DHS|OHA

Office Light Management Guide

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Purpose:

The purpose of this document is to provide guidance regarding office lighting standards for office buildings occupied by the Department of Human Services (DHS) and the Oregon Health Authority (OHA). The guidance will apply to all DHS|OHA occupied facilities.

Background:

Office buildings occupied by DHS|OHA are designed so that adequate and uniformed overhead illumination is available throughout the facility. Additional task light is provided through a combination of under cabinet lighting, desk lamps, and natural light entering the building through windows and sky lights.

DHS|OHA facilities are diverse and require many different types of illumination. Most of the work performed in these facilities involves engaging in customer service, reading technical documents and regulations, using computers for research and data entry, and utilizing communication equipment. Other facilities, such as laboratories, storage areas, loading docks, and information technology operations have unique requirements for both general illumination and task lighting.

Although the type of overhead lighting can vary from one office to another, all illumination levels are designed to comply with the nationally recognized standards adopted by the Illuminating Engineering Society of North America (IESNA).

The quality of a visual environment considers a wide range of variables including the balance of the illumination, color appearance, visibility of multiple visual tasks (often accomplished by a layered lighting system), visual comfort, natural lighting entering the work area, and user acceptance.

Balance of Illumination:

It is important to maintain a comfortable balance of illumination throughout the work environment particularly within the vertical and horizontal view of an occupant. When excessive brightness and darkness are combined in the same view, the contrast requires the eye to continually adjust causing discomfort and eye fatigue, and can lead to other symptoms including headaches and loss of depth perception. Balanced illumination maintains uniformity throughout the area and allows occupants to safely navigate throughout the facility and engage in the tasks at hand.

Color Appearance:

Color appearance is an important factor for comfort and conducting visual tasks. It is critical that the color of the illumination does not have a negative impact on the documents, objects, equipment, or computer screens. Lighting should be designed to accurately reflect the anticipated colors, hues, and lamination in the workplace. Areas where multiple colors are used, such as detailed drawings, blueprints, or spreadsheets, should be equipped with a generally neutral (white) light at illumination levels that do not "wash out" color sensitivity. Office and industrial building occupants generally prefer warm to neutral color. Cooler colors can produce slightly higher visual acuity in some applications but may also create a sense of starkness and institutionalism.

Flicker:

Flicker is the rapid change in light intensity in light fixtures that use ballasts, most in fluorescent lights. A light ballast operating on alternating current creates a flicker that is not visual to the human eye, however some people may report symptoms such as headaches, eye strain, and general discomfort. Maintaining light fixtures with new bulbs, using electric ballasts rather than magnetic ballasts, and increasing the use of natural lighting will significantly reduce or eliminate any issues that could be attributed to flicker.

Layering:

Layering the lighting system with ambient, task, and accent light creates variety in spaces and makes it easier to maintain balanced Illumination. An ambient layer provides a low level of diffuse lighting that can help illuminate objects, people's faces, floors, walls, and areas used to navigate throughout the vicinity. Task lighting provides the actual quantity of light necessary to perform a job and helps focus the eye to the work surface. Accent lighting adds emphasis and visual variety in a space. A well-designed balance of illumination means keeping enough brightness variety in the space to highlight work areas, without making the lighting appear spotty or full of shadows.

Visual Comfort:

Visual comfort relates mostly to glare from any light source – a light fixture, window, skylight, etc. Unfortunately, glare tolerance is often subjective and varies between individuals. There are multiple ways to control glare: relocating the light source, relocating the work activity, adjusting lighting levels, or providing filters that reduce glare. When natural outside light is relied upon, glare will change depending on the time of day or weather. Louvers, shields, fins, overhangs, and blinds all reduce glare from windows and skylights.

Personal Control:

Personal control of lighting and the ability to adjust the workstation to maximize employee comfort is important. It results in user acceptance, increased employee morale, increased productivity, and improved safety. However, personal control must be structured so that the general illumination of the work environment conforms to the needs of the general population of the building and acceptable safety standards.

