Illuminating
ENGINEERING SOCIETY

IES CG-1-20

LIGHTING YOUR WAY TO BETTER VISION

REMAIN INDEPENDENT PROMOTE WELLNESS ENJOY HOBBIES KEEP SAFE

www.ies.org

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Prepared by the IES Lighting for Seniors and the Visually Impaired Committee

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The American Academy of Ophthalmology is the world's largest association of eye physicians and surgeons. We are a global community of 32,000 medical doctors who protect sight and empower lives by setting the standards for ophthalmic education and advocating for our patients and the public. We are honored to endorse Lighting Your Way to Better Vision, which contains critical information about how to minimize the impact of vision loss due to age and/or disease. Key factors to help improve vision are enhanced lighting, reduced glare and increased contrast. The IES standards clearly delineate how illumination can improve the daily lives of people living with vision loss.

AMERICAN ACADEMY OF OPHTHALMOLOGY®
Protecting Sight. Empowering Lives.

AMERICAN GERIATRICS SOCIETY

"The American Geriatrics Society Health in Aging Foundation affirms the value of this document. The AGS Health in Aging Foundation supports the general principles in the document and believes it is of general benefit to the public."

AGS Geriatrics Healthcare Professionals
Leading Change. Improving Care for Older Adults

AMERICAN OPTOMETRIC ASSOCIATION

The American Optometric Association, representing more than 35,000 Doctors of Optometry (OD), optometry students, paraoptometric assistants, and technicians, is pleased to support the information contained in IES CG-1-20, Lighting Your Way to Better Vision. As the population of older adults continues to increase in North America, quality lighting's role in meeting the needs of an aging visual system becomes ever more important.

As we get older, our visual system becomes more vulnerable to eye disease and subtle but normal changes that make focusing more difficult, glare more bothersome, and proper lighting more important. Quality environmental lighting is essential for good mobility, as it can help to prevent falls. And the need for higher light levels also means that control of sources of light is especially important. The recommendations included in this brochure are critically important if ocular diseases, such as age-related macular degeneration or diabetic retinopathy, affect one's vision, or low vision aids are prescribed by an optometrist to maximize one's remaining vision.

Regular comprehensive eye examinations can protect your eyes from diseases and new glasses can be a big help, but proper lighting is also critical to your health, safety, and wellbeing.

AMERICAN OPTOMETRIC ASSOCIATION

GERONTOLOGICAL SOCIETY OF AMERICA

This insightful resource from the Illuminating Engineering Society will benefit us all as we age. We recognize that our visual acuity and age-related changes to our vision can be managed in part by how we plan the lighted surroundings in our homes. We may take for granted the well-lit areas in and around our homes. A good lighting plan can ensure a safe and pleasant environment that allows us to remain at home as we age. The Gerontological Society of America is pleased to recommend this brochure for older people. All involved in aiding older people to safely stay in their homes, including family caregivers, home improvement contractors, and all providing care directly for older people, will find this resource helpful.

The Gerontological Society of America (GSA) is the nation's oldest and largest interdisciplinary organization devoted to research, education, and practice in the field of aging. The principal mission of the Society — and its 5,400+ members — is to advance the study of aging and disseminate information among scientists, decision-makers, and the general public.

THE GERONTOLOGICAL SOCIETY OF AMERICA®

Foreword

The Illuminating Engineering Society (IES) is the recognized lighting authority in North America; its Lighting for Older Adults and the Visually Impaired Committee comprises experts in lighting designed to minimize the impact of age-related vision changes. This committee has developed two documents:

- *ANSI/IES RP-28-20, Recommended Practice: Lighting and the Visual Environment for Older Adults and the Visually Impaired* is a more technical document used by code officials and the design community to address lighting in senior care facilities, public buildings, and homes. The document is available through the IES website, store.ies.org/product/rp-28-20-recommended-practice-lighting-and-the-visual-environment-for-older-adults-and-the-visually-impaired/.
- Consumer Guide CG-1-20 (this brochure) follows the same principles as ANSI/IES RP-28-20; however, it is written in a style that uses terminology and images easily understood by lay public. It is unique and is targeted to improve lighting for seniors and those with low vision at home.

Introduction

As we get older, nothing is more frustrating than not being able to see as well as we used to. An eye examination and new glasses can be a big help, but proper lighting is just as critical. Older people require light levels that are three to five times higher than younger people need, due to normal age-related changes to the eyes and eye diseases. In addition, the quality of the light is equally important to the quantity of light for older normal age-related changes to the eye and eye diseases (refer to heading *Recommendations for good lighting as we age*). Whether you're going to continue living in your home or are moving to an apartment or retirement community, lighting is going to become an ever more important part of your everyday life. It will add to your comfort and enjoyment, and it will help to keep you safe.

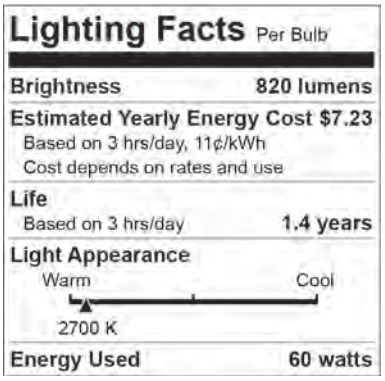
This brochure describes some of the changes that can be made to existing lighting to make your home more comfortable and secure. Some solutions are easily accomplished, such as changing to an LED light bulb or plugging a new (LED) fixture into an electric outlet. Others require changing light fixtures or providing additional electrical boxes for new fixtures. It is recommended that you hire a qualified electrician to do the electrical work for you.

