ANSI/IES RP-9-23

Illuminating Engineering Society

RECOMMENDED PRACTICE:
LIGHTING HOSPITALITY SPACES

AN AMERICAN NATIONAL STANDARD

Approved American National Standard ANSI

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Preface

This preface is not part of ANSI/IES RP-9-23. It is provided for informational purposes only.

This Recommended Practice (RP) does not provide general lighting information that is included in other IES documents. If the reader does not already have this information, it may be obtained as needed from the following IES Standards:

The Lighting Science Series:

- *ANSI/IES LS-1-22, Lighting Science: Nomenclature and Definitions for Illuminating Engineering*
- *ANSI/IES LS-2-20, Lighting Science: Concepts and Language of Lighting*
- *ANSI/IES LS-3-20, Lighting Science: Physics and Optics of Radiant Power*
- *ANSI/IES LS-4-20, Lighting Science: Measurement of Light – The Science of Photometry*
- *ANSI/IES LS-5-21, Lighting Science: Color*
- *ANSI/IES LS-6-20, Lighting Science: Calculation of Light and Its Effects*
- *ANSI/IES LS-7-20, Lighting Science: Vision – Eye and Brain*
- *ANSI/IES LS-8-20, Lighting Science: Vision – Perceptions and Performance*

The Lighting Practice Series:

- *ANSI/IES LP-1-20, Lighting Practice: Designing Quality Lighting for People and Buildings*
- *ANSI/IES LP-2-20, Lighting Practice: Designing Quality Lighting for People in Outdoor Environments*
- *ANSI/IES LP-3-20, Lighting Practice: Designing and Specifying Daylighting for Buildings*
- *ANSI/IES LP-4-20, Lighting Practice: Electric Light Sources – Properties, Selection, and Specification*
- *ANSI/IES LP-6-20, Lighting Practice: Lighting Control Systems – Properties, Selection, and Specification*
- *ANSI/IES LP-7-20, Lighting Practice: The Lighting Design and Construction Process*
- *ANSI/IES LP-8-20, Lighting Practice: The Commissioning Process Applied to Lighting and Control Systems*
- *ANSI/IES LP-9-20, Lighting Practice: Upgrading Lighting Systems in Commercial and Industrial Facilities*
- *ANSI/IES LP-10-20, Lighting Practice: Sustainable Lighting – An Introduction to the Environmental Impacts of Lighting*
- *ANSI/IES LP-11-20, Lighting Practice: Environmental Considerations for Outdoor Lighting*
- *ANSI/IES LP-12-21, Lighting Practice: IoT Connected Lighting*
- *ANSI/IES LP-13-21, Lighting Practice: Introduction to Resilient Lighting Systems*
- *ANSI/IES LP-16-22, Lighting Practice: Documenting Control Intent Narratives and Sequences of Operations*

1.0 Introduction and Scope

1.1 Introduction

This Recommended Practice (RP) has been developed to aid designers, facility managers, and owners in creating lighting systems for hotel applications. The intent is to address how all of the various components of hospitality lighting need to be an integrated system of layers as well as uniquely represented areas of illumination.

Lighting is critical to commercial success in the hospitality industry. Lighting is often the first feature that guests notice (see **Figures 1-1, 1-2**) and is the element that creates that all-important long-lasting positive impression. This first impression may form guests' opinions about the quality, character, convenience, and charm of the hotel even before they reach the front entrance.

Figure 1-1. Bright porte-cochere lighting announces building entry and provides a sense of arrival.
(Photo courtesy of Peter Hugh)

Figure 1-2. Lighting reinforces building's identity and enhances architectural features. (Photo courtesy of Lighting Design Alliance)

This process of evaluation begins when the hotel is first seen from the street. During the day, it is based on the hotel's architecture and the surrounding area. At night, it is largely based on the way exterior lighting accents the building. Well-designed outdoor lighting identifies the hotel and its entrance and welcomes guests. It also reinforces a feeling of safety and security, and provides a first glimpse of the hotel's interior character and style.

Proper lighting indoors is essential in making sure the guests' impressions continue to be positive. This same principle continues as the guests walk down the corridors, visit their rooms, and have their first meal. Creative and effective lighting in restaurants, bars, and shops attracts more patrons, increases sales, and contributes to revenue growth.

Quality lighting is of the utmost importance to business travelers who work in their rooms and/or in the hotel's conference facilities. Effective, well-designed lighting will make their stay pleasurable and productive, entice them to return, and provide positive word of mouth references, which are excellent advertising. All these factors reinforce the brand and are critical to the success of the property.

In addition to the guest benefits, good lighting also helps the staff work more efficiently and effectively and perform their tasks safely. Here again, lighting can improve productivity and increase the hotel's profitability. Lighting controls add convenience and reduce energy use and operating costs. Light source and power supply, and luminaire efficiency, placement, and optical performance all affect operating and maintenance costs.

Addressing every lighting issue of the hospitality industry would require a broader format than available here. Therefore, this Recommended Practice (RP) focuses on key areas in hotels and provides recommendations for the technologies and application designs available at the time it was written.

It is important to recognize that all documents are works in progress. While the main objective of lighting design is to serve human needs, and enhance the human experience with high quality lighting, ways to achieve the objective are constantly evolving. Lighting technologies are continually changing. Effective energy utilization and sustainability issues become increasingly important considerations that alter design parameters. Daylighting and controls are becoming increasingly more integrated and complex. Design styles, trends, and the degree of public sophistication continue to evolve, resulting in changes to the way lighting systems are designed.

1.2 Scope

1.2.1 Key Elements of the Recommended Practice. This document provides guidance specific to lighting design for the following hotel areas:

- Exterior Entrances, Entry Drives,
- Lobbies; Elevator Lobbies
- Public Corridors; Public Restrooms
- Emergency Lighting
- Guest Corridors; Guest Rooms; Guest Bathrooms
- Ballrooms and Multifunction Meeting Rooms
- Exhibition Halls
- Food and Beverage; Retail; Spa Services
- Business Centers
- Fitness Centers

For consistency, each application section follows a standard format. (In addition, all applicable codes, such as the Americans with Disability Act (ADA), described in **Annex C**, and energy and outdoor codes and standards

should be closely followed.) The standard application section format includes these subsections:

- Uses of the Space
- Lighting Design Considerations
- Design Criteria and Solutions

Not covered in this Recommended Practice is theater lighting, which is discussed in *ANSI/IES RP-41-20, Recommended Practice: Lighting Theater and Worship Spaces*.[1]

1.2.2 Hospitality Segments. Hotel classifications may be generally grouped into six main categories in which facilities share similar lodging strategies, based on type, quality, price point, and service levels (listed below). This classification helps guide the execution or design of the entire facility. These categories by no means represent the entire market but are included for representative purposes only.

This RP focuses on general design criteria; it is the responsibility of the individual designer working with the client to choose the appropriate technique for a specific market segment:

- Economy
- Mid-market
- Upscale (see **Figure 3-1**)
- Luxury

Figure 1-2. Lighting reinforces building's identity and enhances architectural features. (Photo courtesy of Lighting Design Alliance)

- All-suite
- Extended-stay
- Resort

2.0 Light Sources and Controls

Having a well-designed luminaire layout and proper lighting source selection is a major piece to providing a complete lighting design system; complementing it with the proper lighting control system can magnify the potential savings and flexibility for the whole lighting system. These savings are not just realized monetary benefits from energy savings, but also maintenance savings, and prolonging the lamp life for all the luminaires being controlled. Due to constant advances in technology, light sources and controls evolve significantly on a continuous basis. Research of current light sources and relevant advancements on the future direction of controls is a key component in providing value to a project.

2.1 Light Sources

It should be noted that LED light sources are proliferating into all aspects of lighting specification and fixture options. There are continual advancements in color rendering, color consistency, flicker, dimmability, and heat dissipation, as well as reduction in price and increase in availability. The advancement in LED transformers and drivers are just as important and significant. It is becoming standard practice that light fixtures will be available with multiple voltage, multiple dimming options such as 0-10 V or PWM, digital addressability (DALI) and, increasingly, artificial intelligence (AI). While light sources such as halogen, OLED, induction, fluorescent, and HID sources are still available, LEDs continue to improve in flexibility, cost effectiveness, energy savings, and quality. This advancement in technology should not deter research by the designer for alternative technologies, however. A responsible designer will weigh all the design options available before making a decision that is best for the project. More-detailed information may be found in *ANSI/IES LP-4-20, Electric Light Sources – Lighting Practice: Properties, Selection, and Specification* (see **Preface**).

2.2 Lighting Controls

Lighting controls are not only beneficial to potential energy savings for a space, but they also provide a space with flexibility and various types of mood settings. Having various levels of lighting available make it possible to set the mood in a space. It is up to the designer to provide a vision of a space and make sure it is clearly conveyed to the client what type of ambience the controls will provide. Selecting the right type of lighting control systems and zoning for the luminaires in a space is critical to ensuring that those ambience levels are achieved. Designers should also be aware of local and state or provincial energy codes that may require additional lighting controls for their respective project.

Different levels of lighting in a space can be achieved with a few approaches. The bi-level approach is where lighting reduction is achieved when at least 50% or more of the luminaires in a space are controlled independently from the rest of the luminaires in the space. The dimming approach is where lighting reduction is achieved through electronic controls that allow the end user to reduce luminaire output from 100% down to 0%. (*Note:* Not every dimmer system can reduce outputs down to 0%, so careful consideration needs to be taken when applying dimmer systems to projects.)

Good lighting control design can be achieved in numerous ways. Understanding the various types of lighting control systems is essential for the designer to service the client. In hospitality projects, the designer will typically have local systems, centralized systems, decentralized systems, or a combination of both. More-detailed information may be found in *ANSI/IES LP-6-20, Lighting Practice: Lighting Control Systems – Properties, Selection, and Specification* (see **Preface**).

3.0 Exterior areas

3.1 Exterior Entrance and Entry Drive

Typically, the guests' first view of the hotel is the façade, a porte-cochere, or in some resorts, an entrance gate. Illumination of the entrance is essential to finding the hotel, especially in an unfamiliar location, and in creating the first impression of character, status, personal safety, and security (see **Figure 3-1**).

Figure 3-1. Iconic themed tower acts as signage for the hotel and high-rise tower in the background.
(Photo courtesy of RMA Architectural Photographers)

3.1.1 Lighting Design Considerations. When designing lighting at property entrances, the designer should first consider the facility's location. Is it in a rural setting, commercial area, or an area bustling with nightlife? Light sources, illumination levels, mounting heights, luminaire shielding, and controls should all be considered when selecting lighting appropriate to the hotel's location.

Designers should strive to prevent light pollution, glare, and light trespass onto neighboring properties. In many jurisdictions, municipal ordinances address these issues by limiting allowable backlight, uplight, and glare produced by luminaires; limiting light levels; and mandating the use of automatic controls.

On properties that have landscaped entry drives, lighting leading to the entry and the surrounding landscape is both practical and aesthetic. In addition to highlighting key landscape and architectural features, this illumination should clearly light the road, help orient guests to the area, and create a pleasant nighttime setting.

Lighting under the porte-cochere or entry canopy should create an air of anticipation and festivity, and at the same time provide adequate light for guests and hotel staff to clearly see luggage and documents and to safely enter the hotel (see **Figure 3-2**).

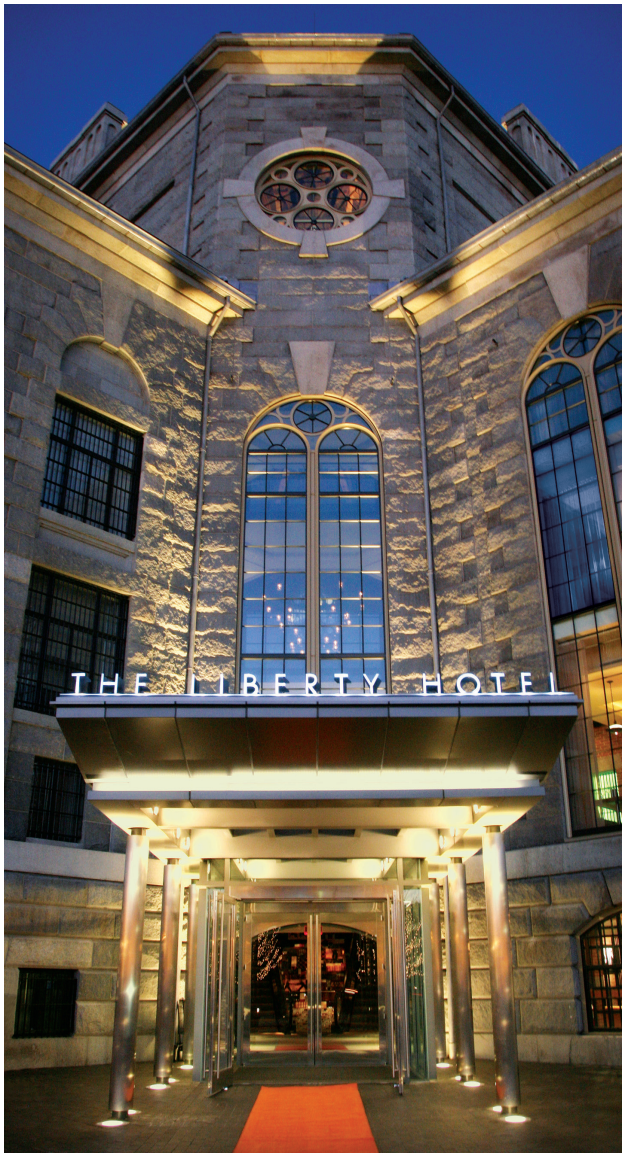

Figure 3-2. Theme tower and indirect canopy illumination provide attention and focus for the building entry. (Photo courtesy of Person & Killian)

3.1.2 Design Criteria and Solutions. Lighting design that emphasizes visibility of entryways is essential for safety. Recommended Illuminance and uniformity levels are shown in the tables in **Annex A** For more complete information, the reader should refer to:

- *ANSI/IES RP-8-22, Recommended Practice: Lighting Roadway and Parking Facilities*[2]
- *ANSI/IES LP-2-20, Lighting Practice: Designing Quality Lighting for People in Outdoor Environments* (see **Preface**)
- *ANSI/IES RP-43-22, Recommended Practice: Lighting Exterior Applications*[3]
- *Joint IDA-IES Model Lighting Ordinance*[4]
- *ANSI/IES TM-15-20, Technical Memorandum: Luminaire Classification System for Outdoor Luminaires*[5]

The designer should keep in mind that local municipal ordinances, environmental considerations, and hotel branding requirements may have different criteria for exterior lighting. It is the designer's responsibility to educate the client about these considerations along with concerns about the environmental impact of exterior lighting, appropriate light levels, and the relationship between visibility, uniformity, and glare.

The first decision is whether to leave the driveway lighting to headlights and concentrate on lighting objects that are potential hazards, points of interest, and/or route identifiers. In addition to—and in some instances in lieu of—roadway lighting, lighting designers may also consider lighting landscape features around the entrance and the building façade to enhance the nighttime appearance of the property. Bright surface illumination of interior ceilings, walls, and artwork can make a glass facade transparent at night, welcoming and inviting guests (see **Figure 3-3**).

The next decision is a choice of luminaires, which may largely depend on available budget. Economy facilities often opt for cobra heads, floodlights, or generic "shoebox" luminaires to meet budget constraints. At a minimum, these luminaires should use white light sources with good color rendition, such as compact fluorescent, ceramic metal halide, LED, or induction lamps, and have appropriate BUG (Backlight, Uplight, and Glare) ratings for the lighting zone in which they

Figure 3-3. The illumination of the interior surfaces in this hotel, seen through the glass façade, provides a welcoming appearance to guests. (Photo courtesy of Barbara Kraft)

are located (refer to *ANSI/IES LP-11-20, Lighting Practice: Environmental Considerations for Outdoor Lighting*; see **Preface)**. In some cases, supplemental shields may be necessary to limit light pollution, glare, and light trespass onto neighboring properties. Luminaire intensities, mounting heights, and styles should be complementary to the hotel and blend in with the neighboring community.

Historically, the porte-cochere or entry canopies provided sparkle and glitter with marquee lights (exposed incandescent lamps). Today's styles are trending toward architectural integration. In addition to sparkle, adequate lighting should be provided for guests, pedestrians, taxi drivers, and hotel attendants working in that area (See **Figure 3-2**, **Section 3.1**).

Light sources at the porte-cochere and hotel entrance should be white with high color rendering index (CRI) so that people, cars, and objects look their best. The designer should select fixtures that can provide accent and sparkle to key features. When a theatrical approach is taken and the use of color is desired, the designer should carefully consider how light is distributed in the space and how color will affect the appearance of what is illuminated.

The porte-cochere is the transition zone between exterior and interior lighting and helps guests adapt from one light level to the other (see **Figure 3-4**). Lighting designers should consider lighting controls that allow varying light levels corresponding to the day/night cycle.

Figure 3-4. Porte-cochere lighting leads visitors to the lobby and should provide sufficient lighting for the visual tasks in that area, including allowing the eyes to adapt between exterior and interior light levels. (Photo courtesy of Fox & Fox Design)

3.2 Exterior Pool, Spas, and Lounges

Exterior pools, spas, and lounges in a hospitality environment can be the traditional standalone element offered to guests or may be combined in a fashion that can be multifunctional. Traditionally, guests' associate the pool and spa to daytime events only. It has become more common for hotels and casinos to offer enhanced pool and spa experiences that span into the nighttime environments. Illumination of these exterior elements is essential to creating a mysterious, fun, inviting first impression of character, excitement, personal safety, and security. Included are a range of activities, from enhanced pool and spa experiences of high intensity, such as company functions, festivals, ultra-lounges, and nightclubs, to low-intensity experiences such as calming poolside massage or exterior gardens.

3.2.1 Lighting Design Considerations. When designing the lighting at these venues, the designer should first consider what the owner's intentions are for the space. Not every property owner will want or have the budget to integrate their pool areas into nightclubs, lounges, or spa-like experiences. Consideration of the facility's location at the property is important. For example, is it in an area near all the hotel rooms, near

dining venues, or near meeting rooms? Consideration of the rating of the hotel and casino will play a major factor, as will the target demographic of the clientele for the property. Light sources, illumination levels, mounting heights, luminaire shielding, and controls should all be considered when selecting lighting appropriate to the location on the property.

Designers should strive to prevent light pollution, glare, and light trespass onto neighboring properties. In many jurisdictions, municipal ordinances address these issues by limiting allowable backlight, uplight, and glare produced by luminaires; limiting light levels; and mandating the use of automatic controls (refer to *ANSI/IES LP-10-20, Lighting Practice: Sustainable Lighting – An Introduction to the Environmental Impacts of Lighting*; see **Preface**).

Many properties have landscaped entry walkways, lighting leading to the pool, spa, and lounge entry areas, and the surrounding landscape is both practical and aesthetic. In addition to highlighting key landscape and architectural features, this illumination should clearly light the walkway, help orient guests to the area, and create a pleasant nighttime setting. Pools, spas, and lounge areas for normal nighttime usage of the facilities to include pleasant and relaxing settings as well as safety lighting. For spaces leading to nightclubs and lounges, consideration should be taken to add a layer of thematic lighting to get the guests excited, and, for example, lighting could be integrated to pulse with the ambient music system.

For high intensity experiences, lighting around the pool and spas should create a feeling of excitement and energy, and at the same time provide adequate light for guests and hotel staff to clearly serve food and beverages, to handle documents, and to safely enter and exit the high-intensity experience area.

For low-intensity experiences, lighting around the pool and spas should create a feeling of calm and anticipation, while also providing adequate light for guests and hotel staff to clearly assist the guests if needed and to safely enter and exit the low-intensity experience area.

3.2.2 Design Criteria and Solutions. Lighting design that emphasizes visibility of walkways and experience areas is essential for safety. Recommended Illuminance and uniformity levels are shown in the tables in **Annex A**. For more complete information, the reader should refer to:

- *ANSI/IES RP-8-22, Recommended Practice: Lighting Roadway and Parking Facilities*[2]
- *ANSI/IES LP-2-20, Lighting Practice: Designing Quality Lighting for People in Outdoor Environments* (see **Preface**)
- *ANSI/IES RP-43-22, Recommended Practice: Lighting Exterior Applications*[3]
- *ANSI/IES LP-11-20*, Lighting Practice: *Environmental Considerations for Outdoor Lighting* (see **Preface**)
- *IDA-IES Model Lighting Ordinance (MLO) with User Guide*[4]
- *ANSI/IES TM-15-20, Technical Memorandum: Luminaire Classification System for Outdoor Luminaires*[5]

The designer should keep in mind that local municipal ordinances, environmental considerations, and hotel branding requirements may have different criteria for exterior pool, spa, and lounge area lighting. It is the designer's responsibility to educate the client about these considerations along with concerns about the environmental impact of exterior lighting, appropriate light levels, and the relationship between visibility, uniformity, and glare.