DHS|OHA ensures that the lighting quantity adheres to applicable nationally recognized health and safety guidance and standards. Lighting measurements are reported in either Lux or Foot-candles. Specialized work such as health laboratories or IT operations will be adjusted to applicable industry specific standards. For general purposes DHS|OHA adheres to Oregon OSHA regulations and the IENSA Lighting Handbook, 8th Edition. The chart below is for general guidance. Site specific measurements and evaluation of lighting concerns can be requested through the DHS|OHA Occupational Health, Safety and Emergency Services Program.

Illuminance Categories and Illuminance Values for Generic Types of Activities in Interiors				
Type of Activity	Illuminace Category	Ranges of Illuminances		Reference Work-Plane
		Lux	Foot candles	
Public Spaces with dark surroundings	A	20-30-50	2-3-5	General Lighting Throughout Spaces
Simple Orientation for short, temporary visits	B	50-75-100	5-7.5-10	
Work spaces where visual tasks are only occasionally performed	C	100-150-200	10-15-20	
Performance of visual tasks of high contrast or large size	D	200-300-500	20-30-50	Illuminance on Task
Performance of visual tasks of medium contrast or small size	E	500-750-1000	50-75-100	
Performance of visual tasks of low contrast or very small size	F	1000-1500-2000	100-150-200	
Performance of visual tasks of low contrast and very small size over a prolonged period	G	2000-3000-5000	200-300-500	Illuminance on task, obtained by a combination of general and local (supplementary) lighting
Performance of very prolonged and exacting visual tasks	H	5000-75000-10000	500-750-1000	
Performance of very specialized	I	10000-15000-20000	1000-1500-2000	

visual tasks of extremely low contrast and small size			

Commercial, Institutional, Residential and Public Assembly Interiors	
Area/Activity	Illuminance Category
Conference Rooms	D
General and Private Offices	D
Lobbies, lounges, and reception areas	C
Mail Sorting	E
Printing and Duplicating Areas	D

Ergonomics Factors

Lighting is a critical element of ergonomics in the workplace. This approach aims to adapt the respective workplace and working environment, through design changes, to the needs of the individual worker. Inadequate and unbalanced lighting, reflection, glare, and shadows can have a negative impact on lighting in the workplace and on individual employees. which could result in eyestrain. Eyestrain means different things to different people; depending on the person it can be experienced as burning, tightness, sharp pains, dull pains, watering, blurring, double vision, headaches, as well as other sensations.

In general, office environments where personal computers are frequently used to accomplish tasks, the principal factors affecting the ability to see well, which can lead to eye strain, are:

- Glare;
- Contrast between the luminance (brightness) difference of what is being looked at and its immediate environment;
- Amount of light;
- Distance between the eye and the screen or document;
- Readability of the screen and document; and
- Worker's vision and any corrective lenses.

Glare

Glare appears as mirror images or white spots on the computer monitor, which causes the iris to contract and the eyes to squint. The amount of light entering the eye is reduced, which can cause eyestrain. Light sources (windows, overhead lights) may cause glare to show up on the monitor making images more difficult to see. Light sources may also cause reflected glare from polished surfaces such as keyboards, causing annoyance or discomfort. Possible solutions to glare may include:

o Placing the face of the display screen at right angles to windows and light sources. Position task lighting (e.g. a desk lamp) so the light does not reflect on the screen.
o Cleaning the monitor frequently. A layer of dust can contribute to glare.
o Using blinds or drapes on windows to help reduce glare.
o Using glare filters that attach directly to the surface of the monitor. Glare filters will reduce glare but should not significantly decrease screen visibility.
o Using light diffusers or louvers on fixtures to reduce glare from overhead lighting.
o Limiting reflections from walls and work surfaces around the screen by painting or covering the area with low reflective materials.
o Arranging workstations to avoid reflected glare on the display screen or surrounding surfaces.
o Tilting the monitor slightly down to prevent it from reflecting overhead light.
o Setting the computer monitor for dark characters on a light background, as they are less affected by reflections than are light characters on a dark background.