Additional information, included recommended light levels, may be found in *ANSI/IES RP-28-20* as well as *ANSI/IES/ALA RP-11-20, Recommended Practice: Lighting for Interior and Exterior Residential Environments*, as well as the latest ANSI/IES Recommended Practice (RP) documents on light and human health.

Understanding the basics of lighting

- ***Ambient light*** is the general lighting of the room, needed for walking around, conversing, and identifying objects.
- ***Task lighting*** provides higher light levels in a specific area for performing visual tasks, e.g., cooking, reading, sewing, cutting.
- ***Accent light*** is used to highlight artwork or special architectural features.

- ***Daylight*** from windows and skylights can provide ambient lighting. It is variable in intensity, and we need to be aware of the potential for glare. Due to the high light levels it can provide, diffused daylight or direct sunlight is sometimes used for visual tasks such as mending or working on puzzles.
- ***Interior surfaces*** can contribute to good lighting. Lighter colors on ceilings and walls will reflect more light within a space. Dark colors absorb the light and should only be used on moldings or small areas. Ceilings and walls should also have a flat or eggshell finish for general areas, and a washable satin (or semi-gloss) finish for kitchens and bathrooms.
- ***Correlated color temperature,* CCT**, is a way to describe the color appearance provided by a light source. It is measured in degrees kelvin (K). A higher CCT indicates a cooler, bluer color, and a lower CCT is warmer in appearance. It is important to note, however, that CCT provides only a rough approximation of how much blue or yellow or red a light source spectrum contains. For example, while an incandescent light and an LED light may each have a CCT of 3000 K, the LED would likely have more blue in its spectrum. This difference in spectrum will then influence how objects of various colors will appear under the two light sources.



- ***Color rendering*** is the ability of a light source to reveal the colors of objects in comparison to a reference light source of the same CCT. One way of indicating this ability is with the color rendering index, CRI, which ranges from 1 to 100, with a high CRI generally indicating better color rendering than a low one.
- ***Lumens*** – A measure of the amount of light emitted from a light source.
- ***Wattage*** – The amount of power a light fixture uses.
- ***Footcandle*** – A measurement of illuminance, the light falling onto a surface. One footcandle is equal to one lumen falling onto an area of one square foot.

- ***Lux*** – The metric equivalent of the footcandle. An illuminance of one lux indicates one lumen falling onto an area of one square meter. Ten lux is approximately equal to one footcandle.
- ***Direct glare –*** An uncomfortable amount of light from a light source; an example is a bare light bulb.
- ***Reflected glare –*** An uncomfortable amount of light reflecting from a surface; examples are bright light bouncing off a mirror, highly polished floors, or countertops.

Recommendations for good lighting as we age

The following recommendations can help compensate for normal age-related visual changes:

- **Lighting should be uniform within a room and from one room to another.** Why? Because older eyes take longer to adapt to changes in light levels.
- **Higher light levels.** Why? Because more light is needed to compensate for normal age-related changes within the eye, which reduce the light coming into the eye and absorb the light that would be used for vision.
- **Glare-free light.** Why? As we age there is increased light scattering within the eye, causing an increased sensitivity to glare and the loss of the ability to see subtle details at lower light levels.
- **Light that helps distinguish colors.** Why? The lens of the eye becomes opaque and yellows with age, and proper lighting can help compensate.
- **Lighting for health.** Why? There is abundant evidence that daylight and electric light directly impact the circadian rhythms and sleep quality of all individuals, especially older adults. The term *circadian rhythms* refers to the regulation of body functions on an approximately 24-hour cycle. Tips for healthy lighting include getting plenty of morning daylight and, at home, using high levels of white light during the daytime with low levels of warm light in the evening and nighttime. This lighting pattern will help regulate one's circadian rhythms and sleep, while positively impacting health. (For additional information, refer to *IES TM-18-18, Light and Human Health: An Overview of Optical Radiation on Visual, Circadian, Neuroendocrine, and Neurobehavioral Responses*.)

Special attention to lighting applications for individuals with eye diseases:

Ophthalmologists and optometrists indicate:

- Individuals with increased intraocular scatter (cataracts, corneal scarring, or inflammatory diseases of the anterior segment or retina) suffer from disability and discomfort glare from any bright sources or surfaces in the central approximately 30° of the visual field.
- Individuals who have diabetic retinopathy may experience abnormally high sensitivity to glare because of a loss of the normal inhibition of the rod system.
- Individuals who have retinitis pigmentosa (RP) or glaucoma lose peripheral vision and have a narrowed field of view.

Badly designed direct lighting negatively affects visual performance. Individuals with eye diseases depend greatly on non-glaring ambient light. In such cases, indirect lighting that fills the space is most suitable and comfortable for persons with ocular disease.