Once the designer has determined what the owner wants for the property, high- or-low intensity experiences or both, then the designer can begin to lay out the approach to the design. The first decision is to concentrate on lighting objects that are potential hazards, points of interest, and/or route identifiers. Lighting designers may also consider lighting landscape features along the walkways and the building façade to enhance the nighttime appearance of the property. Bright surface illumination of exterior canopies, walls, monuments, and artwork can make it exciting and inviting for guests.

The next decision is a choice of luminaires, which may largely depend on available budget. Economy facilities often opt for area lights, bollards, floodlights, or generic "shoebox"-type luminaires to meet budget constraints. At a minimum, these luminaires should use warm-toned

light sources with good color rendition, such as LED, compact fluorescent, ceramic metal halide, or induction lamps, and which have appropriate BUG (Backlight, Uplight, and Glare) ratings for the lighting zone in which they are located (refer to *ANSI/IES LP-11-20, Lighting Practice: Environmental Considerations for Outdoor Lighting*; see **Preface**). In some cases, supplemental shields may be necessary to limit light pollution, glare, and light trespass onto neighboring properties. Luminaire light distribution patterns, mounting heights, and styles should be complementary to the hotel and blend in with the neighboring community. For more-robust budgets, different layers of lighting can be applied to the walkways, from modern low-level landscape lights, to cantilevered lights from above to create canopy lighting effects on the ground, to dynamic lighting to pique the interest of guests to go in a certain direction for excitement.

Historically, pool and spa areas have a combination of area lighting and low-level bollard or step lighting. Today's styles are trending toward architectural integration, with lights integrated into shade structures, canopies, and custom furniture. Within the pools there is a warm-toned source of light; however, for effect, the designer should consider color in the pool or spa areas as a night "scene." In addition to sparkle in and around the pool, adequate lighting should be provided for guests and hotel attendants working in that area.

Light sources at the pools, spas, and lounges should be warm-toned, with high color rendering index properties so that people and objects look their best. The designer should select luminaires that can provide accent and sparkle to key features. For high-intensity experiences, a theatrical approach is recommended, and the use of color is most common. In these situations, the designer should carefully consider how light is distributed in the space and how color will affect the appearance of what is illuminated. It is important for the designer to locate any areas where a main or auxiliary performer may be located and focus theatrical effects accordingly. The main proposed gathering area, dance floor, and focal seating areas should also receive extra attention from the designer. The designer should put a heavy emphasis on coordinating with the A/V designer to ensure lighting and sound combine to create a high-energy environment for the guests. Lighting controls in high-intensity experiences are typically combined with the audiovisual (A/V) component to create preset and/or live shows.

Walkways are the transition zones between exterior and interior elements and help guests adapt from one light level to another. Lighting designers should consider lighting controls that allow varying light levels corresponding to the day-night cycle.

4.0 Lobby

Lobbies are used for guest registration and as congregating spaces, lounges, and art galleries. At the same time, lobbies represent the hotel's image, and therefore the initial impact on guests is particularly important. Successful lighting design that creates an attractive, functional, comfortable space and reinforces the mood set by the interior design becomes an important marketing tool. It creates a favorable impression of the hotel. Well-designed lobby lighting also guarantees that the investments in architectural design elements, furnishings, and artwork are shown to their best advantage (see **Figure 4-1**).

Figure 4-1. The lighting of the high ceiling in the hotel lobby complements the surface materials, creating visual interest. (Photo courtesy of Studio Lux)

The lobby may house a number of areas: the reception desk area, lounge or waiting areas, bell captain's desk, shops, newsstands, specialty stores, elevator lobbies, service areas, and restrooms. Each space requires sufficient lighting to ensure that tasks can be accomplished easily.

Lobbies often have high ceilings, and one of the most important issues related to lighting is maintenance. Luminaires are often difficult to access for cleaning and relamping, and lamps with short rated lives should be avoided. Reducing the frequency of maintenance will help minimize interruption to hotel operations in high traffic areas.

4.1 Lighting Design Considerations

Special care needs to be taken to allow patrons' eyes to adapt from light levels outdoors to the interior light. This is also true when moving from a space with higher light levels, such as the front desk, to an area with lower light levels, such as the lounge. The designer should include transition areas to increase visual comfort and allow guests to see any potential hazards in the area. For example, special consideration should be given to changes in grade via steps, stairs, or ramps. Cooperation and coordination between design disciplines, owner, operator, and contractor are important to ensure the successful resolution of these issues.

The lobby of the hotel is arguably the most multifunctional space. Practical, aesthetic, and emotional aspects of the design all meet here (see **Figure 4-2**) and are equally important to the success of the establishment. Guests should be able to quickly orient themselves and identify the front desk, bell captain's station, concierge, newsstands, stores, restaurants, and all other guest services. Lighting at the front desk, bell captain, and concierge locations should allow guests to easily read documents and maps and handle currency, which may be unfamiliar to travelers from overseas. The layout and appearance of the lobby in general should be easily understood. Any potential hazards, such as steps, ramps, and other changes in elevation, should be well lighted to make navigation easy and safe.

Some of most important considerations in executing successful lighting design include:

Figure 4-2. The lighting of high ceilings should complement the finishes, create visual interest with layering, and provide proper task lighting for the occupants. (Photo courtesy of MCM, Hyatt Regency Hotel, and Ed White Photographics)

- Integration with architecture and interiors
- Cohesive and visually interesting lighting composition
- Optical performance of luminaires
- Appearance, scale, style, and quality of luminaires
- Luminaire access and maintenance
- Color rendition of light sources
- Energy conservation
- Daylight integration and control
- Control of direct and reflected glare
- Light interaction with surfaces
- Task lighting
- Point of interest and accent lighting
- Automated lighting control

4.2 Design Criteria and Solutions

Many hotel owners and operators have design guidelines that define illumination levels for their properties. The lighting design needs to adhere to these guidelines, and at the same time generate visual interest through varying lighting techniques, varying intensities, and quality of light.

Designers should also keep in mind the need to fully integrate and coordinate daylight and electric

lighting with architecture, finishes and style. To this end, a lighting designer collaborating with the interior designer should address the element of luminance ratios between luminaires and their surroundings and between tasks and their backgrounds. These ratios are a function of the reflective qualities of the room's surfaces and the quality and intensity of the light that falls on them.

The registration desk should be easily visible and quickly identifiable to newly arriving guests. It is often one of the most decorated areas in the lobby with higher quality finishes and accessories. Lighting fittings should be equally high quality and create a "wow" factor in concert with the creative level and imagination of the architecture and interior design (see **Figure 4-3**). In addition to the registration desk, designated public telephone areas, shops, newsstands, and other specialty retail areas require task lighting to provide light where it is needed and prevent waste and unnecessary over-lighting. At the same time, the need for uniformity should be carefully balanced with the need for contrast, because it is this intentional contrast that creates drama and interest. Too much lighting uniformity can make a space look lifeless, boring, and institutional. Ambient lighting is generally sufficient for areas in the lobby that are used for simple visual tasks such as walking or congregating.

Figure 4-3. Layered lighting in this lobby provides visual interest and directs visitors to the registration desk.
(Photo courtesy Lighting Design Alliance)

Other techniques often used in lobbies are indirect lighting, often chosen to light the ceiling from coves or coffers, and wall washing for large wall surfaces (see **Figure 4-4**). Lighting ceilings and walls helps balance

Figure 4-4. Coves, decorative luminaires and downlights provide articulation of the architectural features.
(Photo courtesy of John Champelli, Shop 12 Design)

luminances among all the room's surfaces. It makes the room appear grander and more spacious and emphasizes attractive ceiling details. If cove lighting is installed, special consideration should be given to the light source and the configuration of the cover. Typically, linear light sources or sources that create a soft even illumination are preferred to point sources. Likewise, the depth and height of the cove can dramatically affect the wash of light across the ceiling plane. Mockups are recommended to confirm the performance of the cove and to ensure that the light sources are concealed from view.

Retail spaces in the lobby present their own set of challenges. The lighting designer needs to integrate retail spaces into the lobby itself. However, retail spaces are often leased to an operator whose main goal is to draw attention to the store by using very high light levels. The operator often has standards that may use lesser quality lighting equipment inside the store. As a result, lighting designed by the retailer can have a detrimental effect on the appearance of the lobby. To address this potential problem, the lighting designer should bring these issues to the owner's attention and encourage the owner to provide retailers with design guidelines that list permissible illumination levels and sources of lighting, and refer the retailers to the merchandise lighting guidelines in *ANSI/IES RP-2-20, Recommended Practice: Lighting Retail Spaces*.[6]

Another consideration is that hotel lobbies should adapt to changing light levels during the day and at night. Both

daylight and electric lighting systems are utilized, and each has its own characteristics. The lighting systems should integrate these sources so that they complement each other, conserve energy, and allow guests to enjoy views both indoors and out. Designers should address location, size, and orientation of windows, as well as light levels in the areas that have only electric lighting. Use of electric lighting controls and daylight controls, such as blinds, curtains, or architectural overhangs, is of the utmost importance. To achieve good eye adaptation between high and low luminances, the interior lighting in the entrance and areas directly adjacent to the entrance should be between a 3:1 and 5:1 ratio. The style of the hotel and age of the expected occupants could affect the selection.

Luminance is often confused with brightness. Although colloquially these words are often used interchangeably, they describe two different, though related, concepts. *Luminance* is the physical measurable quantity of light, while *brightness* is the subjective sensation or response to that luminance and is a function of adaptation. For example, a computer screen might appear bright in an otherwise unlighted room, whereas it might appear dim when placed in front of a window at noon.

There are many ways to design general lighting. Where ceiling space permits, recessed luminaires are commonly used, as they are typically less conspicuous, less costly, and less prone to vandalism than surface luminaires. When selecting downlights, the designer should evaluate their candlepower distribution curves to determine their ability to deliver light where it is needed. The designer should also ensure that the selected downlights have well shielded light sources and that the reflectors are of a suitable luminance to avoid glare from highly specular materials (see **Figure 4-5**). Care should be taken to avoid extreme contrasts that can make an otherwise ordinary space appear unsafe because of large differences between adjacent under-lighted or over-lighted areas.

The goal of any hotel is to make guests feel comfortable and at home. Most hotel lobbies use accent lighting to draw attention to artifacts, flower arrangements, and other focal points displayed throughout the hotel. Selection of the accent lighting's light source should be based on the ambient lighting source; the type, material, and size of the highlighted object; and the desired effect.

Figure 4-5. An example of scale of lighting. Small-aperture downlights and shielded light sources control glare and result in a pleasant atmosphere.
(Photo courtesy of Jeff Zaruba)

Decorative lighting enhances the aesthetics and adds a residential feel and a human scale to spaces that often have very high ceilings. It also identifies the various areas within the lobby – lounge, reception desk, and others. Strategically placed decorative lighting can help guests become oriented and improve circulation through the lobby. Decorative lighting includes sconces, table lamps, chandeliers, markers, and special effects lighting (see **Figure 4-6**). Decorative lighting is most often selected by the interior designer or owner. The lighting designer should review all decorative luminaire

Figure 4-6. Narrow-beam accents, decorative pendants, table lamps, and back bar lighting provide intimate social scale. (Photo courtesy of Lighting Design Alliance)

selections to ensure that they are appropriate to the overall design from the standpoint of scale, lamping, performance, maintenance, and compatibility with controls.

Lighting is a powerful tool to help guests find their way easily, especially in unfamiliar surroundings (see **Figure 4-7**). For example, the front door and registration desk will be easily identified by a higher light level. Lighting the wall behind the registration desk or its art aids the graphic wayfinding requirement. A similar strategy of highlighting destination points will allow guests to easily identify elevator lobbies, entrances to restaurants, and retail shops, and to make orientation in the space intuitive.

For people and finishes to appear most attractive, with accurate color rendering, light sources used in lobbies should all produce white light with a high CRI. Where dimming is not required, ceramic metal halide might be considered. High-CRI LED lighting is appropriate for accent, sparkle, and ambient lighting. The designer should check that the CRI of any light source to be used in the lobby is acceptable for the application intended. (For lighting recommendations and a guide for critical illumination requirements, refer to **Annex A**.)

Figure 4-7: Ambient lighting in this lobby is provided by cove lighting and is supplemented by strategically placed downlights that highlight flower arrangements and artwork, and large pendants identifying seating clusters. All lighting is dimmable and controlled by presets to appropriate time-of-day scenes.
(Copyright © Jeff Zaruba)

There are many design choices for illuminating lobbies. Lighting can be direct, indirect, uniform, of high contrast, or a combination of techniques. Success in creating an appropriate lighting design lies in an understanding of architecture, interiors, style, proportions, and harmony, as well as an understanding of the interaction of light with finishes. The lighting design should integrate with all building elements and other building systems (see **Figure 4-8**).

Figure 4-8. Drama and visual orientation in these circulation spaces is created by an integration of daylighting, accent lighting, and decorative fixtures.
(Photo courtesy of Lorraine Francis and Fox & Fox Design)

A hotel is not only a home away from home, but also an escape where guests expect to be catered to and where they can relax and enjoy their surroundings. Lighting should support these functions with the aim to make guests feel good in their surroundings and see well. With that in mind, lighting in all public areas should be

of high quality, be comfortable yet imaginative, and create a memorable positive impression.

Owners invest in expensive finishes, art, and flowers to interest guests in their facilities. Lighting should support this goal by showing off these investments with accent lighting, selecting, and placing decorative lighting that is in harmony with the finishes and style of the interiors. The quality of the lighting system should be of the same level as the quality of the finishes and should be appropriate to the design of the facility.

Lighting in the lobbies should be responsive to changes and have different settings appropriate to different times of day and night, creating distinctive moods. The use of automatic lighting control with preset scenes will make these changes in setting seamless and easy to accomplish, while providing the owner with flexibility to change them when desired.

Hotels operate 24 hours per day, 7 days a week, and energy consumption and operating costs are very important. Designers should strive to design the most energy efficient solution without creating a negative impact on other elements of the project. The use of energy effective design, efficient light sources and luminaires, and automatic lighting controls and dimming will reduce energy use and have a positive environmental impact.

5.0 Elevator Lobbies

The primary consideration in lighting elevator lobbies is to create a look consistent with the branding of the hotel and to provide sufficient lighting to clearly read elevator panels. Lighting in these areas should conform to the basic structure of the building, considering the height of the ceilings and converging corridors (see **Figures 5-1, 5-2**). Care should also be taken to maintain a consistent look from the main lobby to the more functional demands of the elevator lobby and public corridors.

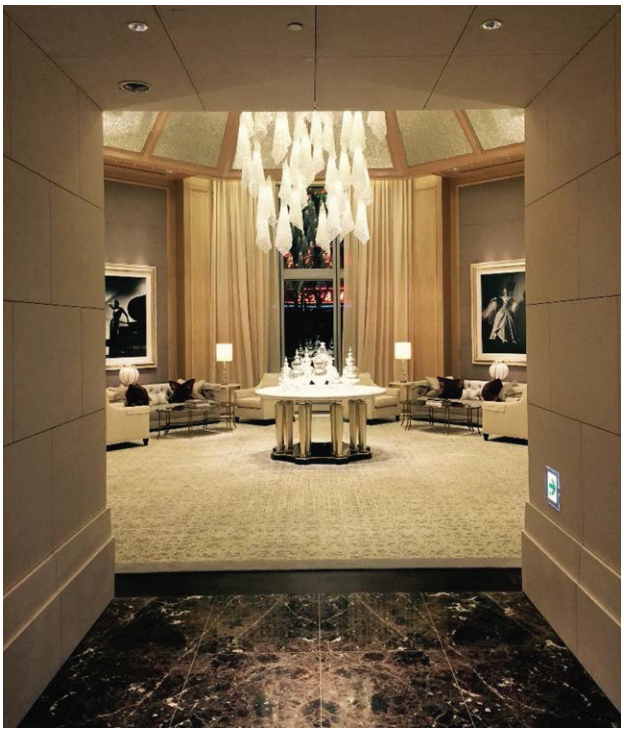

Figure 5-1. Brightness provides visual terminus at corridor junctions. (Photo courtesy of Lighting Design Alliance)

Figure 5-2. Elevator doors are identified by a pool of light from downlights. Decorative wall sconces provide decoration and additional surface illumination on the ceiling. (© iStockphoto)

6.0 Public Corridors

Public corridors provide access for hotel guests to and from the lobby, restaurants, shops, recreation facilities, meeting spaces, ballrooms, and garages. These corridors are also used by staff and visitors attending specific functions at

the property. Lighting and signage should be designed to work together. Signage should be attractive, legible, easy to interpret, and consistently placed to identify entrances, vending areas, public meeting rooms, public restrooms and ballrooms used for public functions. Proper lighting allows guests to find their destinations quickly and easily (see **Figure 6-1a**). Walking through the corridors should be an efficient, pleasant, and safe experience.

In addition to wayfinding, lighting should also be sufficient to see (see **Figure 6-1b**) and avoid any obstacles such as housekeeping carts, food service trays, furniture, steps, or ramps that may be temporarily or permanently located in the corridors. Finally, lighting designers should make provision for sufficient light levels for routine corridor cleaning and maintenance. Good lighting design gives guests, visitors, and staff a sense of security and well-being.

In addition to choosing luminaires that provide appropriate illumination and have aesthetic appeal, designers should consider lamp life and lumen depreciation, as these luminaires normally operate around the clock. Life cycle cost and ease of operation and maintenance of these vital systems are important considerations. Due to intermittent occupancy of corridors, the integration of lighting controls offers an energy and operating-cost saving option.

7.0 Public Restrooms

Light sources with a CRI greater than 90 are the most appropriate sources here. It is important that they meet all the design criteria, including that the light intensity as seen from multiple directions is balanced. Linear lighting mounted within a soffit, or just above the mirror, is not only effective but energy efficient. Sconces on either side of the mirror (see **Figure 7-1**) give the most even illumination to the face, and diffuse lighting minimizes unflattering shadows.

A recessed downlight can be added to light the vanity below and add sparkle to accent the hardware. A surface-mounted decorative luminaire or a general downlight with a wide, soft edge beam pattern can provide basic illumination in the center of the room.

Lighter surfaces make rooms appear brighter and cleaner and will make housekeeping easier. High reflectance

Figure 6-1a and 6-1b. Two cost-effective corridor lighting examples that show creative alternatives while providing necessary illumination. (Left photo courtesy of Lighting Design Alliance; right photo courtesy of Stirling Elmendorf)

Figure 7-1. Decorative luminaires mounted on each side of the mirrors evenly light faces of patrons without creating unpleasant shadows. The lighting is controlled by ceiling-mounted motion sensors. (Photo courtesy of MCM, Hyatt Regency Hotels, and Ed White Photographics)

surfaces can contribute significantly to lighting goals. The lighting designer should discuss reflectance values of specular, highly polished surfaces with the interior designer in order to achieve a balance between good visibility and the need for drama and sparkle. Lighting quality will be improved by using downlights with high quality reflectors, baffles, louvers, diffusers, or lenses to minimize glare.

Lounge areas in restrooms are either pass-through spaces or places to sit and relax, and therefore require only low light levels.

Hotel restrooms operate 24/7 but are occupied only some of that time. The designer should strive to conserve as much energy as possible with an energy effective design using high efficiency and long life light sources and luminaires, and automated controls. These would include dual-technology occupancy sensors and/or multiple occupancy sensors, to prevent lights from turning off while stalls are occupied. Annoying "false-offs" can usually be avoided simply by setting the time delay to 15 minutes or more. To avoid total darkness upon entering, an occupancy sensor can be located in the restroom vestibule, or alternatively, one luminaire can remain turned on at all times. For any application, occupancy sensors should be located so as to prevent nuisance triggering from passersby.

8.0 Emergency Lighting

In public areas of hospitality facilities, the designer should provide lighting for public safety during emergency conditions that will allow guests to easily identify and safely navigate to exits, reducing panic in a stressful situation, and making the evacuation process easier.

Emergency lighting has tremendous impact on public safety and is of primary importance. Emergency lighting systems should be designed to provide adequate egress lighting and clearly identify exits to permit safe egress from the building during evacuation. In situations that do not require evacuation, there should be enough light for occupants to see their surrounds and navigate in the space until general lighting is restored.

8.1 Lighting Design Considerations

Designers should consult national and local codes. In the United States, designers should consult the National Fire Protection Agency (NFPA)'s National Electric Code (NEC), which gives requirements for commercial emergency lighting systems. The minimum emergency egress illumination levels are established by the Life Safety Code, the Uniform Building Code, or the International Building Code, whichever has been adopted by the authority having jurisdiction. When choosing exit signs, a UL 924 listing ensures that a sign meets the stated NEC and Life Safety Code guidelines. For security purposes and to ensure continuity of critical operations, emergency lighting of longer duration may be required.

A common error is the installation of "permanently on" emergency luminaires in restaurants. Since these luminaires cannot be switched off or dimmed at night, they tend to disrupt lighting designed for intimate dining. To meet life safety code and aesthetic requirements, designers should

make every effort to integrate the emergency lighting with the overall lighting system (see **Figures 8-1, 8-2**). Normal-power luminaires can double as emergency lighting with the use of inverters, additional instant-on emergency lamps, and/or the use of relays to turn on dimmed luminaires when a loss of normal power is detected.

