

Preface

Light is experienced subjectively, its performance influencing the character and "atmosphere" of a space. Attractively illuminated urban elements and spaces induce emotions and feelings of pleasantness, leaving a trace in the memory. As a result of broad research in the field of lighting lasting over one hundred years, we have reached a point when certain, very important lighting parameters can be numerically expressed. However, our emotions sense much more. Therefore, lighting quality cannot be expressed through metrics alone.

The purpose of this book is to direct the readers' attention toward the numerous lighting quality factors, which need to be appropriately addressed in order to achieve optimal urban lighting solutions. The relevant lighting standards generally deal with technical aspects and various metrics of urban lighting. This is why our main objective was to focus on guidelines and recommendations regarding quality factors of urban lighting that cannot be numerically expressed. They rely heavily on the results of our own long-lasting research and experience.

Elaboration of some topics presented here was partly given in our previous books (all in Serbian):

- Djokic L (2007) Architectural Lighting: Design Requirements and Guidelines. University of Belgrade, Faculty of Architecture, Belgrade, Serbia
- Djokic L (2012) Illuminating Urban Elements and Spaces: Harmony Through Masterplanning. University of Belgrade, Faculty of Architecture, Belgrade, Serbia
- Kostic M (2000) Lighting Guide. Minel-Schreder, Belgrade, Serbia
- Kostic M (2014) Theory and Practice of Low-Voltage Electrical Installations Design, 3rd edn. Academic Mind, Belgrade, Serbia

Believing that the reader should be familiar with the lighting basics in order to deal with lighting design issues, we started with the physics of light, the human visual system, light sources and luminaires (Chapters 1-4). Trying to explain the relevant terms and their relations in a simple, concise, coherent and comprehensive way, we invested a lot of effort to fulfil an extremely difficult task we set: to explain all terms only through articulation founded on the previously given explanations and well-known scientific facts. An additional effort was made to present the matter with clarity in limited space.

Chapters 5-7, devoted to applications, are concentrated on the three basic types of urban lighting:

- functional (street and road) lighting, where the relevant standards and recommendations have been critically addressed, and particular emphasis given to energy efficiency,
- architectural (decorative) lighting, contributing to the overall urban night character and city beautification, which was treated through comprehensive guidelines and recommendations, and
- ambient lighting (lighting of squares, parks and other spaces dominated by pedestrians), where special attention was devoted to the amenity aspect and creation of ambience.

Illuminated streets, buildings and ambiances demand coordination of lighting effects in order to provide harmony and stress the hierarchy between individual urban elements of different significance. This and other issues of lighting masterplanning were addressed in Chapter 8.

Titles of some sections (subsections) are followed by a list of references, which means that the text of the corresponding section (subsection) is mainly based on the cited references. References positioned within a sentence relate to the sentence, and those placed out of a sentence to the previous text of the corresponding paragraph.

Each chapter ends with questions and their answers, some chapters containing solved problems, aimed to additionally clarify the presented topic and provide improved understanding and implementation of the absorbed knowledge, for both practitioners and students.

Practice gained during the past few decades showed that in addition to safety, security and visual comfort, the four major aspects of urban lighting are city beautification (which always represents a benefit for the society through positive effects on citizens, visitors, tourism and night economy), energy efficiency, costs and environmental issues (such as elimination or limitation of toxic waste and light pollution). In order to prevent lighting solutions which neglect the appearance of urban spaces (usually driven by energy efficiency only), besides technical information, this book offers guidelines and recommendations needed to achieve attractive ambiances.

In addition to lighting designers and city (municipality) authorities, this book is aimed for the attention of students of lighting design (mainly students of architecture and electrical engineering). The parts devoted to applications and lighting masterplanning will also be useful for city planning offices with different areas of expertise (spatial planning, traffic, environmental impacts), manufacturers of lamps, control gear, luminaires and adaptive systems, as well as for companies in charge of urban lighting installation and maintenance.

Although aware of quick changes in both lighting technology and regulations, we believe that a great deal of the knowledge presented in this book will be lasting.

We would like to thank Dr. Peter Boyce for his patient and thorough analysis of the manuscript and the useful and much appreciated comments, which enormously helped us improve the text and stay on track. The final positive opinion of Dr. Boyce was a great relief.

Our gratitude is also aimed toward Aleksandar Prvulj, Dipl. Ing. El., for his constant support and interest in the manuscript, as well as for his help in finding photos which best illustrate the stated recommendations. To Dr. Aleksandra Cabarkapa, Dipl. Ing. Arch., we owe acknowledgement for her contribution regarding ambient lighting and the preparation of the figures in the first five chapters. We are also grateful for the tremendous help of Marko Davidovic, Dipl. Ing. El., who spent a lot of time dealing with the text, photos and tables.

This book contains numerous figures including a large number of photos of illuminated buildings, bridges, urban ambient etc., which all contribute to the expressed ideas, explain our professional opinion and confirm the offered recommendations. Aware of their great importance, we would like to express our gratitude to all individuals, organizations and companies that generously allowed us to use their material.

Finally, the authors would like to express their gratitude to the Ministry of Education, Science and Technological Development of the Republic of Serbia, that partly financed the research, as well as to all companies that sponsored the publication of this book.

With hopes that the book will contribute to the creation of safe, secure, visually comfortable, attractive, energy efficient and environmentally friendly urban spaces, we will be thankful for all future remarks coming from attentive readers.

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