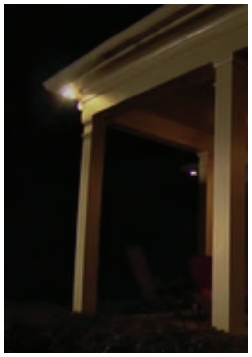
Let's start outside - *Lighting the pathway*

The lighting on the outside of your home should provide even illumination to eliminate dark corners and shadows. Pay special attention to the path between the garage or where you park your car and the general entry to your home; in particular, any level changes or stairs. For example, a porch light with clear glass and bright light bulbs can cause glare and make it difficult or impossible to see steps or level changes. A single light source mounted at the head of the stairs may not be adequate to light the entire step area. Step lights that provide additional light on stair treads, or concealed LED lights attached to the underside of the stair rail, can provide needed even illumination on the path.

Wall mounted step lights provide light across the tread. The light source is well concealed to prevent glare. (Photo courtesy of Eunice Noell-Waggoner)

The lighting in the handrail is well shielded, providing a uniform pattern of light on the stair treads. Partially lighting the stair spindles provides visual interest as well as emphasizing the location of the stairs. (Photo courtesy of Terry McGowan)

A light fixture with a photocell that turn lights on at the onset of darkness, or a motion sensor that turns the lights on when people approach, will guarantee that the light will always be on when needed and may save energy and money.

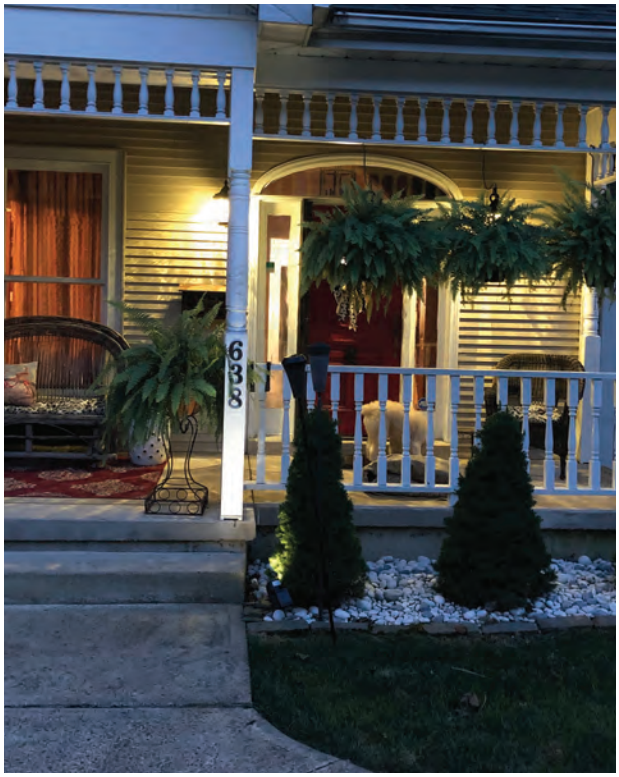


House façade light fixtures with photocell and motion sensors. (Photo courtesy of Cooper Lighting)

Making house numbers easy to read

How many times have you tried to find a friend's home and found it nearly impossible to read the numbers on the front of the houses? Large, lighted house numbers that stand out against the color of the house will easily solve this problem; for example, white numbers against a dark background provide the needed contrast to be able to see the numbers

It is very important you make sure any lighting changes to the exterior of your home abide by neighborhood restrictions and local codes.



Large black numbers mounted on a white background makes the house number very visible during the day and night with the addition of the solar accent spotlight. (Photo courtesy of Tony Randazzo)

The high contrast of the white house numbers against a black background makes them easy to read during the day. At night, a photocell turns on an integrated light source illuminating the numbers to increase their visibility when it is dark.

Lighting your garage

Do you only use your garage for parking your car, or do you use it as a workspace for hobbies? Consider using an occupancy sensor to turn on the lights automatically so that you are not trying to find the light switch in the dark. Some sensors will also turn the lights off if there is enough daylight coming in through the windows. For hobbies, a task light to provide increased illumination will be needed. Like any space, consider surface finishes; lighter finishes will increase the overall light level. Some garages are not temperature controlled, so consider an LED fixture instead of a fluorescent fixture, as LEDs can tolerate cooler temperatures.

Daylight and LED fixtures provide light for the garage workbench. The walls, wall-storage panels, and workbench are all white to reflect the maximum amount of light.

Garages also provide storage for miscellaneous sports equipment and home maintenance supplies. Even illumination provides visual access to stored items as well as aiding in parking the cars. (Photo courtesy of Jim Hutchins)

Indoors, you want to bring the outside light in

If you've lived in your home for several years, it may be time to do some simple upgrades to the lighting. You may have standard incandescent technology, which is inefficient at producing light and adds undesired heat. Changing out incandescent bulbs for LED bulbs or LED fixtures will provide better light, be more energy efficient, and last longer. Today's LED light technology is far superior to earlier versions: the lights produce better color, last longer, and are easier to dim. LED replacement bulbs typically pay for themselves within a year and far outlast fluorescent, halogen, and incandescent sources.

