Analysis of Levels of Rebuilding in Relation to Urban Characteristics, and Incorporation in a Revision of the Policy for Improving Densely Built-Up Areas in the Basic Plan for Housing (National Plan)

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1. Introduction

Dangerous and densely built-up areas mainly consisting of old wooden houses where large-scale urban fires could break out in the event of an earthquake still exist over a wide area of Japan; these areas need to be redeveloped with greater urgency in order to improve their disaster prevention performance. However, the urban characteristics affecting rebuilding of densely built-up areas are diverse, and levels of rebuilding leading to improved disaster prevention performance and effective measures of redevelopment are expected to differ from district to district. It is therefore important to ascertain the rebuilding rate in relation to the physical, social and economic properties of a district. These will include the state of road foundations and scale of land lots, population structure including declining birth rate, aging and population decline, and economic potential.

However, the rebuilding rate in each densely built-up areas has not become clear, owing to the difficulty of obtaining data. As a result, it has been impossible to compare the rebuilding rate in different types of urban area, or to quantitatively analyze the relationship with a district's physical, social and economic properties, which may be considered contributing factors in terms of rebuilding.

2. Construction and analysis of a macro database on urban characteristics of priority densely built-up areas throughout Japan

NILIM has therefore constructed a macro database after gathering data on individual districts in a total of 400 "priority densely built-up areas" nationwide (meaning "densely built-up areas where large-scale fires could break out in the event of an earthquake, etc., and where priority improvement is required" as announced by MLIT on July 11th, 2003). The data collected include physical indicators (building stock classified by construction year, small lot ratio, narrow street ratio, etc.), socio-economic indicators (population change, aged ratio, population by 5-year age groups, 5-year settled domicile ratio, land prices and trends in the same, etc.), and policy or project prioritization. With regard to the rebuilding rate, data on "newbuild renewal ratio" were calculated by dividing the newbuild floorspace area in recent years by stock, using data on the property tax ledger. This enabled us to ascertain the state of rebuilding for each district, compare this by type of urban area, and quantitatively analyze the correlation between the rebuilding ratio and other physical, social and economic indicators.

The analysis results quantitatively confirmed that the newbuild renewal ratio differs according to the type of urban area (Fig. 1), and that a district's newbuild renewal ratio is influenced, among others, by urban characteristics such as the aged ratio, small lot ratio, narrow street ratio (Fig. 2), distance from the nearest station, rented land ratio, and designated floor-area ratio. These have previously been pointed out empirically and qualitatively as factors hindering rebuilding.

3. Incorporation in a revision of the Basic Plan for Housing (National Plan)

In March 2011 the Basic Plan for Housing (National Plan) that defines the government's policy on improving densely built-up areas was revised. As a new target for improvement, it was indicated that approximately 6,000ha of densely built-up areas that would be markedly dangerous in the event an earthquake, etc., would be mostly eliminated in 10 years. As for basic measures aimed at achieving the improvement target, meanwhile, the Ministry conducted a study to find which measures would be effective to suit the type of urban area and urban characteristics. This was based on the results of research

by NILIM on the state of rebuilding in priority densely built-up areas, seen in terms of different types of urban areas and urban characteristics such as the narrow street ratio. As a result, in addition to conventional measures involving the rebuilding or removal of dilapidated buildings posing a high risk of fire spread or collapse, the need for finely detailed measures in relation to local characteristics were incorporated into the Plan as basic measures aimed at achieving improvement targets. These include evacuation routes and firefighting environments in historical urban areas and other similar districts where rebuilding cannot be expected. They also include the use of relaxed restrictions related to road width based on the Building Standard Law, to encourage rebuilding in districts where the narrow street ratio is high (road frontage conditions are bad).
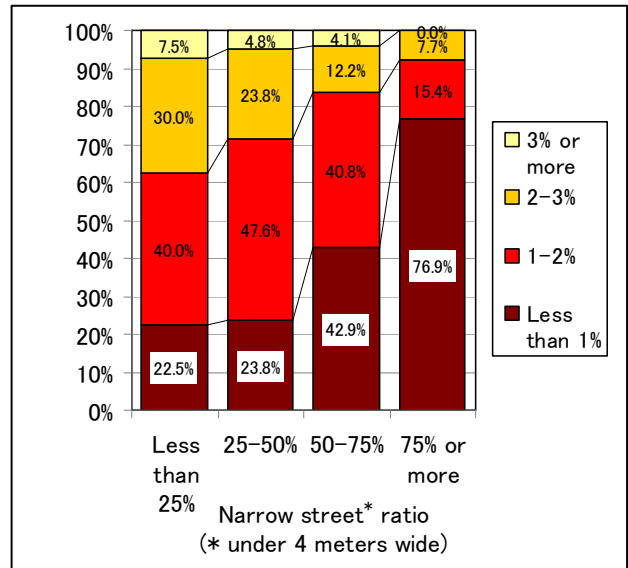

Fig. 2 Newbuild renewal ratio by narrow street ratio in connection with priority densely built-up areas nationwide (based on total floorspace area)
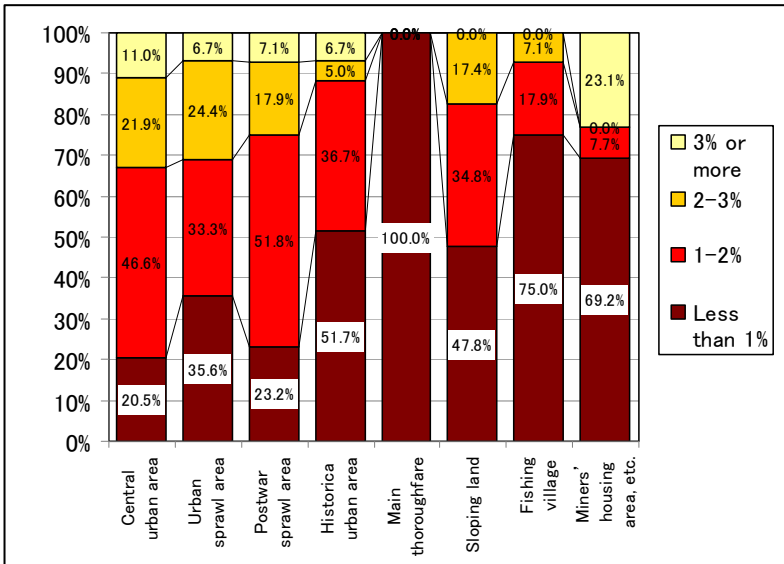

Fig. 1 Newbuild renewal ratio by type of urban area in connection with priority densely built-up areas nationwide (based on total floorspace area)