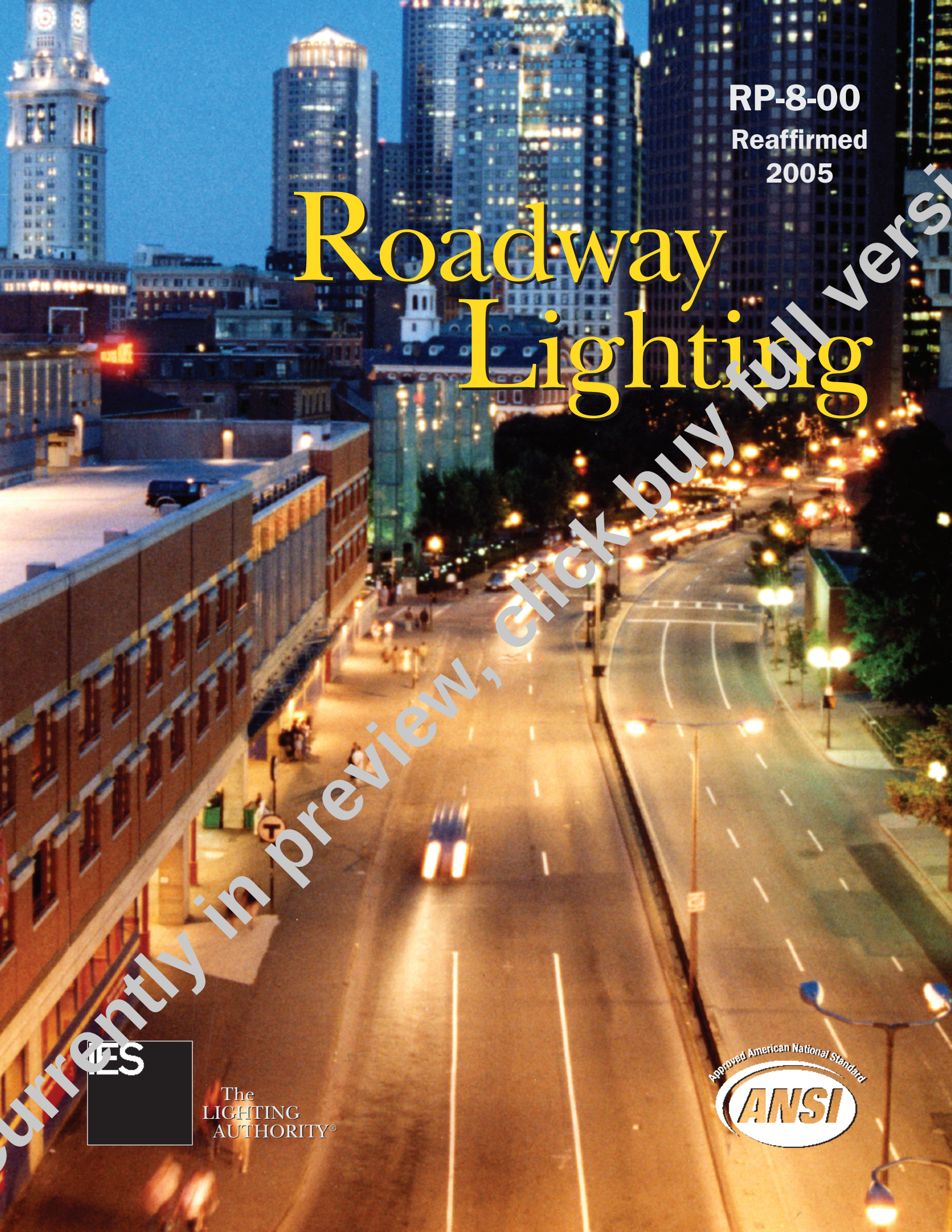

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Roadway Lighting

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American National Standard Practice for Roadway Lighting

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FOREWORD

(This Foreword is not part of the American National Standard Practice for Roadway Lighting, ANSI/IESNA RP-8-2000, but is included for informational purposes only.)

This American National Standard Practice for Roadway Lighting has been approved under the rules of procedure of the American National Standards Institute and under the sponsorship of the Illuminating Engineering Society of North America (IESNA). This document has been revised from the 1993 Practice and introduces the concept of Visibility Level (VL) (refer to **Annex A** and **Annex F**) and its measurement means, Small Target Visibility (STV). The illuminance and luminance (reflected light) methods have been retained from the 1993 practice.

During the 70-year existence of the IESNA Committee on Roadway Lighting, the night use of public ways has grown greatly. Traffic has changed in speed and density. Studies have established a substantial relationship between good fixed lighting and traffic safety. In addition, understanding of the principles of good lighting has advanced. The following earlier publications of the committee reflect progress of the roadway lighting technique through the years.

- *Principles of Streetlighting* 1928
- *Code of Streetlighting* 1930
- *Code of Streetlighting* 1935
- *Code of Streetlighting* 1938
- *Recommended Practice of Streetlighting* 1940
- *Recommended Practice of Street and Highway Lighting* 1945
- *American Standard Practice for Street and Highway Lighting* 1947
- *American Standard Practice for Street and Highway Lighting* 1953
- *American Standard Practice for Roadway Lighting* 1963
- *American Standard Practice for Roadway Lighting* 1972
- *American Standard Practice for Roadway Lighting* 1977
- *American Standard Practice for Roadway Lighting* 1983
- *American Standard Practice for Roadway Lighting* (reaffirmed) 1993

The present Practice has evolved from these earlier documents, and considers the latest research, international standards, experience, and equipment technology.