Example of an LED screw-in replacement for incandescent or compact fluorescent bulbs or tubes. (Photo courtesy of Eunice Noell-Waggoner)

Take a moment to look around each room. If you have heavy draperies or valances on the windows blocking the daylight, you can immediately improve the lighting in your home by replacing them with woven shades or sheer curtains, which will reduce glare while allowing diffused daylight into the room. You can add a separate window covering for privacy in bedrooms and bathrooms. If the budget allows, you may also want to consider adding diffused-lens skylights to the bathroom, living room, kitchen, or hobby area. This is a very effective and efficient way to balance the daylight from your windows, as skylights deliver two to three times as much illumination as an equal-sized window.

LEFT: The existing incandescent lighting fixtures did not distribute light throughout the space, and daylight was limited to the windows. Black appliances and countertops absorbed light, making the space seem dark. RIGHT: Kitchen was remodeled by opening the ceiling to increase daylight from skylights, significantly brightening the space. Layers of light from recessed downlights, undercabinet lights and drop pendants provides more-uniform general lighting of the space and task lighting. The use of lighter colors, which reflect light, make the space brighter.
(Photos courtesy of Doug Walter Architects)

High clerestory windows provide daylight during the day; pendants and fan light provide light when daylight is not present. The light tones of the ceiling and walls reflect the light throughout the space. (Photo courtesy of Doug Walter Architects)

Making living rooms and family rooms more livable

Typically, you use these rooms for visiting with your family and friends, watching television, working on hobbies, or reading. A good balance of ambient light, from a window or skylight, recessed down lights, floor lamps, or table lamps, will make this space much more comfortable. Special attention should be paid to where the television and computer are placed so that there is no glare from the windows or light fixtures.

Other things that will make your living room even more enjoyable include:

- Adding specific task lighting for your hobbies or reading
- Using dimming switches, which will allow you to change the light level and the atmosphere of the room; dimming also saves energy and extends the life of LED and incandescent bulbs
- Considering the color and reflectivity of finishes in the room; for example, a dark floor will absorb more light than a light floor

Windows on two sides balance the daylighting in this great room. A combination of recessed downlights and table lamps light the space at night. (Photo courtesy of Doug Walter Architects)

Interior Stairs

Interior stairs can be dangerous if they aren't properly illuminated. Providing the proper amount of light that is shadow free and uniform is extremely important to having a safe staircase in your home. A small decorative light fixture located on the ceiling of the 2nd floor, far from the bottom step, may not produce enough light to properly light the bottom of the stairs. To improve stair lighting, consider adding lights in the riser of the steps or wall, or tape light under the nosing of the steps. When selecting *all* types of lighting, consider the glare potential of the fixture and the placement.

LEFT: An LED channel with a motion sensor and a grazing light with an optical lens was added to light the stairway and specifically the stair treads. The wall color has a high light reflectance value (LRV 86) so that the light from the one fixture illuminates the space. The contrast of the darker carpet against the white stair skirting helps to define the steps. RIGHT: Step lights spaced frequently along the stairway and landing are another good option to light the treads (Right photo courtesy of Eunice Noell-Waggoner; left photo courtesy of Laurence Weinstein)

Brightening up the kitchen

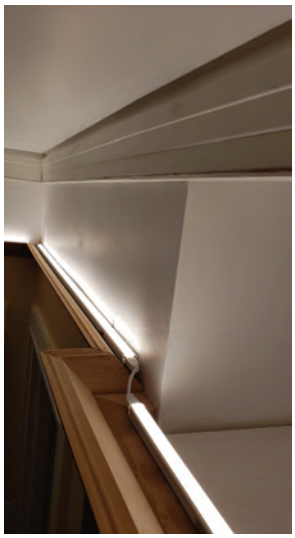
The kitchen is the heart of a modern home. Kitchens have become the main household hub where family and friends gravitate not just to prepare meals and eat, but to socialize and perform many other daily tasks. Good overall layered

lighting with an emphasis on glare-free task lighting is critical for food preparation, cooking, and working at the sink. This extends to the many other daily tasks we typically perform here, such as taking medications, reading mail, and cleaning. Appropriate light levels accompanied by the right controls to accommodate these various scenarios and tasks are very important in supporting this dynamic space.

The cornerstone of *optimal lighting* in a kitchen is glare-free, high light levels that can be adjusted to accommodate all users' needs. This flexibility is important when considering the visual capabilities and challenges of the various users, now as well as into the future. To achieve these goals a *layered* lighting scheme that includes ambient (general), task, decorative, and accent lighting coupled with the appropriate controls is ideal. Different methods of lighting application—direct, indirect, and direct/indirect, as well as the introduction of daylight—can be used to achieve these goals. As always, one of the most important goals is the elimination of glare from both light sources and materials such as glossy floors, counters, and cabinets. Direct and reflected glare can be dangerous and debilitating.

Let's talk a bit about the pros and cons of each lighting application method

Indirect lighting: Indirect lighting is ideal to provide glare-free, even illumination. Typically, the light is directed upward toward the ceiling or another surface, which reflects the light back into the space or onto the desired surface. For this to be effective, it is important that non-glossy, light-colored finishes that have a high reflectance value are used. Example fixture types are up-lighting pendants and concealed fixtures on top of cabinets lighting the ceiling. As part of a layered light system, accent or pendant lighting may be added for visual interest.