Contrast

Contrast is often not considered as much as it should in the office environment. As we age, we need significantly more contrast. Negative screen contrast (black letters/white background) can reduce reflected glare. A white background also reduces the luminance (brightness) difference between the screen and the surrounding background of a normally lighted office. Possible ways to increase contrast may include:

o Darkening the area or wall around the monitor.
o Using contrasting colors on a computer monitor - the standard white background with dark (black) font. Contrast problems occur where light letters are used against a dark background.

Lighting (Illuminance)

The amount of light needed varies by person and particularly by age. At 40 years of age, on average, eyesight begins to deteriorate more drastically and the amount of light needed for a given task may increase. It is for this reason that finding the right amount of light for all employees can be challenging, especially in an office environment with multiple cubicle work stations. Possible ways to increase light amount may include:

o Setting the ambient lighting (which is the general illumination of the office) between 30 and 50-foot candles.
o Providing task lighting for each work station so employees can increase direct lighting illumination as needed.
o Using adjustable task lights to direct light onto paperwork as needed.
o Placing task lighting on the opposite of the writing hand to avoid casting a shadow.
o Ensuring task lighting does not cause glare on the computer monitors.

User management of the computer monitor

Monitor Distance

One of the main reasons for computer related eyestrain is the closeness of the monitor; the closer the object, the more the eyes are strained on both accommodate and converge. Accommodation is when the eyes change focus to look at something close. Convergence is when the eyes turn inward towards the nose to prevent double vision. Reducing those stresses will reduce the likelihood of eyestrain. It is difficult to set an exact limit for the minimum viewing distance for a computer monitor because it varies among individuals. However, what is important to understand is that farther is better. If you can read the monitor then it is not too far away. If you cannot read the characters then it is usually better to make them larger than to bring the monitor closer.

o Generally, the preferred viewing distance is between 20 and 40 inches from the eye to the front surface of the computer screen. However, the "right distance" is for monitors and documents depends on how clearly they can be read at a given distance.
o Text size may need to be increased for smaller monitors.

Monitor Height

When you look down, your eyes have a natural tendency to turn inwards and focus for near vision, since objects that are lower in your field of vision tend to be closer to you. The opposite is true for looking straight ahead or upwards – your eyes tend to turn outwards and focus at a distance, and you will have to work harder to focus on close objects with your head in this position. The overall height of the monitor is very important in preventing awkward neck postures. A person's natural gaze is slightly downward which ultimately means that we need to have what we are trying to see below the level of our eyes. When performing computer work, the top of the monitor should be in line with the eyes or slightly below them which will allow for the ideal viewing angle.

Vision

Eyes

- o Occasionally, eye strain can be triggered by dry eyes which can be prevented by slightly lowering your monitor. When looking slightly downward more of your eye surface is covered by the eyelid causing the eyes to unconsciously blink a bit more frequently.
- o Use of eye drops or conscious blinking can also be useful especially in drier climates.
- o Reading too long, especially without breaks, can cause eye fatigue. Your eyes need to rest just like other parts of your body when they are overworked. Changing focus from one distance to another from time to time needs to take place. Remember the "20/20/20" rule; every 20 minutes look 20 feet away for 20 seconds to give your eyes a rest.

Corrective Vision

- o Consider options other than multifocal lenses (i.e. bifocal, trifocal, etc.).
- o Tinted computer glasses may offer some potential benefits such as minimizing glare or improved comfort and focus.
- o When it comes to any type of corrective eyewear, always seek the council of your eye doctor and ask about computer specific glasses that focus at the right distance when viewing your monitors.

Replacement Ballast Panels, Covers and Other Similar Products

Any product not mentioned in this lighting guide or in a DHS and OHA Shared Services Lighting Management Policy must be authorized for use by the Shared Services Office of Facilities Management and by the Occupational Health Safety & Emergency Services Unit.

DAS Resource Conservation Management Policy:

During normal operations, the DAS Resource Conservation Management policy requires the operation of lighting systems with 30-35 foot-candles for ambient light and 50 foot-candles at desk surfaces with task lighting.

