

## Research Article

# Illuminating Urban *Kampung* in Indonesia

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**Abstract.**

This paper examines the road lighting design practice in Indonesia's urban *kampung*, which is one of the important elements that shape and define an Indonesian city. However, it appears that the current road illumination standard disregards its existence and creates regulations based on the requirements of motorist. In contrast, urban *kampung* roads are more intricate due to their frequent use as shared spaces. The research explains the issue by utilizing a literature review and a case study of urban *kampung* Siwalankerto as an illustration. Even though the placement of streetlights and the measurement of average illuminance comply with SNI standards, there is no significant correlation between the perception of safety and the quantity of light deemed adequate by residents. This finding contradicts the primary function of street illumination, which is to promote night-time safety.

**Keywords:** urban *kampung*, road lighting, illumination, lighting regulation

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## 1. Introduction

The design and specifications of urban road illumination in Indonesia are regulated by the SNI standar 7391:2008 [1]. According to this standard, road lighting is intended to produce uniform illumination on the horizontal working plan, which increases driver safety and precision. The SNI 7391:2008 regulation is formulated using multiple normative references, such as Indonesia's law (Undang – Undang Republik Indonesia), government regulations (Peraturan Pemerintah), and the American Association of State Highway Officials (AASHTO) – policy on geometric design of highways and streets which tailored to conditions and preferences in USA.

SNI 7391:2008 is applied to multiple road categories based on vehicle speed, including pedestrian way, local road, collector road, and arterial road. Accordingly, urban *kampung* roads can be categorized as local roads because they are utilized by low-speed vehicles for local transportation.

However, it can be argued that illuminating urban *kampung* roads using the SNI 7391:2008 standard without considering additional factors beyond vehicle speed and



travel distances is problematic. For example, the dynamics of urban *kampung* in Indonesia are more complex and significantly influenced by the country's history and culture. There are a greater variety of social activities and requirements, and the surrounding facades are smaller in size but more intricate.

## 1.1. INDONESIA AND AMERICA IN THE FORMATION OF THE CITY

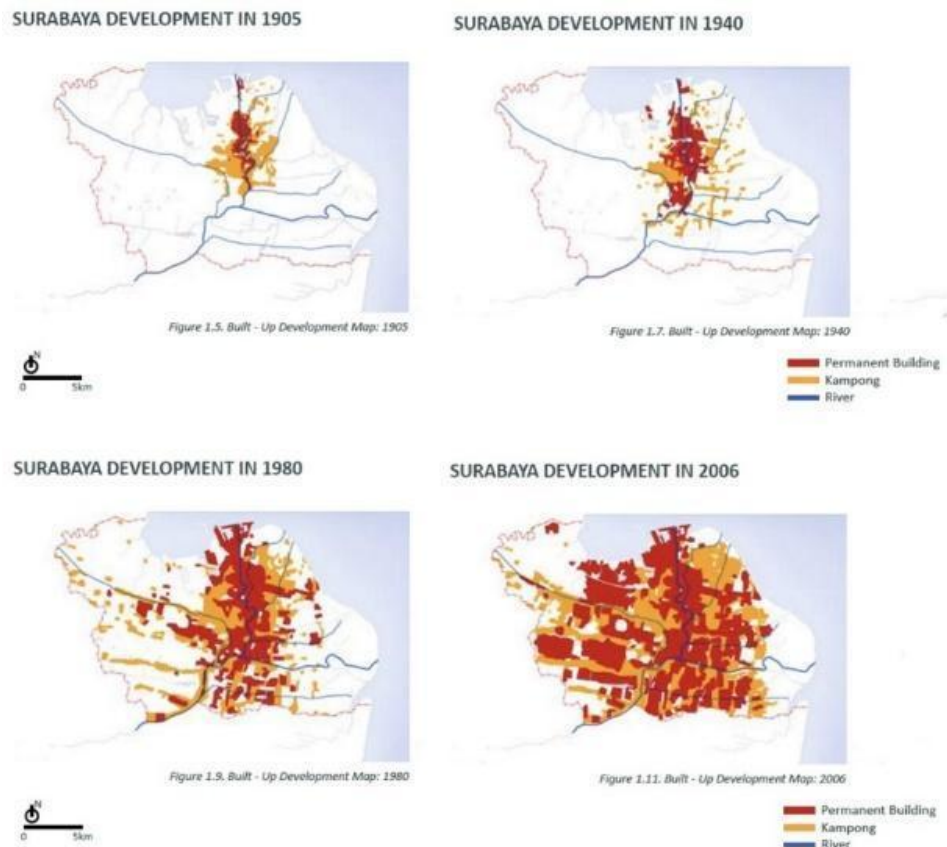
According to Damayanti, Indonesia's cities developed historically from traditional villages that expanded swiftly as a result of colonization. These localities are currently represented as urban *kampung* [2]. The urban *kampung* demonstrates a different form of urban settlement than major western cities [3]. It can be said that the community, social system, and the value of urban *kampung*s are more prominent. The residents tend to know one another and offer assistance to their neighbours. It is also common to find social activities in public spaces, with everyone openly letting the use of their private space for public purposes [2][3].

