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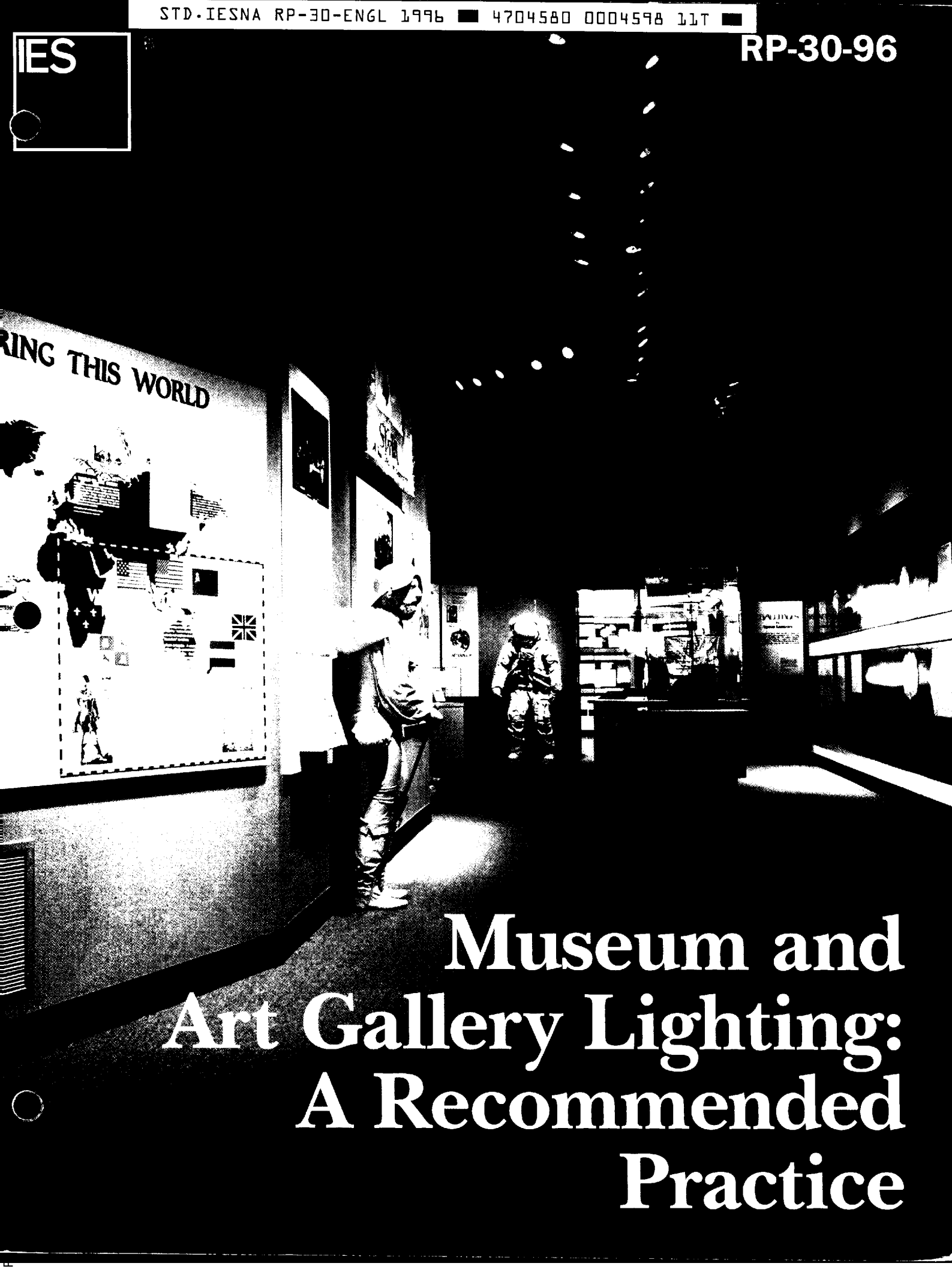

Museum and Art Gallery Lighting: A Recommended Practice

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Publication of this Draft Standard for trial use and comment has been approved by the IESNA. Distribution of this draft standard for comment shall not continue beyond March, 1999. It is expected that following this date, RP-30-96, revised as necessary, will be submitted to the American National Standards Institute for approval as an American National Standard. Suggestions for revisions should be directed to IESNA.

Prepared by the IESNA Committee on Museum and Art Gallery Lighting

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IESNA Standards and Guides are developed through committee consensus and produced by the IESNA Office in New York. Careful attention is given to style and accuracy. If any errors are noted in this document, please forward them to Rita Harrold, Director of Educational and Technical Development, at the above address for verification and correction. The IESNA welcomes and urges feedback and comments.

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INTRODUCTION

Museums and art galleries collect, preserve, and display natural artifacts and/or examples of human achievement and analyze their impact on the world and the universe around us. Effective exhibit lighting must balance exhibition and conservation needs and enrich the museum experience.