Figure 8-1. Indirect lighting in coves makes excellent emergency light sources. (Photo courtesy of Cornell & Company)

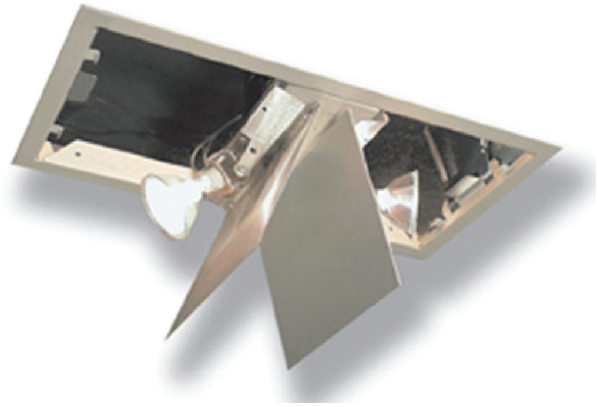

Figure 8-2. Emergency lighting can be hidden until needed in an emergency. (Photo courtesy of Dual-Lite)

8.2 Design Criteria and Solutions

Exit signs are of particular importance. When designing an emergency lighting scheme, the NFPA states that exit signs should operate both with and without utility-supplied power, and that required illumination be provided for a period of 90 minutes. To meet these requirements, designers should be aware of potential alternative power supplies, including:

- A generator that supplies power at the same voltage and frequency as the utility
- An inverter system, or a central rechargeable battery unit that converts direct current into alternating current
- An individual rechargeable battery contained in each exit sign

Once all of the functional aspects of emergency lighting have been considered, there are multitudes of specification-grade exit signs designed for architectural aesthetics. Many feature extruded aluminum and die cast housings with stylish finish options to match the interior design.

Some emergency lighting can be integrated with the architectural lighting system, such as linear light coves and downlights with battery backup for various lamp types (see **Figure 8-3**). In places where ambient lighting is not operating 24/7, designers should consider the overall efficacy of the luminaires that are selected to provide emergency lighting.

Figure 8-3. Downlights on emergency bypass dimmers provide full illumination, while exit signs provide proper direction in emergency conditions. (Photo courtesy Lorraine Francis and Fox & Fox Design)

9.0 Ballrooms and Multifunction Meeting Rooms

9.1 Ballrooms

Ballrooms require multiple lighting effects, depending on the functions that occur in those spaces. Coordination

with the client is important at the beginning stages of the design. A list of the uses of the spaces should be developed, and valuable input can be obtained from the hotel staff, such as the food and beverage managers. Some typical space uses include dining, meetings, presentations, wedding receptions, and parties. Lighting designers should also consider the need for adequate lighting for the hotel staff to set up, tear down, and clean the room.

9.1.1 Lighting Design Considerations. Many operators as well as some marketing departments have design guidelines. The key objective for designers is to create a lighting system with maximum flexibility so that multiple lighting effects can be created and seamless transitions can be made easily between settings.

Ballrooms typically have high ceilings, usually about 7.6 m (25 ft). Unlike in exhibition spaces, the walls, floors, and ceilings are finished. Moveable walls allow the space to be divided into smaller rooms. Open ballrooms may be used for performances with a stage, or perhaps special displays for corporate events, such as a car turnstile. Smaller spaces may be used for more-intimate meetings.

Audio/visual equipment, such as drop-down projection screens, may also be installed. Care should be taken to coordinate the positioning of the screen and overhead lighting to prevent washing out presentation images on the screens.

Full-service ballrooms may also include projection or lighting rooms and even follow-spot balconies located along the mezzanine. Back-of-house corridors to kitchens should have "light locks" or low-level lighting to minimize glare from corridor lighting intruding into a dimmed room.

General lighting levels should be uniform enough to accommodate meetings, note-taking, audio/visual presentations, dining, recognition of faces, hospitality functions, setup/teardown, and housekeeping (see **Figure 9-1**).

Task lighting should consider the need for podium accent, head table accents, reading, and stage lighting or theatrical lighting effects.

Figure 9-1. Coves providing indirect lighting, custom pendants, adjustable downlights, and daylighting shades (controlled with a dedicated partition-able control system) provide the ability to set light levels for a variety of potential functions in this multipurpose ballroom. (Courtesy of Lorraine Francis and Fox & Fox Design)

9.1.2 Design Criteria and Solutions. The lighting design usually consists of three to five discrete lighting systems or "layers." The first "layer" is typically dimmable downlights, which provide general, uniform task and ambient lighting and a predetermined horizontal illumination. Due to the ceiling heights, system efficiencies should be evaluated. Some low level of dimmed incandescent sources may be appropriate but most likely should be properly selected LED sources.

The second "layer" is usually to provide additional general light with perhaps a decorative element in the ceiling. Typical applications include indirect cove lights, rear illuminated panels, and even linear slots. The goal is to introduce even illumination through bright, efficient systems that provide vertical illumination.

The third lighting "layer" is decorative, achieved with pendants, decorative faux skylights, and/or sconces (see **Figure 9-2**). The designer should be aware that illumination from decorative sources is usually minimal but will help add theme and scale to the space and should be fully dimmable.

A fourth system "layer" may include theatrical accents. Depending on the scale of the room, theatrical or stage equipment may be necessary. This equipment can be

Figure 9-2. Multiple "layers" of light can come from, for example, daylight, downlights, sconces, indirect cove lighting, and appropriately scaled chandeliers to provide sparkle. (Photo courtesy of Addison Kelly)

Figure 9-4. Hang-points and power at the ceiling allow for easy integration of theatrical lighting and visual effects. (Photo courtesy of Orlando World Center Marriott Resort)

integrated into the design, or it can be added on a rental basis (see **Figure 9-3**). Structural and electrical support for this equipment may range from an accent light for a speaker's podium to a full lighting truss for a performance (see **Figure 9-4**).

Designers may want to add a final high brightness fifth "layer" for set up and tear down, and often used for maintenance or cleaning crews. High efficiency lighting systems should be used for these functions. Lower efficiency sources should only be used when guests are not present.

If daylighting is introduced, then control should be provided with shading devices or window treatments, such as curtains or blackout shades, for the times when daylight is not needed or desired (see **Figure 9-5**).

Control systems are critical because personnel should be able to dim each room individually (see **Figure 9-6**). When movable partition walls are opened, the lighting in the enlarged room should dim as for one space. Control stations, whether fixed or portable, should be easy for staff to use to adjust lighting scenes or levels.

Note: Energy codes typically require that the connected lighting load calculation assumes that all these lighting systems will be on at the same time. However, some codes also allow counting only the lighting system

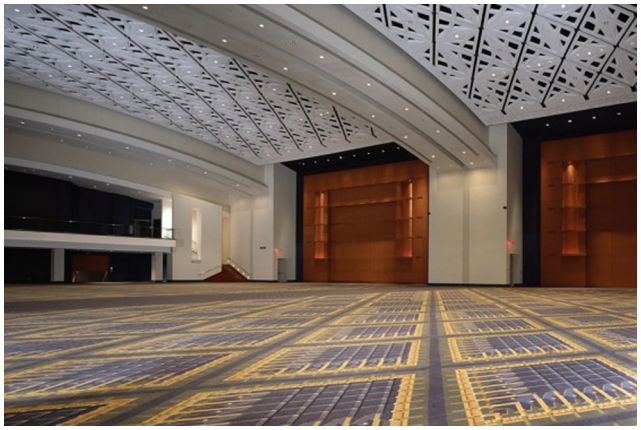

Figure 9-3. These photos represent the same space, with dramatically different functions. Multiple dimming zones for each fixture type and additional circuits for rental lights can be very flexible for dynamic functions with color and video. (Photos courtesy of Brian Gassel/TVS Design)

Figure 9-5. Downlights, thematic chandeliers, and blackout shades work in harmony to provide the appropriate mood and illumination for various functions. (Photo courtesy of Michael Wechsler)

Figure 9-6. In this room, multiple light sources controlled separately allow for flexibility. (© 2010 Ameristar Casinos, Inc.)

with the greatest load if two or more systems are controlled such that only one of them can be on at one time.

9.2 Multifunction Meeting Rooms

Generally, meeting rooms have fixed walls. The space may be set up as a classroom or as a small lecture hall, and its uses may range from reading to dining. The pre-function space adjacent to the meeting rooms also has multiple functions. The style and décor of the lighting should complement that of the meeting spaces. The activities in the pre-function space include general circulation and event check-in as well as small, informal meeting areas, telephone rooms, business centers, graphic displays, and product displays. Each of these areas will require task lighting specific to the use of the space.

9.2.1 Lighting Design Considerations. Typical ceiling heights range from 3.0 m (10 ft) to 4.6 m (15 ft). Occasionally, a large meeting room may be subdivided with moveable walls. If windows or glass doors are present, blackout curtains are recommended. Rooms are typically rectangular, so there is usually a "front" to the space. Walls may be used for displays or pin-ups; therefore, perimeter accents or wall washers are recommended. Types and styles of meetings rooms may vary, but ultimately the functions are similar.

9.2.2 Design Criteria and Solutions. The lighting design usually consists of three to four discrete lighting systems or "layers." The first "layer" is typically dimmable downlights, which provide general, even task lighting and a predetermined horizontal illumination. The lighting designer should be sure to use fixtures that can accommodate emergency batteries for a portion of the layout.

The second "layer," which is optional if the downlights provide adequate illumination, is a linear light source to provide additional general light. This may be indirect cove lighting or a decorative element.

The third "layer" is the architectural or decorative feature. This includes pendants and sconces (see **Figure 9-7**).

Figure 9-7. Decorative pendants provide scale while concealed architectural lighting articulates repetitive features. (Photo courtesy of Lighting Design Alliance)

Accents make up the fourth "layer" or system. Recessed adjustable accents or track lighting may be integrated into the ceiling design (see **Figure 9-8**).

Lighting for setup and housekeeping is usually provided by one or both of the first two system layers. Control systems are used to vary, or modulate, the separate

Figure 9-8. Theatrical lighting hang-points combined with standard lighting in a multifunction room can provide great flexibility. (©iStockphoto)

lighting systems in order to accommodate the exact needs of the user. This can be accomplished with localized dimming units or larger systems.

When designing lighting for multi-function meeting rooms, it is important to keep in mind the need for lighting solutions for informal meetings, social functions, hospitality functions, recognition of faces, setup and tear-down, and housekeeping (see **Figure 9-9**).

Task lighting is required for check-in table accents, public phone areas, reading at desks or in seating areas, and for event graphics and signs. If the pre-function area (see **Figure 9-10**) is adjacent to outdoor terraces or landscaped areas, exterior lighting should be provided to illuminate the space and unify the design.

Figure 9-9. Multiple dimmed scenes can allow for different uses of meeting rooms throughout the day. (Photo courtesy of RMA Photography)

Figure 9-10. Pre-function lighting should complement the event space or ballroom lighting with similar and appropriately scaled features. (Photo courtesy of Lighting Design Alliance)

10.0 Exhibition Halls

Exhibition halls are typically huge, open spaces with high ceilings, minimal columns, and no moving partitions (see **Figure 10-1**). They have a wide range of uses and light level requirements. Although these space types tend to have little or no daylight, they can be ideal candidates for overhead daylighting when proper consideration is given to sunlight control, such as through the use of diffusion glazing. Generally, the perimeter walls have only basic finishes, and decoration is provided by the tenants who rent the space.

Figure 10-1. A typical high-ceiling exhibition hall. High-bay luminaires are used here to provide appropriate light levels for vendors below. (Photo courtesy of Lightfair International)

10.1 Lighting Design Considerations

The entire floor may be set up with trade-show booths that require high light levels; exhibitors often require up to 1,500 lux horizontal (about 150 fc horizontal) measured on the floor. Sporting events requiring a skating rink, dance floor, or boxing ring surrounded by bleachers need special lighting with low levels in the audience and high-illuminance accent lighting on the stage area. Television broadcasts also have special lighting needs.

Sport tournaments such as volleyball or basketball may have multiple courts throughout the convention center or exhibit hall, and special care is needed to limit glare. Large-scale events involving product launches, car shows, and/or boat shows, have their own special lighting requirements.

Giant game tournaments such as poker or bingo require other sources of illumination. Theatrical performances with a true stage require full theatrical lighting and rigging systems. Exhibition halls can also be used for banquets and dining for hundreds of people.

When lighting exhibition halls, designers should consider energy, luminaire efficiencies, dimming requirements (or multi-level switching), and premium color rendering capability. Longevity of the light sources and simplification of maintenance for hard-to-reach luminaires should be factored into the budget.

10.2 Design Criteria and Solutions

To meet these needs, exhibition halls are often lighted with high efficacy light sources. LEDs offer an effective solution with dimming capabilities. Alternatively, fluorescent and metal halide luminaires in combination with dimmable halogen sources can also be cost effective. Catwalks are often installed to access the lighting equipment and to minimize maintenance issues.

The use of a combined system allows the designer to maximize efficiency and reduce the total connected load of the lighting system. For example, LED downlights can provide low light levels, between 10 to 250 lux (1 to 25 fc), allowing full range dimming to accommodate hospitality, dining, and audio-visual presentations.

It is important to have flexible light levels. By utilizing grouping, circuiting, and switching patterns, it is

possible to provide three levels of lighting, e.g., 250, 500 or 750 lux (25, 50 or 75 fc) from a fluorescent or metal halide system, which can be combined with the LED system described above for a total of 500, 750 or 1,000 lux (50, 75 or 100 fc). An alternative would be to have a completely dimmable lighting system, which can be easily accomplished with an LED solution.

11.0 Gaming

Casinos are truly unique environments. Some are located on boats that may have special approval requirements, such as from the U.S. Coast Guard, while others have a very diverse interior with no continuity from venue to venue, similar to a mall and its unique retail tenants. Some casinos have a theatrical show on the exterior facade or sidewalk, while others keep this show inside, and force guests to enter the casino in order to see it.

Lighting for casinos has evolved over the last 50 years. Originally, the exteriors of the casinos employed grand signage in the form of grand porte cocheres and plenty of blinking twinkle lights. Casino interiors were dominated by mirrors and exposed incandescent lamps. In the 1990s, casinos transformed more into destination resorts, complete with themed facades and interiors, and many forms of entertainment in addition to gaming (see **Figure 11-1**). As guests became more sophisticated, so did the casinos' lighting. However, one basic principle has remained unchanged: light the money. Everything else is decoration and theming appropriate for the casino locale, its customer base, and the technical requirements.

Lighting design guidance for the various interior and exterior parts of a casino is provided in the subsections that follow. Illuminance criteria are found in **Annex A**.

11.1 Gaming areas

11.1.1 Lighting Design Considerations. In designing the lighting for the casino gaming floor, the general rule is to "light the money." This could include the playing chips, cash, vouchers, and anywhere theft or deceit could occur. Typical applications include table games such as blackjack, where cards, hands, and chips are all visible and accessible (see **Figure 11-2**). Other areas that require special attention are cashier cages and rooms for money counting. As most electronic games are now cashless, the requirements are not as stringent for the slot machines on the floor. While surveillance cameras are used in all of these areas (see **Figure 11-3**), the potential for veiling reflections on glossy cards will need to be evaluated.

While the original form of security was observation from catwalks in the ceiling and two-way mirrors, surveillance is now done through a series of discrete cameras.

Figure 11-1. Themed lighting concepts continue to evolve, providing for more immersive experiences in casino hospitality spaces. (Photo courtesy of DeKo Productions)

Figure 11-2. The right balance of design elements and table lighting combine to provide form and function. (Photo courtesy of Barry Grossman Photography)

Figure 11-3. Custom chandelier with integrated security system. (Photo courtesy of Alfonso Quiroga)

Therefore, it is important that the lighting design be coordinated with the surveillance team. In addition, all of these critical areas are usually fully supported with instant-on emergency lighting to ensure no "dark" or "down" periods. To achieve this, battery backup and inverters might be required, since a generator system can take up to 10 seconds to turn on. While this might be acceptable for emergency egress, in the case of a casino with exposed cash or chips, it could be disastrous. Casinos are also moving toward providing separate security features in their lighting control systems, so that hackers cannot provide a timed blackout.

Appropriate illuminance levels can vary based on brand expectations and the average age of the guests or players. It is recommended that the designer visit other properties of the same brand with the owner in order to create a consistent look and feel for the brand. When the design team and ownership agree on a look or an effect, then the designer should document it in terms of illuminance levels, uniformity, and CCT.

Another important consideration involves transitions between areas. For example, during the daytime, exterior illuminance can exceed 80,000 lux, while the interiors may be around 50 lux. The lighting designer should consider the visual adaptation process and create variable light levels at entrances and lobbies, to help bridge these extreme brightness ratios. At night, the light levels in the transition zones should be reduced, as the exterior lighting levels are much lower. Dimmers and controls should be used to achieve a consistent light level.

As patrons continue to expect more from their environments, the lighting should be scaled appropriately. In the general spaces, iconic displays, signage, and sculptures are becoming commonplace. Once placed to enhance the theme, they are now intentionally placed to create a photo opportunity or a background for social media postings (see **Figure 11-4**). The result of positive postings adds to a casino's market value, so proper lighting of the background, and even supplemental lighting for the people in the photos, should be explored.

Figure 11-4. An example of a social-media photo-op background. (Photo courtesy of Luke Olson, Shop12 Design)

Lighting is a powerful tool and can be used to literally lead guests through a space. In a casino, lighting is used to create hierarchy and dramatic focal points, but an overabundance of lighting stimulation can serve to distract the guests. High slot machines with flashing signs, as well as the lack of windows and clocks, will help to invite guests in and encourage them to stay longer (see **Figure 11-5**).

11.1.2 Design Criteria and Solutions – Table Games. Table games should be the brightest areas because of their high surveillance requirements and the desire to attract people to the games. The ceilings are usually

Figure 11- 5. Ambient light should not overpower gaming machines' internal lighting effects.
(Photo courtesy of iStock.com/mbbirdy)

decorative, with coves and pendant luminaires, so additional illumination is required (see **Figure 11-6**). Avoidance of glare to the guests is very important. Louvers on luminaires can be effective but can also lower luminaire efficiency. However, the trade-off for decreased efficiency is better comfort for the guests. The lighting should be focused on the tables, not on the chairs, the floor, or even the guests' faces or heads.

It is critical that glare be minimized, as it can be a factor that results in eye fatigue. For example, glare can be caused by a reflection of light off eyewear, or by luminaires shining directly into the eyes. The usual

Figure 11-6. Table games require specific uniform light levels with visual interest contributions from highlights and sparkle in the surrounding architecture.
(Photo courtesy of Barry Grossman Photography)

solution to create a uniformity of illumination and minimize veiling reflections, which can obscure the view from video or digital surveillance cameras, is to light the space with multiple sources, such that the light comes from multiple angles. The typical game table can have two cameras, one directly overhead and one off to the side, so the lighting will need to be coordinated to eliminate veiling reflections. Some casinos require a stringent 1:1 or a 1.5:1 average-to-minimum Illuminance uniformity ratio. Higher illuminance on tables may also mean that surveillance camera aperture measurements or *f*-stop settings will need to be adjusted so that the image is not washed out or over-exposed.

With all the lighting focused on the table, the reflected light can provide a flattering glow on the faces of the players and the dealer. Some casinos allow for each table to be uniquely dimmed so that the guests can request their desired lighting effect. Most game-table surfaces are flat and covered in a matte felt, which helps reduce specular reflections and provides contrast. Occasionally, special games are rear illuminated. In these cases, additional downlighting is required so that the quantity and the colors of the chips can be identified, rather than seen in a dark silhouette effect.

Many times, these areas, which are called "pits," have a unique decorative structure, trellis, or specialty feature. Decorative chandeliers or pendants may be used, but their brightness should be controlled in order to avoid creating a glare source. The lighting in this area can help identify the pits from across a visually confusing casino, but it is critical that glare to the guests playing at the game tables be avoided.

11.1.3 Design Criteria and Solutions – Poker Rooms. Unlike with gaming tables, where all the light is focused down upon a flat surface, poker lighting needs to be more general so that as gamblers pick up the cards, there is light from over their shoulders to help see the cards. Players also need to see facial expressions; therefore, deeply shielded downlights with wider beam spreads and accents highlighting the table's playing surface are recommended. Most card games are played on a flat table, but poker requires higher vertical illuminance levels, so that players can privately read their cards while observing the other competitors' faces

and body language. Coves, sconces, TVs, and pendants are typically added to help break up these larger spaces (see **Figure 11-7**). For large poker tournaments, temporary tables, portable task lighting, and televisions can be added to ballrooms or expansion spaces.