This LED strip is mounted into a channel in the crown molding and fitted with a diffuser. It provides lighting to the ceiling and the upper walls. (Photo courtesy of Eunice Noell-Waggoner)

Pros: Glare free; even illumination; provides an excellent base layer of general lighting in a multilayered design that extends the dynamic range of all other lighting; makes spaces feel larger and more open.

Cons: Can result in low light levels if attention is not given to rooms finishes; can be less attractive if the only type of lighting used.

Direct lighting: This lighting provides the most useable light, enabling high light levels and specific accents, since all the light from the fixture is directed toward the desired surface(s). Fixtures falling into this category are more focused, such as surface mounted lighting, recessed downlighting, under-cabinet lights, and downlight pendants. In all cases, fixtures with good optics and the correct beam spreads used in an appropriate configuration can achieve quality lighting with the desired higher illuminance levels while avoiding the pitfalls of excessive shadows and glare.

Pros: Easily provides high light levels; can be carefully used for general, task, and accent scenarios; great for specific task lighting.

Cons: Potential reflected glare off glossy surfaces; dramatic shadows if misapplied; direct glare from visible light sources with inappropriate optics.

Recessed downlights can be used to provide task lighting on the countertop and inside the cabinets, and to illuminate the circulation areas. (Photo courtesy of Doug Walter Architects)

This kitchen utilizes slim surface-mounted ceiling LED fixtures, pendant fixtures with diffusing glass to cut glare, and under-cabinet lighting, which serves as good task lighting at the counters. Light-colored matte surfaces also help to provide glare-free reflected light. (Photo courtesy of Laurence Weinstein)

Surface mounted fixtures providing downward light coupled with an over-sink task light and under-cabinet lights. (Photo courtesy of Laurence Weinstein)

Direct/indirect lighting: This category includes fixtures that provide both direct light onto a working surface, such as the kitchen counter, and light onto a secondary surface, such as the ceiling, which is then reflected throughout. Fixtures most commonly come in the form of pendants that have both uplight and downlight components. Under-cabinet fixtures can also fall into this category when placed so that they are facing the backsplash, thereby providing both direct lighting onto the counter and reflected light from the backsplash and cabinet underside.

Pros: Best of both worlds, combining direct and indirect light types; can be introduced via pendant fixtures.

Cons: Limited opportunities; must be cautious to avoid glare from visible sources.

LED fixtures installed under upper cabinets.

Indirect LED strip lighting provides a diffused ambient light to the space, while additional task lighting is provided over the sink and under the cabinet to light the work surface. Daylight from two directions balances the daylight in the space. Ceiling, walls and countertop are light colored. (Photo courtesy of Yadira Pagan Fuentes)

Although building codes only mandate a single light in the center of the kitchen, it is impossible to achieve recommended task lighting levels, eliminate glare, and provide a flexible, aesthetically pleasing environment with a single fixture. A layered approach to kitchen lighting is essential, and there are solutions that do not require major renovation. Simple combinations of recessed downlights with good optics and some indirect lighting can provide an excellent balance of high illumination and a glare free environment. Some additional ideas include:

- An over-the-sink LED light fixture that may be recessed, concealed with a valance, or ceiling mounted above the sink to help increase task lighting
- LED strip fixtures concealed on top of cabinets to illuminate the ceiling and create an inexpensive indirect ambient lighting scheme, which is diffused and glare-free
- Accent or decorative lighting, with concealed lamps, above island counters to not only add some character to the space, but also to serve as general and task light

Finally, all application methods can benefit from simple shielded under-cabinet LED or fluorescent fixtures that distribute glare-free light onto work surfaces.

(Photo courtesy of Access Lighting)

Options are listed here, beginning with the least expensive:

- Replacing a single-bulb decorative fixture with a multi-bulb fixture will immediately increase ambient light levels:
- LED strips, preferably with lenses to soften the glare, can be mounted on the front edge of upper-wall cabinets to put light where you need it. These are available in variable CCTs and with dimmers.

LEFT: No under-cabinet lighting. RIGHT: Under-cabinet lighting mounted on the front edge of upper-wall cabinets, providing the needed task lighting. Fixtures are available with cord and plug or hard wired, and in variable CCTs and with dimmers. (Photos courtesy of Rebecca Hadley- Catter)

Increased contrast helps to see detail more clearly. Placing contrasting light-colored or dark-colored placemats or cutting boards on countertops can make it easier to pour liquids and accomplish other food preparation tasks. Adding a contrasting edge to the counter will also help to define the surface area and can reduce breakage or spills due to "missing the counter." Cabinet interiors should be white or light colored to aid in viewing the contents.

