ratio of fire-proofed areas, resistance against spreading fire, ratio of wooden buildings, and density of houses) that are obtained by entering data of physical properties, such as buildings and roads, of an area into computation formulas. These indexes are also used to keep track of the progress of urban redevelopment projects.

The computation formulas are complicated. Thus, it is difficult to quickly identify what kind of development should be implemented and to what extent to secure basic safety in an area and what kind of redevelopment methods are suitable and effective for a given area with restricted financial resources. The simple evaluation sheet was thus developed to enable the identification of future trends of the macro disaster mitigation indexes, including the risk of spreading fire and difficulty of evacuation in an area based on redevelopment plans for public facilities and buildings.

#### (2) Characteristics of the simple evaluation sheet to measure the effect of improving disaster mitigation effects

The simple evaluation sheet to measure the effect of improving disaster mitigation effects is the computation sheet based on Microsoft Excel. It has the following functions.

- Computation of macro disaster mitigation indexes at a given time in the future obtained by entering annual

development plans

- Preparation of graphs showing trends of macro disaster mitigation indexes of each year based on details of development (e.g. re-construction of buildings and widening of roads)
- Computation of annual development cost and other conditions in a given year
- Preparation of graphs showing the relationship between project cost and macro disaster mitigation indexes for specific development (Fig. 2)

### 3. Conclusion

The simple evaluation sheet to measure the effect of improving disaster mitigation effects is going to be provided to local governments. The local governments are expected to use the sheet as a tool to manage the progress of redevelopment to eliminate high-risk dense urban areas and to find effective redevelopment methods to suit regional characteristics.

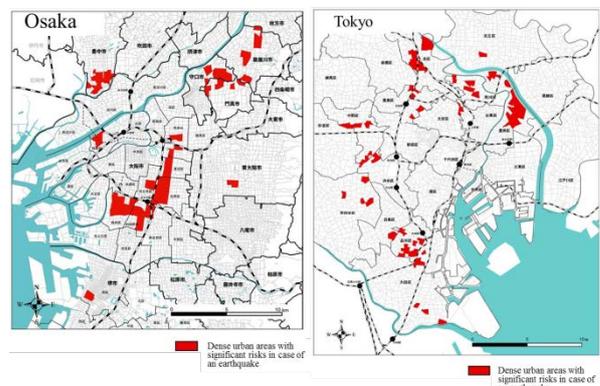


Fig. 1. Distribution of high-risk densely populated urban areas (left: Osaka, right: Tokyo)

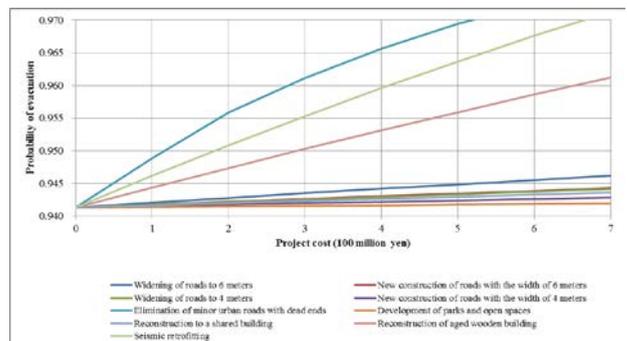


Fig. 2. An example of the relationship between the project cost by development type and the improvement of the probability of evacuation