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A Study on Entrance Design of Speed Limit Zone Based on Users' Consciousness in Japan

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Abstract

Zone 30 system is being promoted into the community roads in Japan now. In order to get an effective design alternative for the entrance of the zones, a study is conducted by taking the Motoshiro region in Toyota City as the objective area and by considering the users' consciousness. The eight alternatives of entrance design based on the basis of the real community road background, including colour pavement, locating of speed limit signs, limit road marking, road edge marking, pedestrian crossings, narrowing of road and their combinations, were shown to the respondents. The study has been made incorporating the users' personalities when driving cars. The statistical analysis is carried out from many viewpoints by considering different respects. Then the proposals are summarized for promoting the speed limit zones in Japan.

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1. Introduction

In 2011, the 9th Fundamental Traffic Safety Program of Japan was finally decided and released. One of the three important viewpoints is focusing on the community road traffic safety measurements. One concrete measure is to introduce the speed limit zone widely over all Japan. Instead of the current point and line speed limits, the area speed limit system was emphasized as an effective approach in the coming years. This is the so-called Zone 30 (kilometer) system being promoted into the community roads. As a famous worldwide guideline, WHO (2008) published a manual. Furthermore, in order to make the speed limit regulation work well, the studies on ISA (intelligent speed adaptation) have been undertaken mainly in Europe, e.g., Warner and Åberg (2008), Carsten (2012) and Van der Pas et al. (2012). In Japan, regarding the speed limit regulation, Hashimoto et al. (2009,

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2010a, 2010b) have discussed about the effects of road space design at the basic road section to make the driving speed down. Officially, The Study Committee on Zone Measures for the Community Roads (2011) published a report where some proposals were listed to improve the space design at the entrance of the community roads. However, there have not been enough studies in Japan on how to let the users to recognize the community roads. Especially, there have been too few studies on the design of the entrances up to now to show a guideline for the road planners and traffic engineers.

On the other hand, Toyota City is one representative automobile dependent city where the headquarter of Toyota Motor Corporation locates. The road traffic safety has been one of the most important issues related with the city development and management. In Toyota City, Motohiro Region was designated as a Safety Walking Area by Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and the National Policy Agency in 2010. In order to get an effective design alternative, the study is conducted by taking the Motohiro region as the objective area and by considering the users' consciousness. A questionnaire survey is implemented with distributing the survey sheets to the households in the Motohiro region. The eight alternatives of entrance design are proposed on the basis of the real community road background, including colour pavement, locating of speed limit signs, limit road marking, road edge marking, pedestrian crossings, narrowing of road and their combinations, are shown to the respondents. The study is made incorporating the users' personalities when driving cars. The statistical analysis is carried out from many viewpoints by considering the different respects. Then the proposals are summarized for promoting the speed limit zones.

2. Outline of Questionnaire Survey

The outline of the questionnaire survey is summarized in Table 1. The area is 1.35km² and the population is 5,116 in Feb. 2011. Other than what shown in Table 1, 94% of respondents have had the driving licenses more than 7 years. 80% of them drive cars within 10,000km per year.

Table 1. Outline of questionnaire survey

Item	Contents
Target group	All households (2,275 in total) in the Motohiro region (to be answered by the person who drive cars most frequently in the household)
Date of survey	Middle of Feb. 2011
Survey method	Distribution by posting and collection by mail
Samples	633 (collection rate: 28%)
Contents of survey	Attributes of respondents, driving behavior, consciousness on community roads, considerations on his/her driving and the other people's driving behavior
Genders of respondents	Male: 434 persons (69%), female: 195 persons (31%)
Age distribution	10s: 1 (0.2%); 20s: 88 (14%); 30s: 147 (23%); 40s: 124 (20%); 50s: 108 (17%); 60~64 yrs: 51(8%); 65~74 yrs: 75 (12%); 75~84 yrs: 30 (5%); 85 and over: 4 (1%).
Driving frequencies	5 days/week and more: 389 (62%); 3~4 days/week: 89 (14%); 1~2 days/week: 92 (15%); 3~4 days/month: 20 (3%); 1~2 days/month: 6 (1%), almost not driving: 27 (4%)

On the basis of the previous study outputs (Hashimoto et al., 2010b) and the current road improvement situation in Japan, the alternative design was conducted by making use of the orthogonal table of the experimental design.

As the good practice in Portsmouth, the so-called gateway measurement at the entrance of Zone 20 (mile) is implemented by the colour pavement and the speed limit signs in both sides of the street. This combination has been considered as the basic measure in this study. On the other hand, although the so-called smooth pavement that the pedestrian crossings are constructed as the humps is also effective in Portsmouth, this measure is not

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