Reference:

Department of Administrative Services (DAS) Statewide Policy, Resource Conservation Management; Number 107-011-010; Effective Date: July 1, 2009 (Appendix C)

Appendix A: Light Measurements

Light meters measure light intensity with results reported in Lux (metric unit = lumen/m2) or Foot-candles (English unit = lumen/ft2). Although there are a variety of light meters, most function using the same technology and can be used identically.

When using a light meter, it is important that you read and understand the user guide. Light meters do vary slightly in how results are displayed. Correction factors for the type and color of lighting are typically programmed into the light meter. Make sure the light meter you use is set to the appropriate settings.

Taking measurements with a light meter is straightforward. The goal is to capture the light intensity that falls upon a work surface, a task, or an operation. Here are some general guidelines when performing a lighting survey:

- Take measurements that reflect the actual work area. Do not make modifications to the work area so that a true baseline reading can be taken.
- Place the light sensor perpendicular to the light source in an area where the employee conducts work.
    - For example – for a person that performs data entry, the light sensor would be placed on the keyboard and other places where they might read documents or analyze data.
- Distance yourself from the light sensor so that your or others' shadows do not interfere with the measurement.
- Take multiple measurements throughout the area to obtain an average. For a typical desk, 3 to 5 measurements should be sufficient.
- Document:
    - The date and time of the measurement;
    - The location of the measurement in relation to where the work is performed;
    - The task(s) or work being performed in that area;
    - The type(s) of lighting sources that may be impacting the result (i.e. task lighting, overhead lighting, natural light through a window or skylight);
- Use the Lighting Survey Form on the next page to record your reading(s); and
- Send a copy of the Lighting Survey Form to the Occupational Health Safety & Emergency Services Unit.

OHSE Light Management Form

Date:

FACILITY NAME	ADDRESS

FACILITY POC	PHONE NUMBER

EMPLOYEE	PHONE NUMBER

DESCRIPTION OF SURVEYED AREA

EVALUATOR	PHONE NUMBER

LIGHT METER:_____

MODEL:_____

SERIAL NUMBER:_____

LOCATION	FOOT CANDLES

NOT TO SCALE

Appendix B: Individual Assessment Guidance

DHS|OHA are committed to providing all employees with a safe and healthful work environment. This document is designed to guide employees and managers through the process of adjusting lighting within a workspace.

If the general lighting has recently been changed in your work area, give your body some time to adjust to the changes. If you have recently moved to a new workspace and it seems brighter or darker, it probably is; give it two weeks before making any significant changes.

What changes can I make to my workspace? Can I increase or decrease my monitor's brightness or reduce glare from natural and overhead lights? Do I have reflective surfaces on my cube walls that could be moved or taken down?

This document contains information that will help guide you on how to adjust your monitor settings or the position of your monitor to eliminate glare from natural or overhead lights. This document also contains information on what to do if the adjusted settings still do not fix the problem. It is a step-by-step process of adjustments that will help you achieve the optimal solution to reducing or eliminating glare. We suggest that you take **the following steps** <u>**in sequential order to help arrive at a solution.**</u>

- ☐ Step 1: Adjust your monitor settings or the position of your monitor.
- ☐ Step 2:   Adjust your physical environment.
- ☐ Step 3:   Request an ergonomic assessment.
- ☐ Step 4:   Obtain an evaluation from medical professionals.
- ☐ Step 5:   Work with your manager to explore other solutions if these steps do not successfully address your concerns.

Step 1: Adjust your monitor settings of the position of your monitor

Have you ever wondered why your computer monitor seems so bright or not bright enough? It is most likely that your monitor settings are not tailored to fit your specific needs. Adjusting your computer monitor setting will help correct illumination problems.

- A.   Adjust the brightness and/or contrast of your monitor by changing the settings.
    - a.   You can also call the OIS Service Desk at (503) 945-5623 or email them at: dhs.servicedesk@state.or.us
- B.   Adjust the position of your monitor (move it closer or further away)

Step 2:   Adjust your physical environment

- A.   Change the position of whiteboards, mirrors, or other decorative items that may reflect light.