An American National Standard represents the consensus of all groups having an essential interest in the provisions of the Standard Practice. The IESNA, as a sponsor, must have the viewpoints of groups interested in roadway lighting represented on the Roadway Lighting Committee.

1.0 INTRODUCTION

1.1 Purpose of this Standard Practice

The primary purpose of this Standard Practice is to serve as the basis for design of fixed lighting for roadways, adjacent bikeways, and pedestrian ways. The Standard Practice deals entirely with lighting and does not give advice on construction. Its purpose is to provide recommended practices for designing new continuous lighting systems for roadways. It is not intended to be applied to existing lighting systems until such systems are redesigned. It has been prepared to advance the art, science, and practice of roadway lighting in North America. Roadway lighting includes pedestrian and bikeway lighting when it is associated with the public right-of-way (**see Figure 2**).

The decision to provide or upgrade roadway lighting at a particular location should be made on the basis of a study of local conditions. Once a decision has been made to provide lighting, this publication provides the basis for designing an appropriate system.

1.2 Purpose of Roadway Lighting

The principal purpose of roadway lighting is to produce quick, accurate, and comfortable visibility at night. These qualities of visibility may safeguard, facilitate, and encourage vehicular and pedestrian traffic. Every designer should provide for those inherent qualities required by the user. A very important consideration is that of making streets and highways useful during hours of darkness as well as during the daytime. Where good visibility is provided through lighting, efficient night use can be made of the large investments in roadways and motor vehicles. Thus, the proper use of roadway lighting as an operative tool provides economic and social benefits to the public including:

(a) Reduction in night accidents, attendant human misery, and economic loss
(b) Aid to police protection and enhanced sense of personal security
(c) Facilitation of traffic flow

(d) Promotion of business and the use of public facilities during the night hours

This Standard Practice is for fixed lighting of the different kinds of public roads, including adjacent pedestrian walkways and associated bikeways, of a quality considered appropriate to modern requirements for night use. The practicability and economy of roadway lighting has been demonstrated. Where appropriate lighting has been installed, the result has often been a marked reduction in night accidents. Pedestrian and vehicular traffic has also been expedited.

1.3 Visual Components of the Driving Task

In order to drive a vehicle on a paved roadway with reasonable confidence, speed, and safety, a driver must visually determine the following:

(a) That the pavement ahead is clear of defects and obstacles for a reasonable distance
(b) The locations of the lane or roadway edges, within which it is intended to maintain the lateral position of the vehicle
(c) The location and meaning of the traffic control devices and signs that affect the "rules of the road"
(d) The present location and future course of moving objects on or near the roadway
(e) The present position of the driver's own vehicle relative to his immediate destination, other objects, and intended turning locations

1.4 Means of Nighttime Lighting

The nighttime lighting for providing visibility or guidance for the driver can come from up to four sources:

(a) Vehicle signals and headlighting systems as required by law
(b) The fixed lighting system covered by this Standard Practice
(c) Traffic signal lights and lighted or retroreflective signs
(d) Extraneous off-roadway light sources

1.5 Night/Day Accident Relationship

Darkness brings increased hazards to users of streets and highways because it reduces the distance they can see. The nighttime fatal accident rate on unlighted roadways is about three times the daytime rate, based on proportional vehicular kilometers/miles of travel. This ratio can be reduced when proper fixed lighting is installed because these lighting systems reveal the environment beyond the range of the vehicle headlights and ameliorate glare from oncoming vehicles by increasing the eye's adaptation level.

Experience has demonstrated that under many circumstances prevailing in North America, it is possible to light urban and suburban streets and highways, so as to reduce the loss of lives and injuries attributable to inadequate visibility. Furthermore, the IESNA Roadway Lighting Committee is of the opinion that the lighting of streets and highways generally is economically practical. These preventive measures can cost a community less than the accidents caused by inadequate visibility.

1.6 Background for Design Criteria

Research has shown that lighting roadways with significant nighttime traffic volume will reduce nighttime accidents. (See **Annex H**, references 1, 2, and 3.) Recent research is concentrating on visibility measurements and results are promising (see **Annex F**). This Standard Practice includes three criteria for designing continuous lighting systems for roadways. These are illuminance, luminance, and Small Target Visibility (STV). Illuminance based design is a simple design approach, which has been historically used in roadway lighting. It calculates the amount of light on the roadway surface. Luminance based design calculates the amount of light directed toward the driver and predicts the luminance of the roadway. STV is a visibility metric, which is used to determine the visibility of an array of targets on the roadway and includes the calculation of target and background luminance, adaptation level, and disability glare. The designer should be familiar with each criterion and may choose the one that meets the needs of the particular situation and design restraints. Consideration may be given to meeting the requirements of two or all of these design criteria.

The illuminance design approach has been shown to be of benefit in reducing pedestrian accidents, reducing fear of crime, and the promotion of business and use of public roads at night. The lighting design for sidewalks, bikeways, intersections, and high mast installations is often best achieved by the use of the illuminance criterion. Luminance has been used internationally by the CIE[4] as the primary method for designing major vehicle traffic routes. STV is a new approach to improve driver safety, which incorporates recent studies of human visual processes. There is currently an active international committee working to develop a visibility recommendation for the design of traffic routes. (CIE Division 4, Technical Committee 4.36, Visibility Design for Roadway Lighting.)

The other parameter in roadway lighting that affects visual performance is the glare from the fixed lighting system. Disability Glare (Veiling Luminance) has been quantified to give the designer information to identify the veiling effect of the glare as a ratio of the maxi-