

Characteristics of the Design of Landscape Lighting of Dongdaeguro in Daegu

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Abstract

The research measured 14 spots including four streetlights, five public buildings, and five officetels to obtain data needed for the improvement of townscape, grasping the characteristics of the design of landscape lighting of Dongdaeguro in Daegu Metropolitan city.

The result of the research shows that landscape lighting by outside lightings of buildings had almost no effect and also it was formed with darker landscape lighting due to high buildings that had no effect of outside lighting. In addition, landscape lighting by streetlights have no unity due to different management facilities of the lightstreets.

Key Words : Landscape Lighting, Streetlight, Building Lighting

1. Introduction

1.1 Background and purposes of the research

Landscape lighting illuminates the night and features of buildings. It promotes stability and comfort, and displays an aesthetic mood. Also, the landscape of a city at night provides special sights to the city's visitors as well as to the city's citizens. As our society's active time expands to midnight, the importance of such landscape lighting is

emphasized.

More recently, led by Seoul metropolitan-level officer of the city is Establishing or a plan has established Urban Night-Scape Plan[1] .

However, until today, outside lighting of a city mainly consisted of road lights and streetlights for crime prevention. In addition, some landscape lighting was installed for bridges and special objects. The city of Daegu largely lacks landscape lighting during the night for visitors, to form a favorable image of the city.

Our research obtained data useful for the improvement of the city's fine view. We focused on the characteristics of the design of landscape lighting in the vicinity of the Dongdaeguro station, which is a gateway of Daegu.

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1.2 Scope and method of the research

The Dongdaeguro station, the Fatima hospital, and the Beomeo crossroads were selected to represent the landscape of Daegu for the study. A total of fourteen locations were measured.

The measurement period was from 7 to 12 July, 2008. The locations were measured for one hour after sunset, between the hours of 8:45pm and 12am. The measurement height was the average height of a pedestrian (150[cm]). The measurement angle was $1/3[^\circ]$. The luminance of illuminated planes of the subjects was measured in accordance with the luminance measurement method (KSC7613) and road lighting standard (KSA3701)<Fig1>.



Fig. 1. Measurement machinery

Luminance meters (LS-110) were used on tripods to prevent their vibrations. In order to visually view their luminance, photos were taken in the day and night. Two persons, trained in advance on these methods, performed the measurements.

2. Dongdaeguro

2.1 Local Environment

The length of Dongdaeguro is about 2,250[m] and its width is about 70[m]. There are six to ten lines.

Dongdaeguro is located in the biggest commercial area of the city of Daegu. The city identified it in 2008 as one of thirteen special landscape management areas.

Dongdaeguro has three crossroads over the road. The characteristics of each crossroad is different. For example, since the section from the Fatima hospital to Dongdaegu station crossroads is a gateway of Daegu, it is closed to Ayangro and it has a lot of traffic.

In the section from Dongdaegu station to the MBC crossroads there are many public buildings and high commercial buildings such as the Dongbu fire station, the Gyeongbuk custom, the chamber of commerce and industry, the Daegu design center, and the culture house for Daegu's juveniles. Since the median strip of the section is planted with many trees, it presents a very unique landscape.

The section from MBC crossroads to the Beomeo crossroads has many commercial facilities and high-rise mixed-use residential buildings that are being constructed, along with the Daegu MBC, the Daegu district court, and the Daegu high court. Since nine mixed-use residential buildings with more than 20 floors are scheduled to be completed around 2010 in this section, it is predicted that a disharmonious skyline will be created due to the mixture of the existing low buildings and the high-rise mixed-use residential buildings<Fig 2>.

2.2 Standards of landscape light

The Commission Internationale de l'Eclairage (CIE) divides the environment into four sections- E1, E2, E3, and E4- according to the luminance of an area. The subject area of the research, Dongdaeguro, is a commercial area and belongs in E4. E4 is active during the night time<Table 1>.