In America, however, communities are typically formed as a result of industrialization. Its cities were constructed with trade and transit in mind [4]. Due to the fact that the majority of American cities have not been historically ruled by monarchs or influenced by particular religion, the absence of 'pre-urban nuclei' is visible. So, merchant capitalism and commerce contribute more to urban development [5].

Based on the preceding description, one could argue that the adoption of the American road illumination standard might not be suitable for Indonesia, particularly for urban *kampung* roads. As Indonesian cities are formed by the continuous presence of indigenous settlers, American cities are predominantly planned and unnatural.

The existence of urban *kampung* in Indonesia is can also be look at as an example in the thesis report of H.S. Hadi, which depicts the growth of Surabaya, the second largest city in Indonesia. Images below shown the development between 1905 to 2006 [6].

Series of maps shown on Figure 1 illustrates how Surabaya city was formed from *kampung*s and continuously grew in between permanent building until 2006. Although the number of permanent buildings increased steadily, urban *kampung*s also continued to thrive. Thus, it is essential to consider the needs of urban *kampung*s as they are an integral part of Indonesia's cities.



**Figure 1:** Surabaya development and the existence of urban *kampung*.

## 1.2. ILLUMINATING URBAN *KAMPUNG* ROAD AS SHARED SPACE

Since urban *kampungs* typically consist of close-knit, one to two-storey homes, they influence the overall appearance of their surroundings, including the streets. The roads become not only a means of transportation, but also a dynamic public space. In comparison to the main roads, which are more sterile and impersonal, the rich, detailed, and varied facades become more interesting and inviting [7]. The space may be utilized by both motorist and pedestrians. This sort of area, according to Karndacharuk et al., could be classified as a shared street or shared zone. The research suggest that this form of street should be designed as a place for people, with the broader needs of residents as the primary consideration [8].

Jan Gehl stated that modern city design is heavily influenced by the speed of vehicles, which travel at 60 km/h, and tends to overlook the presence and necessity of 'slow' architecture, which is focused on the speed of walking [7]. This perplexity appears to extend to the nighttime presentation of the city. Possibly this is one of the reasons why urban *kampungs* adopt the illumination standard of main roads.

Although it is commonly discussed that higher brightness on the road at night can increase the feeling of safety and reassurance [9], other road lighting research also argues that pedestrians naturally require to do multiple tasks simultaneously or with task priority at night [10] and that ambient light at night influences people's travel decisions and supports certain behaviours [11][12]. It is also suggested that distributing light to natural objects is an alternative method for lighting a residential and pedestrian road similar to an urban *kampung* road [13] and that highly uniform lighting, which is typically used as a standard for road lighting, is probably more optimal for motorists and less efficient for pedestrians [14].

On the basis of precedence, it can be stated that illuminating urban *kampung* roads should not be regarded as simply as treating roads as transportation links for only vehicles or only pedestrians. It should be considered as public space with multiple functions, taking into account the need of residents as daily users without sacrificing the importance of safety, as the roads are also accessible to vehicles. Thus, despite the fact that current policies and regulations are influenced by political decisions and contemporary public demands [8], they do not inherently create lighting designs that promote a sense of safety [15]. Lastly, it is crucial to ensure that the road illumination can provide light for movement, orientation, comfort, and reassurance so that users can perceive safety, the adjacent environmental features, and be able to make interpersonal assessment [15][16].

