A study on problem of installation of streetlights in a historic town analyzing their distribution and residents' perception

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ABSTRACT

Streetlights are very necessary for residents also in traditional towns, although they were originally unequipped and their installation were not well-considered for traditional values of the towns. This research attempts to reveal problems on a traditional area as a fundamental study for installation of streetlights in traditional towns.

Keywords : illumination, streetlight, traditional town, safety.

1. Introduction

Many historic towns were built before streetlights were introduced in Japan and lots of streetlights have been installed after modern era. It needs to be considered carefully for historic towns when introducing something new that didn't exist before. Otherwise, it may unsuitable for preservation plan. Meanwhile, residents in historic town need streetlights for security reasons.

In this research, target sites are Hamanaka-Machi Happongi-Shuku(HMHS) area and Hamashozu-Machi Hamakanaya-Machi(HMHM) area located in a traditional town called Hizenhamashuku, Kashima city, Saga prefecture, Japan. These two sites were selected as an important preservation district of traditional buildings in 2006.

In this study, we aim to suggest a project of installation of security lighting by comparative analysis of residents' range of activities and consciousness about security, and distribution of streetlight.

2. Methods of investigation and analysis

Three steps are taken to investigate the illumination of streetlights and residents' opinions about safety.

First, investigation survey is conducted especially on positions and numbers of the streetlights as well as on their shapes and colors taking photos to record both before and after the lights are turned on. Then, illumination and range of lights at 15 places are measured at intervals of 2 meters for each streetlight.

Second, a questionnaire surveys for the residents of the target sites is conducted through visiting house to house. The questions are about roads where they usually walk, streetlight, the fear of crimes, the presence or absence of security items and so on, marking the route (road) they usually go and they feel unsafe to walk on map.

Third, illumination distribution is analyzed using RELUX program which is an illumination simulation program to create an illumination distribution diagram. The types of streetlight in the target sites cannot be specified because a date of product introduction does not remain in government office. An illumination distribution diagram is, therefore, created with the streetlight of the most similar illumination in the RELUX program with reference the illumination of the streetlight examined by ourselves.

3. Results and analysis of surveys

There were 49 streetlights in HMHS and 20 streetlights in HMHM. According to standards for road lighting for pedestrians based on Japanese Industrial Standards (JIS), the horizontal illumination, namely the average illumination on the road surface in the residential area of the road with low traffic volume must be 3 lx or more. Yet, among these, 33 out of 49 streetlights in HMHS and 12 out of 20 streetlights in HMHM were less than 3 lx. Thus, 65% of the total streetlights were not enough for the Japanese Industry Standard, so these places need to be improved (Figures 1 and 2).

Figure 1. Calculation result of illuminance of the area.

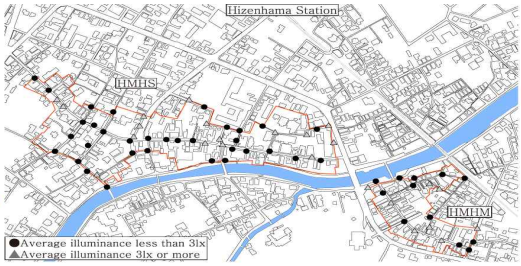

Figure 2. Distribution of streetlights less than 3 lx.

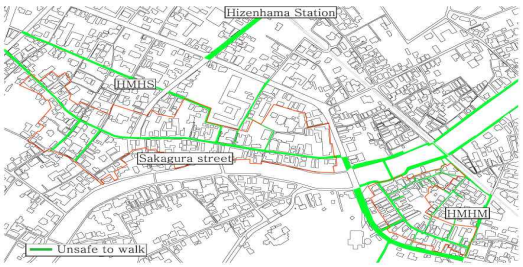

Figure 3. Places where the residents feel unsafe to walk.

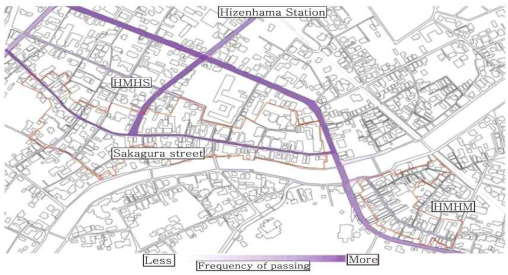

Figure 4. Routes the residents go frequently.

Also, according to the results of the questionnaire, it was found that the Sakagura street in HMHS was a route most people go frequently, but unsafe for residents to walk (Figures 3 and 4). From these results, we could find that the Sakagura street had too much traffic in spite of the narrow width with a waterway, as well as it was an important road in the area as connecting the HMHS and the HMHM.

The answers to the other items of the questionnaire survey on streetlights were as follows (Table 1):

First, it was about the brightness and the number of streetlights. They answered current streetlights are fine, and next, many people answered there are few streetlights and very dark.

Second, it was about the security items or systems they are using in house or store, and many people answered they didn't install any items or systems, and security lights were the second answered.

Third, it was about the crimes they feel unsafe in their daily life, and they said they felt unsafe in order of burglary, traffic accidents, and robbery of a car or a bicycle.

4. Conclusions and future works

In this study, we could compare the results of the illumination survey and the simulation diagram with the JIS standards, and we were able to understand the current situations of streetlights in Hizenhamashuku. Based on the results of the questionnaire survey, we were able to know the residents' opinions about streetlights and crime prevention, and what they were thinking about to make this sites into a safe and secure area. There were overwhelmingly many opinions that they want the bright lights. Moreover, we need to consider not only increasing the number of streetlights to brighten up, but also matching shapes and colors of streetlights to the atmosphere of the area.

As a future work, the residents' opinions about the streetlights should be considered and reflected to the security lighting plan of the target area in accordance with the residential environment maintenance project supported by Saga prefecture. Also, the procedure of measurement should be developed considering survey method on luminance of streetlights viewing from eye level.

Table 1. Residents' perception on the streetlights

No.	Gender	Age	Perceptions
1	Male	60s	I want to have unifying streetlights to match the atmosphere of this area.
2	Male	70s	If new streetlights don't spoil the aesthetic of this area, I will expect it for crime prevention.
3	Male	60s	There are no streetlights in the Hamashuku parking lot.
4	Female	10s	Some streetlights are turned out, so I would like to change or install a new one and increase streetlights. I think there are a lot of crime in dark place and afraid to go outside when it is dark, so it would be nice if there are more streetlights.
5	Male	60s	I don't think there are enough streetlight for the historic town. It would be nice to have unifying streetlights if it matches the atmosphere of the town.
6	Female	Older than 80s	It is scary to walk outside where there are few streetlights especially narrow streets. I wat more streetlights.
7	Male	60s	I think that it may be dark at night for tourists, if the number of tourists increase.
8	Male	70s	We need additional measures if visitors increase and go around at night.

Acknowledgement

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▌References ▐

[1] Road lighting for pedestrians, Japanese Industry Standard(JIS), 2008.