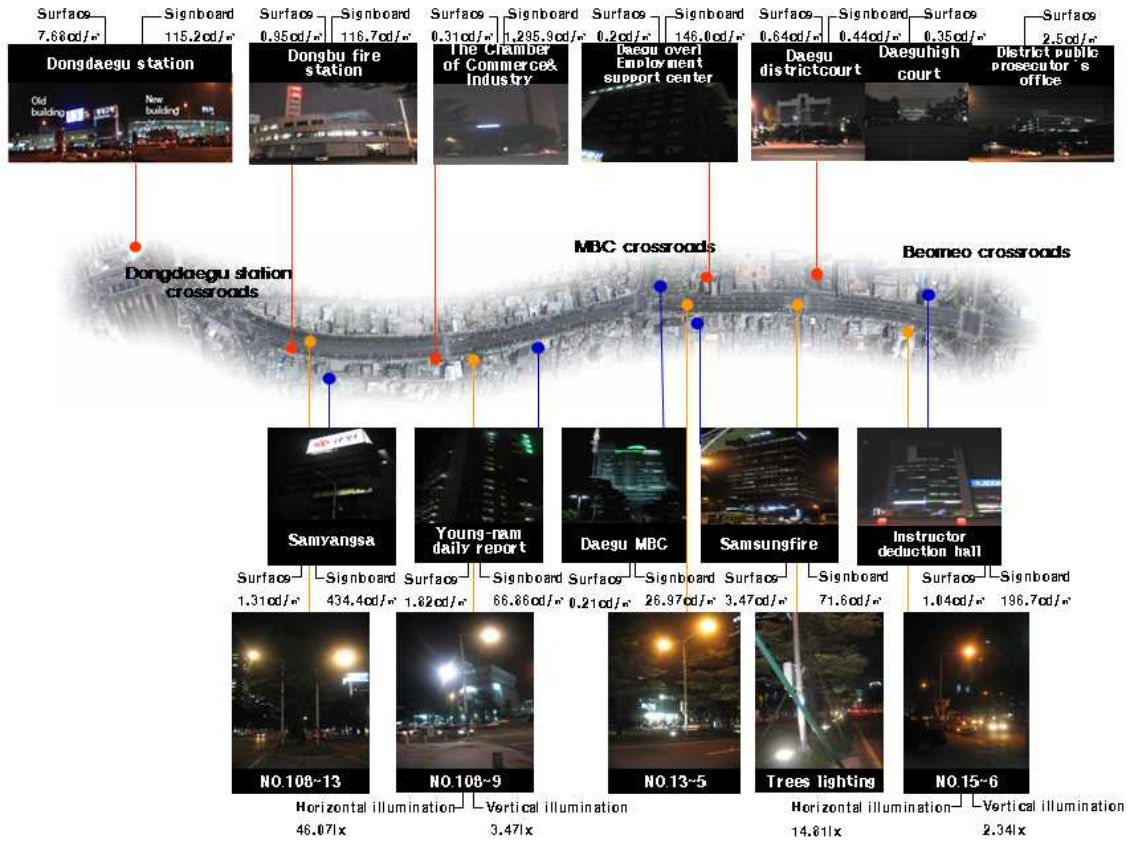


Fig. 2. View of Dongdaegu

Table 1. CIE Classification and the maximum ostensible luminance of environmental sector

Area	Environmental area	Application	Surface type	
			Building Surface	Advertising board Surface
E1	Area of dark view	National park etc.	5	50
E2	Area of low-end luminance distribution	The suburbs and suburban-style housing	5	400
E3	Area of luminance distribution of intermediate degree	Town residential area	10	800
E4	Area of high luminance dispersion	The area where the nighttime activity is active	25	1000

Also, Korean industrial standards(KS) divide roads into four sections according to their traffic and localities, and suggests standards of horizontal

illumination and vertical illumination as follows <Table 2>.