Daily tasks, such as putting knives away, can be made much easier when the knife block is light in color, making the slots appear dark and thus more visible.
(Photo courtesy of Eunice Noell-Waggoner)

LEFT: Limited daylight and poor electric lighting. Dark colors on the soffit above the cabinets and dark floors absorb the light. RIGHT: Kitchen was remodeled to include skylights that provide abundant daylight. Recessed downlights and surface-mounted directional lighting provides light to the island and countertops. Light-colored flooring and cabinetry reflect light in the space.
(Photos courtesy of Doug Walter Architects)

Shedding better light on the dining room table

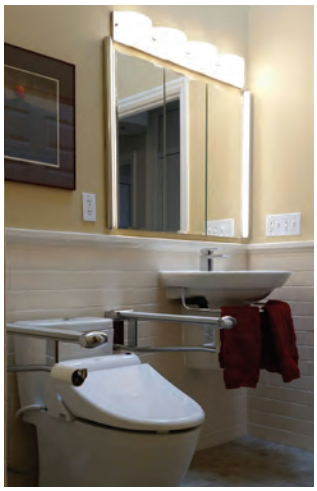
Just think of all that you do sitting at your table. You eat your meals there, of course, but you probably also use it to do paperwork, work on hobbies, or read the newspaper. Dining areas are often part of a living room or kitchen and share the available ambient light. When they are in a separate area, ambient light can be improved with carefully selected fixtures, e.g., a light valance or wall-wash fixtures, or floor lamps placed in the corner of the room.

Task lighting may be located above the dining table, but the light level should be adjustable via a dimmer, since dining does not demand the same level of light required for reading tasks. Care should be taken to avoid glare, and light sources above eye level should be shielded with frosted glass, fabric shades, or other materials that soften and diffuse the light.

A recessed LED strip was added to the modified crown molding of this 100-year-old bungalow to light the perimeter of the room without competing with the original antique dining pendant and wall sconces. Each type of fixture is controlled separately with wall dimmer switches. The top-down/bottom-up shades provide privacy while allowing daylight through the shade material and above the shade. Ceiling, walls, and trim are light colored to reflect the light in the room.
(Photo courtesy of Yadira Pagan Fuentes)

Preventing accidents in the bathroom

A combination of ambient and task lighting will provide you with the best illumination in the bathroom. The light needs to be bright enough for grooming, shaving, or reading labels on medications. Special attention also needs to be given to wall and counter surfaces, which should be of light to medium color, ideally with matte finishes to reduce reflected glare. Decorative light fixtures that create shadows or cast patterns of light on the floors, walls, or ceiling should be avoided.

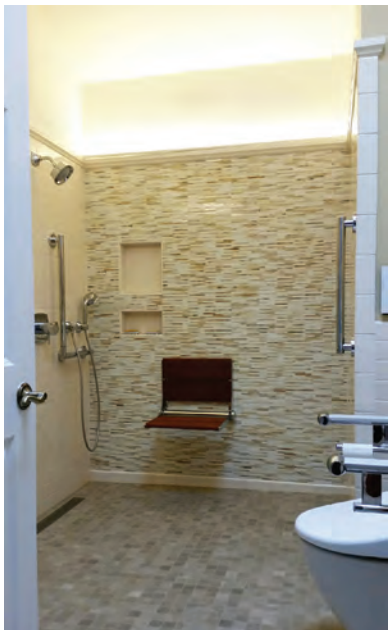


Mirrors are a special challenge

Light sources need to illuminate the individual using the mirror without being reflected in the mirror. If the mirror is wide, a valance light above the mirror will provide light downward but will create shadows on the face. The best option is to place lights vertically on both sides, centered at eye level. This will give you the best illumination of your entire face.

The LED vanity lights, mounted vertically on each side of the mirror with an angled base, direct the light toward the user's face for grooming with an over-mirror light to provide general illumination in this room. Light-colored wall tiles and plumbing fixtures provide a contrast to the medium-colored floor tile. Each is controlled by a separate dimmer.
(Photo courtesy of Yadira Pagan Fuentes)

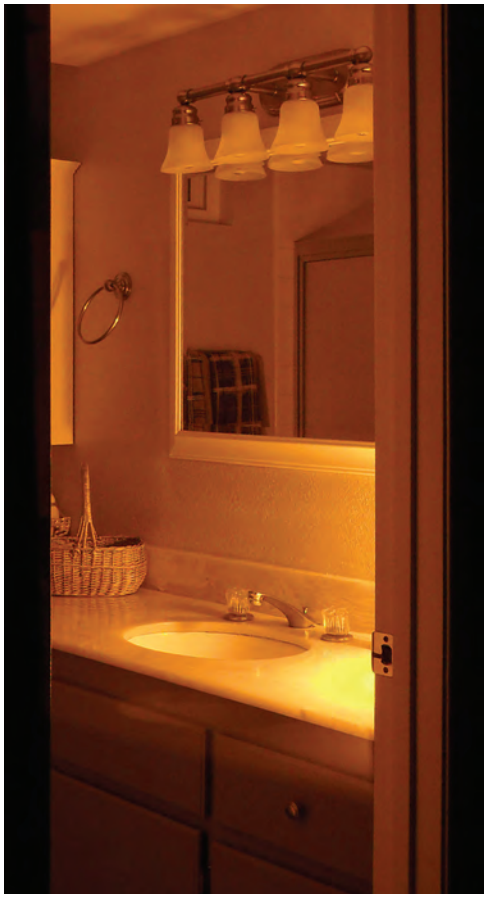
An even better solution, if space allows, is to install a flush, wall-mounted, lighted grooming mirror without a counter in front, which will allow you to stand closer to the mirror. For those with a bad back or difficulty with balance, a counter in front becomes an obstacle. A grab bar may be provided for stability.