Figure 11-7. With the uniform floor and table lighting, the perimeter light outlines the ceiling architecture for visual interest. (Photo courtesy of Resorts World Las Vegas)

11.1.4 Design Criteria and Solutions – High-Roller Areas. High-roller areas are very similar to table-games spaces, but they typically have an additional decorative layer. Whether it is accomplished by crystal chandeliers or video walls, it is important that these spaces feel and look different and upgraded from the rest of the gaming areas. Many times, private salons are used, where special guests can have the room set up to their liking, which means the table games themselves and their location could change; therefore, a more flexible lighting solution is important for such spaces. This means that the general, accent, and table-specific task lighting should be dimmable. In addition, the dimmers' high light level settings should be several times higher than standard, to accommodate a client with special visual needs or for one who might simply desire higher illumination levels. This user-specific lighting might also include the use of dynamic (variable CCT) white lighting. For example, an affluent gamer might desire a "cooler" lighting effect; the ability to offer this kind of lighting flexibility could help attract and retain patrons (see **Figure 11-8**).

11.1.5 Design Criteria and Solutions – Slot Machine Areas. These spaces typically have ceiling heights of

Figure 11-8. The availability of user-specific flexible lighting control might be desirable in a high-rollers area. (Photo courtesy of Resorts World Las Vegas)

3.7 to 6 meters (about 12 to 20 ft). The ceilings might be blacked out, or highly specular. Many of the games now have internal illumination or signs above, and some even have with toe-kick lights or step lights integrated into the base. It is critical that careful attention be paid to the placement and aiming of luminaires to avoid veiling glare on the screens—which can be oriented vertically, horizontally, or at an angle to the player—as well as reflected glare from the highly polished surfaces of the electronic gaming units. This can be extremely problematic on bar-top or tabletop mounted gaming machines (see **Figure 11-9**).

In order to create a fresh experience that draws back repeat customers, casinos are constantly renovating

Figure 11-9. Competing elements of brightness and intense color. (Photo courtesy of iStock.com/DavorLovincic)

their facilities. As a result, slot machines and other gaming tables requiring power and/or data connections will often be relocated to accommodate the design renovations. Flexible power is provided via electrical tracks or ducts under the floor. Because the position of the slot machines is not defined, typical or general lighting is recommended (refer to **Table A-1** in **Annex A**). This does not include additional lighting contribution from the games themselves, which can be used to supplement emergency egress lighting as well as to animate the space by illuminating the guests and vibrant carpet below. Regional or cultural considerations or the average guest age can affect the desired illuminance levels. For example, some of the casinos in Macau are illuminated to levels that approach 500 lux (50 fc).

As mentioned above, some ceilings are blacked out, some have simple coves with uplights, and others use decorative chandeliers. Colored LED lighting, such as red-green-blue-amber (RGBA) types, may be used for creating moods and can even offer the potential for a grand-jackpot-winning event to activate the ceiling-colored lighting. Wall washing is recommended on all tall walls that do not have TVs or signage. Additional accent lights are needed to highlight autos, motorcycles, and other prizes on the elevated platforms throughout the slot machine area. These may require 4 to 10 spotlights, depending upon the ceiling height (see **Figure 11-10**).

Figure 11-10. Accenting lighting is used for grand-jackpot displays. (Photo courtesy of Goat Rodeo Productions)

11.2 Circulation

11.2.1 Lighting Design Considerations. Primary circulation areas are more than just corridors. Dramatic downlights can highlight the special stone, tile, and feature carpet and help to reinforce the graphic wayfinding through the space. More importantly, they illuminate the guests and create a dramatic "runway" effect.

It is important that the lighting be designed to match the current style of the architecture (see **Figure 11-11**).

Figure 11-11. In this bar area, architecturally integrated lighting and graphic neon lights add visual interest and articulation. (Photo courtesy of Barry Grossman Photography)

11.2.2 Design Criteria and Solutions. Illuminance should be higher than in the adjacent slot machine areas. Many times, these circulation routes will also lead to a focal element such as a center bar, and the visual terminuses should be accented accordingly.

Circulation focal points include bars, "mega" games, lounges, clubs, and membership- benefit areas. Each will require some additional illumination. Special care should be taken with bars that have embedded electronic gaming, typically video poker games. Because these have a flat, horizontal screen, light from downlights can be reflected off the screens into the gamer's eyes. Therefore, low or cross-angle lighting is recommended. The machines are also accessed from the front of the bar, so the bar-front lighting that is used in many hospitality applications should perhaps be avoided.

11.3 Cashiers and Cash Cages

11.3.1 Lighting Design Considerations. There are typically many cameras in these areas. The combination of appropriate lighting levels and cameras ensures that there are no disputes over the cash exchange.

11.3.2 Design Criteria and Solutions. As many of these spaces are visible from the casino floor, light source CCTs should match and the illumination of the rear wall be uniform, to ensure that the security cameras function properly. Higher illuminance levels from high-CRI light sources should be provided, both on the cashier's side of the decorative security screen and on the patron's side. Lighting for cashiers and cash cages should have uniform overall lighting, so that there are no dark corners in which cash can be hidden.

11.4 Sports-Book Betting Areas

11.4.1 Lighting Design Considerations. These spaces can be like a giant theater, an intense sports bar, or a combination of both (see **Figure 11-12**). The layout is usually a single focal wall covered with live-streaming sporting events on giant TVs or video screens. The ceiling heights are usually taller to accommodate the tall video wall. The seating areas can be rows of tables, private betting carrels such as in a traditional library, or even club lounge seats and sofas.

11.4.2 Design Criteria and Solutions. Ideally, the guest focus will be on the video screens, so the lighting should be selected and positioned so as not to cast lighting onto the screen. Traditionally, deeply shielded downlights are used.

Decorative ceilings and chandeliers should be limited in order to not be reflected in the screens. Historically, these spaces were dark with low light levels, sometimes as low as 50 lux (5 fc). A more recent trend is to provide higher light levels (see **Annex A**) or even shielded task lighting on the tables, which provides additional illumination for the older patron. The designer should pay attention to the type of betting for a space, as some facilities have general sports betting and horse betting. Traditionally, horse-betting stations have additional task lighting and a TV at each station to take into consideration. For sports-book areas that have separate seating groupings with tables, individual luminaires at the tables with local controls can be used to provide an additional source of focused light without detracting from the overall illumination of the space.

11.5 Interactive Games

To appeal to younger guests, casino operators are looking at how to create interactive gambling games. Like giant computer video games or arena-based layouts with initiative games, these spaces need lighting that will meet their specific needs (see **Figure 11-13**). As e-sports, drone

Figure 11-12. The lighting design takes into consideration all types of lighting, including that from video screens. (Photo courtesy of Barry Grossman Photography)

Figure 11-13. Accent or downlighting is unnecessary in areas with interactive game areas. but in this application, lighting the upper part of the distant wall provides extreme contrast. (Photo courtesy of pxhere.com)

racing, extreme sporting activities, and similar interactive events gain in popularity, casinos can be expected to adapt and to include them in their amenity offerings. The lighting should be planned to match the application.

11.6 Exterior Lighting

11.6.1 Lighting Design Considerations. The location of the gaming facility should influence the exterior lighting design. For example, a casino in a dense urban environment such as Macau or Las Vegas would match up with Lighting Zone 4 (LZ-4) as defined in the IDA-IES Model Lighting Ordinance (MLO),[4] for a high-energy, high-illumination location. Thus, a bright and perhaps dynamic lighting solution might be most appropriate. For casinos located on Native American or First Nations tribal lands, which could be remote sites, lower levels of illumination would be appropriate and would in fact work well, as the adjacent ambient light levels are much lower. Either way, the facade and signage solutions should be compatible to the casino's surroundings.

11.6.2 Design Criteria and Solutions. Color and light contrast can provide visual attraction from a long distance. The design should be appropriate for the site, and it should be evaluated in three steps. The first is to consider the view of the building from a long distance, say, from 2 to 20 kilometers away. Usually, the crown or the top of the building is most visible at a long distance, which is why signage is typically located there (see **Figure 11-14**). This part of the building should be evaluated for both a lighting opportunity and signage location. It is important to remember that the two have to work together and that for signage to be effective, it needs contrast. A bright sign seen against a bright background might not be as visible. Other options for increased visibility are the use of contrasting brightness ratios or differential color values.

The second step is to consider the part of the building's exterior that will be seen from what might be called the "pedestrian zone," whether viewed from a passing automobile or from a pedestrian point of view. This would include the podium, or base, of the building. The lighting should enhance the architectural style of the building; current trends include one or more video or media signs for this part of the building. Architectural lighting such as sconces, signage, or integrated architectural lighting could also be used to bring the lighting down to a pedestrian scale or perspective (see **Figure 11-15**). A dynamic pylon sign is typically located in this part of the building, which could include the project name or advertisements for interior amenities, or could even act as the marquee for current performers. The design of such a pylon should be coordinated with the architects and interior designers to support the theme of the adjacent building.

The final step is to visually tie the top of the building to the base of the building. This can be done in many ways, from simple floodlighting, to integrated lighting effects, to full dynamic graphic LED displays. It is important to

Figure 11-14. Color and light contrast provide visual attraction from a long distance. (Photo courtesy of McNulty Studios)

Figure 11-15. Use of select brightness and shadow to direct attention and wayfinding creating a welcoming entrance. (Photo © Galina Juliana)

be cognizant of the potential for glare as seen from the guest units; for example, blackout shades may be required if the lighting cannot be positioned in a way that does not intrude into the interior spaces.

Illuminance design criteria can be found in **Annex A**.

11.7 Additional Considerations

11.7.1 Codes and Standards. The lighting designer should confer with the client to see if they have any brand standards that require special lighting effects, techniques, or expected lighting levels. It is also the design team's responsibility to ensure that all local codes are met. This could include everything from emergency egress lighting to the local health department's requirement for task lighting on a bar or food-service counter. It is important to be aware that the local gaming board will review the lighting, but as viewed from the security booth and by looking at captured video images from the cameras. Therefore, the lighting and surveillance will need to be coordinated so that the casino can be approved for operations and opening.

11.7.2 Renovations. Lighting and controls technologies have evolved tremendously. Advanced controls and LED technologies should be reviewed. Long light source life is critical to casinos, as most never close. The other benefits of LED systems, including consistent color, improved efficacy, and smaller luminaire apertures, make them natural choices. However, it is important that upgrades to an existing lighting system be carefully reviewed. The simplest option is relamping. Luminaire size, ceiling heights, and current dimming controls all should be reviewed to avoid potential problems.

Another method of upgrading the lighting involves conversion of the luminaires, or retrofitting them with LED drivers, light sources, and even new trims. As with the relamping options, testing is required, such as testing the proposed retrofit light sources and/or drivers for compatibility with the existing, or newly designed, dimming system to mitigate potential flicker or failure at low light levels. The advantage of this option is new technologies without rewiring or ceiling damage, re-plastering, or painting.

The final option is luminaire replacement: removing the old technology and the entire luminaire and replacing it with a newer model. Advantages could be smaller apertures, increased efficiencies, and possibly better glare control. Historically, this has been the most expensive option.

Regardless of the method selected, it is important to test and mock-up the final options to ensure that the performance matches the client's expectation. The associated surveillance system should be adapted and tested at the same time. Due to the loss of revenue during a remodel, designs and construction sequencing should be evaluated carefully to minimize downtime.

11.7.3 Germicidal Ultraviolet. The COVID-19 pandemic has created an opportunity for unique technologies to assist in safety protocols. This could include the use of UV-C luminaires, which can be mounted overhead, into currently installed Plexiglas separation panels, or perhaps into the gaming machines themselves. Additional information is available in *ANSI/IES RP-44-21, Recommended Practice: Ultraviolet Germicidal Irradiation*.

12.0 Food and Beverage

Restaurants and bars within hospitality facilities are complex and energy intensive. Lighting plays a key role in establishing the mood or atmosphere. The success of that lighting depends on appropriate illuminance levels, correlated color temperature of the light source, luminaire type and location in relation to the architecture, and control of glare.

12.1 Lighting Design Considerations

Food service lighting can be categorized as food preparation and handling, food consumption, and cleanup. In the U.S., commercial and institutional food preparation is required to meet U.S. FDA Food Code requirements for minimum illuminance,[7] which have basis in IES guidelines. These illuminance criteria address the safety of those handling and preparing the food; the safety of the food for consumption, which involves inspection; and cleanliness of foodstuffs and facilities.

To avoid food contamination from violent light source failure, light sources used over food preparation areas are required to be suitably protected or used in enclosed luminaires.

In addition to creating an intimate feeling, well-shielded downlights can produce a pleasing sparkle on specular objects such as glassware and provide needed illumination for reading menus. On the other hand, indirect lighting or large-area diffuse sources typically create a brighter-looking space and call more attention to the whole room. Since guests often use restaurants for meetings, adequate lighting is important. At the same time, soft, flattering lighting is always a plus when dining for pleasure.

Decorative effects in a dining area, such as highlighting a picture or sculpture, or washing an entire wall, may require special lighting (see **Figure 12-1**). The effects can range from dramatic and sophisticated to cozy and cheerful. The luminaires themselves may, if used creatively, be decorative features in their own right. The proper use of low-wattage lamps with dimming control in decorative luminaires prevents the decorative luminaires from becoming uncomfortably glaring.

Figure 12-1. Large-screen television projections provide a dynamic dining experience. (Photo courtesy of Barbara Kraft Photo)

12.2 Design Criteria and Solutions

In general dining spaces, supplemental systems, switching, and dimmers make the same space comfortable for breakfast, lunch, and dinner. Designers should consider the need to vary the quantity and quality of light to control light levels at different times of the day. Another consideration is that higher light levels are needed for cleanup. Automatic preset, programmable dimmers with variable fade rates are preferable to switches because they provide a smooth transition between levels that should be imperceptible to guests.

Food displays should be lighted so that they draw customers' attention and allow them to clearly see the details of the food. Color rendering is more important for fresh foods than for packaged foods. A good general rule is that the illuminance used in food displays should be at least twice as high as that of surrounding areas. Designers should also consider the amount of heat emitted from luminaires that are used to highlight fresh, cooled, or frozen foods, although this now tends to be less of a concern when LED luminaires are used, as there is very little heat projected in the beam.

Depending on the type of restaurant and the intended clientele, lighting can vary the mood from subdued and relaxing to bright and lively. Dining spaces usually fall into three categories: intimate, leisure, and quick service.

Intimate spaces, which include cocktail lounges, nightclubs, and some upscale or fine-dining restaurants, are those places where people congregate as much to visit, to be entertained, and to be seen as they do to eat and drink. These spaces characteristically have a subdued atmosphere with low luminances accented with subtly lighted feature elements (see **Figures 12-2** and **12-3**). The lighting should be well controlled in level and distribution.

Figure 12-2. Decorative luminaires enhance the overall interior design in this bar area. (Photo courtesy of Emlyn Altman)

Figure 12-3. Integrating lighting into the furniture or the restaurant decor creates a feature focal element and adds a special "glow" to the overall ambiance of this space. (Photo courtesy of Stirling Elmendorf)

Leisure dining spaces are generally restaurants where eating is the most important activity. A restful atmosphere with interesting decor is appropriate. Lighting should generally be unobtrusive, except where decorative luminaires or highlighted features are used as part of the theme decor (see **Figures 12-4, 12-5**). Moderate illuminance levels of 25 to 100 lux (2.5 to 10 fc) are typical. Good control of glare is also essential.

Many restaurants include bars and visible cooking areas known as exhibition kitchens (see **Figures 12-6** and **12-7**). These areas require higher task lighting for safety and visual inspection, but since they are located directly

Figure 12-4. Decorative luminaires provide scale, while architectural lighting accents display niches and tables. (Photo courtesy of Emlyn Altman)

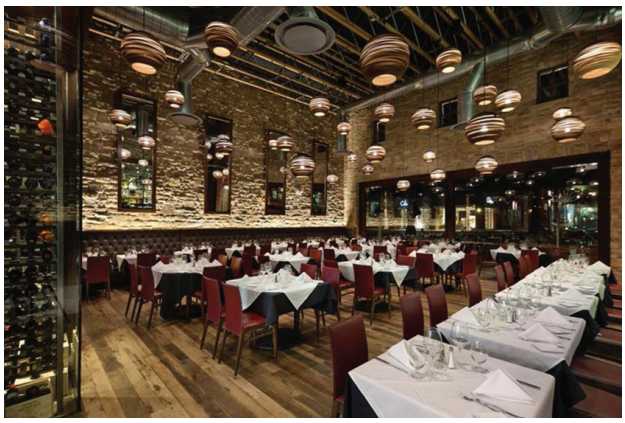

Figure 12-5. Decorative pendants also provide general illumination in the seating area, while grazing light brings out the wall texture. (Photo courtesy of Emlyn Altman)

Figure 12-6. The internally illuminated bar details are counterbalanced with decorative ceiling panels. (Photo courtesy of SUSHISAMBA Rio)

Figure 12-7. Decorative luminaires outline the bar while concealed accents highlight the back bar. (Photo courtesy of Philips Day-Brite)

adjacent to dining areas with more subdued lighting, the control of glare and source luminance are critical issues.

Quick-service areas include lunchrooms, cafeterias, snack bars, coffee shops, and franchise menu restaurants (see **Figure 12-8**). In these areas, the diner and management are intent on both fast service and quick customer turnover. Designers can suggest economy and efficiency with the use of high illuminances of 270 to 1,080 lux (25 to 100 fc) and uniform light distribution.

Figure 12-8. General lighting allows for a flexible dining room. (Photo courtesy of CLM Photographic)

13.0 Retail

The primary lighting goals common to all types of merchandising spaces are attracting and guiding customers, facilitating merchandise evaluation to initiate purchases, and enabling completion of the sale (see **Figure 13-1**). Hospitality retail spaces can range in scope from a simple food pantry or souvenir shop to mall areas containing upscale specialty retailers. This varying level of retail classifications found in the multiple hospitality types creates a wide range of design parameters and objectives. Lighting design for hospitality retail environments requires not only a good understanding of how light will behave in the space and on the merchandise but, most important, how the retail space will integrate with the surrounding hotel spaces, whose design parameters typically take precedent over retail lighting needs. For example, a retail space can be leased to an operator whose main goal is to draw attention to the store by using high

Figure 13-1. Decorative luminaires identify cashier; concealed architectural lighting accentuates merchandise. (Photo courtesy of Lighting Design Alliance)

light levels. Those high light levels may or may not work well with the surrounding hotel lighting design. The final design should try to balance the retailer's need for visual attraction and inspection with the lighting design of the hotel. The lighting designer should bring all issues to the owner's attention and encourage the owner to provide retailers with design guidelines that list permissible illumination levels, sources of lighting, visibility of sources, use of color and dynamic effects, and signage elements. The lighting designer should refer the retailers to the merchandise lighting guidelines in *ANSI/IES RP-2-20, Recommended Practice: Lighting Retail Spaces* for more information.[6]

13.1 Lighting Design Considerations

Designers are encouraged to consider a variety of criteria, not just quantity of light, when developing retail lighting designs. These design issues include[6]:

- Appearance of space and luminaires
- Color appearance
- Chromatic (color) contrast
- Daylighting integration and control
- Direct glare
- Flicker (and strobe)
- Light distributions on surfaces
- Light distribution on task plane (uniformity)
- Luminances of room surfaces, modeling of faces or objects
- Points of interest; reflected glare

- Shadows, source/task/eye geometry
- Sparkle, desired reflected highlights; surface characteristics
- System control and flexibility

Accounting for all of these design issues can be challenging in a hotel environment where size limitations and diverse mixtures of permanent and rotating or seasonal merchandise are typical.

The lighting designer should pay special attention to balancing retail spaces that are located in the lobby. The retail space should incorporate the same lighting equipment quality as the lobby, and light levels should coordinate with the lobby lighting design and control patterns. Careful placement and aiming of the display accent lights should be evaluated to avoid glare in any adjacent spaces. This integration is typically less critical for economy hospitality locations that may have small souvenir or food pantry shops near the check-in counter. These retail spaces are typically operated 24 hours a day, 7 days a week, and if possible, should be supplied with energy efficient lighting, such as LED systems, and occupancy sensors with bilevel dimming luminaires for hours when store traffic is low.

Most other hotel retail spaces have scheduled operating hours, so the lighting designer should work with the owner to determine the most appropriate and economical control system in accordance with applicable codes. These control systems can range from selective lamp or luminaire switching, manual dimming, preset dimming (for scene selection), daylight sensing, astronomical time switch control, individual luminaire control with digital technology, and integration with building management systems.[6] (*Note:* Unless mandated by code, many retailers prefer full light output and eliminating dimmers, for cost savings.)

Many luxury and upscale hotels can contain boutique retailers (see **Figure 13-2**) that may have specific brand-lighting design standards. These image standards should be followed, or an exception requested from the retailer if it is necessary to change the design to properly blend the retail location with the surroundings or with an adjacent hotel space design.

Figure 13-2. In this boutique store, lighting integrated into shelves highlights exclusive merchandise. Overhead recessed adjustable accent lights highlight display cases and provide vertical front lighting for visual clarity. (Photo courtesy of Lighting Design Alliance)

The lighting designer should verify that the lighting systems specified do not interfere with theft protection systems and that adequate light levels and light quality are supplied for security cameras.