### **1.3. URBAN *KAMPUNG* ROAD ILLUMINATION CASE STUDY AT SIWALANKERTO, SURABAYA**

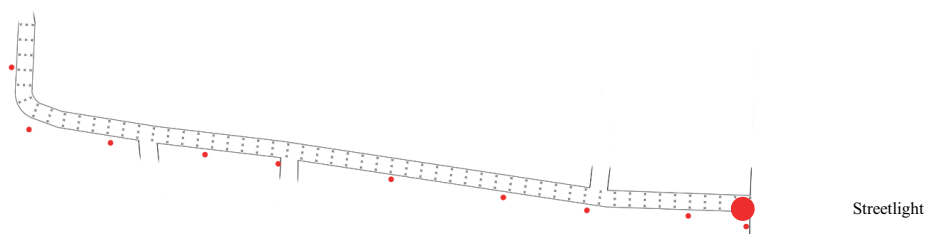
A pilot study was conducted in the urban *kampung* of Siwalankerto, Surabaya, to illustrate the application of SNI 7391:2008 in urban *kampung* roads and to determine whether it fulfils the minimum recommendations and meets the needs of local residents as the primary users.

## 2. Methods and Equipment

### 2.1. Methods

The research consisted of two parts: identifying the application of the SNI standard by measuring the level of illumination on the road at night with lux meter and comparing it with questionnaire result. Twenty-six urban *kampung* Siwalankerto residents participated in a questionnaire survey in which they were asked to evaluate the road's illumination appearance and determine whether they are satisfied or not with the current illumination appearance.

The horizontal illuminance measurement of the road includes 165 points (55 rows x 3 column) as can be seen in figure below:



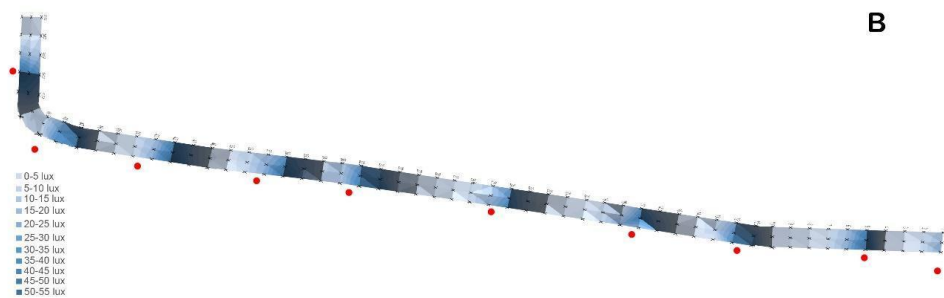
**Figure 2:** Location and placement of street luminaires and illuminance measuring points.

From the illuminance measurement, average illuminance and uniformity ratio of the street is determined. Average illuminance is determined by arithmetic formula which is adding all the illuminance result and divided it with the total number of measurement points. Uniformity counted by dividing the minimum illuminance with the average illuminance.

## 3. Results and Discussion

The result of illuminance measurement revealed the streetlights' light distribution, as depicted in the surface plot below:

Although the luminaire spacing corresponds to the SNI standard, as seen as images B and C, it does not provide an even distribution. Surface plot C demonstrates that the light distribution is concentrated close to the luminaire. Although the design provides an adequate average illuminance ( $E_{av}$ ) of 12, 94 lux, the uniformity ratio ( $U_o$ ) is relatively low and does not meet SNI requirements. The calculated uniformity ratio is 0.007, whereas the standard recommends 2-5 lux of ( $E_{av}$ ) and 0.10 ( $U_o$ ). The questionnaire



**Figure 3:** Illuminance measurement presented using scatter plot.

results also shown that only 1 participant satisfied with the lighting condition. The rest of participant have a varied opinion where 6 people are quite satisfied, 3 people are tend to be satisfied, 2 people are tend to dissatisfied, 6 people are quite dissatisfied and 8 people are dissatisfied. It can be said that the lighting design for the street is not easy meet the residence preferences. Therefore, other factors, such as natural elements and the immediate context of the street, should be considered when implementing lighting standards for urban *kampung* roads as it might improve the appearance of the street and influence the preference of the local residents.

## 4. Conclusion

In summary, this paper examines the application of the SNI lighting standard in urban *kampungs* in Indonesia through literature study and by using urban *kampung* Siwalankerto as a case study. It can be concluded designing illumination for urban *kampungs* should not be generalized as for other roads dedicated to vehicle speed due to its complex social background. The illumination of urban *kampung* road should take into account the variety of users (pedestrians, cyclists, and vehicles) and the road's regular use as a public space by local residents. Additionally, the pilot research indicates that other factors, such as resident preferences and activities, should be considered when establishing illumination design and recommendations for urban *kampung* roads or spaces.

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