Bathing areas require extra attention

Sufficient lighting is even more important here since most people remove their glasses while showering or bathing. It is important that the light not be blocked by the shower curtain or obscured by mist and fog.

Daylight is provided in this accessible bathroom and shower from a 4-ft x 4-ft operable skylight (out of view) above the shower area. An indirect LED strip light mounted at the top of the tile molding directs light to the sloped ceiling, providing diffused light to the shower area. (Photo courtesy of Yadira Pagan Fuentes)



Lighting the nighttime path

For those who get up at night to use the bathroom, nightlights and an illuminated light switch near the bed should be provided for safety. Nightlights should be amber or red and located low on the wall to light the way. Dim the lighting in the bathroom down to a low level at night so that your eyes do not have to adjust to bright light and then readjust to the dark bedroom. Amber rope lighting concealed in a cabinet toe-kick area can provide an appropriate low level of night lighting in a bathroom. Amber LED rope or strip lights are sold with a cord and plug for ease of installation and can be controlled by a switch or motion sensor.

Nighttime vision is enhanced by utilizing contrast, e.g., placing a light-colored coaster under a clear glass of water on a dark-colored nightstand.

A plug-in nightlight with a photocell turns on when no daylight is present in the bathroom. This low-level amber lighting is enough for seeing your way around at night. When the bathroom door is left open, the spill light from the bathroom helps to light the hallway or path to the bathroom. (Photo courtesy of Greg Winchell)

Making the bedroom more comfortable

Because many people have trouble sleeping at night, they tend to nap more during the day. Consequently, they spend more time in bed. Therefore, more activity takes place here, including talking on the phone, watching television, listening to the radio, taking medication, and reading. It is important to balance the daylight and ambient electric light in the space. This will alleviate eye fatigue, making it easier to stay awake while reading or watching television.

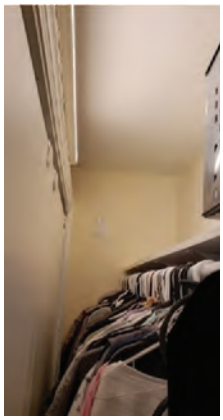
To get a good night's sleep, it is important to sleep in the dark. Make certain that window coverings block light from streetlights and other light from the outside. Turn off or relocate electronic equipment with annoying indicator lights.

Bedside task lighting should be adjustable. It should be easy to reach while in bed, with controls that are easily accessible (a touch-activated sensor base or easy-to-feel-button placed on the bedside table.) Warm-colored LED sources (2700 K to 3000 K) are recommended, as they do not produce heat, as incandescent bulbs do.

The cove lighting in the raised ceiling area provides soft, indirect lighting to the space. Task lighting is provided on each side of the bed and at the window seat. Daylight from two directions helps to balance the light during the day. The white door trim and base provide a good contrast with the walls and floors, making it easier to find your way at night. (Photo courtesy of Doug Walter Architects)

Don't overlook the closets

It's very difficult to select what you're going to wear when you're looking into a dark closet. LED or fluorescent fixtures should be placed so that light will fall on the front of hanging items and on areas between shelves. Only lensed LED or fluorescent fixtures are recommended, due to potential heat build-up and fire hazards posed by incandescent fixtures. In the U.S., code requires any light fixture in a closet to be a minimum of one foot in front of any shelf.



This small LED strip light has a mounting bracket that pivots to allow aiming the light in the desired direction. (Photo courtesy of Eunice Noell-Waggoner)

Adding an LED strip or wrap fixture to a closet in a cooler appearing CCT will assist in discerning a dark blue from black when comparing fabrics. (Photo courtesy of Rebecca Hadley- Catter)

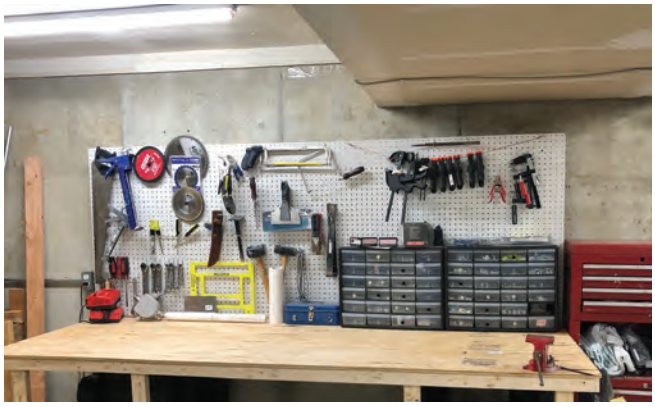
Making a special place for hobbies

One of the things people look forward to when they retire is being able to spend more time pursuing their hobbies, whether it's something as simple as sitting in a chair reading or knitting, setting up an easel for painting, or putting together a complete woodworking shop. No matter the activity, it will be much more enjoyable in a safe, well-lit environment. Hobbies can be done in many rooms of the home. An adjustable LED task light or reading light may be enough for a small area, but woodshops present a bigger challenge.