When selecting light sources for retail environments, several key performance characteristics should be evaluated. These include lamp life, lamp efficacy, lumen maintenance, color rendering, color appearance, and installation and maintenance costs. The light sources in a retail space should have a minimum color rendering index (CRI or similar metric) of 80 or higher; if possible, a minimum of 90 is preferred, with a high R_9 value, to enhance red tones. Light source correlated color temperatures (CCTs) need to be coordinated with adjacent hotel spaces (see *ANSI/IES LS-5-21, Lighting Science: Color* [see **Preface**], for more information on light source color characteristics).

The lighting designer should be careful to specify luminaires that will promote long-term design integrity, yet provide opportunities for hotels to take advantage of increasing technology efficiencies. One way to maintain the lighting design integrity is to avoid specifying luminaires that utilize medium-base sockets, where lamps can be easily replaced with non-directional or inappropriate substitutions. Saving energy is important,

but so is maintaining the optical performance of the luminaires. LED luminaires that use "light engine" modules and drivers that are easily replaceable from below the ceiling are an excellent choice, providing opportunities to replace components as needed.

13.2 Design Criteria and Solutions

Retail lighting design is characterized by employing different types of light, including general (ambient), accent, perimeter, millwork, and casework lighting systems. Which systems are used and how much lighting each system delivers depends largely on overall design concept and the orientation of merchandise display systems.[6]

For hotels, ambient illumination recommendations vary based on the retail classification, integration with surrounding hotel spaces, and designing to meet lighting power density code levels. The ambient lighting system may provide a general diffuse layer of uniform illuminance throughout the store. Typical ambient solutions for hotel applications are recessed downlights, and/or recessed troffers or recessed linear slot luminaires.

For more-upscale hotel retail spaces, downlights are preferred, using energy efficient sources with wide light distribution and low-glare cutoff optics. Coves or decorative luminaires can also be used for ambient lighting. LED downlights with replaceable "light engine" modules (see **Figure 13-3**) should be considered. LED or fluorescent recessed troffer systems are also good choices. Metal halide lamps are not recommended for ambient downlight applications because of their delayed restrike, limited dimming, heat, and UV considerations. With code-mandated lighting power density (LPD) allowances continuing to decrease, incandescent systems for ambient lighting are not recommended.

Figure 13-3. Designers should specify modular systems that can be upgraded as technology improves. (Image courtesy of General Electric Company)

Accent lighting is an important component in most hotel merchandising lighting applications. Accent lighting emphasizes the shape, texture, finish, and color of the product (see **Figure 13-4**). Point sources are ideal for accent lighting because they can be both optically controlled and directed.[6] Typical hotel accent lighting systems include track lighting or recessed track head luminaires, using LED or halogen light sources. The objective of accent lighting is to illuminate the fronts of the merchandise, rather than the tops, as it is the vertical

Figure 13-4. Narrow-beam lighting focused on the merchandise ensures that patrons' gaze is directed onto the products for sale. (Photo courtesy of Lighting Design Alliance)

surfaces that the buyer sees. Adjustable luminaires with glare control are preferred.

Hotel retail lighting can benefit from the use of linear perimeter lighting techniques. Perimeter systems properly implemented can define merchandise spaces, providing the vertical-surface illumination necessary for wall displays and making the space feel larger. Perimeter lighting is typically located in architectural cornices, soffits, or valances in order to minimize glare by concealing light sources from customers.

14.0 Business Center

Many hotel operators include a business center or an office work area for guests to use. These business centers can be simple, small cubicles or countertops in public areas adjacent to the lobby, allowing guests access to computers and/or printers, or they can be more elaborate suites with boardrooms and private offices. The proliferation of wireless communication devices now allows guests the ability to use their portable technology anywhere throughout these spaces.

14.1 Lighting Design Considerations

The size and scale of the business center and its location will inform the lighting design solution. If the business center is adjacent or visible to the lobby, its lighting design should match the lighting aesthetics of the lobby (see **Figure 14-1**). This includes the CCT of the luminaires, any decorative elements, and concealment of light sources. Both ambient and task lighting may be considered for the typical workspaces. Ambient lighting could include sconces, pendants, coves, or even downlights to create an ambiance and provide target illumination levels of 150 to 300 lux (15 to 30 fc). Task lighting can be used to increase illuminance levels where needed, especially at the work plane height. Task lights that are adjustable in both position and intensity, with localized dimming controls, allow the guests to alter the lighting to suit their visual needs. These spaces usually have computers, so potential glare from luminaires should be avoided.

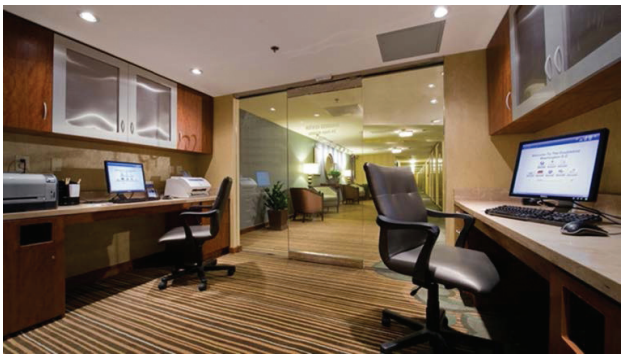

Figure 14-1. Business centers can provide functional workspaces using traditional ceiling lighting solutions. (Photo courtesy of Double Tree Hilton, Washington DC)

14.2 Design Criteria and Solutions

Business center lighting historically was plain and utilitarian. However, the aesthetics of the room should inform the solution. Soft indirect lighting from coves, decorative fixtures or an illuminated wall can provide the needed ambient illumination. LEDs are encouraged because of their color properties, energy efficiencies and longer lamp life. Traditionally, fluorescent sources were utilized.

Where needed, task lighting can raise the illuminance levels. A carefully placed downlight or a simple desk lamp can be used. User controllability is preferred so that the lighting can be adjusted to meet users' needs. As the proximity of light sources to the tasks is shortened, lower wattage and lumen packages should be considered in order to not over light the task areas. Under-cabinet luminaires can also be effectively used where possible.

Controls are critical, as many of these business centers could be unoccupied for hours. Vacancy or occupancy sensors and multiple control zones should be considered, as may be recommended or mandated by energy codes.

15.0 Spa Services

Lighting for a spa environment brings unique considerations for the designer. The blend of a relaxed, inviting

quality of light throughout should be balanced against areas with fine-detail visual tasks (see **Figure 15-1**). The color and uniformity of the light are crucial to appealing to a guest's sense of well-being and self-perception in the space. The purpose of the lighting is to assist the designed environment establish a welcoming relationship with the guest. This may be akin to a more residential quality of light, wherein lower light levels with specific task lighting are balanced to create a working space that does not appear or feel like one (see **Figure 15-2**).

15.1 Lighting Design Considerations

The qualities sought in a spa are *inviting*, *relaxed*, *re-energizing*, and *healthy*. These qualities sum up the purpose for the guest's visit, and it is the responsibility of the designer to help create and maintain these qualities within the lighted environment. The ambient lighting should flatter a person's sense of personal appearance, including complexion, reduce any self-perception of aging, and prepare him or her for the pampered experience to come. This is often accomplished by establishing a more residential feel to the space and incorporating higher color rendering sources (high R_9, minimum CRI of 90; see *ANSI/IES LS-5-21, Lighting Science: Color* (see **Preface**), for more information on color rendering).

Figure 15-1. Dramatic accents and soft, layered lighting provide focus as well as a preview for the coming spa experience. (Photo courtesy of John Champelli, Shop 12 Design)

Figure 15-2. Low-level niche lighting, accent downlights, and candles provide spa guests with a relaxing, low-illuminance environment in this waiting area. (Photo courtesy of John Champelli, Shop 12 Design)

Wayfinding within the space should be easy and anxiety free. Signage and "go to" areas should be easily defined. Light levels, color, and/or decorative effects should lead the guest from the entry to the registration and pre-treatment areas. The lighting should act much as an invisible assistant to assure and point the guest along the way.

Designers should also light for the employees and specialists who perform a myriad of detail work as well. The quantity and quality of light should accommodate detailed work such as nail treatments, skin examination, hair coloring, and hair cutting, yet not compromise the guest experience. Low-glare fixtures and those that reduce hard shadows and high contrasts in the ambient environment are strongly encouraged. Work lights for cleaning and non-treatment functions should be integrated into the overall design or set on separate circuits that allow them to be dimmed or turned off during spa treatment hours.

15.2 Design Criteria and Solutions

15.2.1 Spa Lobby. The lobby should be illuminated for relaxation and yet should excite the guest for the experience to come. Lower ambient light levels and warmer (2200 K to 2700 K) correlated color temperatures (CCT) are preferred. Depending on the theme or look of the spa, the general lighting may be more uniform throughout, or intentionally more dramatic to bring a theatrical flair to the interior. Accent lighting on artwork, interior features, finishes, and/or architectural details should highlight their best qualities without drawing away from the overall harmony of the area (see **Figure 15-3**). This can be accomplished with a slightly higher

Figure 15-3. Dramatic product lighting and soft illumination from downlights provide an inviting atmosphere.
(Photo courtesy of John Champelli, Shop 12 Design)

CCT (3000 K to 3500 K), depending on the feature. This way, accent light levels do not have to be dramatically increased to get the appropriate attention. Should a faux skylight be incorporated into the design—such as in a reception area—CCTs that are even cooler may be desired, to approximate the look of daylight. Care should be taken to minimize light "bleed" from the cool color tones into areas deserving of the warmer color.

Reception desks and areas should be well illuminated in much the same way as a hotel registration desk is. The lighting should serve as wayfinding to that area, as well as address small visual tasks for the guest and receptionist. Waiting areas are often lighted to lower levels with accent lights or local table or floor lamps, to create a more residential or softer environment within the lobby.

Reception areas are also sometimes used as retail sales areas for cosmetics, clothing, and other products. (Refer to *ANSI/IES RP-2-20, Recommended Practice: Lighting Retail Spaces* for additional information.[6])

15.2.2 Spa Treatment Rooms. Spas offer many different treatments, from nail and hair care to massages and yoga. Each activity should be considered carefully for the lighting appropriate to that particular task.

Nail care involves fine detail work as well as high color rendering needs. The lighting should provide higher illumination either from local task lights or from accent lighting on the areas of treatment. The overhead luminaires should be controlled via a separate circuit. The lighting should not create overly hard shadows, which can interfere with the ability of the nail technician to properly assess nail condition, color, and finishing (see **Figure 15-4**).

Figure 15-4. Specific task lighting should be considered for salon service areas. (Photo courtesy of Emlyn Altman)

Treatment rooms used primarily for massages, where the guest may be facing the ceiling at times during the treatment, should strive to use only indirect lighting and/or decorative lighting that may be dimmed to very low levels. This means that direct overhead sources are discouraged as the primary light source, except as required for cleaning or "non-treatment" use. At the same time, the ambient lighting should be comfortable in order to facilitate relaxed conversation or observation of the surroundings.

Decorative luminaires, including wall sconces, pendants, and art accent lighting, can be used to provide pleasing ambient light while adding a perception of brightness to treatment areas (see **Figure 15-5**).

Figure 15-5. A fireplace, candles, and residential type fixtures can reinforce a relaxed, inviting atmosphere.
(Photo courtesy of Emlyn Altman)

Wet treatment areas may include special showers or body sprays that are often temperature controlled (see **Figure 15-6**). The intent may be to stimulate blood circulation or to further relax the mind and body. The designer should understand the intent of the treatment, as the lighting design may need to be different for each to assist in achieving the desired effect. A high circulation shower may be lighted more dramatically, with accent lighting aimed at polished plumbing hardware or at colorful tiles on the wet walls. Steam or waterproof-rated fixtures may be required for wet environments.

Figure 15-6. An example of a wet-treatment area.
(Photo courtesy of Emlyn Altman)

In the more relaxed wet rooms, less dramatic, softer ambient lighting is often preferred. Indirect fixtures or wall-wash lighting can bring softer ambient light without glare or hard shadows into the space. Lensed downlights may be used for cleanup lighting, when higher levels of illumination are needed.

15.2.3 Spa Lockers. Locker areas in a spa are often social gathering and conversation areas as well. The lighting should reflect this activity and feeling. Guests need to easily identify lockers as well as see into them. Luminaires providing higher vertical illuminance without glare should be considered. Good color rendering sources complementing skin tones further relax the guests. Indirect lighting is a good consideration to create a softer quality of light with no glare (see **Figure 15-7**). This often takes the form of luminaires mounted on the lockers to provide the ambient light.

The entry to the locker room area, as well as the transition either to treatment rooms or back to the lobby, should be illuminated to emphasize a sense of room transition and passing-through experiences. One consideration is less ambient and more accent lighting through these areas.

Figure 15-7. Concealed indirect lighting in locker rooms can provide shadow-free solutions at an affordable cost.
(Photo courtesy of Emlyn Altman)

15.2.4 Spa Makeup and Cosmetics. Lighting for makeup and cosmetics should encompass the best color rendering sources possible. The CRI of the light source should be at least 90 and the CCT should be no higher than 3500 K in order to complement skin tones as well as makeup. Depending on the source, 2700 K and lower may be too "warm" in appearance and may not render certain makeup colors well (refer to *ANSI/IES LS-5-21, Lighting Science: Color* [see **Preface**] for more information on CCT and color rendering). The luminaires should provide vertical illumination (see **Figure 15-8**) on faces without glare of any kind that might cause the guest to squint. Uniform illumination is preferred for this area, as shadows caused by direct light may compromise proper applications of product. In some spas, a separate backlit mirror or special task light may be provided for close-up applications.

Figure 15-8. Makeup areas need glare-free lighting with warmer CCTs and very high color rendering for illuminating products and faces. (Photo courtesy of Lighting Design Alliance)

Fluorescent lighting is often discouraged in higher-end spa environments, as the color rendering with "warm" fluorescent lamps is not flattering to skin tones. High color rendering LED, incandescent, and low voltage halogen light sources provide the best quality of light for these task areas.

15.2.5 Barber and Beauty Shops. High illuminances are necessary at the task areas where hair styling, manicures, and pedicures are performed. However, the illuminances associated with manicures and pedicures are best when limited closely to the approximate task area involved. Lighting equipment is necessary for the stylist's work and for the client's periodic mirror-reflection views. Here, lighting should be relatively soft and multi-directional from overhead and front. This avoids shadows and harsh glare, and limits unbecoming shadows under eyes, noses, and chins.

In the hair color lab, a combination lighting system is best, where light sources with CCTs of 2700 K to 3000 K are available on one control zone, and light sources with CCTs of 5000 K to 6500 K are available on a second control zone. This offers three conditions under which to review color.

Light source color rendering should be excellent (CRI or R_a at least 85) throughout these spaces.

16.0 Fitness Center

Fitness centers in hotels can range in scale and scope from converted guest rooms to fully equipped gyms operated by outside purveyors. In some cases, these spaces are operational 24 hours a day. Spaces typically include equipment such as treadmills and stationary bikes as well as weight machines. Some facilities include additional spaces such as studios, and areas for spinning, racquetball, and other specialty sports.

16.1 Lighting Design Considerations

Lighting systems in fitness centers should provide even illumination. Because many exercises occur from a horizontal position looking up, indirect lighting or shielded sources should be considered. Studios should use multiple lighting scenes or dynamic lighting that can be synchronized with music or fitness schedules.

Attention should be given to the height of luminaires because treadmills and other equipment can elevate the patron 23 cm (9 in.) or more.

TV monitors and mirrors are often mounted in the room. Location and shielding of luminaries should be carefully considered to avoid screen reflections and glare (see **Figure 16-1**).

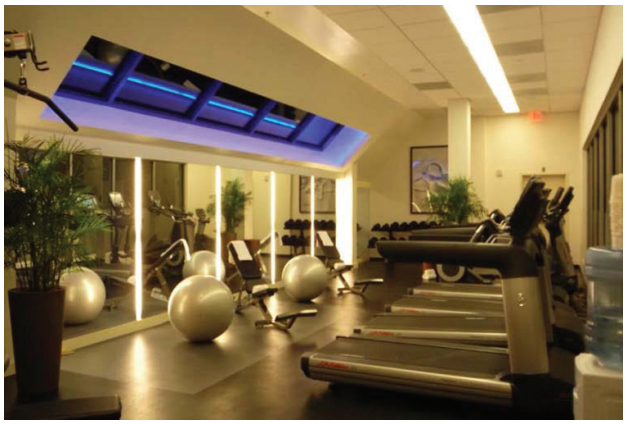

Figure 16-1. Integrated mirror lighting provides vertical illumination, and recessed linear luminaires provide overall high-ambient lighting. (Photo courtesy of Emlyn Altman)

16.2 Design Criteria and Solutions

LEDs and high efficiency fluorescent sources can provide good CCT, good efficacy, and low-heat solutions. Recessed direct/indirect ("basket") luminaires, indirect coves, and decorative-trim downlights provide good solutions that shield the source.

In rooms with ceiling fans, placement of the luminaires should be considered carefully in order to avoid a strobe effect caused by moving shadows of fan blades cast by lights placed above fans.

Daylight controls should be incorporated in facilities where daylight is available (see **Figure 16-2**) so that electric lighting may be shut off when enough daylight is present. Lighting controls should also be considered for tailored lighting moods or effects. Sheer drapes can also attenuate high daytime window luminance, diffuse direct sunlight, and instill a sense of privacy for the occupants of the room while still providing a connection to the outdoors.

Figure 16-2. A combination of cove lighting and downlights within a daylit gym space can be functional and creative. (Photo courtesy of iStock.com by Getty images)

Task lighting for reading can be provided at each exercise station, but as equipment may move, general lighting may be more appropriate (see **Figure 16-3**).

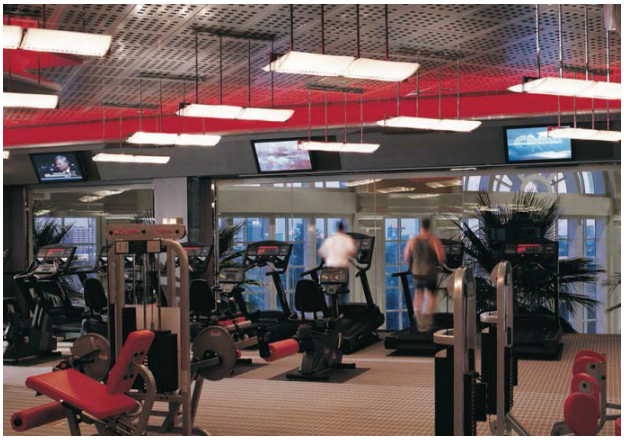

Figure 16-3. A safe environment is provided here by general lighting with minimal shadows. (Photo courtesy of Lighting Design Alliance)

Many new facilities are incorporating interior or exterior sports courts. (Refer to *ANSI/IES RP-6-22, Recommended Practice: Lighting Sports and Recreational Areas* for additional information.[8])

17.0 Guest Corridors

Guest corridors may be interior or exterior. They provide access for both hotel guests and hotel service personnel such as bell staff, housekeeping, room service, engineering, administrative staff, and security personnel. The main consideration in designing lighting for guest corridors is to allow guests to easily and safely circulate to and from their guestrooms. Varying the placement and types of luminaires will make the corridor appear more interesting and pleasant. In corridors, the mounting height and projection of sconces from the wall should comply with applicable codes (see **Annex C** for more information on ADA requirements).

17.1 Lighting Design Considerations

Illuminance levels in guest corridors need to be sufficient for wayfinding and to identify any obstacles, such as housekeeping carts, food service trays, furniture, steps, or ramps that may be temporarily or permanently located in the corridors. Proper lighting will ensure that guests can move safely to and from the public areas to their rooms and suites.

Lighting should also provide adequate illumination to read directional signs and room numbers (see **Figure 17-1**). Guests should be able to easily locate locks and door handles when entering and exiting the room. Good lighting design in guest corridors provides guests a sense of security and wellbeing.

Other considerations for the lighting designer include accent lighting for artwork, lighting for elevator lobbies, transition illumination between daylit and non-daylit spaces, and at intersections of major and minor corridors.

Figure 17-1. Concealed lighting at the guestroom doorway provides illumination for room signage as well as sufficient lighting to operate the entry lock. Decorative sconces provide illumination along the corridor. (Photo courtesy of Emlyn Altman)

Designers should plan for exit illumination in the event of an emergency. Thought should also be given to illumination for routine cleaning and maintenance. In addition to choosing luminaires for aesthetic appeal, designers should consider the lamp life and lumen depreciation of sources that normally operate around the clock in guest corridors. Life cycle cost and ease of operation and maintenance of these vital systems are also factors. A new trend and, in some cases, code requirement is to provide occupancy sensors in corridors to enhance energy savings. Some operators are using two lighting levels; the hallway is never totally dark, and the lights automatically increase to full output when the corridor is occupied. In the event of single-load corridors and/or atrium hotels with daylighting, designers should consider the application of automatic controls such as photocells or motion sensors.