Decisions regarding museum lighting must consider the curator's intended message, the designers' aesthetic presentation, and the conservation needs of the artifact on display. Often the persons having input to these decisions have diverse educational backgrounds and varying levels of lighting expertise. This Recommended Practice, intended primarily for the lighting designer, enhances the decision making process by providing specific standards for satisfying the special requirements of museums and art galleries. Other decision makers, such as the museum administrator, the curator, the conservator, and the exhibit designer, can use this Recommended Practice to improve understanding and communication throughout the exhibition process.

Guidance in lighting design for museum shops, restaurants, and office spaces is provided in other IESNA Recommended Practice publications[1] and in the *IESNA Lighting Handbook, 8th Edition*.[2]

1.0 SUCCESSFUL MUSEUM LIGHTING

1.1 Priority Balance

Exhibit lighting impacts several important groups, including museum curatorial, educational and conservation staffs, designers, and visitors. These groups have different expectations and unique priorities with regard to lighting. For example, museum administrators are most concerned with achieving occupant comfort and long-term lighting system economy, while designers are primarily concerned with achieving clear object form.[3] At the same time, visitors are most interested in the clarity of object form *and* accuracy of color.[4] Effective museum lighting must balance the concerns of each group. Lighting design is truly a collaborative art.

1.2 Systems Approach Solution

In addition to meeting the needs of various groups, successful museum lighting also depends on team decisions and a systems approach to design.[5] While museum lighting can strongly influence the aesthetic appreciation of an artifact, it also affects the building envelope that houses these artifacts. Team decision making, involving the client, the user, the conservator, the designers, and the maintenance staff, should occur from the beginning of a project, and should rely on the expertise of the various members of the team to achieve the goals established.

The systems approach to design considers the interactive impact of lighting on museum occupants, artifacts, and the environment. For example, the placement of artifacts relative to their conservation needs can greatly affect the overall illumination levels, the intended message of the curator, and the physical layout of the gallery. A systems approach to lighting would consider jointly the conservation requirements, the message, the layout, and would maximize the strengths of each. The success of this process depends on three rules, and these are more policy than procedure:

- The artifact should be visible when on display. There is no point causing a little damage (with insufficient light) for no purpose (the artifact cannot be seen).
- The institution must decide how much light damage in how much time is acceptable, i.e., what lifetime is desirable.
- The institution must acknowledge the sensitivity of each artifact, or group of artifacts, as accurately as possible.[6]

1.3 Summary

Museum and art gallery lighting design is a collaborative art and science. It should occur from the beginning of a project and include input from all responsible persons.

2.0 DESIGN GUIDELINES

Successful museum and art gallery lighting design differs from any other type of lighting design because museum objects are unique, and many are extremely sensitive to damage from light. This section discusses general and technical design guidelines that help express the artistic intent of the exhibit. Artistic expression involves the creative use of both electric light and daylight. Technical guidelines, both in this and other sections, explain the science of lighting. In this section, recommended practices to enhance the artifacts' presentation are discussed, including ways to limit exposure time for particularly rare or fragile pieces.

The lighting design process must involve input from many individuals. Discussions with the curator and the museum educators will help determine how the objects should appear when exhibited, how to direct the visitor through the exhibition, and how to direct the visitor's eye in viewing individual objects. Discussions between the conservator and the lighting designer should focus on the light sensitivity of the objects, the illumination limits for the objects, the exposure duration limits, and/or wavelengths. Close work with the exhibition designer will enhance the appearance of the exhibition. Working relationships with the maintenance staff will determine its ability to sustain the design before it is implemented.

2.1 General Design Guidelines

Successful lighting design requires the appreciation of the artistic basics of form, color, content, and dimension. It is a selective visibility process that governs what we see, when we see it, how we see it, and why we see it. (See **Figure 2.1**)

2.1.1 *Form.* Lighting designers apply the artistic basics of form by asking: "Should the light beam pattern be soft or hard? Round or square? Oblong? Triangular? Spherical? Conical? Linear?" Much as other artists make choices of whether to use bronze, aluminum, water colors, or oils, the lighting designer must first make a choice of form or the shape of the illuminated area.

2.1.2 *Color.* The second artistic basic is color. The use of color in museums is complex; color should not change the look of an artifact. The overriding consideration must be the "original appearance" of the artifact. Lighting designers must apply their knowledge of the basic lighting palette—red, blue, and green—with an understanding of the color temperature and the color rendering index of the light to assure that the arti-