The ceiling mounted fixture provides general light to the room and storage areas, while good task lighting is needed to see fine details. (Photo courtesy of Doug Walter Architects)

The balanced daylight in this room is ideal for painting and relaxing. Indirect lighting reflected from the skylight well provides general illumination for the space as daylight dims. (Photo credit: Eunice Noell-Waggoner)

Task lights are provided for ease of reading. (Photo courtesy of Eunice Noell-Waggoner)



A light above the workbench provides both task and ambient light for hobbies. The white wall-storage panel reflects light onto the work surface. (Photo courtesy of Tony Randazzo)

Ambient lighting and additional task lighting may be required in these areas, depending upon the tools being used. The light fixture should be located so that glare isn't created from the reflection of the light source off glossy surfaces. Lighter-colored wall finishes will reflect more light, thus helping to produce a higher light level in the space. Does your hobby require the light to be dimmed? If so, a dimmer switch needs to be installed.

How to get what you want

This brochure has deliberately tried to stay away from using technical terms. However, when you go to the store or talk with a handyman or contractor, this additional guidance may prove helpful:

- ***Ambient lighting:*** Look for fixtures that are designed to shield the light bulb or tube from view, or that have a diffusing cover to diminish the brightness of the bulb and control glare.
- ***Indirect lighting:*** This is light that is directed to the ceiling and walls to provide ambient light. Options include LED and fluorescent fixtures installed out of sight, a light valance, wall-wash fixtures, or a floor lamp providing upward light on the ceiling.
- ***Task lighting:*** This includes installed fixtures or portable table or floor lamps with adjustable light output to provide higher light levels in a specific area. LED lights are an excellent choice for task lighting as they do not produce the heat that incandescent bulbs do.
- ***Color:*** Choosing the color you desire is important. You can obtain any color with LED light fixtures.
  - 2700 K to 3000 K is a warm color, incandescent in feel
  - 3500 K is a more neutral shade
  - 4100 K to 5000 K is richer in blue and cooler in tone
  - Color rendering index (CRI) should be 80 or higher
- ***Paint the walls and ceiling*** with a lighter color, using a flat finish in general areas, or an eggshell or satin finish in kitchens and bathrooms. Most paint companies list the light reflective value (LRV) of each paint color, either in the index or on the paint chip. Suggested range for the ceiling is an LRV of 80 to 90, and the range for the walls is an LRV of 60 to 80. The higher the number, the more light will be reflected.
- ***Windows and skylights*:** Daylight within a space should be balanced to eliminate extreme contrasts of darkness and light, either by providing it from more than one direction (from opposing walls or from walls and skylights) or by increasing the electric lighting. It is important that windows have woven shades or sheer draperies to filter the daylight and control glare. Skylights should be made with diffused glass or plastic. Clear glass allows direct sunlight to enter, which can cause glare and create strong shadows.

Planning to downsize?

So far, we've talked about making adjustments within your existing home. However, if you're planning to move to an apartment or condominium, many of these same suggestions will still apply. You may need to ask your landlord or builder to make some modifications for you. If you're moving into a retirement community, you'll need to talk to the management. Don't assume that the lighting in a retirement community will meet your needs. Be certain to visit both during the daylight hours and in the evening before deciding. This will tell you how much daylight comes in and how much lighting is built in. Portable table and floor lamps are not adequate for safe navigation, since they cannot be readily turned on and off with a switch when entering or exiting the room. It is also difficult to achieve a uniform light level using only table and floor lamps

The following checklist includes questions you'll want to ask about your new home's lighting:

- ☐ Is there adequate lighting in the parking area, and from there to the entry? Are steps and curbs marked with white or yellow strips to indicate a change of level?
- ☐ Are all steps properly lighted to help prevent falls? Both indoors and out?
- ☐ Is the lighting in the corridors uniform, with adequate light to read the apartment number and get the key into the keyhole? Is there an excessively bright (glare causing) window at the end of the corridor? Are corridors carpeted? If the floors are wood or vinyl, has lighting been placed to reduce reflection?
- ☐ How many windows will there be in each room?
- ☐ Is the lighting pleasant, or does it produce glare? Does the lighting create strong shadows? Is the lighting indirect, filling the space with light, or are the fixtures recessed, making the ceiling dark and the room feel cave-like? Do the light fixtures provide balanced, uniform light?
- ☐ Are the lighting controls for the bedroom and bathroom illuminated with a glowing switch?
- ☐ Where are lights placed relative to mirrors? When standing at the mirror, is your face shadowed?
- ☐ Is there lighting in the closets?
- ☐ Are fluorescent or LED task lights installed underneath the cabinets in the kitchen?
- ☐ What types of hobby areas are available? What type of lighting is provided?

With just a little planning, some labor, and not a whole lot of expense, you can continue to live in your home, or move to a new place, and live in a well-lit, comfortable, supportive, cheerful, and safe environment that will help keep you active and involved in all your favorite activities.

Additional information, included recommended light levels, may be found in ANSI/IES RP-28-20, Recommended Practice: Lighting and the Visual Environment for Older Adults and the Visually Impaired *and in* ANSI/IES/ALA RP-11-20, Recommended Practice: Lighting for Interior and Exterior Residential Environments.

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