17.2 Design Criteria and Solutions

To provide adequate illumination for safe passage through the corridors, there should be a maintained minimum illuminance level of 10 lux (about 1 fc) on the floor, with a maximum-to-minimum uniformity ratio of 10:1. Illumination for directional and safety signage posted in the corridors is critical. It should allow guests unfamiliar with the property to find their way to their rooms and any guest service areas located in the corridors. Ideally, an illuminance of 100 lux (about 10 fc) vertical should be provided on all directional signage, with a minimum ratio of 5:1 between this illuminance and the adjacent general ambient illuminance levels.

Illumination at the guest room door is critical for reading room numbers, locating the door handle, and inserting the key or card into the lock (see **Figure 17-2**). Light levels should also be sufficient for guests to identify individuals through the door's view port. A minimum of 100 lux (about 10 fc) vertical should be provided in these areas, with a minimum illuminance ratio of 5:1 with the surrounding surfaces.

Emergency lighting systems should provide a minimum of 10 lux (about 1 fc), measured on the floor, at the beginning of the emergency route and along the

Figure 17-2. A combination of decorative pendants and recessed downlights provides functional illumination in this corridor. (Photo courtesy of Emlyn Altman)

centerline of the path to the exit. *Important:* The designer should refer to the local governing code on emergency egress lighting, *as it may have more-stringent requirements.*

Surface finishes on the walls, ceilings and floors in corridors need to be carefully considered since they can greatly affect the ambient illumination, in both amount and uniformity. Extremely dark finishes (less than 10 percent reflectance), especially for the ceiling and wall surfaces, will greatly affect the number and spacing of luminaires. Light colored, matte finishes for walls and ceilings should be used when possible. The use of specular surfaces, especially glass, mirrors, polished metal, or glossy painted finishes, adds to the difficulty in illuminating surfaces without causing unwanted glare.

Corridors tend to be very long in relation to both their width and height, creating a "tunnel effect." This can be minimized by creating areas of varying illumination. Depending on the locations of the guest room doorways, the task lighting at door locations can give the corridors a more residential, less tunnel-like appearance.

Among the many different ways to light hotel corridors, ambient illumination can be achieved by combining decorative sconces, decorative ceiling luminaires, cove lighting, and/or recessed or surface mounted downlights. Due to limited ceiling heights and obstructed plenums above corridor ceilings, especially in existing properties, cove lighting and recessed downlighting may not be viable options, although many LED cove options and downlights require minimal recessing depth and still provide good ambient illumination. When it is possible to use these solutions, they can provide uniform, energy-efficient lighting.

Decorative sconces and decorative ceiling luminaires are often used either alone or together to provide ambient illumination in a corridor. If either is used by itself, it is important to carefully consider the design and spacing of the luminaires. Large on-center spacing between luminaires—often used to cut construction costs by reducing the number of luminaires—makes it necessary to use higher light outputs to achieve the recommended lighting levels. This can result in glare, especially if the luminaire has small translucent surfaces or shades.

Decorative sconces that only project light up and/or down can be used in conjunction with ceiling luminaires or coves for ambient illumination. When corridor heights are sufficient, decorative ceiling luminaires are often an effective indirect-light solution that provides diffuse illumination through translucent shades.

Because corridors are illuminated 24 hours a day, ambient illumination should be provided by LED or fluorescent sources with the highest life and efficacy ratings. Today's energy codes have all but ruled out most incandescent-only solutions for corridor illumination.

Guest room doors adjacent to low corridor ceiling heights (2.3 m [7.5 ft] or less) may require special soffits

or valences above the guest room doors to provide space to install light boxes with louvers or lenses or a single recessed downlight. These additional luminaires provide the task illumination required on room numbers, door locks, and door handles. Another technique is to use internally illuminated room numbers.

18.0 Guest Rooms

Typical guest room tasks include reading, writing, computer work, dressing, TV viewing, and grooming. Hotel staff tasks include housekeeping and maintenance. In addition to these basic lighting requirements, designers should also consider the need for security and any specific requests from the property owners and operators.

18.1 Lighting Design Considerations

A typical guest room has several zones, including the entry, main room, sleeping area, desk and workspace, and adjoining bathroom, that the lighting design will need to address (see **Figure 18-1**). As mentioned in previous sections, it is always important for the lighting designer to choose luminaires of an appropriate design that is consistent with the overall decor and brand identification of the hotel.

Figure 18-1. In this typical hotel room, downlights and bedside decorative lighting provide accent and functional nighttime lighting. Localized desk lighting provides flexible task illumination as well as opportunity for a unified interior design. Corridor downlighting and high light levels for the bathroom complete the lighting design. (Photo courtesy of Lighting Design Alliance)

Designers should also be aware of any federal, state, provincial, and/or municipal energy codes. When choosing low-energy light sources, it is important to pay close attention to the color of the source as well as its ability to be turned on instantly and reach full intensity quickly, to ensure that it will provide the appropriate quantity and quality of light.

To reduce energy utilization, many newer properties use not only wall switches and dimmers but also room lighting control systems that can turn off all room lights (as well as heating and cooling units) when the room is not occupied.

Finally, maintenance and long-term operational costs should be considered. Choosing lamps with longer lamp life ratings results in a reduction of energy costs and less staff time spent replacing lamps.

18.2 Design Criteria and Solutions

Note that every property, whether a chain or sole ownership, small or large, has developed a contiguous design theme for its guest rooms. The lighting designer should keep this theme in mind in choosing luminaires for the multiple uses of the space (see **Figure 18-2**).

Upon entering the room, there will typically be a single, conveniently located switch that controls the entry light and may control a luminaire and/or outlet in the main portion of the room. Energy management systems,

Figure 18-2. Creative use of industrial fixtures and linear light sources, including glowing furniture, provides interest and functionality in this small guest room (Photo courtesy of Lighting Design Alliance)

which operate lighting throughout the room from a single position in the entryway, have been popular in Asia and Europe for some time. These are becoming more common in North America as the prices for energy continue to rise. These systems allow the lighting load of the room to be turned off when the room is not occupied.

Since the closet is usually located in the entry zone, adequate lighting should be provided to see clothing and other items. Some rooms will use mirrored doors, in which case the designer should choose luminaires that will not produce glare from this surface. Upscale hotels may have a separate luminaire in the closet, controlled by either a jamb switch or an occupancy sensor.

The main part of the guest room requires several luminaires to accommodate a variety of different tasks; sleeping, reading, working at a computer, writing, and eating in the table area (see **Figure 18-3**). Lighting in these areas will frequently overlap. There is also a need for adequate illumination for housekeeping and maintenance. Multiple switches around the room should be conveniently placed and easy to identify.

Adequate illumination for reading in bed is important and requires luminaires that can be switched from the bed location. Table lamps or wall-mounted swing arm lamps, either type with integral or nearby wall switches, can provide this control. Good color rendition, with CRI of 90 or higher, is recommended. Lampshade material and table lamp height should be selected to avoid light shining in the guests' eyes. Good solutions include dimming, using bilevel lamps, or placing multiple luminaires on separate switches.

Designers should consider options for low-level nightlights to illuminate the pathway from the bed to the bathroom. Red or amber light has been shown to cause less disruption in sleep, so some nightlights include a red-spectrum light source or filter.

The typical room has a desk with Internet connections and task lighting. Table lamps are the choice of most

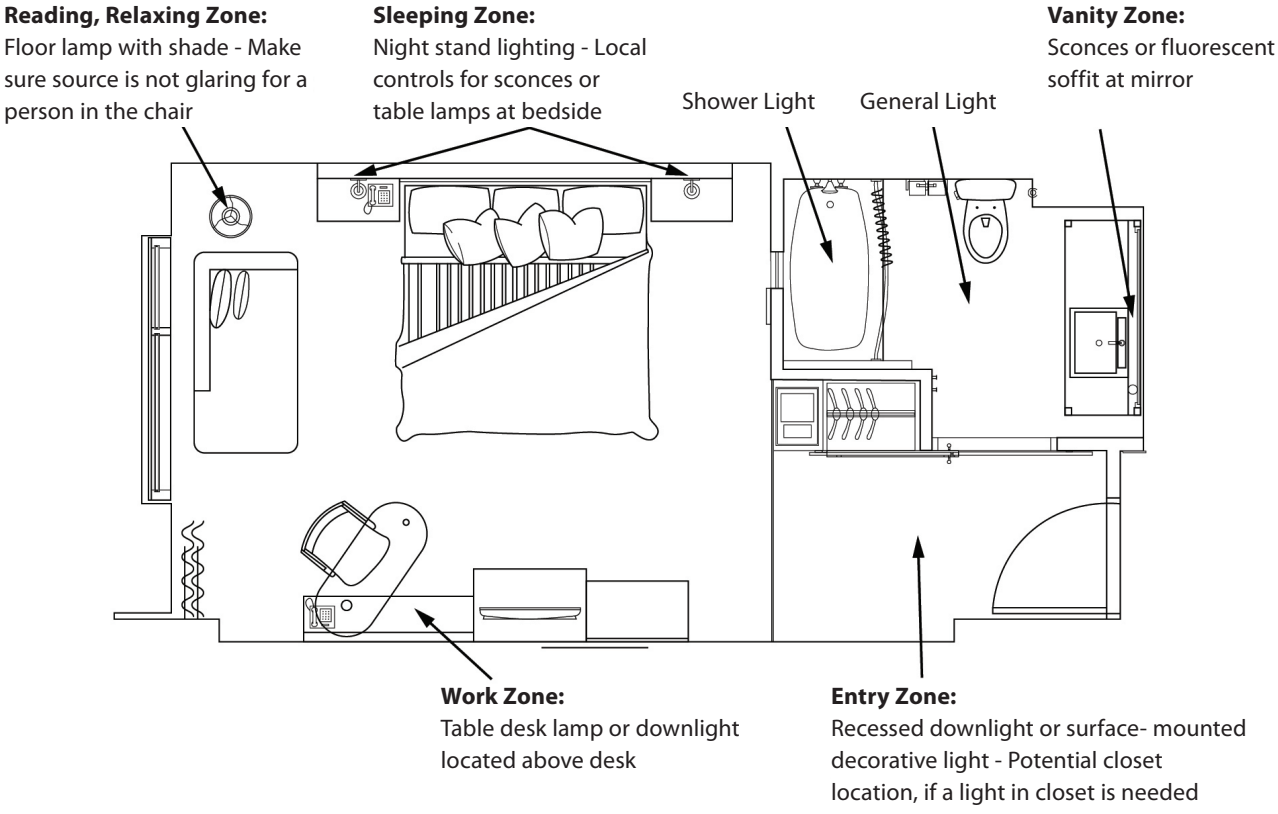

Figure 18-3. Diagram of typical guest room lighting zones. (Graphic based on original by David Ghatan)

room designers. Portable and/or adjustable desk lamps can provide flexibility for a variety of tasks. Sources here should be energy efficient, such as long-life fluorescent or LED. Proper shielding and source coverage are also important to prevent glare on specular laptop screens and in guests' eyes.

Table lamps, floor lamps and pendants can provide a more relaxed, homelike atmosphere for the general seating portion of the room (see **Figure 18-4**). Multi-level illumination not only allows energy reduction, but a variety of levels for guests. Dimmable LED or fluorescent luminaires allow more control for guests at upscale properties. Providing localized lighting control at the bedside is recommended where possible.

Figure 18-4. Decorative shaded fixtures provide soft general illumination while downlights over the bed provide accent and functional night lighting when needed. (Photo courtesy of Lighting Design Alliance)

The cleaning staff will generally turn on all of the luminaires while making up the room, which requires even illumination in all of the task areas. Typically, no additional illumination is necessary for housekeeping, although it is always best to check for any local codes requiring minimum illumination levels.

Higher-end properties, properties with a focus on sustainability, and high-end suites in hotels offer another level of lighting control, with a bedside keypad to control all of the room lighting. This enables the guest to turn off all lighting after retiring. Many of these products can be monitored from a central control system in the maintenance or housekeeping department. The system will indicate when lights are left on after a guest has checked out. Switching the lights off provides additional energy savings for the hotel.

19.0 Guest Bathrooms

Guest bathrooms should supply adequate illumination for applying makeup, shaving, and general grooming, as well as for safety in the shower. Bathrooms have typically been the biggest lighting issue for hotels. Most of the hard-wired lighting energy is used there, and although this provides the best opportunity for energy efficiency, the area can be difficult to light.

19.1 Lighting Design Considerations

The main consideration for vanity lighting is that it be flattering to skin tones and yet provide adequate, even illumination (see **Figure 19-1**).

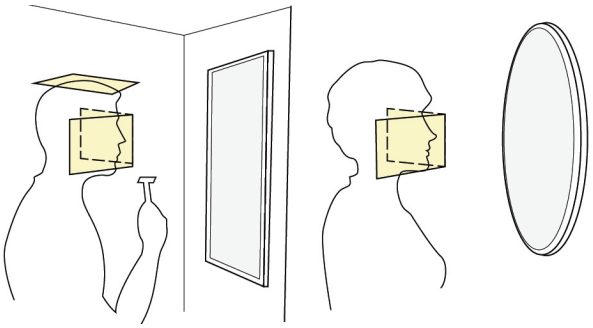

Figure 19-1. Key lighting zones at vanity. (© Illuminating Engineering Society)

If the shower is a separate stall, the designer should consider lighting within that space, as general bathroom lighting will not suffice. Similarly, if the shower is a tub shower, the shower curtain will often be double layered and opaque, which will not allow adequate lighting within the shower. Many properties will install the general downlight over the tub, assuming the shower curtain will be left open when the shower is not in use. If no luminaire is provided for the tub or shower, translucent or transparent shower curtains or doors are recommended.

19.2 Design Criteria and Solutions

Various levels of activity can be addressed with multiple lighting schemes; however, careful consideration should be given to energy usage. (Refer to **Annex A** for specific light level recommendations for the various tasks performed in a guest room.)

A recessed downlight or a surface mounted decorative ceiling luminaire with a wide, soft-edge beam pattern can provide basic ambient illumination in the center of the room.

Linear lighting mounted within a soffit that is above or around the mirror (see **Figure 19-2**) is not only effective but also energy efficient. Lamps with CRI of 90 or greater are recommended for applying makeup and shaving. Sconces on each side of the mirror give the most even illumination to the sides of the face (see **Figure 19-3**). Having separate switches for these areas can also reduce energy usage. If only overhead illumination is used, light colored vanity tops become extremely important, as they can provide more reflected light to better fill the shadows in the face (see **Figure 19-3**).

Nightlights are a convenience in the bathroom. If general or vanity lights are left on overnight, all energy saved by using efficient light sources will be lost. Vacancy sensors are a viable option. LEDs used in illuminated switches and in some wall-mounted hairdryers can serve as nightlights. Using warm white (2200 K to 2700 K) or amber LEDs in either of these may limit sleep disturbance. Some codes may require the controls or light switches be mounted outside the actual bathroom.

Figure 19-2. Integrated mirror lights can provide flattering illumination on the face. (Photo courtesy of MDR Architects)

Figure 19-3. Decorative sconces and a wet-location shower light provide adequate illumination for this guest bathroom. Light colored counter tops will provide reflected light to fill in shadows on the face. (Photo courtesy of Lighting Design Alliance)

Warm color LED step lights may also be used for night-lighting. This type of luminaire, typically located 30 to 45 mm (12 to 18 in.) above the floor, can supply adequate low-level illumination with low energy consumption. Minimal maintenance is required due to the long life of the LED light source, which can be extended by the use of photocell controls.

Annex A – Illuminance Recommendations

Table A-1 in this Annex provides illuminance criteria for tasks and areas specific to this Recommended Practice. For tasks not included in **Table A-1**, the reader is referred to *ANSI/IES RP-10-20, Recommended Practice: Lighting Common Applications*.[9]

General Notes for Table A-1:

a. **Maintained Illuminance Target** values are consensus recommendations for minimum (Min), average (Avg), or maximum (Max) maintained illuminance levels at heights above finish floor (AFF) for application tasks/areas described in the table, for normally sighted people under 65 years of age. This table should be used in conjunction

with other relevant design considerations following these governing criteria:

i. In cases where the height of the visual task may vary, the abbreviation TS (for "task surface") is used. The illuminance criteria then apply at the height of the visual task.

ii. Light loss factors such as luminaire dirt depreciation, lumen depreciation, reduced room surface and furniture reflectances, and other design criteria should be used in calculating maintained illuminances. (Refer to *ANSI/IES LS-6-20, Lighting Practice: Calculation of Light and Its Effects* [see **Preface**] and *ANSI/IES/NALMCO RP-36-20, Recommended Practice: Lighting Maintenance* for additional information.[10])

iii. Illuminance levels are designated for Tasks or Areas. "**T**" (task) designates a visual task, and *illumination level* refers to that of the localized task areas, such as a desk or reading surface (horizontal illuminance), or library stacks (vertical illuminance); the illuminance recommendations apply to that task area only, through the total contribution of general and task lighting. "**A**" (area) designates an area or room where the lighting criterion applies to an entire area under consideration, such as a corridor floor or the field of play in a soccer field.

iv. When multiple tasks are performed within the same space, tasks should be ranked by importance, prevalence, or frequency using data that may be available from the client. From that information, the most commonly occurring task with the highest recommended illuminance should govern the illuminance recommendation for the task or area. Localized task lighting can be used for instances when additional illumination is necessary for infrequent, but more visually demanding, tasks.

b. Variances to Maintained Illuminance Target Values:

i. Health code and safety code requirements supersede these recommendations.

ii. When safety and security or human-vehicular proximity are significant concerns, recommended values are to be minimum maintained illuminances for the task area. For more guidance in applications when security is a concern, refer to *G-1-22, Guide for Security Lighting for People, Property, and Critical Infrastructure*.[11]

iii. An approximate lux-to-footcandle conversion factor of 10:1 is used in these tables, instead of the more accurate conversion factor of 10.76:1.[12] Acceptable tolerances for lighting calculations during the design process are within ±10% of the target value. If a predicted value is below a target recommendation by more than 10%, then a significant percentage of the users of the system may not find the visibility acceptable. If a predicted value exceeds a target recommendation by more than 10%, then over-lighting and energy misuse may result.

iv. When a majority of the occupants of a space are over 65, the illuminance recommendations should be doubled. For special considerations for seniors or visually impaired people of any age, refer to *ANSI/IES RP-28-20, Recommended Practice: Lighting and the Visual Environment for Older Adults and the Visually Impaired*.[13] Localized additional task lighting should be considered for occupants who may require additional lighting, before selecting higher illuminance criteria for the entire space or group.

v. For visual tasks categorized as P through Y and under lighting conditions where the light source S/P Value is different than 1.0, variances are allowed in accordance with *ANSI/IES TM-24-20, Technical Memorandum: An Optional Method for Adjusting the Recommended Illuminance for Visually Demanding Tasks within IES Illuminance Categories P through Y Based on Light Source Spectrum*.[14]

vi. Acceptable tolerances for lighting calculations during the design process are within ±10%. If a predicted value is below a recommendation by more than 10%, then a significant percentage of the users of the system may not find the visibility acceptable. If a predicted value exceeds a recommendation by more than 10%, then over-lighting and energy misuse may result.