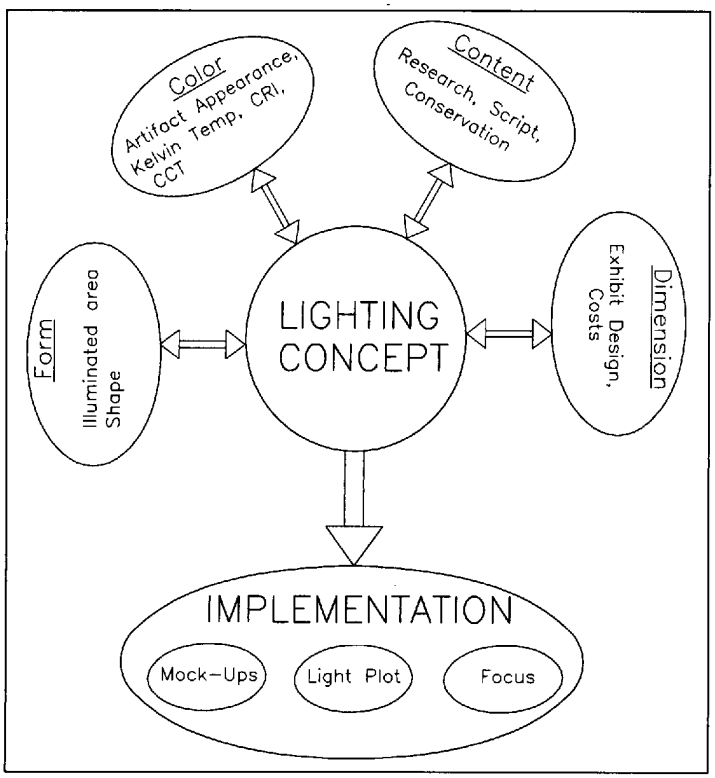

Figure 2.1. This lighting design model illustrates how focused creative effort including the four basic artistic elements (form, color, content, and dimension) can lead to the implementation of a visually interesting and informative exhibition.

facts illuminated appear as their makers intended. Enhancement of certain colors with selective colored light is usually not appropriate when lighting museum artifacts.

The Universal Color Language is based on the Munsell Color System and the idea of precisely defined color name blocks. Essentially, color is "hue", lightness is "value", and saturation is "chroma." For example, lemons and bananas are yellow: that's hue. The yellow lemon is much lighter than the yellow banana: that's value. The yellow lemon is also more vivid than the banana: that's chroma.[7]

The Color Rendering Index (CRI) of the lamp and its correlated color temperature (CCT) will affect the color appearance of artifacts. The Color Rendering Index (CRI) of a light source indicates the degree of color shift objects undergo when illuminated by the light source as compared with the color of those same objects illuminated by a reference source of comparable color temperature. Typically, the higher the CRI, the better the light source for maintaining "true" color (although this is not always the case). Therefore, lamps with CRI values of 80 or greater should be used.

The CCT of the light source will determine whether the display takes on a "cool" or a "warm" appearance, expressed in Kelvin (K). Higher Kelvin values are "cool" or more blue; lower Kelvin temperatures are "warm" or more red. Noontime daylight is cool and has a CCT of about 5000 K; triphosphor fluorescent lamps exhibit CCTs from 2800 K to 6500 K; tungsten-halogen lamps have CCT around 3000 K; and an incandescent lamp is warm and has a CCT of about 2800 K.[8]

2.1.3 *Content.* The third artistic basic is content. It begins with the script and consultations with the curator, conservator, educator, and exhibition designer. These discussions and the script guide the lighting designer in choosing the direction that the viewer's eye will follow. Certain artifacts or areas may be highlighted so that the visitor notices them first. This emphasis helps the viewer progress through an exhibition. Casual spectators will be attracted to the brightest sections. The more interested visitor will stop and enjoy the parts with lesser illumination. The lighting designer must adjust the lighting to complement the graphic and artifact layout. Titles should receive more emphasis than paragraphs.

2.1.4 *Dimension.* The final artistic basic is dimension. All artifacts in a museum, including "flat" paintings and works on paper, have three dimensions. Therefore, when lighting artifacts, care must be taken to make visible the third dimension. The designer should look at an object from many different angles, observing its physical nuances, including surface texture and gloss. The mass of an object, that is, the three-dimensional space it occupies, should be enhanced. Neglecting this can result in an object that resembles a color transparency more than a physical artifact. It is important to give each artifact its "space", enhancing the physical presence of the object. This may require lighting from a number of different directions, and/or lighting the background.[9]

2.1.5 *The Design Concept.* The design concept is formed by applying these four artistic basics. This is the heart of designing. Judicious concept development creates a path for the remainder of the design, much like river banks channeling water to the ocean. The design concept should express the exhibit's artistic intent, concisely stating how the lighting will help convey the exhibition concept.

Concept development begins by analyzing the reasons for the exhibition, or identifying the dominant elements. The designer should then put these ideas into a simple, declarative sentence expressing the lighting concept. Write this concept down on paper! This becomes the "channel" through which the design flows. This one step, followed religiously, will prove immensely valuable. Do it first! Concept development leads easily to implementation.

For example, the Smithsonian Institution's National Air and Space Museum mounted an exhibition in 1992 for the 500th anniversary of Columbus' voyage to the Americas. The exhibition discussed what things humans had needed for exploration in the last 500 years and what humans will need for exploration in the next 500 years. The exhibit included a scenario of humans traveling to and living on Mars. The lighting design concept, derived from the script and members of the exhibition team, was that light diminishes as humans travel further from the sun. The lighting at the beginning of the exhibition was brighter than the latter part where there was a simulated Mars landscape. Light on Mars is one-fourth that of Earth. The concept worked well in preparing the visitor visually for viewing the stellarium, a fiber optic model of the universe within 50 light years of earth, that was presented in a very dark room toward the end of the exhibition.