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Application of Noise Map for the Prediction and Evaluation of Road Traffic Noise in Higashiosaka City

Satoshi Atobe [1)] Yoshinori Saito [1)] Kazunori Harada [2)] Takuya Oshima [3)] Yasuhiro Hiraguri [4)]

1) Nihon Michelin Tire Co., Ltd.
880 Uekino-cho, Ota-shi, Gunma, 373-8668, Japan (E-mail: satoshi.atobe@michelin.com)
2) Okayama Prefectural University, Faculty of Design
111 Kuboki, Soja-shi, Okayama, 719-1197, Japan
3) Niigata University, Faculty of Engineering
8050 Ikarashi2-no-cho, Nishi-ku, Niigata, 950-2181, Japan
4) Kindai University, Faculty of Architecture
3-4-1 Kowakae, Higashiosaka-shi, Osaka, 577-8502, Japan

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Road traffic noise is one of the major sources of environmental noise. In Europe, action plans for reducing the exposure to environmental noise are drawn based on strategic noise maps which are produced on a five-year basis by following the orders of the Environmental Noise Directive (2002/49/EC). On the other hand, environmental noise assessment based on strategic noise maps has not been common in Japan due to difficulties in acquiring and utilizing the data which are essential for noise mapping. Recently, a practical technique suited for mapping road traffic noise in urban cities in Japan has been developed by the members of the authors. This study aims to demonstrate the application of noise maps in Japan by examining the road traffic noise in Higashiosaka City.

Figure 1 shows the road traffic noise map of Higashiosaka City, which is calculated based on the traffic volume and vehicle speed of the roads covered by the 2015 road census data of Ministry of Land, Infrastructure, Transport and Tourism (MLIT). Here, the adopted noise prediction model is ASJ RTN-Model 2018, whose prediction range is up to a normal distance of 200m from a road. As to the noise indicator, day-evening-night level L_{den} is adopted. Table 1 shows the population exposure to noise which has been estimated based on the noise map. Here, residential buildings were identified from the national base map of MLIT, and the number of households of a building was determined from the building's base area and real estate information available from the internet. Moreover, the 2015 population census data, which are published by the Ministry of Internal Affairs and Communications, were also utilized to estimate the number of inhabitants to assign to the building. As can be seen from Table 1, the number of people considered in the present prediction range is approximately 46.9% of the total population of Higashiosaka City.

To investigate the effect of several action plans with regard to the reduction of road traffic noise, the noise level and population exposure are also assessed for the following hypothetical cases;

- Reduction of noise emitted by light vehicles / heavy vehicles.
- Adoption of porous asphalt pavement.
- Deviation in noise prediction between travel speed and limit speed.

and compared with the reference (Fig.1 and Table 1). The results reveal the usefulness of noise maps for quantitatively evaluating the effect of action plans related to road traffic noise in Japan's urban cities on a macro scale.

Fig.1 Road Traffic Noise Map of Higashiosaka City

Table 1 Estimated Population Exposure to Noise

Noise level L_{den} [dB]	Number of people exposed to noise	Proportion to total population [%]
≤ 45	119,482	23.8
45 – 50	49,025	9.8
50 – 55	24,227	4.8
55 – 60	13,126	2.6
60 – 65	17,936	3.6
65 – 70	9,913	2.0
70 – 75	1,415	0.3
75 <	78	0.0