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)													
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)						
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio		
APPLICATION TASK/AREA	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Ratio Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Ratio Basis	
INTERIORS - HOSPITALITY APPLICATIONS																
Ballroom																
Breakout, prefunction																
Accenting	Refer to ANSI/IES RP-10-20: Table A-3															
Circulation	A		K	50 @ 0.00	(5 @ 0.0)	Avg	3:1	Avg:Min		G	15 @ 1.52	(1.5 @ 5.0)	Avg	3:1	Avg:Min	
No event, off hours	A		K	50 @ 0.00	(5 @ 0.0)	Avg	3:1	Avg:Min		G	15 @ 1.52	(1.5 @ 5.0)	Avg	3:1	Avg:Min	
Registration tables	A		O	200 @ 0.76	(20 @ 2.5)	Avg	4:1	Avg:Min		L	75 @ 1.22	(7.5 @ 4.0)	Avg	4:1	Avg:Min	
Social function	A		M	100 @ 0.76	(10 @ 2.5)	Avg	3:1	Avg:Min		I	30 @ 1.22	(3 @ 4.0)	Avg	3:1	Avg:Min	
Control booths	Refer to ANSI/IES RP-41-20: Table A-1															
Functions																
Dancing (social)	A		I	30 @ 0.00	(3 @ 0.0)	Avg	2:1	Avg:Min		F	10 @ 1.52	(1 @ 5.0)	Avg	2:1	Avg:Min	
Dining																
Casual	A		O	200 @ 0.76	(20 @ 2.5)	Avg	3:1	Avg:Min		K	50 @ 1.22	(5 @ 4.0)	Avg	3:1	Avg:Min	
Formal																
Business	A		N	150 @ 0.76	(15 @ 2.5)	Avg	3:1	Avg:Min		J	40 @ 1.22	(4 @ 4.0)	Avg	3:1	Avg:Min	
Evening	A		L	75 @ 0.76	(7.5 @ 2.5)	Avg	3:1	Avg:Min		H	20 @ 1.22	(2 @ 4.0)	Avg	3:1	Avg:Min	
Exhibition	A		R	500 @ 0.91	(50 @ 3.0)	Avg	3:1	Avg:Min		O	200 @ 1.52	(20 @ 5.0)	Avg	3:1	Avg:Min	
Meeting	A		Q	400 @ 0.76	(40 @ 2.5)	Avg	3:1	Avg:Min		N	150 @ 1.22	(15 @ 4.0)	Avg	3:1	Avg:Min	
Presentation (high degree of flexibility)																
Audience																
AV and notes	A		K	50 @ 0.61	(5 @ 2.0)	Avg	2:1	Avg:Min		G	15 @ 1.22	(1.5 @ 4.0)	Avg	2:1	Avg:Min	
AV and no notes	A		F	10 @ 0.61	(1 @ 2.0)	Avg	2:1	Avg:Min		D	6 @ 1.22	(0.6 @ 4.0)	Avg	2:1	Avg:Min	
Feature presentation	A		F	10 @ 0.61	(1 @ 2.0)	Avg	2:1	Avg:Min		D	6 @ 1.22	(0.6 @ 4.0)	Avg	2:1	Avg:Min	
No AV	A		M	100 @ 0.61	(10 @ 2.0)	Avg	3:1	Avg:Min		J	40 @ 1.22	(4 @ 4.0)	Avg	3:1	Avg:Min	
Demonstration	T		T	1,000 @ 0.61	(100 @ 2.0)	Avg	3:1	Avg:Min		R	500 @ 1.22	(50 @ 4.0)	Avg	3:1	Avg:Min	
Screen (front projection)[13]																
Feature AV presentation[11]	T									F	10 @ TS	(1 @ TS)	Max	2:1	Max:Avg	
Periodic screen reference[12]	T									K	50 @ TS	(5 @ TS)	Max	2:1	Max:Avg	
Speaker or panel[14]																
AV																
Face(s) (seated)[15]	T									-	@ 1.22	@ 4.0)	Avg	2:1	Avg:Min	
Face(s) (standing)[15]	T									-	@ 1.52	@ 5.0)	Avg	2:1	Avg:Min	
Task surface[4]	T		-	@ 0.76	@ 2.5)	Avg	2:1	Avg:Min								
No AV (seated)	T		S	750 @ 0.76	(75 @ 2.5)	Avg	3:1	Avg:Min		O	200 @ 1.22	(20 @ 4.0)	Avg	3:1	Avg:Min	
No AV (standing)	T		S	750 @ 1.07	(75 @ 3.5)	Avg	3:1	Avg:Min		O	200 @ 1.52	(20 @ 5.0)	Avg	3:1	Avg:Min	

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)													
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)						
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio		
APPLICATION TASK/AREA	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Ratio Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Ratio Basis	
Room Preparation/Cleanup																
Cleanup	A		N	150 @ 0.76	(15 @ 2.5)	Avg	3:1	Avg:Min		J	40 @ 0.76	(4 @ 2.5)	Avg	3:1	Avg:Min	
Setup, tear-down	A		O	200 @ 0.76	(20 @ 2.5)	Avg	3:1	Avg:Min		L	75 @ 0.76	(7.5 @ 2.5)	Avg	3:1	Avg:Min	
Business Center																
Computer stations	T		N	150 @ 0.91	(15 @ 3.0)	Avg	3:1	Avg:Min		K	50 @ 0.91	(5 @ 3.0)	Avg	3:1	Avg:Min	
Copy stations, print stations	A		P	300 @ 0.91	(30 @ 3.0)	Avg	2:1	Avg:Min		L	75 @ 0.91	(7.5 @ 3.0)	Avg	2:1	Avg:Min	
Informal meeting area	A		M	100 @ 0.61	(10 @ 2.0)	Avg	4:1	Avg:Min		K	50 @ 1.22	(5 @ 4.0)	Avg	4:1	Avg:Min	
Exhibit Hall																
Circulation concourses																
Accenting	Refer to ANSI/IES RP-10-20: Table A-3															
Concessions	Refer to ANSI/IES RP-10-20: Table A-1															
Circulation	A		M	100 @ 0.00	(10 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min	
No exhibition (Auxiliary spaces in use)	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		G	15 @ 1.52	(1.5 @ 5.0)	Avg	2:1	Avg:Min	
Registration Stations	A		Q	400 @ 1.07	(40 @ 3.5)	Avg	4:1	Avg:Min		N	150 @ 1.52	(15 @ 5.0)	Avg	4:1	Avg:Min	
General exhibition																
High light setting	A		R	500 @ 0.00	(50 @ 0.0)	Avg	2:1	Avg:Min		O	200 @ 1.52	(20 @ 5.0)	Avg	2:1	Avg:Min	
Low light setting	A		N	150 @ 0.00	(15 @ 0.0)	Avg	2:1	Avg:Min		L	75 @ 1.52	(7.5 @ 5.0)	Avg	2:1	Avg:Min	
Fitness Center																
Circulation	See Transition Spaces															
Cleanup	A		P	300 @ 0.00	(30 @ 0.0)	Avg	3:1	Avg:Min		M	100 @ 0.61	(10 @ 2.0)	Avg	3:1	Avg:Min	
Exercise areas																
Aerobics	A		N	150 @ 0.00	(15 @ 0.0)	Avg	3:1	Avg:Min		J	40 @ TS	(4 @ TS)	Avg	3:1	Avg:Min	
Group exercise	A		P	300 @ 0.00	(30 @ 0.0)	Avg	3:1	Avg:Min		M	100 @ TS	(10 @ TS)	Avg	3:1	Avg:Min	
Personal training	A		Q	400 @ 0.00	(40 @ 0.0)	Avg	3:1	Avg:Min		N	150 @ TS	(15 @ TS)	Avg	3:1	Avg:Min	
Strength training	A		Q	400 @ 0.00	(40 @ 0.0)	Avg	3:1	Avg:Min		N	150 @ TS	(15 @ TS)	Avg	3:1	Avg:Min	
Lockers	Refer to ANSI/IES RP-10-20: Table A-1															
Showers	Refer to ANSI/IES RP-10-20: Table A-1															
Sauna	See Spas | Saunas															
Spa	See Spas | Saunas															
Restrooms	Refer to ANSI/IES RP-10-20: Table A-1															

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)													
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)						
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio		
APPLICATION TASK/AREA	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Basis	
Gaming[16]																
Circulation corridors																
Back-of-house																
Adjacency passageways[5, 6]	A		-	@ 0.00	@ 0.0)		2:1	Avg:Min		-	@ 1.52	@ 5.0)		2:1	Avg:Min	
Independent passageways	A		-	100 @ 0.00	(10 @ 0.0)	Avg	2:1	Avg:Min		J	40 @ 1.52	(4 @ 5.0)	Avg	2:1	Avg:Min	
Public (In other-than gaming areas)	Refer to ANSI/IES RP-10-20: Table A-1															
Accenting	Refer to ANSI/IES RP-10-20: Table A-3															
Adjacency passageways[7, 8]	A		-	@ 0.00	@ 0.0)		2:1	Avg:Min		-	@ 1.52	@ 5.0)		2:1	Avg:Min	
Independent passageways	A		F	10 @ 0.00	(1 @ 0.0)	Min	3:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	3:1	Avg:Min	
Concourse	A		F	10 @ 0.00	(1 @ 0.0)	Min	3:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	3:1	Avg:Min	
Guest																
Mid-corridor	A		F	10 @ 0.00	(1 @ 0.0)	Min	2:1	Avg:Min		H	20 @ 1.52	(2 @ 5.0)	Avg	2:1	Avg:Min	
Door thresholds	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min	
Cleanup																
Cleanup	A		N	150 @ 0.76	(15 @ 2.5)	Avg	3:1	Avg:Min		J	40 @ 0.76	(4 @ 2.5)	Avg	3:1	Avg:Min	
Gaming areas[17]																
General lighting[9, 10]	A		-	@ 0.00	@ 00)		2:1	Avg:Min		-	@ 1.52	@ 5.0)		2:1	Avg:Min	
Guest Room																
Art	Refer to ANSI/IES RP-10-20: Table A-3															
Bathroom																
Shower, tub	T		K	50 @ 0.00	(5 @ 0.0)	Avg	3:1	Avg:Min		H	20 @ TS	(2 @ TS)	Avg	3:1	Avg:Min	
Restroom	T		J	40 @ TS	(4 @ TS)	Avg	2:1	Avg:Min		G	15 @ TS	(1.5 @ TS)	Avg	2:1	Avg:Min	
Vanity	T		O	200 @ 0.91	(20 @ 3.0)	Avg	2:1	Avg:Min		O	200 @ TS	(20 @ TS)	Avg	2:1	Avg:Min	
Closet (shelf face)	A		I	30 @ 1.22	(3 @ 4.0)	Avg	3:1	Avg:Min		H	20 @ 1.22	(2 @ 4.0)	Avg	3:1	Avg:Min	
Dining table	T		M	100 @ TS	(10 @ TS)	Avg	3:1	Avg:Min		I	30 @ 1.22	(3 @ 4.0)	Avg	3:1	Avg:Min	
Entrance, foyer	A		H	20 @ 0.00	(2 @ 0.0)	Avg	2:1	Avg:Min		F	10 @ 1.52	(1 @ 5.0)	Avg	2:1	Avg:Min	
Reading																
Bed headboard (small area)	T	M	O	200 @ 0.91	(20 @ 3.0)	Avg	3:1	Avg:Min		M	100 @ 0.91	(10 @ 3.0)	Avg	3:1	Avg:Min	
Casual chair (sitting areas)	T	M	N	150 @ 0.76	(15 @ 2.5)	Avg				K	50 @ 0.76	(5 @ 2.5)	Avg			
Desk	T	M	O	200 @ TS	(20 @ TS)	Avg				I	30 @ 1.22	(3 @ 4.0)	Avg			
General	A		H	20 @ 0.00	(2 @ 0.0)	Avg	4:1	Avg:Min		E	8 @ 1.52	(0.8 @ 5.0)	Avg	4:1	Avg:Min	
Steps, stairs	T		J	40 @ TS	(4 @ TS)	Avg	3:1	Avg:Min								
Kitchenette	T		R	500 @ TS	(50 @ TS)	Avg				L	75 @ TS	(7.5 @ TS)	Avg			

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]															
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)												
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)					
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio	
APPLICATION TASK/AREA	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Ratio Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Ratio Basis
Pools, Indoor	See also EXTERIORS | Pools, Outdoors														
In-hot-tub[1]															
In-pool[2]															
Perimeter vertical surfaces	Refer to ANSI/IES RP-10-20: Table A-3														
Pool and hot tub deck[3]															
High activity	T	M	M	100 @ 0.00	(10 @ 0.0)	Avg	3:1	Max:Avg		I	30 @ 1.52	(3 @ 5.0)	Avg	3:1	Max:Avg
Medium activity	T	M	K	50 @ 0.00	(5 @ 0.0)	Avg	3:1	Max:Avg		H	20 @ 1.52	(2 @ 5.0)	Avg	3:1	Max:Avg
Low activity	T	M	F	10 @ 0.00	(1 @ 0.0)	Avg	3:1	Max:Avg		C	4 @ 1.52	(0.4 @ 5.0)	Avg	3:1	Max:Avg
Salons (Hair, Nails)															
Hair Salon, Barber															
Barber chair	T		R	500 @ 1.22	(50 @ 4.0)	Avg				P	300 @ 1.22	(30 @ 4.0)	Avg		
Color lab chair	T		S	750 @ 1.22	(75 @ 4.0)	Avg				O	200 @ 1.22	(20 @ 4.0)	Avg		
General	A		O	200 @ 0.00	(20 @ 0.0)	Avg	3:1	Avg:Min		M	100 @ 1.52	(10 @ 5.0)	Avg	3:1	Avg:Min
Wash	T		P	300 @ 0.91	(30 @ 3.0)	Avg	2:1	Avg:Min		M	100 @ 0.91	(10 @ 3.0)	Avg	2:1	Avg:Min
Styling chair	T		R	500 @ 1.22	(50 @ 4.0)	Avg				P	300 @ 1.22	(30 @ 4.0)	Avg		
Manicures															
General	A		O	200 @ 0.00	(20 @ 0.0)	Avg	2:1	Avg:Min		M	100 @ 1.22	(10 @ 4.0)	Avg	2:1	Avg:Min
Hand est	T		S	750 @ TS	(75 @ TS)	Avg				N	150 @ 1.22	(15 @ 4.0)	Avg		
Pedicures															
Foot rest	T		S	750 @ TS	(75 @ TS)	Avg				N	150 @ 1.22	(15 @ 4.0)	Avg	2:1	Avg:Min
General	T		O	200 @ 0.00	(20 @ 0.0)	Avg	2:1	Avg:Min		M	100 @ 1.22	(10 @ 4.0)	Avg	2:1	Avg:Min

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)													
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)						
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio		
APPLICATION TASK/AREA	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Ratio Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Ratio Basis	
Spas																
Changing rooms	A		L	75 @ 0.00	(7.5 @ 0.0)	Avg	5:1	Avg:Min		M	100 @ 1.52	(10 @ 5.0)	Avg	5:1	Avg:Min	
Cleanup	A		P	300 @ 0.00	(30 @ 0.0)	Avg	3:1	Avg:Min		M	100 @ 0.61	(10 @ 2.0)	Avg	3:1	Avg:Min	
Hamam (accent basin vicinity)	A		H	20 @ 0.00	(2 @ 0.0)	Avg	10:1	Avg:Min		C	4 @ 1.52	(0.4 @ 5.0)	Avg	10:1	Avg:Min	
Lockers																
Guest lockers	T		H	20 @ 0.00	(2 @ 0.0)	Avg	2:1	Avg:Min		H	20 @ TS	(2 @ TS)	Avg	2:1	Avg:Min	
Sports lockers	T		M	100 @ 0.00	(10 @ 0.0)	Avg	2:1	Avg:Min		M	100 @ TS	(10 @ TS)	Avg	2:1	Avg:Min	
Staff lockers	T		O	200 @ 0.00	(20 @ 0.0)	Avg	2:1	Avg:Min		O	200 @ TS	(20 @ TS)	Avg	2:1	Avg:Min	
Showers	A		M	100 @ 0.00	(10 @ 0.0)	Avg	2:1	Avg:Min		K	50 @ TS	(5 @ TS)	Avg	2:1	Avg:Min	
Vanities	T		N	150 @ 0.91	(15 @ 3.0)	Avg	2:1	Avg:Min		O	200 @ TS	(20 @ TS)	Avg	2:1	Avg:Min	
Makeup stations	T		P	300 @ 0.00	(30 @ 0.0)	Avg				P	300 @ 1.22	(30 @ 4.0)	Avg			
Pools	See Pools															
Reception	Refer to ANSI/IES RP-10-20: Table A-1															
Sauna[18]																
Steam room[18]																
Treatment																
Dry and wet treatments																
Room	A		C	4 @ 0.91	(0.4 @ 3.0)	Avg	5:1	Avg:Min		B	2 @ 0.91	(0.2 @ 3.0)	Avg	5:1	Avg:Min	
Table	T		C	4 @ 0.91	(0.4 @ 3.0)	Avg	3:1	Avg:Min		B	2 @ 0.91	(0.2 @ 3.0)	Avg	3:1	Avg:Min	
Pre-treatments, post-treatments	A		J	40 @ 0.91	(4 @ 3.0)	Avg	5:1	Avg:Min		H	20 @ 0.91	(2 @ 3.0)	Avg	5:1	Avg:Min	

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																	
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)														
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)							
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio			
	Task	High	C			Max				C			Max				
	or	Med	A			Avg		Ratio		A			Avg		Ratio		
APPLICATION TASK/AREA	Area	Low	T	Lux @ m	(Fc @ Ft)	Min	Ratio	Basis		T	Lux @ m	(Fc) @ (Ft)	Min	Ratio	Basis		
Support Spaces																	
Coat check or coat rooms	Refer to ANSI/IES RP-10-20: Table A-1																
Copy rooms, print rooms	Refer to ANSI/IES RP-10-20: Table A-1																
Housekeeping																	
Equipment or supply closet	A		M	100 @ 0.00	(10 @ 0.0)	Avg	3:1	Avg:Min		I	30 @ 1.22	(3 @ 4.0)	Avg	3:1	Avg:Min		
Linen																	
Closet	A		K	50 @ 0.00	(5 @ 0.0)	Avg	3:1	Avg:Min		I	30 @ 1.22	(3 @ 4.0)	Avg	3:1	Avg:Min		
Room																	
General	A		N	150 @ 0.00	(15 @ 0.0)	Avg	3:1	Avg:Min		K	50 @ 1.22	(5 @ 4.0)	Avg	3:1	Avg:Min		
Sewing	T		R	500 @ 0.00	(50 @ 0.0)	Avg				P	300 @ 1.22	(30 @ 4.0)	Avg				
Laundry	A		P	300 @ 1.07	(30 @ 3.5)	Avg	3:1	Avg:Min		N	150 @ 1.07	(15 @ 3.5)	Avg	3:1	Avg:Min		
Janitor's closet	Refer to ANSI/IES RP-10-20: Table A-1																
Receiving, shipping	Refer to ANSI/IES RP-10-20: Table A-1																
Storage	Refer to ANSI/IES RP-10-20: Table A-1																
Valet	A		M	100 @ 0.91	(10 @ 3.0)	Avg	3:1	Avg:Min		K	50 @ 1.52	(5 @ 5.0)	Avg	3:1	Avg:Min		
Restrooms	**Refer to ANSI/IES RP-10-20: Table A-1**																
Fixtures	T		M	100 @ TS	(10 @ TS)	Avg	2:1	Avg:Min		I	30 @ TS	(3 @ TS)	Avg	2:1	Avg:Min		
General	A		K	50 @ 0.00	(5 @ 0.0)	Avg	4:1	Avg:Min		I	30 @ TS	(3 @ TS)	Avg	4:1	Avg:Min		
Transition Spaces																	
Accenting	Refer to ANSI/IES RP-10-20: Table A-3																
Circulation corridors[19]																	
Back of house																	
Adjacency passageways[5, 6]	A		-	@ 0.00	@ 0.0)	Avg	2:1	Avg:Min		-	@ 1.52	@ 5.0)	Avg	2:1	Avg:Min		
Independent passageways	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min		
Public																	
Adjacency passageways[7, 8]	A		-	@ 0.00	@ 0.0)	Avg	3:1	Avg:Min		-	@ 1.52	@ 5.0)	Avg	3:1	Avg:Min		
Independent passageways	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min		
Concourse	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min		
Guest																	
Mid-corridor	A		F	10 @ 0.00	(1 @ 0.0)	Min	2:1	Avg:Min		H	20 @ 1.52	(2 @ 5.0)	Avg	2:1	Avg:Min		
Door thresholds	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min		

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)													
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)						
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio		
APPLICATION TASK/AREA	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Ratio Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Ratio Basis	
Elevators	Refer to ANSI/IES RP-10-20: Table A-1															
Entries / Vestibules	Refer to ANSI/IES RP-10-20: Table A-1															
Escalators, moving walkways	Refer to ANSI/IES RP-10-20: Table A-1															
Lobbies																
Circulation, elevator lobbies[19]																
At building entries[20]																
Day	A		M	100 @ 0.00	(10 @ 0.0)	Avg	4:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	4:1	Avg:Min	
Night	A		K	50 @ 0.00	(5 @ 0.0)	Avg	4:1	Avg:Min		H	20 @ 1.52	(2 @ 5.0)	Avg	4:1	Avg:Min	
Distant from entries	A		M	100 @ 0.00	(10 @ 0.0)	Avg	4:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	4:1	Avg:Min	
Concierge, car rental	T		O	200 @ TS	(20 @ TS)	Avg	3:1	Avg:Min		L	75 @ TS	(7.5 @ TS)	Avg	3:1	Avg:Min	
Reading and work areas (sitting)	T		N	150 @ 0.76	(15 @ 2.5)	Avg				K	50 @ 0.76	(5 @ 2.5)	Avg			
Reception lobbies[21]																
Desktop	T		N	150 @ TS	(15 @ TS)	Avg	4:1	Avg:Min		K	50 @ TS	(5 @ TS)	Avg	4:1	Avg:Min	
Focal wall behind desk	Refer to ANSI/IES RP-10-20: Table A-3															
Lounges																
Clubs and game rooms																
General	A		J	40 @ 0.76	(4 @ 2.5)	Avg	4:1	Avg:Min		G	15 @ 0.76	(1.5 @ 2.5)	Avg	4:1	Avg:Min	
Table games	T	M	P	300 @ TS	(30 @ TS)	Avg				K	50 @ 1.52	(5 @ 5.0)	Avg			
Video games	T	H	H	20 @ TS	(2 @ TS)	Avg				C	4 @ 1.22	(0.4 @ 4.0)	Avg			
Reading and work areas (sitting)	T		N	150 @ 0.76	(15 @ 2.5)	Avg				K	50 @ 0.76	(5 @ 2.5)	Avg			
Social and waiting areas	A		J	40 @ 0.00	(4 @ 0.0)	Avg	2:1	Avg:Min		G	15 @ 1.22	(1.5 @ 4.0)	Avg	2:1	Avg:Min	
Stairs[19]																
High activity	A		M	100 @ 0.00	(10 @ 0.0)	Avg	2:1	Avg:Min		K	50 @ 1.52	(5 @ 5.0)	Avg	2:1	Avg:Min	
Live surveillance	A		M	100 @ 0.00	(10 @ 0.0)	Avg	2:1	Avg:Min		K	50 @ 1.52	(5 @ 5.0)	Avg	2:1	Avg:Min	
Typical	A		K	50 @ 0.00	(5 @ 0.0)	Avg	2:1	Avg:Min		I	30 @ 1.52	(3 @ 5.0)	Avg	2:1	Avg:Min	