Table 2. KS Standard(KS A 3701-1991)- standard of illumination of road about pedestrian

Pedestrian traffic at nighttime	Area	Illumination ([lx])	
		Horizontal illumination	Vertical illumination
Road where there is much traffic	Residential area	5	1
	commercial area	20	4
Road where there is rarely traffic	Residential area	3	0.5
	commercial area	10	2

3. Characteristics of landscape lighting in Dongdaegu

3.1 Characteristics of landscape lighting according to buildings

Since buildings near Dongdaegu are more public than commercial (department stores, selling agencies, etc.), there are not many incidences of landscape lighting among buildings.

Signboards of buildings are usually installed on



the outside walls or roofs of buildings. Only one building (the Daegu building of Samyang Corporation) has a relatively wide signboard compared with the size of the building.

Sodium lamps, LED, metal halide lamps, neon, fluorescent lamps, cold cathode, and other sources are used for lighting outside buildings. Among the sources, LED is used the most. These light sources are usually used for sign boards and outside sign lamps<Table 3>.

In July the luminance of buildings was measured. The skylight was 0.03~0.38[cd/m²]. The luminance of building surfaces was 0.2~12.81[cd/m²]. They did not meet the standards of CIE. They were too low.

The luminance of inside lightings coming through windows was 4.06~2260[cd/m²]. Except for the new Dongdaegu station building, of which the luminance of inside lightings was 2260[cd/m²], we believe the luminance of inside lightings of other buildings hardly influenced the landscape lighting. Since the outside walls of the new Dongdaegu station were built with windows, its inside lighting radiates outside through the windows and functions as an outside lighting. It shows a very high level of luminance<Table 4>.

Table 3. Lighting present condition by Building

		Pictures	Lighting present condition		
			Present part	Lighting fixtures	Lighting method
Public buildings	Dongdaegu station		Outer wall Letters signboard	Sodium-vapor lamp LED Metal Halide Lamp	Down lighting Uplighting
	Dongbu fire station		Letters signboard	Neon sign	Luminescence


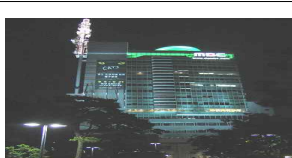
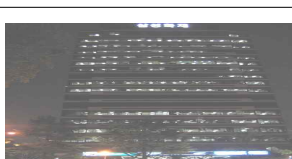
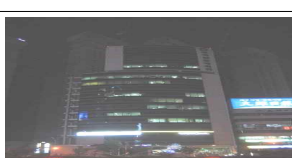



		Pictures	Lighting present condition		
			Present part	Lighting fixtures	Lighting method
	The Chamber of Commerce & Industry		Letters signboard	LED	Luminescence
	Daegu overl Employment support center		Letters signboard	LED	Luminescence
	Daegudistrict public prosecutor's office Daegu high court District court		-	-	-
Office buildings	Samyangsa Corporation		Letters signboard roof signboard	LED fluorescent lamp	Luminescence
	Young-nam daily report		Letters signboard	LED	Luminescence
	Daegu MBC		Outer wall letters signboard	Metal Halide Lamp Cold Cathode LED	Luminescence Wall Washing Lighting
	Samsungfire		Roof signboard letters signboard	LED fluorescent lamp	Luminescence
	Instructor deduction hall		Roof signboard	Fluorescent lamp	Luminescence