B. Use anti-glare screen covers on your monitors to reduce glare (which also provides privacy).

C. Reconfigure cubicle to reduce glare or reflections of light.

STEP 3: Request an ergonomic assessment

A. Talk to your manager about obtaining an ergonomic assessment of your work space.
   a. Contact the ergonomic assessor in your area.
   b. Area assessors can be found by visiting the OHSE Intranet site at:
      https://inside.dhsoha.state.or.us/safety-and-wellness.html (look under Occupational Health &
      Safety) or contacting OHSE at safety.healthwellness@state.or.us.

Step 4: Get an evaluation from medical professionals

A. Make an appointment to be examined by your eye care professional. Explain the problems you are
   experiencing so you and your provider can determine if obtaining computer eye wear will help
   eliminate the problems you are experiencing.

B. Consider contacting your medical professional to look for other causes of the discomfort you are
   experiencing.

Step 5: Work with your manager

A. Work with your manager to determine if there are additional solutions which will address your
   concerns.
B. If no solutions can be found, you may submit a request for accommodation under the Americans with
   Disabilities Act.

For other questions and Concerns please contact:

Occupational Health, Safety & Emergency Services (OHSE) Program

Safety.healthwellness@state.or.us

Program Manager	Emergency Service Coordinator
Stan Thomas	Michelle Patton
503-990-0528	503-508-6669
Stanton.e.thomas@state.or.us	Michelle.k.patton@state.or.us

Ergonomics, Safety and Workers Compensation

Gayla Andresen

503 945-6382

Gayla.a.andresen@state.or.us

Appendix C: DHS|OHA Lighting Policy

**SHARED SERVICES
OFFICE OF HUMAN RESOURCES
SAFETY, HEALTH & WELLNESS**

Operational Policy

Policy title:	Office Lighting Management		
Policy number:	DHS|OHA 080-012		
Original date:	October 6, 2017	Last update:	8/2/2018
Approved:	Name(s) approved by		

Purpose

The Department of Human Services (DHS) and the Oregon Health Authority (OHA) are committed to providing state office buildings, owned or leased by DHS|OHA, with adequate and uniform overhead illumination that comply with nationally recognized standards.

Description

Office buildings occupied by DHS|OHA have a variety of unique requirements for both general illumination and task lighting. This policy establishes the standards for lighting levels in DHS|OHA facilities.

Applicability

This policy applies to all DHS and OHA staff including employees, volunteers, trainees and interns.

As keepers of the public trust, all agency employees have a responsibility to comply with state and agency policies, administrative rule, and state and federal law. The agency takes this responsibility seriously and failure to fulfill this responsibility is not treated lightly. Employees who fail to comply with state or agency policy, administrative rule, or state and federal law may face progressive discipline, up to and including dismissal from state service.

Policy

1. DHS|OHA shall ensure that the lighting quantity adheres to applicable nationally recognized health and safety guidance and standards.
2. DHS|OHA shall adhere to applicable Department of Administrative Services policies, Oregon OSHA regulations and recommendations from the Illuminating Engineering Society's Lighting Handbook, 8th Edition.
3. Lighting in all DHS|OHA offices shall be designed to enhance individual workspaces as well as all public access areas.
4. During normal operations, lighting systems shall operate with a minimum of:
   a. 30 to 35 foot candles for ambient light in public access areas.
   b. 50 foot candles at desk surface with task lighting.
   c. 40 foot candles for conference and training rooms.

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    d. <u>20 foot</u> candles for aisle ways, corridors and stairwells.
    e. <u>20 foot</u> candles for public areas such as entrances, lobbies, waiting areas, elevator corridors, etc.
5. DHS|OHA shall adjust specialized work areas such as health laboratories, information technology offices or other technical operation areas that may rely on industry specific standards.

References
DHS|OHA Office Lighting Management Guide
https://inside.dhsoha.state.or.us/safety-and-wellness.html

Forms referenced
Lighting Individual Assessment Guide

Related policies
DAS Policy 107-011-010, Resource Conservation Management

Contact
Stan Thomas
Program Manager
DHS|OHA Occupational Health, Safety &
Emergency Services (OHSE) Program
503-990-0528
stan.e.thomas@state.or.us

Safety.healthwellness@state.or.us

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