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]																		
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)															
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)								
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio				
	Task	High	C			Max				C			Max					
	or	Med	A			Avg		Ratio		A			Avg		Ratio			
APPLICATION TASK/AREA	Area	Low	T	Lux @ m	(Fc @ Ft)	Min	Ratio	Basis		T	Lux @ m	(Fc) @ (Ft)	Min	Ratio	Basis			
EXTERIORS - HOSPITALITY																		
Lighting for Pedestrians	**Refer to ANSI/IES RP-43-20: Tables A-1 through A-4**																	
Parking and Roadways	**Refer to ANSI/IES RP-8-18**																	
Pools, Outdoor	**See also EXTERIORS | Pools, Outdoors**																	
In-hot-tub[1]																		
In-pool[2]																		
Pool and hot tub deck[3]																		
High activity																		
LZ4	T		F	10 @ TS	(1 @ TS)	Avg	4:1	Avg:Min		D	6 @ 1.52	(0.6 @ 5.0)	Avg	4:1	Avg:Min			
LZ3 (and LZ4 curfew)	T		E	8 @ TS	(0.8 @ TS)	Avg	4:1	Avg:Min		C	4 @ 1.52	(0.4 @ 5.0)	Avg	8:1	Avg:Min			
LZ2 (and LZ3 curfew)	T		D	6 @ TS	(0.6 @ TS)	Avg	4:1	Avg:Min		B	2 @ 1.52	(0.2 @ 5.0)	Avg	8:1	Avg:Min			
LZ1 (and LZ2 curfew)	T		C	4 @ TS	(0.4 @ TS)	Avg	4:1	Avg:Min		A	1 @ 1.52	(0.1 @ 5.0)	Avg	8:1	Avg:Min			
LZ0 (and LZ1 curfew)	T		B	2 @ TS	(0.2 @ TS)	Avg	4:1	Avg:Min										
Medium activity																		
LZ4	T		D	6 @ 0.00	(0.6 @ 0.0)	Avg	4:1	Avg:Min		B	2 @ 1.52	(0.2 @ 5.0)	Avg	4:1	Avg:Min			
LZ3 (and LZ4 curfew)	T		C	4 @ 0.00	(0.4 @ 0.0)	Avg	4:1	Avg:Min		A	1 @ 1.52	(0.1 @ 5.0)	Avg	8:1	Avg:Min			
LZ2 (and LZ3 curfew)	T		B	2 @ 0.00	(0.2 @ 0.0)	Avg	4:1	Avg:Min										
LZ1 (and LZ2 curfew)	T		A	1 @ 0.00	(0.1 @ 0.0)	Avg	4:1	Avg:Min										
LZ0 (and LZ1 curfew)[22]																		
Low activity																		
LZ4	T		B	2 @ 0.00	(0.2 @ 0.0)	Avg	3:1	Avg:Min										
LZ3 (and LZ4 curfew)	T		A	1 @ 0.00	(0.1 @ 0.0)	Avg	3:1	Avg:Min										
LZ2 (and LZ3 curfew)	T		A	1 @ 0.00	(0.1 @ 0.0)	Avg	3:1	Avg:Min										
LZ1 (and LZ2 curfew)	T		A	1 @ 0.00	(0.1 @ 0.0)	Avg	3:1	Avg:Min										
LZ0 (and LZ1 curfew)[22]																		
Sports, Outdoors	**Refer to ANSI/IES RP-6-20: Table A-2**																	

Table A-1. Recommended Illuminance Criteria for Spaces Specific to Hospitality Applications

Recommended Maintained Illuminance Targets[a, b]															
			TS = Task Surface: Recommended illuminances are at height of task surface above finished floor (AFF)												
	Veiling Reflection Risk		Horizontal (E_h)							Vertical (E_v)					
	Light Level for Task or Area?		Target E_h @ Height AFF				Uniformity Ratio			Target E_v @ Height AFF				Uniformity Ratio	
	Task or Area	High Med Low	CAT	Lux @ m	(Fc @ Ft)	Max Avg Min	Ratio	Basis		CAT	Lux @ m	(Fc) @ (Ft)	Max Avg Min	Ratio	Basis
APPLICATION TASK/AREA															
APPLICATION TASK/AREA NOTES															
1. This highly specialized application is often best addressed with equipment and layouts recommended by hot tub or lighting vendors. Consult with respective vendors. Use more lower-wattage luminaires in lieu of fewer higher-wattage luminaires.															
2. This highly specialized application is often best addressed with equipment and layouts recommended by pool or lighting vendors. Consult with respective vendors. Do not center lights in swimming lanes of lap pools. Use more lower-wattage luminaires in lieu of fewer higher-wattage luminaires.															
3. Pool and hot tub presumed to be internally lighted. Lighting should address the pool and a "deck area" extending 3 m (10 ft) beyond the pool edge, or consisting of the actual deck extension, whichever is greater. E_v should be on planes perpendicular to the outline of the pool in two primary directions of travel around the pool.															
4. # indicates value to be determined by designer; avg $E_h \leq 3$ times audience E_h.															
5. # indicates value to be determined by designer; avg $E_h \geq 0.3$ times task E_h of adjacent space, or as cameras or live surveillance requires, but with min. ≥ 10 lux.															
6. # indicates value to be determined by designer; avg $E_v \geq 0.3$ times task E_v of adjacent space, or as cameras or live surveillance requires.															
7. # indicates value to be determined by designer; avg $E_h \geq 0.2$ times task E_h of adjacent space, or as cameras or live surveillance requires, but with min. ≥ 10 lux.															
8. # indicates value to be determined by designer; avg $E_v \geq 0.2$ times task E_v of adjacent space, or as cameras or live surveillance requires.															
9. # indicates value to be determined by designer; avg $E_h \geq 0.1$ times task E_h of adjacent games, or as cameras, live surveillance, or regulations require, but with min. ≥ 10 lux.															
10. # indicates value to be determined by designer; avg $E_v \geq 0.1$ times task E_v of adjacent games, or as cameras, live surveillance, or regulations require.															
11. Little or no live narration or oral presentation.															
12. Live narration or oral presentation accompanied by some AV.															
13. Cited values are intended for screen plane when screen is in use (limit light on screen for best viewing condition).															
14. Lighting at the speaker or panel of speakers.															
15. # indicates value to be determined by designer; avg $E_v \leq 3$ times audience avg E_h.															
16. Consult with gaming and surveillance specialists to establish or confirm illuminance criteria in gaming areas.															
17. Consult with gaming and surveillance specialists for illuminance criteria for tables and money handling areas.															
18. This highly specialized application is best addressed with equipment and layouts recommended by sauna or lighting vendors.															
19. When the architect coordinates contrast markings with steps, curbs, and ramps, localized lighting may be deemed appropriate.															
20. Close proximity to exterior. Lighting should assist with adaptation when passing to or from exterior.															
21. For example, registration, business center, fitness center, spa, concierge lounge.															
22. LZ0 in this category should not have permanent electric lighting.															

Annex B – Color Considerations

B.1 Color and the Hospitality Environment

Color is a powerful hospitality and branding tool. Light and pigment colors for displays and signage attract attention and guide guests. The subject of light and color is complex, and to completely cover it is beyond the scope of this document. Light can instantaneously create an impression about a hotel's image and price range via its warmth or coolness, its color quality, the quantity provided, and its distribution.

Color perception results from the interaction of many factors, including the characteristics of the object or light source, the light incident on the object, the color of the surround, viewing direction, observer characteristics, and observer adaptation level.

Some responses to certain colors and color combinations are almost universal. Although personal tastes in color vary, there is almost universal agreement that yellows, yellow-reds, reds, and red-purples are "warm" colors; and greens, blue-greens, blues, and purple-blues are "cool" colors. All tones of gray approach neutrality of character, whether from the warm or cool side.

A brief overview is provided in the subsections that follow. Additional information on color can be found in *ANSI/IES LS-5-21, Lighting Science: Color* (see **Preface**).

Annex C – Americans with Disabilities Act (A.D.A.) Considerations (U.S.)

C.1 Protruding Objects

Objects projecting from walls (for example, wall sconces and telephones) with their leading edges between 27 in. and 80 in. (685 mm and 2,030 mm) above the finished floor shall protrude no more than 4 in. (100 mm) into walks, halls, corridors, passageways, or aisles (see **Figure C-1**). Objects mounted with their leading edges at or below 27 in. (685 mm) above the finished floor may protrude any amount.

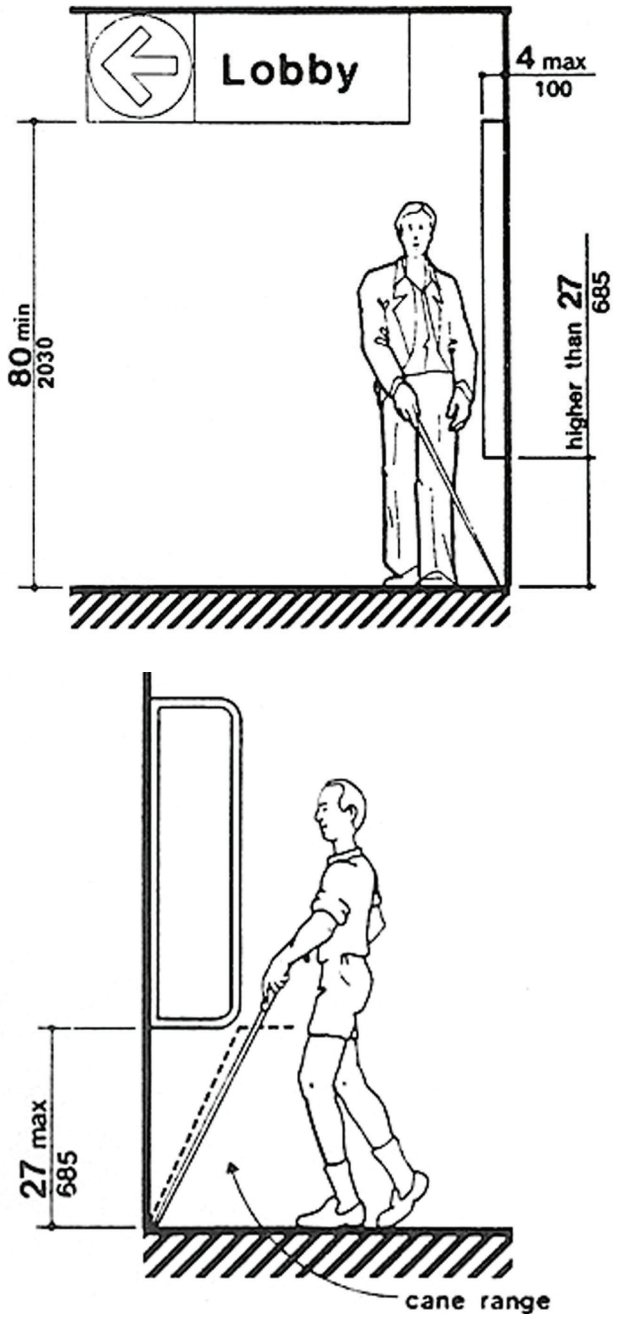

Figure C-1. Restrictions for protruding objects.
(© Illuminating Engineering Society)

Free-standing objects mounted on posts or pylons may overhang 12 in. (305 mm) maximum from 27 in. to 80 in. (685 mm to 2,030 mm) above the ground or finished floor (see **Figures C-2, C-3**).

In addition, protruding objects shall not reduce the clear width of an accessible route or maneuvering space (see **Figure C-4**).

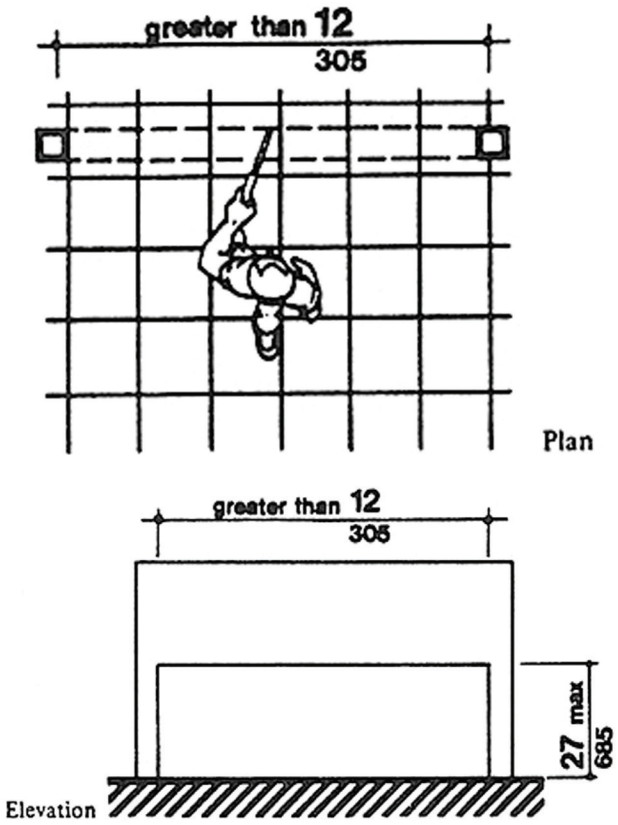

Figure C-2. Top view (*top image*) and elevation view (*bottom image*): Restrictions for protruding objects mounted on posts or pylons. (© Illuminating Engineering Society)

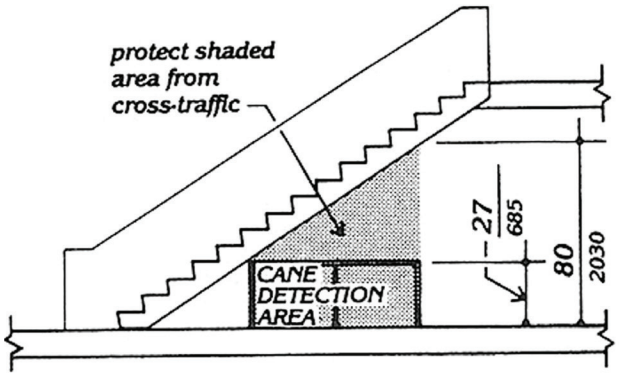

Figure C-3. Protruding objects: example of protection around wall-mounted objects, and measurements of clear widths. (© Illuminating Engineering Society)

C.2 Head Room

Walks, halls, corridors, passageways, aisles, and other circulation spaces shall have 80 in. (2,030 mm) minimum clear head room. If vertical clearance of an area adjoining an accessible route is reduced to less than 80 in. (nominal dimension), then a barrier to warn blind or visually impaired persons shall be provided.

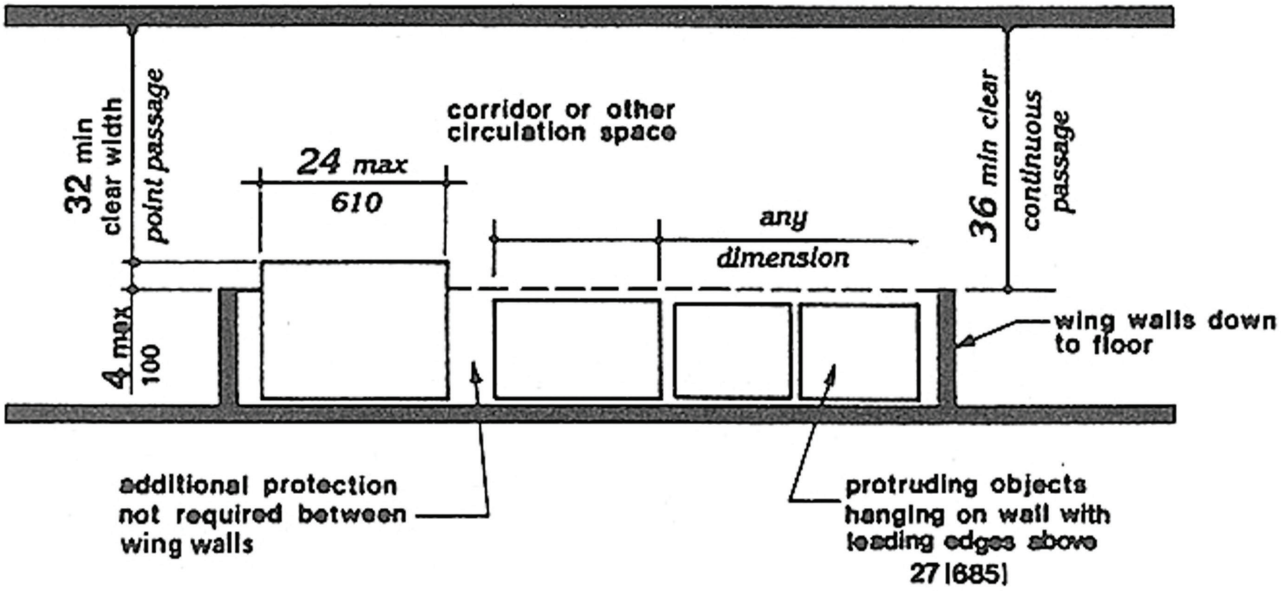

Figure C-4. Protruding objects and overhead hazards (top view). (© Illuminating Engineering Society)

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Process for Change to an ANSI/IES Standard under Continuous Maintenance

This standard is maintained under continuous maintenance procedures, for which IES has an established and documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Committee consideration will be given to proposed changes by June 30 of any given year for proposed changes received by the IES Director of Standards no later than December 31 of the previous year.

Submittal Format

Proposed changes must be submitted to the IES Director of Standards in the announced published format. However, changes may be accepted in an earlier published format, if the differences are immaterial to the proposed change submittal. If the Director of Standards concludes that a current form must be utilized, the proposer may be given up to 20 additional days to resubmit the proposed changes in the current format.

Specific changes in the text or values are required and must be substantiated. Any change proposals that do not meet these requirements will be returned to the proposer. Supplemental background documents to support changes submitted may be included.

Submission to the Committee Chair

The Director of Standards shall forward proposed changes received on appropriate forms to the committee chair for assigning to committee members (responders) to develop responses to submitters of proposed changes.

Review and Clarification

Responders shall review proposals and should contact the proposer if necessary for clarification.

Response Recommendation

Designated responders shall draft a recommended committee response, including any recommended changes to the standard. The 'responders' recommended responses shall be submitted to the committee chair in electronic form usable by Society Staff, including any recommended change to the standard in response to proposals received.

Options for Committee response are limited to:

a) Proposed change accepted for public review without modification
b) Proposed change accepted for public review with modification
c) Proposed change accepted for further study
d) Proposed change rejected

The responders shall provide reasons for any recommendation other than option (a) above.

The designated responders shall not recommend option (c) unless the further study can be completed by October 1 of that year, and providing the Committee can then vote for option (a), (b), or (d) no later than November 15 of that year.

Editing

The Committee chair or his or her designee shall edit the draft responses and circulate the edited drafts to the committee for review.

Form for Proposing Change to an ANSI/IES Standard under Continuous Maintenance

NOTE: Use a separate form for each comment. Submit to the Director of Standards, IES, 120 Wall Street, 17th Floor, New York, NY 10005-4001. Email: standards@ies.org. Fax: 212-248-5017.

1. Submitter: _____
   Affiliation: _____
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2. Title of publications and year published _____
3. Clause (section), sub-clause or paragraph number; and page number: _____
4. My proposal (check one):
   [ ] Change to read as follows
   [ ] Delete and substitute as follows
   [ ] Add new text as follows
   [ ] Delete without substitution

Use underscore to show material to be added (<u>added</u>) and strikethrough for material to be deleted (~~deleted~~). Use additional pages if needed.

5. Proposed change:

_____
_____
_____

6. Reason and substantiation:

_____
_____
_____

Select as applicable:

[ ] Additional pages are attached. Number of additional pages:
[ ] Attachments or referenced materials cited in this proposal accompany this proposed change.

Please verify that all attachments and references are relevant, current, and clearly labeled to avoid processing and review delays. Please list your attachments here:

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