Table 4. Luminance distribution by Building

			Pictures	luminance distribution ([cd/m ²])				
				The sky	Building surface	Surface of advertising board	The inner light which leads the window	Sign-board
public buildings	Dong daegu station	Old building		0.19	7.68	58.03	4.06	115.2
		New building		0.15	12.81	-	2260	93.74
	Dongbu fire station			0.33	0.95	-	13.31	116.7
	The Chamber of Commerce & Industry			0.08	0.31	-	3.31	1295.9
	Daegu overl Employment support center			0.04	0.2	-	-	146
	Daegu district public prosecutor's office			0.03	0.64	-	-	0.44
	Daegu high court			0.05	0.35	-	-	-
	Daegu district court			0.06	2.5	-	7.7	-
Office buildings	Samyangsa Corporation			0.2	1.31	202.1	11.84	434.4
	Young-nam daily report			0.08	1.82	-	5.91	66.86
	Daegu MBC			0.04	0.21	-	16.2	26.97
	Samsung fire			0.38	3.47	-	13.2	71.6
	Instructor deduction hall			0.05	1.04	-	4.7	196.7

3.2 Characteristics of lighting environment of streetlights

Because Dongdaeguro is a wide road, a median strip and streetlights in sidewalks were installed. The section from Fatima hospital to the MBC crossroads is managed by Donggu, and the section from MBC crossroads to Beomeo crossroads is managed by Suseonggu. There is no difference in the kinds of road surface, the widths of road, the methods to arrange lamp poles, and the heights of lamp poles, but there are differences of 25-40[m] exist in the distances of lamp poles. It is believed the reason that the distances of lamp poles are different is because of road conditions that cannot apply the same distance for lamp poles.





The reason the lamps and light sources are different is believed to be because of the different management facilities. The section managed by Donggu has metal halide lamps with a cutoff type, and the section managed by Suseonggu has high pressure sodium lamps with a semi cutoff type.

The horizontal illumination of Dongdaegu station crossroads to MBC crossroads was 46.07[lx] and the vertical illumination was 3.47[lx]. The horizontal illumination met the standard but the vertical illumination did not reach the standard of 4[lx].

The horizontal illumination of MBC crossroads to Beomeo crossroads was 14.61[lx] and the vertical crossroads of it was 2.34[lx]. Both did not reach the standards because Daegu city had an every-second-streetlight-turnoff-system to prepare for the rising oil prices from 11 July. The number of streetlights turned off due to the system was 20,700, and Daegu city predicted that about 1.9 billion won would be saved for one year. However, since the every-second-streetlight-turnoff-system drops the visibility of a driver at night, the risk of car accidents increases.

In Dongdaeguro, the median strip is planted with trees and the road is wide, and there is almost no lighting effect of the opposite streetlights. Consideration of this road environment, as an energy saving plan should be made<Table 5>.

Table 5. Condition of streetlights(2008)

Avenue	The section from Dongdaegu station to MBC crossroads		The section from MBC crossroads to Beomeo crossroads	
Pictures				
Administrative district	Donggu		Suseonggu	
Road surface type	Concrete			
Road length([m])	1,000		760	
Road width([m])	60		60	
Arrangement method of lamp poles	Zigzag		Zigzag	
Heights of lamp poles ([m])	10		10	
Distances of lamp poles ([m])	25~40	32~33	33~40	34~38
Lighting form	Cut off		Semi cut off	
Source of illumination	Metal Halide Lamp	Metal Halide Lamp	High tension sodium-vapor lamp	High tension sodium-vapor lamp
Illumination ([lx])	Horizontal illumination		14.61	
	Vertical illumination		2.34	

4. Results

Our study measured fourteen locations including four streetlights, five public buildings, and five officetels near Dongdaeguro. The data we compiled can be useful for improving the city landscape, and the design of the landscape in Dongdaeguro of Daegu metropolitan city.

The results of the study suggest that landscape lighting by outside lighting has almost has no effect, and also darker landscape lighting is formed by high buildings which have no effect on outside lighting. In addition, landscape lightings by streetlights have no unity due to different management facilities.

Therefore, a total lighting design that makes architectures, lightings, and surrounding environments consistant and harmonized is needed. The design must take into account the image of the city, Daegu. It must also display the characteristics of buildings, secure stability and comfort and include aesthetical landscape lighting.

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Biography



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